Aug. 14, 1956 W. A. GILLETTE 2,758,546

ROTARY PUMP

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Fig. 4.

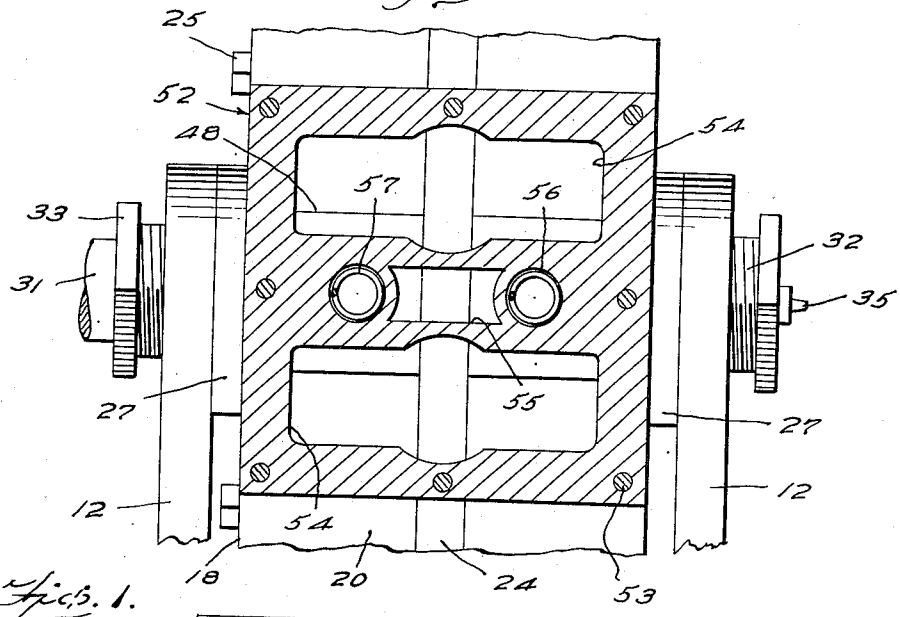


Fig. 1.

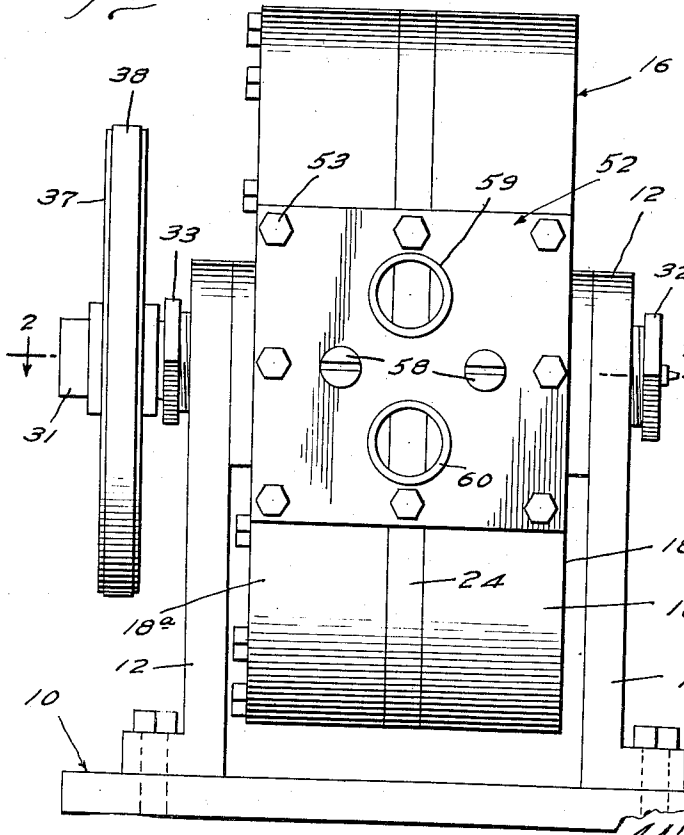
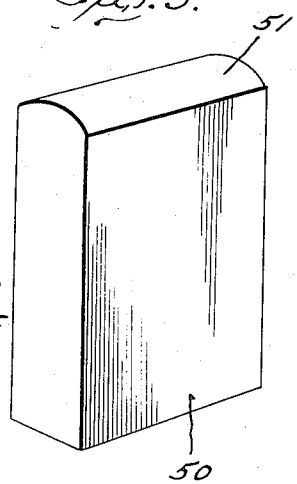


Fig. 5.



