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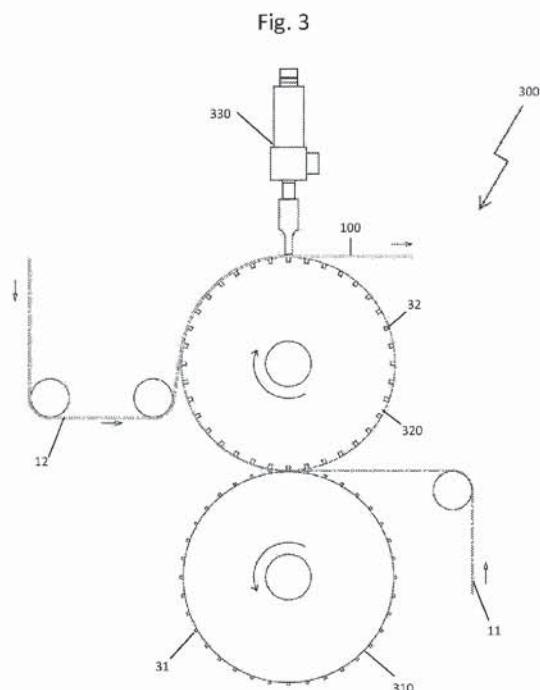
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Published:

— with international search report (Art. 21(3))

(54) Title: METHOD AND APPARATUS OF MANUFACTURING A MULTILAYER ABSORBING ELEMENT FOR SANITARY ARTICLES



(57) Abstract: Manufacturing apparatus (300) of a multilayer absorbent element (100) for organic fluids apt to be incorporated in a sanitary article, which apparatus comprises: - an embossing roller (310), bearing a plurality of first protruding elements (31) and configured to be engaged, in use, by a first layer of sheet material (11); - a pierced roller (320), bearing a plurality of second protruding elements (32) and a plurality of cavities (33), each suitable for receiving a first projecting element (31) of the embossing roller (310), and configured to be engaged, in use, at first only by said first layer of sheet material (11) and then jointly by the first layer of sheet material (11) and by a second layer of sheet material (12); - a unit of cohesion and drilling (330); wherein the configuration is such that, to the first layer of sheet material (11), which after being deformed by the embossing roll (310) and the perforated roller (320) continues to slide on the pierced roller (320), a second layer of sheet material (12) is superimposed, and together said first (11) and second layer (12) of sheet material are carried to the joining and piercing unit (330) in which, at the intermediate zones (14) of the first layer (11), it is provided to form a plurality of holes (15) passing through said first (11) and second layer (12) and to join them near or at said plurality of holes (15).

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

PAPA, Elisabetta
Società Italiana Brevetti S.p.A.
Piazza di Pietra, 39
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ITALIE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing
(day/month/year)

30.01.2020

Applicant's or agent's file reference
BW976R-REPA

IMPORTANT NOTIFICATION

International application No.
PCT/IB2018/058706

International filing date (day/month/year)
06.11.2018

Priority date (day/month/year)
08.11.2017

Applicant
Texol S.R.L.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BW976R-REPA		FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/IB2018/058706	International filing date (day/month/year) 06.11.2018	Priority date (day/month/year) 08.11.2017	
International Patent Classification (IPC) or national classification and IPC INV. A61F13/511			
Applicant Texol S.R.L.			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ (sent to the applicant and to the International Bureau) a total of <u>12</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3ter of Annex C of the Administrative Instructions).			
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement ☐ Box No. VI Certain documents cited ☐ Box No. VII Certain defects in the international application ☒ Box No. VIII Certain observations on the international application			
Date of submission of the demand 05.09.2019		Date of completion of this report 30.01.2020	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465		Authorized officer Boccignone, Magda Telephone No. +49 89 2399-2643	



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IB2018/058706

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-12 as originally filed

Claims, Numbers

1-37 filed with the demand for preliminary international examination

Drawings, Sheets

1/7-7/7 as originally filed

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This report has been established:
- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
 - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 13.01.2020 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
 - ☐ Additional relevant documents have been discovered during the top-up search.
 - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded".

