



## THE PAPER, PRINTING AND ALLIED TRADES.

### GENERAL REPORT.

#### Contents.

	Page
INTRODUCTORY .. .. .	262
Principal results for 1924 .. .. .	262
Comparability of results with those for 1912 and 1907 .. .. .	263
PRODUCTION .. .. .	264
Net output per head in 1924 and 1907 .. .. .	265
EMPLOYMENT .. .. .	265
Employment in 1924 .. .. .	265
Classification of persons employed in a specified week .. .. .	265
Monthly fluctuations in employment .. .. .	266
Employment in 1924 and 1907 .. .. .	267
Classification of average numbers employed .. .. .	268
Sex and age distribution of operatives .. .. .	268
Administrative, technical and clerical staff .. .. .	268
Outworkers .. .. .	269
WAGES IN 1924 .. .. .	269
MECHANICAL POWER .. .. .	270
Power equipment of the various trades in 1924, 1912 and 1907 .. .. .	270
Classification of power equipment of the Paper, Printing and Allied Trades group .. .. .	272
Power equipment in use and not in use in 1924 .. .. .	272
Power available for mechanical and electrical application in 1924 .. .. .	273
FUEL AND ELECTRICITY IN 1924 .. .. .	275
Fuel consumption .. .. .	276
Production and consumption of electricity .. .. .	277

### Introductory.

The following general report deals with the trades engaged in the manufacture of paper, wallpaper, stationery, cardboard boxes, in printing and bookbinding, in printing and publishing newspapers and other periodicals, and in typefounding, electrotyping, engraving, etc.

Measured by the numbers engaged in the various trades, the largest member of the group is the Printing and Bookbinding Trade, which accounted in 1924 for 185,014 persons employed, or 51 per cent. of the group total of 359,922 persons. The next largest is the Printing and Publication of Newspapers, etc., with 58,783 persons employed, or 16 per cent. of the group total.

Each of the trades included in the group forms the subject of a separate report, in which the detailed results of the 1924 Census of Production are set out, and such comparisons as are possible with the results of the Censuses for 1912 and 1907 are made. The object of the present general report is to bring together the principal results for the whole group of trades, and, in addition, to set out certain particulars (e.g., as to fuel consumption) which are more conveniently dealt with here than in the separate trade reports.

### Principal results for 1924.

The number of separate returns received from firms engaged in the Paper, Printing and Allied Trades group in 1924 was 9,257. About 1,210 firms to which schedules were sent did not furnish returns, but the great majority of these firms had very small establishments, and they included a number which were no longer carrying on business at the end of the censal year. On the basis of the information available, it is estimated that they did not employ more than about 3,500 persons in all and that their aggregate net output was probably not in excess of £660,000. These figures represent an omission of, at most, about 1.0 per cent. and 0.7 per cent. respectively of the total figures for the group; and the absence of returns from the firms in question does not materially affect the uses made of the figures in this general report.

The main particulars obtained for 1924 are set out in the following table:—

### Paper, Printing and Allied Trades. Output in 1924.\*

Trade.	Gross output (selling value of goods made and value of work done). (1)	Cost of materials used and amount paid to other firms for work given out. (2)	Net output (excess of col. (1) over col. (2)). (3)	Persons employed (except outworkers). (4)	Net output per person employed as shown in col. (4). (5)
Paper .. .. .	£'000 36,981	£'000 23,999	£'000 12,982	Number 51,390	£ 253
Wallpaper .. .. .	2,854	1,289	1,565	4,598	341
Printing and Bookbinding ..	60,367	21,159	39,208	185,014	212
Printing and Publication of Newspapers, etc. . . . .	46,095	14,224	31,871	58,783	542
Typefounding, Electrotyping, etc. . . . .	3,163	741	2,422	10,091	240
Manufactured Stationery ..	10,362	4,910	5,452	29,787	183
Cardboard Box .. .. .	5,620	2,583	3,037	20,259	150
<b>TOTAL—UNITED KINGDOM .. .. .</b>	<b>165,442</b>	<b>68,905</b>	<b>96,537</b>	<b>359,922</b>	<b>268</b>
England and Wales† .. .. .	145,154	59,570	85,584	313,853	273
Scotland† .. .. .	18,599	8,638	9,961	41,342	241
Northern Ireland .. .. .	1,689	697	992	4,727	210

\* Not including the output of, nor the persons employed by, Government departments, Local authorities, etc.; particulars relating to these establishments are given in the report on Public Utility Services, which forms part of a separate volume. The value of the printing, etc. work done, and the goods made, by such establishments is stated in the individual trade reports concerned (see pages 302, 315 and 337 of this volume).

† In order to avoid the possible disclosure of information relating to individual firms, the particulars relating to the Wallpaper Trade in Scotland have been combined with those for England and Wales.

### Comparability of results with those for 1912 and 1907.

The scope of the Census was not quite the same in the three censal years, and the comparability of the totals for 1924 is affected by the changes referred to in the following paragraphs:—

(1) The Censuses of 1907 and 1924 extended to all firms, however small, but in 1912 firms employing not more than five persons (excluding proprietors) were required to state only the average number of persons employed by them in the year. The exemption of the small firms in 1912 resulted in the exclusion of an important proportion of some of the Paper, Printing and Allied Trades and, both for that reason and because the war interrupted the task of dealing with incomplete and incorrect returns, the information available for that year, for the group as a whole, is not sufficiently complete to warrant its use for detailed comparisons. For this reason the 1907 figures only are, except in respect of power equipment, taken for comparison with those for 1924 in this general report.

