S. FERGUSON.

ROCK DRILL.

APPLICATION FILED AUG. 24, 1908.

925,765.

Patented June 22, 1909.

4 SHEETS—SHEET 1.

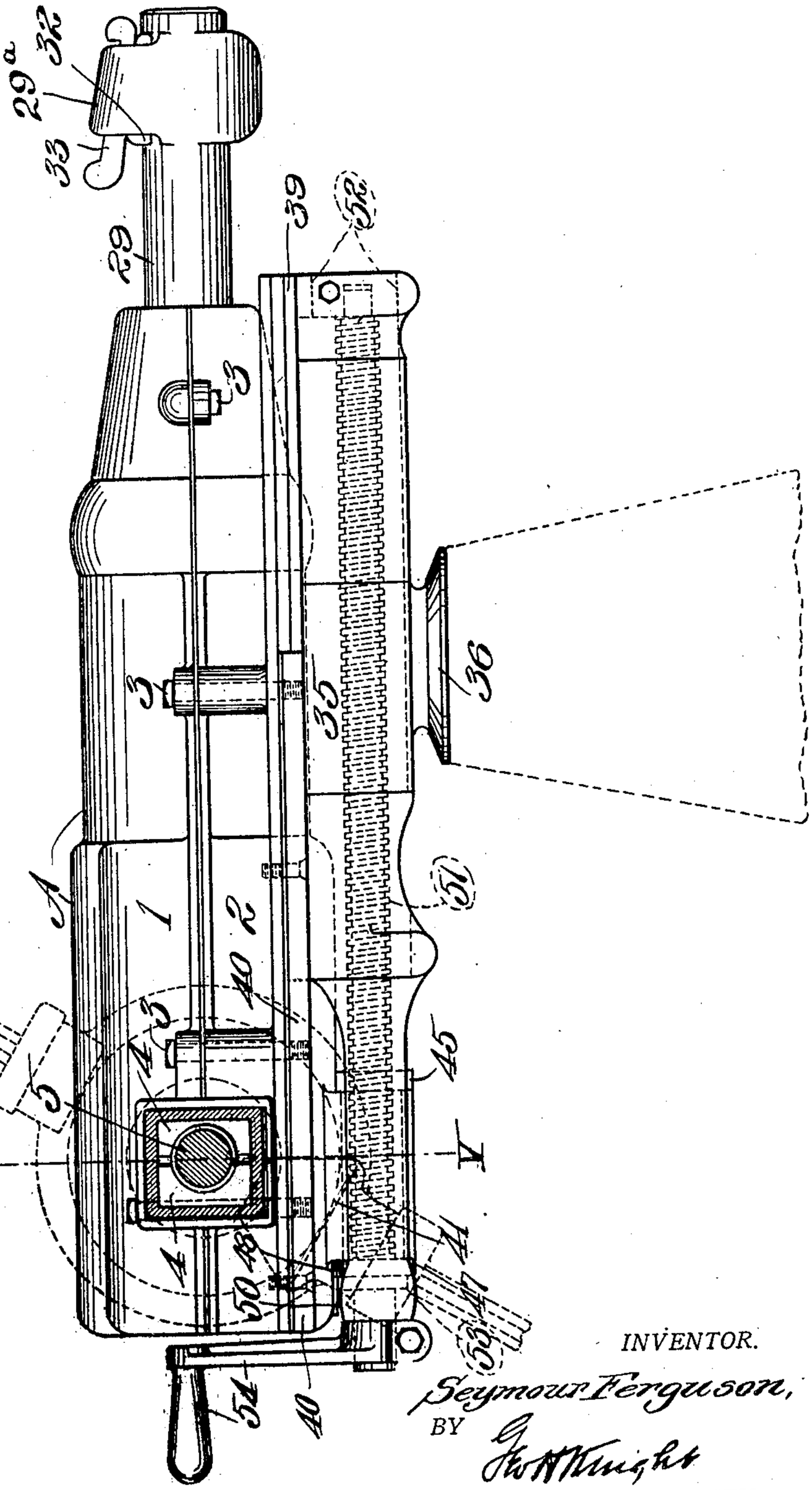

Fig. 1.

