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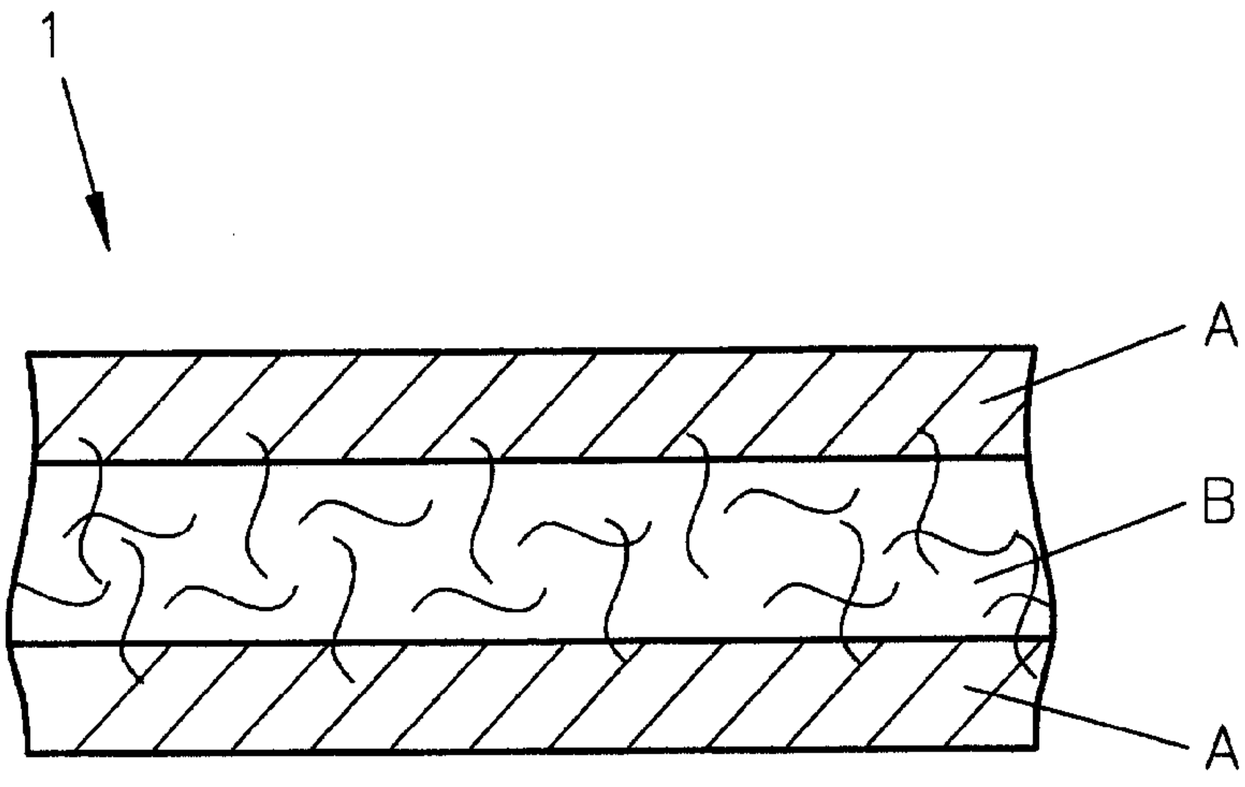
(54) **TORCHON**

(54) **CLEANING CLOTH**



(57) A cleaning cloth is provided having a fleece structure for wet, moist, and/or dry cleaning. The cleaning cloth consists of micro staple fibres of at least two different polymers and absorbent secondary staple fibres. The secondary staple fibres are produced using a spinning process.

ABSTRACT

A cleaning cloth is provided having a fleece structure for wet, moist, and/or dry cleaning. The cleaning cloth consists of micro staple fibres of at least two different polymers and absorbent secondary staple fibres. The secondary staple fibres are produced using a spinning process.

CLEANING CLOTH

Field of the Invention

The invention relates to a cleaning cloth, and in particular to a cleaning cloth having a fleece structure for wet cleaning, moist cleaning, and/or dry cleaning.

Background of the Invention

Cleaning cloths are commonly known and provided for removing and picking up dirt from the surface of an object. In order to fulfill both tasks, a cleaning cloth must have very good cleaning capacity as well as sufficient abrasion resistance and sufficient available pore volume for storing the dirt.

