Jan. 7, 1930. M. LYNAM 1,742,961

ELECTRIC DRILL

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Fig. 1.

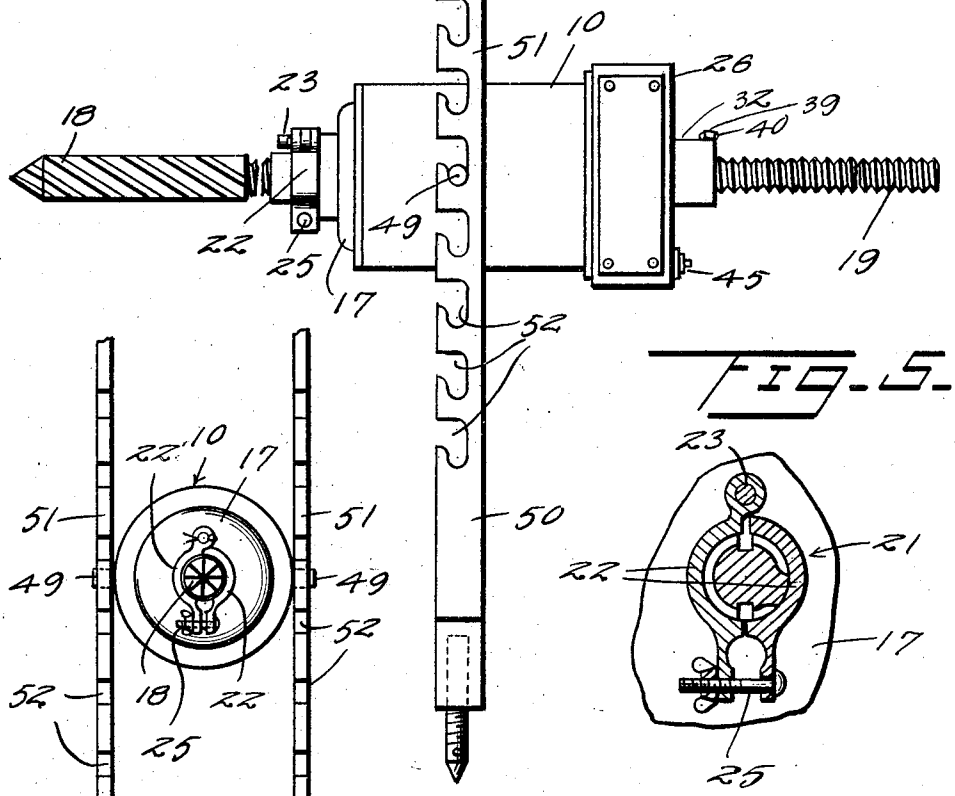


Fig. 5.

Fig. 2.

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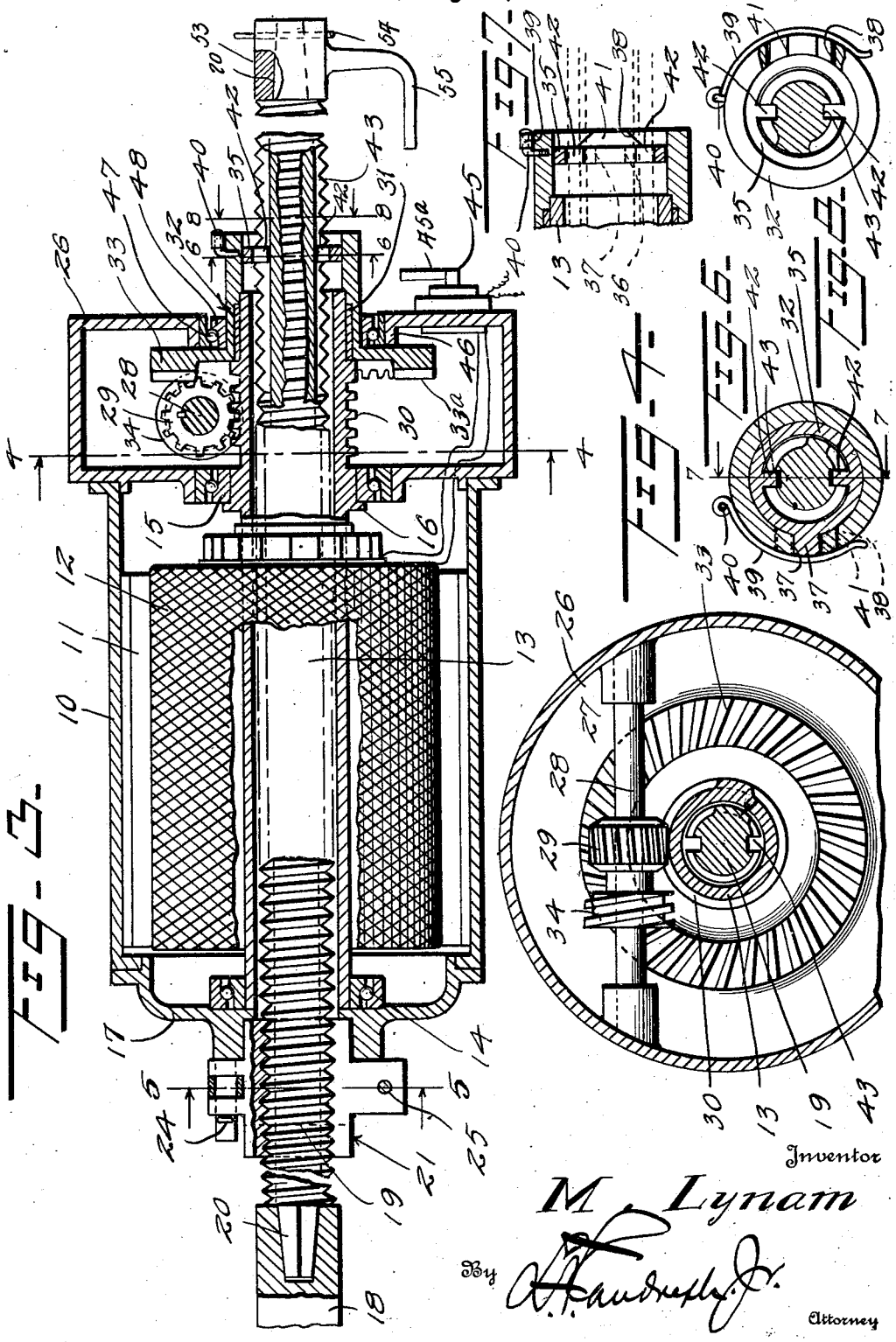
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UNITED STATES PATENT OFFICE

