E. O. SCHWEITZER & N. J. CONRAD.

FUSE DEVICE.

APPLICATION FILED APR. 18, 1912.

1,135,548.

Patented Apr. 13, 1915.

Fig. 1.

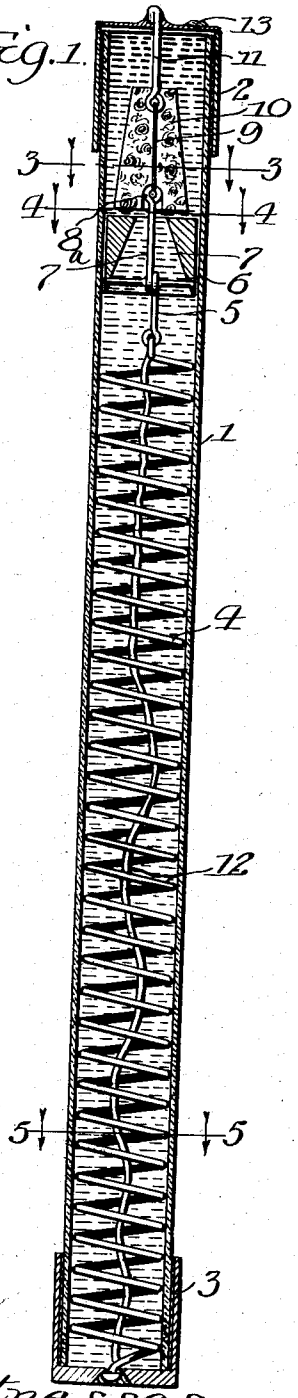


Fig. 3.

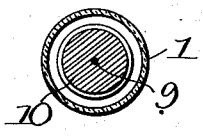


Fig. 4.

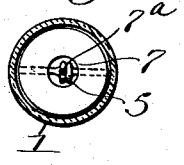


Fig. 5.

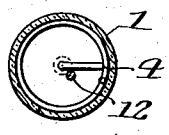
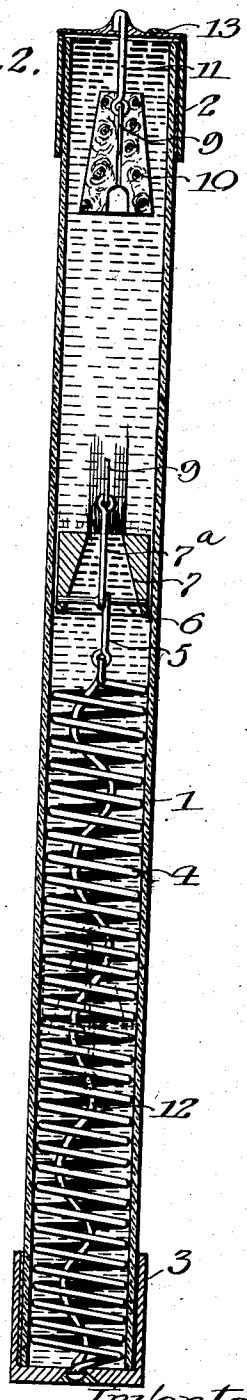


Fig. 2.



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FUSE DEVICE.

1,135,548. Specification of Letters Patent. Patented Apr. 13, 1915.

Application filed April 18, 1912. Serial No. 691,718.

To all whom it may concern:

Be it known that we, EDMUND O. SCHWEITZER and NICHOLAS J. CONRAD, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Fuse Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to an improved fuse device, and has as its principal object the provision of means whereby a stream of insulating liquid may be projected into the space where the arc would naturally form upon the operation of the fuse.

A further object of our invention resides in the particular arrangement and combination of parts hereinafter described.

In the accompanying drawings Figure 1 is a central longitudinal section of our device showing the parts as they are in normal position; Fig. 2 is a view similar to Fig. 1 except that the device is shown as operating and in dotted lines in the fully operated condition; Fig. 3 is a cross section on the line 3—3 of Fig. 1, looking in the direction of the arrows; Fig. 4 is a section on the line 4—4 of Fig. 1, looking in the direction of the arrows; Fig. 5 is a section on the line 5—5 of Fig. 1.

Referring more particularly to the drawings, 1 represents a tube or case preferably of glass containing insulating liquid, preferably carbon tetra-chlorid. Case 1 is provided with two caps or terminal pieces 2 and 3, attached to the tube 1 by suitable cementing material such as shellac. Attached to the terminal piece 3 is a helical spring 4 which is connected at its upper end to a link 5. Link 5 connects in turn with a cross rod 6 which is carried by a fiber member or spout 7 which is free to move in the interior of the tube. Connected to the rods 6 is also a second link 7^a which is hooked at its upper end as shown at 8, so as to connect with a fuse link 9 which is embedded in a piece of resilient material 10 which is preferably of cork. The upper end of the fuse link 9 connects with a third link 11 which passes through the top of the cap 2 being bent over so as to contact with the outer surface of the cap to take the strain of the spring 4. The point where the link 11 passes through the cap 2 is sealed by solder or similar means. The cap 2 is made with a separable top 13 which is soldered to the cylindrical part 2. Owing to the sharp edge of the upper end of piece 2 and the nature of the solder used, the joint between the pieces 2 and 13 will yield under pressure before any other part of the device, thus tforming a vent to prevent rupture of the tube. As will be obvious on inspection of the drawings sliding plug or spout 7 is provided with a conical aperture.

