July 12, 1960 D. F. MOYER 2,945,106

SWITCH ASSEMBLY

Filed May 15, 1957 2 Sheets-Sheet 1

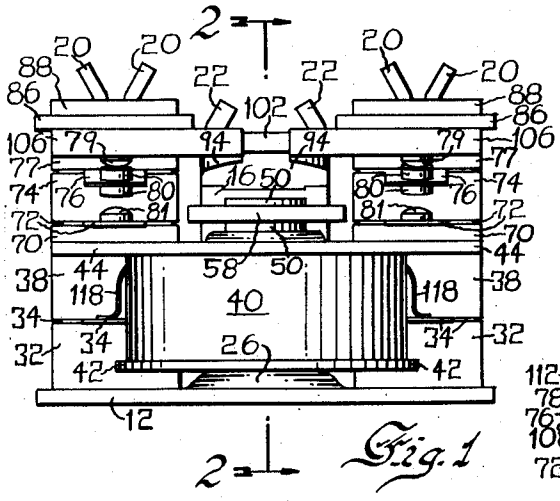


Fig. 1

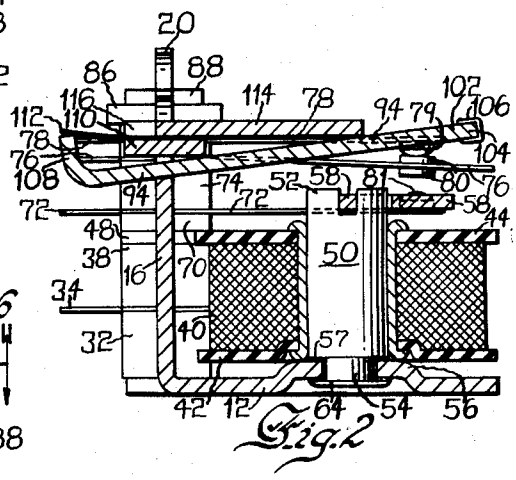


Fig. 2

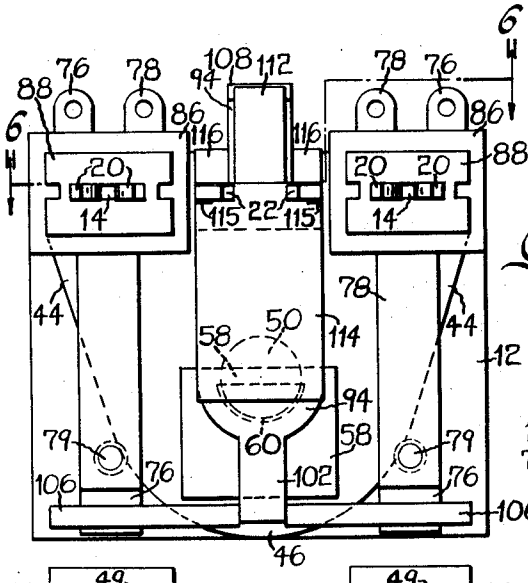


Fig. 4

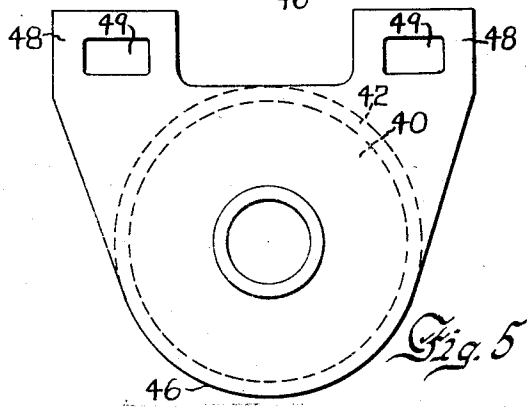


Fig. 5

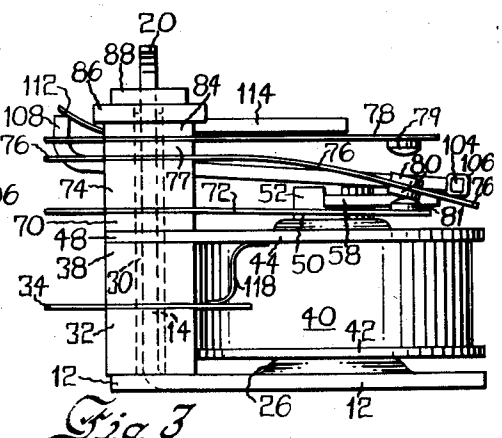


Fig. 3

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SWITCH ASSEMBLY

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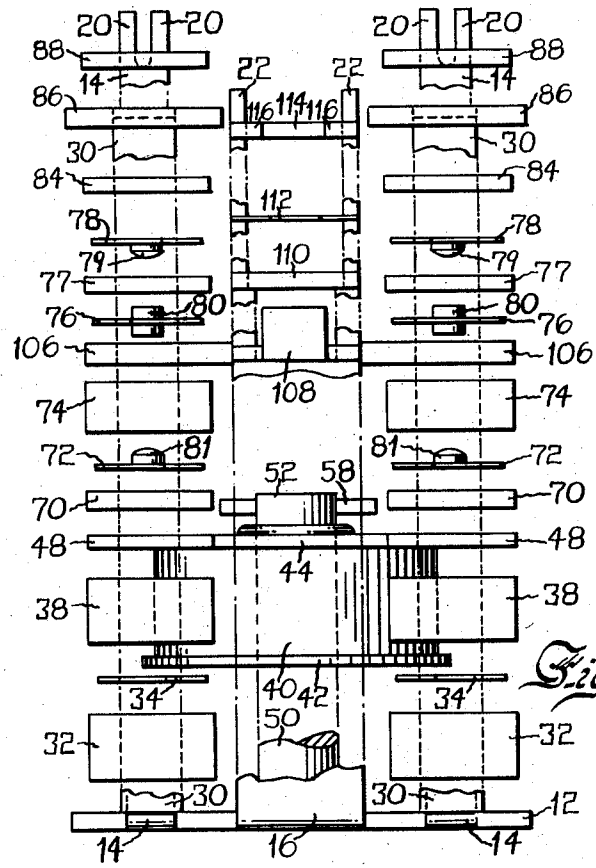


Fig. 7

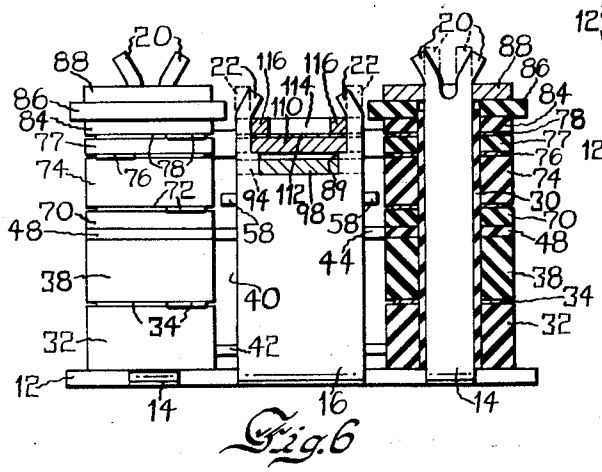


Fig. 6

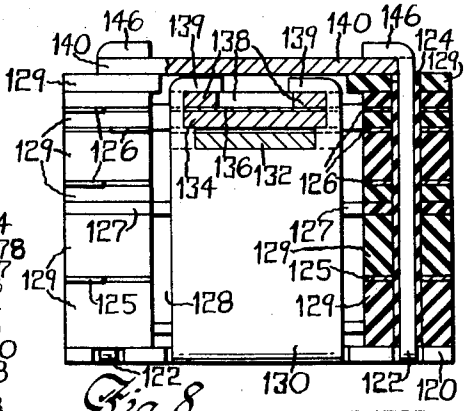


Fig. 8

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2,945,106

SWITCH ASSEMBLY

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16 Claims. (Cl. 200—104)

This invention relates to a switch assembly. The invention relates more particularly to an electrically operable switch assembly sometimes referred to as an electric relay.

An object of this invention is to provide an electrically operated switch or relay which may be constructed and assembled by means of automatically operating machinery.

Another object of this invention is to provide a relay having a rigid support structure for all of the connection terminals or connection lugs.

Another object of this invention is to provide an electrically operable switch mechanism in which all of the terminals and other electrical connection members extend from the support structure an equal distance and in which all of the connection members are precisely positioned, thus adapting the mechanism for attachment to boards or panels having printed circuits.

Another object of this invention is to provide a switch assembly in which all of the parts thereof can be assembled in one direction, thus minimizing the costs of the assembly process.

