G. H. Wood,

Stone Drill.

No. 18,561. Patented Nov. 3, 1857.

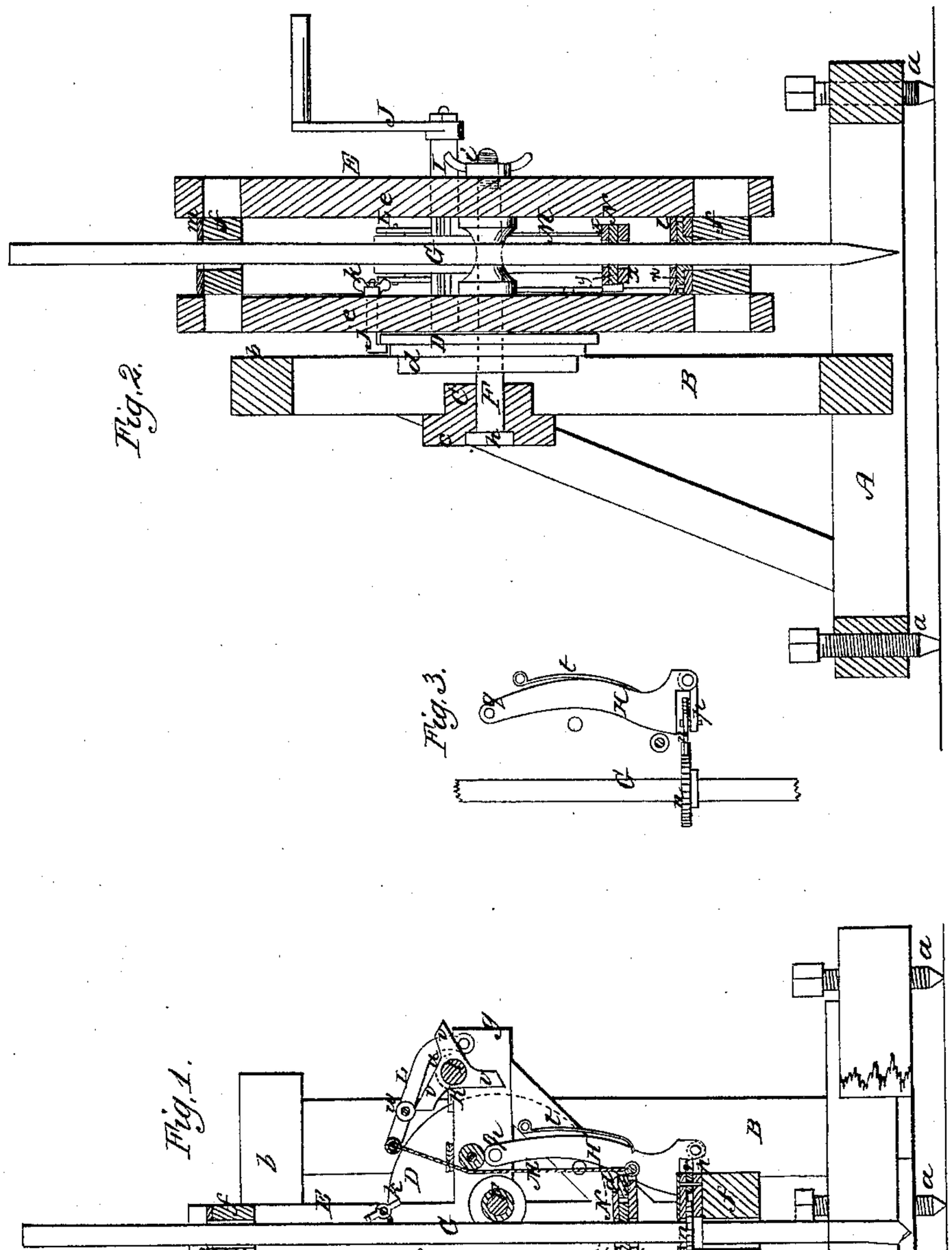

Fig. 2.

Fig. 3.

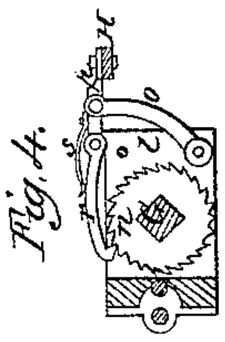

Fig. 4.

