June 21, 1955 J. C. SHARP 2,711,076

TURBINE TYPE HYDRAULIC COUPLING

Original Filed Dec. 10, 1949

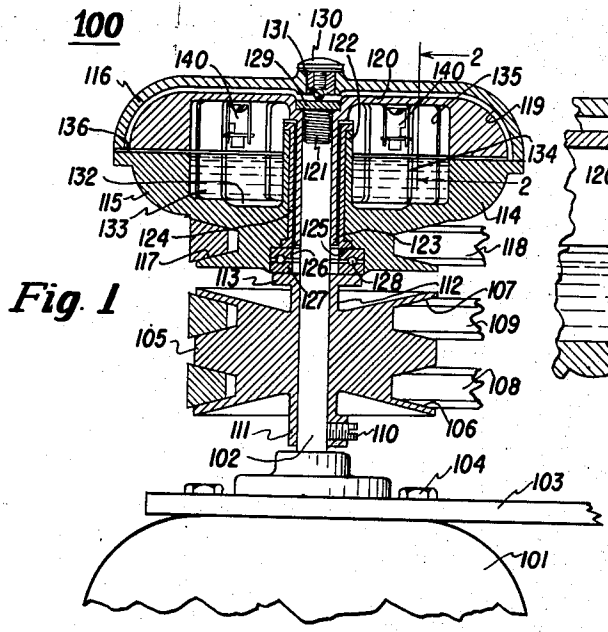


Fig. 1

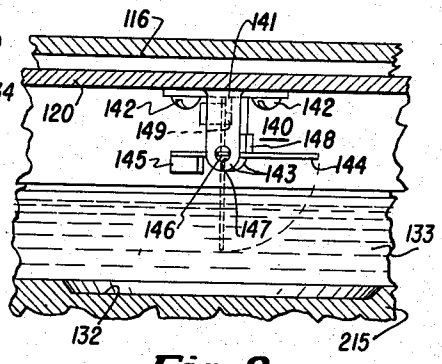


Fig. 2

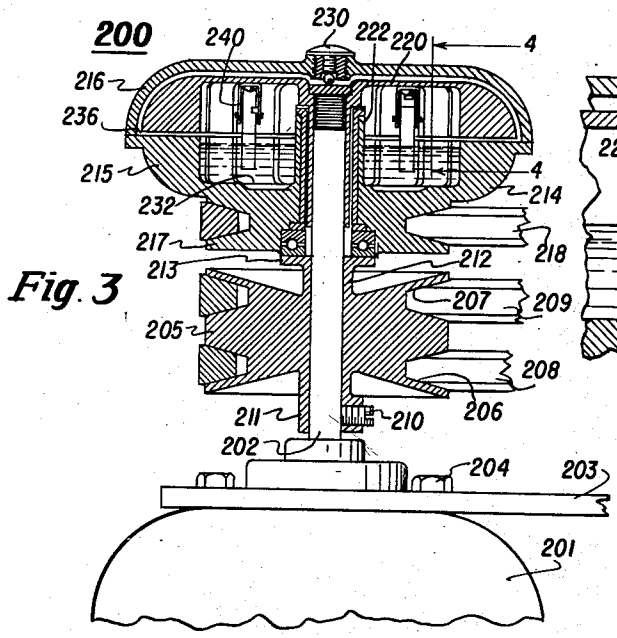


Fig. 3

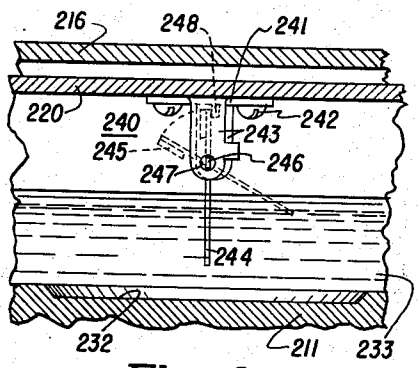


Fig. 4

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TURBINE TYPE HYDRAULIC COUPLING

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Original application December 10, 1949, Serial No. 132,287, now Patent No. 2,648,212, dated August 11, 1953. Divided and this application October 29, 1952, Serial No. 317,561

10 Claims. (Cl. 60—54)

The present invention relates to fluid drive mechanisms, and more particularly to such mechanisms especially adapted for use in clothes washing machines of the spin tub type. This application is a division of the co-pending application of John C. Sharp, Serial No. 132,287, filed December 10, 1949, now Patent No. 2,648,212, dated August 11, 1953.