DE OS 30 35 038 discloses a cleaning cloth having good working characteristics. It consists of porous micro fibres made from a polymeric material which have a basically pore free fibre core and an open porous, foamed fibre sheath. Such a cleaning cloth made from a polymeric material has a particularly high mechanical resistance which has a positive effect with respect to abrasion resistance. By blending micro fibres with staple fibres or endless fibres, an improved spring elasticity and increased loft with improved dirt storage capacity are achieved.

Another form of a cleaning cloth is disclosed in US PS 4,145,464. That cleaning cloth is prepared from a mixture of cellulose and synthetic fibres. The cleaning cloth is covered on both sides by a cellulosic layer and fixed by mutual bonding of all fibres in spaced apart regions. Such a cleaning cloth does not have a sufficient mechanical strength since the cellulose fibres have a relatively short length below 6.35mm which in turn produces an unsatisfactory abrasion resistance. Already after a relatively short usage fibre components can come off, which settle in form of dust-shaped particles or lint on the surface to be cleaned.

EP 0 423 619 discloses a further cleaning cloth which is composed of several layers, namely a layer of synthetic endless fibres, so called filament fibres, which has on at least one surface a layer of staple fibres mixed with natural fibres. The amount of natural fibres is reported to be 15 to 75%. This cleaning cloth achieves a high strength, particularly because of the bottom layer and the central layer of synthetic endless fibres. However, the short natural fibres produce, similarly to the respective covering layer, an unsatisfactory

abrasion resistance, as in the preceding U.S. Patent No. 4,145,464.

Summary of the Invention

The invention is based on the object to produce a cleaning cloth for wet cleaning, moist cleaning, and/or dry cleaning, wherein the cleaning cloth has a high abrasion resistance as well as a large pick up volume for dirt being wiped up. In addition, it should be strong, have a good cleaning capacity, and should be pleasant to handle.

In accordance with the invention, the solution of the posed object is achieved in a cleaning cloth of the above mentioned general type in that the cleaning cloth is made of micro staple fibres from at least two different polymers and of absorbent secondary staple fibres which were produced in a spinning process. The high cleaning capacity and strength of the micro staple fibre and its abrasion resistance are combined with high absorbency of the secondary staple fibres in such a cleaning cloth. The secondary staple fibres are fixed within the micro staple fibres and are held safely therein.

The micro staple fibres are multi-component split fibres, particularly bi-component split fibres. They are mainly formed from polymers based on polyester and polyamide. There is a vast field of possible variations. The selection of the split fibres is preferably carried out from economical and process engineering view points.

The titre of the multi-component fibres is 1.7 to 3.0 dtex before splitting. The titre of the split fibres is below 1 dtex, preferably below 0.2 dtex.

Staple fibres produced from natural fibres are used as secondary staple fibres, particularly cellulose fibres from cotton, viscose, lyocell and/or other absorbent staple fibres, such as polyvinyl alcohol fibres. The titre of the secondary staple fibres is at 1.0 to 3.0 dtex. The spun staple fibres are significantly stronger than common natural fibres.

In order to create the largest possible pore volume, it is favourable to form the cleaning cloth from at least two fleece layers which lie on top of one another. It is particularly favourable if one of the fleece layers consists of micro staple fibres and absorbent secondary staple fibres and if the other fleece layer is formed from polymeric tertier staple fibres, particularly from a thermoplastic material and absorbent secondary staple fibres. The fleece layer produced by using tertier staple fibres is particularly voluminous. This makes use of the high cleaning capacity and abrasion resistance of the micro staple fibres on one side of the cleaning cloth in connection with the special volume

of the tertier staple fibres and the secondary staple fibres on the other side of the towel. The absorbent capacity is increased through the secondary staple fibres. A particularly preferred embodiment provides a fleece layer of polymeric tertier staple fibres and absorbent secondary staple fibres as a central layer flanked by a covering fleece layer of micro staple fibres and absorbent secondary staple fibres on each of its sides. In such a cleaning cloth, the two outer layers, which come into contact with the object to be cleaned, have a high abrasion resistance, while the central layer has an especially large volume with a high absorbency. Staple fibers made of polyamide are preferably used as tertier staple fibres, having a titre larger than the micro fibres, which is a common titre for such fibres.

The preferred process for making a towel having several fleece layers provides that at first individual layers are to be formed and then to join these layers with each other. In this case, each fleece layer can already be provided with secondary staple fibres. However, it is also possible to only provide the tertier staple fibres with secondary staple fibres initially, and to link up the layer of micro fibres having no secondary fibres thereto, and then to introduce the secondary staple fibres into the layer or layers of micro staple fibres by needling of the layers to each other.

