Jan. 10, 1939. C. M. LEFKOWITZ 2,143,158

ELECTRIC SWITCH

Filed July 3, 1936

Fig. 1.

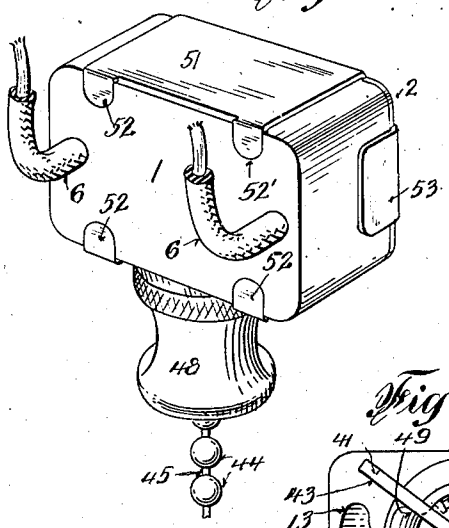


Fig. 2.

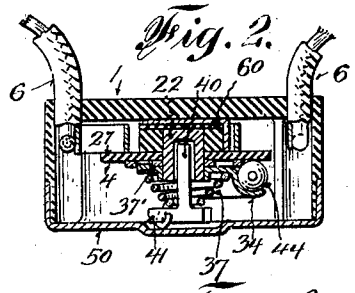


Fig. 3.

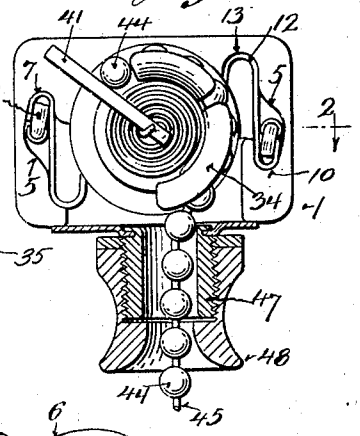


Fig. 4.

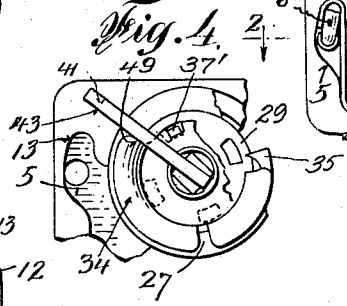


Fig. 5.

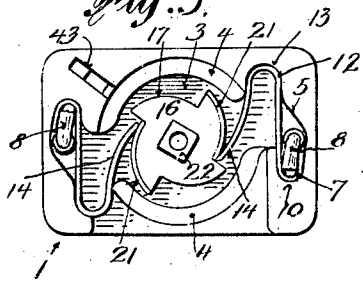


Fig. 6.

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2,143,158

ELECTRIC SWITCH

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8 Claims. (Cl. 200—64)

My invention relates to electric switches, and while it is not necessarily limited to a particular type of switch the invention is particularly useful when embodied in what is known as a canopy switch and I will describe my invention as so embodied, without intending to limit it to this particular embodiment.

One object of the invention is to provide a switch which is of simple and cheap construction and which can be assembled rapidly and inexpensively so that the total cost of the switch is very low but the switch is very efficient and durable. One object of the invention is to provide a switch having a rotor mounted to rotate upon a shaft and this shaft has an arm extending at right angles therefrom, the arm seating in a slot in the base or block of the switch to retain the shaft in proper position. Furthermore, the end of the shaft opposite to the arm referred to need not pass through the bottom wall of the shell of the switch and therefore there is no shaft opening for dust to get through to the interior of the switch.

Another object of the invention is to utilize the angular arm on one end of the shaft as a positive stop for the ratchet device in both directions of movement of the ratchet device. The ratchet device itself oscillates and in one direction of its movement it advances the rotor step by step. This simplifies the construction and eliminates the necessity of providing a stop inside the cover or other part of the switch for the ratchet device and at the same time it provides a positive stop for the ratchet device in each direction.

Another object of the invention is to provide a circular seat in the base or block of the switch on which is adapted to rest a disc, preferably of insulating material, which lies under the ratchet device so that the disc rests against the circular seat and as it is mounted over the shaft and a sleeve and it serves as a guide to assist in the assembly of the parts as well as to form more or less of a bearing for the shaft while the switch is in operation.

Another object is to provide a sleeve which extends into or through the rotor and which has a polygonal end to fit the oscillating plate of the ratchet device, and this sleeve receives within its central bore one end of the vertical shaft. This sleeve permits the rotor and ratchet device to be assembled before being inserted into the switch block, thus permitting rapid assembly of the switch.

Other features and advantages will be set forth in the following detailed description of my invention.

