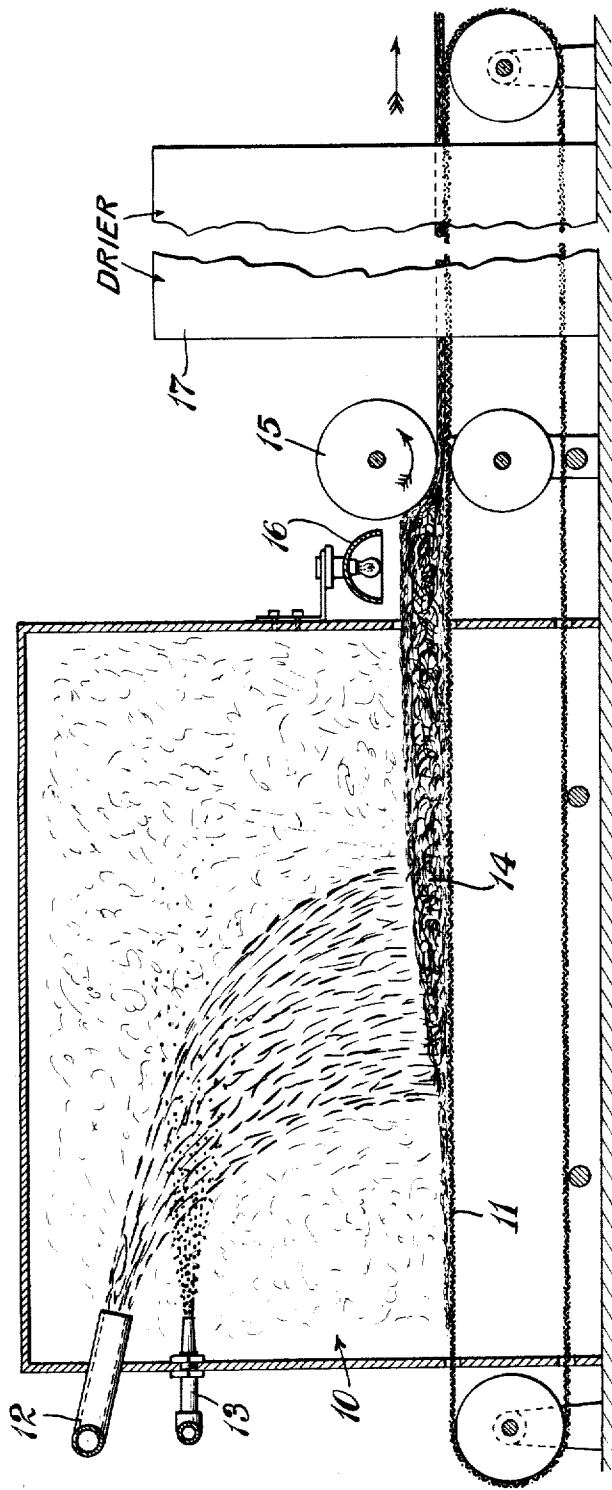


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FORMING FIBROUS FELTS

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FORMING FIBROUS FELTS

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This invention relates to improvements in method of and apparatus for forming felts.

In forming felts of vegetable fibers for insulation or other uses where liquid material is intermixed with the fibers during or after the deposition of the fibers on a forming base, such as a wire screen, the mass of fibers laid down may require passage beneath a compression roll for compacting the fibers to increase the interfelted thereof and reduce the mass to the desired thickness. The compressed felt then usually passes through a drying chamber after which it is removed from the screen for such additional finishing operations as may be required, depending on its intended uses. The liquid material commonly used carries adhesive or bonding material, but in some cases such binder is absent and liquid, such as water, is employed in order to secure the desired character of formation.

