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SWITCH LOCKING MEANS FOR PORTABLE ELECTRIC TOOLS

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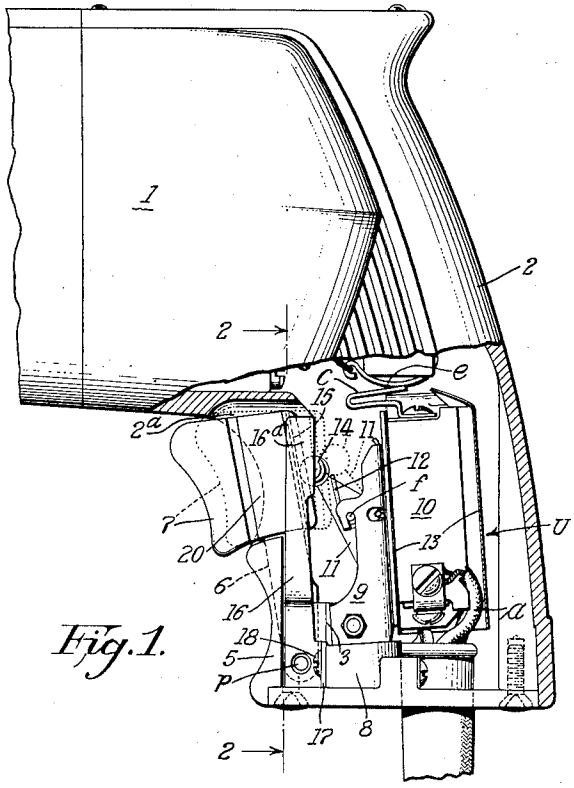


Fig. 1.

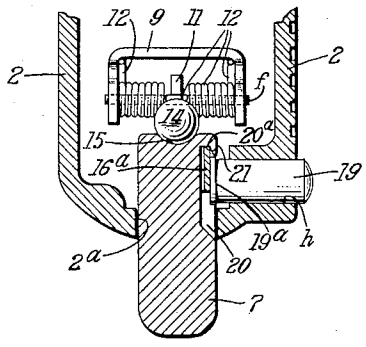


Fig. 4.

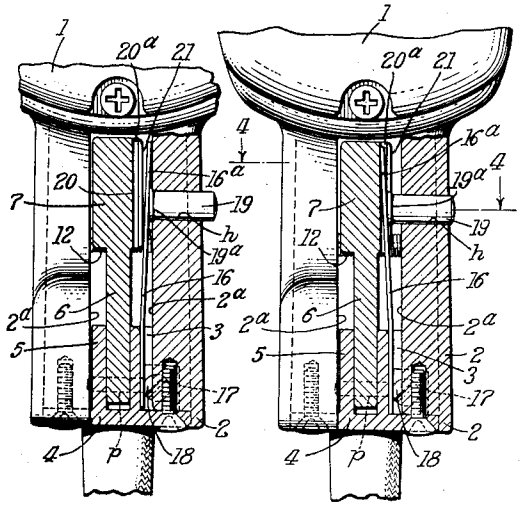


Fig. 2.

Fig. 3.

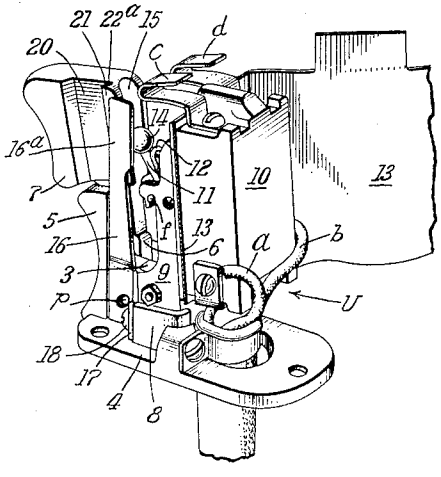


Fig. 5.

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SWITCH LOCKING MEANS FOR PORTABLE ELECTRIC TOOLS

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7 Claims. (Cl. 200—157)

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This invention relates to locking devices for electric switches of the type which are used to control the motors of electrically driven tools, such, for example, as portable electric drills.

In portable electric tools it is customary to provide control, or so-called "off" and "on," switches and so to locate such switches, relative to the handles of the tools, that they may be readily actuated by the operator without moving his hand from its normal holding or operating position. One form of switch which is commonly used in tools of this nature is one in which the switch is normally biased to an open or "off" position and is maintained in closed or "on" position by the finger of the user, usually through the medium of a suitable trigger.

For certain operations it is desirable that the motor run continuously for a considerable time and, to obviate the necessity of the user manually holding the switch closed, various means heretofore have been provided for locking the switch in its closed or "on" position in opposition to its natural bias.

Th present invention has as a primary object to provid improved and simplified means for locking a motor control switch in its closed or "on" position.

