No. 788,593. PATENTED MAY 2, 1905.

F. W. OLCOTT.

MINING DRILL.

APPLICATION FILED JUNE 19, 1899.

2 SHEETS—SHEET 1.

Fig. 2.

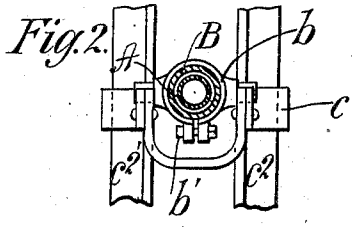

Fig. 3.

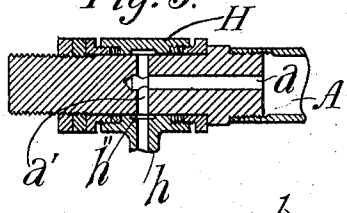

Fig. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 4

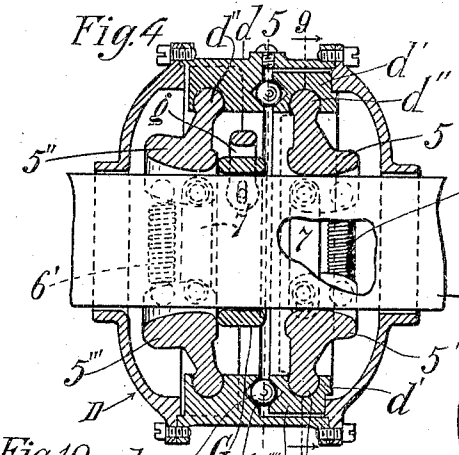


Fig. 5

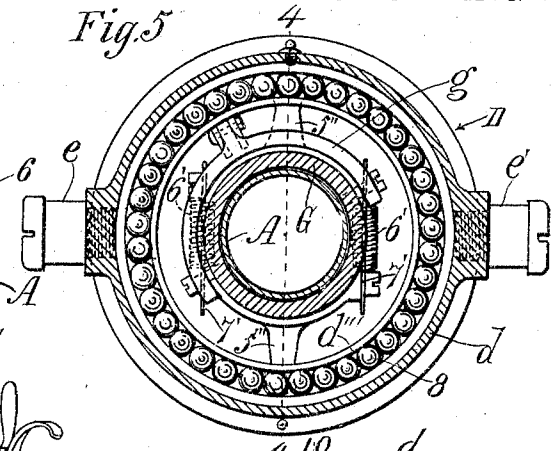


Fig. 10

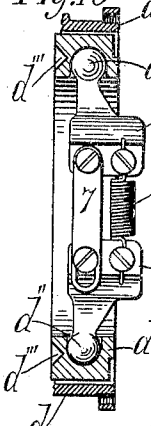


Fig. 6.

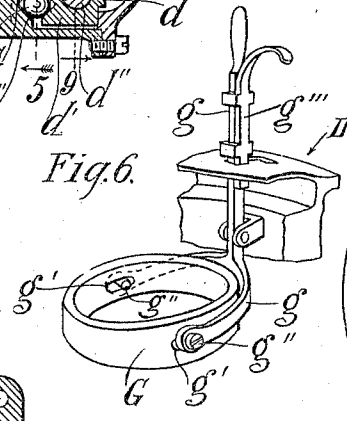


Fig. 9

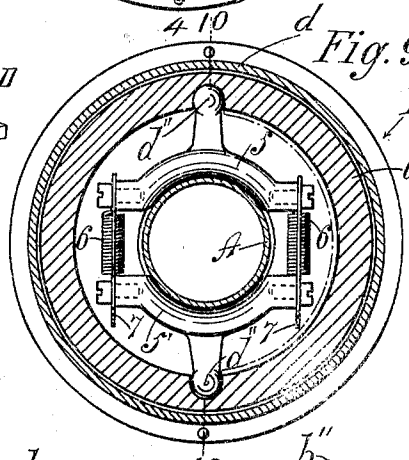


Fig. 7.

