Oct. 12, 1965 B. S. BENGTSSON 3,211,875

SWITCH HAVING INSULATING BASES DEFINING SEPARATE COMPARTMENTS FOR MOUNTING A CONTACT CARRYING BRACKET

Original Filed Nov. 14, 1961

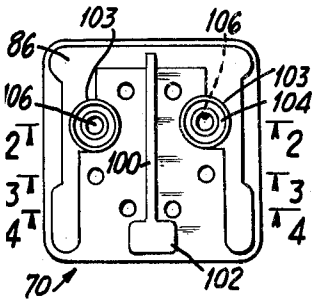

FIG. 1

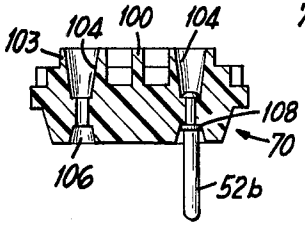

FIG. 2

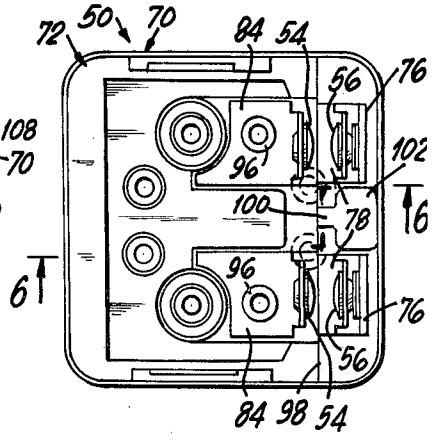

FIG. 5

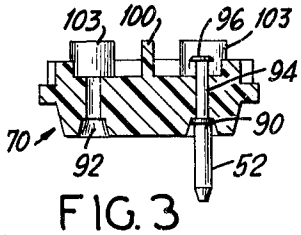

FIG. 3

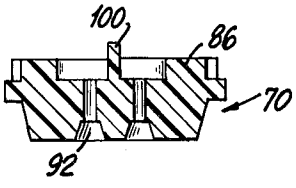

FIG. 4

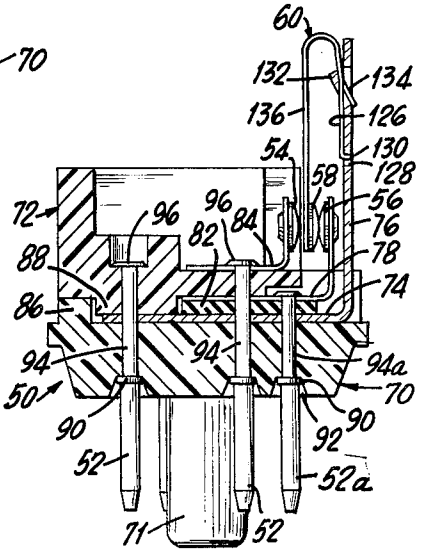

FIG. 6

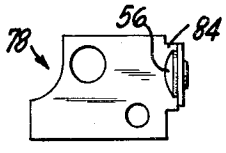

FIG. 7

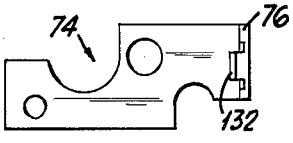

FIG. 9

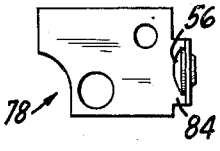

FIG. 8

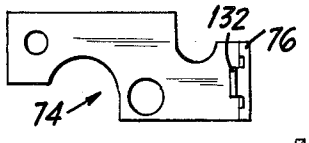

FIG. 10

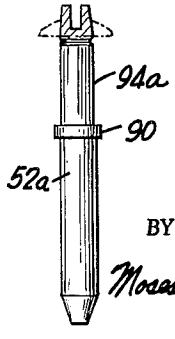

FIG. 11

INVENTOR.
BERTIL S. BENGTSSON

BY

Mason, McGlew & Torzen
ATTORNEYS.

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SWITCH HAVING INSULATING BASES DEFINING SEPARATE COMPARTMENTS FOR MOUNTING A CONTACT CARRYING BRACKET

Bertil S. Bengtsson, Scituate, Mass., assignor to Sigma Instruments, Inc., a corporation of Massachusetts

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3 Claims. (Cl. 200—166)

This is a division of application Serial No. 152,261, filed November 14, 1961.

