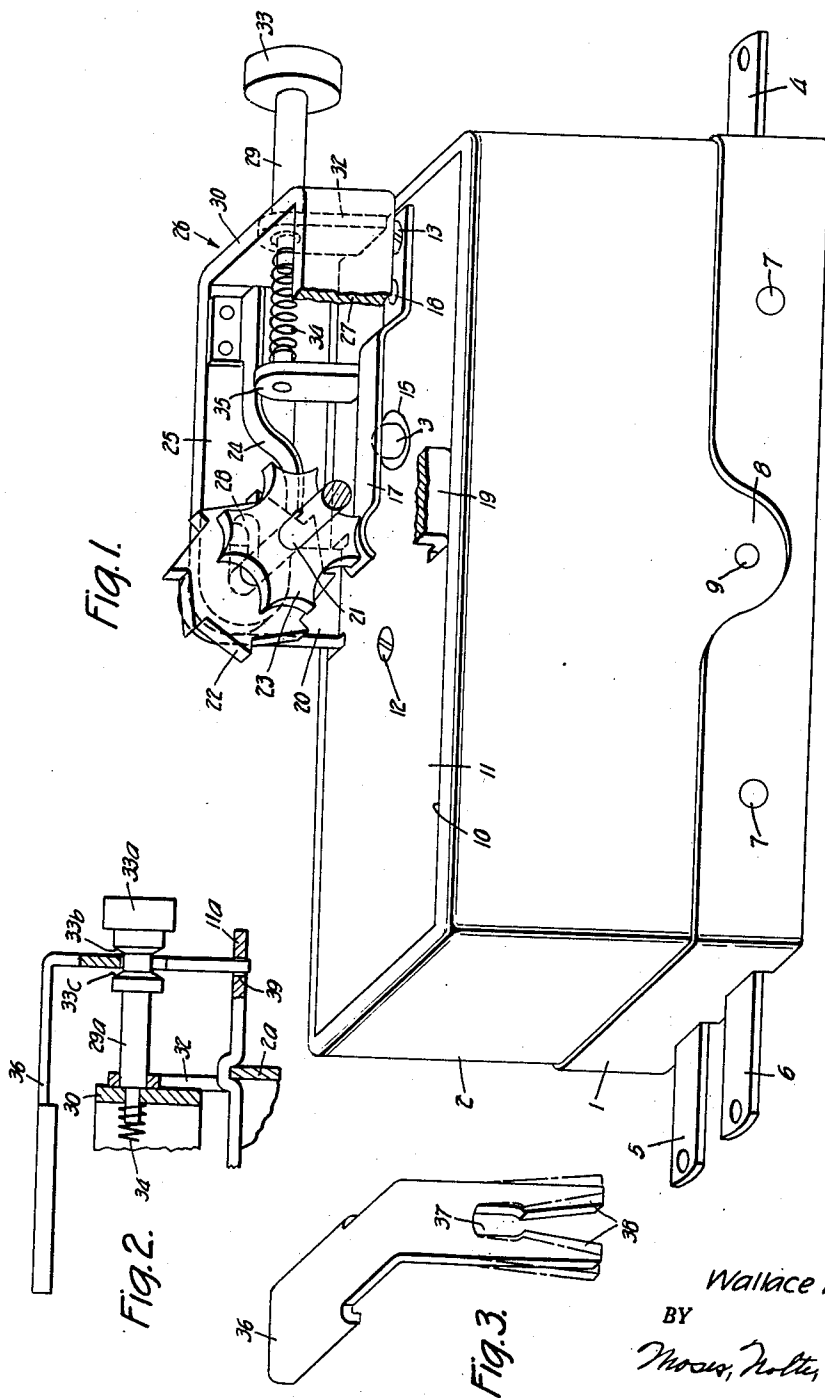


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SEQUENCE ACTUATOR FOR SWITCHES

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SEQUENCE ACTUATOR FOR SWITCHES

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This invention relates to switch actuating mechanism. It is a primary object of the invention to provide a simple, compact and inexpensive actuator attachable to a switch unit, and adapted to be designed to produce any prescribed cycle or schedule of operations for the switch in conjunction with other mechanism.