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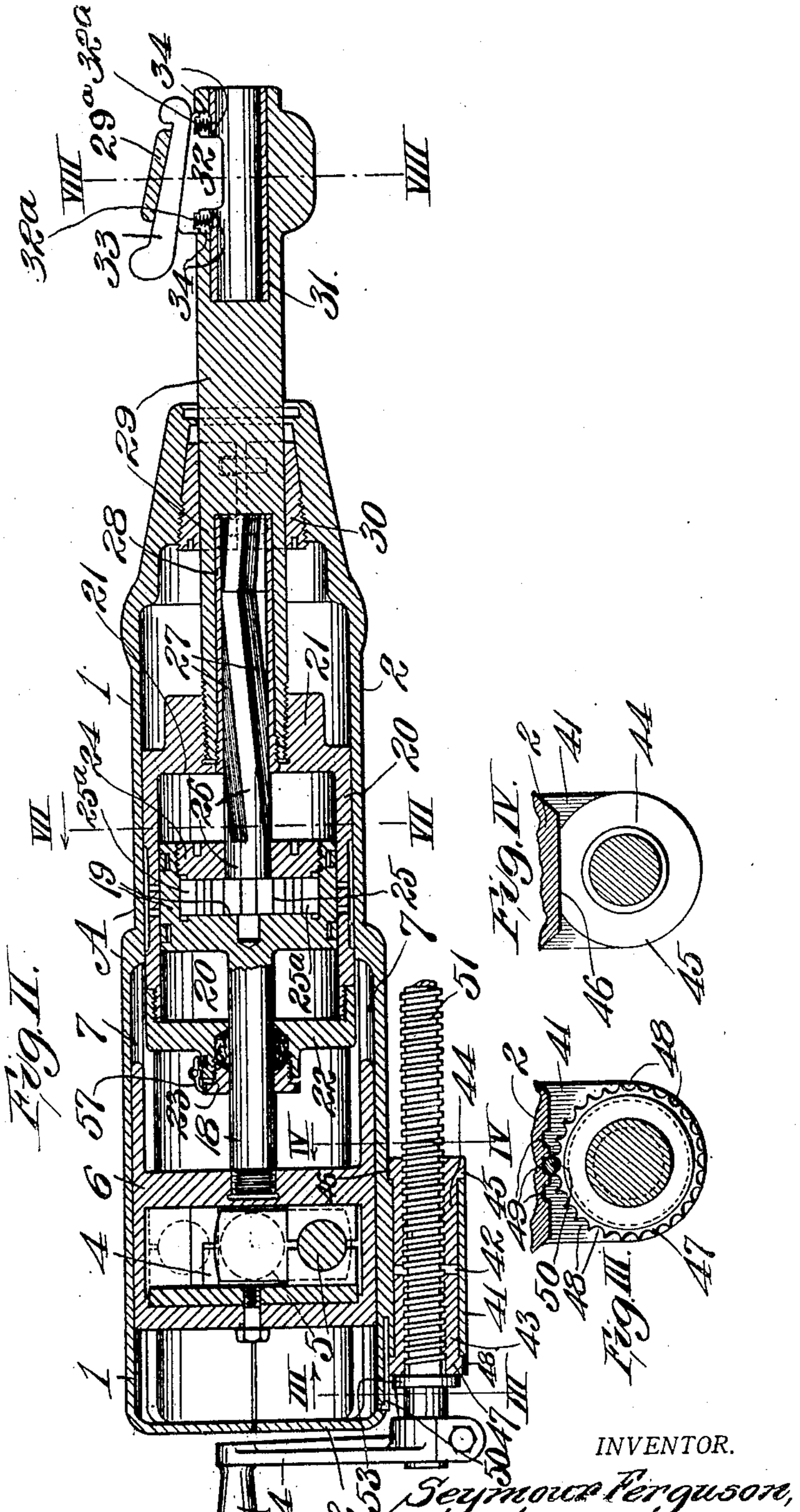

Fig. II.

Fig. IV.

Fig. V.

Fig. III.

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4 SHEETS—SHEET 3.

Fig. VI.

