Nov. 17, 1953 R. H. BOARDMAN 2,659,792

ELECTRIC SWITCH

Filed Feb. 21, 1950

FIG. 1

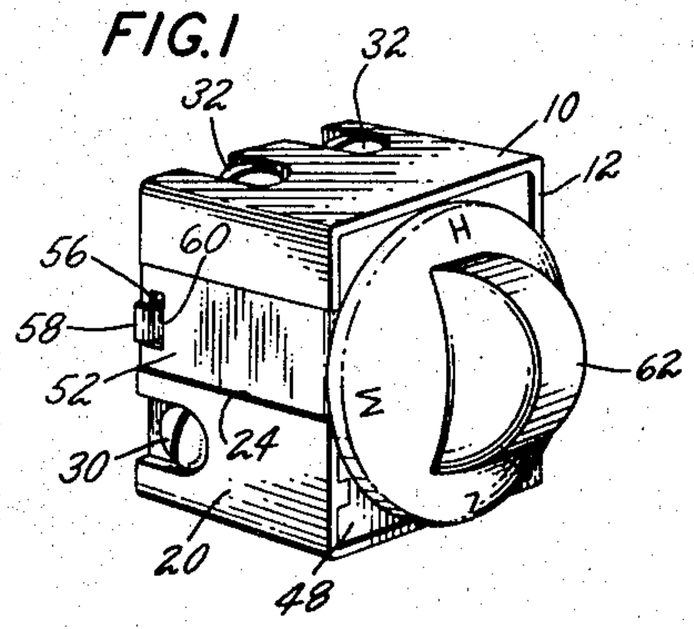


FIG. 2

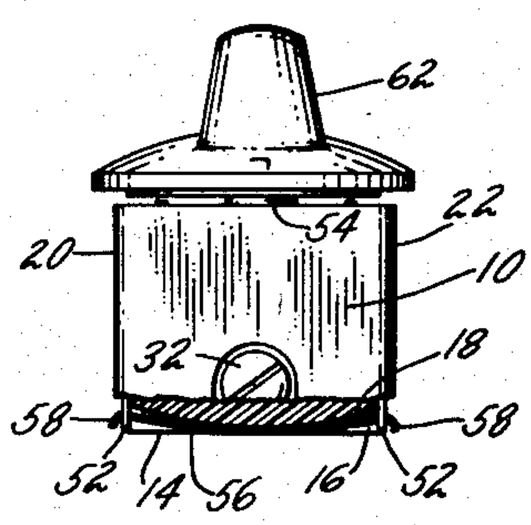


FIG. 3

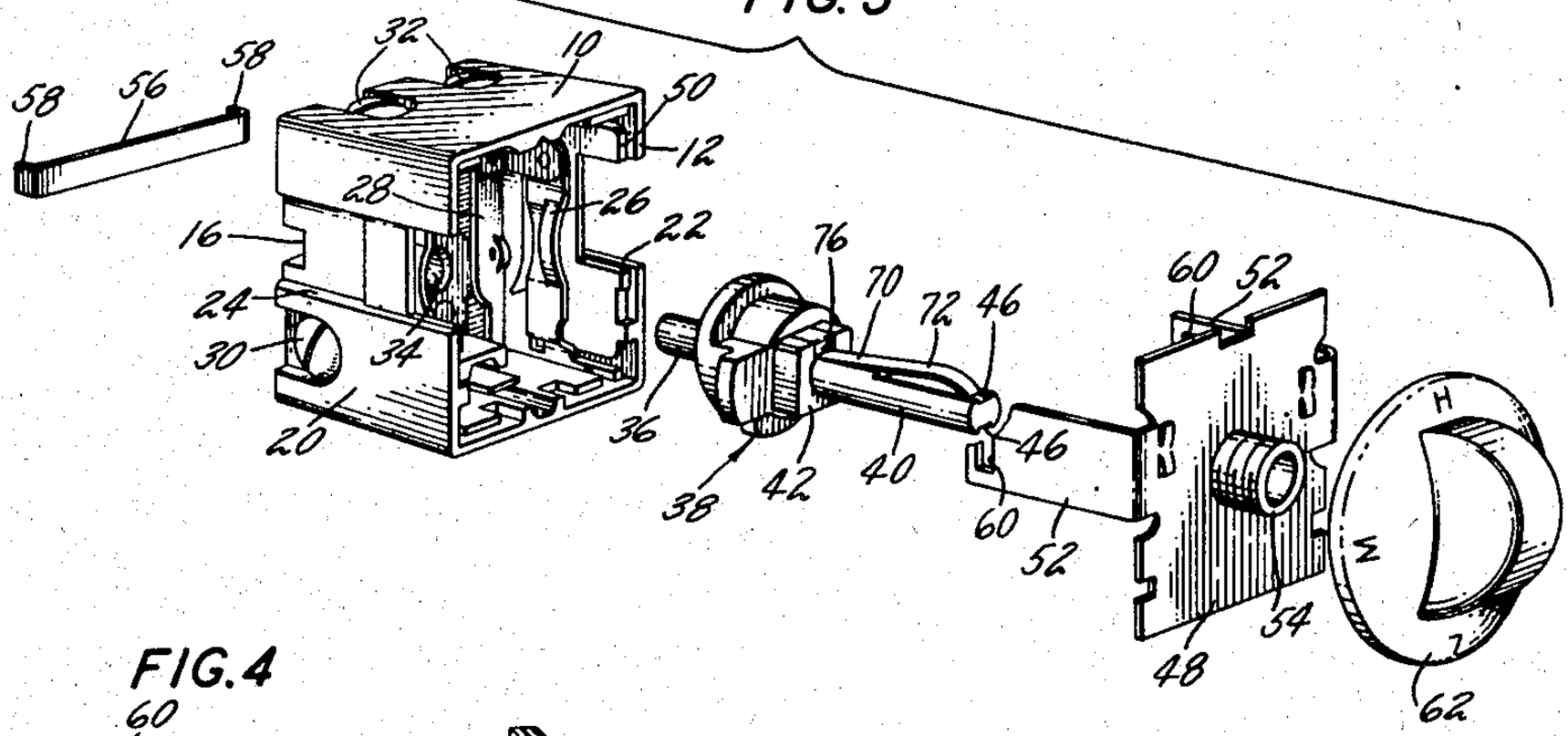
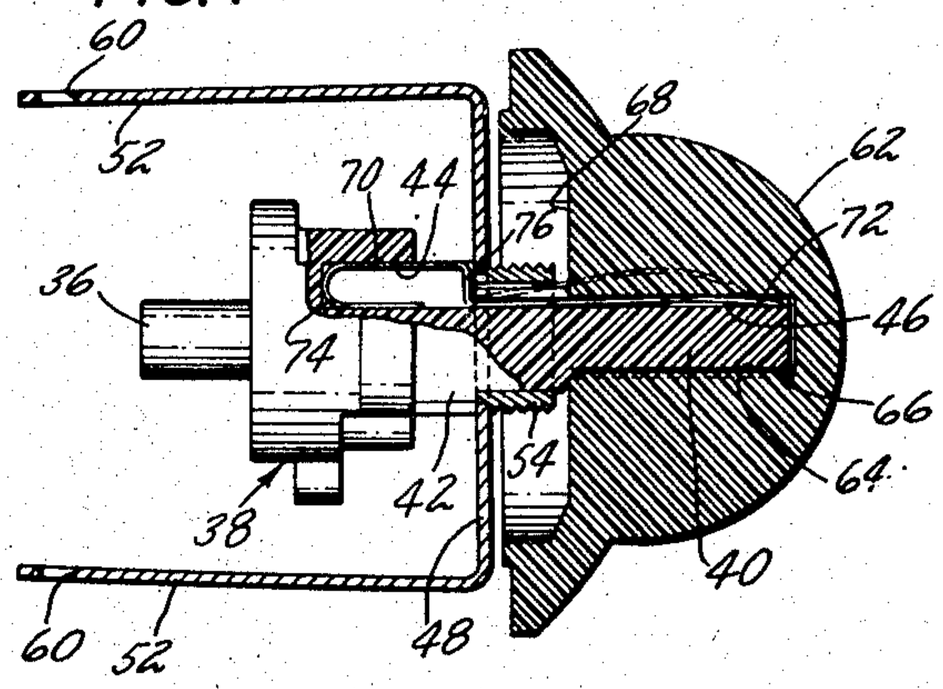


FIG. 4



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2,659,792

ELECTRIC SWITCH

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3 Claims. (Cl. 200—168)

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This invention relates to improvements in an electric switch and, more particularly, to mechanism by which certain elements of said switch are held in assembled relationship.

