United States Patent

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[54] **REVERSING SWITCH FOR POWER TOOLS**
8 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **310/50,** 200/157
[51] **Int. Cl.** **H02k 7/14,** H01h 9/06
[50] **Field of Search** 310/50; 200/157; 74/529

[56] **References Cited**

UNITED STATES PATENTS

3,467,801	9/1969	Matthews	200/157

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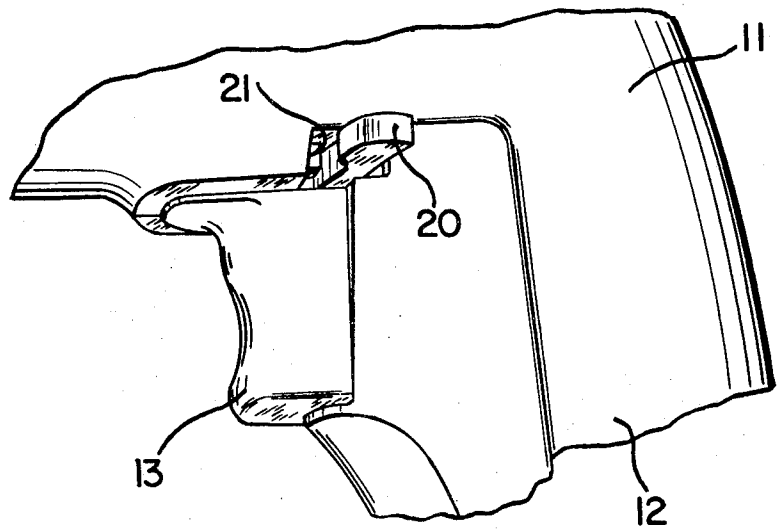
ABSTRACT: A portable power tool including a reversible electric motor, a housing having a handle adapted to be grasped by an operator, and a trigger switch adjacent the handle to be grasped by the operator's finger for energizing the motor. The tool also includes a reversing switch. The operating member for the reversing switch comprises a T-shaped operating lever located above the trigger for convenient engagement by the operator. The base portion of the T-bar is connected through a pivot mounting to the reversing switch whereby rotation thereof through an arc causes operation of the switch. The arm portions of the T-bar extend toward the opposite sides of the tool and protrude slightly through apertures in the housing so that, upon engagement of one or the other by the operator's hand, the reversing switch is moved between its forward and reverse positions.



