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APPARATUS FOR FORMING ABSORBENT MATERIAL

Original Filed Nov. 12, 1963

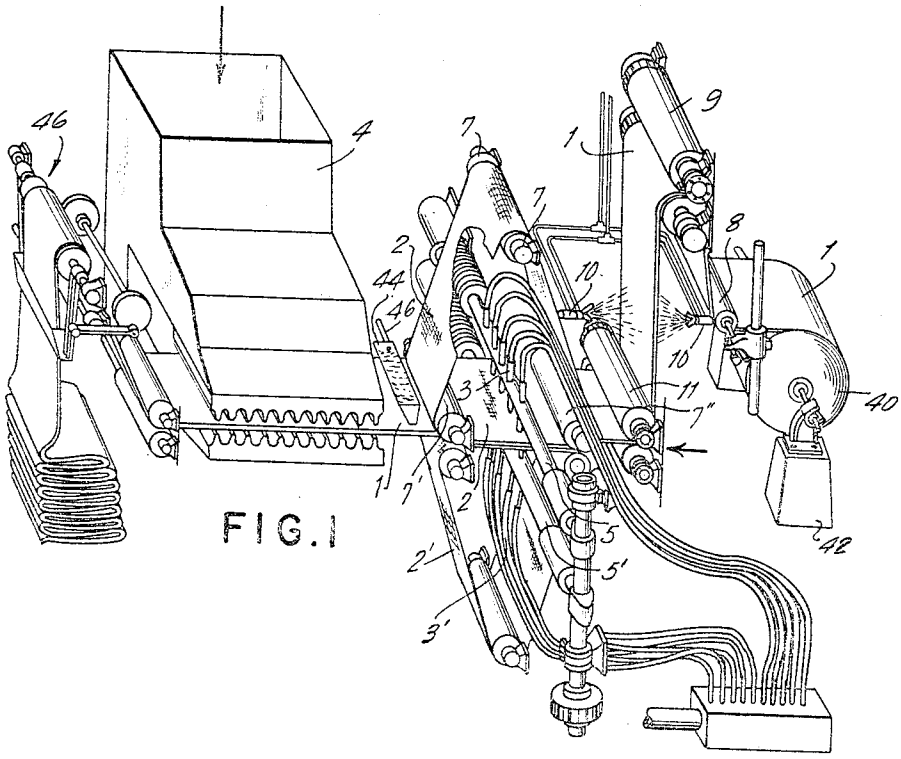


FIG. 1

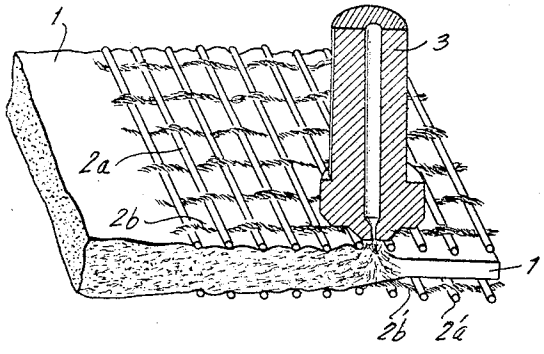


FIG. 2

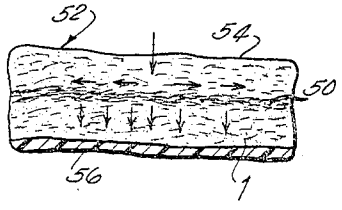


FIG. 3

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APPARATUS FOR FORMING ABSORBENT MATERIAL

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Original application Nov. 12, 1963, Ser. No. 322,967. Divided and this application Mar. 17, 1967, Ser. No. 634,790

Int. Cl. D04h *11/00, 18/00*

U.S. Cl. 19—161 6 Claims

ABSTRACT OF THE DISCLOSURE

An improved absorbent material is formed by expanding and ramifying a pulp or fiber material when it is in a relatively moist condition. This is accomplished by directing a relatively dry air under pressure against the surface thereof while the core is maintained in a rather dense condition. A pulp or fiber sheet is fed between two sets of press rollers to compact the fibers. A spray of a liquid such as water is directed against each surface before the final passage through the press rollers. The sheet in a moistured condition is then conducted between porous belts which hold the material under pressure while the relatively dry air is directed through the porous belts to the material. In this manner the fibers are separated at various areas of the port openings which are not blocked by the solid portions of the porous belts. The fibers become oriented in an upright manner while the spaces between the solid portions of the belts hold the material compactly.

The apparatus for the method of the invention includes upper and lower sets of endless porous belts or wire screen belts which have respective upper and lower reaches which tightly engage and feed the fiber material therebetween and means for pressing the fiber sheet and for directing air through the belts and onto the material as it passes between them.