In the drawing forming part of this application,

Figure 1 is a perspective view of a switch embodying my invention,

Figure 2 is a sectional view taken on the line 2—2 of Figure 3,

Figure 3 is a plan view of a switch with a portion of the cover broken away and with the tubular extension shown in section,

Figure 4 is a view of a portion of the parts shown in Figure 3 but showing the ratchet device stopping against the cross arm of the shaft when the chain is pulled out to the full extent,

Figure 5 is a plan view of the switch block or shell with only the rotor and the brush members assembled therein, and

Figure 6 is an assembly view of all of the parts of the switch.

The present switch may be made very small and compact, especially where it is to be used as a canopy switch, and in the drawing I have shown the device several times enlarged over the device as actually made by me for commercial purposes, in order to clearly illustrate the parts. While I do not limit my invention to a switch of any particular dimensions, nevertheless the present switch may be made smaller than any canopy switch heretofore on the market and in switches of this character this is a very desirable feature.

In the drawing I have shown a block 1 which forms the body of the switch and this may be cast or moulded or pressed of insulating material such as Bakelite or similar material, and this block, together with the cover 2 may constitute a complete enclosure for all of the working parts of the switch. This block or base is shown as provided with a substantially centralized chamber 3 in which the rotor and the ratchet device may revolve and oscillate. Disposed concentrically of the shaft to be hereinafter described, I provide a circular seat 4 in the material of the base which seat is interrupted on opposite sides for the reception of the brush members, and the seat is in a horizontal position and is spaced some distance from the top and bottom of the base. In addition, the base is provided with pockets 5 disposed at opposite sides of the rotor chamber 3 and in communication therewith, and in these pockets are disposed small brush members which are connected with the ends of the wires of the cables 6. The brushes, two of which are shown, similar in construction, have a loop 7 surrounding the contact member 8 on one of the wires of the cables 6, and soldered thereto if desired.

The loop 7 of the brush member seats in the curved portion 10 of the pocket 5 and from there the brush member extends as shown at 11 across the pocket 5 and then the brush member is formed into a loop 12 which seats in the curved recess 13 so that the two loops 7, 12 seating in their respective curved recesses 10, 13 prevent the brush member from being dislocated during the operation of the switch and the construction allows ready assembly of the brush members without the employment of jigs or tools. Both brush members and their pockets are constructed alike. The free arms 14 of the brush members extend into the rotor chamber 3 and on opposite sides of the axis of the rotor they engage with the conducting member 15 which is part of the rotor. The rotor itself consists in part of a disc-like member 16 shown as having four eccentric curved portions 17, each followed by an abrupt shoulder 18. This member of the rotor is preferably made of insulating material. There is a disc 60 of insulating material conforming in outline to the member 16 but it has no aperture therein so that it insulates the sleeve 22 from the member 15. The contact member on the rotor is shown as a disc 19 which lies against the lower face of the disc 60 and it has two arms 20 extending outwardly or radially therefrom and on the ends of these arms are formed contact plates 21 which lie against the outer, curved surfaces of two of the eccentric members 17 of the rotor so that when the rotor is in the position where the free ends of the brush members touch the portions 21 a circuit will be established through the switch because the brush members will be in conducting relation with each other through the metal member 15 of the rotor. On the other hand, when the rotor is turned to a position where the free ends 14 of the brush members rest only against the outer surfaces of the two eccentric portions 17 which are not covered by the contact member 15 the circuit will be opened because there will be no conducting material between the free arms of the brush members.

There is a sleeve 22 of polygonal cross section and the sleeve extends into a central polygonal aperture 26 in the disc member of the rotor 16. The disc 27 is preferably of insulating material and it is of such diameter as to project over the face of the circular shoulder 4 of the base so it may rest in contact with the latter. The sleeve 22 receives the disc 27 thereover and the central aperture 28 in this disc may be circular and large enough so that the disc does not have to rotate with the rotor.

There is another disc 29 which may be made of metal and it is shown as resting face to face against the disc 27 of insulating material. This disc 29 is shown as having a polygonal, preferably a square, central aperture 30 to fit the square end of the sleeve 22. It is also provided with apertures 31, four being illustrated, which are arranged concentrically around the axis of the disc.

The oscillating member of the ratchet device is shown as a disc 32 having a central hub or eyelet 33 which is adapted to oscillate around the shaft of the switch and the sleeve 22 and it is shown as cupped with a plurality of raised arcuate lips 34 on the end of one of which there is formed an offset shoulder 35 adapted to form a hook to be engaged by one end of the pull cord or chain 44, 45. This ocillating member of the switch (portion 32) has a small projection 37' on its under side forming a pawl adapted to engage in any one of the apertures 31 of the disc 29 to advance the latter disc in one direction and to escape from one aperture to the other of the disc upon the return movement of the oscillating member. The helical spring 37 has one end hooked around the cross member 41 of the shaft and one end is hooked against one edge of one of the lips 34 of the oscillating member. This spring performs the operation of returning the oscillating member after each operation by the pull chain to its initial or stop position and it permits the disc 32 to rise slightly to allow the tooth 37' to escape on the plate 29.

