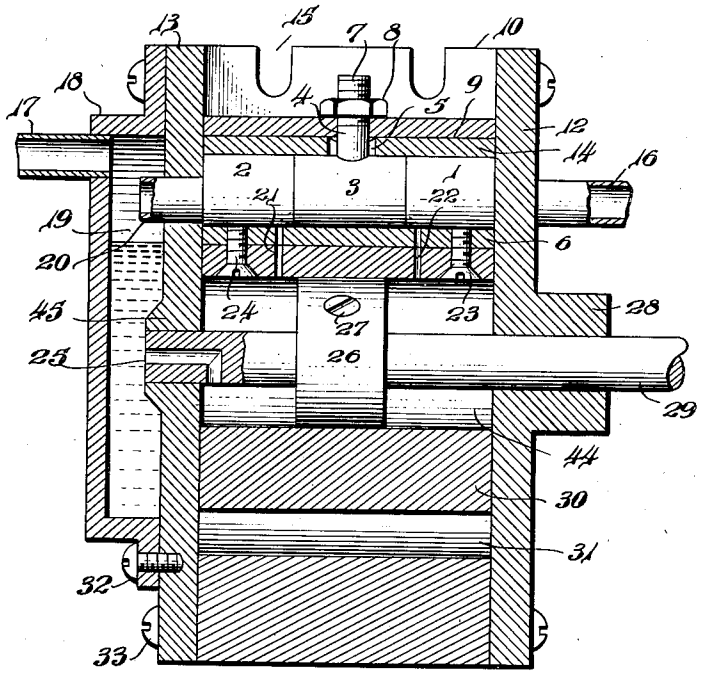
April 2, 1940. J. L. BILDERBECK 2,195,835

ROTARY PUMP

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FIG. 1.



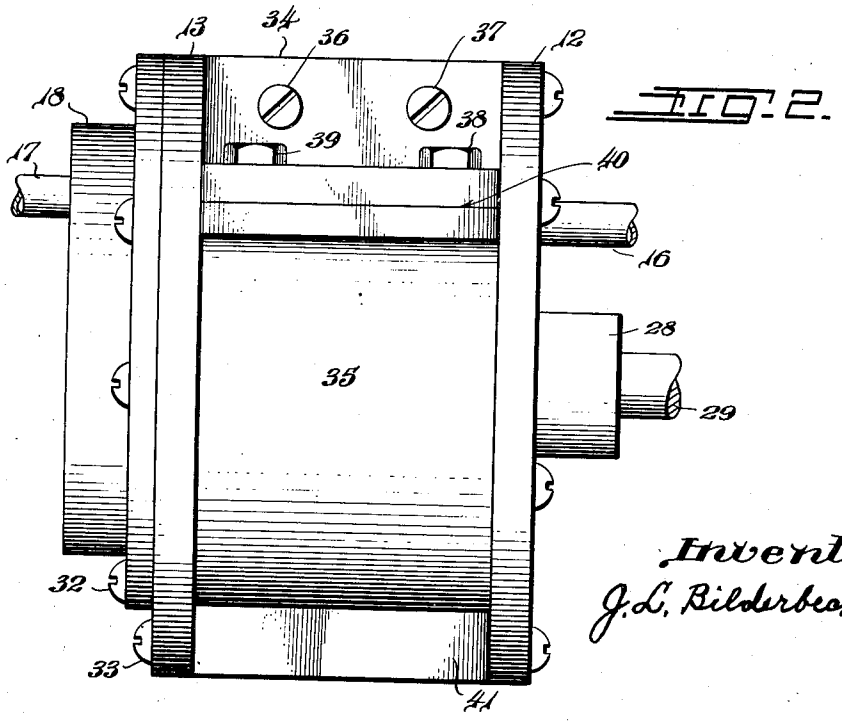


FIG. 2.

