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K. H. FOX

2,438,745

ELECTROMAGNETIC APPARATUS

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Fig. 1

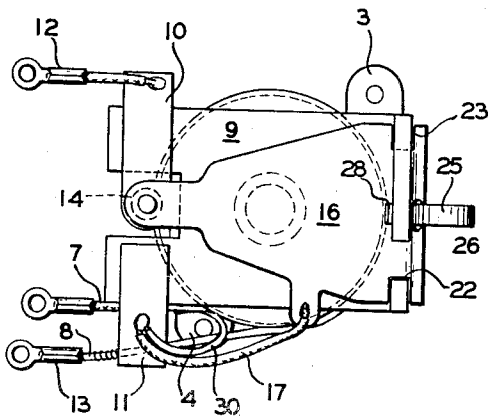


Fig. 3

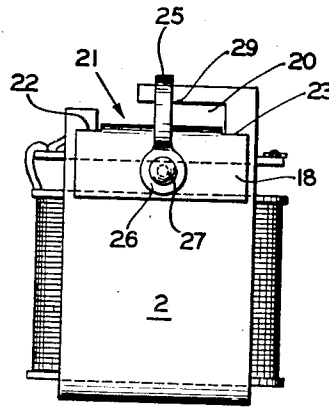


Fig. 2

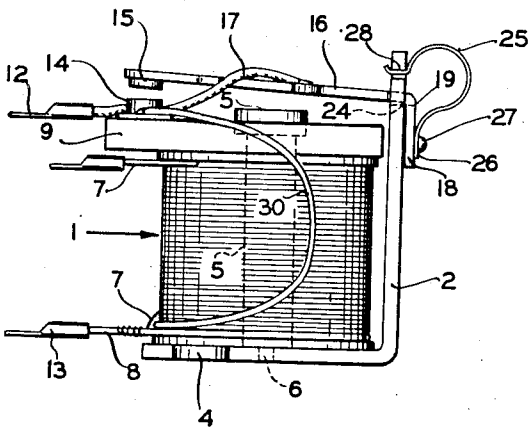
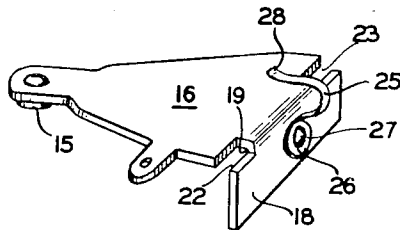


Fig. 4



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ELECTROMAGNETIC APPARATUS

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2 Claims. (Cl. 175-336)

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The present invention relates to an electromagnetic apparatus and more particularly to the mechanical construction of an armature for such an apparatus.

An object of the invention is to provide improvements in the mechanical construction and serviceability of electromagnetic apparatus.

Another object of the invention is to provide an armature construction which may be readily assembled and disassembled.

Another object of the invention is to provide a novel armature construction for an electromagnet having a novel looped spring adapted to bias the armature in a first sense in opposition to the magnetic force of an electromagnet and also serving to maintain the armature in assembled relation in an electromagnetic apparatus.

These improvements are of particular utility when applied to an electromagnet of the type adapted to alternately make and break one or more electrical circuits but it will be apparent from the following specification and the appended claims that the invention is not limited to such application as the improvements hereinafter recited are also capable of embodiment in any electromagnet of the character claimed.

Another object of the invention is to provide a compact electromagnetic apparatus of great efficiency and of such simplicity in construction as to adapt it for manufacture and installation at low cost.

Other objects of the invention will become apparent from inspection of the following specification when read with reference to the accompanying drawing wherein is illustrated the preferred embodiment of the invention. It is to be expressly understood, however, that the drawing is for the purpose of illustration only and is not designed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the accompanying drawing wherein the embodiment of the invention is illustrated and wherein like reference characters refer to like parts throughout the views:

Figure 1 is a top plan view of the device.

Figure 2 is a side elevational view of the device shown in Figure 1.

Figure 3 is a rear elevational view of the device shown in Figure 1 and

Figure 4 is a perspective view of the armature disassembled from the device of Figure 1.

In the drawing, an electromagnet 1 is shown mounted on and supported by an L-shaped bracket 2 formed of suitable ferro-magnetic ma-

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terial. The bracket 2 has lugs 3 and 4 whereby the electromagnetic device may be attached to a suitable mounting panel, not shown. The electromagnet 1 has a magnetic core 5 indicated in dotted lines in Figure 2 and attached at 6 to the L-shaped bracket 2.

The electromagnet 1 may be of the reverse current relay type, well known in the art and having a pair of coils 7 and 8 wound about the core 5. The winding 7 may be a voltage coil preferably wound of fine wire while the coil 8 may be a current coil wound of heavy wire. The two coils are preferably wound about the core 5 with one superimposed on the other as indicated in Figure 2.

