Feb. 10, 1942. D. B. D. BLAKE 2,272,541

WASHING MACHINE

Filed Nov. 23, 1938 3 Sheets-Sheet 1

Fig. 1.

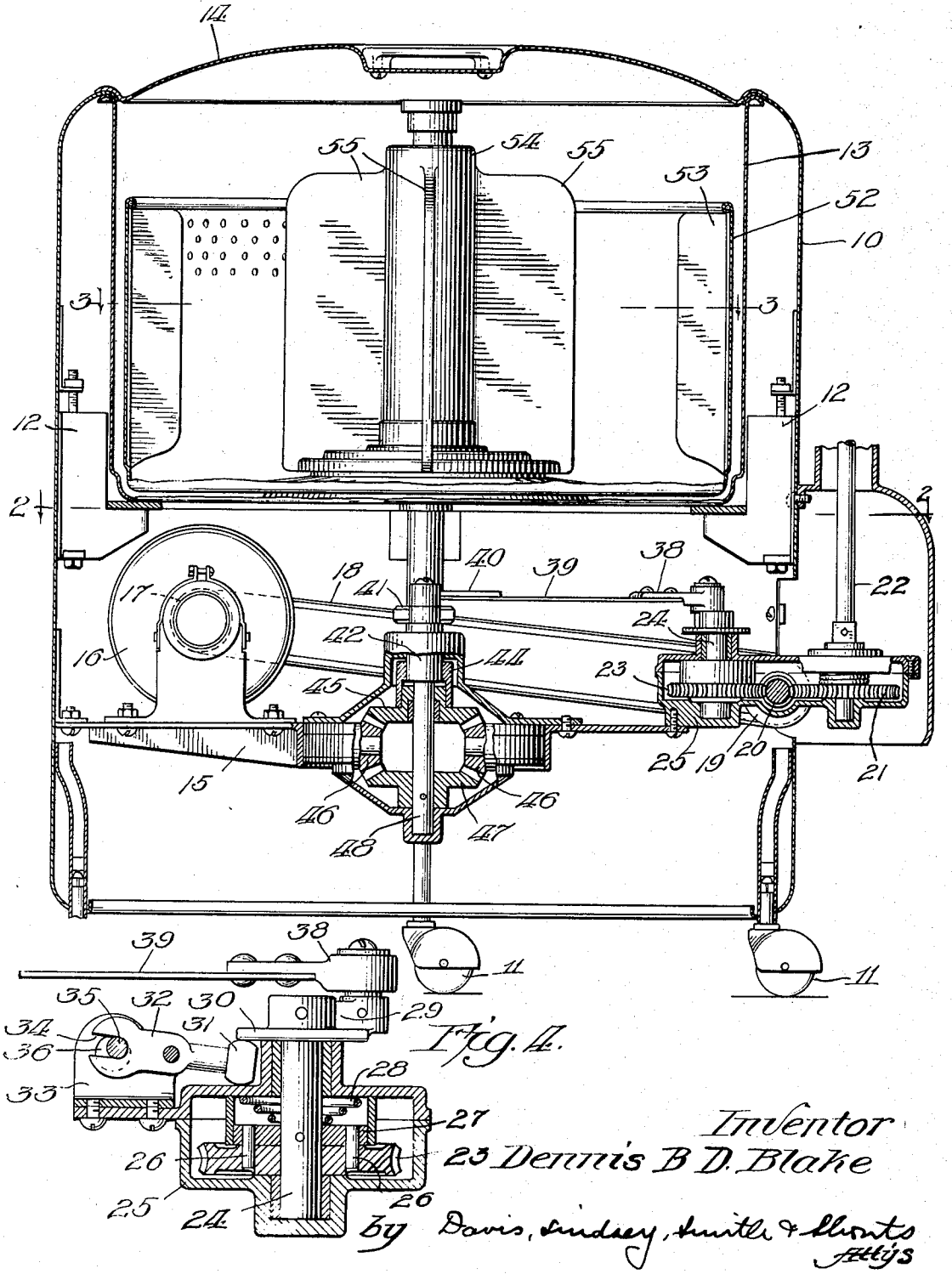

Fig. 4.

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Fig. 2.

