G. PHILLIPS.

ROCK DRILL.

No. 84,576. Patented Dec. 1, 1868.

Fig. 3.

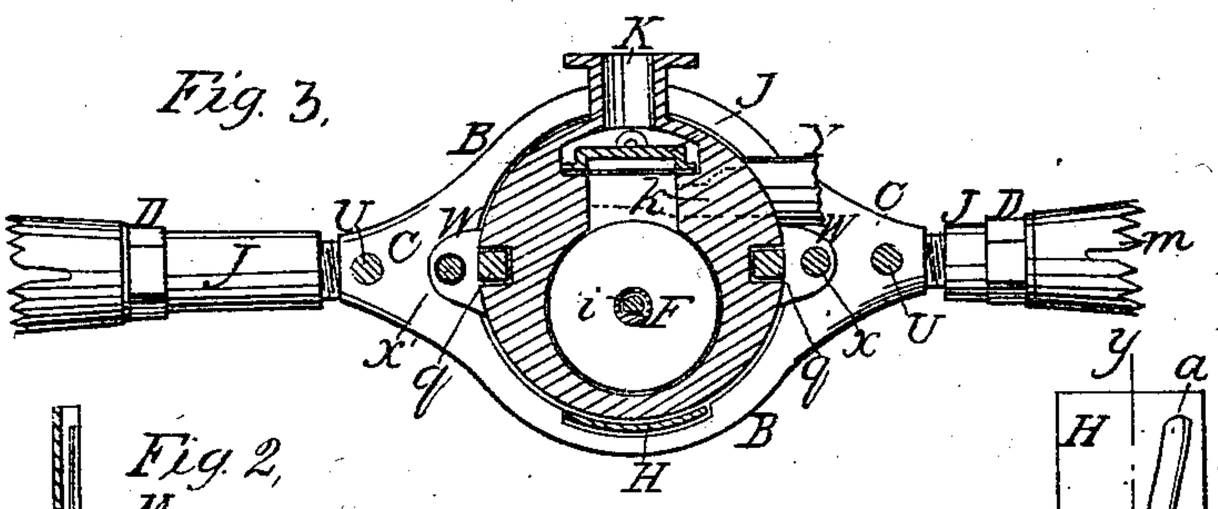


Fig. 2.

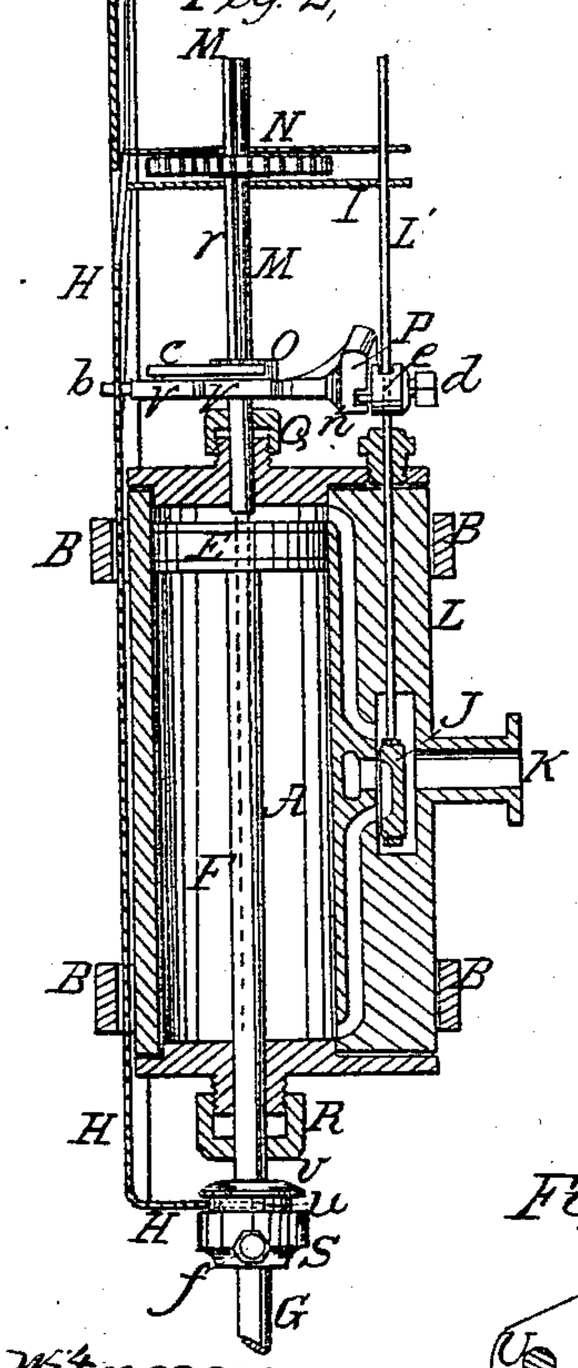


Fig. 1.