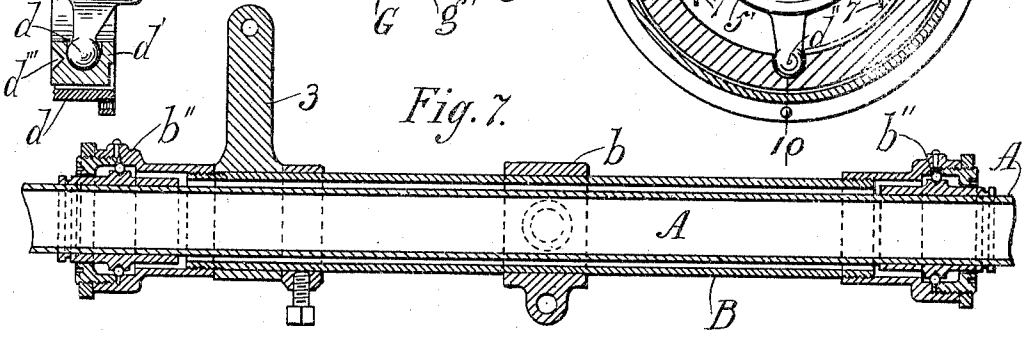
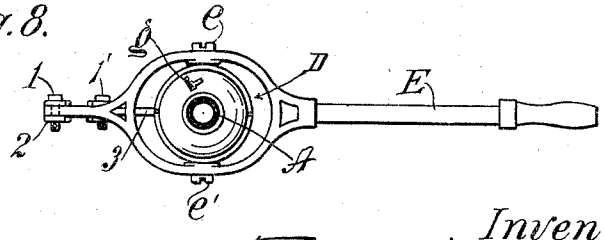


Fig. 8.



Witnesses
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PHOTO-LITHOGRAPHED BY SACKETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

No. 788,593. Patented May 2, 1905.

UNITED STATES PATENT OFFICE.

FREDERIC WILKINSON OLCOTT, OF THE UNITED STATES NAVY, ASSIGNOR TO H. FREDERICA OLCOTT, OF KINGSTON, NEW YORK.

MINING-DRILL.

SPECIFICATION forming part of Letters Patent No. 788,593, dated May 2, 1905.

Application filed June 19, 1899. Serial No. 721,139.

To all whom it may concern:

Be it known that I, FREDERIC WILKINSON OLCOTT, of the United States Navy, have invented a new and useful Mining-Drill, of which the following is a specification.

The object of my invention is to provide a mining-drill which can be conveniently set in position, operated, and moved about by a single operator, the drill to be driven by a flexible shaft driven by any suitable motor—such as an electric motor, a compressed-air motor, or any other suitable form of machine—for imparting rapid rotary motion to the drill.

An important object to be attained is extreme portability of the machine, the parts to be as light as consistent with the required strength.

An object of my invention is to provide superior and simple means whereby the drill can be readily operated at any angle, horizontal or vertical, and adjusted to any elevation and can be readily advanced while in motion and can also be readily retracted.

By my invention the operator can clutch the rapidly-rotating drill and apply the necessary pressure to feed the drill.

The accompanying drawings illustrate my invention.

Figure 1 is a perspective view of my rotary drill in operative position. The operating-lever is shown in a horizontal plane; but it is to be understood that such lever can be adjusted at any angle desired. Fig. 2 is a fragmental sectional elevation on line 2 2, Fig. 1. Fig. 3 is a sectional detail of the water-receiving joint. Fig. 4 is a longitudinal mid-section of the clutch-box, showing a fragment of the rotary drill intact. The feeding-clutch is shown in engagement with the drill. Fig. 5 is a section on line 5 5, Fig. 4. Fig. 6 is a perspective detail of the clutch-shifting collar with a fragment of the clutch-box. Fig. 7 is a longitudinal sectional detail of the drill-supporting bearing. Fig. 8 is an elevation of the clutch-box with its lever and with drill in place. Fig. 9 is a section on line 9 9, Fig. 4, looking to the right. Fig. 10 is a detail showing in elevation the clutch cams or jaws with connecting spring and link viewed from the right in Fig. 9. The box and ring for holding the cams are shown in section. Line 10 10, Fig. 9, indicates the plane of view.

A indicates the rotary drill, carried by the drill-bearing B, in which the drill rotates.

C indicates a pivoted post with an adjustable support *c* for the bearing B.

D indicates the clutch-box, surrounding the drill and pivotally mounted in a lever E by pivots *e e'*. The lever E is connected with the bearing B by means of a connecting-rod 2, pivoted to the lever at 1 and pivoted at 1' to an arm 3, which projects from the bearing B.

