Dec. 20, 1955 H. K. PINKERTON 2,727,469

POWER PUMPS

Filed Sept. 26, 1952 3 Sheets-Sheet 1

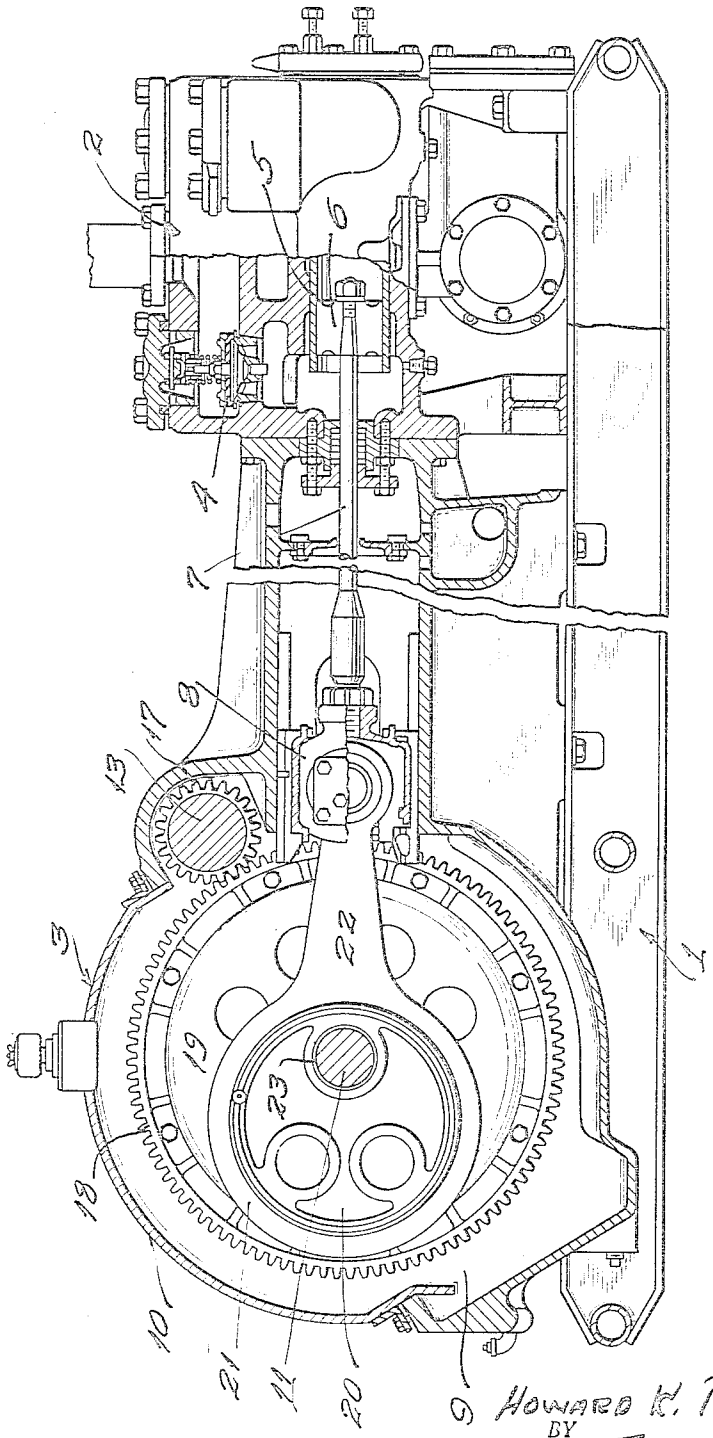


