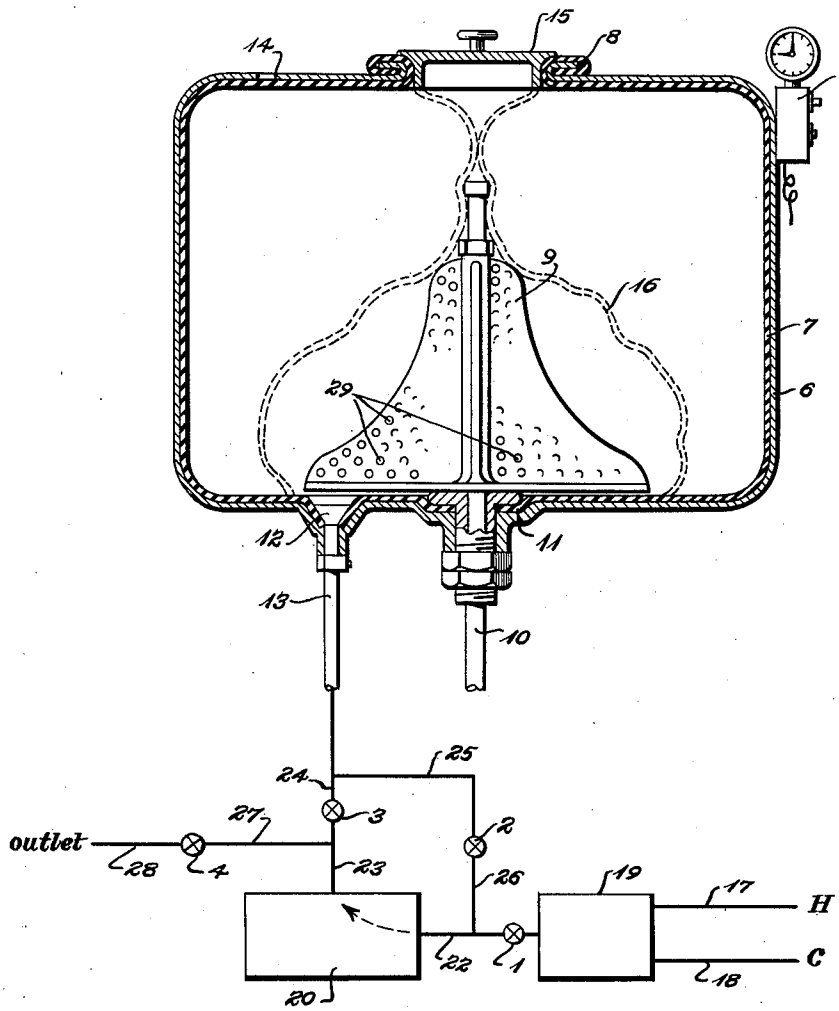
June 2, 1953 H. J. RAND 2,640,342

METHOD OF EXTRACTING LIQUID FROM WET MATERIALS

Original Filed July 9, 1946



INVENTOR.

Henry J. Rand

BY

Maurice W. Green

ATTORNEY

Patented June 2, 1953

2,640,342

UNITED STATES PATENT OFFICE

2,640,342

METHOD OF EXTRACTING LIQUIDS FROM WET MATERIALS

Henry J. Rand, Bratenahl, Ohio, assignor to H. J. Rand Washing Machine Corp., South Bend, Ind., a corporation of Delaware

Original application July 9, 1946, Serial No. 682,322. Divided and this application June 1, 1949, Serial No. 96,428

2 Claims. (Cl. 68—242)

1

Clothes which have been washed have to be dried. The drying operation in connection with washing machines has always been a considerable problem and many types of driers require a good deal of time and hand labor. This has been overcome to some extent in machines wherein the washing operation is performed within a perforated cylindrical container within which the clothes are later dried during a spinning cycle. While this has proved quite satisfactory compared to prior methods, it still leaves a good deal of water in the clothes and the machines are expensive. Spinning produces vibration and requires high speed operation, and therefore requires heavy, expensive construction and rigid, expensive installation.

