Jan. 31, 1961 J. F. CLEARMAN 2,969,739

LAUNDRY MACHINE PUMP

Filed May 31, 1956 4 Sheets-Sheet 1

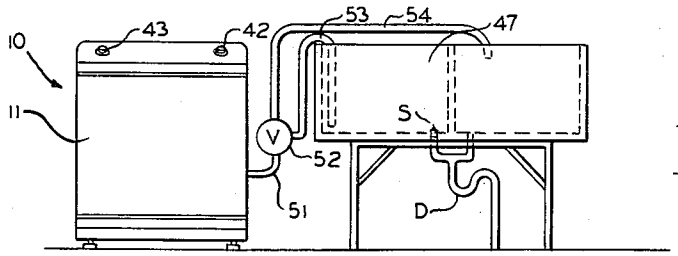


Fig. 1

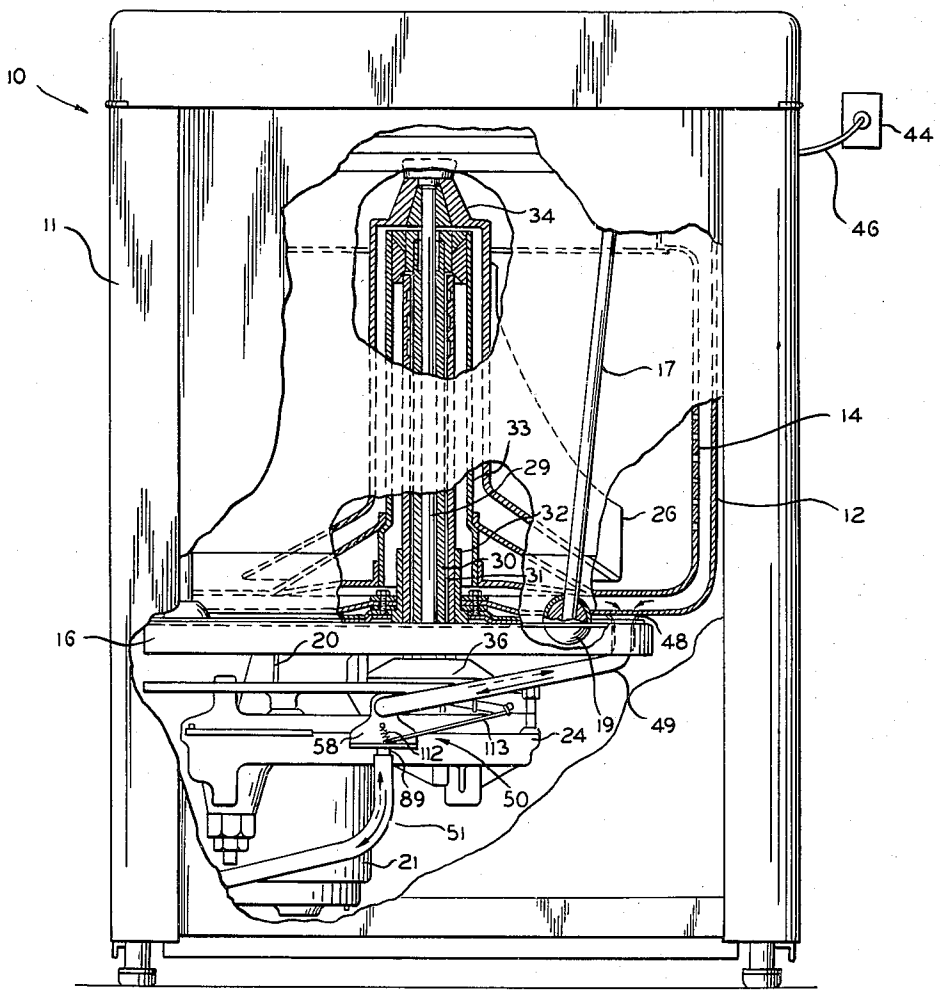


Fig. 2

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4 Sheets-Sheet 2

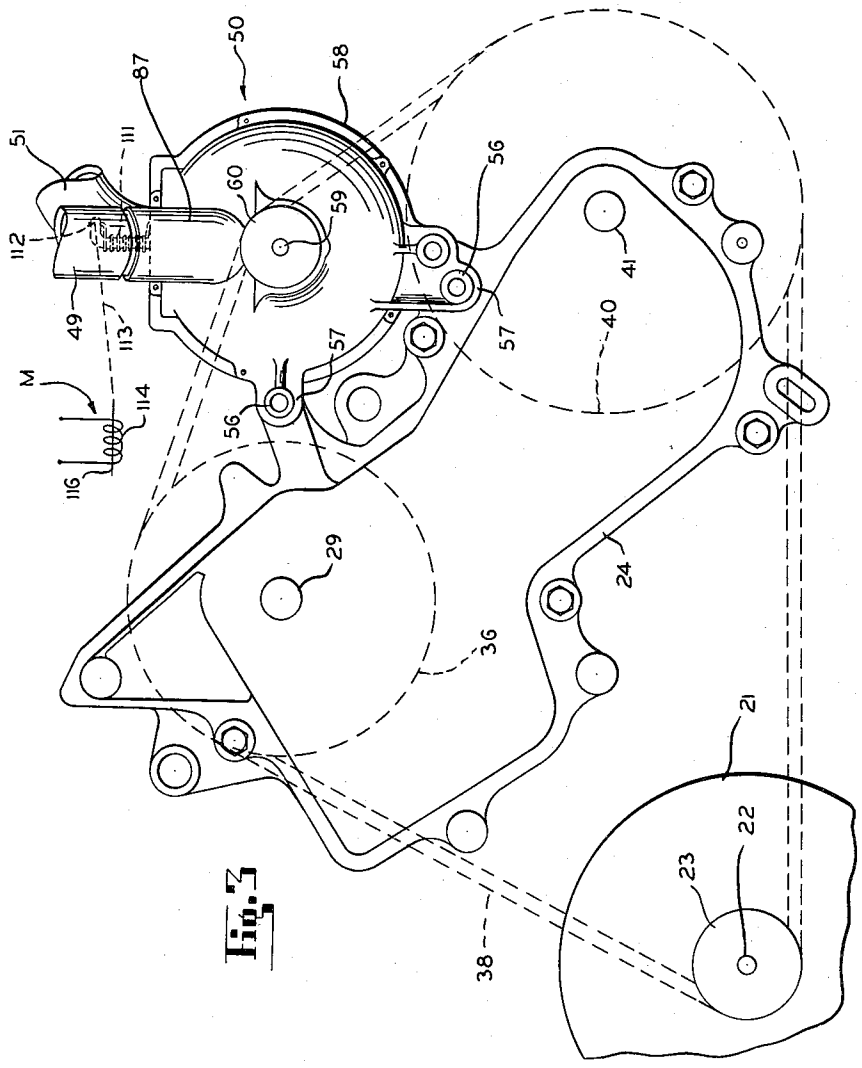


Fig. 3

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LAUNDRY MACHINE PUMP

Filed May 31, 1956 4 Sheets-Sheet 3

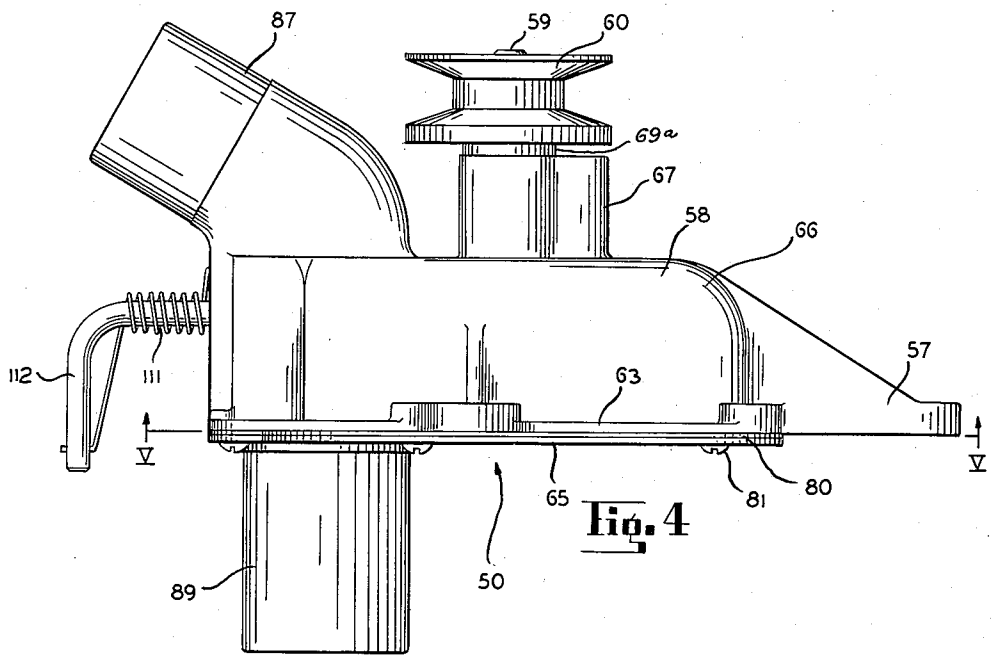


Fig. 4

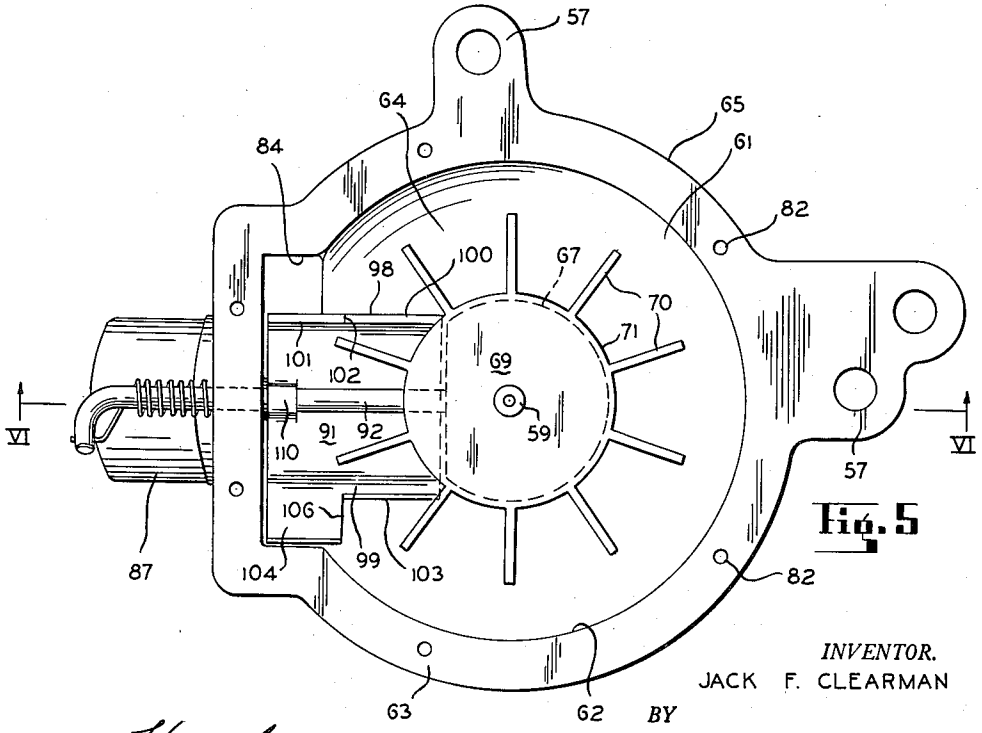


Fig. 5

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LAUNDRY MACHINE PUMP

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4 Sheets-Sheet 4

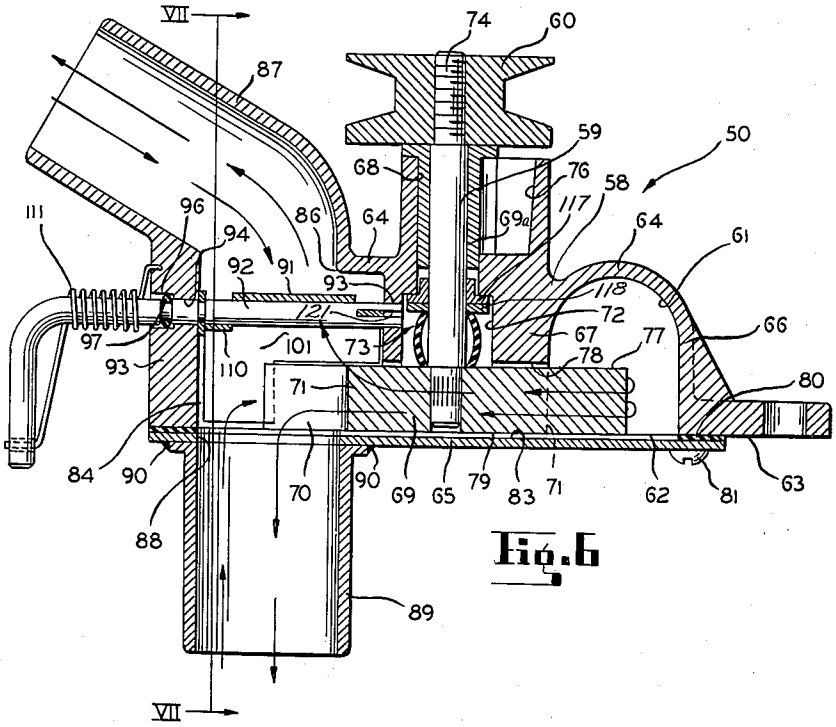


Fig. 6

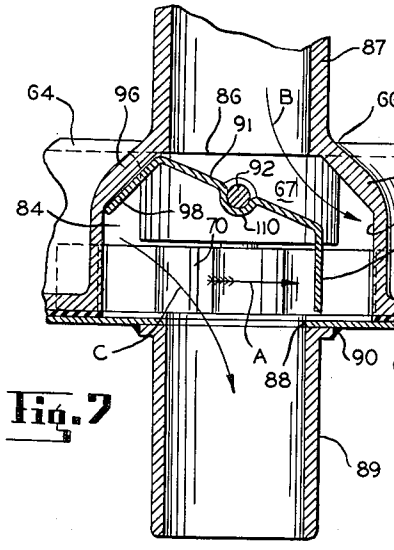


Fig. 7

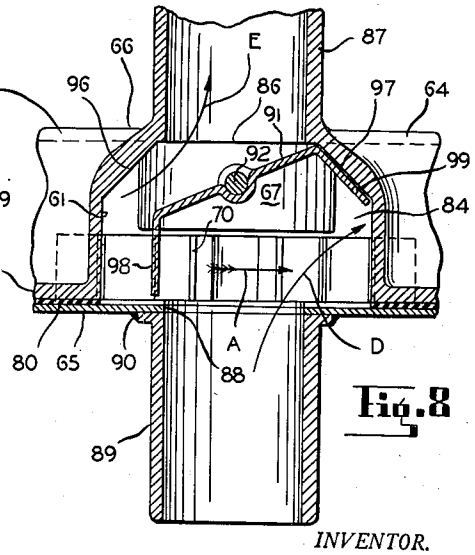


Fig. 8

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United States Patent Office 2,969,739 Patented Jan. 31, 1961

2,969,739

LAUNDRY MACHINE PUMP

