

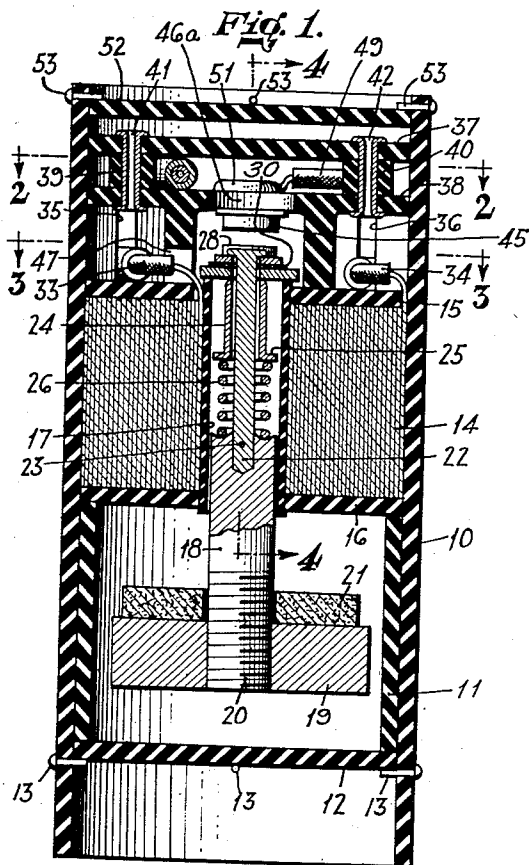
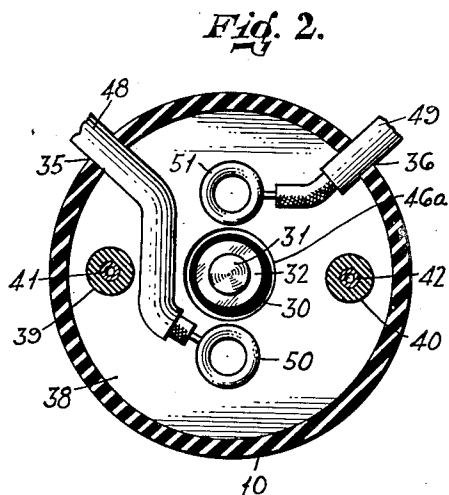
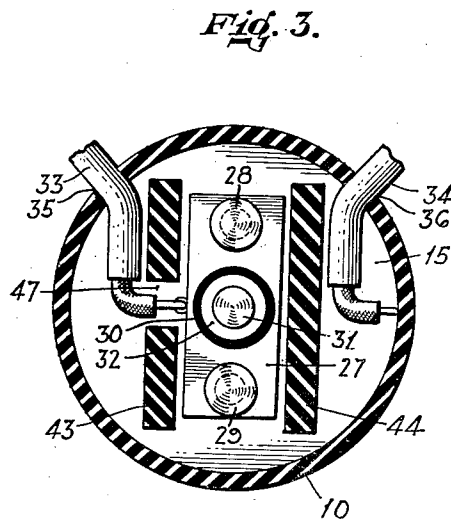
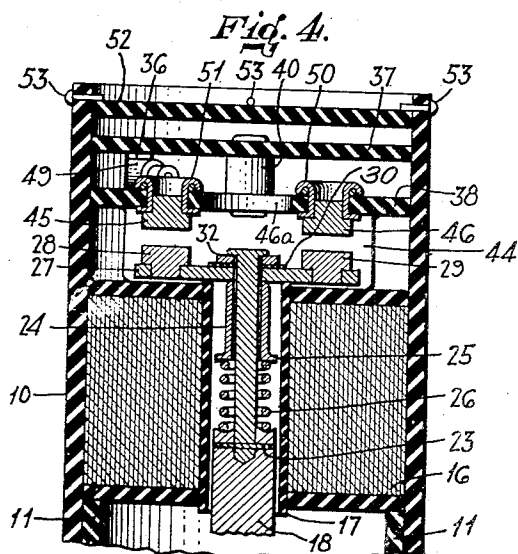
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E. S. BORGKVIST

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RELAY

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BY

INVENTOR.
ELMER S. BORGKVIST
Richard & Leier
ATTORNEYS

UNITED STATES PATENT OFFICE

2,238,154

RELAY

Elmer Severin Borgkvist, Arlington, N. J.

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2 Claims. (Cl. 200—111)

My invention relates to relay switches of a type used to make and break an electrical circuit through the energizing and de-energizing of a magnetic coil.

Considerable difficulty in the past has been experienced in producing a relay switch which is inexpensive, compact, and easily assembled and at the same time constructed in such a manner that the working parts thereof will move quickly and freely and also be protected against foreign particles such as dust.

Relay switches of this type, such as described in my co-pending application, Serial Number 119,180, filed January 6, 1937, and issued August 29, 1939, Patent Number 2,170,961 while efficient, practical, and easy to assemble, present certain difficulties. One difficulty in such a relay is that the armature rod weight is not sufficient to quickly break the contacts in the relay when the same is used in circuits carrying a great amount of current. A different amount of weight is needed in accordance with the amount of current used in the circuit in which the relay switch is placed. Another difficulty encountered is that the contact means on the solenoid tends to bind on the guide means, particularly when one of the contacts on said contact means does not move in the same horizontal plane with the other.

