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PORTABLE ELECTRIC TOOL WITH TWIST LOCK HANDLE

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2 Sheets-Sheet 1

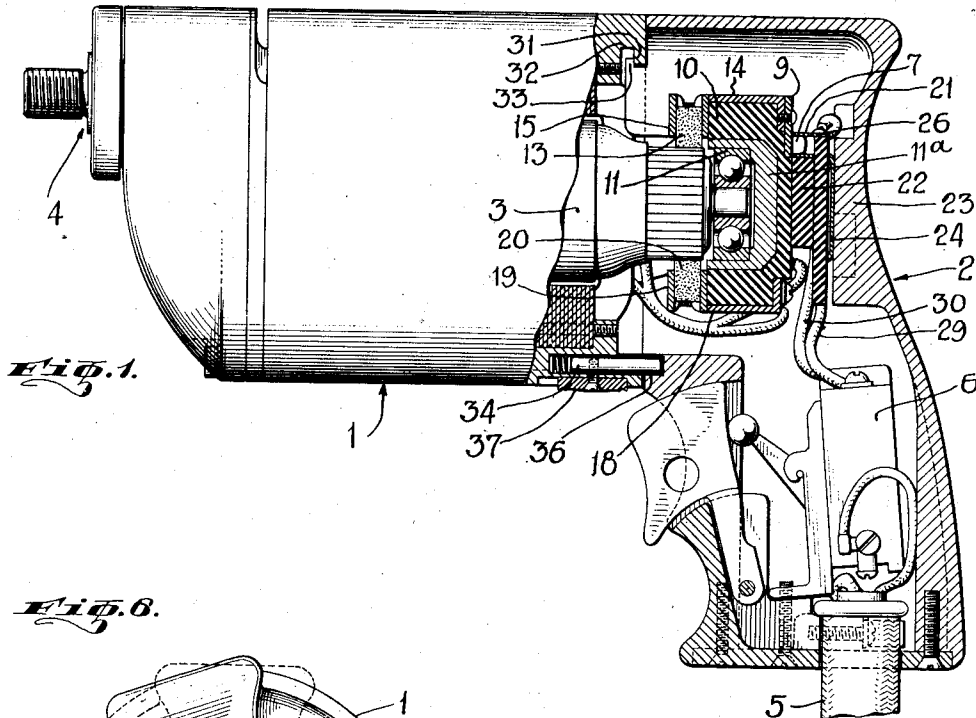


FIG. 6.

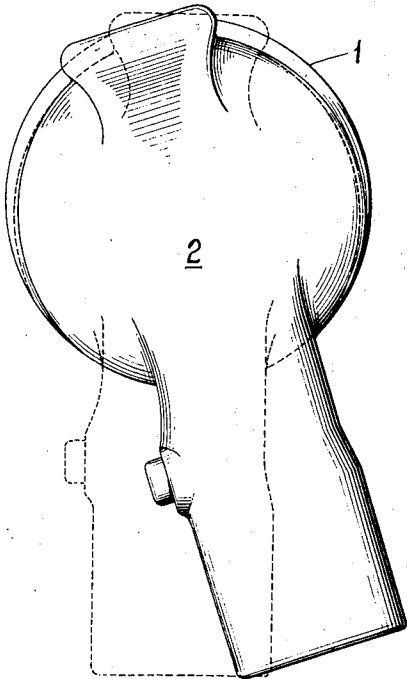
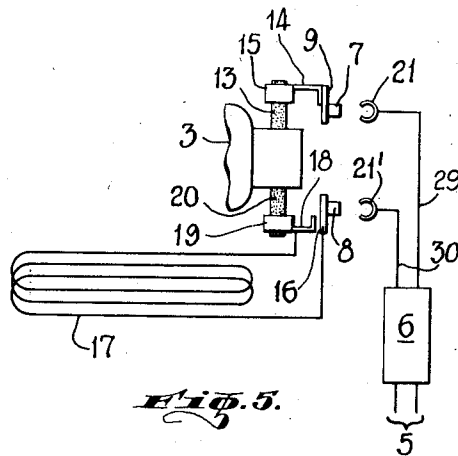


FIG. 5.

