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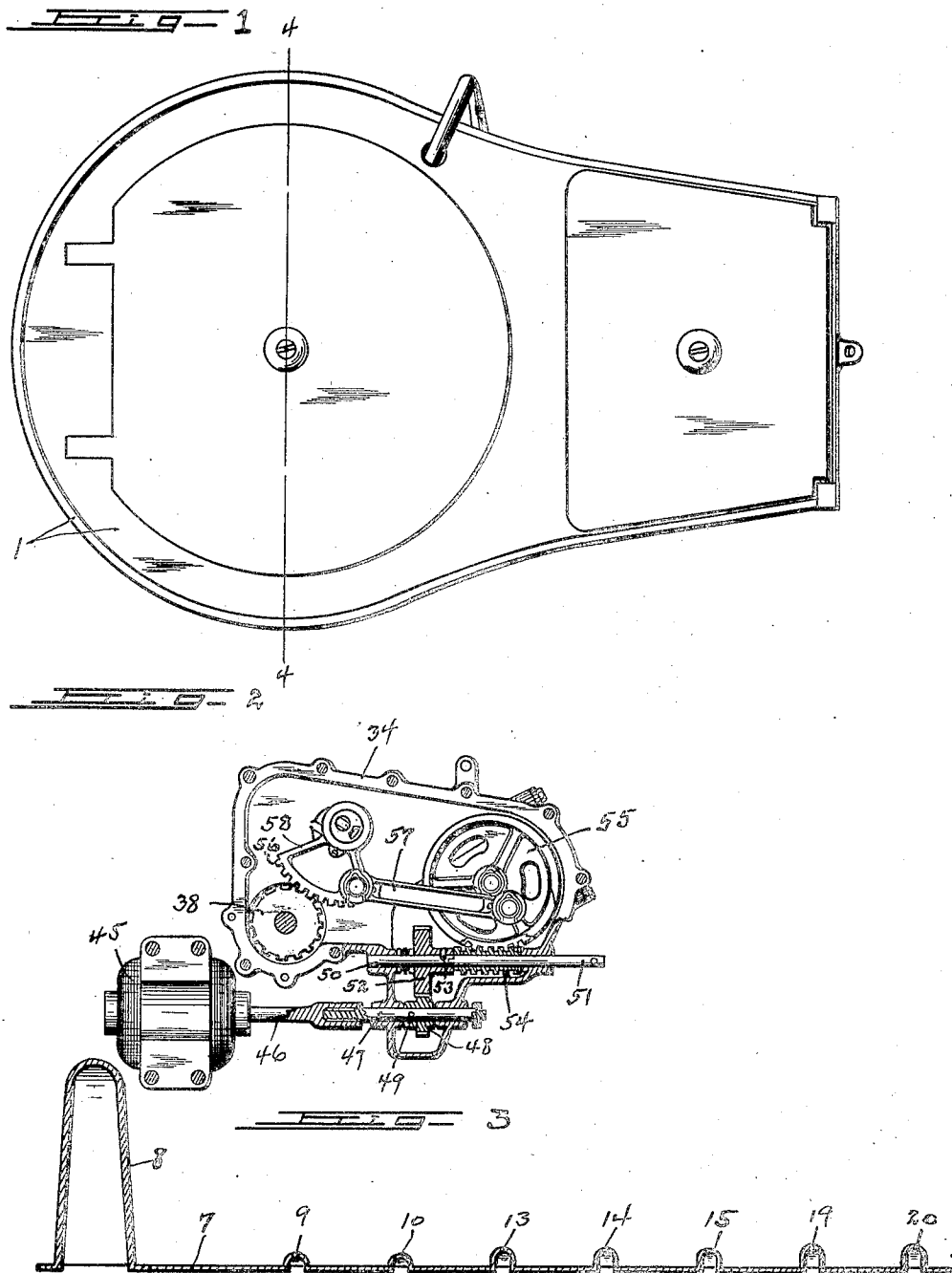
P. E. GELDHOF

1,789,939

WASHING MACHINE

Filed Sept. 25, 1929

3 Sheets-Sheet 1



WITNESS
H. L. Meade.

INVENTOR
Peter E. Geldhof
By
Dwison Thompson
ATTORNEYS.

