April 27, 1948. A. G. HILL 2,440,399

MEANS FOR CONDITIONING TEXTILE FIBERS

Filed Aug. 18, 1944 2 Sheets-Sheet 1

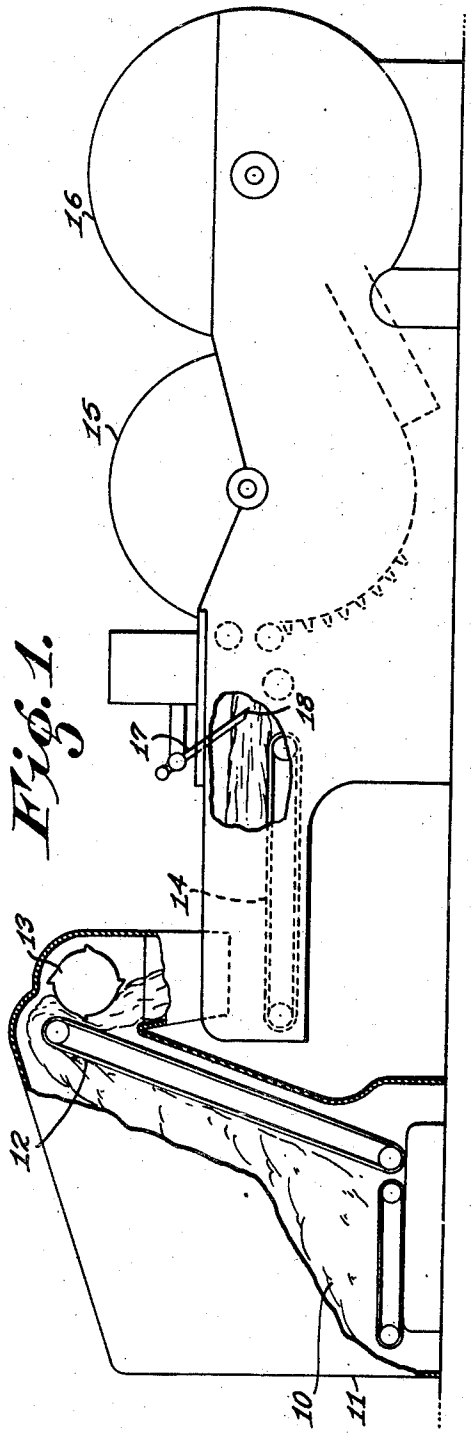


Fig. 1.

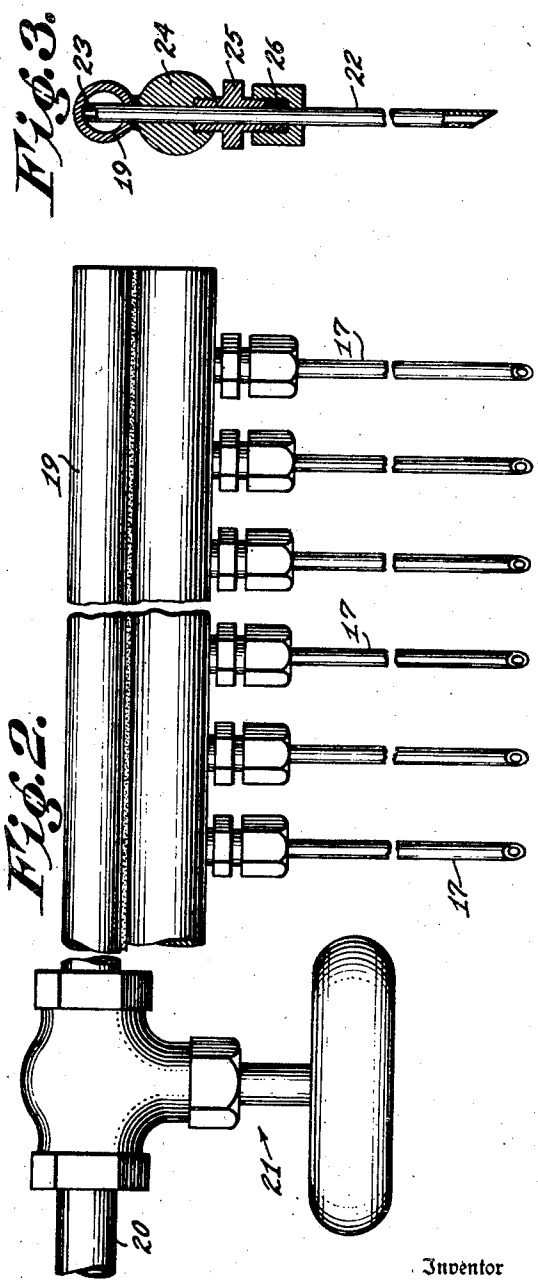


Fig. 2.

