4 Sheets Sheet 1

G. J. Wardwell,

Rock Drill.

No. 95,860. Patented Oct. 12. 1869.

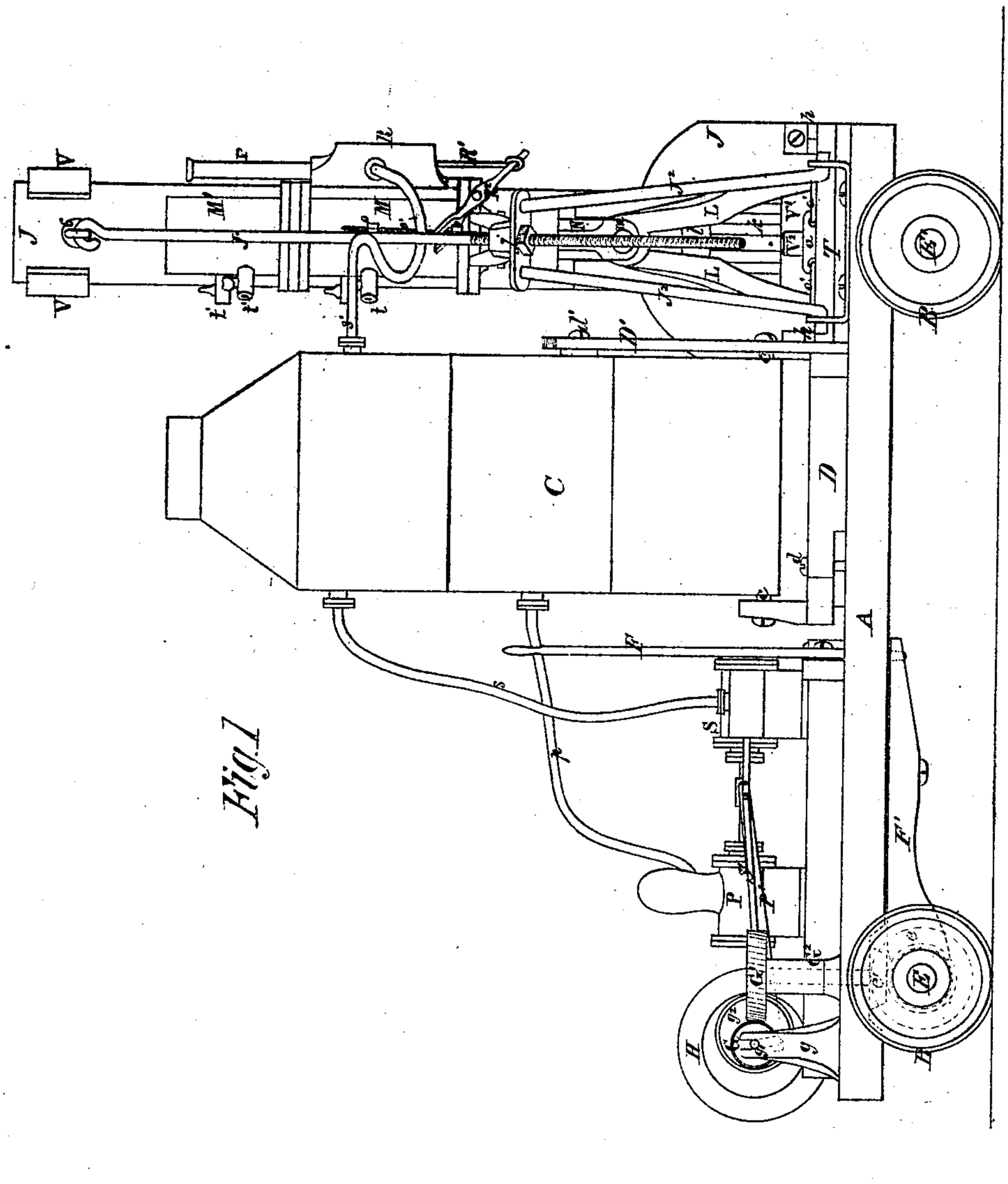

Fig 1

Witnesses.
R. F. Campbell.
J. N. Campbell

Inventor.
Geo. J. Wardwell
by
Munn, Fennell & Lawrence

4 Sheets, Sheet 2.

G. J. Wardwell.

Rock Drill.

No. 95860. Patented Oct. 12. 1869.

