June 1, 1943. H. BROTMAN 2,320,713

LAUNDRY APPARATUS

Filed March 11, 1938 4 Sheets-Sheet 1

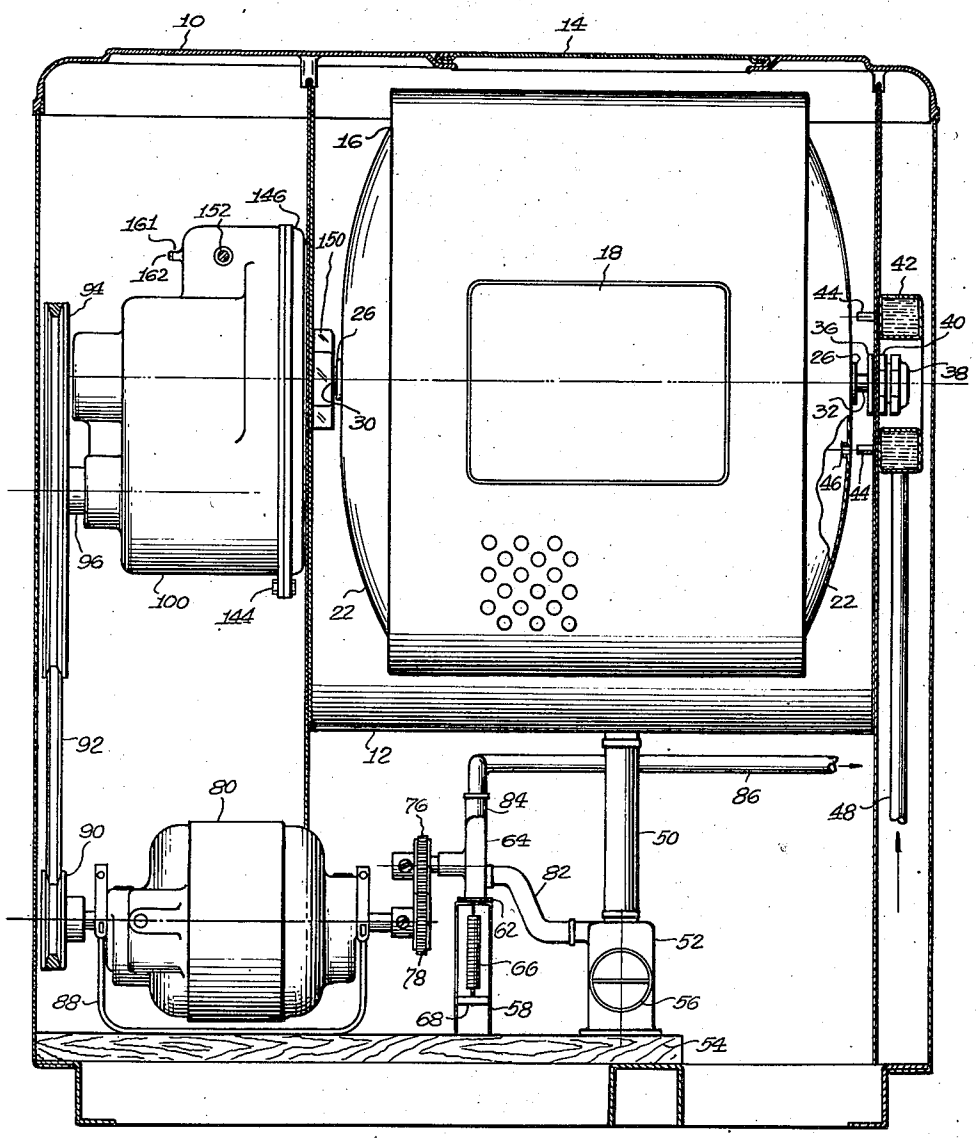


Fig. 1.

