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FIRES DUE TO THE IGNITION OF CARPETS AND FLOOR COVERINGS, 1955-62

by

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SUMMARY

A survey has been made of the incidence of fires in buildings in the period 1955-62 in which carpets and floor coverings were ignited first. In 1955 there were an estimated 692 fires in buildings attended by fire brigades in which carpets or rugs were ignited first: for 1962 the estimate was 1 046. The corresponding estimates for all floor coverings were 904 and 1 452 respectively. These represent increases of 51.2 per cent and 60.6 per cent in carpet and rug fires and all floor covering fires respectively over the eight year period. The annual incidence of all fires in buildings increased from 50 492 to 73 406 during the same period, an increase of 45.4 per cent. Carpeting fires increased at a faster rate than all fires in buildings after 1958, and there is some evidence that carpets made of the newer materials may be more hazardous than the older wool carpets.

There has been a nine-fold increase in incidents involving the ignition of floor covering fires by oil space heating. Solid fuel space heating is the most important single cause of floor covering fires.

Damage was generally slight, 85.8 per cent of the incidents in 1962 being confined to the room of origin.

MINISTRY OF TECHNOLOGY AND FIRE OFFICES' COMMITTEE
JOINT FIRE RESEARCH ORGANIZATION

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Introduction

In 1955 a survey was made of fires in which carpets and rugs were reported to have been the materials ignited first(1). An estimated 692 incidents were attended by fire brigades in the United Kingdom in 1955: by 1962 the estimated number of attendances at these fires had risen to 1 046.

Several possible explanations of this increased frequency have been examined. It could have been due to an increased amount of carpeting at risk; it could be that newer carpets, e.g. some of the non-wool carpets, are more hazardous and more likely to assist the spread of flame; or it could have been due to a changing pattern of fire causes.

Fire frequencies in buildings, 1955-62

This note is concerned only with fires in buildings in which carpets and floor coverings were ignited first and takes no account of other occupancies such as caravans and vehicles.

Table 1: Fires in buildings in which carpets and floor coverings were ignited, 1955-62

Year	Fires in which carpets and rugs were ignited		Fires in which floor coverings were ignited		Percentage of floor covering incidents involving carpets	TOTAL FIRES IN BUILDINGS	
	Frequency	Index (1955=100)	Frequency	Index (1955=100)		Frequency	Index (1955=100)
1955	692	100.0	904	100.0	76.5	50 492	100.0
1956	624	90.2	844	93.4	73.9	51 464	101.9
1957	603	87.1	816	90.3	73.9	50 694	100.4
1958	648	93.6	860	95.1	75.3	51 992	103.0
1959	708	102.3	908	100.4	78.0	61 328	121.5
1960	800	115.6	1 228	135.8	65.1	62 460	123.7
1961	950	137.3	1 344	148.7	70.7	69 588	137.8
1962	1 046	151.2	1 452	160.6	72.0	73 406	145.4

It can be seen from Table 1 that between 1955 and 1962 fires resulting from the ignition of carpets or rugs and floor coverings increased in frequency proportionately more than all fires in buildings and that the increase appears to have occurred mainly after 1958.

The percentage of floor covering incidents involving carpets remained roughly constant (at an average of about 73) over the eight year period, so that about 73 per cent of the increase in fires in which floor coverings were ignited was accounted for by those involving carpets and rugs.

Fires in relation to carpeting at risk

To examine the possibility that the fire danger from the ignition of carpets might be increasing with changing characteristics of the carpets in use, an attempt has been made to relate the fire frequency to the amount of carpeting at risk. To estimate the amount at risk it was assumed first that about 300 million square yards of carpeting (an average of 25 sq. yds./dwelling) remained from before the war until 1954 and that none was manufactured during the war. It was then assumed that the geometric mean life of a carpet or rug would be 25 years and calculations were based on the production figures given in the Annual Abstract of Statistics(2). A second estimate was obtained assuming a geometric mean life of 10 years. From Table 2, Figs 1 (a) and (b) it can be seen that, particularly from 1959 onwards, carpet and rug fires were increasing at a faster rate than the estimated total amount of carpeting at risk; this was so regardless of which estimate is used. Few non-wool carpets were produced before the war, but by 1962 non-wool carpeting accounted for a quarter of the total produced(2).