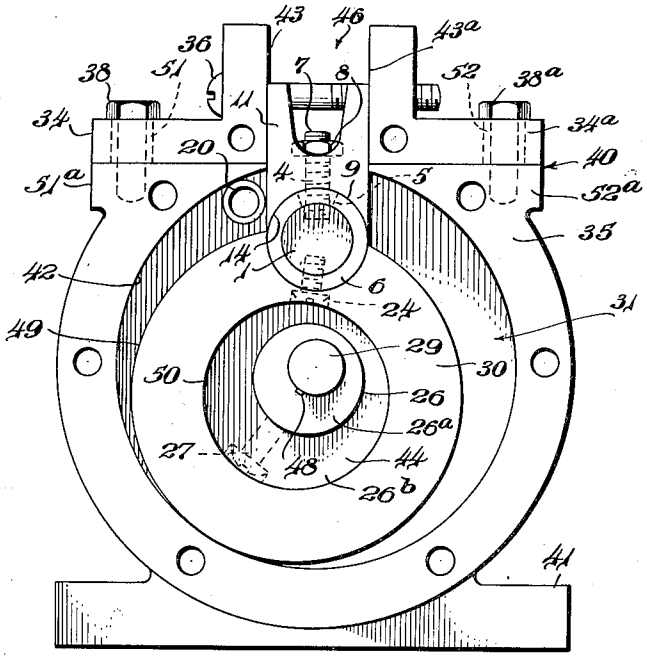
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ROTARY PUMP

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FIG. 3.



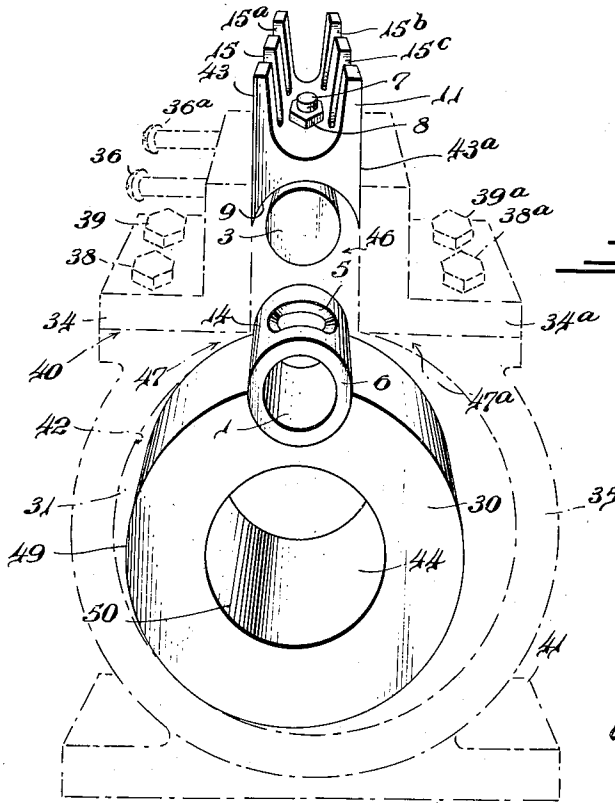


FIG. 4.

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2,195,835

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2,195,835

ROTARY PUMP

James Lorin Bilderbeck, Newberry, Fla.

Application January 13, 1939, Serial No. 250,799

2 Claims. (Cl. 230—147)

The specification of my invention is founded upon the following ideas or purposes:

(1) Since adjustability is advisable in varying the clearance of moving parts in case of pumps, my purpose is to make a pump which, while being adjustable for wear and for amount of clearance, is also adjustable for position and rigidity in machining processes, especially in finishing operations. Furthermore, parts which are thus machined in their natural assembly get their dimensions by construction instead of by measurement.

(2) Another purpose of my invention is to make a pump with a special abutment the construction of which provides for covering the space vacated by the swing of oscillating parts, thus leaving no pockets to prevent a clean sweep of the charge in front of the path of the planetating piston as the space thereof is diminished during operation.

(3) Simplicity of design, ease, and cheapness of manufacture are my purposes.

(4) To make a pump having an efficient oiling system by which all moving parts are automatically lubricated and sealed.

Referring to the layout of the drawings of my pump:

Fig. 1 represents an upright, longitudinal central section.

Fig. 2 represents an upright exterior side view of the device as a whole.

Fig. 3 represents an upright end view with a stator face plate removed.

Fig. 4 represents the same view in perspective as Fig. 3 but with cylinder 3 withdrawn from its socket in ring 6 so as to show elongated slot 5.

Referring more in detail to the drawings, the pump includes a central stator housing 35 mounted on a base 41 and carrying face plates 12 and 13, one face plate containing oil reservoir 18, outlet 20, and hub bearing 45 for rotor shaft 29; the other holding inlet pipe 16 to pumping chamber 31 and the main hub bearing 28 as shown in Figs 1 and 2. Stuffing boxes are not shown here. In event the pump is immersed in oil, reservoir 18 is removed and a stuffing box is not needed as will be seen by noting the purpose of inlet 25.