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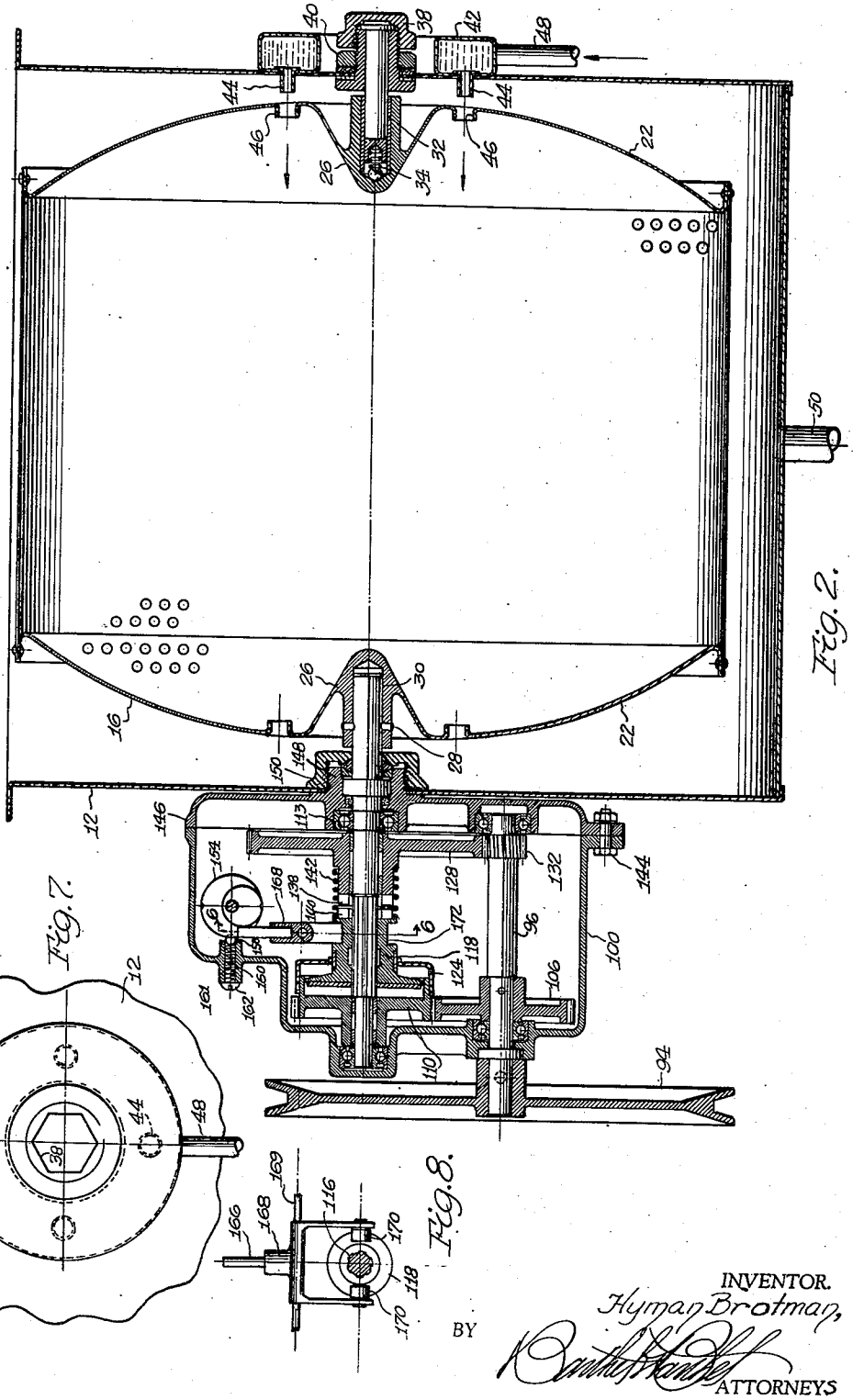


Fig. 2.

Fig. 7.

Fig. 8.

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Fig. 5.

