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 THE COKE AND BY-PRODUCTS TRADE.
 

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### Introductory.\*

The tables on pages 61 to 64 are based on returns received from firms in Great Britain whose business in 1924 consisted wholly or mainly in the manufacture of foundry coke and the distillation of by-products both at collieries and blast furnaces. The number of such separate returns was 172. No production was recorded for Northern Ireland.

*Summary of results.*—The following table shows the main results of the Census of 1924. No comparison can be made with the Censuses of 1912 or 1907, because in those years by-product recovery plants at blast furnaces were treated as part of the blast furnace equipment and the particulars relating to them were incorporated with the similar particulars relating to the rest of the plant.†

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\* See also the Notes on pp. vii to xv.

† See page 26 of the report on the Iron and Steel Trades.

Particulars.	Unit.	1924.
Value of products (Gross output) .. .. .	£'000	24,539
Cost of materials used .. .. .	"	19,481
Net output .. .. .	"	5,058
Average number of persons employed .. .. .	No.	18,739
Net output per person employed .. .. .	£	270
Mechanical power available:—		
Prime movers .. .. .	H.P.	64,004
Electric motors driven by purchased electricity .. .. .	"	32,190

### Production.

Detailed information relating to the output of the Coke and By-products Trade will be found in Table II on page 62.

The distillation of coal is also carried on at gas works, and is dealt with in the report on Gas Undertakings.\* Coal tar products produced by tar distillers are dealt with in the report on the Chemical Trades (see pages 28 to 32).

**Foundry coke.**—In 1907, separate returns were received from coke ovens at collieries but, as stated above, the production of coke and by-products at blast furnaces formed part of the general returns made by iron-masters, the coke made at their works being chiefly for their own use. Voluntary statements were obtained, however, of the total quantity of foundry coke made at blast furnaces, and it was estimated that the total quantity of foundry coke made at all coke ovens in 1907 was 12,322,000 tons, valued at about £10,304,000. In 1924 the total quantity of foundry coke made was returned as 12,841,000 tons, valued at £16,917,000, an increase of 4·2 per cent. in quantity and an increase of 57·5 per cent. in the average value per ton (from about 16s. 9d. to about 26s. 4d.). In 1912 the output was 11,325,000 tons, valued at £8,915,000, or 15s. 9d. per ton, the operations being affected by the dispute at the coal mines in the spring of 1912. Of the total output in 1924 about 9,200,000 tons were produced at coke ovens at collieries and 3,641,000 tons at coke ovens at blast furnaces; in 1907 the figures were 11,344,000 tons and 978,000 tons respectively. The firms that stated that, in 1924, they used 16,588,000 tons of coal and slack for coke-making and for heating ovens (see page 17), returned a production for sale of 11,150,000 tons of foundry coke.

**Tar.**—The total quantity of tar returned as made for sale at coke ovens in 1924 was 504,000 tons, valued at £1,440,000. Tar is also produced at gas works and smaller amounts, consisting chiefly of refined tar, were returned by other trades, the total quantity (including crude and refined tar) recorded on schedules for all trades as produced in 1924 being 1,390,000 tons and 41,238,800 gallons, valued at £4,672,000 and £1,038,000 respectively.

**Pitch.**—The total quantity of pitch recorded on schedules for the Coke and By-products Trade in 1924 was 158,000 tons, valued at

\* See separate volume containing the reports on Public Utility Services.

£437,000. The total output of pitch returned to the Census on schedules for all trades, chiefly by coke ovens, the chemical trades and gas works, was 603,000 tons, valued at £1,822,000.

**Coal tar products.**—The output for sale of coal tar products at coke ovens in 1924 is shown in the following statement; the total output of these commodities as returned on schedules for all trades is dealt with in the report on the Chemicals, Dyestuffs and Drugs Trades (see pages 29 to 32).

Coal tar products produced at coke ovens.	Unit.	Quantity and selling value.
Sulphate of ammonia (21·1 per cent. nitrogen) .. .. .	<i>Th. tons</i>	186
	£'000	2,276
Anthracene (40 per cent. anthracene paste) .. .. .	<i>Th. cwt.</i>	66
	£'000	22
Benzol (50 per cent. benzol) .. .. .	<i>Mill. galls.</i>	38·1
	£'000	1,830
Toluol (90 per cent. toluol) .. .. .	<i>Th. galls.</i>	320*
	£'000	25
Carbolic acid (60 per cent. acid) .. .. .	<i>Th. cwt.</i>	27
	£'000	20
Naphtha (crude) .. .. .	<i>Mill. galls.</i>	1·83
	£'000	88
Naphthalene (crude) .. .. .	<i>Th. cwt.</i>	192
	£'000	54
Tar oils, creosote oils, and other heavy coal tar oils .. .. .	<i>Mill. galls.</i>	17·8†
	£'000	526
Other tar distillation products .. .. .	£'000	173
<b>TOTAL VALUE—COAL TAR PRODUCTS</b> .. .. .	£'000	5,014

\* Equivalent to 1,450 tons.

