

## THE IRON AND STEEL TRADES.

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### Introductory.\*

At the Censuses of 1907 and 1912 the "heavy" iron and steel trades, including the making of pig iron, steel, and puddled iron, and the rolling, casting, and forging of iron and steel, were covered by one schedule, which at the Census of 1924 was divided into two parts, one dealing with blast furnaces and the other with steel works, rolling mills, foundries and forges. In the case of firms that operated both blast furnaces and other works, a combined return for the whole establishment was accepted at each of the first two Censuses, but in 1924 such firms were required to make one return in respect of their blast furnaces and another in respect of their other departments, treating the pig iron transferred to the steel works or other works for further manufacture as if it had been sold to those works. For example, in 1907 and 1912, firms that made steel from their own pig iron showed, as their output, only the pig iron sold from their works and the puddled iron and final steel products made, and, as cost of materials, only the cost of the ore, fuel, fluxes, etc., and of any iron, etc., purchased and used. In 1924, on the other hand, firms owning blast furnaces showed their full output of pig iron on the schedule for blast furnaces, and, if they also operated steel works, the estimated value of pig iron delivered, in solid or molten form, to their steel works, was included in the cost of materials used in producing the steel goods shown as output on the schedule for steel works, etc. The aggregate figures of gross output and of the cost of materials returned on the two schedules together at the 1924 Census are, in consequence, not comparable with the totals obtained at the Censuses of 1907 and 1912.

If there had been no change in the schedules other than that indicated above, it would still have been possible to compare directly the aggregate number of persons employed and the power equipment installed in 1924 with the similar particulars obtained for 1912 and 1907, and also, after making due allowance for the change in the level of values, to compare the aggregate net output and the net output per head of persons employed. There were, however, two other important alterations.

In 1907 and 1912 coke ovens and by-product recovery plants at blast furnaces were treated as part of the blast furnace equipment, and the particulars relating to them, i.e., output, materials used, persons employed, and power equipment, were incorporated with the similar particulars relating to the rest of the plant. In 1924, on the other hand, separate returns were required in respect of coke

\* See also the Notes on pages vii-xv.

ovens and by-product recovery plants at blast furnaces, and the particulars obtained, together with the similar particulars relating to coke ovens at collieries, will be dealt with in the report on the Coke and By-Products Trade which forms part of a separate volume. The second important rearrangement of particulars relates to galvanized sheets. In 1907 nearly three-fifths of the output of galvanized sheets was returned on the schedule for the Iron and Steel (Smelting, Rolling and Founding) Trades and the remainder was made by firms furnishing returns on the schedule for the Galvanized Sheet, Hardware, Hollow-ware, etc., Trades (see page 125); for the Censuses of 1912 and 1924, however, all but a comparatively small fraction of the output of galvanized sheets was returned on schedules for the Iron and Steel (Smelting, Rolling and Founding) Trades. In 1907 the net output per head was £273 for coke works at collieries, £115 for iron and steel works, and £87 for galvanized sheet, hardware and hollow-ware factories, so that the changes referred to are of some importance. Their possible effect should be borne in mind in considering the following statement, in which comparisons are made between the aggregates returned on the two schedules in 1924 and those recorded on the single schedule employed in 1907 and 1912 :—

#### Blast furnaces, steel works and rolling mills.

Particulars.	Unit.	1924.	1912.	1907.
Net output .. .. .	£'000	50,823	33,989	30,048
Average number of persons employed	No.	253,286	262,756	261,666
Net output per person employed ..	£	201	129	115
Mechanical power available :—				
Prime movers .. .. .	H.P.	1,742,438	1,413,200	1,383,586
Electric motors driven by purchased electricity .. .. .	..	483,241	68,116	(not recorded).

In considering the above table and the other tables in this report which show figures for different censal years, it should be borne in mind that the comparability of figures relating to value or cost is affected by the changes which have taken place in the general purchasing power of money. Other qualifications affecting the comparability of the figures for different years are given on pages 34-35.

#### I. THE IRON AND STEEL (BLAST FURNACES) TRADE.

The tables on pages 56-58 are based on returns received from firms operating blast furnaces in Great Britain; there were no blast furnaces in Ireland. The number of separate returns received was 92 and these returns are believed to cover all blast furnaces in operation in 1924.

*Summary of results.*—The following statement shows the main results of the Census of 1924 :—

Particulars.	Unit.	1924.
Value of goods made and work done (Gross output) .. .. .	£'000	36,572
Cost of materials used .. .. .	"	31,315
Net output .. .. .	"	5,257
Average number of persons employed .. .. .	No.	26,970
Net output per person employed .. .. .	£	195
Mechanical power available :—		
Prime movers .. .. .	H.P.	248,118
Electric motors driven by purchased electricity .. .. .	"	25,069

The power capacity shown above was not applied solely to the purposes of blast furnace production. Where blast furnaces were operated in combination with smelting works and the recovery of by-products from metallurgical coke, a return of the power capacity for the undertaking as a whole was frequently accepted, and this return was in most cases made on the schedule relating to Blast Furnaces.

### Production.

Detailed information regarding the output of the Iron and Steel (Blast Furnaces) Trade in 1924 will be found in Table II on page 56.

*Pig iron and ferro-alloys.*—The following statement summarises the particulars furnished to the Census office as to the production of pig iron and ferro-alloys in 1924. It should be noted that complete particulars of production were not obtained at the Censuses of 1907 and 1912, but the Home Office secured and published records of the output in those years, which are shown in the statement. The particulars of quantity which the Board of Trade could require were limited to those classes of pig iron that were specified in the Import and Export List, and, therefore, the more detailed figures collected and published by the National Federation of Iron and Steel Manufacturers in *Statistics of the Iron and Steel Industries* (1924) are reproduced for purposes of comparison. There are differences between the Federation's figures and those returned to the Census office, due, in part, to differences of classification, and, in part, to the fact that the former relate to the calendar year while firms that made returns to the Census were allowed, where it was more convenient, to give particulars relating to their business year most closely corresponding to the calendar year. Of the total output of 7,360,600 tons, only 4,051,000 tons were recorded on returns relating to the calendar year 1924. The monthly figures of output collected by the Federation show that, in the last three months of 1923, there was a larger output of basic iron and a smaller output of hematite iron and foundry iron than in the corresponding

period of 1924. These variations were, however, not sufficient to account for the whole of the divergences between the two statements, and the comparisons of output in the first three months of 1924 and 1925 appear to furnish little support for the view that the explanation is to be found in the differences between the periods covered by the figures. This view is confirmed by the figures representing the aggregate returned to the Federation for the business years of firms whose Census returns were not made for the calendar year. It is clear that not less than 250,000 tons of iron returned to the Federation as hematite iron was otherwise described in the Census returns, and that more than 200,000 tons of the Census total for basic iron was otherwise described in the particulars supplied to the Federation. The difference between the totals for all kinds of iron produced, as returned to the Census and to the Federation, may, however, be attributed to the differing periods covered by the data. The Federation's figures for pig iron and ferro-alloys are estimated as regards 1 per cent. of the total and are, in the aggregate, less than the Census aggregate by about 0.7 per cent.

Pig iron and ferro-alloys.	1924 (Census returns).		1924 (Federation).	1912 (Home Office).	1907 (Home Office).
	Quantity.	Selling value.	Quantity.	Quantity.	Quantity.
	Th. tons	£'000	Th. tons	Th. tons	Th. tons
Pig iron :—					
Hematite .. .. .	2,090.1	9,770	2,342.6	3,472	4,023
Basic .. .. .	2,651.5	11,810	2,445.0	1,772	1,406
Forge .. .. .	2,417.6	10,979	375.9	3,251	4,352
Foundry .. .. .			1,802.6		
Other qualities .. .. .	(Included above)		55.7	(Included above)	
Direct castings .. .. .			94.6		
Total .. .. .	7,159.2	32,559	7,116.4	8,495	9,781
Ferro-alloys :—					
Ferro-manganese .. .. .	196.6	2,531	161.8	256	333
Spiegeleisen .. .. .			25.1		
Ferro-silicon .. .. .	4.8	238	2.8		
Other alloys .. .. .			1.3*		
Total .. .. .	201.4	2,769	191.0	256	333
TOTAL—PIG IRON AND FERRO-ALLOYS .. .. .	7,360.6	35,328	7,307.4	8,751	10,114

\* Silico-manganese.

The Census figures shown above include 400 tons of ferro-tungsten and other ferro-alloys, valued at £53,000, returned by firms making steel (see page 63), and 300 tons of ferro-vanadium and other ferro-alloys, valued at £150,000, returned on schedules for the Non-ferrous Metals (Smelting, Rolling and Casting) Trades.

The above output is free from duplication.

The output of pig iron and ferro-alloys in 1924, as reported to the Census office, viz., 7,360,600 tons, was 27·2 per cent. less than the output in 1907, 15·9 per cent. less than in 1912, and 28·3 per cent. less than the output of 10,260,000 tons in 1913, which was the largest on record. The greater part of the reduction (2,753,000 tons) since 1907 was due to a decrease of 1,934,000 tons in the production described as forge and foundry iron, mainly the result of the development of the use of steel for purposes formerly met by the use of wrought iron, and the decreased demand for foundry iron for export purposes.

The decline in the output of pig iron between 1907 and 1924 is also partly accounted for by the increased use of scrap in production by iron foundries and steel makers: whereas, before the war, the weight of scrap used in steel making was between 20 and 30 per cent. of the total weight of steel produced, in 1924 it had risen, according to the National Federation's estimate,\* to about 50 per cent. During the war the productive capacity of the blast furnaces of the United Kingdom was increased, and it is understood that, in 1924, the trade estimate was that only about 60 per cent. of the total effective capacity was being utilised, whereas in 1907 and in 1913 the output was close to the aggregate effective capacity of the furnaces then in existence.

Apart from the decline in the production of forge and foundry iron, already referred to, the principal change in blast furnace practice between 1907 and 1924 was the replacement of hematite or acid pig iron by basic pig iron. Comparing 1924 with 1907, the Census figures for the later year show a decrease in hematite iron amounting to 1,933,000 tons and an increase in basic pig iron of 1,245,000 tons. According to the information furnished to the Federation, the figures of decrease and increase were 1,680,000 tons and 1,039,000 tons, respectively. The process of change was marked in the period between 1907 and 1912, during which the output of hematite iron decreased by 551,000 tons, or 14 per cent., while an increase of 366,000 tons, or 26 per cent., took place in the production of basic iron. With an impetus during the war years, the process of substitution has continued to the present time. Omitting the ferro-alloys, the proportions of the various kinds of pig iron made in the three censal years was as follows, using the Census figures for 1924:—

	1924.		1912.		1907.	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
<i>Pig iron.</i>						
Forge and foundry .. ..	29·2	38·3	44·5			
Hematite .. .. .	37·0	40·9	41·1			
Basic .. .. .	33·8	20·8	14·4			
Total .. .. .	100·0	100·0	100·0			

\* Based upon information relating to 81 per cent. of the total production of steel in 1924.

*Other products.*—In addition to the output of pig iron and ferro-alloys discussed above, firms that made their returns on the schedule relating to Blast Furnaces included the following goods as part of their output in 1924. These goods, being of kinds recorded mainly in returns on other schedules, are dealt with in the reports on the trades concerned.

Kind of goods.	1924.	
	Quantity.	Selling value.
	Th. tons	£'000
Iron castings in the rough .. .. .	3·4	20
Cinder, slag, etc. (not ground) .. .. .	..	259
Crushed slag and cement .. .. .	743·4	300
Tarred macadam .. .. .	369·5	336
	Th. units	
Electricity sold .. .. .	96,145·3	300
Gas sold .. .. .	..	216
Waste and by-products .. .. .	..	16
TOTAL VALUE .. .. .	..	1,447

The crushed slag shown above was probably intended for road-making material, since basic slag for use as a fertiliser, produced at steel works, was valued at about 27s. 6d. per ton (see page 37).

*Cost of materials.*—The cost of materials used by firms that made their returns on schedules for the Iron and Steel (Blast Furnaces) Trade, was returned as £31,315,000 in 1924, a sum which involves no duplication. Corresponding figures for 1907 and 1912 are not available.

