

Jan. 22, 1935.

E. A. EVERETT

1,988,650

LIGHTNING ARRESTER

Filed Nov. 7, 1930

2 Sheets-Sheet 1

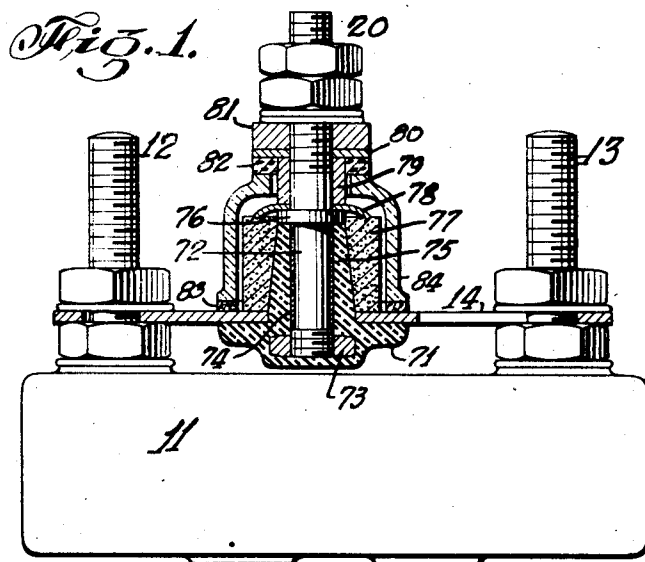


Fig. 2.

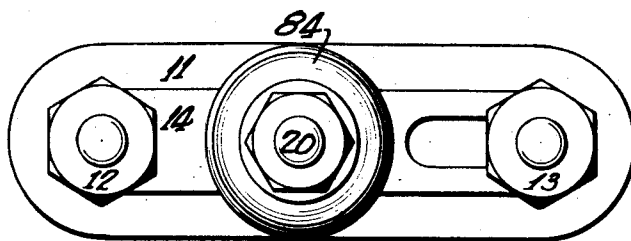


Fig. 3.

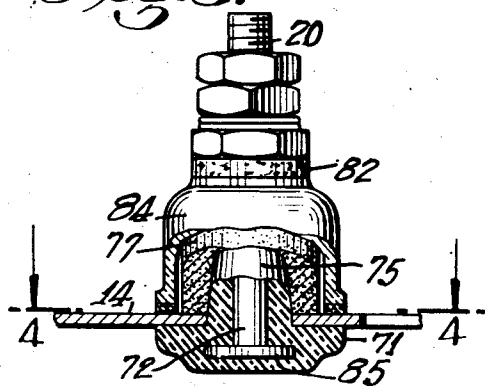
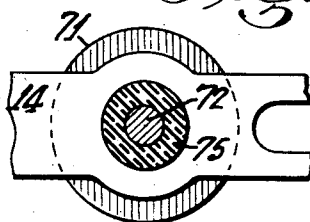


Fig. 4.



INVENTOR.
Edward A. Everett,
BY *M. H. Loughridge*
ATTORNEYS.

