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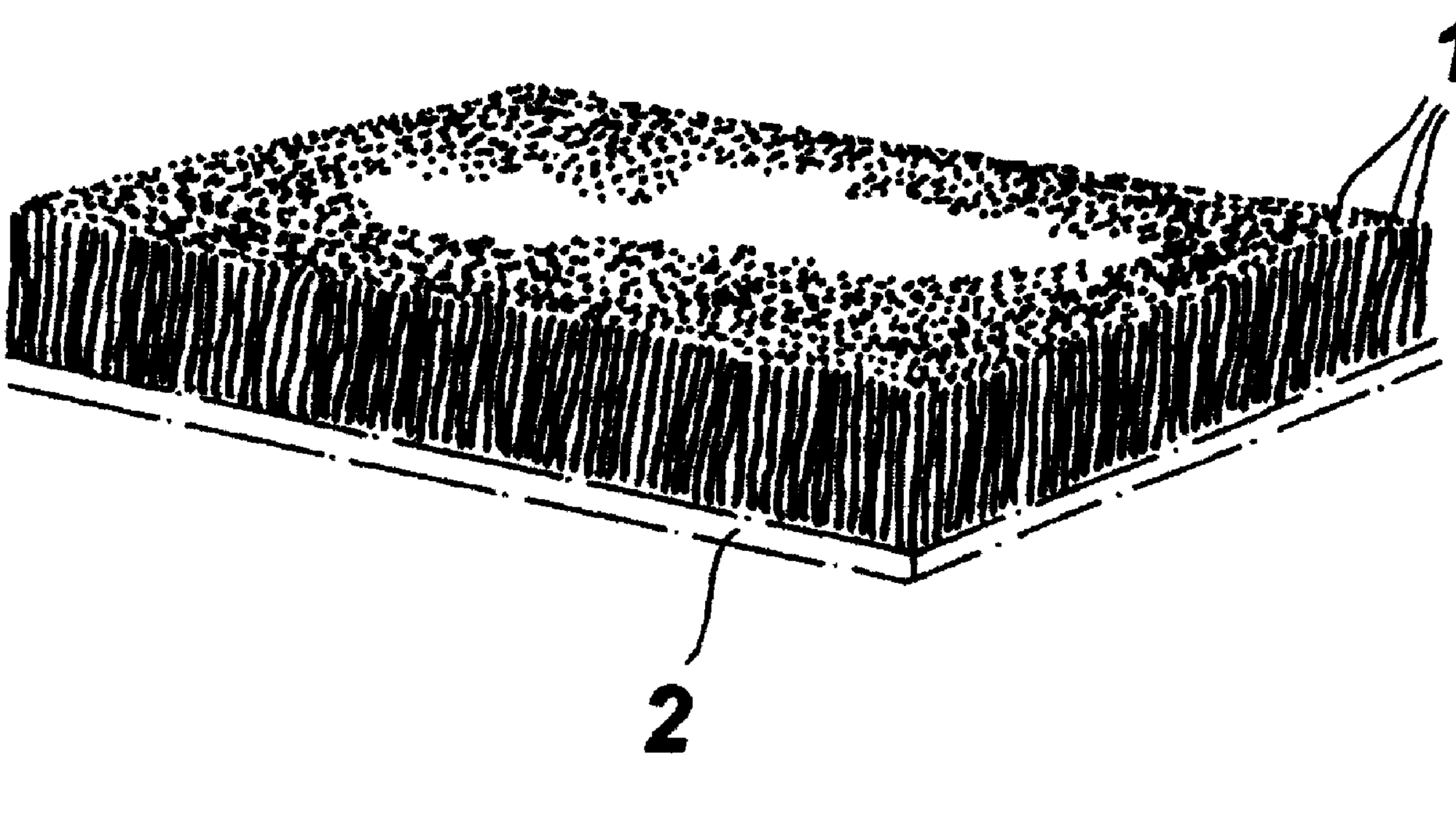


(57) Abrégé/Abstract:
An artificial turf has a base layer and a multiplicity of blades fixed to and projecting upward from the base layer. Each of the blades is formed of an elongated plastic filament having a longitudinally extending inner part of plastic and a longitudinally extending outer part bonded to the inner part and of a plastic different from the inner-part plastic. Both parts extend the full length of the respective blade.

