

[54] **CONSTRUCTION FOR A RELAY**
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[58] Field of Search **335/135, 128, 127, 203, 133, 335/129; 317/122**

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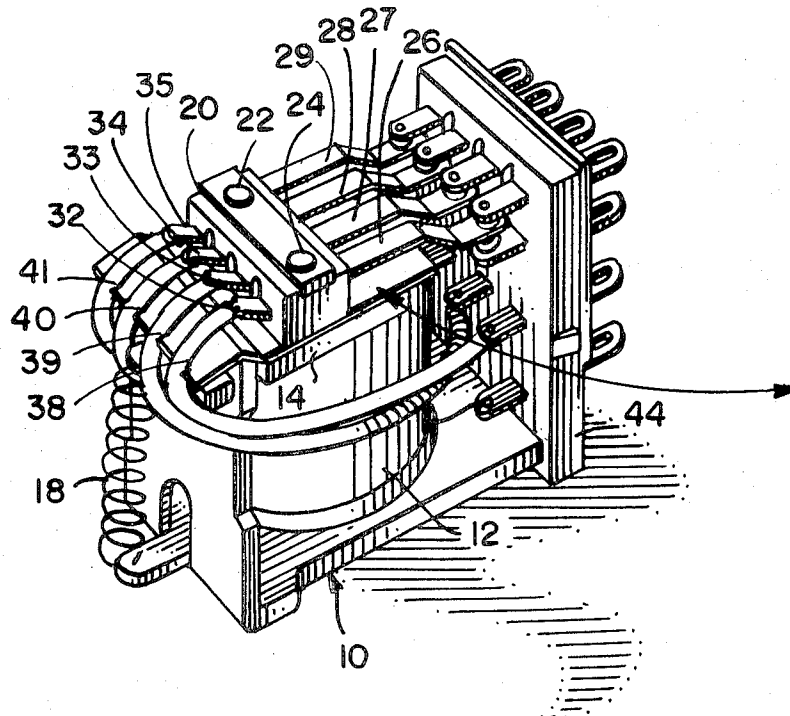
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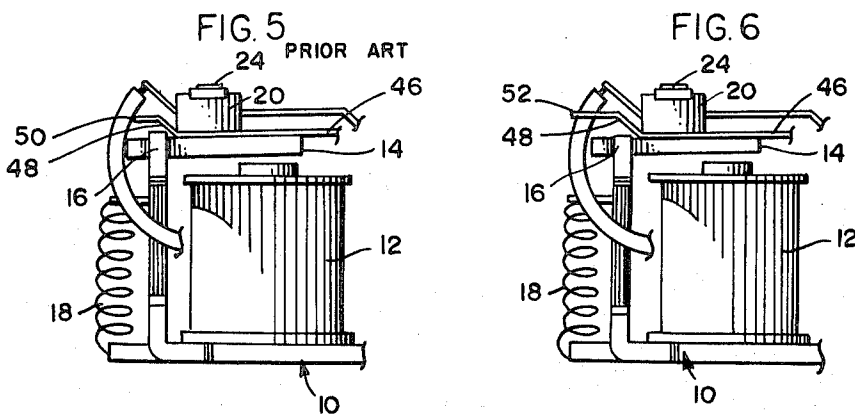
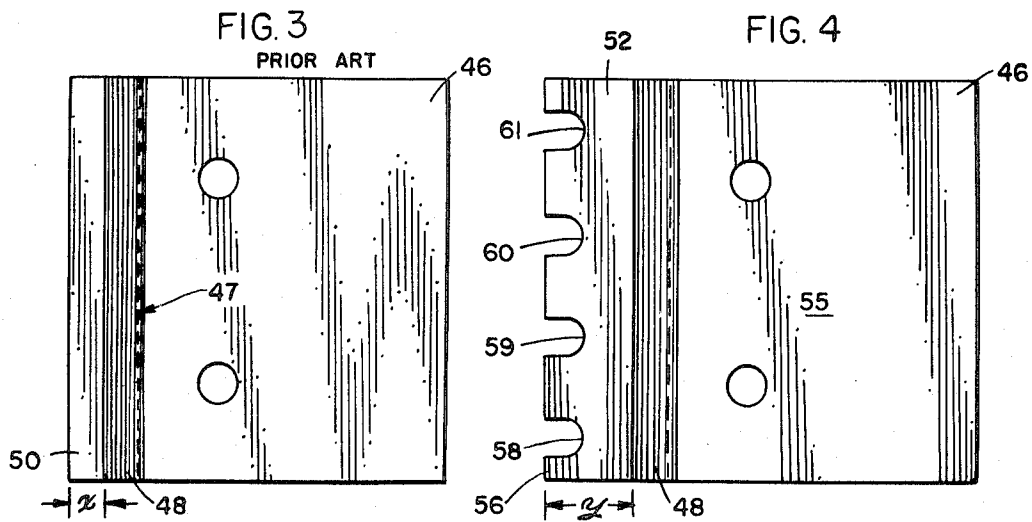
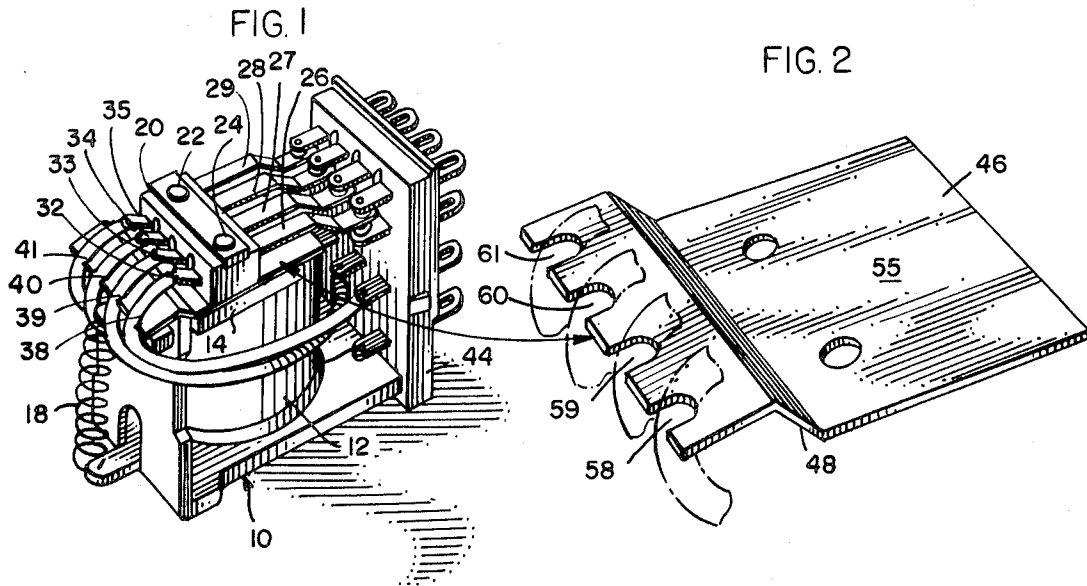
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[57] **ABSTRACT**

