

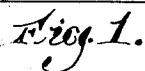
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CLOTH FINISHING

Original Filed Sept. 28, 1935 2 Sheets-Sheet 1



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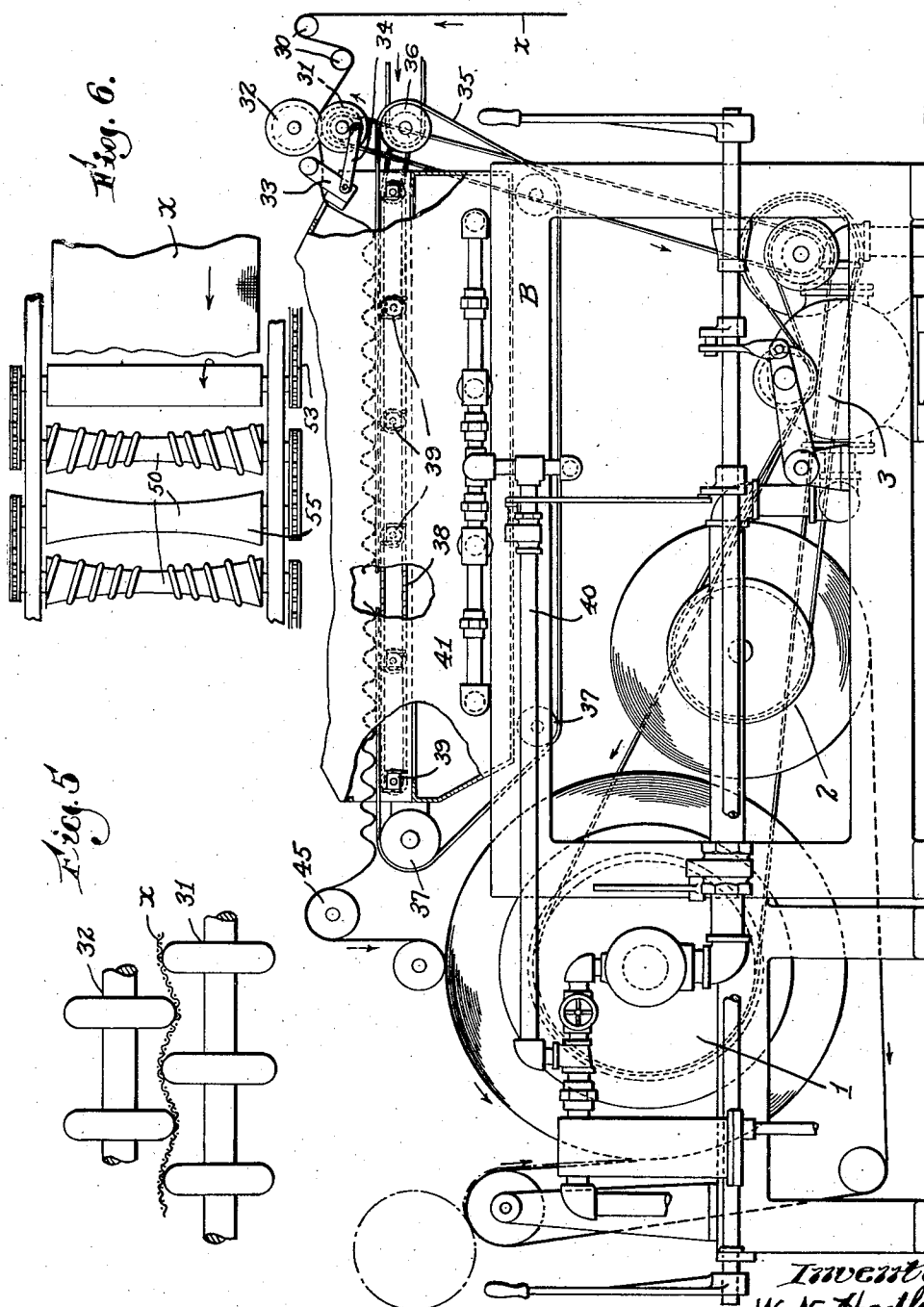


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE

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CLOTH FINISHING

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3 Claims. (Cl. 26—18.5)

This invention relates to the art of finishing cloth, both woven and knitted, and is intended to serve the double purpose of shrinking the cloth preparatory to the dry steam lustering operation which imparts to the cloth its softness of feel and flexibility for draping purposes.

