Feb. 1, 1938. J. E. TORBERT, JR 2,106,937

DRILL

Filed March 4, 1936 2 Sheets-Sheet 1

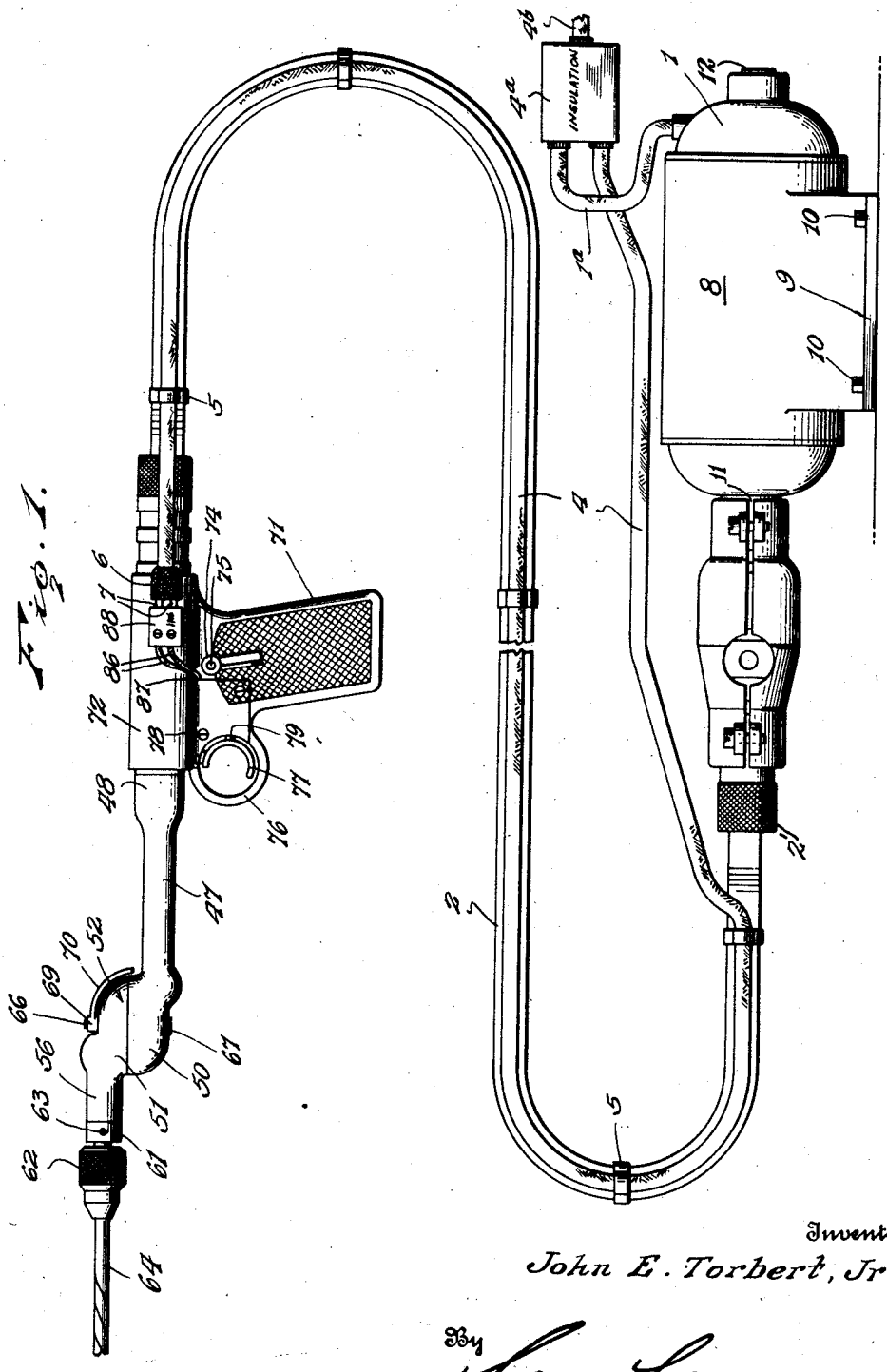


Fig. 1.

