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(54) **CLEANING CLOTH**

(57) The present invention provides a cleaning cloth, in which a large number of parallel ridge regions are formed at predetermined intervals in a nonwoven cloth made of synthetic resin fibers each having a small diameter so that the fibers protrude by needle punching means. This makes it possible for edges of a large number of ridge regions arranged in parallel to each other

to function as cleaning edges to clean a surface of an article to be cleaned effectively. Further, since the ridge regions have the predetermined width, an appropriate strength of the ridge regions can be secured to restrain the quantity of compressive deformation of the edge parts by a frictional force during cleaning. Thus, a high cleaning performance can be exhibited.

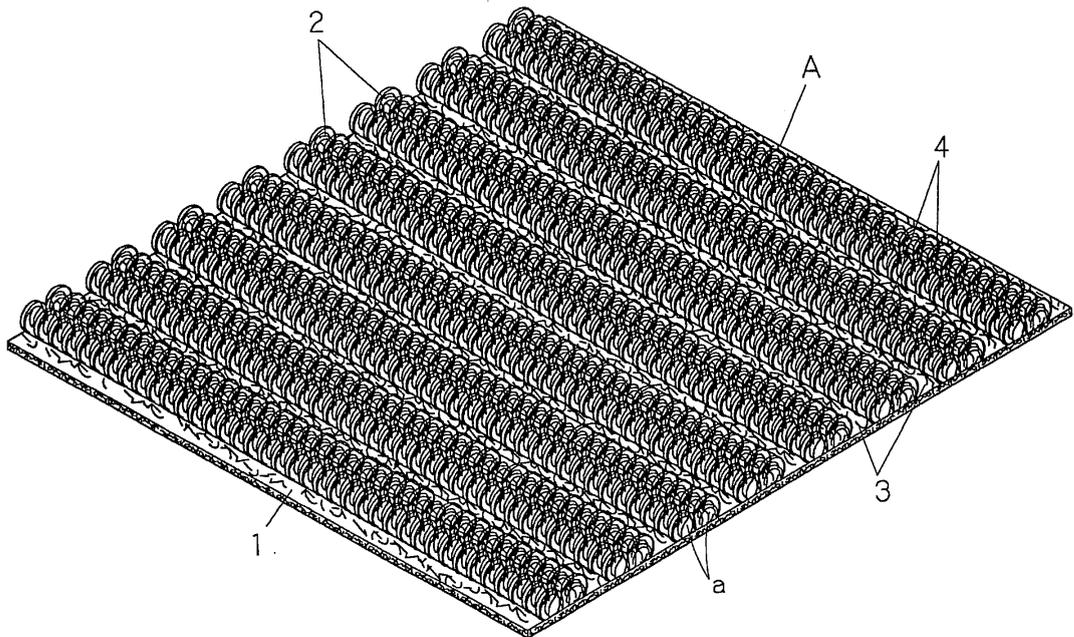


Fig. 2

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Description

TECHNICAL FIELD

[0001] The present invention relates to a cleaning cloth used to wipe off and clean stains adhering to glass, pottery, synthetic resins, metals, stone materials, and other various materials of tableware, rice cooling tools, utensils and others.

BACKGROUND ART

[0002] Hitherto, as multipurpose cleaning cloths for households or industries, cloths formed from nonwoven cloth of synthetic resin fibers have been variously proposed, and used.

For example, Patent Document 1 discloses an abrasive cloth, wherein abrasive grains are bonded and fixed to the fiber surface of a nonwoven cloth containing synthetic fibers each having a flatness factor of 5 or more with a binder interposed therebetween. Patent Document 2 discloses an abrasive cloth, wherein silicon carbide abrasive grains are bonded and fixed to fibers of a nonwoven cloth containing a metal-plated synthetic resin fiber. Moreover, Patent Document 3 discloses an abrasive cloth, wherein a urea resin and silicon carbide abrasive grains are bonded and fixed to fibers of a nonwoven cloth.

[0003] Additionally, Patent Documents 4 and 5 each disclose an abrasive cloth, wherein abrasive grains are bonded and fixed not to individual fibers but to a single surface or both surfaces of a nonwoven cloth with an adhesive agent.

[0004] Further, Patent Documents 6 and 7 each disclose an abrasive cloth, wherein a porous resin layer is formed on fibers of a nonwoven cloth without using any abrasive grain.

