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ELECTRICAL RELAY
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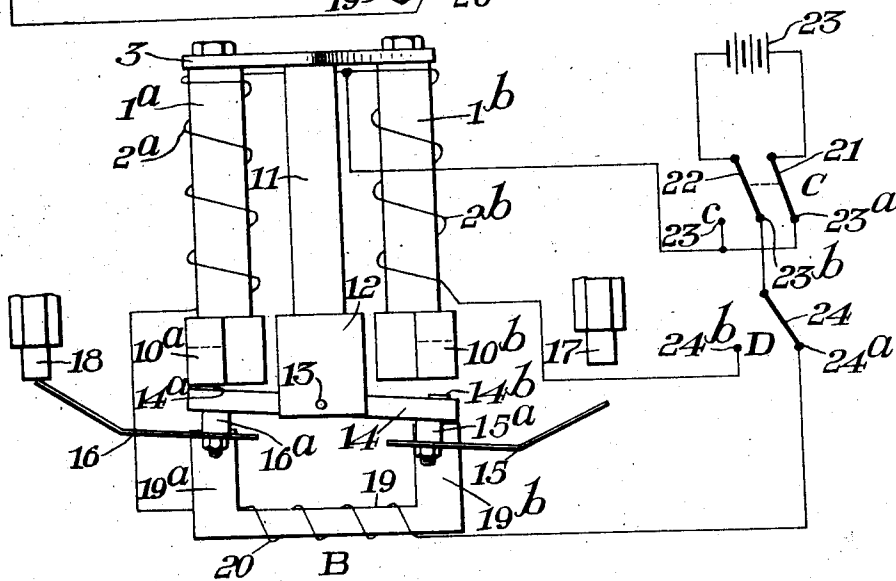
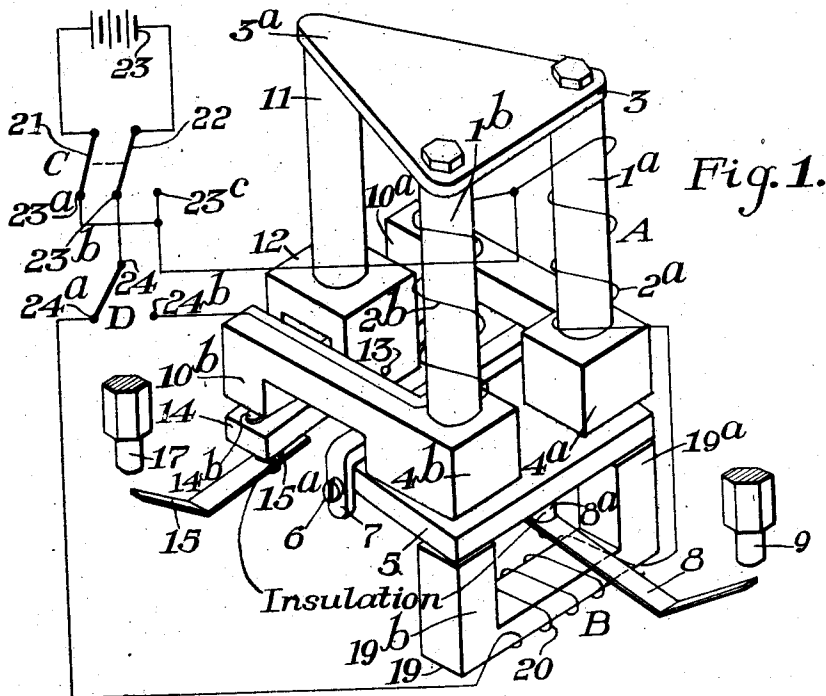


Fig. 2.

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ELECTRICAL RELAY

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My invention relates to electrical relays, and particularly to polarized relays of the type comprising a neutral armature responsive to the presence and absence of operating current, and a polarized armature responsive to the polarity of the operating current.

One object of my invention is the provision, in relays of the type described, of an auxiliary electromagnet for at times preventing the neutral armature from closing when the relay is energized without interfering with the normal operation of the polarized armature.

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

In the accompanying drawings, Fig. 1 is a view, partly isometric and partly diagrammatic, showing one form of relay embodying my invention. Fig. 2 is a back view of the relay shown in Fig. 1.

Similar reference characters refer to similar parts in both views.

Referring to the drawings, the relay comprises a main electromagnet A of the usual type having two parallel cores 1^a and 1^b connected together at their upper ends by a back strap 3 and provided at their lower ends with enlarged pole pieces 4^a and 4^b, respectively. The core 1^a carries the usual operating winding 2^a and the core 1^b carries a similar operating winding 2^b. A non-magnetizable bracket 7 is fastened to the sides of the pole pieces 4^a and 4^b, and this bracket carries two pivot screws 6, only one of which is shown, on which a main tractive armature 5 is pivotally supported for swinging motion toward or away from the pole pieces 4^a and 4^b. Attached to the underside of the armature 5, by means of an insulating stud 8^a, is a contact finger 8 which coacts with a fixed contact 9 in the usual and well known manner.

