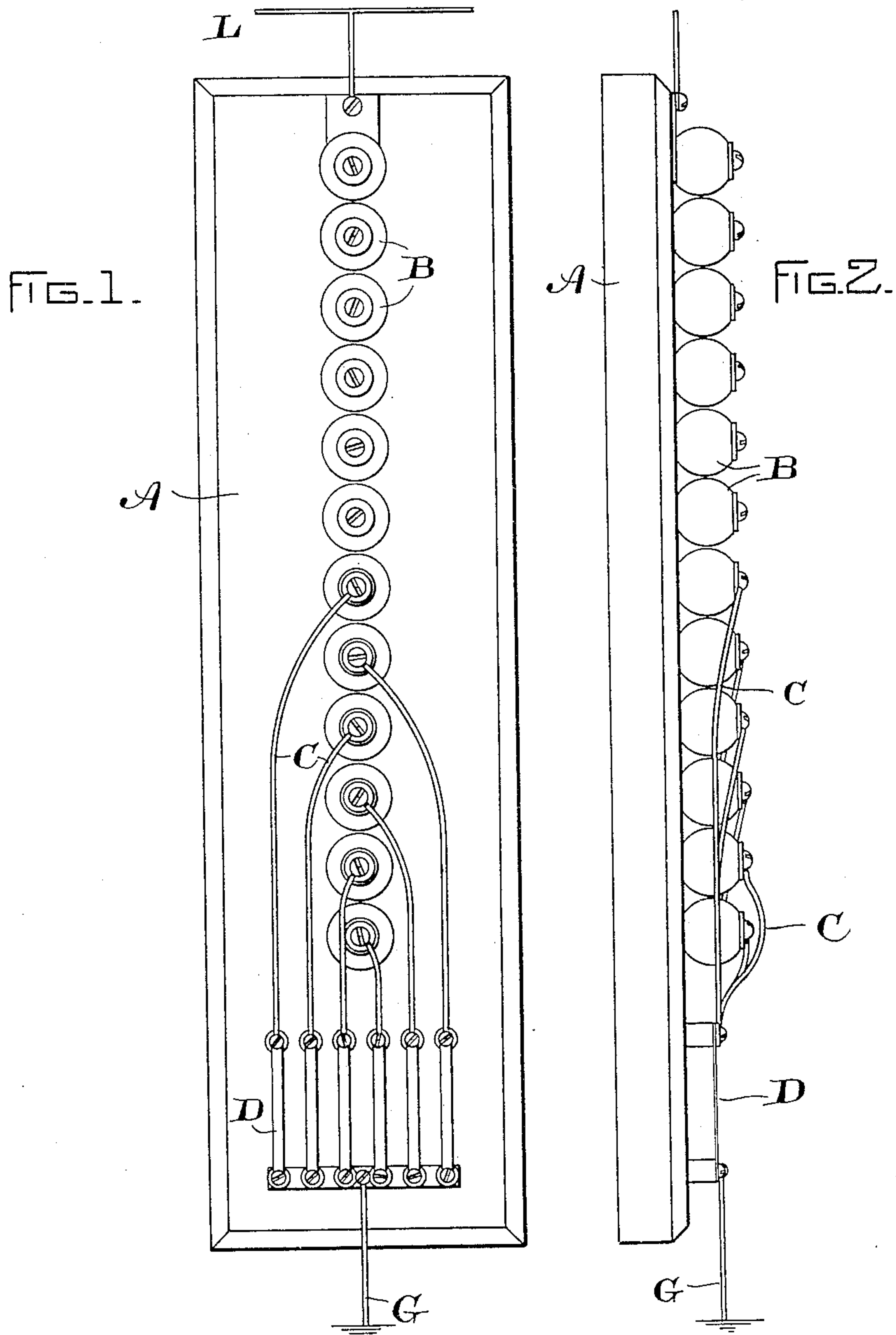


(No Model.)

A. EKSTRÖM.
LIGHTNING ARRESTER.

No. 583,987.

Patented June 8, 1897.



