(No Model.)

T. G. CHAPMAN.

WELL DRILLING MACHINERY.

No. 394,457. Patented Dec. 11, 1888.

Fig. 1.

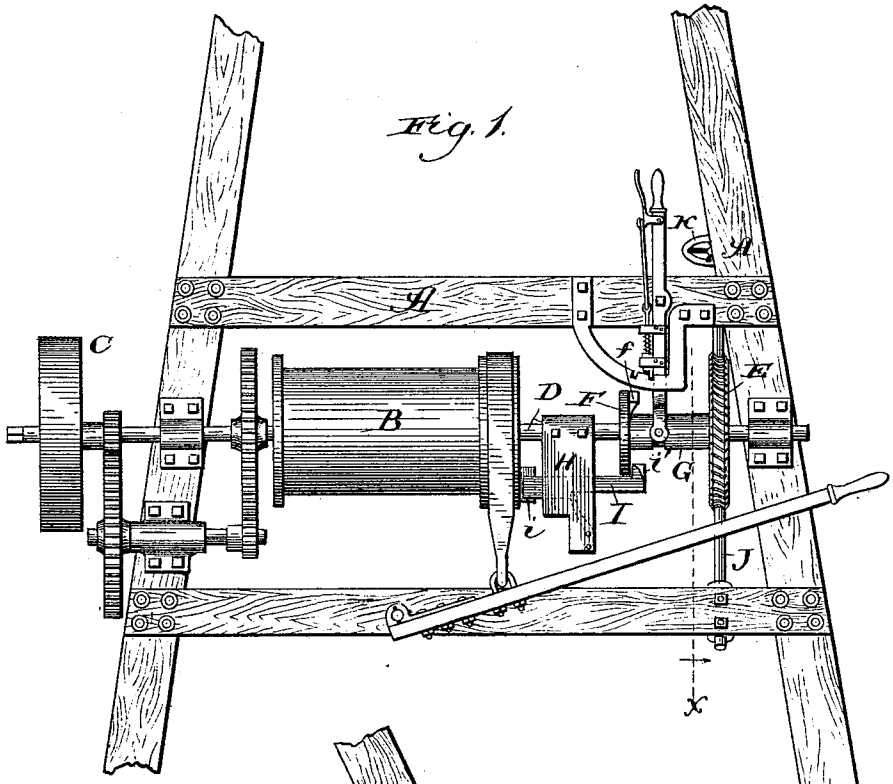
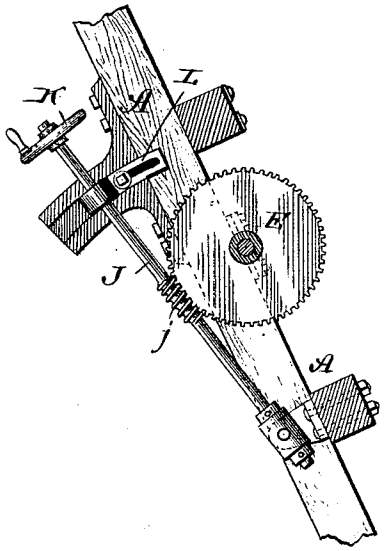


Fig. 2.



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UNITED STATES PATENT OFFICE.

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WELL-DRILLING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 394,457, dated December 11, 1888.

Application filed January 28, 1888. Serial No. 262,282. (No model.)

To all whom it may concern:

Be it known that I, THOMAS G. CHAPMAN, a subject of the Queen of Great Britain, residing at Chicago, Illinois, have invented certain new and useful Improvements in Well-Drilling Machinery, of which the following is a specification.

The object of my invention has more particular reference to the devices by which the rope is lengthened from time to time to adapt it to the progressing depth of the hole; and my invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation showing the operating devices of a well-drilling machine; and Fig. 2 is a vertical section taken in the line *x* of Fig. 1, looking in the direction of the arrow.

A represents the frame-work of the machine; B, the drum; C, a pulley by which the motive power is applied where a belt is used; D, a shaft on which the drum and some of the other parts are mounted; E, a regulating-wheel provided with teeth around its circumference; F, a cam wheel or disk; G, a sleeve connecting the wheels E and F and mounted on the shaft D so as to be movable endwise on the same; H, a revolving head or block turning with the shaft; I, a latch carried by the head-block and engaging with a projection, *i*, on the head of the drum; *i'*, the portion of the latch which engages with a cam on the wheel F; *f*, such cam; J, a pivoted worm-shaft provided with a worm, *j*, to engage with the teeth on the regulating-wheel E; K, a hand-wheel for turning the worm-shaft and worm, and L a bracket for supporting the free end of the worm-shaft and changing its position.

In making my improvements I do not intend to confine myself to any particular style of well-drilling machine, but prefer to use it in connection with the kind which I have illustrated in the drawings. While, therefore, I describe it in connection with the particular kind of machines shown, I desire it to be distinctly understood that I do not limit myself absolutely to that kind of machine. Nor do I confine myself to well-drilling machinery strictly, as it is obvious that they can be used in connection with pile-driving and other machines.