It is common practice in the manufacture of electric switches to provide switch casings containing the switching elements and means for actuating the same, the casing generally having an open side or top to permit mounting the switching members and operating means within the casing. A cover for said open side or top of the casing is then secured to the casing by any conventional means such as a plurality of screws which are threaded into the casing to hold the cover assembled to the casing. Such assembly by screws, for example, requires manual operations which are time-consuming and therefore costly.

Also, the switch operating means is generally actuated by a knob or handle which is easily detachable from a stem projecting from the operating member, and friction means in the form of a spring or otherwise are usually employed to detachably retain the knob on said operating stem. In some constructions presently in use, the spring is somewhat loosely supported by the stem or stem-receiving recess in the knob and, when the knob is removed from the stem, the spring is dislodged from its operative position and has to be replaced when the knob is restored to operative position upon the operating stem.

It is an object of the present invention to facilitate the securing of a cover to the open side of a switch casing by means requiring a minimum amount of manual operation, the locking of the cover to the casing being performed by the simple insertion of a single locking member requiring no threaded attachment.

It is another object of the invention to modify the switch casing without increasing the cost thereof so as to accommodate the locking means and facilitate the attachment thereof to the parts engaged thereby.

It is a further object of the invention to provide friction means for holding a manually operable knob to the stem of a switch actuating means, the friction means being maintained in operative position on said stem without possibility of detachment therefrom during the connection of the knob to the stem or separation of the knob therefrom.

Details of these objects and of the invention as well as other objects thereof are set forth in the following specification and illustrated in the accompanying drawing comprising a part thereof.

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In the drawing:

Figure 1 is a perspective view of an exemplary electric switch embodying the principles of the present invention.

Fig. 2 is a side elevation of the switch shown in Fig. 1, the casing of said switch being partly broken away to illustrate details of the invention.

Fig. 3 is an exploded perspective view illustrating components of the electric switch shown in Fig. 1.

Fig. 4 is a sectional view of a subassembly of some of the components of the switch shown in the other figures and shown on a larger scale than in said figures.

The exemplary switch embodying the present invention comprises a casing 10 which may be suitably molded to the desired shape from any suitable material such as, for example, a moldable phenolic resin resistant to the temperatures generated by the arcing of contacts contained in the casing. In the casing illustrated herein, one wall has been formed open such as the top 12, and a bottom 14 is molded integrally with the side walls of the casing. Extending transversely across the bottom and formed during the molding of the casing is a channel 16 having a convex bottom wall or surface 18. The sides 20 and 22 are also provided with molded channels or flat grooves 24 extending from the open top 12 to the bottom 14, said grooves 24 being parallel to each other and merging at one end with the channel 16 in the bottom 14, as is clearly evident from Fig. 3.

The specific arrangement of switching arms and contacts carried thereby is not of the essence of the present invention and is therefore illustrated only in a general way in Fig. 3. It is considered sufficient to state that the casing 10 contains a plurality of switch arms 26 and 28 which have contacts thereon engageable with fixed contacts supported within the casing but not illustrated in detail in Fig. 3. The various arms and contacts are connected with suitable terminal screws 30 and 32 by which circuit wires or conduits are connected to the switch.

Centrally of the bottom of the casing is a bearing aperture 34 which rotatably supports one end 36 formed on switch operating member 38 which may, for example, be molded from material similar to that from which the casing 10 is formed. Projecting oppositely to the end 36 on member 38 is an operating stem 40 by which the operating member 38 is rotated about its axis relative to casing 10 so as to cause various cams formed on member 38 to actuate the various switch arms

such as 26 and 28. The operating member 38 is also provided with an integral boss 42 having a recess 44 extending thereinto from the outer end thereof in a direction parallel to the axis of the stem 40. The stem 40 is also preferably provided with at least one longitudinal groove 46 for purposes to be described.

A cover 48 which is preferably formed from suitable sheet metal, but may be formed from any other suitable non-metallic material, if desired, is provided for purposes of closing the open top 12 of the casing 10. If desired, the rim of the open top 12 may be provided with a marginal recess 50 extending around the inner perimeter thereof for purposes of receiving the cover 48, whereby the outer surface of the cover may be flush with the top edges of the sides of the casing.

