2 Sheets, Sheet 1.

D. F. Harder,

Boring Artesian Wells.

No. 54,148. Patented Apr. 24, 1866.

Fig. 4.

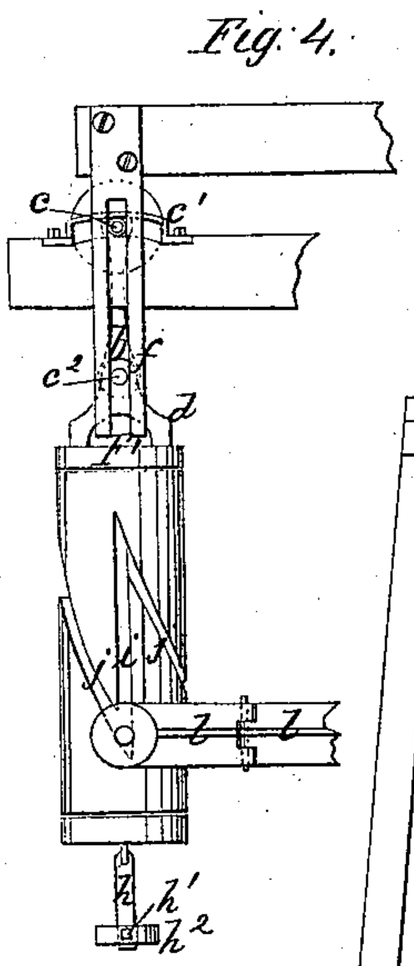


Fig. 1.

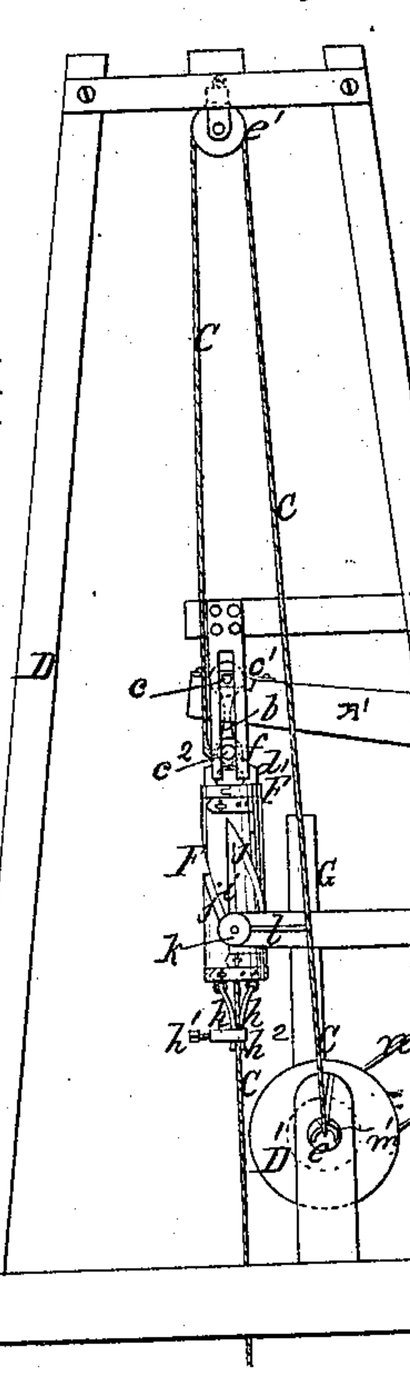


Fig. 5.

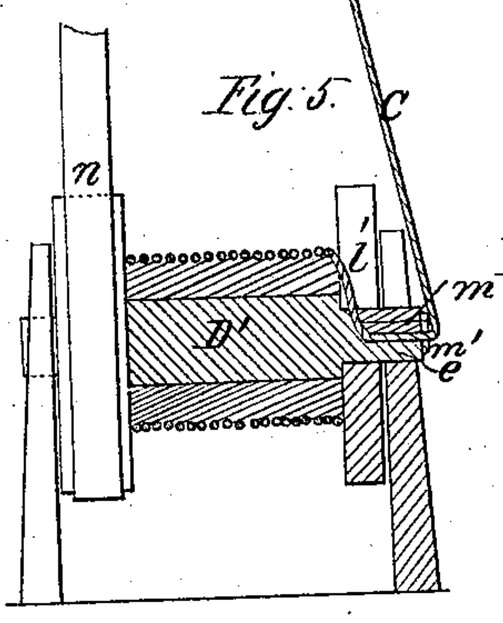


Fig. 2.