M indicates an electric motor driving a flexible shaft F, which is fastened to the rotary drill A to rotate the same. The clutching device D comprises a box *d*, a ring *d'*, mounted to rotate within the box, automatic spring-actuated clutching cams or jaws 5 5', pivoted to the ring *d'* at *d''*. The cams 5 5' project at one side of the drill-engaging portions of the cam, and the projecting portions are connected by springs 6 6. Links 7 connect the cams substantially in a line parallel with the axes of the springs, so that the springs 6 at the projecting portions of the cams will throw the cams to engage the rotary drill A. The springs constitute means to automatically hold the clutch in engagement with the drill. Suitable means are provided for releasing the cams from engagement with the drill. G indicates a shifting ring for this purpose, said ring being operatively connected with a yoke-lever *g*, by which the ring can be shifted into engagement with the cams 5 5' or out of engagement therewith at pleasure.

g' indicates slots in the ring G to allow the pivots *g''* of the yoke-lever to carry the collar to and from the cams without binding.

g''' indicates a latch for the lever *g* to lock it in position to hold the cams out of engagement when required.

5'' 5''' indicate other two cams similar to the clutching-cams 5 5', and these are connected by springs 6' and links 7' in the same manner and for the same purpose as the links and springs of the cams 5 5'. The cams 5'' 5''' are pivoted in the clutching-collar directly and

are disposed in a manner opposite to that of the cams 5 5′, so that the cams 5″ 5‴ will normally clutch the rotary drill to move it in a direction opposite to that in which the cams 5 5 5′ will move the drill. The purpose of the cams 5″ 5‴ is to withdraw the drill in a direction opposite to that in which it will be carried by the cams 5 5′. The shifting ring G is adapted to shift from the cams 5 5′ to the cams 5″ 5‴ and to force either of the cams out of the clutching position. In Fig. 4 the shifting collar is shown in engagement with the cams 5″ 5‴, holding them away from the rotary drill and leaving the cams 5 5′ in engagement with the drill to rotate with it. The box *d* and the ring *d′* are each provided with ball-bearing cups *d‴*, in which are balls 8 to form a ball-bearing between the box and the ring *d′*. The purpose of this is to prevent friction between the box *d* and the rotary ring *d′* when pressure is applied to the box to force the drill into the face to be mined. The pressure exerted by the operator on the lever to force the drill forward is exerted entirely upon the ball-bearing. The drill-bearing B is pivoted in bearings *c*, which are adjustably mounted on the pivoted support-post C, which is provided with adjustable points *c′ c″* at the lower and upper ends to enter the floor and roof of the chamber or tunnel in which the drilling is going on. The point *c′* is adjustable by means of a screw 9, and the point *c″* is slidable lengthwise of the post C in order to be quickly slipped to adjust the length of the post, as required for the depth or width of chamber, drift, or tunnel in which the tool is being operated.

c^2 $c^{2'}$ indicate angle-irons to which the yoke carrying the bearing *c* is clamped by any suitable means, such as the thumb-screws c^3, so that the bearing can be raised or lowered to any desired height. The bearing *c* allows the drill or drill-spindle to be tilted to any angle. The drill-bearing B is a hollow spindle-bearing and is held by a clamping trunnion-collar *b* and can be turned in the collar *b* by loosening the bolt *b′*, by which the trunnion-collar *b* is clamped to the drill-bearing B. By loosening the clamp-bolt *b′* the bearing B can be rotated so as to bring the lever E into any position desired. By loosening the thumb-screws c^3 the drill can be raised and lowered up and down the angle-irons c^2 $c^{2'}$.

H indicates a water-joint sleeve provided with a hollow handle *h*, into which the water is introduced through the valve *h′* from the hose I.

h″ indicates an annular channel communicating with the bore of the handle *h* and surrounding the rotary drill A, which has a central bore *a*, which communicates with the channel *h″* by lateral ducts *a′*, so that the rotary member A can turn at any speed required and water will be fed through the duct *a′* into the central bore *a* of the drill. The drill-bearing B is provided with ball-bearings *b″* at its opposite ends, so that the rotary drill A may be rotated freely within the sleeve without friction.

