Oct. 22, 1940. J. C. SLONNEGER 2,219,080

COUNTERWEIGHTED CRANK

Filed Jan. 6, 1936

Fig. 1

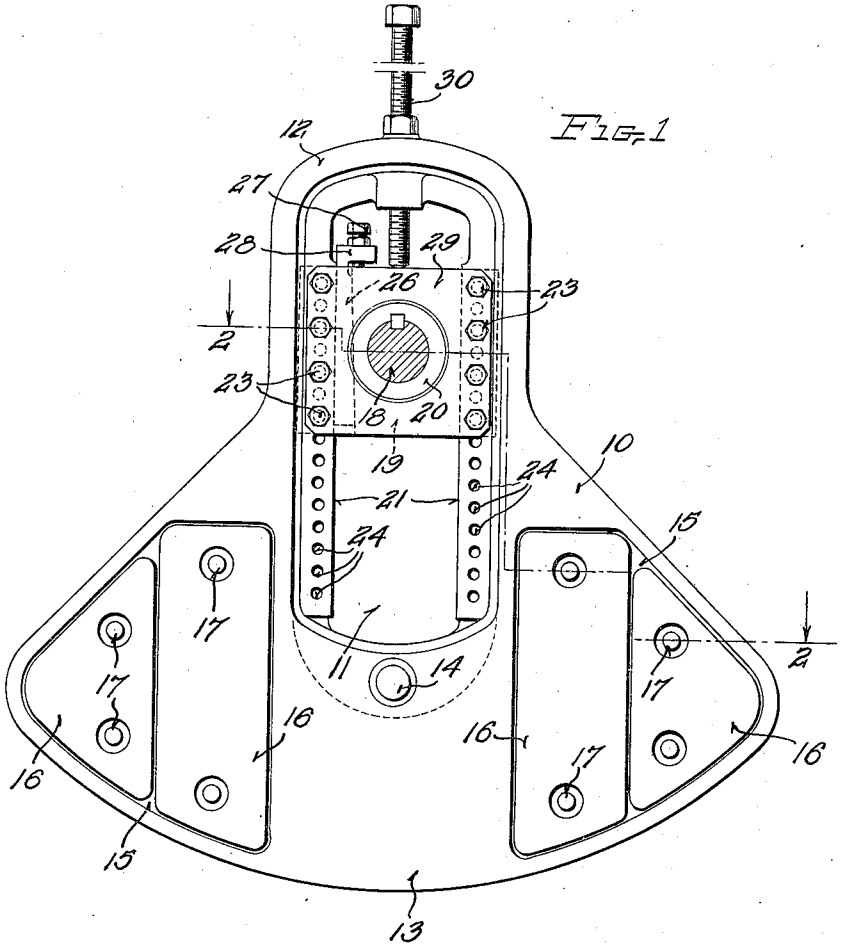
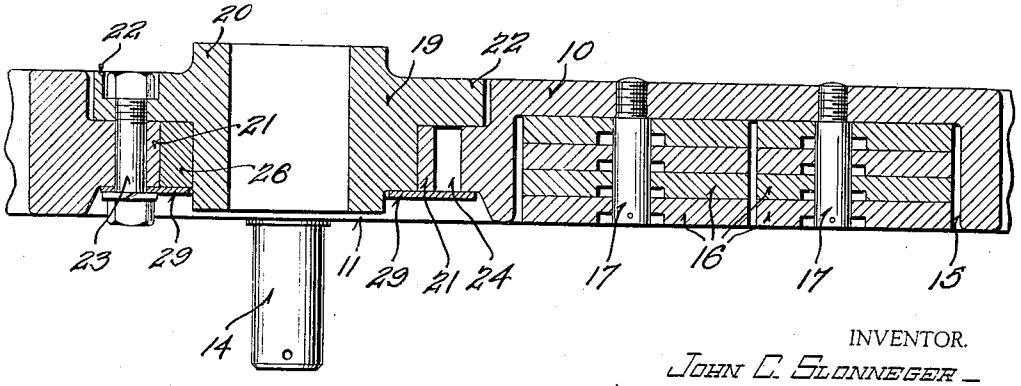


Fig. 2



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COUNTERWEIGHTED CRANK

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4 Claims. (Cl. 74—591)

This invention relates to counterweighted cranks for driving oil well pumps and like equipment.

An oil well pumping apparatus ordinarily includes a long string of pump rods which lead to the bottom of the well and which are supported from and reciprocated by one end of a walking beam arranged at the head of the well. The walking beam is commonly actuated by a power driven rotary crank connected to the other end thereof through a wrist pin and pitman.

It is common practice to regulate the stroke of the pump by regulating the effective length of the crank, this being accomplished ordinarily by shifting the wrist pin from one to another of a plurality of holes provided in the crank at variable distances from the axis of rotation of the crank. The necessary size of the holes and the required spacing between them is such that the number of holes and consequently the number of pin positions is very limited, thus rendering it impossible to effect a fine adjustment of the pump stroke.

It is also quite common practice to fix counterweights to the end of the crank in an effort to smooth out the torque load imposed upon the crank shaft by the fluctuating load transmitted from the pump, and the effect of the counterweights upon the system is disturbed whenever the wrist pin is adjusted to vary the effective length of the crank. To compensate for this, it is ordinarily necessary to independently adjust the size or position of the counterweights whenever the position of the wrist pin is changed.

One object of the present invention is to provide a counterweighted crank for the purposes mentioned in which the position of the counterweights will automatically change to compensate for changes in effective length of the crank.

Another object is to provide a counterweighted crank for the purposes mentioned so constructed as to facilitate adjustment of its effective length.

Another object is to provide a counterweighted crank for the purposes mentioned so constructed as to provide a finer adjustment of crank length than is possible with cranks now in use.