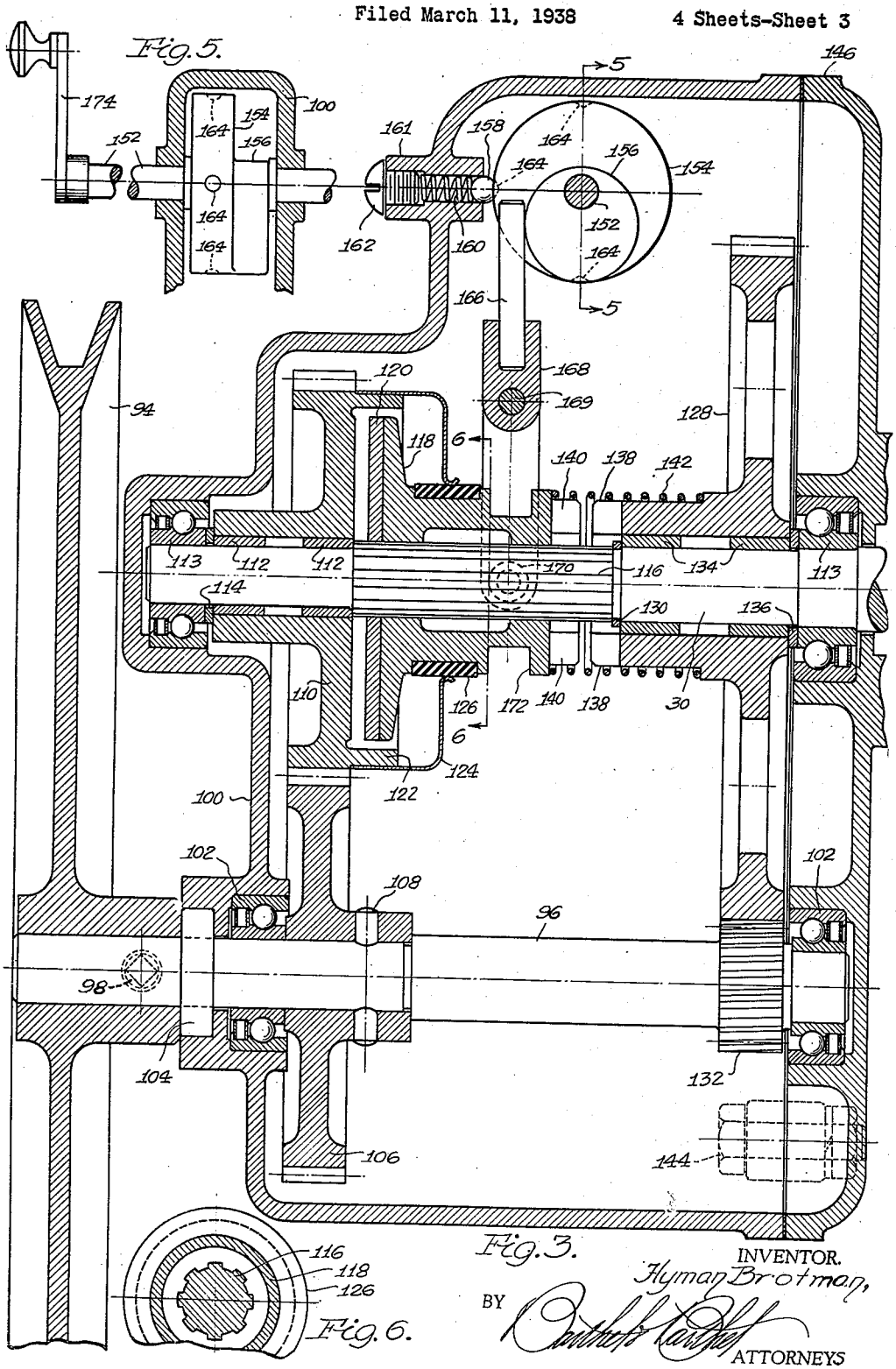


Fig. 3.

Fig. 6.

