T. L. BRADFORD.

WASHING MACHINE.

APPLICATION FILED MAR. 24, 1920.

1,409,333.

Patented Mar. 14, 1922.

4 SHEETS—SHEET 1.

Fig. 13.

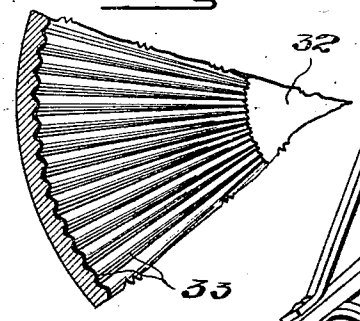


Fig. 8.

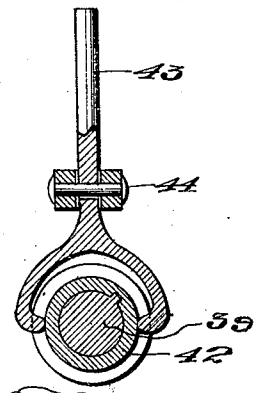


Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.

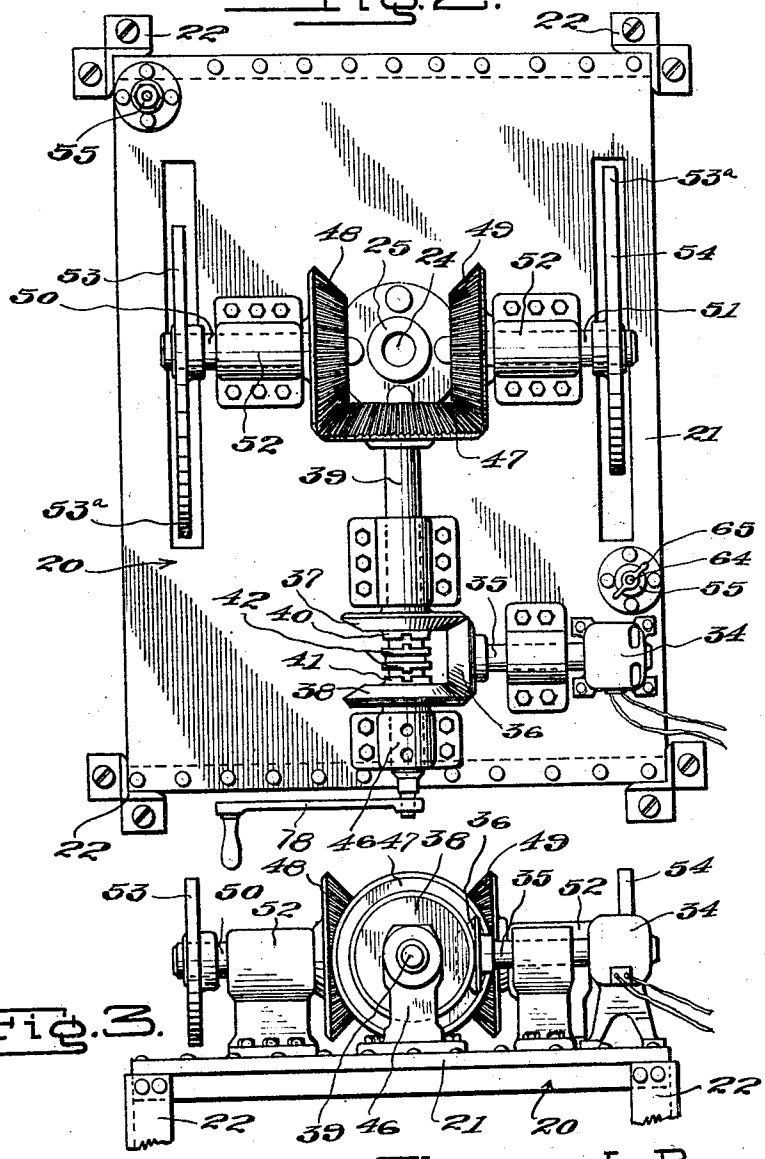


Fig. 3.

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4 SHEETS—SHEET 3.

Fig. 4.

