Nov. 14, 1939. W. C. TROUT ET AL 2,179,649

BEAM WEIGHT

Filed Jan. 27, 1936 3 Sheets-Sheet 1

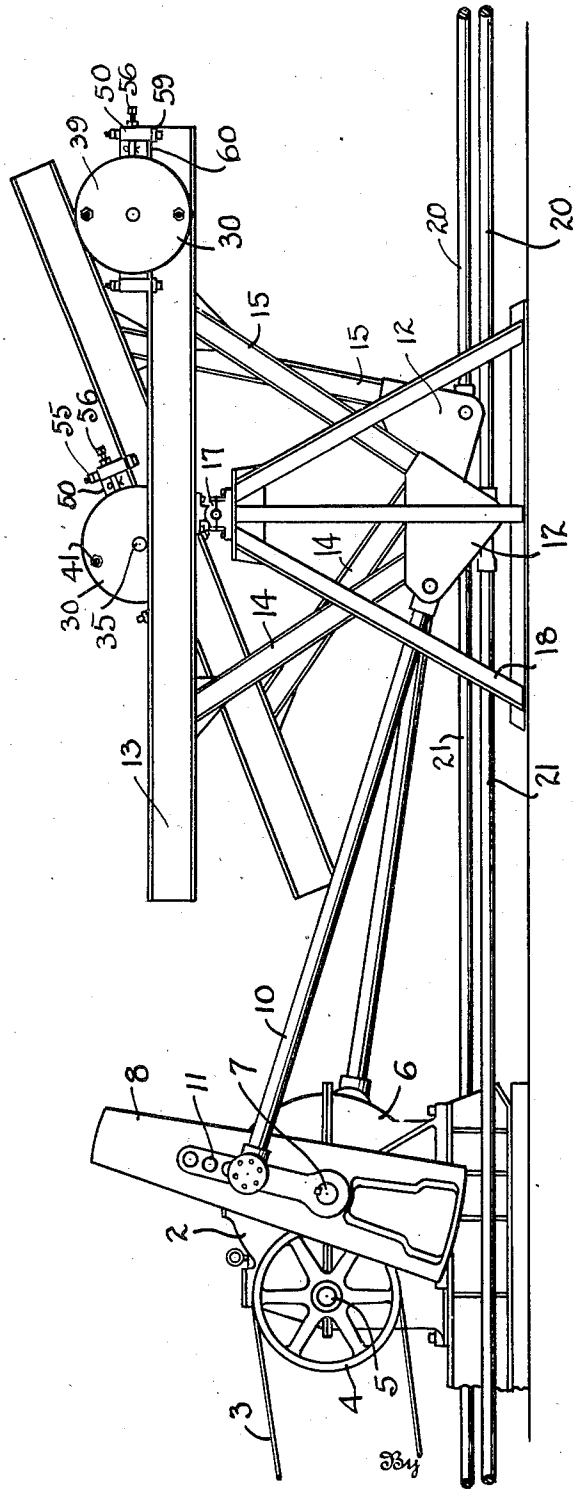


Fig. 1.

