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3,403,364

ONE PIECE ARMATURE BACKSTOP MEMBER FOR A RELAY

Filed June 2, 1966

FIG. 1

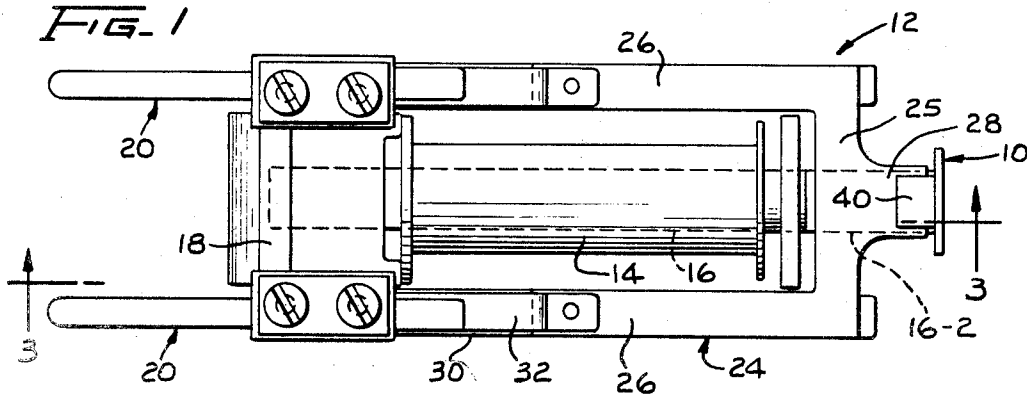


FIG. 2

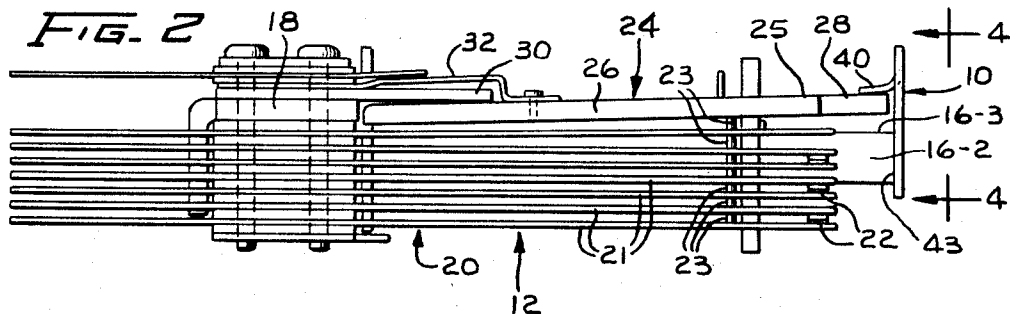


FIG. 3

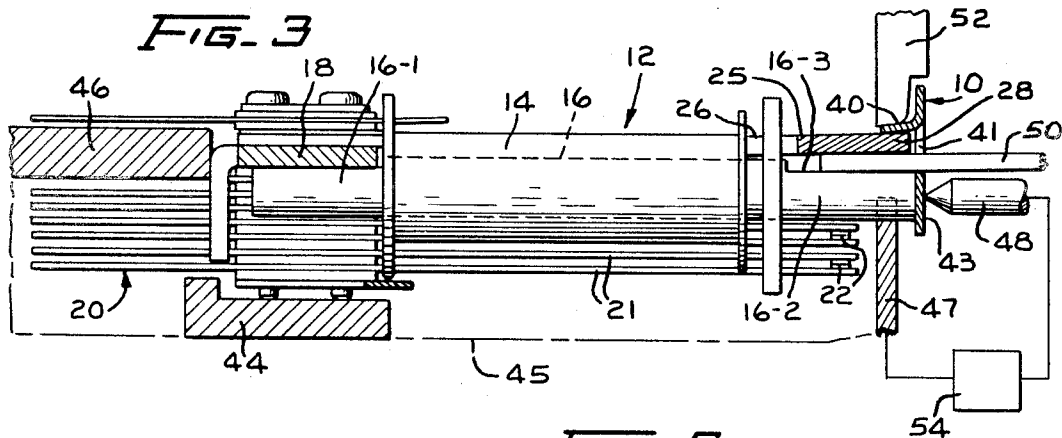


FIG. 4

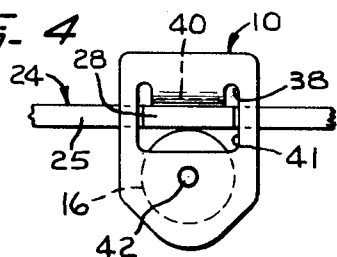
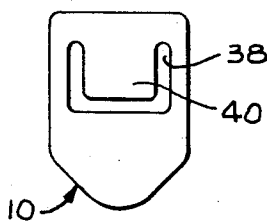


