R. M. DOWNIE.

DRILLING MACHINE.

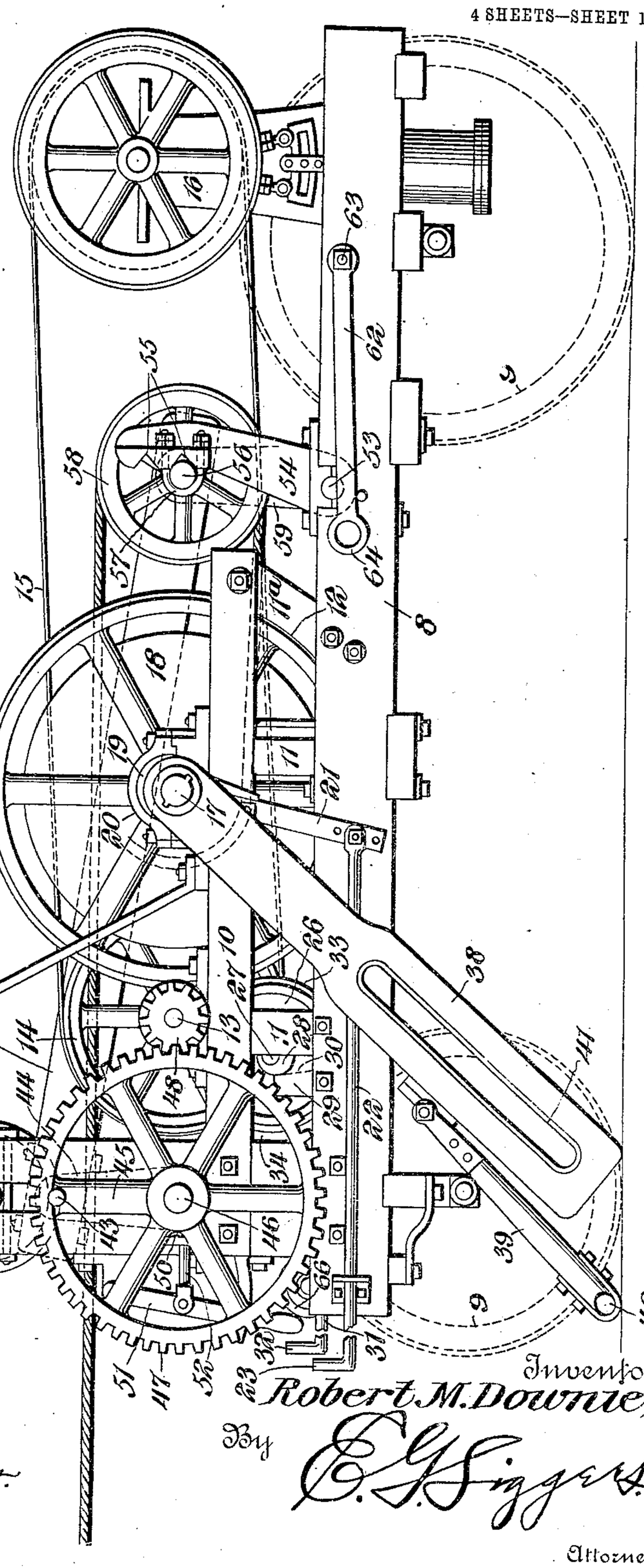
APPLICATION FILED DEC. 26, 1905.

921,680.

Patented May 18, 1909.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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4 SHEETS—SHEET 2.

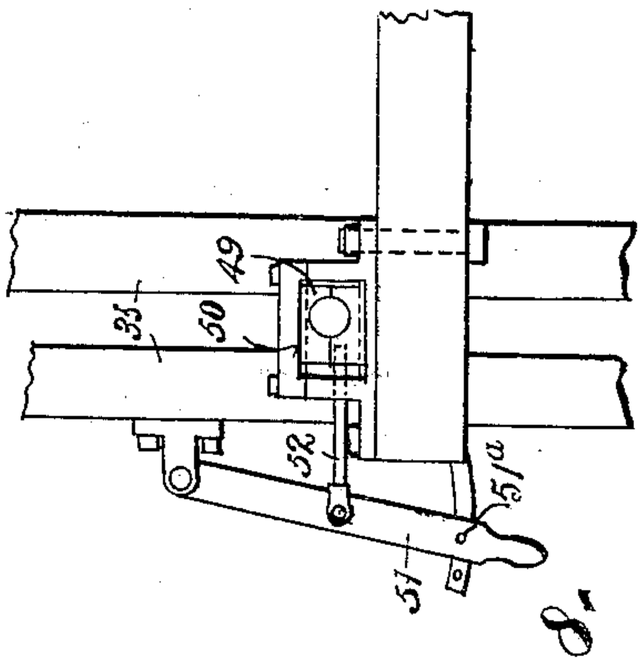

Fig. 2.

