July 4, 1950 G. P. CASTNER 2,513,845

ROTARY FLUID COUPLING

Original Filed Aug. 14, 1946 4 Sheets-Sheet 1

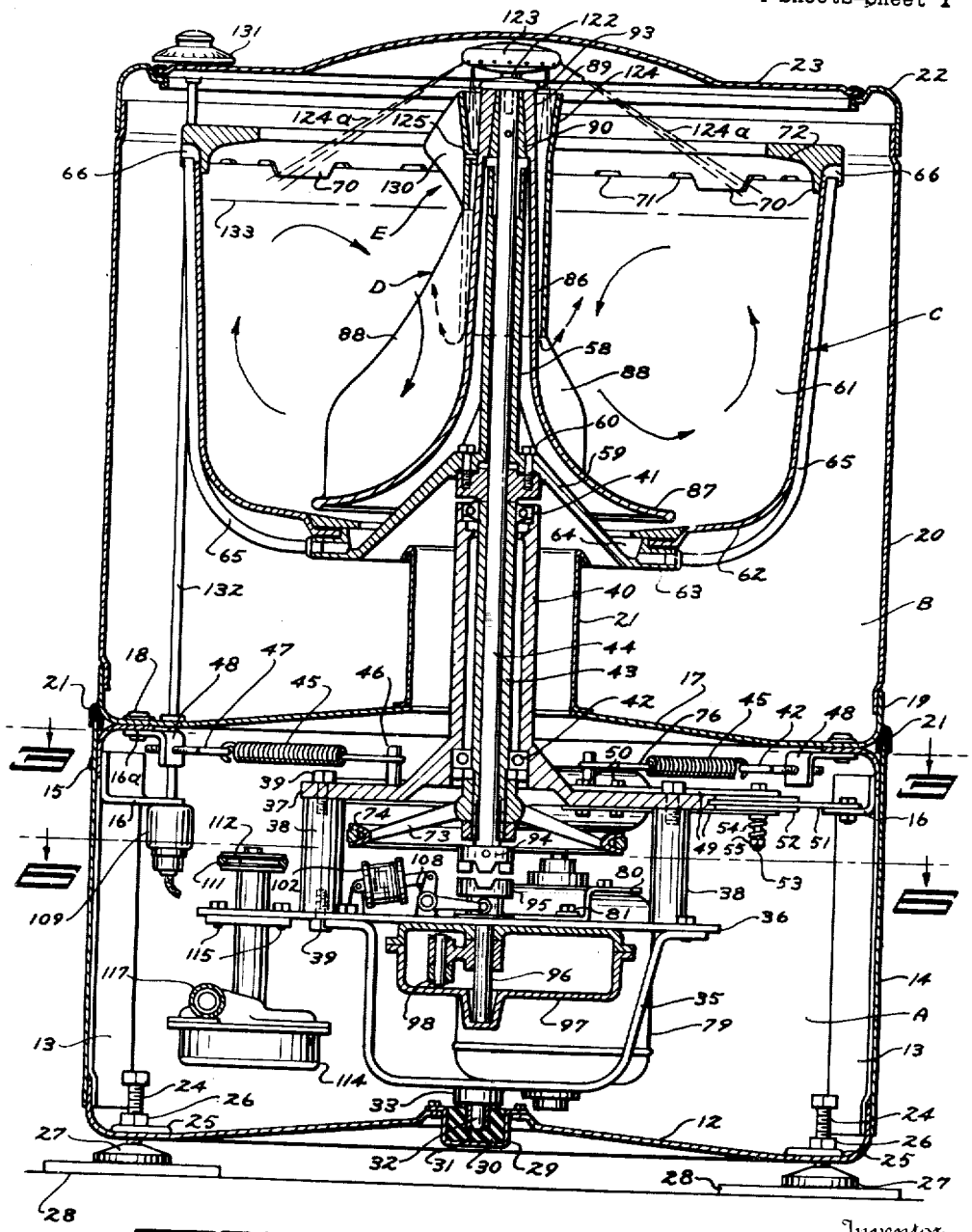


FIG 1

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ROTARY FLUID COUPLING

Original Filed Aug. 14, 1946 4 Sheets-Sheet 2