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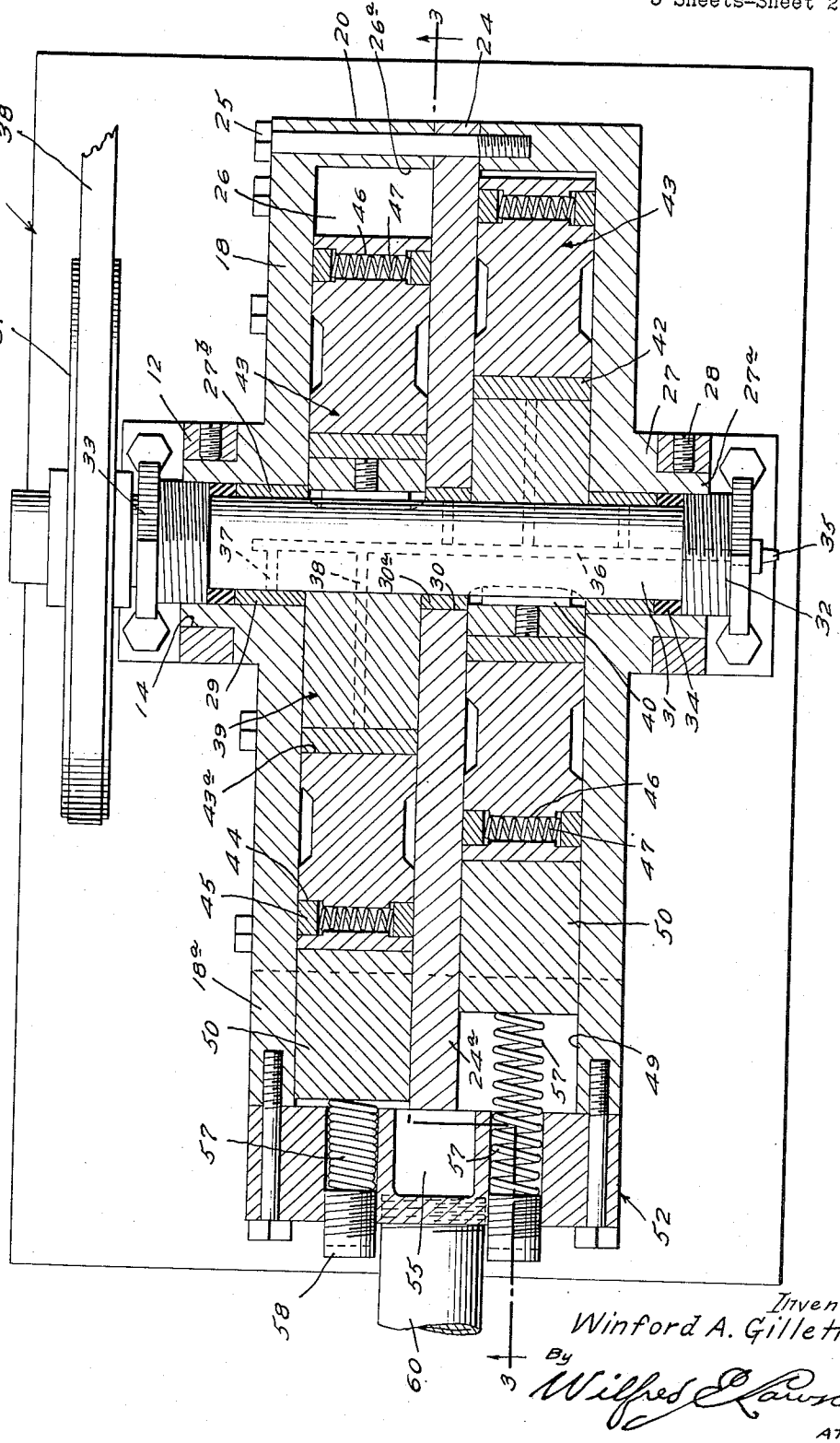


Fig. 2.

