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FIRES IN SCHOOLS. REPORTS OF INCIDENTS ATTENDED BY FIRE BRIGADES
IN ENGLAND AND WALES, 1954

by

Mrs. J.E.L. Hinton

Summary

An analysis has been made of 540 incidents of fires in schools and allied educational institutions. Three hundred and forty-one incidents, 63 per cent of the total, occurred in primary and secondary day schools and 70 (13 per cent) in boarding schools.

One hundred and seventy-nine incidents, 33 per cent of the total, were caused by heating apparatus and a further 55 by cookers (electric, gas, or coal ranges). Seventy-nine incidents occurred in kitchens and canteens (Tables 3a and 3b) and 59 in classrooms.

In 173 incidents (Tables 4a and 4b), constructional materials were ignited first, partitions, walls and wall linings being involved in 19 per cent of these incidents, and floors in a further 23 per cent.

It was possible to obtain the cost of the damage due to some of the fires, where the damage was estimated to amount to more than £10. The total cost of 78 such incidents was about £66 000.

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INTRODUCTION

An analysis has been made of all reports of fires in schools and allied institutions in 1954. This note continues the survey of such incidents started at the request of the Ministry of Education in 1951.

Data have been collected on the type of school, causes of fire and materials first ignited, locations of the outbreaks, methods of fire fighting and the extent of damage. It has also been possible in some cases to obtain the cost of reinstatement of fire damage.

TYPE OF SCHOOL

The types of educational establishment considered and the frequency of the fires occurring in each are shown in Table 1 and Fig.1. Of a total of 540 incidents considered 341 (63 per cent) occurred in primary and secondary day schools, and 70 (13 per cent) in boarding schools.

CAUSE OF FIRE AND LOCATION OF OUTBREAK

The frequency of outbreaks due to various causes are shown in Table 2. One hundred and seventy-nine incidents, 33 per cent of the total, were caused by heating apparatus, and a further 55 by cookers (gas, electric, or coal ranges); 74 incidents (13.8 per cent) were caused by the careless disposal of smokers materials and matches.

Seventy-nine incidents occurred in kitchens and canteens, Tables 3a and 3b, 50 of which were due to cookers (gas, electric, or coal ranges). Sixty-two incidents occurred in boiler rooms or boiler houses, 25 of these were due to radiated heat from the boiler, 9 to radiated heat or sparks from flues and 9 to hot ashes. There were 59 incidents where fire broke out in classrooms, 30 of these were caused by heating apparatus.

CONSTRUCTIONAL MATERIAL FIRST IGNITED

In 173 incidents (Tables 4a and 4b) constructional materials were ignited first. Partitions, walls and wall linings were first ignited in 19 per cent of these incidents, and floors in a further 23 per cent. The most common cause of ignition of constructional materials was radiated heat and sparks from flues (36 incidents, 21 per cent).

METHODS OF EXTINCTION AND EXTENT OF FIRE

One hundred and eighty-three incidents were extinguished before the arrival of the Fire Brigades and in a further 26 cases the fire burned itself out. One hundred and two incidents, 19 per cent of the total, were extinguished by the use of fire extinguishers and 8 by jets from fixed hose reels. In 238 cases the fires were extinguished by apparatus from Fire Brigade appliances.

Four hundred and forty-two (82 per cent) of the outbreaks were confined to the room of origin and in 424 of these the damage was negligible and amounted to less than 50 sq. ft. of the building.

COST OF FIRES

It has been possible to obtain the cost of reinstatement of damage due to many of the incidents where damage was estimated to amount to more than £10.

The total cost of 78 such incidents was about £66 000. This total includes three major fires where the damage amounted to more than £10 000. The number of fires in each loss range is shown in Fig. 2.

REFERENCES

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2. HINTON, J. E. L. Fires in Schools. An analysis of incidents attended by Fire Brigades in England and Wales during 1952. Department of Scientific and Industrial Research and Fire Offices' Committee F.R. Note No.97/1954.
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POST-WAR SCHOOLS

There were 15 incidents reported as occurring in schools of post-war construction. The causes of these incidents and the damage involved are summarised in Table 5. In only two of the incidents was the damage to structure appreciable. The total cost due to the 4 fires known to have caused more than £10 worth of damage each was estimated at about £900.

