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G. T. SHOLTES ET AL
VALVELESS TWO WAY PUMP

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FIG. 1

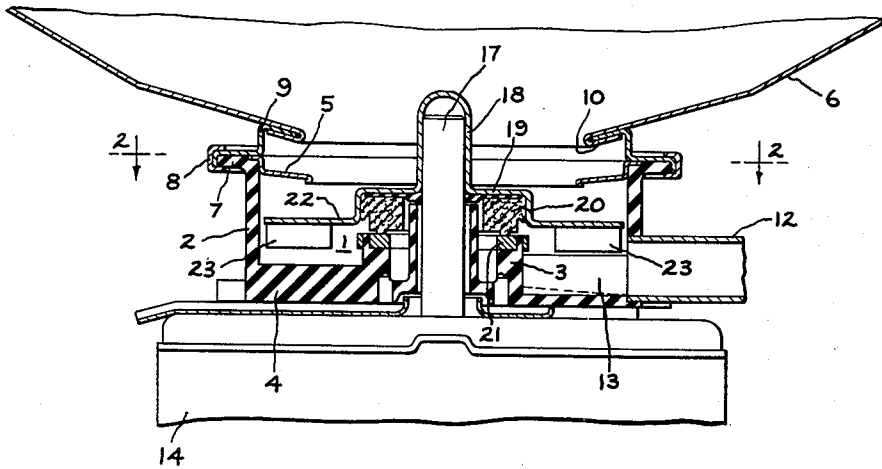


FIG. 2

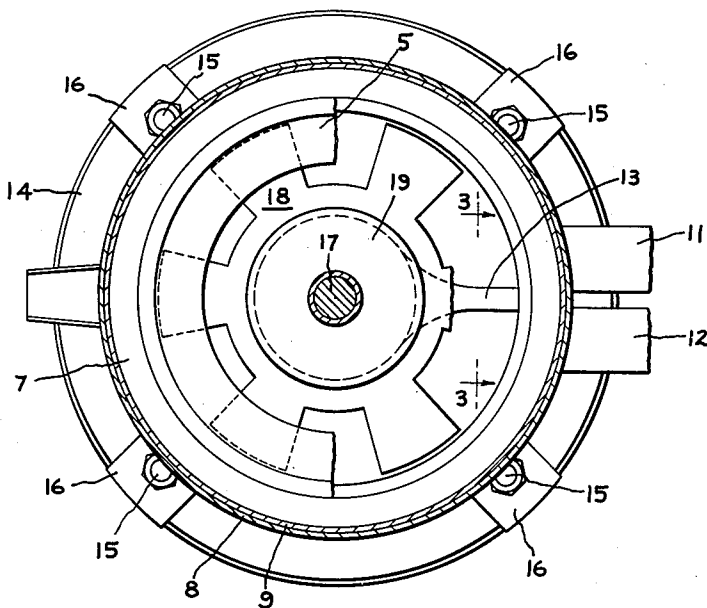
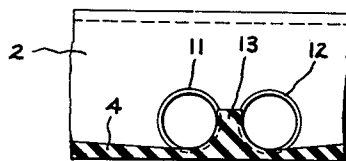


FIG. 3



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VALVELESS TWO WAY PUMP

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3 Claims. (Cl. 103—2)

This invention relates to fluid pumps, and has as its principal object the provision of a reversible pump having only one moving part (a rotary impeller) which nevertheless functions to discharge fluid through one discharge outlet when driven in one direction of rotation, and through another discharge outlet when driven in the opposite direction.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Briefly stated, in accordance with one aspect of this invention there is provided a pump having an annular pump chamber provided with an axial inlet opening and a pair of radial discharge openings, a fixed radially disposed barrier in the chamber joined with the portion of the chamber wall between the two discharge openings, and a reversible rotary impeller mounted in the pump chamber and arranged to discharge fluid through one of the discharge openings when rotating in one direction and through the other discharge opening when rotating in the opposite direction.

For a better understanding of this invention, reference may be made to the following description and the accompanying drawing in which:

Fig. 1 is a fragmentary elevation view, partly in section, of a pump constructed in accordance with the present invention.

Fig. 2 is a cross-sectional view taken along the lines 2—2 in Fig. 1.

Fig. 3 is a cross-sectional view taken along the line 3—3 in Fig. 2.

Referring to the drawing, the numeral 1 designates an annular pump chamber defined by an outer cylindrical wall 2, an inner cylindrical wall 3, a bottom wall 4 and a top wall 5. Top wall 5 is of annular configuration and provides an axial inlet opening overlying pump chamber 1. For purposes of illustration, the present embodiment of the invention is shown as being secured to the bottom wall of a tub or vat 6, the arrangement being such that fluid entering the vat 6 flows by gravity to the inlet opening of pump chamber 1. In order to secure the parts together, the upper portion of side wall 2 is provided with a flange 7 which cooperates with a pair of overlapping flanged support rings 8 and 9, the latter being suitably secured to a circular flange 10 integral with wall 6.

