P. L. MARDIS.

RELAY.

APPLICATION FILED JULY 6, 1917.

1,314,530. Patented Sept. 2, 1919.

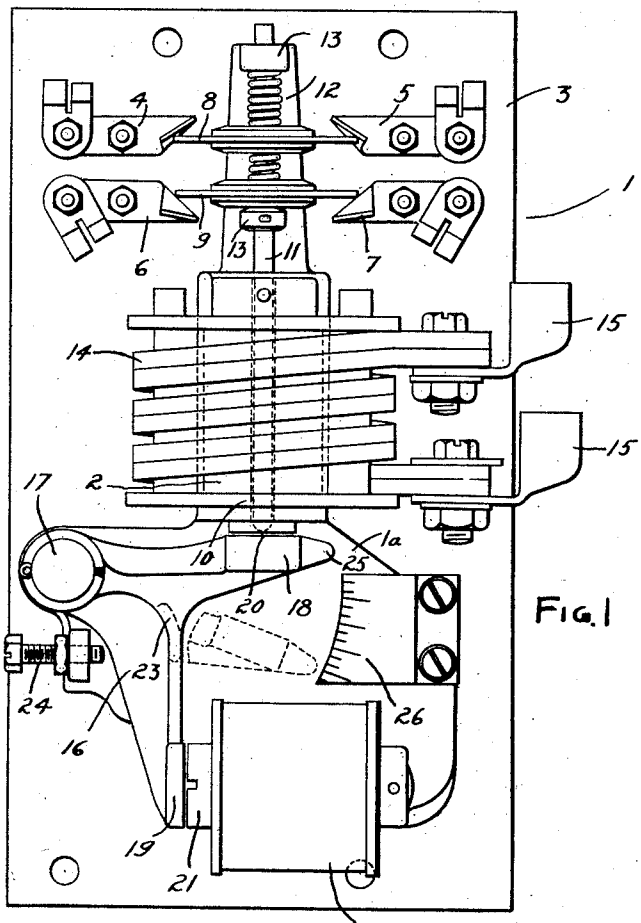


FIG. 1

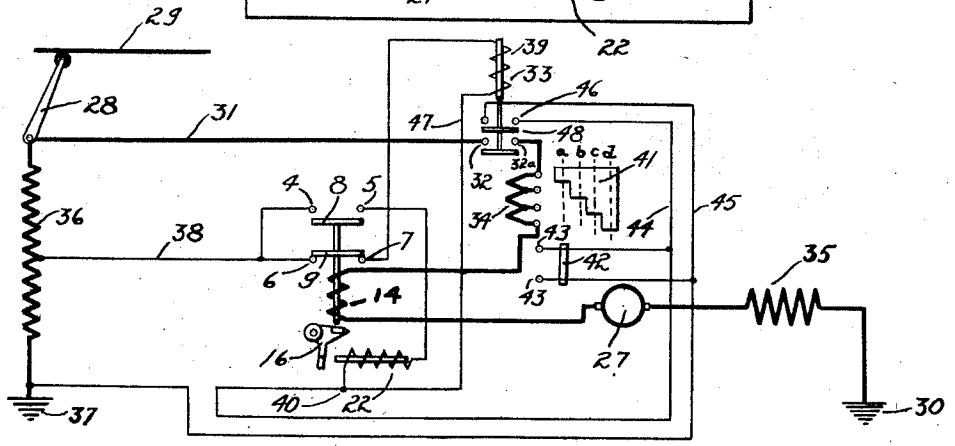


FIG. 2

WITNESSES:

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RELAY.

1,314,530. Specification of Letters Patent. Patented Sept. 2, 1919.

Application filed July 6, 1917. Serial No. 178,919.

To all whom it may concern:

Be it known that I, PAUL L. MARDIS, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Relays, of which the following is a specification.

My invention relates to electromagnetic devices and particularly to relays for protecting electric circuits.

One object of my invention is to provide a relay that shall have electromagnetic means for holding its armature in its actuated position.

Another object of my invention is to provide a relay of the above indicated character that shall be inexpensive to construct and efficient in its operation.

My copending patent application Serial No. 148,431, filed February 13, 1917, discloses a system of control for electric vehicles in which the overload tripping device is electromagnetically held in its tripping position in accordance with predetermined conditions in the circuit.

In my present invention, I provide an overload relay of the above indicated character that has a pivotally-mounted double armature one portion of which is adapted to actuate the contact members and the other portion of which is adapted to be electromagnetically held in its actuated position under predetermined conditions.

In the accompanying drawings, Figure 1 is a front elevational view of a relay embodying my invention, and Fig. 2 is a diagrammatic view of an electrical circuit embodying the relay shown in Fig. 1.

A relay 1 comprising a frame member 1^a, having a magnetizable core portion 2 thereon, is mounted on a supporting member or panel board 3. Stationary contact members 4, 5, 6 and 7 are mounted on the board 3 and are adapted to be engaged by bridging contact members 8 and 9. The core portion 2 of the frame 1^a has an opening 10 therethrough in which is loosely disposed a rod 11. The bridging contact members 8 and 9 are mounted on the rod 11, and a spring 12 is disposed between a projection 13 on the frame 1^a and the bridging member 8 for the purpose of normally holding the rod 11 in such position that a collar 13, which is mounted thereon, normally engages the core portion 2. A winding 14 is disposed around the core portion 2 and is provided with terminal members 15 for securing line conductors thereto.

