No. 887,801. PATENTED MAY 19, 1908.

H. HELLMAN & L. C. BAYLES.

ROCK DRILLING MACHINE.

APPLICATION FILED JAN. 8, 1907.

2 SHEETS—SHEET 1.

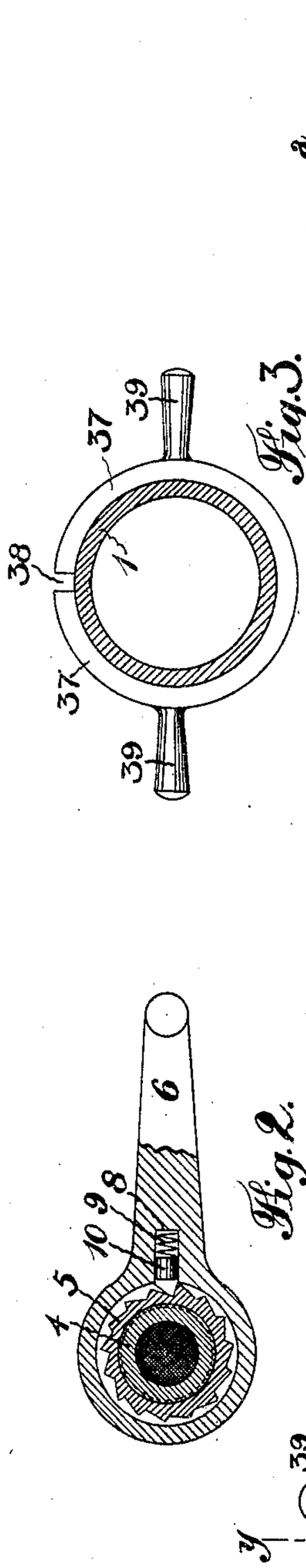
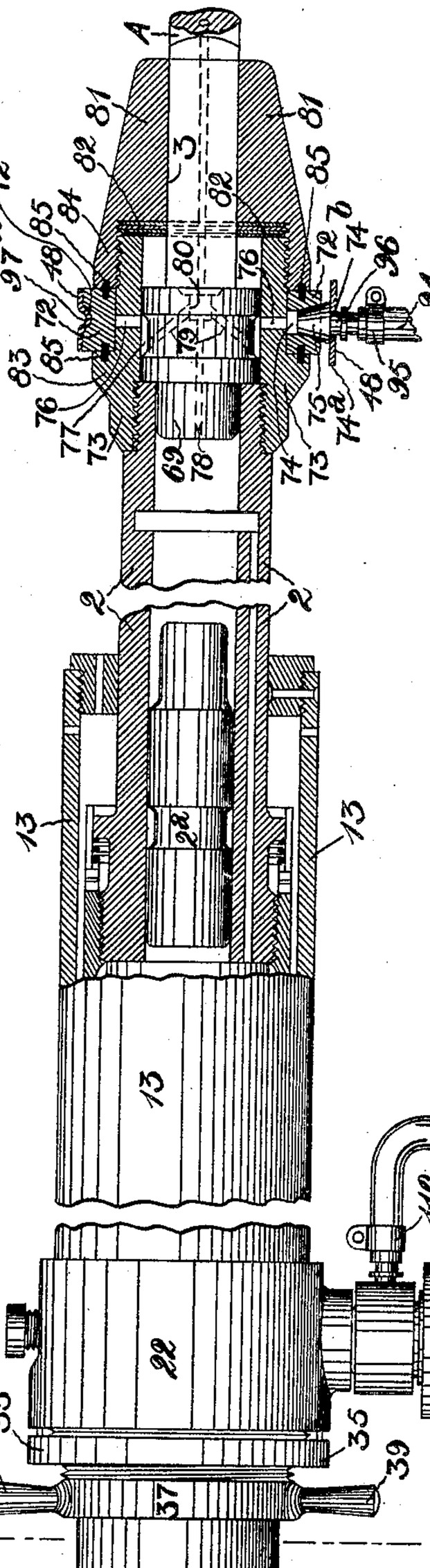


Fig. 3.



