

Nov. 27, 1951

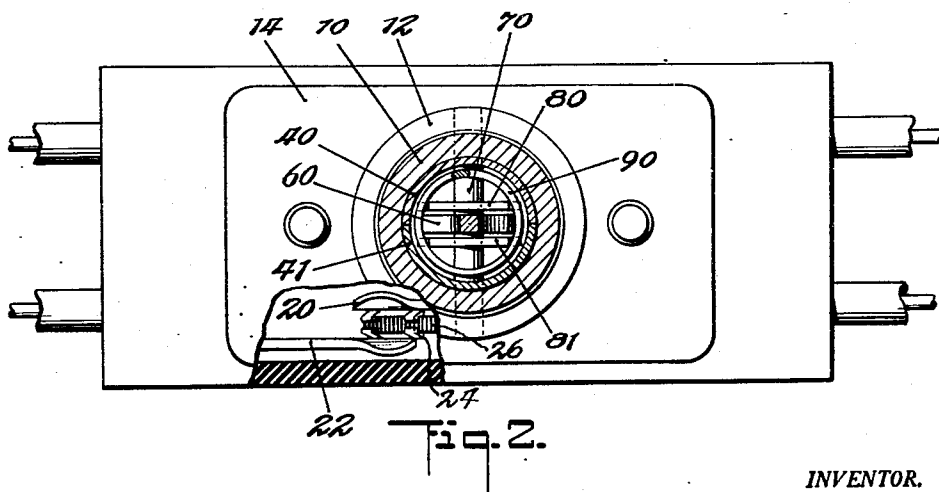
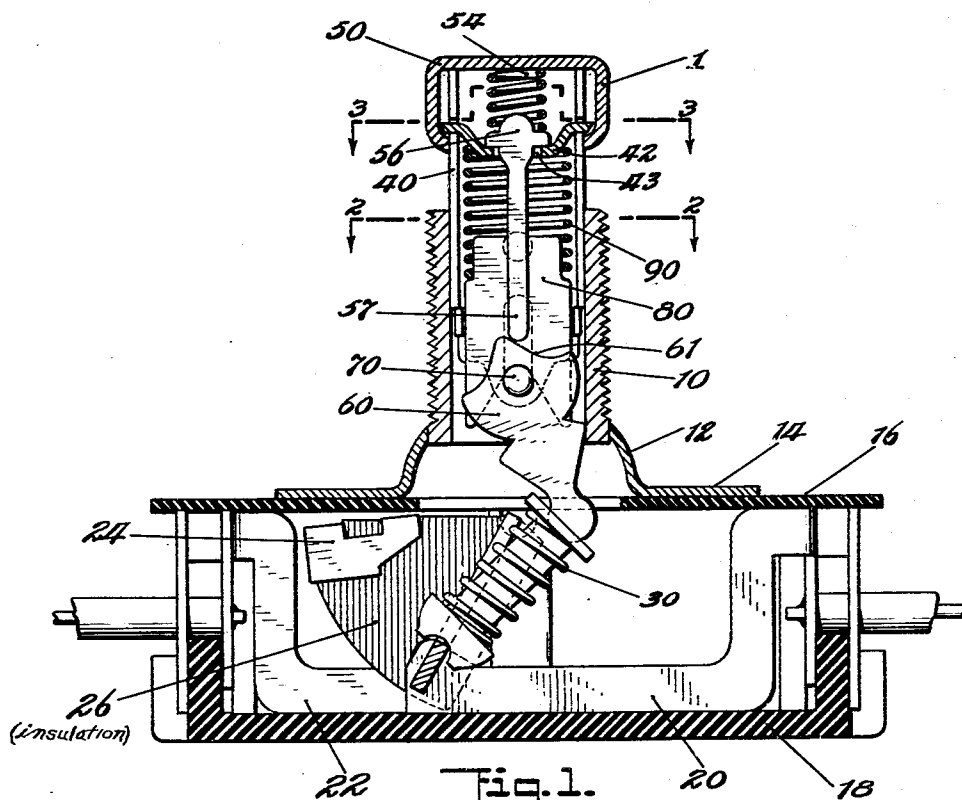
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2,576,771