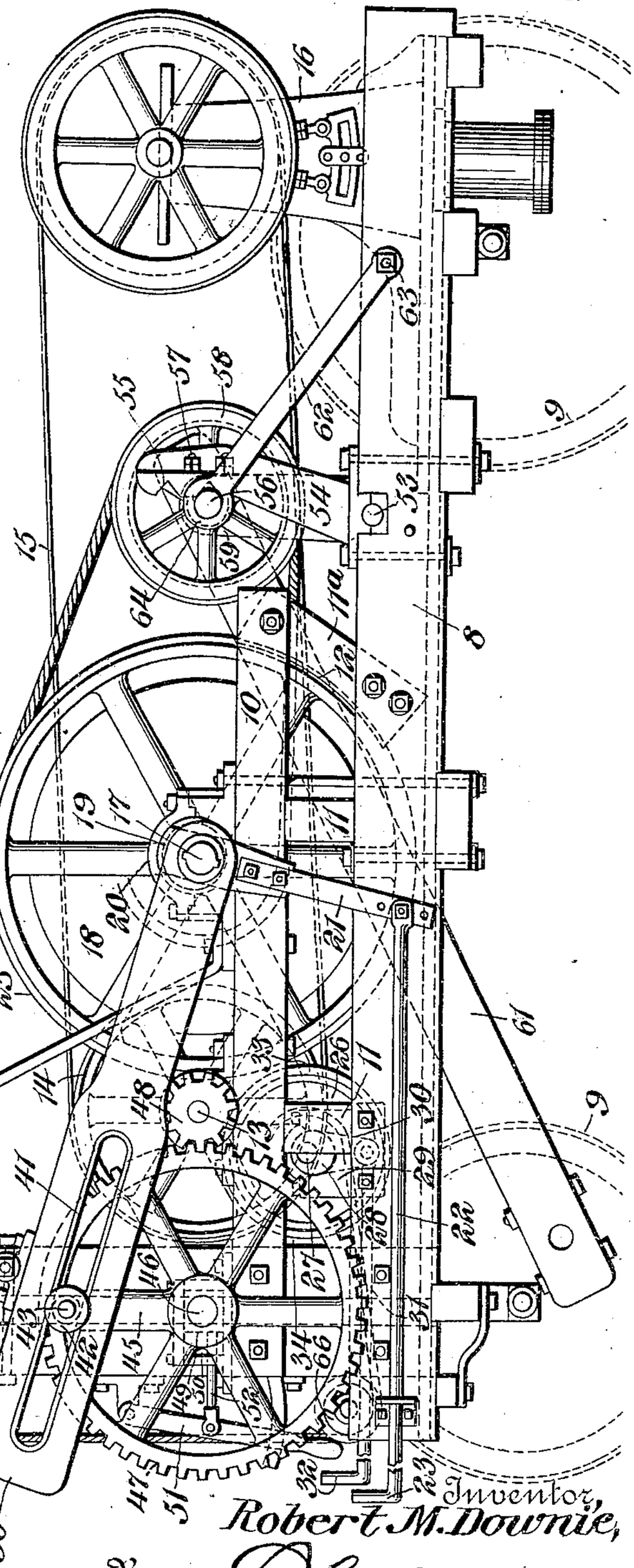

Fig. 8.

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4 SHEETS—SHEET 3.

