

Dec. 20, 1960

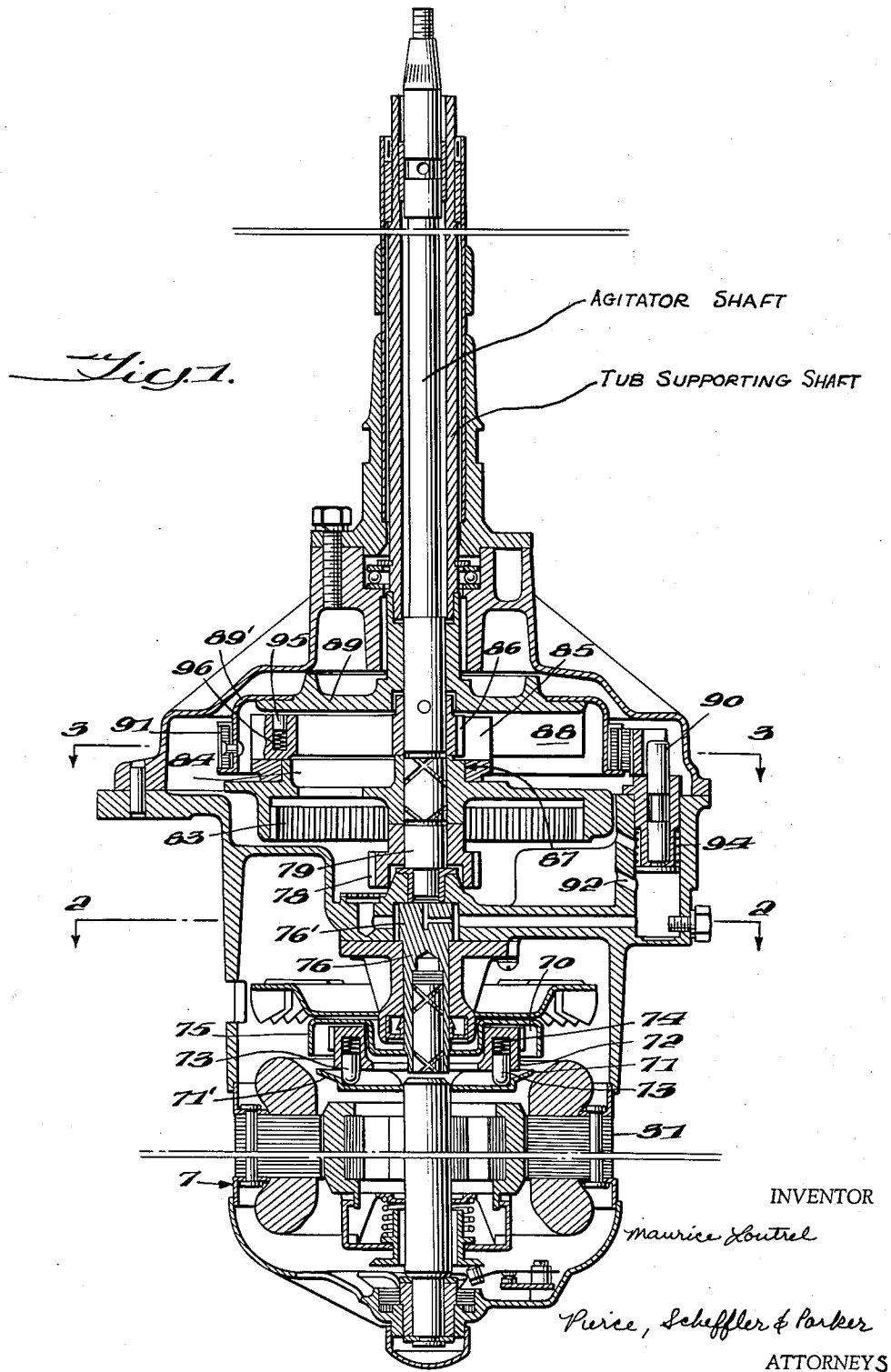
M. LOUTREL

2,964,974

TRANSMISSION MEANS FOR CLOTHES WASHING MACHINES

Filed Dec. 23, 1958

2 Sheets-Sheet 1



Dec. 20, 1960

M. LOUTREL

2,964,974

TRANSMISSION MEANS FOR CLOTHES WASHING MACHINES

Filed Dec. 23, 1958

2 Sheets-Sheet 2

Fig. 2.