(2) The Census of 1907 covered Great Britain and the whole of Ireland, but that of 1924 applied only to Great Britain and Northern Ireland. According to the Census of Production carried out by the Government of the Irish Free State in respect

of the year 1926, the Paper, Printing and Allied Trades carried on in that country employed about 5,800 persons with a gross output of about £1,925,000, that is to say, about 1.6 per cent. of the total number of persons employed and about 1.2 per cent. of the gross output, as returned for the Paper, Printing and Allied Trades in the United Kingdom in 1924.

(3) In any comparison of figures representing money values, the changes in the level of prices which occurred in the period between the first and third Censuses should be kept in mind.

(4) In the report on the 1907 Census it was not possible to publish separate particulars relating to the Wallpaper Trade on account of the risk of disclosing information concerning individual firms and the relevant data were incorporated with more general aggregates in another group of trades. No comparative figures for 1907 are, therefore, available for this trade.

#### Production.

It is difficult to find a satisfactory basis on which to compare production in the several trades in the same year, or in any trade or trades in different years. Obviously, no comparisons between trades could be based on the aggregate quantities of goods produced owing to their varied character, even if the necessary information were available for this purpose. The gross output values recorded in the Census of Production are affected in varying degrees by the duplication of goods or processes which they involve, and hence they do not form a practicable basis for comparisons. Some of the difficulties can be avoided by basing comparisons on net output, which, being arrived at by deducting, from the value of the gross output, the total cost of materials used and the amount paid to other firms for work given out to them, represents completely and without duplication the value added to the materials in the course of manufacture. The net output thus constitutes for any industry the fund from which wages, salaries, rent, royalties, rates, taxes, depreciation, advertisement and sales expenses, and all other similar charges have to be provided, as well as profits, and if the net output for any trade is divided by the number of persons employed by firms in that trade, the resulting figure of net output per head furnishes a basis of comparison between the positions of different trades in the same year (or the same trade in different years) which takes account of differences in the numbers of persons employed and the continuity of their work. The use of net output per head as a basis of comparison was discussed at length in the Final Report on the First Census of Production (1907), where it was pointed out that "as the net output is the fund out of which all charges on industry, except the cost of materials as delivered at the works, are met, it will naturally vary with the amount of those charges" (page 12 of Cd. 6320). The conclusion reached was that "the average net

output per head gives a somewhat fictitious representation of the condition of a trade" and that it constitutes only a rough measure on which to base comparisons (pages 14, 15). Hence, while it remains true that the net output for a trade represents a fact, i.e., the value added to materials by capital and labour, and constitutes the best available basis for the comparisons in view, the qualifications to which its use for this purpose is subject must be kept in mind.

*Net output per head in 1924 and 1907.*—The following table shows, for each of the trades included in the Paper, Printing and Allied Trades group, the net output per head of persons employed in 1924 and 1907:—

#### *Net output per head of persons employed (excluding outworkers).\**

Trade.	1924.	1907.
Paper .. .. .	£ 253	£ 111
Wallpaper .. .. .	341	..
Printing and Bookbinding .. .. .	212	88
Printing and Publication of Newspapers, etc. ..	542	190
Typefounding, Electrotyping, etc. . . . .	240	102
Manufactured Stationery .. .. .	183	75
Cardboard Box .. .. .	150	52
ALL TRADES { including Wallpaper ..	268	..
{ excluding Wallpaper ..	267	103

Excluding the Wallpaper Trade, the net output per head of persons employed increased by 159 per cent. for the group as a whole, the greatest increase (188 per cent.) being recorded in the Cardboard Box Trade and the smallest (128 per cent.) in the Paper Trade. Relatively to the group average in each year, only two trades improved their position, the Printing and Publication of Newspapers, etc., in which the net output per head rose from 84 per cent. above the average in 1907 to 103 per cent. above the average in 1924, and the Cardboard Box Trade, in which the net output per head rose from 50 per cent. below the group average in 1907 to 44 per cent. below the average in 1924. In the Paper Trade the net output per head fell from 8 per cent. above the average in 1907 to 6 per cent. below the average in 1924.

#### Employment.

##### *Employment in 1924.*

*Classification of persons employed in a specified week.*—The following table classifies by sex, age and character of employment the numbers of persons (excluding outworkers) who were recorded as employed in the various Paper, Printing and Allied Trades in the week ended 18th October, 1924.

\* It has been ascertained from the Census records that the exclusion of particulars relating to Southern Ireland from the 1907 figures would not materially affect the results shown.

Number of persons (excluding outworkers) employed in the week ended 18th October, 1924.

Trade.	Operative staff.				Administrative, technical and clerical staff.			
	Males.		Females.		Males.		Females.	
	Under 18.	Total.	Under 18.	Total.	Under 18.	Total.	Under 18.	Total.
	In thousands.							
Paper .. .. .	3.0	35.1	3.2	13.4	207	2,528	105	883
Wallpaper .. .	0.5	3.1	0.4	1.1	65	517	26	149
Printing and Bookbinding .. .	14.6	94.8	19.3	66.3	1,355	18,248	1,299	7,999
Printing and Publication of Newspapers, etc. . . . .	3.0	38.1	0.8	3.7	1,500	14,002	525	3,995
Typefounding, Electrotyping, etc. . . . .	1.3	6.4	0.5	1.3	277	1,929	109	561
Manufactured Stationery .. . . .	1.4	8.5	5.4	17.0	320	2,995	439	2,143
Cardboard Box .. .	0.7	3.9	4.4	15.3	74	1,048	105	616
TOTAL .. . . .	24.5	189.9	34.0	118.1	3,798	41,267	2,608	16,346

In the Manufactured Stationery Trade and the Cardboard Box Trade the number of female operatives greatly exceeded the number of male operatives: the proportion of female to male operatives was also high in the Printing and Bookbinding Trade.

