June 21, 1938. F. CORDES 2,121,286

PORTABLE ELECTRICALLY CONTROLLED TAPPER

Filed Oct. 25, 1937 2 Sheets-Sheet 1

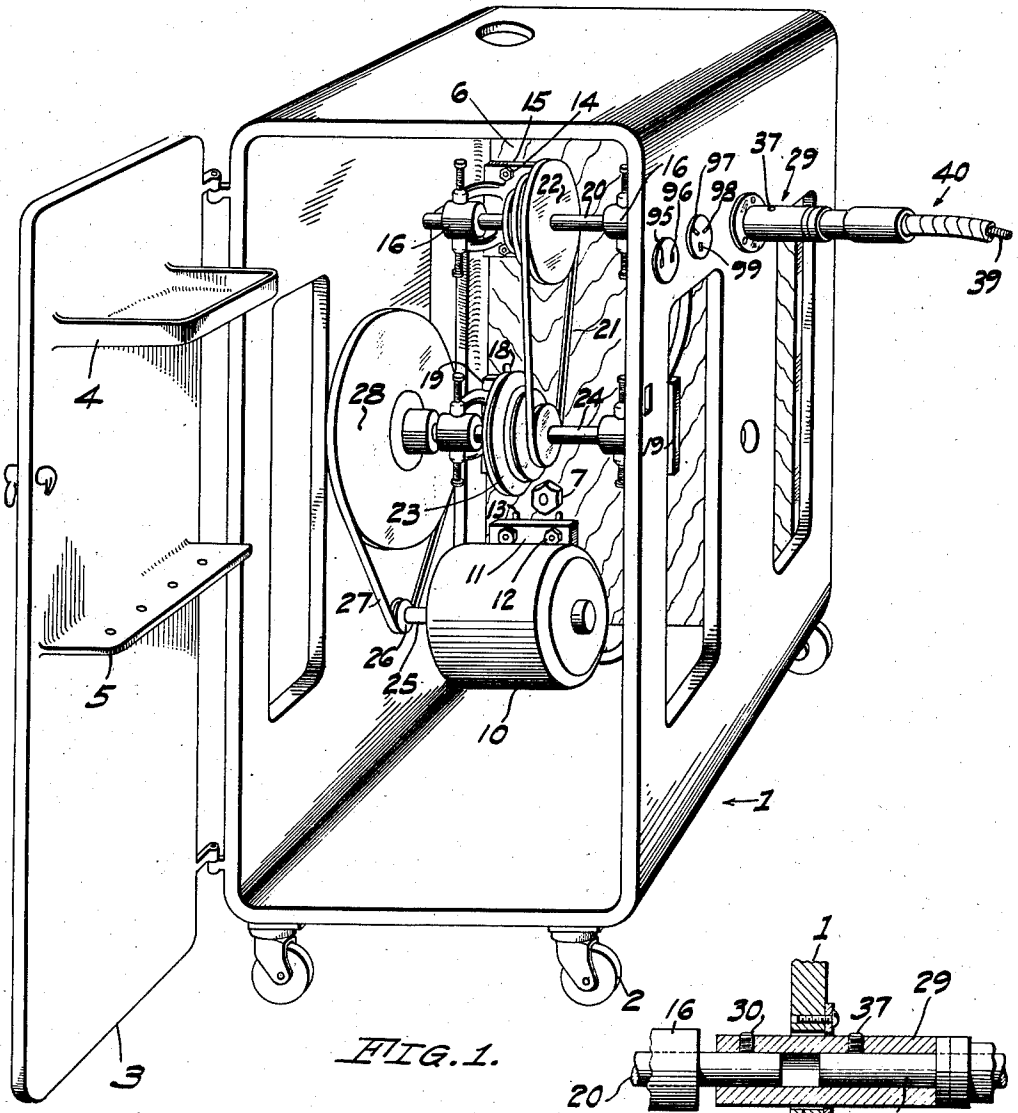



FIG. 1.




FIG. 1A.

