May 20, 1952 E. H. DICKENSON 2,597,574

PERCUSSION TOOL

Filed Dec. 1, 1948

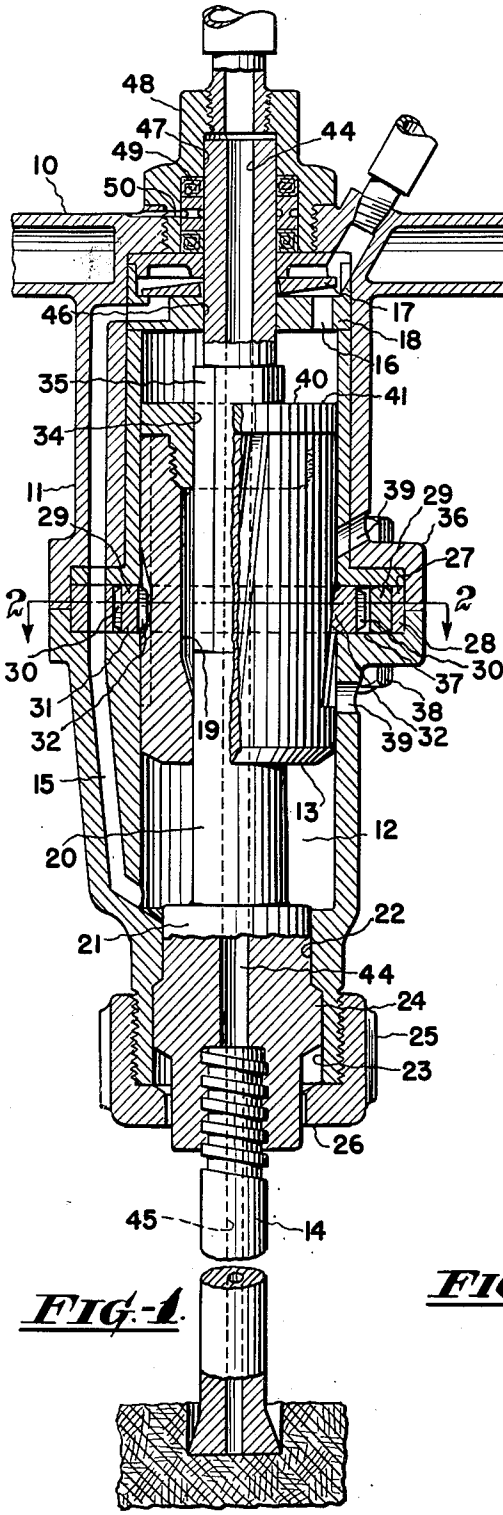


FIG.-1.

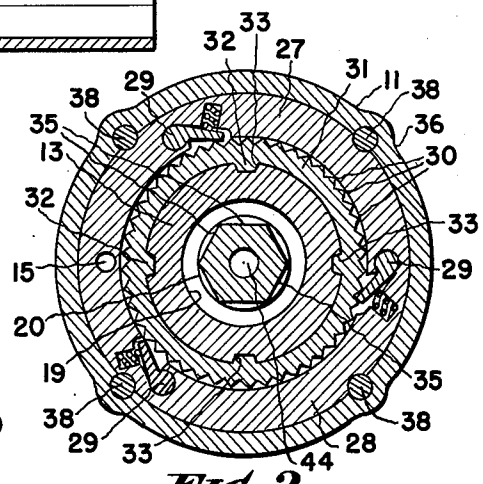


FIG.-2.

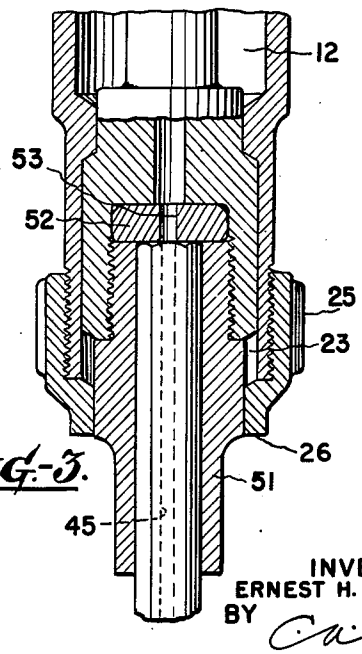


FIG.-3.

