No. 776,613. PATENTED DEC. 6, 1904.

L. S. PFOUTS.

ROCK DRILLING MACHINE.

APPLICATION FILED FEB. 29, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

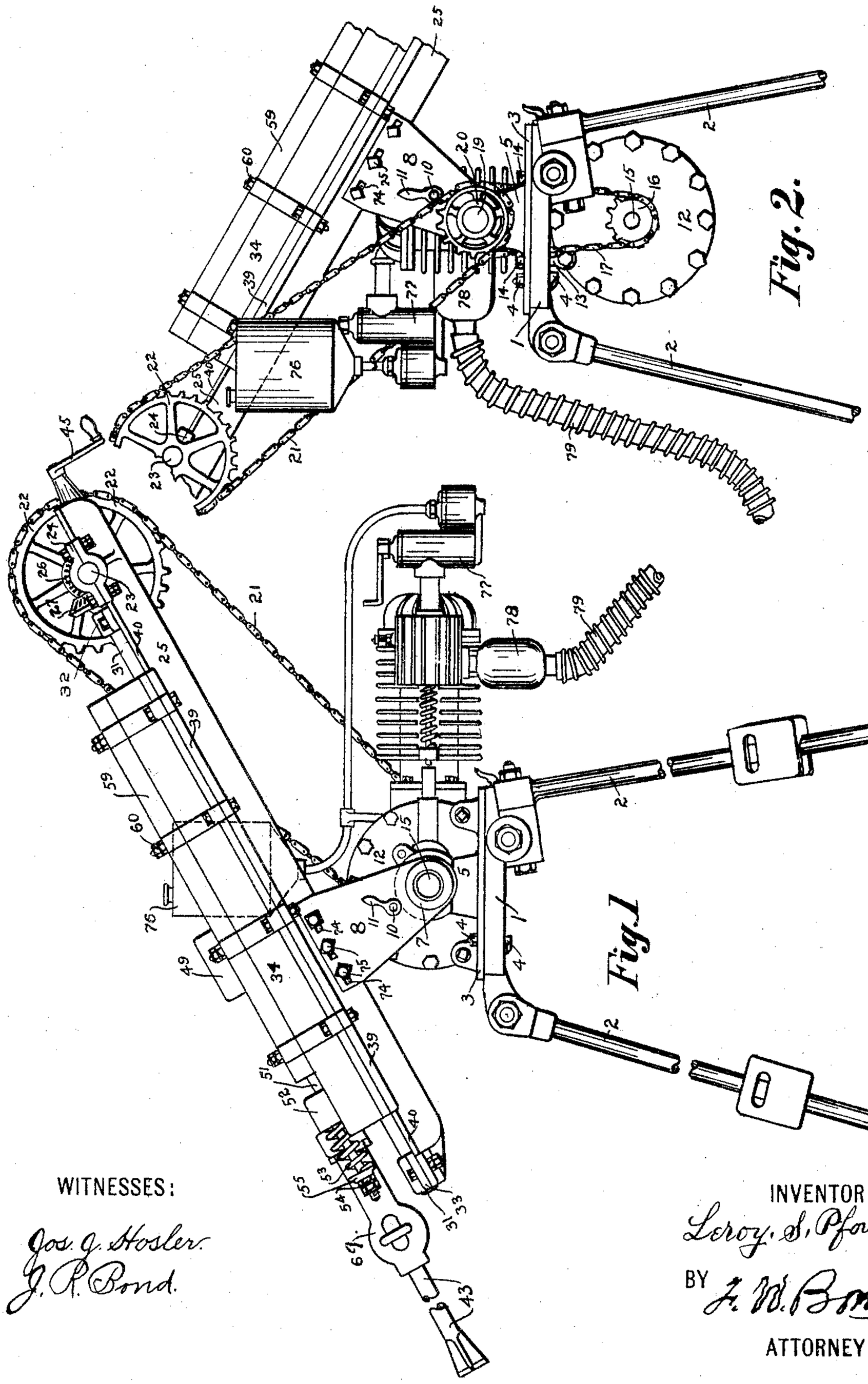


Fig. 2.

Fig. 1

WITNESSES:

Jos. J. Hosler.

J. R. Bond.

INVENTOR

Leroy S. Pfouts.

BY F. W. Bond

ATTORNEY

No. 776,613. PATENTED DEC. 6, 1904.

L. S. PFOUTS.

ROCK DRILLING MACHINE.

APPLICATION FILED FEB. 29, 1904.

