May 18, 1926. 1,585,630

C. F. CARPENTER ET AL

SUPPORT FOR THE WINDINGS AND THE MOVABLE MAGNETIC MEMBERS OF ELECTROMAGNETIC DEVICES

Filed May 11, 1921

Fig. 1.

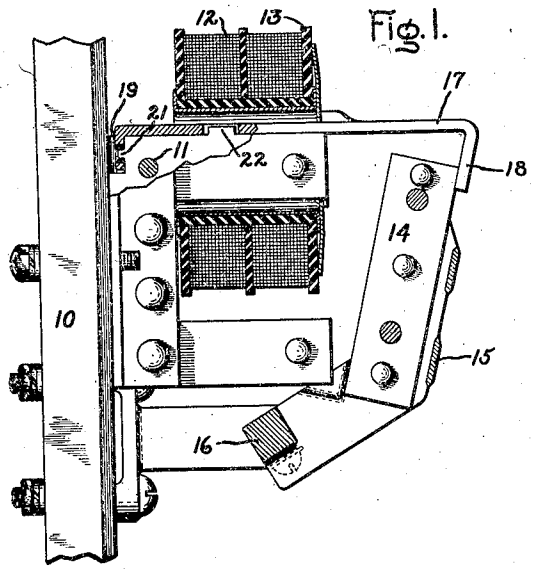


Fig. 2.

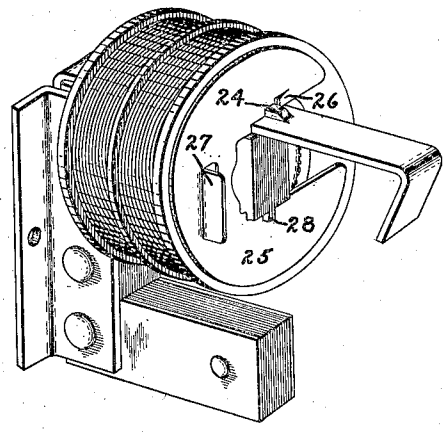


Fig. 3.

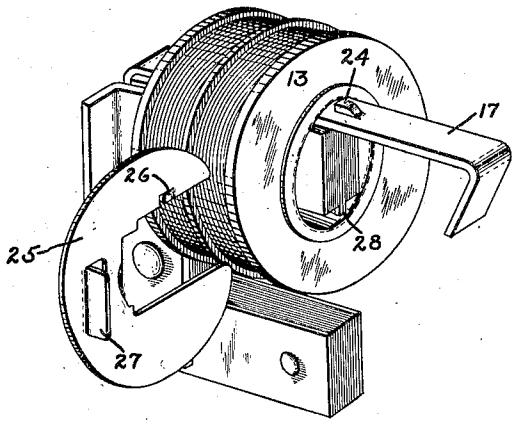
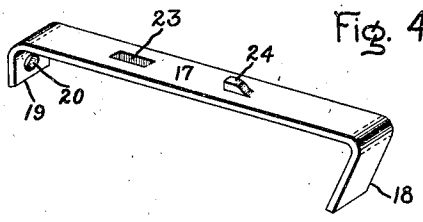


Fig. 4.



Inventors:
Charles F. Carpenter,
Louis J. Weber,
by Albert G. Davis
Their Attorney.

Patented May 18, 1926. 1,585,630

UNITED STATES PATENT OFFICE.

CHARLES F. CARPENTER, OF SCHENECTADY, AND LOUIS J. WEBER, OF SCOTIA, NEW YORK, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SUPPORT FOR THE WINDINGS AND THE MOVABLE MAGNETIC MEMBERS OF ELECTROMAGNETIC DEVICES.

Application filed May 11, 1921. Serial No. 468,697.

Our invention relates to improvements in electromagnetically operated devices, and in particular to the means for holding the winding of the electromagnet on the core thereof and the means for limiting the movement of the movable magnetic member of the electromagnet.

