

Aug. 31, 1943.

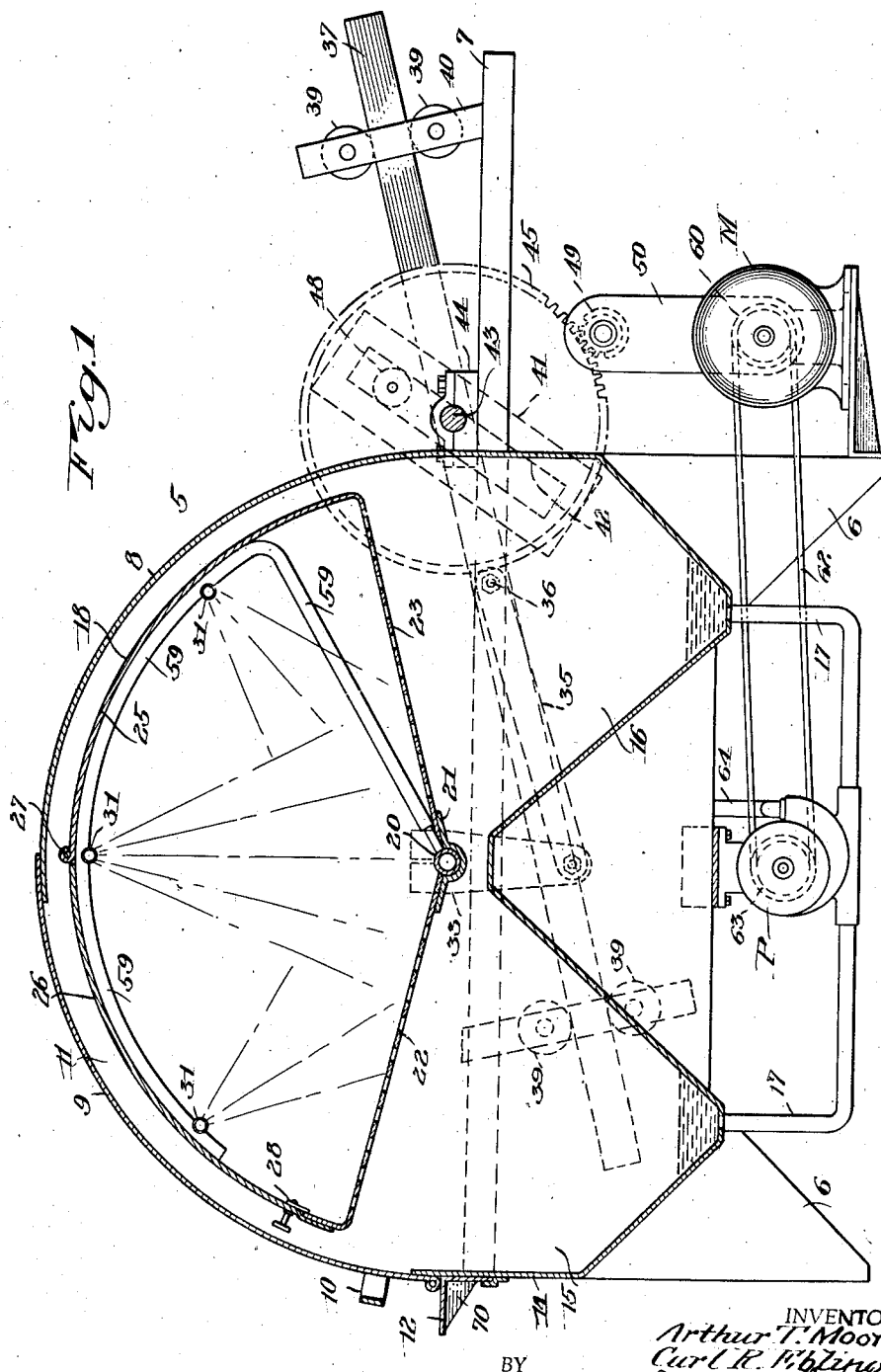
A. T. MOORE ET AL

2,328,026

METHOD OF AND APPARATUS FOR WASHING GARMENTS OR THE LIKE

Filed Dec. 9, 1938

3 Sheets-Sheet 1



INVENTORS
Arthur T. Moore
Curt R. Fitting
D. Clyde Jones
their ATTORNEY.

