(No Model.) 2 Sheets—Sheet 1.

W. MANSON.

WELL DRILLING MACHINE.

No. 379,710. Patented Mar. 20, 1888.

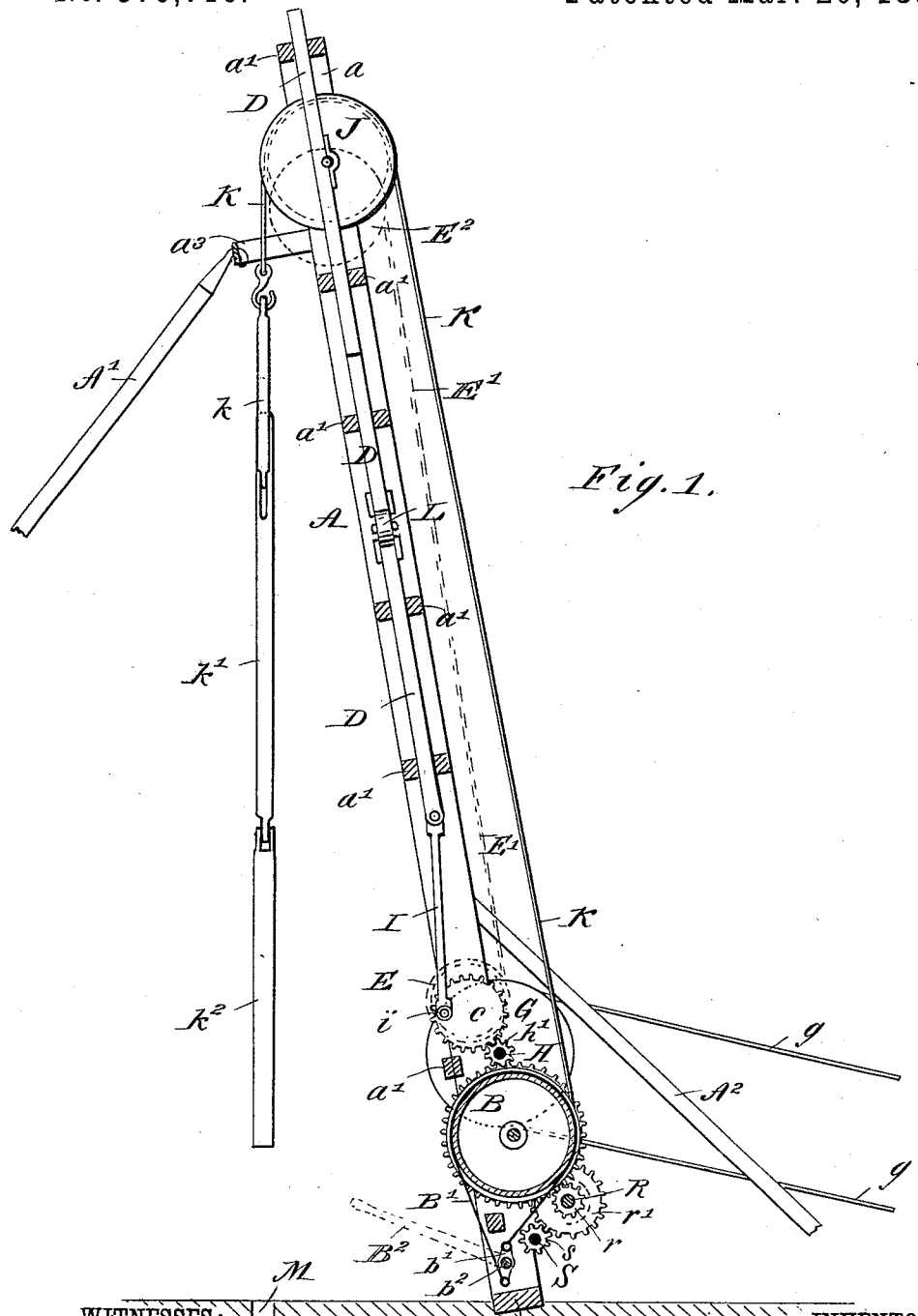


Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

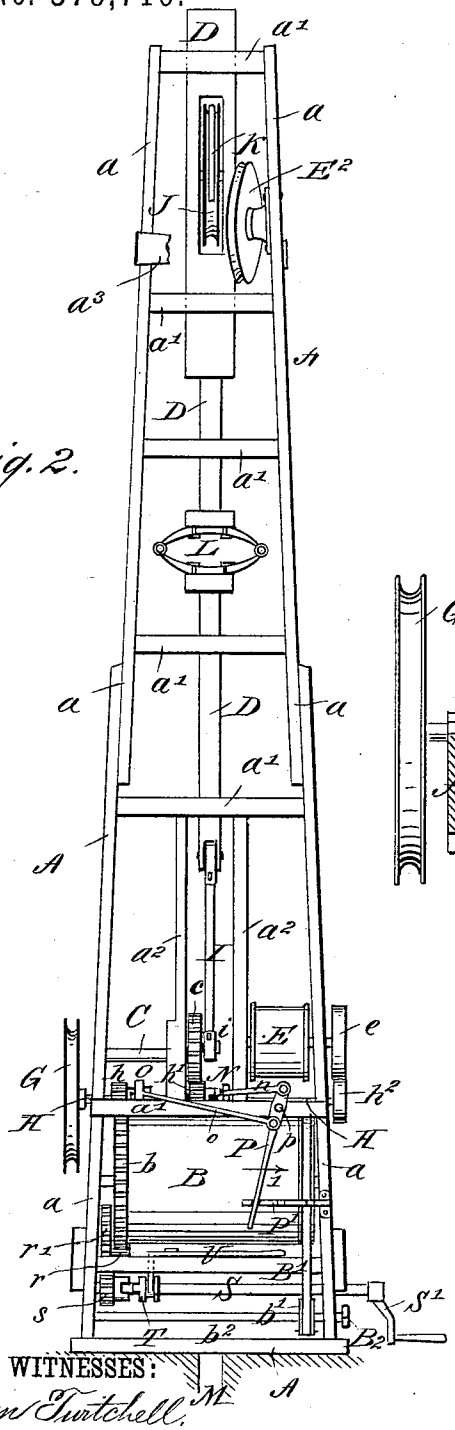
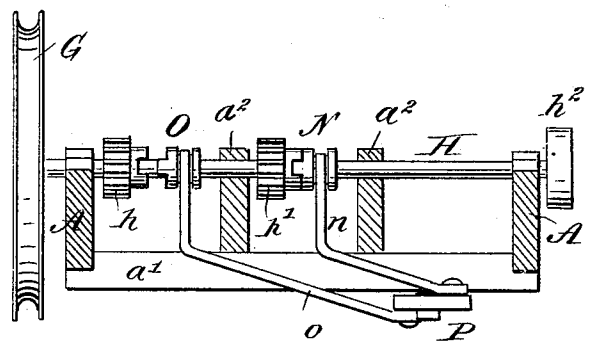


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM MANSON, OF COLTON, CALIFORNIA.

WELL-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 379,710, dated March 20, 1888.

Application filed May 13, 1886. Serial No. 202,052. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MANSON, of Colton, in the county of San Bernardino and State of California, have invented a new and Improved Well-Drilling Machine, of which the following is a full, clear, and exact description.

My invention relates to machines or "rigs" adapted for drilling wells to yield water, oil, or gas, and has for its object to provide a simple, inexpensive, and effective machine of this class operating to bore the well by a gravitating sand pump or tool, and whereby the work may be performed with economy of time and labor and with little or no risk of loss of the boring-tools in clay soils or in quicksands.

The invention consists in certain novel features of construction and combinations of parts of the drilling-machine, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical sectional side elevation of my improved well-drilling machine with the derrick-pole partly broken away. Fig. 2 is a front view of the machine with the boring-tools and derrick-pole removed, and Fig. 3 is an enlarged detail view of the driving and clutch gearing at the main power-shaft of the machine.