*Net output.*—The net output in 1924 of the firms that made their returns on schedules for the Iron and Steel (Blast Furnaces) Trade (whose gross output was valued at £36,572,000) was £5,257,000, that sum representing the total amount by which the value of the aggregate output exceeded the cost of the materials used.

The net output per head of persons employed in the censal year 1924 was £195; no corresponding figure for 1907 or 1912 is available.

*Kinds and quantities of materials used.*—The National Federation of Iron and Steel Manufacturers obtained information, concerning materials used in 1924, from firms producing 89 per cent. of the output of pig iron and ferro-alloys and, on that basis, the following estimate was made by the Federation of the quantities of materials used in the production of the 7,307,400 tons of pig iron, etc., shown in the table on page 29.

Kind of materials.	Total quantity consumed.	Average quantity used in the production of 1 ton of				
		Hematite pig iron.	Basic pig iron.	Forge and foundry iron.	Alloys.	All qualities.
	Th. tons	cwts.	cwts.	cwts.	cwts.	cwts.
Iron ore { Home ..	11,186	9.43	43.80	44.30	1.56	30.62
{ Imported ..	5,694	25.25	9.47	7.66	38.45	15.58
Limestone ..	2,899	8.45	4.87	8.87	12.84	7.94
Other materials* ..	1,241	2.32	6.56	2.70	0.80	3.39
TOTAL ..	21,020	45.45	64.70	63.53	53.65	57.53
Fuel { Raw coal ..	1,375	2.94	0.35	8.34	—	3.76
{ Coke ..	8,609	20.15	27.75	22.82	40.94	23.55
TOTAL COAL EQUIVALENT	14,659	33.84	44.11	43.46	63.50	40.12

\* Cinder, scale, purple ore and scrap.

Similar particulars are not available for 1907 and 1912, but the Home Office Returns show that 25,124,000 tons of ore and cinder and the equivalent of 21,120,000 tons of coal were used in 1907, in the production of 10,114,000 tons of pig iron, or an average of 49.68 cwts. of ore, etc., and 41.76 cwts. of coal per ton of pig iron. For 1912 the corresponding quantities were 8,751,000 tons of pig iron made from 21,959,000 tons of ore and cinder, 17,998,000 tons of coal being used, or 50.18 cwt. of ore, etc., and 41.13 cwt. of coal per ton of pig iron made. There was thus a reduction in 1924 in the quantity of coal used, per ton of pig iron made, of about 4 per cent. as compared with the average for 1907, and of about 2½ per cent. as compared with 1912. The ore and cinder used per ton of iron was about 1 per cent. more in 1912 than in 1907 and 1924.

*Exports and imports.*—The exports and imports of pig iron and ferro-alloys in 1924 are compared in the following table with the output in the censal year :—

Pig iron and ferro-alloys.	Production.	Exports.	Retained imports.
In thousand tons.			
Pig iron :—			
Forge and foundry .. .. .	2,417.6	282.5	114.6
Hematite (acid) .. .. .	2,090.1	195.2	2.3
Basic .. .. .	2,651.5	7.5	170.3
TOTAL .. .. .	7,159.2	485.2	287.2
Ferro-alloys :—			
Spiegeleisen and ferro-manganese ..	196.6	113.4	1.3
Ferro-silicon .. .. .	4.8	0.2	13.2
Other sorts .. .. .		1.1	5.3
TOTAL .. .. .	201.4	114.7	19.8

About 6.8 per cent. of the quantity of pig iron and 57.0 per cent. of that of ferro-alloys recorded as made in the censal year were

exported in 1924. Retained imports of pig iron in 1924 were equivalent to about 4 per cent. and retained imports of ferro-alloys to about 10 per cent. of the British production. It will be noted that, in the main, the imported alloys were not of the same kind as those exported, a feature which, to a considerable extent, is also shown in the figures relating to the trade in pig iron. Exports of pig iron fell from 1,794,300 tons in 1907 to 1,100,000 tons in 1912, or by 38.7 per cent.; the further fall to 485,200 tons in 1924 brought the exports of that year to 27 per cent. of what they had been 17 years earlier. The reduction in exports of ferro-alloys, from 148,000 tons in 1907 and 162,000 tons in 1912 to 115,000 tons in 1924, was less marked.

Retained imports of pig iron rose from 89,200 tons in 1907 to 167,500 tons in 1912, and to 287,200 tons in 1924. In 1907 and, to a less degree, in 1912 also, charcoal iron formed the most important part of the import, while in 1924 the greater part consisted of basic iron.

#### Wages in 1924.

Under the Census of Production Act, 1906, the powers of the Board of Trade to require information do not extend to particulars of the amount of wages paid, and, consequently, no information on this head was secured in connexion with the Census of 1924. As a result, however, of the voluntary enquiry undertaken by the Ministry of Labour into wages and hours in the United Kingdom in 1924, information was obtained as to the total wage-bill of a group of firms in the Iron and Steel (Blast Furnaces) Trade that made returns both to the Ministry of Labour and to the Census of Production office. According to the Census records, this group of firms employed, in the week ended 18th October, 1924, 15,549 operatives, or 64 per cent. of the total of 24,150 operatives for the trade as a whole, and their net output totalled £3,012,000, or 57 per cent. of the aggregate of £5,257,000 for the trade as a whole. The total wage-bill of these firms, as returned to the Ministry of Labour, was £2,472,000, representing about 82 per cent. of their aggregate net output.

The average annual amount of wages, calculated on the average number employed in the censal year (15,408), was £160. The output of pig iron (including ferro-alloys) at the establishments at which these operatives were employed was 4,316,800 tons, or 58.7 per cent. of the total production at all blast furnaces. The average wages per ton of iron produced amounted to approximately 11s. 5d. The National Federation of Iron and Steel Manufacturers secured particulars of the wages paid by firms owning blast furnaces that produced 90 per cent. of the total production of pig iron in 1924, and the average per operative was £162. The particulars in this case covered not only blast furnace workers but also operatives at

coke ovens at blast furnaces, which may sufficiently explain the difference. The average total number of workpeople employed, as calculated by the Federation from the particulars furnished, was 28,533, exceeding by 3,208 the operatives reported to the Census office. The average wages per ton of pig iron made amounted to 12s. 5d., a sum which includes the wages of coke-oven workers. The numbers reported as employed in four specified weeks, by firms responsible for 84.1 per cent. of the total production of pig iron, amounted to 86.0 per cent. of the operatives reported to the Census office for the four nearest weeks for which particulars were supplied. The average wage as shown by the Federation for those four weeks was £3.23 per week per person.

## II. THE IRON AND STEEL (SMELTING, ROLLING AND FOUNDING) TRADES.

The tables on pages 59-66 are based on returns received from firms in Great Britain and Northern Ireland that were engaged in 1924 in the operation of steel works, puddling furnaces, rolling mills, foundries and forges. The number of separate returns received was 1,376. About 260 firms to which schedules were sent did not furnish returns, but these were mainly small foundries and many of them were no longer in existence at the end of the censal year. On the basis of the information available it is estimated that they did not employ more than 800 persons in all and that their net output probably did not exceed £120,000.

*Summary of results.*—The following statement summarises the main results of the Census of 1924. Comparable figures in this form for 1907 and 1912 are not available.

Particulars.	Unit.	1924.
Value of goods made and work done (Gross output) .. .. .	£'000	153,183
Cost of materials used .. .. .	"	107,005
Paid for work given out to other firms .. .. .	"	612
Net output .. .. .	"	45,566
Average number of persons employed .. .. .	No.	226,316
Net output per person employed .. .. .	£	201
Mechanical power available :—		
Prime movers .. .. .	H.P.	1,494,320
Electric motors driven by purchased electricity .. .. .	"	458,172

*Qualifications affecting comparisons.*—In considering the table on page 36 and other tables in this report which show figures for different censal years, the following qualifications should be borne in mind :—

- (1) The comparability of figures relating to value or cost is affected by the changes which have taken place in the general purchasing power of money.

(2) The Censuses of 1907 and 1912 covered Great Britain and the whole of Ireland, but that of 1924 applied only to Great Britain and Northern Ireland. The exclusion of Southern Ireland does not seriously affect the comparability of the figures, since, according to the Census of Production taken by the Irish Free State in respect of the year 1926, the value of the total output of the Metal Trades (excluding Engineering) in that year was only £441,000; miscellaneous iron and steel goods returned in other trades were valued at £13,000.

(3) The Censuses of 1907 and 1924 extended to all firms, however small, but in 1912 firms employing not more than five persons (excluding the proprietors) were required to state only the average number of persons employed by them in the year. According to the information so furnished, the number of persons employed in the establishments thus excluded was only 784, a number too small to disturb comparisons.

*Value of output and cost of materials.*—The figures in the above table representing the total value of goods made and work done and the cost of materials used are the aggregates of the figures recorded by the firms that made returns, and, for the reasons explained in paragraphs (i) and (ii) on pages xii and xiii, they overstate the value of the output of, and the cost of materials used by, the Iron and Steel (Smelting, Rolling and Founding) Trades considered as a whole. The matter is discussed on pages 51 and 52, where it is estimated that the value, free from duplication, of the output of these trades in 1924 lay between £129,000,000 and £131,000,000, and the cost of the materials purchased from sources outside these trades and worked up into their products lay between £83,500,000 and £85,500,000.

### Production.

Detailed information as to the output of the Iron and Steel (Smelting, Rolling and Founding) Trades in 1924 will be found in Table II on pages 60-63.

In addition to the output dealt with in this report, railway material and other iron and steel goods, valued, on a cost basis, at £1,871,000, were produced in 1924 by Railway Companies and Local Authorities.\*

### Principal products.

The following table shows, for the three censal years, the value and quantity of the chief products, made for sale, of the Iron and Steel (Smelting, Rolling and Founding) Trades, the figures for each year being inclusive of the output of similar goods returned on schedules for other trades.

\* Such production falls within the scope of the report on Public Utility Services, which forms part of a separate volume.

## Output for sale in 1924, 1912, and 1907.

Kind of goods.	Unit.	Returned in 1924 on schedules for		1912.	1907.
		The Iron and Steel (Smelting, etc.) Trade.	All trades.	All trades.	All trades.
Quantity and selling value.					
(a) Iron and steel blooms, billets and slabs, other than of special steel .. .. .	Th. tons	1,057·1	1,057·1	545	599
	£'000	9,050	9,050	3,141	3,376
(b) Steel ingots, other than of special steel .. .. .	Th. tons	330·2	330·2	90	104
	£'000	2,185	2,185		536
(c) Special steels .. .. .	Th. tons	80·8	82·8	681	20
	£'000	2,880	3,031		706
(d) Sheet bars and tinsplate bars	Th. tons	1,887·9	1,902·0	1,266	991
	£'000	15,094	15,319	6,378	5,308
Total—(a) to (d) .. .. .	Th. tons	3,356·0	3,372·1	1,901	1,714
	£'000	29,209	29,585	10,200	9,926
(e) Iron bars, rods, angles, shapes and sections .. .. .	Th. tons	352·3	353·0	806	831
	£'000	4,483	4,493	6,090	6,176
(f) Steel bars, rods, angles, shapes and sections .. .. .	Th. tons	1,306·1	1,332·1	1,280	988
	£'000	14,298	14,756	9,720	7,416
(g) Girders, beams, joists and pillars .. .. .	Th. tons	380·6	380·8	211	245
	£'000	3,489	3,492	1,230	1,568
(h) Hoops and strips .. .. .	Th. tons	444·6	445·2	422	390
	£'000	5,670	5,678	3,276	3,045
(i) Wire rods .. .. .	Th. tons	160·4	183·6	118	118
	£'000	2,023	2,316	875	882
(j) Plates and sheets, not coated	Th. tons	1,773·8	1,942·5	2,036	1,631
	£'000	22,260	25,680	17,726	13,748
Total—Rolling mill products, (e) to (j) .. .. .	Th. tons	4,417·8	4,637·2	4,873	4,203
	£'000	52,223	56,415	38,917	32,835
(k) Galvanized sheets .. .. .	Th. tons	696·3	709·9	742	497
	£'000	13,682	13,920	9,494	7,157
(l) Cast tubes, pipes and fittings	Th. tons	413·6	489·4	515	342
	£'000	4,340	7,249†	3,074	2,019
(m) Railway and tramway material .. .. .	Th. tons	1,022·6	1,030·3	1,173	1,270
	£'000	12,630	12,794	9,598	9,914
(n) Iron castings in the rough .. .. .	Th. tons	497·6	796·6	855	1,249
	£'000	8,824	14,464	7,983	10,316
(o) Steel castings in the rough .. .. .	Th. tons	102·6	114·4	91	113
	£'000	4,247	4,686	1,909	2,550
(p) Iron and steel forgings in the rough .. .. .	Th. tons	46·7	126·6	109	123
	£'000	1,907	3,523	3,169	3,262
(q) Iron and steel scrap .. .. .	Th. tons	1,938·3	2,394·2	815	699
	£'000	7,214	8,711	2,466	2,231
(r) Manufactures of iron and steel, unenumerated .. .. .	£'000	4,991*	5,089*	7,023	5,722
Total value—(k) to (r) .. .. .	£'000	57,835	70,436	44,716	43,171
(s) Cinder and slag .. .. .	£'000	382	382	688	660
TOTAL VALUE—(a) to (s) .. .. .	£'000	139,649	156,818	94,521	86,592

\* Includes £3,255,000 in respect of goods whose weight was returned as 166,900 tons. For the remainder no quantities were stated.