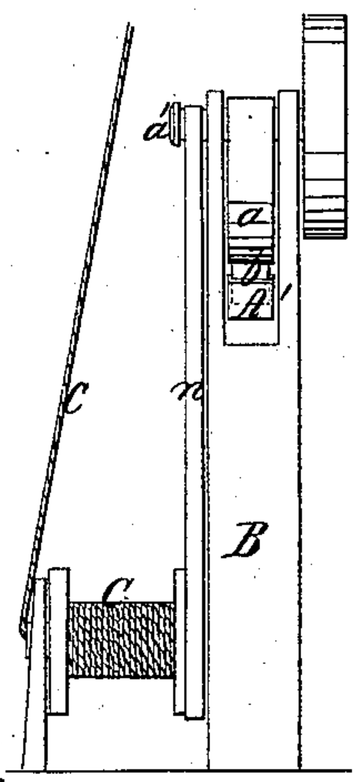
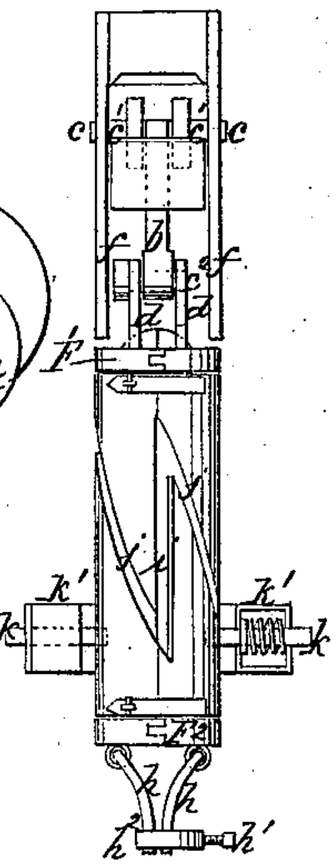


Fig. 3.



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Wm. Francis de Lamar

2 Sheets, Sheet 2.

D. F. Harder,

Boring Artesian Wells.

No. 54,148. Patented Apr. 24, 1866.

Fig. 6.

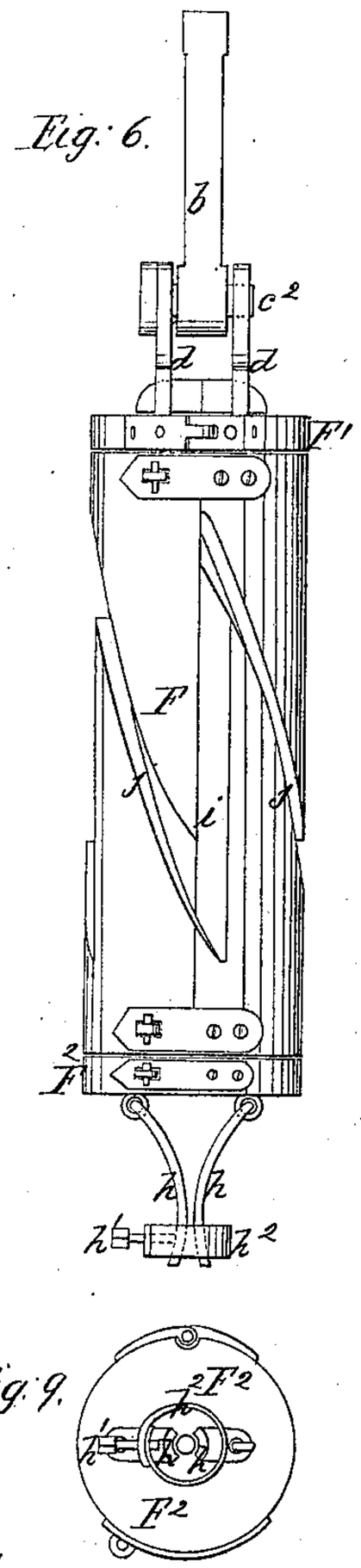


Fig. 9.

