Feb. 17, 1931. B. P. McKINLEY 1,793,412

TUMBLER SWITCH

Filed June 28, 1929

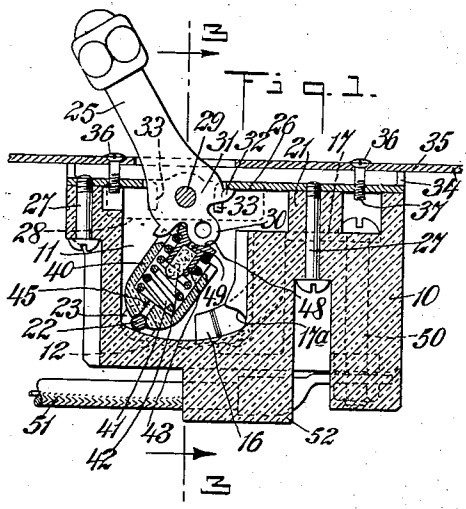


Fig. 1.

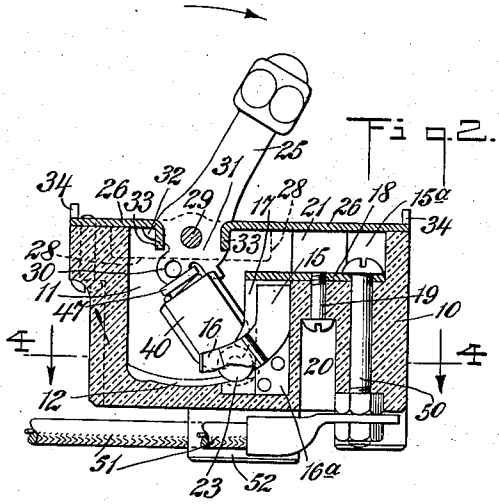
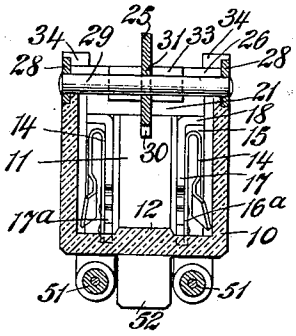


Fig. 2.

Fig. 3.



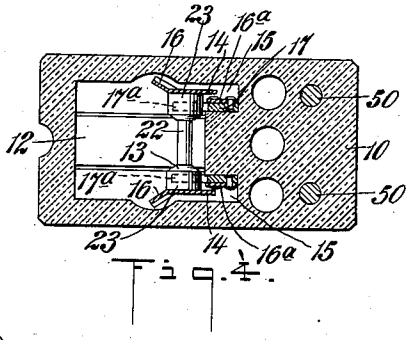
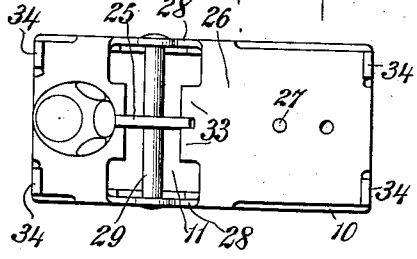


Fig. 4.

Fig. 6.



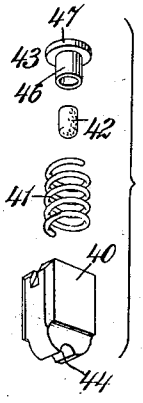


Fig. 5

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UNITED STATES PATENT OFFICE

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TUMBLER SWITCH

Application filed June 28, 1929. Serial No. 374,516.

This invention has to do with electric switches of the so-called tumbler or toggle type. Its object is to simplify the construction and to provide for lubrication of the moving parts.

In the accompanying drawings illustrating one form of switch embodying the invention,

Figure 1 is a sectional view through the switch taken on the long axis.

Figure 2 is a sectional view on a plane parallel to that of the section in Figure 1 and at one side of the long axis to show the parts of the switch mechanism in elevation.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is an exploded view, in perspective, of the parts forming the resilient element of the toggle mechanism by which the circuit controlling element is moved.

Figure 6 is a top plan view of the switch shown in Figure 1.

