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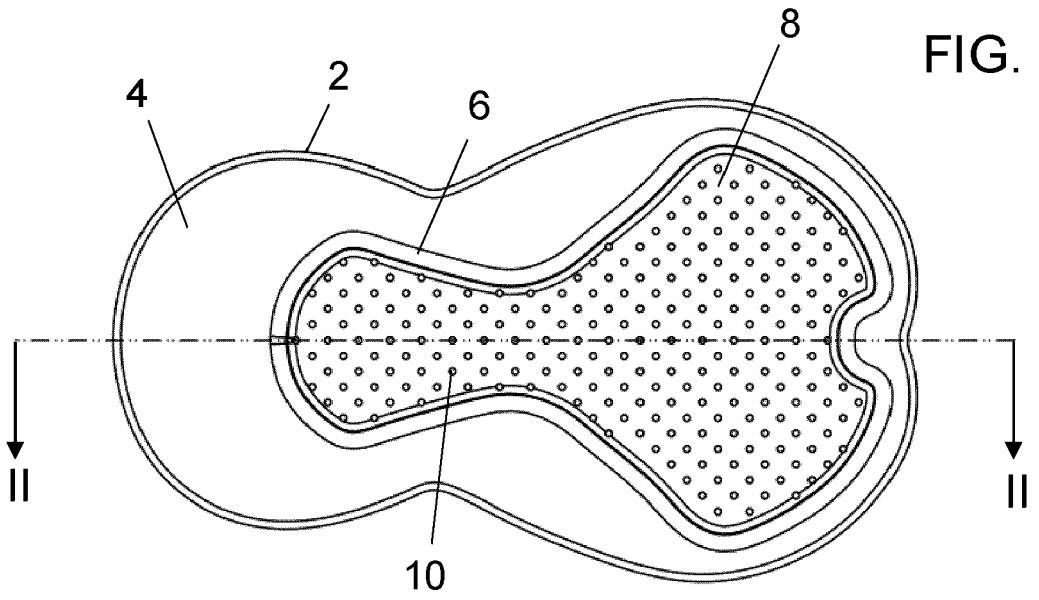
(54) **A MULTILAYER PADDING FOR CYCLING SHORTS**

(57) Multilayer padding for cycling shorts characterized by the fact of including in the order:
- a first layer (2,2') of antibacterial and thermoformable fabric, which faces the cyclist's body during the use of the shorts,
- a second layer (4,4') of flexible polyurethane foam based on polyester or polyether, coupled with said first layer (2,2') and thereby forming a seam-workable structure for its attachment to said shorts,
- at least a third layer (6,6') of polyether-based, cross-linked and transpiring polyurethane foam, with density between 60 and 100 kg/m^3 and carrying capacity between 14 and 22 kPa and filtering properties suitable for promoting the evaporation of any liquids absorbed,
- a fourth layer (8,8') of polyether-based cross-linked polyurethane foam, with a density between 50 and 120 kg/m3 and a bearing capacity between 14 and 22 kPa and presenting, on most of its extension, a through hole (10, 10'), which puts the underlying third layer (6,6') in communication with the outside.

FIG. 1



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Description

[0001] The present invention relates to a multilayer padding for cycling shorts.

[0002] Cycling shorts are known provided with a padding or "pad", which offers the cyclist a comfortable support while pedaling, in order to avoid annoying stresses, grazes and abrasions to the anatomical parts in contact with the saddle, which with the evolution of this sport has taken on an increasingly narrow and essential form.

[0003] US 7739754 already discloses a pad for cycling shorts, with a layer of fabric, which constitutes a sort of interface with the shorts, and with a transpiring multilayer padding, which includes several zones with differentiated elastic compliance.

[0004] EP 3081103 describes another pad for cycling shorts with a layer of fabric intended to come into contact with the anatomical parts of the cyclist and with a multilayer padding with differentiated elastic compliance, obtained with polyurethane materials of different characteristics in the various layers and with thickness which is increasing from the edge of the padding towards the internal parts of this and which is obtained by removing material and not by prestressing, so as not to alter the transpiration and softness characteristics of the starting materials. In particular, the multilayer padding provides that the outer layer, i.e. the layer that in the shorts worn is in contact with the shorts, is made of breathable filter foam, so as to combine the advantages of breathability with those of softness and comfort for the user.

[0005] The object of the invention is to provide a multilayer padding for cycling shorts that is more performing than traditional paddings.

[0006] In particular, the object of the invention is to provide a multilayer padding for cycling shorts which offers higher breathability characteristics.

[0007] Another object of the invention is to provide a multilayer padding for cycling shorts which ensures greater durability, even if applied to shorts intended for intensive use.

[0008] Another object of the invention is to provide a multilayer padding for cycling shorts which can be stitched for its fastening to the shorts.

[0009] Another object of the invention is to provide a multilayer padding for cycling shorts which has excellent properties of absorbing sweat and liquids in general without retaining them, but favoring their evaporation.