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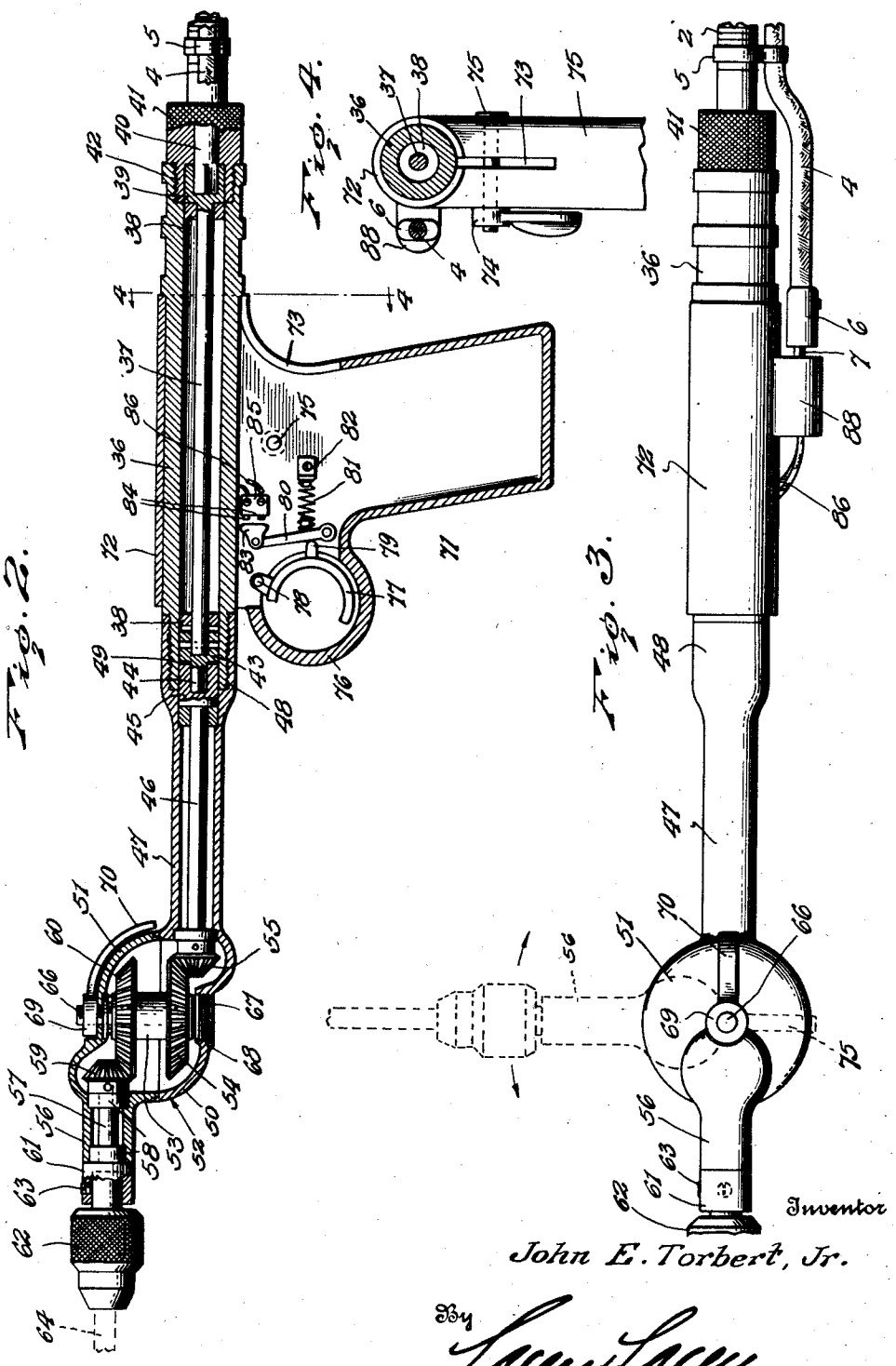


Fig. 2.

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE

2,106,937

DRILL

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Application March 4, 1936, Serial No. 67,146

1 Claim. (Cl. 77—15)

This invention relates to an improved drill which is power driven and one object of the invention is to provide a drill, a source of power such as an electric motor, a flexible shaft receiving rotary motion from the motor shaft, and a tool holder at the other end of the flexible shaft having a housing enclosing shafting for transmitting rotary motion from the flexible shaft to a bit receiving socket, a switch being associated with the housing whereby the workman using the drill may close a circuit through the motor and set the drill in motion whenever desired and also shut off the current while at quite a distance from the place where the motor is located.

Another object of the invention is to so form the drill that the bit holder may be adjusted and disposed either in axial alinement with a shaft in the casing from which it receives rotary motion or at a desired angle transversely thereof and thus allow openings to be drilled in confined spaces which would be difficult to reach with a drill having the bit mounted at the end of a rigid shaft.

