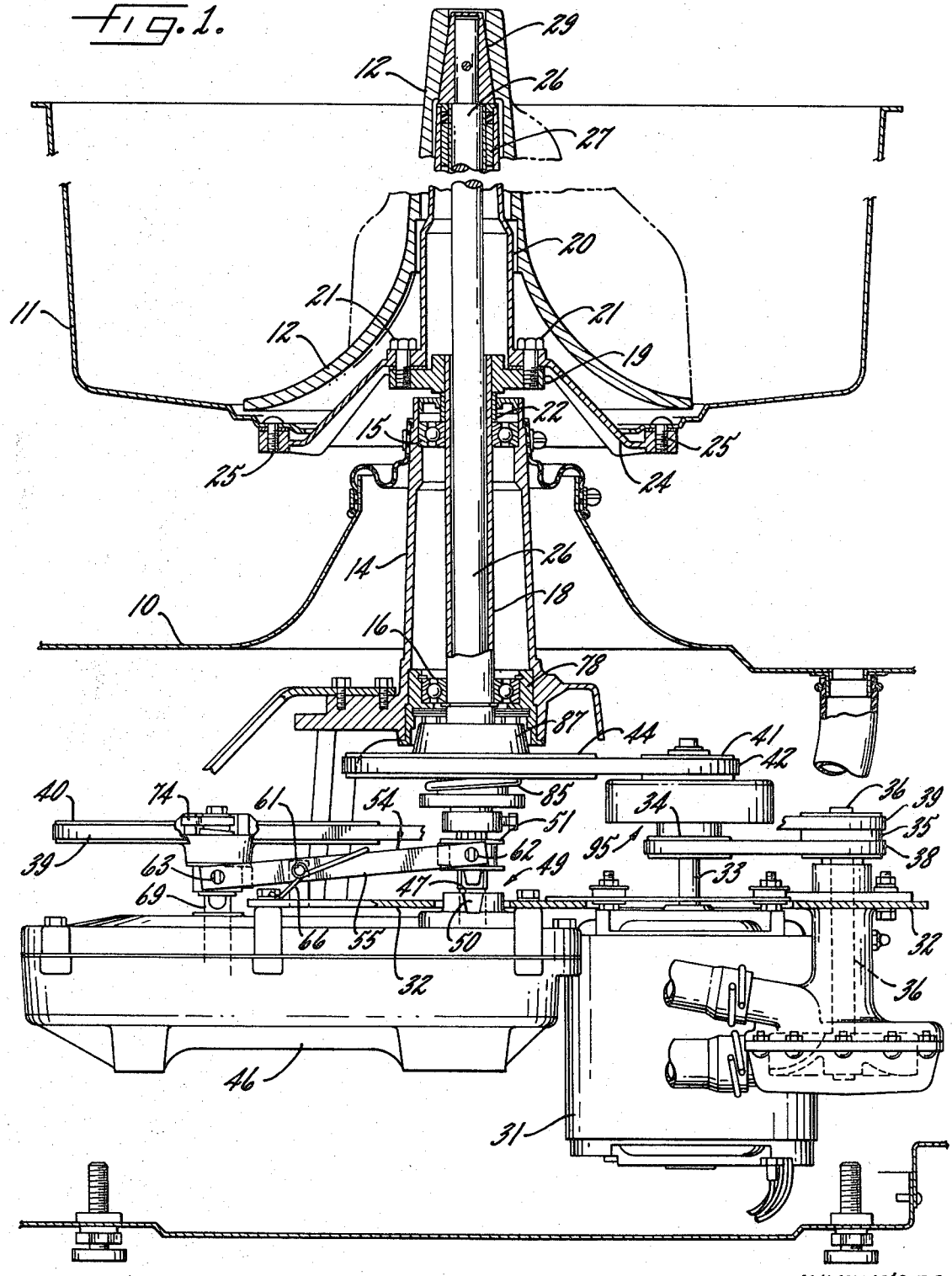
Jan. 26, 1971 K. V. RACENIS 3,557,580

WASHING MACHINE TRANSMISSION

Filed Feb. 10, 1969 3 Sheets-Sheet 1

Fig. 1.



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Filed Feb. 10. 1969 3 Sheets-Sheet 2