Table 2: Estimated carpeting at risk (assuming geometric mean life of 25 years)

Year	Estimated wool carpeting at risk (million sq. yds)		Estimated non-wool carpeting at risk (million sq. yds)		Estimated total carpeting at risk (million sq. yds)		Percentage of carpeting not wool
	Quantity	Index (1955=100)	Quantity	Index (1955=100)	Quantity	Index (1955=100)	
1955	617.9	100.0	45.8	100.0	663.7	100.0	6.9
1956	637.0	103.1	51.6	112.7	688.6	103.8	7.5
1957	653.8	105.8	61.0	133.2	714.8	107.7	8.5
1958	672.8	108.9	73.4	160.3	746.2	112.4	9.8
1959	695.4	112.5	81.6	178.2	777.0	117.1	10.5
1960	709.7	114.9	104.4	227.9	814.1	122.7	12.8
1961	725.7	117.4	123.5	269.7	849.2	127.9	14.5
1962	738.7	119.6	145.4	317.5	884.1	133.2	16.4

Table 2 shows that the estimated amount of non-wool carpeting (based on a geometric mean life of 25 years) increased three-fold over the period 1955-62, whereas wool carpeting increased by a factor of only approximately 1.2.

The correlation coefficient between the number of carpet fires and the estimated amount of non-wool carpeting in existence is 0.94; this is statistically significant. There is thus some evidence to support the theory that the newer (i.e. non-wool) carpets have a greater fire hazard than wool carpets which are constructed of material which spreads flame slowly(3).

Causes of fires involving carpeting and floor coverings

Table 3 illustrates the cause pattern of fires involving floor coverings and this is compared with that for the same causes in all fires in buildings in 1955 and 1962. Graphical representations of the changes in frequencies are shown for some major causes in Figs 2 and 3. It can be seen that space heating appliances were the most frequent causes of fires involving floor coverings. In 1962 these accounted for nearly 75 per cent of the fires, compared with about 22 per cent of all fires in buildings.

Table 3: Causes of fires involving floor coverings and all fires in buildings, 1955 and 1962

Causes of fires	Fires involving floor coverings				All fires in buildings			
	1955		1962		1955		1962	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Space heating								
- solid fuel	600	66.4	714	49.2	12 036	23.8	10 584	14.4
- oil	24	2.7	222	15.3	1 568	3.1	3 824	5.2
- electric	72	8.0	150	10.3	1 512	3.0	1 968	2.7
Total	696	77.0	1 086	74.8	15 116	29.9	16 376	22.3
Smokers' material	48	5.3	124	8.5	4 412	8.7	7 968	10.9
Other and unknown	160	17.7	242	16.7	30 964	61.3	49 062	66.8
TOTAL	904	100.0	1 452	100.0	50 492	100.0	73 406	100.0

Table 4: Fires attributed to certain causes in 1962 in relation to the frequencies in 1955

Causes of fires	Fires involving floor covering			All fires in buildings		
	1955	1962	Index (1955=100)	1955	1962	Index (1955=100)
Space heating						
- solid fuel	600	714	119.0	12 036	10 584	87.9
- oil	24	222	925.0	1 568	3 824	243.9
- electric	72	150	208.3	1 512	1 968	130.2
Total	696	1 086	156.0	15 116	16 376	108.3
Smokers' materials	48	124	258.3	4 412	7 968	180.6
Other and unknown	160	242	151.3	30 964	49 062	158.4
TOTAL	904	1 452	160.6	50 492	73 406	145.4

It can be seen from Table 4 that, for the causes specified, the number of incidents in which floor covering was ignited increased at a faster rate than for the same causes in all fires in buildings. Although there was an increase in the absolute number of fires resulting from the ignition of floor coverings by solid fuel space heating appliances the proportion decreased from 66.4 per cent in 1955 to 49.2 per cent in 1962. There was also a decrease in the proportion of all fires in buildings attributed to this cause (from 23.8 to 14.4 per cent) so that this may have resulted from a decreasing use of this form of heating or from the use of safer appliances.

Oil space heating fires in which floor coverings were ignited increased ninefold during the eight year period; they continued to increase after 1959 despite the fact that there was no significant increase from 1959 until 1963 in the total of oil space heating fires in buildings[4]. Development of these fires where carpets or rugs are involved may be assisted by the wick action of the materials even if the carpeting is itself not readily ignited.

Size of fire and damage

Most of the fires resulting from the ignition of carpets and rugs were small, although all of those considered in this report were of sufficient size to necessitate fire brigade assistance. In 1962, 898 (86 per cent) of the 1 046 fires attended did not spread beyond the room of origin; only 65 per cent of all fires attended in buildings were so restricted in the same year.