In practical operation the post C will be set in position at the place desired and the points *c′ c″* adjusted to engage the roof or floor of the chamber and suitably near to the face to be mined. If desired, the post can be set horizontally in a drift or tunnel and the points *c c′* be set into the walls instead of into the roof and floor. The screw-threaded point *c′* will be turned to force the point into the floor or wall to hold the post firmly. Then the support *c* will be adjusted on the post to the height desired. The operator will then throw the lever *g* to shift the ring G to throw the drill-withdrawing clutch-cams 5″ 5‴ away from the drill and will lock the lever *g* in that position by means of the bolt *g‴*. The clutch-cams 5 5′ are thus left free to be thrown by the springs 6 into the clutching position, as shown in Fig. 4, thereby clutching the drill. Then water is admitted through the hose I, and the motor M is set into operation to rotate the flexible shaft F. The clutch-collar *d′* rotates freely within the box. Then the operator will grasp the lever E and push upon it to move the box D toward the post, and this pressure is applied to the collar *d′* through the ball-bearing *d‴* 8, and the clutch-cams 5 5′ are thus caused to force the drill forward. By this means the drill is fed to the limit of the movement of the lever E. Then if it is desired to continue feeding the drill the lever is drawn back, thus sliding the clutch back along the drill. Then the lever is again moved forward, thus again feeding the drill in the manner above described.

When it is desired to remove the drill from the hole, the motor will be stopped and the lever *g′* adjusted to throw the shifting ring G into engagement with the cams 5 5′ to release said cams from the drill. This allows the springs 6′ to draw the cams 5″ 5‴ into engagement with the drill to clutch the drill to draw it out. The clutch therefore is a reversing clutch, permitting forward or rearward movement of the drill to a considerable distance by successive reciprocation of the lever through a less distance.

When the ring G is midway between the cams, the springs draw both the cams into engagement with the drill, so that the drill can be moved in either direction by moving the box.

k indicates set-screws to hold the pivot-point *c″* of the post or frame C.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a rotary drill; a bearing in which the drill rotates; a box carried by the drill; clutch mechanism, rotatably mounted in the box and adapted to release from the

drill and to clutch the drill and rotate therewith; manual operating means carried by the box and operatively connected with the bearing for moving the box; and means for rotating the drill.

2. The combination of a rotary drill; a bearing in which the drill rotates; a clutch-box carried by the drill; a clutch rotatably mounted in the box for clutching and releasing the drill; a motor; a flexible shaft fastened to the drill and connected with the motor for communicating power from the motor to rotate the drill; and a lever carried by the box and operatively connected with the bearing for moving the box.

3. The combination with a rotary drill; of a box mounted on the drill; a ring mounted to rotate within the box; clutching-jaws carried by the ring and arranged to engage the drill; spring-operated means to automatically hold the jaws in engagement with the drill; and means for releasing the jaws from engagement with the drill.

4. The combination with a rotary drill, of a box around the drill; a ring around the drill and arranged to rotate in the box; clutch-jaws pivoted in the ring and arranged to normally clutch the drill; other jaws pivoted in the box and arranged to normally clutch the drill; and means for disengaging one or the other of the clutches from the drill.

5. The combination with a rotary drill, of a box surrounding the drill; a ring surrounding the drill and arranged to rotate in the box; clutching-jaws pivoted in the ring and arranged to normally clutch the drill; other jaws hinged to the ring and arranged to normally clutch the drill; a shifting ring around the drill between the clutching-jaws; and means for moving the shifting ring into engagement with one or the other of the clutches to disengage the same.

6. The combination with a rotary member; of a box around such member; manual operating means for moving the box axially of said rotary member; a ring rotatably mounted within the box, around said rotary member; and automatic spring-actuated clutching-cams carried by the ring to normally engage the rotary member to clutch the same at the initial movement of the box axially of said member in one direction, and to release said member when the box is moved in the opposite direction.

7. The combination of a bearing, a drill-spindle movable rotatably and longitudinally in said bearing, a non-rotary member surrounding said spindle, a ring rotatably mounted around said spindle; bearing-balls between a face of the said member and a face of the ring; and automatic clutch means connected to said ring to clutch the ring to the spindle upon relative longitudinal movement of the ring on the spindle, in one direction, and to release such clutch connection upon movement of the ring in the other direction, and operating means connected to the aforesaid bearing and non-rotary member to move said member longitudinally.

