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HIGH VOLTAGE PROTECTIVE DEVICE.
APPLICATION FILED SEPT. 8, 1910.

1,033,384.

Patented July 23, 1912.

Fig. 2.

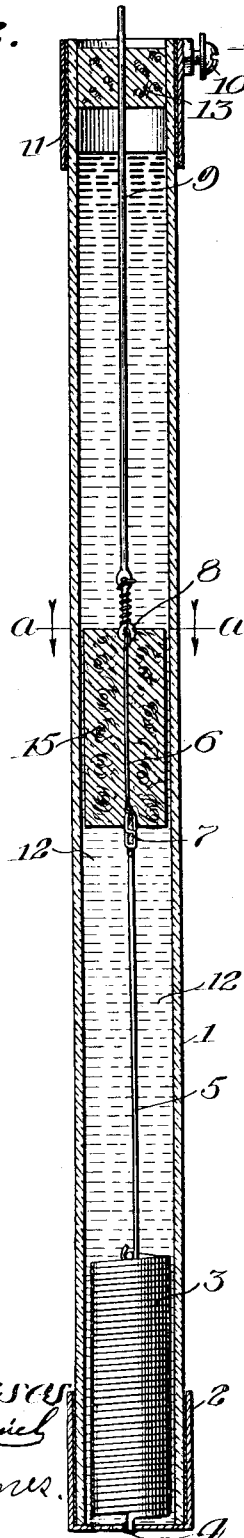


Fig. 1.

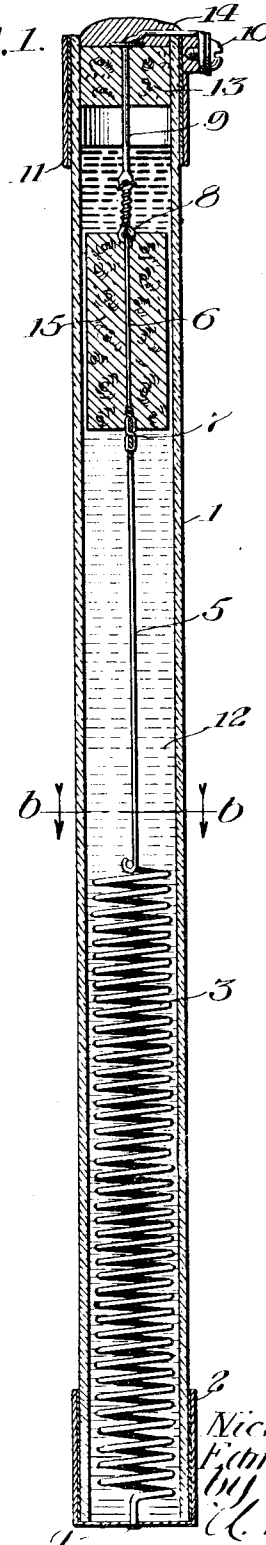


Fig. 3.

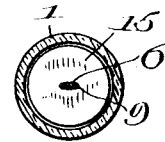
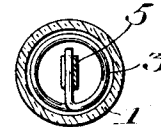


Fig. 4.



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UNITED STATES PATENT OFFICE.

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HIGH-VOLTAGE PROTECTIVE DEVICE.

1,033,384.

Specification of Letters Patent.

Patented July 23, 1912.

Application filed September 8, 1910. Serial No. 581,000.

To all whom it may concern:

Be it known that we, NICHOLAS J. CONRAD and EDMUND O. SCHWEITZER, 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 High-Voltage Protective 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 high voltage protective devices or fuses and has for its object the provision of an improved circuit opening device for use preferably in connection with high voltage systems in which the voltage may be six hundred volts or over and which is equally applicable for circuits in which the voltage may be ten thousand volts or even higher.

In two previously filed applications, respectively Ser. No. 550,219, filed Mar. 18, 1910 and Ser. No. 555,005, filed April 12, 1910, we illustrate a high potential protective device in which a fusible element under tension is used in connection with a non-combustible liquid in which a portion of the fuse is surrounded in a manner to form a barrier to any possible arc that may be formed upon rupture of the fuse.

In our present application we set forth a structure through which we entirely cover the operative length of the fuse with a material which will not combine with the products of combustion when the fuse blows, and which envelop is preferably so made that the hole through which the fuse is drawn is smaller in diameter than the diameter of the fuse wire. The material which we prefer to employ is cork which on account of its resilient characteristics presses inwardly against the fuse wire and thus remains in close association therewith throughout its entire operative length. We thus provide a heat confining means for the fuse so that the heat therein is not dissipated but remains to perform its required function of blowing the fuse when the current reaches the predetermined abnormal value. The heat confining or insulating means herein prevents the substantial radiation of heat from the fuse to the surrounding material. As before stated we find cork as a specific instance of a material which fulfils this requirement.