The individual fleece layers are connected by needling, vortexing, or laminating. Methods of this type are known. Especially good results are achieved when the fleece layers are connected with each other by spot welding. This results in a perforated surface, which increases the cleaning power of the towel. The individual fleece layers can be compacted through fusion zones using heat and pressure during spot welding. But it is also possible to compact the surfaces of the cleaning cloth through fusion zones, particularly by calendering.

The area weight of the cleaning cloth is usually 75 to 250 g/qm, preferably 120 to 180 g/qm. In a three-layered cleaning cloth having a central layer of tertier staple fibres and secondary staple fibres and two covering layers of micro staple fibres and secondary staple fibres, the surface weight of the central layer is chosen such that it is 40 to 80% of the total surface weight. Thus, it is favourable to have covering layers having equal surface weights.

The portion of micro staple fibres in the covering layers exceeds the portion of secondary staple fibres. The portion of micro staple fibres is between 70 and 98%,

preferably between 70 and 80%.

In the central layer, the portion of secondary staple fibres exceeds the portion of tertier staple fibres. It is between 70 and 100%, preferably between 70 and 80%.

Brief Description of the Drawings

The invention is further described with respect to two embodiments presented in the drawings in which:

Fig. 1 shows a largely magnified sectional view of a portion of a cleaning cloth having three fleece layers; and

Fig. 2 shows a sectional view of a portion of a cleaning cloth having three fleece layers connected with each other by spot welding.

Detailed Description of the Invention

Fig. 1 shows a magnified sectional view through a portion of a cleaning cloth 1, which has three layers of fleece material A, B, A. The central layer B consists of synthetic tertier staple fibres mixed with secondary staple fibres, while the two covering layers A, A are made of micro staple fibres and secondary staple fibres. The two covering layers A, A are similar in their composition. The layers of fleece material A, B, A are hydro entangled. The individual fibres are thereby entangled and the micro staple fibres at least partially split. A strong bonding forms between the different fibres and fleece layers.

Fig. 2 also shows a sectional view of a portion of a three-layered cleaning cloth 2. The three layers of fleece material A, B, A have a similar structure as the layers A, B, A of Fig. 1. However, the layers are spot welded on pattern-like assigned positions 3. This results in a higher cleaning effect of the towel 2. The spot welding is carried out by calendering the fleece layers, in that the fleece layers are guided together through two rollers, wherein one of the rollers is provided with knobs distributed in a pattern-like fashion and the other roller has a smooth surface. This yields the single-sided fusion zones of the fleece layers A, B, A at the positions 3 of the towel 2. It is because of this step that the individual layers A, B, A are strongly bonded with each other and furthermore, that the thermoplastic fibres of the individual layers, at least at the surface of the towel, are adhered to each other through the heated rollers and thereby encapsulate the secondary

staple fibres. The fleece layers A, B, A are hydro entangled before their calendering so as to yield a particularly strong bond between the fibres and the layers. Furthermore, the micro staple fibres are split during the hydro entanglement.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A cleaning cloth having a fleece structure for use in at least one of wet cleaning, moist cleaning, and dry cleaning comprising:

micro staple fibres and absorbent secondary staple fibres, said micro staple fibres including at least two different polymers and said absorbent secondary staple fibres being produced in a spinning process.

2. The cleaning cloth as defined in claim 1, wherein the micro staple fibres are selected from the group consisting of multi-component split fibres and bi-component split fibres.

3. The cleaning cloth as defined in claim 2, wherein the bi-component split fibres include polymers based on polyester and polyamide.

4. The cleaning cloth as defined in any one of claims 2 to 3, wherein the multi-component split fibres have a titre of 1.7-3.0 dtex before said multi-component split fibres are split.

5. The cleaning cloth as defined in claim 4, wherein the titre of the multi-component split fibres is below 1 dtex.

6. The cleaning cloth as defined in claim 5, wherein the titre of the multi-component split fibres is below 0.2 dtex.

7. The cleaning cloth as defined in any one of claims 1 to 4, wherein the secondary staple fibres are natural fibres.

8. The cleaning cloth as defined in any one of claims 1 to 4, wherein the secondary staple fibres are absorbent staple fibres.

9. The cleaning cloth as defined in 7, wherein the natural fibres are selected from the group consisting of cellulose fibres, cotton fibres, viscose fibres, and lyocell fibres.

10. The cleaning cloth as defined in claim 8, wherein the absorbent staple fibres are polyvinyl alcohol fibres.

11. The cleaning cloth as defined in any one of claims 1 to 10, wherein the secondary staple fibres have a titre of 1.0 to 3.0 dtex.