Another object of the invention is to provide an improved switch locking means adapted for use in connection with a unitary switch assembly such, for example, as that shown in United States patent of R. Happe, No. 2,405,827, August 13, 1946.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Fig. 1 is a side elevation, partly in section, of a portion of a portable electric tool embodying the present invention.

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1, showing the switch-locking means in its ineffective position.

Fig. 3 is a view similar to Fig. 2 but with the switch-locking means in its effective position in which it maintains the switch closed to effect continuous operation of the motor with which the tool is equipped.

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a perspective view of a unitary switch assembly with the present improved switch-locking means applied thereto.

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Referring more specifically to the drawings, the invention is disclosed as embodied in a portable electric tool comprising a frame 1, housing an electric motor, not shown, a hollow pistol-grip handle 2 having a slot 2^a in its forward wall, and a motor-control switch unit U mounted in said handle. The switch unit may be of the type disclosed in the above mentioned patent to R. Happe, No. 2,405,827 including a supporting member 3 comprising a plate 4, for closing the lower end of the handle, an upstanding slotted wall portion 5 which fits within the slot 2^a and pivotally supports, at *p*, a switch-actuating lever, preferably in the form of a trigger 6 having a finger-piece 7, and a stepped block portion 8 upon which is secured, by a bracket 9, the vertically disposed body portion 10 of the motor control switch. The finger piece 7 also is located within the slot 2^a in the forward wall of the handle 2. Current-conducting wires *a* and *b*, which are adapted to be connected with any suitable source of electricity, are connected to the lower end of the portion 10 and spring contacts *c* and *d* are secured to the upper end thereof. The contacts *c* and *d* frictionally engage complemental contacts, as *e*, provided by the motor. Current flow through the switch is controlled by a suitable circuit making and breaking device including a lever 11 fulcrumed on a pin *f* in the bracket 9 and normally biased to a circuit breaking position (shown in full lines in Fig. 1) by a spring 12 surrounding the pin *f* and engaging the bracket 9 and the lever 11, as shown most clearly in Fig. 4. The portion 10 of the switch and the leads connected thereto may be enclosed within an insulating wrapping 13. The switch lever 11 is formed at its free end as a ball 14 which tracks a groove 15 in the rear edge of the finger-piece 7 of the trigger 6. Pressure of the ball 14 on the trigger 6, under the influence of the spring 12, normally biases the trigger 6 to its outermost or circuit breaking position illustrated in full lines in Fig. 1.

To start the motor, the user pulls the trigger 6 to the position indicated in dotted lines in Fig. 1, thereby shifting the switch lever 11 to its circuit closing position also indicated in dotted lines in Fig. 1. So long as the trigger 6 and lever 11 are maintained in this position the motor will continue to run. Inasmuch as the switch may be of conventional form and its specific construction forms no part of the present invention further illustration and description thereof is deemed unnecessary.

When it is desired to maintain the circuit closed, to effect continuous running of the motor, without manually holding the trigger depressed in opposition to the spring 12, the user actuates the improved switch locking means which constitutes the present invention. This means comprises a vertically disposed leaf spring 16, having, at its lower end, an offset portion 17 which is secured, by a screw 18, to the block portion 8 of the supporting member 3. The spring 16 normally occupies the position shown in Fig. 2 i. e. flatwise with respect to the switch actuating lever 6 and with its head portion 16a out of the path of movement of the finger piece 7 and bearing against the head 19a of a plunger pin 19 slidingly mounted in a smooth straight hole or bore *h* in the front wall of the handle 2. The spring 16 may be biased to the switch locking position shown in Fig. 3, after the trigger has been shifted to the circuit closing position illustrated in dotted lines in Fig. 1, by pressure applied to the outer rounded end of the plunger 19, as, for example, by the thumb of the user. In the position shown in Fig. 3, the head 16a is located in a cavity 20 formed in the finger-piece 7 of the trigger 6. With the spring in this position, pressure on the finger-piece may be relieved whereupon the spring 12 will swing the trigger outwardly until the head 16a of the spring 16 is engaged by the abutment wall 20a of the cavity 20, as shown in Fig. 4. This movement is slight and not sufficient to permit opening of the switch. A retaining flange 21 also is provided by a wall of the cavity 20. This flange overhangs the side of the head 16a of the leaf spring and serves as a manually releasable latch which prevents the spring from returning to its outermost position. When it is desired to open the switch to stop the motor the trigger is again pulled inwardly to release the flange 21 from the head 16a whereupon the spring 16 moves outwardly to the position shown in Fig. 2, pushing the plunger 19 outwardly with it. By then relieving the pressure on the trigger, the trigger will be moved outwardly by the spring 12 and the motor will be stopped.

It will be noted that this switch locking and releasing means comprises only three elements, viz. the spring 16, its attaching screw 18 and the plunger 19 all of which may be easily and cheaply manufactured and assembled. Particular attention is called to the fact that no separate spring and no separate housing means is required for the plunger 19; the switch locking element 16 affording the pressure to shift the plunger outwardly and a plain hole drilled in the handle serving as a housing for the plunger.

