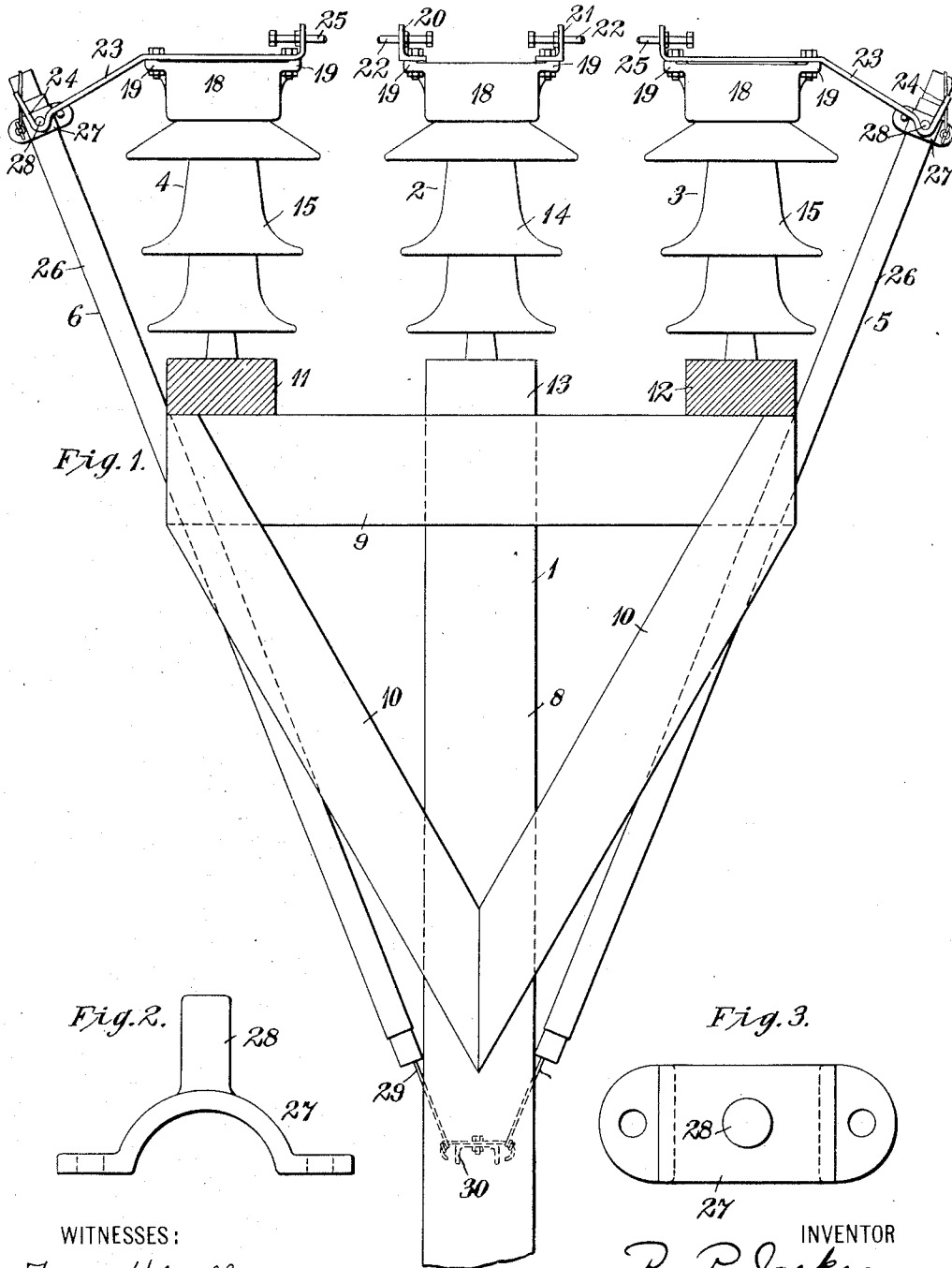


R. P. JACKSON.
LIGHTNING ARRESTER.
APPLICATION FILED DEC. 3, 1906.

981,764.

Patented Jan. 17, 1911.

2 SHEETS—SHEET 1.



WITNESSES:

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LIGHTNING-ARRESTER.

981,764.

Specification of Letters Patent.

Patented Jan. 17, 1911.