Another object of this invention is to provide a switch mechanism having a single integral support structure for all of the elements of the assembly, including the coil, the terminals, the contact members, and the actuator member.

Another object of this invention is to provide a switch assembly which requires a minimum of forming operations in the construction and assembly thereof.

Another object of this invention is to provide a switch mechanism or relay having a low-cost, easily assembled, sturdy, resilient member for biasing the actuator member thereof.

Another object of this invention is to provide a relay assembly in which a group of terminals or connection members are retained in proper position within the assembly by means of a single compression member.

Another object of this invention is to provide a switch assembly within which a wide range of shapes and sizes of terminals or connection leads may be used.

Another object of this invention is to provide a relay, the parts of which are not readily disassembled and the contact arrangement and adjustment of which are of a permanent nature and are not susceptible to tampering.

Other objects and advantages reside in the construction of parts, the combination thereof, the method of manufacture, and the mode of operation, as will become more apparent from the following description.

In the drawings:

Figure 1 is a front elevational view of a switch assembly or relay mechanism of this invention.

Figure 2 is a sectional view taken substantially on line 2—2 of Figure 1.

Figure 3 is a side elevational view of a switch assembly or relay mechanism of this invention.

Figure 4 is a top plan view of a switch assembly or relay mechanism of this invention.

Figure 5 is a top plan view of a coil support member of this invention with the coil attached thereto shown by dotted lines.

Figure 6 is a sectional view taken substantially on line 6—6 of Figure 4.

Figure 7 is a rear elevational exploded view of the switch assembly or relay mechanism of this invention.

Figure 8 is a rear view, with parts shown in section, of a preferred modification of the switch assembly of this invention.

Referring to the drawings in detail, a switch assembly or relay mechanism of this invention comprises a base 12 which is provided with a plurality of post members integral therewith and extending normal thereto from one edge thereof. Herein outer posts 14 and an intermediate post 16 are shown. The posts 14 are substantially identical in form and length. The intermediate post 16 is in substantial parallel spaced-apart alignment with the outer posts 14. The posts 14 have bifurcated end portions 20 and the post 16 has extending finger members 22, all of which, before completion of the assembly, are parallel one to the other as shown in Figure 7.

Each of the post members 14 is provided with an insulating sleeve member 30 which slidably fits thereover, as shown in Figures 3, 6, and 7. After the insulating sleeves 30 are slidably disposed upon the post members 14, an insulating spacer 32 having a suitable aperture therein is slidably moved upon each of the post members 14 and encompasses its insulating sleeve 30. The spacers 32 also engage the base member 12.

Then a connection lug 34 having a suitable aperture therein is slidably moved over each of the posts 14 over the insulating sleeve 30 thereof until the connection lug 34 engages the spacer 32.

Then an insulating spacer 38, similar to the spacer 32, is moved over each of the posts 14 and over the sleeve 30 thereof until the spacer 38 engages the connection lug 34 thereof.

An actuating coil 40, shown in Figures 1, 2, and 3 is wound in any suitable manner and has a lower retainer 42 which is preferably circular in shape. The coil 40 also has an upper retainer or support plate 44 which has an arcuate forward portion 46 concentric with the coil 40. The retainer 44 has a diverging rearward portion provided with short legs 48 each of which has an aperture 49, as shown in Figure 5, adapted to permit the legs 48 to fit over the sleeves 30 of the posts 14. The legs 48 of the support plate 44 rest upon the spacers 38, as shown in Figures 1, 2, 3, 6, and 7. Thus, the coil 40 is supported by the support plate 44 as the support plate 44 rests upon the spacer member 38.

A cylindrical magnetizable core member 50 is inserted through the coil 40. The core member 50 is provided with a slotted upper end 52 and has a reduced portion 54 at the other end thereof. The reduced portion 54 closely fits within an aperture of an offset portion 56 of the base 12. An eyelet 57 of non-magnetic material is shown encompassing the reduced portion 54, engaging the body of the core 50, and engaging the head 62, interposing a non-magnetic gap between the core 50 and the base 12. This prevents detrimental effects of residual magnetism in a well known manner.

A disc 58 has a semicircular cut out portion 60 permitting one edge of the disc 58 to be disposed within the slotted upper end 52 of the core 50. The disc 58 is made of non-magnetic material and serves as a shading coil in a known manner for use with alternating current energy.

