Nov. 1, 1949 G. C. WILHIDE 2,487,011

SWITCH ASSEMBLY FOR PORTABLE ELECTRIC TOOLS

Filed June 18, 1946 4 Sheets-Sheet 1

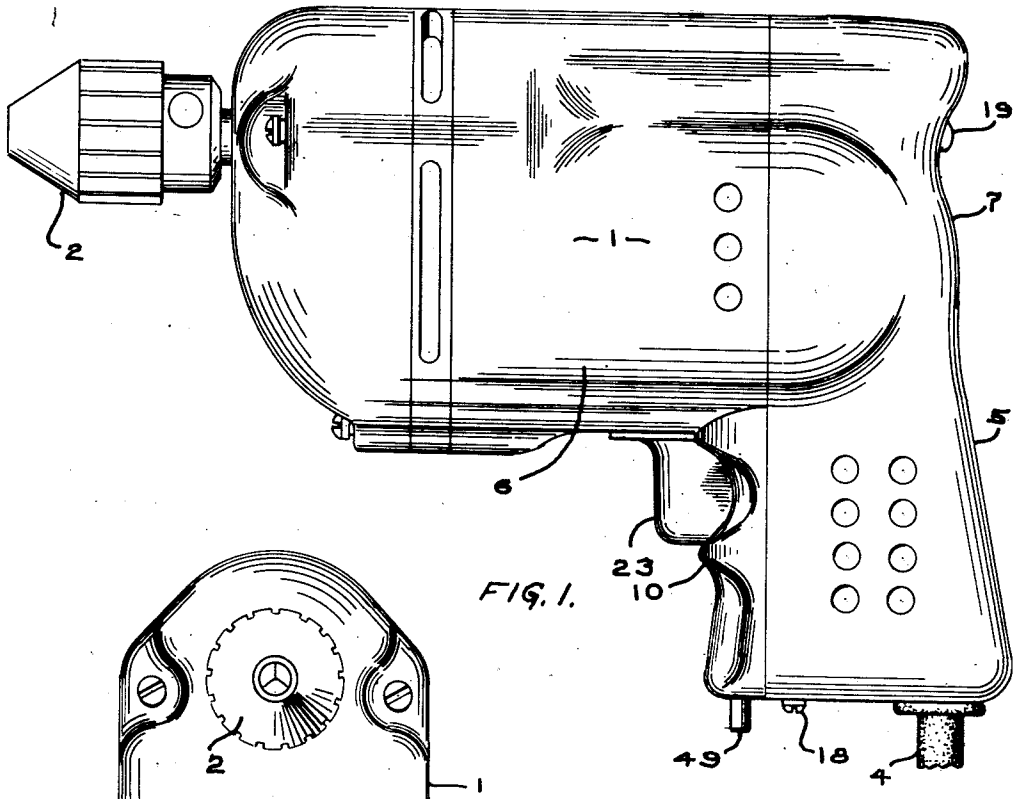


FIG. 1.

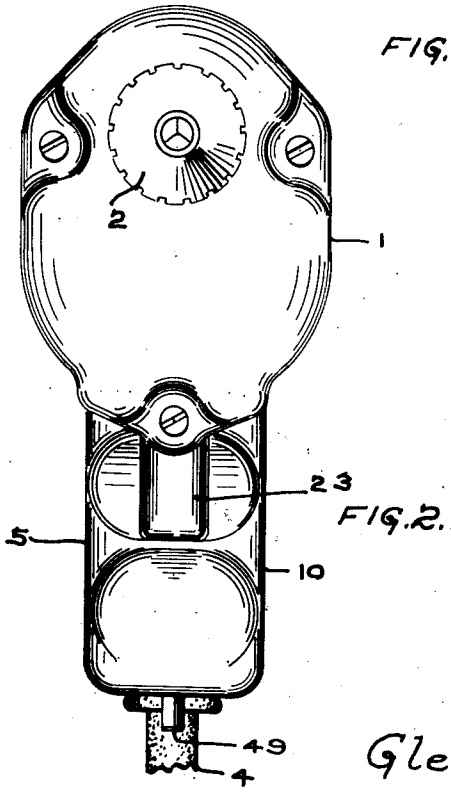


FIG. 2.

