Nov. 2, 1937. J. L. BILDERBECK 2,097,718

ROTARY PUMP

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Fig. 1.

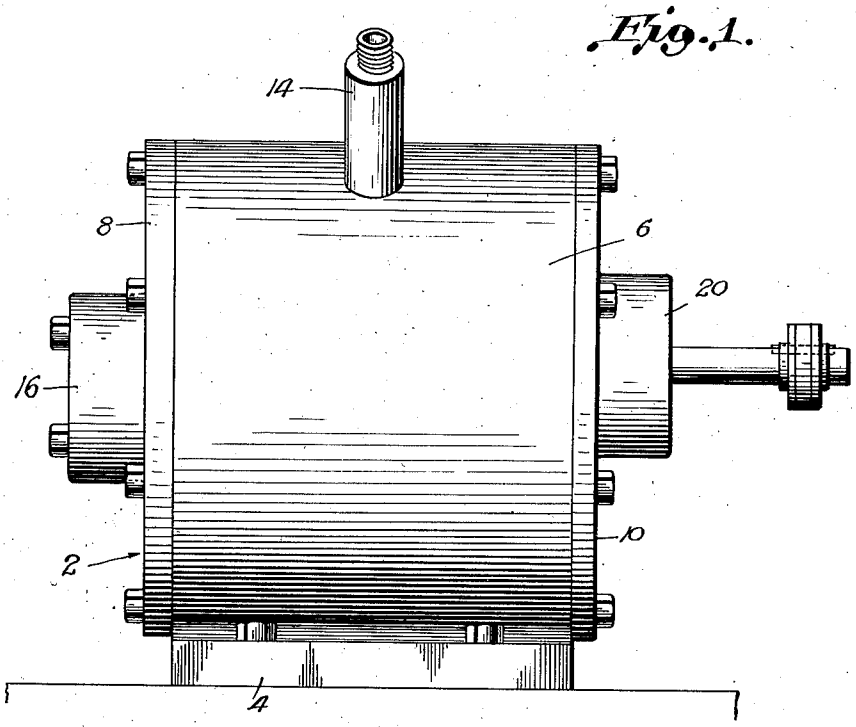
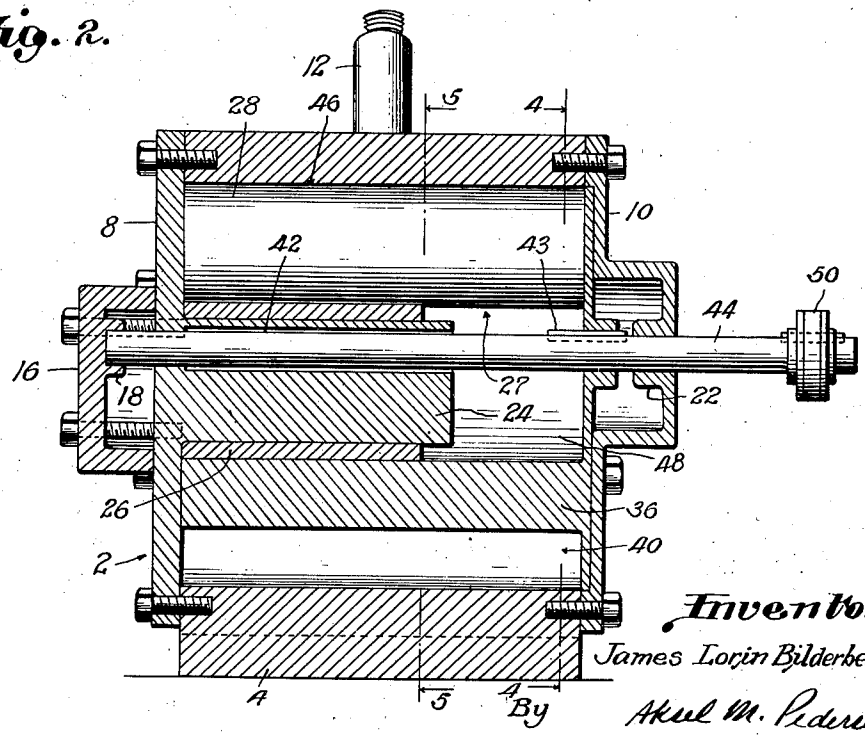


Fig. 2.



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Fig. 3.