Heretofore it has been the practice to wind the cloth along with a cloth-wrapping apron and thereafter subjecting the wound-on or coiled layers of cloth and apron to the penetration of dry steam for a suitable period, after which the moisture is extracted by means of a vacuum pump drawing air through the moisture containing coils of fabric into and through the interior of the drum, drying and cooling the cloth.

While the above described process is much used for giving cloth the desired finish, nevertheless such cloth is subject to shrinkage when made up into garments and it has been the practice, in order to avoid this shrinkage, to subject the cloth to a sponging or shrinking operation before it is cut up for use in garments. It is the object of the present invention to avoid this sponging operation after the cloth has been finished. This is accomplished under the present invention by feeding the cloth while it is in a completely relaxed or tensionless condition both laterally and longitudinally and subjecting it, while in such relaxed or tensionless condition, to a steaming operation for the purpose of shrinking the same while at the same time advancing it to the dry steaming drum and winding apron in an unstretched condition so that the dry steaming finishing operation is performed upon cloth that has already been shrunk and which therefore needs no further shrinking after the finishing operation which succeeds the shrinking.

In addition to devising this new method of treating the cloth I have provided simple and effective means by which the entire process can be economically and quickly performed.

The apparatus for carrying out my improved process is illustrated in the accompanying drawings, in which:

Fig. 1 is an end elevation of a cloth finishing machine showing so much of the apparatus as is necessary to an understanding of the means employed for doing this work.

Fig. 2 is a plan view of the machine shown in Fig. 1, the middle portion of the machine being broken out to permit illustration upon a clear scale.

Fig. 3 is a detail view showing a cross section of the conveyor trough shown in Fig. 1 and Fig. 2.

Fig. 4 is an end elevation showing a modified form of the apparatus in which the cloth is conveyed in a tensionless condition by means of a carrier belt before being deposited upon the dry steaming cylinder.

Fig. 5 is a detail view showing in front elevation the feeding rolls which serve as a means for collapsing the cloth laterally or west-wise.

Fig. 6 shows still another modification of means for supporting and advancing the cloth in a collapsed or tensionless condition.

It is of course well known that textile fabrics, whether woven or knitted, will shrink with the application or absorption of moisture. In the practice of the present invention such fabric, instead of being fed and delivered under tension to the dry steaming drum or cylinder, is provided with feeding and conveying means by which the cloth is advanced in such a collapsed condition, free from tension in any direction, that there is nothing to interfere with the shrinking of the cloth on its way to the steaming drum. This collapsing or relaxing of the cloth may be accomplished in several ways, some of which will now be explained.

The apparatus shown in Fig. 1 and Fig. 2 embodies a cloth steaming drum, a winding apron and an exhaust pump cooperatively associated after a manner well known in this art to permit the winding upon the drum of a piece of cloth in conjunction with an apron, so that they are wound in successive coils or layers upon a perforated drum into whose interior is introduced dry steam under pressure for a comparatively short period of time, after which air is drawn through the coils to extract the moisture and thereafter the rotation of the drum is reversed. The cloth and the apron, respectively, are wound upon separate winding rolls.

In the drawings there is provided a suitable framework A for supporting the various parts, including the revoluble perforated steaming drum 1, the apron supply roll 2 and the exhaust pump 3 in accordance with the usual practice.

A steam supply pipe 4 is provided with a branch connection 5 leading to hollow head 5^a. This hollow head also affords passage to the interior of the drum of the air exhaust pipe 6 which leads to the vacuum pump 3. A manually controllable valve 5^b serves to admit and cut off the supply of steam to the interior of the drum after the dry steaming operation.

The drum is driven by suitable connections with the power shaft 10 and the apron-winding roll 2 is also driven from the power shaft.

A pedal 9 serves to control the forward or winding clutch and belt tightener 8 controls the unwinding or reversing clutch, as is usual, since the steaming drum and the apron roll must be reversed to permit the unwinding of the apron and the cloth from the steaming drum and the rewinding of the apron on its roll 2. These arrangements are well known practice in the art and need no detailed description of the parts. The lever controlled belt tensioning pulley 8 is used for tightening and loosening the driving belt of the apron rolls and a pair of slotted brackets 7 receive the journal of the cloth winding roll which rests upon an apron guide roll 2^b over which the apron 2^a passes to and from the steaming drum.