CASUALTIES

There were in all 30 casualties reported as a result of 21 fires in schools during 1954. Twenty-one of these were adult (including 7 Fire Brigade personnel) and 9 casualties were children. The injuries were slight in most cases, and none proved fatal.

DISCUSSION OF RESULTS AND COMPARISON WITH PREVIOUS ANALYSES

There are no outstanding factors apparent from this analysis of fires in schools which have not been noticed previously. The causes of fires are in the main those common to domestic dwellings, fires due to heating and cooking apparatus accounting for almost half of the total number, and about 15 per cent of the incidents occurred in kitchens and canteens.

About one-third of the fires were extinguished before the arrival of the Fire Brigades which seems to indicate that in these cases the outbreaks were slight and easily dealt with. In only 18 per cent of the incidents did the fire spread beyond the room of origin.

An attempt has been made to compare the results of this analysis with the previous analyses on this subject (1) (2) (3). For 1951 and 1952 analyses were made on a 1 in 2 sample and a 1 in 4 sample of reports respectively and it is unwise to make a comparison in detail between categories in which the frequencies may be small. It can be shown, however, that the pattern of fires in schools remains fairly steady. For instance, considering groups of causes, it appears from Table 6 that about 30 per cent of the incidents in each year are due directly or indirectly to heating apparatus, and between 5 and 10 per cent to cookers (electric or gas) and coal ranges. Smokers materials, matches and children playing with matches give rise to an average of 15 per cent of the incidents each year.

In about 30 per cent of the incidents in each year constructional materials were ignited first and the parts of the structure most frequently ignited were the roof, walls and wall linings and partitions. In each of the years considered about one-third of the fires were extinguished before the fire brigades arrived, indicating that the Brigades were called perhaps as a precaution on account of the nature of the premises. The proportion of fires that spread beyond the room of origin was also consistently low.

The casualties occurring in fires in schools are slight and there have been no fatal casualties reported in the years 1951-54.

In the post-war period there has been a considerable school building programme. Since 1951 the numbers of pupils on the registers of grant-aided schools, direct grant schools and other schools recognised as efficient by the Ministry of Education has risen from about 6 115 000 to 6 795 000 in 1954, and the number of schools or departments (e.g. primary, secondary) available has risen at a rate between 200 and 300 a year.

Despite this increase in school buildings and the increase in child population attending school there is no evidence of a corresponding increase in the number of fires.

The general pattern of fires in schools is now apparent and it is considered that little new information is likely to emerge from further analyses of this type in the immediate future. The number of post-war schools at risk is still too small for statistical techniques to be applicable. It will be necessary to continue to observe the incidence of fires in schools in a general way so that any serious changes in the situation will be noticed, but no further detailed analysis will be undertaken until about 5 years have elapsed.

FIRES IN SCHOOLS 1954

Table 1

TYPE OF SCHOOL

Frequencies obtained from all reports of Fire Brigades in England and Wales 1954

Type of School	L.E.A.	Other	Total
Primary school - non-residential	156	35	191
- residential	3	26	29
Secondary school - non-residential	140	10	150
- residential	2	39	41
Universities - non-residential	-	6	6
- residential	-	7	7
Polytechnics	20	-	20
Other Further Education - non-residential	7	10	17
- residential	5	4	9
Special Schools	11	13	24
Homes - orphanages	12	7	19
Other and undefined establishments	19	8	27
Total	375	165	540

Table 2

CAUSE OF FIRE

Frequencies obtained by analysis of all reports from Fire Brigades in England and Wales 1954

