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(71) Applicant: **GDM S.P.A.** [—/IT]; Via Battindarno, 91, I-40133 Bologna (IT).

(72) Inventors: **PIANTONI, Matteo**; Via Cà Bianca, 2/E, I-24021 ALBINO (Bergamo) (IT). **SOLI, Valerio**; Via del Ravone, 21/2, I-40135 Bologna (IT).

(74) Agent: **BIANCIARDI, Ezio**; Via di Corticella, 87, I-40128 Bologna (IT).

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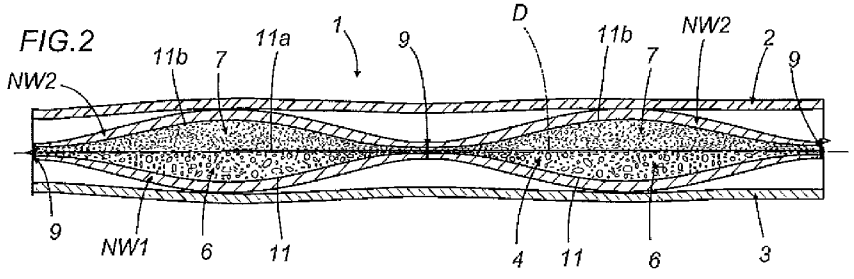
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(54) Title: ABSORBENT SANITARY ARTICLE AND MACHINE FOR MAKING THE ARTICLE

FIG.2



(57) Abstract: An absorbent sanitary article (1) having a main direction of extension (D) comprises a permeable inner layer (2), an impermeable outer layer (3), an absorbent pad (4) interposed between the inner layer (2) and the outer layer (3) and comprising a first layer (NW1) of non-woven fabric, a second layer (NW2) of non-woven fabric partly joined to the first layer (NW1) of non-woven fabric, and an absorbent core (5) interposed between the first and second layers (NW1, NW2) of non-woven fabric; the absorbent core (5) comprises a spread (6) of absorbent polymer material (SAP1, SAP2) and a third layer (7) of non-woven fabric interposed between the first and second layers (NW1, NW2) of non-woven fabric.

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DESCRIPTION

ABSORBENT SANITARY ARTICLE AND MACHINE FOR MAKING THE ARTICLE

Technical field

This invention relates to an absorbent sanitary article, such as a baby nappy or the like, and to a machine for making articles of this kind.

In this description, for simplicity, express reference is made to a nappy but without thereby limiting the scope of the invention.

Background art

As is known, nappies comprise an absorbent pad or padding which is normally enclosed between a permeable inner layer of non-woven fabric and an impermeable outer layer of polyethylene.

Absorbent pads of known type comprise an absorbent core made of an absorbent material, such as, for example, granules of superabsorbent polymer material (SAP) inside a mixture of containment cellulose pulp (fluff) and absorbent material binder, sandwiched between two layers of non-woven fabric.

In order to improve drainage of the absorbed liquid and, at the same time, reduce production costs, manufacturers are opting for absorbent cores with more and more granular superabsorbent material and less and less cellulose pulp, and even absorbent cores that are totally free of cellulose.

One example of absorbent pads comprising absorbent cores made of superabsorbent polymer material and substantially free of cellulose is described in document EP2444046.

The padding described in that prior art document comprises a first layer of non-woven fabric, a second layer of non-woven fabric and the cellulose free absorbent material enclosed between the two layers of non-woven fabric.

The two layers of non-woven fabric are joined by seals which are suitably made in such a way as to form a plurality of cells containing the absorbent material.

In one embodiment, the seals which separate the cells are uninterrupted so as to better contain and position the absorbent material, especially when the product is new, unused and the superabsorbent material dry.

In a second embodiment, the seals have suitable breaks in them so as to improve the diffusion of the liquid and optimize its absorption by the absorbent material.

These solutions, where the absorbent core is cellulose free and the padding thus less coherent, have some disadvantages, however.

In the first of the above mentioned embodiments, the seals compress the absorbent material, limiting its freedom of expansion and thus its absorbing capacity.

If relatively large quantities of liquid are poured into the nappy, the absorbent material may increase in volume until it tears the seals and migrates into an adjacent cell, thus altering its optimal distribution within the pad.

In the second embodiment, the breaks in the seals may allow the granules of absorbent material to move through them relative to their optimal distribution, even when dry.

In the second embodiment, too, although the breaks in the seals provide preferential channels through which the absorbent material may spread, excessive amounts of absorbed liquid may cause the seals themselves to tear, leading to uncontrolled movement of the absorbent material within the pad.

In this context, the main technical purpose of this invention is to propose an absorbent sanitary article which is free of the above mentioned disadvantages.

Aim of the invention

The aim of this invention is to propose an absorbent sanitary article whose padding is substantially free of cellulose and where the absorbent material is allowed to spread in a suitably controlled manner.

The technical purpose and aims specified are substantially achieved by an absorbent sanitary article according to claim 1 and by a machine according to claim 28 for making the absorbent sanitary article.

Brief description of the drawings

Further features and advantages of this invention are more apparent in the description below, with reference to preferred, non-exclusive embodiments of an absorbent sanitary article and of a machine for making the absorbent sanitary article, as illustrated in the accompanying drawings, in which:

- Figure 1 is a schematic cross section illustrating an absorbent sanitary article according to this invention;
- Figure 2 is a schematic cross section illustrating a first embodiment of the absorbent sanitary article according to this invention;
- Figure 3 is a schematic cross section, with some parts cut away for better clarity, illustrating a second embodiment of the absorbent sanitary article according to this invention;
- Figure 4 is a schematic cross section, with some parts cut away for better clarity, illustrating a third embodiment of the absorbent sanitary article according to this invention;
- Figure 5 is a schematic plan view, with some parts cut away for better clarity, illustrating an absorbent sanitary article according to this invention;
- Figures 6 to 9 are schematic views, partly in blocks and with some parts cut away in order to better illustrate others, showing different embodiments of an installation for making an absorbent sanitary article according to the invention.

Detailed description of preferred embodiments of the invention

With reference to the accompanying drawings, the numeral 1 denotes an absorbent sanitary article according to the invention, only partly illustrated, such as for example, a baby nappy, to which express reference is hereinafter made without thereby limiting the scope of the invention, sanitary towels or the like.

The article 1 has a main direction of extension D, a front portion and a rear portion.

In a preferred embodiment, the main extension is the longitudinal one, that is the extension measured between the front portion and the rear portion of the article 1.

The article 1 comprises an inner layer 2 permeable to liquids, also known as "top sheet", preferably defined by a piece of non-woven fabric, and an outer layer 3 impermeable to liquids, also known as "back sheet", preferably defined by a sheet of polyethylene.

The top sheet and the back sheet are joined to each other in known manner to define the outer container of the article 1.

The article 1 comprises an absorbent pad 4 interposed between the permeable inner layer 2 and the impermeable outer layer 3 and delimited by an outer perimeter 4a, illustrated partly in Figure 5.

The pad 4 comprises a first layer NW1 of non-woven fabric and a second layer NW2 of non-woven fabric at least partly joined to the first layer, as explained in more detail below.

The pad 4 comprises a core 5 interposed between the first layer NW1 and the second layer NW2.

In the preferred embodiment illustrated, the core 5 comprises a spread 6 of absorbent material, preferably a polymer known as superabsorbent polymer or SAP, to which express reference is made herein without thereby limiting the invention and which is not further described.

More specifically, in one embodiment, the spread 6 of absorbent polymer material comprises at least a first absorbent polymer material SAP1.

