

April 16, 1929.

E. D. CLARKE

1,709,774

WASHING MACHINE

Filed April 30, 1924

3 Sheets-Sheet 1

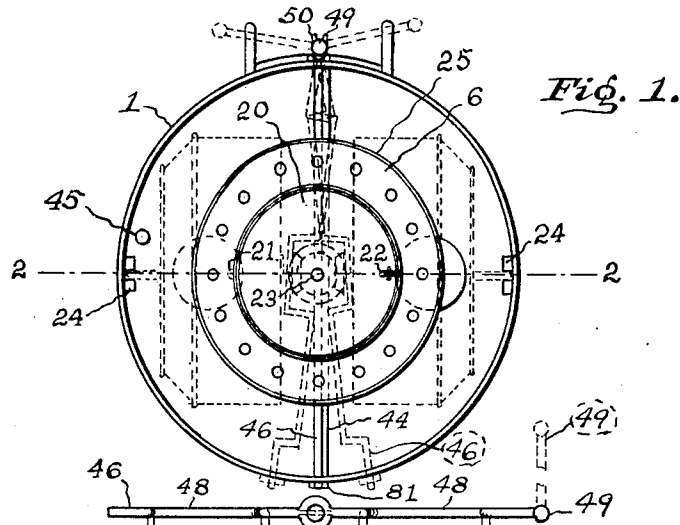


Fig. 1.

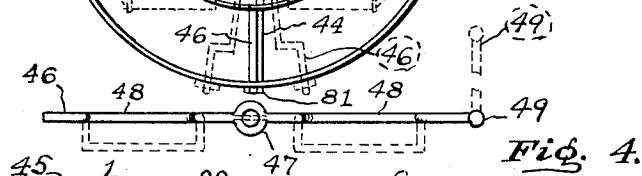


Fig. 4.

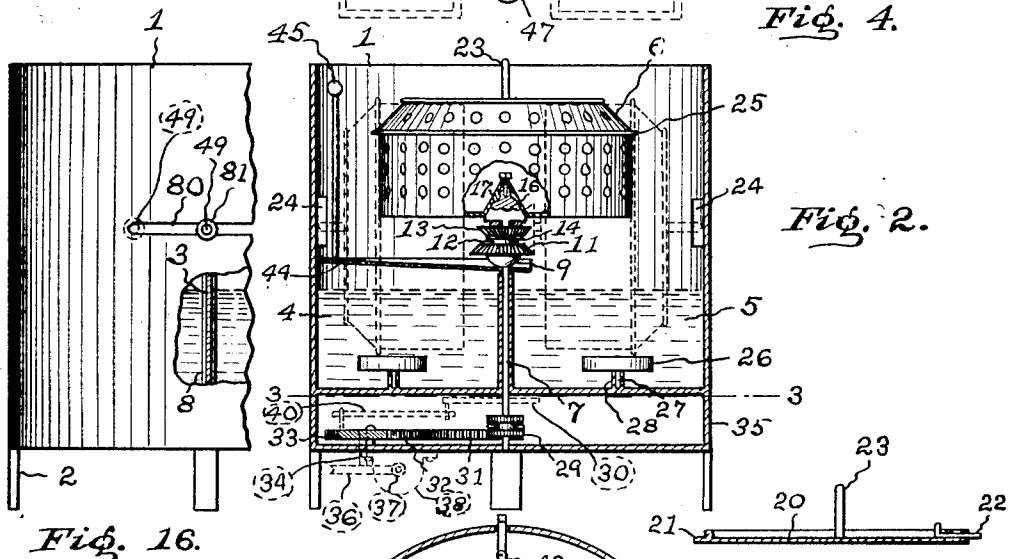


Fig. 2.

Fig. 16.

Fig. 3.

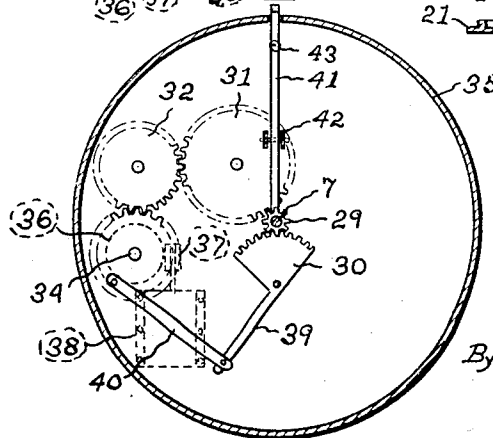


Fig. 5.

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3 Sheets-Sheet 2

Fig. 6.

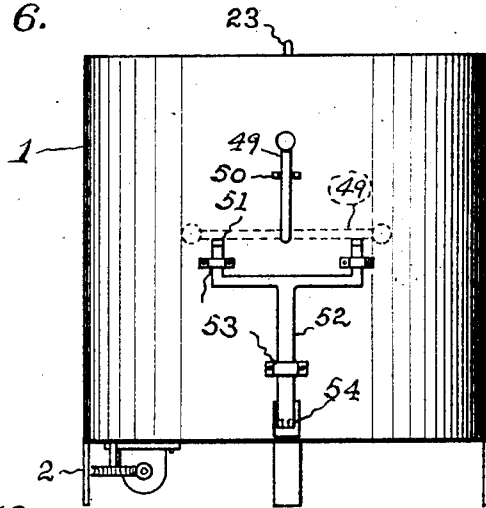


Fig. 11.

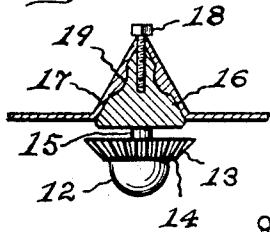


Fig. 9.