*Monthly fluctuations in employment.*—In order to ascertain what fluctuations in employment there might be in the course of the censal year, firms were also required to state the actual numbers of the operative staff employed in one week in each month. The figures for individual trades are shown in the respective reports, and the following table gives the monthly aggregates for all the trades together:—

*Operative staff (excluding outworkers) in the Paper, Printing and Allied Trades in 1924.*

Week ended.	Males.	Females.	Total.
12th January .. . . .	184,514	112,926	297,440
16th February .. . . .	184,720	112,755	297,475
15th March .. . . .	185,661	113,153	298,814
12th April .. . . .	186,794	113,147	299,941
17th May .. . . .	186,833	114,519	301,352
21st June .. . . .	186,865	114,934	301,799
19th July .. . . .	185,986	114,528	300,514
16th August .. . . .	185,246	114,064	299,310
13th September .. . . .	187,166	116,010	303,176
18th October .. . . .	189,905	118,097	308,002
15th November .. . . .	190,181	119,194	309,375
13th December .. . . .	190,573	119,936	310,509
AVERAGE FOR THE 12 MONTHS .. . . .	187,037	115,272	302,309

Apart from a decrease in July and August, which affected both males and females, employment improved from month to month throughout the year, though there was a slight decline in the number of females employed in February. The total number employed at the end of the year exceeded the number employed at the beginning by 13,069, or 4.4 per cent., the increase being composed of 6,059 males and 7,010 females, or 3.3 and 6.2 per cent. respectively.

The average numbers employed were divided between males and females in the proportion of 619 to 381.

#### *Employment in 1924 and 1907.*

The following table shows the average numbers of male and female operatives (wage earners), and administrative, technical and clerical staff (salaried persons), in each of the Paper, Printing and Allied Trades in the two censal years. The figures are exclusive of outworkers. The average numbers shown in this table and the table on page 268 have been determined in the manner explained in Note (19) on page xii.

*Average numbers (excluding outworkers) employed in 1924 and 1907 in the several Paper, Printing and Allied Trades.*

Trade.	Operatives (wage earners).		Administrative, technical and clerical staff (salaried persons).		Total.
	Males.	Females.	Males.	Females.	
Paper .. . . .	1924 34,785	13,194	2,528	883	51,390
Wallpaper .. . . .	1907 25,553	13,089	2,068	245	40,955
Printing and Bookbinding .. . . .	1924 2,988	944	517	149	4,598
Printing and Publication of Newspapers, etc. . . . .	1924 93,630	65,137	18,248	7,999	185,014
Typefounding, Electrotyping, etc. . . . .	1907 104,133	53,319	13,762	2,902	174,116
Manufactured Stationery .. . . .	1924 37,288	3,498	14,002	3,995	58,783
Cardboard Box .. . . .	1907 31,326	2,884	11,539	1,037	46,786
	1924 6,301	1,300	1,929	561	10,091
	1907 4,704	910	811	94	6,519
ALL TRADES .. . . .	1924 8,229	16,420	2,995	2,143	29,787
	1907 8,098	14,968	2,446	715	26,227
	1924 3,816	14,779	1,048	616	20,259
	1907 3,815	16,029	1,018	506	21,368
	1924 187,037	115,272	41,267	16,346	
	1907* 177,629	101,199	31,644	5,499	
TOTAL .. . . .	1924 302,309		57,613		359,922
	1907* 278,828		37,143		315,971

\* Excluding the Wallpaper Trade.

The total numbers employed increased between 1907 and 1924 by 43,951, or 13.9 per cent.; excluding the Wallpaper Trade from the 1924 figures, the increase was 39,353, or 12.5 per cent. The separate trades all showed an increase in the numbers employed except the

Cardboard Box Trade, in which there was a decline of 1,109, or 5·2 per cent., this decline being entirely due to a falling-off in the employment of female operatives. The greatest relative increase occurred in the Typefounding, etc., Trades, in which the numbers increased by 3,572, or 55 per cent. The Printing and Bookbinding Trade showed a decrease (10,503) in the number of male operatives and a roughly similar increase (11,818) in the number of female operatives.

*Classification of average numbers employed.*—The following table shows the distribution, according to sex, age and character of employment, of the average numbers of persons (excluding outworkers) employed in the Paper, Printing and Allied Trades in 1924 and 1907 :—

*Average numbers (excluding outworkers) employed in all Paper, Printing and Allied Trades in the two censal years.*

Sex and age.	1924.		1907*.	
	Operative staff.	Total staff.	Wage earners.	Total staff.
<i>Males :—</i>				
Under 18 .. .. .	24,168	27,966	33,703	37,235
Over 18 .. .. .	162,869	200,338	143,926	172,038
TOTAL .. .. .	187,037	228,304	177,629	209,273
<i>Females :—</i>				
Under 18 .. .. .	33,204	35,812	32,637	33,749
Over 18 .. .. .	82,068	95,806	68,562	72,949
TOTAL .. .. .	115,272	131,618	101,199	106,698
<i>Males and females :—</i>				
Under 18 .. .. .	57,372	63,778	66,340	70,984
Over 18 .. .. .	244,937	296,144	212,488	244,987
TOTAL .. .. .	302,309	359,922	278,828	315,971

\* Not including the Wallpaper Trade.

*Sex and age distribution of operatives.*—Male labour predominated in the Paper, Printing and Allied group in both years. The increased employment of operatives recorded in 1924 (8·4 per cent.) affected all the classes shown in the above table, except that of males under 18, where a decrease of 9,535 took place, the total of both sexes under 18 being also decreased as a consequence. The proportion of operatives under 18 fell from 23·8 per cent. in 1907 to 19·0 per cent. in 1924.