The derrick A of the machine is made of side pieces, *a a*, tied to each other by cross girts or bars *a'*, uprights a^2 a^2 being preferably fixed to the girts *a' a'* immediately over the hoisting-drum B to provide a bearing for the inner end of a driving-shaft, C, which operates the rod D, which works the drilling-tool, as presently explained, and also to give a bearing to the inner end of the shaft of the sand-line reel E, the outer ends of shaft C and the reel-shaft having bearings in the opposite sides *a a* of the derrick. A pole, A', hooked at its upper end into a bowed cross-bar, a^3, on the derrick, near its top, rests by its lower end on the ground to support the derrick in proper working position, and rear stays, A^2, brace the derrick against the pull or strain of a wire-driving rope, *g*, which runs from a drive-wheel on an engine (not shown) to a driving-pulley, G, on the main power-shaft H of the drilling-machine. This shaft H carries loosely a pinion, *h*, which meshes with a gear, *b*, on the hoisting-drum B, and also carries loosely a pinion, *h'*, which meshes with a gear-wheel, *c*, fast on the shaft C. A pitman, I, connected at one end to a wrist-pin, *i*, on the gear-wheel *c*, connects at its other end with the lower end of the bar D, which is fitted to slide in the cross-girts *a'* of the derrick, and at its upper somewhat-enlarged end carries a crown-pulley, J, over which passes a wire cable, K, one end of which is connected to and wound on the drum B, and to the other end of which the drilling-tools are attached at the front of the machine. The drawings in Fig. 1 show jars *k*, a sinker-bar, *k'*, and a sand-pump, k^2, suspended from the cable.

I make the drilling-tool operating-bar D in upper and lower sections or parts, which are connected to the opposite sides of a spring, L, somewhat like a wagon-spring, as clearly shown in Fig. 2 of the drawings. With this construction, as the shaft C is rotated by the clutched gearing *h' c* from the shaft H, the entire bar D and the crown-wheel J will be raised and lowered, and as the cable K is fast to the drum B, which is at rest, the drilling-tools will be raised and lowered for each revolution of the shaft C a distance equaling twice the throw of the wrist-pin *i* on the driving-gear *c* to bore a hole, M, in the earth in front of the derrick. The cable K will be slacked off the drum B to allow the drilling-tools to feed downward properly, and for this purpose there is provided a brake-band, B', on the drum, which band is connected at opposite ends to opposite ends of a cross-bar, *b'*, on a shaft, b^2, to which a hand-lever, B^2, is fixed for turning the shaft to apply and release the brake, as required.

It is obvious that as the drilling-tool is operated, as above described, the spring L in the bar D serves as a buffer to relieve the concussion as the tool strikes the bottom of the hole, and also prevents too sudden strains on the cable K as the tools are lifted, and whereby the derrick, the driving-gearing, and the cable K are protected from overstrain and the durability of the entire rig is promoted.

When drilling in clay or gravel, a bed of quicksand with water is often met and the

tool is liable to sink suddenly and be buried by the quicksand or loose earth, entailing labor to jar it loose or free, and to avoid this there should be a quicker mode of changing from the drill action to a hoisting of the tool than the ordinary beam and temper screw-rigs afford. I secure this quick change of working by clutches on the main driving-shaft and mechanism for operating them, as next explained.

A clutch, N, is splined to the shaft H next the loose pinion h', which meshes with the driving-gear c of the bar D and crown-wheel J, and a clutch, O, is splined to the shaft H next the loose pinion h, which meshes with the driving-gear b of the hoisting-drum B. The pinions h' h have half-clutches, with which the clutches N O, respectively, are adapted to engage. A rod, n, connects clutch N with the end of a lever, P, which is pivoted at p to a cross-bar, a', of the derrick, and a rod, o, connects the clutch O with the lever at a point the other side of the lever-fulcrum from that to which the rod n is attached, and whereby when the lever is shifted either way one of the clutches will be engaged with its opposing pinion and the other clutch will be released from its pinion. For instance, when the long arm of the lever P is moved in the direction of the arrow 1 in Fig. 2 the clutch O will be disengaged from the drum-driving pinion h, and the clutch N will simultaneously or immediately afterward be engaged with the pinion h' to rotate it and lift the bar D to operate the drilling-tool; and should the tool strike quicksand or water and sink suddenly, the lever P may be shifted the other way, which will instantly disengage clutch N from pinion h' and engage clutch O with pinion h, and the bar D will remain at rest, and the hoisting-drum B will be operated to wind the cable K on it and withdraw the drilling-tool in time to prevent its burial by the quicksand in the hole. The lever P may be locked in either extreme position by engagement with teeth or notches in a bar, P', fixed to the derrick. The cable K, being made of wire, will not stretch, as would a hemp or fabric cable; hence the drilling-tool will receive a positive up-and-down stroke from the connecting-rod I and its wrist-pin i.

