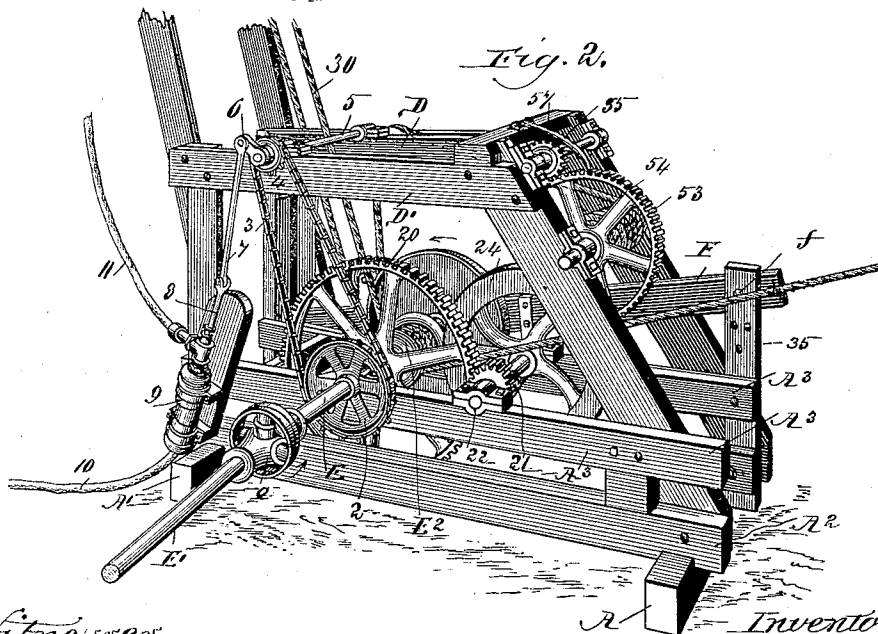
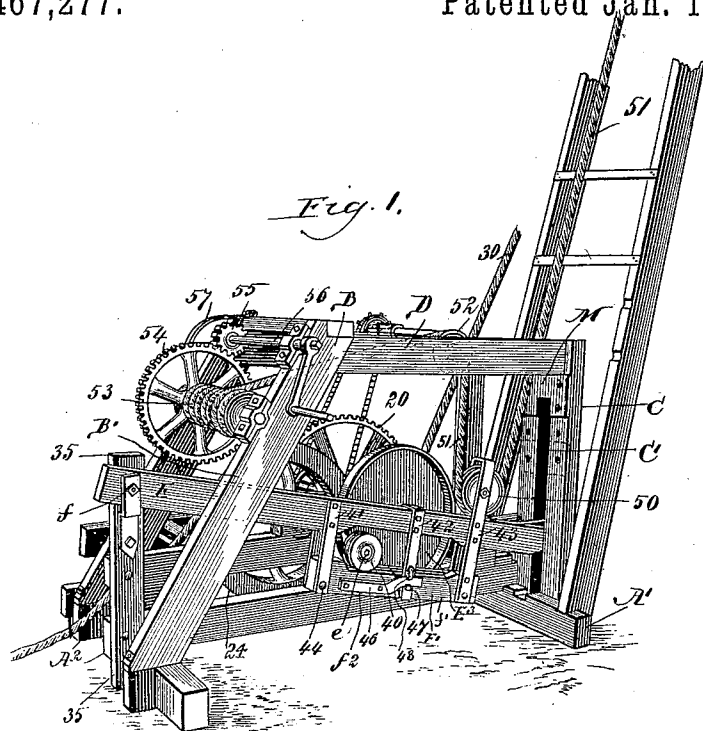


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APPARATUS FOR DRILLING WELLS AND FOR OTHER PURPOSES.

No. 467,277.

Patented Jan. 19, 1892.



Witnesses,
W. Rosier,
L. B. Carpenter

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(No Model.)

