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SUPPORT STRUCTURE FOR ELECTROMAGNETIC REED RELAY

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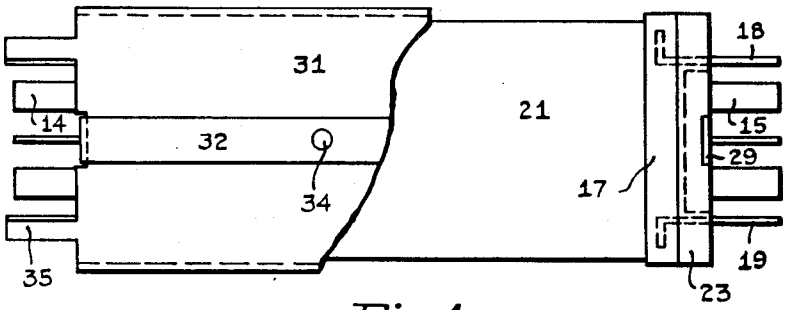


Fig. 1

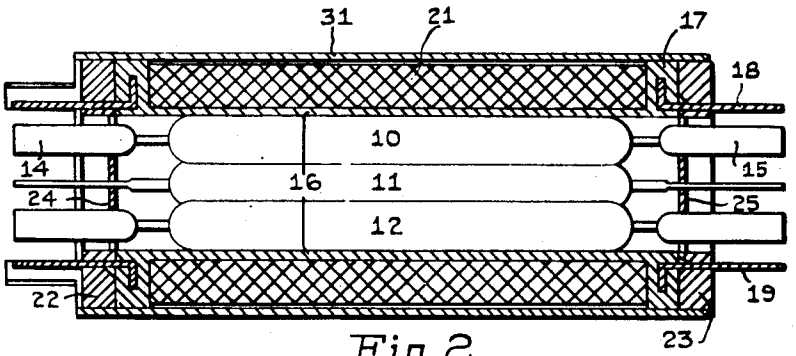


Fig. 2

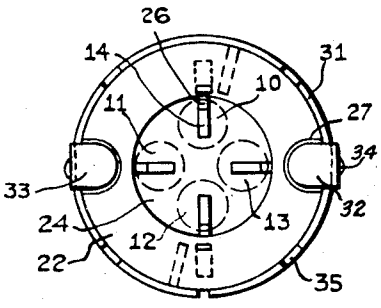


Fig. 3

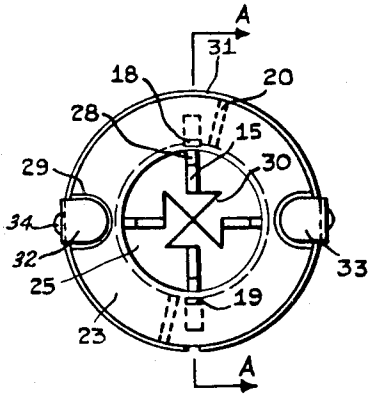


Fig. 4

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SUPPORT STRUCTURE FOR ELECTROMAGNETIC REED RELAY

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The present invention relates to electromagnetic relays and more particularly to such relays incorporating a plurality of enclosed magnetic contacts of the kind used in so-called reed relays.

Reed-relay contact units are usually of the "make" type comprising two blade-like contact springs of magnetic material which extend lengthwise, one from each end, into a sealed cylindrical container generally of glass. In such a unit the inner ends of the blades overlap in the central portion of the container to form contact making areas. The contacts are closed by impressing a magnetic flux upon the contact springs which causes them to be drawn together, and subsequently when the flux is removed the contacts re-open or "break" due to the inherent tension of the spring. The ends of the contacts which emerge axially from the cylindrical container constitute blade-like tags, conveniently lying in the same plane, to which external wires can be connected.

In many cases a reed-relay contact unit is arranged to be operated by the application of current to an individual coil wound upon the container. However, it is also known to employ a plurality of reed contact units in a multi-contact relay, and typically the units would be arranged parallel and in close proximity to each other within the tunnel of a suitable bobbin or former having one or more electrical windings for the control of the units. With this arrangement all the contact units are identically controlled as regards operation and release by the common winding or windings.

Multi-reed relays of this type may in some instances be employed as a substitute for conventional telephone type relays. Moreover the use of such multi-reed relays has been contemplated to provide the crosspoint switching devices in co-ordinate switches in telephone systems.

The object of the present invention is to provide an electromagnetic relay having a plurality of reed contact units with improved mounting arrangements for said units whereby although the units are adequately retained in position during usage they are nevertheless mounted in such a manner as to be readily detachable and replaceable in the event of any unit developing a fault in service.

According to the invention, in an electromagnetic relay incorporating a plurality of encapsulated reed contact units arranged in parallel relationship and having terminal tags extending axially from each end, said contact units are suspended between supporting means of insulating material secured to the body of the relay and having retaining slots or the like in flexible portions thereof through which slots said terminal tags pass, at least one of said supporting means being provided with a network of cuts interconnecting said slots or the like to produce an array of flexible flaps arranged normally to prevent appreciable lateral displacement of the contact units although permitting the substantially axial withdrawal of any contact unit from the relay.

