(No Model.)

T. F. FARRELL.

STEAM ROCK DRILL.

No. 489,471. Patented Jan. 10, 1893.

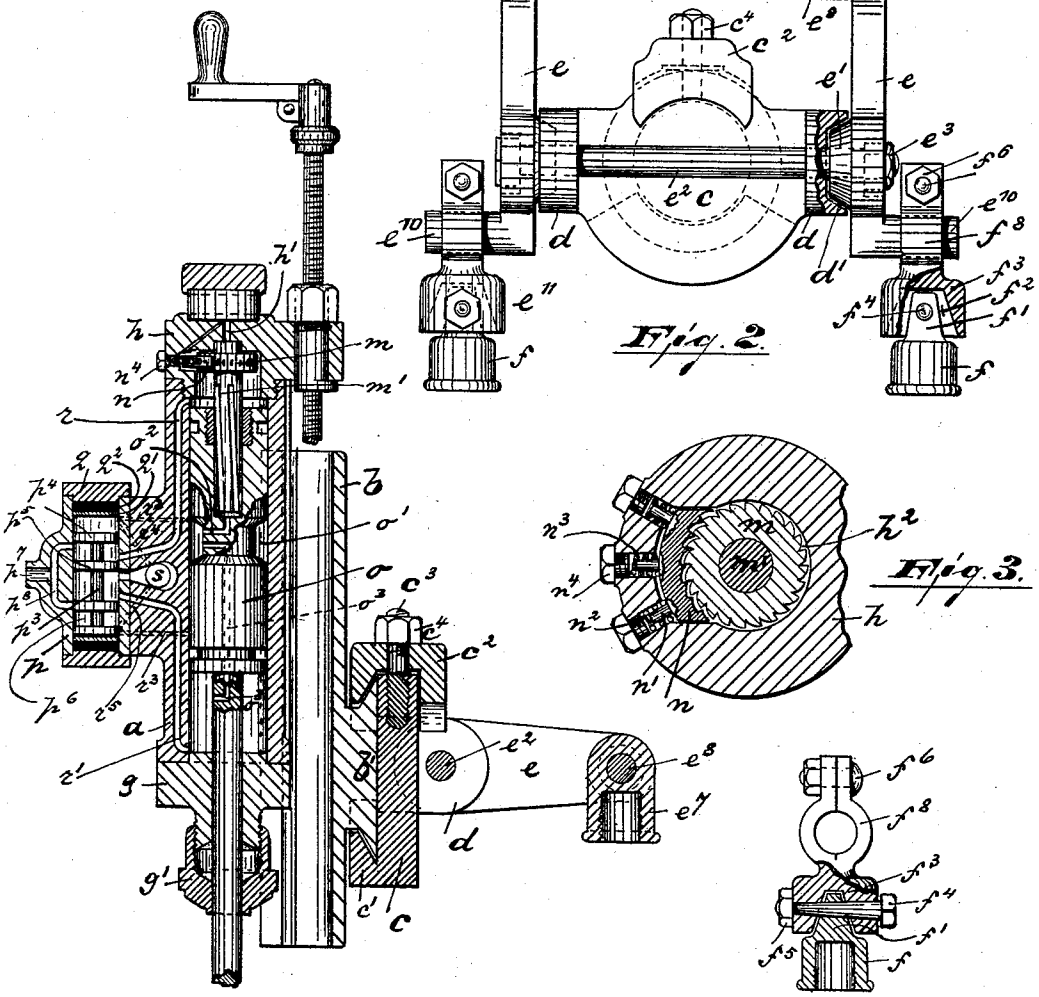

Fig. 1.

