(No Model.) 4 Sheets—Sheet 1.

G. CORBETT.

RIG FOR DRILLING AND PUMPING WELLS.

No. 396,544. Patented Jan. 22, 1889.

FIG. I.

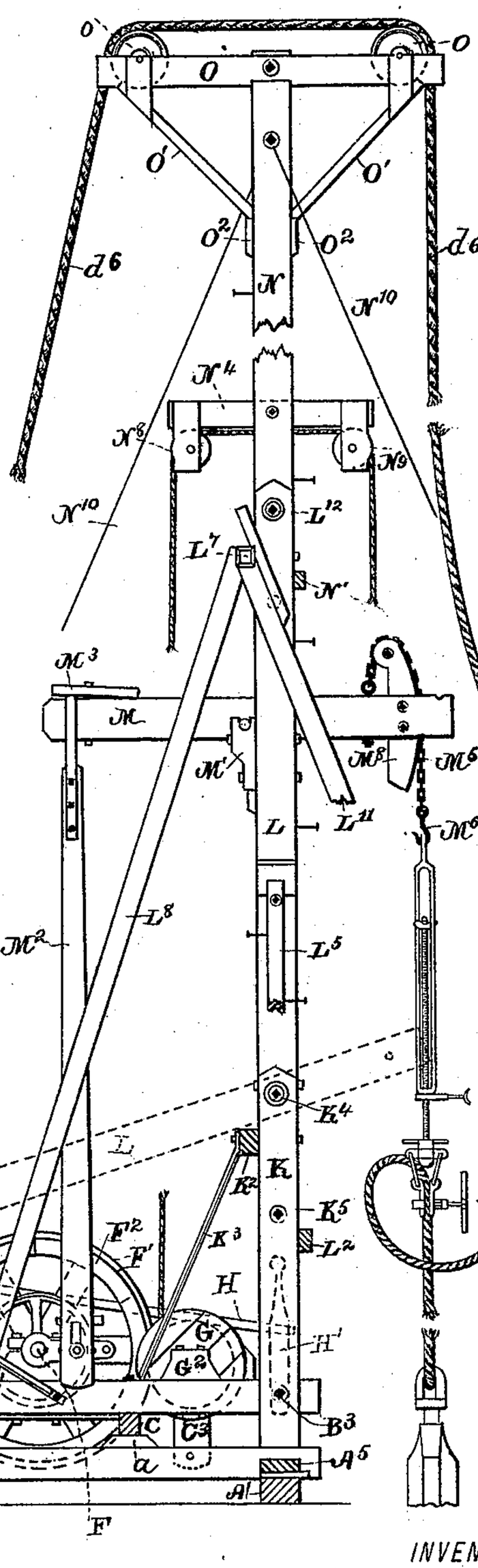

FIG. II.

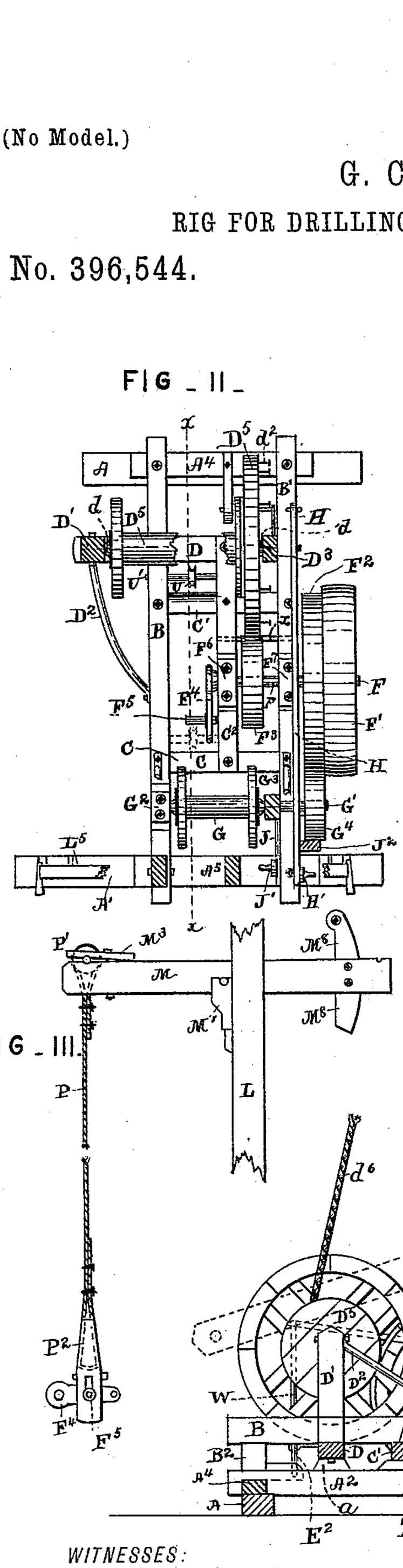

FIG. III.

WITNESSES:

Emma Arthur.

[illegible]

INVENTOR.

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BY Knight Bros.

ATTORNEYS.

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G. CORBETT.

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FIG. IV.

