

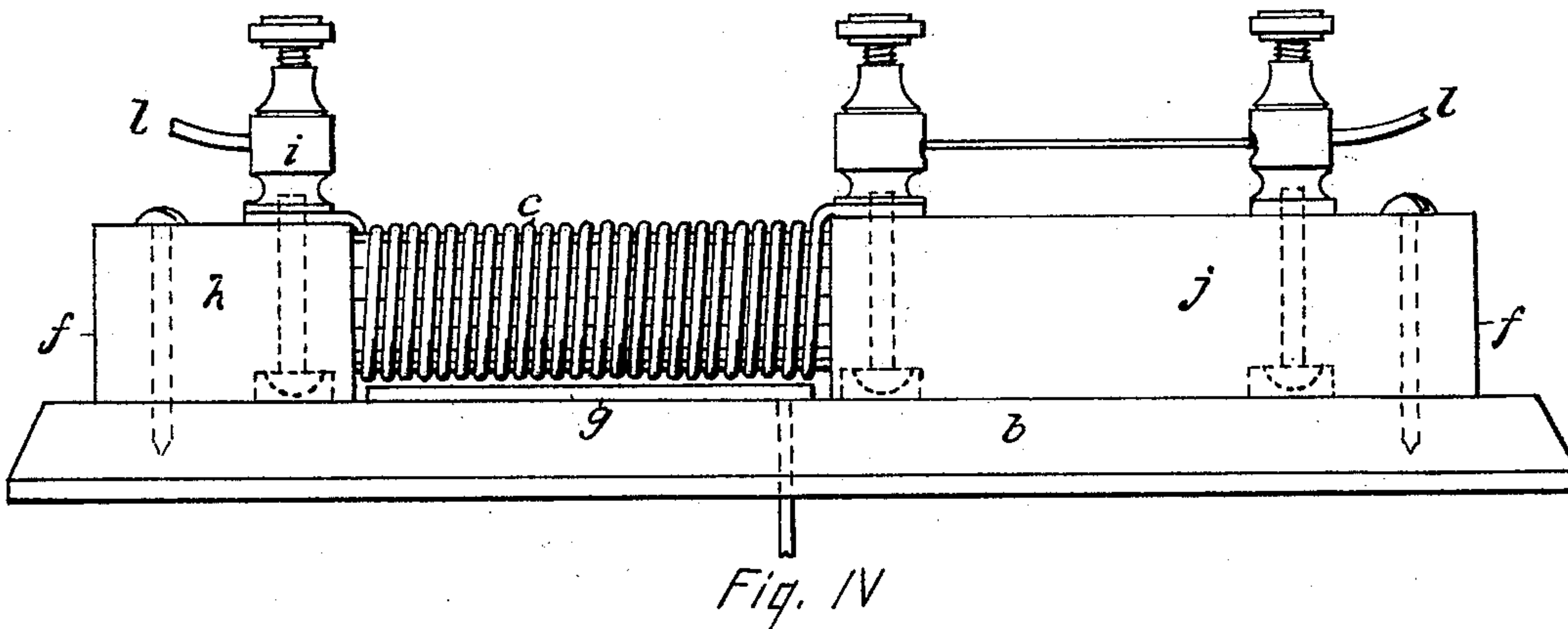
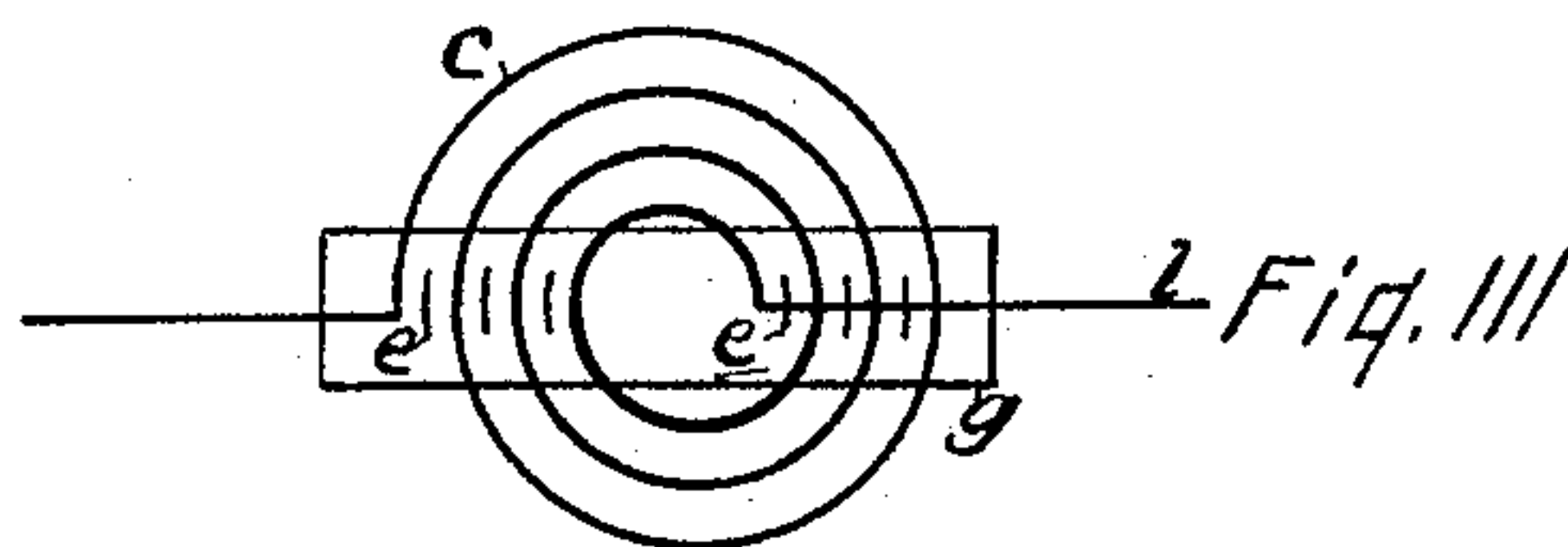
