Jan. 29, 1952 C. F. HUBER 2,583,572

PUMP

Filed Jan. 28, 1948 2 SHEETS—SHEET 1

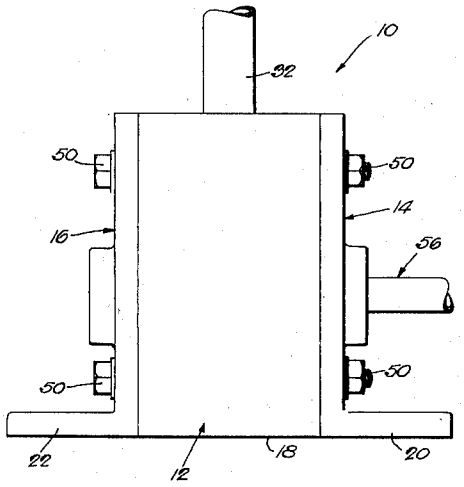

Fig. 1

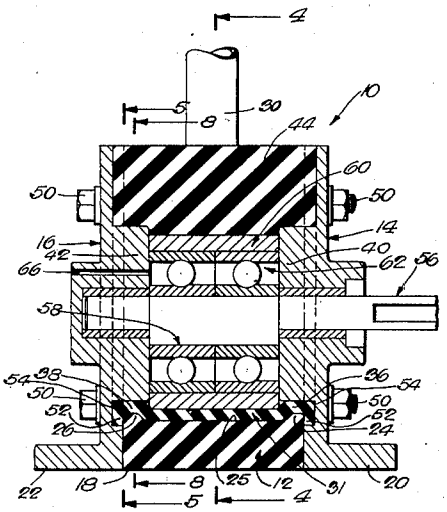

Fig. 3

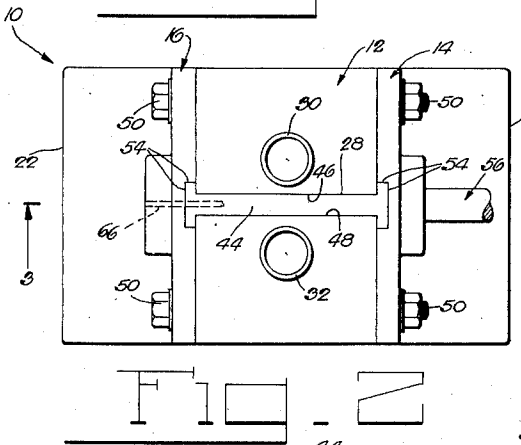

Fig. 2

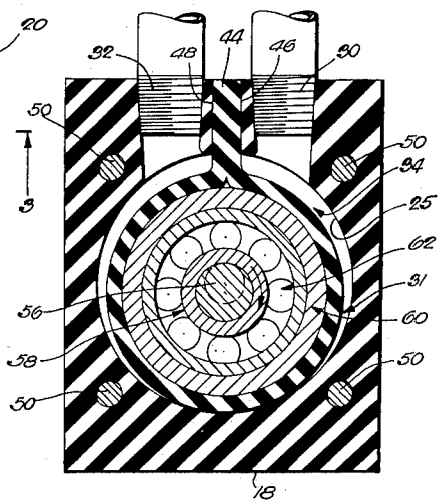

Fig. 4

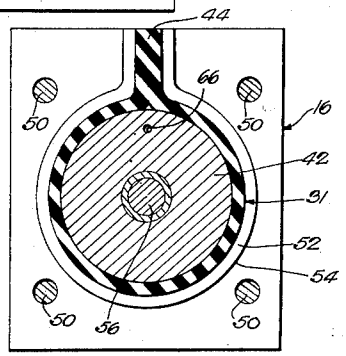

Fig. 5

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Fig. 6

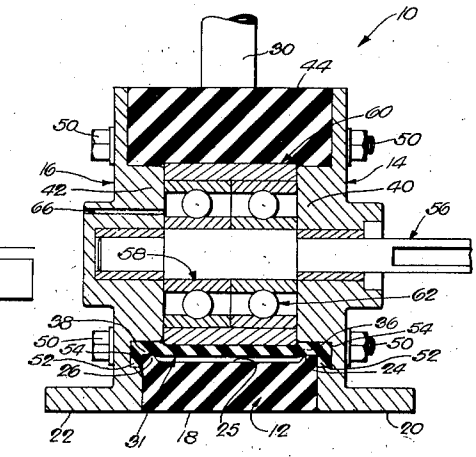


Fig. 7

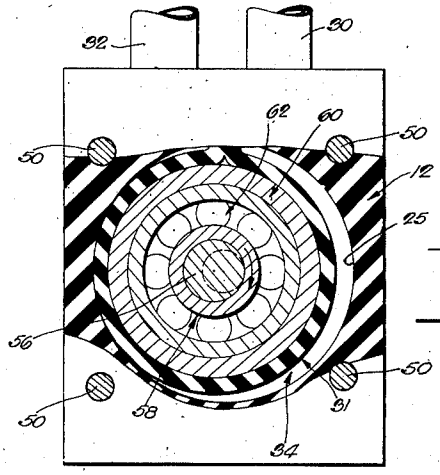
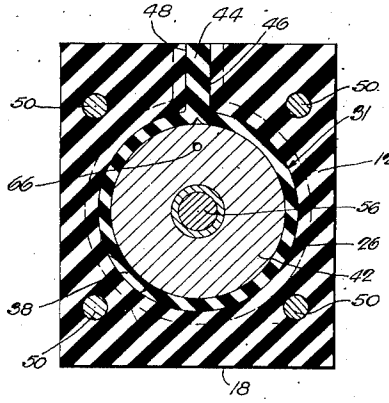


Fig. 8



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Patented Jan. 29, 1952

2,583,572

UNITED STATES PATENT OFFICE

2,583,572

PUMP

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Application January 28, 1948, Serial No. 4,814

5 Claims. (Cl. 103—149)

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This invention relates to pumps or compressors, hereinafter referred to as pumps.

The primary object of the present invention is the provision of a pump which is simple in construction and highly efficient in operation and which, while useful for various purposes is particularly well adapted for pumping various liquid chemicals.

The above and other objects, features and advantages of the present invention will be more fully understood from the following description considered in connection with the accompanying illustrative drawings.

In the drawings:

Fig. 1 is a side view of a pump embodying the present invention;

Fig. 2 is a top plan view of the pump;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a sectional view on the line 5—5 of Fig. 3;

Figs. 6 and 7 are views similar to Figs. 3 and 4 respectively, showing the rotor in a different position;

Fig. 8 is a sectional view on the line 8—8 of Fig. 3.

Referring now to the drawings in detail, the pump 10 embodying the present invention, in the presently preferred form thereof, comprises a casing which includes the body 12 and the end plates or heads 14 and 16. The base of the casing is conveniently formed by the flat bottom part 18 of the casing body 12 and by the flat lateral extensions 20 and 22 of the end plates 14 and 16.

The casing body 12 has an inner cylindrical surface 25 intermediate the circumferentially extending ribs 24 and 26 in outwardly offset relation to the latter, the inner surfaces of said ribs being cylindrical co-axially with surface 25. Said casing body 12 is preferably formed of hard rubber although it can be formed of any other suitable material. As shown, said casing body 12 is split transversely for the full length thereof as indicated at 28. The inlet and outlet openings 30 and 32 are disposed at the opposite sides of the split 28, it being understood that either of said openings may be the inlet opening and that the other of said openings may be the outlet opening, depending upon the direction of rotation of the rotor hereinafter referred to, as will be subsequently more clearly understood. Casing body 12 is preferably formed in one piece, the split being provided therein.