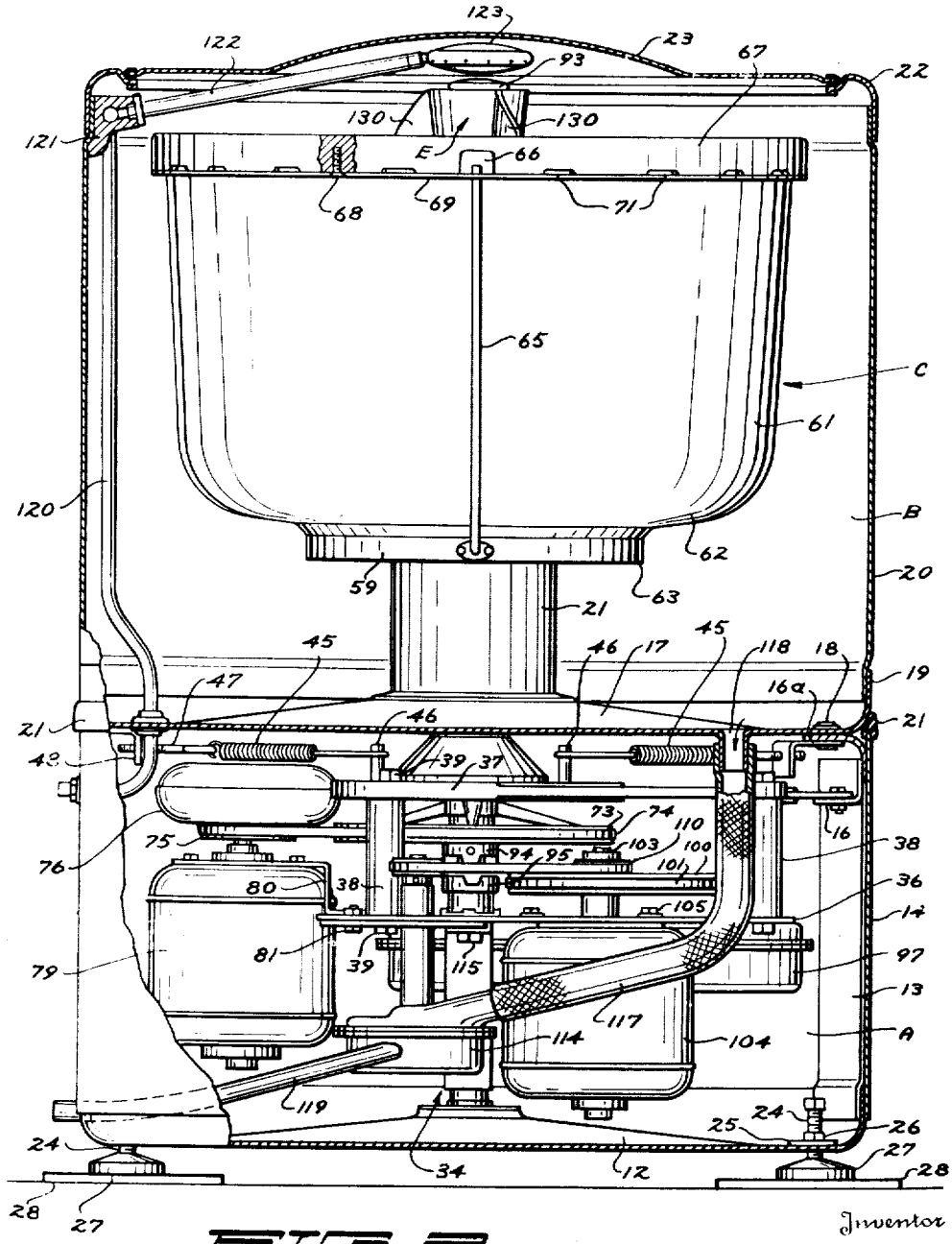


FIG 2

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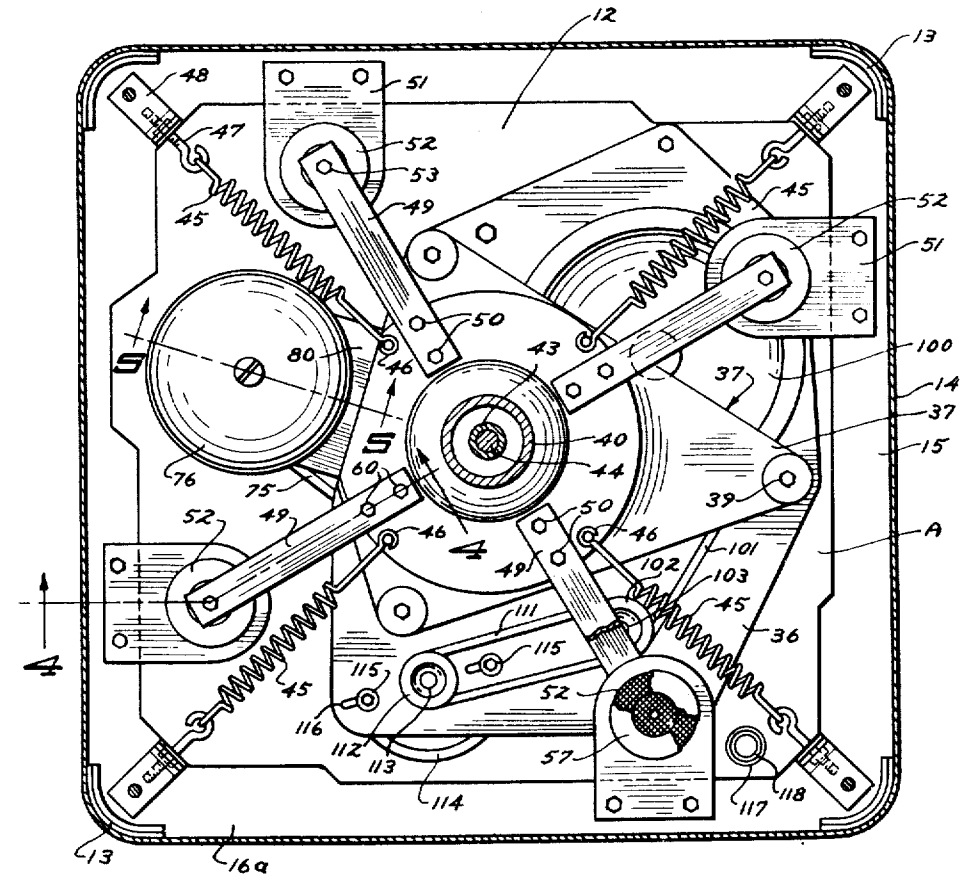
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July 4, 1950 G. P. CASTNER 2,513,845