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To all whom it may concern:

Be it known that I, RAY P. JACKSON, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lightning-Arresters, of which the following is a specification.

My invention relates to such electrical apparatus as is adapted for the protection of electric circuits from lightning or other abnormal static effects and it has special reference to devices in which suitable fuses are connected in series with air gaps.

One object of my invention is to provide a device of the aforesaid class that shall be simple and durable in construction and that shall be adapted for the protection of relatively high-voltage electric circuits.

Other objects of my invention are to provide a multiple discharge path of such character that the efficiency of the device will not be impaired until all of the fuses are interrupted and to provide automatic indicating means whereby an attendant may readily observe that a discharge has taken place.

Figures 1 and 4 of the accompanying drawings are elevations of a lightning arrester constructed in accordance with my invention. Figs. 2 and 3 are detail views of the structure shown in Figs. 1 and 4, and Fig. 5 is a diagrammatic view of a system of distribution to which my improved protective device is connected.

Referring to the drawings, the device illustrated therein comprises a supporting frame 1 of wood or other insulating or insulated material, a plurality of two-point electric discharge members 2, two groups of complementary single-point discharge members 3 and 4, two groups of fuses 5 and 6 and a cut-out switch 7. The single-point discharge members 3 are connected together through the fuses 5, and the single-point discharge members 4 are similarly connected together through the fuses 6. The two-point discharge members 2 may be connected, to the electric circuit or apparatus to be protected, through the switch 7 and the ends of the fuses which are connected together may be grounded or connected to another line conductor. In the arrangement illustrated, six discharge paths are provided when the device is connected in the aforesaid manner and, consequently, a number of static dis-

charges may take place before all the fuses will be ruptured.

It will be readily understood that my invention is not restricted to any specific number of discharge paths, and this and other features in the design of the apparatus will be determined by the service for which it is intended.

The frame 1 comprises end posts 8, cross arms 9 at their upper extremities, and angle braces 10. The two posts are connected by strips 11, 12, and 13 which are respectively disposed at the two ends and at the middle points of the cross arms, and the strips 11 and 12 project a material distance outwardly from one of the posts.

The two-point discharge members 2 are mounted upon insulators 14, disposed along the length of the middle cross strip 13, the material and form of which are determined by the potential of the line which the apparatus is designed to protect. The single-point discharge members 3 and 4 are similarly mounted upon insulators 15 which are supported upon the cross strips 11 and 12 opposite the insulators 14 on the cross strip 13. The terminals of the switch 7 are mounted upon two insulators 16 which are supported by the outwardly projecting ends of strips 11 and 12. All of the insulators are provided with similar collars 18 of cast iron or other conducting material having projecting ears 19 which are drilled so that other conducting parts, hereinafter enumerated, may be readily attached to the collars by bolts or other suitable means.

The collars which are mounted on the insulators 14 are electrically interconnected by angle irons 20 and 21 which are bolted to the collars and which support a plurality of adjustable discharge points 22. The collars which are mounted upon the insulators 15 are provided with brackets 23 each of which consists of a plate bolted to the collars and having an inner end bent at a substantially right angle to the plane of its body, and an outer end that extends outwardly and downwardly and terminates in a bifurcated hook 24. The inner ends of the brackets 23 are parallel to one plane of the angle irons 20 and 21 and are provided with adjustable discharge points 25 which are similar to, and in alinement with, the discharge points 22.

A plurality of insulating tubes 26 are

provided with collar clamps 27 having projections 28 which are adapted to engage the hooked projections 24 on the brackets 23. The clamps 27 are attached to the tubes 5 near their upper extremities and fusible strips or wires 29 are electrically connected to the clamps and extend through the tubes. When the fuse-containing tubes are mounted in the forked hook projections on the 10 brackets 23 they normally assume a substantially vertical position but the lower ends of the fuse conductors are connected to a conducting channel beam 30 which is fastened to the posts 8 and is maintained in a 15 position materially below and parallel to the middle strip 13, so that the fuse-containing tubes are constrained to occupy oblique positions.

The collars 18, which are mounted upon 20 the insulators 16, are provided with terminals 31 and 32 of the switch 7 and may be respectively connected, by means of suitable conductors, to the two-point discharge members and the electric apparatus or line 25 conductors to be protected.