Fig. 12.

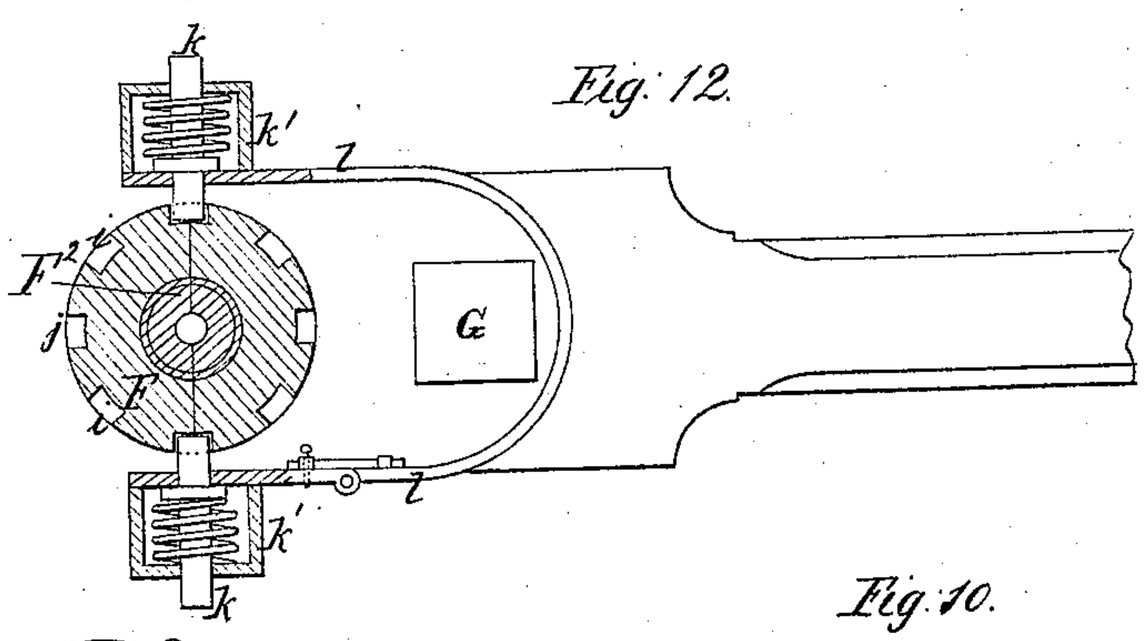


Fig. 8.

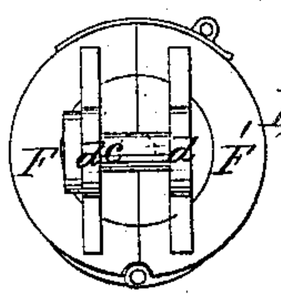


Fig. 7.

Fig. 10.

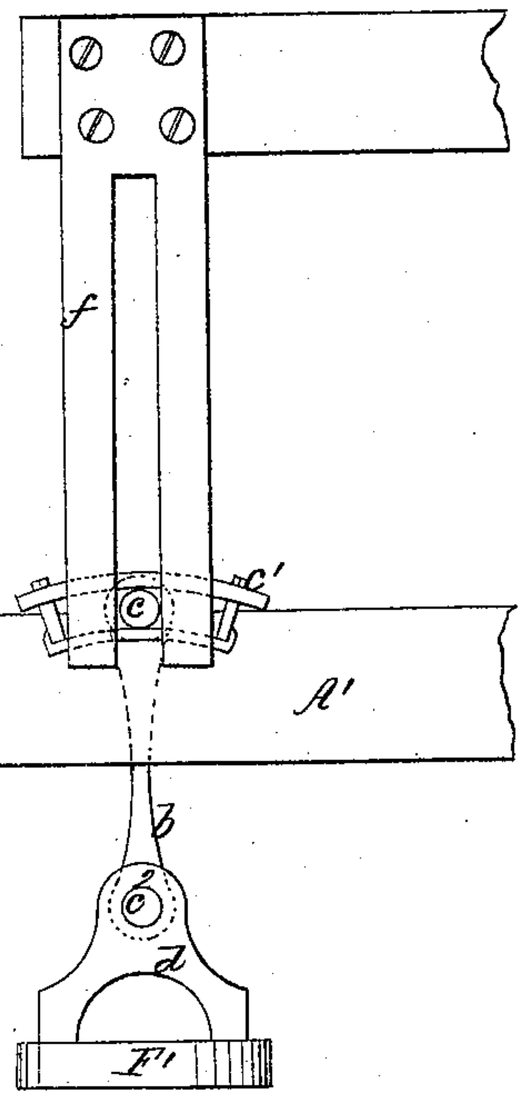
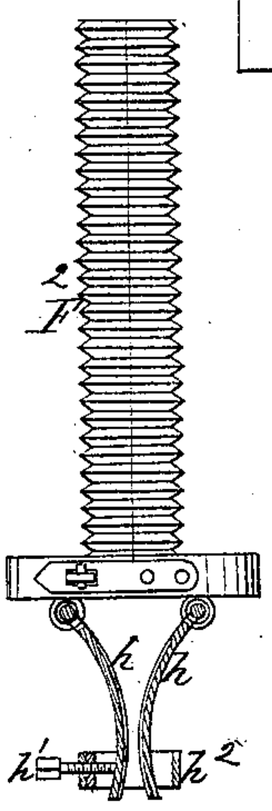


