Aug. 30, 1938. R. POPP 2,128,731

ELECTRICAL SWITCH

Filed Feb. 15, 1935

Fig. 1.

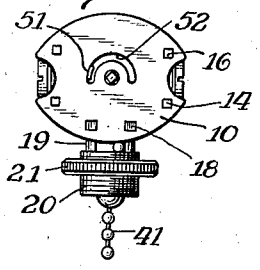


Fig. 2.

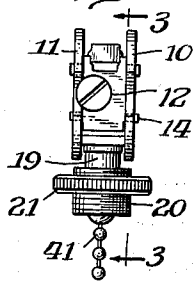


Fig. 3

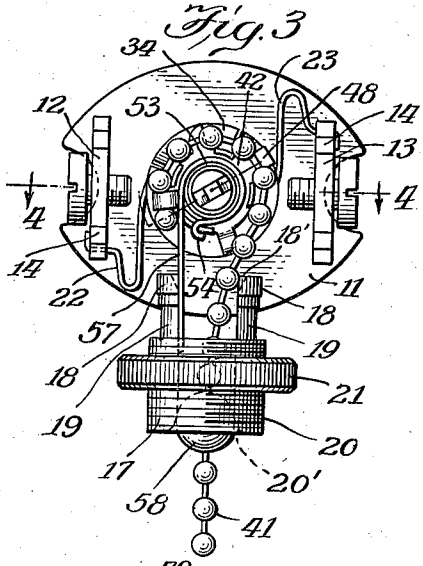


Fig. 4.

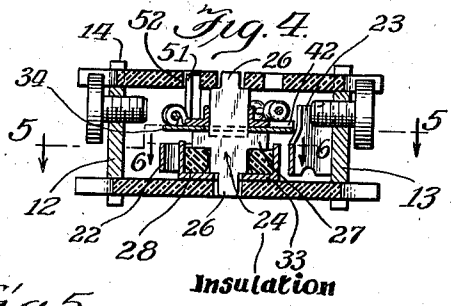


Fig. 5.

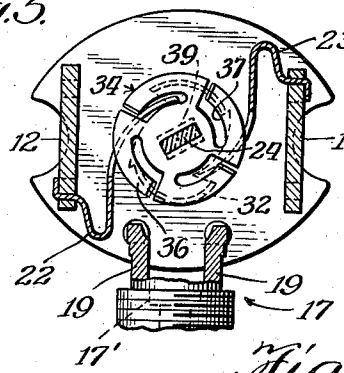


Fig. 6.

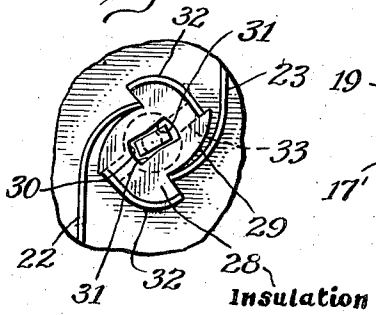


Fig. 8.

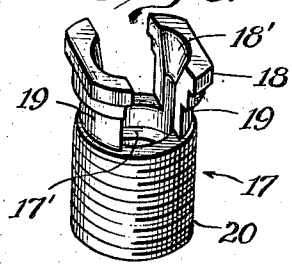
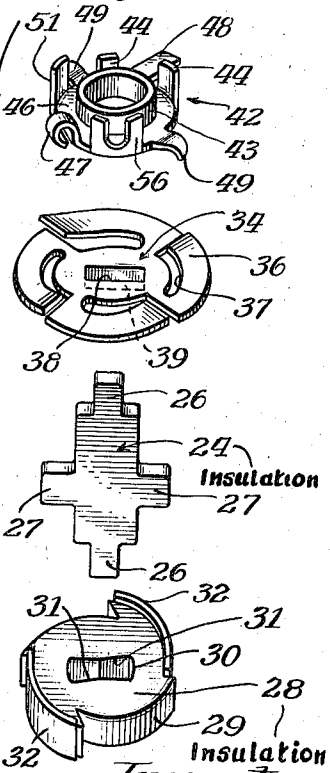


Fig. 7.



Inventor

Rudolf Popp.

By Foorman L. Mueller

Atty.

Patented Aug. 30, 1938 2,128,731

UNITED STATES PATENT OFFICE

2,128,731

ELECTRICAL SWITCH

Rudolf Popp, Valparaiso, Ind., assignor to McGill Manufacturing Company, Valparaiso, Ind., a corporation of Indiana

Application February 15, 1935, Serial No. 6,679

4 Claims. (Cl. 200—168)

My invention relates in general to switch mechanisms and more in particular to a small pull-chain type switch ordinarily employed in a canopy or similar installation for controlling a lamp and other circuits.

An object of my invention is to provide a thin model switch of the above character, certain in operation and sturdy and compact in construction.

A further object of the invention is to provide a switch of the above character in a pull-chain type, having circuit connecting mechanism which operates with a sharp make-and-break action.

