Nov. 7, 1950 G. H. COULTER 2,529,212

COMPACT RELAY AND SUPPORTING MEANS THEREFOR

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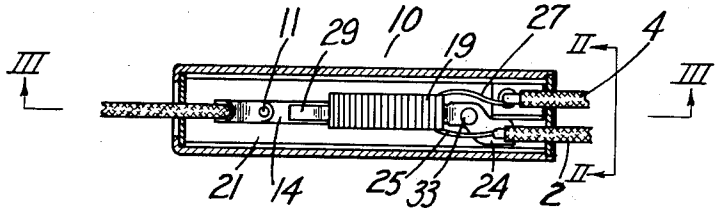

Fig I

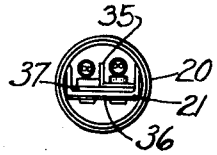

Fig II

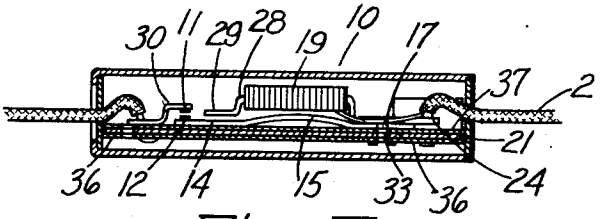

Fig III

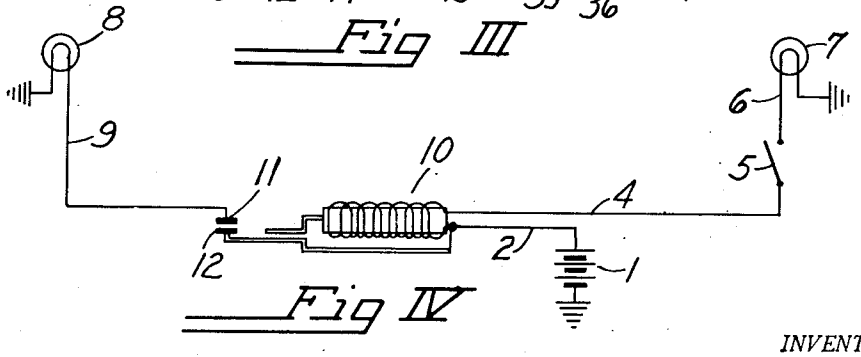

Fig IV

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COMPACT RELAY AND SUPPORTING MEANS THEREFOR

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9 Claims. (Cl. 200—87)

1

The invention embraces the provision of an electro magnetic means of very compact size and of simple construction adapted to control devices which indicate the effectiveness of a circuit of which the means forms a part. The invention comprehends the provision of electro-magnetic switching means so constructed as to occupy a minimum space and which is adapated to be incorporated in a wiring harness on an automobile for example, without the necessity of providing additional supporting means therefor.

Another object of the invention is the provision of an electro-magnetic switching device for controlling a tell-tale means, the device forming a unitary structure housing all the operating parts and being so arranged as to be readily inserted or applied to an established circuit or wiring harness without the necessity of making material changes.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred, in which:

Figure I is a top plan view with the housing in section;

Figure II is a cross sectional view of Figure I and showing one form of electro-responsive switching means;

Figure III is a side elevational view of the device illustrated in Figure I with the housing shown in section;

Figure IV is a diagram of one type of installation of my device.

The drawings illustrate the principles of the invention and their application to a signalling system for vehicles wherein the relay is carried by the electrical wiring itself, but it is to be understood that the invention is not limited to the particular form or systems shown, but that the same or the component features are susceptible of many variations. Thus, in Figure IV, I show battery 1 as a source of electric energy, a battery lead 2 extending to the relay indicated at 10. From the relay 10, a signal light lead 4 connects with manual switch 5, lead 6, to a lamp 7, both lamp and battery being grounded as indicated. One use of my relay is to illuminate a pilot light 8 if lamp 7 is operating properly and hence pilot lamp 8 is also connected by lead 9 to relay 10 as shown.

2

Referring now to Figures I and III, the relay 10 has a stationary contact 11 which is adapted to be engaged by a movable contact 12 carried by the pivoted armature 14, and these contacts are normally retained out of engagement by a spring 15. The armature 14 is connected by the conductor 17 to the battery lead 2 for establishing a secondary circuit between the battery and the tell-tale lamp 8 when the contacts 11 and 12 are in engagement due to the energization of winding 19 of the relay 10.