NO MODEL. 3 SHEETS—SHEET 2.

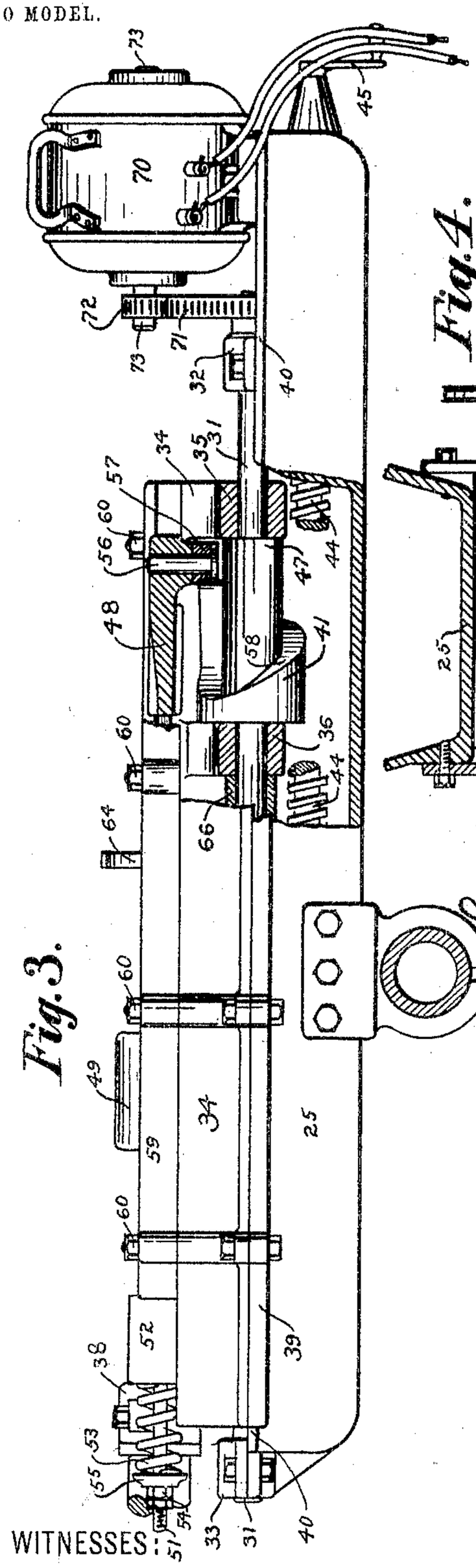


Fig. 3.