*Administrative, technical and clerical staff.*—The increase in the administrative, technical and clerical staff in 1924 (described in 1907 as salaried persons) was 20,470, or 55 per cent. Of this increase males accounted for 9,623 and females for 10,847. The increase in

males probably signified an increase in management and sales staffs ; the increase in females probably related largely to clerical staff, reflecting a widespread adoption of more detailed accounting methods, and to clerical labour associated with selling organisation.

The proportion of males in the administrative staff in 1907 was 85 per cent. and of females, 15 per cent., as compared with 72 per cent. and 28 per cent., respectively, in 1924.

*Outworkers.*—The average number of outworkers employed in the Paper, Printing and Allied Trades group in 1924 was 1,115 as compared with 1,592 in 1907. They were employed in only two of the trades in the group in each year, viz. : the Manufactured Stationery Trade and the Cardboard Box Trade. In the former the average number employed was 239 (30 males and 209 females) in 1924 and 184 (4 males and 180 females) in 1907 : in the latter the numbers were 876 (6 males and 870 females) in 1924 and 1,408 (3 males and 1,405 females) in 1907. The increase in the number of outworkers in the Manufactured Stationery Trade may have been associated with the increased output of cardboard boxes in that trade.

### Wages in 1924.

The following table summarises the information contained in the reports on the separate trades as to the amount of wages paid by firms in those trades in 1924. The particulars of wages shown in column (5) of the table are those ascertained by the Ministry of Labour as a result of the voluntary enquiry undertaken by that Department into wages and hours of labour in the United Kingdom in 1924. The numbers of operatives shown in column (1) are those returned to the Census of Production as employed by the firms concerned in the week ended 18th October, 1924. The proportion of each trade represented by the firms that furnished particulars of their wage-bills is shown in columns (2) and (4) on the bases of numbers of operatives employed and of net output, respectively.

Trade.	Firms furnishing returns of wages.					
	Operatives employed.		Net output.		Wages paid.	
	Number. (1)	Proportion of trade total. (2)	Amount. (3)	Proportion of trade total. (4)	Amount. (5)	Proportion of net output. (6)
		Per cent.	£'000	Per cent.	£'000	Per cent.
Paper .. .. .	36,066	74	9,730	75	4,366	44·9
Wallpaper .. .. .	3,666	86	1,366	87	371	27·2
Printing and Bookbinding .. .. .	93,721	58	23,334	59	12,718	54·5
Printing and Publication of Newspapers, etc. .. .	27,107	65	20,573	65	6,257	30·4
Typefounding, Electro-typing, etc. .. .. .	3,933	51	1,225	51	674	55·0
Manufactured Stationery .. .. .	14,500	57	3,237	59	1,405	43·4
Cardboard Box .. .. .	13,292	69	2,122	70	1,063	50·1
TOTAL .. .. .	192,285	62	61,587	64	26,854	43·6

**Mechanical Power.**

The power equipment of factories consists in the first instance of the prime movers installed in the works, part being used to apply power mechanically and part to actuate generators for the production of electrical energy. Only a portion of that electrical energy is used for power, i.e., to drive electric motors, the remainder being used for lighting, heating, etc., and for manufacturing purposes. In addition, many factories derive part or all of their power from electricity purchased and used for driving electric motors.

*Power equipment of the various Paper, Printing and Allied Trades in 1924, 1912 and 1907.*—The particulars furnished at the three Censuses regarding prime movers and electric generators in factories in the Paper, Printing and Allied Trades are shown in the following table. Particulars of electric motors were not obtained in 1907, and particulars relating to 1924 and 1912 only can be given.

The summary figures of power equipment secured at the 1912 Census are included in this and the following paragraphs, though they are omitted from some of the individual trade reports. The exclusion in that year of firms employing not more than five persons and the incompleteness of many of the returns rendered the results secured for the most part ineffective for purposes of comparison. The figures relating to power equipment are, however, likely to have been affected in a less degree than other aggregates by the omission of the small enterprises. The main interest of the figures given for 1912 lies in the indication which they afford of the increase that has occurred since that year in the use of electricity, particularly purchased electricity, as a source of power. The omission of small firms in 1912 may have had a particular importance in reference to this feature.

In connexion with the omission of the Irish Free State from the 1924 Census (see pages 263 and 264) it may be mentioned that, according to the Census of Production conducted by the Free State Government in respect of the year 1926, the total capacity of prime movers in the Paper, Printing and Allied Trades in that year was 2,500 horse-power, which is less than 1 per cent. of the total recorded for the United Kingdom in 1924; and the capacity of the electric motors driven by purchased electricity was 1,680 horse-power\*, or less than 1.5 per cent. of the United Kingdom figure for 1924. The effect on comparisons with earlier Censuses of the absence of the Irish Free State from the 1924 Census on the comparisons made in this report is, therefore, not appreciable.

\* Includes motors of a capacity of 383 horse-power, for which the source of the electricity was not stated.

*Power equipment of the several Paper, Printing and Allied Trades.*

Trade.	Prime movers.			Electric generators.		
	1924.	1912.	1907.	1924.	1912.	1907.
	Thousand H.P.			Thousand Kw.		
Paper .. .. .	248.9	194.2	172.2	83.0	32.9	15.3
Wallpaper .. .. .	2.6	4.8	..	0.8	0.8	..
Printing and Bookbinding ..	30.1	36.8	38.6	6.8	8.5	7.9
Printing and Publication of Newspapers, etc. .. .. .	9.0	11.1	16.4	4.4	3.3	2.3
Typefounding, Electrotyping, etc. .. .. .	0.8	0.9	0.7	0.1	0.5	*
Manufactured Stationery ..	4.4	5.7	3.6	1.4	1.6	0.4
Cardboard-box .. .. .	2.5	3.0	2.3	0.9	0.6	0.5
<b>TOTAL .. .. .</b>	<b>298.3</b>	<b>256.5</b>	<b>233.8†</b>	<b>97.4</b>	<b>48.2</b>	<b>26.4†</b>

\* Less than 50 Kw.

