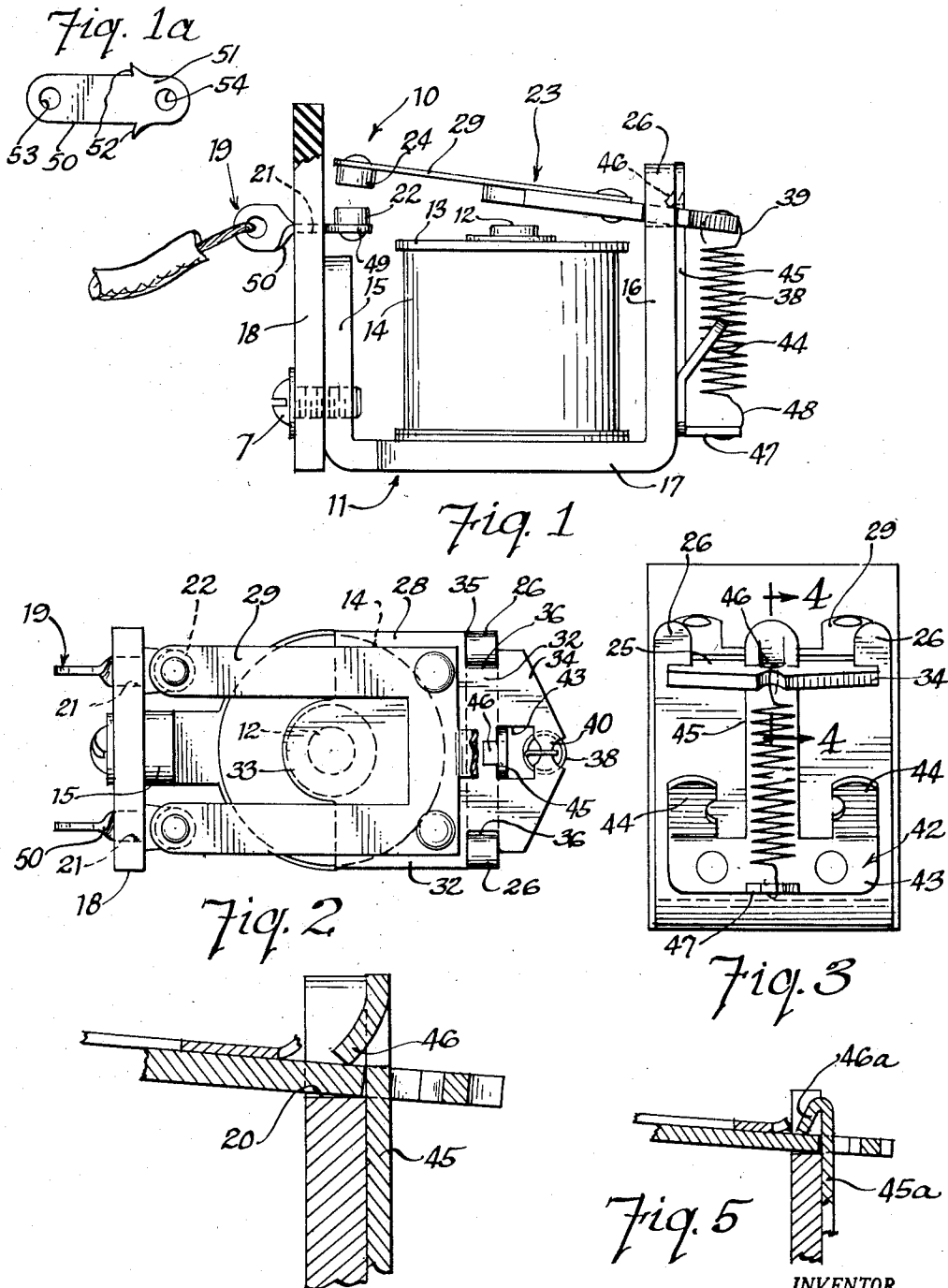


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ELECTROMAGNETIC RELAY
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ELECTROMAGNETIC RELAY

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2 Claims. (Cl. 317—198)

This invention relates to electromagnetic relays.

