

No. 712,597.

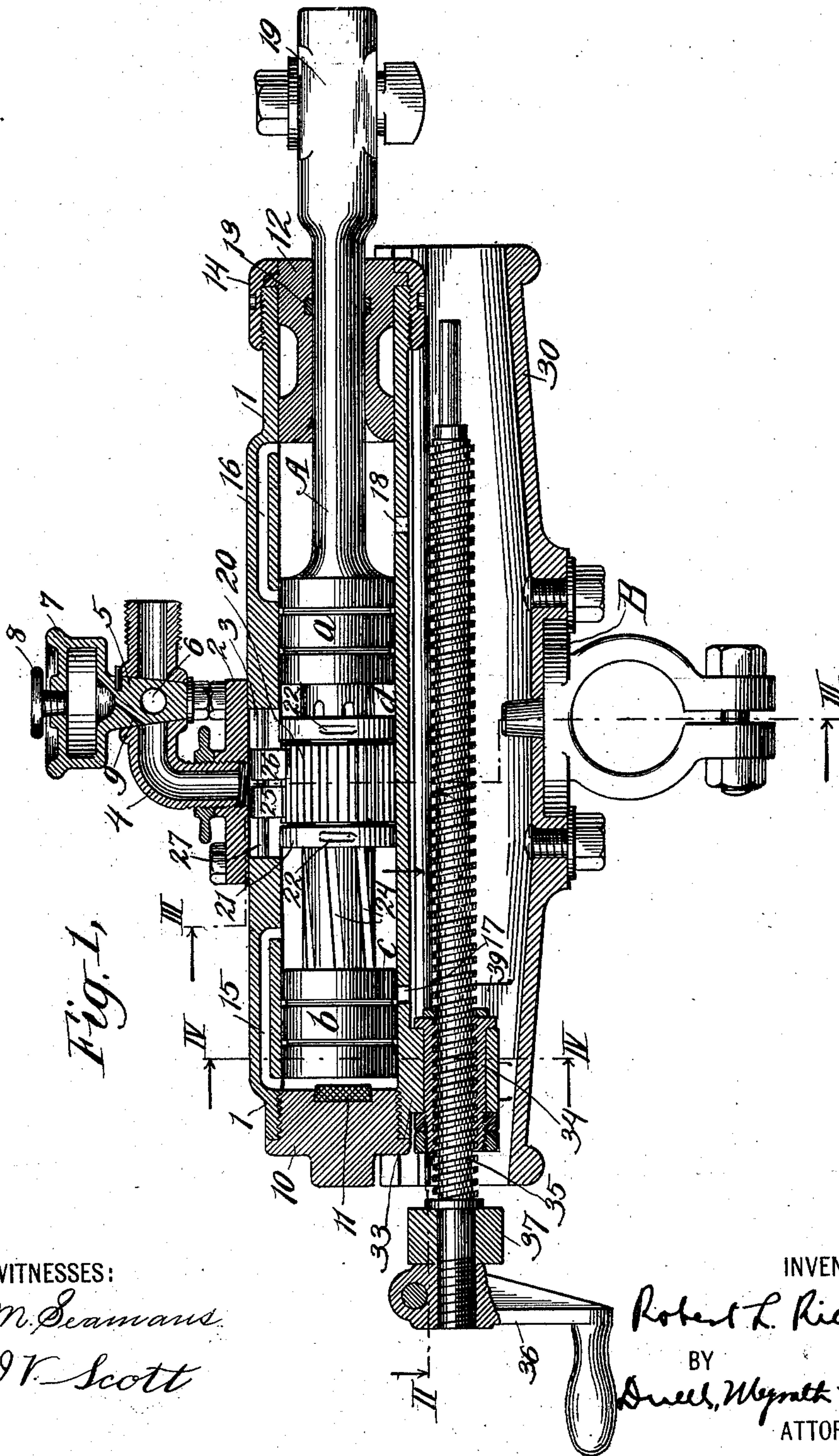
Patented Nov. 4, 1902.

R. L. RICKMAN.
VALVELESS ENGINE FOR DRILLS.

(Application filed Oct. 9, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:
H. M. Seamans
J. V. Scott

INVENTOR
Robert L. Rickman
BY
Duell, Weymouth & Warfield
ATTORNEYS.

