Feb. 22, 1949. M. E. ESTEY 2,462,481

SLIDING VANE PUMP OR MOTOR

Filed Nov. 17, 1944 2 Sheets-Sheet 1

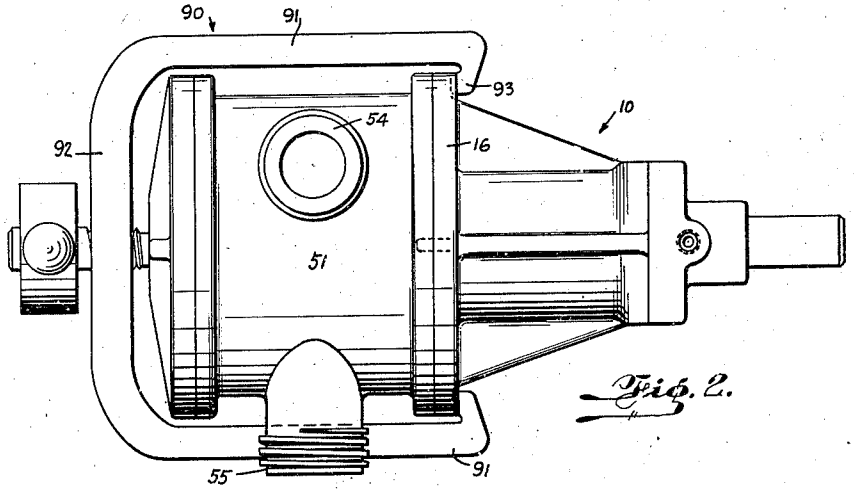


Fig. 2.

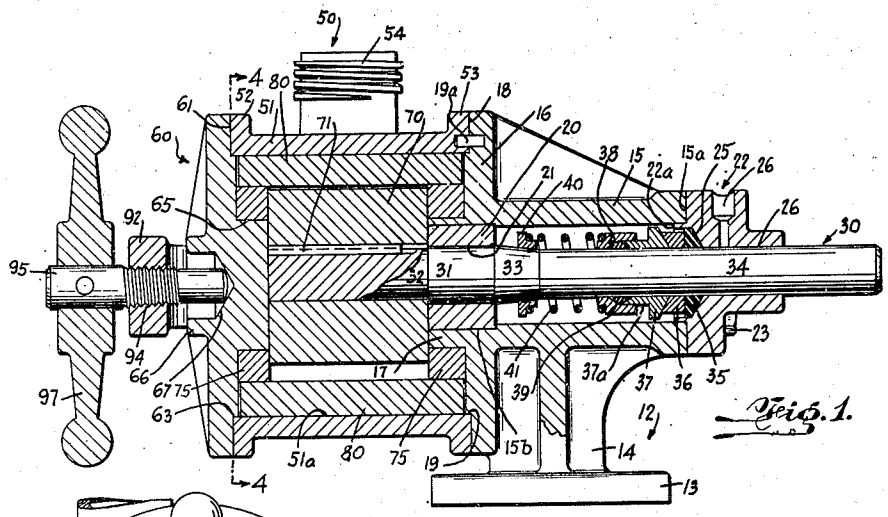


Fig. 1.

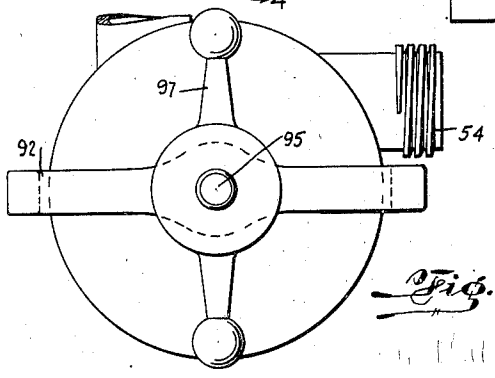


Fig. 3.

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SLIDING VANE PUMP OR MOTOR

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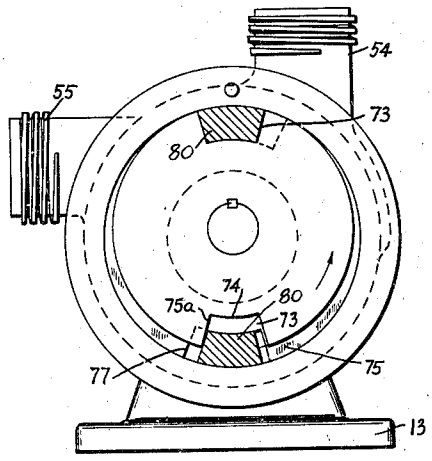


Fig. 4.