Forty per cent of the fires confined to the room of origin caused no structural damage and in a further 29 per cent structural damage was restricted to floors and skirting.

Conclusions

The annual frequency of attendances by fire brigades at fires in buildings in which carpets or rugs were ignited first increased from an estimated 692 in 1955 to an estimated 1 046 in 1962. From 1959 onwards the rate of increase was greater than that of all fires in buildings. The fires starting in carpets and rugs formed a roughly constant proportion, 70 to 75 per cent, of those in which floor coverings were ignited first.

Carpet and rug fires increased at a higher rate than the estimated quantities of carpet at risk. A correlation of 0.94 between the number of carpet and rug fires and the estimated amounts of non-wool carpeting existing suggests that there may be an increased fire risk with the newer (non-wool) types of carpet.

The annual frequency of fires started in floor coverings by oil space heaters increased by a factor greater than 9 in the eight year period considered; oil spillage on carpets may assist the spread of flame in these fires.

Fires caused by the ignition of carpets did not generally achieve large dimensions, 86 per cent being confined to the room of origin in 1962.

References

(1) HINTON, Mrs. J. E. L. The fire hazard of the Domestic Carpet. Joint Fire Research Organization F.R. Note No.320 July 1957.

(2) Annual Abstract of Statistics 1963 Central Statistical Office London, 1963. H.M. Stationery Office.

(3) SIMMS, D. L. Wool and the Fire Hazard. Wool Review August, 1964.

(4) United Kingdom Fire Statistics, 1963. Department of Scientific and Industrial Research, Joint Fire Research Organization. London, 1964. H.M. Stationery Office.