FIG. 5



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ABSTRACT OF THE DISCLOSURE

A one-piece armature backstop member of a relay is formed of sheet metal plate and includes a backstop lug formed by an internal portion of the plate which is bent so as to extend laterally from the plate in spaced relation to the edges thereof. In mounting the backstop member in the relay an elongated magnetic core of the relay is supported on a first welding electrode and the backstop member is held in engagement with a flat end surface of the core by a second welding electrode. A spacing gage is positioned between the armature and the core, and the backstop member is located relative to the core such that a stop surface of the lug engages a surface portion of the armature in mating relationship and such that the lug causes the spacing gage to be firmly engaged between the armature and the core, to establish a limit of movement of the armature away from the core. A welding circuit then is closed through the electrodes, the core and the backstop member to weld the backstop member to the core, after which the spacing gage is removed from between the armature and the core.

This invention relates to relays, and more particularly to improved backstop means for limiting the movement of the armatures of the relays.

In a relay of a type used in telephone communications and having a movable armature for actuating circuit controlling contact springs, the armature was formerly stopped in its open position by an adjustable type backstop. The backstop included a nut adjustably mounted on the threaded shank of a stud which was disposed in a slot in the armature and extended from the iron core of the relay to which it was riveted. The construction of the adjustable nut, the threaded stud, drilling an aperture through the core of the relay, and riveting the stud thereto, the adjusting of the backstop nut on the stud, and the securing of the nut in adjusted position thereon, involves a considerable amount of time and a corresponding cost of fabrication.

Accordingly, it is an object of the present invention to provide a relay having an improved, inexpensive, and readily attachable backstop for the armature thereof, and a simple method of accurately positioning the backstop on the relay and attaching it thereto.

Other objects, advantages and novel aspects of the invention will become apparent upon consideration of the following detailed description, in conjunction with the accompanying drawings, in which:

FIGS. 1 and 2 are plan and side views, respectively, of a relay embodying the present invention;

FIG. 3 is a longitudinal vertical sectional view through the relay taken along the line 3-3 of FIG. 1 and showing the relay supported in a fixture for positioning and bonding the armature backstop to the core;

FIG. 4 is a fragmentary end view of the relay showing the backstop in relation to the relay core and the armature; and

FIG. 5 is a view of the backstop forming blank before being bent to its final shape.

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Referring to the drawings, the improved armature backstop 10 is shown applied to a relay 12 of a type used in telephone communication equipment and including an electromagnetic coil 14 encircling a soft iron magnetic core 16. One end 16-1 of the core extends from the coil 14 and has a flat surface thereon parallel to the axis thereof to which is welded a pole piece 18. Secured to the lateral marginal portions of the pole piece 18 are two spring pile ups 20 disposed parallel to and on opposite sides of the coil 14, the springs 21 thereof having contacts 22 on the ends for opening and closing circuits therethrough. Some of the springs 21 of each pile up have dielectric studs 23 secured thereto which are arranged in a row with the uppermost stud in engagement with an armature 24.

The armature 24 which is disposed substantially parallel to the core 16 is U-shaped and has a base 25 with a pair of parallel arms 26 extending therefrom in one direction and with a centrally disposed armature end 28 extending therefrom in the opposite direction into closed proximity to the backstop 10 and in overlying and aligned relationship to the core end 16-2. The parallel arms 26 of the armature are disposed in overlying and aligned relation to the spring pile ups 20, and the ends of the arms 26 are disposed in substantially abutting alignment with the pole piece 18 and in underlying engagement with dielectric positioning strips 30. A pair of biasing springs 32 which are secured at one end respectively to the pole piece 18 and at the other ends to intermediate portions of the armature arms 26 serve to support the armature 24 for pivotal movement and to urge the armature for movement from the core 16.

In response to energization of the coil 14 the armature 24 is attracted to the core 16 with the armature end 28 moving into engagement with the flat core surface 16-3, and the armature imparting movement to the rows of studs 28 and thereby effecting the movement of selected ones of the contact springs 21.

The backstop 10 for limiting the movement of the armature 24 from the core 16 is in the form of a sheet metal plate of substantially rectangular outline which has a U-shaped slot 38 in the upper portion thereof (FIG. 5). The slot 38 defines a lug 40 which is bent laterally slightly less than 90 degrees and which leaves a relatively large aperture 41 in the backstop 10. The lower portion of the backstop 10 is welded at 42 (FIG. 4) to the flat end surface 43 of the core 16 and extends transversely of the core 16 past the armature end 28. The stop lug 40 of the backstop 10 is disposed in the path of the armature end 28 and in a predetermined spaced relation to the flat surface 16-3 of the core 16 to limit the movement of the armature end 28 from the core to a predetermined distance to effect the efficient actuation of the contact springs 21 from one position to another. In this regard, as is apparent from FIGS. 2 and 3, the degree of bend of the stop lug 40 is such that in the stopping of the armature 24 by the stop lug the top surface of the armature end 28 comes into mating engagement with the under surface of the lug. Further, as is apparent from FIGS. 2 and 3, the backstop 10 is mounted in the relay 12 so that the direction of bend of the lug 40 into its laterally extending position is in the general direction of movement of the armature 24 away from the core 16, rather than in the opposite direction, since the latter arrangement would require bending of the lug in excess of 90 degrees.

