April 6, 1926. 1,579,975

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LONG STROKE LIFT FOR PUMPING WELLS

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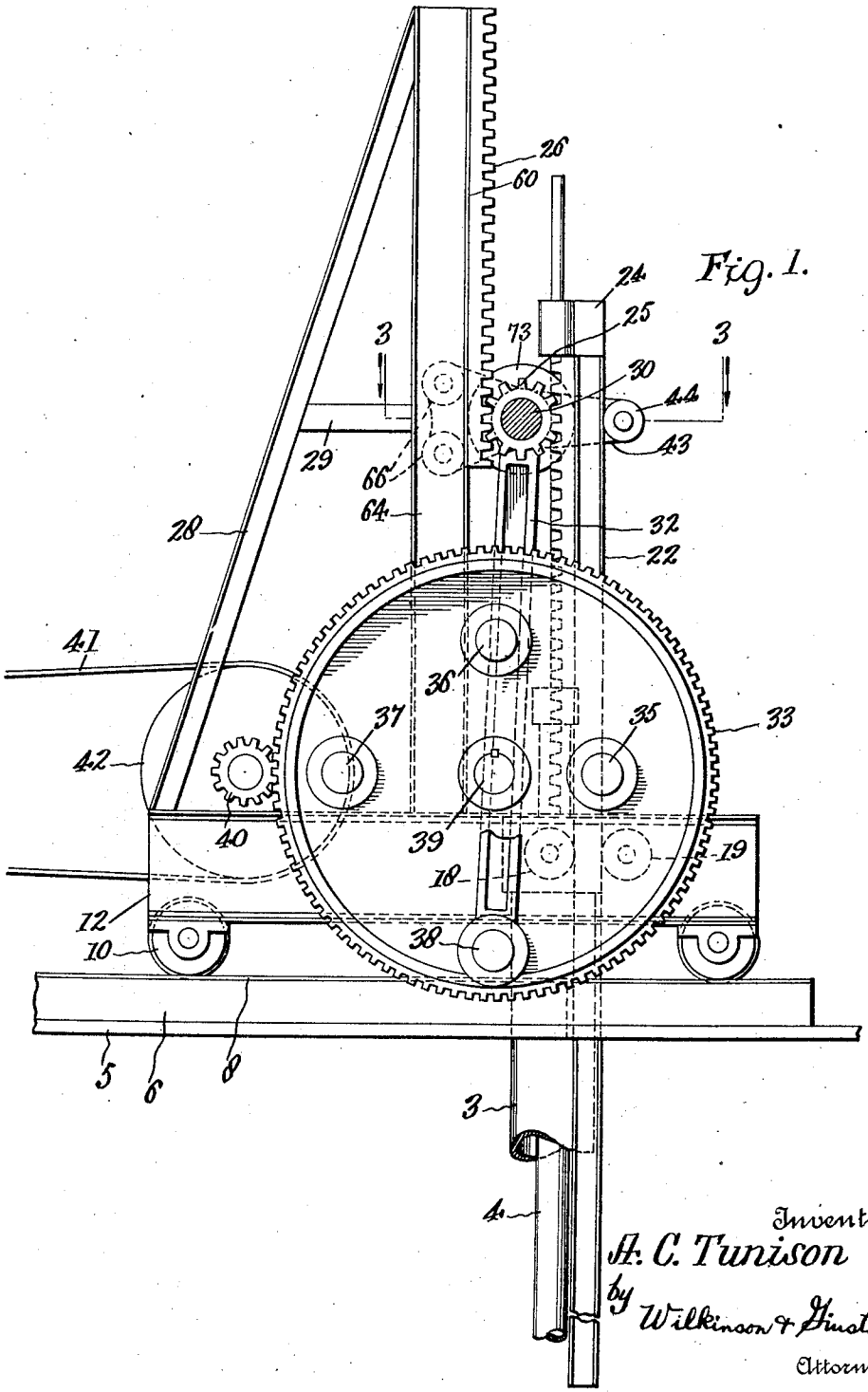

Fig. 1.