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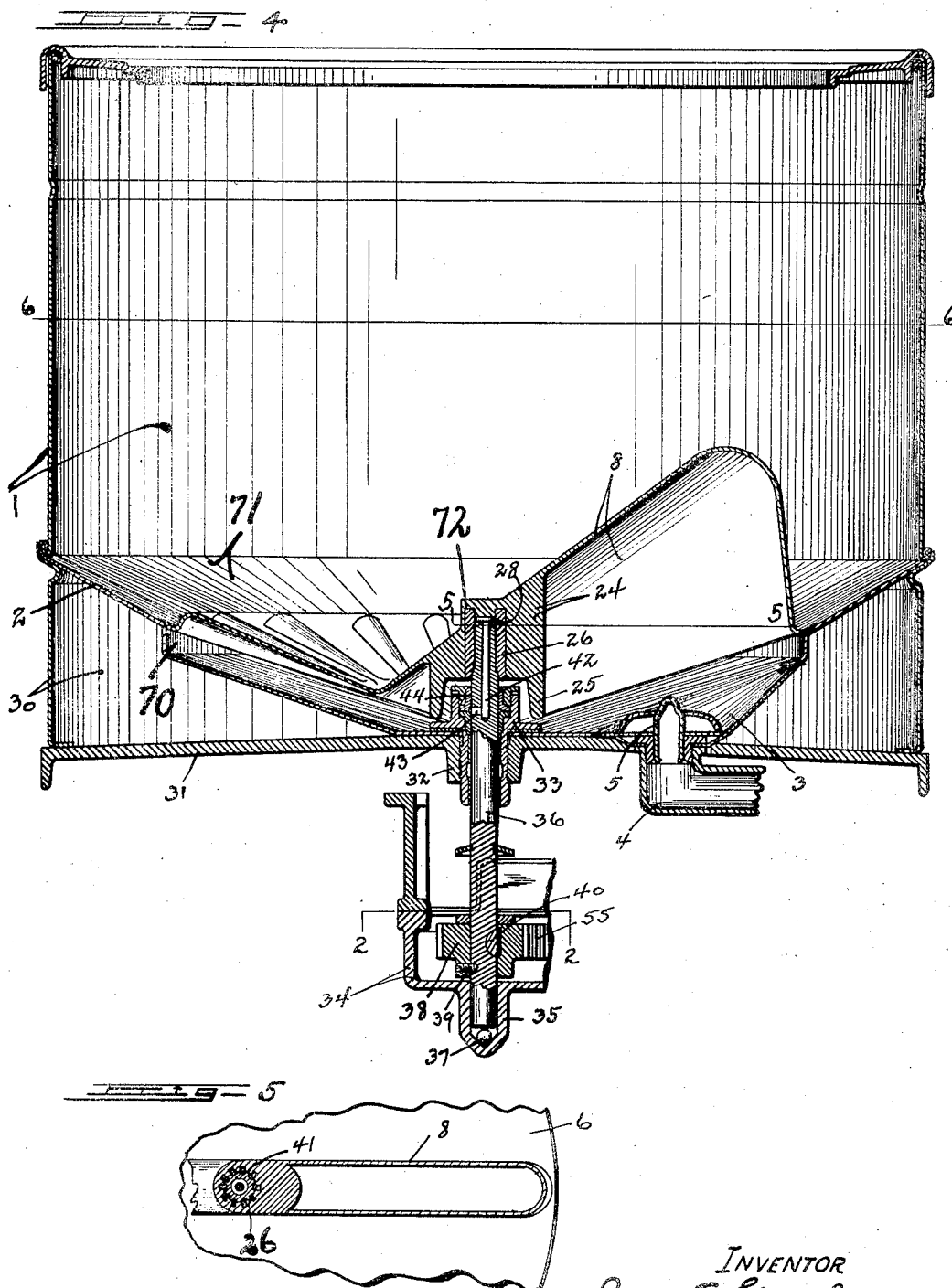
P. E. GELDHOF

1,789,939

WASHING MACHINE

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3 Sheets-Sheet 2



WITNESS
H. L. Meade.

INVENTOR
BY Peter E. Geldhof
Oliver Thompson
ATTORNEYS

Jan. 20, 1931.