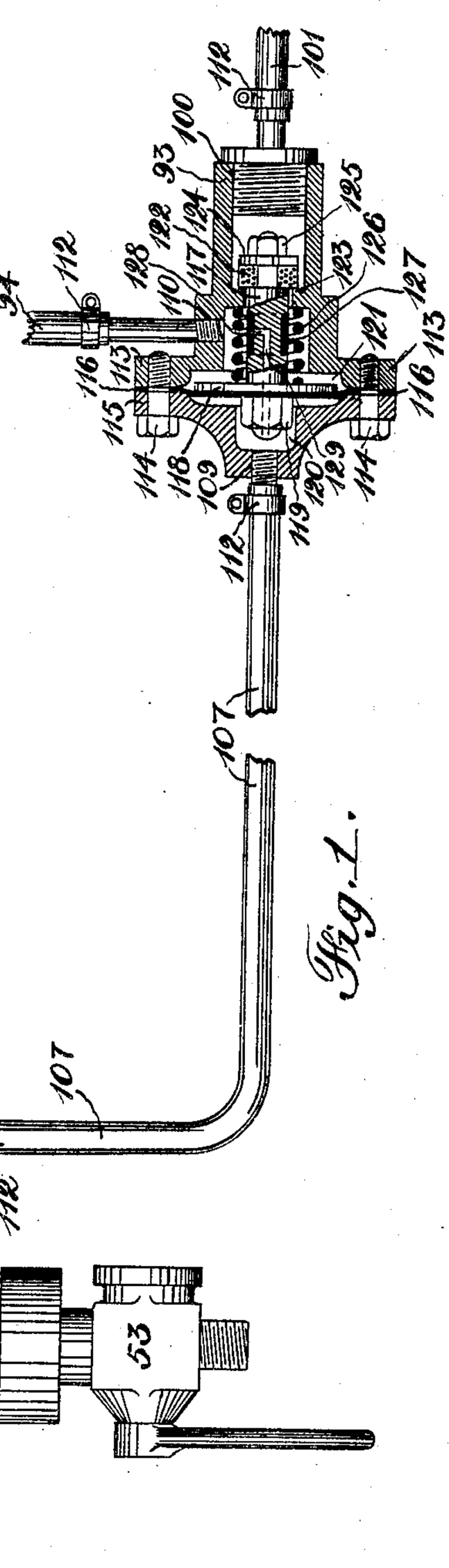


Fig. 1.

Fig. 2.

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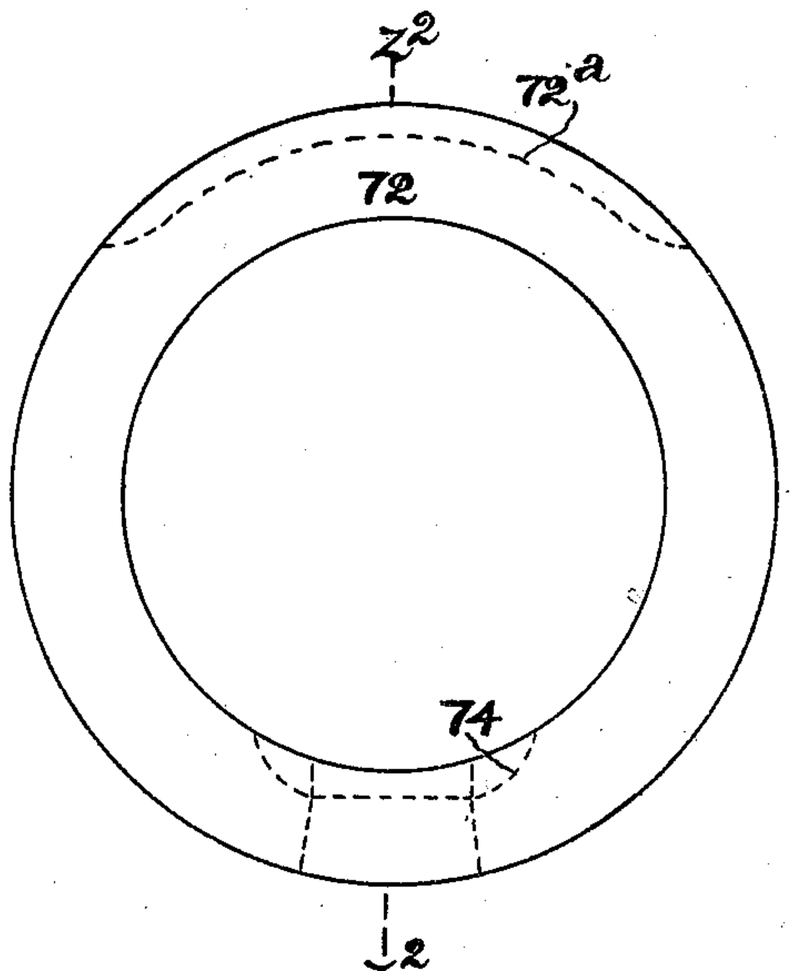