Connected at one end to opposite edges of cover 48 and extending transversely thereto are a pair of preferably slightly flexible, substantially parallel arms 52. In actual practice, when the cover 48 and arms 52 are out of contact with casing 10, it is preferred that the free ends of the arms 52 extend slightly closer to each other than the ends thereof connected to the cover, whereby the free ends of the arms 52 will snugly engage the bottom surfaces of the grooves 24 within the sides of the casing and within which grooves said arms are disposed when the cover is mounted in operative position to close open top 12 of the casing.

Extending centrally from the cover 48 is a threaded boss 54 which extends outward from the cover in an opposite direction from the arms 52. Said boss may be used for securing the switch to a suitable supporting panel, not shown, by being disposed through a hole therein and having a securing nut threaded to the boss 52 to clamp the switch to the panel. When the cover 48 is assembled so as to close the open top 12 of the casing, the inner surface of the cover 48 engages the outer end of boss 42 on operating member 38 so as to hold said operating member in its operative position within the casing. The operating stem 40 projects through and is rotatably supported within the central aperture of boss 54, whereby the operating member 38 is supported at its opposite ends by boss 54 and bearing aperture 34 within the casing 10. If desired, the cover 48 may also be used to retain in operative position within the casing 10 various panels, strips, or other positioning members, not shown, positioned between the inner surface of cover 48 and the various contacts and switch arms supported within the casing in accordance with common practice.

The cover 48 is secured in operative position over the open top 12 of the casing by means of a locking member 56 which extends transversely across the casing into engagement with the arms 52 which are disposed within the grooves 24 of the casing. The locking member 56 is preferably formed from flexible material such as a strip of spring steel, and the ends 58 thereof are bent at an angle thereto as shown in Figs. 1 through 3. The free ends of the arms 52 are provided with openings or slots 60 of sufficient width and length to permit the locking members 56 and the bent ends 58 thereof to be inserted through said slots while the member 56 extends transversely to the planes of the arms 52.

When the cover is assembled in operative position as described above relative to the casing 10, the slots 60 will be disposed adjacent the ends of channel 16 in the bottom 14 of the casing. The assembled casing and cover may be supported

within a suitable jig or fixture to hold them in assembled relationship, said jig or fixture being provided with openings or spaces adequate to permit, for example, insertion of one end 58 of the locking member 56 through the aperture 60 in one of the arms 52 from the exterior thereof, and then permit the locking member 56 to be slidably moved along channel 16 until the leading bent end 58 can be moved through the slot 60 in the other arm 52. Such insertion of the other end 58 can be made after locking member 56 is flexed a certain extent due to the intermediate portion of the locking member engaging the intermediate portion of the convex bottom 18 of channel 16 as illustrated in Fig. 2.

Following the insertion of said end 58 of the locking member through the slots 60 of the second arm 52, the resilience of the locking member 56 will cause the ends 58 thereof to snap a slight distance longitudinally of the arms 52 so that the ends 58 engage the outer surface of the arms 52 adjacent the slots 60 and prevent accidental movement of the locking member from the slots and arms. While there will be a slight space between the outer ends of locking member 56 and the end portions of the bottom of channel 16 when the member 56 is in locking position, the intermediate portions of the locking member and channel will be in firm engagement and the intermediate portion of the locking member will be flexed. The strength of the locking member 56 is also such as to prevent appreciable movement of the arms 52 and cover 48 relative to the casing 10 and the connection therebetween is also enhanced by the frictional engagement of the outer ends of arms 52 with the bottom surfaces of grooves 24 in the sides of the casing.

A manually operable knob 62, which may be formed by molding from synthetic resin or any other suitable material, is provided with a stem-receiving recess 64. Said recess 64 may contain a suitable rib 66 or any other suitable means for interengaging with one of the grooves 46 in stem 40 so as to prevent relative rotation between the stem and knob. Preferably, the knob also contains a cavity 68 extending inward from its inner surface for purposes of accommodating the threaded boss 54. The knob 62 is movable longitudinally of the stem 40, but means are provided for frictionally retaining the knob in operative position upon the stem. Said means comprise a spring 70 having an end 72 which is slightly curved longitudinally so as better to engage with greater friction the walls of the recess 64 in the knob 62. When the knob is removed from the end 72, said end will be spaced away from the stem as clearly shown in Fig. 3 and also, in dotted lines, in Fig. 4. When compressed into frictional engagement with the walls of cavity 68 of the knob, the spring end 72 will be at least partially disposed within one of the grooves 46 in stem 40.