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Witnesses

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SWITCH ASSEMBLY FOR PORTABLE ELECTRIC TOOLS

Filed June 18, 1946 4 Sheets-Sheet 2

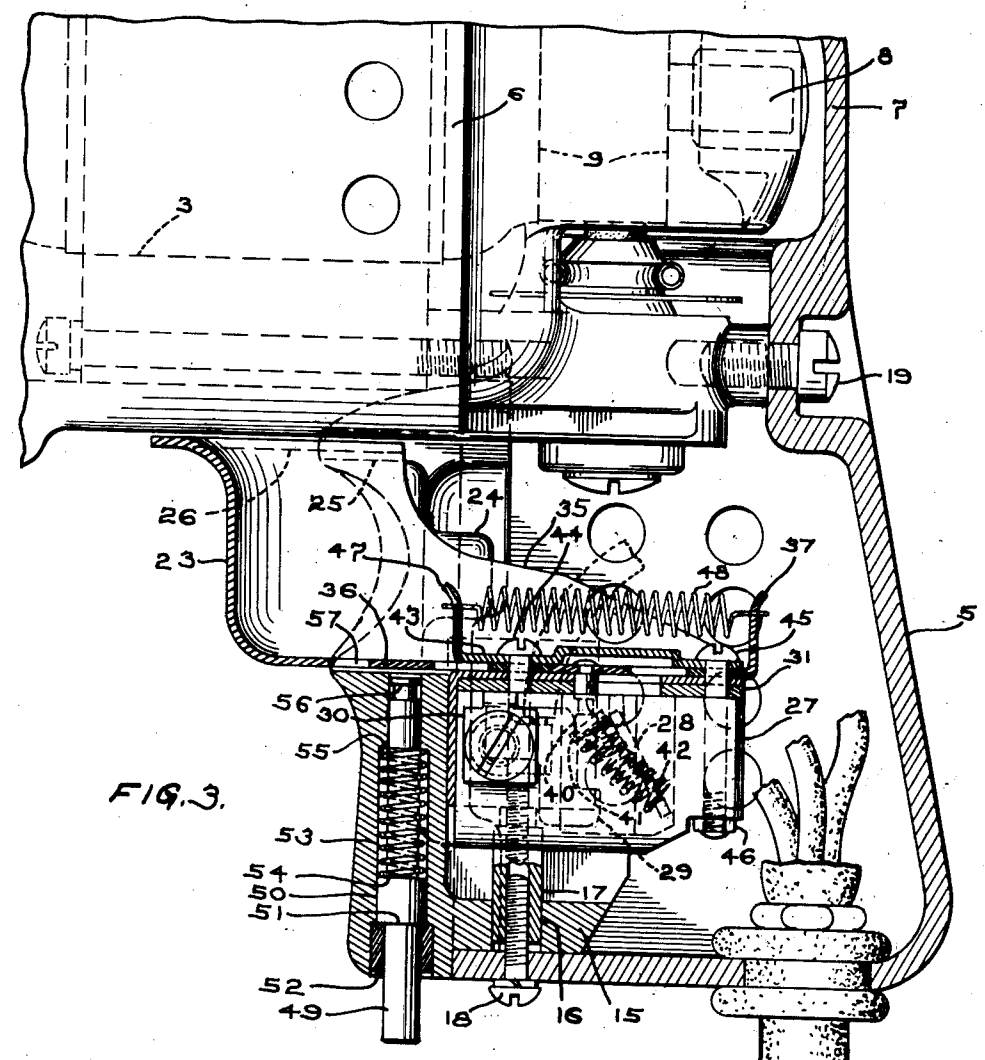


FIG. 3.

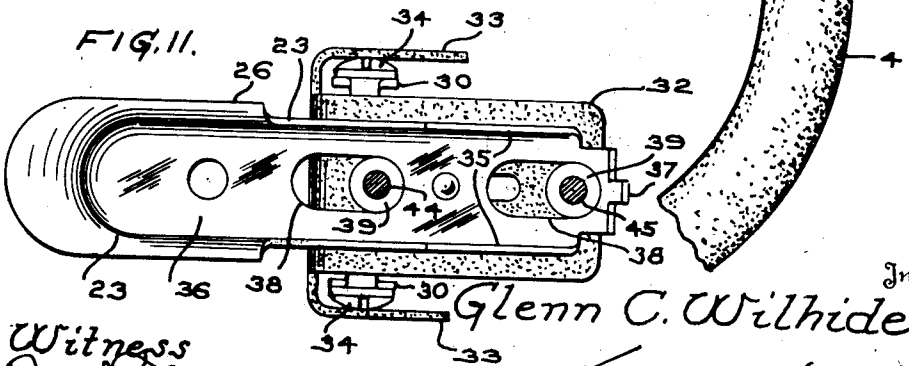


FIG. 11.

