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(54) **Apparatus for pasting two or more plies for manufacturing tissue products**

Vorrichtung zum Kleben von zwei oder mehr Schichten zur Herstellung von Gewebeprodukten

Appareil pour le collage de deux ou plusieurs plis pour la fabrication de produits en tissu

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Description

[0001] The present invention relates to an apparatus for pasting two or more plies for manufacturing tissue products.

[0002] In the papermaking industry, particularly in the manufacturing of tissue products such as toilet paper, paper napkins, paper towels, et cetera, embossing is frequently used to modify the softness and absorption features of the end product.

[0003] Generally, the products are manufactured by bonding multiple plies of paper and there are many different embossing and coupling systems.

[0004] According to the more commonly used systems, two or more paper plies are embossed separately and then mutually bonded by means of tip-to-tip bonding systems or nested bonding systems, so-called random nesting or "DERL" systems, and the like.

[0005] In the tip-to-tip bonding system, two plies are each embossed between an embossing roller, provided with protrusions or tips arranged according to a repetitive pattern, and a presser roller, generally covered with yielding material, such as rubber or equivalent.

[0006] Subsequently, the two plies are bonded by lamination between the two mutually opposite embossing rollers, which are synchronized so that in the lamination groove between the two rollers the tips of one roller are located at the tips of the other roller. The distance between the rollers is such as to cause the lamination of the plies between the mutually opposite tips.

[0007] Generally, before lamination, an adhesive is applied to one of the two plies at the regions in relief generated by the embossing.

[0008] According to the nested embossing and bonding system, instead, the plies are embossed separately in a manner similar to what has been described above and are mutually coupled so that the tips of one ply are interleaved with respect to the tips of the other ply.

[0009] In such cases, the two embossing rollers are not pressed against each other in the groove between them, and the two plies are mutually bonded by lamination between one of the two embossing rollers and a bonding roller.

[0010] Other systems provide for the insertion, in an embossing assembly of the tip-to-tip type, of a redirection component which modifies the path of one of the two plies between the embossing region and the lamination region so as to produce a random nested embossing ("DERL").

[0011] Devices have been proposed for providing both an embossing of a nested type and an embossing of the tip-to-tip type by modifying in each instance the configuration of the components of the device, converting an actual tip-to-tip embossing assembly into an actual nested embossing assembly.

[0012] WO2005/033408 discloses an embossing device for obtaining a sheet comprising two folds. An upper fold comprises first areas forming cells with first cavities; the cells are surrounded by second areas with second cavities; the first areas are elevated on the outer surface in relation to the second areas.

[0013] The aim of the present invention is to provide a new pasting and embossing system which allows to obtain a product which is improved in terms of softness and handfeel.

[0014] An object of the invention is to provide a pasting system which allows to use a reduced amount of paste.

[0015] Another object of the invention is to provide a system which allows to provide any type of pattern on the product.

[0016] This aim and these and other objects which will become better apparent hereinafter are achieved by an apparatus for pasting two or more plies for providing tissue-type products, comprising at least one first embossing roller which cooperates with at least one second embossing roller, characterized in that said first embossing roller comprises a plurality of tips alternated with a plurality of continuous protrusions, said second roller comprising a plurality of tips alternated with a plurality of continuous protrusions, the arrangement of the tips and of the continuous protrusions of said first roller being reproduced identically and mirror-symmetrically on said second roller.

[0017] Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein figures 6 to 15 are not part of the claimed invention and:

Figure 1 is a partial cutout plan view of the flat projection of the surface of an embossing roller according to the invention;

Figure 2 is a sectional elevation view, taken along the sectional plane II-II of Figure 1, of the two embossing rollers according to the invention;

Figure 3 is a partial perspective view of an embossing roller according to the invention;

Figure 4 is a schematic view of the flat projection of the front sheet provided with the apparatus shown in the preceding figures;

Figure 5 is a schematic view of the flat projection of the rear sheet provided with the apparatus shown in the preceding figures;

Figure 6 is a partial cutout plan view of the flattened extension of the surface of an embossing roller not according to the invention;

Figure 7 is a sectional side view, taken along the plane VII-VII of Figure 6;

Figure 8 is a partial perspective view of the embossing roller of Figure 6;

Figure 9 is a schematic view of the flat projection of a pattern on the surface of a first embossing roller of the type shown in Figures 6-8;

Figure 10 is a schematic view of the flat projection of a pattern on the surface of a second embossing

roller of the type shown in Figures 6-8;

Figure 11 is a sectional side view of a region of contact of the two embossing rollers of Figures 9 and 10;

Figure 12 is a plan view, projected flat, which illustrates schematically the interaction between the two rollers of Figures 9-11;

Figure 13 is a schematic view of the flat projection of the front sheet provided with the apparatus shown in the preceding figures;

Figure 14 is a schematic view of the flat projection of the rear sheet provided with the apparatus shown in the preceding figures;

Figure 15 is a schematic view of the flat projection of the step.

[0018] With particular reference to Figures 1-5, the apparatus according to the invention, generally designated by the reference numeral 1, comprises at least one pair of embossing rollers, a first roller 2 and a second roller 3.