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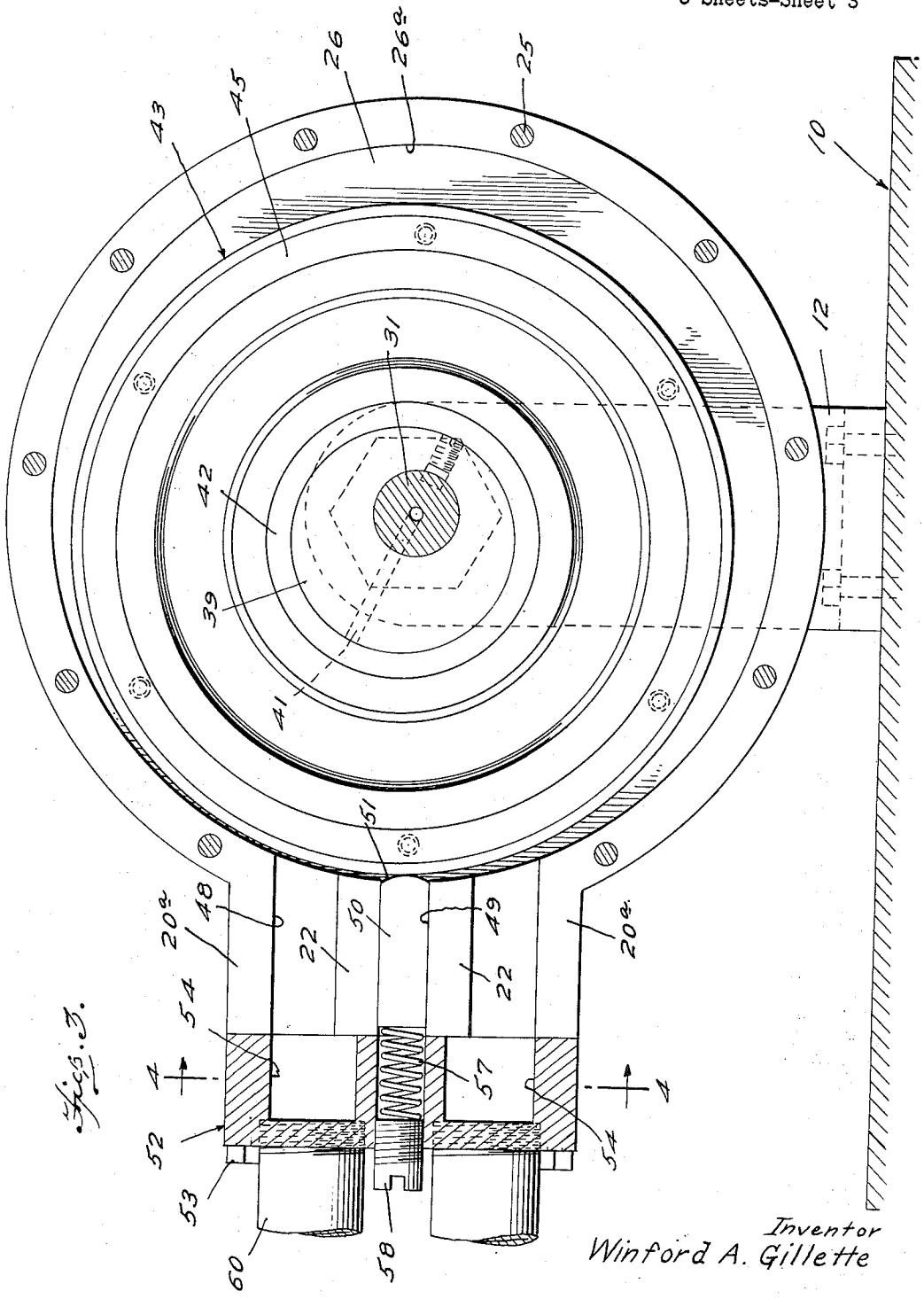


Fig. 3.