ABSTRACT OF THE DISCLOSURE

An artificial turf has a base layer and a multiplicity of blades fixed to and projecting upward from the base layer. Each of the blades is formed of an elongated plastic filament having a longitudinally extending inner part of plastic and a longitudinally extending outer part bonded to the inner part and of a plastic different from the inner-part plastic. Both parts extend the full length of the respective blade.

ARTIFICIAL TURF

SPECIFICATION

FIELD OF THE INVENTION

The present invention relates to artificial turf.

BACKGROUND OF THE INVENTION

Standard to artificial turf, in particular for sports fields and lawns typically has blades made of plastic, normally mixtures of plastic, with mixtures of plastic in particular being used. The artificial turf should meet as many requirements as possible. First, the artificial turf should not cause any injury or discomfort to the skin upon intensive contact with human skin, for example, when athletes fall and slide on it. Moreover, it is desirable for the blades to return to their original position as completely as possible after impact by the users, in particular after the artificial turf has been walked on repeatedly. Furthermore, the artificial turf should also provide sufficient cushion, that is be soft like real grass.

The artificial turfs known up to now have the disadvantage that they normally do not meet all of the requirements mentioned above very well. Up to now, when a known artificial turf is designed such that the blades return to their

erect position in a problem-free fashion after repeatedly being bent over, this feature is traded off against gentleness of the artificial turf on skin. In other words, intensive rubbing of human skin on this artificial turf may result in injury, so-called rug burns. On the other hand, if the artificial turf is designed with an eye to gentleness on the skin, it normally easily crushable, that is the blades to not stand up again once bent over, in other words the turf is readily flattened out. The cushioning ability achieved in the known types of artificial turf also leaves much to be desired. As a result, the known types of artificial turf normally do not meet all of the above requirements and therefore require improvement.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention to provide an improved artificial turf.

Another object is the provision of such an improved artificial turf that overcomes the above-given disadvantages, in particular that has in particular an optimal degree of gentleness on the skin and where nonetheless the blades are able to return to their upright position after stress from human impact over the long term.

SUMMARY OF THE INVENTION

An artificial turf has according to the invention a base layer, and a multiplicity of blades fixed to and projecting upward from the base layer, each of the blades are formed of an elongated plastic filament having a longitudinally extending inner part of plastic and a longitudinally extending outer part bonded to the inner part and of a plastic different from the inner-part plastic.

According to the invention at least one of the two parts extends the entire length of the blade. It is also within the scope of the invention for an intermediate plastic part to form part of the cross section of a blade and to extend at least essentially a fully length of the blade and for the intermediate plastic part to be between the outer and inner plastic parts. Preferably, the intermediate plastic part separates the outer plastic part from the inner plastic part in the multicomponent filament at least partially and preferably completely. The three parts are normally formed by coextrusion.

According to a particularly preferred embodiment of the invention, the multicomponent filaments for the blades are three-part coaxial filaments made of the outer, inner, and intermediate plastic parts. It is useful for the intermediate plastic part to act as a bonding agent between the outer plastic part and the inner plastic part. Thus the multicomponent filaments have a core-sheath structure, with the outer plastic part forming the

sheath and the inner plastic part forming the core of the multicomponent filament. It is useful for the intermediate plastic part to be arranged between the sheath (outer plastic part) and the core (inner plastic part) and it is recommend for it to surround the core at least partially, preferably completely. This means that, due to the intermediate plastic part, there is no direct contact between the core and the sheath.