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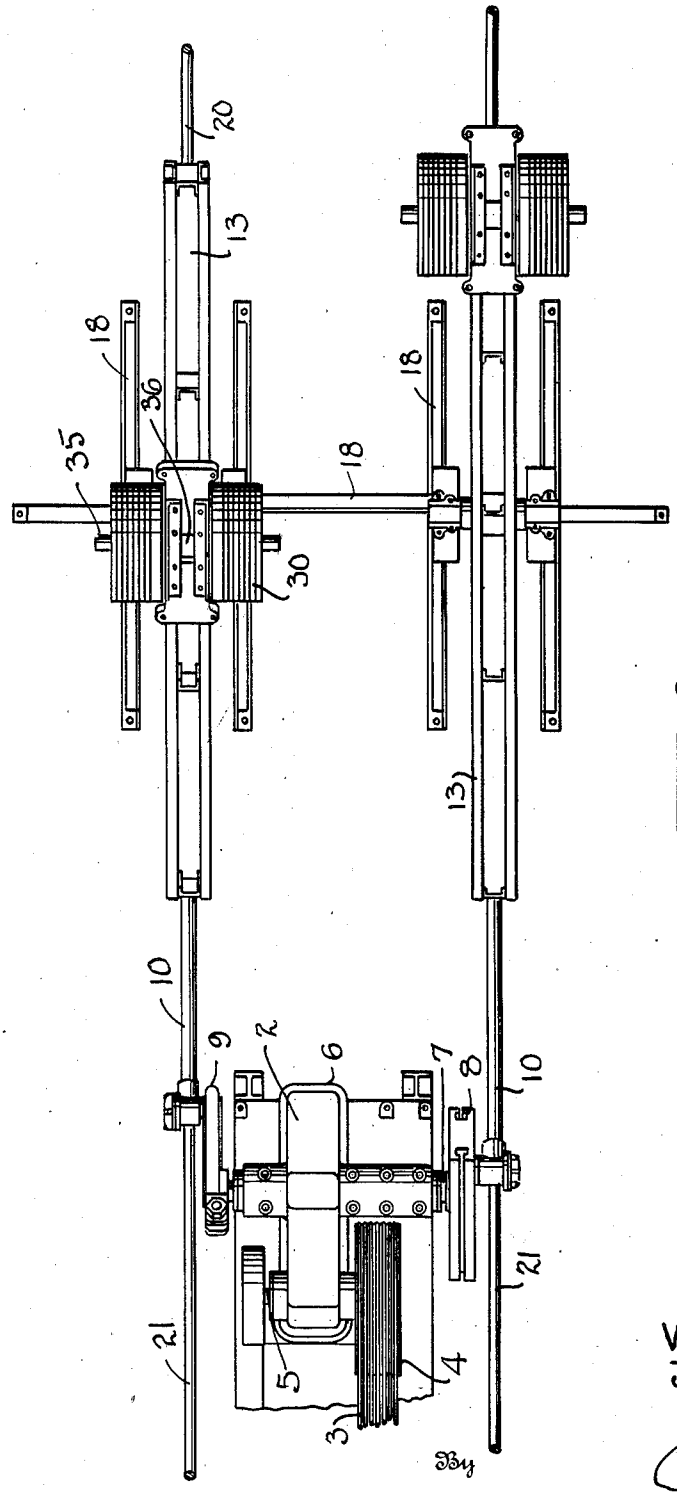


Fig. 2.

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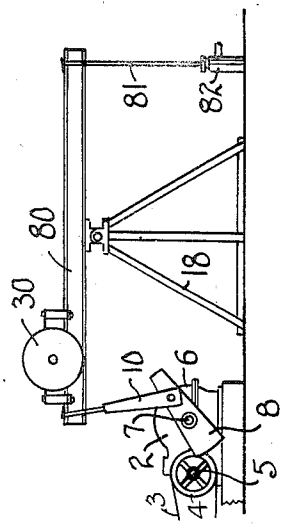


Fig. 6.

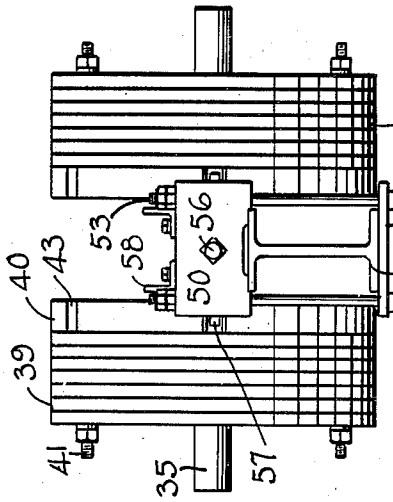


Fig. 5.

