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TREATMENT OF WOVEN PAPER MATERIALS

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FIG. 1.

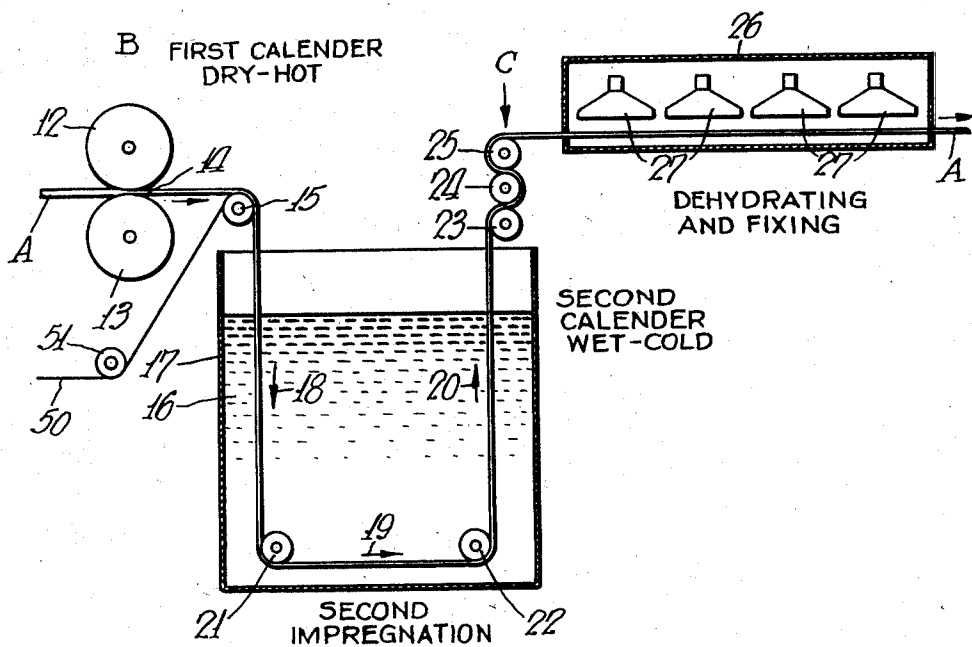
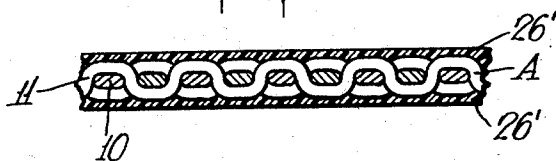


FIG. 2.



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TREATMENT OF WOVEN PAPER MATERIALS

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3 Claims. (Cl. 28—74)

The present invention relates to a treatment of woven paper material and it particularly relates to high strength liquid resistant paper materials.

In weaving twisted paper stock to form woven paper fabrics, it has been found that the resultant woven paper material is not resistant to various aqueous and organic liquids and tends to soil, disintegrate, rupture and unravel.

It is among the objects of the present invention to prepare a novel paper fabric preferably woven from twisted paper filling and warp which will be highly resistant to the aqueous or organic liquids and which will have great durability and which will stand substantial wear and abrasion.

Another object is to provide a woven paper material which will not tend to pick up electrostatic charge and which will be waterproof, rainproof, gasoline-proof and alcohol-proof.

Still another object is to provide a high strength woven paper fabric which will not unravel and which may be used in and about the automobile as a permanent lining material without being affected by fuel, lubricants or anti-freeze compositions and which may be used as a floor mat or trunk lining.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects, it has been found most satisfactory, according to one embodiment of the present invention, to first form a paper warp and a paper filling formed of twisting paper strips which strips preferably have been treated with a dilute wax emulsion before, after or during the twisting operation.

Although not essential it is desirable to form the warp of a round paper yarn material and the filling of a relatively flattened paper yarn material.

These paper twisted strips in round or flat material are then woven together and first subjected to a high pressure treatment in dry condition and then to a relatively low temperature treatment, while in wet condition.

Desirably the wetting agent which is utilized between the two pressure treatments is an alkaline resinous latex dispersion which is thoroughly impregnated into the woven material.

Although various types of impregnating baths may be utilized, it is usually desirable to employ a 1% to 10% wax emulsion for first treating the paper yarn before weaving and then to utilize a 5% to 25% dispersion of a synthetic latex and resin.

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This latter bath for example may have the following compositions:

Material	Preferred, Parts By Wgt.	Range
Water.....	320	100-450
Alkali Soluble Polyelectrolyte.....	41.5	20-60
Fatty Acid Ester.....	13.9	5-30
Aqua Ammonia.....	13.9	5-30
Butyl Benzyl Phthalate.....	111.5	50-150
1% Silicone Solution.....	29.2	10-50
Polystyrene Dispersion Resin.....	470	200-800

In making up the above bath, the fatty acid ester which is a nonionic dispersing agent is mixed with the water together with the alkali soluble polymerized organic electrolyte or as it may be termed polyelectrolyte.

Then the ammonia is added and the mixture is agitated until all of the polyelectrolyte or polymerized organic electrolyte goes into solution.