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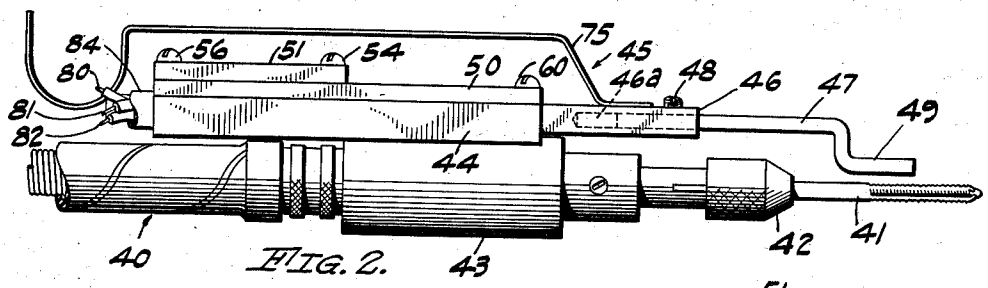



FIG. 2.

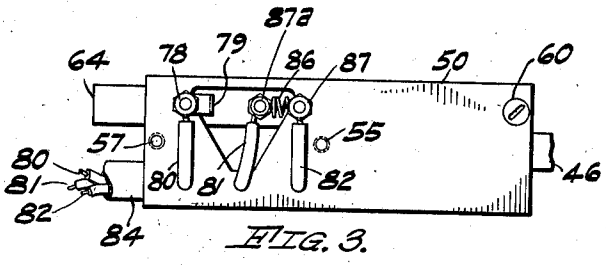



FIG. 3.

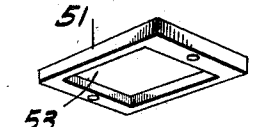



FIG. 9.

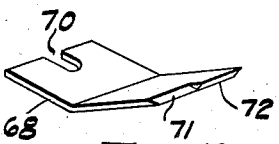



FIG. 10.

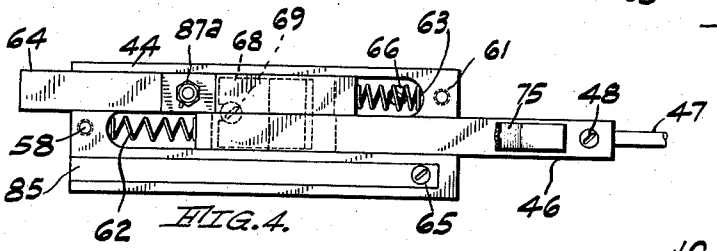



FIG. 4.

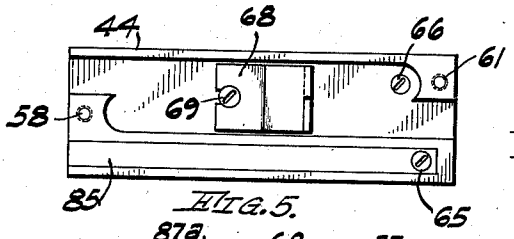



FIG. 5.

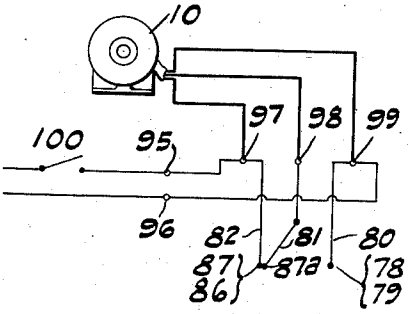



FIG. 11.

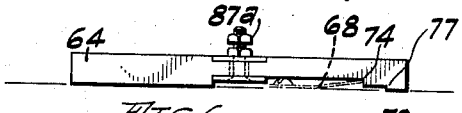



FIG. 6.

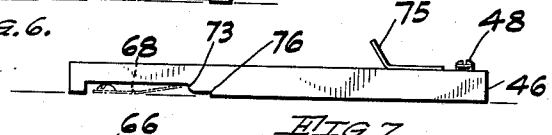



FIG. 7.