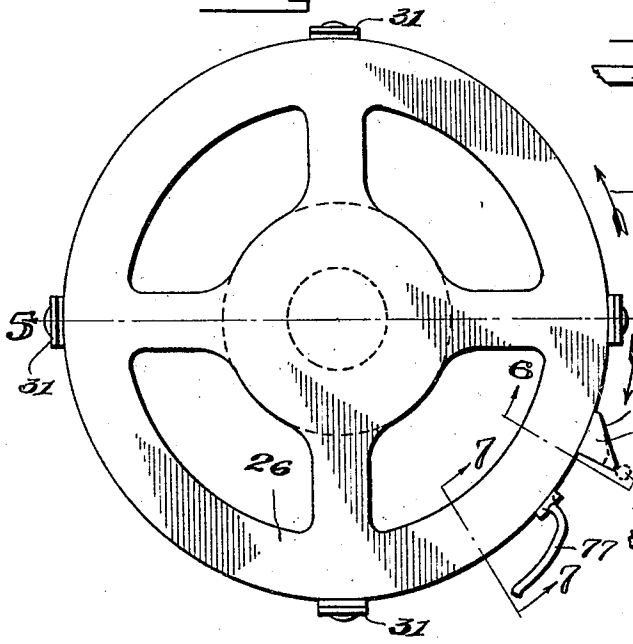


Fig. 6.

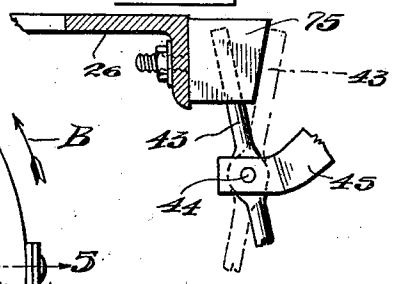
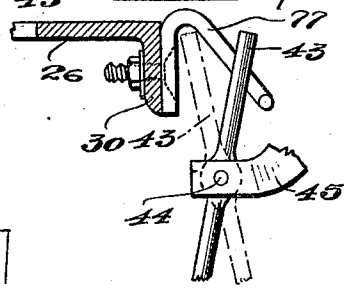


Fig. 7.



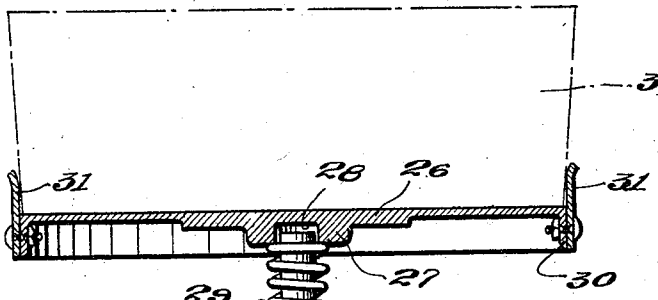
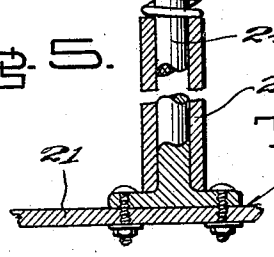


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 9.

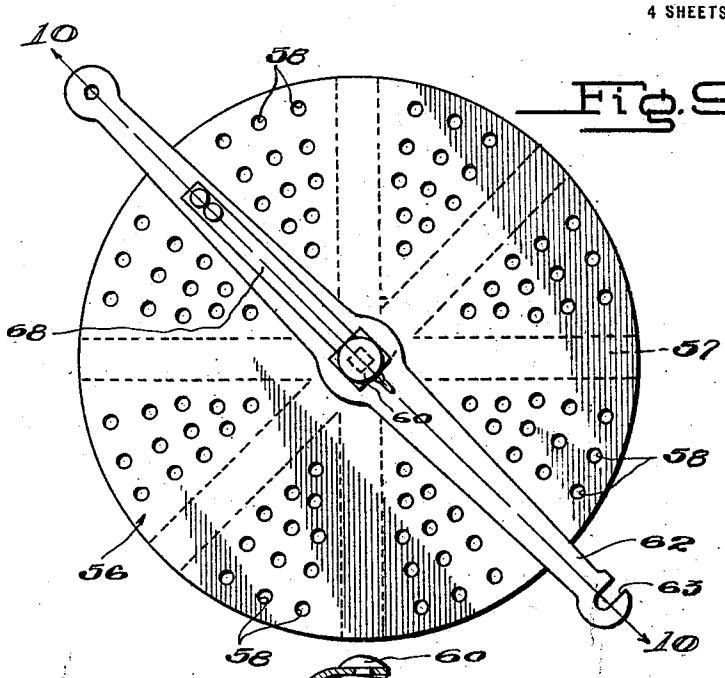


Fig. 12.