Fig. 4.

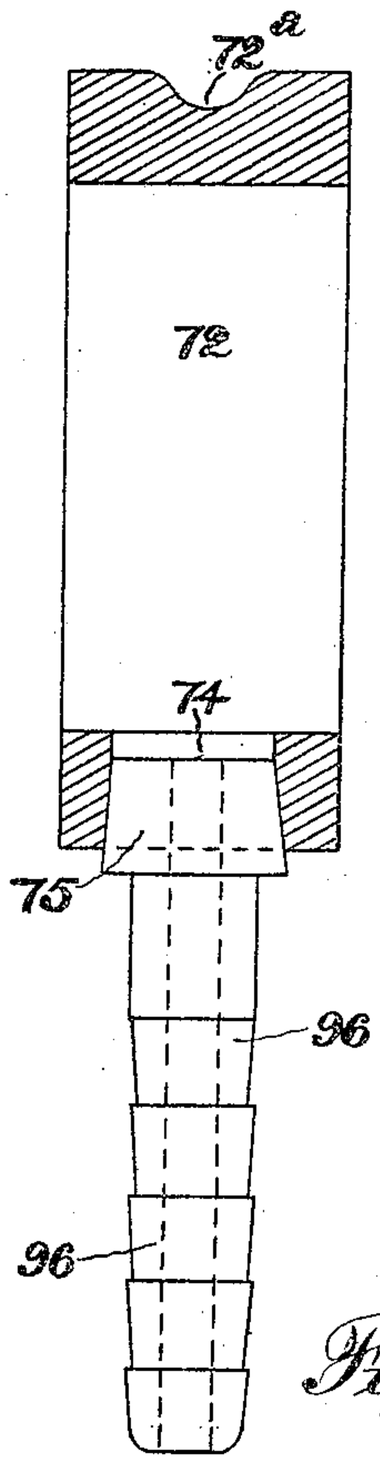

Fig. 5.

