Dec. 14, 1948. E. W. PATTERSON 2,456,531

SETBACK MEANS FOR PUMPING UNITS

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Fig. 1.

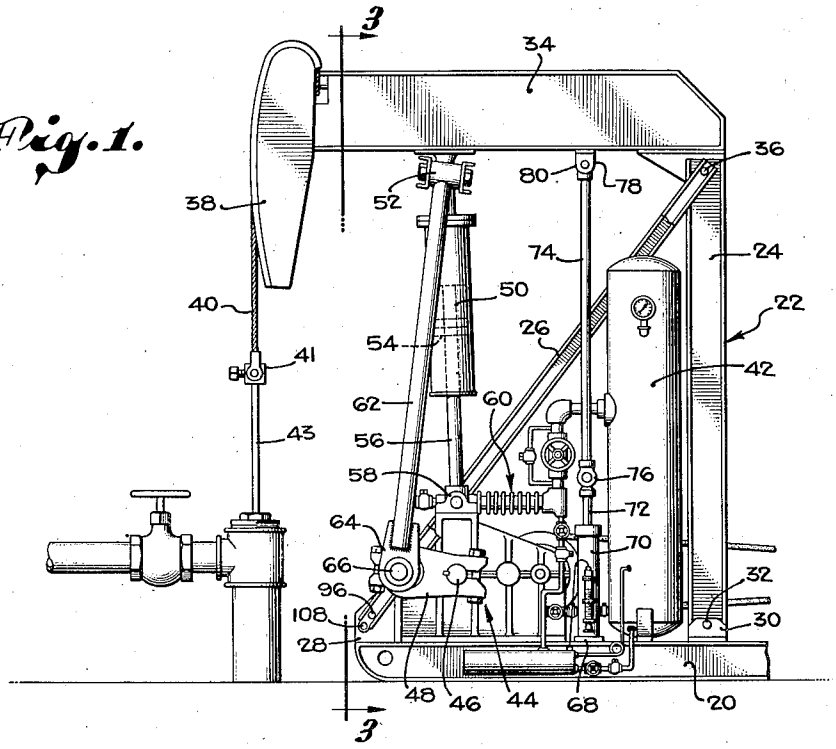
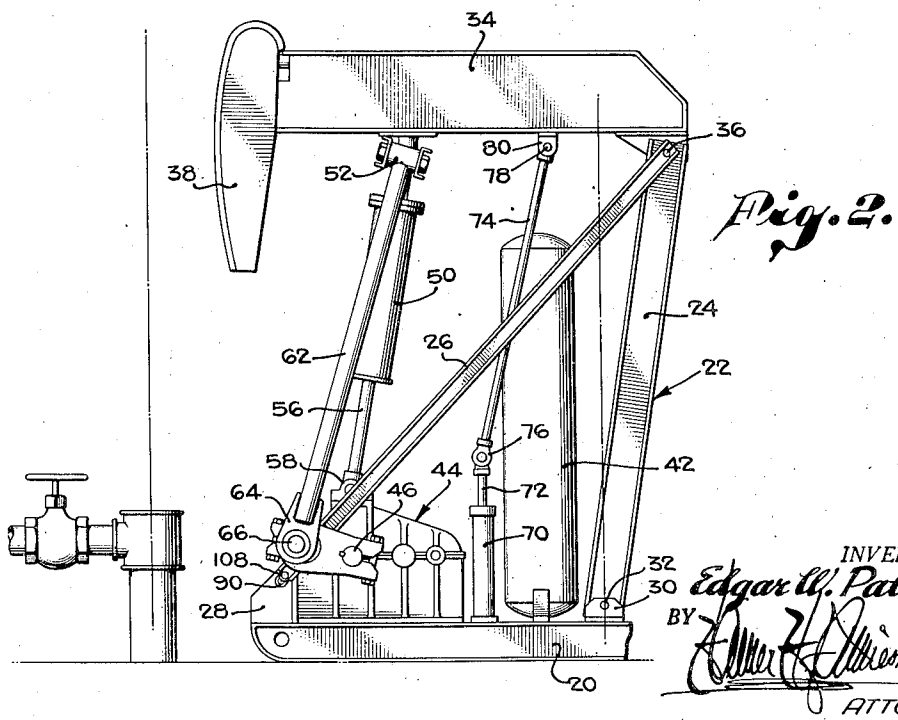


Fig. 2.



