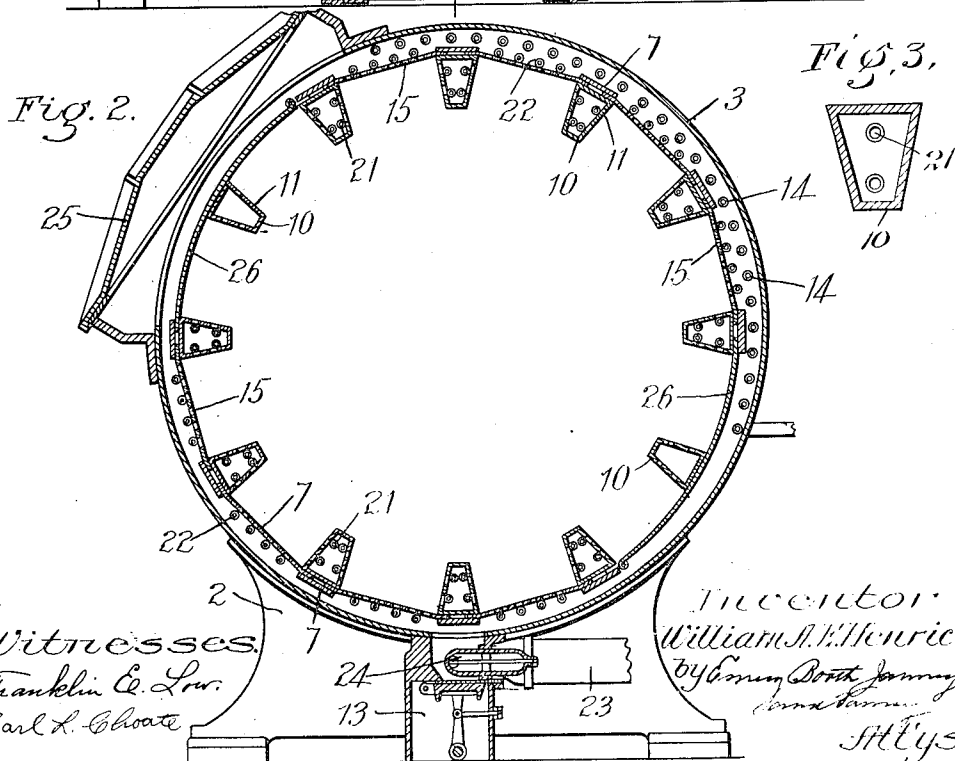
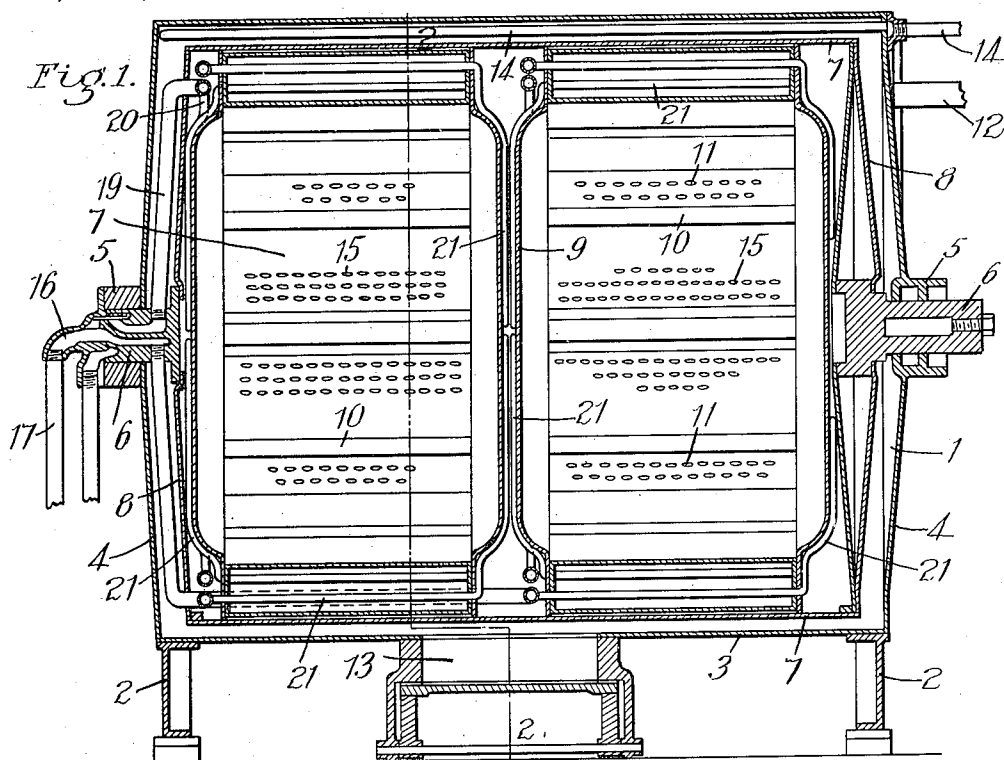


