necessary to insulate lightning rods from buildings by glass or porcelain insulators, but that view is not now generally held.

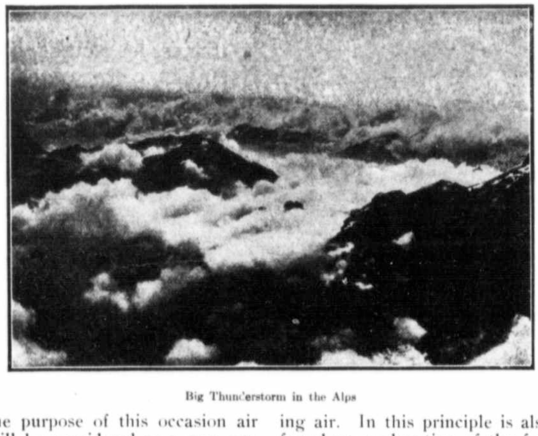
An electrical charge suddenly falling upon a copper conductor will be safely disposed of, provided the conductor is in connection with the earth. On the other hand, the same charge falling upon a piece of wood, the latter being a bad conductor, will split it into many fragments and possibly develop enough heat, by reason of the resistance offered by the wood, to set the latter on fire. For this reason lightning conductors are made with a view to preventing the accumulation of electricity in the object of the earth's surface on which it is placed.

Positive and Negative Electrification.

In nature there are two kinds of electrification, viz., positive and negative; thus a body may be either positively or negatively electrified. The law of electricel attraction and repulsion is generally stated as follows: Bodies electrified in the same manner repel one another; while bodies, one electrified positively, the other negatively, attract one another. In the behavior of oppositely electrified bodies when brought near each other lies the key to many interesting facts in electrical science.

A positively charged body, if placed between two others, one ative charge, will tend to move toward the latter, due,we are told, to the "electrical field" set up by the oppositely charged bodies. By an "electrical field" is meant the region in which work is done to move an electrical charge from one point to another. This work is susceptible of exact measurement; it varies inversely as to the square of the distance separating the bodies, and depends also on the material of the non-conductor separating the bodies. The latter is generally called the "medium" or "dielectric," thus the air separating one cloud from another, or a cloud from the earth, is known and referred to as the "medium" or "dielectric." For the purpose of this occasion air will be considered as a non-conductor.

The force exerted in transferring an electric charge from one point to another, as before stated, depends upon the character of the medium through which it is transmitted. If the medium is a conductor, it will pass from one to the other harmlessly, but if the medium should be a non-conductor, such as the atmosphere, work will have to be done. The work done in the last named case is manifest in lightning strokes by the rending and splitting of the objects struck, as before stated, and in this we find reason for the rule in the erection of lightning conductors, viz., that the conductor should be continuous; there should be no air gaps in it, because a vast increase in the expenditure of energy on the part of the lightning stroke is necessary to cross the gap of non-conducting air. In this principle is also found an explanation of the fact generally observed in the case of a person struck by lightning, viz: that the shoes are almost always torn from the body and badly wrecked. The air gap between the body and the ground, although small, is sufficient to produce the observed effect.



Big Thunderstorm in the Alps

A point has now been reached when it is necessary to introduce another technical term, viz., "electrical potential," or simply "potential." The idea conveyed by "potential" is of the same nature as that of difference in level in case of water; thus water always flows from the higher to the lower level, and the force with which it flows depends, among other things, upon the amount of the difference in level. So in electrical terminology a current of electricity flows from a body with a high potential to a body with a lower potential; or, in other words, the distribution of the electric charge on both bodies is very materially changed when they are brought into conducting communication.

In the definition of lightning we find that one of the great differences between a lightning flash and the ordinary electric current was not pointed out, viz., the first differs from the second in that it is at a much higher potential; that is the force or pressure that impels it is tremendously greater than that which, for example, causes an electric current to flow along a trolley line. The latter flows under small pressnre through a conductor, while the former breaks down the air, a non-conducting body, throughout a path sometimes more than a mile in length.

Let there be any two parellel wires close together. Through one of them, A, passes an electric current. The flow of this current will induce a current in the other wire, B, in a direction opposite to that in A. Telegraph and telephone lines carried on the same poles are operated with great difficulty because of the induced current set up in the telephone wires by the current flowing through the telegraph wires, and certain devices have

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