HYDROSTATIC WASHER TRANSMISSION

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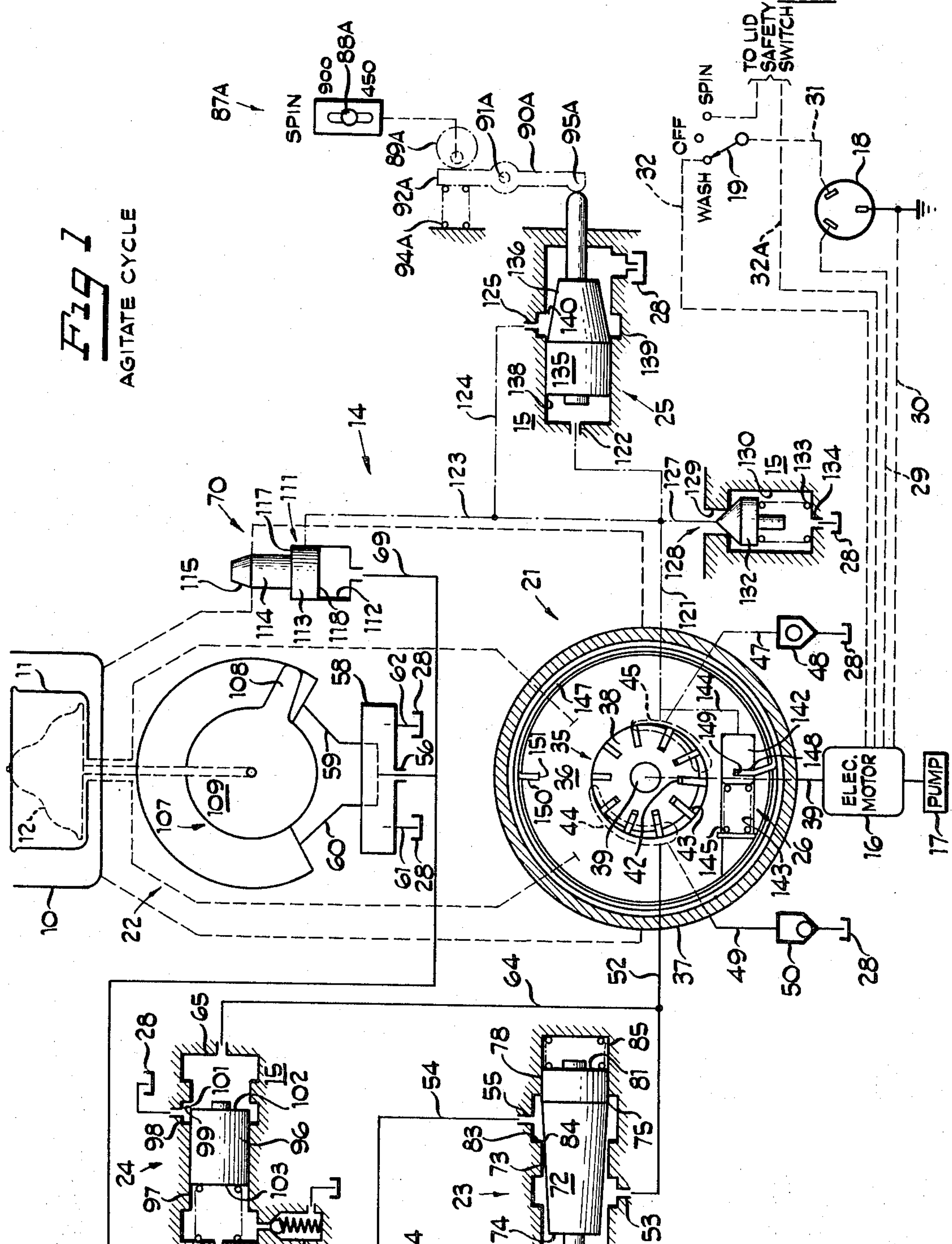

