2 Sheets—Sheet 1.

H. GOULDING.

STONE DRILLING MACHINE.

No. 8,363. Patented Sept. 16, 1851.

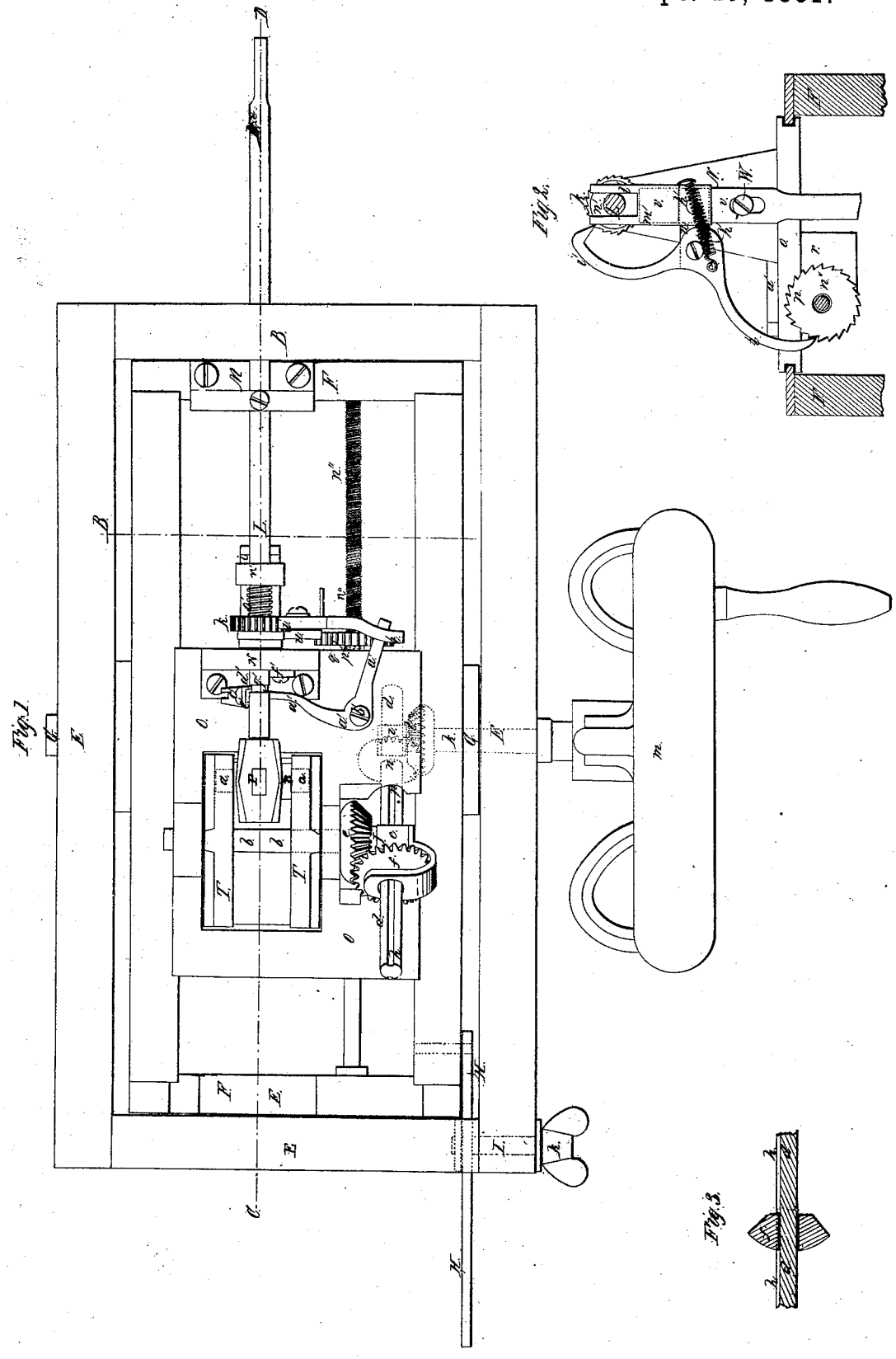

Fig. 1.

Fig. 2.

Fig. 3.