FIG. 1

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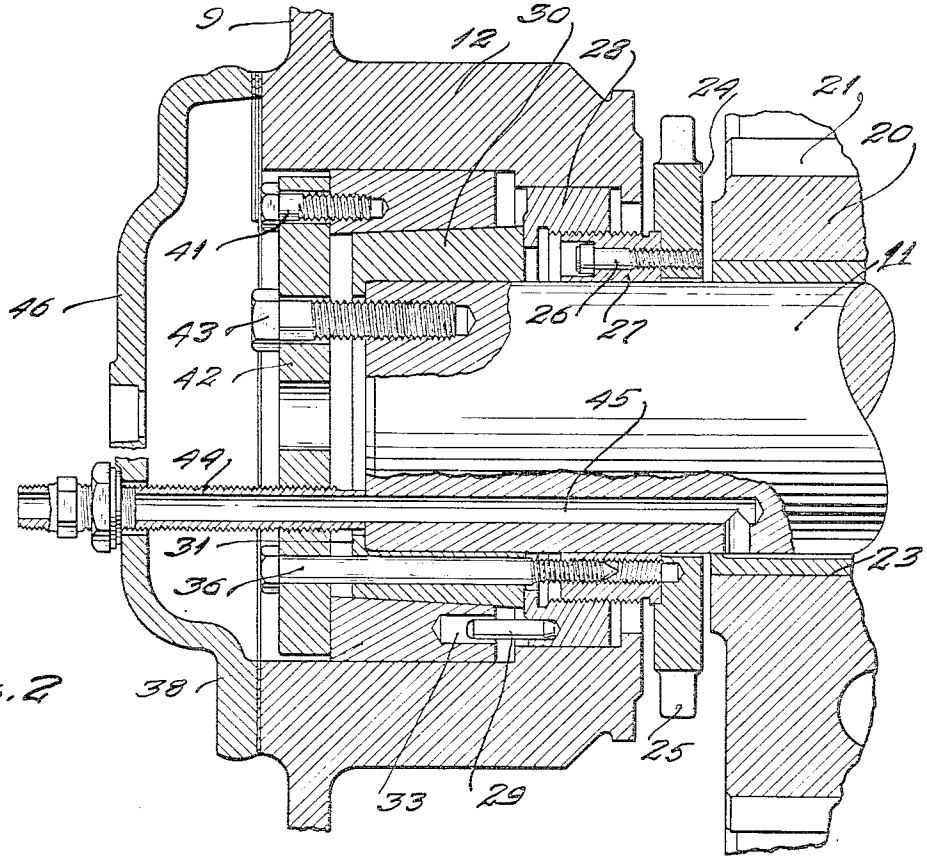


