

March 29, 1966

W. B. ELLWOOD
METHOD OF ASSEMBLING AND MAGNETICALLY
ADJUSTING A REED SWITCH

3,242,557

Filed June 29, 1962

2 Sheets-Sheet 1

FIG. 1

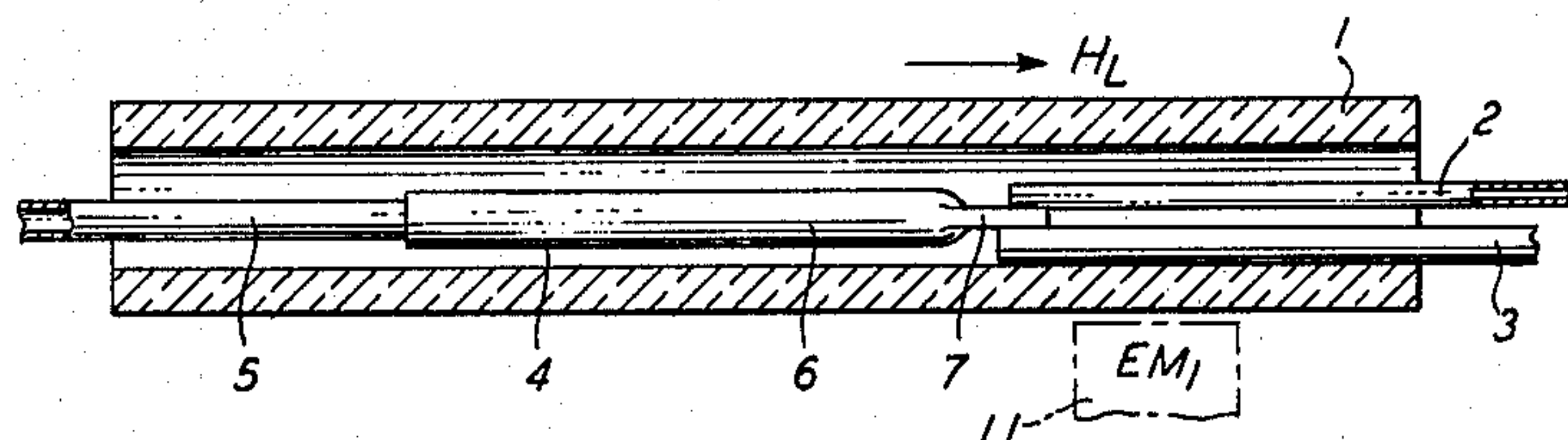


FIG. 2

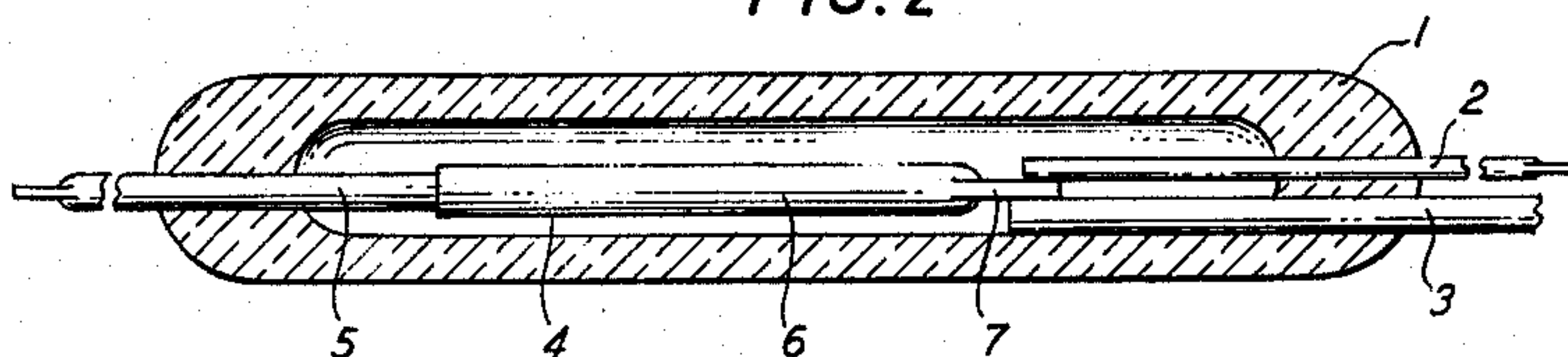
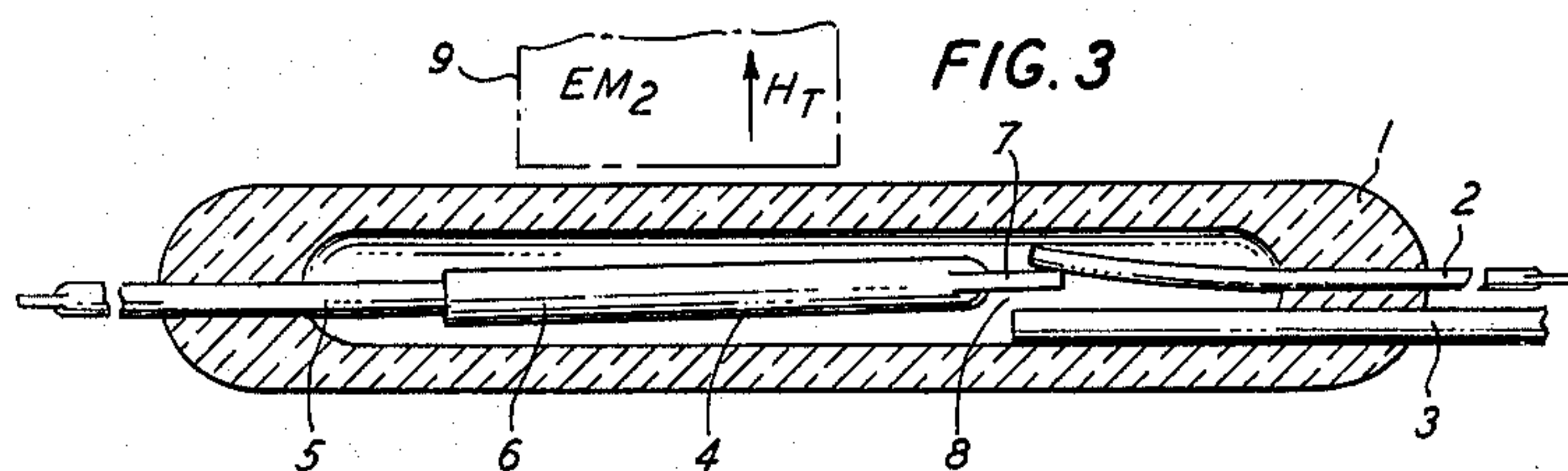