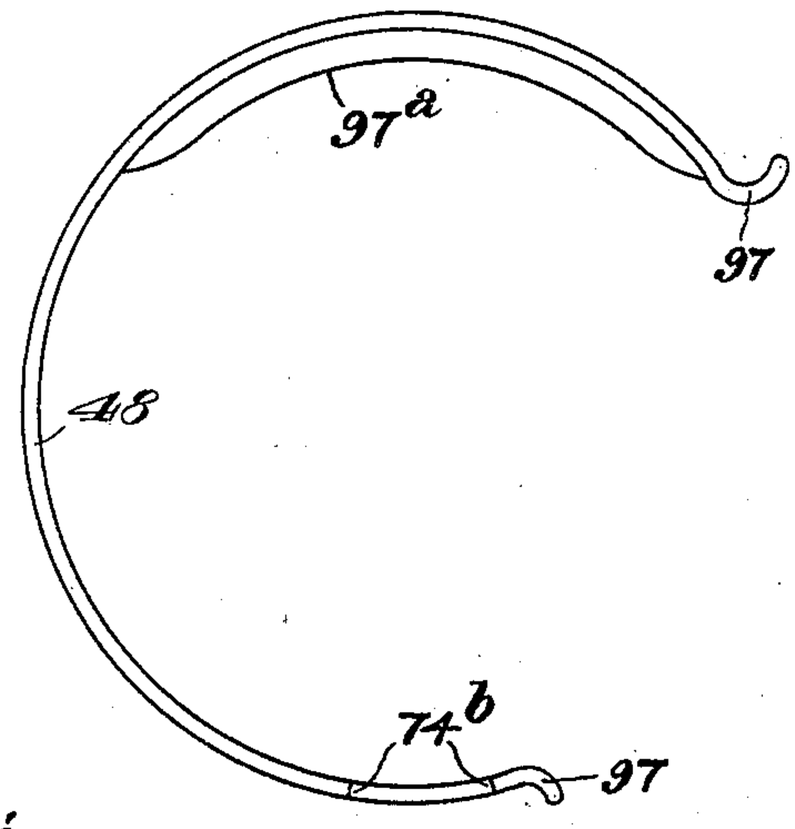

Fig. 6.

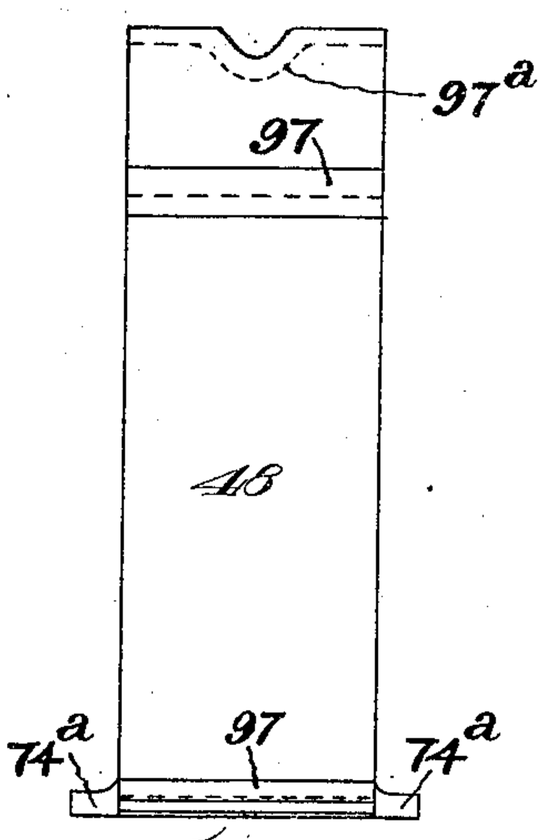

Fig. 7.

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UNITED STATES PATENT OFFICE.

HENRY HELLMAN AND LEWIS CONDICT BAYLES, OF JOHANNESBURG, TRANSVAAL.

ROCK-DRILLING MACHINE.

No. 887,801. Specification of Letters Patent. Patented May 19, 1908.

Application filed January 8, 1907. Serial No. 351,340.

To all whom it may concern:

Be it known that we, HENRY HELLMAN and LEWIS CONDICT BAYLES, citizens of the United States, and residents of Johannesburg, Transvaal, have invented certain new and useful Improvements in or relating to Rock-Drilling Machines, of which the following is a specification.

This invention relates to rock-drilling machines or engines.

The present improvements consist of certain novel features in the construction and arrangement of certain parts of the machine as hereinafter described and pointed out in the appended claims.

The improvements have for their object to simplify the construction and at the same time increase the efficiency of the machine.

The several improvements will now be described by aid of the accompanying drawings, wherein

Figure 1 represents the machine and its attachments in longitudinal sectional part elevation. Fig. 2 is a transverse section on line x—x of Fig. 1. Fig. 3 is a transverse section on line y—y of Fig. 1. Fig. 4 is a front elevation of the water swivel detached. Fig. 5 is a section of Fig. 4 on line z^2—z^2, with the hose stem or spud in position therein. Fig. 6 is a front elevation of a modified form of the spring for securing the hose stem to the swivel, and Fig. 7 is a side elevation of Fig. 6.