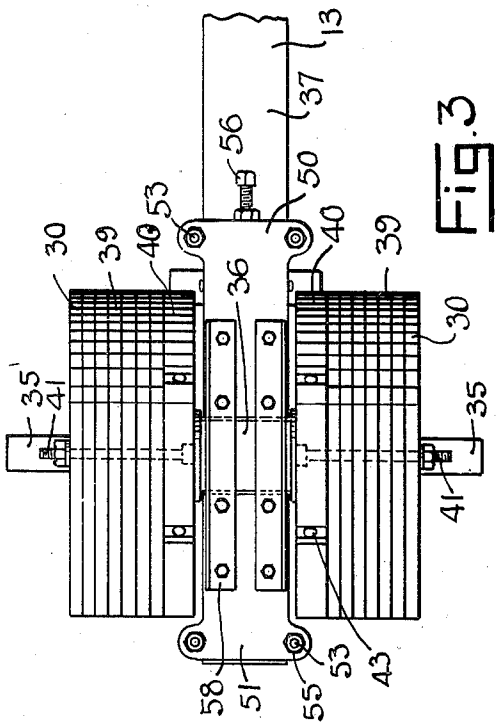


Fig. 3

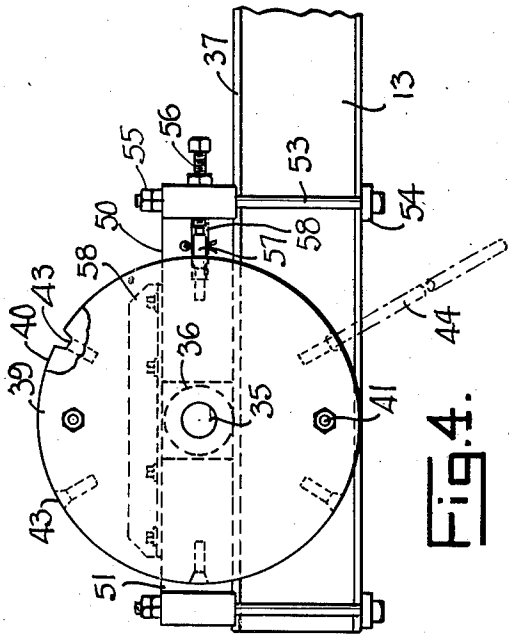


Fig. 4.

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UNITED STATES PATENT OFFICE

2,179,649

BEAM WEIGHT

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Application January 27 1936, Serial No. 60,956

8 Claims. (Cl. 74—41)

The invention relates to an improvement in a counterbalanced vertical swing and particularly of the type used with a walking beam in a well pumping mechanism.

The invention is particularly adapted for use in combination with a pumping unit and back-side crank construction wherein a plurality of wells are pumped with a single pumping unit and in which each well must be balanced independently in order to obtain the most efficient operation.

It is one of the objects of the invention to provide in combination with a pumping unit a plurality of vertical swings each of which may be connected to a well and balanced independently.

Another object of the invention is to provide a beam weight in combination with a pumping jack wherein one or more wells connected to the jack may be balanced.

Another object of the invention is to provide an adjustable beam weight which may be readily moved to any desired position along the beam in order to either balance or counterbalance a pull in either direction with respect to the axis of oscillation and the beam.

Another object of the invention is to provide a beam weight which may be readily adjusted by rolling it longitudinally of the beam and clamping it in any desired position.

Another object of the invention is to provide a beam weight wherein the weights are mounted upon a rotatable shaft which supports the weights upon the beam.

Still another object of the invention is to provide in combination with a walking beam a roller beam weight which may be moved to any position along the walking beam and upon either side of the pivot point of such beam.

Other and further objects of the invention will be readily apparent when the following description is considered in connection with the accompanying drawings wherein:

Fig. 1 is a side elevation of a double crank arm pumping unit connected to a pair of vertical swings in which the back-side crank assembly is illustrated with two pump rods connected to each of the swings.

Fig. 2 is a top plan view of the hookup of Fig. 1.

Fig. 3 is a top plan view of the beam weight in position on the beam.

Fig. 4 is a side elevation of the weight shown in Fig. 3.

Fig. 5 is an end view locking at the beam with the weights assembled in operative position thereon.

Fig. 6 is a diagrammatic view illustrating an arrangement of the crank and beam weight as connected to a standard type of walking beam.

In Fig. 1 a pumping unit is indicated generally at 2 and embodies a construction wherein power is applied to the belt 3 in order to rotate the drive wheel 4. This wheel is in turn mounted upon a shaft 5 carried by the pumping unit and by means of reduction gears inside of the housing 6 the crank shaft 7 is rotated at a relatively slow rate. A crank arm 8 is affixed to the crank shaft 7 and Fig. 2 shows a second crank arm 9 affixed to the opposite end of the crank shaft 7 where it projects from the housing 6 on the opposite side.

