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## (54) MERCURY-WETTED REED CONTACT UNIT

(71) We, C. P. CLARE INTERNATIONAL N.V., a body corporate organised under the law of Belgium, of Overhaamlaan, 3700 Tongeren, Belgium, do hereby declare the 5 invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement.—

10 This invention relates to a sealed magnetic reed contact unit with mercury-wetted reed contacts which is capable of working in all positions with a high switching capability and a high sensitivity.  
 15 A mercury-wetted reed contact unit comprises two metal reeds enclosed in a glass capsule and which are wetted with mercury such that the latter is the effective contact material. In the known mercury 20 wetted reed contact units, the mercury is contained in a small tank and consequently they have to be kept in a vertical position.  
 We have sought to provide an improved mercury-wetted reed contact unit which can 25 be used when in any position.

Accordingly, the present invention provides a mercury-wetted reed contact unit comprising at least two magnetic reeds having coating ends contained in a glass 30 capsule; two sleeves made of magnetic material, each sleeve extending lengthwise within the capsule and around a respective one of the reeds, the sleeves being aligned in spaced apart relation such that an axial 35 gap is formed therebetween, the gap being located in the region of the coating ends of the reeds, the inner walls of the sleeves and the surfaces of the reeds being wetted with mercury, and the tips of the reeds 40 being provided with spots made of a material which cannot be wetted with mercury.

The present invention is further illustrated in the accompanying drawings, 45 wherein:

Figs. 1 and 2 are two lengthwise sectional views of a reed contact unit according to the invention.

The drawings show a sealed glass capsule 50 1 and two reeds 2 contained therein. The

reeds are made of a magnetic material, e.g. Fe-Ni. In the capsule 1 are two sleeves 4 which are spaced apart such that a gap 5 is formed therebetween in which are located contact tips 3 of the reeds 2. The inner 55 walls of the sleeves 4 and the surfaces of the reeds 2 are wetted with mercury 6. with spots 7 made of a material which can

The tips 3 of the reeds 2 are provided not be wetted with mercury, e.g. chromium 60 oxide. These spots 7 must have an area which is sufficiently small such that, when the reed contacts are being switched, splashing mercury from the contact zone is quickly enough replaced otherwise the work- 65 ing of the relay at high switching frequencies would be made difficult.

The tips 3 of the reeds 2 are made sufficiently wide such that a large drop of mercury projected during switching against 70 the wall of the glass capsule in the gap 5 between the sleeves 4 can be taken up by the reeds.

The axial spacing between the sleeves 4 must be relatively small in order to prevent 75 accumulation of mercury there.

This axial extent of gap 5 between the sleeves 4 must be chosen in order to optimize the performance of the contract unit. When this gap is too large, too much mercury 80 can accumulate there which has the effect of drying the reeds 2 and consequently causing the switching capability of the contact unit to decrease. When this gap is sufficiently small, it ensures that a small 85 quantity of mercury is kept there, whereby the mercury circulation is still high. However, when the gap is too small, there is a chance that mercury in the gap causes 90 short circuits to occur.

The sleeves 4 are made of a magnetic material. They form magnetic shunts and have a geometric shape such that a flux concentration is produced in the zone containing the contacts, thereby producing 95 optimum utilisation of the magnetic field.

By using a soft magnetic material for the reeds 2 with a minimum remanence, e.g. Fe-Ni 50-50% or Fe-Ni 22-78% there is provided a normal monostable make con- 100

tact unit.

By using a remanent magnetic material for the reeds with determined coercive force there is provided a bistable contact unit, 5 that is a contact unit which operates when energized by a magnetic field and is held operated when said magnetic field disappears. Such a bistable contact unit opens its contacts when energized by a magnetic 10 field in opposite direction.

The invention permits a bistable contact unit to be achieved with a minimum volume of remanent magnetic material, which is made possible due to several 15 reasons:

- 1) when the contact unit is operated, the airgap is very small due to the absence of non-magnetic contacts by contrast with the known mercury contact units; the small 20 airgap and the sleeves made of soft magnetic material produce a small reluctance effective to produce a high effective magnetic flux in the airgap;
- 2) the spring force of the reeds can be 25 substantially smaller than that of dry reed contact units.

Another advantage of this invention is that it permits conventional glass-metal 30 connections to be used.

#### WHAT WE CLAIM IS:—

1. A mercury-wetted reed contact unit comprising at least two magnetic reed having coating ends contained in a glass capsule; two sleeves made of magnetic 35 material, each sleeve extending lengthwise within the capsule and around a respective one of the reeds, the sleeves being aligned inspaced apart relation such that an axial gap is formed therebetween, the gap being 40 located in the region of the coating ends of the reeds, the inner walls of the sleeves and the surfaces of the reeds being wetted with mercury, and the tips of the reeds being provided with spots made of a 45 material which cannot be wetted with mercury.

2. A mercury-wetted reed contact unit as claimed in claim 1, wherein the reeds are made of soft magnetic material. 50

3. A mercury-wetted reed contact unit as claimed in claim 1, wherein the reeds are made of a remanent magnetic material.

4. A mercury-wetted reed contact unit substantially as herein described and with 55 reference to the accompanying drawings.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*

FIG. 1

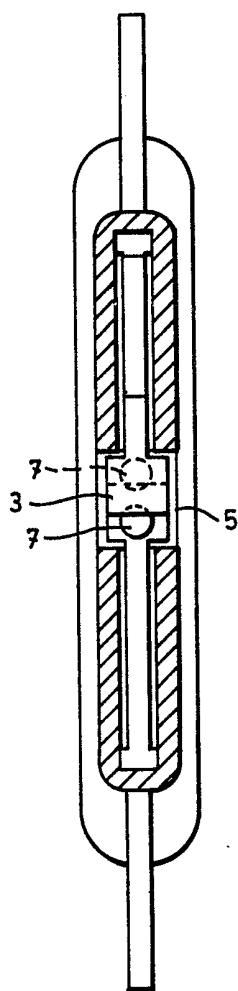


FIG. 2