Fig. 3.

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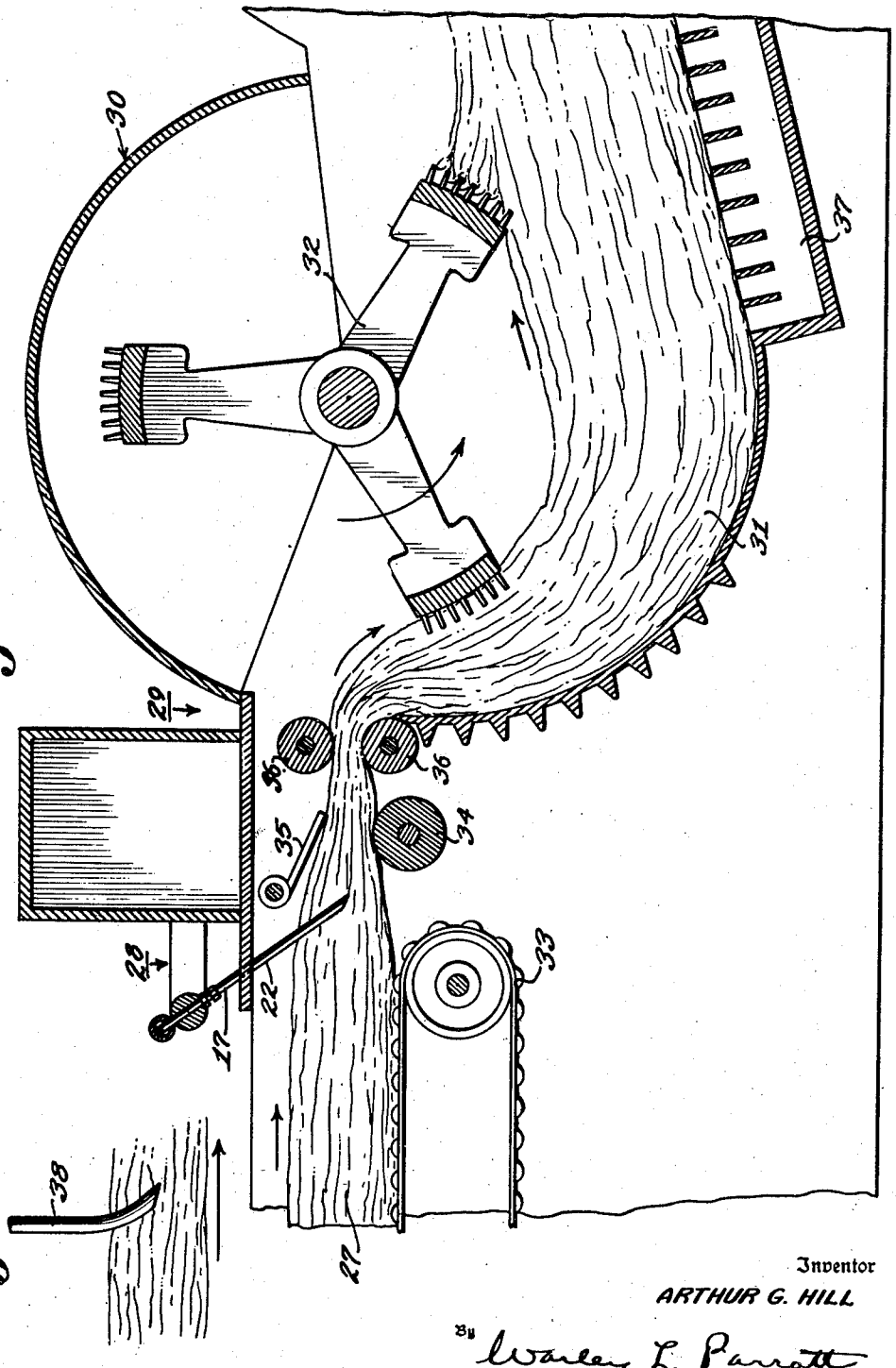


Fig. 4.

