

June 28, 1966

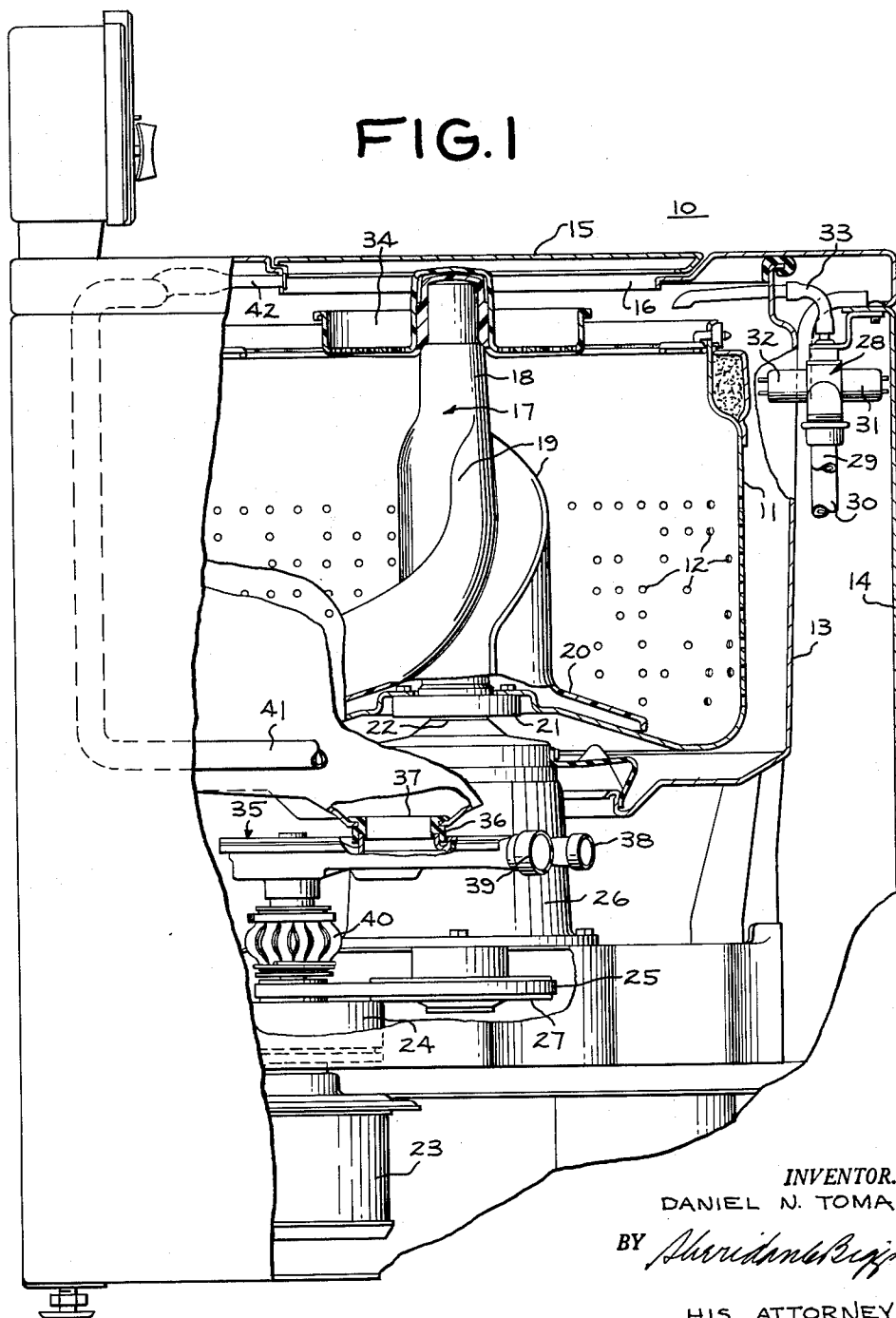
D. N. TOMA

3,257,950

FLUID PUMP DIVERTER

Filed July 8, 1964

2 Sheets-Sheet 1



June 28, 1966

D. N. TOMA

3,257,950

FLUID PUMP DIVERTER

Filed July 8, 1964

2 Sheets-Sheet 2

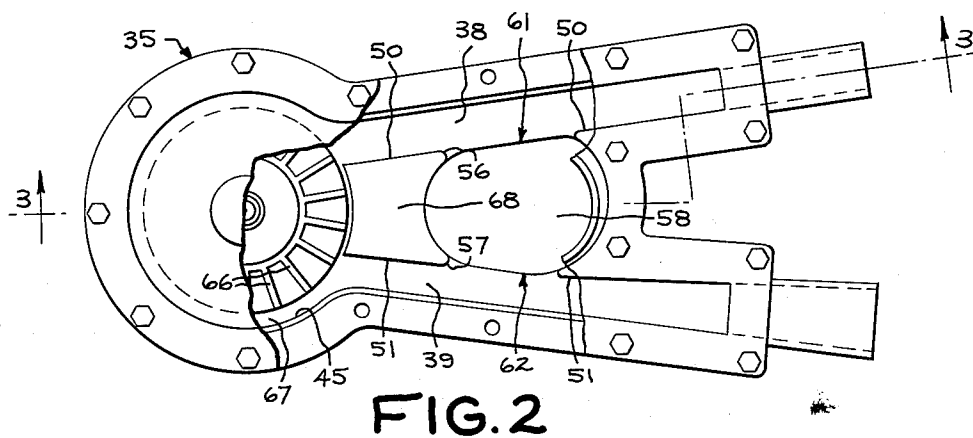


FIG. 3

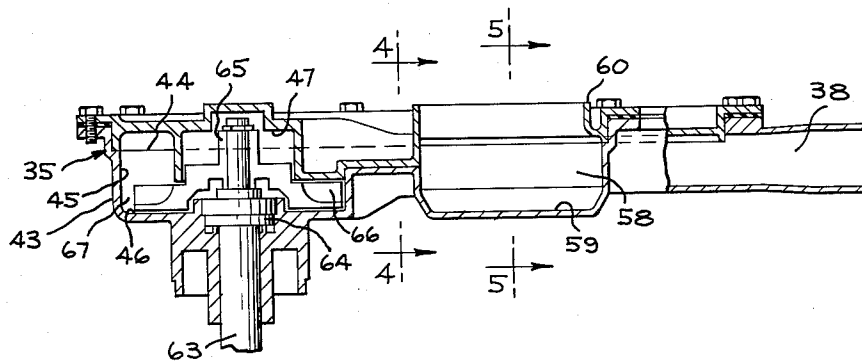
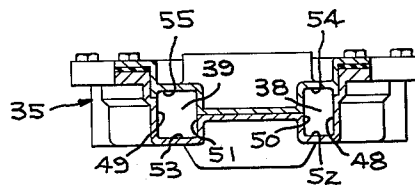


FIG. 5

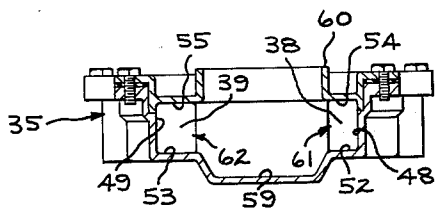


FIG. 4

INVENTOR
DANIEL N. TOMA
BY *Daniel N. Toma*
HIS ATTORNEY

1

3,257,950

FLUID PUMP DIVERTER

Daniel N. Toma, Louisville, Ky., assignor to General Electric Company, a corporation of New York

Filed July 8, 1964, Ser. No. 381,147

4 Claims. (Cl. 103-2)

This invention relates to fluid pumps, and more particularly to turbine type fluid pumps including a diverter which enables a single pump to transfer fluid from a single source to either of two destinations.

Quite often, it is desired to selectively pump fluid from a single source to either of two destinations. A single pump of the centrifugal or combination axial and centrifugal types can perform this function. These pumps, however, are not suitable for all applications because they cannot efficiently pump fluids which have entrained therein foreign matter of a solid nature. In pumps of these types, the impeller must be positioned closely adjacent the wall of the pump chamber for efficient performance and foreign matter of a solid nature can easily become wedged between the impeller and the chamber wall, thus causing the pump to malfunction. The use of a turbine pump, since it has a higher pressure head for the equivalent pump size, as compared to centrifugal and axial pumps, makes it possible to place the impeller at a substantial distance from the wall of the pump chamber and therefore efficiently to pump fluids which have entrained therein foreign matter of a solid nature. However, in prior art turbine pumps it was necessary to use what is called a "double-deck" pump, that is, two pumps built as a single unit and driven from a single power source with each pump functioning to transfer the fluid from the source to one of the destinations. This is not a completely satisfactory arrangement because the use of the "double-deck" pump greatly increases the cost of the pump unit.