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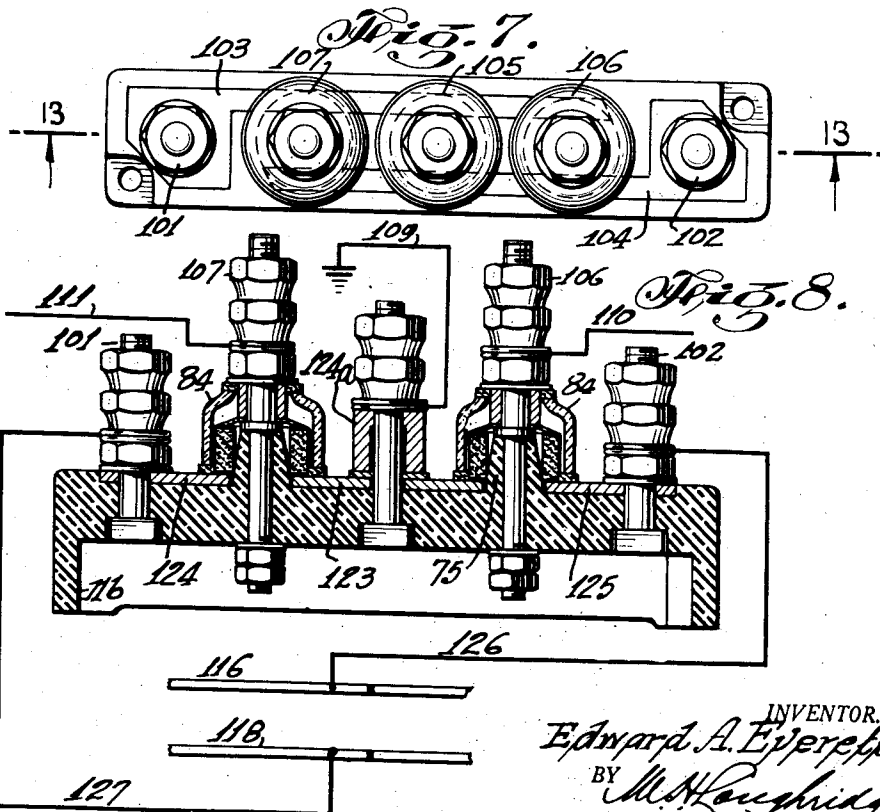
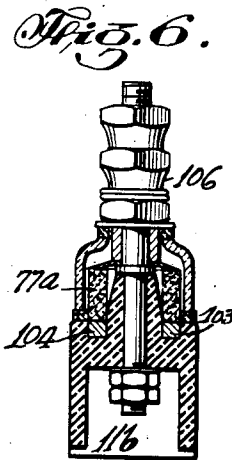
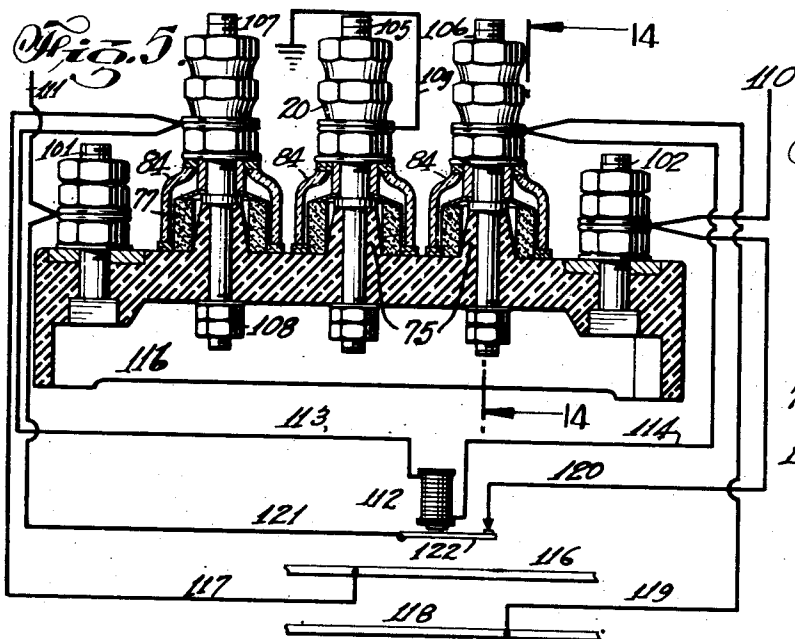
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INVENTOR,
Edward A. Everett
BY *M. Houghridge*
ATTORNEY

UNITED STATES PATENT OFFICE

1,988,650

LIGHTNING ARRESTER

Edward A. Everett, Long Island City, N. Y.