ROTARY FLUID COUPLING

Original Filed Aug. 14, 1946 4 Sheets-Sheet 3

FIG 3



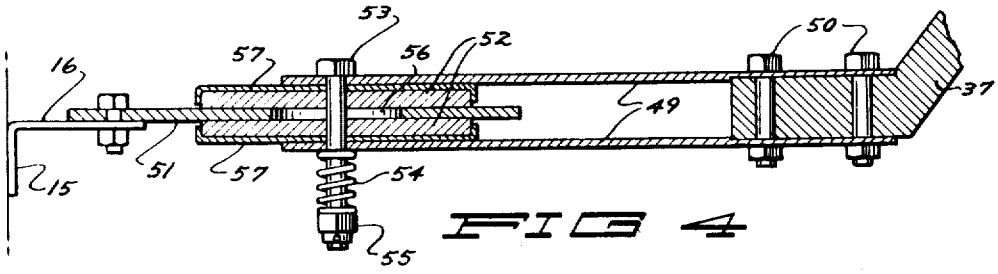


FIG 4

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ROTARY FLUID COUPLING

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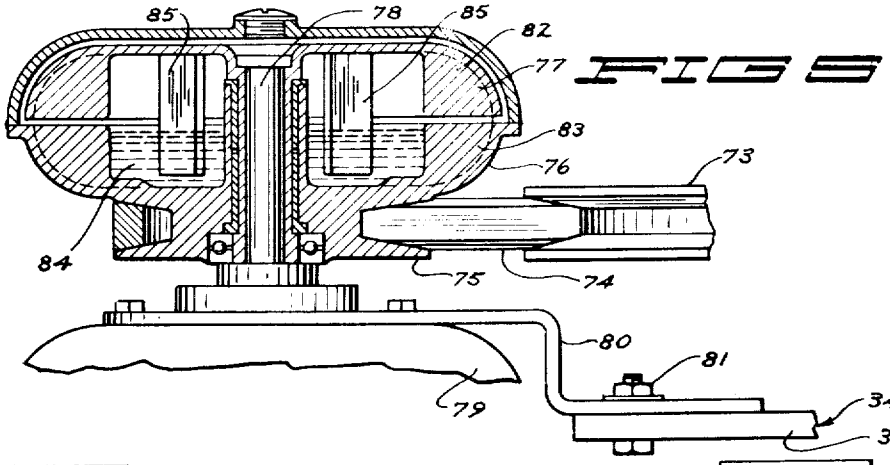


FIG 5

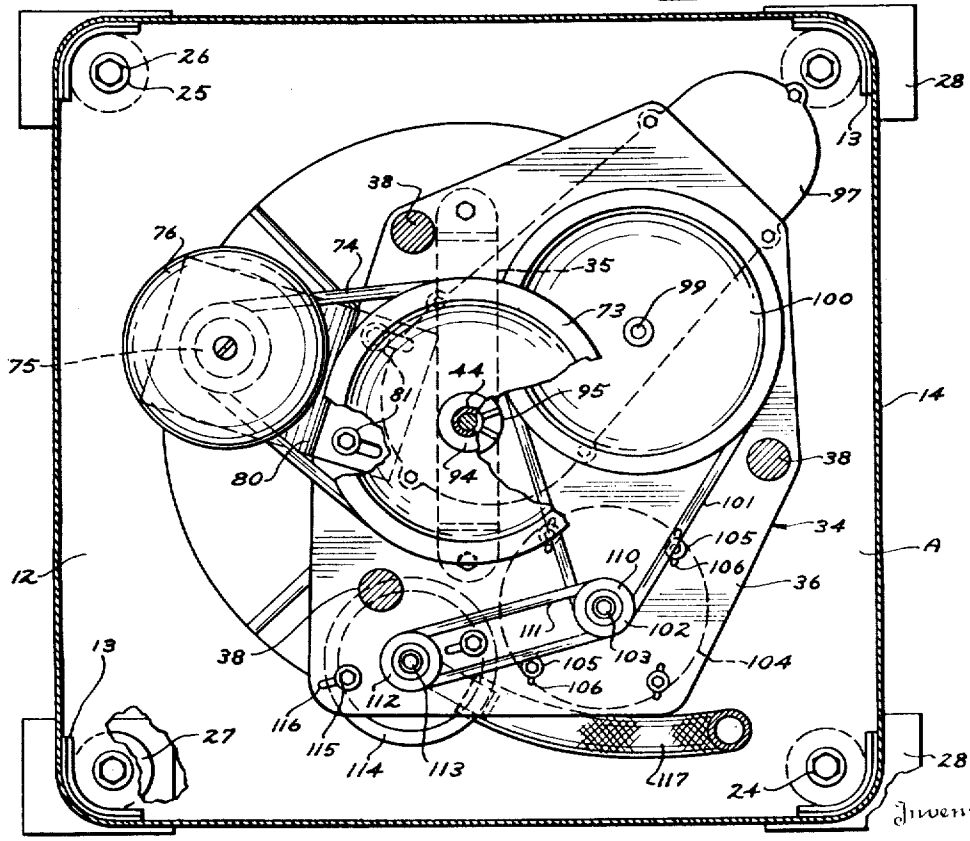


FIG 6

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Patented July 4, 1950 2,513,845

UNITED STATES PATENT OFFICE

2,513,845

ROTARY FLUID COUPLING

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Original application August 14, 1946, Serial No. 690,532. Divided and this application August 13, 1947, Serial No. 768,383

9 Claims. (Cl. 60—54)

1

This invention relates generally to improvements in clothes washing machines of the type in which the clothes are washed, rinsed and centrifugally dried, and more particularly to improvements in drive means for the receptacle in which the clothes are spun to centrifugally extract the liquid.