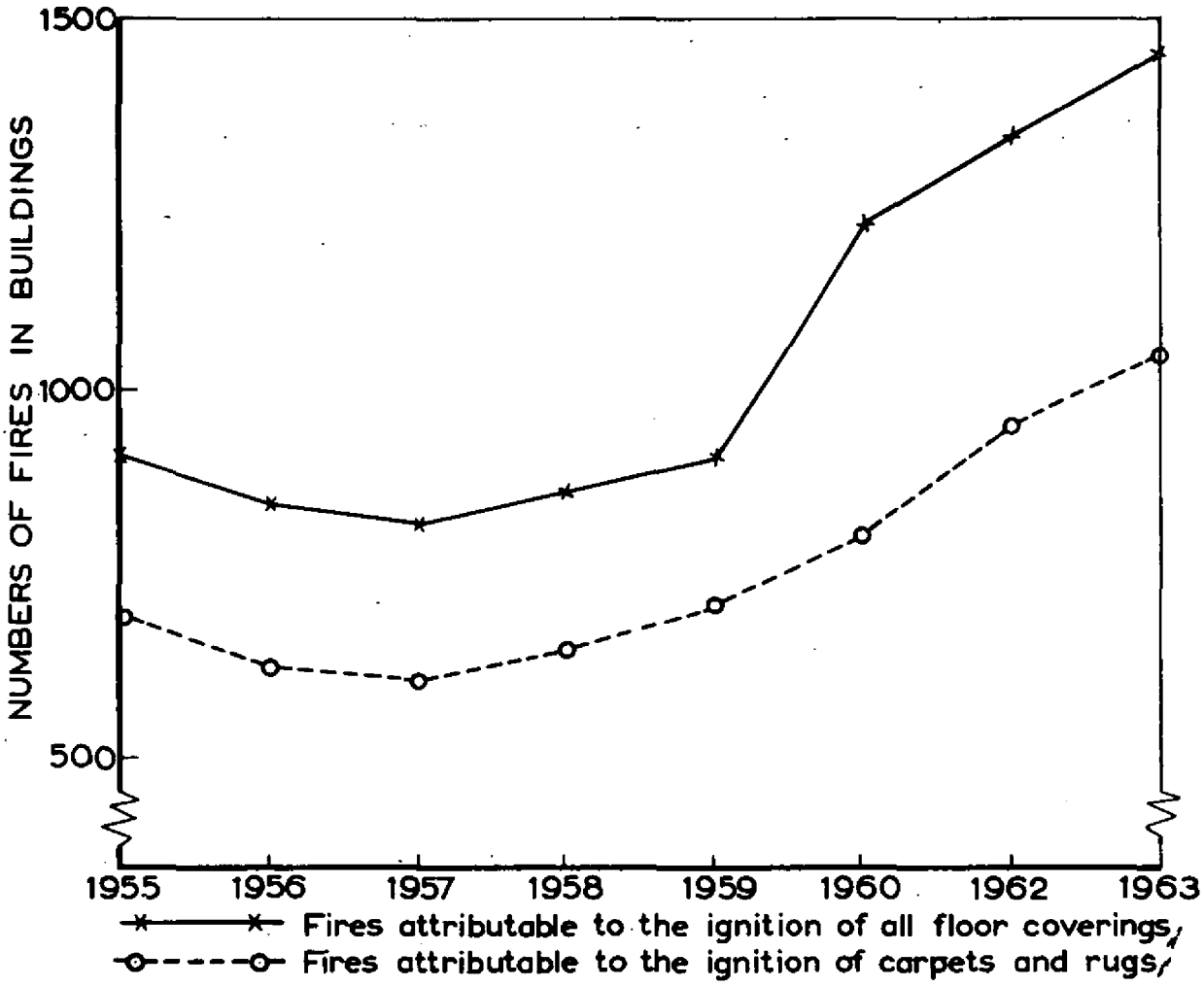

FIG. I (a). ANNUAL FREQUENCIES OF FIRES IN BUILDINGS ATTRIBUTABLE TO THE IGNITION OF CARPETS AND FLOOR COVERINGS.

