

Dec. 11, 1962

A. BRKICH
ROTARY PUMP

3,067,692

Filed Aug. 19, 1959

2 Sheets-Sheet 1

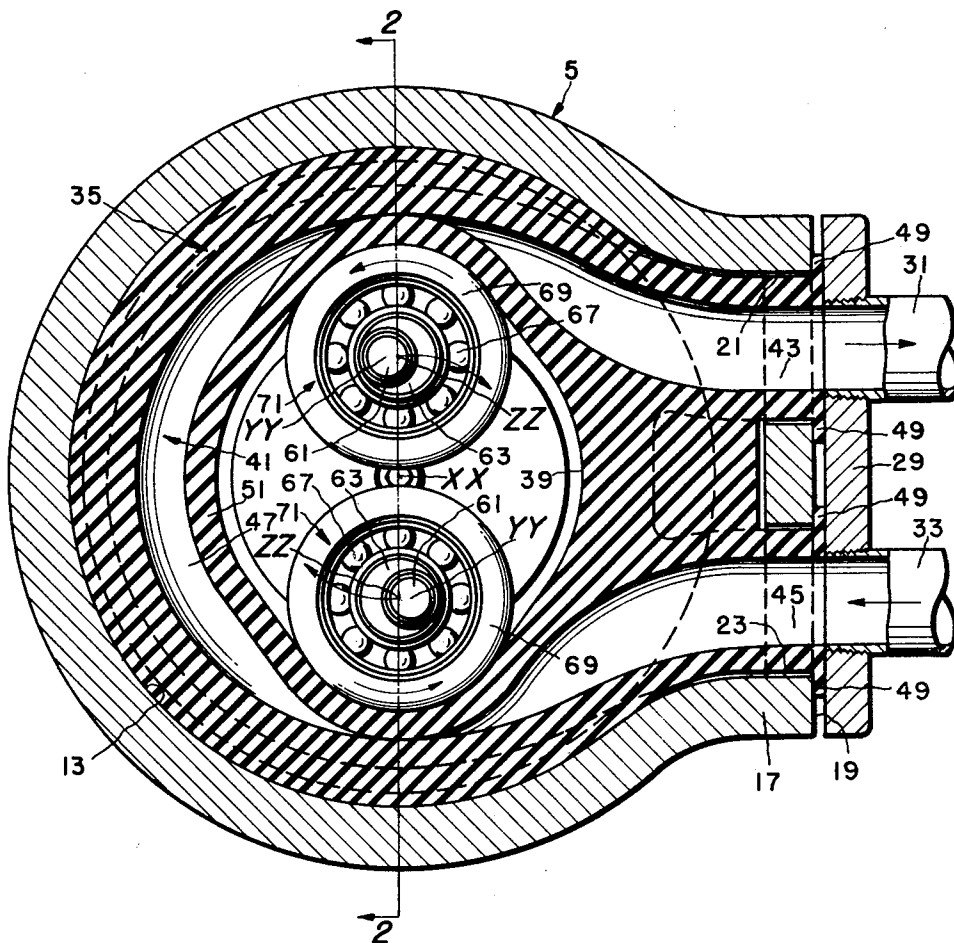


FIG. 1

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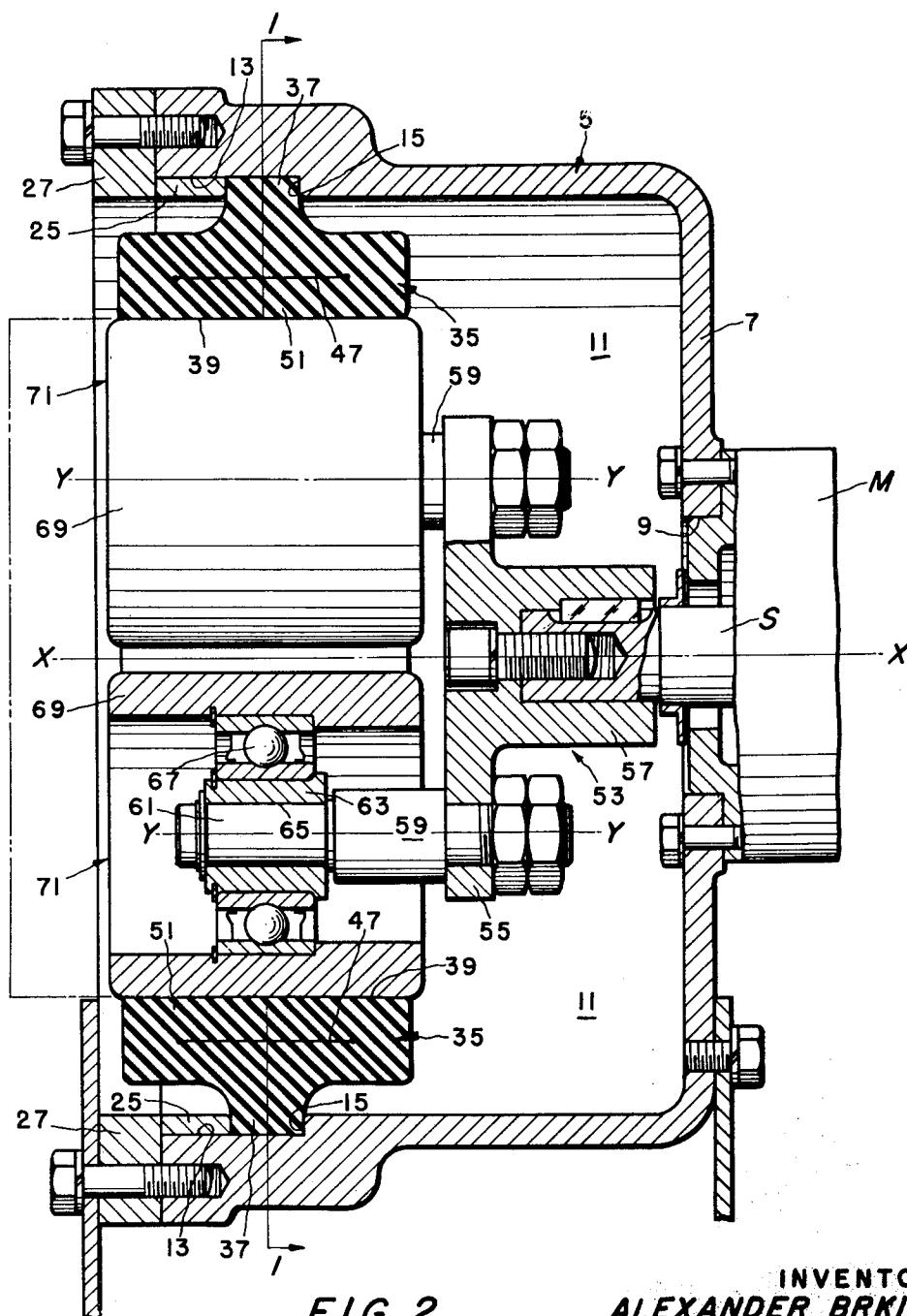


FIG. 2

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3,067,692

ROTARY PUMP

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1 Claim. (Cl. 103-149)

This invention relates to rotary pumps and more specifically to the flexible tube type.

An object of this invention is to provide a pump of this type adapted to operate at a constant speed and pressure.

This and other objects will become apparent by referring to the following description and accompanying drawings in which

FIGURE 1 is a sectional view of a pump in accordance with the invention taken in a plane 1-1 of FIG. 2, and FIG. 2 is a sectional view taken on line 2-2 of FIG. 1.

The pump according to this invention may be positioned vertically or horizontally, however, is shown such that the rotor rotates about a horizontal axis XX.

Referring more specifically to the drawings, the pump has a cup shaped casing 5 including an end wall 7 having an opening 9. An internal chamber 11 formed by the circular outer wall of the casing 5 is positioned concentric with the opening 9 about the axis XX. A motor M is mounted on the wall 7 and has a shaft S extending into the chamber 11 and rotatable about the axis XX. The inner surface of the circular wall of the casing 5 is recessed at 13 and forms an annular seat 15. That portion of the circular wall of the casing 5 remote from the wall 7 is interrupted by a boss formation 