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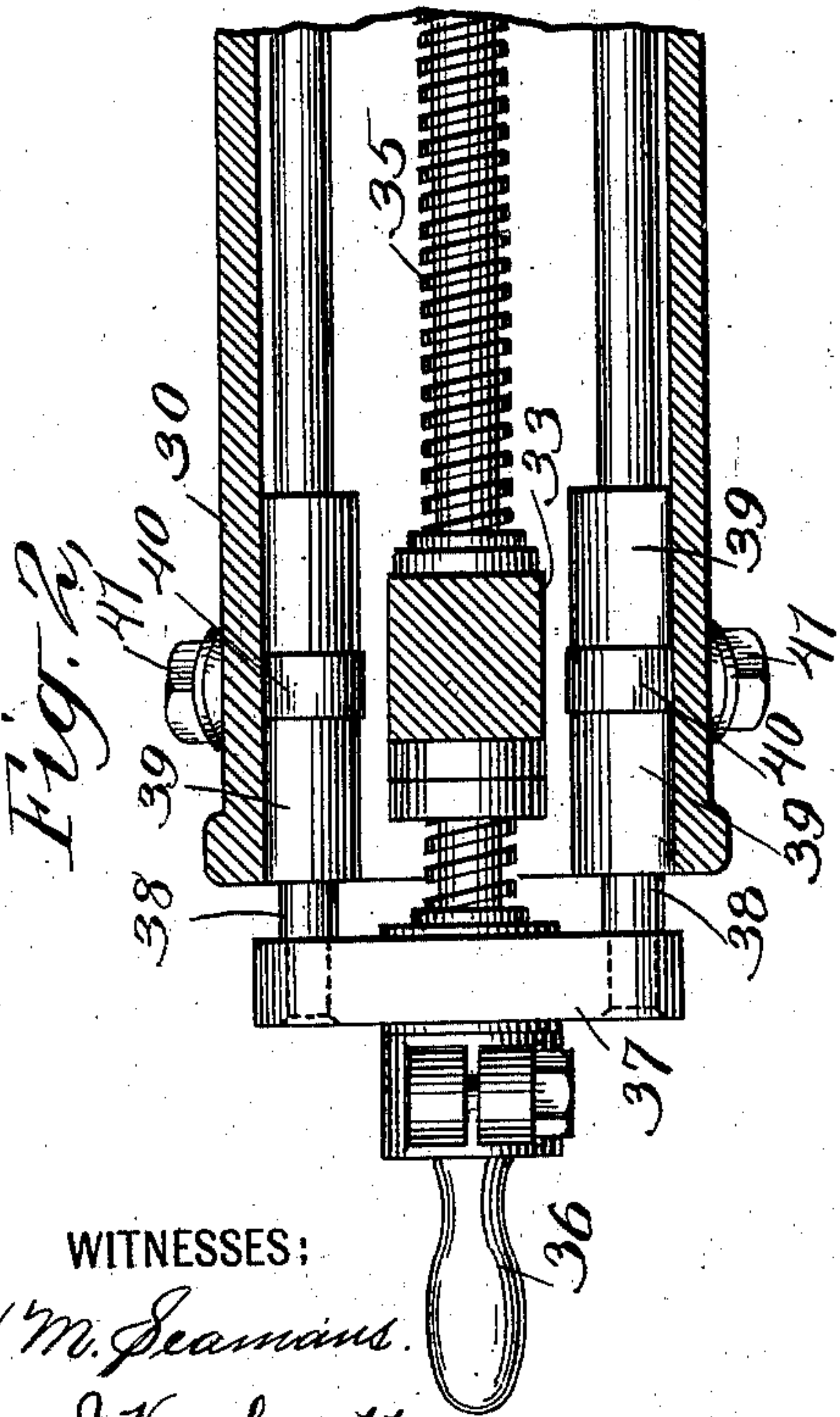
