(12) PATENT ABRIDGMENT (11) Document No. AU-B-32510/89
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 621864

(54) Title
METHOD FOR DEPOSITING PARTICLES AND A BINDER SYSTEM ON A BASE FABRIC

International Patent Classification(s)
(51)[4] **B32B 027/12 D06B 001/04 D06M 021/04**

(21) Application No. : **32510/89** (22) Application Date : **06.04.89**

(30) Priority Data

(31) Number	(32) Date	(33) Country
191440	**09.05.88**	**US UNITED STATES OF AMERICA**

(43) Publication Date : **09.11.89**

(44) Publication Date of Accepted Application : **26.03.92**

(71) Applicant(s)
ALBANY INTERNATIONAL CORP.

(72) Inventor(s)
WILLIAM H. DUTT

(74) Attorney or Agent
DAVIES COLLISON CAVE , GPO Box 3876, SYDNEY NSW 2001

(56) Prior Art Documents
US 4571359
US 4357386
AU 273567 24991/62 41.9 47.7

(57) Claim

1. A method of manufacturing a composite wet-press felt fabric, which comprises:

providing a wet-press felt base fabric of interwoven machine direction and cross-machine direction yarns;

depositing a homogeneous foam of polymeric resin particles, binder material, and a solvent on a surface of the base fabric;

distributing the foam on the surface of the base fabric in a uniformly thick layer; and

applying a heat treatment to the base fabric to evaporate the solvent in the foam, to fuse the polymeric resin particles to each other and to the base fabric, and to cure the binder material.

AUSTRALIA

PATENTS ACT 1952

COMPLETE SPECIFICATION

(ORIGINAL)

621064

FOR OFFICE USE

Application Number:
Lodged:

Complete Specification Lodged:
Accepted:
Published:

Priority:
Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant:	ALBANY INTERNATIONAL CORP.
Address of Applicant:	One Sage Road, Menands, New York 12204, U.S.A.
Actual Inventor:	William H. Dutt
Address for Service:	ARTHUR S. CAVE & CO. Patent & Trade Mark Attorneys Level 10 10 Barrack Street SYDNEY N.S.W. 2000 AUSTRALIA

Complete Specification for the invention entitled METHOD FOR DEPOSITING PARTICLES AND A BINDER SYSTEM ON A BASE FABRIC.

The following statement is a full description of this invention including the best method of performing it known to me:-

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ASC 49

"METHOD FOR DEPOSITING PARTICLES
AND A BINDER SYSTEM ON A BASE FABRIC"

Background of the Invention

Field of the Invention

This invention relates to the manufacture of water-absorbent clothing or felt used on papermaking machines. More specifically, it involves a method by which a uniform layer of polymeric resin particles can be applied to the surface of a textile base fabric and fused to provide a porous, elastic surface.

Description of the Prior Art

One of the key components of a modern papermaking machine is the water-absorbent machine clothing or felt. These so-called felts take the form of endless belts of considerable size, and are custom-made according to specifications, supplied by the papermaker, which include the dimensions of the belt required to clothe a particular machine position and the kind of paper the machine produces.

The felts used in the press section of a papermaking machine concern us here. There, the felts serve at least two important purposes, as they both support the wet fibrous sheet as it is being transformed into the finished paper product and absorb water from that sheet in great quantities.

This can be better understood if one views the press section in terms of its relationship to the other sections of

the papermaking machine. The first section, immediately before the press section, is the forming section, where the wet fibrous sheet is formed by spraying an aqueous suspension of wood pulp fiber on a fine screen or wire. A great deal of water will drain out of the sheet in this stage, but water will still account for a major proportion of its weight as it reaches the end of the forming section. As a result, the sheet has little structural integrity at this point, and will require support if it is not to break and cause machine operating problems.

From the forming section, the sheet proceeds to the press section. There, the press felts provide the necessary support to the sheet as it makes its passage through the presses, where additional large quantities of water are squeezed out. Many papermachine press sections incorporate two or more such felts, and, quite often, the wet sheet will be carried or sandwiched between two felts as it makes its journey through the section. In any case, it is in the press nip, the narrow region between the press rolls where compression occurs, that the felt carries out the function of absorbing the water squeezed out of the wet sheet.

It is important, from the standpoint of economics, that the felt be capable of removing as much water as possible during the transit of the sheet through the press section. This is so because, after leaving that section, the sheet enters the dryer section, where whatever water that remains is evaporated through the use of heated rolls. Costs associated with this heating will be reduced when optimum quantities of

water are absorbed by the felt in the press section, as less water will have to be removed in the dryer section.

Up until fairly recently, wool was the basic raw material used in the production of press felts. As the term "felt" suggests, one of the final steps in the production of these machine belts was that of felting, in which the woven woolen fabric was wet and subjected to rubbing in order to produce a belt having a smooth surface. Today, however, with the advent of a great variety of synthetics, wool has largely fallen out of use.

