Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2477929 C 2009/12/22

(11)(21) **2 477 929**

(12) **BREVET CANADIEN**
CANADIAN PATENT

(13) **C**

(22) Date de dépôt/Filing Date: 2004/08/18

(41) Mise à la disp. pub./Open to Public Insp.: 2005/02/20

(45) Date de délivrance/Issue Date: 2009/12/22

(30) Priorité/Priority: 2003/08/20 (EP03 018 909.6)

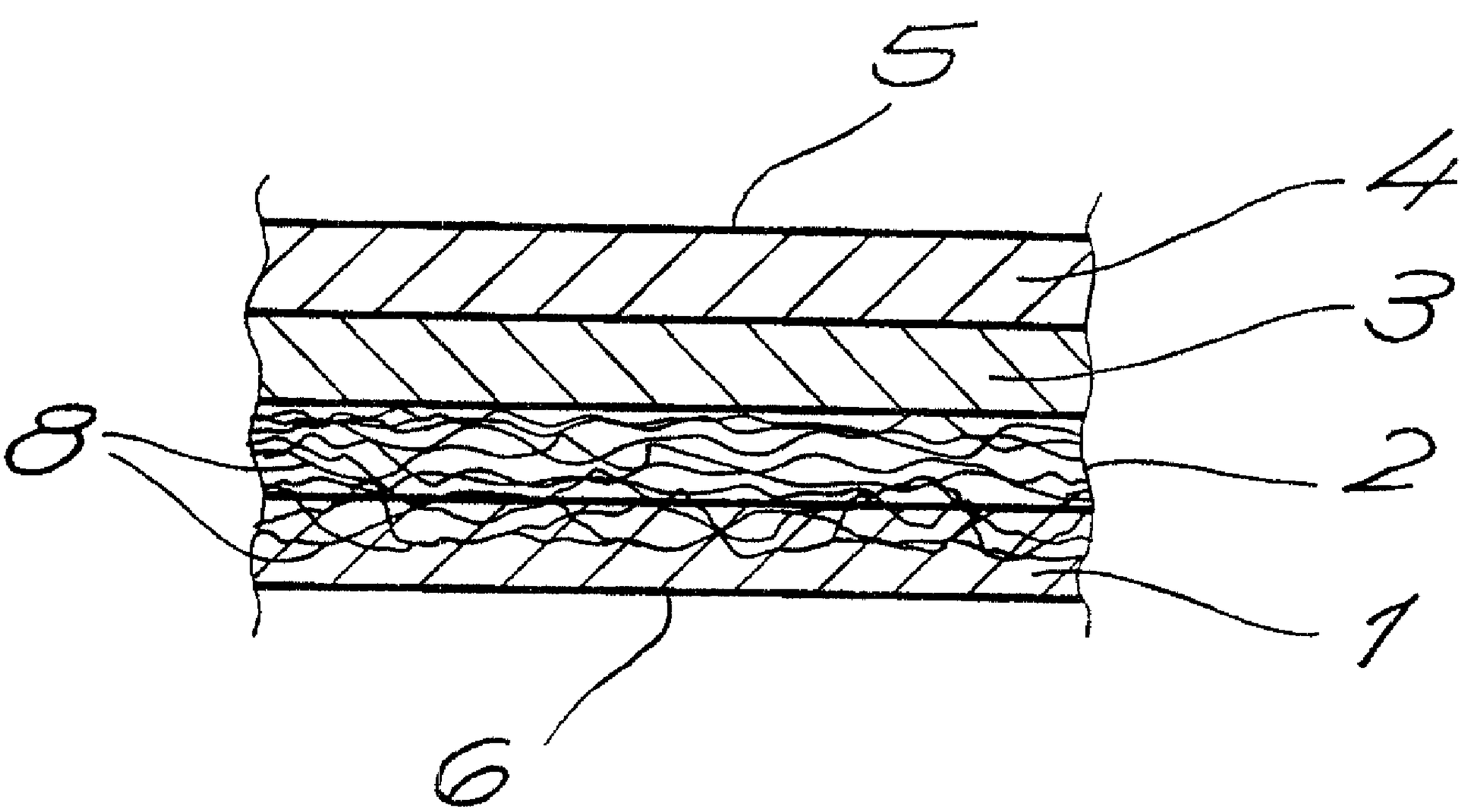
(51) Cl.Int./Int.Cl. *B32B 5/08* (2006.01),
A47L 13/16 (2006.01), *D04H 13/00* (2006.01)