Cause of fire	L.E.A.	Other	Total
Ashes, soot	9	5	14
Blowlamp	14	11	25
Electric cooker	12	-	12
fire	3	5	8
other apparatus	25	15	40
wire and cable	21	7	28
Fire in grate	17	14	31
Flue	33	14	47
Gas cooker	23	6	29
fire	2	3	5
other apparatus	23	6	29
Smokers materials and matches	35	10	45
Children playing with matches	24	5	29
Naked light	6	1	7
Oil lamp, stove	3	6	9
Kitchener stove	10	4	14
Slow combustion stove and boiler	51	14	65
Miscellaneous causes	35	24	59
Unknown cause	29	15	44
Total all fires	375	165	540

Table 3a

CAUSE OF FIRE AND LOCATION OF OUTBREAK OF INCIDENTS IN L.E.A. ESTABLISHMENTS

Frequencies obtained by analysis of all reports from Fire Brigades in England and Wales 1954

Cause of fire	LOCATION OF OUTBREAK																	Total	
	Kitchen, canteen	Separate kitchen	Domestic Science Room	Boiler house	Separate Boiler house	Laboratory	separate Laboratory	Workshops	Cloakroom	Store	Separate store,	Classroom	Separate Classroom	Huts, sheds, pavilions	Roof	Roof other than main	Other and undefined locations		Other locations separate
Ashes, soot	-	-	-	8	1	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Blowlamp	1	-	-	1	-	-	-	1	1	-	-	1	-	-	3	-	5	1	14
Electric - cooker ...	1	10	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
fire	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
apparatus	2	4	-	1	-	-	-	-	1	-	1	-	-	-	-	-	15	3	27
wire and	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cable ...	-	-	-	5	-	-	-	-	1	-	-	2	1	-	1	-	10	1	21
Fire in grate	1	-	1	-	-	-	-	-	-	-	-	6	-	-	-	-	8	1	17
Flue	1	1	-	3	2	-	1	-	-	-	-	3	1	1	7	-	10	3	33
Gas cooker	11	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	23
fire	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3
other apparatus .	-	3	3	2	-	3	1	-	-	2	-	-	-	-	-	-	7	1	22
Smokers' materials and	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
matches	-	-	1	1	-	-	-	1	-	2	-	6	-	4	-	-	16	1	32
Children playing with	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
matches	-	-	-	-	-	-	-	-	1	-	-	3	1	10	-	-	9	1	25
Naked light	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	3	-	6
Oil lamp, stove	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	3
Kitchener stove	4	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	10
Slow combustion stove	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
and boiler	-	4	-	16	3	-	-	-	-	-	-	10	3	3	-	-	12	-	51
Miscellaneous causes	-	2	-	2	-	8	1	-	3	2	-	1	1	3	-	-	10	1	34
Unknown cause	1	1	-	2	-	-	1	-	2	1	1	4	-	6	3	-	8	2	32
Total fires	23	40	6	43	6	11	4	2	9	8	2	37	7	28	14	-	120	15	375

Table 3b

CAUSE OF FIRE AND LOCATION OF OUTBREAK OF INCIDENTS IN NON-L.E.A. ESTABLISHMENTS
 Frequencies obtained by analysis of all reports from Fire Brigades in England and Wales 1954

Cause of fire	LOCATION OF OUTBREAK																Total		
	Kitchen, canteen	Separate kitchen	Domestic Science Room	Boiler house	Separate boiler house	Laboratory	Separate Laboratory	Workshops	Cloakroom	Store	Separate store	Classroom	Separate Classroom	Huts, sheds, pavilions	Roof	Roof other than main		Other and undefined locations	Other locations separate
Ashes, soot	1	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	-	5	
Blowlamp	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	1	-	11	
Electric cooker	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	4	-	5	
fire	-	-	-	-	1	1	-	1	-	-	-	-	-	1	-	7	3	15	
apparatus ..	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	7	
wire and cable	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	13	-	14	
Fire in grate	1	-	-	4	-	-	-	-	-	-	2	-	1	1	-	5	-	14	
Flue	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	
Gas cooker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3	
fire	1	-	-	-	-	3	-	-	-	-	1	-	-	-	-	1	-	6	
other apparatus ..	-	-	-	1	-	1	-	-	-	-	3	-	-	-	-	5	-	10	
Smokers' material and matches	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	4	-	5	
Children playing with matches	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	
Naked light	-	-	-	-	-	-	-	-	-	-	1	-	3	-	-	2	-	6	
Oil lamp, stove	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	
Kitchener stove	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Slow combustion stove and boiler	1	-	-	4	2	-	-	-	-	-	2	-	2	1	-	2	-	14	
Miscellaneous causes	1	1	-	-	-	-	1	-	1	1	-	-	5	-	-	12	2	24	
Unknown cause	-	-	-	-	-	-	-	-	1	-	3	-	-	-	1	9	1	15	
Total	15	1	-	11	2	5	1	1	2	4	-	13	2	13	13	1	75	6	165