17 which has an outer flat face 19 provided with two slotted openings 21 and 23. The casing 5 in the area of the boss portion 17 has a general cross sectional U-shape. A unitary flexible pump housing 35 having an outer profile corresponding to the shape of the casing 5 in the area of the boss portion 17 is received in the casing 5 and has a flange 37 which extends into recess 13 and abuts the seat 15. A clamping ring 25 is inserted into recess 13 and is retained therein by a retaining plate 27 for clamping the flange 37 of the pump housing 35 between the seat 15 and the inner end of the ring 25. The retaining plate 27 has an outer configuration coinciding with the outer shape of the casing 5 at the boss portion and has a circular opening coinciding with the inner surface of the wall surrounding the chamber 11. The portion of plate 27 adjacent to the boss 17 bears against the side of the pump housing 35 and restrains that portion of the housing. The flexible pump housing 35 has a central opening 39 concentric with the chamber 11. A flange 49 at the end of the housing 35 engages the face 19 of the boss 17. A port plate 29 receives an outlet conduit 31 and an inlet conduit 33 and is bolted to the boss 17, clamping the resilient flange 49 between its inner face and the face 19. Thus flange 49 acts as a seal around the pump inlet and outlet. A U-shaped passage 41 extends from the inlet conduit 33 to the outlet conduit 31 and forms three individual chambers, namely, the inlet chamber 45, the outlet chamber 43 and the pump chamber 47. A diaphragm wall 51 is formed between the central opening 39 and the passage 41.

