

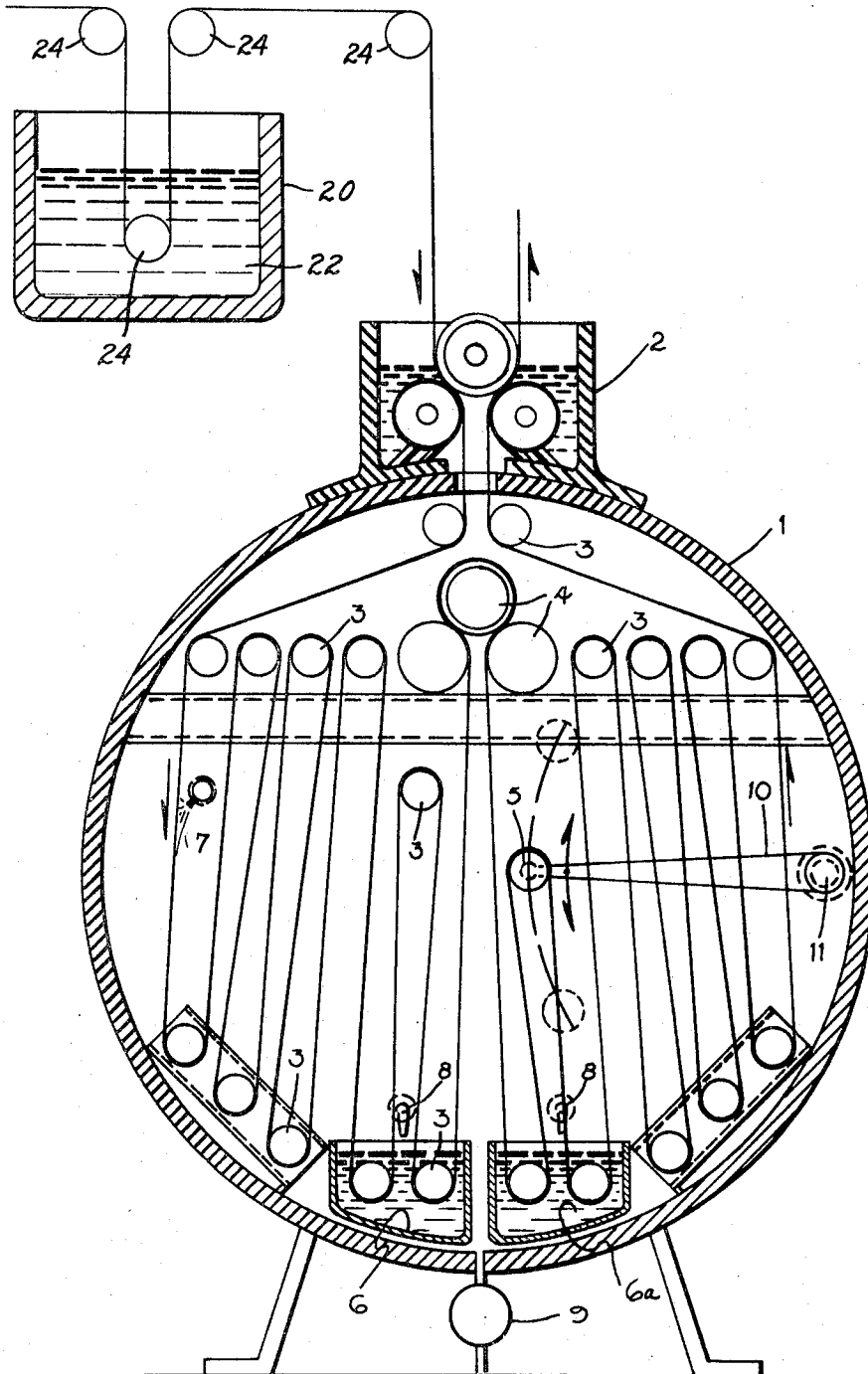
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DEVICE FOR CONTINUOUS BLEACHING

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DEVICE FOR CONTINUOUS BLEACHING

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3 Claims

ABSTRACT OF THE DISCLOSURE

The present invention relates to a continuous method of bleaching textiles wherein the textile is subjected to a first impregnating bath of bleaching liquor, transferred to a pressure vessel wherein a second impregnation is effected within the pressure vessel, followed by a squeezing step wherein the textile is squeezed and finally is re-impregnated with additional bleaching liquor. The pressure vessel is maintained at a pressure in excess of 1 atmosphere and at a temperature in excess of 100 degrees C. The invention also relates to an apparatus suitable for accomplishing the above method.

