C. H. HAESELER.

PERCUSSIVE TOOL.

APPLICATION FILED JAN. 30, 1914.

1,176,443.

Patented Mar. 21, 1916.

2 SHEETS—SHEET 1.

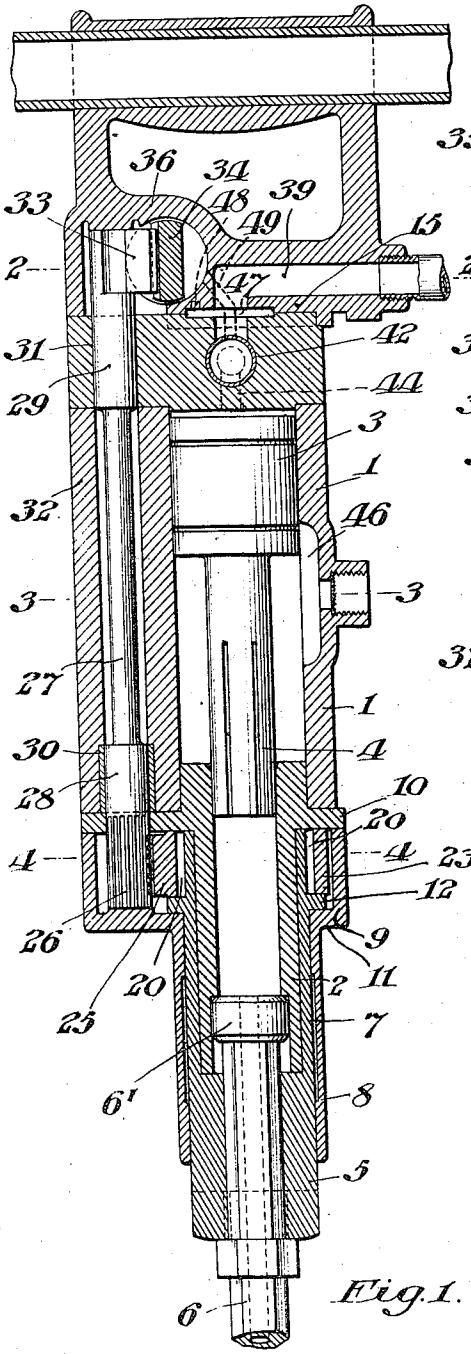


Fig. 1.

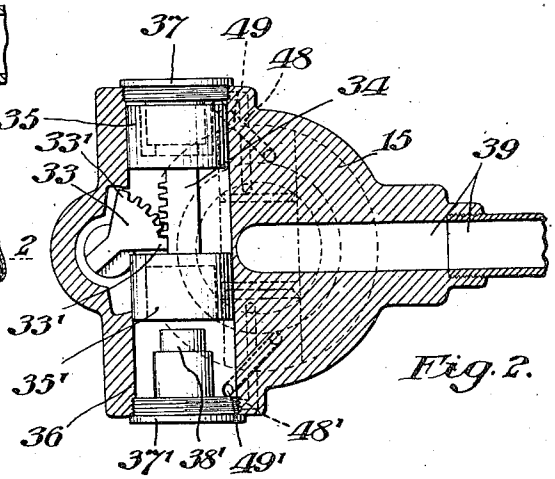


Fig. 2.

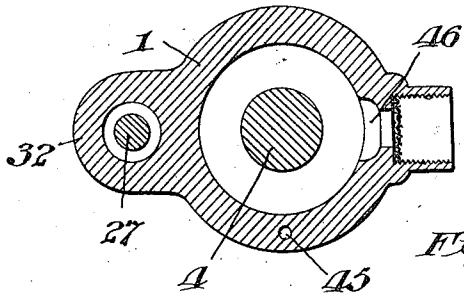


Fig. 3.

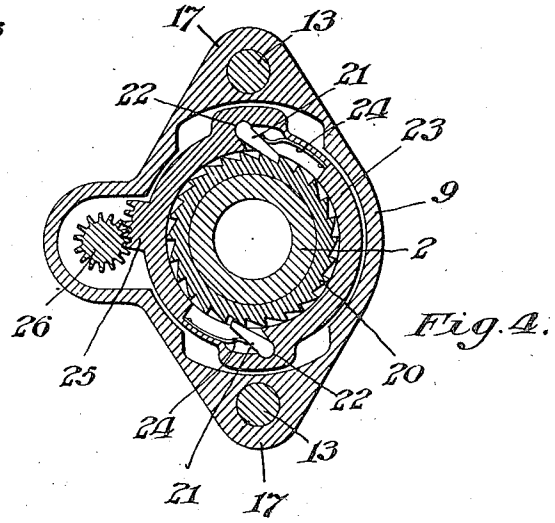


Fig. 4.

