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WELL SINKING APPARATUS.  
APPLICATION FILED SEPT. 26, 1906.

943,913.

Patented Dec. 21, 1909.

3 SHEETS—SHEET 1.

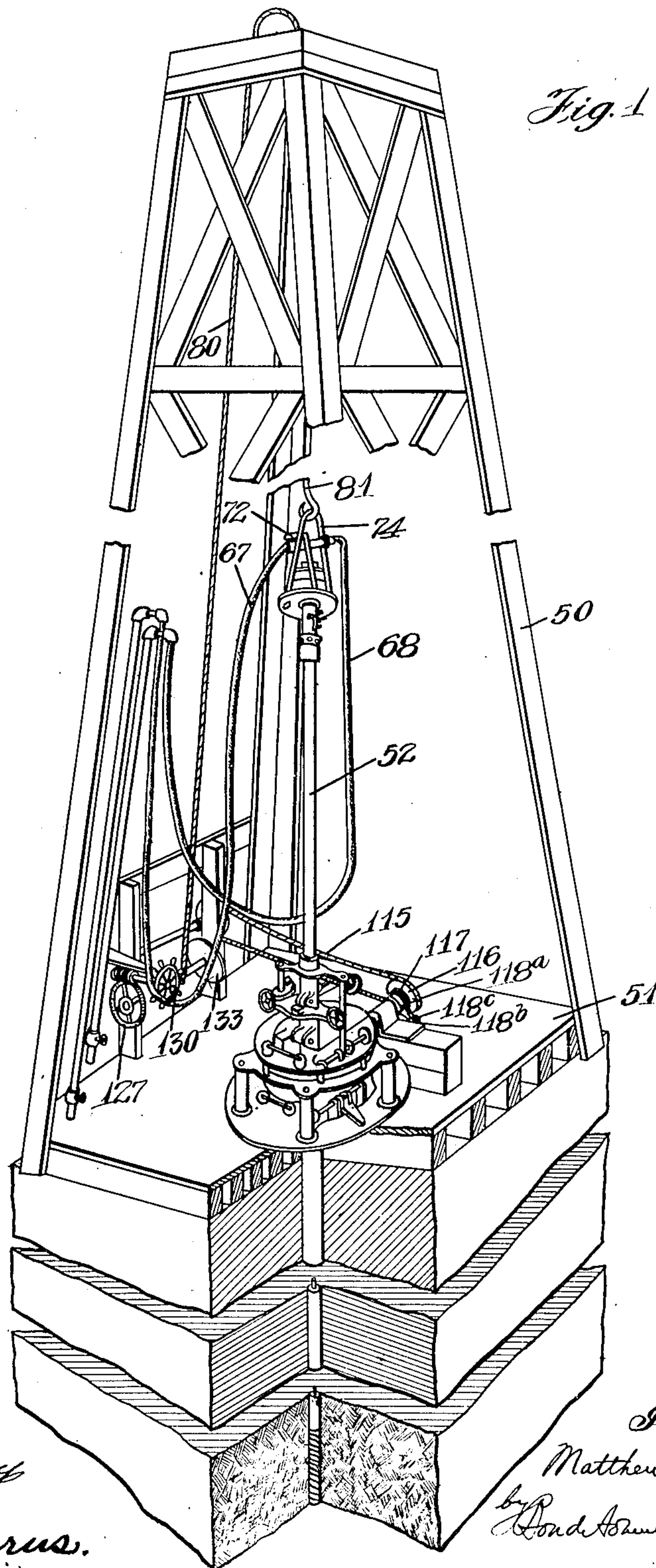


Fig. 1

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L. V. Donarus.