Pumping chamber 31, bounded by an inner cylindrical surface 42, and the parallel inner surfaces of face plates 12 and 13, has a specially constructed opening 46 at its uppermost boundary; by milling off the top of housing 35, surface 40 is formed tangent to inner cylindrical surface 42. If need be, surface 40 may be slightly below the point of tangency in order to leave a suitable thickness of metal at 47 and 47a between the two surfaces mentioned. The foregoing and following descriptions are revealed in Figs. 3 and 4.

Instead of milling a vane slot in solid metal, I build an adjustable slot for a vane and its seat in separate operations, as follows:

In forming the jaws of the slot, I choose L-shaped bars as 34 and 34a whose opposite faces are approximately parallel and whose adjacent faces perpendicular accordingly. I grind the two contacting pieces to form one surface perpendicular to surfaces 43 and 43a, the former one surface being made to coincide with surface 40. When the jaws 34 and 34a are thus finished, vane slot 46 is constructed by seating jaws 34 and 34a on surface 40 with vane member 11 held in its normal position of assembly between the jaws. In this position jaws 34 and 34a are screwed to stator housing 35 by bolts 38 and 38a through slotted holes 51 and 52, so slotted as to allow slight movement during adjustment. Bolts 36 and 36a with thread ends and head ends as shown extend through slots as 15 of vane member 11 and aid in holding aforesaid jaws in adjustment. Then shoulders 51a and 52a of stator housing 35 offer special means for holding said jaws.

The pumping abutment 4 is composed of vane member 11 slidably held in slot 46 and ring or pivotal drum 6. Vane member 11 is held to ring 6 so as to permit rocking contact of surface 9 of the former with surface 14 of the latter, as follows:

Vane member 11 of abutment 4 is joined to cylinder or pivot 3, the latter carrying its component stem 7 upward through the central portion of vane member 11 and ending above the vane in a hollow portion thereof, stem 7 ending in threads which receive a nut 8, by which vane member 11 is held in its adjustment to ring 6.

Cylinder 3 which operates within ring 6 is shown withdrawn above it in Fig. 4, in order to show slot 5. Cylinder 3 has an outer cylindrical surface which is a movable fit with respect to the inner cylindrical surface of ring 6, and cylinder 3 is shorter than ring 6, cylinders or plugs 1 and 2 being driven into the respective ends of ring 6 and milled off flush with the latter. Cylindrical surface 14 of ring 6 is made to match and contact surface 9 of vane member 11 so as to permit sealed oscillation of the former on the latter. In this way slot 5 which is elongated in the direction of oscillation to permit such motion, is itself covered and sealed above and below. In many pumps, oscillating parts require cutting out niches, thus leaving pockets for fluids which cannot be swept out.

It will be evident that as piston 30 oscillates during planetation, ring 6 fastened to it by screws 23 and 24, Figs. 1 and 3, also oscillates or rocks on its own center, causing slot 5 to be displaced on stem 7, which stem 7 connects cylinder 3 with vane member 11 through the slot. It is noted further that the broad cylindrical surface 9 of vane member 11 covers and seals the above men-

toned displacement space. Stem 7 which is screwed into cylinder 3 may as well be welded there.

The planetating piston 30 is bounded by outer and inner cylindrical surfaces 49 and 50 respectively, and contains the lower one half of ring 6 imbedded and securely fastened in its body by screws or the joint may be made by welding.

Now, since cylinder 3 operates within ring 6, vane member 11 receives impetus to reciprocate from planetating piston 30 which piston itself oscillates on cylinder 3 as it planetates, surface 9 of vane member 11 gliding on surface 14 of ring 6 accordingly.

Fig. 1 shows the variable eccentric occupying a comparatively small portion of the chamber in which it is rotatably fitted. Oil holes 21 and 22 lead from the chamber or crankcase 44 and penetrate to cylinder 3 of the abutment 4 so that these parts can be lubricated, channel 25 through eccentric shaft 29 furnishing chamber 44 with oil from reservoir 18. Much oil from chamber 44 passes the piston 30 to produce seal—this oil and much of the oil to abutment 4 returns to reservoir 18 through exit 20. The structure of oil reservoir 18 is revealed in Fig. 1. The oil level 19 must be kept below exit 20.