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ROTARY PUMP

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Application August 20, 1953, Serial No. 375,407

1 Claim. (Cl. 103—4)

This invention relates generally to the class of pumps and is directed more particularly to improvements in pumps of a rotary type.

A principal object of the present invention is to provide an improved rotary type pump designed for pumping liquids or gases wherein there is provided a novel type of impeller actuated by a rotating eccentric member within a circular chamber whereby liquid or gas is drawn through an inlet port and moved around in the chamber to and discharged from an outlet port.

A further and more specific object of the invention is to provide a pump of the character above stated wherein the impeller is in the form of an annulus positioned eccentrically within a circular chamber and operatively coupled to an actuating rotating eccentric whereby the impeller is caused to roll around within the circular chamber to effect the desired movement of the liquid or gas from an inlet port to an outlet port or discharge port.

Still another object of the invention is to provide in a pump of the character stated, an annular impeller member which encircles and is rotatably supported on a rotating eccentric whereby upon the turning of the eccentric the impeller is caused to roll around within a pumping chamber, the eccentric and impeller being rotatable one with respect to the other with a lubricated bearing band interposed between the two.

Still another object of the invention is to provide a rotary pump structure of the character stated employing a spring actuated reciprocating valve plate having edge contact with periphery of the circular impeller and wherein friction and wear between the parts is reduced to a minimum by reason of the fact that the impeller operates with a rolling action in a circular pumping chamber.

Other objects and advantages of the invention will become apparent as the description of the same proceeds and the invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming a part of the specification, with the understanding, however, that the invention is not to be limited to the exact details of construction shown and described since obvious modifications will occur to a person skilled in the art.

In the drawings:

Figure 1 is a view in elevation of the machine or pump looking toward the front thereof, that is the part of the pump housing to which is attached the liquid or fluid inlet and exhaust box.

Figure 2 is a horizontal section taken substantially on the line 2—2 of Figure 1.

Figure 3 is a vertical section taken substantially on the line 3—3 of Figure 2.

Figure 4 is a vertical transverse section taken substantially on the line 4—4 of Figure 3.

Figure 5 is a view in perspective of the sliding valve block.

Referring now more particularly to the drawing it will be seen that the pump structure here illustrated is designed to house two impellers although it is to be understood that any number of impellers may be employed in a housing of suitable size.

In accordance with the present invention there is provided for a two impeller pump structure a suitable supporting base **10** on which are mounted the two vertical or upstanding supporting standards **12** each of which is provided at its top end with a circular opening **14** for the purpose about to be described.

Positioned between the standards **12**, for support thereon in the manner hereinafter set forth, is the pump housing which is generally designated **16**.

The pump housing **16** comprises the two spaced side walls or side plates **18** each of which is of circular form and each of which has a flat radial extension **18***a*.

Each of the side walls is bordered by the inwardly extending circular peripheral wall **20** which is in the nature of a flange as shown in Figure 2 and each of these peripheral walls or flanges extends along the radially directed side of the wall extension as indicated at **20***a* in Figure 3.

In addition to the extension flanges **20***a*, each side wall extension **18***a* has formed upon and extending longitudinally of its inner face, that is, radially with respect to the circular wall **18**, the spaced parallel inner flanges **22**.

Interposed between the two side walls **18** and between the opposing edges of the peripheral walls or flanges **20** and **20***a* is the central partition wall or plate which is likewise of disk form and has a radial substantially rectangular extension portion **24***a*, Figure 2, which is of the same height and same radial length or extent as the wall extensions **18***a* and which lies between the opposing flanges **20***a* of the side walls and the opposing edges of the inner flanges **22** of the two side wall extensions.

