

Dec. 19, 1939.

C. I. THOMAS.

2,184,200

COUNTERROTATING COUNTERBALANCE

Filed May 5, 1938

2 Sheets-Sheet 1

Fig. 2.

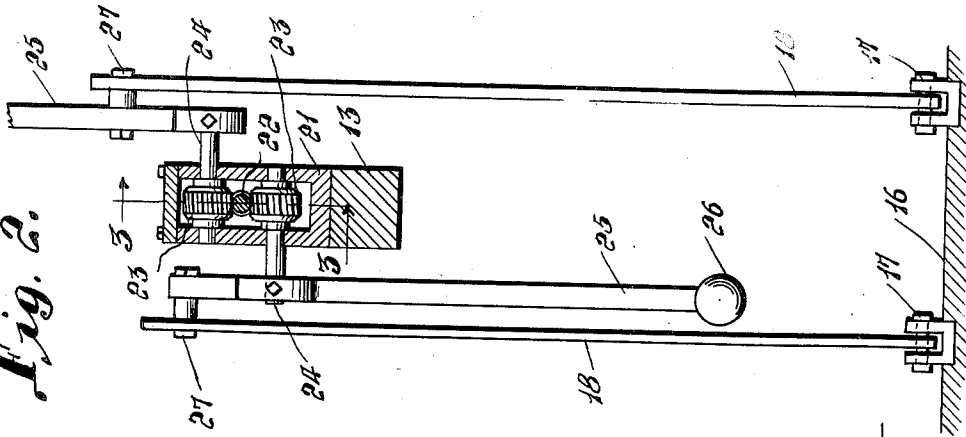


Fig. 3.