With the shading coil or disc 58 thus disposed within the slotted upper end 52 of the core 50 and with the reduced lower end 54 of the core 50 and the eyelet 57 disposed within the offset portion 56 of the base 12,

opposed pressure means are provided at each end of the core 50 so that the slotted upper end 52 has the portions thereof bent one toward the other, firmly retaining the edge of the disc 58 within the slotted upper end 52. Also, during the process of applying opposed pressure to the ends of the core 50, the lower reduced portion 54 is upset, forming a head 64, against the lower surface of the base 12. Also, the eyelet 57 is bent over, as shown in Figure 2. Thus, the core 50 is firmly attached to the base 12 and thus the shading coil or disc 58 is firmly attached to the core 50 as the core 50 extends through the coil 40, as best shown in Figure 2.

The offset portion 56 of the base 12 serves as a recess for the head 64 so that the head 64 does not extend beyond the lower surface of the base 12.

A comparatively thin spacer 70 is placed over each of the posts 14 encompassing the sleeve members 30 thereof and engaging legs 48 of the support plate 44, as shown in Figures 1, 2, 3, 6, and 7. Then a pair of lower contact stems 72, each of which has an aperture therein intermediate the ends thereof, are slidably moved upon posts 14 over the sleeves 30 thereof. There is one lower contact stem 72 disposed over each post 14 and extends laterally therefrom.

Then a spacer 74 is moved over each of the posts 14 over its insulating sleeve 30 and into engagement with the respective lower contact stem 72. Following this, an intermediate contact stem 76 having an aperture therein closely fitting over the sleeve 30 is moved upon each sleeve 30 and into engagement with the upper surface of the spacer 74 of each post 14. Then a spacer 77 is moved over each of the posts 14 encompassing its respective insulating sleeve 30 and engaging its respective intermediate contact stem 76. Then an upper contact stem 78 is placed over each of the posts 14 encompassing the insulating sleeve 30 thereof. Normally the contact stems 72, 76, and 78 extend substantially parallel one with respect to the others.

The upper contact stem 78 of each post 14 has a contact 79. Each intermediate contact stem 76 has a contact 80 at the upper and lower surfaces thereof. Also, each lower contact stem 72 carries a contact 81.

Each of the contact stems 72, 76, and 78 is preferably resiliently bendable toward and away from the others. Thus, as the contacts 79 and 80 are normally in engagement, as shown in Figure 2, there is a wiping action between the contacts 79 and 80. Also, as the intermediate stem 76 is bent so that there is engagement of the contact 80 with the contact 81, as shown in Figure 3, there is a wiping action therebetween.

Encompassing each post 14 and its sleeve 30 and in engagement with the upper contact stem 78 is an insulating spacer member 84. Disposed above each spacer 84 and slightly larger in area is a cover insulating spacer 86. At the top of each post member 14 is a rigid cover plate 88 which may be of metallic material.

As stated above, the intermediate post 16 is provided with a pair of upwardly extending finger members 22 at the end thereof and at opposite lateral edges thereof. The intermediate post 16 is also provided with a shoulder portion forming a slot 89 of reduced width at the lower ends of the fingers 22, as clearly shown in Figure 6.

The slot at the end of the fingers 22 is comparatively shallow in depth and upon the bottom thereof pivotally rests a magnetizable clapper member or actuator plate 94. The actuator plate or clapper member 94 has a reduced portion 98 which extends through the slot 89. However, the actuator plate 94 has a larger width on either side of the intermediate post 16 so that during placement of the actuator plate 94 into the slot 89, the actuator plate 94 must be moved longitudinally along the post 16 as the actuator plate 94 extends substantially normal thereto. The clapper 94 has a body portion, substantially the width of the post 16, extending over the core 50. The clapper 94 has a narrow forward portion 102, as best shown in Figure 4. The comparatively narrow portion 102 has a pair of arm members 104 extending laterally therefrom at opposite edges thereof. Encompassing each of the arm members 104 and extending the length thereof is an insulating tube 106.

The arms 104 with the insulating tubes 106 extend over the end of the intermediate contact stems 76. The forward ends of the intermediate contact stems 76 are longer than the ends of the contact stems 72 and 78, as shown in Figures 2, 3 and 4.

Resting upon the shoulders formed between the fingers 22 and the slot 89 is a spacer member 110, as shown in Figures 2 and 6. Resting upon the spacer member 110 is a resilient leaf spring member 112 which resiliently engages an upturned end 108 of the clapper 94, as shown in Figures 2, 3, and 4.

