Feb. 16, 1932. W. MURAD 1,845,510

SWITCH

Filed Nov. 27, 1929

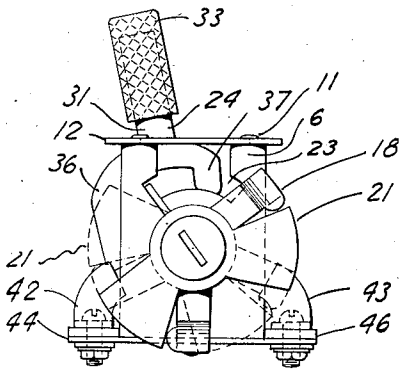


FIG. 1.

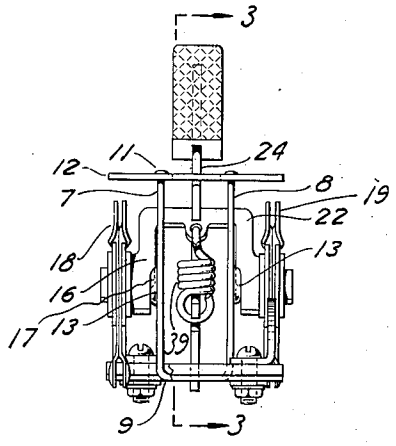


FIG. 2.

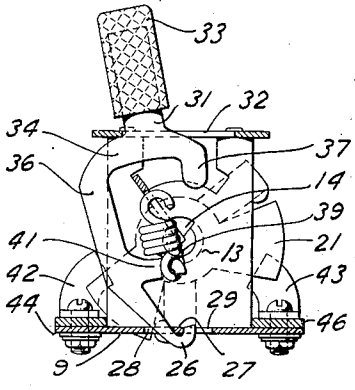


FIG. 3.

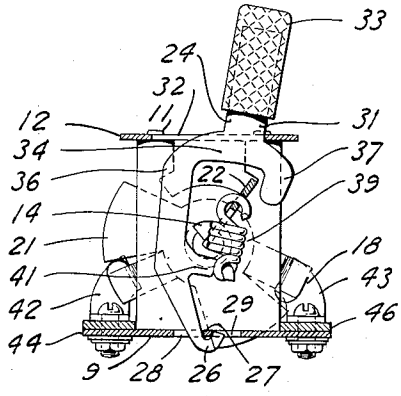


FIG. 4.

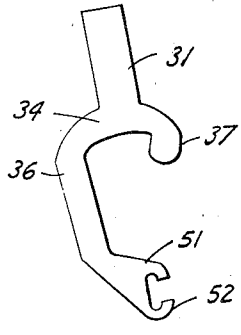


FIG. 5.

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UNITED STATES PATENT OFFICE

WALTER MURAD, OF BURLINGAME, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO PARAMOUNT ELECTRIC MFG. CO., OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA

SWITCH

Application filed November 27, 1929. Serial No. 410,090.

My invention relates to switches for controlling electrical circuits and is especially concerned with snap switches primarily designed for use at moderate voltages and amperage, although the design of my switch is suitable for a wide range of capacities, its physical size is largely determinative of its electrical capacity.

An object of my invention is to provide a snap switch which is capable of handling relatively large electrical capacities in comparison with its physical size.

Another object of my invention is to provide a snap switch which is easily manipulated by an operator.

A further object of my invention is to provide a switch which is easily assembled and disassembled.

Another object of my invention is to provide a snap switch which comprises but a few parts and is inexpensive to manufacture and maintain.

The foregoing and other objects are attained in the embodiment of the invention shown in the drawings, in which

Fig. 1 is a side elevation of a switch constructed in accordance with my invention.

Fig. 2 is an end elevation of my switch, portions being broken away.

Fig. 3 is a cross section on the line 3—3 of Fig. 2, showing the switch in "off" position.

Fig. 4 is a cross section on the line 3—3 of Fig. 2, showing the switch in "on" position.

Fig. 5 is an elevation of a modified form of actuating lever.

In its preferred form, the switch of my invention comprises a frame on which a lever is mounted for pivotal movement. Remote from the fulcrum of the lever is a force receiving portion while intermediate the force receiving portion and the fulcrum the lever encompasses a crank portion on a knife carrier which also is mounted in the frame for pivotal movement. The lever is provided adjacent its force receiving portion with means for engaging the crank portion of the knife carrier and in addition a spring connects the crank portion of the knife carrier with the lever at a point adjacent the fulcrum of the lever.