† Includes £1,166,000, returned on schedules for the Light Castings Trade, for which no quantities were stated (see page 85).

## Other products.

In addition to the products shown in the preceding table, the following amounts were returned on schedules for the Iron and Steel (Smelting, Rolling and Founding) Trades in respect of goods which are of kinds mainly produced in other trades and which are dealt with in the reports on those trades. Detailed particulars of these goods will be found in Table IIB on pages 61–63.

Kind of goods.	1924.	1912.	1907.
	Selling value.	Selling value.	Selling value.
	£'000	£'000	£'000
Iron and steel products :—			
Springs .. .. .	1,147	649	1,212
Drop forgings, etc. .. .. .	831		
Other manufactures .. .. .	2,053		
Total—Iron and steel .. .. .	4,031	649	1,212
Products not of iron or steel :—			
Basic slag, ground .. .. .	277	258	1,441
	(201·6)	(248)	
Non-ferrous metal scrap .. .. .	1,742	2,524	
Other goods .. .. .	635		
Total—Not of iron or steel .. .. .	2,654	2,782	1,441
TOTAL VALUE—OTHER PRODUCTS .. .. .	6,685	3,431	2,653

Adding the total shown above for iron and steel goods to those shown in the table on page 36 (excluding cinder and slag), the aggregate value for 1924 of goods of iron and steel returned on schedules for the Iron and Steel (Smelting, Rolling and Founding) Trades becomes £143,298,000, and the total, inclusive of similar goods returned on schedules for other trades is raised to £160,467,000. The corresponding total for all trades in 1907 (inclusive of Southern Ireland) was £87,144,000.

*Iron and steel structural work, repair and jobbing work and work done for the trade.*

In the case of iron and steel structural work, such as bridges or iron framework for buildings, firms with their own rolling-mills were instructed not to include in the value of any structural work done by them the value of any shapes, sections, joists, etc., which they themselves rolled in their own works, but to enter the value of such material against the proper production heading. All purchased material was, of course, to be included in the value of the structural work. The aggregate entered in this way as the value of iron and steel structural work is not, therefore, comparable with the value of somewhat similar work entered by engineers on schedules for the Engineering Trades (see pages 252 and 262) or by builders on schedules for the Building and Contracting Trades. A great part of the iron and steel structural work done by the heavy Iron and Steel Trades is included by builders in the amount of their sub-contracts. The amounts returned in each year for all classes of work done are shown in the following table:—

Kind of work done.	1924.	1912.	1907.
	Amount received.	Amount received.	Amount received.
Iron and steel structural work*.. .. .	£'000 5,456	£'000 781§	£'000 2,269
Work done "on hire" (tilting, rolling, etc.) ..	989†	455	262
Galvanizing for the trade .. .. .	606‡	510	458
General and jobbing engineering, including repairs .. .. .	184		
<b>TOTAL .. .. .</b>	<b>7,235</b>	<b>1,746</b>	<b>2,989</b>

\* By firms in the Iron and Steel Trades only.

† Including £10,000 returned on schedules for other trades.

‡ Including £376,000 returned on schedules for other trades.

§ The record for 1912 is incomplete.

Even after allowing for the difference in the level of values there was a considerable increase in structural work and in work done "on hire" in 1924, as compared with 1907.

*Total make, exports and imports.*

Firms that made their returns on schedules for the Iron and Steel (Smelting, etc.) Trades were required to furnish particulars of their total make of crude and semi-finished products and of certain more finished goods in 1924, and the information furnished is summarised in the following table, the particulars as to the output of similar classes of goods returned on schedules for other trades being added. Particulars of British exports and of retained imports are included, for comparison, in the same table:—

*Production, exports and retained imports, 1924.*

Kind of goods.	Production.		Exports.	Retained imports.
	Returned on schedules for			
	The Iron and Steel (Smelting, etc.) Trades.	All trades.	Th. tons	Th. tons
<i>Crude and semi-finished iron and steel:—</i>				
Steel ingots, other than of special steel	7,715·7	7,772·7	1·2	37·7
Special steels .. .. .	172·2	194·1	5·8	3·4
Iron and steel blooms, billets, and slabs (other than of special steel) ..	4,287·3	4,287·3	10·6	707·1
Sheet bars .. .. .	921·0	935·1	1·0	357·9
Tinplate bars .. .. .	1,222·9	1,222·9	0·2	20·0
<i>Rolling mill products:—</i>				
Bars, rods, angles, shapes, and sections:—				
Steel .. .. .	1,350·4	1,376·4	273·9	137·1
Iron .. .. .	364·1	364·8	42·4	254·4
Girders, beams, joists, and pillars ..	416·8	417·0	72·6	88·4
Hoops, baling and barrel .. .. .	100·9	100·9	65·1	4·9
Hoops and strips for tubes .. .. .	344·4	345·0	4·4	30·5
Wire rods .. .. .	166·0	189·2*	4·4	73·9
Plates and sheets (not coated):—				
Iron .. .. .	10·3	10·3	3·6	9·1
Steel:—				
Not under ½ in. thick { Armour plates .. .. .	7·5	14·2	—	—
{ Other .. .. .	1,116·0	1,116·0	183·6	122·4
Black sheets under ½ in. thick ..	940·0	1,020·4†	246·7	6·0
Black plates and Canada plates ..	37·4	821·7†	44·4	6·7
<i>Other products:—</i>				
Galvanized sheets:—				
Flat .. .. .	147·9	161·1	140·9	0·1
Corrugated .. .. .	549·1	549·5	508·9	—
Castings in the rough:—				
Iron .. .. .	544·4	843·4	1·5	2·1
Steel .. .. .	114·1	125·9	2·2	6·6
Forgings in the rough:—				
Iron .. .. .	1·1	5·5	0·1	1·9
Steel .. .. .	53·4	128·2	0·8	3·1
Railway, etc., material:—				
Grooved rails for trams .. .. .	70·3	70·3	9·7	0·7
Railway rails and conductor rails for electric traction .. .. .	537·1	537·1	173·5	20·5
Sleepers and fishplates .. .. .	88·2	88·2	91·2	1·3
Tyres and axles .. .. .	119·5	122·8	21·2	2·4
Railway wheels and axles, complete	47·5	110·5‡	16·2	1·4
Other railway material .. .. .	160·0	163·5	58·6	9·4

\* This figure includes 23,200 tons of wire rods, the output for sale returned on schedules for the Wire Drawing Trade (see page 101): the total make of wire rods was not required to be stated by firms that made their returns on those schedules.

† See also the report on the Tinplate Trade, page 68.

‡ Excluding the production of Railway Companies: see also the report on the Railway Carriage and Wagon Building Trade, page 329.



The recorded export of sleepers and fishplates in 1924 exceeded the amount shown in the preceding table as produced in the censal year. Whether this was due to the varying dates to which the accounts were made up by different firms or to exports of goods made in previous years, the information available does not show.

A similar comparison cannot be made between the production, exports and net imports of cast pipes and fittings, since only a small proportion of the pipes returned on schedules other than those for the heavy Iron and Steel Trades were distinguished according to their diameter, as are the exports and imports. The particulars furnished were as follows:—

Cast pipes and fittings.	Production.		Exports.	Retained imports.
	Returned on schedules for			
	The Iron and Steel (Smelting, etc.) Trades.	All trades.		
	Th. tons	Th. tons	Th. tons	Th. tons
Up to 6 inches diameter:—				
Gas and water pipes and radiators ..	125.7	126.5	40.1	11.3
Other pipes .. .. .	23.7	30.5	7.9	7.1
Fittings.. .. .	9.9	9.9	3.0	0.6
Over 6 inches diameter:—				
Pipes .. .. .	243.8	243.9	33.0	5.8
Fittings.. .. .	10.5	10.5	0.5	0.8
Diameters not distinguished:—				
Gas and water pipes .. .. .	—	29.8		
Rainwater and soil pipes .. .. .	—	*		
Other pipes .. .. .	—	24.4		
Fittings.. .. .	—	13.9		

\* Value £1,166,000; quantity not stated.

#### Total make of steel.

In 1907 firms were asked to state voluntarily the quantities of the different kinds of steel made by them, but the information secured in this way represented only about 40 per cent. of the output. In 1912 and in 1924 firms were required to state the total quantity of steel made and were asked to distribute it by kinds, and in 1924 detailed information regarding over 89 per cent. of the total output returned on schedules for the Iron and Steel (Smelting, etc.) Trades was obtained. The British Iron Trade Association published certain particulars of steel output in 1907 and 1912 and the National Federation of Iron and Steel Manufacturers published similar particulars for 1924. The information available from these sources is summarised in the table below and, in comparing the figures, it should be remembered that those compiled by the Trade Associations relate to the calendar years, while the Census figures are the aggregates of the figures furnished by producing firms in respect of their business year most closely corresponding to the calendar year for which the Census was taken.

Kind of steel.	1924.		1912.	1907.
	Census.	Federation.	British Iron Trade Association.	
	Th. tons	Th. tons	Th. tons	Th. tons
Open-hearth steel:—				
Acid .. .. .	1,624.8	2,358.8	3,365.5	3,384.8
Basic .. .. .	4,711.1	5,117.5	1,908.1	1,278.7
Total .. .. .		7,476.3	5,273.6	4,663.5
Bessemer and other converter steel:—				
Acid .. .. .	570.6	405.8	980.7*	1,280.3*
Basic .. .. .	148.7	109.7	541.8*	578.9*
Total .. .. .		515.5	1,522.5*	1,859.2*
Crucible steel .. .. .	10.9	15.2†	††	50.0‡
Electric steel .. .. .	31.5	64.5	††	††
Castings other than electric steel	§	144.9	††	††
Steel not separately distinguished	869.2	—	—	—
TOTALS				
Acid steel (excluding castings) .. .. .	..	2,764.6	4,346.2	4,665.1
Basic steel (excluding castings) .. .. .	..	5,227.2	2,449.9	1,857.6
All kinds .. .. .	7,966.8	8,216.4	6,796.1	6,572.7

\* Bessemer steel only.

† For year to 30th June, 1924 (see Committee on Industry and Trade: *Survey of Metal Industries*, page 116).

‡ Trade estimate. § Included under other heads. †† Not stated separately.

The total output of steel ingots and castings in 1912 as returned to the Census office was 7,312,000 tons (including about 40,000 tons of crucible steel), or 7.6 per cent. above the output as stated by the British Iron Trade Association. This was in part due to possible differences (already alluded to) in the periods covered by the respective series of returns. In 1924, when the same cause operated, the Census figure of output was about 3.0 per cent. below that published by the National Federation, and it would seem probable that the Census figure for 1912 was the result of a more exhaustive enquiry than the Association figure. It is not clear whether steel castings were included in the figures for 1907 though not separately specified.

