

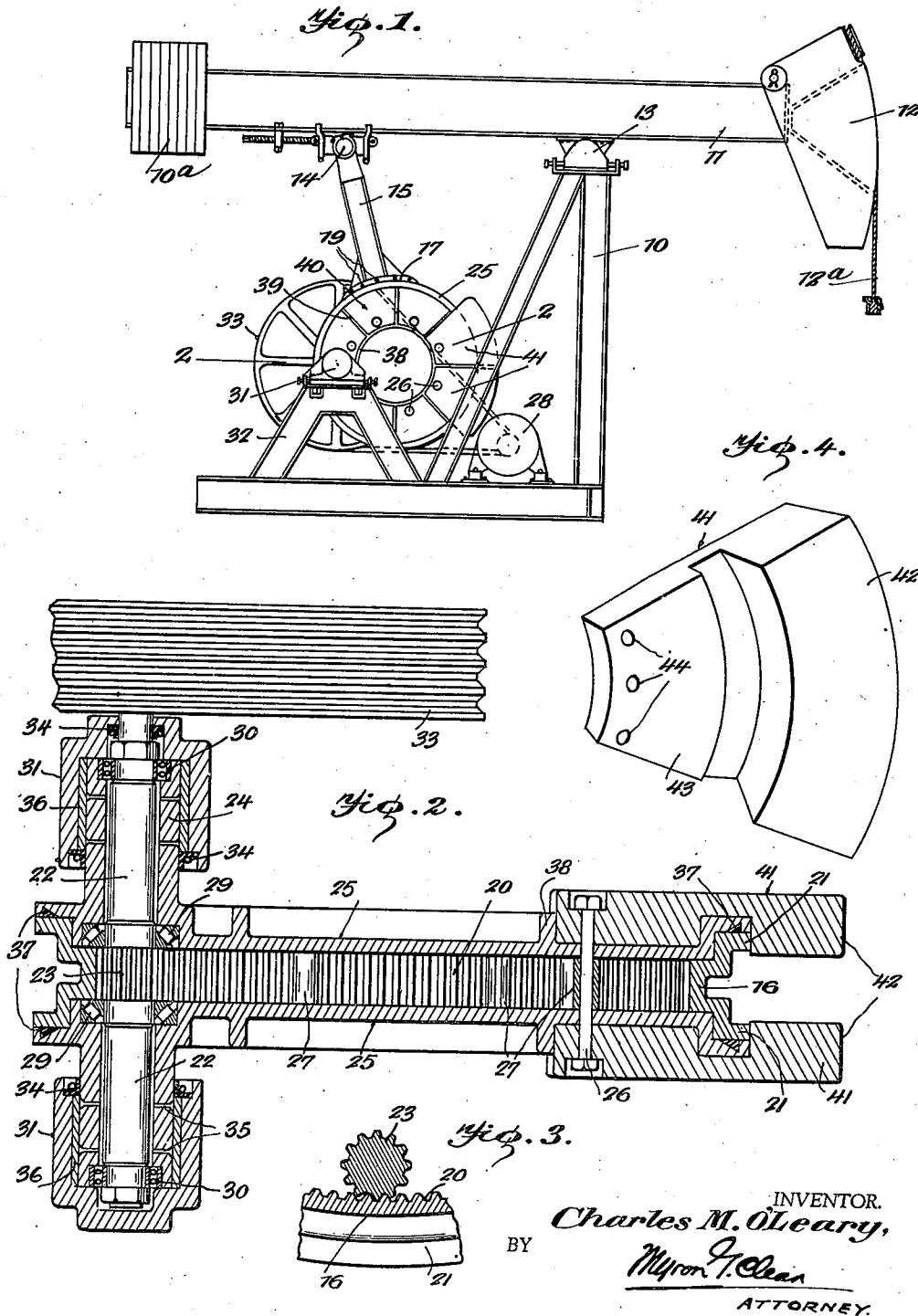
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COUNTERBALANCED PITMAN GEARING

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COUNTERBALANCED PITMAN GEARING

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5 Claims. (Cl. 74—591)

The present invention relates generally to pumping units for oil wells, and more particularly to a pumping unit or apparatus in which a geared pitman is utilized for the purpose of speed reduction as well as an element in the conversion of power rotation to beam or other oscillation, the primary object of the present improvements being the incorporation of counterbalance means in connection therewith and in a manner providing for effectively counterbalanced movements of the unit where, for mechanical or in some instances more or less personal reasons, beam weights are undesirable.

While a geared pitman, utilized with the usual or conventional walking beam, forms an effective unit with counterbalancing weights on the beam, such a pitman may be employed in other hook-ups where it may be highly desirable to counterweight the pitman itself, and it has been found, as proposed by this invention, that the addition of counterweights may be made in a simple, economical manner without otherwise complicating the pitman structure or adversely affecting its intended and desirable functions.

