C. L. LAWTON.

PERCUSSION DRILL.

APPLICATION FILED FEB. 23, 1915.

1,154,642. Patented Sept. 28, 1915.

Fig. 1.

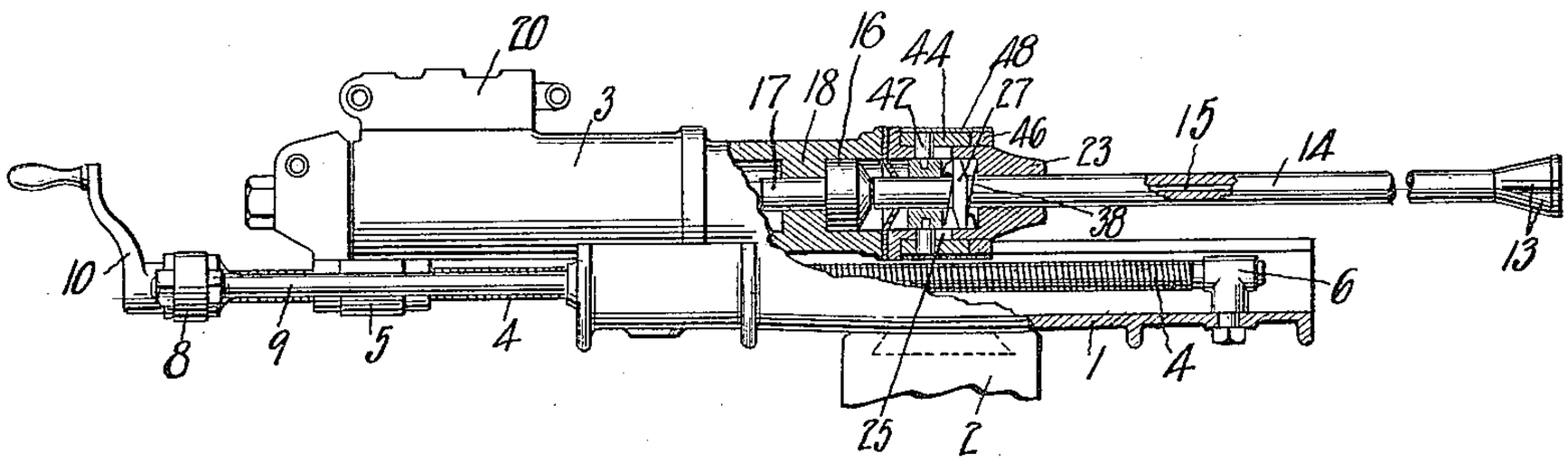


Fig. 2.

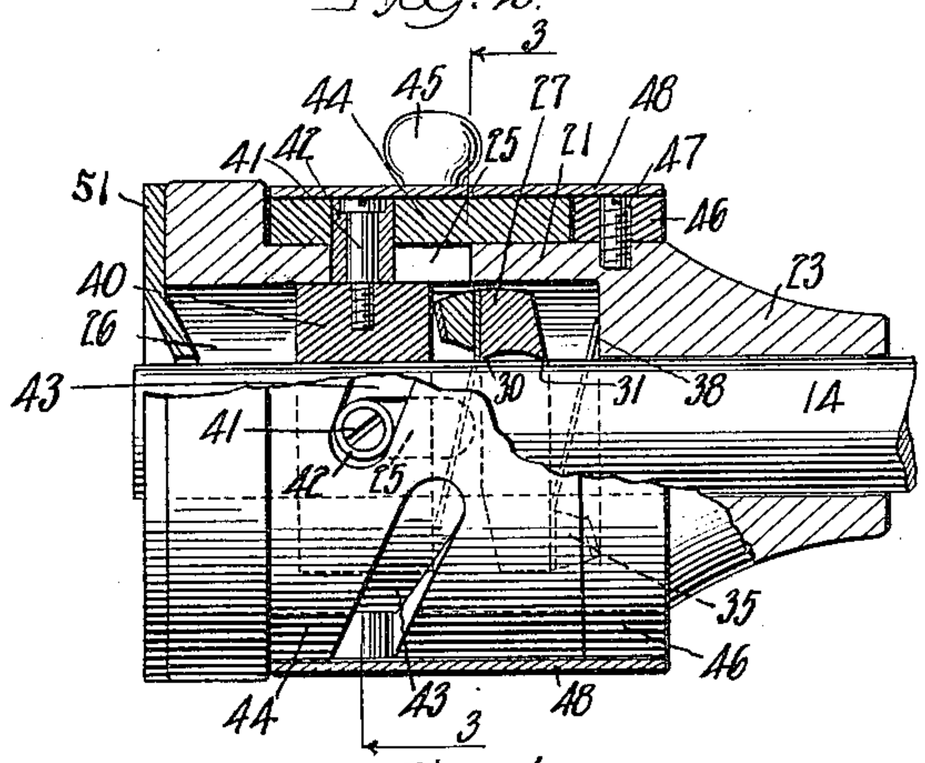


Fig. 3.