FIG. 3



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FIG. 4

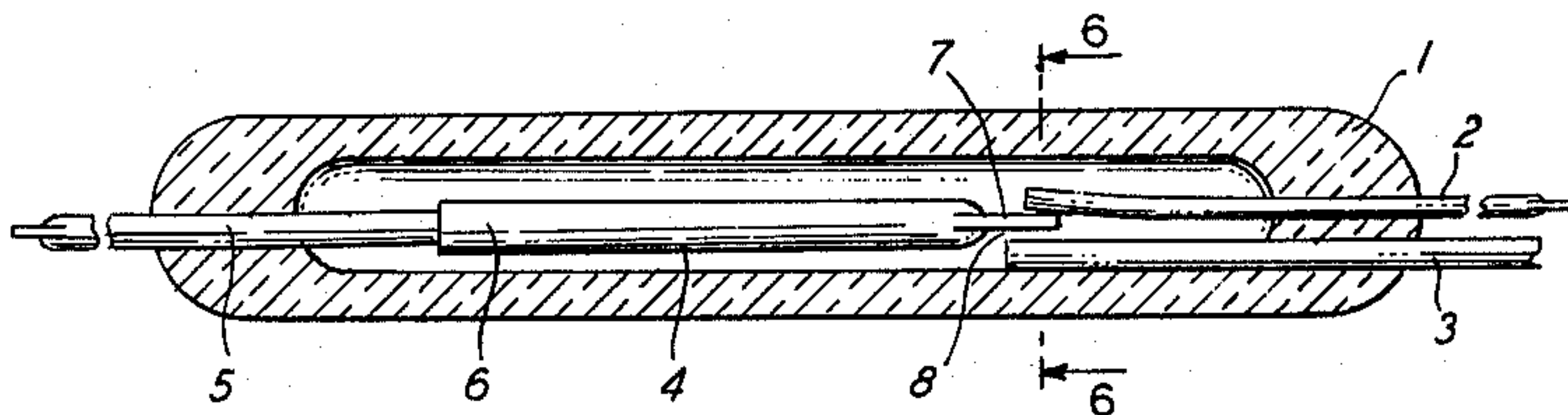


FIG. 5

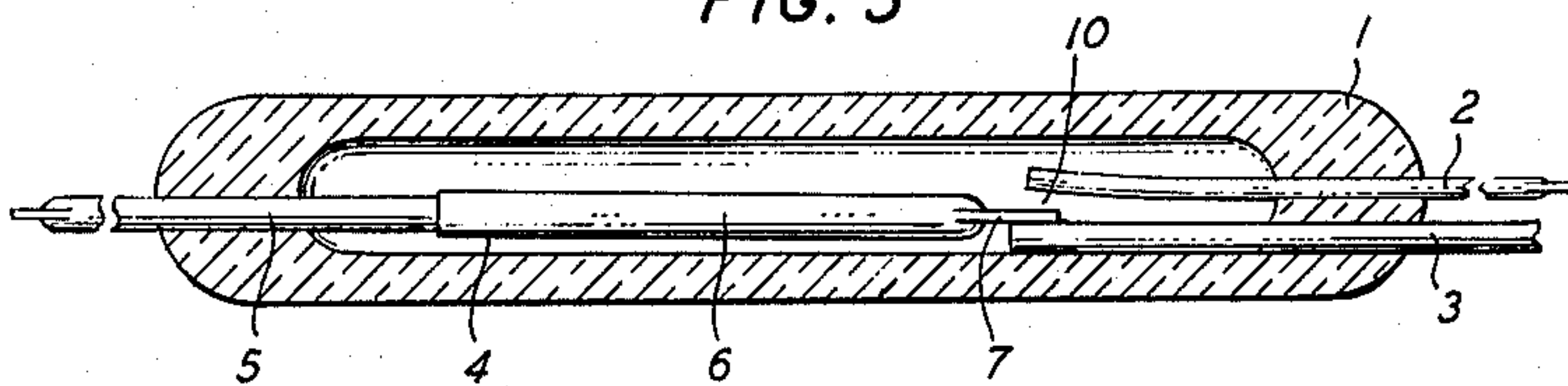
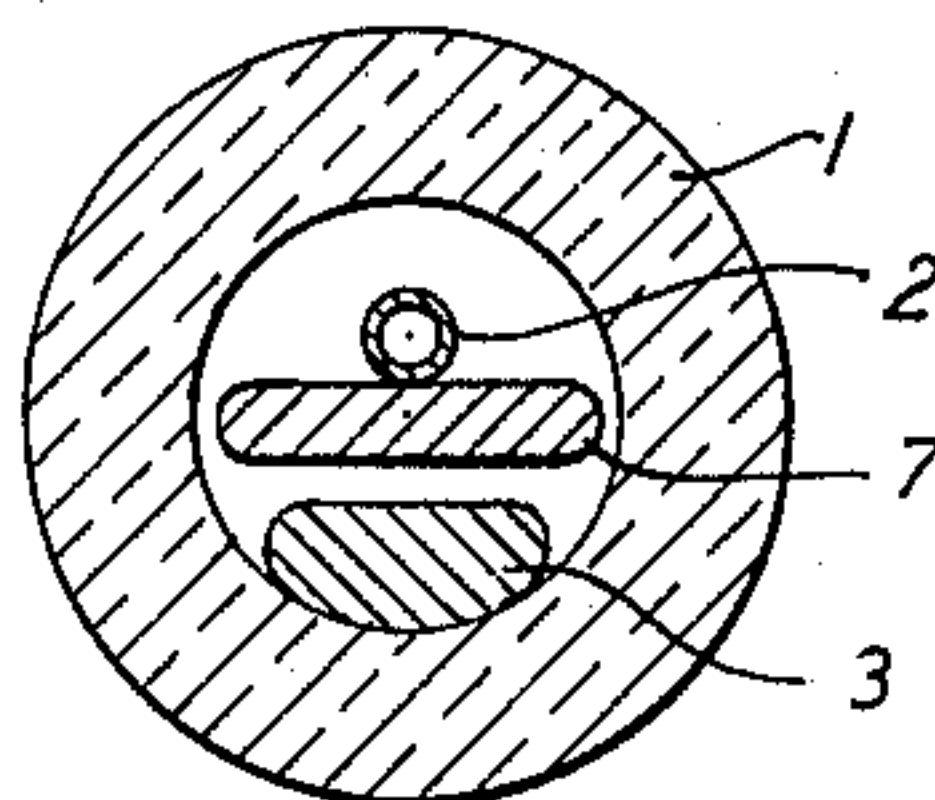


FIG. 6



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METHOD OF ASSEMBLING AND MAGNETICALLY ADJUSTING A REED SWITCH

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2 Claims. (Cl. 29—155.5)

This invention relates to circuit controlling devices and, more particularly, to sealed reed type switches or relays of the so-called "transfer" type.

The switches of interest usually conform to one or the other of two basic configurations. The first comprises a pair of parallel contacts wherein one serves as a "front contact" and the other as a "back contact" with both members sealed in one end of an encapsulating glass tube. Another flexible contact, commonly called the "swinger," is fastened in the other end of the encapsulating glass tube and positioned in such a manner that it overlaps and operates between the front and back contacts.

