July 29, 1952 F. W. TAYLOR 2,604,853

ROTARY FLUID PUMP OR MOTOR

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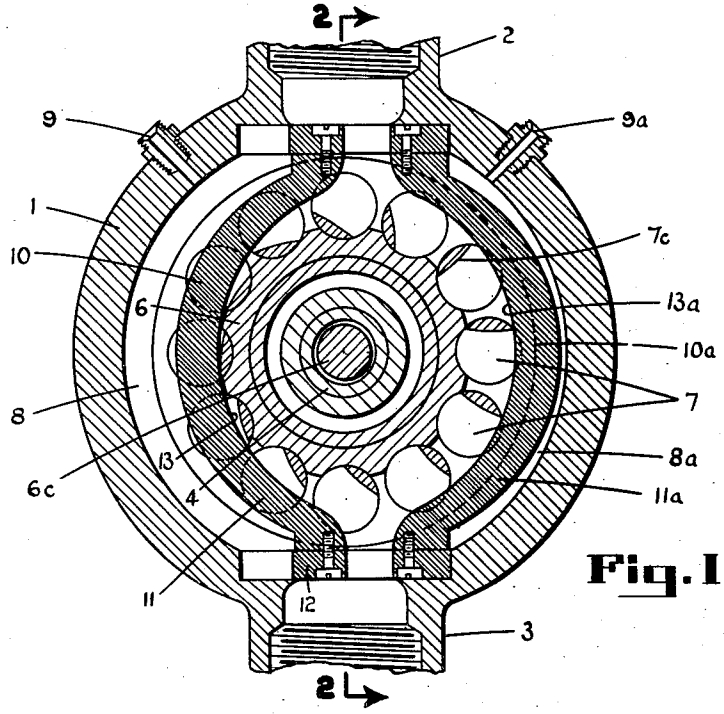
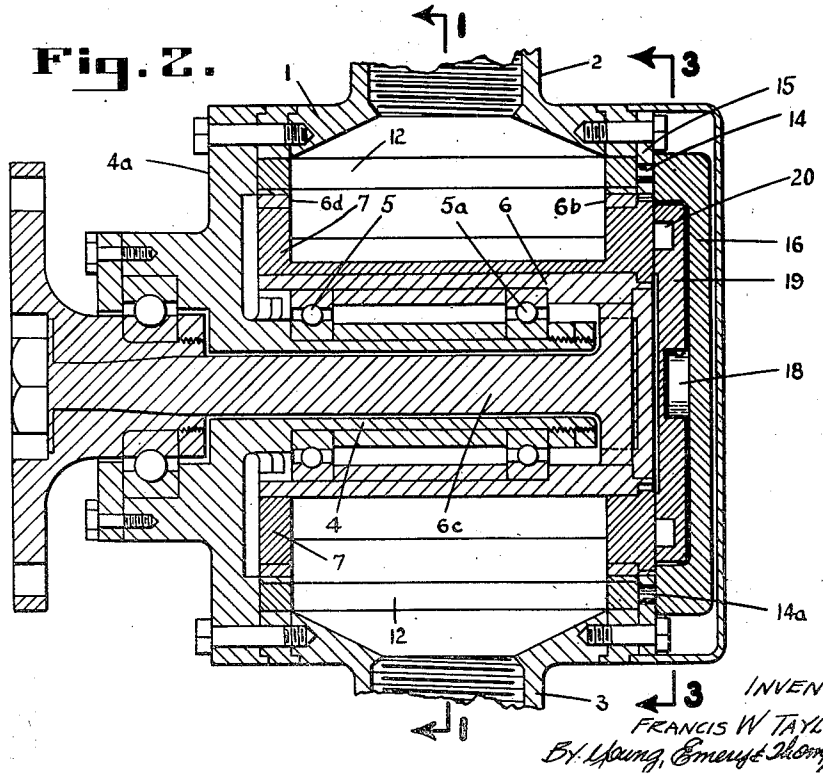


Fig. 1.

Fig. 2.



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Filed Dec. 10, 1946 6 Sheets-Sheet 2

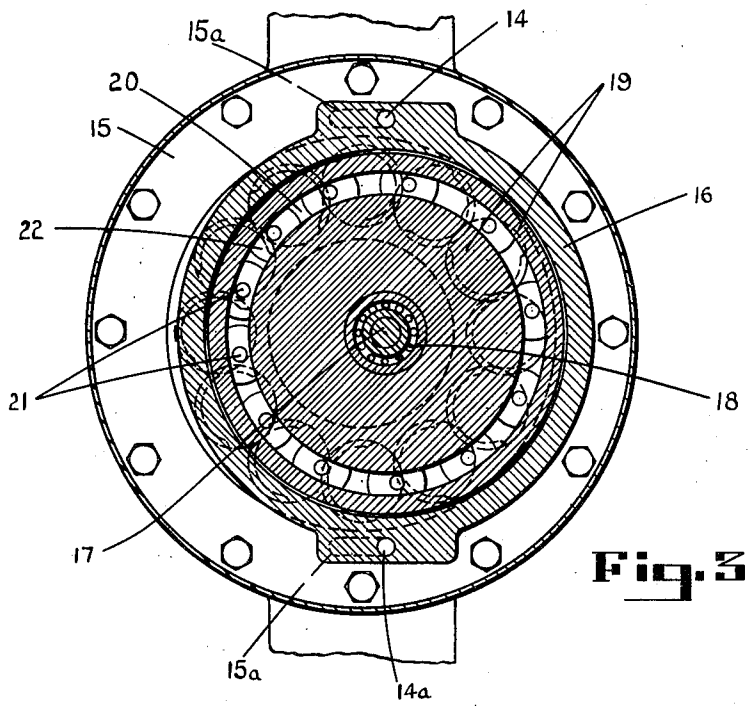


Fig. 3.

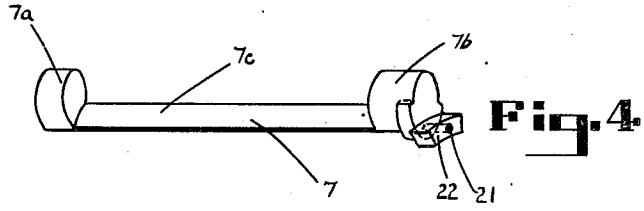


Fig. 4.

