

C. Mather,

Boring Artesian Wells.

N^o 57,827.

Patented Sep. 4, 1866.

Fig. 1

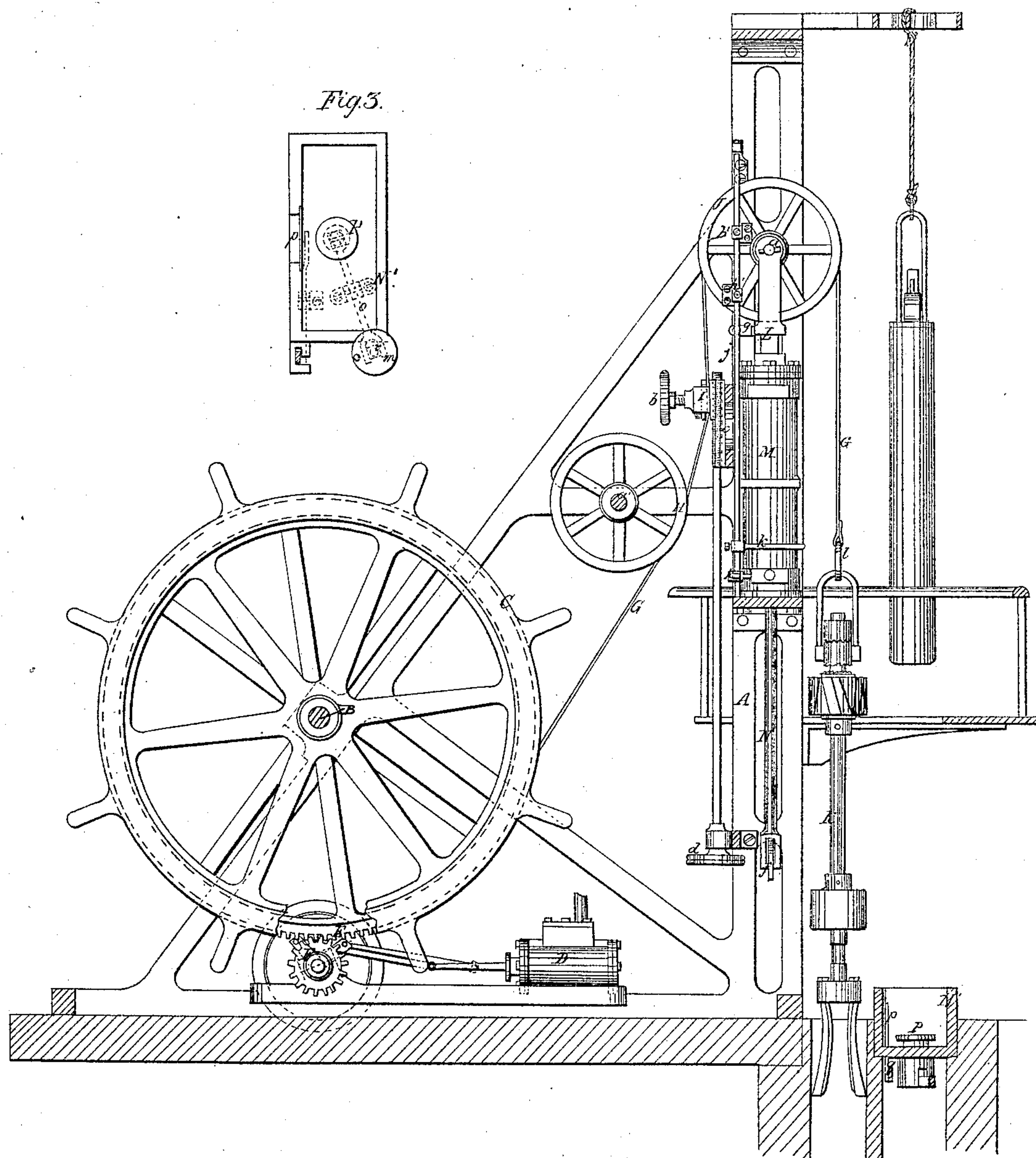


Fig. 3.