FIG. 2

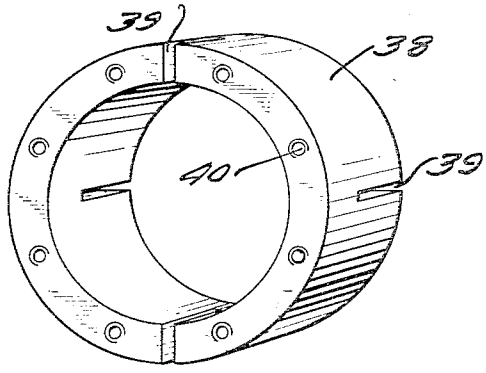


FIG. 3

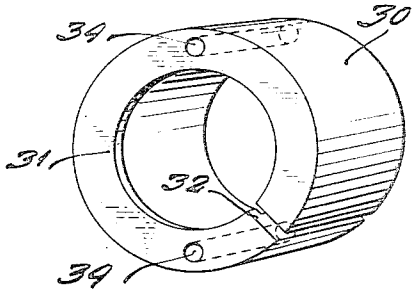


FIG. 4

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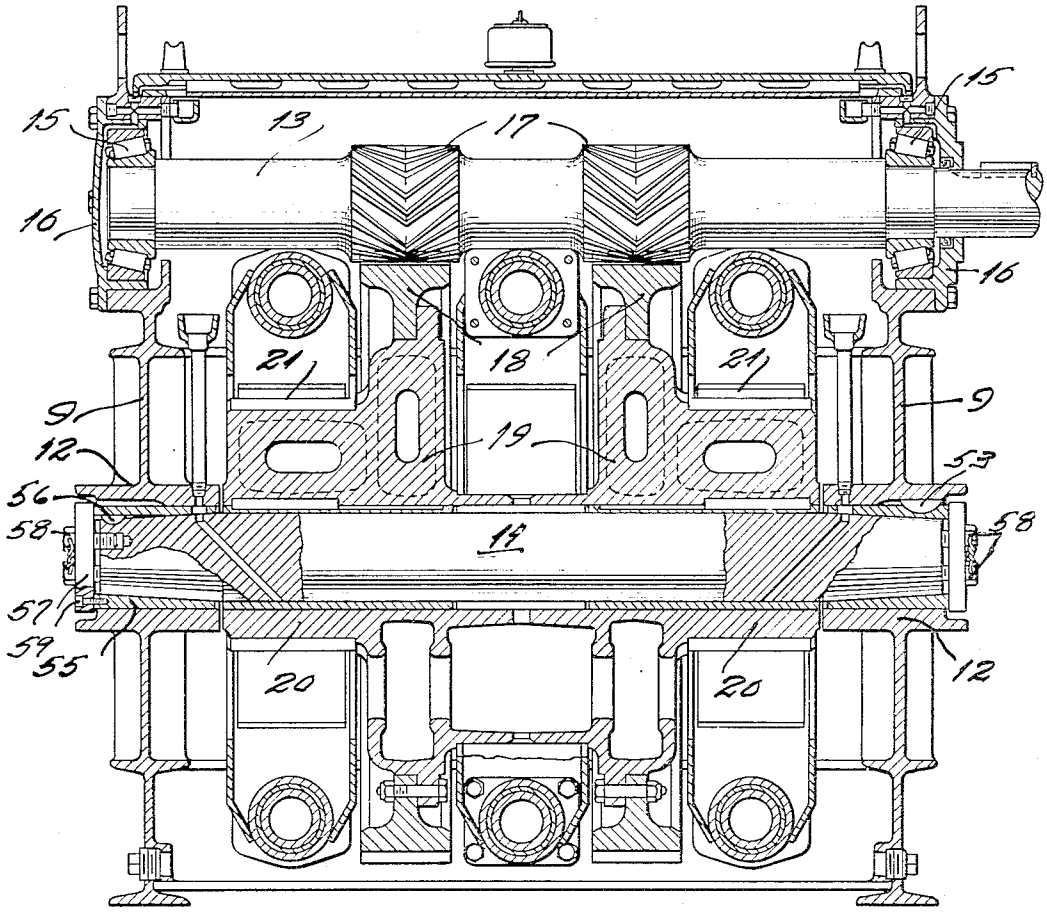


FIG. 5

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POWER PUMPS

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Application September 26, 1952, Serial No. 311,590

2 Claims. (Cl. 103—202)

My invention relates to improvements in power pumps and is more particularly directed to that type of pump intended for use in oil, mining or industrial operations, wherever moderately high pressures are required.

My invention is adapted particularly to a structure whereby rigidity is given to the frame of the unit and a more satisfactory assembly is provided, rendering replacement and renewal of parts economically and with little effort. The main shaft may be removed and a new one installed without removing the eccentric and gears from the frame. Similarly, the bushings in the eccentric can be examined or removed and replaced without removing the eccentric from the frame. Another object of the invention is to provide improved means for holding the ends of the shaft in the frame.

Another object of the invention is to provide improved means for supporting the ends of a main shaft upon which certain elements rotate for driving the pump.

Still a further object of the invention is to provide a rigid shaft upon which certain eccentrics and gears rotate, with improved means for locking the ends of the shaft to the frame.

Further objects of the invention will hereinafter appear, and to all of these ends the invention consists of the features of construction, arrangement of parts, and combination of elements, substantially as hereinafter fully described and claimed in the specification and shown in the accompanying drawings, in which:

Figure 1 is a vertical sectional view taken longitudinally through a pumping unit, showing the power end and the pumping or fluid end.

Figure 2 shows one method of mounting the main shaft within the side walls of the frame enclosing the power end.

Figure 3 is a perspective view of one of the bearing elements for the shaft end.

Figure 4 is a perspective view showing a tapered sleeve which fits upon the shaft end and within the element shown in Figure 3, and

Figure 5 is a sectional view taken through the power end of a larger pumping unit, showing another method of mounting the main shaft in the side walls of the frame.

