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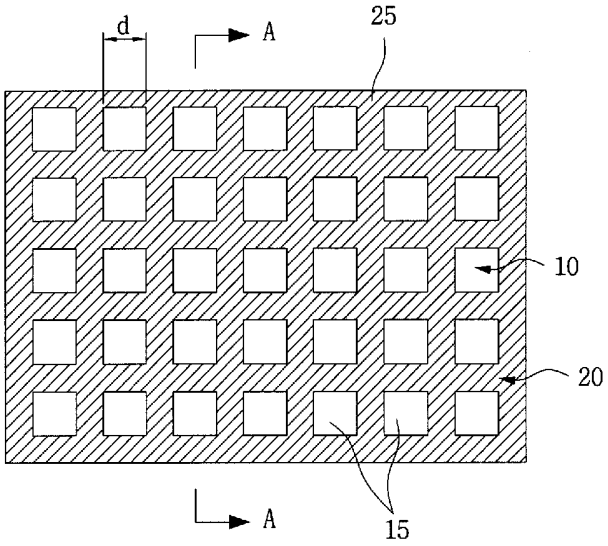
(54) Title: MEDICAL ADHESIVE TAPE



(57) Abstract: Disclosed is a medical adhesive tape, having high water vapor permeability and water resistance, characterized in that a pressure-sensitive adhesive (20) is coated on a base sheet (10) to form a net-shaped structure. As such, the net-shaped structure includes a continuous rectilinear form having square pores, a continuous curvilinear form having slanted square pores, a continuous form having circular pores, or combinations thereof. The adhesive tape includes surgical tape and plasters (first-aid plasters) serving to adhere medical appliances, rolled bandages, wound dressings, transdermal absorbents, etc., to the skin, and can permit the passage of a gas through a plurality of non-coating parts (15) to have high water vapor permeability, and simultaneously have water resistance and sufficient adhesion through a continuous net type coating part (25).

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Description

MEDICAL ADHESIVE TAPE

Technical Field

[1] The present invention relates, generally, to medical adhesive tapes for use in adhering medical appliances, dressings, etc., to the skin. More specifically, the present invention is directed to a medical adhesive tape, having high water vapor permeability and water resistance at the same time, by coating the adhesive on a base sheet to form a net-shaped structure.

[2]

Background Art

[3] In medical fields, medical adhesive tapes (pressure-sensitive tapes), such as surgical tapes, plasters (first-aid plasters), etc., are applied to adhere medical appliances, rolled bandages, wound dressings, transdermal absorbents, etc., to the skin.

[4] The adhesive tape is composed of an adhesive coated on a base sheet. Such an adhesive tape should have adhesion suitable for firmly adhering the medical appliances or dressing materials to the skin and then easily removing them from the skin. Further, the tape should have high water vapor permeability to avoid normal skin damage because it is directly attached to the skin, in which high water vapor permeability can promote wound healing.

[5] Conventionally, the adhesive tape has the pressure-sensitive adhesive coated onto an entire surface of the base sheet. Thus, conventional tapes are disadvantageous in terms of low water vapor permeability, due to the coated adhesive per se, regardless of the water vapor permeability of the base sheet. That is, even though the base sheet having high water vapor permeability is used, the adhesive coated to the entire surface of the base sheet can function to hinder water vapor permeation, therefore decreasing the water vapor permeability of the tape.

[6] In cases where the adhesive tape having low water vapor permeability is attached to the skin for longer periods, a keratin layer of the skin is hydrated by moisture extracted from the skin and thus macerated.

[7] Since such maceration weakens the strength of the keratin layer of the skin, when the adhesive tape attached to the skin is removed from the skin, the keratin layer of the skin may be removed together with the adhesive tape. Otherwise, the skin may be torn, or bacteria may infiltrate through the damaged keratin layer, to cause secondary wounds which induce allergy or infection. Also, a wound dressing is covered over the

wound, after which the adhesive tape is attached on the dressing. As such, the use of the tape having low water vapor permeability results in a decreased wound healing effect.

[8] To solve such problems, there are proposed dot-coating techniques to have a non-coating portion.