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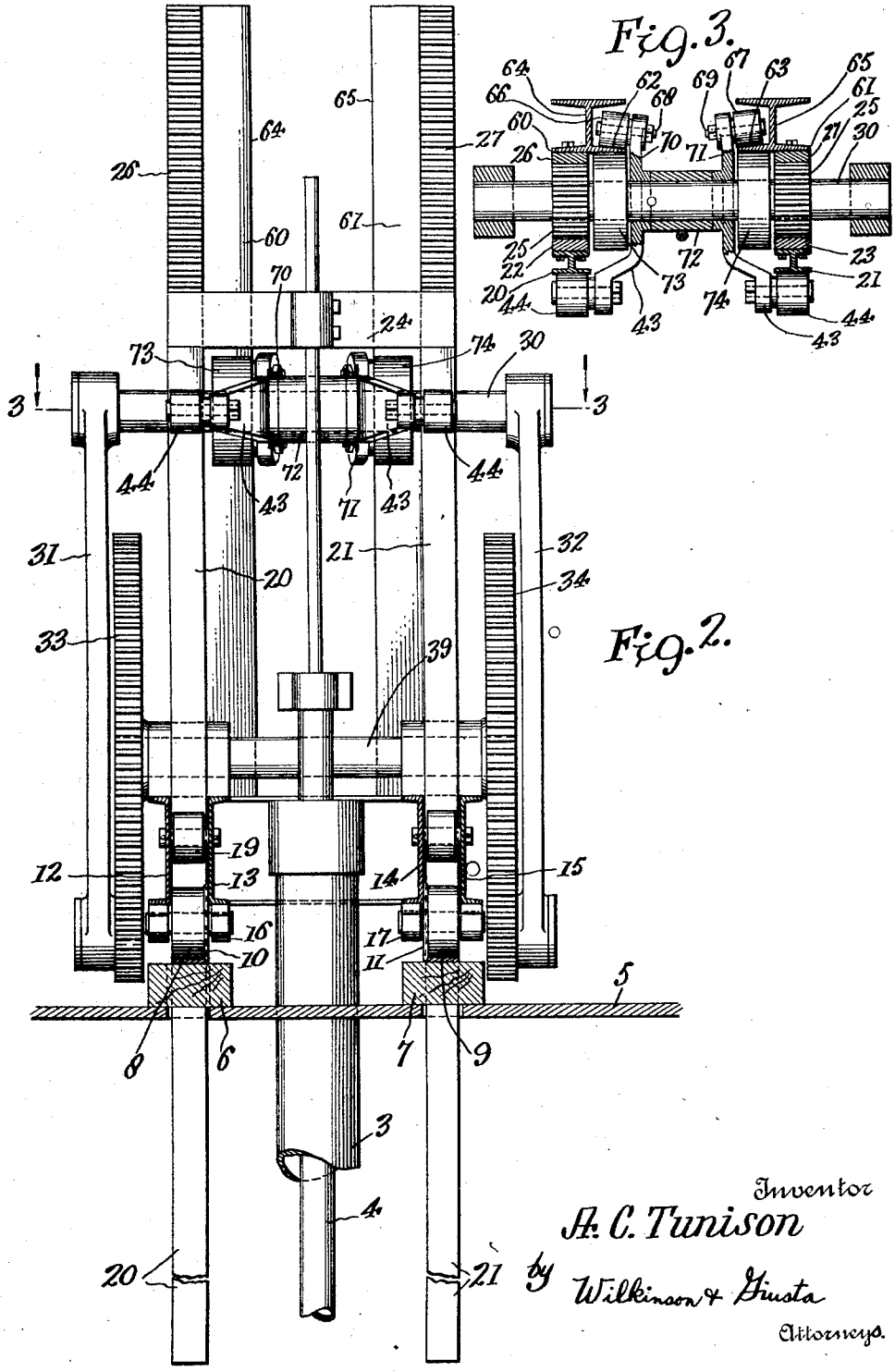

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Patented Apr. 6, 1926. 1,579,975

UNITED STATES PATENT OFFICE.

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LONG-STROKE LIFT FOR PUMPING WELLS.

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To all whom it may concern:

Be it known that I, ARTHUR C. TUNISON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Long-Stroke Lifts for Pumping Wells; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in long stroke lift for pumping wells.

It is desirable to increase the length of the stroke over that possible with the walking beam in order to compensate for the stretch of the rods in deep wells. This stretch of the rods absorbs the stroke, and by the time it is transferred from the lift mechanism at the top of the well to the pump at the bottom of a deep well, a great part of the length of the stroke is lost.