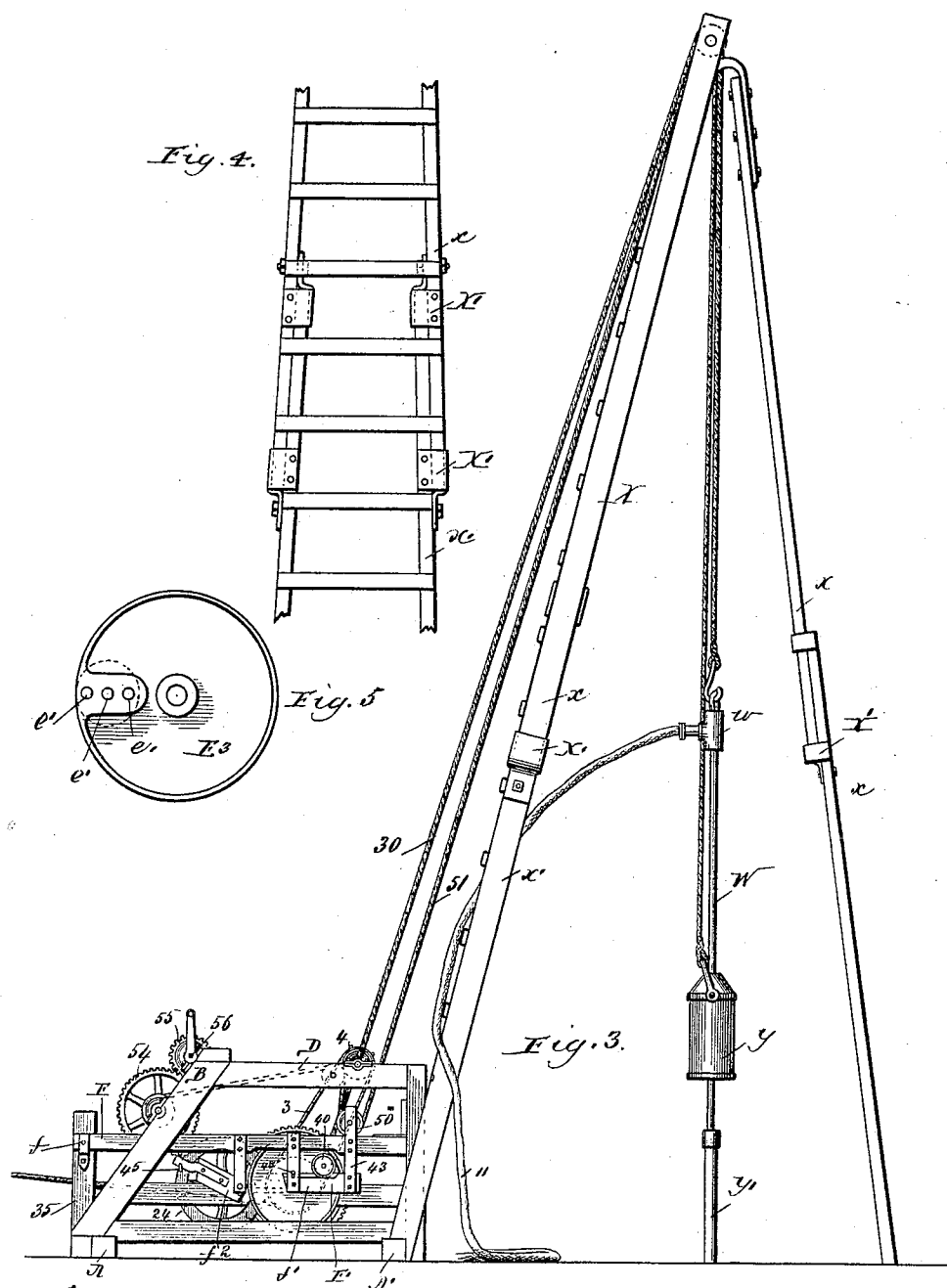
2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

JOHN ROLPH DAVIS, OF CHICAGO, ILLINOIS.

APPARATUS FOR DRILLING WELLS AND FOR OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 467,277, dated January 19, 1892.

Application filed July 16, 1890. Serial No. 358,970. (No model.)

To all whom it may concern:

Be it known that I, JOHN ROLPH DAVIS, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Drilling Wells and for Like Purposes, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention has relation to drilling apparatus, and more particularly does it relate to apparatus designed to be used for the drilling or driving of tubular wells.

In the use of drilling-machines in deep and heavy work it is desirable that a slow movement shall be imparted to the drill. One of the objects of my present invention is to provide improved means whereby this slow and steady movement may be imparted to the drill, and this object I have accomplished by connecting the walking-beam of the machine with the drive mechanism in such manner that the movement of the drill during the beginning and end of its lift will be slow, while the intermediate movement will be faster. In shallow and light work it is desirable to allow the drill to drop suddenly after having been lifted to the required height; and a further object of my invention is to provide improved means whereby after the drill has been lifted to the desired height it will be allowed to drop. These objects of invention I have accomplished by providing the walking-beam of the machine with a groove or way wherein will travel a movable part suitably connected with the driving mechanism, this movable part being preferably an eccentric pin or crank adapted to travel back and forth within the way of the walking-beam, and in order to effect the sudden dropping of the drill when it has lifted it to the desired height I prefer to so form the groove or way in the walking-beam as to permit the eccentric pin or crank to pass therefrom, so that the walking-beam will be drawn freely upward by the weight of the drilling device.

