S. LIPPERT.

GEARING.

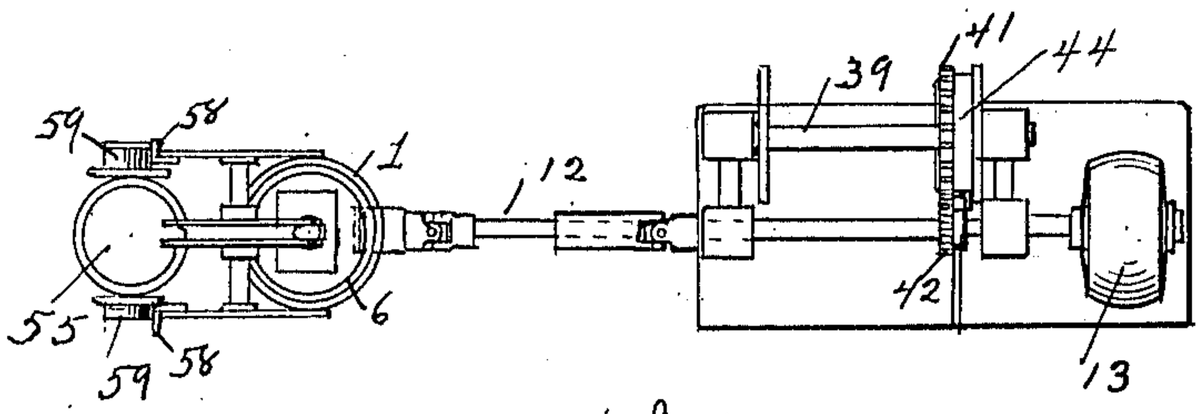
APPLICATION FILED NOV. 22, 1905. RENEWED FEB. 4, 1910.

955,817.

Patented Apr. 19, 1910.

