F. A. FOCKS.

WELL DRILLING MACHINE.

APPLICATION FILED JUNE 11, 1920.

1,371,884.

Patented Mar. 15, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

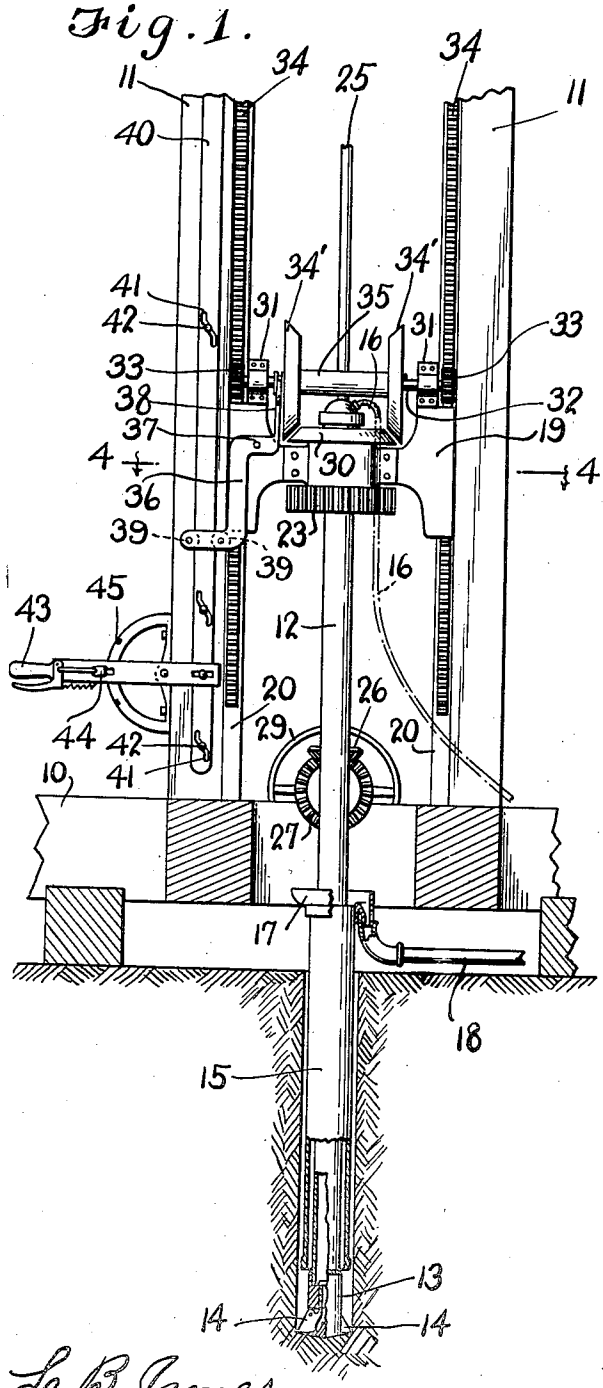
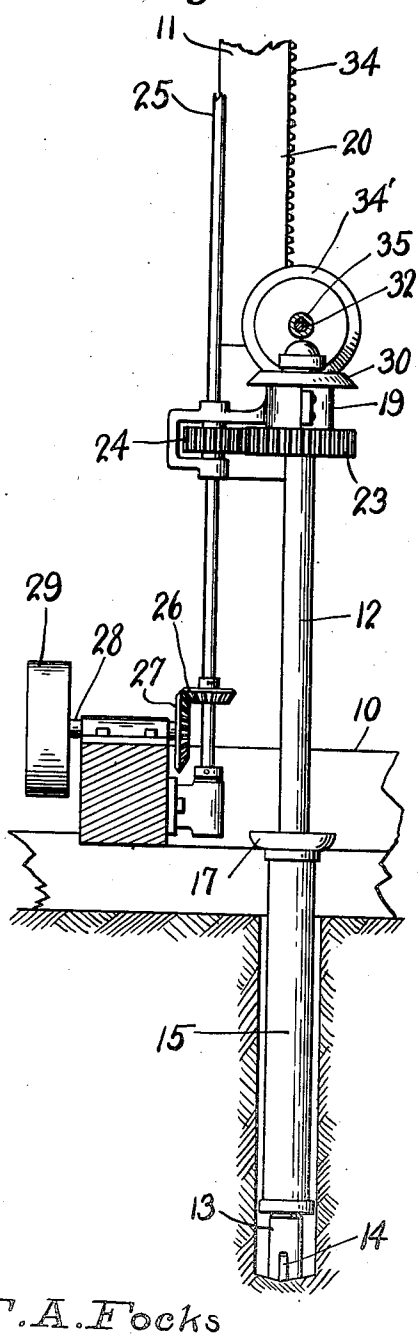