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ELECTRIC DRILL

Application filed August 18, 1927. Serial No. 213,953.

This invention relates to an electric drilling machine such as is used in drilling coal, rock, or other material.

It is aimed to provide a novel construction utilizing an electric motor for driving the drill or tool so that the laborious and expensive hand method of drilling may be supplanted by one much simpler, less laborious and less expensive.

A particular object is to provide a novel structure whereby the parts which directly operate the drill may be released from the electric motor and driven parts, in case of an emergency such as breakage of the electric parts, to permit hand operation of the drill.

Various additional objects and advantages will be pointed out or become apparent from a consideration of the description following taken in connection with accompanying drawings illustrating an operative embodiment.

Figure 1 is a side view in elevation of the improved drill showing it in engagement with the supporting member;

Figure 2 is a front end view;

Figure 3 is a longitudinal sectional view of the drill;

Figure 4 is a transverse sectional view on a plane indicated by the line 4—4 of Figure 3;

Figure 5 is a sectional detail on a plane indicated by the line 5—5 of Figure 3;

Figure 6 is a cross sectional view on the line 6—6 of Figure 3;

Figure 7 is a cross sectional view on the line 7—7 of Figure 4; and

Figure 8 is a cross sectional view on the line 8—8 of Figure 3.

Referring specifically to the drawings, 10 designates a suitable casing which may be the casing of an electric motor supplemented to support the additional parts constituting my invention.

The casing 10 in use is stationary and may have the field 11 of the motor arranged within the same to coact in the usual manner with the rotatable armature 12. The armature 12 of course is rotatable with its shaft and the latter as shown at 13, is hollow. Said shaft may be mounted to move with minimum friction in view of the provision of ball bearings and retainers or other anti-friction means as at 14 and 15. The shaft 13 may have an annular flange 16 adapted to abut the retainer 15 to prevent longitudinal displacement of the shaft in one direction. Longitudinal displacement of such shaft 13 in the other direction is prevented by the abutment thereof with an end section 17 of the casing 10.

The mechanism is adapted to drive a conventional drill such as that illustrated at 18. Drill 18 is driven through the rotation and sliding movement of a tool bar 19 which extends through the hollow of the shaft 13 and which is detachably engageable by the drill bit 18 at a socket and stud 20.

Said tool bar 19 is externally screw threaded and is engaged by a nut 21 carried by the section 17 of casing 10. The nut 21 is in the form of sections 22 hinged together by a pintle 23 projecting from the section 17 and held against displacement therefrom as by means of a cotter 24. The sections 22 are held together at their free ends by means of an adjustable bolt 25. It will be understood that the inner walls of the sections 22 are threaded to correspond with and engage the threads of the tool bar 19. By reason of the nut construction, bolt 25 may be readily removed so that the nut may quickly engage or disengage the threads of the tool bar 19 as the case may be.

A supplemental casing 26 is rigidly but preferably detachably applied to the casing 10 at the end opposite section 17 and the shaft 13 extends through the casing 26.

