March 31, 1931. G. H. BOWLUS 1,798,780

WELL PUMPING HEAD

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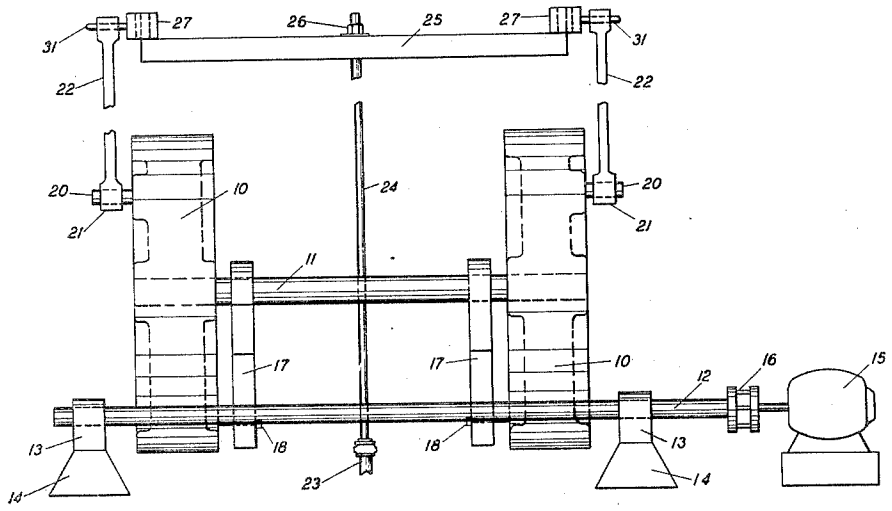


FIG. 1

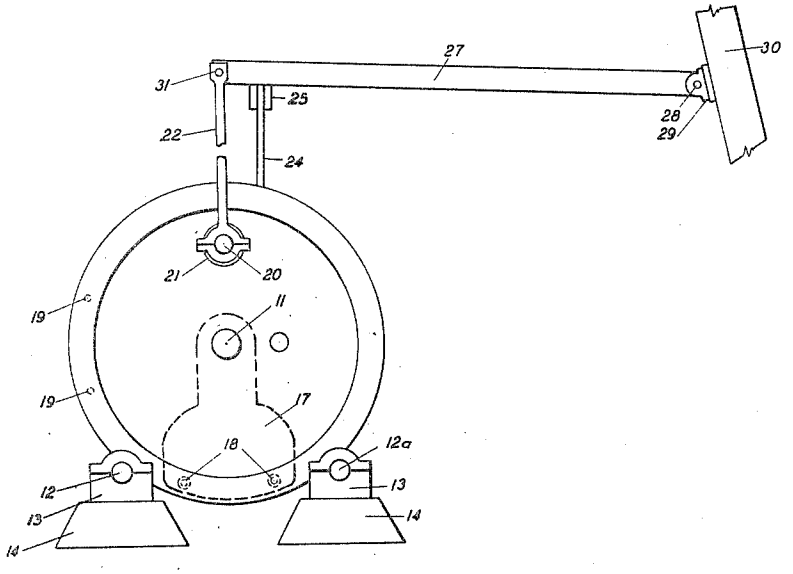


FIG. 2

GLENN H. BOWLUS.
INVENTOR

Paul W. Fritzman
ATTORNEY

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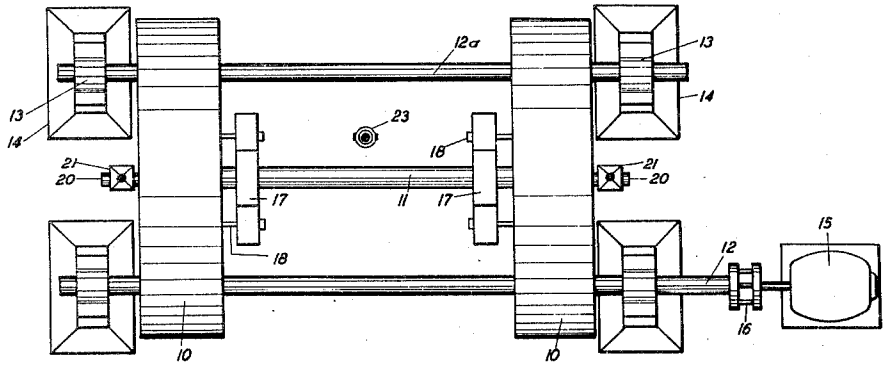