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

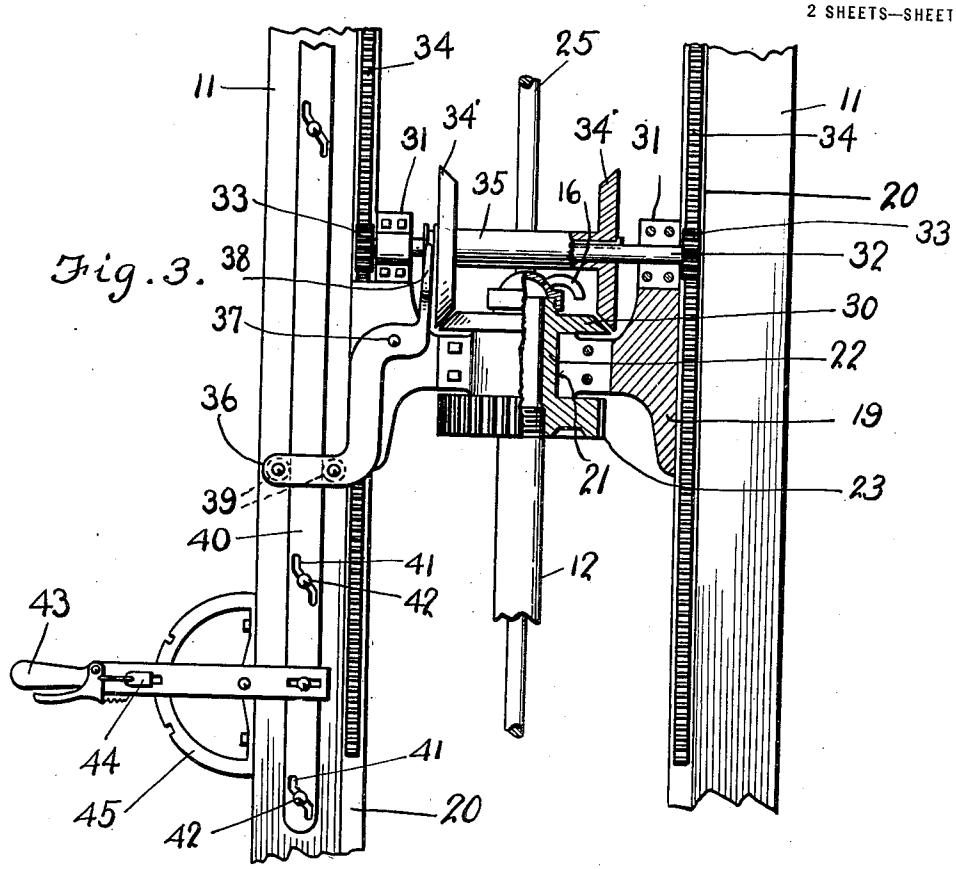
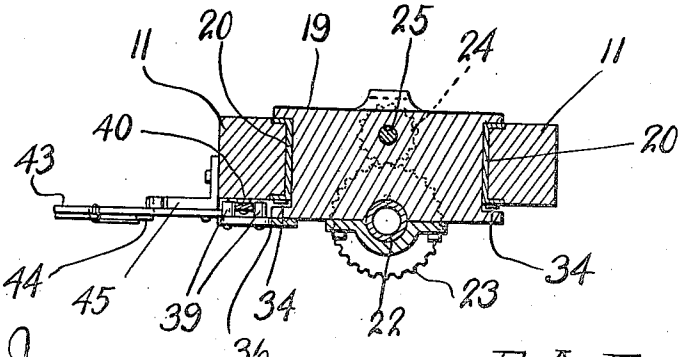


Fig. 4.



