Oct. 27, 1931. W. MORETTI 1,828,903

ELECTRIC TOOL

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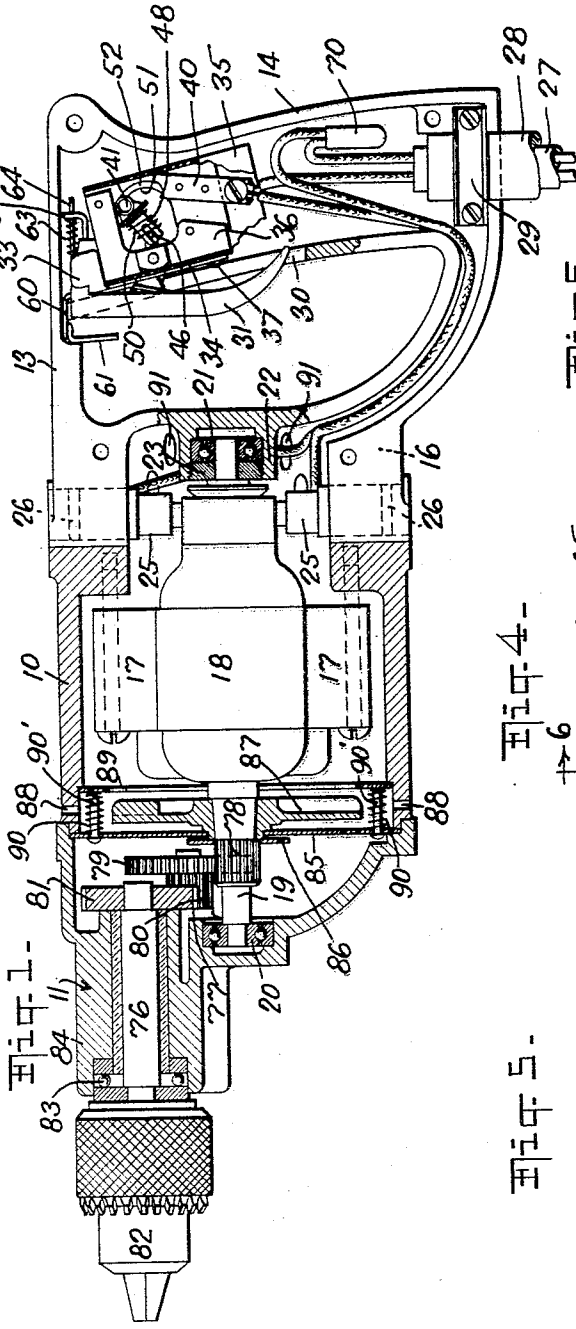


Fig. 1.

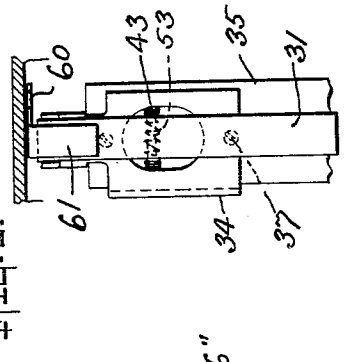


Fig. 5.

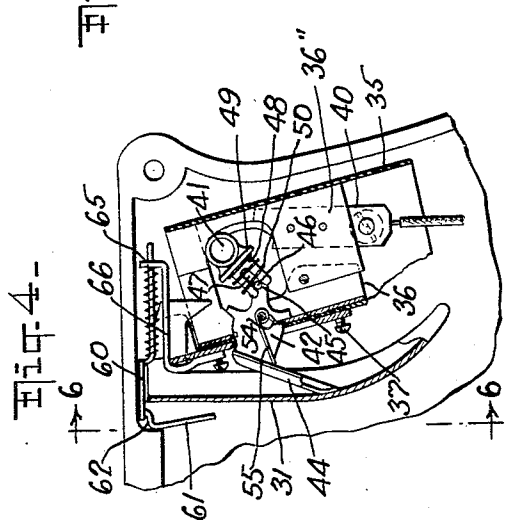


Fig. 4.

