

(No Model.)

2 Sheets—Sheet 1.

S. INGERSOLL.

ROCK DRILL.

No. 344,906.

Patented July 6, 1886.

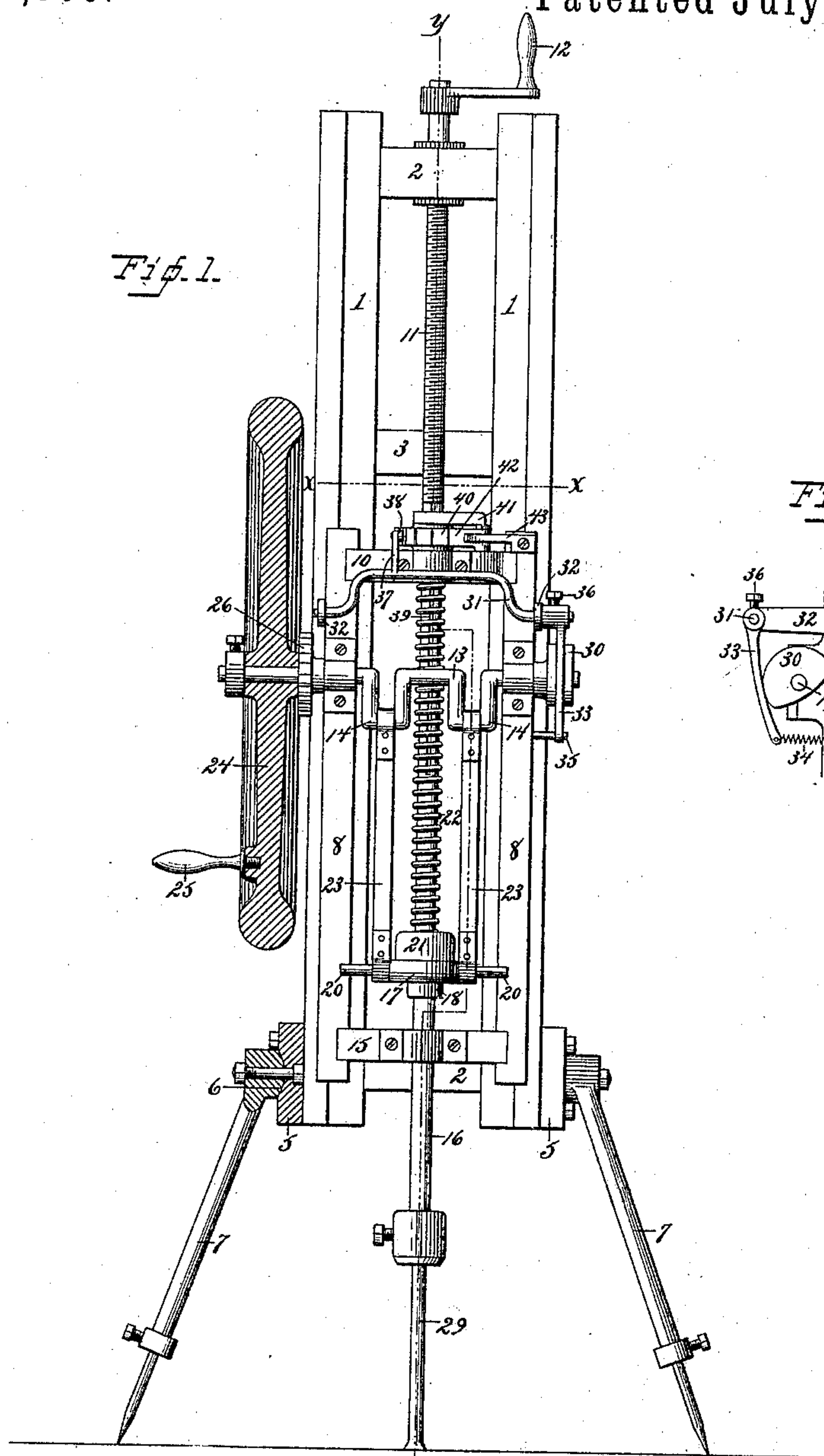


Fig. 3.