Jack F. Clearman, St. Joseph, Mich., assignor to Whirlpool Corporation, a corporation of Delaware

Filed May 31, 1956, Ser. No. 588,285
13 Claims. (Cl. 103—3)

This invention relates generally to laundry machines and more particularly to a so-called suds-return-type laundry machine which is particularly characterized by the utilization of mechanical pumping means which are unidirectional in operation and flow-reversing means which may be automatically operated in correlation with a sequential series of washing, rinsing and extracting periods to automatically remove or return laundry liquid from or to a treatment zone, respectively.

According to the general principles of the present invention, a batch of materials to be laundered in a treatment zone is cyclically manipulated through a series of washing, rinsing and extracting periods by the operation of a combination washing and extracting laundry machine having a presettable sequential control means.

A unidirectional pump under the control of the sequential control means is selectively operated at different portions of the washing, rinsing and extracting periods, while the inlet and outlet flow of the unidirectional pump is alternately reversed to supply and remove a pool of laundry liquid to and from the treatment zone, as required to effect proper correlation with the washing, rinsing and extracting action of the machine.

More specifically, it is contemplated according to the present invention to provide an improved pump of what is generally known as the centrifugal type, having flow-reversing means integrated therewith wherein a generally toroidal pumping chamber having a unidirectionally operated rotary fluid-displacement means for imparting pressure and kinetic energy to the fluid, has the flow characteristics thereof controlled by movable means forming together with the pump casing alternately shiftable axially adjacent inlet and outlet zones in a confined area within the pumping chamber circumjacent the rotary fluid displacement means.