Fig. 5.

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MEANS FOR CONDITIONING TEXTILE FIBERS

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2 Claims. (Cl. 19—66)

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In the conditioning of textile fibers it has been common practice to apply oil or dye, or both, to the fibers at certain processing stages. The oil serves to lubricate the fibers, making them more easily workable in the various mechanical treatments, such as the picking, beating, carding and spinning operations commonly carried out on cotton fibers in a cotton mill. For purposes of applying a fugitive tint that identifies one type of fiber from another, dye has also been applied to the fiber at these various stages of manufacture; this dye or tint 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 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 oil or dye liquid satisfactorily.

Now, in accordance with my present invention, I have, through extensive research in this field, and after satisfactory practical applications, overcome the various disadvantages and limitations of the prior practices outlined above. In accordance with my invention, I avoid any surface application of the liquid and, instead, introduce the liquid into the interior, approximately at the center, of the textile fibers at the thick lap stage. In other words, I apply the liquid oil or dye in the inner body of the mass of fibers at suitable stages prior to the carding machines and subsequent operations. My applications therefore include introducing the liquid into the cotton or other fibers at the picker or beater stages, where the fibers are moving forward in the usual manner and in the form of a lap or blanket of substantial thickness.

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As well known to those skilled in cotton mill practice, the raw stock cotton is first passed from a hopper over an "opener," which functions to open up and spread out the bulk or mass of cotton fibers and deploy them on a conveyor in the form of a heavy lap. A similar and somewhat more refined production of a heavy lap or blanket of these fibers is also produced following the beater chambers in the initial and intermediate stage "picker" machines. It is at these preliminary stages of treatment of the textile fibers that I have found application of the liquid, in the particular manner of my invention, to be most effective.

For a clear understanding of the principles of my invention and application thereof to conventional cotton mill machinery, reference is made to the accompanying drawings in which:

Fig. 1 is a somewhat diagrammatic view of a cotton opener and initial beater stage of the first picker;

Fig. 2 is a front view of the applicator device for applying the liquid;

Fig. 3 is a more detailed sectional view of one of the applicator devices;

Fig. 4 is a sectional view, somewhat diagrammatical, of a portion of the equipment in the picker machine, and showing more in detail one of the beater chambers; and

Fig. 5 is a fragmentary side view illustrating one of the applicator devices imbedded in the body of the moving mass or lap of fibers.

In the following description relative to the accompanying drawings, the fibers will be identified as cotton fibers, but it is understood that the invention is applicable in similar manner to various other forms of textile fibers, including rayon and other artificial silk fibers. Also, in the following specific description, the liquid which is applied to the fibers is identified, for the sake of brevity and convenience, as a dye for dyeing or tinting the fibers. It is understood, of course, that oil or other processing liquids may be applied in similar manner.

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 formed roughly into a thick lap or blanket of fibers as it passes between the belt 12 and the doffer roll 13. The resulting thick layer of fibers is deposited on the conveyor belt 14, which conveys it to beater chambers 15 and 16 of the first picker. While the lap is moving between the opener and the first beater chamber 15, the dye may be applied through the applicator tube diagrammatically shown at 17. It is to be noted particularly that the mat or lap of fibers at this initial stage is of substantial thickness. In common practice, this lap will be about 4" to 6" thick and about 40" in width; and the applicator 17 projects downward into the body of this lap towards the center portion thereof and applies the dye in liquid form to the fibers as they pass by this applicator and in wiping contact with the discharge end of the applicator.

The applicator tube is inserted into the fibers at an angle, for the purpose of conforming with the flow of the fibers and without disturbing or disrupting the fibers, as might occur if the applicator end of the tube terminated at right angles with the moving fibers. The liquid delivery end 18 of the tube is slanted to provide efficient wiping contact with the fibers.

In commercial practice, I have found it advantageous to utilize a plurality or a relatively large number of the applicator tubes 17, located in spaced relationship across the width of the moving lap. In one illustrative but non-limiting embodiment, I have placed these applicator tubes approximately 2" apart, which requires approximately 20 tubes for a 40" width lap. A plurality of these applicator tubes, mounted in spaced relationship and connected to a supply manifold of the dye is illustrated in Fig. 2. The manifold is shown at 19 and is connected to a supply pipe 20 and a gate valve, indicated generally at 21.

