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MOTOR-DRIVEN SCREW DRIVER

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Fig. 1.

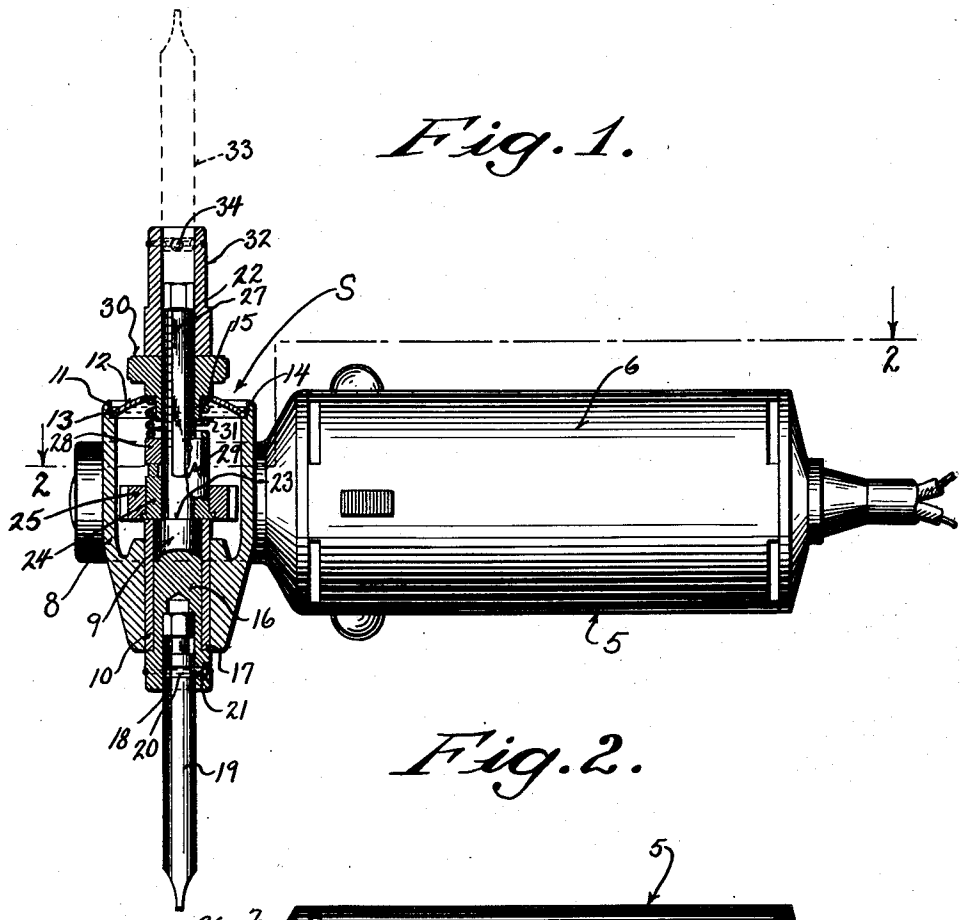
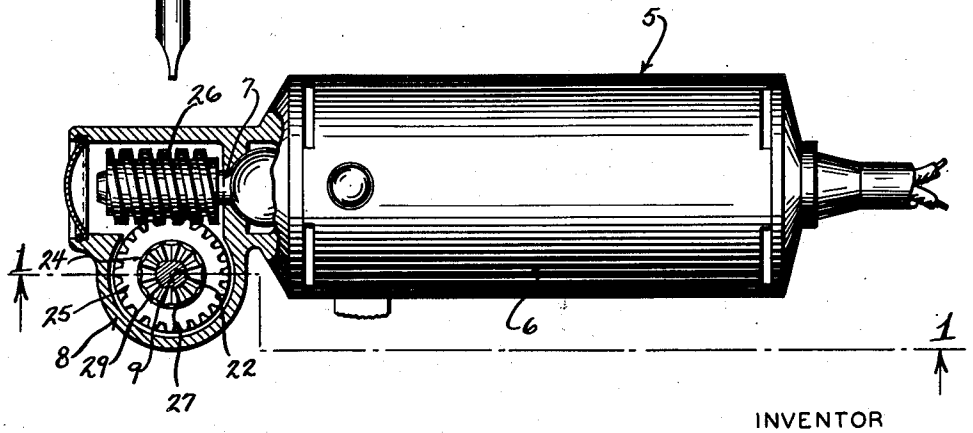


Fig. 2.



