Oct. 15, 1940. T. L. HEDGPETH 2,218,168

POWER TOOL

Filed Feb. 27. 1939 2 Sheets-Sheet 1

Fig. 1.

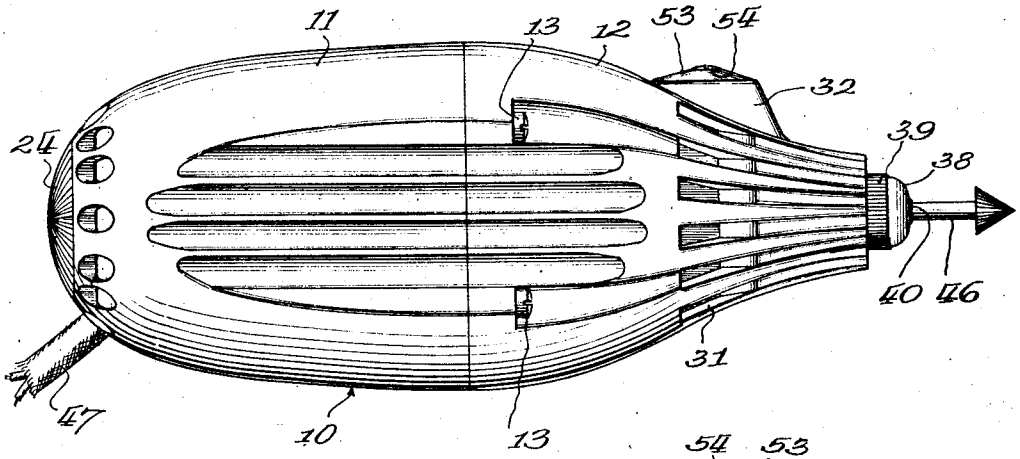


Fig. 4.

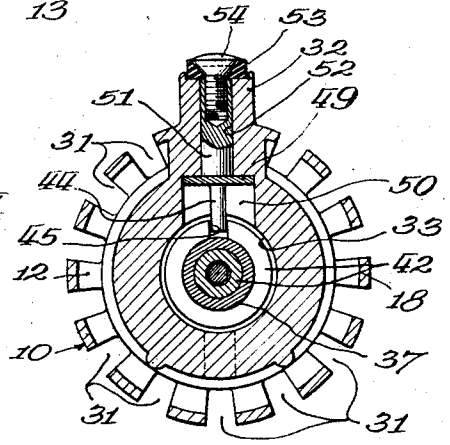
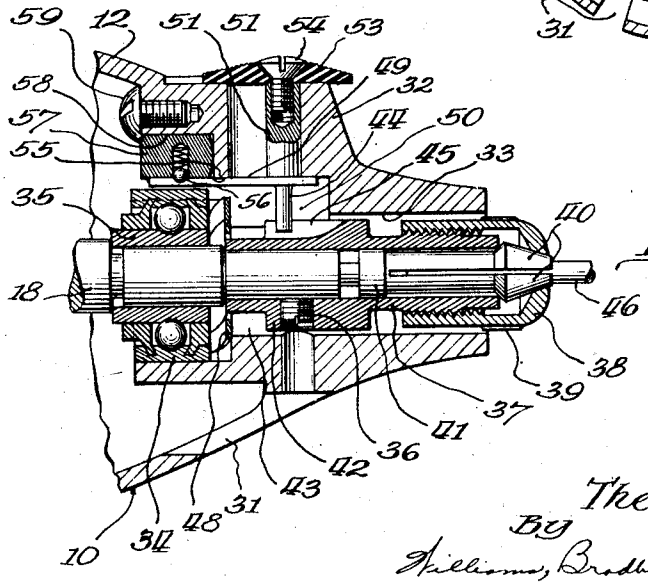


Fig. 3.



