L. W. GREVE.

ROCK DRILL.

APPLICATION FILED AUG. 12, 1913.

1,100,071.

Patented June 16, 1914.

2 SHEETS—SHEET 1.

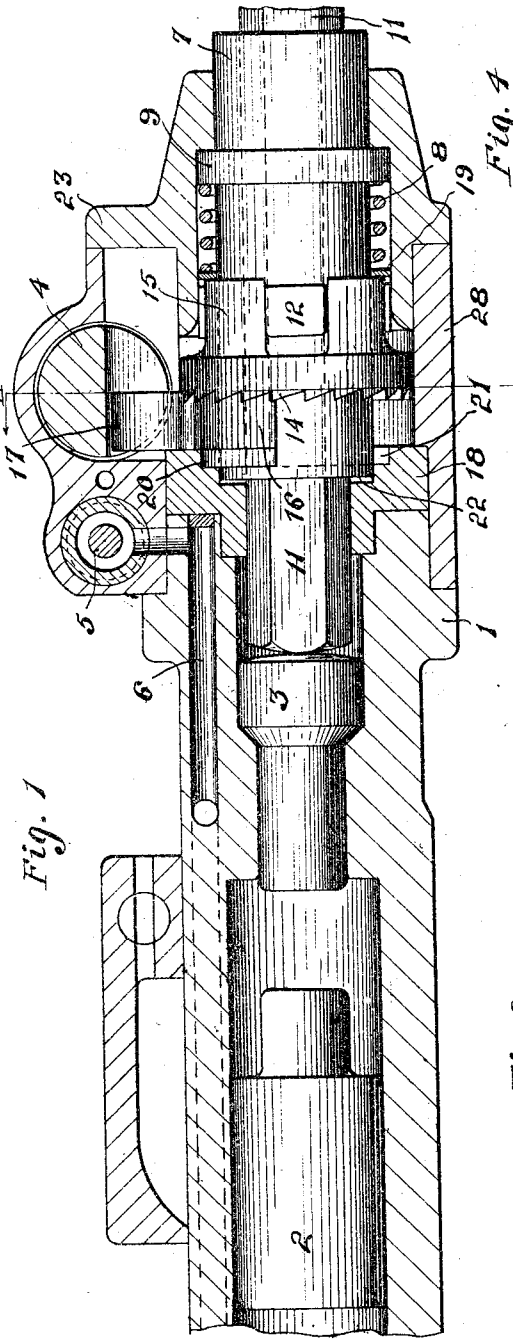


Fig. 1

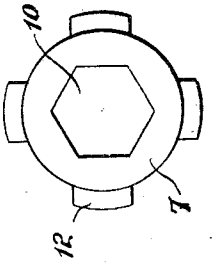


Fig. 4

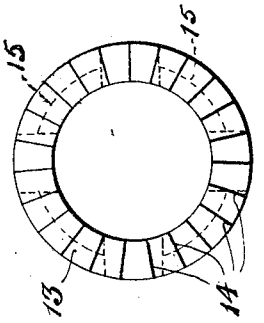


Fig. 3

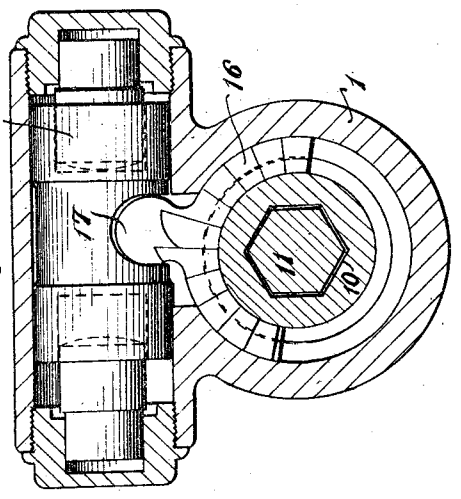


Fig. 2

WITNESSES

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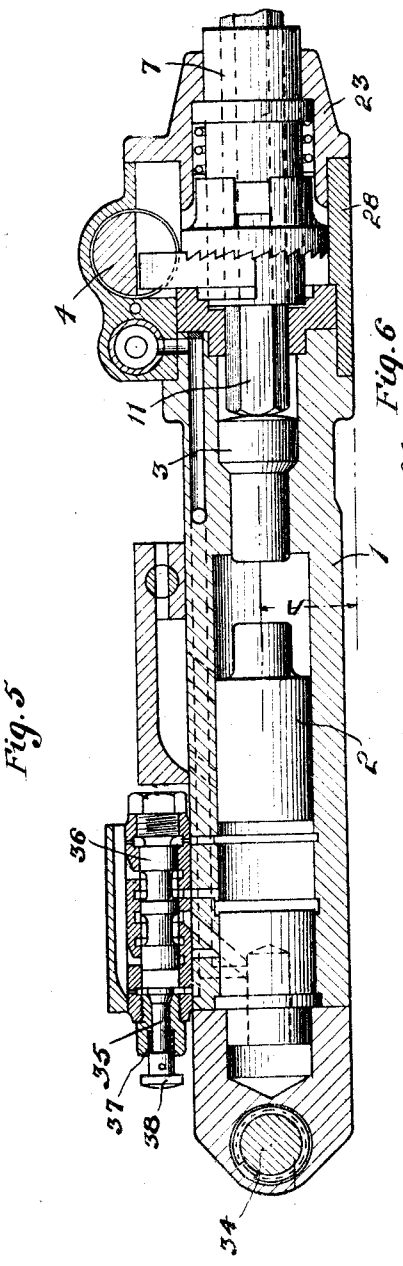


Fig. 5

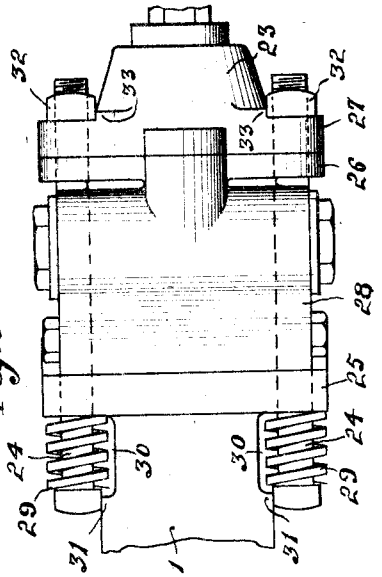


Fig. 6

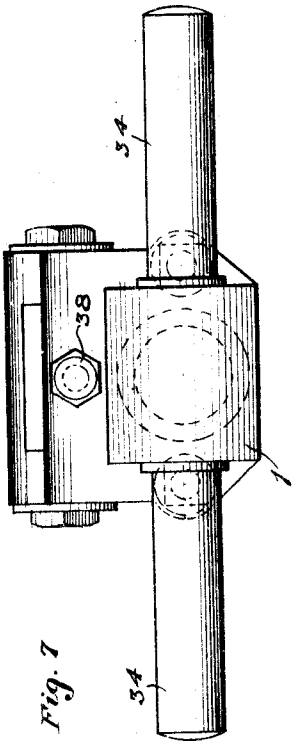


Fig. 7

WITNESSES

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UNITED STATES PATENT OFFICE.

LOUIS W. GREVE, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CLEVELAND ROCK DRILL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

ROCK-DRILL.

1,100,071. Specification of Letters Patent. Patented June 16, 1914.

Application filed August 12, 1913. Serial No. 784,359.

To all whom it may concern:

Be it known that I, LOUIS W. GREVE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification.

