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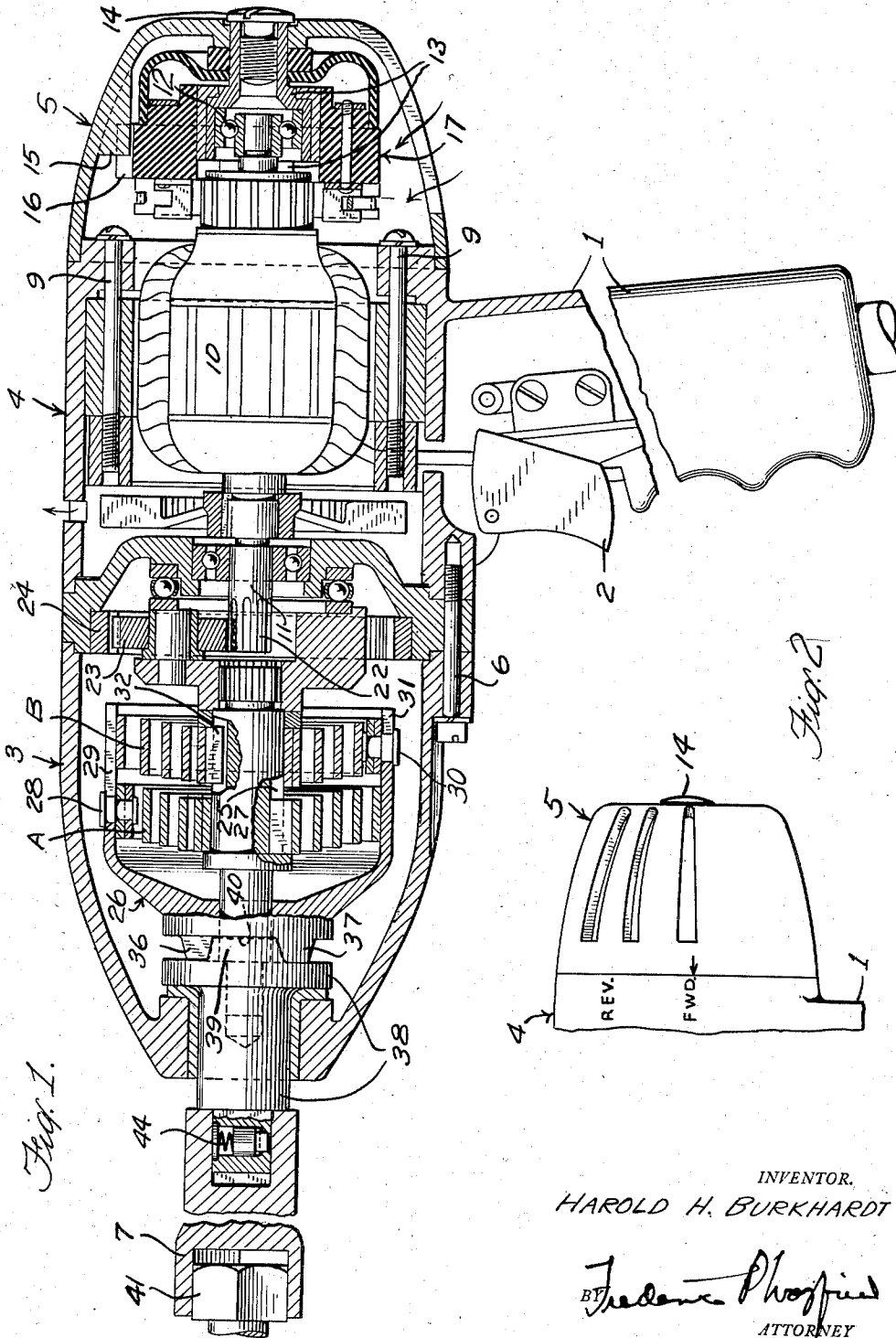
H. H. BURKHARDT