As shown in Figs. 2 and 3, a pair of discharge conduits 11 and 12 are secured to side wall 2 of the pump chamber so as to provide a pair of closely adjacent radial discharge openings. Cooperating with these discharge openings in the manner described below is a fixed radially disposed barrier 13 positioned in chamber 1 and joined with the portion of wall 2 between the discharge openings formed by conduits 11 and 12 and terminating adjacent the center of the chamber to serve as a divider. It will be observed that the top surface of bottom wall 4 slopes from

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a high point diametrically opposite barrier 13 in spiral configuration to low points adjacent discharge openings 11 and 12. Thus, fluid flowing in the chamber in an annular clockwise pattern will eventually reach conduit 11 while fluid flowing in a counterclockwise pattern will eventually reach discharge conduit 12. While the illustrated configuration of pump chamber 1 provides optimum pumping efficiency, it will be understood that the slope of bottom wall 4 may be varied, and in fact the bottom wall may be flat, if desired. As shown in the drawing, walls 2, 3, and 4 and barrier 13 may be conveniently molded from a suitable material such as hard rubber.

Located below the bottom wall 4 of the pump housing defining chamber 1 is an electric motor 14 suitably secured to the housing by means of studs 15 secured to the motor and extending through mounting brackets 16 which in turn are secured to bottom wall of the pump chamber by any suitable means (not shown). Motor 14 includes a motor shaft 17 extending upwardly within inner wall 3 of the pump chamber and arranged to carry a rotary impeller 18.

Impeller 18 is of generally disk shaped configuration and includes a raised central portion 19 within which is located a rotary sealing block 20 arranged to cooperate with a fixed sealing member 21 secured to inner wall 3 of the pump chamber. The peripheral portion 22 of pump impeller 18 which may be made of sheet metal, carries a plurality of blade members 23 preferably formed by slitting and bending down sectors of the peripheral portion. Blade members 23 are positioned so as to provide a pumping force in both directions of rotation, it being understood that these forces will be substantially equal if blade members 23 are bent at substantially a right angle to the surface of the peripheral portion of the impeller. It will, of course, be understood that the peripheral portion of the impeller and blades 23 are positioned with respect to barrier 13 so that the latter does not interfere with rotation of the impeller.

From the preceding description, it will be evident that upon rotation of impeller 18 in the clockwise direction as viewed in Fig. 2, fluid entering pump chamber 1 through the opening defined by top wall 5 will be discharged through discharge conduit 11 and that substantially no fluid will be discharged through conduit 12, there being, in fact, a slight negative pressure at this point. Conversely, when impeller 18 rotates in the counterclockwise direction fluid entering pump chamber 1 will be directed to discharge conduit 12, substantially no discharge through conduit 11 taking place. It is also evident that these functions are achieved by a pump arrangement which includes no moving parts other than the pump impeller itself.

While we have shown and described a particular embodiment of our invention, we do not desire the invention to be limited to the particular construction disclosed, and we intend by the appended claims to cover all modifications within the true spirit and scope of the invention.

What we claim is:

1. A pump comprising wall means defining an annular chamber having an axial inlet opening and a pair of closely adjacent radial discharge openings, a fixed radially disposed barrier wall in said chamber joined with the portion of said wall means between said discharge openings and terminating adjacent the center of the chamber to serve as a divider, and a reversible rotary impeller mounted in said chamber for rotation about the axis thereof and above said barrier wall, said impeller including blade means arranged to pump fluid entering said inlet opening through one or the other of said discharge openings depending upon its direction of rotation.

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2. A pump comprising a pump housing including a cylindrical side wall, a bottom wall and an annular top wall defining an annular pump chamber having an axial inlet opening at the top thereof, said side wall having therein a pair of closely adjacent radial discharge openings positioned adjacent said bottom wall, a fixed radially disposed barrier wall extending upwardly from said bottom wall and joined with the portion of said side wall between said discharge openings and terminating adjacent the center of the chamber to serve as a divider, and a reversible rotary impeller mounted in said annular chamber above said barrier wall for rotation about the axis of said annular chamber, said impeller including blade means arranged to pump fluid entering said inlet opening through one or the other of said discharge openings depending upon its direction of rotation.

3. A pump comprising a pump housing including a cylindrical side wall, a bottom wall and an annular top wall defining an annular pump chamber having an axial

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inlet opening at the top thereof, said side wall having therein a pair of closely adjacent radial discharge openings positioned adjacent said bottom wall, a fixed radially disposed barrier wall extending upwardly from said bottom wall and joined with the portion of said side wall between said discharge openings and terminating adjacent the center of the chamber to serve as a divider, and a reversible rotary impeller mounted in said annular chamber above said barrier wall for rotation about the axis of said annular chamber, said impeller including a peripheral horizontal portion and a plurality of downwardly extending blade members depending therefrom, the lower edges of said blade members being spaced from said peripheral portion so as to pass in close proximity to said barrier wall.

References Cited in the file of this patent

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