2 SHEETS—SHEET 1.

Fig. 2



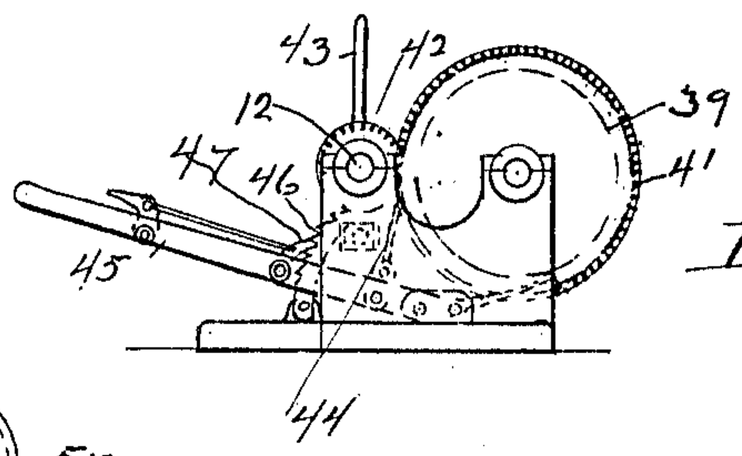
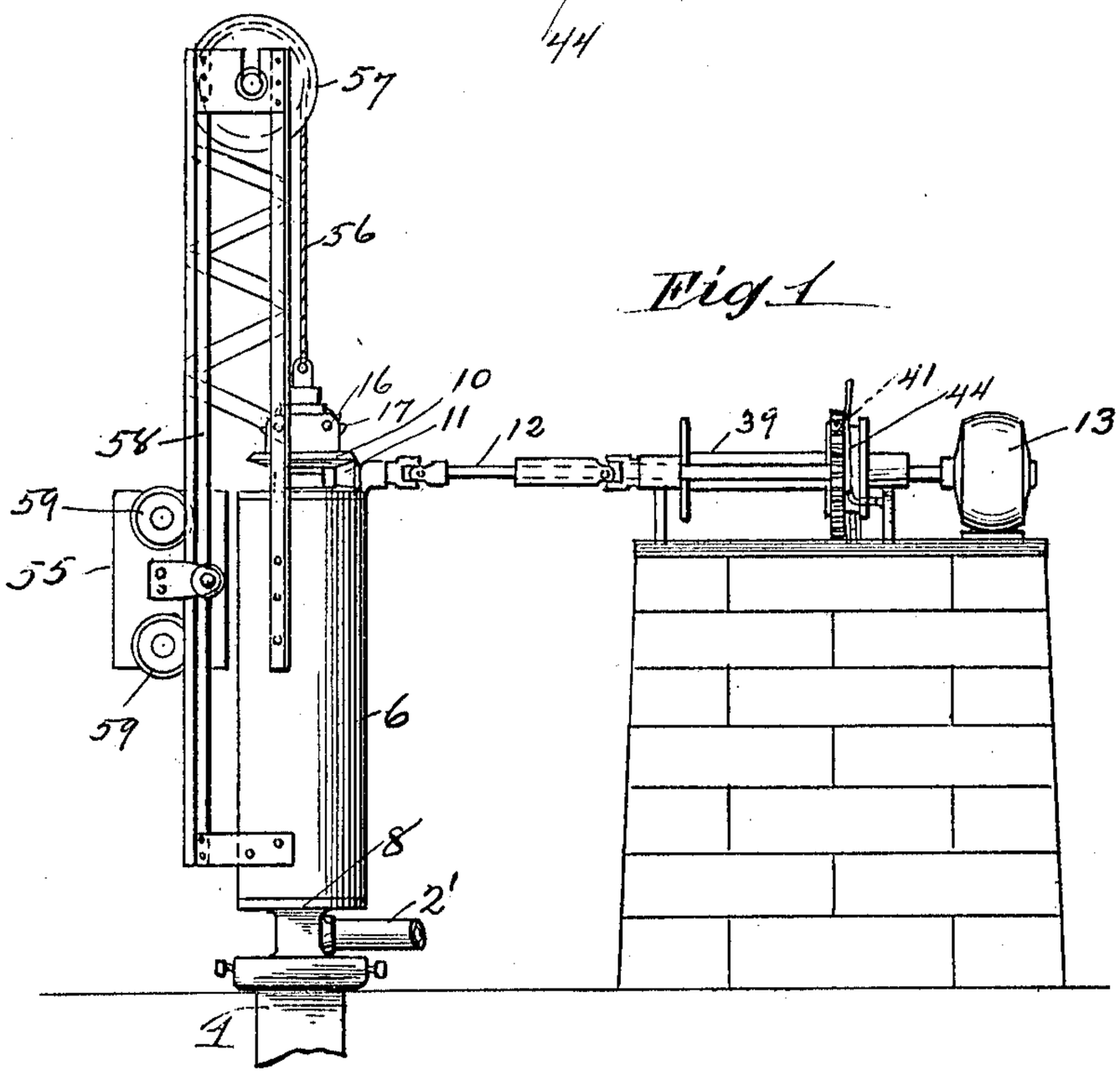


Fig. 9.

Fig. 1



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2 SHEETS—SHEET 2.