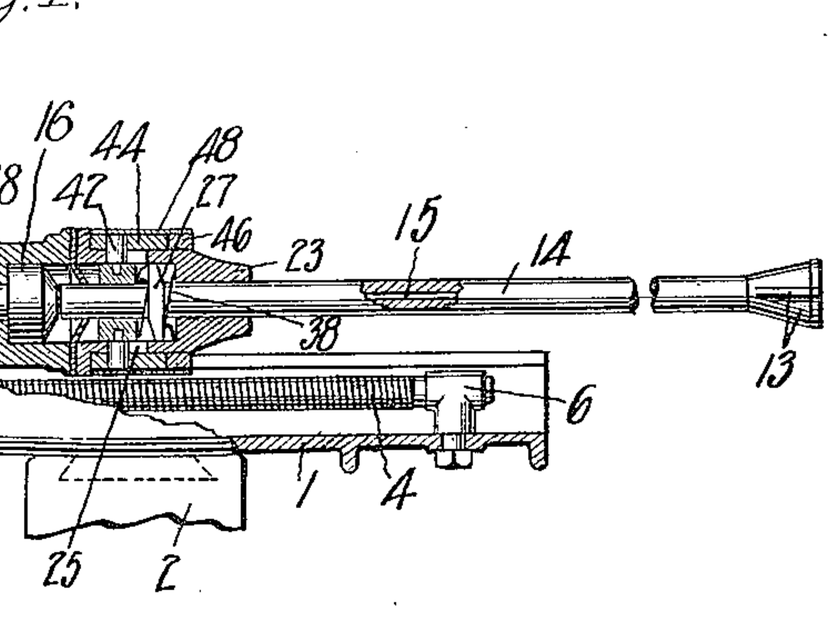


Fig. 4.

Fig. 5.

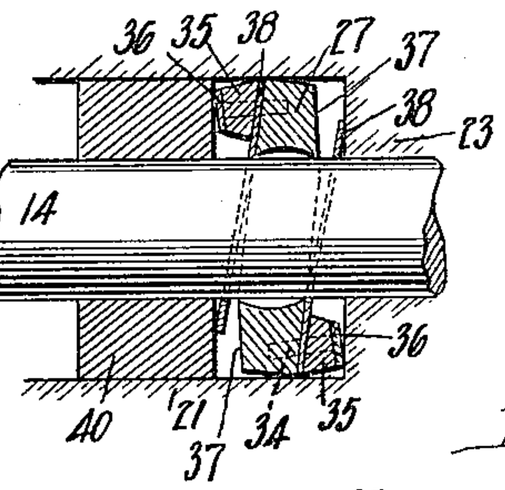
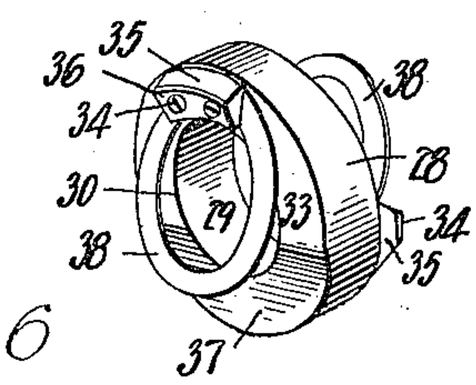
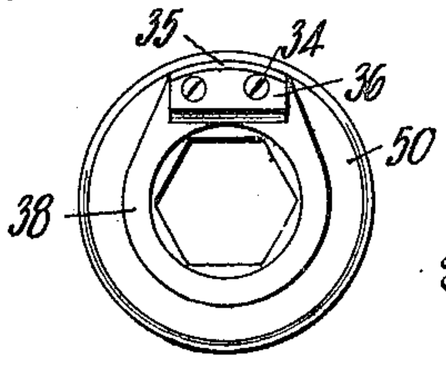


Fig 6





Witnesses

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PERCUSSION-DRILL.