As illustrated in the drawings, I have shown a machine of the kind in which the drum is mounted loosely on a revolving shaft. The drum is provided at one end with a projection, *i*, to afford means to permit it to be revolved. A head or block is mounted on the shaft at a convenient distance from the end of the drum, and is keyed or otherwise rigidly attached to the shaft, so as to revolve therewith. This head or block carries a latch, I, whose inner end when held in its normal position is adapted to engage with the projection *i* and revolve the drum until it is thrown out of engagement and the drum released. The latch is movable in the direction of its length, and a spring is provided, which is shown in dotted lines in Fig. 1, to hold it in its normal position and throw it back after being drawn out when released from pressure, so that its inner end will engage with the projection *i*. A sleeve, G, is also mounted loosely on the shaft, so that it can be rotated and moved lengthwise thereon. The inner end of this sleeve carries a cam-wheel, F, which is provided with a cam, *f*, adapted to engage with the end *i'* on the latch and move it endwise, so as to draw its inner end away from engagement with the projection *i* on the drum until the cam is passed, when the action of the spring will instantly carry the latch back to its normal position, so that its inner end may again engage the projection on the drum and carry it around. In this way the release of the drum may be effected at any predetermined point by changing the position of the cam-wheel. As the latch is drawn out and disengagement effected, the drum, which has been winding the rope up and raising the drilling-tool, will be released and cause it to instantly assume a reverse movement, so that the tool will drop and do its work. The alternate engagement and disengagement of the inner end of the latch with the projection on the drum will cause a constant alternate raising and dropping of the tool as the drum is positively carried in one direction or permitted to revolve in the

other; but as the hole becomes deepened it becomes necessary from time to time to lengthen the rope, so that the tool can continue the operation of deepening the hole. To effect this I provide a toothed regulating-wheel, E, which is preferably mounted on the outer end of the sleeve G, and by turning this regulating-wheel, and with it the sleeve and cam-wheel, from time to time, the point at which the cam-wheel releases the drum may be changed as determined upon and additional rope allowed to unwind from the drum to suit the increasing depth of the hole. To turn the regulating-wheel E from time to time as needed, and so change the point at which the cam-wheel will release the drum, I employ a worm-shaft, J, provided with a worm, *j*, engaging with the teeth on the circumference of the wheel. One end of this worm-shaft may be mounted in a fixed or in a pivoted position and the other mounted in a bracket or other suitable bearing or support. I prefer to mount one end of the worm-shaft in a pivoted bearing, as shown in Fig. 2, though a rigid bearing or journal will answer, and the other end in a bracket whose position may be changed, if desired. As shown in Fig. 2, the bracket which supports the free end of the worm-shaft is held by a nut whose bolt passes through a slot, so that by loosening the nut the bracket may be moved so as to move the worm out of engagement with the teeth of the regulating-wheel. In position for operation, however, the supporting-bracket should be held in that position which will enable the threads of the worm to engage with the teeth of the wheel. The end of the worm-shaft should be provided with a wheel or crank to enable it to be turned from time to time as desired. When it is desired to change the position of the regulating-wheel, and with it the position of the cam-wheel and the point at which it releases the drum, all that is necessary is to turn the worm-shaft in the proper direction, which will cause the regulating-wheel and the cam-wheel to revolve wholly or partially around, and in this way permit a greater or less amount of rope to unwind from the drum to suit the increasing depth of the hole.

As I have before suggested, the sleeve G, with its wheels E and F, is movable lengthwise along the shaft. I have shown a lever with a fork engaging with the sleeve to effect this movement; but as the drawings so plainly illustrate their construction and operation I do not need to describe them in detail. I have also shown the wheels E and F arranged on the sleeve G as separate wheels; but it is obvious that they may be made in one wheel performing the functions of both, if desired; but in the specification and claim I have preferred to refer to them by distinct names, as a "regulating-wheel" and a "cam-wheel," whether made apart or together, and I wish this to be borne in mind in the construction of my claim. When the sleeve G, with its wheels E and F, is moved inward along the shaft, the cam on the cam-wheel will leave the latch free and undisturbed, so that its inner end will remain in engagement with the projection *i* on the drum. If the sleeve with its wheels be moved out along the shaft away from the drum, the latch I will be drawn out, so that its inner end will be held in a state of disengagement from the projection *i* on the drum. In this way the drum may be made to constantly revolve with the shaft to bring the tool to the top of the hole, or permit it to revolve in the other direction and allow the tool to descend to the bottom.

Of course I am aware that wheels or disks have been employed for the purpose of changing the relative position of the cam and drum to allow additional rope to unwind; but, so far as I know, this has always been effected by providing the regulating-wheel with a series of holes, through which a pin was inserted, or by providing it with a series of notches in its circumference, in which a latch or dog was permitted to drop when the position of the wheel was changed. So far as I have been able to learn, however, the position of the regulating-wheel has never been changed by means of a worm, as I have described above. With the old devices, in which holes or notches have been used, it is obvious that the change in the position of the regulating-wheel and in the relative position of the parts must always be to at least the extent of the distance between one hole and the next, or one notch and the next, while by the use of a toothed regulating-wheel whose position is changed by the engagement of the threads with a worm therewith the position of the regulating-wheel may be changed to the slightest extent desired by turning the worm only a slight distance. In this way I am enabled to regulate the position of the parts with relation to each other to the nicest degree, or to as large an extent as I may desire, so as to lengthen the rope from time to time precisely the distance required, and as the revolution of the head or block is rapid it may happen, unless care be used, that a change by withdrawing the pin from the hole or dog from the latch and inserting it in the next hole or notch cannot be effected before the block has carried the latch around again, in which case the cam-wheel is carried around with the head or block until the parts are stopped and the proper adjustment made. By such accidents the tool may be carried wholly or partially up the well-hole before a stoppage could be made and the matter arranged; but nothing of this kind can happen by the use of such a regulating-wheel and worm as I have described, because they are always in engagement while the adjustment is being made.

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

In a well-drilling machine, the combination

of a shaft, a drum mounted loosely thereon, but revoluble therewith until released, a cam-wheel whose cam effects the release of the drum at a predetermined point, a block sustaining a latch, a toothed regulating-wheel whose position determines the point at which the cam-wheel effects the release of the drum, and a worm engaging with the teeth of the wheel, regulating and changing its position as turned, substantially as described.

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ROBERT W. HINES.