

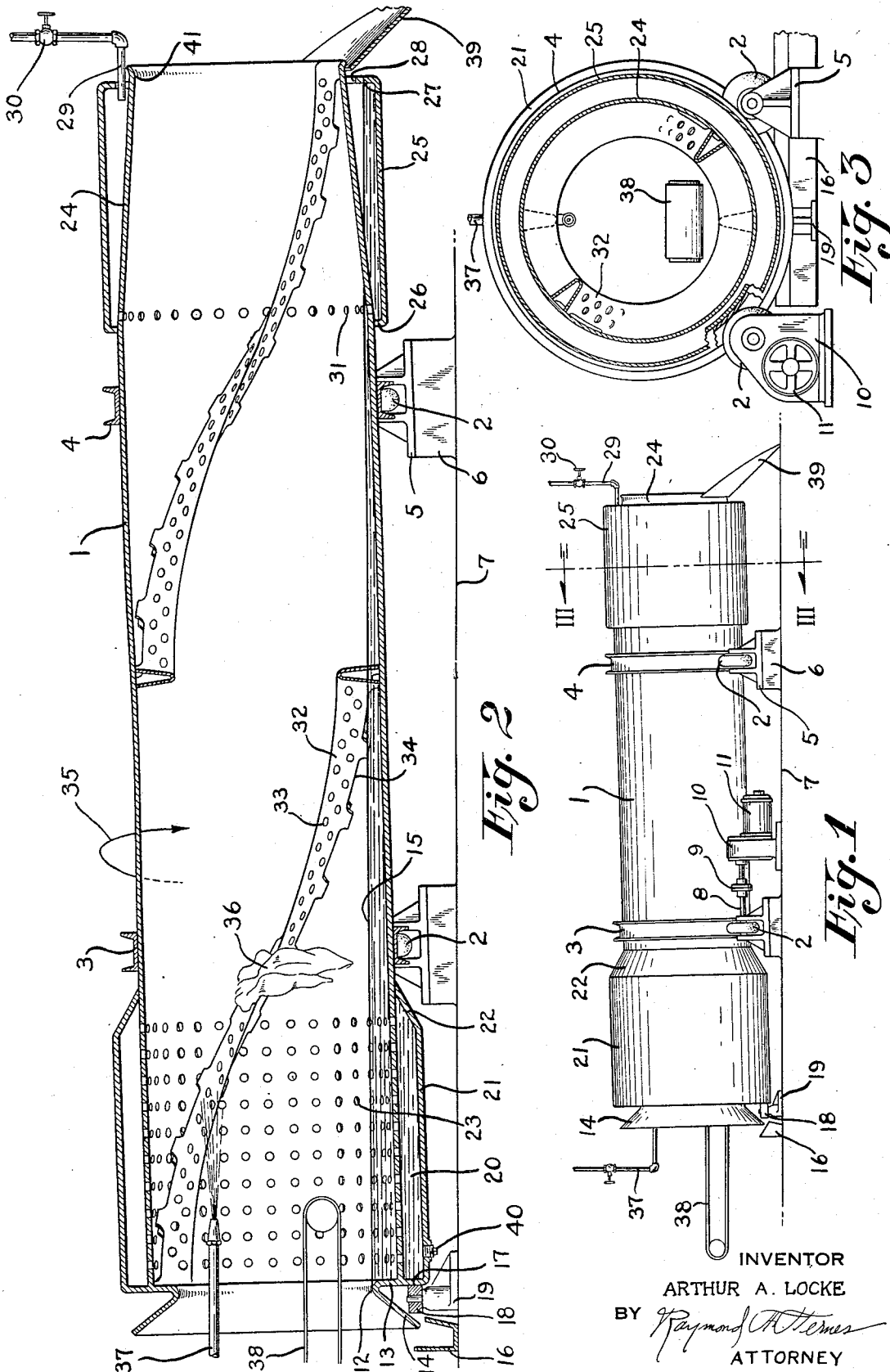
March 2, 1943.

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2,312,657

WASHING MACHINE

Filed June 27, 1941



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2,312,657

WASHING MACHINE

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Application June 27, 1941, Serial No. 400,059

6 Claims. (Cl. 68—146)

This invention relates to washing machines, and in particular it relates to washing machines of the continuous type. More particularly, the invention relates to a washing machine which incorporates a rotating cylindrical barrel including helically disposed baffles arranged in a manner to permit progressive movement of laundry axially through the barrel as the cylinder is rotated.