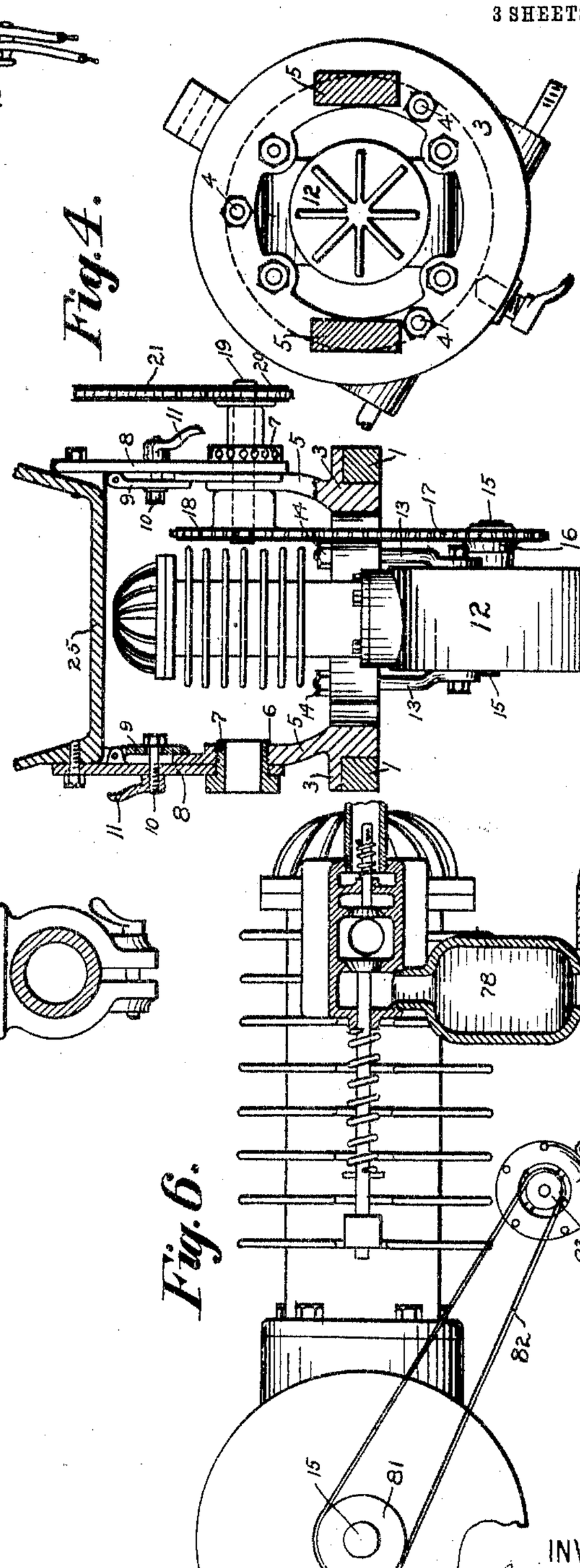


Fig. 4.

Fig. 5.

Fig. 6.

WITNESSES:

Joseph. J. Hosler.

J. R. Bond.

INVENTOR

Leroy. S. Pfouts.

BY F. W. Bond

ATTORNEY

No. 776,613. PATENTED DEC. 6, 1904.

L. S. PFOUTS.

ROCK DRILLING MACHINE.

APPLICATION FILED FEB. 29, 1904.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 8.

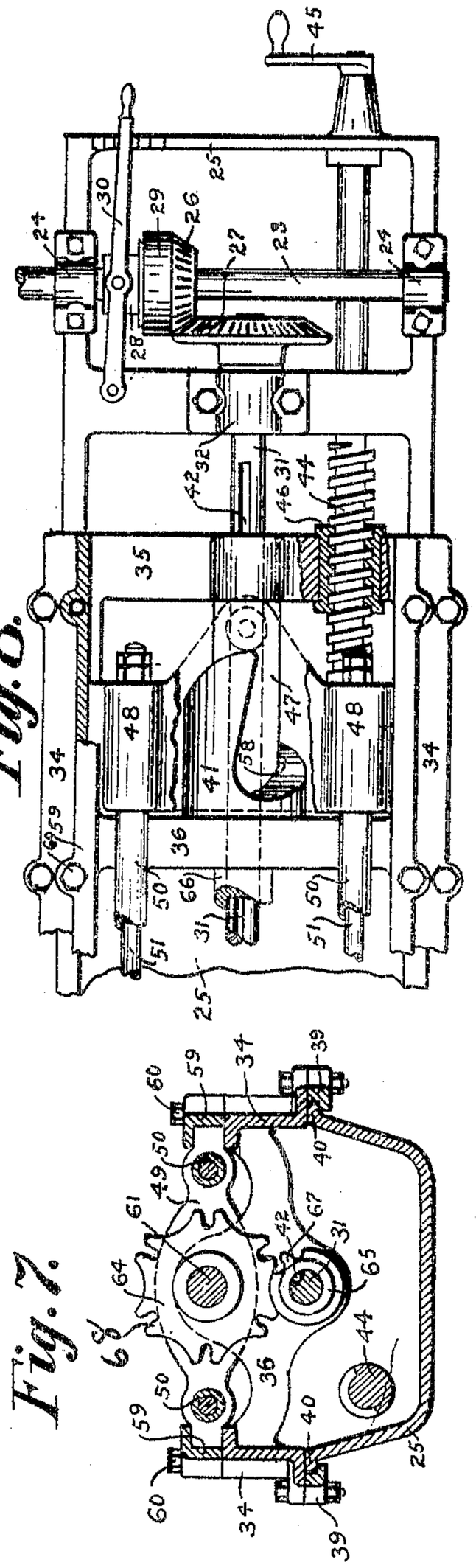
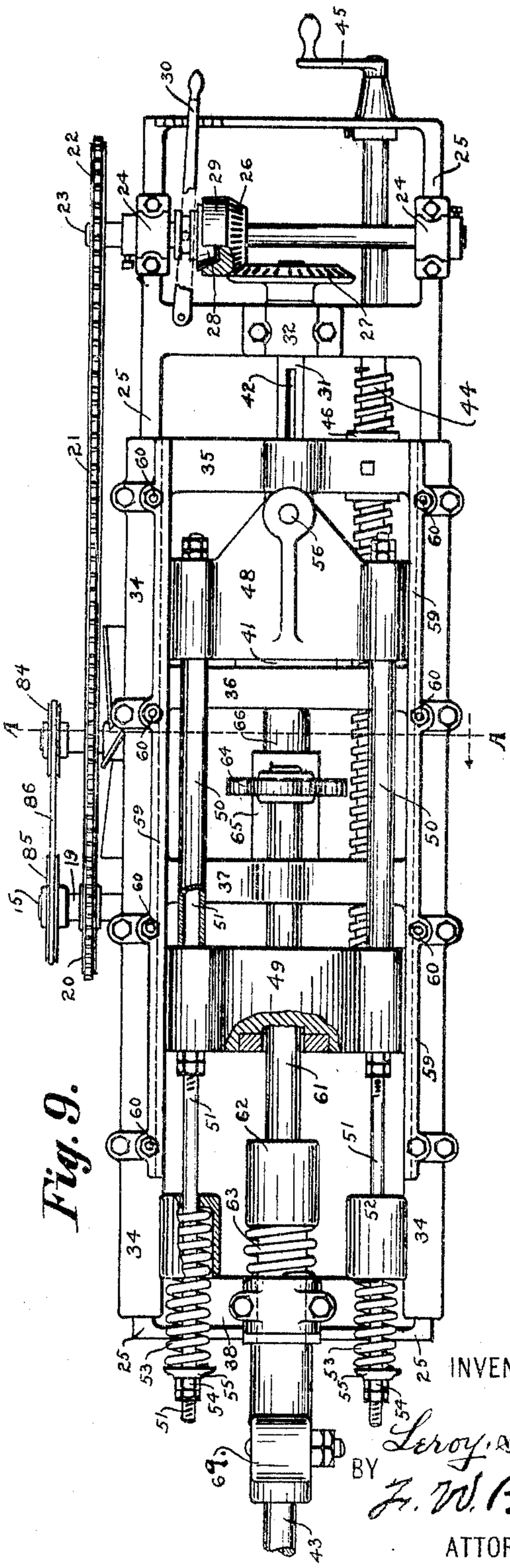


