Sept. 17, 1935. J. R. LONG 2,014,653

WELL PUMPING RIG

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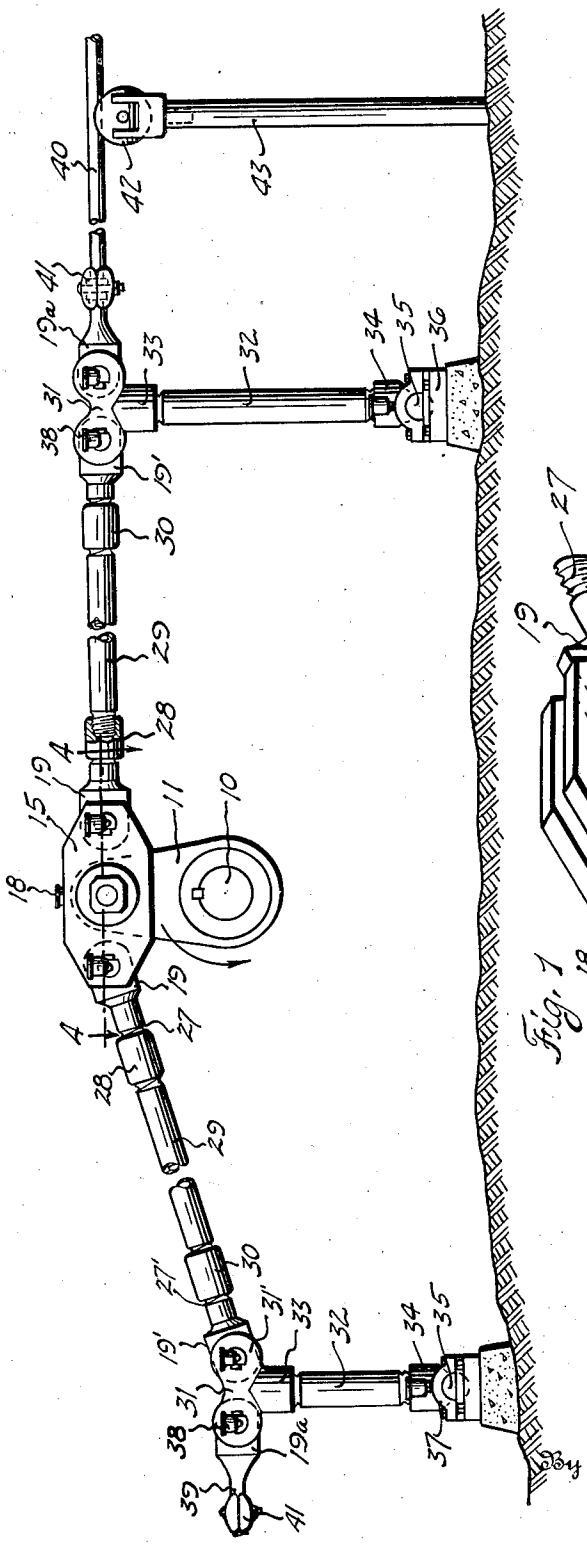


