(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 985 438 B2**

(12) **NEW EUROPEAN PATENT SPECIFICATION**
After opposition procedure

(45) Date of publication and mention of the opposition decision:
19.02.2020 Bulletin 2020/08

(45) Mention of the grant of the patent:
28.12.2016 Bulletin 2016/52

(21) Application number: **08425225.3**

(22) Date of filing: **04.04.2008**

(51) Int Cl.:
B31F 1/07 *(2006.01)*

(54) **Embossed paper web material**

Geprägtes Papierbahnmaterial

Matériau de feuille de papier gaufré

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

(30) Priority: **06.04.2007 IT FI20070084**

(43) Date of publication of application:
29.10.2008 Bulletin 2008/44

(73) Proprietor: **SOFIDEL S.p.A.**
55016 Porcari (LU) (IT)

(72) Inventor: **Emi, Stefani**
55016 Porcari
Lucca (IT)

(74) Representative: **Mannucci, Michele et al**
Ufficio Tecnico Ing.A. Mannucci S.r.l.
Via della Scala 4
50123 Firenze (IT)

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Description

Technical background

[0001] The present invention relates to paper processing and more specifically tissue paper processing. Specifically, the present invention relates to a new type of embossed paper web material, for example utilizable to produce toilet paper, kitchen towels, paper napkins, handkerchiefs or the like.

State of the art

[0002] Embossing is one of the operations typically carried out on plies or sheets of tissue paper, to produce paper articles for personal cleaning and hygiene, or also for commercial or industrial use, such as toilet paper, kitchen towels, paper napkins and handkerchiefs and the like.

[0003] Embossing is an operation performed for the dual purpose of improving aesthetic characteristics and increasing functional characteristics, such as, in particular the softness, smoothness, absorption capacity or thickness of the finished material.

[0004] Normally a tissue paper material, such as kitchen towels and toilet paper, is produced from two or more plies of paper which are embossed separately and subsequently joined together by applying glue and laminating the plies between counter-rotating rollers defining a lamination nip.

[0005] Embossing is typically performed by feeding each ply between an embossing roller, provided with protuberances, and a pressure roller with an outer surface coated in a yielding material, typically rubber. This is referred to as rubber-to-steel embossing, as the embossing roller is typically made of steel. In some cases embossing takes place between two rollers made of steel or another hard material, one provided with protuberances and the other with corresponding recesses. The protuberances of the embossing roller generate corresponding protuberances or projections in the paper ply. The protuberances formed in the two outermost plies are oriented toward the inside of the finished product.

[0006] According to a possible technique (called "tip-to-tip"), the two plies of paper web material are joined to one another by making the protuberances of one ply correspond with the protuberances of the other ply, after a glue has been applied to the protuberances of one of the two plies, or to at least part thereof. In practice, two embossing rollers that separately emboss two plies of paper by means of respective pressure rollers form therebetween a lamination nip, through which the two embossed plies pass, before being detached from said rollers. In the lamination nip the protuberances of one roller coincide with the protuberances of the other and the reciprocal distance between the rollers is such as to cause localized compression of the plies at said protuberances.

[0007] A tip-to-tip embosser to obtain a product of this type is described in US-A-3,414,459. The tip-to-tip embossing technique has been gradually perfected and improved, in order to solve particular problems that arise with this processing method. For example, US-A-5,096,527 describes a technique to reduce vibrations and wear in tip-to-tip embossing units. US-A-6,113,723 describes a distribution of protuberances having the object of increasing the bonding strength through a particular arrangement of the protuberances. US-A-5,736,223 describes a method for producing a paper article in sheet form comprising three layers or plies of tissue paper.

[0008] US-A-5,173,351; US-A-6,032,712; US-A-6,245,414 and US-A-6,053,232 describe embossing-laminating units, which use particular measures to prevent concentrated wear of the protuberances even when these do not coincide completely, but only in regions, with some of the protuberances of one roller coinciding with some of the protuberances of the other roller. US-A-3,961,119 describes a tip-to-tip embossing unit, wherein two embossing rollers cooperating with each other are provided with helical projections. The projections of one embossing roller have protrusions engaging with recesses produced in the helical projections of the opposed embossing roller.

[0009] According to a different technique, the two plies are embossed separately, each between an embossing roller and a counter roller or pressure roller. The two plies are then bonded to each other so that the protuberances of one ply nest between the protuberances of the other. This is referred to as "nested" embossing. Lamination of the two plies is obtained between one of the embossing rollers and a laminating roller, while the two embossing rollers are not touching. Examples of embossing-laminating devices of this type are described in US-A-3,556,907; US-A-3,867,225 and US-A-5,339,730.

[0010] Some embossing units can perform embossing according to the nested

[0011] Embossing was initially performed according to very simple geometrical patterns, with uniform distributions of frusto-cone or frusto-pyramid shaped protuberances. These embossing patterns had a prevalently technical function, being used to produce a product of adequate thickness and with sufficient softness and absorption capacities.

[0012] Currently, embossing is increasing required to perform a double function, both technical-functional and aesthetic. Therefore, embossing patterns and embossing devices have been developed which make it possible to obtain a product that is aesthetically pleasing and at the same time suitable to satisfy the increasingly high technical and commercial requirements demanded of these articles. Embossing is no longer obtained using only simple geometrical patterns, but with a combination of more or less closely spaced embossing patterns (at times micro-embossing patterns) and decorative patterns embossed and, if necessary, printed. Examples of complex embossing patterns are described in US-A-6,136,413; US-A-5,846,636; US-A-6,106,928.

[0013] A new embossing technique which allows particularly prestigious and easily interchangeable patterns to be obtained is described in US-A-6,755,928 and in US-A-6,681,826.

Objects and summary of the invention

[0014] In substance according claim 1, the invention relates to an embossed paper web comprising at least two tissue paper plies, each ply having a grammage between 10 and 40 g/m^2; wherein at least one of said plies is provided with a background embossing pattern constituted by linear protuberances extending according to closed lines projecting toward the inside of the web material; wherein the portions of ply delimited by said closed lines form convexities facing the outside of the web material; and wherein said convexities are distributed with a density equal to or greater than 6 convexities/cm^2 and preferably between 10 and 30 convexities/cm^2; and wherein said linear protuberances have a substantially rectangular extension, with a greater dimension and a lesser dimension, and are arranged in groups intercalated with one another and oriented with the greater dimension according to two different orientations.

[0015] Further advantageous characteristics and embodiments of the material according to the invention are indicated in the appended claims and will be described with reference to some non-limiting embodiment of the invention.

