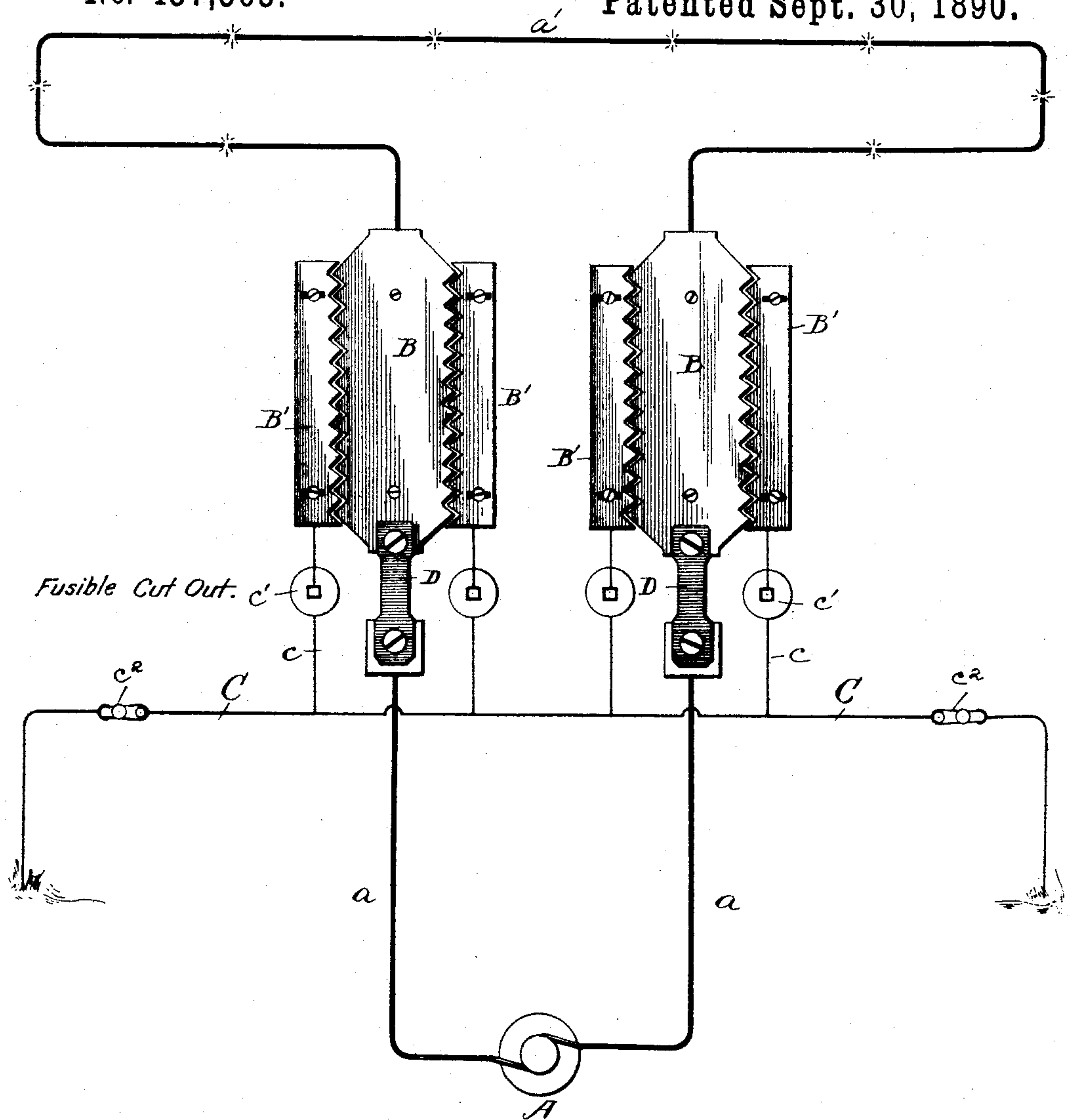


(No Model.)

H. M. KALBACH.
LIGHTNING ARRESTER.

No. 437,363.

Patented Sept. 30, 1890.