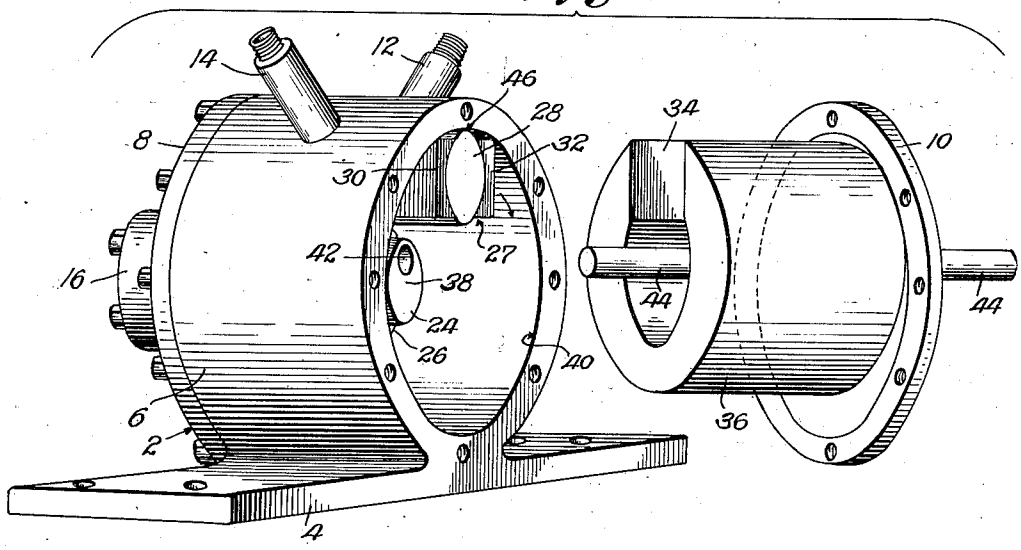
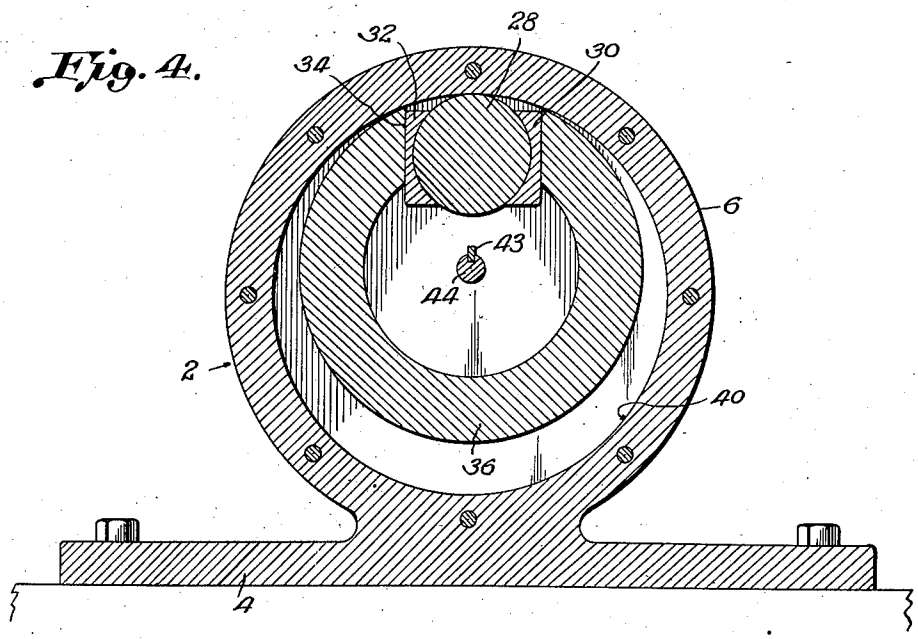


Fig. 4.



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Fig. 5.