It seems obvious that upon rotation of the shaft 7 the cranks 8 and 9 will be caused to rotate.

Connected to the crank 8 is a pitman rod 10 which may be connected in any one of the openings 11 in the crank, depending on the length of the stroke which is desired. The other end of this pitman 10 is connected to the vertical swing at 12 in order to effect oscillation thereof as the crank 8 rotates.

The vertical swing includes the walking beam 13 which has the braces 14 and 15 fixed thereto. These two braces converge at the point 12 and the pitman 10 is connected thereto adjacent this point as seen in Fig. 1.

The walking beam oscillates on the center iron or bearing 17 which is in turn mounted upon the jack post 18. All of these parts are shown as being made of structural steel elements but they may be made of any desired material.

Also connected at the point 12 to the swing are the pump rods, one of which is indicated at 20 and the other at 21. These two rods extend in opposite directions and will be connected by a suitable pumping jack to the sucker rods in the well in order to operate the pump. By connecting a well to each of the rods 20 and 21 a saving in power output is effected because the wells may serve to balance each other to some extent. If desired, however, only one pump rod may be connected to the swing.

In order to obtain the desired balance of one well with the other or one well by itself a beam weight is indicated generally at 30. This weight is best seen in detail in Figs. 3, 4 and 5, and comprises a transverse shaft 35 which carries an enlarged hub portion 36. This hub portion as seen in Fig. 3 is of a width to bear upon the upper surface 37 of the walking beam and in this manner support the beam weight 30.

This weight may be made up of a plurality of discs 39 and the support disc 40 so that the amount

of weight may be varied by affixing the plates 39 to the support weight 40 by means of a plurality of bolts 41.

The support weight 40 is fixed on the shaft 35 and is arranged to rotate therewith when the weight is to be moved longitudinally of the beam. Movement of the weight is effected by means of the sockets or openings 42, a plurality of which are formed in the periphery of the support weight 40. A bar such as 44 in Fig. 4 may be inserted in any one of these openings and the leverage applied will then tend to rotate the support weight 40 and the shaft 35 so that the hub 36 will roll along the top face 37 of the beam. This method of moving the beam in order to obtain the desired balance is of particular advantage because the weights themselves need not be lifted or skidded along where there is considerable friction, but the entire weight may be rolled easily because of the leverage obtained from the turning of the support weight 40 and the rolling hub of the shaft 35.

The hub 36 rests on the top of the beam 13 and is confined between the blocks 50 and 51 which are on opposite sides of the roller hub. These blocks may be suitably anchored to the walking beam as seen in Figs. 3 and 4 by means of the clamping bolts 53 which pass through a bar 54 on the under-side of the walking beam. By tightening the nuts 55 the blocks 50 and 51 may be rigidly clamped in position on the walking beam to confine the shafts 35. A locking or latching device for the roller weights is seen in Fig. 3 where a latch bar 57 is slidably mounted in a slot 58 in the block 50. A set screw 56 is threaded into the block 50 so that the latch bar 57 can be moved into the tapered entrance to the openings 43. When this bar is moved into the opening the weight is locked against vibration. A cap plate 59 is seen bolted to the blocks 50 and 51 to connect them together as a unit, and also serves to confine the hub 36.

Fig. 2 shows a top plan view of the whole assembly wherein the twin swings are in operation by a single pumping unit. If desired only one swing and either one or more wells may be connected to the pumping unit. If desired the swings may be positioned anywhere in the pull line and need not necessarily be adjacent the pumping unit as shown. The walking beams 13 are here shown as assembled of channels.

Either a standard crank such as 9 in Fig. 2 may be used on the pumping unit or a special crank such as 8 may be used so that counterbalance weights may be attached.

Fig. 1 shows a slightly modified form of the clamp for connecting the beam weight to the walking beam, and in this form the bolts 53 are somewhat shorter and pass through a bracket 59 which will engage underneath the upper flange 60 on the walking beam. Either type of clamping mechanism may be used.