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SWITCH ASSEMBLY FOR PORTABLE ELECTRIC TOOLS

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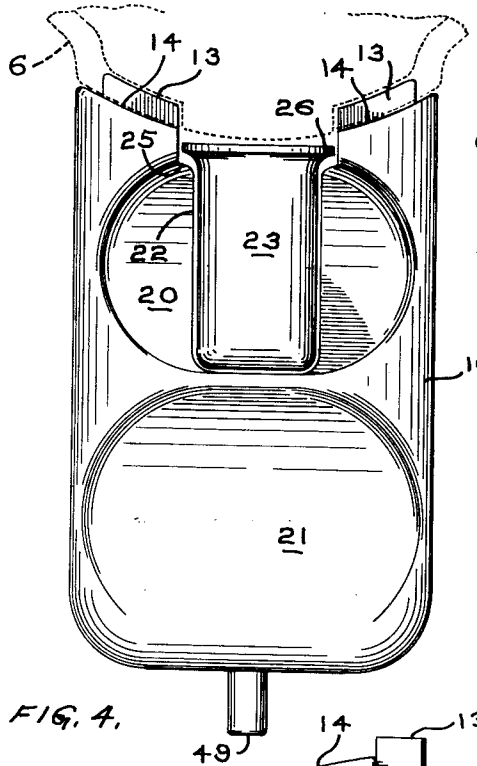


FIG. 4.

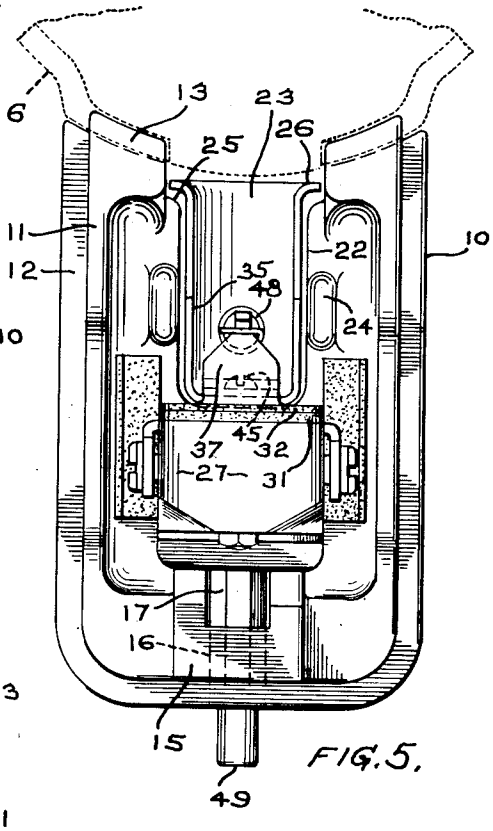


FIG. 5.

