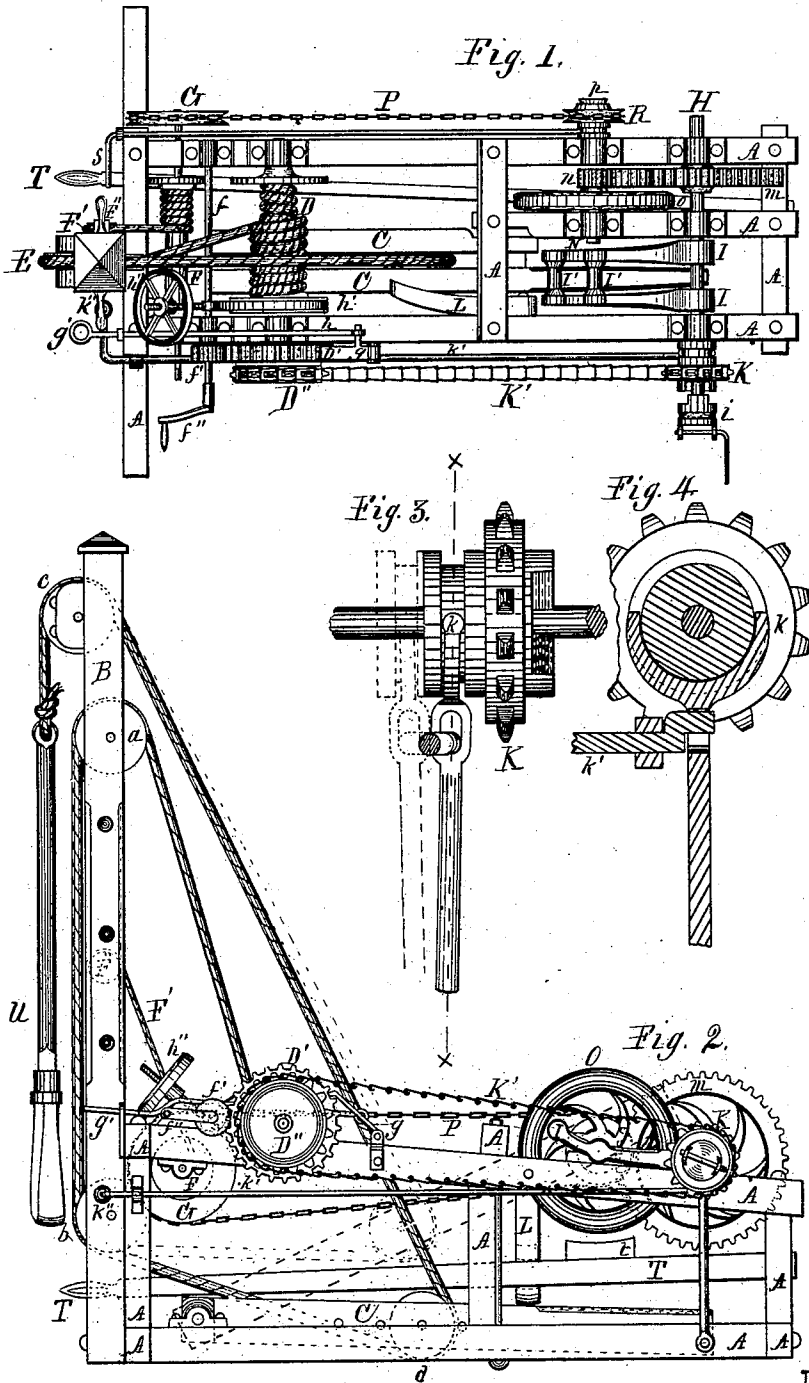


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ROCK-DRILLING MACHINE.

No. 178,909.

Patented June 20, 1876.