In operation one or more wells are connected to each swing and the beam weight can be readily adjusted in order to obtain the desired balance of these two particular wells and the adjustment can be readily made because of the fact that the weight can be rolled longitudinally of the walking beam. If the load on one well is materially greater than the other the weight may be placed at either end of the beam and in Fig. 1 the weight is shown at the extreme right end of the walking beam which is in the foreground, whereas the similar weight on the walking beam in the background is placed approximately at the center indicating that the two wells connected to that walking beam are approximately balanced.

It is to be understood that this beam weight is of particular advantage because it can be rolled along the beam to assume any position either to the right or left of the center iron 17.

Fig. 6 shows a diagrammatic view of the beam weight applied to a walking beam 80 wherein the pumping unit 2 is connected directly to the walking beam and the walking beam in turn connected directly to the pump rod 81 on the well 82.

Broadly the invention contemplates a beam weight which may be readily adjusted and very carefully positioned in order to exactly balance the loads which are applied to the pumping jack and to arrange in combination with a pumping unit a plurality of independently balanced pumping jacks.

What is claimed is:

1. A vertical swing for pumping mechanisms comprising a double jack post, a pair of swings positioned thereon to oscillate in a vertical plane, each of said swings including a beam, a swing frame connected thereto, means to connect each swing to the wells to be pumped and to a pumping unit, and adjustable means to counterbalance each beam in accordance with the pull thereon from the well.

2. In combination with a gear unit, a walking beam, a pull frame fixed thereto, a pitman rod connecting said unit and frame to oscillate said walking beam, two pull rods for wells connected to said frame and extending in opposite directions so that the pull on the wells will substantially balance, and an adjustable counterbalance to balance the pull on said two rods or to counterbalance either one of said rods in event the other rod is disconnected.

3. A pumping unit comprising a double jack post, a pair of swings positioned thereon to oscillate in parallel planes, means extending in opposite directions for connecting each swing to wells to be pumped, a walking beam on each of said swings, and a counterbalance adjustably positioned on each of said beams whereby each swing may be balanced for the composite load thereon, and a single power unit to operate both swings.

4. A pumping unit comprising a pair of walking beams, a counterbalance adjustably positioned upon each of said walking beams, a swing frame depending from each of said beams, means for supporting said beams and swing frames to oscillate in parallel planes, means extending in opposite directions from each of said frames for connection to wells to be pumped, and means for swinging said beams and frames upon said first mentioned means including a power unit having one of said swings connected to each side thereof.

5. A pumping unit comprising a pair of walking beams, a counterbalance adjustably positioned upon each of said walking beams, a swing frame depending from each of said beams, means for supporting said beams and swing frames to oscillate in parallel planes, means extending in opposite directions from each of said frames for connection to wells to be pumped, and means for swinging said beams and frames upon said first mentioned means, said last mentioned means comprising a gear reduction unit having twin crank arms and a pitman rod connected from said arms to the respective swing frames.

6. A pumping unit comprising a pair of swings, each of said swings comprising a walking beam

having a depending frame attached thereto, means for supporting said swings to oscillate side by side in parallel planes, means extending in opposite directions for connecting the depending frame of each of said swings to wells to be pumped, and counterbalance means on each of said beams for adjustably balancing the swing load when either one or two wells are connected to the swing.

7. A pumping unit comprising a pair of swings, each of said swings comprising a walking beam having a depending converging frame attached thereto, means for supporting said swings to oscillate about a common axis, pull rods connected to each of said frames and extending in opposite directions therefrom in the planes of oscillation, a pitman rod connected to each of said frames, means for driving said pitman rods, counterbalance means on each of said beams to balance the swing load, said pull rod connection being releasable to hook on or hook off the loads on said swings.

8. In combination, a walking beam, a pull frame fixed thereto, means connected to the frame to oscillate said walking beam, two pull rods for wells connected to said frame and extending in opposite directions so that the pull on the wells will substantially balance, and an adjustable counterbalance to balance the pull on said two rods or to counterbalance either one of said rods in event the other rod is disconnected.

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