FIG. 3

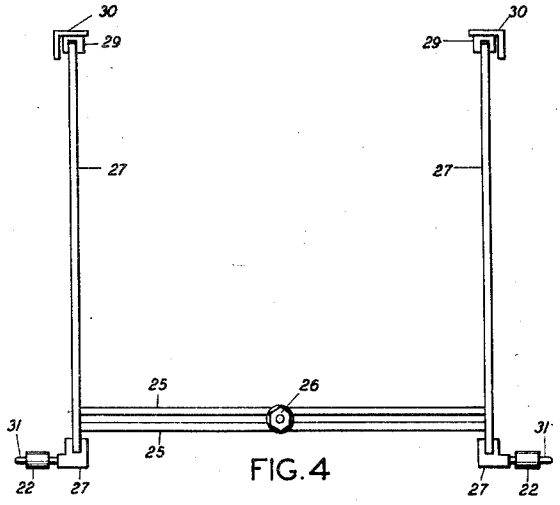


FIG. 4

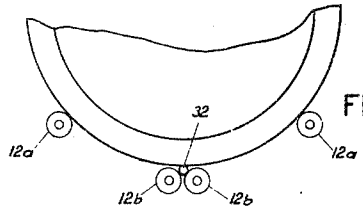


FIG. 5

GLENN H. BOWLUS.
INVENTOR
Paul W. Brutzman
ATTORNEY

Patented Mar. 31, 1931 1,798,780

UNITED STATES PATENT OFFICE

GLENN H. BOWLUS, OF ALHAMBRA, CALIFORNIA

WELL PUMPING HEAD

Application filed October 12, 1929. Serial No. 399,247.

My invention pertains to the art of pumping deep wells, and particularly oil wells, where the great weight of a long string of rods is to be handled and where it is important that a smooth and even motion be imparted to the rod string.

An object of my invention is to provide a pumping head adapted to be contained within the derrick, avoiding the ordinary crank and walking beam. A further object is to provide a pumping head adapted to be readily counterbalanced and particularly adapted to be driven by an electric motor or other high speed prime mover without the use of reduction gearing.

Other objects and advantages of my invention will be evident from the attached drawings and the following description thereof, in which:

Fig. 1 is an assembly of my improved pumping head in longitudinal vertical section;

Fig. 2 is an end elevation of the same;

Fig. 3 is a plan view of the assembly;

Fig. 4 is a plan view of the rocker arm shown in elevation at 27 in Fig. 2, and

Fig. 5 is a partial elevation of one of the crank wheels, showing an alternative method of driving.

Referring to the drawings, 10—10 are two identical wheels of heavy cast iron which should be trued and faced on their circumferential surface. These wheels are firmly keyed to a heavy shaft or axle 11. 12 and 12*a* are stiff steel shafts supported by any suitable bearings 13 resting on pillow blocks 14. Shaft 12*a* is an idler shaft while shaft 12 is shown as direct connected with the electric motor 15 through the medium of the flexible joint 16. This particular drive is suggestive only.

17—17 are counterbalance weights swinging freely on the central shaft 11, as shown in Fig. 2. These counter weights may be bolted to the crank wheels by means of the bolts indicated at 18 and may be put out of commission and allowed to ride on the shaft by withdrawing these bolts. A plurality of bolt holes, as indicated at 19, may be provided so that the counter weight may be moved into different angular positions as regards the throw of the crank pins.