12. The cleaning cloth as defined in any one of claims 1 to 11, wherein the cleaning cloth includes a first fleece layer and a second fleece layer arranged on top of one another.

13. The cleaning cloth as defined in claim 12, wherein the first fleece layer includes polymeric tertier staple fibres and absorbent secondary staple and the second fleece layer includes micro staple fibres and absorbent secondary staple fibres.

14. The cleaning cloth as defined in claim 13, wherein the polymeric tertier staple fibres are thermoplastic fibres.

15. The cleaning cloth as defined in any one of claims 13 to 14, wherein the first fleece layer forms a central layer, said central layer being flanked by a covering fleece layer of micro staple fibres and absorbent secondary staple fibres on each side.

16. The cleaning cloth as defined in any one of claims 13 to 15, wherein the secondary staple fibres are introduced into the second fleece layer by needling of the first fleece layer.

17. The cleaning cloth as defined in any one of claims 12 to 16, wherein the first fleece layer and the second fleece layer are bonded to one another by one of needling, vortexing, and laminating.

18. The cleaning cloth as defined in any one of claims 12 to 16, wherein the first fleece layer and the second fleece layer are bonded to one another by spot welding.

19. The cleaning cloth as defined in any one of claims 12 to 18, wherein the first fleece layer and the second fleece layer are compacted through fusion zones by applying at least one of heat and pressure.

20. The cleaning cloth as defined in any one of claims 1 to 19, wherein a surface of the cleaning cloth is compacted through fusion zones.

21. The cleaning cloth as defined in claim 20, wherein the surface of the cleaning cloth is compacted by calendering.

22. The cleaning cloth as defined in any one of claims 1 to 21, wherein the cleaning cloth has a surface weight of 75 to 250 g/qm.

23. The cleaning cloth as defined in claim 22, having a surface weight of 120 to 180 g/qm.

24. The cleaning cloth as defined in any one of claims 1 to 23, having three layers, a central layer and a pair of covering layers, said central layer including tertier staple fibres and secondary staple fibres and said covering layers each including micro staple fibres and secondary staple fibres, and said central layer having a surface weight of 40 to 80% of a total surface weight of the cloth.

25. The cleaning cloth as defined in claim 24, wherein the surface weight of the two covering layers is substantially equal.

26. The cleaning cloth as defined in any one of claims 24 to 25, wherein each covering layer includes a higher portion of micro staple fibres than secondary staple fibres.

27. The cleaning cloth as defined in any one of claims 24 to 26, wherein the portion of micro staple fibres in each covering layer is 70 to 98%.

28. The cleaning cloth as defined in claim 27, wherein the portion of micro staple fibres is 70 to 80%.

29. The cleaning cloth as defined in any one of claims 24 to 28, wherein the central layer has a higher portion of secondary staple fibres than tertier staple fibres.

30. The cleaning cloth as defined in any one of claims 24 to 29, wherein the portion of secondary staple fibres in the central layer is 70 to 100%.