It is an object of the invention to increase the stroke or the travel of the rods, so that the stretch will not be detrimental to the pumping operation and to the actual out-put of the well.

Another object of the invention is to provide a compact mechanism suitable for construction at the top of a well, and in which the additional stroke length may be accomplished without the application of further power or further operating expense.

With the foregoing and other objects in view, the invention will be more fully described, hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side view with parts shown in section of an improved lift mechanism constructed according to the present invention,

Figure 2 is a front view with parts also shown in section, and

Figure 3 is a horizontal section taken on the line 3—3 in Figure 2.

Referring more particularly to the drawings 3 designates the well casing and 4 the rods extending from the lift mechanism down to the pump at the bottom of the well.

At 5 is indicated a platform on which are laid the beams 6 and 7 at opposite sides of the well shaft, these beams receiving the tracks 8 and 9 upon which the flanged rollers 10 and 11 of the carriage 12 are adapted to roll.

The carriage is constructed in any suitable manner as for instance in part by the pairs of channel beams 12, 13 and 14, 15 disposed in parallel relation at opposite sides of the carriage, and lying in a longitudinal direction with their flanges turned away from each other. The flanges provide for receiving the bearings 16 and 17 for the flanged wheels 10 and 11.

The beams 12, 13 and 14, 15 receive the pairs of rollers 18 and 19, these rollers being disposed upon opposite sides of the guides 20 and 21 for the movable rack bars 22 and 23 which may extend in one piece with the guides 20 and 21; the guides and the movable rack bars being arranged to move substantially vertically. The pump rod extends up through the casing 3, and is secured to a cross head 24 connecting the upper ends of the two movable rack bars 22 and 23. Traveling pinions 25 mesh both with the movable rack bars and with the stationary rack bars 26 and 27 disposed opposite the movable rack bars. The stationary rack bars are erected on the carriage or truck in parallel and spaced relation with respect to the movable rack bars, and such stationary rack bars are suitably braced by the diagonal and lateral braces 28 and 29. The two pinions 25 are carried upon a common shaft 30, the outer ends of which are journaled in the upper ends of the connecting rods or pitman rods 31 and 32, the lower ends of which are adapted to be driven from the gear wheels 33 and 34 to which said connecting rods are secured by the pins. In Figure 1, four pins 35, 36, 37 and 38 are shown all as located at progressively greater distances from the center of rotation of the gear wheels whereby the stroke of the connecting rods may be varied at will by selecting an appropriate pin. The gear wheels 33 and 34 are mounted on the shaft 39 and said gear wheels are disposed in mesh with pinions 40 driven by the belt 41 from an appropriate source of power through the pulley 42 associated with said gear wheels 40.

In Figure 3 the stationary rack bars 26

and 27 are shown as attached to the outer side of the near flanges 60 and 61 of the I beams 64 and 65; while the opposed flanges 62 and 63 provide guide ways for the rollers 66 and 67 journaled upon shafts 68 and 69 which are carried in the rear arms 70 and 71. These arms are arranged upon the sleeve 72 which fits loosely over the shaft 30 between the pinions and between the thrust rollers 73 and 74 which are mounted on the shaft 30 and travel up and down opposite the guide rolls 66 and 67 upon the flanges 62 and 63 of the I beams. The guide beams 20 and 21 to which the movable rack bars 22 and 23 are attached are also preferably, though not necessarily, of I beam construction, and they receive upon their outer sides the guide rollers 44 carried upon the arms 43 projecting forwardly from the sleeve 72 and being curved about the thrust rollers. The guide rollers 44 are in alinement with the two racks and the pinions, while the rear guide rollers 66 and 67 are in alinement with the thrust rollers 73. As shown in Figure 1 the rear guide rollers 66 and 67 are preferably mounted in pairs one above the other in the arms 70 and 71, while the forward guide rollers 44 are single rollers. The double rollers in the rear will prevent any rocking movement of the sleeve in a vertical plane such as may cause disalinement or binding of the parts. There will always be freedom of movement between the pinion teeth and the teeth of the rack bars.