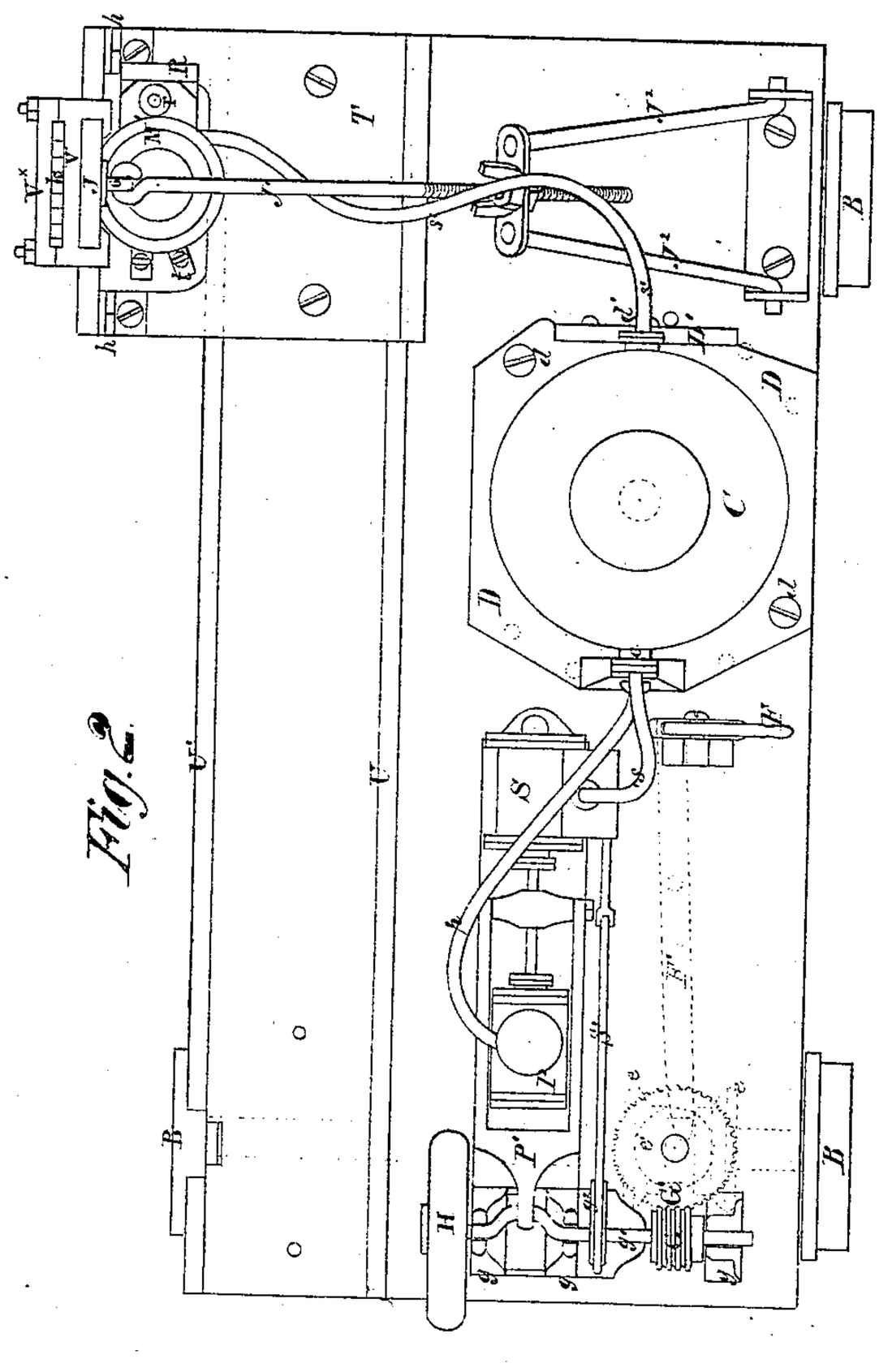

Fig. 2.