† Excluding the Wallpaper Trade.

Trade.	Electric motors driven by electricity generated in same works.		Electric motors driven by purchased electricity.		All electric motors	
	1924.	1912.	1924.	1912.	1924.	1912.
	Thousand H.P.		Thousand H.P.		Thousand H.P.	
Paper .. .. .	108.9	34.9	38.7	4.2	147.6	39.1
Wallpaper .. .. .	1.0	0.5	1.8	0.6	2.8	1.1
Printing and Bookbinding ..	5.5	8.3	72.5	33.7	78.0	42.0
Printing and Publication of Newspapers, etc. .. .. .	1.8	2.7	56.3	29.1	58.1	31.8
Typefounding, Electrotyping, etc. .. .. .	0.1	0.1	3.0	1.4	3.1	1.5
Manufactured Stationery ..	2.1	1.4	7.3	2.4	9.4	3.8
Cardboard Box .. .. .	0.9	0.5	5.1	1.2	6.0	1.7
<b>TOTAL .. .. .</b>	<b>120.3</b>	<b>48.4</b>	<b>184.7</b>	<b>72.6</b>	<b>305.0</b>	<b>121.0</b>

The distribution of the power equipment recorded in 1924 among the three geographical areas covered by the Census was as follows:—

Area.	Prime movers.	Electric generators.	Electric motors driven by	
			Electricity generated in same works.	Purchased electricity.
	Th. H.P.	Th. Kw.	Th. H.P.	Th. H.P.
England and Wales* .. .. .	234.4	66.2	86.4	156.0
Scotland* .. .. .	59.1	30.4	33.1	26.9
Northern Ireland .. .. .	4.8	0.8	0.8	1.8
<b>TOTAL .. .. .</b>	<b>298.3</b>	<b>97.4</b>	<b>120.3</b>	<b>184.7</b>

\* See footnote (†) to table on page 263.

*Classification of power equipment of the Paper, Printing and Allied Trades group.*—The next table, which relates to the power equipment of all the trades taken together, classifies the prime movers according to kinds, the electric generators according to the description of prime movers by which they were driven, and the electric motors according as they were actuated by purchased electricity or by electricity generated in the same factory or works.

Power equipment.	1924.	1912.	1907.*
<b>PRIME MOVERS :—</b>	Th. H.P.	Th. H.P.	Th. H.P.
Reciprocating steam engines .. .. .	193·8	190·0	177·4
Steam turbines .. .. .	58·1	14·5	3·5
Gas and oil engines .. .. .	39·4	41·3	41·9
Water power .. .. .	7·0	10·7	10·9
Other power .. .. .	—	—	0·1
<b>TOTAL .. .. .</b>	<b>298·3</b>	<b>256·5</b>	<b>233·8</b>
<b>ELECTRIC GENERATORS :—</b>	Th. Kw.	Th. Kw.	Th. Kw.
<b>Driven by—</b>			
Reciprocating steam engines .. .. .	44·2	29·1	17·6
Steam turbines .. .. .	41·3	10·8	2·6
Gas and oil engines .. .. .	10·0	0·5	} 6·2
Water power .. .. .	1·9	7·8	
Other power .. .. .	—	—	
<b>TOTAL .. .. .</b>	<b>97·4</b>	<b>48·2</b>	<b>26·4</b>
<b>ELECTRIC MOTORS :—</b>	Th. H.P.	Th. H.P.	Th. H.P.
<b>Driven by—</b>			
Electricity generated in same works ..	120·3	48·4	} † (not ascertained.)
Purchased electricity .. .. .	184·7	72·6	
<b>TOTAL .. .. .</b>	<b>305·0</b>	<b>121·0</b>	<b>..</b>

\* Not including the Wallpaper Trade.

† The total amount of electrical energy recorded as purchased for all purposes in 1907 was 31,027,000 Board of Trade Units (kilowatt-hours) and it would appear that the quantity generated by the dynamos operated by the firms in this group of trades may have amounted to about 48,750,000 Board of Trade Units.

*Power equipment in use and not in use in 1924.*—The firms that made returns to the Census for 1924 were required to distinguish between the prime movers, electric generators, and electric motors ordinarily in use in the course of the year and those that were in reserve or idle. The proportion not in use should not be taken as a direct measure of the inactivity of trade during the year. While some of the engines, generators, and motors were not in use on account of lack of orders for goods, some were idle because they were normally in reserve against a breakdown or sudden rush of trade and others may have been in various stages of obsolescence, awaiting the time for being dismantled. The particulars recorded as to power ordinarily in use and not in use in 1924 are given in the following table :—

*Power ordinarily in use and not in use in the Paper, Printing and Allied Trades in 1924.*

Trade.	Prime movers.		Electric generators.		Electric motors.	
	(a) Ordinarily in use ; (b) not in use.	Percentage not in use.*	(a) Ordinarily in use ; (b) not in use.	Percentage not in use.*	(a) Ordinarily in use ; (b) not in use.	Percentage not in use.*
	Th. H.P.		Th. Kw.		Th. H.P.	
Paper .. .. .	(a) 218·5 (b) 30·5	13·9	61·5 21·6	35·0	124·8 22·9	18·3
Wallpaper .. .. .	(a) 2·4 (b) 0·2	8·5	0·8 †	4·6	2·7 0·1	2·5
Printing and Book-binding .. .. .	(a) 22·3 (b) 7·8	34·7	4·1 2·6	63·5	71·5 6·5	9·2
Printing and Publication of Newspapers, etc.	(a) 4·8 (b) 4·2	87·7	1·0 3·3	334·7	54·7 3·5	6·3
Typefoundry, Electrotyping, etc. .. .	(a) 0·7 (b) †	5·7	0·1 —	—	2·8 0·2	8·6
Manufactured Stationery .. .. .	(a) 3·6 (b) 0·8	21·4	1·3 0·2	15·2	8·4 1·0	11·5
Cardboard Box .. .. .	(a) 2·0 (b) 0·5	29·3	0·6 0·3	42·1	5·7 0·3	6·4
<b>TOTAL .. .. .</b>	(a) 254·3 (b) 44·0	17·3	69·4 28·0	40·4	270·5 34·5	12·8

\* Based in each case upon the actual figures returned.