In one embodiment, the spread 6 of absorbent polymer material comprises a first absorbent polymer material SAP1 and a second absorbent polymer material SAP2.

Advantageously, the response time to liquid of the second material SAP2 is, generally speaking, longer than the response time to liquid of the first material SAP1.

As is known, the response time to liquid is a specific property of the superabsorbent material.

The response time to liquid may, for example, be a function of the permeability and/or liquid retaining capacity and/or *absorption* and/or *retention* and/or *absorption against pressure* of the superabsorbent polymer material. In short, the performance of superabsorbent polymer materials is determined mainly, in substantially known manner, by: *permeability coefficient*, *apparent specific gravity (bulk density)*, *flow rate*, *centrifuge retention capacity (CRC)* and *particle size distribution (PSD)*.

These properties are preferably determined and identified according to the *Worldwide Strategic Partners (WSP) test methods*.

In other words, the first material SAP1 starts absorbing liquid before the second material SAP2 which starts absorbing the liquid at a later stage. That way, during the initial stages of absorption, the second absorbent material SAP2 is permeable to the liquid which is thus free to reach the first absorbent material SAP1.

The core 5, that is, the part of the pad 4 between the layers NW1 and NW2, comprises a third layer 7 of non-woven fabric which is also interposed between the first and second layers NW1 and NW2 of non-woven fabric.

Advantageously, the layer 7 of non-woven fabric is defined by a piece of a continuous web 8 of non-woven fabric.

In one embodiment, the layer 7 extends substantially for the full length of the pad 4.

In a different embodiment, the layer 7 of non-woven fabric is not

continuous along the main direction, that is to say, for each pad 4, it is composed of two or more pieces of the web 8.

In one embodiment, the layer 7 is as long as the entire pad 4 or, alternatively, is shorter than the pad 4 and preferably located in a median portion of the pad along the main direction of extension D.

Preferably, the layer 7 is made of a non-woven fabric whose grammage (*Grams per Square Metre, GSM*) is much greater than the grammage of the non-woven fabric used for the layers NW1 and NW2.

For example, the grammage of the layers NW1 and NW2 is between 8 gsm and 20 gsm, whilst the grammage of the layer 7 may be up to 400 gsm.

A preferred grammage for the layer 7 is between 80 gsm and 160 gsm, in particular equal to 120 gsm.

Advantageously, also, the fibres of the layer 7 are much more open than the fibres of the layers NW1 and NW2.

The layer 7 is preferably made from a non-woven fabric known as "high loft", which is an extruded non-woven fabric of substantially known type and composed typically of polypropylene and polyethylene, to which express reference is made herein without thereby limiting the invention.

Advantageously, the high loft layer 7 defines, in the core 5, a buffer layer where the liquid remains until the absorbent material SAP1 and/or SAP2 absorbs the liquid.

The absorbent sanitary article 1 comprises connecting means operating between the first layer NW1 of non-woven fabric, the second layer NW2 of non-woven fabric and the third layer 7 of non-woven fabric in order to join them and to define the pad 4.

As schematically illustrated also in Figure 5, the connecting means comprise a plurality of seals 9.

The layers NW1, NW2 and 7 are interconnected by the seals 9.

In one embodiment, the connecting means comprise a perimeter seal 9a along the perimeter 4a of the pad 4, which prevents the absorbent material

SAP1 and/or SAP2 from leaking out.

The perimeter seal 9a runs preferably along the longitudinal edges of the pad 4.

In further embodiments, the perimeter seal 9a runs preferably also along the transversal edges of the pad 4.

In the embodiment illustrated, the seals 9 are uninterrupted, whilst in alternative embodiments not illustrated, the seals 9 have breaks in them.

The seals 9 define in the pad 4 a plurality of cells 10 each containing a part of the spread 6 of absorbent material.

In one embodiment, all the cells 10 contain the same absorbent material, for example SAP1 or SAP2, preferably in the same quantity.

In one embodiment, illustrated in Figure 5, the pad 4 comprises cells 10a filled with the first absorbent material SAP1 and cells 10b containing the first and the second absorbent material SAP1 and SAP2.

Preferably, the cells 10b are located in a median portion of the pad 4 along the main direction of extension D of the pad 4 itself.

Preferably, the cells 10b are located more towards the front portion of the article 1 and away from the rear portion.

Preferably, the cells 10b contain a larger quantity of absorbent material SAP1 and/or SAP2 for better absorption in the central zone of the article 1.

As illustrated in Figure 2, in a first embodiment of the article 1, the layer NW1 is located on the impermeable outer layer 3.

The spread 6 of absorbent polymer material is located on the layer NW1 of non-woven fabric.

Preferably, the pad 4 comprises an adhesive layer 11 between the layer NW1 of non-woven fabric and the spread 6 of absorbent polymer material.

The layer 7 of high loft non-woven fabric is located on the spread 6 of absorbent material.

In one embodiment, the pad 4 comprises an adhesive layer 11a between the layer 7 and the spread 6 of absorbent polymer material.

The layer NW2 is located on the high loft layer 7 and the permeable inner

layer 2 is positioned on the layer NW2.

In one embodiment, the pad 4 comprises an adhesive layer 11b between the layer 7 and the layer NW2.

With reference to Figure 4, in one embodiment of the article 1, the layer NW1 is located on the impermeable outer layer 3.

The spread 6 of absorbent polymer material is located on the layer NW1 of non-woven fabric and, preferably, the adhesive layer 11 is interposed between the layer NW1 and the spread 6.

The layer 7 of high loft non-woven fabric is located on the spread 6 of absorbent material.

The embodiment illustrated comprises a second spread 12 of absorbent material located on the high loft layer 7.

In one embodiment, the pad 4 comprises an adhesive layer 16 between the high loft layer 7 and the spread 12 of absorbent polymer material.

The second layer NW2 is located on the spread 12 to close the pad 4.

Preferably, the pad 4 comprises the adhesive layer 11b between the high loft layer 7 and the spread 12 of absorbent material.

In the embodiment shown in Figure 4, the first spread 6 of absorbent material comprises the first absorbent polymer material SAP1, whereas the second spread 12 of absorbent material comprises the second absorbent polymer material SAP2.

Preferably, each cell 10 contains the same quantity of absorbent material SAP1 and of absorbent material SAP2.

The permeable inner layer 2 is positioned on the layer NW2 to define the outer structure of the absorbent sanitary article 1.

With reference to Figure 3, the layer NW1 is located on the impermeable outer layer 3.

The layer 7 of high loft non-woven fabric is located on the layer NW1.

In one embodiment, the pad 4 comprises an adhesive layer 11 between the layer NW1 and the layer 7.

The spread 6 of absorbent polymer material is located on the layer 7 of

non-woven fabric.

In one embodiment, the pad 4 comprises an adhesive layer 14 between the layer 7 of non-woven fabric and the spread 6 of absorbent polymer material.

The layer NW2 is located on the spread 6 of absorbent polymer material and the permeable inner layer 2 is positioned on the layer NW2.

In one embodiment, the pad 4 comprises an adhesive layer 11b between the layer NW2 of non-woven fabric and the spread 6 of absorbent polymer material.

With reference in particular to Figures 1, 3, 4, it may be observed that, especially when the layer NW2 is located on the spread 6, 13 of absorbent material SAP1 and/or SAP2, the absorbent sanitary article 1 comprises a further layer 15 of non-woven fabric illustrated, for simplicity, only in Figure 1.