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FRED A. FOCKS, OF WICHITA, KANSAS.

WELL-DRILLING MACHINE.

1,371,884. Specification of Letters Patent. Patented Mar. 15, 1921.

Application filed June 11, 1920. Serial No. 388,320.

To all whom it may concern:

Be it known that I, FRED A. FOCKS, a citizen of the United States, residing at Wichita, in the county of Sedgwick and State of Kansas, have invented new and useful Improvements in Well-Drilling Machines, of which the following is a specification.

This invention relates to improvements in well drilling machines and aims to provide a positive means for raising and lowering the drill rod, the invention being especially adapted for the drilling of deep wells, as in oil wells.

Another object is the provision of means for raising and lowering the drill rod through the operating of the drilling mechanism, the said means including shiftable reverse gearing and novel means for shifting the latter to render the same inactive to raise or lower the rod.

With the above and other objects in view, the invention further includes the following novel features and details of construction, to be hereinafter more fully described, illustrated in the accompanying drawings and pointed out in the appended claims.

In the drawings:—

Figure 1 is a side elevation of a portion of the drilling mechanism with the invention applied thereto, the lower end of the casing and tubular drill rod being shown in section to illustrate the drill bit.

Fig. 2 is a central vertical sectional view taken at right angles to Fig. 1.

Fig. 3 is an enlarged fragmentary elevation of a portion of the mechanism shown in Fig. 1, parts being shown in section to more clearly illustrate the structure.

Fig. 4 is an enlarged transverse sectional view on the line 4—4 of Fig. 1.

Referring in detail to the drawings, the reference character 10 designates a portion of the derrick structure of a well drilling machine, the latter including spaced uprights 11. The drill which is herein shown as of the rotary type includes a tubular drill rod 12 which carries at its lower end a drill bit 13, the latter being preferably provided with extension cutters 14 to engage the bore of the well. The drill rod 12 is surrounded by a stationary casing 15 which is spaced from the rod 12 so that water may be forced downward through the tubular rod from a suitable pump (not shown), a flexible hose 16 being connected to the upper end of the tubular drill rod 12 for this purpose. The water will thus force the cuttings upward between the drill rod 10 and the casing 15, the upper end of the latter being surrounded by an annular gutter 17 to which is connected a waste pipe 18.

The upper end of the drill rod 12 is carried by a guide bar 19 which operates along guides 20 carried by the uprights 11 the said member being provided with a central opening 21. Secured to the upper end of the drill rod 12 and operating within the opening 21 is a sleeve 22 and connected to the lower end of this sleeve is a gear 23 which is driven by means of a pinion 24. This pinion is mounted upon a shaft 25 which operates in a bearing provided in the guide member 19, while secured to the lower end of the shaft 25 is a pinion 26 which is driven by a beveled gear 27 secured upon a shaft 28 having bearings in the derrick structure 10. The outer end of this shaft is provided with a drive pulley 29 which may be operated by any suitable motor power. As the guide member 19 is capable of vertical movement between the uprights 11, the said pinion is movable longitudinally of the shaft 25 so that the driving connection will be maintained irrespective of the position of the member 19.

Secured to the upper end of the sleeve 22 is a beveled gear 30, while mounted in bearings 31 provided in the guide member 19 is a shaft 32. Mounted upon each end of the said shaft 32 is a pinion 33 which engages a rack 34 secured to each of the uprights 11. These pinions are normally stationary and are capable of rotation in either direction to raise or lower the drill rod 12 and for this purpose there is splined upon the shaft 32 reversing gears which include opposed beveled gears 34′ connected by a sleeve 35. When in neutral position the gears 34′ are both out of engagement with the gear 30, but when it is desired to raise or lower the drill rod 12, one of the gears is shifted into engagement with the gear 30, whereupon the pinions 33 will be rotated through the operation of the drilling mechanism and the member 19 raised or lowered carrying with it the drill rod.