According to trade estimates, it appears that the output of steel in the United Kingdom in 1924 was probably equal to about 70 per cent. of the aggregate effective capacity. The output in 1907 was not surpassed till five years later and the total make in 1912 would have been greater but for the five weeks' coal stoppage in the spring of that year; in 1913 the output rose to 7,664,000 tons, and was probably close to full effective capacity.

*Exports and imports.*—The following statement shows the exports and imports of steel ingots in each of the censal years. The overseas trade in steel ingots is not large and was not shown separately till 1908.

	1924.	1912.	1908.
	Tons.	Tons.	Tons.
<i>Steel ingots</i> :—			
Exports .. ..	1,213	97	416
Retained imports ..	37,748	33,533	21,126
<i>Special steels</i> :—			
Exports .. ..	5,769	} Not separately stated.	
Retained imports ..	3,395		

As there was a reduction in 1925 of just over 800,000 tons from the production of acid and basic steel in 1924, a large part of the 330,200 tons of ingots recorded as made for sale or stock (see page 36) may have represented additions to stocks in the hands of makers.

*Blooms, billets, slabs, sheet bars, etc.*

The following table gives particulars of the output of blooms, billets, slabs, etc. :—

Kind of goods.	Federation.	Census of Production.			
	Total make.	Total make.	Made for sale or stock.†		
	1924.	1924.	1924.	1912.	1907.
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Blooms, billets and slabs* .. ..	4,455.7	4,287.3	1,057.1	545	599
Sheet bars .. ..	2,044.4	921.0	679.2	1,266	991
Tinplate bars .. ..		1,222.9	1,222.8		
TOTAL .. ..	6,500.1	6,431.2	2,959.1	1,811	1,590

\* The Census of Production figures relate to both iron and steel blooms, billets and slabs: for comparative purposes the Federation figure for puddled bars has been added to that for steel blooms, etc., to give the total shown.

† As returned on schedules for all trades.

The Federation figures were nearly 170,000 tons in excess of the Census total for blooms, billets and slabs, and 100,000 tons in defect for sheet and tinplate bars. The divergences may be explained by the different periods covered by the respective series of returns. The Federation did not ascertain the total make of sheet bars separately from that of tinplate bars, and the output of the two together, as reported to them, was 4.6 per cent. less than that reported to the Census.

*Exports and imports.*—The course of overseas trade in these products is shown below :—

Kind of goods.	1924.		1912.		1907.	
	Exports.	Retained imports.	Exports.	Retained imports.	Exports.	Retained imports.
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Blooms, billets and slabs (iron and steel) ..	10.6	707.1	8.9	565.0	4.5	410.1
Sheet bars .. ..	1.0	357.9	}	275.3	—	130.2
Tinplate bars .. ..	0.2	20.0				

British exports of these classes of semi-finished material were negligible in proportion to output in all three years, but in 1924 the retained imports of blooms, billets and slabs were equal to about 16½ per cent. of the home production and retained imports of sheet bars to about 39 per cent. of the production.

*Rolling mill products.*

There are available for 1924 the statements of total make of each class of rolling mill products as returned to the Census and as published by the National Federation. The Federation figures relate to the calendar year 1924, while some of the returns to the Census were made for periods other than the calendar year. Similar figures for 1907 and 1912 are not available, but the quantities made for sale or stock in those years are included in the following table :—

Rolling mill products of steel.	1924.			1912.	1907.
	Federation.	Census of Production.		Made for sale or stock.	Made for sale or stock.
	Total make.	Total make.	Made for sale or stock.		
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Bars, shapes, sections, etc. :—					
Sections, angles, channels and tees .. ..	644.4	1,376.4	1,332.1	1,280	988
Rounds, squares, flats and hexagons .. ..	763.2				
Spring steel .. ..	95.0				
Girders, beams and joists ..	290.8	417.0	380.8	211	245
Total—Bars, shapes, girders, etc.	1,793.4	1,793.4	1,712.9	1,491	1,233
Hoops, baling and barrel ..	435.9*	100.9	100.8	422	390
Strips for tubes .. ..		345.0	344.4		
Wire rods .. ..		264.1	189.2†	183.6	118
Plates and sheets, not coated :—					
Plates, boiler quality ..	100.2	1,130.2	1,100.4	1,436	1,245
Plates, ½ in. and over ..	1,086.0				
Black plates .. ..	849.5				
Sheets under ½ in. .. ..	499.1	1,020.4§	686.9	600	386
Total—Plates and sheets, not coated .. ..	2,534.8	2,972.3	1,932.2	2,036	1,631
Galvanized sheets .. ..	759.2	710.6	709.9	742	497
Rails :—					
50 lb. per yard and over ..	460.2	537.1	537.1	676	733
Over 30 lb. and under 50 lb.	40.2				
30 lb. per yard and under ..	74.9				
Grooved for trams .. ..	64.6	70.3	70.3	21	44
Total—Rails .. ..	639.9	607.4	607.4	697	777
Sleepers and fishplates .. ..	88.9	88.2	88.2	155‡	178‡
TOTAL—ROLLING MILL PRODUCTS .. ..	6,516.2	6,807.0	5,679.4	5,661	4,824

\* This figure includes hoop and strip of both iron and steel.

† See footnote (\*) to table on page 39.

‡ Chairs and sleepers.

§ Includes black sheets afterwards galvanized by the makers.

These rolled products may be divided into three groups :—

(i) *Bars, girders, hoops, etc.*—The Census figures show an excess of 126,200 tons in girders, joists and beams as compared with the Federation total, but an equal deficiency in bars, shapes and sections. It would appear, therefore, that there was some lack of correspondence between the two sets of returns in the matter of the classification of these products.

With regard to hoops and strips the Census schedule did not distinguish those made of iron from those made of steel, and the Census total for hoops and strips together is 10,000 tons above the Federation total, an excess possibly due, in part, to the different periods covered by individual returns. The total make of wire rods as returned to the Census does not cover the rods made by wire-drawers for their own use, and the Federation figure is the more complete. As regards the relation between total make and goods made for sale as returned to the Census, it appears that in 1924 about 3·2 per cent. of the make of shapes and sections and 8·7 per cent. of the make of girders, beams, joists and pillars were used by the makers, presumably in repair and similar work carried out by them or in the manufacture of goods not specified by name; shapes, girders, etc., used in structural work are recorded as such and are not included in the aggregate recorded in respect of the structural work. The output of hoops and strips was practically all sold by the makers.

(ii) *Plates and sheets, not coated.*—Nearly one-third of the black sheets rolled were galvanized in the works of the producing firms, and are included in the figures shown for galvanized sheets. The figures furnished by the Welsh Plate and Sheet Manufacturers' Association to the Federation for tin, terne and black plates represent the sum of the plates coated and the plates made but not coated in the year, and is short of the total make of black plates by the tonnage of the shearings and clippings produced before arriving at the final product.

Included in the totals shown in the table in respect of plates made in 1924 are 14,200 tons of armour plates, of which 12,900 tons were returned as made for sale.

In 1912 the output of black plates was ascertained to be about 700,000 tons. The output of galvanized sheets was about 742,000 tons and that of tinned sheets 48,000 tons, requiring together about 790,000 tons of black sheets, and 74,000 tons of black sheets were exported, to which must be added sheets sold to the motor and other trades. The quantity so sold in 1912 is not known, but was certainly less than that of the corresponding sales in 1924.

From the Census report for 1907 it appears that in that year there was an output of about 527,000 tons of tinned plates, about 2,000 tons of tinned sheets, and about 497,000 tons of galvanized sheets;

exports of black plates were 71,500 tons and of black sheets 67,600 tons. In addition there was an output of galvanized tanks, cisterns, etc., valued at £1,161,000 and probably requiring about 50,000 tons of material, but not all that material would be thin sheets.

(iii) *Rails, sleepers and fishplates.*—Rail-making firms are dependent for their orders on the renewal plans of home railway companies and on the progress of railway schemes abroad. No regular flow of demand comes from either of these two sources, and both the production of rails in the United Kingdom and the export trade are consequently marked by considerable irregularity. The world trade in rails was regulated by the International Rail Makers' Association from 1884 onwards, but this regulation fell into abeyance on the outbreak of the war and was not re-established till 1926, when a European Rail Makers' Association was formed. At the time of the Censuses of 1907 and 1912 British rail production was controlled, and on account of the greater regularity of production it may perhaps be permissible to take the aggregates of the amounts produced in the railmakers' business years most nearly corresponding to those calendar years as fairly representative of the output in the calendar years. In 1924, on the other hand, when trade was unregulated, the output of rails (other than tram rails) as returned to the Census was 6·64 per cent. less than the output ascertained by the National Federation for the calendar year, although, since the output in each of the last six months of 1924\* was less than in the corresponding months of 1923, and the output in the first half of 1925\* was only less by a fraction of 1 per cent. than that of the first half of 1924, the Census figure might have been expected to be the larger of the two; obviously, work was not proceeding regularly, and some firms were busy at times when others were idle. The production of tram rails is subject to the same irregularities of demand. There is probably some lack of correspondence, though not great, between the output described as *sleepers and fishplates* in 1924 and as *chairs and sleepers* in 1907 and 1912. In this case there was no substantial difference between the output in 1924 as ascertained by the Federation and as returned to the Census.

*Exports and imports.*—The following table summarises the course of trade in the three censal years :—

Kind of goods.	Exports.			Retained imports.		
	1924.	1912.	1907.	1924.	1912.	1907.
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Steel bars, shapes, sections, etc. . . . .	273·9	241·1	231·9	137·1	107·8	25·3
Girders, beams, joists and pillars . . . . .	72·6	120·8	106·1	88·4	116·5	87·4
Hoops, baling and barrel	65·1	39·8	54·1	4·9	53·7	17·4
Hoops and strips for tubes	4·4					

\* cf. Statistical Bulletin issued by the National Federation.

Kind of goods.	Exports.			Retained imports.		
	1924.	1912.	1907.	1924.	1912.	1907.
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Wire rods .. ..	4.4	*	*	73.9	95.7	34.4
Armour plates .. ..	—	2.0	0.8	—	—	—
Steel plates not under $\frac{1}{8}$ in. thick .. ..	184.7	140.9	232.6	130.0	74.5	39.0
Black plates and Canada plates .. ..	44.4	65.7	71.5	6.7	25.9	16.5
Black sheets under $\frac{1}{8}$ in. thick .. ..	249.2	74.3	67.6	7.4		
Railway rails .. ..	173.5	407.2	409.6	20.5	6.6	6.9
Tramway rails (grooved)	9.7	3.1	4.1	0.7	8.3	3.4
Sleepers and fishplates ..	91.2	109.9†	*	1.3	*	*
TOTAL .. ..	1,173.1	1,204.8	1,178.3	501.4	489.0	230.3

\* Not separately specified. † Chairs and sleepers.

The imports and exports of the above products, except bars, etc., and girders, etc., include small quantities of iron products as well as those of steel. A noticeable feature is the reduction in the exports of railway material; if the latter be excluded, exports in 1924, after allowing for 9,500 tons of bars, plates, etc., consigned to the Irish Free State, were about 30 per cent. greater than in 1912.

The completion of railway schemes, the inability, in post-war conditions, to raise capital for new extensions, and the development, since the outbreak of the war, of the manufacture of rails in Australia and India, appear to be the main causes of the decline in British export trade in railway material. The large increase in 1924, as compared with 1912 and 1907, in the exports of black sheets reflects the Japanese requirements for reconstruction after the earthquake.

#### Steel castings and forgings.

The following table summarises the information available from the Census of Production returns:—

Steel castings and forgings.	1924.			1912.	1907.
	Total make.		Made for sale or stock (all trades).	Made for sale or stock (all trades).	Made for sale or stock (all trades).
	Iron and Steel Trades.	All trades.			
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Castings in the rough ..	114.1	125.9	114.4	91	113
Forgings in the rough ..	53.4	128.2	121.3	96	86
Railway tyres and axles ..	119.5	122.8	122.8	142	137
Railway wheels and axles (complete)* ..	47.5	110.5	72.0	120†	90‡
Other railway material ..	160.0	163.5	163.5	138	134
TOTAL .. ..	494.5	650.9	594.0	591	560

\* See footnote (‡) to table on page 39. † Total make. ‡ Partly estimated.