The layer 15 is thus interposed between the pad 4 and the permeable inner layer 2.

In one embodiment, the layer 15 is glued to the layer NW2 and the pad 4 comprises an adhesive layer 16 between the layer NW2 and the layer 15 which is glued to the non-woven fabric NW2 on the side opposite the core 5.

In the preferred embodiment, the layer 15 is in the form of pre-cut pieces which are glued to the non-woven fabric NW2 on the side opposite the core 5.

Advantageously, the layer 15 makes the article 1 more comfortable because it defines a relatively softer layer between the absorbent material and the body of a wearer not illustrated.

The layer 15 of non-woven fabric is preferably similar to the layer 7 whose properties apply also to the layer 15.

Thus, the layer 15, too, is preferably made of high loft non-woven fabric.

It should be noted that the adhesive layers 11, 11a, 11b, 14, 16 meet process requirements in that they keep the different layers of the pad 4 in

position during the assembly thereof.

In addition to the above mentioned basic components, absorbent articles comprise further accessory components, such as, for example, elastic bands, faecal barriers and side tabs, which vary the complexity of the structure and production process of the absorbent articles to different degrees and which are not described here because they do not form part of this invention.

With reference to Figures 6 to 9, the numeral 200 denotes in its entirety a machine for making absorbent sanitary articles 1.

The description of the machine 200 is limited to the parts necessary for understanding this invention and, in particular, to the technical features which distinguish the different embodiments of it from each other, it being understood that the other features are the same for all the embodiments and denoted by the same reference numerals.

The machine 200 comprises a line, of substantially known type and not illustrated, for feeding at least one continuous web of impermeable material used to make the impermeable outer layer 3.

The machine 200 comprises a forming unit 100 for making the absorbent pads 4 to form a succession of the pads 4 and to associate them with the continuous web of impermeable material.

The unit 100 comprises a system for feeding a first web 101 of non-woven fabric in a feed direction V along a path P for defining the first layer NW1 of non-woven fabric.

The feed system comprises a suction roller 102 for holding down and feeding at least the first web 101 of non-woven fabric and rotatable in a clockwise direction.

The roller or drum 102 uses suction to hold down the web 101 and, preferably, the further layers of the article 1 subsequently placed on the web 101, as will become clearer as this description continues.

The unit 100 comprises a station 103 for placing a second web 104 of non-woven fabric on the first web 101 of non-woven fabric to define the

second layer NW2 of non-woven fabric of the pad 4.

The station 103 comprises a roller 105 for transferring the second web 104 and tangent to the suction roller 102.

The roller 105 is preferably rotatable in anticlockwise direction.

The unit 100 comprises a station 106 for joining, in particular sealing, the second web 104 to the first web 101 so as to close the layers NW1 and NW2 on the cores 5 of the pads 4.

The joining station 106 comprises a contact roller 107, for example rotatable in anticlockwise direction, tangent to the suction roller 102 and located downstream of the transfer roller 105 relative to the feed direction V of the absorbent pads 4.

The roller 107 has on its outside surface a pattern of the seals 9, 9a.

The joining station 106 comprises a sonotrode 108, of substantially known type, for making the seals 9, 9a and facing the outside surface of the roller 107.

The sonotrode 108 acts on the contact roller 107 and, more specifically, makes the seals 9, 9a based on the predetermined pattern.

In an alternative embodiment not illustrated, the roller 105 itself acts as a contact roller, that is to say, it substitutes the roller 107, and the sonotrode 108 acts directly on the roller 105.

In a further embodiment not illustrated, the roller 102 is the contact roller, that is to say, it has the pattern of seals on its outside surface and the sonotrode 108 is a rotary sonotrode tangent to the roller 102.

Advantageously, this embodiment comprises two sequentially rotating sonotrodes.

The unit 100 comprises a first station 109 for laying out the first 6 of absorbent polymer material on the web 101 of non-woven fabric.

The station 109 is operatively positioned upstream of the first placing station 103 relative to the first feed direction V.

The station 109 comprises a laying-out roller 110 which is rotatable, for example in anticlockwise direction, and which is substantially tangent to

the suction roller 102.

The roller 110 is provided, on its outside cylindrical surface, with a plurality of pockets 111, each feeding and placing along the path P a portion of the absorbent material SAP1 and/or SAP2 of the first spread 6 of superabsorbent polymer material.

The forming unit 100 comprises a second station 112 for placing a third web 113 of non-woven fabric on the first web 101 of non-woven fabric to define the layer 7 of non-woven fabric.

As illustrated, the station 112 is located upstream of the station 103 relative to the feed direction V.

In the embodiment of Figure 6, the station 112 is located downstream of the laying-out station 109 relative to the feed direction V.

More specifically, the station 112 applies the web 113 to the web 104 in such a way that the web 113 will be on top of the web 101 in the pad 4.

In other words, the station 112 is located downstream of the laying-out station 109 in the sense that it acts on the web 104 to apply the web 113 thereto, and the web 104 which, as mentioned above will define the layer NW2 of the pad 4, is applied to the web 101 after the material has been laid out at the station 109.

This configuration makes it possible to obtain the article 1 of Figure 2.

Preferably, the forming unit 100 comprises a second station 114, shown by the dashed lines, for laying out the second spread 12 of absorbent polymer material.

The second station 114 is located downstream of the first laying-out station 109 and upstream of the second placing station 112, relative to the feed direction V.

As illustrated, the second laying-out station 114 comprises a laying-out roller 115 substantially tangent to the suction roller 102 and rotatable, for example, in anticlockwise direction.

The roller 115 is provided, on its outside cylindrical surface, with a plurality of pockets 116, each feeding and placing along the path P a portion of the

absorbent material SAP1 and/or SAP2 of the second spread 12 of superabsorbent polymer material.

The forming unit 100 comprises an adhesive dispenser 117 operating on the web 101 upstream of the laying-out station 109 to apply the layer 11 on the web 101 of non-woven fabric.

Preferably, the forming unit 100 comprises a second adhesive dispenser 118 operating at the first placing station 103 to spread the adhesive 11b on the second web 102.

As already mentioned, the adhesive 11b keeps the web 113 in position relative to the web 104 and the unit 100 comprises an adhesive dispenser 119 for applying the adhesive 11a to the layer 113 once the latter has been glued to the web 104.

In practice, the dispenser 119 restores the layer of adhesive which will go on top of the absorbent material.

With reference to Figure 7, in the embodiment illustrated, which forms the pad 4 shown in Figure 3, the station 112 for placing the web 113 is located upstream of the first laying-out station 109 and downstream of the adhesive dispenser 117, relative to the feed direction V.

Preferably, the unit 100 comprises an adhesive dispenser 120 for applying the adhesive 11 to the layer 113 once the latter has been glued to the web 101.

In practice, the dispenser 120 restores the layer of adhesive which will go under the absorbent material.

With reference to Figure 8, in the embodiment illustrated, which forms the pad 4 shown in Figure 4, the second station 114 for laying out the second spread 12 of absorbent material is located downstream of the station 112 for placing the web 113 and upstream of the station 103 for placing the web 104, relative to the feed direction V.

With reference to Figure 9, in the embodiment where the high loft layer 15 is to be provided on the outside of the pad 4, between the layer NW2 and the permeable layer 2, the unit 100 for forming the pad 4 comprises a

station 121 for applying the layer 15 to the web 104.

The application station 121 comprises a roller 122 for feeding the layer 15 of high loft non-woven fabric and a contact roller 123 tangent to the roller 122 at the web 104.

