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BUILT-IN SWITCH FOR INSULATED PORTABLE ELECTRIC TOOLS

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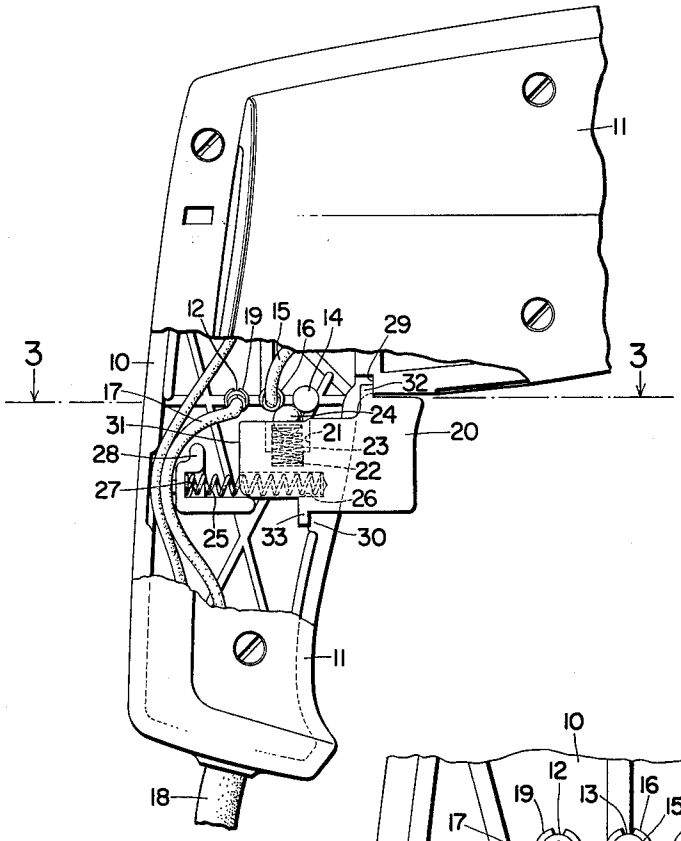

Fig.1

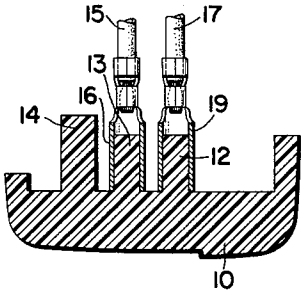

Fig.3

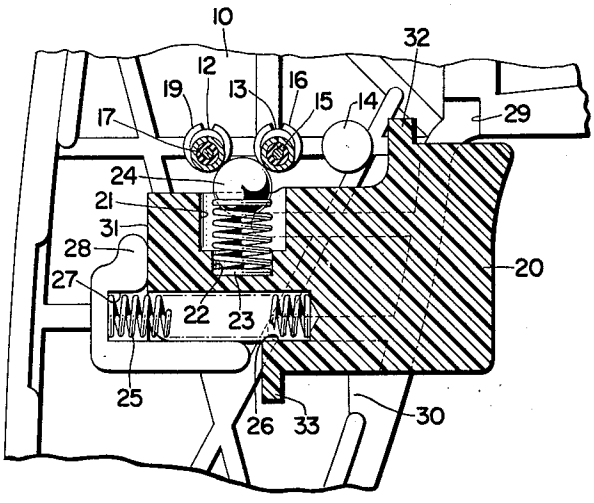

Fig. 2

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BUILT-IN SWITCH FOR INSULATED PORTABLE ELECTRIC TOOLS

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This invention relates to built-in switches for portable electric tools and more particularly to trigger switches having some of their parts formed integrally with the insulated housings of portable electric tools.

It is customary in portable electric tools to use separate completely self-contained switches as insertable elements held within the tool housing. This may be necessary where metallic tool housings are used.

According to the present invention, savings in cost and complexity are effected where insulated tool housings are used by forming some of the switch parts directly from the housing itself.

Specifically, conventional wire terminals are pushed onto two spaced lugs formed integrally with the molded insulated tool housing to form stationary switch contacts. A simple spring-pressed ball actuated by an insulated movable trigger element serves as a movable contact, a third insulated lug providing an "off" switch position for said ball.

It is an object of this invention to provide switch structure for a portable electric tool wherein switch parts are formed by integrally molding them into the insulated tool housing itself.

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.

In the drawing, FIG. 1 is a vertical elevation view of a portable electric tool, partly broken away, to show internal switch structure embodying the invention.

FIG. 2 is a detail view of the device of FIG. 1, partly in section, taken through the trigger element.

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 1.