It is within the scope of the invention for the multicomponent filaments according to the invention to be spun from a spinning nozzle. The individual plastics are supplied to the spinning nozzle by extruders. After the multicomponent filaments have been spun, after the filaments have cooled, and, optionally, after further treatment, the multicomponent filaments are cut into appropriate lengths for the blades according to the invention. Preferably, after spinning of the multicomponent filaments from the spinning nozzle, they are first cooled, preferably in a water bath. According to recommended variant embodiments, the filaments are then stretched, in particular mechanically, and subsequently the filaments are fixed. It then lies within the scope of the invention for the filaments to be cut into the blade lengths. According to a recommended variant embodiment, the filaments or monofilaments are first attached to the base layer by tufting and subsequently trimmed to a uniform length from the base.

According to a particularly preferred embodiment of the invention, the one of the plastic parts is a polyolefin,

preferably a polyethylene. According to a very recommended embodiment of the invention, the polyolefin, preferably polyethylene, forms the sheath part of the multicomponent filament in the core-sheath structure. According to a preferred variant embodiment of the invention, LLDPE (linear low-density polyethylene) is used as the polyethylene. This polyethylene has proven itself particularly well in the context of the invention. The polyolefin, preferably polyethylene, particularly preferably LLDPE, may in particular contain additives with UV-reflecting properties and/or additives with antibacterial properties and/or additives in the form of fungicides.

According to a particularly preferred embodiment of the invention, the inner plastic part is a polyamide or a polyester. Polybutylene terephthalate (PBT) may preferably be used as the polyester. According to a particularly preferred embodiment of the invention, however, the inner plastic part is a polyamide. It is useful for the polyamide to form the core of the multicomponent filament in the core-sheath structure. One recommended variant embodiment of the invention is characterized in that the inner plastic part is a polyamide from the group Nylon 6, Nylon 6.6, Nylon 6.12, Nylon 6.10. Here, the use of Nylon 6 as the inner plastic part is particularly preferred, preferably as the core part of the multicomponent filaments in the core-sheath structure.

In accordance with the invention the intermediate plastic part is a plastic that acts as a bonding agent between

the outer plastic part, preferably the sheath part, and the inner plastic part, preferably the core part. In principle, the skilled practitioner is aware of plastics that are able to act as a bonding agent, in particular between a polyolefin and a polyamide. According to a preferred embodiment of the invention, the intermediate plastic part is a polyamide-polyethylene copolymer. According to another preferred variant embodiment, a polyolefin that has been modified using a maleic acid derivative, usefully maleic anhydride, is used as the intermediate plastic part. The modified polyolefin is preferably a modified polyethylene or polypropylene.

According to a recommended embodiment of the invention, the multicomponent filaments, relative to their cross section or the surface area of their cross section, have 5 to 50%, preferably 10 to 45%, and most preferably 10 to 40% formed by the outer plastic part. These percentages are percentages of surface area occupied by the outer plastic part relative to the area of the overall cross section of the multicomponent filament forming the blade. Preferably the outer plastic part mentioned above is the sheath part of the multicomponent filament in the core-sheath structure, which is preferably composed of polyethylene, particularly preferably of LLDPE. According to a recommended embodiment, the multicomponent filaments, relative to their cross section or the surface area of their cross section, have of 3 to 20%, preferably 5 to 20%, and most preferably 5 to 15% formed by the intermediate plastic part. The intermediate plastic part is

preferably arranged between the sheath part (outer plastic part) and the core part (inner plastic part) of a multicomponent filament in the core-sheath structure. It is useful for the intermediate plastic part in this core-sheath structure to form the inner sheath, as it were, between the outer sheath (outer plastic part) and the core (inner plastic part). According to a very preferred embodiment of the invention, the multicomponent filaments, relative to their cross section or the surface area of their cross section, have 30 to 93%, preferably 30 to 85%, and most preferably 35 to 80% formed by the inner or core plastic part. The inner plastic part can be the primary part of the multicomponent filaments, occupying preferably more than 40%, most preferably more than 45%, of the area of the cross section relative to the overall cross-sectional area of blade.

Preferably, the inner plastic part mentioned above is the core part of the multicomponent filament in the core-sheath structure, which is preferably composed of polyamide, very preferably of Nylon 6.

