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H. C. SERGEANT.

Rock Drill.

No. 202,060. Patented April 2, 1878.

Fig. 2

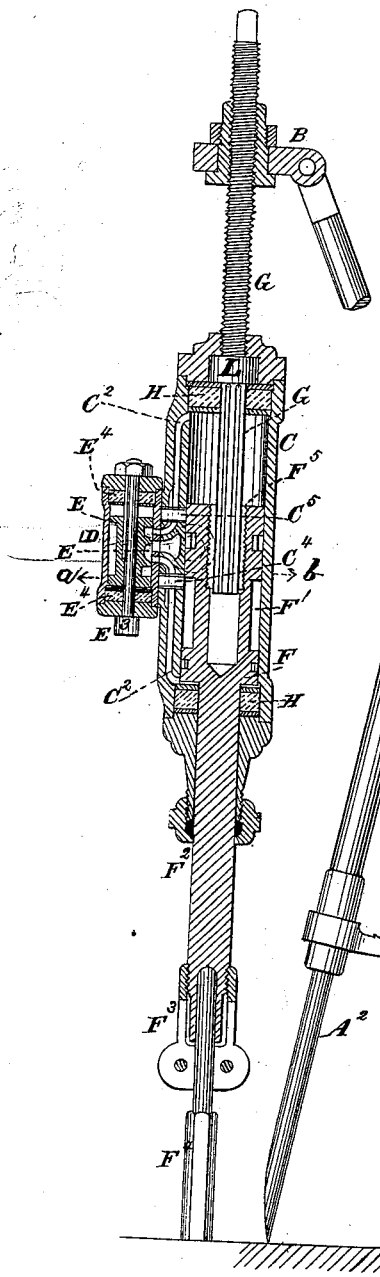


Fig. 1

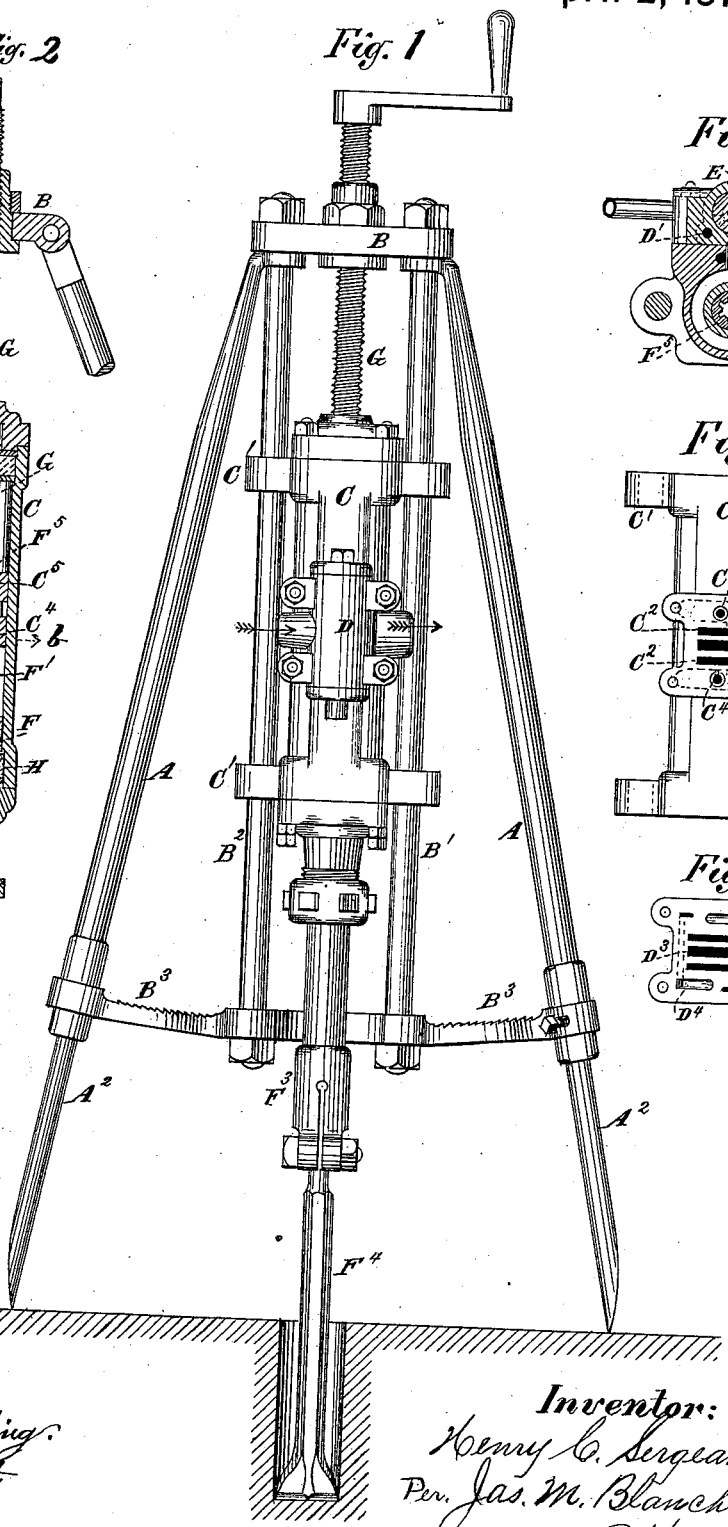


Fig. 3

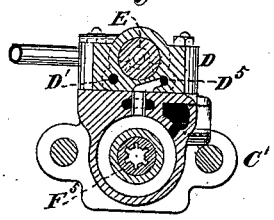