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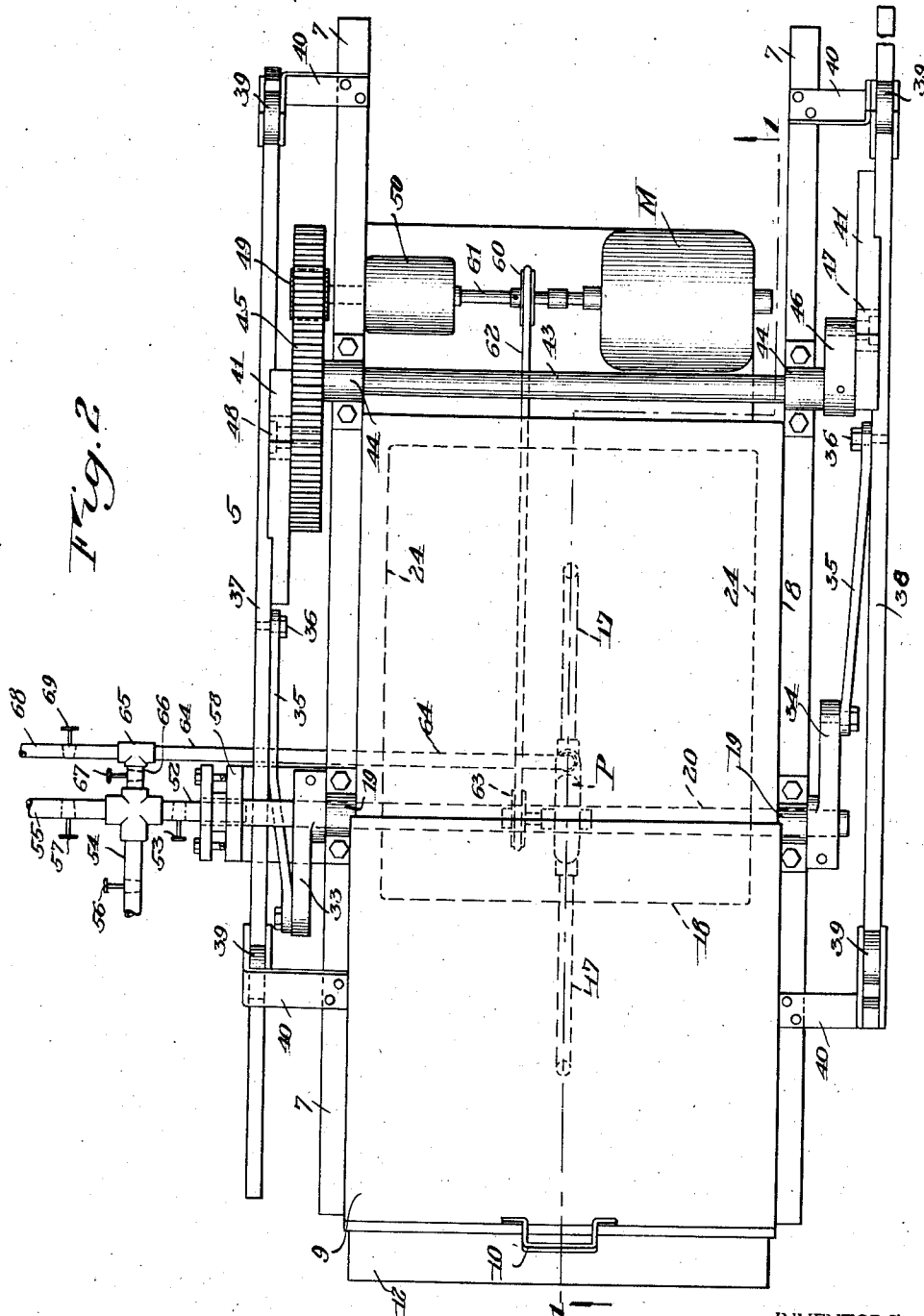
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BY

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D. Clyde Jones
their ATTORNEY