The electro-responsive switching means or relay 10 of the invention is of very compact size, of great simplicity and so constructed that the same can be readily incorporated at any point of the main working circuit, the condition of which is to be indicated by any tell-tale means, without the necessity of providing separate supporting means thereof. One form of construction embodying these features is shown in Figures I and II, and the same includes a circular outside tube or casing 20 having a substantially rectangular brass channel plate 21 for carrying the coil 19 and parts of the relay. Battery lead 2 is connected with an offset arm 24 supported on the base of channel 21, lead 2 being connected with the coil 19 of the relay by connecting lead 25. The other end of coil 19 is connected by lead 27 to main lamp circuit lead 4, switch 5 to lamp 7.

The relay coil 19 has a central core piece 28, with an L-shaped end 29 adapted to attract armature 14 against the action of spring 15. It will be noted that the coil 19 is very compactly wound.

The pilot light 8 is connected by lead 9 to stationary contact 11 by an offset struck up terminal piece 30.

This terminal 30 is insulatingly supported by the channel shaped base member 21.

The movable contact 12 carried by arm 14 and spring 15, as stated above, extends longitudinally along the bottom of the channel 21 and it is secured at 33 to the channel base, the member 14 being centrally located thereof as shown in Figure I, and the terminal 33 is connected by the offset arm 24 of conductive material to be connected to the battery input lead 2. In order to insulate satuisfactorily between the input lead 2 and the lamp lead 4 I provide an insulating wall 35 between these two terminals as shown.

In order to adequately anchor the several parts to the bottom of the channel 21 as indicated above, and at the same time insulate the same from the walls or channels of the member 21 as well as from the tube or housing 20, I provide a pair of insulating strips 36 and 37, one on the bottom side of the channel 21 and the other on

the top side thereof as shown in Figures II and III. It will be understood that the openings in the base of the channel 21 for receiving any anchoring rivets should be made larger than the rivets whereas the opening through these two insulating pieces 36 and 37 will more securely fit the rivets in this way insuring good insulation between the pivots and the base of the channel 21.

This is a divisional continuous application of my application for Signalling Systems, Serial No. 452,521, filed July 27, 1942, now Patent 2,453,702, Nov. 16, 1948.

It is apparent that within the scope of the invention, modifications and different arrangements may be made other than is here disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What I claim is:

1. A compact relay including a hollow tubular housing closed at each end by circular discs of insulating material; a channel-shaped shallow frame snugly fitting said housing forming a reinforced assembly; a magnetizable core carried by said frame; a relay winding around said core and adapted to be connected to a wire from a source of power, the other end of said winding adapted to be connected to an outlet lead; a movable make and break contact adapted to engage a stationary contact insulatingly mounted on said frame and an armature supporting said movable contact carried by said frame insulated therefrom, said movable contact adapted to be connected with said wire from said source of power and said stationary contact adapted to be connected with a second outlet lead; a plurality of openings in one and a single opening in the other of the discs closing the ends of said housing, one for each of said leads whereby, said leads may provide the sole support for said housing.

2. In a relay and supporting construction therefor, a tubular housing; a channel shaped frame the base of said channel contacting substantially diametrically opposite lines on the inside of said tubular housing, the opposite sides of said channel contacting the inside of said housing along substantially parallel lines with the line of contact between said base and said housing to form a reinforced assembly; an insulating strip on the bottom inside of said channel member and another insulating strip on the outside thereof; said frame and strips located within said housing; an inlet wire form a source of energy; a main outlet wire; a pair of terminals for said inlet and outlet wires, said terminals located at one end of said frame and insulated therefrom by said inside and outside strips; a relay magnet including a core and a winding supported within said frame on said inside insulating strip, the ends of said winding connected with said inlet and outlet terminals; an outlet wire for a second circuit; a third terminal at the opposite end of said frame from said first mentioned terminals, said third terminal insulated from said frame by said insulating strips and connected with said second circuit outlet wire; a stationary contact carried by said last mentioned terminal; and a movable contact adapted to engage said stationary contact mounted on an armature operated by said magnet and carried by said frame between said winding and the inside insulating strip, one end of said movable contact being electrically connected with the inlet terminal at the other end of said frame.