A preferred embodiment of the invention is characterized in that the core of the multicomponent filaments in the core-sheath structure has hollow chambers, formed as longitudinally extending voids in the core. The use of multicomponent filaments with hollow chambers of this type in the core has proven itself particularly well. The hollow chambers allow an advantageous absorption of water in the multicomponent filaments and/or in the blades of the artificial turf.

The invention is based on the realization that the artificial turf according to the invention surprisingly fulfills all of the desired requirements. First, the artificial turf according to the invention is distinguished by an excellent gentleness to skin. If, for example, athletes, fall or slip on this artificial turf, no appreciable injuries or skin burns will result. Moreover, the artificial turf according to the invention is distinguished by the ability of its blades to maintain their upright position over the long term. Even in the case of frequent human stress or impact on the blades, they still always return to their original position. Moreover, the artificial turf according to the invention is also distinguished by its good cushioning properties. It should be emphasized that the artificial turf according to the invention is relatively simple and cost-effective to produce. The artificial turf according to the invention is also excellent for landscape gardening.

BRIEF DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1 is a perspective view of a piece of artificial turf according to the invention;

FIG. 2 is a large-scale vertical section through the inventive artificial turf; and

FIG. 3 is a longitudinal section through the multicomponent filament forming the turf blades.

SPECIFIC DESCRIPTION

As seen in FIG. 1, artificial turf in accordance with the invention consists of a plurality of blades 1 fixed on a base layer 2. The blades 1 are formed by a multicomponent monofilament or pieces thereof and are advantageously fixed on the base layer 2 by tufting.

FIG. 2 shows the artificial turf in greater detail. Here, the blades 1 are shown projecting through the base layer 2 and joined together underneath it, with their free ends projecting upward from it. The base layer 2 is in particular a woven, knitted, or felted fabric or plastic textile consisting preferably of a polyolefin, preferably polypropylene or polyethylene. A layer of infill formed of multicomponent fibers and situated between the blades 1 and on the base layer 2 is indicated schematically at 3.

FIG. 3 shows a cross section through one of the blades 1 of a multicomponent filament according to the invention. Here, the blade 1 or multicomponent filament is embodied according to a preferred embodiment of the invention with a core-sheath structure. In the illustrated embodiment, an outer layer, tube, or sheath 4 is composed of polyethylene, preferable LLDPE. An inner layer or core 5 in the illustrated embodiment is composed

polyamide, very preferably Nylon 6. Between the sheath 4 and the core 5 is an intermediate layer 6 composed of a third plastic part that is preferably composed of a polyamide-polyethylene copolymer. This part 6 is an inner tube or sheath that completely surrounds the core 5 and functions as a bonding agent between the sheath 4 and the core 5. FIG. 3 shows longitudinally extending voids or hollow chambers 7 in the core 5 to allow for absorption of water into the blade 1. FIG. 3 also shows that the inner or core part (polyamide or Nylon 6 in the illustrated embodiment) forms the primary part of the multicomponent filament and represents preferably at least 35%, most preferably at least 40% of the surface area of the cross section relative to the area of the overall cross section of the respective blade 7.

I CLAIM:

1. An artificial turf comprising:

a base layer; and

a multiplicity of blades fixed to and projecting upward from the base layer, each of the blades being formed of an elongated plastic filament having a longitudinally extending inner part of plastic and a longitudinally extending outer part bonded to the inner part and of a plastic different from the inner-part plastic, both parts extending generally a full length of the respective blade.

2. The artificial turf defined in claim 1 wherein the outer part is tubular and surrounds the inner part.

3. The artificial turf defined in claim 2 wherein the outer part is a polyolefin.

4. The artificial turf defined in claim 3 wherein the outer part is polyethylene.

5. The artificial turf defined in claim 4 wherein the outer part is linear low-density polyethylene.

6. The artificial turf defined in claim 2 wherein the inner part is polyamide or polyester.

7. The artificial turf defined in claim 6 wherein the inner part is Nylon 6, Nylon 6.6, Nylon 6.12, or Nylon 6.10.

8. The artificial turf defined in claim 2 wherein each part further comprises a tubular intermediate part surrounding the inner part, surrounded by the outer part, and of a plastic different from the plastics of at least one of the inner and outer parts.