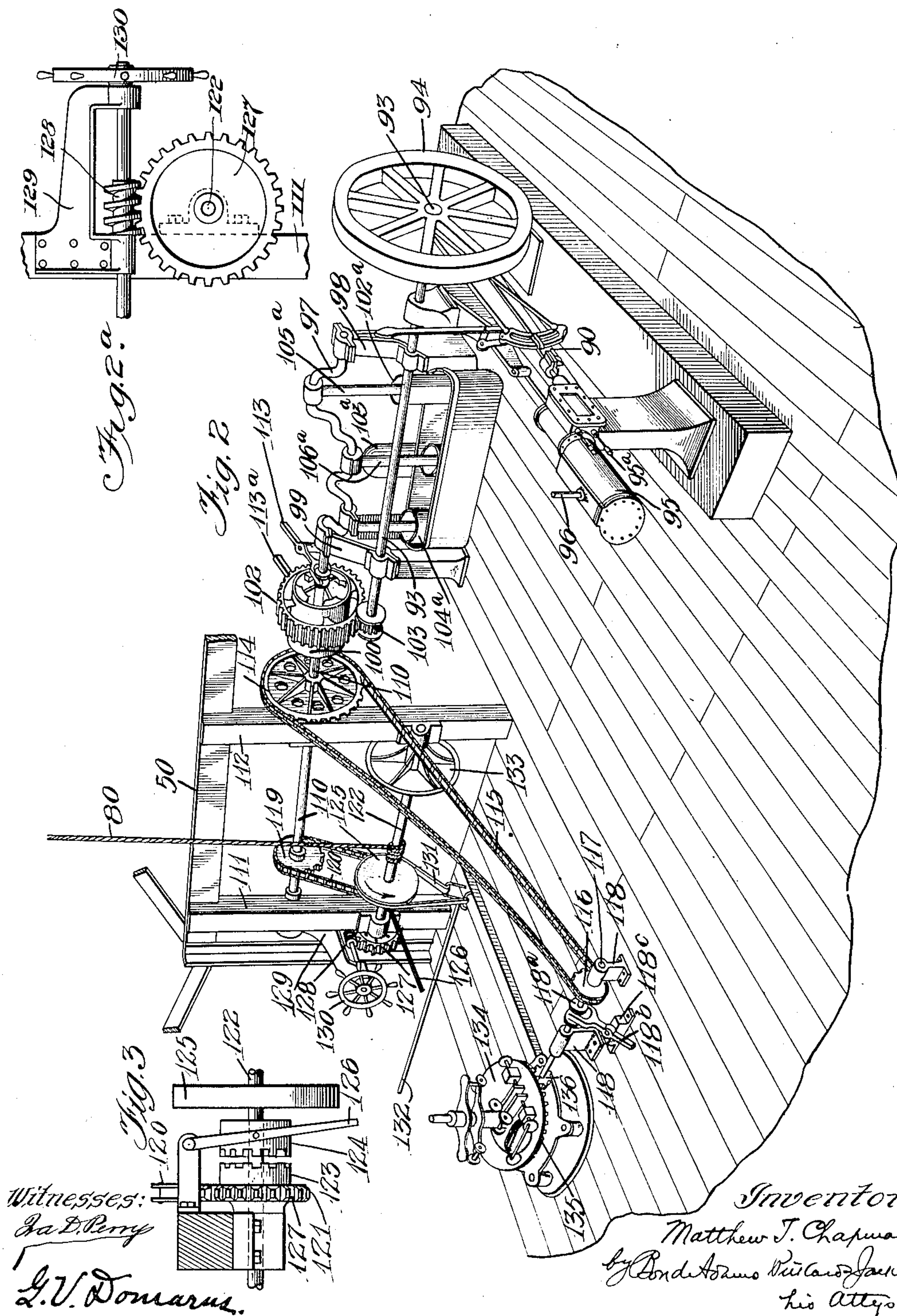