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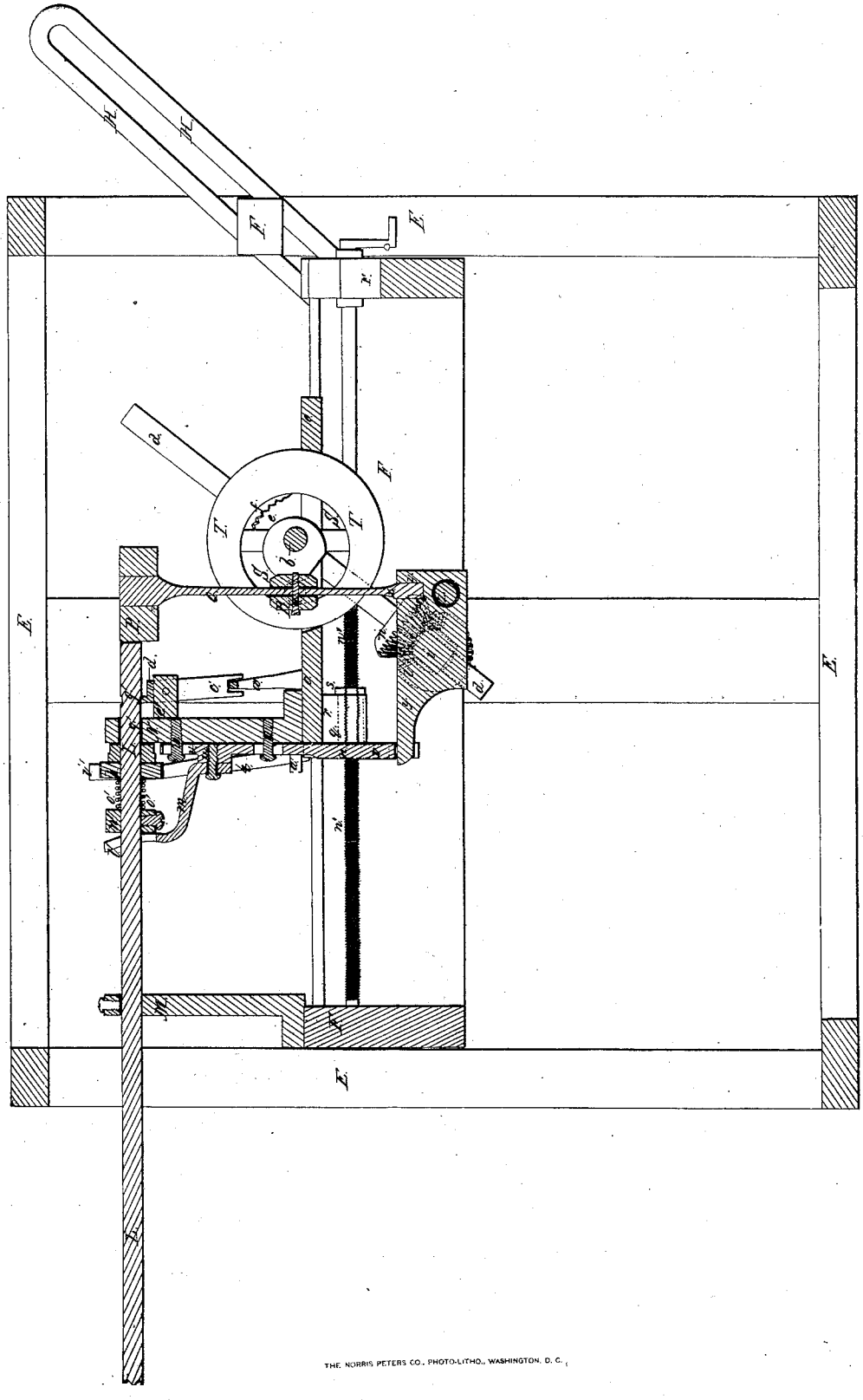

Fig. 4.

UNITED STATES PATENT OFFICE.

HENRY GOULDING, OF BOSTON, MASSACHUSETTS.

STONE-DRILLING MACHINE.

Specification of Letters Patent No. 8,363, dated September 16, 1851.

To all whom it may concern:

Be it known that I, HENRY GOULDING, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Power Drilling-Machines, and that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said invention, by which it may be distinguished from all others for a similar purpose, together with such parts as I claim and desire to have secured to me by Letters Patent.

The figures of the accompanying plates of drawings represent my improvements.