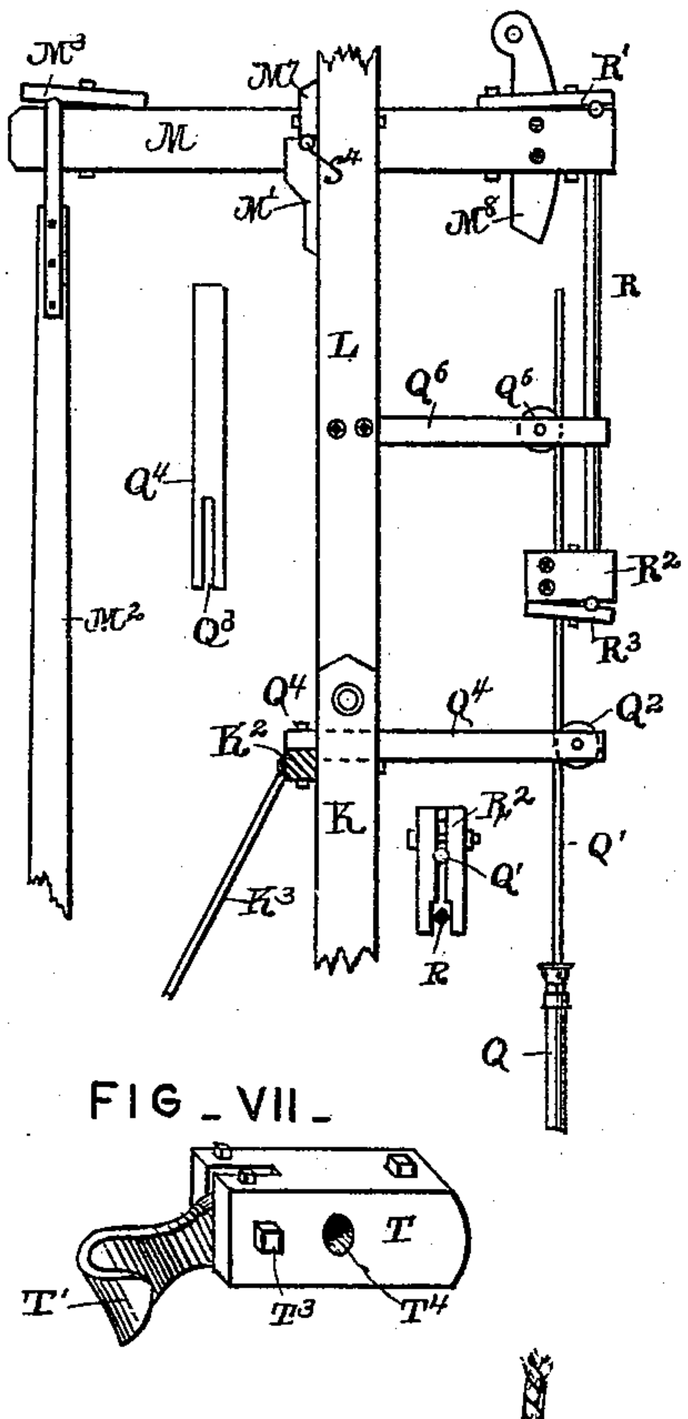


FIG. V.

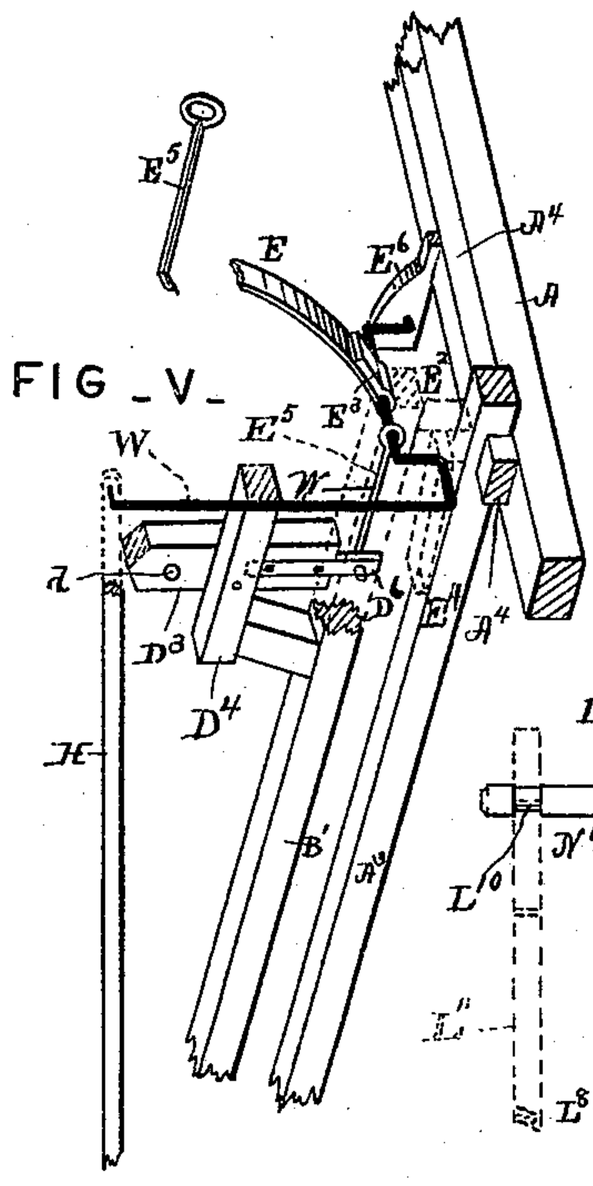


FIG. VI.

