Nov. 30, 1948. E. L. GRATE 2,455,303

ROTARY PUMP

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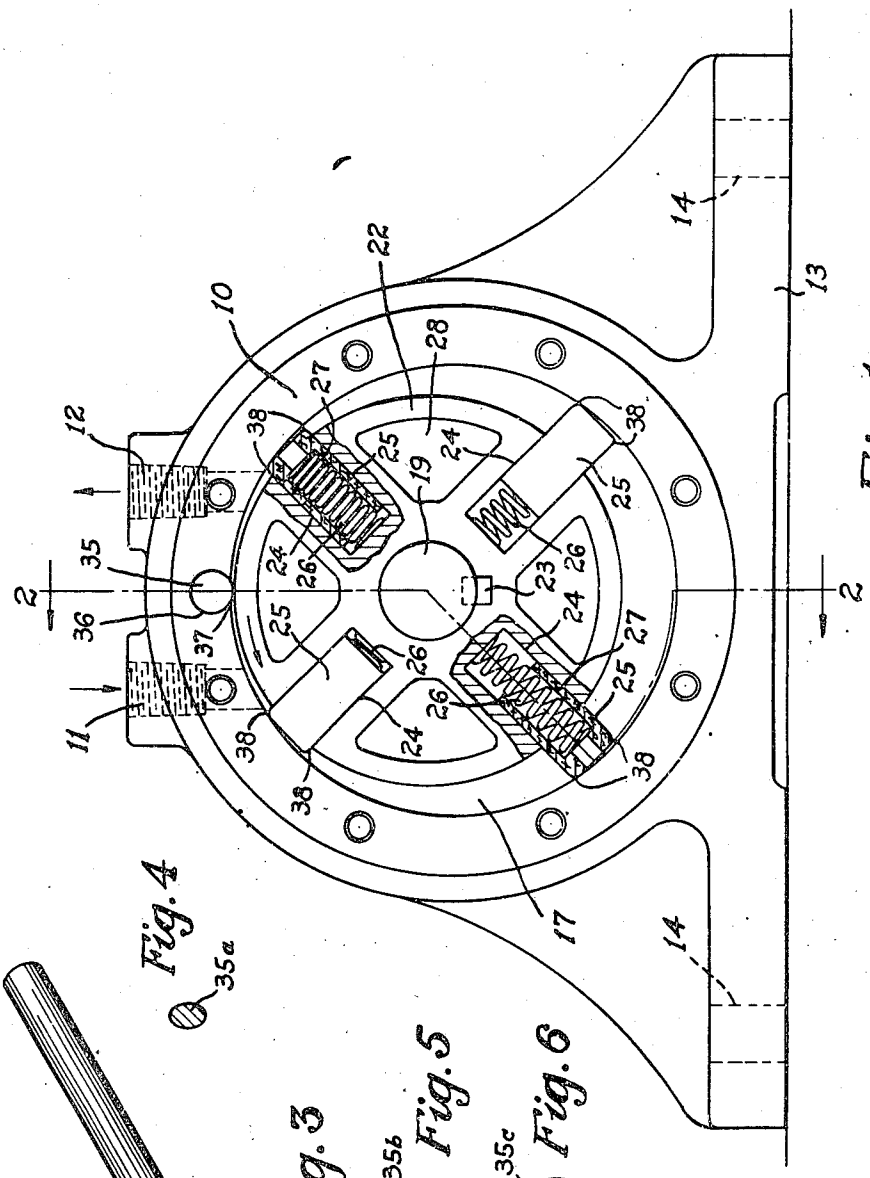