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POWER TOOL

Filed Feb. 27, 1939 2 Sheets-Sheet 2

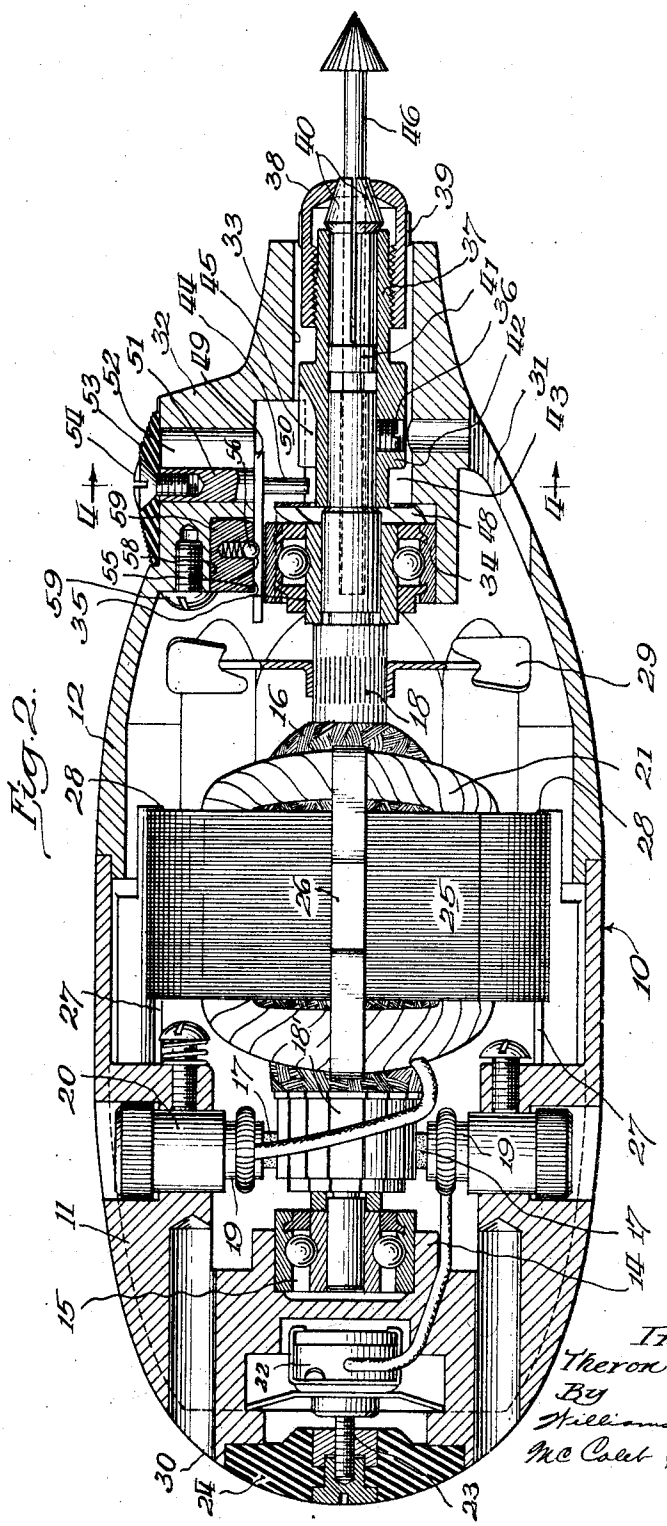

Fig. 2.

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UNITED STATES PATENT OFFICE

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POWER TOOL

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Application February 27, 1939, Serial No. 258,66.

5 Claims. (Cl. 172—36)

This invention relates to a power tool of the type which includes an electric motor located within a housing which may be grasped by the hand. The shaft of the motor carries a chuck which is adapted to receive tools adapted for various purposes.

One of the principal objects of the invention is to provide an improved means whereby the shaft of the motor may be held against rotation to enable the chuck to be operated for the removal and replacement of tools.

A further object of the invention is to provide an improved switch which is arranged so that any danger of the switch being thrown accidentally is reduced to a minimum.

Other objects, advantages and capabilities of the invention will appear from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, in which:

Figure 1 is an elevational view of a hand tool embodying my invention;

Fig. 2 is a sectional elevation therethrough on a somewhat larger scale;

Fig. 3 is a fragmentary view showing certain elements of Fig. 2 in a different position; and

Fig. 4 is a sectional detail view, taken on the line 4—4 of Fig. 2.