W. A. E. HENRICI.
 PROCESS FOR WASHING AND DRYING CLOTHES OR OTHER TEXTILE MATERIALS.
 APPLICATION FILED AUG. 24, 1910.

1,160,109.

Patented Nov. 9, 1915.



UNITED STATES PATENT OFFICE.

WILLIAM A. E. HENRICI, OF BOSTON, MASSACHUSETTS.

PROCESS FOR WASHING AND DRYING CLOTHES OR OTHER TEXTILE MATERIALS.

1,160,109.

Specification of Letters Patent.

Patented Nov. 9, 1915.

Application filed August 24, 1910. Serial No. 579,464.

To all whom it may concern:

Be it known that I, WILLIAM A. E. HENRICI, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Processes for Washing and Drying Clothes or other Textile Materials, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

This invention relates to a process for washing and drying clothes or other textile materials.

The usual method of washing and drying clothes or textile materials on a large scale is to inclose them in a perforated drum contained in a casing into the lower portion of which water and cleansing agents are introduced. The drum is then rotated, being reversed periodically. The water entering the drum through the perforations comes in contact with the clothes, which are caused by the rotation of the drum to pass through the water at a considerable rate of speed, but not however fast enough to cause centrifugal force to carry the clothes around with the drum. To provide agitation of the clothes the inside of the drum is usually provided with projections called lifting bars which, as the drum rotates, constantly lift the clothes from the water and drop them back into it. From time to time the water is changed and different cleansing agents are introduced.

After the clothes have been properly washed and rinsed and the free water drawn off from the casing, the machine is allowed to run a few revolutions so that the clothes may drain. Then and while still wet, the clothes are removed from the machine, and are packed in small baskets which are revolved at high speed in another machine, called an extractor. This removes the bulk of the water by centrifugal force and so partially dries the clothes. The clothes are then placed in tumbling machines to loosen the clothes which have been compressed by the centrifugal action of the extractor. The clothes are then removed and dried by various processes. Some, usually those which require starching, are hung in a dry room where they are dried by heat; such as are generally termed "flat work" are dried in the mangle which also irons them, and others

termed "wet wash" are returned to the owners without further treatment.

By the improved process involving my invention I wash the clothes in much the same manner as described above. After draining however and preferably without removing the wet clothes from the machine where they have been washed, I dry them by an entirely new method viz., having first closed all apertures of the machine where air might gain admittance, I apply means to reduce the atmospheric pressure within the casing and heat the lifting bars or other portions of the drum by steam, electricity or other means in such a manner that, as the drum revolves, the clothes will be tumbled preferably alternately against perforated surfaces and primary heat radiating surfaces. If steam is used it may be introduced into sealed portions of the drum in such a way as not to interfere with the reduced atmospheric pressure in the drum and casing.

The reduced atmospheric pressure lowers the vaporizing point of the water in the clothes and so facilitates the vaporization of the same, especially when contacting with heated surfaces, and the suction usually caused by the atmospheric pressure reducing means removes the vapor as it is formed. The drum in rotating constantly subjects new portions of the clothes to the contact with its heated portions causing the clothes to dry evenly and quickly.