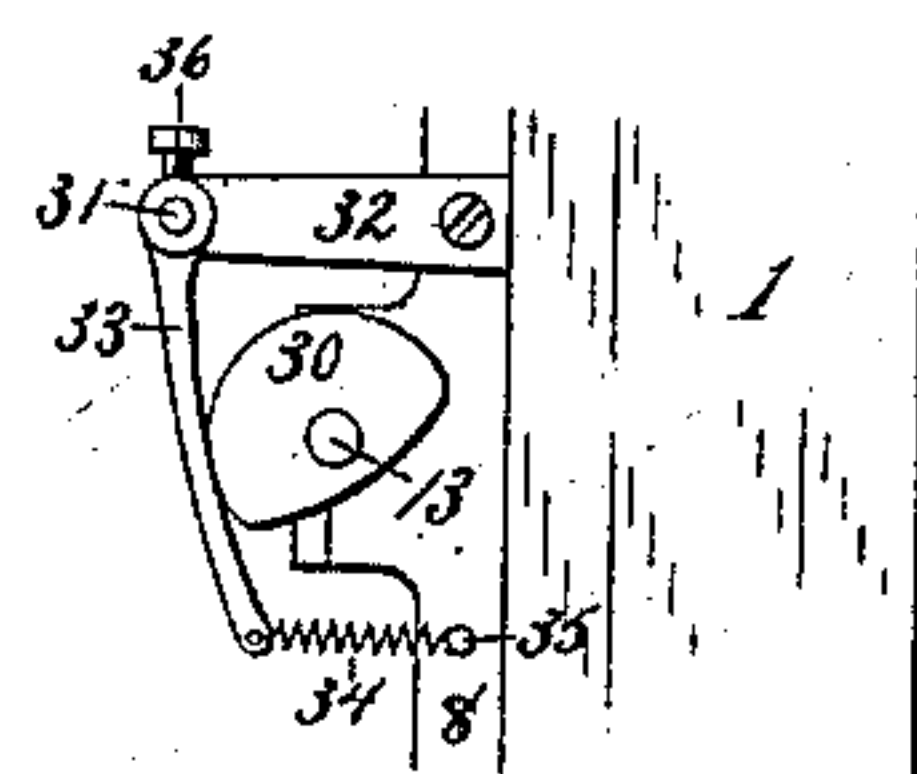
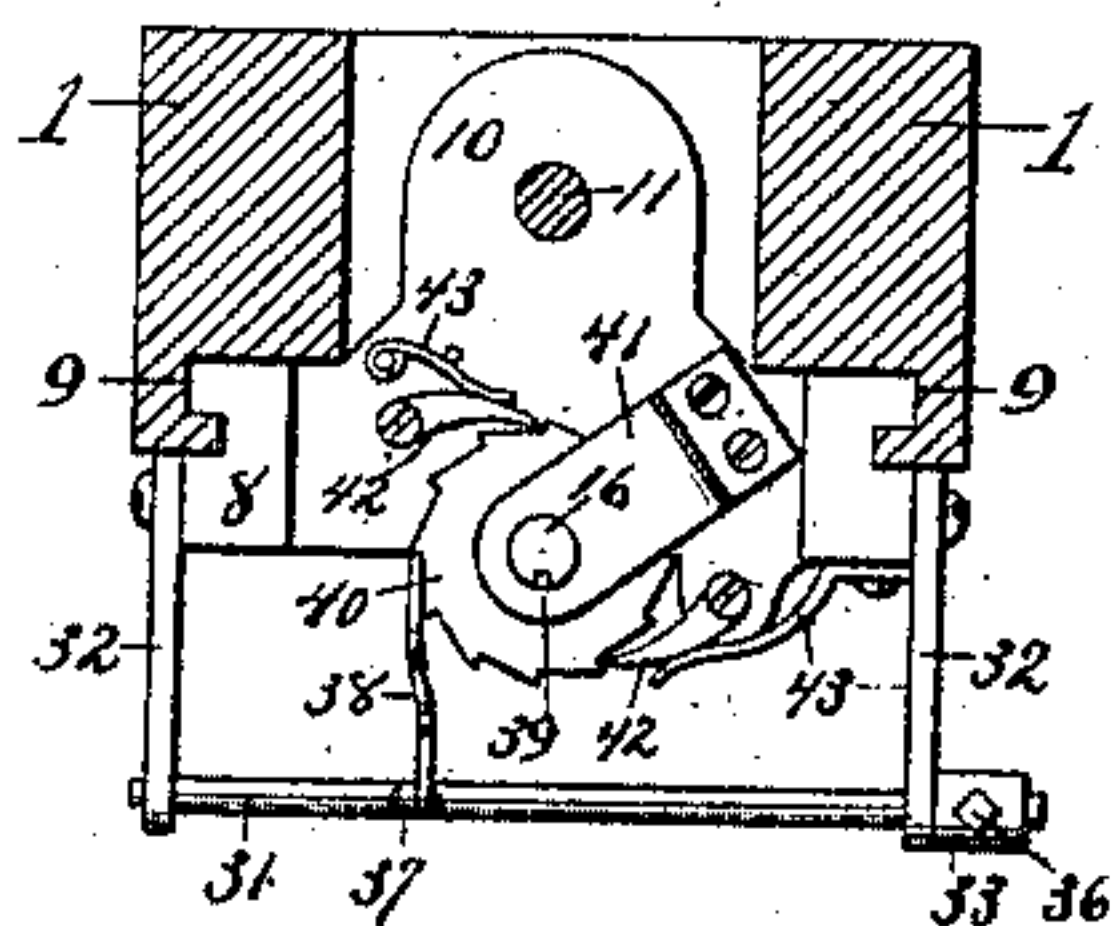