(72) Inventeurs/Inventors:
SOMMER, SEBASTIAN, DE;
KUNZE, BERND, DE

(73) Propriétaire/Owner:
REIFENHAEUSER GMBH & CO. MASCHINENFABRIK, DE

(74) Agent: BORDEN LADNER GERVAIS LLP

(54) Titre : STRATIFIE DE FIBRES ET METHODE DE FABRICATION D'UN STRATIFIE DE FIBRES
(54) Title: FIBRE LAMINATE AND METHOD FOR MANUFACTURING A FIBRE LAMINATE



(57) Abrégé/Abstract:
A fibre laminate, especially absorbent wiping cloth, wherein at least one layer of a spun-bonded web and at least one layer of meltblown fibres is provided. Furthermore, at least one layer of hydrophilic fibres is present. Some of the meltblown fibres (8) are also distributed in the layer of spun-bonded web and/or in the layer of the hydrophilic fibres.

Abstract:

A fibre laminate, especially absorbent wiping cloth, wherein at least one layer of a spun-bonded web and at least one layer of meltblown fibres is provided. Furthermore, at least one layer of hydrophilic fibres is present. Some of the meltblown fibres (8) are also distributed in the layer of spun-bonded web and/or in the layer of the hydrophilic fibres.

Fibre Laminate and Method for Manufacturing a Fibre Laminate

Description:

The invention relates to a fibre laminate, especially an absorbent wiping cloth, comprising at least one layer of a spun-bonded web and at least one layer of hydrophilic fibres. The invention furthermore relates to a method for manufacturing such a fibre laminate. The term fibre laminate means a multilayer product or a laminate comprising a plurality of fibre layers. The spun-bonded web consists of filaments. The term filaments means continuous fibres, i.e., theoretically infinitely long threads from which the spun-bonded web is formed. Within the scope of the invention filaments means especially filaments of a thermoplastic plastic.

A method is known from practice with which absorbent textile structures, also designated as wiping cloth, are produced. In this case, fibres of a thermoplastic plastic are mixed with hydrophilic or water-absorbent fibres. The first fibres can, for example, comprise filaments or fibres of polypropylene or polyethylene terephthalate (PET). The second hydrophilic fibres comprise, for example, cellulose fibres. The fibre mixture is carded as part of the known measures and then water-jet needled or hydraulically solidified. The wiping cloths produced using this known method have only a relatively low elasticity. After deformation of the wiping cloth, barely any elastic restoring forces occur and there is normally no appreciable restoring. Furthermore, these known wiping cloths always exhibit symmetrical behaviour with regard to their liquid permeability or liquid absorption capacity. That is, said properties are identical on both sides, i.e., towards the top and towards the bottom of the wiping cloth. However, that is not always desired.

In contrast, the technical problem forming the basis of the invention is to provide a fibre laminate, especially a wiping cloth, which has exceptional elastic properties and which, when required, can also be constructed as asymmetric with

regard to the liquid permeability and absorption capacity. The invention is furthermore based on the technical problem of providing a method for manufacturing such a fibre laminate.

In order to solve the technical problem, the invention teaches a fibre laminate, especially an absorbent wiping cloth, wherein at least one layer of a spun-bonded web and at least one layer of meltblown fibres is provided,

wherein at least one layer of hydrophilic fibres is present

and wherein some of the meltblown fibres are also distributed in the layer of spun-bonded web and/or in the layer of the hydrophilic fibres.

A spun-bonded web used according to the invention consists of filaments and is appropriately manufactured using a spunbond method. It is within the scope of the invention that the meltblown fibres comprise continuous meltblown fibres. Hydrophilic fibres means within the scope of the invention water-absorbent fibres. Especially cellulose fibres such as, for example, pulp fibres or viscose fibres can be used as hydrophilic fibres. The layer of hydrophilic fibres forms an absorbent layer in the fibre laminate according to the invention. The fact that some of the meltblown fibres are also distributed in the layer of spun-bonded web and/or in the layer of hydrophilic fibres means within the scope of the invention that at least some of the meltblown fibres enter into the intermediate spaces at least of one of said layers. As is explained further below, the meltblown fibres are preferably transferred into said layers in the course of the solidification or the hydrodynamic solidification of the layer aggregate.