A shaft, R, journaled to and across the derrick, carries fixedly a pinion, r, which engages the gear b of the hoisting-drum B, and the shaft carries also a fixed gear-wheel, r', with which meshes a pinion, s, which is loose on a shaft, S, journaled on the derrick, and to shaft S there is splined a clutch, T, adapted to engage clutch-teeth on the pinion s, and adapted, also, to be engaged with and disengaged from the pinion by a shifting-lever, U, pivoted to the frame and extending, like the levers P B^2, within reach of a man standing at the side of the derrick where the hand-crank S' of shaft S is placed.

The lever P may be set to hold both the clutches N O on the driving-shaft H disengaged from their respective loose pinions h' h, whereupon the clutch T may be engaged with the pinion s, and the crank S' be turned by hand to operate the drum B by the gearing r r' b for jarring the drilling-tool loose in the hole or for raising or lowering the tool.

In drilling wells in clay, sand, or gravel I will use any approved form of sand-pump, as at k^2, which will itself clear out the loose earth from the bore; but in drilling in rock I will use a solid drill, and to clear the hole I will employ a sand-pump hung from a cable, E', (shown in dotted lines in Fig. 1,) and which is passed over the obliquely-set wheel E^2, journaled at the head of the derrick to the sand-reel E, which will be operated by the engagement of its friction-wheel e with a friction-wheel, h^2, on the main driving-shaft H when the clutches N O on said shaft are disengaged from their respective pinions h' h. The sand-line wheel E^2 is set obliquely to hang the sand clearing pump as nearly as may be over the drilling-hole and allow the cable to be led more directly from the back edge of the wheel to the reel E, which is at one side of the derrick.

The tube or pipe casing of the well will be forced down as the boring progresses by hydraulic presses or in any other approved way.

An obvious advantage of my well-drilling rig is that the distance from the crown-wheel to the ground (about forty feet) is sufficient to allow a non-stretching wire tool-supporting cable, K, to be twisted or turned around four or five times each way to turn the drilling-tool in the hole, and which cannot be done in ordinary beam and temper screw-rigs, wherein a wire cable cannot be used.

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

1. The combination, in a drilling-machine and with its derrick, a crown-pulley, J, journaled to a bar, D, adapted to slide on the derrick, mechanism for raising the pulley and letting it fall, and a cable passed over the crown-pulley and connected to a retaining device at one end and at the other end to a gravitating drilling-tool, substantially as specified, of a spring, as at L, interposed in the sliding bar D, substantially as described, for the purposes set forth.

2. In a drilling-machine, the combination, with the derrick A, bar D, crown-pulley J, and cable K, of a spring, as at L, interposed in bar D, substantially as herein set forth.

3. The combination, in a drilling-machine, of a derrick, A, shaft C, gear-wheel c, connecting-rod I, bar D, crown-pulley J, cable K, a drum, B, and a spring, L, interposed in bar D, substantially as herein set forth.

4. The combination, in a drilling-machine and with a derrick, A, drum B, having a gear, b, a shaft, C, gear-wheel c, connecting-rod I, bar D, crown-pulley J, and cable K, of a driving-shaft, H, pinions h h', loose thereon, clutches N O, splined to shaft H and adapted to engage the pinions h h', and mechanism for op-

erating these clutches to throw the drilling-tool or hoisting-drum into and out of gear, substantially as herein set forth.

5. The combination, in a drilling-machine and with a derrick, A, drum B, having a gear, *b*, a shaft, C, gear-wheel *c*, connecting-rod I, bar D, crown-pulley J, and cable K, of a driving-shaft, H, pinions *h h'*, loose thereon, clutches O N, splined to shaft H and adapted to engage the pinions *h h'*, a lever, P, pivoted at *p* to the derrick, and rods *n o*, connecting the lever with the clutches N O, substantially as described, for the purposes set forth.

6. In a well-drilling machine comprising a derrick, A, drum B, bar D, crown-pulley J, and mechanism for lifting the parts D J and letting them fall, substantially as specified, the combination, with said elements, of a cable, K, passed over the pulley J and attached to the drum B at one end and to the drilling-tool at the other end, substantially as herein set forth.

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Witnesses:
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G. L. HUTCHINSON.