In the form of my switch which I have chosen to illustrate in the drawings, I provide a frame 6 which is conveniently fabricated of a strip of metal bent upon itself to provide a side face 7 and a side face 8 which are joined by an end face 9. Each of the side faces 7 and 8 is preferably provided with a pair of tabs 11 which are adapted to pass through suitable apertures, not shown, in a cover plate 12 and to be riveted or otherwise secured to the cover plate 12 in order to provide an enclosure. Each of the side members 7 and 8 is provided with a lug 13 preferably formed by displacing a portion of the material of the side member from the general plane of the remainder of the member. In addition, an aperture 14 pierces each of the side members to provide a substantially V-shaped tooth on each of the lugs 13.

Seated on the lugs 13 for pivotal movement with respect to the frame 6 is a knife carrier 16. This member is preferably cut from a planar sheet of metal and includes extensions 17 at either side which are adapted to rest against the lugs 13 and to carry contact blades 18 and 19 which project radially in a predetermined angular relationship. In addition to the contact blades 18 and 19 the extensions 17 also carry, if desired, insulating plates 21, which are approximately co-planar with the flared engaging ends of the contact knives.

Between the extensions 17, the knife carrier 16 is provided with a crank portion 22 which is offset in the general direction of the cover plate 12. Since the knife carrier is adapted to move pivotally with respect to the frame 6 I preferably pierce each of the side members 7 and 8 with an arcuate aperture 23 affording a channel or guide for the crank portion 22. The apertures 23 at one side are preferably bounded only by the cover plate 6 so that when the cover plate is removed, the entire knife carrier with the knife blades assembled thereon can be inserted into the apertures 23 to rest against the projecting lugs 13. The assembly is therefore exceedingly simple.

To actuate the knife carrier I preferably afford a lever 24. This lever is conveniently cut from a sheet of metal and at one end is formed into a hook 26 adapted to be engaged with a bar 27 formed in the end plate 9 between two apertures 28 and 29. The lever extends through the frame 6 and projects in a force receiving portion 31 from the cover plate 12 which is provided with an appropriate longitudinal slot 32 to permit the requisite movement of the lever. If desired, the force receiving portion 31 may be equipped with an insulated handle 33.

The contour of the lever is such that it substantially encompasses the crank portion of the knife carrier and in order to take advantage of this fact and also in order to impel the knife carrier positively from either of its extreme pivoted positions, I provide the lever with means for engaging the crank portion of the knife carrier.

Adjacent its force receiving portion 31 the lever is shaped to provide an integral yoke or cam surface 34 which, on one side is bounded by the intermediate portion of the lever 36 and on the other side is bounded by a projection 37. The contour of the yoke 34 so formed is such that upon pivotal movement of the lever the crank portion of the knife carrier is initially engaged and the knife carrier is positively started from one extreme position toward the other. This is true for both directions of movement.

To increase the celerity of action of my switch, I preferably provide a coil spring 39 which at one end is connected to the crank portion of the knife carrier and at the other end is connected to a finger 41 formed integrally with the lever 24 and projecting therefrom to lie substantially opposite the hook 26. The spring 39 not only urges the knife carrier firmly onto the lugs 13 and the lever 24 firmly onto the bar 27 so that the assembly is securely held together but the spring 39 also passes through the pivotal axis of the knife carrier securing movement of the knife carrier from one extreme position to the other. The action of the spring is thus to impel the knife carrier rapidly toward an extreme position during the final portion of its movement theretoward.

Since the switch blades 18 and 19 move in conjunction with the knife carrier 16, I preferably provide stationary blades 42 and 43 which are adapted to be engaged by the switch blades 18 and 19 for completing an electrical circuit. The stationary blades 42 and 43 are preferably mounted in pairs at either side of the switch and are preferably fastened to ears 44 usually formed integral with the end plate 9 of the switch. The blades 42 and 43 are usually separated from the metallic parts of the remainder of the switch by insulating strips 46.

In the operation of my switch, the lever 24 is moved from one extreme position as shown in Fig. 3 toward the opposite extreme position as shown in Fig. 4. During the initial portion of this movement the portion 36 of the yoke 34 engages the cranked intermediate portion of the knife carrier and positively impels it from one extreme position toward the other by direct mechanical contact during the first half of the total travel. This initial positive movement is supplemented and the celerity of action of the switch is increased by the functioning of the coil spring 39 which passes through the pivotal axis of the knife carrier at substantially the mid-point of its movement and completes the travel of the knife carrier. Return movement of the lever 31 causes the projection 37 initially to engage the crank portion of the knife carrier and initially to impel the knife carrier positively toward the opposite extreme position by direct mechanical contact during the first half of the total travel. The spring 39 is effective to effect the final portion of this movement since it passes through the pivotal axis of the knife carrier at substantially the mid-point of its movement.