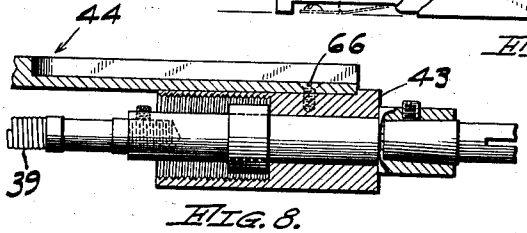



FIG. 8.

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# UNITED STATES PATENT OFFICE

2,121,286

## PORTABLE ELECTRICALLY CONTROLLED TAPPER

Ferdinand Cordes, Los Angeles, Calif.

Application October 25, 1937, Serial No. 170,737

9 Claims. (Cl. 10—136)

This invention relates to a mechanism for drilling and tapping of the type wherein the means for performing the tapping or drilling operation has its direction of rotation automatically reversed and is withdrawn from the work after the particular operation has been completed.

More particularly the invention relates to a portable mechanism for close drilling and tapping wherein the means for operating a tap to form a female screw or for operating a tool for drilling a hole of a particular depth, has its direction of rotation automatically reversed thereby withdrawing it from the work after the tap or drilling tool has reached a predetermined depth for which the machine has been previously set.

Among the objects of the invention are:—

To safeguard against the breaking of tap forming tools; to save time and labor by avoiding the necessity of unloading and bringing parts to be operated on to stationary tapping machines which are cumbersome and unwieldy to handle; to provide an improved combination of drill-operating and drill handling means which will add to speed and convenience of operation, and, in general, to render the construction of such a device simpler, more compact and safer to operate.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawings, Figs. 1 and 2 combinedly illustrate what is deemed at present to be a preferred embodiment of the invention, Fig. 1 showing, in perspective, the driving mechanism for operating the tool shown, in side elevation, in Fig. 2, said tool being shown in combination with the depth gage and associated switch box for reversing the direction of rotation of the motor shown in Fig. 1.

Fig. 1A is a sectional coupling detail.

Figs. 3, 4 and 5 illustrate plan views of the switch box shown in Fig. 2, these views progressively omitting parts from the top downwardly.

Figs. 6 and 7 illustrate side elevations of switch reversing parts shown in Fig. 4.

Fig. 8 is a slightly modified longitudinal mid-section taken through a portion of the lower structure shown in Fig. 2.

Fig. 9 is an underside view of the insulated plate shown in the upper part of the structure of Fig. 2.

Fig. 10 is an enlarged view of the spring part shown in Figs. 4 to 7, and

Fig. 11 is a wiring diagram.

Referring in detail to the drawings, Fig. 1 shows the complete tap-operating assembly and comprises essentially a cabinet 1 supported upon swivelled wheels 2. By preference and as shown the walls of said cabinet are substantially rectangular and at one end thereof is mounted a hinged door 3 carrying on its inner side tool shelves 4 and 5. To the end wall of said casing opposite to said door is removably secured a panel 6 by means of bolts, one of which is designated by the numeral 7, projecting thru said panel and the adjacent end wall of the cabinet.

Upon aforesaid panel 6 is mounted the operating mechanism shown within the casing in Fig. 1 including the motor 10, whose base 11 is secured to said panel by means of bolts 12 which cooperate with the slots 13 to adjustably support the motor at various heights.

In the upper part of said casing to said panel are fixedly mounted by any suitable means, as for example hold down bolts 14, brackets 15 which support the bearings 16 in which the power delivery shaft 20 is journalled. Between the power delivery shaft mounting and motor is counter shaft 24 fastened adjustably to said panel by means of bolts extending thru slots 18 engaging brackets 19.

The power delivery shaft 20 may be variably speed driven by a V-belt 21 which passes over a multiple-diameter V-grooved pulley 22 fixed to said shaft, said belt in turn being driven from a multiple diameter pulley 23 fixed to the counter shaft 24. Said counter shaft is shown driven by the motor shaft 25 through the medium of motor shaft pulley 26, belt 27 and large pulley 28 fixed to said counter shaft.