[0019] According to the invention, each roller has a plurality of tips 4 which are alternated with a plurality of continuous protrusions 5 and with regions or compartments 6 without tips or continuous protrusions.

[0020] In the illustrated example, the first roller 2 has a regular pattern which is constituted by a series of tips 4 spaced by a series of protrusions 5.

[0021] The depth P of the incision is preferably comprised between 0.3 and 2.5 mm.

[0022] According to the present invention, the arrangement of the tips 4 and of the continuous protrusions 5 of the first roller 2 is identically and mirror-symmetrically reproduced on the second roller 3.

[0023] In this manner, the pasting areas between the plies are reduced to the regions 7 that correspond to the presence of a tip 4 on the first or second rollers.

[0024] Even where the roller has a continuous protrusion 5, the pasting areas are constituted only by the regions 7 that correspond to the presence of a tip 4 on the other roller.

[0025] The pattern shown in the illustrated example has been provided, for the sake of simplicity of description, by means of portions of regular straight lines, but it is evident that patterns of any type can be provided by combining continuous protrusions and tips reproduced identically and mirror-symmetrically on the two rollers. Of course, the expression "mirror-symmetrical pattern" here means that the second roller has a pattern that correspond to the first roller but in which the tips are replaced by continuous protrusions and the continuous protrusions are replaced by tips.

[0026] By means of the apparatus according to the present invention, it is possible to obtain on the product a pattern which is composed of lines and dots but is pasted only in points, so as to obtain a product with superior characteristics of softness and handfeel with respect to similar products.

[0027] With particular reference to Figures 6-15, the apparatus according to a non-claimed example, generally designated by the reference numeral 101, comprises at least one pair of embossing rollers, a first roller 102 and a second roller 103.

[0028] Each roller has a plurality of tips 104, which are separated by a plurality of recesses 105, which are arranged on raised regions 107 which are spaced by regions or compartments 106 without tips.

[0029] The raised regions 107, provided with the tips 104, form in each roller a pattern which can be identical, and not mirror-symmetrical, on the two rollers 102 and 103 or can be different for each roller.

[0030] The depth P of the incision of the tips 104, measured between the end of the tip and the bottom of the recess 105, is comprised preferably between approximately 0.15 mm and approximately 0.4 mm.

[0031] The incision depth S of the raised regions, measured between the end of the tip and the bottom of the compartments 106, is comprised preferably between approximately 1 mm and approximately 2.5 mm.

[0032] The pasting of the plies is performed, if the rollers are provided with identical patterns, only at the regions 108 of contact of the tips 104 of the two rollers, since one of the plies to be joined is spread previously with paste, or laminated, only on the protrusions generated by the embossing process.

[0033] If the two rollers are provided with different patterns, or with identical patterns which are not synchronized, the bonding of the plies is provided on the protrusions that meet randomly, as shown schematically in Figures 4-7.

[0034] In practice it has been found that the invention achieves the intended aim and objects, an apparatus having been provided which is capable of pasting two or more plies with a reduced consumption of paste, thus obtaining a product with superior functional characteristics which is cheaper also from a production standpoint.

[0035] With the pasting system according to the present invention it is possible to obtain on the product a visual effect of linear decorations or of continuous pattern wherein the actual pasting is limited to dots, so as to obtain a product with superior characteristics of softness and handfeel with respect to similar products.

[0036] The pasting system according to the present invention also allows to increase the thickness of the embossed paper.

[0037] This application claims the priority of Italian Patent Application No. MI2007A001704, filed on August 30, 2007, the subject matter of which is incorporated herein by reference.

Claims

1. An apparatus for pasting two or more plies for providing tissue-type products, comprising at least one first embossing roller which cooperates with at least one second embossing roller, **characterized in that** said first embossing roller comprises a plurality of

tips alternated with a plurality of continuous protrusions, said second roller comprising a plurality of tips alternated with a plurality of continuous protrusions, the arrangement of the tips and of the continuous protrusions of said first roller being reproduced Identically and mirror-symmetrically on said second roller.

2. The apparatus according to claim 1, **characterized in that** said alternating tips and said continuous protrusions in said first roller of the same incision depth, said alternating tips and said continuous protrusions in said second roller have the same incision depth.

3. The apparatus according to claim 1 or 2, **characterized in that** said first roller and said second roller each comprise regions or compartments without tips or continuous protrusions, the arrangement of said compartments being reproduced on said rollers in a mirror-symmetrically identical manner.

4. The apparatus according to one or more of the preceding claims, **characterized in that** the incision depth of said tip and of said continuous protrusions is comprised between approximately 0.3 and approximately 2.5 mm.

5. The apparatus according to one or more of the preceding claims, **characterized in that** the pasting between the plies occurs exclusively at regions which correspond to the presence of tips on the first or second roller.