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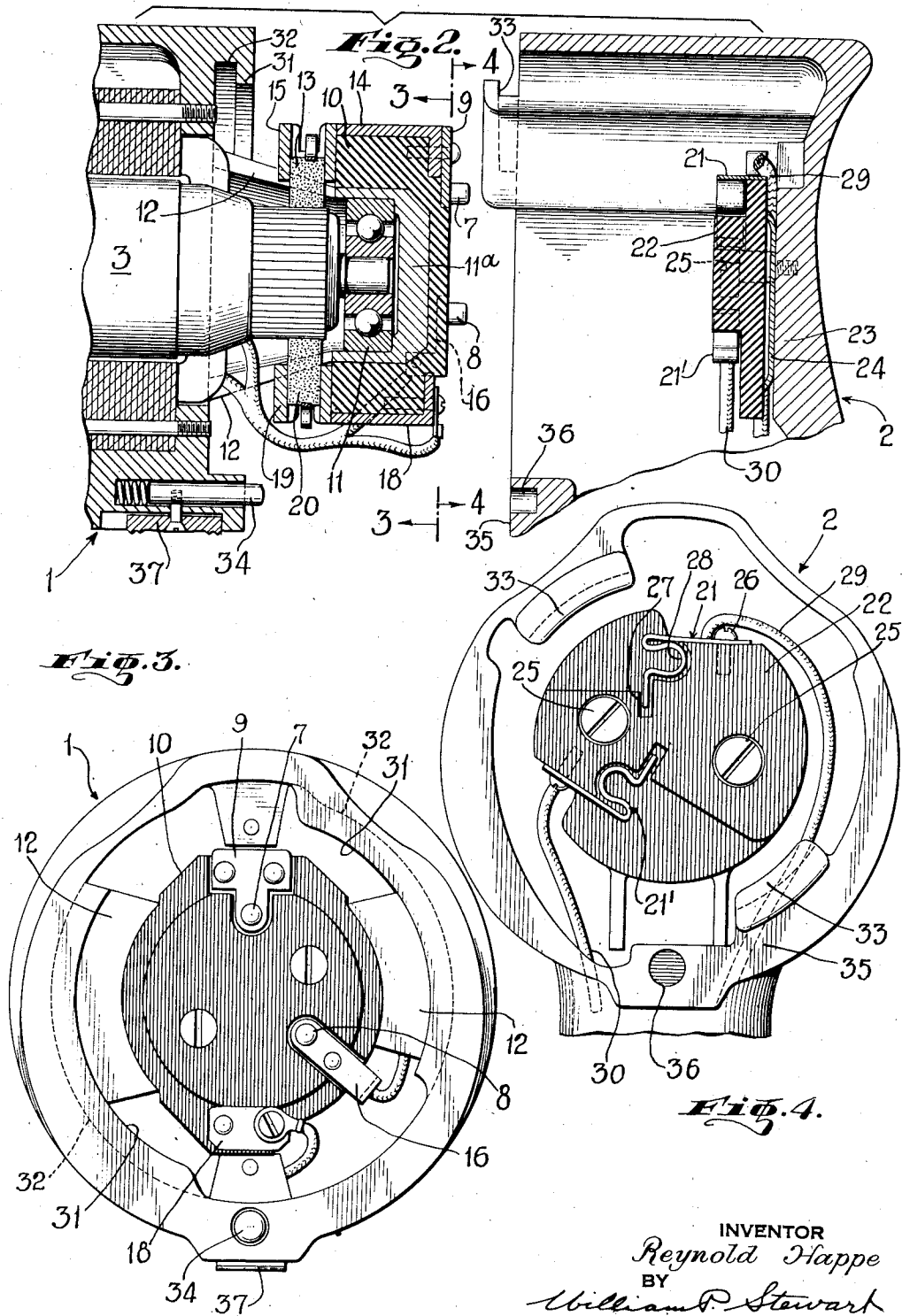
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2 Sheets-Sheet 2



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PORTABLE ELECTRIC TOOL WITH TWIST
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10 Claims. (Cl. 172—36)

1

This invention relates to portable electric tools and has for its principal object the provision of an improved handle structure, to which the current cable for the tool motor is secured, organized for ready and secure attachment to the body portion of the tool, and incorporating contact members arranged for engagement with adjacent cooperating contact members so as to complete the circuit of the motor automatically, or as an incident of the attachment of the handle to the body portion of the tool.