In Plate 1, Figure 1 is a top view of my machine; Fig. 2 is a detail transverse vertical section, taken in the plane of the line A B Fig. 1; and Fig. 3 is a detail sectional view, which will be explained and referred to in the sequel. In Plate 2, Fig. 4 is a longitudinal vertical section, taken in the plane of the line C D, Fig. 1.

Most of the power drilling machines which have recently been devised, have had the steam engine directly connected to the drilling, so that in working in a tunnel, or horizontal drift, the engine must pass into the same, and the smoke and steam must be discharged from such tunnel or drift by artificial means, and this is an obstacle in the working of said machines not easily surmounted.

In my improved machine, the drill is operated by a heavy hammer, and the power may be stationed outside of the drift, and communicated to the machine by bands or otherwise, the apparatus being so arranged as to drill at any angle. There is also in my said machine, a novel mechanical mode of regulating the feed of the apparatus accurately by the progress which the cutting edge of the tool makes in the rock, and a contrivance for drawing the cutting edge of the tool back a little, so that it may be turned in the hole, without breaking the edge, and then carried back against the end of the hole, in season for another stroke of the hammer.

In the several drawings, E E E E represents the main supporting framework of the machine, which may be constructed as shown, or in any other suitably strong manner.

F F F is a rectangular swinging frame, which is suspended by proper journals G G, Fig. 1, Plate 1, in suitable bearings, in the framework E E E, and which may be confined in any angular position, by means of the slotted arm H H, connected to one corner of said frame, and the clamping screw and nut I, K, shown by dotted lines in Fig. 1, Plate 1, the operation of which will be understood by inspecting said figure without further explanation.

L L is the drill shaft which has proper bearings in the upright stanchion M, attached to the front of the swinging frame F F, and a similar stanchion N, on the sliding frame O O, to which frame most of the operative parts of the machine are connected, and which moves or is fed along on the upper side rails of said swinging frame, as shown in Figs. 1 and 2, Plate 1. This drill lays loosely in its said bearings, so as to turn, and move forward and back therein, and is driven forward so as to penetrate the rock, by means of a heavy hammer P, mounted on the upper end of a vertical arm or handle Q R, Fig. 4, Plate 2, said hammer being moved forward and back, by means of two similar eccentric grooves S S, in the circular plates T T, Fig. 1, Plate 1, and Fig. 4, Plate 2, in which grooves the lateral arms *a a* of the hammer handle Q R play, and are moved, so as to drive the hammer forward and back as desired.

The plates T T are fixed on a horizontal shaft *b b*, one journal of which has a proper bearing in the frame O O, and the other journal *j* resting and turning in a sliding box *c*, on the inclined and turning shaft *d d*, Fig. 1, Plate 1, which not only rotates on its axis, but also turns in the direction of its length, as hereinafter explained.

A bevel gear wheel *e* is fixed on that journal of the shaft *b b*, which rests in the box *c*, which engages with another bevel wheel *f*, arranged on the inclined shaft *d d*, so as to turn with it, and slide on it longitudinally, by means of a tongue *g*, on said wheel *f*, fitting and moving in a groove *h h* on said shaft *d d*, as shown in Fig. 3 Plate 1.

The lower end of the shaft *d d* rests in a

box or nut *i* shown by dotted lines, which box is connected to the driving shaft *k*, so as to turn in it but not with, or in the gear *l* as shown by dotted lines in Fig. 1, Plate 1, and Fig. 4, Plate 2. A bevel gear *l* fixed on the driving shaft, engages with a similar bevel gear *n*, fixed on the lower part of the shaft *d d*, and by means of the bevel gears *e* and *f* arranged as before described, motion is communicated from said driving shaft to the shaft *b b*, which carries the eccentrically grooved plates T T, that drive the hammer as before described.

By arranging the journal *j* of the shaft *b b* in a box which slides on the shaft *d d*, and the gear *f* so as to slide on said shaft, and the bearing of the lower end of said shaft *d d*, so as to turn in the driving shaft, or in the gear *l*, the sliding forward of the frame *o o*, and the apparatus, will keep up the connection between the driving shaft *k*, and the shaft *b b* which operates the hammer, whatever may be the position of the sliding frame.

The machine may be driven by a band from any stationary power, passing around a pulley fixed on the driving shaft *k*, in the place of the fly wheel *m*.