The fibers may be deposited on the screen in a settling or forming chamber, being blown or otherwise introduced into the air above the screen for suitable deposition, for example, by gravity and sometimes under influence also of a suction box located beneath at least a portion of the screen on which the deposition takes place. The wetting of the fibers with the liquid or the bonding material may be performed by spraying the bonding material into the air-suspended dry fiber above the screen, or by introducing moist fibers, or by introducing fibers and liquid. The lighter the impact of fibers in depositing, the more difficult it is to manipulate the deposited mass of fibers without damage thereto in subsequent operations, particularly in the compression stage. The wet or moist fibers on the screen prior to compression may be interfelted to such a slight degree and possess so little individual rigidity or resiliency, that the mass is not only not coherent or self-supporting, but ruptures readily if lifted from the screen, or if merely disturbed, and offers but the slightest resistance to the tearing away of fibers from the mass. Hence in passing the wet or damp felt or mat under a compression roll, some fibers generally tend to adhere to the roll surface, fouling the roll and necessitating stoppage of the machine.

Since interfelted of the fibers is augmented by the compression of the fluffy fiber mass as the latter passes under the compression roll, the adhesion of superficial fibers to the roll not only roughens the surface of the felt and fouls the roll, but the tearing away of the fibers from the surface of the mat or blanket tends to disrupt the compact relationship of the subjacent fibers

also and thereby deprives the blanket of the desired uniform density which should be imparted to it by the roll. The use of a doctor blade or scraper on the roll does not offer a satisfactory solution of the difficulty since in forming a most satisfactory blanket or felt, it is desirable that the fibers be deposited uniformly to provide a smooth top surface whereby after compression the surface will not only be smooth but the felted mat will be of highly uniform density. A doctor blade to aid in removing the mat from the compression roll may act to agglomerate the fibers removed from the roll, and to add the agglomerates to the mat, giving visible defects.

An object of the present invention is to provide improved method and means for forming felts or blankets by the deposition of fibers on screens or other conveyers.

An additional object of the invention is to provide means for sufficiently reducing the adhesiveness of those fibers only which constitute the upper surface of a mass of deposited fibers, whereby the fiber mass is not only compressible into a well-interfelted blanket of substantially uniform density, but which blanket while moist may be separated from the compressing means without disruption of the interfiber bond and interfelted relationship of the fibers imparted to the mass by the compression means.

The accompanying drawing schematically illustrates structures embodying the improved apparatus for carrying out the novel method.

In the drawing 10 indicates generally a fiber-depositing or felt-forming region or chamber through the lower portion of which passes the upper run of an endless screen 11. Fibers such as ultimate vegetable fibers are introduced into the chamber 10 adjacent the upper end, as by one or more nozzles 12 to which the fibers may be delivered by an air stream from a shredder not shown.

Adjacent the nozzle 12 may be one or more liquid spray nozzles 13 for injecting into the fiber stream a liquid bonding material such as an aqueous starch solution, for example. The sprayed bonding material wets the fibers which deposit in random relation on the screen in a fluffy mass of substantially uniform thickness transversely of screen 11 and at a uniform rate at every location as indicated at the point where numeral 14 designates the mat.

For the purpose of preventing the top fibers of the mass from adhering to the compression roll, indicated at 15, the deposited mass of fibers, upon emergence from the chamber 10, is subjected

to the drying action of a suitable heat source. The drying action affects preferably only the upper surface portions of the fiber mass, that is those superficial fibers which contact the roll, and while not giving a final set to the adhesive on the exposed fibers, the drying action is sufficient to reduce the tendency of fibers to adhere to the roll by reason of their original moist condition. Radiant heat is preferred to limit the drying action to the surface.

A suitable source of heat for the drying of the upper fibers of the mass comprises a bank of incandescent electric bulbs 16 arranged to direct radiant heat upon the subjacent felt as it moves from the chamber 10 to the roll 15. The lamps preferably are of the infra red type because of their relatively high heat emission. The quantity of heat delivered to the fibers can be regulated by controlling the number of lamps and the current to the lamps or by adjusting the lamps vertically with respect to the mat 14. By proper adjustment of the heating apparatus 16 the surface fibers that contact the roll can be quickly dried sufficiently to avoid disrupting the upper surface of the mat caused by adhesion of the wet surface fibers of the mat to the roll. Likewise the superficial fibers of the mat or felt are not dried to the extent that the bonding material thereof has fully set and hence after compression by the roll the fiber mass is self-retaining in the compressed form. In fact the partially dried surface fibers are by the compression brought into more intimate contact with the underlying wetter fibers, whereby liquid may diffuse up to the top layer and re-moisten them to improve the adhesiveness for the final drying. By reducing the tendency of the superficial fibers to adhere to the roll, actual adherence of the superficial fibers to the roll is prevented by the adhesion of them to the lower fibers combined with the pull resulting from interfelting of fibers in the mat structure effected by the compression.