1 represents a tail pipe which is non-rotatably secured to the rear end of the power cylinder 2; 2^a being the hammer piston. At the forward end the power cylinder 2 is provided with a hole 3 of polygonal section to receive the shank of the bit A which is made of corresponding section, so that when the tail pipe 1 and power cylinder 2 are rotated, said bit is compelled to rotate in unison therewith. Into the rear end of the tail pipe 1 is screwed a plug 4 and over a rearward extension or reduced portion thereof is screwed or, otherwise suitably fixed a ratchet wheel 5.

6 is the crank or handle which is mounted round the ratchet wheel 5, the latter being constructed round the outside with a flange 7 serving as a stop for the handle 6. In a recess 8 in the handle is located a helical spring 9 and riding on the spring is a pawl 10 which is adapted to engage the teeth of the ratchet wheel 5. By this construction it is possible to impart an intermittent rotary motion in one direction to the drilling bit through the power cylinder 2 and tail pipe 1 by rocking the handle 6 or by moving it part of a revolution first in one direction and then in the other direction, thereby obviating the necessity for rotating the handle in the operation of rotating the drill. Under certain circumstances this will be an advantage, as for example in the event of the machine being so mounted that it would be impossible to turn the handle through a complete revolution owing to the machine being mounted near the rock or other obstruction. It will be apparent that the pawl 10 is free to move round the ratchet teeth in one direction without any rotary motion of the tail pipe 1 ensuing, while, when moved in the opposite direction, the ratchet wheel 5 and with it the tail pipe 1 are compelled to rotate.

In the outer end of the plug 4 is tapped a hole and into it is screwed a flanged bushing 12. This flanged bushing 12 serves as a locking or retaining device for the ratchet wheel 5 and handle 6.

For securing the tail pipe 1 within the outer protective casing 13 in order to secure the tail pipe 1, power cylinder 2 and bit in any desired position when it is out of operation, as for example when effecting the changing of the drills or bits, we provide in the gland 35, which serves for retaining packing in the sliding joint between the tail pipe and the back cap 22 of the protective casing 13, a conical screw-threaded hole and provide a correspondingly screwed coned plug 37, which as shown in Fig. 3 is split at 38. 39 are handles formed on the plug 37 for rotating it. The action, of rotating it in one direction screws it into the gland 35 and so tightens it round the tail pipe 1 and clamps the latter to the casing 13. When the plug 37 is screwed in the opposite direction it expands and then allows the tail pipe 1 to slide freely through it. The gland 35 is non-rotataby secured to the rear cap 22 of the casing 13.

For obtaining an intermittent supply of water through the drill steel or boring bit to the cutting extremity by means of the actuating fluid, we dispense with the usual annular recess between the swivel 72 and front head 73 or power cylinder 2 when the swivel is mounted directly on the latter, and construct said swivel 72, with a recess 74 which communicates with the hole in which fits the spud 75 of the hose stem. The front

head 73 (or power cylinder) is formed with one or more of the radial ports 76, which communicate with an annular space 77 formed round the impact piece 69. The impact piece 69 is constructed with the axial hole 78 through which a quantity of the actuating fluid may pass from the power cylinder 2, and with the two forwardly inclined ports 79 communicating with said axial hole 78 at the forward end, or a recess 80 opening to the front of the impact piece 69. From this latter recess 80 the intermittent supply of water and air passes to a longitudinal hole in the drill steel terminating at or in proximity to the cutting end. By this construction a quantity of the actuating fluid is free to pass along the axial port 78 to the drill steel. The water is permitted to pass from the water swivel 72 each time one of the radial ports 76 comes into communication with the recess 74 of the water swivel.