If subsequently preferred layers of the fibre laminate according to the invention are described, the respectively uppermost layer of the fibre laminate comprises the layer which is oriented upwards during the further processing or treatment of

the fibre laminate. Thus, if the fibre laminate is subjected to water-jet solidification acting from above, said uppermost layer is acted upon as the first layer by the water jets. It is within the scope of the invention that the layer of meltblown fibres is arranged on the layer of spun-bonded web and the layer of hydrophilic fibres is deposited on the layer of meltblown fibres. More appropriately in this case, the layer of meltblown fibres lies directly on the layer of spun-bonded web and the layer of hydrophilic fibres preferably lies directly on the layer of meltblown fibres. According to a special embodiment of the invention, a second layer of meltblown fibres can be applied to the layer of hydrophilic fibres. According to a very preferred embodiment of the invention, a further layer of a spun-bonded web is arranged on the layer of hydrophilic fibres. If this layer of spun-bonded web is applied directly to the layer of hydrophilic fibres, this is a fibre laminate with asymmetric behaviour (spun-bonded web/meltblown fibre layer/hydrophilic fibre layer/spun-bonded web). That is, the liquid permeability or liquid absorption capacity is different on both sides (top and bottom) of the fibre laminate. The invention is in this case based on the knowledge that the layer of meltblown fibres which is merely adjacent to a spun-bonded web layer impedes or restricts the liquid permeability. This asymmetric behaviour of such a fibre laminate is desired in many cases. However, it is also within the scope of the invention that the further layer of meltblown fibres is arranged on the layer of hydrophilic fibres with a further layer of meltblown fibres inserted in between. A fibre laminate with symmetrical behaviour is then obtained (spun-bonded web/meltblown fibre layer/hydrophilic fibre layer/meltblown fibre layer/spun-bonded web). The liquid permeability or liquid absorption capacity is then identical or at least very similar on both sides (top and bottom) of the fibre laminate.

According to another embodiment of the invention, the fibre laminate consists of a first layer of a spun-bonded web and a layer of hydrophilic fibres applied directly thereon. Adjacent to this layer of hydrophilic fibres is the layer of

meltblown fibres. A second layer of a spun-bonded web can be applied to this last layer of meltblown fibres.

It is within the scope of the invention that the meltblown fibres used consist at least of one elastomer. An elastomer comprises a material or plastic which is rubber-elastic at room temperature. Elastic meltblown fibres are thus used. According to an especially preferred embodiment, the elastic meltblown fibres consist of at least one elastomer from the group "polyurethane, ethylene-propylene diene mixed polymerisate (EPDM)". It is within the scope of the invention that a fibre laminate according to the invention contains 3 to 15 wt.%, preferably 5 to 10 wt.% meltblown fibres.

In order to solve the technical problem, the invention furthermore teaches a method for manufacturing a fibre laminate, especially an absorbent wiping cloth,

wherein at least one layer of a spun-bonded web of filaments is formed,

wherein at least one layer of meltblown fibres is applied, and

wherein in addition, at least one layer of hydrophilic fibres is applied and

wherein the resulting layer aggregate is solidified to form the fibre laminate and specifically is solidified subject to the condition that the meltblown fibres from the meltblown fibre layer penetrate into at least one adjacent layer of spun-bonded web and/or hydrophilic fibres. It is within the scope of the invention that during the solidification meltblown fibres are transferred into at least one adjacent layer only on one side (top or more appropriately bottom) of the meltblown layer. In any case, meltblown fibres are transferred into the layer directly adjacent to this side of the meltblown fibre layer. This directly adjacent layer preferably comprises a spun-bonded web layer.

It is within the scope of the invention that at least a part of the layers of the fibre laminate is pre-solidified. According to one embodiment, only the layer of the spun-bonded web can be pre-solidified. According to another embodiment, the aggregate of the spun-bonded web layer and the meltblown fibre layer is pre-solidified. The pre-solidification can thus take place before applying the layer of meltblown fibres or after applying this meltblown fibre layer. This pre-solidification is preferably carried out using a calender for example. The hydrophilic fibres are appropriately applied using a card and/or with the aid of an air-laid device.