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A resilient and flexible member or liner 31 which is preferably formed of rubber and which can be formed of any other suitable material is disposed within the casing body 12 and defines with the cylindrical surface 25 of the latter an annular fluid passage 34 which extends laterally between ribs 24 and 26 and circumferentially of casing body 12 from the inlet 30 to the outlet 32. The sides of said passage are sealed by the end portions 36 and 38 of member 31 which are respectively clamped between rib 24 and the cylindrical projection 40 of plate 14 and between rib 26 and the cylindrical projection 42 of plate 16. Direct communication between the casing openings 30 and 32 is prevented by the integral portion 44 of member 31 which is clamped between the confronting ends 46 and 48 of the split portion 28 of the casing body 12. The cylinder plates or heads 14 and 16, which are formed of metal, are secured to the casing body 12 by through-bolts 50. It will be understood that when the bolts 50 at the upper part of the casing are passed through the holes in the casing body 12 and in the end plates 14 and 16, the confronting end portions 46 and 48 of the casing body are forced toward each other and thereby clamp sealing portion 44 of member 31 in fluid-tight relation with said confronting end portions 46 and 48. For accomplishing this clamping action, the upper bolt holes in casing body 12 are located in axially-offset relation to the companion upper bolt holes, respectively, of plates 14 and 16 so that in order to bring said casing bolt holes into axial registry with said bolt holes of the plates, it is necessary to press against the opposite sides of the casing body 12 to move end portions 46 and 48 toward each other sufficiently to bring the bolt holes of the casing body into axial alignment with the bolt holes of the end plates 14 and 16. When the bolts are passed through the aligned holes at opposite sides of the split, portion 44 is held tightly clamped between end portions 46 and 48. Also, it will be noted that member 31 is provided at its opposite ends with annular ribs 52 which are received in the adjacent recesses 54, respectively, in plates 14 and 16 for improving the sealing relation between the peripherally extending side edges of member 31 and the adjacent parts of the pump casing.