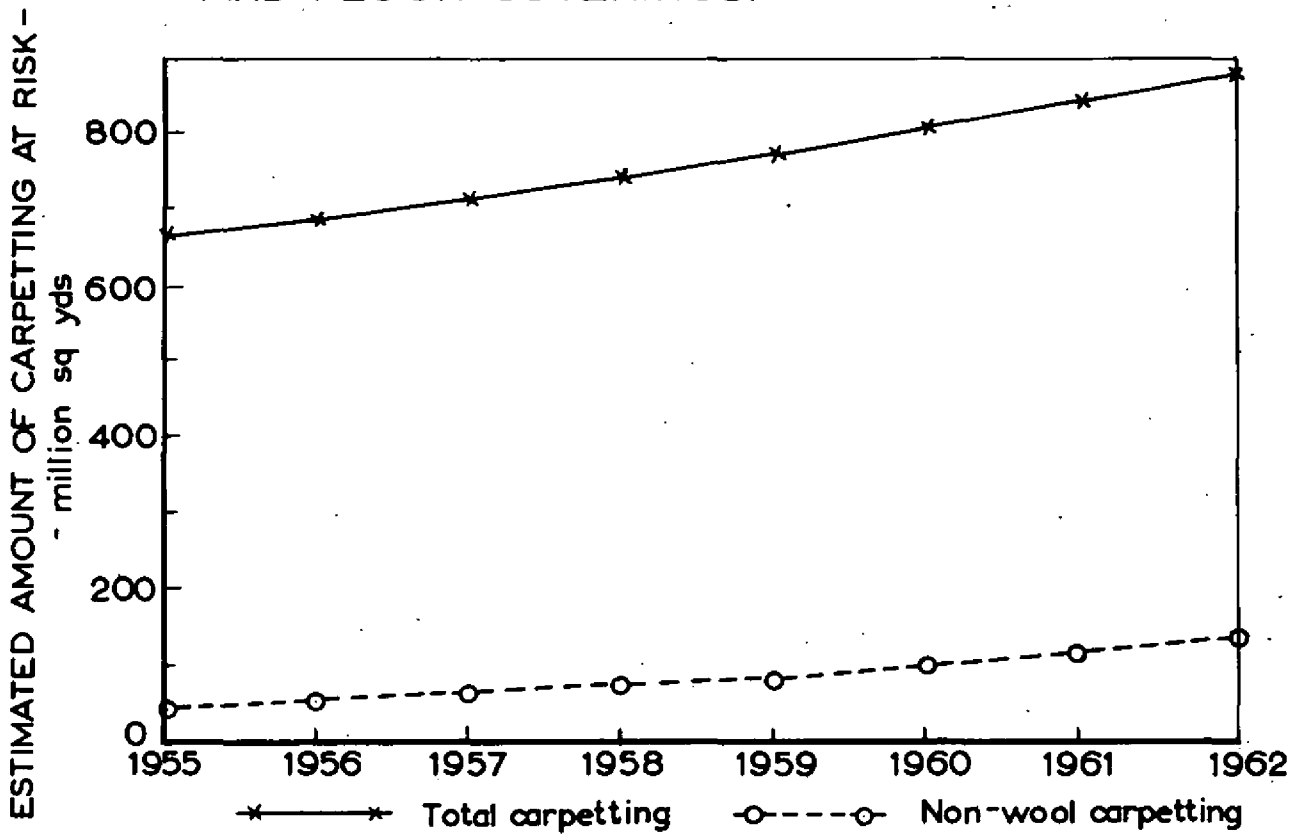

FIG. I (b) ANNUAL ESTIMATES OF AMOUNT OF CARPETTING AT RISK

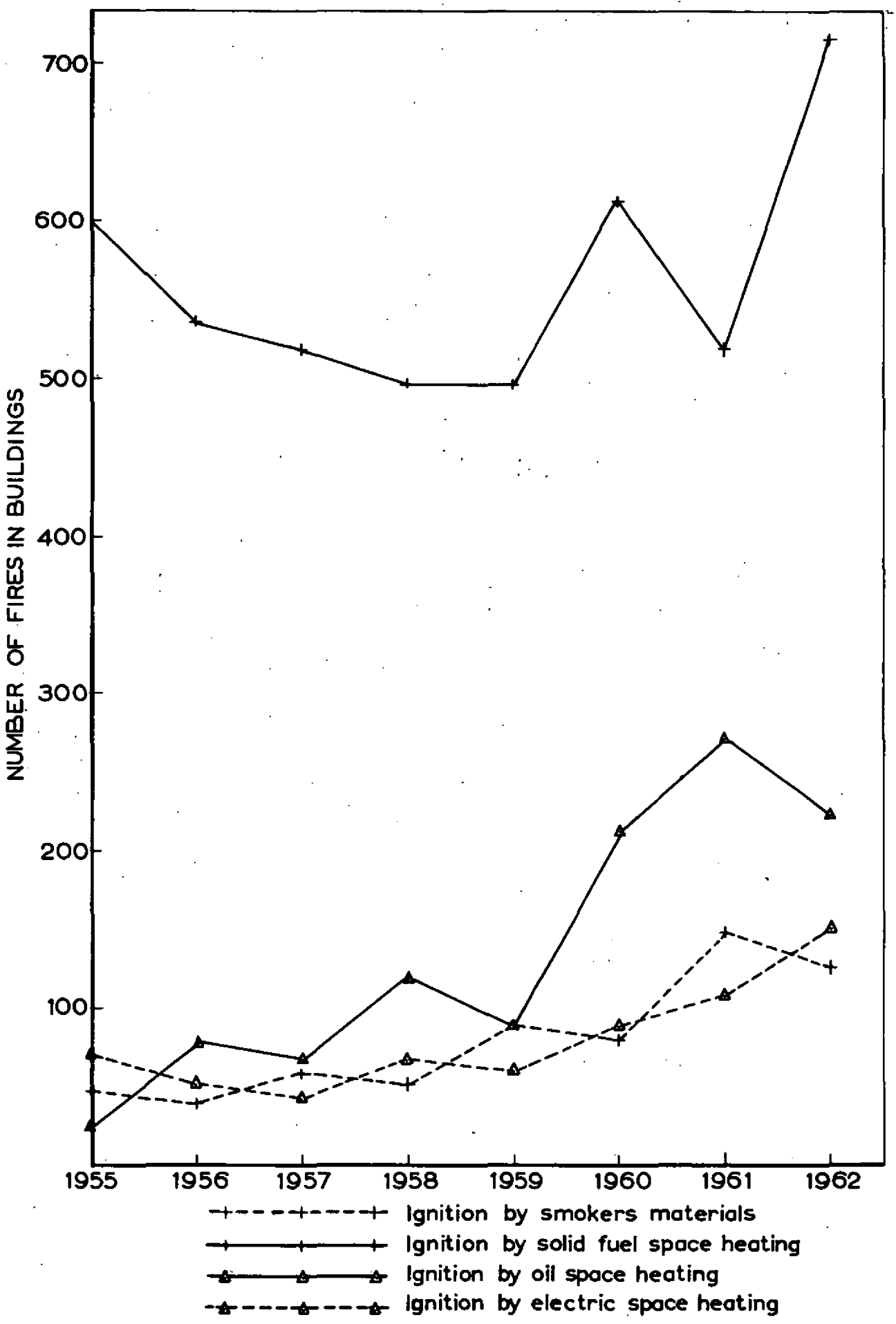

FIG. 2. ANNUAL FREQUENCY OF FIRES IN BUILDINGS ATTRIBUTABLE TO THE IGNITION OF FLOOR COVERINGS BY SPECIFIC CAUSES.

