No. 698,033. Patented Apr. 22, 1902.

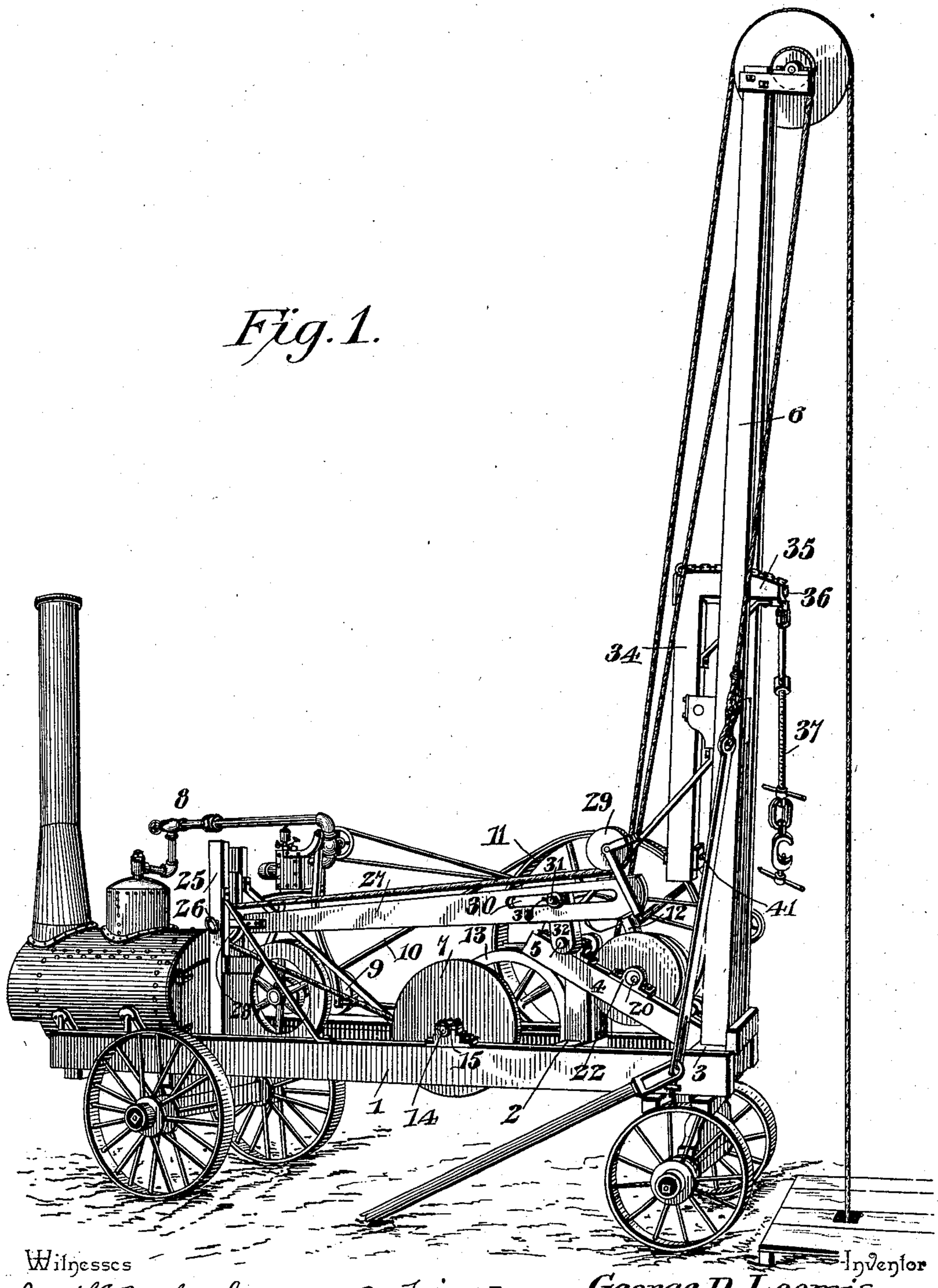
G. D. LOOMIS.