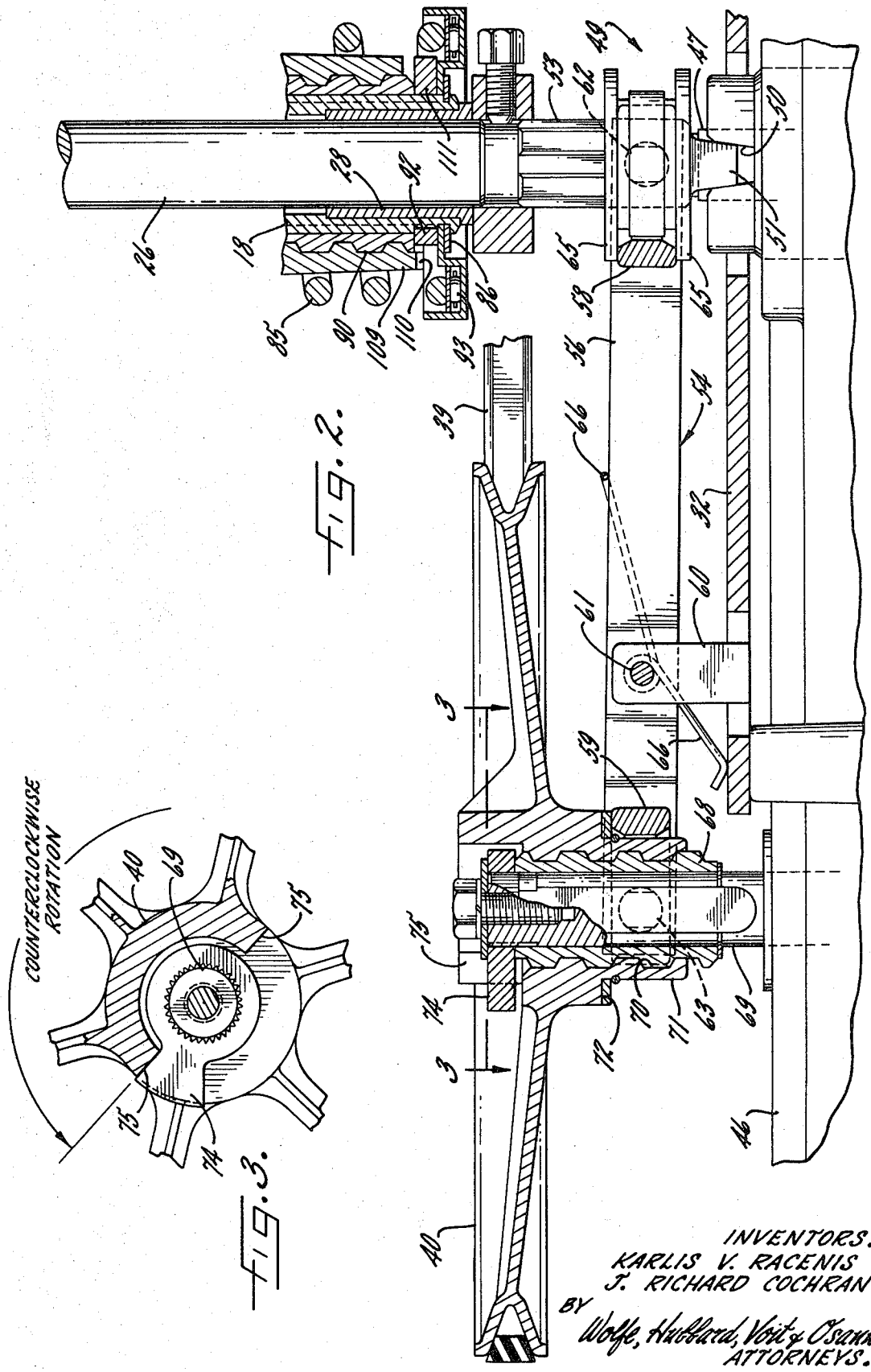


FIG. 2.

FIG. 3.

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WASHING MACHINE TRANSMISSION

