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SUPPORT ASSEMBLY FOR ELECTROMAGNET ARMATURES

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Fig. 1

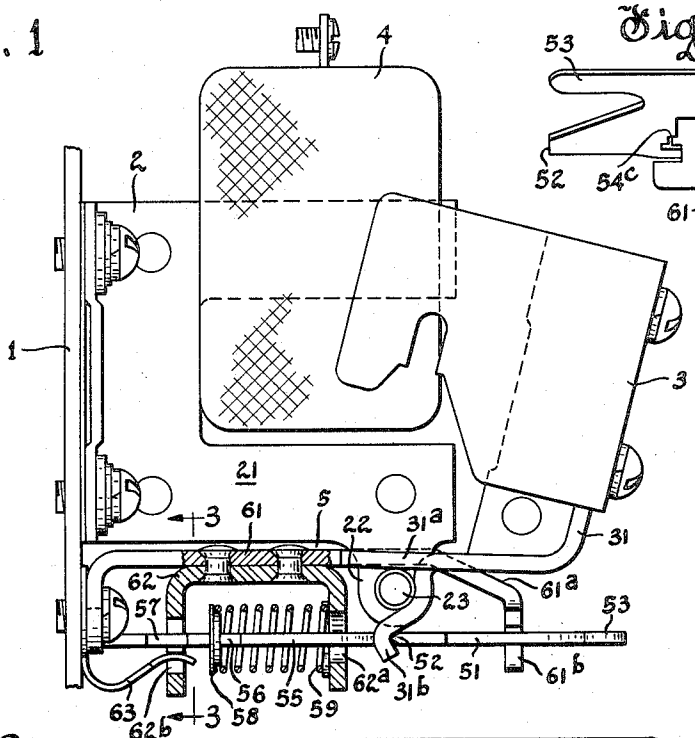


Fig. 4

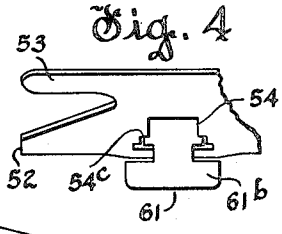
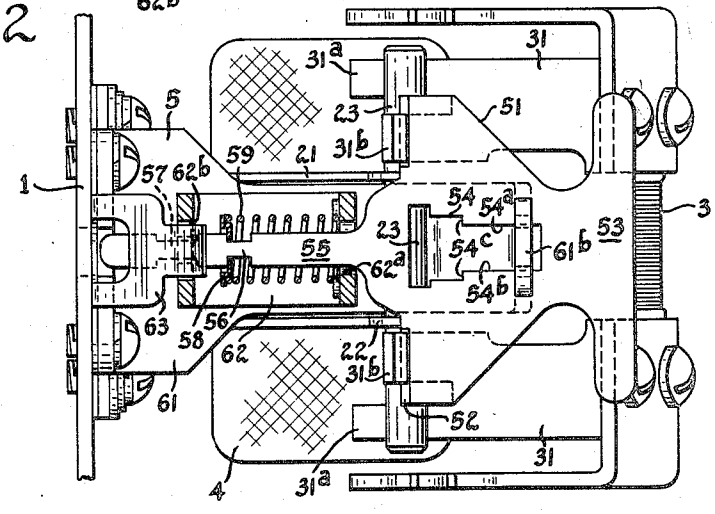


Fig. 2



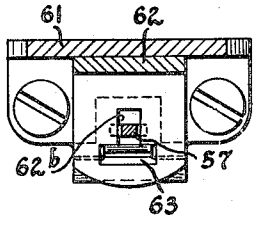


Fig. 3

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SUPPORT ASSEMBLY FOR ELECTROMAGNET ARMATURES

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8 Claims. (Cl. 317—198)

This invention relates generally to electromagnetic switch operating mechanisms and particularly to improvements in the means for retaining the electromagnet armature member on its pivot pin.

In United States Patent No. 2,672,536, granted March 16, 1954, to Theodore F. Rosing and Edwin W. Seeger, and assigned to the same assignee as the instant application, there is shown an electromagnetically operated switch in which the armature member is pivotally mounted on a pivot pin by means permitting quick detachment therefrom. Al though the operation of the armature assembly has been entirely satisfactory, it has been found that under certain conditions, for example, during shipment, the pivot yoke will shift out of position and permit the armature member to fall free of its pivot pin.