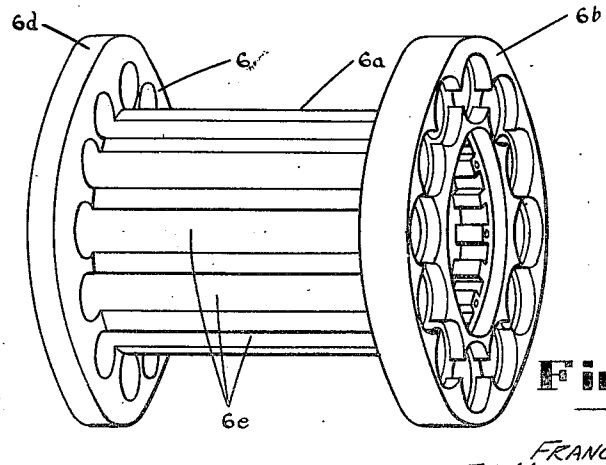


Fig. 5.

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ROTARY FLUID PUMP OR MOTOR

Filed Dec. 10, 1946 6 Sheets-Sheet 3

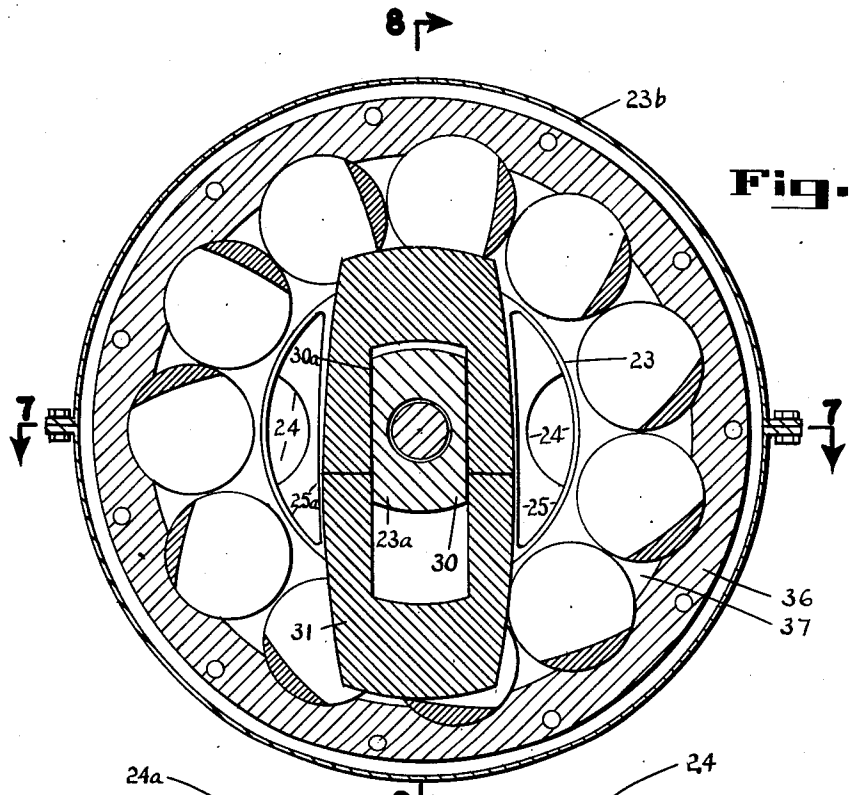


Fig. 6.

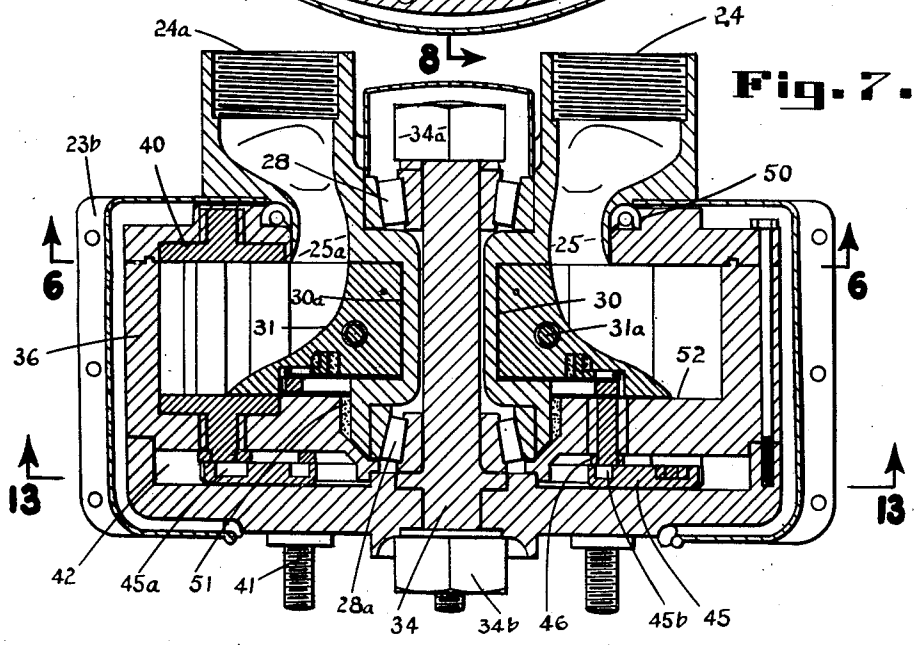


Fig. 7.

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July 29, 1952 F. W. TAYLOR 2,604,853

ROTARY FLUID PUMP OR MOTOR

Filed Dec. 10, 1946 6 Sheets-Sheet 4

Fig. 8.