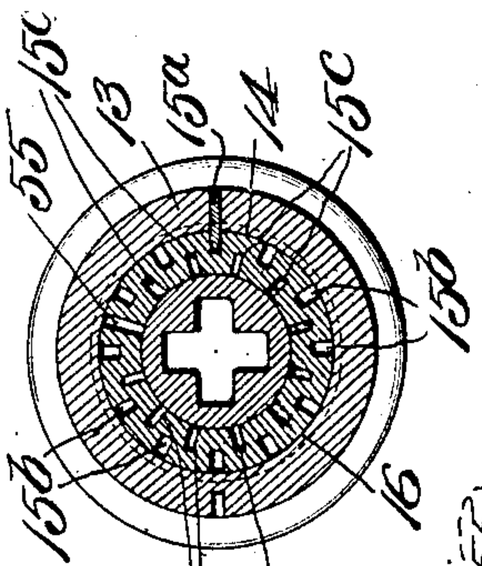

Fig. V.

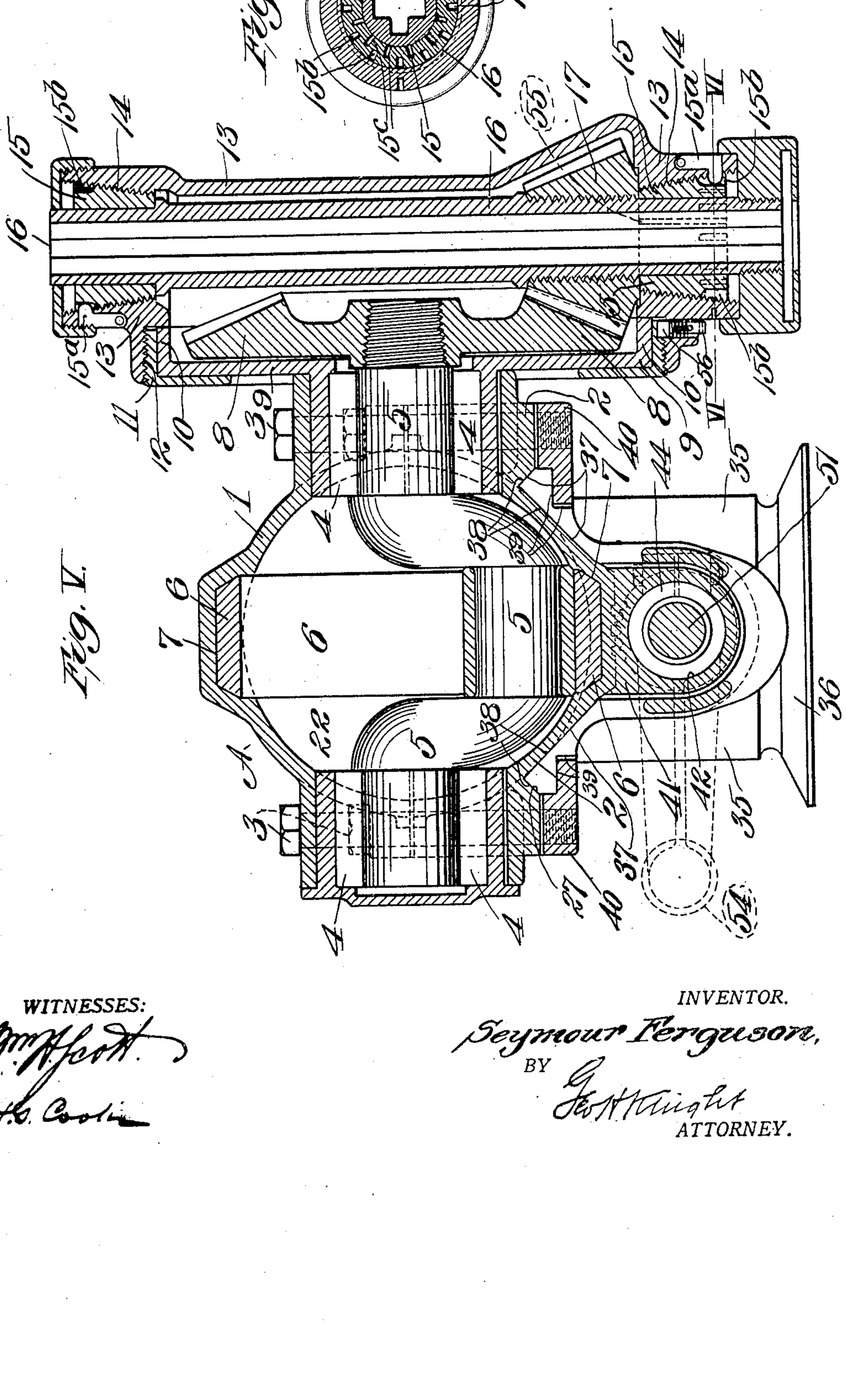