The side walls and partition wall are secured together in concentric relation in a suitable manner as, for example, by the employment of the long screw bolts **25** applied as illustrated in Figure 2.

With the wall construction thus described there are provided, two circular concentric, impeller chambers each of which is designated **26**.

Each of the side walls is formed to provide the central laterally or outwardly extending hub **27** which has the terminal reduced portion **27***a* which is positioned in an opening **14** of a standard **12** as illustrated in Figure 2, where it may be secured in a suitable manner as, for example, by the employment of a set screw **28**.

Each of the hubs **27** has fitted into the passage **27***b*, a suitable bearing sleeve **29**.

The partition wall or plate **24** also has a central opening which is designated **30** and which is in alignment with the passages **27***b* of the side wall hubs and fitted in this opening is a bearing **30***a*.

Extending through the bearings and through the hubs is the shaft **31** and encircling the outer ends of the shaft and threaded into the hubs **27**, are packing nuts **32** and **33** each of which compresses against the adjacent end of the adjacent bearing sleeve **29**, a suitable packing material **34** which encircles the shaft.

One of the packing nuts here shown as the nut **32**, provided with a suitable grease gun coupling **35** which leads to an axial grease distribution passage or bore **36** running through the shaft and communicating with radial outlets **37** and **38** as illustrated for the lubrication of the bearings **29** and **30** and other parts hereinafter described.

One end of the shaft extends a substantial distance outwardly beyond the packing nut, here shown as the nut **33**,

and has mounted thereon and secured thereto a wheel or pulley **37** with which suitable drive may be established with a power source through the medium of a belt **38** or in any other suitable manner.

Within each impeller chamber **26** there is mounted on the shaft **31** an eccentric **39** which is of circular outline and each eccentric is secured to the shaft by a key **40**.

As shown in Figure 2 the eccentrics are positioned with the high points oppositely directed and each eccentric has formed radially therethrough a grease passage **41** which communicates with the adjacent lateral passage **33** of the bore **36**.

Encircling each eccentric **39** is a bearing band **42** and mounted upon each eccentric and encircling the bearing band **42** is the circular impeller **43**.

The opening of each impeller is in the center thereof so that the impeller is in the form of a flat annulus in the central opening **43***a* of which the bearing band **42** is positioned.

The radius of each impeller is such that at all times a peripheral surface of the impeller will be closely positioned against the circular inner wall **26***a* of the impeller chamber.

In order to maintain a leak proof association between the side faces of each impeller and the adjacent side walls of the impeller chamber, each impeller is provided in each side face with the circular packing channel **44** and in each of these channels is the annular packing ring **45** which may be of any suitable material but is preferably bronze and the impeller body is provided with the transverse bores **46** between the concentric bearing channels **44**, in which are positioned expansion springs **47** which bear against the bronze rings and force the latter outwardly against the inner faces of the chamber walls.

The arrangement of the opposing flanges **20***a* provides with the interposed extension of the partition wall or plate **24**, the radial passages or ports **48**, the inner ends of which open into the impeller chambers while the outer ends open into chambers of a manifold box as hereinafter described.

As is also apparent upon reference to Figure 3, the spaced inner flanges **22** provide between them a narrow chamber **49** in which is positioned a sliding valve block **50**, the radial inwardly extending edge **51** of which is rounded and directed into the adjacent impeller chamber for contact with the peripheral surface of the adjacent impeller **43**. As shown in Figure 2 the valve block **50** is of the same width as the impeller **43** against which it bears.

Secured against the outer ends of the side wall extensions **18***a* and the flanges **20***a* thereof to cover the open outer ends of ports **48** and the valve block chambers **49**, is a manifold box which is generally designated **52**. This box is secured in place by the screw bolts **53** as illustrated.