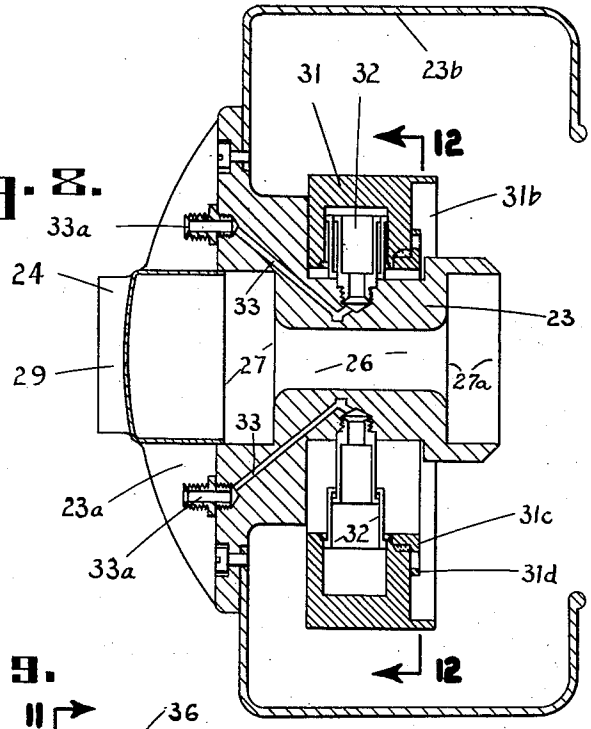
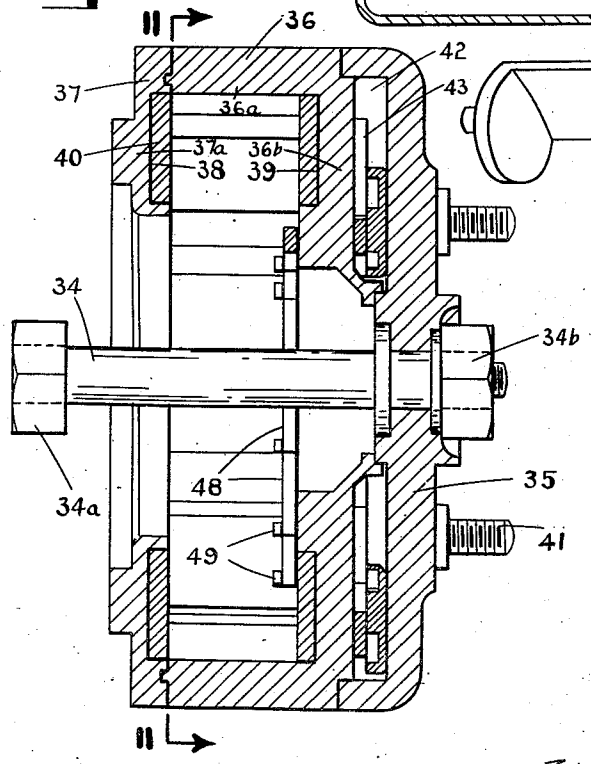


Fig. 9.



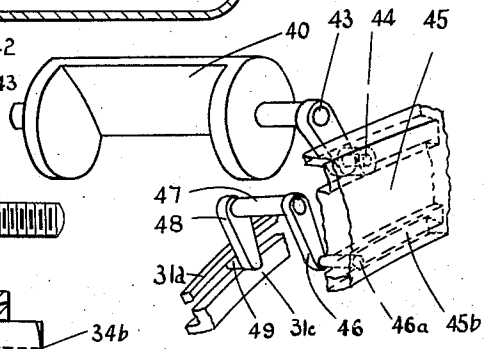


Fig. 10.

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July 29, 1952 F. W. TAYLOR 2,604,853

ROTARY FLUID PUMP OR MOTOR

Filed Dec. 10, 1946 6 Sheets-Sheet 5

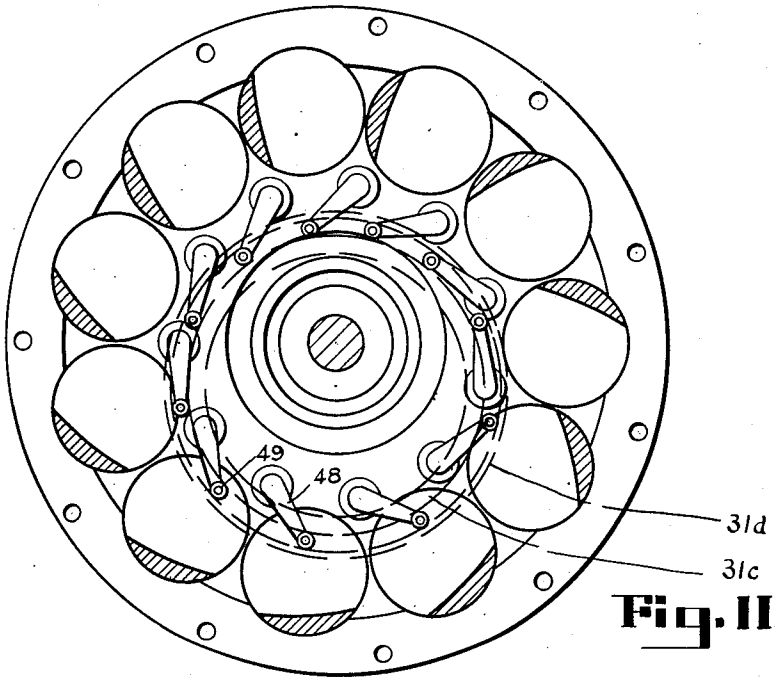


Fig. 11.

