

UNITED STATES PATENT OFFICE

2,304,474

HEAT TREATMENT OF TEXTILE FABRICS

Christian N. Poesl, Buffalo, N. Y., assignor to
E. I. du Pont de Nemours & Company, Wil-
mington, Del., a corporation of Delaware

Application May 22, 1941, Serial No. 394,646

3 Claims. (Cl. 68—6)

This invention relates to the treatment of textile fabrics with a heated fluid, such as steam, for the purpose of thoroughly wetting said fabric and raising its temperature to a suitable extent. More particularly, the invention relates to certain new and improved apparatus suitable for treating textile fabrics with a heated fluid such as steam in an efficient and convenient manner.

Textile fabrics, either in the web form or coiled into a generally rope-shaped form, are frequently subjected in the textile art to the action of various heated fluids. For example, in the treatment of textile goods of vegetable origin with alkaline scouring liquors or with bleaching solutions, or with both, such as by the method disclosed in the copending application of Campbell and Fennell, Ser. No. 264,872, filed March 29, 1939, now Patent No. 2,267,718, issued December 30, 1941, it is customary to subject the textile material to the action of steam. This may be readily accomplished either by passing the textile material in web form through a tube filled with steam, or by loosely forming the web of textile fabric into rope form and passing this rope through the steam chamber. Since the success of various subsequent operations employed for treatment of the textile fabric frequently depends on the thoroughness of wetting and heating in this preliminary steam treatment step, I have devised certain new and improved apparatus which can be more efficiently employed for the steam treatment of textile fabric either in web or rope form.

Accordingly, it is one of the objects of this invention to develop a new and improved steaming tube construction which permits readier and more efficient treatment of textile fibres with a heated fluid such as steam. Another object of this invention involves the improvement of steaming tubes now available by providing for a longer period of contact between the textile fabric and the heated fluid. Still another object of this invention is the development of an improved steaming tube wherein textile fabrics can be readily subjected to the action of a heated fluid such as steam, which steaming tube is so arranged as to permit ready access for inspection and threading-through purposes. An additional object of my invention is the improvement of heating tubes by providing a powerful jet of steam or other heated fluid to impinge upon the textile fabrics, which is travelling in a direction countercurrent to steam flow, said jet serving to drive out the air present in the interstices of the textile fabric, thus securing thorough impregnation. These and still further objects of my invention will be apparent from the ensuing disclosure of a preferred embodiment thereof.

My invention may be more completely de-

scribed with reference to the annexed drawing, wherein Fig. 1 is a vertical cross-sectional view of my improved steaming tube construction, this view showing the fabric in rope form passing through the tube and being subjected to the action of the steam.

Fig. 2 is a plan view showing the upper pulleys and driving mechanism. Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1. Fig. 4 is a cross-sectional view in detail of a certain part of the general assembly shown in Fig. 1, this part being more fully described as the steam conduit and distributor member. Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 4. Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 1.

My improved device consists generally of two vertical tubular members 11 and 12 through which the cloth is passed and wherein it is subjected to the action of the heated fluid. Above tube 12 there is provided pulley 14, while above tube 11 there is provided pulley 15, the fabric passing over these pulleys on its way into and out of the vertically-extending tubes. Below tubes 11 and 12 there is provided a pulley 16. The textile material 18, in web or rope form, travels in the general direction shown by the arrows, entering at the upper right in Fig. 1, passing over pulley 14 down through vertical tube 12, around pulley 16, up through vertical tube 11, over pulley 15, and thence out of the apparatus.

Around pulley 14 there is provided an enlarged box member 20 which is provided with a flue pipe 22 opening to the atmosphere. This pipe is provided with damper 24, which can be adjusted in a number of positions for controlling the draft.

In the wall of the enlarged chamber 20 there is provided an opening 26 for the passage of the textile material 18. Within chamber 20 there is positioned a plate 28, attached as by welding to the lower wall of member 20, and in this plate another opening 30 is provided for the passage of and guidance of the rope or web of textile material being treated. As shown, the pivoted plate member 32 may be opened to permit ready access to the pulley 14.

Around pulley 15 is provided another enlarged chamber or box member 36, provided with a pivoted plate or door member 38. This plate may be opened to permit access to the pulley 15.

Below vertical tubes 11 and 12 there is provided the lower enlarged portion 40 surrounding pulley 16. This member is constructed with a foraminous false bottom 42 through which condensed steam may pass to discharge pipe 44 but on which lint or other foreign matter which may be present is retained. Access to the pulley 16 and to the gauze 42 is afforded through the opening in the member 40 covered by door 48. The

pipe for removing condensate 44 is constructed in U-form so as to provide a liquid seal at the bottom of the apparatus, thereby preventing escape of steam through this pipe.

