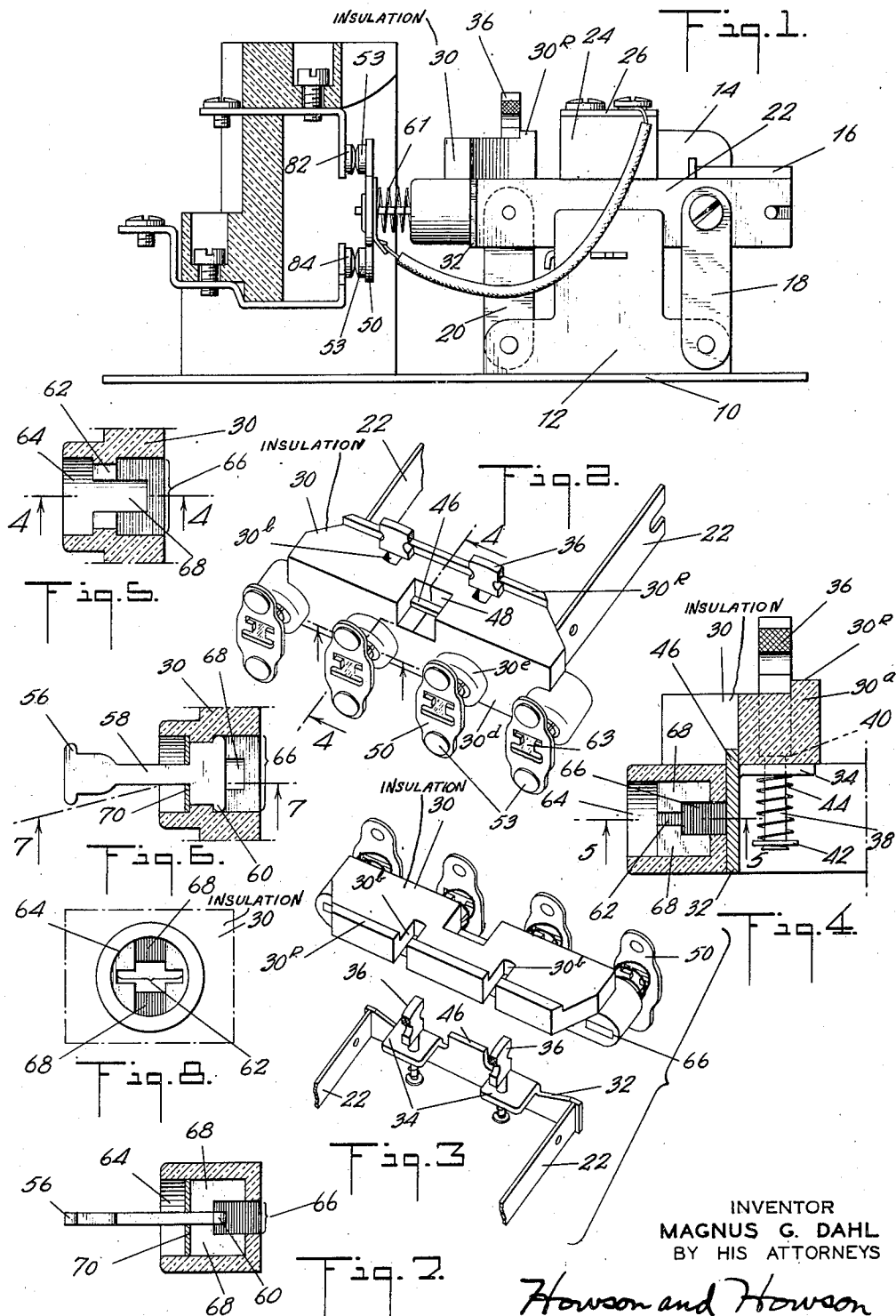


M. G. DAHL

## ELECTRIC SWITCH CONSTRUCTION

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## ELECTRIC SWITCH CONSTRUCTION

Magnus G. Dahl, West Hartford, Conn., assignor  
to The Arrow-Hart & Hegeman Electric Com-  
pany, Hartford, Conn., a corporation of Con-  
necticut

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This invention relates to electric switches. More particularly it relates to electromagnetically operated electric switches having a plurality of poles.

It is an object of this invention to improve and simplify the construction of electric switches, particularly those of the electromagnetically operated type.

Another object of this invention is to improve the means for mounting movable contacts on electric switch operating means, particularly electromagnetically operated electric switches. A further object is to simplify the mounting of the movable contact block upon the contact actuating means and to enable the ready removal of such contact carrying block in case replacement or repair is necessary.

Another object of the invention is to provide means to prevent loss or inadvertent displacement of the wax which is commonly placed in back of the movable contact mounting means, such removal or loss being likely to occur due to the jarring and vibration of the switch as it operates, unless some means is taken to ensure the retention of the wax in its proper position.