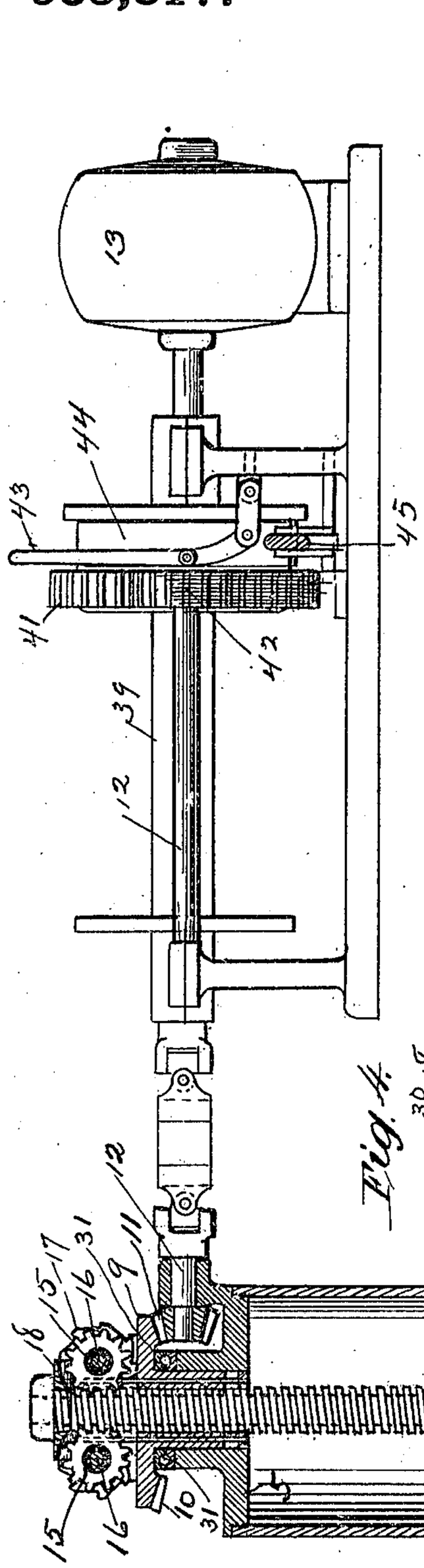

Fig. 3.

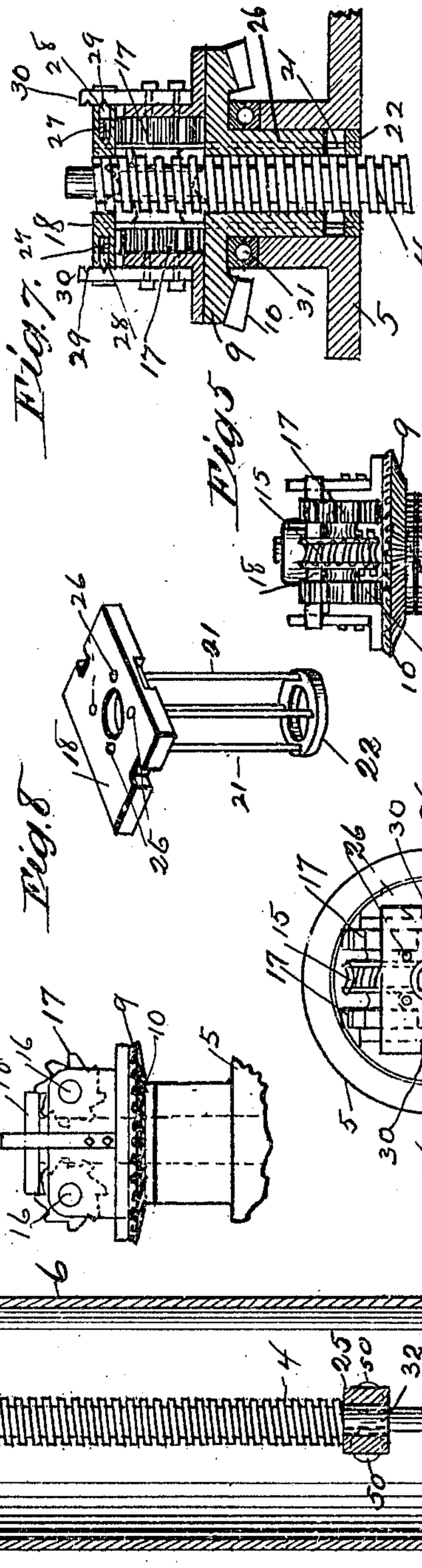

Fig. 7.

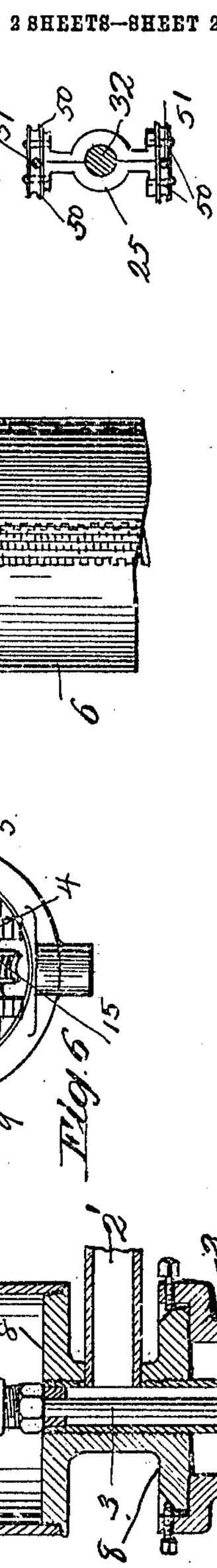

Fig. 8.