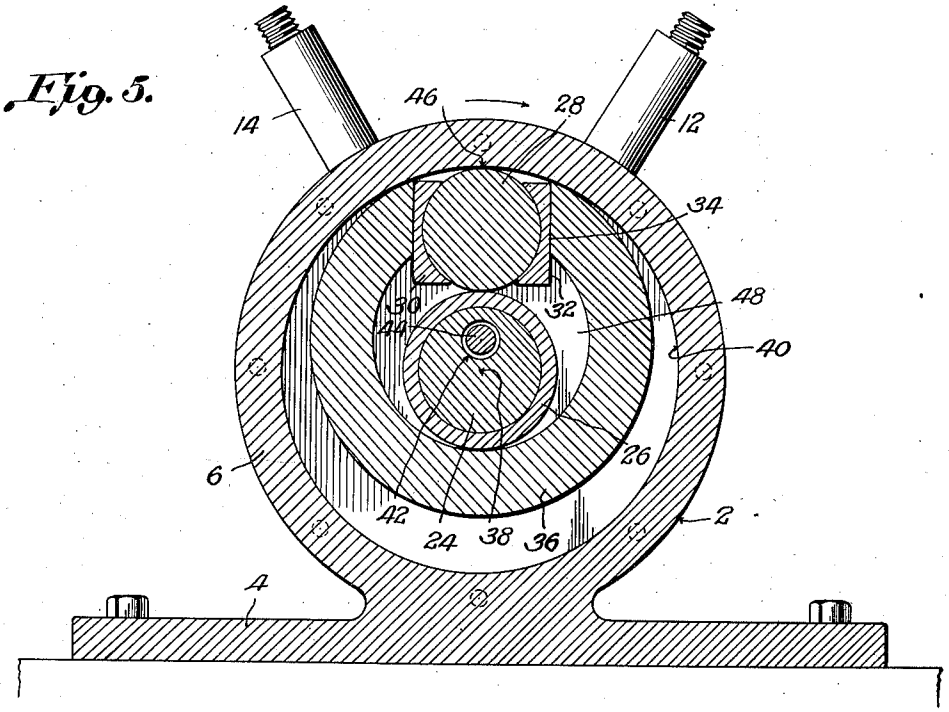
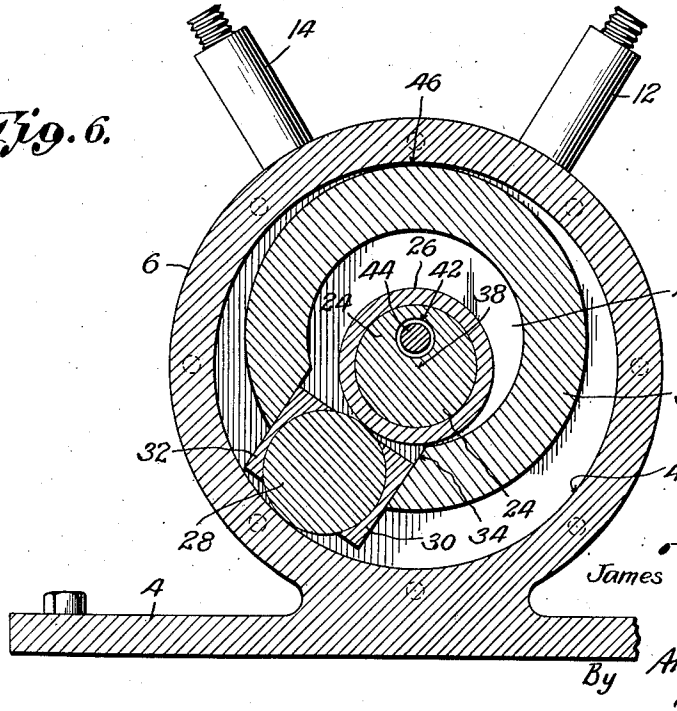


Fig. 6.



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UNITED STATES PATENT OFFICE

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ROTARY PUMP

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Application January 28, 1937, Serial No. 122,837

5 Claims. (Cl. 103—136)

This invention relates to rotary pumps and more particularly to a rotary pump of a novel form having certain special advantages, as will be hereinafter explained.

One of the objects of the invention is to provide a simplified form of rotary pump in which the parts are adapted to operate with a high efficiency and which may be constructed at low cost.

Another object of the invention is to provide a form of rotary pump in which the parts may be readily assembled and which may also be readily disassembled, cleaned and operated by persons having little or no mechanical skill or knowledge.

Another object of the invention is to provide a form of rotary pump in which the parts are designed to operate in a manner to eliminate friction as far as possible and to permit relative sliding movement of the parts without leakage of fluid past the moving parts.

Another object of the invention is to provide a simple form of rotary pump in which during wear of the device the wear will take place over a considerable area rather than locally at one point, whereby high efficiency of the device may be maintained over a long period of time and the necessity of making adjustments for wear and consequent leakage is reduced to a minimum.

With these and other objects in view the invention comprises the various features hereinafter described in detail and illustrated in the accompanying drawings, in which:

Fig. 1 is a view in elevation of the preferred form of rotary pump of my invention;

Fig. 2 is a vertical sectional view of the pump shown in Fig. 1;

Fig. 3 is a view in perspective showing the disconnected main parts of the pump;

Fig. 4 is a transverse sectional view taken on the section line 4—4 of Fig. 2;

Fig. 5 is a sectional view of the pump taken on the section line 5—5 of Fig. 2; and

Fig. 6 is a sectional view of the pump in which the vane member has been rotated through a considerable part of a revolution from the position shown in Fig. 5.