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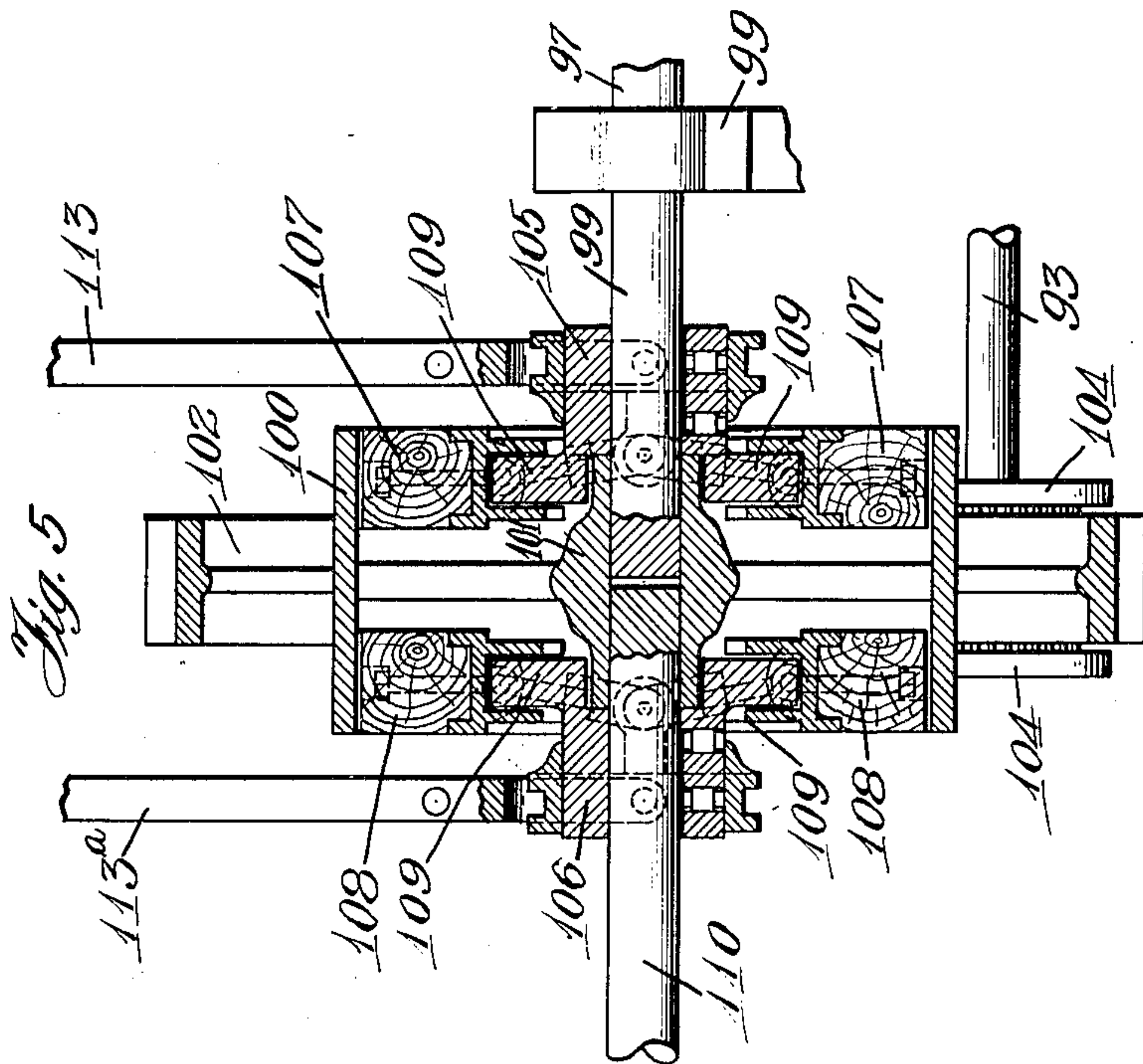