The base 10 of the switch is molded as a single piece of insulating material of such composition as one of the phenolic condensation products well known for the purpose. A well 11, having an arcuate or concave floor with a flat topped bead 12 extending from end to end at its mid part, receives the switch mechanism consisting of fixed contacts and a toggle mechanism adapted to move a roller contact 13 along the floor of the well. The fixed contacts are made up of U shaped resilient pieces 14 received in bays 15 opening to the switch well. One leg of each such piece is provided with a flared forwardly extending terminal 16 which lies in the switch well. The other leg is secured at its lower end 16^a to a down leg 17 of a non-resilient conductive strap which has a horizontal portion 18 lying on a ledge formed by a recess 15^a extending from the bay 15, in which the U shaped piece is mounted, toward the end wall of the base. The two straps are held to the base by screws 19 extending from recesses 20 in the under side of the base and by the terminal screws 50 which receive the lead line conductors 51 on opposite sides of a boss 52 on the bottom of the base. The recesses 15^a in which the straps rest are separated by the boss 21 which reaches to the level of the top of the base. At their lower ends, alongside of the flared terminals 16, the down legs of the straps 17 are provided with concave surfaces 17^a which lie outside of the bays 15 and therefore in the switch well.

The roller 13 forming the circuit closing element has a central shank 22 of smaller diameter than the end portions 23, the difference being sufficient to cause the shank to clear the bead 12. The latter therefore serves only to retain the roller from sidewise movement. When at the end of the well at which the fixed contacts are located, the end surfaces of the roller rest between the resilient terminals 16 and against the lower ends of the conductive straps 17, being guided into final position by the flared ends. The curved surfaces of the large end portions 23 then rest against the concave surfaces 17^a on the down legs of the straps 17. In this way a good electrical connection between the straps is effected and is maintained by the end pressure of the resilient pieces 14 against the loosening tendency of any vibration of the base.

The roller 13 is moved by a toggle mechanism consisting of a compressible element and a rocking lever 25. The latter is mounted on the cover plate 26 which is held to the base by screws 27 extending through the base. This plate has an opening over the switch well and has down turned side flanges 28 for part of its length, between which extends the pin 29 which serves as the pivotal mounting for the hand lever 25. The hand lever is stamped from flat stock and has a leg 30 with a curved surface below the pivotal axis. Near the pivotal axis is an enlarged flat portion 31 having ears 32 which extend in opposite directions, in the plane in which the lever rocks, to engage the underside of the plate and thus to limit the extent of rocking. The lever is guided between lugs 33 which are inturned from the main part of the plate at the margin of the opening through which the lever extends. These lugs lie on opposite sides of the enlarged flat portion 31 of the lever and thereby restrain

the lever from lateral movement on the pin 29. At the ends of the plate are upturned flanges 34 which rest against a face plate 35 secured to the switch by screws 36 threading into the holes 37 in the cover plate.

The resilient element which transmits the rocking movement of the hand lever to the roller contact 13 is made up of a molded cup 40 of insulating material, a spring 41, a lubricant absorbing body 42 and a bearing piece or plunger 43. The cup has a groove 44 in its bottom surface to engage the shank 22 of the roller 13 and an opening 45 through the bottom leading to this groove. Within the cup the spring 41 fits loosely and receives the shank 46 of the bearing piece 43. The head 47 of the latter overlies the end coil of the spring and has a groove 48 in its top surface which serves as a socket for the leg 30 of the hand lever. The head of the bearing piece has an opening 49 from the groove 48 to the interior of its shank 46 where the lubricant absorbing body 42 is retained. The latter may be of any suitable fibrous, wicklike or spongelike material which will absorb lubricant retained within the cup 40. It may, if desired, rest within the cup inside of the coils of the spring without being located in the shank of the bearing piece as shown in the drawings. There may be free body of lubricant in the cup or the absorbent body may be relied on to hold the lubricant. The head of the bearing piece is of a size to slide within the cup, thus making the bearing piece in effect a plunger telescoping with the cup. The cup is recessed at its upper margin on opposite sides to provide freeway for the ears 32 on the rocking lever.