Filed Feb. 10. 1969 3 Sheets-Sheet 3

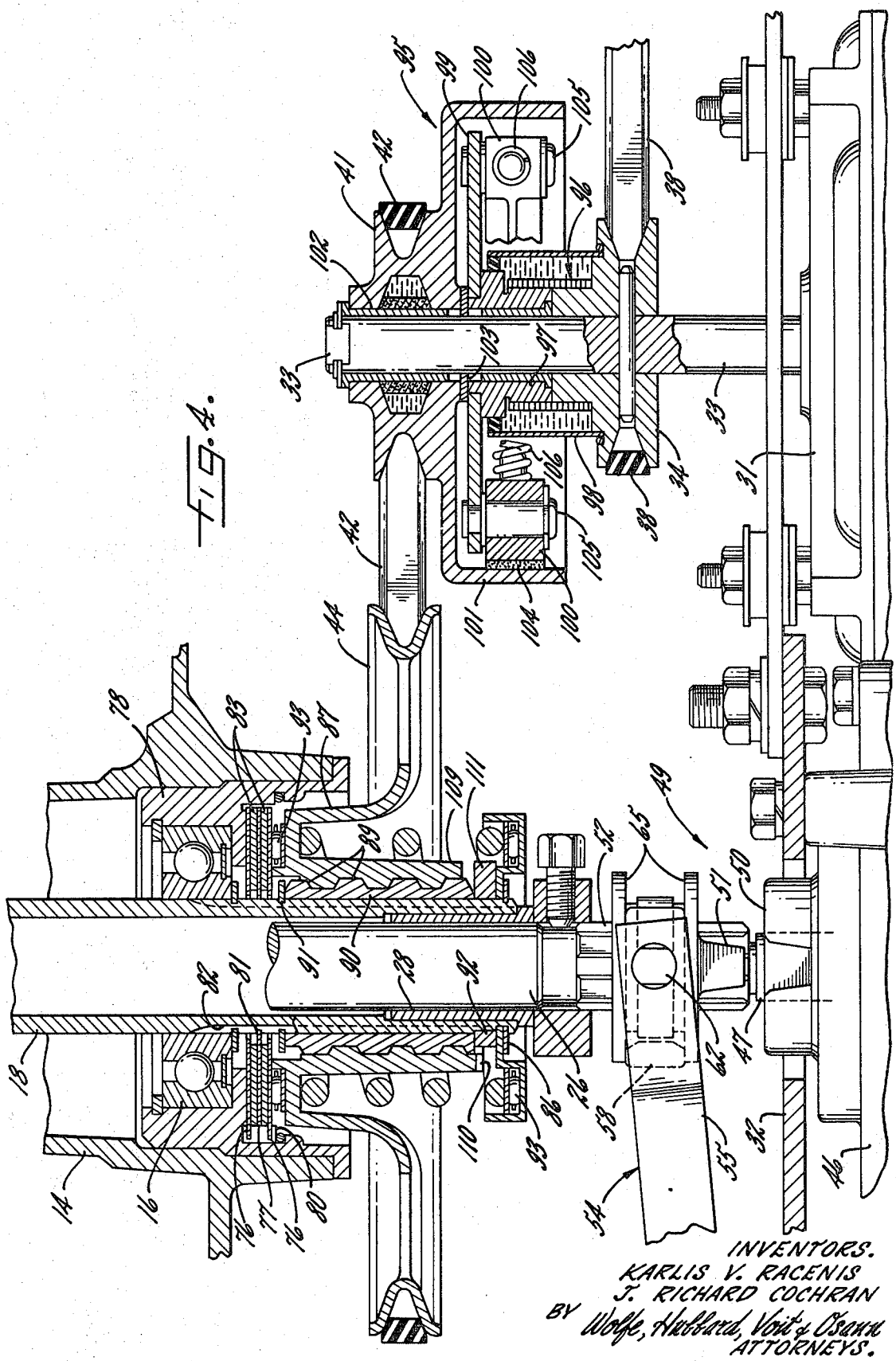


FIG. 4.

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WASHING MACHINE TRANSMISSION

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U.S. Cl. 68—23.7 14 Claims

ABSTRACT OF THE DISCLOSURE

A laundry machine drive mechanism for agitation and centrifgal drying controlled by reversing a power motor which drives through two pulleys mounted on screw threads for limited independent axial and rotational movement, one of which operates a lever to engage and disengage an agitator clutch and the other of which operates to set a tub-brake and alternately to engage a friction clutch to spin the tub for centrifugal drying.

The present invention relates to a drive mechanism for laundry machines of the type having a power driven agitator for washing clothes and a spin tube for centrifugally extracting washing fluid from the clothes.

It is an object of the present invention to provide a reliable drive mechanism for performing and controlling the agitation and spin operation in a laundry machine in whicr both power and control functions are derived from a reversing motor. A related object is to provide such a drive mechanism which has a minimum of rotating mass of mechanical parts during the spinning of the tub. To this end, the present invention has for an object a drive and control for agitation and centrifugal drying in which the support and housing for the agitator gearing is stationary.

A more detailed object of the invention is to provide a control mechanism for selectively agitating and centrifugally extracting washing fluid through direction responsive means for controlled engagement of a pair of clutches and a brake for the clothes receptacle. A further object is to provide positive clutch mechanism transmitting power for both agitating and centrifugal drying through mating abutment means.

In one aspect of the invention, it is an object to provid a novel direction responsive lever mechanism for controlling the agitation of a laundry machine.

Other objects and advantages of the invention will become apparent upon reading the attached detailed description and upon reference to the drawings in which:

FIG. 1 is a partial elevation of a laundry machine showing the tub, agitator and power train assembly incorporating the present invention;

FIG. 2 is an elevation of the agitator control mechanism shown partially in cross section;

FIG. 3 is a partial plan of the agitator transmission drive pulley taken along the line 3—3 of FIG. 2;

FIG. 4 is an elevation partially in cross section of the motor drive and control mechanism on the vertical power shaft and motor shaft.

While the present invention will be described in connection with a preferred embodiment, it will be understood that the intention is not to be limited to the particular embodiment shown but, on the contrary, it is the intention to cover the various alternative and equivalent arrangements included within the spirit and scope of the appended claims.

Referring to the drawings, FIG. 1 illustrates a drive mechanism embodying the present invention for use in a vertical tub, agitator type laundry machine. In general organization, the machine has a cylindrical open top drain tub **10** supported on a suitable framework. Within the

drain tube **10** is an open top cylindrical spin tub **11** journaled for rotation on a vertical axis. The particular spin tub **11** illustrated is an imperforate container which is filled with water for washing and rinsing clothes. Upon rapid rotation or spin, the tub acts as a centrifuge to discharge water over its upper edges into the drain tube **10** and hence remove excess water from the clothes. Washing is accomplished by an agitator **12** which is positioned centrally in the spin tub **11** and which oscillates about a vertical axis concentric with the spin axis of the tub.