The invention relates to rock drills, and particularly to the means for securing a step-by-step rotation of the chuck and drill steel. It has for its primary objects: the provision of improved and simplified means for accomplishing the purpose above specified; the provision of a construction in which the step-by-step movement is secured in a positive manner by means of great durability, and having a minimum number of parts easily assembled and not liable to get out of order; the provision of improved means for securing the stoppage of the hammer piston; the provision of an arrangement whereby the drill can be operated close to a side wall when desired; and the provision of improved means for securing a yielding support of the front end member of the drill casing and preventing the accidental unscrewing of the longitudinally-extending securing bolts or their nuts. One embodiment of the invention is illustrated in the accompanying drawing wherein:

Figure 1 is a longitudinal section through the forward portion of the drill; Fig. 2 is a transverse section on the line II—II of Fig. 1; Fig. 3 is a face view of the ratchet wheel which encircles the chuck; Fig. 4 is an end view of the chuck; Fig. 5 is a longitudinal section through the entire drilling apparatus; Fig. 6 is a plan view of the front end of the drill of Fig. 5; and Fig. 7 is a rear end view of the drill of Fig. 5.

Referring to the drawings, 1 is the body portion or casing of the drill; 2 is the hammer piston; 3 is the anvil; 4 is a transversely moving piston for supplying the power for the step-by-step rotation of the drill steel to be later described; and 5 is the valve for controlling the reciprocatory movement of the piston 4. The foregoing parts may be constructed in a variety of ways, such parts all being old in the art, and constituting no part of the present invention. The reciprocation of the piston 4 controlled by the valve 5 is secured by the admission of fluid pressure through the passage 6 leading to the rear portion of the device under the control of the operator.

Mounted in the front portion of the drill casing is the chuck 7 yieldingly held in its forward position by means of the coil spring 8 bearing against the collar 9 integral with the chuck. By reference to Fig. 4 it will be seen that the chuck is provided with a longitudinal passage 10 angular in cross section, to slidably receive the drill steel 11, and provided with the laterally projecting lugs 12.

Mounted slidably upon the exterior of the chuck is the annular ratchet wheel 13, such ratchet wheel being provided upon its face with teeth 14, and having projecting from the opposite side, the lugs 15 which lie between the lugs 12 on the chuck, so that when the ratchet wheel is rotated the chuck is caused to rotate.

Also mounted upon the chuck, to the rear of the ratchet wheel 13, is the pawl 16. This pawl is concave upon its lower side, so as to fit the upper surface of the chuck, and has projecting from its upper side a lug 17 (Fig. 2). This lug fits into a recess on the under side of the piston 4, so that when the piston is reciprocated the pawl is oscillated. The pawl is held against movement to the left by means of the collar 18, and its teeth are caused to be yieldingly engaged by the teeth of the ratchet wheel 13, by reason of the spring 8 which presses at its rear end against the washer 19 bearing against the ends of the lugs 15. The pawl 16 is also provided with a shoulder 20 (Fig. 1) which fits into the annular recess 21 in the face of the collar 18, and holds the pawl against upward movement. The front face of the collar 18 is also provided with a bearing recess 22 for rotatably supporting the extreme rear end of the chuck 7.

When air is admitted to the passage 6 and the piston 4 is given a reciprocatory movement, the parts heretofore described as cooperating give the chuck and drill steel slidably carried therein a rotary step-by-step movement in the following manner. The engagement between the pawl 16 and the piston 4 secures an oscillatory movement of the pawl. Its teeth engage the teeth of the ratchet wheel 13 and cause the ratchet wheel to rotate a slight distance, thus turning the chuck 7 and the

drill steel carried thereby by reason of the interengaging lugs 15 and 12. On the movement of the pawl in the reverse direction its teeth ride over the teeth of the ratchet wheel, the spring 8 permitting the movement of the ratchet wheel to the right necessitated by this camming action. The spring then causes the teeth to snap back into engagement in readiness for another forward movement.