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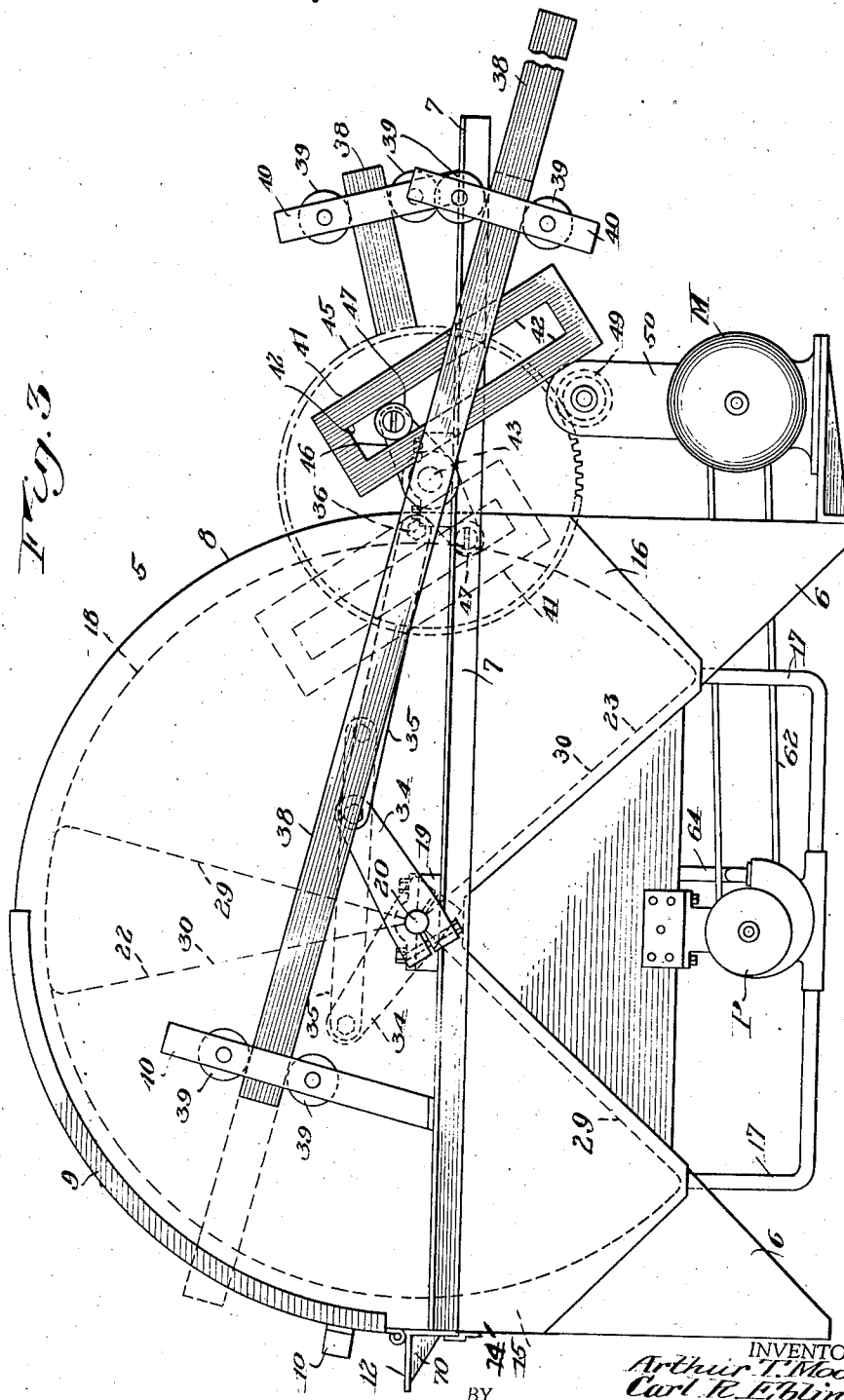
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METHOD OF AND APPARATUS FOR WASHING GARMENTS OR THE LIKE

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INVENTORS
Arthur T. Moore
Carl E. Ebling
D. Clyde Jones
their ATTORNEY.

