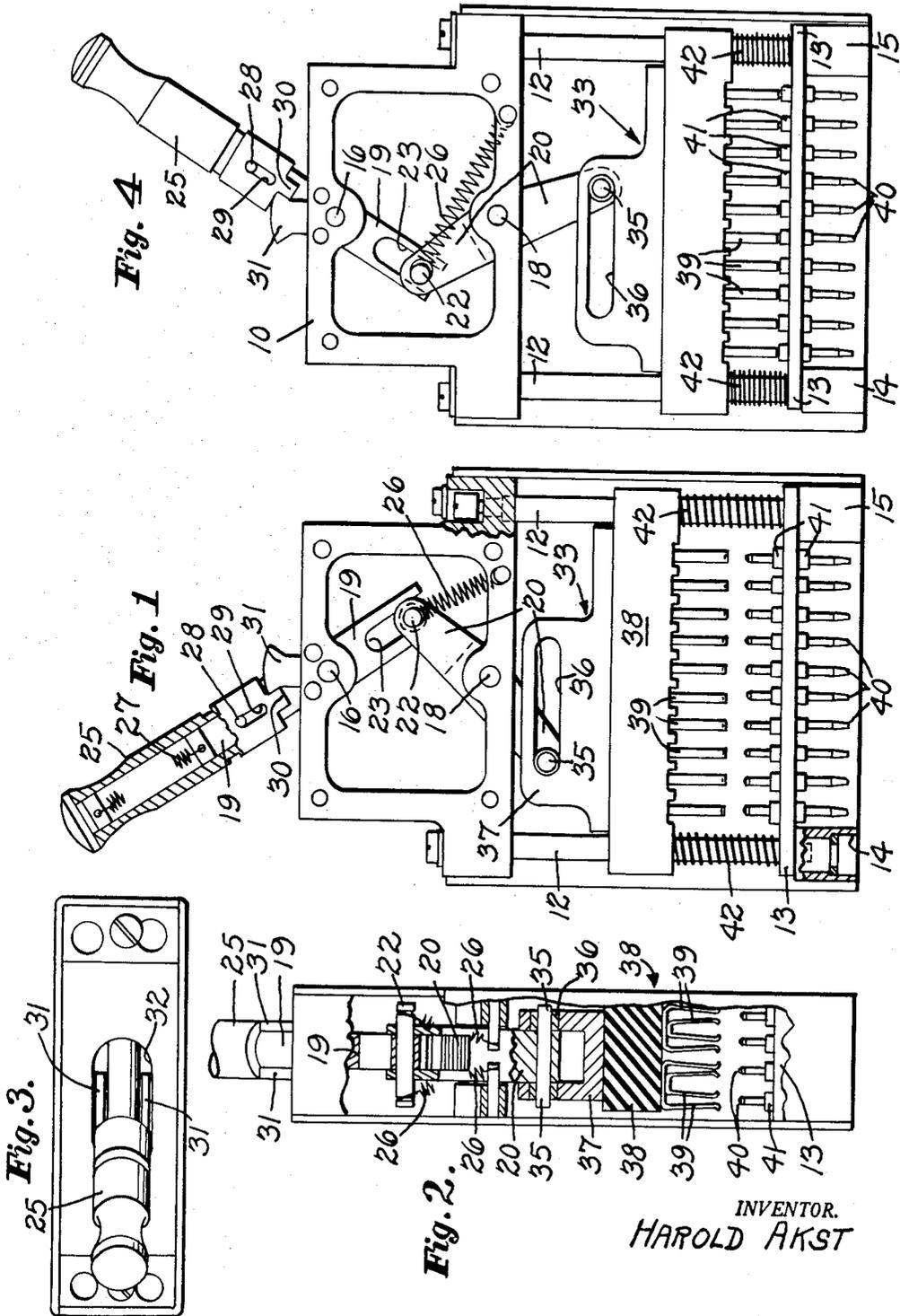


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MULTI-CONTACT MANUALLY-OPERATED ELECTRIC  
SWITCH WITH LEVER ACTUATING MEANS  
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2

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**MULTI-CONTACT MANUALLY-OPERATED ELECTRIC SWITCH WITH LEVER ACTUATING MEANS**

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This invention relates generally to electric switches and more particularly to manually-operated toggle switches.

