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TEXTILE TREATMENT

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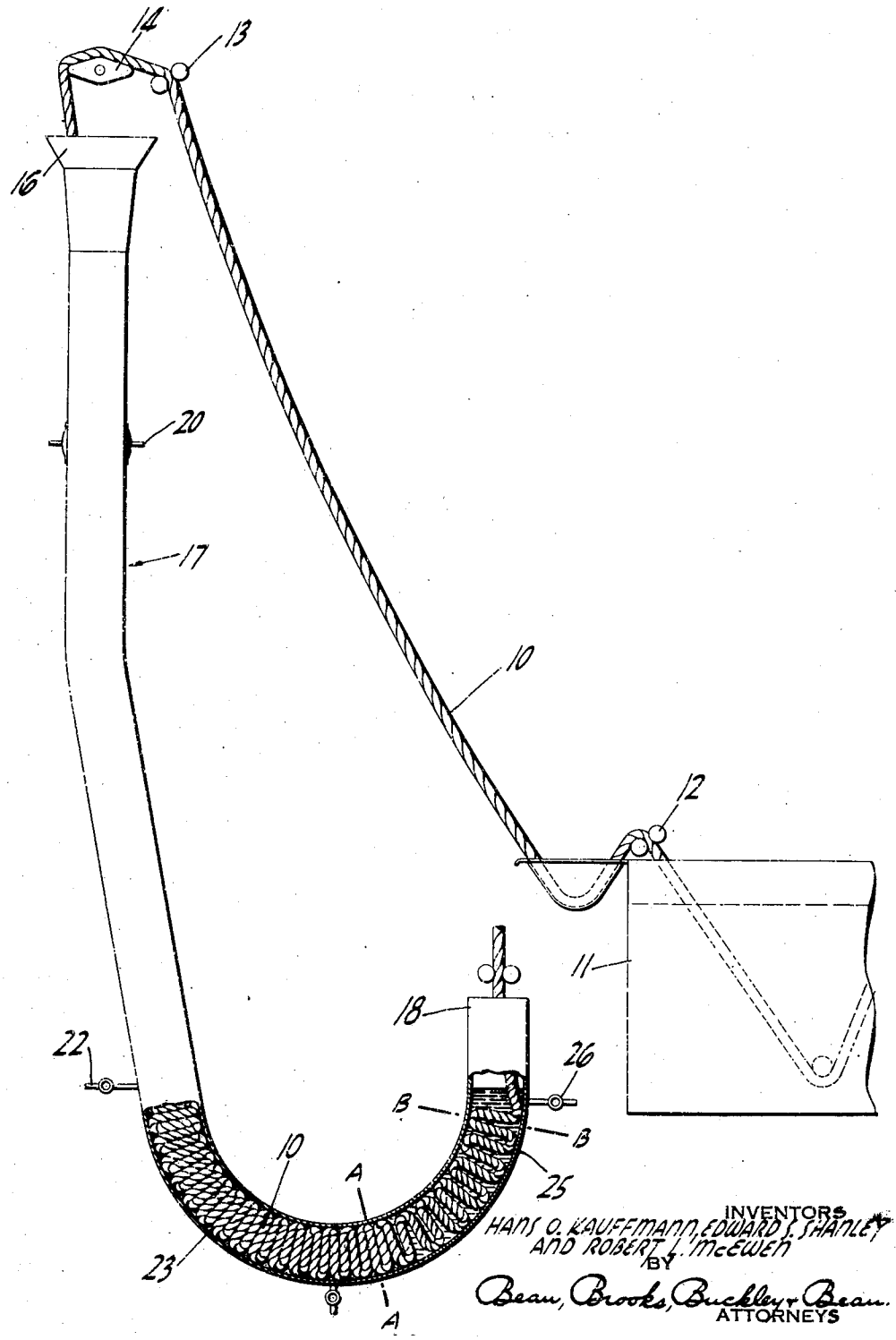

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TEXTILE TREATMENT

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The present invention relates to the treatment of textile goods and more particularly to the treatment of such goods with alkaline solutions at low liquor ratio in J chutes for the purpose of preparing or bleaching the same. This is a continuation in part of Serial No. 486,674 filed May 12, 1943.

It has been common practice to treat textile goods, especially those of vegetable origin as, for instance, cotton or materials containing relatively large amounts of cotton, with alkaline solutions in order to prepare the same. This operation is generally performed prior to the usual bleaching and dyeing steps.