Journaled in suitable bearings 27 within the casing 26 with its axis transverse to that of the shaft 13, is a counter shaft 28. Keyed to the countershaft 28 is a worm wheel 29 in constant mesh with worm teeth 30 provided directly on the shaft 13.

Surrounding the shaft 13 and journaled thereon is a collar or bushing 31, and surrounding the bushing and journaled thereon is the hub 32 of a gear wheel 33 having teeth 33^a thereon of worm type in mesh with a worm gear 34 keyed on the shaft 28. As a result of this construction, the shaft 13 and gear wheel 33 will turn at different speeds but

in the same general direction, the gear wheel 33 traveling at a much lower rate of speed, the speed being governed of course by the proportions of the parts according to the particular circumstance.

The hub 32 has a ring 35 removably disposed within its bore. Said ring has a lateral extension 36 which removably occupies a slot 37 extending inwardly from the free end of the hub and completely through the wall thereof to the periphery and such slot 37 above the portion occupied by the lug 36 has a dove-tail extension 38. In positioning the ring 35, it will be seen that the lug 36 initially passes through the slot extension 38.

A suitable locking or retaining means for the ring 35 is provided and may consist of a leaf spring 39 riveted or otherwise fastened as at 40 against the exterior of the hub 32. Said spring 39 carries a dove-tail block as at 41, adapted to snap into the slot enlargement 38, after the ring 34 has been positioned in the hub 32, to thus be disposed across the lug 36 and prevent displacement of the ring 35. The tension of the spring 39 is to normally maintain such lug in place, but to permit retraction of the block 41 against its tension when inserting or removing the ring 35. Said ring 35 having one or more inwardly extending radial keys 42 which extend into longitudinally extending slots or grooves 43 in the tool bar 13 to the end that when the gear wheel 33 is turned, the ring 35 will be turned therewith and the keys 42 in view of their engagement in the grooves 43 will turn the tool bar and since the latter is in engagement with the nut 21, will gradually feed the same and drill 18 longitudinally as is necessary for efficient drilling.

It will be understood that the additional parts necessary to complete an electric motor are properly disposed in coacting relation with those shown and within the casing 10. An electric switch may be provided as at 45 to control operation of the motor from a suitable source of electric energy. Said switch may be mounted on the casing 26.

Said casing 26 may have an inwardly extending flange at 46 against which the gear wheel 33 bears and between that flange and the hub 32 of gear wheel 33, suitable bearings and a retainer 47 and 48, therefor, may be interposed to reduce friction.

Casing 10 may have diametrically opposite lugs or trunnions at 49 which enables the drill to be properly mounted in connection with a frame 50, adapted to be vertically arranged as usual in a coal mine or elsewhere where the drill is used. Said frame has opposite side bars at 51 provided with bayonet slots 52 selectively engageable by the trunnions 49 to position the drill at different heights.

Switch 45 is a conventional rotatory contact and provided with a laterally extending arm 45ª for actuation of the rotating member. 53 indicates a sleeve securable to stud 20, by means of a pin 54, and having an angular arm 55 extending therefrom. This construction admits of automatically opening the switch 45 when tool bar reaches the limit of its driving movement as it will be understood that angular arm 55 by engaging switch arm 45ª will rotate the switch member and open the switch, thus stopping the flow of current to the motor.

What is claimed is:—

1. A tool of the class described comprising an electric motor having a hollow armature shaft, a nut, a tool bar in threaded engagement with the nut and extending through said shaft, a gear wheel journaled coaxially of the shaft and in driving engagement with the tool bar, and means to drive said gear wheel from said shaft comprising teeth on said shaft, a gear wheel in mesh with said teeth, and a counter-shaft carrying the latter gear wheel, a third gear wheel on the counter-shaft, said third gear wheel being in mesh with the first gear wheel.

2. A tool of the class described, comprising a hollow shaft, means to drive said shaft, a tool bar disposed in said shaft, said shaft having gear threads thereon, a counter shaft suitably journaled, a worm wheel fixed to said counter shaft and meshing with said gear threads to rotate said counter shaft, a gear wheel journaled on said hollow shaft and geared to said counter-shaft, and means to drive said tool bar from said gear wheel.

3. A tool of the class described, comprising a hollow shaft, means to drive said shaft, a casing mounting said shaft, a threaded nut supported by said casing, a threaded tool bar disposed in said shaft and in said threaded nut, the shaft having gear threads thereon, a counter shaft journaled in said casing, a worm wheel fixed to said counter shaft and meshing with said gear threads, a gear wheel journaled on said hollow shaft and geared to said counter shaft, and means to rotate said tool bar from the gear wheel.

In testimony whereof I affix my signature.

MARSHALL LYNAM.