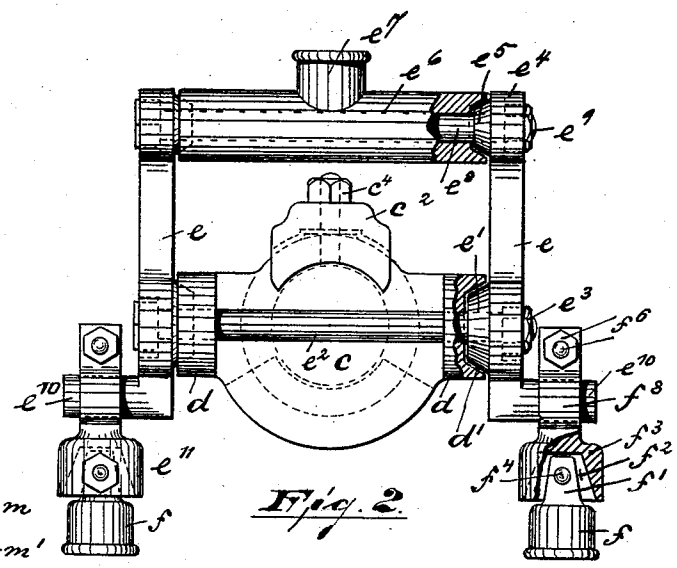

Fig. 2.

Fig. 3.

Fig. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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STEAM ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 489,471, dated January 10, 1893.

Application filed July 1, 1892. Serial No. 438,649. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. FARRELL, a citizen of the United States, residing in Paterson, county of Passaic, and State of New Jersey, have invented certain new and useful Improvements in Steam Rock-Drills; 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 letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide in a steam or air rock drill, simple and durable means for operating the drill carrying piston, means for controlling the rotating bar, and also means for readily adjusting the drill to any desired position.

The invention is an improvement on my application for Letters Patent filed January 11, 1892, Serial No. 417,631, and consists in the improved rock drill, its valve and its tripod, and the combination and arrangement of the various parts thereof, substantially as will be hereinafter more fully described and finally embodied in the clauses of the claims.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures: Figure 1. is a longitudinal sectional view of the improved rock drill, with certain portions removed or broken away; Fig. 2. is an underneath view of the tripod—the leg holders being turned upward; and the pipe legs removed; Fig. 3. is a sectional view on line x, Fig. 1, part of it being broken away, and Fig. 4. is a detail view of one of the front leg holders.

In said drawings, a represents a cylinder, adapted to be moved and guided in carriage b, in the usual manner. Said carriage is provided with a circular mounting plate b', adapted to operate on top plate c of the tripod, which top plate is provided at one side with an inwardly beveled projection c', adapted to engage the beveled edge of the said mounting plate,—and at the opposite side, with a clamping block c^2, adapted to adjustably secure the mounting plate to the said top plate. Said clamping block is operated by the screw c^3 and nut c^4. Said top plate is also provided with downwardly extending bearings d, provided with conical recesses d', adapted to receive the conical projections e' of arms e. Said arms, with their projections, are pivotally secured to and adjusted in said bearings by means of the shaft or spindle e^2, provided with tightening nut e^3. The arms e are provided at their free ends with enlargements e^4, having conical projections e^5, e^5, and are adapted to form the bearings for the sleeve e^6, the latter carrying the rear leg holder e^7. Through said sleeve and through the bearings e^4, e^5 passes the spindle or shaft e^8, adapted to adjustably secure said parts together.

Near the bearings d and on arms e are arranged horizontally extending projections e^{10}, to which the front leg holders e^{11} are adjustably secured. Said leg holders consist of socket f, provided on its top with a tapered projection f', adapted to be pivotally and adjustably secured in the tapered recess f^2 of cup f^3,—by means of tapered bolt f^4 and tightening nut f^5. The upwardly extending portions f^8 of cup f^3 surround the projections e^{10} and are adjustably secured thereto, by means of tightening bolt f^6, as clearly shown in Figs. 2 and 4 of the drawings.

The cylinder a is provided at its lower end with cylinder head g and stuffing box g', and at its upper end with cylinder head h, having oil holes h'. In said cylinder head is arranged a hole or recess h^2, in which operates the toothed wheel m, secured or made integral with the drill rotating bar m'. Said toothed wheel engages the toothed segmental block n provided with two or more pins n', operating in sockets n^2 of cylinder head h. Surrounding said pins and in said sockets are spiral springs n^3, adapted to be controlled by set screws n^4, said springs again controlling the toothed block n, as will be manifest, and clearly shown in Figs. 1 and 3 of the drawings. On said drill rotating bar m', and within the cylinder a, operates the drill carrying piston o, provided at its center with a circular groove o', serving as a chamber for the "live steam," as will be hereinafter more fully described. Said chamber is connected through channels or ports o^2, o^3, with the upper and lower part of cylinder a respectively.