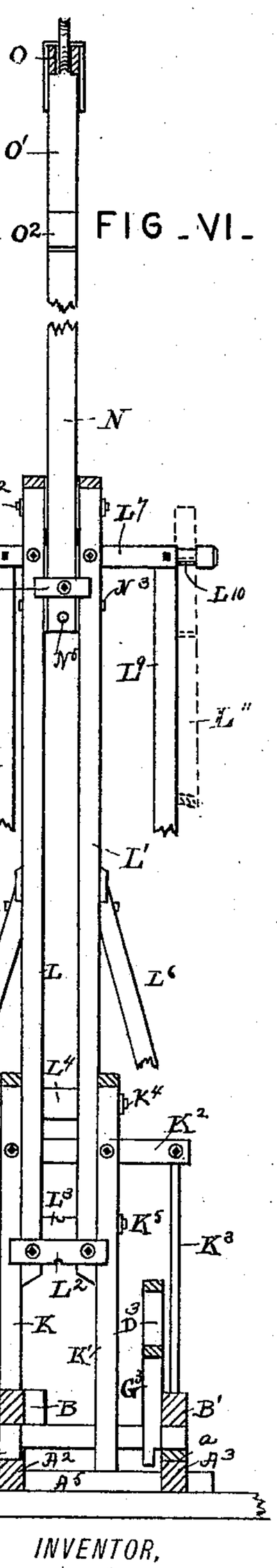
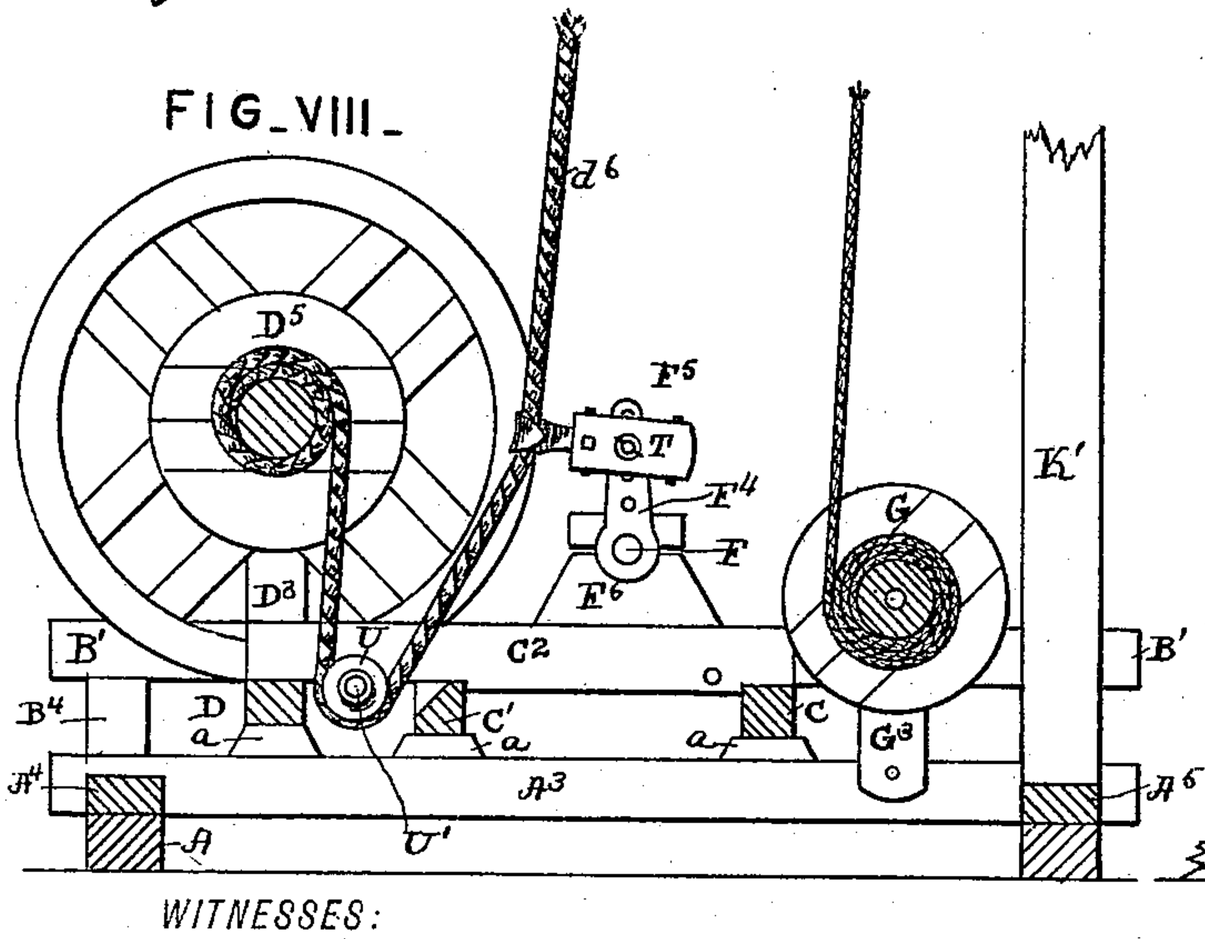


FIG. VII.

FIG. VIII.



WITNESSES:

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G. CORBETT.

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No. 396,544. Patented Jan. 22, 1889.

FIG. IX.

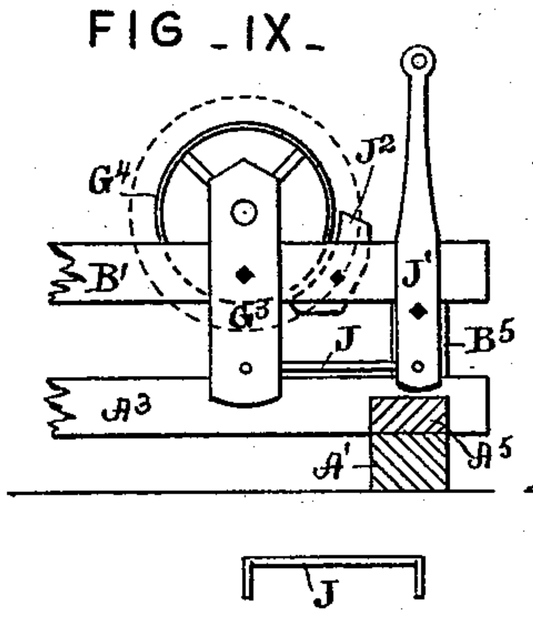


FIG. X.

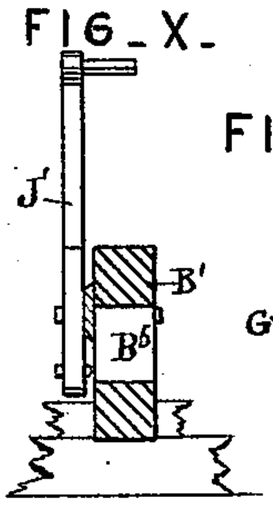


FIG. XI.

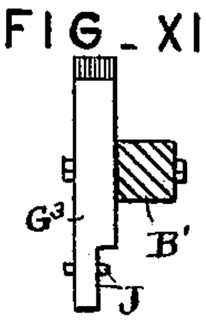


FIG. XII.

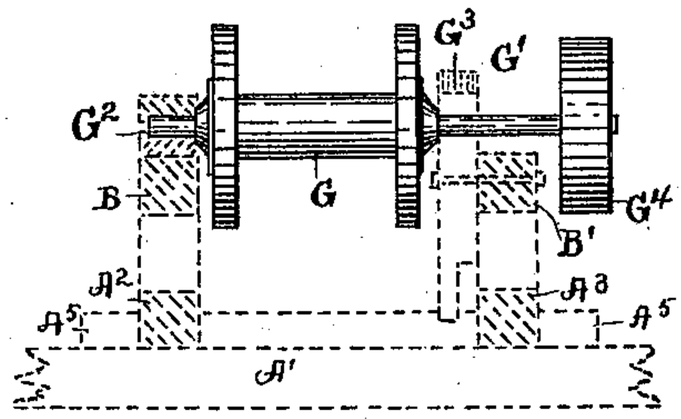


FIG. XIII.

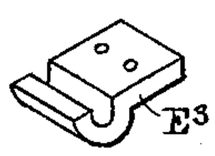


FIG. XIV.