It is not certain whether all the railway material listed above was forged, or whether some of it was cast; it may also include some iron as well as steel. Goods made in railway workshops are excluded, and the wheels and axles made for sale are exclusive of those fitted to vehicles. Railway wheels and axles are discussed in the report on the Railway Carriage and Wagon Building Trade (see pages 328 and 329). Castings and forgings, shown above, represent parts of ships and machines and are, in the main, covered by the final products of the Engineering and Shipbuilding Industries.

*Exports and imports.*—Particulars of the overseas trade in the various products (except railway wheels and axles) are given below:—

Kind of goods.	Exports.			Retained imports.		
	1924.	1912.	1907.	1924.	1912.	1907.
	In thousand tons		tons.	In thousand tons.		tons.
Steel castings in the rough	2.2	0.9	1.2	6.6	7.4	2.9
Steel forgings in the rough	0.8	2.7	2.3	3.1	19.4	6.3
Railway tyres and axles	21.2	25.6*	23.3*	2.4	4.9*	3.4*
Other railway material..	58.6	66.0	64.9	9.4	Not available.	
TOTAL .. ..	82.8	95.2	91.7	21.5	31.7	12.6

\* Including tyres and axles of iron or steel, other than railway material.

It will be observed that exports were less in 1924 than in either 1907 or 1912, and that imports were less in 1924 than in 1912; both exports and imports were greater in 1912 than in 1907.

#### Puddled iron and wrought iron.

The British Iron Trade Association ascertained the production of puddled iron from the year 1881 onwards and the output of scrap, ball and bushelling bars was added from 1917. At the Census of Production for 1907 a partial output of 975,000 tons was reported and it was estimated that the total was about 1,100,000 tons, the difference being probably the quantity of scrap bars. An output of 1,432,000 tons was reported at the Census of 1912, but there is some uncertainty both as to the completeness of this total and as to its division between puddled iron and scrap bars. By the time the third Census was taken *puddled bars* had been removed from the Import and Export List, the trade in them being trifling, and, consequently, manufacturers could not be required to state their total make. According, however, to the statistics published by the National Federation, the total make in 1924 was 599,000 tons.

The output of rolling mill products of iron in the three censal years, so far as ascertained, was as follows:—

Rolling mill products of iron.*	1924.		1912.		1907.
	Federation.	Census of Production.		Made for sale or stock.	Made for sale or stock.
	Total make.	Total make.	Made for sale or stock.		
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Finished products:—					
Bars, rods, shapes, and sections .. .. .	379.3	364.8	353.0	806	831
Rolled strip for tubes ..	49.6	} 10.3	} 10.3	} Included with steel.	
Sheared strip .. .. .	14.3				
Hoops, baling and barrel Plates not under ½ in. thick	4.8				
Sheets under ½ in. thick ..	8.1				
Other finished material ..					
TOTAL .. .. .	456.1	375.1	363.3	..	..

\* Blooms, billets and slabs of iron are included with those of steel (see page 42).

*Exports and imports.*—The course of overseas trade in wrought iron has been as follows:—

Kind of goods.	Exports.			Retained imports.		
	1924.	1912.	1907.	1924.	1912.	1907.
	In thousand tons			In thousand tons		
Puddled bars .. .. .	*	4.8	1.6	*	0.7	1.5
Iron blooms, billets, slabs	1.0	*	*	2.5	*	*
Iron bars, rods, shapes, etc. .. .. .	42.4	142.5	159.1	254.4	162.0	73.5
Iron plates not under ½ in. thick .. .. .	1.1	} Included with steel.	}	7.6	} Included with steel.	}
Iron sheets under ½ in. thick	2.5			1.5		

\* Not shown separately.

*Other goods made.*

This heterogeneous class may be divided into two groups, goods mainly produced within the heavy Iron and Steel Trades included in this report and those mainly produced in other trades. The table below deals with the first group; the second group has already been discussed in the paragraph on *Other products* on page 37.

Kind of goods.	1924.				1912.	1907.
	Total make.		Made for sale or stock.		Made for sale or stock.	Made for sale or stock.
	Iron and Steel Trades.	All trades.	Iron and Steel Trades.	All trades.	All trades.	All trades.
	In thousand tons				In thousand tons	
Iron castings in the rough	544.4	843.4	497.6	796.6	855	1,249
Iron forgings in the rough	1.1	5.5	0.9	5.3	13	37
Cast pipes and fittings	—	—	413.6	489.4*	515	342
Galvanized sheets ..	697.0	710.6	696.3	709.9	742	497
Manufactures of wrought iron .. .. .	—	—	166.9	171.8	18	189
Manufactures of cast iron	—	—	and	and	282	59
Manufactures of iron and steel not elsewhere enumerated .. .. .	—	—	£'000 1,736	£'000 1,834	£'000 150 and	£'000 654
					£'000 3,068	

\* Valued at £6,083,000, to which should be added £1,166,000, the value of rain water and soil pipes returned, by value only, on schedules for other trades.

As the number of kinds of iron and steel manufactures specified in the schedule was greater in 1924 than in 1912 and 1907, it follows that the content of the unenumerated classes was not the same in the three years.

According to the statistics of the National Federation the output of galvanized sheets in the twelve months to June, 1924, was 727,900 tons, in the calendar year 1924 it was 759,200 tons, and in the twelve months to June, 1925, 799,800 tons. The quantity returned to the Census as the output for business years ending at varying dates between 30th June, 1924, and 30th June, 1925, was 710,600 tons, or 6.4 per cent. less than the Federation figure for the calendar year 1924 and about 7 per cent. less than the average of the two years within which lie the periods for which the Census returns were made. Examination of the Census returns shows that the aggregate output of the firms that made returns for periods ending earlier than 31st December, 1924, and the aggregate output of those that made returns for periods ending after that date were the same. The sum of £230,000 returned on schedules for the Iron and Steel Trades as received for galvanizing done for the trade may have related in part to the coating of sheets; and an aggregate of £376,000 returned on schedules for other trades as received for galvanizing done for the trade probably referred to the coating of

wire, hollow-ware, tanks, etc. The average value of sheets at works in 1924 was £15 per ton and that of galvanized sheets £20 per ton, so that £230,000 would provide for the coating of 46,000 tons, a quantity representing approximately the difference between the total of galvanized sheets returned to the Census and the output recorded by the Federation for 1924.

*Exports and imports.*—Exports and retained imports of these products in 1924, 1912 and 1907 were as follows:—

Kind of goods.	Exports.			Retained imports.		
	1924.	1912.	1907.	1924.	1912.	1907.
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons
Iron casting in the rough	1.5	4.7	5.9	2.1	5.9	3.9
Iron forgings in the rough	0.1	0.4	1.2	1.9	1.7	1.5
Cast pipes and fittings	84.4	220.4	227.4	25.6	7.4	3.6
Galvanized sheets	650.0	658.7	467.9	0.1	—	—
Manufactures of iron and steel not elsewhere enumerated	198.5	274.4	175.5	14.1	28.6	21.0

The totals representing goods not separately enumerated in the three years are shown above for the sake of formal completeness, but the figures are in no way comparable; the figures for 1924 exclude certain manufactures of iron and steel that are dealt with in the reports on other trades (e.g. stoves, boilers, fencing material, etc.), but it is impossible to exclude these from the 1912 and 1907 figures shown.

#### *Iron and steel scrap.*

The aggregate quantity recorded on schedules for all trades under the heading of *Iron and steel scrap* in 1924 was 2,394,200 tons, valued at £8,711,000. Firms in the heavy Iron and Steel Trades were not required to state the total quantity of the scrap produced by them in the course of manufacture but only that part which they sold in the year or added to stock at the end of the year. Firms in other trades were similarly required to furnish particulars relating to the quantity produced for sale. The information available from the Census does not, therefore, enable an estimate to be made of the total quantity of scrap used as a material in iron and steel production.

The aggregate figures quoted above also include the iron and steel scrap recovered by firms engaged in the dismantling of ships, machinery, etc., and that produced by scrap merchants who purchased old metal goods and subjected them to some productive process (e.g., breaking, sorting) before re-sale. The bulk of the scrap produced in the course of manufacture was probably sold for direct use to other firms engaged in iron and steel production and the total figures returned to the Census do not, therefore, contain any serious element of duplication. The quantity of iron and steel scrap returned by firms engaged in the dismantling of ships and

machinery and by certain scrap merchants was 1,285,200 tons, valued at £4,686,000, and the quantity recorded by manufacturing firms whether in the Iron and Steel Trade or in other trades was 1,109,000 tons, valued at £4,025,000. The aggregates recorded for the years 1907 and 1912 are believed to relate solely to scrap produced by manufacturing firms and the quantities returned, viz. :—699,000 tons and 815,000 tons respectively, are comparable with that of 1,109,000 tons above referred to. The quantity produced in 1924 was thus greater than in 1907 and 1912 by about 59 per cent. and 36 per cent. respectively. It has already been observed that in modern practice larger quantities of scrap are used than was common before the war.

The scrap produced and used in steel furnaces in 1924 is reported by the National Federation to have been 2,100,000 tons, about the same quantity being purchased.

*Exports and imports.*—The overseas trade in scrap and old rails has been as follows:—

	<i>Exports.</i>		<i>Net imports.</i>	
	Th. tons	Th. tons	Th. tons	Th. tons
1924	88.4	452.1	127.0	61.4
1912	127.0	61.4	175.3	30.0
1907	175.3	30.0		

#### *Value of output free from duplication.*

The gross output of the Iron and Steel (Smelting, Rolling and Founding) Trades in 1924 was returned as £153,183,000, of which a considerable proportion represents goods which, from the point of view of these trades, may be regarded as finished products, although, for the most part, they served as materials for other trades. Amongst these products are included special steels; tinplate bars; angles, shapes and sections; girders, joists and pillars; hoops and strips; wire rods; armour plates and other plates over  $\frac{1}{4}$  in. thick; galvanized sheets; etc. The total value of these goods and of the finished manufactures and other products returned on schedules for the Iron and Steel (Smelting, Rolling and Founding) Trades amounted to £103,737,000, and this aggregate expresses a sum in which no important element of duplication is believed to arise.

The figure of £153,183,000 contains, however, an important class of products which are used for further manufacture in the heavy Iron and Steel Trades themselves, and the extent of the duplication arising from inter-sales of such goods within these trades cannot be determined within narrow limits. The principal products included in this class are iron and steel blooms, billets and slabs; sheet bars; black sheets; and iron bars; of a total value of £35,383,000. Calculations made in the Census office as the result of investigation of the

individual returns and other sources of information indicate that a sum of between £19,700,000 and £21,000,000 represents the possible value of these "semi-finished" goods which is duplicated in the gross figure of £35,383,000 shown above.

Some allowance is also necessary on account of iron and steel scrap sold to other iron and steel firms for re-melting. Finally, the sum of £612,000 recorded as paid for work given out expresses the maximum limit of the duplication involved in the amount received for work done for the trade.

The total amount of duplication in the gross output value of £153,183,000 may thus be tentatively estimated as lying between £22 millions and £24 millions, and the value, free from duplication, of the output of the Iron and Steel (Smelting, Rolling and Founding) Trades in 1924 as between £129 millions and £131 millions. For reasons previously given, the corresponding figure calculated in respect of the Census of 1907 is not comparable with this estimate for 1924.

#### *Cost of materials and work given out.*

The cost of the materials used by firms that made their returns on schedules for the Iron and Steel (Smelting, Rolling and Founding) Trades was returned as £107,005,000 in 1924, a sum which, by the exclusion of purchases of products of other firms in the same trade, is reduced to a figure lying between £83,500,000 and £85,500,000. No corresponding figure for 1907 is available.

The amount paid to other firms for work given out to them was returned as £612,000 in 1924, £422,000 in 1912 and £459,000 in 1907.