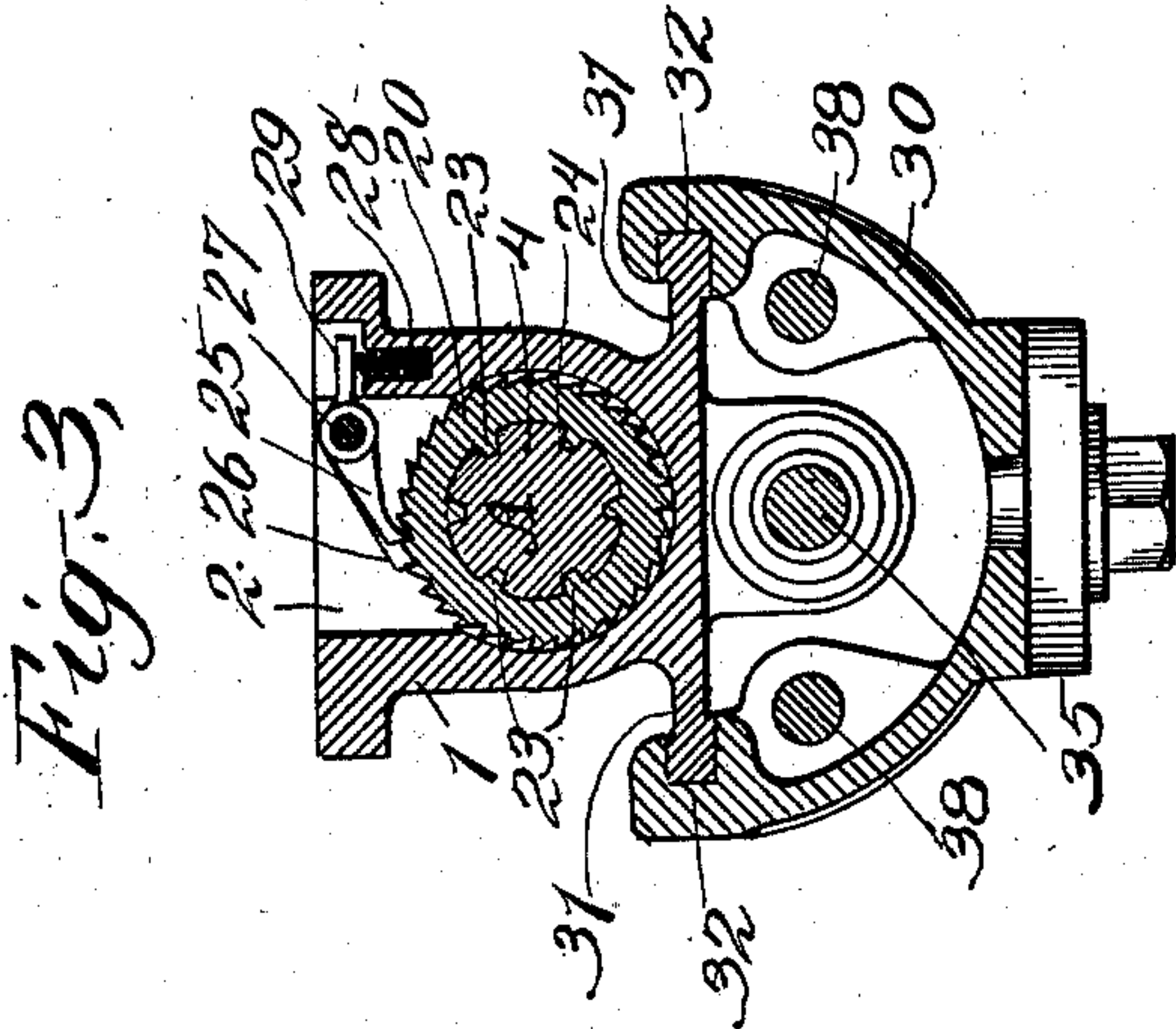
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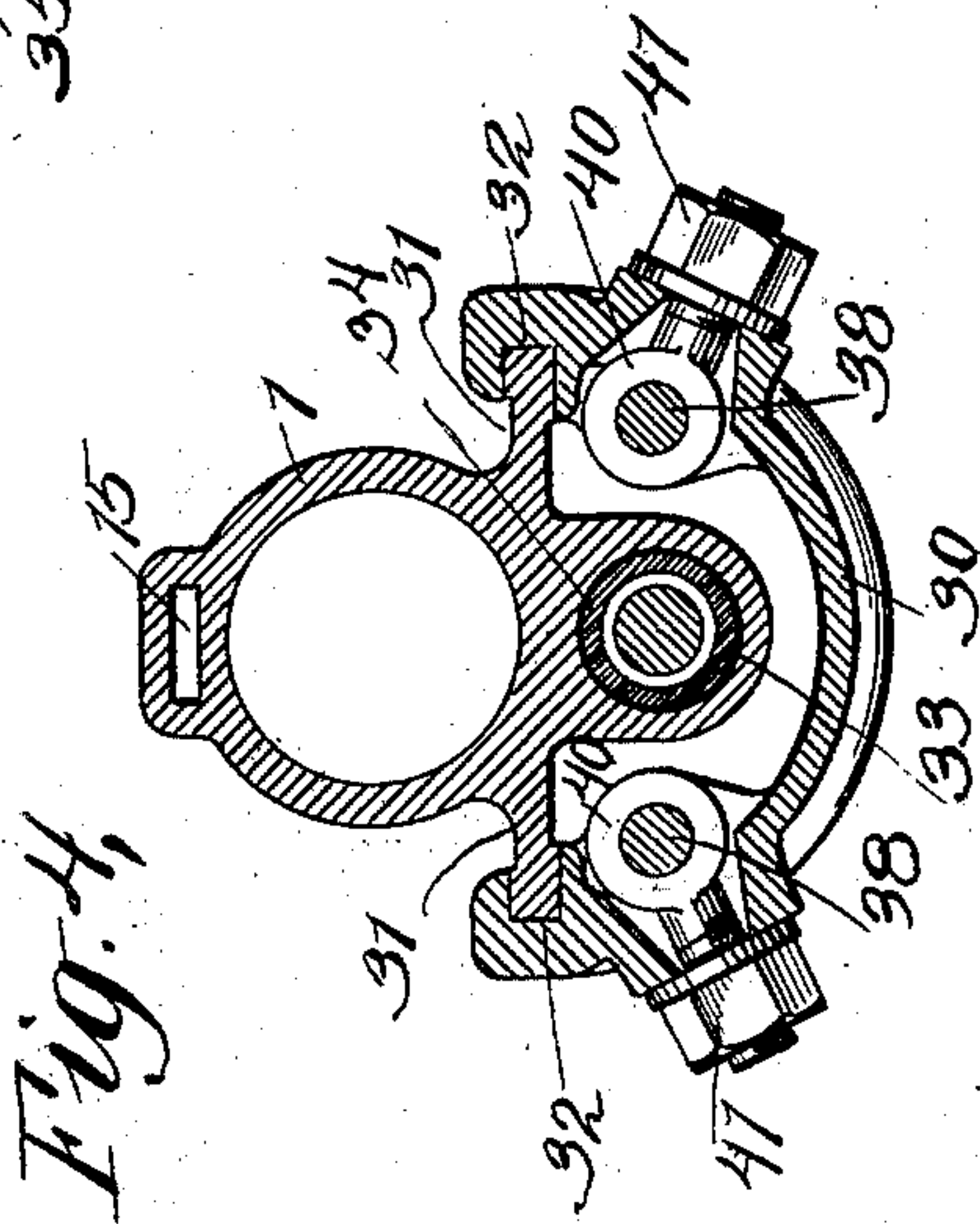
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WITNESSES:
H. M. Seamans.
J. V. Scott