It is an object of this invention to provide an improved pump for transferring from a single source selectively to either of two destinations, fluid having entrained therein foreign matter of a solid nature.

It is a further object of this invention to provide a single unit turbine type pump which is effective to transfer fluid from a unitary source selectively to either of two destinations.

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

FIGURE 1 is a side elevational view of a washing machine incorporating one embodiment of my invention, the view being partly broken away and partly in section for purposes of illustration;

FIGURE 2 is a plan view of the pump included in FIGURE 1, the view being partly broken away for purposes of illustration;

FIGURE 3 is a view taken along line 3-3 of FIGURE 2;

FIGURE 4 is a view taken along the line 4-4 of FIGURE 3, and

FIGURE 5 is a view taken along the line 5-5 of FIGURE 3.

Referring now to FIGURE 1, there is shown an agitator type clothes washing machine 10 having a conventional basket 11 provided over its side and bottom walls with perforations 12. The basket is disposed within an outer imperforate receptacle or tub 13, the tub 13 being rigidly mounted within an appearance cabinet 14 which includes a cover 15. When cover 15 is lifted, it provides access through an opening 16 to basket 11.

At the center of basket 11 there is positioned a vertical axis agitator 17 which includes a center post 18 and a

2

plurality of curved water circulating vanes 19 joined at their lower ends by an outwardly flared skirt 20. Both the basket 11 and agitator 17 are rotatably mounted. The basket is mounted on a flange 21 of a rotatable hub 22 and the agitator 17 is mounted on a shaft (not shown) which extends upwardly through hub 22 and center post 18 and is secured to the agitator in order to drive it. Basket 11 and agitator 17 are driven by a reversible motor 23 through a drive including a clutch 24 which allows the motor to start without load and then accept the load as it comes up to speed. A suitable belt 25 transmits power to a transmission assembly 26 through a pulley 27 so that, depending upon the direction of motor rotation, the transmission is driven in opposite directions.

The transmission 26 supports and drives both the agitator drive shaft and the basket mounting hub. When the motor 23 is rotated in one direction, the transmission causes the agitator to oscillate in a substantially horizontal plane within basket 11. Conversely, when motor 23 is driven in the opposite direction the transmission rotates basket 11 and agitator 17 together at high speed for centrifugal extraction.

Hot and cold water are provided to the basket 11 and tub 13 by a valve 28 which is connected to hot and cold water sources (not shown) through conduits 29 and 30, respectively. The valve 28 has solenoids 31 and 32 so that energization of solenoid 31 permits passage of hot water to the valve, energization of solenoid 32 permits passage of cold water to the valve, and energization of both solenoids permits mixing of hot and cold water in the valve and passage of warm water therefrom through an outlet structure 33 which directs the water into basket 11 and tub 13.

During a typical cycle of operation of machine 10, water is introduced into tub 13 and basket 11 and agitator 17 is then oscillated back and forth on its axis, that is, in a horizontal plane within the basket. This causes washing of clothes within the basket by effecting relative motion of the clothes in the liquid, as well as suitable flexing of the fabric of the clothes. Then, after a predetermined period of this washing action, basket 11 is rotated at high speed to extract centrifugally the washing liquid in the clothes and discharge it to drain. Following this extraction operation, clean water is introduced into the basket for rinsing the clothes and the agitator is again oscillated. Finally, the basket is once more rotated to extract the rinse water.

During the washing and rinsing portions of the cycle of operation, it is desirable that the liquid within the basket and tub be recirculated through a filter 34 to remove from the liquid lint and particles of dirt which the liquid has picked up from the clothing. In order to recirculate the liquid during washing and rinsing portions of the cycle of operation and to discharge the liquid at the conclusion of these portions, a pump generally indicated by the numeral 35 is provided. The pump is connected by an inlet conduit 36 to an opening 37 provided in the lowermost part of tub 13 and includes a pair of outlet conduits 38 and 39. The pump is connected to the clutch 24 by a flexible coupling 40.