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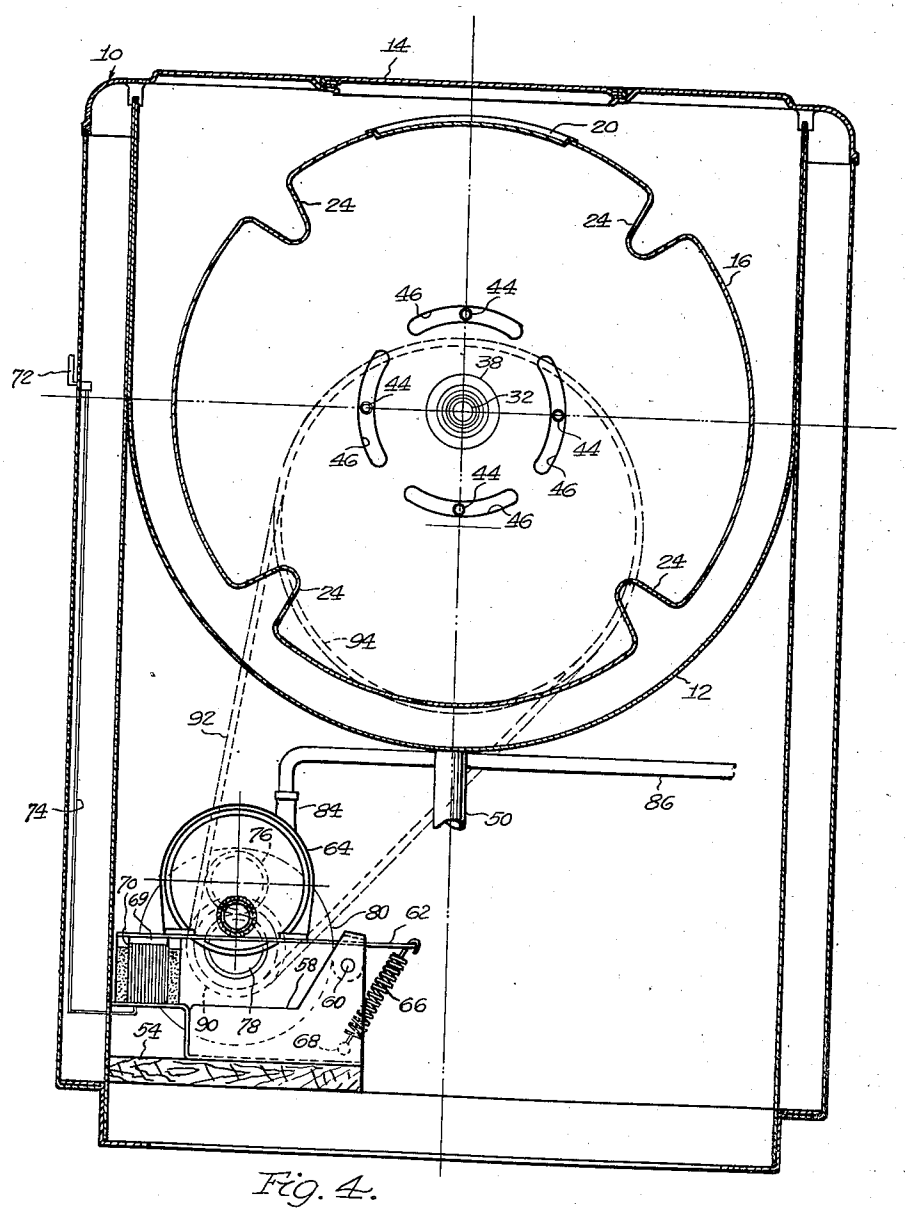


Fig. 4.

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LAUNDRY APPARATUS

Hyman Brotman, Detroit, Mich.

Application March 11, 1938, Serial No. 195,293

2 Claims. (Cl. 74—370)

This invention relates in general to washing machines, and has particular reference to the rotary type machine which is adapted both for washing and damp drying clothes. It has further and specific reference to the transmission of the machine.

One of the main objects of the present invention is to improve the transmission of the rotary type washing machine so that its manipulation is safe, easy, simple and highly effective.