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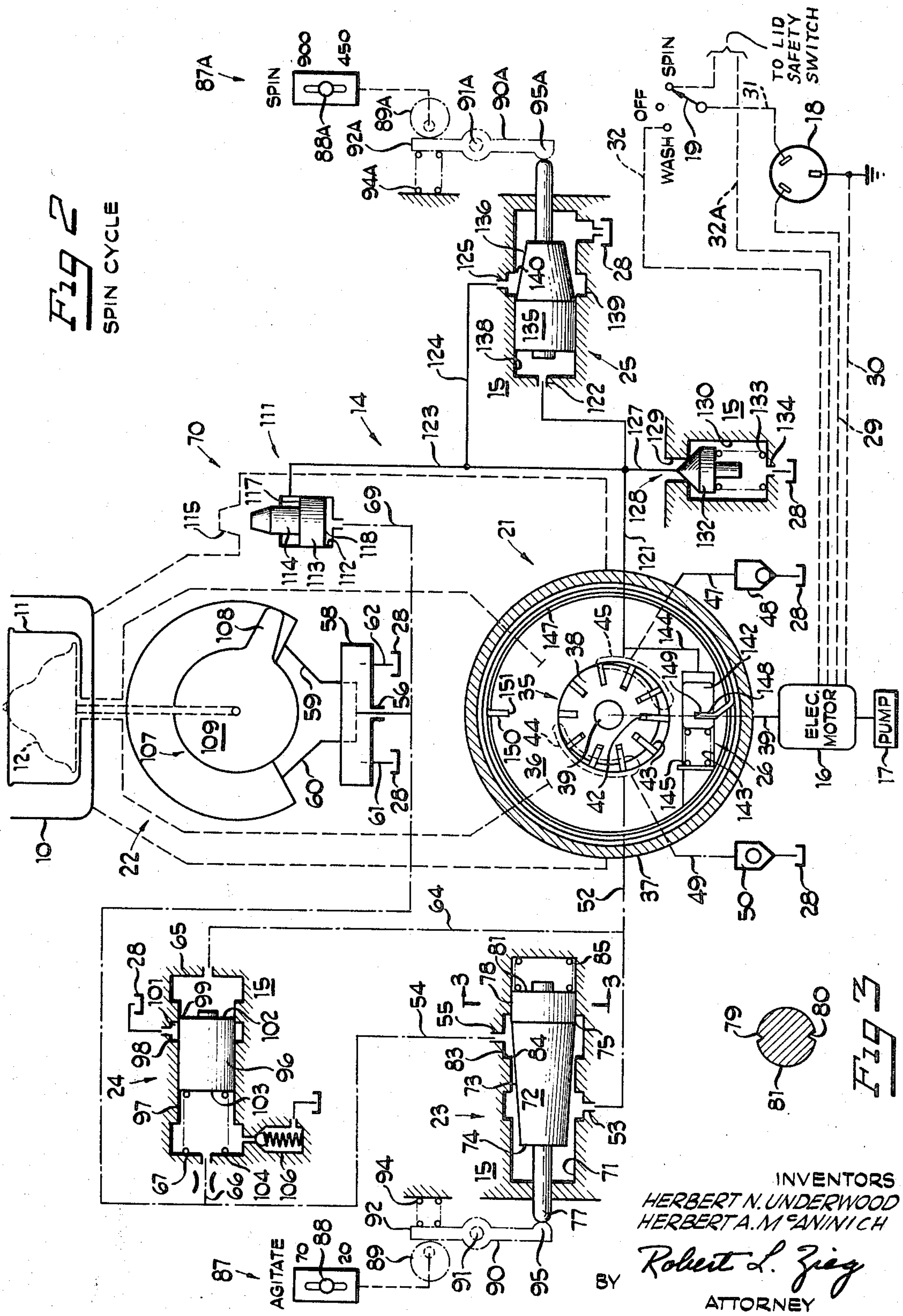

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HYDROSTATIC WASHER TRANSMISSION

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ABSTRACT OF THE DISCLOSURE

A hydraulic transmission for independently oscillating an agitator and rotating a clothes basket of an automatic washing machine including a positive displacement hydraulic pump consisting of a pumping element and a pump housing element which are relatively rotatable, one of these elements being connected to the clothes basket, the other element connected to the output shaft of an electric motor. The pump is used to provide fluid pressure to a hydraulic agitator motor for oscillation of the agitator and includes a device for selectively restricting the flow of fluid from the pump, thereby setting up a reaction torque on the pump element attached to the basket causing the basket to rotate at a speed approximately proportional to the restriction of the pump.

SUMMARY OF THE INVENTION

This invention relates to hydraulic transmissions and more particularly to a hydraulic transmission adapted for use in a fabric treating machine employing an oscillatable agitator and a rotatable clothes container.

Various approaches have been utilized to provide a hydraulic transmission including a minimum number of operating parts and yet further providing the desirable features of an independent speed control for both agitator and spin speed. The most common fluid circuit includes a hydraulic pump and a pair of hydraulic motors, one only of which is operable when the pump is rotated in either direction of rotation. Means to independently control the speed of each of these motors are shown in a copending application Ser. No. 648,630 of common assignee.