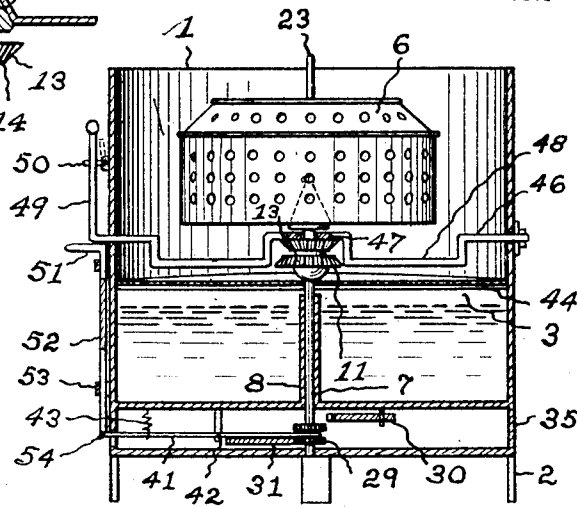
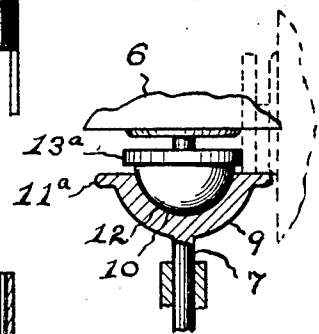
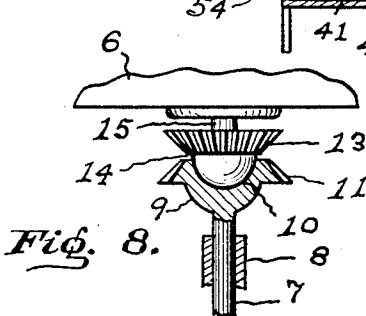
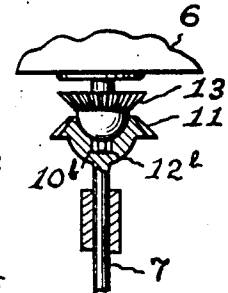


Fig. 7.

Fig. 10.



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3 Sheets-Sheet 3

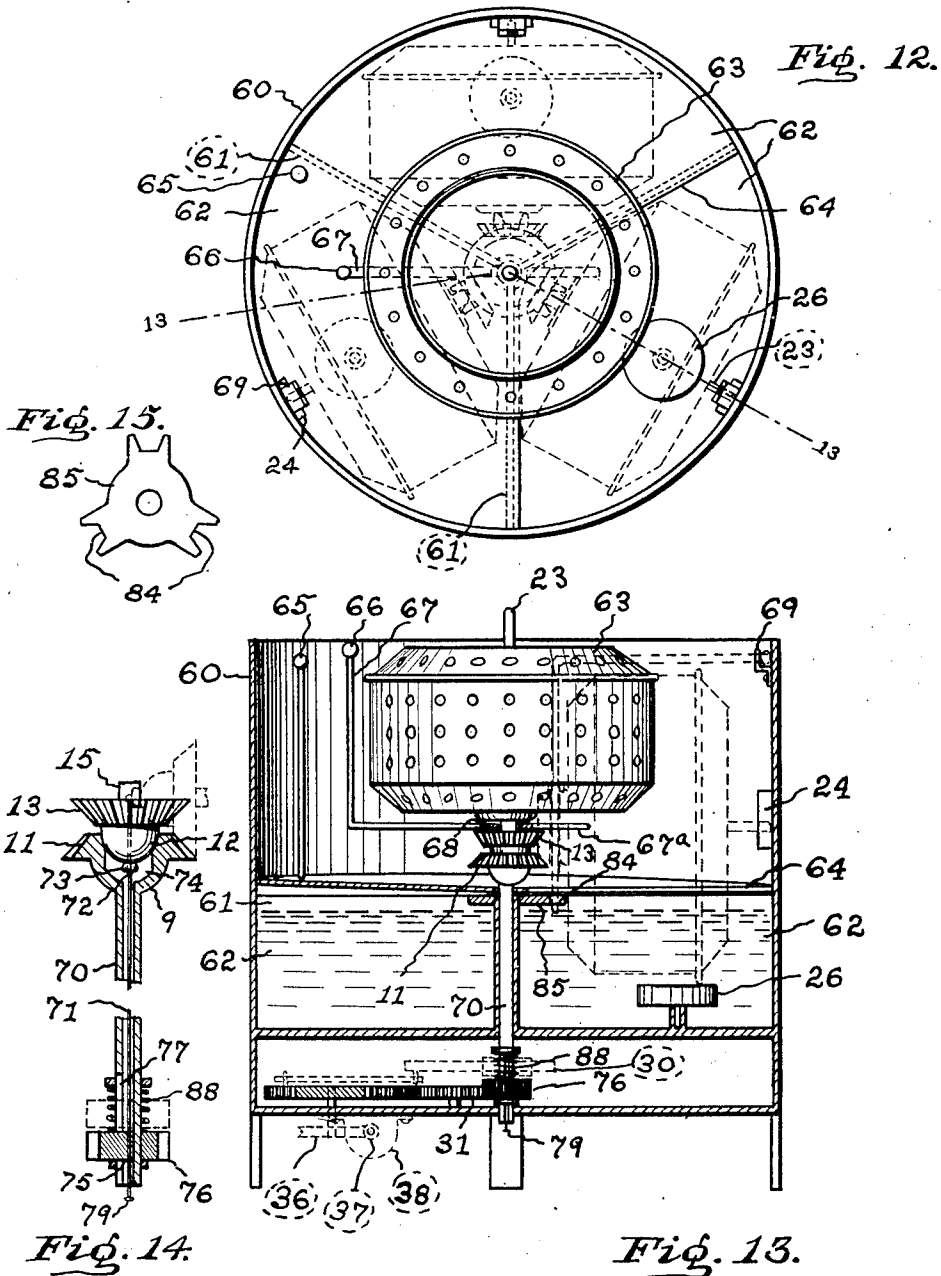


Fig. 13.

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## UNITED STATES PATENT OFFICE.

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## WASHING MACHINE.

Application filed April 30, 1924. Serial No. 709,975.

The present invention relates to certain new and useful improvements in the construction of washing machines of that general type in which centrifugal force is utilized for extracting the water from the clothes after they have been removed from the water, thereby avoiding the use of wringers or like devices.