† Less than 50 H.P.

‡ Less than 50 Kw.

*Power available for mechanical and electrical application in 1924.*—In order to ascertain the actual amount of power available in the several trades, and the proportion of that power applied electrically, the capacity of the prime movers used to actuate electric generators must be replaced by the capacity of the electric motors driven by the electricity so produced. How far it may be legitimate to add together the capacity of engines applying, or intended to apply, power mechanically and the capacity of the electric motors, so as to obtain the power capacity of a factory using both forms of energy, will depend on the organisation of the factory. The information supplied furnishes no guidance as to the effective capacity of the power equipment, for, on the one hand, actual working capacity is not necessarily identical with the indicated horse-power, nor with that which an engine was originally built to develop, data which served largely as the basis of returns; and, on the other hand, it cannot be assumed that an engine can run uniformly at its peak load, and some engine-power is generally provided as a reserve against breakdowns and not for regular use. In particular, a series of motors (whose aggregate capacity would be returned to the Census) may be installed to run on successive processes, some of which are carried on intermittently as the materials to be treated



become available, so that the series always includes some units not actually in operation. In such cases the aggregate horse-power of the motors, being greater than the power called for at any moment, may be greater than the horse-power of the prime movers required to actuate the generators from which the series of motors is driven. Since, however, the mechanical power available per operative employed is regarded as significant of the efficiency of an organisation, an attempt has been made to provide such a measure, though the result can only be regarded as a rough indication claiming no high degree of precision.

In calculating this measure, the power allocated for driving electric generators has to be deducted from the total capacity of prime movers; for this purpose, 746 kilowatts of electrical energy are taken as the equivalent of 1,000 horse-power of mechanical energy, and an average loss of 10 per cent. is allowed in the conversion of mechanical into electrical energy, except in the case of steam turbines, which are usually bolted direct to the shafting of the generator. The power available to be applied mechanically is thus ascertained; and the electrical power available is the sum of the capacities of motors driven by purchased electricity and of those driven by electricity generated in the same works. Comparison with power available in 1907 is not possible, since the capacity of electric motors was not ascertained in that year.

The calculation relating to power available has been made on the basis of the power equipment installed and not on that recorded as being in use. For reasons already given, it must be recognised that the figures representing power available per operative employed are, to some extent which cannot be determined from the data available in the Census office, in excess of the average power utilisable.

The following table sets out the result of the calculation:—

*Power available in the several Paper, Printing and Allied Trades in 1924.*

Trade.	Power for mechanical application.	Power for electrical application.	Total power.	Per head of average number of operatives employed.
	Th. H.P.	Th. H.P.	Th. H.P.	H.P.
Paper .. .. .	131.4	147.6	279.0	5.8
Wallpaper .. .. .	1.4	2.8	4.2	1.1
Printing and Bookbinding .. .. .	20.0	78.0	98.0	0.6
Printing and Publication of Newspapers, etc. .. .. .	2.5	58.1	60.6	1.5
Typefounding, Electrotyping, etc. .. .. .	0.6	3.1	3.7	0.5
Manufactured Stationery .. .. .	2.3	9.4	11.7	0.5
Cardboard Box .. .. .	1.2	6.0	7.2	0.4
TOTAL .. .. .	159.4	305.0	464.4	1.5

The high proportion of electrical power in the Printing and Publication of Newspapers, etc., is the outstanding feature of this table.

### Fuel and Electricity in 1924.

All firms that received schedules were asked to furnish voluntarily particulars of their consumption of fuel (of specified kinds) and electricity (distinguishing that purchased from that generated in the works), under two headings, namely (i) for power (driving engines), and (ii) for heating or lighting the premises, and for manufacturing processes, etc. Firms whose aggregate net output was 67.5 per cent. of the net output of all firms in the Paper, Printing and Allied Trades in 1924 furnished information in response to this request, though, as will appear later, many of them were unable to divide their particulars into the two categories indicated. Moreover, the information returned was not equally representative of fuel consumption, of production of electricity, and of consumption of purchased electricity, as the data supplied under these three headings respectively covered 64.9 per cent. of the capacity of all the prime movers (not hydraulic) in use in the group, 49.4 per cent. of the capacity of the electric generators, and 64.6 per cent. of that of the electric motors driven by purchased electricity. The proportion of the trade for which particulars were furnished also varied between one trade and another, as will be seen from the tables given below.

### Fuel consumption.

In 1907, when firms were only asked to state their consumption of coal and coke without specification of purpose, the firms that furnished particulars had 72 per cent. of the net output of the group as a whole, and they recorded a consumption of 1,625,000 tons of coal and 28,000 tons of coke. The consumption recorded in 1924 by firms representing 67.5 per cent. of the net output of the group, included 1,379,000 tons of coal and 43,000 tons of coke.

The following table summarises the information which was received from firms regarding the quantities of different kinds of fuel which they consumed in 1924. These quantities are divided into (a) the amounts used for power purposes, i.e., driving engines, and (b) the amounts used for the lighting or heating of premises, for manufacturing processes, etc., so far as the particulars furnished enable the classification to be made. It appears from the returns, however, that the basis of classification adopted by the various firms which furnished information was by no means uniform; and, apart from this, considerable quantities were reported for which no particulars of purpose could be assigned. These quantities are shown under heading (c) in the table.