1,154,642. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed February 23, 1915. Serial No. 9,839.

To all whom it may concern:

Be it known that I, CHARLES L. LAWTON, a citizen of the United States, and a resident of Hancock, in the county of Houghton and State of Michigan, have invented a new and Improved Percussion-Drill, of which the following is a specification.

In the use of percussion drills, it sometimes happens that the rock cuttings become packed back of the cutting bit; and as the drill bar is being withdrawn, the cutting bit is held firmly in this wedged material, thus causing much annoyance and delay.

One type of construction in common use comprises a drill bar or steel having a collar or lugs on the shank end and bushings or the like in the casing, whereby the distance the steel may be forced rearwardly into the casing is limited, and whereby rotative movement of the steel about its own axis is allowed. The lugs or collar, as the case may be, also hold the drill bar in the casing as the latter is being drawn back from the hole. This type of drill is, however, expensive to make and maintain, and the drill bar is subject to breakage, seemingly due to crystallization in the vicinity of the lugs.

The difficulties above outlined are completely overcome in the present invention, which consists in a very simple and compact means whereby the drill bar may be either released altogether, or when seized may nevertheless be easily rotated manually about its own axis without necessarily manipulating the clutch in any manner.

The invention also consists in a drill holding means of the nature stated in combination with an anvil whereby blows are transmitted from a hammer to the drill bar and whereby the distance the drill bar may be inserted into the casing may be limited.

The invention further consists in the details of construction shown, described and pointed out in the subjoined claims.

In the drawings, Figure 1 is a side view of one embodiment of my invention, parts being broken away to show the interior construction. Fig. 2 is a detail of the clutch mechanism on a larger scale, the gripping member being in position to release the tool. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is a diagrammatic section similar to Fig. 3 showing the gripping member in tool gripping position. Fig. 5 is a perspective view of the clutch ring. Fig. 6 is a front view of a modified form of clutch ring.

Similar reference characters refer to like parts throughout the several views.

The general construction of the drill shown in the annexed drawings, otherwise than the tool receiving and holding features, is well known, and comprises a base 1 that may be secured to or swiveled on a support 2 in any desired manner. Mounted to slide longitudinally of the base is a casing 3, preferably cylindrical, that may be moved forwardly and backwardly by means of a screw 4 received in a nut 5 on the casing, and having its forward end rotatable, but incapable of longitudinal movement in respect to a bearing 6 carried by the base. Its rear end may for convenience be supported by a cross-bar 8 on rods 9, and a crank 10 may be provided for imparting rotative movement to the screw; but it will be understood that other means for feeding the drill bar to and from the work may be used.

The tool itself comprises the usual cutting bit 13 and shank 14, the latter of which may be hollow, as indicated at 15, to allow water to be forced into the hole formed by the drill, and its rear end is alined with an anvil comprising a head 16 and shank 17, the latter of which is received in a cylindrical bore in a transverse web 18 of the casing 3. Any preferred means (not shown) may be employed for striking blows on the rear end of the anvil, the valve casing for the usual pneumatic hammer being indicated at 20.

The front end of the casing is closed by a housing which may include the tubular, preferably cylindrical body portion 21 provided with the laterally projecting perforated ears 22 through which bolts (not shown) may be passed to secure the housing in place on the casing, and the end portion 23 arranged to constitute a substantial bearing for the tool shank 14. The body portion may have a series of longitudinal slots 25 (Fig. 2), the purpose of which is indicated later.

Seated within the opening 26 in the body portion and surrounding the drill shank 14 rather closely, is a clutch ring 27, the outer surface 28 of which may be curved longitudinally, the inner surface 29 preferably being hollowed out, as shown in Figs. 2 and 4, to form rather sharp gripping edges 30 and 31. The clutch ring has secured thereto along one edge of its rear face 33, for example, by means of screws 34, a lug 35 that

may be faced at 36 with brass or other anti-friction metal. Clamped between the lug and the rear face 33 is a spring 38, preferably flat and of annular shape, that may extend entirely around the drill shank. The front face of the clutch ring is provided at a point removed 180 degrees from the lug 35 with a lug and a spring the same as previously described, and the parts have, therefore, been designated by the same reference numerals. It is desirable to taper each of the front and rear faces of the clutch ring, as indicated at 37, the purpose of which will be hereinafter pointed out.

