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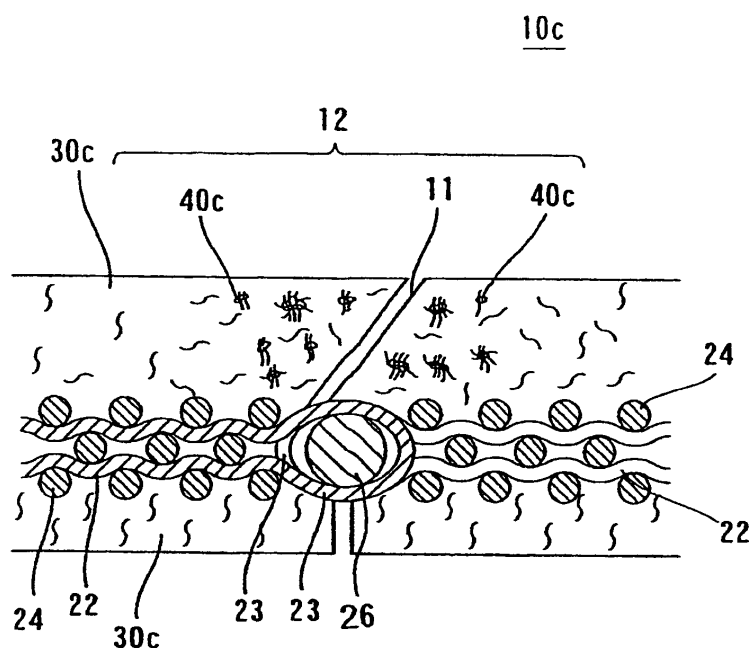
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(54) **SEAMED FELT FOR PAPERMAKING AND PROCESS FOR PRODUCING THE SAME**

(57) A seam felt 10c for papermaking comprises wet paper web side batt layer 30c and seam region 12. Fragments of a sheet-shaped nonwoven fabric 40a, which is disposed at a region of the wet paper web side batt layer 30c adjacent to the seam region 12, and which is crushed

by means of needle punching, are dispersed within the widthwise range of the batt layer. At least a part of the fibers of the batt layer penetrates holes of the fragments of nonwoven fabric 40a, and the fragments of nonwoven fabric 40a are melted by heat and adhere to fibers of the batt layer.

Fig. 5



Description

FIELD OF THE INVENTION

[0001] The present invention relates to a seam felt for papermaking and a manufacturing method thereof.

BACKGROUND ART

[0002] In recent years, mainstream papermaking apparatuses are the ones that operate at high speed and high pressure. It is desirable for a press felt for papermaking to have high permeability to liquid. Therefore, the mainstream press felt is one wherein the fabric structure of the basic part is made of monofilament, so that high permeability is achieved.

[0003] A conventional press fabric that can be seamed on a machine (for example refer to WO02/35000) comprises a batt and a strip made of flow-resistant material, placed on or adjacent to the seam region of a papermaker's fabric, so that the permeabilities of the seam region of the press fabric to air and water are substantially identical to those of the other regions.

[0004] Figure 6 is a machine direction sectional view of a conventional press fabric 10'.

[0005] Press fabric 10' comprises a base fabric 14', which is woven from monofilament yarns, and seam regions 12', which join the base fabric 14' into endless form on the machine.

[0006] The base fabric 14' is a woven fabric comprising machine direction weft yarns 16' and cross-machine direction warp yarns 22'. The machine direction yarns 16' form seaming loops 18'.

[0007] Said seaming loops 18' are interdigitated to create a passage for a pintle 20'. The seaming loops 18' and the pintle 20' are combined to join the base fabric 14'.

[0008] A strip 24' is disposed over the seam region 12', straddling it by amount in the range from 0.5-2.0 inches (1.27-5.08cm) on its top side. The strip 24' is a ribbon of woven fabric, nonwoven fabric or polymeric film, and is punched into the base fabric 14' by needling. A batt 26, made of staple fiber, is driven into the base fabric 14' at least from one side thereof by needling or other means.

[0009] Batt 26 is cleared away from the seaming loops 18' on the bottom side of the base fabric 14 to form a gap 28'.