Patentansprüche

1. Eine Vorrichtung zum Kleben von zwei oder mehr Schichten zur Herstellung von Gewebeprodukten, die mindestens eine Prägewalze umfasst, welche mit mindestens einer zweiten Prägewalze zusammenwirkt, **dadurch gekennzeichnet, dass** die erste Prägewalze eine Vielzahl von Spitzen umfasst, die mit einer Vielzahl durchgehender Vorsprünge abwechseln, und die zweite Prägewalze eine Vielzahl von Spitzen umfasst, die mit einer Vielzahl durchgehender Vorsprünge abwechseln, wobei die Anordnung der Spitzen und der durchgehenden Vorsprünge der ersten Walze identisch und spiegelsymmetrisch auf der zweiten Walze reproduziert werden.

2. Die Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die alternierenden Spitzen und die durchgehenden Vorsprünge in der ersten Walze dieselbe Einschnitttiefe haben, wobei die alternierenden Spitzen und die durchgehenden Vorsprünge in der zweiten Walze dieselbe Einschnitttiefe haben.

3. Die Vorrichtung gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die erste Walze und die zweite Walze jeweils Bereiche oder Zwischenräume ohne Spitzen oder durchgehende Vorsprünge umfassen, wobei die Anordnung der Zwischenräume auf den Walzen auf spiegelsymmetrisch identische Art reproduziert wird.

4. Die Vorrichtung gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** die Einschnitttiefe der Spitze und der durchgehenden Vorsprünge zwischen ungefähr 0,3 und ungefähr 2,5 mm liegt.

5. Die Vorrichtung gemäß einem oder mehreren der obigen Ansprüche, **dadurch gekennzeichnet, dass** das Kleben zwischen den Schichten ausschließlich in Bereichen stattfindet, die der Anwesenheit von Spitzen auf der ersten oder zweiten Walze entsprechen.

Revendications

1. Appareil pour le collage de deux plis ou plus pour fournir des produits de type mouchoir en papier, comprenant au moins un premier rouleau gaufreur qui coopère avec au moins un second rouleau gaufreur, **caractérisé en ce que** ledit premier rouleau gaufreur comprend une pluralité de pointes alternées avec une pluralité de saillies continues, ledit second rouleau comprenant une pluralité de pointes alternées avec une pluralité de saillies continues, l'agencement des pointes et des saillies continues dudit premier rouleau étant reproduit à l'identique et selon une symétrie en miroir sur ledit second rouleau.

2. Appareil selon la revendication 1, **caractérisé en ce que** lesdites pointes alternées et lesdites saillies continues dans ledit premier rouleau ont la même profondeur d'incision, lesdites pointes alternées et lesdites saillies continues dans ledit second rouleau ont la même profondeur d'incision.

3. Appareil selon la revendication 1 ou 2, **caractérisé en ce que** ledit premier rouleau et ledit second rouleau comprennent chacun des régions ou des compartiments sans pointe ou saillie continue, l'agencement desdits compartiments étant reproduit sur lesdits rouleaux de manière identique, selon une symétrie en miroir.

4. Appareil selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** la profondeur d'incision desdites pointes et desdites saillies continues est comprise entre approximativement 0,3 et approximativement 2,5 mm.

5. Appareil selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** le collage entre les plis se produit exclusivement au niveau de régions qui correspondent à la présence de pointes sur le premier ou second rouleau.