Conventional laundry machines and particularly commercial types of laundry machines generally consist of a perforated drum positioned within an outer container. The drum rotates a number of revolutions in one direction and a number of revolutions in an opposite direction. In all cases, these types of washing machines operate according to the batch system; that is, the laundry is placed within the machine, the machine is filled with hot water, a detergent added and the drum rotated for a predetermined period. After the washing operation is completed the water is drained from the container and fresh water added for purposes of rinsing the laundry. The rinsing cycle is usually repeated.

In accordance with the practice of my invention, I provide means with which laundry may be introduced into a cylindrical container, which container rotates continuously throughout the cycle of its operation. Helically disposed baffles within the container pick up the laundry and drop it to the bottom of the container a considerable number of times. Each time the laundry is picked up by the baffle it is advanced a slight distance forward depending upon the speed of rotation of the container until it is ultimately discharged at the outlet end of the container. The lower portion of the container retains water at a predetermined level and the volume of water decreases in the direction of the outlet end until it reaches a point spaced from the outlet end at which point no water is retained by the container. By this arrangement it is possible, with the inclusion of a continuous water inlet spaced from the outlet end of the container, to provide a movement of the washing water which continuously removes the scum from the surface of the water and otherwise maintains the water in a cleaner state. A supply means functions to inject a predetermined amount of detergent continuously through the inlet end of the container.

Among the objects and advantages of my invention are to provide a washing machine which will operate continuously and progressively; to provide a washing machine in which the washing water receives a continuous supply of fresh wa-

ter; to provide a washing machine in which the scum or surface water impurities are removed continuously during the operation of the machine; to provide a washing machine in which the washing operation and rinsing operation are carried on progressively in the same container; to provide a washing machine which progressively washes, rinses and removes the surplus water from the laundry before it is discharged from the washing machine; and, to provide a washing machine which may be manufactured and operated efficiently and economically.

These and other objects and advantages will appear more fully in the following detailed description when considered in connection with the accompanying drawing, in which:

Figure 1 is a side elevational view of a continuous washing machine embodying my invention;

Figure 2 is an enlarged elevational view thereof in longitudinal section; and,

Figure 3 is an enlarged transverse view in section taken along lines III—III of Figure 1.

Referring to the drawing and in particular to Figure 1, I show an embodiment of my invention in the form of a cylindrical sleeve 1 supported in a plane slightly inclined from the horizontal by a plurality of wheels 2 positioned so as to cradle the cylinder 1. Preferably, the wheels 2 are in the form of pneumatic tires so as to impart quiet operation to the rotation of the cylinder 1. A pair of structural channels 3 and 4 circumscribe the cylinder 1 and function as tracks which engage with the wheels 2. Each wheel 2 is rotatably supported by a bracket 5 mounted on platforms 6 extending from the floorline 7.

At least one of the wheels 2 is driven, and the driven wheel imparts rotary motion to the cylinder 1 by frictional engagement therewith. A shaft 8 extending from one of the wheels 2 connects through a coupling 9 to a conventional gear reduction unit 10 including a motor 11. As with conventional units of this kind the motor and reduction unit may be controlled so as to result in a selective choice of speeds for rotating the cylinder 1.

As shown in Figure 2, the cylinder 1 forms the principal housing and structural member of the continuous washing machine. The cylinder, as cradled by the wheels 2, is maintained at a slightly higher elevation at its outlet end than at its inlet end; these end openings in the cylinder being otherwise designated as right hand and left hand ends, respectively. Experiments have indicated that good results may be obtained by main-

taining an angle of approximately three degrees from the horizontal or floor line. The inlet end of the cylinder 1 is provided with an opening 12 which is slightly smaller than the internal diameter of the cylinder. This restricted end is formed in part by an end wall 12 and a flanged member 14 which flares outwardly from the end wall. The purpose of the restricted aperture 12 at the inlet end of the cylinder is to maintain a water level line, as indicated by the numeral 15. The over-flow of water from within the cylinder runs through the aperture 12 and down the flange 14 into a trough 16 from whence it is carried to a drain. An extension wall 17 forming a continuation of the end wall 13, among other purposes, forms a bearing surface which engages with a vertically free rotating roller 18 supported from the floor by a bracket 19. The roller 18 serves as a thrust member for maintaining the cylinder in a uniform position in respect to horizontal movement.

In order to maintain a greater volume of water in the cylinder 1, an additional reservoir 20 is associated with the inlet end of the cylinder by means of a spaced co-axial sleeve 21 joining the end plate extension end 17 and including a wall 22 located at the opposite end for completing the enclosure. A plurality of holes or perforations 23 extend through the wall of the cylinder 1 forming communications to the reservoir 20. By this arrangement it is possible to include a greater volume of water within the cylinder 1 for purposes of increasing the medium into which particles of impurities or foreign matter may be suspended during the washing cycle. A drain plug 40 communicates through the wall of the sleeve 21 for purposes of draining the reservoir 20 in a manual operation, if so desired.