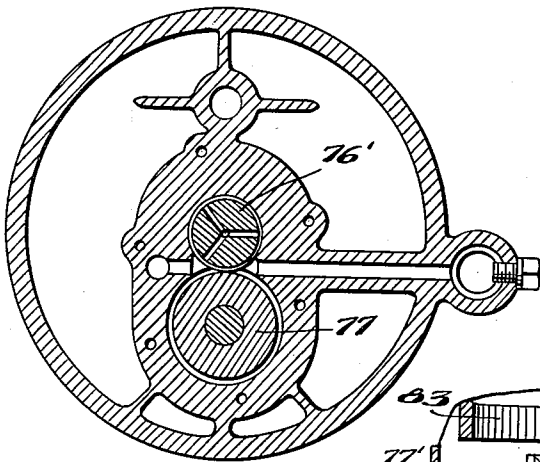


Fig. 5.

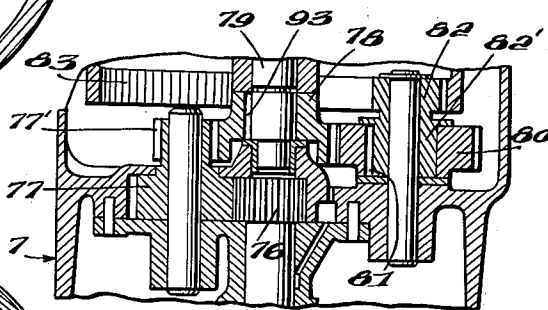


Fig. 3.

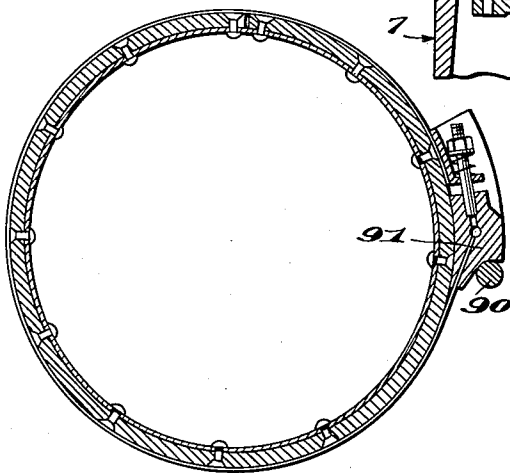


Fig. 6.

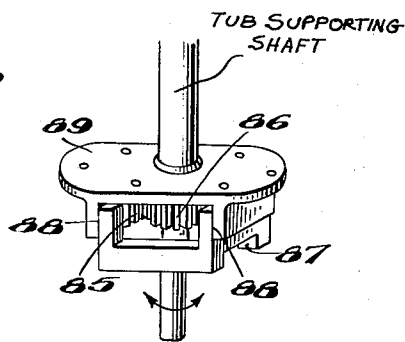
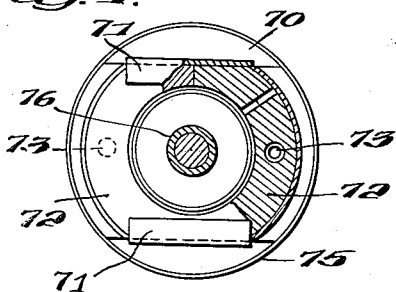


Fig. 4.