The object of my invention is to provide a simple method of washing and drying clothes in which the clothes may be dried in the container in which they are washed, which method utilizes a machine which is economical to build and simple, safe, and efficient in operation, with less vibration and less complicated and expensive construction and installation, and in which the clothes will have the water removed from them to a greater extent than in machines heretofore known.

A particular feature of my invention is the provision of a collapsible bag of resilient material such as rubber which may be evacuated to cause atmospheric pressure to press the bag upon the clothes to remove water therefrom.

Another feature of my invention is the provision of a perforated impeller to facilitate draining.

Another feature of my invention is that the method is safe as there is no way children can be hurt by the series of steps employed in the method with it.

In the drawings, the single figure is a view partly in section and partly schematic of a machine in accordance with the present invention.

The machine for carrying this method comprises a suitable container or support 6 which may be a metal tub having therein a lining of flexible water and airtight material 7 such as rubber which is rigidly attached to the tub 6 at the top as illustrated at 8. The machine may be an ordinary washing machine of the oscillating type using an impeller, the latter being an upstanding member mounted in a central position with respect to the flexible lining, the impeller being illustrated at 9 and the mechanism for operating the impeller to distribute materials during washing and rinsing operations

2

not being shown but being connected to the shaft 10. The rubber lining 7 is sealed to the impeller shaft as shown at 11 to prevent any leakage of air or water at this point. The tub and lining 6 and 7 have openings therein at 12 connecting with a pipe 13 through which water and air may be pumped in and out of the lining. The tub has an opening therein at 14 to permit air to enter between the tub and lining and a cover 15 is provided through which the clothes may be inserted and removed and which will provide a vacuum seal for the rubber lining. The rubber lining 7 is shown at 16 in collapsed position as will hereafter be explained.

The two pipes 17 and 18 are for hot and cold water, respectively, which may be mixed within the mixer 19. Water and air may be pumped in and out of the machine by the pump or compressor 20. I have discovered in my experiments that a diaphragm type of compressor used for paint spraying operates very efficiently to pump both air and water and may be used for this purpose at 20. The intake pipe 22 is made smaller than the outlet pipe 23 to prevent knocking when it handles water. A compressor type pump is not necessary, however, and any pump capable of handling water, moisture vapor and air may be satisfactory.

The mixer, pump and washing machine are connected to one another through a series of valves 1, 2, 3 and 4. A clock and contact switching arrangement which is illustrated at 21 may be used to operate the valves in any desired time cycle. Mechanism for this purpose is well known and is not herein illustrated specifically.

In operation the cover 15 may be removed and the clothes inserted therein, a switch turned and the remainder of the operation be fully automatic by operation of the clock switching arrangement 21. Clothes are placed within the rubber lining in an amount wherein the pile of clothing extends upwardly to a point slightly below the top of the agitator blades. Soap may be inserted at any desired time by removing the cover 15 and replacing it for further operation. The mixer 19 may be set for any desired temperature of the water. The direction of flow of water or air through the pump 20 is in the direction indicated by the arrow from pipe 22 to pipe 23.

To pump water into the machine, the valves 1 and 3 will be opened and the valves 2 and 4 closed. The water will then flow from the mixer 19 through valve 1, pipe 22, pump 20, pipe 23, valve 3 and pipes 24 and 13 into the rubber bag.

Water and air may be pumped out of the bag by opening valves 2 and 4 and closing valves 1 and 3. The flow will then be from pipe 13, through pipe 25, valve 2, pipes 26 and 22, pump 20, pipe 23, pipe 27, valve 4 and pipe 28 to the outlet.

A typical series of method steps might be as follows:

First, there is a soaking step. For this purpose the clothes will be inserted, the cover 15 closed, the valves 1 and 3 opened and the valves 2 and 4 closed to pump water into the rubber bag. Soap may be added, if desired, before or after the water is pumped in. The impeller may also be oscillated during this operation if desired to facilitate the soaking by distributing and agitating the materials.