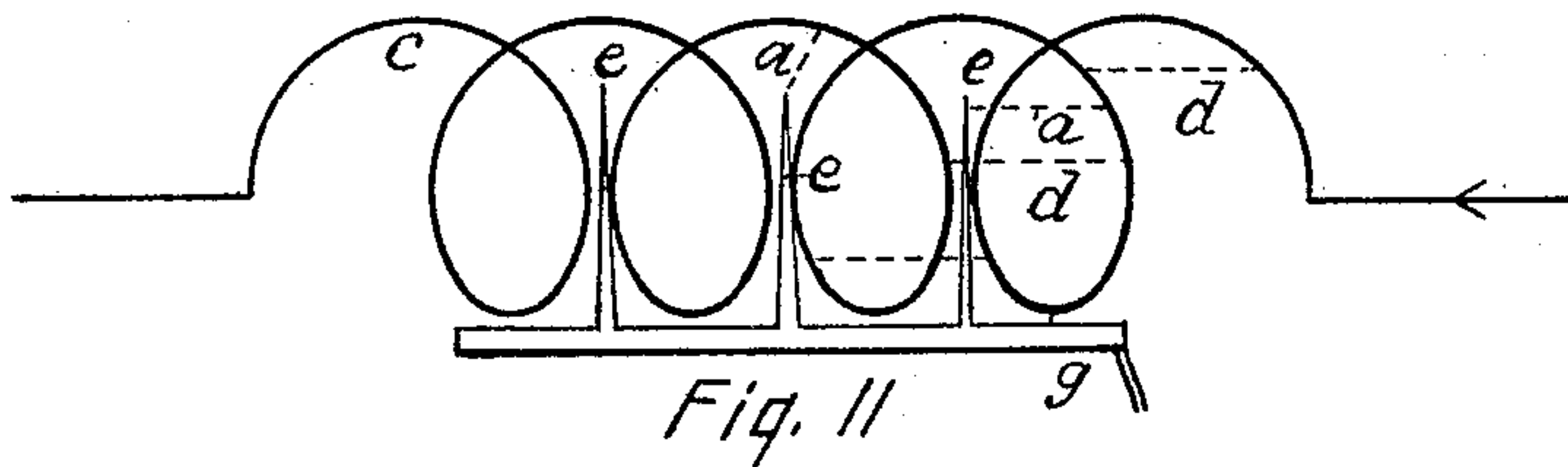
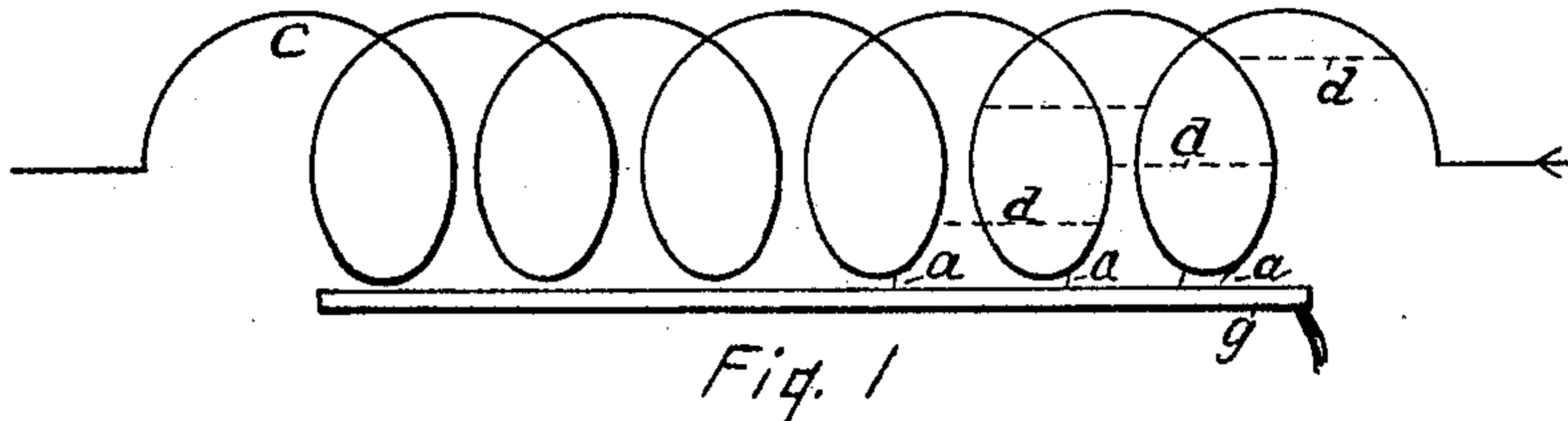
No. 606,954.