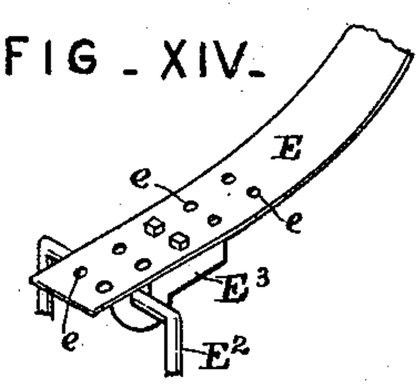


FIG. XV.

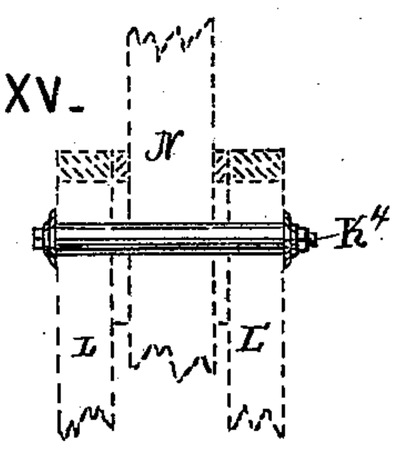


FIG. XVI.

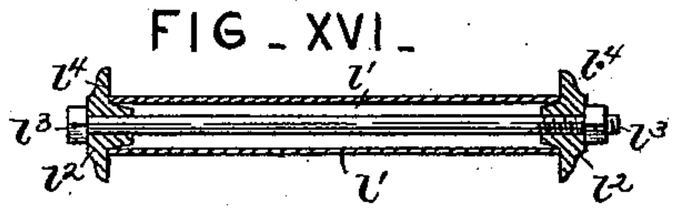


FIG. XVII.

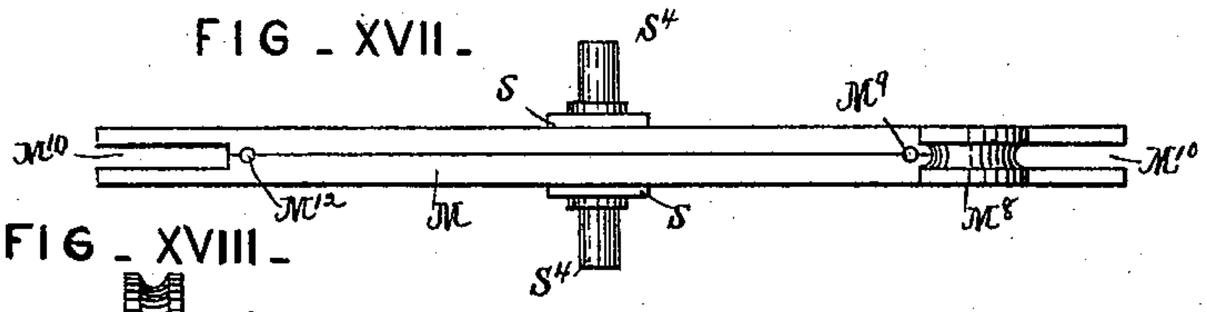


FIG. XVIII.

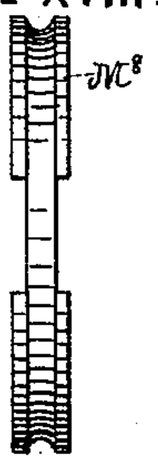


FIG. XIX.

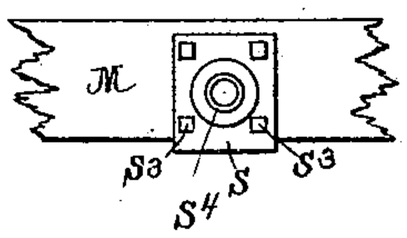


FIG. XX.

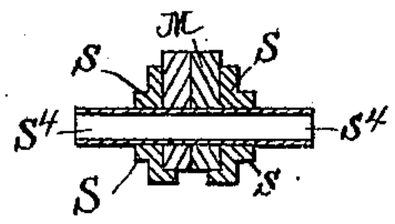
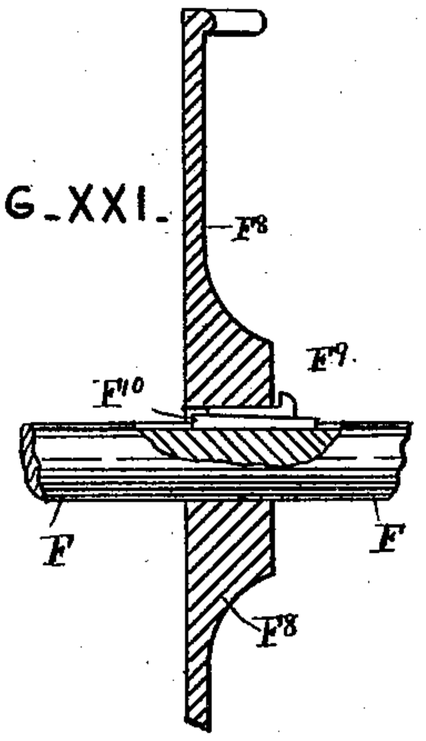


FIG. XXI.



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G. CORBETT.

RIG FOR DRILLING AND PUMPING WELLS.

No. 396,544. Patented Jan. 22, 1889.