Among the objects of the invention are to provide a machine of this character which embodies novel features of construction, whereby the rotatable clothes receiving basket or drum is tiltably mounted so that it can be swung downwardly into a body of water for washing or rinsing purposes and subsequently swung upwardly into proper position for rotation at a high rate of speed to expel the water from the clothes by centrifugal force.

Another object of the invention is to provide a universal joint between the drive shaft and the clothes receiving basket which provides effectively for a limited tilting movement of the basket when the latter is in an upright position to compensate for an uneven distribution of clothes within the basket and enable the basket to obtain a running balance so that it can be rotated at the necessary high rate of speed without excessive vibration. When the basket is rotated at a high rate of speed it will rise and shift its position until its center of gravity is in the vertical line of the drive shaft or axis, thereby obtaining what has been termed a "running balance" and preventing excessive wear upon the drive shaft and bearings.

A further object of the invention is to provide novel means for supporting the basket and operatively connecting the same to the drive shaft while at the same time enabling the basket to be readily removed from the tub.

While certain particular embodiments of the invention will be shown and described in detail for illustrative purposes, it will be understood that many modifications and changes can be made in the details of construction without departing from the spirit of the invention.

For a full understanding of the invention reference is to be had to the following description and accompanying drawings, in which,

Figure 1 is a top plan view of a washing machine which is constructed in accordance

with the invention, the cover being removed and the clothes receiving drum being shown by full lines in a raised position and by dotted lines in the positions assumed when lowered into the respective compartments of the tub.

Figure 2 is a vertical sectional view on the line 2—2 of Figure 1.

Figure 3 is a horizontal sectional view on the line 3—3 of Figure 2, showing the gearing for driving the drum.

Figure 4 is a detail view of the crank shaft for tilting the drum.

Figure 5 is an enlarged sectional view through the removable cover for closing the outer end of the drum.

Figure 6 is a front elevation of the washing machine.

Figure 7 is a vertical sectional view through the washing machine, taken on a plane at substantially right angles to Figure 2.

Figure 8 is an enlarged detail view of the gearing and universal joint by means of which the clothes receiving basket or drum is operatively connected to the drive shaft.

Figures 9 and 10 are similar views showing modified constructions.

Figure 11 is a detail view showing the detachable connection between the clothes receiving basket or drum and the upper gear and clutch member.

Figure 12 is a top plan view of a modified form of the washing machine in which the tub is provided with three compartments, and the clothes receiving drum can be lowered into any selected one of these compartments.

Figure 13 is a sectional view through the washing machine, being taken on the line 13—13 of Figure 12.

Figure 14 is an enlarged detail view of the universal joint between the upper end of the drive shaft and the base of the clothes receiving drum, the means for alternately shifting the gears when the drum is tilted being also shown.

Figure 15 is a detail view of the plate which is used in the construction shown by Figures 12 and 13, and has positioning notches for engaging the end of the drum tilting lever for the purpose of retaining the gearing in mesh when the drum is tilted.

Figure 16 is a rear view of a tub, having the construction shown by Figs. 1 and 2, said figure showing the slot in the back of

the tub within which the rear end of the tub tilting shaft slides.

Corresponding and like parts are referred to in the following description and indicated on all of the views of the drawings by like reference characters.

Referring to the embodiment of the invention shown by Figures 1 to 7 of the drawings, the numeral 1 designates a tub which is supported on the legs 2. The interior of the tub is divided by a partition 3 into two compartments 4 and 5, one of which is adapted to receive the water for washing the clothes and the other to receive the rinsing water. The partition 3 extends partially from the bottom of the tub to the top thereof and leaves a sufficient amount of clearance space at the upper part of the tub to receive the basket or drum 6 when the latter is in an upright position.

A drive shaft 7 extends upwardly through the center of the tub 1, being shown as received within a bearing sleeve 8 at the middle portion of the partition 3. The lower end of the drive shaft has gear connections whereby the shaft may be rotated at a high rate of speed when the clothes receiving drum is being spun to extract the water therefrom by centrifugal force, or oscillated at a comparatively low rate of speed when the clothes receiving drum is tilted downwardly so that it is partially submerged in the water of one of the compartments 4 or 5.

The upper end of the drive shaft is connected to the drum 6 by a universal joint arrangement which permits the drum to have a limited tilting movement in all directions and also enables the drum to be tilted downwardly into either of the compartments 4 or 5 of the tub. With this object in view the upper end of the drive shaft is shown as provided with a head 9 having a socket 10 in the top thereof. In the form of the invention illustrated by Figures 1 to 8 of the drawing the head 9 forms the center of a bevel gear drive member 11. Received within the socket 10 is a ball member 12, which is preferably comparatively large and heavy so that it will assist in balancing the drum and will frictionally engage the walls of the socket to provide what may be termed a friction clutch connection between the drum and the drive shaft when the drum is in an upright position. The upper portion of the ball member 12 is surrounded by a bevel gear member 13 and the tapered end of the gear member is larger than the ball member so that a shoulder 14 is provided which overhangs the top of the head 9 and is slightly spaced therefrom when the drum 6 is in a vertical position. The drum can have a limited tilting movement in all directions before the shoulder 14 engages the head, although when the limit of this tilting movement is reached the shoulder is brought

into contact with the top of the head, thereby shifting the center of support for the drum and tending to prevent further tilting movement thereof. This tilting movement of the drum enables the drum to adjust itself automatically to a somewhat uneven loading thereof and obtain a running balance so that it can be rotated at the necessary high rate of speed for extracting the water from the clothes by centrifugal force without subjecting the mechanism to excessive and objectionable vibration.