As a further consideration, the invention proposes a counterbalanced pitman gearing which may be used with an otherwise conventional walking beam, either with or without beam weights.

In the accompanying drawing, illustrating the present invention and forming a part of this specification,

Figure 1 is a side elevational view of a pumping unit of the conventional walking beam type, embodying the present counterbalanced pitman gearing.

Figure 2 is a horizontal sectional view taken through the pitman gearing substantially on line 2—2 of Figure 1, and upon an enlarged scale.

Figure 3 is a fragmentary sectional view through engaging portions of the shaft pinion and gear ring, and,

Figure 4 is an enlarged detail perspective view of one of the counterbalancing weights.

Referring now to the above described figures of the drawing, and particularly to Figure 1, there is shown by way of illustration and practical use of the invention, certain parts of a conventional walking beam type of pumping unit, including a Samson post 10, walking beam 11, and horse head 12. In such a unit it is well known that the rocking of the beam 11 on its fulcrum atop the Samson post 10, at 13, alternately raises and lowers the horse head 12 at one end of the beam, and that the latter is con-

nected by suitable reins or other connections 12^a to the polish rod of a well pump to thus alternately raise and lower the sucker rods.

The single pitman 15 of the present invention is connected at one end by a pivotal connection at 14, to the walking beam 11, and is rigidly connected at its other end to a selected point peripherally of a shaftless gear ring 16, better seen in Figure 2. For this purpose gear ring 16 may have external, annularly disposed and laterally spaced ribs 17 between which the respective end of the pitman 15 may be seated. The latter end of the pitman may be flared and provided with openings to register with similar openings of the ribs 17 for the reception of clamping bolts as seen at 19 in Figure 1.

As best seen in Figure 2, the ring gear 16 has an internal, continuous, toothed ring gear 20 around its median portion, with laterally outstanding, angular flanges 21, whose inwardly directed annular surfaces form bearing faces, and whose outer side surfaces allow for effective oil sealing in a manner which will presently appear.

A high speed shaft 22 is mounted through, and at right angles to, the gear ring 16, and has a pinion 23 thereon intermediate its ends which is in mesh with the internal ring gear 20 in a manner which will be clearly apparent from a comparison of Figures 2 and 3. This shaft 22 also extends through the eccentrically disposed bearing portions or sleeves 24 of a pair of side supporting plates or discs 25 of circular form and of a diameter which is shown to be equal to the overall diameter of the gear ring 16.

The above mentioned plates or discs 25, as also best seen in Figure 2, have flanged peripheral portions which present outwardly facing bearing surfaces in close uniform bearing contact with the inwardly directed bearing faces of the gear ring flanges 24, as well as opposing side surfaces which are juxtaposed to the side oil sealing surfaces of the gear ring flanges. These plates or discs 25 are, moreover, rigidly connected by clamping bolts disposed at spaced points therearound through the open space within the gear ring 16, and are rigidly spaced apart in their connected relation by thimbles 27 disposed therebetween and around the said clamping bolts 26.

Thus the side plates or discs 25 rotate freely as a single unit on, and eccentrically with respect to, the high speed shaft 22, so as to act as an eccentric guide for the gear ring 16 whereby the latter is adapted to walk or crawl around the shaft in operation and partake of a shift-

ing eccentric movement during which the guide plates or discs also serve to maintain the shaft pinion and ring gear 20 in uniformly engaged relation and constant desirable depth of mesh.

It will be noted that the bearing portions or sleeves 24 of the side plates or discs 25 are laterally elongated so that the high speed shaft 22 may have antifriction bearings 29 and 30 at substantially lengthwise spaced points at each side of its pinion 23.

The bearing portions or sleeves 24 of the side plates or discs 25, it will be noted from Figure 2, are extended into, and have bearing support within, side journal boxes 31, which are adjustably bolted, for alinement purposes, on supporting pedestal frames 32, one at least of said journal boxes 31 being open at its outer side to accommodate the extended end of shaft 22 on which a large, multiple grooved pulley 33 may be keyed or otherwise removably mounted for receiving power, through multiple belts, from any suitable source as, for instance, an electric motor as indicated at 28 in Figure 1, or an internal combustion engine.

Since the side plates or discs 25 effectively close the space within the gear ring 16 to form an oil chamber or reservoir therein whereby the pinion 23 and ring gear 20 operate in an oil bath, suitable oil seal rings 34 may be incorporated within the journal boxes 31 to prevent leakage of oil around the high speed shaft 22, and around the bearing sleeves 24 which have oil channels 35 therethrough feeding oil to the journal brasses 36. Furthermore, suitable oil seal rings 37 may be disposed, to prevent oil leakage, between the outer side surfaces of the gear ring flanges 21 and the coating faces of the discs 25 opposite said flange surfaces as plainly seen in Figure 2.