An armature 16 is mounted on a pin 17 on the frame 1^a, and is provided with two arms 18 and 19 the arm 18 of which is adapted to engage the lower end 20 of the rod 11 when sufficient current traverses the winding 14 to move the armature 16 upwardly. The arm 19 is adapted to engage a stationary core member 21 when the armature is in its actuated position and to be held in this position by reason of the energization of a winding 22 that surrounds the core member 21. A projection 23 on the armature 16 is adapted to engage an adjustable screw member 24 for the purpose of initially setting the overload tripping value of the relay. The outer end 25 of the arm 18 is adapted to cooperate with a scale 26 that is also mounted on the frame 1^a for the purpose of indicating the overload setting of the relay.

The above described relay may be used to protect an electric-vehicle motor 27 that is operatively connected, through a current collecting device 28, to a trolley conductor 29. A conductor 31 is connected to the collecting device 28 and to one terminal 32 of a line switch 33, the other terminal 32^a of which is connected, through a series of resistors 34, to one terminal of the winding 14. The other terminal of the winding 14 is connected to one terminal of the armature of the motor 27. The other terminal of the armature of the motor 27 is connected through its series field winding 35 to a ground conductor 30. A resistor 36 is connected between the collecting device 28 and a ground conductor 37. A conductor 38 is connected from an intermediate point of the resistor 26 to the stationary contact members 4 and 6 of the overload relay 1. The stationary contact member 7 of the relay is connected to one terminal of the winding 39 of the line switch 33, the other terminal of which is connected to one terminal 40 of the holding winding 22. The other terminal of the winding 22 is connected to the stationary contact member 5 of the overload relay 1.

A controller 41 is adapted to control the connection of the resistors 34 in the circuit of the armature of the motor 27 and is provided with an interlock contact member 42 that is adapted to engage stationary contact members 43 when the same is in its initial

position "*a*." That is, the initial starting step of the controller causes the interlock contact member 42 to engage the contact members 43 which are connected to two conductors 44 and 45. The conductor 44 is connected to an auxiliary stationary contact member 46 of the line switch 33 and the conductor 45 is connected to an auxiliary stationary contact member 47 of the line switch 33. The conductor 44 is connected also to the terminal 40 of the winding 22 and the conductor 45 is connected also to the ground conductor 37. An auxiliary bridging contact member 48 is adapted to engage the auxiliary stationary contact members 46 and 47 when the line switch is in its closed position.

When the controller 41 is moved to its initial position "*a*" and the overload relay is in its normal position, a circuit is completed through the conductor 38, the bridging contact member 9, the winding 39 of the line switch 33, the conductor 44, the interlock contact members 42 and 43 and the conductor 45 to the ground conductor 37, thus causing the line switch 33 to be closed and the motor 27 to be started. The closing of the line switch causes the contact members 46, 47 and 48 to be engaged and thus maintain a complete circuit through the winding 39 when the controller is moved to its "*b*" position or some other position in which the interlock contact member 42 is disengaged from the stationary contact members 43. Under this condition, if an overload obtains on the motor 27, the armature 16 of the overload relay will be drawn upwardly, and the bridging contact member 9 will be disengaged from the stationary contact members 6 and 7, thereby open-circuiting the winding 39 and completing the circuit through the holding winding 22. Since the controller 41 is not in its position "*a*" when the winding 39 is deënergized, and, consequently, the interlock contact member 42 is not in engagement with the contact members 43, and, since the contact members 46, 47 and 48 are disengaged, the holding winding 22 will permit the armature 16 to be returned to its initial position and the overload relay to assume its normal position. Thus, the line switch 33 cannot be reclosed until the controller 41 is returned to its initial position "*a*."

I do not limit my invention to the particular application described nor to the particular structure illustrated, as it may be variously modified without departing from the spirit and scope of the invention, as set forth in the appended claims.

I claim as my invention:

1. A relay comprising a stationary magnetizable member having an opening therethrough, a winding therefor, a contact-carrying rod disposed in the opening, a pivoted double armature one portion of which is adapted to be attracted by the magnetizable member to actuate the rod, and an electromagnetic means for coöperating with the other portion of the armature for holding the rod in its actuated position under predetermined conditions.

2. A relay comprising a stationary magnetizable member having an opening therethrough, a winding therefor, a contact-carrying rod disposed in the opening, a pivotally mounted armature for actuating the rod, and electro-magnetic means for holding the armature in its actuated position by magnetic attraction.

3. A relay comprising a stationary magnetizable member having an opening therethrough, a winding therefor, a rod extending through the opening, contact members mounted on the rod, a pivotally mounted armature having two arms one of which is adapted to actuate the rod, and means for coöperating with the other arm to restrain the armature in its actuated position.

4. A relay comprising a stationary magnetizable member having an opening therethrough, a winding therefor, a rod extending through the opening, contact members mounted on the rod, a pivotally mounted armature having two arms one of which is adapted to actuate the rod, and an electromagnet for attracting the other arm of the armature.

5. A relay comprising a stationary magnetizable member having an opening therethrough, a winding therefor, a rod extending through the opening, contact members mounted on the rod, a pivotally mounted armature having two arms disposed substantially at right angles with respect to each other, one of which is adapted to actuate the rod, and electromagnetic means for coöperating with the other arm to restrain the armature in its actuated position.

6. An electromagnetic device comprising a stationary magnetizable frame having a core portion thereon with an opening therethrough, a winding for the core portion, a rod loosely disposed in the opening, contact members resiliently mounted on the rod, a pivotally mounted armature mounted on the frame for actuating the rod, and an electromagnet mounted beneath the core portion for coöperating with a portion of the armature to hold the same in its actuated position.

In testimony whereof, I have hereunto subscribed my name this 27th day of June 1917.

PAUL L. MARDIS.