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MOTOR-DRIVEN SCREW DRIVER

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3 Claims. (Cl. 144—32)

1

This invention appertains to portable electric hand tools, and more particularly to a power driven screw driver.

One of the primary objects of my invention is to provide a tool embodying an elongated electric motor casing constituting a hand grip supporting a housing at its forward end arranged in such a manner that a driven operating shaft can be effectively mounted thereon and actuated from the motor shaft and at one side of the motor shaft, whereby the opposite ends of the driven shaft can be employed, such as for driving screws, turning nuts or bolts, etc., at one end and for unthreading screws, nuts, etc., at the opposite end.

Another salient object of my invention is to provide a novel means for forming and driving the operating shaft, whereby when a certain tortional load or strain is reached, drive thereto will be automatically discontinued, so as to effectively prevent the driving home of screws, nuts, etc., to too great a degree.

A further important object of the invention is to provide means associated with the housing and shaft in a novel manner for increasing or decreasing the driving load that the operating shaft can sustain.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts as will be hereinafter more specifically described and claimed and illustrated in the accompanying drawing, in which drawing,

Figure 1 is a side elevational view of my improved power driven portable screw driver, parts of the same being shown in vertical section, and the section being taken on the line 1—1 of Figure 2, looking in the direction of the arrows, and

Figure 2 is a top plan view of the screw driver with parts thereof in horizontal section, the section being taken on the line 2—2 of Figure 1, looking in the direction of the arrows.

Referring to the drawing in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter S generally indicates my novel screw driver and the same includes a small electric motor 5 of a type and character now found in the open market and hence this motor will not be described in minute detail.

The motor 5 is of a small compact size so that the same can be readily held in the hand of an operator, and includes a cylindrical casing 6 having an armature shaft 7 extending longitudinally therethrough. Formed on, or connected to, the front end of the casing 6 is a right-angularly

2

extending housing 8 and this housing can be formed, if so desired, of the same material as the motor casing 6. The housing 8 preferably extends below the lower side of the motor casing and has rotatably mounted therein a driven or work shaft 9 of a specific character, which will be later set forth. The shaft is mounted in a suitable bearing sleeve 10 carried by the housing and this sleeve extends into the interior chamber 11 defined by the housing. The upper end of the housing 8 is preferably left open to permit free access to the interior of the chamber 11 and the parts enclosed therein, and the upper end of the chamber is closed by a dust cap 12, which is fitted in an annular seat 13 formed on the inner surface of the housing. A resilient split clamp ring 14 is utilized for holding the dust cap against accidental displacement. The cap is of a dome shape and is provided with an enlarged axial opening 15, for a purpose, which will later appear.

The shaft 9 includes a lower cylindrical body portion 16 received in the bearing sleeve 9, and the extreme lower end of the shaft is shouldered as at 17 for engaging against the outer edge of the bearing sleeve. This part of the shaft is provided with an interior socket 18 for receiving a screw driver bit 19 or the like, and the bit can be retained within the socket in any preferred way. In the present instance, the shank of the bit 19 is provided with an annular groove 20 in which is seated a spring pressed pin 21. A part of the bit can be of a polygonal shape in cross-section for fitting in a companion shaped part of the chuck. The shaft above the cylindrical body portion 16 is provided with a reduced axially disposed portion 22 which extends through the opening 15 in the cap 12 and beyond the housing 8. The reduced portion of the shaft defines an inner shoulder 23, and fitted upon this shoulder and arranged within the chamber 13 is a clutch section 24. This clutch section 24 is freely rotatable on the shaft, but is held thereon against longitudinal movement and against the inner edge of the bearing sleeve. Formed on or secured to the clutch section 24 is a worm wheel 25 and meshing with this worm wheel 25 is a worm keyed or otherwise fastened to the armature shaft 7. The reduced portion 22 of the shaft 9 is threaded and its opposite sides are flattened, as at 27, and slidably mounted on the reduced portion of the shaft is a drive clutch section 28. The inner periphery of the drive clutch section 28 corresponds in configuration to the cross-sectional configuration of the reduced portion of the

shaft and consequently the drive clutch section rotates with the shaft 9, but has free sliding movement longitudinally thereon. From the description so far, it can be seen that the drive is through the worm 26, worm wheel 25, clutch section 24 and drive clutch section 28.