Fig. 7.

Fig. 9.



WITNESSES:

Joseph J. Hosler.

J. R. Bond.

INVENTOR

Leroy S. Pfouts

BY F. W. Bond

ATTORNEY

No. 776,613. Patented December 6, 1904.

UNITED STATES PATENT OFFICE.

LEROY S. PFOUTS, OF CANTON, OHIO, ASSIGNOR OF ONE-HALF TO THOMAS F. TURNER, OF CANTON, OHIO.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 776,613, dated December 6, 1904.

Application filed February 29, 1904. Serial No. 195,945. (No model.)

To all whom it may concern.

Be it known that I, LEROY S. PFOUTS, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Rock-Drilling Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in rock-drilling machines; and the object of my invention is to provide what might be termed a "self-contained" machine—that is to say, the motor is supported and carried by the tripod or other support which carries the mechanism for operating the drill and the construction being such that it can be moved from place to place without detaching any of the parts or can be set up and operated without any outside source of power. Heretofore in rock-drills, and especially drills designed for prospecting, it has been customary to supply power from some source outside from the drill mechanism proper wherein the drill is not operated direct by the action of the explosion.

A further object of the present invention is to provide a drilling-machine in which the work is done by successive blows delivered to the drill-bar by a hammer.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation showing the drill and its mechanism located in an inclined position and showing the motor in a horizontal position. Fig. 2 is a side elevation showing a portion of the drill mechanism and illustrating the motor in a perpendicular position. Fig. 3 is a side elevation of the drill-operating mechanism, showing the same detached from its pivotal support and illustrating an electric motor for operation. Fig. 4 is a sectional view of the engine-support and illustrating the manner of transmitting the power from the engine to the drill. Fig. 5 is a top view of the support, showing the drill mechanism removed. Fig. 6 is a side elevation of the motor, showing the parts broken away to illustrate the valve-chambers and illustrating the exhaust-chamber in section also showing the fan for driving exhaust away and the the proper pipe connection leading from the exhaust-chamber. Fig. 7 is a transverse section on line A A, Fig. 9, except that line A A is extended through the drill-transmitting mechanism. Fig. 8 is a top view of the lower end or portion of the drill-frame, illustrating the hammer-operating cross-head and cam for operating the hammer cross-head. Fig. 9 is a top view of the drill mechanism, showing all of the parts properly arranged with reference to each other and illustrating the hammer-head broken away and showing one of the spring-casings broken away, also showing one of the spacing-tubes broken away.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

In the accompanying drawings, 1 represents the motor-support, which is held in proper elevation by the legs 2, which legs are pivotally connected to the support and are constructed and connected in the usual manner, a description of said parts being deemed unnecessary here owing to the fact that the motor-support or tripod form no particular part of the present invention except that the motor is carried by the tripod.

