March 28, 1950 R. N. ROWE 2,501,742

QUICK MAKE AND BREAK MECHANISM
FOR ELECTRIC SWITCHES
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Fig. 1

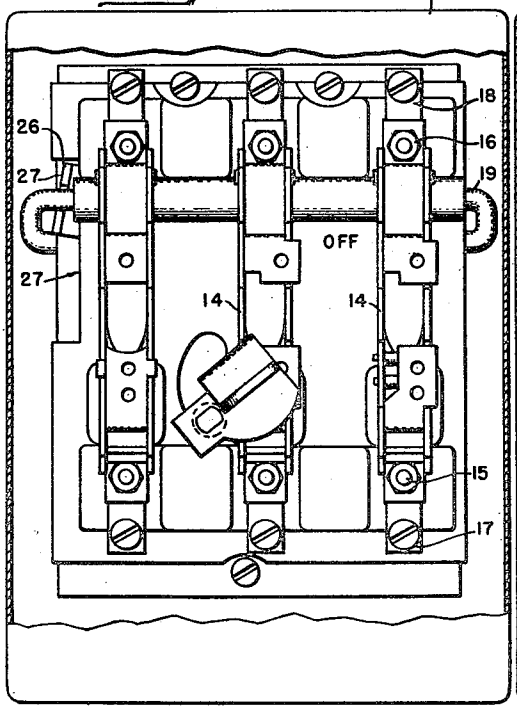
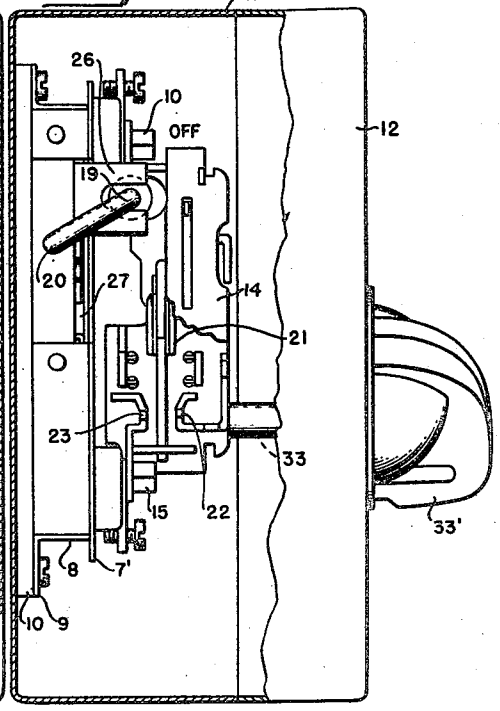


Fig. 2



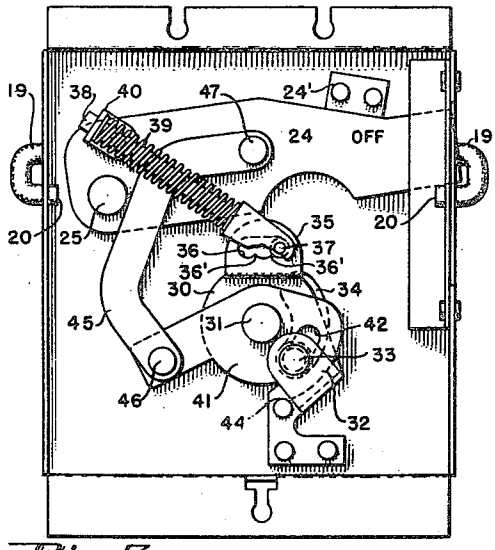


Fig. 3

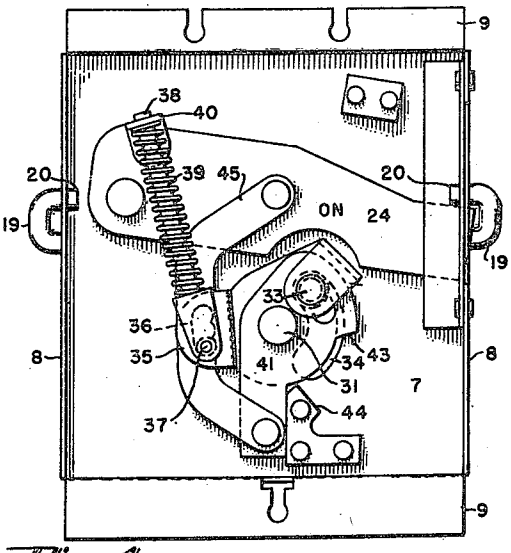


Fig. 4

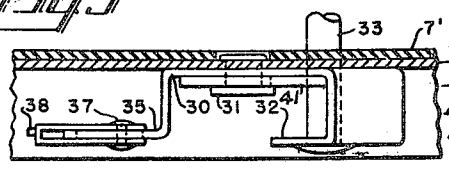


Fig. 5

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QUICK MAKE AND BREAK MECHANISM FOR ELECTRIC SWITCHES

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8 Claims. (Cl. 74—97)

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The invention relates particularly to throwing mechanism which is manually operable and applicable to various types of contact mechanism.