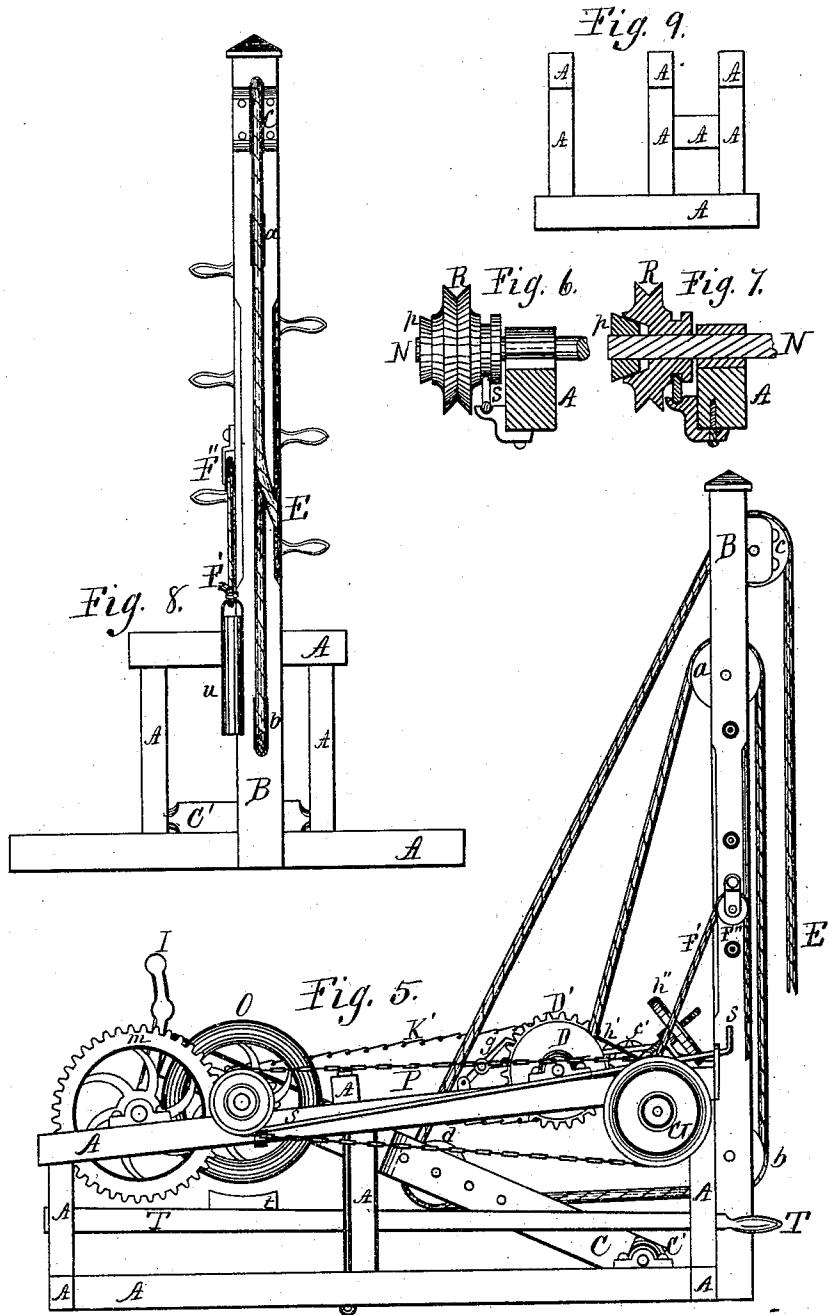
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UNITED STATES PATENT OFFICE.

ORLANDO CLARKE AND ISAAC UTTER, OF ROCKFORD, ILLINOIS.

IMPROVEMENT IN ROCK-DRILLING MACHINES.

Specification forming part of Letters Patent No. **178,909**, dated June 20, 1876; application filed April 6, 1876.

To all whom it may concern:

Be it known that we, ORLANDO CLARKE and ISAAC UTTER, of the city of Rockford, county of Winnebago, and State of Illinois, have invented certain new and useful Improvements in Well-Drilling Machines, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

The object of our invention is to improve the machines employed to operate the drill in well-drilling machines, the drills employed being of that class known in the art as the "churn-drill;" and our invention consists of the devices and combinations, and arrangement of devices, represented in the accompanying drawings, in which—

Figure 1 is a plan view of our improved machine. Fig. 2 is a side elevation. Fig. 3 is an enlarged view of one of the sprocket-wheels, driving-clutch, and shipping device. Fig. 4 is a transverse section of the same on dotted line *x*, in which the crank of the operating-rod is placed in a vertical position. Fig. 5 is an elevation of the side opposite to Fig. 2—in this figure some of the parts are represented in positions differing from Fig. 2. Fig. 6 is an enlarged view of one of the chain-wheels, friction-clutch, and operating device. Fig. 7 is a longitudinal vertical section of the same. Fig. 8 is a front elevation, and Fig. 9 a rear end elevation, of the frame.

In the drawings, A are sills, beams, posts, and girts, of suitable material, of proper size and form, framed and firmly bolted together in the manner shown, forming a rectangular frame, as represented in the figures. This constitutes the main frame of our improved drilling-machine. B is a mast of suitable material, and of proper dimensions, firmly secured in a vertical position to the front end of the main frame, and is fitted centrally on its face with grooved-faced sheaves *a*, *b*, and *c*, to revolve on pin-bearings. C is a lever, composed of a long and short beam, placed parallel to each other, forming an open space between them, and at one end are framed into a transverse roller, C', and near the end of the short beam are fitted with a block between them, at which point they are firmly held in place by a bolt passing transversely through