One approach has been developed utilizing a hydraulic pump and one oscillatory hydraulic motor connected to an agitator, and is shown in U.S. Patent No. 3,388,569. The hydraulic pump, operating in one direction of rotation, supplies fluid pressure to actuate the oscillatory motor. Operating in the other direction of rotation, the hydraulic pump is utilized as a hydraulic coupling drivingly connectible to and rotating the clothes container during the extract-spin operation of the clothes washer, thus eliminating in its entirety a separate hydraulic motor for the spin cycle previously believed to be essential to provide an operative transmission for clothes washers. The present invention is an improvement over the previously discussed transmission of U.S. Patent No. 3,388,569 in that means are provided to independently control the operating speed of both agitator and spin basket and further allows the speed of each to be infinitely varied between predetermined limits. The present invention also incorporates an improved spin brake to retard rotation of clothes basket after the completion of the spin cycle or upon lifting of the lid for any reason.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a schematic view of a hydraulic transmission for a clothes washer during the agitate cycle embodying the principles of the invention.

FIGURE 2 is a schematic view showing the hydraulic transmission during the spin cycle operation.

FIGURE 3 is a section view taken along lines 3—3 of FIGURE 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGURE 1, a washing machine is illustrated comprising a tub **10** adapted to hold a laundering fluid, a clothes container **11** and an oscillatable agitator **12**. A hydraulic transmission **14** is illustrated for independently driving the clothes basket **11** for effecting a centrifugal drying operation herein referred to as the spin operation or the oscillatory agitator **12** of the automatic clothes washer. The transmission **14** includes a transmission inner housing generally designated as **15**. An electric motor **16** is provided having a water pump **17** driven thereby for recirculating water in the clothes container **11** of the automatic washer and a source of power **18** is illustrated for operating the motor **16**. A cycle selector switch **19** is schematically illustrated in simplified form although in a washer installation this function would be performed by a timer switch mechanism of known construction.

The important elements of the hydraulic transmission are as follows: The constant volume reversible fluid pump **21**, an oscillatory agitator motor **22**, a flow control valve **23** for the agitator motor, a bypass valve **24** for the agitator motor, means **25** to selectively restrict the output of the pump **21** and a spin brake **26**.

A fluid sump **28** is provided which is schematically illustrated for convenience at various places in the illustration of the invention, although in the actual construction, one fluid sump **28** is provided into which all the exhaust connections for various elements of the transmission exhaust fluid pressure. Electric leads **29** and **30** interconnect the source of power **18** with the motor **16**, the lead **30** being a ground line. Lead **31** connects the source of power **18** to switch mechanism **19**. Switch mechanism **19** is connected to the motor by a lead **32** or a lead **32***a*.

The hydraulic pump **21** includes a pumping element **35** and a rotatable pump housing element **36** operative within a fixed case **37**. The inner housing generally designated as **15** is attached to, or made a part of, the pump housing element **36** which is attached to clothes container **11**.

Any of a number of well-known types of hydraulic pumps could adequately perform the functions of the hydraulic pump **21**, as for example, the crescent type of the gerotor type, but for reasons that will be later described, it is found that the vane type pump will perform best in the present transmission. For this reason, the hydraulic pump **21** is illustrated as a vane pump.

The pumping element **35** consists of a rotor **38** connectible to a rotatable drive member **39** of the electric motor **16**. The rotor **38** contains a series of radial slots **42**. A plurality of vanes **43** are provided, each vane adapted to slide within a slot **42**.

The rotatable pump housing element **36** consists of an annular disc mounted eccentric to the rotor **38** and is shown drivingly connected to the clothes container **11**. A pair of arcuate ports **44** and **45** are formed in the pump housing element **36** for communicating fluid from the sump **28** to pump **21** and, after the fluid is pressurized, from the pump **21**. The ports **44** and **45** will either be inlet ports or exhaust ports depending upon the direction of rotation of the electric motor **16** and thereby the direction of rotation of the rotor **38**.

A fluid conduit **47** is provided to communicate fluid from the sump **28** to port **45** when the motor **16** is operated in a direction so as to activate the agitate circuit. A check valve **48** allows fluid flow only in a direction from the sump **28** into pump **21**. Fluid conduit

49 is provided to communicate fluid from sump 28 to port 44 when the electric motor 16 is operated in a direction to activate the spin circuit. Check valve 50 allows fluid flow only in a direction from the sump 28 into pump 21.