A principal object of the present invention is to provide an electromagnetic relay and constituent elements thereof which are retained in operative position at all times.

This invention is directed to electromagnetic relays of the type in which an armature is pivotally mounted for engagement of an electrical contact in response to a condition in a control circuit. Prior to the present invention, relays for use in portable devices such as photographic flash units were unreliable, because of the fact that the armature relied upon a simple fulcrum for movement rather than a pivot in the true sense. While a tension spring was provided to assist seating of the armature on its fulcrum the same frequently became displaced from its position when the flash unit was inadvertently inverted or subjected to the shocks of normal handling, and the relay thereby rendered inoperative. In addition, armatures of this type had a tendency to oscillate upon deenergization of the control circuit, which resulted in arcing and consequent pitting of the contacts. Attempts have been made in the past to remedy this condition but with little success. In prior devices, elaborate spring mechanisms were employed to engage the body of the armature and thus assist in maintenance of its location and to limit its unwanted oscillations. These devices were ineffective when the armature itself was displaced from its mounting to any degree.

With the foregoing in mind, another object of the invention is to provide an electromagnetic relay of the type described in which novel retaining means are provided for maintaining the armature in operating position and, at the same time, limit or avoid undesired oscillations thereof.

A further object of the invention is to provide a relay of the type described in which a simple unitary element is used for precluding displacement of the armature on its fulcrum.

Other and further objects, advantages and features of the present invention will be apparent to those skilled in the art from the following description, taken in conjunction with the accompanying drawing in which similar reference characters relate to similar parts, and in which:

Fig. 1 is an elevational view, partly in section, of an electromagnetic relay made in accordance with the present invention;

Fig. 1a is an enlarged plan view of a terminal lug used in conjunction with the relay;

Fig. 2 is a plan view of the relay shown in Fig. 1, with certain elements removed or broken away for clarity;

Fig. 3 is a right hand end elevational view of the relay shown in Fig. 1;

Fig. 4 is an enlarged fragmentary view taken substantially on the line 4—4 of Fig. 3; and

Fig. 5 is a detail similar to Fig. 4 of an alternative form of the armature-retaining means.

With reference to the drawing, there is illustrated an electromagnetic relay 10 comprising essentially a

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U-shaped frame 11 and a core 12 constituting a core structure. Mounted in surrounding relation to the core 12 is a spool 13 on which is wound a coil 14 connected in conventional fashion. The frame 11 includes a pair of upstanding arms 15 and 16 joined by a generally circular base 17 carrying the spool 13. Connected to the arm 15 by a screw 7 is a panel 18 of dielectrical material. One or more substantially rectangular openings 21 are provided in the panel 18 for reception of terminals 19 which carry electrical contacts 22.

According to the invention, the armature 23 and certain cooperating parts are arranged so that displacement of the armature from its operative position is prevented even though the relay should inadvertently be inverted in use or subject to shock in handling. For precluding displacement in a lateral direction, the upper marginal edge of the arm 16 is recessed as at 25 to form a pair of spaced ears 26. The armature 23 comprises essentially a base plate 28 which is narrowed, as at 32, to define a pair of notches 36—36 providing rocking clearance with respect to the ears 26—26 but restraining movement laterally. A bifurcated resilient element 29 is secured to the plate 28 upon which contacts 24 are carried for coaction with the contacts 22. However, any desired arrangement of contacts may be utilized.

Armature 23 is normally retained in the position shown in Fig. 1 by a tension spring 38 which has an upper hook 39 connected to a portion 40 of the armature and a lower hook 48 connected to a lug 47 forming part of retaining means now to be described.