The soaking water may then be pumped out of the machine by closing valves 1 and 3 and opening valves 2 and 4. At this point, the machine may stop if desired in order to permit the insertion of soap for the washing operation.

The machine may then be restarted and additional water pumped into the machine by opening valves 1 and 3 and closing valves 2 and 4 and soap added when desired.

After a sufficient period of washing the water may be pumped out by opening valves 2 and 4 and closing valves 1 and 3.

Rinsing water may then be added by opening valves 1 and 3 and closing valves 2 and 4 and after a desired period of time during which, of course, the impeller 9 may again be operated to distribute the materials, this water may be pumped out by opening valves 2 and 4 and closing valves 1 and 3. As many rinsing operations may, of course, be performed as desired.

Following the last rinsing step and after the water is pumped out, the valves 2 and 4 remain open and the valves 1 and 3 closed and the pump 20 continues to operate to pull the air from the inside of the rubber bag and pull a vacuum therein. This will cause the rubber bag to collapse due to atmospheric pressure so that it may assume the position shown at 16. During the latter portion of this vacuum or drying cycle the sides of the flexible element 16 may be drawn together to contact each other above the agitator as indicated by the dotted line of the drawing. The atmosphere will exert a very high pressure upon the bag forcing a great deal of water from the clothes. Also, because of the vacuum and reduced pressure created within the bag moisture vapors therein are readily released and drawn out by the pump 20, thus drying the clothes more effectively. For best results, a strainer is provided which should be as large as practicable, and for this purpose I provide perforations 29 in the impeller through which the water may pass. After the clothes have been dried by this evacuation step for a sufficient length of time, air may be permitted to enter the rubber bag by opening valves 3 and 4 and keeping valves 1 and 2 closed, or by any other suitable means. This opens the rubber bag to the atmosphere from the inside removing the pressure therefrom and permitting the cover 15 to be removed so that the clothes may be removed from the machine.

It will be obvious to those skilled in the art that my method of extraction can be performed with various modifications of the apparatus disclosed and I do not desire to be limited to the disclosure as given for purposes of illustration but only to the scope of the appended claims. For instance, while the container 6 has been described for illustrative purposes as a tub, it is obvious that other frameworks will suitably support the bag 7 and while rubber has been mentioned as a satisfactory material for the bag 7 other materials which will make the bag air and liquid tight may be satisfactory. Furthermore, water has been described as the washing liquid or detergent but it is obvious that other detergents may be used in this invention.

This application is a division of my co-pending application, Serial No. 682,322, filed July 9, 1946, now Patent No. 2,472,682.

I claim:

1. The method of extracting liquids from wet materials which consists of the step of confining said materials within a substantially completely closed zone of confinement, maintaining said materials in an annular relation within said zone, withdrawing liquid and air by vacuum from within said zone and from said materials, maintaining an area above said materials completely clear of said materials but not of air and water and while extracting liquid and air from said materials, simultaneously withdrawing the liquid and air from above said materials so as to lower the level of the top of said confining zone, and during the entire liquid and air withdrawal step maintaining the exterior of said confining zone exposed to atmosphere.

2. The method of extracting liquids from wet materials which consists of the step of confining said materials within a substantially completely closed zone of confinement, maintaining said materials in an annular relation within said zone, withdrawing liquid and air by vacuum from within said zone and from said materials, completely closing said zone, maintaining an area above said materials completely clear of said materials but not of air and water and while extracting liquid and air from said materials, simultaneously withdrawing the liquid and air from above said materials so as to lower the level of the top of said confining zone, and during the entire liquid and air withdrawal step maintaining the exterior of said confining zone exposed to atmosphere.

HENRY J. RAND.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,178,385	Alward	Oct. 31, 1939
2,182,540	Hutchings	Dec. 5, 1939
2,449,634	Baade	Sept. 21, 1948
2,472,682	Rand	June 7, 1949

FOREIGN PATENTS

Number	Country	Date
341,740	Great Britain	Jan. 22, 1931