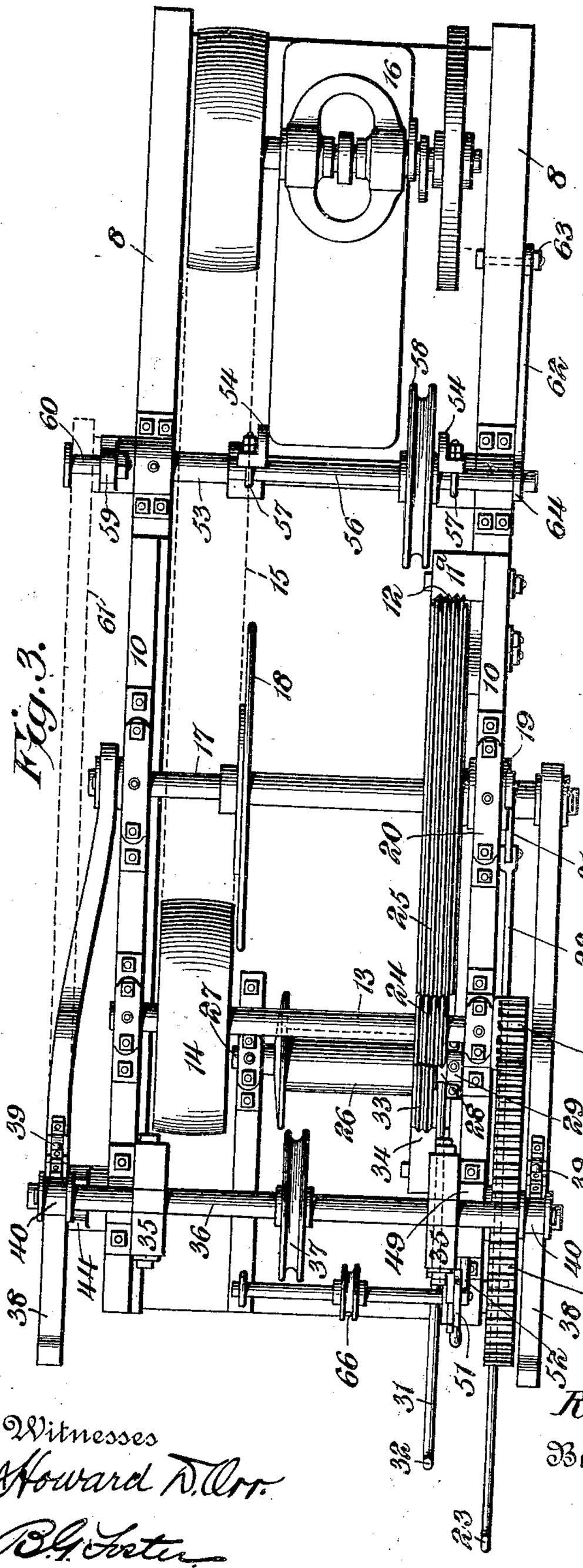

Fig. 3.

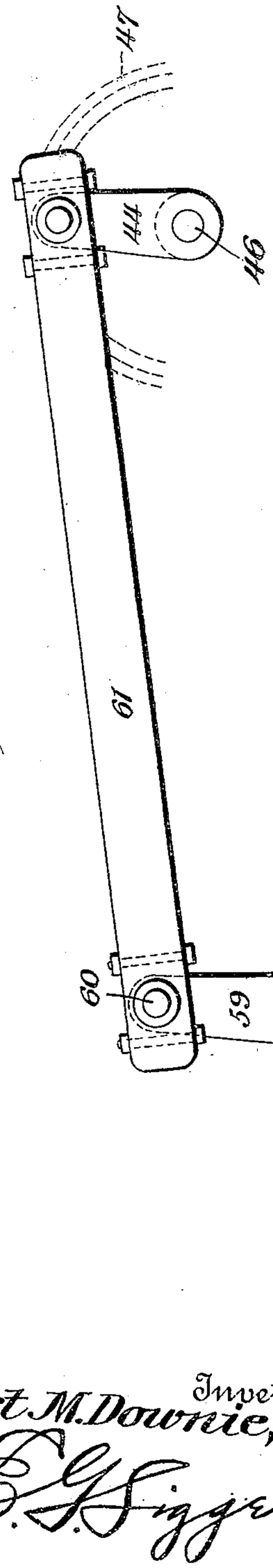

Fig. 5.

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4 SHEETS—SHEET 4.

Fig. 6.