Provision is made to progressively press resilient member 31 against cylindrical surface 25 of the casing for the full width of said surface, the progression of said pressing action being in a direction extending circumferentially of the casing body 12 from the inlet 30 to the outlet

32. The means provided for this purpose comprises a rotary shaft 56 journalled in the end plates or cylinder heads 14 and 16 for rotation co-axially of the cylindrical surface 25. An eccentric rotor 58 is mounted on shaft 56 for rotation about an axis eccentric to the axis of said cylindrical surface. A cylindrical pressure-applying member 60 is mounted on rotor 58 with an interposed ball bearing 62.

In operation, shaft 56 is rotated by an electric motor, or in any other suitable way, for rotating the rotor 58 in the direction of the arrow (Figs. 4 and 7), when the openings 30 and 32 are the inlet and outlet openings respectively of the pump, or in the reverse direction when the openings 32 and 30 are the inlet and outlet openings, respectively. Pressure-applying member 60 is operated by rotor 58 to press the flexible and resilient member or liner 31 against the cylindrical surface 25 for the full width of the latter. It will be understood that member 60 tightly engages the inner cylindrical surface of member 31 and does not move with respect to said member 31. However, it will be noted that the rotor is moved in relation to pressure-applying member 60 during the rotation of shaft 56 whereby to accomplish the above described progressive pressing of liner 31 against the cylindrical surface 25 of the casing body 12.

A vent opening 66 is provided in one of the end plates, here shown as end plate 16. The inner end of said vent communicates with the interior of the space defined by the inner surface of flexible member 31 so as to eliminate a partial vacuum or to prevent excess pressure in said space which might result in interfering with the pressing of said member against the cylindrical surface 25 during the operation of the pump.

It will be understood that various changes in details of construction and in the arrangement of parts may be made without departing from the underlying idea or principles of this invention within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A pump comprising a casing provided with a fluid inlet and a fluid outlet, an inner cylindrical surface and opposite side walls at the opposite side edges, respectively, of said surface, said inner cylindrical surface being provided with circumferentially extending ribs at the marginal side edge portions thereof and an intermediate part offset radially outwardly of said marginal side edge portions, an annular fluid-impelling member having a portion overlying said ribs secured in said casing between said inlet and outlet and having its marginal side edge portions in fluid sealing relation to said circumferentially extending ribs at the marginal side edge portions of said surface of the casing and defining with said intermediate offset part of said surface a fluid passage extending circumferentially of said surface from said inlet to said outlet, and means for progressively pressing said fluid-impelling member against said offset surface, the progression of pressing action being along the length of said passage in the direction from said inlet to said outlet, with progressive relief of said pressing action immediately following the latter in the same direction, said side walls being provided with means having a cylindrical projection which extends into the space defined by said inner cylindrical surface, said last mentioned means holding said marginal side edge portions of said fluid-impeller member in said sealing relation to said ribs at the marginal side edge portions of said casing surface, said cylindrical projection being operative to clamp the portion of said fluid-impelling member overlying said ribs between said cylindrical projection and said ribs in a radial direction in fluid sealing relation to said ribs.

2. A pump comprising a casing provided with a fluid inlet and a fluid outlet, an inner cylindrical surface and opposite side walls at the opposite side edges, respectively of said surface, said inner cylindrical surface being provided with circumferentially extending ribs at the marginal side edge portions thereof and an intermediate part offset radially outwardly of said marginal side edge portions, an annular fluid-impelling member secured in said casing between said inlet and outlet, said fluid-impelling member having a portion overlying said ribs and marginal side edge portions, means extending into the space defined by said inner cylindrical surface and clamping said portion of said fluid-impelling member overlying said ribs between said means and said ribs in a radial direction in fluid sealing relation to said ribs, said last mentioned means having recesses for the reception of said marginal side edge portions of said fluid-impelling member, said fluid-impelling member defining with said intermediate offset part of said surface a fluid passage extending circumferentially of said surface from said inlet to said outlet, and means for progressively pressing said fluid-impelling member against said offset surface, the progression of pressing action being along the length of said passage in the direction from said inlet to said outlet, with progressive relief of said pressing action immediately following the latter in the same direction.