The action of the switch is the same as that of others of this type. When the hand lever is moved, the leg 30 rocks and in doing so compresses the spring by reason of its bearing on the head 47 of the bearing piece with which the spring is associated. When the rocking is sufficient to pass the point of maximum compression, the expanding force of the spring exerts a pressure on the cup, and consequently on the roller which is held between the cup and the floor of the wall, in a direction such that the roller is urged away from the end wall theretofore holding it and toward the opposite end wall. The result is a quick movement of the roller along the floor of the well, either away from or toward the fixed contacts.

The cup construction, with the groove for the roller and the contained spring and bearing piece, the latter acting also as a plunger, affords a simple and effective resilient element which with the rocking lever makes up the toggle. Furthermore, it makes it possible to lubricate the bearing parts of the switch mechanism. The wick or other porous piece holds the lubricant and feeds to the opening 49 and thence to the socket 48 where the rocking leg 30 of the hand lever bears. On each compression of the spring the wick is pressed against or brought close to the bottom of the cup and drops some of the lubricant into the opening 45 so that the bearing between the roller and the cap is kept lubricated.

The construction of the cover plate is one of simplicity in that it makes possible the use of flat material that is readily cut and stamped. This is true both for the plate itself and for the hand lever. The arrangement of the fixed contacts with the associated U shaped resilient guiding and retaining pieces ensures a good electric contact between them and the circuit controller.

There are many changes in details which may be made from the construction shown and described here to illustrate the invention. I wish to include within the scope of protection afforded me all such changes as are within the fair range of the following claims.

I claim—

1. In an electric switch, a circuit controlling member with a rocking hand lever and a resilient element between the two for moving said member, said element comprising a cup, a spring therein and means for feeding lubricant from the cup to the engaging parts of said member and the cup.

2. In an electric switch, a circuit controlling member with a rocking hand lever and a resilient element between the two for moving said member, said element comprising a cup, a spring and a lubricating body therein.

3. In an electric switch, a circuit controlling member with a rocking hand lever and a resilient element between the two for moving said member, said element comprising a cup engaging said member, a spring in said cup adapted to be compressed by said lever in its rocking, and a lubricating body in said cup.

4. In an electric switch, a circuit controlling member with a rocking hand lever and a resilient element between the two for moving said member, said element comprising a cup, a spring therein and a lubricating body within said spring.

5. In an electric switch, a circuit controlling member with a rocking hand lever and a resilient element for moving said member, said element comprising a cup engaging said member, a spring in said cup, a bearing piece between said lever and said spring and a lubricating body within said cup.

6. In an electric switch, a circuit controller formed as a roller, a rocking hand lever and a resilient element for transmitting motion of said lever to said roller, said element comprising a cup grooved in its bottom surface to engage said roller and having an opening through said surface for passage of lubricant to said groove, together with a spring within said cup.

7. In an electric switch, a circuit controller formed as a roller, a rocking hand lever and a resilient element for transmitting motion of said lever to said roller, said element comprising a cup formed of insulating material and adapted to engage said roller to move it, a spring in said cup, a bearing piece between said rocking lever and spring and means for feeding lubricant from said cup to the engaging surface between the cup and roller.

8. In an electric switch, a circuit controller formed as a roller, a rocking hand lever and a resilient element for transmitting motion of said lever to said roller, said element comprising a cup formed of insulating material and adapted to engage said roller to move it, a spring in said cup, a bearing piece between said rocking lever and spring and means for feeding lubricant from said cup to the engaging surface between the bearing pieces and the hand lever.

9. In an electric switch, a circuit controller formed as a roller, a rocking hand lever and means for transmitting motion of said lever to said roller, said means comprising a combined spring and lubricant retainer of insulating material, said retainer engaging said roller and having provision for feeding lubricant thereto.

10. In an electric switch, a circuit controlling member with a rocking hand lever and a resilient element for transmitting motion of said lever to said member, said element comprising a cup engaging said member, a coil spring in the cup, a bearing member extending into said spring and bearing against it to compress it upon movement of said lever and means for passing lubricant from said cup to the engaging surfaces of said lever and bearing member and of said cup and circuit controlling member.

Intestimony whereof I have signed my name to this specification.

BENJAMIN P. McKINLEY.