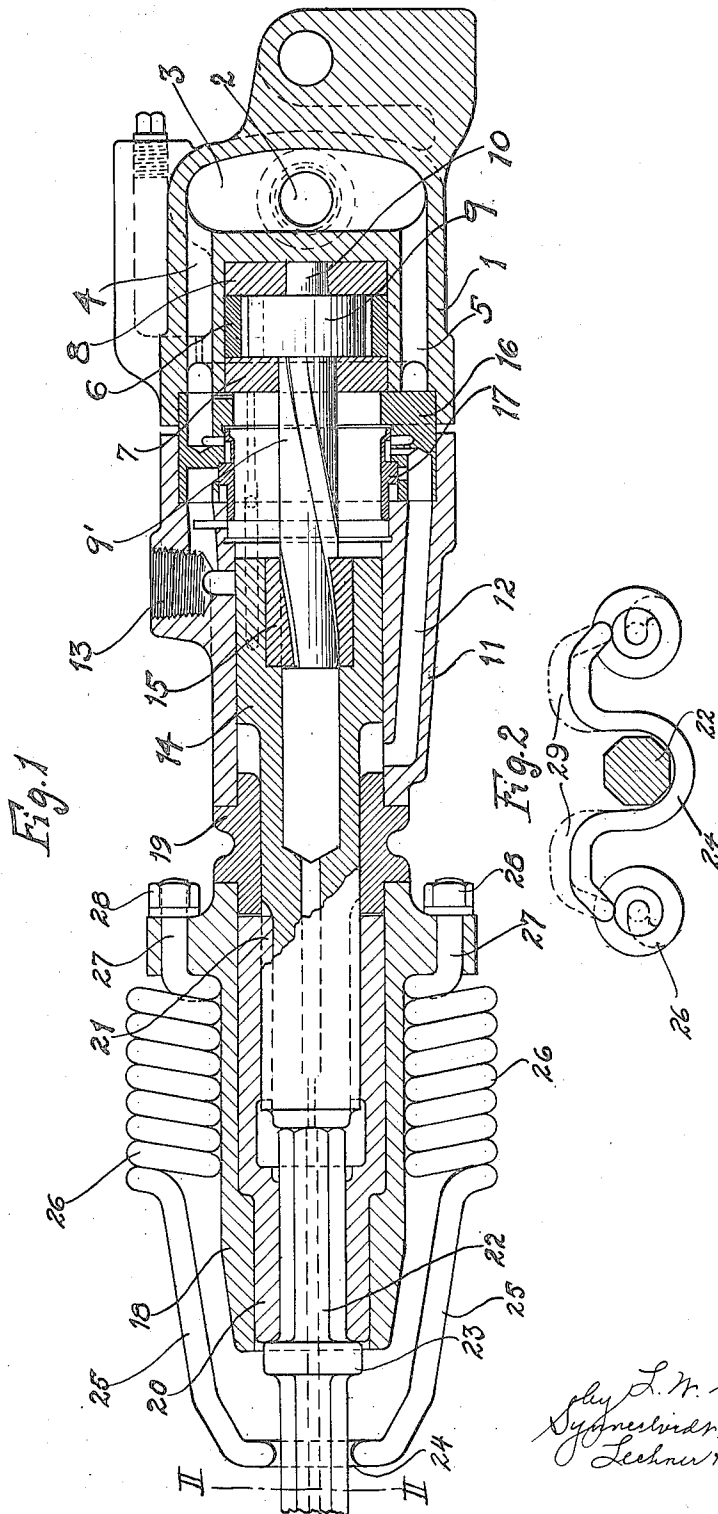


L. W. GREVE.
 FLUID OPERATED DRILLING MACHINE.
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1,208,141.

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INVENTOR.
L. W. Greve
 By *Sydney W. Bradley*
Leech & Sawkey
 ATTORNEYS.

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.

FLUID-OPERATED DRILLING-MACHINE.

1,208,141.

Specification of Letters Patent.

Patented Dec. 12, 1916.

Application filed September 8, 1915. Serial No. 49,492.