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Patented May 20, 1952

2,597,574

UNITED STATES PATENT OFFICE

2,597,574

PERCUSSION TOOL

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Application December 1, 1948, Serial No. 62,859

4 Claims. (Cl. 121—7)

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This invention relates to percussion tools and more particularly to percussion tools of the pneumatic rock drill type.

One object of my invention is to provide a mechanism whereby rotary movement may be imparted to the working implement of a rock drill in which an element extends through the drill for transmitting the blow energy of the piston to the working implement.

Another object of my invention is to minimize the wear on the end of the working implement exposed to the blows of the element extending through the rock drill.

Other objects will become obvious hereinafter.

In the accompanying drawing showing a preferred embodiment of the invention and in which similar reference characters refer to similar parts:

Figure 1 is a vertical elevation, partly in section, of a rock drill constructed in accordance with the practice of the invention,

Figure 2 is a transverse view taken through Figure 1 along the line 2—2 looking in the direction of the arrows, and

Figure 3 is a sectional elevation of an alternate form of front head construction for the drill shown in Figure 1.

Referring to the drawings, 10 designates, in general, a pneumatic rock drill comprising a casing 11 having a chamber 12 in which reciprocates the hammer piston 13 for actuating a working implement 14. Motive fluid, such as compressed air, for actuating the piston 13 is conducted alternately to the forward and rearward ends of the chamber 12 through passages 15 and 16, respectively, controlled by a valve, such as the oscillating valve 17, in the valve chest 18 that forms a closure for the rearward end of the chamber 12.

The piston 13 is provided with a central bore 19 for the reception of an anvil rod 20 extending through the drill and serving as a means for transmitting the rotary movement and the blow energy of the piston 13 to the working implement 14. In furtherance to this end, the rod 20 is provided with an impact shoulder 21 slidably mounted in an opening 22 in the front head of the drill 10 and extending into the chamber 12 to receive the blows of the piston 13. The front end portion of the opening 22 is somewhat enlarged for the reception of an external flange 24 on the rod 20 that cooperates with the shoulder forming the rearward end of the enlarged portion 23 to limit rearward movement of the rod 20. Forward movement of the anvil rod 20 is limited by a cap 25 threaded on the front end of the

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rock drill and having a rim portion 26 lying in the path of the flange 24.

In accordance with the practice of the invention, rotary motion is imparted to the working implement 14 through the rod 20 rotated by the piston 13 which, in turn, is rotated by ratchet mechanism mounted intermediate the ends of the casing 11 and encircling the piston 13.

The ratchet mechanism 27 comprises an annular member 28 in which are mounted spring pressed dogs 29 that extend inwardly to engage external teeth 30 on a ring 31 positioned coaxial with and within the member 28 and having internal splines 32 that ride in spiral flutes 33 in the periphery of the piston 13. The flutes 33 terminate at one end in the rearward end surface of the piston 13 in order to permit the piston to be mounted in the preferred unitary or solid type ring 31—that is, with this flute arrangement, the inwardly extended splines 32 may be inserted in the open ends of the flutes 33 and the ring 31 slid along the piston 13 to its operative position.

With this arrangement, the ratchet 27 will engage and rotate the piston 13 during longitudinal movement thereof in one direction, as shown, on its back stroke, and permit it to run free during longitudinal movement in the opposite or forwardly direction. Thus, by providing means for transmitting rotary motion from the piston to the anvil rod 20, such as the flatted surfaces 34 formed in a cap member 40 threaded in bore 19 that cooperate with similar flatted surfaces 35 on the rod 20, the working implement will be rotated during the backward stroke of the piston and will travel free on the forward stroke thereof.

In order to facilitate mounting the ratchet mechanism 27 in the casing 11, the intermediate portion 36 of the casing is somewhat enlarged to form a ratchet chamber 37 for the mechanism 27; and the casing 11 is split at this juncture and held together by bolts 38. Thus, to assemble the drill, it is merely necessary to insert the piston in the ratchet or rotating mechanism 27, as previously described, then place the mechanism 27 in the chamber 37 and bolt the casing together.

In the form of the invention shown, pressure fluid is exhausted from the chamber 12 through exhaust ports 39 positioned in the casing on the opposite sides of the enlarged portion 36 and, so positioned, the ports 39 communicate with the flutes 33 during at least a portion of every piston cycle. In order to prevent leakage of pressure fluid along the piston 11 through the flutes 33 and thence to the atmosphere, the capping member 40 is disposed at the rearward end of

the piston 13 and is provided with a flange 41 of slightly greater diameter than the piston, so that it overlies the open ends of the flutes 33 to seal against leakage of pressure fluid along the piston. The capping member 40, so positioned and so constructed, also serves to guide the piston and to minimize the wear of the piston due to rubbing against the material bounding the chamber 12.