In a normal cycle of operation, clothes are placed in the spin tub **11** and wash water and detergent are added. The agitator **12** is then operated for a selected period of time to wash the clothes. Thereafter, the spin tub **11** is rotated at high speed to extract the wash water. After the rotation of the spin tub **11** is stopped, rince water is added and, if desired, the agitator **12** is again started. The agitator **12** is stopped once more, and spinning of the tub **11** follows for extracting the rinse water. When the extraction is completed, the clothes are removed from the machine.

The invention is not limited for use with the particular form of tub and agitator shown or the particular laundry cycle described, but is capable of use with any spin tub and agitator requiring independent drive of the tub and agitator.

Supporting the spin tub **11** and agitator **12** is an upright tubular pedestal **14** having upper and lower bearings **15**, **16** in which is journaled a spin tube **18**. A circular flange **19** which is pressed and brazed on the upper end of the spin tube **18** carries an agitator post support **20**, the latter being attached thereto by fasteners, such as bolts **21**. Interposed between the lower face of the flange **19** and the top of the upper bearing **15** is a collar **22** to hold the spin tube and agitator post support **20** in spaced vertical position. At the lower end of the agitator post support **20** is a circular skirt **24** to which the spin tub **11** is rigidly fixed by screws **25** and the joint therebetween is sealed against water leakage. The upper end of the agitator post support **20** extends above the water level of the spin tub **11** and has a sleeve bearing **27** for rotatably receiving an agitator drive shaft **26**. A second sleeve bearing **28** for the agitator shaft is located inside the lower end of the spin tub **11** as shown in FIG. 2. Placed over the agitator post support **20** and extending downwardly around it, is the hollow, bell-shaped agitator **12**. A drive connection at **29**, such as mating tapered splines, is provided between the upper ends of the agitator shaft **26** and the agitator **12**.

Means for driving the spin tub **11** and the agitator **12** are provided by a reversible electric motor **31** which together with power transmitting devices is carried by a horizontal mounting plate **32** located below the spin tube and agitator shaft. The motor shaft **33** is on a vertical axis and carries a pair of pulleys, the lower one **34** of which drives a dual pulley **35** on a pump shaft **36** through a belt **38**. A second belt **39** on the pump pulley **35** transmits power to an agitator gearing input pulley **40**. The upper pulley **41** on the motor shaft **33** is engaged by a belt **42** which carries power to a spin pulley **44** around the lower end of the spin tube **18**.

Interposed in each of the drive trains from the motor shaft are means for alternately oscillating the agitator and rotating the spin tub depending on the direction of rotation of the motor shaft. Considering first the agitator drive mechanism, the motor agitator pulley **34** is pinned or otherwise rigidly fastened to the motor shaft **33** such that the agitator gearing input pulley **40** is continuously driven in forward and reverse directions depending on the direction of motor rotation. To convert the rotary motion of the input pulley **40** to an oscillating drive for the agitator any suitable gearing may be used and in the present instance is a crank type of motion converter mechanism contained in a gear housing **46** bolted to the mounting

plate 32 and having an oscillated output shaft 47 in axial alignment with the lower end of the agitator shaft 26. A suitable gearing arrangement for this purpose is illustrated in U.S. Pat. o. 1,964,440, dated June 26, 1934, although other gearing may be used.

In order to drive the agitator 12 when the motor 31 is being driven in only one of its directions of rotation, clutch means and direction responsive automatic clutch operating means are provided. The exemplary clutch means includes a positive engagement clutch 49 formed by a first jaw clutch member 50 fixed to the output shaft 47 of the gearing mechanism and a mating second jaw clutch member 51 slidably mounted on the lower end portion of the agitator shaft 26. Cooperating axial splines 53 between the shaft 26 and the second clutch member 51 form a rotary driving connection but permit the desired axial sliding such that the two clutch members may be engaged and disengaged.

The movable clutch member 51 is operated by means of a lever 54 of the first class having a pair of spaced arms 55, 56 (FIGS. 1 and 2) and a U-shaped collar 58, 59 pivotally supported between each pair of arms. An upstanding bracket 60 on the horizontal mounting plate 32 carries a horizontal pivot pin 61 which extends through an aperture intermediate the length of the lever 54 to permit up and down swinging motion of the ends of the lever. The pivotal supports for the collars are on axes parallel to the lever pivot and each includes a pair of horizontal studs 62, 63 projecting from diametrically opposed sides of the collar and received by aligned apertures in the arms. One of the collars 58 is received in a flat bottom groove formed by flanges 65 on the periphery of an upper portion of the slidable clutch member 51 such that up and down motion of the corresponding end of the lever moves the clutch member 51 downwardly into engagement and upwardly out of engagement with the relatively stationary clutch member 50 on the agitator gearing output shaft. For swinging the lever 54 in the clutch engaging direction and pressing the clutch collar 58 downwardly into clutching engagement, spring means is provided in the form of a torque spring 66 coiled about the lever pivot pin 61 with one spring extension pressing against the top of the horizontal mounting plate 32 and a second extension pressing downwardly on the top of the operating lever 54. Means are thus provided for resiliently pressing the sliding clutch jaw 51 into engaged position upon release of the opposite end of the control lever 54.