[9] FIG. 1 shows a conventional medical adhesive tape. As shown in FIG. 1, an adhesive 2 is dot-coated on a base sheet 1 to form a non-coating part 1a, thus obtaining circular coating parts 2a. In such a case, gas is easily permeated through the non-coating part 1a to increase water vapor permeability, however, water is infiltrated into a wound or medical appliance.

[10] The user of the adhesive tape may come into contact with water. Hence, water resistance is required to protect the wound or medical appliance. However, as in FIG. 1, water may be infiltrated through any sides of the conventional adhesive tape. Thus, the conventional tape has no water resistance. Specifically, dot-coated circular coating parts 2a are discontinuously formed, that is, the coating parts 2a are not mutually connected, whereby water is infiltrated between the coating parts 2a. Such infiltration of water leads to maceration of the skin, which is harmful to the wound. Moreover, as for the conventional adhesive tape shown in FIG. 1, margins of the base sheet 1 are not coated with the adhesive 2, and the tape loosens at the non-coated margins and thus may be easily removed from the attached skin during use.

[11] Therefore, there is required an improved medical adhesive tape having high water vapor permeability and water resistance, so as to have sufficient adhesion, prevent maceration and infiltration of water, and facilitate effective wound healing.

[12]

Disclosure of Invention

Technical Problem

[13] Therefore, it is an object of the present invention to alleviate the problems encountered in the related art and to provide a medical adhesive tape, which is advantageous in terms of high water vapor permeability and water resistance, by coating an adhesive on a base sheet in a net-shaped pattern to have non-coating parts.

[14]

Technical Solution

[15] To achieve the above object of the present invention, there is provided a medical adhesive tape, comprising an adhesive coated on a base sheet, wherein the adhesive is

coated to form a net-shaped structure.

[16] Based on the present invention, a medical adhesive tape having a pressure-sensitive adhesive coated onto abase sheet is characterized in that the adhesive is coated to form a net-shaped structure.

[17] Specifically, the medical adhesive tape of the present invention is coated with the pressure-sensitive adhesive to have a coating part (with an adhesive) and a plurality of non-coating parts (without an adhesive) on the base sheet, in which the coating part is formed to be a continuous net type while the non-coating parts each are isolated from the others.

[18]

Advantageous Effects

[19] Thus, the adhesive is coated so that the net-shaped structure having the plurality of the non-coating parts and the continuous coating part is formed. Thereby, the adhesive tape permits the passage of a gas through the non-coating parts thereof to realize high water vapor permeability. Simultaneously, absolute water resistance and sufficient adhesion are achieved through the continuous net type coating part of the adhesive tape.

[20]

Brief Description of the Drawings

[21] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[22] FIG. 1 is a top view showing a conventional medical adhesive tape;

[23] FIG. 2 is a top view showing a medical adhesive tape having an adhesive coated in a continuous rectilinear form, according to a first embodiment of the present invention;

[24] FIG. 3 is a sectional view taken along the line A-A of FIG. 2;

[25] FIG. 4 is a top view showing a medical adhesive tape having an adhesive coated in a continuous curvilinear form, according to a second embodiment of the present invention; and

[26] FIG. 5 is a top view showing a medical adhesive tape having circular non-coating parts, according to a third embodiment of the present invention.

[27]

Mode for the Invention

[28] Hereinafter, the present invention is specifically described with reference to the

appended drawings.

[29] FIG. 2 shows a medical adhesive tape, according to a first embodiment of the present invention, and FIG. 3 is a sectional view taken along the line A-A of FIG. 2. As shown in FIGS. 2 and 3, the medical adhesive tape of the present invention includes a base sheet 10 and an adhesive 20 coated to any one surface of the base sheet 10. As such, the adhesive 20 is coated so as to form the net-shaped structure having a plurality of non-coating parts 15 and a coating part 25. Specifically, the coating part 25 is formed to be continuous net type while the non-coating parts 15 are mutually dis-connected.

[30] The base sheet 10 of the adhesive tape has gas permeability. Such a base sheet 10 is composed of a woven fabric, a non-woven fabric or a resin film. Further, the base sheet 10 includes a single layer or two or more layers selected from among a woven fabric, a non-woven fabric and a resin film. Preferably, the base sheet 10 is formed of a resin film having liquid impermeability (water resistance) with gas permeability (water vapor permeability).