In such machines there is provided a receptacle or tub in which the clothes are washed and rinsed, and this receptacle, as it will hereinafter be called, is arranged for rotation about an upright axis, with mechanism for spinning it about said axis and so set up centrifugal force sufficient to throw out the wash or rinse liquid from the clothes. However, much difficulty has been encountered in this phase of the operation of these machines, due to the fact that the clothes are seldom evenly distributed about the axis of rotation and thus they represent an unbalanced load which when set in motion creates eccentric throw with great vibration and other harmful effects. The extent of this vibration, of course, increases with the speed at which the receptacle is spun, and in some cases to my knowledge, the maximum spin speed has to be purposely set so low for this reason that the extraction of the liquid is very imperfect. In other cases the machine as a whole has been bolted or otherwise fastened down so that it cannot move about on the floor although the vibration then still has other injurious effects.

When an unbalance load is set in motion it is extremely desirable to cause the receptacle speed to accelerate gradually, and as the eccentrically disposed weight diminishes due to the expulsion of the water and the tendency of the clothes to distribute themselves around the spin axis, to then cause the speed to increase so that the extraction is finally as perfect as conditions will permit. What is needed, therefore, is a drive for the receptacle which is continuously sensitive to the amount of the eccentric load and which will transmit power to the receptacle in proportion to this load so that not only is a gradual acceleration accomplished but the final spin speed will be as high as is possible with the existing load conditions.

In accordance with my present invention, and as the primary object thereof, I accomplished these results and provide a simple and effective drive which will regulate the spinning rate of the receptacle exactly according to the varying eccentric load therein, said drive including as its essential and in this use novel feature a fluid drive coupling. Further in the accomplishment of the object of my invention I construct and arrange said fluid drive coupling in such manner as to secure the maximum initial slippage and gradual acceleration of the load and provide means for gradually picking up and setting the fluid in motion to transmit power exactly according to requirements.

2

Still further and more specific objects will be discussed in the course of the following specification, reference being had to the accompanying drawings, illustrating a preferred embodiment of the invention, and in which drawings—

Fig. 1 is a vertical sectional view through a washing machine wherein the clothes receptacle is driven according to my present invention.

Fig. 2 is a side elevation with certain parts broken out and in section to disclose interior parts.

Fig. 3 is a horizontal section along the line 3—3 in Fig. 1.

Fig. 4 is an enlarged sectional detail view along the line 4—4 in Fig. 3.

Fig. 5 is an enlarged sectional detail view along the line 5—5 in Fig. 3.

Fig. 6 is a horizontal section along the line 6—6 in Fig. 1.

This application is a division from the joint application of Arthur D. Lund and myself, filed August 14, 1946, Serial No. 690,532, for Washing Machine.

The machine in general as herein disclosed is identical to that shown in said prior joint application and comprises a housing or casing having a lower chamber A formed by an upwardly concaved base plate 12, vertical corner irons 13, and a surrounding wall plate 14, the latter of which may be in whole or part readily removed to give access to the mechanism contained within the chamber. This lower construction also includes a four sided angle iron frame 15 providing inwardly projecting ledges 16 and 16a.

The upper housing structure comprises an upwardly concaved bottom plate 17, secured as at 18, to the ledge 16a, and sealed at its upstanding peripheral flange 19 to the casing walls 20 to provide a fluid tight receptacle or chamber B. Extending upwardly from a center opening in the plate 17 is an upstanding sleeve 21, also sealed to the plate, so as to provide the annular water chamber B between itself and the walls 20. The upper edge of the lower casing wall 14 is preferably maintained in sealing contact with the flange 19 by a sealing strip 21 (Fig. 1). At its upper end the casing 20 has an inwardly curved

flange member 22 upon which is seated the circular, removable lid or cover 23.

The washer is supported on four floor jacks which are so designed that they may be adjusted to properly level the machine on an uneven or irregular floor, and will also prevent creeping of the machine due to vibration. Each of these jacks consists of a vertical bolt 24 threaded in a nut 25 fixed on the base plate 12 and secured by a lock nut 26. The lower end of the bolt has a ball-socket connection to an inverted cup or foot 27 permitting the latter to adjust itself to floor surface irregularities. This cup 27 has a serrated flange resting on and imbedding itself in a rubber or resilient pad 28 which is preferably cemented in proper selected position on the floor. With this construction it will be seen that the machine can be adjusted for equalized four point floor support, while also being cushioned to absorb vibration and sufficiently anchored to prevent creeping.

The washing, rinsing, and centrifuging assembly is supported within the chamber B upon a spindle element projecting upwardly through the sleeve 21 from the operating and transmission assembly contained within chamber A. Both assemblies are primarily supported, as a single unit, upon a single central bearing or cushioned support. This support includes a cup 29, mounted in the plate 12, which, because of its inversely disced shape, provides rigid support, and within the cup there is a rubber block or pad 30 having an inner socket element 31 which releasably receives the lug 32 of a block 33 mounted on the frame 34 of the operating mechanism.

The frame 34 is composed of rigidly connected parts including a generally U-shaped member 35, to which the block 33 is directly fastened, an irregularly shaped plate 36, and an upper but also irregularly shaped plate 37 which is secured to the lower plate 36 by three spacers 38 and tap screws 39. The plate 37 has an integral, tube extension 40, which projects up within the sleeve 21, with freedom for ample clearance with respect thereto, and this tube 40 has upper and lower antifriction bearing rings 41 and 42, respectively, for centering a spindle 43 having an internal shaft 44.

The frame 34 directly supports the power and transmission mechanism, while the spindle 43 and shaft 44 further and additionally support the tub and washing elements, all of which will presently be described.

