No. 662,466. Patented Nov. 27, 1900.

J. SACHS.

LIGHTNING ARRESTER FOR SAFETY CUT-OUTS FOR ELECTRIC CIRCUITS.

(Application filed Sept. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

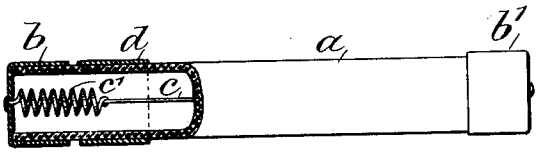


Fig. 1.

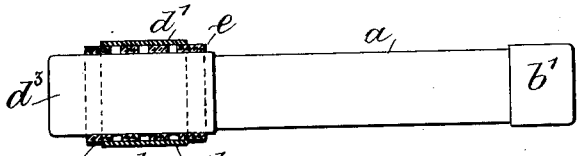


Fig. 2.

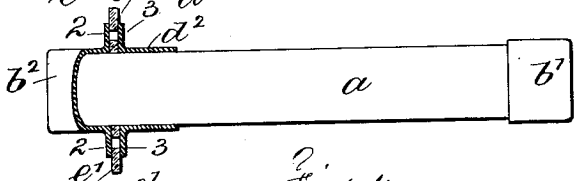


Fig. 3.

Fig. 4

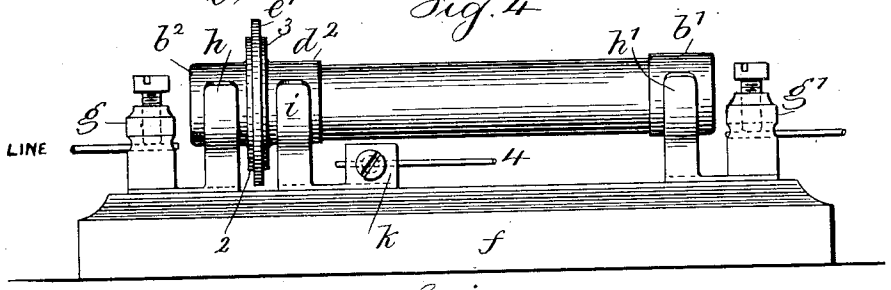
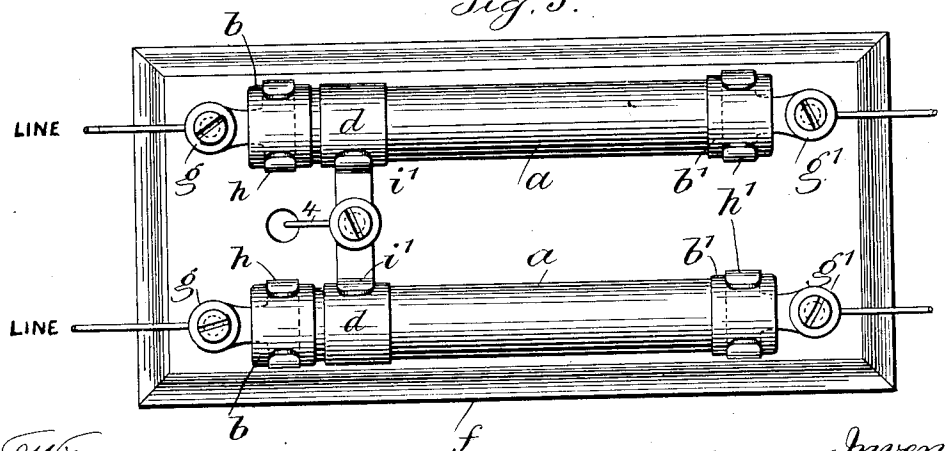


Fig. 5.



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Fig. 7.