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2 SHEETS—SHEET 2.

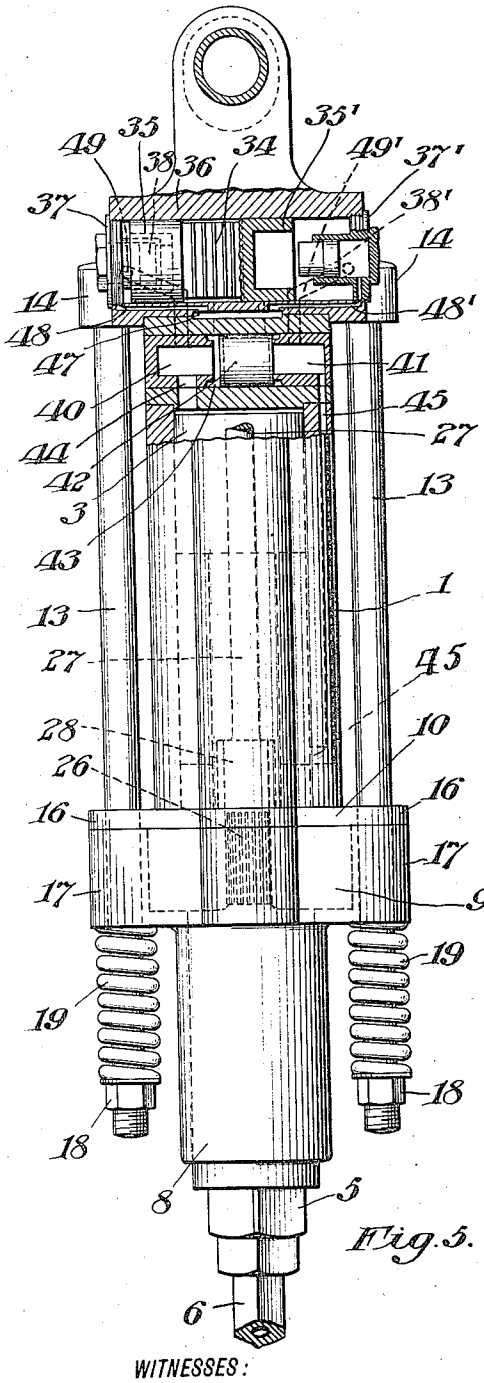


Fig. 5.

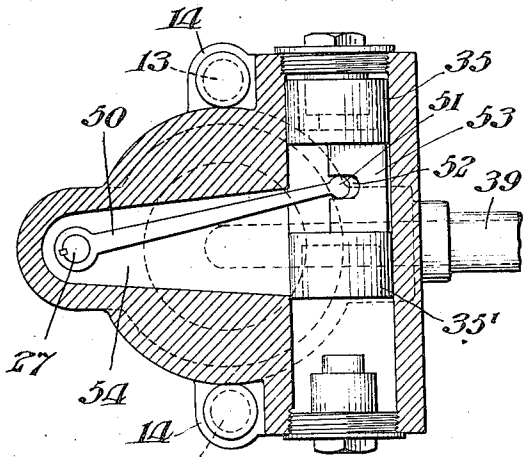


Fig. 6.

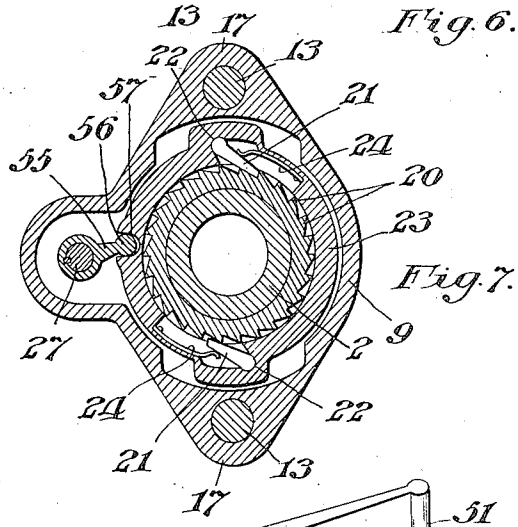


Fig. 7.