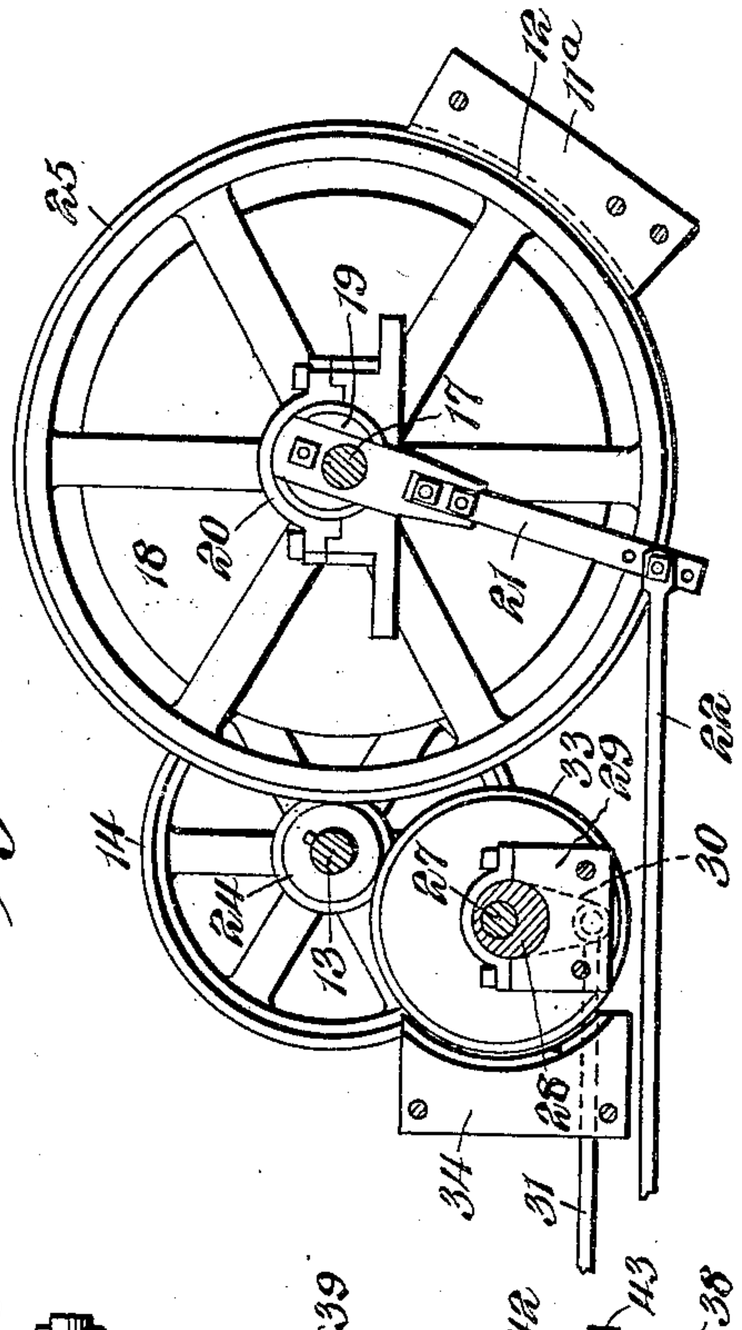


Fig. 7.