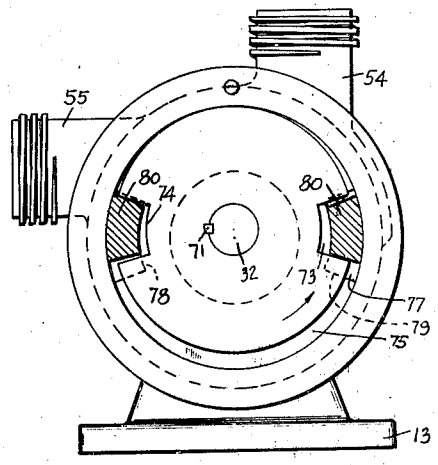


Fig. 5.

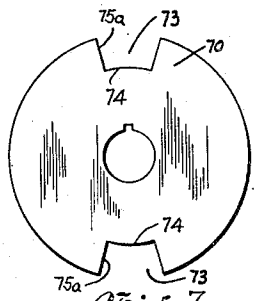


Fig. 7.

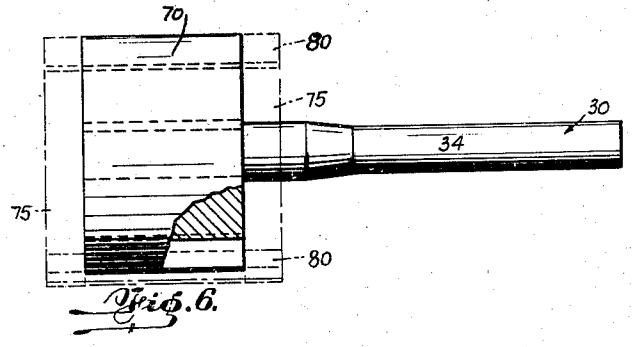


Fig. 6.

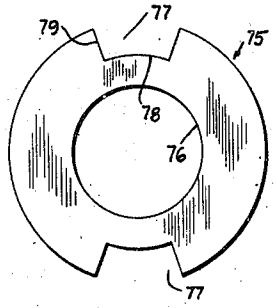


Fig. 8.

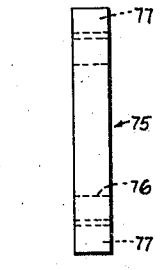


Fig. 9.

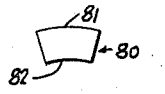


Fig. 11.

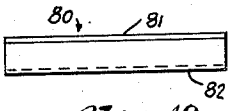


Fig. 10.

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SLIDING VANE PUMP OR MOTOR

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Application November 17, 1944, Serial No. 563,813

1 Claim. (Cl. 103—136)

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This invention relates to rotary pumps.

An object of this invention is to provide an improved rotary pump which may be readily disassembled for cleaning and easily reassembled, and in which the pumping element will sweep the case clean without digging or scraping action.

Another object of this invention is to provide a pump of the character described comprising a casing, a rotor eccentrically mounted within the casing, said rotor being formed at diametrically opposite sides thereof with longitudinal grooves, a pair of rings concentrically mounted for rotation within the casing and having notches at diametrically opposite sides thereof, and piston or divider bars within the casing engaging within the grooves of said rotor and the notches in said rings, the notches in the rings being so shaped as to retain the divider bars against the inner surface of the casing.

Another object of this invention is to provide a reversible, sanitary rotary pump suitable for handling milk, or other fluid, and which may be run at various speeds, anywhere from a relatively slow to a moderately high speed, said pump being so constructed that the capacity thereof may be increased or diminished by merely changing the length of the pumping elements, that is the rotor, the divider bars and the casing, as well as the clamp which clamps the pump parts together.

Another object of this invention is to provide a pump of the character described which is self-sealing regardless of wear of the moving parts, and in which the divider bars are always rotated concentrically and in contact with the perimeter of the case (not radially as in a vane pump), and in which no priming is necessary and the parts are simple and may be clamped in assembled relation by a single clamp.

A still further object of this invention is to provide a strong, compact and rugged pump of the character described which can be assembled in one way only, and which cannot be assembled wrong, and which is relatively inexpensive to manufacture, smooth and positive in operation, and practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claim.

In the accompanying drawing, in which is

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shown various possible illustrative embodiments of this invention:

Fig. 1 is a vertical, axial view through a pump embodying the invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is an end view thereof.

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 4 but showing the rotor rotated 90° further than in Fig. 4.

Fig. 6 is a side view of the rotor and drive shaft removed from the pump.

Fig. 7 is a side view of the rotor.