Fig. 11.



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Inventor;
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by his Atty
Munn, Burdett & Lawrence

UNITED STATES PATENT OFFICE.

DENNIS R. HARDER, OF NORTH CHATHAM, NEW YORK.

IMPROVED METHOD OF BORING OIL-WELLS.

Specification forming part of Letters Patent No. **54,148**, dated April 24, 1866.

To all whom it may concern:

Be it known that I, DENNIS R. HARDER, of North Chatham, in the county of Columbia and State of New York, have invented a new and Improved Machine for Boring Artesian Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an elevation of one side of the machine complete. Fig. 2 is an end view of the cam for operating the working-beam to which the drill is attached. Fig. 3 is an end view, showing the device for rotating the drill-rope. Fig. 4 is a side view of Fig. 3. Fig. 5 is a sectional view of the windlass for carrying the drill-rope and taking the twist out of it during the operation of drilling. Fig. 6, Sheet 2, is an enlarged view of the spirally-grooved device for rotating the drill-rope. Fig. 7 is a view of one-half of the device shown in Fig. 6. Fig. 8 is a top view of Fig. 7. Fig. 9 is a bottom view of Fig. 6. Fig. 10 is a side view of the guides for giving a rectilinear movement to the device which rotates the drill-rope. Fig. 11 is a side view of the central core or "jack-screw" of the device for rotating the drill-rope. Fig. 12 is a sectional view of the device for rotating the drill-rope.

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

This invention relates to certain improvements on machinery for drilling deep wells, where the drill is suspended by means of a rope which is attached to a vibrating working beam.

The main object of my invention is to communicate a continuous rotary motion to a drill which is suspended by a rope at the same time that the drill receives an up-and-down motion, and to prevent the rope from kinking or receiving an undue twist, as will be hereinafter described.

Another object of my invention is to suspend the device which automatically rotates the drill from one arm of a vibrating working-beam in such manner that the drill-rope shall receive a perpendicular movement as the drill is elevated and dropped, as will be hereinafter described.

Another object of my invention is to so construct the device which is employed for rotating the drill-rope and drill that this device can be readily attached to or detached from said rope without removing the drill from the well, as will be hereinafter described.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, A represents an upright post, to which a lever or working-beam, A′, is pivoted, so as to vibrate in a vertical plane. B is another post, which is located in rear of the post A, and which has its upper end forked for receiving one end of the beam A′, and also a single-throw cam, *a*, which latter is keyed on a horizontal transverse shaft, *a′*, that has its bearings in the upper end of the post B, as shown in Figs. 1 and 2. The cam *a* acts upon a friction-roller, *b*, on the rear end of the beam A′, and at every revolution of the driving-shaft *a′* the beam A′ receives a vibration. The cam *a* depresses the rear end of said beam slowly, and then releases this beam, so as to allow its opposite end to drop suddenly.