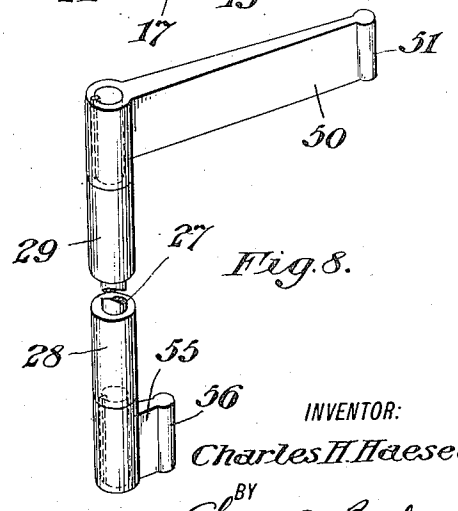


Fig. 8.

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UNITED STATES PATENT OFFICE.

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PERCUSSIVE TOOL.

1,176,443. Specification of Letters Patent. Patented Mar. 21, 1916.

Application filed January 30, 1914. Serial No. 815,329.

To all whom it may concern:

Be it known that I, CHARLES H. HAESELER, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain Improvements in Percussive Tools, of which the following is a specification.

My invention is an improved percussive tool characterized by compactness, simplicity and strength of construction, together with efficiency and certainty of operation.

It is designed particularly to provide improved means for rotating the bits of drills positively and certainly at all speeds and actions of the hammers for driving the bits.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a rock drill embodying my improvements; Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1; Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1; Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1; Fig. 5 is a part sectional elevation of the same construction taken at right angles to Fig. 1; Fig. 6 is a transverse sectional view through the head of a drill of modified construction; Fig. 7 is a transverse sectional view taken through the body of a drill of modified construction; and Fig. 8 is a broken perspective view of mechanism for transmitting the power to the work of turning the bit in the modified form of mechanism shown in Figs. 6 and 7.

The apparatus illustrated in the drawings comprises a compound cylinder having the main section 1 and the smaller section 2 in which reciprocates a compound piston or hammer comprising the section 3 which fits the cylinder section 1 and the smaller section 4 which fits the section 2.

A chuck 5, for turning a drill bit 6 adapted to move longitudinally therein, is provided with a sleeve 7 which is revoluble on the cylinder section 2 and in a cylindrical sleeve 8 of a housing 9, the latter engaging a flange 10 on the section 2 and having a bearing 11 which engages a flange 12 on the sleeve 7, whereby the latter is normally held in abutting relation to the section 2.

Rods 13 are held by lugs 14 on the drill head 15 and pass through lugs 16 of the flange 10 and lugs 17 of the housing 9, the rods being provided with nuts 18 for supporting coiled springs 19 and thereby holding the housing in movable relation to the flange 10 against which it normally bears.

A ratchet 20 is formed on the top of the sleeve 7 and the circularly disposed teeth thereof are adapted to be engaged by the pawls 21 which are adapted to rock in bearings 22 of a collar 23 disposed concentrically with relation to the ratchet, the collar bearing on the flanges 10 and 12 relative whereto it is adapted to turn. The pawls are staggered and held in position to engage the ratchet teeth by the springs 24 fixed in the collar, the staggered relation effecting the positive engagement of a pawl with a tooth on a slight forward movement of the collar.

In the form of the apparatus illustrated by Figs. 1 to 5 inclusive, the collar 23 is provided with an exterior toothed segment 25 which is engaged by a pinion 26 fixed on the lower end of a shaft 27 having journals 28 and 29 adapted to turn in the respective bearings 30 and 31 at the opposite ends of a housing 32 connected with and parallel to the cylinder section 1, the shaft 27 being parallel to the axis of the drill. A toothed segment 33 is fixed to the top of the shaft 27 and is engaged by a rack 34 which connects hollow pistons 35 and 35′ adapted to reciprocate in a cylinder 36 in the head of the drill, the cylinder having the cylindrical heads 37 and 37′ provided with the inwardly projecting pistons 38 and 38′ which are entered in and moved by the hollow pistons at the outer limits of their respective strokes, whereby the action is cushioned. The teeth of the segment 33 are limited by the members 33′ which compel correct registration of the teeth of the segment and rack.