FIG - XXII -

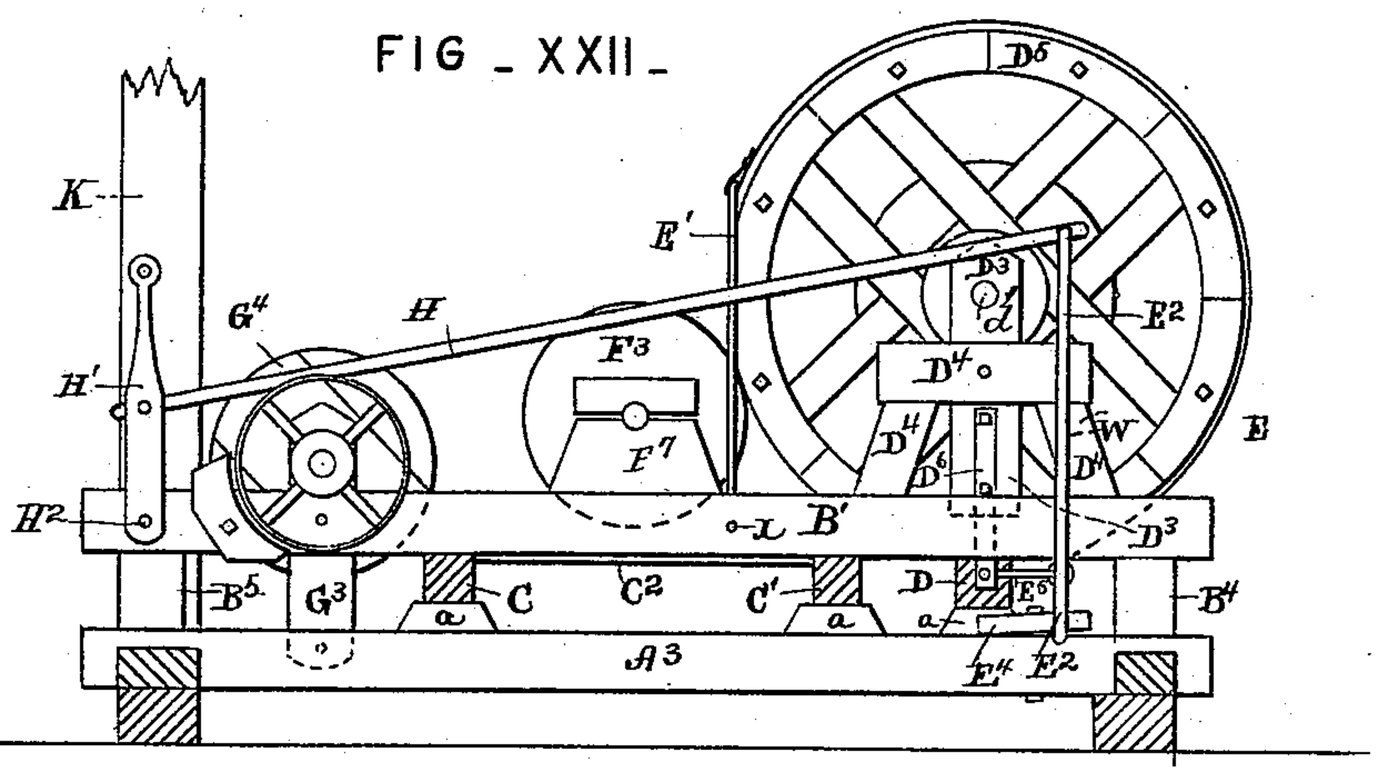

FIG - XXII a

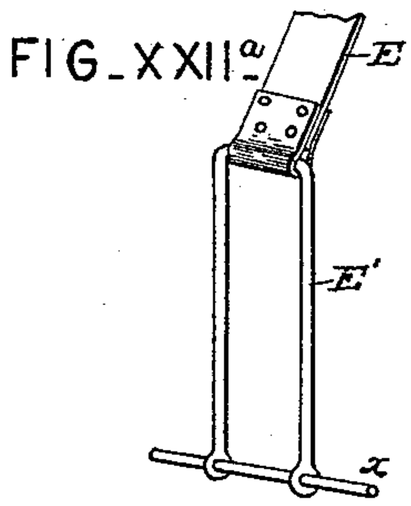

FIG - XXIII -

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L. Hopkins

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George Corbett,

BY Dwight Bros

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UNITED STATES PATENT OFFICE.

GEORGE CORBETT, OF BRADFORD, PENNSYLVANIA.

RIG FOR DRILLING AND PUMPING WELLS.

SPECIFICATION forming part of Letters Patent No. 396,544, dated January 22, 1889.

Application filed June 27, 1887. Serial No. 242,613. (No model.)

To all whom it may concern:

Be it known that I, GEORGE CORBETT, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Rigs for Drilling and Pumping Wells, of which the following is a specification.

My invention will first be described with reference to the accompanying drawings, and then more specifically pointed out in the claims.

In the said drawings, Figure I is a side elevation of my rig. Fig. II is a top view of the same. Fig. III is a view showing one form of pitman to be used. Fig. IV is a view showing the manner of operating the pump. Fig. V is a perspective view of the braking mechanism. Fig. VI is a front elevation of the derrick. Fig. VII is an enlarged detail view of my spudding-hook. Fig. VIII is a longitudinal sectional view, taken on the line *x x*, Fig. II, of the crank side of the rig with portions omitted, showing the spudding-hook in operative position. Fig. IX is a side elevation partly in section of the sand-reel-operating mechanism. Fig. X is an end view of the sand-reel-operating lever. Fig. XI is a detail view. Fig. XII is an end elevation of the sand-reel and its friction-wheel, showing portions of the derrick in dotted lines. Figs. XIII and XIV are enlarged detail views of the brake-strap. Fig. XV is an enlarged view showing the manner of pivoting the mast to the samson-posts. Fig. XVI is an enlarged longitudinal sectional view of said pivot. Fig. XVII is a top view of the walking-beam. Fig. XVIII is an end view of the segment on said beam. Figs. XIX and XX are respectively a side elevation and cross-sectional view showing manner of mounting said walking-beam. Fig. XXI is an enlarged view showing my improved method of keying the band-wheel to its shaft. Fig. XXII is an elevation of the band-wheel side of the rig, showing the brake-lever and its connections, the band-wheel being removed. Fig. XXII[a] is a detail perspective view showing the stirrup hereinafter referred to. Fig. XXIII is a longitudinal section of the rig, showing the method of raising the derrick, unnecessary details being omitted.

A and A′ are mud-sills on which the main sills A^2 A^3 rest, and are held in place by notches in the cross-sills A^4 A^5.

B B′ are plates located directly above and parallel with sills A^2 A^3, the plate B being supported at one end by the post or block B^2, and it is secured at the other by bolt B^3 to the fixed post K, while B′ is supported at each end by a post or block, B^4 and B^5. These plates B B′ are strengthened underneath by the cross-ties C C′, which are mounted upon blocks *a*, and which, together with the bull-wheel sill D, serve to support the crank-sill C^2.

The various parts above named constitute the bed-frame of the rig.

On the sill D is planted the bull-wheel post D′, which is rigidly held by the brace D^2, bolted to the plate B.