As the hole is deepened in the rock, the drill with the sliding frame O O, and all its appendages is fed forward by the following mechanical arrangement: An endless screw shaft *n'' n''* extends the whole length of the swinging frame F F, and has bearings on the same. A ratchet wheel *p* is connected to a nut *q*, which turns on the screw shaft *n'' n''* and passes through the projection *r*, depending from the underside of the sliding frame, and has a shoulder *s*, on the rear side of the same, so that the turning of said ratchet and nut on the screw shaft, moves the sliding frame along. The ratchet wheel *p*, is turned intermittently by means of the pawl *t*, shaped as shown in Fig. 2, Plate 1, and connected to the right angular arm *u*, projecting from the sliding slotted bar *v*, *v*, which moves up and down on the screw guides *w w*, which pass through the slots in said bar, into the stanchion N, above referred to, as shown in Fig. 4, Plate 2. This bar *v v* is moved up and down at each stroke of the hammer, by an extension of the hammer handle *x*, which turns the tilting lever *y y*, on its fulcrum or axis *z*, and operates said bar as before described, and as will be readily perceived by inspection of Fig. 4, Plate 2.

I provide for stopping the feeding forward of the drill, &c., when its edge does not penetrate the rock the proper or usual distance at each blow, by the following arrangement of mechanical devices.

A horizontal bent lever *a' a' a'* turning on a fulcrum *b'*, has one end passing on the inside of the pawl *t*, its other end embraced by the fork of a vertical lever *c' d'*, which has a fulcrum in the projection *e'*, from the stanchion *f'*; the upper end *d'* of said vertical lever, fitting in the transverse groove *g'*, on the inner end of the drill shaft, as shown in Fig. 1, Plate 1, and Fig. 4, Plate 2. When the parts are at rest, or the drill has not penetrated the rock the usual distance at a blow, the lever *a' a' a'*, will keep the pawl *t* out of connection with the ratchet, but when the drill is driven in a sufficient distance it draws the arm of the lever *a' a' a'* away from the front of the pawl, and allows the spiral spring *h' h'* Fig. 2, Plate 1, to draw said pawl inward, so as to make it engage with the teeth of the ratchet wheel *p*, and feed the apparatus along; but if the drill does not penetrate properly at each blow, the said feeding forward will not take place.

There is a hooked pawl *i'*, connected to the pawl *t*, or it may be to the sliding bar *v v*, and this pawl engages with the teeth of the ratchet *k*, fixed on the drill shaft, and at each descent of the bar *v v*, the drill shaft is turned a little, so as to have its cutting edge strike in a different place at each stroke of the hammer. In order to effect this turning without breaking the edge of the tool, it is necessary to draw said edge away from the bottom of the hole, while it is turned, and this is done by means of the inclined claw or fork *l'*, on the end of the bent plate *m'*, which is secured to the front of the sliding bar *v v*, as shown in Fig. 4, Plate 2. This claw works against the collar *n'*, fixed on the drill shaft, and draws said shaft backward. When the bar *v v* rises, and the turning of the drill is going on, and after said turning is effected, the spiral spring *o' o'*, presses against the said collar *n'*, and forces the edge of the tool against the bottom of the hole, ready for another blow of the hammer.

The foregoing description embraces all the essential features of my machine, but it will be evident to any skilful mechanic, that substitutions of mechanical equivalents, for certain parts which I have described, may be made without substantially varying the principles or mode of operating my machine.

Having thus described my new drilling machine I shall state my claims as follows:

What I claim as my invention and desire to have secured to me by Letters Patent is—

1. A power drilling machine in which the drill is driven by a vibrating hammer, operated substantially as herein above described.

2. I claim stopping the "feeding forward" of the sliding frame, and drill, when the latter does not penetrate the rock sufficiently, or to the usual depth at each blow, by keeping the pawl out of the feeding ratchet, excepting when the drill goes in the

requisite length, by means of the combination of the forked vertical lever c' d', connected with the drill shaft, the horizontal lever a' a' a', and the spiral spring h' h', operating substantially as herein above set forth.

3. I also claim drawing the edge of the drill away from the bottom of the hole, when the tool is being turned, by means of the inclined claw or fork l', operating with a collar n', on said drill, substantially as herein above described.

HENRY GOULDING.

Witnesses:

EZRA LINCOLN,

ROBERT L. HARRIS.