

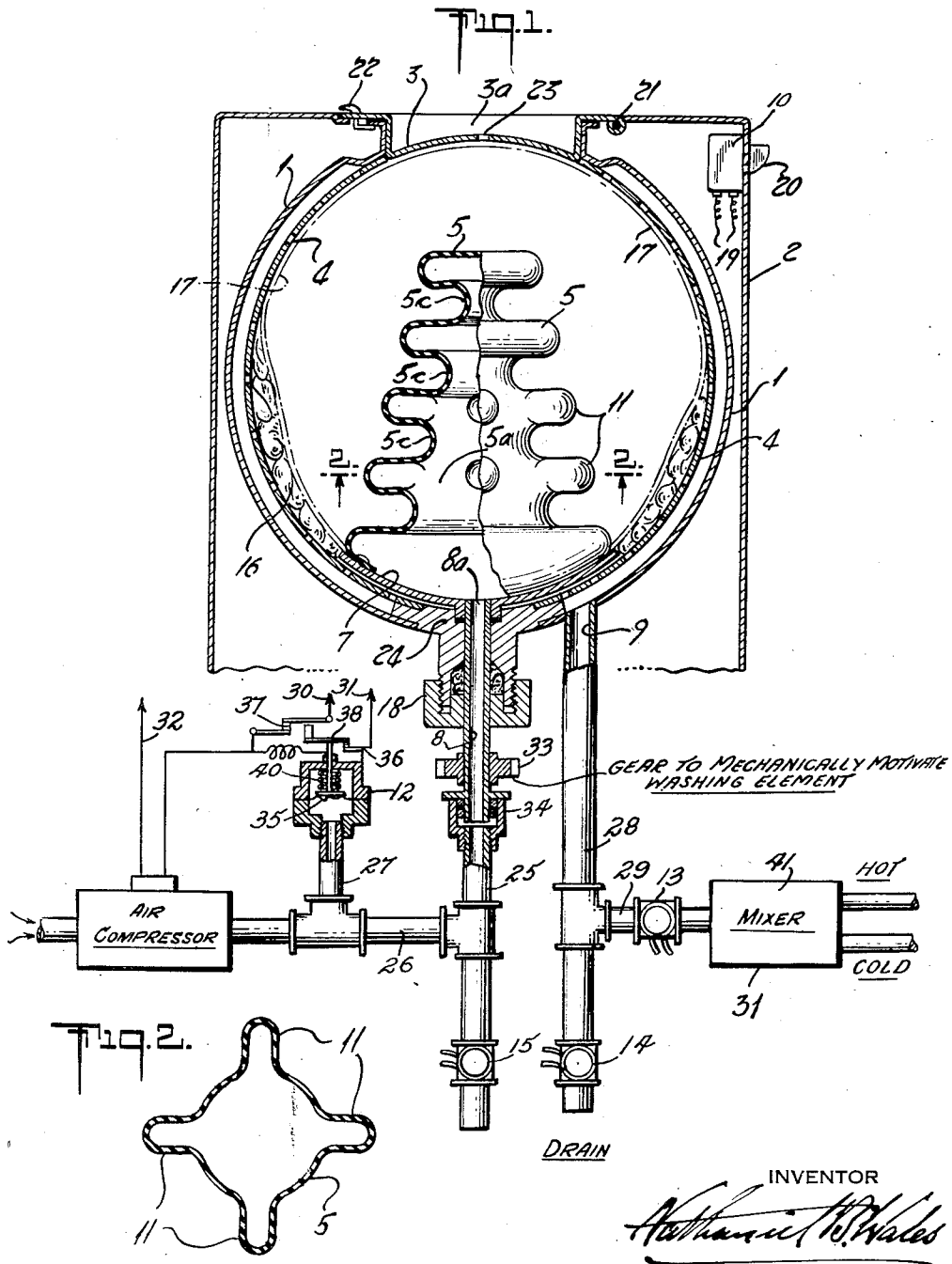
Jan. 13, 1953

N. B. WALES

2,625,029

PNEUMATIC AGITATOR WASHER

Filed June 15, 1950



# UNITED STATES PATENT OFFICE

2,625,029

## PNEUMATIC AGITATOR WASHER

Nathaniel B. Wales, New York, N. Y., assignor to  
Industrial Patent Corporation, New York, N. Y.