Another object of the invention is to so form the casing that it may be very easily held and so locate the switch that the workman may close or open the same without releasing his hold upon the device.

The invention is illustrated in the accompanying drawings, wherein

Figure 1 is a view in elevation showing a drill constructed in accordance with this invention assembled and ready for use.

Figure 2 is a sectional view upon an enlarged scale, taken longitudinally through the bit holder and drill head and handle shown in Figure 1.

Figure 3 is a view looking down upon Figure 2 with the bit holder shown turned to an adjusted position by dotted lines.

Figure 4 is a fragmentary sectional view taken along the line 4—4 of Figure 2.

This improved power drill consists, briefly, of a motor 1, a flexible shaft 2 receiving rotary motion from the shaft of the motor 1, a shaft housing or casing 2' having a bit holder associated therewith and preferably angularly adjustable, and an electric cable 4 for extending along the flexible shaft for connection with a switch carried by the shaft housing or a handle thereof in order that the workman may easily turn on the current when needed. By this arrangement the workman may do his work at quite a distance from the motor without having to walk over to the motor in order to turn on the current or shut it off and may, in fact, cause the current to be turned on or shut off without releasing the drill. The flexible shaft has the cable 4 connected with it by a resilient clip 5 so that the cable extends longitudinally of the shaft in close contacting engagement therewith from the motor to the outer end of the shaft and at its outer end, the cable terminates in a terminal 6 formed with the usual prongs 7 by means of which the terminal 6 may be thrust into sockets of a companion terminal carried either by the shaft housing or its handle, as will be hereinafter set forth.

The motor 1 is of the type used for an electric drill and has been shown mounted in a support consisting of a sleeve 8 formed with a base 9 adapted to be secured upon a bench or the like by fasteners 10. This motor has an extended neck 11 at one end through which the motor shaft 12 projects and the flexible shaft is connected with the motor shaft in any desired manner so that it turns therewith. While it has been stated that the motor 1 is to be secured upon a bench or the like, it is to be understood that the cable 4 and intake cable 1^a of the motor may be connected with a junction box 4^a at the end of a long power cord 4^b and carried from one place to another by a workman or placed upon a floor and dragged from one place to another by pull exerted upon the flexible cable 2. The device will, therefore, be readily portable during use.

The tool which is mounted at the front end of the flexible shaft has a barrel or tubular shaft housing 36 through which extends a shaft 37 having its end portions rotatably mounted by bearings 38. At its rear end the shaft 37 terminates in a socket 39 to receive the squared end of the terminal 40 of the flexible shaft and the coupling 41 which fits loosely about the terminal 40 has a reduced and externally threaded end portion 42 adapted to be screwed into the rear end portion of the barrel 36 about the socket 39 and thus connect the flexible shaft with the shaft 37 and cause the shaft 37 to turn with the flexible shaft. At its forward end the shaft 37 carries a nipple 43 similar to the nipple 22 and having a squared shank 44 for engagement in the socket 45 of a shaft 46 which is rotatably mounted in the tubular shank 47 of the drill head. The shank terminates at its rear end in an enlarged portion defining an internally threaded socket 48 adapted to be screwed upon the reduced and externally threaded forward end portion 49 of the barrel 36 and from an inspection of Figure 2 it will be seen that when the socket 48 is screwed upon the reduced end of the barrel, the shank 44 of the nipple 43 will be engaged in the socket 45 and

cause the shaft 46 to rotate with the shaft 37. At its forward end, the shank 47 carries a cup 50 which, together with the companion cup 51, provides a substantially spherical gear housing 52, in which is rotatably mounted a double gear 53 having its lower gear 54 meshing with a gear or pinion 55 carried by the forward end of the shaft 46. The upper section of the gear housing carries a tubular shank or neck 56 in which a shaft 57 is rotatably mounted by bearings 58 and this shaft carries at its inner end a pinion 59 meshing with the upper gear 60 of the double gear 53. At its outer end, the shaft 57 carries a socket 61 in which a chuck 62 is secured by set screws 63. As the pinions 55 and 59 are of the same size and the upper and lower gears 54 and 60 of the double gear are of the same size, rotary motion will be transmitted from the shaft 46 to the shaft 57 at the same speed of rotation and, of course, a bit 64 will also rotate at the same speed as the shaft 46. The double gear 53 is rotatably mounted about a shaft or bolt 66 having an enlarged threaded head 67 at one end which is screwed into a threaded opening 68 formed centrally of the cup 50. The other end portion of the shaft 66 is threaded and projects externally of the cup 51 and is engaged by a nut 69 carrying a handle 70 which is curved to conform to the contour of the cup 51. When the nut 69 is tight, the cup 51 will be held in a stationary position such as shown in full lines in Figure 3, but when the nut is loosened by applying transverse pressure to the handle of the nut, the cup 51 may be turned about the shaft 66 to a position transversely of the shank 47, as indicated by dotted lines in Figure 3. It will thus be seen that the bit may be disposed either longitudinally of the shaft 46 and shank 47 or transversely thereof and holes may be drilled in places which would be very difficult to reach if this adjustment were not provided for.