This invention relates to electro magnetic devices and particularly to the construction of contact supporting brackets and contacts for relays suitable for general industrial use. Broadly stated, the objects of the invention are to provide a relay having long life, high switching capacity, high reliability, low manufacturing cost, and of such dimensions and characteristics as to be interchangeable with the largest number of competitive relays intended for use under comparable conditions.

A more specific and very important object of the present invention is to eliminate as far as possible the internal wiring in the relay. Much of the available space inside the relay envelope has, in prior constructions, been occupied by wiring between the terminals of the relay proper and its base or plug-in termination. The wiring which has been heretofore required, aside from being space-consuming, is costly, and many solder points are required which are a constant source of trouble, possible breakdown and increased resistance. In the construction of the present invention most of the internal wiring and soldered joints are eliminated. It has thus been possible to utilize the available space in the relay envelope so that, without enlarging over-all dimensions, it has been possible to lengthen the flexible members of the switches, thus permitting a larger cross section for a given spring characteristic. This has made possible reduction of the total contact resistance of the relay, terminal to terminal. This decrease in resistance is in addition to that secured by the elimination of many of the soldered joints required in previous constructions.

An important feature of construction which is preferably embodied in the structure of the present invention is the formation of various parts so as to include within the parts themselves fastening means by which the parts may be assembled. These formations cooperate with formations on other parts and particularly with spring clips by which the parts may be secured. The use of welding or soldering in joining parts is minimized and conventional fastening means such as screws, bolts or rivets are wholly or largely eliminated. Valuable space is thus saved, the expense and nuisance of handling many small parts is reduced, and the danger of screws and nuts becoming loosened during use is avoided.

Other objects and advantages of the invention will appear in the course of the following description of a preferred embodiment thereof. One such preferred embodiment is illustrated in the accompanying drawings. These drawings show a double pole double throw electro magnetic relay which may be provided in forms for either A.C. or D.C. operation. Many features of the invention are obviously applicable to other forms of relay and some of the features are useful in connection with other types of electro magnetic or switching apparatus. The applicability of the various inventive features disclosed is therefore not to be taken as limited to the particular type of relay illustrated.

In the drawings:

FIG. 1 is a top plan view of the pin base of the relay;

FIGS. 2, 3 and 4 are transverse sections of the pin base taken on lines 2—2, 3—3, and 4—4, respectively, of FIG. 1;

FIG. 5 is a plan view of the terminal pin base with the relay base assembled thereon, and having contact brackets carrying their contact elements constructed in accordance with the invention;

FIG. 6 is a vertical section on line 6—6 of FIG. 5 showing the relay base mounted on the pin base;

FIGS. 7 to 10 are plan views of the contact brackets which are also to be mounted on the pin base; and

FIG. 11 is a side elevation of a terminal pin for attachment to a contact bracket or terminal bracket, partly broken away.

Referring to the drawings in detail, the illustrated embodiment of the invention is a double pole, double throw relay. The relay embodies a base **50** of insulating material carrying terminal pins **52**, **52***a*, and **52***b* arranged to fit in a conventional socket (not shown). Mounted on the base are a pair of normally open contacts **54** and normally closed contacts **56**. These are engaged alternately by movable contacts **58** carried on contact springs **60**.

A novel construction of base is provided in which soldered connections are eliminated and also the use of screws and bolts.

The base is made in two pieces of insulating material such as thermo-setting phenolic plastic. The lower of these pieces, **70**, comprises a pin base from which the terminals **52**, **52***a*, and **52***b* project, while the upper piece **72** may be termed the relay base. The pin base is shown as having a guide pin **71** molded integral therewith. On the pin base are mounted the brackets **74** carrying upwardly projecting arms **76** to which are fixed the movable contact springs **60**. Also carried by the pin base are the brackets **78** carrying the normally closed contacts **56**. The brackets **78** are separated from the brackets **74** by pieces of insulating material **82** (FIG. 6). Mounted on the relay base are brackets **84** carrying the normally open contacts **54**. The pin base has a flange or shoulder portion **86** in which lugs **88** on the relay base fit. The pin base **70** and the relay base **72** and brackets **84** are all permanently clamped together by certain of the terminal pins **52**, which are provided midway their length with flanges **90** fitting in sockets **92** in the bottom of the pin base and which have shank portions **94** extending through holes in the pin base **70** and up through matching holes in the relay base **72**. The upper ends of the shanks are spun or flanged over as indicated at **96**. The relay base is narrower than the pin base terminating at the line **98** (FIG. 5) so as to leave a space through which project upwardly the spring-carrying bracket portions **76** and the contact-carrying portions **78** which carry the contacts **56**. The brackets **78** are clamped against the insulating pieces **82** which, in turn, bear on the bracket **74**, these parts being held in firm contact by pins **52***a*, the shanks **94***a* of which are shorter than the shanks **94** of pins **52**.

