

## THE EXPLOSIVES AND FIREWORKS TRADES.

## Contents.

	Page.
INTRODUCTORY .. .. .	142
Summary of results .. .. .	142
Qualifications affecting comparisons .. .. .	143
Value of output and cost of materials .. .. .	143
PRODUCTION .. .. .	144
Principal products .. .. .	144
Other products .. .. .	145
Value of output free from duplication .. .. .	145
Cost of materials .. .. .	145
Net output .. .. .	146
Quantities of certain materials used .. .. .	146
Exports and imports .. .. .	146
WAGES IN 1924 .. .. .	147
EMPLOYMENT .. .. .	147
MECHANICAL POWER .. .. .	148
TABLES .. .. .	149

## Introductory.\*

The tables on pages 149 and 150 are based on returns received from firms in Great Britain whose business in 1924 consisted wholly or mainly in the manufacture of explosives and fireworks. The number of such separate returns was 51. A few firms to which schedules were sent did not furnish returns, but none of these firms is believed to have carried on a manufacturing business of importance. On the basis of the information available it is estimated that they did not employ more than 10 persons in all and that their total net output did not exceed £2,000. No production was recorded for Northern Ireland in 1924.

*Summary of results.*—The following table shows the main results of the Censuses of 1924, 1912 and 1907, comparisons between the figures for the three years being subject to the qualifications mentioned in the next paragraph.

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

Particulars.	Unit.	1924.	1912.	1907.
Value of goods made (Gross output) ..	£'000	5,328	5,107	3,947
Cost of materials used .. .. .	"	2,514	3,087	2,438
Net output .. .. .	"	2,814	2,020	1,509
Average number of persons employed ..	No.	8,636	15,956	12,744
Net output per person employed ..	£	326	127	118
Mechanical power available :—				
Prime movers .. .. .	H.P.	13,694	14,701	15,522
Electric motors driven by purchased electricity .. .. .	"	1,275	578	(not recorded).

*Qualifications affecting comparisons.*—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 :—

(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 output of explosives and fireworks was not published separately in connexion with the Census of Production taken by the Government of the Irish Free State in respect of the year 1926, and the exclusion of Southern Ireland in 1924 cannot seriously affect the comparability of the figures.

(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 merely required to state the average number of persons employed by them in the year. According to the information so furnished, the average number of persons employed in the establishments thus excluded was 72, or 0·45 per cent. of the number employed by the remaining firms, as shown in the above table. Correspondence on defective returns for 1912 had not been completed when the war compelled suspension of this work, and in these circumstances detailed information for 1912 is not given in the remainder of this report. The defects in the aggregate figures given above are, however, not important.

*Value of output and cost of materials.*—The figures in the above table representing the value of goods made 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 page xiii, they probably over-state the value of the output of, and the cost of materials used by, the Explosives and Fireworks Trades considered as a whole. The matter is discussed on page 145, where it is estimated that the value, free from duplication, of the output of these trades in 1924 lay between £5,000,000 and £5,300,000, and the cost of materials purchased from sources outside the trade and worked up into its products lay between £2,200,000 and £2,500,000.

### Production.

Detailed information relating to the output of the Explosives and Fireworks Trades in 1924 will be found in Table II on page 149.

In addition to the output dealt with in this report, explosives, etc., valued, on a cost basis, at £2,970,000, were produced in 1924 by Government Ordnance Factories.\* The corresponding figure for 1907 was £1,278,000.

*Principal products.*—The following table shows the value and (where recorded) the quantity of the principal products of the Explosives and Fireworks Trades returned in the years 1924 and 1907, the aggregate figures for each year being inclusive of the output of similar products recorded on schedules for other trades, but exclusive of the output of Government Ordnance Factories.

Kind of goods.	1924.				1907.
	Returned on schedules for				Total.
	The Explosives and Fireworks Trades.		All trades.		
	Quantity.	Selling value.	Quantity.	Selling value.	Selling value.
	Th. cwt.	£'000.	Th. cwt.	£'000.	£'000.
High explosives and propellant powders .. .. .	473·0	2,457	473·0	2,457	2,175
Small arms ammunition (including empty cartridge cases) :—					
Military .. .. .	35·0	390	37·9	422	} 2,397
Sporting .. .. .	96·7	567	122·1	712	
Fuses and blasting accessories ..	..	985	..	1,051	
Other explosives and ammunition ..	..	407	..	852	
Rockets and pyrotechnic products ..	..	222	..	223	103
<b>TOTAL VALUE .. .. .</b>	..	5,028	..	5,717	4,675

The following particulars, which were furnished voluntarily, show the chief purposes of the high explosives and propellant powders made in 1924.

