A. E. ALLEN.

Rock-Drilling Machine.

No. 164,705. Patented June 22, 1875.

Fig. 1.

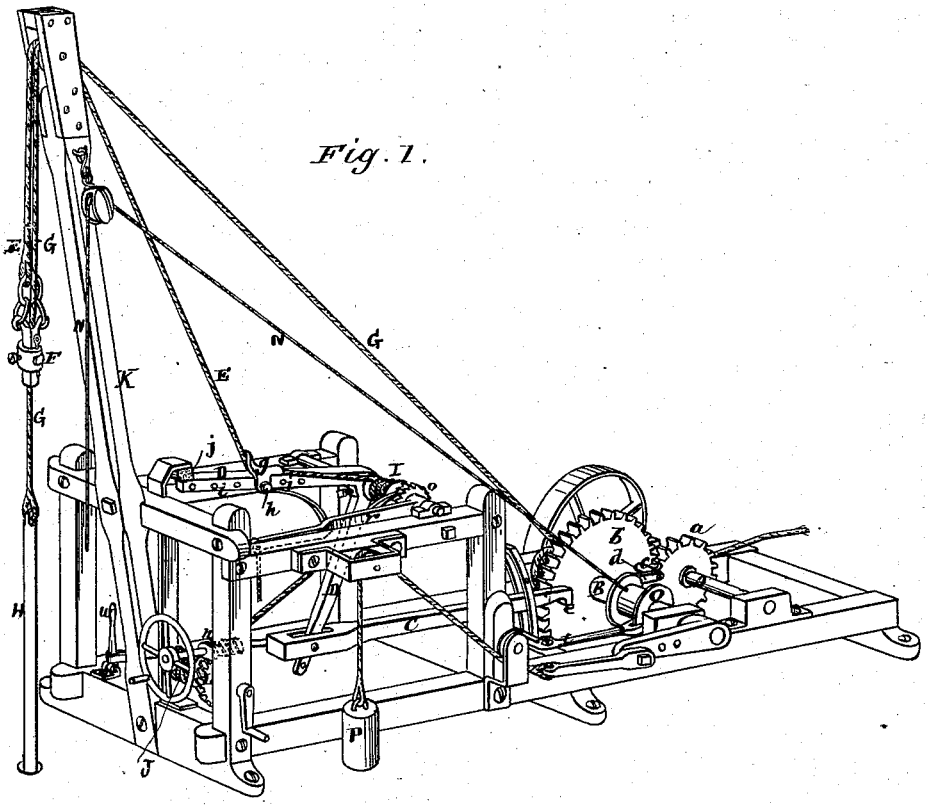


Fig. 2.

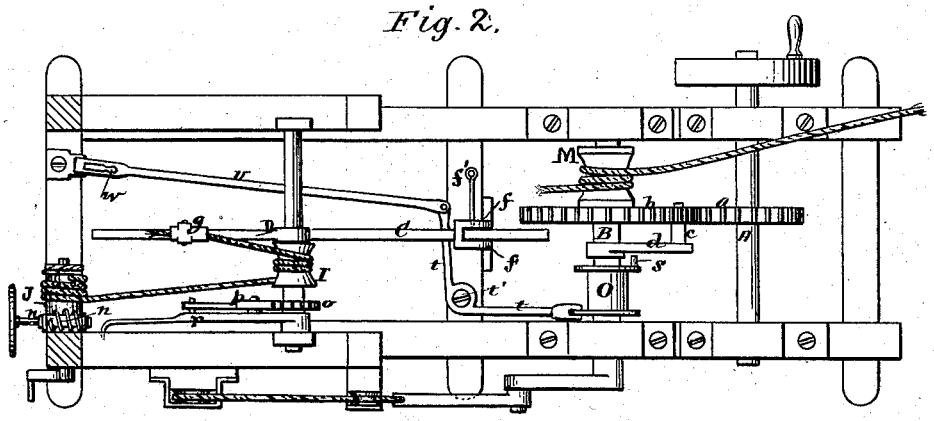
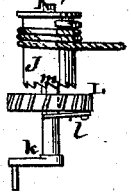


Fig. 3.



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UNITED STATES PATENT OFFICE.

ADDIS E. ALLEN, OF PERCH RIVER, NEW YORK.

IMPROVEMENT IN ROCK-DRILLING MECHANISMS.

Specification forming part of Letters Patent No. **164,705**, dated June 22, 1875; application filed March 6, 1875.