To the forward end of the working-beam A′ a contrivance for rotating the drill-rope is suspended by means of a link, *b′*, the upper end of which passes freely through a vertical slot in said beam, and is pivoted to it by a transverse pin, *c*, which works in slotted bearing-boxes *c′*. (Shown in Figs. 4 and 10.) The lower end of this link *b′* is pivoted between two standards, *d d*, by means of a transverse pin, c^2, which is the axis of motion of the pin *c* in its slotted boxes *c′*. The pin *c* projects out a short distance from each side of the bearing-boxes, on the beam A′, and its ends enter perpendicular slots in two fixed guides, *f f*, that are secured at their upper ends to a horizontal beam of a derrick-frame, D. (Shown in Fig. 1.)

The object of allowing the pin *c* to move in its bearing-boxes *c′* and of guiding this pin *c* by means of the vertical guides *f f* is to prevent the device which rotates the drill-rope from partaking of the vibrating motion of the forward end of the working-beam A′ during the operation of drilling.

By the above arrangement the drill and drill-rope will receive a rectilinear reciprocating motion, and the drill will be moved perpendicu-

larly in the well, whatever may be the length of stroke of the forward end of the vibrating beam A. The device for rotating the drill-rope C is applied to this rope between the forward end of the beam A′ and the surface of the ground, and its axis of motion coincides at all times with the center of the well. The rope C passes from a windlass, D′, through a hub, *e*, of this windlass, and is carried thence to the top of the derrick D, and passed over a pulley, *e′*, thence down through the center of the device for rotating the rope, as shown in Fig. 1. This contrivance for giving a continuous rotary motion to the rope C during the vibration of the working-beam consists of a hollow cylinder, F, which is divided diametrically and the two halves hinged together. This cylinder is provided with latches or catches of a suitable description for securing the two halves together, as shown clearly in Fig. 6, and it is also constructed with a cylindrical neck, *g*, on its upper end, which neck receives a collar, to which the standards *d d* are secured and within which the cylinder F revolves. This collar F′ is also divided diametrically, and the halves secured together by a hinge and catch, as described for the cylinder F.

Within the cylinder F is a jack-screw, F², having a circular flange formed on its lower end. This screw is also diametrically divided and the halves secured together by a hinge and catch. It is made hollow to receive through it the drill-rope C, and it is constructed and applied to the cylinder F in such manner that it can be screwed into and out of this cylinder at pleasure.

The drill-rope C passes loosely through the center of the cylinder F and screw F², and is secured rigidly to the lower end of the latter by means of two curved clamps, *h h*, which are pivoted to the bottom of said screw at their upper ends, and confined on each side of the rope C by means of a clamping-screw, *h′*, which passes through the ends of a split ring, *h²*, as shown in Figs. 6, 9, and 11.

The outer surface of the cylinder F has a number of vertical grooves, *i i*, formed in it, the upper and lower ends of which terminate in oblique grooves *j j*, thus forming four V-shaped grooves at regular intervals apart around the cylinder. The grooves in the cylinder F receive two pins, *k k*, which are arranged opposite each other and applied to spring-boxes *k′ k′*, that are formed on the ends of forked arms *l l*. These arms are secured to the post A, or to a vertical stop-post, G, as may be desired. The pins *k k* are forced toward the center of the cylinder F by means of springs which are inclosed within the boxes *k′ k′*, for the purpose of causing these pins to drop from one slot, *i*, into another, *j*. The slots being made deeper at their termini than at any other point, the spring-pins will be switched from one slot into another as the cylinder F is elevated and dropped. As this cylinder F is raised the pins *k k* follow the oblique slots and move the cylinder around one-fourth of a revolution at every upward stroke of the beam A′; then, as the cylinder F is allowed to drop, the pins *k k* will follow in the vertical slots or grooves in this cylinder.

One end of the rope C is connected to the drilling device in the well and the other end is wound upon the windlass D′. This windlass has a slot, *l′*, in its flange, and a similar slot, *l′*, in the standard thereof. These slots terminate at the center of the hub *e* of the windlass, and receive in them that portion of the rope which passes off from the windlass.

By means of a wedge, *m*, and hook *m′* the rope is held in the position shown in Fig. 5, and cannot be unwound from the windlass without first removing this rope from the flange of the same.