In the use of the device, the belt arrangement 41 will drive the pinions 40 and in this manner the gear wheels 33 and 34 will be rotated, carrying around therewith the connecting rods 31 and 32 and causing the shaft 30 and the traveling pinions 25 to be alternately lifted and lowered. The pinions will climb up and down the stationary rack bars 26 and 27 and will, in a well understood manner, lift and lower the movable rack bars 22 and 23 through a very long stroke. The pump rod being carried with the movable rack bars will thus be lifted and lowered and given an extremely long stroke to take up the stretch in the pump rod. The crank throws may be varied by inserting the pins 35, 36, 37 and 38 in the various holes in the disc gears 33 and 34. The movable racks are lifted not only by the force of the connecting rods 31 and 32, but also by the turning of the pinions 25. The travel of the movable racks is thus substantially doubled.

The sleeve on the shaft 30 is shown in Figure 3 as being separate from the guide roller arms, but the two may also be made in one piece or attached together.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:—

1. A long stroke lift mechanism for wells comprising a frame, stationary rack bars on said frame, movable rack bars opposite said stationary rack bars, pinions meshing with said rack bars, a shaft passing through said pinions, means to move said shaft back and forth, thrust rollers on said shaft, guides for engaging said thrust rollers, and guide means carried by said shaft and engaging said guide means at opposite sides of said thrust rollers.

2. A long stroke lift mechanism for wells comprising a frame, stationary rack bars on said frame, movable rack bars opposite said stationary rack bars, pinions meshing with said rack bars, a shaft passing through said pinions, means to move said shaft back and forth, thrust rollers on said shaft, guides for engaging said thrust rollers, guide means carried by said shaft and engaging said guide means at opposite sides of said thrust rollers, and guide means carried by said shaft and engaging against the outer sides of said movable racks.

3. A long stroke lift mechanism for wells comprising a frame, I beams installed on said frame, stationary rack bars secured to the outer parts of the flanges at one side of said I beams, movable rack bars disposed opposite said stationary rack bars, guide beams carrying said movable rack bars, pinions disposed in mesh with both said rack bars, a shaft passing through said pinions, means to move said shaft back and forth, a sleeve on said shaft between said pinions, thrust rollers on the shaft between the sleeve and pinions and engaging against the inner portions of the flanges of the I beams adjacent the portions to which said rack bars are attached, rearwardly projecting arms on said sleeve, pairs of guide rolls carried by said arms and movable against the portions of the I beams opposite said thrust rollers, arms projecting forwardly from the sleeve, and rolls on said forward arms engaging against the beams for the movable rack.

4. A long stroke lift mechanism for wells comprising a frame, substantially vertical stationary rack bars installed on said frame, movable rack bars disposed opposite said stationary rack bars, pinions meshing with said movable and stationary rack bars and coupled together, means for lifting and lowering said pinions, means in the frame for guiding the movements of said rack bars at their lower portions, and means raised and lowered with said pinions and engaging both said rack bars for guiding the movement of the movable rack bars at their upper portions.

5. A long stroke lift mechanism for wells

comprising a frame, fixed and movable rack bars thereon, said movable rack bars being connected to the pump rod, pinions between said rack bars, connecting rods for lifting and lowering said pinions, means for guiding the movements of said movable rack bars, disc gears having openings at various distances from the center of rotation thereof, and pins to selectively fit in said openings for coupling the connecting rods to said disc gears, and means to rotate said disc gears.

6. A long stroke lift mechanism for wells comprising a carriage having pairs of spaced beams, stationary rack bars erected on said carriage, movable rack bars sliding between said pairs of beams, guide means carried by said pairs of beams between the same for guiding the movements of the lower portions of said movable racks, pinions disposed in mesh with the racks, a shaft joining said pinions, connecting rods coupled to said shaft, means for driving said connecting rods, a shroud for engaging both racks whereby to guide the movement of the upper portions of said movable racks.

7. A long stroke lift mechanism for wells comprising a movable carriage, stationary rack bars erected thereon, movable rack bars sliding through said carriage, pinions in mesh with said movable and stationary rack bars, means for lifting and lowering said pinions, a shroud carried by said pinions and movable therewith, rollers journaled in said shroud and engaging the outside surface of said movable rack bars, and other rollers carried by said shroud for engaging the inside surface of said stationary rack bars.

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