Fig. 4

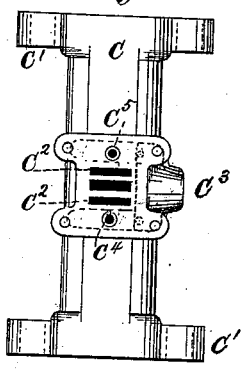
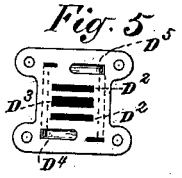


Fig. 5



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2 Sheets—Sheet 2.

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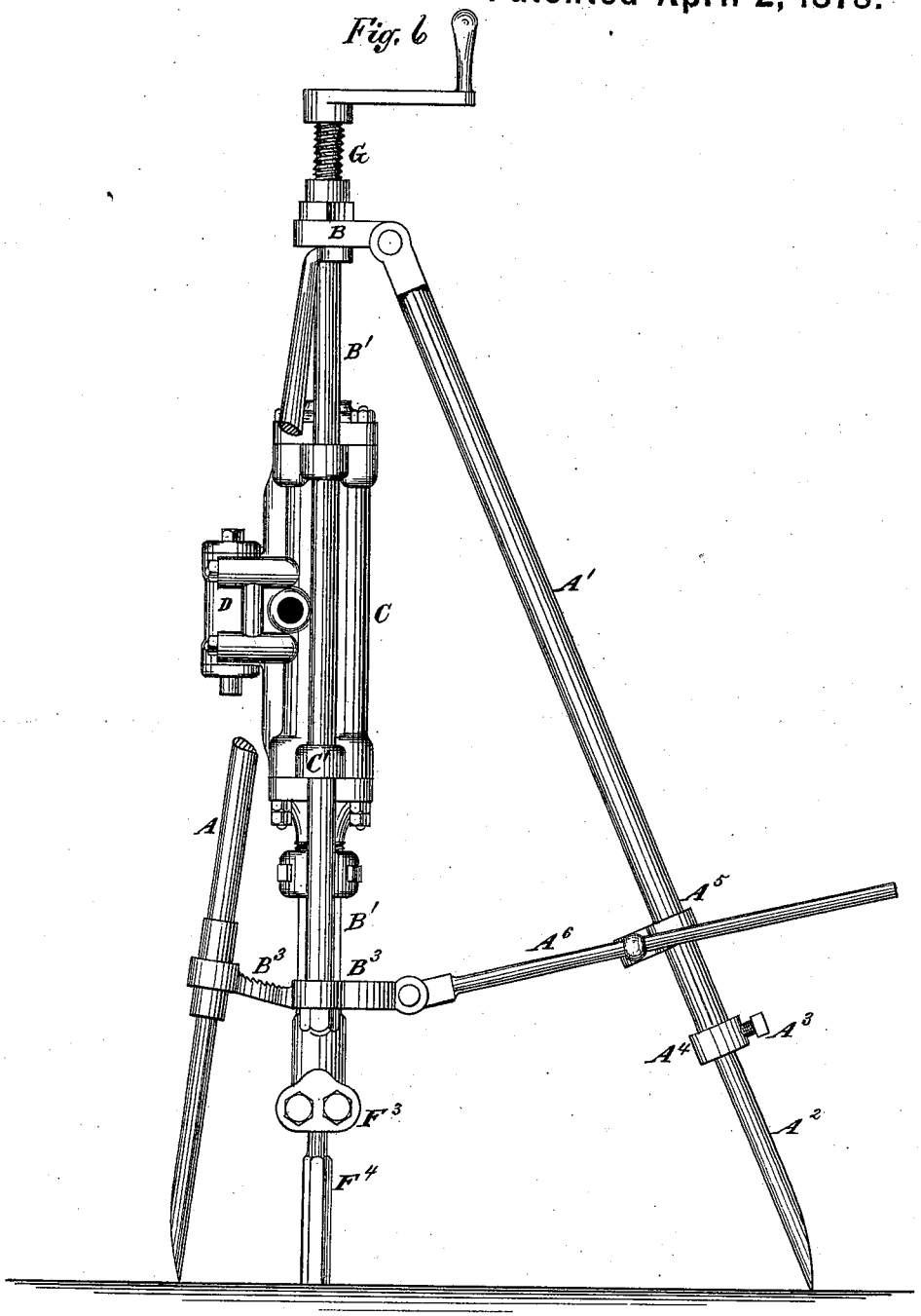
Fig. 6