Upward or disengaging motion of the clutch end of the lever 54 is caused by limited downward axial movement of the input pulley 40 for the agitator gearing. For this purpose, an externally threaded sleeve 68 is fixed to the projecting end of the agitator gearing input shaft 69 for unison rotation. Threaded on the sleeve is the input pulley 40 which has mating internal threads 70 to provide an upward movement of the pulley as it is rotated relative to the input shaft 40 in a counterclockwise direction. To transmit the axial movement of the pulley 40 to the clutch lever 54, the collar 59 on the second end of the shift lever embraces a relieved portion of the downwardly projecting hub 71 of the pulley. At the top of the relieved portion is an annular shoulder 72 against which the collar 59 is presed by the torque spring 66. If desired a thrust washer may be interposed between the shoulder and top side of the collar to reduce friction. It will be seen that when the input pulley 40 is rotated in the counterclockwise direction relative to the input shaft 69 it moves upwardly releasing the second end of the shift lever and thereby permits the clutch spring 66 to press the slidable clutch member 51 into clutched position. On reverse rotation, the pulley 40 moves downwardly forcing the second end of the clutch lever 54 downwardly against the force of the spring 66 to lift the clutch end and disengage the clutch 49.

The rotation of the input pulley 40 relative to the input shaft 69 and hence the relative axial movement, is limited by a lost motion connection between the pulley and the shaft. The lost motion means in the illustrated mechanism comprises a radially projecting drive lug 74 fixed to the top of the gearing input shaft 69 and a pair of spaced apart shoulders 75 formed on the pulley. As shown in FIGS. 2 and 3, the upper hub portion of the input pulley has a cutaway portion, the ends of which are defined by the upright shoulders. In the exemplary construction the shoulders 75 are spaced apart approximately 180 degrees and the drive lug 74 has a width of approximately 42 degrees such that the free rotation or lost motion of the pulley is about 138 degrees. By appropriate selection of the pitch of the pulley mounting thread 70 and the ratio of lengths of the shift lever arms, the slidable clutch member 51 can be moved into and out of engagement during the free rotation of the pulley.

The clutch operating mechanism described takes into account the condition in which the clutch jaws 50, 51 are not rotationally aligned for engagement. Should misalignment be present, the pulley 40 will move upwardly away from its end of the lever and will engage the drive lug 74 for turning the agitator gearing. This rotates the lower clutch jaw 50 until alignment occurs at which time the torque spring 66 presses the slidable jaw member 51 downwardly into engagement. It is preferred to have four teeth on the movable member so that less than a quarter turn is needed to bring the jaws 50, 51 into alignment. A slight taper on the sides of the teeth of the upper clutch member 51 and on the sides of the receiving grooves of the lower member 50 assists in aligning the jaws for engagement. When the jaws are engaged and the pulley 40 continues to be rotated in a counterclockwise direction the output shaft 47 is oscillated resulting in oscillation of the agitator shaft 26 and agitator 12 through abutting engagement of the clutch teeth. Before the clutch can be disengaged, the pulley direction must be reversed by reversal of the motor 31. This reversal moves the input pulley driving abutment away from the input shaft drive lug 74 to relieve the driving force on the clutch while the pulley is moving axially downwardly and through the shift lever 54 causes disengagement of the clutch 49.

While the agitator is being driven, it is desirable that the spin tub be held against rotation. To accomplish this an automatic brake means operable upon rotation of the motor in the agitator drive direction is provided. As best shown in FIG. 4 of the drawings, the brake means is arranged concentrically with the spin tube 18 and includes two interleaved sets of annular brake discs 76, 77 located around the lower portion of the spin tube 18 in a cylindrical chamber formed in the lower end of the stationary bearing support housing 78. One set of brake discs 76 is held against rotation by an internal, axial spline 80 on the bearing housing and a mating groove or notch in the periphery of the discs 76. The second set of discs 77 is rotatable in unison with the spin tube being connected thereto by an internal projection 81 extending into an axial keyway, splines or slot 82 in the outer surface of the spin tube. A layer of friction material 83 is interposed between each of the mating disc faces and fixed to one of the adjacent faces to increase the braking force when the discs are pressed together which in the illustrated form is accomplished by applying an upward force to the lowest disc. The bottom face of the cylindrical chamber in the bearing housing 78 forms an upper abutment which limits the movement of the upper disc when pressure is applied to set the brake.