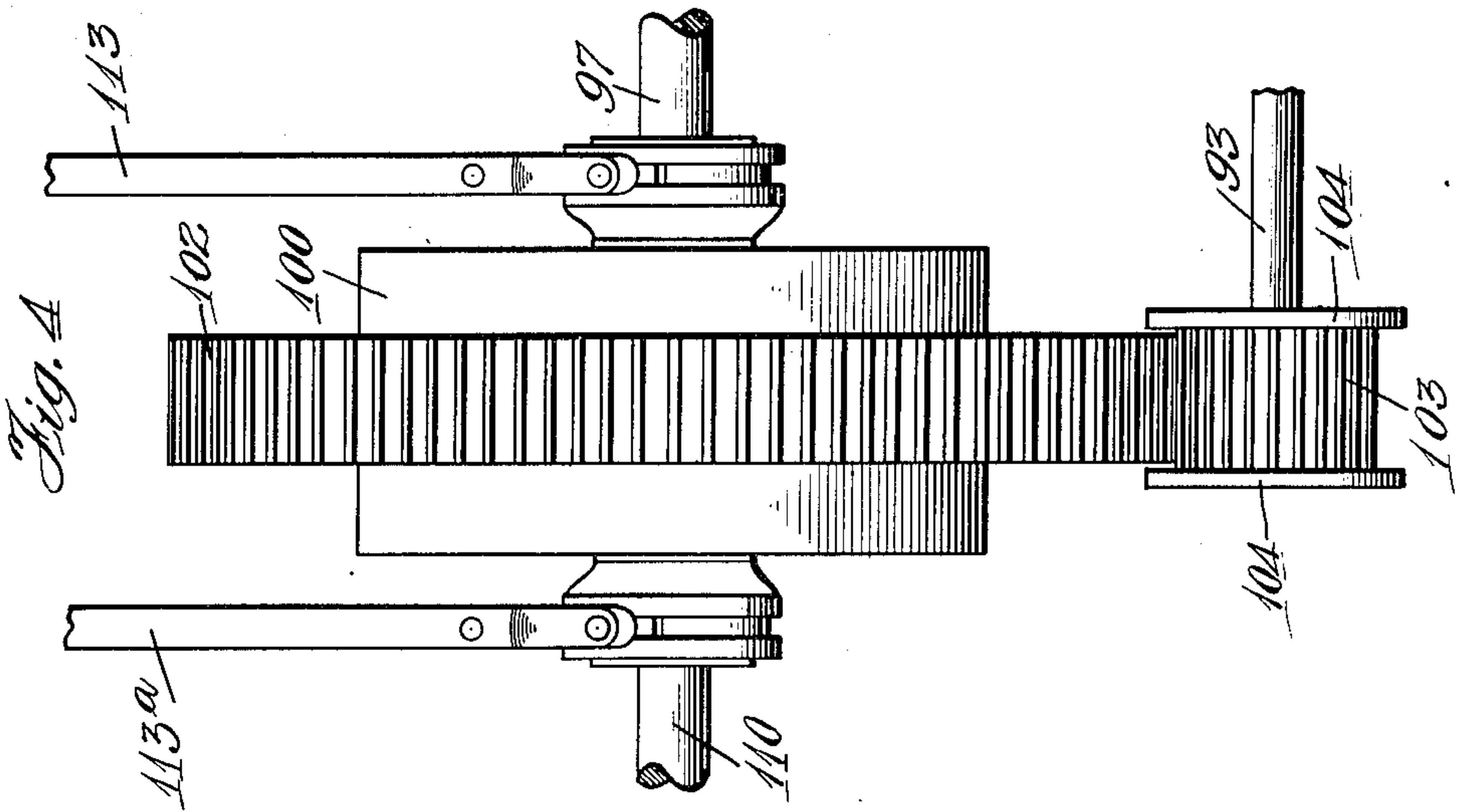