INVENTOR
Robert L. Rickman
BY
Dwight Megrath & Waples
ATTORNEYS

UNITED STATES PATENT OFFICE.

ROBERT L. RICKMAN, OF DENVER, COLORADO, ASSIGNOR TO THE RICKMAN DRILL AND CHANNELLER COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

VALVELESS ENGINE FOR DRILLS.

SPECIFICATION forming part of Letters Patent No. 712,597, dated November 4, 1902.

Application filed October 9, 1901. Serial No. 78,101. (No model.)

To all whom it may concern:

Be it known that I, ROBERT L. RICKMAN, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain
5 new and useful Improvements in Valveless Engines for Drills, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

10 My invention relates to drills; and it consists in improvements in the general construction thereof, in the means for rotating the tool, in the lubricating means, in the feeding means, and, further, in the combinations
15 of elements and construction and arrangement of parts, which with their attendant objects and advantages will be fully set forth hereinafter and the novel features thereof specifically defined in the claims at the end
20 of this specification.

The invention will be understood upon reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section
25 showing the power-cylinder with its piston, the lubricator, the feed-screw, and a swivel-clamp by which the guide-shell is adapted to be attached to any suitable support. Fig. 2 is a transverse sectional view on line II II,
30 Fig. 1, looking in the direction of the arrow. Figs. 3 and 4 are vertical sectional views taken on lines III III and IV IV, respectively, of Fig. 1.

Similar reference characters refer to similar parts throughout the several views.

Parts shown, but not specifically described, are of usual and well-known construction or involve only questions of ordinary machine design.

40 Referring now first to Fig. 1, 1 is the cylinder or power chamber, upon which is bolted a cap-piece 2, adapted to close the inlet-port 3. This cap is tapped to receive the threaded end of inlet-pipe 4, which may communicate with any suitable source of power. Located in said inlet-pipe and suitably supported so that it may be rotated therein is a stop
45 cock or valve 5, having an inlet-passage 6 therethrough. At the upper side this valve

is extended to form a lubricant-chamber 7, 50 having a suitable closing-plug 8. From the bottom of the lubricant-chamber a passage 9 leads substantially at right angles to the passage 6 and communicates with the main inlet-pipe. I have shown inlet-pipe 4 as bent 55 at right angles and the valve located in the horizontal part of said pipe. However, by a simple readjustment the valve may be located in the vertical part of said pipe. It is to be understood throughout that while I describe a preferred embodiment of my invention I am not limited thereto, as many changes may be suggested in design and construction and arrangement of parts which would not involve a departure from my invention. It will 65 be obvious that with this construction of lubricator when the plug is turned to admit the motive fluid, preferably air, the oil is turned off, and vice versa. I thus provide a construction such that the piston is automatically oiled every time the operator stops the drill, and as these drills are run but a few minutes at a time the device will be thoroughly oiled without the attention of the operator. Where the operator has to remove 75 the oil-plug in order to oil the parts, it means both delay, negligence, and in the latter case destruction to the working parts.

One end of the cylinder 1 is closed by a screw-plug 10, which may be provided in its inner 80 face with a rubber buffer 11 to act in case of emergency when the stroke of the piston is not properly cushioned by the air-supply. The forward end of the cylinder is closed by the split gland 12, which carries a packing- 85 ring 13, and is held in the end of the cylinder by screw-cap 14. In addition to the inlet-port 3, to which air is admitted from the inlet-pipe, the cylinder has admission-ports 15 16 at each end of the cylinder and exhaust- 90 ports 17 18, the purpose and use of which are well understood in the art. The piston A, the end of which passes through split gland 12, carries a chuck 19 of any desired form for the attachment of the drill-steels. Within 95 the cylinder the piston is so constructed as to have two parts of substantially the diameter of the cylinder, as at *a* and *b*, with a part

of smaller diameter between, shoulders *c p* being formed thereby. This construction is such that in the reciprocation of the piston by the conjoint action of the admission-ports, exhaust-ports, and shoulders the piston acts of itself to admit and cut off the motive fluid without the aid of any subsidiary valves. Suitable packing-rings, spring-pressed or of spring material, may be used where desired to prevent leakage. Between the two shoulders *c d* on the piston and where said piston is reduced in diameter a ratchet wheel or ring 20 is placed thereon, which is restrained from longitudinal movement by the retaining-rings 21 21. These retaining-rings may be held in position within the cylinder by pins which fit into grooves 22 on the sides of the retaining-rings and into corresponding grooves in the side of the cylinder, as will be readily understood. The inner wall of the ratchet-ring is provided with a number of spiral tongues 23, which fit into a corresponding number of spiral grooves 24 in the piston. Pawls 25 26 are pivoted on the pin 27, which extends across the inlet-port 2, and are held in position by springs 28, resting in sockets in the side of the cylinder and bearing against arms 29, rigid with the pawls. These pawls prevent movement of the ratchet-ring in one direction, and thus as the piston moves forward the spiral tongues will cause the ratchet to revolve upon said piston; but as the piston moves backward the ratchet will be held by the pawls, and thus the piston will be forced to revolve within the ratchet.