The other end of the spring 70 is bent upon itself to form a compressible loop 74, the sides of which loop frictionally engage the opposite walls of the recess 44 formed in boss 42 of the switch operating member 38. Such frictional engagement of the loop 74 with the recess 44 will retain the spring operatively assembled with the operating member 38 prior to the attachment of the knob 62 to stem 40.

Intermediate the ends of the spring, the spring is bent to provide a laterally extending portion 76 which overlies the inner surface of cover 48 as clearly shown in Fig. 4. Thus, when the cover 48 has been assembled with casing 10 so as to hold

the operating member 38 in operative position within the casing, the lateral portion 76 of spring 70 will engage or be only slightly spaced from the inner surface of cover 48 and thereby prevent outward movement of the spring relative to the stem 40. Thus, when knob 62 is being secured to or removed from stem 40 the lateral portion 76 of the spring will prevent outward separative movement of the spring from the stem by engaging the cover 48, and the abutment of the innermost end of loop 76 of the spring with the bottom of recess 44 will prevent inward movement of the spring relative to the stem 40 as when the knob is being attached to stem 40. Thus, the knob 62 may readily be mounted upon the stem or withdrawn therefrom while spring 70 is prevented from separating from the stem 40.

It will be seen from the foregoing that the present invention provides an extremely simple, durable and inexpensive means for maintaining a cover detachably secured to a switch casing and the assembly of the attaching means may be performed quickly and inexpensively with a minimum requirement of manual operations. Inclusion of such securing means within the switch is accomplished by slightly modifying the switch casing, but such modification adds no expense to the production thereof. A substantial overall saving is thus possible when using the present invention to secure the cover to the switch casing, said cover when so secured also serving to retain in assembled, operative position the various movable contacts and switch arms embodied within the casing.

The retaining spring by which the operating knob is removably secured to the stem of the operating member of the switch is also inexpensive to produce and provides means for retaining the spring assembled with the operating stem and permits the attachment of the conventional knob to said stem or removal of the knob therefrom without dislodging the friction spring from its operative position on the stem.

While the invention has been illustrated and described in its preferred embodiment and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways, falling within the scope of the invention as claimed.

I claim as my invention:

1. An electric switch casing having a bottom provided with a convex surface portion and an open top, a removable cover for said open top, a pair of substantially parallel arms connected at one end to opposite edges of said cover and extending along opposite sides of said casing to said bottom, the free ends of said arms having openings therein disposed upwardly relative to the lower-most region of said convex surface portion, and locking means comprising a removable spring member flexed into engagement with said convex surface portion of said bottom and extending across said bottom between said legs and disposed at its ends within said openings in said legs to secure said cover to said casing.

2. An electric switch casing having an open top and a bottom provided with a channel extending across the exterior surface thereof between opposite sides of said casing, the bottom surface of said channel being convexly curved longitudinally, a removable cover for said open top, a pair of arms connected at one end to opposite edges of said cover and extending along opposite sides of said casing to said bottom, the free ends of said arms having slots therein, and a locking means comprising a spring strip bent at its ends to provide locking hooks and flexed into engagement with the intermediate portion of the convex bottom of said channel, said strip extending between said arms transversely to the planes thereof and the ends of said strip extending through said slots in said arms detachably to secure said cover to said casing, the bent ends of said spring strip being movable through said slots during assembly and engageable with the exterior surfaces of said arms to prevent accidental separation of the ends of said strip from said arms.

3. An electric switch casing having an open top and a bottom provided with a channel extending across the exterior surface thereof between opposite sides of the casing, a removable cover for said open top having a pair of arms depending from opposite edges thereof and extending along the opposite sides of the casing to said bottom, the free ends of said arms having slots therein disposed at opposite ends of said channel, and a removable spring strip having hook means at its ends engageable with said arms through said slots with the intermediate portion of said strip disposed within said channel and engaging the bottom of the casing to secure said cover to the casing.

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