Referring now more particularly to Fig. 3, numeral 42 indicates an inverted T-shaped element of spring steel, phosphor bronze or other resilient material secured to the outer surface of the arm 16. Element 42 includes a base portion 43 formed with a pair of oppositely disposed, upwardly and outwardly extending, ground lugs 44. Disposed between the lugs 44 and abutting the outer surface of arm 16 is a stem 45 which is provided at its upper end with a struck-out tongue 46. The tongue 46 engages the upper surface of the armature 23 in close relation to the fulcrum formed by the recess 20 and therefore acts to maintain the armature in operative relation with respect to the relay frame. Since element 42 or at least the stem 45 thereof, is resilient, assembly of the armature or disassembly thereof is easily effected by displacing the stem in the clearance opening 43, disconnecting the spring 38 and lifting the armature upwardly.

A modified armature-retaining member 45a (Fig. 5) is somewhat simplified in concept wherein the upper end is simply bent over, as at 46a instead of being a struck-out portion, as in Fig. 4.

The terminals 19 are formed particularly to facilitate their assembly on the dielectric panels 18. Each of these structures 19 is formed of conducting material and includes (Fig. 1a) an elongated body portion 50 and a head 51 which, in the present instance, is substantially bell-shaped, thus forming shoulders 52. The body portion 50 is inserted in the slot 21 in the panel 10 until the shoulder 52 is in abutting relation to the inner surface of the panel. The body portion 50 is then twisted until the outer end thereof assumes a position substantially perpendicular to the head 51. An aperture 53 is provided at the free end of the body portion 50 for soldering of leads thereto, and an aperture 54 is provided in the head 51 for mounting of the contact 22.

As above described the invention provides means for maintaining the armature of a relay safely against accidental dislodgement while permitting instantaneous dismounting thereof for cleaning of the contacts or for other purposes. The ground lugs 44 and the tongue 47, being formed integrally with the element 42, contribute materially to the economy of manufacture of the relay as the

same is a single punch press part. Also, the terminal structures 19 are quickly and efficiently mounted without the need for washers, grommets and the like.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

I claim:

1. In a relay having an electromagnetic coil, an armature pivotally movable toward and away from the coil, and a fulcrum pivotally supporting one end of the armature, the improvement comprising a unitary member extending generally normal to the armature adjacent the fulcrum and including a rigid base portion disposed beneath the armature, a tab extending outwardly from said base portion, a pair of arms inclined upwardly and outwardly from said base portion and resilient leg means extending upwardly from said base portion to above the plane of the armature, the armature having a hole there-through accommodating passage of said leg means, said leg means including projection means adjacent the upper end thereof normally overlying the armature to retain the armature against disassociation from the fulcrum, said leg means being manually deflectable to facilitate instantaneous demounting of the armature, and an armature biasing spring anchored on the armature and on said tab and extending between said arms to be protected thereby from damage and accidental disassociation from the armature.

2. In a relay having a U-shaped frame, an electromagnetic coil mounted on the base of the frame between the legs thereof, an armature pivotally mounted on the upper edge of one leg of the frame for movement toward and away from the coil, and an armature biasing spring extending generally parallel to the outer surface of said one leg of the frame, the armature and said one leg of the frame having inter-fitting portions retaining the frame against appreciable movement in its own plane, the improvement comprising an integral sheet metal stamping

including a base portion secured to the outer surface of said one leg of the frame, a tab extending outwardly from said base portion centrally of the armature, a pair of parallel arms extending outwardly and upwardly from said base portion to opposite sides of said tab and a resilient cantilever leg extending centrally upward from said base portion along said one leg of the frame to above the plane of the armature, the armature having a hole there-through adjacent the outer surface of said one leg of the frame accommodating passage of said resilient leg, said resilient leg being biased toward said one leg of the frame and having a projection adjacent its upper end extending toward the inner surface of said one leg and normally overlying the armature to retain the fulcrumed end of the armature against appreciable movement in the direction normal to its plane, the hole through the armature accommodating passage of said projection, said resilient leg being manually deflectable away from said one leg of the frame to facilitate removal of the armature, said armature biasing spring being connected at its opposite ends to the armature and said tab and extending between said arms to be protected thereby from damage and accidental displacement from the armature.

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