P. E. GELDHOF

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WASHING MACHINE

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3 Sheets-Sheet 3

FIG. 6

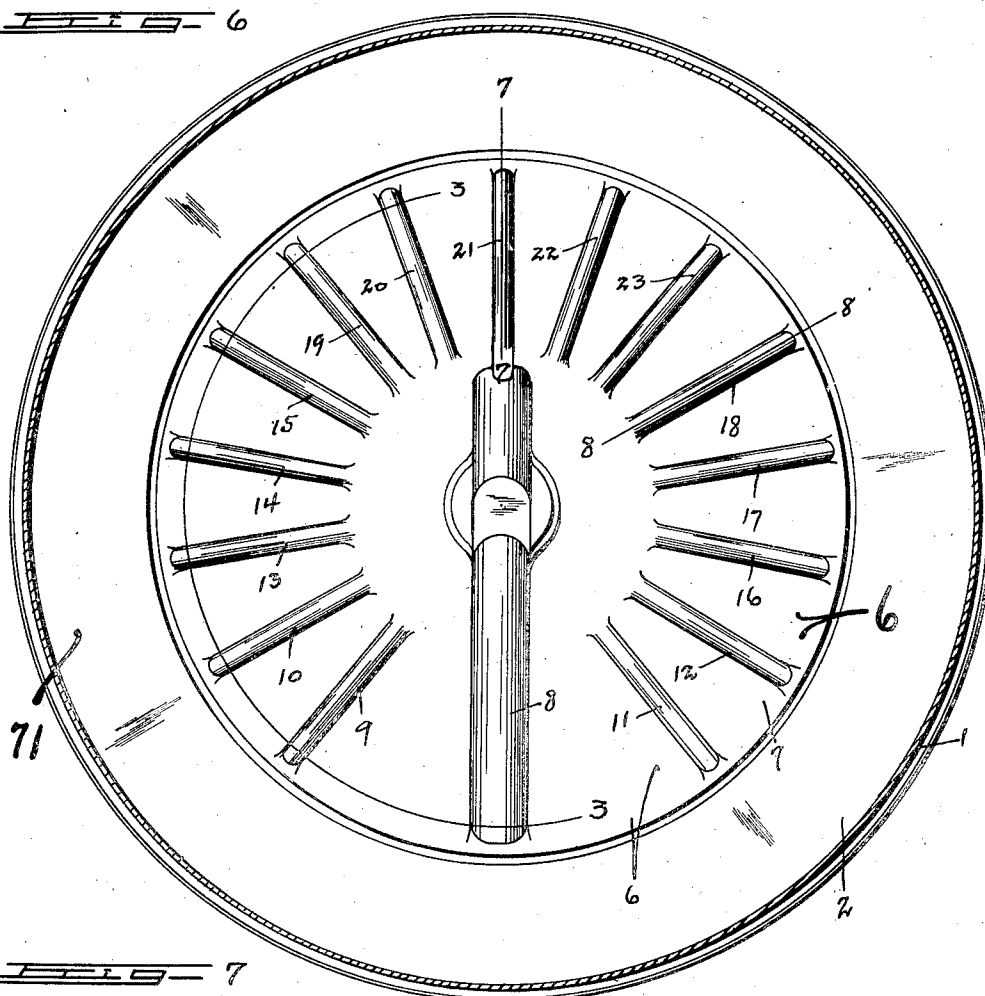
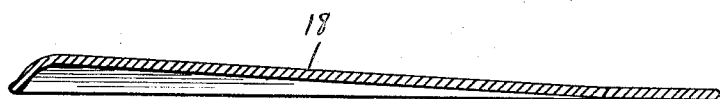


FIG. 7



FIG. 8



WITNESS
H. L. Meade.

INVENTOR
Peter E. Geldhof
BY
Ornison Thompson
ATTORNEYS.

UNITED STATES PATENT OFFICE

PETER E. GELDHOF, OF SYRACUSE, NEW YORK, ASSIGNOR TO SYRACUSE WASHING MACHINE CORPORATION, OF SYRACUSE, NEW YORK, A CORPORATION OF DELAWARE

WASHING MACHINE

Application filed September 23, 1929. Serial No. 394,722.

This invention relates to a new and improved washing machine and has particular reference to the type of washing machine known as the "blade" or "dolly" type.

