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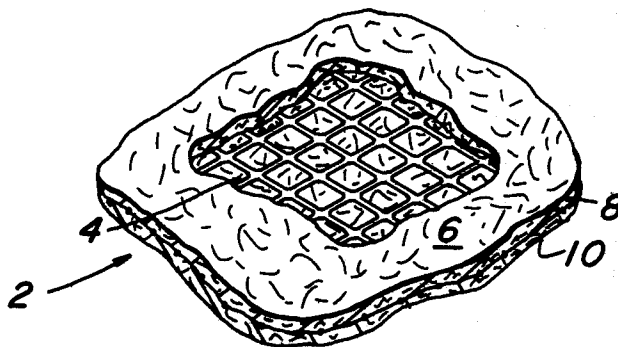
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54 **Method of manufacturing papermaker's felt.**

57 The present invention provides a solution to the prior art problem of producing a high density papermakers batt fabric or felt which may be secured to an undamaged under layer in an economic manner. The present invention provides these improvements by providing a batt which is comprised of a non-woven low melt scrim to which the batt material is initially needled. Subsequent to producing a batt of the required density, the batt may, if desired, be needled or adhered to an under layer fabric. The completed felt will be subjected a heat pressing operation which will elevate the temperature of the batt to a temperature above the softening temperature of the scrim but below the melting point of the batt fibers. In this manner, the batt and under layer fabric are unified to produce a multilayer papermakers felt with minimum effort and disruption of the under layer.



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METHOD OF MANUFACTURING PAPERMAKER'S FELT

Background of the Invention

1. Field of the Invention

The fabric of the instant invention is intended for use in the papermaking industry and finds particular application in the wet press and dryer sections of papermaking equipment. In such equipment, the fabric is a carrying or conveying means which is intended for use in applications requiring either an endless or flat woven fabric. In the papermaking industry, fabrics of the instant invention are frequently referred to as felts, when used in the wet press or dryer section, since they generally comprise a carrier fabric or layer which runs in contact with the equipment and a felt surface which runs in contact with the paper.

2. Description of the Prior Art

It has been recognized in the prior art that it is desirable to provide a felt for use in papermaking machinery which comprises an under layer made of relatively rigid non-deformable material having a compressible felt layer thereon. It has been further recognized by the prior art that it is advantageous to use a needled felt layer in combination with the relatively rigid non-deformable under layer. One example of such a prior art fabric is found in U.S. Patent Re. 21,890 entitled INDUSTRIAL AND PAPERMAKERS FELTS. This prior art reference discloses the most commonly known needled papermakers felt utilized in the papermaking industry. More recently, an effort to improve the papermakers felt was disclosed in U.S. Patent 4,500,588. This patent discloses the use of a barrier layer contained within the

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felt. The purpose of this barrier layer is to prevent filler material from penetrating from the surface of the felt into the remainder of the felt.

5 The difficulty with the prior art approach comes in applying the batt or felt surface to the under layer and in obtaining a batt of sufficient density in an economic manner without damaging the under layer fabric during the needling operation.

Summary of the Invention

10 The present invention provides a solution to the prior art problem of producing a high density papermakers felt having an undamaged under layer in an economic manner. The present invention provides these improvements by providing a batt which is comprised of a non-woven low melt scrim to which the batt material is
15 initially needled. Subsequent to producing a batt of the required density, the batt is then needled or adhered to the under layer fabric. The completed felt will be subjected a heat pressing operation which will elevate the temperature of the batt to a temperature above the softening temperature of the scrim but below
20 the melting point of the batt fibers. In this manner, the batt and under layer fabric are unified to produce the papermakers felt with minimum effort and disruption of the under layer.

Brief Description of the Drawings

25 Figure 1 is a fragmentary section of a batt according to the instant invention which is further fragmented to show the scrim.

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Figure 2 is illustrative of one method of producing the batt in accordance with Figure 1.

Figure 3 illustrates a batt according to the instant invention unified with a woven under layer.

5 Figure 4 is illustrative of a batt according to the instant invention unified with a non-woven under layer which is comprised of a plurality of spiral wound helices which are interconnected by means of pintles.

Figure 5 is a section cut through a batt which is illustrative of an alternative embodiment utilizing multiple scrims.

