(No Model.)

3 Sheets—Sheet 1.

L. W. TRACY.

ROCK DRILLING MACHINE.

No. 314,755. Patented Mar. 31, 1885.

Fig. 1.

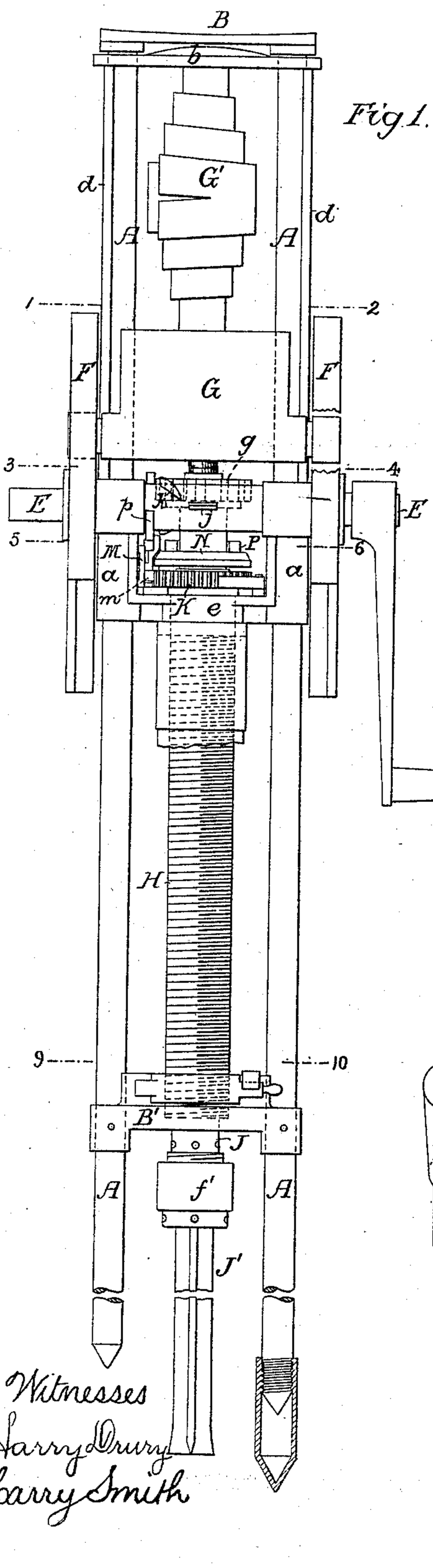

Fig. 2.

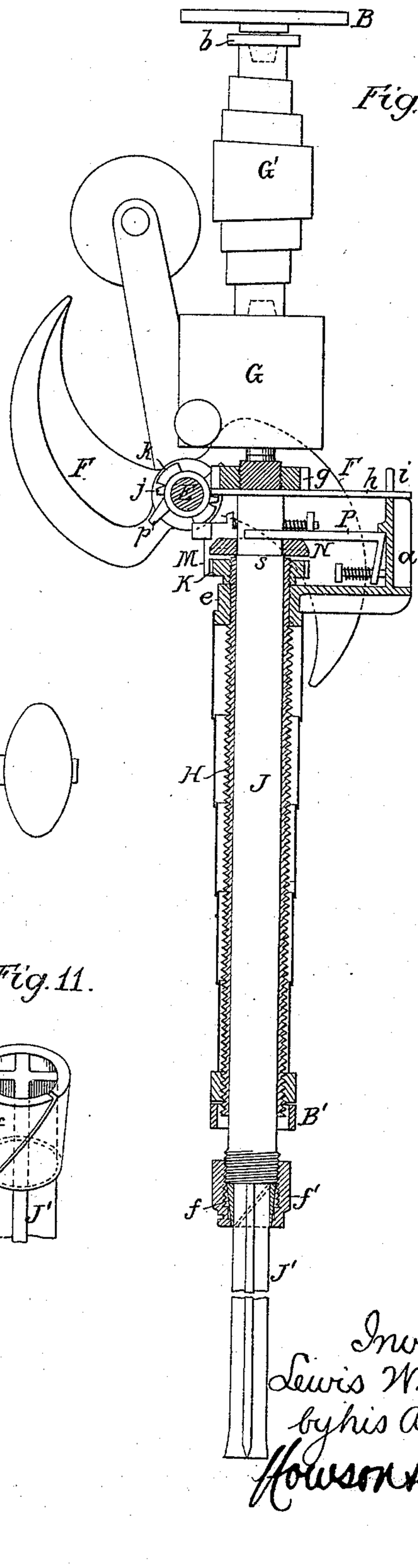

Fig. 11.