It therefore is an object of the invention to provide an improved support assembly for the armature members of electromagnetic switches.

Another object of the invention is to provide for an electric switch an operating assembly in which the armature member is protected against accidental dislodging which might be caused by rough handling of the switch during shipment.

It is also an object of the invention to provide for an electromagnetic switch and improved pivot yoke assembly which is simpler to manufacture and assemble.

Other objects and advantages of the invention will hereinafter appear.

In the accompanying drawing there is illustrated an embodiment of the invention, it being understood that various modifications may be made in the embodiment illustrated without departing from the spirit and scope of the appended claims.

Referring to the drawing,

Figure 1 is a partly-sectioned side elevational view of the complete electromagnetic operating assembly for a switch, the contact blocks having been removed;

Fig. 2 is a bottom plan view of the mechanism shown in Fig. 1 with parts of the pivot yoke support assembly being shown in section;

Fig. 3 is a sectional view taken along lines 3—3 of Fig. 1; and

Fig. 4 is a fragmentary front elevational view of parts of the pivot yoke assembly.

The electromagnetic operating mechanism shown in Fig. 1 includes a mounting plate 1, a C-shaped electromagnetic core 2 suitably attached thereto, a pivotally mounted movable armature member 3, an energizing winding 4, and a pivot yoke support assembly 5.

The side plates 21 of the laminated magnet core 2 include depending portions 22 which are centrally apertured to receive a pivot pin 23, the oppositely extending portions of which support the movable armature 3.

The armature support brackets 31 are split at one end for engagement with said pivot pin. The inner portions 31^a and the outer S-shaped portions 31^b provide for said armature open pivot bearings which are continuously

urged into engagement with the pin 23 by means of a spring biased pivot yoke 51 having knife edges 52.

The improvements which constitute our invention are found in the pivot yoke and the pivot yoke support assembly which will now be described in detail.

The pivot yoke 51 is preferably stamped from a flat piece of sheet metal, all portions thereof being coplanar. The main body portion of yoke 51 includes at one end the knife-edge portions 52 which cooperate with the hooked portions 31^b of the armature support brackets 31. At the other end of the main body portion of yoke 51 is a handle portion 53 by means of which the yoke 51 may be grasped to release it from engagement with the armature support brackets 31. Intermediate said knife-edges 52 and the handle portion of yoke 51 is a cut-out portion 54 the side edges 54^a, 54^b of which are used as guides for the pivot yoke 51 during normal movements of the armature 3.

The pivot yoke 51 is also provided with a thin tongue-like extension 55 having reduced neck portions 56 and 57. The neck portion 56 accommodates a snap-on washer-like spring holder 58 by means of which the compression force of the coil spring 59 is transmitted to the pivot yoke 51 for holding the armature support brackets 31 in firm engagement with the pivot pin 23. The neck portion 57 cooperates with a part of the pivot yoke support assembly which is hereinafter described.

The pivot yoke support assembly 5 is independently attached to the mounting plate 1 by bolts, screws or other suitable securing means, as illustrated in Figs. 1, 2 and 3. It comprises a main support member 61, a substantially U-shaped bracket member 62 and a spring member 63 having a flat inner end portion.

The main support member 61 is formed of relatively heavy sheet metal, the left-hand end portion thereof (Figs. 1 and 2) being somewhat broadened to provide a firm base for its attachment to the switch mounting plate 1. The right-hand or front end (Figs. 1 and 2) of the support member 61 includes an inclined portion 61^a which acts as an abutment or stop for the movable armature when in the unattracted position, and also includes a downwardly depending portion 61^b which assists in supporting and guiding the pivot yoke 51.

