NEW METHOD OF PROTECTING BUILDINGS FROM LIGHTNING.

SPARE THE ROD AND SPOIL THE HOUSE!

Lightning Destroys. Shall it be Your House or a Pound of Copper?

PROTECTION FROM LIGHTNING.

What is the Problem?

In seeking a means of protection from lightning discharges, we have to view two objects—the one the prevention of damage to buildings, and the other the prevention of injury to persons. In order to protect a building in which we may live, it is necessary that work should be done; that is, as physicians express it, to make it impervious to lightning. The energy capable of doing the damage which we seek to prevent exists in the atmosphere, and is of such a nature that it cannot be changed into anything else. It is capable of appearing as what we call electricity. We will therefore call it electric energy. Our electric energy is, in some form, present in every building in which we have to deal with lightning. Therefore, the conversion of this energy into some other form, and the absorption and dissipation of its energy in such a way as shall result in the least injury to property and life.

Why Have the Old Rods Failed?

When lightning-rods were first proposed, the science of energetics was entirely undeveloped; that is to say, in the middle of the last century scientists had not come to recognize the fact that the different forms of energy—heat, electricity, mechanical power, etc.—were convertible one into the other, and that each could produce just so much of the other forms, and no more. The doctrine of the conservation and conversion of energy was first clearly worked out in the early part of this century. There were, however, some facts known regarding the electricity a hundred and forty years ago; and among these were the attracting power of points for an electric space, and the conducting power of metals. Lightning-rods were therefore introduced with the hope that their power existing in the lightning-disk could be converted around the building which it was proposed to protect, and that the building would thus be saved.

The question as to dissipation of the energy involved was entirely ignored, naturally; and from that time to this, in spite of the best endeavors of those interested, lightning-rods constructed in accordance with Franklin’s principle have not furnished satisfactory protection. This reason for this is apparent when it is considered that the electric energy existing in the atmosphere before the discharge, or, more exactly, in the column of dielectric from the cloud to the earth, above referred to, reaches its maximum value on the surface of the ground. Conductors that chance to be within the column of dielectric; so that the greatest display of energy will be on the surface of the very lightning-rods were meant to protect, and damage results, as so often proves to be the case.

It will be understood, of course, that this display of energy on the surface of the old lightning-rods is aided by their being more or less insulated from the earth, but in any event the very existence of such a mass of metal as an old lightning-rod can only tend to produce a disastrous dissipation of electrical energy upon its surface—"to draw the lightning."... As the electrical energy evolved manifests itself on the surface of conductors, the improved rod should be metallic; but, instead of making a large rod, suppose that we make it comparatively small in size, so that the least amount of metal running from the top of the house to some point a little below the foundation shall not exceed one pound. Suppose, again, that we introduce numerous insulating points in this rod. We shall then have a rod that experience shows will be readily destroyed—will be readily dissipated—when a discharge takes place; and it will be evident, that, as far as the electrical energy is consumed in doing this, there will be the less to do other damage.

The only point that remains to be proved as to the utility of such a rod is to show that the dissipation of such a conductor does not tend to injure other bodies in its immediate vicinity. On this point I can only say that I have found no case where such a conductor (the distance, a bell wire has been used, or, elevation, even if resting against a plastered wall, where there has been any injury.

Of course, it is readily understood that such an explosion cannot take place in a confined space without a certain degree of pressure, and it will be necessary when such an explosion is to be feared, that the building be so constructed as to resist the expansive effect—danger only will be dissipated on the surface of a small conductor, the conductor goes, but the other objects around are saved.

A Typical Case of the Action of a Small Conductor.

Franklin, in a letter to Collinson read before the London Royal Society, Dec. 13, 1753, 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 tall 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, till it came near a plastered wall; then it was 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 spike was split 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 lightning passed between the hammer and the clock in the above-mentioned wire, without injuring either of the wires, or having any effect upon them (except making the gimlet-holes, through which the wire passed, a little bigger), and without injuring the plastered wall, or any part of the building. As the rod is, or than the pendulum-wire of the clock extended; which latter wire was about the thickness of a penquill. From the end of the pendulum, down quite to the ground, the building was exceedingly rent and damaged. . . . So part of the aforementioned wire, being about two inches thick that hung to the hammer, and about as much that was fastened to the hammer, and about as much that was fastened to the hammer; all of them was then entirely blown out, and its particles dissipated in smoke and air, as gunpowder is by common fire, and had only left a black smoke behind it on the plastering, three or four inches broad, darkest in the middle, and fainter towards the edges. All the buildings, along the whole distance under it, were rent in pieces, and the church was quite demolished; it was so common and so frequently seen..."
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