Although the invention is not necessarily limited thereto, it has a particular application in electromagnetic switches.

For convenience of manufacture, it is customary to form the winding of an electromagnetic device upon a spool or other form of insulating material and slip this spool over a portion of the core of the electromagnet. Some means must be provided for holding the spool in proper position on the core. It is desirable that the spool shall be easily and quickly put in proper position on the core, and it is also desirable that the spool shall be easily and quickly removable. Our invention provides improved means whereby the spool may be easily and quickly put in place on the core and held there securely, and whereby the spool can be readily removed if desired.

It is also desirable that some means be provided for limiting the movement of the magnetic movable member of the electromagnetic device. In electromagnetic switches this magnetic movable member is frequently an armature pivoted with respect to the core of the electromagnet so as to be turned about its pivot to the attracted position into engagement with the core when the electromagnet winding is energized. A common form of arrangement involves the use of a stop of non-magnetic material against which the end of the armature farthest from the pivotal support of the armature is adapted to rest so as to thereby limit the opening movement of the armature and to fix definitely the air gap between the armature and the core of the electromagnet. It is desirable that this stop for the magnetic movable member shall be readily removable in order for the member to drop completely away from the core of the electromagnet to permit the winding spool to be removed.

Our invention provides an improved removable stop for the magnetic movable member or armature of the electromagnet, and the arrangement is such that this stop has means for holding the winding of the electromagnet in its proper position on the core of the electromagnet. In one form of our invention this removable stop for the armature is arranged so as to interlock with the core of the electromagnet, and a removable washer is interlocked with the said stop and the core of the electromagnet for holding the winding spool in position on the magnet core. By means of our improved arrangement, the armature stop may be readily moved out of engagement with the armature so as to permit the armature to drop free from the core of the electromagnet, and by a simple operation the interlocking between the winding spool and the stop is opened so that the spool may be readily removed from the core of the electromagnet.

For a better understanding of our invention, reference is had to the accompanying drawings, wherein we have shown an embodiment of the invention for purposes of illustration, and in which Fig. 1 is a side view of an electromagnetically operated device embodying our invention, certain of the parts being shown in section for the sake of easily disclosing the manner of construction and arrangement; Fig. 2 is a perspective view of a portion of Fig. 1 with the magnet spool locked in position, the armature of the electromagnet being removed; Fig. 3 is a perspective view similar to Fig. 2 showing the manner in which the washer which interlocks the spool to the armature stop and to the core of the electromagnet is removed from its position to permit the removal of the magnet spool; and Fig. 4 is a detail showing the construction of the stop for the armature of the electromagnet.

Referring to the drawings, the various parts of the electromagnetically operated device are mounted upon an insulated base 10 which supports the core 11 of the electromagnet. The winding 12 of the electromagnet is wound upon a spool 13 of insulating material, and this spool is adapted to be mounted on the upper leg of the core of the electromagnet. The armature 14 of the electromagnet is mounted within a cradle 15

so that when the armature is attracted to the core of the electromagnet, the armature is permitted to accurately align itself with the pole pieces thereof. The cradle 15 is mounted on a shaft 16 which provides a pivotal support for the cradle.

The armature 14 is held in its open position by means of the removable stop 17. This stop is shown in more detail in Fig. 4. It will be seen that the stop is in the form of a strip and comprises a hooked end 18 against which the armature 14 is adapted to rest, and another hooked end 19 which fits over an edge or shoulder of the core of the electromagnet. The turned-up or hooked end 19 of the stop is provided with an aperture 20 within which a projection 21 on the core of the electromagnet is adapted to fit so as to interlock the stop with the core of the electromagnet and hold the stop in proper position. The projection 22 on the core of the electromagnet is adapted to fit in another aperture 23 in the stop so as to provide a further interlocking connection between the stop and the core of the electromagnet. The stop is also provided with a projection at 24 which is adapted to engage the washer 25 for holding the magnet spool in position on the core 11.