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UNITED STATES PATENT OFFICE.

HENRY C. SERGEANT, OF NEW YORK, N. Y.

IMPROVEMENT IN ROCK-DRILLS.

Specification forming part of Letters Patent No. **202,060**, dated April 2, 1878; application filed January 2, 1878.

To all whom it may concern:

Be it known that I, HENRY C. SERGEANT, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Rock-Drills; and I do hereby declare that the following is a full, clear, and exact description thereof, which 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—

Figure 1 being a front elevation of my improved machine, showing the adjustable tripod, the guides for the cylinder to move upon, the cylinder in position, the feeding-screw, and the drill. Fig. 2 is a sectional elevation, showing the cylinder, the piston and its rod, the feeding-screw, having upon its lower end a fluted portion for rotating the drill, and the automatically-operating valve, with a rod passing through its center, and the steam-ports, for the induction and eduction of steam. Fig. 3 is a transverse section on line *a b* of Fig. 2, and showing, also, the flanges upon the lower end of the cylinder through which the guide-rods pass. Fig. 4 is an elevation of the cylinder, with the valve-chest removed, showing the induction and eduction ports. Fig. 5 is an under-side view of the steam-chest, showing the form and direction of the eduction-ports and the induction-ports; and Fig. 6 is a side elevation of the machine, showing the rear leg of the tripod, and the manner of arranging the same so as to give the requisite angle to the drill.

Corresponding letters denote like parts in all of the figures.

This invention relates to that type of rock-drills which are propelled by steam, gas, or compressed air, and in which the cylinder and drill are fed up to the work by hand; and it consists in certain devices and combinations and arrangements thereof, as will be more fully explained hereinafter.

In machines of this character many things are necessary to their effective operation, some of which may be enumerated as follows: First, it is important that the tripod and guides, or frame upon which the cylinder moves, should be so constructed and arranged that they may be readily available for adjusting the drill to the required angle; secondly, it is of vital importance that the same movement of the hand of the operator which feeds the drill up to its work should rotate it to such an extent as to cause it to drill a round or cylindrical hole; and, thirdly, it is important that the valve should be so constructed that it shall be automatic in its movements, and that such movements shall be caused by the action of steam or air entering the chest without any connection by rods or other mechanical devices with any of the moving parts of the machine.

The improvements herein described are intended to accomplish all of the above-named results.