Patent Document 1: JP-A-5-220670
 Patent Document 2: JP-A-6-155310
 Patent Document 3: JP-A-6-155311
 Patent Document 4: JP-A-5-28477
 Patent Document 5: JP-A-9-22886
 Patent Document 6: JP-A-6-17374
 Patent Document 7: JP-A-7-108465

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005] However, in the abrasive cloths disclosed in Patent Documents 1 to 3, a thermoplastic resin is used as a binder to bond and fix abrasive grains to nonwoven cloth fibers. Thus, the friction between the abrasive grains and an article to be abraded or an article to be cleaned is large so that the lubricity is poor. As a result, it is unavoidable to use a cleaner or a lubricant separately. Additionally, the surface of the article to be cleaned, for example, tableware may be scratched since the hard abrasive grains are used. The abrasive cloths have such

problems.

[0006] In the abrasive cloths disclosed in Patent Documents 4 and 5, abrasive grains are bonded and fixed only to a surface layer of a nonwoven cloth with an adhesive agent. Accordingly, only the surface layer region to which the abrasive grains are bonded and fixed has an abrading power; at the same time when an adhesive agent layer is worn away, the abrasive grains are peeled off. Thus, the abrasive cloths have a problem that the abrading power falls rapidly.

[0007] The abrasive cloths disclosed in Patent Documents 6 and 7, wherein a porous resin layer is formed on fibers of a nonwoven cloth, have a problem that the abrading power thereof cannot be exhibited unless an abrasive member containing abrasive grains is separately prepared to be simultaneously used. In a production process for forming the porous resin layer, the nonwoven cloth is impregnated with a solution of a polyurethane resin or a polysulfone resin in a polar solvent having a high boiling point, such as dimethylformamide (DMF) and subsequently the DMF solvent is removed by using water or hot water; therefore, a troublesome step, such as distillation, is necessary to collect the solvent. Furthermore, a large amount of discharging water containing pollutants, such as BOD, is generated so that a pollution problem may be caused. Thus, there also arises a problem that post-treatment of the discharging water is required.

[0008] Therefore, an object of the present invention is to provide a multipurpose cleaning cloth which makes it possible to clean stains adhering to the surface of an article to be cleaned effectively without use of a cleaner in the case of ordinary stains, or with a small amount of cleaner in the case of stubborn stains, without scratching the surface, by taking a structure itself of a nonwoven cloth into a unique consideration without bonding and fixing abrasive grains to fibers of the nonwoven cloth or a surface layer thereof or without forming a porous resin layer on fibers of the nonwoven cloth.

40 MEANS FOR SOLVING THE PROBLEMS

[0009] In order to attain the object, technical means described below are taken in the present invention. Accordingly, the cleaning cloth according to the present invention is a cloth, in which a large number of parallel ridge regions each having a predetermined width are formed at predetermined intervals in a nonwoven cloth made of synthetic resin fibers each having a small diameter so that the fibers protrude in a loop by needle punching means.

[0010] When the invention is carried out, it is preferable that the thickness of regions in the nonwoven cloth, in which the ridge regions are not formed, is from 1 to 3 mm, the density of the nonwoven cloth is from 0.15 to 0.40 g/cm³, the height of the ridge regions is from 4 to 6 mm, the interval between the ridge regions is from 4 to 8 mm, and the width of the ridge regions is from 3 to 6 mm. It is also preferable that the synthetic resin fiber con-

stituting the nonwoven cloth is a polyester fiber, and the fineness thereof is from 20 to 30 dtex.

EFFECTS OF THE INVENTION

[0011] Since the invention has a constituent as described above, it is possible for edges of a large number of ridge regions arranged in parallel to each other to function as cleaning edges to improve a performance of cleaning the surface of an article to be cleaned. Further, since the ridge regions have the predetermined width, an appropriate strength of the ridge regions can be secured to restrain the quantity of compressive deformation (end face sagging) of the edge parts by a pushing-force during cleaning. Thus, a high cleaning performance can be kept. For example, in the case where the cleaning cloth is used while tableware or the like is washed with water, drainage is made good by grooves made between the individual ridges. Thus, the cleaning effect can be improved. Furthermore, the production process is simple and the cleaning cloth can be produced at low cost since the ridge regions can be effectively formed by needle punching using a nonwoven cloth as a base material. Additionally, since the ridge regions, which are substantially regions for a cleaning action, are integrated with the nonwoven cloth, there is an advantageous effect that the cleaning cloth is strong and has a long lifespan.