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Fig. VIII.

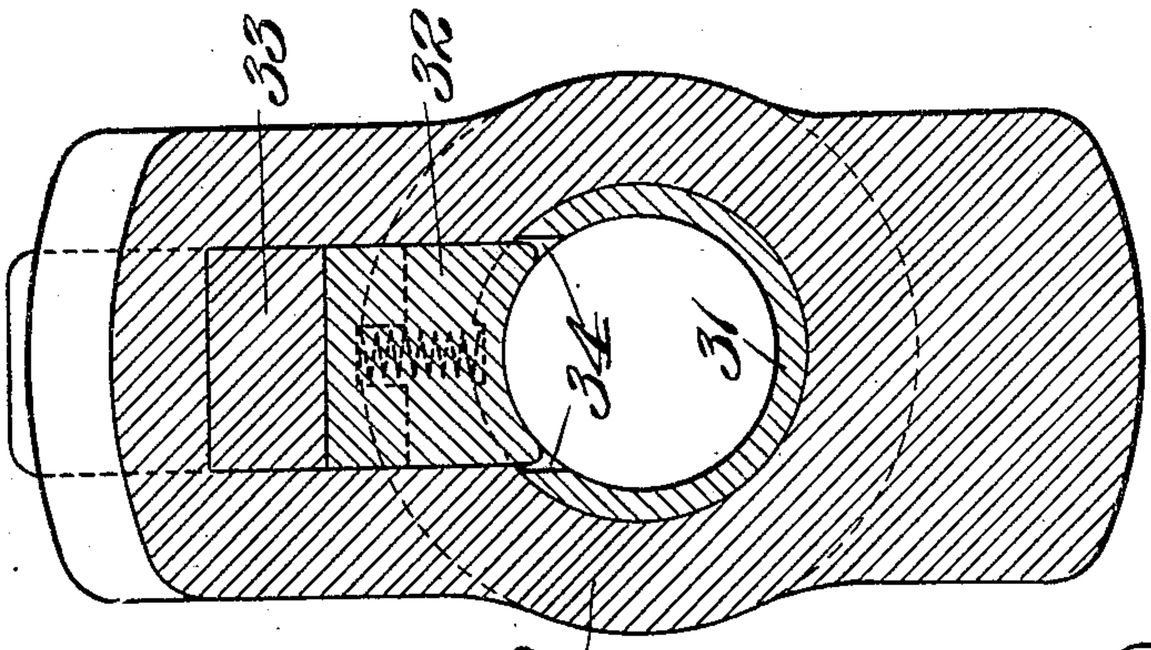
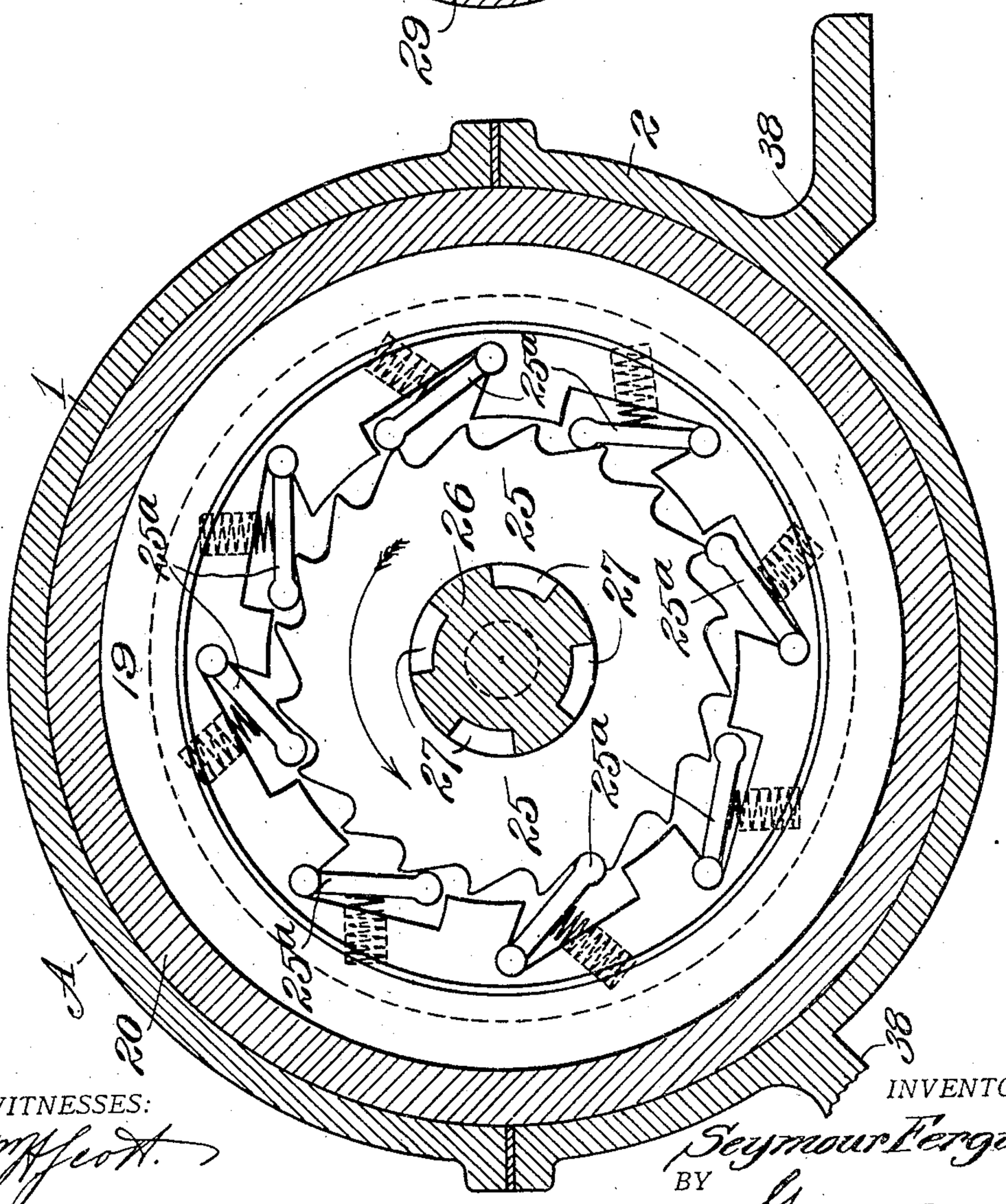