Witnesses
R. Campbell.
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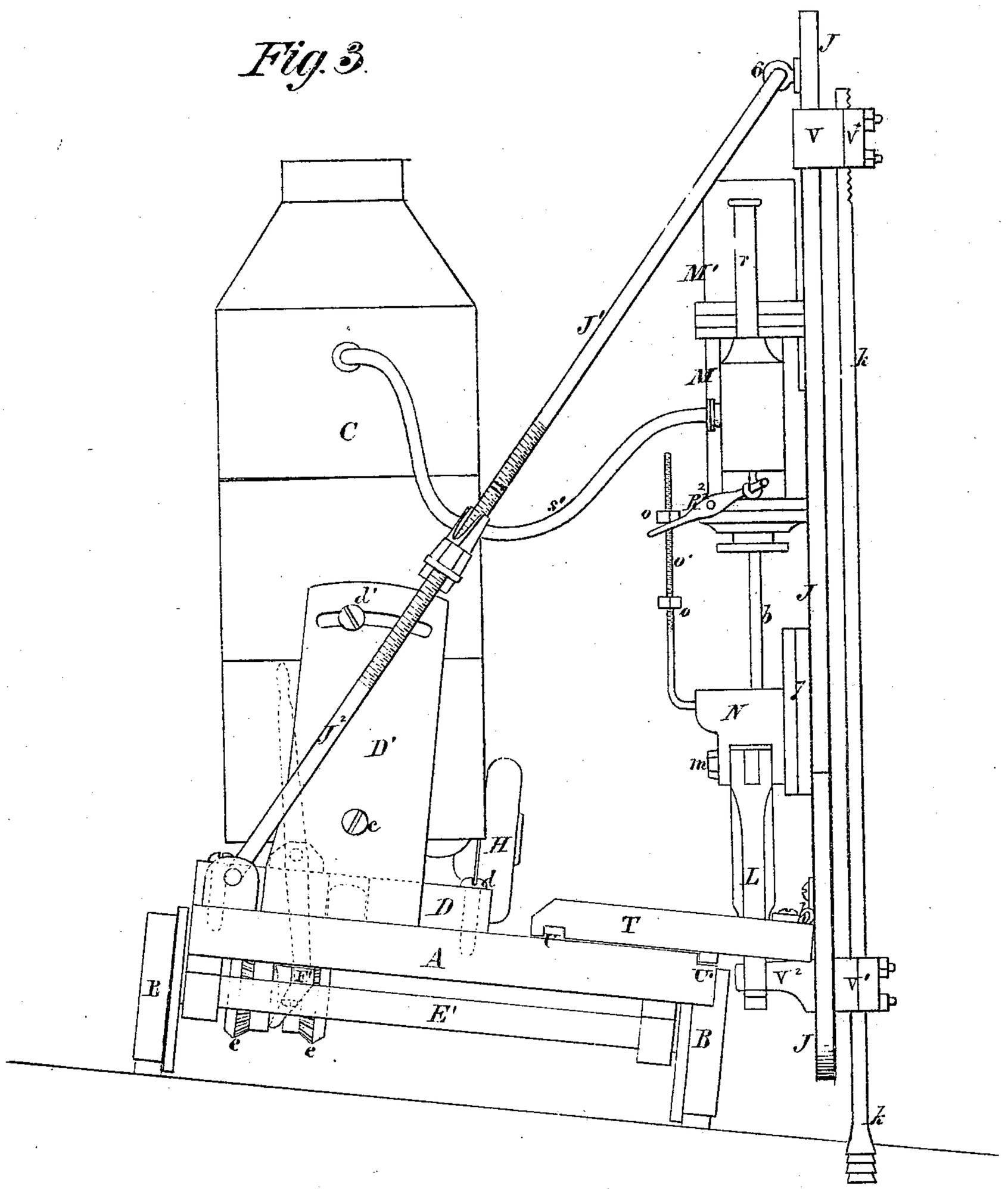
4 Sheets. Sheet 3

G. J. Wardwell,
Rock Drill.

No. 95860. Patented. Oct 12. 1869

Fig. 3.