The housing has slidable therein at a point just at the rear of the clutch ring 27 a pressure ring 40 from which a series of screw-pins 41 bearing rollers 42 may project. These rollers are received in the slots 25 in the body portion of the housing, and also in the spiral slots 43 formed in the annular collar 44 that surrounds the body portion and may be turned axially in respect thereto by the hand grip 45. The collar is, however, prevented from moving longitudinally on the body portion by a retaining ring 46 that may be secured to the housing by a screw 47; and foreign matter is excluded from the slots 25 and 43 by inclosing the collar 44 and ring 46 in a cylindrical shield 48. It will be understood that the hand grip 45 extends through this shield, and that whatever movement is imparted to the collar 44 is transmitted to the shield. The ring 51 is placed between the part 23 and the adjacent end of the casing 3 for the purpose of receiving the blows of the anvil when no drill rod is in position, and thus prevents the anvil from being driven against the ring 40.

Operation: The distance the drill bar may be inserted into the casing is limited by the anvil. When the parts are in the position shown in Fig. 4, that is, when the collar 44 is turned to bring the rollers 42 to the front ends of the spiral slots 43, the said rollers are carried forwardly in the slots 25 and the pressure ring 40 pushes the clutch ring forwardly against the force of the springs 38. The pressure ring 40 and the end portion 23 of the housing pressing on the lugs 35 then cause the clutch ring to swing into the position shown in Fig. 4 and to grip the shank 14 tightly, the tapered surfaces 37 allowing the necessary swinging movement to take place in a small space. The screw 4 now being turned in the proper direction, the drill is withdrawn from the hole. However, should the cutting edges 13 encounter an obstruction, it is only necessary to grasp the drill with the hand in order to rotate it axially, during which movement the clutch ring is carried along, the lugs and springs easily sliding over the surfaces of the pressure ring and the end portion 23. After the drill has been withdrawn, the collar 44 may be turned so as to cause the rollers to approach the rear ends of the slots. The springs 38 thereupon tilt the clutch ring back into the position shown in Fig. 2, and the drill bar may be detached from the drill. If desired, the hammer may be reciprocated somewhat as the drill bar is being withdrawn to jar the latter loose. The clutch ring 50 shown in Fig. 6 differs from that shown in Fig. 5 merely in that the opening through the ring is hexagonal rather than circular, which adapts it more readily to the hexagonal drill bars in common use.

It will be apparent that the details of the construction may be varied within wide limits without departing from the spirit of my invention, and the present embodiment is to be regarded as diagrammatic and explanatory rather than as restrictive. I do not, therefore, wish to be limited otherwise than as indicated by the subjoined claims.

I claim:—

1. A percussion drill comprising a movable support, a drill bar carried by said support and arranged to form a drilled hole, means for moving the support backward from the hole, and movable clutch means arranged in one position to allow the drill bar to be withdrawn from the support, and in another position serving to transmit force from the support to the drill bar whereby the latter may be drawn backward from the hole with the support, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby obstructions may be avoided, said clutch means having an edge extending transversely of and arranged to engage the drill bar.

2. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, and a tiltable clutch ring arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch ring, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions.

3. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a tilt-

able clutch ring arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch ring, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, and manually operable means for tilting the clutch ring in one direction.

4. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a tiltable clutch ring arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch ring, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, manually operable means for tilting the clutch ring in one direction, and resilient means for returning the clutch ring to its previous position.

5. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a tiltable clutch ring arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch ring, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, resilient means tending to hold the clutch ring in the position wherein the drill bar is free to be drawn through said clutch ring, and manually operable means for tilting the clutch ring against the force of the resilient means.

6. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a tiltable clutch ring arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch ring, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, resilient means tending to hold the clutch ring in the position wherein the drill bar is free to be drawn through said clutch ring, and a pressure ring for applying pressure to the clutch ring to tilt the latter into the position wherein it grips the drill bar.

7. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a tiltable clutch ring arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch ring, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, resilient means tending to hold the clutch ring in the position wherein the drill bar is free to be drawn through said clutch ring, a pressure ring for applying pressure to the clutch ring to tilt the latter into the position wherein it grips the drill bar, and means for manually moving the pressure ring longitudinally of the drill bar to tilt the clutch ring.

8. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a clutch housing secured to the casing, and movable clutch means in the housing arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, said clutch means having an edge extending transversely of and arranged to engage the drill bar.

9. A percussion drill comprising a mov-

able casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a hollow clutch housing secured to the casing, and a tiltable clutch ring within the housing, said clutch ring being arranged to surround the drill bar and being adapted in one position to allow the drill bar to be withdrawn from the housing and casing, and in another position serving to transmit force from the housing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions.

10. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a hollow clutch housing secured to the casing, said housing having a slot through its wall, a tiltable clutch ring within the housing, said clutch ring being arranged to surround the drill bar and being adapted in one position to allow the drill bar to be withdrawn from the housing and casing, and in another position serving to transmit force from the housing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, and means extending through the slot in the clutch housing for tilting the clutch ring.

11. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a hollow clutch housing secured to the casing, said housing having a slot through its wall, a tiltable clutch ring within the housing, said clutch ring being arranged to surround the drill bar and being adapted in one position to allow the drill bar to be withdrawn from the housing and casing, and in another position serving to transmit force from the housing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, a collar rotatable on the housing and having a slot therein, and means extending through the slot in the clutch housing and the slot in the collar for tilting the clutch ring when the collar is rotated in one direction.

12. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a hollow clutch housing secured to the casing, said housing having a slot through its wall, a tiltable clutch ring within the housing, said clutch ring being arranged to surround the drill bar and being adapted in one position to allow the drill bar to be withdrawn from the housing and casing, and in another position serving to transmit force from the housing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, a collar rotatable on the housing and having a slot therein, a pin projecting through the slot in the clutch housing and the slot in the collar, and a roller thereon, one of the slots being cam-shaped, whereby the clutch ring is tilted when the collar is rotated in one direction.

13. A percussion drill comprising a movable casing, a support for the casing, a drill bar carried by said casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, a hollow clutch housing secured to the casing, said housing having a slot through its wall, a tiltable clutch ring within the housing, said clutch ring being arranged to surround the drill bar and being adapted in one position to allow the drill bar to be withdrawn from the housing and casing, and in another position serving to transmit force from the housing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, a collar rotatable on the housing and having a slot therein, a pin projecting through the slot in the clutch housing and the slot in the collar, and a roller thereon, one of the slots being cam-shaped, whereby the clutch ring is tilted when the collar is rotated in one direction, and a shield inclosing the collar and excluding foreign matter from the slots.

14. A percussion drill comprising a mov-

able casing, a support for the casing, a drill bar inserted in said casing, means for limiting the distance the drill bar may be inserted in the casing, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, and movable clutch means arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, said clutch means having and edge extending transversely of and arranged to engage the drill bar.

15. A percussion drill comprising a movable casing, a support for the casing, a drill bar inserted in said casing, an anvil carried by said casing and arranged to receive blows and transmit them to the drill bar, means for limiting the movement of the anvil whereby the drill bar is prevented from being inserted into the casing beyond a predetermined amount, said drill bar including a shank and a cutting bit, the latter being arranged to cut a hole of greater diameter than the shank, means for moving the casing backward from the hole, and movable clutch means arranged in one position to allow the drill bar to be withdrawn from the casing, and in another position serving to transmit force from the casing to the drill bar whereby the latter may be drawn backward from the hole with the casing, said clutch means, when in the last mentioned position, allowing the drill bar to be turned about its own axis at will as it is being withdrawn, whereby the cutting bit may be made to avoid obstructions, said clutch means having an edge extending transversely of and arranged to engage the drill bar.

16. Clutch mechanism for percussion drills comprising in combination with the drill bar, a housing for the rear end thereof, a tilting clutch member carried by the housing, said clutch member having an edge extending circumferentially in respect to the drill bar, and being arranged, when the clutch member is in one position, to allow the drill bar to be turned about its own axis while preventing it from being withdrawn from the housing, said edge, when in another position, allowing the drill bar to be withdrawn from the casing, and means for tilting the clutch member.

17. Clutch mechanism for percussion drills comprising in combination with the drill bar, a housing for the rear end thereof, a movable clutch member carried by the housing, said clutch member having an edge extending circumferentially in respect to the drill bar, and being arranged, when the clutch member is in one position, to allow the drill bar to be turned about its own axis while preventing it from being withdrawn from the housing, said edge, when in another position, allowing the drill bar to be withdrawn from the casing, and means for moving the clutch member.