As best shown in Figs. 2 and 4, the depending portion 61^b of support 61 is a substantially T-shape so as to provide supporting extensions for engagement with the lower surface (Fig. 1) of the pivot yoke 51. Normally, the narrowest section of portion 61^b is slidably received within the correspondingly narrow section of pivot yoke cut-out 54 to guide the pivot yoke 51 as it moves with the armature member 3. However, when it is desired to place the pivot yoke 51 in an inoperative position so as to permit ready removal of the armature assembly from the pivot pin, said pivot yoke may be pulled outwardly against the bias of spring 59 and latched in said position by placing the shoulders 54^c against the somewhat enlarged section of support member portion 61^b. (This is best shown in Fig. 4.) The widest portion of the cutout 54 permits the pivot yoke 51 to be slipped on and off the guide portion 61^b.

The support bracket 62 is provided with openings at each end for receiving the pivot yoke extension 55. The opening 62^a is large enough to accommodate the entire width of the extension 55 but small enough to leave an adequate bearing area for the biasing spring 59. The opening 62^b is T-shaped, as best shown in Fig. 3. The lower portion of said opening (Figs. 1 and 3) is large enough to permit insertion therethrough of the inner end of the pivot yoke extension 55. The upper portion of said opening 62^b is small enough to prevent axial withdrawal of the pivot yoke extension 55 when the neck portion 57 thereof is positioned within said upper portion.

It should also be noted that the lengths and relative positions of the several parts are such that when the neck portion 57 is positioned within the narrow portion of opening 62b and the pivot yoke is moved outwardly (toward the right in Fig. 1) against the bias of spring 59, the broadened inner end portion of the extension 55 will abut the bracket 62 before the guide portion 61b leaves the narrow section of cut-out 54.

The spring 63 is mounted in the manner shown to resist movement of the pivot yoke extension 55 out of the narrow portion of opening 62b. The free end of said spring normally abuts the projections defining the T-slot and is slightly curved to present a cam surface to be engaged by the end of the pivot yoke extension when inserted into the opening 62b.

When the electromagnetic device is energized, armature 3 closes into abutting engagement with the pole faces of core 2. Hooked portions 31b of the armature support brackets 31 move pivot yoke 51 longitudinally in the right-hand direction as seen in Fig. 1 against the force of biasing spring 59. When the electromagnetic device is deenergized, biasing spring 59 acts through knife-edge portions 52 and hooked portions 31b to return the armature to its normally open position. Should the device be subjected to shock by rough handling during shipment or the like, the shoulders adjacent neck portion 57 of extension 55 will limit movement of pivot yoke 51 to prevent accidental dislodgement of the armature brackets from pivot pin 23. To remove the armature, extension 55 is moved laterally against the force of spring 63 into the cross portion of T-shaped opening 62b to release the interlock thereby to permit withdrawal of the broadened end portion of extension 55 through opening 62b in bracket 62. Pivot yoke 51 is simultaneously drawn in the right-hand direction as seen in Fig. 1 until shoulders 54c of cut-out 54 clear depending portion 61b of support member 61 whereupon handle portion 53 of pivot yoke 51 is moved laterally to latch the pivot yoke as shown in Fig. 4. In this position knife-edge portions 52 of the pivot yoke are sufficiently removed from hooked portions 31b that the armature can be freely removed. After the armature is replaced, it is only necessary to move handle portion 53 of pivot yoke 51 laterally in the opposite direction to return the parts to their normal positions. When handle portion 53 is moved laterally in the opposite direction, shoulders 54c will clear the enlarged section of support member portion 61b whereupon spring 59 snaps pivot yoke 51 in the left-hand direction as seen in Fig. 1 to an extent that knife-edge portions 52 engage hooked portions 31b. As pivot yoke 51 snaps in the left-hand direction, the enlarged end portion of extension 55 clears bracket 62 whereupon spring 63 snaps neck portion 57 of extension 55 into the leg portion of T-shaped opening 62b to reestablish the interlock.

Assembly of the movable armature, the pivot yoke and its biasing spring is readily accomplished. After first placing the biasing spring 59 between the opposed ends of the bracket 62, the pivot yoke extension is inserted through the opening 62a thence through said spring and into the wide part of opening 62b by depressing the flat spring 63. The spring holder 58 is then slipped onto the extension neck portion 56 where it is held by the force of said spring. The pivot yoke 51 may then be latched in the position shown in Fig. 4 to permit unimpeded attachment of the movable armature support brackets 31 to the pivot pin 23. After the armature 3 is in position, it is only necessary to depress the handle portion 53 and permit pivot yoke 51 to slide forward under the bias of the spring 59. The knife edges 52 on the pivot yoke will then engage the hooked extensions on the armature support brackets 31 and the neck portion 57 on the pivot yoke extension will slip into the narrow part of opening 62b where it will be retained by the bias of spring 63.