Witnesses
Harry Drury
Harry Smith

Inventor
Lewis W. Tracy
by his Attorneys
Howson & Sons

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Fig. 3.

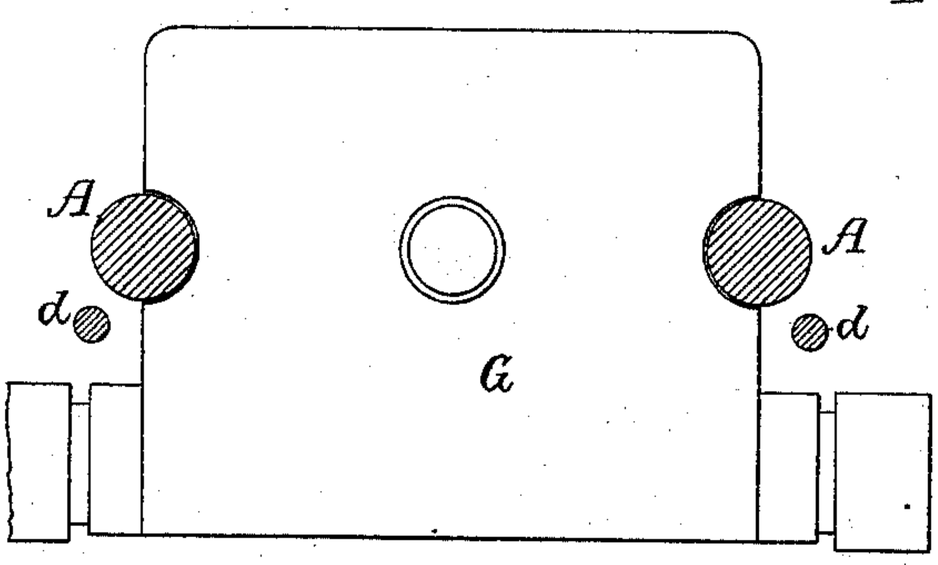


Fig. 4.

Fig. 6.

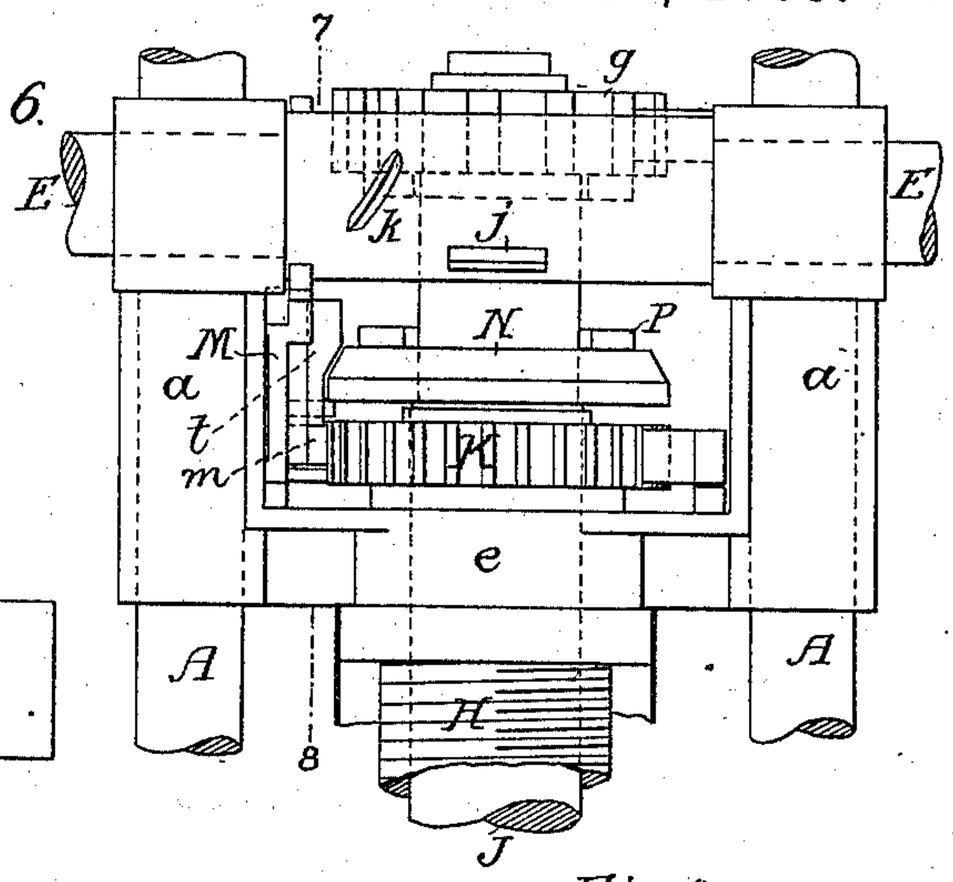


Fig. 5.

