April 18, 1950 H. REIFEL 2,504,101

RELAY

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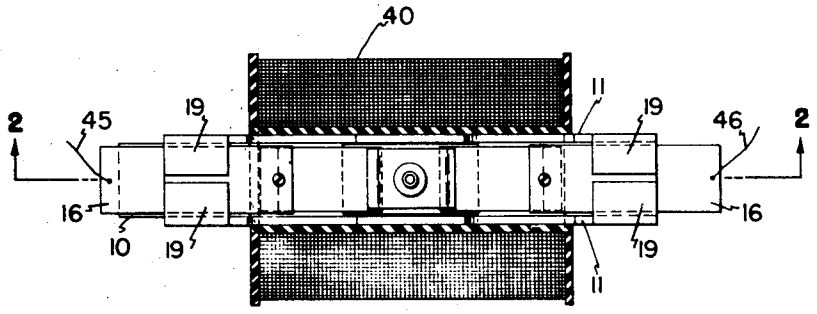

FIG. 1

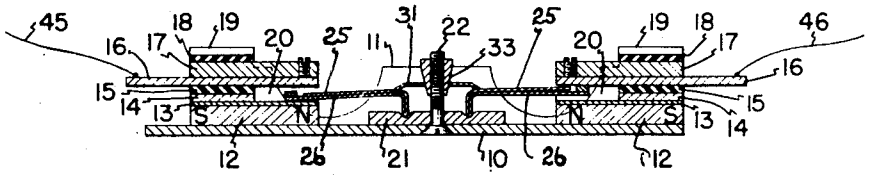

FIG. 2

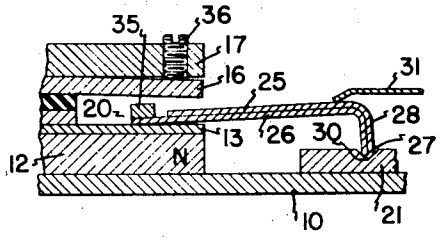

FIG. 3

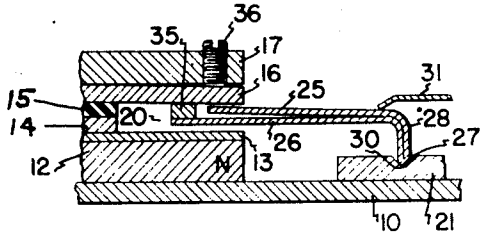

FIG. 4

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RELAY

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6 Claims. (Cl. 200—103)

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This invention relates to relays, and relates more particularly to polarized relays.

One of the most serious troubles experienced with relays is the bouncing of their armatures away from the contacts they strike when the relays are energized. This causes erratic operation and arcing, and, while attempts have been made to prevent such bouncing as by damping the movements of the armatures, so far as is known, such expedients have not been entirely successful.

This invention provides a simple and effective method of preventing the bouncing of the armature of a relay. In one embodiment of the invention, a flexible strip of magnetizable spring metal is bent back on itself along a transverse line between its ends so as to provide two normally straight contacting armatures, one longer than the other and carrying a contact. The strip adjacent the line of bending is turned at right angles to the two armatures, and the strip at the line of bending is held in a V-shaped slot in a base member, by the end of a strip of spring metal. A contact strip of magnetizable metal has its inner end overlapping the outer ends of the armatures, and has a contact portion in alignment with the contact on the longer of the armatures. A magnetizing coil extends around the armatures and the contact strip. When the coil is energized by direct current, the contact strip and the two armatures are so magnetized that the outer ends of the armatures are attracted to and moved towards the inner end of the contact strip, and in the ordinary construction the contact would strike the contact strip and would bounce away from same. In the present construction, when the contact on the longer armature strikes the contact strip, thus stopping the movement of the longer armature, the shorter armature continues to move toward the contact strip and, since the two armatures are formed from one strip, the continued movement of the shorter armature causes the strip at its bending line to pivot in the V-shaped slot in the base member, and to transmit motion towards the contact strip to the longer armature, causing the contact to be pressed against the contact strip, thus preventing bouncing.

An object of the invention is to restrain the bouncing of an armature of a relay away from a contact it strikes when the relay is energized.