Fig. III.



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UNITED STATES PATENT OFFICE.

SEYMOUR FERGUSON, OF OCOTOLAN, OAXACA, MEXICO.

ROCK-DRILL.

No. 925,765. Specification of Letters Patent. Patented June 22, 1909.

Application filed August 24, 1908. Serial No. 449,959.

To all whom it may concern:

Be it known that I, SEYMOUR FERGUSON, a citizen of the United States of America, residing at the city of Ocotolan, in the State of Oaxaca, Mexico, have invented certain new and useful Improvements in Rock-Drills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a new and useful improvement in rock drills, the same being particularly, but not necessarily designed for mining purposes, and has for its object to produce an inexpensive and practicable device of that character and one which is susceptible of various adjustments for purposes hereinafter to be explained.

The invention further consists in the novel features of construction, arrangement and combination of the several parts all of which will hereinafter be described and afterward pointed out in the claims.

Figure I is a side view partly in elevation and partly in section of the drill casing, its support and other parts connected thereto, the driving mechanism being omitted. Fig. II is a vertical longitudinal section of the drill casing, its contained parts and other parts connected thereto. Fig. III is an enlarged detail transverse section taken on line III—III of Fig. II. Fig. IV is an enlarged detail transverse section taken on line IV—IV of Fig. II. Fig. V is an enlarged transverse section taken on line V—V of Fig. I. Fig. VI is a horizontal section taken on line VI—VI, of Fig. V. Fig. VII is an enlarged transverse section taken on line VII—VII, of Fig. II, the removable piston head being omitted. Fig. VIII is an enlarged transverse section taken on line VIII—VIII, of Fig. II.

In the drawings, A designates the casing of the drill proper which is preferably formed of two semi-cylindrical upper and lower sections 1 and 2 respectively, their meeting edges being preferably arranged on a horizontal plane, said sections being secured together by means of bolts 3.

4 designates a pair of sectional journal boxes which are located in suitable recesses formed part in the upper section 1 and part in the lower section 2 of the casing A. These journal boxes receive the ends of a crank shaft 5 the "throw" of which crank shaft is journaled in a reciprocatory cross-head 6 which operates in suitable longitudinal grooves 7 formed in each section of the casing A. One end of the crank shaft 5 extends some distance beyond the side of the casing and has secured thereto in any suitable manner, a bevel gear wheel 8 which is located in a suitable gear housing, one member 9 of which is provided with inwardly disposed flanges which fit, and are secured in place, between the journal boxes 4 and the sections 1 and 2 of the casing. This member 9 of the gear housing is formed with an outwardly disposed annular marginal flange 10 and surrounding said marginal flange and lapping over on the rear face of the member 9 is a ring 11 having an external screw thread 12.

13 designates the other member, or main portion, of the gear housing which has screw threaded connection with the ring 11. Diametrically opposite to each other, and extending at right angles to the axis of the crank shaft 5, are conical screw threaded bores 14 formed in the member 13 which are engaged by suitable conically shaped screw threaded bushings 15 and in which bushings is journaled a hollow shaft 16. This hollow shaft 16 has secured externally thereof a bevel pinion 17 properly positioned to be in mesh with the bevel gear wheel 8 before mentioned. The bore of the hollow shaft 16 is non-circular and is designed to receive a like shaped non-circular driving shaft indicated in dotted lines in Fig. I, the rotation of which imparts, through the instrumentality of hollow shaft 16, bevel pinion 17, bevel gear wheel 8, and crank shaft 5 reciprocatory motion to the before mentioned cross-head 6.

18 designates a piston rod, secured to the forward end of the cross-head 6 in any suitable manner, which is provided upon its forward end with a hollow piston 19 operable in a cylindrical body 20, (see Fig. II). This cylindrical body is provided upon its forward end with an integral head 21 and upon its rearward end with a detachable head 22 which latter is provided with a stuffing box 23 through which the piston rod 18 passes. The hollow piston 19, before referred to, has detachably secured within it a cap or disk 24

and between which disk and the inner wall of the hollow piston is located a ratchet wheel 25. This ratchet wheel has secured to it a piston shaft 26 which passes through a suitable bore formed in the disk 24, said piston shaft being arranged in axial alinement with the piston and piston rod 19 and 18 respectively. This piston shaft 26 is provided with a plurality of spirally arranged grooves 27 which have the appearance of the "rifle-bore" of a gun, said spirally arranged grooves being designed to receive complementary spirally arranged ribs formed in a tube 28, in turn secured within a bore formed in one end of a tool carrying element or chuck 29, which chuck is secured to the integral head 21 of the cylinder 20. This chuck 29 passes through a conical bushing 30 located within, and near the outer end of the casing A and extends some distance there beyond, the same being provided with a cylindrical bore formed in its outer end, which bore receives a section of tubing 31 which in turn is designed to receive the tool proper or chisel. The tool proper or chisel is secured within the tubing 31 by means of a spring actuated block 32 having an inclined upper face which is engaged by a wedge 33 interposed there between and a portion 29^a of the head of the chuck 29. The under face of this block 32 passes through suitable registering slots 34 formed in the tubing 31 and chuck 29, as will be clearly understood from an inspection of Figs. II and VIII of the drawings.