Details of the applicator tube are illustrated more clearly in the sectional view in Fig. 3, in which it will be noted that the tube comprises a tubular stem portion 22, which extends adjacent the top of the manifold tube 19, and has a slot 23 which forms the entrance for the liquid dye into the tubular stem 22 in the manifold tube 19. As shown, the manifold tube 19 is rigidly supported on, or formed integrally with a supporting bar 24. Attached to the supporting bar 24 and surrounding the tubular stem 22 is a nipple 25, provided with a conventional packing gland 26, to prevent any leakage of the liquid dye about the exterior of the stem 22.

Another and later stage of application of the dye to the cotton lap is illustrated in Fig. 4, which shows a portion of the equipment used in an intermediate or final picker. The cotton lap or mat, which has received some preliminary beating and conforming, is illustrated at 27, and it is important to note that even at this later stage the lap is still of substantial thickness, for example 4" to 6" thick, and is of the same 40" width mentioned above. In actual practice, I have found it advantageous to apply the dye or other liquid at the particular stage indicated generally at 28, of processing of the cotton fibers. Application of the dye is illustrated by the dye applicator 17, the hollow stem portion of which extends down into the center body portion of the lap of fibers 27 just before the lap is condensed for feeding into the beater chamber. In some respects, it is more practical to apply the dye at the location indicated generally at 28 in Fig. 4, where the space limitations for installation of

the applicator devices 17 are considerably less strict than they are immediately adjacent the beater chamber or just inside of the entrance to the beater chamber, as indicated generally at 29. At any of the chosen stages, the stems 22 of the plurality of dye applicators project well into the body of the moving fibers and apply in drip form the liquid dye to the interior of the fibers. The subsequent beating and condensing operations on the fibers cause the dye thus applied to be distributed fairly generally throughout the lap of the fibers, but at the same time avoiding any free, unabsorbed excess of the dye on the surface of the fibers, which would result in the contamination of the machinery as described above.

The beater chamber in Fig. 4 is indicated generally at 30, and the mass of fibers shown at 31, to which the dye has been applied, are beaten up in this chamber by the rotor 32. Conventional parts of the picker machinery are illustrated in Fig. 4 and include the belt conveyer 33, guide roll 34, a presser member 35 for pressing somewhat and leveling the lap of cotton fibers; two guide rolls 36 and a grill, or other suitable device 37 for removing the foreign matter and fine fiber which results from the beating operation in the beater chamber 30.

The thus dyed and otherwise treated lap of fibers 31 passes from the beater chamber 30 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 dyed 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 dye or other 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 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 or blanket 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, and that in each instance the fibers take up or absorb the applied liquid by wiping contact with that liquid, which is applied through the hollow or tubular stem of the applicators.

The liquid can be caused to flow 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 liquid through the various tubular applicators. Such equipment is not illustrated in the drawings since various and sundry arrangement

for supplying the liquid to the tubular applicators may be utilized.

The liquid may be applied through the straight side wall type of tube 17, illustrated in Figs. 1–3, which is inserted into the lap of fibers at an angle. Or it may be applied through the modified type of tube shown at 38 in Fig. 5 and which has the bottom portion of the tube slightly bent in the direction of flow of the fibers.

Some of the novel features of my invention are set forth in the appended claims.

I claim:

1. In appparatus for treating textile fibers, a beater, means for conveying a relatively thick lap of the textile fibers to said beater, at least one applicator for applying liquid to the moving lap of fibers, said applicator being located above said conveyor means and at a position ahead of said beater, said applicator extending at an angle well down into the relatively thick lap of fibers so that it effects wiping contact with the inner fibers of the lap for applying treating liquid thereto and before the lap enters said beater.

2. In apparatus for treating textile fibers, a beater, means for conveying a relatively thick

lap of the textile fibers to the beater, a plurality of spaced applicators positioned transversely of said lap and at a location between said conveying means and said beater, said applicators penetrating said relatively thick lap to approximately the center thereof for applying treating liquid through said applicators to the inner fibers of said lap by wiping action of the fibers on the innermost end of said applicators before said lap enters said beater.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
288,465	Mathews	Nov. 13, 1883
1,973,761	Hill	Sept. 18, 1934
2,003,935	Howard	June 4, 1935
2,019,079	Herring	Oct. 29, 1935
2,115,218	Siever	Apr. 26, 1938
2,229,566	Hill	Jan. 21, 1941
2,296,035	Hill	Sept. 15, 1942