As will be evident, the entire combination assembly of frame, operating mechanism, and upper, washer unit will be primarily supported on the central bearing cushion 31, and, as a result, it becomes necessary to provide means for balancing such assembly in its perpendicular or vertical position. This is done by the devices now to be described and which also permit limited radial vibration and gyratory deflection, which is of paramount importance, particularly during the starting and spinning operations, as it operates to absorb vibrations and accommodates the machine to unbalanced load conditions that result when the clothes are not uniformly distributed in the drying receptacle.

To yieldably restrain the assembly in its normal, true vertical position, and to restore it thereto, there is provided a series of radial springs 45, the inner ends of which are attached by adjustable eye bolts 47 to corner brackets 48 on the ledge 16a. In addition, the plate 37 is provided with radially extending pairs of bars or

metal straps 49, the inner ends of which are anchored rigidly to the plate, by bolts 50, while the other or outer ends frictionally engage bracket plates 51, attached to the ledge 16, through the medium of snubber discs 52. These discs are held in frictional contact with the plates 51 by bolts 53 which also extend through the bars 49, and each bolt has a compression spring 54 disposed between the lower bar 49 and an adjusting nut 55 on the bolt. It will be seen that the bolt opening 56, in the plate 51 (Fig. 6) is relatively large so as to permit horizontal movements of the bars 49, discs 52, and plate 37 with respect to the plates 51, and it may further be noted that while the discs 52, of leather, fiber or other composition material, have direct face contact with the plate 51, their surfaces adjacent the bars 49 have flanged metal covers or washers 57 to insure proper retention of the discs with respect to the bolts 53 and bars 49.

The clothes receptacle C, comprises an axial sleeve 58 terminating at its lower end, in a conical section 59 that is rigidly secured to the top of the spindle 43 by bolts 60. The receptacle wall 61 is imperforate throughout and has a slightly tapered, downwardly curved bottom flange 62 that is secured in tight sealing engagement upon the outer rim 63 of the conical part 59. The base portion of the cone 59 has an elliptical trough or sediment trap 64, into which sand and other sediment from the tub C will settle, and this sediment is carried off by the tubes 65, during the centrifuging operation as shown and claimed more specifically in my application Serial No. 636,304, filed December 21, 1945, now Patent No. 2,470,140, issued May 17, 1949.

The upper ends of the tubes 65, in the present instance, discharge into outwardly flared deflector pockets 66, in what is designated as a balancing ring 67. This ring is preferably of heavy cast material and is secured by tap screws 68 to the flange rim 69 of the tub C. The ring is also provided with inset lugs 70, to engage the inner surface of the tub wall, and between these lugs are openings 71 through which the fluid is expelled from the tub into the chamber B during the centrifuging operation. The ring 67 has an inwardly directed flange 72 to prevent the upward escape of clothes from the tub during the drying or spinning action thereof. Another and very important function of the ring is to counteract the tendency of the tub to rotate eccentrically, with respect to a true vertical axis, under an unbalanced load. Thus the weight of the ring not only in itself tends to stabilize the rotation but will further tend to correct "throw" because of the face that any tilting of the spindle axis from bearing center 32 will correspondingly tilt or wobble the ring, and, as is well known, the centrifugal force or momentum imparted will set up a gyroscopic action and tend to restore the body to its correct axis of rotation. This effect is enhanced by the great height at which the ring is located upon the point 32, since the ring is on top of the receptacle and as far above point 32 as the size of the casing will permit.

The tub C is rotated by the spindle 43, on which it is mounted, and the latter is provided, at its lower end, with a pulley 73 driven by a belt 74 from a pulley 75 on the driven member 76 of a fluid coupling which also includes a driving member 77 (Fig. 5). The member 77 is mounted on the vertical shaft 78 of an electric motor 79 carried by a bracket 80 that is adjustably secured, as at 81, to the frame plate 36.

The fluid coupling 76—77 is of the turbine type, through which power is hydraulically transmitted by opposed, annularly spaced series of vanes or blades 82 and 83, but since the axis of the unit is vertically disposed and the unit is but partially filled with fluid, in the present instance, it will be seen that when the coupling is idle (as in Fig. 5) the power transmission fluid 84 is contained entirely within the driven member 76 and does not therefore contact the vanes or blades 82 of the driving member as would normally occur when the coupling axis is horizontal or the unit completely filled. Consequently rotation of the driving member 77 would not initiate the fluid turbulence or circulation that is essential to this type of power transmission. For that reason, the driving member 77 is provided with paddle extensions or starting vanes 85 that project down into the fluid body within the inner edges of the blades 83 so as not to contact the latter. With this arrangement it will be seen that rotation of the member 77 will cause the extensions 85 to act on the fluid sufficient to initiate and maintain the toroidal circulation required for power transmission. In addition to this novel feature the fluid coupling cooperates as a unit to reduce "throw" or eccentric vibration during centrifuging in a manner later to be set forth.

The actual clothes washing operation within the tub C is accomplished in somewhat conventional manner, by an oscillating agitator D, made up of a tubular sleeve 86, flared out at its bottom, in a skirt 87, and having integrally formed, radial agitator blades 88. The skirt edge 86 is spaced above and extends beyond the trap 64 so that sediment may escape downward and inwardly to the trap.

The upper end of the sleeve 86 has an integral hub 89 with an axial socket which is upwardly tapered and square or hexagonal in cross section to fit snugly upon a similarly shaped plug 90 that is secured upon the upper end of shaft 44 by a pin 91. Between the plug 20 and spindle 58 is a flanged bushing 92 that serves as a bearing between the shaft 44 and spindle 58. The agitator D is held down in place upon the plug 90 by a cap 93 having a shank threaded into the end of the shaft. By removing the cap 93 the agitator can, of course, easily be removed and replaced.