An object of the present invention is to provide a rugged, simply assembled switch having a small number of parts and which may be manufactured at a low cost.

Another object of the present invention is to provide a toggle-type switch having an actuating mechanism which locks the switch contacts in either the open or the closed position to prevent accidental dislodgement.

The foregoing objects and advantages and others will become apparent during the course of the following description taken in conjunction with the accompanied drawings in which:

FIG. 1 is a front elevational view of an electric switch embodying the invention;

FIG. 2 is a side view of the structure of FIG. 1 with parts in section;

FIG. 3 is a plan view of the structure of FIG. 1; and

FIG. 4 is a view similar to FIG. 1 with the movable parts of the switch in their opposite extreme positions.

Referring to the drawings in greater detail, 10 designates a frame which is a part of the switch body into which it is assembled by means provided on it for this purpose which include shouldered apertures at each of its sides through which extend posts 12 that are arranged in pairs at the sides of the switch and serve to join to the frame a terminal board 13 backed up by mounting blocks 14 and 15 at the other end of the switch. The frame 10, which is also a part of a toggle actuating mechanism, provides a pair of pivot axes fixed in spaced relation to each other at which, by means of pins 16 and 18, are pivotally mounted levers 19 and 20, each of which has an end connected to the other within the frame by structure which permits the ends to travel in separate arcuate paths but dependently between two stable conditions of the toggle. Such structure, in the instance, comprises a pin 22 and a slot 23 connection, the pin being carried on the end of the lever 20 which is bifurcated as shown in FIG. 2 to accommodate the slotted end of the lever 19. The pin 22 is actuated directly by manipulation of a handpiece 25 on the free end of the lever 19 and moves across the line joining the pair of pivot pins 16 and 18 between the position shown in FIG. 1 corresponding to the relaxed condition of the toggle and the position shown in FIG. 4 corresponding to the over-center condition of the toggle. A pair of tension springs 26 connect the pin 22 to the frame as shown to yieldably bias the toggle into its relaxed position.

The handpiece 25 is telescopically engaged over the free end of the lever 19 and yieldably urged inwardly on such end by a tension spring 27 and against a stop 28 for which purpose slots 29 are provided in the lower end of the handpiece 25. The tension spring 27 has one of its ends affixed on the lever 19 and the other to the inside of the handpiece as shown in FIG. 1. The handpiece 25 is provided with a pair of ears 30 on its lower end below the slot 29 by which it is locked in its throw positions on opposite sides of bosses 31 which project from the top of the frame 10 within an elongated slot 32 in the top cover plate of the switch. The switch also has front, back and side cover plates as shown but is without a bottom cover plate for effecting electrical connection to the switch as will be later explained. In order to

rotate the lever 19 about its pivot axis at the pin 16, the handpiece 25 must be pulled upon outwardly of the free end of the lever 19 against the urging of the spring 27 until ears 30 clear the bosses 31 so that the lever 19 can move within the slot 32 between the bosses 31. Even under the most severe demands of service, the intermediate toggle pin 22 cannot be accidentally dislodged from its extreme positions.

The end of the lever 20 opposite that which carries the pin 22 is coupled to a movable contact assembly 33 by means which include a pin 35 on this end of the lever and slots 36 in the spaced upright sides of a part 37 of the assembly 33. The lever 20 is arranged on its pivot axis at the pin 18 with relation to its operative ends where the pins 22 and 35 are located as a bellcrank to move the pin 35 through an arc which, while being the same as that for the intermediate toggle pin 22, will produce a greater axial movement end to end of the switch. The part 37 of the assembly 33 and the slots 36 therein are arranged to one side of the center of the switch where the pin 35 operates as shown and this part is fixed fast to an insulated body portion 38 provided with bores on its opposite sides that make a snug sliding fit with the posts 12 to stabilize the movement of the assembly.