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-37</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-37</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-37</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Reference is made to the following documents:

- D1 WO 2015/098373 A1 (KAO CORP [JP]) 2 July 2015 (2015-07-02)
- D2 WO 03/048436 A2 (TREDEGAR FILM PROD CORP [US]; CREE JAMES W [US]; IULIANETTI LINO [IT];) 12 June 2003 (2003-06-12)

Re Item VIII

The feature "in proximity of" should have been deleted from the independent claims. "proximity of" is not limiting, i.e. it does not mean in direct contact nor very close to, but merely not so far away from something. Thus, it has no limitation on the scope of the claim. However, for the assessment of novelty/inventive step, the claim has to be read in its broadest sense: thus an hydrophilic agent not too far away from the holes deprives the claim of its novelty/inventiveness.

Additionally, the term "preferably" renders the features to which it is combined entirely optional (PCT Guidelines, C.5.40).

Re Item V

Document D1 (page 3 - page 12; figures 1,2) discloses a method for manufacturing a multilayer absorbent element for organic fluids apt to be incorporated into a sanitary article, which method provides the steps of:

- deforming a first layer of sheet material by embossing, to obtain in it a plurality of protrusions alternating with a plurality of intermediate zones without said protrusions and substantially planar;
- overlapping onto said first layer of sheet material a second layer of sheet material;
- making a plurality of through holes on said first layer of sheet material and on said second layer of sheet material, at said intermediate zones of said first layer;
- joining together said first layer and said second layer of sheet material in proximity of, or at walls of through holes of said plurality.

Document D1 does not disclose a second layer being a film. Instead the second layer of D1 is a nonwoven web. Moreover, in D1 no hydrophilic agent is applied on the first nonwoven layer.

As to document D2, it discloses a first layer made of a nonwoven fabric and a second layer being a film. Moreover an hydrophilic surfactant is applied during the process of D2: however the hydrophilic substance is applied to the film and not to the nonwoven fabric and not on the apertures.

The advantage of the claimed structure is to facilitate the drainage of the biological fluid from the first layer 11 to the second layer 12.

Starting from D1, a person skilled in the art would not find teachings regarding either a selective application of a hydrophilic agent at through holes or any application of an hydrophilic agent at a first layer having protrusions. Nor he would find in D2 any teaching thereto either.

Thus, the subject-matter of claim 1 is novel and inventive (Article 33(1) and (2) PCT).

The same applies to the apparatus claim 9 and to the multilayer absorbent element of claim 20 as well as the sanitary article of claim 37, which are thus also inventive (Article 33(1) and (2) PCT).

Dependent claims 2 to 8; 10 to 19 and 21 to 36 define further features of the subject-matter of their corresponding independent claims and, thus, also relate to novel and inventive subject-matter. The possibility of industrial application is obvious.

Società Italiana Brevetti
Intellectual Property



Roma, 5 September 2019

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Texol S.r.l.
International Patent application No. PCT/IB2018/058706
Our Ref.: BW976R/REPA/rbf

REPLY TO THE WRITTEN OPINION OF THE EPO/ISA

Dear Examiner,

In conjunction with the above-identified International Application, herewith enclosed is an amended set of claims (in both a "clean" and a "marked up" version), pursuant to Art. 34 PCT.

Please find below an explanation of the enclosed amendments and substantive arguments in support of patentability of the amended claims, in reply to the objections raised in the Written Opinion issued by the EPO/ISA on 10.01.2019.

* * *

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1. CONDUCT OF THE EPO/ISA

The present International Application claims priority from Italian standard patent application no. 102017000127010 filed on 08 November 2017. For this latter

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05/09/2019

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priority application the EPO issued a Search Report with annexed Written Opinion.

Following said Report and Opinion, the Applicant filed the present International Application with a set of claims amended with respect to claims as filed in the national application.

The International Search Report and annexed Written Opinion issued in conjunction with the present application recite the same claim language of the Italian priority application instead of the actual claim wording of the International Application. The Applicant filed a written complaint in this respect on 14 January 2019, asking re-issuance of the Report and annexed Opinion on the basis of an appropriate analysis of the actual claim wording. The EPO replied by phone only, asserting that the actual claim language had been considered, that the Opinion recited the wrong claim due to a clerical error and refusing to re-issue the Report and Opinion.