Alkaline treatments most widely employed comprise the well-known kier boiling operations, wherein the goods are submerged in hot, circulating, caustic alkali for periods of from 6 to 10 hours at temperatures at the boiling point of water, or even at more elevated temperatures in those cases where the kier boiling is performed under pressure. This alkaline treatment softens and loosens the waxy incrustations of the cotton fiber, and loosens and dissolves the motes. Goods so treated are more amenable to bleaching and dyeing than goods that have not been treated with alkali.

It is well understood in the art that the foreign matters loosened, dissolved and removed from the textile goods, by the alkaline solution, remain in the solution and circulate over and through the goods as the solution is circulated. A disadvantage of kier boiling operations resides in the possibility that the solution may form channels through the goods with the production of unevenness in the goods and, furthermore, sedimentation of foreign matter may occur upon the goods, producing spots and areas loaded with waxy or other foreign material initially removed by the action of the alkali.

Textile goods have also been treated with alkaline solutions by impregnating or padding the goods with the alkaline solution in sufficient quantities merely to dampen the goods and thereafter effecting action of the alkaline solution on the goods by subjecting the padded goods to the action of heat.

This heating treatment is generally performed in equipment of a particular type, and for continuous processing so-called J chutes are employed.

As in the kier boiling, the waxes, motes and other foreign material are loosened, dissolved or changed to a condition where the usual washing operations eliminate these undesirable materials from the goods. However, due to the relatively high concentration of the caustic alkali, sodium silicate and other chemicals employed in low liquor ratio bleaching and the presence in the water normally employed of dissolved salts, generally materials inducing hardness, as well as inorganic materials present in the goods, considerable amounts of insoluble materials at times precipitate from the treating solution. These materials being insoluble and being of the nature of oxides, hydroxides, and silicates of metals, produce deposits which may appear either as films on the goods or as film-forming materials depositing on the inner surfaces of the treating J chute. Under long continued use there is a tendency for these insoluble and incrusting materials to build up what might be called an abrasive surface on the inner walls and surfaces of contact between the treating J and the goods passing therethrough as the coefficient of friction between textile goods and such deposits is greater than between the goods and the wall of the chute which is generally of polished metal.

Where passage of the goods through the J, as in the instant invention, is induced by gravity, little or no damage to the goods is effected in straight, relatively vertical J's. However, where it is desired to provide the J chute adjacent the discharge end, as in the instant invention, with a curved portion which retards the free passage of goods through the J, the weight of the superimposed goods in the vertical portion of the J creates some friction in moving the bulk of the goods through the lower curved portion thereof. Where this frictional action is higher than a predetermined amount, the goods do not pass smoothly through the curved portion, as is the case in a clean J chute, but tend to tangle, and difficulties are encountered in removing the goods in rope form from the discharge angle of the J.

Another disadvantage of treating methods wherein goods containing small amounts of highly concentrated alkaline solutions are heated, is that some surface drying is produced on the goods with the formation of incrustations on the goods.

It is an object of the present invention to provide a method of treating goods with alkaline solutions which avoids the disadvantages of the prior methods.

It is a further object of the invention to provide a method for heat treating alkali impregnated textile goods whereby the formation of incrustations is substantially eliminated.

The present invention also provides a method

of treating textile goods with alkali by heating the same and subjecting the heated goods to a preliminary wash to reduce caustic content of the goods prior to the final wash.

It is the ultimate object of the invention to provide a method for the uninterrupted continuous treatment of goods in those treatments when padded goods are heated in confined heating or steeping J chutes and move therethrough in bulk by the action of gravity.

The method of operation of the invention possesses the advantage that goods may be heated in a J box or chute and removed therefrom with substantially no danger of producing snarls and tangles.

It is also an object of the invention to reduce damage to the goods which may be caused by passing a heavy bulk of goods through a J chute having a curved discharge end.

The above objects and advantages of the invention may be accomplished preferably by continuously passing goods either in rope form, in open width, or in chains, through the alkaline treating solution, at such a rate as will permit a saturation of the goods with alkaline solution. This rate will, of course, depend upon the form in which the goods are passed through the solution, whether in rope form or in open width, and upon the previous history and character of the goods. The goods, after saturation with the alkaline solution, are passed to a conventional device which eliminates the excess of the solution carried by the goods, yet leaves the goods padded or impregnated and dampened with the alkaline solution. In general, it will be found advantageous to employ squeezer rolls for this purpose and to discharge the goods from the rolls in a dampened condition so that they carry from about 50 to 150 pounds by weight of the treating solution per hundred pounds of dry weight of the goods. In some instances, it may be found advantageous to employ vacuum extraction for this purpose.