In constructions known in the art the pawl and ratchet used as a means for rotating the piston have been located at the end of and outside the cylinder. The advantages of my construction, wherein the ratchet is located intermediate the length of the piston and within the power-chamber, reside in the fact that the piston and the ratchet can be oiled at the same time instead of necessitating separate lubricating devices. The drill is rendered more compact and better balanced, since the cumbersome housing projecting from one end of the cylinder, which tends to seriously interfere with the proper balancing of parts necessary in constructions of this sort, is done away with. In my construction the end of the cylinder can be tightly and strongly closed, whereas in the old construction, wherein a long pin connected with the ratchet must project through into the end of the cylinder and into the center of the hollow piston, it was difficult to secure a proper closure of the end of the cylinder, and the ratchet was located in such position that it was constantly subject to strain from the blows of the piston, the general construction being weak and faulty.

In order to feed the drill forward, a suitable guide-shell 30 is provided. On the sides of the cylinder are two wings or guides 31, which fit into grooves 32 in the guide-shell, and on the under side of the cylinder is a lug

33, through which passes the feed-screw nut 34, flanged at one end and threaded at the other for the reception of suitable lock-nuts, by which it is held in position within the lug. Feed-screw 35, having handle 36, is attached to feed-screw yoke 37, which is secured to the guide-shell by means of two extension-rods 38 38. These extension-rods, which may be termed "extension-arms" or "adjustable arms," pass through lugs 39 on the inner side of the guide-shell, and eyebolts 40 40, passing through the guide-shell between said lugs and encircling said extension-rods with their eyes, are adapted to clamp the extension-rods in any desired position with reference to the guide-shell. If it is desired to increase the length of feed, as for the purpose of permitting the operator to change from short to long drill-steels, the extension-rods may be drawn out and clamped at any desired distance, whereby any desired length of feed is secured. The ease with which this may be done will be apparent upon inspection of Figs. 2 and 4. By simply loosening the nuts 41 on the ends of eyebolts 40 the extension-rods are left free to be adjusted as desired, and by turning down the nuts they can be clamped with any degree of rigidity. Thus the necessity of a long feed-screw and guide-shell is obviated and the operator can change the drill quickly without changing the position of the guide-shell. The guide-shell may be turned to any desired angle on the swivel-clamp B and rigidly held in such position by means of two stud-bolts, as shown in Fig. 1.

It will be obvious that the construction of guide-shell herein may be utilized in various connections in which it is desired to feed a guided member with relation to a guiding member.

It is believed that the operation is sufficiently clear from the description already given. While I have described this invention in connection with a drill, it should be noted that various features herein described are of general application and may be used with tools and constructions of various sorts.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a motor, an inlet-pipe, a valve therein, a lubricant-chamber in connection with such valve and a lubricant-passage in such valve communicating with the inlet-pipe and with said chamber and being in such relation to the valve-inlet passage that as the one passage is opened to communicate with the motor the other is closed.

2. In a motor, an inlet for motive fluid, a valve in said inlet, a lubricant-chamber in connection with such valve and a lubricant-passage in such valve at an angle to the inlet-passage for the motive fluid such that as one passage is opened the other is closed.

3. In a drill, a cylinder, a piston, a ratchet for rotating such piston, and a single means for supplying a lubricant both to the ratchet and to the piston.

4. In a drill, a cylinder, a piston, a ratchet for rotating such piston, and means whereby a lubricant is supplied simultaneously to the ratchet and piston from a common source.

5. In a motor, an inlet-pipe for motive fluid, a stop cock or valve in said pipe, and a gravity-feed lubricant-passage in such valve communicating with a suitable source of supply, the relation between the motive-fluid inlet and the lubricant-inlet being such that the one is closed as the other is opened.