International Preliminary Examination is being herewith requested in order to engage a proper technical discussion with the Examiner concerning the distinguishing features of the invention.

2. EXPLANATION OF THE ENCLOSED AMENDMENTS (CLAIMS)

Independent claim 1 has been amended as explanation below.

- The subject-matter of originally-filed dependent claims 6 and 7 has been incorporated into claim 1.
- The word "or" has been deleted.
- It has been specified that the hydrophilic agent is applied onto the first layer, as disclosed, e.g. at page 5, last line, and page 11, second and third line, of the originally-filed application / International Publication.
- The claim has been slightly re-phrased, in formal respects only, in the last part to improve clarity.

Enclosed independent claims 9 (apparatus, corresponding to original claim 11) and 20 (absorbent element, corresponding to original claim 22) have been amended consistently with the modifications in claim 1 as explained above.

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Originally-filed claims 6 and 8 have been deleted, and the remaining claims re-numbered accordingly.

Enclosed dependent claim 6 comprises the subject-matter of the originally-filed claim 7 without the feature "*is a plastic film*", now incorporated in the claim 1.

Enclosed dependent claim 8 (corresponding to original claim 10) has been amended to improve translation with respect to the originally-filed Italian text.

3. CLARITY (Art. 6 PCT, Item VIII of the Written Opinion)

The objection raised under point 1 - and relating to the material of the first and second layer recited in claim 1 - should be regarded as overcome by the amendments explained in previous section 1.

At point 2, the Examiner states that "[...] *it should have been made clear in claim 1 that the through holes and joining are performed together in the same unit. This for consistency of claim 1 with claim 11*".

The underwriter respectfully disagrees. The Applicant is entitled to claim a method (claim 1) and a specific implementation of an apparatus carrying out said method (PCT International Search and Preliminary Examination Guidelines, 5.13). In other words, the apparatus of enclosed independent claim 9 (corresponding to original claim 11) – by reciting the joining and piercing unit - is not inconsistent with the method of the independent claim 1, but simply relates to a specific (narrower) embodiment of the same inventive concept when translated from the method of claim 1 to a structure (the claimed apparatus).

4. NOVELTY OF ENCLOSED INDEPENDENT CLAIMS 1, 9, 20 (Art. 33(2) PCT, Item V of the Written Opinion)

In the Written Opinion of the ISA, all the originally-filed claims are objected for

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lack of novelty with respect to each of prior art documents WO2015/098373A1 (D1) and WO03/048436A2 (D2).

The underwriter submits that enclosed independent claim 1 is novel with respect to each of D1 and D2, for the following reasons.

D1 discloses a three-dimensional sheet (denoted by 10 in the drawings) that comprises a first nonwoven fabric (1) with protrusions and a second, apparently flat nonwoven fabric (2) joined together. Sheet-forming sealed portions (3), in which the first nonwoven fabric and second nonwoven fabric are partially heat-sealed, comprise through holes (6). The second non-woven fabric (2) is more hydrophilic than the first non-woven fabric (1). (See, e.g., Fig. 1, the Abstract, and the passages cited in the International Search Report).

Accordingly, enclosed claim 1 differs from D1 in the following main features:

- (a) D1 does not disclose any selective application of a hydrophilic agent at through holes;
- (b) D1 does not disclose any application of an hydrophilic agent at a first, NWF layer;
- (c) D1 does not disclose a second layer being a plastic film.

In addition to the above, D1 does not disclose intermediate zones (i.e. zones between protrusions) that are substantially planar.

D2 discloses an absorbent article (10) made of a backsheet (14), an absorbent core (16) and a composite topsheet (20). The composite topsheet (20) includes a resilient, three dimensional apertured film (22) facing the absorbent core (16) and a nonwoven web (30) joined to the aperture film (22) on the user's side. Small scale apertures (28) are provided in the film (22) and large scale apertures (32) are provided through the whole topsheet (20). (See, e.g., Fig. 1 and the passages cited in the International Search Report).

D2 describes a preferred embodiment wherein (page 9, lines 25-27) *"the side of formed film 22 which is facing the nonwoven web 30, the male side 24 in the Figure 1 or the female side in the Figure 2, is treated with a surfactant, and therefore is more hydrophilic"*.