Referring to the drawings, the improved hand tool comprises an exterior housing 10 which may suitably be of metal. This housing is of general pear-shape form and is of a size suitable for holding in the user's hand. The housing member comprises two main portions 11 and 12 which are secured together by means of bolts 13. The housing member 11 is provided with a suitable seat 14 for a ball bearing 15 in which the inner end of the shaft of the armature 16 is received.

The housing member 11 carries brushes 17 which engage the commutator 18' of the motor, as shown in Fig. 2. The brushes 17 are slidably mounted in metal sleeves 19. The metal sleeves 19 are mounted by means of sleeves 20 of insulating material in radial position in the housing 11. One of the metal sleeves 19 is connected to the field windings 21. The other is connected to the switch 22.

The switch 22 is a snap switch which is turned on and off alternatively by stepwise movements of a spindle 23. This spindle projects towards the rear end of the tool and it has mounted thereon a button 24 which is flush with the surface of the tool. The button 24 is provided with a roughened exterior surface so that pressure may be applied to the button and the button rotated by the operator's hand. It will thus be seen that there is practically no opportunity for the accidental actuation of this switch. It is unobtrusive, presents no projecting portions which might be accidentally displaced or which might impede the free handling of the tool by the user. Nevertheless, it can be easily operated when desired to turn the motor on or off.

The field core 25 may suitably consist of annular laminations provided with internal pole portions on which the field windings 21 are located. The field windings 21 may be secured to the core by means of straps 26. The field core 25 may suitably be mounted on the housing 11. It may, for example, have a forced fit inside rails 27 formed in the inner side of the housing portion 11 so as to project radially into this housing. These rails have outer portions or continuations which extend into the housing member 12, as shown at 28 in Fig. 2.

The armature shaft 18 carries on the outer side of the field member a fan 29 which is adapted to draw air inwardly through a series of openings 30 which may suitably be arranged around the button 24. It may here be noted that the seat 14 is carried on a spider so that the air may move freely from the openings 30 into the interior of the housing member 11.

The housing member 12 is provided with a series of openings 31 for the discharge of the cooling air. This series of openings 31 is continuous around the forward part of the housing member 12, except for the portion which is occupied by the boss 32 which will hereinafter be more fully described.

It will be understood that when the motor is in operation the fan 29 rotates very quickly and draws a large volume of air inwardly through the openings 30, past the armature and field core. This air is discharged through the openings 31 in such a position that dust and debris created by the operation of the tool are blown away, facilitating the observation of the work by the user.

The forward end of the housing portion 12 is provided with a bore 33 in axial alignment with the armature shaft. The bore 33 is provided with an enlarged rear portion 34 which receives the ball bearing 35 for the forward end of the armature shaft. The forward end of the armature shaft is secured thereto by means of a set screw 36 and a chuck sleeve 37, which is externally threaded to receive the chuck cap 38 which projects somewhat beyond the housing member 12, as best seen in Fig. 2. The projecting portion

of the chuck cap 38 is knurled, as shown at 39, to facilitate the opening and closing of the chuck jaws 40 which are carried by a sleeve 41 located within the sleeve 37.

The chuck sleeve 37 is provided with an enlarged portion 42 which terminates a short distance ahead of the ball bearing 35 and ahead of the recess 34 in which the ball bearing is located. Consequently, a free annular space 43 is provided rearwardly of the enlargement 42 and in this annular space is normally located a locking pin 44. The enlarged portion 42 of the chuck sleeve 37 is provided with a longitudinal groove 45 which opens from the annular space 43. Consequently, if the pin 44 is pressed forwardly and the armature is turned solely by means of the cap 38, the locking pin 44 will enter the groove 45 and prevent rotation of the armature. When the armature is so locked the cap 38 may be unscrewed from the sleeve 37 and the tool 46 may be removed and replaced. If the locking pin 44 is then retracted from the position shown in Fig. 3 into the position shown in Fig. 4, the tool is ready for use. It may here be noted that the forward portion of the armature shaft may be made hollow in order to receive the shank of the tool 46.