STEAM POWER WELL DRILLING MACHINE.

(Application filed June 17, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

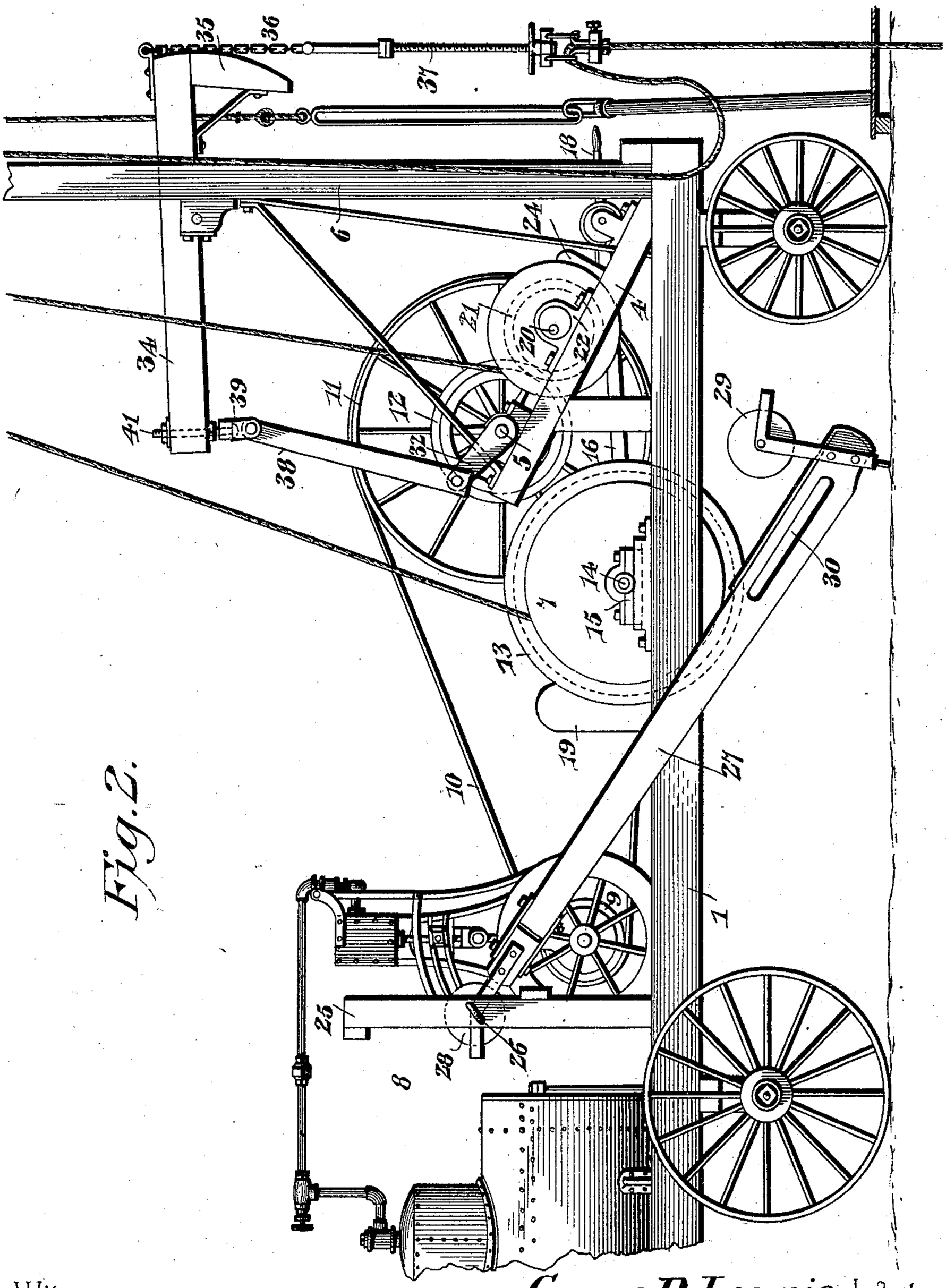

Fig. 2.