Fig. 5.

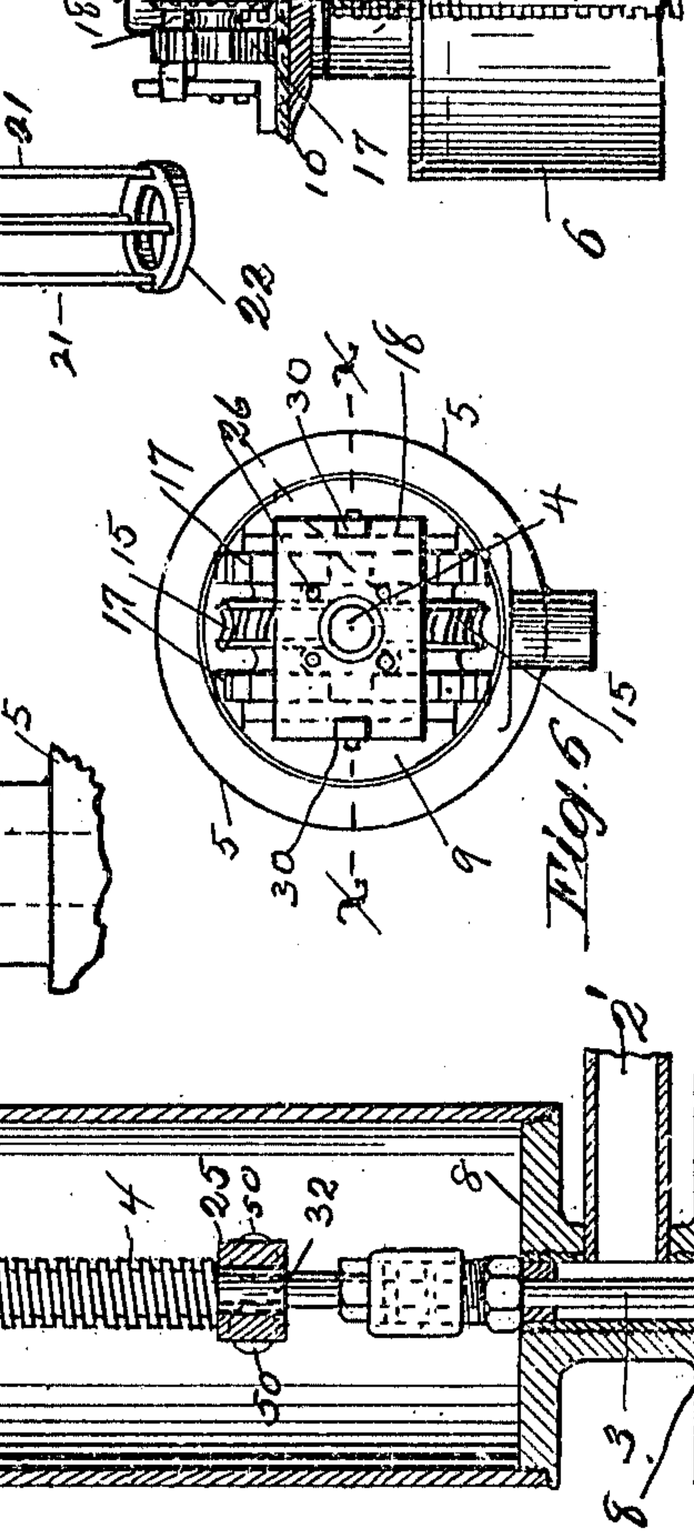

Fig. 4.

Fig. 6.

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UNITED STATES PATENT OFFICE.

SAMUEL LIPPERT, OF CLEVELAND, OHIO, ASSIGNOR TO THE RECIPROCATING POWER AND PUMP COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

GEARING.