This is a division of application Ser. No. 322,967, filed Nov. 12, 1963, now abandoned.

SUMMARY OF THE INVENTION

This invention relates in general to an absorbent material composition and to a method of making the same, and in particular to a new and useful absorbent material, particularly for absorbing menses blood, and to an improved method for forming such material.

Prior to the present invention materials for absorbing menses blood have usually comprised folded crepe paper wrapped in gauze. Such a material is very expensive to manufacture, due to the necessity of folding the crepe paper and assembling the paper in the gauze material.

In accordance with the present invention there is provide an improved absorbent material formed by expanding and ramifying a pulp or fibre material when in a moist condition in order to expand at least the fibre on the surface thereof while the core is maintained in a rather dense condition. A material formed in this manner provides improved absorption characteristics, and because the density of the fibre is lessened and the fibre is expanded, the permeability and dropping speed of the material to be absorbed is rapid. Bacause of the core of

the absorbent material remains relatively dense, the absorbent material is retained in the dense core and in any event will not pass out through the opposite side which is preferably covered with a waterproof material.

In accordance with the improved method of the invention, a pulp or fibre sheet is directed out of the drying portion of a paper making machine in a relatively wet condition or it is passed through a water spraying means for adding moisture thereto. The moistened pulp sheet is then directed either betwen a pair of porous belts or wire mesh screens which are operated to permit the pulp sheet to be directed therebetween in tight engagement. As the pulp is advanced between the wire mesh screens, air is directed under pressure against the surface of the pulp sheet and the fibre is expanded and ramified thereby. When the compressed air is directed against the sheet at the location of the elements of the wire screen or porous belt, the jetting of the air is intercepted by these elements and the ramification and expansion is weakened in those areas so as to produce an intertwining of the fibre by the ramification and expansion in the other areas.

Accordingly it is an object of this invention to provide an improved absorbent material.

A further object of the invention is to provide an absorbent material which comprises a fiber sheet which is expanded and ramified at least adjacent the surfaces thereof.

A further object of the invention is to provide an absorbent material comprising a fibre sheet having surface fibres which are expanded, with a relatively dense core and including a waterproof coating on one side thereof.

A further object of the invention is to provide a method of forming an absorbent material which comprises directing a relatively moist pulp web between opposed perforated endless belt means and directing a gas under pressure against each surface of the sheet through the porous belts as the pulp sheet is being advanced therebetween.

A further object of the invention is to provide an improved method of making an absorbent material which comprises directing a relatively moist fibrous web into association with means for increasing the moisture thereof and thereafter directing the web between opposed pairs of continuously running perforated elements such as screens, simultaneously directing air under pressure against the opposed surfaces of the fibrous web by directing air or an inert gas both between the wires of the wire mesh and directly against the wire to ramify and expand the fibres at diverse areas over the surface thereof and thereafter applying a waterproof material to at least one surface of the pulp sheet.

A further object of the invention is to provide absorbent material which is simple in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in where there is illustrated and described a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a somewhat schematic perspective view of an apparatus for making an improved absorbent material in accordance with the invention;

FIG. 2 in an enlarged perspective view indicating the manner in which air under pressure is directed against the surface of the fibrous sheet; and

FIG. 3 is an enlarged transverse section of an absorbent material pad constructed in accordance with the invention.

Referring to the drawings in particular, FIG. 1 indicates an improved apparatus for carrying out the method of the present invention for forming an improved absorbent material. In the drawing a roll **40** of a relatively moist fibrous web or pulp sheet **1** is indicated being supported on a roll stand **42** permitting the web **1** to be fed around guide roller **8** and between upper and lower sets of press rollers **9** and **11**.

In accordance with the invention it is preferable to include the apparatus for forming the improved absorbent material directly on a paper making machine in an intermediate portion of the drying portion of the machine, in which event the pulp sheet **1** is pulled out in a wet condition for treatment in accordance with the invention.

The pulp sheet **1** is advantageously treated when in a preferably moist condition, and for this reason, as indicated in FIG. 1, nozzles **10, 10** are provided to spray the surfaces of the web **1** with moisture. Upper and lower wire mesh or porous belts **2** and **2'** are trained to run between triangularly arranged guide rollers, including an upper roller **7**, a forward roller **7'** and a rear roller **7''** in a manner permitting the web **1** to be fed between adjacent reaches of the upper and lower wire mesh belts **2** and **2'**. For this purpose means are provided to continuously move the porous belts **2** and **2'**, such as a drive connection to one of the shafts on the rollers **7, 7'** and **7''**, as the web **1** is advanced therebetween.