The lower end of the shaft 44 has a vertically stationary clutch part 94 adapted to be engaged and disengaged by a complemental clutch member 95, which is slidably keyed to a shaft 96 journaled in a transmission casing 97. The shaft 96 is oscillated by a linkage mechanism 98 which is not shown in detail but may be of the type shown and described in Patch Patent No. 1,964,440, issued June 26, 1934. This mechanism is actuated by a shaft 99 which is rotated in the housing, and which mechanism converts the rotary motion of the shaft to oscillatory motion of the shaft 96. The shaft 99 projects upwardly from the casing 97 to support a pulley 100, driven by V-belt 101 from a smaller pulley 102 on the shaft 103 of a motor 104. This motor is adjustably secured, as by bolts 105 and slots 106, to the plate 36, in a manner permitting tension adjustment of the belt.

The clutch 94—95 is normally open or separated, as in Fig. 1, but is closed or engaged by energization of a solenoid 107 that operates a shipper lever 108. This is done automatically by an electric timer 109 as will presently be described.

The shaft 103, of motor 104, carries a second pulley, 110, which operates a V-belt 111 to drive a pulley 112 on the shaft 113 of a centrifugal pump 14. This pump is adjustably secured to the plate 36 by bolts 115, in slots 116, which are so arranged that adjustments can be made to slacken or tighten the belt 111 as may be required. The inlet side of the pump is connected by a conduit 117 to a drain spout 118 of the chamber B, and since the pump is subject to vibration with respect to the casing this conduit is preferably of flexible tube or hose material. The outlet side of the pump is connected to a flexible conduit 119 for discharging used fluid to a convenient point outside the casing.

Washing and rinsing water is introduced to the machine by a pipe or tube 120 which preferably extends in through a side wall of the casing 14, and thence outwardly through the bottom plate 17 and to a coupler 121. A second pipe 122 is detachably secured to the coupler 121 and extends inwardly and slightly upwardly, terminating in a spray head 123 which it supports in an axial position over the tub C and slightly spaced above the cap 93. Exteriorly of the machine the pipe 120 is adapted for connection with one or more mixing valves (not shown) so that water of desired temperature and volume may be supplied to the spray head 123.

The spray head 123 has circular rows of openings which deliver the liquid to the receptacle and a part of the liquid enters the tubular part 124 of a baffle unit E which is mounted atop the agitator D by a set screw 125. This baffle unit E has vanes 130 which enhance the washing operation as pointed out in the aforesaid patent application, Serial No. 690,532.

The timer 109 which controls the electric current to the two motors 79 and 104 and to the solenoid switch 107 is of conventional or standard design, well known in the art, and consequently neither it nor the wiring diagram is shown in detail. It is sufficient to note that in the present instance a start and stop switch for the timer may conveniently take the form of a dial 131, mounted on top of the machine and connected to the timer by rod 132. This dial (Fig. 1) can be set to control the duration of the washing operation but thereafter the extracting, rinsing and drying operations automatically follow at predetermined time intervals. It will also be understood that the timer may operate to control the sequence and supplies of hot and cold water in synchronism with the motor actuating so that once started the machine can function to complete the entire operation without manual adjustment or intervention.

Operation

To wash, rinse and dry a batch of clothes the nature and cycle of the various operations, together with the various advantages flowing from the present construction, may be described as follows:

The desired amount of clothes and soap are placed in the tub C, and water of the required temperature is then filled in (under manual valve control) through the pipes 120 and 122, and spray head 123, until it reaches the predetermined water level line 133 (Fig. 1). The lid or cover 23 is then closed and the dial 131 is set, by turning it to the desired number of wash minutes. The dial is then lifted to start the timer which closes the circuit to motor 104 and solenoid 107 to close clutch 94—95. The motor 104 then drives

the pump 114 through belt connection 111, and operates belt 101, transmission mechanism 98 and clutch 94—95, to oscillate the shaft 44 and agitator D secured thereon. The resulting washing process, as such, is of the well known action in which the agitator impellers 88 impart a turning or toroidal movement to the suspended clothes to subject the latter to constant contact with currents of the soapy water until clean. During this step of the process any grit, sand or other heavy foreign matter will find its way into the sediment trap 64, while any fluid or suds splashing over the tub and into the casing chamber B will be drawn off through the drain 118 by the pump 114 which is constantly running.

A feature preferably reserved for the rinsing operation but which may also be used in the washing step consists of opening the water supply to the spray head 123 toward the end of the washing period. When this is done the water surface is raised above the level of line 133 and up to that of the openings 71. The water from spray 125a flows up from the lower edge of the baffle tube E, as indicated by the arrows in Fig. 1, and the wider spray 124a acts outwardly against the upper surface. The combined spray action has a tendency to stop or retard the normal rolling or tumbling rotation of the clothes and the spray 124a acts to push the surface scum outwardly through the holes 71 and thus remove it from further contact with the clean clothes. This action is supplemented by the fins 130, of the baffle unit, which fins are now operating below the level of the increased body of water and tend to fan or impel outwardly the scum disposed within the spray 124a. This descumming step may be by either manual or automatic control.

When the washing operation is completed the solenoid 107 is deenergized to disconnect the clutch 94—95 which in turn stop the oscillations of the agitator D, while the motor 104 continues to operate the pump 114.