BACKGROUND OF THE INVENTION

This application is a continuation of an application filed Feb. 28, 1963 having Ser. No. 262,301 now abandoned.

The general concept of bleaching textiles is a well-known art which has been practiced for many years. The principal methods for accomplishing the bleaching of textiles is the use of batch or non-continuous processes due to the requirement that the bleach be uniformly distributed on the textile and react in a constant manner. Recently, continuous bleaching processes have been developed. It has been proposed to bleach cotton goods and other textiles in a continuous manner by applying the bleaching liquor outside of the pressure vessel, and thereafter introducing the treated goods into the pressure vessel. Likewise, it has been suggested that the goods may be introduced into the pressure vessel either in a wet or dry condition and thereafter be subjected to a bleaching liquor. Both of these methods have substantial drawbacks which result in nonuniform bleaching of textile fabrics.

The pre-impregnation method has failed to properly effect a bleaching step in textiles since the goods must pass into the pressure vessel through a pressure type inlet slot, whereby the bleaching liquor is essentially squeezed out of the textile and reduces the quantity of bleaching liquor to an amount substantially less than that necessary to effect proper bleaching. Furthermore, due to the high temperature difference between the outside and inside of the pressure vessel, a condensate forms immediately on both sides of the textile goods, which in turn considerably dilutes the bleaching liquor in the very outer layer of the goods. This is disadvantageous since one purpose of bleaching is to render the cotton husks optically invisible, and the condition of the outer layer is especially critical.

The method whereby the textile is treated after it has been introduced into the pressure vessel has also been found to be inadequate. As the textile is passed through the pressure vessel, quantities of air entrained in the textile are carried along through the path of the textile and no

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bleaching is effected in the interior of the goods. It has been proposed to humidify the textiles prior to the introduction of the textile into the pressure vessel, but this does not bring about an improvement for the reason that the above mentioned dilution effect takes place. As a result, a nonuniform and spotty bleaching is obtained.

In both instances, attempts have been made to obviate the above drawbacks by selecting a higher liquor concentration, but experience has proved a higher concentration of the liquor brings about far too fast a decomposition of the bleach so that the costs of the bleaching process become economically excessive.

It is therefore an object of this invention to provide a device for continuous bleaching which will overcome the above mentioned drawbacks set forth above.

It is another object of this invention to provide a device for continuous bleaching which will permit the use of a bleaching liquor insider a pressure vessel.

It is a further object of this invention is to provide a bleaching device which achieves substantially uniform bleaching throughout the goods at a minimum of expense.

Other objects will appear hereinafter upon a careful reading of the following specification in connection with the accompanying drawings.

DESCRIPTION OF THE INVENTION

It has now been discovered that a uniform bleaching of textiles may be accomplished in the following manner. In its most simple form, the process of this invention consists of a pre-impregnation step carried out at a point outside of a pressure vessel, followed by an impregnation step within the pressure vessel, a squeezing action after the impregnation step, and finally a re-impregnation step after squeezing while the textile is still inside the pressure vessel. Substantial advantages are realized by the process, with the most important advantage being achievement of a uniform and even bleaching effect.

A wide variety of bleaching liquors may be employed in the present invention. The substantial benefits accruing from the use of the present invention have not been found to be limited by any particular bleaching liquor, and any of the conventional formulations may be employed with equal success. Normal concentrations of bleaching liquors may be employed, since the efficiency of the present invention is not dependent upon high concentrations and their accompanying excessive rate of decomposition.