At the opposite or outlet end of the cylinder 1 a portion 24 of the cylinder wall tapers inwardly resulting in a smaller outlet diameter 41 at the outlet end as compared with the general internal diameter of the cylinder. The purpose of this tapered effect at the outlet end is to provide means for the introduction of water at a point spaced from the outlet end. To accomplish this, I provide a cylindrical sleeve 25 circumscribing the tapered wall 24 in spaced relation and forming a union with the principal wall of the cylinder 1 by means of an end enclosure plate 26. At the opposite end of the sleeve 25 a partial end wall 27 forms a continuation of the wall 25 but permits an opening 28 having a diameter which allows a space between the opening 28 and the outer surface of the wall 24. This opening permits the entrance of a conduit 29 from which water and preferably hot water may be injected at a rate of flow controllable by a valve 30. As the water is injected from the conduit 29 it collects in the lower reservoir formed by the sleeve 25 and enters the interior of the cylinder 1 through a plurality of perforations 31 formed through the wall of the cylinder 1 at a point spaced a substantial distance from the outlet end of the washing unit. By introducing the inlet water at a point spaced from the outlet end, the continuous washer removes from the materials washed therein excessive amounts of water before the washed materials are ejected from the apparatus.

Within the cylinder 1 and attached thereto are a plurality of baffles 32 extending helically throughout the length of the cylinder and its continuation wall 24. These baffles contain perforations 33, and cutaway portions 34 at the base

thereof, so as not to restrict too greatly the movement of water by reason of the presence of the baffles. The pitch of each baffle is such that the pitch is equal to the length of the complete cylinder.

The direction of rotation of the cylinder is indicated by the directional line 35. In other words, the article of laundry represented by the numeral 36 in the position illustrated is being moved upwardly, due to the rotation of the cylinder. It is in this position that the article 36, as it is picked up by the baffle 32, slides slightly forward toward the outlet end of the cylinder before the article is dropped or released from the baffle 32. Soap or other detergent is entered into the cylinder 1 at the inlet end by means of a nozzleled conduit 37. For purposes of entering clothing or laundry into the cylinder a conventional type of conveyor 38 may be employed and this conveyor may extend through the opening 12 in the inlet end of the cylinder. A guide pan or slideway 39 is located at the outlet end of the cylinder for guiding the washed laundry into a receptacle or other means for disposing of the wet laundry.

In the operation of the continuous washing machine, the cylinder 1 is caused to rotate at the desired speed and the valve 30 is controlled so as to cause a steady flow of hot water into the cylinder. To reach the cylinder, the hot water enters the cylinder through the perforations 31 spaced from the outlet end. Due to the inclination of the cylinder the water runs towards the lower end of the cylinder until it overflows over the inlet aperture 12 and into drain trough 16. A suitable detergent is caused to flow through the conduit 37 and the washing machine is in receptive position for articles to be washed. Clothing or other laundry is placed on the conveyor 38 and is moved to the interior of the cylinder where it is dumped off the end of the conveyor. Thereafter, the baffles 32 pick up the articles of laundry until the baffle reaches a position where its angles of inclination is no longer capable of sustaining the articles. The article thereupon drops to the bottom of the cylinder. Before the article is dropped from the baffle it reaches a point where the angle of the baffle, in respect to the horizontal, is the steepest, such as illustrated by the article 36, at which point the article slides slightly forward before it is dropped to the bottom of the cylinder. The speed of rotation of the cylinder determines the distance in which the article will slide forward; the slower the speed the greater the movement forward. By controlling the speed of rotation of the cylinder the speed with which the article moves can be controlled with a great degree of accuracy. Tests have indicated that the article on an average may be moved forward a distance of about one-half inch per rotating cycle or up to several inches forward in each rotating cycle.

It has also been found that by increasing the speed of the cylinder the article can be made to maintain an equilibrium point or it can be made to move backwards. This is due to the fact that, at the faster speeds, the article will not slide forward on the baffle but will drop to the base of the cylinder, and, due to the inclination of the cylinder, a resultant backward movement of the article is attained. While it is preferred to move the articles of laundry progressively in a continuous washing cycle, it is possible to vary the speed of rotation of the cylinder through the

washing cycle so as to retain the articles within the washer for any desired period.