OPERATING MECHANISM FOR ELECTRIC SWITCHES

Filed March 1, 1949

2 SHEETS—SHEET 1



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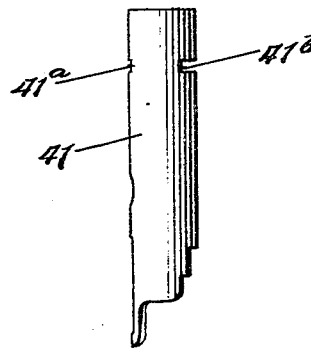
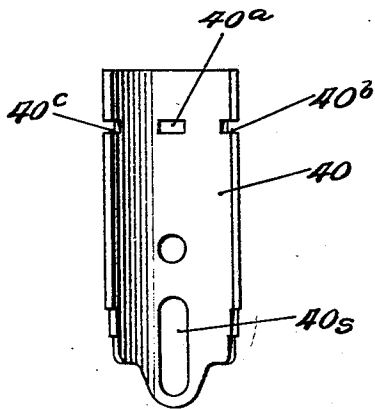
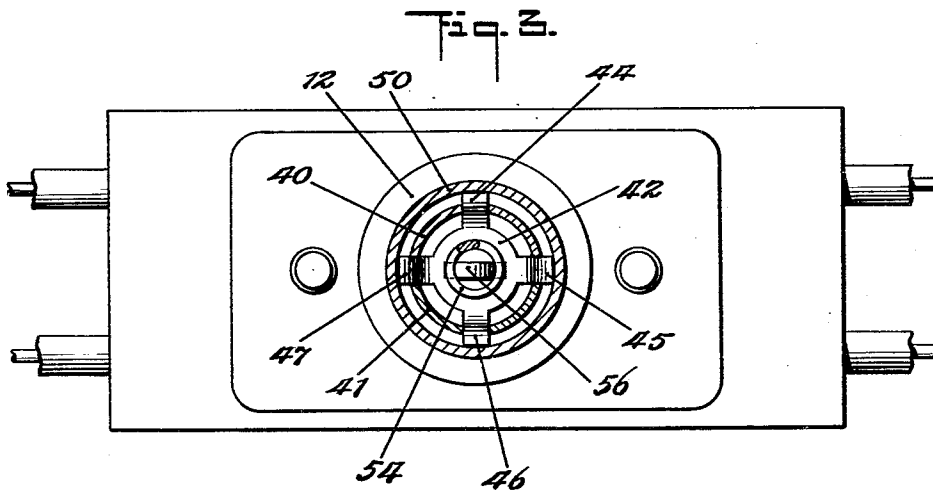
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2 SHEETS—SHEET 2



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OPERATING MECHANISM FOR ELECTRIC SWITCHES

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9 Claims. (Cl. 200-67)

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This invention relates to electric switches. More particularly it relates to the construction of operating mechanism for electric switches. As described, the invention is embodied in a switch wherein the operating member is pushed to cause movement of a contact through appropriate mechanism. However, the invention is applicable to other mechanisms of similar and related types as will become apparent.

Heretofore in the type of switch herein described, the cost has been relatively high for certain parts due to the fact they had to be made on screw machines or by similar relatively expensive methods. It has been known that stamped metal parts are less expensive to manufacture than parts made on a screw machine or the like.

With the foregoing in mind it is an object of the invention to provide an electric switch in which all of the parts of the operating mechanism, except the springs, may be stamped from sheet metal.

Another object of the invention is to provide an electric switch structure of the type wherein certain operating parts are within a hollow cylindrical member and in which the parts are so constructed and related as to permit said hollow member to be made in two identical symmetrical parts from stamped sheet metal and concomitantly to enable new and less expensive assembling methods to be employed than heretofore.

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

In the drawings:

Fig. 1 is a longitudinal section view through a switch embodying the invention;

Fig. 2 is a transverse section view taken along line 2-2 of Fig. 1;

Fig. 3 is a transverse section view taken along line 3-3 of Fig. 1;

Figs. 4 and 5 are interior and side elevation views respectively of one-half of the plunger.

