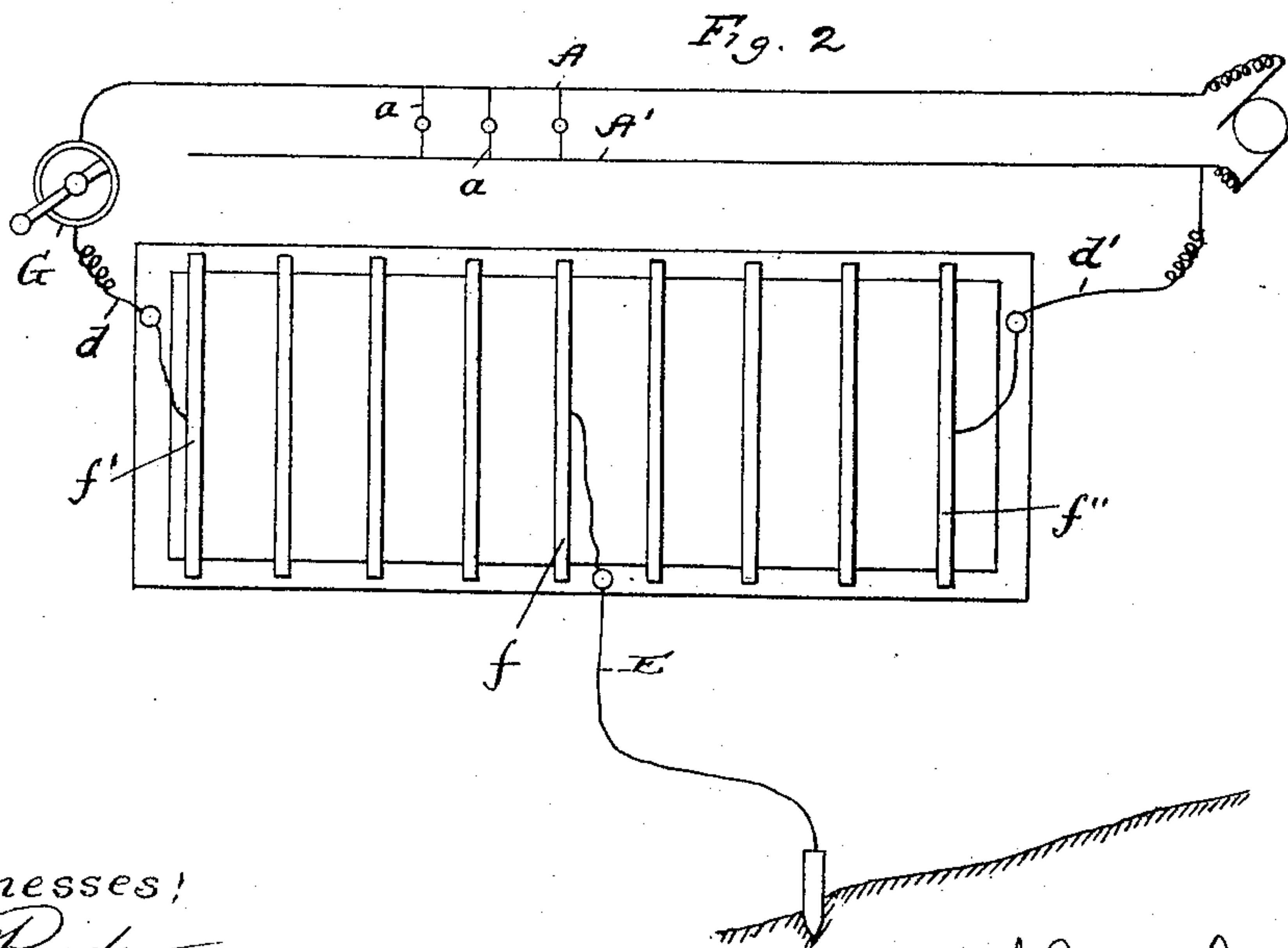
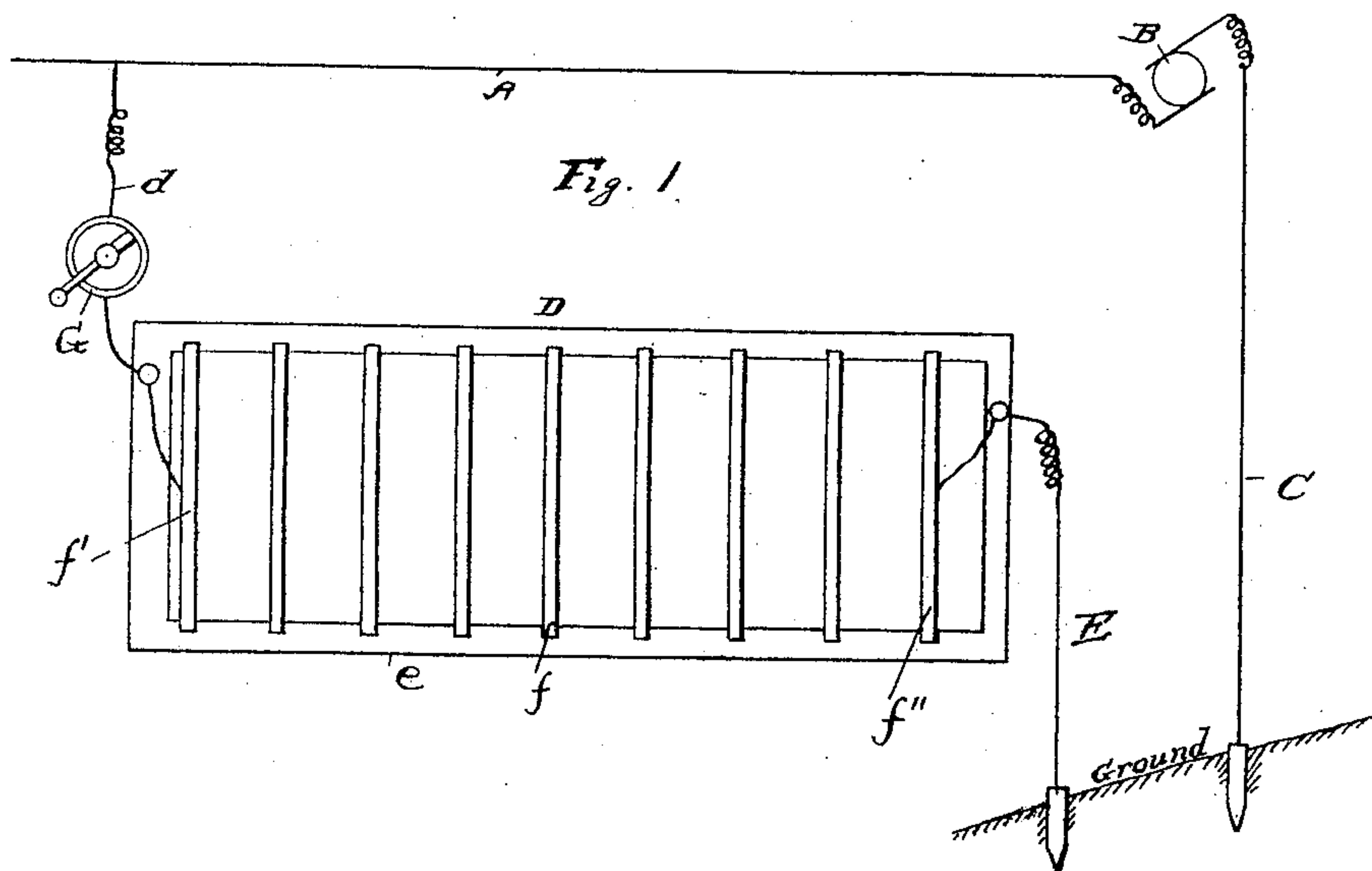