Fig. 8 is a side view of one of the rings.

Fig. 9 is an end edge view of one of the rings.

Fig. 10 is a side view of one of the divider bars.

Fig. 11 is an end view thereof.

Referring now in detail to the drawing, 10 designates a pump embodying the invention. The same comprises a stand or base 12 having a bottom plate 13, and upstanding wall 14, a horizontal sleeve 15, and an end wall 16 at one end of the sleeve. Sleeve 15 has an end edge 15a at its other end. Extending outwardly from the end wall 16 is an eccentric hub 17. The hub 17 is eccentric with respect to the axis of sleeve 15. End wall 16 is circular and concentric with the hub 17. Said end wall is formed adjacent its perimeter with a recessed surface 18 forming an annular shoulder 19 for the purpose hereinafter appearing. Extending from surface 18 is a locating dowel pin 19a parallel to the axis of sleeve 15. Within one end of sleeve 15 is a circular recess 15b concentric with the sleeve 15 and in which is a bearing 20 formed with an axial through opening 21. Fixed to the outer end of sleeve 15 is a cap 22 contacting edge 15a and fixed thereto by studs 23 or in any other suitable manner. The cap 22 is formed with an axial through opening 24. Cap 22 has a hub 22a fitted within the open end of sleeve 15. It is furthermore formed on the inner side thereof with a tapered recess 25. It may also be formed with an oil opening 26 as shown in Fig. 1 of the drawing.

Extending through bearing 20 and cap 22 is a rotary drive shaft 30 axial with respect to sleeve 15. Shaft 30 has an enlarged portion 31 within the bearing opening 21 of bearing 20, a portion 32 extending beyond said portion 31 to one side thereof, an inwardly tapered portion 33 extending to the opposite side, and a portion 34 of reduced diameter extending from said tapered portion 33. The portion 34 passes through opening 24 in cap 22.

Means is provided to seal the shaft at the cap

22. To this end there is fitted within recess 25 a washer or gasket 35 of rubber, plastic material, or any other suitable compressible material. The washer 35 surrounds shaft portion 34 as shown in the drawing. It has a flat outer surface. On shaft portion 34 is a sealing ring 36 made of self-lubricating material. The ring 36 has an inner frusto-conical surface. On shaft portion 34 is a collar 37 having an outer frusto-conical surface engaging the frusto-conical surface of ring 36. On said shaft portion 34, furthermore, is a gland 38 receiving a reduced neck portion 37a on collar 37. A compressible ring 39 may be provided between the gland 38 and said portion 37a. On tapered portion 33 of the shaft is a collar 40. Interposed between collar 40 and the gland 38 is a coil compression spring 41, which serves to keep the seal tightly pressed against the cap 22.

Contacting end wall 16 is a casing member 50. Said casing member comprises a cylindrical wall 51 having end flanges 52 and 53. Flange 53 contacts recessed surface 18 of end wall 16 and contacts the shoulder 19 which fits therein. Extending upwardly from wall 51 is an outlet tube 54. There also extends from wall 51 an inlet tube 55 disposed at right angles to tube 54. Obviously, tubes 54 and 55 communicate with the interior of casing 50. The end flange 53 has a dowel opening to receive the dowel pin 19a whereby to angularly locate the casing relative to the end wall. The cylindrical wall 51 has an inner surface 51a concentric relative to the hub 17. The casing 50 is closed by an end cap 60 having on one side a recessed annular surface 61 contacting the end flange 52 of the casing. It is also formed with an annular shoulder 63 fitted within the cylindrical wall 51. Said end cap is furthermore formed with a hub 65 having the same outer diameter as the outer diameter of hub 17 and projecting into the casing. Said end wall is provided on the outer surface thereof with an annular boss 66 forming a central recess 67 for the purpose hereinafter appearing.

Within casing 50 and mounted on shaft portion 32 is a rotor 70. The rotor is concentric with respect to the shaft but eccentric with respect to the casing. The rotor has an axial through opening to receive shaft portion 32 and is splined to the shaft by a key 71. The rotor is substantially tangent to the inner surface 51a of the casing at a point between the inlet and outlet tubes 55, 54. Said rotor has a cylindrical outer surface but is formed with a pair of diametrically opposed longitudinal surface grooves or slots 73. Said slots 73 may have curved bottom surfaces 74 and radial side surfaces 75a.