Associated with the electromagnet A is a constantly magnetized core 11 here shown as a permanent magnet, the upper end of

which engages the underside of an extension 3^a of the back strap 3, and the lower end of which is provided with a bifurcated pole piece 12. Pivoted at 13, between the bifurcations of the pole piece 12, is a polarized armature 14, as best seen in Fig. 2. The pole pieces 4^a and 4^b of the electromagnet A are provided with integral extensions 10^a and 10^b, respectively, the pole faces of which overlie the opposite ends of the armature 14, and it will be apparent that the armature 14 will swing toward one or the other of these extensions depending upon the polarity of the current supplied to the windings 2^a and 2^b. Stops 14^a and 14^b are attached to the armature 14 to prevent the armature from actually engaging these extensions. When the polarized armature is swung toward the extension 10^a, a contact finger 16, fastened to the armature by means of an insulating stud 16^a, engages a fixed contact 18 as best seen in Fig. 2. When the polarized armature 14 is swung toward the extension 10^b, however, the contact finger 16 moves out of engagement with the fixed contact 18, and a similar contact finger 15, attached to the armature by means of an insulating stud 15^a, engages a fixed contact 17.

Also associated with the main electromagnet A is an auxiliary electromagnet B comprising a magnetizable core 19 provided with an operating winding 20 and having two upwardly extending poles 19^a and 19^b. The electromagnet B is located directly beneath the armature 5 near its outer edge in such a position that, if winding 20 is energized, the flux set up in core 19 will thread armature 5 and hold armature 5 away from the pole pieces 4^a and 4^b as will be presently made clear.

Current from a suitable source such as a battery 23 is at times supplied to the winding 2^b of electromagnet A and at other times to winding 2^a of electromagnet A and winding 20 of electromagnet B connected in series.

The supply of current to the relay windings may be controlled in any suitable manner. As here shown, it is controlled by a manually operable pole changer C and by a manually operable switch D.

Without tracing the circuits in detail, it will be seen from the drawing that when contact 24—24^a of switch D is closed, winding 2^a of electromagnet A and winding 20 of electromagnet B are supplied in series with current of one polarity when contact members 21 and 22 of pole changer C are in engagement with contact buttons 23^a and 23^b, respectively, as illustrated in the drawing, and with current of the opposite polarity when these contact members engage contact buttons 23^b and 23^c, respectively. When current of one polarity is supplied to windings 2^a and 20, polarized armature 14 is swung toward extension 10^a of pole piece 4^a as illustrated in Fig. 2 and contact 16—18 is closed. When current of the other polarity is supplied to windings 2^a and 20, however, polarized armature 14 is swung toward extension 10^b of pole piece 4^b, thereby closing contact 15—17. The parts of electromagnets A and B are so proportioned that under either of the above conditions, the magnetic pull exerted on armature 5 by the flux from electromagnet B is greater than the magnetic pull exerted on armature 5 by the flux from electromagnet A so that armature 5 is held in the position illustrated in Fig. 1, and contact 8—9 is held open.

It will also be apparent from the drawing without tracing the circuits in detail that when contact 24—24^b of switch D is closed, current of one polarity or the other is supplied to winding 2^b of electromagnet A depending upon the position of pole changer C. Under these conditions, polarized armature 14 swings toward extension 10^a of pole piece 4^a or extension 10^b of pole piece 4^b depending upon the relative polarity of the current supplied to winding 2^b, and armature 5 closes regardless of the polarity of the current supplied to winding 2^b.

It will thus be seen that I have provided a polarized relay in which both the polarized and main armatures may be operated in the usual manner, or in which only the polarized armature may be operated.

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 appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination, a main electromagnet and an auxiliary electromagnet, means for at times supplying current of one polarity or the other to both said electromagnets, means for at other times supplying current of one

polarity or the other to said main electromagnet only, a first armature controlled by said main electromagnet in accordance with the polarity of the current supplied thereto, and a second armature normally occupying one position and arranged to be operated to another position when said main electromagnet is energized provided said auxiliary electromagnet is de-energized.

2. In combination, a main electromagnet, a first armature controlled by said main electromagnet in accordance with the polarity of the current supplied thereto, a second armature biased to one position but arranged to be operated to another position when said main electromagnet is energized, an auxiliary electromagnet arranged when energized to hold said second armature in said one position irrespective of the condition of energization of said main electromagnet, means for at times supplying current of one polarity or the other to both said electromagnets, and means for at other times supplying current of one polarity or the other to said main electromagnet only.

3. In combination, a main electromagnet, a first armature controlled by said main electromagnet, a second armature biased to one position but arranged to be operated to another position when said main electromagnet is energized, an auxiliary electromagnet arranged when energized to hold said second armature in said one position irrespective of the condition of energization of said main electromagnet, means for at times supplying current to both said electromagnets, and means for at other times supplying current to said main electromagnet only.