Briefly the invention herein about to be described is an improvement in the method of mounting a main shaft in the side walls of a power pump. Heretofore such shafts have been of the revolving type, supported by tapered or roller bearings, positioned within the side walls of the pump frame. The result being that longitudinal movement, to a certain degree, of the shaft is permitted with respect to the bearings, thus creating a general spreading action between the side walls, causing misalignment of the shaft and the elements associated therewith.

The present invention provides means for rigidly mounting each end of a driven shaft in the side walls of a frame forming a positive support upon which the eccentric and gear rotate, eliminating the possible longitudinal movement of the shaft and likewise the spread of the frame.

With these and other objects in view, numeral **1** indicates the side of a support or skid upon which the pumping unit is mounted, the unit including a fluid end **2** and a power end **3**.

The fluid end **2** includes a cylinder block having suitable inlet and outlet valves, one of which is shown at **4** and a cylinder lining **5** in which is positioned for reciprocation a piston **6** having a rod **7** connected to a crosshead **8**.

Movement of the piston **6** within the cylinder **5**, will, of course, draw liquid or semi-liquid material in the cylinder and force the same out under high pressure to its point of use. Such a structure is well known in the art and it is therefore deemed unnecessary to show and describe in detail the full structure involved, inasmuch as the invention does not reside therein.

The power end of the pump includes a frame structure having side walls **9** in which are supported certain shafts hereinafter set forth. The frame includes a removal cover **10** for access to the working parts of the power end.

The power end includes a main shaft **11**, the ends of which are rigidly supported against movement in suitable housings **12**, formed within the side walls **9** of the frame. Also positioned within the side walls of the frame are the ends of a rotating jack shaft **13**, supported upon suitable roller bearings **15** held within a removable cap **16** bolted to each side wall. One or both ends of the shaft may extend through the cap **16** for the reception of a driving gear or the like, not shown, to which operating force is delivered from a suitable power unit.

The jack shaft **13** carries one or more gears **17** formed integrally therewith or rigidly connected thereto and which are adapted to mesh with corresponding gear rings **18**, detachably connected to hubs **19** rotatable about the fixed main shaft **11**. Each gear hub **19** is provided on one of its faces with an eccentric **20** about which is positioned a ring **21** of a connecting rod **22**, the free end of the rod being pivotally connected to the crosshead **8**.

All of the foregoing is common in any pumping unit of a class referred to regardless of size or volume. The present improvement residing in the method and means for mounting the ends of the main shaft within the side walls of the frame, for the purpose previously set forth and hereafter apparent.

Referring to the drawings, particularly Figure 2, it will be observed that the gear hub **19** and eccentric **20** have pressed therein a bushing **23** which forms a removable bearing for the reception of the main shaft **11**.

To prevent longitudinal movement of the bushing **23** and the hub **19** with respect to the shaft **11**, there is fitted over each end of the shaft a thrust bearing ring **24**, the inner vertical face of which might be engageable with the eccentric **20** and bushing **23** tending to hold the same in proper position upon the shaft **11** and the gear ring **18** in its proper relation with its co-acting gear **17** carried by the shaft **13**. The periphery of the ring **24** has a plurality of outwardly extending projections or fingers **25** against which a suitable tool might be placed to rotate the ring upon the shaft **11** for a purpose hereinafter described.

As shown in Figure 2, the ring **24** has locked to its outer face, by a removable stud bolt **26**, a threaded nut or ring **27** for engagement with a second threaded ring **28** fitted snugly within the housing **12** and held against rotation by a locking pin **29** hereinafter described.

Thus it will be apparent that by placing a tool or the like against any one of the projections **25** of the ring **24**, the ring **24** may be rotated with respect to the shaft **11**. When rotated the threaded ring **27** locked thereto will rotate and move inwardly or outwardly with respect

to the ring 28, moving the bearing ring 24 to its proper position between the end of the housing 12 and the eccentric 20.

To support the ends of the shaft 11 within the housing 12, formed in opposite vertical walls of the frame 9, each end of the shaft has pressed thereon a collar 30, the outer periphery of which tapers toward its outer end or the end of the shaft. The outer end of the collar 30 has a turned-in flange 31 which abuts the end of the shaft 11 preventing further longitudinal movement of the collar upon the shaft end.