Air is admitted to the drill through the conduit 39 which communicates with the passages or chambers 40 and 41 under control of a hollow, light and readily actuated cylindrical valve 42 movable in a cylindrical chamber 43 so as to alternately close and open the adjacent ends of the chambers 40 and 41; thereby controlling the passage 44 from the chamber 40 to the top of the cylinder section 1 above or in the rear of the piston section 3, the passage 49 connecting the chamber 40 with the cylinder 36, the passage 45 connecting the chamber 41 with the cylinder section 1 below or forward of the piston section 3, and the passage 49′ connecting the chamber 41 with the cylinder 36. The cylinder section 1 is provided with a port 46 by which its opposite ends com-

municate with the atmosphere under control of the piston section 3. The conduit 39 also communicates through the part 47 and the passages 48 and 48′ with the dash pots or interiors of the hollow heads 37 and 37′ in the rear of the pistons or dash pot plungers 38 and 38′.

In the position of the mechanism illustrated in Figs. 1–5 inclusive, air, admitted through the conduit 39, flows through the chamber 40 and passages 44 into the cylinder section 1, actuates the piston 3—4 and causes it to strike the anvil 6′ which transmits the blow to the bit 6. At the same time, air is forced through passages 47, 48 and 49 against the pistons 35 and 38, which actuate the rack 34, segment 33, rock shaft 27, pinion 26, segment 25, and collar 23, thereby retracting the pawls 21. The hammer piston 3—4, having established communication from the passage 44 to the port 46 and delivered its blow, is returned to the initial position by air now flowing from the conduit through the chamber 41 and passages 45, due to the movement of the valve 42 by air forced through the passage 49′, by the piston 35′. As the hammer piston is retracted, the bit is turned by the movement of the pistons 35 and 35′ which act through the parts 34, 33, 27, 26, 25, and 23, to advance the pawls 21, one of which positively engages a tooth of the ratchet 20 and turns the chuck 5 with the bit 6 therein, the turning operation being effected notwithstanding slow action and short strokes of the hammer piston, which fail to effect the desired turning operations in structures commonly used.

As illustrated in Figs. 6 to 8 inclusive, the leverage between the shaft 27 and the piston heads 35, 35′ may be increased by placing these parts oppositely with reference to the axis of the drill, and such parts may be connected by an arm 50 fixed on the shaft 27, provided with a curved end bearing 51 which acts in a seat 52 of the coupling 53 between the heads 35 and 35′, and reciprocates in a transverse recess 54 in the head of the drill. The lower or forward end of the rock shaft 27 may be provided with an arm 55 having a curved bearing 56 which acts in a seat 57 formed in the collar 23.

The apparatus described, comprising a journaled shaft connecting motor mechanism in the head of the drill with chuck turning clutching mechanism at the opposite end thereof, has the characteristic advantages which my improvements are designed to attain.

Having described my invention, I claim:

1. In a percussive tool, a cylinder, a hammer piston adapted to reciprocate therein, a chuck journaled relatively to said cylinder, a second cylinder disposed in the rear of and transversely to said cylinder first named, a reciprocating piston in said second cylinder, a journaled shaft, means comprising an oscillating arm whereby said second piston turns said shaft, and means whereby said shaft turns said chuck.

2. In a percussive tool, a cylinder, a hammer piston adapted to reciprocate in said cylinder, a chuck journaled relatively to said cylinder, clutch mechanism adapted to turn said chuck, a journaled shaft extending in the direction of movement of said piston, gearing whereby said shaft operates said clutch mechanism, a cylinder extending transversely to said shaft, a reciprocating piston in said cylinder last named, and means whereby said piston last named turns said shaft.

3. In a percussive tool, a cylinder, a piston adapted to reciprocate in said cylinder, a chuck journaled relatively to said cylinder, a ring having teeth thereon, clutch mechanism whereby said ring turns said chuck, a journaled shaft having teeth fixed thereto and engaging the teeth of said ring, a fluid motor comprising a piston in the rear of said cylinder, and engaging devices fixed to said shaft and piston last named whereby said motor rocks said shaft.

4. In a percussive tool, a cylinder, a piston adapted to reciprocate in said cylinder, a chuck journaled relatively to said cylinder, an oscillatory ring disposed concentrically on said chuck, clutching mechanism by which the oscillation of said ring effects the step by step revolution of said chuck, a journaled shaft disposed substantially parallel to the movement of said piston, mechanism whereby said shaft oscillates said ring, a cylinder disposed in the rear of and transversely to said cylinder first named, a reciprocating piston in said cylinder second named, and lever mechanism whereby said last named piston oscillates said shaft.

In testimony whereof, I have hereunto set my name this 29th day of January, 1914, in the presence of the subscribing witnesses.

CHARLES H. HAESELER.

Witnesses:
Jos. G. Denny, Jr.,
C. N. Butler.