[31] The resin film used for the base sheet 10 to have high water vapor permeability is exemplified by synthetic polymers, such as polyurethane, polyethylene, silicone resin, natural and synthetic rubber, polyglycolic acid, polylactic acid or copolymers thereof, polyvinylalcohol and polyvinylpyrrolidone, and natural polymers or synthetic polymers derived therefrom, such as collagen, gelatin, hyaluronic acid, sodium-malginate, chitin, chitosan, fibrin and cellulose, or mixtures thereof. More preferably, a polyurethane film is used. The polyurethane film is superior in physical properties, for example, tensile strength, elongation, etc., as well as gas permeability (water vapor permeability) and liquid impermeability (water resistance). The polyurethane film is prepared by an extrusion process, a solvent volatilization process, or a solidification process.

[32] The adhesive 20 is selected from the group consisting of acryl-, rubber-, urethane- or silicone-based pressure-sensitive adhesive. Most preferably, an acryl-based adhesive is used, because it little induces skin allergy.

[33] According to the present invention, the adhesive20 is coated on the base sheet 10 so as to form the net-shaped structure having the coating part 25 and the non-coating parts 15 on the base sheet10. In the present invention, the net-shaped structure includes a continuous rectilinear form having square pores, a continuous curvilinear form having slanted square pores, a continuous form having circular pores, or combinations thereof. Specifically, the coating part 25 of the adhesive tape, according to the first

embodiment of the present invention, is formed to be a continuous rectilinear type net having square pores, as in FIG. 2. Meanwhile, as for an adhesive tape according to a second embodiment of the present invention shown in FIG. 4, a coating part 25 is formed to be a continuous curvilinear type net having slanted square pores. Otherwise, the coating part 25 has a continuous rectilinear or curvilinear type net having circular or polygonal pores. Accordingly, the non-coating parts 15 have various shapes, such as squares, circles, etc., corresponding to the shapes of the pores of the net type coating part 25. FIG. 5 shows a plurality of non-coating parts 15 having circular shapes, in an adhesive tape according to a third embodiment of the present invention.

[34] As such, as seen in FIGS. 2 and 5, margins of the base sheet 10 of the adhesive tape are coated with the adhesive20 so that the adhesive tape does not loosen at the margins thereof when being attached to the skin.

[35] Hence, the medical adhesive tape of the present invention can permit the passage of a gas through the non-coating parts 15, thus achieving high water vapor permeability. Further, the inventive adhesive tape has water resistance, and simultaneously, is increased in adhesion, by means of the continuous net type coating part 25.

[36] That is, compared to conventional adhesive tapes having totally coated adhesive 20, the adhesive tape of the present invention has the non-coating parts 15 permitting the passage of a gas, thus having high water vapor permeability. Also, compared to the dot-coated conventional technique (FIG. 1), the coating part 25 of the adhesive tape of the present invention is formed to be continuous net type, whereby infiltration of water is completely prevented by the coating part 25 formed on all margins of the base sheet 10 (four sides in FIG. 2), resulting in water-proofing. Moreover, the adhesive 20 of the adhesive tape is coated at a wide coating distribution, and thus the adhesive tape has superior adhesion. As shown in FIGS. 2 and 5, since the adhesive 20 is coated to the margins of the base sheet 10 of the adhesive tape, the adhesive tape of the present invention does not loosen at the margins thereof, and thus is not removed from the skin during use, thereby having higher adhesion, compared to the conventional adhesive tape as in FIG. 1.

[37] Although the coating part 25 of the inventive adhesive tape is not particularly limited, it is preferably coated to have 10-90% of an entire area of the adhesive tape (or an entire area of the base sheet). If the area of the coating part25 is less than 10%, it is difficult to realize a desired adhesion. Meanwhile, if the area exceeds 90%, high water vapor permeability cannot be achieved.

[38] Further, spaces (d) between each other of the continuous net type coating part 25

may be adjusted to achieve sufficient adhesion, depending on the size and use of the adhesive tape (product).

