Feb. 7, 1950 L. H. MATTHIAS ET AL 2,496,555

CONTACT FOR ELECTRICAL SWITCHES

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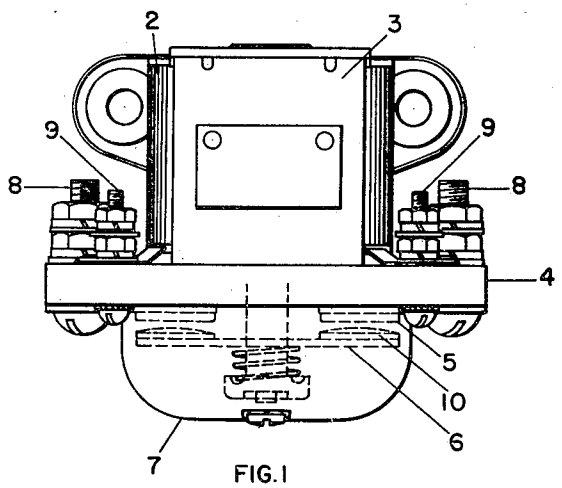


FIG.1

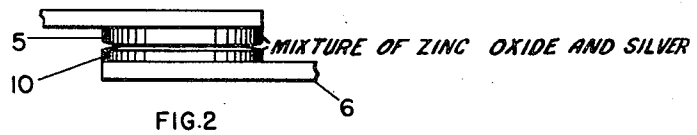


FIG.2

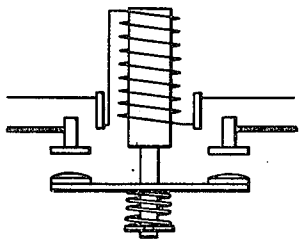


FIG.3

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CONTACT FOR ELECTRICAL SWITCHES

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6 Claims. (Cl. 200—166)

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This invention is concerned with contacts for electrical switching devices and in particular with such contacts when used in direct current circuits.

The performance of various materials when used as contacts in the electrical switching devices depends on the electrical circuit conditions in which the contacts are used, the mechanical characteristics of the actuator, and the service to which the switching device is subjected. In general, it is desirable that a contact material have properties which permit closing on high currents without welding or sticking; that the material assist in quenching the arc which may exist on opening of the circuit; that the loss of material per operation be low; that the specific electrical resistance be low; that the contact resistance be low and constant; and that the transfer of material, particularly when used in a D. C. circuit, be a minimum.

It is an object of this invention to obtain the foregoing requirements of switch contacts to a high degree. It is also an object of this invention to obtain such contacts by a manufacturing process which is economical, and further it is an object of this invention to obtain such contacts of materials which are of comparatively low cost.

We have discovered that a combination of zinc oxide and silver provides such contacts. We have made contacts of these materials of the following percentages:

	Per cent by weight
Zinc oxide	2½ to 10
Silver	Balance

In the manufacture of the contacts, silver of 200 mesh is mixed together with the zinc oxide, the mixture is then placed in the die and is subjected to a pressure of about 35 tons per square inch. The contacts are then removed from the die and sintered by being placed in an oven and heated at 1400° F. for fifteen minutes. A contact thus formed can be attached to stationary contact post or movable contact arm by silver soldering.

A test was conducted of an automatically actuated switch having two sets of such contacts in series. The contacts in this particular case had a diameter of .62 inch and the composition of the contacts was zinc oxide 7½% by weight and silver making up the balance. The pressure exerted between the faces of each set of contacts was approximately three pounds. This switch was considered of a capacity to carry 100 amperes continuously. The voltage drop over the two sets of contacts in series was 60 millivolts. This voltage drop was uniform throughout a test of 50,000 operations of switching a resistance load of 100 amperes at 24 volts direct current.

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This same switch showed an extremely satisfactory operation on the making and breaking of a circuit having a voltage of 24 volts direct current and a load up to and including 1500 amperes. The load in this case was made up of resistance.

An application of this invention is shown in the accompanying drawings forming a part of this specification. Figure 1 shows an automatic switch as used in aircraft, in which the circuit is broken at two places. This particular switch is comprised in the main of a magnet coil 2, of a U-shaped iron fieldpiece 3, of a support of insulation 4, of stationary contacts 5 and set of movable contacts 10 on a bridge bar 6. A cover of insulation material is usually provided to enclose the stationary and movable contacts. The load circuit of the switch is through terminal post 8, down through stationary contacts 5 and movable contacts 6, out through the other terminal post 8. The connections to the magnet coil are made from posts 9. In Figure 2 an enlarged view of one set of stationary and movable contacts is shown and in Figure 3 a wiring diagram of the connections to the automatic switch are shown. In each view like numbers represent identical parts.

While this invention has herein been described by reference to a specific instance of its embodiment, it is not intended that the protection to be afforded hereby shall be unnecessarily limited by such specific instance. The intention is that the protection to be granted hereunder shall extend to the full limit of the inventive advance disclosed herein as defined by the claims hereto appended.

We claim as our invention:

1. In an electrical switch a stationary contact, a movable contact to engage said stationary contact, said contacts consisting of a mixture of zinc oxide and silver, said zinc oxide within the range from 2½ per cent to 10 per cent of the total weight of each contact.

2. In an electrical switch arranged for automatic operation to carry and switch direct cur-

rent having a stationary contact and a movable contact to engage said stationary contact, said contacts consisting of a mixture of zinc oxide and silver, said zinc oxide within the range from 2½ per cent to 10 per cent of the total weight of each contact.

3. In an electrical switch to carry 100 amperes direct current and having a stationary and movable contact each in the shape of a disc of substantially ⅝ inches in diameter, said contacts consisting of a mixture of zinc oxide and silver, said zinc oxide being substantially 7 per cent of the total weight of each contact.

4. In an electrical switch having contacts between which an electrical circuit is to be made and broken, said contacts consisting of a mixture of silver and zinc oxide, the silver of the order of 90 per cent of the total weight of each contact.

5. A composition of matter suitable for use as an electrical contact material consisting of a compacted strongly cohesive intimate physical mixture of metallic silver and from 2½ to 10 per cent by weight of zinc oxide.

6. As a composition of matter suitable for use as an electrical contact material a compacted and sintered mixture of from 2½ to 10 per cent by weight of zinc oxide and the remainder finely divided metallic silver.

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