Among the preferred active substances in formulating the bleaching liquor, most preferred are the peroxides, the alkali metal hydroxides and alkali metal chlorites. It is most often-times necessary to include conventional stabilizing agents such as sodium silicate, carbocyclic acids and other conventional materials. For example, when a peroxide bleaching liquor is employed, the pH may be adjusted from acidic to slightly alkaline. A preferred range is from approximately a pH of 4 to a pH of 9, with a most preferred pH range of 6 to 8. Similarly, when alkali metal chlorite bleaching liquors are employed, the pH may range from about neutral to a value of 9 or more, with a pH in the area of 8 being most preferred.

The pressure vessel itself must be maintained at pressures in excess of 1 atmosphere and at a temperature in excess of 100 degrees C. Normal pressure will range from approximately 1 atmosphere to as high as 6 atmospheres or higher. The temperature will normally be adjusted to

some point over 100 degrees C. which is not deleterious to the textile itself.

As has been set forth above, the method for continuous bleaching of textiles which represents the method of this invention comprises impregnating the textile with a bleaching liquor to form a pretreated textile, introducing the pretreated textile into a pressure vessel, and thereafter treating the textile within the pressure vessel by impregnating the textile with additional bleaching liquor, squeezing the textile within the pressure vessel and re-impregnating the textile with additional bleaching liquor. The pressure vessel must be maintained at a pressure in excess of 1 atmosphere and at a temperature in excess of 100 degrees C. Residence time of the textile inside the pressure vessel is preferably less than 60 seconds, so that the reaction conditions do not materially affect the properties of the textile. Peroxides, alkali metal hydroxides and alkali metal chlorites may be employed as active components of the bleaching liquor. Stabilizers, pH adjusting agents, and other conventional additives may also be employed in making up the bleaching liquor.

The process of this invention is admirably suited to be carried out in the apparatus of this invention. Briefly, this apparatus consists of a combination of elements wherein a first means is provided to pretreat the textiles with a bleaching liquor. The second means comprises a pressure vessel adapted to receive the textile from the pretreating means. The pressure vessel contains an inlet for introducing the textile into the vessel, and impregnating means within the vessel for impregnating the textile with additional bleaching liquor, squeezing means to press the textile, and re-impregnating means to further treat the textile. Finally, the pressure vessel contains an outlet to withdraw the textile from the vessel. In a preferred embodiment, the pressure vessel may contain stretching means to properly maintain the size and shape of the textile within the treating zone.

Referring to the drawing now, the figure illustrates a section through a device according to the present invention.

With respect to the drawing in detail, the arrangement illustrated herein represents a pressure cooker 1 provided with a standard pressure sealing charging and discharging device 2 for the textile goods.

The arrangement furthermore contains direction reversing rollers 3 passing the webs along loops back and forth. Additionally, there is provided a squeezing device 4, a stretching device 5, and a plurality of liquor containing troughs 6 and/or liquor spraying devices 7. The impregnating liquor is fed into the troughs 6 or into the spray device 7 under pressure. Liquor flowing over from the troughs, spraying devices or squeezing means passes into the sump of the vessel to where it is discharged through a floating liquid discharging device 9. The stretching device 5 for the goods is journaled in two long levers 10, the pivot points of which are located outside the cooker. A proper pressure seal 11 is provided. The levers may be loaded by corresponding weights or the like.

For the purposes of example, it is possible to utilize the above device to carry out a peroxide bleaching step in the device described in the drawing. The goods are first pre-impregnated with a bleaching liquor at a point outside of the pressure vessel shown as trough 20 containing bleaching liquor 22 and a series of rollers 24 to guide the goods into and out of the liquor. The goods are then introduced into the vessel, and are impregnated with the bleaching liquor by means of a spraying device 7 and/or a liquor containing trough 6. Subsequently, the goods are squeezed in the squeezing mechanism 4 to a humidity content of from about 100 to 120 percent. In a preferred embodiment, the goods may be stretched by use of a stretching means 5. From this point, the goods are passed through a second liquor trough 6a wherein a post or re-impregnation is effected with a bleaching liquor. In this case, an

alkalized solution may be employed. Finally, the textile is withdrawn from the pressure vessel.