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(No Model.) 4 Sheets--Sheet 3.

Fig. 6.

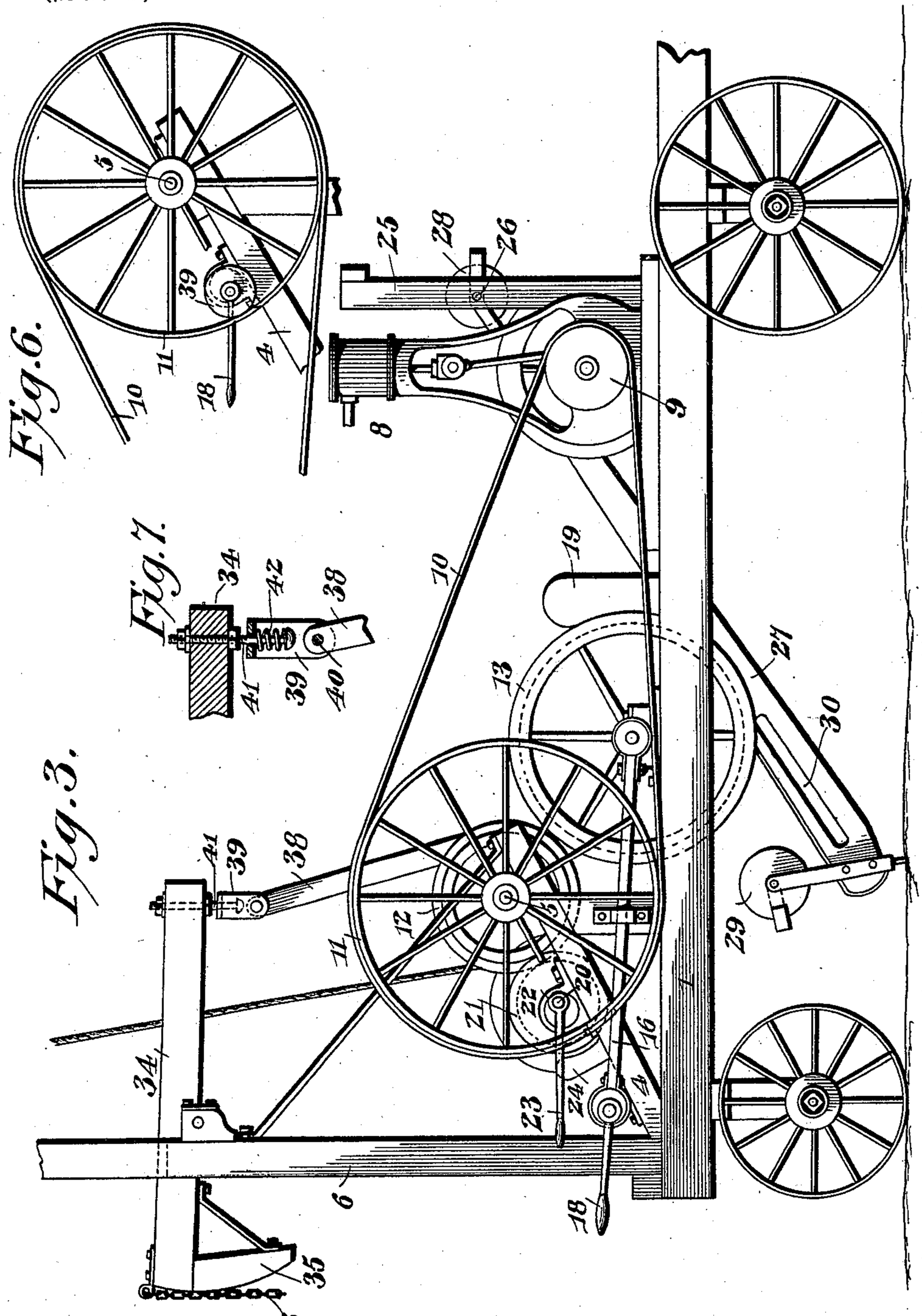

Fig. 7.