[0010] A slit 30' is cut obliquely through the batt 26' and strip 24'. The strip 24' provides a press fabric 10' wherein the permeabilities to air and water of the seam region 12' are not inferior to those of other regions.

DISCLOSURE OF THE INVENTION

[0011] In the above-mentioned press fabric with a slit thereon, it was necessary to use a strip having suitable weight for maintaining or improving the bondability of the batt placed on the seam region, in order to prevent depilation. Inevitably, it was difficult to equalize the perme-

abilities to air and water, and the physical property of the felt (compressibility, permeability, and fouling component accumulation) in the seam region with those of other regions.

[0012] In a press fabric, since the texture of the wet paper web adjacent to the seam region is altered in the papermaking process, if permeability to air and water, and the physical properties of the felt differ between the seam region and other regions, there is a danger that the quality of a wet paper web will fail, or the wet paper web will be torn. Moreover, there is a problem that the durability and the quality of a seam felt are spoiled.

[0013] Thus, the object of the present invention is to provide a seam felt for papermaking and a manufacturing method thereof, wherein the depilation-resistant property of a flap is improved, while the physical properties of the felt in the seam region are kept identical to those in other regions.

[0014] The present invention solves the above problems by providing a seam felt for papermaking having a wet paper web side batt layer and a seam region, characterized in that fragments of a sheet-shaped nonwoven fabric, fractured by needle punching, are dispersed in a region of said wet paper web side batt layer adjacent said seam region within the depthwise range of said batt layer, at least a part of the fibers of said batt layer penetrates holes of said fragments of nonwoven fabric, and said fragments of nonwoven fabric melt by heat and adhere to fibers of said batt layer.

[0015] The invention also solves the above problems by providing a manufacturing method for a seam felt for papermaking, wherein a base fabric having seam loops is woven by a weaving machine, characterized in that, when a batt layer is implanted into both sides of said base fabric to make a seam felt for papermaking in a needling process, a sheet-shaped nonwoven fabric is disposed in a position adjacent said seam loops, said sheet-shaped nonwoven fabric is fractured by needle punching, fragments of nonwoven fabric are dispersed into said batt layer, a flap is formed by cutting said batt layer at the region of said seam loops in a widthwise direction, and said fragments of nonwoven fabric are melted by heating.

[0016] According to the present invention, fragments of sheet-shaped nonwoven fabric are dispersed in a depthwise direction of a felt, so that the permeabilities to air and water and the physical properties of the felt in the seam region approximate those of other regions.

[0017] Moreover, according to the present invention, depilation or falling off of batt fibers of a flap can be effectively prevented. As a result, the present invention can provide a seam felt for papermaking which has good durability and which can manufacture a wet paper web of high quality with less danger of tearing in the papermaking process.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

Figure 1 is a machine direction sectional view of a seam felt for papermaking before the needle punching process.

Figure 2 is a machine direction sectional view of a seam felt for papermaking after the needle punching process, fragments of nonwoven fabric being enlarged.

Figure 3 is an enlarged perspective view showing the forms of fragments of nonwoven fabric and batt fiber after the needle punching process.

Figure 4 is a machine direction sectional view of a seam felt for papermaking wherein a slit is formed after the needle punching process, fragments of nonwoven fabric being enlarged.

Figure 5 is a machine direction sectional view of a seam felt for papermaking after a heating process, fragments of nonwoven fabric being enlarged.

Figure 6 is a machine direction sectional view of a conventional press fabric.

BEST MODES FOR CARRYING OUT THE INVENTION

[0019] Figure 1 is a machine direction sectional view of a seam felt for papermaking before the needle punching process.

[0020] In addition, "machine direction (MD)" is a longitudinal (length) direction toward which a seam felt is conveyed in a papermaking machine; and "cross-machine direction" (CMD) is a latitudinal (width) direction crossing the above direction toward which a seam felt is moved in a papermaking machine.

[0021] At first, a weaving process of a base fabric 20 is explained.

[0022] A base fabric 20 is produced by weaving longitudinal yarns (machine direction yarns) 22 and latitudinal yarns (cross-machine direction yarns) 24 with ends on a weaving machine.

[0023] In a seam region 12 of said base fabric 20, so-called seam loops 23, 23 are formed on said longitudinal yarns 22, 22.

