March 29, 1960 T. R. SMITH 2,930,215

TUB ASSEMBLY FOR WASHING MACHINE

Filed May 2, 1955 2 Sheets-Sheet 1

Fig. 1.

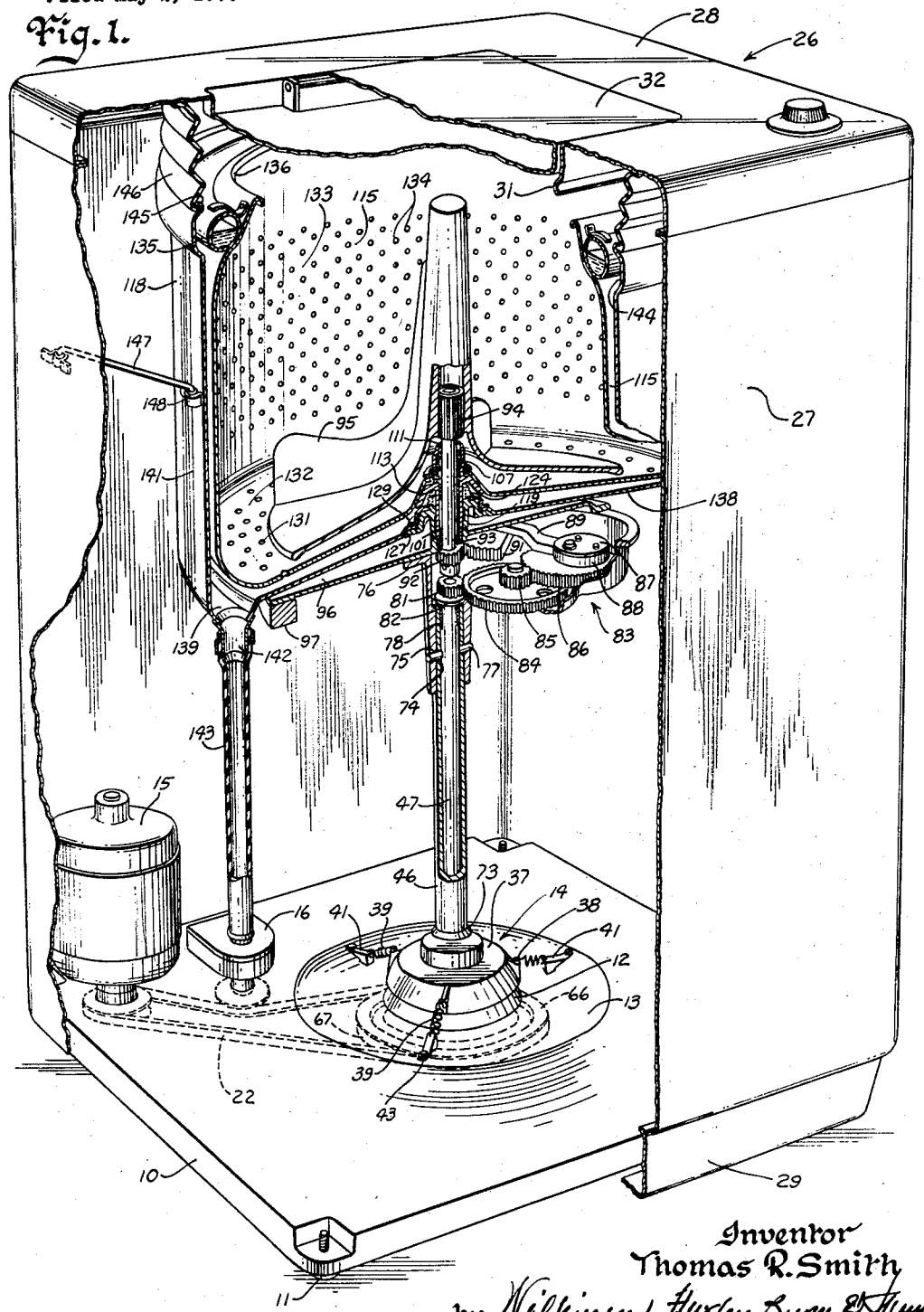

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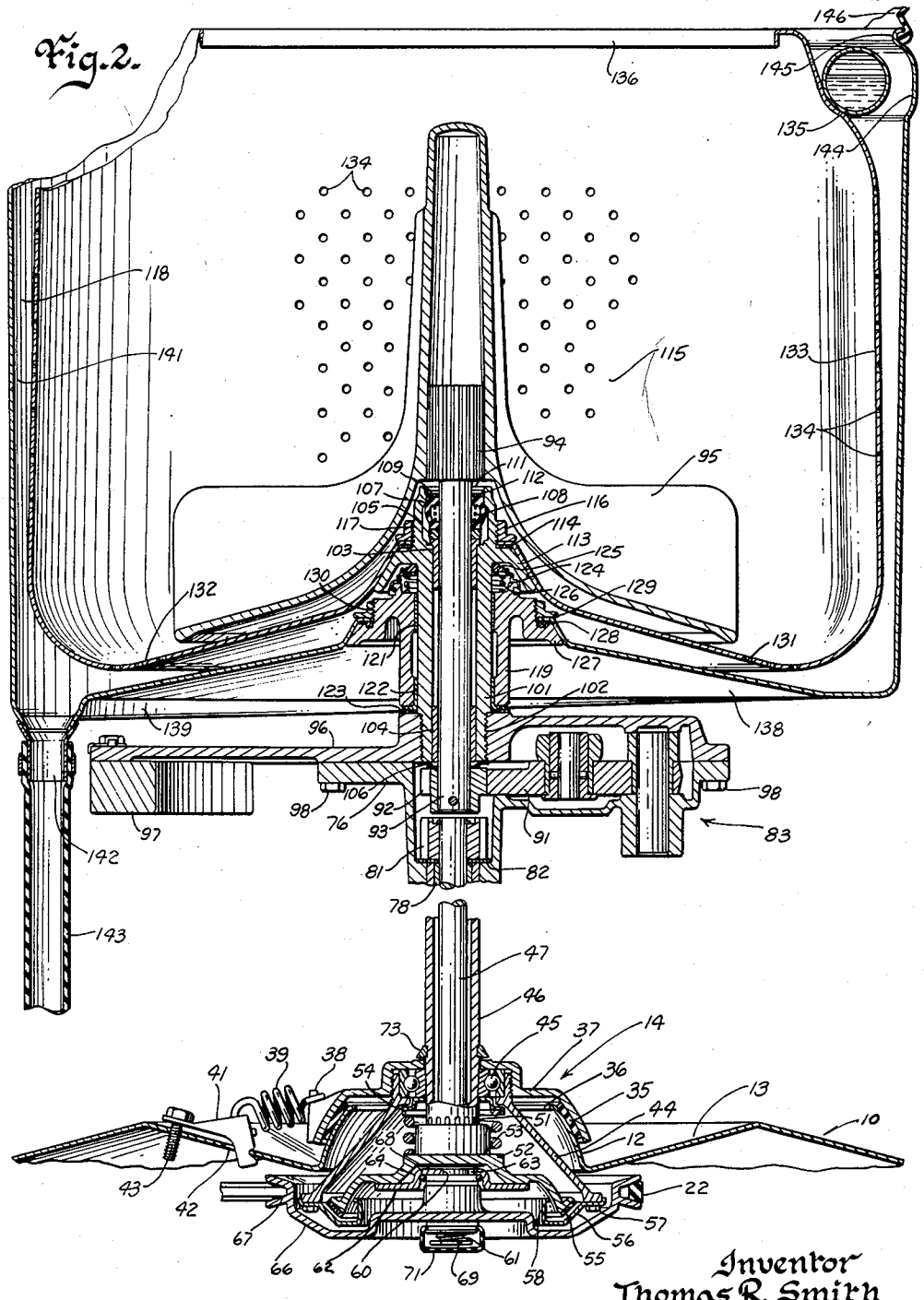
Fig. 2.



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TUB ASSEMBLY FOR WASHING MACHINE

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Application May 2, 1955, Serial No. 505,269

18 Claims. (Cl. 68—23)

This invention relates to an improved tub assembly for an automatic washing machine of the vertical axis type. In my Patent No. 2,645,108, entitled Combined Washing Machine and Centrifugal Fluid Extractor and issued July 14, 1953 to the same assignee as the instant application there is disclosed one tub assembly for a combination washing machine and fluid extractor. In that patent disclosure, an outer imperforate tub and a cooperating perforate basket nested within the tub are both affixed to a gear housing connected integrally with a spin tube mounted for nutational movements about its lower end. During periods of agitation, the tub and basket are restrained against rotation while an agitator driven by a shaft journaled within the spin tube produces the necessary degree of agitation of the fluids and fabrics within the stationary tub assembly. During spin periods, the double tub assembly is released for rotation and the outer tub, inner basket, agitator and gear housing are all spun in unison at centrifuging speeds to extract the fluids from the fabrics within the tub assembly.

