

(No Model.)

2 Sheets—Sheet 1.

C. S. VAN NUIS.
LIGHTNING ARRESTER.

No. 478,383.

Patented July 5, 1892.

Fig. 1.

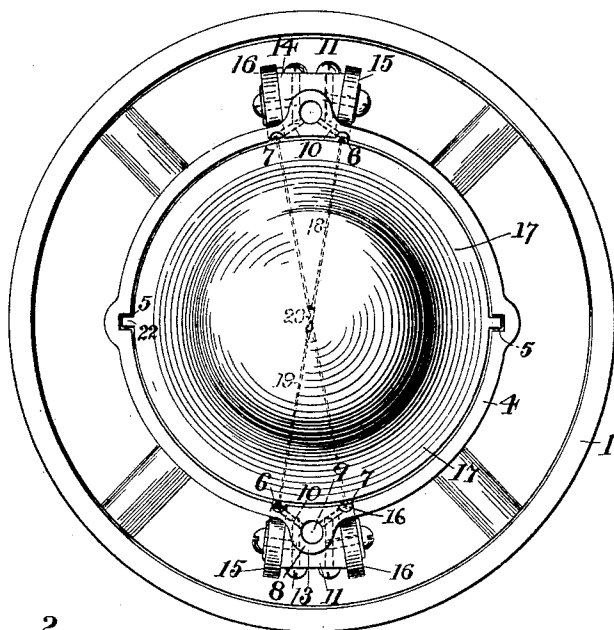
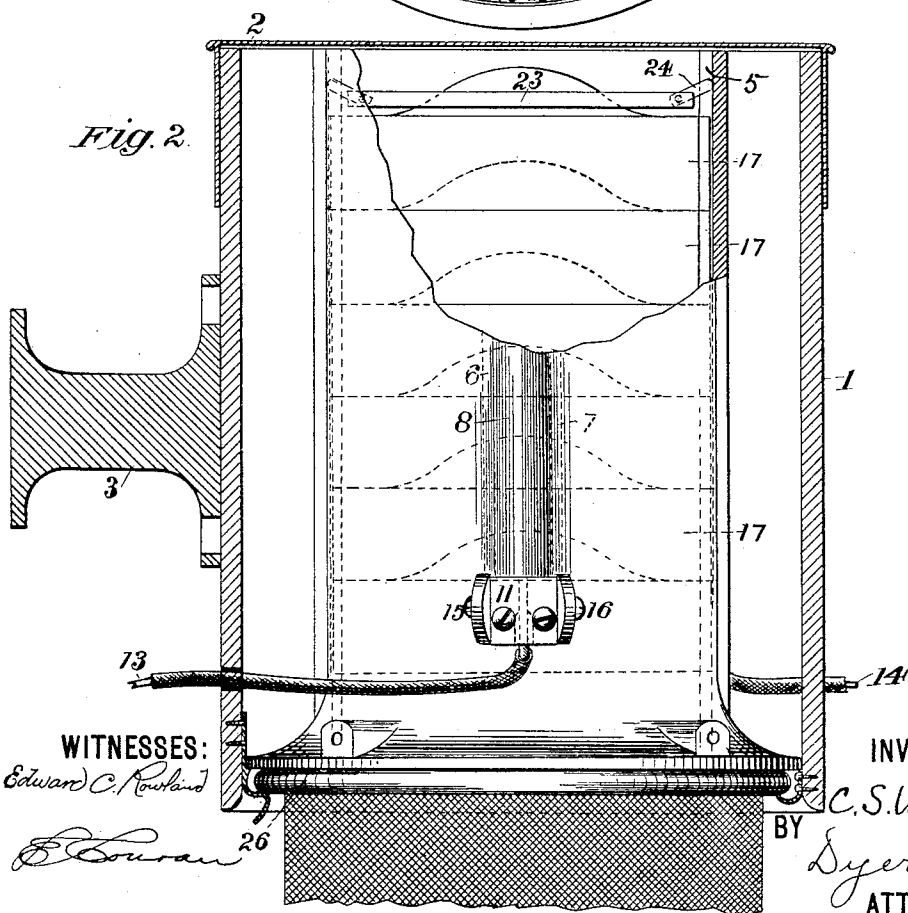


Fig. 2.