In the agitate circuit shown in FIGURE 1, a first fluid conduit 52 connects the fluid pump 21 to an inlet 53 of the agitator motor flow control valve 23.

A fluid conduit 54 receives fluid from an outlet 55 of the agitator flow control valve 23 and communicates the fluid to an inlet 56 of a reversing valve 58 provided to alternately direct fluid pressure to either side of the agitator motor 22 through fluid conduits 59 or 60. Fluid is exhausted from the agitator motor 22 to sump 28 through conduits 61 and 62.

A fluid conduit 64 interconnects the fluid conduit 52 with an end 65 of the bypass valve 24. This end will be hereafter referred to as the "upstream" side of the bypass valve. Fuid conduit 66 communicates fluid from fluid conduit 54 to the other end 67 of the bypass valve 24, which end will be hereafter referred to as the "downstream" side of the bypass valve.

Fluid conduit 69 connects fluid conduit 54 to a basket lock 70 providing fluid pressure to urge the device in its lock position as will be hereafter described.

Agitator flow control valve 23 comprises a chamber 71 defined by the transmission housing 15. A valve member 72 is adapted to slide axially within the chamber 71 and has a tapered section 73 including a small end 74 and a large end 75. A cylindrical rod 77 concentric with the valve member 72 extends from the small end 74 of the tapered section 73 outside the housing 15. Immediately adjacent the large end 75 is a pilot section 78 of essentially the same diameter as the large end 75.

As shown in FIGURE 3, a pair of grooves 79 and 80 are provided in the pilot section 78 for the purpose of communicating fluid to act against an end 81 of the pilot section 78. The tapered section 73 coacts with an edge 83 of the housing 15 to define a variable orifice 84 through which fluid is communicated to the outlet 55 of the agitator flow control valve 23. A spring 85 acts against the end of the pilot section to bias the valve member 72 to the left.

An agitator speed control mechanism 87 is provided to vary the position of the valve member 72 and thereby vary the area of the orifice 84. The speed control mechanism 87 includes a control lever 88 suitably attached to a cam 89 and adapted to rotate the cam according to a setting of the control lever 88. A lever arm 90 is provided pivoted about an axis 91 having an end 92 biased to contact the cam 89 by a spring 94. The other end 95 of lever arm 90 is adapted to contact the cylindrical rod 77 and thereby selectively vary the position of valve 72 in response to positioning of the control level 88.

The bypass valve 24 includes a valve member 96 acting within a bore 97 defined by the housing 15. An annular chamber 98 in the bore 97 coacts with an edge 99 of the spool valve 96 to define a variable orifice 101 in fluid communication with sump 28. The spool valve 96 has an end face 102 against which fluid pressure in the "upstream" end 65 acts and an end face 103 against which fluid pressure in the "downstream" end 67 acts. A spring 104 is provided in the "downstream" end 67 of bore 97 to urge spool valve 96 toward the "upstream" end 65 of bore 97. A pilot relief 106 is proivded in communication with bore 97 to serve as a safety valve by connecting the bore 97 to sump in case of extreme pressure build-up in the agitator motor supply conduit 54.

The agitator motor 22 is of the rotary actuator or single vane motor type and receives fluid from the reversing valve 58. The agitator motor 22 includes a rotary actuator 107 connected to agitator 12, the rotary actuator 107 comprising a vane 108 attached to an integral hub section 109. Any combination of commonly used vane fluid motors and reversing valves may be used, for example, the type whose operation is described in U.S. Patent No. 3,383,856.

The basket lock 70 is attached to the pump housing element 36 and consists of a piston member 111 adapted to slide within a bore 112 in response to fluid pressure. The piston member 111 includes a land section 113 and a pin section 114. The pin section 114 is adapted to contact an indent 115 in the fixed case 37 to prevent rotation of the pump housing element 36 and thereby prevent rotation of the clothes container 11 as will be hereafter described.

Fluid will be communicated to act on either a top-side 117 or a bottom side 118 of the land section 113 depending on the direction of rotation of electric motor 16 so that when the electric motor is rotated in the agitate direction, fluid pressure will act on the bottom side 118 of the land section 113 urging the pin section 114 into restraining contact with indent 115 located in fixed case 37. When the electric motor 16 is rotated in the spin direction of rotation, fluid will act on the top side 117 of land section 113 urging the pin section 114 out of contact with the fixed case 37 and freeing the rotatable pump housing element 36 of the pump for rotation.