In washing machines of the dolly type it has been customary to provide merely a vertical blade or blades oscillating a limited number of degrees, and such blade or blades is or are the only means provided to agitate the clothes and perform the washing operation.

In this type of machine the clothes which are in immediate juxtaposition to the blade or blades are subjected to a reasonably thorough washing operation, but certain of the clothes may not be subjected to a sufficiently complete washing operation unless and until the apparatus has been operated an undesirable length of time.

In washing clothes in machines of the dolly type, it is not only desirable that the clothes be moved back and forth through the washing fluid by the action of the dolly, but it is also desirable that at the same time the clothes be moved in relation to each other with an up-and-down and over-and-over or "tumbling" movement.

If such a movement is obtained and maintained all of the clothes in the machine will be subjected to a thorough and rapid cleansing operation, whether or not they are in immediate juxtaposition to a blade.

The main object of my invention is to provide a machine of the dolly type which will be so constructed that all of the clothes in the machine will be at all times thoroughly and uniformly agitated, and the washing fluid forced through them irrespective of whether or not they are in juxtaposition to a dolly blade.

Another object is to provide a device which is so constructed that during its operation the position of the clothes with respect to the dolly blades will be altered so that all of the clothes will from time to time be sub-

jected to the direct moving action of the main blade of the dolly.

Other objects and advantages relate to the size, shape and arrangement of parts, all as will more fully appear from the following description taken in connection with the accompanying drawings in which:—

Fig. 1 is a top plan view of my washing machine.

Fig. 2 is a section on line 2—2 of Fig. 4. 55

Fig. 3 is a section on line 3—3 of Fig. 6.

Fig. 4 is a section on line 4—4 of Fig. 1, the cover being omitted.

Fig. 5 is a section on line 5—5 of Fig. 4.

Fig. 6 is a section on line 6—6 of Fig. 4. 60

Fig. 7 is a section on line 7—7 of Fig. 6.

Fig. 8 is a section on line 8—8 of Fig. 6.

The apparatus consists of a washing vat —1— preferably circular in form and having a bottom —2— in the shape of an inverted two-step cone, providing a central depressed chamber or well —3— of circular form and separated from the outer portion 71 of the bottom —2— by a concentric shoulder 70 of suitable height for the purpose hereinafter described. 70

A drain-pipe —4— leads outwardly from the depressed chamber —3— and a cage or screen —5— is preferably positioned in the upper end of the drain pipe. It will be understood that a suitable valve may be provided in the drain-pipe to control the passage of fluid therethrough. 75

The agitator, or dolly —6— comprises a circular disk in the shape of an inverted cone of low pitch. The disk —7— is provided with a vertically extending main blade —8— diametrically disposed with respect to the disk and formed with its outer end extending substantially vertically from the outer edge of disk —6— and having its top surface inclined gradually from the outer edge downwardly and inwardly across the axis of disk —7— to a point some distance on the oppo- 80 85 90

site side of said axis where it merges into the upper surface of the disk.

On the upper surface of disk —7— there is also provided a plurality, in this case shown as fifteen (15) in number of auxiliary relatively smaller radial blades which extend from the outer edge of the disk —7— inwardly to points in spaced relation from the axis of the disk —7—. These auxiliary blades are likewise higher at their outer ends and inclined gradually downwardly as they extend inwardly to finally merge into the disk —7—, and as shown, extend a distance equal to about one-half the radius of the disk, and are substantially equally spaced except as to the two auxiliary blades adjacent to and on opposite sides of the main blade —8—.

It will be seen that the main blade —8— merges into the surface of disk —7— at a point adjacent the place where the inner ends of certain of the auxiliary blades also merge into the upper surface of the disk. However, as shown, blade —21— may connect with the end of the main blade —8— as the two are in alignment.

For the purpose of more effectively washing the clothes the outer ends of blades 9, 10, 11 and 12 are of slightly less height than the outer ends of blades 13, 14, 15, 16, 17 and 18, and the outer ends of these last mentioned blades are of slightly less height than the outer ends of the blades 19, 20, 21, 22 and 23.

