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O. ZIEGEL
ELECTRIC FUSES
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Fig. 1

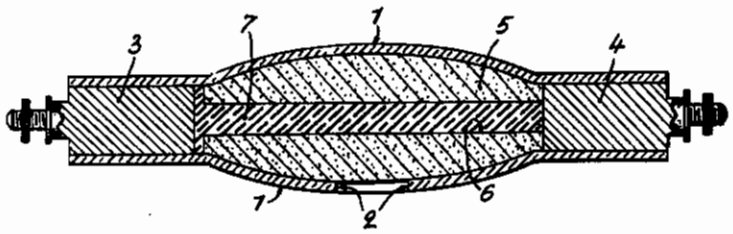


Fig. 2

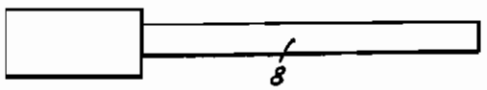


Fig. 3

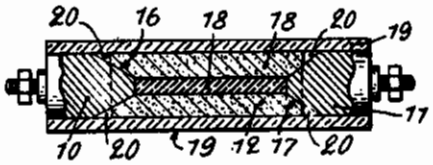
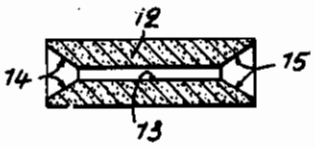


Fig. 4



OLIVIER ZIEGEL
INVENTOR
By C. C. Schmuck
his ATT'Y.

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ALIEN PROPERTY CUSTODIAN

ELECTRIC FUSES

Olivier Ziegel, La Chapelle-Gauthier, France;
vested in the Alien Property Custodian

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The invention relates to electric fuses adapted to interrupt an electric circuit under the action of a rise of temperature and, thus to protect any suitable apparatus, machine, motor or installation against undue overheating, either of the apparatus itself, or of the surrounding objects subjected to the action of the heat developed by the apparatus.

This fuse essentially comprises a loose or movable conducting member, which is held in a fixed position and in a state of continuity in contact with the terminals of the electric circuit, by means of a sheath of fusible insulating material, the whole being arranged within an envelope of insulating material, or within an insulated envelope, whereby a rise of the surrounding temperature above a predetermined value, causes melting of the insulating material, thus releasing the conducting member which falls down or breaks down and looses contact with the terminals or otherwise interrupts the electric circuit.

In a preferred embodiment of the invention, the electric fuse according to the invention comprises a glass tube in which are arranged the terminals for the electric circuit, the movable or loose conducting member being constituted by a thin column of mercury, which bridges the two terminals and is held in contact with them by a sheath of wax or the like. At a determined temperature, which is constant for a fuse of determined construction, but varies according to the constructional data, the wax melts and releases the column of mercury, which breaks down or falls down and looses contact with the terminals, thus breaking the circuit.

In the accompanying drawing, which is given solely by way of example:

Fig. 1 is an axial section of a fuse according to an embodiment of the invention.

Fig. 2 shows a calibrated mandrel adapted for use in filling the fuse.

Fig. 3 is a view similar to Fig. 1, showing a modification of the invention, and

Fig. 4 is an axial section of an insulating sheath of fusible material for use in the device of Fig. 3.

According to the embodiment shown in Fig. 1, the fuse comprises a glass tube 1, which is slightly bulged in the middle, and whose wall is provided with an aperture 2. At both ends of said tube are secured the terminals 3—4 for connection with the electric circuit. The central part of the tube, between the terminals, is filled with wax, or like material, forming a sheath 5, the centre of which is provided with a cylindrical duct 6, filled with a thin column of mercury 7, in contact at its ends with the terminals 3—4.