In the drawings I have shown an illustrative embodiment of one form of apparatus, which I have found satisfactory for the carrying out of my improved process.

Figure 1 is a vertical, longitudinal sectional view of said illustrative embodiment; and Fig. 2 is a vertical, cross sectional view on the line 2—2 of Fig. 1. Fig. 3 is a vertical cross sectional view of one of the lifting bars illustrating a modified means of heating the bars.

Referring first to Fig. 1, I provide a casing 1 which may be supported upon suitable legs 2, and which may be of any suitable material, such for example as metal, preferably cylindrical in shape, and comprising sides 3 and headers 4. The headers are provided with bearings 5 to receive trunnions 6 of a drum of any suitable material, such as metal, designed to receive the clothes and be revolved within the casing 1. Said drum may comprise sides 7 110

and heads 8, suitably secured to the trunnions 6, and may be rotated within said casing 1 by any suitable means.

The drum is preferably provided between its ends with partitions 9 extending crosswise thereof, thus providing two or more compartments adapted to receive several different lots of goods to be washed.

On the inner face of the sides 7 of the drum is provided a plurality of lifting bars 10, which may be of any desired type, but preferably hollow, and provided with apertures 11, said lifting bars being designed to raise the clothes as the drum rotates and subsequently drop them into the water and to the bottom of the drum, thereby agitating them in the water and cleansing them.

The partitions 9 are preferably inclined longitudinally of the drum near their lower edges and just above the point at which they contact with the ends of the lifting bars 10; and the drum at its ends is provided with similarly shaped members 11^a. These curved sections of the partitions 9 and end members 11^a serve to deflect the clothes from the ends and partitions inwardly and away from the joint of the lifting bars 10 with the partitions 9 and end members 11^a, thereby decreasing the liability of the clothes becoming caught in any of said joints and thereby torn.

The casing 1 is provided with an inlet 12, for water, at a convenient point on one or both ends thereof, and also with an outlet 13 (see Fig. 2), by means of which all the water may be drawn off from the casing and drum. For heating the casing any suitable agent may be employed, such for example as steam, which may be introduced thereto by means of a pipe 14 at a suitable point on one or both ends of said casing, and for distributing the heat throughout the inner surface of the casing said pipe may be continued longitudinally of the casing and carried circumferentially around the drum so far as desired, either by connecting the ends of the pipe 14 to headers at the ends of the casing or by doubling the pipe on itself at either end of the casing and thus indefinitely continuing it circumferentially around and within the casing.

The drum is preferably provided on its side walls with oblong apertures 15, which permit the free circulation of the water between the casing and the drum, said circulation being also continued in and through the lifting bars 10 by means of the apertures 11 therein.

After the clothes have been properly washed by the rotation of the drum within the casing the water is drawn off through the valve 13 referred to, and the clothes are then ready for drying. For this purpose any suitable agent may be used, such as steam, hot water, etc.; I have shown in this

case means for using steam and for introducing it into the various portions of the drum. For this purpose one of the trunnions 6 is preferably provided with an aperture 16 connected with a steam supply pipe 17 and communicating at its other end with a pipe 19 extending radially of the drum. This pipe is turned inwardly near the side walls of the drum and there connects with a plurality of pipes 20 extending preferably radially of the drum, in such number as may be desired and required to give the desired temperature. Extending longitudinally from these pipes 20 are pipes 21 which may be caused to extend within and through the several lifting bars 10, except those bars that are secured to the inner face of the doors, and radially, adjoining the partitions 9 to and through other lifting bars on the opposite side of the drum, thereby providing each of the lifting bars with a heating member. If preferred, of course the lifting bars may be constructed in the form of inclosed chambers, into which the heating agent may be introduced by means of suitable pipes 21, see Fig. 3, in place of the pipes herein shown, Fig. 1, as extending into and through them.

One or more rows of pipes 22 may be arranged longitudinally of the drum and outside the side wall thereof, thereby supplying also a direct or primary heating agent for the drum wall.

It will be obvious that by the above described means, heat may be applied directly to the inner face of the drum casing 1, to the outer face of the drum wall 7 and also to the interior of the lifting bars 10, as well as the ends and partition members.