18. Clutch mechanism for percussion drills comprising in combination with the drill bar, a housing for the rear end thereof, a tilting clutch member carried by the housing, said clutch member having an edge extending circumferentially in respect to the drill bar, and being arranged, when the clutch member is in one position, to allow the drill bar to be turned about its own axis while preventing it from being withdrawn from the housing, said edge, when in another position, allowing the drill bar to be withdrawn from the casing, means for tilting the clutch member from the last named position to the first named position, and resilient means tending to return the clutch member to the position in which the drill bar may be withdrawn therefrom.

19. Clutch mechanism for percussion drills comprising in combination with the drill bar, a housing for the rear end thereof, a movable clutch member carried by the housing, said clutch member having an edge extending circumferentially in respect to the drill bar, and being arranged, when the clutch member is in one position, to allow the drill bar to be turned about its own axis while preventing it from being withdrawn from the housing, said edge, when in another position, allowing the drill bar to be withdrawn from the casing, means for moving the clutch member from the last named position to the first named position, and resilient means tending to return the clutch member to the position in which the drill bar may be withdrawn therefrom.

20. Clutch mechanism for percussion drills comprising in combination with a drill bar, a housing for the rear end thereof, a movable clutch member carried by the housing, said clutch member having two spaced edges extending transversely of the axis of the drill bar, and being arranged when in one position to bind against the drill bar and prevent withdrawal of the latter from the housing while at the same time allowing rotative movement of the drill bar in the housing, said clutch member, when in another position, allowing the drill bar to be withdrawn from the casing, and means for moving the clutch member from one position to the other.

21. Clutch mechanism for percussion drills

comprising in combination with a drill bar, a housing for the rear end thereof, a tilting clutch member carried by the housing, said clutch member having two spaced edges extending transversely of the axis of the drill bar, and being arranged when in one position to bind against the drill bar and prevent withdrawal of the latter from the housing while at the same time allowing rotative movement of the drill bar in the housing, said clutch member, when in another position, allowing the drill bar to be withdrawn from the casing, and means for tilting the clutch member from one position to the other.

22. Clutch mechanism for percussion drills comprising in combination with a drill bar, a housing for the rear end thereof, a movable clutch member carried by the housing, said clutch member having two spaced edges extending transversely of the axis of the drill bar, and being arranged when in one position to bind against the drill bar and prevent withdrawal of the latter from the housing while at the same time allowing rotative movement of the drill bar in the housing, said clutch member, when in another position, allowing the drill bar to be withdrawn from the casing, resilient means tending to hold the clutch member in the last named position, and means for moving the clutch member to the position first named.

23. Clutch mechanism for percussion drills comprising in combinaton with a drill bar, a housing for the rear end thereof, a movable clutch member carried by the housing, said clutch member having two spaced edges extending transversely of the axis of the drill bar, and being arranged when in one position to bind against the drill bar and prevent withdrawal of the latter from the housing while at the same time allowing rotative movement of the drill bar in the housing, said clutch member, when in another position, allowing the drill bar to be withdrawn from the casing, resilient means tending to hold the clutch member in the last named position, and cam means for moving the clutch member to the position first named.

24. Clutch mechanism for percussion drills comprising in combination with a drill bar, a housing for the rear end thereof, a tilting clutch member carried by the housing, said clutch member having two spaced edges extending transversely of the axis of the drill bar, and being arranged when in one position to bind against the drill bar and prevent withdrawal of the latter from the housing while at the same time allowing rotative movement of the drill bar in the housing, said clutch member, when in another position, allowing the drill bar to be withdrawn from the casing, and cam means for tilting the clutch member from one position to the other.

25. Clutch mechanism for percussion drills comprising in combination with the drill bar, a housing for the rear portion of the drill bar, said housing having a slot through its wall, a tiltable clutch ring within the housing, said clutch ring being arranged to extend around the drill bar and having a pair of spaced edges on its inner surface, and means extending through the slot for tilting the ring to cause the edges to grip the bar, said clutch ring being arranged, when in one position, to bind against the drill bar and prevent withdrawal of the latter from the housing while at the same time allowing rotative movement of the drill bar in the housing, and, when in another position, allowing the drill bar to be withdrawn from the housing.

In testimony whereof I sign this specification in the presence of two subscribing witnesses.

CHARLES L. LAWTON.

Witnesses:
RUSSEL CONGDON,
RICHARD T. MÜHLHAUSER.