9. The artificial turf defined in claim 8 wherein the inner part, the intermediate part, and the outer part all extend generally full lengths of the filament.

10. The artificial turf defined in claim 8 wherein the intermediate layer is formed of a polyamide/polyolefin copolymer or a polyolefin modified with maleic acid derivative.

12. The artificial turf defined in claim 8 wherein the outer part has a cross-sectional area equal to between 5% and 50% of a total cross-sectional area of the blade.

13. The artificial turf defined in claim 8 wherein the outer part has a cross-sectional area equal to between 10% and 40% of a total cross-sectional area of the blade.

14. The artificial turf defined in claim 8 wherein the intermediate part has a cross-sectional area equal to between 3% and 20% of a total cross-sectional area of the blade.

15. The artificial turf defined in claim 8 wherein the intermediate part has a cross-sectional area equal to between 5% and 15% of a total cross-sectional area of the blade.

16. The artificial turf defined in claim 8 wherein the outer part has a cross-sectional area equal to between 30% and 93% of a total cross-sectional area of the blade.

17. The artificial turf defined in claim 8 wherein the outer part has a cross-sectional area equal to between 35% and 80% of a total cross-sectional area of the blade.

18. The artificial turf defined in claim 1 wherein the inner part is formed with at least one longitudinally extending void.