Fig. 3.

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Fig. 4.

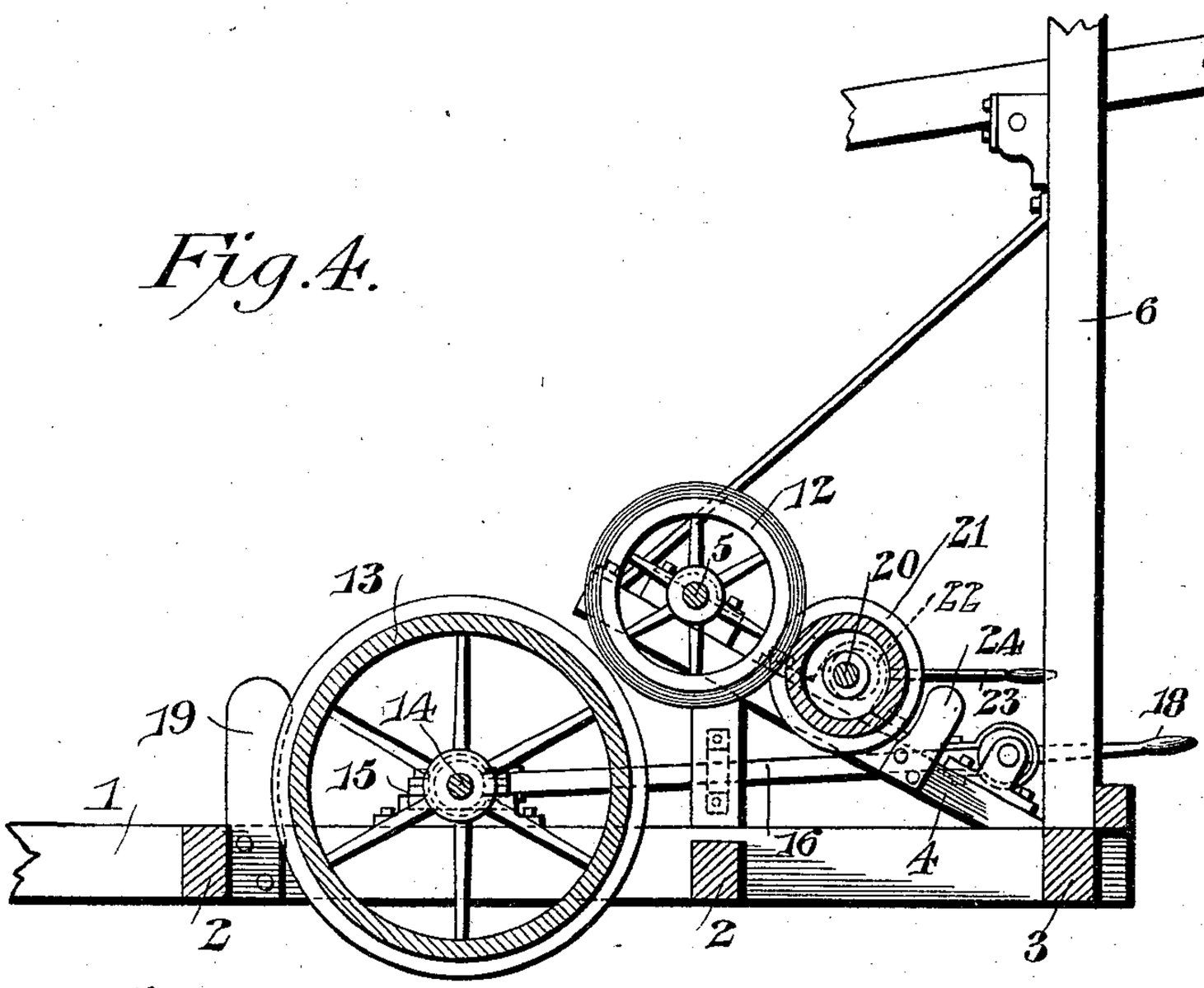
