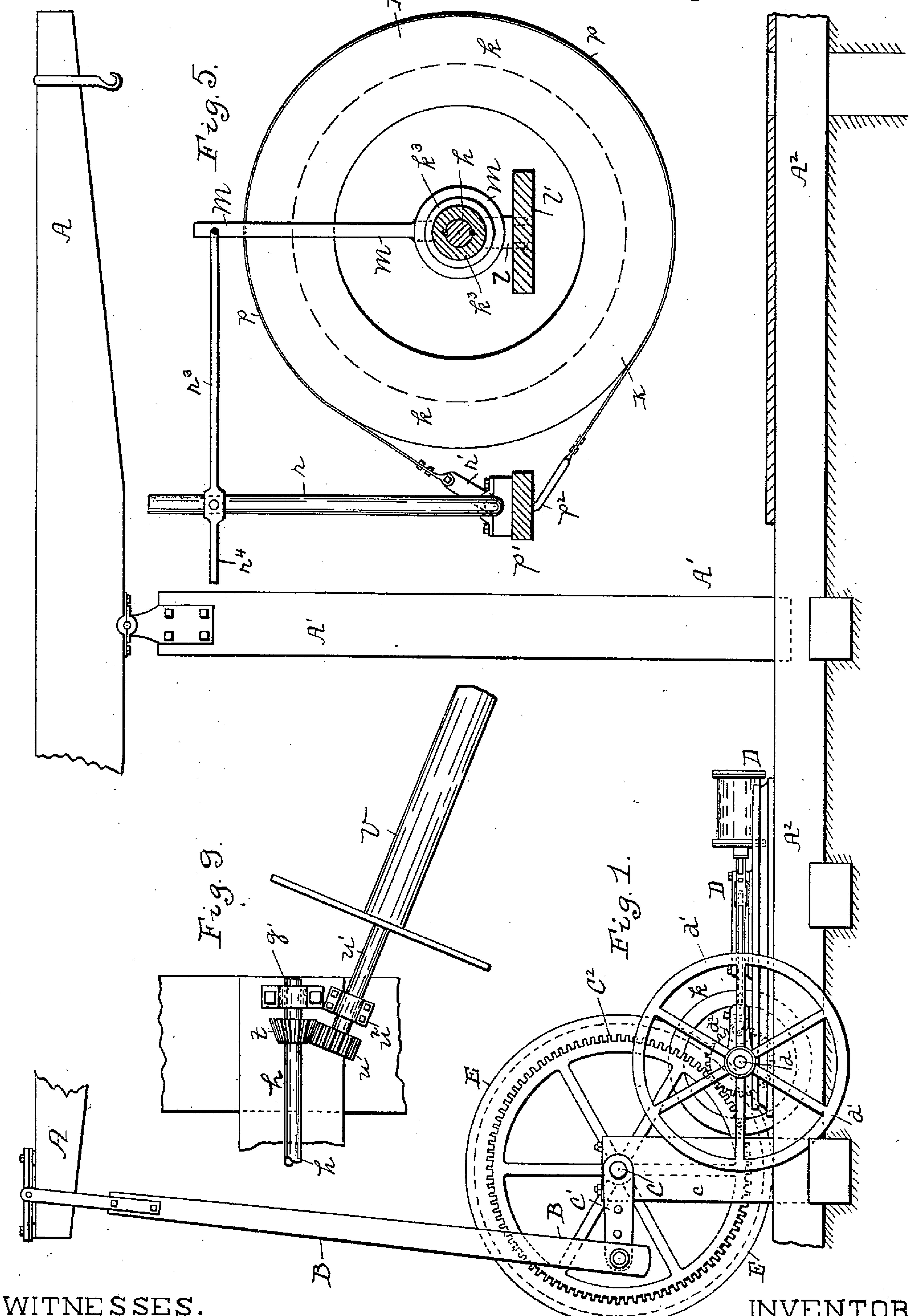
(No Model.) 3 Sheets—Sheet 1.

D. J. THAYER.

OIL WELL DRILLING APPARATUS.

No. 495,852. Patented Apr. 18, 1893.