It is, therefore, among the objects of my invention to provide an improved switch relay in which the working parts may be easily and inexpensively assembled in a casing which prevents foreign particles from entering and interfering with the working of said parts.

Another object of my invention is to provide a guide means for the movable contacts in a switch relay which allows free movement of said contacts.

A further object of my invention is to provide a switch relay assembly in which all lead wires may be positioned at the end of the switch on which the contacts are mounted.

Another object of my invention is to provide the end of the solenoid rod, opposite the one carrying the contacts, with means for making said rod heavier or lighter as desired.

A still further object of my invention is to provide means whereby the movable contacts will not be permitted to come in contact with lead wires to the solenoid coil and thereby short circuit the same.

Other objects will be obvious or will appear during the course of the following specification.

In accomplishing the above results, it has been found most satisfactory, according to one em-

bodiment of the present invention, to provide a fixed contact mounting to be positioned in one end of the casing, said mounting having two spaced parallel bars between which the fixed contacts are mounted. The bars are so positioned that the movable contact member in the solenoid rod may freely move therebetween and the contacts on said movable contact member may cooperate with the fixed contacts. The parallel bars also act to separate the lead wires to the coil from the movable parts.

I provide the opposite end of the solenoid rod with a weight, which may be varied. This weight may move freely longitudinally since all wiring is located on the opposite end of the relay.

In the drawing is shown one of the various possible embodiments to which my invention is by no means restricted, the drawing being merely by way of illustration and not by way of limitation.

In the drawing:

Figure 1 is an elevational view in section of the device of my present invention showing the construction of the interior of the same;

Figure 2 is a horizontal section taken on the line 2—2 of Figure 1;

Figure 3 is a horizontal section taken on the line 3—3 of Figure 1; and

Figure 4 is a partial sectional view on the line 4—4 of Figure 1.

Like numerals refer to like parts throughout the several views.

In the embodiment of the invention shown in the drawing, the switch relay of my present invention consists of an outer casing or housing 10 of insulating material having closely fitted to the inside surface thereof adjacent one end, a hollow piece of insulating material 11 forming a hollow portion on said casing of lesser diameter than the diameter of the remainder of the casing. An end cap 12 is held in position against one end of the hollow piece 11 by pins 13 extending through the casing 10, the end cap 12 sealing one end of the casing to prevent dust or any other foreign material from entering the relay switch.

A magnetic coil 14, which has end flanges 15 and 16 and a hollow core 17 of insulating material, is contained within the casing 10, the flange 16 resting against the opposite end of the piece of hollow insulating material 11.

Reciprocably mounted within the hollow core 17 is a solenoid rod 18 of magnetic material, preferably cold-drawn steel. A weight 19 of non-magnetic material, such as brass, is fastened to

one end of the rod 18, preferably by means of screw threads 20 on said rod. In this manner, weights of different sizes may be used on the rod in accordance with the amount of electric current used in the circuit in which the relay switch is to be inserted. A washer 21 of resilient material, preferably felt, is positioned on top of the weight 19 to prevent the weight from coming in contact with the end flange 16, thereby having a cushioning effect.

A pin 22 of non-magnetic material is fastened to the top of the solenoid rod 18 by means of a pin 23. A sleeve 24 is loosely fitted about the rod 22 and has a flange 25 which rests against a spring 26 which encircles the rod 22. The opposite end of the sleeve engages a bar 27 of conductive non-magnetic material slidably mounted on the pin 22. Contact points 28 and 29 are mounted on the bar 27. A washer 30 which may be of paper or any other sound absorbing material, is fastened to the top of the bar 27 to prevent any hum or vibrating noise caused by the current passing through the magnetic coil 14. The top of the pin 22 is upset to form a head 31 and a washer 32 is placed between the head 31 and the washer 30. The spring 26 normally holds the bar 27 and washer 30 against the washer 32 and head 31.

Lead wires 33 and 34 run from the coil 14 through the slots 35 and 36 in the housing 10 and are connected into the circuit in which the relay is to be used.

A fixed contact mounting, comprising an upper disc 37 and a lower disc 38 spaced apart by washers 39 and 40 and held in this relation by eyelets 41 and 42, is mounted within the casing 10 at the top thereof. The bottom disc 38 has transverse parallel bars 43 and 44 spaced apart a sufficient distance to permit the movable switch bar 27 to longitudinally reciprocate therebetween. The bars 43 and 44 act as guiding means for the bar 27 and permit free longitudinal reciprocation of bar 27 as the coil 14 is energized and de-energized.