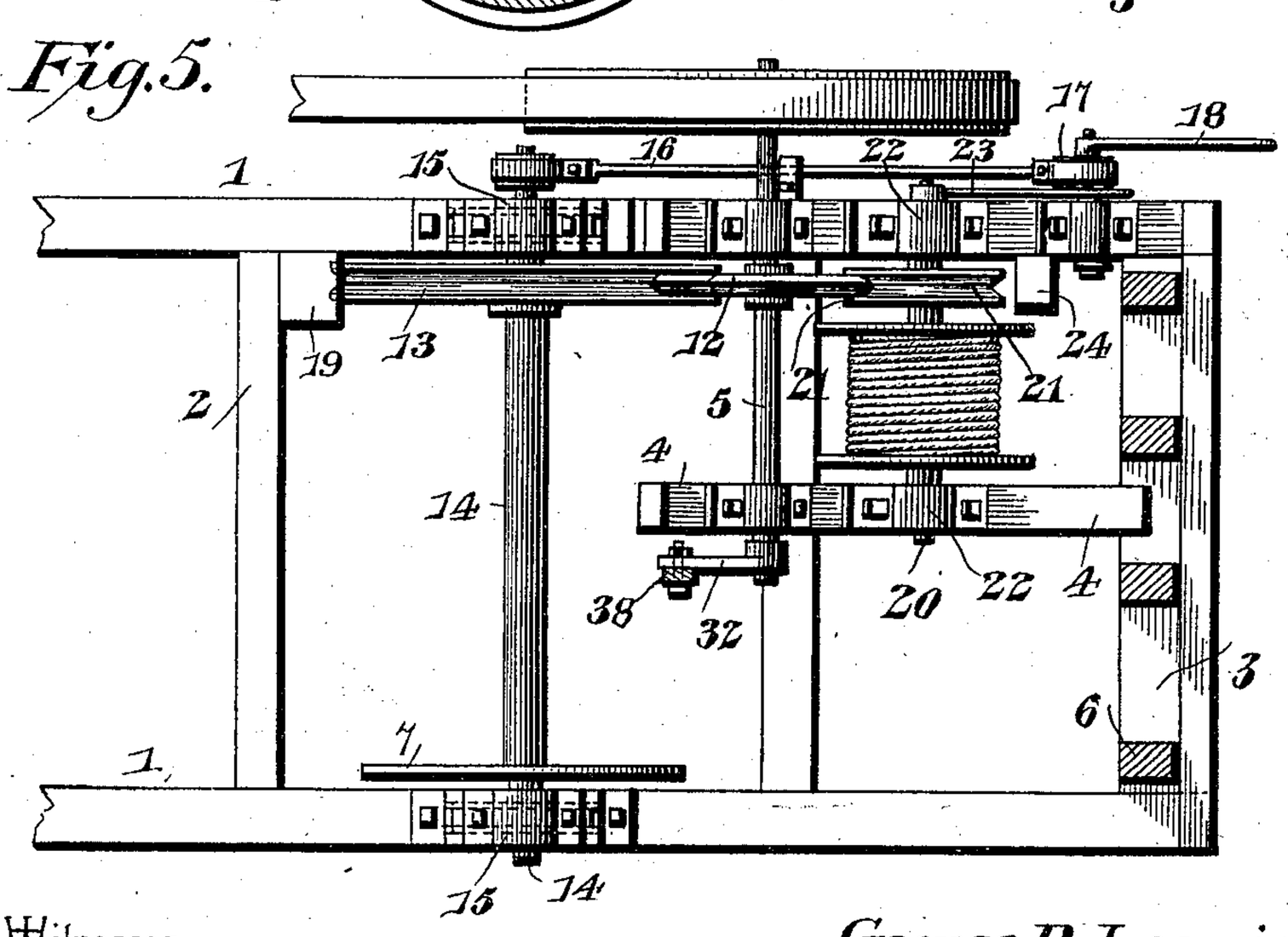


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE DUDLEY LOOMIS, OF TIFFIN, OHIO.