The ball member 12 is shown as connected by a neck 15 to a weight 16. This weight may be of a tapered or conical shape, and fits within a correspondingly shaped pocket 17 formed at the center of the drum 6 and projecting upwardly into the interior of the drum. A suitable fastening member such as the screw 18 may be provided for securing the drum to the weight, and the walls of the pocket 17 may be formed with lugs 19 which engage corresponding recesses in the weight to provide an interlocking connection between the drum and the weight so that relative rotation between the members is prevented. When the fastening screw 18 is in position the drum 6 is rigidly connected to the weight, although by removing the screw or fastening element the drum can be easily lifted out of position. The combined weight of the ball member 12 and weight 16 is considerable, being preferably greater than the combined weight of the drum and clothes contained therein. This weight of the ball member 12 and weight 16 is arranged at the central portion of the bottom of the drum and extends downwardly below the drum, so that the center of gravity is at the central portion of the drum and at a point near the bottom thereof. When the drum is rapidly rotated the axis thereof tends to rise to a vertical position and the universal joint permits the drum to rise until the center of gravity of the drum and its contents is in the vertical line of the drive shaft, at which time what is termed in this application a "running balance" is obtained. The considerable weight at the center of the drum also serves to steady the drum and prevent excessive oscillation thereof.

The drum 6 is shown as having the periphery thereof perforated and the top or swinging end of the drum is tapered so that the upper edges of the drum will clear the walls of the tub when the drum is swung downwardly into either of the compartments of the tub, as indicated by dotted lines on Figure 1. The cover 20 for the perforated drum 6 is held detachably in position. As is shown quite clearly by Figure 5, one side of the cover is provided with a tongue 21 which may engage a recess in the walls of the drum 6 at the mouth thereof, while the other side of the cover is pro-

vided with a slidably mounted locking bolt 22 which can be moved into and out of operative position. The center of the cover is provided with an outwardly projecting stub shaft 23 which is arranged on the axis of the drum, and when the drum is tilted downwardly into washing or rinsing position the stub shaft 23 is received between spaced flanges 24 on the walls of the tub. The upper ends of each pair of the flanges 24 may flare outwardly to facilitate the entrance of the stub shaft between the same, and the stub shaft is free to move up and down between the flanges, although it co-operates with the flanges to hold the drum against lateral swaying movement.

The periphery of the drum 6 is provided with an annular rib 25 which projects therefrom, and when the drum is tilted downwardly into a horizontal position this rib 25 will rest upon and engage a horizontally disposed supporting wheel or dolly 26. These wheels 26 are arranged at the bottom of the respective tub compartments 4 and 5, and may be mounted in any suitable manner, although for illustrative purposes they are shown as provided with spindles 27 which are loosely received within bearing sleeves 28 projecting from the bottom of the tub. These wheels 28 limit the downward tilting movement of the drum when it is swung laterally into a horizontal position, and the supporting wheels rotate as the drum is revolved, thereby providing an antifriction support for the drum.

The lower end of the drive shaft 7 has a pinion 29 keyed thereon so that the pinion and shaft rotate together although the pinion can slide freely upon the shaft. When the pinion 29 is moved upwardly on the shaft it is caused to mesh with a geared segment 30 which is adapted to oscillate back and forth in order to alternately rotate the drum in opposite directions. When the pinion 29 is moved downwardly it is brought into mesh with a gear wheel 31. This gear wheel 31 meshes with an intermediate gear wheel 32 which in turn meshes with a gear wheel 33. The shaft 34 of this gear wheel extends downwardly through the bottom of the gear housing 35 where it is provided with a worm wheel 36 which meshes with a worm 37 on the shaft of an electric motor 38. An arm 39 which is rigid with the geared segment 30 is connected by a pitman 40 to the gear wheel 33, so that the electric motor serves to rotate the gear wheels and also to oscillate the geared segment. The ratio of the gearing is such, however, that the shaft 7 will be driven at a high rate of speed when the pinion 29 thereof meshes with the gear wheel 31, and at a comparatively slow rate of speed when the said pinion is in mesh with the geared segment 30. A shifting

lever 41 is provided for sliding the pinion 29 on the drive shaft, said lever being pivotally mounted between its ends, as indicated at 42, and having a spring 43 connected to the outer end portion thereof which normally tends to swing the lever and slide the pinion 29 downwardly into mesh with the gear wheel 31.

One of the tub compartments is adapted to receive a cleansing fluid for use in washing the clothes or fabrics, while the other compartment may receive a rinsing water or the like. The clothes or other fabrics to be washed are placed in the drum 6 and the cover 20 of the drum then securely fastened in position by means of the locking bolt 22. The drum is then tilted over into horizontal position so that it is submerged in the washing fluid of one of the tub compartments. When the drum is thus swung over into a horizontal position the gear members 11 and 12 are brought into mesh with each other and the drum is supported upon the supporting wheel 26 with the stub shaft 23 of the cover thereof confined between the flanges 24 and in engagement with the walls of the tub. The pinion 29 at the lower end of the drive shaft is then caused to mesh with the geared segment 30 with the result that the drum is alternately rotated a predetermined number of revolutions in opposite directions, thereby repeatedly forcing the washing fluid through the fabric of the clothes so that the clothes will be cleansed. After the washing operation has been completed the drum is swung upwardly into an upright position in the upper portion of the tub and, if necessary, the clothes or fabrics may be evenly distributed within the drum. The ball and socket joint between the base of the tub and the upper end of the drive shaft permits the drum to have a limited tilting movement until the shoulder 14 engages the top of the head 9, and the drum can thus shift its position to automatically accommodate itself to a certain amount of unequal distribution of clothes and fabrics therein. After the drum has been swung upwardly the pinion 29 at the lower end of the drive shaft is caused to engage the gear wheel 31, with the result that the drum is rapidly rotated in such a manner as to expel the water from the clothes therein by centrifugal action. The ball and socket joint provides in effect a friction clutch between the drum and drive shaft, so that the shaft and drum can rotate independently of each other and the clutch will take hold gradually when the spinning operation is started and let go gradually when the spinning operation is completed. The ball and socket joint provides a flexible coupling means which permits the drum to have a limited universal movement, although

the action of the shoulder 14 is such as to restrain this movement when the limit is reached. This flexible coupling enables the drum to gyrate or follow its natural course without tending to deflect the shaft or straining the bearings thereof, even though the clothes or fabrics within the drum may be somewhat unevenly distributed.