Fig. 1

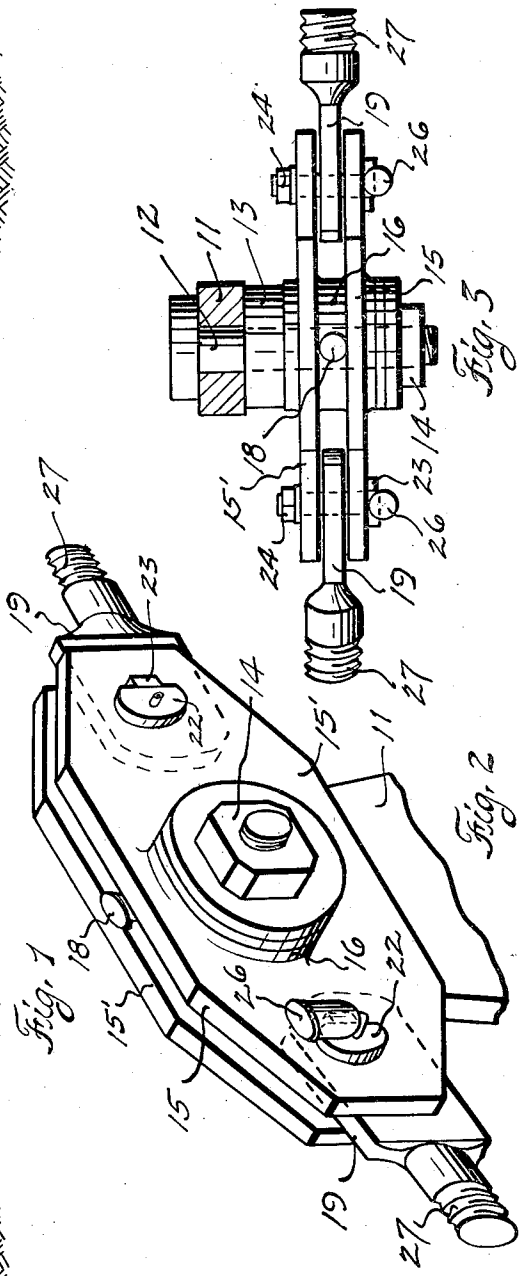


Fig. 2

Fig. 3

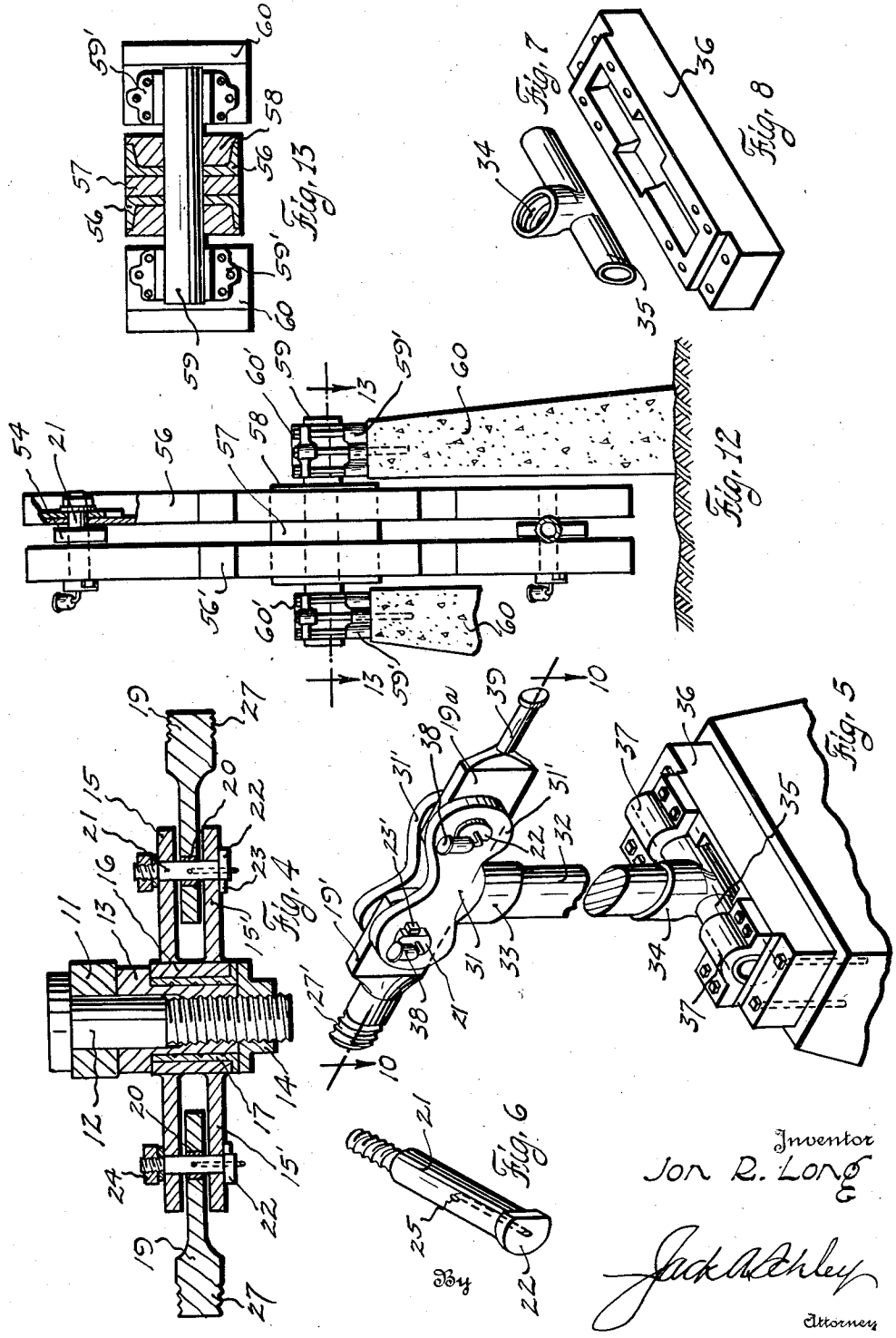