† Equivalent to 86,800 tons.

In addition, 13,000 tons of ammoniacal liquor, valued at £15,000, were recorded by firms that made their returns on schedules for the Coke and By-products Trade in 1924.

Firms were requested to return their products in terms of the standards stated above, and the majority of them did so. Nevertheless an important number returned their output according to different standards and a further number did not state the strengths according to which their products were expressed. It follows, therefore, that the statements of quantity for the first five classes of products in the foregoing table cannot be taken as affording more than a rough approximation to the actual output in the standards specified.

The value of the tar, pitch and coal tar products enumerated above was equal to 10s. 9d. per ton of foundry coke produced in 1924, as against 2s. 0d. per ton of foundry coke produced at coke ovens at collieries and blast furnaces in 1907. The greater money yield of by-products per ton of coke is in part due to the rise in the price of by-products, but is mainly attributable to the very great decrease in the use of beehive coke ovens at which no by-products are produced, such ovens being common at collieries in 1907.

*Other products.*—In addition to the principal products, particulars of which are given in the preceding paragraphs, firms that made their returns on schedules for the Coke and By-products Trade recorded the following additional output for sale in 1924.

Kind of output.	Unit.	Quantity and selling value.
Waste heat sold .. .. .	£'000	53
Gas sold :—		
{ Quantity stated .. .. .	Mill. cub. ft.	11,765·3
{ Quantity not stated .. .. .	£'000	283
{ .. .. .	£'000	132
Electricity sold :—		
{ Quantity stated .. .. .	Mill. B.T. units	26·0
{ .. .. .	£'000	89
{ .. .. .	£'000	41
Breeze, ballast, etc. :—		
{ Quantity stated .. .. .	Th. tons	30
{ .. .. .	£'000	11
{ .. .. .	£'000	18
{ .. .. .	£'000	89
Other output .. .. .	£'000	89
<b>TOTAL VALUE .. .. .</b>	<b>£'000</b>	<b>716</b>

The total value of the output returned by firms operating coke works at collieries and blast furnaces in 1924 was £24,539,000, a sum which is probably free from duplication.

*Cost of materials.*—The cost of materials used by firms that made their returns on schedules for the Coke and By-products Trade was returned as £19,481,000 in 1924.

*Net output.*—The net output in 1924 of the firms that made their returns on schedules for the Coke and By-products Trade (whose gross output was valued at £24,539,000) was £5,058,000, that sum representing the total amount by which the value, as delivered, of the aggregate output exceeded the cost, as purchased, of the materials used.

The net output per head of persons employed in the censal year 1924 was £270.

*Exports and imports.*—In 1924 about 1,847,700 tons of foundry coke, or about 14·4 per cent. of the total quantity made in the year, were exported; retained imports were only 122 tons.

### 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 Coke and By-products 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, 4,970 operatives, or 29 per cent. of the total of 16,917 operatives for the trade as a whole, and their net output totalled £2,005,000, or 40 per cent. of the aggregate net output of £5,058,000 for the trade as a whole. The total wage-bill of these firms, as returned to the Ministry of Labour, was £867,000, representing about 43 per cent. of their aggregate net output.

### Employment.

The detailed information relating to employment in 1924 is summarised in Table III on page 63. The following table sets out certain particulars for that year. 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 .. .. .	444	17,618	3	25	447	17,643
Administrative, etc. ..	61	1,058	2	38	63	1,096
<b>TOTAL .. .. .</b>	<b>505</b>	<b>18,676</b>	<b>5</b>	<b>63</b>	<b>510</b>	<b>18,739</b>

The numbers of operatives recorded month by month in 1924 ranged from 872 above the average, in February, to 801 below the average, in November. Between these months the numbers fell off continuously (see Table IIIB, page 63). The average during the second half of the year was less by 1,097 than that for the first half year.

### Mechanical Power.

Where by-product recovery plants were operated in conjunction with blast furnaces and steel works, it was frequently found impracticable to state separately the proportion of the total power equipment that was assignable to each of the three undertakings. The figures in this table do not, therefore, necessarily represent the mechanical power equipment that was definitely applicable to coke ovens and by-product recovery plants.

The detailed information relating to mechanical power in 1924 is summarised in Table IV on page 64. The following table sets out the particulars for 1924 relating to the capacity and kinds of *prime movers* and the capacity of *electric generators* installed.