According to an aspect of the invention, in an electromagnetic relay comprising a bobbin-wound control winding embracing a plurality of reed contact units arranged in parallel relationship, a plate of insulating material is secured at each end of the bobbin, said plates having central flexible portions provided with retaining slots arranged to cooperate with the terminal tags emerging axially from each end of said units to laterally locate the latter, the flexible portion of at least one of the plates being provided with a network of cuts producing in conjunction with the slots an array of flexible flaps permitting axial withdrawal of any contact unit from the relay.

According to a further aspect of the invention, in an electromagnetic relay incorporating a plurality of encapsulated reed contact units arranged in parallel relationship and having terminal tags extending axially from each end, said contact units are suspended between supporting means of insulating material which are located at fixed positions on the relay and are provided with retaining slots through which said terminals pass and at least one of said supporting means has a flexible portion consisting of a plurality of flaps lying substantially in one plane and arranged so that said retaining slots are formed between facing edges of adjacent flaps in such a manner as normally to prevent appreciable lateral displacement of the contact units although permitting the substantially axial withdrawal of any contact unit from the relay.

The invention will be better understood from the following description of the preferred method of carrying it into effect which should be read in conjunction with the accompanying drawings comprising FIGS. 1 to 4.

The drawings show different views of a relay in accordance with the invention, FIG. 1 being a side elevation, FIGS. 3 and 4 representing views towards the left and right-hand ends of FIG. 1 respectively, and FIG. 2 is a cross-sectional view taken in the direction of the arrows A—A shown in FIG. 4.

The relay incorporates four reed-type contact units **10**, **11**, **12** and **13** each involving a pair of magnetically deflectable reeds enclosed, in known manner, within a hermetically sealed glass envelope. Each contact unit is provided with a terminal tag **14** and **15** at each end, the tags being of blade-like configuration and those of the individual contact units lying in the same plane.

The four contact units are disposed in spaced parallel relationship within the hollow body of the moulded plastic bobbin or former **16** which is provided with end cheeks such as **17**. It may be taken that the present relay is provided with two control windings and accordingly each of the end cheeks carries two strip-metal terminal tags **18** and **19**, the winding being accommodated in the space **21** on the bobbin and being separately terminated on such a pair of tags. Each tag **18** or **19** is securely embedded in the relevant cheek with its free end projecting outwardly lengthwise with respect to the bobbin **16**.

Radial slots such as **20** are provided in each end check of the bobbin, in close proximity to the points at which tags **18** and **19** are anchored. The fine wire ends (not shown) of the windings are passed through appropriate ones of these slots and are each attached to the adjacent tag by a compact soldered joint, close to the outer face of the particular cheek.

The lateral positioning of the four reed contact units is effected by two moulded circular end plates **22** and **23** of preferably transparent plastic material, such as poly-

thene or other material having a similar degree of flexibility. The end plates are substantially identical in outline, thus end plate **22** involves a robust outer rim and a central membrane or wall **24**. The latter is considerably thinner than the rim and is therefore relatively flexible. Likewise the end plate **23** comprises a robust outer rim and a central membrane **25**. Incidentally each end plate is provided with a pair of diametrically opposed recesses such as **27** and **29** in the outer face, and the function of these recesses will be made evident later.

Also each end plate **22** or **23** has two slots formed in the rim at points coinciding with terminal tags of the bobbin. With the tags passed snugly through the relevant slots, each end cap is positioned in abutment with a bobbin cheek. It may be mentioned that a suitable cavity (not shown) is formed at the inside end of each slot to accommodate the previously mentioned soldered joint.

Considering the left-hand end plate, it can be observed from FIG. 3 that this incorporates four radial slots such as **26** in the membrane **24**, and these are disposed at right angles to each other. The slots extend from the inner boundary of the rim of the end plate a predetermined distance towards the centre of the device. The width of each slot with respect to the thickness of the reed unit terminal tags is such that, when the tags are passed into the slots as illustrated, the tags are adequately gripped.

As regards the right-hand end plate, clearly illustrated in FIG. 4, this has four radial slots **28** similar to those described with reference to left-hand end plate, and it will be observed that in the complete assembly the slots of the two end plates are in alignment. The inner ends of each diametrically opposite pair of radial slots, such as **28**, are joined by a thin Z-shaped cut **30** extending through the membrane **25**, the two similar cuts intersecting at the centre. It is important to note that the slots and cuts effectively divide the membrane into four flexible flaps of identical configuration.

With the four reed contact units **10**, **11**, **12** and **13** disposed within the hollow bobbin, and the terminal tags **14** and **15** of the units passing through corresponding slots such as **26** and **28** of the end plates, the envelopes of the contact units lightly engage, or are very slightly clear of, the inside surface of the bobbin, and moreover the inner edges of said tags abut, or are close to, the inner edges of the aforesaid radial slots. Accordingly lateral play of the units with respect to the end plates is minimised. The flexible nature of the end-plate membranes impart a degree of resilience to the mounting of the contact units, and this affords some protection under conditions of mechanical shock or vibration.