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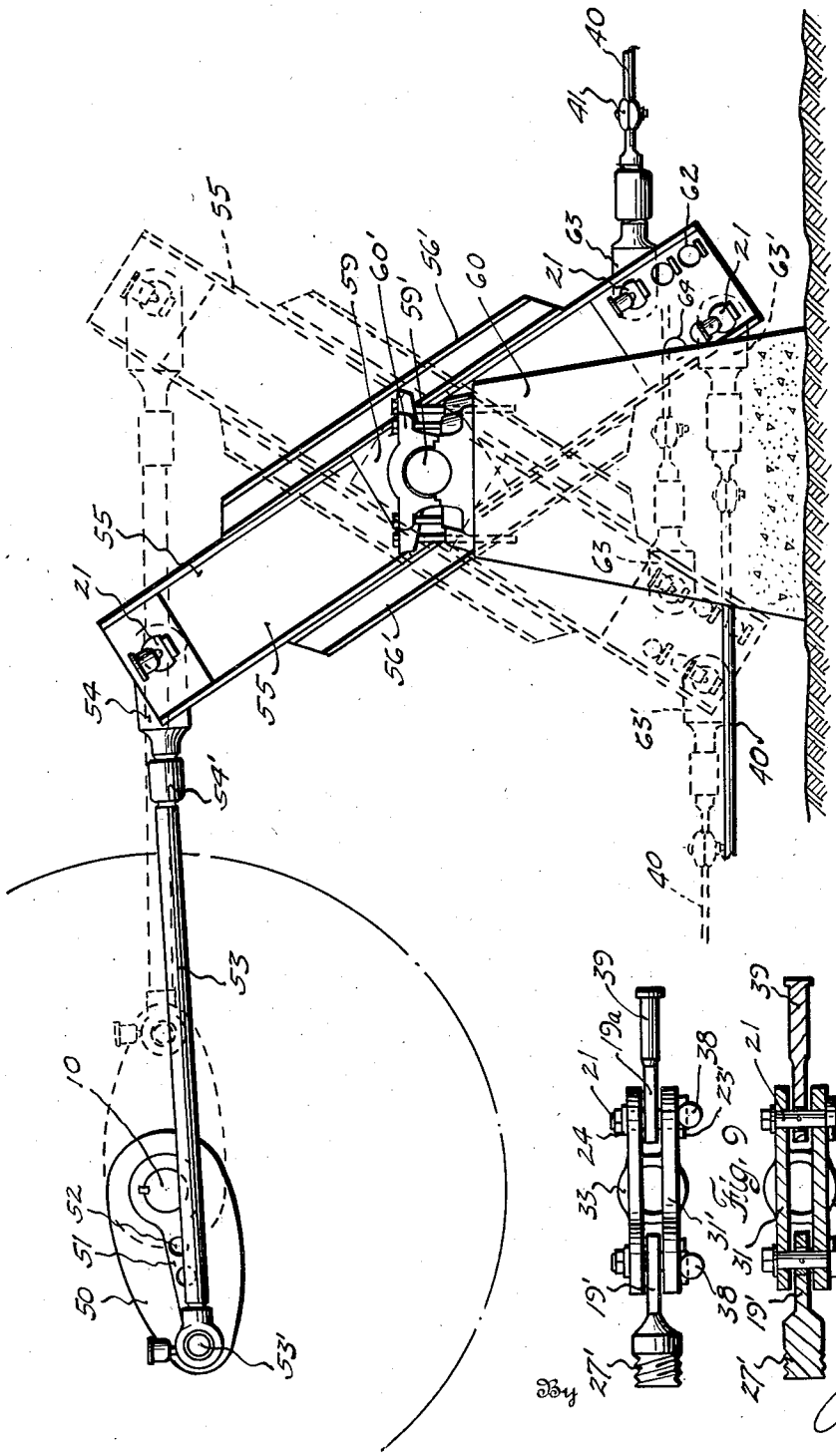