Figure 6 is a section cut through a batt which is illustrative of an alternative embodiment utilizing multiple scrims which are positioned adjacent to each other and in a staggered relationship.

15 With reference to Figure 1, there is shown a batt in accordance with the instant invention. The batt 2 is comprised of a scrim 4 which is surrounded by batting material 6 which in the illustration is initially provided as upper layer 8 and lower layer 10. If desired, the batting material 6 may be provided as one or more upper layers 8 with or without lower layer 10. The
20 scrim 4 is preferably comprised of a low melt synthetic material such as polypropylene which has a softening point of about 285° to 330° F. and a melting point of about 320° to 350° F. Other synthetic materials may be selected so long as they have a melting point below that of the batt material 6. It will be noted
25 that the scrim material 4 has a generally regular lattice configuration, however, such a regular configuration is not a requirement, although it is preferred. The regular lattice configuration is preferred since it provides a measure of

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predictability with respect to the location of the scrim within the batt 2 and does not adversely effect the required moisture absorption or permeability of the batt. It is expected that the scrim will have a finer mesh, more interstices per square inch, in certain applications in which it is desired to reduce marking. With respect to the interstices of the scrim 4, it should be noted that there is no required open area for the interstices but the scrim should be selected with interstices which will not adversely effect the felts' performance in the areas of moisture absorption, making and/or permeability.

It is intended that the scrim 4 will be selected so as to provide sufficient area for fiber retention while preserving the felt characteristics. In the illustrative embodiment the interstices of the scrim 4 are about one quarter inch squares and the scrim is approximately 15 mils thick. The scrim may be purchased in sheet form or may be made by laying suitable yarns in a lattice work which is then unified by heat setting or ultrasonic means. It will be understood by those skilled in the art that the yarns forming the scrim need not be bonded at each of the intersections but should be bonded in amounts sufficient to permit handling of the scrim.

With respect to the batting material 6 which is shown as comprised of an upper layer 8 and a lower layer 10 prior to needling about scrim 4, it will be understood by those skilled in the art that the initial batt layers 8 and 10 may be formed through the usual needling processes. Additionally, it will be understood by those skilled in the art that the batt material 10

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prior to needling with the scrim 4 may comprise a roving of fibers which is placed over the scrim and needled thereto. In addition, it is contemplated that a blanket of roving may be used in place of individual rovings. In the preferred embodiment, it is preferred to use batting material which has been initially needled to provide batting material having a generally uniformed density and to facilitate handling thereof.

With reference to Figure 2, there is shown a means for producing the batt of Figure 1. A first supply roll 20 of scrim material is provided and a second supply roll 22 of batt material is provided in close proximity thereto. Both of these materials are provided in unison over a support bed 24 which is positioned below a needling head 26. Needling heads such as 26 are known to those skilled in the art and one example thereof is shown in U.S. Patent Re. 21,890. The materials are presented simultaneously to needling head 26 and are needled in accordance with fabric design to achieve the required density. Subsequent to needling, the material is rewound on supply roll 28. In the event that it is desired to apply a second layer of batt material, the supply roll is then positioned at 20 so that the material discharged from the roll will present the scrim in a face up position towards needling head 26. A second layer of batt is then applied in the same manner as the first. This procedure may continue until such time as the desired thickness for the batt material is achieved.

Depending upon the thickness of the completed batt and the degree of stability desired, the batt produced in accordance with the above may be further provided with another scrim layer

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and additional batt material or initially provided with two scrim
or more. Thus, with reference to Figure 5 and 6, it can be seen
that two scrim layers 4 are provided in the final needled batt.
In the embodiment of Figure 5 the scrim layers are separated by
5 batt material. In the embodiment of Figure 6 the scrim layers are
adjacent to each other. It will be understood by those skilled in
the art that the needling process must accomplish sufficient depth
of needling to provide the desired uniformity and that the
respective layers of batt material 6 will be fully unified and
10 stabilized in the heat treatment process. Likewise, it will be
understood by those skilled in the art that the scrims may be
vertically aligned, such as Figure 5, or staggered, such as Figure
6, depending upon the desired application.