Thus, the fluid is pumped in a confined annular pumping zone and inlet fluid is supplied to a confined area adjacent one side face of the impeller. Outlet fluid is discharged at a confined outlet area adjacent the opposite side face of the impeller and the inlet and outlet areas or zones are selectively and alternately shifted to change the direction of flow through the inlet and outlet port means of the pump without changing the direction of rotation of the impeller.

It is an object of the present invention, therefore, to provide a laundry machine having an improved suds return system.

Yet another object of the present invention is to provide a unitary pump and valving arrangement wherein a reversal of fluid flow can be effected without changing the direction of rotation of the pump impeller.

A further object of the present invention is to provide a pump having integral flow-reversing means incorporated therein of a simplified construction.

Another object of the present invention is to provide a structure which permits a change in the direction of pumping without changing the flow pattern in the pump.

Another object of the present invention is to provide a centrifugal pump having means forming inlet and outlet zones adjacent opposite sides of opposite side faces of the centrifugal pump impeller with a movable butterfly valve alternately shifting the inlet and outlet zones to change the direction of flow of the pump without changing the direction of rotation of the impeller.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings in which a preferred structural embodiment of a laundry machine is illustrated by way of exemplification of the principles of the present invention.

This application is a continuation in part of my copending application 534,195 filed September 14, 1955.

On the drawings:

Figure 1 is a somewhat diagrammatic view illustrating the plumbing environment of a laundry machine embodying the principles of the present invention;

Figure 2 is an elevational view of a laundry apparatus with parts broken away and parts shown in cross-section illustrating a laundry machine embodying a pump with flow-reversing means according to the present invention and capable of practicing the methods disclosed herein;

Figure 3 is a plan view of the gear case embodied in the laundry apparatus of Figure 1 and illustrating how the pump of the present invention is incorporated in the laundry machine;

Figure 4 is an elevational view of the pump provided in accordance with the principles of the present invention;

Figure 5 is a view of the pump of Figure 4 with the cover member removed and taken generally on line V—V on Figure 4;

Figure 6 is a cross-sectional view of the pump of Figures 4 and 5 taken generally on the line VI—VI of Figure 5 but with parts shown in elevation and with other parts repositioned for purposes of clarity; and

Figures 7 and 8 are fragmentary cross-sectional views taken generally on the line VII—VII of Figure 6 and illustrating details of construction of the flow-reversing means, Figure 7 indicating one position of adjustment of the flow-reversing means and Figure 8 indicating a second position of adjustment whereby the flow through the porting means of the pump is reversed.

As shown on the drawings:

It will be understood that the principles of the present invention are of general applicability to washing machines per se, as well as to combination washers and extractors or to combination washer-extractor-driers. Moreover, insofar as the pump subcombination is concerned, it will be further appreciated that the principles of the present invention are of general applicability to any fluid system wherein a pump exhibiting the desirable properties disclosed herein is required.

For purposes of illustrating the principles of the present invention, however, there is shown in Figures 1 and 2 an automatic washing, rinsing and extracting machine 10 having a cabinet 11 forming an enclosure for a tub 12 which is adapted to confine a pool of liquid such as water or laundry liquid, thereby restricting the pool of laundry liquid within the confines of a treatment zone.

A receptacle or container indicated at 14 is rotatably mounted within the tub 12 and the tub 12 is carried on a floating base 16 suspended from the top portion of the cabinet on suspension links 17 encased in rubber at their ends and carried in a corresponding plurality of sockets 19 in the base 16 and in similar sockets at the upper part of the cabinet (not shown) for damping oscillatable movement which may occur between the base and the cabinet.

Suspended from the base 16 on a hanger bracket 20 is an electric motor 21 which operates as the drive motor for the machine. A power take-off shaft indicated in Figure 3 at 22 drives a motor pulley 23 forming a component of a pulley system referred to in greater detail hereinafter for driving the rotatable components of the laundry machine.

A gear casing is indicated at 24 through which an

oscillatable drive mechanism actuates an independently operable washing element or agitator 26 located interiorly of the container or receptacle 14, and, hence, interiorly also of the tub 12.

The gear casing 24 is also suspended from the base 16 and is positioned in fixed parallel spaced relation with respect to the base 16. Although not necessary to a proper understanding of the principles of the present invention, it may be noted that the gear casing 24 is of a form utilizing two parts, a lower part housing an oscillatable drive gearing for oscillatably driving the washing element or agitator 26 and an upper part housing operating and control mechanism of the machine.

With respect to the actuation of the washing element or agitator 26, however, there is shown an oscillatable drive shaft at 29 rotatably carried in the gear casing 24 in a boss at the lower part of the gearing casing 24. The shaft 29 is also journaled within a rotatable drive sleeve 30 concentrically disposed within a stationary sleeve 31 and inwardly with respect to a hollow center post 32. The hollow center post 32 forms a closure for the central part of the bottom of the tub 12 and extends upwardly from the bottom of the tub 12.

The sleeve 31 is carried in the hollow center post 32. The rotatable sleeve 30 provides a support for a hollow upright support member 33 attached in firm assembly with the container or receptacle 14. Thus, the container or receptacle 14 is supported near its upper end for spinning. The washing element or agitator 26 is locked to the upper end of the shaft 29 as at 34 and will be oscillatably driven upon corresponding oscillatable movement of the shaft 29.

The rotatable sleeve 30 is driven by a drive sheave 36 or spin pulley, as it may be referred to herein, mounted on the lower portion of the sleeve 30 through a clutch of the friction-disk-type, the clutch being controlled by suitable actuating mechanism well known to those versed in the art.