Thus, when the motor rotates to cause agitation of the clothes, the pump functions to draw liquid in through opening 37 and inlet conduit 36 and discharge it through outlet conduit 38 which is adapted to be connected to a recirculation conduit 41 and nozzle 42 so that the liquid is returned to the tub 13 and basket 11 through filter 34. Conversely, when the motor rotates in the opposite direction to rotate the basket 11 and agitator 17 at high speed, the pump functions to draw liquid in through inlet conduit 36 and discharge it through conduit 39 which

is adapted to be connected to a drain (not shown) to dispose of the liquid.

Thus the pump 35 must be capable of selectively transferring liquid from a unitary source to either of two destinations. The washing and rinsing liquid in automatic washing machines often has entrained in it solid objects such as lint, string, hairpins, small rocks, etc., which have been removed from the clothes by the washing action. The pump must function despite such objects being drawn into it. My new and improved pump will function to selectively transfer fluid from a unitary source to either of two destinations despite the presence of such solid foreign matter.

Referring now to FIGURES 2 through 5, the pump includes a housing 43 defining an annular pump chamber 44 formed by an outer cylindrical wall 45, a bottom wall 46 and a top wall 47. Housing 43 also forms outlet conduits 38 and 39 which communicate with annular pump chamber 44. The outlet conduits 38 and 39 include outer walls 48 and 49, inner walls 50 and 51, bottom walls 52 and 53, and top walls 54 and 55, respectively. Preferably, the walls of the outlet conduits are substantially flat so that, within the housing 43, the outlet conduits 38 and 39 are generally rectangular in cross-section. The outer walls 48 and 49 join cylindrical wall 45 to form a continuous smooth surface while the inner walls are offset at 56 and 57, respectively. With such a construction the Coanda effect causes fluid flowing outwardly through conduits 38 and 39 to flow along outer walls 48 and 49, respectively.

An inlet chamber 58 is formed between the outlet conduits and includes a portion 59 extending below the outlet conduits to provide a fluid reservoir. The housing 43 includes an upstanding wall 60 to which the inlet conduit 36 is attached to connect the inlet chamber 58 to a source of fluid such as tub 13 of the washing machine illustrated in FIGURE 1. The inner walls 50 and 51 are discontinuous adjacent offsets 56 and 57 to form openings 61 and 62 which connect inlet chamber 58 to outlet conduits 38 and 39, respectively. While the openings 61 and 62 are shown adjacent the offsets 56 and 57, such a construction is not necessary for proper operation of the pump. In this regard it is necessary only that pump chamber 44 and openings 61 and 62 be located on opposite sides of the offsets 56 and 51, respectively.

A shaft 63 extends through housing 43 into the center of pump chamber 44 and is sealed with respect to the lower wall 46 by a gasket 64. A turbine type impeller 65 is mounted on shaft 63 and includes a plurality of blade members 66. The outer periphery of impeller 65 is spaced a substantial distance from cylindrical wall 45 as indicated at 67. Thus, as fluid is pumped through pump 44, sufficient clearance is available between the impeller and the wall of the pump chamber to allow foreign matter of a solid nature to pass through the pump. Although the impeller 65 passes close to the portion 68 of the housing between inner walls 50 and 51, no liquid is pumped in this area and a close tolerance creates no problem.

Shaft 63 is connected to a suitable source of power for reversible rotation such as flexible coupling 40, clutch 24 and motor 23 of the washing machine shown in FIGURE 1. Thus, when shaft 63 rotates impeller 65 in the clockwise direction (as seen in FIGURE 2) liquid received in inlet chamber 58 is drawn into pump chamber 44 through outlet conduit 39 and is discharged through outlet conduit 38. Conversely when shaft 63 rotates impeller 65 in the counterclockwise direction (as seen in FIGURE 2) fluid is drawn into pump chamber 44 through outlet conduit 38 and is discharged through conduit 39.

Since walls 48, 45 and 49 form a smooth continuous surface and inner walls 50 and 51 are offset at 56 and 57, the Coanda effect will cause the fluid discharged from pump chamber 44 to flow along the outer walls 48 and 49 of the outlet conduits 38 and 39, respectively, depending on the direction of rotation of impeller 65. Therefore, as the discharged fluid flows past openings 61 and 62, the

fluid is spaced from the openings and does not tend to draw fluid from inlet chamber 58 out through outlet conduits 38 and 39 respectively. When the impeller rotates in the clockwise direction (as viewed in FIGURE 2) fluid will be drawn from inlet chamber 58 through outlet conduit 39 into pump chamber 44. The fluid will then be discharged through outlet conduit 38. Conversely, when the impeller rotates in the counterclockwise direction (as viewed in FIGURE 2), the fluid will flow from inlet chamber 58 through outlet conduit 38 into pump chamber 44 and will be discharged through outlet conduit 39. Thus, depending on the direction of rotation of impeller 65, the pump 35 functions to transfer fluid from a single source selectively to either one of two destinations.