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 Fluid-Operated Drilling-Machines, of which the following is a specification.

The invention relates to fluid operated drilling machines, and particularly to the type in which the rotation of the hammer piston causes the rotation of the drill steel. The invention has for its primary objects the provision of a compact arrangement of the type specified wherein a shell valve is employed; and the provision of a simple efficient construction having an improved arrangement for holding the parts including the ratchet mechanism and valve block in position. One embodiment of the invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a longitudinal section through the apparatus constituting my invention, and Fig. 2 is a transverse section on the line II—II of Fig. 1 looking to the right.

Referring to Fig. 1; 1 is the handle casing provided with the admission passage 2 and the air pocket or reservoir 3. This casing is also provided with passages 4 and 5 leading to the valve mechanism. Mounted in this casing is the ratchet cage 6, the bearing plates 7 and 8, and the ratchet block 9 provided upon its front face with the rifle bar 9' and upon its rear face with the bearing projection 10. The block 9 carries the usual pawls for engaging the teeth upon the ratchet cage 6 so that the rifle bar and block are free to rotate in one direction but not in the other, this construction being well known in the art and being shown in my patent 1,129,347. The bearing plates 7 and 8 and the cage 6 are keyed against rotation in the handle casing.

Lying with its end opposite to the end of the handle casing 1 is the piston casing 11, such casing having the admission and exhaust passage 12 and the exhaust outlet 13 to which all of the exhaust from the machine is conducted. The hammer piston 14 is of the usual construction and is provided in its rear end with the nut 15 with which the rifle bar coöperates so that the piston is rotated upon its rear movement. Between the opposing ends of the handle casing 1 and piston casing 11 is the valve block 16 which

carries slidably upon its interior the sleeve valve 17. A very similar valve construction is shown and claimed in my co-pending application, Serial No. 872,063, and no claim for this valve mechanism is made in the present case, it being sufficient for the present case to point out that the valve reciprocates and controls the movements of the piston and that the piston in its rearward movement travels into the valve. Any other type of sleeve valve control might be employed if so desired. The two casings 1 and 11 are secured together to clamp the valve block 16 between them by means of lugs and bolts at the sides of the casing, not shown in the section of Fig. 1, and the right hand end of the valve block engages the front face of the bearing plate 7 and serves to hold this plate and the ratchet mechanism in position.

At the front end of the machine is the chuck sleeve 18, such sleeve being clamped to the piston casing by lugs and bolts not shown in the section of Fig. 1, and interposed between these parts is a buffing block 19, such buffing block telescoping into the sleeve and into the piston casing in the manner illustrated. Rotatably mounted in the chuck sleeve 18 is the chuck 20, such chuck being provided with ridges 21 fitting grooves in the front end of the piston 14 so that the rotation of the piston causes the rotation of the chuck sleeve, such construction being well known in the art. The interior of the chuck at its forward end is made hexagonal in cross-section so as to fit the hexagonal drill steel 22 and secure its rotation.

The drill steel is provided with an enlargement or shoulder 23, and means are provided for coöperating with this enlargement to prevent the accidental withdrawal of the drill steel from the machine. This means consists of a U-shaped collar 24 which partially surrounds the drill steel in front of the enlargement 23 and is provided with a pair of spring arms 25 coiled as indicated at 26 with the rear ends 27 extending through lugs in the chuck sleeve 18 and held in position by means of nuts 28. This device prevents the accidental removal of the drill steel from the machine, and at the same time permits of the ready removal of the drill steel when such removal becomes necessary. In order to remove the drill steel it is only necessary to press the collar 24 laterally out of alinement with the en-

largement 23 so that the steel may be removed. This lateral movement is permitted because of the resiliency of the arms 25 and the coils 26, the coils 26 adding to the lateral resiliency and also giving the retainer greater springiness axially of the machine. The retainer can be very cheaply constructed and is easily manipulated. It is preferably constructed so that the arms spring to the position indicated by the dotted lines 29 in Fig. 2 when the drill steel is removed, the collar 26 thus exerting yielding pressure upon the drill steel and insuring that it will not be accidentally removed or jarred to a position such that the enlargement 23 can move past it.