In order to shift the reversing gears 34′ there is provided a shifting lever 36 which is pivotally mounted as at 37 upon the guide member 19 and is provided with a forked end 38 which engages the grooved collar of

one of the gears 34'. The opposite end of the shifting lever 36 carries spaced rollers 39 and operating between these rollers is a rod 40. This rod is provided with substantially Z-shaped slots 41 which receive pins 42 carried by one of the upright members 11, the said slots being disposed transversely of the rod. Pivotally secured to the rod 40 is one end of an operating lever 43, the opposite end being provided with a spring latch 44 for engagement in notches provided in segment 45. When the latch 44 is engaged in the central notch of the segment 45, the pins 43 will occupy a position centrally of the inclined portion of the Z-shaped slots and the reversing gears 34' will be in neutral position with the guide member 19 stationary. To move the guide member in one direction and consequently the rod 12, the operating lever 43 is shifted so that the latch will engage either the uppor or lower notch, whereupon the rod 40 will be moved longitudinally and laterally so that the pins will occupy the position at one end of the slots 41. This will shift the lever 36 upon its pivot and cause one of the gears 34' to engage the beveled gear 30. The movement of the lever 44 in an opposite direction will cause a reverse movement of the shifting lever 36 and a corresponding reversal of the direction of rotation of the pinions 33 so that the reverse movement of the guide member 19 will be obtained.

The invention is susceptible of various changes in its form, proportions and minor details of construction and the right is herein reserved to make such changes as properly fall within the scope of the appended claims.

Having described the invention what is claimed is:—

1. In a well drilling machine, the combination, with a drill rod having a vertically movable guide member secured thereto and means for operating the drill rod, of vertically disposed stationary rack bars, pinions carried by the guide member and engageable with the rack bars to raise and lower the guide, normally inactive pinion moving means carried by the guide member and engageable with the drill rod operating means and means for controlling the operation of the pinion moving means to control the direction of travel of said pinions.

2. In a well drilling machine, the combination with a drill rod having a vertically movable guide member secured thereto and means for operating the drill rod, of vertically disposed stationary rack bars, a horizontal shaft mounted in bearings in the guide member, a pinion secured to each end of the shaft and engageable with the rack bars to raise and lower the guide member, a beveled gear operated by the drill rod operating means, normally inactive reversing gears mounted upon the pinion shaft and capable of engaging the beveled gear to control the direction of operation of the pinions and means for adjusting the reversing gears.

3. In a well drilling machine, the combination with a drill rod having a vertically movable guide member secured thereto and means for operating the drill rod, of vertically disposed stationary rack bars, a horizontal shaft mounted in bearings in the guide member, a pinion secured to each end of the shaft and engageable with the rack bars to raise and lower the guide member, a beveled gear operated by the drill rod operating means, normally inactive reversing gears mounted upon the pinion shaft and capable of engaging the beveled gear to control the direction of operation of the pinions, a pivotally mounted shifting lever for moving the reversing gears to selectively engage the beveled gear and a laterally and longitudinally movable bar engageable with the opposite end of the shifting lever to move the latter upon its pivot.

4. In a well drilling machine, the combination with a drill rod having a vertically movable guide member secured thereto and means for operating the drill rod, of vertically disposed stationary rack bars, a horizontal shaft mounted in bearings engaged in the member, a pinion secured to each end of the shaft and engageable with the rack bars to raise and lower the guide member, a beveled gear operated by the drill rod operating means, normally inactive reversing gears mounted upon the pinion shaft and capable of engaging the beveled gear to control the direction of operation of the pinions, a pivotally mounted shifting lever for moving the reversing gears to selectively engage the beveled gear, a laterally and longitudinally movable bar engageable with the opposite end of the shifting lever to move the latter upon its pivot and stationary pins engageable in substantially Z-shaped slots disposed transversely of the bar for guiding the latter to control the operation of the shifting lever.

In testimony whereof I affix my signature.

FRED A. FOCKS.