Extending across the upper end of the electromagnet 1 is a block of insulating material 9 on which are mounted electrical conductors 10 and 11. The conductor 10 has a suitable electrical connector 12 fastened thereto, while ends of the coils 7 and 8 lead to a connector 13 as shown in Figures 1 and 2. Mounted on the conductor 10 is a contact 14 arranged so as to cooperate with a contact 15 mounted on a novel armature 16.

Armature 16 is connected to the conductor 11 by a flexible wire 17. The armature 16 has an end plate 18 which projects from the armature 16 at an obtuse angle, somewhat greater than 90 degrees, so as to form with the armature 16 a bearing surface at 19. The L-shaped bracket 2 has formed therein at the upper end a slot 20 open at 21 as shown in Figure 3 for receiving the armature 16.

The armature 16 has suitable slots 22 and 23 which are arranged to cooperate with slot 20 so that the armature 16 may be slipped into the slot 20 and the bearing surface 19 pivoted on an edge 24 which defines the lower edge of the slot 20.

There is further provided a looped U-shaped spring 25 having an end 26 fastened to the end plate 18 of the armature 16 by a rivet 27. An opposite end 28 of the spring 25 is arranged to be inserted through the slot 20 so as to bear on a surface 29. The latter surface 29 defines the upper edge of the slot 20, as shown in Figure 3.

The looped U-shaped leaf spring 25 is thus arranged so as to exert a force on the end plate 18 which tends to bias the armature member 16 in a clockwise direction about the pivot edge 24, as shown in Figure 2. The latter clockwise movement of the armature 16 is limited by the end plate 18 which is arranged so as to contact the L-shaped bracket 2 as shown.

The conductor 11 which is connected to the ar-

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mature 16 by the flexible wire 17 is also connected to one end of the coil 8 by a conductor 30. The switch contacts 14 and 15 are arranged so as to control energization of the current coil 8.

Upon energization of the voltage coil 7 sufficiently so that the magnetic force of the electromagnet 1 overcomes the aforementioned biasing force of the spring 25, the armature 16 will be drawn in a counter-clockwise direction so as to close contacts 14 and 15, and thereby close a circuit between conductor 10 and conductor 11 whereupon energization of the current coil 8 is effected.

During normal operation, as is well known in the art, the electromagnetic force created by the latter energization of the current coil 8 will tend to augment the magnetic force of the voltage coil 7 so that the contacts 14 and 15 will be held in a circuit closing position. However, upon a flow of current in a reverse direction to the normal condition, the energization of the current coil 8 will tend to counteract the magnetic force generated by the voltage coil 7 so that the armature 16 under the biasing force of the spring 25 will be moved to a contact open position. The contacts may be arranged so as to open and close a generator-battery charging circuit, while the coil 7 may be connected across the generator output lines as is well known in the art.

The novel feature of the invention resides in the armature arrangement. It will be seen that through the provision of the novel looped U-shaped leaf spring 25, the armature member 16 may be readily assembled and disassembled from the magnetic device by merely removing the end 28 from the slot 20 and then by an upward and lateral movement of the armature plate 16 as shown in Figure 3 to the left, the armature may be withdrawn from the slot 20.

The latter arrangement permits a more rapid assemblage of the device for production purposes and a simple and efficient arrangement for effecting the desired result.

Although only one embodiment of the invention has been illustrated and described, various changes in the form and relative arrangement of the parts, which will now appear to those skilled in the art, may be made without departing from the scope of the invention. Reference is, therefore, to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In apparatus of the class described, an electromagnet, a bracket having a pair of arms extending substantially at right angles one to the other, said electromagnet having one end thereof fixedly mounted on one of said arms, an arma-

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ture member having one end thereof projecting through the other of said arms and pivotally mounted therein, said armature member cooperating with the other end of said electromagnet, a plate projecting from said armature member at said one end and cooperating with said other arm of said bracket, a looped leaf spring having one end thereof fastened to said end plate, said other arm of the bracket having a slot formed therein for receiving the one end of said armature member and another end of said looped leaf spring, said leaf spring being arranged so as to bias said armature member away from said electromagnet, and said slot permitting the removal of said other end of the leaf spring and said armature member for disassembling the armature member from said bracket.

2. An apparatus of the class including an electromagnet, a bracket having a pair of arms extending substantially at right angles one to the other, said electromagnet having one end thereof fixedly mounted on one of said arms, an armature member having one end thereof projecting through the other of said arms and pivotally mounted therein, said armature member cooperating with the other end of said electromagnet, and a part projecting from said armature member at said one end and cooperating with said other arm of said bracket; the improvement comprising said other arm of the bracket having a slot formed therein for receiving the one end of said armature member and an opening in said slot for removal of said armature member from said other arm, a leaf spring having one end thereof fastened to said projecting part and the opposite end of said spring so bent as to be releasably engaged in the slot formed in the other arm of the bracket, said leaf spring being arranged so as to bias said armature member away from said electromagnet, and said leaf spring and armature member removably mounted in said slot so that the armature member may be disassembled from the bracket.

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