Power equipment.	Ordinarily in use.	In reserve or idle.	Total.
<b>PRIME MOVERS :—</b>	H.P.	H.P.	H.P.
Reciprocating steam engines .. .. .	25,819	8,665	34,484
Steam turbines .. .. .	10,546	4,679	15,225
Gas engines .. .. .	9,925	4,145	14,070
Petrol and light oil engines .. .. .	5	—	5
Heavy oil engines .. .. .	20	—	20
Other .. .. .	200	—	200
<b>TOTAL .. .. .</b>	<b>46,515</b>	<b>17,489</b>	<b>64,004</b>
<b>ELECTRIC GENERATORS :—</b>	Kw.	Kw.	Kw.
Driven by—			
Reciprocating steam engines .. .. .	4,628	3,953	8,581
Steam turbines .. .. .	5,660	4,050	9,710
Gas engines .. .. .	5,173	940	6,113
<b>TOTAL .. .. .</b>	<b>15,461</b>	<b>8,943</b>	<b>24,404</b>

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

Electric motors.	Ordinarily in use.	In reserve or idle.	Total.
<b>Driven by :—</b>	H.P.	H.P.	H.P.
Electricity generated in own works .. .. .	12,308	3,658	15,966
Purchased electricity .. .. .	26,074	6,116	32,190

## TABLES.

## I.—Summary of results.

*Note.—No production was recorded in Northern Ireland.*

Particulars.	Unit.	England and Wales.	Scotland.	Great Britain.
Value or products (Gross output) ..	£'000	23,299	1,240	24,539
Cost of materials used .. .. .	„	18,736	745	19,481
Net output .. .. .	„	4,563	495	5,058
Average number of persons employed	No.	17,834	905	18,739
Net output per person employed ..	£	256	547	270
Mechanical power available :—				
Prime movers .. .. .	H.P.	57,712	6,292	64,004
Electric motors driven by purchased electricity .. .. .	„	31,141	1,049	32,190

## II.—Production.

Output sold or added to stock.	Unit.	England and Wales.	Scotland.	Great Britain.
Coke, foundry .. .. .	<i>Th. tons</i>	12,374	467	12,841
	£'000	16,223	694	16,917
Tar .. .. .	<i>Th. tons</i>	492	12	504
	£'000	1,396	44	1,440
Pitch .. .. .	<i>Th. tons</i>	118	40	158
	£'000	335	102	437
Coal tar products :—				
Sulphate of ammonia (21·1 per cent. nitrogen) .. .. .	<i>Th. tons</i>	173	13	186
	£'000	2,112	164	2,276
Anthracene (40 per cent. anthracene paste) .. .. .	<i>Th. cwts.</i>	66	—	66
	£'000	22	—	22
Benzol (50 per cent. benzol) .. .. .	<i>Th. galls.</i>	36,719	1,342	38,061
	£'000	1,753	77	1,830
Carbolic acid (60 per cent. acid) .. .. .	<i>Th. cwts.</i>	*	*	27
	£'000	*	*	20
Naphtha (crude) .. .. .	<i>Th. galls.</i>	*	*	1,830
	£'000	*	*	88
Naphthalene (crude) .. .. .	<i>Th. cwts.</i>	*	*	192
	£'000	*	*	54
Tar oil, creosote oil and other heavy coal tar oils .. .. .	<i>Th. galls.</i>	13,773	4,039	17,812
	£'000	407	119	526
Toluol (90 per cent. toluol) .. .. .	<i>Th. galls.</i>	320	—	320
	£'000	25	—	25
Other tar distillation products .. .. .	£'000	145	28	173
TOTAL VALUE—COAL TAR PRODUCTS	£'000	*	*	5,014
Ammoniacal liquor .. .. .	<i>Th. tons</i>	13	—	13
	£'000	15	—	15
Waste heat sold .. .. .	£'000	53	—	53
Gas sold :—				
Quantity stated .. .. .	<i>Mill. cub. ft.</i>	*	*	11,765·3
	£'000	*	*	283
Quantity not stated .. .. .	£'000	132	—	132
Electricity sold :—	<i>Mill. B.T. units</i>	26·0	—	26·0
Quantity stated .. .. .	£'000	89	—	89
Quantity not stated .. .. .	£'000	41	—	41
Breeze, ballast, etc. :—				
Quantity stated .. .. .	<i>Th. tons</i>	30	—	30
	£'000	11	—	11
Quantity not stated .. .. .	£'000	18	—	18
Other output .. .. .	£'000	89	—	89
TOTAL VALUE OF PRODUCTS (GROSS OUTPUT) .. .. .	£'000	23,299	1,240	24,539

\* 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 .. .. .	398	16,077	3	23	401	16,100
Administrative, etc.*	61	1,014	2	32	63	1,046
TOTAL .. .. .	459	17,091	5	55	464	17,146
<i>Scotland :—</i>						
Operatives .. .. .	28	814	—	3	28	817
Administrative, etc.*	—	44	—	6	—	50
TOTAL .. .. .	28	858	—	9	28	867
<i>Great Britain :—</i>						
Operatives .. .. .	426	16,891	3	26	429	16,917
Administrative, etc.*	61	1,058	2	38	63	1,096
TOTAL .. .. .	487	17,949	5	64	492	18,013

\* Administrative, technical and clerical staff.