To provide a force for engaging the brake, a helical compression spring 85 is positioned around the spin tube 18 and retained thereon by a flange 86 fixed to the lower end of the spin tube. In the exemplary construction, the upper end of the spring 85 does not directly engage the brake discs, but abuts the lower side of a central annular flange portion 87 of the spin pulley hub. From this central

hub flange **87**, the pulley disc or spoke section extends downwardly and outwardly in a bell-shape to the outer rim. The upper face of the hub flange **87** transmits the spring force to the brake discs. It will be seen that relative rotation between the brake members and the adjacent parts is minimized by providing a stationary brake disc **76** on the top and bottom of the brake unit.

For transmitting the spring force through the pulley **44** to set the brake and for releasing the brake, the spin pulley is mounted for limited axial movement. As will be explained later the axial movement of the pulley **44** also affects a drive for rotating the spin tub. The axial movement is provided by an external screw thread **89** on the spin tube between the bottom tube flange **86** and the brake unit. As illustrated in the drawings, the screw thread **89** is formed on the outer surface of a sleeve **90** which is keyed to the spin tube **18** and held against axial movement by an upper retainer ring **91** and a lower spacing drive member **92**, which bears on the bottom spin tube flange **86**. The internal bore of the spin pulley has a mating screw thread formed therein such that the brake spring **85** tends to rotate the spin pulley **44** upwardly along the screw thread. It is desirable to insert needle thrust bearings **93** between the spin pulley hub flange **87** and the lower brake disc **76** and between the bottom of spring **85** and the flange assembly **86** to reduce the friction as the spring causes the pulley to rotate upwardly and push the brake discs together to hold the tub stationary during agitation.

Following agitation or rinsing of clothes in the spin tub, the tub **11** is to be rotated to remove the water in the tub and centrifugally extract water from the clothes. This is accomplished as previously described by first stopping agitation by reversing the direction of the motor **31** which initially declutches the agitator shaft clutch **49**. Continued rotation of the motor in the reverse direction releases the tub brake discs **76, 77** and drives the tub. For this purpose the motor shaft **33** carries clutch means responsive to direction of rotation and to speed. The direction responsive means comprises a one-way spring clutch **95** in which one portion of a coil spring **96** engages an upward extension of the lower motor shaft pulley **34** and a second portion of the spring engages a clutch hub **97** journaled on the motor shaft by a sleeve bearing. During counterclockwise motor rotation the spring clutch **96** is disengaged and during clockwise rotation is engaged to rotate the clutch hub. To provide lubrication for the spring clutch a retainer tube **98** surrounds the spring **96** and is sealed at its ends to the respective lower pulley **34** and driven hub **97** to form an annular space which is filled with lubricant. The clutch hub **97** also serves as a portion of the speed responsive clutch means which in the illustrated device is a form of centrifugal clutch. Completing the centrifugal clutch are a clutch yoke **99** fixed to the hub **97** for unison rotation, a pair of arcuate clutch shoes **100** each of which is pivotally connected at one end to opposite ends of the yoke **99**, and a driven clutch drum **101**. The clutch drum **101** has an internal, cylindrical clutch surface surrounding the clutch shoes **100** and an upper closed end plate or web to which an output pulley **41** is rigidly attached. The drum **101** and output pulley **41** are freely rotatable one the motor shaft by a sleeve bearing **102** and for independent relative rotation of the drum and the yoke a thrust bearing washer **103** is placed between the two parts. Friction lining material **104** is affixed to the arcuate faces of the clutch shoes such that outward swing of the shoes about their respective pivots **105** brings the lining material **104** into contact with the drum clutching surface to effect frictional driving engagement. A compression spring **106** is positioned between the pivoted end of each clutch shoe **100** and the free end of the other shoe to provide initial frictional engagement. Rotation of the clutch hub and yoke causes the clutch shoes to engage the clutch drum with greater force as increasing speed of rotation increases the centrifugal force acting on the shoes.

A driving connection between the centrifugal clutch pulley and the spin pulley is provided by the belt drive **42**. As a result, reverse or clockwise rotation of the motor **31** initially screws the spin pulley **44** downwardly against the force of the brake spring **85** to release the tub brake. After the pulley **85** has moved far enough to release the brake a driving connection is made between the spin pulley **44** and spin tube **18** for spinning the tub **11**. To permit release of the brake prior to applying power to drive the tub and to allow the agitator to be released from its driving connection prior to applying a torque to the spin tube, a lost motion connection is provided in the spin tube drive. For this purpose, the lower end portion **109** of the spin pulley hub has a cut out portion forming a relieved arcuate section defined by a pair of opposed radial walls, one of which is shown at **110**. At least one of the walls **110** is a driving abutment wall which engages a radial projection **111** on the lower end of the spin tube **18** to form a force or torque transmitting connection. In the preferred embodiment, the radial projection **111** is so proportioned in relation to the length of the notch or cut out portion and to the pitch of the pulley thread that it passes above the second radial wall upon rotary, upward braking movement of the pulley **44**.