The clutch sections 24 and 28 are provided with mating V-shaped teeth 29 and the inclination of these teeth is such that when driving strain is placed upon, say the bit 19, the clutch section 28 will be pushed longitudinally away from the driven clutch section 24.

Threaded upon the reduced portion 22 of the shaft 9 is an adjusting nut 30, and this nut is provided with an inner cylindrical bearing portion, which extends through the opening 15 in the cap 12. The nut is roughened at its outer end to facilitate the turning thereof by the fingers, and an expansion spring 31 is coiled about the shaft and is confined between the clutch section 28 and the nut 30, so as to normally hold the clutch section 28 in driving connection with the clutch section 24. Obviously, when the strain on the bit 19 overcomes the tension of the spring 31 the clutch section 28 will be moved upwardly against the tension of the spring 31. The tension of the spring can be increased or decreased by threading the nut 30 in or out.

A lock nut 32 is threaded on the outer end of the reduced portion 22 of the shaft against the nut 30 and this lock nut 32 constitutes a chuck for a second screw driver or like implement. This screw driver is shown in dotted lines and is indicated by the reference character 33. The nut constitutes a chuck for receiving a screw driver or like implement and the screw driver can be retained in the nut by a spring pressed pin 34. This construction is the same as shown at the bottom of Figure 1. The thread of the shaft is opposite to the direction of rotation so that strain on the nut 32 will tend to tighten the nut.

The bit 19 can be utilized for driving screws and by utilizing this bit or a bit 33 in the nut 32 and reversing the position of the ends of the shaft screws can be rapidly unthreaded or removed.

From the foregoing description, it can be seen that I have provided an effective small implement for driving screws and the like and for removing such screws by the mere reversal of the tool and without change in the direction of rotation of the drive motor.

Changes in details may be made without departing from the spirit or the scope of this invention, but what I claim as new is:

1. An electrically driven hand tool comprising an electric motor including a longitudinally extending casing constituting a hand grip and a longitudinally extending motor shaft in said casing, a housing on the forward end of the casing extending at an angle thereto, the motor shaft being extended into the housing, a driven work shaft rotatably mounted in said housing at one side of the motor shaft, the opposite ends of said driven work shaft being extended beyond the opposite sides of the housing, and one end of said shaft being provided with a tool receiving socket, a clutch section freely rotatable on the driven working shaft arranged within said housing, means for driving said clutch section from the motor shaft, a second clutch section rotatable with the driven work shaft and slidable longitudinally thereon, said clutch sections having mating teeth provided with inclined faces, a nut threaded on the shaft, an expansion spring on said shaft confined between the nut and the last mentioned clutch section, said housing having its end open adjacent to said nut, a dust cap closing the open end of the housing provided with an axial opening and said nut having a reduced extension for movement in the opening in the housing.

2. An electrically driven hand tool as defined in claim 1, and a lock nut threaded on said shaft against said first nut, said lock nut having a tool receiving socket.

3. In a motor shaft driven implement, a longitudinally extending motor, a shaft driven by said motor and arranged at the front thereof and extending at an angle thereto, said shaft extending beyond the opposite sides of the motor, one end of said shaft having a tool receiving chuck, a driven clutch section rotatably mounted on the shaft, means for driving said clutch section from the motor, a second clutch section slidably mounted on the shaft for rotation therewith, a nut threaded on said shaft, an expansion spring confined between the nut and the last mentioned clutch section for normally holding the clutch sections into driving engagement, and a lock nut threaded on the outer end of the shaft against said first mentioned nut, said lock nut instituting a tool receiving chuck.

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