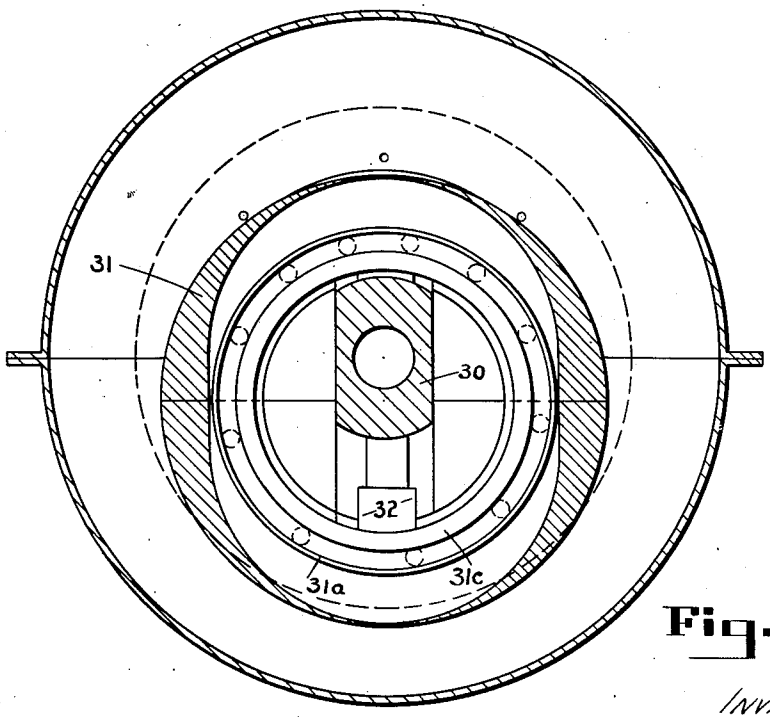


Fig. 12

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ROTARY FLUID PUMP OR MOTOR

Filed Dec. 10, 1946 6 Sheets-Sheet 6

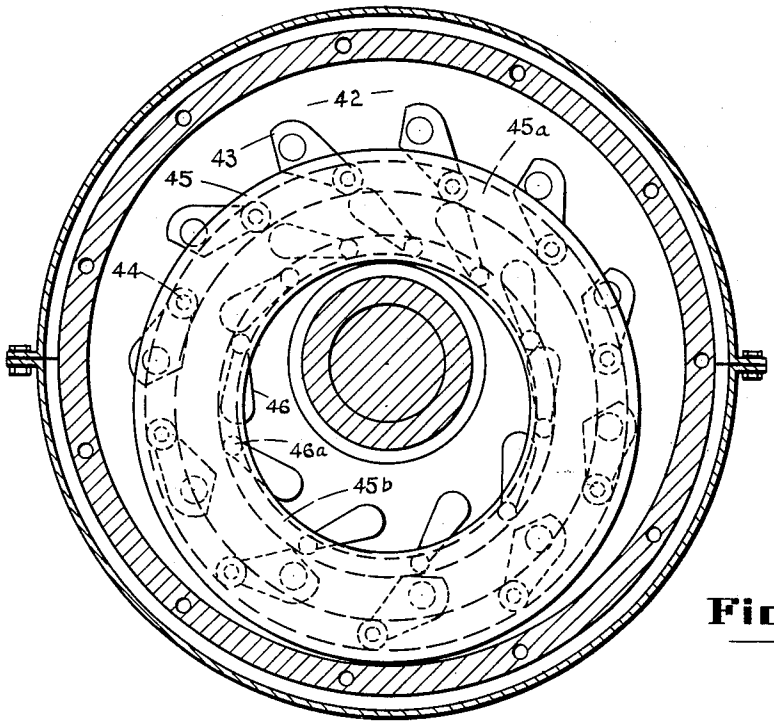


Fig. 13.

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Patented July 29, 1952

2,604,853

UNITED STATES PATENT OFFICE

2,604,853

ROTARY FLUID PUMP OR MOTOR

Francis William Taylor, Wellington, New Zealand

Application December 10, 1946, Serial No. 715,267
In New Zealand August 2, 1946

13 Claims. (Cl. 103—120)

1

This invention relates to rotary fluid pumps or motors.

Various forms of rotary fluid pumps or motors are known. Furthermore it is known to provide for the effective capacity of a rotary fluid pump or motor to be variable.

Many existing rotary fluid pumps or motors are open to the objection that undue friction develops between the vanes and the stator, with consequent rapid wear and loss of efficiency.

Furthermore, so far as I am aware, in all existing variable capacity rotary fluid pumps or motors the volumetric capacity is very low—i. e. for a given capacity of unit the said unit has to be unduly large and cumbersome.

Furthermore, it is not possible with present rotary fluid pumps or motors to reverse the direction of the fluid delivered, in the case of a pump, or to reverse the direction of the drive, in the case of a motor, without reversing the direction of the drive in the one case or the direction of fluid flow in the other case.

The invention aims primarily to provide a construction of rotary fluid pump or motor in which there is a minimum of sliding friction as compared with a common type of rotary fluid pump or motor utilising an eccentric rotor having sliding vanes held outwards by spring pressure or centrifugal force against the inner periphery of the housing.

Another of the objects of the invention in one aspect is to provide a variable capacity rotary fluid pump or motor of improved volumetric capacity.

The invention further in one aspect aims to provide a rotary fluid pump or motor which is reversible without requiring reversal of its actuating member or medium.

The invention, in one aspect, consists in a rotary fluid pump or motor, comprising a stator, a rotor associated therewith, a plurality of vanes carried by the rotor and mechanical means for oscillating the said vanes in timed relation to the rotation of the rotor, so that they will pass the coacting part or parts of the stator with an approved clearance.

The invenion, also, in another aspect, consists in a rotary fluid pump or motor, comprising a stator, a rotor associated therewith, a plurality of vanes carried by the rotor, an adjustable part or parts of the stator adapted to coact with the vanes, means for adjusting said part or parts of the stator towards and away from the rotor, and mechanical means for oscillating the said vanes in timed relation to the rotation of the rotor so

2

that they will pass the coacting part or parts of the stator with an approved clearance.

The invention also, in a further aspect, consists in a rotary fluid pump or motor, which is reversible to deliver fluid in opposite directions as required or to rotate in opposite directions as required without requiring the drive to the pump (in the one case) or the fluid supply to the motor (in the other case) to be reversed.

The invention further, in one aspect, consists in a rotary fluid pump or motor comprising a stator, a rotor associated therewith, fluid-flow confining gate means forming part of the stator and projecting towards the rotor, a plurality of vanes each forming part of an oscillatable member pivotally carried by the rotor, means to pivotally oscillate the oscillatable members in timed relation to the rotation of the rotor so that the vanes will pass the gate means with an approved clearance, an inlet passage-way for the fluid into one of the compartments separated by the gate means, and an outlet passage-way from the other compartment, the construction being such that irrespective of the rotary position of the rotor at least one of the vanes will be coacting with the gate means at each side of the rotor between the inlet and the outlet.

The invention also, in a still further aspect, consists in a rotary fluid pump or motor comprising a stator; gate means forming part of the stator; a rotor associated with the stator; a plurality of vanes carried by said rotor and disposed between the rotor and the stator; an inlet into the space between said rotor and said stator and an outlet from the said space, said inlet and outlet being disposed so that in operation fluid introduced through the inlet will actuate the vanes and consequently cause a rotation of the rotor (in the case of a motor) or so that on rotation of the rotor and attached vanes fluid will be drawn into the inlet and ejected through the outlet (in the case of a pump); means for eccentrically adjusting the gate means in relation to the rotor so as to vary the cross-sectional area of a passage-way through which the vanes pass at one side of the rotor between the inlet and the outlet and so as to oppositely vary the cross-sectional area of a passage-way through which the vanes pass at the other side of the rotor between the inlet and the outlet; and mechanical means for mechanically oscillating the vanes in timed relation to the rotation of the rotor so that the vanes will pass the gate means with an approved clearance.