As seen in Figure 1, the beam 10 has been shown with beam weights 10^a for counterbalancing purposes, this being a very common manner of counterbalancing a pumping unit of the walking beam type.

There is, however, widespread objection in practical use to the employment of beam weights, and it is for this reason the present invention contemplates that such weights may be eliminated by directly counterbalancing the geared pitman itself, although nothing herein is to be taken as avoided by the use of both beam weights and pitman weights as a combined counterbalance for the unit considered as a whole.

To effectively adapt counterbalancing weights to the geared pitman of the present invention, it is proposed to secure such weights directly to, and as substantially a part of, the supporting side plates or discs 25, since these are the rotating parts of the geared pitman. It is also preferable to extend and utilize the connecting bolts 26 for the above purpose. In furtherance thereof, the plates or discs 25 preferably have external reinforcements including centrally located circular ribs 38, outstanding on their outer faces, and from which radial ribs 39 extend to the flanged edges of the plates or discs, to thus form around the circular ribs, annular series of segmental spaces or pockets 40, each having therein one or more of the connecting bolts 26.

The weights 41, each of similar segmental form, and one of which is shown removed in Figure 4, may have desirably thickened larger ends 42, and inner smaller portions 43 of a shape and size to interfitt the segmental spaces or pockets 40 of the side plates or discs 25.

The smaller end portions 43 of the weights 41

are provided with openings indicated at 44, to receive one or more connecting bolts 26 as in Figure 2, and thus the weights may be employed in opposing relation in pairs without materially increasing the overall transverse dimension of the gear ring 16 and side plates or discs 25, and without materially increasing the length of the high speed shaft 22 to provide for their clearance.

While the segmental weights 41 may take various forms to increase their weight value, it is preferable for this reason to thicken their outer larger end portions 42, beyond the peripheries of the plates or discs 25, in a direction toward each other across the periphery of the gear ring 16 as in Figure 2. In this way it becomes an easy matter to assemble the pitman counterbalancing weights in direct, rigid connection with the side plates or discs 25.

Having thus fully described the invention, what is claimed is:

1. A counterbalanced pitman gearing including a pitman, an internally toothed gear ring rigid with the pitman at one end thereof, a shaft extending through the gear ring and having a pinion thereon in mesh with the internal teeth of said ring, side plates journaled to rotate eccentrically around the shaft and having peripheral bearing engagement with the gear ring at opposite sides of the latter, and counterbalancing weights secured to, and outstanding from, said side plates at approximately equidistantly spaced points upon opposite sides of the pitman.

2. A counterbalanced pitman gearing including a pitman, an internally toothed gear ring rigid, and in line, with the pitman at one end thereof, a shaft extending through the gear ring and having a pinion thereon in mesh with the internal teeth of said ring, side plates journaled to rotate eccentrically around the shaft and having peripheral bearing engagement with the gear ring at opposite sides of the latter, and peripheral counterweights secured directly and rigidly to said side plates at approximately equidistantly spaced points upon opposite sides of, and closely adjacent to, the pitman.

3. A pitman, an internally toothed gear ring at one end of, and in line with, the pitman, a pair of side plates in peripheral interfitting and rotatable relation with the gear ring at opposite sides of the latter, a driving shaft extending through the said plates and forming an eccentric axis of rotation for the latter, a pinion on said shaft in mesh with the internal teeth of the gear ring, said plates having strengthening ribs on the external faces thereof, forming pockets therebetween, counterbalancing weights having portions thereof within said pockets of both plates in oppositely disposed, approximately equidistantly spaced, relation to the pitman, and means rigidly connecting said plates and serving also to anchor the said weights in connection with the plates.

4. In combination, a pitman, an internally toothed shaftless gear ring at one end of the pitman, discs at opposite sides of the gear ring and in peripheral bearing relation therewith, a shaft journaled eccentrically through portions of said discs and having a pinion thereon in mesh with the internal teeth of the gear ring, and counterbalancing weights connected rigidly to the outer faces of said discs peripherally thereof and projecting radially beyond the same and the gear at approximately equidistantly spaced points upon opposite sides of the pitman.

5. In combination, a pitman, an internally

toothed shaftless gear ring at one end of the pitman, discs at opposite sides of the gear ring and in peripheral bearing relation therewith, a shaft journaled eccentrically through portions of said discs and having a pinion thereon in mesh with the internal teeth of the gear ring, counterbalancing weights at the outer faces of said discs peripherally thereof and extending 5 radially beyond the discs and the gear ring at approximately equidistantly spaced points upon opposite sides of the pitman, and means extending transversely through, and connecting, the discs and also extending through and connecting the balancing weights to the discs.

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