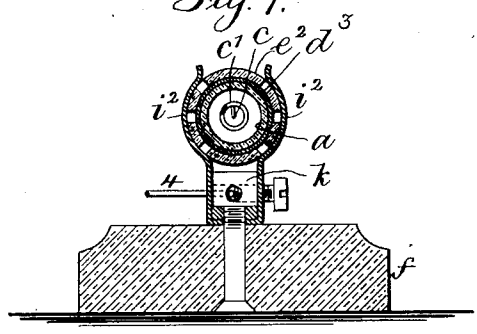
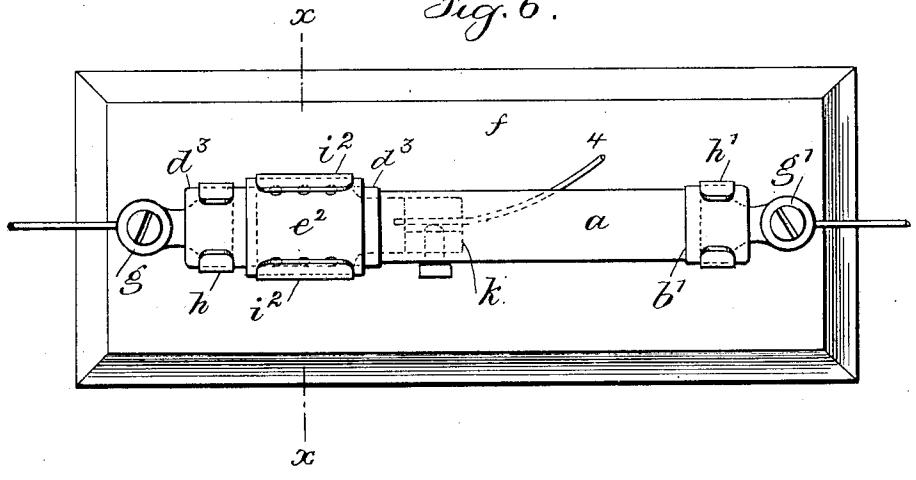


Fig. 6.



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JOSEPH SACHS, OF HARTFORD, CONNECTICUT.

LIGHTNING-ARRESTER FOR SAFETY CUT-OUTS FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 662,466, dated November 27, 1900.

Application filed September 28, 1899. Serial No. 731,898. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SACHS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented an Improvement in Lightning-Arresters for Safety Cut-Outs for Electric Circuits, of which the following is a specification.

My invention relates to a device adapted for use in connection with the safety cut-outs for electric circuits heretofore invented by me and which device acts as a means of protection from the effects of lightning discharges. In connection with this invention the safety cut-out preferably comprises a tubular case of insulating material and metal circuit connections or caps at the respective ends of the case forming terminals for the fuse device contained within the case, which fuse device may be of any desired character and which forms no essential part of the present invention.

In carrying out my invention and in combination with a tubular safety cut-out case of insulating material and the metal circuit connections, end caps, or terminals upon the same I employ a sleeve of metal surrounding the case of insulating material or an equivalent device of metal engaging the case and adjacent to one metal end connection, and the same is preferably connected by suitable devices to a ground-wire. The said sleeve and the end terminal are in close proximity; but there is sufficient space between the two to prevent any electric current except one of unusual potential, such as a lightning discharge, from jumping the gap and passing to ground. The line-terminals are preferably connected to the circuit connections or metal end caps, and I prefer to employ a choke-coil with one end connected to the fuse and the other connected to the terminal, and in case a lightning discharge passes to the line and reaches the line-terminals the same will be diverted by the choke-coil and the lightning charge will jump the gap between the metal end cap and the said sleeve as offering the least resistance and will pass by the wire to ground, so that the instruments that may be on the other end of the line past the fuse will be protected from the effect of the lightning discharge. This device is also exceedingly useful should a cross occur between the line and another line of high voltage, as therein while the fuse would probably be destroyed by the excess current due to the increased voltage of the current switched from the crossing line the current from the crossed line, if of sufficiently high potential, will jump the gap to the adjacent sleeve and so pass by the wire to ground.

The sleeve for the lightning-arrester around the tubular case of insulating material may be closely adjacent to the end terminal-cap or it may be larger than the end terminal-cap and surround the same and the intervening space be filled with a layer of perforated mica or similar non-conducting material, which will act as an insulator, but will allow the discharge of a high potential through the perforations of the mica to the outside sleeve and to ground.

The end terminal-cap and the adjacent sleeve may each be made with disks contiguous to one another and between which is a disk of perforated mica acting the same as the hereinbefore-stated sleeve of mica.