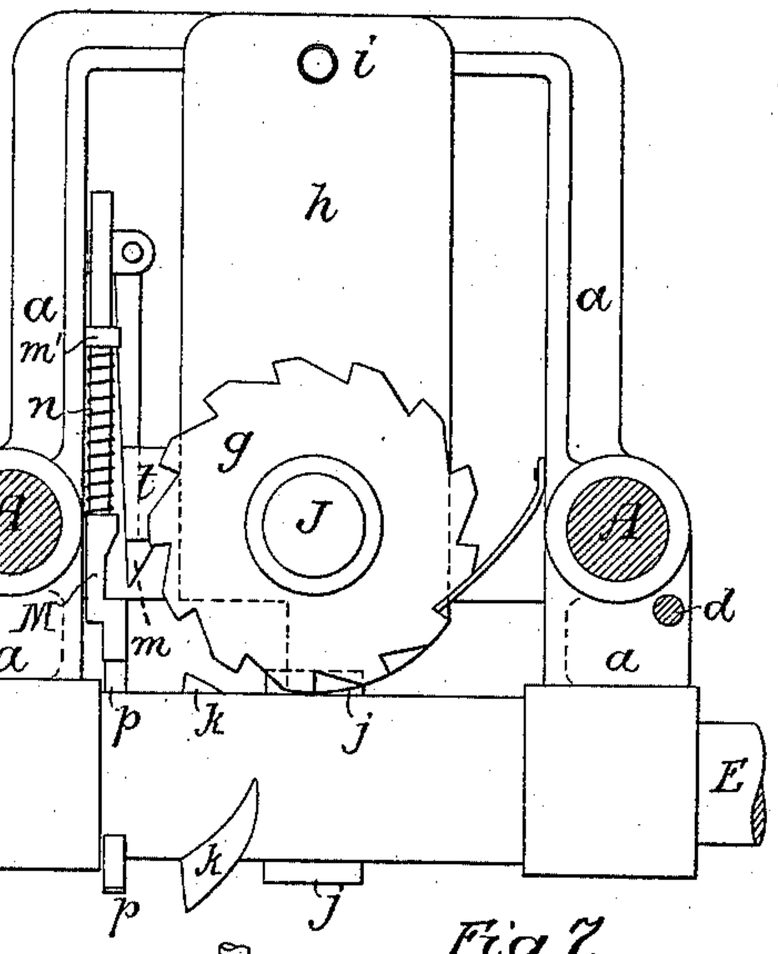


Fig. 7.