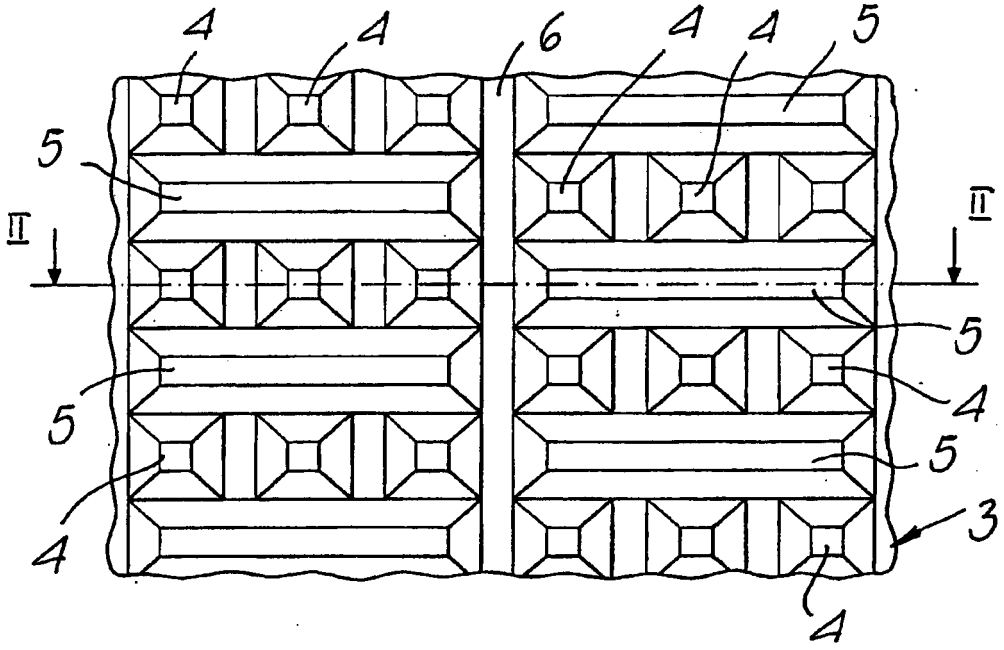

Fig. 1

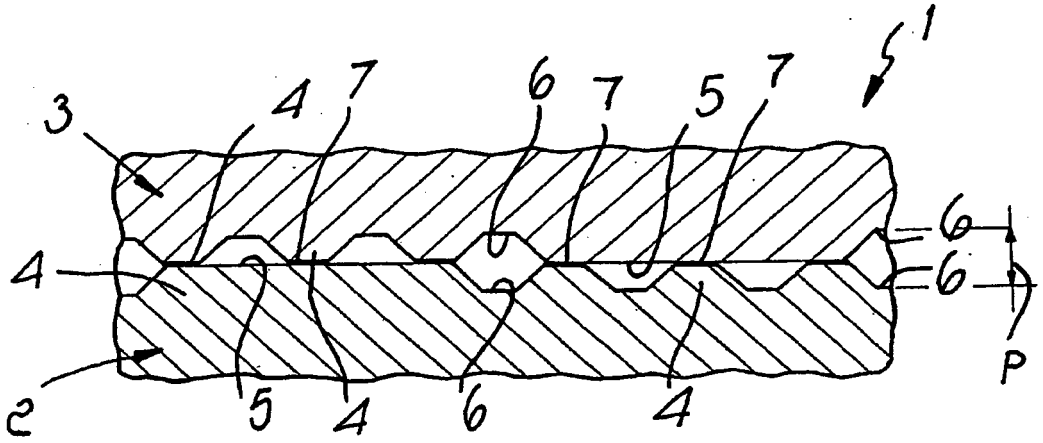

Fig. 2

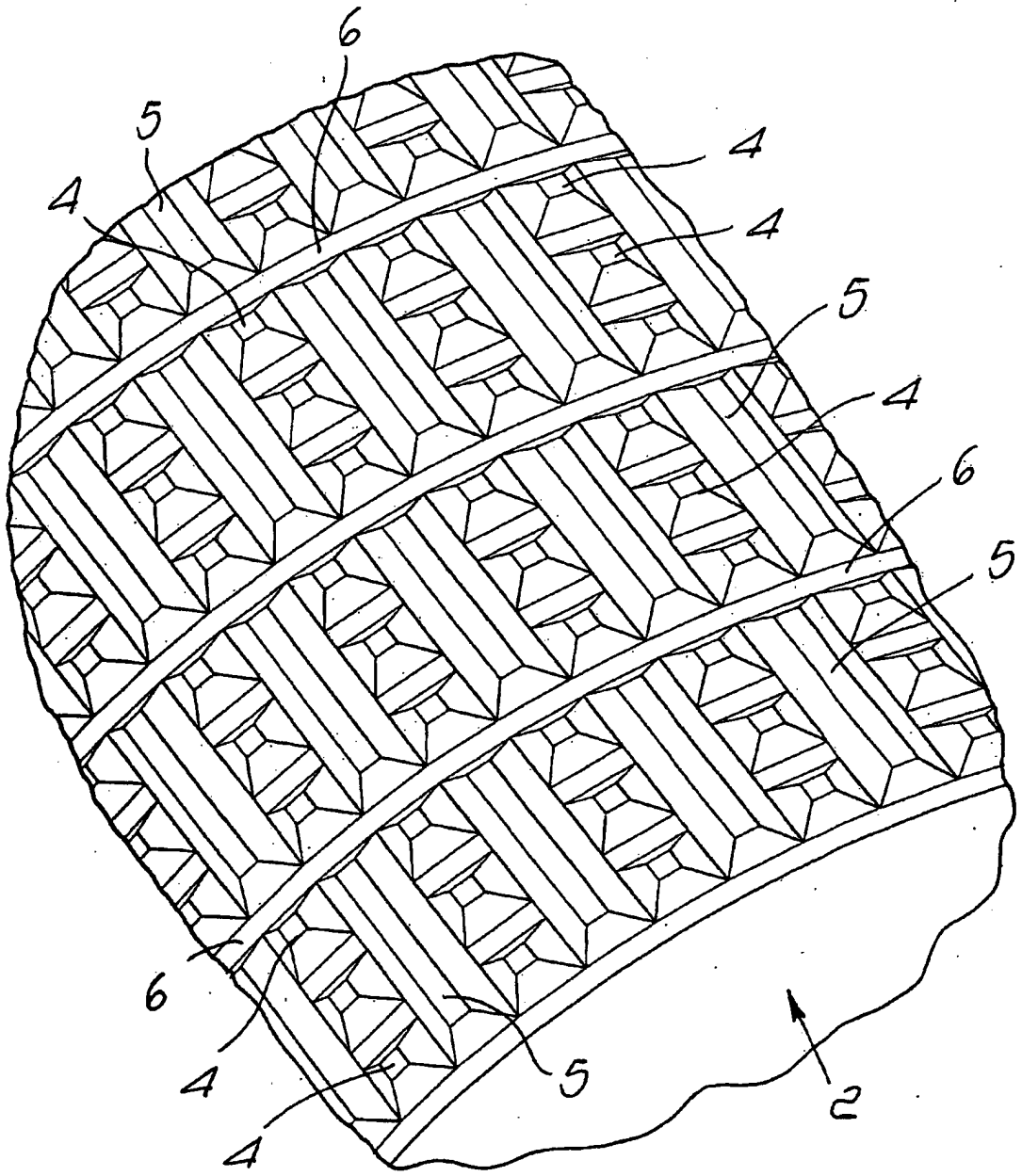

Fig. 3