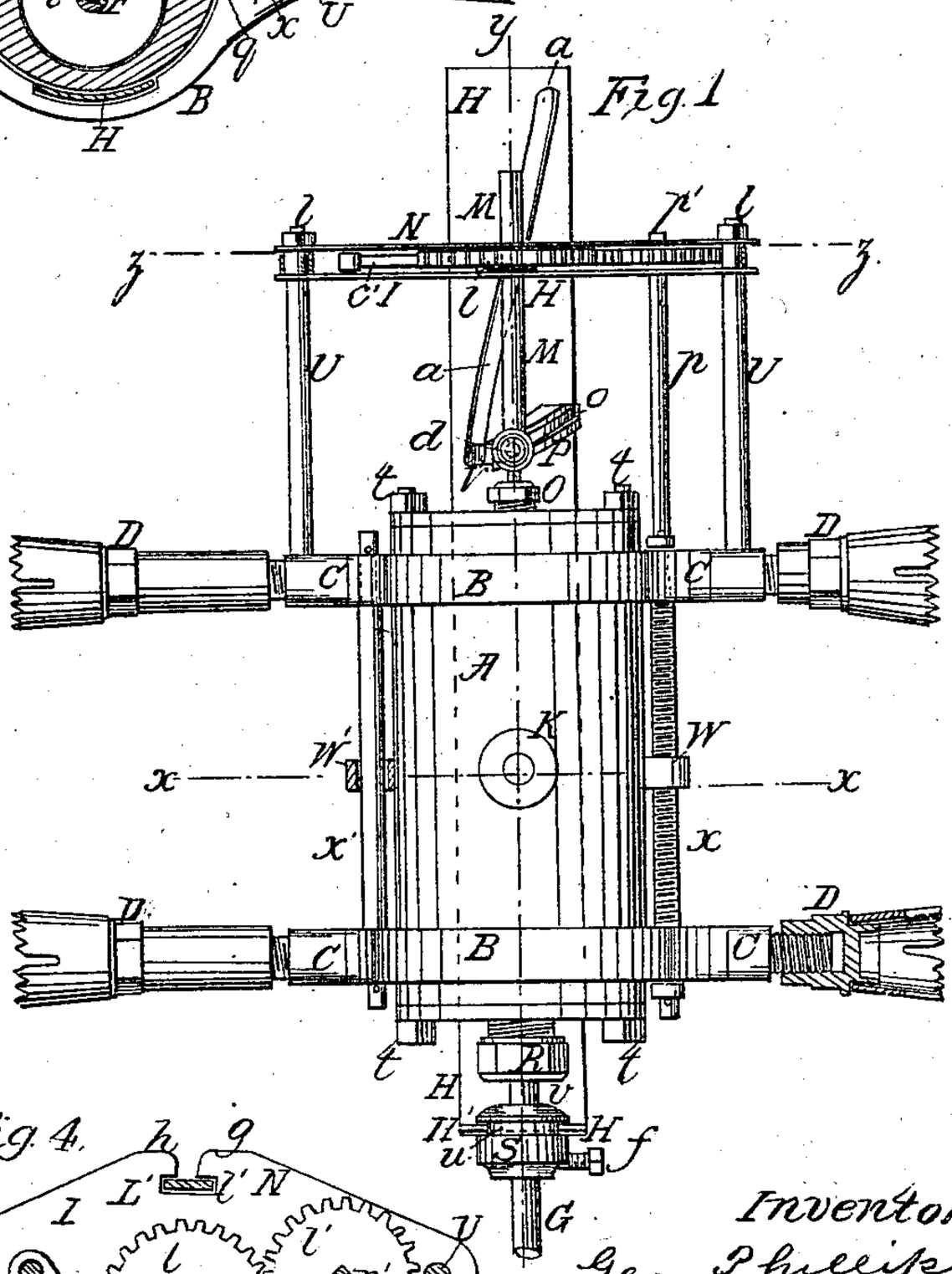
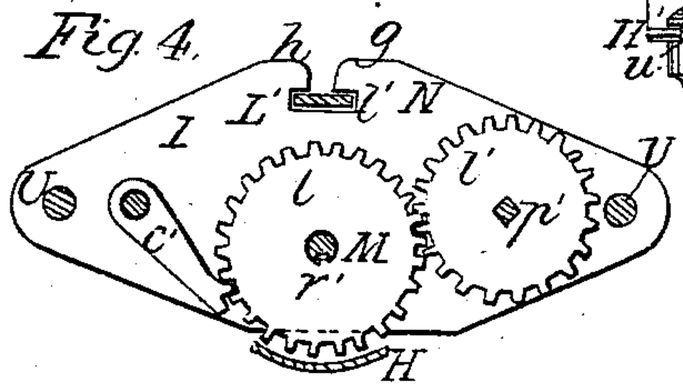