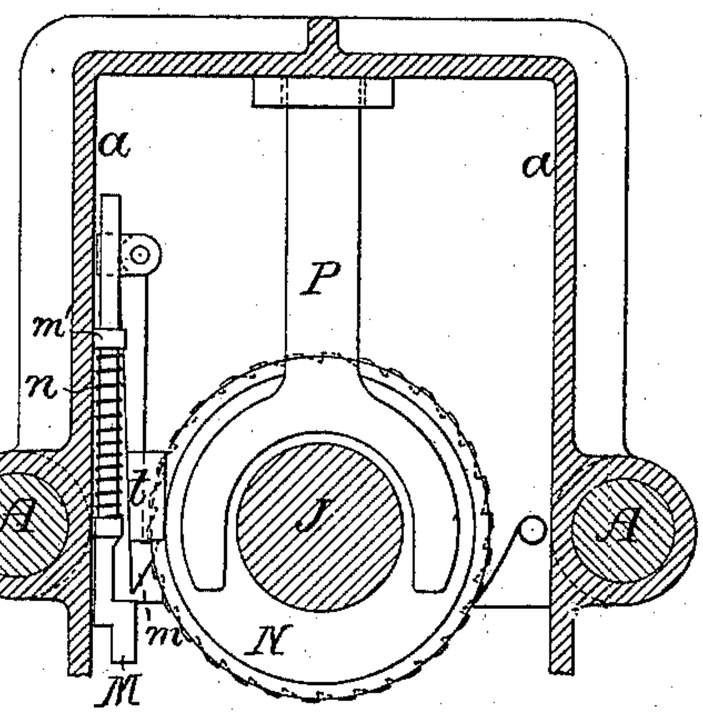
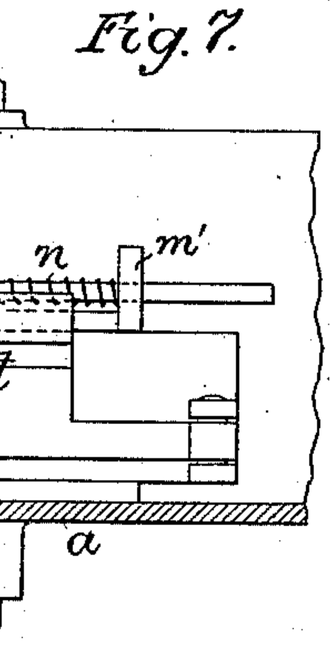
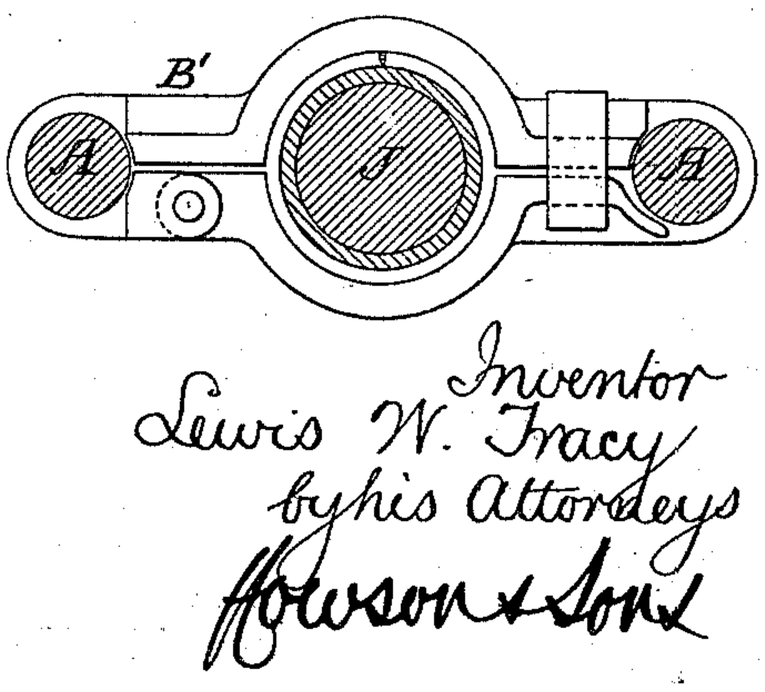


Fig. 8.





Witnesses
Harry Drury
Harry Smith

Inventor
Lewis W. Tracy
by his Attorneys
Howson & Sons

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L. W. TRACY.

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Fig. 9.