Other objects and advantages will appear, expressed or implied, from the following description of a counterweighted crank constructed in accordance with the present invention.

In the accompanying drawing:

Fig. 1 is an elevation of a counterweighted crank embodying the present invention.

Fig. 2 is a fragmentary sectional view on a larger scale taken along the line 2—2 of Fig. 1.

The crank selected for illustration comprises a casting 10 having an elongated opening 11 formed therein. In this instance the opening 11 extends from a yoke formation 12 at one end into a flaring segmental formation 13 at the other end.

The formation 13 carries a heavy wrist pin 14 securely anchored in the approximate center thereof adjacent the end of the opening 11. The pin 14 projects from the face of the crank in position to receive the usual pitman through which it is connected to the usual walking beam in a well known manner.

In this instance, the formation 13 is dished or hollowed out, as indicated at 15, to receive and partially house a number of plates 16 which constitute counterweights. Various numbers and sizes of plates 16 may be employed in accordance with the magnitude and distribution of the weight required. The plates 16 are shown anchored in place by appropriate studs 17.

The crank 10 is supported and actuated from a shaft 18 through a block 19 adjustably fixed in the opening 11 and having a central hub 20 keyed or otherwise fixed to the shaft. In this instance the block 19 is arranged between a pair of heavy longitudinal guide ribs 21, disposed at opposite sides of the opening 11, and is provided with a pair of heavy marginal flanges 22 which seat against the ribs 21.

The block 19 is releasably secured to the ribs 21 by bolts 23 projecting through the flanges 22 and through perforations 24 formed in the ribs. It will be noted that a series of perforations 24 is provided in each rib 21, extending substantially throughout the length thereof, so that the block 19 may be fixed in various positions within the opening 11 and thereby position the crank pin 14 at various distances from the shaft 18. The effective length of the crank may thus readily be varied. It will also be noted that the perforations 24 are relatively small and closely spaced so that an unusually fine adjustment of the effective crank length is available.

It will be further noted that each adjustment of the effective length of the crank in the manner just described is accompanied by a corresponding adjustment of the counterweights 16 relative to the shaft 18. That is to say, when the block 19 is in the upper end of the opening 11, as indicated in Fig. 1, the effective length of the crank is increased to a maximum and the counterweights are at a maximum distance from the shaft 18; and when

the effective length of the crank is shortened by adjustment of the block 19 toward the lower end of the opening 11, the distance of the counterweights from the shaft 18 is correspondingly reduced. By thus automatically maintaining this relationship, the counterbalancing effect of the counterweights upon the pumping system remains substantially the same in all positions of adjustment.

The crank 10, with its counterweights 16, is very heavy and is subjected to severe stresses during normal functioning, so that any play between the block 19 and the crank 10 would result in severe wear. To avoid this, provision is made for uniting the block 19 and crank 10 into a solid mass. In the crank shown this is accomplished by inserting a wedge bar 26 between the block 19 and one of the ribs 21 in such manner as to securely clamp the block 19 between the ribs 21. In this instance the bar 26 is drawn and secured in tight wedging position by a screw 27 threaded in an offset lug 28 at the small end of the bar and bearing against an end face of the block 19.

A tie plate 29, spanning the opening 11 in the crank 10, and secured in place by the bolts 23, serves to reinforce the crank structure against the spreading effect produced by the wedge bar 26.

Provision is also preferably made for facilitating adjustment of the crank 10 relative to the block 19. In this instance a jack screw 30 is provided for the purpose, the screw being threaded in the yoke 12 and arranged to bear against the end face of the block 19.

Adjustment of the crank 10 relative to the block 19 is best effected while the crank is in the vertical position shown with its counterweighted end 13 below the block 19. With the screw 30 adjusted into contact with the block 19, the wedge 26 is loosened, the bolts 23 and plate 29 are withdrawn, and the screw 30 then turned in a direction to raise or lower the crank 10 relative to the block 19 into the position desired. Then, while retained in the adjusted position by the screw 30, the plate 29 and bolts 23 are reapplied and tightened, and the wedge bar 26 again drawn tight between the block 19 and guide 21 by adjustment of the screw 27. The crank is then ready for operation.

Various changes may be made in the embodiment of the invention hereinabove specifically described without departing from or sacrificing the invention as defined in the appended claims.

I claim:

1. A rotary crank for driving oil well apparatus, said crank comprising a member having an elongated opening formed therein and carrying a heavy mass, a wrist pin carried by said member adjacent the mass, a supporting block guided in said opening for adjustment relative to said wrist pin, and means including bolts for releasably securing said block to said member in various positions of adjustment.

2. A rotary crank for driving oil well apparatus, said crank comprising a member having an elongated opening formed therein and carrying a heavy mass, a wrist pin carried by said member adjacent the mass, a supporting block in said opening and adjustable longitudinally thereof to regulate the effective radius of the crank, and means for securing said block in various positions of adjustment including means for wedging said block in said opening.

3. A rotary crank for driving oil well apparatus, said crank comprising a member having an elongated opening formed therein and carrying a heavy mass, a wrist pin carried by said member adjacent the mass, a supporting block in said opening, screw means for adjusting said block in said opening, and additional means for locking said block in various positions of adjustment.

4. A rotary crank for driving oil well apparatus, said crank comprising a member having an elongated opening therein, a wrist pin carried by said member, guide ribs at the opposite sides of said opening, each rib having a longitudinal series of perforations therein, a supporting block longitudinally adjustable in said opening and having marginal portions seated upon said ribs, bolts in said marginal portions projecting through certain of said perforations to fix said block in various positions of adjustment in said opening and wedge means between said supporting block and one of said guide ribs for tightening said block within said opening.

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