INVENTOR

Maurice Loutrel

BY *Pierce, Schaffer & Parker*
ATTORNEYS

1

2,964,974

TRANSMISSION MEANS FOR CLOTHES WASHING MACHINES

Maurice Loutrel, Paris, France, assignor to Cemam-Conord, Societe Anonyme, Paris, France, a corporation of France

Filed Dec. 23, 1958, Ser. No. 782,504

Claims priority, application France Dec. 24, 1957

3 Claims. (Cl. 74-665)

This invention relates generally to an improved transmission means for an automatic clothes washing and spinning machine, and more particularly to improved motor driven transmission means for imparting oscillatory movement to an agitator within a stationary clothes drum during the washing operation for one direction of rotation of the motor, and rotary motion to the drum and agitator as a unit during the spinning operation upon reverse rotation of the motor.

The present application is a companion application to my prior U.S. patent application Serial Number 659,418, filed May 15, 1957, entitled "Washing Machine Transmission."

In the prior application a machine for washing and spinning clothes was disclosed having a drum for receiving the clothes to be washed, an agitator in the drum for agitating the clothes, and motor transmission means for oscillating the agitator during washing and for rotating the agitator and drum as a unit during spinning. Reservoir means were also provided for the recovery of wash water for a subsequent laundering operation.

The present invention relates to improved transmission means which permits braking and stopping of the drum with respect to the agitator during the washing operation and release of these elements during the spinning operation. According to the present invention the braking is obtained by means of self-tightening drum brake activated by a hydraulic piston system controlled by the oil pressure produced by a gear-type oil pump driven by a reversible electric motor. The arrangement is such that for rotation of the motor in one direction, oil pressure will cause activation of the piston system to achieve braking of the drum, while upon rotation of the motor in the opposite direction, the negative oil pressure produced by the gear pump will cause release of the drum braking means.

In addition to being fully automatic this system has the advantage also of being controllable solely by the starting and direction of rotation of the electric motor, thereby avoiding the erroneous operation which often occurs with systems utilizing intermediate mechanical controls.

The primary object of the present invention is the provision of a transmission system for automatic washer and spinner machines having self-tightening drum braking means operable by a stop-finger piston actuated in accordance with the oil pressure of a motor-driven gear pump for braking a drum-supporting shaft during the washing operation.

A more specific object of the invention is to provide hydraulically-controlled stop-finger plunger means for operating a transmission brake drum, said finger being parallel or perpendicular to the axis of rotation of said brake drum so that the movement of said finger is controlled by a small amount of power and able to withstand substantial variations in pressure without affecting the action of the brake.

Another object of my invention is to provide a trans-

2

mission brake drum tightening means requiring low tolerances of manufacture compatible only with the precision of the gears of the mechanical pump.

Other objects and advantages of my invention will become more apparent from a study of the following specification when considered in conjunction with the accompanying drawings in which:

Fig. 1 is a longitudinal sectional view of the transmission mechanism;

Fig. 2 is a sectional view taken along line 2-2 of Fig. 1;

Fig. 3 is a sectional view taken along line 3-3 of Fig. 1;

Fig. 4 is a sectional view taken along line 4-4 of Fig. 1;

Fig. 5 is a detailed longitudinal sectional view of the gearing means taken along a plane normal to the sectional plane of Fig. 1; and

Fig. 6 is a perspective detail view of the rack and pinion drive means of Fig. 1.

Referring now to Fig. 1, the motor mechanism unit 7 includes a reversible electric motor 31 which drives the transmission gearing through the connection of automatic centrifugal clutch 70. The clutch prevents connection of the motor shaft with the transmission gearing when the speed of rotation of the motor is less than a predetermined value. The clutch 70 includes a driving disk 71 connected to the motor shaft and a driven drum 75 secured to gear shaft 76. Disk 71 has a stepped upper surface as shown in Fig. 1, upon which ride the lower extremities of the studs 73. Stud 73 is vertically movable in the radially-displaceable centrifugal masses 72 (see Fig. 4) and are biased downwardly by springs 74. When the speed of the motor shaft reaches a desired value, masses 72 move radially outwardly until the lower extremities of studs 73 ride upon the inclined surfaces 71' of disk 71. Members 72 are then urged upwardly into engagement with drum 75 by the springs 74 and direct drive between the motor shaft and gear shaft 76 will be achieved. Then the motor is stopped, the force of the springs on the studs and the weight of the masses 72 will cause the masses to slide downwardly and radially inwardly on the sloped surfaces 71' to their initial positions.