The front head 73 at its rear end is screwed over the forward end of the power cylinder 2, and at its forward end is constructed with an external screw-thread over which is screwed a nosepiece 81. Between the inner end of the front head and the bottom of the internally threaded hole in the nosepiece 81 are placed a number of thin metal rings 82 which form liners or washers between the nosepiece and front head. The nosepiece 81 jams against the washers or liners 82. One or more of the washers 82 are removed as may be necessary from time to time to take up wear between the sides of the water swivel 72 and front head 73 and nosepiece 81. The hole 3 of polygonal cross section in which the bit A is loosely positioned, is formed in the nose-piece 81. The bit projects through the center of the liners or washers 82 and at its inner end abuts the impact piece 69, which latter is struck by the hammer piston 2^a. The water swivel 72 is positioned between an annular shoulder or flange 83 formed round the front head 73 and the rear end 84 of the nose-piece 81. 85 are packings located between the water swivel 72 and the shoulder 83 and nosepiece 81 respectively. With a machine constructed as shown the rotation is always to the right, accordingly the screw-threads on the power cylinder 2 for the front head 73 and on the front head for the nosepiece 81, are right hand threads. This obviates the necessity for the use of any locking device, as the tendency is for the parts to screw up or work tight and not to unscrew or work loose.

For connecting to the swivel 72 the water controlling valve or the hose stem of the pipe which serves for conducting the water from the valve to the swivel, we provide, as shown in connection with Figs. 4 to 7 of the drawings a split ring 48. 74^b is the hole in the spring 48 in which fits round the hose stem 96 beneath the spud 75 and serves for keeping the latter in position in the coned recess in the water swivel 72. This hole 74^b is formed near one end of the spring and this end of the spring, as shown at 74^a in Fig. 7, is increased somewhat in width to strengthen it. The extremities 97 of the spring are preferably curved outwards slightly to facilitate the removal of the locking spring from the swivel. The other end of the spring opposite the hole 74^b is "fullered in" or formed with an internal depression 97^a and the water swivel 72 as shown in Figs. 4 and 5, is formed with a corresponding groove 72^a in which said depression 97^a fits when the spring is in position round the swivel. This construction prevents lateral movement of the spring.

The construction of the valve for controlling the admission of the water to the swivel 72, consists of the valve body or casing 93, 109 is the air supply inlet to said casing, 100 the water supply inlet to the casing, and 110 the water and air supply outlet from the casing to the swivel 72. 94, 101 and 107 are hose or other suitable flexible pipes communicating with the several openings 110, 100 and 109 respectively, and 112 are clamps fixing said flexible pipes to their rigid tubular connections with the valve body. 107 communicates with the main air inlet between the inlet in the casing back cap 22 and throttle valve 53. The valve 93 is constructed on the one side with a flange 113 and to it, by means of the screws 114, is fixed a cover or end plate 115. Between this cover 115 and the flange 113 of the body is arranged and secured a flexible diaphragm 116 of rubber or other suitable material.

Inside the body is located the valve comprising a cylindrical center portion 117 formed towards one end with an annular enlargement or flange 118. The extremity of the valve projects through a hole in the center of the flexible diaphragm 116 and is secured thereto by means of a nut 119. 120 is a recess in the cover for the nut 119 and end of the valve and to allow for movement of the valve. The body 93 is formed with a recess 121 slightly exceeding in diameter that of the flange 118 which is adapted to move backwards and forwards therein in the operation of the valve. The other extremity of the valve is provided with a leather or other resilient packing 122 adapted to seat on the valve face 123. 124 is a washer and 125 a nut for securing the packing 122. In the valve body 93 and concentrically disposed round the valve is a helical spring 126 which at one end bears against the valve body 93 and at the other end bears against the flange 118. This spring 126 operates to keep the valve closed. The center piece 117 of the valve is reduced, and surrounding it is a hol-

low cylindrical piece 127 of rubber or other suitable resilient material. This rubber valve serves for closing a radial port 128 which communicates with an axial hole or port 129 opening into the recess 120 in the front of the air inlet 109. The air entering by the pipe 107 exerts pressure on the flexible diaphragm 116 and raises the valve 122 off its seat 123 and allows water, which has entered the valve body 93 by the pipe 101, to pass into the chamber round the center portion 117 of the valve. At the same time a quantity of the compressed air or actuating fluid passes along the axial port 129, radial port 128, and escapes through the rubber valve 127 to the chamber, from which it escapes along with the water by the pipe 94 to the swivel 72. It will be apparent that this construction of valve prevents the possibility of the water passing out of the valve body along the air supply pipe to the machine.

