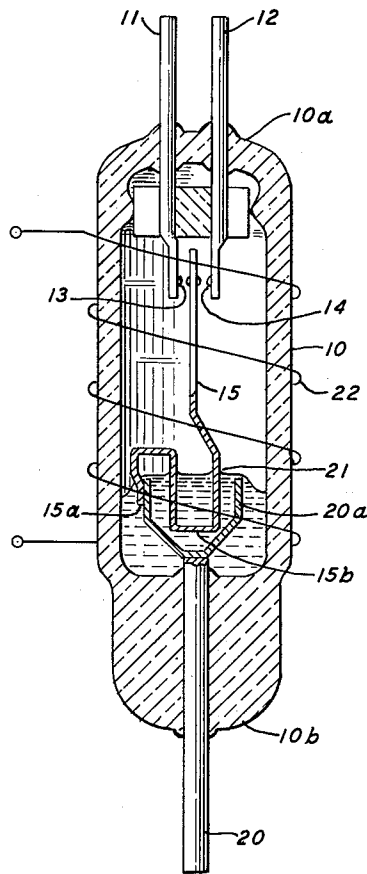


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C. E. POLLARD, JR.
MEANS FOR PREVENTING CONTACT STICKING IN
MERCURY CONTACT SWITCHES
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MEANS FOR PREVENTING CONTACT STICKING IN MERCURY CONTACT SWITCHES

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5 Claims. (Cl. 200-166)

This invention relates to electric switches and particularly to such switches in which metallic material in liquid form is used as a medium through which circuit continuity is effected.

Switches of the kind under consideration are often called "mercury" switches because of the common use of this material as the liquid contact medium. Although a mercury switch may take several forms, there is disclosed for illustrative purposes one of the mercury contact type as in Patents 2,609,464 to J. T. L. Brown and C. E. Pollard, Jr. and 2,868,926 to C. E. Pollard, Jr.

It has been previously discovered, as set forth in Patent 2,732,459 to C. E. Pollard, Jr., that in switches having mercury as the contact medium, the contacts have a tendency to stick. One solution of the sticking problem is set forth in this last noted patent, namely, the use of a copper-mercury solution in place of mercury alone where all contacts are substantially platinum.

It is an object of this invention to further improve the structure and thus the operation of mercury type contact switches in which the wetted contacts tend to stick where one or more of the contacts are nickel or a similar metal.

This object is attained in accordance with a feature of this invention by using a solution of mercury, copper and tin as the contact medium.

The foregoing and other objects and features of this invention will appear more fully and clearly from the ensuing description of a switch structure illustrated in the appended drawing in which the single figure shows in partial section an electromagnetically operable sealed reed switch having as a contact medium a solution of mercury, copper and tin.

The reed switch illustrated comprises an envelope or housing 10, which may be of glass. In one end 10a of the envelope 10, spaced pole-piece terminals 11 and 12 of magnetic material are sealed. The facing inner ends of the terminals 11 and 12 are provided with contacts 13 and 14, respectively, which may be of platinum or platinum and nickel.

The opposite end 10b of the envelope 10 has a metal tube 20 extending through and sealed therein. A part of the tube within the envelope has a flared or cup-like portion 20a. Contained within this cup portion and designated 21 is a quantity of the mercury-copper-tin solution previously noted. There may be an excess of this solution surrounding the cup.

A reed or swinger 15 of magnetic material, such as Permalloy, is secured to the cup 20a as at 15a and has a looped portion 15b within the cup. The reed 15 may

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be advantageously coated with nickel to improve its mercury wettability.

An energizing coil 22, shown schematically in the drawing, surrounds the envelope 10.

The theory of operation of mercury contact switches is known to those skilled in the art and is, accordingly, not here discussed. For further information with regard to the particular type of switch chosen to illustrate this invention, reference is made to the previously noted Patents 2,609,464 and 2,868,926.

The liquid contact medium may comprise the mercury, tin and copper in various proportions. For example, suitable nonsticking contacts have been made with 6.0 milligrams of tin and 0.3 milligram of copper in 0.1 cubic centimeter of mercury. The lower limit of copper useful for the intended purpose is not clearly defined, although 0.25 milligram of tin and 0.3 milligram of copper in 0.1 cubic centimeter of mercury attained the desired result. The upper limit for copper appears to be 0.05 percent and that for tin about 0.5 percent by weight. The lower limit for tin appears to be about 0.01 percent by weight.

Thus, one may use the maximum amount of tin and of copper or less of either or both down to a minimum beyond which the desired effect is not achieved. In view of the much greater amount of tin than copper that may be dissolved in mercury and of its apparently greater effect on the contact operation, the "minimum" of copper may be none at all provided sufficient tin is used.

Although this invention has been disclosed with respect to a particular switch illustrative thereof, it is not confined to such structure but may be used advantageously in other liquid contact switches subject to contact sticking.

What is claimed is:

1. In an electric switch of the type employing engageable wetted contacts, an agent for wetting the contacts comprising a mercury-tin-copper solution.
2. In an electric switch of the type employing engageable wetted contacts, at least one of which is nickel, an agent for wetting the contacts comprising a mercury-tin-copper solution.
3. In an electric switch having engageable contacts housed in an insulating envelope, liquid mercury with tin and copper dissolved therein.
4. An electric switch having movable circuit controlling elements housed in a sealed insulating envelope, and a pool of mercury-tin-copper solution in said envelope.
5. An electric switch in which circuit continuity is maintained by way of contacts wetted by a liquid contact material comprising tin in an amount up to 0.5 percent by weight and copper in an amount up to 0.05 percent by weight dissolved in mercury.

References Cited in the file of this patent

UNITED STATES PATENTS

2,319,259	Peterson	May 18, 1943
2,732,459	Pollard	Jan. 24, 1956
2,796,495	Keitel et al.	June 18, 1957