Fig. 2.



Witnesses,

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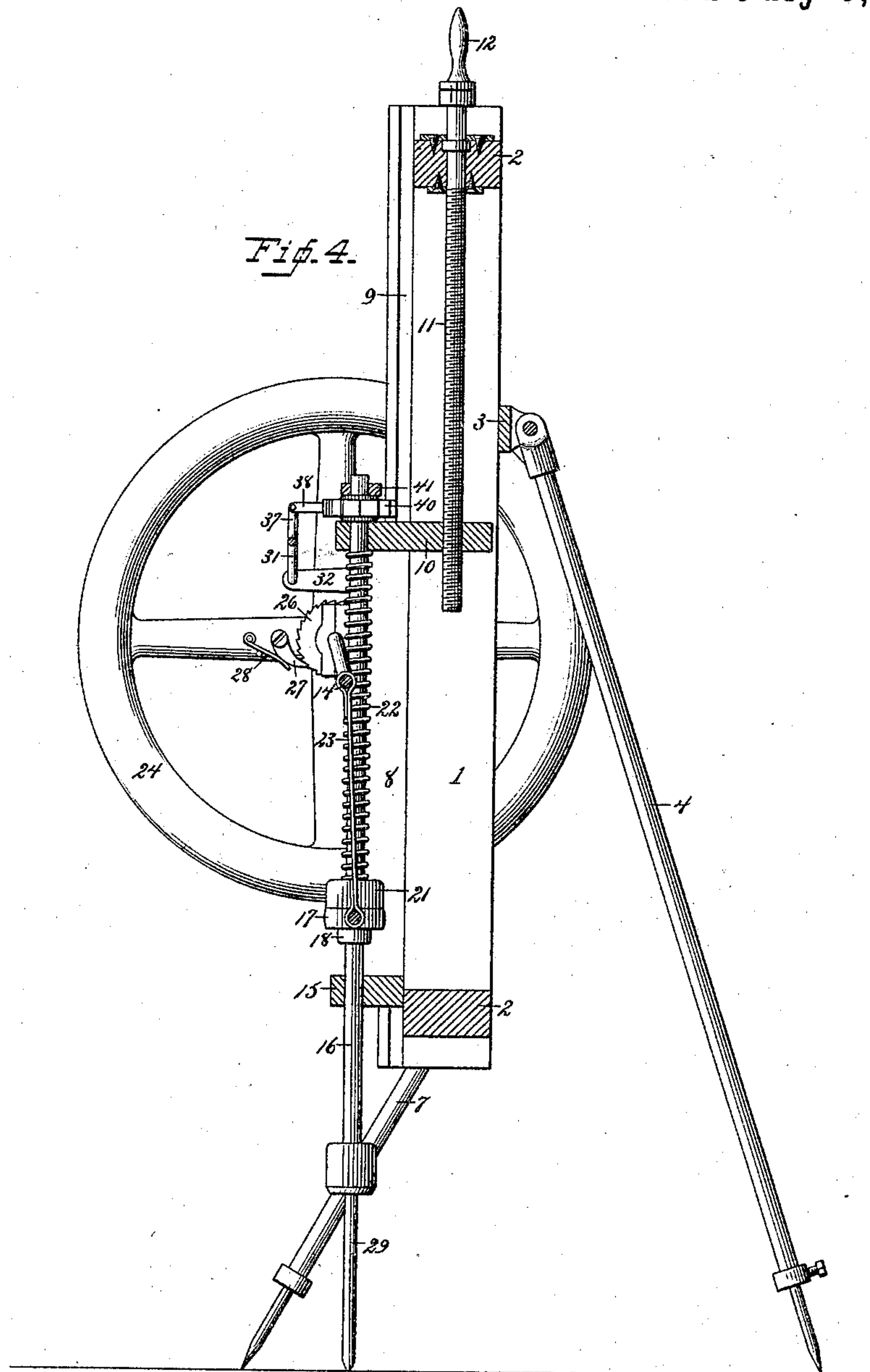
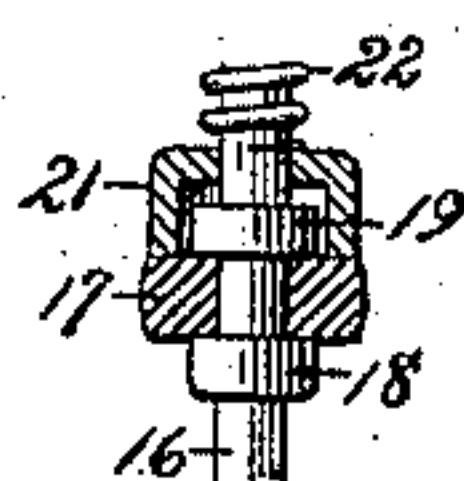