The quantity of heat supplied to the fiber mass for rendering the adhesive of the superficial fibers of the mass effectively non-adherent to the roll, is regulated in accordance with operating conditions, such as the character of the bonding material, the moistened condition of the fibers, the rate of travel of the conveyer screen and other factors. As will be apparent, by adjusting the supply of heat properly to the prevailing conditions in accordance with the present improvements, a sufficient drying or setting of the adhesive occurs on the superficial fibers only to prevent adhesion to the compression roll whereby fouling of the roll is avoided, as well as the tearing away of fibers from the upper surface of the blanket and the disruption of the interfelted relationship and the interbonding of those fibers beneath the top surface of the blanket. By means of the present invention a blanket can be formed having a smooth top surface as well as one wherein the fibers have a relatively uniform interfelted and interbonded relationship. Not only is the maximum density which is imparted initially to the fiber mass by the compression roll substantially preserved, but due to the fact that the initial interfelted relation of the fibers and the interbonding thereof are not disrupted by adherence to the upper fibers to the roll, the completed blanket is relatively high in tensile strength and has high uniformity in resisting breakage due to flexing during handling or use.

After passing from the compression roll 15, the felt may be subjected to further drying, such as

in a drying chamber 17 which, as illustrated, is of known form. Upon emergence from the drying chamber, the felt is removed from the conveyer or screen 11.

The apparatus shown in the drawing is for the purpose of illustrating the principle of the invention and it will be apparent that various forms of apparatus may be employed without departing from the spirit of the invention.

I claim:

1. In combination, means providing a fiber-depositing region, a conveyer passing therethrough upon which fibers are deposited, means for depositing wet fibers onto said conveyer to form a mat, a compression roll positioned to compress said mat of wet fibers deposited on said conveyer, means in advance of said roll for directing heat upon the upper surface of the fibers on said conveyer and motive means for advancing said conveyer at a speed sufficient to permit drying of the superficial fibers of said mat only by said heat directing means to prevent adhesion of the same to the roll.

2. In combination, means providing a fiber-depositing region, a conveyer passing therethrough upon which fibers are deposited, means for depositing fibers onto said conveyer in said region to form a mat, means for wetting the fibers with bonding material, fiber compression means exterior to said depositing means for compressing the wet fibers on the conveyer, and radiant heat generating means above the conveyer and between the fiber depositing region and compression means for drying the superficial fibers only of the mat sufficiently to prevent adhesion of the same to the compression means.

3. In combination, wet-fiber depositing means, a movable conveyer upon which fibers are deposited by said means to form a wet mat, means for compressing the deposited wet fibers of the mat on the conveyer to effect interfelting and interbonding of the fibers, and an infra red light source in advance of said compression means for directing radiant heat of an intensity upon the upper surface of the fibers on the moving conveyer for drying the superficial fibers only sufficiently to prevent adhesion of the same to the compression means.

4. The method of forming a vegetable fiber blanket which comprises depositing fibers moistened with liquid adhesive material upon a conveyer to form a substantially non-coherent fluffy mass, subjecting the top surface of the mass to radiant heat to remove liquid from the superficial fibers only of the mass, passing the mass while rendering the fibers at the top surface of the mat non-adhesive to the hereinafter mentioned compression roll under a compression roll to compress the superficial fibers into bonding relation with the undried subjacent fibers and to reduce the mass to a coherent blanket form of the desired thickness and to effect interfelting and interbonding of the fibers from face-to-face of the blanket so formed, and thereafter drying the entire blanket.

5. The method of forming a vegetable fiber blanket which comprises depositing adhesive moistened fibers upon a conveyer to form a substantially non-coherent mass, passing the mass through a zone of radiant heat generated by a source of infra red light for removing liquid from the superficial fibers only of the mass to reduce the adhesiveness of the superficial fibers to subsequently applied compressing means, applying

compressing means to the superficial fibers to press the same into bonding relation with the moistened subjacent fibers and to compress the mass to a selected density and effect interfelting and interbonding of the fibers from face-to-face of the blanket so formed, and thereafter drying the blanket.