Other objects and advantages will hereinafter appear.

In the drawing forming part of this specification

Fig. 1 is a fragmentary perspective view showing a novel end actuator embodying features of the invention attached to a switch of standard construction;

Fig. 2 is a fragmentary view showing an overhead actuator embodying the invention applied to a switch of standard construction; and

Fig. 3 is a perspective view of a bell-crank actuating member employed in the actuator of Fig. 2.

The switch illustrated in Fig. 1 may be in all substantial respects identical with the switch disclosed and claimed in a pending application of Peter J. McLaren and Cyril O. Benson, Serial No. 718,832 filed December 27, 1946, now Patent No. 2,521,015 for Snap Over Toggle Switch. Reference may be had to said pending application for a full, detailed disclosure of the switch.

The switch comprises lower and upper casing members 1 and 2 within which a snap over toggle switch mechanism is mounted. The switch mechanism is arranged to be actuated by a plunger 3. The lower casing member 1 is provided with contact tongues 4, 5 and 6. The contact tongue 4 is invariably connected, directly or indirectly, to one terminal of a voltage source, while the tongues 5 and 6 are alternatively, selectively connected to the opposite terminal of the voltage source.

The movable switch contact moves up in response to a downward thrust of pin 3, and moves down as the pin returns to the up position. The tongue 5 is connected to a conductor which extends above the movable switch member within the casing to engage said member in the down or actuated position of the plunger 3, while the tongue 6 is connected to a lower contact which extends below the movable switch member to engage it when the plunger 3 is in the up or normal position. The more common practice is to connect the tongue 5 in circuit and leave the tongues 6 unconnected, so that the up position of the plunger 3 will be an open circuit position, and the down position will be a closed circuit posi-

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tion. In some instances, however, the tongue 6 may be connected and the tongue 5 left unconnected, so as to make the upper contact an active one, and the lower contact an idle one.

The lower casing member 1 is formed with openings 7 through which mounting screws (not shown) may be passed for securing the casing to a supporting structure. The upper casing section 2 has ears 8 which fit into recesses formed in the side margins of the lower casing section 1. A pin 9, passed into the ears 8, and through the central body portion of the lower casing section 1, serves to secure the casing sections in fixed relation to one another.

The casing sections 1 and 2 are desirably molded of an insulating, phenolic condensation product such as Bakelite. The upper casing section 2 has formed in its upper face a recess 10, shown as generally rectangular, to receive and firmly locate a metallic adapter plate 11. The upper casing member 2 is formed with two drilled openings in which case hardened, self-tapping screws 12 and 13 are threaded for securing the adapter plate to the casing. The adapter plate is formed with an opening 15 through which the plunger 3 passes.

The spring arm 17 is attached to the plate 11 by a single rivet 18, and is held against turning by the screw 13, which is passed through it.

The plate 11 is formed with a pair of upstanding ears 19 and 20 at its opposite sides which provide aligned bearings for a rotatable shaft 21. The shaft 21 has fast upon it a ratchet wheel 22 and a cam 23. The cam 23 includes a succession of notches at tooth space intervals which are of varying depth. The shaft is advanced through the ratchet wheel a tooth space at a time by mechanism to be described, and causes the cam 23 to be correspondingly advanced in contact with the leaf spring 17.

The leaf spring, influenced by the cam, operates the actuating plunger 3 of the switch, the plunger being held down when the cam occupies a position like that shown in the drawing, and being allowed to rise when the cam is advanced to locate a deeper notch over the end of the leaf spring 17. The leaf spring 17 serves both as an operating member for the plunger, and also as a spring detent for preventing over-travel of the ratchet wheel and retrograde movement thereof.