After combining of the layers, the resulting layer aggregate is solidified to give a fibre laminate. The term solidification here means the final solidification. According to a very preferred embodiment of the invention, the layer aggregate is hydrodynamically solidified. In this case, it is within the scope of the invention that the fibre laminate is hydrodynamically solidified by water-jet treatment. In such a water-jet solidification or water-jet needling fine, very fast water jets or high-pressure water jets solidify the fibre laminate. As a result of this hydrodynamic solidification meltblown fibres are pressed or pushed from the meltblown fibre layer and into the adjacent layer. This has the consequence that after the solidification or final solidification some of the meltblown fibres are present in at least one layer adjacent to the meltblown fibre layer.

During the normal manufacture of spun-bonded web or web laminates using conventional raw materials such as polyolefins and polyesters, elastic products or products with elastic restoring properties cannot easily be manufactured. However, the invention is based on the knowledge that in a fibre laminate according to the invention, elastic properties can be adjusted in a simple fashion by incorporating meltblown fibres or elastic meltblown fibres into the laminate in the manner according to the invention. The elastic properties of the fibre

laminate acquire quite particular importance within the scope of the invention. According to the invention, it is possible to produce an absorbent or water-absorbent wiping cloth which is additionally distinguished by an excellent elasticity. The elasticity is in this case achieved with the meltblown fibres incorporated in the fibre laminate. As has already been described above, in a fibre laminate according to the invention symmetrical or asymmetric properties with regard to the liquid permeability or liquid absorption capacity can be advantageously adjusted as required.

The invention is explained in detail subsequently with reference to the drawings which show only one exemplary embodiment. In the figures:

Fig. 1 is a schematic diagram showing a section through a fibre laminate according to the invention with asymmetric properties and

Fig. 2 shows the subject matter according to Fig. 1 with symmetrical properties.

The fibre laminate shown in Fig. 1 consists of a first layer 1 of spun-bonded web of filaments. Applied directly to this is a first layer 2 of meltblown fibres 8. Adjacent to this layer 2 of meltblown fibres 8 is a layer 3 of hydrophilic fibres. A second layer 4 of a spun-bonded web is applied to this layer 3. This fibre laminate exhibits asymmetric behaviour with regard to the water permeability or water absorption capacity. This means that the water permeability or water absorption capacity is different with reference to the top 5 and with reference to the bottom 6 of the fibre laminate.

The fibre laminate in Fig. 2 on the other hand comprises a symmetrical fibre laminate. In this case, a second layer 7 of meltblown fibres 8 is located on the

layer 3 of hydrophilic fibres. A second layer 4 of spun-bonded web is applied to this said layer 7.

It has also been indicated in Figs. 1 and 2 that meltblown fibres 8 are located in the intermediate spaces of the layer 1 of spun-bonded web and in Fig. 2 they are also located in intermediate spaces of the layer 3 of hydrophilic fibres. These meltblown fibres 8 originate from the layer 2 or 7 of meltblown fibres 8 located thereabove. During manufacture of the fibre laminate shown in Figs. 1 and 2 meltblown fibres 8 were inserted or pressed into the layer 1 or 3 during the hydrodynamic solidification. According to a preferred embodiment of the invention the layer 1 of spun-bonded web and/or the layer 3 of hydrophilic fibres contains more than 1 wt.%, preferably more than 2 wt.% of meltblown fibres 8 (wt.% data is only related to the layer 1 of spun-bonded web or to the layer 3 of hydrophilic fibres).

CLAIMS:

1. A fibre laminate comprising:

at least one layer of a spun-bonded web;

at least one layer of meltblown fibres arranged on the spun-bonded web, with the meltblown fibres consisting at least partially of an elestomer; and

at least one layer of hydrophilic fibres arranged on the layer of meltblown fibres;

wherein at least some of the meltblown fibers from the meltblown fibre layer are distributed only in the adjacent layer of spun-bonded web and are not distributed in the adjacent layer of hydrophilic fibres.