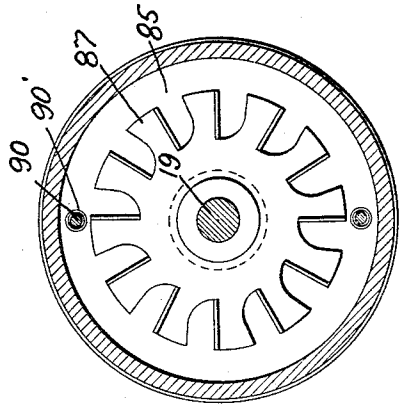


Fig. 5.

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Fig. 3.

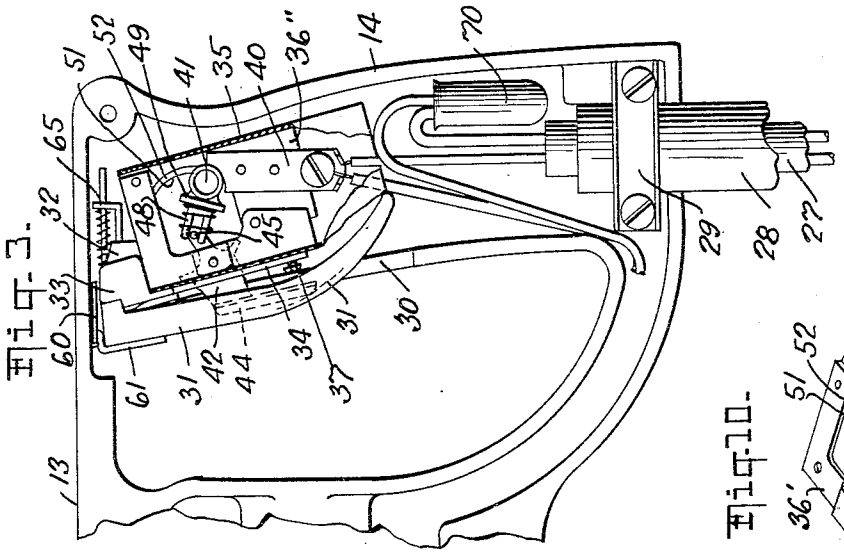


Fig. 10.

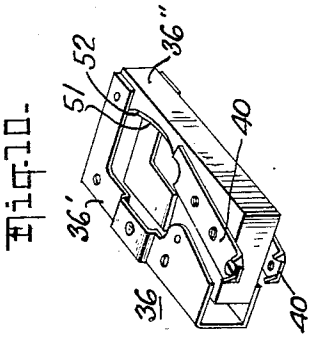


Fig. 7.

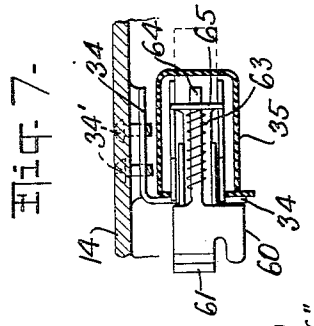


Fig. 8.

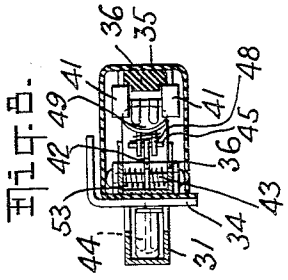


Fig. 9.