[0012] As recited in claim 3, by forming, in middles of the ridge regions, narrower middle grooves along a ridge direction in the invention, ridge region edges at the middles grooves or at upper ends of the grooves also function as the cleaning edges to produce an effect that a higher cleaning performance can be obtained.

[0013] As recited in claim 5, by making the sectional shape of the synthetic resin fibers into a sharp cross section having different diameters, such as a triangle or a rectangle, in the invention, there is produced an effect that the cleaning performance is further promoted.

[0014] As recited in claim 6, when the synthetic resin fibers are formed to have a sheath/core structure, a core material is polyester and a sheath material is polyethylene having a lower melting point than that of the core material, it is possible to: form the ridge regions so that the fibers protrude by a needle punching manner in the production process for forming the ridge regions; and subsequently subject the resultant to heating treatment under the condition of a temperature, which is not higher than the melting point of the core material and causes the surface of the sheath material to be melted, thereby heating some parts of the fibers protruded toward the side of the ridge regions and intertwined with each other. As a result, the form of the ridge regions can be adjusted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a perspective view illustrating a cleaning

cloth according to the invention before forming ridge regions, wherein alternate long and two short dashes lines represent punching plan lines of a needle punch.

5 Fig. 2 is a perspective view illustrating a cleaning cloth of a first embodiment according to the invention.

Fig. 3 is an enlarged sectional view of a main portion of the cleaning cloth.

10 Fig. 4 is an enlarged sectional view illustrating a fiber of the cleaning cloth according to the invention.

Fig. 5 is a front view illustrating an example of use of the cleaning cloth according to the invention.

15 Fig. 6 is a perspective view illustrating a cleaning cloth of a second embodiment according to the invention.

Fig. 7 is an enlarged schematic view illustrating an example of cleaning by use of the cleaning cloth according to the invention.

20 Fig. 8 is an enlarged sectional view of a fiber illustrating a third embodiment.

Fig. 9 is an enlarged schematic view illustrating an example of cleaning by use of the cleaning cloth of the third embodiment.

DESCRIPTION OF REFERENCE NUMBERS OR SYMBOLS

[0016]

30 1 nonwoven cloth
2 ridge regions
3 grooves
4 middle groove
35 A cleaning cloth
a fibers

BEST MODE FOR CARRYING OUT THE INVENTION

40 **[0017]** When the invention is carried out, synthetic resin fibers used in a nonwoven cloth are preferably polyester resin fibers since the fibers are firm and have abrasion resistance. When the resin fibers each have a triangular or rectangular sectional shape and apexes thereof are made as sharp as possible, a preferable cleaning effect can be expected.

Embodiment 1

50 **[0018]** Preferred embodiments for carrying out the invention will be described in detail hereinafter in accordance with the attached drawings.

Fig. 1 shows a nonwoven cloth, which is a base material of a cleaning cloth A according to the invention. This nonwoven cloth 1 is preferably made of polyester fibers having a fineness of 20 to 30 dtex, preferably 28 dtex, and a thickness (t) of 1 to 3 mm, preferably 1.5 mm.

[0019] In the invention, a large number of parallel ridge

regions 2 are formed with grooves 3 interposed therebetween by protruding the fibers out by needle punching means, that is, punching a needle to the nonwoven cloth. In this case, the density of the nonwoven cloth 1 is from 0.15 to 0.40 g/cm³, and is preferably 0.20 g/cm³. If the density is 0.15 g/cm³ or less, the strength for keeping the shape deteriorates and further the effect of pulling out the fibers with the needle punch gets worse. If the density is more than 0.40 g/cm³, the needles are unfavorably damaged many times.

[0020] From results of cleaning performance tests, as illustrated in Fig. 3, the cleaning cloth of the invention is preferably a cleaning cloth wherein the height (h) of the ridge regions 2 is from 4 to 6 mm, preferably 5 mm, the width (W1) of the ridge regions 3 is from 3 to 6 mm, preferably 4 mm, the interval between the ridge regions 2, that is, the width (W2) of the grooves 3 is from 4 to 8 mm, preferably 6 mm.