On the underside face of the portion 38 between the posts 12, transverse tracks are provided, as shown, each of which accommodate a pair of bridging contacts 39 that have spring fingers for extended sliding engagement with the upper ends of prong contacts 40 embedded in the terminal board 13. Each contact 39 bridges a transverse adjacent pair of contacts 40 as shown in FIG. 2 and each of the latter has a lower end which, like the upper end, is insulated from the terminal board 13 by the insulating means shown as indicated at 41. The terminal board 13 and the lower ends of the contacts 40 protruding therefrom serve with the lower edges of the front and back cover plates and with the mounting blocks 14 and 15 as a multicontact plug-in receptacle for effecting electrical multiconnection to the switch. Each transverse adjacent pair of contacts 40 that are bridged by one of the contacts 39 may carry an electrical circuit which will be either interrupted or made depending upon the position of the movable contact assembly in relation to the stationary one. The cooperating contacts 39 and 40 are in make position over the majority of the travel of the movable assembly but its movement is rapid due to the direct toggle action described so that a very smooth and efficient make and break action is regularly obtained with multi-contacts. The action of the switch in interrupting the multi-circuits is accelerated by the toggle mechanism described, particularly in the arcuate path of movement imparted to the pin 35 by the intermediate toggle pin 22, and by balanced anti-inertia forces which are imparted to the movable assembly during its disengagement movement by means which include compression springs 42 concentrically disposed individually about each post 12 between the terminal board 13 and the portion 38 of the movable assembly.

It will thus be seen that there has been provided by the present invention an improved electric switch in which the objects hereinabove set forth together with many thoroughly practical advantages have been successfully achieved. It should be understood that variations and changes may be resorted to without departing from the ambit of the invention as defined in the appended claims.

What is claimed is:

1. An electric switch comprising a frame, a first manually operable lever having a spring-biased handpiece thereupon, said first lever pivoted on said frame and rotatable between two extreme positions, a second lever pivoted on said frame, said second lever in sliding engagement

3

with and rotatable in response to the rotation of said first lever, a stop means on said frame, said stop means engaging said handpiece when said first lever is in one of the two extreme positions and preventing the rotation thereof in the absence of a manual force overcoming the spring bias of said handpiece, a support means depending from said frame, a movable contact assembly slidably positioned on said support means, a terminal board carried by said support means, and actuating means urging said assembly along said support means in response to the rotation of said second lever.

2. The switch of claim 1 further including a first plurality of contacts on said assembly and a second plurality of cooperating contacts on said board, the movement of said assembly toward said board effecting electrical multi-connections therebetween.

3. An electric switch comprising a frame, a first manually operable lever having a spring-biased handpiece thereupon, said first lever pivoted on said frame and rotatable between two extreme positions, a second lever pivoted on said frame, said second lever in sliding engagement with and rotatable in response to the rotation of said first lever, a stop means on said frame, said stop means

4

engaging said handpiece when said first lever is in one of the two extreme positions and preventing the rotation thereof in the absence of a manual force overcoming the spring bias of said handpiece, a support means depending from said frame, a movable contact assembly slidably positioned on said support means, said assembly having an upstanding portion with a slot therein, and a pin on one end of said second lever extending into said slot, whereby the rotation of said second lever causes said pin to move along said slot and urges said assembly along the support means.

## References Cited by the Examiner

## UNITED STATES PATENTS

1,729,756	10/29	Wood	200—153
1,852,336	4/32	Samuels et al.	200—153 X
2,174,232	9/39	Baker	200—116
2,211,107	8/40	Fisher et al.	200—116
2,370,206	2/45	Taylor	200—116
2,654,055	9/53	Kilminster	200—163 X

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