[0010] Another object of the invention is to provide a multilayer padding for cycling shorts which has a high degree of breathability and which allows a certain control of the temperature of the anatomical parts of the cyclist in contact with the padding itself.

[0011] Another object of the invention is to provide a multilayer padding for cycling shorts which offers effective support to the cyclist without creating friction problems during pedaling.

[0012] All these objects and others that will result from the following description are achieved jointly or separately according to the invention with a multilayer padding for cycling shorts as defined in claim 1.

[0013] The present invention is further clarified hereinafter in some of its preferred forms of practical embodiments reported for purely illustrative and non-limiting purposes with reference to the attached drawings, in which:

figure 1 shows a plan view from the external side of a multilayer padding for cycling shorts according to the invention in a first embodiment,

figure 2 shows it according to the longitudinal section II-II of figure 1,

figure 3 shows the enlarged detail enclosed by the circular line A of figure 2,

figure 4 shows it in plan from the external side in a second embodiment,

figure 5 shows it according to the longitudinal section VV of figure 4, and

figure 6 shows the detail enlarged enclosed by the circular line A in figure 4.

[0014] In this description, the "internal side" of the padding refers to the one facing the cyclist's body, with the "external side" the opposite one, that is, facing the shorts, and with "crosslinking" that chemical / physical process based on combustion, by means of which the cells of the expanded polyurethane are made to explode with the aid of special gases (hydrogen and the like) to cause the rupture of the membranes between one cell and another, making the polyurethane completely transpiring.

[0015] As can be seen in the figures, in the embodiment illustrated in figures 1-3 the padding according to the invention comprises a first layer or inner layer 2 of preferably elastic, antibacterial, thermoformable fabric, which can be in various colors depending on the needs and requests. It is made up of 75-85%, preferably about 80%, of polyamide or polyester and the remaining 15-25%, preferably about 20%, of Elastane, which is a polyurethane-based fiber, characterized by excellent characteristics of elastic extensibility. This first layer 2 can advantageously have a thickness of about 1 mm.

[0016] The padding according to the invention then comprises a second layer 4 of flexible polyurethane foam based on polyester or, alternatively, based on polyether, having a density between 50 kg / m^3 and 80 kg / m^3, preferably of 75 kg / m^3, And subjected to crosslinking. It has a thickness generally comprised between 3 mm and 5 mm, preferably about 4 mm.

[0017] The first layer 2 and the second layer 4 are coupled to each other and have the characteristic of being able to be stitched and therefore being able to be fixed by means of this to the cycling shorts.

[0018] The padding according to the invention also comprises a third layer 6 of polyether-based, cross-linked and transpiring polyurethane foam, having a density between 60 kg / m^3 and 100 kg / m^3, preferably of about 80 kg / m^3, with bearing capacity between 14 and 22 kPa,

preferably about 19kPa.

[0019] The thickness of this third layer 6 is advantageously between 6 mm and 10 mm and is preferably equal to about 8 mm. It can be called a "filter", as the characteristics of the highly cross-linking polyurethane that forms it allow the air to pass and at the same time absorb sweat and liquids in general, without however retaining them but rather favoring their evaporation. This ensures that the pad remains substantially dry while wearing the garment.

[0020] The padding according to the invention also comprises a fourth layer or external layer 8 of polyether-based cross-linked polyurethane foam having a density between 100 kg / m^3 and 120 kg / m^3 and preferably equal to 110 kg / m^3 with a bearing capacity included between 16 and 22 kPa, preferably of about 19 kPa and presents a plurality of through holes 10, which place parts of the surface of the third layer 6 in communication with the outside. These through holes 10 are preferably distributed over the entire surface of the fourth layer 8, have a diameter between 2.0 and 3.5 mm, preferably about 2.5 mm, and a center distance between 7 mm and 10 mm, preferably about 8.5 mm.

[0021] The thickness of this fourth layer 8 is advantageously between 3 and 6 mm and is preferably equal to about 4 mm.

[0022] Given the high density of this fourth layer 8 and its equally high elastic return, it offers great support to the cyclist during pedaling and its composition does not involve problems of any kind and in particular problems of rubbing, when it is a contact with cycling shorts.

[0023] Thanks to the particular arrangement of these four layers and more specifically thanks to the position of the "filter" layer 6, which is not in contact with the fabric that forms the cyclist's shorts but is protected by the outer layer 8, its duration is significantly increased compared to traditional solutions, in which the "filter" layer 6 is in direct contact with the fabric that forms the shorts and with their intensive use inevitably leads to rapid crumbling and deterioration. At the same time, the lower breathability of the third layer 6, given its non-external position, is practically compensated by the presence of the holes 10, which place it in communication with the outside; therefore the padding according to the invention offers a high protection of the filter layer 6, without practically losing its characteristics of high transpiration.