The manifold box has formed therein the two transverse fluid chambers **54** and between them a valve block lubricant chamber **55**.

Each of the fluid chambers **54** communicates with two ports **48** lying at one side of a valve block **50** while the intermediate lubricant chamber **55** communicates with a valve block chamber **49**. At each side of the lubricant chamber **55** the manifold block has formed therein from the outer side thereof the passage **56** which is in line with the back edge of a valve block **50** and houses a valve block actuating spring **57**.

The outer end of each spring passage **56** is closed by the adjustment nut or screw **58** whereby the tension of the spring **57** can be adjusted as desired.

The manifold block also has formed through the outer wall thereof two threaded openings or passages **59**, each of which leads into a fluid chamber **54** and each of which is designed to have secured therein an end of a fluid conducting pipe **60** as shown in Figures 2 and 3.

The ports or passages **48** and the chambers **54** have not been distinguished one from the other as inlet or exhaust ports as it will be readily apparent that either of the passages **48** may be an inlet passage or an inlet port or either may be an outlet or exhaust port depending upon the direction of rotation of the impellers **43**. Consequently the ports or passages **48**, the chambers **54** and pipes **60** may function as inlets or outlets as will be readily apparent.

From the foregoing it will be seen that in the operation of the present pump, when the shaft **31** is rotated the eccentrics **39** in turning will impart a rolling movement to the circular impellers mounted thereon, the impellers rolling around against the circular inner surfaces **26***a* of the chambers in which they are housed. With this action it will be seen that there is no rubbing contact between the periphery of the impeller and the circular wall of the housing but merely a rolling action which reduces wear to a minimum. Likewise the frictional contact between the spring actuated valve blocks **50** and the peripheries of the impellers is such that a minimum of wear occurs.

While the circular impellers are moved with a rolling motion as stated it will also be seen that they are free to turn with respect to the eccentrics **39** so that there may be some turning of the eccentric within the impeller in association with the rolling action of the impeller.

Since the impeller is a separate and free part which is centered between the housing side wall and center plate by action of the springs **47** against the bronze packing rings **45** the necessary fluid tight connections are made with the side walls of the impeller chamber at all times without being affected by expansion or contraction of the parts. The face or peripheral surface of the impeller is the only part which makes close contact with the wall of the housing, this contact being with the circular inner surface **26***a*. This contact with the face of the impeller causes the impeller to roll as previously stated to thereby move the fluid instead of pushing the fluid as would be the case if the impeller were an eccentric body turning with the driving shaft.

As previously pointed out the valve blocks are in chambers which are in communication with the lubricant chamber **55** of the manifold block and as this lubricant chamber is filled or partly filled with suitable lubricant, the valve blocks will be fully lubricated at all times and the springs will be assisted in maintaining an equal and constant contact of the valve blocks with the peripheral faces of the impellers.

It will also be readily apparent from the foregoing that a pump constructed in accordance with the present invention has moving parts reduced to a minimum and is of such design that either impeller or impeller eccentric, or other parts can be removed and replaced with a minimum of effort and it will also be seen that the pump structure can be readily placed at any desired angle without impairing its efficiency.

I claim:

A pump of the character stated, comprising a body having a circular chamber, a partition centered between the side walls of said chamber to divide the same into two equal parts, a shaft extending through the radial center of the chamber and supported for rotation in said side walls and said partition, a circular member mounted eccentrically on the shaft in each chamber part, means securing each member to the shaft, an annular impeller concentric with and encircling each member for free turning movement therearound and having peripheral contact with the circular wall of the chamber, adjacent parallel inlet and outlet ports opening into the chamber through said circular wall to either side of the adjacent edge portion of said partition so that said ports are common to both chamber parts, a spring urged valve block directed radially into each of the chamber parts and bearing against the periphery of each impeller, and a lubricant chamber opening through said circular wall between said ports for discharging the lubricant into the chamber parts to either side of the adjacent edge

portion of said partition the impeller and valve block being equal in width to the inside width of the chamber.

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