*Consumption of fuel (so far as reported) in the several Paper, Printing and Allied Trades in 1924.*

NOTES.—(1) The figures in italics below the name of the trade represent respectively (1) the percentage of the total net output of the trade represented by the firms giving information, and (2) the percentage of the total capacity of prime movers (not hydraulic) in use in the trade represented by the firms giving information.

(2) The fuel consumed is, in each case, classified according to the purpose for which it was used, as follows:—(a) for power (driving engines); (b) for heating and lighting premises and for manufacturing processes, etc.; (c) for purposes not separately distinguished.

Trade.	Coal and slack.	Coke and breeze.	Heavy oils.	Light oils.	Gas* purchased.
	Th. tons.	Th. tons.	Th. galls.	Th. galls.	Th. therms.
Paper .. .. .	(a) 179·1	†	201·5	8·7	10·1
(1) <i>67·0</i> ; (2) <i>65·6</i> ..	(b) 103·0	1·6	1·3	93·1	253·2
	(c) 1011·6†	1·3	2006·7	2·0	7·5
Wallpaper .. .. .	(a) —	—	—	—	1·6
(1) <i>13·3</i> ; (2) <i>3·7</i> ..	(b) 0·9	0·6	—	3·5	5·3
	(c) 1·0	—	—	—	—
Printing and Bookbinding ..	(a) 22·7	0·8	195·5	23·7	1042·3
(1) <i>65·7</i> ; (2) <i>67·8</i> ..	(b) 26·5	21·3	18·0	190·8	2922·7
	(c) 1·6	†	0·3	0·4	224·7
Printing and Publication of Newspapers, etc. ..	(a) 4·6	0·2	14·3	6·6	226·9
(1) <i>73·3</i> ; (2) <i>72·3</i> ..	(b) 10·8	11·9	121·9	317·1	1698·6
	(c) 0·4	0·1	5·6	7·0	178·0
Typefounding, Electrotyping, etc. .. .. .	(a) 1·7	—	—		17·1
(1) <i>64·1</i> ; (2) <i>68·3</i> ..	(b) 1·2	0·6	0·1	7·0	311·6
	(c) †	†	—	—	31·1
Manufactured Stationery ..	(a) 1·6	—	6·2	0·4	123·6
(1) <i>60·8</i> ; (2) <i>37·5</i> ..	(b) 6·0	2·2	1·3	67·6	232·2
	(c) 0·4	—	—	0·4	9·6
Cardboard Box .. .. .	(a) 2·3	0·2	1·3		51·2
(1) <i>66·0</i> ; (2) <i>77·3</i> ..	(b) 3·7	2·4	1·9	75·0	217·5
	(c) 0·4	—	—	—	15·2
ALL TRADES .. .. .	(a) 212·0	1·2	418·8	39·4	1472·8
(1) <i>67·5</i> ; (2) <i>64·9</i> ..	(b) 152·1	40·6	144·5	754·1	5641·1
	(c) 1015·4†	1·4	2012·6	9·8	466·1
GRAND TOTAL (ALL PURPOSES) ..	1379·5†	43·2	2575·9	803·3	7580·0

\* The amount of gas purchased was, in some cases, returned in terms of cubic feet; in such cases 200 cubic feet have been taken as equivalent to 1 therm.

† Less than 50 tons.

‡ Includes 22,400 tons of coal and coke, not separately distinguished.

|| Less than 50 gallons.

The difficulty of drawing conclusions and making generalisations on the basis of the figures shown in the preceding table is due primarily to the quantities of fuel consumed for which no particulars of purpose could be specified by firms that furnished information. Thus, in the Paper Trade, the proportions returned for purposes not defined were 78 per cent. for coal, 46 per cent. for coke, 91 per cent. for heavy oils and about 2 per cent. each for light oils and gas. For the group as a whole the proportions were 74 per cent. for coal, 3 per cent. for coke, 78 per cent. for heavy oils, 1 per cent. for light oils and 6 per cent. for gas.

Where the quantities of fuel consumed for purposes not distinguished form only small percentages of the total quantities reported, it may involve no great error to distribute them, e.g., in the proportions recorded for the purposes for which consumption was specified; but where the undistributed portion is large in proportion to the total consumption such a process might lead to erroneous conclusions.

In these circumstances it is not practicable to estimate with any degree of confidence the quantities of the different kinds of fuel used for power, and for other purposes, by the firms that replied to the question in the Census schedules on the subject. Any attempt to extend the particulars furnished so as to estimate the quantities of different kinds of fuel used by all the firms in each of the Paper, Printing and Allied Trades would encounter other difficulties, even if distinction of purpose be ignored and attention be confined to the fuel used for all purposes combined. The table on page 276 shows that the firms that furnished information represented varying proportions of the several trades, and in no case was the proportion, as measured by net output, as high as 75 per cent. Any assumption that the firms that did not furnish information distributed their consumption among the different kinds of fuel in the proportions represented by the practice of those firms that supplied particulars would be extremely hazardous in the absence of information regarding the general practice of the several trades.

For the foregoing reasons, therefore, the information given in the table referred to should not be used as being of more than face value without extreme caution.