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Fig. 3.

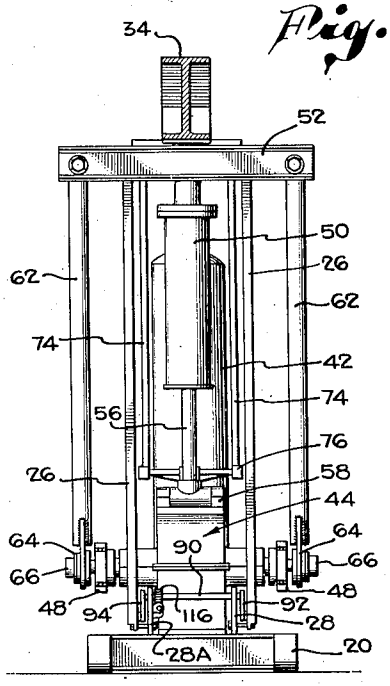


Fig. 4.

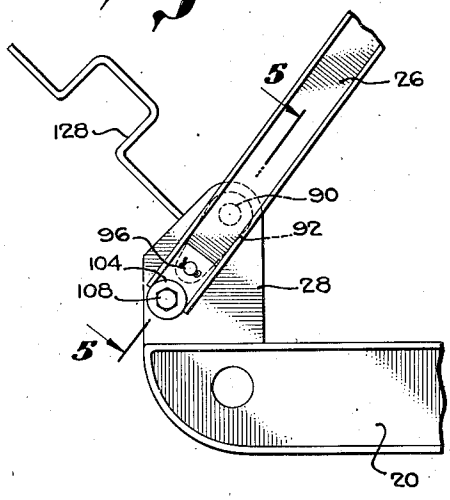


Fig. 5.

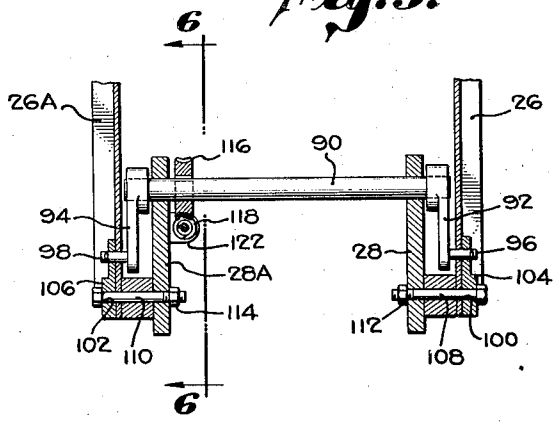
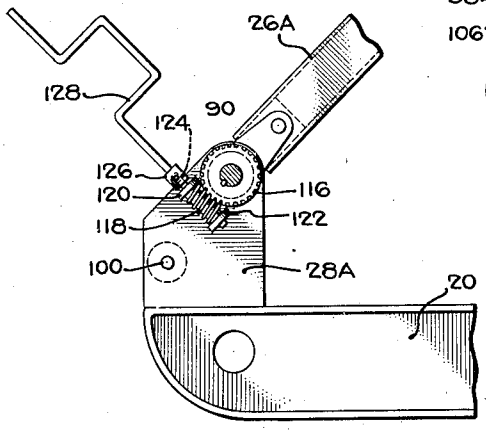


Fig. 6.



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SETBACK MEANS FOR PUMPING UNITS

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Application June 30, 1947, Serial No. 758,130

1 Claim. (Cl. 255—17)

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This invention relates to pumping units such as the air balanced oil pump shown in my United States Patent No. 2,169,815 and includes among its objects provision of improved means for temporarily displacing the head of a pumping unit from its operating position immediately over the mouth of a well.

In prior constructions, such as above referred to, a vertically oscillating pump arm, or rocking beam is pivotally mounted at one end thereof so as to suspend from its other end the line of a sucker rod suspended in the mouth of the well directly below, the movement of the rocking beam being caused by a vertical drive arm attached between its ends, and the whole unit, including air compressor, reservoir, balance chamber and motor, being mounted on a generally horizontal base to which are attached upright bracing members supporting the rocking beam.