It will be seen that the apparatus is compact and simple, and also that it may be easily assembled and disassembled upon the removal of the end casing member 23 (Fig. 1), such end casing member being held in position by the longitudinally-extending bolts hereinafter described. The use of the plurality of interengaging teeth upon the pawl and ratchet insures positive action and give the parts a relatively long period of life before replacement is necessary. The single spring 8 performs the dual function of maintaining the chuck yieldingly in its forward position, and of securing engagement between the ratchet wheel and pawl, and the number of parts throughout is reduced to a minimum. The spring 8 is advantageously arranged, since both the collar 9 and the washer 19 move with the chuck and spring, and there is no wear such as would occur if the spring bore at one end against a non-rotating part.

In order to support the end casing member 23 yieldingly, the bolts 24 shown in Fig. 6 are employed. These bolts extend through the flanges 25, 26 and 27, carried by the members 1, 28 and 23 respectively (Figs. 1 and 6). Interposed between the flange 25 and the heads of the bolts are the compression springs 29, a recess 30 being provided in the casing 1 for such springs. The heads of the bolts come opposite abutments 31 while the nuts 32 come opposite the abutments 33 so that when the bolts are held by the springs in the position illustrated in Fig. 6, neither the bolts nor the ends can turn. The arrangement, including the springs therefore provides a means whereby the accidental disengagement of the bolts and nuts is prevented and also whereby the end casing member 23 is yieldingly supported against longitudinal movement. This latter function is more or less important in protecting the parts against injury due to the impact of the hammer piston in case the drill steel is too far forward to take the impact of the piston.

In order to disengage the bolts and their nuts 32, the casing 1 may be supported in a vise and the heads of the bolts forced to the right by any desired means, which movement carries the nuts 32 forward to such a point that they clear the abutments 33 and may therefore be unscrewed. The clearance spaces 30 would also permit of the rotation of the heads of the bolts if the nuts 32 were held in their forward position by wedging means interposed between the nuts and the flange 27. The bolts might also be obviously reversed in position if desired, although the arrangement shown is the preferred one.

By reference to Figs. 5 and 7 it will be noted that the handle 34 extending through the rear end of the casing 1 lies in parallelism with the piston 4 for rotating the steel. This is of advantage inasmuch as it permits the casing to be placed close to a side wall which would not be the case if the handle 34 were at right angles to the axis of the piston 4, which is the common arrangement. By this arrangement the center line of the drill steel can be gotten within the distance A (Fig. 5) from a side wall, floor or ceiling adjacent which it is desired to work.

In order to stop the hammer piston 2 in one extreme of movement (preferably its rear extreme) the stem 35 is provided (Fig. 5) for controlling the movement of the valve 36. The valve 36 controls the admission of fluid to the cylinder in which the hammer piston 2 works, admitting fluid to one end of such cylinder when the valve 36 is in one extreme of movement, and to the other end of the cylinder when the valve is in its other extreme of movement. The stem 35 is held yieldingly in the retracted position shown, by means of the spring 37, but may be pressed forward by the thumb-piece 38, and when in forward position, engages the end of the valve 36 and holds it against movement to the left. This of course arrests the movement of the hammer piston 2. Any desired arrangement of ports may be employed for controlling the piston from the valve 36, the particular arrangement shown not constituting any part of my invention.

What I claim is:

1. In combination in a rock drill, a hammer piston, a rotatable chuck, a drill steel extending through the chuck in slidable but non-rotatable engagement therewith, a piston working transversely of the chuck, a pawl provided with a plurality of ratchet teeth and mounted for oscillatory movement above the chuck and having engagement with the last mentioned piston, a ratchet wheel encircling the chuck in slidable but non-rotatable engagement therewith, and a spring pressing the ratchet wheel longitudinally of the chuck so that its teeth engage the teeth of the pawl.

2. In combination in a rock drill, a hammer piston, a rotatable chuck, a drill steel extending through the chuck in slidable but non-rotatable engagement therewith, a piston working transversely of the chuck, a pawl having its front face provided with a plurality of ratchet teeth and having its lower face concaved to fit the top of the

chuck for oscillation thereon and having engagement with the last mentioned piston, a ratchet wheel encircling the chuck in slidable but non-rotatable engagement therewith, and a spring pressing the ratchet wheel longitudinally of the chuck so that its teeth engage the teeth of the pawl.