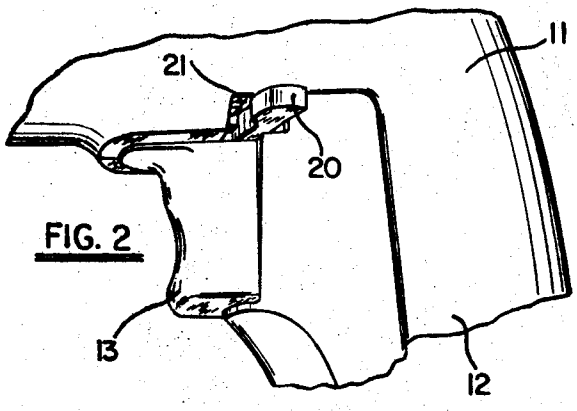


FIG. 2

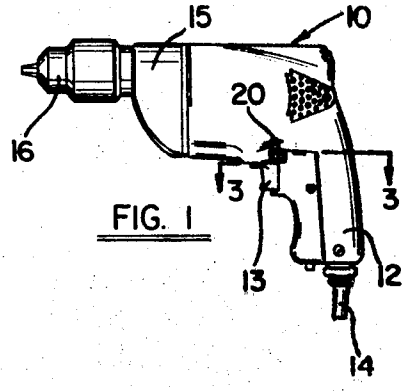


FIG. 1

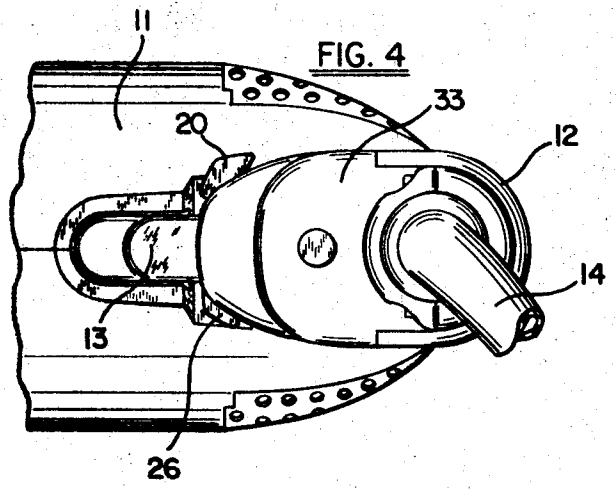


FIG. 4

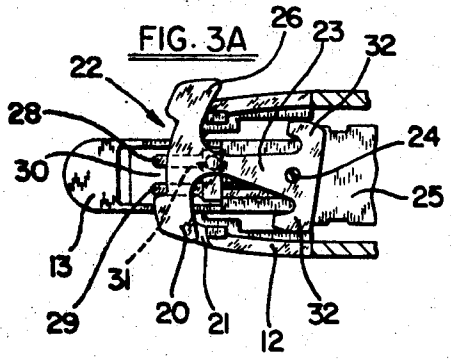


FIG. 3A

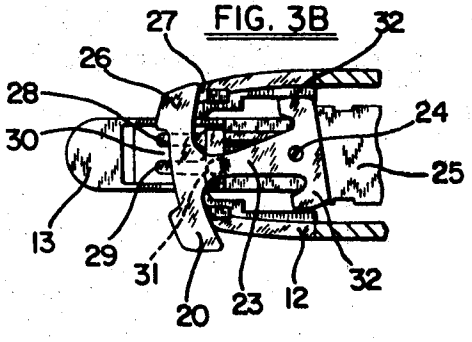


FIG. 3B

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REVERSING SWITCH FOR POWER TOOLS

The present invention is directed to an improved reversing switch for portable power tools.

Power tools of the type including a pistol grip handle and trigger switch have previously been provided with a reversing switch which is connected in the circuit of the tool so as to produce reverse operation of the motor and of the output device. However, the operating mechanisms of previous reversing switches have been subject to one or more of several objections. For example, some of the operating levers are provided in inconvenient locations on the tool, while others protrude from the tool so that they can be broken off when the tool is dropped or inadvertently operated when moving the tool past an external object. Other objections include the fact that some are positioned so as to be in the way of the operator's hand when he grasps the tool or that they are basically made for right-hand operation and are inconvenient for left-handers.

Accordingly, it is an object of the present invention to provide a reversible electric switch for a portable electric tool or appliance which is not subject to the previously noted objections.

It is another object of the present invention to provide a reversible switch means for a portable tool which is convenient for one hand use by the operator.

Another object of this invention is the provision of a reversible electric switch operator for a portable electric tool which does not protrude from the overall configuration of the tool but which, at the same time, is convenient for use.

These and other objects of the present invention will become apparent from a reading of the following specification, taken in conjunction with the enclosed drawings, in which:

FIG. **1** is a plan view of a portable electric tool embodying the reversing switch of the present invention;

FIG. **2** is an enlarged detail portion of FIG. **1**;

FIGS. **3A** and **3B** are plan views of the reversing switch of the present invention in its respective positions; and

FIG. **4** is a bottom view of the tool of FIG. **1**.

Briefly, in accord with one embodiment of this invention, a portable power tool is disclosed which includes a reversible electric motor, a housing including a handle adapted to be grasped by an operator, and a trigger switch adjacent the handle to be grasped by the operator's finger for energizing the motor. The tool also includes a reversing switch and, in accord with the present invention, the operating member for the reversing switch comprises a T-shaped operating lever which is disposed closely adjacent the trigger for convenient engagement by the operator. The base portion of the T-bar is connected through a pivot mounting to the reversing switch whereby rotation thereof through an arc causes operation of the switch. The arm portions of the T-bar extend toward the opposite sides of the tool and protrude slightly through apertures in the housing so that, upon engagement of one or the other by the oeprator's hand, the reversing switch is moved between its forward and reverse positions.

In FIG. **1**, a representative electric tool is illustrated which embodies the present invention. Specifically, an electric drill **10** is shown which comprises a housing **11** having a pistol grip handle **12** and trigger switch **13**. The drill also includes a power cord **14** for connection thereof to a source of current and a motor (not shown) is located within the housing **11** in driving relationship to a reduction gear assembly contained within a gear case **15**. A chuck **16** is provided for receiving a tool element such as a screwdriver bit or other output device. The motor is adapted to drive the chuck and tool element when a voltage is applied thereto via the trigger switch **13**. The tool also includes a reversing switch, located internally of the handle **12**, for changing the direction of rotation of the motor, chuck and tool element. In the course of using this or other electric tools during a work day, it is necessary to use the switch frequently and it is therefore desirable to provide it in as convenient a location as possible. Also, it may often be

necessary to operate the switch when the tool is being held in an extended position or when only one hand is available to manipulate the switch. Accordingly, the present invention is directed to an improved operating lever for the reversing switch which overcomes these objections as well as those previously noted. Specifically, an operating lever is provided, preferably disposed immediately above the trigger switch **13** which includes a first operating arm **20** which protrudes from the housing through an opening **21** therein. This arrangement is illustrated more clearly in FIG. **2** where it can be seen that the operating arm **20** is immediately available to the hand of an operator using the tool.