Patented July 5, 1898.

W. E. ATHEARN.  
LIGHTNING ARRESTER.

(Application filed Aug. 9, 1897.)

(No Model.)



WITNESSES:

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# UNITED STATES PATENT OFFICE,

WILLIAM EDWARD ATHEARN, OF BROOKLYN, NEW YORK.

## LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 606,954, dated July 5, 1898.

Application filed August 9, 1897. Serial No. 647,661. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM EDWARD ATHEARN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Lightning-Arresters, of which the following is a specification, which I declare to be a full and exact description of my invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to devices for diverting static and other stray electric currents from lines for the protection of said lines, instruments, and machinery, commonly known as "lightning-arresters;" and has for its object a simplified and unfailing method of accomplishing this purpose. The object is attained by the means set forth in the specification and the accompanying drawings, which fully explain the principles that render my device effective.

Figures I and II are representations of wire coils or helices. Fig. III is a flat spiral. Fig. IV illustrates a form of my lightning-arrester.

It is a tolerably-well-known fact that lightning-currents or any heavy static discharges in passing through a coil do not traverse the convolutions of the coil as do currents of low tension, but leap from one convolution to another. Thus if Fig. I represents a spiral or coil of wire and a lightning charge be supposed to enter it from the right-hand end instead of the current passing round and round the coil the entire length of the wire it will leap from convolution to convolution, as indicated by the broken lines *d d d*. If a "ground-plate" *g* be placed contiguous to the coil, as shown, then the discharges will be from the right-hand convolutions to the plate, as indicated at *a a a*, and the retarding effect of the coil will cause the current to so leave the coil from the first several convolutions. A peculiar feature of the action is the fact that the current does not all leave the coil at the first convolution. If the current comes from the right, then the discharges will take place from the first few right-hand convolutions, diminishing in intensity with each succeeding convolution. This distribution of the discharge possesses an important advantage, to wit: The usual forms of lightning-arresters