The invention may be applied to a drive transmission system utilising a unit construction ac-

cording to the invention as a driving pump and/or a unit constructed according to the invention as a driven motor. In this application of the invention, the said invention has advantages over some existing fluid transmission systems in that it does not rely on fluid "slip" for its operation.

The invention will now, however, be described with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a diagrammatic cross-section through one form of rotary fluid pump or motor according to the invention, wherein the rotor is mounted within the stator, the section being on the line 1—1, Figure 2,

Figure 2 is a diagrammatic axial section through the form of the invention shown in Figure 1, on the line 2—2, Figure 1,

Figure 3 is a diagrammatic cross-section through the form of the invention shown in Figures 1 and 2, on the line 3—3, Figure 2,

Figure 4 is a pictorial view of one of the vane members used in the form of the invention shown in Figures 1 to 3 with a slipper attached,

Figure 5 is a pictorial view of the main portion of the rotor used in the construction shown in Figures 1 to 4,

Figure 6 is a diagrammatic cross-section through another form of rotary fluid pump or motor according to the invention wherein the rotor rotates around an internal stator, the section being on the line 6—6, Figure 7.

Figure 7 is an axial section through the fluid pump or motor, on the line 7—7, Figure 6,

Figure 8 is an axial section through the stator and its attachments, on the line 8—8, Figure 6,

Figure 9 is an axial section through the rotor and its attachments, on the line 8—8 Figure 6,

Figure 10 is a pictorial view of one of the rotary vane members and the actuating means therefor,

Figure 11 is a section on the line 11—11, Figure 9, showing the location of the primary cranks by which the vanes are actuated, the primary vane-control ring being shown by broken lines.

Figure 12 is a section on the line 12—12, Figure 8, showing the primary vane-control ring carried by the stator, and

Figure 13 is a section on the line 13—13, Figure 7, showing how the secondary cranks of the vane-control mechanism are coupled through the secondary vane-control ring to the vane cranks.

In the construction shown in Figures 1 to 5, a housing 1 is provided and would be provided with suitable mounting means (not shown) by which it could be mounted for its particular purpose. Said housing is built up of separable parts in an appropriate manner to enable the pump or motor to be assembled and dismantled.

The housing is provided at opposite sides with an inlet 2 and an outlet 3 for the fluid.

To one end of the housing is bolted a circular flange 4*a* of an inwardly directed centrally disposed cylindrical sleeve member 4 which supports roller bearings 5 and 5*a* by which a rotor 6 is rotatably mounted to the sleeve member. The bearings 5 and 5*a* are only shown diagrammatically in the drawings.

The rotor which is located within the stator, comprises an intermediate hollow substantially cylindrical part 6*a* located around the sleeve member 4, an outwardly projecting annular flange part 6*b* at one end of the cylindrical part 6*a* (disposed beyond the inner end of the sleeve member 4 of the stator) with a separate axle part 6*c* splined to the cylindrical portion 6*a* and passing through said sleeve member 4 from the flange part 6*b*, and an outwardly projecting annular flange part 6*d* formed on the opposite end of the cylindrical part 6*a*.

The cylindrical part 6*a* is arcuately grooved at intervals as at 6*e* and the flange parts 6*b* and 6*d* are outwardly disposed and provided with bearings at intervals, in order to accommodate a plurality of pivotally oscillatable vane members 7 which are carried around by rotation of the rotor, and are disposed parallel with the axis thereof, and with their axes equidistant from the centre thereof.

Each oscillatable vane member 7 consists of two end journals parts 7*a* and 7*b* passing through and engaging in the bearings in the flange parts 6*b* and 6*d* and a vane 7*c* connecting the journal parts and of a width slightly greater than one quarter of their circumference. The outer surface of the vane 7*c* coincides as to curvature with the outer periphery of the journal parts, while its inner surface is of such curvature that the vane member can be rotated so that said vane 7*c* lies completely within the circle of the outer periphery of the part 6*a* of the rotor, and in such case said inner surface of the vane will form a continuation of the periphery of said part 6*a* of the rotor.

Means are provided to adjust the rate of output of the unit if it is operating as a pump, or its rate of rotation for a given input if it is operating as a motor. Said means are constructed as follows:

Within opposite sides of the housing 1 are provided control fluid compartments 8 and 8*a* having fluid admission and exhaust connections 9 and 9*a*, leading thereto, and fluid flow confining gate means consisting of two slidable arcuate gate members 10 and 10*a* are mounted in opposition to each other and partially enclose the rotor with the control fluid compartments at the outer sides thereof, each gate member having a curved working part 11—11*a* which fits closely between the flange portions 6*b* and 6*d* of the rotor, said gate members being secured to two opposite apertured connecting plates 12 the apertures of which permit the passage of fluid into or from the pump or motor. Fluid admitted under pressure to one of the control fluid compartments 8—8*a* will cause the two gate members to move bodily, with the connecting plates 12, diametrally in relation to the rotor, so as to vary the cross-sectional area of the passage-way through which the vanes pass at one side of the rotor between the inlet and outlet and so as to oppositely vary the cross-sectional area of the passage-way through which the vanes pass at the other side of the rotor between the inlet and the outlet.

The inner surfaces 13—13*a* of the working parts of the gate members are so curved that while in general the radius of curvature is slightly greater than the radius of the circle of travel of the outer edges of the vanes, the radius of curvature of the medial part of each gate member coincides with the radius of the said circle of travel. The construction is such, that there will always be at least one vane co-acting with the working part of each gate member. The gate members form a substantially fluid-tight obstruction preventing fluid from passing from either side of the rotor to the other side thereof except with an accompanying movement of the vanes through the passages between the gate members and the member 6*a* of the rotor.

The gate members in effect separate two com-

partments within the pump or motor, one compartment being near the inlet and the other being near the outlet.