Referring more in detail to the drawings, the rotary pump of my invention comprises a casing member 2 having a base member 4, a circular body portion 6, in which the operating parts are mounted, a rear cover plate 8 and a forward cover plate 10.

The circular body portion 6 of the pump is provided with an inlet pipe 12 and an outlet pipe 14, which are preferably arranged at an angle to each other and positioned preferably at the top portion of the casing.

The rear cover plate 8 of the casing preferably carries a housing 16 in which is a rear bearing member 18 for the drive shaft and a forward cover plate 10 which carries a housing 20 in which is a forward bearing 22 for the drive shaft.

In the preferred form of my invention, the pumping of fluids is accomplished by the rotation of a vane member 27 in connection with a rotor member or rotary part 36 which is mounted eccentrically with respect to the inner cylindrical surface so that the point of maximum displacement from the cylinder wall 40 moves progressively around a casing or inner chamber during the revolution of the vane member, so that as the vane member passes the opening to the inlet member 12 a suction is produced back of the vane member 27 by the enlarging space behind the member, and as the vane member 27 passes the inlet pipe 12 it sweeps the material ahead of it out through the outlet pipe 14.

It will be obvious that while the fluid is being admitted by suction behind the vane member 27 during its rotary movement, the vane is sweeping out the charge taken up behind the vane member during its preceding passage around the chamber.

The preferred form of my invention has a vane member 27 comprising a cylindrical roller 28 which is preferably encased in a housing comprising members 30 and 32, which are positioned on both sides of the roller 28 and which are of dimensions so as to fit snugly around the cylindrical roller 28 and contact with the sides of the opening or milled slot, 34 which is provided in the rotor member 36 to produce a sliding fit so as to produce a seal during the rotation of the vane 27 within the casing.

The cylindrical roller 28 is mounted so as to ride on a cylindrical sleeve or ring member 26 which is carried on the stator shaft 24. The sleeve member 28 is axially mounted with respect to the shaft 24. The center or axis 38 of the shaft 24 is also the axis of the inner cylindrical wall 40 of the stator housing 2.

The sleeve or ring 26 is preferably of phosphor bronze and is free to turn on the shaft 24.

It will be understood that during the rotation of the vane 27, the cylinder 28 is always tangent also to the interior wall 40, rolling between the wall 40 and the cylindrical surface of the sleeve 26.

In order to have the rotor member 36 rotate

eccentrically with respect to the inner surface 40, so as to produce pumping action, the shaft 24 which is preferably integral with or carried by the cover plate 8 is provided with a cylindrical opening 42 through which a shaft 44 passes, the forward end of the shaft being carried by a bearing 18 in the housing 16, and the rear end of the shaft being carried by bearings 22 in the housing 20, the shaft being keyed to the rotor member 36 by means of a key 43. The center of the opening 42 is preferably about half way between the center 38 of the shaft 24 and the outer cylindrical surface of the shaft, the opening 42 being of sufficient size so that the shaft 44 passing therethrough will not contact with the walls of the opening to avoid friction or binding action.

The center of the opening 42 is preferably located directly between the center or axis 38 of the shaft 24 and the point or element 46 of the cylindrical surface 40, which element or point is midway between the inlet pipe 12 and the outlet pipe 14. By means of this construction the rotor member remains substantially continuously in contact with or tangent to the inner surface 40 at the point 46.

In order to rotate the shaft 44, a pulley member 50 is provided whereby as the shaft 44 is rotated, the rotor member 36 is also rotated, whereby the vane member 27 is swept around the interior surface 40 of the casing. As the vane element revolves the cylinder 28 rides on the sleeve member 26 so that the axis of the cylinder 28 moves in a path concentric with the surface 40. The rotor element however rotates around the center of the shaft 44 which is eccentric with respect to the axis 38 of the shaft 24, and as the rotor remains tangent to the surface 40 at the element 46, the vane member 27 during the rotation slides outwardly with respect to the slot or opening 34 in the rotor member until the vane member reaches the position diametrically opposite to the element 46 in the cylindrical surface 40. From that point on during the rotation of the rotor element 36 the vane member 27 moves relatively inwardly with respect to the slot 34 until it again reaches the uppermost position as shown in Fig. 3 of the drawings.