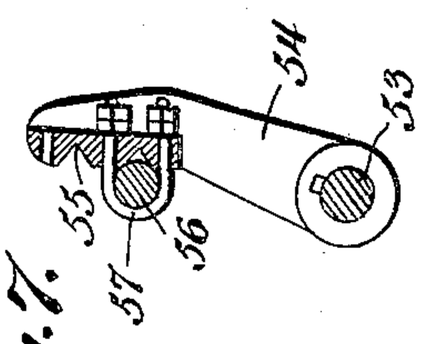
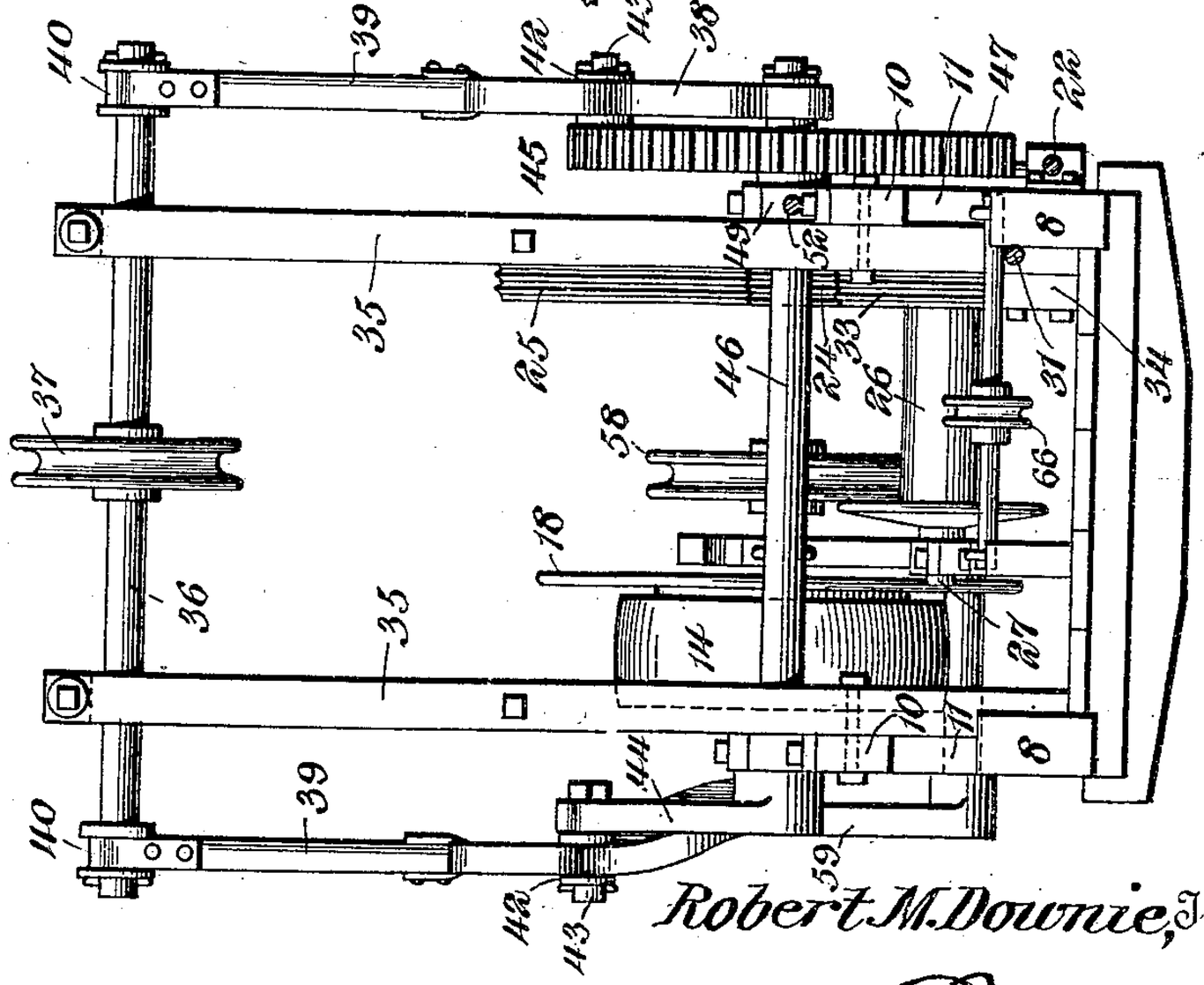


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT M. DOWNIE, OF BEAVER FALLS, PENNSYLVANIA, ASSIGNOR TO THE KEYSTONE DRILLER COMPANY, OF BEAVER FALLS, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DRILLING-MACHINE.

No. 921,680. Specification of Letters Patent. Patented May 18, 1909.

Application filed December 26, 1905. Serial No. 293,406.

To all whom it may concern:

Be it known that I, ROBERT M. DOWNIE, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Drilling-Machine, of which the following is a specification.

The present invention is more particularly intended for drilling large holes for hydraulic elevators, though not necessarily limited to this use. The necessities of that particular kind of work require a machine at once very strong and combined into the smallest possible compass, so that it may be taken into cellars of buildings or narrow alleys, and it must also be constructed so that it will operate the drilling cable either in a perpendicular direction or horizontally. For instance, in case it is impossible to place the drilling machine close beside the spot where the hole is to be drilled, the practice is to place the machine in an adjacent street or yard area and carry the drilling cable horizontally from the machine into the elevator shaft, thence up the same over the crown pulley and down to the well.

The principal object of this invention is to provide a machine having all these essential features, namely, compactness and strength, as well as an adaptability for operation either with a perpendicular or a horizontal pull of the drilling cable.

An embodiment of the invention, that is at present considered the preferable one, is illustrated in the accompanying drawings, and is described in the following specification. An inspection of the claims will clearly indicate that said invention is not limited to this disclosure.

In the drawings:—Figure 1 is a side elevation of the machine when arranged for imparting a horizontal spudding action to the cable. Fig. 2 is a similar view, showing the machine converted into a vertical spudding apparatus. Fig. 3 is a top plan view of the arrangement disclosed in Fig. 2. Fig. 4 is an end elevation of the same. Fig. 5 is a detail side elevation illustrating the connection between the driving means and horizontal spudding device. Fig. 6 is a detail sectional view showing an arrangement of the reels and the operating mechanism therefor. Fig. 7 is a detail sectional view through one of the rocker arms of the horizontal spudding means. Fig. 8 is a detail view of the means for shifting the gear wheel.