[39] Therefore, the medical adhesive tape of the present invention serves as a adhering tape for use in adheringa medical appliance, a rolled bandage, a wound dressing, a transdermal absorbent, etc., to the skin, and includes surgical tape and plaster (first-aid plaster). In such a case, if an adhesive tape having a wound dressing at a central portion (adhesive-coated portion) thereof is commercially provided, it should further include a back sheet. The back sheet is a releasing film, such as a disposable vinyl film upon the use of the adhesive tape.

[40] Having generally described this invention, a further understanding can be obtained by reference to specific examples and comparative examples which are provided herein for purposes of illustration only and are not intended to be limiting unless otherwise specified.

[41]

[42] Example 1

[43] Polyurethane elastomer was added to a mixture solvent of dimethylformamide (DMF) and methylethylketone (MEK) (DMF:MEK = 40:60), and heated at 60C while being stirred, to obtain a viscous polyurethane solution. Then, a mold for a base sheet was manufactured in such a way that tape was attached to margins of a releasing film to form a barrier having a predetermined height, and the releasing film and the barrier were coated with silicone to have water resistance. The polyurethane solution was poured onto the releasing film (the mold) and coated at a uniform thickness by use of a film coater (Test SANGYO Co. Ltd., PI-1210), and then dried at 100C in an oven for one hour. Thereafter, a 20 m thick polyurethane film was obtained.

[44] An acryl-based adhesive (HT-900A acryl copolymer based adhesive, Jaesung Co., Ltd., Korea) was coated on the polyurethane film by use of a screen printer (DS-68M, Dasan Tech Co., Ltd., Korea), and dried at 100C in an oven for five min., to obtain an adhesive tape having a coating part 25 in a form of a continuous rectilinear type net as in FIG. 2. As such, the resultant adhesive tape had a coating area of 10% of an entire area thereof, in which the coating area was measured by an image analyzer (RZR 2051, Inu Hi-Tek Co., Ltd., Korea).

[45] The adhesive tape was measured for water vapor permeability and thickness. The results are shown in Table 1, below.

[46]

[47] Examples 2-5

[48] Respective adhesive tapes were prepared in the same manner as in Example 1, with the exception of having different coating areas. For example, the adhesive tapes had various coating areas of 30% (Ex. 2), 50% (Ex. 3), 70% (Ex. 4), and 90% (Ex. 5) of the entire area thereof. Water vapor permeability and thickness of the adhesive tapes were measured. The results are shown in Table 1, below.

[49] The above measurement was performed according to the following procedures.

[50]

[51] Water vapor permeability

[52] According to ASTM E96-90 (inverted cup method) using a thermohydrostat, factors required to measure water vapor permeability were determined. As such, the measurement was performed at 350.5C under relative humidity of 505%. The water vapor permeability was calculated according to the following equation:

[53] $P = A/S$

[54] $A = ((a_1 - a_0) + (a_2 - a_1) + (a_3 - a_2))/3$

[55] Wherein,

[56] P: water vapor permeability (g/㎡/24hr)

[57] A: average weight increased for one hour (g)

[58] S: vapor permeating area of a test piece (㎡)

[59] a_0: weight measured after one hour

[60] a_1, a_2, a_3: weights measured after two, three and four hours

[61]

[62] Thickness measurement

[63] The adhesive tape and the polyurethane film were measured for thickness by use of a dial type micrometer.

[64]

[65] Comparative Example 1

[66] The present comparative example was performed in the same manner as in Example 1, with the exception that an adhesive was not coated onto the polyurethane film (adhesive coating area 0%). The obtained adhesive tape was measured for the physical properties (water vapor permeability and thickness) as in Example 1. The results are given in Table 1, below.

[67]

[68] Comparative Example 2

[69] The present comparative example was performed in the same manner as in Example 1, with the exception that an adhesive was coated onto an entire surface of

the polyurethane film by use of a film coater (adhesive coating area 100%). The obtained adhesive tape was measured for the physical properties (water vapor permeability and thickness) as in Example 1. The results are given in Table 1, below.

[70]

[71] Comparative Example 3

[72] In the present comparative example, an adhesive tape commercially available from M was used (adhesive coating area 100%, trade name: Tegaderm). The physical properties were measured as in Example 1. The results are given in Table 1, below.

