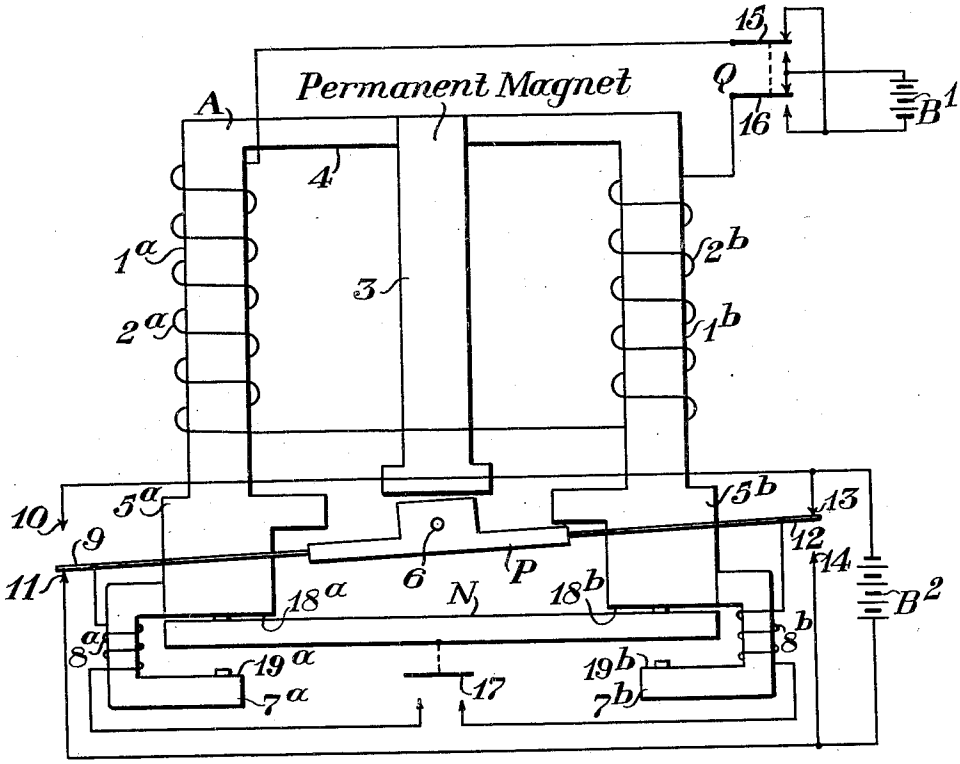
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ELECTRICAL RELAY

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ELECTRICAL RELAY

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My invention relates to electrical relays, and particularly to relays of the direct current polarized type. One feature of my invention is the provision, in a relay of this type, of means for preventing the neutral armature from closing unless the polarized armature responds to a reversal of the polarity of the current supplied to the operating winding of the relay.

I will describe one form of relay embodying my invention, and will then point out the novel features thereof in claims.

The accompanying drawing is a view, partly diagrammatic, showing one form of relay embodying my invention.

Referring to the drawing, the relay comprises a core A made up of three parallel legs 1^a, 1^b and 3 connected by a back strap 4. The middle leg 3 is a permanent magnet, but might of course equally well be a constantly energized electromagnet; the two outer legs and the back strap are ordinary magnetizable material. The outer legs 1^a and 1^b are provided with pole pieces 5^a and 5^b, respectively, and these pole pieces are provided with U-shaped extensions 7^a and 7^b, respectively.

The operating winding of the relay comprises two coils 2^a and 2^b on the two legs 1^a and 1^b, respectively, and this winding is included in circuit with a battery B^1 and a pole-changer Q made up of two contacts 15 and 16.

The relay is provided with a polarized armature P pivotally mounted at 6 immediately under the permanent magnet 3, and this armature cooperates with the two pole pieces 5^a and 5^b in such manner that the armature swings to one position or the other according as the operating winding of the relay is supplied with current of one polarity or the other.

The relay also comprises a neutral armature N, which cooperates with the pole pieces 5^a and 5^b, and with the extensions 7^a and 7^b on these pole pieces. Armature N is biased by gravity to such position that it rests against pole faces 19^a and 19^b on the extensions 7^a and 7^b, respectively, but it can be moved against the action of gravity into engagement with pole faces 18^a and 18^b on the under sides of pole pieces 5^a and 5^b, respectively.

The two pole piece extensions 7^a and 7^b are provided with coils 8^a and 8^b, which coils constitute an auxiliary or bucking winding, and the supply of current to this winding is controlled by contacts 9 and 12 operated by the polarized armature P. The auxiliary winding is supplied with current from a second battery B^2.

As shown in the drawing, pole-changer Q is in its normal position, so that current of what I will term "normal polarity" is being supplied to the operating winding, with the result that the polarized armature P is in its normal position and the neutral armature N is closed against pole faces 18^a and 18^b. The circuit for the bucking winding 8 is therefore opened at contact 17 operated by the neutral armature N. I will now assume that pole-changer Q is reversed, thereby reversing the polarity of the current supplied to the operating winding 2^a, 2^b. This will result in the release of the neutral armature N, so that this armature will drop into engagement with the auxiliary pole faces 19^a and 19^b. The polarized armature P will swing in clockwise direction into its reverse position. The bucking winding will then become energized through a circuit which passes from the upper terminal of battery B^2, through contact 10—9, coil 8^a, contact 17, coil 8^b, and contact 12—14 to the lower terminal of battery B^2. The current thus supplied to the coils 8^a and 8^b will be of such polarity that each coil will buck or oppose the flux from the main winding 2^a, 2^b which tends to pass through the associated pole piece extension 7^a or 7^b, so that the neutral armature N will again become closed against pole faces 18^a and 18^b.