These safety cut-out devices, with the lightning-arrester, may be employed singly or may be grouped in pairs and connected by suitable devices, such as clips, to a foundation-plate, as hereinafter more particularly described.

In the drawings, Figure 1 is an elevation and partial section illustrating my improvement. Figs. 2 and 3 are elevations showing modifications of the same. Fig. 4 is an elevation showing my improvement and foundation-supports and electrical connections. Fig. 5 is a plan view illustrating two safety cut-out devices, the foundation-support, and the engaging devices and electrical connections. Fig. 6 is a plan view of a modified form of my invention, and Fig. 7 is a cross-section at $x\ x$ of Fig. 6.

The tubular case a, of insulating material, is provided with electrical connections or metal end terminal-caps $b\ b'$, and within the case is a fuse device c and resistance or choke coil c', connected to and suspended between the terminal-caps $b\ b'$, and surrounding the tubular case a and adjacent to the end cap b is a metal sleeve d. The wires and choke-coil c' are connected to the terminal-caps $b\ b'$,

and the current under all ordinary circumstances passes through the fuse device c and coil c'. An unusual potential, such as would be produced by a discharge of lightning, will be diverted by the choke-coil and jump the gap between the terminal-cap b and the sleeve d and pass to ground. On a suitable base f, Fig. 5, I have shown two of the fuse devices, such as are represented in Fig. 1, supported by the clips h h', receiving and forming electric connection with the end circuit connections or terminal-caps b b', and from which clips metallic connections extend to the binding-posts g g', to which binding-posts the line and instrument wires are connected. The sleeves d are connected by a ground-clip i', to which is fastened a wire that extends to ground, so that in case a lightning discharge or a cross-current of very high electromotive force comes over the line the same passes from the end terminal-caps b to the sleeves d, jumping the gap from them to the ground-clip i', and by the wire 4 to ground, so that the instruments on the other end of the line are not injuriously affected.

In the modification shown in Fig. 2 one end terminal-cap d^3 is made longer than the other, and a sleeve d' is provided of larger diameter than the end cap d^3, and between the said parts there is a sleeve of mica e or similar insulating material perforated at intervals, the said insulating-sleeve fitting snugly upon the end cap and the metal sleeve d' around the same, the current discharging through the perforations of the insulating-sleeve e to the sleeve d'.

In the modification shown in Figs. 3 and 4 the metal end cap b^2 is made with a disk 2, and the metal sleeve d^2 is made with a disk 3. Between said metal disks, which are adjacent to one another, there is a perforated disk e', of mica or similar material, of slightly greater diameter than the metal disks 2 3, so that the excess current will pass from one disk 2 to the disk 3 through the perforations of the disk e'.

Fig. 4 shows the devices of Fig. 3 and a base f, to which they are connected by clips h h', and metallic connections therefrom to the binding-posts g g', to which binding-posts the line-wires are connected, there being a ground-clip i connected to the base and grasping the metal sleeve d^2 with an electric connection from the said ground-clip to a post k, with a wire 4 extending to ground, thus providing an outlet for the excess of lightning-current.

In the modification shown in Figs. 6 and 7 a sleeve of perforated mica or similar material e^2 surrounds the metal end terminal d^3, and the sleeve d' of Fig. 2 is substituted by the clip-arms i^2 upon the base f and to which the ground-wire 4 is connected. This construction is simple and efficient.

I claim as my invention—

1. The combination with a case, a safety-fuse within and extending through the case, and terminals at the ends of the case attached to the safety-fuse, of a base and circuit terminals connected therewith and adapted to receive the safety-fuse case at said terminals, a ground-terminal adjacent to and insulated from one of said case-terminals, and a device securing the same to said base and an electrical connection therefrom to ground, substantially as set forth.

2. The combination with a safety cut-out fuse, the case therefor and end metal circuit connections, of a current-retarder connected to one end metal terminal and to the cut-out fuse, a metal body adjacent to said terminal but free therefrom and a line from the same to ground, substantially as specified.