Upon the support 1 is located the turn-table plate 3, which is properly fitted to the support 1, so that it can be rotated in a horizontal plane, or substantially so, and for the purpose of preventing the turn-table 3 from becoming accidentally detached from its support the hook-bolts 4 are provided. The turn-table plate 3 is provided with the integral upright members 5, which members are spaced apart to allow the motor to be placed between said support. The upright members 5 are provided with apertures 6, which apertures are for the purpose of receiving the hollow coupling-thimbles 7, to which coupling-thimbles are connected the drill-frame-carrying mem-

bers 8. It will be understood that by connecting the drill-frame supports 8 to the turn-table members 5, as just above described, the drill-frame supports and the drill-frame can be turned at any desired inclination to a horizontal line and that by connecting the turn-table plate to the motor-support the drill-frame can be turned at any angle in a horizontal plane, thereby providing a universal movement as between the motor, its support, and the drill-frame proper, by which arrangement I am enabled to bring the drill into operative position regardless of its inclination or its horizontal position.

For the purpose of holding the drill-frame at any desired point of adjustment the hinged clamping-plates 9 are provided, which clamping-plates are supported by the drill-frame-carrying members 8, and their bottom or lower ends bear against the upright members 5 when clamped against the inner faces of said members by means of the screw-threaded bolts 10 and their nuts 11.

The motor 12 is suspended from the bolts 13, which bolts extend upward and pass through the turn-table plate 3. The top or upper ends of the bolts 13 are provided with the nuts 14, by which arrangement the motor can be brought to or from the turn-table plate by turning the nuts 14 in opposite direction, this feature being desirable for the purpose of adjusting the tension of the driving-chain, as hereinafter described.

Upon the motor-shaft 15 is mounted the sprocket-wheel 16, from which sprocket-wheel leads the drive-chain 17, which drive-chain leads to the sprocket-wheel 18, which sprocket-wheel is mounted upon the counter-shaft 19, which shaft passes through one of the hollow coupling-thimbles 7. Upon the outer end of the counter-shaft 19 is mounted the sprocket-wheel 20, from which sprocket-wheel leads the drive-chain 21, which drive-chain leads to and extends around the sprocket-wheel 22, which sprocket-wheel is mounted upon the shaft 23, said shaft being journaled in the bearings 24, which bearings are fixed to the rear end of the drill-frame 25, said drill-frame consisting of a rectangular structure substantially of the form shown in Figs. 3 and 9. Upon the shaft 23 is loosely mounted the beveled pinion 26, which beveled pinion meshes with the beveled wheel 27. For the purpose of allowing the shaft 23 to rotate independent of the beveled pinion 26 the clutch member 28 is provided, which engages the integral clutch member 29, formed integral with the beveled pinion 26. The clutch member 28 is thrown in and out of contact by means of the lever 30. The clutch here described is an ordinary friction-clutch; but it will be understood that any kind of clutch may be provided, and no detail description is deemed necessary.

The beveled gear-wheel 27 is secured to the drill-operating shaft 31, which shaft is supported at its ends by means of suitable bearings 32 and 33, the bearing 32 being shown in Fig. 9 and the bearings 33 shown in Fig. 3. Upon the frame 25 is slidably mounted a drill-carriage, which drill-carriage consists of the members 34 and the cross or tie members 35, 36, 37, and 38, all of said members being formed integral or connected together, so as to constitute a rectangular frame. For the purpose of holding the drill-carriage upon the frame 25 the ways 39 are provided, which ways are jointed to the members 34 of the drill-carriage, said ways coming under the flanges 40.