6. As a new article of manufacture, a valve-plug having therein the usual inlet-passage, an extension on said plug forming a lubricant-chamber, and a passage from said lubricant-chamber extending through the plug at an angle to said inlet-passage so that one passage will be opened as the other is closed by the revolution of the plug in a suitable seat.

7. In combination, pipe 4, valve-plug 5 having chamber 7 in connection therewith, passage 9 leading from said chamber, and the usual inlet-passage 6 therethrough, substantially as and for the purpose described.

8. In combination, the cylinder 1 having an inlet-port 3, piston A, ratchet 20 located on said piston beneath said inlet-port, pipe 4 opening into said inlet-port, and a lubricating device in said pipe whereby the lubricant may be supplied to the piston and to the ratchet at the same time.

9. In a valveless drill, a power-chamber having suitable ports for the passage of motive fluid, a piston having suitable shoulders for controlling said ports, and means for rotating said piston located on said piston between said shoulders.

10. In a valveless drill, a power-chamber having suitable ports for the passage of motive fluid, a piston having suitable shoulders for controlling said ports, and means for rotating said piston located on said piston within said power-chamber.

11. In a drill, a cylinder having suitable ports for the passage of motive fluid, a piston having a reduced central portion adapted to control said ports, a ratchet-ring mounted upon said reduced central portion, coacting tongues and grooves upon said piston and the inner wall of said rings, and pawls arranged in connection with such ratchet to prevent rotation thereof in one direction.

12. In a drill, a cylinder, a piston reciprocable within such cylinder and having a reduced central portion, a ratchet-ring located upon such reduced central portion, coacting spiral grooves and tongues located upon the inner wall of said ratchet and upon said reduced portion of the piston, and means for preventing the rotation of said ratchet in one direction.

13. In a valveless drill, a cylinder having a suitable inlet, admission and exhaust ports, a piston having a reduced central portion and adapted to control said ports, a ratchet-ring located upon said reduced central portion, pawls for restraining the movement of said

ratchet in one direction, and connections between said piston and said ratchet whereby as the piston is reciprocated it is intermittently rotated.

14. In a valveless drill, a cylinder having a suitable inlet, admission and exhaust ports, a piston having a reduced central portion and adapted to control said ports, a ratchet-ring located upon said reduced central portion, corresponding spiral ribs and grooves on the inner wall of said ring and on said piston, and a pawl engaging said ratchet, whereby as the piston is reciprocated it is intermittently rotated.

15. In combination, piston A having grooves 24 thereon, ratchet 20 having ribs 23, pawls 25, 26 in connection with said ratchet, and means for reciprocating said piston.

16. In a device of the class described, in combination, a guiding and a guided member, extension-arms adjustably connected to such guiding member, a yoke carried by said adjustable arms, and a feeding device for said guided member supported by said yoke.

17. In a device of the class described, a guiding and a guided member, extension-arms carried by said guiding member and adapted to be adjustably clamped thereto, a yoke carried by said arms, a feed-screw carried by said yoke and a coacting feed-nut upon said guided member.

18. In a device of the class described, a guiding and a guided member, extension-arms carried by said guiding member and adapted to be adjustably clamped thereto by means of eyebolts passing through said guiding member, a yoke carried by said extension-arms, a feed-screw carried by said yoke, and a coacting feed-nut on said guided member.

19. In combination, in a device of the class described, a cylinder, a guide-shell on which said cylinder is reciprocable, a feed-nut on said cylinder and a feed-screw connected to said guide-shell, said connections comprising extension-rods and eyebolts by which said extension-rods may be adjustably clamped to said guide-shell.

20. In a device of the class described, in combination, a cylinder, a guide-shell therefor, a feed-nut in connection with said cylinder, extension-rods adapted to be adjustably connected to said shell by eyebolts, and a feed-screw carried by said extension-rods and passing through said feed-nut.

21. In combination, a cylinder, a guide-shell 30 therefor, extension-rods 38 clamped to said guide-shell by eyebolts 40, yoke 37 carried by said extension-rods, feed-screw 35 connected to said yoke, and feed-nut 34 connected to said cylinder.

In testimony whereof I affix my signature in the presence of two witnesses.

ROBERT L. RICKMAN.

Witnesses:

B. D. GREEN,
E. B. ANNIS.