When quicksand is encountered in the drilling operation, it is found very difficult to force the casing in which the drill operates through the sand, since as soon as the drill ceases operation and before the casing can be

driven to any considerable extent the sand packs around the casing and holds it in such manner and with such an elastic action that the forcing of the casing through the sand is exceedingly difficult. I have found, however, that by conjointly operating the mechanism for driving the casing and the drill mechanism the packing of the sand about the casing is in great measure obviated, so that the driving of the casing is much more readily effected.

A still further object of my invention is to provide an improved construction of derrick, the legs whereof are formed of sections, so that the derrick may be taken apart and more easily handled and transported and so that a higher derrick may be readily provided.

These various objects of invention I have accomplished by the improvements herein-after described, illustrated in the accompanying drawings, and particularly pointed out in the claims at the end of this specification.

Figure 1 is a perspective view of a drilling-machine embodying my invention, a portion of the derrick only being shown. Fig. 2 is a perspective view from the opposite side shown in Fig. 1. Fig. 3 is a view in side elevation of the machine complete. Fig. 4 is a detail fractional view of the ladder portion of the derrick. Fig. 5 is a detail side view of the driving-wheel.

Any suitable construction of frame-work may be employed for sustaining the operating mechanism, although the construction illustrated in the drawings I regard as a particularly efficient one. This frame-work consists of the cross-bars A A', united together by the horizontal bars A², and from these cross-bars A A' rise the vertical front bars B B' and rear bars C C'. Above the horizontal bars A² extend, also, the horizontal bars A³, and the upper ends of the vertical bars B B' and C C' are united by the horizontal top bars D D'. Upon the horizontal bars A³ is journaled the main shaft E, that has motion imparted thereto from the drive-shaft E' in the usual manner, these shafts being united by a coupling e, as well understood in the art.

Upon the shaft E is journaled a sprocket-wheel 2, over which passes a sprocket-chain

3, that passes also over a sprocket-pinion 4, fixed to the end of a cross-shaft 5, that is journaled upon the horizontal bars D D', and upon the outer end of this shaft 5 is keyed a crank 6, which, through the medium of the pitman 7, imparts reciprocating movement to the piston 8 of the pump 9. This pump 9 is furnished with an induction-pipe 10, whereby water is admitted to the pump, and with a delivery-pipe whereby water is delivered to the swivel *w* at the top of the hollow drilling-tool *w* when it is necessary to use water for forcing out of the pipe the material cut away by the drill. This use of a pump, being well understood in the art, need not be more particularly explained. Upon the shaft E is also keyed the gear-wheel 20, that meshes with the pinion 21, keyed to the shaft 22, journaled upon the horizontal bars A³, and upon this shaft 22 is fastened a fly-wheel 24, which serves to give steadiness of motion to the mechanism. The main shaft E also carries the spool E², over which passes, with several turns, a rope 30, that leads over the top of the derrick and connects with the maul Y in manner well understood. The rope 30 will be passed around the winding-drum E² merely a sufficient number of times to enable it to bite upon the drum, and the free end of the rope will be extended to a position where it may be held by the operator, so that when it is desired to cause the lift of the maul Y it will only be necessary for the operator to strain the rope 30, thereby causing it to be wound upon the drum E² and to lift the maul Y, and after the maul is lifted to the desired height the operator will slacken the free end of the rope 30, thereby permitting the maul to drop in order to drive the casing or tube through which the drill W passes. The maul Y is perforated from top to bottom to permit it and the drill W to move freely with respect to each other. Upon the outer end of the shaft E is keyed a driving-wheel E³, from the side of which near its periphery extends a pin, preferably carrying the friction-roll 40, whereby movement is imparted to the walking-beam F. This pin *e* is thus eccentrically held with respect to the drive-shaft, (although a crank-arm to carry the pin might be employed instead of the wheel E,) and by preference the wheel E is furnished with a series of perforations *e'* at different distances from its center in order to enable the position of the pin *e* to be shifted to vary the throw of the walking-beam when desired. This walking beam or bar is conveniently pivoted, as at *f*, at the upper end of a vertical bar 35, that is bolted to the horizontal beams A² A³, and to this beam is connected the guide-rail F', between the upper edge of which and the lower edge of the beam rises the roller 40 of the drive-wheel E³. The guide-rail F' is attached to the walking-beam F, preferably, by means of the bars or hangers 41 42 43, and this guide-rail, in the preferred form of my invention, is formed of two parts, the part *f'* being fixed, while the part