Upon the operating-shaft 31 is rotatably mounted the cam 41 and the cam being so connected that it can move endwise or longitudinally upon the shaft 31, and for the purpose of rotatably connecting the cam 41 with the shaft 31 the keyway 42 is provided, which keyway receives an ordinary key carried by the cam and the key adapted to slide back and forth in the keyway. The key adapted to slide back and forward in the keyway is not illustrated; but it will be understood that the cam 41 is provided with a key which fits in the way and corresponds with the shape of the keyway. The drill rod and carriage, together with the drill 43, is fed forward in the usual manner by means of the screw-threaded shaft 44, which screw-threaded shaft is provided with an ordinary crank 45. The screw-threaded shaft 44 passes through the screw-threaded bushing 46, which screw-threaded bushing is fixed to the cross-arm 35. The cam 41 is provided with the hub 47, which hub is formed of a length equal to the distance between the inner faces of the cross-bars 35 and 36, so that there can be no end movement of the cam independent of the drill-carriage. Upon the drill-carriage, which consists of the members 34 and the cross-bars 35, 36, 37, and 38, are mounted the two cross-heads 48 and 49, which cross-heads are held in proper spaced relation with reference to each other by means of the hollow tubes 50, which hollow tubes are mounted upon the rods 51. The rods 51 extend through both cross-heads and through spring-sockets 52 and the springs 53, and for the purpose of confining the springs at their outer ends the nuts 54 are employed, and, if desired, washers 55 may be interposed between the nuts 54 and the ends of the springs 52. The cross-head 48 is provided with the stud 56, upon the lower end of which is mounted the antifriction-roller 57, which antifriction-roller is so adjusted that it will come in contact with the face 58 of the cam 41.

In Fig. 3 the cam is shown in position which brings the cross-head 48 together with the different parts connected thereto and belonging to the mechanism connected with the cross-head at its farthest rearward point, which movement of the cam compresses the

springs 53 and stores power therein. As the cam continues to rotate, the antifriction-roller is freed from the cam-face, at which time the cross-heads 48 and 49, together with the different parts carried thereby, are free to be moved in the guideways 59, which guideways are connected to the carriage members 34 by means of the bolts 60. It will be understood that when the cross-heads 48 and 49 are moved backward the springs will be compressed and held in a compressed condition until the antifriction-roller is released, after which a quick and sudden forward movement of the cross-heads, together with the different parts carried thereby, is given.

For the purpose hereinafter described the cross-head 49 is formed heavy, so that in quick forward movement it will act as a hammer or sledge and give a sharp and quick blow to the drill, as hereinafter described.

Upon the drill-shaft 61 is securely fixed the collar 62, said drill-shaft being journaled in bearings located upon the cross-bars 37 and 38 and the drill-shaft so journaled that it can have and does have a slight reciprocating movement. Said drill-shaft also passes through the cross head or hammer 49, as illustrated in Fig. 9. For the purpose of freeing the drill after it has been given a stroke by the cross-head hammer 49 the spring 63 is interposed between the collar 62 and the cross-bar 38. Upon the drill-shaft 61 is securely mounted the intermittent gear-wheel 64, which intermittent gear-wheel meshes with the pinion 65. The pinion 65 is rotatably mounted upon the drill-operating shaft 41 and is located between the cross-bars 36 and 37, so that there can be no end movement of the pinion independent of the carriage, and in order to accomplish this result the pinion may be formed of a length equal to the distance between the cross-bars, or, as shown, it may be provided with the extension or hub 66. The pinion 65 is in this instance provided with the single tooth 67, and hence it will require one complete revolution of the pinion 65 to rotate the intermittent gear one-sixth of a revolution, as shown in Fig. 7, or the intermittent gear 64 may be provided with any desired number of notches 68 to suit the kind of work designed to be performed.

It will be understood that the cam 41, the antifriction-roller 57, the intermittent gear-wheel 64, and the pinion 65 should be so timed with reference to each other that the drill-shaft 61 will be rotated just before the antifriction-roller 57 is released from the cam-face, so that the blow may be given to the drill by the device above described. By timing the different parts, as just above described, the drill when it is rotated is free from the rock or other material, owing to the fact that the interposed spring 63 will force the drill-shaft 61 backward as the antifriction-roller 57 comes in contact with the cam-face 58 and starts the cross-heads 48 and 49 on their backward movement.

To the front or forward end of the drill-shaft 61 is connected in any convenient and well-known manner the drill socket or holder 69, which socket receives and holds the drill 43. The socket 69 may be of any well-known construction and needs no description here, as it will be understood that any kind of drill-socket can be employed without departing from the nature of the present invention.

In Fig. 3 I have illustrated an electric motor 70, which may take the place of the motor 12, which electric motor may be located on the end of the drill-frame 25, and of course beveled gear-wheel 27 will be displaced and the straight-faced gear-wheel 71 substituted, which is driven by the straight-face pinion 72, said pinion 72 being located upon the armature-shaft 73. I have illustrated this manner of furnishing power as a modification from that shown in the remaining figures. It will be understood that by the use of the electric motor the drill-frame, together with all the different parts, can be turned at any angle in the same manner that it is turned when the motor is suspended from the support.