Witnesses.
R. Campbell
J. N. Campbell

Inventor
Geo. J. Wardwell
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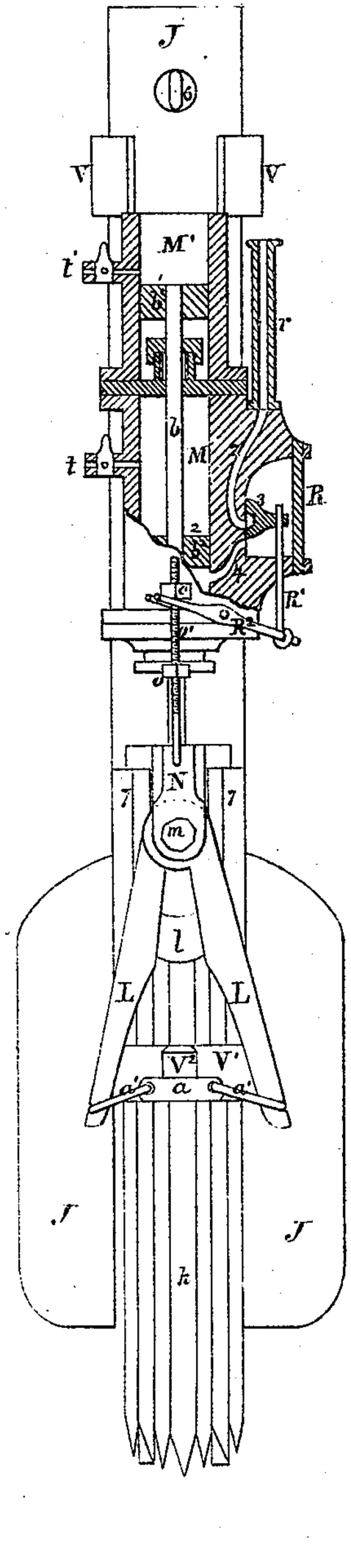
4 Sheets Sheet 4

G. J. Wardwell.

Rock Drill.

No. 95860. Patented. Oct 12 1869.

Fig 4



Witnesses.
R. Heaupbell
J. Cp. Campbell

Inventor
Geo. J. Wardwell
by
Munn. Fenwick & Lawrence.

United States Patent Office.

GEORGE J. WARDWELL, OF RUTLAND, VERMONT, ASSIGNOR TO STEAM STONE-CUTTER COMPANY, OF NEW YORK CITY.

Letters Patent No. 95,860, *dated October* 12, 1869.

IMPROVED STONE-CHANNELLING MACHINE.

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 J. WARDWELL, of Rutland, in the county of Rutland, and State of Vermont, have invented certain novel Improvements in Stone-Channelling Machinery; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, sheet 1, is an elevation of one side of the improved machine.

Figure 2, sheet 2, is a plan view of the machine.

Figure 3, sheet 3, is an elevation of one end of the machine, showing the carriage supported upon a laterally-inclined bed, and the cutters adjusted in a vertical plane.

Figure 4, sheet 4, is a view of the chisels or cutters and their standard, showing, in section, the air and steam-pistons for working the cutters.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements on machinery for cutting channels in stone, and which is especially useful in quarrying stone.

The invention also relates, in part, to improvements on Letters Patent, which have been previously granted to me, for cutting channels in stone, preparatory to removing large blocks from quarries.

The nature of my invention consists—

First, in mounting a steam-boiler upon the bed of the carriage or truck-frame, in such manner that the boiler can be made to assume a vertical position, whether the carriage be upon a grade which inclines in a direction with the length of the carriage, or in a direction which is transverse to the length of the carriage, employing, for this purpose, a sub-bed, upon which the boiler is supported by trunnions, and which is adjustable about a vertical centre, as will be hereinafter explained.

Secondly, in making the cutter or chisel-carrying standard adjustable upon the carriage-bed, in such manner that the cutters can be arranged to operate at any desired point with respect to the length of the carriage, thereby rendering unnecessary the turning of the machine around on a quarry-bed, in order to cut a channel the required length, as will be hereinafter explained.

Thirdly, in the combining an air-chamber with a steam-cylinder, in which works a piston that gives motion to a gang of cutters, and providing such air-chamber with one or more cocks, that more or less air can be confined above the said piston, and caused to react upon it during the ascending strokes of the cutters, as will be hereinafter explained.

Fourthly, in arranging above the steam-cylinder, in which works the piston that gives motion to the cutters, another cylinder, which is open at its top, and in which works a piston that is fast upon the rod of the steam-piston, and in providing this open-top cylinder with one or more air-cocks, for admitting air in suitable quantities below the upper piston, to serve as an elastic cushion therefor during the descending strokes of the cutters, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

The gang of chisels *k*, their standards J, and the braces J^1 J^2, may all be constructed as described in my Letters Patent, dated on the 18th day of May, 1869.