The shaft for guiding the rotor and the oscillating member is shown as having a vertical portion 40 which may be round or rectangular in cross section and this portion of the shaft extends through the center of the spring 37 and into the central aperture 22' of the sleeve 22 but preferably this end of the shaft does not extend through an aperture of the base as in prior devices, thereby eliminating the possibility of dirt working through a shaft aperture into the casing. It is sufficient that the shaft merely enter the sleeve 22 to guide it and thereby guide the rotor and the ratchet device where the shaft is provided with the angular arm hereinafter referred to.

The shaft has a laterally extending arm 41 at its upper end and near the outer free end of this arm there is a downwardly extending member 42 which is adapted to move vertically down into the slot 43 of the switch base so that this projecting end seats in the slot 43 in which it fits and forms a support and guide for the vertical portion of the shaft.

The pull chain for operating the switch is shown as consisting of a number of spheres 44 connected by links 45 and is of the usual type employed in switches of this character. The first ball of the chain is placed ahead of the projection 35 of the ratchet device so that the adjacent link engages in the notch 46. From there the chain extends partly around the ratchet device, the balls lying in the cup shaped members 34 and in the condition shown in Figure 3 the chain extends from the lowermost end of the lower cup shaped member 34 through the bore of the tubular connection 47 which is integral with or attached to the metal cover and thence through the bore of the tubular nut 48 from which the chain hangs down sufficiently to be grasped by the fingers.

When the parts are in the position shown in Figure 3 the end ball 44 of the chain which is on one side of the member 35 rests against one side of the lateral arm 41 of the shaft so that the latter acts as a stop for the ratchet device upon its return to the inactive or starting position, as shown in this figure. When the ratchet device is oscillated by the pulling on the chain the parts will move to the position shown in Figure 4 and the end 49 of the cup shaped member 34 of the ratchet device will strike against the opposite side of the lateral arm 41 of the shaft and thus limit the movement of the ratchet device in one direction, i. e., it limits the movement when the chain is pulled. Thus, the lateral arm of the shaft acts as a stop for the ratchet device in both directions of movement, limiting the oscillating of the ratchet device to approximately one-quarter of a revolution.

The cover for closing the shell is shown as stamped from sheet metal and consisting of a plate portion 50 which covers the open side of

the base and therefore covers the several compartments 3, 5; and there are two depending side walls 51 extending from the top wall, and these side walls enclose and lie against opposite sides of the block 1 and the tongues 52 formed in the free ends of these plates 51 are adapted to be turned over into the notches 52' of the base to lock the cover in place. I have also shown end tongues 53 adapted to lap over the end walls of the block to guide and hold the cover.

When the parts of the switch are assembled as shown in Figures 1, 2 and 3, the free ends 14 of the brushes will press against the eccentric surfaces 17 of the rotor, or as shown in Figure 5, against the plates 21 of the conducting member 15 which cover two of the eccentric surfaces 17. While the switch is at rest or in starting position as shown in Figure 3, the end ball 44 of the chain is resting against the portion 41 of the shaft where it is pressed by the action of the spring 37.

When the parts are in the position shown in Figure 5 the current is on. If the chain 44, 45 is pulled, the oscillating member 32 will be turned until the edge 49 of one of the members 34 strikes against the one side of the member 41 of the shaft, thereby stopping the movement of the oscillating member 32. During this movement of the member 32 the tooth 37' engaging in one of the apertures 31 of the disc 29 causes the latter to be rotated one-quarter turn so that the parts 17 of the rotor which are covered with the plates 21 move out of contact with the arms 14 of the brushes and the two uncovered projections 17 move under the arms 14 and of course the circuit is thus broken.

There can be no retrograde movement of the rotor because of the shoulders 18 which cannot turn backward because of the brush arms 14. When the chain is released the spring 37 returns the member 32 to the first or starting position shown in Figure 3, ready for a second operation. The disc 29, however, is not returned because the projection 37' on the member 32 escapes from one aperture 31 back to the next aperture as the member 32 may rise, to allow this escape against the pressure of the spring 37. The torque action of the spring 37 is the force which returns the member 32 to the starting position. The disc 27 does not revolve; its purpose is to facilitate assembly of the parts and also serve as a guide for the disc 29 and the sleeve 22, and through the latter it acts to guide the vertical shaft 40.