This washer 25 is preferably of the shape shown in Figs. 2 and 3 and will be seen to have a slot, by means of which the washer may be slipped over the end of the spool 13 with the stop 17 in its proper position, the slot in the washer registering with the configuration of the end of the core of the electromagnet. This spring washer is provided with a resilient detent 26 which is adapted to engage the projection 24 on the stop 17 so as to hold the washer and the various parts in their respective positions on the core of the electromagnet. A kicked-up fin 27 is also provided on the washer for the purpose of sliding the washer radially of the spool 13 in order to remove the spool from the core of the electromagnet. The projection 28 on the end of the core of the electromagnet also cooperates with the washer 25 to hold the washer in its proper position.

As thus constructed and arranged, and with the parts in the various positions shown in Figs. 1 and 2, in order to remove the winding spool, it is necessary to simply raise the stop 17 so that the end 18 thereof is free from the upper end of the armature 14, thereby permitting the armature to drop out of the way of the winding spool. The winding spool can now be readily removed by pressing the spring catch 26 inward and out of locking engagement with the projection 24 on the armature stop. After the projection 26 is free from the armature stop, the washer 25 can be slid to the left as shown in Fig. 3, by pressing on the fin 27. The winding spool can now be readily removed from its position on the core of the electromagnet.

In order to replace the spool on the electromagnet, it is simply necessary to slip the spool in position on the core of the electromagnet, then slide the spring washer 25 back of the projection 24 on the stop and the projection 28 on the core until the spring catch 26 has passed the projection 24. The armature 14 of the electromagnet can then be returned to its proper position and the end 18 of the stop raised so that when returned, the armature will rest against the stop.

It will be seen that we have provided a very convenient arrangement whereby the armature and the winding spool may be held in their proper respective positions. The armature stop is readily put in place and removed, no bolts or other similar fastenings are necessary, and all of the various parts may be very quickly assembled or disassembled.

In accordance with the provisions of the patent statutes, we have described the principle of operation of our invention, together with the apparatus which we now consider to represent the best embodiment thereof, but we desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What we claim as new and desire to secure by Letters Patent of the United States, is:—

1. A readily removable stop for the pivotally mounted armature of an electromagnet having a core with a shoulder and a removable winding spool disposed on the core to effect movement of the armature from its biased unattracted position to its attracted position, the said stop being in the form of a strip having a portion intermediate the ends thereof arranged to be interposed between the magnet spool and the magnet core and the ends thereof angularly disposed with respect to said intermediate portion, one of the said ends being arranged to cooperate with the magnet armature to arrest the movement thereof away from the attracted position and the other end being arranged to hook over the shoulder of the magnet core to hold the stop in position with respect to the magnet core against the pull exerted by the magnet armature tending to move away from its attracted position.

2. A readily removable stop for the pivotally mounted armature of an electromagnet having a core with projections and a shoulder, and a removable winding spool disposed on the core to effect movement of the armature from its biased unattracted position to its attracted position, the said stop being in the form of a strip having a portion intermediate the ends thereof arranged to be in-

terposed between the magnet spool and the magnet core and the ends thereof angularly disposed with respect to said intermediate portion, one of the said ends being arranged to cooperate with the magnet armature to arrest the movement thereof away from the attracted position and the other end being arranged to hook over the shoulder of the magnet core to hold the stop in position with respect to the magnet core against the pull exerted by the magnet armature tending to move away from its attracted position, the said stop having openings therein which are arranged to cooperate with said projections on the magnet core to form a readily removable connection with the magnet core.

3. A readily removable stop for the pivotally mounted armature of an electromagnet having a core with a shoulder and a removable winding spool disposed on the core to effect movement of the armature from its biased unattracted position to its attracted position, the said stop being in the form of a strip having a portion intermediate the ends thereof arranged to be interposed between the magnet spool and the magnet core and the ends thereof angularly disposed with respect to said intermediate portion, one of the said ends being arranged to cooperate with the magnet armature to arrest the movement thereof away from the attracted position and the other end being arranged to hook over the shoulder of the magnet core to hold the stop in position with respect to the magnet core against the pull exerted by the magnet armature tending to move away from its attracted position, the said stop having a projection thereon arranged to cooperate with the magnet spool to hold the spool in position on the magnet core.