Resting on the upper surface of the leaf spring 112 is a stop plate 114. The stop plate 114 has bifurcated rearward end portions 116 which are disposed rearwardly of the post 16 and normal thereto. The stop plate 114 has transverse slots 115 permitting the plate 114 to be placed upon the post 16 only by movement along the fingers 22 as the fingers 22 extend through the slots 115.

The leaf spring 112 is held by the portion of the stop plate 114 which is forward of the post 16 but the leaf spring 112 is disposed between the bifurcated portions 116 rearwardly of the post 16. Thus, the leaf spring 112 is held against the spacer member 110 by means of the stop plate 114. However, the leaf spring 112 is resiliently movable along a vertical line intermediate the bifurcated end portions 116.

The lower surface of the forward end of the stop plate 114 is normally engaged by the clapper member 94 as the forward portion of the clapper member 94 is resiliently urged against the stop plate 114 by the leaf spring 112, as clearly shown in Figure 2.

The elements of the assembly comprising the support plate, the spacers, the connector lugs, the contact stems, and the cover member encompassing each of the posts 14 and the sleeve 30 thereof are firmly retained in position by means of the bifurcated end portions 20 of the posts 14 which are bent over, as shown in Figures 1 and 6, while the elements are held in compression. Simultaneously with the bending over of the bifurcated end portions 20 of the posts 14, the fingers 22 of the intermediate posts 16 are bent one toward the other, as shown in Figures 1 and 6, firmly retaining the stop plate 114, the spring 112, and the spacer 110.

The coil 40 is provided with a pair of electrical connection leads 118 which are soldered or attached in any other suitable manner to the connection lugs 34, as shown in Figures 1 and 3.

As clearly shown in Figures 2 and 3, the contact stems 72, 76, and 78 and the connection lugs 34 extend rearwardly from the posts 14 so that these connection elements can readily be attached to any suitable electrical conductor members. These connection elements may be of any desired length or shape and are firmly retained in precise position so that the entire switch assembly or relay of this invention is adapted for electrical and physical attachment to prearranged panels and circuits.

When the coil 40 is energized, the core 50 is magnetized, drawing the clapper member or actuator plate 94 into engagement with the core 50. When the clapper 94 moves into engagement with the end 52 of the core 50, the arm members 104 are moved toward the contact stems 76 causing the insulating tubes 106 thereof to engage the intermediate contact stems 76, bending the contact stems 76. Thus, the contact 80 of each contact stem 76 is moved from its normal engagement with the contact 79 of the stem 78. The contact stems 76 are bent downwardly by the arms 104 bringing the contacts 80 into engagement with the contacts 81 of the contact stems 72.

As stated above, due to the fact that the stems 72 and 76 are resilient, the stems 76 move slightly toward the

coil **40** after engagement of the contacts **80** with the contacts **81**. This provides a wiping action between the contacts **80** and **81**.

Thus, it is understood that when the coil **40** is energized the normally-closed circuits between each pair of contact stems **76** and **78** are opened and circuits are established between each pair of contact stems **72** and **76**.

When the coil **40** is deenergized the clapper **94** is returned to engagement with the stop plate **114** by the resilient leaf spring **112**. Thus, the ends of the contact stems **76** are permitted to resiliently return to the normal position thereof adjacent the stems **78** so that the contacts **80** are again in engagement with the contacts **79**.

Figure 8 shows a rear elevational view of a preferred modification of a switch assembly or relay mechanism of this invention.

A base **120** is provided with post members **122** integral therewith and substantially normal thereto at the rearward edge thereof. The post members **122** are substantially square in cross section thus permitting a comparatively small insulating sleeve **124** to be placed upon each of the post members **122**.

A connector lug **125** and a plurality of contact stems **126** encompass each post **122** and the sleeve **124** thereof. Also, a support plate **127** for a coil **128** encompasses each post **122** and the sleeve **124** thereof.

A plurality of spacer members **129** encompass each of the post members **122** and the sleeve member **124** thereof separating the contact stems **126** one from the other and separating the support plate **127** and the connector lug **125** in a manner similar to that described with respect to the preferred embodiment.

An intermediate post **130** pivotally carries an actuator plate or clapper member **132** in a manner similar to that discussed with respect to the clapper member **94** of the preferred embodiment. The intermediate post **130** also carries a spacer **134**, a leaf spring **136**, and a stop member **138**.