Other objects and advantages of my invention will become apparent as it is described in connection with the accompanying drawing.

In the drawing—

Fig. 1 is a side elevation view with the block upon which the stationary contacts are mounted, shown partly in section.

Fig. 2 is a perspective view of the movable contact mounting block and its supporting structure.

Fig. 3 is a perspective view of parts shown in Fig. 2 but with the contact block and its support separated from each other.

Fig. 4 is a section view taken through the parts shown in Fig. 2 along the line 4—4 of Fig. 2.

Fig. 5 is a detailed section view taken along line 5—5 of Figs. 2 and 4.

Fig. 6 is a view similar to Fig. 5 but with the contact supporting bar in place.

Fig. 7 is a section view taken along line 7—7 of Fig. 6.

Fig. 8 is an end view showing in detail the recess in the movable contact supporting block in which the contact supporting bar is mounted and into which the wax is poured.

Referring to the drawing the device is mounted upon a sheet metal base 10 which has a pair of spaced parallel sheet metal brackets 12 secured thereon and extending perpendicularly upwards therefrom. Between these parallel brackets and supported by them is an electromagnet coil 14

of conventional construction which acts upon an electromagnet armature 16 of which a portion extends within the core of the electromagnet coil 14. The armature 16 is movably supported upon a parallelogram linkage. In this linkage parallel links 18 and 20 are pivotally connected to the bottom portion of the brackets 12 and the top ends of these links are pivotally connected with a bar 22 upon which the electromagnet armature 16 is supported. Appropriate connections are made by flexible leads connected with binding posts 26 which are mounted upon insulating blocks 24 which in turn are fixedly mounted upon the brackets 12 in suitable fashion.

Energization of the solenoid 14 causes movement to the left (in Fig. 1) of the armature 16 and of the parallelogram linkage upon which the armature is supported. This parallelogram linkage also supports and carries a movable contact block 30 of insulating material. To accomplish this purpose a transverse metal bar 32 extends between the ends of the horizontal links 22 at the opposite end of the linkage from the armature 16 forming a frame or supporting structure for the contact carrying block 30. At the mid-portion of this transverse bar 32 lugs 34 are bent out of the plane of the bar and at right angles thereto. These lugs are apertured and have passing through their apertures pins having enlarged flat heads 36, the heads being above the lugs. The portion of the pins which pass through the lugs are of reduced diameter, as at 38, forming a shoulder 40 which rests upon the top surface of the lugs 34. The bottom ends of the pins have enlarged washers 42 secured thereto and a compression spring 44 presses upon this washer and upon the lower surface of the lugs 34 urging the pins downwardly and tending to keep the shoulders 40 in engagement with the upper surface of the lugs 34.

The block 30 upon which the movable contacts are mounted is of irregular shape and may be molded from insulating material. Its form may best be observed in Figures 2 and 3. In transverse section it is substantially of inverted L-shape, the horizontal extension 30<sup>a</sup> thereof having its lower face resting upon the upper faces of the lugs 34. By referring to Figures 2 and 3 it will be noted that in this horizontal extension 30<sup>a</sup> there are provided slots 30<sup>b</sup> in the mid-portion thereof. The width of these slots is slightly greater than the width of the flat heads of the pins so that when the block 30 is mounted upon the parallelogram linkage the flat head 36 may slip through the slot 30<sup>b</sup> and when

the block 30 is seated upon the transverse bar 32 the heads 36 of the pins may be pulled up against the action of the springs 44 and the pins may then be twisted into the position shown in Fig. 2, wherein the blocks will be firmly held upon the transverse bar 32. In order to prevent movement of the block 30 laterally away from the transverse bar 32 a tongue 46 is provided upon the bar 32 extending upwardly from the mid-portion of the bar into a slot 48 formed in the mid-portion of block 30 and extending vertically there-through. To additionally ensure against lateral movement of the contact block 30 away from the supporting arm 32 a rib 30<sup>r</sup> may be provided along the edge of the block 30 adjacent the flat heads 36 of the securing pins. These heads and the rib are so constructed and arranged that when the heads are turned to the position shown in Fig. 2 their side faces will engage against the side of the rib 30<sup>r</sup> tending to hold the blocks 30 more firmly in position.

In the embodiment of the invention illustrated there are four movable bridging contacts which are identical in construction and only one need be described. These bridging contacts consist of a flat piece of metal 50 at the ends of which are mounted contact buttons 53 of conventional form. The central portion of the plate 50 has formed therein an H-aperture 63, one leg of which is longer than the other so that the head 56 of a contact supporting post may be moved through the long leg of the H-aperture and the narrower shank of the supporting post may be moved laterally through the transverse portion of the aperture into the smaller leg of the aperture wherein the head 56 will not permit removal of the post and wherein the plate 50 will be held by a compression spring 61 pressing against it and against the insulating block 30.