[73]

[74] Table 1

Measurement of Physical Properties of Adhesive Tape

Ex. No.	Permeability(g/m²/24hr)	Polyurethane(㎛)	Adhesive Tape(㎛)	Coating Area(%)
1	2800	20	45	10
2	2400	20	45	30
3	2000	20	45	50
4	1500	20	45	70
5	1000	20	45	90
C.1	3000	20	20	0
C.2	650	20	45	100
C.3	450	25	50	100

[75]

[76] As apparent from Table 1, it can be seen that water vapor permeability of the adhesive tape increases as the coating area of the adhesive decreases. From this, it can be found that adjustment of the coating area of the adhesive results in easy control of the water vapor permeability of the adhesive tape. Further, water vapor permeability is remarkably low in Comparative Examples 2 and 3 having a wholly-coated adhesive, whereas it is very high in Examples 1 to 5.

[77]

Industrial Applicability

[78] As described hereinbefore, the present invention provides a medical adhesive tape, characterized by having high water vapor permeability through a plurality of non-

coating parts, and superior water resistance and adhesion through a continuous net type coating part. Thus, the adhesive tape of the present invention is advantageous in terms of fast wound healing, and prevention of maceration of a keratin layer of the skin and infiltration of water, thus inhibiting a secondary wound inducement.

[79] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

[80]

Claims

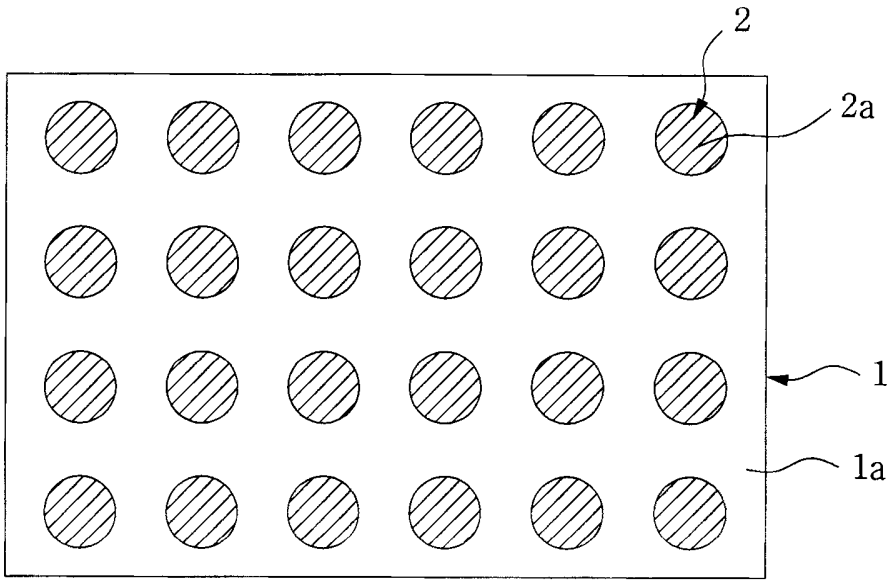
[1] A medical adhesive tape, comprising a pressure-sensitive adhesive coated on a base sheet, wherein the adhesive is coated to form a net-shaped structure.

[2] The adhesive tape as defined in claim 1, wherein the net-shaped structure comprises a continuous rectilinear form having square pores, a continuous curvilinear form having slanted square pores, a continuous form having circular pores, or combinations thereof.