It is necessary from time to time to have access to the well for other than the pumping operations, as, for example, when pulling the pump or removing the tubing.

Accordingly it is necessary to move aside, by one way or another, the overhanging end of the rocking beam to allow clearance for the travelling block, hook and elevators.

This is done by removing the horsehead or swinging it back on the beam or to the side, or back from the well bore, or by rolling the pumping unit away. Accordingly provision for pivotally mounting the upright supports so as to thereby swing to one side the rocking beam was depicted in my patent above referred to. However such pivotal assembly has been operated for many years by a gang of men who upon freeing the locking elements, obtained the necessary leverage to move the assembly by the use of crow bars, applied along the edge of the base adjacent the well mouth. One drawback to such operations has been the presence of the compressed air in the unit which at such time may unexpectedly release and cause damage.

By the present invention there is now provided easy operating means whereby the upright supporting structure may be progressively swung back in constantly controlled manner and with self-braking means provided throughout the whole cycle of operation.

It is an object of the invention thus to provide an arrangement of parts whereby such a pumping unit may have its walking beam and horsehead tilted back from the well mouth a controlled amount and with increased safety and operating facility for the workman.

Other objects and advantages of the invention will be apparent from the following description and claim, the novelty consisting in the features of construction, combination of parts, the unique relations of the members and relative proportioning, disposition, and operation thereof, all as more completely outlined herein and particularly pointed out in the appended claim.

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In the drawings, which form part of the present specification:

Figure 1 is a side elevational view of a well pumping unit embodying my invention shown located in operating position in relation to the mouth of a well;

Fig. 2 is a similar view with parts removed for greater clarity and particularly showing the pump head in displaced or retracted position in relation to the mouth of the well;

Fig. 3 is an end elevational view of the well pumping unit as seen from the left of Figure 1, partly in section;

Fig. 4 is an enlarged fragmentary side elevational view of the base of the unit particularly showing the portion which embodies my invention;

Fig. 5 is a transverse sectional view taken along the line 5—5 of Figure 4; and

Fig. 6 is a longitudinal sectional view taken along the line 6—6 of Figure 5 and particularly showing the worm gear.

As seen particularly in Figure 1, there is provided a pumping unit supported jointly by a generally horizontal base 20, and an identical pair of upwardly extending, parallel, triangular members 22 disposed on opposite sides thereof. The individual members 22 are joined together by suitable bracing to form a vertically mounted Samson post 24 and a pair of angular struts or supports 26, the latter having their ends secured respectively to the top of the upright 24 and adjacent the horizontal base 20, being affixed at the latter point to vertical brackets 28. The lower end of the Samson post 24 is in turn attached to a pair of mounting shoes 30 of the base by means of a horizontal pin 32.

The conventional, generally horizontal walking beam 34 is pivotally secured at one end to the top of the Samson post 24 by means of a fulcrum shaft 36 and carries at its opposite end a horsehead 38 over which the reins 40 of a pump polish rod are led into a cross-bar 41 to which the polish rod 43 is attached. The base of the unit is located adjacent the well head in such manner that the horsehead will be located directly thereabove in the conventional manner.

An air reservoir tank 42 is located adjacent the Samson post and mounted on the base 20. Rotatably journalled in the conventional gear box 44 is a low speed drive shaft 46 to the ends of which is keyed a pair of crank arms 48, one on each side of the gear box. The shaft 46 is operatively connected to a power unit by suitable driving means not shown in detail.

A cylindrical air balance cylinder 50 is pivotally supported by a universal mounting from a cross-head 52 affixed to the underside of the walking beam 34, the balance cylinder being thus adapted to reciprocate vertically along a stationary piston 54 supported within the chamber by a vertically disposed hollow piston rod 56, which is pivotally mounted at its base. The upper end of the hollow piston rod communicates with the cylinder 50 and the lower end of the hollow rod 56 communicates with the air reservoir 42 through the pivotal base 58 and air line 60.

A pair of vertically swinging pitman rods 62 is pivotally secured to the cross-head 52 at its upper end and attached by a terminal crank pin bearing housing 64 to the crank arm 48 by means of a horizontal crank pin 66 mounted in crank arm 48.