The belts 21 and 27 may be tightened or loosened by shifting the motor 10 and countershaft 24, aforesaid slots 13 and slots 18 being provided respectively for hold down bolts 12 of the motor and bolts of the counter shaft brackets, not shown.

The motor 10 is of the quick reversing type. It responds to a change in current connections by stopping and reversing almost instantaneously. The motor together with the variable speed mechanism, by reason of their peculiar mounting are withdrawable bodily as a unit from the casing.

Fig. 1A illustrates the manner in which the power delivery shaft 20 may be disconnected from the remainder of the drive permitting this detachability. In said figure is shown a sleeve coupling 29 extending thru a side wall of the cabinet, said coupling having its inner end joined by means of a screw 30 to the free end of the

shaft 20 which projects thru the bearing 16 nearest said side wall.

Continuing the description of the coupling means, the power delivery shaft 20 has detachably connected to it the flexible shaft structure 40 the continuing terminal portion of which is shown in Fig. 2 projecting outside the casing thru an aperture 36 provided therefor, screw 37 being provided for attaching the inner terminal portion of the shaft 38 which, in turn, is fastened to the cable 39 that operates the tapping tool 41.

Referring more particularly to Fig. 2, the tapping tool 41 is shown secured to the flexible driving shaft 40 by means of a conventional drill chuck 42, the adjacent part of the flexible shaft being surrounded by a bushing 43 with which is combined the body portion 44 of the depth gauge, current connection, direction changing apparatus indicated generally by the reference numeral 45.

The tap depth gauge includes a bar 46 which is longitudinally adjustable from a retracted, non-operative position to an extended position wherein it maintains a gauge rod 47 carried by it in a position automatically to gauge the depth to which the taps will be operated to form the thread.

The gauge rod 47 has a slidable fit within a slot 46*a* within said bar 46, the amount of its extrusion therefrom being fixedly maintained by the set screw 48. Said gauge bar has an offset terminal portion 49 located close to the tool 41 for engagement with the work being operated upon, the distance from the end of the terminal 49 to the end of the tap representing approximately the distance the tap will go into the work before it is reversed by an automatic change in current connection and caused to back out.

The mechanism whereby this reversal is effected will now be described with particular reference to Figs. 2 to 11.

Fig. 2 discloses the arrangement of parts comprising the depth gauge, current connection direction changing apparatus in superposed relation; that is to say, bushing 43 supports part 44 comprising the body portion, part 44 which houses the current changing apparatus in turn supports cover plate 50, and part 50 in turn supports the uppermost part 51 comprising a bakelite insulator which is adapted to cap the terminals of the conductors thru which a change of current is effected.

Part 51 is cavitated on its under side as shown by the numeral 53 in Fig. 9. Said part is secured to its adjacent part 50 by means of screw 54 tapped into hole 55 shown in Fig. 3 and by means of screw 56 extending thru hole 57 in part 50 and screwed into tapped hole 58 shown in part 44 in Figs. 4 and 5.

Part 50, in addition to its fastening to part 44 by means of screw 56, is also fastened to the latter part by means of screw 60 screwed into tapped hole 61 shown in Figs. 4 and 5.

Fig. 3 shows part 50 with part 51 removed and Fig. 4 shows part 44 with part 50 removed. Fig. 5 shows part 44 stripped of its movable parts, i. e., springs 62 and 63 and switch actuating bars 46 and 64, the latter parts also being separately shown in Figs. 6 and 7. Part 44 is secured to the bushing 43 by means of screws 65 and 66.

When the machine is tapping, the parts have the relative positions shown in Fig. 4. This relation is also shown in Fig. 3. This relative relation is maintained by means of a spring 62 abutting the inner end of bar 46 and a leaf spring 68 fastened to the body portion 44 by means of a screw 69 extending thru a slot 70 in said spring, said spring 68 having tapered edges 71 and 72 engaging notches 73 and 74 in bars 46 and 64 respectively and said bar 46 being provided with a rounded shoulder between notches 73 and 76 to permit movement of leaf spring 68 from the former notch to the latter. This position is maintained until the gauge bar is manually actuated by means of the trigger 75 depressing said spring to release it from notch 73 and cause it to occupy notch 76, or the spring is depressed by virtue of the contact of the bar 49 with the work effecting the same movement. Either means will cause the spring 68 to become depressed whence a change in current connection is effected.