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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## WELL-SINKING APPARATUS.

943,913.

Specification of Letters Patent.

Patented Dec. 21, 1909.

Application filed September 26, 1906. Serial No. 336,269.

*To all whom it may concern:*

Be it known that I, MATTHEW T. CHAPMAN, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Well-Sinking Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to well-sinking apparatus, and has for its object to provide certain improvements in apparatus for sinking wells which will be hereinafter fully described.

What I regard as new is set forth in the claims.

In the accompanying drawings,—Figure 1 is a view partly in section, illustrating the devices for supporting and gripping the well-tube, and certain other parts of the apparatus; Fig. 2 is a perspective view, illustrating the combined air-compressor, pump and driving-apparatus; Fig. 2<sup>a</sup> is a detail, showing the construction of the worm and connected parts; Fig. 3 is a detail of the clutch-mechanism which controls the operation of the hoisting-drum or shaft; and Figs. 4 and 5 are, respectively, front and sectional views of the clutch-mechanism by which the operation of the pumps and other parts of the apparatus are controlled.

My present invention has to do with well-sinking apparatus in which the well is sunk by means of a tube carrying at its lower end a suitable bit, or other means, for cutting or grinding its way through the earth or rocky matter encountered,—said tube, which afterward forms the well-casing, being rotated by means of gripping-devices carried by a turntable. As in addition to rotating the well-tube it is frequently necessary to “jump” it, the gripping-devices are so arranged as to permit of the jumping of the well-tube without interfering with its rotation, and also to permit endwise movement of the well-tube independently of the gripping-devices, so that the well-tube may descend into the earth as the well deepens.

In practice a derrick is arranged over the site of the proposed well, and the well-tube is connected by a swivel-connection with a hoisting-apparatus, by which it may be raised for jumping purposes. Air and water connections are frequently provided for

washing out the borings,—water being supplied from the surface until a sufficient supply is secured from the well itself, after which air is employed to effect the discharge of the water, carrying with it the borings.

My patent No. 775,417, granted November 22, 1904, and my pending application, Serial Number 68,383, filed July 15, 1901, embody certain of the features above mentioned, and my present application, in part, is for certain improvements upon the constructions embodied in my said patent and said pending application. Other features hereinafter set forth are generic in character. I wish it to be understood, therefore, that the claims hereinafter made are generic in character and are to be construed broadly, except in so far as they particularly include specific features of construction.

Referring to the drawings,—50 indicates the usual derrick, and 51 the derrick-floor.

52 indicates the well-tube.

Heretofore it has been the practice to provide separate and independent means for operating the pumping, hoisting and rotating mechanisms, and where air has been employed, to provide a separate air-compressor,—thereby greatly complicating the work of operating the machinery and increasing the expense accordingly. In my improved apparatus I greatly simplify the mechanism, and reduce the expense of operating it, by providing means for operating the pumping-devices and hoisting-mechanism, the turntable and the compressed-air supplying-mechanism from a single engine,—meanwhile preserving independent control of the different mechanisms so that they may be stopped and started independently, as may be desired. In Figs. 2, 3, 4 and 5, I have illustrated my improved apparatus, so far as these features are concerned.

As shown in Fig. 2, 90 indicates an engine, of which 91 is the cylinder. 92 indicates the pitman of the engine, which is connected with a crank-shaft 93 in the usual way. 94 indicates the fly-wheel. 95 indicates an air-compressor cylinder, which is arranged in line with the engine-cylinder 91 and is connected with the piston thereof, so that reciprocation of the piston in the cylinder 91 also operates the piston in the air-



compressor cylinder 95,—the air-compressing mechanism being thus operated directly by the engine 90. The air-compressor is provided with the usual valves 95<sup>a</sup>, which  
 5 are made removable so that the air-compressing apparatus may be thrown out of operation by removing a valve at each end of the compressor. 96 indicates a compressed-air pipe, which communicates with  
 10 the pipe 72 for supplying compressed air to the well (see Fig. 1). 97 indicates a crank-shaft, mounted in suitable supports 98-99 arranged beside the crank-shaft 93.

