June 12, 1923. 1,458,611

L. S. BRACH

LIGHTNING ARRESTER

Filed May 17, 1921

FIG. 1

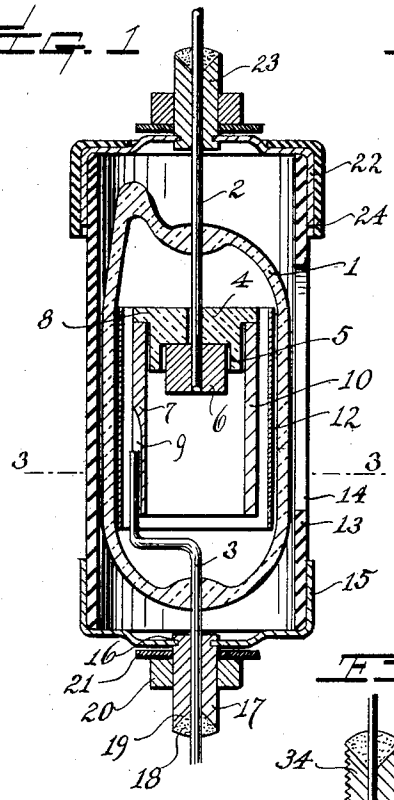


FIG. 2

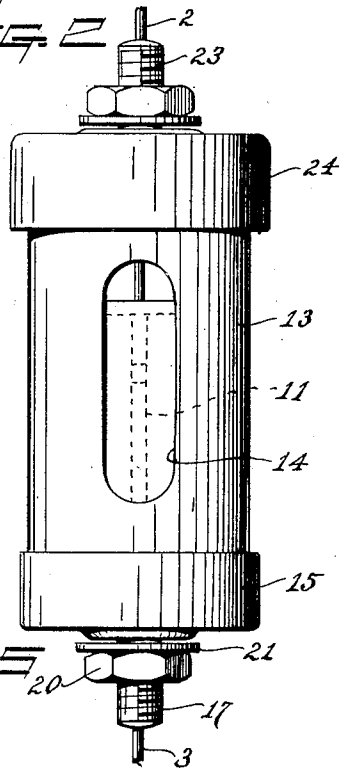


FIG. 5

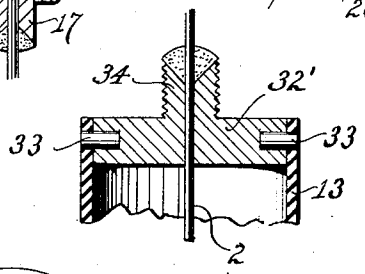


FIG. 3

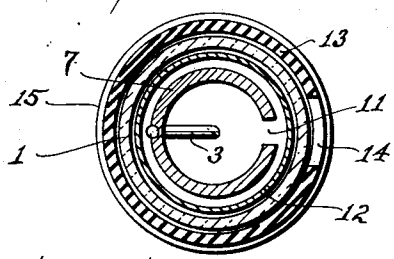


FIG. 4

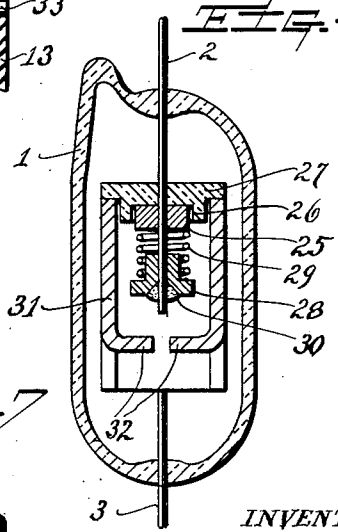


FIG. 6

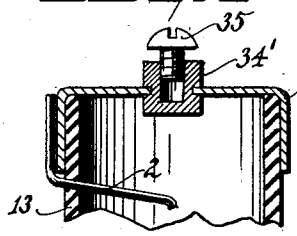
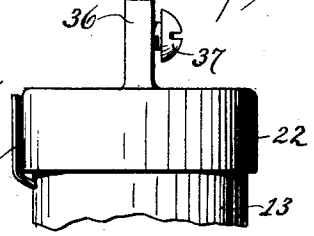


FIG. 7



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Patented June 12, 1923. 1,458,611

UNITED STATES PATENT OFFICE.

LEON S. BRACH, OF EAST ORANGE, NEW JERSEY.

LIGHTNING ARRESTER.

Application filed May 17, 1921. Serial No. 470,374.

To all whom it may concern:

Be it known that I, LEON S. BRACH, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in a Lightning Arrester, of which the following is a specification.