*f*² is pivoted, as at 44, so that it can be turned backward into the position seen in Fig. 3, and be held in such position by a suitable hook 45. By preference the abutting ends of the sections *f'* *f*² of the guide-rail are inclined or beveled, as shown, and the movable section *f*² is furnished with a latch-plate 46, the free end of which will spring over the nut 47 of a bolt passing through the strap 42, and will be conveniently held in such position by a swinging button or clamp 48. From this construction it will be seen that when it is desired (for a purpose to be presently stated) to turn backward the movable section *f*² of the guide-rail it is only necessary to turn the button 48 and then spring the plate 46 from off the nut 47, after which the section *f'* of the guide-rail can be turned backward, as shown in Fig. 3. To the upper end of the bar 43 is journaled the sheave 50, over which passes the drill-rope 51, one end of this rope being connected to the drill, while the main portion of the rope will pass from the sheave 50 up over a friction roll or sheave 52, and thence over the windlass 53. This windlass 53 is journaled in the vertical bars B B' and at its end is provided with a gear-wheel 54, that meshes with the pinion 55 upon shaft 56, journaled in the uprights B B' and adapted to be operated by a crank in order to effect the winding of the rope upon the windlass. A suitable check-pawl 57 will be employed to prevent the backward movement of the windlass.

From the construction of parts as thus far defined it will be seen that when motion is imparted to the main shaft E and the drive-wheel E³ the rotation of this wheel will cause the friction-roll 40 to ride within the space formed by the walking-beam F and the guide-rail F', and consequently will cause the walking-beam to vibrate in vertical direction. It will be manifest that as the walking-beam is forced downward by the travel of the roll 40 upon the guide-rail F' it will carry with it the sheave 50, and consequently will draw downward the drill-rope 51, and inasmuch as this rope is passed over the top of the derrick X and is connected to the drill W the downward movement of the walking-beam will effect the upward movement of the drill.

My purpose in passing the drill-rope 51 over a sheave attached to the walking-beam and thence upward is to enable a greater lift to be imparted to the drill by the movement of the walking-beam, and it is obvious that as the walking-beam is moved downward it will lift the drill twice as high as it would be lifted if the drill-rope 51 were merely connected to the walking-beam and did not pass over the sheave 50 and thence upward over the pulley 52. This feature is of importance, since it enables me with a comparatively short movement of the walking-beam to effect a very considerable lift of the drill. An advantage incident to extending the drill-rope 51 backward and over the windlass 53 is that I am enabled to more readily withdraw the

drill from the tube in case of accident, or whenever such withdrawal of the drill can be effected, by merely turning the crank attached to the shaft 56, and, through the medium of this shaft-pinion 55, and gear-wheel 54, effect the desired rotation of the windlass necessary to wind the drill-rope 51 thereon, thereby supplementing the usual hoisting-power for lifting the drill in case the latter becomes stuck.

By providing the walking-beam F with the guide-rail F', I am enabled to give to the drilling-tool a much more effective motion than is possible to be given by the means ordinarily employed for imparting movement to the walking-beam—that is to say, I am enabled to give to the drill as slow upward movement, which gradually increases and then, just before the upward movement of the drill is completed, gradually decreases, so that severe strain upon the machinery is avoided. This variable movement of the walking-beam results from the fact that at the beginning and end of the stroke the friction-roll 40 is moving along the way or space formed by the walking-beam and the guide-rail, and consequently at such time is imparting but slight movement to the walking-beam, whereas during the time that the friction-roll is moving more nearly in vertical direction the motion imparted to the walking-beam will be rapid.