The station 121 comprises a dispenser 124 for spreading the adhesive 16 on the web 104, upstream of the rollers 122 and 123 relative to the feed direction of the web 102 in such a way that the rollers 122 and 123 cause the web 104 to be joined to the layer 15.

The machine 200 comprises a line, of substantially known type and not illustrated, for feeding and applying at least one continuous web of permeable material used to make the permeable inner layer 2.

The pads 4 are interposed between the outer layer 3 and the inner layer 2.

The invention described brings important advantages.

The layer 7 of loft or high loft non-woven fabric helps hold the core 5 together better, especially if the seals 9, 9a are torn and, in practice, makes up for the absence of cellulose fibre, or fluff, in the absorbent core 5.

Thanks to the production process, the absorbent material SAP1, SAP2 is embedded in the layer 7 and is thus made more stable.

The layer 15 on the outside of the core 5 makes the article 1 more comfortable, especially in the case where the absorbent material SAP1, SAP2 is directed towards the wearer's skin.

The adhesive layers limit the migration of the absorbent material both when the absorbent material is dry and during the formation of the pad 4.

CLAIMS

1. An absorbent sanitary article having a main longitudinal direction of extension (D) and comprising

- a permeable inner layer (2);
- an impermeable outer layer (3);
- an absorbent pad (4) interposed between the inner layer (2) and the outer layer (3) and comprising:
  - a first layer (NW1) of non-woven fabric;
  - a second layer (NW2) of non-woven fabric partly joined to the first layer (NW1) of non-woven fabric;
  - an absorbent core (5) interposed between the first and second layers (NW1, NW2) of non-woven fabric, the absorbent core (5) comprising a spread (6) of absorbent polymer material (SAP1, SAP2);
  - a plurality of seals (9, 9a) for connecting the first layer (NW1) of non-woven fabric to the second layer (NW2) of non-woven fabric;

the absorbent sanitary article being characterized in that the absorbent core (5) comprises a third layer (7) of non-woven fabric interposed between the first and second layers (NW1, NW2) of non-woven fabric.

2. The absorbent sanitary article according to claim 1, wherein the first layer (NW1) of non-woven fabric is positioned on the impermeable outer layer (3), the spread (6) of absorbent polymer material is positioned on the first layer (NW1) of non-woven fabric, the third layer (7) of non-woven fabric is positioned on the spread (6) of absorbent polymer material, the second layer (NW2) of non-woven fabric is positioned on the third layer (7) of non-woven fabric and the permeable inner layer (2) is positioned on the second layer (NW2) of non-woven fabric.

3. The absorbent sanitary article according to claim 2, wherein the absorbent core (5) comprises a second spread (12) of absorbent polymer

material interposed between the third layer (7) of non-woven fabric and the second layer (NW2) of non-woven fabric.

4. The absorbent sanitary article according to claim 3, wherein the first spread (6) of absorbent polymer material comprises a first absorbent polymer material (SAP1) and the second spread (12) comprises a second absorbent polymer material (SAP2).

5. The article according to claim 4, wherein the first and second absorbent polymer materials (SAP1, SAP2) are the same absorbent polymer material.

6. The absorbent sanitary article according to claim 1, wherein the first layer (NW1) of non-woven fabric is positioned on the impermeable outer layer (3), the third layer (7) of non-woven fabric is positioned on the first layer (NW1) of non-woven fabric, the spread (6) of absorbent polymer material is positioned on the third layer (7) of non-woven fabric, the second layer (NW2) of non-woven fabric is positioned on the spread (6) of absorbent polymer material and the permeable inner layer (2) is positioned on the second layer (NW2) of non-woven fabric.

7. The absorbent sanitary article according to any one of the preceding claims, wherein the coupling between the first layer (NW1) of non-woven fabric, the second layer (NW2) of non-woven fabric and the third layer (7) of non-woven fabric is accomplished by a plurality of seals (9) defining in the absorbent pad (4) a plurality of cells (10, 10a, 10b).

8. The absorbent sanitary article according to claim 7, wherein the cells (10, 10a, 10b) comprise one or more first cells (10a) containing a first quantity of absorbent polymer material of the first spread (6) and one or more second cells (10b) containing a second quantity of absorbent polymer material (SAP1) of the first spread (6), the second quantity being greater than the first quantity.

9. The absorbent sanitary article according to claim 8, wherein the absorbent pad (4) comprises a plurality of the second cells (10B) located

in an intermediate portion along the main longitudinal direction of extension (D).

10. The absorbent sanitary article according to any one of the preceding claims, wherein the first spread (6) of absorbent polymer material comprises at least a first absorbent polymer material (SAP1) and at least a second absorbent polymer material (SAP2).

11. The absorbent sanitary article according to claims 4 and 7, wherein the cells (10, 10a, 10b) comprise one or more first cells (10a) containing a first quantity of absorbent polymer material of the first spread (6) and a first quantity of absorbent polymer material of the second spread (12), one or more second cells (10b) containing a second quantity of absorbent polymer material of the first spread (6) and a second quantity of absorbent polymer material of the second spread (12).

12. The absorbent sanitary article according to claim 11, wherein the first quantity of absorbent polymer material of the first spread (6) and the first quantity of absorbent polymer material of the second spread (12) are substantially the same.

13. The absorbent sanitary article according to claim 11 or 12, wherein the second quantity of absorbent polymer material of the first spread (6) and the second quantity of absorbent polymer material of the second spread (12) are substantially the same.

14. The absorbent sanitary article according to claim 2, wherein the absorbent pad (4) comprises an adhesive layer (11) between the first layer (NW1) of non-woven fabric and the spread (6) of absorbent polymer material.

15. The absorbent sanitary article according to claim 2, wherein the absorbent pad (4) comprises an adhesive layer (11a) between the third layer (7) of non-woven fabric and the spread (6) of absorbent polymer material.

16. The absorbent sanitary article according to claim 2, wherein the absorbent pad (4) comprises an adhesive layer (11b) between the third

layer (7) of non-woven fabric and the second layer (NW2) of non-woven fabric.

17. The absorbent sanitary article according to claim 3, wherein the absorbent pad (4) comprises an adhesive layer (11) between the first layer (NW1) of non-woven fabric and the spread (6) of absorbent polymer material.

18. The absorbent sanitary article according to claim 3, wherein the absorbent pad (4) comprises an adhesive layer (13) between the third layer (7) of non-woven fabric and the second spread (12) of absorbent polymer material.

19. The absorbent sanitary article according to claim 3, wherein the absorbent pad (4) comprises an adhesive layer (11b) between the second spread (12) of absorbent polymer material and the second layer (NW2) of non-woven fabric.

20. The absorbent sanitary article according to claim 6, wherein the absorbent pad (4) comprises an adhesive layer (11) between the first layer (NW1) of non-woven fabric and the third layer (7) of non-woven fabric.

21. The absorbent sanitary article according to claim 6, wherein the absorbent pad (4) comprises an adhesive layer (14) between the third layer (7) of non-woven fabric and the spread (6) of absorbent polymer material.

22. The absorbent sanitary article according to claim 6, wherein the absorbent pad (4) comprises an adhesive layer (11b) between the spread (6) of absorbent polymer material and the second layer (NW2) of non-woven fabric.

23. The absorbent sanitary article according to any one of the preceding claims, wherein the grammage of the third layer (7) of non-woven fabric is much greater than the grammage of the first and second layers (NW1, NW2) of non-woven fabric.