To all whom it may concern:

Be it known that I, ADDIS E. ALLEN, of Perch River, Jefferson county, New York, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification:

The drilling-machine in which my invention is comprised operates on the same general principle as that described and claimed in my Letters Patent No. 131,074, dated September 3, 1872, inasmuch as I employ a compensating balance-weight and a reciprocating connecting-rod, intermittently engaging a crank or wrist pin on the driving-shaft, as described in my said Letters Patent. My present improvements have reference, principally, to the mechanism by which the feed of the drill is effected and regulated. It also has reference to the arrangement of the drop mechanism, to combining with the drilling-machine a mechanism for operating a sand-pump whenever required, and to other features, which will be developed in the course of the description.

I shall now proceed to give a description of the nature of my improvements, and the manner in which the same are or may be carried into effect, referring at the same time to the accompanying drawing, in which—

Figure 1 is a perspective view of a machine embodying my improvements. Fig. 2 is a plan of the same with the mast removed.

A is the driving-shaft, operated from any suitable prime mover. B is the main shaft, driven from shaft A by gearing *a b*. C is the sliding or reciprocating connecting-rod, with a hook or notch, *e*, at one end to intermittently engage the wrist-pin *c* of crank *d*, in the manner and for the purposes substantially as described and claimed in my Letters Patent aforesaid. The wrist-pin is formed by a pin or stud fastened at one end in the crank-arm, and at the other end in the gear-wheel *b*, and carrying on that part of it intermediate between the arm and wheel a friction-roller. This arrangement gives strength and stability to the crank device under the heavy load that it is required to raise. The connecting-rod moves between guides *f* near its hooked end, and at the other end is jointed to one arm of an angle-lever, D, to the other arm of which is connected the drop or feed rope E. The feed-rope is adjustably connected with the lever by means of saddle-piece *g*, under which it passes. The saddle is attached to the lever by a pin or bolt, *h*, passing through the arms of the saddle and one of a series of holes, *i*, formed in the angle-lever. The object of this arrangement is to regulate the length of stroke. The nearer the saddle is to the fulcrum or axis of vibration of the lever the shorter will be the stroke. Other means than the saddle may be employed for the purpose—as, for instance, a simple eyebolt, through the eye of which the rope can pass; but I prefer, on the whole, the arrangement shown in the drawing. When the crank or wrist pin draws forward the connecting-rod C the lever D will be thereby moved in a direction to depress its upper arm, which will have the effect of drawing down the drop or feed rope, and, consequently, of elevating the drill. Upon disengagement of the rod C from the wrist-pin the drill will drop by reason of its own weight, forcibly and suddenly drawing up the upper arm of the lever. A bumper or buffer, J, fixed on the machine above this arm of the lever, is provided to check at the proper point the movement of the arm when it is jerked upward by the descending drill. The feed-rope passes up over a sheave in the top of mast K, and thence to the rope-clamp F, by which said feed-rope is fastened to the main rope G, from which is suspended drill-rod H. The drop or feed rope passes from the saddle *g* around a small capstan, I, on the shaft of the angle-lever D. It makes two or three turns around this capstan, and thence passes to feed-drum J, to which it is secured. The arrangement of the feed-drum is more clearly indicated in Fig. 3 on an enlarged scale. It is fast on a shaft, K′, which has its bearings in the frame of the machine, and is provided at the outer end with a crank-handle, *k*. The shaft passes loosely through a helicoidal or worm wheel, L, to which is attached a spring-pawl, *l*, that works through the wheel against a ratchet, *m*, on the adjoining end of the feed-drum. This arrangement will permit the drum to be rotated by crank-handle *k*, to wind up the feed-rope without revolving the worm-wheel, the pawl, when the drum rotates in this direction, riding over the

ratchet-teeth. With the worm-wheel is combined a worm-shaft, *n*, supported in suitable bearings, and meshing with the worm-wheel. To the end of the worm-shaft is affixed a hand-wheel, by means of which the worm can be rotated to effect the revolution of the worm-wheel in either direction—either to wind up or to unwind the feed-rope. I use it principally, however, for the latter purpose, the combination of the worm, worm-wheel, and feed-drum being primarily for the purpose of feeding the drop-rope from the drum during the operation of drilling.

The capstan I is of advantage in that it prevents the feed-works from being unduly strained. This capstan I is mounted loosely on its supporting-shaft, and on its hub is formed a ratchet, *o*, which is engaged by a spring-pawl, *p*, on the vibratory lever *r*, whose axis of vibration is the capstan-supporting shaft. The free end of the lever is adapted to engage a detent or equivalent device on the drill-frame, which will hold the lever firmly in position when it is not in use. The object of this ratchet, pawl, and lever arrangement is to hold the capstan in position, and to provide, at the same time, a means by which any slack in the drop-rope can be readily taken up.