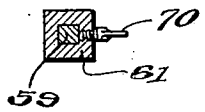
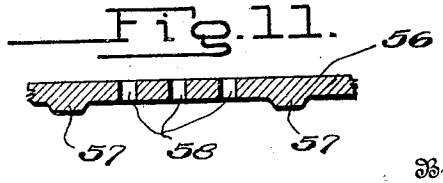


Fig. 10.

Fig. 11.



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UNITED STATES PATENT OFFICE.

THOMAS L. BRADFORD, OF DETROIT, MICHIGAN.

WASHING MACHINE.

1,409,333. Specification of Letters Patent. Patented Mar. 14, 1922.

Application filed March 24, 1920. Serial No. 368,383.

To all whom it may concern:

Be it known that I, THOMAS L. BRADFORD, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Washing Machines, of which the following is a specification.

This invention relates to washing machines, particularly designed for washing clothing or articles of apparel. It is a well known fact that clothing are more thoroughly cleansed with less tearing or injury by their being manually rubbed upon a washboard, as the worker or washer rubs, scrubs and squeezes the dirt out of the clothes which dirt is released from the garment by the action of the water or soap or other suitable detergent.

It is an object of this invention to provide the washing machine which imitates the movement of a person manually rubbing clothes upon a washboard as much as possible, to effect the thorough cleansing of the clothes.

More specifically, the invention comprehends the provision of a washing machine as specified wherein an oscillatory motion is imparted to the tub or container of the machine, the dasher being maintained stationary and which tub is further moved upwardly to give a squeezing action upon the clothes therein between the fixed dasher and the bottom of the tub.

A further object of the invention is to provide a washing machine which may be power driven, such as by an electric motor or analogous motor, the motion from which is transmitted to the movable receptacle or tub of the machine through the medium of friction gears and cams, together with a clutch mechanism which is associated with the friction gears; and also to provide means which will automatically operate the clutch at predetermined times for reversing the direction of rotation of the cam and consequently reversing the rotation of the container or tub of the washing machine, thereby causing a rubbing, scrubbing and squeezing action upon the clothes within the container.

A still further object of the invention is to provide means for yieldably mounting the dasher at certain times to prevent breaking of any part of the washing machine in case the dasher which has corrugations on its under surface should be moved so that the said corrugations or ribs would interengage with the corrugations or ribs on the inner surface of the bottom of the container while the prime mover was operated, and means to lock the dasher against yieldable movement after the clothes have been placed therein and the machine is ready for cleansing or washing the said clothes.

Other objects of the invention will appear in the following detailed description taken in connection with the accompanying drawings, forming a part of this specification and in which drawings:

Figure 1 is a side elevation of the improved washing machine.

Figure 2 is a top plan of the operating mechanism of the washing machine.

Figure 3 is an end elevation of the operating mechanism of the washing machine.

Figure 4 is a plan of the support for the removable tub or container.

Figure 5 is a vertical section on the line 5—5 of Figure 4.

Figure 6 is a fragmentary vertical section taken on the line 6—6 of Figure 4, showing a part of the mechanism for automatically operating the clutch to reverse the direction of movement of the container.

Figure 7 is a fragmentary section taken on the line 7—7 of Figure 4, illustrating another part of the mechanism for automatically operating the clutch.

Figure 8 is a vertical section illustrating the clutch operating lever.

Figure 9 is a top plan of the dasher.

Figure 10 is a vertical section through the dasher taken on the line 10—10 of Fig. 9.

Figure 11 is a fragmentary section taken through the dasher.

Figure 12 is a cross-section on the line 12—12 of Figure 10.

Figure 13 is a fragmentary section taken on the line 13—13 of Figure 1.

Referring more particularly to the drawings, wherein like characters indicate like and corresponding parts, 20 indicates the supporting structure of the washing machine, as an entirety which comprises a suitable supporting platform 21 mounted upon standards or supporting legs 22. The platform 21 has a standard 24 attached thereto in any suitable manner, about a portion of

which standard a sleeve 25 is mounted. The standard 24 supports the container or tub support 26 which is preferably a spider like construction as clearly shown in Figure 4 of the drawings and has an enlarged depending hub portion 27 at the center thereof in the under surface of which the recess 28 is formed into which the upper end of the standard 24 extends. A spring 29 is coiled about the standard 24 and its lower end engages the upper end of the sleeve 25 while the upper end of the spring engages the under surface of the hub 27 providing a yieldable mounting for the support 26 which will permit limited vertical movement of the said support.