The shanks of the terminal pins are of such diameter in relation to the sizes of the holes in the respective terminal brackets mounted thereon that the shanks have to be forced through the holes with substantial pressure. The force fit thus obtained insures good electrical contact without soldering. The shank diameter should be sufficiently larger than the hole diameter to result in substantial stressing of the metal so that a tight contact is maintained under all temperature conditions to which the instrument will be subjected.

The pin base, in addition to having the marginal flange **86**, has a central partition wall **100** terminating at its front end in a lug **102**, the flange and lug being slightly higher than the marginal flange **86**. Also projecting upward

from the pin base are cylindrical projections **103** which have tapered sockets **104** therein communicating with holes **106**. Hollow pins **52***b* having flanges **108** are mounted in these holes. The relay base fits on top of the pin base as above described and it has a groove in its lower face which receives the upper edge of the partition **100** so as to seal off the spaces between the bases in which the two contact systems are mounted. The relay base also has two large holes in which the upper edges of the projections **103** are received.

The contact springs **60** are of inverted U shape having legs **126** which are fixed to the arms **76** of the brackets **74**. The arms **76** are shown as provided with holes **128** which receive outwardly bent lugs **130** on the lower ends of the spring legs **126**. The arms **76** also have tongues **132** (FIGS. 6, 9 and 10) bent inwardly near their upper ends and the spring legs **126** have tongues **134** (FIG. 6) bent outwardly so as to slide behind the tongues **132**. The springs are thus held firmly by slipping the tongues **134** into position and the lugs **130** into the holes **128**. The long outer legs **136** of the contact springs have fixed to their ends the movable contacts **58**.

In devices of the lower ratings where current values are not too great, the mounting of the contact springs by means of the lugs and tongues described, forms a low resistance connection so that no other fastening means between the springs and the arms **76** of the brackets is required. This is advantageous because the assembly is very quickly effected without the use of any special tools and also the contact springs may be readily detached from the brackets for adjustment or replacement. Where high currents are involved, it may be desirable to weld or solder the springs to the brackets. In this case, the lug and tongue connections described facilitate the welding and soldering by holding the springs in proper position during such operations.

The base section comprising the pin base, relay base, pins carried thereby which also secure the base parts together, the fixed contact brackets and movable contact brackets and springs carried thereby, constitute a complete sub-assembly (FIG. 6) which may be put together by spinning over the ends of the pins as above described (and by welding the contact springs to their brackets, where this is needed).

While but one specific embodiment of this invention has been shown and described in detail, it will be understood that many variations may be made in the construction and that many features of the invention are capable of being used without others in different types of devices. It is desired, therefore, to cover the invention in whatever form its principles may be embodied.

I claim:

1. In an electro-magnetic switch device, a base of insulating material, a metal contact pin carried by said base having a shank passing through a hole in the base, a metal contact carrying bracket mounted on the base and said bracket having a substantially straight flat wall with a hole through which said pin shank extends, said pin shank being slightly larger in diameter than the hole of said straight flat wall and being forced through said hole without bending said wall so that the metal surrounding said shank is elastically stressed whereby good electrical contact without soldering is secured between said pin shank and said bracket which is maintained through a substantial temperature range.

2. In double pole electrical switch construction, superimposed first and second bases of insulating material and pairs of electrical contacts mounted between said bases, said first and second bases being formed to provide separate first and second compartments separated by portions of the insulated material of one of said bases, said first compartment receiving brackets for one set of switch poles which are disposed solely within said first compartment, said second compartment receiving brackets for the other set of switch poles, said first base separating said first and second compartments, whereby short circuiting between the respective switch assemblies is prevented.

3. In double pole electrical switch construction, superimposed first and second bases of insulating material and pairs of electrical contacts mounted between said bases, said first and second bases being formed to provide separate first and second compartments separated by portions of the insulated material of one of said bases, said first compartment receiving brackets for one set of switch poles which are disposed solely within said first compartment, said second compartment receiving brackets for the other set of switch poles, said first base separating said first and second compartments whereby short circuiting between the respective switch assemblies is prevented, and a metal contact pin for each bracket extending through said bases and through respective brackets and being electrically connected to respective ones of said brackets.

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BERNARD A. GILHEANY, *Primary Examiner.*