3. In a relay and supporting construction therefor the combination of a tubular housing; a channel shaped frame; an insulating strip on the bottom inside of said channel member and another strip on the outside thereof; said frame and strip located within said housing with the opposite sides of said channel in tight engagement with the inside walls of said housing to form a reinforced assembly; an inlet wire from a source of energy; a main outlet wire; a pair of terminals for said inlet and outlet wires, said terminals located at one end of said frame and insulated therefrom by said inside and outside strips; a relay magnet including a core and a winding supported within said frame on said inside insulating strip, the ends of said winding connected with said inlet and outlet terminals; an outlet wire for a second circuit; a third terminal at the opposite end of said frame from said last mentioned terminals, said third terminal insulated from said frame by said insulating strips and connected with said second circuit outlet wire; a stationary contact carried by said last mentioned terminal and a movable contact mounted for engagement with the stationary contact on an armature operated by said magnet and carried by said frame between said winding and the inside insulating strip, one end of said movable contact being electrically connected with the inlet terminal at the other end of said frame, insulating discs closing the opposite ends of said tubular housing, one of said discs having a pair of openings therein for receiving said two first mentioned wires and the other end disc having a single opening therein for receiving the third circuit wire.

4. In a compact relay and supporting construction therefore, the combination of a tubular housing; an insulating base strip; a channel shaped metal frame above said strip and having an insulating strip on the inside thereof; said frame and base strip closely fitting within said housing forming a reinforced fully enclosed assembly; an inlet wire from a source of energy and a main outlet wire located at one end of said tubular member; a pair of terminals for said inlet and outlet wires, said terminals carried by and located at one end of said frame and insulated therefrom by said inside and outside strips; the lower side of said terminals riveted to the under side insulating strip; a relay magnet including a core and a winding supported within said frame on said inside insulating strip, the ends of said winding connected with said inlet and outlet terminals; and outlet wire at the other end of said tubular member for a second circuit; a third terminal at that end of said frame insulated from said frame by said insulating strips and connected with said second circuit outlet wire; a movable make and break contact carried by an armature operated by said magnet for engagement with a stationary contact carried by said frame between said winding and the inside insulating strip, one end of said movable contact being electrically connected with the inlet terminal at the other end of said frame and two circular insulating discs for closing the opposite ends of said tubular housing, one of said discs having a pair of centrally located openings for receiving said first mentioned inlet and outlet wires and the other disc having a central opening for receiving said other outlet wire.

5. In a device of the character described, a

compact enclosed relay and supporting terminal construction, including, in combination, a channel-shaped elongated frame member, a pair of terminals at one end of said member and a single terminal at the other end; a pair of lead in wires connected with said pair of terminals at one end and a single lead in wire connected to said terminal at the other end of said frame; said frame forming a continuous support between the lead in wires at one end of the frame and the lead in wire at the other end thereof, an insulating strip in the base of said channel-shaped frame, said terminals being insulated from said frame by said insulating strip; a relay magnet including an elongated longitudinally extending core and a winding supported by said frame on said insulating strip, the ends of said relay winding connected with said inlet and outlet terminals; a movable make and break contact operated by said magnet for engagement with a stationary contact carried adjacent one end of said frame, said movable contact carried by an armature located between said winding and the insulating strip, one end of said movable contact being electrically connected with the inlet terminal at the other end of said frame; a tube forming a tubular housing for said unit surrounding said frame in tight engagement with the side walls of said channel forming a reinforced enclosing assembly; and two circular insulating discs for closing the opposite ends of said tubular housing, one of said discs having a pair of openings for receiving said first mentioned inlet and outlet wires and the other disc having a central opening for receiving said other outlet wire.

6. In a compact relay and supporting construction therefor, the combination of an elongated channel frame member; an insulating strip carried therein, a relay coil carrying member supported on said insulating strip and spaced thereby from said frame; an inlet wire from a source of energy and a main outlet wire located at one end of said frame; a pair of terminals for said inlet and outlet wires, said terminals carried by and located at one end of said frame and insulated therefrom by said insulating strip; a relay magnet including an elongated longitudinally located core and a winding supported on said frame on said insulating strip, the ends of said winding connected with said inlet and outlet terminals; an outlet wire at the other end of said frame member for a second circuit; a cooperating terminal at said end of said frame insulated from said frame by said insulating strip and connected with said second circuit outlet wire; a make and break movable contact operated by said magnet for engagement with a stationary contact carried by said frame above said insulating strip, said movable contact being electrically connected with the inlet terminal at the other end of said frame, a tubular housing surrounding said frame member and carried thereby, said housing being adapted to snugly fit said frame member forming a reinforced outer assembly to produce said supporting construction, and two circular insulating discs for closing the opposite ends of said tubular housing, one of said discs having a pair of openings for receiving said first mentioned inlet and outlet wires and the other disc having a central opening for receiving said other outlet wire.