A rotor assembly 53 having a circular base plate 55 including a bored boss 57 is keyed and bolted to the shaft S for rotation. A pair of stub shafts 59 extending along parallel axes YY are carried by the base plate 55 and spaced radially outward from the axis of rotation XX of rotor assembly 53 diametrically opposite one another. Each shaft 59 has a reduced terminal portion 61 which receives sleeve 63. Sleeve 63 is locked to

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the terminal portion 61 against longitudinal movement by any conventional means. Sleeve 63 is rotatable about terminal portion 61 and has a bore 65 eccentric to the outer periphery of sleeve 63, the eccentricity being equal to the distance between the axis YY of the shaft 59 and the axis ZZ (FIG. 1) of eccentric bore 65 in the sleeve 63. A ball bearing assembly 67 surrounds the sleeve 63 with the inner race thereof being locked to the sleeve while a circular drum 69 is locked to the outer race. The wall contacting members 71 comprising the sleeves 63, the bearings 67 and the drums 69 extend into the circular opening 39 in the pump housing 35 to engage and displace the formed wall 51 radially outward until the inner surface of the passage 41 abuts the outer surface thereof.

As the pump rotor 53 rotates clockwise about the axis XX carrying the members 71 in a substantially circular path, each drum 69 is free to pivot about the axis YY as well as to rotate about axis ZZ. The rotary and combined rotary pivotal movement of each drum 69 about the axes YY and ZZ provides radial movement of the drums 69 toward and away from the axis of rotation XX while they rotate about axis ZZ and are rotated about axis XX.

In operation, the rotor 53 is rotated clockwise carrying the members 71 in a circular path about axis XX. Centrifugal force causes sleeve 63 and drum 69 of the members 71 to pivot about axis YY, forcing drums 69 outwardly away from axis XX into a rolling contact with the inner surface of the flexible diaphragm wall 51. Assuming rotation of rotor assembly 53 is clockwise, the direction of rotation of the drums 69 is counter-clockwise.

As shown in the drawings, the portions of diaphragm wall 51 adjacent drums 69 are forced against housing 35, the portions of the passage 41 adjacent the drums being completely collapsed, to form chambers 43, 45 and 47 which are completely segregated one from the other.

Each of the members 71 alternately opens the passage 41 adjacent the chamber 43 and closes this passage adjacent the chamber 45 and progressively moves the formed closure towards the discharge end of the passage. Thus the pumping chamber 47 is alternately connected to the inlet chamber 45 and the outlet chamber 43. As one of the members 71 rotates about the axis XX it will advance the formed closure to advance towards the discharge side and thus the fluid trapped within the chamber 47 is forced towards the chamber 43 and new fluid entering behind this closure will be trapped by the member advancing towards the inlet chamber 45 to form a second closure as the first closure opens to the discharge member.

As the rotor 53 rotates about the axis XX the centrifugal force (urging members 71 to pivot about the axis YY to move outwardly away from the axis XX to force the diaphragm wall 51 towards housing 35) at a constant speed of rotation remains constant and determines the discharge pressure of the pump. Should, however, the force of the discharge pressure exceed the centrifugal force, when, for instance, the discharge from chamber 43 is obstructed, the excess force, transmitted by diaphragm wall 51 to the upper drum 69 and sleeve 63 causes drum 69 and sleeve 63 to pivot clockwise about the axis YY toward the axis XX. Simultaneously, the force acting to pivot drum 69 and sleeve 63 causes diaphragm wall 51 away from housing 35 to effect communication between discharge chamber 43 and pump chamber 47, and thereby permit the excess pressure in chamber 43 to escape to chamber 47.

When the aforementioned obstruction of the discharge from chamber 43 continues, the excess pressure in

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chamber 47 causes the lower drum 69 and sleeve 63 to pivot clockwise about axis YY permitting the portion of diaphragm wall 51 adjacent the lower drum 69 to move away from housing 35. Thus, communication is formed between chamber 47 and inlet chamber 45, and consequently, communication is formed between discharge chamber 43 and inlet chamber 45 as long as the force of the discharge pressure and the centrifugal force is unbalanced.

With this arrangement the discharge pressure of the pump is constantly controlled to maintain a constant operational pressure and to insure a pressure relief whenever the discharge pressure exceeds a predetermined amount.

Thus by the above construction are accomplished, among others, the objects hereinbefore referred to.

It is to be understood that various changes and modifications may be made without departing from the spirit and scope of the invention as set forth in the appended claim.

Having thus described my invention, I claim:

A fluid pump, comprising a rotor, a housing having flexible means therein connected to receive fluid to be pumped and discharge the pumped fluid, a plurality of shafts positioned eccentrically of the axis of said rotor

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and having their axes substantially parallel with the axis of said rotor connected to said rotor for rotation by the latter about the axis of said rotor, a member connected to each shaft and disposed to engage said flexible means so as to provide pump chambers for receiving and discharging fluid upon rotation of said rotor, each member including an eccentric connected to said shaft to allow for movement of said member away from the axis of said rotor solely by centrifugal force when said member is rotated about the axis of said rotor and automatically allow said member to move toward the axis of said rotor when said member is not rotating and when the force of the pressure of the discharged fluid exceed said centrifugal force.

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