In the embodiment illustrated, a supporting frame is employed, which includes spaced longitudinal sills 8, which may be mounted on wheels indicated in dotted lines at 9, said wheels being provided for the purpose of transportation. Over the sills 8 are arranged supporting beams 10, carried by studs 11, secured to the sills 8, one of these studs 11^a being set at an inclination, as shown at Fig. 2, and having a curved inner face 12, forming a brake, as hereinafter described.

Journaled on the beams 10 is a drive shaft 13, having a pulley 14, around which passes the driving belt 15. Power is imparted to this belt from any suitable source, as, for instance, an engine 16 mounted on the rear end of the frame. A drill cable reel comprising a shaft 17 and heads 18, is journaled on the supporting beams 10, one end of the shaft 17 being mounted in a cam or eccentric 19 that is journaled in a boxing 20 secured to one of said beams 10. The cam is turned by means of an arm 21 secured thereto and a link 22 pivoted to the arm, said link extending to one end of the machine, and having a suitable handle 23. The driving shaft 13 carries a grooved friction wheel 24 of comparatively small diameter while the cable reel is provided with a large friction wheel 25, the periphery of which is also grooved. This wheel is so arranged that when the cam 19 is turned in one direction, it will be brought into operative engagement with the wheel 24 of the driving shaft, and when said cam is turned in the opposite direction, it will be moved out of such engagement, and into frictional engagement with the said curved inner face 12 of the stud 11^a. By this means, therefore, the movement of the cable reel is readily controlled. A sand reel 26 has a shaft 27 journaled beneath the supporting beams, one end of said shaft being mounted in a cam or eccentric 28, journaled in a boxing 29 secured to the frame. This cam has an arm 30, to which is attached an operating rod 31, terminating in a handle 32, located adjacent to the handle 23. A friction wheel 33 forming a part of said reel, has a grooved periphery, that is movable into and out of coaction with the wheel 24 of the driving shaft 13. Upon the turn-

ing of the cam 28, said periphery is likewise movable out of and into coaction with a brake shoe 34, secured to the frame and arranged outside of said heel. It will thus be apparent that by moving the handle 32 in one direction or the other, the sand reel can be moved into and out of engagement with the wheel 24 of the driving shaft and with the brake shoe, so that the movement of such reel can be readily controlled.

Mounted on one end of the frame are upright spaced guideways formed by sets of spaced standards 35 and in these guideways is mounted a vertically reciprocatory shaft 36, the ends of which project beyond the guideways, and the standards. A spudding pulley 37 is mounted on the shaft between the guideways. Levers 38 are each fulcrumed at one end upon the cable reel shaft 17, and pivotally connected to the other end portions of said levers are links 39 having detachable and pivotal connections 40 with the projecting ends of the shaft 36. These levers are provided with longitudinal slots 41, in which are arranged rollers 42, carried by crank pins 43 of crank members 44 and 45. The said crank members are mounted on the ends of a shaft 46, journaled on the supporting bars 10 and extending between the standards 35. One of said crank members as 44 is an arm, while the other is preferably in the form of a gear wheel 47 that meshes with a pinion 48, carried by the drive shaft 13. This gear wheel is movable into and out of mesh with said pinion, and to this end, the boxing 49 for the shaft 46 that is adjacent to the wheel 45 is slidably mounted as shown at 50. A lever 51 journaled on the frame has a link connection 52 with the slidable boxing, therefore by swinging this lever, the gear wheel can be brought into and out of mesh with the pinion. A holding pin 51[a] that is adapted to be passed through the lever 51 and any of a series of openings in a quadrant 52[a] holds the lever in adjusted position.

Journaled on the opposite end portion of the frame to that carrying the vertically movable spudding mechanism above described, is a rock-shaft 53, that is provided with spaced upstanding rocker arms 54, these rocker arms being each provided with a plurality of recessed seats 55. An axle 56 is arranged to be located in either of the corresponding sets of seats, and is held therein by clips 57 adjustably engaged with the arms. Mounted on the axle 56 between the arms is a substantially horizontally movable spudding pulley 58. One end of the rock-shaft 53 is provided with a crank arm 59, having a crank pin 60, and a pitman 61 is arranged to connect this crank pin with the crank arm 44 of the shaft 46. Means are provided for securing the rocker arms 54 and the associated parts against movement. While any suitable means may be employed, in the present embodiment, a brace or holding link 62 is provided, one end of which is secured as shown at 63 to the sill, the other end having an eye 64 arranged to be placed over the adjacent end of the axle 56.