Fig. 5.



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UNITED STATES PATENT OFFICE.

SIMON INGERSOLL, OF GLENBROOK, CONNECTICUT, ASSIGNOR TO POND,
WEST & SIMONS, OF PORT CHESTER, NEW YORK.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 344,906, dated July 6, 1886.

Application filed January 2, 1886. Serial No. 187,365. (No model.)

To all whom it may concern:

Be it known that I, SIMON INGERSOLL, a citizen of the United States, residing at Glenbrook, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Hand Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to simplify and improve the construction of this class of devices.

With these ends in view I have devised a novel construction, of which the following description, in connection with the accompanying drawings, is a specification, numbers being used to indicate the several parts of the device.

Figure 1 is a front elevation, the balance-wheel being shown in section, likewise the attachment of one of the legs; Fig. 2, a transverse section on the line *xx*, looking down; Fig. 3, a detail view showing the end of the crank, shaft, cam, &c., in elevation; Fig. 4, a longitudinal section of the entire machine on the line *yy* in Fig. 1, looking toward the left; and Fig. 5 is a detail sectional view of the cross-head and cap upon which the spring rests, the plane of the section being the same as in Fig. 4.

1 indicates frame-work, preferably made of wood and having cross-pieces 2.

3 indicates a metallic cross-piece secured to the frame-work and provided with ears, to which the long leg 4 is pivoted.

5 indicates metallic blocks bolted to the lower end of the frame-work, and provided with sockets 6, in which the short legs 7 are bolted, as is clearly shown in Fig. 1, said legs being adapted to turn when the bolt is loosened, but having no endwise motion.

8 is a sliding carriage, which moves in ways 9 in the frame-work.

10 is the upper cross-piece of the carriage, which is engaged by a screw, 11, supported in the upper cross-piece of the frame-work, as shown in Figs. 1 and 4. This screw is provided with a crank, 12, by which the carriage

and the operating parts of the machine are raised and lowered when in use.