The clothes washing machine disclosed in the Sharp application mentioned comprises an upstanding casing, an upstanding tub arranged in the casing and mounted for rotation, and an upstanding agitator arranged in the tub and mounted for oscillation. A water supply system communicates with the tub, and a drain conduit communicates with the casing; water is supplied from the system into the tub for washing and rinsing purposes, and excess water that is supplied to the tub is overflowed therefrom and caught in the casing. In order to effect extraction of the wash water and the rinse water from the tub and the clothes contained therein, the tub is spun or rotated, whereby the water is centrifuged from the tub and the clothes contained therein and caught in the casing, the water that is caught in the casing being discharged therefrom via the drain conduit to the exterior. Further, the clothes washing machine comprises an electric motor of the reversible type that is employed both to oscillate the agitator and to rotate the tub. More particularly, motion translating mechanism is directly driven by the electric motor in either direction of rotation thereof, and the agitator is driven by the motion translating mechanism, rotary motion being translated into oscillatory motion in the motion translating mechanism. Clutch mechanism is arranged between the motion translating mechanism and the agitator so that the agitator may be selectively operated during washing and rinsing operations as required in the operation of the machine. Also a drain pump is directly driven by the electric motor in either direction of rotation thereof and arranged to discharge the water through the drain conduit to the exterior under pressure. Finally, a fluid drive mechanism, embodying the features of the present invention, is directly driven by the electric motor in one direction of rotation thereof and arranged to drive the tub in order to accommodate slippage therebetween in the rotation of the tub in the water extracting operations. This arrangement of the fluid drive mechanism between the electric motor and the tub not only insures smooth and gradual acceleration of the tub in response to rotation of the electric motor in the one direction, but it also permits the tub to be rotated at a lower-than-normal speed in the event of an abnormal unbalance of the tub during a water extracting operation should the clothes in the tub become "bunched" or otherwise unevenly distributed therein.

As disclosed hereinafter, the fluid drive mechanism, embodying the features of the present invention, is so constructed and arranged that it is automatically clutched to effect a drive between the electric motor and the tub when the electric motor is rotated in the one direction

for the spin purpose, and is automatically declutched to interrupt the drive between the electric motor and the tub when the electric motor is rotated in the opposite direction for the washing purpose. Thus, it will be understood that in the clothes washing machine of the Sharp application mentioned selective washing and water extracting operations may be carried out upon the clothes in the tub fundamentally by controlling the direction of rotation of the reversible electric motor.

Accordingly, it is the general object of the present invention to provide an improved fluid drive mechanism that is expressly adapted for use in a clothes washing machine of the character described.

Another object of the invention is to provide an improved fluid drive mechanism that is direction-responsive.

A further object of the invention is to provide a fluid drive mechanism that incorporates an improved selectively operative starting arrangement.

A further object of the invention is to provide in a fluid drive mechanism an improved direction-responsive starting arrangement.

A still further object of the invention is to provide a fluid drive mechanism of improved and simplified construction and arrangement.

Further features of the invention pertain to the particular arrangement of the elements of the fluid drive mechanism, whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with accompanying drawing, in which Figure 1 is a vertical sectional view of a fluid drive mechanism embodying the present invention;

Fig. 2 is an enlarged fragmentary vertical sectional view of the fluid drive mechanism shown in Fig. 1, this view being taken in the direction of the arrows along the line **2—2** therein;

Fig. 3 is a vertical sectional view of a modified form of the fluid drive mechanism embodying the present invention; and

Fig. 4 is an enlarged fragmentary vertical sectional view of the fluid drive mechanism shown in Fig. 3, this view being taken in the directions of the arrows along the line **4—4** therein.

Referring now to Figs. 1 and 2 of the drawing, the fluid drive mechanism **100** there illustrated and embodying the features of the present invention is operatively associated with an electric drive motor **101** of the reversible rotor type provided with an operating or drive shaft **102**. The motor **101** is mounted upon a frame **103** by an arrangement including a plurality of bolts **104** so that the drive shaft **102** occupies a substantially vertical position. The drive shaft **102** extends well above the upper end of the motor **101** and the frame **103** and has rigidly secured thereto a fixture **105** that is arranged to provide two V-belt pulleys **106** and **107** respectively carrying two V-belts **108** and **109**. The fixture **105** is rigidly secured to the drive shaft **102** by an arrangement including a set screw **110** disposed in a threaded opening provided in a sleeve **111** carried on the lower end thereof, the upper end of the fixture **105** carries a sleeve **112** that terminates in an outwardly extending annular flange **113**.