Witnesses
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IMPROVED MACHINE FOR BORING WELLS.

Specification forming part of Letters Patent No. 57,827, dated September 4, 1866.

To all whom it may concern:

Be it known that I, COLIN MATHER, of Manchester, England, have invented new and useful Improvements in Machinery for Boring Wells, &c.; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of the specification, in which—

Figure 1 represents a sectional side elevation of this invention, the line *xx*, Fig. 2, indicating the plane of section. Fig. 2 is a front view of the same, partly in section. Fig. 3 is a detached plan or top view of the receiving-box for the débris discharged from the sand-pump.

Similar letters of reference indicate corresponding parts.

This invention relates to a machine for boring wells or other holes into the ground, in which a flat drill rope or band is used, in contradistinction to the ordinary round rope and metal rods, the drill being arranged in such a manner that the same makes a part of a revolution after each blow. The drill-rope extends over a pulley which is secured to the top end of a piston-rod to which a rising-and-falling motion is imparted by the action of steam on a piston fitted into a suitable cylinder. The stroke of the piston is adjustable, and it is regulated by adjustable tappets, which change the steam and exhaust valves, and which are actuated by roller-studs secured to the piston-rod. The drill-rope is taken from a drum which can be revolved in either direction by the action of a steam-engine, and that portion of said rope which extends from the drum over the rising and falling pulley is held by a clamp which is operated by hand, and which serves to give to the drill the requisite quantity of rope to enable it to strike the bottom of the hole with the desired force. The drill connects with the rope by a simple snap-hook, so that it can be readily released and replaced by the sand-pump, and a suitable box or reservoir close to the well-hole serves to receive the débris and dirt discharged from the sand-pump. This reservoir is provided with an adjustable table or stand for the sand-pump to lodge upon, and the operation of discharging said sand-pump is facilitated.

A represents a frame or derrick made of wood, metal, or any other suitable material or combination of materials. This frame forms the bearings for a shaft, B, on which is mounted the drum C, and to which a revolving motion is imparted by the action of a steam-engine, D, with which the same is geared together by cog-wheels E F; or the drum may be operated by any other suitable power, and its connection with the engine may be varied as circumstances may require.

On the drum C is wound the drill-rope G, which is flat, in contradistinction to the ordinary round drill-ropes, so that a drill or other article suspended from the same will remain stationary and not be liable to turn or twirl. Said flat drill-rope extends from the drum C, under a guide-pulley, H, and through a clamp, I, and thence over a pulley, J, and down to the drill K, which is suspended from its loose end, as clearly shown in the drawings.

The guide-pulley H is mounted on a shaft, *a'*, which has its bearings in the frame A, and revolves freely in the same.

The clamp I is composed of two jaws, which are compressed by a set-screw, *b*, and said clamps slides up and down in a grooved bracket, *c*, which is firmly connected to the frame A. A hand-screw, *d*, serves to raise said clamp to give out the rope as the operation of boring progresses.

The pulley J is mounted on a shaft or axle, *a*, which has its bearings in the forked end of a rod, L, which rises from a piston working in a steam-cylinder, M, and which is square or polygonal, and guided in a corresponding aperture in the upper cylinder-head. Another rod, N, extends from the piston through the lower cylinder-head, and is provided with a fork at its lower end, which straddles a hand-lever, *f*, so that by the action of the hand-lever the piston, together with the pulley J, can be raised and lowered at pleasure.

From the rod L, above the cylinder M, project two roller-studs, *g*, which, by coming in contact with the tappets *h h' i i'*, cause the steam and exhaust valves to open and close at the proper intervals. The tappets *h h' i i'*, are secured to vertical rods *j j'*, which have their bearings in suitable arms or brackets secured to the frame A, and which connect with the steam and exhaust valves by suitable toes *k*.