[0021] In the production process of the cleaning cloth of the invention, the ridge regions 2 are formed so that a large number of fibers a protrude in a loop toward one of both surface sides thereof by needle punching means. As illustrated in Fig. 1, in this case, the needles are punched into the nonwoven cloth 1 along needle punching lines L having pairs of two adjacent lines L1 and L2, whereby the ridge regions 2 having a predetermined width can be formed by using the fibers a protruded toward the single surface. When the interval between the individual pairs of the two lines L1 and L2 is changed, for example, when the interval is made slightly large, slender immediate grooves 4 can be formed along the ridge direction between the ridge regions 2 and 2, as illustrated in Figs. 2 and 3.

Embodiment 2

[0022] As illustrated in Fig. 6, the ridge regions 2 having no intermediate grooves can be formed at intervals.

[0023] As described above, the ridge regions 2 are formed, and subsequently the surfaces of the protruded fibers are subjected to heating treatment to be shrunken, thereby adjusting the form of the ridge regions 2 and further improving the strength thereof. In this case, it is advisable that the fibers a are rendered fibers each having a triangular form and its apexes are made sharp, as illustrated in Fig. 4(a), or that the fibers a are made into a sheath/core structure, a core material c thereof is made of polyester, and a sheath material b thereof is made of polyethylene having a lower melting point than that of the core material c, as illustrated in Fig. 4(b). This manner makes it possible to deform some parts of the protruded and intertwined fibers a and a to adjust the form of the ridge regions 2 by subjecting the fibers to heating treatment under the condition of a temperature, which is not higher than the melting point of the core material c and causes the surface of the sheath material b to be melted. The heating temperature in the heating treatment preferably ranges from 150 to 180°C.

[0024] The thus-formed cleaning cloth A of the first embodiment is a cleaning cloth, wherein the sectional shape of the individual fibers a, which constitute the cleaning cloth A, is made into a substantially equilateral triangle having sharp apexes. As illustrated in Fig. 7, therefore, stains such as hot water scurf and water scurf, and oily stains on tableware can be rubbed off with the sharp apexes of the individual fibers a. The stains rubbed off once can be floated and embraced into water held between the fibers. Thus, the stains are not again rubbed against the surface to be cleaned, so that stains can be effectively cleaned up only by water without using any cleaner.

Embodiment 3

[0025] Figs. 8 and 9 illustrate a third embodiment. Fig. 8 is an enlarged view illustrating a sectional shape of a drawn monofilament made in the form of a substantial rectangle having projected portions 10, 10, ..., which are projected into four directions.

[0026] About a nonwoven cloth made of such drawn monofilaments, which each have a sectional shape made into the form of a substantial rectangle, the monofilaments protrude in a loop by needle punching means, as in the first embodiment, to make ridge regions.

[0027] As illustrated in Fig. 9, the thus-formed cleaning cloth also makes it possible to rub off stains such as hot water scurf and water scurf, and oily stains on tableware with the sharp apexes 10, 10, ... of the individual fibers a, which constitute the cleaning cloth. Thus, in the same manner as in the case of the cleaning cloth A disclosed in the first embodiment, stains can be effectively cleaned up only by water without using any cleaner.

[0028] As illustrated in Figs. 4 and 8, in the invention, the sectional shape of the polyester fibers a is preferably made into a sectional shape having different diameters, which has sharp apexes, as in fibers a having a substantially triangular shape or fibers a having a rectangular shape. This makes it possible to promote the cleaning performance.

[0029] The cleaning cloth A of the invention may be used as it is in the state that the cloth is appropriately divided and cut into the form of sheets. Usually, as illustrated in Figs. 3 and 5, a soft sponge support made of a foamed resin may be stuck on the lower surface of the cleaning cloth A so as to make the cloth into a cleaning tool.

INDUSTRIAL APPLICABILITY

[0030] The cleaning cloth of the invention can be used as a tool for cleaning articles in wide fields whether the articles are articles for households or industries in order to wipe off and clean stains adhering to the surface of glass, pottery, synthetic resins, metals, stone materials, and other various materials of tableware, rice cooling tools, utensils and others.