Table 4a

NATURE OF CONSTRUCTIONAL MATERIALS FIRST IGNITED IN L.E.A. ESTABLISHMENTS

Frequencies obtained by analysis of all reports from Fire Brigades in England and Wales 1954

Cause of fire	CONSTRUCTIONAL MATERIAL FIRST IGNITED																
	Roof	Ceiling	Partitions, walls, linings to walls	Floor	Timber under hearth	Wooden surround to fireplace	Timber in chimney	Other wooden fittings	Lagging of pipes	Elec. insulation - no fire spread	Elec. insulation - floorboards, walls, rafters, ceilings	Elec. insulation - fusebox panel, dis- tribution board only	Fusebox panel etc.- spreading to floors, rafters, etc.	Elec. insulation - spreading to built- in cupboards only	Elec. insulation spreading to other	Miscellaneous	Total
Blowlamp	2	1	-	2	-	-	-	3	2	-	-	-	-	-	-	-	10
Electric cooker	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
Electric fire	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Electric other apparatus	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2
Electric wire and cable	-	-	1	-	-	-	-	-	-	3	5	7	-	-	-	1	19
Fire in grate	-	-	-	2	4	3	1	-	-	-	-	-	1	-	-	-	10
Flue	8	1	1	10	4	-	4	-	1	-	-	-	-	-	-	-	28
Gas cooker	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3
Gas fire	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Gas other apparatus	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	3
Smokers materials and matches	-	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	3
Oil lamp - stove	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Kitchener stove	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Slow combustion stove	-	-	15	7	2	1	-	1	-	-	-	-	-	-	-	1	27
Miscellaneous	1	-	1	2	-	-	-	-	-	-	-	-	-	-	-	1	5
Unknown	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Total	11	2	23	31	10	4	5	5	3	4	5	7	1	1	2	3	117

Table 4b

NATURE OF CONSTRUCTIONAL MATERIALS FIRST IGNITED IN NON-L.E.A. ESTABLISHMENTS
 Frequencies obtained by analysis of all reports from Fire Brigades in England and Wales 1954

Cause of fire	CONSTRUCTIONAL MATERIAL FIRST IGNITED																
	Roof	Ceiling	Partitions, walls linings to walls	Floor	Timber under hearth	Wooden surround to fireplace	Timber in chimney	Other wooden fittings	Legging of pipes	Elec. insulation - no fire spread	Elec. insulation - Floorboards, walls, rafters, ceilings	Elec. insulation - fusebox panel, dis- tribution board only	Fusebox panel etc. - spreading to floors, rafters, etc.	Elec. insulation - spreading to built- in cupboards only	Elec. insulation spreading to other	Miscellaneous and undefined	Total
Ashes, soot	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Blowlamp	7	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	9
Electric fire	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Electric other apparatus	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
Electric wire and cable	-	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	6
Fire in grate	-	-	-	1	7	1	1	-	-	-	-	-	-	-	-	-	10
Flue	1	-	2	1	-	-	2	1	-	-	-	-	-	-	-	-	8
Gas fire	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Gas other apparatus	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Oil lamp - stove	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Kitchener stove	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Slow combustion stove, boiler	1	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Miscellaneous causes	2	2	1	1	-	-	1	1	-	-	-	-	-	-	-	-	8
Total	13	2	10	8	7	1	5	3	-	-	3	2	-	-	-	2	56

