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ELECTRICAL SWITCH ASSEMBLY

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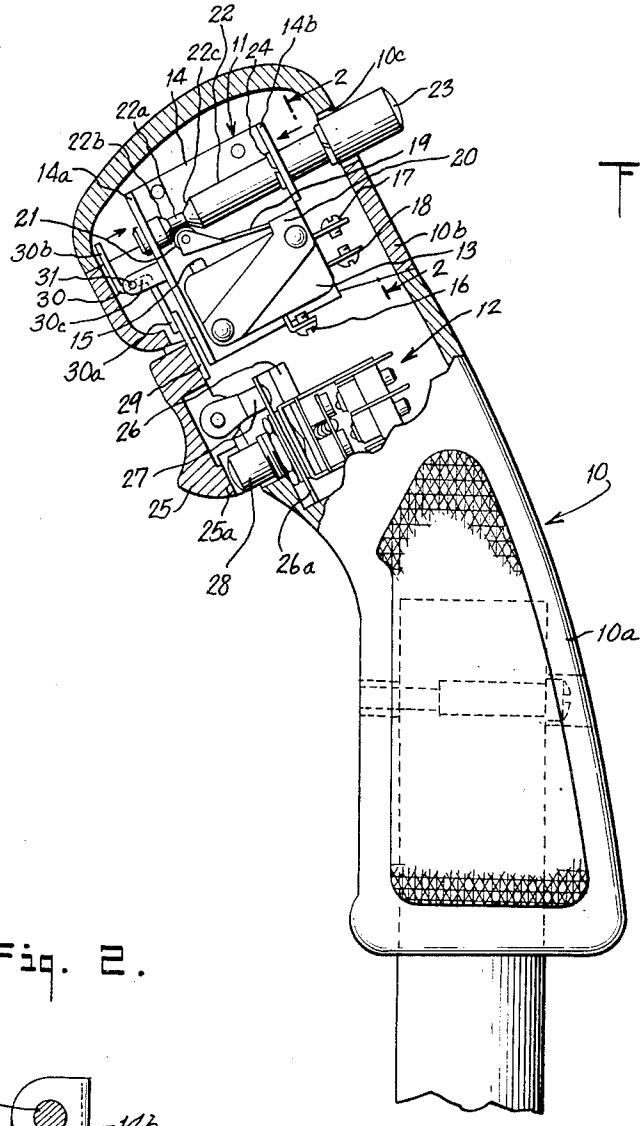
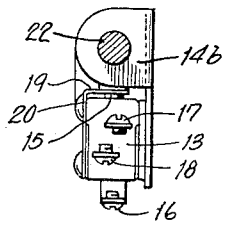


Fig. 1.

Fig. 2.



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ELECTRICAL SWITCH ASSEMBLY

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The present invention relates generally to electrical switch assemblies and more particularly to switch assemblies incorporated within a manual grip and controllable by separate fingers of the operator's hand.

It is known to install electrical switches in grip members which may be grasped in the hand of an operator, the switches being operated by push-buttons and the like projecting from the body of the grip. From the standpoint of human engineering it has been found that where the same button is used both to actuate and de-actuate the switch, the possibility of operational error is increased. Moreover, switches controlled by a single button usually require springs, washers and guides to lock-out the switch.

Accordingly, it is the main object of this invention to provide in a grip a switch assembly having separate finger operated means to actuate and de-actuate the switch. A significant feature of the invention resides in the fact that the normal positions assumed by the fingers of the hand when holding the grip are conveniently related to the positions of the switch control means to facilitate the rapid operation thereof. A switch assembly based on the invention may be readily operated even when the user is wearing heavy gloves.

More specifically it is an object of the invention to provide a switch assembly wherein the switch may be locked-out without the use of springs, washers, or guides, as are entailed in conventional arrangements. Thus a switch assembly in accordance with the invention is of relatively simple and efficient design and may be manufactured at low cost.

Also an object of the invention is to provide within a grip housing a push-switch assembly in cooperative relationship whereby actuation of the trigger switch serves simultaneously to de-actuate the push-switch.

For a better understanding of the invention, as well as other objects and further features thereof, reference is made to the following detailed description thereof to be read in conjunction with the accompanying drawing wherein like components in these figures are represented by like reference numerals.

In the drawing:

Fig. 1 is a front view, partially in section, of a grip having switch assemblies installed therein in accordance with the invention.

Fig. 2 is a view taken along lines 2—2 in Fig. 1.

Referring now to the drawings, there is shown a grip **10** of hollow construction comprising a handle portion **10***a*, whose exterior walls are corrugated or otherwise roughened to facilitate handling, and a housing portion **10***b*. Mounted within housing **10***b* at the upper end thereof is a push-switch assembly, generally designated by numeral **11**, and mounted therebelow is a trigger-switch assembly **12**.