The lower edge of the aperture in element 7 is sharp so as to project as much liquid as possible through the aperture with a minimum resistance. A flexible wire 12 is connected in parallel with the spring to relieve the spring of a portion of the current so that it may not become overheated when the fuse operates. Now when the fuse blows the connection between link 7^a and link 11 will be severed and the spring will be free to draw the plug 7 toward the bottom of the tube. As indicated clearly in Fig. 2, while the spout is being thus drawn to the bottom of the tube, the liquid below the spout will be forcibly ejected through the aperture therein, causing a stream of liquid to pass through said aperture directly in the path of such arc as may happen to form between the fixed link 11 and the link 7^a, and immediately extinguish such arc. The spout 7 will come to rest in the lower part of the tube and the position indicated in the dotted lines in Fig. 2.

It will be obvious to those skilled in the art that the principle of forcing a stream of liquid into the fuse space may be applied in other ways than that in which we have shown, and described in this application, and it is to be understood that we contemplate all such arrangements and devices for accomplishing this result which are the electrical and mechanical equivalent in any way of the device shown and described herein.

It will be observed that the fusible element is shown as situated substantially at the end of the inclosing tube which has the weakened joint, the connection 11 being very short. This arrangement insures that the pressure due to an explosion within the tube or casing will be transmitted directly to the cap or top 13, so that it will yield before an undue pressure is generated. If the connection 11 were longer so that the fuse were removed from the end of the case

and a substantial amount of liquid intervened between the cap and the fuse, and inertia of such liquid would present such resistance to sudden movement as to largely increase the pressure and endanger the tube in case of short circuit.

Having thus described our invention what we claim is:

1. In a fuse device in combination, a pair of terminals, a fuse intermediate of said terminals, and means for projecting a stream of liquid into the space occupied by the arc formed upon the melting of said fuse.

2. In a device of the class described in combination, a pair of tips connected by a fuse, at least one of said tips being movable, and means for projecting a stream of liquid into the path of movement of said movable tip.

3. In a device of the class described in combination, a fixed tip, a movable tip, a fuse connecting said tips, a spring for operating said movable tip, and means for projecting a stream of liquid into the path of movement of said movable tip.

4. In a device of the class described in combination, a fixed tip, a movable tip, a fuse connected to said tips, a movable member to which said movable tip is connected provided with an aperture therein, said aperture being in alinement with said movable tip, and a spring connected to said tip for operating it upon the melting of the fuse.

5. In a device of the class described in combination, a tube containing an insulating liquid, fixed and movable tips, a fuse connecting said tips, a resilient shield surrounding said fuse, a movable member to which said movable tip is connected having an aperture therein in which said tip is partially situated and a spring for operating said movable member.

6. A circuit opening device having a movable member provided with a tapering opening and carrying a fuse terminal in line with said opening and a fuse connected to said terminal.

7. An automatic fuse device comprising in combination, a movable terminal, a fuse connected to said terminal, means carried by the movable terminal for directing a stream of liquid on to the arc, and a spring for actuating said means.

8. An automatic fuse device comprising in combination, a movable terminal, a fuse connected to said terminal, a spout carried by said terminal for directing a stream of liquid on to the arc, and automatic means for operating said spout.

9. In a device of the class described in combination, a tube containing an insulating liquid, fixed and movable tips, a fuse connecting said tips, a resilient shield surrounding said fuse, a movable member to which said movable tip is connected having an aperture therein in line with said tip, and a spring for operating said movable member.

10. A device of the class described in combination, a tube containing insulating liquid, end caps for said tube, a spring connected to one of said caps, a movable member provided with a conical aperture connected to said spring, a terminal carried by said member situated partially in said aperture, a terminal connected to the second of said caps, a fuse connecting said terminals and a cork shield surrounding said fuse.

11. The combination of an elongated casing containing an insulating liquid, a fuse mounted in said casing, a spring normally held extended by said fuse, and a movable member submerged in said liquid attached to said spring and operated thereby upon the melting of said fuse, said movable member having a central aperture in alinement with said fuse and occupying substantially the entire cross-sectional area of said casing except for said aperture.

12. The combination of an elongated casing containing an insulating liquid, a fuse mounted in said casing, a spring normally held extended by said fuse, and a movable member submerged in said liquid attached to said spring and operated thereby upon the melting of said fuse, said movable member having a funnel shaped aperture in alinement with said fuse and occupying substantially the entire cross-sectional area of said casing except for said aperture.

13. In a fuse device in combination, a tube containing an insulating liquid, a fuse carried in said casing, a resilient shield surrounding said fuse, a movable tip to which said fuse is connected, a movable member to which said tip is connected having an aperture therein in line with said fuse, a spring for operating said movable member holding said fuse normally under tension, and means for holding said fuse against the tension of said spring.

14. A fuse device comprising in combination, an exterior tube or casing substantially filled with insulating liquid, and a fuse element mounted in said casing substantially at one end thereof, said casing having a weakened connection at the end having the fuse.

In witness whereof, we hereunto subscribe our names this 11th and 16th days of April A. D., 1912.

EDMUND O. SCHWEITZER.
NICHOLAS J. CONRAD.

Witnesses:
A. L. JONES,
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