D^4 is a truss planted on the plate B′, (see Figs. V and XXII,) to which is pivoted a hanging lever, D^3, in whose upper end and the upper end of post D′ are journaled, at *d*, the bull-wheel gudgeons. At the lower end and on the outside of this lever D^3 is bolted a bar or plate, D^6, the lever proper being shorter than the radius of the friction-wheel D^5 on the bull-wheel, in order to allow the handles d^2 on said wheel to pass. This bar D^6 extends downward and is connected by a link, E^5, to the crank-bar E^2, which is journaled at one end in the block E^6, supported on cross-sill A^4, and at the other end between the cap E^4 and sill A^3, and carries at this end an upwardly-projecting arm, W, at whose upper end is pivoted a draw-bar, H, which extends to the other end of the rig, and is pivoted to the vertical hand-lever H′, the latter being pivoted to the plate B′.

E is the brake-band, which nearly encompasses the wheel D^5, and is provided at one end with a series of holes, *e*, by means of which and the clamp E^3, having a transverse groove or channel, (see Figs. XIII and XIV,) the said brake E is secured to the crank-bar E^2 at one end, while at the other end it is secured to the plate B′ and the sill C^2 by means of a stirrup, E′, which straddles the friction-wheels D^5 and F^3 and a bolt, *x*, the series of

holes *e* being for convenience in adjusting the length of the band E.

Mounted on the sill C^2 and the plate B′ are pillow-blocks F^6 and F^7, respectively, in which is journaled the driving-shaft F, on whose outer end is keyed the band-wheel F′, and on the inner end is a crank, F^4. This shaft also carries two friction-wheels, F^2 F^3, for bearing against a wheel on the sand-reel and against the bull-wheel friction-wheel, respectively. The sand-reel G is mounted on a shaft, G′, which latter is journaled at one end in a block, G^2, and at the other in the upper end of a hanging lever, G^3, similar to the one in which the bull-wheel is journaled, which is connected at its lower end by means of rod J to the vertical lever J′, which is pivoted to the plate B′, but on the opposite side thereof to that on which the lever H′ is pivoted.

Now, it will be seen that when the lever H′ is moved in one direction the lower end of the lever D^3 will be drawn toward the brake-band, and at the same time the brake-band will be moved away from the bull-wheel friction-wheel, while the latter will be forced into contact with the friction-wheel F^3, and thus the bull-wheel will be revolved and wind up the drilling-rope. When the tools have been thus sufficiently elevated from the well, the lever H′ is moved in the opposite direction, whereupon the bull-wheel friction-wheel disengages with the friction-wheel F^3, and the brake-band and the bull-wheel friction-wheel are moved toward one another and in contact, thus checking the operation of the latter. The sand-reel being operated and governed on the same principle, of course it will be seen that when its hand-lever J′ is moved in the one direction the rod J will cause the hanging lever G^3 to move in the same direction and through the friction-wheel G^4 on shaft G′ against the large revolving friction-wheel F^2, and thus cause the sand-reel to revolve rapidly. When it is desired to stop the revolution of the sand-reel, the lever J′ is moved in the opposite direction, which will cause the wheel G^4 to disengage with wheel F^2 and come in contact with a block-brake, J^2, secured to plate B′.

K K′, Figs. I and VI, are the fixed posts of the derrick, the post K being seated on and tenoned in the main sill A^2, while K′ is seated on and tenoned in the cross-sill A^5, each being securely bolted to the cross-bar K^2, which latter is rigidly braced by the braces K^3, secured to the plates B B′. It will be seen that the mast is really made in two sections pivoted together, though I have here termed the single piece N the "mast," and the pieces L L′ the "samson-posts." The object in having the vertical part of the derrick in sections pivoted together is for convenience in transportation.

As will be observed, the parts may be readily folded down upon one another, and thus the rig will be in a comparatively compact state. Between the upper ends of the posts K K′, I pivot the samson-posts L L′ by means of the pivots K^4, hereinafter described, and which posts L L′ are secured and held fast at their lower ends by the bolt K^5.

L^3 L^4 are blocks placed between the samson-posts for the purpose of giving the latter rigidity and keeping them at the proper distance asunder.

L^2 is a cross-bar bolted to the lower ends of the samson-posts and projecting at each end far enough to come in contact with the fixed posts K K′, the purpose of which is to prevent the samson-posts from passing the perpendicular when being erected. The braces L^5 and L^6 are fastened to the samson-posts at the proper height, and are keyed to the mud-sills at their lower ends. Near the top of the samson-posts is bolted the cross brace-bar L^7, to which are secured the braces L^8 L^9, which latter are secured to the plates B B′, respectively.

Near the outer ends of the brace-bar L^7 are grooves L^{10} L^{10}, in which fit complementary notches in the upper ends of long props or braces L^{11}, whose lower ends may be planted in the earth at a considerable distance from the rig, and thus insure rigidity to the derrick. Between the upper ends of the samson-posts L L′ is pivoted at L^{12} the mast N, on whose lower end is secured a block, N′, for a purpose similar to that of the cross-bar L^2, the mast being held rigid by a bolt, N^3, which passes through the samson-posts and its lower end.

On one side of the mast is secured the sand-pulleys frame N^4, which consists of a bar provided with housings at each end for the pulleys N^8 N^9 to work in.

It will be observed that the pulley N^9 is held away from the mast and as nearly as possible directly over the drilling-hole without interfering with the raising and lowering of the tools, and the other pulley, N^8, is very nearly directly over the center of the sand-reel shaft. This enables the rope to coil evenly on the reel, and by the described location of pulley N^9 the sand-pump may be raised and lowered almost perpendicularly from the well.

On the top of the mast is tenoned the frame O, in which are mounted the crown-pulleys *o*. This frame is supported at each end by props O′, whose lower ends rest on blocks O^2.

The mast N is guyed by wires or rods N^{10}, which are secured to stakes in the ground or to any other suitable anchor.