[0024] Said seam loops 23, 23 are so arranged as to line up with one another in cross-machine direction. A stick core wire (a pintle wire) 26 is interposed between said seam loops 23, 23 to make said base fabric 20 endless.

[0025] In the needling process, which occurs next, a batt layer 30, comprising batt fiber 32, is intertwined by needle punching with both sides of said base fabric 20 to make said seam felt 10 into a papermaker's felt.

[0026] In above needle punching process, a single or multi layer sheet-shaped nonwoven fabric 40 is placed in or on the surface of the batt layer 30 at the seam region 12. Specifically, it is preferable that the sheet-shaped nonwoven fabric 40 be placed on the side of the seam loops 23, 23 toward the side that contacts a wet paper web, in the way that it covers the overall width of the seam felt 10 along the cross-machine direction. Preferably, the length of the sheet-shaped nonwoven fabric 40

in the machine direction is in the range from 1 to 20 cm.

[0027] In a seam felt 10a (refer to Figure 2) produced by a needle punching process, the sheet-shaped nonwoven fabric 40 is crushed in the vicinity of the seam region 12 to form fragments of nonwoven fabric 40a. As a result, fragments of nonwoven fabric 40a are dispersed about the seam region 12 through almost the entire depth of the batt layer 30a. Along with dispersion, the batt fiber 32 penetrates holes 41a in the fragments of nonwoven fabric 40a, as shown in Figure 3.

[0028] Next, as shown in Figure 4, the core wire 26, which was interposed in the seam loops 23, 23 of the seam felt 10b produced by needle punching process, is pulled out. Then, in a region above the location of the core wire 26, a slit 11 is formed in a batt layer 30b in the cross-machine direction of the seam felt 10b, the slit extending obliquely toward the base fabric 20.

[0029] The reason why the slit 11 is slanted relative to the machine direction by cutting the batt layer 30b diagonally is that it is less likely that marks at the seam region will be transferred to a wet paper web than in the case where the batt layer is cut vertically in the cross-machine direction. On the other hand, a cut 11' below the location of the core wire can be vertical.

[0030] As shown in figure 4, a triangular section having slit 11 as its hypotenuse serves as a flap f. In this case, the direction of travel of the seam felt 10b on a papermaking machine is from the right to the left in Figure 4.

[0031] In a hot pressing process occurring after above-described processes, the core wire 26 is put through the seam loops 23, 23 once again, and the endless seam felt 10b is laid over between a pair of rolls, which are not illustrated. By means of a heat source (not shown) arranged between said pair of rolls and a press roll, the seam felt 10b is hot pressed. The above hot pressing operation is optional, and sometimes only heating is applied.

[0032] As shown in Figure 5, fragments of nonwoven fabric 40a are melted by a hot pressing process, and the melted fragments of nonwoven fabric 40c adhere to the points where the longitudinal yarns 22, the latitudinal yarns 24, and the batt fiber 32 contact one another, and to the regions where the batt fibers 32 contact one another.

[0033] Thus, without damaging permeability to air and water, and the physical properties of the seam region 12 (compressibility, permeability, and fouling component accumulation), the present invention effectively prevents depilation and falling off of batt fibers 32 of flap f.

[0034] In addition, by pulling out the core wire 26 from the seam loops 23, 23 of the endless seam felt 10c after the hot pressing process, the seam felt 10c can be separated into a form with ends. Thus, the seam felt 10c can be packaged and shipped in rolled condition.

[0035] Therefore, when applying in a papermaking machine, after one end of a seam felt 10c having ends is put into the machine, and the seam felt 10c surrounds rolls of the papermaking machine, by engaging the seam

loops 23 at one end with the seam loops 23 at the other end, interposing the core wire 26, and connecting seam felt 10c at the seam region 12, the seam felt 10c can be rejoined into an endless form on the machine.

[0036] Preferably, the sheet-shaped nonwoven fabric 40 of the present invention is a sheet-shaped fiber assembly made of spunbond, melt blown or spunlace filament or staple fiber.

[0037] For good dispersion of the sheet-shaped nonwoven fabric 40 in the needle punching process, it is preferable that the sheet-shaped nonwoven fabric 40 be relatively lightweight. It is therefore preferable to put in place a plurality of sheet-shaped nonwoven fabrics, the basis weight or areal weight of each of which is about 12g/m².