The switch blades 18 and 19 pivot according to the pivotal movement of the knife carrier and thus engage the two stationary blades 42 and 43 in one of the extreme positions of the knife carrier and of the actuating lever and are disengaged from the stationary blades 42 and 43 in the other extreme position of the knife carrier and of the lever. The extreme positions of the knife carrier being determined by the contour of the arcuate apertures in the side plates 7 and 8 there is no shock imparted to the lever 31 as would be the case if the yoke 34 acted as a stop for the knife carrier.

In the modified form of lever shown in Fig. 5 I have situated the finger 51 somewhat closer to the hook 52 in order to accommodate a longer coil spring and increase the rigidity of the lever.

In the switch of my invention it will be appreciated that the assembly and disassembly of the switch is simply and easily accomplished and that the individual parts making up the switch are in themselves simple and inexpensive to manufacture. Additionally, the location of the knife carrier with its crank portion directed away from the fulcrum of the actuating lever permits a positive mechanical start and stop to be given the knife carrier and a quick completion of the pivotal movement of the knife carrier thus resulting in a very marked improvement in the operation of switches of this general type.

It is to be understood that I do not limit myself to the form of the switch shown and described herein, as the invention, as set forth in the following claims may be embodied in a plurality of forms.

I claim:

1. A switch comprising a frame, a knife carrier having a cranked portion between its ends and mounted on said frame for pivotal movement, a lever mounted at one end away from said cranked portion for pivotal movement on said frame, a force receiving portion at the other end of said lever, means on said lever adjacent said force receiving portion for engaging and moving said knife carrier pivotally in either direction, and a spring connected at one end to said cranked portion and at the other end to said lever adjacent the mounting thereof.

2. A switch comprising a frame, a lever having a force receiving portion at one end thereof, a knife carrier having a portion cranked toward said force receiving portion and mounted on said frame for pivotal movement, means for relating the other end of said lever and said frame for pivotal movement, means on said lever adjacent said force receiving portion for engaging said cranked portion, means adjacent the other end of said lever for engaging a spring, and a spring connecting said last-named means and said cranked portion.

3. A switch comprising a frame, a monoplanar lever at one end having a force receiving portion and at the other end mounted on said frame for pivotal movement, a knife carrier mounted on said frame to pivot about an axis between the ends of said lever, said knife carrier having a portion cranked toward said force receiving portion, means on said lever for engaging said cranked portion, and a spring connecting said cranked portion to said lever and adapted to pass through said axis.

4. A switch comprising a frame, a lever at one end having a force receiving portion and at the other end mounted on said frame for pivotal movement, a knife carrier mounted on said frame to pivot between limits on an axis between the ends of said lever, said knife carrier having a portion cranked toward said force receiving portion, means on said lever for effecting a lost motion engagement with said cranked portion to impel said knife carrier positively for substantially half way of its travel between said limits, and a spring for urging said knife carrier the remainder of its travel between said limits.

5. A switch comprising a frame, a knife carrier mounted to pivot on said frame, said knife carrier having a cranked portion, a monoplanar lever mounted on said frame to pivot on an axis on the opposite side of said knife carrier from said cranked portion, means on said lever partially encompassing said cranked portion for a lost motion engagement therewith, a spring in the plane of said lever adapted to take up said lost motion, and a force receiving portion on said lever.

6. A lever for a switch comprising a planar structure having a force receiving portion at one end, an arcuate hook for pivotal mounting at the other end, an offset intermediate portion, an arcuate finger facing said arcuate hook for spring attachment, and a projection which, together with said offset portion, forms a yoke.

7. A switch comprising a frame, a lever at one end having a force receiving portion and at the other end mounted on said frame for pivotal movement, a knife carrier mounted on said frame to pivot between limits on an axis between the ends of said lever, said knife carrier having a portion cranked toward said force receiving portion, means on said lever engaging said cranked portion to impel said knife carrier positively for the initial portion of its travel between said limits, and a spring for urging said knife carrier the remainder of its travel between said limits.

In testimony whereof, I have hereunto set my hand.

WALTER MURAD.