The spider-like support 26 has a depending annular flange 30 formed thereon, to which, at spaced intervals, upstanding lugs 31 are attached. The lugs 31 are adapted to engage the outer surface of the container or tub 32, which is shown in dot and dash lines of Figure 5 of the drawings, and in solid lines in Figure 1. This container 32 may be an ordinary tub such as used for washing clothes. However, it has the inner surface of its sides and a portion of the inner surface of the bottom corrugated as shown at 33 in Figure 13 of the drawings, to provide a roughened surface for rubbing the clothes during operation of the washing machine. The tub or container 32 is removably mounted upon the support 26, so that it may be removed and used independently of the machine if desired.

A motor, which may be an electric motor, as shown at 34 or any other suitable type of prime mover is supported by the platform 21 and the operating shaft 35 thereof has a bevelled friction cone 36 mounted thereon. This friction cone or pinion 36 meshes with friction gears 37 and 38, bevelled to engage the bevelled surface of the pinion 36 and opposite sides of the axis thereof as clearly shown in Figure 2 of the drawings. The bevelled friction gears 37 and 38 are loosely mounted upon an operating shaft 39 and they have clutch sections 40 and 41 respectively formed on their inner facing sides. These clutch sections 40 and 41 are adapted to be engaged at different times by the clutch 42 which is feathered upon the shaft 39. The clutch 42 is shifted, by means of the shifting lever 43 which is pivotally mounted intermediate its ends as shown at 44 upon a suitable bracket 45 which may extend from the supporting structure 20 in any suitable manner, preferably from the outer bearings 46 of the shaft 39.

The shaft 39 has its bevelled gear 47 upon its inner end which meshes with bevelled gears 48 and 49 mounted upon shafts 50 and 51 respectively. These shafts 50 and 51 are positioned in alignment with the longitudinal axis of the stem 24 and extend one upon each side of the said stem, being supported by suitable bearings 52. The shafts 50 and 51 have cams 53 and 54 keyed upon their outer ends which cams engage the under surface of the support 26 for oscillating the support and the container or tub 32 which is mounted thereon.

The platform 21 has a pair of uprights 55 carried thereby which support the dasher structure of the washing machine. The dasher structure includes the circular dasher 56, the under surface of which is corrugated, providing downstruck ribs 57 for rubbing the clothes or articles to be washed in the machine. This dasher 56 is also provided with a plurality of openings 58 to permit the water to pass upwardly therethrough during the squeezing action of the washing machine upon the clothes and also to prevent the formation of a vacuum beneath the dasher. The dasher 56 is carried at the lower end of a rectangular dasher rod 59, which has a head 60 upon its upper end and which extends through a sleeve 61. The sleeve 61 is rectangular in cross-section and extends through the support 62. The support or supporting arm 62 of the dasher structure is pivotally connected at one end to one of the standards 55 and is provided with a recess 63 at its other end which engages over a bolt 64 carried by the opposite upright 55 upon which bolt the recessed end of the supporting bar 62 is clamped by means of an ordinary wing nut 65. Spiral springs 66 and 67 engage the upper and lower ends of the sleeve 61 and they are also engaged by the terminals of arms 68 and 69 respectively which are attached to the supporting arm or bar 62 and are slidably mounted upon the dasher carrying standard or stem 69. A set screw 70 extends through the sleeve 61 and is adapted for binding engagement with the stem or rod 69 to rigidly connect this stem or rod to the sleeve, to prevent vertical movement of the dasher independently of the support and the sleeve 61. The arms 68 and 69 are preferably made of resilient material and when the set screw 70 is turned outwardly to be free from engagement with the stem or rod 59 the dasher 56 and its stem or rod 59 are adapted to have limited vertical movement thereby eliminating the breaking of any parts of the washing machine in case the dasher should be in its lowermost point when placed in operative position and locked when the cam is in its lowermost position. This prevents the ribs 57 on the dasher from engaging the ribs 33 formed on the tub or container while the motor is running.