4. In combination, a main electromagnet, a first armature controlled by said main electromagnet, a second armature biased to one position but arranged to be operated to another position when said main electromagnet is energized, an auxiliary electromagnet arranged when energized to hold said second armature in said one position irrespective of the condition of energization of said main electromagnet, means for at times supplying current to said auxiliary electromagnet and a portion of the winding of said main electromagnet, and means for at other times supplying current only to a portion of the winding of said main electromagnet.

5. In combination, a main electromagnet, a first armature controlled by said main electromagnet, a second armature biased to one position but arranged to be operated to another position when said main electromagnet is energized, an auxiliary electromagnet arranged when energized to hold said second armature in said one position irrespective of the condition of energization of said main electromagnet, means for at times supplying current to said auxiliary electromagnet and a portion of the winding of said main elec-

tromagnet, and means for at other times supplying current only to a different portion of the winding of said main electromagnet.

6. In combination, a main electromagnet having a first and a second winding, a first armature controlled by said main electromagnet, a second armature biased to a normal position but arranged to be moved away from said normal position when said main electromagnet is energized, an auxiliary electromagnet arranged when energized to hold said second armature in its normal position irrespective of the energization of said main electromagnet, means for at times supplying current only to said first winding, and means for at other times supplying current to both said second winding and said auxiliary electromagnet.

7. In combination, a main electromagnet having a first and a second winding, a first armature controlled by said main electromagnet in accordance with the polarity of the current supplied thereto, a second armature biased to a normal position but arranged to be moved away from said normal position when said main electromagnet is energized, an auxiliary electromagnet arranged when energized to hold said second armature in its normal position irrespective of the energization of said main electromagnet, means for at times supplying said first winding with current of one polarity or the other, and means for at other times supplying current of one polarity or the other to said second winding and to said auxiliary electromagnet in series.

8. In combination, a main electromagnet having a first and second winding, an auxiliary electromagnet having a third winding, means for at times supplying current of one polarity or the other to said first winding and for at other times supplying current of one polarity or the other to said second and third windings connected in series, a polarized armature responsive to the polarity of the current supplied to either said first or said second winding, and a main armature controlled by both said electromagnets in such manner that said main armature is attracted by said main electromagnet when said first winding is supplied with current but that said main armature is held away from said main electromagnet when both said second and third windings are supplied with current.

9. In combination, a main electromagnet comprising two parallel cores connected together at one end by a back strap and each provided at the other end with a pole piece, a first winding on one core and a second winding on the other core, an auxiliary electromagnet comprising a magnetizable core provided with a third winding, means for at times supplying said first winding with current of one polarity or the other and for at

other times supplying said second and third windings in series with current of one polarity or the other, a polarized armature responsive to the polarity of the current supplied to said first or said second windings, and a main armature which is swung toward the pole pieces of said main electromagnet when said first winding is supplied with current but which is held away from the pole pieces of said main electromagnet by said auxiliary electromagnet when said second and third windings are supplied with current.

10. In combination, a main electromagnet comprising two parallel cores connected together at one end by a back strap and each provided at the other end with pole pieces having integral extensions, a first winding on one core of said main electromagnet and a second winding on the other core of said main electromagnet, an auxiliary electromagnet comprising a magnetizable core provided with a third winding and having two poles, means for at times supplying said first winding with current of one polarity or the other and for at other times supplying said second and third windings in series with current of one polarity or the other, a main armature pivoted to swing between the pole pieces of said main electromagnet and the poles of said auxiliary electromagnet and controlled by both said electromagnets in such manner that said main armature moves toward the pole pieces of said main electromagnet when said first winding is supplied with current but that said main armature is held away from said pole pieces by the poles of said auxiliary electromagnet when said second and third windings are supplied with current, a permanently magnetized core having one end engaging said back strap and having the free end located between the extensions of the pole pieces of said main electromagnet, and a polarized armature pivotally supported by the free end of said permanently magnetized core and arranged to swing toward one or the other of the extensions of the pole pieces of said main electromagnet depending upon the relative polarity of the current supplied to said first or said second winding.

11. In combination, a main electromagnet comprising two parallel cores connected together at one end by a back strap and each provided at the other end with an enlarged pole piece, a first winding on one core and a second winding on the other core, an auxiliary electromagnet comprising a magnetizable core provided with a third winding and having two poles, means for at times supplying said first winding with current of one polarity or the other and for at other times supplying said second and third windings in series with current of one polarity or the other, a polarized armature responsive to the

polarity of the current supplied to said first and second windings, and a main armature pivoted to swing between the poles of said auxiliary electromagnet and the pole pieces of said main electromagnet and controlled by both such electromagnets in such manner that said main armature moves toward the pole pieces of said main electromagnet when said first winding is supplied with current but that said main armature is held away from said pole pieces by the poles of said auxiliary electromagnet when said second and third windings are supplied with current.

In testimony whereof I affix my signature.

BRANKO LAZICH.