The fluid drive mechanism **100** is mounted upon the extreme upper end of the drive shaft **102** and upon the flange **113** and comprises a hollow casing **114** including lower and upper sections **115** and **116** hermetically sealed together. The lower portion of the casing **115** provides a V-belt pulley **117** that receives an associated V-belt **118**. The hollow upper casing section **116** provides a

substantially annular chamber 119 therein; and a substantially annular head 120 is arranged within the chamber 119 and rigidly secured to the extreme upper end of the drive shaft 102 by an arrangement including a threaded connection 121. The lower casing section 115 has a substantially centrally disposed opening therein through which the upper end of the drive shaft 102 projects, which opening terminates in an upstanding annular sleeve 122, the head 120 being provided with a downwardly projecting annular sleeve 123 formed integral therewith and projecting into the sleeve 122. The sleeves 122 and 123 are arranged in spaced-apart relation and are separated by an interposed bearing sleeve 124, the bearing sleeve 124 being frictionally secured to the interior surface of the opening provided in the sleeve 122. A recess 125 is formed in the lower portion of the lower casing section 115 within the pulley 117 and receives and anti-friction bearing element provided with upper and lower races 126 and 127. The lower race 127 is directly supported upon the adjacent upper surface of the flange 113 provided on the fixture 105, and the upper race 126 engages the lower end of the lower casing section 115, as well as the lower end of the bearing sleeve 124, the races 126 and 127 being supported in spaced-apart relation by a plurality of circumferentially spaced-apart balls 128. A centrally disposed recess is provided in the upper portion of the head 120, and a disk 129 is frictionally secured therein. Further, a centrally disposed threaded opening is provided in the upper portion of the upper casing section 116 and receives a threaded member 130 positioned above the disk 129, a thrust ball 131 being arranged between the lower end of the threaded member 130 and the disk 129. The lower bearing arrangement, including the balls 128, and the upper bearing arrangement, including the ball 131, positively locates the casing 114 with respect to the head 120 and permit free rotation of the drive shaft 102 and the head 120 in the chamber 119 independently of the casing 114.

Further, a substantially centrally disposed annular reservoir 132 is formed in the lower casing section 115 below the head 120 and surrounding the sleeve 122, which reservoir 132 contains a quantity or body of fluid 133, such, for example, as a quantity of light oil or other hydraulic medium. The upper level of the body of fluid 133 is disposed slightly below the junction between the lower and upper casing sections 115 and 116 so that the head 120 is disposed above and normally entirely out of contact with the body of fluid 133 arranged in the reservoir 132. The lower casing section 115 carries a plurality of circumferentially spaced-apart main driven blades 134 disposed exteriorly of the reservoir 132 and communicating therewith; and likewise the head 120 carries a plurality of circumferentially spaced-apart main drive blades 135 disposed above and exteriorly of the reservoir 132 and cooperating with the main driven blades 134. Thus the drive blades 135 carried by the head 120 are disposed above and out of contact with the driven blades 134 carried by the lower casing section 115, a narrow annular space 136 being provided between the sets of main blades 134 and 135. The arrangement described above permits free rotation of the head 120 and the drive blades 135 carried thereby with respect to the lower casing section 115 and the driven blades 134 carried thereby.

Finally, the fluid drive mechanism 100 comprises a direction-responsive starting arrangement including two substantially diametrically positioned start devices 140 carried by the head 120 above and adjacent to the body of fluid 133 disposed in the reservoir 132. Preferably, the devices 140 are identical, each comprising a fixture 141 provided with a body secured directly to the adjacent surface of the head 120 by a pair of screws 142, and a pair of spaced-apart depending arms 143 carrying a pivotally mounted start blade 144. The device 140 is disposed in an offset position with respect to the center line of the drive shaft 102 and the center of the head 120; and the start blade 144 carries a depending counterbalance or weight 145 on the rear end thereof, the front end of the start blade 144 normally being disposed somewhat above the level of the body of fluid 133 provided in the reservoir 132. Specifically, the start blade 144 is pivoted intermediate the ends thereof upon a pair of oppositely directed trunnions 146 supported in cooperating bearing openings 147 provided in the arms 143 of the fixture 141. Thus when the drive shaft 102 is at rest, the start blade 144 occupies a substantially horizontal position, the counterbalance 145 pivoting the start blade 144 to the position noted about the trunnions 146 in order to insure that the front end of the start blade 144 is out of contact with the body of fluid 133 provided in the reservoir 132.