In the embodiment illustrated, nozzle assemblies **3** and **3'** are arranged on the respective sides of the web and within the respective porous belts **2** and **2'** for directing air or an inert gas under pressure downwardly toward the web **1** as it is advanced between the porous belts **2** and **2'**. The wire mesh or porous belt conveyors **2** and **2'** hold the web **1** and prevent dispersion of the fibre by the blowing of the compressed air exiting through nozzles **3** and **3'**.

The nozzles **3** and **3'** are affixed to respective distribution tubes **5** and **5'** and advantageously are arranged to move back and forth inside the triangular outline of the porous belts **2** and **2'**. The arrangement is such that the free movement of the web **1** is permitted and a jet is directed randomly against the surface thereof, and in some instances against the elements of the porous belts **2** and **2'**.

As indicated particularly in FIG. **2**, when the nozzles **3** and **3'** are located to overlie the elements **2***a* and **2***b*, the jetting of the air is intercepted and expansion and ramification is weakened at these areas. When the nozzles are directed between the elements **2***a* and **2***b* of the porous belts **2** and **2'**, the jetting of the air against the pulp heat is very strong and expansion and ramification of the fibre takes place to a great extent. The result is that the surfaces of the web **1** are expanded and ramified in an irregular manner to insure an intertwining of the fibre and an irregular dispersion pattern.

After the fibre is expanded and ramified, it is moved beneath an extruder **44** which is supplied with a moisture sealing material through a conduit **46**. The moisture sealing material is directed directly onto one surface of the web **1** which has been treated in the manner of the invention. Thereafter the web is passed through a drier **4** and then through means generally designated **46** for arranging the finished product in a desired form for finishing.

An example of an absorbent material formed in accordance with the invention includes a web **1** which weighs about 500 grams and which is directed through the guide rollers **8** and press rollers **9** and **11** to smooth

out the furrows and then is moistened to add 10 to 120% moisture to the web **1**. A pulp sheet which is pulled out of a drier of a paper making machine, however, will contain the proper amount of moisture and no additional moisture need be applied. The jetting of the compressed air is arranged so that the core **50** of a resultant absorbent material pad generally designated **52** is formed in a relatively dense condition. With a pad of this nature, menses blood will rapidly permeate the surface **54** of the sheet and will sink by its own weight toward the dense core **50** thereof. The menses blood contacting the surface **54** is very meagerly absorbed at such location and is mostly repelled and spread and the blood gradually permeates all over the pulp sheet or pad by capillary action. The pad **52** is coated at the bottom with a waterproof material **56** which may be, for example, resin, paraphin or silicon dissolved in some organic solvent and sprayed onto the sheets by means of the device **44** in FIG. 1.

The invention makes it possible to provide an absorbent material which can be made in an inexpensive manner without first folding paper which has already been manufactured and then arranging it in combination with other material such as gauze. By merely treating a wet pulp web by blowing compressed air against the surface thereof in the manner set forth herein it is possible to form a very inexpensive absorbent material. When the core part of the sheet is left unexpanded and non-ramified, with only the surfaces being expanded and ramified, an improved absorbent pad may be constructed. Since the device finds particular application in the use of absorbing menses blood, the absorbent pad so constructed functions in a very desirable manner to cause absorption of the menses blood at the core while the surface may be kept clean and very hygienic.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A device for forming mense blood absorbent material from a pulp or fibrous material comprising first and second pressure roller means, means for feeding a dense continuous fibrous material between first and second pressure roller means, means for adding moisture to the sheet as it is being fed, continuously movable porous belt means engageable with said sheet as it is fed and holding and compacting the surface of said sheet, and means for directing a relatively dry air under pressure through the porous belt means in a manner such that the air engages the sheet without complete penetration in the areas of the pores to expand and ramify the fibers on the surface of said sheet as it is fed while leaving the core part of said sheet unexpanded and non-ramified.

2. A device for manufacturing menses blood pulp fibre sheet absorbent material comprising upper and lower porous endless belts having opposed reaches, means for feeding a dense continuous pulp-fibre web between the opposed reaches of said upper and lower porous belts, and nozzle means for directing air under pressure through the pores of said belts against contact areas of said web underlying the pores without complete penetration to loosen and expand the fibres in the contact areas as said web is advanced between the reaches of said porous belts while leaving the core part of said web in a dense condition.

3. A device, according to claim **2**, including means for moistening the web before it is directed between said porous belts.

4. A device, according to claim **2**, wherein said porous belts comprise wire mesh elements.

5. A device, according to claim **2**, including means for applying a moisture-proof material to at least one side of

the web after it passes between the reaches of said porous belts.

6. A device, according to claim 2, including means for drying said web after it passes through the reaches of said porous belts.

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