Brief description of the drawings

[0016] The invention will be better understood by following the description and accompanying drawing, which shows practical non-limiting embodiments of the invention. More specifically, in the drawing:

Figure 1 shows a diagram of an embossing unit for producing web material according to the invention in a first embodiment;
Figure 1A shows an enlargement of a detail in Figure 1;
Figure 1B shows a further detail in Figure 1;
Figures 2 and 3 show a schematic and greatly enlarged cross section of the web material obtainable with the embossing device or unit in Figures 1, 1A and 1B;
Figure 4 shows a diagram of an embossing device in a different embodiment;
Figure 5 shows a greatly enlarged schematic cross section of a web material obtainable with the embossing unit in Figure 4;
Figure 6 shows the diagram of a further embossing unit according to the invention;
Figures 6A and 6B show enlarged details of Figure 6;
Figure 7 shows a greatly enlarged schematic section of a web material obtainable with the embossing unit in Figure 6;
Figure 8 shows an unwrapped view of a cylindrical surface of an embossing roller to produce web material according to the invention;
Figure 9 shows a greatly enlarged view of a portion of Figure 8;
Figures 10 and 11 show local sections according to X-X and XI-XI in Figure 9; and
Figure 12 shows a greatly enlarged view of a cross section of a portion of embossed product according to the invention.

Detailed description of embodiments of the invention

[0017] With initial reference to Figure 1, in a possible embodiment an embossing unit 1 comprises a first embossing roller 3 cooperating with a first pressure roller 5 provided with a surface 5A made of elastically yielding material, such as rubber or the like. A first ply V1, which will form a web material N, is fed into the embossing nip between the embossing roller 3 and the pressure roller 5. The surface of the embossing roller 3 (shown in a greatly enlarged schematic view in Figure 1A) is provided with a raised pattern constituted by protuberances P1 and recesses P3, the shape of which is better illustrated hereunder with reference to Figures 8 to 11.

[0018] A glue dispenser, indicated schematically with 7, and a laminating roller 9 are arranged along the extension of the embossing roller 3. A second ply V2 is fed into the nip formed between the laminating roller 9 and the embossing roller 3 and is bonded to the ply V1 by gluing in the lamination nip between the rollers 3 and 9, due to the pressure exerted by the laminating roller 9 on the projecting surfaces of the protuberances P1 of the embossing roller 3, on which the embossed ply V1 is located and to the raised regions of which, obtained by embossing and coinciding with the protuberances P1, the glue dispenser 7 has applied a glue for bonding to the ply V2.

[0019] In one embodiment, an auxiliary embossing unit 11 is provided along the path of the ply V2, comprising an embossing roller 13 and a pressure roller 15, for example provided with a coating 15A made of elastically yielding material, analogous to the pressure roller 5 with its coating 5A. As shown in the detail in Figure 1B, the embossing roller 13 is provided with an embossing or micro-embossing pattern with protuberances P13, for example frusto-pyramid or frusto-cone shaped protuberances of small dimensions and high density, for example a density greater than 15 protuberances/cm^2 and preferably greater than 30 protuberances/cm^2.

[0020] The embossing unit 1 described above can be used to produce a web material N with two plies V1 and V2, the ply V1 of which has been embossed by the embossing roller 3 with the pressure roller 5, while the ply V2 is smooth. In this case the embossing unit 11 is deactivated or omitted.

[0021] Figure 2 shows a schematic enlargement of a web material of this type, which is obtained by deactivat-

ing or omitting the auxiliary embossing unit 11. Protuberances 1P are produced on the ply V1 facing the inside of the web material and generated by the raised regions P1 of the embossing roller 3. Due to the formation of the protuberances P1 and the recesses P3 of the embossing roller 3, as will be described below, the ply V1 also has cushioned or convex regions, indicated with 1C, facing outward.

[0022] Figure 3 shows a schematic and greatly enlarged section of the web material obtained with the embossing unit 1 when the auxiliary embossing unit 11 is also operating. The same numbers indicate the same or equivalent parts to those in Figure 2. In this case the ply V2 has a micro-embossing pattern constituted by the protuberances facing the inside of the web material N, generated by the projections or protuberances P13 of the auxiliary embossing roller 13.

[0023] With reference to Figures 8 to 11, in one embodiment the protuberances P1 on the embossing roller 3 are constituted by linear protuberances defined by closed lines, which in the example shown have an approximately rectangular extension. In the enlargement in Figure 9, which shows a view of a portion of the embossing roller 3 flattened on a planar surface, the raised areas P1 have a net shape with substantially rounded rectangular mesh surrounded by recesses P3 etched in the surface of the embossing roller 3. The recesses P3 are arranged in pairs staggered angularly by 90° with respect to each other. The mesh or net structure in Figure 9 is therefore substantially constituted by a group of protuberances extending linearly, which form a continuous structure, each of which extends according to a substantially rectangular closed line which surrounds a respective recess P3.

[0024] Figures 10 and 11 schematically show the sections according to planes orthogonal to each other, of the protuberances P1 and of the hollows or recesses P3 defined inside the protuberances. According to Figures 10 and 11, the protuberances P1 have a front surface P1F with a rounded section, i.e. provided with regions without sharp connecting corners at the sides, indicated with P1 L, of these protuberances. The bottom of the hollow regions P3, indicated with P3F, is connected to the sides P1 L of the protuberances P1 through curved surfaces, i.e. also in this case without sharp corners. Ultimately, therefore, both the hollows or recesses P3 and the tips or protuberances P1 have a beveled or rounded shape preferably on the entire surface extension of the embossing roller 3.

[0025] This rounded shape, together with the particular configuration with closed meshes or according to closed lines, along which the protuberances P1 extend, allow the embossed material, in particular the ply V1, to take the configuration shown schematically and in detail in the enlargement in Figure 12.

[0026] In a plan view the material in ply V1 is substantially provided with an embossing pattern that repeats the pattern in Figure 9, with the difference that on the ply V1 the hollow regions P3 of the roller 3 correspond to the convex or cushioned portions 1C projecting toward the outside of the web material V1, while the protuberances P1 with continuous linear shape defining the net structure correspond to projections 1 P on the embossed material facing the inside of the web material and to which the glue C is applied for bonding to the ply V2 below.

[0027] The active surface of the embossing roller 3, i.e. the raised region corresponding to the protuberances P1 that follow the continuous closed lines, can be in the order of 20-40% of the total surface, more preferably between 25 and 35% and even more preferably between 28 and 32% of the total surface of the roller.

[0028] According to one embodiment, the convexities 1C, i.e. the raised portions or projections generated on the ply V1 and oriented toward the outside of said ply as a result of embossing through the linear protuberances P1 extending according to closed lines surrounding the raised regions P3, are distributed with a density of at least 6 convexities/cm^2 and preferably between 10 and 30 convexities/cm^2.