2,817,827

ELECTRICAL CONNECTOR

Original Filed Feb. 28, 1952

2 Sheets-Sheet 1



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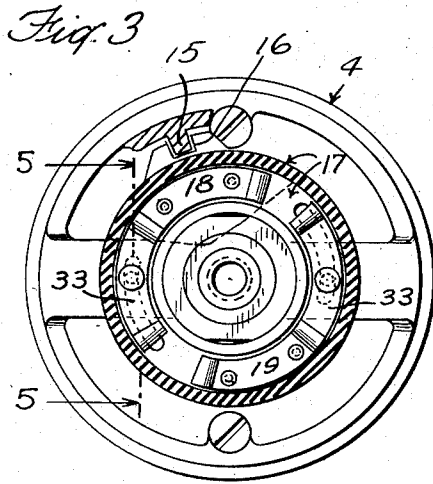
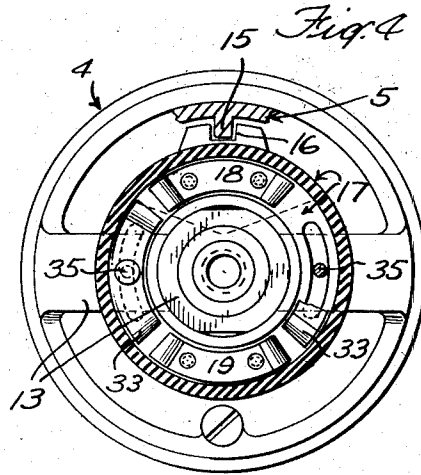
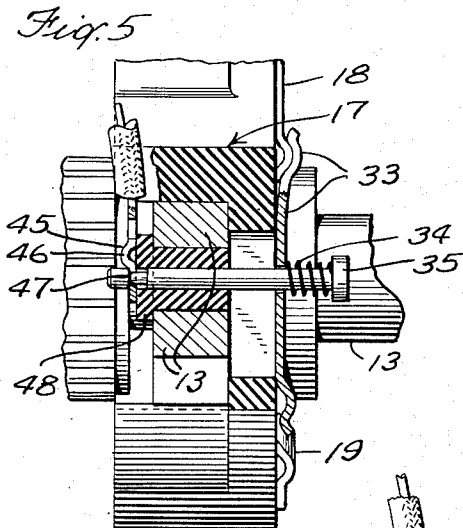
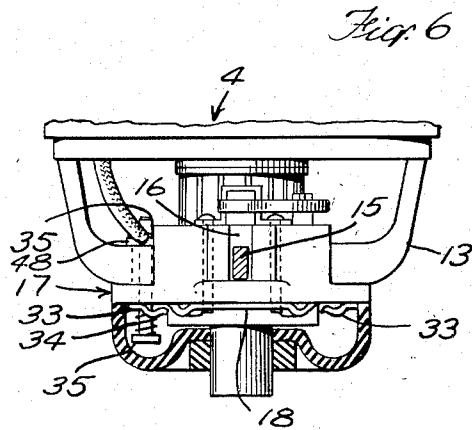
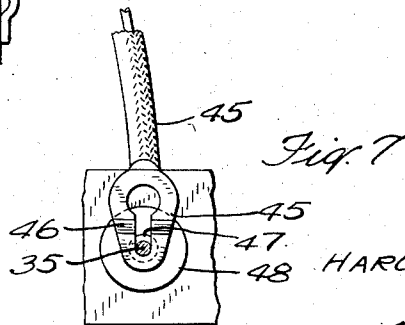
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ELECTRICAL CONNECTOR

Original Filed Feb. 28, 1952

2 Sheets-Sheet 2



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2,817,827

ELECTRICAL CONNECTOR

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Original application February 28, 1952, Serial No. 273,995, now Patent No. 2,662,434, dated December 15, 1953. Divided and this application April 13, 1953, Serial No. 348,378

2 Claims. (Cl. 339—252)

This invention relates to reversing mechanism for impact wrenches and the like.