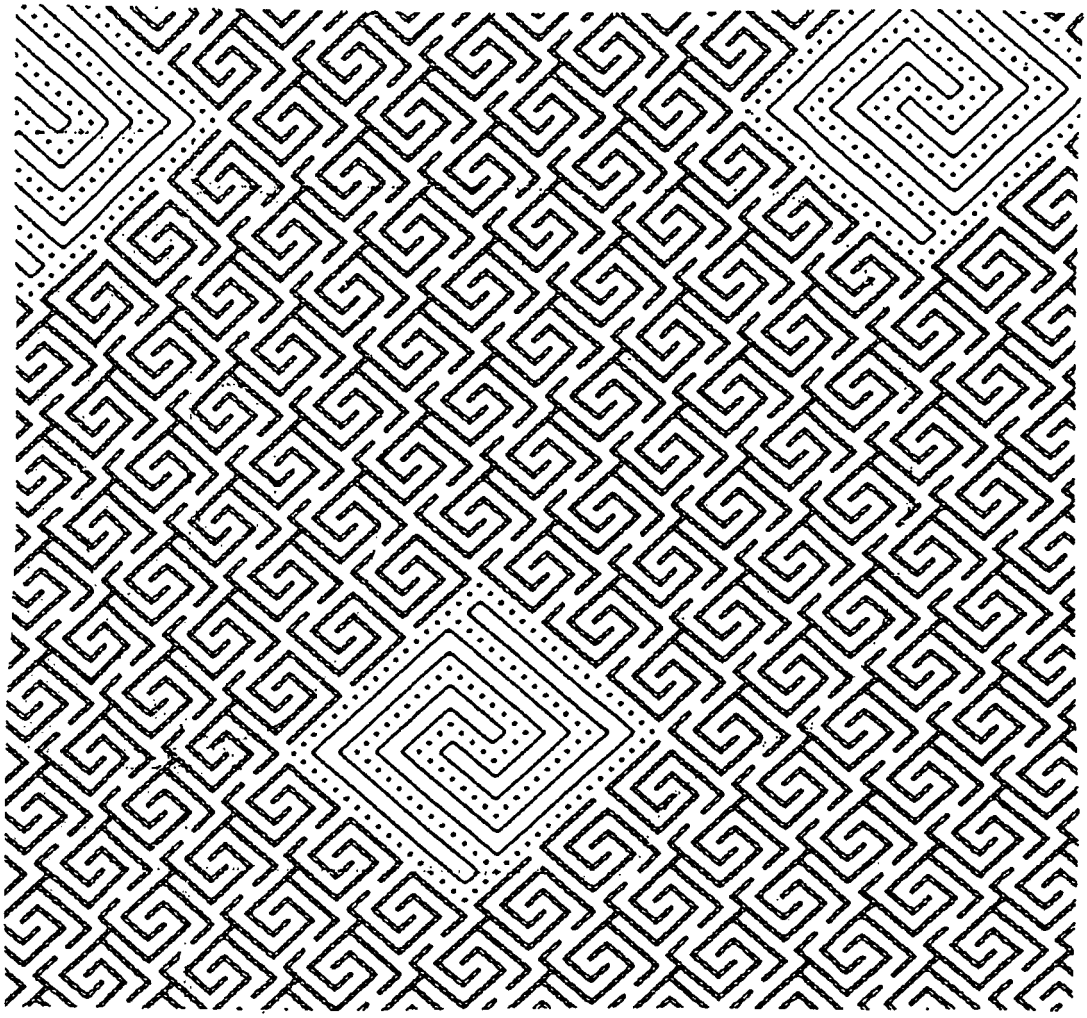

Fig. 4

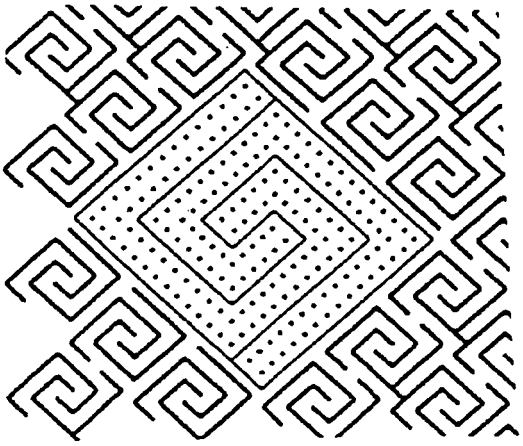

Fig. 5

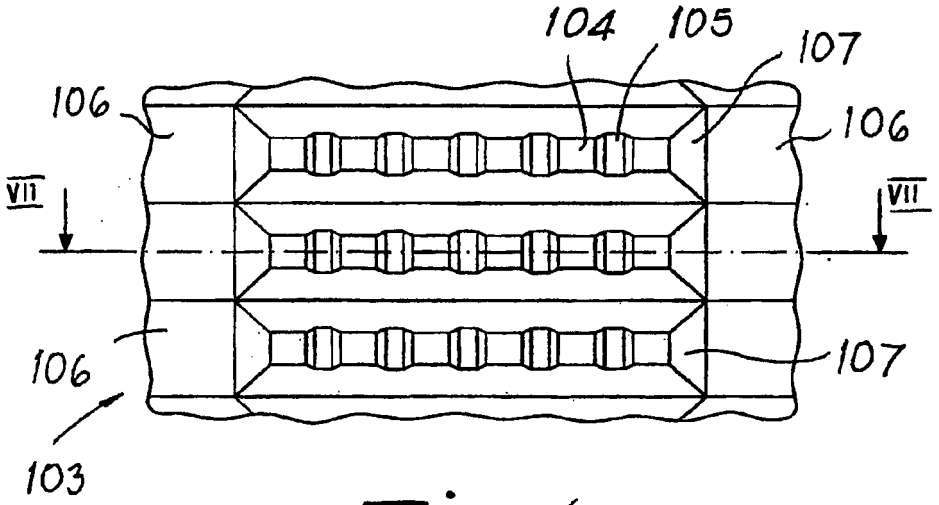
104
105