During the clothes washing operation the vertical agitator shaft is oscillated and the clothes drum supporting shaft concentrically mounted therein is maintained stationary in the following manner.

When the motor 31 is started in a given direction and the motor shaft achieves a predetermined rotational speed to cause connection of the motor shaft to the gear shaft 76, gear 76' secured to shaft 76 will drive gear 77. As shown in Fig. 2, gears 76' and 77 constitute a pressure oil pump the function of which will be described in greater detail below. Gear 77 has pinion 77' secured thereto (as shown in Fig. 5) which drives gear 78 to transmit rotary movement to gear 80. It is important to note that for this direction of rotation gear 78 is freely rotatable on the lower portion 79 of the agitator shaft. Gear 80 is rotatably mounted on shaft portion 82' of pinion 82 and is connected thereto upon rotation of pinion 82 in the given direction by means of the one-way connection provided by roller 81 mounted in a cam slot in shaft portion 82'. Gear 82 rotatably drives gear rim 83 which is provided on its upper surface with an eccentric 84 for transmitting oscillatory movement to the agitator shaft by means of rack 85 and gear 86. Rack 85, actuated by eccentric 84 turning between slides 87 (see Figs. 1 and 6), is actuated in an alternating rectilinear motion between slides 88 secured to flange 89 of the drum supporting shaft. Gear 86 is, of course, rigidly secured to the agitator shaft.

Rotation of flange 89 and the drum supporting shaft is prevented during the washing cycle by means of the self-tightening brake 91 of Fig. 3 which is concentrically mounted upon brake drum 89' secured to the drum supporting shaft flange 89. Brake 91 is actuated by means of the piston stop-finger 90 which is longitudinally displaceable within its cylindrical housing by the oil which is fed under pressure by the gear-type oil pump 76'—77. Orifice 92 in the wall of the piston cylinder permits entry of the pressure oil beneath the piston 90 to urge the same upwardly to achieve tightening of the brake band 91. When flange 89 of the drum supporting shaft is maintained stationary by the friction of brake band 91 on the drum 89', oscillatory motion is transmitted to the agitator shaft by the rack 85 and pinion 86.

During the drying operation the agitator and the drum are caused to rotate at high speed as a unit as follows.

When the direction of rotation of electric motor 31 is reversed in a known manner (as by throwing a switch to reverse the polarity of the leads of the supply voltage for example), clutch 71 will transmit the rotary motion of the motor shaft to the gearing shaft 76 when the motor speed is sufficient to operate the centrifugal clutch 71. Gear 76' drives gear 77 having integrally thereon the pinion 77' which drives gear 78 on the agitator shaft 79. Due to the one-way coupling between shaft 79 and gear 78 achieved for this direction of rotation by the roller 93 cooperating with a suitable cam groove in gear 78, shaft 79 will also be rotated by the pinion 77'. Pinion 78 will also drive gear 80 which for this direction of rotation merely rotates freely on shaft portion 82' in view of the one-way coupling achieved by the roller 81. Rotation of gear 78 and shaft 79 rigidly connected thereto causes gear 86 secured thereon to drive rack 85 to an end position of its longitudinal reciprocatory path of travel. The teeth of gear 86 and rack 85 act as a key to permit simultaneous driving of flange 89' of the drum supporting shaft and gear rim 83 of the agitator shaft. This is achieved by means of the set of slides 87 and 88; in this way gear 82 multiplies its speed with no effect whatsoever since its shaft portion 82' is freely rotatable in gear 80 due to the disengagement of the one-way connecting roller 81.