This prior type assembly produces excellent results for removing excess moisture from the fabrics during the spin dry period by extracting the liquids outwardly through the perforate basket wall and against the vertical wall of the imperforate outer tub where the extracted fluids pass up and over the upper edge of the outer tub without passing through the fabrics and recontaminating them during this extraction period.

Though this type of double tub construction has produced better results than the use of a single imperforate tub, it has two distinct disadvantages. One of these disadvantages is that the use of this type tub assembly necessitates the use of an outer tub basin enclosing the tub assembly to catch the extracted fluids once they have passed over the upper edge of the outer imperforate tub in order to pass these fluids on to an external drain. The second disadvantage of this prior type double tub assembly is that not all of the heavier particles of sand and sediment separated from the soiled fabrics and settling between the basket and tub are always extracted from the tub during the fluid extraction process. Unlike the smaller particles of sand, etc., flushed from the assembly, some of these heavier particles remain within the tub assembly and are not flushed over the upper edge of the outer tub because of the action of the centrifugal forces pressing them outwardly against the vertical wall of the outer tub.

This invention therefore has as one of its prime objects the elimination of the necessity for use of an outer tub basin surrounding the tub assembly.

The second object of this invention is to produce a satisfactory tub assembly capable of efficiently extracting fluids from fabrics during the spin dry period while permitting sand and heavy sediment settling to the bottom of the tub assembly during the agitation periods to be thoroughly removed from the tub assembly before the end of each spin cycle so as to prevent recontamination of fabrics in subsequent operating cycles.

Another object is to produce a tub assembly in which the power housing containing the motion converting mechanism which drives the agitator within the assembly may be affixed directly to the spin tube to utilize the mass of the power housing and its mechanism to stabilize the gyrations of the spinning assembly during the centrifuging operation.

An additional object of this invention is to produce a tub assembly which includes a non-rotatable outer tub to facilitate water and sediment removal from the assembly with the tub being supported by and journalled on an upstanding shaft which rotates a perforate basket nested with the non-rotatable outer tub.

Other objects, advantages and features of this invention will be more apparent when reference is made to the following specification and drawings in which:

Figure 1 is a perspective view of an automatic washing machine embodying my invention and showing the relationship of my tub assembly with respect to cooperating assemblies supporting and powering the tub assembly, and

Figure 2 is a vertical elevation showing the detailed parts of my tub assembly and the associated drive assembly of Figure 1.

In these drawings there is shown a base member **10** mounted on adjustable feet **11** and provided with a supporting dome **12** rising out of a centrally located depression **13** in base **10**. Dome **12** serves as a mounting for a drive assembly **14** such as that of the John D. Goodlaxson application Serial No. 505,231, filed May 2, 1955, and assigned to the same assignee as that of the instant application.

Base member **10** also supports the upended reversible motor **15** and water pump **16** which like drive assembly **14** is driven by motor **15** through belt **22** beneath base **10**.

The cabinet **26** formed from wrap-around portion **27**, removable top portion **28** and toe board **29** is attached to and encloses base **10** together with the drive and tub assemblies supported thereby. Cabinet **26** also acts to reinforce base **10** against torsional stresses exerted on that base during the operation of the machine. Cabinet **26** is provided with an access opening defined by the depending flange **31** in cover portion **28**. This access opening is covered by closure **32** during normal operation of the washing apparatus.

The specific details of the drive assembly **14** supporting and controlling the tub assembly and forming the subject matter for the aforesaid Goodlaxson application will now be briefly described.

In Figure 2 it can be seen that dome **12** is provided with friction pads **35** on its periphery adjacent the aperture **36** in its uppermost portion. An umbrella-like support member **37** rests on these friction pads **35** and is provided with three equally spaced ears **38** for the three centering springs **39**. The opposite ends of centering springs **39** are each attached to an L-shaped bracket member **41** having a first pair of notched bifurcated legs fitted into a rectangular opening **42** in base **10** and a second leg fastened to base member **10** by means of an anchor screw **43** threaded into that base member. This not only centers and restrains umbrella member **37** against rotation but also provides a means for regulating the degree of dampening of the gyratory movements of umbrella member **37** on pads **35**.