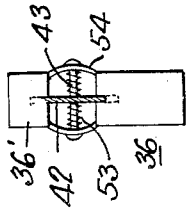
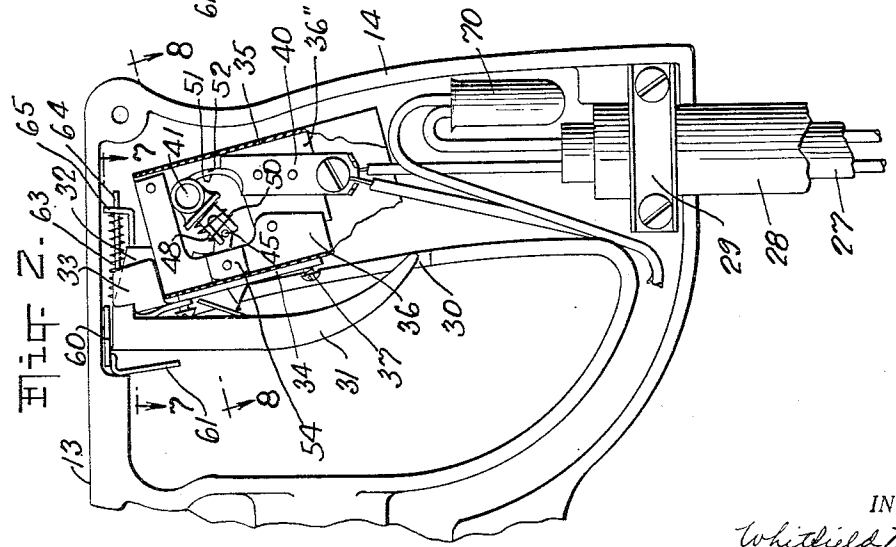


Fig. 2.



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UNITED STATES PATENT OFFICE

WHITFIELD MORETTI, OF MONTAGUE, MASSACHUSETTS, ASSIGNOR TO MILLERS FALLS COMPANY, OF MILLERS FALLS, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

ELECTRIC TOOL

Application filed June 16, 1928. Serial No. 285,940.

This invention relates to an improved type of portable electric tool.

It is an object to provide a device of this type which will efficiently perform the purposes for which it is intended, and which will also be economically and readily manufactured and easily assembled.

It is a further object to construct an electric tool which will operate at maximum efficiency over long periods of time, and the parts of which will be maintained at a satisfactory temperature during the entire period of operation.

A still further object resides in providing an electric tool, the operating mechanism of which will be effectually housed, but in which those parts which should be inspected, renewed or adjusted at comparatively frequent intervals will be readily accessible.

Another object is that of furnishing an electric tool capable of use in numerous different connections, particularly intended to be employed as a drill and which will be compact in construction and light in weight so that it may readily be manipulated by an operator, and in which, furthermore, the control will be arranged with respect to the other mechanism thereof so that the tool may be handled with nicety, and the finished work will accordingly be free from marring and other errors.

With these further objects in mind, the invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the claims.

This application is a continuation in part of my application Serial No. 36,142, filed June 10, 1925.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a view mainly in longitudinal cross-section showing an electric tool constructed to embody the present invention;

Fig. 2 is an enlarged fragmentary view partly in section and partly in elevation showing details of the switch construction employed in the handle of an electric tool as shown in Fig. 1;

Fig. 3 is a view similar to Fig. 2, but showing the parts in a slightly different position;

Fig. 4 is a fragmentary view of a portion of Fig. 2 showing sections of certain parts shown in elevation in Fig. 2;

Fig. 5 is a transverse sectional view near the front end of the electric tool shown in Fig. 1, taken to illustrate the fan construction employed herein;

Fig. 6 is a fragmentary sectional view taken on the line 6—6 in Fig. 4;

Fig. 7 is a fragmentary sectional view taken on the line 7—7 in Fig. 2;

Fig. 8 is a similar view taken on the line 8—8 in Fig. 2;

Fig. 9 is a view partly in elevation and partly in section showing a side of the switch-frame employed in the present invention; and

Fig. 10 is a perspective view of the same.