This invention relates to protective devices designed for the protection of low voltage apparatus and devices from innjury due to abnormal electric discharges through the line, such for instance as lightning discharges or such discharges as might occur when a telephone, telegraph, or signal wire becomes crossed with a line of high potential. The present invention deals more particularly with lightning arresters of the vacuum type where spaced electrodes are enclosed in an evacuated container or in a closed vessel containing a rarefied inert gas.

One of the objects of the invention is to provide an arrester of the class described which will possess more enduring qualities than have arresters of this class as hitherto constructed.

Another object of the invention is to provide an arrester wherein the electrodes are contained in a glass container, the latter being so mounted and protected that it is practically impossible for the container to be broken, either from external shocks and jars, or from internal heat generated at the arcing point during abnormal discharges through the arrester.

Another object of the invention is to provide a metallic protecting device for the glass container, which also serves as an electrode such that the interior of the device is always open for inspection.

Another object of the invention is to provide an arrester of the class described, which is small and compact, can be readily assembled, and which possesses electrical advantages over arresters of this type as hitherto constructed.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawings wherein I have illustrated preferred forms of embodiment of my present invention:

Figure 1 is a longitudinal sectional view taken through the device.

Figure 2 is an elevational view of the exterior thereof.

Figure 3 is a cross-sectional view taken through the arrester on the line 3—3 of Figure 1.

Figure 4 is a longitudinal sectional view taken through a modified form of the invention; and

Figures 5, 6 and 7 are views of modified details of construction.

Referring now to the drawings, wherein similar reference characters refer to similar parts through the several views thereof, the reference numeral 1 denotes the evacuated glass container through the ends of which are sealed the leading in wires 2 and 3.

The leading in wire 2 passes through a block 4 formed of a high heat resisting insulating material, such as porcelain. Seated in a circular recess 5, formed in the block 4, is an electrode 6. The leading in wire 2 is suitably electrically connected with this electrode. In the present instance it extends into an aperture formed in the electrode and is suitably fastened therein. Although various metals may be employed in forming the electrode 6, I preferably employ nickel steel in this relation, owing to the fact that this material has the advantage of not emitting gas from the heat generated by a discharge through the arrester.

Surrounding the electrode 6, and suitably spaced therefrom to provide a spark gap of the desired dimensions, is a tubular electrode 7. This electrode is also preferably formed of nickel steel and at one end encircles the block 4 and engages a shoulder or flange 8 formed upon the rear end thereof. The opposite end of the electrode 7 is provided with a recess 9, which receives the end of the leading in wire 3, which is soldered or braised to the electrode.

The electrode 7 is not a complete cylinder but is formed of a sheet of metal bent into the form of a cylinder with the free ends of the sheets spaced slightly apart from end to end, leaving a recess through which the interior of the device may be viewed as will be hereinafter more fully described.

This split cylinder construction has the further advantage in that assembling it with

the block 4 a more perfect fit between the parts is assured inasmuch as the cylinder will spring enough to accommodate the slight irregularities which often appear on porcelain parts.

One of the free ends of the split cylinder is shown at 10 in Figure 1, and the spaced ends are indicated at 11 in Figures 2 and 3.

Surrounding the electrode 7 is a cylindrically formed sheet of mica 12, the same being located between the electrode and the inside surface of the glass container.

The glass container 1 is preferably enclosed in a cylinder 13 formed of a tough, heat resisting, insulating material, such as fibre, although other materials, such as composition containing asbestos, may be used in this relation. This cylinder quite closely embraces the glass container, and is provided with an elongated slot or opening 14, which when the device is assembled is located directly opposite the slot or opening 11 in the electrode 7. When the interior of the arrester can be viewed through these registering openings, the mica shield and the wall of the glass container.

Fitted upon one end of the fibre tube 13 is a metallic cap 15, having a central opening, the walls of which are received in a peripheral slot 16 formed in the inner end of a terminal member 17, through which the leading in wire 3 extends, and which wire is soldered to the terminal member 17, by means of a body of solder 18, located in a recess 19 formed in the outer end of the terminal member. The terminal member 17 is preferably externally threaded and is provided with the brass nut 20 and washer 21, by means of which a line or ground connection may be attached.

Upon the opposite end of the fibre tube 13 is mounted a similar metallic cap 22 (preferably formed of brass) to which terminal member 23 is similarly attached and through which the leading in wire 2 extends. Mounted upon the metallic cap 22 is a cap 24 preferably formed of a suitable insulating material, such as fibre. The object of this insulating cap is to permit close mounting of arresters without danger of grounding across neighboring current carrying parts.

In the embodiment of my invention disclosed in Figure 4 a metallic block 25 is seated in the recess 26 formed in the porcelain block 27 and the leading in wire 2 extends through this block. The metallic electrode 28 is slidably mounted upon the leading-in wire, and an extensile spring 29 is positioned between the block 25 and the electrode, the latter being held in the position shown by a body of solder 30, formed upon the inner end of the leading in wire.