The intermediate post **130** is provided with finger members **139** at the upper end thereof which are bent over against the stop member **138**. Thus, the stop member **138** is firmly retained in engagement with the leaf spring **136** so that the leaf spring **136** is firmly secured between the stop member **138** and the spacer **134**, in a manner similar to that described with respect to the preferred embodiment.

A single cover plate **140** extends between the posts **122** and engages the uppermost spacer member **129** of each of the posts **122**. Each of the posts **122** has an upper end **146** which is bent over against the cover plate **140**, thus firmly retaining the cover plate **140** against the uppermost spacer member **129**, thus firmly securing in proper position all of the elements encompassing each of of the posts **122**.

It is to be understood that the switch mechanism of this invention is operable in any position.

It is also to be understood that the clapper member or actuator plate and contact stems of this invention may be so arranged that various combinations of normally-open or normally-closed circuits may be operated as the clapper member is actuated.

From the drawings and description above, it is readily understood that the switch assembly or relay mechanism of this invention may be assembled by automatically operating machinery. Furthermore, it is obvious that the assembly of this invention is sturdily constructed and has a minimum number of moving parts.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. A switch assembly comprising a base, a plurality of spaced-apart post members attached to the base and extending normal thereto, the post members being in parallel alignment adjacent one edge of the base, there being a pair of outer post members and an intermediate post member, a pair of insulating sleeve members, there being an insulating sleeve member encompassing each of the outer post members, a support plate provided with a pair of apertures therein each of which encompasses one of the outer post members, spacer members encircling the outer post members and engaging the base and the support plate maintaining the support plate in parallel spaced relation from the base, a coil of electric conductor material attached to the support plate and disposed between the base and the support plate, a magnetic core attached to the base and extending through the coil, the coil having a pair of electric connection leads extending therefrom, each of the electric connection leads including a connection lug, each connection lug closely encircling one of the outer post members, a plurality of resilient contact stems, there being a plurality of contact stems encircling each of the outer post members, each of the stems having a portion normally extending substantially parallel to the support plate, spacer means encircling each of the outer post members and interposed among the contact stems which encircle the post members for separation thereof, a magnetizable actuator pivotally carried by the intermediate post member, a leaf spring member carried by the intermediate post member in spaced relation from the actuator and having an extending portion in resilient engagement with the actuator, the spring member urging the actuator in a direction away from the core, the actuator being engageable with the core upon energization of the coil, means attached to the actuator and engageable with at least one contact stem carried by each post member for movement thereof with respect to the other contact stems.

2. In a relay assembly comprising a magnetizable support structure, the support structure having a first portion and a second portion, the portions being normal one to the other, a coil, a support plate attached to the coil, the support plate being carried by the first portion of the support structure with the coil disposed adjacent the second portion, a magnetizable core extending through the coil, the core having one end thereof attached to the second portion, the other end of the core having a slot therein, a shading coil firmly retained in the slot by overturned portions of the end of the core having the slot therein, a magnetizable actuator plate pivotally carried by the first portion of the support structure and having a section adjacent the end of the core having the slot therein, a pair of resiliently movable contact stems carried by the first portion of the support structure and extending adjacent the actuator plate, a leaf spring carried by said first portion of the support structure in engagement with the actuator plate, the leaf spring urging the actuator plate in a direction from the core, an arm attached to the actuator plate and engageable with one of the contact stems for movement thereof with respect to the other contact stem as the actuator plate pivotally moves toward the core, a connector lug electrically attached to the coil and supported by the first portion of the support structure, and insulating means electrically separating the contact stems and the connector lug one from the other and from the support structure.

3. In a switch mechanism comprising a base, a pair of posts integral with the base and extending from one side of the base, the base having an aperture therein, a core having a reduced portion extending through the aperture of the base, the core extending from the base in the same direction as the posts, the end of the core opposite the base having a slot therein, a shading coil of non-magnetic material partially disposed within the slot, the ends of the core being upset thus retaining the shading

coil within the slot at one end thereof and thus securing the core to the base, a coil encircling the core, the coil having a support plate attached thereto, the support plate having a pair of apertures therethrough, the posts slidably extending through the apertures, a plurality of electrical connection members, each of the connection members having an aperture therein, each of the posts slidably extending through at least two of the connection members, a plurality of spacer members, each of the spacer members having an aperture therethrough, there being a plurality of spacer members slidably encircling each of the posts and separating the connection members thereof one from the other and separating the support plate from the base, a third post integral with the base and extending therefrom at the same side thereof as the pair of posts, and an actuator carried by the third post.