Fig. 1

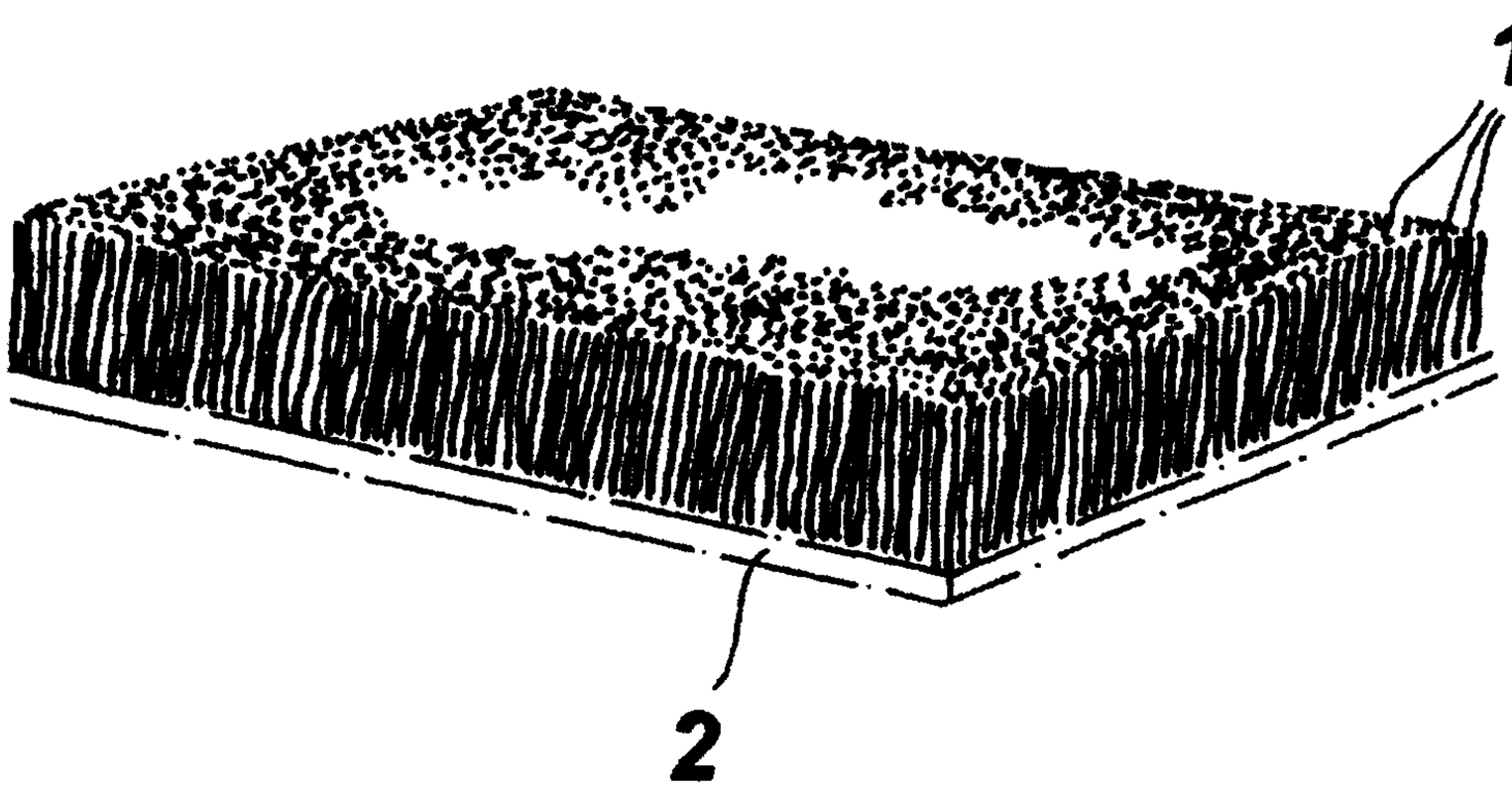


Fig. 2

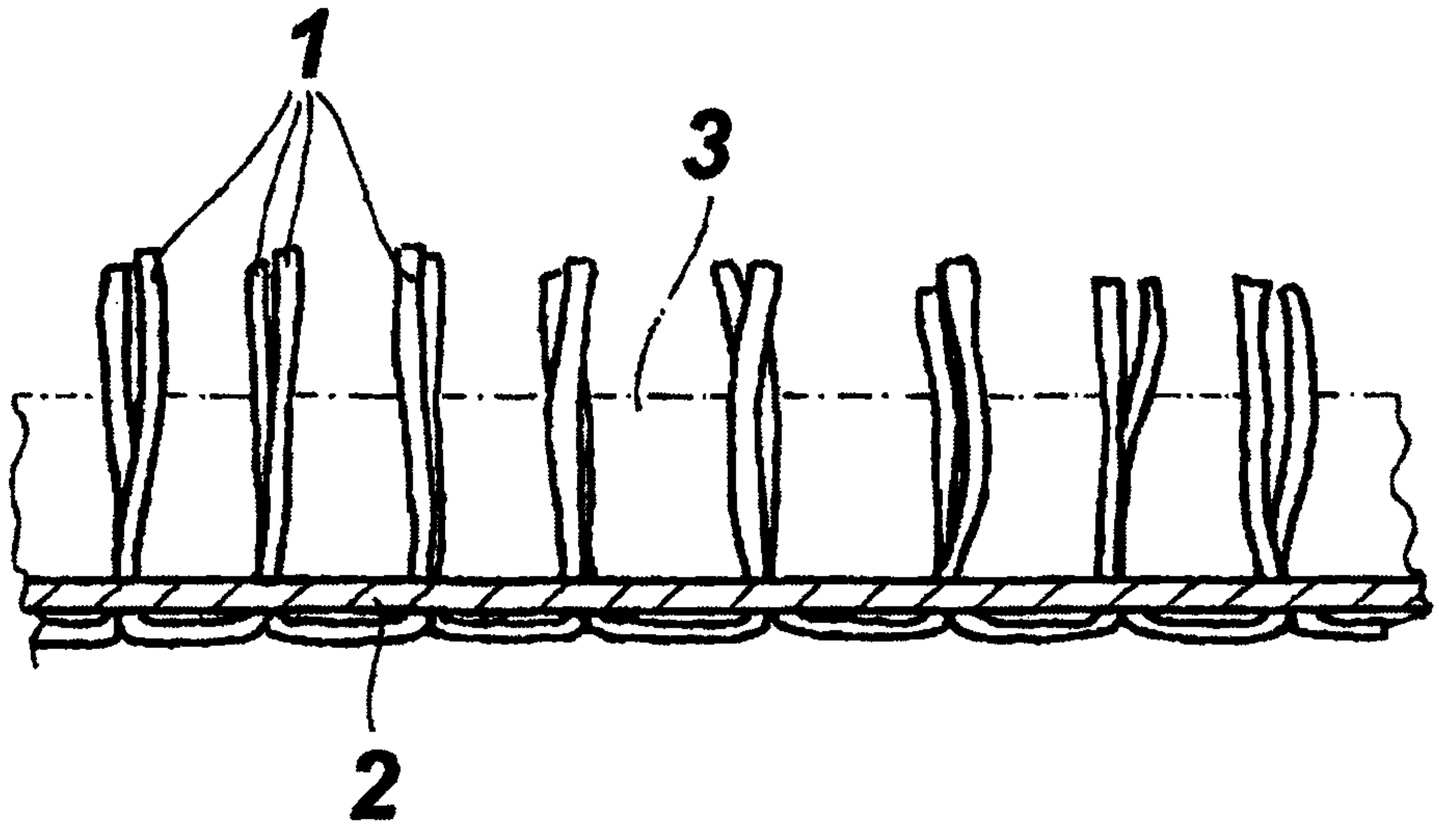