The cloth x supported on a platform or other support at the front of the machine passes up around the tensioning and smoothing rolls 13 to the feed roll 12 which has a friction surface for feeding the cloth and which is driven from the power shaft by means of a belt 11, whose action is controlled by a belt tensioning device 19 and its lever 19^a. To maintain the cloth being fed into the apparatus in close contact with its feeding roll 12, a weight roll 13 is mounted in a slotted bracket to rest upon the cloth and press it upon the surface of said feed roll. A stripper 14 serves to strip the cloth from the frictional feed roll 12 and deliver it upon the inclined perforated trough or support 15 which rests above the two or more compartments of a steam chest 16, which is divided by a vertical partition 17. Into this steam chest steam is delivered by means of a branch pipe 18 controlled by a cut-off valve 18^a. The conveyor trough or support 15 is given an inclination so that as the free end of the cloth descends and is deposited upon the upper end of the conveying support, it forms slight folds or transverse wrinkles before it reaches the upturned rear end of the trough, whence the cloth is to be led upward over a delivery roll 20 which is preferably crowned toward the middle and which is driven by means of a belt or preferably sprocket connection 21 leading from the feed roll 12, so that both rolls may feed the cloth at the same rate of travel.

As shown in Fig. 3, the conveyor 15 is concave transversely for the purpose of giving a collapsing tendency laterally to the cloth to remove all tension and leave the cloth in a relaxed condition, both longitudinally and laterally, as it passes over the perforated support and is penetrated by the steam. In its relaxed condition the moistening of the cloth by the steam tends to shrink it in all directions and thereafter the cloth is conveyed to and deposited upon the steaming drum without stretching.

Of course before winding the cloth upon the steaming drum with the apron, it must be threaded by hand through the smoothing rolls 13, the feed roll 12 and its associated weight roll 13, then through the trough 15 at the top of the steam chest, up over the crowned roll 20 and under the weight roll 22, whose journals lie in slotted brackets 23 to permit the roll to be supported on the steaming drum and to lift under successive windings of the cloth and the apron to accommodate itself to increasing diameter of the coiled-on material.

The advance end of the cloth may be fed through the rolls 12 and 13 into the cloth relaxing conveyor and support 15 when obviously it will form wrinkles as it slides down the inclined face of the trough, the feeding continuing until

more than sufficient slack has been provided to allow threading of the cloth by hand around the roller 20 and onto the surface of the drum, there still being enough slack or looseness left in the cloth that lies on the inclined steaming plate so that when the feeding of the cloth is resumed for the purpose of being wound on by the starting of the steaming drum in revolution there is sufficient slackness of the cloth over the steaming chest 16 to facilitate the shrinkage of the cloth resting thereon in its relaxed condition. That portion of the cloth lying between the steaming chest and the guide roller 20 is too short to have any stretching effect upon the cloth, while the slight crowning of the guide roll 20 serves to smooth the cloth without putting it under tension. From that point the gravity of the cloth tends to preserve its tensionless or unstretched condition as it is deposited upon the drum for winding. Furthermore, the steam escaping from the steam chest continues in contact with this portion of the cloth so that it is shrunk to the desired degree in all directions when it is delivered upon the apron that is being wound on the steaming drum with it.

After the cloth has been wound on, the winding may continue for one or two turns to enclose its end in additional coils or windings of the apron and steam is then admitted through the valve 5^b for such length of time as may be required in the judgment of the operator to accomplish the desired dry steaming or finishing of the fabric.

Thereafter the vacuum pump is set in operation to draw the external air through the coiled-on windings of cloth and apron until the cloth has reached the desired degree of coolness and dryness.

Following the usual practice, the apron is unwound to expose the outer end of the cloth, which is then attached to a rewinding roll which rests upon the guide roll 2^b. The apron winding roll is then set in operation to rewind the apron on its roll 2, while at the same time winding the cloth on the cloth winding roll.