In the embodiment of the invention shown, the rod 20 also serves to define a channel through the drill for the passage of cleansing fluid through the drill hole and to this end, is provided with a central passage or bore 44 which registers with a similar passage 45 in the working implement 14 threaded in the forward end of the rod. The rearward end portion of the rod 20 extends slidably through a hole 46 in the valve chest 18 and thence into a bore 47 in a plug 48 mounted on the back head of the drill.

Thus, by providing means, such as the seal 49 and the associated atmospheric duct 50 in the cap 48, to prevent the leakage of air or other motive fluid from the valve chest 18 into the passage 44, a cleansing fluid may be passed through the drill 10 in either direction to remove cuttings from the drill hole. That is, by passing a cleansing fluid, such as water, through the drill and into the drill hole, the cuttings are washed from the hole; or if dry or dustless drilling is desirable, a negative pressure source, such as a vacuum pump (not shown), is communicated with the passage 44 to draw the cuttings from the drill hole through the rock drill.

Such an arrangement provides a highly important advantage due to the various conditions under which the drill may be required to operate. For example, under one condition, such as stopping, or overhead drilling, dry drilling would be advantageous whereas under another condition wet drilling may be preferable. In the present invention, shifting from one mode of drilling to the other merely necessitates changing the pressure source for the cleansing fluid.

In the alternate front head construction (shown in Figure 3), a sleeve or chuck 51 is threaded on the forward end of the anvil rod 20 and a removable impact washer 52 provided with a central perforation or opening 53 that registers with the passages 44 and 45 in the anvil rod and working implement respectively, is interposed between the opposed ends of the chuck 51 and the anvil rod 20. The washer 52, so positioned, serves to transmit longitudinal movement imparted to the anvil rod 20 by the piston 13 to the working implement 14. Thus, a relatively inexpensive and readily replaceable impact washer eliminates direct contact between the end portions of the working implement and anvil rod and minimizes the wear of said ends.

It is obvious from the previous discussion that a rock drill constructed in accordance with the practice of this invention is provided with a new and simple arrangement for rotating the working implement of a rock drill, and it is also clear that such an arrangement precludes any possibility of intermixing of the cleansing and motive fluid by providing a seal at the rearward end of the rock drill.

While I have shown and described specific forms of my invention, it is to be understood

that various changes and modifications may be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. In a rock drill, the combination of a reciprocable working implement and a motor having a reciprocatory hammer piston for actuating the working implement, means extending through the hammer piston for transmitting the blows of the hammer piston to the working implement, means for securing the first mentioned means to the working implement, a mechanism for rotating said piston, and means on the hammer piston and on the first mentioned means slidably interlocked with each other for transmitting the rotary movement of the piston to the first said means.

2. A percussion tool including a casing having a chamber therein, a reciprocative piston in said chamber, a working implement, means extending through said piston for transmitting the blow energy of the piston to the working implement, a mechanism for rotating the piston, and means on the piston and on the first said means slidably interlocked with each other for transmitting the rotary movement of the piston to the first said means.

3. A rock drill, comprising a casing having a compression chamber therein, a reciprocative piston in said chamber having a central passage therethrough and longitudinally disposed peripheral grooves, a working implement actuated by the piston, an anvil rod extending slidably through said passage and in interlocking engagement with the piston, an impact shoulder on said rod for the reception of the blows of the piston, means at an end of said anvil rod for securing the working implement thereto, and a ratchet mechanism encircling said piston and having splines in sliding engagement with said grooves, said mechanism being arranged to impart rotary motion to the piston during longitudinal movement of the piston in one direction and to permit the piston to run free during longitudinal movement in the opposite direction.

4. A pneumatic rock drill comprising, a casing having a chamber therein, a reciprocative hammer piston in said chamber having a passage therethrough, a member extending through said passage in slidable interlocking engagement with the piston, grooves in the periphery of the piston opening into an end surface of the piston, a ratchet mounted on said casing slidably interlocked with said grooves, and a cap overlying such end surface of the piston and the end of the grooves for preventing the leakage of pressure fluid along said grooves.

ERNEST H. DICKENSON.

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