By means of a belt, *n*, passing over a pulley on the driving-shaft *a*, and also over one of the flanges of the windlass D′, the latter is rotated in such direction and at such speed with reference to the movement of the cylinder about its axis as will cause this windlass to untwist that portion of the rope between the cylinder and windlass as rapidly as that portion of the rope below the cylinder F is rotated. In this manner the rope leading from the cylinder to the windlass will not be twisted out of its normal state.

The great advantage gained by the rope C being constantly turned in the same direction as its own twist is that it is kept uniformly tense from the drill upward, partaking in some particulars of the nature of a solid, like a bar of iron or wood, and even stronger, as the rope is not liable to twist off, when of great length, like wood or iron.

The drill is made to revolve regularly, and must make a round hole, thus obviating the liability of the drill getting fast in an irregular hole.

When it becomes necessary to raise or lower the drill the device for rotating it can be readily unfastened and removed from the drill-rope, and when this rope is taken out of the contrivance for rotating it must also be taken out of the center of the hub of the windlass. The rope and its windlass may now be used for any purpose for which it may be required.

If desirable, the contrivance for rotating the rope C may be made of solid cylindrical parts instead of semi-cylindrical sections, in which case it should be detached from the working-beam A′ when the drill is to be raised from the well and drawn up to the top of the derrick by means of a small pulley and rope. When the drill is again lowered into the well the rotating device is returned to its former position and attached to the working-beam.

The vertical post G is provided on its upper end with a suitable spring, for the purpose of receiving the blow of the beam A′ should the drill break through a rock or suddenly drop into a crevice. This will prevent the machinery from receiving such a shock as would be

liable to injure it. If desirable, the power for operating the beam A′ may be placed on that side of the post A which is nearest the well.

The object of the jack-screw F^2, to which the drill-rope is attached, as above described, is to enable a person to adjust the rope and allow the drill to descend as rapidly as it cuts the rock. If desirable, a contrivance may be applied to the jack-screw F^2 for securing this screw in any desired position, and thus preventing it from turning of itself.

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

1. Rotating the drill and drill-rope continuously in one direction during the operation of drilling by means of a suspended reciprocating cylinder having grooves in its surface which are acted upon by pins *k k*, through the center of which cylinder the drill-rope is passed loosely, substantially as described.

2. Supporting and guiding a reciprocating device adapted for rotating the drill and drill-rope in such manner that this device shall receive a perpendicular movement when actuated by means of a vibrating working-beam A′, substantially as described.

3. The grooved cylinder F, with a hole through its center and also with a hollow adjustable jack-screw, F^2, for receiving and holding the drill-rope, all constructed substantially as described.

4. The combination of rope-clamps *h h*, jack-screw F^2, and a rotating cylinder, F, substantially as described.

5. The divided cylinder F, in combination with the divided screw F^2, substantially as described.

6. Attaching the rotating device F to the working-beam A′ in such manner that said device F can be detached therefrom, and also detached from the drill-rope at pleasure without lifting the drill from the well, substantially as described.

7. The stationary fork *l*, spring-pins *k k*, and rotating cylinder F, in combination with a drill-rope which passes through the center of said cylinder, and which is affixed thereto, substantially as described.

8. The perpendicular stop-post G, in combination with the working-beam A′, lifting-cam *a*, and the device for rotating the drill-rope C, substantially as described.

9. In combination with the device for automatically rotating the drill-rope C continuously in one direction, providing a means for lowering the drill as the well deepens, substantially as described.

10. In combination with a drilling apparatus wherein the feeding-rope passes through the turning-guide, which is turned with an intermittent motion always in the same direction, a device for preventing the rope from becoming twisted, and also for supplying the rope to the drill, the said device having but a single axis of revolution, substantially as described.

11. The combination of a drill which is suspended by a rope and receives a vertical and rotary motion with a device for preventing the rope from becoming twisted, and also carrying the supply-rope, the said device having but a single axis of revolution, substantially as described.

Witness my hand in matter of my application for a patent for improved machine for boring oil-wells and other wells.

D. R. HARDER.

Witnesses:

R. T. CAMPBELL,

EDW. SCHAFER.