When the polyelectrolyte has all dissolved, then the phthalate is added and then agitation is continued at a high speed until a fine emulsion has been obtained.

Finally the silicone solution is added and the polystyrene resin is finally added with agitation at a high speed until a uniform blend is obtained.

It has been found that a resin latex solution will impregnate and coat the wax impregnated paper fibres during the second calendering or pressure operation in the cold following the hot high pressure calendering operation.

With the foregoing and other objects in view the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described, and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

Fig. 1 is a diagrammatic side sectional view indicating the procedure of treating the woven paper material.

Fig. 2 is a side sectional view of a portion of the woven paper material after the double coating and double calendering operation.

Referring to Fig. 1, the woven paper material A has a relatively flattened filling 10 and a rounded warp 11.

The filling and warp may be formed of twisted strips of paper slitted from a twelve to sixteen pound weight of paper with a thickness of about .004 to .008 inch.

Desirably the paper is either of kraft or sulfite or sulfate and it may be in various colors.

Desirably it is slitted in one-half inch widths which may range from 7/16 to 3/4 in. width.

Both the warp and the filling are twisted and then passed through a water wax solution desirably consisting of a saponified wax. This wax emulsion may be applied before, during or after the twisting and desirably the strips are given from two to four and one-half turns per inch.

In the preferred construction the warp yarn is rounded while the filling yarn is flattened.

The woven fabric A is then subjected to pressure between the high pressure rollers 12 and 13 which will be at a temperature of from about 250°-300° F. to about 450°-500° F. and apply about 400 to 500 pounds per square inch pressure.

This will result in a substantial flattening of the woven fabric as indicated at 14 and will result in the wax emulsion being thoroughly dispersed throughout the paper strands of woven fabric A.

Then the paper passes over the guide roller 15 into the bath 16 in the vessel 17.

This bath may contain from 5% to 15% of a polystyrene latex and from 5% to 15% of a water dispersed resinous material.

The paper will pass in the direction of the arrows 18, 19, and 20 through the bath 16 and under the rollers 21 and 22. Then the paper material is subjected to a wet pressure treatment by the calender rolls 23, 24, and 25 using 110 lbs. and resulting in a thorough impregnation of the coating material as indicated at 26' in Fig. 2.

Finally the paper material after the second calendering treatment is passed into the drying chamber 26 to evaporate any moisture and is subjected to the infra red lamps 27 which will usually effectively fix the coating and impregnation upon the paper stock or woven paper fabric A.

It is generally desirable that the first pressure treatment B be at a temperature of 300° to 500° and at a pressure of 400 to 500 lbs. per square inch and that the second pressure treatment C be at a temperature of zero to 50° F. and a pressure of 100 to 300 lbs. per square inch.

Desirably the dehydration treatment should be from two to three minutes at 300° F.

Although the structure of the fabric A may vary, it is generally satisfactory to have about 16 warp ends per inch and about 11 filling ends per inch although these may range from 10 to 30 as desired.

Generally the fabric should weigh about 16 oz. per square yard and the impregnation should add between 10% to 25% weight.

The double impregnation and double calendering operation will prevent slippage, eliminating electrostatic charge and render the paper fabric highly wear resistant while giving it full flexibility.

The paper fabric will be rainproof, waterproof, oilproof, gasoline-proof and it does not need an edge binding when cut.

It will have a high tensile strength and may be used for flooring or trunk linings.

It is also possible to apply a sheet of paper to the back of the woven paper fabric so that there is provided a

combination of a woven paper fabric such as indicated at A and a matted paper fabric.

In such case the paper can be fed in at 50 under the roller 51 and then over the roller 15 to be assembled with the woven sheet A.

The additional backing sheet of the matted paper sheet then will pass through the second impregnation bath and through the second calender 23—24—25 and into the dehydrating and fixing chamber 26.

The backing sheet 50 may range from ten pounds to forty pounds kraft paper and when it is used it is desirable to increase the pressure of the rollers 23—24—25 in the second calender at C.

While there has been herein described a preferred form of the invention, it should be understood that the same may be altered in details and in relative arrangement of parts within the scope of the appended claims.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed, what is claimed is:

1. A process of finishing woven paper fabrics which comprises calendering them at high pressure between rollers while dry and then at a low pressure between rollers while wet, said high pressure rollers having a temperature of 250° to 460° F. and a pressure of 400 to 500 pounds per square inch and said low pressure rollers having a temperature of 0 to 50° F. and a pressure of 100 to 300 pounds per square inch.

2. The process of claim 1 in which the woven fabric is subjected to an impregnation with a latex bath between the two pressure applications.

3. A process of finishing woven twisted paper fabrics having a flattened filling and a rounded warp both formed of twisted strips of paper, which strips have been impregnated with saponified wax, comprising subjecting the fabric in dry condition to pressure between rollers having a temperature of 250° F. to 460° F. at 400 to 500 pounds per square inch, impregnating in a latex bath, calendering at 100 to 300 pounds per square inch between rollers having a temperature of 0 to 50° F. and then drying.

References Cited in the file of this patent

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