Since the bar 27, on which the contacts 28 and 29 are attached, is slidably and yieldably connected to the solenoid rod 18, both ends of the bar may, in some instances due to a loose fitting of parts and an uneven movement of the solenoid rod 18 in the core 17, not be raised in the same horizontal plane. The guide means of my present invention consisting of the transverse parallel bars 43 and 44 allow free movement of the contact bar 27 and prevents binding between the guide means and the contact bar. The bars 43 and 44 also prevent rotary movement of the bar 27. The lower disc 38 also has fixed contact points 45 and 46 positioned between the parallel bars 43 and 44 on either side of an aperture 46a. The contacts 45 and 46 are so spaced as to cooperate with the movable contacts 28 and 29 respectively. The aperture 46a is positioned above the head 31 of the pin 22. The bar 43 has an opening 47 for the lead wire 33 of the coil 14.

As shown in Figure 3, the guide bars 43 and 44 will prevent the bar 27 from rotating to such an extent as to cause a short circuit between the lead wires 33 and 34. It will be understood that the parallel bars 43 and 44 may be formed integrally with the disc 38, as shown in the drawing, or may be formed of separate pieces and fastened to said disc. It will also be understood that the bars may be mounted on the flange 15. Fixed contacts 45 and 46 are connected to the electrical circuit in which the relay is to be used by

means of lead wires 48 and 49 which extend from said contacts between the upper and lower discs 37 and 38 and through slots 35 and 36 respectively in the casing 10. The lead wires 48 and 49 are fastened to the contacts 45 and 46 by means of eyelets 50 and 51. A top cover 52 is inserted inside of the casing 10 above the disc 37 and held in position by pins 53. This cover will prevent any dust or foreign particles from entering the relay.

This switch relay is assembled by placing the rod 18 inside of the hollow core 17 and placing the washer 21 and any desired weight 19 upon one end of the same. The spring 26 and sleeve 24 are then placed about the pin 22 and the contact bar 27 placed on top of said sleeve. The washers 30 and 32 are then placed on top of said bar and the end of the rod 22 upset to form the head 31. The coil and armature assembly are then placed inside the casing 10, the flange 16 resting against the insulating material 11. The lead wires 33 and 34 are placed in the slots 35 and 36. The fixed contact mounting is then placed in the casing, parallel bars 43 and 44 being positioned either side of the bar 27 so that the bar 27 may reciprocate therebetween. The parallel bars will rest against the flange 15 and the lead wires 48 and 49 will be placed through the slots 35 and 36 respectively. The top cap 52 is then placed in position on the casing or housing 10, pins 53 being inserted to hold said cap in position. The end cap 12 is also placed in position at the bottom of the casing and held by pins 13.

In the operation of the relay, with the same assuming a vertical position, as shown in Figure 1, the solenoid rod 18 is normally in its lowermost position. Upon energizing the coil 14, the rod 18 is moved upwardly until the movable contact points 28 and 29 contact the fixed points 45 and 46, which completes the external circuit of lead wires 48 and 49. Since the bar 27 is yieldably mounted on the rod 18, rod 18 may move upwardly slightly after the contact points are in engagement, the head 31 entering the aperture 46a.

When the coil 14 becomes sufficiently de-energized, the weight 19 will move the solenoid rod 18 downwardly quickly disengaging the contacts 28 and 29 from the contacts 45 and 46, returning the solenoid rod 18 to its lowermost position. Should the bar 27 be moved by the rod 18 so that the contacts 28 and 29 mounted thereon would not be moved in the same horizontal plane, no binding between the guide means and the movable bar 27 will take place since said bar is free to reciprocate between the parallel bars 43 and 44.

It is not my intention to limit the present invention to the embodiments of the invention herein described, but rather to include all equivalent structures as covered by the scope of the following claims.

What I claim is:

1. In a relay of the class described having a magnetic coil for actuation of an armature rod, both encased in an insulating housing forming chambers in both ends thereof, the combination of a movable switch member comprising a bar bearing switch elements yieldingly connected to one end of said rod for longitudinal movement only, said bar being approximately the same width as said rod, a weight adjustably connected to the opposite end of said rod, a fixed contact mounting comprising inner and outer insulating

discs spaced apart said inner disc having points to contact said switch elements on said bar, parallel projections formed integrally with said inner disc and extending toward the adjacent end of said coil said projection being positioned either side of said movable switch member to prevent rotation of the latter and permit longitudinal movement of the same therebetween and to form a chamber between said guide members and said housing, connections from said coil extending from the end of said coil adjacent said guide members and through said chambers and end caps on both ends of said housing.

2. In a relay of the class described having a magnetic coil for actuation of an armature rod, both encased in an insulating housing, forming chambers in both ends thereof, the combination of a movable switch member comprising a bar bearing switch elements yieldingly connected to one end of said rod for longitudinal movement

only, said bar being approximately the same width as said rod, a weight adjustably connected to the opposite end of said rod, a fixed contact mounting comprising inner and outer insulating discs spaced apart said inner disc having points to contact said switch elements on said bar, parallel projections formed integrally with said inner disc and extending toward the adjacent end of said coil said projection being positioned either side of said movable switch member to prevent rotation of the latter and permit longitudinal movement of the same therebetween and to form a chamber between said guide members and said housing, connections from said coil extending from the end of said coil adjacent said guide members and through said chambers, lead wires from said switch points extending between said inner and outer disks and through said housing, and end caps on both ends of said housing.

ELMER SEVERIN BORGVIST.