Fig. 4.



Witnesses

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GEORGE PHILLIPS, OF CADET, MISSOURI

Letters Patent No. 84,576, *dated December* 1, 1868.

IMPROVED ROCK-DRILL.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GEORGE PHILLIPS, of Cadet, in the county of Washington, and State of Missouri, have invented new and useful Improvements in Drilling-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of my improved drilling-machine.

Figure 2 is a vertical central section of the same, through the line *y y*, fig. 1.

Figure 3 is a horizontal section of the same, through the line *x x*, fig. 1.

Figure 4 is a top view of the plate I and gearing-wheels, through the line *z z*, fig. 1.

Similar letters of reference indicate corresponding parts.

This invention relates to the drilling of rock for wells, deep blasts, and like purposes; and consists of a cylinder and piston for employing steam or compressed air in actuating the drill, in combination with the improved devices constituting the mechanism controlling and regulating the operation of the drill, all of which will hereinafter be more fully set forth.

In the accompanying plate of drawings, the cylinder A slides with finished contact within the iron bands B, which latter are formed with lateral arms, C, as shown.

These arms terminate in screw-jacks, D, as shown, which are for the purpose of affixing the said arms to the upright of any suitable frame-work of wood, to support the cylinder and its attachments.

The piston-rod F, of the piston E, is hollow, and encloses the reduced prolongation of the ratchet-rod M, which latter fits, steam-tight, in the stuffing-box Q, and is rotated slowly at each downward stroke of the drill by mechanism hereinafter described.

The drill-holder S, on the piston-rod F, with its set-screw *f*, holds the drill G firmly, so that the drill, the hollow piston-rod F, and piston E, all revolve together a short distance at each stroke downward of the piston, whereby the edge of the drill is presented in a different radial direction from the preceding one, which conduces to the boring effect.

The mechanism for operating the valve J, and producing the rotation of the drill, will now be described.

The slide-bar H has vertical motion in guide-slots in the bands B, as shown in figs. 2 and 3.

The lower end of this slide-bar is provided with horizontal projections, H′ H′, made by bending the forked end of the slide-bar, as shown.

This forked end fits in the annular groove *u*, of the drill-holder S, so that the holder S, and the flange *r* of the same, cause the said slide-bar to move up and down with the piston and drill.

The slide-bar extends above the cylinder, as shown, and has a diagonal slot, *a*, cut in it.

A lever, V, works with easy contact on the ratchet-rod M.

This lever bears a pawl, which is actuated by a spring, *c*, to press upon the ratchet-pinion *o*, which is in the rod M, and is held from lateral motion, on the said rod, by a set-screw, the point of which enters the longitudinal slot *r* in the rod.

By this slot and set-screw, the ratchet is permitted to move along on the rod M, with the lever V, when the cylinder is lowered slightly at each stroke of the drill.

The diagonal slot *a*, in the slide-plate H, causes the vibration of the lever V, for the reduced end, *b*, of the said lever works in the said slot, as shown, whereby, as the slide-plate H moves up and down, the lever is vibrated, and its pawl catches on the loose ratchet-pinion, in the manner common to such a device, and rotates the rod M a short distance at each double stroke of the piston.

The piston is made to follow the rotation of the rod M by means of a flat face on the reduced prolongation of the same, as shown at *i*, fig. 3, for the bore of the piston-rod, in which the said prolongation fits, is formed with a corresponding flat face to fit the face on the prolongation *i*, so that the rod F and its piston shall turn with the rod M, as stated.

Other equivalent devices may be employed to accomplish the same result, as, for example, the rod F may be provided with a set-screw to fit in a groove or slot occupying the place of the aforesaid flat face.

The bore of the rod F, and the surface of the prolongation *i*, may be correspondingly fluted, or made with any corresponding angular sections.