In the present embodiment, the invention has been shown as a drill which includes a casing having a main body 10, to the forward end of which a gear and spindle head 11 is preferably detachably secured. The rear end of the casing is extended to provide an integral head 13 and a handle 14, the latter being in the nature of what is commonly known as a "pistol-grip" and extending substantially in line with the main body 10 of the casing. This handle is hollow and is preferably arranged so that its interior may be exposed.

Situated within the interior of the casing and locked relatively thereto is the field member 17 of a motor, and an armature 18 is mounted upon a shaft 19, the outer end of which is carried by a bearing 20 housed within a suitable recess formed in the head 11. The inner end of the armature shaft is also carried by a suitable bearing 21, and this bearing may be supported by the head 13 by forming the latter with an inwardly-extending collar 22 of ample inner diameter and depth to accommodate both the bearing and

a packing member 23, which latter serves to prevent the escape of lubricant from within the chamber provided by the collar. The motor brushes 25 are mounted so that their bodies extend into openings formed in the handle-portion 14, it being preferable that screw-caps 26 may be employed to retain them in position.

The head 11 has an interior contour such as to be adapted for the accommodation of the outer end of the armature shaft 19, the spindle or chuck-shaft 76 and a countershaft 77. Secured to the first of these shafts is a gear 78 meshing with a comparatively large gear 79 secured to the countershaft 77,—this shaft also mounting a comparatively small gear 80, in turn meshing with a gear 81 of relatively large size secured to the spindle or chuck-shaft 76. Thus, a reduction train is furnished which will increase the torque and slow down the speed developed by the chuck 82 or other element associated with the shaft 76, and this train is so arranged that its components occupy a relatively small amount of space, it being observed that, if desired, a suitable bearing 83 may be carried by the extension 84 of the casing, which latter at this point provides adequate support for the shaft 76.

The interior of the head 11 is preferably packed with lubricant, and in order to prevent the escape of the latter it will be observed that in the present instance a plate 85 is interposed between the outer edge of the main casing body 10 and a shoulder formed adjacent the inner edge of the head. This plate has an opening of ample size to accommodate the armature shaft 19, and obviously serves to prevent the rearward flow of lubricant into the main casing body. To also prevent the rearward flow of this lubricant through the opening furnished for the armature shaft and parts assembled therewith, the latter may carry a disk 86, which is fixedly secured thereto at a point adjacent the rear face of the gear 78 and the forward face of the plate 85 so that the likelihood of the lubricant being forced into the main casing is reduced to a minimum.

In the construction shown, in order to cool the motor mechanism, a fan 87 may be coupled to the shaft 19 at a point immediately adjacent the rear face of the plate 85, and the casing 10 at this point is formed with a radial series of openings 88 through which the air may be exhausted. In order that the air flow may be most effectual, the fan or impeller 87 is mounted within a chamber, one wall of which is formed by the plate 85, and the second wall of which, in the present instance, is formed by a washer 89 which bears against an annular shoulder formed in the inner face of the casing 10 and is retained in this position by means of springs 90 carried by pins 90′, which are associated with the plate 85 and of a sufficient resiliency to accomplish the result desired. The head 13, together with the complementary portion 16, is formed with openings 91, through which the air is drawn into the casing 10 so that the cool air will play directly upon the commutator and brushes, and thus, a flow of air may be established when the motor is in operation.

In order to energize the motor, an electric conduit 27 is made to enter the casing through an opening in the base of the handle-portion 14, which conduit is shown as reenforced against extreme bending, and also prevented from relative movement at its point of entry to the casing, by providing a tube 28 of resilient material enclosing the conduit at this point and for a short distance beyond the handle, and employing a clamping-member 29 in association with the casing and bearing against this tube. The inner edge of that portion of the handle 14 which extends at substantially right-angles to the body of the casing is formed with an opening or slot 30 at its upper end, and extending through and beyond this opening is a trigger-member, comprising a shank 31 of substantially U-shape in cross-section in order to rigidify the same. The upper end of the shank 31 has a hook portion 32 which engages with and pivots upon a cradled member 33 formed by bending over the upper sides of a supporting strip 34 which is secured in the handle-portion 14 in any convenient manner, for example, by means of the screws 34′, as shown in Fig. 7. Mounted on the member 34 is a switch-casing 35. This casing is tubular in form, preferably rectangular in cross-section, having open upper and lower ends, and may be constructed of insulating material as indicated in the drawings. The mounting on the casing 35 is conveniently effected by gripping it between the switch-frame 36 of the switch mechanism that is inserted in the casing and the member 34; the switch-frame being secured to the member 34 in any convenient manner, for example by means of the screws 37.