4. A readily removable stop for the pivotally mounted armature of an electromagnet having a core with projections and a shoulder, and a removable winding spool disposed on the core to effect movement of the armature from its biased unattracted position to its attracted position, the said stop being in the form of a strip having a portion intermediate the ends thereof arranged to be interposed between the magnet spool and the magnet core and the ends thereof angularly disposed with respect to said intermediate portion, one of the said ends being arranged to cooperate with the magnet armature to arrest the movement thereof away from the attracted position and the other end being arranged to hook over the shoulder of the magnet core to hold the stop in position with respect to the magnet core against the pull exerted by the magnet armature tending to move away from its attracted position, the said stop having openings therein which are arranged to cooperate with said projections on the magnet core to form a readily removable connection with the magnet core and the stop having a projection thereon arranged to cooperate with the magnet spool to hold the spool in position on the magnet core.

5. In combination, a magnet core having a shoulder, a winding spool removably mounted on said core, a pivotally mounted armature biased away from its attracted position, a readily removable stop for holding said spool in position on said core and for limiting the movement of said armature away from its attracted position, the said stop being in the form of a strip with ends angularly disposed with respect to the intermediate portion thereof, the said intermediate portion being surrounded by said magnet spool, one of said ends cooperating with said armature to limit the movement thereof away from the attracted position thereof and the second of said ends hooked over the said shoulder of the magnet core, a readily removable pin and slot connection between said core and said stop, and a projection on said stop cooperating with said spool for holding the same on said core, the said spool being readily removed from the magnet core by tilting the first of said ends of said stop to release the said armature to move clear of the magnet spool and by releasing the holding effect of said projection.

6. The combination in an electromagnetically operated device of a magnet core, a removable winding spool mounted thereon, a movable magnetic member, a stop for the said member having an interlocking connection with the said magnet core, and a removable washer having an interlocking connection with the said stop for holding the said spool in position on the said magnet core.

7. The combination in an electromagnetically operated device of a magnet core, a removable winding spool mounted thereon, an armature, a removable stop for the armature adapted to hook over an edge of the said core and having openings adapted to register with projections on the said core, and a removable washer interlocked with the said stop and the said core for holding the said spool in position on the said magnet core.

8. The combination in an electromagnetically operated device of a magnetic core, a removable winding spool mounted thereon, a magnetic movable member, a stop for the said member interlocked with the said magnet core, and a removable washer for holding the said spool in position on the said magnet core, the said washer having a resilient catch adapted to engage the stop for interlocking the washer with the stop.

9. The combination in an electromagnetically operated device of a magnet core, a removable winding spool mounted thereon,

an armature, a removable stop for the armature adapted to hook over an edge of the said core, and a removable washer interlocked with the said stop and said core for holding the said spool in position on the said core.

10. The combination in an electromagnetically operated device of a magnet core, a removable winding spool mounted thereon, an armature, a removable stop for the armature adapted to hook over an edge of the said core and having openings adapted to register with projections on the said core, and a removable washer having an opening adapted to register with the said core and stop for holding the said spool in position on the said core.

11. The combination in an electromagnetically operated device of a magnet core, a removable winding spool mounted thereon, an armature, a removable stop for the armature adapted to hook over an edge of the said core and having openings adapted to register with the projections on the said core, and a removable washer having an elongated opening adapted to register with the core and stop for holding the said spool in position on the core, the said washer having a resilient catch adapted to engage the said stop.

In witness whereof, we have hereunto set our hands this 10th day of May, 1921.

CHARLES F. CARPENTER.
LOUIS J. WEBER.