Fig. 1

Fig. 3

Fig. 4



Fig. 5



Fig. 6

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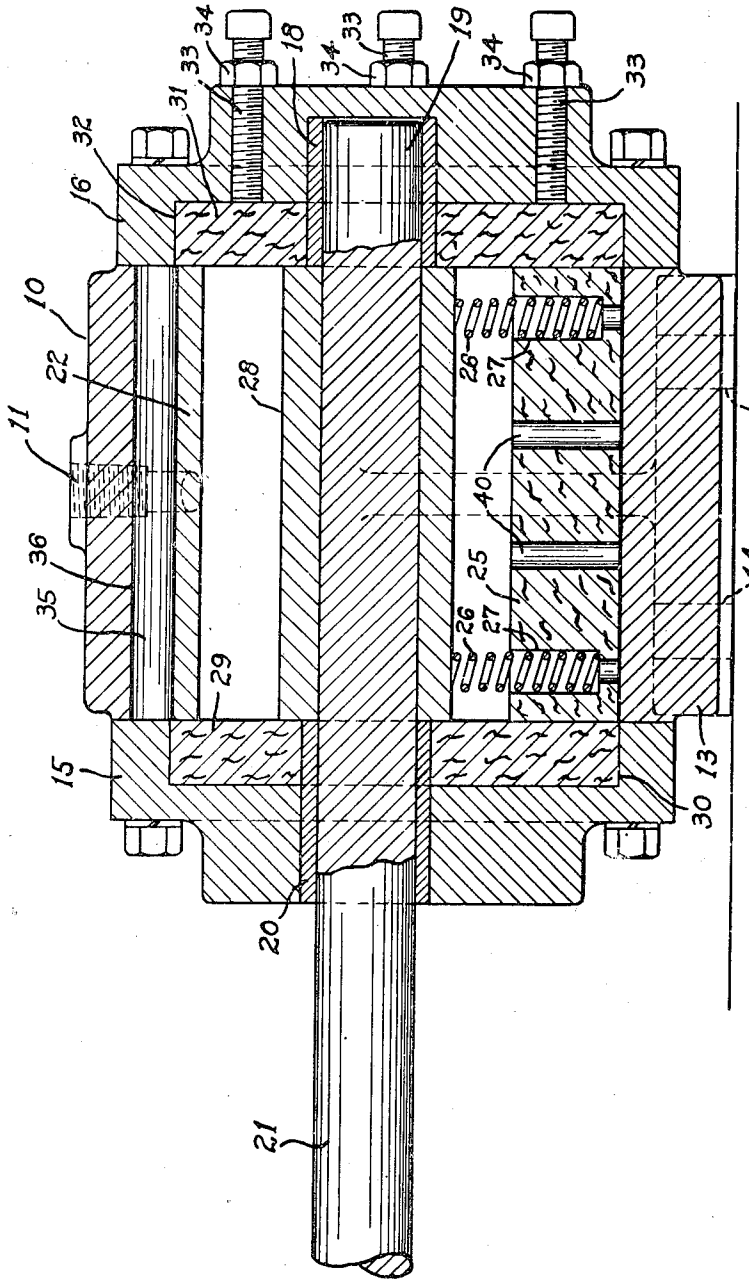


Fig. 2

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ROTARY PUMP

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2 Claims. (Cl. 103—136)

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The invention relates to rotary pumps, and more particularly to that type of pumps in which a cylindrical rotor with radially extended, spring pressed vanes are mounted to rotate eccentrically within a cylindrical casing, and is more especially directed to certain improved sealing means for preventing leakage of liquid around the rotor and within the casing, between the inlet and outlet sides of the pump.

It is an object of the invention to provide a simple, inexpensive and efficient sealing means for pumps of this general character.

A further object is the provision of such sealing means especially adapted for use in rotary pumps having single inlet and outlet means.

Another object is to provide a seal of the character referred to which when worn may be quickly and easily removed and replaced in a different position to form a water-tight seal between the inlet and outlet of the pump.

A still further object of the invention is the provision of such sealing means in the form of a metal rod which may be of round, oval or polygonal cross sectional shape arranged to be mounted in stationary condition within a similarly shaped longitudinal opening in the pump casing with one side thereof in contact with the periphery of the rotor at a point between the inlet and outlet.

It is still another object of the invention to provide a sealing abutment between the intake and discharge sides of the pump which requires no spring or other means for holding it in adjusted position.

A further object is to provide adjustable means for preventing leakage between the ends of the rotor and the heads of the casing.

The above objects together with others which will be apparent from the drawings and following description, or which may be later referred to, may be attained by constructing the pump in the manner illustrated in the accompanying drawings, in which:

Figure 1 is an end elevation of a rotary pump embodying the invention, with one head removed from the pump casing, and parts broken in section for the purpose of illustration.