WITNESSES.
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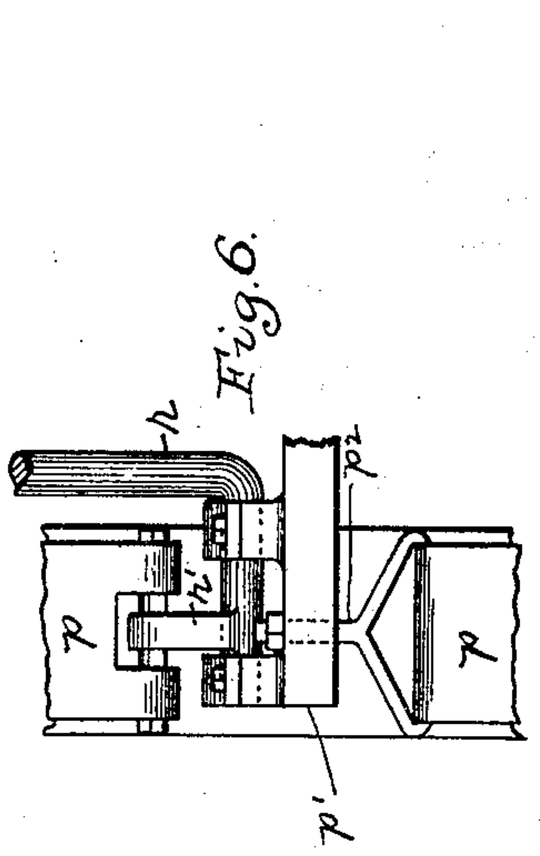

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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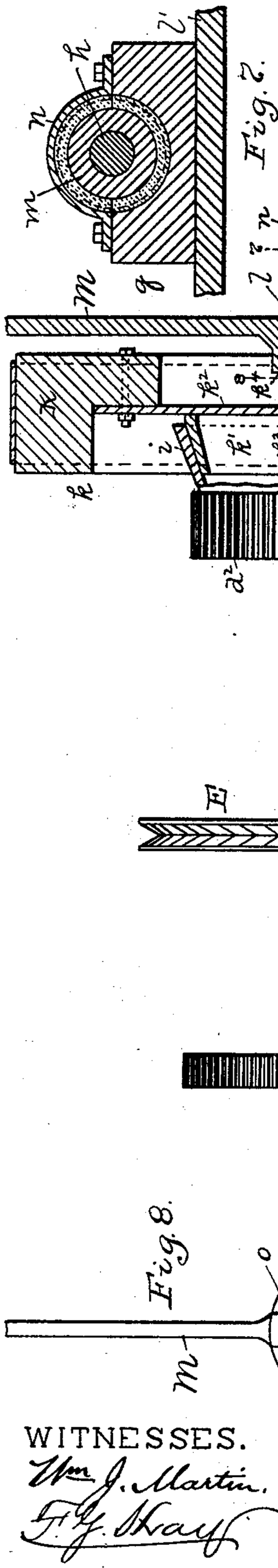

Fig. 2.

Fig. 4.

Fig. 3.

Fig. 8.

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UNITED STATES PATENT OFFICE.

DEXTER J. THAYER, OF PITTSBURG, PENNSYLVANIA.

OIL-WELL-DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 495,852, dated April 18, 1893.

Application filed September 23, 1892. Serial No. 446,680. (No model.)

To all whom it may concern:

Be it known that I, DEXTER J. THAYER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Oil-Well-Drilling Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for drilling and pumping oil, gas or Artesian wells.

The object of my invention is to provide a form of apparatus in which the engine and all the parts for operating the well may be confined within a small area, the power generated may be applied by positive mechanism to the operation of the walking beam, and the power generated in the dropping of the tools be stored so as to be utilized in raising the same, and the parts be so mounted and supported as to insure strength to sustain strains, and durability, while the construction of the apparatus is at the same time greatly simplified.

To these ends my invention comprises certain improvements in construction and combinations of parts, all of which will be fully hereinafter set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of my improved drilling apparatus. Fig. 2 is a plan view. Fig. 3 is an end view partly broken away. Fig. 4 is an enlarged sectional view of the clutch mechanism for driving the sand reel. Fig. 5 is a view of the brake mechanism for controlling the movement of the sand reel. Fig. 6 is a detail view of part of the brake mechanism for the sand reel. Fig. 7 is a cross section of the worm on the line 7—7, Fig. 4. Fig. 8 is a section on the line 8—8, Fig. 4; and Fig. 9 is a view showing another part of my invention.