The switch-frame 36, as shown more clearly in Fig. 10, comprises a metallic portion 36′ to which the moving parts of the switch are attached, and an insulating portion 36″ to which the stationary contact-members 40 are secured, one on each side. The stationary contact-members 40 serve as terminals to which are secured the conducting leads which conduct current from the conduit 27 to the brushes and field of the motor in the usual manner. The stationary contacts 40 are arranged to be bridged by a movable contactor 41 which, when it engages the contacts 40, as indicated in Fig. 3, connects them electrically in series, the circuit being broken when the contactor 41 is out of engagement therewith in the position shown in Figs. 2

and 4. The contactor 41 is arranged to be actuated from the shank 31 in any convenient manner by a quick acting mechanism, for example, by means of the toggle-mechanism shown comprising the actuating lever 42 pivoted in the frame portion 36′ by means of a transverse pivot 43, which lever has a depending arm 44 engaged by the shank 31 and a short arm 45 having a transverse pin 46 which engages in a slot 47 formed in the link 48 that supports the contactor 41. The link 48 is preferably of insulating material and has a head 49, between which and the pin 46 there is inserted a resilient member, for example a helical spring 50, which is under compression and causes the link 48 to bear outwardly, its motion being limited by the contour 51 of an opening cut in the insulating portion 36″ of the switch-frame. The opening 51 preferably has marginal grooves 52 cut in each side thereof which form guides for the moving contactor 41. These marginal grooves are so shaped as to convey the bridging contactor into contacting relation directly across the stationary contacts 40 when in one position, and to convey a contactor some distance away from the contacts 40 when in the other position.

In order to bias the lever 42 in the open circuit position, a helical spring 53 is coiled about the pivotal support 43 of the actuating lever and arranged to have the free end 54 bear upon one edge of the opening in the switch-frame 36 through which the actuating lever 42 passes, the other end 55 being arranged to bear against the depending arm 44 of the lever so as to cause it to push outwardly against the shank 31 and thereby hold the trigger mechanism in actuating position, and at the same time causing the short arm 45 to move to its downward position which is below the line of centers for the toggle linkage when the contactor is engaging with the contacts 40. Consequently, it will snap upwardly to the position shown in Figs. 2 and 4.

When the shank 31 is squeezed inwardly by an operator, the depending arm 44 is depressed, thereby causing the short arm 45 of the actuating lever to move upwardly until it is above the line of centers of the toggle linkage, whereupon the contactor 41 is caused to snap downwardly into engagement with the contacts 40.

In order that the operator of the tool provided herein need not continually press upon the shank 31 while the tool is being operated, a locking mechanism is preferably provided which holds the shank 31 depressed for as long a period as it is desired to operate the tool. The locking mechanism, as illustrated in Figs. 1, 2, 3, 4 and 6, consists of a sliding member 60 provided with a depending actuating portion 61. This sliding member has a wedging portion 62 struck up therefrom at the junction of the portion 61 with the main portion of the member 60. This struck-up portion 62 is adapted to slide between the upper end of the shank 31 and the inner side of the handle 14, the depth to which the wedging portion is struck up being sufficient to prevent it from being slid between the upper end of the shank 31 and the inner side of handle 14 when the trigger mechanism is in the normal position, but to permit it to slide in between the shank 31 and the inner portion of the handle 14, as indicated in Fig. 3, when the trigger mechanism is in the depressed position. When the shank 31 is released, after the sliding member 60 has been moved to the position shown in Fig. 3, the sliding member is gripped between the upper end of shank 31 and the inner side of handle 14 and is held frictionally in such position as long as it is desired to operate the tool.