[0029] In the embodiment described above, only one of the two plies V1, V2 is provided with an embossing pattern defined by convex or cushioned regions 1C projecting toward the outside and formed by portions of ply V1 defined on the inside of the protuberances 1P extending according to closed lines. However, it would also be possible for both plies V1, V2 to be provided with an embossing pattern of this type. For this purpose, an embossing-laminating unit of the type shown in Figure 4 can be used. This embossing-laminating unit indicated with 51 comprises a first embossing roller 53 cooperating with a first pressure roller 55 provided with a surface coating 55A made of elastically yielding material. The embossing roller 53 cooperates with a glue dispenser 57 and with a second embossing roller 59. The latter in turn cooperates with a pressure roller 61 with a coating 61A made of elastically yielding material. The embossing roller 59 and the pressure roller 61 emboss a ply V2 fed into the embossing nip between the two rollers 59, 61. The surfaces of the two embossing rollers 53 and 59 are engraved according to patterns analogous or equivalent to those in Figures 8 and 9, so that the two plies V1, V2 are embossed separately from each other according to an embossing pattern equivalent to the one generated by the embossing pattern in Figure 9.

[0030] In the nip between the embossing rollers 53 and 59, said rollers are pressed against each other, or more precisely the more prominent surfaces of the protuberances P1 of each of the two rollers 53, 59 are pressed against each other with the material of the two embossed plies V1, V2 interposed between the rollers. With this process the two plies V1, V2 are bonded by lamination and consequently the web material N is formed due to the glue distributed by the glue dispenser 57 on the more prominent regions of the ply V1 embossed on the embossing roller 53.

[0031] Figure 5 schematically shows a greatly en-

larged cross section of a portion of web material N formed by the two plies V1, V2, which in this case are provided with similar embossing patterns with areas 1C projecting in relief according to a sort of cushion or convexity toward the outside of the web material N. The regions 1C are surrounded by projections 1P which instead face the inside of the web material, in the same manner as provided for the ply V1 alone in the diagram in Figure 3. As in the previous embodiment, also in this case the convexities or cushioned regions have a rounded shape, without sharp corners, due to the rounded shape of the engravings produced on the embossing rollers. Together with the raised embossing effect obtained by means of the convexity of the projections 1C, this gives the finished product a particular effect more pleasing to the touch.

[0032] In one embodiment the projections or convexities 1C have a maximum dimension between 2 and 6 mm. Correspondingly, the recesses P3 of the embossing roller have a maximum dimension between, for example, 2 and 6 mm, and preferably no greater than 5 mm. Figure 9 indicates the maximum and minimum dimensions D1 and D2 of the recesses P3. The dimensions of the base of the protuberances of convexities 1C of the embossed product can be defined analogously. For example, Figure 12 indicates with D the dimensions of the convexity or projection 1C facing the outside measured in the plane of the section. The recesses P3 of the embossing roller and analogously the projections or convexities 1C of the ply can have an approximately rectangular shape, as shown, or other polygonal shapes. In general, maximum plan dimensions (in the case of the rectangular shape the maximum dimension is that of the diagonal), which can be between 2.5 and 8 mm and preferably no greater than 7 mm, can be defined.

[0033] In one embodiment, the embossing pattern described above, which forms on one, on the other or on both of the two plies V1, V2 the outward facing raised regions 1C, can be used as background embossing or as the sole embossing pattern of the web material. In a modified embodiment, this embossing pattern can be superposed by a decorative embossing pattern produced with protuberances of greater dimensions, for example in particular of greater height. In one embodiment these protuberances extend according to decorative or aesthetic motifs which are also applied by embossing on one or other of the plies V1, V2 after they have been subjected to background embossing according to the embossing patterns described above.

[0034] Figures 6, 6A, 6B shows an embossing unit 101 which can be utilized to obtain embossing pattern of this type. V1 and V2 again indicate the two plies which once bonded form the web material N. Figure 7 shows a greatly enlarged schematic section of the web material N with the plies V1 and V2 glued to each other. In this embodiment the ply V2 is smooth, but it would also be possible for it to be provided with an embossing pattern similar to the one obtained on the ply V1 with the cushioned regions 1C and the protuberances facing the inside 1P, or with micro-embossing with frusto-cone or frusto-pyramid shaped protuberances analogous to those in the embodiment in Figures 1 and 3 for the ply V2.

[0035] The embossing unit 101 has an embossing roller 103 cooperating with a pressure roller 105 coated with an elastically yielding layer 105A.

[0036] Along the path of the web material V1 a further embossing unit 109 is provided, comprising an embossing roller 111, for example engraved like the embossing roller 3 of the embodiment in Figure 1. The embossing roller 111 cooperates with a pressure roller 113, whose external cylindrical surface is advantageously coated with a layer 113A of elastically yielding material, such as rubber or the like.

[0037] While the protuberances of the embossing roller 101, indicated with P1 in the enlargement in Figure 6A, define an embossing pattern analogous to the one shown in Figure 9, and in the sections in Figures 10 and 11, the embossing roller 103 can have an embossing pattern characterized by protuberances 103P distributed according to decorative motifs. The height of the protuberances 103P is greater than that of the protuberances P1 provided on the embossing roller 111, so that, after double embossing, the ply V1 is as shown in Figure 7, i.e. with a series of decorative protuberances P103 facing the inside of the web material and of a greater height H than the height of the protuberances 1 P facing the inside of the web material. The protuberances P103 define the decorative motifs and the gluing regions in which the ply V1 is bonded to the ply V2 by means of the glue C distributed by the glue dispenser 117 on the portions of ply V1 located on the top or front surfaces of the projections or protuberances 103P.

[0038] Also in this case it must be understood that the ply V2 can be embossed in different ways with micro-embossing, embossing of the type 1C, 1 P or in another suitable manner, instead of being smooth as shown schematically in Figure 7.

[0039] It is understood that the drawing only shows an example provided by way of a practical arrangement of the invention, and that said invention can vary in forms and arrangement without however departing from the scope of the claims.

Claims

1. An embossed paper web material comprising at least two tissue paper plies, each ply having a grammage between 10 and 40 g/m^2; wherein at least one of said plies is provided with a background embossing pattern constituted by linear protuberances extending according to closed lines projecting toward the inside of the web material; wherein the portions of ply delimited by said closed lines form convexities facing the outside of the web material; and wherein said convexities are distributed with a density equal to or greater than 6 convexities/cm^2 and preferably

between 10 and 30 convexities/cm^2; and wherein said linear protuberances have a substantially rectangular extension, with a greater dimension and a lesser dimension, and are arranged in groups intercalated with one another and oriented with the greater dimension according to two different orientations.