Referring to the drawings, an exteriorly-threaded cylindrical metallic nipple 10 is fixedly mounted in and extends up from a boss 12 in a metallic cover plate 14 lying upon a thin sheet insulation plate 16. The plate 16 lies upon the top face of a molded insulating base 18. Narrow stationary stamped sheet metal contacts 20 and 22 extend into the hollowed-out central portion of the casing from opposite ends. A movable U-shaped switch contact 24 is adapted to bridge the stationary contacts 20 and 22 whose end portions lie adjacent one another. The movable con-

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tact 24 is bent around the edge and thus is carried by a sheet insulation rocker 26 which is moved by conventional switch mechanism of the over-center type, designated generally by the numeral 30.

The actuating means for the switch mechanism is located within the cylindrical nipple 10. The actuating means comprises a hollow cylindrical plunger 40 formed from two identical symmetrical stamped sheet metal parts as shown in detail in Figs. 4 and 5. The two halves of this plunger can be fitted together. When so fitted they hold a spider member 42 stamped from thin sheet metal and having four radial arms 44, 45, 46 and 47 which are spaced 90° apart and are bent or offset toward the top of the plunger from the plane of the body of the spider. Each half of the hollow plunger is provided with an aperture such as 40a in the upper part thereof and other recesses 40b and 40c diametrically opposite each other and at the same level as the aperture 40a. The recesses 40c and 40b are in opposite edge portions of that half of the plunger and are half the size of the aperture 40a. Hence when the two halves of the plunger are fitted together, the recesses such as 41b and 40b will cooperate to form an aperture equal in size to the aperture 40a. The apertures 40a and 41a in the two opposite halves are diametrically opposite each other. Thus said apertures and recesses receive the arms 44, 45, 46 and 47 respectively of the spider member 42. By making the plunger member in two identical halves, it is thus possible to insert the spider member when putting together the two halves of the plunger which would be impossible if the plunger were of one piece.

To hold the two halves of the plunger together and to afford a cover for its top, a cap member 50 which may be stamped from sheet metal or formed in any other suitable fashion, is placed upon the top of the plunger with its side portions concentrically surrounding the top portion of the plunger. The edge of the cap member extends below the position of the arms 44 to 47 and said edge is peened under said arms, said arms extending beyond the periphery of the plunger and thus serving to hold the cap in place after this peening-over process.

Between the cap 50 and the spider 42 is a stiff compression coil spring 54 which at its top bears against the inside of the cap 50. The lower end of the spring 54 bears upon a stamped sheet metal operating member 56 which is in shape of a cross, as best illustrated in Fig. 1.

The leg 57 of the operating member extends through a slot 43 in the spider 42. Both the operating member and the spring 54 are placed in position before the cap is secured over the two halves of the plunger. By this means the operating member 56 is resiliently mounted in or upon the spider 42 and within the cap 50.

The end of the leg 57 is adapted to engage with one or another of two cam surfaces such as is 61 on a contact-actuating member 60.

The cam surfaces are symmetrically arranged at the upper end of the contact-actuating member and are on opposite sides of the longitudinal axis of the member. The contact-actuating member 60 is pivotally mounted upon a retaining and thrust pin 70 which is fixedly and diametrically mounted within the nipple 10. This thrust pin passes through elongated slots such as 40s in each of the halves of the plunger, the slots in the halves being diametrically opposite to one another when the halves are placed together. Thus the plunger is permitted to move to and fro in an axial direction within the nipple 10 so far as is permitted by the slots.

In order to guide the movement of the operating member 57 and the contact-actuating member 60 in a diametrical plane, two flat thin guide plates 80 and 81 stamped from sheet metal are placed within the plunger in parallel relationship on opposite sides of the plane of the leg 57 and the contact-actuating member 60. In the bottom edges of these plates there are V-shaped recesses in the apex of which is located the thrust and retaining pin 70. The plates 80 and 81 are cut away from the top surfaces along their side edges about one-third of the length of the plate to receive and afford a seat for a spring 90 which acts to return the plunger to its uppermost position. Thus the spring 90 is located within the plunger. The top of the spring presses against the spider 42. Since the guide plates 80 and 81 rest upon the fixedly-positioned pin 70 and since the plunger-return spring 90 rests upon said plates, the lower end of the spring is thus fixed. As a result, the pressure of the spring is constantly upward against the plunger normally tending to raise the plunger into its uppermost position. This upward movement is limited by the engagement of the lower end of the slots, for example slot 40s with the retaining and thrust pin 70.