107
106
106
VII
VII
106
107
103

Fig. 6

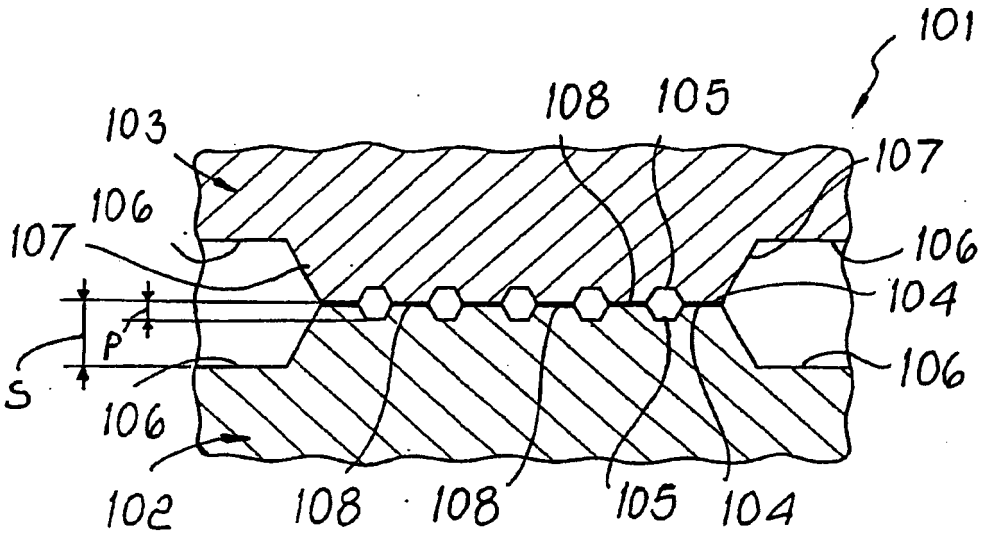
101
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Fig. 7