31. The cleaning cloth as defined in claim 30, wherein the portion of secondary staple fibres is 70 to 80%.

Fig.1

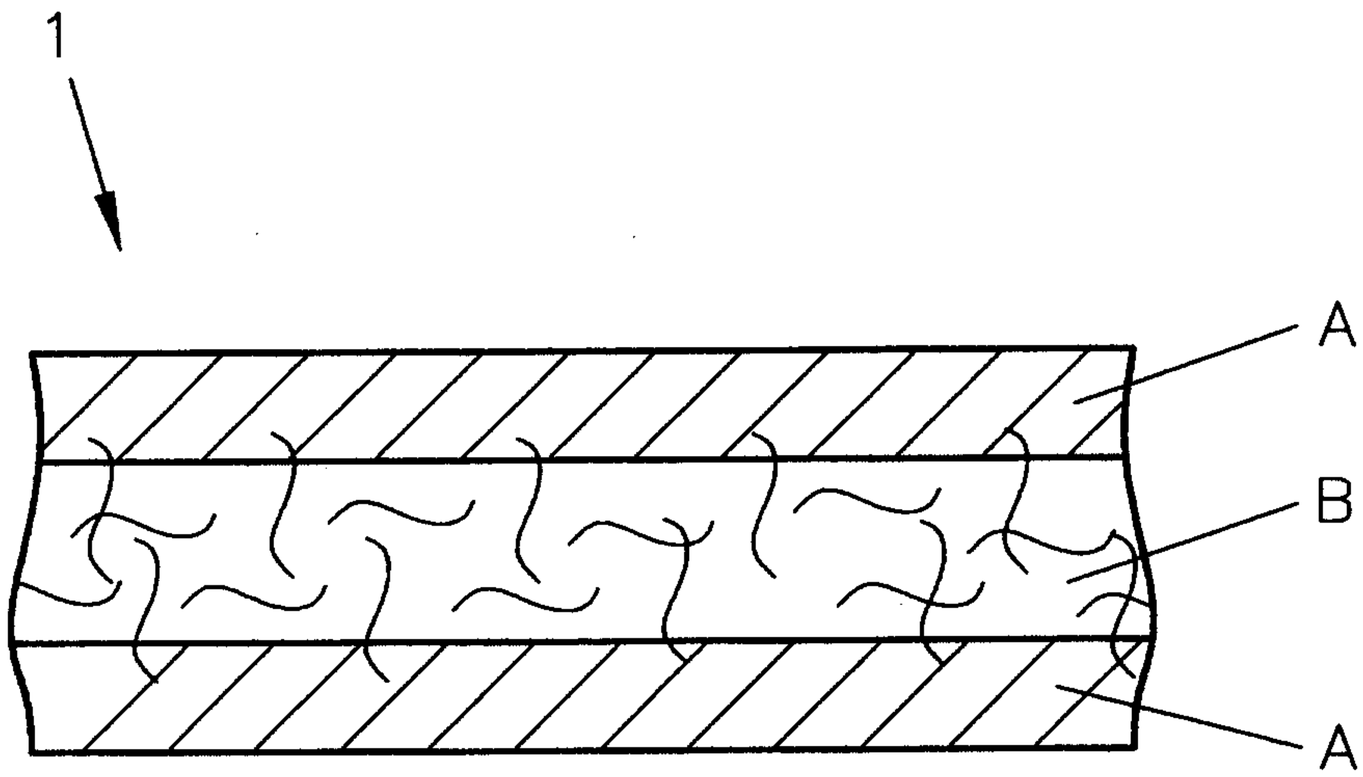