3. The combination with the safety cut-out fuse, the case therefor and end circuit-terminals thereto, of a choke-coil with one end connected to one terminal and the other end to the cut-out fuse, a metal body adjacent to but free from the terminal to which the choke-coil is connected and a line from the metal body to ground, substantially as specified.

4. The combination with the safety cut-out fuse, the tubular case therefor and an end cap to the case, of a choke-coil with one end connected to said end cap and the other end to the cut-out fuse, a sleeve surrounding the case and adjacent to but free from the end cap to which the choke-coil is connected and a line from the sleeve to ground, substantially as specified.

5. The combination with the safety cut-out, the case therefor, and a metal end cap, of a sleeve surrounding the said case and adjacent to said cap and a connection from said sleeve to ground, substantially as and for the purposes set forth.

6. The combination with the safety cut-out, the case therefor, and a metal end cap, of a sleeve surrounding the said case, and perforated insulating material between the said sleeve and the said metal end cap leaving an air-gap, and a connection from said sleeve to ground, substantially as and for the purposes set forth.

7. The combination with the safety cut-out, the case therefor and a metal end cap, of a sleeve surrounding the said case and an insulating-material separator between the said sleeve and the said metal end cap leaving an air-gap and a connection from said sleeve to ground, substantially as and for the purposes set forth.

8. The combination with the safety cut-out, the case therefor and a metal end cap, of a metal sleeve surrounding the case and adjacent to the end cap, and insulating material between the adjacent portions of the end cap and sleeve and leaving an air-gap, substantially as and for the purposes set forth.

9. The combination with the safety cut-out, the case therefor of insulating material and metal end caps, of a sleeve of metal surrounding the case of insulating material and adjacent to one end cap, a foundation-support,

clips connected to the foundation-support for engaging and holding the safety cut-out at the metal end caps, electric connections from the line to the metal end caps and a connection from the sleeve to the ground, substantially as and for the purposes set forth.

10. The combination with the safety cut-out, the case therefor of insulating material and ends of conducting material, of a circularly-disposed layer of insulating material adjacent to one end, a foundation-support, clips connected to the foundation-support for engaging and holding the safety cut-out at the ends, electrical connections from the lines to the said ends of conducting material, and a metallic connection contacting with the surface of said circularly-disposed layer of insulating material and extending electrically to the ground, substantially as and for the purposes set forth.

11. The combination with the safety cut-out, the case therefor of insulating material and a metal end cap, of a sleeve of metal surrounding the case of insulating material and adjacent to the said end cap, a disk of metal formed with the end cap and another disk of metal formed with the said sleeve, the disks being adjacent to one another and in parallel planes, and a perforated disk of insulating material, such as mica, between the said disks and surrounding the case of insulating material, substantially as and for the purposes set forth.

12. The combination with the safety cut-out, the case therefor of insulating material and metal end caps, of a sleeve of metal surrounding the case of insulating material and adjacent to one end cap, a disk of metal formed with the said end cap and another disk of metal formed with the said sleeve, the disks being adjacent to one another and in parallel planes, and a perforated disk of insulating material, such as mica, between the said disks and surrounding the case of insulating material, a foundation-support, clips connected to the foundation-support for engaging and holding the safety cut-out at the metal end caps, electric connections from the line to the metal end caps and a connection from the sleeve to ground, substantially as set forth.

13. The combination with a safety cut-out fuse, the holder therefor and circuit-terminals of conducting material, of a current-retarder connected to one terminal and to the fuse, and a metal body adjacent to one terminal, but electrically free therefrom, and a line from the same to ground, substantially as specified.

14. The combination with a safety cut-out fuse, the holder therefor and circuit-terminals of conducting material, of a choke-coil connected to one terminal and to the fuse and a metal body adjacent to one terminal, but electrically free therefrom, and a line from the same to ground, substantially as specified.

15. The combination with a safety cut-out fuse and the end metal circuit connections therefor, of a current-retarder connected in one line with the fuse and between the end metal circuit connections, and a metal body adjacent to one terminal but free therefrom, and a line from same to ground, substantially as set forth.

Signed by me this 21st day of September, 1899.

JOSEPH SACHS.

Witnesses:
GEO. T. PINCKNEY,
S. T. HAVILAND.