Therefore, the subject-matter of enclosed claim 1 differs from D2 at least for the same features (a) and (b) mentioned above.

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In conclusion, thus, the subject-matter of enclosed claim 1 is novel over the cited prior art, pursuant to Art. 33(2) PCT.

The same considerations do apply for enclosed independent claims 9 and 20.

5. INVENTIVE STEP OF ENCLOSED INDEPENDENT CLAIMS 1, 9, 20 (Art. 33(3) PCT, Item V of the Written Opinion)

According to the previous section, enclosed independent claim 1 differs from each of D1 and D2 at least for the above-mentioned features (a) and (b).

As explained in the International Application as originally filed (from page 5, last paragraph, to page 6, first paragraph), the technical problem solved by said differentiating features (a) and (b) is that of improving flow conditions from the first layer to the second layer in a way that is efficient and cost-effective.

In particular, the aforementioned passage of the description explains that *"The drainage of the biological fluid from the first layer 11 to the second layer 12 is facilitated by the presence of a deposition of a surfactant agent 16, which has the function of an hydrophilizing agent. Said surfactant agent 16 is shown in black in Figure 1. Advantageously, it is deposited on the first layer 11, preferably only on it and not on the second layer 12. In particular, the agent 16 is present in proximity of, or at, walls of the holes 15 or portions of the first layer 11 which are lateral or circumscribed with respect to the same holes, while the remaining areas of the first layer 11 are left substantially hydrophobic or neutral. In this way, a surface tension gradient is realized, both on the first layer 11 and between the latter and the second layer 12, which helps to draw the biological fluid towards the holes 15"*.

Starting from D1, a person skilled in the art would not find teachings regarding either a selective application of a hydrophilic agent at through holes or any application of an hydrophilic agent at a first layer having protrusions.

As already noted in previous section 4, D1 does not disclose an application of a hydrophilic agent. On the contrary, as reported at penultimate paragraph of the automatic description pdf-file generated by Espacenet®, D1 teaches to use a "[...] second nonwoven fabric 2"- that - *"has a higher hydrophilicity than the first nonwoven fabric"* and specifies that *"here, the "hydrophilicity" is determined*

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based on the contact angle of the fiber [...] specifically, a high hydrophilicity is synonymous with a small contact angle, and a low hydrophilicity is synonymous with a large contact angle".

Therefore, D1 suggests using two types of nonwoven fabric having different hydrophilicity, but does not teach to treat a specific portion of the layer with protrusions (i.e. the portion near through holes) with an hydrophilic agent. Even more so, D1 teaches that hydrophilic properties must be conferred to the second, flat layer as opposed to the claimed first undulated layer.

D2 does not provide any useful teaching in the direction of the claimed invention. In fact, D2 explicitly discloses that (page 9, lines 25-29) "*[...] the formed film 22 which is facing the nonwoven web 30, [...], is treated with a surfactant. And therefore is more hydrophilic*". D2 is completely silent about the possibility to apply in a selective manner a hydrophilic agent on a specific portion of the nonwoven web (30).

Accordingly, the person skilled in the art, when considering D2, would at the most be driven to substitute the second nonwoven fabric of D1 with a formed plastic film treated with a surfactant in order to reach a different hydrophilicity between the first layer and the second layer.

The same conclusions as above are reached when D2 is considered as a starting point for the assessment of inventive step.

Therefore, it is submitted that the subject matter of enclosed claim 1 is inventive over the cited prior art, pursuant to Art. 33(3) PCT.

The same considerations do apply for enclosed independent claims 9 and 20.

6. CONCLUSIONS

In our opinion, the amendments and arguments hereby presented should make the present application complying with the requirements laid down in the PCT. Therefore, we look forward to receiving a positive International Preliminary Examination Report.

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Nevertheless, should the Examiner envisage issuing a negative IPRP with respect to patentability of the enclosed claims, the issuing of another Written Opinion pursuant to Art 34(2)(c) PCT and another opportunity to submit arguments or amendments pursuant R. 66.4 PCT / Notice from the EPO 31.08.2011 is herewith requested.

* * *

Respectfully,

Elisabetta Papa
Representative**Encl.:** as specified above.