STEAM-POWER WELL-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 698,033, dated April 22, 1902.

Application filed June 17, 1899. Serial No. 720,955. (No model.)

To all whom it may concern:

Be it known that I, GEORGE DUDLEY LOOMIS, a citizen of the United States, residing at Tiffin, in the county of Seneca and State of Ohio, have invented a new and useful Steam-Power Well-Drilling Machine, of which the following is a specification.

My invention relates to well-drilling machinery adapted particularly for operation by steam or analogous power; and the object in view is to provide a simple, compact, and efficient machine possessing durability and adapted to be manufactured at a comparatively small cost, the same being capable of performing the operations of spudding and drilling and also of pipe-driving with the minimum effort upon the part of the operator, the changes of adjustment necessary to suit it to the different kinds of work being accomplished with facility and without loss of time.

A further object of the invention is to so arrange the bull-wheel or the drum for the drill-rope at such a point with relation to the other parts of the structure as to insure a direct downward pressure upon the derrick or ladder, whereby side strains may be avoided, and also to provide means for strengthening and bracing the crank-shaft, whereby the strain due to the operation thereof is distributed throughout the frame and distortion is prevented.

A further object of the invention is to provide a simple and efficient spudding-lever and means for mounting the same, whereby it may be arranged in operative position and engaged with the drill-rope without difficulty, the strain upon the drill-rope due to the vibration of the lever being such as to avoid unduly straining the frame of the mechanism.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims, it being understood that the improvement is susceptible of various changes in the form, proportion, size, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a perspective view of a drilling-machine constructed in accordance with my invention, the parts being arranged for spudding. Fig. 2 is a partial side view with the members arranged for drilling. Fig. 3 is an opposite side view with the members arranged as in Fig. 2. Fig. 4 is a longitudinal section of a portion of the machine to show the means for communicating motion from the crank-shaft to the bull-wheel and sand-reel shafts. Fig. 5 is a plan view of the same. Fig. 6 is a detail side view of the movable bearing for one end of the sand-reel shaft. Fig. 7 is a detail sectional view of the cushioning device between the pitman and the walking-beam.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

The main frame of the machine embodying my invention consists, essentially, of side sills 1, connected terminally and at intermediate points by cross-beams 2 and also near their forward ends by a cross-beam 3, which supports the rear ends of brackets 4, upon which the crank-shaft 5 is journaled. Rising from the frame at its front end is a derrick or ladder 6, and the bull-wheel or main drum 7 is journaled upon the side sills well forward or adjacent to the vertical plane of the derrick, whereby when the machine is in use for drawing tools the strain upon the derrick is vertically downward rather than lateral or backward, as when the drum is positioned at a considerable distance from the plane of the derrick. The frame supports a suitable engine, (indicated at 8,) of which the driving-shaft carries a pulley 9, connected by a belt 10 with the driving-pulley 11 on the crank-shaft, and fixed to the crank-shaft is a friction-pulley 12 for peripheral contact with a friction-wheel 13 on the bull-wheel or drum-shaft 14, that bearing 15 of the bull-wheel shaft which is adjacent to the plane of the friction-wheel 13 being mounted to slide upon the frame and being connected by a rod 16 with an eccentric-strap on an eccentric 17, said eccentric being provided with an operating-lever 18. The friction-wheels 12 and 13 are provided with interlocking peripheries, respectively convexed and concaved, one of them, as the wheel 12, having a convexed cross-sectionally-V-shaped periphery, and the other, as the wheel 13, having a concaved cross-sectionally-V-shaped periphery, and by