The ratchet wheel 25 before referred to cooperates with a plurality of spring-actuated pawls or dogs 25^a pivoted at one end between the stationary and removable heads respectively of the hollow piston 19. These pawls or dogs are of such a number relative to the number of teeth of the ratchet wheel, with which they coöperate, that at least one of them will always, or very nearly, be in engagement with some one tooth of the said ratchet wheel.

Having now described the major parts of my improved drill, I will now explain the operation of the device up to this point. When the cross head is driven forwardly by the throw of the crank shaft, in the manner previously described, the piston rod 18 and its carried piston head 19 are likewise moved forwardly, the latter operating within the cylindrical body 20, compressing the air between the integral cylinder head 21 and the piston disk 24. After the air between the elements 21 and 24 has been compressed to a certain degree, the movement of the piston will cause the cylinder 20 to move forwardly thereby driving the chuck and its carried chisel outwardly, the latter effecting the desired end sought by this invention. When the piston head, carrying the ratchet wheel and its rifle grooved piston shaft advances, these last two elements are caused to partly rotate in the direction of the arrow shown in Fig. VII, due to the engagement of the said rifle grooves with the complementary ribs carried by the chuck, the latter remaining non-rotatable, due to greater resistances in the form of friction being present, than there is between the ratchet wheel and its coöperating pawls. The ratchet wheel in partly rotating will simply move any or all of the pawls out of its path of movement, and will permit said rifle grooved piston shaft to move inwardly into its rifled bore, the chuck and its carried chisel moving inwardly to the work in a non-rotatable manner. Now, when the cross-head and piston are moved rearwardly, said elements both being non-rotatable, the rifle grooved piston shaft is withdrawn from its rifle bored groove and as the ratchet wheel conjoined to said rifle grooved piston shaft is held against rotation in a direction opposite to the arrow in Fig. IV, by the pawls, the cylinder and its conjoined chuck is caused to partly rotate, thereby causing the chisel to also partly rotate and prevent the cutting end thereof from striking against the rock, or other substance to be drilled, in the same spot in which it previously did when the piston and associate parts again move forwardly.

35 designates a support for the casing A and upon which the latter can be longitudinally adjusted in order to advance the chisel to the work. This support 35 is provided upon its under side with a base 36 designed to rest, and be pivotally mounted, upon a pedestal or tripod, not shown, whereby the device as an entirety can be moved to any desired, approximately, horizontal angle. The support 35 is provided upon its upper face with inclined guide faces 37 designed to receive complementary inclined faces 38 formed on the lower section of the casing A, the said support being also provided with an offset 39 designed to receive guide strips 40 bolted or otherwise secured to the said casing A which guide strip prevents any upward movement of the said casing relative to its support.

41 designates a downwardly extending lug formed preferably integral with the lower section of the casing A said lug being provided with a longitudinally disposed bore 42 and in which bore is arranged two internally screw threaded bushings 43 and 44. The bushing 44 is provided with an outwardly extending flange 45 which rests against the forward end of the lug 41, said flange being formed with a flat upper face 46 which rests against the flat face formed upon the under face of the lower section of the casing A and by which construction the said bushing 44 is rendered non-rotatable in the bore 42. The bushing 43 is provided with an outwardly extending flange 47 which rests against the

rearward end of the lug 41, the said flange being provided with a plurality of peripherally arranged notches 48.

49 designates a plurality of notches formed in the under face of the lower section of the casing A, said notches being arranged in juxtaposition to the notches 48 of the bushing 43 and when one of the said notches 48 is brought into registration with one of the notches 49 a key or pin 50 is introduced into said notches and rotary movement of the bushing is thereby prevented.

51 designates a feed screw which is arranged preferably below and parallel with the casing A, its forward end being journaled in a thrust-block 52 carried by the forward end of the support 35. This feed screw also engages the screw threaded bushings 43 and 44 mounted in the bore of the lug 41 and is provided with an integral collar 53 which acts as a stop to limit the outer movement of the casing A and its carried parts.