From the above it will be apparent that I have provided simple means for stopping the ratchet device, improved the assembly of the switch, eliminated the shaft hole which might otherwise allow dirt to enter the switch. I have also provided the sleeve 22 with a rotor, permitting certain parts to be assembled before being placed into the shell.

Having described my invention, what I claim is:

1. A switch including a shell or base having a compartment, a rotor revolvable in said compartment, a vertical shaft for said rotor, a laterally extending arm on the end of said shaft beyond the outer face of said rotor, said base having a slot to receive the laterally extending member of said shaft therein, a ratchet device for operating said rotor and means for operating said ratchet device comprising a member mounted to oscillate about the vertical portion of said shaft and having means to engage the ratchet device to operate the latter step by step as the oscillating member is oscillated and thereby operate the rotor step by step, said oscillating member being so positioned that as it oscillates, at least a portion thereof strikes against the lateral member of the shaft, whereby said lateral member of the shaft acts as a stop for the oscillating member.

2. A switch including a shell or base having a compartment, a rotor revolvable in said compartment, a vertical shaft for said rotor, a laterally extending arm on the end of said shaft beyond the outer face of said rotor, said base having a slot to receive the laterally extending member of said shaft therein, a ratchet device for operating said rotor and means for operating said ratchet device comprising a member mounted to oscillate about the vertical portion of said shaft and having means to engage the ratchet device to operate the latter step by step as the oscillating member is oscillated and thereby operate the rotor step by step, said oscillating member being so positioned that as it oscillates it strikes against the lateral member of the shaft in both directions of oscillation whereby said lateral member of the shaft acts as a stop for the oscillating member in both directions of oscillations thereof.

3. A switch including a shell or base having a compartment, a rotor revolvable in said compartment, a sleeve fitting into said rotor and having a polygonal cross section, said sleeve extending beyond the outer face of the rotor, a ratchet device for rotating the rotor step by step and including a disc having a polygonal opening fitting the polygonal portion of said sleeve, and a vertical shaft for said rotor extending into a central aperture in said sleeve, a laterally extending arm on the outer end of said shaft, said base having a slot to receive the laterally extending arm of the shaft.

4. A switch including a shell or base having a compartment, a rotor revolvable in said compartment, a polygonal sleeve fitting into said rotor and having a portion extending beyond the outer face of the rotor, a ratchet device for rotating the rotor step by step and including a disc having a polygonal opening fitting the polygonal portion of said sleeve, and a vertical shaft for said rotor extending into a central aperture in said sleeve, a laterally extending arm on the outer end of said shaft, said base having a slot to receive the laterally extending arm of the shaft, said shaft terminating within said base whereby there will be no shaft opening in the bottom wall of the base.

5. A switch including a shell or base having a compartment, parts adapted to be assembled before insertion into said base, including a rotor, a polygonal sleeve extending into the rotor and having a portion extending beyond the outer face of the rotor, a ratchet device including a disc having a polygonal aperture to fit the sleeve, an oscillating ratchet device mountable on said sleeve and having means to act on said disc and to move the rotor step by step, said parts adapted to be inserted in assembled condition within the base, and a vertical shaft adapted to project into an aperture in said sleeve and having a lateral arm, said base having a slot to receive said lateral arm to guide and hold the shaft, and a spring surrounding said shaft and acting on said oscillating member, said spring and shaft being insertable into the base after said first mentioned assembled parts have been placed in position.

6. A switch including a shell or base having a compartment, a rotor revolvable in said com-

partment, a sleeve fitting into said rotor and adapted to turn the rotor, said base having a shoulder intermediate the top and bottom of the base, a non-revolvable disc surrounding said sleeve and seated on said shoulder of the base, a shaft for said rotor extending into an aperture in said sleeve and a ratchet device for operating the rotor step by step.

7. A switch including a shell or base having a compartment, a rotor revolvable in said compartment, a sleeve fitting into said rotor and adapted to revolve said rotor, said base having an arcuate shoulder intermediate the top and bottom of the base, a circular, non-revolvable disc surrounding said sleeve and seated on said arcuate shoulder of the base, a shaft for said rotor extending into an aperture in said sleeve and a ratchet device for operating the rotor step by step.

8. A switch including a shell or base having a compartment, a rotor revolvable in said compartment, a polygonal sleeve fitting into said rotor and having a portion extending beyond the outer face of the rotor, a non-revolvable disc on said sleeve, said base having a shoulder on which said disc is adapted to rest, a ratchet device for advancing the rotor including a disc having a polygonal aperture to fit said sleeve, an oscillating member mounted on said sleeve and having means for advancing said second named disc step by step, a vertical shaft projecting into an aperture in said sleeve, and a laterally extending arm on the outer end of said shaft, said base having a slot to receive said laterally projecting arm therein.

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