Threaded into umbrella member **37** is the stator support member **44** which cooperates with member **37** by gripping the outer race of thrust bearing **45** provided with a tapered inner race. Mating with and seated in this tapered inner race of bearing **45** is the spin tube or shaft **46** which journals a power shaft **47** extending past the lower end of tube **46**. With this construction all weight placed on

the vertical tube 46 may be used to an advantage to provide an ample frictional force between umbrella member 37 and the friction pads 35 for dampening nutational movements of the shafts 46 and 47.

The lower end of tube 46 is provided with splines 51 which mate with internal splines of rotor member 52 so as to allow the latter member to move relative to tube 46 in an axial direction only. Rotor 52 is urged downwardly by a large coil spring 53 abutting rotor 52 and a spring retainer member 54 which in turn presses upwardly against the inner race of bearing 45.

Spring 53 moves rotor member 52 downwardly until brake lining 55, cemented to the bevelled edge of rotor member 52, engages the brake stator 56 which is fastened to stator support member 44 by means of cap screws 57 threaded into the latter member. Annular flange 58 extending upwardly from the brake stator 56 provides a reservoir for a small quantity of lubricating fluid in case a dry brake lining is not desired.

That lower portion of power shaft 47 extending beyond the lower end of tube 46 is provided with a flat 60 and a helix 61 spaced from each other. A clutch member 62 having a D-shaped opening 63 in its raised central portion 64 slides over the helix 61 and seats on flat 60 so that clutch member 62 may move axially of shaft 47 but is restrained against rotation relative to that shaft.

The contoured pulley 66 covering the bottom portion of the drive assembly 14 is threaded onto helix 61 permitting pulley 66 to spiral upwardly or downwardly on helix 61 as determined by the direction of rotational movements imparted to pulley 66 by reversible motor 15 through belt 22.

It should be noted that while tube 46 is supported by dome 12, concentric shafts 46 and 47 actually nutate on a point determined by the radii of curvature of this dome. In the modification of this drive assembly shown in the accompanying drawings, this point is also the intersection of the shafts' axis of rotation with the horizontal plane bisecting groove 67 of pulley 66.

The central portion 64 of clutch member 62 serves as the outer race for balls 68 so as to permit relative rotary movement between clutch member 62 and the upper end of pulley 66 which provides the inner race for these balls.

Pulley 66 is prevented from turning itself off the bottom of shaft 47 by a left hand cap screw 69 threaded into the lower end of shaft 47. With this construction a spiral movement of pulley 66 downwardly against cap screw 69 tends to tighten the latter into shaft 47. Resilient seal 71 provides a means for keeping foreign matter out of helix 61 and the space between the abutting surfaces of pulley 66 and cap screw 69.

Now with reference to the tub assembly forming the invention of the instant application it can be seen that tube 46 extends upwardly from drive assembly 14 and past the deflector seal 73 keeping foreign liquids and particles out of drive assembly 14. The upper end of tube 46 is provided with a pair of diametrically opposed holes 74 which mate with holes 75 formed in the lower extension of lower power housing cover 76. By inserting pins 77 into these mating holes 74 and 75, the lower power housing cover 76 becomes a unitary extension of tube 46.

The upper end of tube 46 is provided with a bushing 78 which journals the power shaft 47 for rotation within tube 46. Securely fastened to the upper end of shaft 47 is a driven pinion 81 which rests upon thrust washer 82 within lower power housing cover 76 to prevent shaft 47 from moving downwardly within tube 46. It should be apparent with this construction that shaft 46 and thrust bearing 45 support shaft 47 in addition to all weight placed on lower gear case cover 76.

In order to obtain an oscillatory movement from the rotary motion imparted to power shaft 47, a motion converting unit 83 is provided. In unit 83 the input pinion 81 rotates spur gear 84 and its affixed pinion 85 which in turn rotates gear 86. Gear 86 is affixed to an eccentric 87 which rotates within strap 88 to rock segmental gear 91 through pitman 89. The rocking segmental gear 91 oscillates the driven pinion 92 affixed to the agitator drive shaft 93 which in turn is fastened by means of splines 94 to the conventional agitator 95.

To enclose and counterbalance motion converting unit 83, the upper power housing cover 96 carrying counterweight 97 is secured to lower casing cover 76 by means of cap screws 98. In addition to enclosing and counterbalancing unit 83, top cover 96 provides a support for the stub shaft or vertical mounting stem 101 threaded into top cover 96 by means of threads 102. It should be noted that other types of motion converting units may be used in the power housing formed by covers 76 and 96 to drive agitator shaft 93.