The second basic configuration comprises a pair of parallel contacts sealed in the same end of an encapsulated glass tube wherein one serves as a swinger and the other as a front or back contact. A third contact is sealed in the other end of the encapsulating glass tube parallel to and between the swinger and the wall of the tube. This contact serves as a back or front contact as required.

In general, the swinger and the front contact are made of a magnetic material, but the back contact may be magnetic or nonmagnetic as desired. In order to establish a transfer switching function, the swinger is biased in some fashion to a position against the back contact. As a result, application of an operative flux axially through the switch assembly will cause the swinger to move from its position against the back contact into a new position against the front contact, thereby producing the desired switching function.

Proper operation of the transfer device depends upon maintaining a firm contact between the swinger and the back contact. However, preset contact arrangements are usually adversely and almost always uncontrollably affected by the heat applied in sealing the encapsulating tube. The foregoing has proved to be a recurring problem. Various attempts to provide such a firm contact have been attempted, but none have proved to be satisfactory. The solution to the problem, however, lies in adjusting the forces between the contacts after the sealing operation.

One general object of this invention is to improve the performance characteristics of reed type transfer switches or relays.

Another general object of the invention is to simplify the structure and facilitate the manufacture of such switches or relays.

It is a specific object of the invention to provide a compact reed type switch or relay of economical construction that has positive switching action and which is insensitive to shock and vibration.

It is another specific object of the invention to provide a process whereby a reed type switch or relay can be assembled, positioned, sealed and adjusted in that order in a fast, convenient and inexpensive manner.

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It is still another specific object of this invention to provide a sealed contact transfer switch that is small, reliable, sensitive and fast operating.

In one illustrative embodiment of this invention, a transfer switch comprises a plurality of contact members. A first member serves as a front contact that is magnetic, fixed, substantially rigid, and is fastened at one end of an encapsulating tube, while another or second member, fastened parallel to and at the same end of the tube as the aforesaid member, serves as a back contact that is magnetic, fixed and moderately compliant. Still another or third member serves as a swinger that is magnetic, fixed, less compliant than the back contact, and is fastened in the opposite end of the encapsulating tube from the other contact members. The comparison involving "compliant" in the foregoing relates to deformation of the respective members. For a given common deflection the swinger member will permanently deform although the back contact member need not. The swinger is arranged to extend between the fixed front and back contact members in such a manner that it makes electrical connection with the back contact while establishing an air gap between itself and the front contact. Further, the swinger may comprise a bendable and a rigid part joined together. The elements recited are assembled in cooperative relationship within the hermetically sealed tube for insertion in an operating field. The tube is usually glass, but is not restricted thereto.

These and other features of the invention will be more fully apprehended from the following detailed description taken in conjunction with the appended drawing, in which:

FIGS. 1, 2 and 3 disclose the steps in assembling the embodiment of FIGS. 4 and 5;

FIG. 4 discloses an illustrative embodiment of the assembled invention in the unoperated state;

FIG. 5 discloses an illustrative embodiment of the assembled invention in the operated state; and

FIG. 6 is a section view from FIG. 4 along the line 6—6 showing preferred configurations of the operative contacts.

Referring to FIG. 1, the first step in the process leading to the final assembly of this invention comprises positioning the front contact 3 and back contact 2 with the swinger assembly 4 inserted therebetween in an unsealed encapsulating glass tube 1 with the contact 3 in a position against one wall of the tube. The elements are then held firmly against the glass tube by the application of a holding force induced by a flux emanating orthogonally from a magnet 11 and in alignment with each other by the application of another force induced by an axial flux H_L from a suitable source, until the tube ends are sealed about the positioned contact members.

In this embodiment, the elements are held in position by the holding forces manifested by virtue of their magnetic characteristics. However, the back contact 2 need not be magnetic. It is hollow, so a magnetic wire inserted through a hollow nonmagnetic material will accomplish the same result. Further, although the holding forces in this embodiment may conveniently be induced magnetically, the generation of such forces need not be limited thereto.

FIG. 1 further discloses an advantageous configuration for the contacting components. The back contact 2 is made from a hollow tube of suitable magnetic material,

The operating of the switch will now be described with reference to FIG. 5. FIG. 5 shows the switch in the operated state. The application of an operating flux axially along the swinger assembly 4 and through the ma- 75

and thereafter magnetically deflecting the swinger against the back contact until the portion of said swinger that is less compliant than said back contact

is strained beyond its elastic limit whereby the swinger is thereafter urged against the back contact and away from the front contact.

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