7. In a compact relay and supporting construction therefor, the combination of an elongated frame member; an insulating strip carried thereon; a relay coil mechanism supported on said insulating strip and spaced thereby from said elongated frame member; an inlet wire from a source of energy and a main outlet wire located at one end of said frame; a pair of terminals for said inlet and outlet wires, said terminals carried by and located at one end of said frame and insulated therefrom by said insulating strip; said coil mechanism comprising, a movable elongated armature attached to said insulating strip; a coil-core with a base portion attached to said frame, said base portion provided with an upwardly turned section connected to a horizontal portion passing through said coil, and said horizontal portion formed with a downwardly turned end to constitute a magnetic pole for said movable armature when said relay coil is energized; an elongated winding surrounding said core, the ends of said winding connected with said inlet and outlet terminals; an outlet wire at the other end of said frame member for a second circuit; a cooperating terminal at said end of said frame insulated from said frame by said insulating strip and connected with said second circuit outlet wire; a make and break movable contact carried by said armature and being operated by said magnet for engagement with a stationary contact, said stationary contact carried by said frame, said movable contact being electrically connected with the inlet terminal at the other end of said frame, a tubular housing surrounding said frame member and carried thereby, said housing being adapted to tightly contact with said frame member forming a reinforced assembly to produce said supporting construction, and two circular insulating discs for closing the opposite ends of said tubular housing, one of said discs having a pair of openings for receiving said first mentioned inlet and outlet wires and the other disc having a central opening for receiving said other outlet wire.

8. In a compact relay and supporting construction therefor, the combination of an elongated frame member; an insulating strip carried thereon; a relay coil mechanism supported on said insulating strip and spaced thereby from said elongated frame member; an inlet wire from a source of energy and a main outlet wire located at one end of said frame; a pair of terminals for said inlet and outlet wires, said terminals carried by and located at one end of said frame and insulated therefrom by said insulating strip; said coil mechanism comprising, a movable elongated armature attached to said insulating strip; a coil-core having a base portion attached to said frame, said base portion having an upwardly turned section connected to a horizontal portion passing through said coil, and said horizontal portion formed with a downwardly turned end to constitute a magnetic pole for said movable armature when said relay coil is energized; an elongated winding surrounding said core and supported on said frame on said insulating strip, the ends of said winding connected with said inlet and outlet terminals; an outlet wire at the other end of said frame member for a second circuit; a cooperating terminal at said end of said frame insulated from said frame by said insulating strip and connected with said second circuit outlet wire; a make and break movable contact operated by said magnet for engagement with a stationary contact, said stationary contact carried by said frame, said movable contact being mounted on said movable elongated armature and connected thereby with

the inlet terminal at the other end of said frame, a tubular housing surrounding said frame member and carried thereby, said housing being in tight contact with said frame member forming a reinforced assembly to produce said supporting construction, and two circular insulating discs for closing the opposite ends of said tubular housing, one of said discs having a pair of centrally located openings for receiving said first mentioned inlet and outlet wires and the other disc having a central opening for receiving said other outlet wire.

9. In a compact relay and supporting construction therefor, the combination of an elongated frame member; an insulating strip carried thereon; a relay coil mechanism supported on said insulating strip and spaced thereby from said elongated frame member; an inlet wire from a source of energy and a main outlet wire located at one end of said frame; a pair of terminals for said inlet and outlet wires, said terminals carried by and located at one end of said frame and insulated therefrom by said insulating strip; said coil mechanism comprising, a movable elongated armature; a coil-core having its end portion attached to said frame, said end portion being connected to an upwardly turned section provided with a horizontal portion passing through said coil, and said horizontal portion formed with a downwardly turned end to constitute a magnetic pole for attracted said movable armature when said relay coil is energized; one end of said movable armature and said coil-core being supported above said insulating strip on said frame by a single insulated rivet passing through the bottom of said frame and said pieces, an elongated winding surrounding said core and supported on said frame on said insulating strip, the ends of said winding connected with said inlet and outlet terminals; an outlet wire at the other end of said frame member for a second circuit; a cooperating terminal at said end of said frame insulated from said frame by said

insulating strip and connected with said second circuit outlet wire; a movable make and break contact mounted on said armature and operated by said magnet for engagement with a stationary contact, said stationary contact carried by said frame, said movable contact being electrically connected with the inlet terminal at the other end of said frame, a tubular housing surrounding said frame member and carried thereby, said housing being in tight contact with said frame member forming a reinforced assembly to produce said supporting construction, and two circular insulating discs for closing the opposite ends of said tubular housing, one of said discs having a pair of centrally located openings for receiving said first mentioned inlet and outlet wires and the other disc having a central opening for receiving said other outlet wire.

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