#### *Net output.*

The net output in 1924 of the firms that made their returns on schedules for the Iron and Steel (Smelting, Rolling and Founding) Trades (whose gross output was valued at £153,183,000) was £45,566,000. That sum represents, without duplication, the total amount by which the value of the aggregate output exceeded the cost of the materials used and the amount paid to other firms for work given out to them, and is inclusive of any cost for transport effected by the staff and with the equipment of the producing firms themselves.

The net output per person employed in the censal year 1924 was £201; no corresponding figure for 1907 is available.

#### *Kinds and quantities of materials used.*

Basing their calculations on returns received from firms producing about 81 per cent. of the output of steel, the National Federation of Iron and Steel Manufacturers, in their statistics for 1924, estimated

that the materials, other than fuel, required for the production of 8,201,200 tons of steel were as follows:—

	Tons
Pig iron .. .. .	4,481,800
Scrap .. .. .	4,194,400
Ferro-manganese .. .. .	137,500
Ore and other materials .. .. .	854,200

It was thus estimated that, in the aggregate, 46·4 per cent. of pig iron and 43·4 per cent. of scrap was used; of the pig iron nearly 62 per cent. was made by the steel firms, the remainder being bought. The scrap bought was practically equal in quantity to that produced.

#### **Wages in 1924.**

Under the Census of Production Act, 1906, the powers of the Board of Trade to require information do not extend to particulars of the amount of wages paid, and, consequently, no information on this head was secured in connexion with the Census of 1924. As a result, however, of the voluntary enquiry undertaken by the Ministry of Labour into wages and hours in the United Kingdom in 1924, information was obtained as to the total wage-bill of a group of firms in the Iron and Steel (Smelting, Rolling and Founding) Trades that made returns both to the Ministry of Labour and to the Census of Production office. According to the Census records, this group of firms employed, in the week ended 18th October, 1924, 100,992 operatives, or nearly 50 per cent. of the total of 203,970 operatives for the trades as a whole, and their net output totalled £23,287,000, or 51 per cent. of the aggregate of £45,566,000 for the trades as a whole. The total wage-bill of these firms, as returned to the Ministry of Labour, was £15,920,000, representing about 68 per cent. of their aggregate net output.

The average annual amount of wages calculated on the average number employed in the censal year (103,614), was £154. The total of operatives covered by the average includes a number employed at foundries, the exclusion of which would raise the average to about £157. The output of steel ingots and castings at the works for which these particulars of wages were supplied amounted to 6,113,500 tons, or 76·4 per cent. of the total returned for the trade. The National Federation of Iron and Steel Manufacturers secured particulars of the wages paid by firms owning steel works at which an average of 117,052 persons were employed and which produced 92·5 per cent. of the total production of steel ingots and castings in 1924, the average of wages per operative being £158. The particulars in this case excluded galvanized sheet workers. The numbers reported as employed in four specified weeks by firms responsible for 87·4 per cent. of the total production of steel ingots and castings amounted to only 48·7 per cent. of the total number of operatives in these trades reported to the Census office for the four nearest weeks for which particulars were supplied. The average wage as shown by the Federation for those four weeks was £3·13 per week per person.

THE IRON AND STEEL TRADES (BLAST FURNACES, SMELTING WORKS,  
ROLLING MILLS, ETC.).

**Employment.\***

The detailed information relating to employment in 1924 is summarised, for blast furnaces, in Table III on page 57 and, for smelting works, etc., in Table III on pages 64 and 65. The following table sets out certain particulars for both these trades for that year together with those relating to the two previous censal years. For the purpose of this comparison, the average numbers of operatives of each sex returned for 1924 have been divided between the two age-groups in the proportions shown by the data relating to the week ended 18th October.

Average number.	Males.		Females.		Males and females.	
	Under 18.	All ages.	Under 18.	All ages.	Under 18.	All ages.
	<b>1924.</b>					
Operatives .. ..	19,943	229,206	800	3,100	20,743	232,306
Administrative, etc. ..	1,646	17,931	335	3,049	1,981	20,980
<b>TOTAL .. ..</b>	<b>21,589</b>	<b>247,137</b>	<b>1,135</b>	<b>6,149</b>	<b>22,724</b>	<b>253,286</b>
<b>1912.</b>						
Wage earners .. ..	21,918	244,023	792	2,802	22,710	246,825
Salaried .. ..	1,756	13,717	84	513	1,840	14,230
<b>TOTAL .. ..</b>	<b>23,674</b>	<b>257,740</b>	<b>876</b>	<b>3,315</b>	<b>24,550</b>	<b>261,055</b>
<b>1907.</b>						
Wage earners .. ..	21,999	244,599	793	2,805	22,792	247,404
Salaried .. ..	1,759	13,748	85	514	1,844	14,262
<b>TOTAL .. ..</b>	<b>23,758</b>	<b>258,347</b>	<b>878</b>	<b>3,319</b>	<b>24,636</b>	<b>261,666</b>

The numbers of operatives recorded month by month in 1924 ranged from 5,760 above the average, in February, to 10,324 below the average, in September (see Table IIIB, p. 57).

**Mechanical power.\***

The detailed information relating to mechanical power in 1924 is summarised, for blast furnaces, in Table IV on page 58 and, for smelting works, etc., in Table IV on page 66. The following table sets out the particulars for both these trades for the three censal years relating to the capacity and kinds of *prime movers* and the capacity of *electric generators* installed.

\* See Introductory paragraphs, pages 26 and 27.

Power equipment.	1924.			1912.	1907.
	Ordinarily in use.	In reserve or idle.	Total.	Total.	Total.
	H.P.	H.P.	H.P.	H.P.	H.P.
<b>PRIME MOVERS :—</b>					
Reciprocating steam engines .. ..	1,056,229	267,066	1,323,295	1,235,489	1,281,384
Steam turbines .. ..	227,658	100,103	327,761	87,699	33,212
Gas engines .. ..	65,168	22,228	87,396	87,444	
Petrol and light oil engines .. ..	671	128	799	659	53,689
Heavy oil engines .. ..	1,191	374	1,565		
Water power .. ..	491	30	521	1,909	2,280
Other .. ..	986	115	1,101	—	13,021
<b>TOTAL .. ..</b>	<b>1,352,394</b>	<b>390,044</b>	<b>1,742,438</b>	<b>1,413,200</b>	<b>1,383,586</b>
<b>ELECTRIC GENERATORS :—</b>	Kw.	Kw.	Kw.	Kw.	Kw.
Driven by—					
Reciprocating steam engines .. ..	29,919	25,947	55,866	67,972	68,061
Steam turbines .. ..	112,933	48,545	161,478	48,189	10,481
Gas engines .. ..	30,476	11,313	41,789	29,278	15,511
Petrol and light oil engines .. ..	101	61	162		
Heavy oil engines .. ..	638	242	880		
Water power .. ..	210	—	210		
Other prime movers .. ..	—	—	—		
<b>TOTAL .. ..</b>	<b>174,277</b>	<b>86,108</b>	<b>260,385</b>	<b>145,439</b>	<b>94,053</b>

The capacity of *electric motors* recorded in 1924 and in 1912 was as shown below :—

Electric motors.	1924.			1912.
	Ordinarily in use.	In reserve or idle.	Total.	Total.
	H.P.	H.P.	H.P.	H.P.
<b>Driven by—</b>				
Electricity generated in own works .. ..	450,083	106,435	556,518	248,840
Purchased electricity .. ..	418,030	65,211	483,241	68,116

Corresponding information was not required for 1907. The total number of Board of Trade units of electricity purchased for power and lighting purposes in that year was returned as 18,018,000.



## TABLES.

## THE IRON AND STEEL (BLAST FURNACES) TRADE.

## I.—Summary of results.

Note.—No production was recorded in Northern Ireland.

Particulars.	Unit.	England and Wales.	Scotland.	Great Britain.
Value of goods made (Gross output) ..	£'000	33,224	3,348	36,572
Cost of materials used .. .. .	"	28,239	3,076	31,315
Net output .. .. .	"	4,985	272	5,257
Average number of persons employed..	No.	24,435	2,535	26,970
Net output per person employed ..	£	204	107	195
Mechanical power available :—*				
Prime movers .. .. .	H.P.	218,106	30,012	248,118
Electric motors driven by purchased electricity .. .. .	"	23,336	1,733	25,069

\* See the Note at the top of Table IV on page 58.

## II.—Production.

Goods sold or added to stock.	Unit.	England and Wales.	Scotland.	Great Britain.
Quantity and selling value.				
Pig iron :—				
Forge and foundry .. .. .	Th. tons	1,977.4	440.1	2,417.5
Basic .. .. .	£'000	8,909	2,070	10,979
Acid (hematite) .. .. .	Th. tons	*	*	2,651.5
Spiegeleisen, ferro-manganese and other ferro-alloys .. .. .	£'000	*	*	11,810
Iron castings in the rough .. .. .	Th. tons	1,892.2	197.9	2,090.1
Cinder, slag, etc. (not ground) .. .. .	£'000	8,855	915	9,770
Crushed slag and cement .. .. .	Th. tons	200.7	—	200.7
Tarred macadam .. .. .	£'000	2,566	—	2,566
Electricity sold .. .. .	Th. tons	3.3	0.1	3.4
Gas sold .. .. .	£'000	19	1	20
Waste and by-products .. .. .	£'000	*	*	259
TOTAL VALUE OF GOODS MADE (GROSS OUTPUT) .. .. .	Th. tons	*	*	743.4
	£'000	*	*	300
	Th. tons	369.5	—	369.5
	£'000	336	—	336
	Th. B.T.	*	*	96,145.3
	£'000	*	*	300
	£'000	151	65	216
	"	16	—	16
TOTAL VALUE OF GOODS MADE (GROSS OUTPUT) .. .. .	£'000	33,224	3,348	36,572

\* In order to avoid the possible disclosure of information relating to individual firms, figures are given only for Great Britain as a whole.

## III.—Employment.

## A.—NUMBERS EMPLOYED IN WEEK ENDED 18TH OCTOBER, 1924.

Kind of staff.	Males.		Females.		Males and females.	
	Under 18.	All ages.	Under 18.	All ages.	Under 18.	All ages.
<i>England and Wales :—</i>						
Operatives .. .. .	387	21,944	4	52	391	21,996
Administrative, etc.* ..	97	1,300	9	128	106	1,428
TOTAL .. .. .	484	23,244	13	180	497	23,424
<i>Scotland :—</i>						
Operatives .. .. .	86	2,122	4	32	90	2,154
Administrative, etc.* ..	21	187	2	30	23	217
TOTAL .. .. .	107	2,309	6	62	113	2,371
<i>Great Britain :—</i>						
Operatives .. .. .	473	24,066	8	84	481	24,150
Administrative, etc.* ..	118	1,487	11	158	129	1,645
TOTAL .. .. .	591	25,553	19	242	610	25,795

\* Administrative, technical and clerical staff.