carry off the current at one discharge, with the result that the intensity of the discharge frequently fuses the ground-plate at the point where the discharge strikes it and raises a bur of metal on the plate. When the arrester-plates lie very close to each other or are separated only by some thin non-conductor, this bur will be and commonly is sufficient to make a contact between the two plates, or if not making an actual contact will so shorten the space between the bur and the opposite plate as to facilitate the formation of an arc from the main line to the ground. The tendency of the coil to break up the current into numerous small discharges entirely overcomes this difficulty, as no single discharge will be of sufficient intensity to produce such an effect.

In Fig. II, *c* represents a coil, as in Fig. I. If the ground-plate *g* be provided with points *e e e*, projecting between the convolutions, the discharge will be from the convolutions to the points, as indicated by the broken lines *d d d*. Various arrangements may be made to take advantage of this action of the current for the purpose of lightning-arresters. A flat spiral or coil, as shown in Fig. III, may be employed in place of a helix; but I find the form of arrester as shown in Fig. IV to be absolutely reliable as a protector against lightning or other currents of high tension.

Fig. IV represents an arrester consisting of four parts, a base *b*, a body *f* of glass, porcelain, or any suitable non-conductor, a coil *c*, forming part of the circuit it is designed to protect, and a ground-plate *g*. The end *h* of the body *b* is provided with a binding-post *i*, to which one terminal of the coil and one end of the line *l* are attached. The end *j* of the body *b* carries two binding-posts, to one of which line *l'* is attached, and the other terminal of the coil is secured to the other post. These two binding-posts are united by a proper fuse-wire provided to protect the line from heavy currents of low tension that will not pass through space and would therefore not jump from the coil to the "ground." The portion of the body *b* occupied by the coil is given a spiral groove in which the preferably bare wire is wound. The plate *g* lies close to the coil, without, of course, contact with it, and is adapted for connection with a ground-line.



It is plain that the coil wound on the body  
6 might be of insulated wire and so not re-  
quire a spiral groove in which to wind it; but  
if the insulation of the wire be of a high char-  
5 acter, such as rubber or gutta percha, there  
can be no discharge from the convolutions of  
the coil to the ground-plate, while if the in-  
sulating substance be thin or composed of  
cotton or other fiber the discharges from the  
10 coil will have a tendency to carbonize the in-  
sulation and enhance the liability to leakage,  
and under certain conditions, such as damp-  
ness, make actual electrical contact with the  
ground-plate. Again, the insulating mate-  
15 rial increases the distance between the con-  
volutions themselves, as well as between the  
coil and the ground-plate, thus rendering the  
apparatus less effective.

The action of this arrester will be plain  
20 from the foregoing description. A foreign  
current entering the coil will pass off through  
the ground-plate in the manner already de-  
scribed.

It is obvious that the "ground" may be a  
25 plate, wire coil, or any shape which will an-  
swer the purpose of a receiver of the broken  
discharges.

Plainly I do not wish to be limited in the  
application of this invention to the form of  
construction as herein shown and described 30  
so long as I adhere to the principles of the  
invention.

Having described my invention, what I  
claim, and desire to secure by Letters Patent,  
is—

A lightning-arrester comprising a porcelain  
block having a spiral molded on its middle  
portion to receive a coil of wire, one end of  
the block provided with a connector to re-  
ceive one end of the coil and one end of the 40  
line, the other end of the block having two  
connectors one for the coil-terminal and one  
for the other end of the line, the two connec-  
tors being connected by a fusible wire, the  
whole mounted on a base with a ground-plate 45  
contiguous to the coil, substantially as herein  
shown and described.

Signed at New York, in the county of New  
York and State of New York, this 19th day of  
July, A. D. 1897.

WILLIAM EDWARD ATHEARN.

Witnesses:

JOHN F. O'RYAN,  
WM. ARNOUX.