Claims

1. A cleaning cloth, in which a large number of parallel ridge regions each having a predetermined width are formed at predetermined intervals in a nonwoven cloth made of synthetic resin fibers each having a small diameter so that the fibers protrude in a loop by needle punching means. 5
2. The cleaning cloth according to claim 1, wherein the thickness of regions in the nonwoven cloth, in which the ridge regions are not formed, is from 1 to 3 mm, the height of the ridge regions is from 4 to 6 mm, the interval between the ridge regions is from 4 to 8 mm, and the width of the ridge regions is from 3 to 6 mm. 10 15
3. The cleaning cloth according to claim 1 or 2, wherein, in middles of the ridge regions, narrower middle grooves are formed along a ridge direction. 20
4. The cleaning cloth according to any one of claims 1 to 3, wherein the synthetic resin fiber is a polyester fiber, the fineness thereof is from 20 to 30 dtex, and the density of the nonwoven cloth is from 0.15 to 0.40 g/cm³. 25
5. The cleaning cloth according to any one of claims 1 to 4, wherein the sectional shape of the synthetic resin fiber is triangular or rectangular. 30
6. The cleaning cloth according to any one of claims 1 to 5, wherein the synthetic resin fibers are formed to have a sheath/core structure, and a core material is made of polyester and a sheath material is made of polyethylene having a lower melting point than that of the core material. 35

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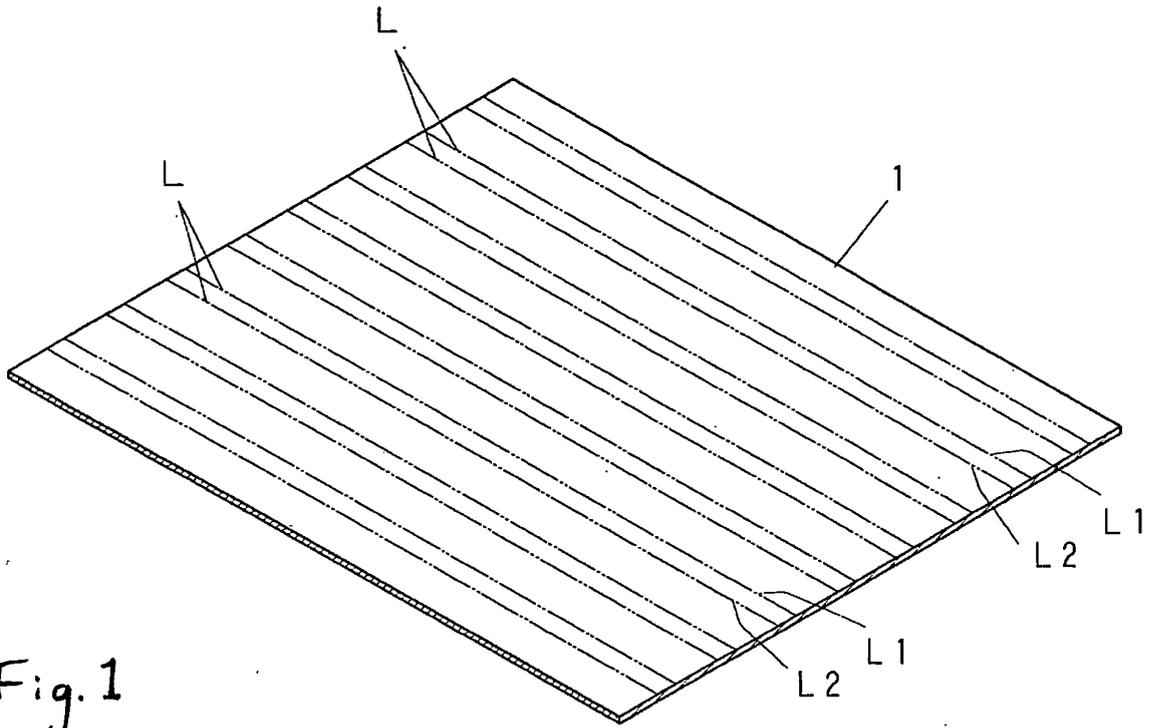