It has been demonstrated that the continuous lifting of the article out of a shallow bed of water and the intermittent drop of the article back into the water produces an excellent condition for cleansing the article. It has been found that this method of washing presents new surfaces of the article to be exposed for washing and prevents the article from becoming tangled or otherwise subject to a localized scrubbing action. As the articles of laundry move progressively forward they pass into the tapered area near the outlet end at which location there is an absence of washing fluid, nevertheless the baffles in this region act upon the laundry to raise the articles and in an intermittent dropping operation effectively beat the water therefrom. By this arrangement much of the surplus water is removed from the article and it is finally ejected from the outlet end in a dripless state.

While I have thus shown and described a preferred embodiment of my invention, it is believed apparent that I have provided a novel arrangement for continuously and efficiently washing articles of laundry, and it is intended to include those modifications which appear within the spirit of the invention and the scope of the appended claims.

Having thus described my invention what I claim and desire to protect by Letters Patent is:

1. A washing machine comprising a tumbling barrel having open inlet and outlet ends, means for rotatably supporting the barrel in an inclined position, driving means attached to one of the barrel supports for rotating the barrel, a helical baffle attached to the inner wall of the barrel and extending throughout the length of the barrel, and a sleeve positioned concentrically and in spaced relation with the outer surface of the barrel at the outlet end to form a partially enclosed chamber, said sleeve being attached to and rotatable with the barrel, said barrel at a spaced distance from the outlet end having a plurality of apertures extending through the barrel wall and communicating with said partially enclosed chamber.

2. A washing machine comprising a tumbling barrel having open inlet and outlet ends, means for rotatably supporting the barrel in an inclined position, driving means attached to one of the barrel supports for rotating the barrel, a helical baffle attached to the inner wall of the barrel and extending throughout the length of the barrel, and a cylindrical wall positioned concentrically and in spaced relation with the outer surface of the barrel at the inlet end to form an enclosed chamber, said wall being attached to and rotatable with the barrel, said barrel having a plurality of perforations through the barrel wall forming communications with the enclosed chamber.

3. A washing machine comprising a tumbling barrel having open inlet and outlet ends, means for rotatably supporting the barrel in an inclined position, driving means attached to one of the barrel supports for rotating the barrel, a helical baffle attached to the inner wall of the barrel and extending throughout the length of the barrel, a sleeve positioned concentrically and in spaced relation with the outer surface of the barrel at the outlet end to form a partially enclosed cham-

ber, said sleeve being attached to and rotatable with the barrel, said barrel at a spaced distance from the outlet end having a plurality of apertures extending through the barrel wall and communicating with said partially enclosed chamber, and a cylindrical wall positioned concentrically and in spaced relation with the outer surface of the barrel at the inlet end to form an enclosed chamber, said barrel having a plurality of perforations through the barrel wall forming communications with the enclosed chamber.

4. A washing machine comprising a liquid retaining sleeve tumbling barrel having open inlet and outlet ends, means for rotatably supporting the barrel into an inclined position, driving means attached to one of the barrel supports for rotating the barrel, a helical baffle attached to the inner wall of the barrel and extending throughout the length of the barrel, means spaced from the outlet end of the barrel for introducing fluid through the sleeve wall and into the barrel during rotation of the barrel, and a cylindrical wall positioned concentrically and in spaced relation with the outer surface of the barrel at the inlet end to form an enclosed chamber, said wall being attached to and rotatable with the barrel, said barrel having a plurality of perforations through the barrel wall forming communications with the enclosed chamber.

5. A washing machine comprising a tumbling barrel having open inlet and outlet ends, means for rotatably supporting the barrel in an inclined position, driving means attached to one of the barrel supports for rotating the barrel, a helical baffle attached to the inner wall of the barrel and extending throughout the length of the barrel, and a sleeve positioned concentrically and in spaced relation with the outer surface of the barrel at the outlet end to form a partially enclosed chamber, said wall being attached to and rotatable with the barrel, said barrel at a spaced distance from the outlet end having a plurality of apertures extending through the barrel wall and communicating with said partially enclosed chamber, the wall of said barrel forming an inwardly tapering sleeve extending substantially from the point of said apertures extending through the barrel wall to the outlet end.

6. A washing machine comprising a tumbling barrel having open inlet and outlet ends, means for rotatably supporting the barrel in an inclined position, driving means attached to one of the barrel supports for rotating the barrel, a helical baffle attached to the inner wall of the barrel and extending throughout the length of the barrel, and a sleeve positioned concentrically and in spaced relation with the outer surface of the barrel at the outlet end to form a partially enclosed chamber, said barrel at a spaced distance from the outlet end having a plurality of apertures extending through the barrel wall and communicating with said partially enclosed chamber, an end wall forming a continuation of the barrel wall at the inlet end, said end wall having a large opening therethrough, said means for supporting the barrel providing an inclination whereby an imaginary horizontal line is formed from the lower edge of said end wall opening to substantially the lower point of said apertures.

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