

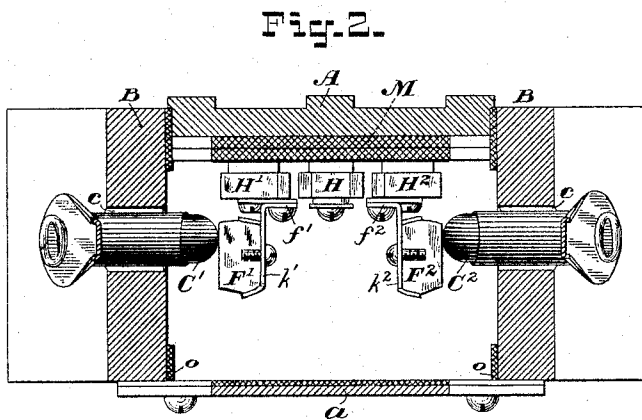
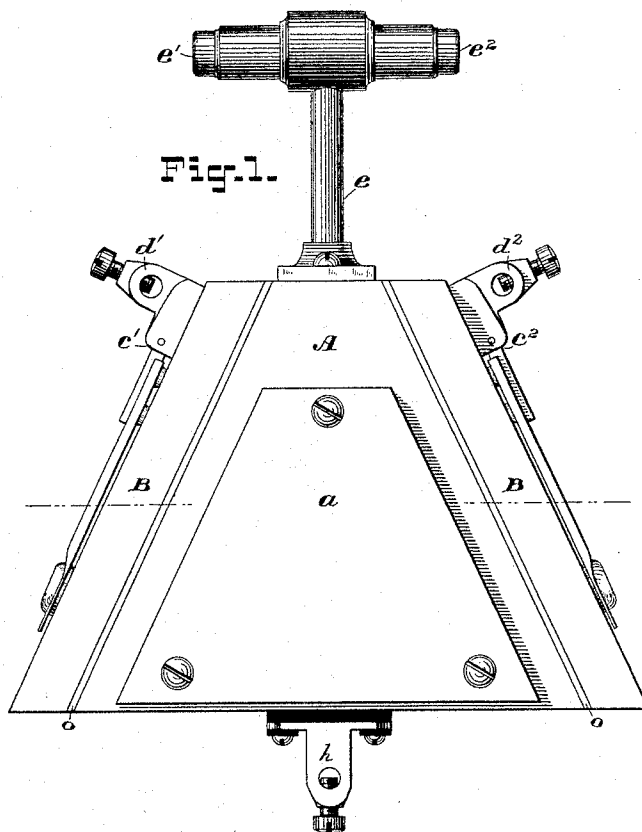
(No Model.)

2 Sheets—Sheet 1.

C. F. SCOTT.
LIGHTNING ARRESTER.

No. 492,544.

Patented Feb. 28, 1893.



Witnesses
H. S. MacKay
R. D. Mershon

Charles F. Scott Inventor
By *his Attorney*
Charles A. Terry

(No Model.)

2 Sheets—Sheet 2.

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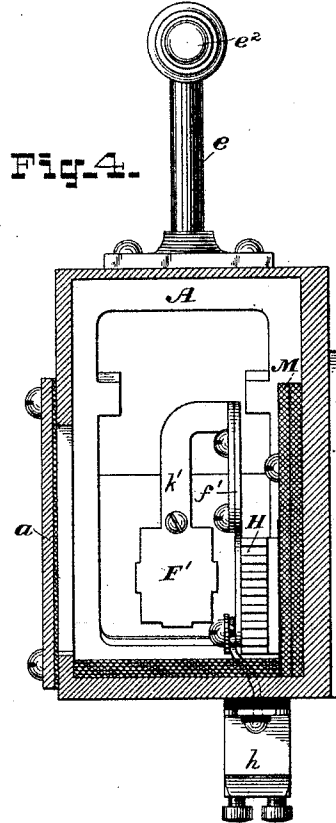
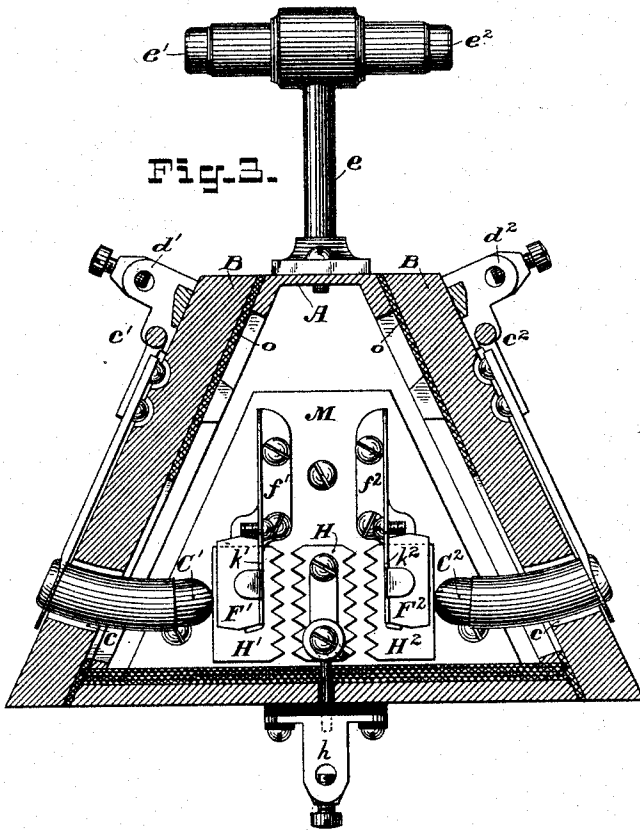
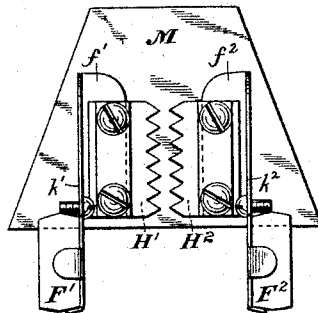