Table 5

FIRES IN SCHOOLS OF POST-WAR CONSTRUCTION

(A summary of the causes and the amount of damage in 15 fires reported as occurring in schools of post-war construction)

Type of construction	Cause of fire	Damage
2 storey. Precast reinforced concrete walls, all floors concrete, precast reinforced concrete and bitumenous felt roof	Unknown	10 per cent contents of cupboard damaged, room slightly damaged by heat smoke and water (Cost estimated at £385)
Brick walls, concrete floors faced with timber, boarded and slated roof	Heat from flue set fire to stored firewood in boiler room	Small quantity of firewood damaged by fire
Single storey, brick walls concrete floors, asphalt roof	Lighted cigarette end fired cleaning material in switch room	Small quantity of cleaning rags burned
Single storey, sheet aluminium walls lined with hardboard, concrete floor faced with Semp-tex tiles. Sheet aluminium roof on fibre-boards.	Malicious ignition	6'x6' of Semp-tex floor tiles destroyed, 3 panes of glass cracked by heat. (Cost estimated at £150)
Single storey, brick walls part concrete, part timber floor, timber and asbestos roof.	Spark from short circuit of electrical wiring set fire to insulation.	Slight damage to about 2'x3' of fibre-boarding in roof.
2 storey, brick walls, concrete floors, boarded and tiled roof.	Unknown	No structural damage. 10 per cent of contents of classroom damaged by fire.
Single storey, brick walls, floors part timber and part concrete, tiled roof.	Short circuit in refrigerator motor.	Refrigerator in kitchen damaged by fire.
Single storey, prefabricated school	Roof timbers ignited by stove pipe.	20'x10' of roofing damaged by fire. (Cost estimated at £340)
Single storey, brick walls, part stone, part timber floors, concrete and asphalt roof.	Boiling tar drawn from boiler in playground splashed on to hot exterior of boiler and became ignited.	Doors of refuse bin enclosure damaged. Glazing of dining hall window cracked by heat

Table 5 cont.

Type of construction	Cause of fire	Damage
Range of steel framed buildings, single and multi-storeys tiled and timber floors with both protected and unprotected internal columns	Ignition of accumulation of coal gas under cooker after gas tap turned on prematurely	Small quantity of coal gas and slight burns to person
Training college, 3 and 4 storey, all floors concrete, lead bearing walls	Short circuit of refrigerating plant motor	Damage to motor and junction boxes.
Single storey, timber floors	Malicious ignition	4'x4' floor boards destroyed. Stationery damaged
Single storey timber building, boarded walls all floors timber, boarded and felted roof. (Temporary infants school)	Unknown	Appreciable damage to walls, floor and roof. (Damage estimated at £20)
Single storey, steel framed building, walls infilled with brick. Partition walls 2" breeze block, 2" cavity. Roof precast hollow concrete block, floor wood blocks.	Heat from short circuit in fluorescent lighting fitting igniting insulating materials and plastic lampshade	Lighting fitting tube wiring and lampshade damaged
One and three storeys brick walls, floors and roof concrete	Careless disposal of smoking materials ignited waste paper in basket	Curtains and pelmet damaged by fire. Ten semastic floor tiles slight damaged by heat.

Table 6

PROPORTIONS OF TOTAL FIRES IN SCHOOLS DUE TO CERTAIN CAUSES 1951-54

Cause of fires	1951	1952	1953	1954	Average
	%	%	%	%	%
Heating apparatus	29.0	30.2	31.4	33.1	30.4
Cooking apparatus	8.4	5.4	8.6	10.1	8.1
Smoking materials, matches, children playing with matches	11.0	20.1	14.8	13.7	14.9
Gas apparatus other than cooker or fire	4.6	7.0	5.6	5.4	5.6
Electric apparatus other than cooker or fire	9.9	9.3	8.9	12.5	10.1