The main object is to provide a simple and reliable snap action mechanism requiring but few and simple parts.

Other objects are to provide a snap action mechanism which can be readily assembled and easily inspected and which is cheaper to make.

Another object is to provide a snap acting mechanism with a dead center position so unstable that it is impossible as a practical matter to stop the mechanism on the dead center position.

Another object is to provide a snap acting mechanism which is extremely compact so as to be suitable for use in a box behind the switch units which it operates.

The form shown is especially adapted to use with front operated switches of the enclosed type but the invention is not so limited.

Fig. 1 is a front view of an enclosed type of switch embodying my invention showing the cover broken away and the switch parts in the "off" position.

Fig. 2 is a side view and partial section of the same.

Fig. 3 is a view of the back of the switch showing the quick make and quick break mechanism in the "off" position.

Fig. 4 is a view similar to Fig. 3 but showing the parts in the "on" position.

Fig. 5 is a fragmentary detail edge and sectional view showing the mounting of the actuating hub and shaft.

As the invention relates to the quick make and quick break mechanism the other parts need only be described briefly.

The base plate 7 has flanges 8 extending backward and terminating at the ends in feet 9 adapted to be secured to a support 10 in the bottom of the box 11 having a cover 12.

Switch units such as 14, 14 are suitably mounted on the front of the base plate being secured by nuts 15, 16 and provided with circuit terminals 17 and 18. Such a unit is shown and claimed in my application Ser. No. 708,375 filed Nov. 7, 1946, now Patent 2,468,235. An insulating plate 7' is interposed between the plate 7 and the switch units.

These switch units are actuated by a crank shaft 19 hinged at 20 in the side flange 8. The shaft extends in front of the base plate and beneath the switch units and is connected in any suitable manner with suitable movable switch members 21 which coact with contacts 22 and 23 for instance as shown in my said Patent 2,468,235.

The throwing lever arm 24 is pivoted at 25 and has a forked tip 26 bent around one side of the

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base plate through a slot 27 to connect with one arm of the crank shaft 19. A stop 24' may be provided for arm 24.

An oscillatable hub 30 is pivoted on a central bearing pin 31 beneath the base plate 7 and has an offset 32. The actuating shaft 33 passes through an arcuate slot 34 in the base plate and through the hub and is secured to the hub 30 and the offset 32 so that the hub can be turned by the shaft 33 through an angle limited by the length of the slot 34. The shaft has an external handle 33' of suitable construction.

The hub plate has an offset 35 with a slot 36 to receive a bearing roller or pin 37 on the end of the rod 38 which carries the spring 39. This spring is compressed between the head of the rod 38 and the lug 40 pivoted to the lever arm 24 so as to tend to rotate the hub plate clockwise as viewed in Fig. 3 and counterclockwise in Fig. 4 about 90°.

A rocker 41 is also pivoted on pin 31 and has a slot 42 through which the shaft 33 passes. The spring pressure therefor biases the hub plate, the shaft 33 and the rocker 41 to the position of Fig. 3 where the shoulder 43 abuts against the stop 44 so that the rocker may have a free turning angle of about 60°. The link 45 passes to one side of the hub and connects the rocker arm at 46 with the lever arm 24 at 47.

To move the parts from the "off" position of Fig. 3 to the "on" position of Fig. 4 it is merely necessary to turn the hub plate 30 anti-clockwise as viewed in Fig. 3 by means of the shaft 33. As soon as the bearing 37 passes the line of centers (31—40), the bearing 37 will slide from the right hand end of slot 36 to the left hand end and thus suddenly reverse the action of the spring and throw the parts to the "on" position of Fig. 4 when the arm of the rocker 41 abuts against the stop 44. This construction makes it practically impossible to stop the mechanism in its dead center position.

To turn from the "on" to the "off" position the action is reversed.

To further ensure avoidance of a dead center action, I may provide an inclined shoulder 36' near each end of the slot 36 so that when the hub member 34 is being turned the roller bearing 37 will be held back until the center line has been passed whereupon the bearing will slip over the shoulder and suddenly pass to the opposite end of slot 36 and reverse the action of the spring.

It will thus be seen that the parts are simple and of such a form as to be easily made and as small as practical considering the forces they must transmit.