What I claim is:

1. In combination in a fluid operated drilling machine, a handle, a casing, a rifle bar mounted in the rear portion of the casing and projecting forwardly, mechanism at the rear of the casing permitting the bar to rotate in one direction but not in the other, a piston having a nut cooperating with the rifle bar whereby the piston is rotated as the piston moves to the rear, a drill steel rotated by the piston, and a sleeve valve for controlling the piston located to the front of the said mechanism, surrounding the rifle bar and adapted to receive the piston when it moves to its rear position.

2. In combination in a fluid operated drilling machine, a handle, a casing, a rifle bar mounted in the rear portion of the casing and projecting forwardly, mechanism at the rear of the casing permitting the bar to rotate in one direction but not in the other, a piston having a nut cooperating with the rifle bar whereby the piston is rotated as the piston moves to the rear, a drill steel rotated by the piston, a fluid supply reservoir behind the said mechanism in the casing, means for supplying fluid under pressure to the reservoir, and a sleeve valve, for controlling the piston and supplied with fluid under pressure from said reservoir, surrounding the rifle bar and adapted to receive the piston when it moves to its rear position.

3. In combination, in a fluid operated drilling machine, a handle casing, ratchet mechanism mounted in the forward portion of the casing and carrying a forwardly projecting rifle bar, a piston casing to the front of the handle casing carrying a rotatable reciprocating piston, a valve block held between the opposing ends of the handle casing and the piston casing, a reciprocating sleeve valve mounted in the valve block and adapted to receive said piston, a rotatable chuck to the front of the piston casing carrying a drill steel, and means whereby the rotation of the piston causes the rotation of the chuck and drill steel.

4. In combination, in a fluid operated drilling machine, a handle casing, ratchet mechanism mounted in the forward portion of the casing and carrying a forwardly projecting rifle bar, a piston casing to the front of the handle casing carrying a rotatable reciprocating piston, a valve block held between the opposing ends of the handle casing and the piston casing, a reciprocating sleeve valve mounted in the valve block and adapted to receive said piston, a chuck sleeve to the front of the piston casing, a buffing block for the piston held between the opposing ends of the piston casing and chuck sleeve, a chuck mounted in the chuck sleeve and rotatable by the piston, and a drill steel mounted for reciprocation in the chuck and rotatable thereby.

5. In combination, in a fluid operated drilling machine, a handle casing, a ratchet cage fitting in the front portion thereof, ratchet mechanism and a forwardly projecting rifle bar supported in the cage, a piston casing to the front of the handle casing carrying a rotatable reciprocating piston engaging the rifle bar, a valve block held between the opposing ends of the handle casing and piston casing and itself holding the ratchet mechanism and cage in position, a sleeve valve carried by the valve block, and a chuck and drill steel rotated by the piston.

6. In combination, in a fluid operated drilling machine, a handle casing, a ratchet cage fitting in the front portion thereof, ratchet mechanism and a forwardly projecting rifle bar supported in the cage, a bearing plate in front of the cage through which the rifle bar extends, a piston casing to the front of the handle casing carrying a rotatable reciprocating piston rotated by the rifle bar, a valve block held between the opposing ends of the handle and piston casings and itself holding the ratchet mechanism and cage in position, a sleeve valve carried by the valve block, and a chuck and drill steel rotated by the piston.

7. In combination, in a fluid operated drilling machine, a handle casing, a ratchet cage fitting in the front portion thereof, ratchet mechanism and a forwardly projecting rifle bar supported in the cage, bearing plates in front and to the rear of the cage and fitting around the rifle bar, a piston casing to the front of the handle casing carrying a rotatable reciprocating piston rotated by the rifle bar, a valve block held between the opposing ends of the handle and piston casings and itself holding the bearing plates and cage in position, a sleeve valve carried by the valve block, and a chuck and drill steel rotated by the piston.

LOUIS W. GREVE.