In operation, the motor or prime mover 34 will transmit motion through the medium of the shaft 35 and friction gears 36, 37 or 38 to the shaft 39, which shaft will in turn impart rotation to the shafts 50 and 51 through the medium of the bevelled gears

47, 48 and 49. The cams 53 and 54 which are mounted upon the shafts 50 and 51 respectively are positioned so that corresponding portions thereof will simultaneously engage the under surface of the support 26 or so that the mounts or highest portions 53ª of the cam will simultaneously engage the under surface of the support for raising the tub to impart a squeezing action to the clothes therein. The engagement of the periphery of the cams 53 and 54 with the under surface of the support 26 will rotate the latter and consequently rotate the tub or container 32. Means is provided for automatically reversing the direction of rotation of the support 26 and container 32, and this mechanism includes a lug 75 which is carried by the periphery of the disc-like spider support 26 and presents an inclined surface 76 for engagement against the upper end of the shifting lever 43 of the clutch 42, moving said shifting lever outwardly along the said inclined surface into substantially the position indicated in dotted lines in Figure 4 of the drawings, when the support 26 is rotated in the direction indicated by the arrow B. This shifting of the lever 43 will shift the clutch 42 for moving it into operative engagement with the opposite friction gear 37 or 38 which it was originally in operative connection with and consequently rotate the support 26 in a direction reverse to that indicated by the arrow B. During the rotation of the support 26 in this reverse direction or in the direction indicated by the arrow A, in Figure 4 of the drawings, the upper end of the lever 43 will be engaged, by the guiding finger 77 which guiding finger is shaped to rock the lever 43 upon its pivot 44 moving the upper free edge inwardly toward the periphery of the support 26 as shown in dot and dash lines in Figure 7 of the drawings, thus reversing the movement of the clutch and consequently reversing the direction of rotation of the support 26 or causing the support to rotate in the direction indicated by the arrow A. In this manner the rotation of the support 26 and container 32 will be constantly altered during operation of the washing machine and consequently thoroughly rubbing the clothes being clamped therein while an oscillatory action will be imparted to the tub through the medium of the cams 53 and 54, which cams will also move the tub or retainer 32 upwardly when the mounts 53ª of the cam are in engagement with the under surface of the support 26, thereby imparting a squeezing action to the clothes between the container and the dasher 57.

A crank handle 78 may be mounted upon the outer end of the shaft 39 and the motor or prime mover 34 disconnected to permit operation of the washing machine by hand if so desired.

Changes in details may be made without departing from the spirit of this invention; but;

I claim:

1. In a washing machine, the combination, of a container, means for rotating said container, a dasher, means yieldably supporting said dasher to permit limited vertical movement thereof, means for rendering said yieldable means inactive, said rotating means for the container adapted to move the container toward the dasher at predetermined intervals to impart a squeezing action to clothes between the bottom of the container and dasher, and means operated by the rotation of the support for automatically reversing the direction of rotation of the support and container.

2. In a washing machine, the combination, of a support, a clothes container removably carried by the support, cams engaging said support for rotating and reciprocating the support and container, a prime mover, means operatively connecting said prime mover to said cams for rotating the cams by operating of the prime mover, a clutch interposed in said connecting means whereby the direction of rotation of said cams may be reversed.

3. In a washing machine, the combination, of a support, a clothes container removably carried by the support, cams engaging said support for rotating the support and container, a prime mover, means operatively connecting said prime mover to said cams for rotating the cam by operation of the prime mover, a clutch interposed in said connecting means whereby the direction of rotation of said cams may be reversed, and means carried by said support for automatically operating said clutch at predetermined intervals during the rotation of said support and container for reversing the direction of rotation of the cams.

4. In a washing machine, the combination, of a base, a support carried by the base, a clothes container associated with the support, means for imparting a rotary and reciprocatory movement to the support and container, standards carried by the base, a yoke connecting the standards and extending across the container and having a centrally disposed opening formed therein, a sleeve slidably mounted in the opening, a stem slidably mounted in the sleeve, means for adjustably and releasably connecting the stem to the sleeve, upper and lower resilient arms carried by the yoke arranged to receive the stem, a head formed on the stem, and springs coiled around the stem and interposed between the resilient arms and the sleeve.

5. In a washing machine, the combination, of a base, a vertically movable and rotatable support carried by the base, a clothes con-

tainer associated with the support, a dasher for the clothes container, a drive shaft, a drive gear secured to the drive shaft, a counter shaft carried by the base, a pair of gears rotatably mounted upon the counter shaft and engaging the opposite sides of the drive gear, a pair of operating shafts rotatably carried by the base and arranged adjacent to the diametric center of the container, means operatively connecting the operating shafts with the counter shaft to permit the operating shafts to be driven in opposite directions, cams carried by the operating shafts and arranged to engage the lower surface of the support and spaced points, a clutch splined to the counter shaft and adapted to engage either end of the gears rotatably mounted upon the counter shaft at different times, and means carried by the support for operating said clutch.

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