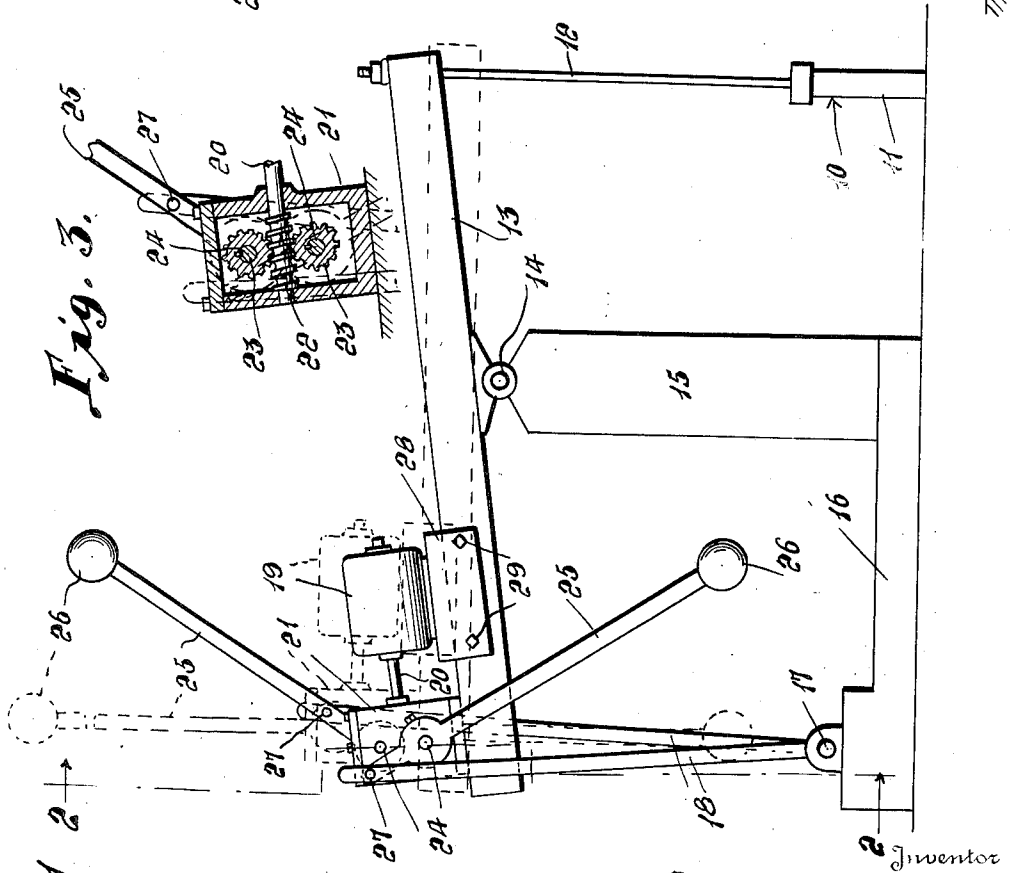


Fig. 1

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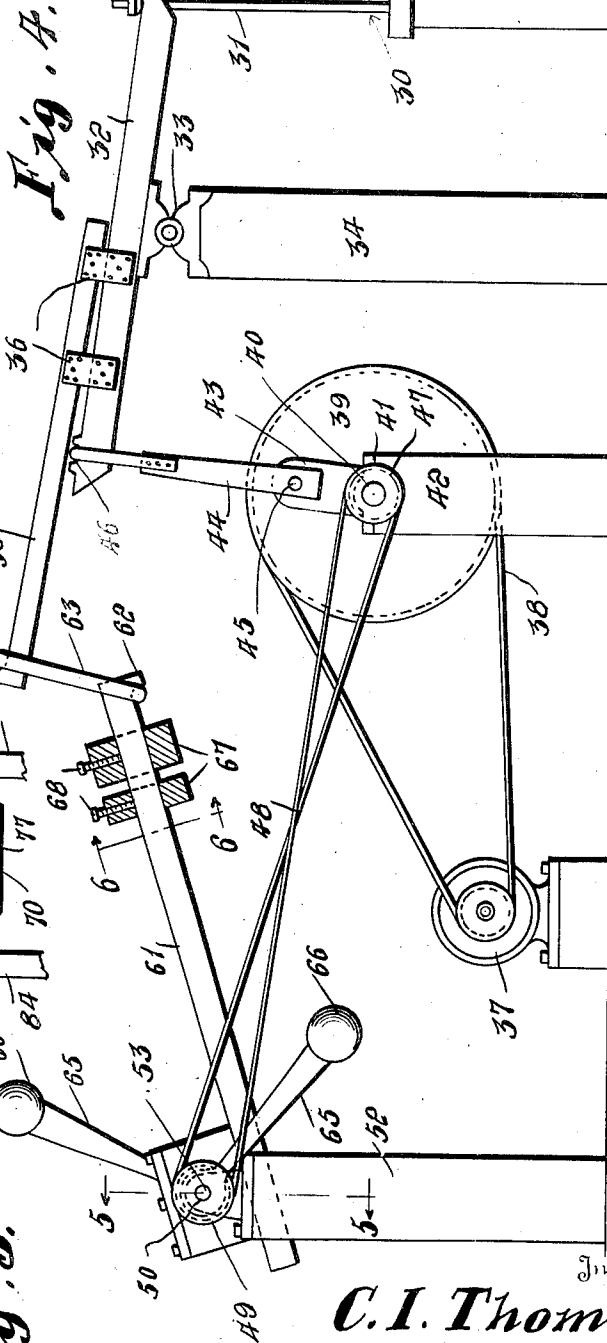
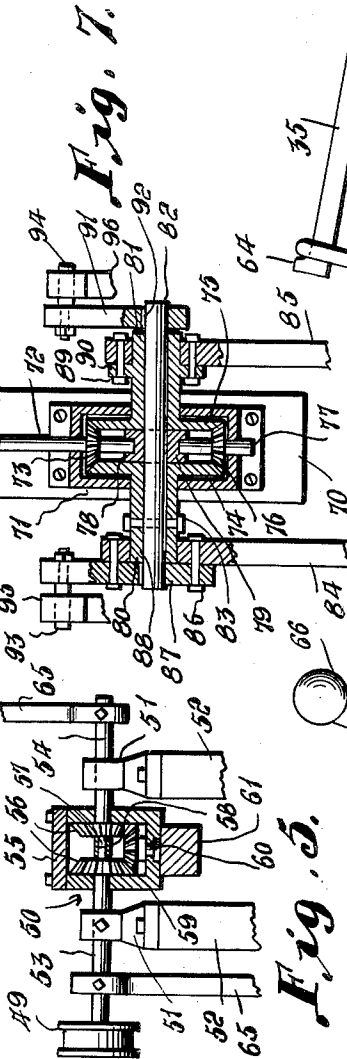
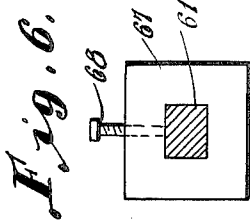
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2 Sheets-Sheet 2



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COUNTERROTATING COUNTERBALANCE

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Application May 5, 1938, Serial No. 206,249

5 Claims. (Cl. 74-41)

This invention relates to a counterrotating counterbalance particularly applicable on a beam and forming part of a pumping rig or apparatus for wells.