2. Web material as claimed in claim 1, wherein a second of said plies is provided with a background embossing pattern constituted by linear protuberances extending according to closed lines projecting toward the inside of the web material; wherein the portions of ply delimited by said closed lines form convexities facing the outside of the web material; and wherein said convexities are distributed with a density equal to or greater than 6 convexities/cm^2 and preferably between 10 and 30 convexities/cm^2.

3. Web material as claimed in claim 1 or 2, wherein each of said closed lines has a substantially polygonal extension.

4. Web material as claimed in claim 3, wherein said closed lines have a substantially quadrangular and preferably rectangular extension.

5. Web material as claimed in claim 1, 2 or 3, wherein said closed lines define as a whole a net or mesh structure, each mesh containing one of said convexities.

6. Web material as claimed in claim 3, 4 or 5, wherein said closed lines have rounded corners.

7. Web material as claimed in one or more of the preceding claims, wherein said closed lines define meshes with dimensions not exceeding 8 mm and preferably not exceeding 6 mm.

8. Web material as claimed in one or more of the preceding claims, wherein said linear protuberances of the first ply are provided with glue.

9. Web material as claimed in one or more of the preceding claims, wherein said linear protuberances have a height equal to or below 1.5 mm.

10. Web material as claimed in one or more of the preceding claims, wherein said greater dimension is approximately double the lesser dimension and said protuberances are disposed in pairs.

11. Web material as claimed in one or more of the preceding claims, wherein adjacent linear protuberances are bonded together, forming on the web material portions projecting toward the inside joined together to form a net, the meshes of which are defined by contours formed by said linear protuberances and the inside of said meshes being defined by said portions of ply forming said outward facing convexities.

12. Web material as claimed in one or more of the preceding claims, wherein at least said first ply comprises a second embossing pattern associated with said background embossing pattern and defining decorative motifs.

13. Material as claimed in claim 12, wherein said second embossing pattern comprises protuberances facing the inside of the web material and of a greater height with respect to said linear protuberances.

14. Material as claimed in claim 13, wherein said protuberances of the second embossing pattern are glued.

15. Material as claimed in one or more of the preceding claims, wherein said protuberances facing the inside of the web material are rounded.

16. Material as claimed in one or more of the preceding claims, wherein said convexities have a rounded surface substantially without sharp corners.

17. Material as claimed in one or more of the preceding claims, wherein said convexities have dimensions at the base not exceeding 8 mm.

Patentansprüche

1. Prägepapierbahnmaterial, das zumindest zwei Seidenpapierlagen umfasst, wobei jede Lage eine Grammatur zwischen 10 und 40 g/m^2 aufweist; wobei zumindest eine der Lagen mit einem Hintergrundprägemuster versehen ist, das durch lineare Vorsprünge gebildet ist, die sich gemäß geschlossenen Linien erstrecken, die hin zum Inneren des Bahnmaterials vorstehen; wobei die Lagenabschnitte, die durch die geschlossenen Linien begrenzt werden, Ausbuchtungen bilden, die dem Äußeren des Bahnmaterials zugewandt sind; und wobei die Ausbuchtungen mit einer Dichte verteilt sind, die größer gleich 6 Ausbuchtungen/cm^2 ist und vorzugsweise zwischen 10 und 30 Ausbuchtungen/cm^2 liegt; und wobei die linearen Vorsprünge eine im Wesentlichen rechteckige Erstreckung mit einer größeren Abmessung und einer kleineren Abmessung aufweisen und in Gruppen angeordnet sind, die ineinander gefügt und mit der größeren Abmessung gemäß zwei unterschiedlichen Ausrichtungen ausgerichtet sind.

2. Bahnmaterial nach Anspruch 1, wobei eine zweite der Lagen mit einem Hintergrundprägemuster versehen ist, das durch lineare Vorsprünge gebildet ist, die sich gemäß geschlossenen Linien erstrecken,

die hin zum Inneren des Bahnmaterials vorstehen; wobei die Lagenabschnitte, die durch die geschlossenen Linien begrenzt werden, Ausbuchtungen bilden, die dem Äußeren des Bahnmaterials zugewandt sind; und wobei die Ausbuchtungen mit einer Dichte verteilt sind, die größer gleich 6 Ausbuchtungen/cm^2 ist und vorzugsweise zwischen 10 und 30 Ausbuchtungen/cm^2 liegt.

3. Bahnmaterial nach Anspruch 1 oder 2, wobei jede der geschlossenen Linien eine im Wesentlichen polygonale Erstreckung aufweist.

4. Bahnmaterial nach Anspruch 3, wobei die geschlossenen Linien eine im Wesentlichen viereckige und vorzugsweise rechteckige Erstreckung aufweisen.

5. Bahnmaterial nach Anspruch 1, 2 oder 3, wobei die geschlossenen Linien als Ganzes eine Netz- oder Maschenstruktur definieren, wobei jede Masche eine der Ausbuchtungen enthält.

6. Bahnmaterial nach Anspruch 3, 4 oder 5, wobei die geschlossenen Linien abgerundete Ecken aufweisen.

7. Bahnmaterial nach einem oder mehreren der vorstehenden Ansprüche, wobei die geschlossenen Linien Maschen mit Abmessungen definieren, die 8 mm und vorzugsweise 6 mm nicht überschreiten.

8. Bahnmaterial nach einem oder mehreren der vorstehenden Ansprüche, wobei die linearen Vorsprünge der ersten Lage mit Klebstoff versehen sind.

9. Bahnmaterial nach einem oder mehreren der vorstehenden Ansprüche, wobei die linearen Vorsprünge eine Höhe kleiner gleich 1,5 mm aufweisen.

10. Bahnmaterial nach einem oder mehreren der vorstehenden Ansprüche, wobei die größere Abmessung ungefähr doppelt so groß wie die kleinere Abmessung ist und die Vorsprünge paarweise angeordnet sind.

11. Bahnmaterial nach einem oder mehreren der vorstehenden Ansprüche, wobei benachbarte lineare Vorsprünge aneinander gebondet sind, wobei sie auf dem Bahnmaterial Abschnitte bilden, die hin zum Inneren vorstehen, die miteinander verbunden sind, um ein Netz zu bilden, wobei die Maschen davon durch Konturen definiert sind, die durch die linearen Vorsprünge gebildet sind, und das Innere der Maschen durch die Lagenabschnitte definiert ist, die die nach außen gewandten Ausbuchtungen bilden.

