

(No Model.)

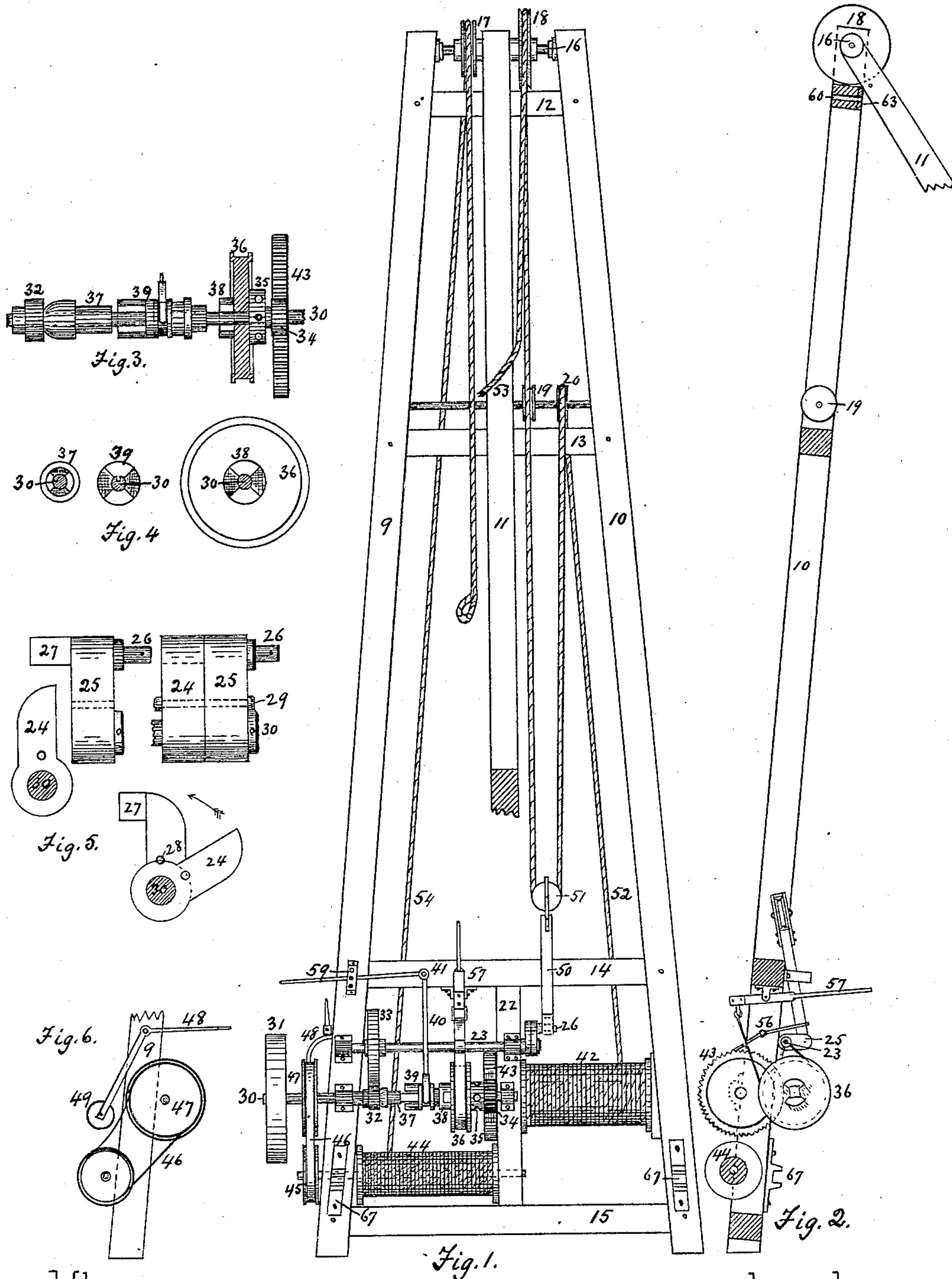
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APPARATUS FOR DRILLING WELLS.

No. 285,010.

Patented Sept. 18, 1883.



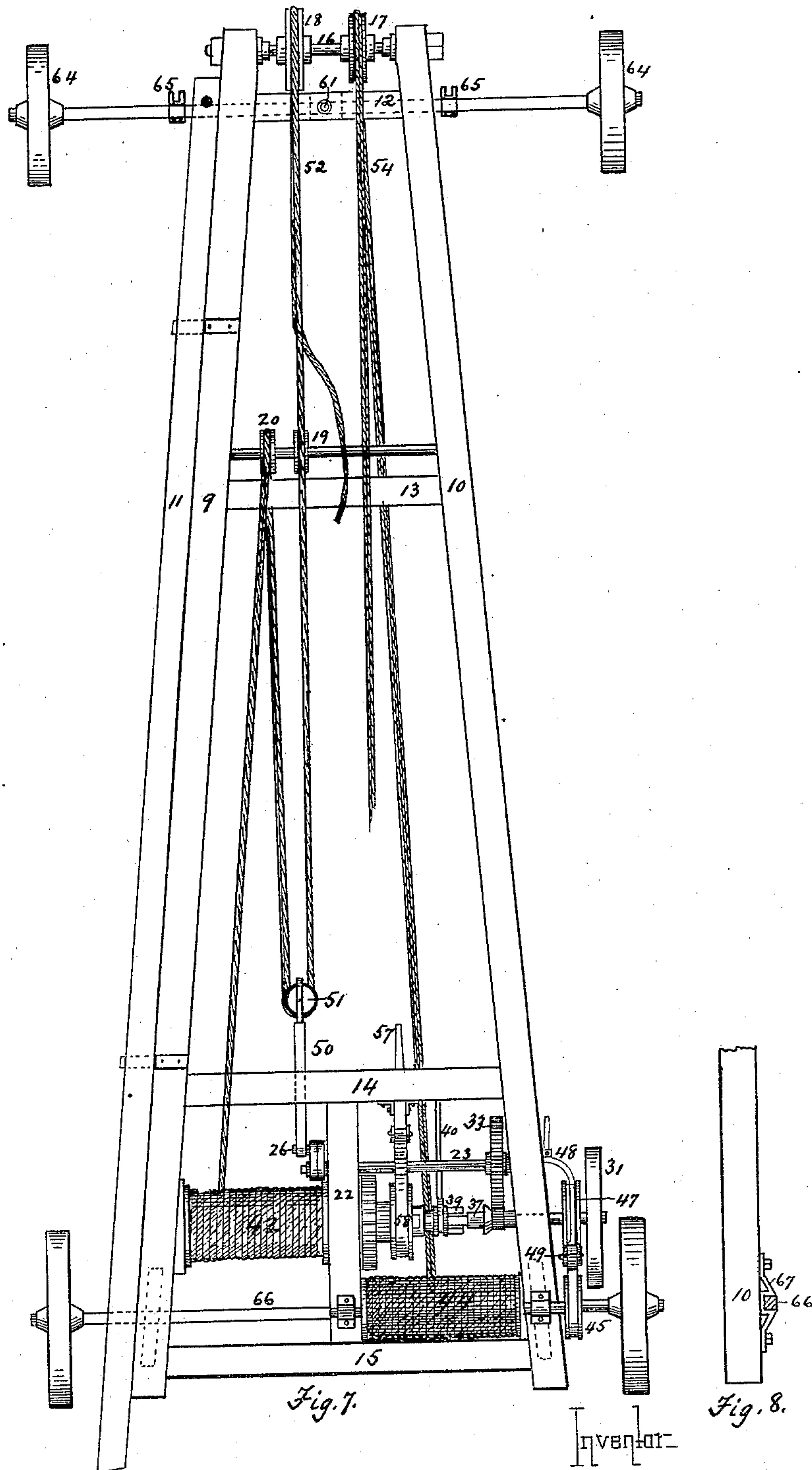
Witnesses.
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2 Sheets—Sheet 2.

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WESSES.

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UNITED STATES PATENT OFFICE.

JOHN CAIN, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR DRILLING WELLS.

SPECIFICATION forming part of Letters Patent No. 285,010, dated September 18, 1883.

Application filed January 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN CAIN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Drilling Wells, and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an elevation of my improved derrick for drilling Artesian wells. Fig. 2 is a vertical section of the same. Figs. 3, 4, 5, and 6 are detail views. Fig. 7 is a plan view of the derrick when provided with running-gear for transportation. Fig. 8 is a detail.

Like figures of reference indicate like parts.

The derrick has three poles or uprights, 9, 10, and 11, two of which, 9 and 10, are framed together with cross-timbers or sills 12, 13, 14, and 15, and the third, 11, is pivoted to a bolt or shaft, 16, so that when the derrick is in use it may support the frame composed of the first two and their cross-timbers. The upright 11 is broken off for greater clearness of illustration. The bolt 16 acts as a shaft or hanger for two crown-pulleys, 17 and 18.

At any suitable point at or near the middle of the uprights 9 and 10 is a bolt or rod, 19, upon which are two shears or pulleys, 20 and 21.

Framed to the sills 14 15 is a vertical timber, 22, and journaled in suitable boxes fastened to the upright 9 and timber 22 is a shaft, 23, having an arm or driver, 24, keyed to it near its inner end, and inside of the timber 22.

Journaled loosely on the shaft 23, and close to the driver 24, is a crank, 25, having a wrist or crank pin, 26, on its outer side, and a projection, 27, on its inner side, which projects in front of the end of the arm or driver 24, so that as the driver revolves in the direction of the arrow in Fig. 5 it catches on the projection 27 and carries the crank 25 around with it. The driver 24 and crank 25 are provided with a hole, 28, for the reception of a bolt, 29, to fasten them together, for the purpose hereinafter stated.

Below the shaft 23 is a drive or power shaft, 30, also journaled in suitable bearings on the upright 9 and timber 22, having a pulley, 31, at its outer end, which is driven by a belt

from the engine, and inside of the upright 9 a loose pinion, 32, which meshes into and drives a gear-wheel, 33, on the shaft 23, and thereby drives the shaft 23, as hereinafter described.

On the inner end of the shaft 30 is a pinion, 34, a barrel, 35, and a flanged band-wheel, 36, all connected together and loose on the shaft.

Connected to the pinion 32 is a clutch, 37, and on the inner side of the wheel 36 is a clutch, 38, and mounted on the shaft 30, between the clutches 37 and 38, is a sliding clutch, 39, of corresponding shape, which is connected to the shaft by a feather and spline, so as to turn therewith. The clutch 39 is moved along the shaft 30 in either direction by means of a bifurcated angle-lever, 40, which is pivoted to the sill 14 at 41.

Journaled to the timber 22 and the upright 10 is a drum or reel, 42, on the shaft of which is a gear-wheel, 43, which meshes into the pinion 34 and is driven thereby.

Journaled to the timber 22 and the upright 9, below the shaft 30, is a drum or reel, 44, on the shaft of which is a pulley, 45, driven by a belt, 46, from a pulley, 47, on the shaft 30.

Mounted on a lever, 48, which is pivoted to the upright 9, is a tightening-pulley, 49, which is designed to be used to tighten the belt 46.

Connected to the crank-pin 26 is a small pitman, 50, having a rope-sheave, 51, at its upper end. The drill-rope 52 is wound on the reel 42, and passes thence up to and over the pulley 20, thence down to and around the sheave 51, thence up to and over the pulley 18, and down into the well. The tools are fastened to the end 53. The sand-pump rope 54 is wound on the drum 44, and passes up to the top of the derrick over the pulley 17, and thence down, and the sand-pump is fastened to the end 55.

Pivoted to the timber 22 is a pawl, 56, which plays into the gear-wheel 43, for holding the drum while drilling.

Pivoted to the sill 14 is a brake-lever, 57, the brake being a band, 58, extending around the periphery of the pulley 36, one end being fastened to the lever and the other to the shaft 23. The barrel 35 is provided with a number of holes for receiving the end of the feed lever or bar, which is any loose bar capable of use as a lever.

The operation of my machine is as follows:

If it is desired to lower the drilling-tools into the well, they are attached to the end 53 of the drilling-rope 52 and placed in the mouth of the well. Then a bar or lever—which I will denominate the “feed-lever”—is inserted into one of the holes in the barrel 35, and a downward pressure applied to it until the pawl 56 is loosed from the toothed wheel 43. The operator then takes hold of the brake-lever 57 and sustains the weight of the tools thereby by applying a pressure to the brake-wheel 36. The pawl is then thrown out of gear with the wheel 43, and the pressure of the brake 57 is eased up and the tools allowed to descend slowly by their own weight to the bottom of the well. They are then drawn up a short distance by the use of the feed-lever until the rope 52 is tight. When this is done, the pawl 56 is dropped into place, and the weight of the tools is then allowed to rest upon the gear-wheel 43 and pawl 56. The power-shaft 30 is revolving continuously in its bearings. The crank 25 and driver 24 are united by means of the bolt 29. The clutch-lever 40 is then moved to throw the clutch 39 into gear with the clutch 37, and the lever 40 is secured in place by the pin 58, so as to hold the clutches 37 and 39 in gear. This causes the pinion 32 to turn and to drive the shaft 23 by means of the gear-wheel 33, thereby operating the crank 25 and pitman 50, giving the requisite movement through the medium of the rope 52 and sheave 51 to the tools in the well. When it is desired to lower the tools further into the well as the drilling advances, it is done by disconnecting the pawl from the wheel 43, and then turning the reel 42 by the use of the feed-lever inserted into one of the holes of the barrel 35, and when the tools reach the proper depth the pawl is again thrown into gear. In the construction heretofore used the tools have been fed by means of a temper-screw attached to the end of the walking-beam; but when it was necessary to draw the tools for the purpose of sand-pumping, which is done about once in every four feet, the drill-rope had to be disconnected from the temper-screw and the temper-screw drawn back out of the way of the drill-rope before the tools could be drawn from the well, and then when the tools were again lowered into the well the rope had to be again connected to the temper-screw. This made a loss of at least twenty minutes of time every time the tools were drawn, and involved considerable additional labor. The time and labor thus lost are all saved by the use of my machine, which can be made to do all the work and requires no change or disconnection whatever.

I have been describing the construction by which an even motion is given to the tools; but I propose to give a positive drop motion to them, except when they are working in crevices or similar places, when the even motion is desirable. This I accomplish by drawing out the bolt 29 and disconnecting

the crank 25 from the driver 24. The crank, being loose on the shaft 23, is turned downward by the driver 24 coming in contact with the projection or lug 27. When the crank passes below the shaft and begins to ascend, the whole weight of the tools being on it, it is drawn around to the point of its highest range with great rapidity by the fall of the tools, and stops there until the driver 24 comes around again and carries it down, thereby raising the tools.

If it is desired to raise the tools out of the well, the clutch 39 is thrown into gear with the clutch 38 by means of the lever 40. This causes the pinion 34 to be driven by the shaft 30, and in turn to drive the reel 42 by means of the gear-wheel 43. When the reel 42 is turned, it winds up the rope 52 and draws the tools out of the well. The sand-pump reel is operated to raise the sand-pump by tightening the belt 46 by means of the tightening-pulley 49, which is pressed down on the belt by the use of the lever 48. The belt 46 causes the pulley 45 to be driven by power from the pulley 47. To lower the sand-pump into the well the belt 46 is slackened. Then the weight of the pump will cause it to descend in the well. If it goes down too rapidly, its descent may be checked by tightening the belt 46 by means of the pulley 49, which is pressed tightly enough to cause the motion of the pulley 47 to retard the motion of the pulley 45, and thereby check reel 44.

In order to make my improved derrick portable, I provide it with running-gear in the following manner: The sill 12 is provided with a hole or socket, 60, for the passage of the king-bolt 61, which is attached to an axle, 62. The sill 12 is also provided with a bolster-plate, 63, there being another on the axle. The axle 62 is provided with wheels 64, and with suitable shaft or pole clips, 65. The rear axle, 66, is secured in suitable straps, 67, fastened to the under side of the uprights 9 and 10. These straps 67 are of such form that they can be dropped on the square axle, which is held in place by the weight of the derrick.

When it is desired to place the derrick on the axles for transportation, it is lowered, so that the socket 60 shall cover the bolster-pin 61. The lower end of the derrick is then raised and the axle 66 put under it in the straps 67, as shown in Figs. 7 and 8. The upright 11 may be unshipped and secured on the axles in brackets extending from the sides of the upright 9, as shown at 68 in Fig. 7. When thus placed, the derrick can be conveyed from place to place at will. It is easily put on and removed from the trucks, and requires no disconnection of the working parts in order to be taken down and moved.

It is customary to drive the casing of oil-wells down through the surface earth until the bed-rock is reached, and then to drill out the earth inclosed by the casing. This driving has heretofore been done by means of the

drilling-tools. A steel cap is placed on the upper end of the casing, and the drilling-tools, operated mainly by hand, are raised and dropped repeatedly on the steel cap until the necessary length of casing is driven. Then the cap is taken off and the casing drilled out. This work cannot be performed by the ordinary drilling apparatus alone, but involves very severe labor to the operator.

10 My improved apparatus can be operated just as well for tube-driving as for drilling, and that without imposing any additional labor upon the operator.

What I claim as my invention, and desire to 15 secure by Letters Patent, is—

1. The combination, in a derrick, of the drill-rope reel, the drill-rope passing over a sheave, and thence around a sheave on a pitman, and thence over the crown-pulley to the well, with 20 a crank connected to the said pitman and a shaft for operating the pitman, substantially as and for the purposes described.

2. The combination, in a derrick, of the drill-rope reel, the drill-rope passing over a sheave, 25 and thence back around a sheave on a pitman, and thence over the crown-pulley to the well, with a crank mounted loosely on a shaft and a driver mounted rigidly on said shaft, for the purpose of giving the crank its downward motion, substantially as and for the purposes de- 30 scribed.

3. The combination, in a derrick, of a drill-rope reel, a barrel capable of being operated by hand, mounted loosely on the power-shaft 35 and connected by gearing to the reel, a pulley attached to the barrel, and a friction-brake on

said pulley, substantially as and for the purposes described.

4. The combination, in a derrick, of a drill-rope reel, a barrel capable of being turned by 40 a hand-lever to operate the reel, and a friction-brake controlling the reel, substantially as and for the purposes described.

5. The combination, in a derrick, of a power-shaft provided with a sliding clutch, gear- 45 wheels mounted loosely on said power-shaft, and each provided with a clutch capable of union with the sliding clutch, and shafts for operating the drilling-tools, and the drill-rope reel connected by gearing with the gear-wheels 50 on the power-shaft, substantially as and for the purposes described.

6. A derrick for drilling wells, having the drilling and sand-pump machinery mounted on a frame composed of two of the uprights, 55 connected by cross-sills, said frame being sustained in a vertical position by a leaning bar pivoted to the spindle of the crown-pulleys, substantially as and for the purposes described.

7. A derrick for drilling wells, having the 60 machinery mounted on a flat frame, composed of uprights and cross-sills, in combination with removable wheeled axles, with the first of which it has a pivotal connection, substantially as and for the purposes described. 65

In testimony whereof I have hereunto set my hand this 12th day of January, A. D. 1883.

JOHN CAIN.

Witnesses:

W. B. CORWIN,
T. B. KERR.