A sheet of insulating material is positioned between the contact block and the pivotal armature of a relay. The insulating material extends beyond the pivot axis of the armature and engages the lead wires of the relay to maintain the length of the lead wire between the sheet and contact terminals on the block in a substantially fixed position whenever the armature is pivoted.

1 Claim, 6 Drawing Figures





CONSTRUCTION FOR A RELAY

BACKGROUND OF THE INVENTION

This invention relates to means for increasing the service life of a relay.

Typically, a relay consists of a field piece with a coil mounted thereon. An armature is pivotally attached to the field piece and responds to current passing through the coil. A contact block with contact blades, attached to the armature, pivots with the armature to effect switching by the relay whenever current is passed through the coil.

Generally, lead wires from the contact blades in the contact blocks connect with contact terminals on a common terminal block. These lead wires usually extend over the pivotal axis of the armature on the field piece and flex as the armature is pivoted.

Such relays are well known in the art and are available from numerous manufacturing sources. Generally, such relays are rated to operate at 50 million cycles without failure. However, it has been found, in some instances, that the lead wire from the terminal block to the contact terminal of the contact block will sometimes break, particularly at the solder connection thereby causing failure of the relay. It is an object of the present invention to eliminate such a relay failure possibility.

SUMMARY OF THE INVENTION

In a principal aspect, the present invention is an improved relay of the type which includes a field piece with an attached armature that pivots about a pivot axis to thereby switch attached contact blades. The improvement includes a sheet of insulating material which is fixed between a contact block mounted on the armature and the armature. The sheet extends to engage wires that are connected to contact blades of the contact block.

It is thus an object of the present invention to provide an improved relay.