Push-switch assembly **11** includes a microswitch **13**, supported on a bracket **14** secured by screws or other means to the wall of the housing. Microswitch **13** is of conventional design and includes an actuator pin **15** projecting from a point adjacent the upper left comb

which, when depressed, causes a flexible movable contact to engage a fixed contact, the movable contact normally engaging a second fixed contact. Thus the microswitch is provided with exterior terminal posts **16**, **17** and **18** for connection respectively to the movable contacts and the first and second fixed contacts.

To operate actuator pin **15** there is provided a leaf spring **19**, one end of which is integral with a bracket **20** riveted to the face of the microswitch casing whereby the spring flexes about a point adjacent the upper right corner of the switch. Attached to the free end of leaf spring **19** and rotatably supported between lugs **19** thereon is a roller **21**. The leaf spring is so tensioned that normally it is out of engagement with actual pin **15**.

Bracket **14** is provided at either side thereof with flanges **14***a* and **14***b* for slidably supporting a shaft **22** which is disposed in parallel relation to the microswitch and is in operative relation to roller **21**. To form bearing surfaces for the shaft, the flanges **14***a* and **14***b* are provided with aligned openings which are disposed in axial registration with an opening **10***c* in the rear wall of the grip, the shaft extending therethrough and terminating a push-button **23**.

Shaft **22** is of cylindrical shape and has formed therein adjacent the inner end a section **22***a* of restricted diameter flanked by tapered cam surfaces **22***b* and **22***c*. When the shaft is in its normal position, as shown in Fig. 1, the section **22***a* is in alignment with roller **21**, whereby the roller nestles therein and the leaf spring **19** is disengaged from the actuator pin. When push-button **23** is depressed to shift shaft **22** to the left, the roller **21** rides down cam surface **22***c* to contact the surface of shaft **22** which is of large diameter relative to section **22***a* whereby the leaf spring is caused to engage the actuator pin **15** to operate the microswitch.

The vertical forces developed through depression of the leaf spring and the actuator pin along with the frictional forces prevalent in the shaft provide a relatively large locking force. It will be noted that the spring forces are vertical, whereas the frictional forces are horizontal.

Thus the depression of button **23** effects actuation and locking of the switch. To unlock and de-actuate the switch, it is necessary to push shaft **22** to the right to an extent limited by a stop ring **24** secured to the shaft and abutting flange **14***b*. This is effected by separate control means in the form of a trigger member **25** projecting through the front wall of grip **10**. Trigger member **25** is included in a trigger switch assembly **12**. Assembly **12** is supported on a mounting bracket **26** having a side flange **26***a* from which projects a post **27** on which trigger member **25** is pivotally mounted. The trigger switch is provided with an actuator button **28** in operative relation with the heel **25***a* of the trigger member, such that when the member is rocked about its pivot, the button **28** is depressed to operate the switch and when the trigger member is released, the button **28** reverts to its initial position to de-actuate the switch.

Attached to the underside trigger member **25** at the upper end **25***b* thereof and extending thereabove is a plate **29** which is engageable with the lower leg **30***a* of a step-shaped link **30**. Link **30** also includes an upper leg **30***b* and a cross arm **30***c* connecting the legs, the upper leg being engageable with the end of shaft **22**. Arm **30***c* is pivotally connected to a fulcrum **31** projecting from the flange **14***a* of the mounting plate **14** such that the link **30** acts as a class A lever. Thus when the trigger member **25** is operated, plate **29** engages the lower leg **30***a* of the link to swing same about fulcrum **31** and cause the upper leg **30***b* to engage shaft **22** and to push it to the right. Since the force developed by the link is horizontal, it will override the horizontal frictional forces

and because of the wedge effect on the shaft and roller, the shaft will shift axially to the right to unlock the microswitch.

It will be seen therefore that when the trigger switch **12** is actuated by depressing the trigger member **25**, the microswitch **11**, if previously actuated and locked, will be unlatched and deactuated. Push-button **18** which projects from the rear wall of the grip housing **10***b* is best manipulated by the thumb of the user whose fingers encircle the handle **10***a* of the grip. The trigger member is best operated by the trigger finger of the hand. Thus it is possible for the user in rapid succession to operate one and then the other switch, as desired.

While there has been shown what is considered to be a preferred embodiment of the invention, it will be manifest that many changes and modifications may be made therein without departing from the essential spirit of the invention. It is intended, therefore, in the annexed claims to cover all such changes and modifications as fall within the true scope of the invention.