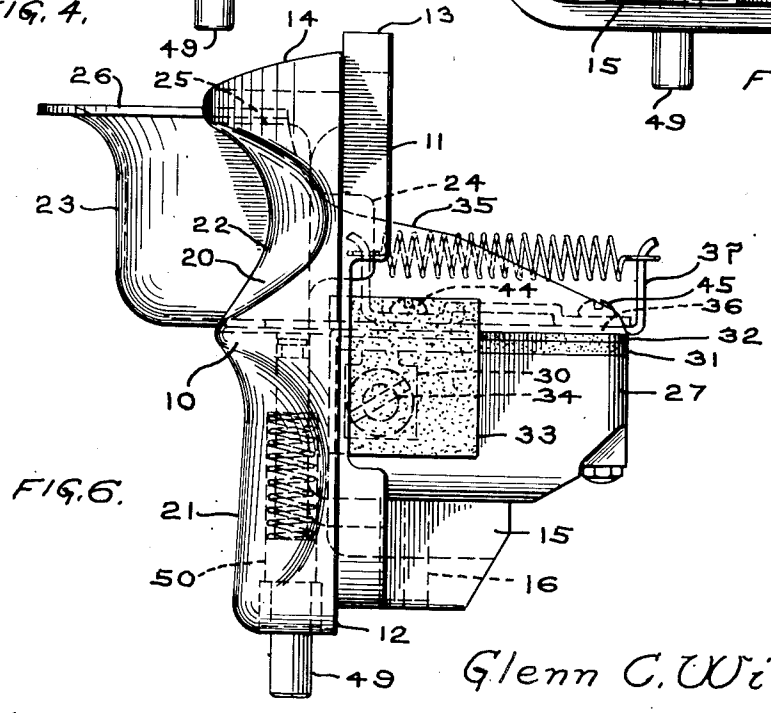


FIG. 6.

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SWITCH ASSEMBLY FOR PORTABLE ELECTRIC TOOLS

Filed June 18, 1946 4 Sheets-Sheet 4

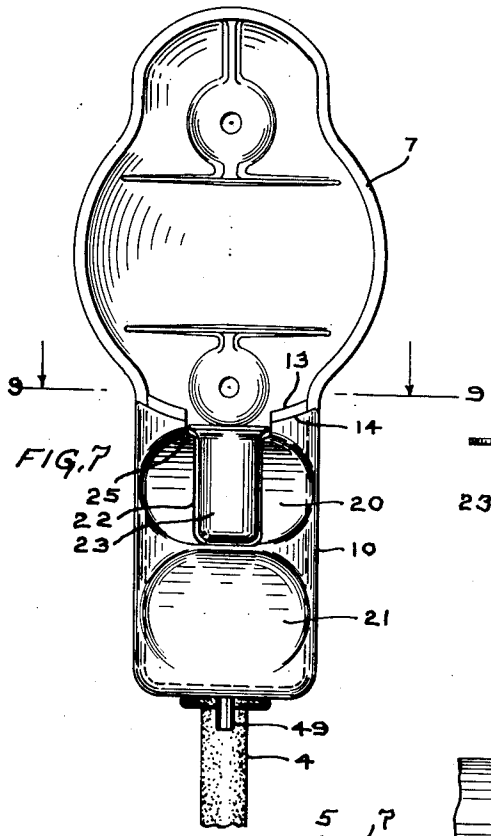


FIG. 7.

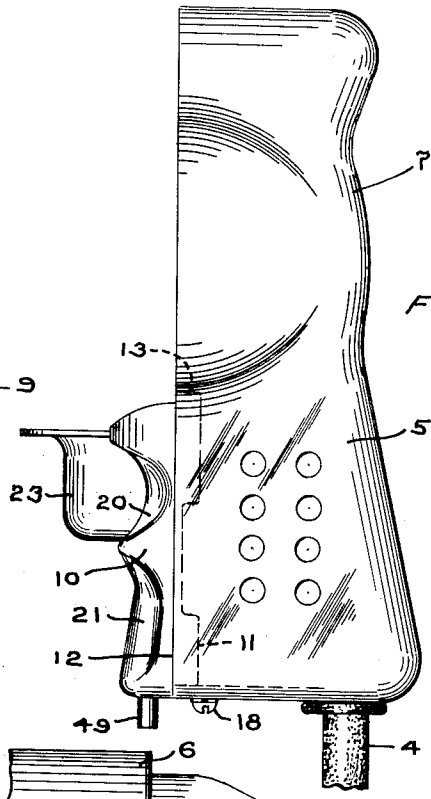


FIG. 8.

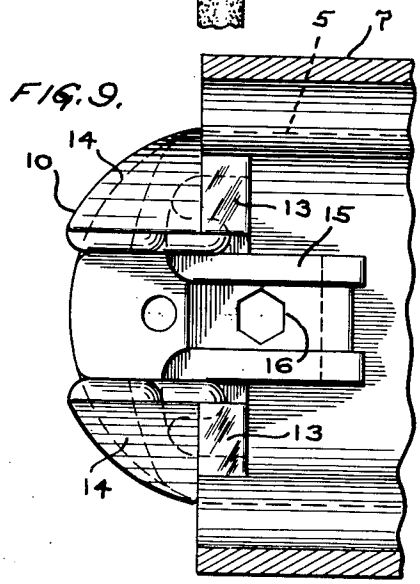


FIG. 9.