Considering now the operation of the fluid drive mechanism 100, when rotation of the drive shaft 102 is initiated in the counterclockwise direction, as viewed from the top of the mechanism 100, the head 120 moves toward the right in Fig. 2, and the impulse that is transmitted from the head 120 through the fixture 141 and the trunnions 146 to the start blade 144 causes the start blade 144 to be pivoted in the clockwise direction, as viewed in Fig. 2. This pivotal movement of the start blade 144 is brought about primarily by the inertia of the weight 145, the center of gravity of the weight 145 being disposed below the trunnions 146. When the start blade 144 is thus pivoted in the clockwise direction, as viewed in Fig. 2, the front end thereof dips into the body of fluid 133 provided in the reservoir 132, whereby the start blade 144 is pivoted further in the clockwise direction into a substantially vertical position about the trunnions 146, as indicated by the dotted lines in Fig. 2. The start blade 144 is restrained, when it is at rest, in its substantially horizontal normal position by a stop 148 extending between the arms 143 of the fixture 141; and the start blade 144 is restrained, when it is moved in the counterclockwise direction, as viewed from the top of the mechanism 100, into its substantially vertical operated position by a stop 149 depending from the body of the fixture 141. When the start blade 144 thus occupies its substantially vertical operated position and is rotated in the counterclockwise direction, as viewed from the top of the mechanism 100, the front end thereof catches the fluid contained in the reservoir 132 and splashes, or deflects it outwardly away from the center line of the rotating drive shaft 102 and into the drive blades 135 and the space 136 disposed between the drive blades 135 and the driven blades 134. In order positively to insure that the fluid contained in the reservoir 132 is directed outwardly, as described above, each of the start devices 140 is mounted at a slight angle with respect to a radius of the head 120 extending to the center line of the drive shaft 102. When the fluid contained in the reservoir 132 is thus directed into the space 136 and between the blades 135 and 134, the drive blades 135 exert a torque upon the driven blades 134, whereby rotation of the casing 114 is initiated. When rotation of the casing 114 is thus initiated the fluid contained in the reservoir 132 is flung outwardly by the centrifugal force into the space 136, thereby further insuring the drive relationship between the blades 135 and 134. Accordingly the casing 114 is gradually accelerated and ultimately rotates at a speed somewhat below that of the head 120 in view of the fact that there is always some slippage between the blades 135 and 134. Accordingly, when rotation of the drive shaft 102 is initiated in the counterclockwise direction, as viewed from the top of the mechanism 100, rotation of the casing 114, and consequently the pulley 117 carried thereby, is initiated, whereby rotation of the pulley 117 is gradually accelerated to a speed somewhat below that of the head 120 carried by the drive shaft 102.

Subsequently when operation of the motor 101 is ar-

rested, rotation of the drive shaft **102** in the counterclockwise direction, as viewed from the top of the mechanism **100** is gradually decelerated, whereby the fluid contained within the casing **114** ultimately falls back by the action of gravity into the reservoir **132**. When operation of the motor **102** is thus arrested, rotation of the mechanism **100** stops shortly thereafter by virtue of the connected loads upon the pulleys **106**, **107** and **117**, in an obvious manner; whereby the start blades **144** of the start devices **140** are returned to their normal positions by the weights **145**.