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Fig. 3.

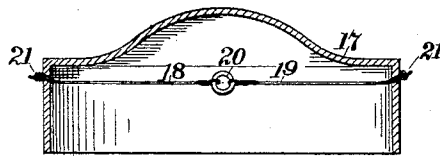
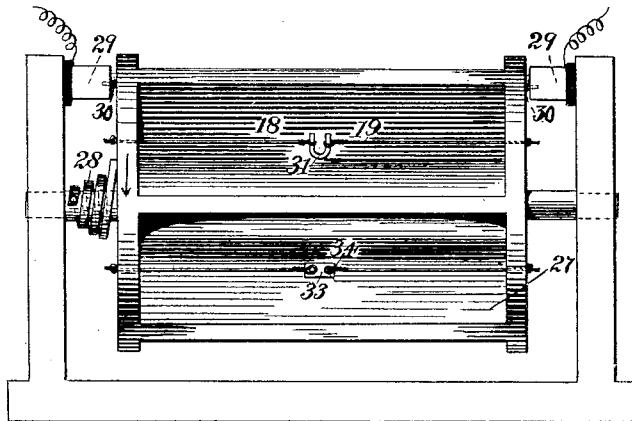


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES S. VAN NUIS, OF NEW BRUNSWICK, NEW JERSEY.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 478,383, dated July 5, 1892.

Application filed September 16, 1891. Serial No. 405,845. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. VAN NUIS, a citizen of the United States, residing at New Brunswick, in the county of Middlesex and State of New Jersey, have invented a certain new and useful Improvement in Lightning-Arresters, of which the following is a specification.

The present invention relates to devices for protecting electrical instruments from the effect of lightning discharges.

One object of the invention is to provide a reservoir-arrester—that is, one having several devices brought into operation successively—in which the breaks across which the discharge has to take place are of uniform length, and said breaks are centrally located between the terminals to which the line and ground wires are connected for the purpose of removing the arc as far as possible from said terminals.

Another object is to provide an improved arrangement of the several lightning-arrester devices in the reservoir and for supporting and releasing the same.

Other minor objects will appear from the following description.

In the accompanying drawings, Figure 1 is a plan view of one form of arrester and reservoir, the cover being removed. Fig. 2 is a section of the same. Fig. 3 is a central section of one of the arresters removed from the case, and Fig. 4 is a view of a different form of arrester.

1 is a cylinder or casing of other suitable form, having at its upper end a cover 2 and being open at its lower end. This casing may be supported by a suitable bracket 3 or otherwise. Within the casing is a second casing 4 of substantially the same outline and which is open at the top and bottom. This inner casing or cylinder is preferably of fibrine and is provided on its inner face with grooves 5 5, 6 6, and 7 7. Between the grooves 6 7 are ribs 8, which are provided with central passages 9, said passages being connected to the grooves 6 7 by branch passages 10. Supported on the inner casing near the bottom and preferably at diametrically-opposite points are metal terminals 11 12, one of which is adapted to be connected by wire 13 to ground in the ordinary manner and the other

of which is adapted to be connected by wire 14 to line. These terminals are provided with two carbon contact-disks 15 16, the peripheries of which project through openings in the wall of the casing 4 into the grooves 6 7.