The tubular electrode 31 is slit at its outer end so that the two flanges 32 may be bent inwardly. By reason of this construction it will be noted that the device will automatically short circuit should too heavy a discharge pass through the arrester causing the solder 29 to melt and permitting the spring 29 to force the electrode 28 forwardly into engagement with the flanges 32, thus completing a direct electrical connection between line and ground.

Figures 5, 6 and 7 illustrate modified details of construction.

In Figure 5 the metallic and fibre caps are omitted, a metallic block 32′ being received in the ends of the fibre cylinder 13 and fastened in place by the pins 33, an integrally formed terminal member 34 being formed upon the block 32′.

In Figure 6 the leading in wire 2 instead of extending through the terminal member is soldered to the metallic cap 22 and the terminal member 34′ is provided with a threaded aperture which receives the line wire attaching screw 35.

In the modification illustrated in Figure 7 the terminal member 36 is formed integral with the cap 22 and is provided with the clamp screw 37.

Reverting now to the first described embodiment of my invention, it will be seen that I have provided a structure particularly well adapted to attain, among others, all of the ends and objects pointed out in a most facile manner. The structure is strong and rigid and while possessing the advantage of having an evacuated glass container has, as well, the other advantages of metallic arresters. Moreover, the construction is such that the interior of the device can be viewed and the condition of the vacuum ascertained at all times. It will be further observed that it is intended that the leading-in wires shall be relatively stiff and strong, thereby entirely relieving the walls of the glass container from any strain or stress. Moreover, the metallic caps and terminal members are entirely carried and supported upon the fibre tube, thus further relieving the glass container of any strain or stress.

As many changes could be made in this construction without departing from the scope of the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrated only and not in a limiting sense.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, the combination of an evacuated container, spaced electrodes within said container, leading-in wires sealed through the wall of said container, and a casing for protecting the walls of the container located exteriorly

thereof, and extending throughout the length of said container, and extending from one end to the opposite end of said evacuated container.

2. In a device of the class described, the combination of an evacuated container, spaced electrodes within said container, leading-in wires sealed through the wall of said container, and means for protecting the walls of the container located externally and internally thereof.

3. In a device of the class described, the combination of an evacuated glass container, leading-in wires extending through the wall of said container and being sealed therein, an insulating block mounted upon one of said leading-in wires within said container, a block electrode seated in a recess formed in said insulating block and connected with said leading-in wires, a tubular electrode encircling said first named electrode and spaced therefrom to form a spark gap, said tubular electrode being connected with the other of said leading-in wires, said tubular electrodes having formed therein a longitudinally extending slot, a tubular casing surrounding said container, a terminal mounted upon each end of said casing, and said casing being provided with an aperture which registers with the slot provided in the tubular electrode.

4. In a device of the class described, the combination of an evacuated glass container, of leading-in wires extending therein and sealed in the wall thereof, an insulating support for an elctrode mounted upon one of said leading-in wires, an electrode seated in said support and connected with one of said leading-in wires, a cylindrically formed electrode surrounding said first named electrode and engaging with its support, said cylindrically formed electrode being engaged with the other of said leading-in wires, said cylindrically formed electrode being provided with a slot or aperture portion through which the interior thereof may be viewed, a tubular casing formed of insulating material surrounding said casing, and having its end projecting beyond the ends of the container, metallic caps mounted upon ends of said container and form closures thereof, and terminal members mounted upon said caps and connected with said leading-in wires, said container being provided with an aperture which registers with the aperture in the cylindrically formed electrode.

5. In a device of the class described, the combination of an evacuated container having transparent side walls, spaced electrodes mounted therein, leading-in wires connected to said electrodes and extending through the walls of said container and a casing formed of opaque material completely enclosing said container, said casing being provided with a window spaced opposite the gap between said electrodes.

6. In a device of the class described, in combination, a cylindrically formed evacuated glass container having leading-in wires sealed through the walls thereof, spaced electrodes located within said container, a cylindrically formed hollow casing enclosing said evacuated container to provide mechanical protection therefor, and a metallic terminal member carried by one end of said casing, and connected with one of said leading-in wires.

7. In a device of the class described, a container, a cylindrically formed evacuated glass container having leading-in wires sealed through the walls thereof, spaced electrodes located within said container, a cylindrical hollow casing formed of relatively strong insulating material enclosing said evacuated container, to provide mechanical protection therefor, and a metallic terminal member carried by each end of said casing, and connected with one of said leading-in wires.

In testimony whereof I affix my signature in the presence of two witnesses.

LEON S. BRACH.

Witnesses:
EMMA WEINBERG,
H. E. SERNER.