No. 777,311. PATENTED DEC. 13, 1904.

H. C. SERGEANT.

DRILL.

APPLICATION FILED DEC. 10, 1903.

NO MODEL.

Fig. 1.

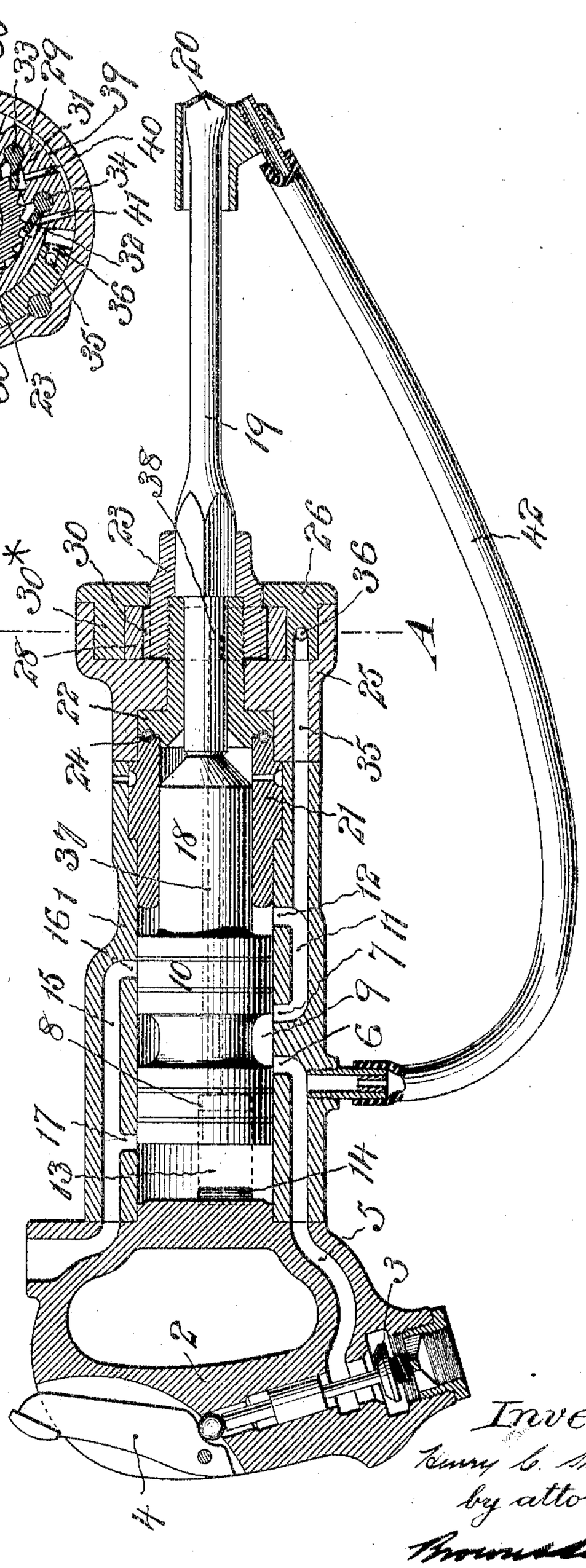
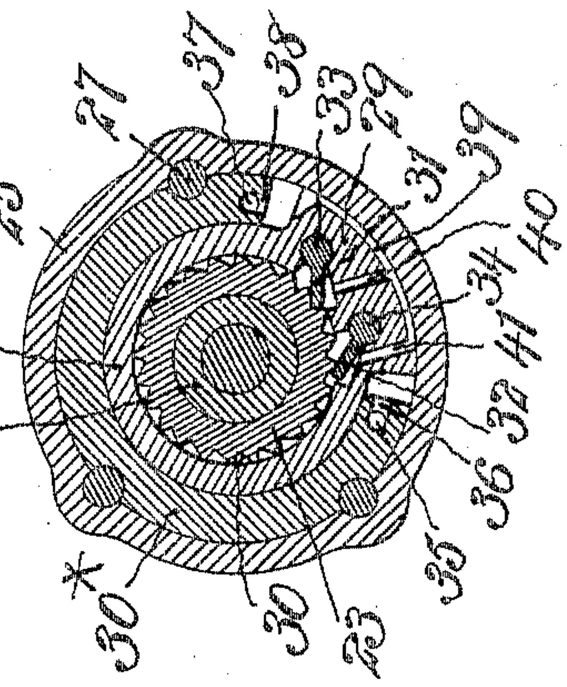


Fig. 2.



Witnesses:-
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by attorneys
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No. 777,311. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

HENRY C. SERGEANT, OF WESTFIELD, NEW JERSEY.

DRILL.

SPECIFICATION forming part of Letters Patent No. 777,311, dated December 13, 1904.

Application filed December 10, 1903. Serial No. 184,567. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SERGEANT, a citizen of the United States, and a resident of Westfield, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Drills, of which the following is a specification.

My invention relates to an improvement in drills, and has for its object to provide certain improvements in that class of drills known as "hammer-drills."

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents the drill in longitudinal central section, and Fig. 2 is a transverse section taken in the plane of the line A A of Fig. 1.