WITNESSES:

Frank S. Ober
Thomas H. Treuehard

INVENTOR

Harry M. Kalbach
BY *W. J. Johnston*
ATTORNEY.

UNITED STATES PATENT OFFICE.

HARRY M. KALBACH, OF ASHLAND, PENNSYLVANIA.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 437,363, dated September 30, 1890.

Application filed January 29, 1890. Serial No. 338,503. (No model.)

To all whom it may concern:

Be it known that I, HARRY M. KALBACH, a citizen of the United States, residing in Ashland, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Lightning-Arresters, of which the following is a specification.

My invention relates to lightning-arresters for protecting electrical apparatus, its object being to provide an arrester for use in connection with a generator which will effectually carry off to ground an abnormal current due to a stroke of lightning upon the conductors or to a short circuit, and after such current is thus carried off and when there is no longer any danger of damage to the machine will leave the apparatus in condition to resume its work automatically without any appreciable loss of time or stoppage of the translating devices on the circuit.

The main feature of my invention is the location of a thermal cut-out in the ground-circuit. When a charge of lightning forms an arc across the space between the plates and leads off through the ground-circuit, it offers a path for the current from the generator to ground also. Now the fuse in the ground-circuit may not always be blown by the lightning-charge; but when the latter is augmented by the current from the dynamo the fuse is sure to go. It is my intention to make the fuse withstand an ordinary lightning-charge, so that there will be sufficient time for the lightning to ground before the fuse is destroyed. When the fuse is finally destroyed by the added dynamo-current, the dynamo is no longer grounded; but its current resumes its normal course over the mains.

In the accompanying drawing, the figure represents a plan and diagram of the apparatus and circuits.

a a represent the mains proceeding from the generator A.

a' represents the external circuit, including translating devices. There is placed in each of the mains a plate B, having two opposite edges serrated, and other plates B' placed adjacent to the serrated edges. The plates B' connect with ground-wire C through branches *c*, including fusible cut-outs *c'*. The plates B' are made adjustable, as shown, so as to adapt them to any system. The double arrange-

ment of adjustable plates B'—one on each side of main plate B, and each connecting with ground through a cut-out and a switch—possesses the following advantages: An unusually heavy charge of lightning may pass over both plates B'; but ordinarily only one cut-out will be fused, and the attendant during the storm can with safety, by operating the proper switch *c'*, replace the fused cut-out with a new one.

D represents the usual ampère slips, which protect the machine in case of short-circuit upon line. In the ground-circuit I place a switch or switches *c'*, which are closed during storms.

The operation is as follows: When lightning strikes the external line, the plates B become heavily charged and the current jumps across the spaces between the plates B and B' and flows through branches *c* and line C to ground. As soon as the arc is formed between these plates the current from the generator leaves the line and follows the lightning-charge to earth, thus causing a short circuit. The current from the generator, however, added to the lightning-charge fuses the strips at *c'* and breaks the ground-circuit, but not before the lightning is grounded. This having been done, the current from the generator again resumes its normal course through the mains. After the fuses *c'* are blown the switches *c'* are opened and new plugs inserted, after which the switches are again closed and the apparatus is ready for another lightning-stroke.

Having thus described my invention, I claim—

1. The combination, with a metallic electric circuit, of a lightning-arrester therein consisting of the serrated plate B, an adjustable serrated plate B' on each side of plate B, and a grounded branch leading from each of said plates B', said branch provided with a cut-out, substantially as described.

2. The combination, with a metallic electric circuit, of a lightning-arrester therein, consisting of the serrated plate B, an adjustable serrated plate B' on each side of plate B, and a grounded branch leading from each of said plates B' and provided with a cut-out and a switch, substantially as described.

3. The combination, with an electric gener-

ator A and mains *a*, the serrated plate B and
ampère slips D, adjustable serrated plates B'
on each side of plates B, and a grounded
branch leading from each plate B' and pro-
5 vided with a thermal cut-out and a switch,
substantially as described.

In witness whereof I have hereunto set my

hand in the presence of two subscribing wit-
nesses.

HARRY M. KALBACH.

Witnesses:

W. H. HEATON,

E. V. BURKERT.