The blade —8— is preferably of hollow form except at the hub 24 so that the dolly may be as light as is reasonably possible and is tapered naturally and downwardly on a small angle as perhaps best shown in Fig. 3, and for the purpose of mounting the dolly in position in the vat there is provided in connection with the blade —8— at the central portion of the disk —7— the said hollow hub 24 which has a depending annular rim or flange 25 surrounding and spaced radially from the packed bearing for the rotary driving shaft 38, as hereinafter described, to provide an air seal for the bearing.

The upper end of this bearing for shaft 38 is also spaced axially from the hub 24, the space thus provided being in free communication with the space between the bearing and the flange 25.

The hub 24 is provided with a plurality of cast in splines 26 equal in number to the number of grooves in the upper end of shaft —36— and adapted to seat in such grooves to provide a driving connection between the shaft and the dolly and, as shown, the splines 26 may as shown, extend upwardly into the closed end of the hub 24 as illustrated at —72—.

The upper end of the drive shaft 36 is provided with an oil conduit 42 and a radial opening 43 leading therefrom so that oil introduced in the upper end of conduit 42 will pass downwardly through the conduit in the

shaft and outwardly through the radial opening to the bearing as hereinafter described.

To the upper end of the bottom —2— and to the lower end of the side wall of the vat there is secured a depending housing 30 preferably conforming in shape to the shape of the vat —1— and provided with a bottom wall 31 through which drain —4— extends. The inner edge of the bottom wall —2— of the vat is clamped or confined between the bottom wall 31 and a bearing member 33 hereinafter more fully described, suitable packing being interposed between the members to prevent leakage.

At the central portion of the bottom there is provided a tubular interiorly threaded boss 32 and the bearing member 33 is threaded into the boss 32 and has a portion which extends upwardly into the bottom portion of the vat —1— and a packed joint is provided between the shaft 36 and the bearing member 33 and which, as shown, comprises a pair of oppositely disposed cup-leathers meeting adjacent the radial opening 43 and a locking nut threaded into the upper portion of the bearing member 33 to confine the cup-leathers in place.

Beneath the central portion of the bottom wall 31 there is provided a gear housing 34 for enclosing the actuating mechanism for shaft 36.

Housing 34 is provided with a downwardly extending hollow boss 35. A shaft 36 has its lower end rotatably mounted in boss 35 with a ball 37 interposed between the lower end of shaft 36 and the bottom of boss 35. Just above boss 35 and in housing 34 I provide a gear 38 secured to shaft 36 as by a set screw 39 and a key 40. Shaft 36 extends vertically from housing 34 into and through bearing 33. The upper end of shaft 36 is provided with a plurality of spaced grooves 41 adapted to engage the splines 26 in the hub —24—.

When it is desired to place the agitator —6— in operative position the hub is lowered on to shaft 36 with splines —26— seating in the grooves 41 until the upper end of hub 24 rests upon the upper end of shaft 36 and preferably a fibre or other washer —28— is forced into the hub so that the upper end of shaft 36 is spaced from the closed end of the hub —24— by said washer or disk.

When the agitator 6 is in operative position the depending annular rim 25 will be in spaced relation to the upper end of bearing member 33 so as to provide an air pocket to prevent the passage of washing fluid from the vat 1 to the bearing for shaft 36.

It will be obvious that with the splines 26 in engagement with the grooves 41 in shaft —36—, the oscillation of the shaft 36 will cause the oscillation of agitator 6.

Although it is possible to transmit an oscillating movement to shaft 36 in various ways, I have here shown a particular arrangement

of parts in which is provided a motor 45 secured to the under side of the frame of the washing machine, such frame not being here specifically shown, and which frame also functions as a support for housing 34.

The armature shaft 46 of motor 45 is operatively connected to a shaft 47 journaled in housing 34. On shaft 47 and in housing 34 I provide a gear 48 secured to shaft 47 as by a pin 49. Adjacent shaft 47 and in parallel relation thereto, I provide a second shaft 50 having one end journaled in housing 34 and having its other end jointed by a tongue and groove connection to the inner end of a shaft 51, shaft 51 having its outer end journaled in housing 34. On shaft 50 I provide a gear 52 secured thereto as by a pin 53, gear 52 being in mesh with gear 48. Adjacent gear 52 and secured to a shaft 51 I provide a worm gear 54. A spiral gear 55 is rotatably mounted in housing 34 in operative engagement with worm gear 54. A segment and gear 58 is journaled in housing 34 having its teeth 56 in mesh with gear 38.