the beams and block. The ends of the roller C' are fitted with journals that have their bearings in suitable boxes, secured to the upper side of the side sills, near the front end of the main frame, in such a manner as to permit of an up-and-down movement of the free end of the lever. This lever is fitted with a grooved-faced sheave, *d*, placed between the beams and fitted to revolve on a pin passed through the beams and sheave. The lever is provided with a series of holes for the purpose of changing the position of the sheave nearer to or farther from the fulcrum of the lever, to increase or lessen the leverage. D is a spool of suitable construction, fitted to revolve in bearings on the upper side of the upper beams, near the front end of the main frame. E is a rope wound on spool D, from which it is passed over sheave *a* in the upper end of mast B, thence under sheaves *b* and *d* and over sheave *c*, from which its free end hangs in front of the mast, and to which a drill, U, of proper construction, is attached in the usual manner of attaching drills to such machines. The object of employing the sheave *a* placed high in the mast is to reduce the lateral angle of the rope, when wound, toward the ends of the spool, which insures a more perfect winding on the spool, less chafing, and consequently greater durability of the rope.

From the foregoing description it will be seen that if the lever C be in the position represented in Fig. 2, and free to rise, the drill would drop from the force of gravity, and, if the operation of the lever be continued, a churning motion would be imparted to the drill.

f is a shaft, having its bearings on main frame forward of spool D, and is fitted with a pinion, *f'*, the teeth of which engage the teeth of wheel D' on the shaft of spool D, and by means of the winch *f''* the rope E may be wound on or unwound from the spool, for the purpose of raising or lowering the drill, and a pawl, *g*, engages the teeth of wheel D', which serves to hold the rope from unwinding. The pawl *g* can be operated from the front of the machine by means of a rod, *g'*. The head *h* of spool D is grooved on its periphery, which receives the friction-band *h'*, one end of which is looped on shaft *f*, and its other end is screw-

threaded, and enters the screw-threaded center of hand-wheel h'' , by means of which the friction-band h' is made to operate as a friction-brake on both the shaft f and spool D for the purpose of lowering the drill, and to hold the spool to prevent the rope from unwinding when operating the drill. The shaft of spool D is also fitted on one end with a sprocket-wheel, D'' . F is a spool of suitable construction fitted to revolve in bearings on the under side of the upper beams of the main frame, between the shaft f and the front end of the machine. F' is a rope wound on spool F, from which it is passed over a grooved-faced sheave, F'' , fitted to revolve on pin-bearing on the mast, and from which its free end depends, to which a bucket, u , of any suitable construction is attached. The projecting end of the shaft of spool F is fitted to receive the winch f'' , by means of which the spool F may be turned in either direction for the purpose of lowering and raising the bucket to remove the debris from the well, cut by the action of the drill. The shaft of spool F is also fitted with a grooved-faced sheave, G. H is a shaft fitted to revolve in bearings on the rear end of the main frame, having the clutching device i fixed to its projecting end, and is provided with ears forming part of a universal-joint connection of a tumbling-rod, to connect it with the prime mover. The shaft H is provided with lever-arms I, fitted with rollers I' , which, as the lever-arms revolve, come in contact with the free end of the lever C, depressing it and causing the drill U, attached to the free end of the rope E, to rise, and, as the arms I revolve, will pass over the end of the lever C, permitting it to rise and the drill to drop, thus imparting a churning motion to the drill by means of the revolving arms. K is a sprocket-wheel loosely mounted on shaft H, having its hub fitted in clutch form to engage the fixed clutch i . The hub of this sprocket-wheel is also provided with an annular groove for the reception of the yoke k , the stem of which is pivoted at its lower end to the sill of the main frame, and is also fitted near the yoke with a vertical elongated slot, to receive the crank-formed end of the shipping rod k' , which is supported in bearings on the main frame, and extends forward of the frame, where it is bent horizontally with its end weighted; as at k'' , to hold the clutch locked in position either in or out of gear, which is accomplished by the crank of shipping-rod k' resting on the bottom of the vertical slot in the stem of yoke k .

This device is more clearly shown in the enlarged views at Figs. 3 and 4, in which the dotted lines show the position of the parts when out of gear. The sprocket-wheels K and D'' are connected by a rag chain belt, K' , and is employed for the purpose of raising the drill out of the well by the power employed to operate the drill. This is accomplished by first turning the stop L in Fig. 1 in the position seen at L, Fig. 2, which holds the lever

C out of the action of the operating lever-arms I, and by turning the weighted end k'' of shipping-rod k' outward, the clutches K and i will be thrown into gear, and motion from the shaft H will be imparted to the spool D by means of the rag-chain connection, causing it to revolve in the direction to wind up the rope E, and raise the drill thereto attached from the well. On the shaft H is mounted a gear-wheel, m , the teeth of which engage the teeth of a pinion, n , on shaft N, supported in bearings on the main frame forward of shaft H. A balance-wheel, O, is mounted on the shaft N for the purpose of equalizing the velocity of the machine in overcoming the unequal resistance in its movement in operating the drill.