In the spin circuit shown in FIGURE 2, a fluid conduit 121 connects the fluid pump 21 to a first fluid inlet 122 of the restricting means 25. A fluid conduit 123 interconnects the fluid conduit 121 and the basket lock 70. A fluid conduit 124 communicates fluid from conduit 123 to a second fluid inlet 125 of the restricting means 25. A fluid conduit 127 communicates fluid pressure from conduit 121 to a spin-up relief 128.

The spin-up relief 128 is essentially a pressure relief valve and consists of an orifice 129 in the housing 15 which admits fluid to a chamber 130 also formed in the housing 15.

A tapered valve member 132 acts within the chamber 130 and is biased to close the orifice 129 by a resilient member, here shown as a spring 133. A fluid outlet 134 serves to communicate the chamber 130 with sump 28.

Restricting means 25 includes a valve member 135 having a uniformly tapered section 136 acting within a bore 138 formed in the housing 15. The tapered section 136 coacts with an annular chamber 139 in communication with the fluid inlet 125 to define a variable orifice 140 through which fluid is communicated from pump 21 to sump 28.

A spin speed control mechanism 87*a* is provided to selectively vary the position of the valve member 135 and thereby vary the area of the orifice 140. The spin speed control mechanism 87*a* is similar in design and operation to the agitator speed control mechanism 87, like numbers with the addition of suffix *a* being used to designate like components.

The spin brake 26 includes a piston 142 acting within a chamber 143 in response to fluid pressure supplied from the hydraulic pump 21 through a conduit 144. Biasing means, here shown as a spring 145, are provided to urge piston 142 toward the right side of the chamber 143 as seen in FIGURE 1 when conduit 144 is not pressurized. A break band 147 is shown having one end 148 adapted to be inserted in a slot 149 in the piston 142 and another end 150 adapted to be inserted in a slot 151 in the pump housing element 36. The brake band 147 is shown encircling the pump housing element 36 one and a half times although it is obvious that other arrangements would be acceptable. The brake band 147 is adapted to contact the fixed case 37 throughout its inner circumference when activated to retard relative rotation between the rotatable pump housing element 36 of the hydraulic pump 21 and the fixed case 37.

The operation of the hydraulic transmission of the present invention in summary is as follows: The timer or cycle-selector switch of the automatic washer schematically represented by switch **19** will select either the wash or spin cycle for the hydraulic transmission.

When the electric motor **16** is activated in either direction of rotation, the pumping element **35** will also rotate, its speed of rotation corresponding to the speed of rotation of the rotatable drive member **39**. After the first revolution of the pumping element **35**, the vanes **43** will be disposed within their corresponding slots **42** out of contact with the pump housing element **36** effecting a zero output of the pump **21** since no pumping action is taking place. At a predetermined rotational speed, the vanes will be urged to move radially outward by centrifugal force to contact the pump housing element **36** thereby initiating a pumping action. The desired rotational speed at which pumping becomes effective can be achieved by properly designing the geometry of the rotor and vanes. The obvious result of using this particular type of hydraulic pump is that it enables the electric motor to build up sufficient speed before imposing a load on it. This allows use of a more economical split-phase motor rather than a more expensive capacitive start motor or an induction motor.

If the agitate cycle is selected, the pump **21** supplies fluid pressure to conduit **52** which communicates the fluid to the inlet **53** of the agitator motor flow control valve **23**. Fluid then enters the chamber **71**. The position of cam **89** will determine the size of the orifice **84** between the tapered section **73** of the valve member **72** and edge **83**.

Fluid leaves the chamber **71** through outlet **55** at a pressure lower than the pressure of the fluid which enters the chamber **71** in accordance with the principle well known in the art whereby a pressure drop will result when fluid flows through a control orifice.

Fluid leaving chamber **71** is communicated to reversing valve **58** and agitate motor **22** through conduit **54** to drive the agitator **12** of the washing machine. Fluid is also communicated to basket lock **70** through conduit **69** and acts against the bottom side **118** of piston member **111** urging the piston member into locking engagement with the indent **115** and fixed case **37** thereby preventing rotation of the clothes container **11** in the agitate cycle.

In the absence of bypass valve **24**, it would be obvious that the variation in size of orifice **84** would have little effect on the speed of the agitate motor. The speed of the agitate motor **22** is directly proportional to the volume of fluid supplied to reversing valve **58** per unit time. Using a constant displacement pump the effect of reducing the size of orifice **84** would be to increase the average velocity of fluid across the orifice, the volume flow per unit time remaining essentially unchanged.