955,817. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed November 22, 1905, Serial No. 288,536. Renewed February 4, 1910. Serial No. 542,074.

To all whom it may concern:

Be it known that I, SAMUEL LIPPERT, a citizen of the United States, and resident of Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Gearing, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The objects of the invention are to pump and pull the rods of a single well by means of electric power, which may be supplied from one source to hundreds or more wells, each provided with my device.

The invention is particularly applicable to the pumping and pulling of the well in an oil field, irrespective of the broken or mountainous character of the country and not interfering with the tillage of the soil in farming communities.

By the present method the production of oil is expensive and generally unsatisfactory for the following reasons: By the use of the drilling derrick, beam pumping, the use of a steam boiler and steam engine, or a gas engine are required and the constant attention of a man to every two or three wells. When the pumping is done by steam pumping heads, the steam, or compressed air with which it is run must be piped from the central source or power plant to each well, which is very expensive and requires another power to pull the well rods for repair. The flowing of the oil wells by compressed air requires still more piping and also has the objectionable feature of making the oil roily and muddy, and requires constant attention and a separate mechanical means for pulling the pipes, to mend them when out of repair. The pumping of wells by gas engine and eccentric pumping power, connecting the wells by means of shackle rods, can only be used in level countries and cuts up the tillable surface of the soil. The rods are run from the central power plant in all directions, leaving wedge shape strips of tillage surface between them. The farmer in trying to utilize the unoccupied spaces between the rods, drives over and under them, which kinks and breaks them. By this means alone one-third of the wells pumped by this method are put out of commission. A further objection exists on account of the distance the rods must be run. Whenever the lost motion equals the stroke a new power must be provided, or the well abandoned. This occurs if the well is more than 5000 feet from the power. Many small but paying wells have been abandoned for this cause alone, and another objection is that by this means all the wells on the power are pumped at once to balance the power, and some of the wells are pumped too much and the oil becomes roily, while others are not pumped enough to get all the oil possible. By this process the farmer is depended on to furnish teams to pull the wells, whenever the cups are worn out, or the valves leak, or the well breaks down by the breaking of the shackle rods, which usually occurs when the farmer is busy harvesting, plowing or seeding and cannot furnish his team, thus the oil man waits the pleasure of the farmer while he loses his production, yet his expenses are going on. The pumping of wells with the beam or pumping jack wears the stuffing box hole oblong in shape as the end of the beam or jack travels in an arc. The stuffing box leaks badly at this point and can only be stopped for a short period by repacking. The lost production from this source is enormous. A further objectionable feature is that these rods run in grooves in posts set in the ground from twelve to sixteen feet apart and the friction requires at least one-half of the power necessary to pump with.

My invention is designed to overcome all of these objectionable features. By utilizing the alternating electric current applied to a three phase non-sparking motor at each well it accomplishes:

1st. The pumping of the well at any desired stroke and speed, by a straight stroke which will stay packed and absolutely save the production now wasted because of worn stuffing boxes. This loss alone if saved will pay the cost of my device.

2nd. Should the well valves become worn and leaky or sanded the pulling windlass is so arranged that in a moment the rods can be lifted out of the well and mended without the aid of a team or steam engine.

3rd. The counter balance is so arranged that it equalizes the weight of the rods so that a minimum power is only necessary to create the necessary and desired motions.

4th. The land is unmolested for farming purposes. The wires carry the electric current to the well on long poles high enough to permit the free use of the ground underneath, and the device requires less surface space at the well.

5th. One man can operate as many wells as he can visit and can repair anything found wrong with any well, the device being especially arranged for quick repair and continuous working.