13 is a shaft, which is journaled in the carriage, and is provided with cranks 14.

15 is the lower cross-piece of the carriage, and 16 the spindle which is supported in said cross-piece of the carriage.

17 is a cross-head which rests upon collar 18 on the spindle, being held in place by a removable collar, 19, which is placed above it and secured there in any suitable manner. The ends 20 of the cross-head rest upon the carriage and give additional stability to the parts when the machine is in use.

21 is a cap covering collar 19, (see Fig. 5,) and resting upon the cross-head. This cap serves as a bearing for the lower end of spring 22, the upper end of which bears against the upper cross-piece, 10, of the carriage.

23 indicates flexible straps, the lower ends of which are attached to the cross-head and the upper ends thereof to cranks 14 upon the shaft.

24 is the balance-wheel, which is loose upon the shaft, as indicated in Fig. 1.

25 is a handle upon the balance-wheel, by which it is turned. Just inside the balance-wheel is a ratchet, 26, which is rigidly secured to the shaft.

27 is a pawl, carried by an arm of the balance-wheel, and 28 a spring, the action of which is to keep said pawl in engagement with the ratchet.

29 is the drill, which may be of any suitable construction, and is secured to the spindle in the usual or any preferred manner.

The operation of this portion of my invention is as follows: The normal position of the parts is shown in Figs. 1 and 4. When the balance-wheel is turned, the engagement of pawl 27 with the ratchet carries the shaft with it until the cranks are raised to their uppermost position and carried past the dead-center. It will be understood, of course, that the spindle has free vertical movement in the cross-pieces of the carriage, so that when the cranks are turned the flexible straps will raise the cross-head, and with it the spindle and drill, against the power of spring 22. As soon, however, as the cranks have passed the dead-

center, spring 22 will force the drill down violently, thus giving a blow to the rock. When this instantaneous movement of the spindle and drill takes place, it will be apparent that the shaft and ratchet must move away from the balance-wheel.

In practice I have found, owing to the flexibility of the straps, that the cranks are carried considerably past the dead-center at the bottom. At the instant that the forward movement of the shaft and ratchet is checked pawl 27 engages the ratchet again, and the movement is repeated to raise the spindle and drill. It will thus be seen that during each rotation of the balance-wheel the ratchet necessarily makes a complete revolution and more than half of another revolution. The exact gain that the ratchet makes upon the balance-wheel will of course depend upon the distance the drill moves before it strikes the rock. Spring 22 is necessarily made powerful, so that a very heavy blow is instantly imparted, and the shaft is as quickly engaged or "picked up" again by the engagement of the pawl with the ratchet. In practice it is of course necessary that the drill shall make a partial revolution after each blow, so that no two blows of the drill will strike in the same place. This rotation of the drill I accomplish as follows: 30 is a cam at the outer end of the shaft that is opposite to the balance-wheel. 31 is a rock-shaft journaled in brackets 32 upon the carriage. 33 is a downwardly-projecting arm, which is rigidly secured to shaft 31. This arm is held in engagement with the surface of cam 30 by spring 34, one end of which is attached to the lower end of said arm and the other end to a pin, 35, upon the carriage. 36 is a set-screw for the adjustment of arm 33. 37 is an arm which projects upward from shaft 31, and 38 is a pawl rigidly secured to said arm or made part thereof. 39 is a groove in spindle 16, and 40 a ratchet having a spline which engages said groove, and through which rotary motion is imparted to the spindle. Ratchet 40 rests upon the upper cross-piece of the carriage, and is held in place by a bracket, 41, which is secured to said cross-piece. It will thus be seen that the spindle has free vertical movement through the ratchet, as is of course necessary in giving each blow of the drill, and, furthermore, that when the ratchet is turned the spindle and drill are necessarily carried with it. The manner in which the spindle and drill are rotated is clearly shown in Figs. 2 and 3. It will be seen that each rotation of cam 30 imparts a forward and backward movement to arm 33, which rocks arm 31, thus imparting a forward and backward movement to pawl 38. At the instant said pawl is at its farthest position toward the front it engages a tooth of the ratchet, and as the pawl moves forward the ratchet is carried with it, thus imparting a partial rotation to the spindle and drill. The ratchet is securely held against backward

movement by pawls 42, pivoted to the carriage, and held in engagement with the ratchet by spring 43.