A driving belt 38 (Figure 3) is trained over the pulley 23 of the drive motor 21 and over the sheave or pulley 36 operatively connected to the shaft 29, thereby to rotate the container or receptacle 14 at a speed suitable for extracting liquid from clothes contained therein upon actuation of the clutch mechanism.

The belt 38 is also trained over a drive pulley 40 which constitutes the main drive pulley of the machine and which is fastened to a shaft 41 (Figure 3) extending out of the oscillatable drive mechanism housed within the gear casing 24. It will be understood that the shaft 29 will be oscillatably driven by the motor 21 through the oscillating mechanism and a detailed description of the driving mechanism does not appear to be necessary to a proper explanation of the present invention.

It will be understood that the washing machine 10 is provided with a sequential controller for automatic operation of the machine through a series of washing, rinsing and extraction periods. The sequential controller is particularly characterized by the utilization of presettable means to selectively and automatically actuate the driving means of the machine through a selected programming schedule. The actuating element or presettable means of the sequential controller is indicated on Figure 1 by the reference numeral 42. A water temperature selection means is indicated at 43. Hot and cold water from the usual domestic supply is furnished to the machine and the details of such mechanism will not be described herein as such details are not necessary to an understanding of the present invention. The electrical components of the machine are energized from the usual domestic outlet indicated at 44 through a conductor wire indicated at 46 (Figure 2).

As shown in Figure 1, the machine 10 is shown in proximity to a laundry tub or receptacle 47 particularly adapted to operate as a laundry liquid storage means or suds storage reservoir. The tub 12 has an outlet 48 (Figure 2) to which is connected a conduit 49 leading to the pump of the present invention, indicated generally by the reference numeral 50. A second conduit 51 leads from the pump 50 to a two-way valve 52 (Figure 1). From the two-way valve 52 leads a first conduit 53 having its end disposed within the receptacle 47. A second conduit 54 is connected to the two-way valve 52 and leads to drain. With a conventional type laundry stand, this arrangement is conveniently effected by keeping a stopper S in the compartment of the receptacle 47 to be used as a liquid reservoir and by leading the conduit 54 into the other compartment directly open to the drain indicated at D.

In accordance with the principles of the present invention, it is contemplated that upon the completion of the washing cycle, the laundry liquid maintained as a pool of laundry liquid within the tub 12 will be drained out of the tub 12 and temporarily stored in the receptacle 47. Thereafter, the rinsing and extracting procedures can be carried out in the laundry machine 10. The stored laundry liquid is then available for further use in washing additional batches of materials to be laundered and is returned to the tub 12 by the pump 50.

Referring now more particularly to Figure 3, the mechanical disposition of the pump on the laundry machine 10 is illustrated in greater detail. The pump 50 is attached to the gear casing 24 by means of bolts 56—56 which pass through the apertured legs 57—57 formed on the main casing or housing 58 of the pump 50. A shaft 59 journaled in the housing 58 of the pump 50 carries on the end thereof a pulley 60 over which is threaded the drive belt 38. Accordingly, whenever the motor 21 is operated, the pulley 60 and the shaft 59 will be unidirectionally rotated.

The pump 50 comprises the casing 58 which includes more specifically a body member 66 and a cover member 65. Formed within the body member 66 is a generally toroidal-shaped pumping chamber 61 which has an open side 62 flanged as at 63, the opposite side of the toroidal pumping chamber 61 being bounded by generally radially extending wall means indicated at 64.

The wall means 64 at one side of the toroidal pumping chamber 61 is particularly characterized by the formation thereon of a centrally disposed boss 67 which is formed as a bearing boss and which is bored as at 68 to receive and seat a bearing member 69*a* flanged to overlie a portion of the boss 67 extending outwardly of the body member 66. The bearing member 69*a* journals the shaft 59 for rotation.

The shaft 59 extends through a portion of the boss 67 protruding inwardly into the pumping chamber 61 and carries in firm assembly on the end thereof an impeller 69 having a hub 69*a*. Extending generally radially outwardly from the hub of the impeller 69 are a plurality of circumferentially spaced vanes or blades 70 having a root diameter indicated at 71 approximately the same as the diameter of the inwardly extending portion of the boss 67. Accordingly, the blades 70 project into the toroidal-shaped pumping chamber 61 and operate as a rotary fluid displacement means to impart pressure and kinetic energy to the fluid within the chamber 61 upon rotation of the shaft 59.

The boss 67 is counterbored as at 72 and receives thereon a press-fitted seal face 117, graphite washers 118 and a resilient annulus 73 for effecting a seal along the length of the shaft 59.

The outside end of the shaft 59 is threaded as at 74 thereby to effect a threaded assembly with the pulley wheel 60. The impeller subassembly is thus retained in firm assembly with the body member 66.

A recess 76 is formed in the boss 67 adjacent the bearing 69 and forms a lubricant reservoir which may be packed with a suitable lubricant-impregnated material thereby to maintain a supply of lubricant in communication with the bearing surfaces.

Upon referring to Figure 6, it will be noted that the impeller has a first side face 77 which lies adjacent an adjoining end face 78 of the boss 67. The opposite side face of the impeller is indicated at 79 and lies in generally co-planar relation to the surface provided by the flange 63 on the body member 66.

The cover member 65 includes a substantially flat plate portion which overlies the flange 63. Suitable fastening means are provided between the body member 66 and the cover member 65 to place the components in firm assembly with one another to form the casing structure. In this embodiment, a sealing gasket 80 is interposed between the flange 63 and the cover member 65 and a plurality of screws 81 engage suitably threaded apertures 82 formed in the flange 63. The cover member 65 provides an inside face 83 which is closely spaced to the side face 79 of the impeller.