*Production and consumption of electricity.*

For 1907 the Census returns showed that about 37,725,000 units of electricity were generated in establishments with dynamos of 20,460 kilowatt capacity, equivalent to 77 per cent. of the total capacity of 26,425 kilowatts in the Paper, Printing and Allied Trades as a whole. In 1924, firms with generators (in use) of 34,300 kilowatt capacity (49·4 per cent. of the group total) recorded an aggregate of 112,000,000 units of electricity generated and consumed in their works. As regards purchased electricity, a return was obtained from all firms at the 1907 Census, and this showed a total of nearly 31,030,000 units purchased for all purposes. In 1924 the information received showed that about 91,800,000 units were purchased by firms owning 64·6 per cent. of the electric motors (in use) driven by purchased electricity. While the figures form an inadequate basis for general estimates covering the entire group at both dates, they show clearly that a very large increase in the use of electrical energy took place in these trades, and appear also to be in harmony with the conclusion indicated on page 270 as to the tendency to rely more largely on electricity purchased from public supply undertakings than on the installation of generating plant in the works themselves.

The table on page 279 summarises the detailed information received from firms in the Paper, Printing and Allied group of trades as to the generation and consumption of electricity in 1924. The figures must, however, be regarded as subject to qualifications similar to those which apply to the particulars given on pages 275 to 277 respecting consumption of fuel; and, for the same reason, they cannot be appropriately used as the basis of generalised deductions. The percentages of the reported consumption of electricity for which no particulars of purpose could be given were as follows:—

*Proportion of consumption of electricity for purposes not defined.*

Trade.	Electricity.	
	Purchased.	Generated in own works.
	Per cent.	Per cent.
Paper .. .. .	59.7	66.7
Wallpaper .. .. .	8.9	—
Printing and Bookbinding .. .. .	6.8	29.3
Printing and Publication of Newspapers, etc. .. .. .	3.7	23.1
Typefounding, Electrotyping, etc. .. .. .	11.9	87.4
Manufactured Stationery .. .. .	1.0	—
Cardboard Box .. .. .	2.8	18.9
ALL TRADES .. .. .	25.2	65.5

Reference to the table on page 279 will show that the percentage of the electric generators in use in the trade that was represented by the information furnished regarding electricity generated, was generally smaller than the percentage of the electric motors driven by purchased electricity that was represented by the information furnished regarding electricity purchased. This may be due, in part, to the predominance, among the firms replying to the voluntary question, of firms drawing the bulk of their electric power from public supply authorities and not from generators installed in their own works; but, at the same time, it may reflect the fact that, while all firms necessarily know the quantity of electricity they purchase, many do not record the quantity generated in their own works.

The particulars representing the average amount of electricity generated per kilowatt capacity, as shown in column (3) of the table, exhibit a wide range of variation. These variations doubtless correspond to some extent with differences in the continuity with which the electric generators were operated in the works of the firms that furnished information. The difficulty of basing general conclusions regarding the several trades as a whole on the data shown in the table applies not less to this particular aspect of the matter than to the others.

*Consumption of electricity (so far as reported) in the several Paper, Printing and Allied Trades.*

NOTES.—(1) The figures in italics below the name of the trade represent respectively (1) the percentage of the total capacity of electric generators in use in the trade represented by the firms which stated the quantity of electricity generated in their works; and (2) the percentage of the total capacity of electric motors, driven by purchased electricity, in use in the trade represented by the firms which stated the quantity of electricity purchased by them.

(2) The electricity generated and the electricity purchased are, in each case, classified according to the purpose for which they were used, as follows:—(a) for power (driving engines); (b) for heating and lighting premises and for manufacturing processes, etc.; (c) for purposes not separately distinguished.

Trade.	Electricity generated in works of firms giving information.				Electricity purchased by firms giving information.	
	Capacity of electric generators (in use).	Quantity of electricity generated.	Average per kilowatt capacity of generators.	Capacity of electric motors (in use) driven thereby.	Quantity of electricity purchased.	Capacity of electric motors (in use) driven thereby.
	(1)	(2)	(3)	(4)	(5)	(6)
	Th. Kw.	Million B.T. units.	B.T. units.	Th. H.P.	Million B.T. units.	Th. H.P.
Paper .. .. . <i>(1) 49.9; (2) 56.2.</i>	30.7	{ (a) 31.2 (b) 5.0 (c) 72.6	3,545.3	66.4	{ (a) 15.0 (b) 0.4 (c) 20.1	18.6
Wallpaper .. .. . <i>(1) —; (2) 20.0.</i>	—	{ (a) — (b) — (c) —	—	‡	{ (a) † (b) † (c) †	‡
Printing and Bookbinding. <i>(1) 58.7; (2) 63.2.</i>	2.4	{ (a) 1.2 (b) 0.3 (c) 0.6	897.1	3.3	{ (a) 22.7 (b) 4.4 (c) 2.0	42.0
Printing and Publication of Newspapers, etc. <i>(1) 56.9; (2) 72.9.</i>	0.6	{ (a) 0.1 (b) 0.1 (c) 0.1	417.2	1.7	{ (a) 13.2 (b) 5.5 (c) 0.7	38.8
Typefounding, Electrotyping, etc. <i>(1) 7.7; (2) 57.0.</i>	*	{ (a) — (b) † (c) †	3,177.4	0.1	{ (a) 1.4 (b) 0.3 (c) 0.2	1.6
Manufactured Stationery. <i>(1) 15.7; (2) 71.9.</i>	0.2	{ (a) 0.2 (b) 0.1 (c) —	1,281.3	0.2	{ (a) 3.2 (b) 0.7 (c) †	4.7
Cardboard Box .. .. . <i>(1) 62.2; (2) 62.6.</i>	0.4	{ (a) 0.4 (b) † (c) 0.1	1,435.9	0.7	{ (a) 1.5 (b) 0.2 (c) 0.1	3.0
TOTAL .. .. . <i>(1) 49.4; (2) 64.6.</i>	34.3	{ (a) 33.1 (b) 5.5 (c) 73.4	3,268.6	72.4	{ (a) 57.2 (b) 11.5 (c) 23.1	108.7

\* Less than 50 Kw.

† Less than 500,000 Board of Trade units.

‡ Less than 50 H.P.