The dampened or padded goods, thus carrying 50% to 150% of alkaline treating solution, are then passed at any desired operating speed, for instance, 150 yards per minute, to a J chute, and are piled and packed therein by the employment of conventional piling equipment.

The goods are preferably impregnated with the alkaline solution at room temperature, that is to say, temperatures up to about 125° F. although when special effects are to be obtained, and the character of the goods permits, they may be impregnated at temperatures higher than 125° F., particularly in those instances where such treating temperatures do not adversely affect the activity of the solution or produce undesirable changes in the goods or in the active ingredient of the solution, or the goods after impregnation may be heated prior to piling.

In general, the padded goods are passed in unheated condition to the J chute although, under special circumstances, they may be heated prior to the passage into the J chute. In the preferred method of operation, the goods after being packed in the J chute are permitted to move therethrough by reason of the action of gravity upon the pile or bulk of goods and the action of the alkaline solution upon the goods is brought to completion by adding steam to the bulk of the goods in the J chute. In general, steam is added adjacent the feed end of the J chute, all as more fully described in United States Letters Patent No. 2,353,615 issued July 11, 1944. The convective action of the steam raises the temperature of the goods to a temperature in the neighborhood of 212° F. and the temperature throughout the mass of goods is maintained relatively constant.

In accordance with the present invention, a solution is introduced into the lower portion of the J chute. This solution penetrates, encases and surrounds the goods and dilutes the more concentrated solution adhering to the heated goods. At the same time, the goods are subjected to a preliminary washing action thereby reducing the alkali concentration of the solution. The washing solution also buoys up the goods and reduces the frictional action present by reason of passage of the total bulk of goods through the curved portion of the J. At the same time the washing solution tends to prevent excess deposition of incrusting materials upon the inner contact surface of the J chute and at the same time, in effect, acts as a lubricant between the goods and the J chute wall. By reason both of the buoying action and the lubricating action of the washing solution, the bulk of goods travels through the curved portion of the J in its regular and predetermined packed condition, thereby eliminating the possibility of snarling and tangling encountered in chutes wherein washing solutions are not so employed. At the same time, the formation of undesirable incrustations upon the goods is eliminated due to the fact that incrustation forming matter is held in solution or suspension and drying in is avoided.

The solution surrounding and penetrating the goods permits the bulk of goods to pass freely through the bottom curved portion of the J chute towards the outlet, up to the line designated on the drawing at B—B. It is evident, therefore, that the goods can now be easily removed from the bulk at high speed as they remain in the same position with the exception that the bulk has been reversed about 180°.

The alkaline solution employed for treatment of the goods may contain caustic soda from 1 to 10%. Other alkaline solutions, such as solutions of soda ash, potash, borax, sodium silicate, trisodium phosphate, as well as other phosphates, may be used in lieu of, or as additions to the caustic soda. It will also be understood that the alkaline solution may contain other ingredients having a beneficial action upon the goods as, for instance, bleaching agents such as the peroxides, hydrogen peroxide, alkali metal peroxides, alkaline earth metal peroxides, the perborates, percarbonates and the like, all classed herein as peroxides. The preferred solution added to the lower part of the J box is water, although aqueous solutions of soaps or other detergent agents may be added to the solution to obtain any desired beneficial effect brought about therewith.

Referring to the drawing, wherein there is illustrated a form of apparatus suitable for carrying out the method of the present invention, a rope of goods 10 is passed into an alkaline solution contained in tank 11 and then through squeezer rolls 12 which are set to eliminate the excess of the alkaline solution from the goods but to maintain from 50 to 150% of the solution in the goods, based on the dry weight of goods. Rope 10 is then passed through tension rolls 13 over a conventional piler 14 and into the feed end 16 of J chute 17.

Piler 14 piles the goods uniformly in chute 17, filling the same from side to side with a bulk of goods, which bulk moves downwardly through

the chute as the goods are withdrawn at discharge end 18 of the J chute. The goods, depending upon their weight and the type of treatment to be effected, remain in the chute for from 20 minutes to several hours. To produce the desired action in the goods, steam is admitted to the chute through steam chest 20 whereby the goods are heated uniformly to a temperature in the neighborhood of 212° F. and generally to a temperature somewhat above 212° F.