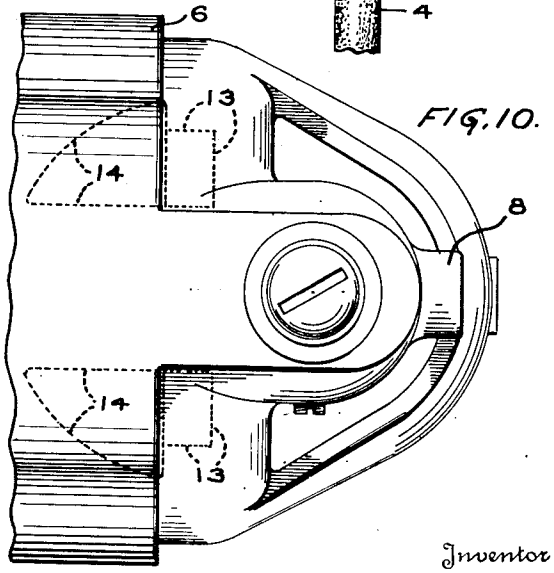


FIG. 10.

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UNITED STATES PATENT OFFICE

2,487,011

SWITCH ASSEMBLY FOR PORTABLE ELECTRIC TOOLS

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Application June 18, 1946, Serial No. 677,465

11 Claims. (Cl. 200—157)

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This invention relates to a switch actuating mechanism for use on a portable electric tool. It is shown on a portable electric drill.

The entire switch and its actuating mechanism is located in the handle or grip of the tool and it may be quickly assembled with the handle and tool by the use of only one screw. The parts composing the actuating mechanism are so few in number and so simple and so rigidly placed that they will operate for long periods of time without requiring servicing or replacement and without getting out of order or adjustment. They are so compactly arranged that they fit readily into a small handle. The operating mechanism is arranged to maintain the switch in its off position except when it is desired to turn it on and it resumes this off position upon being released, that is, the switch is automatically opened. A mechanism is also provided to maintain or hold the switch in its on position without the exercise of tension by the operator of the tool and this holding mechanism is so designed that it may be quickly released by the operator. Economy of manufacture and simplicity of dismantling for servicing are other objects attained by the present invention.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings forming a part hereof and in which:

Figure 1 is a side elevation of a drill embodying the switch operating mechanism of this invention.

Figure 2 is a front elevational view of the same.

Figure 3 is a fragmentary side view partly in section of the switch operating mechanism and its surrounding parts.

Figure 4 is a front elevational view of the plate forming the front of the tool handle and of the switch operating block.

Figure 5 is a rear elevational view of the parts shown in Figure 4 and in addition the switch casing.

Figure 6 is a side elevational view of the parts shown in Figure 5.

Figure 7 is a front elevational view of the handle of the tool removed from the tool.

Figure 8 is a side elevational view of the handle removed from the tool.

Figure 9 is a fragmentary sectional view on line 9—9 of Figure 7 with the block and switch removed.

Figure 10 is a plan view of the rear of the tool with the handle of Figure 8 removed.

Figure 11 is a plan view of the switch operating block mounted on the switch casing.

In the drawings similar numerals refer to similar parts throughout the several views.

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The portable electric tool 1 has a chuck 2 to hold a drill or other tool and a motor 3 to operate the tool. Current is led to the motor through cord 4 entering the bottom of handle 5 forming the rear end of the casing 6 of the tool 1. The handle is shaped at its top 7 to enclose the rear bearing 8 of the motor and the commutator 9.

The handle 5 is made of one casting and at its lower portion it has a front switch support plate 10 to close the opening. The top part 7 of the handle fits snugly over the rear of the motor and joins the body 6 flush as shown in Figure 1.

The plate 10 is preferably a casting with its rear edges 11 fitting closely within the opening of the handle 5 and with a projecting shoulder 12 fitting flush with the outer edges and bottom of the handle. The rearwardly projecting edges 11 of the plate project upwardly forming lugs as shown at 13, above the top 14 of the plate 10 to rest upon the body of the motor casing and within the edge of the body of the casing 6 to securely anchor the plate in the handle on the motor and the casing 6 at the upper end of the plate.