Fluid pressure is admitted to the upstream end **65** of bore **97** from conduit **64** to act against end face **102** of the valve member **96** to urge the valve member **96** to the left allowing some of the fluid in the upstream end **65** of bore **97** to escape to sump. It is evident from FIGURE 1 that the pressure of fluid supplied to upstream end **65** is substantially the same as the pressure of fluid supplied to orifice **84**.

Fluid at the lower pressure is admitted to the downstream end **67** of bore **97** from conduit **66** to act against end face **103** of the valve member **96** which has the same area as face **102**. This force acts in cooperation with the force of spring **104** to bias the valve member **96** to the right thereby restricting the flow of fluid from upstream end **65** to sump **28**.

It can now be seen that the characteristics of the spring **104** determine the value of the pressure drop across the orifice **84**. The pressure drop for any given size orifice is dependent upon the volume of fluid passed through the orifice per unit time. As the volume flow through the orifice increases, the resulting pressure drop across the orifice will also increase. The converse is also true.

If for a range of orifice sizes the desired pressure drop is, for example, 10 p.s.i., a spring will be chosen with characteristics such that it will exert a force equal to that exerted by a pressure of 10 p.s.i. against the area of end face **102** of valve member **96**. It is understood, of course, that the variation of spring force due to compression of the spring is negligible due to the small displacements involved and a low spring constant. For the bypass valve to open, the pressure of the fluid entering upstream end **65** of bore **97** must exceed the pressure of the fluid entering downstream end **67** by at least 10 p.s.i. If the pressure differential, hence the pressure drop across the orifice **84**, is greater than 10 p.s.i., the bypass valve will open wider allowing a greater volume of fluid to be bypassed to sump. The volume of fluid through, hence the pressure drop across the orifice **84** will therefore be reduced until the pressure differential equals 10 p.s.i. at which point the system will be in equilibrium.

If the pressure differential is less than 10 p.s.i., the spring force plus the pressure force on end face **103** of the valve member **96** will exceed the force on the end face **102** causing the valve member **96** to close until the pressure differential reaches equilibrium at 10 p.s.i. Thus, it has been shown that with the selection of the proper spring the pressure drop across the orifice **84** can be held to the same predetermined value over a range of orifice sizes. Making use of this principle, it has been further shown that by varying the size of the orifice **84**, which is accomplished by varying the orientation of the cam **89**, the volume of fluid per unit time passing through the orifice **84** and delivered to the agitator motor may be varied, the speed of the agitator motor increasing as the flow increases.

If the spin cycle is selected, as shown in FIGURE 2, the pump **21** supplies fluid pressure to conduit **121** which communicates the fluid to bore **138** to act against valve **135** urging it in contact with lever arm **90*a***. Fluid is also communicated to the basket lock **70** to conduit **123** to act against top side **117** of land section **113** urging piston member **111** out of contact with indent **115** and thereby fixed case **37** and allowing clothes container **11** to be rotated for the centrifugal drying operation. Fluid conduit **144** is also pressurized, the fluid acting against the piston **142** urging the piston to move to the left against the force of spring **145**. As the piston **142** moves to the left, the brake band **147** will be drawn toward the rotatable pump housing element **36** and out of contact with fixed case **37**. Fluid is communicated from conduit **123** to chamber **139** of restricting means **125** by conduit **124** and flows from chamber **139** to sump **28** through the variable orifice.

By restricting the flow of fluid from chamber **139** to sump **28**, we effectively restrict the output of the hydraulic pump **21** which creates a reaction torque on the rotatable pump housing element **36** inducing a rotation of the pump housing element **36** and, through its previously described connection, the clothes container **11** connected thereto. It can now be seen that by varying the position of valve member **135**, we vary the area of orifice **140** and thereby vary the flow of fluid through orifice **140** to sump. The smaller the orifice **140** the less fluid is allowed to pass to sump and the more nearly the rotational speed of the pump housing element **36** approaches the speed of the pumping element **35**. The difference in rotational speed between the pump housing element **36** and the pumping element **35** is accounted for mainly by the fluid allowed to leak to sump. If the valve member **135** were to completely close off communication between the outlet of the pump **21** and sump **28** and assuming zero leakage in the spin circuit, the rotational speed of both elements would be substantially the same, the hydraulic fluid becoming trapped in the circuit. The net flow output of the pump would be zero since there would be no relative rotation between the pumping elements.