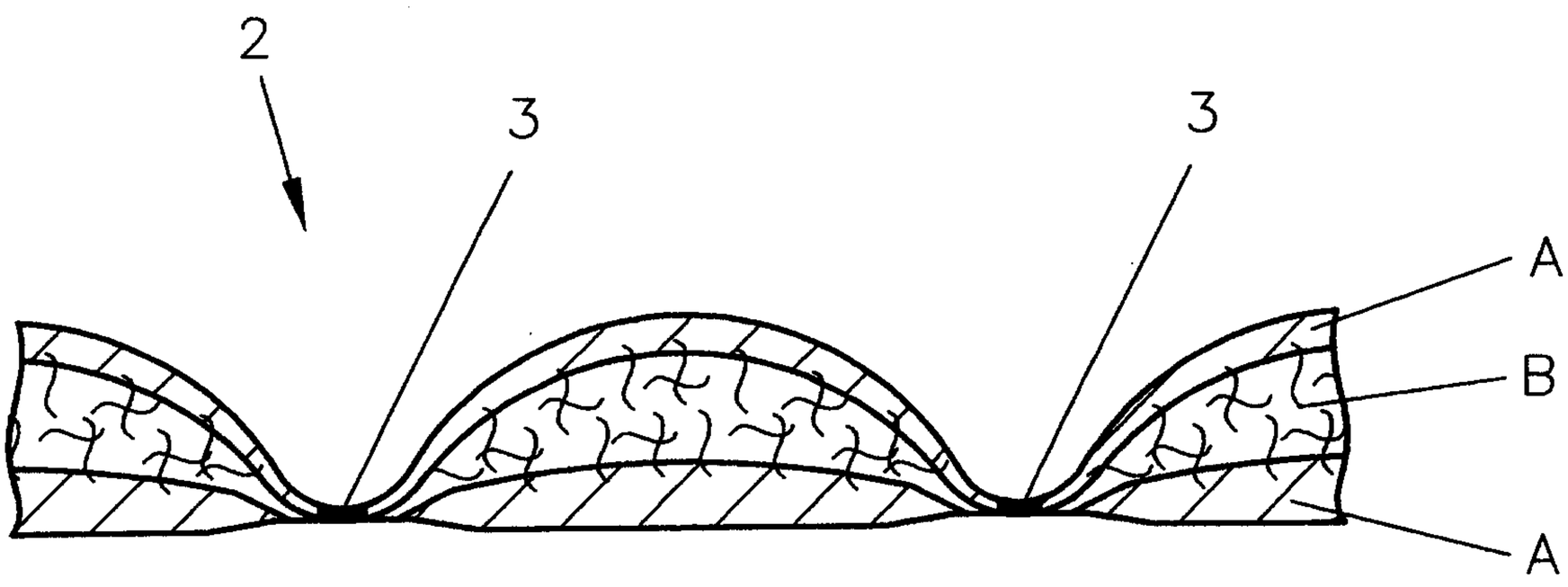
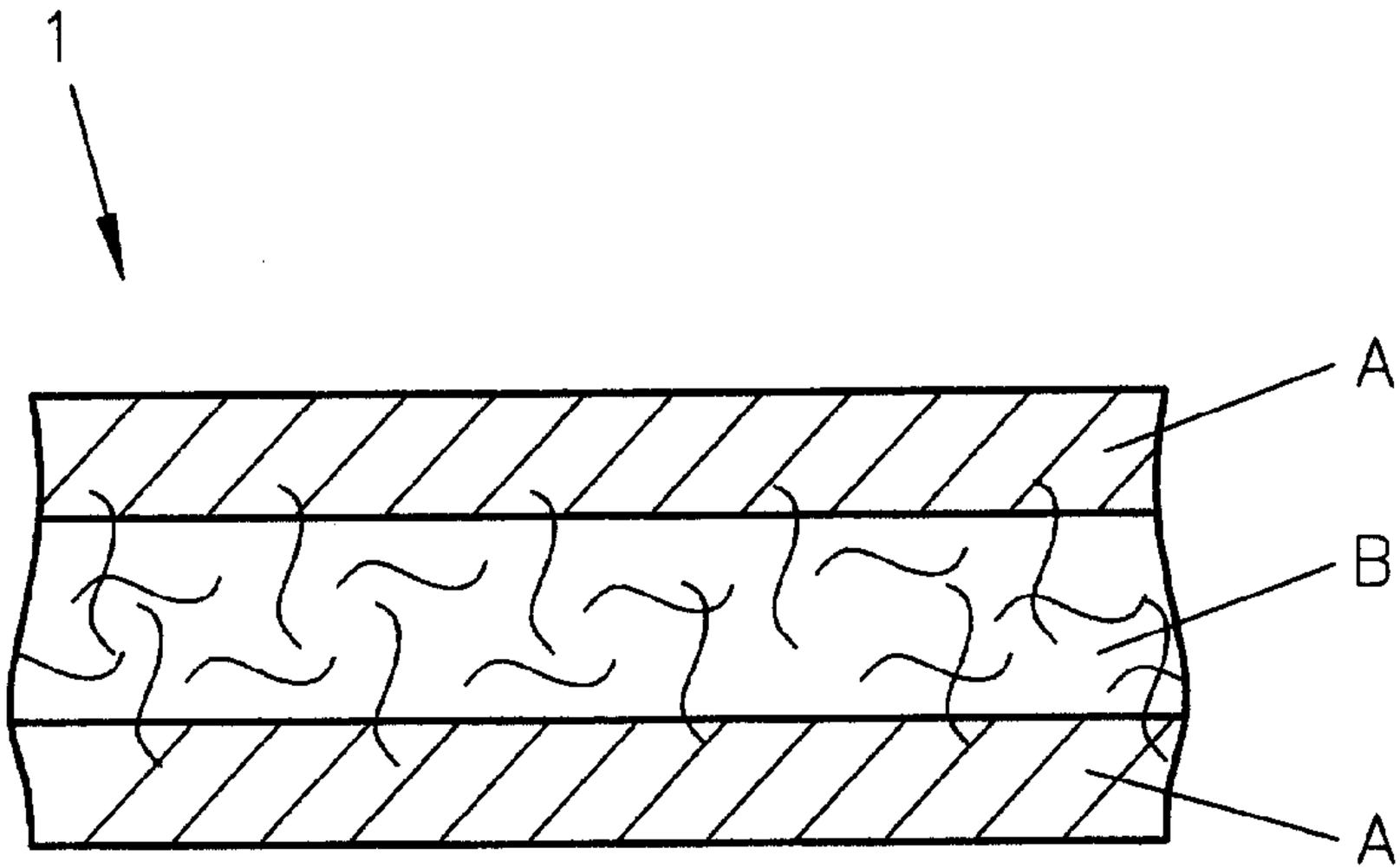


Fig.2

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