I accomplish these results by means of a motor secured to the windlass platform and located in close proximity to the well. The motor shaft is connected to a gear which runs a larger gear upon which are mounted two worm wheels and ratchets and dogs, to hold and prevent the worm wheels from turning on their axes until the pump rod, which is screw threaded to mesh in the threads of the two worm wheels, reaches the upper limit of its stroke, when it raises the dogs out of the ratchet wheels, which allows the rods to return in mesh with the screw threaded wheels to a shoulder near the top, which drives the dogs into the ratchets again, when the upward stroke begins again. As these rods weigh from 1000 to 1800 pounds and the load lifted weighs from 700 to 1200 pounds, it requires a great deal of power to lift the rods, so I have provided a counter balance by means of which the weight is almost all taken off, just leaving enough to make the rods fall by gravity when raised to the limit of the stroke. This also reduces the power required to operate a well from 6 HP to $\frac{1}{2}$ HP per well, and acts the same as two wells connected on one crank shaft; one coming up while the other goes down and balancing each other. If this principle were not employed the eccentric power could not be used at all, as the power required would cost more than the oil produced is worth.

The invention consists further, in the peculiar mechanical movement of a divisional and automatically released nut upon the screw threaded extremity of the sucker or pumping rod, in mechanism for rotating the nut, in the pulling device, and in the various forms of construction, and combination and arrangement of parts as hereinafter described, shown in the accompanying drawings and specifically pointed out in the claims.

In the accompanying drawings Figure 1 is an elevation of an oil well, casing and head, and pumping or sucker rod, showing an electric motor secured upon a platform which is adjacent to the well head and showing also the nut and gear devices for operating the well rod, a counter balance for the rod, and a windlass for pulling the well. Fig. 2 is a plan view of the same, showing the windlass also for pulling the well. Fig. 3 is a vertical section of the well and pumping head showing the motor and motor shaft in elevation. Fig. 4 is an elevation of pumping head. Fig. 5 is a similar view taken from a position at right angles to Fig. 4. Fig. 6 is a plan view of the pumping head. Fig. 7 is a vertical section on line *x*—*x* Fig. 6. Fig. 8 is a perspective view of the holding plate and shifting ring, showing the rods connecting them. Fig. 9 is an end elevation of windlass gearing, showing brake mechanism. Fig. 10 is a transverse section of the screw threaded shaft, showing the vertical rod and rollers which prevent the shaft from turning as the nut revolves.

In these views 1 is the casing head of an oil well, 2 the well tube, 2′ the discharge pipe, 3 the pumping or sucker rod, 4 a screw threaded portion or terminal screw for the pumping rod, 5 is a plate secured upon a supporting tube 6 which rests upon a solid foot 8 which is set into the casing 1 and into which the well tube 2 is screwed. Upon the plate 5 is secured the gear nut 9 which engages the screw threaded extremity of the pumping rod and by rotating this nut longitudinal movement in one direction is given to this rod. The nut is provided with gear teeth 10 on its outer edge and is rotated by means of the pinion 11 upon a drive shaft 12, and by means of the electric motor 13, thus forming an independent motive power for the well. The nut is peculiarly constructed to give upward or outward movement of the pumping rod, the return stroke being accomplished by gravity alone, without intervening reverse mechanism of any character. This is accomplished by means of the worm rollers 15, pivoted at 16 on the gear 9 upon either side of the screw threaded rod, and the worm teeth engage the rod in the same manner as the teeth of a nut. These worm rollers are locked and prevented from turning upon their axes on the upward movement of the rod by means of ratchet wheels 17 upon their pivot axes 16, and locking plate 18 which moves down upon the opposite ratchet wheels and its edges serve as dogs to prevent movement thereof when the screw threaded rod is being moved upward by means of the worm rollers. In order to disengage the ratchets from the holding plate to permit of the downward movement of the pumping rod by gravity, the plate 18 is connected by rods 21 with a lower ring 22. A shoulder 25 is seen upon the pumping rod which, when it rises, strikes upon the ring 22 and raises it, thus lifting the holding plate out of connection with the ratchet wheels and permitting the rollers to revolve on their axes and the rod to fall by gravity.

In Fig. 7 holes 26 are shown in dotted

lines, which serve as guides for the rods 21 passing through the gear 9. The rods 21 thus serve to rotate the plate 18 in unison with the roller nut.

Springs 27 upon the pin dogs 28 serve to retain the holding plate 18 where placed, and the two positions for engagement and release are preserved by means of notches 29 in the upright bars 30.

Balls 31 serve to prevent friction of the nut 9 in its bearings.

The screw threaded portion 4 of the sucker rod may be a portion of the rod, or a sleeve secured thereon as shown at 32.