Fig. 1

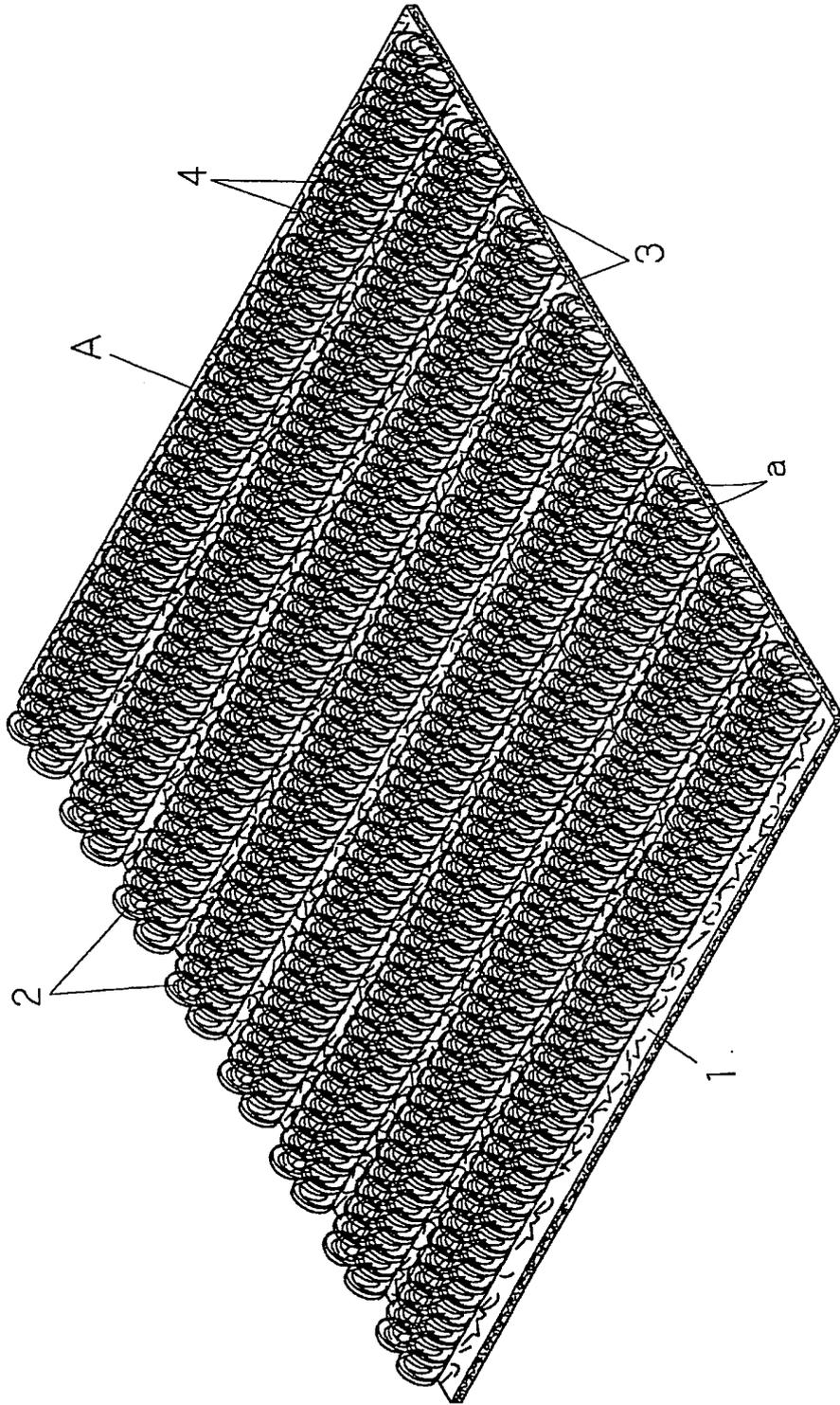


Fig. 2

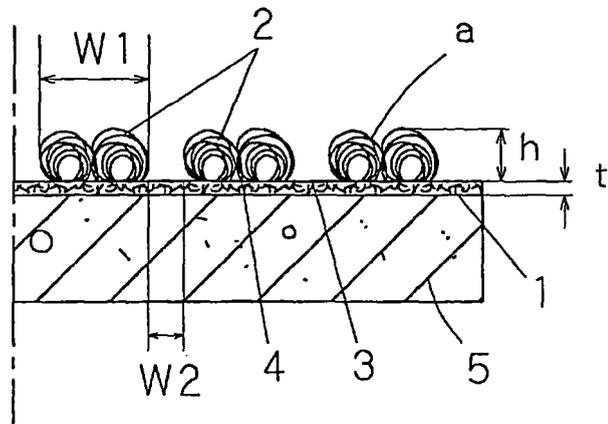


Fig. 3

(a)