As best shown in Figs. 2 and 5, the crank-shaft 97 projects a short distance beyond the support 99, where it registers with a shaft 110 carried by the derrick 50,—said shaft being fitted in suitable bearings carried by beams 111-112, as shown in Fig. 2. The  
 15 shafts 97-110 are adapted to rotate, either independently of one another or in unison, as desired; and to this end, suitable clutch-mechanism is provided for driving said shafts, either separately or together, from  
 20 the shaft 93. Said clutch-mechanism is best shown in Figs. 4 and 5, and consists of a clutch-wheel 100 having a hub 101 which fits loosely upon the adjacent ends of the shafts 97-110, as shown. The clutch-wheel  
 25 100 carries an external gear 102, which meshes with a pinion 103 mounted on the engine-shaft 93; so that said clutch-wheel 100 is driven constantly from the engine. The pinion 103 is preferably provided with  
 30 lateral flanges 104, to hold it in mesh with the gear 102, as shown in Fig. 4. For driving either or both the shafts 97 and 110 from the clutch-wheel 100, I provide suitable clutch-mechanism, consisting of sleeves  
 35 105-106 mounted, respectively, on feathers on the inner ends of the shafts 97-110, so that said sleeves may move toward and from the clutch-wheel 100. Said sleeves 105-106 carry, respectively, clutch-blocks 107-108,  
 40 which are movable toward and from the clutch-wheel 100,—being carried by levers 109 pivoted at their outer ends to said clutch-blocks and at their inner ends to the sleeves 105-106, respectively. The arrangement is such that when the clutch-blocks  
 45 107, for example, are out of engagement with the clutch-wheel 100, the levers 109 connected to said blocks assume an inclined position. By moving the sleeve 105 toward the clutch-wheel, however, said levers are  
 50 moved to a more nearly radial position, forcing the blocks 107 outward into frictional engagement with the inner surface of the clutch-wheel,—thus locking the shaft  
 55 97 to said clutch-wheel and causing it to be driven from the shaft 93 through the gearing above described. The shaft 110 is driven in a similar manner. When both clutches are in operative position, obviously,  
 60 both shafts 97 and 110 will be driven; but

either of said shafts alone may be driven by operating the corresponding clutch. Operating levers 113-113<sup>a</sup> are provided for shifting the sleeves 105-106, respectively, to control the operation of their respective shafts. 70

102<sup>a</sup>-103<sup>a</sup>-104<sup>a</sup> indicate pumping-cylinders, connected by piston-rods 105<sup>a</sup>-106<sup>a</sup>-107<sup>a</sup> with the crank-shaft 97, so that said pumping-devices are operated by the rotation of said shaft. 75

114 indicates a sprocket-wheel, keyed upon the shaft 110 and connected by a chain 115 with a sprocket-wheel 116 loosely mounted on a shaft 117 carried in suitable standards 118 secured to the derrick-floor, as  
 80 shown in Fig. 2. The shaft 117 operates to drive the turntable, as will be hereinafter described. The sprocket-wheel 116 is connected to, or disconnected from, the shaft 117, for controlling the operation of said  
 85 shaft, by means of a clutch 118<sup>a</sup> operated by means of a lever 118<sup>b</sup>, shown in Fig. 2. The clutch 118<sup>a</sup> may be of any suitable pattern, and the lever 118<sup>b</sup> be mounted in any suitable manner,—being preferably pivoted  
 90 upon a suitable support 118<sup>c</sup>, as shown in Fig. 2.