In constructing machines of this character, I employ a tripod, consisting of two fixed legs, A A, which, at their upper ends, are firmly secured to the cross-head of the machine, and one adjustable leg, A^1, which is pivoted to said cross-head, as shown in Figs. 2 and 6, all of said legs being tubular throughout the greater portion of their length, in order that they may receive into their lower portions rods A^2, of steel or other suitable metal. These rods are adjustable vertically in the tubular legs, and are held in position by means of set-screws A^3, which pass through collars A^4 upon the ends of the tubes A and A^1, and also through said tubes, and thus the operator is enabled to raise or lower the operating mechanism, as circumstances may require.

Upon the leg A^1 there is placed an arm, A^5, which may be secured thereto by a set-screw, or in any other adjustable manner, so that it may be moved up and down thereon, through one end of which a rod, A^6, passes, or to which it is pivoted, as shown in Fig. 6, so that the lower end of leg A^1 may be placed at a greater or less distance from the points of support of the legs A, by which means the angle of the drill can be readily adjusted.

In making provision for moving the cylinder and drill toward and away from the rock to be drilled there are attached to the cross-head B, to which the legs of the tripod are attached, guide-rods B^1 B^2, which are secured firmly to said cross-head by nuts or other suitable fastenings, and which extend to and are secured in a yoke, B^3, which is attached to the

tubular portions of legs A A near their lower ends. These rods are parallel with the axis of the cylinder, and form the guides upon which it moves in being carried toward or away from the work which is being done.

The cylinder C, which is used in this type of machines, has projecting flanges C^1 at its ends, through which the guide-rods B^1 B^2 pass, as shown in Figs. 1, 3, and 4. It also has, at or near its center, a seat for a steam-chest, and it is provided with induction and eduction ports, as shown in Fig. 4, those lettered C^2 being the induction-ports to the main cylinder, and that lettered C^3 being the eduction-port of the same, while those lettered C^4 C^5 are the eduction-ports of the valve-cylinder. The steam-chest D is made to cover these ports, and has leading from its valve-seat corresponding openings, the central one, D^3, communicating with the eduction-passage C^3 in the cylinder, while those lettered D^2 communicate with the induction-passages C^2 C^2.

In addition to the ports in the steam-chest already referred to, it has formed in it eduction-ports D^4 and D^5, as shown in Fig. 5 of the drawings, said ports serving as eduction-ports for the piston-valve, which moves in a cylinder formed in the steam-chest.

The valve which I employ for operating this type of machines is of peculiar construction, it being shown in section in Fig. 2 of the drawings, and lettered E.

It will be seen that this valve is cylindrical in form, it having projecting flanges at its ends, said flanges being enough smaller than the interior of the cylinder in which it moves to allow sufficient steam to pass them from the reduced portion at its center to move the same from end to end of its cylinder as the steam is exhausted from the ends thereof, as will soon be described.

That portion of this valve which is in contact with the inner surface of the cylinder, or which is nearest to the main cylinder, has a projection formed upon its central portion, which is provided with a cavity, E^1, which, in operation, registers with the ports C^3 of the cylinder and D^3 of the steam-chest, and so forms the eduction-passage for the steam which operates the main piston of the machine. The smaller ports on either side of the exhaust-port E^1, just alluded to, are induction-ports, and when the machine is in operation register alternately with the ports D^2 of the chest and C^2 of the cylinder. In order that the valve E may be made of such diameter as to allow the steam which operates it to pass from the smaller portion in the central portion thereof to its ends, and still be retained in working contact with its cylinder, a rod or bolt, E^3, is passed through its center in the direction of its line of movement, upon which said valve slides and by which it is to some extent guided, the bolt also serving as a means of holding the heads of the valve-cylinder in steam-tight contact therewith. To prevent the valve E from being broken and from breaking the heads of the cylinder in which it works, cushions E^4 are placed in each end of the cylinder and around the rod, as shown in Fig. 2, by which the movements of the valve are arrested at each terminus of its stroke without any jarring or other injurious effect.