What is claimed is:

1. A switching assembly comprising a first switch element provided with a depressible actuator pin to operate said switch, a shaft axially shiftable from a first position to a second position and having a section of restricted diameter, means operatively coupling said shaft and said pin and including a member which when said shaft is in its first position nestles in said section whereby said pin is unactuated and in the second position of said shaft bears against the larger portion of said shaft thereby to depress said pin, operator means adapted to engage one end of said shaft to shift same from said first position to said second position, separate operator means adapted to engage the other end of said shaft to shift same from said second position to said first position, and a second switch element operatively coupled to said separate operator means and actuated thereby whereby, when said second switch element is actuated, the pin of said first element is unactuated.

2. A switching assembly comprising a first switch element provided with an actuator pin and a leaf spring having a roller supported at one end thereof, said roller being adapted when flexed downwardly to depress said pin to operate said switch, a shaft axially shiftable from a first position to a second position, said shaft being operatively disposed relative to said roller and having a section of restricted diameter so disposed that when said shaft is in its first position it nestles said roller to effect disengagement of said spring from said pin, said roller in the second position of said shaft bearing against the larger portion of said shaft thereby to flex said spring to depress said pin, first operator means adapted to engage one end of said shaft to shift same axially from said first position to said second position, second and separate operator means adapted to engage the other end of said shaft to shift same from said second position to said first position, and a second switch element operatively coupled to said separate operator means and actuated thereby whereby, when said second switch element is actuated, the pin of said first element is unactuated.

3. A switching device comprising a grip, a switch assembly disposed within said grip and including a first switch element provided with an actuator pin and a leaf spring having a roller supported at one end thereof and adapted when flexed downwardly to depress said pin to operate said switch, a shaft axially shiftable from a first position to a second position, said shaft being operatively disposed relative to said roller and having a section of restricted diameter which when said shaft is in its first position accommodates said roller to effect disengagement of said spring and said pin, said roller in the second position of said shaft bearing against the enlarged portion of said shaft thereby to flex said spring to depress said pin, operator means on one wall of said grip adapted to shift said shaft axially from said first position to said second position, separate operator means on another wall of said grip adapted to engage the other end of said shaft to shift same from said second position to said first position, and a second switch element operatively coupled to said separate operator means and actuated thereby whereby, when said second switch element is actuated, the pin of said first element is unactuated.

4. A switching device comprising a grip provided with front and rear walls and having an handle portion and a housing portion, a switch assembly disposed within said housing portion and including a first switch element provided with an actuator pin and a leaf spring having a roller supported at one end thereof and adapted when flexed downwardly to depress said pin to operate said switch, a shaft axially shiftable from a first position to a second position, said shaft being operatively disposed relative to said roller and having a section of restricted diameter which when said shaft is in its first position accommodates said roller to effect disengagement of said spring and said pin, said roller in the second position of said shaft bearing against the enlarged portion of said shaft thereby to flex said spring to depress said pin, one end of said shaft projecting through the rear wall of said grip, a push button attached to said one end of said shaft to shift same from said first position to said second position, operator means mounted on the front end of said grip adapted to engage the other end of said shaft to shift same from said second position to said first position, and a second switch element operatively coupled to said separate operator means and actuated thereby whereby, when said second switch element is actuated, the pin of said first element is unactuated.

5. A switching device comprising a grip provided with front and rear walls and having a handle portion and a housing portion, a switch assembly disposed within said housing portion and including a switch element provided with an actuator pin and a leaf spring having a roller supported at one end thereof and adapted when flexed downwardly to depress said pin to operate said switch, a shaft axially shiftable from a first position to a second position, said shaft being operatively disposed relative to said roller and having a section of restricted diameter which when said shaft is in its first position accommodates said roller to effect disengagement of said spring and said pin, said roller in the second position of said shaft bearing against the enlarged portion of said shaft thereby to flex said spring to depress said pin, one end of said shaft projecting through the rear wall of said grip, a push bottom attached to said one end of said shaft to shift same axially from said first position to said second position, whereby the upward pressure of said spring against said shaft locks said switch, a trigger member pivotally mounted on the front end of said grip, lever means operated by said trigger member adapted to engage the other end of said shaft to shift same from said second position to said first position, and a second switch assembly supported within said housing and including an actuator button in operative relation with said trigger member.

6. A device, as set forth in claim 5, wherein said trigger has a pusher plate attached to the underside thereof, and said lever means is constituted by a pivotally mounted step-shaped element having an upper leg adapted to engage said other end of said shaft, the pusher plate being engageable with the lower leg of said lever element to cause said upper leg to engage said shaft.

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