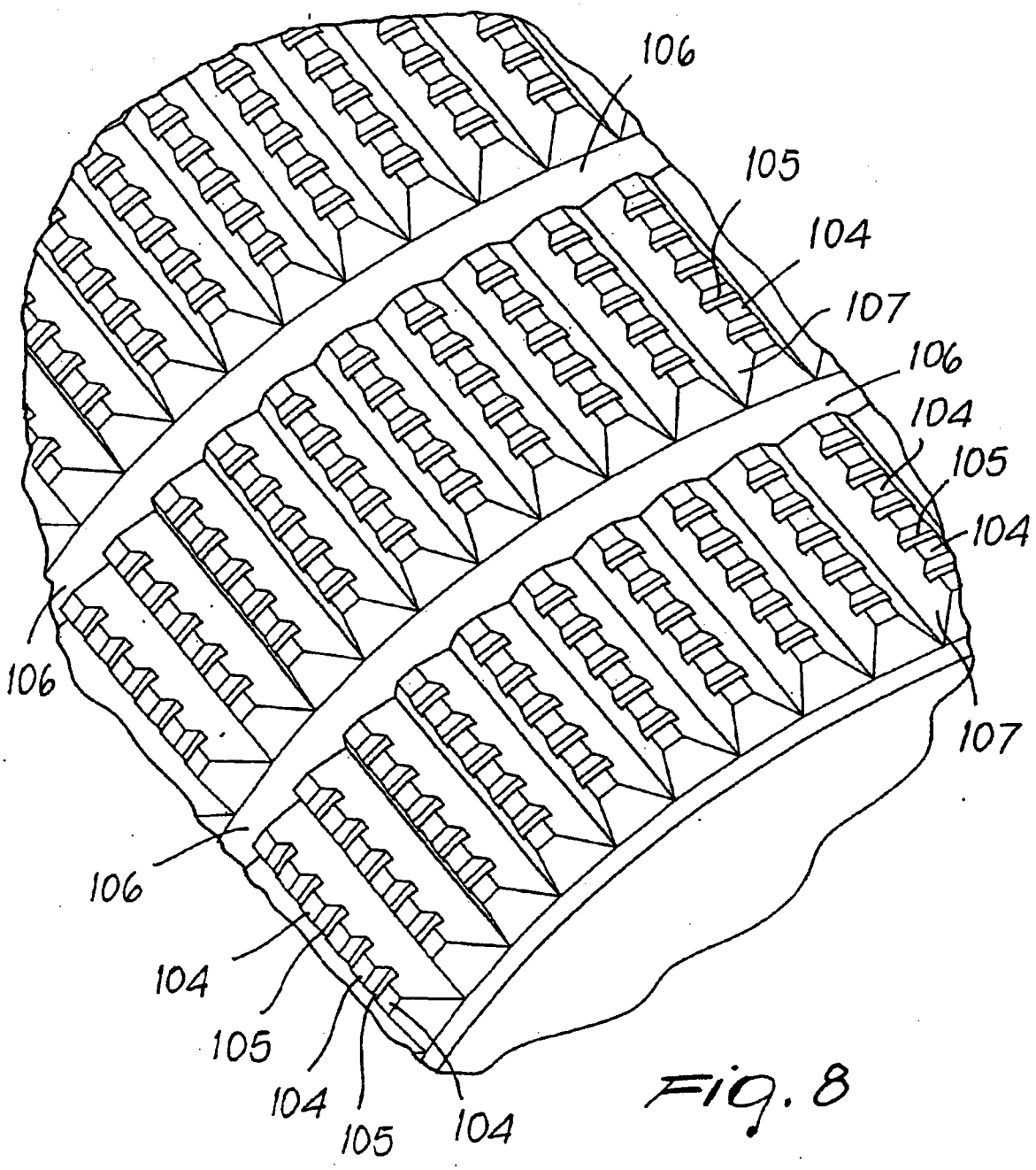

Fig. 8

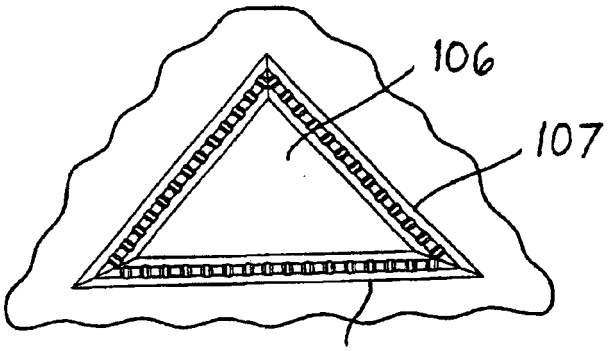

Fig. 9

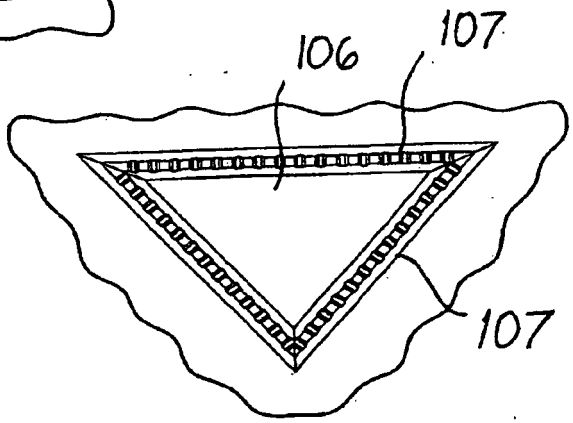

Fig. 10

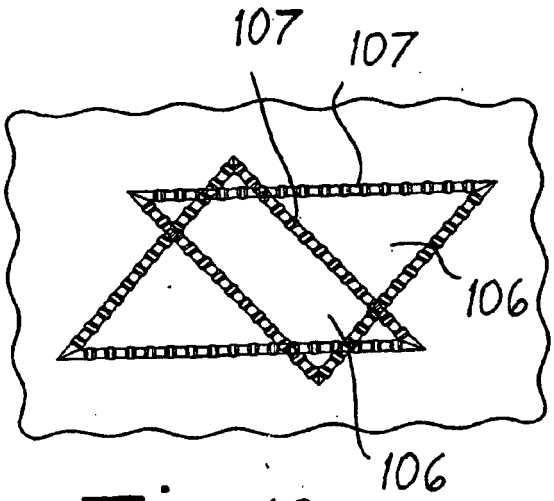

Fig. 12

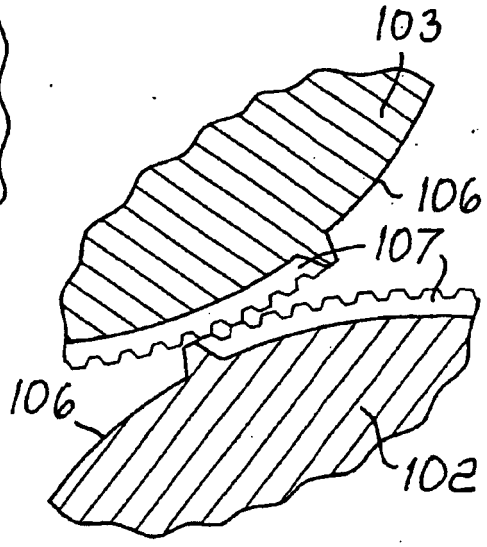