17 is a cup-shaped device for supporting the lightning-arrester proper, which consists of two fusible wires or sections 18 19, in line with each other end to end rather than side by side, connected at the center by an insulating-bead 20, the ends of the wires being inserted through the bead and then bent back and twisted, as shown. Of course it is not essential that the two fusible sections of wire should be in exactly the same straight line, although this will usually be the case. While two sections of fusible wire are shown, I need not limit myself to two, but may use more, in which case there would be two or more breaks. The outer ends of the wires pass through holes in the walls of the cup, are knotted or twisted, and have short projecting ends 21 for a purpose hereinafter described. As already indicated, this arrangement protects the terminal-contacts by causing the arc to be formed at a distance from them and in a large open chamber, in which the heat is rapidly dissipated. In putting the conductors in place it is preferable to first form the knots at the ends and to thread the wires through the holes from the outside of the cup, then to insert the inner ends through the bead, turning the wires back, pulling them taut, and twisting the ends to secure them. This cup-shaped support may be made of fibrine, paper, or other suitable insulating material. The cups are formed with ribs or lips 22, adapted to enter the grooves 5, so that the devices will necessarily be put in place in the proper manner to bring the fusible conductors in line with the terminal-contacts. In some of the cups the fusible conductors lie in a line corresponding to the dotted line between 6 6, Fig. 1, while in others they occupy a line corresponding to that between 7 7. I propose to make the cups of two different colors, having the fusible conductors differently arranged in each, and placing them alternately in the case or reservoir. After filling the reservoir, as indicated in Fig. 2, a ring 23 is placed over the upper cup. Said ring is provided with two inclined pawls 24, the ends

of which move along in the grooves 5. At the bottom of the reservoir is a wire-gauze basket 25, carried by the ring 26. This is for excluding insects and for receiving the cups 5 as they fall from the reservoir.

In Fig. 4 the lightning-arrester conductors 18 19 are mounted on a rotatable flanged drum 27, having a spring 28, tending to rotate it. 29 are terminals adapted to be connected to ground and to line in the usual manner, against which the knotted ends 30 of the wires bear. In this figure the wires are shown connected by devices of slightly different form—namely, a U-shaped insulating-staple, as at 15 31, around the legs of which the two wires are carried, as shown, and the block 33, having pins 34, around which the two wires are twisted. For convenience these devices are all termed “beads,” and other forms may be used, the essential feature thereof being that 20 they shall bring the ends of the fusible wires near together and give breaks of uniform extent in the different arresters.

From what has already been said it will be clear that with the first form described the 25 several arresters are placed one above another, the lower one supporting those above and it in turn being supported by the knots and contact ends 21, which rest in the grooves 6 or 7 and on the terminal-contacts. When a lightning discharge takes place, the arc first forms at the central bead, where the break is found, and this is the point where the highest heat occurs. The entire fuse, however, is in- 35 stantly vaporized by the intense heat, even that part which extends through the wall of the casing and is knotted. This at once allows the reserve arresters to fall by gravity until the next succeeding one comes to rest on the terminal-contacts. Owing to the alternate ar- 40 rangement of the conductors in the supporting-cups the second arrester will come to rest on the terminal-contacts at the opposite ends of the metal terminals from those on which the fuse rested which was last burned out. The object 45 of this is to bring the new fuse into contact with cold or comparatively-cool contacts instead of contacts highly heated, as those would be on which the burned fuse rested. When 50 the new arrester is allowed to fall onto the same terminal-contacts as the preceding arrester rested on, the projecting ends of said new arrester will frequently be immediately burned off by the heat of the contacts themselves, thereby allowing the device to move 55 another space. When a fuse burns out, the fumes generated tend to lift the overlying lightning-arresters; but this is prevented by the ring 23 and pawls 24, and the fumes quickly 60 escape through the lower side of the casing. The passages 9 10 are designed to conduct away the fumes generated in the grooves 6 7. The operation will be substantially the same with the apparatus in Fig. 4, except that the 65 succeeding arresters will be brought into position by the spring 28 instead of by gravity. In this device, as illustrated, the arrester-con-

ductors are all in one circle; but it is clear that by arranging them alternately in different circles the successive conductors would 70 strike the terminal-contacts at different points.

In some cases when small inexpensive supports for the fusible conductors are used in the form of apparatus shown in Figs. 1 and 2 75 the basket at the bottom will be unnecessary, since the supports may be allowed to fall to the ground as the conductors burn away.

