Dec. 13, 1932. P. N. MARTIN 1,890,525

ELECTRICAL RELAY

Filed Jan. 7, 1932

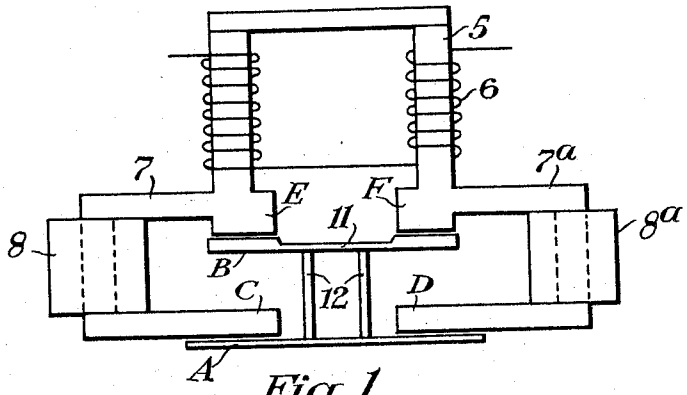


Fig. 1.

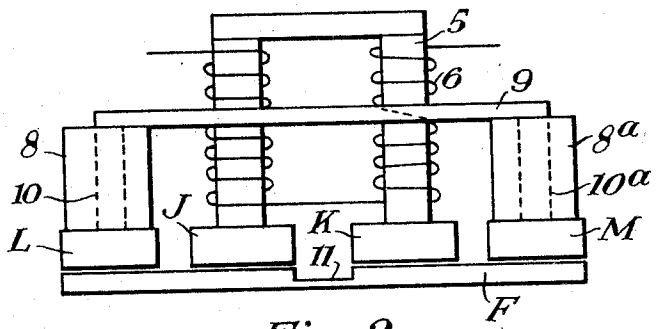


Fig. 2.

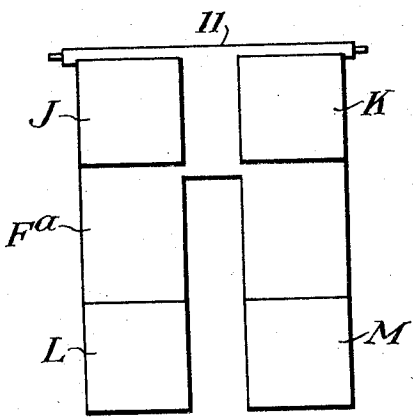


Fig. 3.

INVENTOR.
Paul N. Martin.

By A. R. Vennell

His ATTORNEY.

Patented Dec. 13, 1932

1,890,525

UNITED STATES PATENT OFFICE

PAUL N. MARTIN, OF SWISSVALE, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

ELECTRICAL RELAY

Application filed January 7, 1932. Serial No. 585,326.

My invention relates to electrical relays, and particularly to relays of the direct current polarized 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.

Relays of this type as ordinarily constructed, are characterized by the fact that the neutral armature opens momentarily when the polarity of the current supplied to the operating winding is reversed. One feature of my invention is the provision of novel and improved means for preventing the neutral armature from opening due to the reversal of the polarity of the current supplied to the operating winding.

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

In the accompanying drawing, Fig. 1 is a view, partly in side elevation and partly diagrammatic, showing one form of relay embodying my invention. Fig. 2 is a view similar to Fig. 1, but showing a modified form of relay embodying my invention. Fig. 3 is a bottom plan view showing a modification of a portion of the relay shown in Fig. 2 and also embodying my invention.

Similar reference characters refer to similar parts in each of the several views.

Referring first to Fig. 1, the relay in the form here shown comprises a U-shaped core 5 provided with the usual main pole pieces E and F and the usual operating winding 6. Co-acting with the pole pieces E and F is a main armature member B, this member being biased by gravity to drop away from the pole pieces, whereby it is attracted to the pole pieces when the winding 6 is energized.