It will also be noted that this construction permits ready removal of the switch unit from the handle for inspection or repair without any special consideration of the switch locking means; the spring 16 being removable with the unit and the plunger 19 merely remaining in the hole *h* until the switch unit is reinserted into the handle.

Having thus set forth the nature of the invention, what we claim herein is:

1. A locking device for a switch unit having a shiftable switch-actuating lever normally biased to one of two predetermined positions and provided with an abutment surface; comprising a leaf spring mounted flatwise adjacent said lever and normally out of the path of movement of said abutment, and means including a manually slidable plunger engaging said lever and operable when said lever is in one of said predetermined positions in opposition to its normal bias, to deflect said leaf spring into the path of movement of said abutment surface to hold said lever against return movement to its other predetermined position.

2. A locking device for a switch unit having a shiftable switch-actuating lever normally biased to a circuit breaking position and provided with a cavity a wall of which affords an abutment surface and a retaining flange; comprising a leaf spring mounted flatwise adjacent said lever and having an end portion adapted to enter the cavity in said switch actuating-lever when said lever is in its circuit closing position, and a manually slidable plunger adapted to engage said leaf spring to deflect said end portion into said cavity and into the path of movement of said abutment surface to hold said lever against movement to its other predetermined position, said retaining flange engaging said leaf spring to maintain it in said cavity and in the path of movement of said abutment.

3. A locking device for a switch unit having a shiftable switch-actuating lever normally biased to a circuit opening position but shiftable to a circuit closing position and provided with an abutment surface; comprising a leaf spring mounted flatwise adjacent said lever, a manually operable member constructed and arranged to deflect said leaf spring into the path of movement of said abutment surface to cause the spring to hold the lever in its circuit closing position in opposition to its normal bias, and a manually releasable latch device carried by said lever and engaging said spring to maintain it in lever-holding position.

4. In an electric tool having a casing, a handle having a wall provided with an aperture, an electric motor in said casing and a motor-controlling switch unit mounted in said handle and having a shiftable switch-actuating lever normally biased to one of two predetermined positions and provided with an abutment surface; the improvement which consists in the provision of a locking device for said switch-actuating lever comprising a leaf spring mounted on said switch unit and arranged flatwise adjacent said lever and normally maintained out of the path of movement of said abutment surface, and a manually operable plunger slidably mounted in the aperture in said handle and engaging said leaf spring for deflecting it into the path of movement of said abutment surface thereby to obstruct the normal return movement of said lever.

5. In an electric tool having a casing, a hollow handle having a side wall provided with a straight bore and a front wall provided with a slot, an electric motor in said casing and a motor-controlling switch unit removably mounted in said hollow handle and having a shiftable switch-actuating lever normally biased to one of two predetermined positions and provided with an abutment surface and a retaining flange; the improvement which consistes in the provision of a locking device for said switch-actuating lever comprising a leaf spring mounted on said switch unit and arranged flatwise adjacent said lever and having an end portion normally maintained out of the path of movement of said abutment surface and retaining flange, and a manually operable cylindrical plunger slidably mounted in the aperture in said handle and having a head located in said slot and engaging said leaf spring for deflecting it into the path of movement of said abutment surface and to a position behind

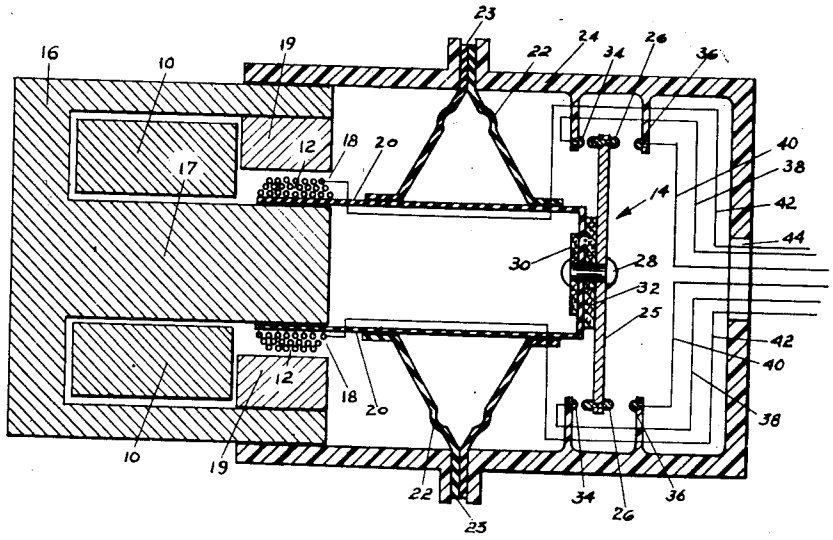
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ELECTRODYNAMIC RELAY

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