Rotatably mounted on the hubs 17 and 65 are a pair of similar circular rings 75. The rings 75 are concentric with respect to the casing wall 51. The outer surfaces of the rings substantially fit within the cylindrical wall 51a. The rings have central openings 76 to receive the hubs of the end walls of the casing. Said rings are furthermore each formed with a pair of diametrically opposed longitudinal grooves or notches 77 in the outer periphery thereof. The depth of the notches is equal to the depth of the grooves 73. The bottom walls 78 of the notches are part cylindrical whereas the sides 79 thereof are radial. The notches 77 are of greater angular extent than the grooves 73. The notches 77 register with the grooves 73 of the rotor 70.

Disposed within the casing are a pair of piston or divider bars 80. Each divider bar is received in one of the notches 73 and in one notch 77 of each of the rings 75. The bar 80 has a curved outer surface 81 having the same radius of curvature as the inner surface 51a of the casing. It has a part cylindrical inner surface 82 similar to the part cylindrical surface 78 of each ring 75. The length of each divider bar is such as to extend substantially from end wall 60 to end wall 16. The angular extent of each divider bar 80 is substantially the same as the angular extent of groove 73. It will now be understood that when drive shaft 30 is rotated, the rotor will be rotated to thereby turn the divider bars which in turn turn the rings 75. The divider bars are kept against the inner surface of the casing by the rings 75. It will now be understood that as the pump operates, liquid will enter the casing and will be carried around by the divider bars to the outlet passage or tube 55, thereby causing pumping operation.

Means is provided to clamp end wall 60 against the casing and to hold the pump parts in assembled relation. To this end there is provided a U-shaped or yoke clamp 90. Said clamp has a pair of similar symmetrically disposed legs 91 interconnected by a cross-portion 92. At the outer ends of legs 91 are inwardly turned hooks 93 adapted to engage the end wall 16. The cross portion 92 is formed at the middle thereof with a screw-threaded hole 94. Screwed through the hole is a screw 95 entering the recess 67 and contacting the center of the end wall 60. Fixed to the outer end of screw 95 is a handle 97. It will now be understood that when the handle is turned to tighten the screw, clamp 90 will engage end wall 16 for firmly clamping end wall 60 to the casing.

It will now be understood that all the parts may be quickly disassembled for cleaning and as readily reassembled. To disassemble the pump it is only necessary to loosen the screw 95 to permit the clamp to be removed. All the parts of the casing, the rings and the rotor may be taken out and washed and then reassembled again. The clamp may be put on the casing and tightened up and the pump is then ready for operation.

It will be noted that the divider bars are maintained in contact with the inner surface of the casing and, therefore, sweep the case clean without digging or scraping action. The rings 75 and the divider bars aid in maintaining the rotor in alignment so that it cannot cant over. The rotor is maintained to rotate in a true perpendicular plane to the axis of the pump and it cannot wobble. The pump can handle free flowing or viscous fluids and can be run at anywhere from low to moderate speed, namely from 50 R. P. M. to 1800 R. P. M.

It will be noted furthermore that the capacity of the pump may be increased or diminished by merely changing the length of the pumping elements and clamp; and furthermore, the pump is reversible and sanitary. The pump further is self-sealing regardless of wear of the moving parts. The divider bars are always rotated concentrically and in contact with the perimeter of the case. The divider bars do not move radially as in a vane pump. The pump requires no priming. All the parts are extremely simple. It will be noted, furthermore, that the pump cannot be assembled wrong so that it may be assembled even by unskilled labor.

While there is described and shown one preferred means for clamping or securing together the casing and end walls, it will be obvious that other means may be employed to removably se-

cure together the parts of the pump. The end plates 16 and 60 may be removably or even permanently secured to the casing 51 by bolts or other fastening means.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

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

A pump comprising a sleeve, an end wall at one end of the sleeve, a drive shaft passing through said sleeve, bearing means for said shaft within said sleeve, a hub on said end wall eccentric relative to the shaft, a ring concentrically mounted for rotation on said hub, said shaft having a portion extending beyond said end wall, a rotor on the extending portion of said shaft, said rotor being concentric with respect to said shaft, a casing contacting said end wall and disposed concentrically of said hub, an end wall at the opposite end of said casing to close the same, said second end wall being formed with a hub on the inner side thereof concentric with respect to said casing, a ring on said second hub concentric therewith and mounted for rotation thereon, said rotor being disposed between said rings, said rotor being formed with a pair of diametrically opposed longitudinal surface grooves, said rings each being formed with a pair of diametrically opposed notches registering with said grooves, the walls of said grooves and of said notches being radially disposed to present tapered recesses, divider bars in each groove extending into the notches in said rings, said divider bars being of segmental cross-section to correspond with said tapered recesses, said casing being formed with an inlet and an outlet passage, and means to fix said end walls and casing together.

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