Suitable hand-levers *h'*, secured to the rods *j j'*, serve to change the valves by hand whenever it may be desired. As the piston-rod *L* rises, the studs *g*, by coming in contact with the tappets *h h' i i'*, open and close the valves at the proper intervals, and the drill, suspended from the rope *G*, is raised or lowered, as may be desired. The tappets *h h' i i'* are adjustable on the rods *j j'*, so that the length of the stroke of the piston can be increased or diminished at pleasure.

The drill *K* is connected to the drill-rope *G* by a snap-hook, *l*, so that it can be readily connected to the same, or disconnected and replaced by the sand-pump, if desired. Said drill is so constructed that it revolves by mechanical means after each stroke, the rope being prevented by its flat shape from imparting to the drill a revolving motion.

In close proximity to the well-hole *I* arrange a reservoir, *N'*, which is intended to receive the débris and dirt to be discharged from the sand-pump *O*. This sand-pump, when filled with dirt, sand, and water, is raised from the well-hole and placed on a table, *P*, in the reservoir, and this table is adjusted by a hand-wheel, *m*, which is mounted on a vertical spindle, *n*, and acts by a lever, *o*, on a pin which catches under the table and serves to adjust the same, so that its surface is always clear above the débris and dirt contained in the reservoir. Said reservoir is provided with an adjustable gate, *p*, which is operated by a lever, *q*. If desired, jets of water may be injected to wash off the débris and dirt which may lodge on the table, and also to clean out the reservoir *N'* whenever it should be required.

The operation is as follows: After the rope has been drawn from the drum under the guide-pulley and through the clamp and over the pulley *J*, the drill is secured to it, and a sufficient quantity of rope is given out to permit the drill to strike the ground. The rope is then clamped fast, and by admitting steam to the cylinder *M* a reciprocating motion is imparted to the pulley *J* and the cutting-edge of the drill is caused to strike against the ground and to open a hole. As the depth of the hole increases the clamp is fed up so as to give out sufficient rope to enable the drill to strike at each blow with sufficient force. After the drill has cut down to a certain depth it is disconnected from the drill-rope and replaced by the sand-pump *O*, to which a reciprocating motion is imparted by the action of the piston in the steam-cylinder *M*, so that the débris and dirt ascend in it, being retained in its barrel by the check-valve at the lower end

thereof. After the sand-pump is filled it is raised from the well-hole and deposited on the table *P* in the reservoir *N'*, and by opening the valve at the bottom of the pump the contents thereof are allowed to discharge by the pressure of the water which fills the upper part of the barrel of the pump. After the well-hole has been cleaned the sand-pump is removed from the rope *G*, and the drill is again connected to the same, and a sufficient quantity of rope is given out from the drum *C* to permit the drill to strike with the requisite force.

The drum *C*, which is operated by the engine *D*, also serves to raise the drill and the sand-pump from the well-hole, which is of considerable importance, particularly after the hole has attained a great depth.

With this machine well-holes of great depth and of considerable diameter can be drilled with comparative ease, and in much less time than with the ordinary machines as now used for the same purpose.

It will be readily seen from the principles upon which this machine is constructed, and which govern every detail of it, that the great desideratum of all earth-boring has been well kept in view—namely, to bore great depths of large diameter with rapidity and safety. The object is to keep either the boring-head or shell-pump constantly at work at the bottom of the hole, where the work has to be done; to lose as little time as possible raising, lowering, changing, &c.; to expedite all the operations at the surface, and to economize manual labor in every particular.

Thus we have a self-acting machine, which, with ordinary attention and care, renders the difficulties of well-boring no longer discouraging.

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

1. The adjustable clamp *I*, in combination with the drum *C* and rising and falling pulley *J*, constructed and operating substantially as and for the purpose described.
2. The steam-cylinder *M* and pulley *J*, in combination with the clamp *I* and drum *C*, constructed and operating substantially as and for the purpose set forth.
3. The adjustable table *P* in the reservoir *N'*, in combination with the sand-pump *O*, constructed and operating substantially as and for the purpose described.

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Witnesses:

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