A still further object of my invention is to provide a switch mechanism composed primarily of punched parts, which is exceptionally low in cost, yet very efficient in operation.

Other objects and advantages will be apparent from the following description taken with the drawing, in which:

Fig. 1 is a plan view of the assembled switch mechanism.

Fig. 2 is an end elevation of the same.

Fig. 3 is a plan view with the top insulating plate removed, along the line 3—3 of Fig. 2.

Fig. 4 is a cross sectional view along the line 4—4 of Fig. 3.

Fig. 5 is a sectional view along the line 5—5 of Fig. 4.

Fig. 6 is a detail view of the stationary contacts and contact wheel illustrating particularly the wheel mounting on the rotary axis.

Fig. 7 is a view of the movable switching mechanism showing the various parts in perspective and disassembled from one another.

Fig. 8 is a detail view in perspective of the threaded mounting stem for the frame.

In practicing my invention I provide a switch mechanism having a frame including upper and lower insulating plates spaced apart by, and supported on, terminal posts at either end thereof, and a one-piece mounting stem on one side. Stationary contacts are supported on the terminal posts and connection is completed between them by a rotary mechanism including a contact wheel keyed to a movable axis which in turn is supported between the insulating plates with the contact wheel driven by the combination of a pawl member keyed to the movable axis and an actuating member carrying a pull chain and having means for engagement with the pawl member to move said axis which in turn rotates the contact wheel.

Referring now to the drawing, I provide a switch mechanism having a frame which includes an upper insulating plate 10 and lower insulating plate 11. The plates are spaced apart and supported by a pair of terminal posts 12 and 13 having upstanding lugs 14 fitting into apertures 16 in each of the plates. Further support is provided in a one-piece threaded stem 17 as shown particularly in Fig. 8, having integral upstanding lugs 18 fitting into corresponding apertures in both insulating plates. In the commercial embodiment of the switch very satisfactory results are obtained with a complete one-piece stem member made as a screw machine part. The lugs 18 are integral with a split head in which the two separated tongues 19 extend back to an annular thread section 20 for receiving an ordinary knurled nut or clamping collar 21. A seat 17' is provided in the mounting stem to take the end of the retrieving spring as is shown in Fig. 3, and as will be hereinafter described. Means are provided in the stem in concave portions 18', and a bell mouth 20' to prevent the chain from catching and of course facilitate the action thereof. This construction for the stem provides not only a very strong and inexpensive member, but also permits the thread section to extend up to the ordinary housing (not shown) so that only an ordinary thin knurled nut need be employed.

The pair of stationary contact members 22 and 23 are supported on the terminal posts 12 and 13 and extend inwardly as shown in Fig. 5. Connecting mechanism rotates between the stationary contacts and includes an axis or rotor 24 which comprises a flat piece of insulating material punched out in the shape shown in Fig. 7 with bearing portions 26 at each end and a connecting body portion having a pair of integral spacing ears 27 extending outwardly from the body portion and intermediate the bearing portions 26. A rotary contact wheel 28 with a plurality of cam-shaped teeth 29 on the outer edge is keyed to the rotor 24 by means of a rectangular aperture 30. Slight enlargements 31 are provided in each of two oppositely disposed corners of the aperture to permit a slight play when the wheel is mounted on the axis, and expedite the contact breaking action when the wheel is rotated as will be hereinafter explained. The enlargements are angular in shape and extend from substantially the middle of the side of the aperture to the corner thereof as shown particularly in Figs. 6 and 7. Contact segments 32 with an integral connecting strip 33 are mounted on two opposite teeth 29 in the usual manner as shown in Figs. 6 and 7. The contact segments engage the stationary contacts 22 and 23 to complete a circuit through the switch, and the circuit is

broken in the usual manner when the contact wheel is rotated so that the members 22 and 23 lie on the intermediate insulated teeth 29.

In the prior art this general type of pull-chain switch has been manufactured in a somewhat bulky structure which is not adaptable to many of the present day lighting fixture installations. The switching mechanism is of course largely responsible for the bulky structure in the prior art devices. There is also some degree of uncertainty in the operation of the switches due to lack of precision in assembly and adjustment. In my invention I employ metal parts which are stamped to provide a low cost compact assembly accurate in adjustment and certain and efficient in operation. My actuating mechanism includes a pawl 34 stamped in a metal disc with segmental portions sheared on two sides as shown in Fig. 7 to provide a free end 36 for each portion. This free end is curved upwardly to a slight extent and with the slot 37 on the inner edge of the segmental portion, a resiliency results which is effective in the operation of the switching mechanism as will be hereinafter described. The pawl is keyed to the rotor 24 by means of a rectangular aperture 38 corresponding to the sides of the body portion of said rotor, and reinforced by a narrow flange 39 sheared in punching out the aperture, and folded back upon each side as shown in Figs. 4 and 5.