On the other hand, when rotation of the drive shaft **102** is initiated in the clockwise direction, as viewed from the top of the mechanism **100**, the head **120** moves toward the left in Fig. 2, and the impulse that is transmitted through the arms **143** of the fixture **141** and the trunnions **146** to the start blade **144** is such that the weight **145** tends to pivot the start blade **144** further in the counterclockwise direction, as viewed in Fig. 2. However, further pivotal movement of the start blade **144** in the counterclockwise direction is prevented by the stop **148** carried by the arms **143** of the fixture **141**, whereby the start blade **144** remains in its normal position. Accordingly, when rotation of the drive shaft **102** is initiated in the clockwise direction, as viewed from the top of the mechanism **100**, the start blades **144** of the start devices **140** remain in their normal positions, whereby the body of fluid **133** contained in the reservoir **132** is not disturbed and consequently the drive blades **135** are rotated freely with respect to the driven blades **134** and rotation of the head **120** is not transmitted to the casing **114**.

In view of the foregoing description of the mode of operation of the mechanism **100**, it will be understood that it is direction-responsive and that power is transmitted from the motor **101** to the pulley **117** carried by the casing **114** only in the event the drive shaft **102** is rotated in the counterclockwise direction, as viewed from the top of the mechanism **100**. Accordingly, it will be appreciated that the load that is connected to the pulley **117** carried by the casing **114** may be selectively rotated through the V-belt **118** dependent upon the direction of rotation of the drive shaft **102**. On the other hand, since the fixture **105** is rigidly secured to the drive shaft **102**, the pulleys **106** and **107** drive the connected loads through the respective V-belts **108** and **109** when the drive shaft **102** is rotated in either direction.

Referring now to Figs. 3 and 4, the modified form of the fluid drive mechanism **200** there illustrated and embodying the features of the present invention is operatively associated with an electric drive motor **201** of the reversible rotor type provided with an operating or drive shaft **202**. The motor **201** is mounted upon a frame **203** by an arrangement including a plurality of bolts **204** so that the drive shaft **202** occupies a substantially vertical position. The drive shaft **202** extends well above the upper end of the motor **201** and the frame **203** and has rigidly secured thereto a fixture **205** that is arranged to provide two V-belt pulleys **206** and **207** respectively carrying two V-belts **208** and **209**. The fixture **205** is rigidly secured to the drive shaft **202** by an arrangement including a set screw **210** arranged in a threaded opening provided in a sleeve **211** carried on the lower end thereof. The upper end of the fixture **205** carries a sleeve **212** that terminates in an outwardly extending annular flange **213**.

The fluid drive mechanism **200** is mounted upon the extreme upper end of the drive shaft **202** and upon the flange **213** and comprises component elements **214** to **236**, inclusive, respectively corresponding to the elements **114** to **136**, inclusive, of the fluid drive mechanism **100** described above, which elements **214** to **236**, inclusive, are not again enumerated in the interest of brevity.

Finally, the fluid drive mechanism **200** comprises a direction-responsive starting arrangement including two substantially diametrically positioned start devices **240** of modified construction and arrangement and carried by the head **220** above and adjacent to the body of fluid **233** disposed in the reservoir **232**.

Preferably the devices **240** are identical, each comprising a fixture **241** provided with a body secured directly to the adjacent surface of the head **220** by a pair of screws **242**, and a pair of spaced-apart depending arms **243** carrying a pivotally mounted start blade **244**. The device **240** is disposed in an offset position with respect to the center line of the drive shaft **202** and the center of the head **220**, and the start blade **244** carries a small depending counterbalance or weight **245** on the rear end thereof, the front end of the start blade **244** normally being projected into the body of fluid **233** provided in the reservoir **232**. Specifically, the start blade **244** is pivoted intermediate the ends thereof upon a pair of oppositely directed trunnions **246** supported in cooperating bearing openings **247** provided in the arms **243** of the fixture **241**. Thus when the drive shaft **202** is at rest the start blade **244** occupies a substantial vertical normal position, the counterbalance **245** permitting the start blade **244** to pivot to the position noted about the trunnions **246** in order to insure that the front end of the start blade **244** is immersed in the body of fluid **233** provided in the reservoir **232**.