Various means may be employed for conducting the cloth in a longitudinally and laterally collapsed or loose condition to the delivery roll, whence it is deposited upon the steaming drum, and a modified arrangement for accomplishing the same purpose is shown in Figs. 4 and 5. In this case the steaming drum 1, the apron roll 2 and the vacuum pump 3 are of the usual construction mounted in a modified arrangement of frame B to allow the lowering of the drum in order to avoid undue elevation of the cloth feeding and conveying mechanism. In this case the cloth, after having passed over guide and smoothing rolls 30, passes over a driven feed roll 31 which, instead of being in the form of a cylinder, comprises, as shown in Fig. 5, a central shaft with a series of spaced discs thereon, the same being surmounted by a weight roll 32 of similar construction, the disc of the weight roll being offset with relation to the discs of the driving feed roll. In this way the feed rolls themselves are caused to collapse the cloth laterally by producing longitudinal wrinkles.

To produce the transverse wrinkles in order to relieve any longitudinal tension on the cloth, there is provided an oscillating vibrator 33 over which the cloth passes which is oscillated through a small arc by means of a connecting rod 34 attached to an eccentric pin on the feed roll 31. This imparts undulations or transverse

wrinkles in the cloth which has already been relieved from any lateral stress by its lateral contraction when passing through the rolls 31, 32. From the plicator 33 the cloth in its collapsed condition is deposited upon a travelling belt 35, which passes over the driving roller 36 and around idler rolls 37, the travel of the belt being regulated to correspond with the surface speed of the delivery roll 45.

10 This endless belt passes through a steam chest 41, which is supplied by a branch steam pipe 40, as in the form shown in Fig. 1.

To prevent adhesion of the cloth to the travelling belt that might in any way interfere with its complete shrinkage when subjected to the steam in its travel, there is provided a series of rotary beaters 39 driven from the apron roller 36 by means of belt or sprocket 38, so that when the cloth reaches the delivery roll 45 it has been fully shrunk to the desired degree without being subject to any stretch or tension.

Still another modification accomplishing the same purpose is shown in Fig. 6 in which, instead of the travelling apron 35 shown in Fig. 4, the cloth is deposited upon a series of closely arranged revolving carrier rolls 50, some of which are provided with oppositely turned projecting helical threads so that the threads act to collapse the cloth laterally while allowing a slight sag between consecutive rollers. It is not necessary that all the rollers shall be provided with a helical feed and intermediate rollers 55 may be provided without the helical feed. The rollers are driven from a sprocket driving wheel 53 at the intake end, which is connected with a sprocket on the adjacent end of the first roller 50, whose opposite end is connected by sprocket and chain with the next roller, the sprocket chain connections alternating from side to side so that all rollers travel with a uniform surface speed. It will be understood that this would take the place of the endless belt 35 so that the cloth would pass through a steam chamber corresponding to chamber 41 before passing around the delivery roller 45 for deposit upon the steaming drum.

From the foregoing it will be understood that the features of this invention comprise the feeding of the cloth at a predetermined rate in a

longitudinally and laterally collapsed condition to free it from all tension or stress while at the same time subjecting it to a steaming operation to cause it to shrink in all directions without resistance from tension on the cloth. The second characteristic consists in depositing the cloth, while in its shrunken unstretched condition, upon the steaming drum of a dry steaming cylinder and apron to effect the finishing of the cloth. Third, the various constructions by which this novel mode of treatment is effected is a further feature of this invention.

What I claim is:

1. In a cloth shrinking apparatus the combination of a power driven feed roll, a cloth conducting support comprising an inclined transversely concaved perforated trough, a steam chest upon which the trough is mounted and from which steam is supplied to pass through the perforations and penetrate the cloth travelling over it, and means for drawing the cloth from said trough to deliver it in its shrunken condition.

2. In a cloth shrinking apparatus the combination of cloth feeding means, an inclined foraminous transversely concaved cloth conducting support arranged to receive the cloth from the feed roll and conduct it away from the feed roll by force of gravity, the support having an upturned lower end against which the cloth abuts during its movement, and steam supply means for directing steam through the foraminous support to penetrate the cloth in a loose relaxed condition and cause it to shrink.

3. In a cloth shrinking apparatus the combination of a pair of spaced feeding means for the cloth, the cloth between the feeding means being in the form of a relatively deep downwardly hanging loop, an inclined foraminous cloth conducting support arranged below the feeding means to contact and support the loop of cloth through part of its travel from one of the feeding means to the other, a support having an upturned lower end which contacts the cloth passing over the support to effect transverse wrinkles in the same, and means for directing steam through the foraminous support to penetrate the wrinkled cloth to cause the same to shrink.

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