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

*England and Wales. (Annual average : Males, 16,765 ; Females, 23 ; Total, 16,788.)*

Week ended.	Males.	Females.	Total	Week ended.	Males.	Females.	Total.
Jan. 12th ..	17,458	24	17,482	July 19th ..	16,798	22	16,820
Feb. 16th ..	17,556	24	17,580	Aug. 16th ..	16,332	23	16,355
March 15th ..	17,456	24	17,480	Sept. 13th ..	16,200	23	16,223
April 12th ..	17,153	24	17,177	Oct. 18th ..	16,077	23	16,100
May 17th ..	17,128	24	17,152	Nov. 15th ..	16,009	23	16,032
June 21st ..	16,913	23	16,936	Dec. 13th ..	16,098	23	16,121

*Scotland. (Annual average : Males, 853 ; Females, 2 ; Total, 855.)*

Jan. 12th ..	940	1	941	July 19th ..	823	2	825
Feb. 16th ..	935	2	937	Aug. 16th ..	816	2	818
March 15th ..	873	2	875	Sept. 13th ..	817	2	819
April 12th ..	873	2	875	Oct. 18th ..	814	3	817
May 17th ..	861	2	863	Nov. 15th ..	808	2	810
June 21st ..	850	2	852	Dec. 13th ..	827	2	829

*Great Britain. (Annual average : Males, 17,618 ; Females, 25 ; Total, 17,643.)*

Jan. 12th ..	18,398	25	18,423	July 19th ..	17,621	24	17,645
Feb. 16th ..	18,489	26	18,515	Aug. 16th ..	17,148	25	17,173
March 15th ..	18,329	26	18,355	Sept. 13th ..	17,017	25	17,042
April 12th ..	18,028	26	18,054	Oct. 18th ..	16,891	26	16,917
May 17th ..	17,989	26	18,015	Nov. 15th ..	16,817	25	16,842
June 21st ..	17,763	25	17,788	Dec. 13th ..	16,925	25	16,950

## IV.—Mechanical Power.\*

PARTICULARS OF PRIME MOVERS, ELECTRIC GENERATORS AND  
ELECTRIC MOTORS.

Power equipment.	England and Wales.		Scotland.		Great Britain.	
	Ordinarily in use.	In reserve or idle.	Ordinarily in use.	In reserve in use.	Ordinarily or idle.	In reserve or idle.
<b>PRIME MOVERS :—</b>	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.
Reciprocating steam engines .. ..	21,615	8,157	4,204	508	25,819	8,665
Steam turbines .. ..	9,736	3,909	810	770	10,546	4,679
Gas engines .. ..	9,925	4,145	—	—	9,925	4,145
Petrol and light oil engines .. ..	5	—	—	—	5	—
Heavy oil engines .. ..	20	—	—	—	20	—
Other .. ..	200	—	—	—	200	—
<b>TOTAL .. ..</b>	<b>41,501</b>	<b>16,211</b>	<b>5,014</b>	<b>1,278</b>	<b>46,515</b>	<b>17,489</b>
<b>TOTAL OF PRIME MOVERS INSTALLED .. ..</b>	<b>57,712</b>		<b>6,292</b>		<b>64,004</b>	
<b>ELECTRIC GENERATORS :—</b>	Kw.	Kw.	Kw.	Kw.	Kw.	Kw.
Driven by—						
Reciprocating steam engines .. ..	4,389	3,953	239	—	4,628	3,953
Steam turbines .. ..	5,660	4,050	—	—	5,660	4,050
Gas engines .. ..	5,173	940	—	—	5,173	940
<b>TOTAL .. ..</b>	<b>15,222</b>	<b>8,943</b>	<b>239</b>	<b>—</b>	<b>15,461</b>	<b>8,943</b>
<b>TOTAL OF ELECTRIC GENERATORS INSTALLED</b>	<b>24,165</b>		<b>239</b>		<b>24,404</b>	
<b>ELECTRIC MOTORS :—</b>	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.
Driven by—						
Electricity generated in own works .. ..	12,187	3,604	121	54	12,308	3,658
Purchased electricity	25,296	5,845	778	271	26,074	6,116

\* See first paragraph under *Mechanical Power* on page 59.