			<i>Cwt.</i>
For industrial purposes .. .. .	..	..	449,700
For military purposes .. .. .	..	..	4,100
For sporting purposes .. .. .	..	..	13,800
For other purposes .. .. .	..	..	5,400
<b>TOTAL .. .. .</b>	..	..	473,000

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

As particulars of output were required by value only in 1907, it is impossible to state precisely what change occurred in the quantity of output, but it seems clear that there was a considerable decline in the production of high explosives and propellant powders in 1924, as compared with 1907. Small arms ammunition, fuses, and other explosives and ammunition, were combined under one heading in 1907, and that heading also included rockets for war purposes (included with rockets and pyrotechnic products in 1924), and detailed comparison cannot therefore be made between the output of the other principal products enumerated above.

*Other products.*—In addition to the principal products shown in the preceding table, firms that made their returns on schedules for the Explosives and Fireworks Trades recorded, for 1924 and 1907, the following amounts in respect of goods which are mainly produced in other trades and are dealt with in the reports on those trades :—

Kind of goods.	1924.	1907.
	Selling value.	Selling value.
	£'000.	£'000.
Chemical products .. .. .	80	58
Metal goods .. .. .	38	104
Other goods .. .. .	182	72
<b>TOTAL VALUE.. .. .</b>	300	234

*Value of output free from duplication.*—The gross value of the output returned on schedules for the Explosives and Fireworks Trades was £5,328,000, but this sum includes possible duplication in respect of detonators, tubes, primers, cartridge cases, percussion caps, rockets, etc., sold to other firms in the trade or transferred to other works in the same ownership for which separate returns were made. There may also have been some small amount of duplication in respect of fuses and blasting accessories, though in the bulk these were probably sold out of the trade. It appears probable that the amount of duplication did not exceed £300,000, and that the value of the output returned on schedules for the Explosives and Fireworks Trades may be estimated, free from duplication, at a sum lying between £5,000,000 and £5,300,000. The corresponding figure for 1907 was estimated as lying between £3,500,000 and £3,900,000.

*Cost of materials.*—The cost of materials used by firms that made their returns on schedules for the Explosives and Fireworks Trades was returned as £2,514,000 in 1924, a sum which, by the exclusion of purchases of the products of other firms in the trade, is reduced to a sum lying between £2,200,000 and £2,500,000; the corresponding net figure for 1907 was estimated to lie between £2,000,000 and £2,400,000.

*Net output.*—The net output in 1924 of the firms that made their returns on schedules for the Explosives and Fireworks Trades (whose gross output was valued at £5,328,000) was £2,814,000, that sum representing, without duplication, the total amount by which the value, as delivered, of the aggregate output exceeded the cost, as purchased, of the materials used. The corresponding figure for 1907 was £1,509,000.

The net output per head of persons employed in the census year 1924 was £326, as compared with £118 in 1907.

*Quantities of certain materials used.*—Manufacturers making returns on schedules for the Explosives and Fireworks Trades were asked to state voluntarily the quantities of certain materials used by them during the year of return. The following particulars were supplied by firms with a total output of £3,559,000, or 66·8 per cent. of the aggregate output of the trade, and cover £2,444,000, or 99·5 per cent. of the total output recorded for high explosives and propellant powders.

Kind of material used.	Quantity.
Raw cotton .. .. .	1,354,400 lb.
Nitrate of soda .. .. .	316,490 cwt.
Nitrate of ammonia .. .. .	82,750 cwt.
Nitrate of potash .. .. .	90,770 cwt.
Glycerine .. .. .	123,450 cwt.
Pyrites .. .. .	291,080 cwt.
Industrial alcohol .. .. .	161,010 gallons.

*Exports and imports.*—Exports and imports are classified in much greater detail than it was found possible to adopt for the purposes of the Census of Production, but, grouping them together as far as possible, the following comparative statement for 1924 is obtained.