Fig. 11

Fig. 9

Fig. 10

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WELL PUMPING RIG

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3 Claims. (Cl. 74—51)

This invention relates to new and useful improvements in well pumping rigs.

In the pumping of oil wells it is customary to employ a walking beam. The polish rod of the well is suspended from one end of the beam and the beam is rocked by a pitman operated by a crank fastened on one end of the shaft, which in turn is revolved by a band wheel driven from the power plant by a belt or the like. Because of the depth of many of the wells, counter-balancing weights are secured to the shaft to off-set the jerk due to the down stroke of the pump rods. Frequently wells belonging to a single owner are located in close proximity, but unless an expensive power plant is used, each well must be equipped with a walking beam and a separate power unit.

One object of the invention is to provide improved means for economically pumping a number of adjacent wells by driving their pump jacks from the same shaft which operates the walking beam, so that the usual power unit for one well may be utilized in pumping a number of wells, thereby saving power, reducing the cost of equipment and saving expense in maintenance.

Another object of the invention is to eliminate the counter-balancing weight by utilizing the lifted load in the other wells, thereby applying the usually wasted power to lift the oil in the adjacent wells.

A further object of the invention is to provide means for taking up or absorbing the whip and vibrations in the surface rod line, thus making for more uniform and steady operation.

Still another object of the invention is to provide a pumping rig wherein adequate lubrication is obtained and frictional losses are reduced to a minimum; together with the production of a strudy and efficient structure.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings in which an example of the invention is shown, and wherein:

Figure 1 is a side elevation of a pumping rig constructed in accordance with the invention,

Figure 2 is a perspective view of the crosshead,

Figure 3 is a plan view of the same,

Figure 4 is an enlarged horizontal cross-sectional view taken on the line 4—4 of Figure 1,

Figure 5 is a perspective view of one of the stroke posts,

Figure 6 is a detail of one of the pivot pins,

Figure 7 is a perspective view of one of the rockers,

Figure 8 is a perspective view of the stroke post bearing block,

Figure 9 is a plan view of one of the post heads,

Figure 10 is a horizontal cross-sectional view taken on the line 10—10 of Figure 5,

Figure 11 is a side elevation of another form in which the invention may be carried out,

Figure 12 is an end elevation of the same, and

Figure 13 is an enlarged horizontal cross-sectional view taken on the line 13—13 of Figure 12.

In the drawings the numeral 10 designates the shaft on which a band wheel is mounted. This wheel (not shown) is revolved by the power unit and in turn revolves the shaft. The crank and pitman which operate the walking beam are mounted on one end of the shaft and in carrying out the invention I fasten a crank 11 on the opposite end of said shaft. On the outer end of the crank is mounted a wrist pin 12, as is best shown in Figure 4. A flanged sleeve 13 is fastened on the pin by a flanged nut 14. By this means the pin is securely fastened to the crank; however any type of pin may be used.

An elongated crosshead 15 is provided with a central collar or hub 16. A flanged bushing 17 is driven into the collar and is journaled on the sleeve 13. A suitable oil cup 18 is mounted on the hub for oiling the bearing. The crosshead is formed of a pair of spaced side plates 15' united by the hub. Gudgeons 19 are pivoted in the ends of the head between the plates. The head may be formed in any manner suitable to receive the gudgeons. Each gudgeon is preferably made flat and mounted vertically between the plates 15' so as to provide broad bearing surfaces. The gudgeons are provided with bushings 20 and pivot pins 21 fastened in the head are mounted therein.

Each pin 21 has a mutilated flanged head 22 engaging a lug 23 cast on the side plate 15', whereby the pin is held against rotation. Each pin is fastened by a nut 24 and is provided with an oil duct 25 (Figure 6) leading from its head to its bushing. An oil cup 26 mounted in the flanged head supplies oil by way of the duct to the bushing. The lubrication is very important because of the heavy loads. The cups are convenient and require less attention than other means. The bushings which are usually of bronze are an important feature, as they reduce frictional losses and conserve power.

Each gudgeon is provided with a screw-threaded shank 27 for receiving a collar 28, whereby it may be coupled to a pitman 29. The opposite end of each pitman is coupled by a collar 30 with the shank 27' of a gudgeon 19', similar to the gudgeons 19. It will be seen that by removing the collars either gudgeon may be removed and further old tubing or shafting may be used for the pitman. Also the flat gudgeons with their broad bearing surfaces and bushed bearings are made possible.

Each gudgeon 19' is pivoted in the head 31 of

a stroke post 32. The same type of pin 21 is used and lugs 23' hold them against rotation. Each head is formed of two plates 31' similar to the head 15, but these plates are united by a depending cap 33 internally screw-threaded to receive the upper end of the post 32, which may be made of tubing or shafting. The lower end of the post is screwed into the central socket 34 of a rocker 35 journaled in a bearing block 36 and held by a cap 37.

A second gudgeon 19a is journaled in the head 31 the same as the other gudgeons. Oil cups 38 supply oil to the pins 21 of the head 31, like the cups 26. Each gudgeon 19a has a headed shank 39. The pump rods 40 are connected to the shanks 39 by clamps 41. Where necessary the rods 40 are supported on guide rollers 42 carried by posts 43. It is obvious, as is shown in Figure 1, that the stroke posts 32 may vary in height according to the elevation of the pump rods.