Fixedly secured to the base adjacent the air reservoir by means of a footing member 68 is an upright compressor unit 70 having slidably extending from its upper end a piston rod 72 connected to a vertically disposed pair of pitman rods 74 through a cross-head 76, the upper ends of the pitman rods being provided in turn with horizontal trunnions 78 transversely disposed in a dependent bracket 80 of the walking beam.

Journalled jointly in the upright brackets 28 and 28—A is a horizontal shaft 90 bearing on each end, beyond the brackets, a vertically swinging crank arm 92 and 94, each arm having fixed to its free end an outwardly projecting pivot pin 96 and 98 respectively inserted transversely through the adjacent angular braces 26 and 26—A. The lower ends of the braces are each provided with a transverse aperture 100—102 parallel to the pivot apertures longitudinally displaced along the struts thereabove and extending through a common reinforcing block 104 and 106 disposed in the aperture formed in the angular strut. When the pump head is in operating position the apertures 100 and 102 are disposed in alignment with corresponding openings in the adjacent brackets 28 and 28—A so as to have inserted jointly therethrough a locking bolt 108 and 110 having a nut 112 and 114 respectively threadedly mounted on one end. Adjacent the inner face of one bracket (28—A) the shaft 90 has fixed thereto a radially extending worm wheel 116 operatively engaged by a horizontal worm gear 118 which is journalled in a pair of transversly extending, parallel mounting ears 120 and 122. The outwardly projecting axle 124 of the worm gear in turn is adapted to be engaged by the coupling socket 126 of an operating crank 128.

Accordingly, when it is desired to tilt back the horsehead 38, the two lock bolts 108 and 110 are first removed and the operating crank 128 is then rotated to move the worm wheel 116 which by its rotation turns jointly the two crank arms 92 and 94 so as to travel slowly through an arc of 180 degrees and thereby throw back the triangular frame 22 from the position illustrated in Figure 1 to that shown in Figure 2. It is to be noted that during the entire operation, the engaged worm 118 and gear 116 are in self-locking position so as to be moved only by the force positively applied to the operating crank. Accordingly the crank may be released at any intermediate position and the frame 22 will remain in this location until subsequently moved in either direction by the crank. This is of particular importance in

view of possible accidental venting of compressed air remaining in the unit as previously noted.

When it is again desired to bring forward the operating head of the pump, the movement of the crank 128 is accordingly reversed. A significant advantage by this construction is that when thus dropping the frame to its resting position, engagement of the gear 118 and wheel 116 control or break the throw so that the struts 26 are retracted gradually, thereby preventing shock and strain to the assembly which would be occasioned by their suddenly slamming down. Subsequent replacement of the lock bolts 108 and 110 results in a quickly effected strengthening of the frame structures to produce a reinforced rigidity essential for prolonged operation.

It should be noted additionally that the present assembly may be retracted or retrieved entirely through the medium of the effort of a single workman on the operating crank 128, in marked contrast to the prior construction. This is in addition to the great advantage of increased safety and uniform controllability of the unit at any position in the arc of travel.

While I have shown and described in some detail a presently preferred embodiment of my pump tilting mechanism it is to be understood that various modifications may be made in the construction and operation thereof within the spirit and scope of the subsequently claimed invention which is to be construed broadly and limited only by the prior art.

I claim:

In a well pumping unit including a base, a post pivoted at its lower end to said base and extending upwardly therefrom, a walking beam pivotally secured to the upper end of said post with one end arranged to extend over a well to be pumped, a strut connected at its upper end to said post, and releasable means for positively securing the upper end of said post against pivotal movement relative to said base during pumping operation of said unit: the improvement which comprises a horizontal shaft rotatably mounted transversely of said base, a crank arm secured to said shaft, with the outer end of said crank arm pivotally secured to the lower end of said strut, a worm wheel secured to said shaft, a self locking worm gear rotatably mounted on said base for meshing engagement with said worm wheel, and means for rotating said worm gear to rotate said shaft and crank arm to cause said strut to pivot said post relative to said base to selectively position said end of said walking beam over a well or to retract such end from over the well without movement of said base, said worm gear being operative to lock said worm wheel, shaft, crank arm, strut and post against movement from any position of adjustment thereof.

EDGAR W. PATTERSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
921,680	Downie	May 18, 1909
2,169,815	Patterson	Aug. 15, 1939
2,194,066	Caldwell	Mar. 19, 1940