12. Bahnmaterial nach einem oder mehreren der vorstehenden Ansprüche, wobei zumindest die erste Lage ein zweites Prägemuster umfasst, das mit dem Hintergrundprägemuster assoziiert ist und dekorative Motive definiert.

13. Material nach Anspruch 12, wobei das zweite Prägemuster Vorsprünge umfasst, die dem Inneren des Bahnmaterials zugewandt sind und eine größere Höhe als die linearen Vorsprünge aufweisen.

14. Material nach Anspruch 13, wobei die Vorsprünge des zweiten Prägemusters geklebt sind.

15. Material nach einem oder mehreren der vorstehenden Ansprüche, wobei die Vorsprünge, die dem Inneren des Bahnmaterials zugewandt sind, abgerundet sind.

16. Material nach einem oder mehreren der vorstehenden Ansprüche, wobei die Ausbuchtungen eine abgerundete Oberfläche im Wesentlichen ohne scharfe Ecken aufweisen.

17. Material nach einem oder mehreren der vorstehenden Ansprüche, wobei die Ausbuchtungen Abmessungen an der Basis aufweisen, die 8 mm nicht überschreiten.

Revendications

1. Matériau de feuille continue de papier gaufré comprenant au moins deux plis de papier mince, chaque pli ayant un grammage entre 10 et 40 g/m^2 ; dans lequel au moins l'un desdits plis est pourvu d'un dessin de gaufrage de fond constitué de protubérances linéaires s'étendant selon des lignes fermées saillant vers l'intérieur du matériau de feuille continue ; dans lequel les portions de pli délimitées par lesdites lignes fermées forment des convexités tournées vers l'extérieur du matériau de feuille continue ; et dans lequel lesdites convexités sont réparties avec une densité supérieure ou égale à 6 convexités/cm^2 et de préférence entre 10 et 30 convexités/cm^2, et dans lequel lesdites protubérances linéaires ont un prolongement sensiblement rectangulaire, avec une dimension plus grande et une dimension plus petite, et sont agencées en groupes intercalés les uns avec les autres et orientés avec la dimension plus grande selon deux orientations différentes.

2. Matériau de feuille continue selon la revendication 1, dans lequel un second desdits plis est pourvu d'un dessin de gaufrage de fond constitué de protubérances linéaires s'étendant selon des lignes fermées saillant vers l'intérieur du matériau de feuille continue ; dans lequel les portions de pli délimitées par lesdites lignes fermées forment des convexités orientées vers l'extérieur du matériau de feuille

continue ; et dans lequel lesdites convexités sont réparties avec une densité supérieure ou égale à 6 convexités/cm^2 et de préférence entre 10 et 30 convexités/cm^2.

3. Matériau de feuille continue selon la revendication 1 ou 2, dans lequel chacune desdites lignes fermées a un prolongement sensiblement polygonal.

4. Matériau de feuille continue selon la revendication 3, dans lequel lesdites lignes fermées ont un prolongement sensiblement quadrangulaire et de préférence rectangulaire.

5. Matériau de feuille continue selon la revendication 1, 2 ou 3, dans lequel lesdites lignes fermées définissent dans leur ensemble une structure de filet ou de maille, chaque maille contenant l'une desdites convexités.

6. Matériau de feuille continue selon la revendication 3, 4 ou 5, dans lequel lesdites lignes fermées ont des coins arrondis.

7. Matériau de feuille continue selon une ou plusieurs des revendications précédentes, dans lequel lesdites lignes fermées définissent des mailles avec des dimensions ne dépassant pas 8 mm et de préférence ne dépassant pas 6 mm.

8. Matériau de feuille continue selon une ou plusieurs des revendications précédentes, dans lequel lesdites protubérances linéaires du premier pli sont pourvues de colle.

9. Matériau de feuille continue selon une ou plusieurs des revendications précédentes, dans lequel lesdites protubérances linéaires ont une hauteur inférieure ou égale à 1,5 mm.

10. Matériau de feuille continue selon une ou plusieurs des revendications précédentes, dans lequel ladite dimension plus grande est approximativement le double de la dimension plus petite et lesdites protubérances sont disposées par paires.

11. Matériau de feuille continue selon une ou plusieurs des revendications précédentes, dans lequel des protubérances linéaires adjacentes sont liées ensemble, formant sur le matériau de feuille continue des portions saillant vers l'intérieur assemblées ensemble pour former un filet, les mailles sont définies par des contours formés par lesdites protubérances linéaires et l'intérieur desdites mailles étant défini par lesdites portions de pli formant lesdites convexités tournées vers l'extérieur.

12. Matériau de feuille continue selon une ou plusieurs des revendications précédentes, dans lequel au moins ledit premier pli comprend un second dessin de gaufrage associé audit dessin de gaufrage de fond et définissant des motifs décoratifs.

13. Matériau selon la revendication 12, dans lequel ledit second dessin de gaufrage comprend des protubérances tournées vers l'intérieur du matériau de feuille continue et d'une hauteur plus grande par rapport auxdites protubérances linéaires.

14. Matériau selon la revendication 13, dans lequel lesdites protubérances du second dessin de gaufrage sont collées.

15. Matériau selon une ou plusieurs des revendications précédentes, dans lequel lesdites protubérances tournées vers l'intérieur du matériau de feuille continue sont arrondies.

16. Matériau selon une ou plusieurs des revendications précédentes, dans lequel lesdites convexités ont une surface arrondie sensiblement dépourvue de coins pointus.

17. Matériau selon une ou plusieurs des revendications précédentes, dans lequel lesdites convexités ont des dimensions au niveau de la base ne dépassant pas 8 mm.

