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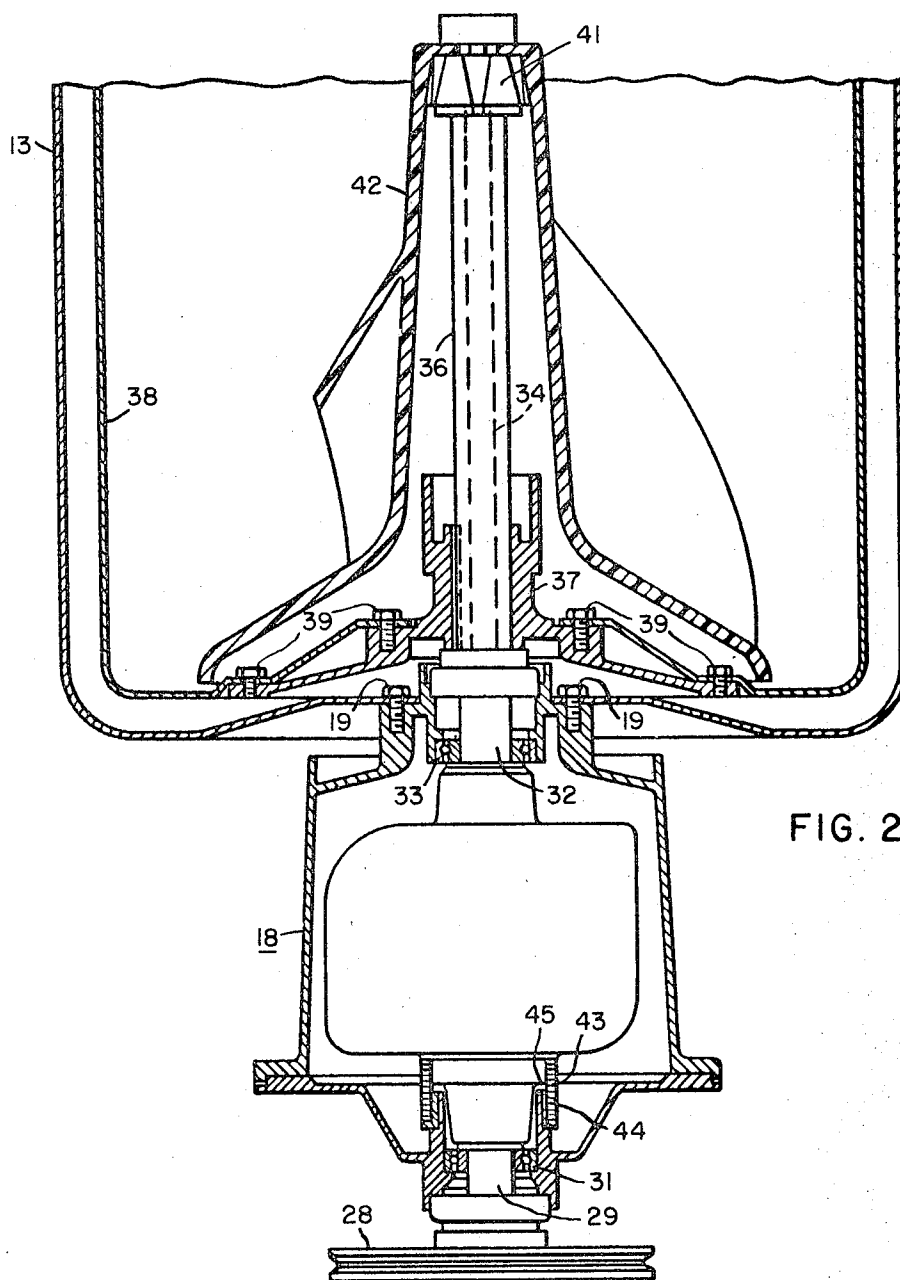
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BELT DRIVE FOR A TOP-LOADING WASHING MACHINE