The invention will now be described with reference to the drawing of which:

Fig. 1 is a plan view of a relay embodying this invention with the spool of the energizing coil shown in section;

Fig. 2 is a sectional view along the lines 2—2 of Fig. 1 but with the energizing coil omitted;

Fig. 3 is an enlarged, fractional view illustrating the positions of the armatures at one

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end of the relay when the relay is deenergized, and

Fig. 4 is a view similar to Fig. 3 but illustrating the armatures in the positions they occupy when the relay is energized.

The relay illustrated has a brass frame with a base 10 and two sides 11 extending perendicular thereto. The relay at each end has a permanent magnet 12 in contact with the base 10 and which has the brass spacers 13 stacked thereon and extending the length thereof. The brass spacers 14 are stacked on the spacers 13, and the mica spacers 15 are stacked on the spacers 14. The contact strips 16 of magnetizable metal such as steel, are stacked on the spacers 15. The adjusting bars 17 are stacked upon the strip 16. The mica spacers 18 are stacked on the bar 17. The sides 11 of the frame have the extended portions 19 which are bent over at right angles against the spacers 18 for holding the stacked assemblies described in the foregoing in position.

The spacers 14 and 15 have shorter lengths than the spacers 13 and the contact strip 16 which they space apart, so as to provide the spaces 20 therebetween in the areas of their inner ends.

The mounting block 21 is attached to the upper surface of the base 10 and has the screw 22 extending through the center thereof and through the base.

The armatures 25 and 26 are formed from strips of magnetizable spring metal such as steel, the strips being bent back on themselves at the transverse lines of bending 27 so that the armatures 25 and 26 extend in contact with each other when the relay is deenergized, as illustrated most clearly by Fig. 3. The ends of the armatures 25 terminate short of the ends of the armatures 26.

The strips from which the armatures are formed have the inner portions 28 adjacent the lines 27 extending perpendicular to the armatures. The strips at the lines 27 are held in the V-shaped slots 30 in the block 21 by the pressure of the inner ends of the spring 31, through the center of which, the screw 22 extends. The nut 33 has a tapered lower portion which extends through the central opening in the spring 31 through which the screw 22 extends, and which is threaded down upon the screw against the spring, for providing the necessary tension in the spring to hold the armatures 25 and 26 in the position illustrated by Fig. 3 when the relay is deenergized.

The strips at their lines of bending 27 act as pivots in the V-shaped slots 30, whereby movement of the shorter armatures 25 will transmit motion in the same direction to the longer armatures 26, as will be described.

The ends of the armatures 25 and 26 extend into the spaces 20. The ends of the armatures 26 have the contacts 35 on their upper surfaces.

The screws 36 are threaded into the tapped openings in the undersides of the bars 17, and serve to enable the contact strips 16 to be adjusted towards and away from the contacts 35.

The energizing coil 40 extends around the armatures 25 and 26 and around the contact strip 16, and is adapted to have direct current passed therethrough for energizing the relay.

The wires 45 and 46 connected to the contact strip 16 and the base 10 respectively, serve to connect the relay in the electric circuits in which it is to be used.

The relay illustrated has two sets of armatures and contacts, one set at each end portion. When the coil 40 is energized in one direction, the armatures in one end of the relay will move to close their contacts. When the coil is energized in the other direction, the armatures in the other end of the relay will move to close their contacts.

When the relay is deenergized, the armatures 25 and 26 will occupy positions such as illustrated by Fig. 3, with the outer ends of the armatures 26 in contact with the spacers 13, the contacts 35 at such time being spaced from the contact strip 16.

Assuming the coil 40 to be energized in a direction so that the armatures at left-hand end of the relay (facing the drawing) are magnetized to the same polarity as the inner end of their associated permanent magnet 12 so that they are repelled thereby, and are attracted by the inner end of their associated contact strip 16, then the outer ends of the armatures will move towards the strip 16 so that the contact 25 strikes the strip. The movement of the armature 26 towards the strip 16 is, of course, stopped when the contact 25 strikes the strip. The outer end of the armature 25 continues to move towards the strip 16 after the armature 26 has stopped movement. This movement is transmitted through the pivoting of the armature strip in the V-shaped slot 30, to the armature 26, and has the effect, with reference to Fig. 4, of lifting the outer end of the armature 26 upwardly, causing the contact 35 to be pressed tightly against the lower surface of the strip 16, thereby preventing bouncing of the contact away from the contact strip.