The motor 79 is then energized and has as its sole function to spin the receptacle C through belt 74, pulley 73 and spindle 43, to partially dry the clothes. It will be understood that under this centrifuging action the water will be forced outwardly to the wall 61 of the receptacle and will then move upwardly along the tapered wall until it reaches the escape ports 71 from which it will be discharged into the chamber B for prompt removal by the pump 114. It will also be noted that the inner flange 72 of the balancing ring will prevent the upward escape of clothes during the centrifuging, while the elliptical form of the sediment trap and the arrangement of pipes 65 will cause centrifugal flushing and discharge of any foreign matter that has settled in the trap.

During the first spinning operation, which may be maintained for approximately five minutes it may be found desirable to give the clothes one spray flushing with hot water. In any event, and when the cleaning fluid has been substantially removed, the spinning motor (79) is deenergized, cold rinse water is supplied to the tub, and the clutch 94—95 is re-engaged to again activate the agitator D. After rotational tumbling of the clothes is now sufficient to insure proper rinsing the clutch is again disengaged and the spinning motor is again operated to dry the clothes, for hanging or ironing.

The single cushioned support 32 in combination with the centering and shock absorbing springs 45 and snubbers 52 all cooperate to reduce vibration but I have found the fluid drive

for the receptacle to be of substantial and distinctive importance in this connection due to the fact that it causes a very gradual acceleration of the load when the receptacle is started on the spin cycle, and proportions the speed of the receptacle according to the load. As stated hereinbefore, and as well known to all skilled in this art, it is the eccentrically distributed load of the wet clothes, about the spin axis, which causes the injurious vibration and which in most cases sets a limit on the speed which may be used for extraction.

The fluid coupling unit 76—77 according to my invention is believed to be broadly new in its application to this purpose and the comparatively high initial slippage factor obtained by placing the fluid drive unit on an upright axis and by only partially filling with fluid so that the fluid at the outset clears the impeller 77 is very advantageous. It is found in practice that the very heavy load of a badlly distributed wash of clothes may thus be set in motion without any sudden high surges of current to the driving motor and the electrical load is thus also cushioned. This has the further beneficial effect of allowing the motor starting switch to throw out immediately so that the motor starts off at practically full speed and the danger of burn out is eliminated.

In addition to the gradual acceleration of the load due to the high initial slippage factor of the fluid coupling it is further an important feature of the machine or phase of the fluid drive that it automatically compensates for varying load conditions and limits the maximum speed of the receptacle to a safe value for varying eccentric loads. Put in another way it may be said that the flexibility of the fluid drive, co-acting with the energy absorbing means, represented by the receptacle and its load, provides for the action of slowing down the machine when out-of-balance.

Actually the slippage rate in this type of fluid drive may have a rate of change which has a straight line relationship to the eccentric load but at a fairly critical point, as regards the amount of fluid in the coupling related to its vane size and other factors, it is found that beyond a certain eccentric load, say for example three pounds, the slippage rate suddenly increases rapidly thus providing a safety factor such that the larger eccentric loads will not be spun at a rate exceeding the capacity of the balancing mechanism of the machine to control deflection of the receptacle and possible damage. In the present machine and based on present knowledge the drive unit will be filled less than half-full of fluid to achieve this operation.

As an example of the conditions which may occur in practice the following figures, while not constituting limits, are taken from test runs of the machine and indicate the accommodation of the fluid drive unit to the varying load conditions thus assuming the receptacle 18 to be empty or in a balance condition its speed may be 720 R. P. M., then—

If the eccentric load be:	Tub speed is:
None or balanced	720 R. P. M.
1 pound	690 R. P. M.
2 pounds	670 R. P. M.
3 pounds	610 R. P. M.
5 pounds	565 R. P. M.
7 pounds	350 R. P. M.

The foregoing table contemplates an initial no

load slippage factor of approximately 18 per cent based on a motor speed of 1740 R. P. M. and a speed reduction between the pulleys 75 and 73 of two to one so that the speed at the pulley 73 with no slippage would be 870 R. P. M. Thus, the slippage factor varies (from no load to 7 pound eccentric load, which is the maximum here given and represents an extreme condition seldom encountered), from 18 per cent to better than 50 per cent but for practical purposes a range of 7 per cent to 50 per cent might be considered as suitable for my purposes.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a washing machine having a receptacle adapted to be rotated by a driven shaft, a motor, a hydraulic drive coupling comprising vertically opposed vaned elements mounted for rotation about an upright axis, and one of which forms an outer sealed chamber about the other, the upper vaned element being driven by the motor and the lower vaned element being connected to said driven shaft to drive the same, fluid in said sealed chamber of an amount such that the surface level thereof will be below and out of driving contact with the vanes of the upper element when the lower element and fluid are in repose, and means responsive to rotation of the upper element for engaging the fluid when in repose and moving it into contact with the vanes of the upper element to gradually establish driving contact of the fluid between the opposed elements whereby initial resistance to rotation by the driven shaft will be progressively absorbed by the torque of the motor running at normal speed.

2. In a centrifugal extractor having a rotatable receptacle adapted to be driven by a driven shaft, a motor, hydraulic drive connection between the motor and shaft comprising a coupler mounted for rotation about a vertical axis, said coupler including opposed upper and lower vaned elements the upper of which is driven by the motor and the lower of which is connected to the driven shaft to drive the same, one of said elements having a casing portion enclosing the other element and forming with itself a sealed chamber for containing driving fluid, driving fluid in said chamber in an amount substantially less than the total capacity thereof whereby drive connection by the fluid will permit variable slippage between the elements in response to varying degrees of resistance offered by the driven shaft.