54 designates an operating handle or crank suitably secured to the rearmost end of the feed screw 51 and by which the latter is rotated in order to move the casing A forwardly and backwardly. The conically shaped screw threaded bushings 15 before referred to are formed with a longitudinal slit or saw kerf 55 (see Fig. VI) whereby the inner bore thereof can be reduced in diameter, when said bushings are properly adjusted, in order to compensate for wear of the rubbing surfaces there between and the hollow drive-shaft 16. These bushings are held in proper adjusted position by means of a dog 15^a pivoted to the gear housing, which engage one of a plurality of notches 15^b formed in the outer external ends of said bushings (see Fig. V).

The bushing 30 before referred to is made of two sections, held together against independent longitudinal movement relative to each other with dowel pins or holes (see dotted lines in Fig. II) and when it is desired to compensate for wear between the sections of said bushing and the chuck, the upper section of the casing A is removed and the bushing as an entirety rotated in the proper direction to cause said bushing to adequately fit the chuck, after which the said upper section of the casing is properly replaced.

56 designates a spring actuated bolt mounted in the gear housing which is designed to engage one of a plurality of notches formed in the outer face of the ring 11, the purpose of which is to lock together the two elements, *i. e.* the gear housing and ring 11. It will be observed from an inspection of Fig. III of the drawings that the driving shaft is permitted to occupy varying degrees of angles relative to the casing and its carried parts by simply partly rotating the gear housing proper relative to its support.

57 designates a spring actuated dog pivoted to the removable head 22 of the cylinder 20 one end of which engages one of a plurality of notches formed in the stuffing box gland, the purpose of said dog and its cooperating notches being to prevent the gland from unscrewing which would spoil the effectiveness of the packing.

In addition to what has already been said with reference to the elements which clamp the tool or chisel to the chuck 29, I might mention that the springs 32^a upon which the block 32 rests are for the purpose of raising said block clear of the tool or chisel when the wedge 33 is retracted, in order that the said tool or chisel will have free movement in the tubing 31 for its ready removal or insertion and furthermore that owing to the particular inclination of the said wedge 33 and the upper inclined face of said block 32 that the impact of said tool against its work will tend to drive said wedge more tightly in place, thereby insuring against any accidental displacement of the said tool or chisel.

Referring again to the bushings 15 shown in Figs. V and VI of the drawing, it will be observed that I have formed a plurality of longitudinally disposed internally arranged slits or saw kerfs 15^c, the function of which is to permit of the bushings having more elasticity when adjusting the same, whereby they will allow the interior bore of said bushings to more nearly contact with the entire surface of the drive shaft for which they form bearings.

I claim:

1. The combination of a casing, a reciprocatory crosshead guided in the casing, a crank shaft journaled in the casing, and having its throw working in the crosshead, a sliding cylindrical body located in advance of the crosshead, a tool carrying chuck connected with the cylindrical body and extending through the casing, a hollow piston sliding within the cylindrical body, having a piston rod extending through the rear end of the cylindrical body and connected with the crosshead and a piston shaft extending from the piston and through the forward end of the cylindrical body and having spiral groove and rib connection with the tool carrying chuck, a ratchet wheel fixed to the piston shaft and confined within the piston and pawls hinged to the piston and adapted to engage the ratchet wheel.

2. The combination of a casing having longitudinal grooves and journal box recesses, journal boxes located in the recesses, a reciprocatory crosshead guided by the longitudinal grooves, a crank shaft journaled in the journal boxes, and having its throw working in the crosshead, a sliding cylindrical body located in advance of the crosshead, a tool carrying chuck connected with the cylindrical body and extending through the casing, a hollow piston sliding within the

cylindrical body, having a piston rod extending through the rear end of the cylindrical body and connected with the crosshead and a piston shaft extending from the piston and through the forward end of the cylindrical body and having spiral groove and rib connection with the tool carrying chuck, a ratchet wheel fixed to the piston shaft and confined within the piston, and pawls hinged to the piston and adapted to engage the ratchet wheel.

SEYMOUR FERGUSON.

In the presence of—
LILY ROST,
E. M. HARRINGTON.