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES F. SCOTT, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF SAME PLACE.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 492,544, dated February 28, 1893.

Application filed July 29, 1892. Serial No. 441,570. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. SCOTT, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lightning-Arresters, (Case No. 499,) of which the following is a specification.

The invention relates to the construction of devices for affording a path for lightning discharges and for interrupting the connections of such path after the lightning discharge, for the purpose of breaking the short circuiting of the source of current which may occur.

The invention relates to the class of lightning arresters in which the expansion of atmosphere contained within a more or less closed chamber is employed for opening circuit connections, or extinguishing an arc; and the present invention involves certain details in the construction and general organization of the apparatus.

In the accompanying drawings illustrating the invention, Figure 1 is an elevation of the apparatus. Fig. 2 is a longitudinal section, and Figs. 3 and 4 are respectively a cross-section and a transverse section. Fig. 5 illustrates a modification.

Referring to the figures, A represents a frame for forming an inclosing box or chamber. It may be of any suitable material, as, for instance, of cast iron. The sides, B, B, of this box are for convenience formed of non-conducting material, such, for instance, as marble. Through opening *c* formed in these sides there normally extends electrodes *C'*, *C*², which are pivoted in suitable supports, *e'*, *e*², carried at the upper ends of the side-pieces. Suitable binding-posts, *d'*, *d*², are in electrical connection with these pivoted electrodes, and they may for convenience be formed integral with the plates carrying the pivoted arms. The arms normally rest against the sides of the box with the electrodes projecting through the openings into the box, but they are free to be thrown upward so as to strike against suitable buffers or arms, *e'*, *e*², carried upon an upright, *e*, at the top of the box. The

lengths of these arms are such that the electrodes will, even when against the arms, have a tendency to fall forward into their normal position, when they are held by their own weight against the slanting sides of the box.

When the electrodes *C'*, *C*², are in their normal position, their ends rest against suitable contact-plates *F'*, *F*², within the box. These plates are carried upon arms or supports, *f'*, *f*², which are electrically connected with discharge plates, *H'*, *H*², respectively. These discharge plates are, with advantage made with serrated edges in the usual manner of a discharge-plate, and these edges are presented to the corresponding edges of an intermediate plate or electrode *H*, which in turn is connected through the base of the case with the binding-post *h*, designed to be connected with the earth. The contact-plates *F'*, *F*², are usually supported upon more or less flexible arms *k'*, *k*², to allow them to yield slightly when the electrodes *C'*, *C*², fall against them. The electrodes *C'*, *C*², and the plates *F'*, *F*², as well as the plates *H*, *H'*, *H*², may with advantage be of carbon. In practice it is found desirable to make only the contact portion or end of the electrodes *C'*, *C*², of carbon, and this may be accomplished by making the body of that portion of the arm which projects into the box of a curved tube of copper, the contact-piece being inserted in the ends of these tubes. The plates *F'*, *F*², and *H*, *H'*, *H*², are all supported from the back of the box by means of an intermediate plate of non-conducting material, as shown at *M*. This may be of any suitable non-conducting material. In practice marble is found to give good results.

For the purpose of rendering the device compact and affording space for a comparatively thick piece of marble between the electrodes *H*, *H'* and *H*², and the back of the box, these plates or electrodes are placed in nearly the same plane as the electrodes *C'*, *C*². The arms carrying the plates *F'*, *F*², pass from beneath the plates *H'*, *H*², thus giving sufficient length for securing the flexibility required to permit the plates *F'*, *F*², to yield when the electrodes *C'*, *C*², strike against them.