Application November 7, 1930, Serial No. 494,164

13 Claims. (Cl. 175—30)

- This invention relates to lightning arresters and has for an object to provide an arrester which is compact, easily assembled, and disassembled and readily inspected when in service. Another object of the invention is to provide an arrester which can be mounted upon a terminal block of a commercial type; another object of the invention is to provide a lightning arrester of the resistor type which can be connected into one or more circuits to discharge lightning. Other objects of the invention will appear from the following specification and the accompanying drawings, in which,
- Fig. 1 is an elevation, partly sectioned, of a terminal block fitted with an arrester according to the present invention;
- Fig. 2 is a plan view corresponding to Fig. 1;
- Fig. 3 is an elevation, partly sectioned, showing a slight modification of the arrester construction;
- Fig. 4 is a horizontal cross-section of the mounting for the arrester taken on the top of the connecting strip;
- Fig. 5 is another modified form of the invention shown in sectional elevation in which a plurality of resistor elements are provided for discharging lightning from a plurality of independent circuits, this figure also shows one application of the device to the circuits of a railway signal system;
- Fig. 6 is an end elevation, in section, corresponding to Fig. 5, and;
- Fig. 7 is a plan view corresponding to Fig. 5, and;
- Fig. 8 is another modification, in sectional elevation, in which a pair of discharge elements connect a plurality of independent circuits with a plurality of grounds.
- In the installation of railway signal systems, it is common practice to terminate the insulated conductors which control the apparatus in junction boxes and instrument cases and these wires are usually connected to terminals which are mounted on a porcelain base. A standard form has been adapted for this base, by the American Railway Association, which is known as the "R. S. A. terminal" and the purpose of the present invention is to construct a lightning arrester so that it may be mounted upon a standard base. Arresters of this type have been made, which include a spark gap by the metallic plates across which the lightning jumps when a breakdown voltage is reached. Another form of arrester in common use includes a resistor element, that is, an element which has the characteristic of offering a comparatively high resistance to the normal circuit while it has comparatively low resistance to the discharge of lightning. Arresters have also been made in which the spark gap and resistor element are used in multiple to discharge lightning. The present invention can be readily adapted for discharging lightning by the spark gap method, however, a resistant compound has been found sufficient for this purpose, without the use of spark gaps with their liability to become fused.
- It is found, in practice, that a resistant has the characteristic of being able to discharge lightning for lightning arrester purposes without material change in use and with a comparatively large capacity. For this reason spark gaps are not used in this arrester. The compound referred to is more particularly described in my co-pending application Serial No. 493,097 filed, November 3, 1930, which has matured into patent Number 1,939,679.
- This arrester is constructed so that it can be readily inspected on the ground and so that it may be taken apart and any of its parts replaced without impairing the operation of the device. The construction includes a central stem to which one of the connections may be made, as for instance the ground connection. The lower part of this stem is surrounded by a hollow insulating stem and around this hollow stem a cylinder of the resistor is placed. The bottom face of the resistor directly contacts with terminal strips leading to the conductors and the top face connects by a washer or spring disc with the central stem. This provides a path of very high resistance between the terminal strips and the central stem which ordinarily does not influence the normal operation of the circuit, but which on the discharge of lightning lowers its resistance and permits the discharge of lightning to ground. As soon as the lightning is discharged and the resistor has cooled off, its high resistance to the normal circuit is restored. The resistor is enclosed by a bell shaped glass or transparent container to protect it against the accumulation of dust and foreign matter and to facilitate inspection.
- In the drawings 11 is a terminal block, usually made of porcelain, supporting the binding posts 12 and 13, to which the electric wires are connected and the circuit is maintained between these binding posts by the connector strip 14, which for convenience in application is usually applied with a jaw connection. In the form shown in Fig. 1, the arrester is mounted upon the connector strip 14 by providing an enlarged

aperture in the center of this strip, as indicated in Fig. 4 through which the stem 75 projects from the flanged base 71. The base 71 and the stem 75 are preferably formed integral from a moulded insulating material, such as bakelite. The binding post 72 is centered in the projecting stem 75 and is thoroughly insulated from the connector strip 14. This binding post may be provided with a flanged head as at 85 in Fig. 3 and embodied in the mould of the stem, or it may be fitted to the stem after it is moulded by moulding a nut 73 in the flange 71, into which the stem is screwed until the collar 76 rests upon the stem 75. The post may be further secured in the stem by the use of a suitable adhesive cement as indicated at 74.

A cylindrical resistor 77 with a tapered aperture is mounted upon the tapered stem 75 as shown in section in Figs. 1 and 3, a spring washer 78 is mounted on the post 72 to engage the upper end of the resistor 77, a collar 79, also mounted on post 72 rests upon the washer 78 and this collar is clamped in place by the nut 81 and washer 80 on the stem 72.