It is during the aforementioned needling operation that
15 the scrim provides a secure base work which prevents excessive
fiber migration as a result of the needling operation. As a result
of this, it is possible to needle the batt more severely than can
be done without the scrim and more severely than can be done
directly on the woven or spiral formed under layer. As a result, a
20 more uniformed higher density homogeneous batt is obtained. After
the desired thickness of the batt is obtained the batt may be
subjected to a heat pressing operation at a temperature below the
melting point of the batt fibers but at a temperature sufficient
to cause softening or melting (flowing) of the scrim. However, it
25 is preferable to have the heat pressing operation done after
needling of the batt to the under layer fabric. It will be
understood by those skilled in the art that the temperature will

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generally exceed the heat setting temperature of the scrim and must be sufficient to result in tackiness of the scrim. It will be further understood that such a temperature may be achieved without a complete melting or flowing of the scrim. It will
5 likewise be understood that the scrim may undergo shape deformation as a result of the heat treatment and that the drawing figures are merely illustrative of the invention.

As a result of the heat treatment of the scrim, it will adhere to the batt fibers and increase the adhesion between the
10 batt materials. In this manner, the scrim will add to the strength of the batt and reduce the likelihood that the batt will experience fiber migration or layer separation during use. As can be seen from the foregone, the scrim provides a denser batt, a more uniformed or homogeneous batt and a batt having greater
15 tenacity than the prior art batts.

With reference to Figure 3, there is shown a batt 2 according to the instant invention unified with a woven under layer 30. Batt 2 and under layer 30 may be unified through a needling process, such as that described with reference to Figure
20 2 and known to those skilled in the art, or may be unified through the application of adhesives between the batt 2 and under layer 30. The application of such adhesives to the batt will be also known to those skilled in the art as exemplified by U.S. Patent 4,528,236.

25 With reference to Figure 4 there is shown a batt 2 according to the instant invention adhered to a non-woven under layer 40 formed of a plurality of helices interconnected by

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pintles. The fabric of Figure 4 may be unified in accordance with the method discussed with reference to Figure 2 or by the application of adhesives. Once again, the methods of unifying the fabric will be known to those skilled in the art and is exemplified by U.S. Patent 4,528,236.

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Claims

1. An improved papermakers fabric of the type having an under layer and a fiber batt needled thereto, wherein the improvement comprises incorporating into said batt a scrim having a lower melting point than the melting point of the fibers of said batt.

2. An improved homogeneous fiber batt for use as a papermakers fabric, wherein the improvement comprises incorporating into said batt a scrim having a lower melting point than the melting point of the fibers incorporated into said homogeneous batt.

3. A method of providing an improved homogeneous papermakers batt comprised of:

- a) providing a low melting point scrim material;
- b) providing a batt material comprised of fibers having a melting point greater than the melting point of said scrim material;
- c) needling a layer of said batt material to said scrim; and
- d) elevating the temperature of the product of step (c) to a temperature at least equal to the softening temperature of said scrim but below the melting point of the said fibers.

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4. The method of claim 3 further comprised of:
 needling a second layer of batt material to said
scrim prior to performing step (d).

5. The method of claim 4 further comprised of:
 needling said second layer of batt material to said
scrim on the side opposite said layer of batt material.

6. A method of providing an improved papermaker's felt
comprising the steps of:

- a) providing a low melting point scrim material;
- b) providing a batt material comprised of fibers
having a melting point greater than the melting point of said
scrim material;
- c) needling a layer of batt material to said
scrim;
- d) needling the product of step (c) to an under
0 layer fabric; and
- e) elevating the temperature of the product of
step (d) to a temperature at least equal to the softening
temperature of said scrim but below the melting point of said
fibers.

7. The method of claim 6 further comprised of:
 the step of needling a second batt of material to
said scrim prior to performing step (d).

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8. The method of claim 7 further comprising the step
of:

 needling said second layer of batt material to said
scrim on the side opposite said first layer of batt material.