Considering now the operation of the fluid drive mechanism **200**, when rotation of the drive shaft **202** is initiated in the counterclockwise direction, as viewed from the top of the mechanism **200**, the head **220** moves toward the right in Fig. 4, and the impulse that is transmitted from the head **220** through the fixture **241** and the trunnions **246** to the start blade **244** causes the start blade **244** to exert a force upon the fluid contained in the reservoir **232** tending to rotate the start blade **244** in the clockwise direction, as viewed in Fig. 4. However, further pivotal moverent of the start blade **244** in the clockwise direction from its substantially vertical normal position is prevented by a stop **248** depending from the body of the fixture **241**. When the start blade **244** thus occupies its substantially vertical normal position and is rotated in the counterclockwise direction, as viewed from the top of the mechanism **200**, the front end thereof catches the fluid contained in the reservoir **232** and splashes or deflects it outwardly away from the center line of the rotating drive shaft **202** and into the drive blades **235** and the space **236** disposed between the drive blades **235** and the driven blades **234**. In order positively to insure that the fluid contained in the reservoir **232** is directed outwardly, as described above, each of the start devices **240** is mounted at a slight angle with respect to a radius of the head **220** extending to the center line of the drive shaft **202**. When the fluid contained in the reservoir **232** is thus directed into the space **236** and between the blades **235** and **234**, the drive blades **235** exert a torque upon the driven blades **234**, whereby rotation of the casing **214** is initiated. When rotation of the casing **214** is thus initiated the fluid contained in the reservoir **232** is flung outwardly by the centrifugal force into the space **236**, thereby further insuring the drive relationship between the blades **235** and **234**. Accordingly, the casing **214** is gradually accelerated and ultimately rotates at a speed somewhat below that of the head **220** in view of the fact that there is always some slippage between the blades **235** and **234**. Accordingly when rotation of the drive shaft **202** is initiated in the counterclockwise direction, as viewed from the top of the mechanism **200**, rotation of the casing **214** and consequently the pulley **217** carried thereby is initiated, whereby rotation of the pulley **217** is gradually accelerated to a speed somewhat below that of the head **220** carried by the drive shaft **202**.

Subsequently when operation of the motor **201** is arrested, rotation of the drive shaft **202** in the counterclockwise direction, as viewed from the top of the mecha-

nism 200, is gradually decelerated, whereby the fluid contained within the casing 214 ultimately falls back by the action of gravity into the reservoir 232. When operation of the motor 201 is thus arrested, rotation of the mechanism 200 stops shortly thereafter by virtue of the connected loads upon the pulleys 206, 207 and 217, in an obvious manner, whereby the start blades 244 of the start devices 240 are retained in their normal positions due to the fact that in each start blade 244 the center of gravity is disposed in the front end thereof.

On the other hand, when rotation of the drive shaft 202 is initiated in the clockwise direction, as viewed from the top of the mechanism 200, the head 220 moves toward the left in Fig. 4, and the impulse that is transmitted through the arms 243 of the fixture 241 and the trunnions 246 to the start blade 244, causes the front end of the start blade 244 to drag out of the body of fluid 233 contained in the reservoir 232, whereby the start blade 244 is pivoted in the counterclockwise direction, as viewed in Fig. 4, into its operated position indicated by the dotted lines. Further, the impulse that is transmitted to the start blade 244 in this case also assists in the pivotal movement of the start blade 244 from is substantially vertical normal position to its inclined operated position. When the start blade 244 is thus operated into its inclined operated position the front end thereof is disposed somewhat above the level of the body of fluid 233 disposed in the reservoir 232 and out of contact therewith. Accordingly, when rotation of the drive shaft 202 is initiated in the clockwise direction, as viewed from the top of the mechanism 200, the start blades 244 of the start devices 240 are immediately pivoted from their normal positions into their operated positions, whereby the body of fluid 233 contained in the reservoir 232 is not substantially disturbed and consequently the drive blades 235 are rotated freely with respect to the driven blades 234 and rotation of the head 220 is not transmitted to the casing 214.

In view of the foregoing description of the mode of operation of the mechanism 200, it will be understood that it is direction-responsive and that power is transmitted from the motor 201 to the pulley 217 carried by the lower casing section 215 only in the event the drive shaft 202 is rotated in the counterclockwise direction, as viewed from the top of the mechanism 200. Accordingly, it will be appreciated that the load that is connected to the pulley 217 carried by the lower casing section 215 may be selectively rotated through the V-belt 218 dependent upon the direction of rotation of the drive shaft 202. On the other hand, since the fixture 205 is rigidly secured to the drive shaft 202, the pulleys 206 and 207 drive the connected loads through the respective V-belts 208 and 209 when the drive shaft 202 is rotated in either direction.

In view of the foregoing description of the fluid drive mechanisms 100 and 200, it will be understood that either of these embodiments may be employed as the fluid drive mechanism in the clothes washing machine disclosed in the Sharp application mentioned.