The spring 68 is shown in Fig. 10 on an enlarged scale with its reversely tapered edges 71 and 72 which make for better operation of the spring. This spring when assembled with its associated parts as shown in Fig. 4, is placed slightly under a bending strain at its bend.

Now when the bar 47 strikes the work it is forced to the left causing leaf spring 68 (Fig. 7) to leave notch 73 and enter notch 76. This operation causes the edge 72 of spring 68 to move down out of notch 74 in Fig. 6. The spring 63 of Fig. 4 is now free to force bar 64 to the left until the edge 72 of spring 68 in Fig. 6 has contacted stop 77. Lead 81 of Fig. 3 now has contacted lead 80 at contact point 79 (79 is a flat springy piece of copper fastened under nut 78). This change in current connection reverses the direction of rotation of the motor and backs the tap out.

When the motor is to be started in the forward direction again, the operator pushes with his thumb on the left end of bar 64 (Fig. 3) and reloads the mechanism to the position shown by Figs. 3 and 4.

Bar 46 never stays back to the left with edge 71 of spring 68 in notch 76 (Fig. 7) after it is released by the work, because spring 62 (Fig. 4) forces bar 46 to the right whenever part 49 is not contacting the work.

Numerals 80, 81 and 82 indicate three leads from the motor in an insulating tube 84 which rests in a groove 85 of Fig. 5. Said leads come up thru insulating cover 50 of Fig. 3 as shown. Yieldable part 86 of Fig. 3 comprises a spring fastened under nut 87 and serves as contact for nut 87*a* in the position shown. Spring 86 gives the play necessary to insure bar 64 moving far enough to the right so that the edge 72 of spring 68, Fig. 6, can enter notch 77.

As shown by the wiring diagram in Fig. 11 there are three leads 80, 81 and 82 from the motor. If 81 contacts 80 at points 87*a* and 78 (79) the motor turns in a counter-clockwise direction; if 81 contacts 82 at points 87*a* and 87 as shown, the motor turns in the clockwise direction. These three leads are shown in Fig. 3, 81 being fastened to bar 64 which is slidable in a metal box described as body portion 44 in Fig. 4. Numerals 95, 96, 97, 98 and 99 in Fig. 11 are shown as being plug contacts in Fig. 1. 100 indicates a switch which may be placed in the power line source in close proximity to the operator when he is at a remote distance from the casing.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

What I claim is:

1. In a portable electrically operable machine for tapping holes of various drilled depth and at the completion of the tapping operation having the direction of movement of the tap reversed whereby it is withdrawn out of the hole, a portable cabinet, a detachable panel fastened to a wall of said cabinet, driving mechanism fastened to said panel and withdrawable therewith from said cabinet, a tapping tool, flexible driving means connecting said tool and said driving mechanism, means to actuate said tool thru the medium of said flexible means and said driving mechanism, and means mounted adjacent said tool for automatically reversing the direction of rotation of said driving mechanism upon completion of a tapping operation.

2. In a portable electrically operable machine for tapping holes of various drilled depth and at the completion of the tapping operation having the direction of movement of the tap reversed whereby it is withdrawn out of the hole, a portable cabinet, a detachable panel fastened to a wall of said cabinet, a quickly reversible motor fastened to said panel, a tap, variable speed driving mechanism mounted upon said panel interconnecting said motor and tap, flexible driving means connecting said tap and said variable speed driving mechanism, a depth gauge mounted adjacent to said tap for regulating the depth of hole being tapped, and means associated with said depth gauge automatically to reverse the rotation of said motor when a predetermined depth of tapping is reached.