The standard J is hinged at *h* to a base or bracket, T, which is adjustably connected to the carriage-bed A, and which should be provided with bolts, clamps, or other movable fastenings, for securing it down rigidly to this carriage-bed in the required position for operation.

The longitudinal parallel ways U U^1, shown clearly in fig. 2, are intended for guiding and keeping laterally in place the base or bracket T, while it is being moved from one end to the other of the carriage.

If desirable, the said base or bracket, and its appurtenances, may be moved from one end to the other of the carriage, by means of a screw-shaft carrying a travelling nut, which is connected to the base T in a suitable manner.

By thus providing for adjusting the cutters, their standards and appurtenances to either end of the carriage, it is obvious that the machine need not be turned around in a quarry when it is desired to work close to banks at both ends of the channels.

To do this with the stone-channelling machinery hitherto employed, it was necessary to construct the machines double, that is to say, with cutters on both sides, and to turn the machine bodily around, so as to cut that portion of the rock-bed which could not be cut at the start.

The carriage is provided with flanged truck-wheels, B, adapted for running on tracks, as fully described in my Letters Patent above referred to.

The axle E of one pair of truck-wheels has twin bevel-wheels, *e e*, applied to it by a key-tenon, so that they can be shifted in a direction with the length of their axle.

The lever F^1 and hand-lever F are used for shifting these wheels *e e* to the right or left hand, according to the direction it is desired to move the carriage.

Between the two wheels *e e*, and keyed on the lower end of a shaft which passes through a standard, G^2, is a bevel-spur wheel, *e'*, which receives a slow rotary motion from a worm-wheel, G, acting on the teeth of the tangent-wheel G^1.

The worm-wheel G is keyed on a crank-shaft, g^1, which is sustained by standard, *g g*, that rise perpendicularly from the carriage-bed A.

This crank-shaft receives motion from a steam-engine, S, through the medium of a pitman-rod, P′, which rod is connected to a cross-head on the piston-rod of said engine.

On this crank-shaft, g^1, an eccentric, g^2, is keyed, which works the slide-valve of the engine through the medium of the valve-rod S′.

A balance-wheel, H, is also keyed on the crank-shaft g^1, which is useful as a regulator of motion when the pump P is operated to supply water to the boiler C.

During the operation of supplying the boiler with water, the two wheels *e e*, on axle E′, are disconnected from the wheel *e′*, so that the carriage is not moved.

The steam-boiler C is mounted upon a sub-base, D, by means of trunnions *c c*, and sustained in an upright position by means of a clamp-bolt, *d′*, which passes through a segment-slot made through the trunnion-standard D′, as shown in fig. 1.

The sub-base D is adjustable around a central pivot, and this sub-base is secured fast, after adjustment around said pivot, by means of bolts, *d d*, which pass through holes or slots made through the carriage-bed.

I am aware that a steam-boiler of the upright kind has been mounted upon the carriage of a stone-channelling machine by means of trunnions, so as to allow such boiler to be adjusted vertically when the carriage was arranged upon a laterally-inclined track-bed, as shown in fig. 3; but I am not aware that an adjustable sub-base, D, has ever been used prior to my invention, which would allow the boiler to be adjusted vertically when the carriage is arranged to work upon a longitudinally-inclined track-bed.

The adjustable sub-base D, having the carriage mounted upon it by trunnions, as above described, will allow the boiler C to be adjusted in a vertical position, no matter what may be the position of the carriage.

The steam-space of the boiler C is connected to the engine S by means of a flexible pipe, *s*, and it is also connected to the valve-chest R, of a steam-cylinder, M, by a flexible pipe, *s′*, so that these two pipes will accommodate themselves to the different positions which it may be required to adjust to the boiler C.

The gang of cutters or chisels *k* receives a rectilinear reciprocating motion from a piston, b^2, working in a cylinder, M, on standard J.

The rod *b* of this piston passes down through a stuffing-box in the lower end of cylinder M, and is connected to a reciprocating cross-head, N, working in guides 7 7, applied rigidly to the standard J.

This cross-head N is connected to a bracket, V^2, which is bolted fast to the lower clamps V^1 of the cutters, by means of an elastic pitman, which is composed of two jointed levers, with a spring, *l*, between them.

The upper ends of the said levers L L are pivoted at *m* to the cross-head N, and their lower ends are connected, by loose links, *a′ a′*, and a block, *a*, to the bracket V^2, as shown in fig. 4.