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CLAIMS

1. A method for manufacturing a multilayer absorbent element (100) for organic fluids apt to be incorporated into a sanitary article,

which method provides the steps of:

- deforming a first layer of sheet material (11) by embossing, to obtain in it a plurality of protrusions (13) alternating with a plurality of intermediate zones (14) without said protrusions (13) and substantially planar;
- overlapping onto said first layer of sheet material (11) a second layer of sheet material (12);
- making a plurality of through holes (15) on said first layer of sheet material (11) and on said second layer of sheet material (12), at said intermediate zones (14) of said first layer (11);
- joining together said first layer (11) and said second layer (11) of sheet material in proximity of, or at, the holes (15) of said plurality;

wherein said first layer of sheet material (11) is a non-woven fabric (NWF) and said second layer of sheet material (12) is a plastic film,

wherein also a step of application of a hydrophilic agent (16) onto said first layer (11) is provided, which hydrophilic agent (16) is applied in proximity of, or at, walls of through holes (15) of said plurality, which hydrophilic agent (16) is in particular a surfactant agent (16).

2. A manufacturing method according to claim 1, wherein said steps of making through holes (15) and joining are performed together in a same unit.

3. A manufacturing method according to claim 1 or 2, wherein said joining step is performed by means of a modality selected in a group which comprises: ultrasound application, heat application and pressure application.

4. A manufacturing method according to any one of the preceding claims, wherein said joining step provides a joining between the first layer of sheet material (11) and the second layer of sheet material (12) performed along the perimeter of each through hole (15) of said plurality.

5. A manufacturing method according to any one of the preceding claims, wherein said embossing step is performed by means of a pair of rollers coupled in rotation.

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6. A manufacturing method according to any one of the preceding claims, wherein said second layer of sheet material (12) has a further plurality of holes or openings (17).

7. A manufacturing method according to any one of the preceding claims, wherein said first layer of sheet material (11) and/or said second layer of sheet material (12) is a laminated material.

8. A manufacturing method according to any one of the preceding claims, wherein said through holes (15) are made jointly onto said first layer of sheet material (11) and onto said second layer of sheet material (12).

9. A manufacturing apparatus (300, 300') of a multilayer absorbent element (100) for organic fluids apt to be incorporated into a sanitary article, which apparatus comprises:

- a first embossing roller (310) bearing a plurality of first protruding elements (31) and configured to be engaged, in use, by a first layer of sheet material (11);
- a second roller (320) configured for being engaged, in use, by the first layer of sheet material (11) and a second layer of sheet material (12) which overlaps the first layer of sheet material (11);
- a joining and piercing unit (330) configured to make a plurality of through holes (15) on the first (11) and on the second layer (12) at selected zones thereof and to join the first (11) and the second layer (12) in proximity of, or at, the holes (15) of the plurality;
- application means of a hydrophilic agent (16) on said first embossing roller (310) and/or on said second roller (320), which application means preferably comprises one or more kiss roller (340), which application means is configured to apply the hydrophilic agent at, or in proximity of, walls of the through holes (15) of said plurality onto said first layer (11).

10. Apparatus (300, 300') according to the preceding claim, wherein said first (310) and second (320) rollers are coupled in rotation.

11. Apparatus (300, 300') according to claim 9 or 10, wherein said second roller (320) has a plurality of cavities (33), each suitable for receiving a respective first protruding element (31) of said embossing roller (310).

12. Apparatus (300, 300') according to any one of claims from 9 to 11, wherein said second roller (320) bears a plurality of second protruding elements (32) configured to cooperate with said joining and piercing unit (330) to make the through holes (15).

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13. Apparatus (300, 300') according to the preceding claim, wherein each of said second protruding elements (33) of said second roller (320) has a cylindrical profile.

14. Apparatus (300, 300') according to the preceding claim, wherein said second protruding elements (33) of said second roller (320) have a diameter of about 0,5 mm.

15. Apparatus (300, 300') according to claim 12, wherein each of said second protruding elements (33) of said second roller (320) has a tapered profile, in particular conical or frusto-conical.

16. Apparatus (300, 300') according to the preceding claim, wherein said second protruding elements (33) of said second roller (320) have a greater diameter of about 0,5 mm.