3. A portable cabinet, a detachable panel fastened to an inside wall of said cabinet, variable speed driving mechanism mounted upon said panel, a quick reversing electric motor also mounted upon said panel, driving means operatively connecting said motor and said variable speed mechanism, said driving means, variable speed mechanism and motor being bodily withdrawable as a unit from said cabinet, a tool, flexible driving means connected to said variable speed mechanism for operating remotely said tool, means fastened to said flexible driving means adjacent said tool for automatically reversing the direction of rotation of said motor upon the completion of a working operation of said tool, and manually operable means fastened to said automatically reversing means to at will also reverse the direction of rotation of said motor.

4. A portable cabinet, a detachable panel fastened to an inside wall of said cabinet, variable speed driving mechanism mounted upon said panel, a reversible electric motor also mounted upon said panel, driving means operatively connecting said motor and said variable speed mechanism, said driving means, variable speed mechanism and motor being bodily withdrawable as a unit from said cabinet, a tool, flexible driving means connected to said variable speed mechanism for operating remotely said tool, a bushing fastening said tool to said flexible driving means, a gauge mounted upon said bushing in a predetermined relation with said tool, said gauge being adjustable for governing the operation of said tool upon the work being operated upon, and said gauge upon the completion of a working operation automatically reversing the direction of rotation of said motor for withdrawing said tool from the work being operated upon, and electrical connections effecting a change in current of said motor actuated by the movement of said gauge.

5. A cabinet including a detachable panel, a power delivery shaft mounted on said panel, motor means including a variable speed drive mounted on said panel to actuate said shaft, a tool, flexible driving mechanism operatively connecting said tool and said power delivery shaft, apparatus including current connections mounted on said flexible driving means adjacent said tool, and means mounted in juxtaposition to said tool and operatively related to said apparatus and current connections, automatically to effect a change of said current connections.

6. A cabinet, a power delivery shaft mounted in said cabinet, motor means including a variable speed drive mounted in said cabinet for operating said shaft, a tool, flexible driving mechanism relating said tool and said shaft for operating said tool remotely from said cabinet, current reversing mechanism mounted on said flexible mechanism adjacent said tool, means mounted on said flexible mechanism in juxtaposition to said tool to gauge the operation of work performed by said tool, conductors connecting said current reversing mechanism and said motor, and means associated with said gauge means to actuate said current reversing mechanism automatically to cause said motor to rotate in the opposite direction.

7. A portable cabinet, a detachable panel fastened to an inside wall of said cabinet, variable speed driving mechanism mounted upon said panel, an electric motor also mounted upon said panel, driving means operatively connecting said motor and variable speed mechanism, said driving means, variable speed mechanism and motor being bodily withdrawable as a unit from said cabinet, a tool, flexible driving means connected to said variable speed mechanism for operating remotely said tool, and means fastened to said flexible driving means adjacent said tool for automatically reversing the direction of rotation of said motor upon the completion of a working operation of said tool.

8. A portable cabinet, a detachable panel fastened to an inside wall of said cabinet, variable speed driving mechanism mounted upon said panel, an electric motor also mounted upon said panel, driving means operatively connecting said motor and said variable speed mechanism, said driving means, variable speed mechanism and motor being bodily withdrawable as a unit from said cabinet, a tool, flexible driving means connected to said variable speed mechanism for operating remotely said tool, a bushing fastening said tool to said flexible driving means, and a gauge mounted upon said bushing in a predetermined relation with said tool, said gauge being adjustable for governing the operation of said tool upon the work being operated upon.

9. A cabinet, a power delivery shaft mounted in said cabinet, motor means mounted in said cabinet operatively related to said shaft, a tool, driving mechanism relating said tool and said shaft for operating said tool remotely from said cabinet, current reversing mechanism mounted on said driving mechanism adjacent said tool, means mounted on said driving mechanism in juxtaposition to said tool to gauge the operation of work performed by said tool, conductors connecting said current reversing mechanism and said motor, and means associated with said gauge means to actuate said current reversing mechanism automatically to cause said motor to rotate in the opposite direction.

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