To the cylinder a is secured, in any desired

manner, the valve chamber p, in which is arranged a cylindrical piston valve, consisting of the piston rod p^3 and two sets of piston heads p^4 and p^5—each set forming a steam chamber p^6, which is connected with the steam inlet p^7 through port p^8. At each end of the valve chamber is arranged a cap or head q, to which is secured a metallic plate q' with intermediate rubber cushion q^2. The upper and lower chambers of cylinder a are connected with the valve chamber through ports r and r' respectively. The ports r^2 and r^3 connect the "live steam" chamber with the valve chamber, and the ports r^4 and r^5, the latter with the exhaust s.

In operation, the cylinder is first adjusted on the tripod in the required position. Steam is then applied through inlet p^7 and port p^8 into (see Fig. 1.) the upper chamber p^6 (formed by the piston heads p^4 and p^5), from where it enters through port r into the upper chamber of cylinder a. The drill carrying piston is forced downward, and, as the rotating bar—by its toothed wheel m engaging the toothed block n—is prevented from turning, said piston can turn in one direction only. The steam, from the upper chamber of cylinder a, enters (as the rotating bar never fits tightly into the piston) through port o^3 into the "live steam" chamber o', and as soon, as the latter, (during the downward movement of the piston) reaches the port r^3, the steam will enter through said port into the chambers formed by the lower piston head p^4 and the lower metallic disk q', and throw the valve over. Simultaneously the exhaust steam of the upper chamber of cylinder a, will escape through ports r^2 and r^4 into the exhaust s. The steam, which has thrown the valve over, will escape through port r^5 into the exhaust s. A like circulation of steam controls the upward movement of the drill carrying piston. During the said upward movement, the rotating bar is free to turn with its wheel in one direction only, as the toothed block, engaging the teeth of wheel m prevents its reversing.

I do not intend to limit myself to the exact construction shown and described, as various changes can be made, without changing the scope of my invention.

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

1. A rock drill, combining therein a cylinder, a cylinder head secured to each end of said cylinder, the upper one of said heads being provided with a hole or recess, a drill carrying piston, adapted to move up and down in said cylinder, a drill rotating bar, a toothed wheel secured to the top of said rotating bar, a segmental shaped toothed block arranged in the hole or recess of the upper cylinder head, and adapted to engage said toothed wheel, two or more pins secured to said toothed block, and adapted to operate in sockets in the upper piston head, spiral springs, surrounding said pins and adapted to control said toothed block, and set screws, controlling said spiral springs, all said parts being arranged and adapted to operate substantially as described and for the purposes set forth.

2. In a rock drill rotating device, the combination with the cylinder, piston and cylinder head, of a rotating bar, a toothed wheel secured to the top of said bar and adapted to operate in a recess of the upper piston head, a segmental shaped toothed block arranged in said recess and adapted to engage said toothed wheel, two or more pins secured to said block and adapted to operate in sockets in the cylinder head, spiral springs surrounding said pins and set screws controlling said spiral springs, all said parts substantially as described and for the purposes set forth.

3. In a rock drill, the combination with the cylinder and the piston, said piston being provided with an annular groove, connected by channels o^2, o^3 with the upper and lower steam chambers respectively, of a valve chamber secured to said cylinder, a double headed cylindrical piston valve arranged in said valve chamber, each piston head consisting of two disks forming a steam chamber, channels connecting said steam chambers with the upper and lower steam chambers of the cylinder, a cylinder head arranged at each end of the valve chamber, a metallic plate secured to said cylinder head, a rubber cushion arranged between said metallic plate and cylinder head, a series of channels r^2, r^3 and r^4, r^5 connecting the chambers between the metallic plates and the outer disks of the cylindrical piston valves with the live steam chamber o and the exhaust respectively, all said parts, substantially as described and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of June, 1892.

THOMAS F. FARRELL.

Witnesses:
ALFRED A. VAN HOENBERG,
WM. D. BELL.