SCIENCE

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THE NEW METHOD OF PROTECTING BUILDINGS FROM LIGHTNING.

In April last I read a paper on my new method of lightning protection, before the American Institute of Electrical Engineers. This paper and the discussion were published in *Science* of May 8 and 15, 1891.

In that paper I stated that, simply as a matter of experience, I had failed to find a case on record of any damage by lightning, within certain limits given below, when the conductor was destroyed by the discharge. The why and the wherefore of this did not concern me, though of course interesting as theoretical questions.

As no exception was cited at the meeting referred to, and as I could not elicit the citing of an exception through the publication of the article in *Science*, or of the article or abstracts of it in the several electrical journals of the country, I began in the issue of *Science* for June 19, 1891, the regular insertion, which was continued till Feb. 15, 1892, of the following: —

Query.

Can any reader of *Science* cite a case of lightning stroke in which the dissipation of a small conductor (one-sixteenth of an inch in diameter, say,) has failed to protect between two horizontal planes passing through its upper and lower ends respectively? Plenty of cases have been found which show that when the conductor is dissipated the building is not injured to the extent explained (for many of these see volumes of Philosophical Transactions at the time when lightning was attracting the attention of the Royal Society), but not an exception is yet known, although this query has been published far and wide among electricians.

This has also failed to bring out a single exception to what, so far as I know, is true, that by the destruction of a small conductor all else is saved to the extent named.

Let me describe here in Franklin's own words a typical case of protection furnished by a small conductor dissipated by the discharge.

Franklin, in a letter to Collinson read before the Royal Society, Dec. 18, 1755, describing the partial destruction by lightning of a church-tower at Newbury, Mass., wrote: "Near the bell was fixed an iron hammer to strike the hours; and from the tail of the hammer a wire went down through a small gimlet-hole in the floor that the bell stood upon, and through a second floor in like manner; then horizontally under and near the plastered ceiling of that second floor till it came near a plastered wall; then down by the side of that wall to a clock, which stood about twenty feet below the bell. The wire was not bigger than a common knitting-needle. The spire was split all to pieces by the lightning, and the parts flung in all directions over the square in which the church stood, so that nothing remained above the bell. The lighting passed between the hammer and the clock in the above mentioned wire, without hurting either of the floors, or having any effect upon them (except making the gimlet-holes, through which the wire passed, a little bigger), and without hurting the plastered wall, or any part of the building, so far as the aforesaid wire and the pendulum-wire of the clock extended; which latter wire was about the thickness of a goose-quill. From the end of the pendulum, down quite to the ground, the building was exceedingly rent and damaged. . . . No part of the aforementioned long, small wire, between the clock and the hammer, could be found, except about two inches that hung to the tail of the hammer, and about as much that was fastened to the clock; the rest being exploded, and its particles dissipated in smoke and air, as gunpowder is by common fire, and had only left a black, smutty track on the plastering, three or four inches broad, darkest in the middle, and fainter towards the edges, all along the ceiling, under which it passed, and down the wall."

There can be plenty of cases cited of the failure of a large conductor to protect, as is well known to all who have looked into the subject. Of course, all sorts of excuses have been offered for the failure of the ordinary rods, which have been well put by Oliver J. Lodge, F.R.S., who has investigated the electrical problems connected with lightning and lightning protection more than any-one else, and is a complete sceptic as to the efficiency of rods, who says that "when, in spite of all precautions, accidents still occurred; when it was found that from the best-constructed conductors flashes were apt to spit off in a senseless manner to gun-barrels and bell-ropes, and wire-fences and water-butts, — it was the custom to more or less ridicule and condemn either the proprietor or its erector, or both, and to hint that if only something different had been done, — say, for instance, if glass insulators had not been used, or if the rod had not been stapled too tightly into the wall, or if the rope had not been made of stranded wires, or if copper had been used instead of iron, or if the finials had been more sharply pointed, or if the earth-plate had been more deeply buried, or if the rainfall had not been so small, or if the testing of the conductor for resistance had been more recent, or if the wall to which the rod was fixed had been kept wet, — then the damage would not have happened. Every one of these excuses has been appealed to as an explanation of a failure; but because the easiest thing to abuse has always been the buried earth connection, that has come in for the most frequent blame, and has been held responsible for every accident not otherwise explicable."

This fact of the complete protection furnished by a dissipable conductor stands, therefore, uncontroverted. One very pleasant endorsement comes from Moses G. Farmer, the veteran electrician, who writes: "My experience and observations both confirm his [my] views."

I repeat, Can any one cite a case of failure, not any theoretical considerations *pro* or *con*, but an actual case of failure under the conditions and to the extent named?

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