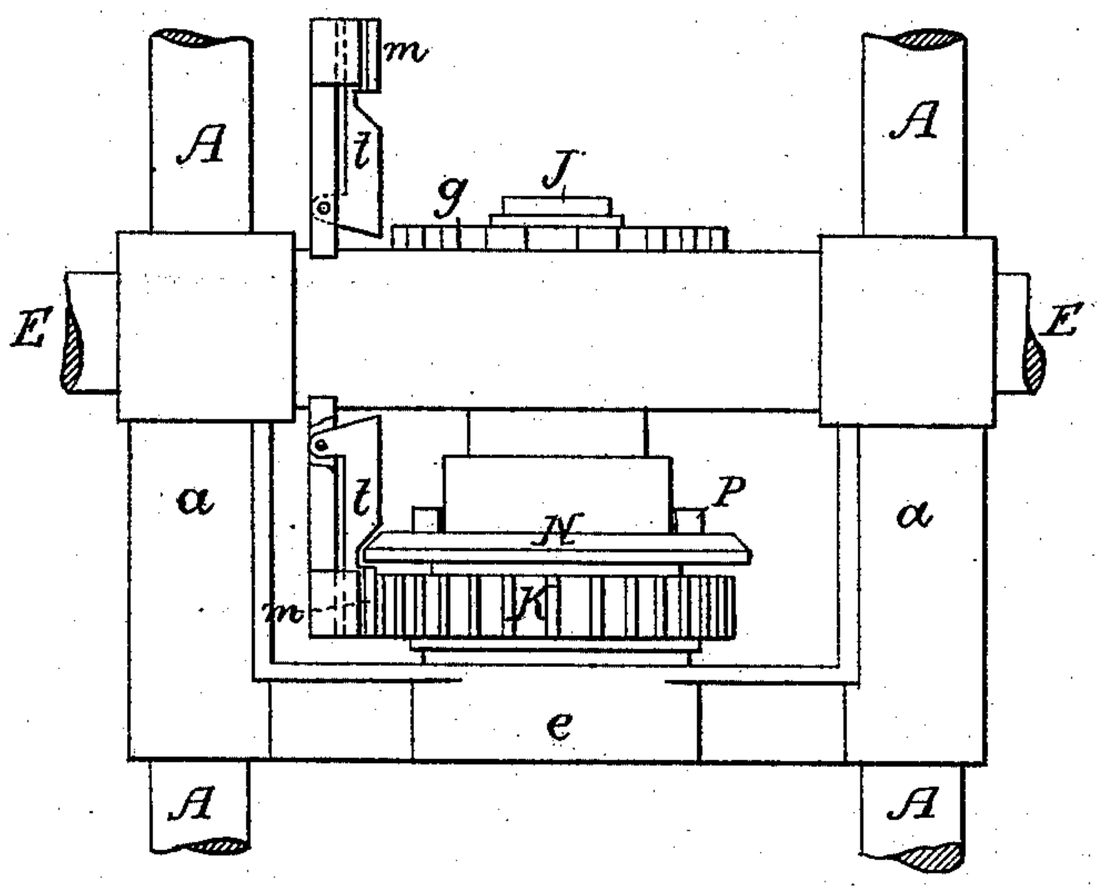
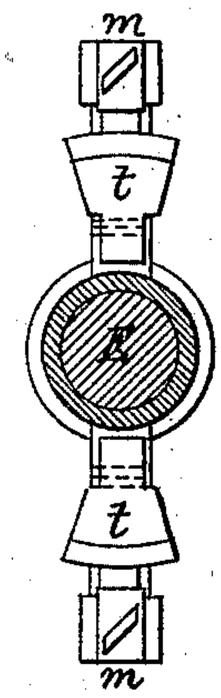


Fig. 10.



Witnesses

Harry Drury
Harry Smith

Inventor
Lewis W. Tracy
by his Attorneys
Howson & Sons

UNITED STATES PATENT OFFICE.

LEWIS W. TRACY, OF PHILADELPHIA, PENNSYLVANIA.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 314,755, dated March 31, 1885.

Application filed March 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, LEWIS W. TRACY, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Rock-Drilling Machines, of which the following is a specification.

My invention consists of certain improvements in that class of rock-drills in which the drill-rod, a spring-hammer, and devices for actuating the latter are secured to a carriage adapted to slide on the frame of the machine; and the objects of my invention are to render such a machine compact, to simplify the construction of the drill rotating and feeding devices, and to insure the firm connection of the drill-rod and drill-bit. These objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a front view, partly in section, of my improved rock-drilling machine; Fig. 2, a longitudinal section of the same; Figs. 3, 4, and 5, Sheet 2, sectional plans of part of the machine on the lines 1 2, 3 4, and 5 6, respectively, Fig. 1, all drawn to a larger scale than said figure; Fig. 6, a front view of part of Fig. 1, also on a larger scale than said figure; Fig. 7, a section on the line 7 8, Fig. 6; Fig. 8, a sectional plan on the line 9 10, Fig. 1; Figs. 9 and 10, Sheet 3, views illustrating a modification of my invention; and Fig. 11, Sheet 1, a detached perspective view of part of the drill-holding chuck.

The frame of the machine comprises the opposite guide-rods A A, suitably connected together by transverse bars B B′, the lower ends of the rods being pointed and adapted to bear upon the rock on the opposite sides of the drill.

In the drawings I have shown the machine in the vertical position; but in practice the frame of the machine will be furnished with legs, whereby it can be held in any position which the character of the work to be performed may suggest, these legs not being shown in the drawings, as they constitute no part of my invention.

On the guide-rods A is adapted to slide a carriage comprising a frame, *a*, and a plate, *b*, connected together by rods *d*. On the frame *a* are formed bearings for the operating-shaft E, which has suitable handles at each end, and is provided with cams F, the latter acting on anti-friction rollers carried by a weight, G, which is guided on the rods A, and between which and the plate *b* intervenes a helical spring, G′, the tendency of this spring being to impart a downward thrust to the hammer when the latter is released from the control of the cams F.