The end of the lever V, which is opposite to the end *b*, is formed with a slotted head, P, the slot therein running diagonally or upward, as shown at *o*, fig. 1, and in this slot a stud-pin or projection, *n*, from the block *e* (which latter is clamped to the guide-rod L by a set-screw, *d*,) works.

By this device, the valve-rod and its valve J are made to travel, at each stroke of the piston, in the usual manner, and admit steam or air for moving the same.

The block *e* can be adjusted up or down in the rod, to give lead at either end of the cylinder, as required.

The mechanism for causing the cylinder to descend slightly within the bands B, at each stroke of the drill, will now be described.

The cylinder fits, with smooth contact, within the bands B, and is supported firmly at any one point by the screw X, which works in a lug, W, cast on or affixed to the cylinders, as shown.

This screw forms part of the extension *p*, which bears the toothed wheel Z′ at its upper end.

This wheel engages with another toothed wheel, Z, which is turned by the rod M.

This latter wheel is not firmly keyed on the rod M, but is held from turning on the said rod, as an axle, by a tongue, *r*′, in the eye or hole of the wheel, which

tongue fits in the slot *r*, in the rod M, as shown at fig. 4. The wheel Z is thereby made to revolve with the rod, and also to permit the rod to work up and down when the cylinder is moved up and down.

By the co-operative action of the above-described devices, the drill is made to rotate a small distance at each downward stroke of the same, and also the cylinder to descend a small increment of space within its bands B at each downward stroke of the drill, whereby the drilling of rock will be accomplished automatically by the action of the steam without interruption.

The rod X′ is tapped into or otherwise affixed to the arms C, and serves as a guide for the lug W′ to traverse on, and thereby steady the movement of the cylinder.

t t t t are the nuts of the rods *q*, which hold on the cylinder-heads.

K is the steam-induction pipe.

Y is the exhaust or eduction pipe.

The valve-chest of the cylinder is situated within the exterior surface of the body of the cylinder, as shown, so that the latter may have motion up or down within the rings B, the bore of the cylinder being eccentric with the axis of metal, to allow room for the valve-chest and ports, as shown.

The wheels Z and Z′ are located between horizontal plates, N and I, which plates are held by the uprights or pillars U U, tapped into the arms C, as shown.

The plates N and I are separated by thimbles, and held in place by nuts *l l*, as shown.

The first or the upper plate conduces to provide bearings for the rod M and shaft-extension *p*, but the lower plate, I, supports the loose wheel Z, which would otherwise slip downward on the rod M.

Projections *h* and *g*, on these plates, form guides, as shown at fig. 4, for the guide-rod L′ of the valve-rod L.

A pawl, *c′*, catches in the teeth of the wheel Z, and serves as an auxiliary pawl to hold the rod M from turning backward, if the drill should strike any hard part of the rock, and, by glancing, would bring the strain upon the ratchet-pinion and its small pawl.

R is the lower stuffing-box.

The lever V fits, with finished contact, upon the rod M, and, in practice, rests on the upper cap Q of the stuffing-box.

Collars *w*, on the screw-rod X, hold said rod in place, the upper collar sustaining, for the most part, the weight of the cylinder.

The screw-jacks D are made as shown, or in any other suitable manner.

In fig. 4, a small part of the upper plate is shown at N.

When the cylinder has descended to the length of its limit, which is when the top of the rod M is even with the plate N, the cylinder is again elevated to its first position, by means of a crank fitting on the square arbor *p′*, figs. 1 and 4.

The advantages of this combination of devices consist generally in the durability, simplicity, and moderate cost of the whole machine, but particularly in its rapid and effective operation, which latter has been practically demonstrated.

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

1. The slide-bar H, with its diagonal slot *a*, and the lever V, with a slotted head, P, both constructed and operated substantially as shown and described, in combination with the stud *n*, for the purpose of operating the valve of a drilling-machine by the piston-rod of the same, all as set forth.

2. The ratchet-pinion O, in combination with the ratchet-rod M, slide-plate H, lever V, and piston-rod F, of a drilling-machine, all operating substantially as shown and described, to rotate the drill G of a drilling-machine, in the manner set forth.

3. The projections *h* and *g*, of the plates I and N, substantially as shown and described, and for the purpose of forming guides for the guide-rod L′, all as set forth.

4. The plate I and uprights U U of a drilling-machine, in combination with the cylinder A of the same, substantially as and for the purpose shown and described.

Witnesses: GEORGE PHILLIPS.

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JOSEPH CROCKER.