Another object of the invention is to provide an improved washing machine transmission with means for rapidly changing over the operations of the machine from that of washing to that of drying, or vice versa.

Another object of the invention is to provide a novel form of clutch for an improved type of rotary washing machine, said clutch being adapted for driving said machine at a plurality of selective variable speeds.

Other objects and advantages will become readily apparent from a reference to the following specification, taken in conjunction with the accompanying drawings, of which there are four (4) sheets and in which:

Figure 1 is a front elevational view of the washing assembly embodying the present invention, and showing parts of the assembly in section and others broken away;

Fig. 2 is an enlarged vertical sectional view of the transmission, tank and cylinder shown in Fig. 1, and showing in detail the transmission in assembly;

Fig. 3 is an enlarged and detailed view, in section, of the transmission shown in Fig. 2;

Fig. 4 is an end sectional view of the apparatus shown in the preceding figures, and showing in elevation and in detail the pumping means in operative position and the actuating means therefor;

Fig. 5 is a sectional view taken through the lines 5—5 in Fig. 3 and showing in elevation the eccentric and its actuating means;

Fig. 6 is a sectional view taken through the lines 6—6 in Fig. 3;

Fig. 7 is an end elevational view of the distributing chamber shown in Figs. 1 and 2; and

Fig. 8 is an elevational view of the clutch operating yoke taken along the lines 8—8 in Fig. 2.

The figures illustrate a washing machine of the revolvable washing cylinder type, and shown generally at 10 is an outer casing for the washer, said casing being assembled and supported in the usual manner and being adapted for enclosing the washer and its apparatus in its entirety. Rigidly secured to the top of and being supported within said outer casing in spaced relation to one of its end walls is a stationary semi-cylindrical washing tank 12, said tank being formed to prevent water from escaping therefrom into said casing and being open at its top to communicate with an opening in said casing, said opening being closed by a removable cover plate 14. Adapted for revolving about a fixed axis within the tank 12 is a perforated washing cylinder 16 having an opening 18, or plurality thereof, formed therein through which said cylinder can be loaded with clothes, opening 18 being closed by a cover 20, and the perforations in cylinder 16 serving to permit fluid to pass therethrough from the tank 12. Cylinder 16 is closed at its ends, as usual, by a pair of perforated end plates 22 secured to the body of cylinder 16 in any appropriate manner, such as by bolting or welding, said cylinder being preferably provided or formed on its inner surface with a plurality of axially directed baffles 24 for giving one of the desirable forms of water actions to the clothes within cylinder 16.

Each of the end plates 22 of cylinder 16 is centrally provided or formed with a hub portion 26 into one of which, by means of a pin 28, is keyed a shaft 30 for rotatively driving the washing cylinder 16, and into the other of which hub is slidably provided a stub shaft 32, one end of said shaft 32 being provided with a spring and ball arrangement 34, and the other end of shaft 32 being journalled in a bearing 36 which itself is supported by the body of the washing tank 12. Threadedly secured to the end of bearing 36 is a shaft seal nut 38 which tends to keep shaft 32 in place against axial movement toward the right, and the spring and ball arrangement 34 tending to keep the hub 26 of the washing cylinder 16 up against the pin 28 on shaft 30. Bearing 36 is provided with a shoulder on one end and a lock nut 40 spaced therefrom, said shoulder and nut being adapted for retaining up against opposite faces of the wall of tank 12 the usual seal washers for preventing the escape of fluid from said tank at said bearing. Obviously, the shaft 32 can be pressed into or otherwise non-rotatably held by the bearing member 36, and if such is the case, then the bore of hub portion 26 of cylinder 16 is preferably hardened or otherwise provided with means for withstanding the wear thereat due to the relativity of movement between said bore and the shaft 32.