Filed July 12, 1968

3 Sheets-Sheet 2



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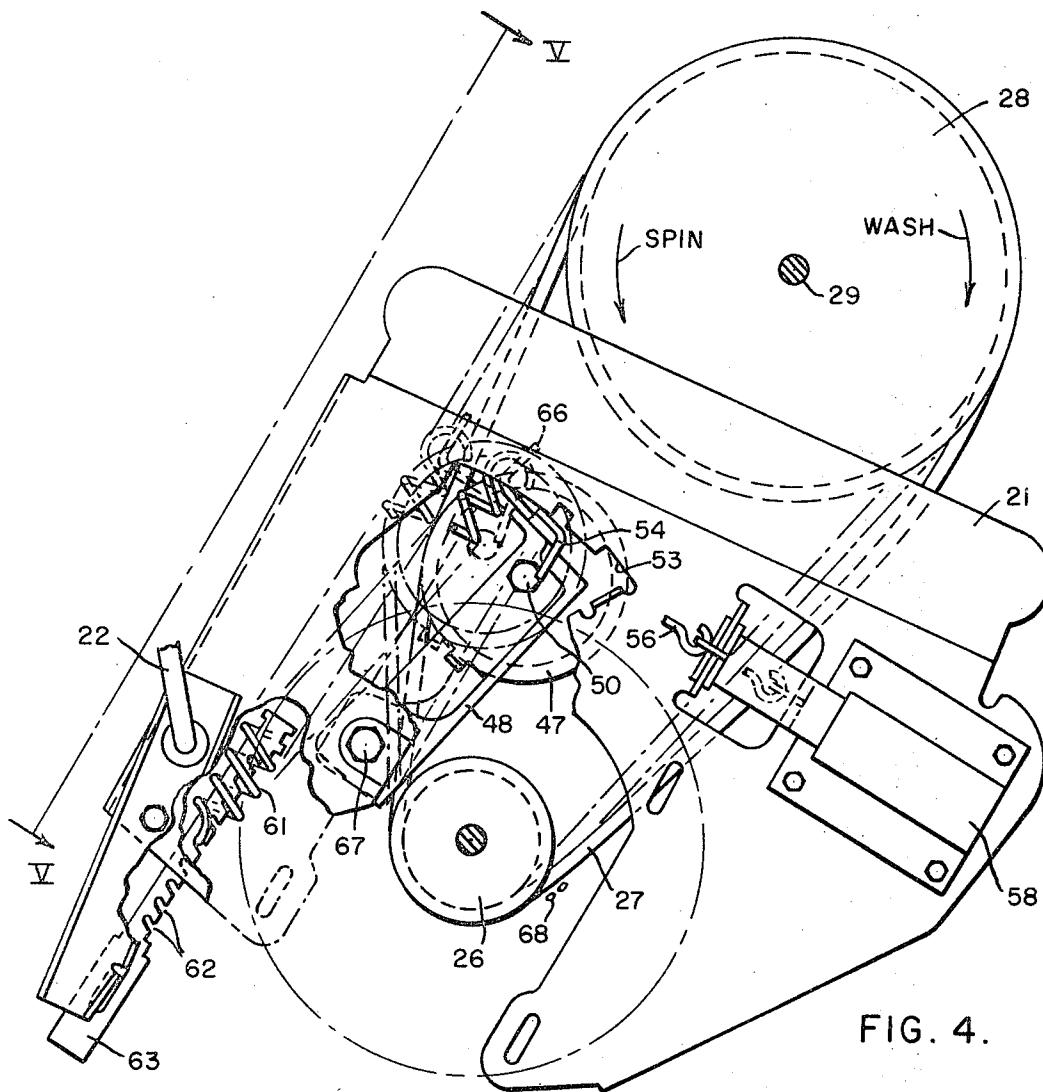
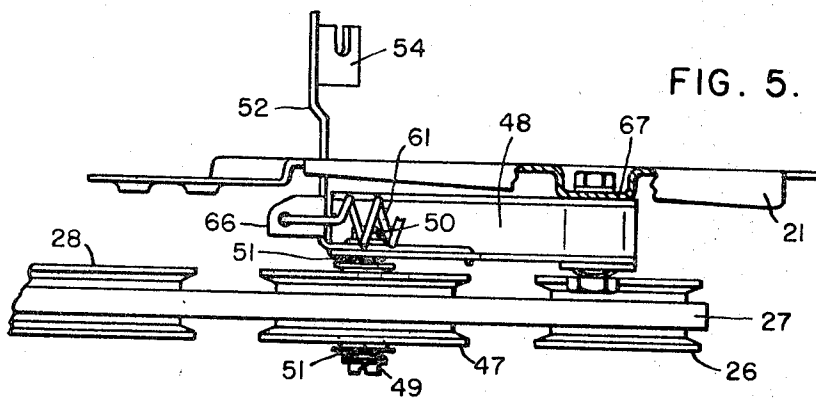
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BELT DRIVE FOR A TOP-LOADING WASHING MACHINE

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6 Claims

ABSTRACT OF THE DISCLOSURE

A clothes washing machine of the center post agitator type having a reversible belt drive and associated components for producing washing and spin modes of operation. The belt engages an idler pulley movably mounted adjacent the tight side of the belt to thereby permit belt slippage during the initial stages of the spin mode of operation. In order to take up the slack in the belt during the washing mode, accomplished through motor reversing, a tension spring biases the pulley into engagement with the belt, this spring being so positioned relative to the means movably mounting the pulley, so as to exert a greater force at the point of engagement of the belt and pulley during the washing mode of operation than during the spin mode of operation.

BACKGROUND OF THE INVENTION

This invention relates, in general, to top-loading clothes washing machines and, more particularly, to belt drive mechanism therefor.