On the frame *a* is formed a bearing, *e*, for the upper end of the feed-screw H, which is confined to the bearing, as shown in Fig. 2, so that it can turn freely in; but can have no other movement independent of, said bearing. The lower end of the feed-screw engages with a halved nut on the cross-bar B′ of the frame, so that on properly turning the screw the carriage will be fed forward on the guide-rods A, the halved nut, however, providing means for readily throwing the screw out of gear when necessary. The feed-screw is tubular for the reception of the drill-rod J, the lower end of which is provided with a chuck for the drill-bit J′, this chuck comprising a diagonally-slotted taper sleeve, *f*, and a nut, *f′*, adapted to the threaded lower end of the drill-rod, and to the slotted taper sleeve, as shown in Figs. 1, 2, and 11. Secured to the upper end of the drill-rod is a ratchet-wheel, *g*, and between the latter and a shoulder on the rod is secured a plate, *h*, which is guided by a pin, *i*, on the frame *a*.

On the shaft E are radial tappets *j* and inclined lugs *k*, so that as the shaft is rotated the drill is lifted by the action of the tappets *j* on the plate *h*, and rotated by the action of the lugs *k* on the ratchet-wheel *g*, the tappets *j* being set somewhat in advance of the lugs *k*, so that the rotation of the drill-rod is effected at a time when the front end of the drill is free from contact with the rock at the bottom of the hole. The plate *h* is cut away at the front end, as shown in Fig. 4, to permit the proper action of the lugs *k* on the teeth of the ratchet-wheel.

To the upper end of the feed-screw H is secured a ratchet-wheel, K, which is acted upon by a pivoted pawl, *m*, carried by a slide, M, Figs. 4, 5, and 7, this slide being guided by a projection, *m′*, on the frame *a*, and being acted upon by a spring, *n*, and by tappets *p* on the shaft E, so that as said shaft is rotated in the

direction of the arrow, Fig. 7, a reciprocating movement will be imparted to the slide, and the pawl *m* will act upon the teeth of the ratchet-wheel K, and will effect the partial turning of said wheel and of the feed-screw. A shoulder, *s*, is formed upon the drill-rod, and upon this shoulder bears a ring, N, which is acted upon by one arm of a bell-crank lever, P, hung to the frame *a*, the other arm of the lever being under control of a spring, *v*, which tends to cause such a movement of the lever that it effects a downward pressure of the ring N upon the shoulder of the drill-rod, and thus insures the maintenance of the point of the drill in contact with the rock at the bottom of the hole at all times, except when the drill is raised by the action of the tappets *j*. The ring N also serves to regulate the operation of the feed-screw, so that it shall accord with the rate of penetration of the drill, the pawl *m* having a beveled projection, *t*, which rests upon the beveled outer edge of the ring N, the vertical position of which thus governs the lateral position of the pawl *m* and regulates the extent of engagement of the said pawl with the ratchet-wheel K, the rotation of the latter being thus restricted or stopped when the drill strikes a hard stratum of rock.

In Figs. 9 and 10 I have shown a modification of this feature of my invention, in which, instead of being pivoted to a slide, M, the pawls are hung to arms on the shaft E, the beveled projections *t* on the pawls acting in conjunction with the ring N to control the action of said pawls on the ratchet-wheel K, as before. It is not necessary that both the ring N and the projections on the pawls should be beveled, as in some cases the ring only, and in other cases the projections on the pawls only, need be beveled. It is preferable, however, to bevel both.

By the formation in the taper sleeve of the chuck of a diagonal slot, instead of the usual straight slot, the opposite edges of the sleeve are at all times supported at some point in their length by one of the ribs of the drill, and I thus prevent the fracture of the sleeve, which is likely to occur when the slot is straight and occupies a position between two of the ribs of the drill when the sleeve is subjected to pressure.

I do not desire to claim, broadly, interposing a spring directly between the hammer and an end plate of the carriage; but

I claim as my invention—

1. The combination of the drill-rod, the ring N thereon, the feed-screw having a ratchet-wheel, K, the pawl-carrier, and a pivoted pawl, *m*, having a projection, *t*, said projection or ring, or both, being beveled, as described, whereby they co-operate to control the extent of engagement of the pawl and the ratchet, as set forth.

2. The combination of the drill-rod and the ribbed drill with the chuck comprising the diagonally-slotted taper sleeve *f*, and the confining-nut *f'*, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS W. TRACY.

Witnesses:

HARRY DRURY,

HARRY SMITH.