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,—one the prevention of damage to buildings, and the other the possible hazard to persons. If a building is wholly or in part, it is necessary that work should be done; that is, as physicians express it, to prevent the disease and not to cure the injured, and to cure in some form that makes it capable of appearing as we call electricity. We will therefore call it disease. 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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 scientific men had not come to recognize the fact that the different forms of energy—heat, electricity, mechanical power, etc.—were convertible into one another, and that each could produce just so much of each of the other forms, and no more. The doctrine of the conservation and correlation of energy was first clearly worked out in the early part of this century. There were, however, some facts known in regard to electricity a hundred and forty years ago; and among these was the attracting power of points for an electric spark, and the conducting power of metals. Lightning-rods were therefore introduced with the idea that the electricity existing in the lightning-discharge could be conveyed away from the building which it was proposed to protect, and that the building might thus be saved from the shock.

The question as to dissipation of the energy involved was entirely ignored. It is, therefore, the duty of all who design and construct such a rod to provide for the dissipation of the energy in some manner. It is not possible to provide a rod that will not dissipate some of the energy, but it is possible to provide a rod that will dissipate the energy in a comparatively small amount. The question at this time is, does the rod thus modified dissipate the energy in a manner that will be of no inconvenience, or is it necessary to provide some other means for its dissipation?

As the electrical energy involved 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 in comparatively small sizes, so that the electrical energy may dissipate itself by small pieces of metal running from the top of the house to some point a little below the foundation, and so be dispersed, with the least possible damage to the building. If we introduce this scheme, we shall have numerous insulating points in the rod. We shall then have a rod that experience shows will be readily dispersed, will be comparatively durable, and such a discharge takes place, as it will be evident, that, so far as the electrical energy is consumed in doing this, there will be the less to do other damage.

The object to be preserved is to use the affability of such a rod 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 (for instance, a bell wire) has been dispersed, even if resting against a plastered wall, where there has been any other damage to other bodies in its immediate vicinity.

The following complete case is to be considered:

A Typical Case of the Action of a Small Conductor.

Franklin, in a letter to Collinson read before the London Royal Society, Dec. 13, 1750, 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 gilded hole in the floor that the bell stood upon, and through a second door in the same 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 a wall, to a clock, which stood about twenty feet below the bell. The wire was not hotter than a common knitting needle. The spike was split all to pieces by the lightning, and the bars falling in all directions over the square in which the church stood, so that nothing remained above the bell. The lightning thus cottoned the wire, and the clock in the above-mentioned wire, without hurting either of the wires, or having any effect upon them unduly except as it dissipated the electrical force, through which the wire passed, a little bigger, and without hurting the plastered wall, or any part of the building, as far as the wire reached. The clock was, however, turned equally in all directions, but the clock did not suffer."

When lightning struck a small conductor, a conductor so strong as to resist the explosive injury, — to the very expense of the building, the clock, or other objects around it are saved.