3. In a centrifugal extractor having a receptacle mounted for rotation about a vertical axis and adapted to be driven by a driven member, a motor, a hydraulic drive coupler for transmitting torque from the motor to the driven member comprising a casing mounted for rotation about a vertical axis and connected with the driven member to drive the same, said casing forming a sealed chamber for containing an amount of transmission fluid less than the total capacity of the chamber, turret vanes carried by the casing in the lower part of the chamber, a vaned impeller mounted in the upper part of the chamber in vertically opposed position to the turret vanes for driving the casing, said impeller being driven by the motor, and means carried by the impeller for engaging the transmission fluid when in repose to progressively establish power transmitting contact of the fluid with the impeller vanes when the impeller is initially driven by the motor.

4. A device for driving a rotatable load member from a motor comprising vertically opposed upper and lower fluid coupling elements operatively supported for rotation about a generally upright axis and connected, respectively, to the motor and load member, the upper coupling element having depending vanes and the lower coupling element having upwardly extending vanes, means enclosing the coupling elements for supporting a fixed charge of fluid in cooperative relationship to the coupling elements for establishing a variable slip fluid drive connection between the motor and load member, the volume of said fixed charge of fluid being such that it will stand at a level below the vanes depending from the upper coupling element when the coupling elements are at rest, and means for vortexing the fluid in response to the initial motion of the upper coupling element to actuate the fluid into driving engagement with the vanes of both elements.

5. A device for driving a rotatable load member from a motor, comprising upper and lower fluid coupling elements operatively supported for rotation about a generally upright axis and operatively connected, respectively, to the motor and load member, the upper coupling element having an annular series of depending vanes and the lower element having an annular series of vanes in opposed positions with respect to the vanes of the upper coupling element, means supporting a fixed charge of fluid in cooperative relationship to the coupling elements for establishing a variable slip fluid drive connection between the motor and load member, the said fixed charge of fluid being such that it will stand at a level below the vanes depending from the upper coupling element when the coupling elements are at rest, and means on the upper coupling element for engaging and gradually actuating the fluid into transmission contact with the vanes of the upper coupling element.

6. In a centrifugal extractor having a rotatable clothes receptacle adapted to be rotated by a driven member, a motor, and a mechanism for transmitting power from the motor to the driven member comprising superimposed upper and lower vaned fluid coupling elements operatively supported for rotation about a generally upright axis and operatively connected to the motor and driven member, respectively, the upper coupling element having an annular series of depending vanes, means supporting a fixed charge of fluid in cooperative relationship to the coupling elements for establishing a variable slip fluid drive connection between motor and driven member, the said fixed charge of fluid being of such volume that it will stand at a level below the vanes of the upper coupling element when the coupling elements are at rest, and means carried by the upper coupling element and extending below the operating faces of the vanes thereof so as to engage the charge of fluid and operative upon rotation of the upper element by the motor to set the fluid in motion and agitate it into power transmitting engagement with the vanes of the upper coupling element.

7. In a centrifugal extractor having a rotatable clothes receptacle adapted to be rotated by a driven member, a motor, and a mechanism for transmitting power from the motor to the driven member comprising superimposed upper and lower vaned fluid coupling elements operatively supported for rotation about a generally upright axis and operatively connected to the motor and driven member, respectively, the upper cou-

pling element having an annular series of depending vanes, means supporting a fixed charge of fluid in cooperative relationship to the coupling elements for establishing a variable slip fluid drive connection between motor and driven member, the said fixed charge of fluid being of such volume that it will stand at a level below the vanes of the upper coupling element when the coupling elements are at rest, and means carried by the upper coupling element and extending below the operating faces of the vanes thereof so as to engage the charge of fluid and operative upon rotation of the upper element by the motor to set the fluid in motion and agitate it into power transmitting engagement with the vanes of the upper coupling element, said fluid-engaging means consisting of at least one agitating member that extends down into the lower coupling element to a point radially within the vanes thereof.

8. In a laundry machine having a rotatable clothes receptacle for the centrifugal extraction of fluid from the clothes and adapted to be driven by a driven member, and a motor for driving the driven member, power transmission from the motor to the driven member comprising a fluid coupling housing rotatable about a vertical axis and for sealing in a predetermined amount of transmission fluid, said housing being connected to the driven member to drive the same and being provided in its lower part with fluid actuated vanes, a driving element disposed in the upper part of the housing and connected to the motor to be driven thereby, said driving element having vanes extending downwardly in opposed relationship above said fluid actuated vanes of the coupling housing, the amount of transmission fluid in the housing being such that the surface level thereof will be below and out of contact with the vanes of the driving element when the latter is in repose, and means responsive to rotation of the driving element by the motor for engaging and gradually establishing transmission contact of the fluid in the lower part of the housing with the driving element whereby initial resistance to rotation by the driven member will be progressively absorbed by the torque of the motor running at normal speed.

9. In a centrifugal extractor having a clothes receptacle mounted for rotation about an axis but having freedom for eccentric deflection with respect to said axis in response to an out-of-balance load condition in the receptacle and adapted to be rotated by a driven shaft, a motor, a drive connection between the motor and driven shaft comprising a fluid coupling disposed for operation about a vertical axis, said coupling comprising a pair of rotatably opposed vaned elements the upper of which is driven by the motor and the lower of which is driven by the upper element and connected to said shaft to rotate it, one of said elements having a casing portion enclosing the other element and forming with itself a sealed chamber for containing a predetermined amount of driving fluid less than the total capacity of the coupling, whereby drive connection by the fluid between the elements will permit variable slippage therebetween in response to increased resistance produced by the driven shaft when the latter is subjected to varying degrees of such out-of-balance load.

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