[0038] The preferable materials for the sheet-shaped nonwoven fabric 40 are copolymerized nylon, the fusing point of which is in the range from 120 to 180 degrees Celsius, and copolymerized polyester or polyolefin, i.e., materials that have a lower fusing point than the materials of the base fabric 20 and the batt layer 30, such as nylon, polyester, aromatic nylon, polyester or polyether-ester.

INDUSTRIAL APPLICABILITY

[0039] The present invention is able to make the permeabilities to air and water, and the physical properties of the felt in the seam region approximate those of other regions. Moreover, the present invention can provide a seam felt for papermaking which has good durability and which can manufacture a wet paper web of high quality with less danger of tearing in the papermaking process.

Claims

1. A seam felt for papermaking having a wet paper web side batt layer and a seam region, **characterized in that:**

fragments of a sheet-shaped nonwoven fabric fractured by needle punching are dispersed in a region of said wet paper web side batt layer adjacent to said seam region within the depth-wise range of said batt layer;
at least a part of fibers of said batt layer penetrates holes of said fragments of nonwoven fabric; and
said fragments of nonwoven fabric melt by heat and adhere to fibers of said batt layer.

2. A method of manufacturing a seam felt for papermaking, wherein a base fabric having a seam loop is woven by a weaving machine, **characterized in that**, when a batt layer is implanted into both sides of said base fabric to make a paper making seam felt in a needling process:

a sheet-shaped nonwoven fabric is disposed at

a position adjacent said seam loop;
said sheet-shaped nonwoven fabric is fractured by needle punching, and fragments of nonwoven fabric are dispersed into said batt layer;
a flap is formed by cutting said batt layer at the region of said seam loop in a widthwise direction;
and
and said fragments of nonwoven fabric are melted by heating.

3. A method of manufacturing a seam felt for papermaking according to claim 2, wherein said sheet-shaped nonwoven fabric is made of a material the fusing point of which is in the range from 120-180 degrees Celsius.