The form and construction of the supporting post may be noted best by reference to Figures 6 and 7. The supporting post in addition to having the enlarged head 56 and reduced shank 58 has, at its inner end (see Figure 6) an enlarged head 60. In order that this post may be mounted in the supporting block 30 a narrow slot 62 is provided for each set of contacts. This slot 62 passes entirely through the vertical extension or arm of the insulating block 30 (see 30<sup>d</sup>) and through circular bosses 30<sup>e</sup> which form part of each contact mounting, these bosses being formed as extensions upon the insulating block 30. The bosses 30<sup>e</sup> are cylindrically bored to form a seat for the compression spring 61. The slot 62 in passing through the insulating block 30 merges into the cylindrical bores 64 at one end and at the other end enlarges into recesses 66 of rectangular shape. Into the opposite side walls of the passage 62 are cut or molded passages 68 extending from the circular bore 64 less than the whole way through the block 30.

In assembling the contacts on the mountings 30 the head 56 of the supporting post is first slipped through the slot 62 from the rear until the enlarged head 60 is seated in the enlarged passage 66. The length of this passage 66 and the size of the head 60, as well as the size of the slot 62, are proportioned and arranged so that the head 60 is entirely within the insulation block 30. When in this position a washer 70 may be slipped over the head 56 of the supporting bar and into the bottom of the cylindrical bore 64. Then the spring 61 may be seated upon this washer and the bridging contacts may be mounted upon the supporting post by slipping the head

56 through the larger leg of the H-aperture 52 and compressing the spring 61 into the shank 58 so that the shank may pass through the transverse portion of the aperture, after which the spring 61 may be allowed to expand and the contact 50 will be held against the enlarged head 56 of the contact supporting post. Wax may then be poured into the enlarged slot 66 to cover up the head 60 of the contact supporting bar. The wax will flow into the inner end of the recesses 68 which communicate with the enlarged slot 66. It will be noted that the communication of the recesses 68 with the enlarged slot 66 is in the nature of an offset or undercut so that when the wax hardens no amount of vibration will permit it to jar loose and fall out of the insulating block 30. This is a valuable feature since in switches of this type considerable vibration occurs and wax that may be used to cover up current carrying parts may very easily become loosened and fall out of its recess unless effective means are taken to prevent it.

When the switch is assembled the movable bridging contact buttons 53 may engage with stationary or fixed contacts 82 and 84 which may suitably be mounted upon an insulating block 80 attached to the base 10 of the switch.

From the foregoing it will be observed that I have provided a novel and effective means for mounting a movable contact assembly upon its supporting member in an electromagnetically operated switch and that I have provided a simple and efficient way to maintain the parts intact and to prevent loss of any insulating material due to vibration or jarring of the switch during its normal operation.

Although the embodiment shown is an electromagnetically operated switch the principles of the invention may be applied equally to electric switches which are operated by other means. Many modifications within the scope of the invention will occur to those skilled in the art. Therefore I do not limit my invention to the specific embodiment shown.

I claim:

1. In an electric switch, a movable supporting structure having a tongue extending therefrom, an insulating block carried by said structure and having a slot receiving said tongue to position said block on said structure, contact members carried by said block and spring-pressed devices mounted on said structure and engaging with said block to hold said block on said structure, said spring pressed devices being manipulable into a releasing position free of said block to permit removal thereof from said tongue.

2. In an electric switch, a movable supporting structure having a tongue extending therefrom, an insulating block carried by said structure and having a slot receiving said tongue to position said block on said structure, contact members carried by said block, and spring-pressed bolts journaled at spaced fixed points in said supporting structure and having non-circular heads adapted to fit within correspondingly shaped and spaced recesses in said block and to be rotated each about its own journal while said tongue is in said slot to engage with and hold said block on said structure.

3. In an electric switch, a movable supporting structure, an insulating block carried by said structure and having non-circular recesses in one edge, contact members carried by said block, and spring-pressed bolts journaled at spaced fixed points in said supporting structure and having

correspondingly shaped heads adapted to fit within said recesses and to be rotated to engage with and hold said block on said structure.

4. In an electric switch, a supporting structure including a transverse bar having a tongue extending therefrom, spring pressed bolts mounted on said bar, a block of insulation carried by said structure and having a slot receiving said tongue and recesses for said bolts, said bolts having enlarged heads engageable with said block to hold said block on said structure, and contacts carried by said block.

5. In an electric switch, a supporting structure including a transverse bar having a tongue extending therefrom, spring pressed bolts mounted on said bar, a block of insulation carried by said structure and having a slot receiving said tongue and recesses for said bolts, said bolts having flat heads adapted to slip through said recesses and to be turned thereafter to engage and hold said block on said structure, and contacts carried by said block.

MAGNUS G. DAHL.