From the foregoing it will be understood that upon pressure being applied in a downward direction to the cap 50, the plunger will move down against the action of the spring 90 causing that spring to be compressed. The downward movement will cause the end of leg 57 of the operating member to slide over the cam surface 61 of the contact-actuating member 60 (to the right in Fig. 1) until the force of the leg moves the contact-actuating member 60 in a clockwise direction. This clockwise movement of the contact-actuating member 60 moves the switch mechanism 30 in a fashion well-known to those familiar with the art, causing the contact-actuating plate 26 to pivot with a snap action and causing the movable contact 24 to curve downwardly and bridge the stationary contacts 20 and 22.

Upon removal of the downward pressure from the cap 50 of the plunger, the plunger-return spring 90 will force the plunger upwardly carrying with it the operating member 56. During this movement the end of the leg 57 will be dragged over the point of intersection of the two cam surfaces at the top of the contact-actuating member 60. Thus the next time the plunger descends the

leg 57 will act upon the other of the cam surfaces of the contact-actuating member 60. However the overcenter action of the switch mechanism is not claimed as novel, it now being known and well understood by those skilled in the art.

From the foregoing it will be observed that by making the plunger of two identical halves, the plunger can thus be stamped from sheet metal. Also it is possible by such construction to insert the spider 42 in the plunger in a manner impossible with any other type of construction. The cap 50 of the plunger can also be stamped from sheet metal. Thus besides economizing in the structure of the plunger itself, the assembling of the parts within the plunger is facilitated by the novel structural details which form the subject of this invention.

Many modifications within the scope of the art, and applications of the invention to other switches of different details of construction, will be apparent to those skilled in the art. Therefore I do not limit it to the specific embodiment illustrated.

I claim:

1. In an electric switch mechanism, separable contacts, contact-moving means, actuating means for actuating said contact-moving means comprising a hollow actuating member formed of a plurality of separate longitudinally divided co-operating parts, a plurality of cooperating members including a spring to bias said actuating means to an inactive position all assembled within said actuating member and comprising the entire operating mechanism for said actuating means, and means holding said parts of said actuating member together with said plurality of cooperating members inside.

2. In a switch as claimed in claim 1 having a separate transverse support in said actuating member, and a cap on said actuating member comprising the means to hold the actuating member parts together, said support cooperating with said cap to hold the latter on said actuating member.

3. A switch as claimed in claim 1 wherein one of said plurality of cooperating members is an operating member within said actuating member, and means to resiliently support said operating member permanently in said actuating member.

4. A switch as claimed in claim 3 having guide means within said actuating member for said operating member.

5. In an electric switch mechanism separable contacts, contact-moving means, means for actuating said contact-moving means comprising an actuating member formed in at least two co-operating parts divided longitudinally, a resiliently mounted operating member within said actuating member, a support for said operating member mounted transversely in said actuating member, and a cap member over the ends of said parts of said actuating member holding them together after said operating member and support have been mounted therein.

6. In an electric switch mechanism separable contacts, contact-moving means, means for actuating said contact moving means comprising an actuating member divided lengthwise formed of two cooperating parts, identical sheet metal stampings, a resiliently mounted operating member within said actuating member, a support for said operating member mounted transversely in said actuating member, and a cap member over the ends of the parts of said actuating member and

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holding them together with said support and operating member inside.

7. A switch as claimed in claim 5 having guide means within said actuating member for said operating member, and a spring between said guide means and support.

8. An electric switch as claimed in claim 1 wherein the hollow actuating member is divided longitudinally into identical halves.

9. An electric switch as claimed in claim 1 having a separate transverse support in said actuating member, and a cap on said actuating member comprising the means to hold the actuating member parts together, said support cooperating

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with said cap to hold the latter on said actuating member.

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