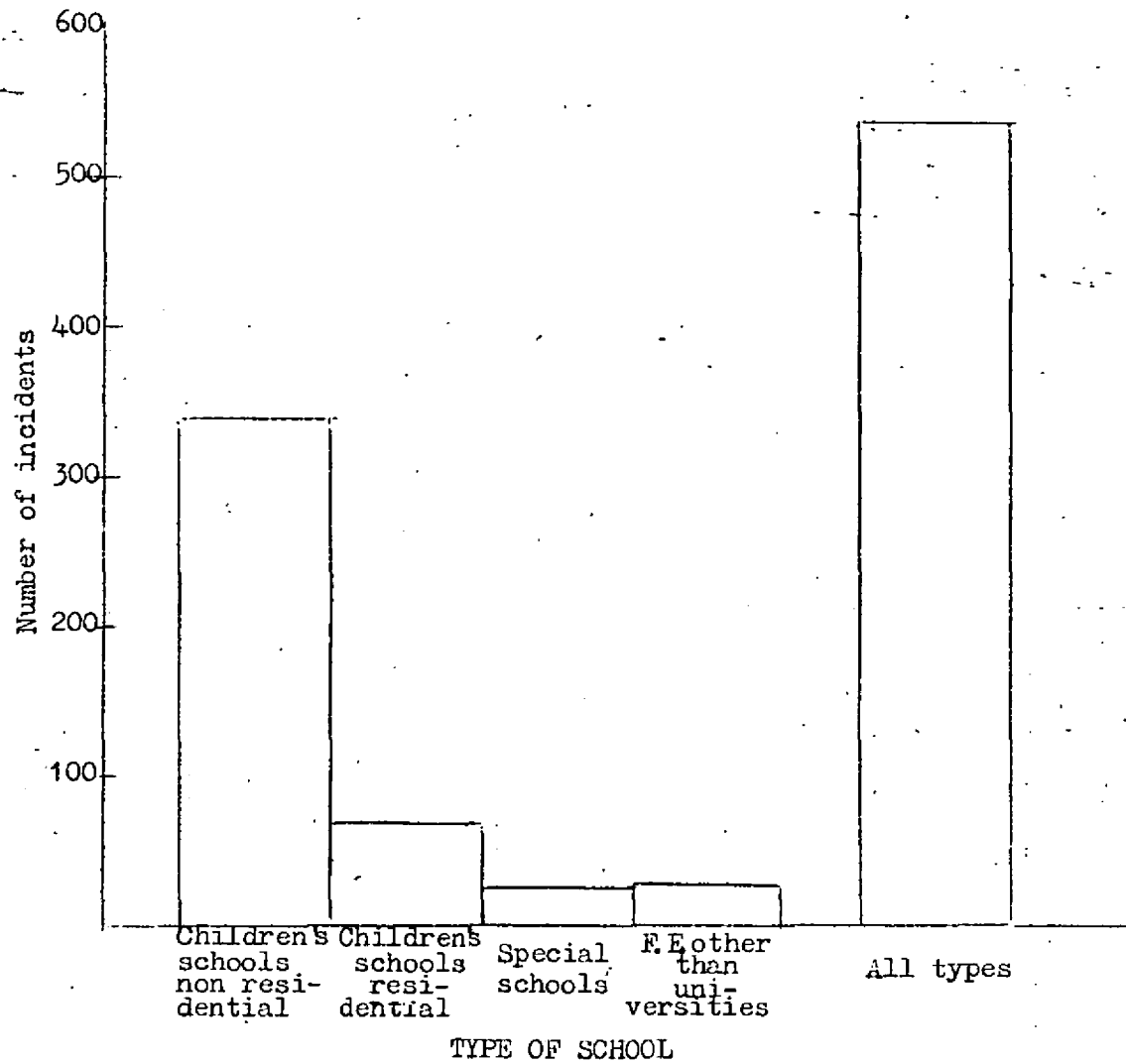


FIG. 1. NUMBER OF INCIDENTS OCCURRING IN SCHOOLS IN ENGLAND AND WALES, 1954 SHEWEN BY TYPE OF SCHOOL