For the manufacture of this fuse, the following method may be used: the terminal 4 is secured at one end of the tube and a core or mandrel 8, shown in Fig. 2, is introduced through the opposite end of the tube in the place of terminal 3. The size of core 8 corresponds to the volume taken up by terminal 3 and by the column of mercury 7. Then, molten wax is cast through aperture 2. When this wax has set into an insulating sheath, core 8 is withdrawn and the required amount of mercury (usually a small drop) is poured into the duct 6 left in the wax, care being taken that the mercury comes into contact with terminal 4 and overflows slightly at the opposite end of the sheath, so as to secure a good contact with terminal 3, as the latter is secured at the corresponding end of the tube.

It will be understood that, when the fuse is brought to a temperature corresponding to the melting point of the wax, the latter will melt and flow out through aperture 2; the column of mercury will then disintegrate, thus interrupting the current between the terminals.

It is not essential to provide an exit for the molten wax, because as the wax becomes fluid, the mercury, which is denser, falls to the bottom. Hence, use may be made of a plain tube without an aperture, as shown in Fig. 3. In this embodiment of the invention, the fuse comprises two cylindrical terminals 10—11 ending in conical tips, and a moulded or perforated sheath 12 of fusible material (Fig. 4) having a central cylindrical duct 13 opening into conical depressions 14—15, whose surface corresponds to the conical tips 16—17 of terminals 10—11. The column of mercury 18 is poured into the duct 13 and the whole is arranged in a cylindrical envelope 19 of insulating material, such as glass, china, etc.

The assembly of this fuse may be made as follows:

One of the conical depressions (16 for example) of sheath 12 is stopped by the corresponding terminal 10, duct 13 is filled with mercury, the opposite aperture 15 is then stopped by terminal 11 and the whole is inserted into insulating tube 19.

When the temperature rises above the melting point of sheath 12, the ends of this sheath, which are in contact with the terminals 10—11, and whose temperature rises faster than the middle portion are softened; the mercury will thus flow between the conical tips 16—17 of the terminals and the molten ends of the sheath, and a por-

tion of this mercury will collect in the small space 20, left between the tips of the terminals, the wall of the tube and the ends of the sheath, this breaking the mercury column 18 and interrupting the circuit.

In this embodiment of the invention, the insulating tube 19 may be made of a rigid material, or of a flexible material which is wound around the terminals 10—11 and sheath 12.

It will be seen that the breaking off of the circuit takes place progressively without giving rise to any important induction current.

Fuses according to this invention may be devised to operate at various temperatures, either by using insulating sheaths made of materials fusible at various temperatures, such as beeswax, paraffin wax, gutta, tar, etc., or by varying the mass of the insulating sheath, or the mass of the terminals, or the size of the movable or loose conducting member, or the shape of the fuse, or the heat conductivity of the surrounding tube. However, for a fuse of a determined construction and size, the operating temperature will be constant.

The column of mercury may be replaced by a small bar of conducting material, adapted to be supported by the insulating sheath and to fall down as the latter melts, thus causing interruption of the circuit.

Tube 1 may be of any suitable material, such as a suitably insulated metallic tube.

This fuse may be used in all kinds of electric apparatus, such as domestic appliances provided with heating resistances, whose prolonged heating, due for example to oblivion, may set fire to surrounding objects. It may as well be used to protect the apparatus itself: electric motor, wireless set, ignition element for an engine, etc., to be protected against overheating.

The fuse according to the invention may also be used for the protection of any suitable plant having an electric control, such as an engine, where overheating may be produced by any cause and, for example, the fuse may be installed at any suitable part of the plant, for instance in the cooling radiator of an engine, and on the current inlet circuit of the control member. The fuse, instead of being installed in the circuit of the electric apparatus, or of an electric control member, may be located in an auxiliary circuit connected with any suitable alarm device, either luminous or sonorous.

Finally, it will be seen that this fuse may operate under the action either of external heat due to heating of the whole of the plant, or of internal heat developed within the fuse by an increase of the current or the tension, the operation being adjusted by selecting the material used for the fusible sheath, or by varying the cross-section or the resistivity of the movable or loose conducting member.

OLIVIER ZIEGEL.