An object is to provide a reversing mechanism which shall be comparatively simple in construction and efficient in operation.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention, accordingly, comprises the features of construction, combinations of elements and arrangement of parts, which will be exemplified in the constructions hereinafter set forth, and the scope of the application of which will be indicated in the claims.

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 longitudinal cross section.

Figure 2 is a fragmentary rear end elevation view.

Figure 3 is a transverse section showing the parts in position for driving the tool in one direction.

Figure 4 is a similar view showing the parts in the off or neutral position.

Figure 5 is an enlarged section on the line 5/5 of Figure 3.

Figure 6 is an end plan view showing the parts in position corresponding to that of Figure 4.

Figure 7 is a fragmentary section.

Turning now to the drawings, Figure 1 shows the tool as driven by electric power with handle 1, and pivoted switch 2 for turning power on and off, as conventional in such tools.

The enclosing body of the tool is made up of three parts, 3, 4, and 5. Parts 3 and 4 are connected after assembly as by lead screw or screws 6, and the other end portion 5 is free to rotate about the central part 4, in order to change the direction of rotation of the driven tool, shown here as a wrench 7, encircling bolt head 41.

Carried by central cover portion 4 as by screw bolts 9 are the field pole pieces of an electric motor of conventional design having armature 10, and driving a shaft 11.

The outer end of this motor shaft is carried in a ball bearing mounting 12, carried in a part 13, an extension of part 4, upon which is mounted part 5 and held for rotation by cap screw 14.

The rotatable outer end 5 of the cover section carries a projection 15 which engages a slot 16 in the rotatable part 17, which carries contact members 18 and 19 (see Figures 3 and 4). Upon rotating the part 5, contacts 18 and 19 may be changed from the position of Figure 3 to that of Figure 4 and vice versa to determine the direction of rotation of the shaft.

This is shown clearly in Figures 3, 4 and 5 wherein contact members 18 and 19 are connected to 17, and upon rotation pass under one end or the other of the part 33, and thereby reverse the direction of rotation of the armature 10. The part 33 is held yielding in

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position by springs 34 carried around the studs 35 adjacent the head thereof as shown in Figures 5 and 6.

Part 35 is provided near its other extremity with a bevel or chamfer and, near the end, with an annular groove 47. Part 45 brush lead terminal shown in Figure 7 is provided with a round hole and slot, the round hole to permit insertion of the stud 35, and the slot of a width suitable to accept the small diameter of groove 47 in stud 35. Terminal 45 is further provided with a stamped detent 46 to insure contact of terminal 45 to stud 35 under all conditions except when removal of terminal is desired. Groove 47 is of a width greater than height of detent 46. To attach terminal 45 to stud 35 it is only necessary to depress stud 35, compressing spring 34, and causing stud 35 to protrude beyond insulating bushing 48. By placing terminal 45 so that stud 35 enters the large round hole and terminal 45 is in line with groove 47 in stud 35, a slight pull on lead wire will displace terminal 45 until small diameter of groove 47 comes to rest at extremity of the slot. Detent 46 having passed through the groove comes to rest on the opposite side of stud 35. Releasing pressure on head of stud 35, thereupon locks all members together securely, tension on stud 35 by spring 34 causing pressure on contact 33, and by reaction on terminal 45, with detent 46 preventing any possibility of unintentional breaking of electrical contact or mechanical disassembly of the parts.

It is to be noted that the two studs serve to lock the entire reversing switch mechanism, making assembly and disassembly quick and easy without the use of tools.

It is also to be noted that the reversing mechanism not only reverses the brush connections, thereby reversing rotation of the motor, but it physically translates the brushes into the commutating plane most efficient for that rotation of motor.

The commutator, brushes and other parts shown at the right of Figure 1 are of conventional design and are not further described.