## B.—OPERATIVES EMPLOYED IN ONE WEEK IN EACH MONTH OF 1924.

*England and Wales. (Annual average : Males, 22,949 ; Females, 58 ; Total, 23,007.)*

Week ended.	Males.	Females.	Total.	Week ended.	Males.	Females.	Total.
Jan. 12th ..	24,195	61	24,256	July 19th ..	22,845	59	22,904
Feb. 16th ..	23,757	60	23,817	Aug. 16th ..	22,913	58	22,971
Mar. 15th ..	23,900	60	23,960	Sept. 13th ..	22,326	56	22,382
Apr. 12th ..	23,360	60	23,420	Oct. 18th ..	21,944	52	21,996
May 17th ..	23,234	60	23,294	Nov. 15th ..	21,886	52	21,938
June 21st ..	23,058	58	23,116	Dec. 13th ..	21,962	53	22,015

*Scotland. (Annual average : Males, 2,284 ; Females, 34 ; Total, 2,318.)*

Week ended.	Males.	Females.	Total.	Week ended.	Males.	Females.	Total.
Jan. 12th ..	2,729	31	2,760	July 19th ..	2,187	38	2,225
Feb. 16th ..	2,733	32	2,765	Aug. 16th ..	2,056	39	2,095
Mar. 15th ..	2,317	33	2,350	Sept. 13th ..	1,995	35	2,030
Apr. 12th ..	2,330	33	2,363	Oct. 18th ..	2,122	32	2,154
May 17th ..	2,347	34	2,381	Nov. 15th ..	2,137	34	2,171
June 21st ..	2,330	37	2,367	Dec. 13th ..	2,135	33	2,168

*Great Britain. (Annual average : Males, 25,233 ; Females, 92 ; Total, 25,325.)*

Week ended.	Males.	Females.	Total.	Week ended.	Males.	Females.	Total.
Jan. 12th ..	26,924	92	27,016	July 19th ..	25,032	97	25,129
Feb. 16th ..	26,490	92	26,582	Aug. 16th ..	24,969	97	25,066
Mar. 15th ..	26,217	93	26,310	Sept. 13th ..	24,321	91	24,412
Apr. 12th ..	25,690	93	25,783	Oct. 18th ..	24,066	84	24,150
May 17th ..	25,581	94	25,675	Nov. 15th ..	24,023	86	24,109
June 21st ..	25,388	95	25,483	Dec. 13th ..	24,097	86	24,183

## IV.—Mechanical power.

## PARTICULARS OF PRIME MOVERS, ELECTRIC GENERATORS AND ELECTRIC MOTORS.

Note.—For the reasons explained in the Introductory paragraphs to this report (pages 26 and 27) it was not usually possible, where steel works were operated in conjunction with blast furnaces, and, in some cases, by-product recovery plant, to state accurately what part of the total power equipment was required for the former and what part for the latter. The figures in this table must not, therefore, be regarded as expressing the mechanical power equipment applicable to blast furnaces alone.

Power equipment.	England and Wales.		Scotland.		Great Britain.	
	Ordinarily in use.	In reserve or idle.	Ordinarily in use.	In reserve or idle.	Ordinarily in use.	In reserve or idle.
	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.
<b>PRIME MOVERS :—</b>						
Reciprocating steam engines .. ..	54,827	45,179	8,457	5,189	63,284	50,368
Steam turbines .. ..	71,198	28,850	9,053	3,620	80,251	32,470
Gas engines .. ..	13,920	3,087	2,000	1,600	15,920	4,687
Petrol and light oil engines .. ..	25	12	—	—	25	12
Other .. ..	911	97	75	18	986	115
<b>TOTAL .. ..</b>	<b>140,881</b>	<b>77,225</b>	<b>19,585</b>	<b>10,427</b>	<b>160,466</b>	<b>87,652</b>
<b>TOTAL OF PRIME MOVERS INSTALLED .. ..</b>	<b>218,106</b>		<b>30,012</b>		<b>248,118</b>	
	Kw.	Kw.	Kw.	Kw.	Kw.	Kw.
<b>ELECTRIC GENERATORS :—</b>						
Driven by—						
Reciprocating steam engines .. ..	7,037	7,637	569	620	7,606	8,257
Steam turbines .. ..	17,308	5,020	1,750	450	19,058	5,470
Gas engines .. ..	6,510	1,050	—	—	6,510	1,050
<b>TOTAL .. ..</b>	<b>30,855</b>	<b>13,707</b>	<b>2,319</b>	<b>1,070</b>	<b>33,174</b>	<b>14,777</b>
<b>TOTAL OF ELECTRIC GENERATORS INSTALLED .. ..</b>	<b>44,562</b>		<b>3,389</b>		<b>47,951</b>	
	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.
<b>ELECTRIC MOTORS :—</b>						
Driven by—						
Electricity generated in own works ..	68,213	13,131	2,256	925	70,469	14,056
Purchased electricity ..	7,761	15,575	1,733	—	9,494	15,575

## THE IRON AND STEEL (SMELTING, ROLLING AND FOUNDING) TRADES.

## I.—Summary of results.

Particulars.	Unit.	England and Wales.	Scotland.	Great Britain.	Northern Ireland.
Value of goods made and work done (Gross output) ..	£'000	132,406	20,680	153,086	97
Cost of materials used ..	"	92,441	14,499	106,940	65
Paid for work given out to other firms .. ..	"	589	23	612	*
Net output .. ..	"	39,376	6,158	45,534	32
Average number of persons employed .. ..	No.	192,851	33,374	226,225	91
Net output per person employed .. ..	£	204	185	201	352
Mechanical power available :—					
Prime movers .. ..	H.P.	1,203,522†	290,798	1,494,320†	†
Electric motors driven by purchased electricity ..	"	367,843†	90,329	458,172†	†

\* Less than £500.

† In order to avoid the possible disclosure of information relating to individual firms, the particulars for Northern Ireland have been combined with those for England and Wales and for Great Britain.

## II.—Production.

## A.—TOTAL MAKE OF IRON AND STEEL PRODUCTS IN 1924 (AS RETURNED ON SCHEDULES FOR THE IRON AND STEEL (SMELTING, ETC.) TRADES).

Kind of goods.	England and Wales and N. Ireland.†	Scotland.	United Kingdom.
	Th. tons	Th. tons	Th. tons
Iron and steel blooms, billets and slabs, other than of special steel .. .. .	3,324.6	962.7	4,287.3
Steel :—			
Ingots, other than of special steel .. .. .	6,515.2	1,200.5	7,715.7
Special steels .. .. .	144.5	27.7	172.2
Bars, rods, angles, shapes and sections, other than of special steel :—			
Sheet bars .. .. .	*	*	921.0
Tinplate bars .. .. .	1,222.9	—	1,222.9
Wire rods .. .. .	166.0	—	166.0
Other .. .. .	1,104.4	246.0	1,350.4
TOTAL—Steel bars, rods, angles, shapes and sections .. .. .	*	*	3,660.3
Castings in the rough .. .. .	94.8	19.3	114.1
Forgings in the rough .. .. .	52.1	1.3	53.4
Girders, beams, joists and pillars .. .. .	*	*	416.8
Iron :—			
Bars, rods, angles, shapes and sections .. .. .	311.7	52.4	364.1
Castings in the rough .. .. .	445.9†	98.5	544.4†
Forgings in the rough .. .. .	1.0	0.1	1.1
Hoops, baling and barrel .. .. .	*	*	100.9
Hoops and strips for tubes .. .. .	238.8	105.6	344.4
Plates and sheets, not galvanized or tinned, etc. :—			
Iron .. .. .	*	*	10.3
Steel :—			
Not under ½ in. thick { Armour plates .. .. .	*	*	7.5
Other .. .. .	700.3	415.7	1,116.0
Black sheets under ½ in. thick .. .. .	843.9	96.1	940.0
Black plates (including Canada plates)‡ .. .. .	*	*	37.4
TOTAL—Plates and sheets, not galvanized or tinned, etc. .. .. .	1,588.0	523.2	2,111.2
Galvanized sheets :—			
Flat .. .. .	*	*	147.9
Corrugated .. .. .	*	*	549.1

\* In order to avoid the possible disclosure of information relating to individual firms, figures are given only for the United Kingdom as a whole.

† In order to avoid the possible disclosure of information relating to individual firms, the small output of Northern Ireland has been included with that of England and Wales.

‡ See also page 68, Total make of black plates.

## B.—OUTPUT SOLD OR ADDED TO STOCK AND WORK DONE.

Kind of goods made and work done.	Unit.	England and Wales and N. Ireland.†	Scotland.	United Kingdom.
		Quantity and selling value.		
Iron and steel :—				
Blooms, billets and slabs, other than of special steel .. .. .	Th. tons £'000	927.4 7,886	129.7 1,164	1,057.1 9,050
Steel :—				
Ingots, other than of special steel .. .. .	Th. tons £'000	325.0 2,148	5.2 37	330.2 2,185
Special steels .. .. .	Th. tons £'000	* *	* *	80.8 2,880
Bars, rods, angles, shapes and sections, other than of special steel :—				
Sheet bars .. .. .	Th. tons £'000	* *	* *	665.1 5,126
Tinplate bars .. .. .	Th. tons £'000	1,222.8 9,968	— —	1,222.8 9,968
Wire rods .. .. .	Th. tons £'000	160.4 2,023	— —	160.4 2,023
Other .. .. .	Th. tons £'000	1,063.2 11,863	242.9 2,435	1,306.1 14,298
TOTAL—Steel bars, rods, angles, shapes and sections .. .. .	Th. tons £'000	* *	* *	3,354.4 31,415
Castings in the rough .. .. .	Th. tons £'000	84.1 3,529	18.5 718	102.6 4,247
Forgings in the rough .. .. .	Th. tons £'000	44.6 1,834	1.2 38	45.8 1,872
Girders, beams, joists and pillars .. .. .	Th. tons £'000	* *	* *	380.6 3,489
Iron :—				
Bars, rods, angles, shapes and sections .. .. .	Th. tons £'000	299.9 3,833	52.4 650	352.3 4,483
Castings in the rough .. .. .	Th. tons £'000	400.0† 7,432†	97.6 1,392	497.6† 8,824†
Forgings in the rough .. .. .	Th. tons £'000	* *	* *	0.9 35
Hoops, baling and barrel .. .. .	Th. tons £'000	* *	* *	100.8 1,281
Hoops and strips for tubes .. .. .	Th. tons £'000	238.2 3,126	105.6 1,263	343.8 4,389
Plates and sheets, not galvanized or tinned, etc. :—				
Iron .. .. .	Th. tons £'000	* *	* *	10.3 183
Steel :—				
Not under ½ in. thick { Armour plates .. .. .	Th. tons £'000	* *	* *	6.2 791
Other .. .. .	Th. tons £'000	700.2 6,893	387.3 4,505	1,087.5 11,398
Black sheets under ½ in. thick .. .. .	Th. tons £'000	537.5 8,289	96.1 1,221	633.6 9,510
Black plates (including Canada plates) .. .. .	Th. tons £'000	* *	* *	36.2 378
TOTAL—Plates and sheets, not galvanized or tinned, etc. .. .. .	Th. tons £'000	1,279.0 16,078	494.8 6,182	1,773.8 22,260

\*† See notes on p. 63.

B.—OUTPUT SOLD OR ADDED TO STOCK AND WORK DONE—*contd.*

Kind of goods made and work done.	Unit.	England and Wales and N. Ireland.†	Scotland.	United Kingdom.
Galvanized sheets :—		Quantity and selling value.		
Flat .. .. .	<i>Th. tons</i>	*	*	147.7
	£'000	*	*	3,068
Corrugated .. .. .	<i>Th. tons</i>	*	*	548.6
	£'000	*	*	10,614
Tubes, pipes and fittings :—				
Cast :—				
Gas and water (including radiators)	<i>Th. tons</i>	110.1	15.6	125.7
	£'000	1,110	172	1,282
Up to 6 in. diameter { Other pipes .. .. .	<i>Th. tons</i>	*	*	23.7
	£'000	*	*	329
Fittings .. .. .	<i>Th. tons</i>	8.0	1.9	9.9
	£'000	143	38	181
Over 6 in. diameter { Pipes .. .. .	<i>Th. tons</i>	*	*	243.8
	£'000	*	*	2,378
Fittings .. .. .	<i>Th. tons</i>	*	*	10.5
	£'000	*	*	170
TOTAL—Cast tubes, pipes and fittings .. .. .	<i>Th. tons</i>	374.4	39.2	413.6
	£'000	3,874	466	4,340
Wrought tubes :—				
Weldless .. .. .	<i>Th. tons</i>	4.3	—	4.3
	£'000	114	—	114
Welded .. .. .	<i>Th. tons</i>	5.3	—	5.3
	£'000	145	—	145
Fittings for wrought tubes .. .. .	<i>Th. tons</i>	1.8	—	1.8
	£'000	96	—	96
TOTAL—Wrought tubes and fittings .. .. .	<i>Th. tons</i>	11.4	—	11.4
	£'000	355	—	355
Railway and tramway material :—				
Steel rails, new :—				
Grooved for trams .. .. .	<i>Th. tons</i>	70.3	—	70.3
	£'000	666	—	666
Railway (including conductor rails for electric traction) .. .. .	<i>Th. tons</i>	482.6	54.5	537.1
	£'000	4,145	472	4,617
Sleepers and fishplates .. .. .	<i>Th. tons</i>	*	*	88.2
	£'000	*	*	944
Tyres and axles .. .. .	<i>Th. tons</i>	*	*	119.5
	£'000	*	*	2,840
Railway wheels and axles, complete .. .. .	<i>Th. sets</i>	*	*	32.1
	<i>Th. tons</i>	*	*	47.5
	£'000	*	*	1,218
Railway material, not elsewhere specified .. .. .	<i>Th. tons</i>	156.2	3.8	160.0
	£'000	2,311	34	2,345
TOTAL—Railway, etc., material .. .. .	<i>Th. tons</i>	935.7	87.0	1,022.6
	£'000	11,658	972	12,630
Other axles, not for railway or tramway vehicles :—				
For motor cars .. .. .	£'000	*	*	149
For other road vehicles .. .. .	<i>Th. tons</i>	1.4	—	1.4
	£'000	96	—	96
Springs :—				
Laminated .. .. .	<i>Th. tons</i>	23.4	—	23.4
	£'000	906	—	906
Coil .. .. .	<i>Th. tons</i>	5.5	—	5.5
	£'000	241	—	241

\*† See notes on p. 63.