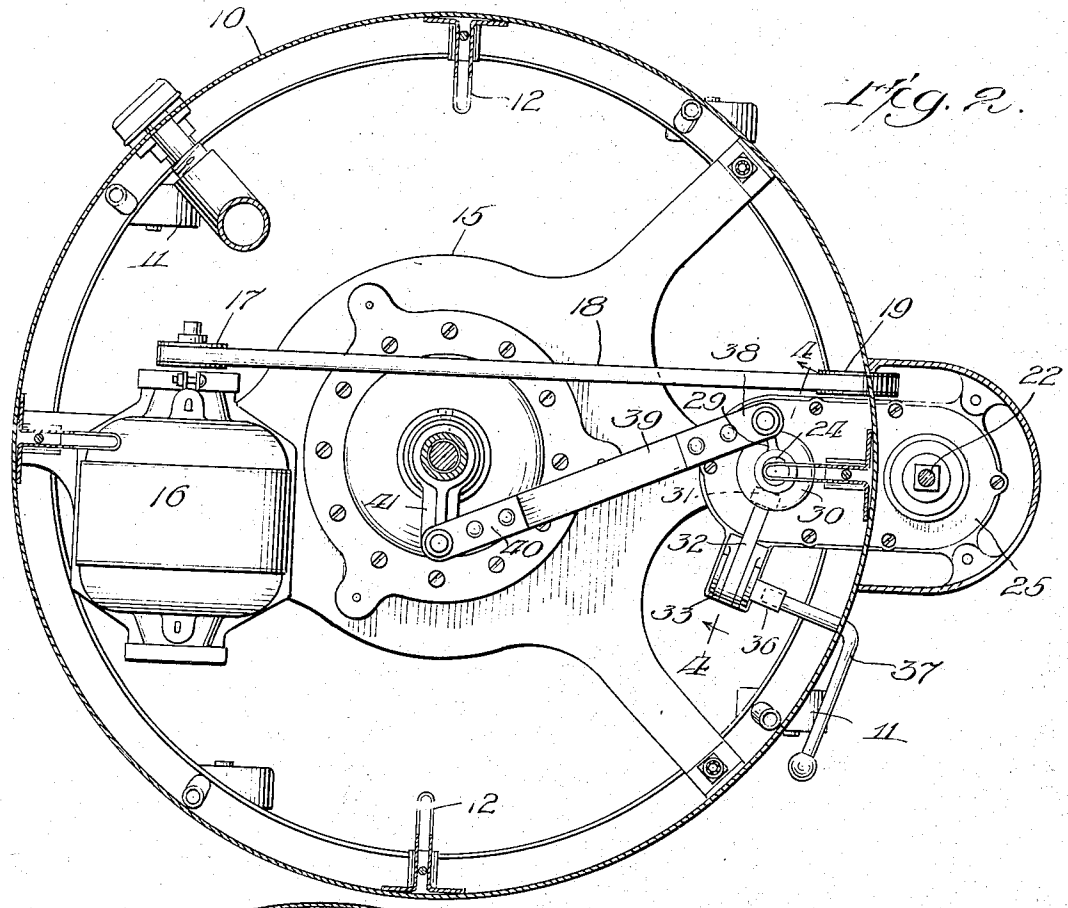
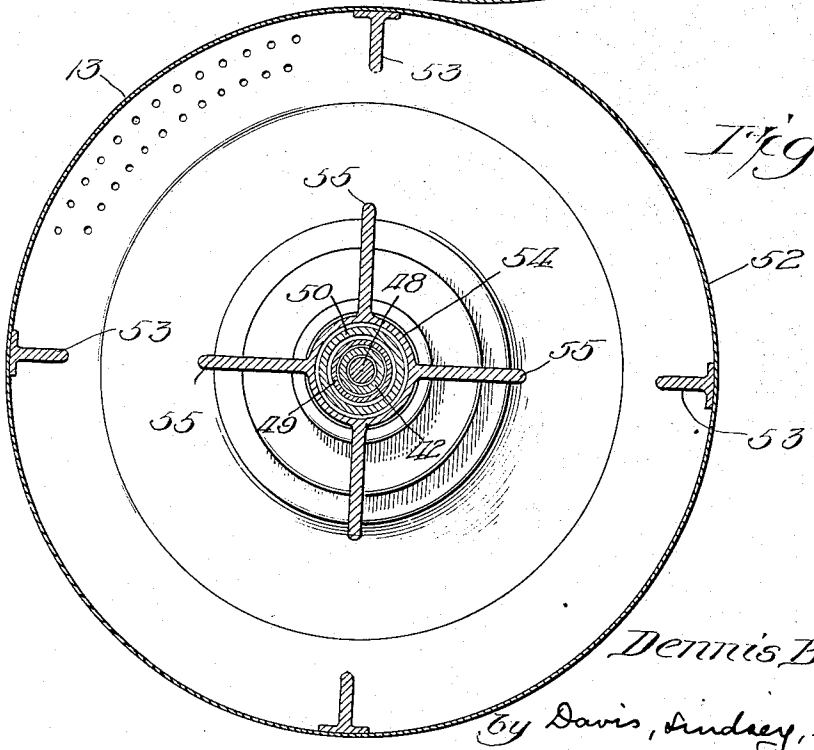


Fig. 3.