The important advantage of my improved construction is, that it enables me to impart the partial rotation to the drill at the instant that it is stationary at its highest position—that is, just before spring 22 acts to force it down. I thus avoid the great strain upon the parts which is unavoidable when the rotary movement is imparted to the drill either while it is rising or falling. The exact instant at which the rotation is made depends, of course, upon the timing of the machine; but I am not aware of another construction that enables the rotary movement to be given at any other time than while the drill is either rising or falling. It will of course be understood that the details of construction may be widely varied without departing from the spirit of my invention.

I claim—

1. In a hand rock-drill, the combination, with the spindle, cross-head, and spring 22, of a shaft having cranks 14, and flexible straps connecting said cranks with the cross-head.

2. The spindle, cross-head, and spring, in combination with the shaft having cranks 14, the ratchet 26 on said shaft, flexible straps connecting said cranks with the cross-head, and a loose balance-wheel having a pawl adapted to engage the ratchet, substantially as described.

3. The combination of the frame-work having vertical ways, and the carriage adapted to slide in said ways, the vertical spindle free to rotate and slide in said carriage, the shaft 13, having cranks 14, the cross-head, the flexible connections between the latter and said cranks, and the spring 22, for depressing said cross-head, substantially as set forth.

4. The shaft having cranks 14, and a ratchet, and a balance-wheel loose on said shaft, and provided with a pawl to engage said ratchet, in combination with the spindle, spring, and cross-head, and flexible straps connecting said cross-head with the cranks, whereby the cross-head is lifted, but when the dead-center is passed is instantly forced down by the spring, the ratchet leaving the balance-wheel until picked up again by the pawl.

5. In a rock-drill, the combination, with the spindle, cross-head, and spring, of a shaft having a ratchet and cranks, flexible straps connecting the cross-head with the cranks, and a loose balance-wheel having a handle, and a pawl adapted to engage the ratchet, whereby the ratchet is carried until forced ahead by the spring, and then picked up again by said pawl after having gained part of a revolution.

6. The frame-work having ways 9, the carriage adapted to slide therein, and the shaft, spindle, and cross-head upon said carriage, in combination with screw 11, journaled in the frame-work and held against vertical move-

ment therein, and whose thread is adapted to engage the carriage, whereby the latter is raised or lowered.

7. The combination of the vertically-movable carriage, the vertical spindle free to rotate and slide therein, the spring surrounding said spindle, the shaft 13, having cranks 14, the cross-head having ends 20 for steadying the same, and the straps connecting said cross-head with said cranks, substantially as set forth.

8. The combination, with the shaft having cam 30, the carriage, and the spindle, of a ratchet, 40, upon the spindle, pawl 38, carried by rock-shaft, and an arm engaging cam 30, whereby the shaft is rocked and pawl 38 is caused to actuate the ratchet and spindle.

9. The combination of the vertically-movable carriage, the spindle 16, having groove 39, the spring surrounding said shaft, the ratchet-wheel 40, engaging said groove, the bracket 41, for holding said ratchet in position, a pawl, and a rock-shaft for actuating the lat-

ter, and thereby intermittingly rotating said ratchet-wheel, substantially as set forth. 25

10. The spindle having groove 39, a ratchet keyed to said spindle, but permitting free vertical movement thereof, and cam 30 on the shaft, in combination with a rock-shaft having an arm, 33, held against the cam by a spring, and an arm, 37, carrying a pawl, 38, which actuates the ratchet. 30

11. The combination of the vertically-movable carriage having bracket 41, the spring-actuated pawls 42, the vertical spindle having the groove 39, the ratchet-wheel 40, engaging said groove, the rock-shaft 31, having arms 33 and 37, the pawl 38, the spring 34, and a cam for operating said arm 33, substantially as set forth. 35

In testimony whereof I affix my signature in presence of two witnesses. 40

SIMON INGERSOLL.

Witnesses:

A. M. WOOSTER,
E. D. HOWELL.