The switching mechanism is rotated upon pulling the chain 41 extending through the mounting stem and carried on an actuator member 42, slidably supported on the pawl 34. The actuator includes an annular body portion with a round flanged aperture 43 in the center thereof fitting over the rotor 24 as shown in Fig. 4. Guide legs 44 are formed vertically of the ring 46 of the body portion, and spaced about the periphery thereof to guide the chain 41 which is looped about the actuator from the hooked arm 47. Fig. 3 illustrates this construction together with the integral horizontally disposed chain supporting arm 48. The actuator 42 engages the pawl 34 by means of substantially oppositely disposed switch arms 49. The arms 49 are curved slightly to give them a very large bearing surface for engagement with the raised end 36 of the pawl. This construction makes it possible to use ordinary thin stock for the actuator and insures against the arm slipping under the raised end 36 when brought to bear against the same. A vertical lug 51 formed from the body portion of the actuator adjacent the chain-fastening arm has an extension to carry it into a segmental slit 52 in the top frame plate 10. The length of the slit is such as to properly limit the movement of the actuator on the advancing or retrieving operation. The lug 51 also acts as a guide for the chain.

A tightly coiled retrieving spring 53 lies on the ring 46 of the body portion of the actuator, with one hooked end 54 lying in the U-shaped projection 56, and the other end 57 retained against rotary movement by one of the tongues 19 in the head of the mounting stem, and the seat or cavity 17' in the thread portion of the stem. The entire switch is assembled, with the terminal posts, stationary contacts and mounting stem being positioned on the lower frame plate 11. The assembled contact wheel is placed on the rotor 27 and the two assembled on the lower plate. The pawl 34 is then slipped onto the rotor and rests on the top of the spacing ears 27. The chain 41 is then pushed through the mounting stem, a distance limited by the enlarged ball 58, and fastened in the hooked arm 47 of the actuator, after which the chain is looped as necessary about the guide lugs and the actuator slipped over the rotor to rest on pawl 34. As noted, the retrieving spring is then positioned as shown in Fig. 3 and brought to a tension with the elongated end 57 retained within the head of the mounting stem. The assembly is then held in position until the top plate 10 is pressed onto the lugs 16 and 18.

Ordinarily in the prior art, in switches of this general type, a loose spring, which is unwieldy and expensive, must be used to provide the necessary vertical play in the rotary movement of the switch mechanism. I accomplish this by the raised cam-like resilient segments in my pawl member. The retrieving spring 53 may then be tightly coiled, reducing the cost of the part and facilitating the assembly of the switch. It is further noted that the integral ears 27 on the axis 24 act not only to space the pawl from the contact wheel, but they also insulate one from the other.

As to the operation of the switch, I employ the usual pull chain action wherein the slidable chain carrying actuator 42 engages the pawl 34 through the switch arms 49, and the pawl being keyed to the flat spindle member 24 turns said axis to rotate the contact wheel 28 which is also keyed to the axis. With the angular enlargements 31 in the aperture 30 of the wheel, and the spindle 24 rectangular in cross-section, there is a slight play betweeen the spindle and wheel. When the stationary contacts are at the end of the segmental contacts 32 in the movement of the wheel, the spring tension in said stationary contacts snaps the wheel sufficiently, and the play permits the wheel to move quickly ahead, so that contact is broken simultaneously at each of the segments 32. The members are still maintained in relative alinement, however, by the straight portions of the sides of the aperture in the wheel. This construction and function is important in preventing arcing, and in effect provides a more precise adjustment in the switch parts, with the resultant more efficient and satisfactory operation of the switch as a whole.

Although I have described my invention in its preferred embodiment, it is understood that I am not limited thereby, but limit the invention only by the scope of the appended claims.

I claim:

1. A one-piece tubular stem for a switch having spaced support members, said stem including an externally threaded portion at one end thereof, and a head of larger diameter at the other end thereof, a wide slice of said head being removed to form spaced lugs adapted to fit into corresponding apertures in the support members of the switch.

2. A one-piece tubular stem for a switch having spaced support members, said stem including an externally threaded portion at one end thereof, and a head at the other end thereof including two portions, one of larger diameter than the other; a wide slice of said head being removed to form spaced upstanding lugs from the larger portion thereof for insertion in corresponding apertures in said support members, and to form spaced rests on the smaller portion of the head for resting against said support members.

3. A one-piece mounting stem for an electric switch having spaced apart frame members, said stem including an externally threaded portion at one end for receiving a mounting nut, and a head at the other end split to provide spaced lugs for fitting into corresponding apertures of the frame

members, said stem including an internal recess seat extending inwardly beyond the head portion and within the threaded portion, and a switch actuating means seat adjacent the outer end of the threaded portion.

4. A one-piece mounting member for a switch including actuating mechanism having a return spring and operating means, said mounting member comprising a threaded annular neck with an integral seat for the return spring of the switch at one end of the neck and an integral seat for the operating means to limit the movement thereof at the other end of the neck, and a securing head for the mounting member integral with the neck and extending longitudinally from the return spring seat end thereof to an open end with securing studs extending upwardly and downwardly at the open end with a relatively wide slice being removed from said head intermediate the stud portions.

RUDOLF POPP.