Power is applied to the tool by means of a cable 47 which is connected in usual manner to the switch 22 and the motor.

Within the recess 34 is a spring washer 48 which bears against the bearing 35 and forces the armature rearwardly against the bearing 14. The bearings 14 and 35 are thrust bearings of known type. The spring 48 holds the armature 16 and tool 46 against longitudinal movement during use.

The pin 44 is rigidly mounted on the under side of a plate 49 which slides longitudinally in a recess 50 in the forward end of the body portion 12 immediately below the boss 32. The plate 49 is provided with an integral pin 51 which is adapted to move in a slot 52 formed in the boss 32. On the upper end of the pin 51 is mounted a knurled thumb plate 53 by means of a screw 54. The plate 53 bears against the upper surface of the boss 32 and the plate 49 can be moved forwardly to bring the pin 44 into the slot 45, thereby locking the armature against rotation.

The armature is unlocked by merely moving the thumb plate 53 rearwardly. To hold the plate 49 in its forward and rearward positions I provide two depressions 55 on its upper side. These depressions are adapted to receive a spring pressed ball 56 which is carried by a block 57. This block is located immediately above the plate 49 in a recess 58, which is narrower than the recess 50, and is formed in the rear of the boss 32. The block is held in position by the plate 49 and by a screw 59 in the rear face of the boss 32, the head of this screw overlying the block 57 as shown in Figs. 2 and 3. The housing members 11 and 12 may suitably be die castings and the pin 44 and associated elements may readily be mounted in the housing member 12 without the necessity of any machining.

Although the invention has been disclosed in connection with the specific details of a preferred embodiment thereof, it must be understood that such details are not intended to be limitative of the invention except in so far as set forth in the accompanying claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A power tool comprising a housing adapted to be held in the hand, a motor in said housing, a tool carrying member projecting from the housing adapted to be actuated by the motor, said housing being of generally oval form, a switch in said housing, and an actuating member for said switch located at one end of said housing and substantially flush with, and conforming in shape to said housing.

2. A power tool comprising a housing adapted to be held in the hand, said housing being of generally oval form having a pointed forward end and a substantially spherical rear end, a motor within said housing, tool carrying means mounted on the rotor and extending out of said housing at the pointed end, a switch within said housing, and an actuating member for said switch comprising a rotary button mounted in the substantially spherical end of the housing so as to be flush with the surface thereof, said button being of convex form to conform to the shape of the housing.

3. A power tool comprising a housing, a motor within the housing having a rotor, tool carrying means mounted on said rotor extending out of said housing, means on said rotor having a slot extending in the longitudinal direction of the rotor, and a member mounted in said housing for sliding movement in said longitudinal direction, said member being adapted to move into and out of said slot to hold the rotor against rotation and to release it, said member including a thumb piece located on the exterior of said housing.

4. A power tool comprising a housing, a motor within the housing having a rotor, tool carrying means mounted on said rotor extending out of said housing, means on said rotor having a longitudinal slot, a longitudinal guideway in said housing adjacent and parallel to said slot, a plate in said guideway, a pin carried by said plate adapted to be moved into and out of said slot by movement of the plate, a slot in said housing communicating with said guideway, a member rigidly carried by said plate extending into last said slot, and a thumb piece rigidly secured to last said member overlying said slot and securing the plate within said guideway.

5. A power tool comprising a housing, a motor within the housing having a rotor, tool carrying means mounted on said rotor extending out of said housing, means on said rotor having a longitudinal slot, a longitudinal guideway in said housing adjacent and parallel to said slot, a plate in said guideway, a pin carried by said plate adapted to be moved into and out of said slot by movement of the plate, a slot in said housing communicating with said guideway, a member rigidly carried by said plate extending into last said slot, a thumb piece rigidly secured to last said member overlying said slot and securing the plate within said guideway, said housing having a recess opening into said guideway, and a block in said recess including a spring pressed member, said plate having a pair of recesses adapted to receive said spring pressed member whereby said plate is frictionally held in its rotor locked and rotor unlocked positions.

THERON L. HEDGPETH.