24. The absorbent sanitary article according to any one of the preceding claims, wherein the third layer (7) of non-woven fabric is defined by a piece of a continuous web (113).

25. The absorbent sanitary article according to any one of the preceding claims, wherein the second layer (NW2) of non-woven fabric faces the permeable inner layer (2), the absorbent sanitary article comprising a fourth layer (15) of non-woven fabric which is interposed between the second layer (NW2) of non-woven fabric and the permeable inner layer (2) and whose grammage is much greater than the grammage of the first and second layers (NW1, NW2) of non-woven fabric.

26. The absorbent sanitary article according to any one of the preceding claims, wherein the absorbent pad (4) has an outer perimeter (4a) and comprises a peripheral seal (9a) joining at least the first and second layers (NW1, NW2) of non-woven fabric, the peripheral seal (9a) extending at least partly along the outer perimeter (4a).

27. A machine for making absorbent sanitary articles (1) according to any one of claims 1 to 26, the machine comprising a line for feeding at least one continuous web of impermeable material for defining the impermeable outer layer (3), a line for feeding at least one continuous web of permeable material for defining the permeable inner layer (2) and at least one unit (100) for forming the absorbent pads (4) to form a succession of the absorbent pads (4) and to associate the absorbent pads (4) with the continuous web of impermeable material, the forming unit (100) comprising a system for feeding a first web (101) of non-woven fabric in a feed direction (V) along a path (P) for defining the first layer (NW1) of non-woven fabric, a first station (103) for placing a second web (104) of non-woven fabric on the first web (101) of non-woven fabric for defining the second layer (NW2) of non-woven fabric, a station (106) for joining the second web (104) of non-woven fabric to the first web (101) of non-woven fabric, a first station (109) for laying out the first spread (6) of absorbent polymer material on the first web (101) of non-woven fabric and being

operatively positioned upstream of the first placing station (103) relative to the first feed direction (V), the machine being characterized in that the forming unit (100) comprises a second station (112) for placing a third web (113) of non-woven fabric between the first web (101) of non-woven fabric and the second web (104) of non-woven fabric which defines the third layer (7) of non-woven fabric and which operates upstream of the first placing station (103) relative to the feed direction (V).

28. The machine according to claim 27, wherein the second placing station (112) is located downstream of the first laying-out station (109) relative to the feed direction.

29. The machine according to claim 28, wherein the forming unit (100) comprises a second station (114) for laying out the second spread (12) of absorbent polymer material and being located downstream of the second placing station (112) and downstream of the first placing station (103) relative to the feed direction (V).

30. The machine according to claim 28, wherein the forming unit (100) comprises a second station (112) for laying out the second spread (12) of absorbent polymer material and being located downstream of the first laying-out station (109) and upstream of the first placing station (103) relative to the feed direction (V).

31. The machine according to any one of claims 27 to 30, wherein the forming unit (100) comprises a first adhesive dispenser (117) operating at the feed system to spread the adhesive layer (11) between the first layer (NW1) of non-woven fabric and the third layer (7) of non-woven fabric or between the first layer (NW1) of non-woven fabric and the spread (6) of absorbent polymer material, the first adhesive dispenser (117) being located upstream of the first laying-out station (109) relative to the feed direction.

32. The machine according to any one of claims 27 to 31, wherein the forming unit (100) comprises a second adhesive dispenser (118) operating at the first placing station (103) to spread the adhesive layer (11b)

between the first spread (6) of absorbent polymer material and the second layer (NW2) of non-woven fabric or between the second spread (12) of absorbent polymer material and the second layer (NW2) of non-woven fabric, or between the third layer (7) of non-woven fabric and the second layer (NW2) of non-woven fabric.

33. The machine according to claim 31, wherein the second placing station (112) is located upstream of the first laying-out station (109) and downstream of the first adhesive dispenser (117) relative to the feed direction.

34. The machine according to claim 33, wherein the forming unit comprises a third adhesive dispenser (120) which is located downstream of the second placing station (112) and upstream or downstream of the first laying-out station (109) and which spreads the adhesive layer (14) between the third layer (7) of non-woven fabric and the spread (6) of absorbent polymer material.

35. The machine according to any one of claims 27 to 34, wherein the feed system comprises a suction roller (102) for holding down and feeding at least the first web (101) of non-woven fabric.

36. The machine according to claim 35, wherein the first laying-out station (109) and/or the second laying-out station (114) comprise a laying-out roller (110, 115) which is substantially tangent to the suction roller (102) and which is provided on its outside cylindrical surface with a plurality of pockets (111, 116), each feeding and placing along the path (P) a portion of the first and/or second spread (6, 12) of absorbent polymer material.

37. The machine according to claim 35 or 36, wherein the first station (103) for placing the second web (104) of non-woven fabric comprises a roller (105) which transfers the second web (104) of non-woven fabric and which is tangent to the suction roller (102) and the joining station (106) comprises a contact roller (107) tangent to the suction roller (102) and located downstream of the transfer roller (105) relative to the feed direction (V) of the absorbent pads (4), the joining station (106) comprising

at least one sonotrode (108) for sealing the absorbent pads (4) and acting on the contact roller (107), the contact roller (107) having on its outside surface a predetermined pattern of the seals (9, 9a).

38. The machine according to any one of claims 27 to 37, wherein the forming unit (100) comprises a station (121) for applying the fourth layer (15) of non-woven fabric to the second web (104) of non-woven fabric, the application station (121) comprising a roller (122) for feeding the fourth layer (15) of non-woven fabric and tangent to the second web (104) of non-woven fabric, the application station (121) comprising an adhesive dispenser (124) operating on the second web (104) of non-woven fabric and located upstream of the roller (122) for feeding the fourth layer (15) of non-woven fabric relative to the feed direction of the second web (104) of non-woven fabric.

39. The machine according to claim 35 or 36, wherein the first station (103) for placing the second web (104) of non-woven fabric comprises a roller (105) which transfers the second web (104) of non-woven fabric and which is tangent to the suction roller (102), the joining station (106) comprising the transfer roller (105), the transfer roller comprising on its outside cylindrical surface a predetermined pattern of the seals and defining a contact roller, the joining station (106) comprising at least one sonotrode (108) for sealing the absorbent pads (4) and acting on the contact roller (107).

40. The machine according to claim 35 or 36, wherein the joining station (106) comprises the suction roller (102), the suction roller comprising on its outside cylindrical surface a predetermined pattern of the seals and defining a contact roller, the joining station (106) comprising at least one rotary sonotrode for sealing the absorbent pads (4) and acting on the suction roller (102).