Stub shaft 101 is provided with upper and lower bushings 103 and 104, respectively, journalling the agitator shaft 93 and maintaining that latter shaft in its vertical position. Pressed onto shaft 93 near its upper end is a thrust collar 105 which is resiliently urged against upper bushing 103 by means of the flexible thrust washer 106 between driven pinion 92 and the lower end of stub shaft 101.

Urged against the top side of collar 105 is the shaft seal 107 which encloses coil spring 108 and presses upwardly against a washer 109 maintained in its position at the mouth 111 of stem 101 by means of an expansible C-ring 112 engaging an annular mating groove within mouth 111.

Mounting stem 101 is provided with a basket mounting flange 113 which serves as a seat for gasket 114 and the perforate tub or basket 115 which is forced against gasket 114 by means of a large nut 116 mating with threads 117 on the mounting stem 101. This connection between basket 115 and mounting stem 101 prevents any relative rotation between these members and provides a unitary connection between tube 46 and basket 115.

Basket 115 nests within a non-rotating outer tub 118 which is secured to a tub journal bearing or tub carrier 119 by connections similar to those used in attaching basket 115 to stem 101. Tub carrier 119 is provided with an upper bushing 121 and a lower bushing 122 both of which journal mounting stem 101 and the latter of which rests upon a thrust washer 123 carried on the top side of the upper power housing cover 96 so as to permit relative rotation between the mounting stem 101 and the tub carrier 119. The upper end of tub carrier 119 is provided with a resilient bellows type seal 124 formed integrally with an annular carbon nose seal ring 125 urged against the lower side of annular flange 113 by means of a coil spring 126.

Tub 118, spaced from basket 115, has its central portion mating with a mounting flange 127 and is pressed against a resilient beaded gasket 128 by means of a nut 129 mounted on threads 130 of tub carrier 119 and having an inner diameter larger than the largest diametrical extent of flange 113. This produces an unitary waterproof connection between tub 118 and tub carrier 119.

While tub 118 and basket 115 may be connected to their respective flanges by machine screws or other methods, it should be apparent from this description that the disclosed construction lends itself to easy repair and assembly. Once agitator 95 and cabinet top 28 have been removed, one need only to unscrew nut 116 to remove basket 115 from cabinet 26. After basket 115 has been removed, tub 118 can also be removed in a similar manner by loosening its drain hose connection, unscrewing nut 129 and taking tub 118 from its supporting flange 127.

Basket 115 slopes downwardly from annular flange 113 beneath agitator 95 and is provided with three rings of holes 131 in the lowermost portion of its bottom wall 132 before rising into the nearly cylindrical wall 133 provided with holes 134 and supporting a balancing ring 135

near the rolled edge 136 defining an access opening for basket 115.

Tub 118 is provided with an imperforate bottom wall 138 which slopes downwardly from its mounting flange 127 in a nearly parallel relationship to bottom wall 132 of basket 115 before merging into a C-shaped gutter 139 at its junction with cylindrical wall 141. As is apparent from Figure 2 gutter 139 is of varying depths with its shallowest portion beginning diametrically opposite its deepest portion which is immediately over the drain 142 leading to water pump 16 through drain hose 143.

Cylindrical wall 141 is imperforate and is provided with an annular recess 144 adjacent balancing ring 135 to create clearance between these parts and to add strength to the outer tub 118. The lip 145 formed at the upper edge of wall 141 serves as an anchor for a large beaded bellows seal 146 which presses upwardly against and slides on the lower side of cabinet top 28 to seal and prevent the escape of steam from within the tub assembly. This vapor seal may also be created by attaching one end of a bellows seal to depending flange 31 and the other end to lip 145 so as to maintain a vapor seal within the tub assembly during nutational movement of that tub assembly on its supporting shaft 46.

Though the drag forces caused by the rotation of mounting stem 101 may tend to cause the rotation of tub carrier 119 and its attached tub 118, drain hose 143 connected between tub 118 and the water pump 16 prevents outer tub 118 from following rotational movements imparted to mounting stem 101. If it is desired to relieve all forces from hose 143 as caused by attempted rotation of tub 118 upon rotation of spin tube 46, other tub restraining devices such as link 147 connected between cabinet portion 27 and tub 118 and mounted in rubber grommets 148 may be used to anchor and prevent rotation of tub 118.