In view of the foregoing, it is apparent that there has been provided a direction-responsive fluid drive mechanism of improved and simplified construction and arrangement.

While there has been described what is at present considered to be the preferred embodiment of invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A fluid drive mechanism comprising a casing having a substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis, a drive shaft extending through said opening into said casing and mounted for rotation about said substantially vertical axis independently of said casing, structure defining a substantially annular reservoir in the lower portion of said casing out of contact with said drive shaft, a head rigidly secured to said drive shaft within said casing and above said reservoir, a plurality of annularly disposed drive blades carried by said head exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said casing exteriorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally disposed below and out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, a start blade carried by said head adjacent to said reservoir and movable between two positions with respect to said body of fluid, said start blade being respectively withdrawn from and projected into said body of fluid in its two corresponding positions, said start blade in its position projected into said body of fluid deflecting the fluid from said reservoir into the space between said drive blades and said driven blades causing said drive blades to exert a torque through the fluid upon said driven blades in response to rotation of said drive shaft so as to effect rotation of said casing, and control mechanism for selectively moving said start blade between its two positions.

2. The fluid drive mechanism set forth in claim 1, wherein said drive shaft is mounted for rotation in either direction about said substantially vertical axis and said control mechanism is responsive to the direction of rotation of said drive shaft for selectively moving said start blade between its two positions.

3. A fluid drive mechanism comprising a casing having a substantially centrally disposed opening formed in the bottom thereof and mounted for rotation about a substantially vertical axis, a drive shaft having an upper end extending through said opening into said casing and mounted for rotation about said substantially vertical axis independently of said casing, structure defining a substantially annular reservoir in the lower portion of said casing surrounding said drive shaft and out of contact therewith, a head secured to the upper end of said drive shaft within said casing and above said reservoir, a plurality of annularly disposed drive blades carried by said head exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said casing exteriorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally disposed below and out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, a start blade carried by said head adjacent to said reservoir and movable between two positions with respect to said body of fluid, said start blade being respectively withdrawn from and projected into said body of fluid in its two corresponding positions, said start blade in its position projected into said body of fluid deflecting the fluid from said reservoir into the space between said drive blades and said driven blades causing said drive blades to exert a torque through the fluid upon said driven blades in response to rotation of said drive shaft so as to effect rotation of said casing, control mechanism for selectively moving said start blade between its two positions, a pulley carried by said casing, and bearing structure arranged between said casing and said drive shaft.

4. A fluid drive mechanism comprising a casing having a substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis, a drive shaft extending through said opening into said casing and mounted for rotation about said substantially vertical axis independently of said casing, structure defining a substantially annular reservoir in the lower portion of said casing out of contact with said

drive shaft, a head rigidly secured to said drive shaft within said casing and above said reservoir, a plurality of annularly disposed drive blades carried by said head exteriorly of said reversoir, a plurality of annularly disposed driven blades carried by said casing exteriorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally disposed below and out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, a pair of substantially diametrically opposed start blades carried by said head adjacent to said reservoir, each of said start blades being movable between two positions with respect to said body of fluid, each of said start blades being respectively withdrawn from and projected into said body of fluid in its two corresponding positions, each of said start blades in its position projected into said body of fluid deflecting the fluid from said reservoir into the space between said drive blades and said driven blades causing said drive blades to exert a torque through the fluid upon said driven blades in response to rotation of said drive shaft so as to effect rotation of said casing, and control mechanism for simultaneously and selectively moving said start blades between their two positions.

5. The fluid drive mechanism set forth in claim 1, wherein said drive shaft is mounted for rotation in either direction about said substantially vertical axis and said control mechanism includes an inertia part selectively responsive to rotation of said drive shaft in a given direction for moving said start blade into its position projected into said body of fluid.

6. A fluid drive mechanism comprising a casing having a substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis, a drive shaft extending through said opening into said casing and mounted for rotation in either direction about said substantially vertical axis independently of said casing, structure defining a substantially annular reservoir in the lower portion of said casing out of contact with said drive shaft, a head rigidly secured to said drive shaft within said casing and above said reservoir, a plurality of annularly disposed drive blades carried by said head exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said casing exteriorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally disposed below and out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, a start blade carried by said head and mounted for movements between an operated position withdrawn from said body of fluid and a normal position projected into said body of fluid, said start blade in its normal position deflecting the fluid from said reservoir into the space between said drive blades and said driven blades causing said drive blades to exert a torque through the fluid upon said driven blades in response to rotation of said drive shaft so as to effect rotation of said casing, and means selectively responsive to rotation of said drive shaft in a given direction for moving said start blade from its normal position into its operated position.