At the lower end of the plate 10 there is a projecting seat 15 having therein a hexagonal opening 16 receiving long hexagonal nut 17 the lower end of which serves as a nut for screw 18 which holds the plate in the handle at the lower end of the plate. The handle is securely held to the motor casing in line contact with the main housing section 6 by screws 19. The final assembly of the handle is therefore effected by running into place screws 18 and 19 and the removal of these same screws will allow the removal of the handle and the switch and the switch operating mechanism.

Plate 10 is molded as at 20 and 21 to fit the last three fingers of the operator's hand as he holds and directs the drill for use, the first finger and thumb lying along opposite sides of the motor casing. The plate has a U-shaped opening 22 in its top for the switch operating block or trigger 23 to pass therethrough. The rear of the plate has extending projections 24 and the top has grooves 25 to form ways guides or guide ways for the sides of the trigger block 23 and the flanged top 26 of the block. As the trigger block 23 is pulled back by the long finger of the operator that finger will come into the recess 20 of the plate 10, securely holding the finger on the block and locating the placement of the finger on the trigger block.

The snap switch is mounted in casing or housing 27. The switch is shown as having a swinging U-shaped bar 28 swung to open or off position in Figure 3 and when it is swung to the left in Fig-

ure 3 it will be between contacts 29 which contacts have portions 30 leading outside the casing 27 and to which wires are attached for the passage of current therethrough, to complete the circuit of the wires in the cord 4 for the motor operation.

The housing 27 of the switch is made of insulating material and closed at the top by lower insulating member 31 and upper insulating member 32 which extends over the top of the casing 27 and is bent down forward and has projecting flaps 33 to cover the screws 34 holding the wires on the contacts 30. This is clearly shown in Figure 11.

The switch operating block 23 is channel shaped with sides 35 and a bottom 36 and it has an upstanding rear end 37. In the bottom 36 are longitudinally extending openings 38 riding over washers 39.

Riveted to the bottom 36 of the block 23 is switch operating knob 40. This knob rests in a small socket 41 in spring 42 to throw the switch member 28 back and forth. On top of the bottom 36 of block 23 is an L-shaped plate 43 raised at its center to allow the rivet head of the knob member 40 to freely pass under it. A screw 44 passes through the forward end of the plate 43, through the washer 39, the insulating strips 31 and 32, through the switch housing 27 and down to the hexagonal nut 17. A similar screw 45 passes through the rear of the assembled members and the rear of the switch casing 27 and is held securely by nut 46. These two screws serve to hold the switch operating block 23 firmly on the switch casing 27 unitarily joining the two together, and to allow a free, relative, limited, rectilinear motion between the two parts. The hexagonal nut 17 fits closely within the hexagonal opening 16 in the seat 15 of the plate 10 and tightening up screw 18 thus holds the plate 10, the switch casing 27 and the trigger block 23 firmly in place and allows the sliding motion of the trigger block through the U-shaped opening 22 in the plate 10.

Plate 43 has a forward upstanding end 47 around which one end of the spring 48 is hooked, the other end being hooked over the upstanding rear end 37 of the block 23. Since the upstanding end 47 is held against relative motion with the casing 27 and the upstanding end 37 slides on this casing 27, the tendency of the spring is to pull the actuating block 23 forward, so that the switch is in the off or open position. When the block 23 is moved rearwardly against the tension of the spring 48, the switch is turned on, to close the circuit and operate the tool.

A sliding pin 49 is in vertical opening 50, its motion downwardly is limited by shoulder 51 abutting on collar 52 fitting tightly in the bottom of the opening 50. A spring 53 surrounding a portion of the pin 49 and resting upon a shoulder 54 thereon and at its other end on shoulder 55 in opening 50 constrains the pin to its downward position. The top of pin 49 is flanged as at 56 and the top of the pin fits easily in hole 57 in the bottom 36 of the block 23. When the trigger block is pulled in and it is desired to keep the tool operating and thus the switch closed, the pin 49 may be forced up so that its head passes through the opening 57 and then the flanged top 56 will hold the pin up, against the action of its spring 53, so that the operation of the motor of the tool may be continuous. When it is desired to stop the motor, a slight additional pull or pressure by the forefinger on the block 23 will

allow the pin to be withdrawn from the opening 57 by the action of its spring 53 and then the action of spring 48 will draw the block forward and throw the switch to its off or open position.