3. A pump comprising a casing having an inlet and an outlet, said casing having a hollow body provided with an inner cylindrical surface and opposite side walls, said cylindrical surface being provided with circumferentially extending ribs at the marginal side edge portions thereof, means including a flexible and resilient member secured in said casing and defining with said surface of the casing a fluid passage extending circumferentially of said surface from said inlet to said outlet, said flexible and resilient member having a portion overlying said ribs of said cylindrical surface and having circumferentially extending ribs disposed at the opposite sides of said hollow body and the adjacent side walls, respectively, of the casing, a rotor mounted for rotation in said casing about an axis eccentric to the axis of said cylindrical surface, movable pressure-applying means operated by said rotor and operable on said resilient member to progressively press said resilient member against said surface of the casing circumferentially thereof in a direction from said inlet to said outlet during the rotation of said rotor, and stationary means in said casing at opposite sides of said movable pressure-applying means permanently sealing said passage at the opposite circumferentially extending side edges thereof, said stationary sealing means comprising a cylindrical projection extending into the space defined by said inner cylindrical surface and clamping said portion of the flexible and resilient member overlying said ribs of said cylindrical surface between said projection and said last mentioned ribs, said stationary sealing means clamping the ribs of said flexible and resilient member in fluid-sealing engagement with said ribs of said cylindrical surface.

4. A pump comprising a casing having an inlet and an outlet, said casing having a hollow body

provided with an inner cylindrical surface and opposite side walls, a pair of end plates associated with said hollow body, said cylindrical surface being provided with circumferentially extending ribs at the marginal side edge portions thereof, means including a flexible and resilient member secured in said casing and defining with said surface of the casing a fluid passage extending circumferentially of said surface from said inlet to said outlet, said resilient member having a portion overlying said ribs of said cylindrical surface and having circumferentially extending ribs disposed at the opposite sides of said hollow body and the adjacent side walls, respectively, of the casing, a rotor mounted for rotation in said casing about an axis eccentric to the axis of said cylindrical surface, and movable pressure-applying means operated by said rotor and operable on said resilient member to progressively press said resilient member against said surface of the casing circumferentially thereof in a direction from said inlet to said outlet during the rotation of said rotor, each of said end plates being provided with means for permanently sealing said passage at the opposite circumferentially extending side edges thereof, said means comprising a cylindrical projection extending into the space defined by said inner cylindrical surface and effective to clamp said portion of said resilient member overlying said ribs of said cylindrical surface between said projection and said last mentioned ribs, said sealing means having a portion effective to clamp said ribs of said resilient member in fluid sealing engagement with said ribs of said cylindrical surface.

5. A pump comprising a casing having an inlet and an outlet, said casing having a hollow body provided with an inner cylindrical surface and opposite side walls, a pair of end plates associated with said hollow body, said cylindrical surface being provided with circumferentially extending ribs at the marginal side edge portions thereof, means including a flexible and resilient member secured in said casing and defining with said surface of the casing a fluid passage extending circumferentially of said surface from said

inlet to said outlet, said resilient member having a portion overlying said ribs of said cylindrical surface and having circumferentially extending ribs disposed at the opposite sides of said hollow body and the adjacent side walls, respectively, of the casing, a rotor mounted for rotation in said casing about an axis eccentric to the axis of said cylindrical surface, and movable pressure-applying means operated by said rotor and operable on said resilient member to progressively press said resilient member against said surface of the casing circumferentially thereof in a direction from said inlet to said outlet during the rotation of said rotor, each of said end plates being provided with means for permanently sealing said passage at the opposite circumferentially extending side edges thereof, said means comprising a cylindrical projection extending into the space defined by said inner cylindrical surface and effective to clamp said portion of said resilient member overlying said ribs of said cylindrical surface between said projection and said last mentioned ribs, said sealing means having a recess for the reception of said ribs of said resilient member whereby said sealing means is effective to clamp said ribs of said resilient member in fluid sealing engagement with said ribs of said cylindrical surface.

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