Kind of goods.	Production.		Exports.		Net imports.		Available for use in United Kingdom.		Share of home market held by British-made goods.	
	Th. cwt.	Th. cwt.	Th. cwt.	Th. cwt.	Th. cwt.	Th. cwt.	Th. cwt.	Per cent.	Per cent.	
High explosives and propellant powders .. .. .	473·0	176·9	7·1	303·2	97·7					
Small arms ammunition (including empty cartridge cases) :—										
Military .. .. .	37·9	14·5	0·4	23·8	98·3					
Sporting .. .. .	122·1	69·8	9·6	61·9	84·5					
Value at factory .. .. .	£'000.	£'000.	£'000.	£'000.						
Fuses and blasting accessories .. .. .	1,051	464	16	603*	97·3					
Rockets and other pyrotechnic products .. .. .	223	24	6	205*	97·1					
Other explosives and ammunition .. .. .	852	362	23	513*	95·5					

\* These figures are in defect by the (unknown) difference between the value of exports *ex factory* and *f.o.b.*

It will be seen that the British manufacturers supplied the great bulk of the home market, and that in each of the categories set out in the table, except rockets and other pyrotechnic products, the export trade was important compared with the production. It should be borne in mind that, while the figures for exports exclude stores shipped for the use of H.M. Forces abroad, they may include explosives, ammunition, etc., purchased by the Dominions or Crown Colonies, etc., from Government Ordnance Factories; the output of these establishments is excluded from the figures of production shown.

### 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 Explosives and Fireworks 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, 6,200 operatives, or 76 per cent. of the total of 8,150 operatives for the trades as a whole, and their net output totalled £2,322,000, or 83 per cent. of the aggregate net output of £2,814,000 for the trades as a whole. The total wage-bill of these firms, as returned to the Ministry of Labour, was £627,000, representing about 27 per cent. of their aggregate net output.

### Employment.

The detailed information relating to employment in 1924 is summarised in Table III on pages 149 and 150. The following table sets out certain particulars for that year together with those relating to the 1907 Census. 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 .. .. .	449	3,611	1,311	4,070	1,760	7,681
Administrative, etc. .. .. .	33	653	24	302	57	955
TOTAL .. .. .	482	4,264	1,335	4,372	1,817	8,636
<b>1907.</b>						
Wage earners .. .. .	564	6,462	1,275	5,363	1,839	11,825
Salaried .. .. .	55	758	20	161	75	919
TOTAL .. .. .	619	7,220	1,295	5,524	1,914	12,744

The numbers of operatives recorded month by month in 1924 ranged from 469 above the average, in October, to 424 below the average, in March (see Table IIIB, page 150).

### Mechanical Power.

The detailed information relating to mechanical power in 1924 is summarised in Table IV on page 150. The following table sets out the particulars for 1924 and 1907 relating to the capacity and kinds of *prime movers* and the capacity of *electric generators* installed.

Power equipment.	1924.			1907.
	Ordinarily in use.	In reserve or idle.	Total.	Total.
	H.P.	H.P.	H.P.	H.P.
<b>PRIME MOVERS :—</b>				
Reciprocating steam engines ..	3,341	1,804	5,145	12,395
Steam turbines .. .. .	4,120	1,980	6,100	—
Gas engines .. .. .	607	90	697	1,615
Petrol and light oil engines ..	75	47	122	
Heavy oil engines .. .. .	261	107	368	1,405
Water power .. .. .	1,262	—	1,262	
Other .. .. .	—	—	—	107
<b>TOTAL .. .. .</b>	<b>9,666</b>	<b>4,028</b>	<b>13,694</b>	<b>15,522</b>
	Kw.	Kw.	Kw.	Kw.
<b>ELECTRIC GENERATORS :—</b>				
Driven by—				
Reciprocating steam engines	1,018	756	1,774	2,688
Steam turbines .. .. .	3,060	1,480	4,540	—
Gas engines .. .. .	135	45	180	90
Petrol and light oil engines ..	30	—	30	
Heavy oil engines .. .. .	63	39	102	23
Water power .. .. .	23	—	23	
Other prime movers .. .. .	—	—	—	—
<b>TOTAL .. .. .</b>	<b>4,329</b>	<b>2,320</b>	<b>6,649</b>	<b>2,778</b>

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

Electric motors.	Ordinarily in use.	In reserve or idle.	Total.
	H.P.	H.P.	H.P.
Driven by—			
Electricity generated in own works ..	8,470	2,204	10,674
Purchased electricity .. .. .	1,063	212	1,275

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 135,000.