If valve member **135** was now moved to allow a slight fluid flow from pump **21** to sump **28**, this would allow a slight relative rotation between the elements. Since the rotational speed of pumping element **35** is substantially constant and determined by the speed of electric motor **16** to which it is attached, the result will be a decrease in the rotational speed of the pump housing element **36** and correspondingly a decrease in rotational speed of clothes container **11.**

As the area of orifice **140** increases, the flow from pump **21** to sump increases allowing more relative rotation between the elements and slower speeds for clothes container **11.** When the valve member **135** is positioned such that it offers virtually no resistance to the fluid flow between pump and sump, we reach the point of minimum rotational speed of the clothes container **11.** The reaction torque on the pump housing element **36** at this time is solely due to the viscous drag between the pump elements.

Thus, it has been shown that the speed of clothes container **11** can be infinitely varied between a predetermined minimum and maximum speed by varying the restriction in the output of the hydraulic pump. A spin speed range of from 450 r.p.m. to 900 r.p.m. has been found to be adequate for most applications.

When the spin cycle is initiated, the torque required to accelerate the clothes container **11** and the wet clothes contained therein from a position initially at rest up to a desired rotational speed is initially quite high. This high starting torque results in a relatively high pressure in the spin fluid circuit. The spin-up relief **128** is set to open at a predetermined pressure bypassing some of the output of hydraulic pump **21** to sump until the clothes container **11** has attained a sufficient velocity and the inertia of the standing basket and clothes has been overcome. The torque now required to rotate the clothes container **11** is considerably less and the pressure in the spin circuit correspondingly decreases allowing the spin-up relief **128** to close and further allowing restricting means **25** to maintain control over the rotational speed of the clothes container **11.**

When the spin cycle has been completed and the cycle selector switch has been automatically switched to off, the electric motor will stop spinning substantially instantaneously, thereby stopping rotation of the pumping element **35.** Absent some provisions for a spin brake, the clothes container and clothes would tend to continue spinning and the only forces acting to decelerate the container would be the viscous drag between the pump elements and the effects of friction.

When the pumping element **35** ceases rotation, the conduit **144** is no longer pressurized and the spring **145** forces piston **142** to the right causing the brake band **147** to contact the inner face of fixed case **37** around substantially the entire inner circumference. This contact between the rotating brake band **147** and the fixed case **37** serves to rapidly decelerate the rotation of the pump housing element **36** and the clothes basket **11** connected thereto.

What is claimed is:

1. A drive arrangement for a fabric-treating machine including a fabric container the drive arrangement comprising; a motor having a rotatable drive member; a hydraulic pump comprising a pumping element and a pump housing element which are relatively rotatable, one of said elements connected to said drive member and the other of said elements connected to said container; means for selectively restricting the flow of fluid from said pump to induce rotation of said container by said pump element attached thereto whereby the rotational speed of said container is responsive to said restricting means; speed control means associated with said restricting means operative to vary the position of said restricting means, thereby varying the speed of rotation of said container.

2. A drive arrangement as in claim **1** including means normally biased closed and adapted to open at a predetermined fluid pressure to bypass some of the flow of fluid from the outlet of said pump to a hydraulic sump until said fabric container has reached a predetermined rotational speed.

3. A drive arrangement as in claim **1** including: a fixed case enclosing said hydraulic pump; brake means associated with said pump element connected to said fabric container and adapted to contact said fixed case to decelerate rotation of said pump element and thereby said container; actuating means attached to said brake means operative to position said brake means out of contact with said fixed case when said container is rotated and also operative to urge said brake means into contact with said fixed case when said motor is deactivated.

4. A drive arrangement for a clothes cleaning machine having a clothes container and an agitator in said container, the drive arrangement comprising: an electric reversible motor having a rotatable drive member; driving means for said agitator operative to actuate said agitator when said motor is operated in a first direction of rotation; driving means for said container including a pump comprising a pumping element and a pump housing element, one of said elements being connected to said container, the other of said elements being connected to said drive member; means for selectively restricting the flow of fluid from said pump when said electric motor is operated in a second direction of rotation to induce rotation of said container by said pump element attached thereto whereby the rotational speed of said container is responsive to said restricting means; speed control means associated with said restricting means operative to vary the position of said restricting means, thereby varying the speed of rotation of said container.