In order to protect the resistor against dust and foreign matter and, at the same time, to make inspection easy, a transparent cover in the form of the bell shaped glass 84 is mounted upon collar 79 and is clamped in place between the gasket 82 at the top and gasket 83 at the bottom and by the washer 80 and nut 81.

It will be noted that the yielding washer 78 is rigidly engaged by the collar 79 which is clamped by the washer 80, also that the glass bell 84 is engaged by the yielding gaskets 82 and 83 clamped by the washer 80 with the purpose of effecting a tight seal around the glass container 84, and, at the same time, securing pressure between washer 78 and the resistor 77. It will be observed that by removing the binding nuts on the terminal post 27 the container 84, washer 78, resistor 77 and stem 75 may be removed from the connector strip 14 thereby facilitating inspection, replacement of parts and assembling.

In the construction shown in Figs. 1, 2, 3 and 4 the line circuit is usually connected to the binding posts 12 and 13 and the ground circuit is connected to the central post at 20. It is apparent that a circuit is established from the connector strip 14 to the terminal post 72 through the mass of the resistor 77 which has its lower face connected with the connector strip 14 and its upper face connected with the post 72 through the washer 78. This will discharge lightning in accordance with the characteristic of the resistor 77 for this purpose. It should here be noted that the position of the line conductors and the ground connection can be reversed without impairing the operation of the device as a lightning arrester.

Fig. 5 illustrates a form of my invention in which a plurality of resistors are mounted upon a base 11b from which stems 75 project for each arrester unit. In this construction it will be noted that the end binding post 101 connects to terminal plate 103, flush with the top of the mounting and extends in a continuous piece on one side below the resistors of the units 105, 106 and 107; and the other end binding post 102, connects to a similar plate 104, flush with the top of the mounting and extending in a continuous piece on the opposite side below the resistor elements 105, 106 and 107. As indicated in Fig. 6, each of the resistors 77a, rest upon the con-

ductor strips 103 and 104 and form a shunt in multiple between each of these strips.

One application of this arrester is illustrated in Fig. 5 to a railway signal system in which advantage is taken of the grounding effects of the track rails as well as an independent ground connection to discharge lightning. The central unit of the arrester 105 is grounded by wire 109. The unit 106 connects by wire 119 to one rail 118 of the track and the binding post 107 connects by wire 117 with the other rail 116 of the track. The track relay 112 is also connected by wire 113 with the post 107 and by wire 114 with the post 106. The line circuit 110 connects to the end post 102 and the line circuit 111 connects to the post 101. The end post 101 also connects by wire 121 to the relay contact finger 122 and the end post 102 connects by wire 120 to the same relay contact. This is a form of the invention which has gone into extensive use. It will be noted that lightning on either lines 110 or 111 is shunted from the apparatus by the resistors in each of the units 105, 106 and 107, bridging the contact strips 103 and 104, also that each of these resistors provide an independent shunt path to ground.

Another form of this invention is illustrated in Fig. 8 in which a pair of arrester units are connected to a central ground post. It will be noted that the contact strip 123, through the metallic collar 124a, is grounded on wire 109 and that lightning on conductor 111 is shunted through the resistor to the contact strips 123, connecting to ground, also through strip 124, terminal 101, and wire 127 to rail 118. Lightning on conductor 110 is shunted through the resistor of the arrester to the ground plate 123 and to the plate 125 connected to terminal post 102 and by wire 126 to the rail 116. The plates 123, 124 and 125 are flush with the top of the base 11b and are separate from each other, the plates 123 and 124 are bridged by the resistor on stem 107 and the plates 123 and 125 are bridged by the resistor on stem 106.

This invention permits a variety of applications and is intended to cover a full range of equivalents.

Having thus described my invention, I claim:

1. In a lightning arrester, the combination, a conducting strip, an insulating stem projecting at right angles thereto, a terminal post centered in said stem, a cylindrical resistor surrounding said stem and having one end connecting with said strip, a spring washer mounted on said terminal post engaging the opposite face of said resistor, a sleeve on said post engaging said washer, a transparent cylindrical container mounted on said terminal post, a gasket on said container and a nut on said post for clamping said strip, resistor, washer and container in place.