In case air is being pumped, outlet 17 should be as far above exit 20 as possible in order to separate oil and air.

Shaft 29 is centrally located with reference to inner cylindrical surface 42 of the pumping chamber by bearings in hubs 28 and 45 respectively; so that during motivation the planetating piston 30 may sweep the entire inner cylindrical surface 40 due to the throw of a variable eccentric 26 held to shaft 29; moreover, the sweep may thus be varied by varying the throw of variable eccentric 26.

The variable eccentric 26 is made of an eccentric as 26*a* within a larger one as 26*b*, the former being held to shaft 29 by key 48 and the latter being held to the former by set screws as 27. It is plain that if the latter eccentric is turned with reference to the former eccentric by loosening set screw 27, the eccentricity of the planetating piston 30 may be thus varied.

Operation

As to operation of my pump, it has been noted how variable eccentric 26 keyed to rotor shaft 29 causes a planetating oscillating piston 30 to contact all parts of the inner cylindrical surface 42 of the pumping chamber 31. When rotor shaft 29 is turned in the direction of the arrow shown in Fig. 3, we have a moving line of tangency of the outer cylindrical surface of the planetating piston 30 and the inner cylindrical surface 42 of the pumping chamber. This tends to create pressure in front of and a vacuum behind the aforesaid line of tangency as said line of tangency moves with respect to abutment 4, the pressure of the charge being swept out at outlet 20 against abutment 4. The center of oscillation of planetating piston 30 is the central axis of ring 6. Vane member 11 simply reciprocates up and down in its slot 46 and forms a septum between vacuum and pressure as mentioned. In final analysis, we note that the surfaces of stator housing 35 are made to converge in thin metal between surface 40 and inner cylindrical surface 42, so as to reduce to a minimum the size of the pocket left between housing 35 and vane member 11. The latter does not contact the former over a large area. Similar convergence gives similar results due to the tangency of the sliding surfaces of vane member 11 with the cylindrical surface 14 of ring 6. These and other means in operation result in a clean sweep of chamber 31. Having thus described my pump, what I claim as new is:

1. A rotary pump comprising a casing having a cylindrical inner surface providing a chamber, an inlet to said chamber and an outlet therefrom, a couple of vane jaws arranged radially with respect to said chamber, a vane member reciprocably mounted between said jaws, an annular piston mounted in said chamber so as to move in contact with said cylindrical inner surface, a crankcase in said annular piston, a crankshaft operative in said crankcase, a pivotal ring embedded in and between and secured to said piston and said vane member so as to expose diametrically opposed arcs of said ring adjoining circumferential portions of said piston respectively, said vane member having parallel faces tangent respectively to said arcs so as to render the latter reciprocable within said jaws and so as to provide convergent edges of said vane member adapted to sweep said arcs respectively so as to render the minima of unswept spaces thereabout at the end of each piston stroke, said casing having an exterior plane surface intersecting said cylindrical inner surface so as to form diminishing portions of said casing one on either side of said vane member, said jaws being adjustably attached to said plane surface so as to contact and cover said diminishing portions respectively said piston containing oil ducts communicating with said ring and said crankcase.

2. A rotary pump comprising a casing having a cylindrical inner surface providing a chamber, an inlet to said chamber and an outlet therefrom, a couple of vane jaws arranged radially with respect to said chamber, a vane member reciprocably mounted between said vane jaws, an annular piston mounted in said chamber so as to move in contact with said cylindrical inner surface, a crankshaft in said piston operative therewith, and a pivotal drum having a cylindrical interior cavity and a plug driven in either end thereof inclosing said cavity, said piston being secured to said drum by means of said plugs and screws, said drum containing a peripheral slot extending therethrough into said cavity, said vane member having a pivotal portion thereof containing a curved depression and hollow central portion thereof supporting an adjusting nut, said drum containing a pivot having a body portion thereof inclosed in said cavity so as to be slidable therein, a stem portion of said pivot extending through said slot and engaging threads in said adjusting nut so as to hold said drum in slidable contact with said curved depression, said casing having shoulders oppositely arranged one on either side of said chamber, said vane jaws having each a basal support thereof containing slotted holes, said supports being bolted respectively to said shoulders through said slotted holes, said pivotal end portion of said vane member being rigidly braced between said supports during operation, said drum being similarly held at the end of each piston stroke.

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