5. A hydraulic drive arrangement for a clothes cleaning machine having a clothes basket and an agitator in said basket, the drive arrangement comprising: a pump including a pumping element and a pump housing element which are relatively rotatable, one of said elements being connected to said basket; a motor having a drive member connectible to the other of said said pump elements; a hydraulic motor connected to said agitator; valve means controlling operation of said hydraulic motor to actuate said agitator; means for selectively restricting the flow of fluid from said pump to compel rotation of said pump element attached to said basket and thereby said basket whereby the rotational speed of said basket is responsive to said restricting means; speed control means associated with said restricting means operative to vary the position of said restricting means thereby varying the speed of rotation of said basket.

6. A hydraulic drive arrangement as in claim **5** including: a fixed case enclosing said pump; brake means associated with said pump element connected to said fabric container and adapted to contact said fixed case to decelerate rotation of said pump element and thereby said container; actuating means attached to said brake means operative to position said brake means out of contact with said fixed case when said container is rotated and also operative to urge said brake means into contact with said fixed case when said electric motor is deactivated.

7. A hydraulic drive arrangement for a clothes cleaning machine having a clothes basket and an agitator in said basket, said drive arrangement comprising: a pump including a pumping element and a pump housing element which are relatively rotatable, one of said elements being connected to said basket; a reversible electric motor having a drive member connectible to the other of said pumping elements; a hydraulic motor connected to said agitator; valve means controlling operation of said hydraulic motor to actuate said agitator when said electric motor is operated in a first direction of rotation; means including restricting means for selectively restricting the flow of fluid from said pump when said electric motor is operated in a second direction of rotation to induce rotation of said pump element attached to said basket and thereby said basket whereby the rotational speed of said basket is responsive to said restricting means; speed control means associated with said restricting means operative to vary the position of said restricting means thereby varying the speed of rotation of said basket.

8. A hydraulic drive arrangement as in claim **7** including: a fixed case enclosing said hydraulic pump; brake means associated with said pump element connected to said fabric container and adapted to contact said fixed case to decelerate rotation of said pump element and thereby said container; actuating means attached to said brake means operative to position said brake means out of contact with said fixed case when said container is rotated and also opertaive to urge said brake means into contact with said fixed case when said electric motor is deactivated.

9. A hydraulic drive arrangement as in claim **7** including: a fixed case enclosing said hydraulic pump; brake means associated with said pump element connected to said fabric container and adapted to contact said fixed case to decelerate rotation of said pump element and thereby said container; actuating means attached to said brake means operative to position said brake means out of contact with said fixed case when said container is rotated and also operative to urge said brake means into contact with said fixed case when said electric motor is deactivated.

10. A hydraulic drive arrangement for a clothes cleaning machine having a clothes basket and an oscillatable agitator in said basket, the drive arrangement comprising: a pump including a pumping element and a pump housing element which are relatively rotatable, one of said pump elements being connected to said basket; a reversible electric motor having a drive shaft connectible to the other of said pump elements; a rotary actuator type hydraulic motor connected to said agitator; valve means controlling the flow of hydraulic fluid to alternate sides of a vane of said hydraulic motor to oscillate said agitator when said electric motor is operated in a first direction of rotation; means including restricting means for selectively restricting the flow of fluid from said pump when said electric motor is operated in the second direction of rotation to induce rotation of said pump element attached to said basket and thereby said basket whereby the rotational speed of said basket is responsive to said restricting means; speed control means associated with said restricting means operative to vary the position of said restricting means thereby varying the speed of rotation of said container.

11. A hydraulic drive arrangement as in claim **10** including: a fixed case enclosing said hydraulic pump; brake means associated with said pump element connected to said basket and adapted to contact said fixed case to decelerate rotation of said pump element and thereby said container; actuating means attached to said brake means operative to position said brake means out of contact with said fixed case when said basket is rotated and also operative to urge said brake means into contact wtih said fixed case when said electric motor is deactivated.

12. A hydraulic transmission having first and second output members at least one of which is selectively operable; a reversible fluid pump comprising a pumping element and a pump housing element which are relatively rotatable; first and second fluid circuits connected to said pump whereby fluid pressure is supplied to said first fluid circuit to rotate said first output member when said pump is rotated in one direction and fluid pressure is supplied to said second fluid circuit to oscillate said second output member when said pump is rotated in the opposite direction; means connecting one of said pump elements to said first output member; means for selectively restricting the flow of fluid from said pump to induce rotation of said first output member by said pump element attached thereto whereby the rotational speed of said output member is responsive to said restricting means; speed control means associated with said restricting means operative to vary the position of said restricting means thereby varying the speed of rotation of said first output member.

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