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WASHING MACHINE

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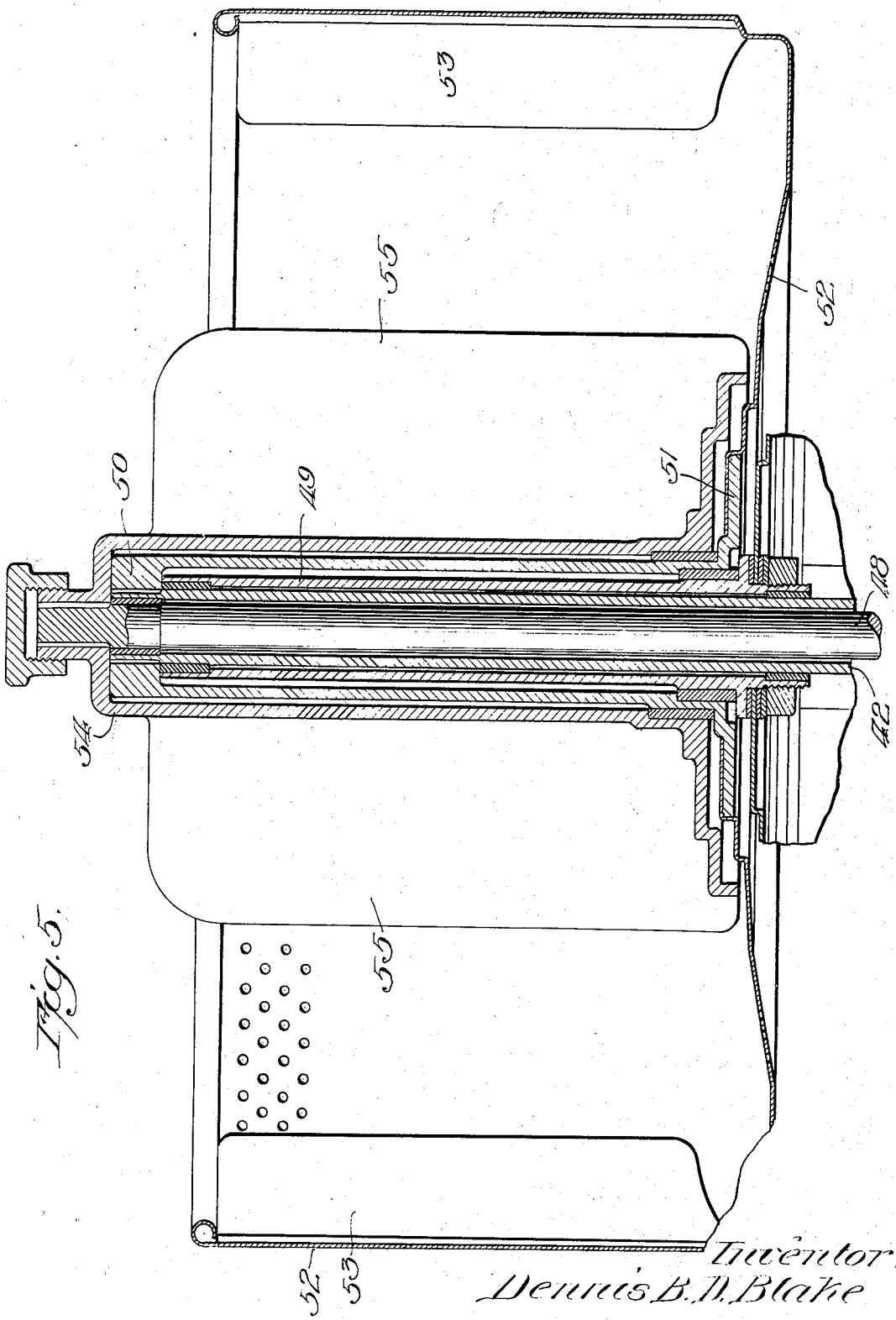

Fig. 5.

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UNITED STATES PATENT OFFICE

2,272,541

WASHING MACHINE

Dennis B. D. Blake, Danville, Ill.