A link 57 has one end pivotally mounted on the inner end of rack 58 and has its other end pivotally mounted on spiral gear 55 eccentric to the axis of gear 55.

When the motor 45 is in operation it will, through gears 48 and 52 and worm gear 54, cause the rotation of gear 55. Link 57, being eccentrically mounted on gear 55, the rotation of gear 55 will cause the outer end of link 57 to be moved towards and from gear 55 and this, in turn, will cause an oscillating movement of rack 58, which oscillating movement will be transmitted to shaft 36 due to the fact that the teeth 56 of rack 58 are in mesh with gear 38 which is secured to shaft 36.

The disk —7— of the dolly is of an external diameter just slightly less than the internal diameter of the concentric shoulder 70 and the general conical shape of the dolly disk is of slightly less pitch than the outer annular portion 71 of the bottom wall —2—, giving a substantial tendency to the clothes to feed inwardly to the dolly. However, the outer edge of the dolly terminates at substantially the same level as the inner periphery of the portion 71 so as to avoid unevenness at the junction and the main blade and the auxiliary blades project upwardly from the disk and the periphery of the dolly is spaced a considerable distance by the inclined portion 71 from the peripheral wall of the vat to permit desired outward, upward and then downward movement of the clothes being washed.

The particular bearing structure and air seal for the same, as well as the particular apparatus illustrated for actuating the drive shaft are not herein specifically claimed, but are being made the subject-matter of separate applications.

The form and structure of the dolly taken in connection with the related portions

of the vat effect a definitive movement of the clothes being washed, and produces a more effective and rapid washing operation.

It will be noted that the dolly reciprocates through an arc of about 180 degrees. As the dolly starts in one direction the centrifugal force produced by it throws the clothes ahead of the dolly outwardly where they come in contact with the side wall of the vat and rise to the top of the washing fluid and move around the vat to a point substantially diametrically opposite the main blade of the dolly where they gradually move downwardly toward the bottom of the vat and come in contact with the auxiliary blades on the upper surface of the dolly, these auxiliary blades acting upon the clothes in much the same manner as a washing operation is effected by the use of a washboard.

As the dolly moves in one direction it produces a vacuum behind it which tends to move the water through the clothes at the rear of the dolly. On return movement of the dolly it moves the clothes ahead of it outwardly and upwardly so that they rise to the upper surface of the washing fluid and move around the vat gradually dropping to the bottom of the vat at a point diametrically opposite the normal central position of the main blade of the dolly.

It will be apparent that in two diametrically divided portions of the vat each determined by a line extending through the axis of the drive shaft lengthwise of the main blade —8— that the clothes are subjected to similar washing operations at alternate movements of the dolly, and that the main blade is the primary moving force for the clothes, and the washing fluid, whereas the supplemental blades assist in the action of washing the clothes as the blades rub across them.

The particular form and construction of the dolly including the shape of the disk portion thereof, the form and disposition of the blades thereof, is an essential feature of this invention, particularly taken in connection with the special form of the bottom of the vat in which the dolly moves in the well or chamber at the center of the bottom —2— and is spaced a considerable distance from the periphery of the vat by the inclined portion 71, and these features are the special subject-matter claimed in this application.

And although I have shown and described in detail a preferred form of the invention, I do not desire to restrict myself to the exact form, structure or relation of parts, as changes and modifications may be made within the scope of the invention as set forth in the appended claims.

I claim:

1. In a device of the class described, a vat, a shaft extending into the vat, an agitator operatively connected to the shaft and comprising a circular bottom portion of the

shape of an inverted cone having radially extending spaced ribs of varying heights and a blade extending upwardly from such bottom portion, and means for oscillating the shaft.

2. In a device of the class described, a vat having a bottom of the shape of an inverted cone, a shaft extending into the vat, an agitator operatively connected to the shaft and comprising a circular bottom portion of the shape of an inverted cone having radially extending spaced ribs of varying heights, and a blade extending upwardly from such bottom portion, and means for oscillating the shaft.