The drill-frame, together with all of the different parts carried by the drill-frame, turns upon a center common to the counter-shaft 19 when the motor is placed in a vertical position and common to the thimbles 7 regardless of the position of the motor, whether it be placed in a vertical or horizontal position or the motor attached to the drill-frame, by which arrangement the change of the angularity of the drill-frame to a horizontal plane will not change the distance between the shaft 23 and the shaft of the hollow thimbles 7 of the shaft located through either of the thimbles 7, by which arrangement the drive-chain 21 is always held in operative position. It will be understood that it may become necessary to adjust the distance between the wheels over which the drive-chain passes to compensate for any wear of stretch of said drive-chain, and in order to provide this adjustment the upper ends of the drill-frame-carrying members 8 are provided with the slots 74, through which slots the clamping-bolts 75 pass, this adjustment becoming necessary only when it is desired to adjust the tension of the drive-chain 21.

The motor carried by the drill-support proper is a self-contained motor and forms no part of the complete movable structure, said motor aside from the electric motor containing within itself and without any additional source or connection the motor-power for operating the drill, this feature being desirable and especially advantageous in many instances, owing to the fact that the drill mechanism or machine can be transported from place to place independent of any outside motive force. The motor most desirable is an

internal-combustion motor employing as a motive force gasolene, naphtha, alcohol, or other explosive fluids. I do not in this invention claim any particular kind of motor of the class just above described; but I illustrate an air-cooled motor, which is the most desirable and convenient for the purpose intended. The motor here shown employs a common tank 76 and a common carbureter 77, and for the purpose of removing the exhaust-gases I provide the exhaust-chamber 78, from which exhaust-chamber leads the exhaust-pipe 79, which exhaust-pipe may be of any desired length, and for the purpose of preventing any accumulation of gases in a tunnel or mine the exhaust-pipe 79 should lead a sufficient distance from the drill to prevent any annoyance or danger arising from the accumulation of exhaust-gas, and in order to accomplish this result I provide a fan 80, which is an ordinary blow-fan and located so that the blast from the fan will pass the exhaust-chamber 78 and carry with the blast the exhaust-gas, which is forced through the tube 79. The fan may be propelled by any suitable mechanism; but I have illustrated a wheel 81, mounted upon the power-shaft 15, and a drive-belt 82, leading to the fan-wheel 83; but this should be varied without departing from the nature of the present invention, as the only object designed is to provide a blast to remove the exhaust-gas.

It will be understood that the motor herein described, whether vertical or horizontal, is an air-cooled motor, and an ordinary and common fan is used to produce an air-blast, which fan may be driven by the pulleys 84 and 85 and the belt 86.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rock-drilling machine, the combination of a support, a turn-table carried by the support, a motor connected thereto and carried thereby, said support provided with upright members spaced from each other, a drill-frame pivotally connected at right angles to the pivotal connection of the motor turn-table, a sliding carriage and said drill-frame carrying operating mechanism, and the drill-operating mechanism driven from a motor-pinion having a common center with a pivotal connection of the drill-frame and motor-supporting turn-table, substantially as and for the purpose specified.

2. In a rock-drilling machine, a support provided with a turn-table, a motor carried by the turn-table, said motor sustained by the turn-table, a drill-frame having pivotal connection between the turn-table, and said frame and drill-operating mechanism carried by the drill-frame, and said drill-frame adapted to be rotated in horizontal and vertical planes, and a drill-driving pinion having a common center with the pivotal center between the turn-table and drill-frame, and means for intermittently rotating the drill, substantially as and for the purpose specified.

3. In a rock-drilling machine, the combination of a supporting turn-table carrying a motor, a drill-frame pivotally connected to the turn-table, said drill-frame having slidably mounted thereon a carriage, means for sliding the carriage upon the frame, cross-heads carried by the carriage and adapted to reciprocate independent of the movement of the carriage, means for reciprocating the cross-heads in one direction, a drill-shaft journaled to the carriage and provided with a head, a spring interposed between the head, and a member of the carriage, rods extended through the cross-heads, said rods having located thereon springs adapted to move the cross-heads when released and one of the cross-heads adapted to strike the head located upon the drill-shaft, substantially as and for the purpose specified.