8. The combination with a rotary member, of a box around the member; a ring journaled in the box; a clutch-jaw carried by the ring and extending in cam shape along the rotary member and extending laterally beyond the sides of the rotary member; links attached to the jaws substantially in line with their pivotal supports; and springs attached to a projecting limb of the jaws to throw the jaws into action.

9. The combination of a rotary drill; a pivoted bearing in which the drill rotates; a clutch-box around the drill; an automatic clutch rotatably mounted within the box to clutch the drill to move it axially in one direction and to release it in the other direction; a lever to which the clutch-box is pivoted; and a connecting-rod pivoted at one end to the bearing and at the other end to the lever.

10. The combination with a rotating drill; of a box carried by the drill; two oppositely-arranged automatic clutching devices carried by the box for alternately clutching and releasing the drill to advance and retract it respectively; manual operating means for controlling the clutching devices; and means for moving the box to advance or retract the drill.

11. The combination of a rotary drill; a flexible shaft attached to the rotary drill for driving the same; a pivoted post; an adjustable support on the post; a bearing pivoted in the support; a rotary drill in the bearing; a box around the drill; a clutch rotatably mounted in the box; a lever pivoted to the box; and a connecting-rod pivotally connected with the lever and with the bearing.

12. The combination of a rotary drill pivotally mounted on a support; a box around the drill; an automatic clutch carried by the box and arranged to rotate therein to clutch the drill when moved axially in one direction and to release it when moved in the opposite direction; and a lever to which the box is pivoted.

13. In a drill, a support, a yoke mounted thereon, a spindle-bearing mounted in the yoke so as to be rotatably adjustable, a spindle rotatably mounted in the bearing, and manual operating means connected with the bearing and rotatable therewith, for moving the spindle longitudinally.

14. In a drill, a support, a yoke mounted thereon, a hollow spindle-bearing mounted in the yoke so as to be rotatably adjustable, a spindle rotatably mounted in the bearing, and manual operating means connected with the bearing and rotatable therewith and releasably connected with the spindle for moving it longitudinally.

15. In a drill, a support, a yoke mounted thereon, a hollow spindle-bearing mounted in

the yoke so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, and manual operating means connected therewith and releasably connected with the spindle for moving it longitudinally.

16. In a drill, a support, a yoke mounted thereon, a hollow spindle-bearing pivotally mounted in the yoke so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a lever connected with the bearing to be rotated therewith, and clutch means connected with said lever and engaging said spindle to transmit movement of the lever in one longitudinal direction, to the spindle, and to release the connection between the lever and spindle on movement of the former in the opposite direction.

17. In a drill, a spindle-bearing, a spindle movable longitudinally and rotatably in said bearing, a clutch having two relatively rotatable members to engage and move the spindle longitudinally when the clutch is moved respectively forward or rearward of the drill, and operating means for moving the clutch members longitudinally of the drill.

18. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a two-part clutch detachably connected with the spindle, means common to both of said parts for detaching either of said parts from the spindle, and means for connecting one of said parts of the clutch with the spindle-bearing.

19. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a two-part clutch detachably connected with the spindle, a ring on the spindle between said parts, a lever for moving the ring in either direction upon the shaft, and means for connecting one of said parts with the spindle-bearing.

20. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a two-part clutch detachably connected with the spindle, one of said parts being slotted, a ring on the spindle between said parts, a lever pivotally mounted on the slotted part, one end of the lever engaging with the ring and the other end projecting through the slot and provided with means for locking it in position when the ring is in engagement with either one of said parts, and means for connecting the slotted part with the spindle-bearing.

21. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a two-part clutch detachably connected with the spindle, one of said parts being slotted and said slot being provided with a shoulder at each end, a slotted ring on the spindle between said parts, a lever pivotally mounted on the slotted part, one end of which is provided with a yoke and means for engaging with the ring, and the other end projects through the slot, a locking-bolt on the projecting end of the lever for engaging with said shoulders, and means for connecting the slotted part of the clutch with the spindle-bearing.

22. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a clutch-box connected with the bearing and mounted on the spindle, an annular member rotatably mounted in the box, two pairs of jaws, one for the box and the other for the member, each of said jaws being normally in contact with the spindle, and means for moving said jaws out of engagement with the spindle.

23. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a clutch-box connected with the bearing and mounted on the spindle, an annular member rotatably mounted in said box, two pairs of curved jaws, one pair for the box and the other pair for the member, each jaw being provided with a knuckle-bearing and having a curved clamping-surface, the pairs of jaws being arranged opposite to each other longitudinally of the spindle and the jaws of each pair being upon opposite sides of the spindle, and means for moving either pair of jaws out of engagement with the spindle.

24. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a clutch-box connected with the bearing and mounted on the spindle, an annular member rotatably mounted in the box, two pairs of curved jaws arranged opposite to each other longitudinally of the spindle, each jaw being elongated in cross-section and having a pivot projecting from the outer curved surface at its inner edge, means connected with the outer edges of the jaws upon opposite sides of the spindle for normally holding them in contact with the spindle, and means for forcing the jaws of either pair out of contact with the spindle.

25. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a clutch-box connected with the bearing and mounted on the spindle, said box being provided with two members, the adjacent faces of which are annularly grooved and one of them is rotatable relatively to the other, anti-

friction-balls within said grooves, jaws connected with said members and normally engaging with the spindle and means for releasing the jaws from the spindle.

26. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a two-part clutch connected with the bearing and mounted on the spindle, each part of the clutch being provided with a pair of curved jaws, each jaw being elongated in cross-section and having a pivot projecting from the outer curve of the inner edge, a spring for connecting the oppositely-located ends of each pair of jaws at the outer edges and normally forcing the inner edges of said jaws into contact with the spindle, and means for moving the opposite edges away from each other, whereby the jaws are released from the spindle and the springs are placed under tension.

27. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, a longitudinally-movable spindle rotatably mounted in the bearing, a two-part clutch connected with the bearing and mounted on the spindle, each part of the clutch being provided with a pair of spring-pressed curved jaws, each end of said jaw being flat and in line with the end of the jaw on the opposite side of the spindle, a flat link pivotally secured to the oppositely-located ends of each pair of jaws in position to hold said ends in alinement with each other, and means for forcing either pair of jaws out of engagement with the spindle.

28. In a drill, a support, a hollow spindle-bearing mounted on the support so as to be rotatably adjustable, one end of which is provided with an arm, a longitudinally-movable spindle rotatably mounted in the bearing, a two-part clutch on the spindle, a lever connected with one member of the clutch, a link for connecting one end of the lever with the arm, and means for releasing either part of the clutch from the spindle.

29. The combination of a bearing, a drill-spindle mounted to move rotatably and longitudinally in said bearing, a manual operating-lever connected with said bearing and a reversing-clutch connected to said lever to clutch said drill-spindle to cause longitudinal movement thereof in one direction as the lever is reciprocated, and manual operating means to reverse the action of said clutch.

30. In a drill, a longitudinally-movable rotary spindle, a two-part clutch on the spindle, one part being rotatable and the other non-rotatable and each part being provided with a pair of clamping-jaws, the jaws of the two pairs facing in opposite directions longitudinally of the spindle, means for causing the jaws on the rotatable part of the clutch to engage with the spindle when the drill is being fed forward and for causing those on the non-rotatable part to engage with it when the drill is being withdrawn.

31. In a drill, a longitudinally-movable rotary hollow spindle, one end of which is adapted to receive a drill and the other end is perforated and provided with means for connecting a motor therewith, an internally-recessed sleeve mounted on the perforated portion of the spindle and provided with a hollow handle adapted to receive a pipe from a source of water-supply, and a two-part clutch for engaging with the spindle, one part being rotatable and adapted to be in engagement when the spindle is fed forward and the other part is non-rotatable and adapted to be in engagement when the spindle is being withdrawn.

32. The combination of a bearing, a drill-spindle mounted to move rotatably and longitudinally in said bearing, an operating-lever connected with said bearing and a reversing-clutch connected to said lever to clutch said drill-spindle to cause longitudinal movement thereof in one direction as the lever is reciprocated, and operating means to reverse the action of said clutch.

33. In a drill, a pivoted bearing, a support therefor, a longitudinally-movable rotary drill-spindle mounted in the bearing and manually-operated means connected with the bearing for moving the spindle longitudinally in either direction, said means being adapted to automatically engage with the spindle when moved in one direction and to be forcibly engaged with it when moved in the opposite direction.

FREDERIC WILKINSON OLCOTT.

Witnesses:
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G. R. WILTON.