In the vertical tube 11 there is provided the steam supply and distribution member shown more clearly in detail Figures 4 and 5. Steam or other heated fluid is supplied through conduit 50, and the steam impinges against the cylindrical baffle 52 positioned in the steam distribution member between the inlet 50 and the apertured distribution pipe 54. This baffle member is supported in the steam distribution member, designated generally by the numeral 56, by spider members 58. Extending down through the center of the steam distribution member 56 and in general alignment with vertical tube 11 is the apertured tube 54, through the apertures of which steam passes into the vertical tube 11. The baffle members 58 serve to distribute the steam uniformly over the entire length of the apertured distribution pipes 54. To permit the escape of condensed steam there is provided outlet 60 below baffle member 52.

In operation the textile material enters in either web or rope form through eyes 26 and 30, passes over pulley 14, down through vertical tube 12, over pulley 16, up through vertical tube 11, through the area within the apertured steam distribution tube 54, and out of the apparatus over pulley 15. Steam supplied through conduit 50 is distributed by baffle 52 throughout the entire extent of the member 56, and passing through the apertures in the apertured distribution tube 54, comes into contact with the textile material. The steam entering through the apertures in distribution member 54 passes downwardly through pipe 11, its upward travel being restricted by the partial closure lip 55, forming an eye through which the fabric being treated passes. After passing downwardly through the vertical tube 11, the steam then passes upwardly through vertical tube 12, thus coming into contact and impregnating and heating the textile material during the entire period that it is within the apparatus. This steam is permitted to escape to the atmosphere after emerging from the upper part of the vertical tube 12 through the damper-controlled flue discharge 22. The condensed steam is drawn off through the outlet pipe 44, constructed in U-form as previously explained to provide for a sealing trap at the bottom of the apparatus.

It will be noticed that the direction of flow of the steam or other heated fluid supplied is generally countercurrent to the direction of travel of the textile web or rope. This is an important feature of my arrangement, and, combined with the impinging of the steam directly on the textile fabric, thus driving out air present in the interstices therein and replacing it by heated medium, thereby resulting in thorough impregnation, results in much more satisfactory heating than heretofore possible. Moreover, the air entering with the web or rope of fabric at 26 is discharged through the flue 22, its removal from the apparatus at this point being aided by the stream of steam escaping therethrough, in which stream of steam the air is entrained.

Access to the pulleys 14, 15 and 16 for inspection and for the purpose of threading the textile material through the apparatus is provided by pivoted door members 32 and 38 and through the pivoted door 48 in the lower enlarged compartment 40. Pulleys 14 and 15 are driven from

sprocket 66, drive shaft 68, sprocket 70, chain or sprocket belt 72, sprocket 74, and drive shaft 76, serving to drive pulley 14, as shown more fully in Fig. 2. The lower pulley 16 on shaft 17 is an idler pulley.

It should be understood that various changes and modifications might be made in the apparatus as described which would nevertheless come within the purview of my invention. Its scope is therefore not to be restricted to details intended merely as illustrative of the preferred embodiment thereof herein described, except as necessitated by the prior art and appended claims.

I claim:

1. In an apparatus for subjecting textile fabric to the action of a heated fluid, in combination, a plurality of tubes arranged in a generally parallel arrangement, pulleys positioned adjacent the ends of said tubes for passing the textile material therethrough, and a heated fluid distributor member positioned in and forming a part of one of said tubes, said heated fluid distributor member including an inlet conduit, a distributor baffle for distributing said heated fluid uniformly throughout said distributor member, and a perforated distributor pipe through which said heated fluid passes, thus coming into contact with said textile fabric, said perforated distributor pipe coacting with other portions of said tube in which said fluid distributor member is positioned to form a conduit through which said textile fabric passes.

2. In an apparatus for subjecting textile fabric to the action of a heated fluid, in combination; a plurality of tubes arranged in a generally parallel arrangement; pulleys positioned adjacent the ends of said tubes for passing the textile material therethrough; and a heated fluid distributor member inserted in and forming a part of one of said tubes; said heated fluid distributor member including an inlet conduit, a distributor baffle for distributing said heated fluid uniformly throughout said distributor member, a perforated distributor pipe through which said heated fluid passes, thus coming into contact with said textile fabric, and a plurality of extending flange members, said flange members being adapted to coact with said tube in which said fluid distributor member is positioned, whereby said fluid distributor member may be securely attached to said tube by means of said flange members, said perforated distributor pipe coacting with said tube to form a conduit through which said textile fabric travels.

3. In an apparatus for subjecting textile fabric to the action of a heated fluid, in combination: a plurality of tubes arranged in a generally parallel arrangement; pulleys positioned adjacent the end of said tubes for passing the textile material therethrough; a damper member serving to remove spent heated fluid positioned adjacent the upper end of one of said tubes; and a heated fluid distributor member positioned in and forming a part of one of said tubes, said heated fluid distributor member including an inlet conduit, a distributor baffle for distributing said heated fluid uniformly throughout said distributor member, and a perforated distributor pipe through which said heated fluid passes, thus coming into contact with said textile fabric, before leaving said apparatus through said damper member, said perforated distributor pipe coacting with a portion of said tube in which said fluid distributor member is positioned and serving therewith to enclose the path through which said textile fabric travels.

CHRISTIAN N. POESL