The inner end of the shaft 11 is provided with teeth 22, meshing with a planetary gear 23, which through the fixed gear 24 shown, drives the shaft 25. About this shaft 25 is carried weight 26 free to revolve about the shaft 25 or to be displaced axially therealong. This weight 26 is driven, in the construction shown, by two torsion springs A and B, each of which has one end locked to the shaft 25 and the other end connected to the weight 26. The weight 26 is provided on its forward extension with two radial lugs 36 and 37, provided with angular cam faces.

As shown, spring A is held to the shaft 25 by spring end engaged in slot in shaft as at 27. The outer end of spring A is held by stud 28 to the weight 26. This stud 28 as shown in Figure 1 is at the lower end of a slot 29 in weight 26. This causes an offsetting of the coils of the spring A as shown, thus preloading the spring A in compression and assuring firm contact of weight 26 to anvil 38 before camming occurs and rapid return of weight 26 after camming.

This is also true of the upper spring B which is connected by a stud 30 resting in a short slot 31 while the connection at 32 to the shaft 25 is below the line of the stud 30, causing this spring also to be offset as shown.

The anvil 38 is provided with two radial lugs 39 and 40 with mating cam faces, and the anvil carries at its outer end the wrench 7, shown as driving in this instance the bolt head 41. Figure 1 shows at 44 a spring pressed ball end pin acting as a releasable connection between the anvil 38 and the wrench 7.

The operation of this tool, as shown as a wrench, may now be followed. When the motor shaft 11 is revolv-

ing at its predetermined speed, the weight 26, driven through the torsion springs A and B, after a slight lag due to its inertia, revolves at the same speed.

When, however, the anvil is caused to stop or decelerate as by the fact that the bolt is driven substantially home, it causes a similar deceleration or stopping in the weight 26, the cams being engaged. The driving shaft, however, continues to rotate and torsional energy is stored in the springs. When the torque reaches a certain value, it causes the cams to disengage. At the moment of disengagement, the weight 26 rotates on the shaft 25 at the rotating velocity of the shaft 25 plus the energy imparted to it by the energy stored in the spring. As this spring energy is delivered to the weight 26, the compressive force of the spring is again asserted, and moves the weight 26 forward so that it causes its cam lugs to strike those on the anvil with considerable impact.

Thus it will be seen that in operation by the switch 2, the wrench as shown is driven in one direction to run the bolt quickly home and thereafter firmly set by the action of the spring control device shown. When this has been sufficiently accomplished, the power is released and the tool withdrawn.

When it is desired to turn the wrench in the opposite direction, whether for unscrewing a bolt or for screwing, a left-handed bolt, as distinguished from the more usual right-handed bolt, the operator has only to turn the outer end member of the cover 5 as by following the inscriptions Rev. and Fwd. for "reverse" and "forward" on Figure 2, and the operation is adjusted accordingly.

It will thus be seen that I have provided a construction which accomplishes all the objects set forth above, and others, and provides a most efficient, useful, and durable tool.

Certain features of this invention, and especially the construction illustrated in Figures 5 and 6, may be used in a non-reversing tool, showing special advantages in assembly, operation and repair in which case the rotating end section will be locked in the proper position.

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.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which as a matter of language might be said to fall therebetween.

This application is filed as a division of my application for Impact Tool, Serial No. 273,995, filed February 28, 1952, now Patent No. 2,662,434, granted December 15, 1953.

I claim:

1. In an electric tool, a spring pressed stud, an annular groove at one end of said stud, a brush lead terminal having a hole therein, and a slot of a width suitable to accept the diameter of the stud groove, a detent upon said terminal adapted to bear against the stud, but of a width less than the width of the stud groove.

2. In an electric tool, a spring pressed stud, an annular groove at one end of said stud, a brush lead terminal having a hole therein, and a slot of a width suitable to accept the diameter of the stud groove, a detent upon said terminal adapted to bear against the stud, but of a width less than the width of the stud groove, and a second similar spring pressed stud, diametrically opposite to the first stud.

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