3. In a washing machine, an oscillating dolly comprising an inverted cone disk of low pitch, a main blade extending vertically from the disk diametrically thereof and having its portion of greatest extension at the edge of the disk and gradually inclined downwardly therefrom across the axis of the disk and merging some distance beyond the axis into the contour of the disk, a hub at the center of the disk, and a plurality of auxiliary blades of less vertical extension than the main blade extending inwardly from the edge of the disk and inclined downwardly as they extend inwardly so as to merge into the contour of the disk at points spaced from the axis of the disk.

4. In a washing machine, an oscillating dolly comprising an inverted cone disk of low pitch, a main blade extending vertically from the disk diametrically thereof and having its portion of greatest extension at the edge of the disk and gradually inclined downwardly therefrom across the axis of the disk and merging some distance beyond the axis into the contour of the disk, a hub at the center of the disk, and a plurality of auxiliary blades of less vertical extension than the main blade extending inwardly from the edge of the disk and inclined downwardly as they extend inwardly so as to merge into the contour of the disk at points spaced from the axis of the disk, said auxiliary blades being uniformly spaced from each other except as to the two auxiliary blades upon opposite sides of the main blade.

5. In a washing machine, a vat having a bottom wall separated into an outer annular frusto-conical portion and an inner conical portion separated from the outer portion by a substantially vertical shoulder to form a central well in the bottom portion of the vat, an oscillating dolly positioned in said well and having its outer edge of slightly less diameter than the interior diameter of said annular shoulder and disposed upon a level substantially the same as the level of the inner edge of said outer portion of the bottom wall, said oscillating dolly comprising an inverted cone disk of low pitch, a main blade extending vertically from the disk dia-

metrically thereof and having its portion of greatest extension at the edge of the disk and gradually inclined downwardly therefrom across the axis of the disk and merging some distance beyond the axis into the contour of the disk, a hub at the center of the disk, and a plurality of auxiliary blades of less vertical extension than the main blade extending inwardly from the edge of the disk and inclined downwardly as they extend inwardly so as to merge into the contour of the disk at points spaced from the axis of the disk.

6. In a washing machine, a vat having a bottom wall separated into an outer annular frusto-conical portion and an inner conical portion separated from the outer portion by a substantially vertical shoulder to form a central well in the bottom portion of the vat, an oscillating dolly positioned in said well and having its outer edge of slightly less diameter than the interior diameter of said annular shoulder and disposed upon a level substantially the same as the level of the inner edge of said outer portion of the bottom wall, said oscillating dolly comprising an inverted cone disk of low pitch, a main blade extending vertically from the disk diametrically thereof and having its portion of greatest extension at the edge of the disk and gradually inclined downwardly therefrom across the axis of the disk and merging some distance beyond the axis into the contour of the disk, a hub at the center of the disk, and a plurality of auxiliary blades of less vertical extension than the main blade extending inwardly from the edge of the disk and inclined downwardly as they extend inwardly so as to merge into the contour of the disk at points spaced from the axis of the disk, said auxiliary blades being uniformly spaced from each other except as to the two auxiliary blades upon opposite sides of the main blade.

7. In a washing machine, an oscillating dolly comprising a circular bottom portion of the shape of an inverted cone, a vertically extending main blade extending diametrically from the edge of the bottom portion some distance across the axis, the height of the blade gradually decreasing from its outer end to its inner end, a plurality of auxiliary blades of less height than the main blade extending radially in spaced relation from the edge of the bottom portion to points short of the axis of the bottom portion, the height of the auxiliary blades gradually decreasing from the outer ends to the inner ends.

8. In an oscillating dolly, an inverted cone disk, a main blade extending vertically diametrically of the disk, and a plurality of auxiliary blades extending radially in spaced relation, said auxiliary blades being less in vertical extension than the main blade and

being divided into groups which differ from each other in vertical extension.

9. In an oscillating dolly, an inverted cone disk, a main blade extending vertically diametrically of the disk, and a plurality of auxiliary blades extending radially in spaced relation, said auxiliary blades being less in vertical extension than the main blade and being divided into groups which differ from each other in vertical extension, all of said blades having their greatest vertical extension at the outer end and gradually inclining downwardly therefrom.

In witness whereof I have hereunto set my hand this 31 day of August, 1929.

PETER E. GELDHOF.