Application June 15, 1950, Serial No. 168,326

4 Claims. (Cl. 68—21)

1

This invention relates to a washing machine employing pressure extraction for squeeze-drying the laundry and is an improvement on and a continuation in part of my pending application, Serial No. 164,153 filed May 25, 1950.

In the referred to pending application, the agitating or washing element in the tub is composed of a rigid support chassis enveloped by an expansible envelope or membrane, the envelope being supported from displacement by the chassis during its oscillation or rotation for washing.

This invention uses a unitary element for the washing or agitating means composed of a flexible rubber material molded into a form which not only provides means for its dilation when under fluid inflation to squeeze-dry the laundry but also to give an adequate degree of rigidity to agitate the wash and wash water during the washing period when it is oscillated. Provision is also made to partially inflate the convoluted agitator during its oscillation to compensate for the weight of water in which it is substantially immersed.

An object of this invention is to devise an extensibly-formed unitary agitating or washing element which will serve both as a washing means and as a squeeze-dry means.

A further object is to utilize a low degree of fluid pressure within the extensible agitating element to assist to maintain its water-displacing factor when it is oscillated during a washing period and a higher degree of fluid pressure within the element to completely inflate the agitating element to its normal maximum of displacement to squeeze-dry laundry in the washing machine.

A further object is to incorporate the inflation of the agitating element into the predetermined cycle of an automatic washer.

Other objects will be apparent from the specific details of structure seen in the accompanying specifications and drawings in which similar numerals refer to similar parts.

Figure 1 is a view partly in vertical section and partly schematic of a washing machine in accordance with the invention.

Figure 2 is a section of the agitating element taken on lines 2—2 in Figure 1.

In Figure 1, numeral 1 is a wash tub which is shown in spherical form. Numeral 2 is a case in which tub 1 is enclosed. A laundry-access door 3 closes aperture 3a in tub 1 and the door 3 is shown suitably hinged at 21 to case 2 and locked thereto by latch 22. A shaft 8 having orifice 8a therein is secured to base plate 7, and shaft 8 passes into tub 1 through fluid-sealing means 18

2

secured to member 24 which member may serve as a support for tub 1 as well as a spacer for the inner perforated liner 4 which acts as a pressure-squeezing anvil within tub 1. A flexible fluid-tight rubber washing element or agitator 5 is suitably secured at its base to plate 7. Conventional motor-driven means, not shown, actuate shaft 8 preferably in an oscillatory motion to thereby oscillate agitator 5. Agitator 5 is shown in its normal position during washing and rinsing and due to the thickness of the rubber molding of which it is formed and its convoluted form, its stability is sufficient to displace and agitate the wash water when it is in a state of oscillation.

To materially increase the stability of agitator 5 when immersed in wash water, provision is made through orifice 8a in shaft 8, which orifice communicates with the hollow interior volume 5a of agitator 5, to maintain a predetermined fluid pressure therein from air compressor or pump 6 through pipes 26 and pipe 25 which is hermetically connected to orifice 8a in shaft 8 by the pressure-sealing gland member 34 for relative angular movement therebetween. A dual pressure control switch 12, the actuating diaphragm 35 of which is actuated by the fluid mean pressure existing in pipes 25, 26 and 27 as well as within washing element 5, actuates the dual switch contacts 36 and 37, which in turn open or close their respective control circuits 31—32 and 36—37 which are in circuits, not shown, connected with master cyclic control clock 10, which is conventionally used in automatic washers to determine the operative automatic washing, rinsing and extraction cycle in terms of duration and degree as manually pre-set by control knob 20 thereof.