Machines, of the type herein contemplated, comprise at least two modes of operation, i.e., a washing mode and a spin mode. It is well known that there is little difficulty for the motor to attain its running speed for the washing mode, since the acceleration is relatively low. This is not the case with the spinning mode, consequently, some means has to be provided to limit the torque on the motor in order to prevent overloading thereof. In lieu of using a larger, much more expensive motor, friction clutches have been employed in conjunction with the drive pulley attached to the motor, the drive pulley having a cylindrical wall extending from the hub portion thereof, which wall is frictionally engaged by the clutch. An expandable brake band forming a part of the clutch has a liner secured thereto which engages the cylindrical wall. Such constructions, it has been found, are expensive and operate inconsistently over the life thereof. Furthermore, these clutches are quite troublesome, requiring extensive servicing in the field, particularly, when the machine has not been recently operated and when the clutch is required to control the torque developed at a number of motor speeds such as when variable speed motors are employed.

Use of variable speed motors also presents the problem, where the pump is driven directly by the main motor to obtain a lower cost system, of inadequate pump performance. For example, where the pump is designed for operation at a high speed, the performance is inadequate at lower motor speeds.

Where, in the interest of providing a low cost system as mentioned above, the pump is directly driven by the main motor, certain problems are encountered when washing heavily soiled clothes which are embedded with grit. When a load is centrifuged or put through a spin cycle with a full tub of water, the dirty water is forced through the clothes causing a concentration of the dirt in the area of the perforations of the clothes basket which results in a "polka dot" effect on the clothes.

In view of the foregoing, the general object of this in-

vention is to provide a new and improved top-loading clothes washing machine.

It is a more particular object of this invention to provide, in a top-loading washing machine, new and improved torque limiting structure.

Another object of this invention is to provide, in belt drive for a top-loading washing machine wherein the pump is driven directly by the motor, structure for disengaging the pump, prior to centrifuging.

Still another object of this invention is to provide a new and improved belt tensioning mechanism for a belt drive which automatically compensates for wear and stretching of the belt.

Yet another object of this invention is to provide a new and improved belt tensioning device which is easily adjusted at the time of installation.

BRIEF SUMMARY OF THE INVENTION

Briefly, the above-cited objects are accomplished by the provision of a belt and pulley drive between the motor of a washing machine and the input shaft of the transmission thereof. An idler pulley is also provided for properly tensioning the belt while allowing belt slippage in a specific mode of operation. To this end, the pulley is pivotally mounted on a rigid arm such that it engages the belt on its tight side during the spin mode of operation. A tension spring having one end attached to the arm carrying the pulley while its other end is fixedly secured such that when the idler pulley moves, due to changes in tension, the moment arm of the line of force of the tension spring changes relative to the pivot point of the pulley. This arrangement produces a negative force effect on the pulley since the force acting on the pulley is less when the belt tension is greatest, as is the case during the spin mode of operation. Contrariwise, when the belt tension is least, when the effective force of the spring is the greatest.

Further objects and advantages of the present invention will become more apparent when considered in view of the following detailed description and drawings forming a part hereof.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary elevational view, partly in section, of a top-loading washing machine representing the invention;

FIG. 2 is an elevational view in cross section of the tub, basket, end gear housing of the machine shown in FIG. 1;

FIG. 3 is a view similar to that of FIG. 1, but with the motor and pump removed;

FIG. 4 is a cross-sectional view taken along the line IV—IV of FIG. 1; and

FIG. 5 is a cross-sectional view taken along the line V—V of FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, especially FIG. 1, reference character 10 designates generally a washing machine comprising cabinet structure 11 including a bottom panel 12. A non-rotating tub 13 is supported within the cabinet structure 11 by means of circumferentially spaced braces 14 and a dome-shaped member 16 attached to the braces 14. The dome-shaped member engages a pad (not shown) which is provided in the bottom panel 12 and cooperates therewith to pivotally support the tub 13, proper positioning being accomplished by a plurality of springs 17 secured to the braces 14 and bottom panel 12. The tub 13 is also secured, as shown in FIG. 2, to a gear housing 18 through suitable bolts 19.

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A motor mounting bracket 21 supported by a pair of rods 22 and suitable bolts 23, in turn, supports a reversible motor 24 having suitable external wiring (not shown for sake of clarity), which is connected to the controls (also not shown) of the machine. The motor 24 has pinned to the lower end of its output shaft, a pulley 26 which drives, by means of the belt 27, a pulley 28. The driven pulley 28 is suitably attached to a driving or input shaft 29 (FIG. 2) supported by a bearing structure 31 in the lower end of the gear housing 18. The shaft 29 extends into the lower end of the gear casing and serves as the input to the gear system housed therein. The general arrangement of the gear system and the frame is of well known construction in the art, with the output therefrom being provided by an output shaft structure 32. The output shaft 32 is supported by a bearing structure 33 and extends upwardly and is disposed within the center of the tub 13.