In certain classes of drilling-work it is desirable to impart a slow steady movement to the drill, whereas in other classes of work it is desirable to allow the drill to drop suddenly after it has been lifted to the required height. Thus, for example, in deep drilling the slow and steady drop of the drill is desirable, whereas in shallow and light drilling the quick drop of the drill is preferred. My purpose in forming the guide-rail F' with the fixed sections f' f'^2 is to enable either a slow or a quick drop of the drill to be effected to suit either class of work. Thus it will be seen that when the guide-rail F' is in position shown by Fig. 1 the roll 40 of the drive-wheel E will continually travel within the space formed between the walking-beam and the guide-rail, and the slow drop before described will be given to the drill. If, however, the section f'^2 of the guide-rail F' be turned backward to the position seen in Fig. 3, it is obvious that as soon as the roll 40 passes off the end of the fixed section f' of the guide-rail, at which time the walking-beam will be at its lowest position and the drilling-tool at its highest position, the walking-beam, being no longer restrained against upward movement by the guide-rail F', will be drawn suddenly upward by the weight of the drill, and as a consequence the drill will be allowed a sudden drop. When, however, in the course of the rotation of the drive-wheel E³ the roll 40 passes again into the space between the fixed section f' of the guide-rail and the walking-beam, the walking-beam will be again drawn downward and the drill will be again lifted, to

be dropped again as soon as the roll 40 passes from off the fixed section of the guide-rail. In order to limit the upward movement of the walking-beam when this sudden "drop movement" is imparted, I prefer to employ a buffer M, bolted to the vertical bars C C', between which the free end of the walking-beam moves, and I prefer, also, to provide the end of the walking-beam with a spring F². This buffer M may be detachable and is preferably U-shaped, as more particularly seen in Fig. 1 of the drawings, since by such shape a convenient variation in the extent of the upward movement of the walking-beam can be obtained. Thus it will be seen that if the buffer M be in position seen in full lines in Fig. 1 the walking-beam will be allowed to travel to the greatest extent, whereas if the buffer be turned to the position shown by dotted lines the upward movement of the walking-beam will be correspondingly restricted. It is plain, also, that by the adjustment of the eccentric-pin e within the perforations of the wheel E the extent of movement of the walking-beam can be varied as desired.

From the foregoing construction it will also be seen that in case quicksand is encountered and it is desired to conjointly operate both the maul Y for driving the casing Y' and the mechanism for moving the drill, it is only necessary for the attendant, while the drill is being worked in manner before described, to alternately tighten and loosen the free end of the maul-rope 30, so that this rope will be wound upon the spool E² in order to operate the maul in manner before defined. It will be understood, of course, that while working in quicksand the pump 9 will also be operated in order to withdraw the sand from the drill.

In order to enable the derrick X to be conveniently handled and transported, and as well, also, to enable a higher derrick to be used than could be conveniently furnished if the legs of the derrick were each in single piece, I form each of the legs x of the derrick of upper and lower sections x x' . Each of the sections x is provided with a stirrup X', bolted thereto and adapted to receive the upper end of the corresponding section x' of the derrick, and each of the sections x' is provided at a distance from its top with a stirrup X', adapted to receive the lower end of the corresponding section x of the derrick. It will be observed that the stirrups X' are so formed as not only to embrace the ends of the leg-sections, but also to form stops to better sustain these sections. Hence it will be seen that when the sections of the derrick-legs are to be put together for use it will only be necessary to set the ends of the sections x x' within the stirrups of the corresponding sections.

The details of construction before set out may be varied within wide limits without departing from the spirit of my invention. Thus, for example, instead of providing the walking-beam F with a supplemental rail for

forming the way or space in which the eccentric-pin 40 shall travel, this way or space may be formed in any other convenient manner. So, also, various features of the invention may
5 be employed without its adoption as an entirety.

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

10 1. In a drilling-machine, the combination, with suitable driving mechanism—such, for example, as a shaft—of an eccentric-pin connected with said shaft, and a walking-beam provided with a short way along which the
15 eccentric-pin can travel, but from which it can pass during a portion of its stroke, whereby the walking-beam is disengaged from the eccentric-pin to permit the beam to move independently thereof, substantially as de-
20 scribed.

2. In a drilling-machine, the combination, with a shaft, of an eccentric-pin suitably connected to said shaft, and a walking-beam pro-

vided upon its under side with a short rail whereon said pin will travel during a portion 25 of its downward movement, substantially as described.

3. In a drilling-machine, the combination, with a shaft, of an eccentric-pin connected to said shaft, and a walking-beam provided 30 with a rail whereon said pin will travel, said rail having a movable section, substantially as described.

4. In a drilling-machine, the combination of a derrick the legs of which are formed of 35 detachable sections, each of said sections being furnished with stirrups X', bolted thereto, said stirrups being adapted to encircle the ends of the leg-sections and form stops or rests against which the ends of said legs will 40 abut, substantially as described.

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Witnesses:

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