After the washing fluid has thus been expelled from the clothes and fabrics by spinning the drum, the drum is tilted over into the other tub compartment whereupon the pinion 29 is again brought into engagement with the geared segment 30, so that the drum is alternately rotated in opposite directions in the rinse water. After the clothes have thus been rinsed the drum is swung upwardly into a vertical position and again spun at a high rate of speed to expel the rinse water from the clothes by centrifugal action. The water or fluid which is expelled from the clothes and fabrics by centrifugal action is intended to be drained back into the particular compartment of the tub from which it was originally taken. For this purpose a drain plate 44 is mounted in the tub just above the partition 3. The drain plate is shown as pivotally mounted upon the upper end of the drive shaft 7, so that it can turn upon the same as an axis, and the drain plate is adapted to be swung over either of the tub compartments, leaving the other compartment uncovered. A handle such as that indicated at 45 may be applied to the drain plate for convenience in moving the same. The drain plate is preferably arranged so that it will be slightly inclined toward the uncovered compartment of the tub, and it will be obvious that by properly positioning the drain plate the water or fluid which is expelled from the clothes during the spinning of the drum will be carried back into the particular tub compartment from which it was originally taken.

A shaft 46 extends transversely through the tub and is provided at its middle portion with a collar element 47 which loosely engages the neck 15 above the ball joint member 12 of the drum. Crank portions 48 provide clearance spaces for the drum when it tilts, and one end of the shaft is provided with a handle 49, while the other end thereof passes loosely through a horizontal slot 80 at the back of the tub and has a plate 81 applied to the extremity thereof. By swinging the handle 49 the shaft can be rotated and the drum tilted and when the drum is tilted the rear end of the shaft is moved laterally in the slot 80 into one of the dotted line positions indicated on Figure 1. If desired, suitable latch means such as the swinging U-shaped member 50 may be mounted upon the side of the tub and arranged to engage the lever or handle

49 when the same is in a vertical position. When the handle is swung into a horizontal position and the drum thereby tilted into one of the tub compartments, the handle will engage one of the out-standing arms 51 at the forked upper end of a slide 52 which is mounted upon the exterior of the tub, being adapted to move up and down within the keepers 53. The lower end of the slide is pivotally connected at 54 to the shifting lever 41 of the driving gear connections. When the handle 49 is up the spring 43 of the shifting lever will move the shifting lever to slide the pinion 29 of the drive shaft into engagement with the gear wheel 31, thereby providing for spinning the drum at a high rate of speed. On the other hand, when the drum is tilted downwardly into one of the tub compartments, the handle 49 will move the slide 52 downwardly and operate the shifting lever 41 to move the pinion 29 of the drive shaft into engagement with the geared segment 30, with the result that the drum will be rotated back and forth in opposite directions in the desired manner for washing or rinsing.

A slight modification is shown by Fig. 9 in which friction gearing is substituted for the bevel gear members 11 and 13. A friction gear member 11<sup>a</sup> takes the place of the bevel gear 11, and a friction gear member 13<sup>a</sup> takes the place of the bevel gear element 13. In all other respects the operation is the same as that previously described.

A further slight modification is shown by Figure 10, in which the shoulder 14 which limits the compensating tilting movements of the tub is omitted. The same result is achieved by providing the bottom of the ball member 12 with a projection 12<sup>b</sup> which operates within a recess 10<sup>b</sup> at the base of the socket 10. The projection 12<sup>b</sup> has a certain amount of play in the recess 10<sup>b</sup> which permits the drum to have a limited universal rocking movement to compensate for a certain amount of unequal distribution of the clothes and fabrics therein and enables the drum to gyrate or follow its natural course when spinning without tending to deflect the drive shaft and straining the shaft and bearings. In order to tilt the drum over into either of the tub compartments it is necessary to first lift it a sufficient amount to disengage the projection 12<sup>b</sup> from the recess 10<sup>b</sup>.

A modification is shown by Figures 12 to 15 inclusive, in which the tub 60 is subdivided by the partitions 61 into three separate compartments 62. One of these tub compartments is adapted to receive the soapy water or cleansing fluid, while another of the tub compartments receives the rinsing water and the third tub compart-

ment receives the bluing water. The perforate drum 63 is constructed substantially as previously described, with the exception that the lower end or base thereof is tapered, so that it will the more readily clear the partitions 61 when the drum is swung downwardly into a horizontal position. Each of the tub compartments is provided at the bottom thereof with a dolly 26 to support the drum when it is lowered into that particular compartment, and the side walls of the tub are provided with the flanges 24 for engaging the stub shaft 23 of the cover 20 of the drum, just as in the previous instance. A drain plate 64 is provided and this drain plate is of sufficient size to extend over any two of the tub compartments 62, leaving the other tub compartment uncovered. The drain plate will incline slightly toward the uncovered compartment, so that the fluid or water which is expelled from the clothes and fabrics during the spinning of the drum will be drained back into that particular tub compartment from which it was originally taken. A suitable handle 65 is applied to the drain plate for convenience in shifting the position thereof.

In order to tilt the drum a handle 66 is provided at one side thereof, said handle being at one end of an L-shaped lever 67, the other end of the lever being provided with a collar 68 which engages the neck 15 above the ball joint member of the drum. The L-shaped member thus provides a means for tilting the drum and when the drum has been tilted into a horizontal position the handle 65 may be brought into engagement with suitable rests or supports 69 applied to the walls of the tub.

The arm of the L-shaped lever 67 which is arranged under the drum is provided with an extension 67<sup>a</sup>, and when the drum is tilted into a horizontal position this extension is adapted to engage one of the positioning notches 84 of a plate 85 which is arranged under the universal joint connection between the drum and the drive shaft. The plate 85 is held rigidly in position and is provided with one of the positioning notches 84 for each of the tub compartments. When the drum is tilted into a selected one of the tub compartments the extension 67<sup>a</sup> of the L-shaped lever 67 enters the corresponding positioning notch 84 and cooperates therewith to prevent lateral movement of the end of the tub which is provided with the gear member. The two gear members are thus maintained in mesh with each other, so that the drum will be driven in the desired manner.

The vertical drive shaft 70 has a tubular formation and a gear shifting rod 71 extends through the shaft. The upper end of this rod 71 is connected by a pivot joint 72

to a member 73 that has a swiveled connection with the ball member 12 of the universal joint. The head 9 is suitably recessed at 74 to provide a clearance for the swivel member 73 as the drum is tilting.