2. In a lightning arrester, the combination, a conducting strip, a flange with an insulating stem, a terminal post centered in said stem, said strip resting upon said flange, a cylindrical resistor mounted on said stem and having one end engaging said strip, a washer mounted on said post engaging the opposite end of said resistor, a collar on said post engaging said washer, an insulated cylindrical container mounted on said collar and a nut on said post for clamping said strip, resistor, washer, collar and container in place.

3. In a lightning arrester, the combination, a conducting strip, a flange of insulation with a stem, a terminal post centered in said stem, said

strip resting upon said flange, a cylindrical resistor mounted on said stem and having one end engaging said strip, a spring washer mounted on said post engaging the opposite end of said resistor, a collar on said post engaging said washer, a cylindrical glass container enclosing said resistor, a gasket mounted on said collar engaging said glass container, and a nut on said post clamping said resistor in place and independently clamping said container through said gasket.

4. In a lightning arrester, the combination, a rectangular insulating block, a plurality of arrester elements arranged in a row on said block, each of said elements having a resistor, projections formed integral with said block engaging said resistors to hold said resistors in place and a plurality of bars spaced longitudinally and flush with the surface of said block, said resistor elements resting upon said bars.

5. In a lightning arrester, the combination, a rectangular insulating block having spaced projections thereon, a plurality of arrester elements, each placed around one of said projections and having a resistor, parallel conducting bars on said block passing on each side of said projections, said bars being bridged by said resistors.

6. In a lightning arrester, the combination, a conducting strip having an aperture, a flange of insulation with an integral stem projecting through said aperture, said strip resting on said flange and projecting beyond said flange, means for supporting the projecting ends of said strip, a terminal post projecting from said stem, a cylindrical resistor centered on said stem with one face resting on said strip and a binding nut on said post clamping said resistor, flange and strip in place.

7. In a lightning arrester, the combination, a conducting strip having an aperture therein, a flange of insulation with an integral stem projecting through said aperture, said strip resting on said flange and projecting beyond said flange, a terminal post projecting from said stem, a resistor surrounding said stem with one face resting on said strip, a spring resting on said resistor and a binding nut on said terminal post clamping said resistor, strip and flange in place through said spring.

8. In a lightning arrester, the combination, a conducting strip, a flange of insulating material with an integral stem, a terminal post centered in said stem, said strip resting upon said flange and projecting on each side beyond said flange, a resistor mounted on said stem and resting on said strip and means for clamping said resistor,

strip and flange by a nut on said terminal post.

9. In a lightning arrester, the combination, a conducting strip with an aperture therein, a flange of insulating material with a stem projecting through said aperture, said strip resting on said flange and projecting on at least one side substantially beyond said flange, a terminal post centered in said stem, a cylindrical resistor surrounding said stem and having one face making electric contact with said strip opposite said flange, a spring washer mounted on said terminal post and engaging the opposite face of said resistor and a nut on said post for clamping said washer, resistor, strip and flange in place.

10. In a lightning arrester, the combination, a rectangular insulating block having a pair of parallel grooves, a terminal post at each end of said block, a conductor strip connected to each post, said strips embedded in said parallel grooves flush with the top of said block and a plurality of arrester elements arranged on the centre line of said block, each of said elements having a resistor bridging said conducting strips.

11. In a lightning arrester, the combination, a block of insulation, a terminal post at each end of said block, a conducting strip connected to each post, said strips extending parallel to each other on said block, said block having projections between said strips and an arrester element mounted on said projections and resting upon the top of said strips.

12. In a lightning arrester, the combination, a block of insulation, a terminal post at each end of said block, a conducting strip connected to each post, said strips extending parallel to each other on said block, said block having integral projections between said strips, an arrester element surrounding each of said projections and bridging said strips and a terminal post centered in each of said projections and clamping said arrester element in place.

13. In a lightning arrester, the combination, a block of insulation, a terminal post at each end of said block, a conducting strip connected to each post, said strips extending parallel to each other and embedded in said block so as to be substantially flush with the surface of said block, terminal posts mounted in said block centered between said strips, an individual arrester element mounted on each post and arranged to bridge said strips and forming a lightning discharge path between said posts and strips and an insulating cover for each element secured in place by said terminal posts.

EDWARD A. EVERETT.