3. In combination in a rock drill, a hammer piston, a rotatable chuck, a drill steel extending through the chuck in slidable but non-rotatable engagement therewith, a piston working transversely of the chuck, a pawl provided with a plurality of ratchet teeth and mounted for oscillatory movement upon the chuck and having engagement with the last mentioned piston, a ratchet wheel encircling the chuck in slidable but non-rotatable engagement therewith, and a spring yieldingly pressing the chuck in one direction and the ratchet wheel in the reverse direction so that the teeth thereof engage the teeth of the pawl.

4. In combination in a rock drill, a hammer piston, a rotatable chuck, a drill steel extending through the chuck in slidable but non-rotatable engagement therewith, a piston working transversely of the chuck, a pawl provided with a plurality of ratchet teeth and mounted for oscillatory movement upon the chuck and having engagement with the last mentioned piston, a ratchet wheel encircling the chuck in slidable but non-rotatable engagement therewith, a spring pressing the ratchet wheel longitudinally of the chuck so that its teeth engage the teeth of the pawl, and guide means for the pawl holding it against movement away from the chuck and to the rear.

5. In combination in a rock drill, a hammer piston, a rotatable chuck, a drill steel extending through the chuck in slidable but non-rotatable engagement therewith, a piston working transversely of the chuck, a pawl provided with a plurality of ratchet teeth and mounted for oscillatory movement upon the chuck and having engagement with the last mentioned piston; a ratchet wheel encircling the chuck and slidable longitudinally thereof, interengaging projections on the chuck and ratchet wheel whereby relative rotation is prevented, and a spring for holding the pawl and ratchet wheel in yielding engagement.

6. The combination with a fluid-operated device having a casing, hammer piston, and end casing member, of means for securing the end casing member yieldingly in position comprising a longitudinally-extending bolt extending through portions of the end casing member and the casing and provided with a head and a nut, a spring for holding the bolt against longitudinal movement with respect to the casing, and abutments engaging the sides of the head and nut of the bolt when in its normal position as held by its spring and preventing its rotation, a clearance space being provided in advance of the abutment engaging the nut to permit its rotation when the bolt is forced forward and the spring compressed.

7. The combination with a fluid-operated device having a casing, hammer piston, and end casing member, of means for securing the end casing member yieldingly in position comprising a longitudinally-extending bolt extending through portions of the end casing member and the casing and provided with a head and a nut, a spring for holding the bolt against longitudinal movement with respect to the casing, and abutments engaging the sides of the head nut of the bolt when in its normal position as held by its spring and preventing its rotation, a clearance space being provided in advance of the abutment engaging the head of the bolt to permit the rotation of the bolt when it is forced forward and the spring compressed.

8. The combination with a fluid-operated device having a casing, hammer piston, and end casing member, of means for securing the end casing member yieldingly in position comprising a longitudinally-extending bolt extending through portions of the end casing member and the casing and provided with a head and a nut, a spring for holding the bolt against longitudinal movement with respect to the casing, and an abutment engaging the side of the bolt head and preventing rotation thereof when the bolt is held in its normal position by the spring, a clearance space being provided in advance of the abutment to permit the rotation of the bolt when it is forced forward compressing the spring.

9. In combination in a rock drill, a casing, a hammer piston, a rotatable chuck provided with a collar engaging the casing and held thereby against forward movement, a drill steel extending through the chuck in slidable but non-rotatable engagement therewith, a toothed pawl mounted for oscillation upon the chuck, a ratchet wheel mounted upon the chuck slidably but non-rotatably with respect thereto, and a spring between the said collar on the chuck and the said ratchet for holding it yieldingly in engagement with the said pawl.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

LOUIS W. GREVE.

Witnesses:
GEO. H. HALL,
J. DE MOOY.