Contemporary synthetics carry the advantages of greater strength, durability, and resistance to chemical and bacterial attack when compared to woolen flat. The term "felt", strictly speaking, is no longer applicable to these fabrics as they cannot be felted in the literal sense. Instead, alternate manufacturing steps are taken during their production to give them surface characteristics and finish similar to those of true felt. For example, the so-called batt-on-base felts, currently in wide use and considered the standard of the industry, consist of a woven fabric base with a batt surface attached by needling and have surface characteristics similar to those of woolen felt. In addition, a wide variety of other constructions are available, including non-woven press felts. Yet, despite the complete absense of wool and traditional felting processes during production, they are still commonly, if not universally, referred to as "felts" in the papermaking industry.

Press felt are characterised by such factors as fiber

variety, weave type, permeability, and surface characteristics. The choice of felt to be used on any given machine is governed by the machine design and operating parameters, the grade of paper being produced and the desired surface finish.

As noted above, there are alternatives available for use instead of the popular batt-on-base press felts. For example, U.S. Patent 4,571,359 entitled "Papermaker's Wet-Press Felt and Method of Manufacture", disclosed a novel papermaker's felt composed of a textile base fabric having a surface layer of polymeric resin particles fused together to provide a porous, elastic surface. In practice, however, it has proven difficult to apply the resin particles in a manner that will leave them uniformly and evenly distributed on the surface of the base fabric. The present invention is addressed to alleviating that problem.

According to one aspect of the present invention there is provided a method of manufacturing a composite wet-press felt fabric, which comprises:

providing a wet-press felt base fabric of interwoven machine direction and cross-machine direction yarns;

depositing a homogeneous foam of polymeric resin particles, binder material, and a solvent on a surface of the base fabric;

distributing the foam on the surface of the base fabric in a uniformly thick layer; and

applying a heat treatment to the base fabric to evaporate the solvent in the foam, to fuse the polymeric resin particles to each other and to the base fabric, and to cure the binder material.

According to another aspect of the present invention there is provided a composite wet-press felt fabric manufactured as described above.

The method of the present invention may be used for manufacturing the papermaker's wet-press felt disclosed in U.S. Patent Specification No. 4571359.

It is desirable that the viscosity of the homogeneous foam is of a degree that bleed through the fabric structure can be avoided. In this way, all of the polymeric particulate material will be retained on the surface of the fabric.

Preferred embodiments of the present invention will hereinafter be described with reference to the accompanying drawing.

Figure 1 depicts one mode by which the disclosed method can be put into practice.

Figure 1 shows a textile base fabric 1 in the process of being coated according to the method of this invention. It is assumed that this base fabric 1 is being maintained in a taut and flat condition and is being moved along in the direction indicated by the arrow by some suitable means not shown.

In order to ensure that the coating being applied to the base fabric 1 be of uniform thickness, the method incorporates the use of a horizontal surface 2 that supports the base fabric 1 from below, i.e., from the side not being coated, during the

entire process. In this way, sag in the base fabric will be avoided and the foam will be deposited in a uniformly thick layer.

The foam 3 of polymeric resinous particles, binder material, and solvent, homogenized and stored in an apparatus not shown, is applied to the base fabric 1 through a suitable outlet 4. The polymeric resinous particles can be as described in U.S. Patent No. 4,571,359, that is, they should have an average diameter in the range from approximately 0.15 mm to 5mm. The preferred size is about 0.5 mm. By selecting the size of the particles and their distribution as they are deposited on the base fabric, the final void size and distribution on the wet-press felt of the invention can be controlled. Representative of the polymeric resins are polyolefins such as polyethylene, polyurethanes, including polyether and polyester polyurethanes and the like. The binder material can be high-temperature resistant resins, such as polyamide and polyimide resins, which are applied as liquids and which cure to a solid film under heat. Water is quite suitable for use as the solvent, although others could serve equally well.

A levelling blade 5, oriented in such a way to push excess foam 3 from the base fabric 1, distributes the foam 3 smoothly and evenly upon the surface of the base fabric 1 in a layer of uniform thickness.

The evenly coated base fabric 6 next passes beneath a heat source 7, which evaporates the solvent in the foam 3, and fuses the particles of polymeric resin to each other and to the base fabric 1. The processing temperature of the heat source should be high enough to soften the polymeric resin particles, but below a degradative temperature. This will also cure the binder material, and, as noted above, evaporate the solvent. The finished product (8), a belt having a porous, elastic surface, emerges from beneath the heat source 7 at the extreme right of the figure.

The claims defining the invention are as follows:

1. A method of manufacturing a composite wet-press felt fabric, which comprises:

providing a wet-press felt base fabric of interwoven machine direction and cross-machine direction yarns;

depositing a homogeneous foam of polymeric resin particles, binder material, and a solvent on a surface of the base fabric;

distributing the foam on the surface of the base fabric in a uniformly thick layer; and

applying a heat treatment to the base fabric to evaporate the solvent in the foam, to fuse the polymeric resin particles to each other and to the base fabric, and to cure the binder material.

2. A composite wet-press felt fabric manufactured according to the method in claim 1.

3. A method of manufacturing a composite wet-press felt fabric substantially as hereinbefore described with reference to the drawing.

4. A composite wet-press felt fabric substantially as hereinbefore described with reference to the accompanying drawing.

DATED this 28th day of October, 1991.

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