A water distributing chamber 42, of annular

shape and concentrically disposed with relation to shaft 32 and its bearing assembly, is secured within the casing 10 to and in fluid tight relationship with the washing tank 12 except for a plurality of orifices 44 which open therefrom into openings provided therefor in said tank and which are in alignment with a plurality of slotted openings 46 formed in the end plates 22 of the cylinder 16. Chamber 42 is communicated with a water source (not shown) by means of a conduit 48, the conduit permitting water to enter the chamber 42 under pressure and to be discharged rapidly from the latter into the tank 12 and cylinder 16 simultaneously.

For discharging the water from the tank 12 and cylinder 16 there is provided at the bottom of the former an outlet pipe 50 which empties into a separating chamber 52, said chamber 52 being shown as supported by a horizontal supporting member 54. Chamber 52 is adapted for separating out the heavy foreign matter from the water passing through the chamber from the tank 12, such as buttons, coins, nails and sludge, and is provided with a clean-out door 56 for enabling free access into said chamber for the removal therefrom of said foreign matter. Secured to and supported by said horizontal supporting member 54 is a bracket 58, at one end of which bracket 58, such as by a pin 60, is pivoted a pump platform 62 upon which is permanently supported or mounted a pump 64. To one end of the platform 62 is secured an end of a spring 66, the opposite end of said spring being secured to the bracket 58, such as at 68. The strength of spring 66 is such as, normally, to urge the platform 62, with the pump 64 mounted thereon, out of a horizontal position about the pivot 60. The end of platform 62 opposite its pivoted end is formed or provided with material 69 which is sensitive to magnetic forces and insulated from said platform and is shown in Figs. 1 and 4 as being magnetically held in proximity to the coil of a properly supported electrically energized magnet 70, said coil being shown diagrammatically as being connected to a closed switch 72 in an electric circuit through conduits 74. While in such closed position of switch 72 and during the energization of the magnet 70, a rubber faced pulley or gear 76, mounted on the pump 64 for driving same, is held in contact with a power pulley 78 mounted on a driving motor 80, such contact between pulleys 76 and 78 being caused by the assumption by the platform 62 of a horizontal position against the force of the spring 66 and causing the pump 64 to operate. The pump 64 is provided with a flexible inlet 82 and a flexible outlet 84, said inlet being connected between the pump 64 and the top of separating chamber 52, said outlet being connected to a discharge conduit 86, and said flexibility of inlet 82 and outlet 84 being necessary on account of the movement of the pump 64 and its platform 62 about the pivot 60 during the energization and de-energization of the magnet 70 through the operation of the switch 72.

The motor 80 is resiliently supported by a cradle 88, which cradle is supported in the usual manner on the horizontal supporting member 54, the motor being connected in the usual manner to a proper source of power (not shown) by a proper system of conduits (not shown). Secured to the end of the motor shaft for rotation therewith and opposite the end thereof on which pulley 78 is fixedly mounted is a drive pulley 90 for driving a belt 92. Belt 92 is adapted for driving, in turn, a larger pulley 94 which is secured to a shaft 96 for driving same by means of a screw 98, the shaft 96 being rotated at constant speed by the belt 92 and being journaled in the walls of a transmission housing, generally indicated at 100, by means of a plurality of combination axial and radial thrust bearings 102. Between the hub portions of the pulley 94 and the housing 100 there is provided an oil seal 104 which is pressed into the latter to prevent the escape of oil and grease outwardly from the housing around the shaft 96.

A gear 106 is pinned to the constantly rotatable shaft 96 for rotation therewith by means of a pin 108, the gear being secured against axial movement between one of the bearings 102 and a shoulder formed on said shaft. In constant mesh with gear 106 for being rotated at the same speed thereof is a gear 110 running idly on the shaft 30 around oil-less bearings 112. The portion of this washing cylinder driving shaft 30 which extends into the housing 100 for being supported thereby is journaled in the walls of said housing by means of a plurality of combination radial and axial thrust bearing assemblies 113. Between one of said bearings 113 and the end of the hub of gear 110 is disposed an annular metallic thrust washer 114.