6. The method of forming a fiber blanket which comprises depositing substantially individualized vegetable fibers carrying liquid to render the fibers adhesive into a thick pile in the form of a mat while employing an impact of each fiber on already deposited fibers which impact is substantially that of the fiber falling in air, whereby the fibers at the surface of the mat are poorly felted into the body of the mat and while being adhesive are readily removable vertically from said mat by any contacting member to which the wet and adhesive fibers may adhere, and reducing the thickness of said mat by compressing the said mat while contacting and compressing the upper surface thereof with compressing means to which said liquid-carrying fibers tend normally to adhere, said compression increasing the interfelting of all the fibers in the resulting compressed mat compared to the uncompressed mat, whereby as to the surface fibers of the compressed mat in contact with the compressing means there is a conflict of forces, one force being that of adhesion of the fibers to the compressing means and the other being that combination of adhesion of fiber to fiber with interfelting into the mat, and prior to said compression drying the surface only of said mat at least in part to render the surface fibers of the said compressed mat in effect non-adhesive to said compressing means, while also retaining

liquid adhesive on the fibers on the interior of the mat, then removing said compression means thereby providing a mat of thickness reduced by reason of said compression, and drying the resulting mat.

7. The method of forming a fiber blanket which comprises depositing substantially individualized vegetable fibers carrying liquid to render the fibers adhesive into a thick pile in the form of a mat, whereby the fibers at the surface of the mat while being wet and adhesive are readily removable vertically from said mat by any contacting member to which the adhesive fibers may adhere, and reducing the thickness of said mat by compressing the said mat while contacting and compressing the upper surface thereof with compressing means to which said liquid-carrying fibers tend normally to adhere, said compression increasing the interfelting of all the fibers in the resulting compressed mat compared to the uncompressed mat, whereby as to the surface fibers of the compressed mat in contact with the compressing means there is a conflict of forces, one force being that of adhesion of the fibers to the compressing means and the other being that combination of adhesion of fiber to fiber with interfelting into the mat, and prior to said compression drying the surface only of said mat at least in part to render the surface fibers of the said compressed mat in effect non-adhesive to said compressing means, while also retaining liquid adhesive on the fibers on the interior of the mat, then removing said compression means thereby providing a mat of thickness reduced by reason of said compression, and drying the resulting mat.

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CERTIFICATE OF CORRECTION.

Patent No. 2,363,480.

November 28, 1944.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 56, strike out the comma and words ", passing the mass" and insert the same before "under" in line 59, same column; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of April, A. D. 1945.

Leslie Frazer

Acting Commissioner of Patents.

(Seal)

compressing means to the superficial fibers to press the same into bonding relation with the moistened subjacent fibers and to compress the mass to a selected density and effect interfelting and interbonding of the fibers from face-to-face of the blanket so formed, and thereafter drying the blanket.

6. The method of forming a fiber blanket which comprises depositing substantially individualized vegetable fibers carrying liquid to render the fibers adhesive into a thick pile in the form of a mat while employing an impact of each fiber on already deposited fibers which impact is substantially that of the fiber falling in air, whereby the fibers at the surface of the mat are poorly felted into the body of the mat and while being adhesive are readily removable vertically from said mat by any contacting member to which the wet and adhesive fibers may adhere, and reducing the thickness of said mat by compressing the said mat while contacting and compressing the upper surface thereof with compressing means to which said liquid-carrying fibers tend normally to adhere, said compression increasing the interfelting of all the fibers in the resulting compressed mat compared to the uncompressed mat, whereby as to the surface fibers of the compressed mat in contact with the compressing means there is a conflict of forces, one force being that of adhesion of the fibers to the compressing means and the other being that combination of adhesion of fiber to fiber with interfelting into the mat, and prior to said compression drying the surface only of said mat at least in part to render the surface fibers of the said compressed mat in effect non-adhesive to said compressing means, while also retaining

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