2. The fibre laminate according to claim 1, wherein the fibre laminate is an absorbent wiping cloth.

3. The fibre laminate according to claim 1 or 2, wherein at least one further layer of a spun-bonded web is arranged on the layer of the hydrophilic fibres.

4. The fibre laminate according to any one of claims 1 to 3, wherein the meltblown fibres consist of at least one elastomer consisting of polyurethane or EPDM.

5. A method for manufacturing a fibre laminate, the method comprising the steps of:

providing an initial layer of spun-bound web;

applying a second layer of meltblown fibres to said spun-bound web layer, wherein the meltblown fibres consist at least partially of an elastomer;

applying a third layer of hydrophilic fibres to the second layer of meltblown fibres; and

hydrodynamically solidifying the fibre laminate to cause penetration of the meltblown fibres from the meltblown fibre layer into the spun-bonded web to form the fibre aggregate with the provision that some of the meltblown fibres are pressed only into the adjacent spun-bound web and not into the layer of hydrophilic fibres;

wherein the resulting spun-bound web contains at least 2% meltblown fibres by weight.

6. The method according to claim 5, wherein at least a part of the spun-bonded web layer and the meltblown fibre layer is pre-solidified.

7. The method according to any one of claims 1 to 6, wherein the layer aggregate is hydrodynamically solidified.

8. A method for manufacturing a fibre laminate, the method comprising the following steps:

providing an initial layer of spun-bound web;

applying a second layer of meltblown fibres to said spun-bound web layer, wherein the meltblown fibres consist at least partially of an elastomer;

applying a third layer of hydrophilic fibres to the second layer of meltblown fibres; and

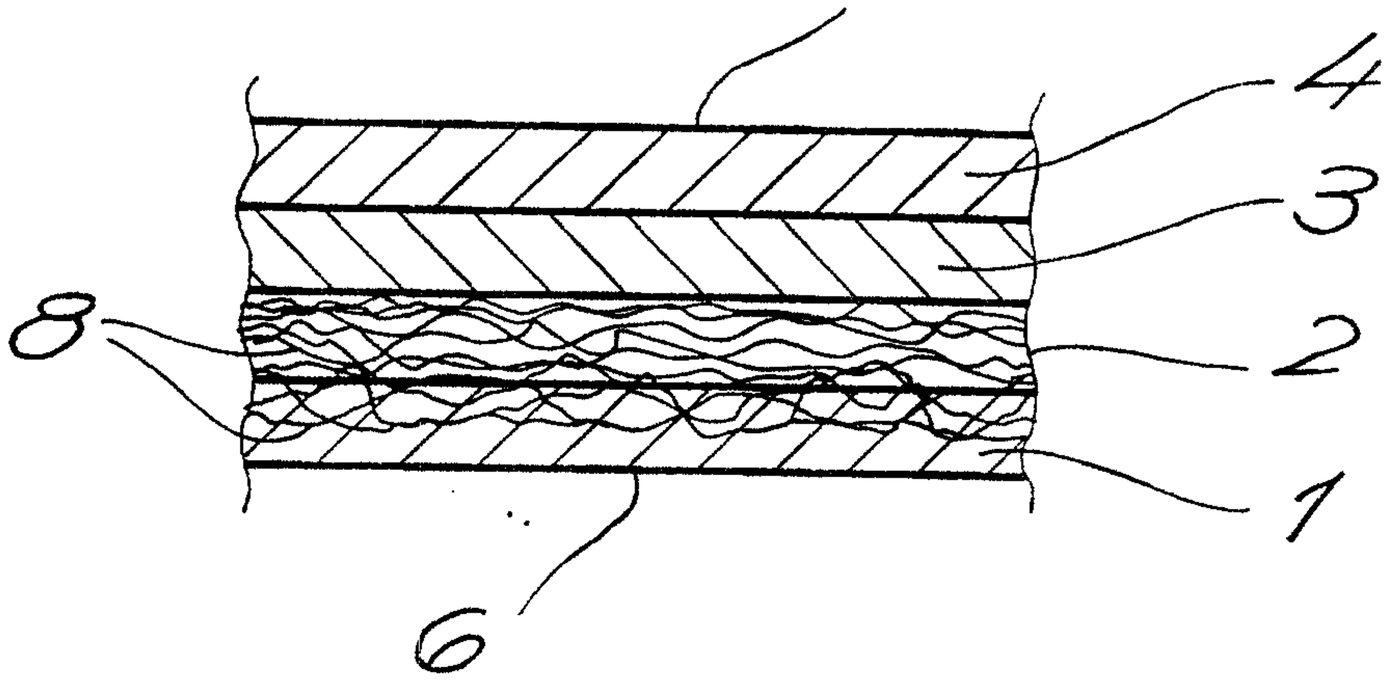
hydrodynamically solidifying the fibre laminate to cause penetration of the meltblown fibres from the meltblown fibre layer into the spun-bonded web to form the fibre aggregate with the provision that some of the meltblown fibres are pressed only into the adjacent spun-bound web and not into the layer of hydrophilic fibres;