It is desired to permit the drill head 47 and the tubular shaft housing 36 to be easily held and in order to do so there has been provided a handle 71 which resembles the stock or grip of a pistol. This handle is formed of metal which is resilient and at its upper end carries a sleeve 72 of a diameter permitting the tubular shaft housing 36 to be slid through it to the position shown in Figures 1 and 2 with the threaded forward end portion of this shaft housing projecting forwardly from the sleeve for engagement by the socket 48. The handle 71 has its upper portion formed with a slit 73 at its back which extends into the under portion of the sleeve and, therefore, the sleeve may be contracted about the shaft housing to firmly grip it when the nut 74 of the bolt 75 which passes transversely through the upper portion of the handle is tightened. A loop 76 resembling the trigger guard of a pistol is provided at the front of the handle and within this loop or guard is mounted a trigger 77 pivoted at its upper end by a small bolt or pin 78. This trigger is in such position that it may be easily engaged by the first finger of a hand grasping the handle 71 and when the trigger is moved rearwardly by pressure applied to it, the lug or finger 79 of the trigger will shift the arm 80 rearwardly against action of the spring 81 mounted in the handle between the arm and an abutment bracket 82. A block 83 formed of conductive material is pivoted to the upper end of the arm 80 which is formed of insulating material and when the arm is moved rearwardly, this block engages and bridges the contact 84 of the terminal 85 to which the wires 86 are secured. These wires extend outwardly through an opening 87 formed in a side of the handle near the upper end thereof and are secured in the usual manner to the sockets of a terminal provided at one side of the sleeve 72 to receive the prong 7 of the plug 6. By this arrangement a workman may carry out work at quite a distance from the motor and may easily grasp the handle 71 and extend his first finger through the trigger guard 76 for engaging the trigger 77. When pressure is applied to the trigger, the contacts 84 will be bridged to close a circuit through the motor and rotary motion will be transmitted through the flexible shaft to the shaft 37 and from this shaft through the shaft and gearing of the tool head 47 to the bit. When the trigger is relieved of pressure, the spring 81 moves the arm 80 and the block or bridge 83 away from the terminal 85 thus breaking the circuit and shutting off the motor. It will thus be seen that the device will only be in operation when actually in use.

Having thus described the invention, what is claimed as new is:

In a power drill, a tool head including a shaft housing, a shaft rotatably mounted therein and having one end portion adapted to receive rotary motion from a drive shaft, a gear housing having companion upper and lower sections, a bolt extending through the gear housing centrally thereof and having a threaded head at its lower end screwed into a threaded opening formed in the lower section, the upper end portion of said bolt being threaded and projecting outwardly through an opening in the upper section of the gear housing, a double gear loosely mounted about said bolt within the gear housing and having upper and lower beveled gears, a tubular shank extending laterally from the lower section of the gear housing and detachably connected with an end portion of said shaft housing, a shaft rotatably mounted in the shank of the lower section and having one end portion detachably connected with the shaft in the shaft housing and a beveled gear at its other end meshing with the lower beveled gear of the double gear, a tubular shank extending laterally from the upper section of the gear housing, a shaft rotatably mounted in the shank of the upper section and having tool holding means at its outer end and a beveled gear at its inner end meshing with the upper beveled gear of the double gear, a nut threaded upon the projecting end portion of said bolt, and an actuating handle formed rigid with said nut and extending radially across the upper section of the gear housing and terminating adjacent the shank of the lower section whereby the nut may be loosened to permit turning of the upper section to dispose its shank in predetermined angular relation to the shank of the lower section and the nut then again tightened to secure the upper section in the adjusted position.

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