Referring specifically to Figure 5 in connection with Figure 6, it will be noted that the pumping chamber 61 is provided with a flow control area indicated at 84 which lies radially outwardly the boss 67 and is disposed in a confined area circumjacent the pumping vanes 70 of the impeller. More specifically, the body member 66 of the casing 58 includes a boss portion which is recessed to provide the flow control area 84 as a hollow space generally rectangular as seen in Figure 5. Means for conducting fluid to and from the flow control zone or area 84 are provided. According to the present invention, the wall means 64 on the body member 61 is particularly characterized by the formation therein of a port or an opening 86 (Figures 6–8). The port or opening 86, of course, is on the side of the pump corresponding to the side face 77 on the impeller. An angled conduit portion 87 leads away from the opening 86 and can be utilized for effecting conduit connections to the pump, for example, to the conduit 49, as shown in Figure 2.

The cover member 65 is also characterized by the formation of a port or an opening 88 therein which port or opening lies adjacent the blades 70 of the impeller and on the side of the pump corresponding to the side face 79 of the impeller. The ports or openings 86 and 88 are coaxially disposed on opposite sides of the toroidal pumping chamber 61 and on opposite sides of the flow control area or zone 84.

A conduit member 89 is affixed to the cover member 65 as by welding indicated at 90, thereby to facilitate fluid connection of the opening 88 with conduit means, for example, the conduit 51, as shown in Figure 2.

According to the principles of the present invention, a flow control means is provided which conveniently comprises a movable or shiftable valve plate or baffle indicated generally at 91 which is employed to partition the flow control area 84 into contiguous inlet and outlet zones and which may be selectively and alternately shifted with respect to the flow control openings 86 and 88, thereby to reverse the flow of fluid through the ports or openings 86 and 88 without reversing the rotational direction of the centrifugal impeller.

The movable partition means provided by the valve plate 91 more specifically comprises a butterfly valve carried on a pivot pin 92 having one end journaled as at 93 in the boss 67 and having the opposite end extending through a wall portion 93 formed on the body member 66 apertured as at 94 to provide a bearing for journaling the pivot pin 92 and counterbored as at 96 to receive a seal member 97 for establishing a shaft seal between the casing and the pivot pin 92.

It will be noted that the axis of the pivot pin 92 and the rotational axis of the impeller, as determined by the shaft 59, are at right angles to one another. Since the shaft 59 and the pivot pin 92 are angularly offset with respect to one another on intersecting axes, it is possible to locate the pivot pin 92 in an area adjacent the side face 77 of the impeller. Thus, the butterfly valve 91 is pivotally adjusted on the pivot pin 92 to control the flow of fluid between the openings 86 and 88 and in so doing the butterfly valve 91 provides baffle portions which lie closely adjacent to the side face 77 of the impeller as well as the peripheral tips of the blades 70. In other words, the butterfly valve forms a partitioning means which extends across the control area or zone 84 between the wall means 64 and the cover member 65 to partition the control area 84 into selectively shiftable contiguous inlet and outlet zones.

Referring particularly to Figures 7 and 8, it will be noted that the body member 66 has a pair of shoulders 96 and 97 disposed on angularly intersecting planes on opposite sides of the pivot axis established by the pivot pin 92. The shoulders 96 and 97 are spaced apart from one another and diverge away from the opening 86 in the wall means 64. The shoulders 96 and 97 blend into the pumping chamber 61 and form valve seats for a flange 98 and a flange 99 provided on the butterfly.

As is most clearly shown in Figure 5, the flange 98 is recessed as at 100, thereby leaving a flange extension 101 which provides an edge 102 lying closely adjacent to the peripheral edges of the blades 70. The recessed portion of the flange 98 provides another edge which lies closely adjacent the side face 77 of the impeller and specifically closely adjacent the edges of the vanes 70, as shown in Figure 5. The flange extension 101 can also be positioned closely adjacent the cover member 65.

In like manner, the flange 99 is recessed as at 103, thereby leaving a flange extension 104 and providing an edge 106 for lying adjacent the periphery of the vanes 70. The edge of the flange 99 at the recess 103 lies adjacent the side face of the vanes 70.

Although the butterfly valve plate 91 could be made of rubber, brass or any other suitable form of corrosion-resistant material and although the valve plate 91 could be made as a stamping, a casting or as a molded article, only one exemplary form of construction is illustrated herein wherein the valve plate 91 is made as a metal member having a pair of embossments 110 receiving the pivot pin 92 in assembly therewith. The end of the pivot pin 92 is slotted as at 121 and engages an offset embossed portion of the valve plate 91 to insure corotatability between the pivot pin 92 and the valve 91.

In operation, the impeller is unidirectionally rotated in the direction of the arrow A (Figures 7 and 8). Biasing means comprising a torsion spring 111 is provided in operatively connected relation between the pivot pin 92 and the casing body member 66 in order to continuously bias the butterfly valve 91 towards a first position of adjustment indicated in Figure 7. Thus, the flange 98 is seated against the shoulder 96, while the flange 99, together with the flange extension 104, closely embraces the vanes or blades 70 of the impeller. The butterfly valve 91 together with the casing forms separated inlet and outlet zones between the openings 86 and 88. For example, as shown in Figure 7, wherein the butterfly valve is positioned to partition the flow control area or zone 84 crosswise from the cover member 65 to the wall means 64, then the opening 86 functions as an inlet opening and fluid will be directed as indicated by the arrow B into the pumping chamber 61 and impelled by the vanes 70 of the impeller to the other side of the baffle formed by the butterfly valve 91, namely, that portion of the flow control area 84 which functions as an outlet zone in the position of adjustment of Figure 7. The arrow indicated at C depicts the flow of fluid out of the pumping chamber 61 and through the opening 88 which functions as an outlet opening.