119 indicates a second sprocket-wheel, also keyed on the shaft 110 and connected by a chain 120 with a sprocket-wheel 121  
 95 mounted in a shaft 122 which may be termed the hoisting-shaft or drum. Said hoisting-shaft 122 is mounted in suitable bearings in the beams 111-112, as shown in Fig. 2, and is arranged parallel with the  
 100 shaft 110. The sprocket-wheel 121 is loosely mounted on said shaft and is adapted to be operatively connected thereto by means of clutch-members 123-124, best shown in Fig. 4. The clutch-member 123 is connect-  
 105 ed to the sprocket-wheel 121, while the clutch-member 124 is mounted on a feather on the shaft 122, so as to be movable into and out of engagement with the clutch-member 123. By means of the clutch-mem-  
 110 bers 123-124 the rotation of the shaft 122 may be controlled at pleasure. For adjusting the clutch-member 124 a lever 126 is provided, as shown in Figs. 2 and 4.

125 indicates a brake-wheel, mounted on  
 115 the shaft 122 and keyed thereto.

127 indicates a worm-wheel, mounted on the shaft 122 preferably near one end thereof, as shown in Fig. 2. The worm-wheel 127 is adapted to engage a worm 128 sup-  
 120 ported by a bracket 129, as shown in Fig. 2,—said worm being movable in its bearings into or out of position to be engaged by the worm-wheel 127.

130 indicates a hand-wheel, mounted on  
 125 the outer end of the worm 128 for rotating said worm to rotate the worm-wheel 127 and through it the shaft 122. The arrangement is such that by moving the hand-wheel 130 inward as far as possible, the worm 128  
 130



may be brought into engagement with the worm-wheel 127.

By rotating the hand-wheel 130 the shaft 122 may be rotated slowly by hand independently of the driving-mechanism, which, of course, is at that time disconnected. This construction serves to hold the drum-shaft 122, and permit feeding down and adjusting of the boring-tools. When the hoisting-mechanism is driven by power it rotates in the direction indicated by the arrow in Fig. 2, and consequently the worm-wheel 127 acts to move the worm 128 outward, as shown by the arrow thereon in Fig. 2,—thereby carrying said worm out of engagement with the worm-wheel. I thus provide means by which the hoisting-mechanism may be operated either by power or by hand, as may be desired.

131 indicates a brake-strap, which embraces the brake-wheel 125 and is operated by a lever 132 in the usual way. 133 indicates a head mounted on the shaft 122, which serves as a guide for the hoisting-rope,—the brake-wheel 125 forming another head for the same purpose. By applying the brake 131 so as to hold the shaft 122 against rotation the worm 128 may be disengaged from the worm wheel by rotating the hand wheel 130 in the proper direction. This is done when it is desired to lower the well-tube or other weight sustained by the hoisting rope more rapidly than could be done with the worm.

134 indicates the turntable, which carries the gripping-devices for gripping the well-tube for rotating it. As shown in Fig. 2 the turntable is provided with an annular rack 135 on its under side near its periphery, which is engaged by a pinion 136 mounted on the shaft 117, as shown in Fig. 2. The turntable may be of any suitable construction, but I prefer that shown and described in my pending application, Serial Number 189,770, filed January 19, 1904, of which this is a division.

The water in the well is employed to carry out the borings,—the water, with the borings, being pumped out by means of compressed air supplied through the air-tube 72.

While I have described specifically the construction illustrated in the accompanying drawings, I wish it to be understood that my invention is not restricted to such details of construction, except in so far as they are particularly claimed, but includes, generically, the subject-matter of the broader claims.

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

1. In a well-sinking apparatus, the combination of an engine, means operated thereby adapted to engage and rotate the pipe, an air compressor operated by said engine, means for conducting compressed air from

said compressor to the well-tube and independent means for controlling the operation of said pipe-rotating means.

2. In a well-sinking apparatus, the combination of an engine, means operated thereby adapted to engage and rotate the pipe, an air compressor operated by said engine, means for conducting compressed air from said compressor to the well-tube and independent clutch mechanism for controlling the operation of said pipe-rotating means.