The apertured connecting plates 12 are connected by means of pins 14—14a parallel to the axis of the pump or motor and passing through slots 15a in a ring member 15 forming part of the stator to an outer control member 16 which carries a journal 17 the axis of which is concentric with the rotor when the gate members are equally adjusted (i. e. at the inoperative setting of the motor or pump).

On the said journal 17 is provided a roller bearing shown diagrammatically at 18, said bearing rotatably carrying an annularly grooved vane-control ring 19 having an annular groove 20 therein, the medial centre line of said groove having the same diameter as the circle about which the outer edges of the vane members revolve. A crank pin 21 secured to the journal 7b of each vane member engages a slipper 22 engaging in the groove 20 of the vane-control ring 19, the centre line of each crank-pin 21 being substantially in line with the outer or working edge of the vane whereby the working edges of the vanes are constrained to move in a circle corresponding to the medial center line of groove 20.

The construction and proportions and arrangement of the above parts is such that when the gate members are actuated by oil pressure so that one of the gate members is nearer to the rotor than is the other gate member, as shown in Figures 1 and 2 the diametral movement of the gate members will cause an identical movement of the control ring and adjust the oscillations of the vanes according to the adjustment of the gate members. On adjustment of the gate members, the pins 14—14a, outer control member 16, journal 17, bearing 18, grooved vane-control ring 19, slippers 22 and crank-pins 21 operate to tilt the vanes so that as they pass the middle of the gate members they will be disposed at an approved clearance from, i. e. just clear of, said gate members. By approved clearance as used in the description and claims is understood minimum clearance.

Suitable sealing means, including glands where necessary, are necessary to confine the fluid to the desired chambers and passages in the pump or motor, and to seal against leakage of the oil used for adjusting the gate members.

In operation, when the invention is used as a pump, a desired setting is given to the gate members and apertured connecting plates 12, which causes a corresponding adjustment of the vane-control ring 19, and a corresponding adjustment of the vanes.

The pump is driven per medium of the shaft 6c.

Owing to the different cross-sectional areas of the passages through which the vanes pass (between the gate members and the part 6a of the rotor) the fluid being pumped passes at a greater rate at one side of the rotor than at the other, with the result that fluid is drawn in through the inlet 2 and is discharged through the outlet 3. Variations in the setting of the gate members and associated parts result in corresponding variations in the ratio of the cross-sectional areas of the said passages, with consequent increases or reductions in the rate of flow through the pump. At the middle setting of the pump the rate of flow is zero, while when the difference is greatest the flow is at its maximum. Should the gates be carried past the middle setting the direction of flow is reversed.

It will be obvious that the unit is reversible in its principle of operation when it is used as a motor. Assuming that there is an appropriate difference between the cross-sectional areas of the aforesaid passages, fluid introduced through the inlet 2 will actuate the vanes (i. e. cause them to pass through the aforesaid passages) and consequently cause a rotation of the rotor.

As the rotor rotates, the vanes rotate with it, and owing to the provision of the vane-control ring 19 and associated mechanism the said vane members are oscillated about their axes as the rotor rotates, in such a manner that the outer or working edges of the vanes 7c will always pass the gate members just clear of same, while throughout the pivotal oscillations of the vanes the opposite edges of the said vanes maintain a seal against leakage in conjunction with the grooves in the part 6a of the rotor, with which they coact, the grooves being so shaped and proportioned as to provide for this.

It will be obvious that instead of the gate members being actuated by oil pressure they may be directly actuable manually. For example, a screw and wheel system may be employed. The modifications required where a screw and wheel system is to be employed would be obvious to any person skilled in the art.

The size of the inlet and outlet will depend on the maximum area or the available or effective area of the vanes. It will be obvious that the rigidity of the vanes is an important factor in the pump or motor shown in Figures 1 and 2.

In the construction shown in Figures 6 to 13, the stator 23 shown more clearly in Figure 8 is disposed within the rotor and comprises a member 23a by which the pump or motor can be mounted, said member having an auxiliary outer shell 23b secured thereto. The member 23 has formed in it a fluid inlet boss 24 and a fluid outlet boss 24a, see Figures 6 and 7, said bosses communicating with inlet and outlet ports 25 and 25a which are elongated to provide a smooth flow for the fluid passing into the pump or motor, and outwards therefrom.

The stator 23 has a central passage-way 26 (Figure 8) therethrough adapted to receive a rotor spindle 34 to be hereinafter described, said passage-way being enlarged at each end as at 27 and 27a to receive bearings 28 and 28a by which the said spindle 34 is carried.

A removable cap 29 is provided over the passage-way enlargement 27 to cover the end of the spindle and the securing nut 34a thereon.

Referring to Figure 6, the stator member 23a is provided with an intermediate guide portion 30 which is of elongated cross-section, with parallel sides 30a which form guiding surfaces. On the said intermediate guide portion 30 there is provided a double gate member 31 which is made in two parts held together by bolts 31a, and is adapted to coact simultaneously with vanes at the opposite sides of the rotor, said double gate member being slidable vertically on the said guide portion 30. The double gate member 31 is circular at the end remote from the inlet and outlet 24 and 24a and is narrow at the other end, where its shape is as shown in section in Figure 6. The gradual change of shape which is employed in order to avoid or minimise turbulence will be apparent by reference to Figure 7 of the drawings.

The enlarged end of the gate member 31 has a recess 31b therein in which is located and suitably secured annular primary vane control means comprising a primary vane-control ring

part 31c, Figures 8, 11 and 12 which is adapted to form part of a guide for a series of crank-pins 49 to be hereinafter described, the guide being completed by an outer primary vane-control ring 31d, the crank-pin being in effect held in a guide groove. Although both of the ring parts are shown in position in Figures 8 and 12 the outer ring is freely mounted around the crank pins.

Hydraulic means are provided to adjust the gate member, said means consisting of hydraulic jacks 32, Figure 8, of the telescopic type, said jacks being located within the gate member and coacting with said gate member and with the part of the stator within the gate member. Said hydraulic jacks are adapted to be supplied with oil under pressure per medium of either of the passages 33 which are connected by the nipples 33a to control means (not shown) which in use direct oil under pressure to either of said jacks at will and exhaust the other of said jacks.