5 An important object is to provide a means which will make the load on the motor of a pumping well more nearly even and continuous throughout the complete cycle so that it will be possible to use smaller motors with less consumption of power or electricity.

10 It is further aimed to carry out the invention through the use of weights or weighted arms in pairs, on the same or a different shaft, but mounted on or in the same beam, with one rotating 15 opposite the other, for instance through the medium of gears or reaction links, and at the sides of the beam. Such weights or arms are balanced vertically one above and one below the beam, with the beam in a horizontal position and then 20 with the beam in that position, the weights are moved forward approximately one-fourth of a revolution and are synchronized with the center of the well back stroke, the synchronization varying with the type hook up and with the load.

25 It is further aimed to provide a structure carrying out the invention having crank arms to operate in the same direction.

The more specific objects and advantages will become apparent from a consideration of the description following taken in connection with accompanying drawings illustrating an operative embodiment.

In said drawings:

35 Figure 1 is a side elevation of one form of well pumping device or rig carrying out the invention;

Figure 2 is a vertical sectional view taken substantially on the plane of line 2-2 of Figure 1;

Figure 3 is a vertical sectional view taken substantially on the plane of line 3-3 of Figure 2;

40 Figure 4 is a side elevation of a second form of the invention;

Figure 5 is a view taken substantially on the plane of line 5-5 of Figure 4;

45 Figure 6 is a detail section taken on the plane of line 6-6 of Figure 4, and

Figure 7 is a horizontal sectional view, fragmentarily showing another form of the invention.

Referring specifically to the drawings wherein like reference characters designate like or similar 50 parts, and first to Figures 1 to 3, 10 conventionally shows an oil or other well pump the same having a cylinder or casing 11 and pumping mechanism associated therewith, of which 12 is the polish rod reciprocable therein as usual. Such rod at its 55 upper end is connected to a beam or lever 13 piv-

oted at 14 to a support or Samson post 15 rising from a case member 16. Pivoted to the base member in spaced apart relation, as at 17 is a pair of upstanding reaction links 18.

A prime mover such as an electric motor 19 is 5 mounted on beam 13 and its main shaft 20 is journaled in the wall of a casing or housing 21, mounted on said beam. Keyed to the shaft 20 within the casing 21 is a worm 22 enmeshed with 10 worm wheels 23 keyed to shafts 24 journaled in walls of said casing 21, at a right angle to the shaft 20. Weighted members or arms 25 are keyed, one to each of the shafts 24 and are located on opposite sides of the casing 21. Said 15 members 25 carry weights 26 at their free ends and each member at a crank or wrist pin 27 is pivotally connected to the upper end of the adjacent reaction link 18.

A suitable weight or weights as at 28 is adjustably mounted on the beam 13 as by means of 20 screws 29.

It will be realized that the motor 19 through the shaft 20 and gearing rotates the weighted arms 25 in opposite directions and actuates the reaction links and accordingly the beam 13 and 25 the pumping mechanism. The weight of the balls or members 26 is approximately one-eighth of the fluid load to be lifted by the pump and the weight 28, when the beam is level and the reaction links vertical, has a weight equal to the total of the arms 30 or rods 25 plus one-fourth of the fluid lift. The weights are adjustable and are but approximate.

Referring to the form of Figures 4, 5 and 6, the pumping mechanism at 30 is conventional and similar to that at 10, the polish rod 31, being con- 35 nected to a beam 32 pivoted at 33 at the top of a support or Samson post 34. Said beam 32 has an extension 35 fastened thereto as at 36. The operating prime mover is shown at 37 in the form of an electric motor driving an endless belt 38 40 trained around a pulley 39 keyed to a shaft 40 journaled in a bearing or bearings 41 mounted by supporting means 42. A crank 43 is fastened to shaft 40 and pivoted to a reaction link 44 at 45, which reaction link is loosely connected at 46 to the beam 32.

A pulley 47 is keyed to the shaft 40 and a belt 48 is trained thereover and over a pulley 49, 50 keyed to a shaft 50 in suitable bearings 51 surmounting posts or supports 52. Shaft 50 consists of aligned sections 53 and 54 journaled in walls of a gear casing or box 55 within which a beveled gear 56 is keyed to each shaft section 53 and 54. Said shaft sections have reduced inward exten- 55 sions 57, unconnected to each other, and loosely

journalled in a sleeve 58. An intermediate beveled gear 59 is enmeshed with the gear 56 and it is carried by a short shaft 60 journalled in the bottom wall of the gear case 55.