It is a further object of the present invention to provide a relay which will uniformly be able to operate for 50 million cycles without failure of lead wires or solder connections of the lead wires.

These and other objects, advantages and features of the present invention will be set forth in the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWING

In the detailed description which follows, reference will be made to the drawing comprised of the following FIGURES:

FIG. 1 is a perspective view of a relay incorporating the improvement of the present invention;

FIG. 2 is an exploded partial perspective view illustrating the insulating sheet which comprises the improvement to the relay of the present invention;

FIG. 3 is a top plan view of an insulating sheet that is utilized in the prior art;

FIG. 4 is a top plan view of the improved insulating sheet of the present invention;

FIG. 5 is a side view of a typical prior art relay; and

FIG. 6 is a side view of a relay utilizing the improvement of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference is first directed to FIGS. 1, 5 and 6 for a description, in general, of relays. A relay is comprised of a field piece 10 with a coil 12 mounted thereon. An armature 14 which is responsive to the electromagnetic force from the coil 12 is pivotally attached to the field piece 10. Armature 14 pivots about a pivot axis 16 in response to energization of the coil 12. A spring 18 maintains the armature 14 in a biased counter-clockwise position as illustrated in the FIGS. 1, 5 and 6.

A contact block 20 is attached to the armature 14 by pins or rivets 22 and 24. A plurality of contact blades 26-29 are mounted in the contact block 20. The contact blades 26-29 include contacts which are adapted to be moved between stationary contacts on a terminal block 44 depending upon the actuated position of the armature 14. Each of the blades 26-29 also extend through the block 20 in a direction opposite the contacts and terminate at a contact terminal 32-35 respectively. Lead wires 38-41 respectively are connected to terminals 32-35 respectively. The lead wires 38-41 connect with appropriate terminals on the terminal block 44.

In prior art relays, as illustrated in FIG. 5, a Mylar sheet 46 was commonly interposed between the contact block 20 and the armature 14. The Mylar sheet 46 included a rear shaped extension 47 having an angled run 48 and a planar run 50. The shaped extension 47 permitted one end of the sheet 46 to fit over a topmost portion 52 of field piece 10. The sheet 46 thus provided an insulating barrier between the block 20 and the armature 14 or field piece 10. The length of the run 50 for the sheet 46 is indicated in FIG. 3 by the distance x . This distance x is just sufficient to insure that the block 20 was shielded from the armature 14 and field piece 10.

As illustrated in FIGS. 1, 2, 4 and 6, the improvement of the present invention provides for an extended planar run 56 in a sheet 55 having a lateral dimension y as illustrated in FIG. 4. Additionally, a plurality of notches 58-61 are defined in the run 56 of sheet 55. The notches 58-61 coincide with wires 38-41 as illustrated in FIG. 1. Thus, the run 56 extends beyond the end of the armature 14 over the axis 16 and engages the lead wires 38-41. Run 56 thus holds the lead wires 38-41 in a substantially fixed position relative to the terminals 32-35 respectively.

Because of this construction, the wires 38-41 do not tend to flex or bend at the soldered connection to the terminals 32-35 respectively. As a result, relays which were observed to fail due to breakage in the lead wires 38-41 after two to three or no more than 10 million cycles are now operable for more than 110 million cycles without failure. This is possible because the insulating sheet between the block 20 and the armature 14 is now redesigned and restructured to provide support for the lead wires 38-41 particularly in the region intermediate the notches 58-61 and the terminals 32-35. Thus, when cycling the relay bending in lead wires 38-41 is spread out over the length of the lead wires 38-41. As a result, the operating lifetime of the relay is significantly increased and relay failure substantially eliminated. All relays can therefore meet a rated specification requirement of 50 million cycles.

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While in the foregoing there has been set forth a preferred embodiment of the present invention, it is to be understood that the invention shall be limited only by the following claim and its equivalents.

What is claimed is:

1. In a relay of the type including a field piece with an armature attached thereto to pivot about a pivot axis, said armature having a contact block mounted thereon, said block including at least one blade with a terminal end, and a lead wire connected between a contact terminal and said terminal end, said lead wire being sub-

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jected to bending whenever said armature is pivoted, the improvement comprising, in combination:

a thin insulating sheet between said block and said armature, said sheet extending over the surface of said armature and beyond the pivot axis, said sheet including a notch to engage said lead wire and hold the length of lead wire between said notch and said terminal end in a substantially fixed relation during pivotal movement of said armature and attached block.

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