The body of the multi-contact relay assembly is snugly enclosed by a split sleeve **31** of relatively springy ferromagnetic material serving as a magnetic shield. This shield has a pair of formed leaf springs **32** and **33** secured to it by rivets such as **34**. The free limbs of the springs are tensioned towards the body of the assembly, and the extremities are formed inwardly to locate in the recesses **27** and **29** of the end plates in such manner that the latter are urged against the bobbin cheeks.

The sleeve **31** has four lugs such as **35** formed at one end. These are provided to enable the relay to be secured upon a mounting plate in a simple manner. The mounting plate would be provided with four slots in alignment with the lugs, and after passing the lugs through the slots so that the sleeve abuts the face of the mounting plate, the lugs would be twisted to anchor the relay in position.

The important facility provided by relay described, is that which enables a reed contact unit which develops a fault in service to be readily removed and a substitute fitted without removing the whole relay from its mounting plate and dissembling the whole device. The procedure for the removal of a unit is first to remove the external connecting wires from the tags **14** and **15** and then by using say a pair of pliers to grip the appropriate tag **15**, withdrawing the unit from that end of the assembly involving end plate **23**.

During this action the contact unit may tend to move towards the centre of the end-plate membrane by virtue of the increased flexibility in that area. Some or all of the flaps of the membrane open outwardly to permit the passage of the unit, and then re-close when withdrawal is completed. A substitute unit may then be inserted by the reverse procedure, and it may be noted that the transparent nature of the end caps assists in the guiding of the tag such as **14** into the appropriate slot in the remote end plate **22**.

It will be apparent to those skilled in the art that many detailed modifications may be made to the relay without departing from the invention. Thus, for example, both end plates might well be identical in that they incorporate the feature of the flexible flaps so that a unit could be replaced from either end. Moreover the dimensions of the construction may be modified to accommodate fewer or more reed contact units, and the contact units may be mounted in other than the radial manner described. In the latter respect the locating slots, provided in the end plates for the tags of the reed contact units, may be disposed in parallel planes with adjoining flexible flaps of suitable configuration in at least one of the end plates. Another modification which is envisaged is that one of the end plates, for instance **22**, represented in the drawings, might well be formed integrally with the moulded bobbin.

I claim:

1. An electromagnetic relay comprising a bobbin, an axial tunnel through said bobbin, a control winding wound on said bobbin, a plurality of reed contact units having terminal tags extending axially from the ends thereof, first and second support means of insulating material located at fixed positions relative to said bobbin and closing the ends of said tunnel, a plurality of slots in each of said first and second support means, said contact units being suspended within said tunnel between said first and second support means by the terminal tags of each of said contact units passing through alined slots in said first and second support means, one of said support means having a central flexible portion which includes said slots and a network of cuts in said flexible portion to produce an array of flaps, the slots in said one support means being formed between two facing edges of adjacent flaps.

2. An electromagnetic relay as claimed in claim 1, wherein said support means comprise plates secured one to each end of the bobbin.

3. An electromagnetic relay as claimed in claim 2, wherein said plates comprise a robust outer rim portion and a central flexible portion in which the said array of flaps is formed, openings being provided in the rim portion of at least one of the plates through which openings pass the terminal tags for the control winding.

4. An electromagnetic relay comprising a bobbin, an axial tunnel through said bobbin, a control winding wound on said bobbin, a plurality of reed contact units having terminal tags extending axially from the ends thereof, a first plate of insulating material secured to and closing one end of said tunnel, a second plate of insulating material secured to and closing the other end of said tunnel, said first and second plates each having a central flexible portion, slots provided in the flexible central portions of said first and second plates, corresponding slots in the two central portions being in axial alignment, said contact units being suspended within said tunnel between the plates by the terminal tags thereof, and a network of cuts provided in the central flexible portion of said first plate, said network of cuts interconnecting the slots in the central flexible portion of said first plate to produce an array of flaps.

5. An electromagnetic relay as claimed in claim 4, and further comprising a split sleeve of springy ferromagnetic material which snugly encloses said control winding and a plurality of mounting lugs at one end of said sleeve.

6. An electromagnetic relay as claimed in claim 5, and further comprising a pair of formed leaf springs secured to said split sleeve, the free limbs of said springs being tensioned towards said split sleeve, inwardly formed ends to the free limbs of said springs and recesses in said first and second plates in which said inwardly formed ends are located whereby the supporting plates are urged against the ends of the bobbin.

7. An electromagnetic relay comprising a bobbin, an axial tunnel through said bobbin, a control winding wound on said bobbin, a plurality of reed contact units having terminal tags extending axially from the ends thereof, a first plate of insulating material secured to and closing one end of said tunnel, a second plate of insulating material secured to and closing the other end of said tunnel,

said first and second plates having central flexible portion, slots provided at diametrically opposite positions in the flexible central portions of said first and second plates, corresponding slots in the two central portions being in axial alignment, said contact units being suspended within said tunnel between the plates by the terminal tags thereof and a plurality of substantially Z-shaped cuts provided in the central flexible portion of said first plate, each one of said Z-shaped cuts interconnecting diametrically opposite slots in the central flexible portion of said first plate to produce an array of flaps.

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