Nov. 22, 1938. N. F. AGNEW ET AL 2,137,747

ELECTRICAL RELAY

Original Filed Sept. 16, 1935

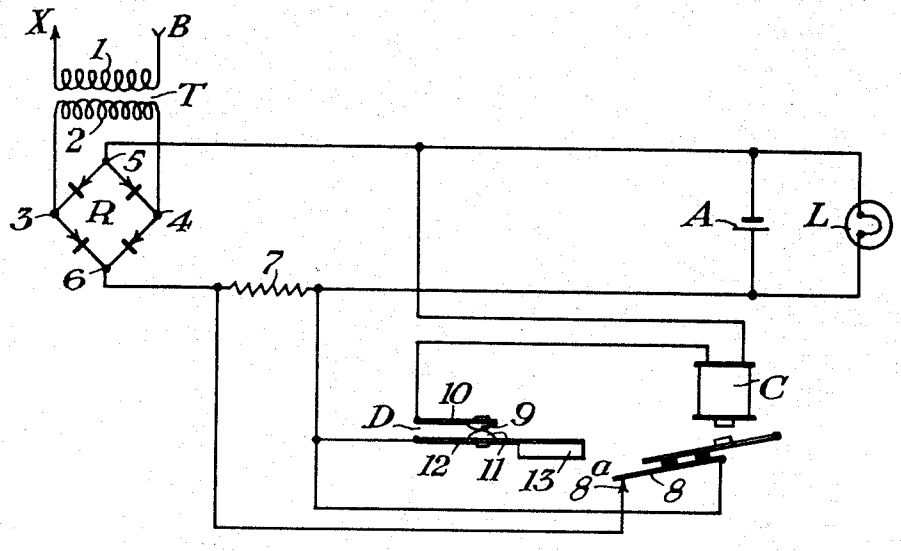


Fig. 1.

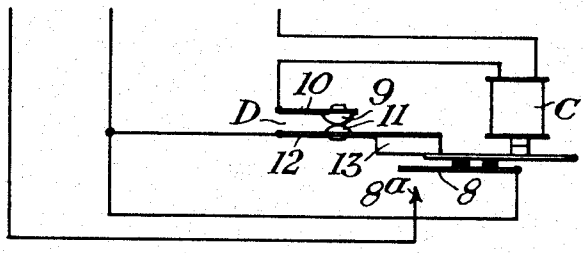


Fig. 2.

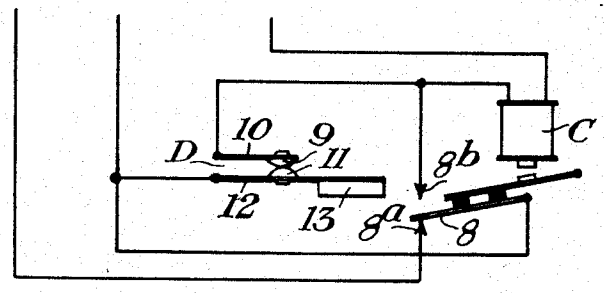


Fig. 3.

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ELECTRICAL RELAY

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Original application September 16, 1935, Serial No. 40,728. Divided and this application May 2, 1936, Serial No. 77,590

7 Claims. (Cl. 175—320)

Our invention relates to electrical relays, and particularly to electrical relays which are connected with a source of varying potential, and which are adapted to pick up when and only when the potential of the source increases to a predetermined value.

One object of our invention is to provide means for preventing relays of the type described from picking up at lower potentials than the predetermined pick-up potential due to the effect of shock or vibration.

The present application is a division of our copending application, Serial No. 40,728, filed on September 16, 1935, for Electrical relays.

We will describe three forms of relays embodying our invention, and will then point out the novel features thereof in claims.

In the accompanying drawing, Fig. 1 is a diagrammatic view showing our invention applied to a relay which controls the charging rate of a battery. Figs. 2 and 3 are detail views showing modifications of our invention.

Similar reference characters refer to similar parts in all three views.

Referring first to Fig. 1, the reference character T designates a transformer, the primary 1 of which is constantly connected with the terminals B and X of a suitable source of current not shown in the drawing, and the secondary 2 of which is connected with the input terminals 3 and 4 of a full wave rectifier R. The output terminals 5 and 6 of the rectifier R are connected, through a current limiting resistance 7, with a battery A which may supply current to any desired load, here shown for purposes of illustration as a lamp L. The resistance 7 is connected in multiple with a back contact 8—8ª of a relay C, and the parts are so proportioned that when the relay C is deenergized so that the resistance 7 is short circuited by the contact 8—8ª, the battery B will be charged at a relatively high rate, but that, when the relay C is energized so that the resistance 7 is not short circuited by the contact 8—8ª, the battery A will then be charged at a relatively low rate.