More specific examples of the operation of the present invention are set forth in the following examples, which are intended to illustrate the particular embodiment described herein, and are not to be construed as limitations upon the scope of the appended claims.

EXAMPLES

A kier boiled cotton interlining fabric having a basic weight of 256 grams per square meter was impregnated outside of the pressure vessel by a bleaching liquor. This bleaching liquor contained 1.2 percent peroxide, 0.6 percent caustic soda, 3.0 percent sodium silicate, 0.3 percent of an alkaline earth salt to maintain a pH at approximately 8, and 0.2 percent of a protein splitting-fatty acid condensation product to prevent silicate deposits. After the fabric had been pre-impregnated in the exterior bath, the fabric was introduced into the pressure vessel. Inside the pressure vessel, the cloth was impregnated with a second bleaching liquor, followed by passing the textile through a squeezing means and a subsequently re-impregnation. The second bleaching liquor, employed within the pressure vessel, contained 0.5 percent of 100 percent peroxide buffered with an alkali phosphate at a pH of 7. The third or re-impregnation liquor contained 0.2 percent caustic soda, 1.0 percent sodium silicate and 0.2 percent of the above mentioned protein splitting-fatty acid condensation product. The temperature was at all times maintained at approximately 140 degrees C.

The resultant product was withdrawn from the bleaching vessel and was found to be satisfactory in all respects. The fabric was well bleached, and had a good power of absorption. The whiteness, based on MgO was 88 percent, and the flow capacity was 3.2.

In another experiment, a kier-boiled cotton terry fabric having a basis weight of 400 grams per square meter was impregnated at a point outside of the pressure vessel with a chlorite bleaching liquor containing 18 grams per liter of sodium chlorite (80 percent active), 20 grams per liter of sodium nitrate as a corrosion inhibitor, 1.3 grams per liter of sodium formate as an activator and buffer, and 4 grams per liter of an ethylene oxide condensate employed as a wetting agent. Small amounts of sulphuric acid and formic acid were employed for fine pH adjustment to a value of 5.7. After this pre-impregnation, the cloth was introduced into the reaction or pressure vessel.

After introduction into the pressure vessel, the cloth was impregnated with a second bleaching liquor containing 7 grams per liter of sodium chlorite (80 percent active), 10 grams per liter of sodium nitrate for corrosion inhibition, and 0.8 gram per liter of sodium formate to adjust the pH up to 8.0. The residence time of the cloth was 60 seconds and the temperature within the pressure vessel was 140 degrees C.

After this impregnation step, the cloth was squeezed and re-impregnated with the above bleaching solution. Finally, the fabric was withdrawn.

The fabric produced by the above example was very satisfactorily bleached and was free of seed husks, and had a whiteness of 90.2 percent. The flow capacity was 4.0 and the power of absorption was judged to be outstanding.

Thus it can be seen that the process and apparatus of this invention are admirably suited to accomplish uniform and effective bleaching of textiles. Various modifications and other embodiments will become apparent to the skilled worker upon a reading of the claims appended hereto.

Having thus described the invention, what is claimed is:

1. An apparatus for continuously bleaching textiles comprising in combination: means for pre-impregnating a textile with a bleaching liquor, and a pressure vessel

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being substantially free of moisture adapted to receive said textile from said pre-impregnating means, said vessel comprising an inlet, impregnation means for treating said textile with a bleaching liquor, squeezing means to press said textile after impregnation has been effected, and re-impregnation means to further treat said textile with a second bleaching liquor after said textile has been squeezed, and an outlet to withdraw said textile from said vessel.

2. The apparatus of claim 1 wherein said impregnating means comprises a bleaching liquor trough.

3. The apparatus of claim 1 wherein said re-impregnation means comprises a trough.

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