20—20 are crank pins running in the boxes 21 at the lower ends of the connecting rods 22. 23 is the upper end of the pump tubing and 24 an extension of the polish rod which is suspended from a pair of cross members 25 by means of a nut and washer 26. The ends of the cross members are supported from the two rocker arms 27, the fixed ends of which are pivoted on pins 28 let into suitable boxes 29, which boxes are attached to a convenient portion of a derrick frame or other fixed object indicated at 30. The moving end of each of the rocker arms carries a pin 31 which passes through a suitable bearing in the upper end of the corresponding connecting rod 22.

In the operation of this device the drive shaft 12 is positively rotated in the desired direction by the motor 15, the weight of the crank wheels rests on the drive shaft 12 and on the idler shaft 12*a*, the weight of these wheels plus the weight of the rod string and counterbalance being sufficient to produce the frictional engagement between the shaft and the circumference of the wheel required to rotate the wheels and actuate the cranks. It will be noted that the central shaft 11 does not come over the casing head, but is set to one side a distance sufficient to bring the upper end of the polish rod in line with the tubing when the rocker arm is advanced say ⅛ revolution over upper center. On account of the length of this arm it is possible to impart a substantially vertical movement to the upper end of the polish rod.

12 and 12*a* must obviously be sufficiently stiff to support the weight of the crank wheels without undue deflection and where these wheels are very heavy the diameter of the shaft must thus be so increased that it is not feasible to use the direct motor drive shown in Figs. 1 and 3. In such cases the difficulty may be obviated in the manner indicated in Fig. 5 in which the four shafts numbered 12*a* and 12*b* in such figure are all idlers, but the two lower idlers 12*b* are not in contact with the circumference of the wheel but are set close together and slightly spaced

from the circumference, leaving room for the driving shaft 32. As this shaft is supported throughout its length by the idlers 12*b* stiffness is not required and it may be made of any desired reduced diameter and direct connected to an electric motor or other high speed drive.

While I have shown the idler shaft 12*a* as being continuous beneath the two crank wheels it will be obvious that separate idlers, if supported by their own bearings, may be used. This does not apply to the drive shaft 12, which of course must drive both wheels at the same speed.

I claim as my invention:

1. A well pumping head adapted to actuate a pump rod, comprising: a pair of crank wheels mounted on an unsupported shaft, said wheels being supported at their periphery only; a plurality of rotative cylindrical members supporting said wheels, one of said members being adapted to produce rotation of said wheels by peripheral frictional contact; means for directly connecting said rotation-producing member to a prime mover for synchronous rotation therewith; a pair of counter balances so mounted on said axle that said axle may rotate within said counterbalances; removable means for causing said counterbalances to rotate with said axle; crank pins mounted in axial alignment on said crank wheels and projecting outwardly therefrom, and means connecting said crank pins with said pump rod for translating the rotative movement of said pins into a reciprocating movement of said rod.

2. A well pumping head adapted to actuate a pump rod, comprising: a pair of crank wheels mounted on an unsupported shaft, said wheels being supported at their periphery only; a plurality of rotative cylindrical members supporting said wheels, one of said members of relatively small diameter being supported by two of said members of greater diameter, said smaller member being adapted to produce rotation of said wheels by peripheral frictional contact; means for directly connecting said rotation-producing member to a prime mover for synchronous rotation therewith; a pair of counterbalances so mounted on said axle that said axle may rotate within said counterbalances; removable means for causing said counterbalances to rotate with said axle; crank pins mounted in axial alignment on said crank wheels and projecting outwardly therefrom, and means connecting said crank pins with said pump rod for translating the rotative movement of said pins into a reciprocating movement of said rod.

In witness that I claim the foregoing I have hereunto subscribed my name this 2nd day of October, 1929.

GLENN H. BOWLUS.