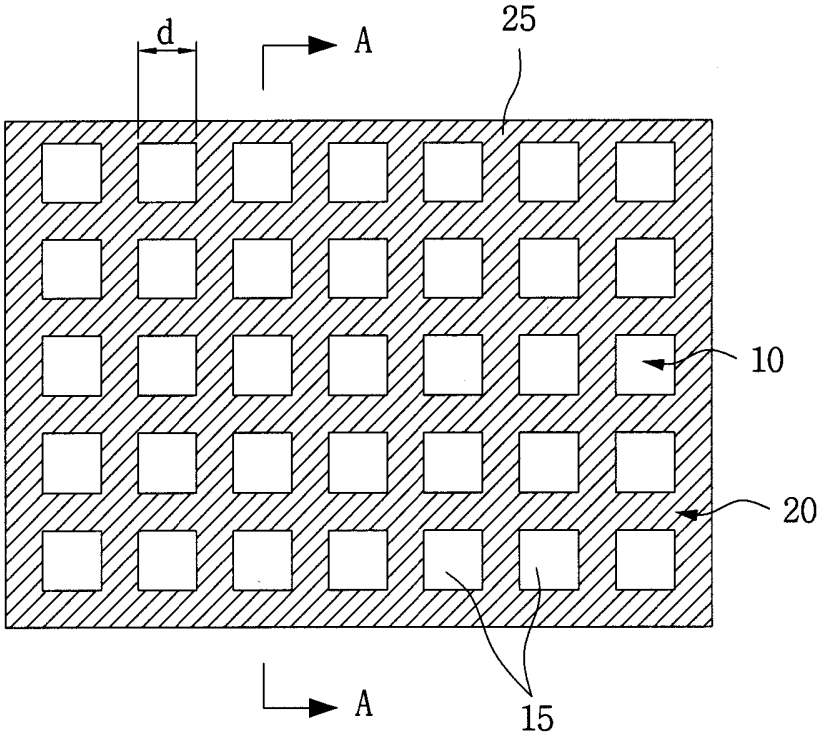
[3] The adhesive tape as defined in claim 1 or 2, wherein the adhesive is coated to margins of the base sheet.

[4] The adhesive tape as defined in claim 1 or 2, wherein a coating part of the net-shaped structure amounts to 10-90% of an entire area of the adhesive tape.

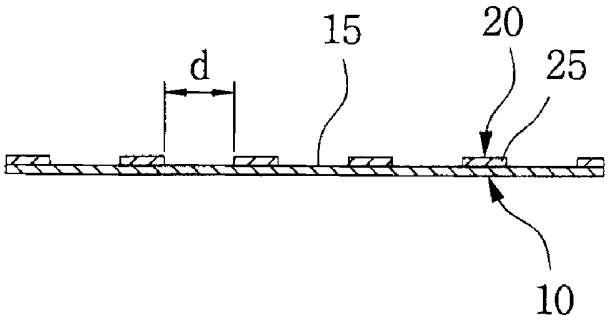
[Fig. 1]



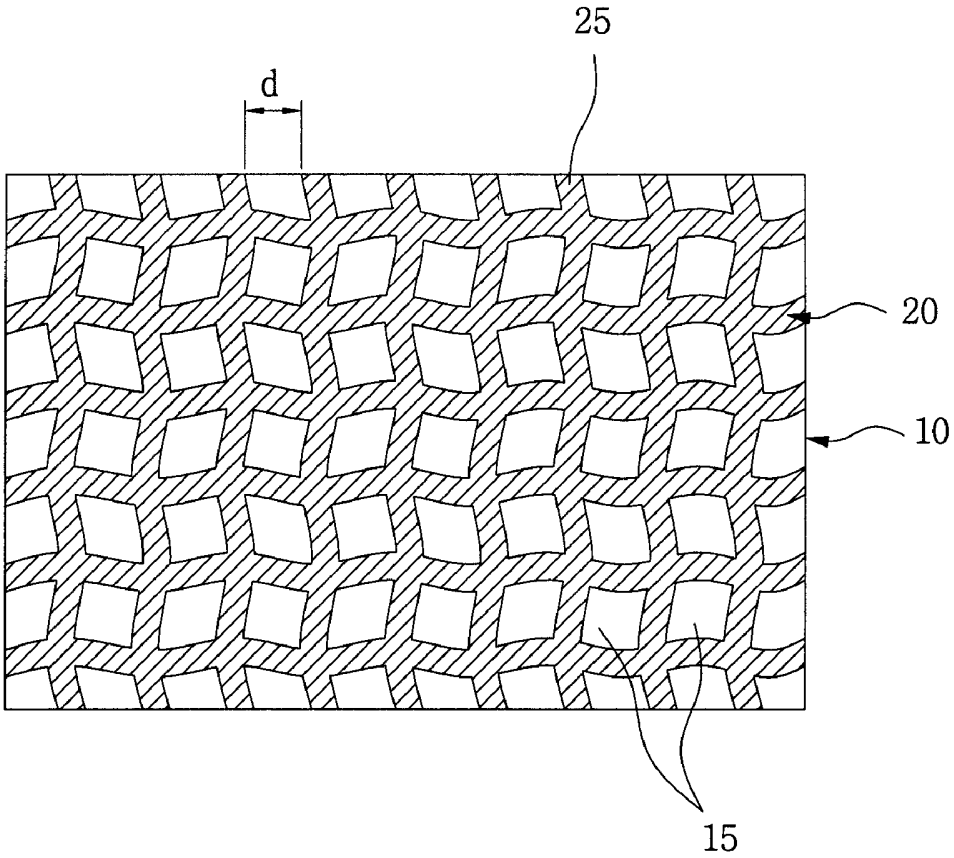
[Fig. 2]