the operation of the eccentric-lever 18 the adjustable journal-bearing of the bull-wheel shaft may be moved to bring the pulley on said shaft into peripheral contact with the cooperating pulley on the crank-shaft to provide for the communication of rotary motion from the crank-shaft to the bull-wheel to take up or wind the drill-rope. The opposite movement of the bearing 15 will bring the periphery of the pulley 13 into frictional contact with a stationary brake-block 19, arranged upon the frame, whereas in an intermediate position the pulley 13 is free to rotate to unreel the drill-rope.

Mounted upon the framework, as upon the brackets 4 in front of the crank-shaft or between the same and the plane of the derrick, is a sand-reel shaft 20, having a friction-pulley 21, adapted for peripheral contact with the friction-pulley 12 on the crank-shaft, the periphery of the said friction-pulley 21 also being cross-sectionally V-shaped, either convexed or concaved, to correspond and interlock with the periphery of the pulley 12, and that end of the sand-reel shaft which is adjacent to said pulley 21 is mounted in a movable bearing 22, of which the position is controlled by an eccentric-lever 23 to enable the operator to throw the pulley 21 into or out of operative frictional engagement with the wheel 12. Located at the opposite side of the pulley 21 is a fixed brake-block 24, into contact with which the pulley may be thrown to check its rotary motion, while at an intermediate point of the movement of the bearing the pulley 21 is free to rotate to unreel the sand-rope.

From the above description it will be seen that the shafts of the main drum and sand-reel are mounted upon opposite sides of the plane of the crank-shaft and are provided with friction-pulleys, either or both of which are adapted to be thrown into operative engagement with a friction-wheel on the crank-shaft by the movement of the eccentric-levers provided for that purpose, whereas an opposite movement of either lever will cause the braking of the connected shaft which is controlled thereby. No intermediate gearing either of the spur, chain, or belt type is required in connection with the improved drilling-machine to operate the drums which control the drill-rope and sand-pump rope.

Rising from the frame in rear of the vertical plane of the main drum is a standard 25, preferably consisting of parallel bars spanned by a transverse pivot 26, and upon this pivot and arranged between said bars is the extremity of a spudding-lever 27, provided at its extremities with rope-pulleys 28 and 29 and also having a longitudinal slot 30 for engagement by the wrist-pin 31 of the crank-arm 32 on the crank-shaft, a suitable key 33 being employed to maintain the slot of the spudding-lever in engagement with said wrist-pin when this feature of the mechanism is in use. The drill-rope is extended from the drum rearwardly to and around the pulley 28, thence forward to and around the pulley 29, which is elevated above the plane of the upper edge of the spudding-lever by means of a suitable stirrup, and thence upward to the usual rope-pulley at the upper end of the derrick or ladder, and finally downward to the drill-tools. This arrangement of the parts insures a direct downward strain upon that portion of the drill-rope which extends from the pulley 29 of the spudding-lever to the derrick-pulley, and hence in operation the derrick is not exposed to a transverse strain, whereas the movement which is imparted to the tools is approximately equal with that of the vibratory end of the spudding-lever or, in other words, to the diameter of the path of the crank-arm.

For drilling I use a walking-beam 34, having its bearing-pin suitably mounted upon the derrick, having a segmental head 35 traversed by the chain 36, which connects with the temper screw or clamp 37, the other end of said walking-beam being connected by a pitman 38 with the wrist-pin of the crank-arm. Said temper screw or clamp may be of the ordinary or any preferred construction and being adapted for use as in the ordinary practice.