It will be seen that the spring *l* will operate, both at the terminus of the ascending and descending strokes of the chisels, to relieve the standard and the carriage from injurious concussion.

The lower ends of the levers L L will be drawn toward each other, so as to compress spring *l*, according to the length of vibration which the links *a′ a′* are allowed to receive and the force to be overcome in moving the cutters.

I consider the arrangement, in a stone-channelling machine, of an elastic pitman or other equivalent connection between the cutters and the cross-head N, a very valuable improvement over rigid connections which have hitherto been used.

The piston b^2 is lifted by the admission of steam beneath it through a port, 4.

This port communicates with the steam-chest R, in which works a D-valve, 3, and through this port the steam from the cylinder M is allowed to exhaust into a passage, 2, and through a pipe, *r*.

The valve 3 may be worked by a rod, R^1, a forked lever, R^2, a rod, *o′*, and nuts, *o o*. The rod *o′* rises from the cross-head N, and the nuts *o o*, between which, one end of the lever R^2 plays, are adjustably applied on this rod, so that the length of strokes of valve 3 can be regulated.

Above piston b^2 the cylinder M forms a chamber for air, which can be admitted in more or less quantities through the air-cock *t*.

The air, which is confined in the cylinder M, above the piston b^2, will operate by its elasticity to give the descending strokes to the piston and its attachments, while the elasticity of the steam admitted below the said piston will operate to lift it, and, at the same time, compress the air which is confined above it.

The force of the descending strokes of the cutters will be regulated by the degree of compression of the air above the piston.

On top of the cylinder M, and also secured to the standard J, is a cylinder M′, open at its top, and closed at its bottom.

In this cylinder M′ is a piston, b^1, which is applied fast on the piston-rod *b*.

This rod *b* passes up through a stuffing-box applied to the head of the cylinder M, and thus serves for both the pistons.

The cylinder M′ is provided with one or more air-cocks, *t′*, suitably arranged for admitting more or less air beneath piston b^1, when the latter is at the termination of its up-stroke, which air becomes entrapped beneath said piston, and serves as an elastic cushion for regulating the descent of the two pistons and the cutters.

By the admission of more or less air beneath the piston b^1, not only the force of the descending strokes of the cutters can be regulated, but the amount of descent of these cutters can be adjusted as the channel which is being cut gradually deepens.

I do not claim, under this petition, the cutting-device or chisels, nor the adjustable standard to which these cutters are applied.

Nor do I claim the feed-motion for moving the carriage back and forth upon its track.

Neither do I claim, broadly, an adjustable steam-boiler upon the carriage of a stone-channelling machine; nor operating the cutters by means of a steam-engine applied to cutter-standard.

I am aware that adjustable drills have been applied to standards, which were mounted upon an adjustable platform, upon a circularly-movable base. Such a contrivance will be found in the Letters Patent granted to William Plummer, on the 6th of October, 1857.

Plummer's machine is designed for drilling holes into banks of rock, and he mounts his drill upon a platform, which is moved automatically so as to feed the drill up to its work.

The base upon which the said platform is mounted, is of a circular form, and is designed to turn about a centre for giving proper direction horizontally to the drill.

By reference to the accompanying drawings it will be seen that the cutter-standard is mounted upon a sub-base which is adjustable in a direction with the length of its supporting-carriage, which latter is movable in a right line.

My object is to provide for cutting channels close

up to embankments at both ends of the channels, which was never contemplated by William Plummer, above referred to.

I do not, therefore, claim the contrivance described in Plummer's Letters Patent.

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

1. A stone-channelling machine, having its cutter-standard J applied to a base, T, which is adjustable upon the carriage A, substantially as described, and for the purpose set forth.

2. The combination of a hinged cutter-carrying standard, J, and an adjustable base, T, with the carriage A, substantially as described, and for the purpose set forth.

3. The adjustable sub-base D, on carriage A, having a steam-boiler mounted upon it by trunnions, substantially as described.

4. The air-chamber above the piston b^2, in cylinder M, and air-cock t, in combination with reciprocating cutters, and a support or standard, J, substantially as described.

5. The air-chamber below piston b^1, in cylinder M^1, and air-cock t', adapted to operate substantially as described.

GEO. J. WARDWELL.

Witnesses:
C. CLARK,
C. W. SAFFORD.