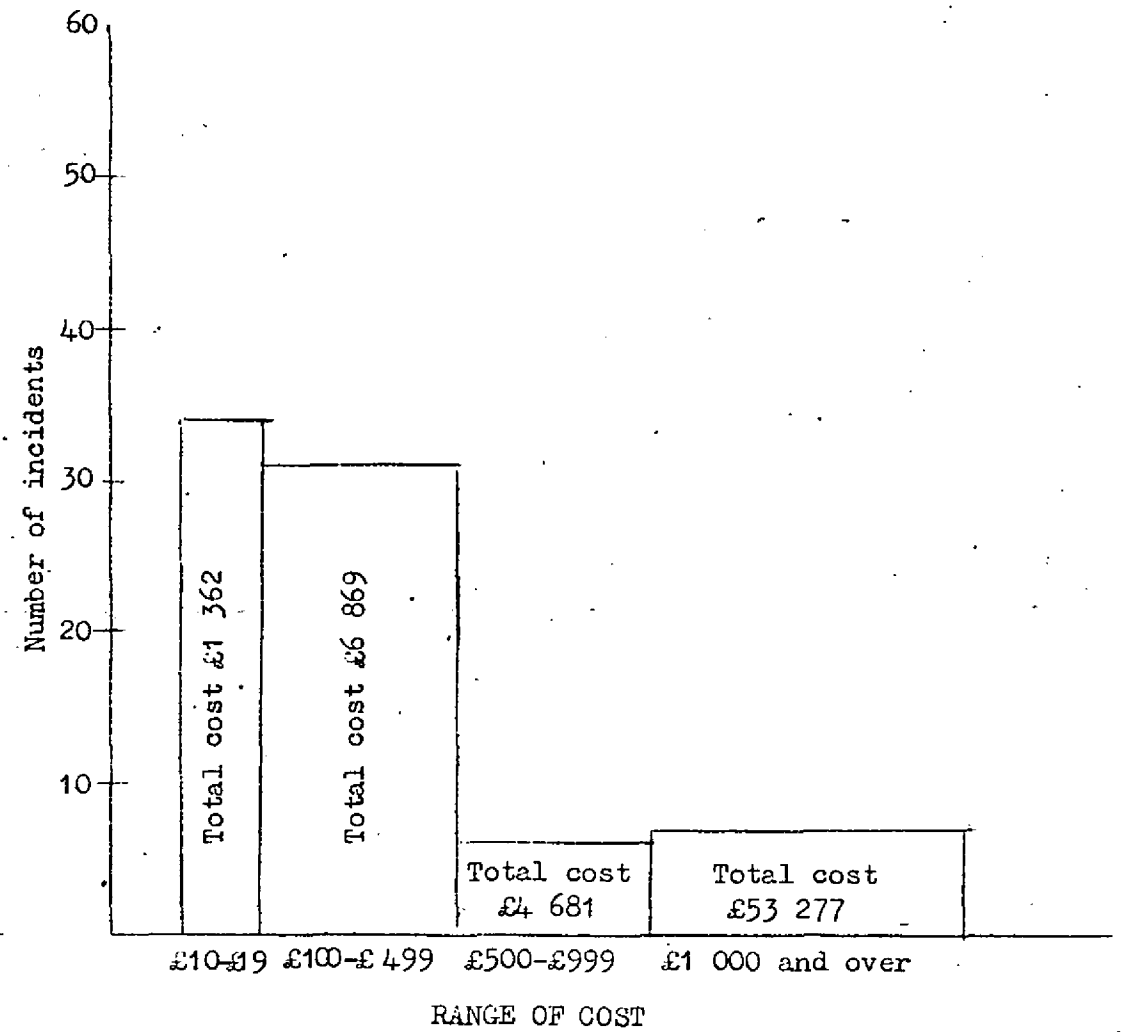


FIG. 2. COST OF REINSTATEMENT OF DAMAGE CAUSED BY SOME FIRES IN SCHOOLS IN ENGLAND AND WALES, 1954