What we claim as our invention and desire to protect by Letters Patent is:—

1. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, means for conducting water to said swivel, the front head having a passage placing the swivel in communication with a longitudinal hole in the bit, a nosepiece screwed to the front head and serving as a retaining device for the swivel, and a bit supported by and non-rotatable in the nosepiece.

2. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, an impact piece reciprocal within the front head and adapted to be struck by the reciprocal percussive member, a swivel piece surrounding the front head, means for conducting water to said swivel, the front head having a passage placing the swivel in communication with a longitudinal hole in the bit, a nosepiece screwed to the front head and serving as a retaining device for the swivel, packings between the swivel, front head and nosepiece and washers or liners between the front head and nosepiece, and a bit having a longitudinal hole extending therethrough supported by and non-rotatable in the nosepiece and abutting the impact piece, and the impact piece having passages leading from the power cylinder to the longitudinal hole in the bit.

3. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, means for conducting liquid to said swivel, means for attaching said latter means to the swivel comprising a split locking spring located round the swivel, the front head having a passage placing the swivel in communication with the longitudinal hole in the bit, and a bit having a hole extending therethrough.

4. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, said piece being formed with a peripheral groove, means for conducting liquid to said swivel piece comprising a hose, and hose stem and a split locking spring for attaching the hose stem to the swivel piece, the spring having an internal projection fitting the peripheral groove in the swivel.

5. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, said piece being formed with a peripheral groove, and with an internal recess and recess for the hose stem in communication with the first mentioned recess, means for conducting liquid to said swivel piece, said swivel piece comprising a hose and hose stem, and a split locking spring for attaching the hose stem to the swivel piece, the spring having an internal projection fitting the peripheral groove in the swivel, the front head having a passage placing the swivel in communication with the longitudinal hole in the bit, a nosepiece screwed to the front head and serving as a retaining device for the swivel, packings between the nosepiece front head and swivel, and a bit non-rotatably supported by the nosepiece.

6. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, means for conducting water to said swivel, means for automatically shutting off the water supply when the machine is put out of operation, and a bit supported by and rotatable with the power cylinder having a passage extending therethrough with which the swivel piece communicates.

7. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, means for conducting water to said swivel, means for automatically shutting off the water supply when the machine is put out of operation and com-

prising a casing, a valve located therein, said valve being connected with a diaphragm acted upon by the motive fluid to operate the valve to admit the water to the means leading to the swivel, and a port controlled by a separate valve for allowing a quantity of the actuating fluid to pass with the water to the swivel while preventing the passage of the water into the motive fluid supply pipe, and a bit supported by and rotatable with the power cylinder having a passage extending therethrough with which the swivel piece communicates.

8. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, means for conducting liquid to the swivel, means for automatically shutting off the liquid supply when the machine is out of operation, means for permitting a quantity of the actuating fluid to pass from the cylinder through the drill bit and a drill bit having a longitudinal hole extending therethrough for conducting the liquid and actuating fluid to the hole being drilled, the drill bit being supported by and rotated through the medium of the power cylinder.

9. In a rock drilling machine, in combination, a rotatable power cylinder, means for rotating said cylinder, a reciprocal percussive member in the power cylinder, a front head screwed to the cylinder, a swivel piece surrounding the front head, means for conducting water to said swivel, means for automatically shutting off the water supply when the machine is put out of operation comprising a valve interposed in said conducting means, means placing the casing of said valve in communication with the main actuating fluid inlet, so that the valve is actuated to admit water to the swivel when the actuating fluid is passing into the power cylinder, and means which permit a quantity of the actuating fluid to pass to the swivel with the water, while at the same time preventing the passage of the water to the main actuating fluid inlet, and a bit supported by and rotatable with the power cylinder having a passage extending therethrough with which the swivel piece communicates.

In witness whereof we have hereunto set our hands in the presence of two subscribing witnesses.

HENRY HELLMAN.
LEWIS CONDICT BAYLES.

Witnesses:
CHAS. OVENDALE,
FRED OVENDALE.