For reducing the atmospheric pressure in the casing, any suitable vacuum or exhausting means may be used, which may be connected by a pipe 23 (see Fig. 2) and valve 24 with the interior of the casing.

The clothes having been properly washed in the usual manner, the atmospheric pressure within the casing may be reduced by any suitable means as described, to reduce the vaporizing point of the water in the clothes, and thereafter rotation of the drum will bring the clothes into intimate contact with the various heated lifting bars and heated side wall portions of the drum, thereby causing them to dry evenly and quickly.

The drum is preferably not rotated fast enough to cause the clothes to cling to the sides of the drum through centrifugal action, but simply fast enough to cause them to be effectively and continuously subjected to different heated portions of the drum.

The drum and casing may of course be provided with the usual and suitable doors 25 and 26 for introducing the clothes into and removing them from the drum.

I have found that clothes treated in this

manner may be dried much more quickly and with much less handling than by methods previously used. The clothes when removed from the machine are dry and light and if any knots have been formed in them they are much more easily untied than when the clothes are wet, as has heretofore been the case.

I have described my drying process as used in a washing machine of the rotatable type and I have described my reduced atmospheric feature in connection with the tumbling of the clothes against heat radiating surfaces. My invention however is not confined to such combination.

By primary heating surfaces I mean surfaces which are heated by direct contact of the heating agent with the members of which they are parts, and which radiate heat transmitted substantially direct to them from a heating agent such as steam or electricity, to distinguish from indirect heat radiating surfaces such as the plates of the drum when the steam is used to heat the outer casing which incloses the rotating drum and the heat is transmitted to the plates of the drum through the medium of an intervening space.

While I have described my invention in connection with cleansing clothes it is equally applicable to dyeing textiles or other processes in which textiles are first made wet and then dried.

Having thus described one method of practicing my invention and an illustrative machine for carrying out the process what I claim and desire to secure by Letters Patent is:—

1. That process of removing moisture from textile goods which consists in alternately tumbling them against perforated surfaces and primary heat radiating surfaces while under less than atmospheric pressure.

2. That process of removing moisture from textile goods which comprises tumbling them against primary heating surfaces while a suction is applied to remove the vaporized moisture.

3. The process of cleansing and drying textile goods that consists in cleansing the material in a perforated drum provided with circumferentially disposed lifting bars on the drum wall and rotatable in a casing, drawing off the water from the casing, substantially inclosing the drum within a wall of hot air by heating the inner wall of the casing and the exterior wall of the drum, heating the interior walls of the lifting bars, withdrawing vapor and reducing the air pressure in the casing below the atmospheric point and rotatably tumbling the material alternately from one heated lifting bar to a perforated heated drum section.

4. The process of removing moisture from textile material which consists in tumbling the goods successively over a plurality of heated bars while under less than atmospheric pressure.

5. The process of removing moisture from textile goods which consists in alternately presenting the goods, while under less than atmospheric pressure, to drying members heated to different degrees.

6. The process of removing moisture from textile goods which consists in introducing the goods to a heated member and then precipitating the pieces of goods therefrom in loose relation to each other to a member heated to a less degree, repeating the operation with substantial regularity while the goods are under less than atmospheric pressure.

7. The process of removing moisture from textile goods which consists in introducing the goods to a heated member, then precipitating and unrolling the pieces of goods on a member heated to a less degree, and repeating the process with substantial regularity while the goods are under less than atmospheric pressure.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM A. E. HENRICI.

Witnesses:

ROBERT H. KAMMLER,
PRESTON UPHAM.

It is hereby certified that in Letters Patent No. 1,160,109, granted November 9, 1915, upon the application of William A. E. Henrici, of Boston, Massachusetts, for an improvement in "Processes for Washing and Drying Clothes or other Textile Materials," an error appears in the printed specification requiring correction as follows: Page 3, line 66, claim 4, for the word "material" read *goods*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of December, A. D., 1915.

[SEAL.]

R. F. WHITEHEAD,

Acting Commissioner of Patents.

Cl. 34—24.