3. In a well-sinking apparatus, the combination of an engine, pumping-mechanism operated thereby, means adapted to engage the pipe for rotating the same, means for driving said rotating-mechanism from said engine, means for independently controlling the operation of said rotating-mechanism, an air-compressor, and means for operating said air-compressor from said engine.

4. In a well-sinking apparatus, the combination of means for engaging and rotating the pipe, means for hoisting the pipe, an air-compressor for supplying compressed air to the pipe, pumping-mechanism for supplying water to the pipe, an engine for operating said mechanisms, and means for controlling the operation of said rotating-mechanism independently of the other mechanisms.

5. In a well-sinking apparatus, the combination of means for engaging and rotating the pipe, means for hoisting the pipe, an air-compressor for supplying compressed air to the pipe, pumping-mechanism for supplying water to the pipe, an engine for operating said mechanisms, and means for controlling the operation of said hoisting-mechanism independently of the other mechanisms.

6. In a well-sinking apparatus, the combination of means for engaging and rotating the pipe, means for hoisting the pipe, an air-compressor for supplying compressed air to the pipe, pumping-mechanism for supplying water to the pipe, an engine for operating said mechanisms, and clutch-mechanism between said rotating and hoisting-mechanisms and the engine.

7. In a well-sinking apparatus, the combination of an engine, a shaft, means for driving said shaft from the engine, pumping-mechanism operated from said shaft, a second shaft in line with said first-mentioned shaft, pipe-rotating mechanism and hoisting-mechanism, means for driving said pipe-rotating and hoisting-mechanisms from said second shaft, and clutch-mechanism between said first and second shafts.

8. In a well-sinking apparatus, the combination of means adapted to engage and rotate the pipe, an air-compressor, pumping-mechanism, an engine, means for operating said pumping-mechanism and said pipe-rotating mechanism from said engine, and



means for independently controlling the operation of said pipe-rotating mechanism.

9. In a well-sinking apparatus, the combination of means adapted to engage and rotate the pipe, an air-compressor, pumping-mechanism, an engine, means for operating said pumping-mechanism and said pipe-rotating mechanism from said engine, and means for independently controlling the operation of said pumping-mechanism.

10. In a well-sinking apparatus, the combination of means adapted to engage and rotate the pipe, pumping-mechanism, a shaft for driving said pipe-rotating mechanism, a shaft for driving said pumping-mechanism, clutch-mechanism adapted to engage either of said shafts for driving the same, an engine, and means for driving said clutch-mechanism from the engine.

11. In a well-sinking apparatus, the combination of means for engaging and rotating the pipe, hoisting-mechanism for hoisting the pipe, pumping-mechanism, an engine for driving said rotating, hoisting and pumping mechanisms, said rotating, hoisting and pumping mechanisms being independently controlled, and independent means for controlling the operation of said mechanisms.

12. In a well-sinking apparatus, the combination of means for engaging and rotating the pipe, hoisting-mechanism for hoisting the pipe, pumping-mechanism, air-compressing mechanism, an engine for driving

said mechanisms, said rotating, hoisting, pumping and air-compressing mechanisms being independently controlled, and independent means for controlling the operation of said mechanisms.

13. A well-sinking apparatus, consisting of an engine arranged to drive separately or collectively, a hoisting-drum for hoisting and lowering the well-boring pipe, a pipe-rotating apparatus for rotating the pipe, a pumping-engine for pumping water down through said pipe, and an air-compressor for supplying compressed air to the pipe.

14. In a well-sinking apparatus, the combination of a well-tube, means for supplying water to the well, means for rotating the well-tube for sinking the well, an air-compressor adjustably connected with said rotating means, said air-compressor being adapted to supply compressed air to the well for removing therefrom the borings with the water in the well.

15. In a well-sinking apparatus, the combination of a well-tube, driving mechanism for rotating said well-tube for sinking the well, an air-compressor for supplying compressed air to the well for removing the borings and water therefrom, and means operated by said driving mechanism for operating said air-compressor.

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