WITNESSES.
A. H. Abell.
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INVENTOR.
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by
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UNITED STATES PATENT OFFICE.

AXEL EKSTRÖM, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE
GENERAL ELECTRIC COMPANY, OF NEW YORK.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 583,987, dated June 8, 1897.

Application filed May 15, 1896. Serial No. 591,639. (No model.)

To all whom it may concern:

Be it known that I, AXEL EKSTRÖM, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Lightning-Arresters, (Case No. 404,) of which the following is a specification.

My invention relates to lightning-arresters, and has for its object to provide an apparatus of this description which shall be efficient and reliable in operation, able to take care of a number of static discharges in succession, and yet which shall maintain a substantially constant resistance, so that lightning-discharges may not be diverted from the ground path provided for them into the line-circuit through the machines to be protected or the line-current follow the static discharge by lessening the resistance of the ground connection. To this end I arrange the lightning-arrester with a number of spark-gaps in series, and to those of the electrodes nearest to the ground in the series I connect fuses in multiple to the ground-terminal. By this arrangement the lightning or static discharge passes across the series of spark-gaps until it reaches one of the electrodes connected by a fuse with the ground-terminal, when it passes over this conductor to earth. The line-current, if it have sufficient potential to bridge the spark-gaps, also passes by the fuse. This latter is, however, made of small capacity and is readily ruptured by excess of current. There may of course be as many fuses as may be desirable. With the rupture of each fuse an additional gap would be introduced in the series of spark-gaps in the arrester. The passage of the line-current is also liable to melt the electrodes slightly, so that the resistance of the several gaps may be decreased. For this reason I prefer as the basis of my improved arrester to employ one of the so-called "ball" type, in which a series of brass or composition balls are arranged upon a base of insulating material, the balls being rotatable about the studs affixing them to the base.

The accompanying drawings show an embodiment of my invention, Figures 1 and 2 being a front and side elevation, respectively,

of a lightning-arrester constructed according to its principles.

A is the base of the apparatus.

B B are the balls or electrodes. C C are the conductors leading from the lower ones of these electrodes to the fuses, (indicated at D.) The path of the discharge would be from the line L through the series of spark-gaps and over one of the conductors C to one of the fuses D, which are connected in multiple, and to the ground-terminal G. The fuse and its connector forming a circuit of low resistance, the discharge would ordinarily take this path.

A non-inductive resistance might be included in the ground-circuit with this lightning-arrester and an inductive coil in the line between the arrester and dynamo. I have not illustrated these devices, however, as they are well understood in the art and are not claimed by me.

The operation of the device as thus described is briefly as follows: After each discharge it will be found that one of the gaps, sometimes more, will be partly bridged by the fusion of the electrodes, and the resistance of the arrester will be thus decreased. Its efficiency is also decreased, the line-current following the discharge more readily; but as each discharge takes place a new gap is introduced into the line by the melting of one of the fuses, so that the substantial equality of resistance to which I have referred is maintained.

The essential feature, therefore, of my invention is maintaining the substantial equality of resistance across the terminals of the lightning-arrester, and this is obtained by employing a number of spark-gaps in series, and means for increasing the number when the resistance of one of the gaps is diminished.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A lightning-arrester comprising a number of spark-gaps in series, of a kind to have their resistance decreased by use, combined with means controlled by such decrease in resistance, for increasing the number of spark-gaps in series.

2. A lightning-arrester comprising a number of spark-gaps in series, a part of those in series being short-circuited, and means for

opening the short circuit as the resistance of the gaps already operating decreases.

3. A lightning-arrester comprising a number of spark-gaps in series, the electrodes of
5 the spark-gaps nearest the ground-terminal being connected to that terminal by a number of fuses arranged in multiple.

4. A lightning-arrester comprising a number of spark-gaps in series, the electrodes be-

ing substantially of ball shape, and those nearest the ground-terminal being connected thereto by fuses.

In witness whereof I have hereunto set my hand this 13th day of May, 1896.

AXEL EKSTRÖM.

Witnesses:

B. B. HULL,
E. W. CADY.