Relay C is intended to be connected with the terminals of battery A in such manner that the potential which is impressed on the relay winding will vary with the state of charge or discharge of the battery, and the relay is so designed that it will pick up its armature and open its back contact 8—8ª when the potential which is impressed across its winding is equal to the potential of the battery when the battery is fully charged. For example, if the potential of the battery A when the battery is fully charged is 2.3 volts, the relay C will be so designed that it will pick up its armature and open its back contact 8—8ª at 2.3 volts.

It will be readily understood that when relay C is connected across the terminals of battery A in the intended manner, if the relay is subjected to shocks, it may pick up at a somewhat lower potential than the fully charged potential of the battery. This is undesirable and in order to prevent this from happening, we provide means for decreasing the energization of this relay when the relay is subjected to shocks. As here shown, these means comprise a contact D which is connected in series with the relay winding between the terminals of the battery, and which is so designed that it will vibrate open in response to shocks. The contact D may have any preferred construction, but, as here illustrated, this contact comprises two cooperating contact members, one of which, 9, is secured to a fixed conducting member 10, and the other of which, 11, is secured to a cantilever type spring 12 of conducting material, intermediate the ends of the spring. The spring 12 is rigidly supported at one end and is provided at the other end with a weight 13. The parts are so proportioned that when the relay is not subjected to shocks, the tension of the spring will cause the contact member 11 to engage the contact member 9 and thus close the contact D, but that, any shocks which would be sufficient to cause the relay to pick up at a potential below the calibrated pick-up potential will cause the contact spring 12 to vibrate and thus intermittently open contact D. It will be apparent that when the contact D is opened, relay C will be disconnected from the battery A, and it follows that the relay cannot pick up due to shock unless the battery is fully charged, in which event the relay will pick up in the usual manner even though the contact D is at times vibrated open.

Under some conditions it is desirable to insure that contact D will not cause the relay to become released after it is once picked up. This result may be accomplished by so locating the contact D that when the relay is picked up, the armature, or a member secured thereto, will mechanically engage the weight 13 in a manner to prevent the contact from opening, as shown in Fig. 2. This result may also be accomplished by providing the relay with a front contact 8—8ᵇ which, when the relay is picked up, provides a low resistance shunt around the contact D, as shown in Fig. 3.

If it is desired to prevent the contact D from arcing, a high resistance may be shunted around

this contact. When this is done, the opening of the contact will merely reduce the operating current a predetermined amount rather than completely cut off the supply of current to the relay.

It is preferable that the contact D should be built into the relay C and form a part thereof, but this contact may, if desired, be enclosed in a separate housing which is secured to, or located in the vicinity of the relay, in such manner that the contact will be subjected to the same shocks as it would be subjected to if it were built into the relay.

It should be particularly pointed out that while in illustrating our invention we have shown it applied to a relay which controls the charging rate of a battery, our invention is equally applicable to any relay which is adapted to be connected with a source of varying potential, and which is designed to pick up at a predetermined potential.

Although we have herein shown and described only three forms of apparatus embodying our invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of our invention.

Having thus described our invention, what we claim is:

1. The combination with a relay which is connected with a source of varying potential and which is designed to pick up at a predetermined potential, of a contact connected in series with the relay winding, said contact comprising a first contact member secured to a fixed support and a second contact member secured to a cantilever type spring which is rigidly supported at one end and which is provided at the other end with a weight, the parts being so proportioned that said second contact member is biased into engagement with said first contact member by said spring but that shocks will cause said second contact member to vibrate out of engagement with said first contact member, and means controlled by said relay for preventing said second contact member from vibrating out of engagement with said first contact member when said relay is picked up.

2. The combination with a relay which is connected with a source of varying potential and which is designed to pick up at a predetermined potential, of a contact which is designed to vibrate open in response to shocks and which is connected in series with the winding of the relay, and means controlled by said relay for rendering said contact ineffective to deenergize said relay when said relay is picked up.

3. The combination with a relay which is connected with a source of current and which is designed to pick up at a predetermined potential, of a contact which is connected in series with the winding of the relay and which is designed to vibrate open in response to shocks, and means controlled by said relay and effective when said relay is picked up for preventing said contact from opening.

4. The combination with a relay which is connected with a source of current and which is designed to pick up its armature at a predetermined potential, of a contact which is connected in series with the relay and which is designed to vibrate open in response to shocks, and a contact of the relay connected in multiple with said first mentioned contact when the armature of the relay is picked up.

5. In combination, a source of current, a contact which is designed to vibrate open in response to shocks, and a relay connected with said source over a contact which is closed when the armature of the relay is attracted and which is connected in multiple with said first mentioned contact.

6. In combination, a source of current, a relay, a contact which is designed to vibrate open in response to shocks but which is prevented from vibrating open by the relay armature when said relay is energized, and means including said contact for connecting said relay with said source.

7. The combination with a relay which is connected with a source of current and which is designed to pick up its armature at a predetermined potenial, of a contact which is connected in series with the winding of said relay and which is designed to vibrate open in response to shocks, and means controlled by the armature of said relay for rendering said contact ineffective to deenergize said relay when said armature occupies its picked up position.

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