Referring to Fig. 5 of the drawings the rotor 36 moves preferably in a clockwise direction whereby the pipe 12 serves as an inlet and the pipe 14 as an outlet to the chamber within the casing. Referring to Fig. 6 of the drawings, it will be noted that as the rotor member has revolved through a part of a revolution the vane member 27, including the cylinder 28 and the housing members 30 and 32 have moved outwardly with respect to the adjacent slot surfaces of the rotor member.

It will be understood that the form of the invention as illustrated in the drawings and as above described constitutes the preferred embodiment thereof and that various changes or modifications may be made therein without departing from the spirit or scope of the invention as defined in the claims.

Having thus described the invention, what is claimed as new is:

1. A rotary pump comprising a casing having a cylindrical inner surface forming a chamber therein, an inlet to said chamber and an outlet therefrom, a central shaft member mounted in said chamber concentric to said cylindrical surface, a hollow cylindrical rotor member mounted within said chamber enclosing said central shaft member and mounted eccentrically with respect to said central shaft member, said hollow member having an outwardly extending opening therein, a vane member comprising a cylinder and a split housing therefor carried by said hollow member in said opening, said cylinder being of a diameter so as to ride on said central shaft member and to contact with the cylindrical inner surface of said casing, said split housing comprising two sections, each of said sections having a cylindrical inner surface engaging said cylinder and an outer surface engaging the adjacent surface of said opening, said housing sections being of a height so as to expose a portion of said cylinder above and below the housing sections and a drive shaft operatively connected to said hollow member.

2. A rotary pump comprising a casing, a chamber in said casing having a cylindrical inner surface, an inlet to said chamber and an outlet therefrom, a central shaft member mounted axially in said chamber, a vane member comprising a central cylinder and a split housing substantially surrounding said cylinder, said cylinder being mounted to ride on and aparallel with said central shaft member and of a diameter to maintain contact during rotation with both the inner surface of the said casing and said central shaft member, a hollow cylindrical rotor member of substantially less diameter than that of said cylindrical inner surface mounted eccentrically with respect to said central shaft member and having an outwardly extending radial opening adapted to carry the said vane member, the sides of said split housing around the said cylinder fitting the sides of said opening so as to maintain a seal during the rotation of the said hollow rotor member and a drive shaft operatively connected to said hollow rotor member.

3. In a device of the kind described, the combination comprising a stator element having a cylindrical inner surface, a rotor element in substantially the form of an annulus, means for mounting the said rotor element eccentrically with respect to said stator element, a cut-out portion having flat sides extending through one side of said rotor element parallel with the axis thereof, a vane assembly comprising a cylinder and a split housing, said split housing having inner cylindrical surfaces engaging the said cylinder and outer flat surfaces engaging the sides of said cut-out portion so as to render the vane assembly slidable therein during rotation of said rotor element, means for rotating said rotor element comprising a drive shaft mounted concentrically with respect to said rotor element, a ring member mounted within the rotor element concentrically with respect to the inner cylindrical surface of the stator element, the said ring member having an external diameter of a dimension so as to engage and retain the said cylinder continuously in contact with the interior wall of the said cylindrical inner surface of the stator element during rotation of the said rotor element.

4. In a device of the kind described, the subcombination comprising a slotted rotor element, said rotor element being in the form of an annulus in section and having a single slot extending entirely through the rim of the annulus parallel to the axis of the rotor element, the slot therein extending outwardly from the center of the annulus in a direction corresponding in cross-section to a portion of the rim of the annulus intercepted between parallel chords equidistant from the center of the annulus, a vane element slidably fitting the said slot and comprising a cylinder and cooperating housing mem-

bers, said housing members extending partially around said cylinder so as to leave the top and bottom portion of the periphery of the cylinder exposed, and having inner cylindrical surfaces fitting the said cylinder and outer parallel surfaces slidably engaging the side walls of said slot.

5. A rotary pump comprising a casing, a chamber therein having a cylindrical inner surface, an inlet to said chamber and an outlet therefrom, a central shaft member of large diameter axially mounted in said chamber, a sleeve member mounted on said shaft member, a rotor member substantially annular in section mounted in said chamber for rotation eccentric to said central shaft member, said rotor member having a slot portion extending through the rim thereof, a vane assembly mounted in said slot portion and comprising a cylinder and a split housing, said cylinder being of a diameter to ride on said sleeve member and to contact with said cylindrical inner surface and said split housing in said slot portion being of a form to engage the cylinder at a plurality of points on the surface thereof so as to be retained in place within said slot portion and maintain a seal durng the rotation of said rotor member and a drive shaft operatively connected to said rotor member.

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