The rotor comprises the spindle 34 before mentioned, and secured to the said spindle 34 by means of the nut 34b, an end plate 35 to which is secured a main rotor member 36 having a rotor ring member 37 secured to its other end. The rotor, in effect, comprises an intermediate hollow substantially cylindrical part 36a and two inwardly projecting annular end flanges 36b and 37a forming part of the main rotor member 36 and rotor ring member 37 respectively.

The inwardly projecting end flanges 36b and 37a are provided with the requisite number of circular recesses 38 and 39 which are centrally drilled and fitted with bearings adapted to receive vane members 40 which are similar to the vane members shown in Figures 1, 2 and 3, except that the inner faces of the vanes are concave, said vanes being crescent-shaped in section.

The rotor end plate 35 is provided with a desired number of studs 41 by which any appropriate driving or driven member may be mounted thereto, according to the purpose to which the unit is put.

One of the pivot pins of each vane member 40 extends through the end flange 36b of the rotary member into a control compartment 42 situated between said flange 36b and the end plate 35. Referring to Figure 13, in said compartment 42 the said pivot pins have secured thereto vane cranks 43 carrying pivot pins or rollers 44 engaging in an outer annular groove 45a of a secondary vane-control ring 45. The medial centre line of the groove 45a has the same diameter as the circle described by the inner edges of the vanes.

The secondary vane-control ring 45 is also provided with an inner annular groove 45b which is concentric with the groove 45a and is engaged by the crank pins 46a of a desired number of secondary cranks 46 secured to control shafts 47 which pass through the rotor end flange 36b and have secured to their opposite ends primary cranks 48 having the crank pins 49 thereon.

Although the stator is shown assembled, separate from the rotor in Figure 8, and the rotor is shown assembled, separate from the stator, in Figure 9, it will be obvious that the two parts can not be assembled in the correct co-relation in this condition. Furthermore, the drawings are only diagrammatic, and it will be obvious that adequate provision will require to be made for ready assembling and dismantling. What provision to make for this purpose will be apparent to any person skilled in the art.

When the stator and rotor are assembled, it will be seen, from Figures 6 and 7, that the vanes rotate about the gate member 31, the crankpins 49 being in engagement with the primary vane-control ring parts 31c and 31d so that, according to the eccentric adjustment of the gate member 31, the primary vane-control ring 31c—31d operates through the cranks 48, control shafts 47, cranks 46, secondary vane-control ring 45 and vane cranks 43 to adjust the pivotal positions of the vanes so as the said vanes pass through the passages between the top and bottom of the gate member and the adjacent part of the rotor member 46 said vanes are at the correct adjustments to coact with the gate member without friction or undue clearance therebetween.

The rotor is sealed from the stator at the end of the unit adjacent to the inlet and outlet bosses 24 and 24a by sealing means 50 and at the other end of the unit the seal is effected at 51, while the larger end of the gate member 31 is spaced at an approved clearance from the inner face 52 of the rotor member 36. Also, the disc portions of the vane members are recessed flush within grooves in the intermediate hollow substantially cylindrical part of the rotor, the grooves being so shaped and proportioned that throughout the pivotal oscillations of the vanes, said vanes coact with the grooves to effect a seal against leakage. It will be obvious to any person skilled in the art where to apply sealing means other than in the above-mentioned places.

The operation of this form of the invention is similar to the operation of the form of the invention shown in Figures 1 to 5.

It will be obvious that in use the primary vane-control means and the secondary vane-control ring and associated mechanism adjust the oscillations of the vanes in accordance with adjusting movement of the gate members.

The invention is applicable to fluid pumps or motors, whether the fluid in question is gaseous or liquid, and makes possible a variable delivery in the case of a pump, or a variable torque in the case of motors over a wide range.

Several proposed uses of the invention are set out as follows:

As a fluid pump handling liquid or gaseous fluids

As the capacity of the pump is variable from zero at mid-position of the gate member to a maximum as the gate member is moved to its extreme position at each side of the said mid-position, the unit may be used as a variable delivery pump with the direction of flow immediately reversible to any degree between what may be termed "positive" and "negative" maximum capacities while the speed at which it is driven remains constant or variable in one direction.

Conversely the unit may be used where a steady or fluctuating flow is required at a fluctuating shaft speed.

As a fluid motor operable by liquid or gaseous fluids

In the same way, the unit may be used when fluid pressure is applied as a variable speed mo-

tor, the torque decreasing from a maximum at one extreme setting of the gate member to zero at the mid-position of said member, and increasing in the reverse direction as the other extreme position of the gate member is approached.

Conversely, the unit may be made to maintain a steady speed or torque in either direction with a variable pressure of fluid supplied thereto.

As a torque converter utilising a liquid medium

The invention may be utilised in a multiple or single torque converter, with one or several units being driven as variable delivery pumps, their outputs supplying a common pressure line, and a return line being provided for supplying the pumps, these lines being operatively connected to one or several units operating as variable torque motors (which may be used as additional pumps where braking resistance is required). The system so devised would theoretically provide, in each motor unit, an individual ratio variable from zero to infinity in either direction as the gate members of the pump units are advanced from the mid-position to the extreme position in either direction, and the gate members of the motors are simultaneously moved from the extreme position to the mid-position.

A particular application of the above principle would be for the propulsion of vehicles.

As a vacuum or exhaust pump, where gases are expelled, and where either a fixed or a variable vacuum is required one "side" of the pump would be a suction inlet from the vacuum lines while the other "side" would be a simple exhaust, the position of the gate member from its mid-position determining the rate of expulsion of the gas.

A particular example of this would be supplying a constant but quickly recoverable vacuum for vacuum type breaking systems.

I consider the construction shown in Figures 1 to 5 to be suitable for use, among other purposes, for metering the flow of fluids, the variability of the motor being advantageous in this application of the invention.