UNITED STATES PATENT OFFICE

2,328,026

METHOD OF AND APPARATUS FOR
WASHING GARMENTS OR THE LIKEArthur T. Moore and Carl R. Ebling, Batavia,
N. Y.; said Ebling assignor to said Moore

Application December 9, 1938, Serial No. 244,826

10 Claims. (Cl. 8—147)

The present invention relates to a method of and to an apparatus for washing garments or the like.

In prior laundry machines the washing action usually consists of agitating the garments and the like while they are completely submerged in the cleaning fluid. The agitation has been obtained in many ways as by plungers or oscillating dollies disposed in the washing machine tub or by rotating a cylindrical tub having projections, ribs, or baffles on the interior surface thereof. Since a large quantity of water is needed to cover the garments in the tubs of these prior machines a proportionately large quantity of soap must be used to alkalinize the water sufficiently to obtain proper cleaning of the garments. Another disadvantage present in known machines is that the soapy water must be drained from the washing machine if they are to be rinsed in the washing machine. Since several rinsings are required not only is a large amount of water needed but also much time is consumed in draining the soapy water and the rinse water from the machine.

The present invention has for its purpose to overcome the disadvantages of present washing machines and also to provide an improved method of washing garments or the like whereby the time required to thoroughly clean them is substantially reduced. To accomplish this end it is proposed to wash garments or the like by repeatedly tossing or throwing them between two surfaces, under a continuous spray of a cleaning fluid and draining the fluid from the garments. There is also provided an improved washing machine comprising a cradle for the garments or the like, which may be oscillated to throw the garments from one side thereof to the other, while continuously spraying a cleaning or rinsing fluid on the garments, means being provided for recirculating the cleaning and rinsing fluids and for oscillating the cradle.

Further features of the invention will appear from the detailed description and claims when taken with the drawings in which:

Fig. 1 is a vertical section view of a washing machine embodying the principles of the present invention, the section being taken on line 1—1 of Fig. 2;

Fig. 2 is a plan of the machine shown in section in Fig. 1 and

Fig. 3 is a right side view of the machine shown in Figs. 1 and 2, and illustrating the two extreme positions of the cradle and the mechanism for operating the same.

Referring to the drawings, there is illustrated a washing machine incorporating the principles of the present invention and specifically adapted to perform the improved method of washing garments and the like as will appear hereinafter. The washing machine, generally designated 5 comprises a frame including the legs 6 and the horizontal side rails 7, preferably made of angle iron. A casing 8 of sheet metal or the like supported on this frame, has a sliding panel or door 9 provided with a convenient handle 10 thereon, so that the panel may be raised to furnish access to the interior 11 of the casing. A loading platform 12 at the front of the casing and immediately below the sliding panel aids the operator in loading and unloading clothes from the washing machine. Since it is proposed to continuously spray water, a soap solution or other suitable cleaning agent upon the garments during the washing operation, the lower part of the casing 8 comprises a drainage tub 14 which is substantially W-shaped in section. While this tub may be an integral part of the casing it is preferably made separate therefrom so that the upper part of the casing is removable to facilitate assembly and repair of the machine. The front and rear tub compartments 15 and 16 respectively, are connected by means of pipes 17 to the suction pump P so that liquid draining into these compartments during the washing operation can be rapidly removed therefrom and thus prevent the cradle 18, to be later described, from being immersed, it being understood that the present washing machine does not immerse the garments in the cleaning solution.

The side rails 7 of the frame, support bearings 19 for the transverse axle 20 which extends through the casing. The cradle 18 is disposed within the casing 8, and is rigidly secured to the axle as indicated at 21 in Fig. 1. The axle and the cradle thereon are adapted to be oscillated in a manner and by a mechanism to be hereinafter described. The cradle resembles a hollow sector of a cylinder having front and rear bottom walls, 22 and 23 respectively which converge toward the axle, and also having side walls 24 and the arcuate top wall 25. The bottom walls, and if desired, the remaining walls of the cradle, are perforated to allow the cleaning solution to drain into the tub compartments. A section or door 26 of the top wall is hinged as at 27 to provide an opening which may be aligned with the opening in the front of the casing so that the garments or the like to be washed, may be placed

within the cradle. While the door 26 is shown hinged to the cradle, like door 9, it may be slidably mounted if desired. One or more suitable latches 28 are provided along the free edge of the hinged section for securely locking it in closed position while the machine is operating.