Fig. 11

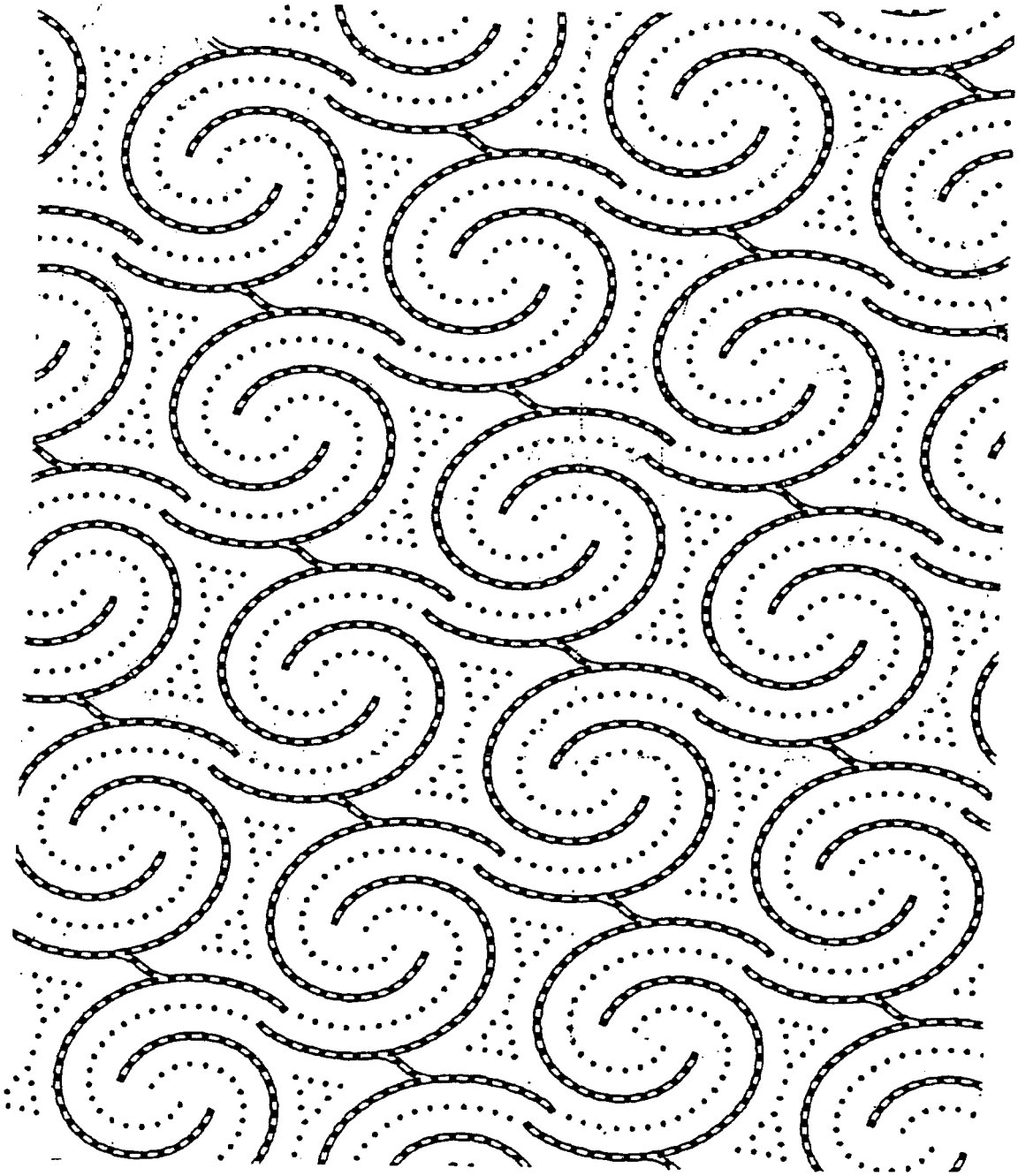

Fig. 13

Fig. 14

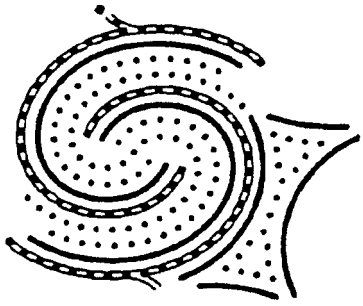

Fig. 15

REFERENCES CITED IN THE DESCRIPTION

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