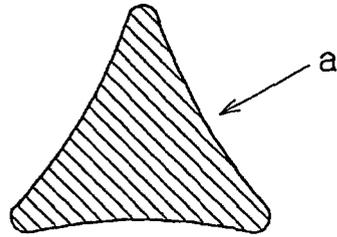


Fig. 4

(b)

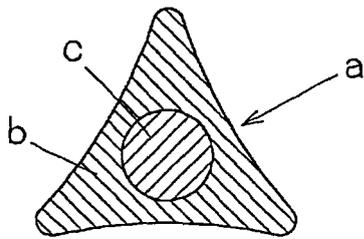
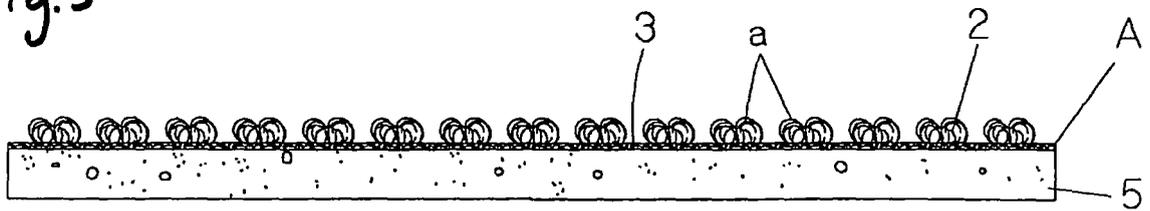


Fig. 5



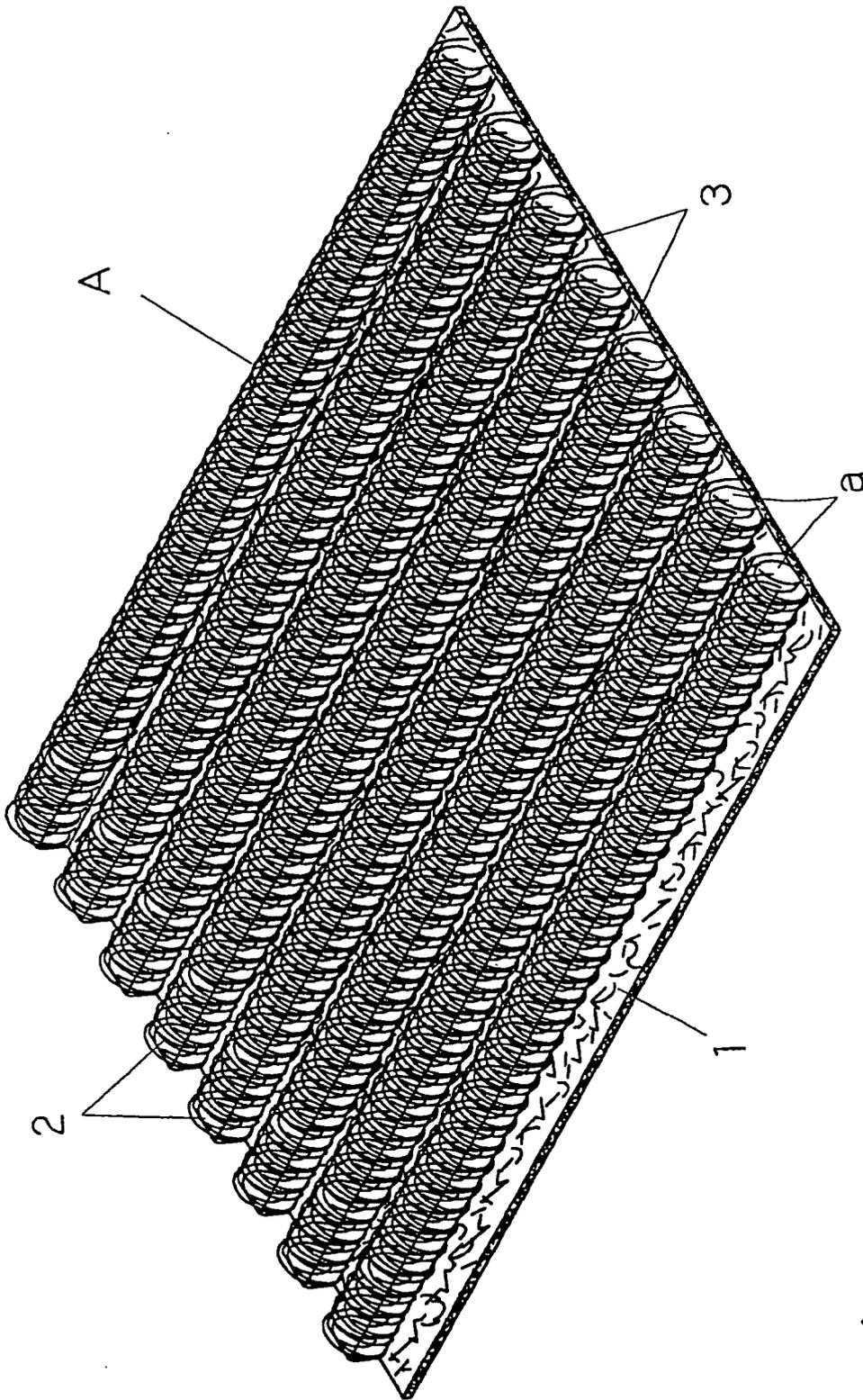


Fig. 6

Fig. 7

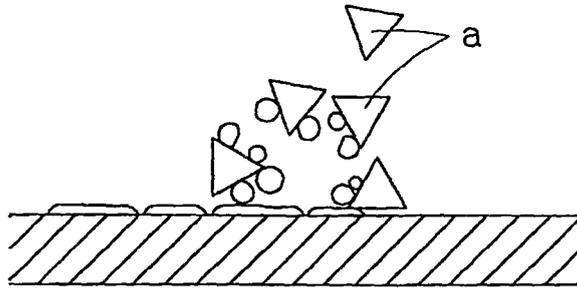


Fig. 8

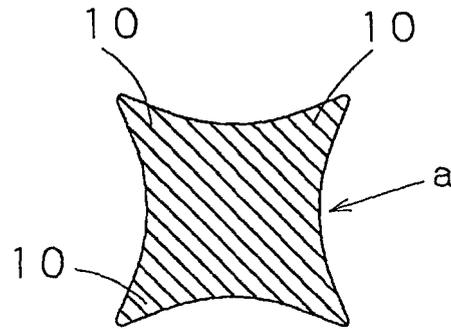
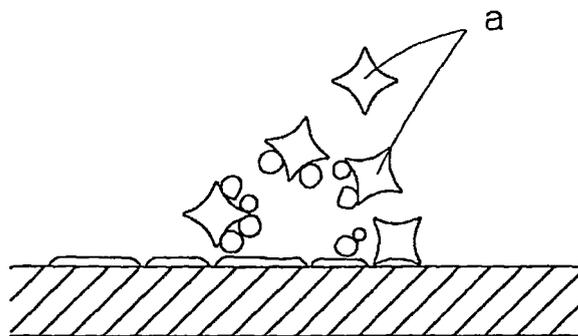


Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2005/016657

A. CLASSIFICATION OF SUBJECT MATTER <i>D04H11/08</i> (2006.01), <i>A47L13/16</i> (2006.01)		
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) <i>D04H1/00-18/00</i> (2006.01), <i>A47L13/00-13/62</i> (2006.01)		
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 1996-2005 Kokai Jitsuyo Shinan Koho 1971-2005 Toroku Jitsuyo Shinan Koho 1994-2005		
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.
X Y A	JP 3-941 Y (Kabushiki Kaisha Akasaka), 14 January, 1991 (14.01.91), Claims 1, 2; column 4, lines 32 to 45; Fig. 1 (Family: none)	1, 2, 5 1, 2, 4-6 3
Y	JP 9-59861 A (Unitika Ltd.), 04 March, 1997 (04.03.97), Claim 7; Par. Nos. [0001], [0021]; Figs. 6, 7 (Family: none)	1, 2, 5
Y	JP 2003-24254 A (Kao Corp.), 28 January, 2003 (28.01.03), Par. Nos. [0011], [0013] to [0015] & EP 1212972 A & US 2002/65012 A	4, 6
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
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Date of the actual completion of the international search 01 December, 2005 (01.12.05)		Date of mailing of the international search report 20 December, 2005 (20.12.05)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
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REFERENCES CITED IN THE DESCRIPTION

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