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 drawings:

Fig. 1 is a partially-sectioned, side elevation of a tool embodying the invention;

Fig. 2 is an enlarged, broken-out, sectional view showing the body and handle portions of the tool in spaced relation, or exploded;

Fig. 3 is an elevational view as on the line 3—3 of Fig. 2;

Fig. 4 is an elevational view as on the line 4—4 of Fig. 2;

Fig. 5 is a wiring diagram; and

Fig. 6 is a rear elevation illustrative of the manner of assembling the body and handle portions of the tool.

In the preferred form illustrated, the tool comprises generally a body portion 1 and a handle portion 2. The body portion carries the motor 3 and appropriate transmission mechanism for the chuck mount 4; and the handle portion carries the cable 5 by which the current is supplied to the motor, under the control of a manually actuable switch 6, through the separable contact mechanism below described. The switch, the details of which form no part of the present invention, may be of any suitable construction.

The separable contact mechanism includes contacts mounted respectively on the body and handle portions of the tool and adapted for engagement and disengagement by relative rotation of these two portions about the major, longitudinal axis of the tool; that is, about the axis of rotation of the motor; and preferably these contacts are respectively of male and female form, adapted for snap-engagement. In this preferred form the male contacts are shown and

2

referred to as mounted on the body portion and the female contacts on the handle portion.

The male contacts comprise stationary upper and lower pins 7 and 8, respectively, rigidly supported on the rear end of the motor which, as shown, projects into the hollow interior of the handle portion of the tool. The upper pin 7 is carried by a plate 9 which is secured to the insulating block or cap-piece 10 which surrounds and is suitably secured to the support 11 for the rear motor bearing 11. While forming no part of the present invention, it will be noted that the support for the rear motor bearing 11 and the cap-piece 10 are located by the spoke-like supports 12 which project inwardly and rearwardly from the body portion of the tool. The upper pin 7 is suitably connected to one of the commutator brushes 13, as by a conductor strip 14 connected to the brush-holder 15.

The lower pin 8 is carried by a plate 16 which is likewise secured to the cap-piece 10. The plate 16, as shown in the wiring diagram Fig. 5, is connected through the motor field coils 17 to conductor strip 18 (secured to cap-piece 10), to brush-holder 19 and the other commutator brush 20.

Complementary upper and lower female contacts, 21 and 21', respectively, are mounted on an insulating disc 22 secured to the rear wall 23 of the handle portion 2 and located to mate with the rear face of the cap-piece 10. To guard against engagement of the contact elements interfering with the action of the later-described interlock between the body and handle portions of the tool, and to insure a snug fit of the parts, the insulating disc 22 may be yieldingly supported, as by a spring washer 24. As will be understood, the shanks of screws 25 by which the disc 22 is secured to wall 23 are of a length to leave the required clearance between the disc and wall when the screws are turned home. The shanks of the screws 25 can serve to locate the spring washer 24.

The upper female contact 21 consists of a piece of strip stock formed to provide an anchoring end by which it is secured by screw 26 to disc 22 and, at its opposite end, a locating tongue to seat in a slot 27 formed in disc 22. Intermediate its ends the strip is shaped to form a socket 28 having a laterally directed entrance. The lower female contact 21' is of similar form; and as shown, particularly in the wiring diagram Fig. 5, the contacts 21 and 21' are connected by leads 29 and 30, respectively, to the switch 6 and through the switch to cable 5.

As will now be understood, the motor connections from cable 5 are completed by the application of the handle portion to the body portion of the tool, followed by a turn of one relatively to the other as indicated in Fig. 6. By such movement the male and female contacts are snap-engaged, pin 7 with contact 21 and pin 8 with contact 21', and the motor is ready for operation under the control of switch 6. Disengagement of the contacts, of course, requires only a reverse relative rotation of the body and handle portions of the tool.

By reason of the described construction, the snap-engagement of these laterally engaged contacts serves, in part at least, to interlock the body and handle portions, that is, against relative rotation; but cooperating means are preferably provided both to reinforce such interlock and to secure the body and handle portions against inadvertent longitudinal separation, such cooperating means being arranged to effect their function coincidentally with, and as the result of the self-same relative rotation of the parts required to engage the contacts.

