Oct. 5, 1965 P. A. SOSNOSKI 3,210,499

SMALL CURRENT FLOW RELAY SWITCH

Filed July 2, 1963

Fig. 1

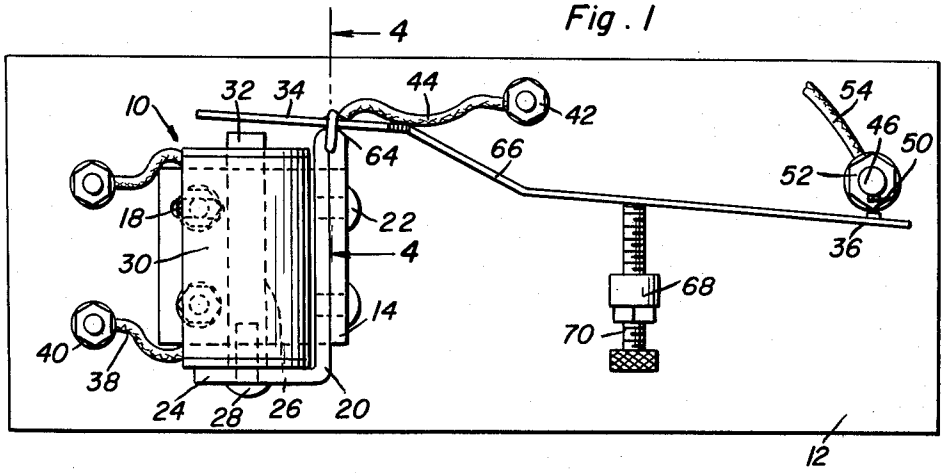
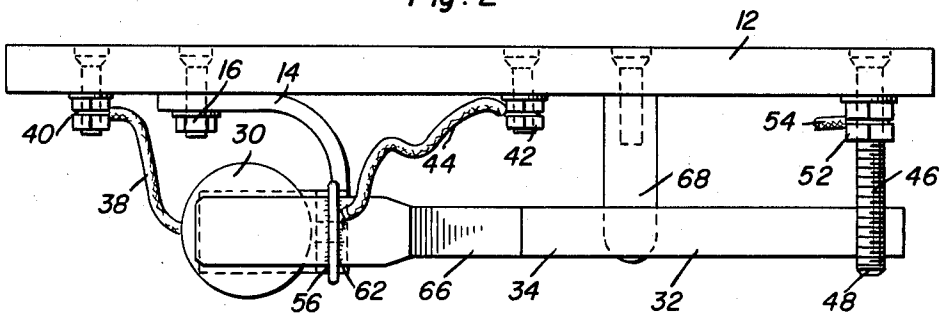


Fig. 2



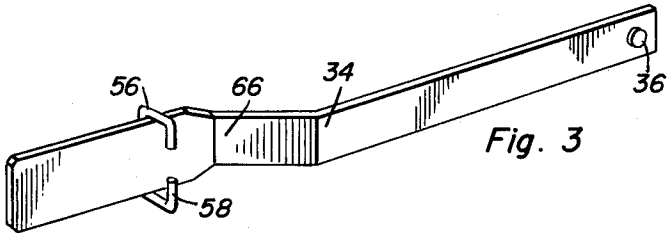
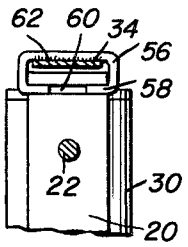


Fig. 3

Fig. 4



Peter A. Sosnoski

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

United States Patent Office

3,210,499

Patented Oct. 5, 1965

3,210,499

SMALL CURRENT FLOW RELAY SWITCH

Peter A. Sosnoski, P.O. Box 205, Shamokin, Pa.

Filed July 2, 1963, Ser. No. 292,245
4 Claims. (Cl. 200—87)

The present invention generally relates to improvements in a relay switch having general utility but more specifically constructed for use in conjunction with the circuitry illustrated in prior Patent No. 2,844,765 for Protective Circuitry issued July 22, 1958, and requiring a relatively small current flow for operation of the device.

An object of the present invention is to provide a relay switch incorporating an electromagnet including a coil and a stationary iron core or pole piece together with a pivotal armature related thereto in such a manner that the armature will have one end attracted by the electromagnet when energized and the other end provided with a movable contact whereby the relationship of the pivotal support of the armature which is in the form of an elongated arm will in effect increase the distance of movement of the movable contact in relation to the movement of the end of the arm attracted by the electromagnet.

Another object of the present invention is to provide a relay switch having an extremely non-complicated construction which does not employ any springs whatsoever for return of the armature or contact arm to an open position, this being accomplished by gravity and by varying the balance characteristics of the armature or contact arm.