In operation over typical agitation and spin periods, the fabrics to be cleaned are inserted into basket 115 through the access openings defined by depending flange 31 and rolled edge 136. A suitable detergent is added to the water placed within tub 118 by a water supply system not forming a part of this invention. Though a valve may be used in the drain hose 143 to prevent the washing fluids from draining from tub 118, the water may be retained within tub 118 in this illustrated embodiment by merely maintaining the external drain hose (not shown) attached to the outlet of pump 16 at a higher elevation than the elevation of the water contained within tub 118.

During the tub filling period when the liquid rising within the tub 118 has covered holes 131 in basket 115, air is trapped between bottom walls 132 and 138 due to the presence of seal 124 and the air tight connections between basket 115 and tub 118 and their respective flanges 113 and 127. This prevents fluids from contacting seal 124 or nut 129. Likewise, when the liquid level rises above the lower edge of agitator 95, air is trapped beneath agitator 95 and prevents liquids from contacting either seal 107 or nut 116.

When tub 118 has been filled with a sufficient quantity of washing fluid, the reversible motor 15 is energized through a control system (not shown) to rotate pulley 66 in a clock-wise direction as viewed in Figure 1. Rotation of pulley 66 in this direction causes pulley 66 to spiral downwardly on helix 61 until it abuts the head of cap screw 69. After this engagement between these parts has been made, further rotation of pulley 66 rotates inner shaft 47 to the exclusion of tube 46 which continues to be restrained against rotation by the braking action of rotor 52 which is pressed against stator 56 by coil spring 53. This rotation of shaft 47 and its attached pinion 81 drives through motion converting unit 83 so as to produce an oscillatory movement for agitator drive shaft 93 and its attached agitator 95 in the agitation period.

The oscillating action of agitator 95 forces the cleaning fluid through the fabrics within basket 115 and separates impurities held by them. The larger and heavier particles such as sand and sediment fall to the bottom of basket 115 where they pass through holes 131 in the lowermost portion of bottom wall 132. This agitation of fluids within tub 118 also causes these heavier particles to work their way down the sloping wall 138 and into the gutter 139 around the periphery of that bottom wall. Once in this gutter 139, these particles continue to seek a lower elevation in the agitated fluid and find their way into the deepest part of gutter 139 and eventually into the drain outlet 142 in the lowermost portion of tub 118.

Upon completion of the agitation cycle and the initiation of the spin or liquid extraction period, motor 15 is reversed causing the water pump 16 and drive assembly pulley 66 to reverse their directions also. When driven in this direction, water pump 16 is permitted to pump the washing fluid together with the accumulation of sand and sediment from tub 118 through its drain connections.

This reversal of driving power causes pulley 66 to spiral upwardly on helix 61 against balls 68 and move clutch plate 62 upwardly against the urging of coil spring 53. Upward movement of clutch member 62 causes this latter member to engage and lift rotor member 52 away from the brake stator 56 freeing rotor 52 and drive tube 46 for rotation. However, relative rotation between pulley 66 and clutch member 62 on balls 68 continues until clutch member 62 abuts the lower end of spin tube 46. This causes member 62 to cease its upward travel with the result that balls 68 become wedged between clutch member 62 and rotor 52 and prevent further upward travel of pulley 66 on helix 61. Further rotation of pulley 66 therefore causes tube 46 to rotate in a counter clockwise direction as viewed in Figure 1 through a power path provided through pulley 66, shaft 47, flat 60, clutch member 62 and rotor 52. This causes shafts 46 and 47 to rotate in unison with their driven assemblies.

It should be noted that when pump 16 and drive assembly 14 are stopped and immediately reversed and driven together as illustrated in this embodiment some water will be present in the tub assembly during the initial liquid extraction operation. Depending upon the torque input to tube 46, certain drag forces will be exerted by the water within tub 118 on the rotating basket 115 and may be utilized to prevent the basket 115 from immediately coming up to speed until enough of the washing fluid has been emptied from the tub 118 so as to insure that no water will attempt to pass over lip 145 of tub 118 during the spin process. In this way all water extracted from the fabrics within basket 115 may be utilized to flush all impurities down drain 142 and into the drain hose 143. Thus, while it possesses the extraction efficiency of the centrifugal fluid extractor of the aforesaid Smith Patent No. 2,645,108, this improved tub assembly gains the advantage of removing through the bottom of the tub assembly those heavier particles which were difficult to pass over the upper sides of that prior type of tub assembly.