17. Apparatus (300, 300') according to any one of claims from 9 to 16, wherein said joining and piercing unit (330) comprises an ultrasonic device.

18. Apparatus (300, 300') according to any one of claims from 9 to 17, wherein said first protruding elements (31) of the embossing roller (310) and/or said cavities (32) of the pierced roller (320) have a substantially cylindrical or hemi-spherical embossing profile.

19. Apparatus (300, 300') according to the preceding claim, wherein said first protruding elements (31) of the embossing roller (310) and/or said cavities (32) of the pierced roller (320) have a diameter of about 2 mm.

20. Multi-layer absorbent element (100) for organic fluids, apt to be incorporated into a sanitary article, which absorbent element (100) comprises:

- a first layer of a sheet material (11), having a plurality of protrusions (13) and a plurality of intermediate zones (14) without such protrusions (13), wherein said first layer of sheet material (11) is a non-woven fabric (NWF);
- a second layer of a sheet material (12), superimposed on said first layer (11), which second layer of sheet material (12) is a plastic film;

wherein at, or in proximity of, said intermediate zones (14), said first layer of sheet material (11) and said second layer of sheet material (12) have a plurality of through holes (15),

wherein in proximity of, or at, said through holes (15), said first layer (11) and second layer (12) are joined to each other,

and wherein in proximity of, or at, said through holes (15), there is a hydrophilic agent (16), in particular a surfactant agent, applied onto said first layer (11).

- 21.** Multilayer absorbent element (100) according to claim 20, wherein each of said through holes (15) has a substantially conical or cylindrical profile.
- 22.** Multi-layer absorbent element (100) according to claim 20 or 21, wherein each of said protrusions (13) has a substantially cylindrical or hemi-spherical profile.
- 23.** Multi-layer absorbent element (100) according to claim 22, wherein each protrusion (13) has a diameter of about 2 mm.
- 24.** Multi-layer absorbent element (100) according to any one of claims from 20 to 23, wherein said first layer of sheet material (11) has a thickness comprised within a range of about 350-1.000 microns and/or a grammage comprised within a range of 6-150 grams/m² (gsm).
- 25.** A multi-layer absorbent element (100) according to any one of claims from 20 to 24, wherein said first layer of sheet material (11) is in non-woven fabric.
- 26.** A multi-layer absorbent element (100) according to any one of the claims from 20 to 25, wherein to said first layer of sheet material (11) fillers to make it opaque and/or coloured are added.
- 27.** Multi-layer absorbent element (100) according to any one of the claims from 20 to 26, wherein said second layer of sheet material (12) is substantially planar.
- 28.** Multi-layer absorbent element (100) according to any one of the claims from 20 to 27, wherein said second layer of sheet material (12) is a plastic film, in particular an olefinic or polyolefinic film.
- 29.** Multi-layer absorbent element (100) according to any one of the claims from 20 to 28, wherein said second layer of sheet material (12) has a thickness of 0,3-6,0 mm.
- 30.** Multi-layer absorbent element (100) according to any one of the claims from 20 to 29, wherein to said second layer of sheet material (12) substances capable of masking the amount and the colour of the absorbed organic liquids, in particular with titanium dioxide, are added.
- 31.** Multi-layer absorbent element (100) according to any one of the claims from 20 to 30, wherein said second layer of sheet material (12) has a plurality of openings (17).
- 32.** Multi-layer absorbent element (100) according to claim 31, wherein each of said openings (17) has a substantially cylindrical profile.
- 33.** Multi-layer absorbent element (100) according to claim 31, wherein each of said openings (17) has a substantially tapered profile, in particular conical or frusto-conical.

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34. Multi-layer absorbent element (100) according to claim 32, wherein each of said openings (17) has a diameter of about 0,5 mm.

35. Multi-layer absorbent element (100) according to claim 33, wherein each of said openings (17) has a maximum diameter of about 0,5 mm.

36. Multi-layer absorbent element (100) according to any one of the claims from 20 to 35, wherein said through holes (15) and/or said openings (17) have different dimensions and/or different orientation.

37. A sanitary article comprising a multilayer absorbent element (100) according to any one of the claims from 20 to 36.

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