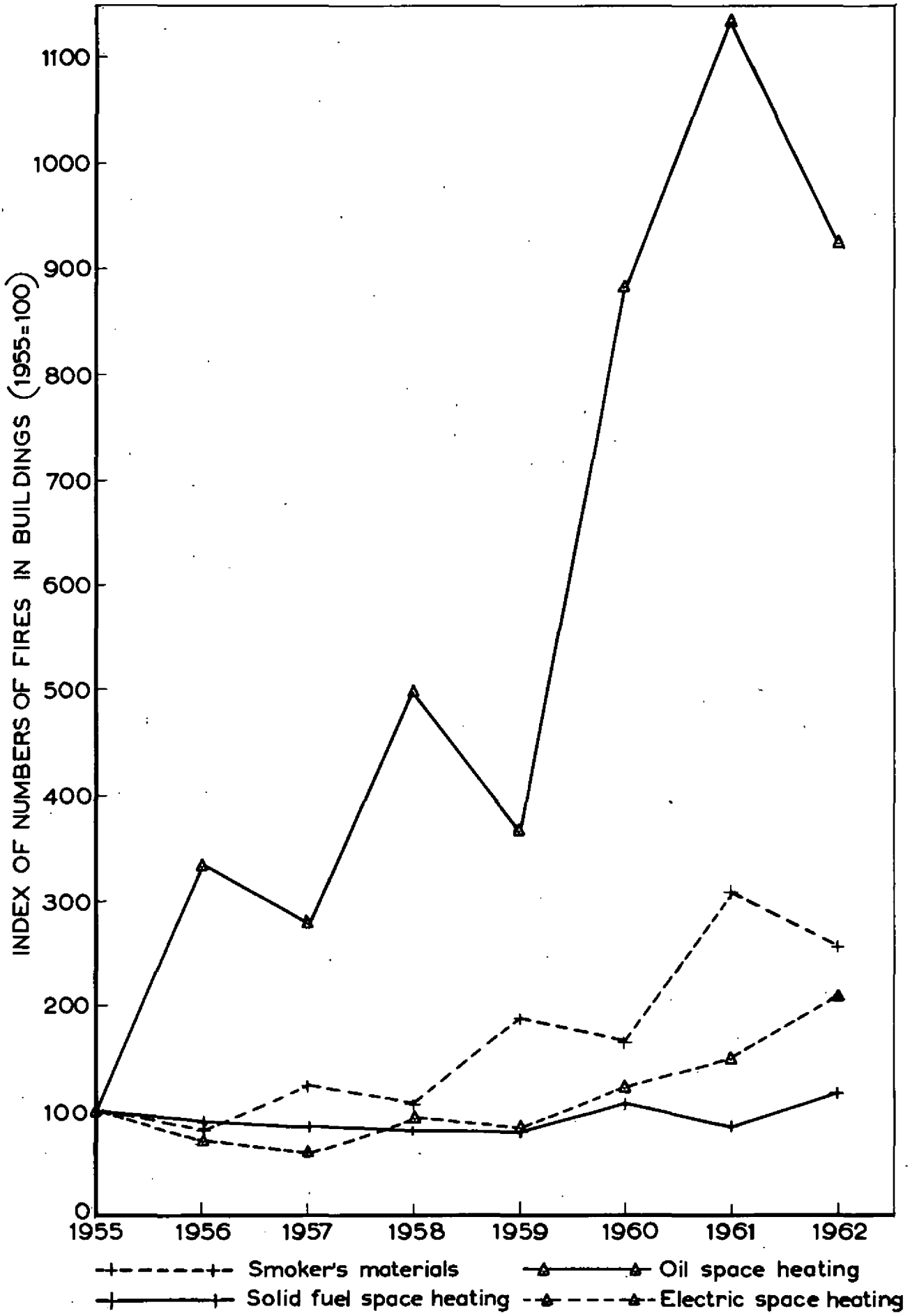

FIG. 3. ANNUAL FREQUENCY OF FIRES IN BUILDINGS ATTRIBUTABLE TO THE IGNITION OF FLOOR COVERINGS BY SPECIFIC CAUSES IN RELATION TO FREQUENCY IN 1955