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UNITED STATES PATENT OFFICE

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ARC-QUENCHING MATERIAL

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This invention relates to arc quenching materials, especially those adapted for use in connection with high tension apparatus and materials, as for instance fuses, cables, entrance bushings, switches, and transformers; and to insuring positively a prompt quenching of the arc when the fuse blows. Heretofore a good deal of difficulty has been met in preventing and suppressing incipient arcs and consequent deterioration and ionization in cables; as also in controlling the flash and in extinguishing the arc or spark in high voltage fuses, especially for large currents. These troubles relate both to the mechanical security of the apparatus, cable or fuse and also to the tendency of an unquenched arc to spread and cause extensive collateral damage, as by burning, ionization and the like, besides failure of the fuse or other member to perform promptly its appropriate function.

The main objects of this invention are to provide an improved kind of arc quenching material; to provide such material in amorphous pasty or semi-solid form adapted for convenient handling and use; to provide such a filler having great chemical stability under intense heat as against carbonization, oxidation or ionization; to provide such an arc-quenching material adapted to absorb or arrest the electrons liberated by the arc; to provide such a material which will recede or creep away from a heated body, such for instance as a fuse element when the latter gets hot and so let the fuse blow; and to provide an improved kind or form of arc-quenching immediate environment for the fuse wire itself.

The filler material which I have discovered comprises a mixture of carbon tetrachloride, aluminum stearate and aluminum palmitate. The two latter materials are first mixed in about the proportion of seven to three in the order named, respectively, and then about 10% of this mixture is mixed with about 90% of the carbon tetrachloride, the resulting product being a gelatinous substance having extremely high dielectric strength and other properties especially adapting it for arc quenching in fuse cartridges. Although the proportions above stated are well adapted for general purposes, it is practicable to vary these somewhat according to particular needs as may be found desirable.

Before these component materials are mixed together, they have their own respective characteristics. The carbon tetrachloride is electrically and chemically a stable liquid, but physically, by itself alone, is very volatile at all ordinary temperatures. The other two materials are mineral soaps of a substantially solid consistency. The carbon tetrachloride is rendered physically stable by mixing it with the soaps specified. The reason for using more stearate than palmitate is that such a proportion results in a firmer jelly. The proportion of this "soap" mixture may vary from 3% to 15%, but if too much is used the jelly is too stiff and the carbon tetrachloride is less free to perform its arc-smothering function. But if too little of said mixture is used, the jelly is too soft and yielding and will not creep away from the fuse element properly as the latter gets hot, the fuse thus losing its due responsiveness.

At the instant when the fuse blows, a volatilized fuse metal is scattered explosively through and is instantly chilled by the jelly which, being dielectric, insulates the various particles and thereby at the same time quenches the arc and also precludes appreciable ionization.

In operation, when the temperature reaches 100° to 150° C. the jelly shrinks away from the fuse wire, thus reducing its cooling action and permitting the fuse to respond promptly by blowing.

The use of this material in electric safety cutouts is set forth in my divisional application, Serial No. 439,248, filed March 26, 1930.

The said jelly when used in transformers serves with great efficiency to quench any incipient arcing and without any resultant carbonization such as occurs when oil is used. Moreover, the jelly serves as a good distributor for the heat generated in a transformer and meets admirably all transformer requirements.

The jelly referred to when used to impregnate insulating paper in cables instantly

quenches and suppresses any arcing or incipient tendencies to arc and also prevents ionization.

This jelly is especially well adapted for use as a filler for high tension bus compartments, as will be understood.

Although a few specific uses of this invention are herein suggested, it is to be understood that no attempt has been made to mention specifically all of its practical uses.

I claim:

1. As an electric arc quenching material, a mixture of carbon tetrachloride, aluminum stearate and aluminum palmitate.

2. An electric arc quenching material comprising a mixture of from eighty-five per cent to ninety-seven per cent of carbon tetrachloride with a combination of aluminum stearate and aluminum palmitate.

3. An electric arc quenching material comprising a mixture of from eight-five per cent to ninety-seven per cent of carbon tetrachloride with a combination of aluminum stearate and aluminum palmitate, the two latter being mixed in the mutual ratio of about seven to three.

4. An electric arc quenching material in jelatinous form composed of liquid carbon tetrachloride and a mixture of naturally solid metallic soaps, the latter being capable of absorbing sufficient of said liquid to produce the consistency of jelly.

5. A conductor bedding material composed of an arc quenching volatile liquid and a metallic soap of naturally solid consistency, the latter being jellified by absorption of the former at ordinary temperatures and the liquid being volatile at temperatures occurring adjacent to fuse elements as the latter heat up under load.

6. As a dielectric material, a compound of carbon tetrachloride, eighty-five to ninety-seven percent, in combination with three to fifteen percent of a mixture of aluminum stearate and aluminum palmitate mutually proportioned at about seventy per cent of the former to thirty percent of the latter.

Signed at Chicago this 14th day of March, 1928.

GODFREY STEERUP.