It will be seen that in order to change the machine when arranged for spudding to adapt it for drilling it is necessary simply to disengage the slot of the spudding-lever from the wrist-pin of the crank-arm and substitute the pitman of the walking-beam, said spudding-lever being turned off to one side and allowed to drop out of the way about its pivot-pin 26 as a center, and if after having proceeded with the drilling it is found necessary to drive the casing the pitman of the walking-beam may be again disengaged to allow said beam to fold parallel with the derrick, and the spudding-lever may be returned to its engagement with the crank-arm, a suitable driving-tool being connected with the drill-rope.

In Fig. 6 I have shown a slightly-modified arrangement of the means for communicating rotary motion to the shaft of the sand-pump reel or spool, wherein said shaft is provided with a flat-faced friction-pulley 39 for contact with the inner surface of the main belt-pulley 11; but it will be understood that in this, as in the other form of connection, both the main drum and the sand-reel are driven from the crank-shaft and that the same means may be employed in both constructions for throwing the pulley of the sand-reel shaft into engagement with the coöperating member of the crank-shaft.

It will be seen from the foregoing description that I have provided a compact and efficient construction embodying the minimum number of elements for accomplishing the several operations of spudding, drilling, and pipe-driving, both the spudding-lever and the walking-beam being driven from the same

single crank-shaft, which is in direct connection with the driving-shaft of the engine, and both the main drum and the sand-reel being adapted for actuation from the crank-shaft without the use of intermediate gearing, and it will be understood, furthermore, that this simplification of construction provides for attaining increased strength and durability and also allows the substantial bracing of the operating parts of the mechanism to resist the severe strains to which a machine of this class is subjected in operation.

In order to cushion the connection between the pitman 38 and the walking-beam 34, I preferably employ a stirrup 39, pivoted, as at 40, to the pitman and having a guide-opening fitted upon a connecting-bolt 41, which extends through the walking-beam and is engaged at opposite sides of the plane thereof by suitable nuts. Between the head of said connecting-bolt and the closed end of the stirrup is arranged a cushion-spring 42, which is adapted to be compressed by the downward draft of the pitman in operating the walking-beam.

Having thus described my invention, what I claim is—

1. In a well-drilling machine, the combination with a supporting-frame including longitudinal sills, and a derrick-mast, of inclined beams mounted with their forward ends at the base of the mast and having their rear ends raised above the sills, a drive-shaft mounted upon the frame at the foot of the mast and carrying a drive-pulley and a drill-operating crank, a sand-drum mounted between the drive-shaft and the foot of the mast, with its axis in a plane below the axis of the drive-shaft, said sand-drum being adapted for movement into and out of operative relation to the drive-shaft to receive motion therefrom, a bull-wheel mounted upon the sills in the rear of the drive-shaft and adapted for bodily movement into and out of operative relation thereto, whereby the drive-shaft will have the functions of operating the adjacent sand-drum and bull-wheel, and of operating the drill-rope, the bull-wheel shaft lying below the drive-shaft, and a power-shaft mounted upon the frame in the rear of and below the drive-shaft, and having a belt connecting with the drive-shaft, whereby the strain will be in the direction of the bull-wheel shaft to maintain operable connection therewith.

2. In a well-drilling machine, a frame having a mast, a walking-beam pivotally mounted on the mast and adapted when disused to be turned to a vertical position, a driven shaft having a crank, a connection, including a pitman, to communicate power to said walking-beam from said crank, said pitman being adapted to be attached to and disconnected from the wrist of said crank, a standard on said frame, a spanning pivot supported by said standard and disposed transversely with reference to the frame and at one side thereof, a spudding-lever mounted on said spanning pivot, for lateral movement thereon and having at its inner end a pulley 28, mounted and shiftable laterally on said spanning pivot, with said spudding-lever, the latter having at its outer end a slot 30 adapted for the reception of the wrist of said crank, whereby said spudding-lever may be operated by or unshipped from said crank, and when unshipped therefrom may be free to drop its outer end to the ground, said spudding-lever having a sheave 29 at its outer end, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE DUDLEY LOOMIS.

Witnesses:

HARRY TAGGART,

E. T. NAYLOR.