p is a friction-cone secured on the outward-projecting end of shaft N. R is a grooved-faced sheave loosely fitted on shaft N. The outer end of its hub is of hollow cone form, to receive the cone p forming a friction-clutch. The inner end of the hub of sheave R is provided with an annular groove, to receive the upturned end of shipping-rod s , which is supported in bearings on the main frame, and extends to the forward end of the machine, where its end is bent inward, forming a lever, by means of which the sheave may be forced outward on the friction-cone, to impart motion to the sheave by frictional contact. The sheaves G and R are connected by a cable chain-belt P for imparting motion to the spool E for the purpose of elevating the bucket u attached to the free end of the rope F' by the power employed to operate the machine. This device is also employed for lowering the bucket, by regulating the friction by means of the shipping-rod s . T is a brake-lever pivoted to the rear end of the frame, and extends to the forward end of the machine, passing under the balance-wheel O, at which point it is fitted with a brake-shoe, t , in such a manner that when the free end of the lever is raised the brake-shoe t will act upon the periphery of the balance-wheel, for the purpose of stopping the machine when required.

From the foregoing description it will be seen that both the drill and the bucket, attached to their respective ropes, may be raised by the power employed to operate the drill, and lowered by means of the friction devices, or they may be raised or lowered by hand, by means of the winch f'' .

For the purpose of enabling one attendant to readily control the operations of all parts of the machine, we have constructed our machine with the controlling-levers g' , k'' , s , and T, all extending to the front end of the machine, which, together with the hand-wheels h'' and winch f'' , are all within easy reach of the attendant at the drill. Our drilling-machine is also constructed and arranged in such a manner that it may be changed to perform all its different functions without interfering with the prime mover, the motion of which may be continuous. This we accom-

plish by means of the stop L, shipping-rod k' , s , and g , and the hand-wheel h'' and winch f'' , these parts constructed, arranged, and operating as hereinabove stated. We have described our machine as a well-drilling machine, but do not wish to confine ourselves to this particular purpose, as it is evident that it may be used as a quarry or mining drill, or for other similar purposes.

We are aware that well-drilling machines, in some respects similar to the above-described machines, have been constructed and used, among which is the machine patented to J. E. B. Morgan and Henry Kelly, of Osage, Iowa; and some of the devices employed in the patent issued to Robert David Napier, of Limehouse, England, may be found in the above description; therefore, so far as these machines, by virtue of said Letters Patent, are rightfully the property of the said patentees, we hereby enter and make this our disclaimer to any of the foregoing, the same being of right the property of the above-named patentees; but

We claim as our invention—

1. The combination, in a well-drilling machine, of the mast B fitted with sheaves a , b , and c , operating lever C fitted with sheave d , and rope E from the spool D, passing over and under the sheaves a , b , c , and d , as described, for the purpose of imparting a churning motion to a drill attached to the free end of the rope E by means of a down-and-up movement of the free end of the lever C, as hereinbefore set forth.

2. The mast B fitted with sheaves a , b , and c , lever C fitted with sheaves d , and rope E, employed as described, in combination with lever-arms I secured to shaft H, for the purpose of operating the lever C, to impart a churning-motion to a drill attached to the free end of the rope E, as and for the purpose hereinbefore set forth.

3. The weighted shipping-rod k' and pivoted yoke k , in combination with the sprocket-wheel K, with clutch-formed hub, for the purpose of shipping and unshipping the clutch, and holding it in or out of gear, substantially as hereinbefore set forth.

4. The combination of the pall g , operating-rod g' extending to the front end of the machine, and gear-wheel D' on the shaft of spool D, to hold the spool, to prevent the rending of rope E, as hereinbefore set forth.

5. The friction-band h' looped on shaft f , in combination with spool D and hand-wheel h'' operating as a friction-brake on both the shaft f and spool D, for the purpose of lowering the drill when attached to the free end of the rope E, as hereinbefore set forth.

6. The combination of the sheave R, friction-cone p , chain-belt P, spool F, and shipping-rod s , for the purpose of operating a bucket attached to the free end of rope F, substantially as and for the purpose hereinbefore set forth.

8. The stop L, shipping-rods k' , s , and g' , hand-wheel h'' , and winch f'' , these parts constructed, arranged, and operating, substantially as hereinbefore set forth, for the purpose of changing the machine to perform its different and separate functions without stopping or interfering with the continuous motion of the prime mover employed to operate the machine.

9. In a well-drilling machine, substantially as described, the sheave a in mast B, as herein described, for the purpose of lessening the lateral angle of the rope when wound toward the ends of the spool, as and for the purpose set forth.

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