Fig. 1.

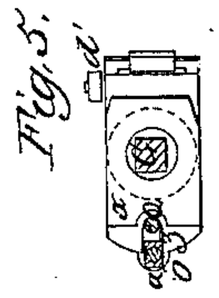

Fig. 5.

UNITED STATES PATENT OFFICE.

GEORGE H. WOOD, OF GREEN BAY, WISCONSIN.

ROCK-DRILL.

Specification of Letters Patent No. 18,561, dated November 3, 1857.

To all whom it may concern:

Be it known that I, GEORGE H. WOOD, of Green Bay, in the county of Brown and State of Wisconsin, have invented a new and Improved Rock-Drill; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figures 1 and 2, are vertical central sections of my improvement the two planes of sections crossing each other at right angles. Figs. 3 and 4, are detached views of the device for rotating the drill. Fig. 5, is a detached view of the gripping device by which the drill is operated longitudinally in one direction.

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

This invention consists in the employment in combination with a drill raised, turned, and operated as above described of a supplementary spring for the purpose of controlling the rebounding of the drill, as hereinafter set forth.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A represents a horizontal frame which has screws (*a*) passing vertically through it at its ends for the purpose of allowing said frame to be adjusted perfectly horizontal, or, to have a proper bearing on uneven ground. To this frame A, two uprights B, B, are attached. These uprights are properly braced and are connected at their upper ends by a cross tie (*b*).

C, represents a block having a head (*c*) formed on its outer end. The block is fitted between the two uprights B, B, and a metallic circular disk or plate D, is attached to the inner end of the block, the inner surface of the disk or plate D, having a rectangular projection (*d*) upon it which projection also fits between the uprights B, B.

E represents a frame which is formed of two parallel bars (*e*) (*e*) connected at their ends by cross ties (*f*) (*f*) said bars having projecting bars (*g*) (*g*) attached to them at right angles at about their centers.

Through the frame E, and at the junction of the bars (*e*) (*e*) (*g*) (*g*) a bolt F, passes, said bolt also passing through the disk or plate D, and block and head C, (*c*); one end of the bolt F, has a head (*h*) formed on it and the opposite end is provided with a screw thread on which a thumb nut (*i*) is fitted, see Fig. 2.

The frame E is allowed to turn freely on the bolt F, by lowering the nut (*i*) and the frame E, may be secured at any desired angle of inclination by having a hooked bar (*j*) pass through the inner bar (*e*) of the frame E, the hooked end of said bar being behind the edge of the disk or plate D, and made to bind firmly against it by means of a thumb nut (*k*) which is placed on its outer end. When the frame E is to be adjusted the nut (*k*) is of course loosened or unscrewed as well as the nut (*i*). Those parts will be perfectly understood by referring to Fig. 2.

G, represents the drill which is of usual construction. This drill is fitted longitudinally in the frame E, and allowed to slide freely back and forth in circular holes made in the cross ties (*f*) (*f*) and also in metallic plates (*l*) (*l*) (*m*) attached to the cross ties. Between the two plates (*l*) (*l*) a ratchet wheel (*n*) is placed and the drill G, passes through the center of the ratchet, and is allowed to slide freely back and forth through the ratchet. Between the two plates (*l*) (*l*) a bar (*o*) is pivoted and the outer end of bar (*o*) is pivoted to a bar (*p*) the outer end of which is pivoted to a lever H, which works on a fulcrum pin (*q*) attached to the frame E. To the bar (*p*) a pawl (*r*) is attached and this pawl is made to catch into or between the teeth of the ratchet (*n*) by a spring (*s*), see more particularly Fig. 4. A spring (*t*) which is attached to the frame E bears against the outer side of lever H. To the outer ends of the bars (*g*) (*g*) of the frame E the bearings (*u*) of a shaft I, are attached. To the outer end of this shaft a crank J, is attached and a tappet K, formed of three arms (*v*) is placed on said shaft at about its center, see Fig. 1. To the outer ends of the bars (*g*) (*g*) a metallic frame L is pivoted, and a friction roller (*w*) is placed in the inner end of the frame L, and a strap M, is attached to the inner end of said frame, the straps being attached to one end of a metallic box N, formed of two plates (*x*) (*x*) and having a circular plate or disk (*y*) fitted between them, said plate or disk having a square opening made through its center to allow the drill to pass through, circular openings are made through the plates (*x*) (*x*) for the same purpose. The end of the box N, opposite to that

where the strap M, is attached has a recess (*z*) made in it to receive a small sleeve or slide (*a'*) which is fitted and allowed to move freely on a shaft O, attached to the inner side of frame E. On this shaft O, a spiral spring P, is placed, said spring being between the sleeve or slide (*a'*) and a hub (*b'*) attached to the rod O, by a set screw (*c'*) so that by adjusting the hub (*b'*) on the shaft O, the spring P, may be more or less compressed and consequently made more or less powerful as desired.