The main rope G passes from the drill H up over a sheave on the mast K, and thence to a capstan, M, fast on the main shaft B, around which capstan it is coiled loosely two or three times. The object of this arrangement is to provide for lifting the drill out of the hole. To do this I first throw the machine out of gear by raising the connecting-bar C out of the path of the crank *d e*. The bar is held in this position by inserting beneath it, and through holes formed at a suitable height in guides *f*, a pin, *f'*. I then loosen the rope-clamp F, which detaches the drop-rope E from the main rope G, after which the main rope is taken hold of by its free end, and is hauled tightly on the capstan M.

The machine is now put in motion, and the revolution of the main-shaft capstan will wind up the main rope, and thus elevate the drill-rod until it is lifted out of the hole, when it is permitted to drop and rest by the side of the hole. An attendant, of course, holds the free end of the rope during this operation, and takes up the slack. It is necessary at times to thus lift the tools in order to "sand-pump." An arrangement for lifting and lowering the pump is shown in the drawing.

N is the sand-pump rope, to the free end of which the sand-pump is connected. The rope runs up over a sheave on the mast K, and thence to a reel, O, loose on main shaft B. From the side of the reel adjoining crank-arm *d* projects a pin, *s*, which, while normally out of the path of the crank, will, when the reel is moved endwise on the shaft B toward the crank, lie directly in the path of the crank, in which position the latter, in its revolution, will engage said pin, and therefore revolve the reel.

The endwise movement of the sand-pump reel, to throw it into or out of engagement with the driving mechanism, may be effected in any suitable way. In this instance it is effected by means of an angle-lever, *t*, pivoted at *t'*, having a forked end, which straddles one rim of the reel. The other end of this angle-lever is pivoted to a connecting-rod, *v*, which at the other end is jointed to a vibratory lever, *w*, by which the system of levers is operated to shift the reel to one position or the other.

To sand-pump after the drill-tools are lifted out, as above described, the pump can readily be lowered. The reel being out of gear, the pump, by its weight, will be carried to the bottom. To raise the pump, the reel is thrown into gear with the revolving crank-arm, and the sand-pump rope will thereby be wound up on the reel.

I would remark, in conclusion, that with the machinery here shown I also use a compensating balance-weight, P. This weight, however, is combined and arranged to operate in connection with the main shaft in substantially the same manner as described in my Letters Patent No. 131,074, of September 3, 1872. It therefore requires no further mention here.

Having described my invention, and the manner in which the same is or may be carried into effect, I would state that I do not limit myself to the precise details herein shown and specified in illustration of my invention; but

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

1. The described combination, in the drilling-machine, of the sand-pump reel and mechanism, substantially as shown and described, to throw said reel into or out of gear at pleasure with the driving mechanism of the drilling-machine.

2. In feed mechanism of drilling-machines, the combination, with the feed-drum, to which is attached the feed or drop rope, of a worm-wheel and worm, by which said drum is rotated to effect the feed of the drill, substantially as and for the purposes set forth.

3. The worm-wheel and worm, in combination with the feed-drum, connected with the worm-wheel by a ratchet-and-pawl connection, as described, which permits the drum to be rotated by a crank-handle or otherwise independently of the worm-wheel, to effect the winding up of the feed-rope.

4. In combination with the feed-drum and feed-rope, the capstan on the angle-lever shaft, interposed between the feed-drum and the drop, to take the strain from the feed-works, substantially as set forth.

5. In combination with the angle-lever shaft, the feed-rope capstan loose thereon, and the lever, pawl, and ratchet mechanism, for holding said capstan in place, and taking up slack in the drop-rope, as set forth.

6. The combination, with the vibratory angle-lever, of the feed or drop rope, operated

by said lever, as described, and the feed mechanism, whereby said rope can be let out or taken up during the movement of said lever, and without stoppage of the machine, substantially as set forth.

7. The feed-rope, the feed mechanism for taking up and letting out the same while the machine is in motion, and the drop mechanism by which said rope is operated to raise and let fall the drill, as described, in combination with the main rope attached to the drill, and normally loose on its capstan when the machine is in operation, as set forth.

8. The combination, in a drilling-machine, of a drop-rope, by which the drill is intermittently operated, and a main rope connected with the drill, but normally loose on its capstan during the working of the drill, substantially as and for the purposes set forth.

In testimony whereof I have hereunto signed my name this 15th day of February, A. D. 1875.

ADDIS E. ALLEN.

Witnesses:

F. W. SPICER,
MYERS THOMPSON,
H. L. BALDWIN.