4. In a switch mechanism comprising a base, a pair of posts integral with the base and extending from one side of the base, the base having an aperture therein, a core having a reduced portion extending through the aperture of the base, the core extending from the base in the same direction as the posts, a coil encircling the core, the coil having a support plate attached thereto, the support plate having a pair of apertures therethrough, the posts slidably extending through the apertures, a plurality of electrical connection members, each of the connection members having an aperture therein, each of the posts slidably extending through at least two of the connection members, a plurality of spacer members, each of the spacer members having an aperture therethrough, there being a plurality of spacer members slidably encircling each of the posts and separating the connection members thereof one from the other and separating the support plate from the base, and a third post attached to the base and extending therefrom in the direction of the pair of posts, the third post having a longitudinal notch therein at the end thereof opposite the base, an actuator plate having a width substantially equal to the width of the third post, the actuator plate having a pair of lateral notches therein at opposite edges thereof, the actuator plate being pivotally carried by the third post within the longitudinal notch thereof with the lateral notches of the actuator plate intermeshed with lateral portions of the third post.

5. In a relay mechanism comprising a magnetizable base, a plurality of magnetizable posts attached thereto and extending therefrom at one side thereof, a magnetizable core attached to the base and extending therefrom at the same side as the posts, a coil encircling the core, a support plate attached to the coil, the support plate encircling at least one of the posts and slidably movable thereupon, a spacer member slidably movable upon the last said post and separating the support plate from the base, a plurality of electrical connection members slidably movable upon one of said posts and extending laterally therefrom, a spacer member encircling the last said post and separating the connection members, an actuator member carried by one of the posts and movable toward and away from the core, a leaf spring carried by one of the posts and in engagement with the actuator member urging the actuator member in a direction from the core, at least one of the connection members being a switch member, the actuator member being movable to engage the switch member for operation thereof, at least one of the connection members being a connection lug, the coil being electrically connected to the connection lug.

6. In a relay mechanism, magnetizable support structure, a core attached to the support structure and extending therefrom, a coil encircling the core, a magnetizable actuator plate carried by the support structure and movable toward and away from the core, a leaf spring carried by the support structure and in engagement with the actuator plate urging the actuator plate in a direction from the core, a plurality of resiliently movable switch members mounted upon the support structure so that a portion of each switch member encompasses a portion of the support structure, the actuator plate being engageable with at least one of the switch members for operation thereof as the actuator plate moves toward the core.

7. In a relay assembly, a magnetizable base member, a plurality of magnetizable post members integral with the base member and angular thereto, a magnetizable core member attached to the base and extending therefrom, an electric coil encircling the core member, a plurality of resilient electrical connection members encompassing at least one of the post members and extending therefrom and carried thereby, and insulator means separating the connection members one from the other and separating the connection members from the post members, a magnetizable actuator supported by at least one of the post members and pivotally movable to engage at least one of the connection members for movement thereof with respect to another connection member.

8. In a relay assembly, magnetizable support structure, a magnetizable core attached to the support structure, a coil encompassing the core, a magnetizable actuator member carried by the support structure and movable toward and away from the core, a leaf spring carried by the support structure and engageable with the actuator member urging movement thereof in a direction away from the core.

9. In a switch mechanism, a magnetizable base member, a magnetizable post member integral with the base member and substantially normal thereto, a plurality of conductor members encompassing the post member and carried thereby, insulator means encompassing the post member separating the conductor members one from the other and separating the conductor members from the post member, a cover plate encircling the post member adjacent the end thereof, the post member having an end portion bent over against the cover plate thus firmly retaining the conductor members and insulator means with respect to the post member and with respect to the base.

10. In a switch mechanism, a magnetizable base, a pair of posts integral with the base and extending from one side of the base, the base having an aperture therein, a core having a reduced portion extending through the aperture of the base, the core extending from the base in the same direction as the posts, a coil encircling the core, a plurality of electrical connection members, each of the connection members having an aperture therein, each of the posts slidably extending through at least two of the connection members, a plurality of insulator members, there being a plurality of insulator members slidably encircling each of the posts and separating the connection members thereof one from the other and separating the connection members from the posts, a third magnetizable post integral with the base and extending therefrom at the same side thereof as the pair of posts, a magnetizable actuator carried by the third post, the actuator having a portion movable toward and away from the core and engageable with at least one connection member of each of the posts for operation thereof.