Shown in Figure 4, the collar 30 is provided with a longitudinal slot 32 extending from one end face to the other and through the flange 31, the purpose being to permit expansion of the collar when pressing the same upon the shaft end. The collar 30 is further provided with holes or passageways 34 through which may pass a locking bolt 36 threadedly connected to the adjusting nut 27. Thus it will be apparent that when the thrust plate or ring 24 is adjusted with respect to the hub and bushing, and within the fixed threaded ring 28, the plate 24 may be locked in its desired position by the bolt 36.

Fitted within the housing 12 is a ring 38 provided at each end with diametrically opposite slots 39, permitting expansion and contraction of the ring with respect to the housing 12 and the collar 30 over which the ring 38 is positioned for movement. It will be noted that the inner face of the ring 38 tapers correspondingly with the co-acting tapered periphery of the collar 30. The inner end face of the ring 38 is provided with a socket 33 to receive the extending end of the locking pin 29 fixed within the adjacent face of the stationary threaded ring 28. Such a structure permits longitudinal movement of the ring 38 with respect to its co-acting elements but prevents rotary movement of either the ring 38 or threaded ring 28. Thus any inward movement of the ring 38 upon the collar 30 will cause a wedging action between the collar and the housing 12 locking rigidly the shaft 11 to the side wall 9 and at the same time preventing any longitudinal or rotary movement of the shaft.

The outer end face of the ring 38 carries a plurality of threaded sockets 40 for the reception of stud bolts 41, securing to the ring 38 an end plate 42. The plate 42 is locked against movement with respect to the shaft end by a stud bolt 43 passing through the plate and threadedly receivable within a socket formed in the end of the shaft. From this structure it will be apparent that by turning the threaded stud bolt 43 in one direction, the wedging ring 38 will be forced inwardly of the housing 12, locking firmly thereto the shaft end. If desired, additional stud bolts 43 may be provided to equally distribute the wedging force to all areas of the ring 38.

It will be further noted that the plate 42 supports the outer end of the adjusting bolt 36 which is threadedly connected to the nut 27 serving to lock the same against movement.

The plate 42 supports a lubricating conveying tube 44, the inner end of which communicates with a passageway 45 formed within the shaft end and leading to one end of the rotatable bushing 23 pressed with the hub 19 and eccentric 20. The outer end of the tube 44 is locked to a removable plate 46 closing the housing 12 and forming a cover for the supporting elements of the shaft therein.

Referring to Figure 5 it will be observed that all of the elements of the pumping unit previously described, are present with the exception of those forming the means for locking the shaft within the housing 12 of the side walls 9. Shown in this structure, the pump includes a plurality of ring gears 18 and eccentrics 20 rotatable upon the fixed shaft 11, the ends of which are tapered and have pressed thereon a tapered ring 55 keyed to the shaft as indicated at 56 and also keyed to the housing as indicated at 53. The collar is maintained within the housing 12 and upon the tapered end of the shaft 11 by an end plate 57 connected to the shaft by the stud bolt or bolt 58 and to the outer face of the collar by studs 59. Thus it will be apparent that by tightening the stud bolt 58, the plate will be moved inwardly toward the shaft end and at the same time forcing the tapered ring within the housing 12 and upon the tapered end of the shaft. Thus a rigid structure is provided for supporting the shaft 11 against longitudinal and rotary movements with respect to the side walls.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim, is:

1. A unit of the class described including a frame, a shaft supported by the frame and having rotatable thereon a gear and eccentric, means rigidly connecting the shaft to the frame including a pair of relatively movable tapered rings, an adjusting ring rotatable about the shaft holding the gear and eccentric against longitudinal movement thereof, and means locking the adjusting ring against movement with respect to the tapered rings.

2. A unit of the class described including a frame, a shaft supported by the frame and having rotatable thereon a gear and eccentric, a pair of relatively movable tapered rings; one engaging the shaft and the other the frame holding the shaft against movement, an adjusting ring rotatable about the shaft maintaining the gear and eccentric against longitudinal movement thereof, and means locking the adjusting ring and tapered rings against movement one with respect to the other.

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