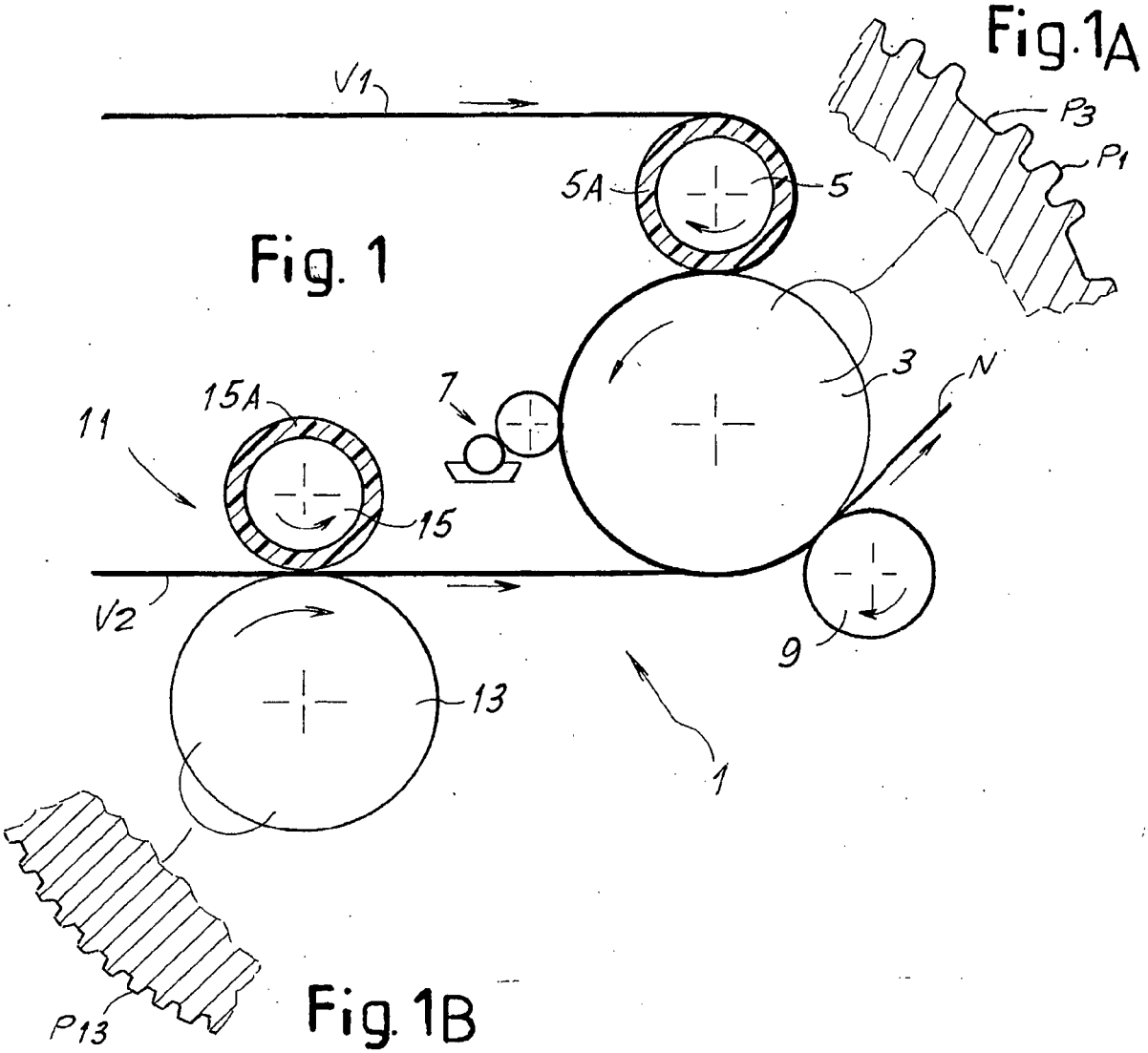


Fig. 1

Fig. 1A

Fig. 1B

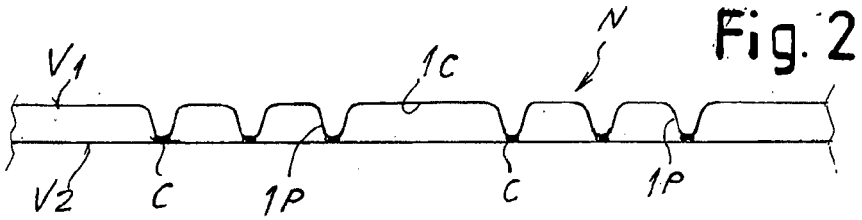


Fig. 2

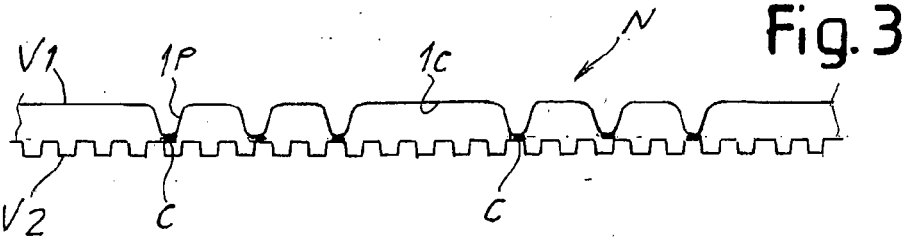


Fig. 3

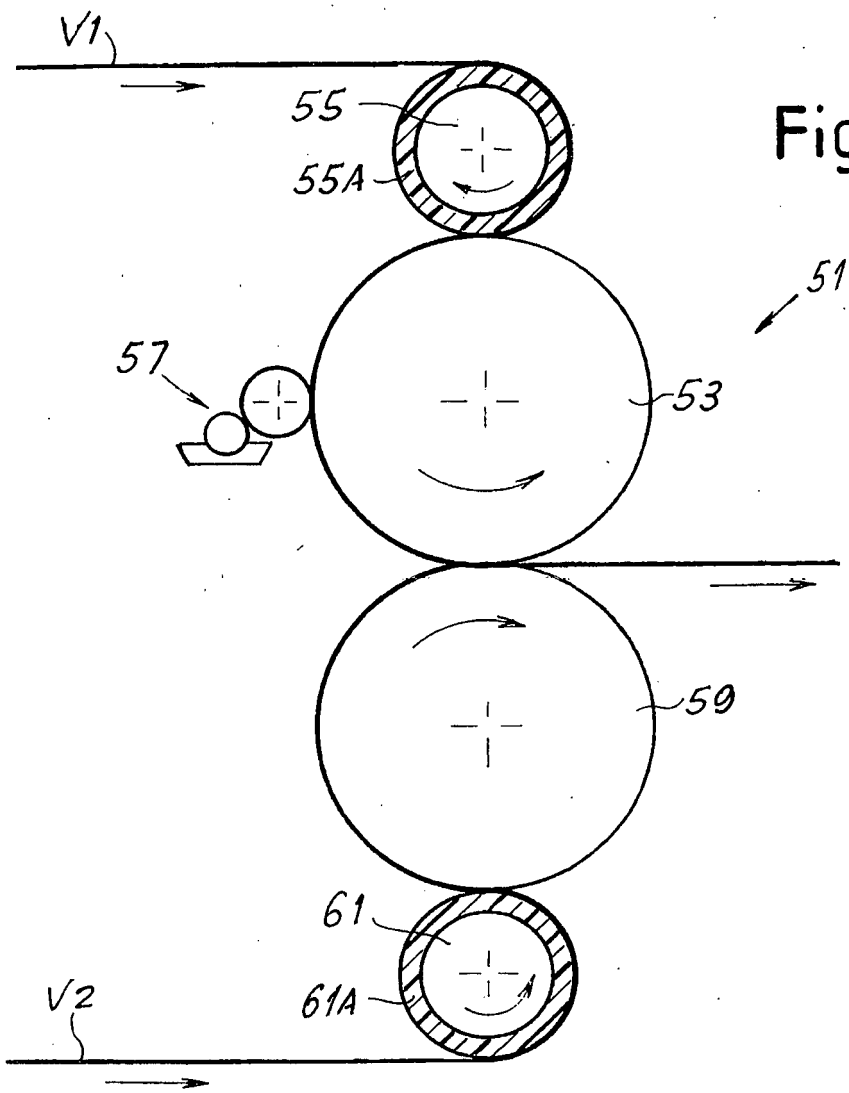