By means of the foregoing described mechanisms, a drive mechanism for the agitator **12** and spin tub **11** is provided which performs a timed sequence of operations governed by reversal of the drive motor **31**. In rest position, the motor **31** is drivingly connected to the agitator input pulley **40** which will be in its upper or lower drive position depending on the last previous direction of motor rotation. The spin pulley **44** will be disconnected from the motor **31** due to the release of the centrifugal clutch **95**. Since the spin pulley **44** is released from the motor, it will be in its upper position and its hub **87** will be pressed upwardly by the force of the brake spring **85** against the brake assembly to set the latter. In normal operation of the laundry machine, the tub is filled with water and agitation is thereafter started. This occurs when the motor is energized for rotation in the counterclockwise direction. Under this condition, the spin tub **11** remains braked because no driving force is applied to the spin pulley due to release of the one-way spring clutch **96** in the motor shaft clutch assembly. The first fraction of a turn of the agitator input pulley 40 causes it to move upwardly. During this movement the agitator clutch lever 54 is released by the pulley and its clutch end is pressed downwardly by the clutch engaging spring **66**. If the agitator clutch jaws **50, 51** are not angularly (rotationally) aligned, the clutch does not engage until the agitator pulley **40** completes its rotationally upward movement, engages the agitator gear drive abutment **74** and the agitator gears are rotated sufficiently to turn the lower clutch jaw **50** into alignment. The clutch lever spring **66** then presses the jaws together and agitation commences. Upon and comes to a stop. At this time nothing changes and agitation could begin immediately upon reenergizing the motor in the counterclockwise direction. However if the motor 31 is energized for reverse rotation in the clockwise, the agitator pulley **40** rotates downwardly through a fraction of a turn to press on the clutch lever **54** and release the agitator clutch **49**. The agitator is not driven during the release operation because the agitator pulley **40** is free wheeling on the gear input shaft **69**. Not until after pulley downward movement releases the clutch **49** does it again drive the agitator gearing. The gearing merely idles during the reverse rotation. Upon initiation of the reverse rotation of the motor, the one-way spring clutch **96** on the motor shaft assembly engages and rotates the centrifugal clutch shoes **100**. No drive is effected through the centrifugal clutch until a predetermined minimum motor speed is obtained. When the mini-

mum speed is reached, the spin pulley **44** is driven downwardly along its threaded support against the force of the brake spring **85** to release the spin tub. Continued downward rotation engages the spin pulley driving abutment **110** on its hub, and the spin drive projection **111** on the spin tube. It is desirable to proportion the speed ratios of the various pulleys and the angular free travel or lost motion of the agitator input and spin pulleys such that the agitator clutch is released prior to driving the tub. This permits the agitator **12** to be free for rotation with the water and clothes in the tub. The time required for the motor to come up to speed may also be taken into account in determining the proportions. After the engagement is effected continued clockwise drive brings the tub upto full spin speed which continues until the desired amount of water is extracted from the clothes. When the motor **31** is deenergized after the spin is completed, the agitator mechanism stops but no change is made in the position of the agitator clutch lever. In the spin mechanism, slowdown of the motor releases the centrifugal clutch, removing driving force from the spin pulley **44**. The brake spring 85 then pushes on the spin pulley so that it rotates in a counterclockwise movement upwardly to apply the brake. This permits the brake to assist in slowing down the spinning tub and to hold the tub stationary during other laundry operations. Rinse water may be added to the tub and the spinning repeated if desired or agitation may be used simply by controlling the direction of rotation of the drive motor.

It will be seen from the foregoing description that a drive mechanism for agitation and centrifugal drying is provided which is particularly adapted for automatic washing machines, without the use of electric solenoids or other auxiliary control apparatus.

We claim as our invention:

1. A drive mechanism for a laundry machine having a vertical spin tub and an agitator therein,

a vertical spin tube connected to said tub and a vertical agitator shaft journaled therein connected to said agitator,

a reversible drive motor,

means for rotatively driving said spin tub upon rotation of said motor in one direction,

means for braking said spin tub against rotation during rotation of said motor in a second direction,

a transmission means having a rotatable input shaft and an oscillating output shaft in alignment with said vertical agitator shaft,

clutch means for interconnecting said transmission output shaft and said agitator shaft including a member movable axially with respect to said output shaft between a clutched position and an unclutched position,

an agitator drive pulley mounted on said input shaft having a helically threaded engagement therewith for axial and rotational movement relative thereto,

means for drivingly connecting said motor and said pulley,

a lever means operatively connected at one portion for axially moving said clutch member between clutched and unclutched positions and operatively engaged at a second position by said pulley for movement thereby upon axial movement of said pulley relative to said input shaft,

a lost motion connection between said pulley and said input shaft to permit limited free rotation of said pulley relative to said input shaft to disengage said clutch means upon rotation of said motor in said one direction and to engage said clutch upon rotation of said motor in said second direction during the free rotation of said pulley.

2. The combination as claimed in claim **1** in which said lost motion connection comprises a radial projection on said input shaft and an abutment on said agitator pulley for engaging said projection upon limited rotational movement of said pulley relative to said input shaft, said engagement limiting the axial movement of said pulley and forming a connection for driving said transmission.