At the end of the spin dry operation motor 15 is stopped causing drive pulley 66 to lose angular momentum. The inertia of the tub assemblies driven by shafts 46 and 47 causes these shafts to continue their rotation so that relative rotation between pulley 66 and shaft 47 results. This relative rotation between pulley 66 and helix 61 causes pulley 66 to spiral downwardly on helix 61. The coil spring 53, which constantly forces downwardly on rotor 52, causes rotor 52, clutch member 62 and balls 68 to follow the downward travel of these parts. These parts progress downwardly in unison until rotor 52 engages brake stator 56 to quickly stop the rotation of spin tube 46 and basket 115. Inner shaft 47, when released from its driving connection with shaft 46, also comes to a quick stop due to the drag forces acting on pulley 66 and motor 15. Though these periods may be repeated and rinse periods added, this terminates the spin period of my illustrated operational cycle.

While I have illustrated the operation of my tub assembly in cooperation with a reversible drive assembly, other drive assemblies such as that disclosed in the aforesaid Smith Patent 2,645,108 may be used.

In addition, while only one embodiment of my invention has been shown in the accompanying drawings, it is understood that modifications of this embodiment may be made without departing from the scope of my invention as set forth in the following claims.

I claim:

1. A tub assembly for a washing machine provided with a support member, comprising, a rotatable shaft mounted in said support member for nutational movements about a point lying on the axis of rotation of said rotatable shaft, a gear case connected unitarily with and supported by said rotatable shaft, a stub shaft connected to and extending upwardly from said gear case in coaxial alignment with said rotatable shaft, a tub supported by and journalled on said stub shaft, and bearing means mounted on said stub shaft for supporting said tub.

2. A tub assembly for a washing machine provided with a support member, comprising, a rotatable shaft mounted in said support member for nutational movements about a point lying on the axis of rotation of said rotatable shaft, a gear case connected unitarily with and supported by said rotatable shaft, a stub shaft connected to and extending upwardly from said gear case in coaxial alignment with said rotatable shaft, a tub supported by and journalled on said stub shaft, bearing means mounted on said stub shaft for supporting said tub, and a perforate basket nested within said tub and connected to said stub shaft.

3. In a washing machine, a power housing mounted for rotation about a vertical axis, a shaft connected unitarily with and extending upwardly from said power housing, an imperforate tub journalled on and supported by said shaft, bearing means mounted on said shaft for supporting said imperforate tub, a perforate basket nested within said tub and integrally connected with said shaft, means for rotating said power housing, and anchor means restraining said tub against rotation.

4. In a washing machine, a revoluble power housing, a support shaft connected unitarily with and extending upwardly from said power housing, an imperforate tub journalled on and supported by said support shaft, bearing means mounted on said support shaft for supporting said imperforate tub, a perforate basket nested within said tub and unitarily connected with said support shaft, an agitator within said perforate basket, an agitator shaft journalled within said support shaft and connected to said agitator, mechanism enclosed by said power housing for driving said agitator shaft, means for rotating said power housing, and restraining means holding said tub against rotation.

5. In a washing machine, a rotatable shaft, a power housing connected unitarily with and supported by said rotatable shaft, a stub shaft affixed to and extending upwardly from said power housing, an imperforate tub journalled on and supported by said stub shaft, bearing means mounted on said rotatable shaft for supporting said imperforate tub, a perforate basket nested within said tub and connected unitarily with said stub shaft, an agitator shaft journalled within said rotatable shaft, an agitator positioned within said basket and connected to said agitator shaft, mechanism enclosed by said power housing for driving said agitator shaft, means for rotating said rotatable shaft, and anchor means restraining said tub against rotation with said rotatable shaft.

6. In a washing machine, a supporting frame, a power housing mounted on said supporting frame for rotation about a vertical axis and for nutation about a point lying on said axis, a shaft unitarily connected with and extending upwardly from said power housing, a tub journalled and supported on said shaft for nutational movements with said power housing, bearing means mounted on said shaft for supporting said tub, and a perforate basket nested within said tub and connected to said shaft for rotational movement relative to said tub.

7. In a washing machine, a supporting frame, a support shaft mounted on said supporting frame for rotation about a vertical axis and for nutation about a point lying on said axis, a power housing connected integrally with and supported by said support shaft, a stub shaft affixed to and extending upwardly from said power housing, a tub journalled and supported on said stub shaft for nutational movements with said support shaft, bearing means mounted on said stub shaft for supporting said tub, and a perforate basket nested within said tub and connected to said stub shaft for rotational movement relative to said tub.