For these purposes the body and handle portions are provided with bayonet lock means adjacent their mating faces. The rear, open end of the body portion is formed with inwardly directed lugs 31 overlying the circumferentially extending channels 32; and the forward, open end of the handle portion is formed with complementary, outwardly directed lugs 33. As shown in Figs. 3 and 4, these lugs are so located, circumferentially, that the lugs 33 enter the channels 32 and interlock with the lugs 31 upon the same (Fig. 6) rotation of the handle portion relatively to the body portion as effects the snap-engagement of the motor circuit contacts. The adjacent surfaces of the lugs 31 and 33 may be formed with a slight cam slope which serves to draw the body and handle portions into snug engagement. As will be recognized, the spring washer 24 permits the insulating disc 22 to yield, as required, in the event it engages the rear face of cap-piece 19 in advance of full engagement of the lugs 31 and 33.

As a further precaution against inadvertent rotation of the handle portion in a direction to free it from the body portion, an additional lock is illustrated. It comprises a spring-actuated plunger 34 mounted in and projecting rearwardly from the lower wall of the body portion. When the handle portion is applied to the body portion (in the angular position indicated in full lines in Fig. 6) the plunger engages and is forced back by the lower face 35 of the handle portion; but at the end of the described relative rotation of the handle portion, the plunger snaps into the hole 36 in the face 35 and the parts are then positively locked against reverse rotation. When it is desired to remove the handle portion, the plunger 34 is retracted by the finger-piece 37.

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

1. In a portable tool having a body, housing an electric motor, and a detachable handle to which the current leads for the motor are connected, the improvement which comprises stationary contacts mounted on the end of the motor adjacent the handle, a member supported on the handle in position to be engaged by said end of the motor, and laterally directed contacts mounted on said member and located for engagement with said first-mentioned contacts upon rotation of the handle relatively to the body.

2. In a portable tool having a body portion, housing an electric motor, and a detachable handle portion to which the current leads for the motor are connected, bayonet lock means on said portions adapted to interlock the same against endwise separation by relative rotation of such portions, and stationary contact pins and stationary spring socket contacts on said portions, said pins and socket contacts located and adapted for snap-engagement and disengagement by said relative rotation of the handle and body portions.

3. In a portable tool having a body portion, housing an electric motor, and a detachable handle portion to which the current leads for the motor are connected, stationary contact pins and stationary spring socket contacts on said portions, the said pins and socket contacts located and adapted for snap-engagement and disengagement by relative rotation of said handle and body portions.

4. In a portable tool having a body portion, housing an electric motor, and a detachable handle portion to which the current leads for the motor are connected, stationary contact pins and stationary spring socket contacts on said portions, the said pins and socket contacts located and adapted for snap-engagement and disengagement by relative rotation of said handle and body portions, and a motor control switch located in said handle portion and connected with the current leads for said motor.

5. In a portable tool having a body, housing an electric motor, and a detachable handle to which the current leads for the motor are connected, the improvement which comprises stationary contacts mounted on the end of the motor adjacent the handle, a contact supporting member secured to the handle, stationary contacts mounted on said member and located for engagement with said first-mentioned contacts upon rotation of the handle relatively to the body.

6. In a portable tool having a body, housing an electric motor, and a detachable handle to which the current leads for the motor are connected, the improvement which comprises stationary contacts mounted on the end of the motor adjacent the handle, a contact supporting member secured to the handle, stationary contacts mounted on said member and located for engagement with said first-mentioned contacts upon rotation of the handle relatively to the body, and a manually actuable motor control switch located in said handle and connected with the current leads for the motor.

7. In a portable tool having a body, housing an electric motor, and a detachable handle to which the current leads for the motor are connected, interlocking means adapted for securing the handle to the body in response to relative rotation thereof, and snap-interlock contact means on said handle and body located to be brought into engagement by said relative rotation of the handle and body.

8. In a portable tool having a body, housing an electric motor, and a detachable handle to which the current leads for the motor are connected, cam means adapted for securing the handle to the body in response to relative rotation thereof, circuit contacts mounted respectively on the handle and body and located to be brought into engagement by said relative rotation of the handle and body.

9. In a portable tool having a body, housing

5

an electric motor, and a detachable handle to which the current leads for the motor are connected, interlocking means adapted for securing the handle to the body in response to relative rotation thereof, circuit contacts mounted respectively on the handle and body and located to be brought into engagement by said relative rotation of the handle and body.

10. In a portable tool having a body, housing an electric motor, and a detachable handle to which the current leads for the motor are connected, interlocking means on said body and handle adapted for securing the one to the other, and pairs of circuit contacts mounted respectively on the handle and body and adapted for engagement in response to relative rotation of the handle and body.

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6

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