Application November 23, 1938, Serial No. 241,944

2 Claims. (Cl. 68—133)

My invention relates to washing machines and more particularly to an improved agitating arrangement and driving mechanism therefor.

One object of my invention is to devise a washing machine in which the detergent action is effected by agitating devices which periodically reverse the movement of the pieces being washed and direct masses of water along opposite sides of and through the pieces.

A further object is to provide a machine of the character indicated having cooperating agitating devices which create a water turbulence that tumbles and shifts the pieces to and fro in the cleaning fluid and substantially free of contact with the enclosing basket.

A further object is to devise a washing machine having agitating devices arranged in a pair of groups which oscillate in opposite directions and act to virtually suspend the pieces therebetween by water movements induced by the agitators.

These and further objects of my invention will be set forth in the following specification, reference being had to the accompanying drawings, and the novel means by which said objects are effectuated will be definitely pointed out in the claims.

In the drawings:

Figure 1 is a sectional elevation of my improved washing machine;

Figs. 2 and 3 are sections along the lines 2—2 and 3—3, respectively, in Fig. 1, looking in the direction of the arrows;

Fig. 4 is an enlarged section along the line 4—4 in Fig. 2, looking in the direction of the arrows, and showing the arrangement for making and breaking the driving connection to the agitating devices; and

Fig. 5 is an enlarged, vertical sectional elevation of the basket for receiving the pieces to be washed and the general relation of the agitating devices.

Referring to Fig. 1 of the drawings, the numeral 10 designates a casing that may be supported by the usual casters 11 and which has secured to the interior thereof a plurality of brackets 12 that are spaced around the casing. These brackets support a tub 13 that opens upwardly and which may be closed by the usual cover 14.

The casing 10 is indicated as possessing a circular shape, but may have other configurations and, at a convenient distance from the bottom thereof, the casing wall is strengthened by a multi-armed strut 15 that is also utilized as a support for other elements of the machine, as hereinafter described. One of these elements is a motor 16 that is supported on a convenient pad provided on the strut 15 and to the shaft of the motor is secured a pulley 17 that is connected through a belt 18 with a second pulley 19 that drives a worm 20. This worm meshes on one side thereof with a worm gear 21 that is drivably secured to a vertical shaft 22 which is intended to operate any desired type of wringer mechanism (not shown).

The worm 20 also meshes with a worm gear 23 (see Fig. 4) that is freely rotatable on an endwise movable vertical shaft 24 whose ends are journaled in a housing 25 that is also supported by the strut 15. Driving connection between the worm gear 23 and the shaft 24 is effected by means of a pair of clutch pins 26 whose upper ends are fixed in a clutch disk 27 and whose lower ends are freely received within perforations provided in the gear 23. The disk 27 is pinned to the shaft 24 and is normally urged downwardly to drivably engage the pins 26 with the gear 23 by a spring 28 that encircles the shaft 24, the lower end of the spring abutting against the top surface of the disk 27 and the upper end against the top of the housing 25.

The shaft 24 extends upwardly through the top of the housing 25 and has secured thereto an arm 29 whose hub portion is provided with a flange 30. A roller 31 bears against the under surface of this flange and is mounted on one end of a lever 32 that is intermediately pivoted on a bracket 33 which is supported by the strut 15, while the opposite end of this lever is bifurcated as at 34 to embrace an eccentric pin 35 secured to a rock shaft 36. This rock shaft projects through the casing 10 and is provided with a handle 37. By this arrangement, it is possible to rock the lever 32 upwardly from the position shown in Fig. 4 to thereby interrupt the flow of power between the worm gear 23 and the shaft 24 for a purpose presently explained.

The arm 29 has pivotal connection with an arm 38 which in turn is connected to a similar arm 40 by means of a link 39. This link may be formed of any desired material and possesses sufficient rigidity to transmit the required power between the arms 38 and 40 but is capable of flexing or bending slightly in vertical directions to permit of the endwise shifting of the shaft 24 by the lever 32. This arrangement obviates any necessity for pivotally connecting the ends of the link 39 to the arms 38 and 40.

The arm 40 has pivotal connection with a crank arm 41 whose hub portion encircles and is secured

to a sleeve 42 that is concentric with the axis of the casing 10 and whose lower end is secured to the upper end of a sleeve 44 that extends downwardly for securement to the hub of a bevel pinion 45. The pinion 45 meshes with a pair of intermediate bevel gears 46 which also mesh with a bevel gear 47 that is secured to the lower end of an agitator shaft 48.