In this manner, during the washing period of the automatic cycle, the master cyclic control clock 10 dictates the operation of the pump 6 to inflate the washing element 5 to neutralize the collapsing factor thereon of the weight of water now in tub 1. This inflation continues until switch 36 is opened by a predetermined relatively low pressure existing in washing agitator 5 as reflected on diaphragm 35. This low pressure inflation neutralizes the collapsing effect and increases as well the rigidity of pneumatic washing element 5. The pressure switch 36 now breaks circuit 31—32 leading to master cyclic control clock 10 and the motor, not shown, ceases to actuate pump 6. Again, during the water-extraction period of the automatic cycle, master cyclic control clock 10 dictates the operation of pump 6 through circuit 36—37 connecting in switch 37 incorporated in pressure control 12 with control

clock 10. However, when the pump 6 has inflated pneumatic washing agitator 5 to a relatively high predetermined pressure sufficient to adequately extract water from the laundry in tub 1 by washing element 5 now dilated to a position indicated by numeral 17, switch 37 opens to terminate a further increase of pressure. It is to be noted that switch 37 is so positioned in respect to switch actuator 38 that diaphragm 35 must be deflected against spring 40 to a greater degree to effect the opening of circuit 30—32 by switch 37 then is the case in opening switch 36. Likewise, magnetically-actuated valve 13, which connects tub 1 through tub port 9 through pipe 28 and 29 with the hot and cold water supply through the temperature mixer 41 as well as drain valve 14, may be actuated in any suitable timed cyclic action as dictated by cyclic control clock 10 to fill or drain tub 1 during the washing and rinsing period in the washer's automatic cycle.

The inflatable agitator 5 due to its normally convoluted structure 5c has sufficient amplitude to assume the position 17, shown in broken lines in Figure 1, when the cyclic control clock 10 dictates through pressure control 12 to pump 6 to raise the pressure within element 5 to fill its interior volume 5a to a pressure adequate to squeeze-dry the laundry in tub 1, which is shown at 16 pressed against perforated surface 4 therein.

The combined washing and squeezing element 5 may be formed to provide arms or blades 11, shown in Figure 2, to effectively displace wash water in tub 1 and to give added rigidity to its normal contour. The washing element 5 is hermetically secured to support plate 7 which is of a diameter to afford a stable support to element 5.

The operation of my invention as incorporated in an automatic washer is as follows. When manual cyclic control dial 10 is set to start the cycle, valve 14 is closed and valve 13 is opened and the water temperature mixer is set to give the desired wash water temperature. Water is admitted to the interior of tub 1 through pipes 28 and 29 and through tub port 9. The air vent 23 in cover 3 permits the escape of air therein due to the water's displacement thereof. When a desired volume of wash water had been admitted into tub 1, its level in tub 1 is controlled by a float control, not shown. The cyclic timer control 10 now dictates the closure of valve 13 and the oscillation of shaft 8 by motor actuation. Soap having been added to the wash water, the laundry washing period starts. After a predetermined period as dictated by timer control 10, drain valve 14 is opened and the wash water emptied from tub 1 and as many rinsing operations follow by a repetition of the above procedure as timer control 10 may dictate.

At the termination of the last rinsing operation, timer control 10 closes the vent valve 15 and starts the compressor 6, likewise stopping the motor-actuated oscillations of shaft 8 and washing element 5. The pressure in interior volume 5a of element 5 now rises to a predetermined degree as dictated by pressure control switch 12, thereby dilating the convolutions 5c in element 5 so that element 5 assumes an inflated position as is seen by numerals 17, squeezing the laundry 16 against the perforated partition 4 in tub 1 to squeeze dry said laundry 16.