Shaft 30 is provided with a longitudinally splined portion 116 at its periphery to which is engaged for being driven thereby an internally splined clutch member 118, member 118 being adapted for rotation with shaft 30 and for axial movement along the splined portion 116 of said shaft. The clutching face of member 118 is provided with a disc 120 of non-metallic material which is adapted, when member 118 is in frictional engagement with the rear driving face of gear 110, to drive the shaft 30 at the same speed as the speed of the gear 110. Gear 110 is provided at its periphery with an annular rearwardly extending flange 122 between the inner sides of which is formed on said gear the aforementioned driving face. To the outer periphery of the flange 122 is tightly secured a metal enclosure member 124 which is adapted to rotate with gear 110, to completely enclose the clutch member 118 to prevent the presence of grease and oil at the clutching faces of members 110 and 118, and to be tightly and resiliently held up against a rubber sleeve 126 securely mounted on the clutch member 118.

Needless to say, the splined portion 116 of shaft 30 is of greater length than the hub width of the clutch member 118, said portion 116 terminating at one end at the clutching face of gear 110 and providing a shoulder thereat for preventing axial movement of said gear. The other end of said splined portion 116 terminates substantially at the hub of a gear 128, with a snap ring 130 disposed therebetween for holding the gear 128 against axial movement on shaft 30, gear 128 being of greater diameter than gears 106 and 110 and being in constant mesh with a splined portion 132 formed on driving shaft 96, the gear 128 being idly mounted on shaft 30 around a plurality of oil-less bearings 134. Between gear 128 and one of the bearing assemblies 113 is disposed a fibre washer 136 for further preventing axial displacement of the gear 128. The splined portion 132 of shaft 96 is of small diameter so that meshing with the gear 128 of large diameter causes gear 128 to have a considerably lower rotary speed than that of the gear 110 which is driven by gear 106, the two latter gears being of an equal diameter which is less than that of gear 128 and greater than that of spline 132.

The hub of gear 128 is elongated to form a plurality of equally spaced axially directed teeth 138 which are adapted, upon movement of clutch member 118 to the right, to be meshed into the slots provided between equally spaced similar teeth 140 formed on the hub end of the clutch member 118, such meshing providing a metal to metal contact between member 118 and gear 128 and causing the member 118 to drive the shaft 30 at the rotary speed of gear 128. Held in position between shoulders provided therefor on member 118 and the hub of the gear 128, and telescoping said hub and the teeth 140 and 138 of said members, is a spring 142 which tends to oppose the engagement between the clutch member 118 and the gear 128.

As shown in Fig. 2, the transmission housing 100 has secured thereto, by means of a series of annularly spaced bolts 144, an end plate 146 with a proper gasket therebetween, said end plate being formed at its center with an exteriorly threaded hub portion 148 which protrudes through an opening provided therefor in the washing tank 12 and on to which is threaded a shaft sealing nut 150. The shaft 30 extends from within the housing 100 through hub 148 of plate 146, through the nut 150, and into the hub 26 of the washing cylinder 16, to be locked therein by the pin 28. The shaft 30, lying between the right hand bearing 113 and nut 150, is provided with a sufficient number of proper sealing members for sealing the transmission housing against entrance thereinto of water and moisture.