If it is desired to reverse the flow without reversing the direction of rotation of the impeller, the butterfly valve 91 is shifted to the position shown in Figure 8, whereupon the respective zones will be alternated or selectively shifted. In this position of adjustment the flange 99 seats against the shoulder 97 and a partition is

formed across the flow control area or zone **84** which extends from the wall means **64** to the cover member **65** in crosswise direction. In this position of adjustment, the opening **88** functions as an inlet opening and fluid will be directed as indicated by the arrow D through the inlet opening **88** and into the pumping chamber **61**, whereupon the fluid will be impelled by the vane **70** of the impeller and discharged as indicated by the arrow E past the opposite side of the butterfly valve **91** and out through the opening **86**, now functioning as an outlet opening.

Although it would be possible to manually position the butterfly valve **91**, the pivot pin **92** is provided with a control portion **112** outside of the casing **58** by means of which the valve may be automatically operated in accordance with the requirements of the automatic washing machine with which the pump assembly is associated. Thus there is shown diagrammatically in Figure 3 a mechanical linkage **113** connected to the actuating portion **112** and motivated by an electric motor indicated at M and including, by way of illustrative example, a solenoid winding **114** and a core **116**. It will be understood that the electric motor or solenoid M is associated with the necessary electrical circuitry affording actuation as a part of the programing schedule selected on the actuator **42** of the sequential control means. In operation, the pump **50** is selectively operated unidirectionally under the control of sequential controller **42** at different portions of the washing, rinsing and extracting periods, while the inlet and outlet flow through the openings **86** and **88** are alternately reversed through operation of the butterfly valve **91**, thereby to supply and remove a pool of laundry liquid to and from the treatment zone as required for the washing, rinsing and extracting periods of the machine operation.

Since the pump has an inlet area and an outlet area with a rotary impeller arranged to move fluid through two separate paths between the inlet and the outlet areas, it will be appreciated that in operation the valve **91** functions as a diverter means or as a shiftable wall member movable between two positions of adjustment to alternately connect oppositely extending portions of a fluid circuit with the inlet and outlet areas.

Although various minor structural modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon, all such modifications as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A pump comprising a rotatable impeller having a hub portion and a plurality of circumferentially spaced radially outwardly extending vanes, a casing having bearing means for journaling said hub portion and providing an annular pumping chamber in which said vanes are rotated, a pair of coaxially disposed ports formed in said casing on opposite sides of said annular pumping chamber generally parallel to the impeller axis and transversely of the plane of rotation of said impeller, reversible flow control means for selectively reversing the direction of flow through said ports including a valve plate movably positioned crosswise in said chamber between said ports and pivotally displaceable on an axis intersecting the rotational axis of said impeller and the axis of said ports, continuous biasing means operatively disposed between said casing and said valve plate normally biasing said valve plate into a first position extending crosswise across said pumping chamber wherein said valve plate together with said casing forms an inlet passage for said pumping chamber adjacent one of said ports and an outlet passage adjacent said other port, and actuating means operatively connected to and moving said valve plate against said continuous biasing means to a second crosswise position wherein said valve plate together with said casing forms an inlet passage for said pumping chamber adjacent said other port and an outlet passage adjacent said first port, thereby to reverse the direction of flow of the pumped fluid without reversing the direction of rotation of said pump impeller.

2. In a pump, an impeller, a casing journalling said impeller for rotation on an axis and having two coaxially disposed axially spaced apart ports on opposite sides of said impeller and being spaced radially outwardly of said rotational axis and generally parallel thereto, said casing having a pumping chamber formed therein in which said impeller is rotated and having a portion thereof extending radially between said ports whereby the ports are transverse to the plane of rotation of the impeller, and a movable baffle pivotally mounted in said casing and crosswise positioned in said pumping chamber between said ports to selectively interconnect said ports and said pumping cavity in alternate inlet and outlet relation.

3. A pump comprising a casing having a generally toroidal pumping chamber, a pair of ports formed in first and second walls of said casing on axially opposite sides of said chamber generally parallel to the chamber axis, rotor impeller means in said chamber providing an annular row of circumferentially spaced blades rotatable in said chamber to impel fluid from one of said ports to the other of said ports, a movable partition member in said chamber separating said ports from one another, and actuating means connected to said partition member and selectively moving said partition member between first and second crosswise positions between said ports wherein said ports selectively and alternately function as inlet and outlet ports for the pump without requiring a change in the direction of rotation of the rotary impeller means.

4. A pump comprising a casing having a generally toroidal pumping chamber, a centrally disposed boss extending axially into said chamber and having bearing means formed therein, rotary fluid displacement means journaled in said bearing means and rotatable in said pumping chamber, a confined flow control area formed in said chamber radially outwardly of said boss and having an opening formed therein on each of opposite sides of said rotary fluid displacement means, said openings being coaxial and parallel to the pump rotational axis and transverse to the plane of rotation of the fluid displacement means and a movable valve plate positioned crosswise between said openings in said flow control area partitioning said area into contiguous inlet and outlet zones, and means connected to said movable valve plate for shifting said plate to a second crosswise position between said openings to reverse the flow of fluid through said openings without reversing the direction of rotation of said rotary fluid displacement means.

5. A pump comprising a casing having a generally toroidal pumping chamber, a centrally disposed boss extending axially into said chamber and having bearing means formed therein, rotary fluid displacement means journaled in said bearing means and rotatable in said pumping chamber, a confined flow control area formed in said chamber radially outwardly of said boss and having an opening formed therein on each of opposite sides of said rotary fluid displacement means, said openings being axially aligned parallel to the rotational axis and transverse to the rotational plane of the fluid displacement means, a butterfly valve in said flow control area having closure portions on opposite sides of a pivot axis, and means mounting said valve for pivotal movement between two crosswise extending positions between said openings wherein said valve partitions the control area into inlet and outlet zones, and means connected to and shifting said valve to said positions with respect to said openings for reversing the flow of fluid through said openings.