In Figs. I, III, IV, XVII, XVIII, and XIX I have shown the walking or "working" beam adapted to its various uses. This beam is indicated by the letter M, and it is pivoted between the samson-posts on blocks M′. At one end of this beam is attached the pitman, by means of which motion is imparted to the former, and at its other end will be seen the temper-screw chain M^5, which is bolted to the beam and passes over a segment, M^8, and down through the bifurcation M^{10} of the beam, and

carries the temper-screw hook M^6 at its free extremity. The advantages afforded by using this segment are well known, and therefore will not be described here. This walking-beam is adapted for both drilling and pumping, though I prefer to employ a separate pitman which is specially adapted to the particular class of work to be done. For instance, in deep drilling and after the surface-water is cased off I employ the style of pitman shown in Fig. III, which is a wire rope secured at one end to a block, P^2, which has a slot for the reception of the wrist-pin F^5 on crank F^4, and at the other end it is passed around a pulley, P′, whose spindles are journaled between the cap M^3 and the top of the beam M, the latter having at this end also a bifurcation down through which the said pitman passes. In Figs. I and IV is shown the style of pitman preferred in shallow drilling and pumping. This pitman is specially adapted for pumping, although it can be used for drilling shallow wells. In this instance the pitman is perfectly rigid. The manner of mounting this beam is fully shown in Figs. XVII, XIX, and XX. The plates S, having flanges on their lower edges, are bolted to the beam on opposite sides, and thus form a saddle in which the latter sits. The pivot S^4 passes through these and the beam, and is secured against rotation in the posts by a set-screw, pin, or any suitable device. The beam is preferably formed of two plates, as shown, the perforations M^9 M^{12} being for the temper-screw chain-bolt and the bolt which secures the cap M^3 on, respectively. It is preferred to use a flexible pitman in deep drilling, for the reason that with a rigid pitman when the crank is on the lower center the tools are raised from the bottom of the well to their highest point. After passing the lower center, the tools gravitate with increasing velocity until the upper center is reached, when they are suddenly arrested by the pitman on its downward stroke. The sudden reverse motion causes a jar, which is imparted by the rigid pitman to the rig, and a further disadvantage of the rigid pitman in deep drilling is that the pitman pushes the beam upward possibly faster than the tools descend, and thus causes the rope to slack, whereas the flexible pitman merely pulls down on the beam and allows it to be raised by the weight of the cable and tools only, and then, too, the flexible pitman takes up the major part of the jar by reason of its slight elasticity.

When the pump is to be used, I employ the mechanism shown in Fig. IV. In this case it is necessary to place a block, M′, above the block M′, to prevent the beam rising out of its bearings on the downward stroke of the sucker-rod.

Q^4 and Q^6 are brackets secured between the samson-posts LL′, and having bifurcated ends, in which are mounted grooved rollers Q^2 Q^5.

R is an "adjuster" rod which has a T-head at each end, the upper one being journaled between the cap R′ and the top of the beam M, and the lower one being journaled to an adjuster-clamp, R^2, by means of the cap R^3, the said clamp R^2 being formed of two pieces whose inner faces are cut away at one end, so as to provide a bifurcation through which the rod R passes.

Q is the top of the well-tubing, in which is the sucker-rod Q′, and to which latter is clamped the adjuster R^2. The rod Q′ passes up through the bifurcations of the brackets Q^4 Q^6, and is held perpendicularly while being operated by the rollers Q^2 Q^5, which bear on opposite sides of it. The object of the adjuster R and R^2 is for convenience in connecting the walking-beam with any length of sucker-rod.

In Figs. VII and VIII is shown the spudding-block which I employ. This consists of the block T, having a bifurcated end, in which is pivoted the flat hook T′, and has a perforation, T^4, in which the wrist-pin F^5 on the crank F^4 is inserted, as shown. The drilling-rope d^6 is passed through the hook T′ and under the pulley U, which is mounted on shaft U′, journaled in sill C^2 and plate B. The bull-wheel is secured by the brake and the crank-shaft set in motion, which will produce the necessary twitching to the rope. When the hole is deep enough to allow the tools to be lowered to a sufficient depth, the temper-screw may be clamped on the drilling-rope above them, the spudding dispensed with, and the drilling continued by the use of the pitman and walking-beam.

When the derrick is to be raised or lowered, Fig. XXIII, the pulley U is moved forward and a rope fastened around the cross-bar L^2 between the lower ends of the samson-posts L L′, passing under the pulley U and around the bull-wheel. Thus it will be seen that by winding the rope upon the bull-wheel the samson-posts will be erected and may be secured in place by the means before described. The rope is then removed from the bar L^2 and passed through and secured in the hole N^5 in the lower end of the mast N, and by a similar operation the mast is erected and secured to its place.

In Figs. XV and XVI, I have shown the form of pivot used in pivoting the samson-posts between the posts K K′ and in pivoting the mast between the samson-posts. This pivot consists of the cylinder l', at each end of which is a perforated cap, l^2, which fits into the end of the cylinder for the purpose of affording a bearing-surface for the latter. These caps have flanges l^4, which abut against the outside pieces of the pivoted members, and thus the whole may be securely held together by the bolt l^3.

Fig. XXI shows the method of keying the band-wheel F′ to its shaft. It is essential that this wheel should be secured to the shaft in a manner that will enable its ready removal when desired, because its removal greatly facilitates in transporting the rig

about the field. To accomplish this I use two wedge-shaped keys, F^9 F^{10}, so formed that their contiguous edges or faces will act as cams upon each other, and at the same time their outer or diametric edges or faces will always remain parallel while the keys are together.

The key F^{10} is placed in its seat in the shaft, and F^9 is placed upon it and driven in, thus securing the wheel. When it is desired to remove the wheel, it is only necessary to jam the bottom key in a little, and thus loosen the wheel, no matter how rusty the keys may be.

I am aware that in devices of this character the bull-wheel has before been mounted in a pivoted lever which is provided with means for oscillating it so as to bring a friction-wheel on the bull-wheel in contact with a friction-wheel on the driving-shaft, and to bring said bull-wheel friction-wheel in contact with a brake when moved away from the driving-shaft; but this is not the equivalent of my invention, nor do I wish to broadly claim the same.

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

1. In a rig for drilling and pumping wells, the derrick consisting of a bed-frame, samson-posts rigid thereon, and a mast in two sections pivoted together and one pivoted to the samson-posts, substantially as set forth.

2. The combination, with the driving-shaft, of a friction-wheel thereon, a bull-wheel, a friction-wheel thereon, a pivoted lever in which the bull-wheel at one end is mounted, means for oscillating said lever for disengaging said friction-wheels, and a strap-brake immovably secured at one end and connected at the other to the lower end of said pivoted lever and partially surrounding said bull-wheel friction-wheel, substantially as set forth.