## TABLES.

### I.—Summary of results.

Note.—No production was recorded for Northern Ireland.

Particulars.	Unit.	Great Britain.*
Value of goods made (Gross output) .. .. .	£'000.	5,328
Cost of materials used .. .. .	"	2,514
Net output .. .. .	"	2,814
Average number of persons employed .. .. .	No.	8,636
Net output per person employed .. .. .	£	326
Mechanical power available :—		
Prime movers .. .. .	H.P.	13,694
Electric motors driven by purchased electricity	"	1,275

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

### II.—Production.

Goods sold or added to stock.	Great Britain.*	
	Quantity.	Selling value.
	Cwt.	£'000.
High explosives and propellant powders .. .. .	473,000	2,457
Small arms ammunition (including empty cartridge cases) :—		
Military .. .. .	35,000	390
Sporting .. .. .	96,700	567
Fuses and blasting accessories .. .. .	..	985
Explosives and ammunition not elsewhere specified	..	407
Rockets and other pyrotechnic products .. .. .	..	222
Chemical products .. .. .	..	80
Metal goods .. .. .	..	38
Other goods .. .. .	..	182
<b>TOTAL VALUE OF GOODS MADE .. .. .</b>	<b>..</b>	<b>5,328</b>

\* See footnote to Table I.

### 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>Great Britain* :—</i>					
Operatives .. .. .	476	3,831	1,392	4,319	1,868	8,150
Administrative, technical and clerical staff .. .. .	33	653	24	302	57	955
<b>TOTAL .. .. .</b>	<b>509</b>	<b>4,484</b>	<b>1,416</b>	<b>4,621</b>	<b>1,925</b>	<b>9,105</b>

\* See footnote to Table I.

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

Great Britain.\* (Annual average : Males, 3,611 ; Females, 4,070 ; Total, 7,681.)

Week ended.	Males.	Females.	Total.	Week ended.	Males.	Females.	Total.
Jan. 12th ..	3,488	4,103	7,591	July 19th ..	3,587	3,941	7,528
Feb. 16th ..	3,501	3,912	7,413	Aug. 16th ..	3,659	4,177	7,836
March 15th ..	3,437	3,820	7,257	Sept. 13th ..	3,726	4,275	8,001
April 12th ..	3,527	3,890	7,417	Oct. 18th ..	3,831	4,319	8,150
May 17th ..	3,583	3,925	7,508	Nov. 15th ..	3,724	4,254	7,978
June 21st ..	3,562	4,001	7,563	Dec. 13th ..	3,709	4,214	7,923

\* See footnote to Table I.

## IV.—Mechanical Power.

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

Power equipment.	Great Britain.*	
	Ordinarily in use.	In reserve or idle.
	H.P.	H.P.
<b>PRIME MOVERS :—</b>		
Reciprocating steam engines .. .. .	3,341	1,804
Steam turbines .. .. .	4,120	1,980
Gas engines .. .. .	607	90
Petrol and light oil engines .. .. .	75	47
Heavy oil engines .. .. .	261	107
Water power .. .. .	1,262	—
<b>TOTAL</b> .. .. .	<b>9,666</b>	<b>4,028</b>
<b>TOTAL OF PRIME MOVERS INSTALLED</b> ..	<b>13,694</b>	
	Kw.	Kw.
<b>ELECTRIC GENERATORS :—</b>		
Driven by—		
Reciprocating steam engines .. .. .	1,018	756
Steam turbines .. .. .	3,060	1,480
Gas engines .. .. .	135	45
Petrol and light oil engines .. .. .	30	—
Heavy oil engines .. .. .	63	39
Water power .. .. .	23	—
<b>TOTAL</b> .. .. .	<b>4,329</b>	<b>2,320</b>
<b>TOTAL OF ELECTRIC GENERATORS INSTALLED</b>	<b>6,649</b>	
	H.P.	H.P.
<b>ELECTRIC MOTORS :—</b>		
Driven by—		
Electricity generated in own works .. ..	8,470	2,204
Purchased electricity .. .. .	1,063	212

\* See footnote to Table I.