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

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A fluid pump of the turbine type including:
 - (a) a pump housing forming a pump chamber,
 - (b) an impeller mounted in said chamber for selective rotation in opposite directions,
 - (c) first and second outlet conduits for selectively transferring fluid from said pump chamber dependent upon the direction of rotation of said impeller, each of said conduits including an inner and an outer wall,
 - (d) means causing the fluid emitted from said pump chamber to flow along said outer walls of said outlet conduits,
 - (e) an inlet conduit communicating with said inner wall of each of said outlet conduits whereby rotation of said impeller draws fluid from said inlet conduit into said pump chamber through one of said outlet conduits and discharges it through the other of said outlet conduits.
2. A fluid pump of the turbine type including:
 - (a) a pump housing forming a pump chamber having an outer peripheral wall,
 - (b) an impeller mounted in said chamber for selective rotation in opposite directions,
 - (c) first and second outlet conduits for selectively transferring fluid from said pump chambers dependent upon the direction of rotation of said impeller, each of said conduits including an inner and an outer wall,
 - (d) said outer walls of said chamber and of said outlet conduits forming a smooth, continuous surface and said inner walls of said outlet conduits being offset so that fluid transferred from said chamber through said outlet conduits will flow along said outer walls of said outlet conduits, and
 - (e) an inlet conduit in communication with said inner wall of each of said outlet conduits,
 - (f) said pump chamber and said inlet conduit being disposed on opposite sides of said offsets, whereby rotation of said impeller draws fluid into said pump chamber through one of said outlet conduits and discharges it through the other of said outlet conduits.
3. A fluid pump of the turbine type including:
 - (a) a pump housing forming a pump chamber having an outer peripheral wall,
 - (b) an impeller mounted in said chamber for selective rotation in opposite directions,
 - (c) first and second spaced outlet conduits for selectively transferring fluid from said pump chamber dependent upon the direction of rotation of said impeller, each of said conduits including an inner and an outer wall,
 - (d) said outer walls of said chamber and of said outlet conduits forming a smooth, continuous surface and said inner walls of said outlet conduits being offset so that fluid transferred from said chamber through said

5

outlet conduits will flow along said outer walls of said outlet conduits, and

(e) an inlet conduit forming an inlet chamber in communication with said inner wall of each of said outlet conduits,

(f) said pump chamber and said inlet chamber being disposed on opposite sides of said offsets, whereby rotation of said impeller draws fluid into said pump chamber through one of said outlet conduits and discharges it through the other of said outlet conduits.

4. A fluid pump of the turbine type including:

(a) a pump housing forming a pump chamber having an outer peripheral wall,

(b) an impeller mounted in said chamber for selective rotation in opposite directions,

(c) first and second spaced outlet conduits for selectively transferring fluid from said pump chamber dependent upon the direction of rotation of said impeller, each of said conduits including an inner and an outer wall,

(d) said outer walls of said chamber and of said outlet conduits forming a smooth, continuous surface and said inner walls of said outlet conduits being offset so that fluid transferred from said chamber through

5

10

15

20

6

said outlet conduits will flow along said outer walls of said outlet conduits,

(e) an inlet chamber formed between said outlet conduits including a reservoir portion of greater depth than said outlet conduits,

(f) opposite sides of said inlet chamber communicating with said inner walls of said outlet conduits and the top of said inlet chamber defining an opening for connection to an inlet conduit,

(g) whereby fluid flowing from the inlet conduit is received in said inlet chamber and rotation of said impeller draws the fluid from said chamber into said pump chamber through one of said outlet conduits and discharges it through the other of said outlet conduits.

References Cited by the Examiner

UNITED STATES PATENTS

2,946,286	7/1960	Sholtes et al.	103—2
3,040,663	6/1962	Cushing	103—3

MARK NEWMAN, *Primary Examiner*.

W. J. KRAUSS, *Assistant Examiner*.