3. The combination as claimed in claim **1** in which said lever means includes spring means resiliently biasing the same to clutched position and is engaged by said pulley for movement to disengage said clutch.

4. The combination as claimed in claim **1** in which said transmission means and said motor are mounted on stationary support means and said lever means is pivoted on said support means for swinging movement to move said clutch member.

5. The combination as claimed in claim **1** in which said clutch means includes a jaw member on said oscillating output shaft and said axially movable member is a jaw member axially slidable on said agitator shaft.

6. The combination as claimed in claim **5** in which said lever means includes a first collar journaled on said movable jaw member and connected to one end portion of said lever means, a second collar journaled on said pulley and connected to the other end portion of said lever means, and pivotal support means for said lever means between said end portions.

7. The combination as claimed in claim **1** in which said lost motion connection comprises a radial projection on said input shaft and a pair of abutments on said pulley defining an arcuate notch for receiving said projection and permitting relative rotary motion between said input shaft and said agitator pully.

8. The combination as claimed in claim **1** in which means for rotatively driving said spin tub includes a one-way clutch means operative upon rotation of said motor in said one direction and friction clutch means operative to transmit power above a predetermined speed of said motor.

9. The combination as claimed in claim **1** in which means for braking said spin tub includes a member threadedly mounted on said spin tube for axial and rotational movement relative thereto and a spring means pressing said threaded member in one axial direction for braking said tub, and in which said means for driving said spin tub rotates said threaded member in a direction to move the latter in a second axial direction to release the braking of said tub.

10. The combination as claimed in claim **9** in which said threaded member is a spin pully having a portion operatively engaged by said spring means, said brake means further includes braking surfaces interposed between a portion of said pully and a stationary portion of the machine.

11. The combination as claimed in claim **1** in which said means for driving said spin tub includes a one-way clutch and a speed responsive clutch connected to said spin pulley for moving said spin pulley in said second axial direction to release said brake, and mating abutments on said spin pulley and said spin tube engageable upon movement of said spin pulley in said second axial direction for rotatively driving said spin tub.

12. A drive mechanism for a laundry machine having a vertical tub and an agitator therein, comprising in combination

a reversible drive motor,

a vertical spin tube operatively connected to said tub for spinning said tub, said spin tube having a helical thread thereon,

a vertical agitator drive shaft within said spin tube operatively connected to said agitator,

a spin drive member in threaded engagement with said spin tube for rotational and axial movement relative thereto,

means for drivingly connecting said motor and said drive member in one direction of motor rotation,

means for drivingly connecting said motor and said agitator drive shaft including gear means and clutch

means, said clutch means being responsive to rotation of said motor in the reverse direction for driving said agitator drive shaft and for releasing the latter upon rotation in said one direction,

brake means including one brake member fixed against rotation and a second cooperating brake member axially slidably mounted on said spin tube for rotation in unison therewith,

a compression spring surrounding said spin tube and having one end supported thereon for relative rotation and against endwise movement, said spring having its second end in pressing engagement with said drive member for rotating the latter on said threaded member and thereby moving the same axially into braking applying engagement with said second brake member when said motor is rotating in the second direction,

stop means on said spin tube for engagement with said drive member upon rotation of said motor in said first direction to move said member along said threaded member against the force of said spring for releasing said brake means and spinning said tub.

13. The combination as claimed in claim **12** in which said drive member is a pulley, and said means for drivingly connecting said motor and said drive member includes a one-way spring clutch, a speed responsive clutch and a belt interconnecting the speed responsive clutch and said pulley.

14. A drive mechanism for a laundry machine having a spin tub and an agitator comprising in combination

a reversible motor,

an agitator transmission having a rotatable input shaft and an oscillating output shaft,

a rotatably mounted spin shaft operatively connected to said spin tub for rotating the latter,

a spin pulley threadedly mounted on said spin shaft,

an agitator pulley threadedly mounted on said transmission input shaft,

first clutch means for driving said spin pulley upon rotation of said motor in a first direction,

means for reversibly driving said agitator pulley upon reversing rotation of said motor,

second clutch means interposed between said transmission output shaft and said agitator,

lever means interconnecting said agitator pulley and said second clutch means for transmitting axial movement of said agitator pulley along said transmission input shaft upon rotation of said motor in the first direction to release said second clutch means and to engage said clutch upon motor rotation in the second direction,

lost motion means for transmitting rotary motion of said agitator pulley to said transmission input shaft after limited axial movement of said agitator pulley relative to said input shaft,

brake means for holding said spin shaft stationary,

resilient means engaging said spin pulley for urging the latter axially in one direction on said threaded mounting for moving said brake means to braked condition,

stop means for said spin shaft for limiting axial movement of said spin pulley in a second direction upon rotation of said motor in said first direction of rotation to rotate said spin shaft in unison with said spin pulley.

and speed responsive clutch means interposed between said first clutch means and said spin pulley for gradually applying spin torque to said spin shaft.

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2,751,773	6/1956	Woodson	68—23.7

WILLIAM T. PRICE, Primary Examiner

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