The operation of the device is as follows: Assuming that all of the fuses and their protecting tubes are mounted in position; that the channel beam 30 is connected to 30 ground, and that the switch 7 is closed, thereby connecting the two-point discharge members to the line; if the voltage of the circuit to which the device is connected is materially raised above its normal value, by 35 reason of lightning or other static disturbances, at least one of the air gaps formed between the adjustable discharge points 22 and 25 will break down under the electrostatic strain and will permit the discharge 40 to pass off to ground. If the arc established by this discharge is maintained by the voltage of the line, sufficient current will pass through one of the conductors 29 to cause its rupture by fusing. In this way, normal 45 conditions are restored in the circuit and the protective apparatus is still capable of performing its protective function, since only one of its discharge paths is rendered inactive. Upon the rupture of a fuse, its containing 50 tube immediately assumes a vertical position by reason of the action of gravity, and thereby indicates to the attendant that a renewal of the fused conductor is necessary.

Insulating tubes 26 protect apparatus 55 which may be located in the vicinity from injury when the discharge circuit is interrupted and by making the fuse-containing tubes of suitable length and by providing 60 suitable insulators for supporting the single and two-point discharge members, the device may be adapted for the protection of very high-voltage circuits.

Modifications in size and arrangement of 65 details may be effected within the scope of my invention, and I desire that only such

limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. The combination with an electric circuit, a set of two-point static discharge 70 members connected thereto, and two complementary sets of single-point discharge members disposed at material distances from the first set, of a plurality of fusible conductors that severally connect the single- 75 point discharge members to ground, and pivotally suspended inclosing tubes for said conductors, said tubes being held in unstable equilibrium by the conductors.
2. The combination with an electric circuit, a set of two-point static discharge 80 members connected thereto, and two complementary sets of single-point discharge members disposed at material distances from the first set, of a plurality of fusible 85 conductors that severally connect the single-point discharge members to ground, inclosing tubes for said conductors, means for pivotally suspending said tubes, and means 90 coöperating with the lower ends of the fusible conductors to hold the tubes in inclined positions until said conductors are ruptured.
3. The combination with a set of adjustable electro-static discharge members 95 connected to an electric circuit, and a plurality of adjustable electric discharge members separated by material distances from the first set and connected in multiple circuit and to 100 ground through a plurality of fusible conductors, of pivotally suspended and laterally restrained inclosing tubes for said conductors.
4. The combination with a set of adjustable electro-static discharge members 105 connected to an electric circuit, and a plurality of adjustable electric discharge members separated by material distances from the first set, of a plurality of fusible conductors that severally connect the single-point 110 discharge members to ground, and pivotally suspended inclosing tubes for the conductors which are held in laterally restrained positions by the conductors and automatically 115 assume substantially different positions when the conductors become fused.
5. The combination with an electric circuit, a set of two-point static discharge 120 members connected thereto, and two complementary sets of single-point discharge members disposed at material distances from the first set, of conducting brackets 125 electrically connected to the single-point discharge members and extending outwardly therefrom, a plurality of insulating tubes each of which is pivotally suspended from 130 one of the said brackets, and fusible conductors inclosed in said tubes and connecting the conducting brackets to ground.
6. The combination with an electric cir-

5 cuit, a set of two-point static discharge mem-
bers connected thereto, and two comple-
mentary sets of single-point discharge
members disposed at material distances from
the first set, of conducting brackets extend-
ing outwardly from the single-point dis-
charge members and terminating in two-
part hooked projections, insulating tubes,
collar clamps attached to the tubes and hav-
ing oppositely extending projections which
engage said hooked projections, and fusible
conductors inclosed in said tubes to electric-
ally connect the conducting brackets to
ground and to mechanically hold the insulat-
ing tubes in oblique positions.

7. The combination with an electric cir-
cuit, a set of two-point static discharge mem-
bers connected thereto, and two comple-

mentary sets of single-point discharge mem-
bers disposed at material distances from the
first set, of conducting brackets projecting
outwardly from the single-point discharge
members, a plurality of insulating tubes
pivotally suspended from said brackets, and
fusible conductors inclosed in said tubes
to electrically connect the conducting brack-
ets to ground and mechanically hold the
tubes in oblique positions.

In testimony whereof, I have hereunto
subscribed my name this 30th day of No-
vember, 1906.

RAY P. JACKSON.

Witnesses:

W. J. DUNWIDDIE,
BIRNEY HINES.