FIGS. **3A** and **3B** represent views taken along the lines **3–3** of FIG. **1**, but respectively show the reversing switch in its opposite positions. As illustrated therein, the operating lever comprises a T-shaped member **22**, the base portion **23** of which is pivotally mounted at **24** for movement in a plane transverse to the sliding movement of a trigger **13**. Rotation of the pivot **24** upon transverse movement of the lever **22** causes operation of a reversing switch **25** which is preferably disposed immediately below the operating lever. This portion of the operating mechanism is well known to those skilled in the art and is, for example, illustrated in the Frenzel Pat. No. 3,260,827, **issued July** 12, 1966.

The operating lever includes two arm portions **20** and **26** which extend transversely from the base portion **23** in the manner of the cross bar of a T. These arms extend outwardly through housing apertures **21** and **27** so as to be engageable by the operator. An interlocking mechanism is also provided to prevent operation of the reversing switch when the motor is energized. Any suitable means may be employed, such as parallel slots **28** and **29** formed internally of the sliding trigger, an abutment **30** between the slots, and a pin **31** depending from the operating lever **22** for relative sliding movement within one of the slots **28**, **29**. Thus, the reversing member is precluded from movement when the trigger **13** is depressed to energize the motor.

As shown in FIGS. **3A** and **3B**, wing portions **32** may be provided on the end of the base portion **23**. These serve to stabilize the switch when the reversing lever is moved.

It will be clear from these illustrations that the operating lever of the reversing switch in accord with the present invention provides an improved arrangement for operating the reversing switch. The operating member **22** is conveniently located for operating during use of the tool in either the left or the right hand. Furthermore, since the respective arm portions **20** and **26** can be engaged and operated by the hand holding the tool, the operator's other hand is not required for reversing the switch. A further advantage of this construction is illustrated in FIG. **4**, wherein it can be seen that the arms **20** and **26** protrude only a small distance beyond the forward section **33** of the handle **12** and, since the switch is located immediately below the upper portion of the housing **11**, the arms do not significantly interrupt the overall contour of the tool. Thus, the possibility of breakage or of inadvertent operation is substantially reduced or eliminated because of the shielding provided by the housing.

It will be clear to those skilled in the art that many changes and modifications from the illustrated embodiment may be made without departing from the spirit of the present invention; for example, the operating lever illustrated may readily be adapted to use in an end-handle tool or to other similar handles. Also, the T-shape illustrated may be approximated by a generally triangular shape or other equivalent configurations while still utilizing the advantages and principles of this invention. Accordingly, it is intended that the appended claims cover all such changes and modifications as may fall within the true spirit of this invention.

I claim:

1. In a portable power tool including a reversible electric motor, a housing including a handle adapted to be grasped by an operator, a trigger switch adjacent said handle and arranged to be operated by the operator's finger for energizing

said motor, and a reversing switch for reversing the direction of operation of said motor, the improvement comprising:

an operating lever for said reversing switch, said lever comprising a base portion and a transverse portion, said lever being disposed adjacent said trigger for convenient engagement by the operator;

the base portion of said lever extending to a pivot mounting whereby rotation thereof through an arc about said pivot causes operation of said reversing switch;

a pair of apertures on opposite sides of said housing;

the ends of said transverse portion of said lever extending toward said apertures for engagement thereof by the operator;

said lever being pivotable between two positions upon engagement by the operator with said ends of said transverse portion thereof to select forward or reverse operation of said motor.

2. Apparatus as claimed in claim 1 wherein said lever is substantially T-shaped and said transverse portion is the crossbar of said T.

3. Apparatus as claimed in claim 1 wherein said lever is disposed immediately above said trigger switch.

4. Apparatus as claimed in claim 3 wherein said transverse portion is mounted transversely to said handle.

5. Apparatus as claimed in claim 1 wherein said lever is provided with interlocking means for preventing operation thereof when said trigger switch is depressed.

6. Apparatus as claimed in claim 5 wherein said interlocking means comprises a pin on said lever adapted to engage one of a pair of slots in said trigger switch when said trigger switch is depressed.

7. Apparatus as claimed in claim 1 wherein, when said lever is pivoted toward one side of said tool, the corresponding end of said transverse portion protrudes through the corresponding one of said apertures.

8. Apparatus as claimed in claim 7 wherein said ends, when protruding from said apertures, are shielded by an adjacent portion of said housing.