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FIG. 1

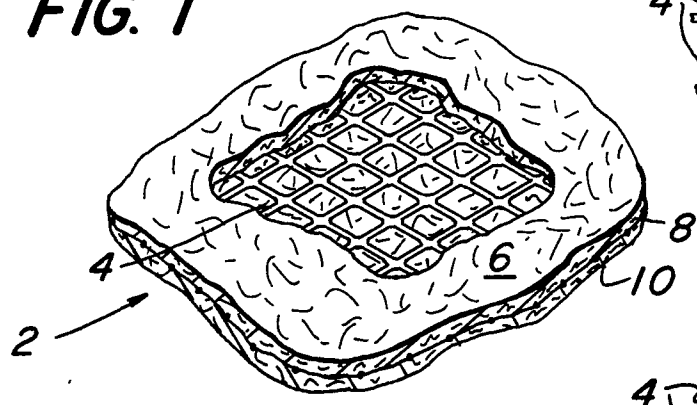


FIG. 5

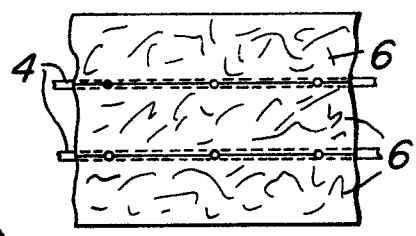


FIG. 6

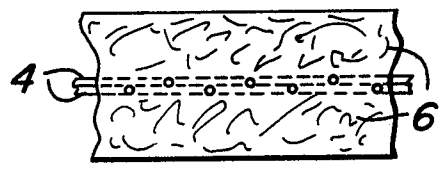


FIG. 2

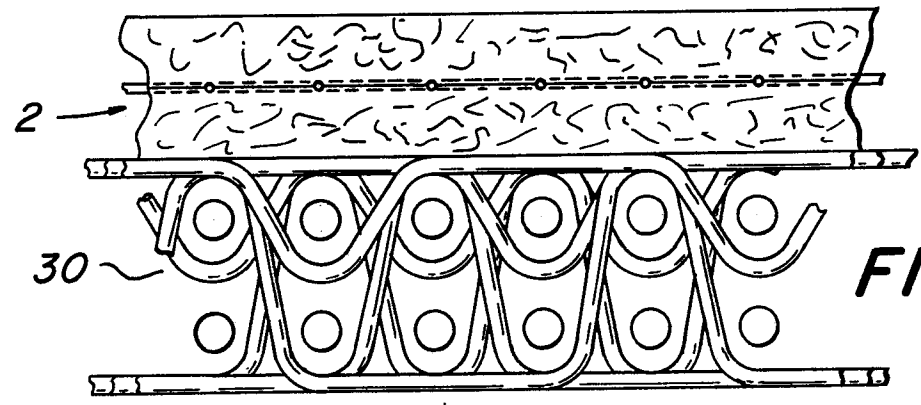
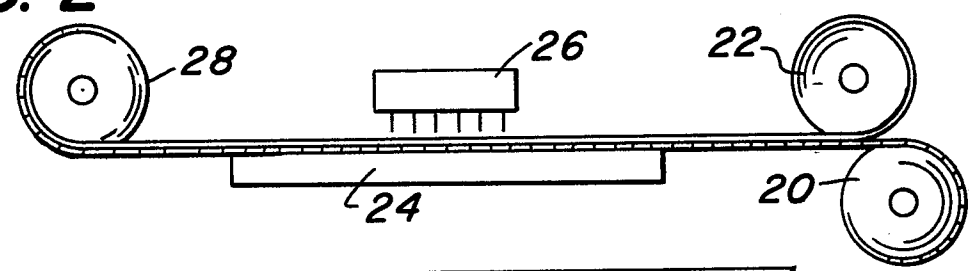


FIG. 3

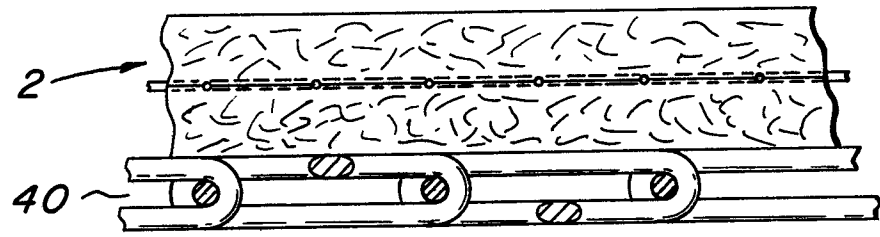


FIG. 4