The sleeve 42 extends upwardly through the bottom of the tub 13 and coaxial therewith and is journaled in a concentric sleeve 49 whose lower end is mounted in the bottom of the tub. At its upper end, the sleeve 42 is keyed to the upper end of a concentric sleeve 50 that encloses the sleeve 49, but is spaced therefrom, and at its lower end is provided with an annular flange 51 that is secured to the bottom of a cylindrical basket 52 whose bottom and peripheral wall may be perforated in the usual manner. Only a few of these perforations are illustrated. The basket wall is provided with a plurality of radially disposed blades 53 which constitute one set of agitating devices for the machine.

The agitator shaft 48 projects upwardly within the sleeve 42 and beyond the upper end thereof is keyed to a hub sleeve 54 that extends downwardly and surrounds the sleeve 50. A plurality of radially disposed blades 55 are secured to the sleeve 54. The blades 53 and 55 may possess any desired configuration and any dimensions as regards length and width. Preferably, these blades are vertically disposed and it has been ascertained that good results may be obtained by making the width of each blade 55 approximately twice that of each blade 53. By this arrangement it is possible to substantially balance the masses of water thrust inwardly and outwardly by the blades 53 and 55, respectively, and thus maintain the pieces being washed in the zone between the blades, generally speaking. If the blades 53 and 55 possessed the same width for any given height, then the greater speed of the blades 53, due to their being swung through a longer arc in the same time as the blades 55, would impart a thrust to the water in excess of that created by the inner blades so that the pieces would tend to collect around the hub 54. As many of the respective blades may be employed as desired, but they are preferably equally spaced, respectively, around the basket and the sleeve hub 54.

In describing the operation of my improved machine, it will be first understood that, due to the link connection between the arms 38 and 40, the rotary movement of the arm 29 imparts an oscillatory movement to the arm 41 and consequently to the gear 45 and the basket 52. A similar oscillatory movement, but in an opposite direction, is imparted to the sleeve hub 54 and attached blades by reason of the bevel gear mechanism.

Preferably, the blades 53 and 55 are so related that, at the mid-point of their respective swing in any direction, they occupy the relative positions shown generally in Fig. 3. The respective angularity of swing of the blades 53 and 55 is relatively unimportant, since the extent of these swings may be easily controlled by varying the length of the arm 41, but, in any case, it is considered that best results are obtained by restricting the swing to an angle of less than ninety degrees.

During the washing operation, the blades 55 act to propel the cleaning fluid and goods toward the wall of the basket 52, while the blades 53 exert a contrary action. Accordingly, the pieces being washed are prevented from either collecting at the wall of the basket 52, or from being impacted and balled together against the blade hub 54. In effect, the pieces are maintained in the cleaning fluid between the basket wall and the blade hub 54 while undergoing periodic reversals of movement. At the same time the pieces are subjected to the highly effective scrubbing action of the fluid created by the opposite, oscillatory movements of the blades 53 and 55. These movements not only direct the masses of the cleaning fluid along opposite sides of any piece of goods, but also directly through these pieces. The scrubbing action is further enhanced by the impact of masses of water-moving in opposite directions, as set up by the blades 53 and 55. In so far as it is possible to observe the movement of single pieces of material during the washing operation, it is believed that each piece traverses a path generally having the forms of the figure 8. Since the goods are not impacted against the basket wall or the sleeve hub 54, the washing action is free of any undue rubbing action by the metallic walls of the basket or hub that would result in wear on the clothes.

I claim:

1. In a washing machine, the combination of a receptacle for receiving the pieces to be washed, flat agitating blades carried by the peripheral wall of the receptacle, other flat agitating blades disposed centrally of the receptacle and arranged for movement as a unit, and means for respectively imparting rotary, oscillating movements of equal angular extent in opposite directions to the receptacle and said other agitating blades, all of the blades extending for substantially the depth and for a substantial distance radially of the receptacle, and said other agitating blades having a width substantially twice that of the receptacle blades whereby the inner and outer thrusts exerted on the water by the two groups of blades are substantially balanced.

2. In a washing machine, the combination of a receptacle for receiving the pieces to be washed, flat, rectangular shaped, agitating blades carried by the peripheral wall of the receptacle, other flat, rectangular shaped, agitating blades disposed centrally of the receptacle and arranged for movement as a unit, and means for respectively imparting rotary, oscillating movements of equal angular extent in opposite directions to the receptacle and said other agitating blades, all of the blades extending for substantially the depth and for a substantial distance radially of the receptacle, and said other agitating blades having a width substantially twice that of the receptacle blades whereby the inner and outer thrusts exerted on the water by the two groups of blades are substantially balanced.

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