In applying the sides to the box, it is found advantageous to place a sheet of asbestos between the iron of the frame and the marble, as shown at *o*, this lining being cut away above the openings through which the electrodes project as shown.

The front of the box is usually closed by means of a removable plate *a*. This affords means for convenient access to the interior of the box.

The operation of the apparatus is as follows: a lightning discharge entering through the electrode *C'*, for instance, passes to the plate *F'*, thence across the air-gap between the plate *H'* and the ground-plate *H*, and thence to earth. The heat developed within the box by the passage of the lightning discharge, or by the current from the dynamo, which tends to follow such discharge, expands the air within the box and causes the arms *C'*, *C*², to shoot outward. The separation of the arms *C'*, *C*², from the contact-plates *F'*, *F*², causes two additional arcs to be formed in the circuit which increase the heating and the expansion of the air in the chamber. The arms are blown violently out of the position beyond which the current is not able to maintain the arcs, and they are therefore broken. The arms then fall back to their normal position, and as the arc across the air-space between the discharge points has been broken, the arrester is in condition for receiving another lightning discharge.

In the modification shown in Fig. 5, the intermediate ground plate *H* is dispensed with, and the plates *H'*, *H*², directly confront each other. One electrode *C*² is then connected with the earth, and the other electrode *C'* with the main line conductor. Such an arrangement may be used in instances where it is desired to ground only one side of the circuit, for instance, in an electric railway system, in which one side only of the circuit is normally insulated from the ground.

It is, of course, evident, that where only one side of the circuit is to be provided for, one of the movable electrodes might be dispensed with, provided one break in the circuit be sufficient to interrupt the short-circuit of the dynamo to which the arrester is connected.

I claim as my invention—

1. The combination with an inclosing box, of one or more electrodes projecting into the box, one or more contact-plates within the box against which said electrodes normally rest, and lightning discharge plates between which are intermediate air-gaps placed within the box and respectively connected with said plates, substantially as described.

2. The combination with an inclosing box or chamber of an electrode projecting through the side of the box into the chamber, a contact-plate against which said electrode normally rests, discharge-plates leaving intermediate air-gap, and a flexible arm support-

ing said contact-plate, substantially as described.

3. In a lightning arrester the combination of an inclosing chamber, movable electrodes, contact-plates with which said movable electrodes are normally in electrical connection within said chamber, and flexible supports for said contact-plates, substantially as described.

4. In a lightning arrester, the combination with an inclosing chamber, of one or more movable electrodes, contact-plates with which said electrode or electrodes are normally in contact and away from which they are thrown by the expansion of the air within the chamber, and a normally interrupted ground circuit, substantially as described.

5. In a lightning arrester, the combination of a chamber, electrodes within the chamber through which the lightning discharges pass, said electrodes being thrown away from each other by the expansion of the air within said chamber contact plates against which said electrodes normally rest, and a normally open ground circuit leading from said plates, substantially as described.

6. In a lightning arrester, the combination within a closed chamber, of discharge-plates placed within the chamber, a non-conducting support therefor secured to the case and perforated converging side walls of non-conducting material, and curved arms or electrodes pivoted to the upper ends of said side walls, and projecting through the perforations therein, substantially as described.

7. In a lightning arrester, the combination with pivoted arms, constituting electrodes, of an inclosing chamber within which said electrodes terminate, a contact-plate therefor, a stop against which said electrodes strike when thrown away from said contact-plate, and a flexible support for the contact-plate, substantially as described.

8. In a lightning arrester, the combination with a metal frame formed with open sides, of converging marble sides covering said openings and having perforations, substantially as described.

9. In a lightning arrester, the combination of normally separated lightning discharge plates, movable electrodes, contact-plates against which said electrodes normally rest, and flexible arms supporting said contact plates.

10. In a lightning arrester, the combination of normally separated lightning discharge plates, movable electrodes, contact-plates against which said electrodes normally rest, and flexible arms supporting said contact plates and electrically connecting same with the lightning discharge-plates.

11. In a lightning arrester, the combination of normally separated lightning discharge plates, movable electrodes, contact-plates against which said electrodes normally rest, flexible arms supporting said contact

plates and electrically connecting the same with the lightning discharge-plates, a marble support for said lightning discharge-plates, and a case inclosing the same, to the back of which said marble support is secured.

5 12. In a lightning arrester, the combination of an inclosing box or chamber, a movable electrode terminating within the chamber, a contact-plate therefor, an earth dis-

charge-plate and an air-gap intervening between said plates.

In testimony whereof I have hereunto subscribed my name this 28th day of July, A. D. 1892.

CHAS. F. SCOTT.

Witnesses:

R. D. MERSHON,
H. S. MACKAYE.