Fig. 4

Fig. 5

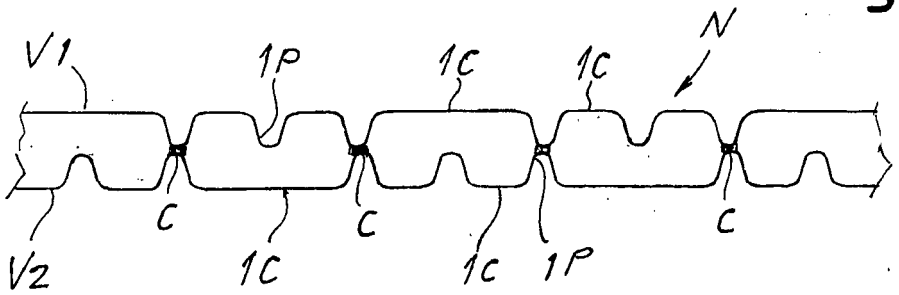


Fig. 6A

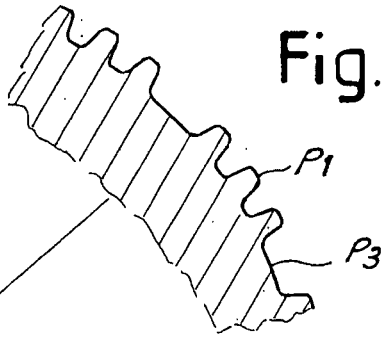


Fig. 6B

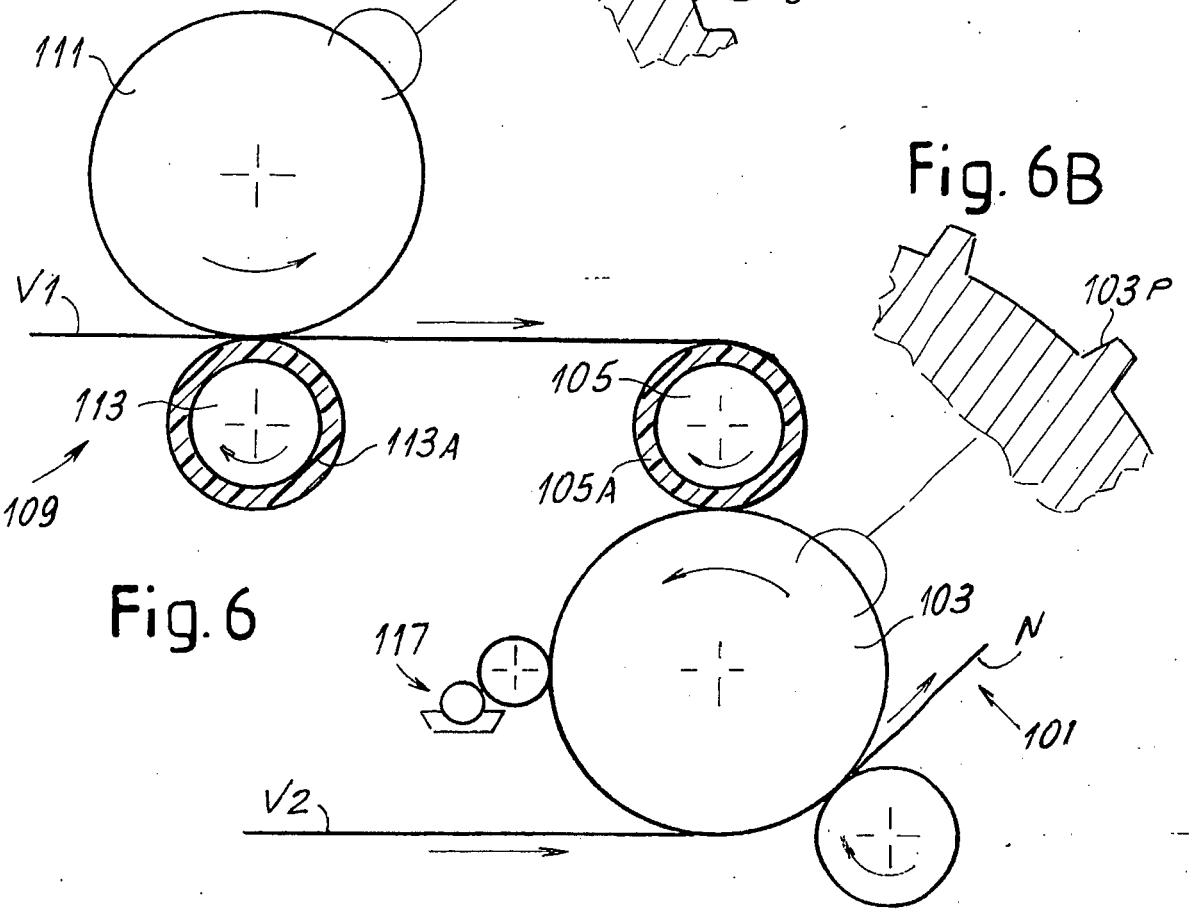
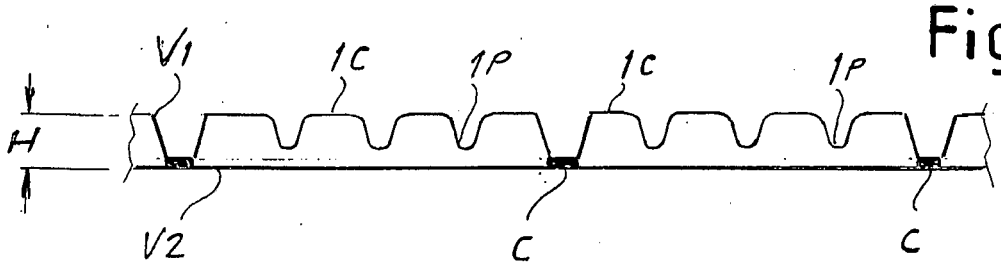