As the goods enter the chute in the unheated condition and are packed tightly therein filling the cross-sectional area of the chute, they tend to form a seal at the top of the chute preventing exit of convective steam. Furthermore, as the goods tend to move downwardly in the chute, the effective action of the heating fluid is relatively more effective in the direction of motion of the goods so that the alkaline solution acts under the influence of steam.

A fluid inlet 22 is provided adjacent the lower curved portion 23 of J chute 17 and encasing fluid is admitted therethrough to the chute to cover and surround the goods passing through portion 23 whereby the goods are washed, the incrustations removed, and the goods buoyed up and lubricated. In general, water will serve the purpose, which water may be either hot or cold and may contain, if desired, soaps or other detergent materials which tend to produce a preliminary washing action of the goods and to decrease the quantity of alkali on the goods so that when the rope is discharged from the chute, oxycellulose formation is substantially eliminated. Furthermore, the liquid, as shown at 25, permits free passage of the bulk of cloth 10, as originally packed, through the lower curved portion 23 of the J chute 17, allowing removal of the rope 10 from the end 18 of the J chute 17 without tangles, snarls, and at a high speed and uniform rate.

Solution may be admitted at 22 or at any convenient position at or near the curved portion 23 of the J chute. The solution may be withdrawn from the outlet 26 or from an outlet at the lowest part of the J chute at a rate necessary to maintain a desired liquid level.

It is to be understood that our invention is not limited to the exact type of J chute described heretofore and illustrated in the attached drawing except as it is equipped with a curved discharge portion. The method of heating, method of impregnating and piling, and the type and state of goods, may be different and any variation therefore is not to be construed as outside the scope of this invention.

The instant invention thus provides an improved method for continuously treating goods with alkaline solutions in J chutes having a curved discharge portion for retarding the free passage of the goods through the chute.

What is claimed is:

1. The method of treating textile goods which comprises passing the goods impregnated with an alkaline solution into one end of an enclosing J chute to form a bulk of packed goods in said chute, said chute being provided with a curved discharge portion for retarding free passage of goods therethrough, heating the goods to obtain the desired action of the alkaline solution upon the goods, maintaining an enclosing liquid in the curved portion of the chute and passing the goods still in bulk into and through the enclosing liquid whereby the goods are buoyed up, preliminarily washed and protected from the action of air.

2. The method of treating textile goods which comprises passing the goods impregnated with an alkaline solution into one end of an enclosing J chute to form a bulk of packed goods in said chute, said chute being provided with a curved discharge portion for retarding free passage of goods therethrough, subjecting the bulk of goods to the action of steam to perfect the action of the alkaline solution upon the goods, maintaining an enclosing liquid in the curved portion of the chute and passing the goods still in bulk into and through the enclosing liquid whereby the goods are buoyed up, preliminarily washed and protected from the action of air.

3. The method of treating textile goods which comprises passing the goods impregnated with an alkaline solution into one end of an enclosing J chute to form a bulk of packed goods in said chute, said chute being provided with a curved discharge portion for retarding free passage of goods therethrough, subjecting the bulk of goods to the action of steam to perfect the action of the alkaline solution upon the goods, maintaining wash water in the curved portion of the chute and passing the goods still in bulk into said wash water whereby the goods are buoyed up, preliminarily washed and protected from the action of air.

4. The method of treating textile goods which comprises passing the goods impregnated with an alkaline solution into one end of an enclosing J chute to form a bulk of packed goods in said chute, said chute being provided with a curved discharge portion for retarding free passage of goods therethrough, subjecting the bulk of goods to the action of steam to perfect the action of the alkaline solution upon the goods, maintaining wash water in the curved portion of the chute and passing the goods still in bulk into said wash water and continuously adding fresh wash water to said enclosing solution as the goods are withdrawn therefrom to enclose the goods entering said zone, to decrease the amount of alkali in the goods, to buoy up the goods and to protect them from the action of air.

5. The steps in the treatment of goods padded with an alkaline solution which comprise: heating the goods, packing the goods into a steeping J chute to form a bulk of goods therein, said chute being provided with a curved discharge portion to retard free passage of goods therethrough, passing the bulk of heated goods downwardly by gravity in said chute wherein they are maintained in the heated condition into an enclosing washing solution in the curved portion of the chute and continuously withdrawing the goods in extended form from the washing solution at substantially the same rate at which fresh goods are fed to the bulk while adding fresh solution to the discharge portion of said chute to enclose the goods entering therein, to decrease the amount of alkali in the goods, to buoy up the goods and to protect them from the action of air.

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