It will be apparent from the above detailed description that a most compact and effective operating mechanism is provided which is economical to manufauture and assemble and which may be dismantled for adjustment with only the release of the few outside holding screws to expose the switch and its operating parts to view.

Although the switch operating block 23 is shown in the form of a trigger working parallel with the axis of the tool and is centrally placed to be used by either the right or left hand, it will be apparent that other positions for its operation could be arranged within the scope of the invention. It will also be apparent that many other modifications could be made in the detailed structure shown in the drawing without departing from the invention.

What is claimed as new and is desired to be secured by Letters Patent is:

1. In an electric tool having a pistol grip handle having a switch therein, the switch having a swinging operating bar therein, said handle having a forwardly extending opening therethrough and guide ways therein, a casing enclosing the switch, means to mount the casing securely in the handle adjacent said opening in such a position that the bar swings rearwardly and forwardly, a block projecting forwardly from and slidable through said opening on said ways and being unitarily joined to said switch casing within the handle and having means thereon to throw said bar to turn the switch to on and off positions upon its sliding movement, the unitary structure of the switch and block enabling their unitary assembly in the tool handle.

2. The electric tool of claim 1 in which means are provided on and extending between the block and the switch casing to urge the block to the position where the switch is off.

3. The electric tool of claim 1 in which means are provided on and extending between the block and switch casing to urge the block to the position where the switch is off, and means are also provided connectable with said block to hold the same in the position where the switch is on.

4. In a portable electric tool having a pistol grip handle and having a switch in the handle, the switch having a swinging operating bar therein, a separable plate comprising the forward wall of said handle, said plate having a forwardly extending opening therethrough and ways therein, a block extending forwardly from and slidable through said opening on said ways, a casing for said switch supported on said plate adjacent said opening, said block within the handle, being slidably and unitarily joined to said casing, means on said block to throw said bar to actuate said switch upon sliding the block relatively to the switch casing, the unitary structure of the switch and block enabling their unitary assembly on said plate.

5. In a portable electric tool having a pistol grip handle removable therefrom and a switch in the handle, a separable plate comprising the forward wall of said handle, said plate having a forwardly extending opening therethrough and ways therein, a block extending forwardly from and slidable through said opening on said ways, a casing for said switch supported on said plate adjacent said opening, said block, within the handle, being slidably and unitarily joined to

said casing, means on said block to actuate said switch upon sliding the block relatively to the switch casing, the unitary structure of the switch and block enabling their unitary assembly on said plate, means to hold the handle and plate assembled with the tool, said means being releasable to remove said plate, block and switch.

6. In a portable electric tool having a handle and a switch in the handle, a separable plate comprising the forward wall of said handle, said plate having a forwardly extending opening therethrough and ways therein, a block extending forwardly from and slidable through said opening on said ways, a casing for said switch supported on said plate adjacent said opening, means within the handle to slidably, unitarily join said block to said casing, means on said block to actuate said switch upon the sliding of the block relatively to the switch casing, the unitary structure of the switch and block enabling their unitary assembly on said plate, said joining means limiting the sliding movement of the block independently of the switch.

7. The electric tool of claim 6 in which means are provided on and extending between the block and the switch casing to urge the block to the position where the switch is off.

8. The electric tool of claim 6 in which means are provided on and extending between the block and switch casing to urge the block to the position where the switch is off, and means are also provided, connectable with said block to hold the same in the position where the switch is on.

9. The electric tool of claim 6 including means extending between said block and casing to urge the block to the position where the switch is off, and means in said plate connectable with said

block to lock the block in the position where the switch is on.

10. In a portable electric tool having a pistol grip handle removable therefrom and a switch in the handle, the switch having a swinging operating bar therein, a separable plate comprising the forward wall of said handle, said plate having a forwardly extending opening therethrough, a casing enclosing the switch, said plate having a rearwardly projecting seat and means to mount said casing on said seat adjacent said opening, a block slidable in and extending forwardly from and through said opening, means within the handle to unitarily join said block to said casing, means on said block to throw said bar to move the switch to on and off positions upon sliding the block in and out of the opening, the unitary structure of the switch and block enabling their unitary removal without the removal of the handle from the tool.

11. The electric tool of claim 10 including means to hold the handle and plate assembled together and with the tool, said means including the means to mount the casing on the plate seat.

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