While only one embodiment of the invention has been disclosed, it should be understood that the invention is not limited thereto since other variations may occur to those skilled in the art. Thus it is intended that our invention be given the broadest possible interpretation within the terms of the following claims.

We claim:

1. In combination, an electromagnetic switch operating mechanism including a movable armature assembly; a pivot pin upon which said armature assembly is removably mounted with open bearings; a spring-biased pivot yoke engageable with said armature assembly for maintaining it on said pivot pin, said pivot yoke being normally movable between each of two positions with movement of said armature and also being manually movable to a third position wherein said armature may be removed from its pivot pin; and means associated with said pivot yoke to insure against accidental movement thereof to said third position.

2. In combination, an electromagnetic switch operating mechanism including a movable armature assembly; a pivot pin upon which said armature assembly is removably mounted with open bearings; a spring-biased pivot yoke engageable with said armature assembly for maintaining it on said pivot pin, said pivot yoke being normally movable between each of two positions with movement of said armature and also being manually movable to a third position wherein said armature may be removed from its pivot pin; and locking means associated with said pivot yoke to insure against accidental movement thereof to said third position, and said locking means being manually releasable to permit manual movement of said pivot yoke to said third position to effect armature removal.

3. In an electromagnetic operating mechanism for a switch wherein the movable armature member is supported on a pivot pin by open pivot brackets and is held in engagement with said pivot pin by a pivot yoke, an enlongated extension member on said pivot yoke extending generally in the direction of the force to be supplied by said yoke; spring biasing means operably connected to said extension member whereby said pivot yoke is maintained in engagement with said pivot brackets; means cooperable with said extension member for limiting the axial movement thereof when in a given position; and manually releasable means for maintaining said extension member in said given position.

4. In an electromagnetic switch having an armature member with open pivotal bearings and a pivot yoke and a spring for biasing said yoke, a pivot yoke supporting structure comprising a first member having a depending guide and support portion for cooperation with a correspondingly apertured portion of said pivot yoke; a second member having two spaced apart depending portions one of which is adapted to provide a stop for one end of said biasing spring and the other of which is provided with manually releasable means cooperable with a portion of said pivot yoke to limit movement of said pivot yoke in a given direction; and associated spring means for yieldably resisting manual release of said pivot yoke from said last mentioned means.

5. A pivot yoke supporting structure for electromagnetic switches having armatures with open pivotal bearings, said pivot yoke supporting structure comprising a first bracket member having a depending guide portion cooperable with a part of said pivot yoke; a second bracket member attached to said first bracket member and having two spaced depending portions one of which is apertured to permit part of said pivot yoke to move freely therethrough and the other of which has a T-slot for receiving a portion of said pivot yoke; a spring member for resisting movement of said last-mentioned pivot yoke portion out of the leg portion of said T-slot; and spring means positioned between said depending portions of said second bracket member and provided with means for effecting a biasing connection with said pivot yoke.

6. In an electromagnetic switch comprising a core, an

armature and open pivotal bearings for removably mounting the armature on the core, a spring-biased pivot yoke member normally in engagement with said pivotal bearings for biasing the armature in its normally open position, and interlocking means associated with said member for permitting movement of the latter against the force of said spring when the armature is closed but normally limiting such movement to prevent dislodging the armature, said interlocking means being selectively releasable to permit further movement of said member to release the armature for removal.

7. In an electromagnetic switch comprising a stationary core, a movable armature and open pivotal bearings for removably mounting the armature on the core, a spring-biased pivot yoke member normally in engagement with said pivotal bearings for biasing the armature in its normally-open position, interlocking means associated with said member for permitting movement of

the latter against the force of said spring when the armature is closed but normally limiting such movement to prevent dislodging the armature, and means whereby said interlocking means can be selectively unlocked to permit additional movement of said member against the force of said spring for removing the armature.

8. The combination according to claim 7, and latching means for retaining said member against the force of said spring while the armature is being removed.

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