When the crank 11 is revolved the crosshead 15 will be swung thereby and owing to its pivot on the pin 21 and its pivotal connection with the pitman 29, will aline itself according to the load. In Figure 1 the crank is shown as revolving in a counter-clockwise direction and the load or pull is on the right hand rod 40. The left hand rod 40 is being pulled by the pump jack and well rods (not shown) which are on the down stroke. The stroke posts swing the pitman in unison with the crank, thus taking vibration and causing a uniform stroke. It would be possible to have both pitmen under load so as to counter-balance the walking beam when its pump rods are on the down stroke.

In Figures 11 to 13, I have shown another structure for carrying out the invention. This form is particularly adapted when the rods are on the ground and adjustment of the stroke is desirable. A crank 50, similar to the crank 11, is mounted on the shaft 10, which carries the band wheel (not shown). This crank is formed with a radial boss 51 which is provided with a plurality of holes or openings 52. A pitman 53 has one end pivotally mounted on a pin 53' in one of the openings 52. The other end of the pitman is secured by a collar 54' to a gudgeon 54, similar to the gudgeons 19. The gudgeon is pivoted to a swinging member 55 in the same manner as the gudgeons 19 are mounted, that is, it is mounted on the pin 21.

The swinging member 55 includes a pair of vertical channel bars 56 which are secured together at their center positions by a spacer block 57. Filler blocks 58 of the same size as the spacer block (Figure 13) are secured in the channels and serve to provide sufficient bearing space for a rocker shaft 59 to extend therethrough. The shaft is mounted in bearing blocks 59' and are held therein by caps 60'. The blocks are secured to standards 60 extending upwardly from the ground. Thus, it will be seen that the member 55 is mounted to swing in an arc as the pitman 53 reciprocates. Suitable reinforcing or back bars 56' may be secured to the outer sides of the channel bars 56 to reinforce said bars, as well as to give added weight at their central portions.

The lower end of the channel bars are provided with a plurality of holes 62 on one side thereof. A gudgeon 63, similar to the gudgeon 19a, is pivoted on the pin 21 in one of these holes and is secured by the clamp to a pumping rod 40. A second set of holes 64 is provided in the channels opposite to the holes 62 and another gudgeon 63' is pivoted in one of these holes. This gudgeon has connection with another pump rod 40. The particular details of the gudgeons and their mounting, shown in Figures 11 to 13, have not been described, for since they are similar to the gudgeons shown in Figures 1 to 10 a detailed description would merely be a repetition. It is pointed out that all the parts are sufficiently lubricated by oil cups.

By observing Figure 11, it is obvious that as the crank 50 revolves the pitman 53 will reciprocate to swing the member 55. Thus, the pump rods 40 secured to the lower end of the member will also be reciprocated to pump the adjoining wells. If it is desired to vary the pump stroke of either or both of the rods 40, it is only necessary to secure their respective gudgeon in a different hole. The openings 52 in the boss of the crank 50 permit varying the stroke of the pitman 53. A quick and easy adjustment can be made and a desired stroke of the rods 40 is had at all times.

The description which has been given recites more or less detail of a particular embodiment of the invention, which is set forth as new and useful, however, I desire it understood that the invention is not limited to such exact details of construction, because it is manifest that changes and modifications may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent, is:

1. A pumping rig comprising, a crank, a crosshead journaled on the crank and including a pair of side plates suitably secured together, a pair of gudgeons pivotally secured to each end of the plates, oppositely extending push and pull pitmen secured to the gudgeons, swinging members pivoted to the pitmen, and means for pivotally connecting pump rods to the swinging members, whereby reciprocation of the pitmen by the rotation of the crank will reciprocate the pump rods.

2. A pumping rig comprising, a crank, a crosshead journaled on the crank, oppositely extending push and pull pitmen pivotally connected to the crosshead, stroke posts each having a head at its upper end and mounted to be rocked, each head including a pair of side plates spaced apart and secured to each other, a gudgeon pivoted between the plates at one end thereof and connecting one end of the adjacent pitman therewith, and a second gudgeon pivoted in said plates at their opposite ends for pivotally connecting the post with a pump rod.

3. A pumping rig comprising, a crank arm revolving in a vertical orbit, a horizontal pin on the outer end of the crank arm, a crosshead pivoted on the pin and having flat sides substantially parallel to the vertical side of the arm, gudgeons pivoted in each end of the crosshead, push and pull pitmen extending laterally on each side of the arm, means for coupling each pitman to one of the gudgeons, and vertical swing posts mounted on each side of the arm having cross heads at their upper ends, each of said last named crossheads having a pivotal connection in one end coupled to the adjacent pitman and a rod clamp pivoted in the other end.

JON R. LONG.