Referring to FIG. 1, 10 and 11 represents the two molded halves of a vertically split insulated housing for a portable electric drill of conventional type. The top half 11 is cut away to show the internal switch structure embodying this invention.

Formed integrally with the bottom molded half 10 are spaced-apart upstanding cylindrical lugs 12, 13 and 14. (FIG. 2). Wire lead 15, connected to a driving motor (not shown), is secured to a split conductive terminal 16 which is pushed onto the lug 13, as shown best in FIG. 3. Wire lead 17, which forms one of the line leads of the external cable 18, is secured to a split conductive terminal 19 pushed onto the lug 12. The terminals 16 and 19 provide conductive covers for lugs 12, 13 and form the stationary contacts of the switch. The lug 14 is left without a conductive covering.

An insulated trigger element 20 is formed with a pocket 21 having a counterbore 22 in which is seated a spring 23. Carried by the free end of the spring 23 is a conductive ball 24 which is thus urged towards the lugs 12, 13 and 14, as seen best in FIG. 2.

A compression spring 25 carried within a bore 26 in the trigger element 20 is seated within a pocket 27 formed in an abutment portion 28 formed integrally with the

housing half 10. The spring 25 biases the trigger element 20 to the position shown in FIG. 1, in which position the ball 24 is in position between conductive terminal 16 and the uncovered lug 14. This is the open or "off" position of the switch.

As the operator presses inwardly on the trigger element 20, it slides to the position shown in FIG. 2, being guided by portions 29 and 30 formed on housing 10 until the end 31 of the trigger element 20 strikes the abutment 28. The portions 29 and 30 also serve as abutments for the projections 32 and 33 on the trigger element 20 to limit its travel to the right as viewed in FIG. 2.

It will be understood that the top housing half 11 is formed with symmetrical portions mating, when assembled, with those portions 28, 29 and 30 of the bottom half 10 to form guiding and stop means for the trigger element 20 which is thus slidably held for limited movement between them.

In the position shown in FIG. 2, the ball 24 is in bridging contact with conductive terminals 16 and 19 and this is the closed or "on" position of the switch. In the transition between the positions shown in FIG. 1 and FIG. 2 the ball 24 compresses spring 23 and slides and/or rolls around the terminal 16 to its new position which it enters with a snap action due to the clearance between the spring 23 and the pocket 21.

It will be perceived from the above that there has been provided by this invention a built-in switch structure for a portable electric tool which utilizes to advantage the insulated housing of the tool for some of the switch parts to gain extreme simplicity of assembly with attendent low cost. An important feature of this construction is the dual use of the terminals 16 and 19 as wire connectors and also as switch contacts.

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

1. The combination in a portable electric tool having a molded insulated housing, of spaced insulated lugs formed integrally with said housing and carrying sleeve-type conductive wire terminals pushed onto said lugs to cover said lugs and form stationary switch contacts, with a spring-pressed conductive ball carried by an insulated movable trigger element to selectively bridge and unbridge the wire terminals to supply a switching function.

2. In a portable electric tool having a molded insulated housing, a switch comprising spaced insulated upstanding lugs molded integrally with said housing, wire leads carrying sleeve-type conductive terminals, said terminals being pushed onto said lugs to cover said lugs and form stationary contacts for said switch, a manually movable trigger element, a spring-pressed conductive ball carried by and movable with said trigger element and guide, and stop means for said trigger element to limit the movement of said ball to positions of bridging and unbridging the conductive terminals.

3. In a portable electric tool having a molded insulated housing, a switch comprising spaced insulated lugs formed integrally with said housing, wire leads, conductive terminals secured to said wire leads and pushed onto said lugs to cover same and form stationary contacts, an insulated manually movable trigger element, and a spring-pressed conductive ball carried by said trigger element for movement selectively into and out of electrical bridging relation with said conductive terminals.

4. In a portable electric tool having a molded insulated housing, a switch comprising three spaced lugs formed integrally with the housing, two wire leads, conductive terminals secured to the ends of said wire leads and pushed onto two adjacent ones of said lugs to cover same and form stationary switch contacts, a manually slidable insulated trigger element, a spring-pressed conductive

ball carried by said trigger element and selectively moved into a first bridging position between said conductive terminals to electrically connect the wire leads and into a second bridging position between one of said conductive terminals and the other one of said lugs to electrically disconnect said wire leads.

5. The combination in a portable electric tool having a molded insulated housing, of spaced insulated lugs formed integrally with said housing and carrying conductive wire terminals frictionally secured to said lugs to cover same and form stationary switch contacts, with a spring-pressed conductive element carried by an insulated movable trigger element to selectively bridge and unbridge the wire terminals to supply a switching function.

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