7. A fluid drive mechanism comprising a casing having a substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis, a drive shaft extending through said opening into said casing and mounted for rotation in either direction about said substantially vertical axis independently of said casing, structure defining a substantially annular reservoir in the lower portion of said casing out of contact with said drive shaft, a head rigidly secured to said drive shaft within said casing and above said reservoir, a plurality of annularly disposed drive blades carried by said head exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said casing exteriorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally disposed below and out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, a start blade carried by said head adjacent to said reservoir and mounted intermediate the ends thereof for pivotal movements between two positions, one end of said start blade being respectively withdrawn from and projected into said body of fluid when said start blade respectively occupies its two positions, said one end of said start blade projected into said body of fluid deflecting the fluid from said reservoir into the space between said drive blades and said driven blades causing said drive blades to exert a torque through the fluid upon said driven blades in response to rotation of said drive shaft so as to effect rotation of said casing, and means including a weight carried by the other end of said start blade and selectively responsive to rotation of said drive shaft in a given direction for pivoting said start blade from one of its positions into the other of its positions.

8. The fluid drive mechanism set forth in claim 1, wherein said drive shaft is mounted for rotation in either direction about said substantially vertical axis and said control mechanism includes a fluid drag part selectively responsive to rotation of said drive shaft in a predetermined direction for moving said start blade into its position withdrawn from said body of fluid.

9. A fluid drive comprising a casing having a substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis, a drive shaft extending through said opening into said casing and mounted for rotation in either direction about said substantially vertical axle independently of said casing, structure defining a substantially annular reservoir in the lower portion of said casing out of contact with said drive shaft, a head rigidly secured to said drive shaft within said casing and above said reservoir, a plurality of annularly disposed drive blades carried by said head exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said casing exteriorly of said reservoir, said drive blades being disposed in cooperating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally disposed below and out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, a start blade carried by said head and mounted for movements between a normal position projected into said body of fluid and an operated position withdrawn from said body of fluid, said start blade in its normal position deflecting the fluid from said reservoir into the space between said drive blades and said driven blades causing said drive blades to exert a torque through the fluid upon said driven blades in response to rotation of said drive shaft so as to effect rotation of said casing, means selectively responsive to rotation of said drive shaft in a predetermined direction for moving said start blade from its normal position into its operated position.

10. A fluid drive mechanism comprising a casing having a substantially centrally disposed opening formed therein and mounted for rotation about a substantially vertical axis, a drive shaft extending through said opening into said casing and mounted for rotation in either direction about said substantially vertical axis independently of said casing, structure defining a substantially annular reservoir in the lower portion of said casing out of contact with said drive shaft, a head rigidly secured to said drive shaft within said casing and above said reservoir, a plurality of annularly disposed drive blades carried by said head exteriorly of said reservoir, a plurality of annularly disposed driven blades carried by said casing exteriorly of said reservoir, said drive blades being disposed in coop-

erating relation with said driven blades and spaced thereabove a short distance, a body of fluid arranged in said reservoir and normally disposed below and out of contact with said drive blades to permit free rotation of said drive blades with respect to said driven blades, a start blade carried by said head adjacent to said reservoir and mounted intermediate the ends thereof for pivotal movements between a normal position and an operated position, one end of said start blade being respectively projected into and withdrawn from said body of fluid when said start blade respectively occupies its normal and operated positions, said one end of said start blade projected into said body of fluid deflecting the fluid from said reservoir into the space between said drive blades and said driven blades causing said drive blades to exert a torque through the

fluid upon said driven blades in response to rotation of said drive shaft so as to effect rotation of said casing, and means including a stop carried by said head and cooperating with the other end of said start blade for restraining said start blade in its normal position when said drive shaft is rotated in a given direction, said start blade being pivoted from its normal position into its operated position by the drag between said one end of said start blade and said body of fluid in response to rotation of said drive shaft in the opposite direction.

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