When the pole-changer Q is restored to its normal position, the operating winding 2^a, 2^b will again receive current of normal polarity, so that the neutral armature N will again release and the polarized armature P will swing back to its normal position. The bucking winding will then receive current of the opposite polarity, the circuit being from the

upper terminal of battery B^2, through contact 13—12, coil 8^b, contact 17, coil 8^a and contact 9—11, to the lower terminal of battery B^2. This current will again be of such polarity as to buck the flux due to the operating winding 2^a, 2^b which tends to flow through the pole piece extensions 7^a and 7^b, with the result that the neutral armature N will again be attracted to the pole pieces 5^a and 5^b.

I will now assume that with the parts in the positions shown in the drawing, polechanger Q is reversed, but that the polarized armature P does not reverse in response to the reversal of polarity of the current in the operating winding 2^a, 2^b. The current in the bucking winding 8^a, 8^b will then be of normal polarity, whereas the current in the operating winding 2^a, 2^b will be of reverse polarity, and the effect of the bucking coils will be to assist the flux in the pole piece extensions 7^a, 7^b due to the current in the operating winding 2^a, 2^b, so that the neutral armature N will be held magnetically in its open or released position against the auxiliary pole faces 19^a and 19^b. The same result will follow the failure of the polarized armature P to move to is normal position in response to change of polarity of the current in the operating winding 2^a, 2^b from reverse to normal.

It will be seen from the foregoing, that in a relay embodying my invention, the failure of the polarized armature to respond to a change of polarity in the operating winding will result in a failure of the neutral armature to close, and, consequently, the neutral armature serves as a check on the correct operation of the polarized armature.

Although I have herein shown and described only one form of relay embodying my 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 my invention.

Having thus described my invention, what I claim is:

1. A relay comprising an operating winding, a polarized armature responsive to the polarity of the current in said operating winding, a neutral armature responsive to the presence and absence of current in said winding, and means for presenting said neutral armature from closing unless said polarized armature occupies the position corresponding to the polarity of the current being supplied to said winding.

2. A relay comprising a core provided with pole pieces, an operating winding on said core, a polarized armature cooperating with said pole pieces and responsive to the polarity of the current in said winding, a neutral armature the upper surface of which coacts with the ends of said pole pieces, an extension on each pole piece coacting with the underside of said neutral armature, a bucking winding on each extension, and means controlled by said polarized armature for supplying current of normal or reverse polarity to said bucking windings according as the polarized armature is in normal or reverse position, the parts being so arranged that unless the polarized armature occupies the position corresponding to the polarity of the current being supplied to the operating winding said bucking windings assist the operating winding in holding the neutral armature against the pole piece extensions but that when the polarized armature occupies the position corresponding to the polarity of the current being supplied to the operating winding the bucking windings oppose the flow of flux through said extensions so that the neutral armature will be closed against the pole pieces.

3. A relay comprising a core provided with pole pieces, an operating winding on said core, a polarized armature cooperating with said pole pieces and responsive to the polarity of the current supplied to said winding, an extension on each pole piece forming an auxiliary pole face confronting the face of the pole piece, a neutral armature biased to engage said auxiliary pole faces but movable toward the faces of said pole pieces, a bucking winding on each said extension, and means controlled by said polarized armature for supplying current of normal or reverse polarity to said bucking windings according as the polarized armature is in normal or reverse position, the parts being so arranged that unless the polarized armature occupies the position corresponding to the polarity of the current being supplied to the operating winding, said bucking windings assist the operating winding in holding the neutral armature against the pole piece extensions but that when the polarized armature occupies the position corresponding to the polarity of the current being supplied to the operating winding the bucking windings oppose the flow of flux through said extensions so that the neutral armature will be closed against the pole pieces.

4. A relay comprising a core provided with pole pieces, an operating winding on said core, a polarized armature cooperating with said pole pieces and responsive to the polarity of the current supplied to said winding, an extension on each pole piece forming an auxiliary pole face confronting the face of the pole piece, a neutral armature biased to engage said auxiliary pole faces but movable toward the faces of said pole pieces, a bucking winding on each said extension, means controlled by said polarized armature for supplying current of normal or reverse polarity to said bucking windings according as the polarized armature is in normal or reverse position, and means for opening the

circuit for said bucking windings when said neutral armature is closed against said pole pieces, the parts being so arranged that unless the polarized armature occupies the position corresponding to the polarity of the current being supplied to the operating winding, said bucking windings assist the operating winding in holding the neutral armature against the pole piece extensions but that when the polarized armature occupies the position corresponding to the polarity of the current being supplied to the operating winding the bucking windings oppose the flow of flux through said extensions so that the neutral armature will be closed against the pole pieces.

In testimony whereof I affix my signature.

BRANKO LAZICH.