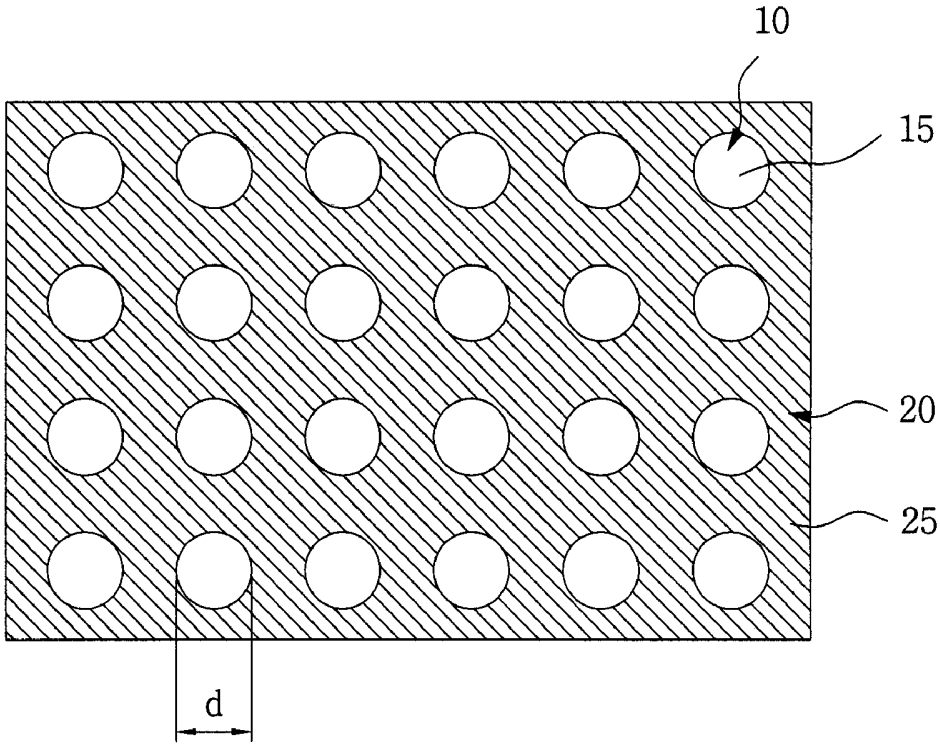
[Fig. 3]



[Fig. 4]



[Fig. 5]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2004/001577

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 C09J 7/02

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)
IPC7 A61F 13/02, A61L 15/58, C09J 7/02

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

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)
PAJ, E-SPACENET, E-KIPASS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 09-220252 A (FUKUNAGA MIKIO) 26 AUGUST 1997 See claims and figures	1-4
Y	US 5736470 A (GARY E. SCHNEBERGER ET AL) 7 APRIL 1998 See figures 1-7	1-4
A	JP 11-009623 A (NICHIBAN CO LTD) 19 JANUARY 1999 See the whole document	1
A	US 6544615 B2 (ULRICH OTTEN ET AL) 8 APRIL 2003 See the whole document	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
26 NOVEMBER 2004 (26.11.2004)	**26 NOVEMBER 2004 (26.11.2004)**

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Authorized officer
KIM, Seung Soo
Telephone No. 82-42-481-5581

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 5736470 A	07.04.98	NONE	
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