6. A pump comprising a casing having a body mem-

ber and a cover member, said body member having a generally toroidal pumping chamber formed therein extending circumferentially around a centrally disposed apertured bearing boss, one side of said chamber being open and the other side being formed by a generally radially extending wall means, a first flow opening formed in said wall means radially outwardly of said boss, a rotatable impeller having a hub journaled in said bearing boss and a plurality of circumferentially spaced radially outwardly extending blades movable through said pumping chamber, said cover member being assembled across said one side of said body member to form a radially extending wall means for the pumping chamber spaced from said first radially extending wall means and having a second flow control opening formed therein oppositely disposed from and axially aligned with said first flow control opening, a butterfly valve having a pivot pin providing a pivot axis extending normally to the axis of rotation of said impeller and having closure portions disposed on opposite sides of said pivot axis, pivot means supported in said boss and in said casing outwardly of the pumping chamber for pivotally mounting said butterfly valve in an area of said pumping chamber between said first and second flow openings, said butterfly valve having a body portion extending adjacent said blades and marginal edge portions on opposite ends of said body portion angularly offset in the direction of said blades and recessed to provide a baffle extending radially outwardly of said blades lying closely adjacent the peripheral and side face portions of the blades and crosswise between said flow control openings, thereby to partition the area between said openings as alternate inlet and outlet zones with respect to said pumping chamber, continuous biasing means disposed on said pivot pin and normally maintaining said butterfly valve in one crosswise position between said openings to effect flow in one direction through said openings, and means connected to and selectively shifting said butterfly valve to a second crosswise position between said openings wherein the direction of flow is reversed.

7. A pump having a generally toroidal pumping chamber, rotary fluid displacement means in said chamber for impelling fluid, said chamber having inlet and outlet ports coaxially aligned with respect to one another at the periphery of said chamber and being parallel with the rotational axis of said rotary fluid displacement means and transverse to the plane of rotation thereof, and a movable baffle plate selectively positioned crosswise between said ports, and means shifting said baffle from one crosswise position to an opposite crosswise position to interconnect said ports and said pumping chamber in alternate inlet and outlet relation.

8. A reversible flow unidirectional pump comprising a housing having a pumping cavity, a rotatable centrifugal impeller in said cavity, inlet and outlet ports in said housing communicating with said cavity and being coaxially aligned with one another at the periphery of the cavity in parallel disposition relative to the axis of rotation of said impeller and transverse to the plane of rotation of said impeller, and a movable valve in said housing selectively crosswise positionable between said ports in first and second positions and interconnecting said ports and said pumping cavity in alternate inlet and outlet relation.

9. A pump comprising a housing having a pumping cavity, a rotatable impeller means in said cavity, coaxially aligned inlet and outlet ports in said housing at the periphery of said pumping cavity and disposed parallel relative to the axis of rotation and transverse to the plane of rotation of said impeller means, a valve plate in said housing having a pivot pin providing an intermediate pivot axis and closure portions on opposite sides of said axis and being crosswise positioned between said ports, continuous biasing means disposed on said pivot pin and normally maintaining said valve in one crosswise position between said ports to effect flow in one direction through said ports, and means connected to and selectively moving said valve to a second crosswise position between said ports and effecting flow in an opposite direction through said ports.

10. A pump comprising a housing having a pumping cavity, rotatable impeller means in said cavity, coaxially aligned inlet and outlet ports in said housing at the periphery of said pumping cavity and disposed parallel relative to the axis of rotation and transverse to the plane of rotation of said impeller means, a valve plate in said housing having an intermediate pivot axis and closure portions on opposite sides of said axis and being crosswise positioned between said ports, continuous biasing means operatively disposed between said valve plate and normally maintaining said valve plate in one crosswise position between said ports to effect flow in one direction through said ports, and means connected to and selectively moving said valve plate to a second crosswise position between said ports effecting flow in an opposite direction through said ports, said valve plate having marginal edge portions on opposite sides of said pivot axis and being angulary offset to engage adjoining wall portions of said housing.

11. A pump comprising, a pump casing including first and second generally parallel walls, an impeller revolubly positioned within said casing between and on an axis intersecting said first and second walls, a first port in said first wall, a second port in said second wall coaxial with said first port, the axis of said ports being parallel to and spaced from the axis of said impeller, means for rotating said impeller to pump fluids through said ports and said casing, a valve member positioned within said casing adjacent a radially outward portion of said impeller and pivoted on an axis transverse to the axis of rotation of said impeller, said valve member having opposite ends movable to positions adjacent opposite sides of said second port upon pivotal movement of said valve member, and means operatively connected to and moving said valve member to selectively provide either of two directions of fluid flow through said ports during unidirectional rotation of said impeller.

12. The invention set forth in claim 11 in which said valve member includes flanges engageable with said casing to limit movement of said opposite ends relative to said second port.

13. A pump comprising, a casing having an annular confined pumping zone formed therein, rotary fluid displacement means in said pumping zone having opposite side face portions, means in said casing forming axially aligned inlet and outlet zones adjacent opposite sides of said opposite side faces of said rotary fluid displacement means and parallel to the rotational axis of said rotary fluid displacement means, and a movable baffle crosswise positioned in a first position between said inlet and said outlet zone and actuating means connected to said baffle and moving said baffle to a second crosswise position between said inlet and said outlet zones to change the direction of flow of said pump without changing the direction of rotation of said rotary fluid displacement means.

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