Another object of the present invention is to provide a relay switch which may be mounted in various orientations and may be adjusted as to the angular disposition thereof to obtain the characteristics desired.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a side elevational view of the relay switch of the present invention;

FIGURE 2 is a top plan view of the construction of FIGURE 1;

FIGURE 3 is a perspective view of the armature illustrating the contact structure at one end thereof; and

FIGURE 4 is a detail sectional view taken substantially upon a plane passing along section line 4—4 of FIGURE 1 illustrating the structural details for mounting the armature pivotally on its supporting bracket.

Referring now specifically to the drawings, the numeral 10 generally designates the relay switch of the present invention which is illustrated as being mounted on any suitable supporting base 12 or the like. An arcuately curved bracket 14 preferably of aluminum or other suitable material is mounted on the mounting base 12 by fastener bolts 16. The apertures through which the fastener bolts 16 extend may be in the form of oval-shaped slots 18 for enabling adjustment of the bracket 14 in both a rectilinear and pivotal manner. The outer end of the bracket 14 is attached to an L-shaped bracket 20 by virtue of screw-threaded fasteners, rivets or the like 22. One end of the L-shaped or angle iron bracket 20 is provided with an arm 24 attached to an iron core 26 by virtue of a screw threaded fastener 28 or the like. Surrounding the iron core 26 is a magnetic coil 30 which will cause the projecting end of the core 26 which is designated by numeral 32 to attract one end of an elongated armature 34 which has a contact 36 at the opposite end thereof. The armature 34 may be relatively lightweight in construction and constructed of sheet metal or any other similar lightweight ferrous material capable of attraction to the projecting pole 32 forming a part of the iron core 26 of the electromagnet assembly.

A pair of conductors 38 are connected to the coil 30 in a conventional manner and are also connected to terminal posts 40 secured to the mounting base 12 so that a source of electric current may be connected to the conductors 38 by connection with the terminal post 40 in an obvious manner. Also, the mounting base 12 is provided with a terminal post 42 having a conductor 44 connected thereto which in turn is connected to the armature 34 and a terminal post 46 is provided on the mounting plate 12 for association with the outer end of the contact arm or armature 32 and is longer than the terminal post 40 and 42 in that the outer end thereof 48 is provided with a contact member 50 for association and engagement by the contact 36 on the armature or contact arm 34. The external surface of the terminal stud is threaded and receives a pair of retaining nuts 52 for fastening a conductor 54 thereto for completing a circuit from the conductor 44 to the conductor 54 or vice versa when the contacts 36 and 50 are closed. Due to the elongation of the armature or arm 34 between its pivotal supporting connection with the supporting bracket and the contact 36 as compared with the length thereof overlying the iron core 32, the contact 36 will normally be disposed in spaced relation to the contact 50 due to the force of gravity and will return to the open position without utilizing any springs or mechanical contrivances whatsoever.

For supporting the armature or contact arm 34, the armature 34 is provided with a generally U-shaped steel wire 56 having inturned ends 58 which are received in a bore 60 formed between the ends of the supporting bracket 14 and L-shaped bracket 20 as illustrated particularly in FIGURE 4. The bight portion of the steel wire 56 is soldered to the outer surface of the contact arm or armature 34 as indicated by numeral 62 and this soldered connection also forms a soldered connection for the conductor 44 thereby assuring proper electrical contact between the conductive contact arm and armature 34 at the point of pivotal movement thereby requiring very little flexing of the conductor 44 thereby eliminating one source of trouble normally employed in conjunction with movable contact switches, that is a relatively high degree of flexibility required and subsequent failure or some type of pivotal connection for the electrical energy where the contact arm swivels. In this construction, the conductor is connected directly to the contact arm 34 but has very little pivotal movement imparted thereto. Also, the ends of the sprocket 14 and bracket 20 which receives the steel wire 56 are rounded as indicated by numeral 64 to further facilitate the pivotal movement of the armature or contact arm 34.

The armature or contact arm 34 is provided with an offset portion 66 immediately outwardly of the pivotal wire 56 and the degree of offset may be varied for varying the position on the contact 36 for alignment with the contact 50 and also for varying the initial spaced relation therebetween. If desired, the mounting plate 12 may be provided with a stop member 68 having a screw-threaded abutment member 70 mounted thereon for engaging the contact arm or armature 34 to limit the movement thereof in a direction away from the contact 50 thereby assuring that the end of the armature or contact arm 34 associated with the iron core 32 will not go beyond a predetermined spaced relation to the end of the iron core 32 so that the armature will also be effectively attracted to the pole or core 32 when the electromagnet coil 30 is energized.