What I claim is—

1. A lightning-arrester having sections of 80 fusible wire in line with each other end to end, the meeting ends of which are separated by a short space and the outer ends of which are adapted to be connected to line and to earth, the wires being of such size and mate- 85 rial that when an arc is formed they will be quickly fused, thereby opening the circuit, substantially as described.

2. A lightning-arrester consisting of an insulating-bead or similar connecting device 90 and wires connected thereto on different sides in substantially the manner described, whereby the wires are mechanically connected end to end, but are electrically disconnected, sub- 95 stantially as described.

3. A lightning-arrester consisting of an insulating-bead or similar connecting device and fusible wires connected thereto on differ- 100 ent sides by being wound around the same, the outer ends of said wires being held by a suitable support, substantially as described.

4. A lightning-arrester consisting of an insulating-bead or similar connecting device and fusible wires connected thereto on differ- 105 ent sides by being wound around the same, the outer ends of said wires being held by the rim of a cup-shaped support, substantially as described.

5. A lightning-arrester consisting of an insulating-bead or similar connecting device 110 and fusible wires connected thereto on different sides by being wound around the same, the outer ends of said wires being held by a suitable support, in combination with circuit-terminals in co-operative relation thereto, 115 substantially as described.

6. The combination of a supporting-body, a fusible conductor supported thereon, said con- 120 ductor being knotted or twisted at the end and having a projecting end, and a terminal or stop against which said end is adapted to impinge, substantially as described.

7. The combination, in a lightning-arrester or cut-out, of one or more circuit-terminal and several fusible conductors movable success- 125 ively into contact with the terminals and arranged alternately in different planes, said terminal or terminals being so arranged that the alternate conductors make contact there- 130 with at different points, whereby the fuse which is thrown forward is not destroyed by the heat of the terminal due to the burning of the preceding fuse, substantially as de- scribed.

8. The combination of an inclosing case, line-terminals near the bottom thereof, and several separate supports and fusible conductors carried thereby in the case, one above another, said conductors having contacts adapted to come to rest successively on the terminals, substantially as described.

9. The combination of an inclosing case having grooves in its inner surface, line-terminals having contact-surfaces projecting into said grooves, and fusible conductors, the ends of which move in said grooves and make contact with the terminals, substantially as described.

10. The combination of an inclosing case having grooves in its inner surface, line-terminals having contact-surfaces projecting into said grooves, fusible conductors, the ends of which move in said grooves and make contact with the terminals, and means for conducting hot gases or fumes from said terminals, substantially as described.

11. The combination of an inclosing case and several lightning-arresters, one above another, therein and movable forward in a straight line when released, said arresters being supported by the bottom one of the series while it is whole, but which are released when the same is burned, whereby when the arrester is burned the reserve arresters fall by gravity, bringing the following arrester into operative position, substantially as described.

12. The combination of line-terminals, several lightning-arresters movable forward in

a straight line when released and in position to fall by gravity to bring them successively into operative connection with said terminals, and means operated by burning of the arrester in operative position to release the reserve arresters, substantially as described.

13. The combination, in a lightning-arrester, of line-terminals and a fusible conductor connected to each terminal, said conductors being electrically disconnected centrally between said terminals, said fusible conductors being of such character as to be fused, so as to be broken down or destroyed by the formation of an arc, whereby when an arc is formed between the adjacent ends of the fusible conductor the line-terminals will be at a distance from the point of greatest heat, and whereby the circuit will be opened, substantially as described.

14. The combination, in a lightning-arrester apparatus, of a reservoir having a groove on its inner surface, lightning-arrester conductors and supports therefor in the reservoir, and terminal-contacts, said supports having projections extending into said groove, whereby the conductors are held in line with the contacts, substantially as described.

This specification signed and witnessed this 31st day of August, 1891.

CHARLES S. VAN NUIS.

Witnesses:

CHARLES M. CATLIN,
EUGENE CONRAN.