Advantage may be taken of the source of fluid pressure from compressor 6 to partially inflate element 5 during the washing and rinsing periods

as has been previously described by incorporating a dual critical pressure point in pressure-actuated switch 12, a lower one for partial inflation during the washing period to compensate for the hydraulic pressure existing on element 5 due to its submerged position and a higher pressure point which is attained for squeeze-drying, the cyclic timer control 10 dictating the circuit in use in which particular pressure point is effective in respect to the washing or squeeze-drying periods.

To those skilled in the art, it is evident that the form of convolutions 5c together with the varying thicknesses thereof as determined in manufacture of element 5 can produce a water-displacing factor from the oscillation of element 5 without exceeding a fatigue point in the rubber material thereof over a conventional service period.

What I desire to protect by United States Letters Patent is encompassed in the following claims.

I claim:

1. A laundry washing machine comprising a substantially double-walled tub, a laundry-access opening in the top thereof, a closure therefor, a perforate laundry-squeezing surface formed by perforations in the innermost wall of said tub, said perforations extending about its vertical axis, means to fill said tub with washing fluid, means to drain said double-walled portion of said tub, a hollow washing element in the vertical axis of said tub, means to mechanically motivate said washing element, said washing element formed of a fluid-tight flexible material and incorporating therein normally compacted convoluted surfaces whereby to increase the rigidity of said flexible material in order to agitate said washing fluid by the mechanical agitation of said element, and means to inflate said washing element with fluid under pressure to squeeze-dry laundry in said tub against said perforate surface by the unfolding of said compacted convolutions.

2. A laundry washing machine comprising a tub, a laundry-access opening in the top thereof, a closure therefor, a perforate water-extracting surface formed by a perforated portion of the tub extending about its vertical axis, means to collect on the exterior of said perforated tub portion water thus extracted, means to fill said tub with washing fluid, means to drain that exterior portion of the tub which is perforated, a hollow washing element in the vertical axis of said tub, means to mechanically motivate said washing element, said washing element formed of a fluid-tight flexible material and consisting of normally convoluted surfaces whereby to increase the rigidity of said flexible material in order to agitate said washing fluid by the mechanical agitation of said element, and means to inflate said washing element by a pressure differential between the interior and the exterior of said washing element to squeeze-dry laundry in said tub against said perforate surface.

3. A laundry washing machine comprising a tub, a laundry-access opening in the top thereof, a closure therefor, a double-walled structure incorporated in a portion of said tub, the inner wall thereof being perforate to form a perforate laundry-squeezing surface about the vertical axis of said tub, means to fill said tub with washing fluid and means to drain said double-walled portion of said tub, means to mechanically motivate said washing element, said washing element formed

5

of a fluid-impervious flexible material and having normally compacted convoluted surfaces therein, means to partially inflate said element with a fluid whereby to increase its rigidity and decrease its deformation during its mechanical 5 actuation to agitate said washing fluid, and means to fully inflate said washing element with fluid pressure to squeeze-dry laundry in said tub against said perforate surface.

4. A laundry washing machine comprising a 10 symmetrical tub, a laundry-access opening in said tub, a closure therefor, a double-walled structure incorporated in a portion of said tub, the inner wall thereof being perforate to form a perforate laundry-squeezing surface about the 15 vertical axis of said tub, means to fill said tub with washing fluid and means to drain said double-walled portion of said tub, a hollow washing element in the vertical axis of said tub, means to mechanically motivate said washing element, 20 said element formed of a fluid-tight flexible material and having hollow horizontal projections about its axis adapted to agitate said washing

6

fluid when said washing element is mechanically motivated, and means to inflate said washing element by a fluid pressure differential between its exterior surface and its interior surface to squeeze-dry laundry in said tub against said perforate surface.

NATHANIEL B. WALES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,187,770	Chamberlin et al.	Jan. 23, 1940
2,237,813	Dunham	Apr. 8, 1941
2,417,998	Wales	Mar. 25, 1947
2,428,710	Jorgenson et al.	Oct. 7, 1947

FOREIGN PATENTS

Number	Country	Date
109,099	Australia	Nov. 13, 1939