Another advantage of this armature construction is that the armatures 25 and 26 slide against each other during their movement, and the frictional damping thus produced aids in preventing the bouncing of the armatures.

Contacts, could, of course, be placed on the contact strips 16 in alignment with the contacts 35.

At the time the coil 40 is energized to cause the contacts at one end of the relay to close, the armatures and the contact strip at the other end would be magnetized so that the armatures would be repelled by the contact strip and would be attracted by the permanent magnet 12, so that the contacts at that end would not close.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A relay comprising a frame; a contact member of magnetizable metal supported adjacent one end of said frame and having an inner end extending inwardly of said frame; a pair of armatures of magnetizable spring metal having ends overlapping said inner end of said member, one of said armatures being longer than the other, the end of the longer armature which overlaps the contact member having a contact on its surface opposite said inner end of said member, the shorter of said armatures lying normally in contact with the longer thereof and on the same side thereof as said contact member; an armature pivoting member having a recess therein, the other ends of said armatures being joined together and pivoted in said recess; resilient means contacting one of said armatures between its ends for holding said other ends of said armature in said recess; and an energizing coil extending around the ends of said armatures which overlap said contact member, and around said inner end of said contact member.

2. A relay comprising a frame; a contact member of magnetizable metal supported adjacent one end of said frame and having an inner end extending inwardly of said frame; an armature pivoting member having a transverse slot therein; a strip of magnetizable spring metal bent back on itself along a transverse line so as to form two armatures having a common end at said line, said common end being pivoted in said slot, said armatures having other ends overlapping said inner end of said contact member, one of said armatures being longer than the other and having a contact thereon opposite said inner end of said contact member, the shorter of said armature lying normally in contact with the longer thereof and on the same side thereof as said contact member; resilient means contacting one of said armatures for holding said common end in said slot; and an energizing coil extending around said ends of said armatures which overlaps said contact member, and around said inner end of said contact member.

3. A relay as claimed in claim 1 in which said armatures adjacent their said other ends have portions extending substantially perpendicular to their other portions.

4. A relay as claimed in claim 2 in which said strip adjacent said common end has a portion extending substantially perpendicular to the remainder thereof.

5. A relay comprising a frame; a contact member of magnetizable metal supported adjacent one end of the frame and having an inner end extending inwardly of the frame; an armature pivoting member spaced from said contact member and extending substantially parallel thereto, said pivoting member having a transversely extending substantially V-shaped slot therein; a pair of armatures joined together so as to have a common end, said common end being pivoted in said slot, said armatures having portions adjacent said common end extending substantially perpendicular to the other portions thereof, the other ends of said armatures overlapping said inner end of said contact member, said armatures having different lengths, the longer of said armatures having a contact thereon opposite said inner end of said contact member, the shorter of said armatures lying normally in contact with the longer thereof and on the same side thereof as said contact member; resilient

means contacting one of said armatures between its ends for holding said common end of said armatures in said slot; and an energizing coil extending around the ends of said armatures which overlap said contact member, and around said inner end of said contact member.

6. A relay comprising a frame; a contact member of magnetizable metal supported adjacent one end of the frame and having an inner end extending inwardly of the frame; an armature pivoting member spaced from said contact member and extending substantially parallel thereto, said pivoting member having a transversely extending substantially V-shaped slot therein; a strip of magnetizable spring metal bent back on itself along a transverse line so as to form two armatures lying normally in contact and having a common end at said line, said armatures having portions adjacent said common end extending substantially perpendicular to the other portions thereof, the other ends of said armatures overlapping said inner end of said contact member, said armatures having different lengths, the longer of said armatures having a contact thereon opposite said inner end of said contact member, the shorter of said armatures lying normally in contact with the longer thereof and on the same side thereof as said contact member; resilient means contacting one of said armatures between its ends for holding said common end of said armatures in said slot; and an energizing coil extending around the ends of said armatures which overlap said contact member, and around said inner end of said contact member.

HARRY REIFEL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,876,295	Hofgaard	Sept. 6, 1932
2,245,391	Dickten, Jr.	June 10, 1941
2,264,022	Ellwood	Nov. 25, 1941