4. In a rock-drilling machine, a drill-frame consisting essentially of a rectangular structure and pivotally connected to a turn-table at a common center with the drill-driving-mechanism wheel, a drill-operating shaft journaled to the drill-frame, means for rotating the drill-operating shaft, a cam rotatable with the rotation of the drill-operating shaft and slidably mounted upon said shaft, a carriage movable upon the drill-frame and the cam located upon the drill-operating shaft movable with the carriage, a cross-head adapted to reciprocate independent of the carriage, said cross-head provided with an antifriction-roller and the antifriction-roller normally located against the face of the cam, a hammer cross-head adapted to reciprocate in unison with the cross-head having the antifriction-roller, a drill-shaft provided with a head, means for reciprocating the cross-heads in one direction independent of the cam and antifriction-roller, and means for intermittently rotating the drill-shaft, substantially as and for the purpose specified.

5. In a rock-drilling machine, the combination of a drill-frame pivotally mounted upon a turn-table, a power-shaft located at a common center with the pivotal center of the drill-frame, said drill-frame having journaled thereto a drill-operating shaft, means for rotating the drill-operating shaft, a carriage located upon the drill-frame, a drill-shaft journaled to the carriage and movable with the carriage, an intermittent gear-wheel mounted upon the drill-shaft, and an intermittent pinion mounted upon the drill-operating shaft, said intermittent wheel and pinion meshing with each other, substantially as and for the purpose specified.

6. In a rock-drilling machine the combination of a drill-frame having mounted thereon a carriage, said drill-frame having journaled thereto a drill-operating shaft and the carriage

having journaled thereto a drill-shaft, means for intermittently rotating the drill-shaft, cross-heads adapted to reciprocate on the carriage, said cross-heads spaced from each other, and one of the cross-heads reciprocated along the drill-shaft, and said drill-shaft provided with a head, said head located in operative contact with the cross-head reciprocated along the drill-shaft, and means for releasing the drill from operative contact during the backward movement of the cross-head along the drill-shaft, and means for reciprocating the cross-head in one direction by the intermediate mechanism from the motor, and means for reciprocating the cross-head in the opposite direction independent of the source of power for the drill-operating mechanism, substantially as and for the purpose specified.

7. In a rock-drilling machine, the combination of a drill-frame rotatably mounted in horizontal and vertical planes, said drill-frame provided with a drill-operating shaft, said drill-operating shaft provided with a cam and an intermittent pinion, said cam and intermittent pinion slidably mounted upon the drill-operating shaft, a carriage slidably mounted upon the drill-frame and the cam and intermittent pinion slidable along the drill-operating shaft, said cam and intermittent pinion held in spaced relation with reference to each other, a drill-shaft provided with an intermittent gear-wheel, and said intermittent gear-wheel adapted to slide with the drill-shaft upon the intermittent pinion, the drill-shaft provided with a head, and a cross-head adapted to strike the head upon the drill-shaft and move, the drill-shaft with the forward movement of the cross-head, substantially as and for the purpose specified.

8. In a rock-drilling machine, the combination of a drill-frame pivotally mounted upon a turn-table in horizontal and vertical planes, a drill-operating shaft journaled to the pivoted drill-frame, a carriage slidably mounted upon the drill-frame, means for sliding the carriage upon the drill-frame, said carriage having journaled thereto a drill-shaft, means for intermittently rotating the drill-shaft by the rotation of the drill-operating shaft, a cam-actuated cross-head mounted upon the carriage, and a drill-shaft reciprocatingly actuated by the cross-head, and a self-contained motor, substantially as and for the purpose specified.

9. In a rock-drilling machine, a drill-frame pivotally mounted upon a turn-table, a carriage mounted upon the drill-frame, reciprocating mechanism mounted upon the carriage, means for moving the carriage upon the drill-frame, means for reciprocating the mechanism mounted upon the carriage, said reciprocating mechanism mounted upon the carriage adapted to be reciprocated independent of the reciprocating movement of the drill-shaft and the drill-shaft carried by the carriage mounted upon the drill-frame, said reciprocating mechanism carried by the carriage adapted to move the drill-shaft in one direction, and means independent of the reciprocating mechanism adapted to move the drill-shaft in the opposite direction from that imparted to the drill-shaft by the reciprocating mechanism carried by the carriage, substantially as and for the purpose specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

LEROY S. PFOUTS.

Witnesses:
JOHN H. SPONSELLER,
F. W. BOND.