The mounting base is constructed of an insulative material and the various bolts, nuts and washers may be con-

structed of brass material. The space between the armature 34 and the iron core 32 is such that very little electrical current is required for energizing the electromagnetic coils 30 sufficiently to attract the armature 34 to the core 32. When current is applied across the conductors 38 and through the high reactance coil 30, the magnetic attraction of core 32 will attract the metal strip or armature 34 thus closing contacts 36 and 50. This then closes a circuit through conductor 44 to the conductor 54 in an obvious manner for effectively opening a circuit or closing a circuit as desired. This construction provides a highly sensitive relay switch having a very small space between the core 32 and the armature 34 and a relatively large space between the contacts 36 and 50. This construction also eliminates all springs to return the armature to a desired normal position and the relay switch of the present invention may be orientated in any desired angular relationship so that the armature 34 will have a vertical vector of force due to gravity so that it will return to a normal position due to the force of gravity. The various brackets may be adjusted to any desired angle and the contact arm or armature 34 may be formed to orientate inself in any desired manner and additional weights may be mounted on the contact arm or armature 34 to vary the weight characteristics thereof and also to vary the movement characteristics thereof by varying the weight distributtion and thus varying the forces which tend to cause the armature 34 to move under the influence of gravity. The orientation of the components of the relay switch may be reversed or orientated in various different orientations to enable the device to be installed in many various arrangements. The relay switch of the present invention is low in cost of construction, simple in operation, efficient in operation, and is constructed so that the armature will be operated upon application of very little current to the coil 30.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A relay switch comprising a coil, an iron core immovably associated with said coil for forming a magnetic field when the coil is energized, an elongated arm forming an armature normally disposed with one end thereof in spaced relation to an end of the core and subject to attraction when the coil is energized, means pivotally supporting said armature adjacent the core for pivotal movement of one end of the armature towards and away from the core, the other end of the armature having a contact element thereon spaced from the point of pivotal support a considerably greater distance than the spaced relationship between the point of pivotal support and the core thereby enabling a relatively large distance of movement of the contact on the armature as compared with the movement of the end of the armature associated with the core, said coil being supported from an insulated base, an

arcuate supporting bracket interconnecting the insulated base and the coil, an L-shaped bracket attached to the upper end of the supporting bracket and attached to the end of the core thereby supporting the core with the coil carried by the core, the pivotal support means for the armature including a generally U-shaped wire soldered to the armature and including inturned ends, the ends of the supporting bracket and L-shaped bracket having a bore extending therethrough receiving the inturned ends of the wire, means detachably interconnecting the ends of the supporting bracket and L-shaped bracket for enabling the inturned ends of the wire to be disposed in the bore without deforming the wire.

2. The structure as defined in claim 1 wherein said wire is of steel construction and soldered to said armature, a conductive lead wire also being soldered to said armature by the same soldering connection as connects the supporting U-shaped wire to the armature.

3. The structure as defined in claim 2 together with an insulated mounted base having terminal posts thereon, one of said terminal posts being elongated, a contact carried by the elongated terminal post for contact with the movable contact carried by the armature for enabling a circuit to be opened and closed upon pivotal movement of the armature.

4. A relay switch comprising a coil, an insulated base supporting said coil, an arcuate supporting bracket interconnecting the insulated base and the coil, an iron core immovably associated with said coil for forming a magnetic field when the coil is energized, an L-shaped bracket attached to the upper end of the supporting bracket and attached to the end of the core thereby supporting the core and the coil carried by the core, an elongated arm forming an armature normally disposed with one end thereof in spaced relation to an end of the core and subject to attraction by said core when the coil is energized, a U-shaped wire connected to the supporting bracket and L-shaped bracket at one end thereof and being soldered to the armature at the other end to thereby pivotally support said armature for pivotal movement of one end of the armature towards and away from the core, the other end of the armature having a contact element thereon spaced from said U-shaped wire a distance greater than the spaced relationship between the U-shaped wire and the core thereby enabling a relatively large distance of movement of the contact on the armature as compared with the movement of the end of the armature associated with the core.

References Cited by the Examiner

UNITED STATES PATENTS

725,259	4/03	Kitsee	200—153
929,319	7/09	McBerty	200—87
2,583,789	1/52	Mejean	317—198
2,608,630	8/52	Harrison	200—104
3,033,957	5/62	Dean	317—198
3,117,255	1/64	Peterson	200—87

BERNARD A. GILHEANY, *Primary Examiner.*

ROBERT K. SCHAEFER, *Examiner.*