I claim:

1. In a quick make and break switch, a base plate, a hub mounted on said plate and having two offset arms and having a limited rotative

movement on said plate, an actuating shaft passing through said plate and connected to said hub and to one of said offset arms, a rocker pivoted coaxially with said hub and having a lost motion connection with said hub and shaft, a throwing arm hinged to said plate at one side of said hub, a link connecting said rocker to said arm, a rod and spring interposed between the other arm of said hub and said throwing arm, and stops for limiting the turning of the rocker and a switch actuating member held in its "off" position by the pressure of said spring and said throwing arm.

2. In a quick make and break switch, a base plate, a hub mounted on said plate and having two offset arms and having a limited rotative movement on said plate, an actuating shaft passing through said plate and connected to said hub and to one of said offset arms, the other arm being slotted, a rocker pivoted coaxially with said hub and having a lost motion connection with said hub and shaft, a throwing arm hinged to said plate at one side of said hub, a link connecting said rocker to said arm, a rod and spring interposed between the slotted arm of said hub and said throwing arm, the hub and its slotted arm being turnable on its axis so as to carry its slotted arm from one side of the center line connecting the guide of the throwing arm and the axis of the hub to the other side of said center line and a switch actuating member held in its "off" position by the pressure of said spring and said throwing arm.

3. In a snap action switch a base plate for supporting switch units, a hub mounted beneath the base plate and having two offset arms extending from its periphery with the radii of the arms spread apart, an actuating shaft passing through a slot in the base plate and connected to one of said arms, the other arm having a slot transverse to the radius of said latter arm, a throwing rod having a bearing at one end slidable in said slot, a throwing arm hinged to the base plate at one side of said hub and slidably supporting the other end of said rod, a rocker hinged coaxially with said hub and having at one end a lost motion connection with said shaft and a link hinged to the other end of said rocker and hinged to said throwing arm and means for limiting the swing of said arm and a switch actuating member above said base plate actuated by said throwing arm.

4. In a snap action switch a base plate for supporting switch units, a hub mounted beneath the base plate and having two offset arms extending from its periphery with the radii of the arms spread apart, an actuating shaft passing through a slot in the base plate and connected to one of said arms, the other arm having a slot transverse to the radius of said latter arm, a throwing rod having a bearing at one end slidable in said slot, a throwing arm hinged to the base plate at one side of said hub and slidably supporting the other end of said rod, a rocker hinged coaxially with said hub and movable back and forth approximately 90° and having at one end a lost motion connection with said hub, a link hinged to the other end of said rocker and hinged to said throwing arm and a switch actuating member above said base plate actuated by said throwing arm.

5. In a snap action switch a base plate for supporting switch units, a hub mounted beneath the base plate and having two offset arms extending from its periphery with the radii of the arms

spread apart, one arm having a return bend, an actuating shaft passing through a slot in the base plate and connected to said hub and to the return bend of one of said arms, a throwing rod having a bearing with a lost motion connection to the other arm, a throwing arm hinged to the base plate at one side of said hub and slidably supporting the other end of said rod, a rocker hinged coaxially with said hub and having at one end a lost motion connection with said shaft between said hub and said return bend, a link hinged to the other end of said rocker and hinged to said throwing arm and stops for limiting the swing of said rocker and a switch actuating member above said base plate actuated by said throwing arm.

6. In a snap action switch a base plate for supporting switch units, a hub mounted beneath the base plate and having two arms extending from its periphery with the radii of the arms spread apart about 120°, an actuating shaft passing through the base plate and connected to one of said arms, the other arm having a slot transverse to the radius of said latter arm, a throwing rod having a bearing at one end slidable in said slot, a throwing arm hinged to the base plate at one side of said hub and slidably supporting the other end of said rod, a rocker hinged coaxially with said hub and having at one end a lost motion connection with said hub, a link hinged to the other end of said rocker and hinged to said throwing arm and stops for limiting the swing of said rocker and a switch actuating member above said base plate actuated by said throwing arm.

7. In a quick make and break switch, a base plate, a hub mounted on said plate and having two offset arms and having a limited rotative movement on said plate, an actuating shaft passing through said plate and connected to said hub, a rocker pivoted coaxially with said hub and having a lost motion connection with said shaft, a throwing arm hinged to said plate at one side of said hub, a link connecting said rocker to said arm and a rod and spring interposed between the other arm of said hub and said arm and having a lost motion connection with said arm and a switch actuating member held in its "off" position by the pressure of said spring and said throwing arm.

8. In a quick make and break switch, a manually oscillatable hub having an arm projecting radially thereof, a pivoted throwing arm, a spring-pressed rod connecting said throwing arm and the arm of said hub, said latter arm having a slot extending transversely of the radius of said arm and having two inclined projections along the edge of said slot spaced from the ends of said slot and said rod having a roller in said slot coacting with one of said shoulders as the hub is turned from the "on" to the "off" position and from the "off" to the "on" position.

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