Fig. 1

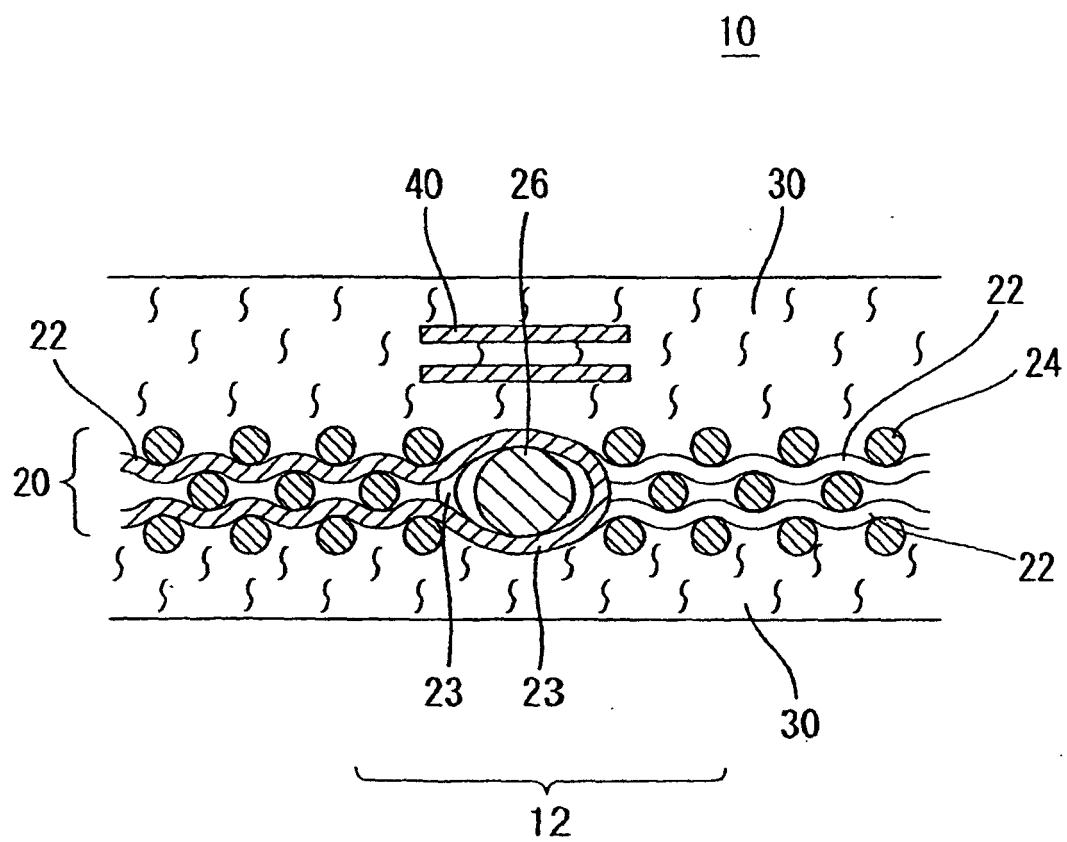


Fig. 2

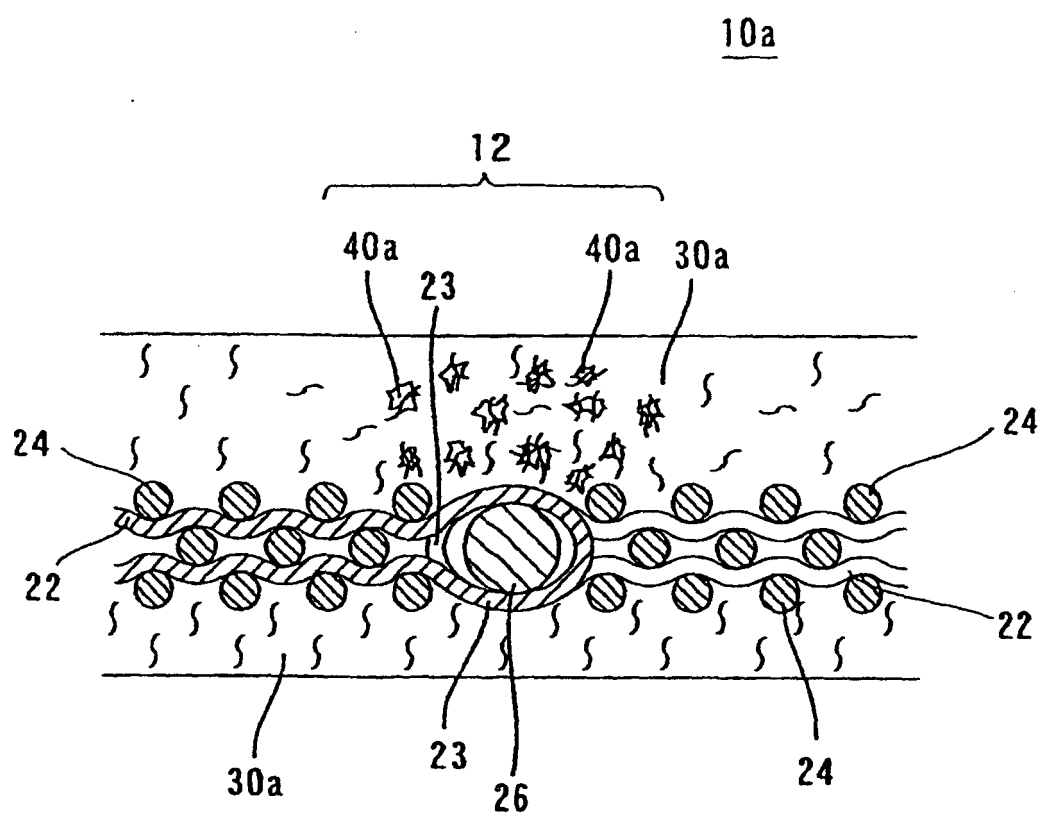


Fig. 3

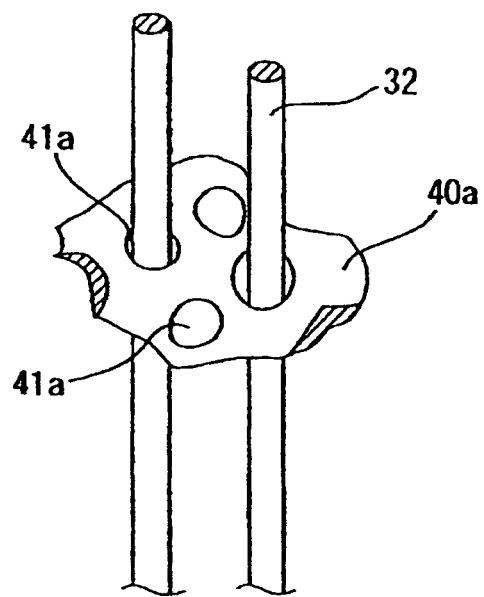


Fig. 4

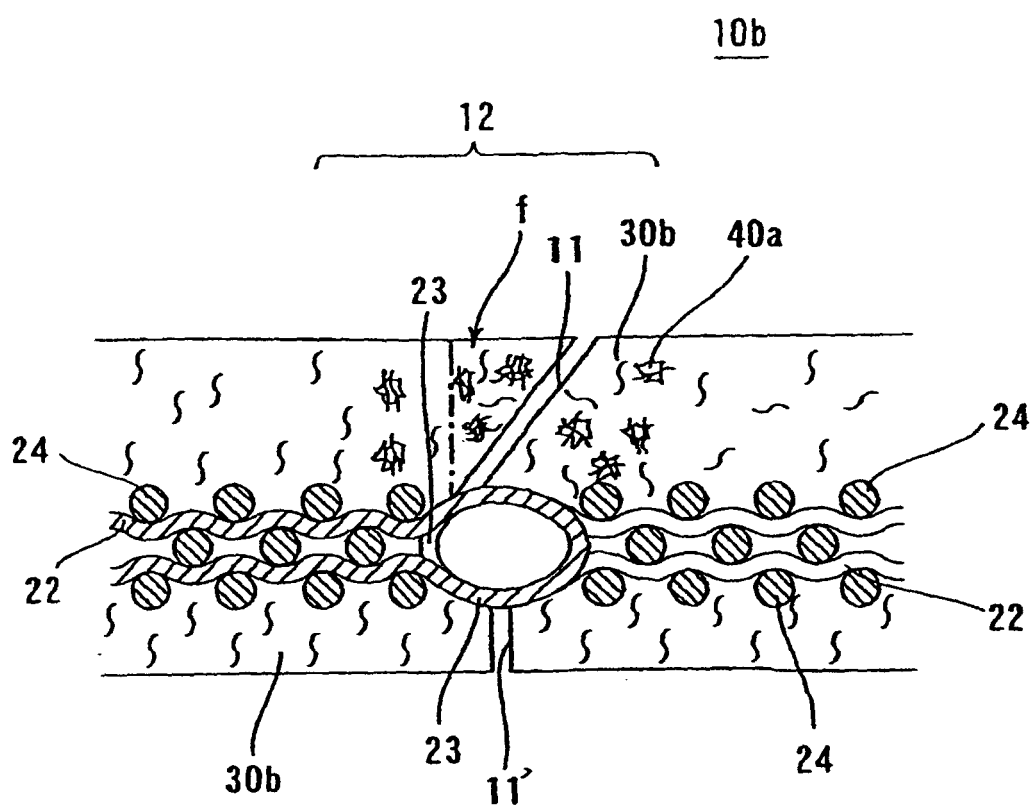


Fig. 5

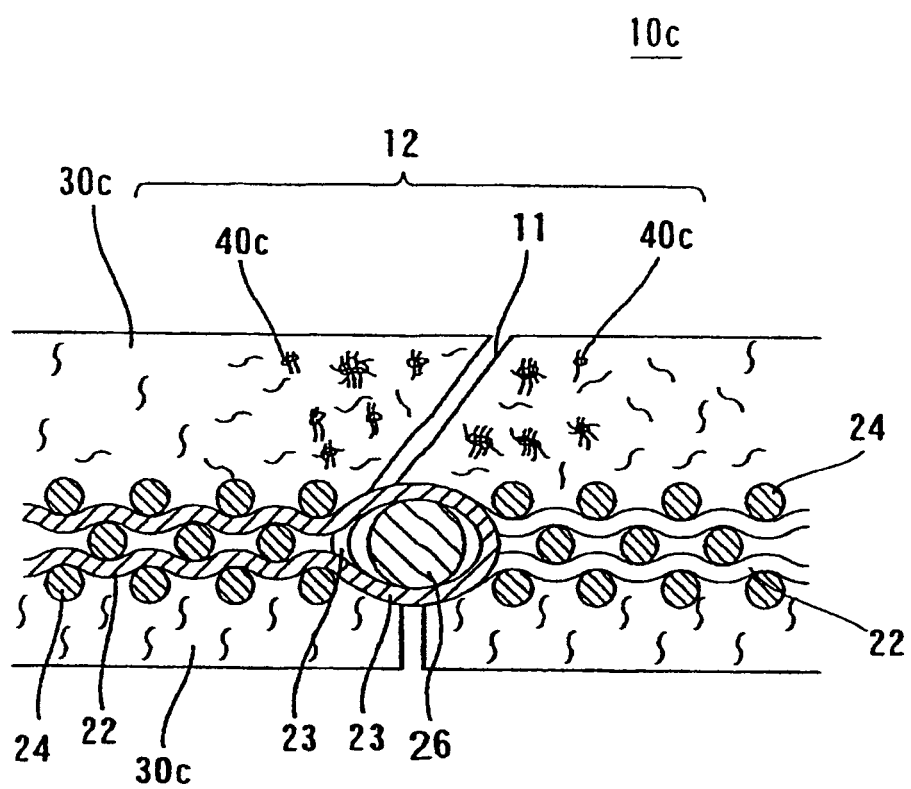
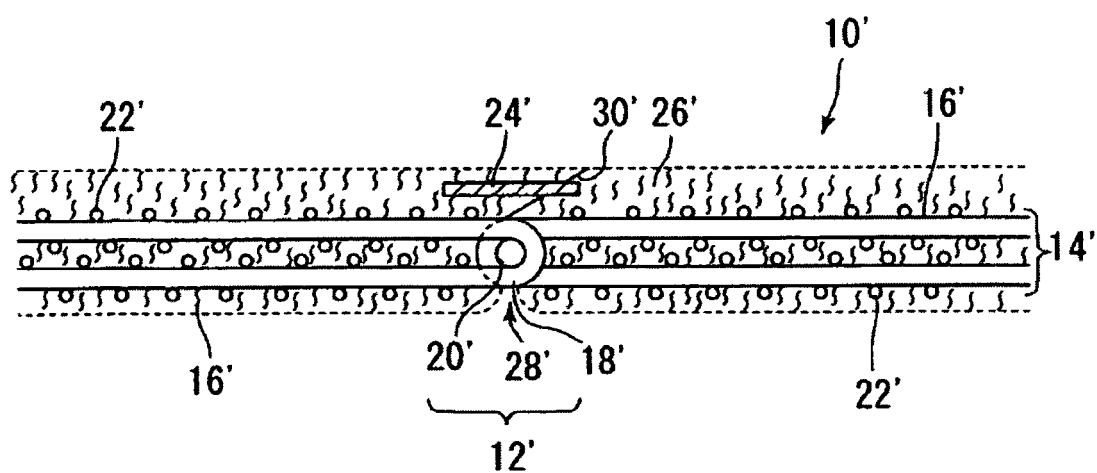


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/315064

A. CLASSIFICATION OF SUBJECT MATTER

D21F7/10(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D21F7/08-7/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02/35000 A1 (ALBANY INTERNATIONAL CORP.), 02 May, 2002 (02.05.02), Full text & JP 2004-512441 A & US 2002-115368 A1 & EP 1328681 A & AU 2598102 A & CA 2421817 A & NO 20031781 A & TW 510851 B & BR 114594 A & NZ 524582 A & CN 1469951 A	1-3

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Date of the actual completion of the international search
11 August, 2006 (11.08.06)Date of mailing of the international search report
22 August, 2006 (22.08.06)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/315064

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 695827 A2 (ALBANY INTERNATIONAL CORP.), 07 February, 1996 (07.02.96), Full text & JP 8-60586 A & US 5601877 A & US 5789052 A & AU 2045695 A & CA 2151329 A & NO 952277 A & KR 199708 B & BR 9502721 A & NZ 272169 A & CN 1125278 A & FI 952507 A & ZA 9504739 A	1-3

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 0235000 A [0003]