B.—OUTPUT SOLD OR ADDED TO STOCK AND WORK DONE—*contd.*

Kind of goods made and work done.	Unit.	England and Wales and N. Ireland.†	Scotland.	United Kingdom.
		Quantity and selling value.		
Ferro-tungsten and other ferro-alloys .. .. .	<i>Th. tons</i>	0.4	—	0.4
	£'000	53	—	53
Drop forgings, stampings and other parts for the Motor and Engineering Trades .. .. .	£'000	*	*	831
Vehicles and parts (including colliery tubs) .. .. .	"	149	—	149
Nails (not of wire), rivets and washers .. .. .	<i>Th. tons</i>	*	*	12.6
	£'000	*	*	205
Tools and implements .. .. .	£'000	124	—	124
Electrical apparatus and parts (including magnets) .. .. .	"	133	—	133
Galvanized tanks and hollow-ware .. .. .	"	*	*	358
Fences, hurdles and gates .. .. .	<i>Th. tons</i>	*	*	12.7
	£'000	*	*	331
Anchors and cables .. .. .	<i>Th. tons</i>	1.6	—	1.6
	£'000	43	—	43
Builders' ironwork .. .. .	£'000	57	—	57
Manufactures of iron and steel, unenumerated { <i>Weight stated</i> .. .. .	<i>Th. tons</i>	129.3	35.6	164.9
	£'000	2,596	659	3,255
{ <i>Weight not stated</i> .. .. .	£'000	1,674	62	1,736
Scrap iron and steel .. .. .	<i>Th. tons</i>	1,603.1†	335.2	1,938.3†
	£'000	5,793†	1,421	7,214†
Manufactures of non-ferrous metals { <i>Weight stated</i> .. .. .	<i>Th. tons</i>	0.8	0.2	1.0
	£'000	90	30	120
{ <i>Weight not stated</i> .. .. .	£'000	99	1	100
Scrap of non-ferrous metals .. .. .	<i>Th. tons</i>	65.2†	3.8	69.0†
	£'000	1,385†	177	1,562†
Leaded lights .. .. .	£'000	20	—	20
Basic slag for use as fertiliser .. .. .	<i>Th. tons</i>	*	*	201.6
	£'000	*	*	277
Cinder and slag (ground and unground) .. .. .	£'000	323	59	382
Dross and other galvanizers' waste .. .. .	"	156	24	180
Electricity sold .. .. .	<i>Th. B.T. units</i>	17,580.9	—	17,580.9
	£'000	62	—	62
Other goods made .. .. .	£'000	276	57	333
TOTAL VALUE OF GOODS MADE .. .. .	£'000	127,010	19,324	146,334
		Amount received.		
Iron and steel structural work .. .. .	£'000	4,233	1,223	5,456
Work done "on hire" (tilting, rolling, etc.) .. .. .	"	977	2	979
Galvanizing for the trade .. .. .	"	*	*	230
General and jobbing engineering, including repairs .. .. .	"	*	*	184
TOTAL VALUE OF WORK DONE .. .. .	£'000	5,493	1,356	6,849
TOTAL VALUE OF GOODS MADE AND WORK DONE (GROSS OUTPUT) .. .. .	£'000	132,503	20,680	153,183

\* In order to avoid the possible disclosure of information relating to individual firms, figures are given only for the United Kingdom as a whole.

† The small output of Northern Ireland has, for convenience, been included with that for England and Wales, the items affected being also marked thus (†). The total value of such output was £97,000, of which £73,000 was in respect of 27,800 tons of scrap iron and steel; the two remaining items cannot be stated separately without disclosing information relating to individual firms.

## III.—Employment.

## A.—NUMBERS EMPLOYED IN WEEK ENDED 18TH OCTOBER, 1924.

Kind of staff.	Males.		Females.		Males and females.	
	Under 18.	All ages.	Under 18.	All ages.	Under 18.	All ages.
<i>England and Wales</i> :—						
Operatives .. .. .	16,387	170,527	791	2,966	17,178	173,493
Administrative, etc.* ..	1,294	14,074	285	2,382	1,579	16,456
TOTAL .. .. .	17,681	184,601	1,076	5,348	18,757	189,949
<i>Scotland</i> :—						
Operatives .. .. .	2,753	30,254	23	129	2,776	30,383
Administrative, etc.* ..	233	2,358	39	509	272	2,867
TOTAL .. .. .	2,986	32,612	62	638	3,048	33,250
<i>Great Britain</i> :—						
Operatives .. .. .	19,140	200,781	814	3,095	19,954	203,876
Administrative, etc.* ..	1,527	16,432	324	2,891	1,851	19,323
TOTAL .. .. .	20,667	217,213	1,138	5,986	21,805	222,199
<i>Northern Ireland</i> :—						
Operatives .. .. .	11	94	—	—	11	94
Administrative, etc.* ..	1	12	—	—	1	12
TOTAL .. .. .	12	106	—	—	12	106
<i>United Kingdom</i> :—						
TOTAL .. .. .	20,679	217,319	1,138	5,986	21,817	222,305

\* Administrative, technical and clerical staff.

## B.—OPERATIVES EMPLOYED IN ONE WEEK IN EACH MONTH OF 1924.

*England & Wales.* (Annual average : Males, 173,510 ; Females, 2,885 ; Total, 176,395.)

Week ended.	Males.	Females.	Total.	Week ended.	Males.	Females.	Total.
Jan. 12th ..	175,437	2,772	178,209	July 19th ..	173,737	2,955	176,692
Feb. 16th ..	177,224	2,821	180,045	Aug. 16th ..	172,199	2,919	175,118
Mar. 15th ..	176,355	2,817	179,172	Sept. 13th ..	165,099	2,631	167,730
April 12th ..	176,343	2,872	179,215	Oct. 18th ..	170,527	2,966	173,493
May 17th ..	176,671	2,890	179,561	Nov. 15th ..	171,188	3,018	174,206
June 21st ..	175,137	2,906	178,043	Dec. 13th ..	172,204	3,051	175,255

*Scotland.* (Annual average : Males, 30,384 ; Females, 123 ; Total, 30,507.)

Jan. 12th ..	29,410	117	29,527	July 19th ..	29,949	125	30,074
Feb. 16th ..	31,258	120	31,378	Aug. 16th ..	30,426	115	30,541
Mar. 15th ..	30,895	119	31,014	Sept. 13th ..	29,603	116	29,719
April 12th ..	30,949	121	31,070	Oct. 18th ..	30,254	129	30,383
May 17th ..	31,073	124	31,197	Nov. 15th ..	30,428	130	30,558
June 21st ..	30,791	127	30,918	Dec. 13th ..	29,576	128	29,704

*Great Britain.* (Annual average : Males, 203,894 ; Females, 3,008 ; Total, 206,902.)

Jan. 12th ..	204,847	2,889	207,736	July 19th ..	203,686	3,080	206,766
Feb. 16th ..	208,482	2,941	211,423	Aug. 16th ..	202,625	3,034	205,659
Mar. 15th ..	207,250	2,936	210,186	Sept. 13th ..	194,702	2,747	197,449
April 12th ..	207,292	2,993	210,285	Oct. 18th ..	200,781	3,095	203,876
May 17th ..	207,744	3,014	210,758	Nov. 15th ..	201,616	3,148	204,764
June 21st ..	205,928	3,033	208,961	Dec. 13th ..	201,780	3,179	204,959

*Northern Ireland.* (Annual average : Males, 79 ; Females, — ; Total, 79.)

Jan. 12th ..	63	—	63	July 19th ..	115	—	115
Feb. 16th ..	61	—	61	Aug. 16th ..	115	—	115
Mar. 15th ..	56	—	56	Sept. 13th ..	121	—	121
April 12th ..	52	—	52	Oct. 18th ..	94	—	94
May 17th ..	52	—	52	Nov. 15th ..	87	—	87
June 21st ..	54	—	54	Dec. 13th ..	79	—	79

## IV.—Mechanical Power.

## PARTICULARS OF PRIME MOVERS, ELECTRIC GENERATORS AND ELECTRIC MOTORS.

*Note.*—For the reasons explained in the Introductory paragraphs to this report (pages 26 and 27) it was not usually possible, where steel works were operated in conjunction with blast furnaces and, in some cases, by-product recovery plant, to state accurately what part of the total power equipment was required for the former and what part for the latter. The figures in this table must not, therefore, be regarded as expressing the mechanical power equipment applicable to steel works alone.

Power equipment.	England and Wales and Northern Ireland.†		Scotland.		United Kingdom.	
	Ordinarily in use.	In reserve or idle.	Ordinarily in use.	In reserve or idle.	Ordinarily in use.	In reserve or idle.
<b>PRIME MOVERS :—</b>	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.
Reciprocating steam engines .. ..	808,319	154,676	184,626	62,022	992,945	216,698
Steam turbines .. ..	121,632	54,997	25,775	12,636	147,407	67,633
Gas engines .. ..	†48,116	13,524	1,132	4,017	†49,248	17,541
Petrol and light oil engines .. ..	536	26	110	90	646	116
Heavy oil engines .. ..	1,081	374	110	—	1,191	374
Water power .. ..	211	30	280	—	491	30
<b>TOTAL .. ..</b>	<b>979,895</b>	<b>223,627</b>	<b>212,033</b>	<b>78,765</b>	<b>1,191,928</b>	<b>302,392</b>
<b>TOTAL OF PRIME MOVERS INSTALLED</b>	<b>1,203,522</b>		<b>290,798</b>		<b>1,494,320</b>	
<b>ELECTRIC GENERATORS :—</b>	Kw.	Kw.	Kw.	Kw.	Kw.	Kw.
<b>Driven by—</b>						
Reciprocating steam engines .. ..	20,259	16,177	2,054	1,513	22,313	17,690
Steam turbines .. ..	74,375	35,075	19,500	8,000	93,875	43,075
Gas engines .. ..	†23,767	7,268	199	2,995	†23,966	10,263
Petrol and light oil engines .. ..	60	11	41	50	101	61
Heavy oil engines .. ..	592	242	46	—	638	242
Water power .. ..	10	—	200	—	210	—
<b>TOTAL .. ..</b>	<b>119,063</b>	<b>58,773</b>	<b>22,040</b>	<b>12,558</b>	<b>141,103</b>	<b>71,331</b>
<b>TOTAL OF ELECTRIC GENERATORS INSTALLED .. ..</b>	<b>177,836</b>		<b>34,598</b>		<b>212,434</b>	
<b>ELECTRIC MOTORS :—</b>	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.
<b>Driven by—</b>						
Electricity generated in own works .. ..	322,861	77,934	56,753	14,445	379,614	92,379
Purchased electricity .. ..	†337,259	30,584	71,277	19,052	†408,536	49,636

† See footnote to Table I: the items affected by the inclusion of Northern Ireland are also marked (†).