8. A tub assembly for a washing machine comprising, a vertical shaft, a tub carried and supported on said vertical shaft in an upright position, bearing means mounted on said vertical shaft for supporting said tub, a perforate basket nested within said tub and connected to said vertical shaft, an agitator within said perforate basket, said vertical shaft journalled in said tub, and an agitator shaft connected to said agitator and journalled within said vertical shaft.

9. A tub assembly for a washing machine comprising, a vertical shaft, a tub carried and supported on said vertical shaft, said vertical shaft journalled in said tub, bearing means mounted on said vertical shaft for supporting said tub, a perforate basket nested within said tub and connected to said vertical shaft, an agitator within said perforate basket, and an agitator shaft connected to said agitator and journalled within said vertical shaft.

10. A tub assembly for a washing machine comprising, a vertical shaft, a tub carried and supported on said vertical shaft, said vertical shaft journalled in said tub, bearing means mounted on said vertical shaft for supporting said tub, a perforate basket nested within said tub and connected to said shaft, an agitator within said perforate basket, an agitator shaft connected to said agitator and journalled in said vertical shaft, a power housing unitarily connected with said vertical shaft and spaced from said tub, and means within said power housing for driving said agitator shaft.

11. A tub assembly for a washing machine comprising, a support shaft, a gear case connected to and supported by said support shaft, a stub shaft connected to and extending upwardly from said gear case, a tub carried and supported on said stub shaft, said stub shaft journalled in said tub, bearing means mounted on said stub shaft for supporting said tub, and a perforate basket nested within said tub and connected to said stub shaft.

12. A tub assembly for a washing machine comprising, a support shaft, a power housing connected unitarily with and supported by said support shaft, a stub shaft affixed to and extending upwardly from said power housing in coaxial alignment with said support shaft, a tub supported on said stub shaft, said stub shaft journalled in said tub, and bearing means mounted on said stub shaft for supporting said tub.

13. A tub assembly for a washing machine comprising, a support shaft, a power housing connected unitarily with and supported by said support shaft, a stub shaft affixed to and extending upwardly from said power housing in coaxial alignment with said support shaft, a tub carried and supported on said support shaft, said stub shaft journalled in said tub, bearing means mounted on said stub shaft for supporting said tub, and a perforate basket nested within said tub and connected to said stub shaft.

14. A tub assembly for a washing machine comprising, a support shaft, a gear case connected unitarily with and supported by said support shaft, a stub shaft affixed to and extending upwardly from said gear case in coaxial alignment with said support shaft, a tub carried

and supported on said stub shaft in an upright position, said stub shaft journalled in said tub, and bearing means mounted on said support shaft for supporting said tub.

15. A tub assembly for a washing machine comprising, a support shaft, a gear case connected unitarily with and supported by said support shaft, a stub shaft affixed to and extending upwardly from said gear case in coaxial alignment with said support shaft, a tub carried and supported on said stub shaft in an upright position, said stub shaft journalled in said tub, bearing means mounted on said support shaft for supporting said tub, and a perforate basket nested within said tub and connected to said stub shaft.

16. In a washing machine, a rotatable shaft, a tub carried and supported on said rotatable shaft, said rotatable shaft journalled in said tub, bearing means mounted on said rotatable shaft for supporting said tub, a perforate basket nested within said tub and connected to said rotatable shaft, an agitator within said perforate basket, an agitator shaft connected to said agitator and journalled in said rotatable shaft, means for rotating said rotatable shaft, and restraining means holding said tub against rotation within said rotatable shaft.

17. In a washing machine, a supporting frame, a revoluble shaft, means mounting said shaft in said supporting frame for rotation about a vertical axis and for nutation about a point lying on said axis, a tub carried and supported on said shaft for nutational movements with said shaft, said shaft journalled in said tub, bearing means mounted on said shaft for supporting said tub, and a perforate basket nested within said tub and connected to said shaft for rotational movement relative to said tub.

18. In a washing machine, a supporting frame, a revoluble shaft, means mounting said shaft in said supporting frame for rotation about a vertical axis and nutation about a point lying on said axis, a tub pierced by said shaft and mounted thereon for nutational movement with said shaft, bearing means mounted on said shaft for supporting said tub, sealing means between said tub and said shaft providing a leakproof connection therebetween, means restraining said tub against rotation with said shaft, and a perforate basket nested within said tub and connected to said shaft for rotational movement relative to said tub.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,930,215 March 29, 1960

Thomas R. Smith

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 13, for "with" read -- within --.

Signed and sealed this 20th day of September 1960.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents