April 27, 1948. A. G. HILL 2,440,400

MEANS FOR CONDITIONING TEXTILE FIBERS

Filed Oct. 1, 1945 2 Sheets-Sheet 1

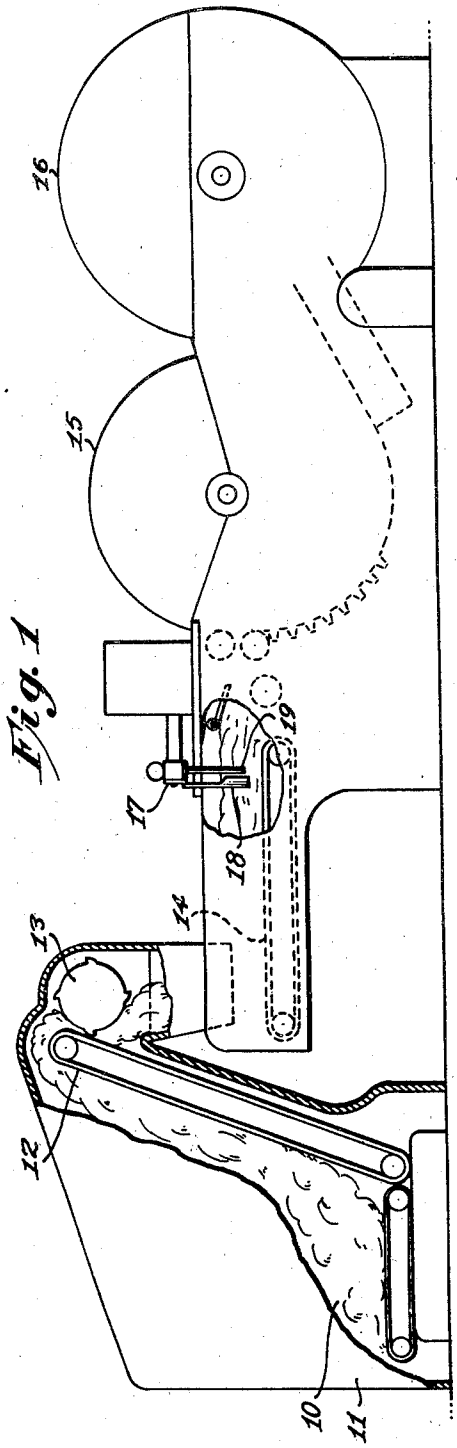


Fig. 1

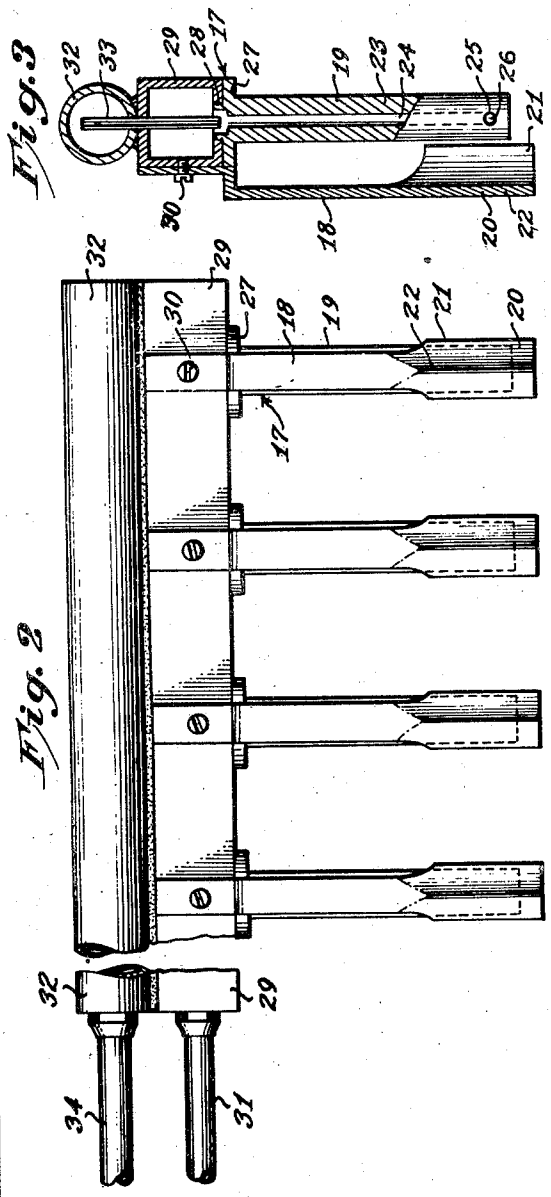


Fig. 3

Fig. 2

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Fig. 4

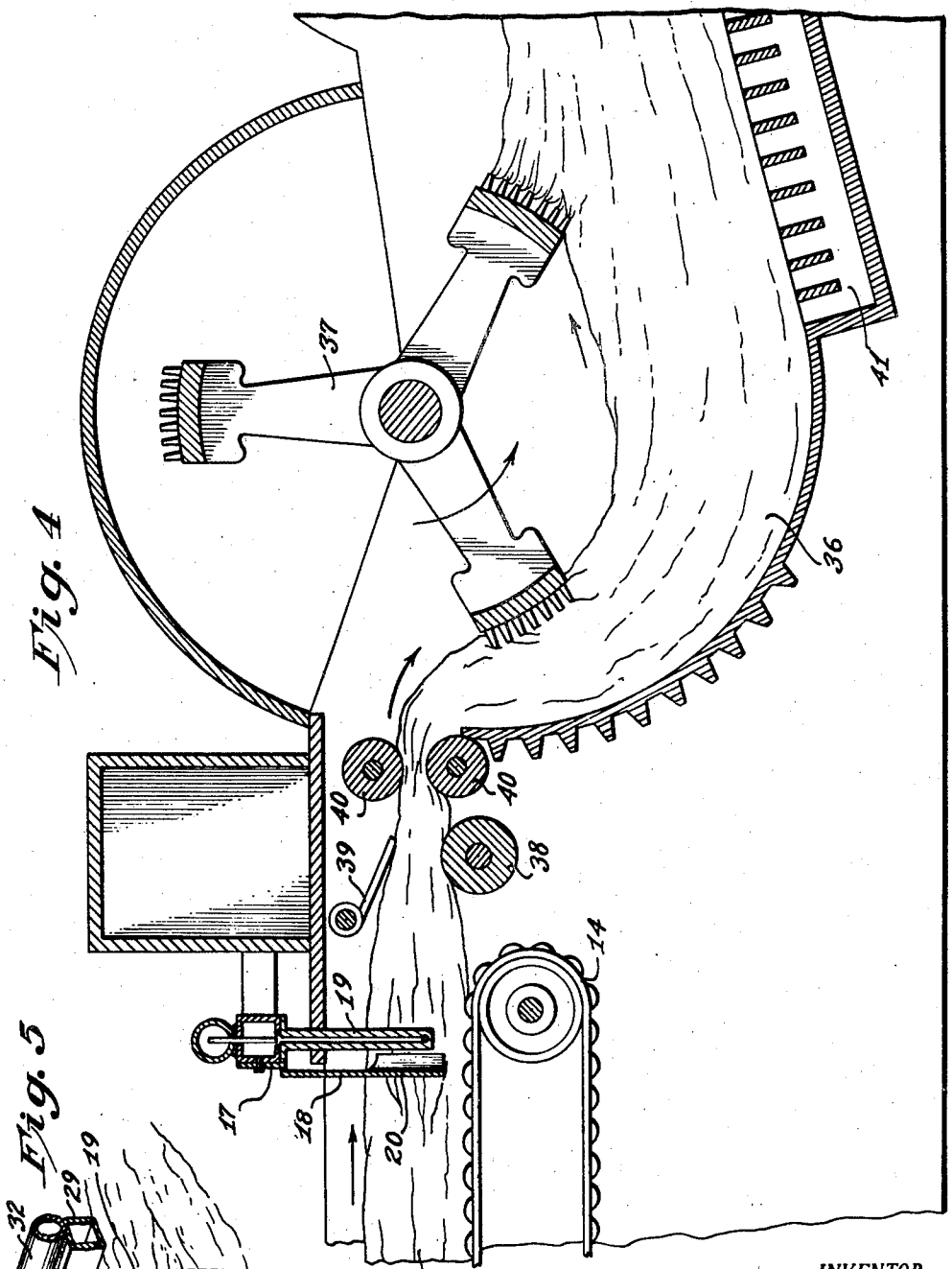
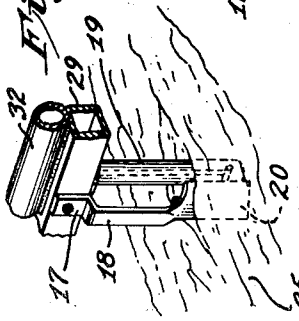


Fig. 5



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MEANS FOR CONDITIONING TEXTILE FIBERS

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4 Claims. (Cl. 19—66)

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This invention relates to the conditioning of textile fibers to render them more easily worked, or to provide for identification of the fibers as with a fugitive tint, and for similar purposes.

This is a continuation-in-part of my copending application Ser. No. 550,082, filed August 18, 1944.

It is common practice in the processing of textile fibers to apply a conditioning liquid such as an oil or a dye to the fibers at certain processing stages. The oil serves to lubricate the fibers, making them more easily worked in the various mechanical treatments such as picking, beating, carding and spinning, to which the fibers are commonly subjected during processing. Dyes are often used in a similar manner to apply a fugitive tint as a means of identifying one type of fiber from another at the various stages of processing; the dye being later removed, after it has served its purpose as an identification means.

In the prior practices, the above mentioned oil or dye, or both, has been applied to the cotton fibers in several different manners, for example by spraying the liquid oil or dye onto the surface of the fibers, either at the initial "opener" or beater stage, or at the later stages in the series of operations mentioned above. Likewise, it has been proposed heretofore to apply the oil or dye in drip or liquid form, as distinguished from an atomized vapor form, following the carding of the fibers, and especially at the point where the fibers are condensed and pass through the device known as a "trumpet."

The well recognized objections to the spray or atomized type of application on the surface of the fibers is that it does not provide uniform distribution of the liquid throughout the inner body of the mass of fibers; also, the oil so applied on the surface of the fibers is picked up by the various machinery parts and results in collecting and sticking of the fibers on these parts and generally interfering with the machinery, which requires repeated cleaning thereof and, often, shut-downs of the operation.

When it is attempted to apply the oil or dye liquid at the trumpet, it has been found that this type of application also is not satisfactory. The principal reason is that the cotton fibers which come from the carding rolls and converge into the trumpet are in the form of an extremely thin, practically veil-like sheet or film of the fibers and, as such, are not receptive to any substantial application of the liquid between the carding roll and the trumpet. If one attempts to overcome this difficulty by injecting the liquid well into

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the trumpet itself, as proposed in some of the prior art patents, it is found that this is entirely impractical, in view of the relatively very small opening in the trumpet, which is smaller than a lead pencil, and through which the converging thin band of fibers must pass. Within these very close restrictions, it is not feasible to apply the oil or dye liquid satisfactorily.

According to my above mentioned copending application the various disadvantages and limitations of prior practices are overcome by introducing the conditioning liquid interiorly of the textile fibers at the thick lap stage. That is, the conditioning liquid is introduced into the inner body of the mass of fibers at suitable stages prior to the carding machines, such as the picker or beater stages where the fibers are moving forward in the form of a lap of substantial thickness.

In cotton mill practice the raw stock cotton is first passed from a hopper to an opener which functions to open up and spread out the bulk or mass of cotton fibers and dispose them on a conveyor in the form of a heavy lap. The fibers are subjected to further mechanical treatment in heavy lap form in succeeding picking and beating operations. It is at these preliminary stages of treatment of the fibers that the conditioning liquid is interiorly applied in accordance with my above mentioned copending application.

The system of applying conditioning liquid to textile fibers as disclosed by my above mentioned copending application has proved effective in obviating the objectionable features heretofore encountered when surface application of the conditioning liquid was employed. But because the conditioning liquid is applied according to my copending application at a stage when the textile fibers are disposed in a heavy lap, difficulty has been experienced in obtaining fully adequate distribution of the conditioning liquid through the fibers. The applicator members which are used according to my copending application depend on wiping action to apply the conditioning liquid. This wiping action tends to localize the application of conditioning liquid, and furthermore does not insure a positive transfer of conditioning liquid from the applicator into the moving lap.

I have now found that the advantages of interiorly applying the conditioning liquid at the heavy lap stages while at the same time substantially improving the uniformity of distribution of the conditioning liquid can be obtained by parting the lap of fibers transversely with respect to its width as it moves forward in heavy lap

form and introducing or depositing the conditioning liquid interiorly of the lap of fibers at the point of parting. After application of the conditioning liquid in this manner, the parted fibers may then be allowed to close and continue through the processing operation in lap form in the usual manner. My invention is particularly adapted for treatment of cotton fibers and for convenience is described generally in terms of its application to such fibers, but it will be understood as generally applicable in similar manner to other textile fibers.

The conditioning liquid applicator member is adapted according to the present invention to effect both the parting of the lap of fibers and depositing of the conditioning liquid. For this purpose, the applicator member comprises a parting element positioned to extend well into the inner portion of the lap of fibers so that it parts the lap as it moves forward, and a depositing element positioned beyond the parting element with respect to the path of travel of the moving lap of fibers and adapted to extend into the part formed in the lap of fibers and direct the introduction of conditioning liquid interiorly of the lap of fibers at the point of parting. As the above mentioned parting element does not extend entirely through the lap of fibers, the part which it effects in the lap forms in effect a pocket which is well adapted to receive the deposit of conditioning liquid for distribution through the surrounding fibers. Moreover, an arrangement of this sort has the advantage of providing positive transfer of the conditioning liquid from the applicator member to the lap of fibers.

The depositing elements may be adapted to supply the conditioning liquid to the lap of fibers drop-wise if desired; the interior application of the conditioning liquid obviating the objectionable features of methods heretofore in use for surface application of conditioning liquid dropwise. In the preferred form of my invention, however, as illustrated in the drawing, the depositing element takes the form of a spray element adapted to atomize the conditioning liquid and apply it to the lap of fibers at the point of parting in spray form. To accomplish this result, suitable air connections are made to the applicator member as shown in the drawing.

My invention is illustrated in the accompanying drawing in which:

Fig. 1 is a diagrammatic view of a cotton opener and associated initial beater chambers;

Fig. 2 is a front elevation illustrating the disposition of the preferred form of applicator members used for applying the conditioning liquid;

Fig. 3 is a vertical section through one of the applicator members;

Fig. 4 is an enlarged detail corresponding to Fig. 1 and showing the beater chamber more in detail; and

Fig. 5 is a perspective view illustrating the manner in which the moving lap of textile fibers is parted and deposited with conditioning liquid by the applicator members.

As illustrated in Fig. 1, the raw stock cotton 10, contained in the housing 11, is first processed by being conveyed upward and over the opener belt 12 and is roughly formed into a thick lap of fibers as it passes between the belt 12 and the doffer rolls 13. The resulting thick lap of fibers is then deposited on the conveyor belt 14, which conveys it to the beater chambers 15 and 16. While the lap is moving between the opener and first beater chamber 15, the conditioning liquid may be applied effectively according to the present invention through the applicator members indicated at 17 in Fig. 1. It is noted particularly that the lap of fibers in this initial stage is of substantial thickess. In common practice this lap will be about four to six inches thick and about forty inches in width; and as described more in detail below the applicator members 17 are positioned to project into the body of this lap toward the center portion and deposit the conditioning liquid interiorly of the lap of fibers as it moves forward on the conveyor 14 to the beater chambers 15 and 16.

The applicator members 17 are illustrated more in detail in Figs. 2 and 3. As previously noted, they comprise a parting element 18 and a depositing or spray element 19. The parting element 18 consists essentially of an extending bracket which is formed at its free end with a plow-shaped portion 20 to perform the parting function. The plow-shaped portion 20 is formed with symmetrically disposed angled flanges 21 which meet at a point 22 to part the lap of fibers evenly, and corresponds in length to the depth of insertion of the parting element 18 into the moving lap of fibers so that a parting effect is accomplished throughout the depth of insertion.

The depositing element 19 is associated with the parting element 18 to effect transfer or introduction of the conditioning liquid into the lap of fibers at the point of parting. For this purpose, the depositing element 19 is positioned beyond the parting member 18 with respect to the path of travel of the moving lap of fibers on the conveyor 14, and is adapted to extend into the part formed by the plow-shaped portion 20 of the parting member 18 and direct the deposit of conditioning liquid interiorly of said moving lap at the point of parting. As illustrated in the drawing, the depositing member 19 comprises a tubular stem portion 23 having an internal channel 24 which terminates in a lateral channel 25 opening (as 26 in Fig. 3) at either side of the free end of the depositing element 19. At its fixed end the depositing element 19 is provided with a suitable shoulder 27 formed with a threaded portion 28 for attachment to a fixed support.

According to the preferred form of the present invention for spray application of the conditioning liquid as illustrated in the drawing, the depositing element 19 is attached by means of the above mentioned threaded portion 28 to an air manifold 29. Likewise, the parting element 18 may be supported from the air manifold 29 as at 30. The air manifold 29 consists of a closed chamber, as shown in the drawing, extending in a length sufficient to accommodate the number of applicator members 17 used in a particular instance, and fitted with a suitable air supply connection as at 31.

Conditioning liquid is supplied from a second manifold 32 associated with the air manifold 29. Tubular supply channels 33 are positioned to extend from the conditioning liquid manifold 32 through the air manifold 29 to a position closely adjacent the fixed end opening of the internal channel 24 of the depositing element 19. The conditioning liquid manifold 32 is also fitted with a suitable supply connection as at 34.

In operation, conditioning liquid is maintained in the manifold 32 at a level sufficient to allow an adequate supply through the supply channels 33, and air is supplied under pressure to the

manifold 29 so that a draft is created around the extending tip of supply channels 33, which causes the conditioning liquid to issue from the channels 33 in atomized form. The atomized conditioning is then carried into the internal channel 24 of the depositing element 19 and issues at the extending end of the element 19 through the openings 26 of the lateral channel 25 as a spray directed interiorly of the lap of fiber at the point of parting effected by the parting element 18. This arrangement results in an initial general distribution of the conditioning liquid throughout the pocket formed by the parting element 18 in the lap of fibers, and substantially facilitates the application of the conditioning liquid.

As previously mentioned, the air manifold 29 and associated means for atomizing the conditioning liquid may be omitted if desired, and the conditioning liquid may be introduced drop-wise in the lap of fibers. In such a case it is usually advantageous to arrange a number of points of issue (not shown) at the extending end of the depositing element 19 so as to divide the flow of conditioning liquid and avoid undue localization of its application to the lap of fibers.

In any event, a relatively large number of applicator members 17 should be employed, spaced across the width of the moving lap of fibers. The arrangement of applicator members 17 in this manner is illustrated in Fig. 2. In practice, I have found that a spacing of about 2" for the applicator members 17 gives good results.

The relative operative disposition of the applicator members 17 is further illustrated in Fig. 4 which shows the initial beater chamber 15 more in detail. The lap of fibers is shown proceeding through the equipment at 35, and as indicated is of substantial thickness at this stage, usually at least 4" to 6". The applicator members 17 are positioned to extend well into the inner portion of the lap of fibers 35, so that the parting element 18 effects a parting of the lap 35 transversely with respect to its thickness as it moves forward. The actual parting is accomplished by the plow-shaped portion 20 of the parting element 18 which, as shown in Fig. 4, extends into the lap 35 and is generally oriented with respect to the thickness of the lap so that the angled flanges 21 of the plow-shaped portion 20 effect a parting transversely with respect to the thickness of the lap. The manner of parting is perhaps best shown in Fig. 5 which is a fragmentary illustration in perspective of an applicator member 17 extending into the lap of fibers 35. The plow-shaped portion 20 of the parting element 18 and the free end of the depositing element 19 are indicated in dotted lines.

The depositing element 19 is positioned beyond the parting element 18 with respect to the path of travel of the lap of fibers 35, and adapted to extend into the part formed in the lap 35 and direct, as described above, the application of the conditioning liquid interiorly of the lap at the point of parting, either in spray form or drop-wise as desired. The subsequent beating and condensing operations on the fibers cause the conditioning liquid thus applied to be distributed generally throughout the lap of fibers 35, but at the same time avoiding any free, unabsorbed excess of the conditioning liquid on the surface of the fibers, which would result in the contamination of the machinery as mentioned above.

The lap of fibers to which the conditioning liquid has been applied is indicated in the beater

chamber 15 in Fig. 4 at 36. These fibers 36 are beaten up in this chamber by the rotor 37. Other conventional parts of the processing equipment are illustrated in Fig. 4, and include the previously mentioned belt conveyor 14; guide roll 38 and presser member 39 for leveling and condensing somewhat the lap of fibers 35 as it passes to the beater chamber 15; two further guiding and condensing rolls 40, and a grill 41, or other suitable device, for removing the foreign matter and fine fiber beaten out in the beater chamber 15. The thus conditioned lap of fibers 36 passes from the beater chamber 15 into any desired additional number of beater chambers and is then conveyed, either continuously or in roll lap form, to a carding machine where the conditioned fibers are then carded in conventional manner and finally drawn and spun into continuous fibers for weaving, all as commercially practiced in the textile art.

One of the important features of the method of my invention is the application of the conditioning liquid at a stage preceding the carding machines, and thereby avoiding the disadvantageous and serious limitations of any practical application of a liquid to the carded or drawn fibers. By applying the conditioning liquid at one of the preliminary stages, and especially at the interior of a thick lap of the fibers and at a relatively very large number of locations in the moving lap of fibers, thorough and effective tinting or oiling or other processing of the fibers is obtained. The practicability and effectiveness of this application has definitely been found not to be obtainable at the later stages of processing of the cotton fibers, especially following the carding operation.

While, as illustrated in the drawings, the application of the liquid in accordance with my invention may be effected at several different locations in the preliminary operations, it is important to the practical benefits of my invention that all applications be made in a lap of substantial thickness, such as 4" or more in thickness. It is likewise important that the applications be made at a plurality or series of points across the width of the moving thick lap of fibers.

The conditioning liquid can be caused to flow to the applicator members 17 by gravity from an overhead supply tank, not shown in the drawings, or any other suitable conventional means. The supply equipment may also include, if desired or found necessary, a pump for forcing the conditioning liquid through the various applicator members 17. Such equipment is not illustrated in the drawings since various arrangements for supplying the liquid to the applicator members 17 may be utilized.

I claim:

1. A system for applying a conditioning liquid to textile fibers comprising, in combination with textile processing equipment, such as pickers or beaters, in which the textile fibers are disposed in a moving lap of substantial thickness, a plurality of applicator members arranged in said textile equipment for applying the conditioning liquid to the moving lap, said applicator members comprising a parting element positioned to extend well into the inner portion of a moving lap disposed in said textile equipment and adapted to part said moving lap transversely with respect to its thickness, and a depositing element positioned beyond said parting element with respect to the path of travel of said moving lap and adapted to extend into the part formed in said moving lap by said parting element and direct a deposit of

conditioning liquid interiorly of said moving lap at the point of parting.

2. A system for applying a conditioning liquid to textile fibers comprising, in combination with textile processing equipment, such as pickers or beaters, in which the textile fibers are disposed in a moving lap of substantial thickness, a plurality of applicator members arranged in said textile equipment for applying the conditioning liquid to the moving lap, said applicator members comprising a parting element formed with a plow-shaped portion positioned to extend well into the inner portion of a moving lap disposed in said textile equipment and adapted to part said moving lap transversely with respect to its thickness, and a spray element positioned beyond said parting element with respect to the path of travel of said moving lap and adapted to extend into the part formed in said moving lap by said parting element and direct an atomized spray of conditioning liquid interiorly of said moving lap at the point of parting.

3. A system for applying a conditioning liquid to textile fibers comprising, in combination with textile processing equipment, such as pickers or beaters, in which the textile fibers are disposed in a moving lap of substantial thickness, an applicator arranged in said textile equipment for applying the conditioning liquid to the moving lap, said applicator comprising a parting element positioned to extend well into the inner portion of a moving lap disposed in said textile equipment and adapted to part said moving lap transversely with respect to its thickness, and a depositing element positioned beyond said parting element with respect to the path of travel of said moving lap and adapted to extend into the part formed in said moving lap by said parting element and

direct a deposit of conditioning liquid interiorly of said moving lap at the point of parting.

4. A system for applying a conditioning liquid to textile fibers comprising, in combination with textile processing equipment, such as pickers or beaters, in which the textile fibers are disposed in a moving lap of substantial thickness, an applicator arranged in said textile equipment for applying the conditioning liquid to the moving lap, said applicator comprising a parting element formed with a plow-shaped portion positioned to extend well into the inner portion of a moving lap disposed in said textile equipment and adapted to part said moving lap transversely with respect to its thickness, and a spray element positioned beyond said parting element with respect to the path of travel of said moving lap and adapted to extend into the part formed in said moving lap by said parting element and direct an atomized spray of conditioning liquid interiorly of said moving lap at the point of parting.

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