The main piston of this type of machines may be formed of steel, wrought-iron, or of any other suitable metal, and may have formed upon or attached to one of its ends a rod which is to pass through one of the cylinder-heads and carry upon its outer end a clamp for holding the drill. The drawings show a piston, F, which, it will be observed, is of sufficient length to admit of there being formed at its center a cavity, F^1, of such a length that when the piston has reached the terminus of its stroke in either direction said cavity will still register with the ports C^4 and C^5 leading from the steam-chest, and thus allow the steam from the valve to be exhausted therein. The ends of this piston are of such diameter as to nearly fill the bore of the cylinder, and are provided with packing-rings of any approved form, to prevent the passage of the steam from the ends of said cylinder to the cavity in the center of the piston. To one end of the piston above referred to there is attached a rod, F^2, which extends outward to any desired distance, passing through one of the cylinder-heads, which is provided with a stuffing-box and gland for the purpose of packing said rod, upon the outer end of which there is secured a clamp, F^3, for holding a drill, F^4, which clamp is held in position by means of a socket and screw-thread, as shown in Fig. 2 of the drawings. This clamp has upon its outer end ears or flanges, through which bolts are passed for the purpose of causing it to clasp the shank of the drill, it having a slit formed in it, as shown in Fig. 3, for the purpose of making it capable of such action.

The end of the piston which is opposite to the one to which the rod F^2 is attached has an aperture formed in it, which may receive a socket, F^5, to be screwed therein, the interior surface of which is fluted or corrugated, as shown in Fig. 3, it being for the reception of a fluted rod, G, for rotating the drill. This rod extends into the upper head of the cylinder, at which point it is provided with a collar, L, which works in a recess formed in said head, and by which it is prevented from having any vertical movement. That portion of this rod which is outside of the cylinder-head has a screw-thread formed upon it, which passes up through the yoke B, or through a nut fixed therein, and has its outer end provided with a crank, by the turning of which the screw will be rotated, and with it the piston and drill, and at the same time the cylinder and drill will be fed up to the work.

To prevent injury to the piston or cylinder, and to prevent shocks and jars upon the whole structure, cushions H H are placed in each end

of the cylinder, which are composed of rubber or some other elastic material capable of resisting the action of the steam, their inner faces being covered with a plate of metal, if preferred.

The operation of the valve, piston, and drill will be as follows: The parts being arranged for operation, steam, gas, or compressed air, from any suitable reservoir for retaining the same under pressure, is admitted to the steam-chest through the opening in its side, and passes directly to the cavity formed between the two flanges on the ends of the valve. If at this stage of the operation the valve is placed at one end of its cylinder, the steam will be exhausted from its opposite end, and thus the resistance to its movement in that direction will be removed, when steam will rush past the flange nearest to the end of its cylinder and shoot or force the valve in the opposite direction, its movement being controlled by the cavity in the main piston, it being of such a length as to prevent said valve from being shifted in the opposite direction until the main piston has reached the end, or nearly the end, of its stroke, when it will uncover the exhaust-port of the valve-cylinder in which the steam is confined, and the steam contained therein will pass into one of the ports D^4 or D^5, and thence to the opposite end of the chest, from which it will pass, through the port C^4 or C^5, to the cavity in the piston. By this arrangement the valve is made to move automatically, and is controlled, as to the times of its movement, with reference to the main piston, by said piston, and without having any mechanical connection therewith.

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

1. In a rock-drill, the combination of an adjustable tripod, an adjustable cylinder supported upon said tripod, and guide-rods for giving direction to said cylinder, substantially as set forth.

2. A cylindrical sliding valve, having its ends of slightly less diameter than the bore of the cylinder in which it moves, in combination with a rod which passes through the center of said valve, thereby guiding the same and presenting a wearing-surface therefor, substantially as set forth.

3. The combination of a valve for controlling the ingress and egress of steam, a bolt passing through the center of said valve, a steam-chest, and cushions for receiving the valve at the end of its stroke.

4. The combination and arrangement of the steam-ports C^4 and C^5, D^4 and D^5, for regulating the exhaust of steam from the ends of an automatically-operating valve, substantially as set forth.

5. The combination and arrangement of the exhaust-ports D^4 and D^5, cavity F in the body of the piston, and ports C^4 and C^5, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HENRY CLARK SERGEANT.

Witnesses:

JOHN W. PILLING,

C. M. CONNELL.