

Improvement in Rock-Drilling Machines.

Patented May 9, 1871.

Fig. 4.

H. J. Threlk
Thos. D. D. Andrews

J. W. Spangler.
W. L. Boyd.

Heem &
Attorneys.

United States Patent Office.

JACOB W. SPANGLER, OF JACKSON TOWNSHIP, AND WILLIAM L. BOYD
OF YORK, PENNSYLVANIA.

Letters Patent No. 114,617, dated May 9, 1871.

IMPROVEMENT IN ROCK-DRILLING MACHINES.

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

To all whom it may concern:

Be it known that we, JACOB W. SPANGLER, of Jackson township, in the county of York and State of Pennsylvania, and WILLIAM L. BOYD, of York, in the county and State aforesaid, have invented a new and improved Rock-Drill; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a side elevation, partly in section;

Figure 2 is a front elevation;

Figure 3 is a side elevation of the worm; and

Figure 4 is a view of one of the props.

This invention relates to a mechanism by which three separate movements are imparted to the drill, viz., an intermittent rotary motion for cutting a cylindrical hole, a plunging vertical descent alternating with the necessary ascents for cutting the rock, and a gradual vertical descent for feeding the drill down to its work.

Referring to the drawing—

The mechanism for imparting the intermittent motion to the drill *a* consists of an annular ratchet, *b*, fixed on the drill near its upper end, and a pawl, *c*, pivoted to a frame, *d*, that is attached to the standard *A* of the frame. As the drill rises the ratchet strikes the pawl and rotates the drill.

We are aware that there is nothing new in this part of the apparatus.

The mechanism for imparting the vertical reciprocating motion to the drill consists of a horizontal shaft, *e*, which is rotated by any suitable arrangement of gearing; a disk, *f*, fixed on one end of the shaft *e*, and bearing a wrist-pin, *g*; a vibrating frame, *h*, connected with the wrist-pin *g*; a serrated vertical sliding rod, *i*, jointed at its lower end to the top of the frame *h*, and guided by lugs *k*, which project from the standard *A*; and a collar, *l*, inclosing the drill *a* just beneath the ratchet *b*, and connected with the serrated rod or rack *i* in a manner to be hereinafter described.

The rotation of the disk *f* communicates the requisite reciprocating plunging motion to the drill through the medium of the above-enumerated parts.

The mechanism for imparting a gradual vertical descent to the drill consists of a toothed wheel, *m*, mounted on a pin projecting from a lug, *n*, that incloses the rack *i*, said lug itself projecting from the collar *l* that incloses the drill *a*; a spiral worm, *o*, secured to the inner side of the wheel *m* and en-

gaging with the rack *i*; and a pawl, *p*, pivoted to the sliding frame *d*.

As the wheel *m* rises with the drill it strikes the pawl *p*, and is by that rotated a certain distance, which rotation causes the worm *o* to work downward along the rack *i* and carry the drill *a* downward with it.

Whenever this descent of the drill is greater than the distance the drill is able to penetrate the rock at the next stroke, the drill yields upwardly as the wrist-pin *g* approaches the lowest point of its revolution, by reason of a spiral spring, *q*, which incloses a rod, *r*, that is jointed to said wrist-pin and extends upward into the frame *h*, the spring *q* being within said frame, and bearing against the lower end of the same.

By this arrangement the disk *f* is enabled to perform its revolution without straining or breaking the other parts of the apparatus.

The mechanism we have just described adjusts itself to rocks of various degrees of hardness, in the following manner:

Whenever the drill yields upwardly, in the way explained above, its next succeeding rise is lessened by the amount of such yielding, and in proportion as the distance the drill rises is decreased the extent to which the worm *o* descends along the rack *i* is decreased, because the wheel *m* continues for a shorter time in contact with the pawl *p*; and in proportion as the descent of the worm is decreased the additional descent which the worm imparts to the drill is decreased also.

The sliding frame *d*, before alluded to, is provided with a lug, *s*, that projects from the lower end of said frame in front of the standard *A*.

As the collar *l* descends it strikes the lug *s* and draws the frame *d* downward, so as to make the pawls *c* and *p* follow the drill downward.

A spring, *t*, is attached to the top and rear side of the frame *d*, which spring is pressed by a set-screw, *u*, against the standard *A*.

The office of the spring and screw is, by pressure against the standard, to prevent the sliding frame being carried downward too far by the stroke of the collar *l*.

The wheel *m* should be held upon its shaft in such a manner that it may be readily slipped backward, so as to separate the worm *o* from the rack *i* when it is required to raise the drill out of the bore for any purpose.

Props *v*, having flanges *w* extending from each side

of their tops, the distance between which flanges should be a trifle greater than the width of the rear standards B of the frame, are used to prevent the frame from tipping over when tilted backward so far that it would capsize if not supported.

The props have set-screws, *z*, passing through the flanges, by which they are attached to the standards.

Having thus described our invention,

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

1. The combination of the shaft *e*, disk *f*, frame *h*, rack *i*, collar *l*, wheel *m*, worm *o*, and drill *a*, as specified.

2. The combination of the frame *h*, rod *r*, spring *q*, and disk *f*, as described.

3. The frame *d*, lug *s*, spring *t*, and set-screw *u*, in combination with the standard A, as set forth.

4. The prop *v*, provided with flanges *w*, as explained.

JACOB W. SPANGLER.
WM. L. BOYD.

Witnesses to the signature of SPANGLER:

J. W. BRAFFT,
THOS. J. WILHELM.

Witnesses to the signature of BOYD:

W. J. STINE,
H. CLAY MCINTYRE.