(No Model.)

H. G. OSBURN.  
LIGHTNING ARRESTER.

No. 486,498.

Patented Nov. 22, 1892.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

HARRY G. OSBURN, OF CHICAGO, ILLINOIS.

## LIGHTNING-ARRESTER.

**SPECIFICATION** forming part of Letters Patent No. 486,498, dated November 22, 1892.

Application filed December 26, 1891. Serial No. 416,125. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY G. OSBURN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have  
5 invented certain new and useful Improvements in Lightning-Arresters; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-  
10 pertains to make and use the same.

This invention relates to safety devices or lightning-arresters for charged electric circuits or conductors designed for the transmission of electric energy for light and power  
15 purposes; and the object in view is to provide simple and cheap means for readily carrying off through a closed circuit the excess of electric fluid caused by a flash of lightning upon the conductors of a charged circuit and effectually obviate such lightning discharge  
20 from burning out or injuring the armature or insulation thereof of the dynamo in such circuit.

One of the common forms of lightning-arresters for electric circuits consists in using  
25 two separated or spaced plates, one of which is connected to the conductors of the circuit and the other has a ground connection, so that the excessive discharge of the electric fluid  
30 will leap across the space between said separated plates and become discharged into the ground, while the current supplied by the dynamo to the circuit is prevented from becoming grounded by the separation of the plates,  
35 as such current is of such electro-motive force that it will not cross the space between the plates. It has been found, however, that this common form of arrester does not at all times operate with perfect success, and it is  
40 not unfrequently the case that the excessive discharge of electric fluid from lightning finds its way to a weak part of the insulation in the armature of the dynamo, which is thereby pierced by such lightning discharge and the  
45 armature injured to such an extent as to require its removal and repair. I aim to overcome these objections, and in my improved system for arresting the discharge of lightning I use a continuous normally-closed con-  
50 ductor, which forms a path for the easy transmission of the lightning discharge.

To prevent the current received in the circuit from becoming grounded, I employ an electrical generator, which is connected by the aforesaid conductor with the wires of the  
55 charged circuit, and said generator having a grounded connection, the generator being of such a capacity that it will generate a counter or reverse current of energy of such electro-motive force in proportion to the electro-  
60 motive force of the current in the charged circuit as to prevent the latter current from passing through said generator, thereby effectually obviating grounding of the charged circuit and at the same time affording a normally-  
65 closed free path for the discharge of lightning.