It is thought that the manner in which the machine is used can now be made clear. If the apparatus is to be employed for imparting a horizontal spudding movement to the drill cable, the parts are arranged as disclosed in Fig. 1. The drilling cable 65 preferably passes from the underside of the reel underneath and about the spudding pulley 58, thence in a horizontal direction through the mechanism. The levers 38 are detached from the cranks 44, and 45, the holding link 62 is detached from the axle 56, and the pitman 61 is connected to the crank 44, and the crank 59. Assuming therefore that the engine is in operation, it will be apparent that when the gears 45 and 48 are thrown into mesh, the crank 44 will be rotated and the crank 59 oscillated, thereby effecting the oscillation of the pulley 58 and securing what may be termed the horizontal spudding action of the cable. If, however, the machine can be placed contiguous to the hole and the cable can be arranged in a substantially vertical direction, then the machine is converted, so that the parts are disposed, as illustrated in Figs. 2, 3 and 4, that is to say, the oscillatory pulley 58 is secured against movement by the link 62, the pitman 61 is detached from the crank 44, and the levers 38 are connected to said crank 44 and to the crank wheel 45. The links 39 are also connected to the vertically movable pulley 37 and the cable still passing about the pulley 58, which now acts merely as a guide, is also passed beneath and around the cable sheave 37. Upon the operation of the machine as so arranged, it will be apparent that the drilling cable will be given a vertical movement. It is thought that the operation of the reels will be clearly apparent. Under ordinary condition, the wheel 25 of the drill wheel is in engagement with the brake 12, consequently said reel is held against rotation. If, however, the wheel 25 is moved into engagement with the wheel 24, the reel will be rotated. In like manner, the wheel 33 of the sand reel is ordinarily in engagement with the brake 34, but when moved out of engagement with the said brake, and into coaction with the wheel 24, it will be revolved to wind thereupon the cable, which is shown in Fig. 2, and is designated 65, said cable preferably passing about a pulley 66 suitably journaled on the frame. It will also be clearly evident to those skilled in the art that the structure disclosed is applicable for use on a single well. Thus for spudding in or starting the well when the tools are of necessity operat-

ing above the surface of the ground, the vertically operating mechanism is employed, and afterward, when the well has been started, the horizontally operating mechanism can be used for finishing it, the latter then being employed in place of the usual walking beam mechanism.

It will thus be seen that a comparatively simple, compact and powerful machine is provided, which can be employed either in horizontal or vertical spudding, and is thus peculiarly useful for drilling the wells or holes for hydraulic elevators, though as already stated, it is not necessarily limited to this use.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

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

1. In a drilling machine, the combination with means for effecting a substantially vertical movement of the drilling cable, of means for effecting a substantially horizontal movement of the drilling cable, one of said means constituting a cable guide when the other is in operation and driving mechanism arranged to be connected with either of said cable moving means.

2. In a drilling machine, the combination with a supporting frame, of a spudding device mounted thereon and capable of substantially vertical movement thereon, another spudding device mounted on the supporting frame and capable of substantially horizontal movement thereon, one of said spudding devices constituting a cable guide when the other is in operation driving means, and devices for connecting the driving means to either spudding device.

3. In a drilling machine, the combination with a supporting frame, of a spudding pulley mounted thereon and capable of substantially vertical movement, another spudding pulley mounted on the supporting frame and capable of substantially horizontal movement, one of said pulleys constituting a cable guide when the other is in operation, driving means, and devices for connecting the driving means to either spudding pulley.

4. In a drilling machine, the combination with a supporting frame, of a spudding device mounted thereon and capable of substantially vertical movement, another spudding device mounted on the supporting frame and capable of substantially horizontal movement, one of said devices having a reciprocatory movement, the other having an oscillatory movement, one of said devices furthermore constituting a cable guide when the other device is in operation, and means for separately operating either of said devices.

5. In a drilling machine, the combination with a supporting frame, of a substantially vertically reciprocating spudding device mounted thereon, an oscillatory substantially horizontal moving spudding device also mounted on the supporting frame, one of said devices constituting a cable guide when the other is in operation, driving means, and devices for connecting the driving means to either spudding device for effecting the said movements.

6. In a drilling machine, the combination with a supporting frame, a substantially vertically movable spudding device mounted thereon, a substantially horizontally movable spudding device mounted on the supporting frame, a shaft, one of said spudding devices constituting a cable guide when the other is in operation, and devices for connecting the shaft to either spudding device.