The lower end of the gear shifting rod 71 slides through an arm 75 of a pinion 76 which corresponds to the pinion 29 of the previously described construction. The arm 75 is slidable within a slot 77 in one side of the tubular shaft, and a spring 88 engages the pinion 76 and normally tends to slide the same downwardly into mesh with the gear wheel 31 of the driving gear. When the drum is tilted over into a horizontal position and caused to be partially submerged in the fluid of one of the tub compartments, the gear shifting rod 71 is moved upwardly through the tubular drive shaft, with the result that a button 79 on the lower end thereof engages the arm 75 and moves the pinion 76 upwardly against the action of the spring 78 until the pinion is brought into mesh with the geared segment 30. The driving gear that cooperates with the pinion 76 is identical with that previously described and the same reference characters that were previously used are applied to the elements of this gear on Figure 13.

This form of the invention provides for successively washing, rinsing and bluing the clothes in the three compartments of the tub, and after the clothes and fabrics have been subjected to the action of the fluid in each compartment the fluid is extracted therefrom by centrifugal force and drained back into the tub compartment from which it was originally taken. The clothes and fabrics may be carried through the several waters or fluids and centrifugally dried without handling them or removing them from the drum until after the several operations have been completed and they are ready to be hung up on the line for drying.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is,

1. A machine of the character described, including a drive shaft, a clothes receiving drum, a ball element carried by one of the said members, a socket element carried by the other of said members, the ball element and socket element frictionally engaging each other to produce a driving connection between the shaft and the drum and permitting the drum to have a limited tilting movement, and cooperating stop shoulders on the socket element and ball element, respectively, to limit the tilting movement of the drum.

2. A machine of the character described, including a drive shaft, a clothes receiving drum, a ball element carried by one of the said members, a socket element carried by the the other of said members, the ball element and socket element frictionally en-

gaging each other to produce a driving connection between the shaft and the drum, and permitting the shaft to rotate independently of or at a different speed than the drum, said ball and socket joint also permitting the drum to tilt laterally and automatically obtain a running balance on the shaft when being spun to centrifugally dry the contents thereof, means for tilting the drum into a horizontal position, and means for obtaining a driving connection between the drum and the shaft when it is so tilted.

3. A machine of the character described, including a drive shaft, a clothes receiving drum, a ball element carried by one of the said members, a socket element carried by the other of the said members, the ball element and socket element frictionally engaging each other to produce a driving connection between the shaft and the drum and permitting the drum to tilt laterally, a weight on the drum, and stop shoulders on the socket element and ball element, respectively, for limiting the normal tilting movement of the drum, the drum and weight thereof being lifted if the drum is forcibly tilted after the shoulders engage each other.

4. A machine of the character described, including an upright drive shaft, a socket at the upper end thereof, a clothes receiving drum, a ball element carried by the clothes receiving drum and received within the socket of the shaft to provide a driving connection between the shaft and the drum and permitting the drum to tilt laterally to obtain a running balance on the shaft when being spun to centrifugally dry the contents thereof, and cooperating stop shoulders on the ball element and socket element, respectively, for limiting the normal tilting movement of the drum, the ball element being lifted from the socket if the drum is forcibly tilted after the shoulders engage each other.

5. A machine of the character described, including a drive shaft, a clothes receiving drum, a ball element carried by one of the said members, a socket element carried by the other of said members, the ball element and socket element frictionally engaging each other to produce a driving connection between the shaft and drum and permitting the shaft to rotate independently of or at a different speed than the drum, said ball and socket joint also permitting the drum to tilt laterally and automatically obtain a running balance on the shaft when being spun to centrifugally dry the contents thereof, means for tilting the drum into a horizontal position, means for obtaining a driving connection between the drum and the shaft when it is so tilted, and means actuated by the tilting of the drum into a horizontal position to automatically change the speed of rotation of the drive shaft.

6. A machine of the character described including a shaft, a clothes receiving drum, a ball and socket joint between the shaft and the drum, whereby the latter has a limited tilting movement and can automatically adjust itself to obtain a running balance when being spun to centrifugally dry the contents of the drum, and cooperating shoulders on the members of the ball and socket joint for limiting the said tilting movement of the drum.

7. A machine of the character described including a tub, an upright drive shaft, a clothes receiving drum, a universal joint connection between the shaft and drum whereby the latter can tilt laterally and automatically adjust itself to obtain a running balance on the drive shaft when being spun in an upright position to centrifugally dry the contents of the drum, means for limiting the said tilting movement of the drum, and means for forcibly overcoming the said limiting means and swinging the drum downwardly into the tub.

8. A machine of the character described including a tub, an upright drive shaft, a clothes receiving drum, a universal joint connection between the shaft and the drum whereby the latter can tilt laterally and automatically adjust itself on the drive shaft to obtain a running balance when being spun in an upright position to centrifugally dry the contents of the drum, means for swinging the drum downwardly into the tub, and gear members operatively associated with the universal joint connection to engage with each other when the drum is swung downwardly.

9. A machine of the character described including a tub, an upright shaft, a clothes receiving drum, a ball and socket connection between the shaft and the drum whereby the latter has a limited tilting movement and can automatically adjust itself on the shaft to compensate for an uneven load when being spun to centrifugally dry the contents of the drum, means for swinging the drum downwardly into the tub, and cooperating gear members on the elements of the ball and socket joint, said gear members being disengaged when the drum is in an upright position, and engaging with each other when the drum is swung downwardly.

10. A machine of the character described including a tub, an upright drive shaft, a clothes receiving drum, a ball and socket connection between the shaft and the drum whereby the latter can tilt laterally and automatically adjust itself to an uneven load when being spun to centrifugally dry the contents of the drum, cooperating shoulders limiting the said tilting movement of the drum, means for forcibly swinging the drum beyond the said limiting means, and bringing it down into the tub, and cooperat-

ing gear members on the ball and socket elements, said gear members being disengaged when the drum is in an upright position and being brought into engagement when the drum is swung downwardly.