In order to perform the method of washing garments which forms a part of the present invention, the cradle 18 is oscillated about the axis of the axle 20 between its extreme position indicated by the dotted lines 29 (Fig. 3) in the front tub compartment 15 to the extreme position indicated by dotted lines 30 (Fig. 3) in the rear tub compartment 16, while continuously spraying a suitable cleaning or rinsing fluid on the garments in the cradle. The cleaning and rinsing fluids are directed onto the garments in the cradle by means of the perforated spray pipes 31 (Fig. 1) extending across the upper part of the cradle.

The oscillation of the cradle is such that in moving from one extreme position 29 to the other extreme position 30 and vice versa, the speed of the cradle accelerates until it reaches approximately the mid-point in its travel, that is, substantially the position shown in Fig. 1, and then decelerates until coming to a momentary stop at its other extreme position. This motion causes the garments to be tossed or thrown from one side of the cradle to the other side thereof, after the cradle has completed more than half of its travel, effecting a thorough pounding of the clothes. The force of this pounding is due not only to the momentum of the garments but also to the fact that the cradle preferably reaches the end of its travel and is moving in the opposite direction by the time the clothes reach the opposite side of the cradle. This repeated pounding of the garments in the presence of a continuous spray of cleaning or rinsing fluid, provides a very effective washing action in that the fluid is expressed from the garments with each pounding of the clothes. It will be understood that the oscillation of the cradle will be continued a suitable length of time until the clothes are thoroughly washed and cleaned.

In order to obtain the above described oscillation of the cradle, the projecting ends of the axle 20 are provided respectively with the crank arms 33 and 34 which are shown offset approximately 180° with respect to each other. It is not essential that two crank arms be provided and the crank arms need not be offset relative to each other, since they may be alined if desired. The free end of each crank arm has one end of a related link 35 pivoted thereto, the other end of each of the links being in turn pivoted at 36 to the respective slide members 37 and 38 located at the sides of the washing machine. The slide members are also offset angularly with respect to each other, as will be apparent from a comparison of Figs. 1 and 3, and are mounted for reciprocatory movement between the spaced sets of guide rolls 39 supported by means of brackets 40 on the adjacent side rail 7 of the frame. It will be understood that these links 35 and the related crank arms 33 and 34 will translate a reciprocating movement of the slide members to an oscillatory movement of the cradle. If it is desired to have the crank arms 33 and 34 alined instead of offset 180° as shown, the slide members 37 and 38 will also be alined and not offset relative to each other as shown.

In order to reciprocate the slide members 37 and 38 and thereby oscillate the cradle between the two extreme positions 29 and 30 (Fig. 3),

each slide member is provided with a yoke or guide block 41 having a slot 42 therethrough. A transverse shaft 43 supported for rotation in the bearings 44 mounted on the side rails 7 at the rear of the casing 8, is provided with a large gear 45 at one end and an arm 46 at the other end. A roller 47 pivotally mounted on the free end of the arm 46 runs in the slot of the adjacent guide block 41 while a roller 48 pivotally mounted on the outer face of the gear 45 runs in the slot of the other guide block. It will be understood that each of these rollers are spaced equally from the axis of the transverse shaft 43. A small pinion gear 49, driven by the motor M through a gear reduction unit 50, engages the large gear 45 to rotate the same.

From the above described mechanism, it will be understood that as the pinion gear 49 rotates to drive the large gear 45, each of the rollers 47 and 48 will move in a fixed circular path about the axis of the transverse shaft 43. Since the rollers move in the slots 42 of their respective guide blocks 41 they will reciprocate the guide blocks and also the slide members 37 and 38 on which they are mounted. This reciprocation of the slide members will, as above described, oscillate the cradle 18 between its two extreme positions 29 and 30.

As previously mentioned, the clothes contained in the cradle are preferably sprayed with water or other cleaning fluids discharged by the perforated spray pipes 31 extending across the arcuate top wall 25 of the cradle during the entire washing operation. In order to supply hot or cold water to these spray pipes, the left end portion of the axle 20 is hollow and has connected thereto the main supply pipe 52 provided with a quick opening valve 53. The pipe 52 is in turn connected to a hot and a cold water supply by the pipes 54 and 55 having quick opening valves 56 and 57 respectively. The main supply pipe 52 is preferably telescoped into the hollow end of the axle, a conventional packing gland unit 58 being provided at the joint to prevent leakage. A pipe 59 disposed within the cradle communicates with the interior of the hollow portion of the axle and is connected to the spray pipes 31 for conducting the cleaning and rinsing fluid thereto.