7. In a drilling machine, the combination with a supporting frame, of a substantially vertically reciprocating spudding device mounted on one portion of the frame, an oscillatory spudding device mounted on another portion of the frame, one of said spudding devices constituting a cable guide when the other spudding device is in operation, a shaft journaled on the frame, and devices for connecting the shaft to either spudding device.

8. In a drilling machine, the combination with a supporting frame, of a substantially vertically reciprocating spudding device mounted on one portion of the frame, an oscillatory spudding device mounted on another portion of the frame, one of said spudding devices constituting a cable guide when the other is in operation, a shaft journaled on the frame beneath the vertically reciprocating spudding device and having a crank, a lever for connecting the crank and the vertically movable spudding device, and a pitman for connecting the crank and the oscillatory spudding device.

9. In a drilling machine, the combination with a supporting frame having upright guides, of a shaft reciprocating in the guides, a spudding pulley mounted on the shaft, rocker arms journaled on the frame, another spudding pulley carried by said arms, one of said pulleys constituting a cable guide when the other is being operated, a driving shaft having a crank, and devices for connecting the crank to the rocker arms or to the reciprocatory shaft.

10. In a drilling machine, the combination with a supporting frame, of spaced upright

guides mounted on one end of the same, a reciprocatory shaft mounted in said guides, a spudding pulley carried by the shaft, another shaft journaled on the frame and carrying rocker arms, another spudding pulley carried by said rocker arms, one of the pulleys constituting a cable guide when the other is in operation, a shaft journaled on the frame and having a crank, a lever arranged to be connected to the crank and having a connection with the reciprocatory shaft carrying the spudding pulley, and a pitman for connecting the crank and the shaft having the rocker arms.

11. In a drilling machine, the combination with a supporting frame, of mechanism for effecting a substantially vertical movement of the drilling cable, mechanism for effecting a substantially horizontal movement of such drilling cable, one of said mechanisms constituting a cable guide when the other is in operation and means for holding one of the mechanisms against movement when the other is in operation.

12. In a drilling machine, the combination with a supporting frame, of mechanism for effecting a substantially vertical movement of the drilling cable, mechanism for effecting a substantially horizontal movement of the drilling cable, and means for securing the horizontally moving mechanism against movement when the vertically moving mechanism is in operation, said horizontally moving mechanism constituting a cable guide when so held against movement.

13. In a drilling machine, the combination with a supporting frame, of mechanism for effecting a substantially vertical movement of the drilling cable, said mechanism including a vertically movable pulley, mechanism for effecting a substantially horizontal movement of the cable, said latter mechanism including a substantially horizontally movable pulley, one of the pulleys constituting a cable guide when the other is being moved, and means for holding one of the pulleys against movement when the other is in operation.

14. In a drilling machine, the combination with a supporting frame, of a vertically reciprocating spudding pulley mounted thereon, rocker arms journaled on the frame and carrying an oscillatory spudding pulley, driving means including a shaft having a crank, devices for connecting the crank to either pulley, and means for securing the oscillatory pulley against movement when the reciprocatory pulley is in operation, said oscillatory pulley when held stationary constituting a cable guide.

15. In a drilling machine, the combination with a rocker arm, of an axle disposed transversely thereof and adjustable longitudinally along the arm, a clip embracing the axle and having an adjustable engagement with the arm, said clip securing the axle to the arm, and means for oscillating the arm.

16. In a drilling machine, the combination with a rock-shaft, of means for rocking the same, rocker arms carried by the rock-shaft and having a plurality of seats, an axle arranged to be engaged in the different seats, clips surrounding the axle and secured to the rocker arms, and a spudding pulley mounted on the axle.

17. In a drilling machine, the combination with a sill, of a supporting beam mounted thereover, studs connecting the sill-supporting beam, one of said studs constituting a brake shoe, a drive shaft journaled on the supporting beam, a reel also journaled on the supporting beam and movable into and out of coaction with the drive shaft and the shoe, and means for thus moving the reel.

18. In a drilling machine the combination with a supporting frame, of spudding means movably mounted thereon, other spudding means also mounted on the frame, one of said means constituting a cable guide, and mechanism for securing said cable guide means against movement when the other is in operation.

19. In a drilling machine, the combination with a supporting frame, of independently operable spudding devices moving in angularly disposed paths, and mechanism for securing one of the devices against movement when the other is in operation, the mechanism so held constituting a cable guide during the operation of the other mechanism.

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

ROBERT M. DOWNIE.

Witnesses:

J. VALE DOWNIE,

F. W. RANSOM.