11. A relay assembly comprising a magnetizable support structure, the support structure having a first portion and a second portion, said portions being angularly disposed one with respect to the other, a core carried by the second portion and extending substantially parallel to the first portion, a coil encircling the core, a plurality of electrical connection lugs electrically connected to the coil and directly carried by the first portion of the support structure, a magnetizable actuator member pivotally carried by said first portion and having a section thereof movable toward and away from the core, a resilient spring member carried by said first section and in engagement with the actuator member urging the actuator member in a direction from the core, the actu-

ator member being movable toward the core with energization of the coil, and resilient switch means attached directly to the first portion of the support structure and extending adjacent the actuator member, the switch means being engageable by the actuator member for operation thereof during movement of the actuator member toward the core.

12. A relay mechanism comprising a magnetizable base member, a plurality of magnetizable post members attached to the base member and extending substantially normal thereto, a coil, a magnetizable core attached to the base member and extending through the coil, a plurality of current conductive resilient stems directly carried by one of the post members, means electrically separating the stems and insulating the stems from the post member, the stems extending substantially normal to the post members, the stems having extending portions adjacent the core and engageable one with the other, a magnetizable actuator pivotally carried by one of the post members, the actuator being movable toward and away from the core, a leaf spring carried by one of the post members, the leaf spring engaging a portion of the actuator and urging the actuator in a direction from the core, a plurality of electric connection lugs carried by at least one of the post members and electrically connected to the coil, energization of the coil causing magnetization of the core and the base member and the post members and the actuator causing pivotal movement of the actuator toward the core, the actuator having portions thereof engageable with at least one of the stems causing relative movement between said stems.

13. A relay assembly comprising magnetizable support structure, the support structure being provided with a first portion and a second portion, said portions being substantially normal one to the other, a magnetizable core attached to the second portion, a coil encompassing the core, an actuator plate carried by said first portion and movable toward and away from the core, a leaf spring member engaging the actuator plate urging the actuator plate in a direction from the core, and resiliently operable switch means carried directly upon the first portion and extending adjacent the actuator plate, the switch means being engageable by the actuator plate for operation of the switch means during movement of the actuator plate.

14. A switch mechanism comprising a magnetizable base, a first magnetizable post and a second magnetizable post attached to the base and extending normal thereto, a magnetizable core attached to the base, a coil encircling the core, an electrical connection lug electrically connected to the coil and directly supported by the first post, a plurality of resiliently movable electrical contact stems engageable one with another and attached directly to the first post and extending adjacent the core, means insulating the connection lug and the contact stems from the first post, a magnetizable actuator plate pivotally carried by the second post and extending adjacent the core, the actuator plate being movable toward the core with energization of the coil, a leaf spring carried by one of the posts and in engagement with the actuator plate and urging the actuator plate away from the core, an arm attached to the actuator plate and engageable with one of the contact stems for movement thereof with movement of the actuator plate.

15. In a switch mechanism, a magnetizable base, magnetizable post means attached to the base substantially normal thereto, an actuating coil, a pair of connector lugs encompassing the post means and electrically connected to the coil, a magnetizable core firmly attached to the base and extending through the coil, a magnetizable actuator member directly carried by the post means and having a portion movable toward and away from the core, resilient means carried by the post means urging the actuator member away from the core, and switch means directly attached to the post means and extending adjacent the actuator member, the actuator member having portions thereof engageable with the switch means for operation thereof.

16. A switch mechanism comprising a magnetizable base, a plurality of magnetizable posts integral with the base and extending from the base, the base having an aperture therein, a core extending through the aperture of the base and attached to the base, the end of the core opposite the base having a slot therein, a shading coil of non-magnetic material having a portion disposed within the slot, the ends of the core being upset thus retaining the portion of the shading coil within the slot, a coil encircling the core, a plurality of electrical connection members, each of the connection members having a portion encompassing a post and extending therefrom, insulator means separating the connection members one from the other and from the posts, and a magnetizable actuator carried by one of the posts and extending adjacent the core and movable into engagement with at least one of the connection members for movement thereof with respect to another connection member.

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