A pulley 60 mounted on the shaft 61 of the motor M is connected by means of a belt 62 to the pulley 63 of the suction pump P for driving the same. The discharge pipe 64 of the suction pump P is connected to the T-piece 65. One branch of the T-piece is connected to the main supply pipe 52 by means of the pipe 66 having a quick-opening valve 67 therein, while the other branch of the T-piece discharges into a sewer or the like (not shown), through the pipe 68 having a quick-opening valve 69.

The manner of utilizing the machine of the present invention for performing the novel method of washing garments and the like, is briefly as follows: The sliding door 9 and the hinged door 26 are opened and the garments or the like to be washed are placed in the cradle. The doors are then closed and the hot and cold water supply valves 56 and 57 are opened to allow water at a desired temperature to be discharged through the spray pipes 31 into the cradle. A sufficient quantity of soap may be added to the water through a trough 70 provided below the loading platform 12. This trough opens into the tub compartment 15. The motor M is then started and oscillates the cradle between its two extreme

positions 29 and 30. After a sufficient quantity of water has been sprayed onto the clothes, the hot and cold water valves 56 and 57 may be closed, it being understood that the valve 69 remains closed, while the valves 53 and 67 are open. The pump P recirculates the soapy water from the tub 14 to the spray pipes 31 to continuously spray the clothes while they are repeatedly pounded by being tossed or thrown alternately from one side of the cradle to the other side thereof. After the clothes have been thoroughly washed, the valve 67 is closed and the valve 69 is opened so that the soapy water may be discharged into a sewer or otherwise disposed of. After the soapy water has been entirely removed from the machine, the hot and/or cold water supply valves 56 and 57 are again opened so that clean water of the desired temperature may be sprayed on to the clothes for rinsing them. The rinse water may either be recirculated or disposed of through pipe 68.

It has been found by actual test that in the practice of the above described method, garments and the like can be washed in a much shorter time than heretofore possible with known methods and that the present machine can be operated at a great saving in cost over that of prior laundry machines since only a fraction of the water and soap heretofore required is needed.

While the crank mechanism, specifically illustrated in the drawings, is preferred, it will be understood that the cradle may be oscillated by other means. These means may comprise, e. g. suitably proportioned cams or compressed air cylinders directly connected to the cradle.

What we claim is:

1. A washing machine comprising a casing including a tub portion, a receptacle having converging garment-supporting bottom walls, said receptacle having drain holes therein and being supported for oscillation within the casing about an axis approximately at the intersection of the planes of said converging bottom walls, said axis being sufficiently above said tub portion to keep the receptacle above the liquid level in said tub, means for oscillating said receptacle about said axis to raise and toss the garments alternately from one side of the receptacle to the other side thereof, means for continuously spraying a liquid into said receptacle, and means for maintaining the liquid level in said tub portion below the path of said receptacle.

2. A washing machine comprising a casing including a tub portion, a receptacle having converging garment-supporting bottom walls, said receptacle having drain holes therein and being supported for oscillation within the casing about an axis approximately at the intersection of the planes of said converging bottom walls, said axis being sufficiently above said tub portion to keep the receptacle above the liquid level in said tub, means for oscillating said receptacle about said axis to raise and toss the garments alternately from one side of the receptacle to the other side thereof, means for continuously spraying a liquid into said receptacle, and means for recirculating the liquid draining from said receptacle into the tub portion, to said spraying means and maintaining the liquid level in said tub portion below the path of said receptacle.

3. A washing machine comprising a tub, a receptacle within said tub having converging, garment-supporting bottom walls, said receptacle being perforated to allow liquid to drain freely therefrom, means for oscillating said receptacle

about an axis approximately at the intersection of the planes of said converging walls and through an angle and at a speed sufficient to toss the contents from one converging wall to the other with a definite impact, means for spraying a liquid into said receptacle towards said converging walls, said tub being disposed below said receptacle for receiving the liquid draining from said receptacle, and means for continuously withdrawing the liquid draining into said tub whereby the receptacle will not be immersed in liquid standing in said tub.