The invention further consists in the construction and combination of parts, which will be hereinafter described, and particularly  
70 pointed out in the claims.

In the accompanying drawings, Figure 1 is a view of my system used in connection with a single-charged conductor. Fig. 2 is a view  
75 of the system adapted to protect two circuits when both are exposed to lightning.

Referring by letter to the drawings, A indicates the conductor of the charged circuit.

B indicates the dynamo, and C the ground connection from the dynamo.  
80

D indicates my electrical generator receiver, which has a connection *d* with the charged conductor A and the ground connection E. The electrical generator receiver D comprises a suitable box or case *e* and a series of me-  
85 tallic partitions or plates *f f' f''*, which are secured in the cell, so as to form liquid-tight joints therewith and provide a number of cells *g*, each of which contains a suitable electrolyte.  
90

The casing or box may be lined with any non-conducting material which would not be affected by electrolyte—such as rubber, porcelain, or resinous material—and constructed  
95 in any convenient way, and the plates or partitions *f f' f''* are made of lead or similar material and are secured in the box in any preferred manner, so as to secure the desired tight joint between the box and the plates or partitions. The electrolyte may be of any  
100 suitable character—as, for instance, one part of sulphuric acid to eight parts of water; but



I do not confine myself to this particular electrolyte. The lead plate or partition  $f'$  at one end becomes one pole of the generator and the other plate or partition  $f''$  becomes the other pole of the generator, while the intermediate plates  $f$  are part positive and part negative. Thus the plate  $f'$  is the positive, and the plate  $f''$  is the negative, pole of the generator, while that part of the plate  $f$  which faces either the positive or negative plates  $f'$  or  $f''$  becomes a positive or negative conductor, as the case may be. Thus the intermediate plates  $f$  are partly positives and partly negatives.

The chemical action of the electrolyte and lead plates or partitions in my generator is similar to that of a storage-battery, and the hydrogen and oxygen gases thereby generated are deposited or collected separately on the negative and positive plates, respectively.

The conductor  $d$ , between the generator and the charged conductor A, is connected to one pole or element of the generator, and the ground connection E is connected to the other pole or element of said generator.

The number of plates or partitions employed in the box depends upon the electro-motive force or voltage of the current in the charged circuit, and a sufficient number of such plates are employed to give the generator a capacity for producing a current of an electro-motive force sufficient to counteract the electro-motive force of the current in the charged circuit, and thereby prevent the current from such charged circuit from being grounded through the generator, while at the same time a normally-closed conductor for a lightning discharge is maintained to insure the free transmission of an excessive current resulting from lightning or other causes.

It is not essential that the lightning-arrester shall always remain in service—as, for instance, in clear weather. I therefore provide a switch G at a suitable point in the conductor  $d$ , which can be opened to cut the generator out of the charged circuit A; but in cloudy or stormy weather this switch should be adjusted to establish continuity of the conductor  $d$ , and thus bring the generator in the charged circuit.

When two conductors and circuits are exposed to the lightning and connected to the same dynamo, as in Fig. 2, I connect the conductors A A' by cross-wires  $a$ , and one conductor is connected to the positive pole and the other to the negative pole by the wires  $d$   $d'$  and the ground connection E' is employed, which is connected to the middle plate  $f$  of the generator. The action in this arrangement is the same as in the embodiment of my invention shown by Fig. 1.

Although I have described a generator of the storage-battery species, I do not desire to be confined to the same, and it is obvious

that an inductive generator apparatus of any known species may be employed.

I am aware that modifications may be made in the proportion and arrangement of devices herein described and shown as an embodiment of my invention, and I therefore reserve the right to make such alterations and changes as fairly fall within the scope of my invention.

Having described my invention, what I claim is—

1. The combination, with a charged circuit, of a generator receiver, which provides a normally-closed path connected to said circuit and having a ground connection and adapted to produce a current of sufficient electro-motive force to counteract the current in the charged circuit, substantially as described.

2. The combination, with a charged conductor, of an electrical generator-receiver, which provides a normally-closed path to the ground for an excessive discharge of electric fluid resulting from lightning and which produces a current of sufficient force to counteract the current in said charged conductor, substantially as described.

3. The combination of a conductor and a closed circuit leading therefrom containing a generator receiver, whereby an excessive discharge will generate a current of sufficient electro-motive force to counteract the current in the charged conductor.

4. The combination, with a charged conductor and a dynamo having the ground connection, of a generator receiver having closed connections with said charged conductor and a continuous ground connection, said generator provided with plates forming cells for an electrolyte, substantially as described.

5. The combination, with a charged conductor and a dynamo, of a generator receiver having a series of plates or partitions forming a series of cells for an electrolyte, a ground connection at one pole of said generator and a connection between the other pole of the generator and the charged conductor, and a switch for cutting the generator out of circuit with the charged conductor, substantially as described.

6. The combination, with the connected charged conductors and a dynamo, of a generator receiver, which provides a normally-closed path and having its poles connected, respectively, with said conductors, and a ground connection from the generator, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY G. OSBURN.

Witnesses:

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N. A. FINCH.