Fig. 2 a longitudinal, sectional view through the pump, taken as on the line 2—2, Fig. 1;

Fig. 3 a detached, perspective view of the round sealing abutment rod shown in Figs. 1 and 2;

Fig. 4 a transverse sectional view through a modified form of oval, sealing abutment rod;

Fig. 5 a similar view of another modified form of hexagonal sealing abutment rod, and

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Fig. 6 a similar view of still another modified form of octagonal sealing abutment rod.

The pump comprises the cylindrical casing 10 having the spaced intake and discharge ports 11 and 12 respectively, which as shown in Fig. 1 of the drawings, may be located on opposite sides of the center at the top of the casing.

A base or footing 13 may be formed upon the lower portion of the pump casing and provided with apertures 14 for securing the pump to a stationary support as by means of bolts or screws.

A pair of caps or heads 15 and 16 are provided for closing opposite ends of the casing so as to form therewith a pump chamber 17 within the casing. A bushing 18 may be provided within the cap 16, within which is journalled one end of the rotor shaft 19, and a bushing 20 is located through the other cap to form a bearing for the shaft at this point.

The outer end portion 21 of the shaft may be connected in any usual and well known manner to any suitable source of power for rotating the shaft at the desired speed.

As best shown in Fig. 1 of the drawings, it will be seen that the shaft 19 is eccentrically mounted within the pump chamber 17, being shown as located considerably above the axial center of said pump chamber.

A cylindrical rotor 22 is concentrically mounted upon the shaft 19 to which it is fixed as by the key 23, whereby the rotor is eccentrically mounted within the pump chamber 17, as shown in Fig. 1, the upper side of the rotor being almost in contact with the inner wall of the pump chamber at the top thereof and spaced the greatest distance therefrom at the bottom.

At equi-distant points around the rotor, radial guide slots 24 are provided, four being shown in the drawings. Radially slidable propeller vanes 25 are mounted in the slots 24 and maintained in projected position against the inner wall of the pump chamber 17 by means of coil springs 26, which may be located within suitable bores 27 in the vanes and butted against the inner ends of the radial slots 24.

For the purpose of reducing the weight of the rotor, the same may be cut away at points between adjacent blades as indicated at 28 and for the purpose of providing a water-tight closure between the ends of the rotor and the caps or heads 15 and 16 of the casing, a disc of pressed fibre or similar material indicated at 29 may be mounted within a recess 30 in the cap 15 for frictionally engaging one end of the rotor, and a similar disc 31 may be mounted in a recess 32

in the cap 16 and arranged to be adjusted toward the other end of the rotor, to compensate for wear, as by means of the adjusting screws 33, lock nuts 34 being mounted thereon for holding the screws in adjusted position.

In the form of the invention shown in the drawings, referring to Fig. 1 the rotor should rotate in counter clockwise direction so as to draw in liquid through the intake port 11 and carry it around within the pump chamber 17 by means of the propeller vanes 25 and discharge the same through the discharge port 12.

In order to obtain the maximum efficiency of the pump it is necessary that the rotor and casing be sealed between the intake and discharge ports so as to prevent leakage of fluid between these points. An important feature of the invention is a simple and efficient sealing abutment for preventing such leakage.

As shown in Figs. 1, 2 and 3 this sealing abutment is in the form of a straight rod 35 of round cross section, as best shown in Figs. 1 and 2, which snuggly fits within the similarly shaped longitudinal opening 36 formed through the upper portion of the casing 10, and open on its under side into the pump chamber 17 as indicated at 37 in Fig. 1, so that the under side of the abutment rod 35 will project slightly into the pump chamber and frictionally contact the periphery of the rotor 22.

The outer corners of the propeller vanes 25 are preferably rounded as at 38 so that they will easily pass over the abutment rod 35. Thus it will be seen that in the operation of the pump a tight seal is maintained between the intake and discharge sides, preventing leakage of fluid at this point.

When the portion of the rod 35 contacting the periphery of the rotor 23 becomes worn to such an extent that the seal is broken it is only necessary to remove the caps or heads 15 and 16 of the pump, drive the sealing abutment rod 35 out of the opening 36 in the casing and rotate it slightly upon its axis so as to bring a new, unworn surface to register with the open under side of the openings 36, the rod 35 being then driven back into the opening 36 in this position.