Extending between and through the walls of the transmission housing 100 and supported thereby is a shaft 152 upon which is mounted for rotation therewith a disc 154 and an eccentric 156. Shaft 152 is disposed above the driven transmission shaft 30 and its axis lies in a vertical plane which is perpendicular to a vertical plane which includes the axis of shaft 30. The disc 154 is adapted for being peripherally contacted by a ball member 158 which is spring impressed against said disc by means of a spring 160, said spring being supported in a bore provided therefor in boss 161 formed in the wall of housing 100, said bore being outwardly closed by a screw 162. The disc 154 is provided at its periphery with a plurality of equally spaced depressions 164, said depressions being engageable by said ball for holding said disc and eccentric in the desired selected position. Engaged by the surface of eccentric 156 is a rod 166 which is secured to an end of a yoke member 168, the forked portion of yoke 168 being provided with inwardly directed lugs or rollers 170 which fit into an annular depressed portion 172 on clutch member 118. Yoke 168 is mounted for pivoted movement about a rod 169 which is mounted in the walls of housing 100. So that, when shaft 152 is turned clockwise from the position shown in Fig. 3, the ball 158 will be upset from its lodgment in the depression 164, the surface of the eccentric 156 will force the rod 166 and yoke 168 to the left, the clutch member 118 consequently being forced to the right, and the teeth 140 on member 118 will engage with the slots between the teeth 138 on gear 128, the shaft 30 thereafter being driven at the same rate as that of the gear 128. Opposite movement of the shaft 152 will of course bring the face 120 of clutch member 118 into frictional engagement with the clutching surface of the gear 110, the shaft 30 being thereafter driven at the same rate, or substantially so, as that of the gear 110. The movement of shaft 152, for causing the different driving speeds for shaft 30, can be effected by means of a handle 174 connected to the shaft 152.

It is contemplated that the structural features of the apparatus for moving the clutch member 118 in either direction can be rearranged and that, where members have been shown separable, they can be made integral, and vice versa. It is also contemplated that such structure can be operable automatically, rather than manually as shown, such as by providing a properly controlled motor (not shown) in association with shaft 152 for driving same.

It is preferred to drive the shaft 96 at a constant speed of approximately 360 R. P. M.; to provide a one-to-one ratio between gears 106 and 110; and to provide a one-to-six ratio between gear 128 and spline 132. By doing this, the proper washing and drying speeds of approximately 60 R. P. M. and 360 R. P. M., respectively, can be attained.

Although the invention has been described with some detail it is not intended that the description be definitive of the limits of the inventive idea. The right is reserved to make such changes in the specification and drawings as will come within the purview of the attached claims.

What I claim is:

1. In a laundry machine transmission, a shaft supported for rotation about its axis, a pair of driving gears freely carried on said shaft with a fixed axial spacing therebetween and unitarily rotatable about said axis one at a relatively high speed and the other at a relatively low speed, said low speed gear having a hub extending toward said high speed gear, the portion of said shaft residing between said high speed gear and said hub being integrally formed with axially extending splined means, an annular spring loaded driven member carried on said shaft portion and being internally splined for driving engagement with said means, said member being movable along said means in opposite directions toward and away from said hub and said high speed gear and biased in the direction of said high speed gear, a friction clutch having a driving section formed on the side of said high speed gear facing said member and a driven section formed on the end of said member facing said high speed gear, said sections being interengageable upon movement of said member toward said high speed gear for driving said shaft at the speed of said high speed gear, and a jaw clutch having a driving section formed on said hub and a driven section formed on the opposite end of said member, said last two mentioned sections being interengageable upon movement of said member toward said low speed gear for driving said shaft at the speed of said low speed gear.

2. In a laundry machine transmission, a shaft supported for rotation about its axis, a pair of driving gears freely carried on said shaft with a fixed axial spacing therebetween and unitarily rotatable about said axis one at a relatively high speed and the other at a relatively low speed, said low speed gear having a hub extending toward said high speed gear, the portion of said shaft residing between said high speed gear and said hub being integrally formed with axially extending splined means, an annular driven member carried on said shaft portion and being internally splined for driving engagement with said means, said member being movable along said means in opposite directions toward and away from said hub and said high speed gear, a friction clutch

having a driving section formed on the side of said high speed gear facing said member and a driven section formed on the end of said member facing said high speed gear, said sections being interengageable upon movement of said member toward said high speed gear for driving said shaft at the speed of said high speed gear, a jaw clutch having a driving section formed on said hub and a driven section formed on the opposite end of said member, said last two mentioned sections being interengageable upon movement of said member toward said low speed gear for driving said shaft at the speed of said low speed gear, and a coil spring telescopically arranged about said hub, said opposite end of said member and said last two mentioned clutch sections for urging said member in one of said directions and for opposing movement of said member in the other of said directions.

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