I claim:

1. A rotary fluid pump or motor of variable capacity comprising a stator, a rotor associated therewith, fluid-flow confining gate means forming part of the stator and projecting towards the rotor so as to form two compartments bounded by the stator, the rotor and the said gate means, a plurality of vanes each forming part of an oscillatable member pivotally carried by the rotor, means to pivotally oscillate the oscillatable members in timed relation to the rotation of the rotor so that the vanes will pass the gate means with an approved clearance, said means comprising a control member provided with a control groove of constant radii and crank pins appropriately carried by the vanes and operably associated with the control groove to oscillate the vanes on rotation of the rotor, the center line of each crank pin coinciding substantially with the working edge of the vane with which it is associated, an inlet passageway for the fluid into one of the compartments and an outlet passageway from the other compartment, the construction being such that irrespective of the rotary position of the rotor at least one of the vanes will be co-acting with each of the gate means between the inlet and the outlet, and means to adjust the gate means towards and away from the rotor and to diametrally adjust the axis of the control member in accordance with adjusting movement of the gate means, to adjust the oscillations of the vanes.

2. A rotary fluid pump or motor as claimed in claim 1, the rotor being disposed within the stator and comprising an intermediate substantially cylindrical part and two outwardly projecting annular end flanges, the oscillatable members having journal parts passing through and engaging in bearings in the end flanges, said oscillatable members also having vane parts which engage in grooves in the intermediate substantially cylindrical part, the grooves being so shaped and proportioned that throughout the pivotal oscillations of the vanes, said vanes co-act with the grooves to effect a seal against leakage.

3. A rotary fluid pump or motor as claimed in claim 1, the rotor being disposed around the stator and comprising an intermediate hollow substantially cylindrical part and two inwardly projecting annular end flanges, the oscillatable members having journal parts passing through and engaging in bearings in the end flanges, said oscillatable members also having vane parts which engage in grooves in the intermediate hollow substantially cylindrical part, the grooves being so shaped and proportioned that throughout the pivotal oscillations of the vanes, said vanes coact with the grooves to effect a seal against leakage.

4. A rotary fluid pump or motor of variable capacity comprising a stator, gate means forming part of the stator, a rotor associated with the stator, said stator and the rotor having a space therebetween, the said space being divided into two compartments by the gate means, a plurality of vanes each forming part of an oscillatable member pivotally carried by the rotor, said vanes being disposed between the rotor and the stator, an inlet into one of the compartments between the said rotor and the said stator and an outlet from the other compartment, said inlet and outlet being disposed so that in operation fluid introduced through the inlet will actuate the vanes and consequently cause a rotation of the rotor (in the case of a motor) or so that on rotation of the rotor and attached vanes fluid will be drawn into the inlet and ejected through the outlet (in the case of a pump), means for eccentrically adjusting the gate means in relation to the rotor so as to vary the cross-sectional area of the passageway through which the vanes pass at one side of the rotor between the inlet and the outlet and so as to oppositely vary the cross-sectional area of the passageway through which the vanes pass at the other side of the rotor between the inlet and the outlet, and mechanical means for mechanically oscillating the oscillatable members in appropriate timed relation to the rotation of the rotor so that the vanes will pass the gate means with an approved clearance, said means for mechanically oscillating the oscillatable members comprising a control member provided with a control groove of constant radii, and crank pins appropriately carried by the oscillatable members and operably associated with the control groove to oscillate the said members on rotation of the rotor, the center line of each crank pin being substantially coincident with the working edge of the vane with which it is associated, and means for diametrally adjusting the axis of the control member in accordance with the adjusting movement of the gate means, to adjust the oscillations of the vanes.

5. A rotary fluid pump or motor as claimed in

claim 4 wherein the rotor is disposed within the stator, two opposite connected gate members being employed, said adjusting means comprising a member rotatably carrying the control member and operatively connected to the gate members so that diametral movement of the gate members will cause an identical movement of the control member and adjust the oscillations of the vanes according to the adjustment of the gate members.

6. A rotary fluid pump or motor as claimed in claim 5 wherein appropriate hydraulic means are provided for adjusting the gate members and consequently the control member.

7. A rotary fluid pump or motor as claimed in claim 5 wherein said gate members consist of two opposite arcuate members fitting within the stator of the pump or motor and partially enclosing the rotor and so shaped and adjustable across the stator that the working edges of the revolving vanes will just clear the arcuate members, the connection between the ends of the arcuate members being adapted to permit the passage of fluid into and from the pump or motor.

8. A rotary fluid pump or motor as claimed in claim 7 wherein control fluid compartments are provided at the outer sides of the gate members so that control fluid applied to the appropriate control fluid compartment will adjust the position of the gate members.

9. A rotary fluid pump or motor as claimed in claim 4 wherein the rotor is disposed around the stator, a double gate member being mounted on the stator so as to coact simultaneously with vanes at opposite sides of the rotor, the means for oscillating the oscillatable members comprising annular primary vane control means carried by the double gate member, control shafts carried by the rotor and carrying crank pins engaging said primary vane control means, and a secondary vane control member, two annular grooves in said secondary vane control member, one of the said grooves being engaged by crank pins carried by the control shafts and the other groove being the control groove engaged by the crank pins carried by the oscillatable members, the primary vane control means and the secondary vane control member and associated mechanism being adapted to adjust the oscillations of the vanes in accordance with adjusting movement of the gate members.

10. A rotary fluid pump or motor as claimed in claim 9 wherein appropriate hydraulic means are provided for adjusting the gate member and consequently the primary vane control means and the secondary vane control member.

11. A rotary fluid pump or motor as claimed in claim 10 wherein said hydraulic means consist of telescopic hydraulic jacks located within the gate member and coacting with said gate member and with a part of the stator within the gate member.

12. A rotary fluid pump or motor as claimed in claim 4, wherein the rotor is disposed within the stator, said rotor comprising an intermediate substantially cylindrical part and two outwardly projecting annular end flanges, the oscillatable members having journal parts passing through and engaging in bearings in the end flanges, said oscillatable members also having vane parts which engage in grooves in the intermediate substantially cylindrical part, the grooves being so shaped and proportioned that throughout the pivotal oscillations of the vanes said vanes coact with the grooves to effect a seal against leakage.

13. A rotary fluid pump or motor as claimed in claim 4 wherein the rotor is disposed around the stator and said rotor comprises an intermediate hollow substantially cylindrical part and two inwardly projecting annular end flanges, the oscillatable members having journal parts passing through and engaging in bearings in the end flanges, said oscillatable members also having vane parts which engage in grooves in the intermediate hollow substantially cylindrical part, the grooves being so shaped and proportioned that, throughout the pivotal oscillations of the vanes, said vanes coact with the grooves to effect a seal against leakage.

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