Our invention further contemplates other details not shown in the before mentioned

two applications among which might be mentioned means for sealing a device so as to secure practical results from its operation.

We will explain our invention more in detail by reference to the accompanying drawing illustrating the preferred embodiment thereof in which:

Figure 1 is a sectional view of our device in completed form ready for use; Fig. 2 shows a cross-sectional view of the device during the process of assembling; Fig. 3 is a sectional view on lines *a-a* of Fig. 2, and: Fig. 4 is a sectional view on lines *b-b* of Fig. 1.

It will of course be understood that we are describing specifically herein the form which we have at present selected to carry out our invention without meaning to limit ourselves thereby to this precise structure but meaning it to signify merely one of the many forms to which our invention is applicable.

We use a tube preferably of glass which has a sealing cap 2 at one extremity thereof, which cap is sealed to the glass preferably by the use of some suitable material not soluble in the liquid used within the tube in this case is carbon tetra-chlorid. The adhesive which we use for this sealing purpose is hot shellac which is a vegetable gum having the necessary characteristics. A spring 3 has one extremity securely fastened in the cap at 4 and is associated at its other extremity with a link 5. The upper extremity of the link 5 has fastened thereto a fuse 6 which is coiled as shown at 7 about this extremity to fasten the fuse thereto. The upper extremity of the fuse is coiled around the eyelet 8, which eyelet ends in a wire 9. The wire 9 is brought out through the sealed end at the upper extremity of the tube 1 and is fastened by means of a screw 10 to an annular shell 11 suitably cemented to the tube 1. Carbon tetra-chlorid 12 is provided within the interior of the tube 1 as shown.

The novel form of sealing the upper extremity of the device consists in the provision of a cork 13 which is forced into the tube 1 so that on account of its resilience it will always bear tightly against the glass even during expansion and contraction on account of the changes of temperature. The remaining portion of the tube 1 outside of the cork is sealed by means of the compound 14 which should be of such character-

istics that its temperature coefficient is similar to that of the material of which the tube 1 is constructed, and a material which we find gives us these qualifications is litharge cement. A litharge cement having these properties may be made of finely ground litharge mixed with Portland cement, one part of cement to fifty parts of litharge, mixed with glycerin to form a thick paste. The spring 3 normally maintains the fuse under tension and the construction here pointed out is of special utility in the assembling, as will be apparent from Fig. 2 where the wire 9 is of considerable length and the parts are assembled as shown in Fig. 2 which is easily accomplished. Thereafter the wire 9 is pulled through the cork 13 until the fuse is under the required tension and is then bent around the screw 10 and secured in place, the protruding end at the wire then being cut off. Thereafter the sealing compound is placed in position. The most important feature of our construction resides in the provision of an envelop 15 which surrounds the fuse throughout its entire operative length, that is, the ends of the fuse are doubled when they enter the cork so that the rupture point of the fuse when blowing must be somewhere within the cork. The envelop 15 has a hole 16 somewhat smaller than the diameter of the fuse and the fuse is drawn into the envelop through this hole so that the two are always in direct association. We prefer to use cork for this envelop as on account of its resilience it is pressed against the fuse. The envelop should be of an inert material which will not be affected by the operation of the fuse. The envelop 15 is also of sufficient size to form practically a barrier to the arc which might be formed between the eye 8 and the link 5 upon rupture of the fuse. Sufficient space however is left about the periphery of the cork to permit the carbon tetra-chlorid to flow freely. The liquid within the tube should be of a non-inflammable character and yet have such

characteristics as will permit it to flow readily into the smallest apertures. Carbon tetra-chlorid fulfils these requirements and we use it for that purpose.

While we have herein shown and particularly described the preferred embodiment of our invention, we do not mean to limit ourselves to the precise construction and arrangement as herein set forth, but

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A high voltage protective device comprising a fuse, an inert envelop in substantial contact with the entire operative length of said fuse and a bath of non-inflammable fluid to flow between the terminals upon rupture of said fuse.

2. A high voltage protective device comprising a fuse, means for maintaining said fuse under tension, an inert envelop covering and compressing the entire operative length of said fuse and a bath of non-inflammable fluid to flow between the terminals upon rupture of said fuse.

3. A high voltage protective device comprising a fuse, an envelop of cork covering the entire operative length of said fuse and a bath of non-inflammable fluid to flow between the terminals upon rupture of said fuse.

4. A high voltage protective device comprising a fuse, and an envelop of cork covering the entire operative length of said fuse.

5. A high voltage protective device comprising a fuse, an envelop covering and compressing the entire operative length of said fuse and an arc extinguishing bath therefor.

In witness whereof, we hereunto subscribe our names this 31st day of August A. D., 1910

NICHOLAS J. CONRAD.
EDMUND O. SCHWEITZER.

Witnesses:

MAX W. DABEL,
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