5 Said gear case 55 is rigid on an auxiliary beam 61 having a hooked end 62 loosely engaging a link 63 loosely suspended from a hooked end 64 of the extension beam 35.

10 Keyed to the shaft 50 on opposite sides of the supports 52 are weights or arms 65 adapted to swing in opposite directions, and provided with weights 66 at the free ends thereof.

15 Said arms 65 rotate in opposite directions and function similarly to the arms 25 of the preceding form. It will be realized that the motor 37 the belts 38 and 48 and associated pulleys, drive the shafts 40 and 50 and through the same operate the beams 32, 61 and 35. Adjustable weights 67 are provided on the auxiliary beam 61 adapted to be secured in adjusted positions by screws as at 68.

20 A third form of the invention is disclosed in Figure 7. In such figure, a beam is disclosed at 70. On this beam, a gear casing or housing 71 is mounted in a wall of which, a shaft 72 is journalled, and which shaft may be driven by a motor such as that shown at 19 in Figure 1. On shaft 72, an intermediate beveled gear wheel 73 is keyed, enmeshed with beveled gear wheels 74 and 75 which in turn are enmeshed with an intermediate gear wheel 76 carried by a shaft 77, journalled in a wall of the casing 71. Shafts 72 and 77 are inwardly extended so as to engage sockets at 78 in a bearing block 79, located between the gears 74 and 75. Said gear wheels 35 74 and 75, respectively have sleeves 80 and 81 extending therefrom and journalled in walls of the casing 71. A shaft 82 passes through the sleeves 80 and 81 and the bearing block 79 and sleeve 80 is fixed to the shaft 82 as by a bolt at 83 and the sleeve 81 is journalled on the shaft 40 82. Weighted arms 84 and 85, similar to and functioning like those at 25, are employed. Such arm 84 is bolted as at 86 to a crank 87 keyed at 88 to the shaft 82 while weighted arm 85 is bolted as at 89 to a flange 90 on the sleeve 81, adjacent which, a crank 91 similar to that at 87, is keyed at 92 to the shaft 82. Said cranks 87 and 91, are respectively connected by wrist pins, bolts or the like as at 93 and 94, to reaction links 50 95 and 96, respectively, mounted and functioning like those disclosed at 18.

55 Through operation of the mechanism of Figure 7, the same results are accomplished as with the weights or weighted arms of the other forms, such weighted arms rotating in opposite directions but the cranks 87 and 91 rotate in the same direction.

Various changes may be resorted to provided they fall within the spirit and scope of the invention.

I claim as my invention:

1. In an operating mechanism for a well pump or the like, said mechanism including an operating beam, means to rock said beam including cranks, said means further including oppositely rotatable weight devices, a gear connected to each device, gearing to operate said gears in 10 opposite directions, and reaction links operated by said cranks.

2. In an operating mechanism for a well pump or the like, said mechanism including an operating beam, means to rock said beam, said means including oppositely rotatable weight devices, a gear connected to each device, gearing to operate said gears in opposite directions, cranks rotatable in opposite directions and reaction links operated by said cranks. 20

3. In an operating mechanism for a well pump or the like, said mechanism including an operating beam, means to rock said beam, said means including oppositely rotatable weight devices one serving to rock the beam and the other 25 serving as a balance, a motor on said beam, gearing operated by the motor including oppositely movable gears, one connected to each of said devices.

4. In an operating mechanism for a well pump or the like, said mechanism including an operating beam, means to rock said beam, said means including oppositely rotatable weight devices, a motor on said beam, a casing on said beam having shafts connected one to each device, a worm gear wheel on each shaft, and a worm driven 35 by the motor enmeshed with said worm wheels, reaction links, and crank connections forming part of the first means located between said devices and reaction links. 40

5. In an operating mechanism for a well pump or the like, said mechanism including an operating beam, means to rock said beam, said means including oppositely rotatable weight devices, a casing mounted on the beam, gears journalled in 45 the casing having sleeves extending therefrom, means to operate the gears in opposite directions, a shaft passing through the sleeves and keyed to one of them, the other sleeve being rotatable on the shaft, cranks keyed to the shaft, a weighted arm fastened to one of the cranks, a weighted 50 arm fastened to one of the sleeves, reaction links, and wrist pins connecting the reaction links to said cranks.

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