FIG.1

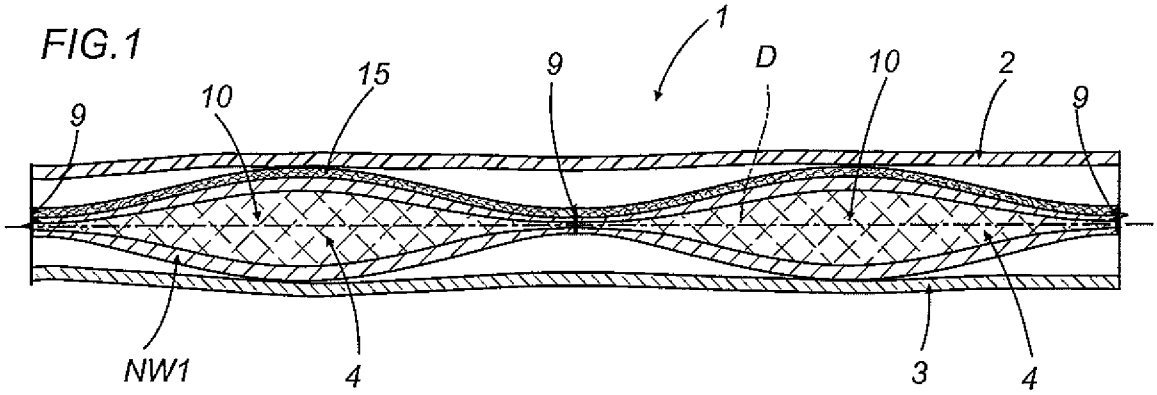


FIG.2

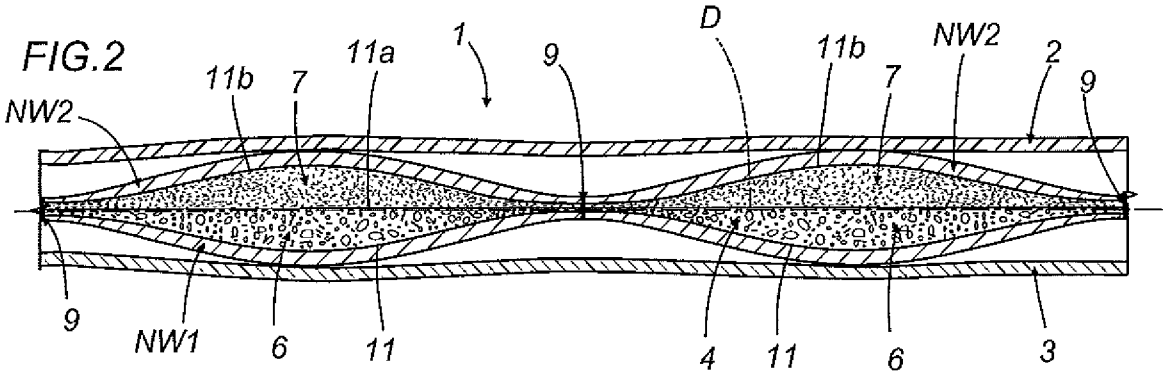


FIG.3

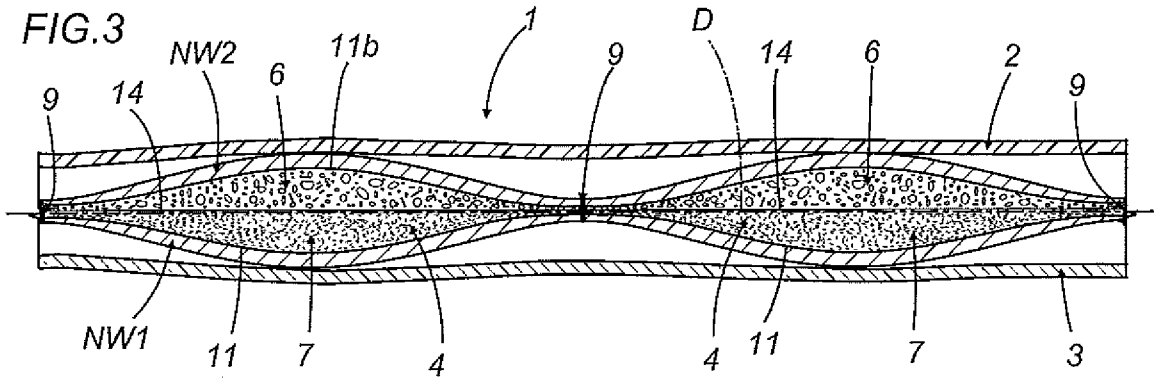


FIG.4

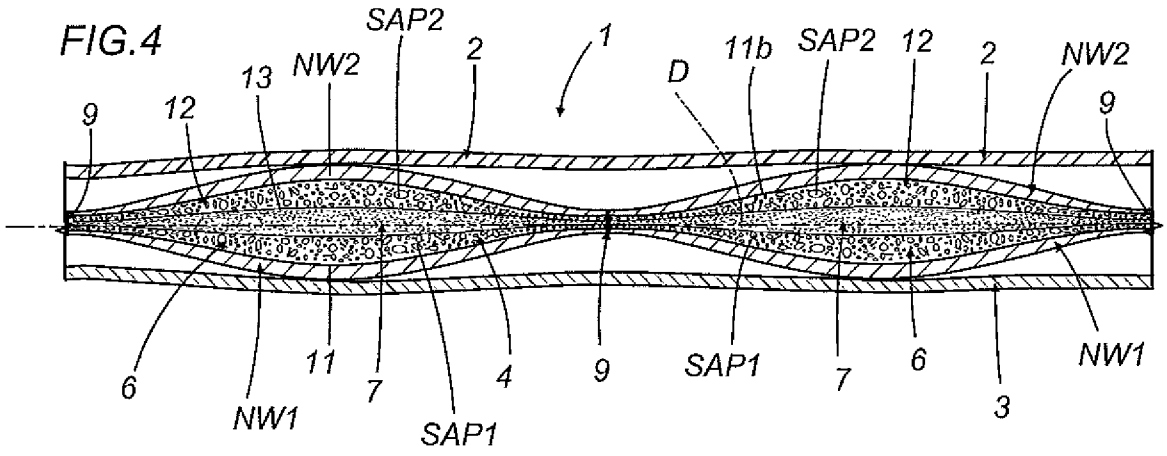


FIG.5

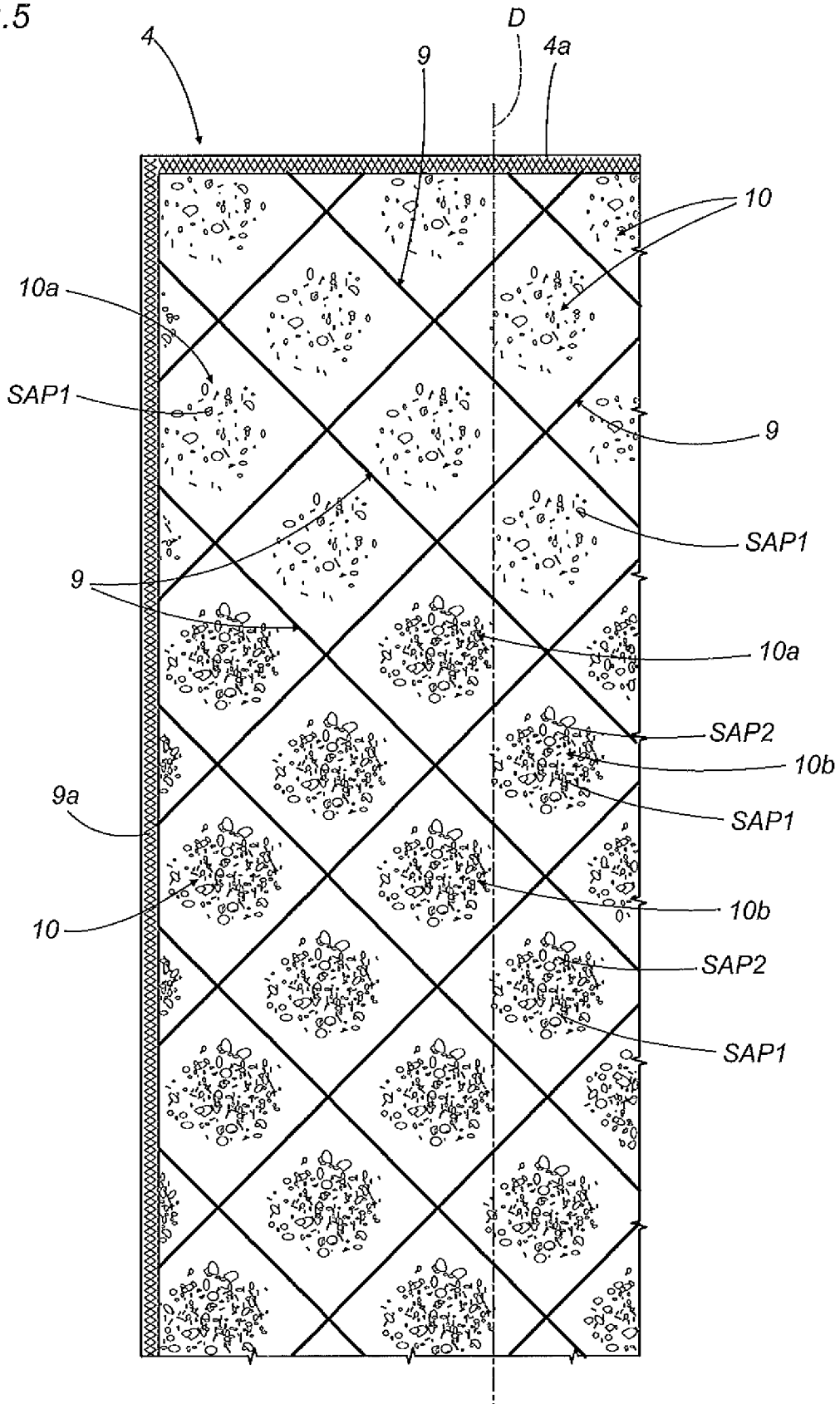


FIG.6

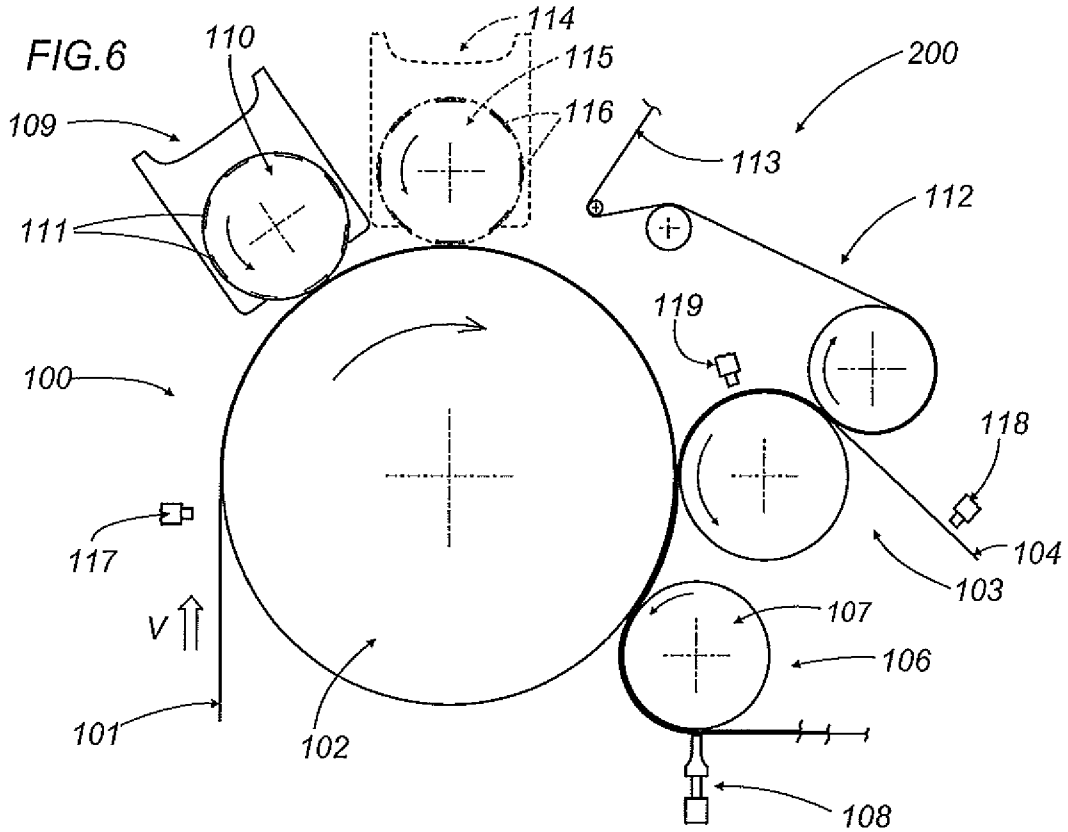

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FIG.7

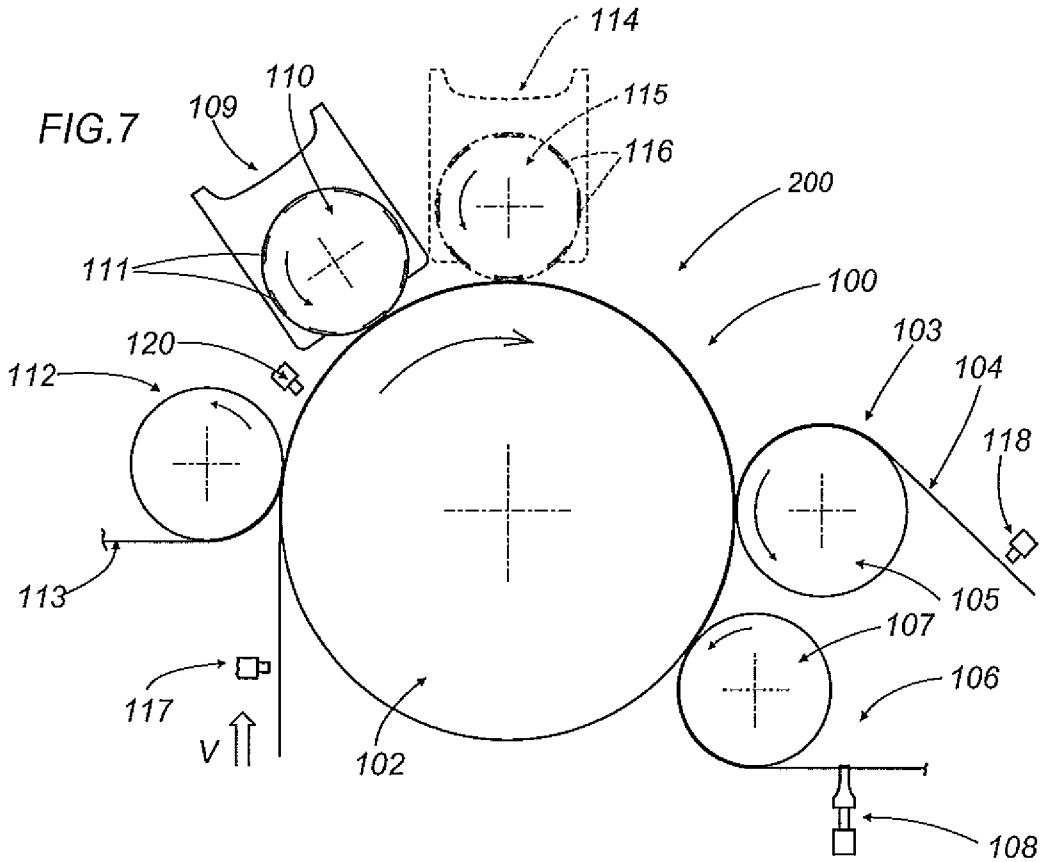

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FIG.8

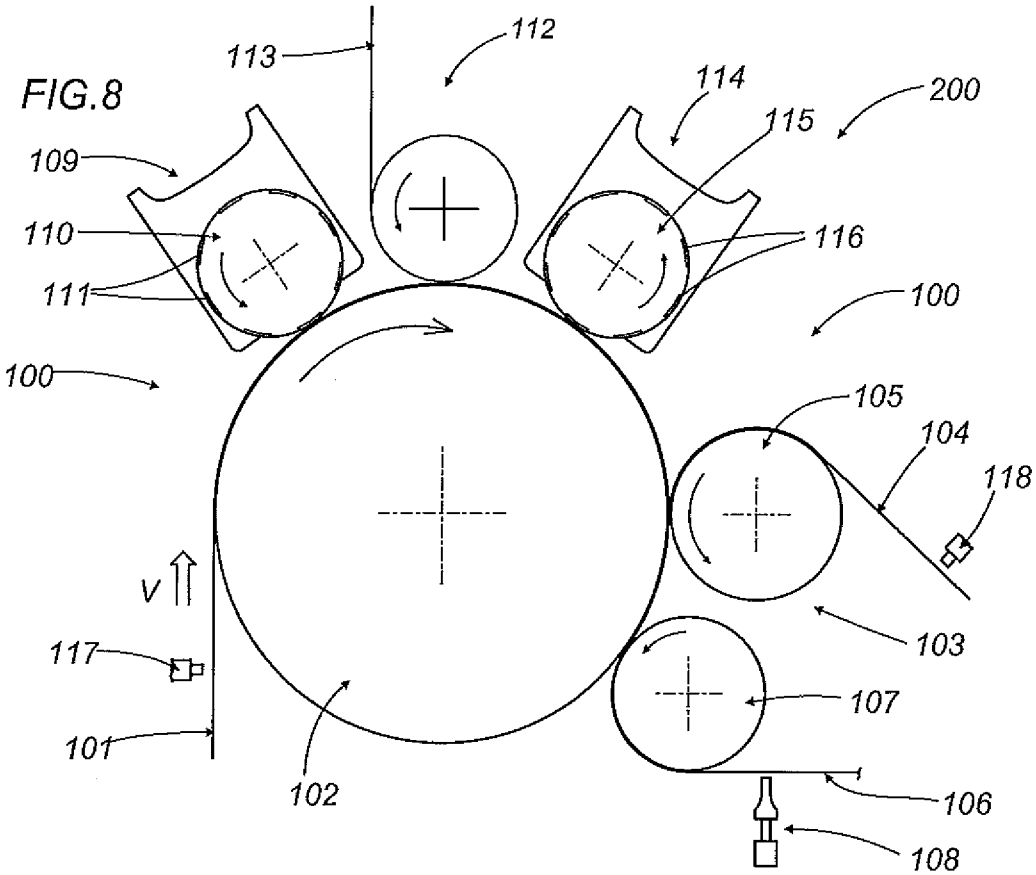
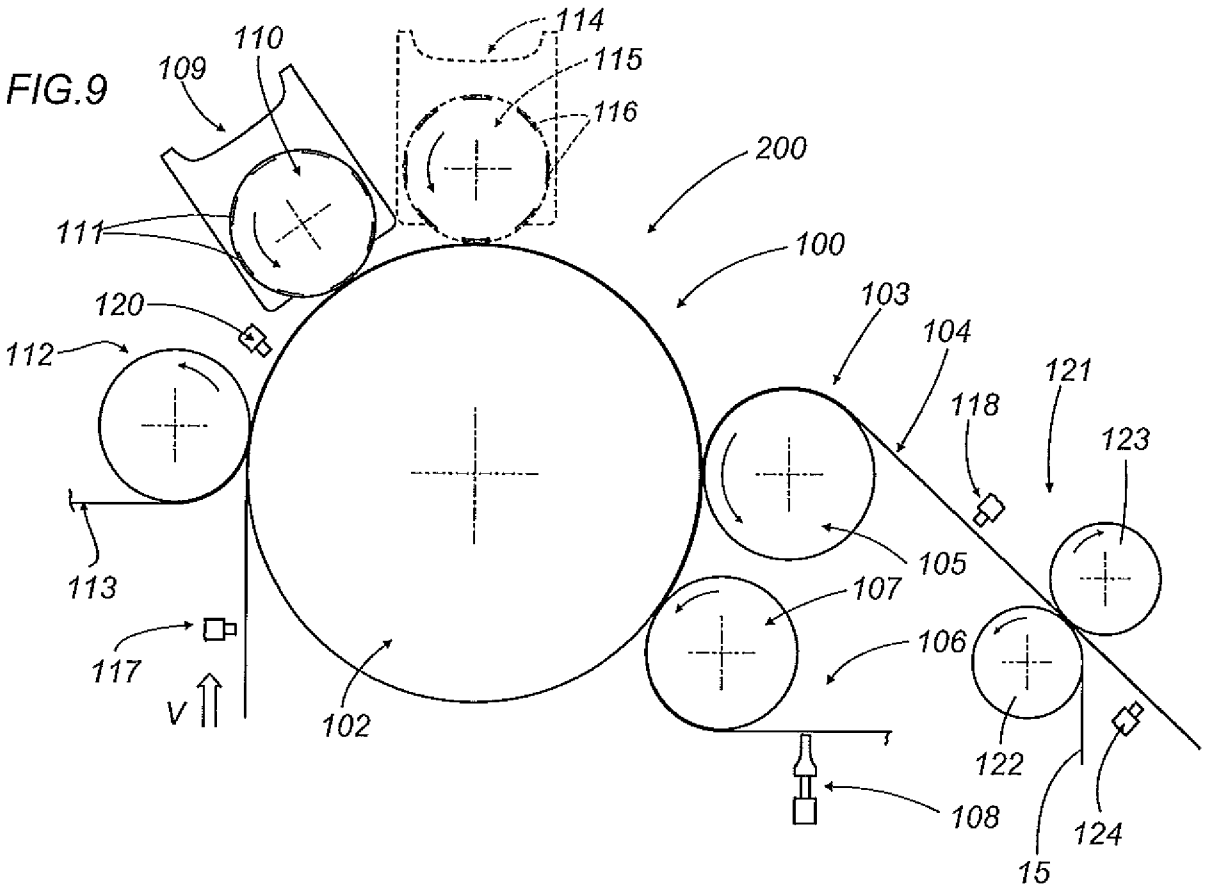

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FIG.9


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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/060800

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61F13/532 A61F13/534 A61F13/539
ADD.

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)
A61F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2011/080858 A1 (LIVEDO CORP [JP]; URUSHIHARA MAKIKO [JP]) 7 July 2011 (2011-07-07)	1
Y	paragraph [0082] - paragraph [0087];	2-26
A	figure 5	27-40

X	US 2013/079741 A1 (NAKASHITA MASASHI [JP] ET AL) 28 March 2013 (2013-03-28)	1
Y	paragraphs [0001], [0034], [0035],	2-26
A	[0036], [0052]; figures 2-8	27-40

A	WO 2012/048878 A1 (ROMANOVA BVBA STARTER [BE]; VAN DE MAELE MARLEEN [BE]) 19 April 2012 (2012-04-19) claims 1-13; figures 1-22	1-40

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

☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 July 2014	09/07/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Gennari, Silvia

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2014/060800

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