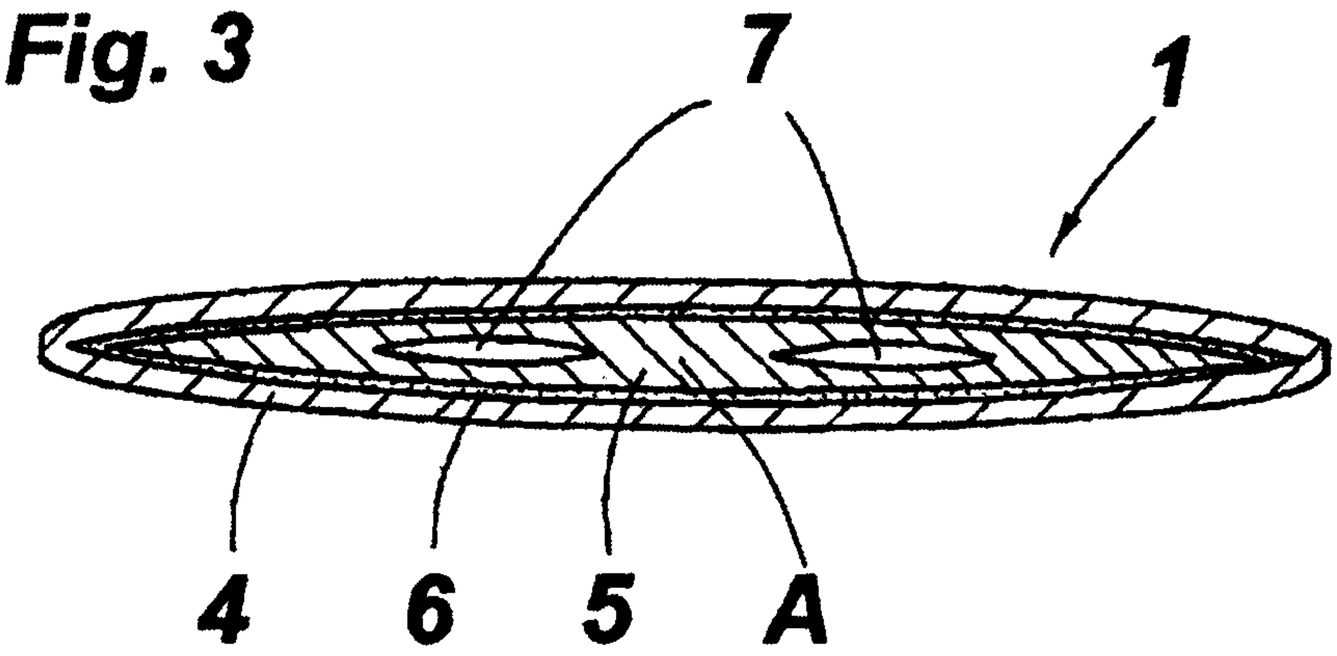
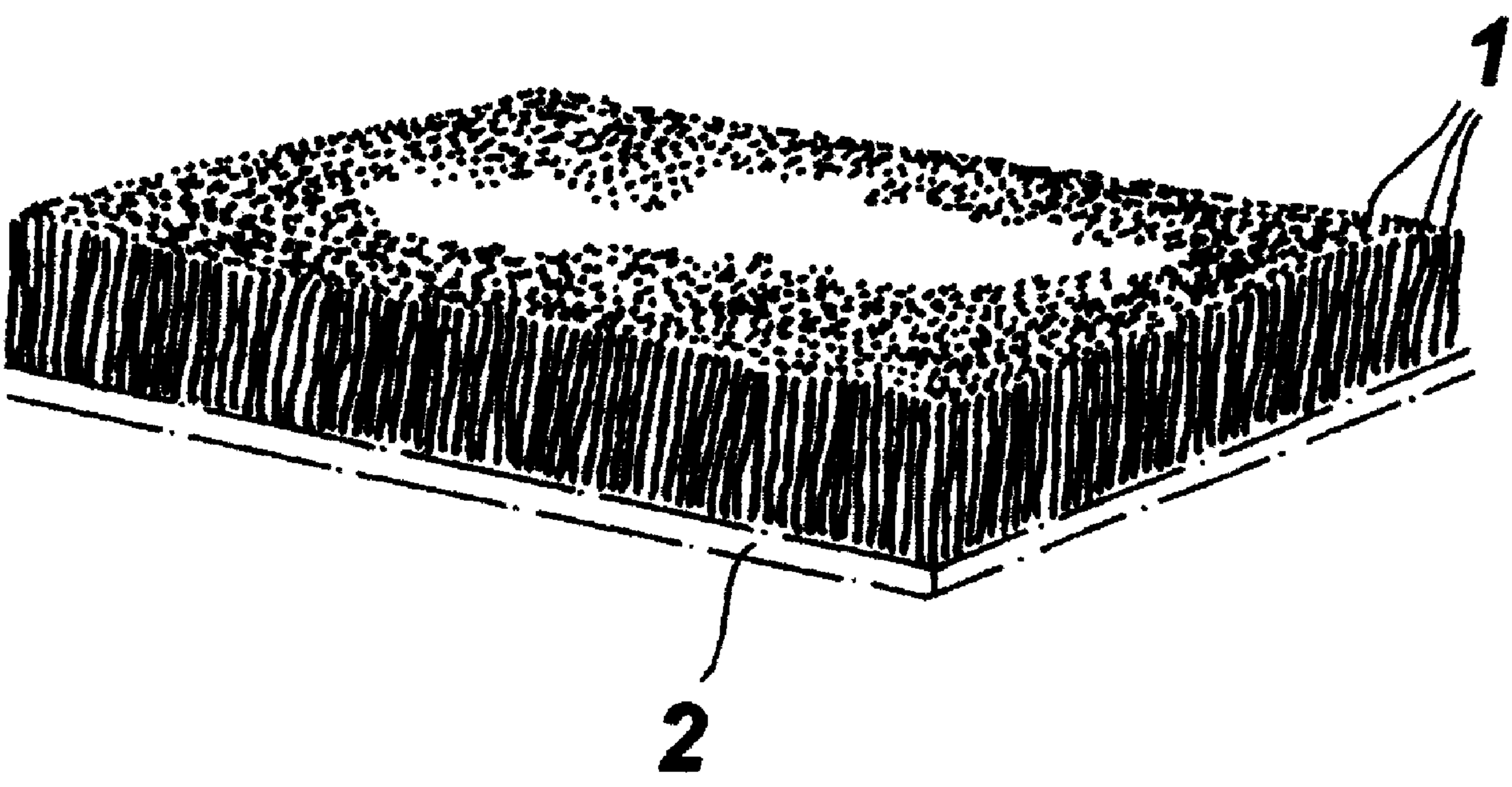


Fig. 3

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