The drill represented herein is of the portable type, in which the cylinder 1 is provided with a handle 2, which handle is provided with the usual inlet-valve 3 for the motive fluid and the controlling device 4 therefor. A duct 5 leads from the handle to an inlet-port 6, opening into the interior of the cylinder 1 intermediate the ends of the piston-chamber in position to be brought into open communication with the one or the other of two ports 7 and 8 through an annular circumferential groove 9 in the piston 10. A duct 11 leads from the port 7 to a port 12 at the forward end of the cylinder-chamber, and a duct 13 leads from the port 8 to a port 14 at the rear end of the cylinder-chamber. An outlet-duct 15 leads from two exhaust-ports 16 17 to the exterior, which exhaust-ports are arranged in position to exhaust the motive fluid from the one or the other side of the piston 10 as the piston is reciprocated. The piston 10 is provided with a forwardly-projected hammer 18, fitted to strike the rear end of the shank 19 of the drill 20. This hammer 18 is fitted to slide in a tube 21, located in the forward end of the cylinder 1.

The chuck comprises an inner member 22 and an outer member 23, secured together, preferably, by screwing the outer member 23 onto the inner member 22. An antifriction-bearing 24, in the present instance shown as a ball-bearing, is interposed between the chuck and the tube 21.

The forward or outer end of the cylinder 1 is completed by a block 25 and an end plate 26, the several parts being held assembled by longitudinal bolts 27.

The rotary movement of the drill is controlled by the motive fluid, as follows: An oscillating piston comprising a tubular collar 28 and a head 29 is mounted within the end plate 26 of the cylinder, the head 29 being located in a space formed by cutting away the wall 30* of the end plate 26 for a portion of its length, the cut-away portion being somewhat longer than the piston-head, so as to permit the piston-head a limited rocking or oscillating movement therein. This oscillating piston has a pawl-and-ratchet connection with the outer member 23 of the drill-chuck for imparting a rotary movement to the drill-chuck. In the present instance the pawl-and-ratchet connection between the two is established by providing the outer member 23 with the ratchet 30 and the piston with two pawls 31 32, which pawls have a limited rocking movement by mounting their trunnions 33 34 in the head 29 of the piston. Motion is applied to the opposite sides of the piston-head 29, as follows: A duct 35 leads from the duct 11 to a port 36, opening into the chamber upon one side of the piston-head, and a duct 37 leads from the duct 13 to a port 38, opening into the chamber upon the other side of the piston-head. The pawls are held in engagement with the ratchet as the oscillating piston is moved in a direction to rotate the drill by pressure from the motive fluid, as follows: A duct 39 leads along the piston-head 29 from that portion of the chamber adjacent to the port 38, for instance, which duct is provided with branches 40 41, leading to open spaces in back of the two pawls 31 32.

A blast of the motive fluid may be directed to the point of the drill for preventing the undue heating of the same through a tube 42, the inner end of which opens into the duct 5 and the outer end of which leads to a point adjacent to the drill-point.

In operation as the piston is reciprocated

by the motive fluid the piston will alternately open and close communication to the different sides of the head 29 of the oscillating piston, thus reciprocating the oscillating piston, and thereby rotating the drill-tool at the same time that the tool is being operated upon by the hammer. The rapidity with which the tool may be rotated with respect to the number of blows imparted to the tool may be regulated by the number of teeth upon the chuck and the distance which the chuck is moved at each oscillation of the piston 28 29. The antifriction-bearing between the chuck and the tube 21 of the cylinder permits the tool to be rotated with the least amount of friction at the same time that it is being operated upon by the hammer.

The term "oscillating" used in the foregoing specification is to be understood as referring to a movement back and forth in a curved path, as the motion of a pendulum or rocking motion on an axis.

What I claim is—

1. A drill, a reciprocating piston for driving the drill, a rocking piston for rotating the same, and means for feeding a motive fluid to both sides of the pistons at predetermined intervals.

2. A drill, a reciprocating hammer-piston for striking the drill, a rocking piston for rotating the same and means for feeding a motive fluid to both sides of the pistons at predetermined intervals.

3. A drill, a motive-fluid-controlled hammer-piston for striking the same, a drill-chuck, a motive-fluid-controlled rocking piston and a pawl-and-ratchet connection between the rocking piston and the chuck for imparting a rotary movement to the drill as the piston is rocked.

4. A drill, a motive-fluid-controlled hammer-piston for striking the same and a motive-fluid-controlled rocking piston, a drill-chuck, a pawl carried by the one and a ratchet carried by the other for imparting a rotary movement to the drill as the rocking piston is rocked and means for directing the motive fluid to the back of the pawl for holding the pawl in engagement with the ratchet when the rocking piston is moved in one direction.

5. A drill, a motive-fluid-controlled hammer-piston for striking the same, a motive-fluid-controlled rocking piston, a drill-chuck, a ratchet carried thereby and a pawl carried by the rocking piston for imparting a rotary movement to the drill as the piston is rocked.

6. A drill, a motive-fluid-controlled hammer-piston for striking the same, a motive-fluid-controlled rocking piston, a drill-chuck, a ratchet carried thereby and a motive-fluid-controlled pawl carried by the rocking piston for rotating the drill when the piston is moved in one direction.

7. A drill, a reciprocating hammer-piston for striking the same and motive-fluid ducts leading from a source of supply to both sides of the piston, a rocking piston, a pawl-and-ratchet connection between the piston and drill for imparting a rotary movement to the drill and motive-fluid ducts leading to the opposite sides of the rocking piston, the movement of the rocking piston being controlled by the movement of the reciprocating hammer-piston.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 8th day of December, 1903.

HENRY C. SERGEANT.

Witnesses:

FREDK. HAYNES,

ALIDA M. EGBERT.