To facilitate the accurate positioning and the welding of the armature backstop 10 to the core 16 of the relay, the relay is supported on a member 44 of a holding fixture 45 indicated diagrammatically at 45 (FIG. 3) with the pole piece 18 abutting the side of a member 46 of the fixture, and with the end portion 16-2 of the core 16 resting in a seat of a vertically disposed fixed welding

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electrode 47. The backstop 10 is placed against the end surface 43 of the core 16 and is held there lightly by a movable welding electrode 48.

A spacer gage 50 is then placed between the armature end 28 and the core surface 16-3. The spacer gage 50 may be inserted through the aperture 38 in the backstop 10 or may be positioned between the core and the armature transversely of the core and adjacent to one side of the backstop 10. A plunger 52 of the fixture 45 is then lowered to move the backstop 10 downwardly and cause the stop lug 40 thereof to engage and press the armature end 28 against the gage 50, and the gage 50 against the core surface 16-3.

With the armature 26 thus held accurately in its open position, pressure is applied to the horizontal electrode 48 to cause it to press the backstop 10 tightly against the end face of the core end 16-2 after which a welding potential from a suitable source 54 is impressed across the electrodes 47, 48 to effect the resistance spot welding of the backstop 10 to the end surface 43 of the core end 16-2. Thereafter the pressure member 52, the spacer gage 50 and the electrode 48 are removed from the relay 12, and the relay is removed from the supporting fixture 45.

From the foregoing it will be apparent that a relatively inexpensive one-piece improved backstop is provided which is accurately positioned relative to the relay core and is readily welded thereto and serves to stop the armature end 36 in a position in a precise spaced relation to the core surface 16-3 when the coil 14 is in its deenergized condition.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a relay which includes:

- an electromagnetic coil;
- a magnetic member mounted adjacent said coil and having a flat surface; and
- an armature mounted for movement into engagement with said magnetic member and biased away from said magnetic member;

the improvement which comprises:

- a one-piece armature backstop member in the form of a substantially sheet-like plate member and secured to said magnetic member;
- said backstop member including a lug having a stop surface in a predetermined spaced position relative to said magnetic member and engageable by a surface portion of said armature for stopping said armature in a predetermined spaced position relative to said magnetic member, said lug being completely preformed prior to the securing of said backstop member to said magnetic member such that when said backstop member is secured to said magnetic member with said lug in its predetermined position the stop surface of said lug and the surface portion of said armature engage in mating relationship when said armature is stopped by said lug; and

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said backstop member having a flat surface in mating engagement with the flat surface of said magnetic member, the extent of the flat surfaces being such that, prior to the securing of said backstop member to said magnetic member, said backstop member can be moved relative to said magnetic member with the flat surfaces of said magnetic member and said backstop member in sliding engagement, to locate said lug in its predetermined spaced position relative to said magnetic member.

2. In a relay as recited in claim 1, the improvement which further comprises:

said lug being formed by a portion of said plate member which is bent laterally of said plate member less than ninety degrees and in the general direction of movement of said armature away from said magnetic member.

3. In a relay as recited in claim 2, the improvement which further comprises:

said lug of said backstop member being formed by an internal portion of said plate member which is bent so as to extend laterally from said plate member in spaced relation to the edges thereof and so as to provide an aperture in said backstop member through which a spacing gage may be positioned for establishing a limit of movement of said armature away from said magnetic member.

4. In a relay which includes:

- an electromagnetic coil;
- a magnetic member mounted adjacent said coil; and
- an armature mounted for movement into engagement with said magnetic member and biased away from said magnetic member;

the improvement comprises:

- a one-piece armature backstop member formed of a substantially sheet-like plate member and secured to said magnetic member;
- said backstop member including a lug having a stop surface engageable by a surface portion of said armature for stopping said armature in a predetermined spaced position relative to said magnetic member; and
- said lug being formed by a portion of said plate member which is bent laterally of said plate member less than ninety degrees and in the general direction of movement of said armature away from said magnetic member, the degree of bend of the plate member portion being such that the surface portion of said armature and the stop surface of said lug engage in mating relationship when said armature is stopped by said lug.

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