To the frame E, and parallel with the shaft O, a shaft Q, is attached. This shaft Q, has a spiral spring R, placed on it. The spring R is arranged precisely similar to the spring P, but it is somewhat shorter as shown in Fig. 1. To one side of the box N a friction roller (*d'*) is attached and the lever H bears against said roller.

The operation is as follows. The frame E is first adjusted or turned and secured in proper position for the drill to act upon the rock and motion is given the shaft I and as said shaft rotates the arms (*v*) of the tappet K strike successively the roller (*w*) in the frame L and draw back the box N, and as the strap M is attached to the end of the box N said box will, as it is drawn back be inclined as will also the plate or disk (*y*) and this oblique position in which the plate or disk is drawn by the strap causes the aperture at the center of the disk to clutch or grip the drill G which is consequently drawn back with the box N. As the box N is drawn back the spring P is compressed and as the arms (*v*) of the tappet pass the roller (*w*) the drill is driven or forced against the rock by the spring P, and as the drill is forced forward it is rotated a certain distance in consequence of the roller (*d'*) on the box N actuating the lever H which communicates motion to the ratchet (*n*) through the medium of the pawl (*r*).

From the above description of parts it will be seen that the drill may be operated very rapidly and in all rock drilling machines it is essential that the movement of the drill be so controlled as to prevent unnecessary play or the rebounding of the drill caused by the concussion or force of the blows. If this be not prevented a great deal of time is sacrificed, it is necessary that there be some elasticity or play in order to prevent the wearing of the working parts but when more than is necessary is allowed a loss of time is the result. I prevent this rebounding of the drill and control its motion perfectly by means of the supplementary spring R on the rod Q. This is considerably stiffer than the spring P, and the box N does not come in contact with it until it has nearly reached the end of the backward stroke.

The employment of two springs in my drill is not, as might at first be supposed, merely a division of power, which might just as well be applied through the medium of a single spring. One spring, however it may be made and of whatever pressure will not answer the purpose. The power of blow, in drilling rock, requires to be varied according to the character of the rock. It should not be too violent or too light. Now with the first or long spring, I get by the adjustable stop or fastener, the power of blow desired. Suppose the motion to be slow, and the bar to have little or no appreciable momentum upward, the gripper rises just to the bottom of spring R, and is thrown down always with the same velocity. But under rapid motion, say 800 blows per minute, the drill-bar has an immense upward or backward momentum which carries the gripper much above the bottom of spring R, and lifts the said spring. Now, it consumes time for the bar to travel this distance; and hence while running at great speed, the drill-bar is liable to be caught and raised again by the gripper before the drill has made its full descent. This endangers the machine. I found by using only one spring, my speed was very limited, unless the spring was very powerful and pressed hard down, in which case it required an enormous power to turn the machine. My only resource, therefore, was to use an additional and much stiffer spring, the pressure of which should be felt after the lifting was all done. This checks and eases off the upward momentum of the drill-bar, and prepares it for instant return to its blow; thus doubling and even trebling the number of blows which can be made without adding anything to the power required to lift the drill-bar. The advantages, then, of the extra spring R, are great and obvious. 1st. The blows are equalized. 2nd. The speed at which the machine can be worked is greatly augmented. 3rd. These advantages are obtained without requiring any addition to the power.

The above advantages cannot be secured by using a single spring, however constructed. The two springs permit a perfect adjustment of the force of the blow.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

The employment in combination with a drill raised, turned, and operated as above described of the supplementary spring R, for the purpose of controlling the rebounding of the drill G, in the manner substantially as set forth.

GEO. H. WOOD.

Witnesses:
W. TUSCH,
J. F. BUCKLEY.