The ratchet wheel is operated by a pawl 24 which consists of a leaf spring affixed to one arm 25 of a U-shaped slide frame 26. The opposite arms 25 and 27 of the frame 26 are formed with slots 28 through which the shaft 21 passes. As

the frame 26 reciprocates to carry the pawl to and fro, it is supported and guided in part by the shaft 21. The U-shaped frame 26 spans the ratchet wheel 22 and the cam 23.

A stem 29 rigidly attached to the body 30 of the frame 26 is slidably guided and supported in an upstanding ear 32 of the plate 11. The stem is desirably provided with an operating collar 33 at its outer end which may be actuated manually or by a cam (not shown). A compression coil spring 34 is interposed between the body 30 of the frame 26 and a fourth upstanding ear 35 of the plate 11. The spring 34 urges the frame 26 toward the right as the parts are shown in the drawing to the retractive limit of movement of the pawl 24. When the stem 29 is thrust toward the left as far as it can go, a feed step is imparted to the ratchet wheel 22, and hence to the shaft 21 and the cam 23.

The cam 23 is shown as having alternate shallow and deep notches. The sequence can be varied in any desired manner, however, so as to produce a sequence of operations of the switch harmonious with the law of operation of the mechanism in connection with which the switch is used.

In some installations it is advantageous to adapt the sequence actuator for operation from the top rather than the end of the switch. To this end, the structure of Fig. 1 is modified as illustrated in Fig. 2 to provide an overhead actuator.

Except for the parts which will be described in detail, the sequence actuator of Fig. 2 is the same as that of Fig. 1. The adapter plate 11 of Fig. 1 is replaced by a longer adapter plate 11a as illustrated in Fig. 2, but otherwise the entire mechanism of Fig. 1 is retained. The button 33a of Fig. 2 which corresponds to the operating collar 33 of Fig. 1 is provided with a reduced portion in which is formed a circumferential groove defined by tapered sides 33b and 33c. A bell crank actuator 36 (see Fig. 3) is provided with a slotted opening 37 and with legs 38. The actuator is normally loosely confined in the button groove and in suitable openings 39 which are formed in the adapter plate 11a. Confinement of the actuator 36 is accomplished by initially forming the opening into the slot 37 wide enough to pass the waist portion of the button 33a between the shoulders 33b and 33c as shown by dotted lines in Fig. 3, and then reducing the opening by crimping the legs 38 together after the assembly of the parts has been effected. The structure of Fig. 2 with the bell crank 36 omitted may be provided if only end operation is desired. Alternatively, the structure as illustrated in Fig. 1 may be utilized.

I have described what I believe to be the best embodiments of my invention. I do not wish, however, to be confined to the embodiments shown, but what I desire to secure by Letters Patent is set forth in the appended claims.

I claim:

1. A switch actuator adapted for application to a switch unit comprising, in combination, a mounting plate attachable to the switch unit, a switch actuating member carried by the plate, a shaft, ears on the mounting plate for providing aligned bearings for the shaft, a cam fast on the shaft for engaging and operating the actuating member, a ratchet wheel fast on the shaft, a pawl for actuating the ratchet wheel step by step, a frame upon which the pawl is mounted, said frame being U-shaped to span the cam and the ratchet wheel and having guide slots in its legs through which the shaft extends, the frame also including a rigid operating stem, and an ear on the mounting plate in which the stem is slidably supported.

2. A switch actuator adapted for application to a switch unit comprising, in combination, a mounting plate attachable to the switch unit, a switch actuating leaf spring carried by the plate, a shaft rotatably supported by the plate, a ratchet wheel fast on the shaft, a pawl for advancing the ratchet wheel a tooth space at a time, a cam fast on the shaft for engaging and operating the switch actuating leaf spring, the cam having a succession of notches of varying depths at tooth space intervals, and the switch actuating leaf spring having a rounded projecting portion for entering the notches and adapting the spring to serve effectively also as a spring detent cooperating with the cam to prevent over-travel of the ratchet wheel and retrograde movement thereof.

WALLACE A. LAUDER.

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