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JOINT FIRE RESEARCH ORGANIZATION

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FIRES ASSOCIATED WITH TEXTILES

by

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FIRES ASSOCIATED WITH TEXTILES

Textile fires attended by the Fire Brigades

During 1953, 4,375 fires were attended by Fire Brigades in the United Kingdom in which textiles were first ignited; this amounts to about one in twenty of all the fires attended. Nearly one half of the fires were started in clothing, and in 375 of the incidents, clothing was ignited while being worn. Of the fires not involving clothing, the materials first ignited were in order:-

jute and hessian,
tarpaulins and oilskins,
rags,
cotton,
canvas.

Casualties resulting from clothing fires

Of the 375 incidents involving clothing being worn, 143 resulted in fatalities. This is nearly one-third of all fatalities reported by the Fire Brigades. Taking into account the distribution of the population in the age groups 0 - 16, 16 - 60 and over 60 years, the relative incidence is 21.5 per cent, 2 per cent and 76.5 per cent, so that the danger is one affecting almost entirely children under 16 years and old people over 65 years.

The incidence of burning is much greater with females than with males, the ratio being about 2 : 1, and the greater severity of the injuries associated with the loose, highly flammable clothing of females is strongly suggested by the disparity in the case mortality rates which are quoted by Colebrook as being 29 per cent for females, as compared with 13 per cent for males.

In a detailed analysis of 71 cases it would appear that burns occur most frequently before 10 a.m. and after 6 p.m., and as nightdresses figure largely among the garments first ignited, it would not be unreasonable to suppose that the ignition was associated with dressing and undressing. In over two-thirds of the fatal accidents the ignition was caused by gas, electric or open fires.

The above figures relate only to fires attended by the Fire Brigades. Figures published by Colebrook (1) would suggest that the casualties associated with clothing becoming ignited amount to just under 20,000 per year, of which just over 5,000 prove fatal. The average period of in-patient treatment for casualties as a result of clothing fires is 54 days, so that quite apart from any other consideration, accidents of this kind place a heavy burden on the health services of the country.

Recognition of dangerous materials

During the last eighteen months, measurements have been made by the Joint Fire Research Organization of the vertical speed of propagation of flame on fabrics, as it seems reasonable to assume that this is a measure of the hazard of burning materials. In the course of this work it has been shown that the speed of propagation of flame on cellulosic materials, in as diverse forms as paper, textiles and wood veneers, is inversely proportional to their weight per unit area, so that it is certain that light-weight materials propagate flame most rapidly.

Of the materials tested, light-weight cotton and net spread flame with a speed of about 1 ft/s; on the other hand wool, nylon, and terylene do not flame continuously, although nylon nets which have been stiffened with some resins propagate flame at rates comparable with cotton nets. Mixtures of wool/cotton, wool/nylon, and wool/terylene propagate flame at a rate similar to that of cotton of the same weight.

Although the vertical flame speed is relatively difficult to measure, a simple apparatus has been devised suitable for use in the field with which the speed of flame propagation can be measured by relatively unskilled operators. The apparatus consists of a semi-circular arched track 21 in. long, over which the sample of material $1\frac{1}{2}$ in. wide is placed; the material is lit at one end and the distance to which the flame spreads is noted. If the flame spreads completely round the semi-circle the time is noted. The vertical flame speed from either of these measurements is obtained by reference to a chart.

It is clearly important to relate the results given by this apparatus to the reports of casualties. In co-operation with the Ministry of Health, a number of Hospital Boards are being asked to supply both samples of material from burns casualties, together with information as to the area of burning on the body and other details of the case. In this way it is expected to collect information from about 5,000 casualties during the coming year and to correlate the area of burning against the performance of the material first ignited on the flammability test.

Conclusions

(1) Every effort should be made to bring home to the public the danger to which children and old people are exposed from unguarded fires of any kind. This one item forms by far the most important source of ignition.

(2) Burning casualties of females outnumbered those of males by a factor of 2 : 1, and of these the fatality rate is twice as high. Many of these injuries are caused by children's nightdresses becoming ignited and undoubtedly many accidents of this kind could be prevented by clothing all children in pyjamas.

(3) By the development of a test which will measure the hazards of fabrics, it should be possible to recognize materials which are particularly fire-safe, and perhaps consideration could be given to the provision of a British Standard marking, denoting materials which are particularly suitable for children's garments.

Reference

- (1) COLEBROOK, C. and COLEBROOK, V. The prevention of burns and scalds. Lancet, 1949, 2 (6570) 181-8.

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