3. In combination with the driving-shaft and friction-wheel thereon, the bull-wheel mounted in a pivoted lever at one end, a friction-wheel on said bull-wheel, a strap-brake partially surrounding the friction-wheel of the bull-wheel, a lever with which both the pivoted supporting-lever and the strap-brake are connected, and means for operating said lever, substantially as set forth.

4. The combination, with the bull-wheel having a friction-wheel, of a pivoted lever in which the bull-wheel is mounted, a strap-brake partially surrounding said friction-wheel, and a crank-shaft having connection with said lever and with one end of said brake and having means of operation whereby the wheel and the brake are moved in opposite directions.

5. In a rig, the combination, with the bull-wheel having a friction-wheel thereon and a pivoted lever in which it is mounted, of an extension, D^6, at one end of said lever, a crank-shaft journaled in the bed-frame and connected with said extension D^6, a strap-brake partially surrounding said friction-wheel and immovably secured at one end and connected at the other to the crank of said shaft, and means for operating said crank-shaft, substantially as set forth.

6. The combination, with the friction-wheel and the strap-brake E, having a series of holes, *e*, embracing said wheel, of a shaft having a crank in its length, and the clamp E^3, adapted to be secured to said strap-brake in any of the holes *e*, and having a groove for the passage of said crank between the clamp and the strap-brake, as set forth.

7. The combination, with the derrick and driving-shaft having a crank, of a walking-beam having bifurcated ends with a segment, M^8, mounted in one end, a chain secured to said beam and passing over said segment and through the bifurcation, and a pitman pivoted to said crank and secured to the walking-beam by means of the cap M^3, as set forth.

8. In combination with the driving-shaft having a friction-wheel, a bull-wheel having a friction-wheel and a strap-brake partially surrounding the latter friction-wheel, and a stirrup fixed to one end of said strap-brake, straddling one of the friction-wheels, and pivotally connected to the bed-frame, substantially as set forth.

9. In a well-drilling rig, the combination, with the derrick and the necessary ropes, of a walking-beam and a saddle for pivotally supporting said beam the saddle consisting of a pair of plates placed upon opposite sides of the beam, having flanges engaging beneath the beam, and trunnions or pivots supported by the derrick, substantially as set forth.

10. In combination with the derrick, a bull-wheel, and a spudding-rope fixed to the bull-wheel and running over pulleys on the derrick, a crank-shaft, a block pivoted on the wrist-pin of the crank, and a flat hook pivoted to said block and engaging with the spudding-rope, substantially as set forth.

11. In a well-drilling rig, the combination, with the derrick, a bull-wheel, and a single continuous spudding-rope fixed to the bull-wheel, so as to be capable of winding thereon, passing over suitable guiding devices, and having the drilling-tool attached thereto, of a crank-shaft and a hook pivotally connected to the wrist-pin of the crank and having the spudding-rope passing through it, the arrangement being such that the rope may be paid out or unwound without disengaging the same from said hook, substantially as set forth.

12. The combination, with the mud-sills A A′, the longitudinal sills A^2 A^3, having blocks *a* and held together by notched sills A^4 A^5, the plates B B′, having supports B^2, B^3, B^4, and B^5, cross-ties C C′, and sill D, resting on blocks *a* and supporting the crank-sill C^2 and plates B B′, of a bull-wheel post, D^3, planted on sill D and braced by bar D^2, and the fixed posts K K′, tenoned in sills A^2 and A^5 and having cross-bar K^2, to which and to the plates B B′ braces K^3 are secured.

13. The combination, with a shaft having a key-seat and a wheel mounted on said shaft

and having a key-seat, of a key for fitting in said seats, consisting of two wedge-shaped pieces whose outer or remote edges are parallel when the pieces are placed together, substantially as set forth.

14. The combination, with a mast or derrick formed in sections and pivoted together, of a transverse block secured to the pivoted section and adapted to strike against the other sections of said mast, whereby it is prevented from passing the perpendicular when being erected.

15. The combination, with the beam M, the derrick, and the sucker-rod, of the brackets Q^4 Q^6, having slots and rollers mounted in said slots at unequal distances from the derrick for guiding the sucker-rod in a vertical plane, as set forth.

16. The combination, with the beam M, mounted in blocks M′, the derrick, and the sucker-rod connected to said beam, of the block M^7, located above the blocks M′, substantially as and for the purposes set forth.

17. The combination, with the post D′ and the truss D^4, of the lever D^3, pivoted to the truss D^4, and bull-wheel journaled at its respective ends in said lever and post, of a friction-drum on one and a flexible brake on the other side of said bull-wheel, the said brake being connected with the end of said lever, whereby when said lever is operated in one direction it will push the brake away from the bull-wheel and force the latter in contact with the friction-drum, and when operated in the other direction will cause the bull-wheel and brake to move toward each other, substantially as set forth.

18. In a rig, the combination, with the mast or derrick and the pumps having a sucker-rod, of brackets secured to said mast and pulleys journaled to said brackets and bearing upon opposite sides of said sucker-rod, as set forth.

19. In a rig, the combination, with the mast and the beam M, having a bifurcated end mounted thereon, and a pump having a sucker-rod, of a clamp secured to said sucker-rod and having a bifurcation, and the rod R, passing through the bifurcation of said beam and clamps and having the T-head at each end, substantially as and for the purposes set forth.

20. In a rig, the combination, with the mast and a pump having a sucker-rod, of the brackets Q^4 Q^6, secured to said mast, having bifurcated ends through which said sucker-rod passes, and grooved pulleys journaled in said brackets upon opposite sides of the said rod, as set forth.

21. In a rig, the combination, with the mast, a walking-beam journaled thereon, and a pump having a sucker-rod, of guides for restricting said rod to a vertical movement and a clamp adjustably secured to said rod and pivotally connected to said beam, substantially as set forth.

22. In a rig for drilling and pumping wells, the combination, with the frame, a walking-beam having a bifurcated end, and the means for imparting to said beam an oscillatory motion, of a segment mounted perpendicularly in said bifurcation at a distance from the end of the beam, whereby the sucker-rod of the pump may be attached to said end, or a rope or chain may be secured to the beam and passed over the curved surface of said segment for suspending the tools, substantially as set forth.

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Witnesses:
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