11. A machine of the character described including a tub, an upright drive shaft, a clothes receiving drum, a ball and socket joint between the shaft and the drum whereby the latter can tilt laterally and automatically adjust itself on the shaft to an uneven load when being spun to centrifugally dry the contents thereof, a weight at the center of the drum for obtaining a firm frictional engagement between the elements of the ball and socket joint, and steadying the drum while it is being rotated, means for swinging the drum downwardly into the tub, and cooperating gear members carried by the shaft and drum, respectively, and arranged to be disengaged when the drum is in an upright position and brought into engagement with each other when the drum is swung downwardly into the tub.

12. A machine of the character described, including an upright drive shaft, a socket element at the upper end thereof, a clothes receiving drum, a ball element carried by the clothes receiving drum and received within the socket to frictionally engage the same and produce a driving connection between the shaft and drum when the drum is in an upright position, the ball and socket connection permitting the drum to have a limited tilting movement to obtain a running balance when being spun in an upright position to centrifugally dry the contents thereof, cooperating shoulders on the ball element and socket element, respectively, for limiting the normal tilting movement of the drum, the ball element being lifted out of the socket when the drum is forcibly tilted downwardly after the shoulders have engaged each other, and cooperating gear elements on the ball element and socket element which mesh with each other when the drum is swung downwardly.

13. A machine of the character described including a tub, an upright shaft, a clothes receiving drum, a ball and socket joint between the shaft and drum, whereby the said members are frictionally connected when the drum is in an upright position, and the drum can tilt laterally to assume a running balance on the drive shaft when it is being spun to centrifugally dry the contents thereof, cooperating gear members carried by the drum and shaft, means for forcibly swinging the drum downwardly into the tub whereby the ball and socket elements will be separated and the gear members brought into engagement with each other, means for operating the drive shaft at different rates of speed, and means for automatically changing the speed of the drive

shaft when the drum is raised or lowered.

14. A machine of the character described including a tub provided with a plurality of independent compartments, a drive shaft, a drum, and a universal joint connection between the shaft and the drum, whereby the latter can be swung downwardly into any selected one of the tub compartments.

15. A machine of the character described including a tub provided with a plurality of independent compartments, an upright shaft, a clothes receiving drum, a universal joint connection between the shaft and drum whereby the latter can be swung into any selected one of the tub compartments, and means for covering the other compartments.

16. A machine of the character described including a tub provided with a plurality of independent compartments, an upright drive shaft, a clothes receiving drum, a universal joint connection between the shaft and the drum whereby the latter can be swung into any selected one of the tub compartments or moved into an upright position for spinning to centrifugally dry the contents of the drum, and a drain plate covering all but one of the tub compartments and draining into the uncovered tub compartment.

17. A machine of the character described including a tub provided with a plurality of independent compartments, an upright shaft, a clothes receiving drum, a ball and socket joint between the shaft and the drum whereby the latter has a frictional drive connection with the shaft when it is in an upright position and can have a limited tilting movement for automatically assuming a running balance on the upright shaft when being spun to centrifugally dry the contents thereof, means for swinging the drum downwardly into any selected one of the tub compartments, cooperating gear members on the drum and shaft respectively which are disengaged when the drum is in an upright position and brought into engagement when the drum is swung downwardly, and means for operating the drive shaft at a high rate of speed when spinning the drum to centrifugally dry the contents thereof, and at a lower rate of speed when operating the drum in one of the tub compartments.

18. A machine of the character described including a tub, a drive shaft, a clothes receiving drum, a universal joint connection between the shaft and the drum whereby the latter can be swung into an upright position, or downwardly into the tub, and a rotatable support at the bottom of the tub for rotatably supporting the drum.

19. A machine of the character described, including a tub provided with a plurality of independent compartments, a drive shaft, a drum, a separable connection between the shaft and drum, means for supporting the

drum in any selected one of the tub compartments, and means for obtaining a driving connection between the drum and the drive shaft in any of its positions.

20. A machine of the character described, including a tub provided with a plurality of independent compartments, a drive shaft, a drum, means for mounting the drum in any one of the compartments, means for obtaining a driving connection between the drum and drive shaft when the drum is in any one of the compartments, and means for mounting the drum upon the drive shaft for spinning the same to centrifugally dry the contents of the drum.

21. A machine of the character described including a tub, a drive shaft, a clothes receiving drum, a universal joint connection between the shaft and the drum whereby the latter can be tilted into different positions, means for driving the shaft at different speeds, and means actuated automatically by the tilting of the drum for varying the speed of the shaft.

22. A machine of the character described, comprising a tub having a compartment therein adapted to contain a cleansing fluid, an upright drive shaft, a clothes receiving drum, and a separable driving joint between the shaft and the drum which admits of the drum being rotated by the shaft in either an upright position or when tilted downwardly into the compartment.

23. A machine for washing fabrics and the like, including a tub provided with a plurality of independent compartments adapted to contain different fluids with which the fabrics are to be successively treated, a fabric receiving drum, means for supporting the drum in any selected one of the tub compartments, and means for rotating the drum when it is supported in anyone of the compartments, and means for supporting and rapidly spinning the drum above the compartments to centrifugally dry the contents thereof.

24. A machine of the character described including a drive shaft, a clothes receiving drum, a universal joint connection between the shaft and the drum whereby the latter can be tilted into different positions, cooperating gear members on the shaft and drum which are brought into mesh when the drum is tilted, and means for holding the driven end of the drum against lateral movement when the gear members are in engagement with each other.

25. A machine of the character described including a drive shaft, a clothes receiving drum, a ball and socket joint connecting the shaft and drum whereby the drum can be tilted into different positions, cooperating gear members on the shaft and drum which are brought into engagement when the drum

is tilted, and means for holding the gear of the drum in engagement with the gear of the shaft when the drum is tilted.

26. A machine of the character described including a drive shaft, a clothes receiving drum, a ball and socket joint connecting the shaft and drum whereby the latter can be tilted, cooperating gear members on the drum and shaft which are brought into mesh when the drum is tilted, a drum tilting member, and means engaging the drum tilting member to hold the gear of the drum in mesh with the gear of the shaft when the drum is tilted.