Like letters indicate like parts in each of the figures.

The samson post A′ is firmly secured to the main sill or rig timber A^2, and the walking beam A is mounted centrally to swing on the samson post, while the pitman B, connected to the inner end of the walking beam, extends down to the crank shaft C, being connected to the crank C′ thereof, the pitman being connected to the end of the walking beam opposite to that from which the tools are hung, it being understood that the tools, either the temper screw and clamp and the rope carrying the drilling tools, or the pump rods, are hung from the end of the walking beam above the well opening. The crank shaft C is mounted in suitable bearings *c c′* which rest upon the main sill A^2 and the sub-sill A^3. Supported on said main sill A^2 is the engine D, the engine shaft *d* thereof being mounted in suitable bearings and having the fly wheel *d′* and the pinion d^2 thereon. The pinion d^2 meshes with the gear wheel C^2 secured to the crank shaft C, thereby driving said crank shaft and operating the walking beam. The power is thus applied directly from the engine shaft to the pinion d^2, thence through the gear wheel C^2 to the crank shaft, and from its crank C′ to the pitman B, and thence to the end of the walking beam opposite to that carrying the tools, a very simple and compact mechanism for operating the walking beam being thus obtained. It will thus be seen that the parts of the drilling apparatus which are subjected to greatest strain are all connected to the main sill A^2, the walking beam rising therefrom, the bearing for the crank shaft having its principal support thereon, while the engine rests on said main sill, and as the power is transmitted by gearing, the heavy strains in the operations of drilling or pumping are all sustained by said main sill, which is massive and strong and forms the principal rig timber, durability and strength to sustain the heavy strains incident to the drilling of deep wells being obtained. The power is thus applied from the engine to the walking beam by positive gear connections (all danger of the slipping of the connections, as in belt and pulleys, being over come), and as the weight of the tools or pumping mechanism in the descent thereof draws the walking beam down rapidly, the increased speed acts, through the gear mechanism, to increase the speed of the fly wheel, so storing the power to assist in raising the tools; while as the power is applied at the end of the walking beam opposite to that carrying the tools, the power acts with the swing or vibration of

the beam, and the combined action of the engine, fly wheel and geared connection to the beam reduces the power necessary to operate the tools, and provides positive acting mechanism for the purpose.

Mounted on the crank shaft C is the grooved pulley E adapted to be connected up to the bull-wheel (not shown) by a suitable rope-belt, said belt being thrown off said bull-wheel when it is not in operation.

Mounted in the bearings g g' in line with and adjoining the engine shaft d is the shaft h. The pinion d^2 on the engine shaft d has extending out from one face thereof the conical clutch member i which is adapted to engage with the conical clutch member k' on the wheel k, said wheel k being connected by a feather to and adapted to slide on the shaft h so that when the two clutch members i k' are brought into engagement through the mechanism hereinafter set forth, the shaft h will be rotated to operate the sand reel V. The rim or outer periphery K of the wheel k is constructed of wood and is connected with the clutch member k' by the disk k^2 which extends up from the hub k^3 by which the feather connection between the shaft h and the clutch member k' is formed. Back of the hub k^3 is a washer l which is prevented from turning by the stationary rest l' with which it has a sliding connection, as at l^2, in such way that while capable of sufficient longitudinal movement around the hub k^3, it is held from rotating by its connection with the rest l' and so prevents the turning of the worm sleeve m during the rotation of the shaft h. The worm sleeve is mounted loosely on the shaft h back of and bears against the washer, and the lever M engages with the worm sleeve, and has a lip o extending over the washer l and engaging with the annular flange k^4 on the hub, to draw back the hub when the clutch is released, so that by pressing upon the washer when the worm sleeve is advanced it can through the washer press upon the hub k^3 of the wheel and force it forward so as to cause the clutch members i k' to engage, and in turning the worm sleeve back the lever M will through the lip o separate the clutch members. The worm sleeve engages with a worm face n supported on the rest l', so that when the worm sleeve is turned it will be forced forward by means of such stationary worm face n whereby the wheel k and its clutch member k' will be forced into engagement with the clutch face i. By such construction when the operator desires to connect the shaft h with the engine shaft d, by pulling upon the lever M he forces the two clutch members into engagement and so rotates said shaft h; but on account of the non-rotating washer l between the hub k^3 and the worm sleeve m, all liability of friction between the hub k^3 and the said worm sleeve m operating to turn said sleeve and jam the operative mechanism is prevented.

The wooden rim K on the wheel k forms what may be termed a brake wheel, being a wooden wheel with a broad surface and having around the same a metal band p, one end of which is anchored to the stationary rest p', as at p^2, while the other end is connected to the hand lever r by means of the crank loop r' on said lever, which, when the lever is in a vertical position, extends inwardly toward the band wheel. By this arrangement when the lever r is forced toward the brake rim K, it will cause the strap to bind around said rim K and by its friction thereon around the surface of the wheel k control the movement of the same. As will more fully hereinafter appear, this braking mechanism is particularly applicable to the braking of the sand reel during the lowering of the sand line. In the operation the lever M and the lever r are preferably connected together, a suitable operating rod r^3 extending between these levers, and a rod r^4 extending thence to the main or derrick floor by which the apparatus can be fully controlled, and as the lever M is drawn forward so as to connect the brake wheel with the pinion d^2, by means of the clutch members i k' the withdrawal of the friction of the braking strap p from the braking rim K is insured, while at the same time when it is desired to apply the brake, such as in the lowering of the sand line, by forcing over the lever r the worm sleeve m is turned through the lever M so as to disengage the clutch members i k'. This arrangement of the mechanism necessarily throws the body of the sand reel V to one side of the derrick so that if the sand line were carried thereto from the wheel at the top of the derrick, if the reel were parallel with the engine shaft, such as if secured upon the shaft h, the rope would wind around one end of the reel only, unless some guide were employed to distribute the line over the reel. I therefore preferably mount the reel, as shown, at an angle to the shaft h so that the reel is at about a right angle to a line extending from its center to the well opening, so that when in operation the sand line will distribute itself evenly over the entire length of the reel and the bunching or crowding of the line at one end of the reel be avoided without the attention of the operator. To this end the shaft h is provided with the pinion t adapted to mesh with the pinion u on the sand reel shaft u'. The sand reel shaft u' is journaled at one end in bearings u^2 adjacent to the bearings g' in which one end of the shaft h is journaled, while the opposite end of said sand reel shaft is journaled in bearings u^3 in the standard u^4, said standard being arranged at a point sufficiently nearer to the well opening than the bearings u^2 to give said shaft the proper angle for the even distribution of the sand line over the sand reel V, as above described.

In the operation of well drilling with the apparatus above described, power is transmitted from the engine to its shaft d and thence through the pinion d^2 and the gear

wheel C^2 to the crank shaft C. In this manner a positive and more powerful movement of the walking beam is obtained, and the power is stored and utilized, and the strain of the drilling or pumping action sustained by the main sill carrying the operative parts, as above described. When it is desired to operate the sand reel, the operator simply throws the clutch members *i k'* into engagement in the manner above described, in which case the sand reel is driven through the engine shaft *d*, the clutch mechanism described, the shaft *h* and the pinion *t* meshing with the pinion *u* on the sand reel shaft. In this manner the sand line is reeled up evenly along the entire length of said reel, as above described; and when it is raised the levers M *r* are thrown in the proper direction to free the clutch members *i k'* and cause the braking strap *p* to bind upon the brake wheel *k*, and control the movement of the pump until it is dropped and emptied, when the pump is again dropped into the well and by drawing the lever *r* back slightly is permitted to descend into the well. The movement of the sand line and pump is controlled according to the braking pressure applied to the brake wheel. In this manner the sand pump can be lowered quickly until it strikes the bottom and is again filled with sand, while at the same time a quick and efficient means of connecting the sand reel to the operating mechanism, to raise the same, is provided.

By the employment of the shaft *h* in direct line with the engine shaft *d* and clutch mechanism for transmitting power from said engine shaft directly to said shaft *h* the apparatus for drilling wells is greatly simplified and compacted as only a gear wheel and a pinion are employed to operate the crank shaft and the shaft *h* which operates the sand reel. While I have described the shaft *h* as mounted in line with the engine shaft, it is evident that the power driven clutch member may be mounted in any suitable way to apply the power to the shaft through the mechanism described.

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

1. In oil well drilling or pumping apparatus, the combination of the main sill or rig timber A^2, the samson post A' secured thereto, the walking beam A mounted on the samson post and carrying the tools at one end, the crank shaft C mounted in bearings supported on the main sill A^2, and sub-sill A^3, the pitman B connecting the crank shaft to the opposite end of the walking beam, the engine D secured to the main sill, and gearing connections between the engine shaft and crank shaft, substantially as and for the purposes set forth.

2. In well drilling or pumping apparatus, the combination of a sand reel, a power driven clutch member, a shaft operating said sand reel, a braking wheel having a clutch member and adapted to slide to and fro on said shaft, lever mechanism for throwing said clutch members into engagement, and braking mechanism applied to said braking wheel to control the movement of said sand reel, substantially as and for the purposes set forth.

3. In well drilling or pumping apparatus, the combination of an engine having an engine shaft provided with a fly wheel and pinion and driving a continuously running friction clutch member, a crank shaft having a gear wheel meshing with said pinion, a walking beam carrying the tools at one end, a pitman connecting the opposite end of the walking beam to the crank shaft, sand reel apparatus having a friction clutch member engaging with said power-driven clutch member, a braking wheel positively connected to the sand reel apparatus, and a brake applied thereto, substantially as and for the purposes set forth.

4. In well drilling or pumping apparatus, the combination of a power driven clutch member, a shaft in line with said clutch member, a braking wheel having a clutch member and sliding on said shaft, lever mechanism for throwing said members into engagement, a sand reel secured to a suitable shaft and arranged at an angle to said first mentioned shaft and gearing mechanism between said shaft and sand reel shaft, substantially as and for the purposes set forth.

5. In well drilling or pumping apparatus, the combination of the sand reel V, the shaft *h* operating the sand reel, the power-driven clutch member *i*, the clutch member *k'* having a sliding connection with said shaft *h*, the worm sleeve *m*, and worm face *n* for forcing said clutch members into engagement, substantially as and for the purposes set forth.

6. In well drilling or pumping apparatus, the combination of the sand reel V, the shaft *h* operating the sand reel, the power driven clutch member *i*, the clutch member *k'* having a sliding connection with the said shaft *h*, the worm sleeve *m* and worm face *n* for forcing said clutch members into engagement, and the sliding non-rotating washer *l* around the hub k^3 between the worm sleeve and said hub, substantially as and for the purposes set forth.

7. In well drilling or pumping apparatus, the combination of the power shaft *d* carrying the pinion d^2 and clutch member *i*, separate shaft *h* in line therewith and operating the sand reel, wheel *k* having a sliding connection with the shaft *h*, and carrying the clutch member *k'*, and lever mechanism to force the clutch members into engagement, substantially as and for the purposes set forth.

8. In well drilling or pumping apparatus, the combination of the sand reel V, shaft *h* operating the sand reel, power driven clutch member *i*, the braking wheel *k* on said shaft *h* having a clutch face *k'*, and the metallic strap *p* anchored to the stationary rest *p'* ex-

tending around the braking wheel and connected to the lever r, substantially as and for the purposes set forth.

9. In well drilling or pumping apparatus, the combination of the sand reel V, shaft h operating the sand reel, power driven clutch member i, a braking wheel k sliding on said shaft h and having a clutch member k', and the metallic strap p anchored to the stationary rest p' extending around the braking wheel and connected to the lever r, the worm face n and the worm sleeve m having the lever M, said levers M and r being connected with each other, substantially as and for the purposes set forth.

In testimony whereof I, the said DEXTER J. THAYER, have hereunto set my hand.

DEXTER J. THAYER.

Witnesses:
J. N. COOKE,
ROBT. D. TOTTEN.