4. The method of cleansing textile articles which comprises tossing said articles with substantial velocity alternately against spaced perforate walls and while substantially all of said articles are fully unsubmerged in any liquid throughout their movement, directing a cleaning liquid in streams under substantial velocity against said articles throughout such treatment, withdrawing said cleaning liquid which is forced from said articles by the impact of said articles against said walls and that which is unabsorbed by said articles during such treatment, with sufficient promptness to prevent any immersion of the articles in a body of said cleaning liquid during any of such treatment, and making the velocity of tossing sufficient to cause a substantial amount of the cleaning liquid carried by the articles at the time of each impact with each wall to be squeezed from the articles by reason of such impact.

5. The method of cleansing textile articles which comprises tossing said articles with substantial velocity alternately against spaced perforate walls and while substantially all of said articles are fully unsubmerged in any liquid body of liquid and while the walls at the instant liquid in streams under substantial velocity against said articles throughout such treatment, withdrawing said cleaning liquid which is forced from said articles by the impact of said articles against said walls and that which is unabsorbed by said articles during such treatment, with sufficient promptness to prevent any immersion of the articles in a body of said cleaning liquid during any of such treatment, making the velocity of tossing sufficient to cause a substantial amount of the cleaning liquid carried by the articles at the time of each impact with each wall to be squeezed from the articles by reason of such impact, and using said withdrawn cleaning liquid as the cleaning liquid to treat said articles further.

6. The method of cleansing textile articles which comprises throwing said articles with substantial velocity alternately against spaced perforate walls and while substantially all of said articles are free of any immersion in any substantial body of liquid and while the walls at the instant of impact by said articles are moving in directions counter to the movements of the articles at the instant of impact, spraying a cleaning liquid against said articles substantially continuously, and throughout such movement, making the velocity of throwing sufficient to cause a substantial amount of the cleaning liquid carried by said articles at the time of impact against each wall to be squeezed out of said articles by reason of said impact, and withdrawing said cleaning liquid which is forced from said articles by the impact of said articles against said walls and that which is unabsorbed by said articles during such treatment, with sufficient promptness to prevent

any immersion of the articles in a body of said cleaning liquid during any of such treatment.

7. The method of cleansing textile articles which comprises tossing said articles back and forth between spaced, opposed perforate walls by movement of said walls in directions between said walls while substantially all of said articles are free of any substantial immersion in a liquid, spraying a cleaning liquid against said articles during such tossing, making the velocity of tossing sufficient to cause a substantial amount of the cleaning liquid carried by said articles at the time of impact against said walls to be squeezed out of said articles solely by the forces of said impact against said walls, and withdrawing said cleaning liquid which is forced from said articles by said impact against said walls and that sprayed liquid which is unabsorbed by said articles with sufficient promptness to prevent any immersion of the articles in a body of said cleaning liquid during any of said treatment.

8. The method as set forth in claim 7, and replacing delivery of said cleaning liquid with rinse liquid and continuing the tossing under the same conditions with sprayed rinse liquid until the articles are substantially free of said cleaning liquid.

9. The method of claim 7, and accelerating the

speed of travel of each of said walls as that wall meets said articles to increase the force of the impact and then decelerating the speed of said travel of that wall to cause a tossing of said articles back to the other of said walls.

10. The method of cleansing textile articles which comprises tossing said articles with substantial velocity alternately against spaced perforate walls, during which substantially all of said articles are at all times free of any material immersion in any body of liquid, spraying a cleaning liquid against said articles during such tossing, moving said walls alternately in the opposite directions to the travel of said articles in each toss to increase the relative velocity of impact of the articles against said walls, accelerating the speed of travel of the walls until after the said impact and then decelerating such travel in the same direction, and collecting and withdrawing said cleaning liquid which is forced from said articles by their impact against said walls and that which is not attached to said articles, with sufficient promptness to prevent any substantial immersion of any of said articles in a body of said cleaning liquid during any such treatment.

ARTHUR T. MOORE.
CARL R. EBLING.