Rotation of drum supporting shaft 79 is permitted since the brake 91 is released for this direction of rotation of motor 31 as follows. Due to the reversed direction of rotation of the oil pump gears 76', 77, the pump will operate as a vacuum pump and no oil pressure is applied beneath stop-finger piston 90; consequently spring 94 will urge the piston downwardly to release brake band 91.

An obvious advantage of the present invention is that the machine automatically compensates itself for faulty or undesirably-rapid operation. For example, should the motor be stopped during a drying operation, the drum due to its own inertia, will continue to rotate for a certain period of time. Should the motor 31 be suddenly started in the opposite washing direction, pressure oil supplied by the gear pump will operate finger 90 to cause activation of the self-tightening brake band 91.

Thus the braking drum 89' secured to agitator shaft flange 89 will be frictionally engaged by the brake band 91 and the drum supporting shaft will be slowed down and gradually braked with no harm to the transmission gearing. It should be mentioned that the couple of the drum during the spinning operation is stronger than during the washing operation to permit this gradual braking effect.

In order to provide frictional engagement between rack 85 and flange 89, a plurality of fingers 95 are dis-

posed in the upper surface of rack 85 and are biased upwardly into engagement with the lower surface of flange 89 by springs 96. Thus displacement of the rack is prevented after stoppage of the motor in the spinning direction in order to prevent any relative oscillatory movement of the agitator during continuous circular movement of the washing drum.

While in accordance with the patent statutes I have illustrated and described the best form and embodiment of my invention now known to me, it will be apparent to those skilled in the art that other changes may be made in the apparatus described without deviating from my invention as set forth in the following claims.

I claim:

1. In a clothes washing and spinning machine having a housing, an agitator shaft rotatably mounted in said housing, a clothes drum supporting shaft concentrically mounted on said agitator shaft, a reversible motor mounted in said housing and having a motor shaft, and transmission means operable by said motor shaft for oscillating said agitator shaft when said drum supporting shaft is maintained stationary during the washing operation upon rotation of the motor shaft in a first direction and for rotating the drum supporting shaft and the agitator shaft as a unit during the spinning operation upon rotation of the motor shaft in the opposite second direction; the improvement wherein said transmission means comprises gear-type oil pump means driven by said motor shaft, said pump means producing positive oil pressure when said motor is rotated in the first direction and suction oil pressure upon rotation of said motor in the second direction, said drum supporting shaft having a flange with a brake drum secured thereto within said housing, and brake means operable by positive pressure oil from said pump means for preventing rotation of said clothes drum when said motor rotates in said first direction comprising a normally disengaged self-tightening brake band concentrically-mounted upon said brake drum, a stop-finger piston slidably movable in a cylinder adjacent said brake band, conduit means connecting said cylinder to said oil pump means, said piston being displaced in one direction in said cylinder by the pressure oil upon rotation of said motor in the first direction to actuate said brake band means, and spring means normally biasing said stop-finger piston in the opposite direction to cause disengagement of said brake band.

2. Apparatus as defined in claim 1 and further wherein said transmission means includes meshing rack and pinion means driven by said motor shaft to oscillate said agitator shaft when said motor rotates in said first direction, said pinion being secured to said agitator shaft and said rack being adjacent the flange of said clothes drum supporting shaft and connected to said motor shaft by gearing and eccentric means so that said rack will be reciprocated as said motor shaft is rotated in said first direction, said rack having a plurality of spring-biased fingers in frictional engagement with the flange of said clothes drum supporting shaft to prevent oscillatory movement of said agitator shaft upon continuous rotational movement of said drum supporting shaft when said motor is operated in said second direction.

3. Apparatus as defined in claim 1 wherein said piston is arranged for longitudinal movement in a direction parallel to the axis of said brake drum.

References Cited in the file of this patent

UNITED STATES PATENTS

2,406,226

Kimball

Aug. 20, 1946