"The Risk of Buildings from Fire"

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"Captain Shaw, of the London Fire Brigade, has published a little book under the title of 'Fire Surveys,' which, if well studied and acted on by those engaged in the construction and the guarding of buildings, will, says the *Builder*, save life and property in time to come. If it were desired that we should point out the main purpose, we should say it was to enforce the truth, which has only recently dawned upon legislators and constructors, that iron and stone are not fireproof materials; stone is absolutely inadmissible for stairs or to support weights internally, and no structure can properly be called fireproof, the ultimate strength of which depends on any metal.

"In the whole range of building materials, the writer maintains, there is perhaps none so unsuited for resisting fire as that most commonly in use – stone. It is true that, if embedded in cement or in thoroughly good mortar of lime and sand, it will resist for a considerable time heat gradually applied; but even in such a case it will become calcined, and will crumble to so great an extent as to be unable to carry a load afterwards. In the case of any sudden change in temperature, either from cold to heat or from heat to cold, it cracks instantly without notice, not only leaving a passage for smoke and flame, but in many instances causing the wall to fall. Stone may, however, be used with a certain amount of safety for external walls, but even for this purpose it is very much inferior to bricks.

"Walls should be constructed in such a manner as not to separate easily, either from defects in the foundation, irregularity of the loads placed on them, vibration, shocks, or other causes. A wall built of hard bricks laid in sound mortar or cement, and properly bonded, is perhaps the soundest of all for general purposes; but even such a wall is likely to fail on an emergency, if not firmly bonded into a cross wall.

"Bond timber in walls is dangerous, as we have long taught, and should not be allowed. When it rots or burns, there is a tendency in the walls to crack. Hoop iron forms a much better bond, and is free from the drawbacks attending the use of wood. Lean-to buildings are dangerous if there are windows in the wall above them. Weather-boarding causes two dangers – one of taking fire from without, the other of conveying fire through the windows. Wherever iron is used, it must be allowed sufficient play for its elasticity, and also for the expansion and contraction which it undergoes unceasingly in consequence of changes in temperature.

"Walls may be destroyed by buckling outwards from a thrust, or inwards after the falling of the floors, by inherent weakness, absence of proper ties, and in a variety of other ways; but the principal cause of their 'tumbling about,' to use a fireman's expression, is undoubtedly, in almost all cases, the want of a proper foundation. The weights carried by different parts of the same wall frequently vary very considerably, and if the ground underneath be all of the same consistency, as is generally the case, some intermediate structure beyond common foundation is absolutely necessary for buildings liable to be heavily or irregularly loaded. The neglect of this precaution has frequently been the cause of heavy losses.

"Copings, balconies, cornices, and other projections should never be constructed of stone, as this material is certain to fall down at an early stage of a fire, and is likely to kill both persons endeavoring to escape and those coming to render aid. Wherever such projects are placed, and whatever materials they may be composed of, they should invariably be well supported from the inside, and should be of a weight in proper proportion to the strength and tenacity of the internal supports. Cornices and other projections of the same kind are very dangerous when the internal supports are burned away, and the bond stones by which they are generally fastened to the walls are of no use when the flames are coming out of the windows underneath. This is a point very much neglected in many large buildings, but it is one of paramount importance in connection with fires.

"No fireman of large experience has ever seen a stone staircase escape when subjected to much heat; and this being the case, it would seem to be most desirable that there should be introduced a prohibition of the use of stone as a material for lobbies, corridors, passages, landings, or stairs, except where it is supported throughout and not overhanging in any part. We repeat that the use of stone is most dangerous for this purpose, except when it is supported throughout."