This readjustment of the rod 35 may be repeated several times until the entire surface thereof has become worn after which a new rod may be inserted in the opening 36.

Although the rod 35 is shown as of round cross section as in Figs. 1 and 3, the purpose may be accomplished by using rods of other cross sectional shape, such as the oval cross sectional shape 35*a* shown in Fig. 4, which of course would only provide for two adjustments of the rod before replacement of the same would be necessary; the hexagonal cross sectional shape of the rod 35*b* shown in Fig. 5, which would permit six adjustments of the rod; and the octagonal cross sectional shape rod 35*c* shown in Fig. 6, which would permit eight adjustments of the rod before the same is entirely worn out.

As shown in Fig. 2 the propeller vanes 25 are of the same width as the rotor 22, so that the ends of the vanes are in sliding contact with the fiber discs 29 and 31, and any wear upon the ends of the vanes, as well as upon the ends of the rotor, may be compensated for by adjusting the disc 31 toward the adjacent end of the rotor, by means of the adjusting screws 33.

Each vane 25 is also preferably provided with one or more openings 40 extending entirely therethrough, in order to relieve the pressure of the fluid when it seeps or is forced to the rear of the vanes, to prevent the backed up fluid at the rear of the vanes from maintaining the vanes in projected position and interfering with the proper operation of the pump.

Furthermore these openings permit liquid to pass into the radial slots or recesses of the rotor when the vanes are pushed outwardly by their springs, preventing any vacuum or partial vacuum within the recesses in rear of the vanes which might interfere with the operation of the springs and prevent a close contact between the outer edges of the vanes and the inner wall of the pump chamber.

The operation of the pump itself will of course be obvious. Assuming the rotor is rotating in counter clockwise direction as viewed in Fig. 1, as each vane 25 passes the inlet port 11 it will propel liquid entering from the intake port around the pump chamber 17, the vanes being held outwardly against the inner wall of the pump chamber by the springs 26, and as each vane approaches the discharge side of the pump it will be thrust inwardly into the corresponding slots in the rotor due to the eccentric mounting of the rotor within the pump chamber, the fluid being discharged through the discharge port 12, the vane being entirely collapsed within the rotor as it passes under the sealing abutment 35.

I claim:

1. A rotary pump including a casing having a cylindrical pump chamber therein and adjacent intake and discharge ports at the top of the chamber only, a pair of caps closing the ends of the chamber, a shaft eccentrically located through the chamber and journalled in said caps, a cylindrical rotor fixed upon the shaft and eccentrically located within the chamber, the length of the rotor being substantially equal to the distance between the caps and one side of the rotor being in close proximity to but slightly spaced from the inner wall of the pump chamber at a point between the intake and discharge ports, there being a longitudinal opening located through the wall of the casing at a point mid-way between the intake and discharge ports, said longitudinal opening being open along one side into the pump chamber, and a sealing abutment comprising a longitudinally disposed bar tightly non-rotatably fixedly mounted within said longitudinal opening and having one side extending through the open side of the longitudinal opening and into the chamber in sealing contact with the periphery of the rotor, said longitudinal bar being of the same cross sectional shape as the longitudinal opening whereby the bar may be selectively mounted in a plurality of peripherally adjusted positions within the opening.

2. A rotary pump including a casing having a cylindrical pump chamber therein and adjacent intake and discharge ports at the top of the chamber only, a pair of caps closing the ends of the chamber, a shaft eccentrically located through the chamber and journalled in said caps, a cylindrical rotor fixed upon the shaft and eccentrically located within the chamber, the length of the rotor being substantially equal to the distance between the caps and one side of the rotor being in close proximity to but slightly spaced from the inner wall of the pump chamber at a point between the intake and discharge ports, there being a longitudinal opening located through the wall of the casing at a point mid-way between the intake and discharge ports, said longitudinal opening being open along one side into the pump chamber, and a sealing abutment comprising a longitudinally disposed bar tightly non-rotatably

fixedly mounted within said longitudinal opening and havng one side extending through the open side of the longitudinal opening and into the chamber in sealing contact with the periphery of the rotor, said longitudinal bar and longitudinal opening both being of round cross sectional shape whereby the bar may be selectively mounted in a plurality of peripherally adjusted positions within the opening.

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