wherein the resulting spun-bound web contains at least 2% meltblown fibres by weight; and

wherein the fibre laminate contains a total of 3 to 15% meltblown fibres by weight.

9. The method according to any one of claims 5 to 8, wherein the fibre laminate is an absorbent wiping cloth.

Fig. 1



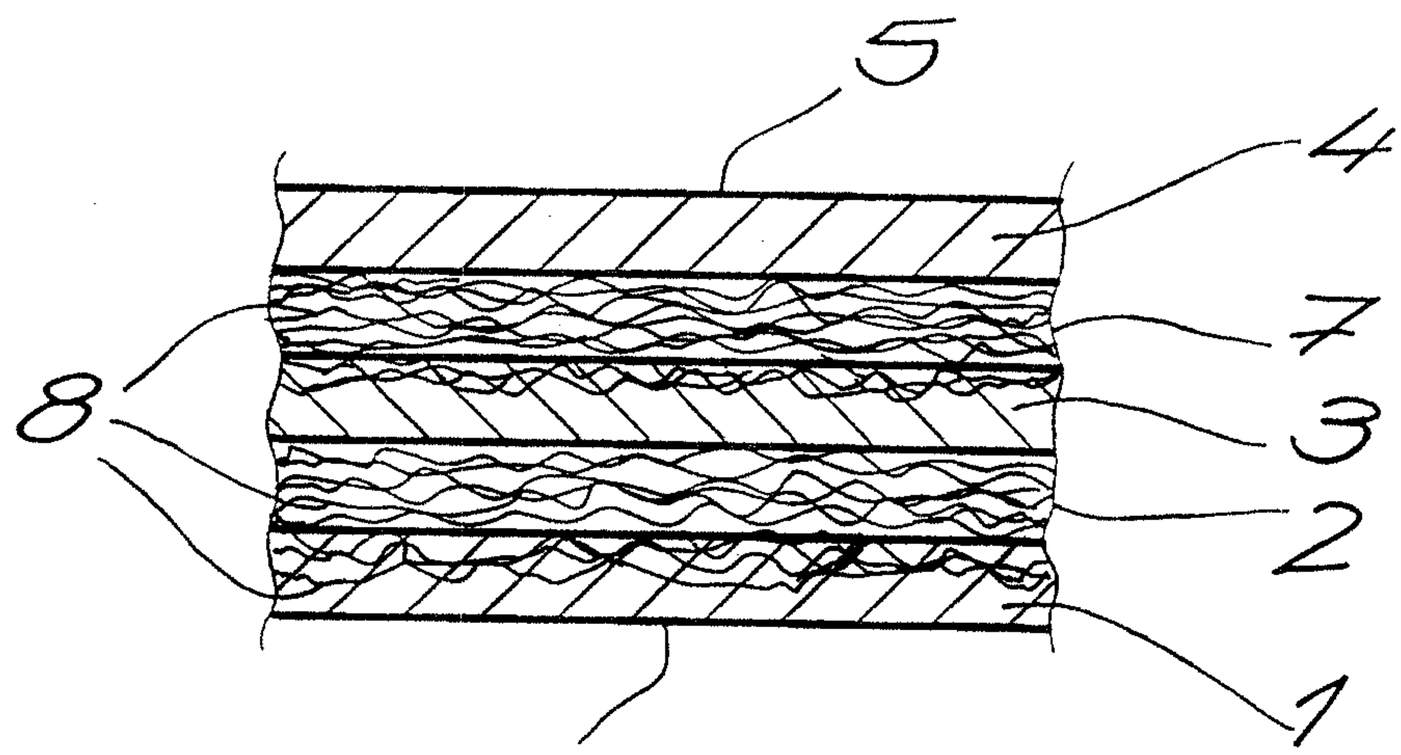
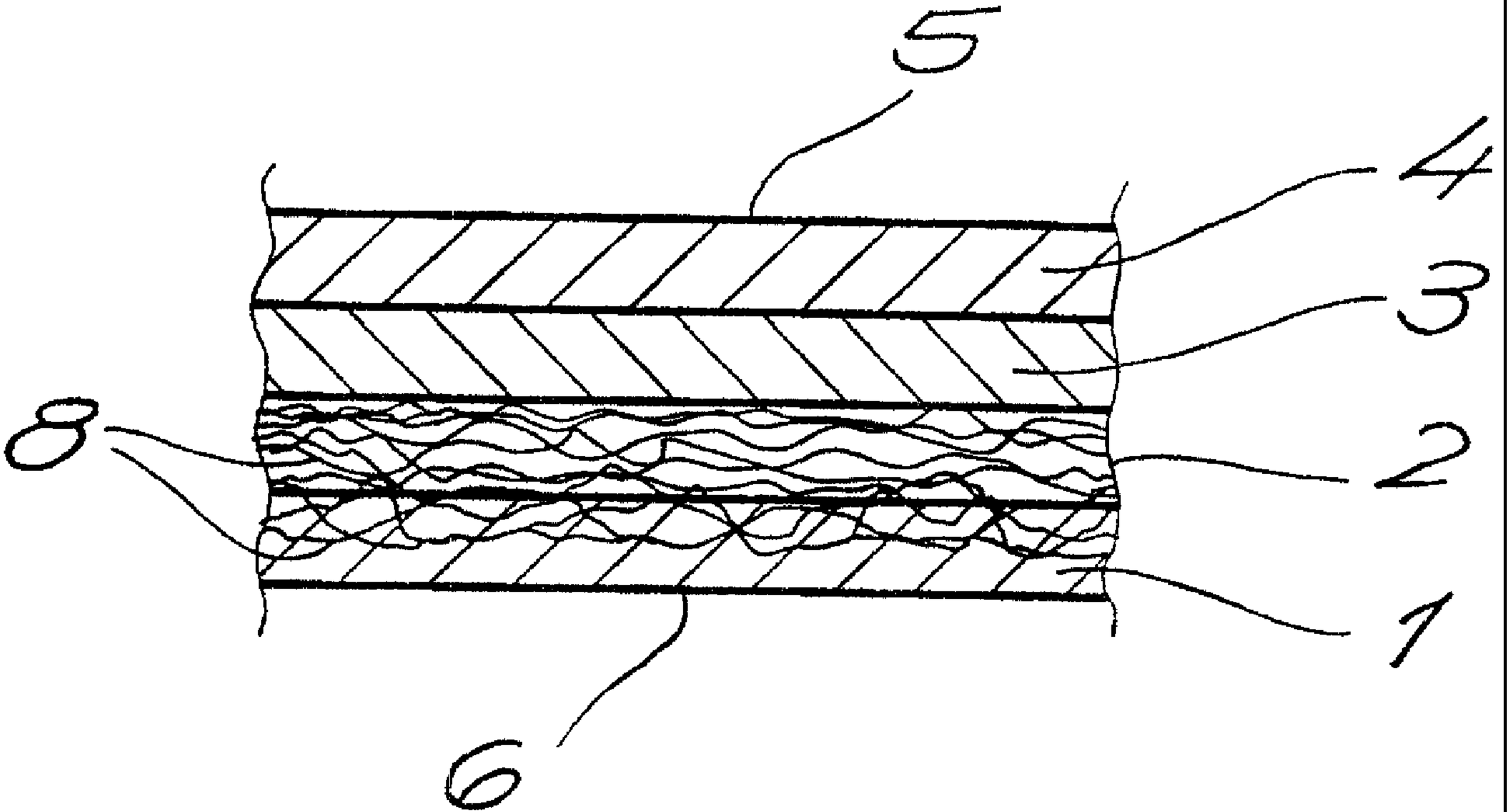


Fig. 2


5
4
3
8
2
1
6