The shaft of the electric motor may be flexible, as shown, to permit of placing the motor and windlass and platform at any angle to the well so as to adapt it to a hillside. It is not essential however that the shaft should be flexible, since it might be rigid and the platform secured to the support for the pumping device or well tubing, without departing from the spirit of the invention. It is only required that the motor and windlass should be closely adjacent to the well.

Fig. 10 shows guide rollers 50 which are secured to the shifting sleeve 25, and run upon guide rods 51, which serve to prevent the screw from turning around as the nut revolves.

The weight of the screw and well rods or "sucker rods," as they are called, is partially balanced so as to lessen the friction and resulting wear upon the screw, and also to lessen the force of the fall when the screw is released. This is accomplished, as shown in Figs. 1 and 2, by means of the bucket 55 which may be filled with earth, or with as many weights as are required to overcome so much of the weight of the rods and screw as may be necessary. A rope 56 passing over an elevated pulley 57 is secured to an eye in the end of the screw. Guide rods 58 are employed for the wheels 59 upon the bucket.

In Figs. 1, 2, 3 and 9 the windlass 39 and its geared connections with the motor shaft are shown clearly. Here the windlass shaft is shown provided with a spur gear 41 and a corresponding driving pinion 42 is shown on the motor shaft. A shifting lever 43 is shown for the pinion, and a powerful brake band is provided and is shown at 44. 45 is the brake lever, 46 is the ratchet and 47 the holding dog therefor.

It will be seen by reference to Fig. 3 that the screw threaded rod and well rods can be lifted easily out of the tube 6 and well casing and that the large bevel gear bearing the ratchets and worm rollers will lift out of its inclosing sleeve or bearing 5 without difficulty.

In case the well should be a dug well and should not be provided with a metal casing, the foot 8 of the pumping device can be supported upon the usual well platform.

It will readily be seen that the novel mechanism herein described may be used for many analogous purposes as well as for pumping oil wells, and the invention includes such other uses for which the device for obtaining a longitudinal movement of a rod in one direction may be employed.

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

1. In a device for obtaining a longitudinal movement of a rod in one direction, the return movement being automatically accomplished, the combination with the rod having a screw threaded extremity, of a support for said rod, a gear mounted upon said support, a pair of worm rollers pivotally mounted upon said gear and engaging said screw threaded portion of said rod, ratchets upon said rollers, a locking plate adapted to engage said ratchets simultaneously, rods passing through said gear and secured to said plate at their upper ends, a ring to which the lower ends of said rods are secured, shoulders upon the screw threaded rod adapted to engage said plate and ring alternately and means for temporarily detaining the locking plate when in and when out of engagement with the said ratchet wheels, comprising bars upon said gear and spring pressed pins in one member and spaced notches in the other member, substantially as described.

2. In the device described, a rod having a screw threaded extremity, a cylindrical support therefor, a plate or head therefor through which said screw threaded rod passes, a roller bearing for said head, a bevel gear mounted upon said roller bearing loosely sleeved over said shaft, a driving pinion and shaft therefor, for rotating said gear, mechanism upon said gear arranged to move said screw threaded rod in one direction the return movement being accomplished automatically, a transverse bar and sleeve on said shaft, and guides therefor in said support, whereby the rotation of the screw threaded rod is prevented during the movement of the operating mechanism and an adjustable counter weight attached to said screw threaded rod, substantially as described.

3. In the device described, the combination with a screw threaded rod, of a bevel gear loosely sleeved therein, a pair of worm rollers pivoted upon said gear and adapted to engage said screw threaded shaft, ratchet wheels on said gear, a locking plate adapted to engage said ratchet wheels, means mounted upon said rod for releasing said locking plate, and for returning the same into en-

gagement with said ratchet wheels, temporary retaining devices for said locking plate, a bevel driving pinion and shaft for said bevel gear, a cylindrical support and plate therein on which said bevel gear rests, and a closely adjacent source of power for the driving shaft, substantially as described.

In testimony whereof I hereunto set my hand.

SAMUEL LIPPERT.

Witnesses:
WM. M. MONROE,
C. H. OLDS.