The output shaft 32 is of the coaxial type comprising an inner solid shaft 34 and an outer tubular shaft 36. Attached to the outer shaft 36 is a basket hub 37 which is adapted to support an inner basket 38 attached thereto by a plurality of bolts 39. The inner shaft 34 has a hub member 41 secured thereto for supporting an agitator structure 42, to which movement is imparted by the shaft 34 and the gear train (not shown). A spring clutch 43 engages surfaces 44 and 45, respectively of the gear housing and gear frame and effects movement of the agitator structure 42 through the gear train (not shown), when the motor 24 rotates in one direction and effects rotation of the inner basket when the motor rotates in the reverse direction.

Attached to the upper end of the shaft of the motor 24 is a combination pump 46 which, at predetermined time periods, serves to recirculate water through the basket 38 and a filter (not shown) and serves to drain water from the basket. It will be appreciated that with such an arrangement of pump and motor, that the pump must run whenever the motor is operating.

To provide proper tensioning of the belt at all times, regardless of belt condition or mode of operation (i.e., washing or spinning etc.), an idler pulley 47 is provided. The pulley 47 is rotatably secured to a rigid idler arm 48 which is pivotally supported on the underside of the motor mounting bracket 21 by means of a bolt 49, nut 50 and spring washers 51. The idler arm 48 carries an L-shaped bracket 52, one end of which extends upwardly through an opening 53 in the motor mounting bracket 21. The one end of the arm has a bifurcated portion 54 which engages a rod 56 attached at its one end, by means of the spring 57 to one of the braces 14 and at its other end to a solenoid 58, which at a predetermined point in the cycle of the operation (i.e. prior to the spin mode of operation), is energized to pull the rod 56 to the right as shown in FIG. 4 whereupon an abutment 59, thereon, pulls the L-shaped bracket 52 to the right to effect disengagement of the idler pulley 47 from the belt 27.

Biasing of the idler pulley into engagement with the belt 27 is accomplished by means of a tension spring 61 having one end received in one of a plurality of notches 62 provided in an adjustment link 63 secured to a depending leg of a bracket 64 secured to the motor mounting bracket 21. The other end of the spring 61 is attached to a sidewardly extending flange 66 of the L-shaped bracket 52.

As viewed in FIG. 4, when the motor 24 rotates counter-clockwise, as indicated by the arrow, the machine is in the spin mode of operation which corresponds to the solid line position of the idler pulley 47. Contrariwise, when the motor 24 rotates clockwise, as viewed in FIG. 4, the machine is in a washing mode of operation which corresponds to the dotted line position of the pulley 47 and arm 48 and the spring 61. It will be noted that the longitudinal axis of the spring 61 varies relative to the fixed pivot point 67 of the arm 48 to thereby produce an

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effective force on the belt 27, by the pulley 47, which is greater when the pulley is in the solid line position than when in the dotted line position.

A wire form 68 depending from the underside of the motor mounting bracket 21 adjacent the belt 27 serves to captivate the belt relative to the pulley 26 so as to prevent the belt from coming out of the pulley groove when the idler pulley is retracted prior to the spin mode of operation.

Since numerous changes may be made in the above-described apparatus and different embodiments of the invention may be made without departing from the spirit thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. Belt drive mechanism for a clothes washing machine having a basket supported for rotation and a vaned structure for agitating the clothes in said basket, said drive mechanism comprising: a motor having a plurality of operational modes, an input shaft, means including a belt interconnecting said motor and said input shaft, means providing coupling between said input shaft and said basket for effecting rotation thereof during a first mode of operation of said motor, said coupling means permitting actuation of said vaned structure during a second mode of operation of said motor, an idler pulley engaging said belt at the tight side thereof during said first mode of operation, means biasing said pulley into engagement with said belt to effect tensioning thereof simultaneously with both modes of operation and slippage thereof during at least a part of said first mode of operation.
2. Structure as specified in claim 1 including, rigid means for pivotally mounting said pulley, said bias means being attached at one end to said rigid means, at an end thereof opposite its pivot point, the other end of said bias means being fixedly attached such that the distance between the longitudinal axis thereof at said pivot point varies between modes of operation.
3. Structure as specified in claim 2 wherein, said bias means comprises a tension spring.
4. Structure as specified in claim 1 including, a pump operatively connected to said motor, means for maintaining the speed of said pump substantially constant throughout the cycle of operation of said machine.
5. Structure as specified in claim 4, wherein said maintaining means comprises means for effecting disengagement of said belt and said pulley during at least a portion of said first mode of operation.
6. Structure as specified in claim 5 including, means for captivating said belt when said idler pulley is disengaged.

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