The relay also comprises two auxiliary core members 7 and 7ª attached to the two pole pieces E and F respectively, and terminating in auxiliary pole pieces C and D, which coact with another armature member A. Members A and B are rigidly connected together by rods 12. The auxiliary core members 7 and 7ª are provided with bands or ferrules 8, 8ª respectively, of electro-conductive material, which bands serve to oppose and thereby delay any change of flux in the auxiliary members.

The armature member B is preferably provided with a portion 11 of restricted cross-sectional area, the area of this portion being such that it is saturated by magnetic flux when the winding 6 is energized, thereby forcing an appreciable amount of flux, due to current in the winding 6, through the auxiliary core members 7 and 7ª and the armature member A.

The operation of the relay shown in Fig. 1 is as follows: When the winding 6 is energized, armature member B is attracted to pole pieces E and F, while armature member A is attracted to pole pieces C and D. When the polarity of the current supplied to the winding 6 is reversed, the flux through armature member B will momentarily pass through zero, but at such time the flux through armature member A will still have an appreciable value, due to the bands or ferrules 8, 8ª, and so this armature member will hold the armature assembly in its attracted position until the flux in member B builds up to the value required to hold the armature assembly. When winding 6 becomes deenergized for an appreciable length of time, however, the flux flowing through both armature members will drop to zero and the armature as a whole will then be released.

It is understood that the relay will also be provided with a polarized armature responsive to the polarity of the current supplied to the operating winding 6, but this armature is omitted from the drawing because it is not essential to a clear understanding of my invention.

Referring now to Fig. 2, the relay shown in this view comprises a U-shaped core member 5 provided with pole pieces J and K and carrying the usual operating winding 6. The relay also comprises two auxiliary pole pieces L and M connected by an auxiliary U-shaped core made up of two legs 10, 10ª and a back strap 9. The armature, which is here designated F, co-acts with all four pole pieces L, J, K and M, and is provided with a portion 11 of reduced cross-sectional area between the

poles J and K. The legs 10 and 10ª are provided with bands or ferrules 8, 8ª respectively, for the purpose of delaying change of flux in the auxiliary magnetic path.

When the winding 6 is energized, part of the flux due to the current in this winding flows from pole piece J to pole piece K or vice versa through the armature F. The remainder of the flux flows in a path which passes from pole piece J through the left-hand portion of armature F, pole piece L, leg 10, back strap 9, leg 10ª, pole piece M and the right-hand portion of armature F to pole piece K. When the winding 6 becomes deenergized, the portion of the magnetic flux which flows directly through the armature between pole pieces J and K will pass through zero, but at this time the flux flowing through the auxiliary magnetic path will have an appreciable value, and will serve to keep the armature F in its attracted position until the flux in the main magnetic circuit builds up to an appreciable value.

The back strap 9 in Fig. 2 will, of course, be offset to pass around the winding 6 on the main core 5.

If desired, the pole pieces of the relay shown in Fig. 2 may be arranged in the manner shown in Fig. 3, in which case the armature, which is here designated Fª, will be U-shaped as shown in the drawing, the restricted portion 11 being disposed in that part of the armature which bridges pole pieces J and K.

The polarized armature is omitted from Figs. 2 and 3, for the reasons stated above in discussing Fig. 1.

Although I have herein shown and described only a few forms of relays 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 a core provided with the usual main pole pieces and operating winding, a main armature member co-acting in the usual way with said main pole pieces, two auxiliary core members attached to said two pole pieces respectively and terminating in auxiliary pole pieces, means for delaying the change of flux through each of said auxiliary core members, and an auxiliary armature member mechanically attached to said main armature member and co-acting with said auxiliary pole pieces.

2. A relay comprising a core provided with the usual main pole pieces and operating winding, a main armature member co-acting in the usual way with said main pole pieces, two auxiliary core members attached to said two pole pieces respectively and terminating in auxiliary pole pieces, means for delaying the change of flux through each of said auxiliary core members, and an auxiliary armature member mechanically attached to said main armature member and coacting with said auxiliary pole pieces, said main armature member having a portion of restricted section between said two main pole pieces to force flux through said auxiliary core members and said auxiliary armature member.

In testimony whereof I affix my signature.

PAUL N. MARTIN.