27. A machine of the character described, including a tub, an upright drive shaft therein, said tub being provided with a plurality of independent compartments arranged around the drive shaft, a drum, a drum shaft, means for mounting the drum in any selected compartment with the drum shaft extending radially from the drive shaft, and gearing between the drive shaft and drum shaft for driving the drum when it is supported in any selected one of the tub compartments.

28. A machine of the character described, including a tub, an upright drive shaft within the tub, said tub being provided with a plurality of independent compartments which are arranged around the drive shaft, a drum, a drum shaft, means for mounting the drum in any one of the compartments with the drum shaft extending radially from the drive shaft, gearing between the drive shaft and drum shaft for driving the drum when it is supported in any selected one of the tub compartments, means for connecting the drum shaft to the drive shaft in alignment therewith to support the drum in an upright position and spin the same to centrifugally dry the contents of the drum, and means for draining the centrifugally expelled fluid into any selected one of the compartments.

29. A machine of the character described including a tub, partitions extending across the tub and dividing it into a plurality of compartments, a drive shaft extending through the tub, a fabric handling device driven from the drive shaft, and means for shifting the fabric handling device into cooperative relation with any of the compartments.

30. A machine of the character described, including a tub which is provided with a compartment adapted to receive a cleansing fluid, an upright drive shaft, a clothes receiving drum, and a separable driving connection between the drum and the shaft including a ball and socket joint, means for rotating the drum in either an upright position or when swung downwardly into the compartment, the joint also enabling the drum to have a universal tilting movement

when in an upright position so that it can automatically adjust itself to obtain a running balance on the drive shaft.

31. A machine of the character described, including a tub provided with a plurality of independent compartments, an upright drive shaft, a drum, a separable universal joint connection between the shaft and the drum, whereby the latter can be lifted out of the tub or swung downwardly into any selected one of the tub compartments, said drum being also adapted to be brought into an upright position for spinning to centrifugally dry the contents thereof, means for rotating the drive shaft at different rates of speed, and means actuated by the movements of the drum for causing the drive shaft to be rotated at a higher rate of speed when the drum is in an upright position than when it is swung downwardly into one of the tub compartments.

32. In a washing machine, the combination of a tub having a plurality of compartments for different fluids in the lower portion thereof, a rotary clothes container mounted in the tub above the compartments and arranged to rotate about a vertical axis, and a shiftable drain arranged in said tub between the compartments and said clothes container to deflect the fluid from the container into any one of said compartments.

33. In a washing machine the combination of a tub having a plurality of compartments for different fluids in the lower portion thereof, a rotary clothes container mounted in the tub above the compartments and arranged to rotate about a vertical axis, means for rotating said container and a support for said rotating means, and a member rotably mounted on said support between said compartment and said clothes container to deflect the fluid from the container into any one of said compartments.

34. In a washing machine, the combination of a tub formed with a partition dividing it into compartments for different fluids, a shiftable cover over one of the compartments, a rotary clothes container mounted in the tub above the compartments and normally arranged to rotate about an axis at an angle to the vertical whereby the container dips into one compartment, and being shiftable to rotate about another axis at an angle to the vertical whereby it dips into the other compartment, means for supporting the rotary clothes container in either position and means for rotating it in either of the said positions.

35. In a washing machine, the combination of a tub formed with a partition dividing it into compartments for different fluids, a drain member arranged above the compartments for returning the fluid falling upon the same back to the compartment from which it came, a rotary clothes container

mounted in the tub above the compartments and normally arranged to rotate about an axis at an angle to the vertical whereby the container dips into one compartment, and being shiftable to rotate about another axis at an angle to the vertical whereby it dips into the other compartment, and being also shiftable into an upright position whereby it is out of the compartments, means for supporting the clothes container in any of the aforesaid positions, and means for rotating it in any one of the aforesaid positions.

36. In a washing machine, the combination of a tub formed with a partition dividing it into compartments for different fluids, a rotary clothes container mounted in the tub above the compartments and normally arranged to rotate about an axis at an angle to the vertical whereby the container dips into one compartment, and being shiftable to rotate about another axis at an angle to the vertical whereby it dips into the other compartment, means for supporting and rotating the clothes container in either of the aforesaid positions, and a shiftable drain arranged to be positioned over either compartment to deflect fluid dropping upon the same into the other compartment.

37. In a washing machine, the combination of a tub formed with a fluid receiving compartment, an upright drive shaft, a clothes receiving drum, a separable driving connection between the shaft and the drum which admits of the drum being driven in either an upright position or when swung downwardly into the compartment, and means for automatically causing the drive shaft to rotate at different speeds for the two positions of the clothes receiving drum.

38. In a washing machine, the combination of a tub which is formed with a fluid receiving compartment, an upright drive shaft, a clothes receiving drum, a driving connection between the drum and the shaft including separable parts applied to the drum and shaft respectively, and adapted to engage each other with the drum either in an upright position or arranged to rotate in the compartment, and gear shifting means controlled by the drum for causing the drive shaft to rotate at a different speed for each position of the drum.

39. A washing machine comprising a pair of containers for washing fluid; a receptacle for fabrics pivotally mounted for alternative operation in the containers, and for rotation about a vertical axis above the containers and a drain cover for the containers disposed beneath the receptacle and movable into operative position with respect to either container.

40. A washing machine comprising a pair of containers for washing fluid, a receptacle for fabrics pivotally mounted for alternative operation in the containers, and for ro-

tation about a vertical axis above the containers and means for selectively draining fluid from the receptacle into either container.

- 5 41. A washing machine comprising a circular tub, a center shaft within the tub, a substantially vertical partition for dividing the tub into two separate compartments for washing fluid, a semi-circular cover for sep-

arately closing the compartments and for 10 draining washing fluid into the uncovered compartment and rotatable about the axis of the tub to its operative positions, and a drum for containing the fabrics mounted for rotation in either compartment and 15 above both compartments and the said cover.

In testimony whereof I affix my signature.

ERIC D. CLARKE.