Fig. 6

Fig. 7



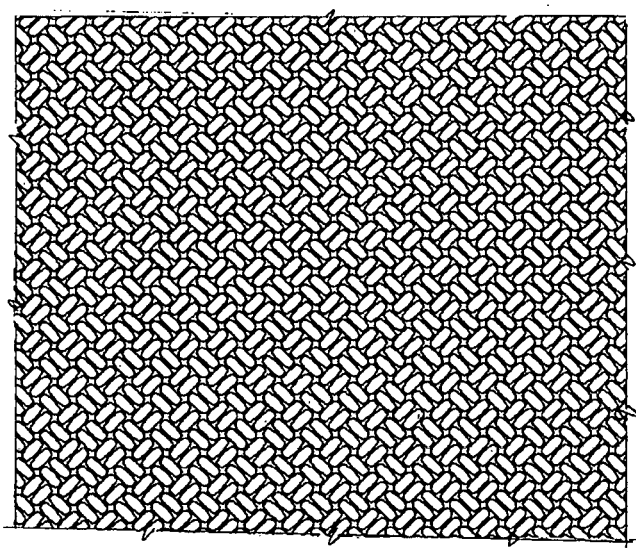
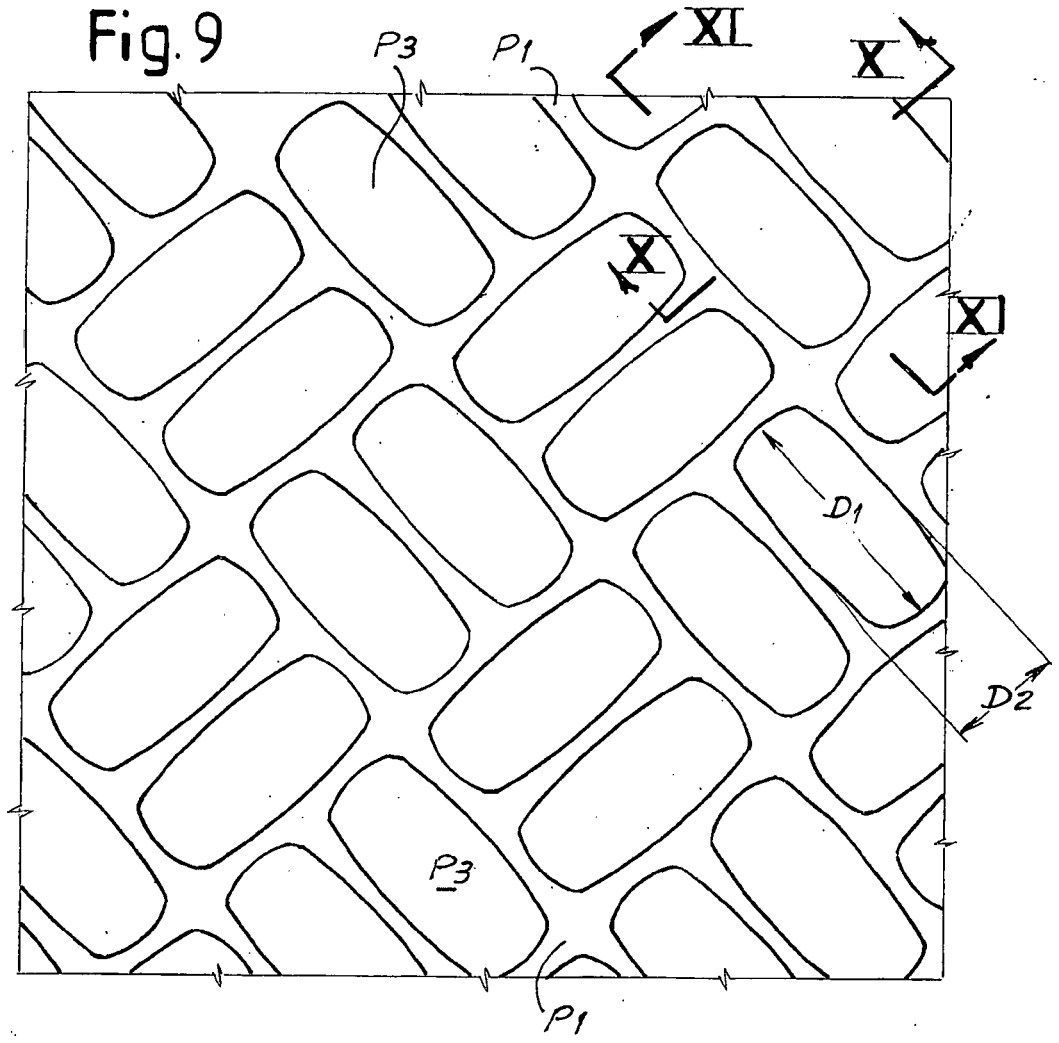


Fig.8

Fig.9



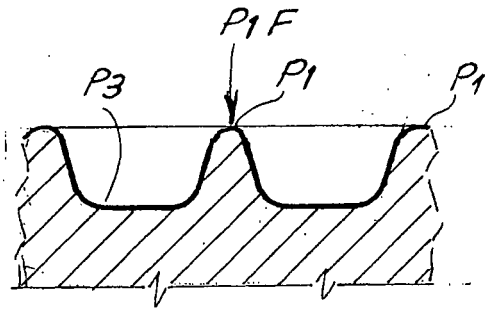


Fig.10

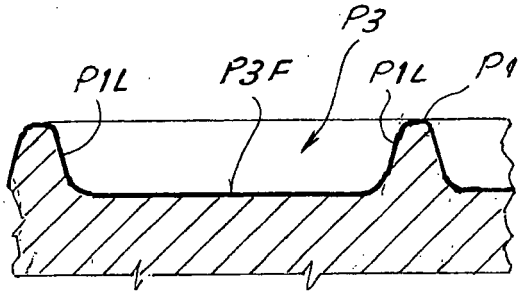


Fig.11

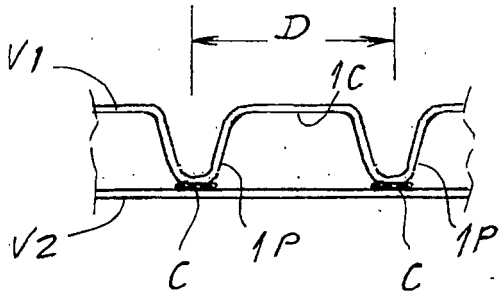


Fig.12

REFERENCES CITED IN THE DESCRIPTION

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