It is desirable to have the sliding member automatically resume its normal position when it is desired to stop the tool. To this end, a spring 63 is provided to react against the sliding member when moved to the position shown in Fig. 3. This spring is preferably coiled about a projecting tongue 64 on the sliding member and bears against the main portion 60 of the sliding member for one abutment and against a stationary prong 65 as the other abutment. This prong is preferably arranged, in addition, to serve as a guide for the tongue 64 and comprises an extension of a supporting plate 66 that is secured to the supporting member 34, as shown in Fig. 4. It is thus seen that the sliding member is normally retained in the shank disengaging position but may be moved by the pressure of a finger of an operator into engagement with the shank 31 when depressed to actuate the switch mechanism to close the circuit through the motor, this sliding member then being frictionally retained between the upper end of the shank and the inner side of the handle 14 so that the switch mechanism remains in circuit-closed position. When it is desired to stop the tool, the operator again presses inwardly slightly upon the shank 31 so as to remove the frictional engagement between the upper end of the shank and the wedging portion 62 whereby the resilient member 64 operates to move the sliding member to its normal position so that when the workman releases his pressure upon the shank 31 the circuit is thereby opened.

The handle 14, besides housing the switch mechanism above described, is adapted also to house connectors or other convenient circuit controlling devices such as the cartridge device shown at 70 in the drawings.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the

above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an electric tool having a handle portion including a hollow pistol-grip, the combination with said pistol-grip, of a trigger member pivotally mounted therein and extending along said grip, a switch supporting frame disposed in said hollow portion and removably secured in said grip, a pair of stationary contacts on said frame, a contactor guide in said frame, a movable contactor mounted to move on said guide into and out of a bridging position across said contacts, a snap-actuating lever mounted on said frame extending into engagement with said trigger member, and electrical connections disposed in said grip connected to said contacts and leading from a source of current to said tool.

2. In an electric tool having a handle portion including a hollow pistol-grip, the combination with said pistol-grip, of a trigger member pivotally mounted therein and extending along said grip, a switch supporting frame disposed in said hollow portion and removably secured in said grip, a pair of stationary contacts on said frame, a contactor guide in said frame, a movable contactor mounted to move on said guide into and out of a bridging position across said contacts, a snap-actuating lever mounted on said frame extending into engagement with said trigger member, and a sliding member having an engaging portion adapted to be moved into and out of wedging engagement with said trigger member and said handle, whereby when said trigger is depressed and the sliding member is in engaging position said trigger is retained in depressed position without continued pressure from the operator.

3. In an electric tool, the combination comprising, a handle-portion, a trigger member and a switch member adapted to close an electric circuit upon the movement of said trigger member, and a sliding member having an engaging portion adapted to slide into wedging engagement with said trigger member and said handle whereby when said trigger member is depressed and the sliding member moved into engagement therewith it may be retained in said depressed position without continued pressure from the operator.

4 In an electric tool, the combination comprising, a handle-portion, a trigger member pivoted therein, a switch mechanism in said handle portion adapted to be actuated by said trigger member to make and break an electric circuit, and a sliding member adapted to slide between a relatively moving portion of said trigger member and said handle-portion, said sliding member having a wedging portion adapted to intervene between said relatively moving portion of said trigger member and said handle-portion so as to retain said trigger member in depressed position by frictional engagement therewith, and resilient means bearing against said sliding member and adapted to cause the same to move to normal position when the frictional engagement between said trigger member and said handle-portion is removed.

In testimony whereof I affix my signature.

WHITFIELD MORETTI.