[0024] The realization of the padding according to the invention is traditional and provides that a multilayer of uniform thickness formed by the four layers 2,4,6,8 coupled together is firstly sheared so as to form the individual bottoms, which obviously have uniform thickness.

Subsequently, with a traditional cold shaping process, the portion of multilayer already sheared to size is subjected to a localized removal of material, which transforms the sheared portion of plywood with uniform thickness into a portion with differentiated thickness, as illustrated in fig. 2, which in practice comprises the first two layers 2,4 which develop with uniform thickness over the entire cut surface, and the other two layers 6,8 which define a raised portion within the surface defined by the first two.

[0025] Finally, the semi-finished product thus obtained is subjected to a traditional hot pressing, which regularizes the previously shaped surface, joins together the different layers of the multilayer and finishes the relief shape formed by the third and fourth layer 6,8.

[0026] In the embodiment illustrated in Figures 4-6 the first layer 2' and the second layer 4' of the padding according to the invention have the same characteristics as the corresponding first layer 2 and second layer 4 of the previous embodiment, but, difference from this, an intermediate layer 5 is applied to the second layer 4', consisting of a polyether-based, cross-linked and transpiring polyurethane foam, with a density between 100 kg / m^3 and 120 kg / m^3, preferably about 110 kg / m^3, with a bearing capacity of about 19 kPa, and a thickness generally comprised between 3 mm and 5 mm, preferably about 4 mm.

[0027] Given its high density and its high elastic return, it offers great support to the cyclist during pedaling.

[0028] Still in this second embodiment, the padding according to the invention is applied to the intermediate layer a third 6', consisting, similarly to the third layer 6 of the previous embodiment, of a polyether-based, cross-linked and transpiring polyurethane foam, with density between 60 kg / m^3 and 100 kg / m^3, preferably 80 kg / m^3, with bearing capacity between 14 and 22 kPa, preferably about 19kPa, and with thickness between 3 mm and 5 mm, preferably of about 4 mm.

[0029] This third layer 6' is the "filter" layer with characteristics and functions similar to the filter layer 6 of the previous embodiment.

[0030] Finally, the padding according to the invention in this second embodiment comprises a fourth layer 8' of flexible polyurethane based on polyether, having a density between 50 kg / m^3 and 80 kg / m^3 and preferably about 75 kg / m^3 and subsequent reticulation, and is preferably affected on its entire surface by a through hole 10' which places the third layer 6' in communication with the outside.

[0031] This fourth layer 8' has a thickness generally between 3 mm and 5 mm and preferably about 4 mm and, given the high density of the material that forms it and its equally high elastic return, offers great support to the cyclist during the ride while pedaling and its composition does not involve problems in general and rubbing problems in particular, when it is in contact with cycling shorts.

[0032] Also in this second embodiment the "filter" layer 6' is not in direct contact with the fabric of the shorts and therefore does not suffer that strong deterioration due to rubbing with them during use, and its lower breathability, given its internal position, is compensated by the holes 10', which are made in the fourth layer 8, similarly to the holes 10 made in the fourth layer 8 of the previous embodiment.

[0033] The present invention has been illustrated and described in some of its preferred embodiments but it is understood that executive variations may be applied to them in practice, without however departing from the scope of protection of the present patent for industrial invention.

Claims

1. Multilayer padding for cycling shorts **characterized by** the fact of including in the order:

   - a first layer (2,2') of antibacterial and thermoformable fabric, which faces the cyclist's body during the use of the shorts,
   - a second layer (4,4') of flexible polyurethane foam based on polyester or polyether, coupled with said first layer (2,2') and thereby forming a seam-workable structure for its attachment to said shorts,
   - at least a third layer (6,6') of polyether-based, cross-linked and transpiring polyurethane foam, with density between 60 and 100 kg/m^3 and carrying capacity between 14 and 22 kPa and filtering properties suitable for promoting the evaporation of any liquids absorbed,
   - a fourth layer (8,8') of polyether-based cross-linked polyurethane foam, with a density between 50 and 120 kg/m3 and a bearing capacity between 14 and 22 kPa and presenting, on most of its extension, a through hole (10, 10'), which puts the underlying third layer (6,6') in communication with the outside.

2. Padding according to claim 1 **characterized in that** said first layer (2) is made up of 75-85% polyamide or polyester and 15-25% of a polyurethane-based fiber with high elastic extensibility characteristics, in particular of Elastan.

3. Padding according to one or more of the preceding claims **characterized in that** said first layer (2,2') has a thickness of about 1 mm, said second layer (4,4') has a thickness of between 3 and 5 mm, preferably about 4 mm and the entire padding has an overall thickness of between 14 and 17 mm.

4. Padding according to one or more of the preceding claims **characterized in that** it comprises a third layer (6) having a thickness between 6 mm and 10 mm, density of about 80 kg/m3 and carrying capacity of about 19 kPa.

5. Padding according to claim 4 **characterized in that** it comprises a third layer (6) has a thickness of about 8 mm and a bearing capacity of about 19kPa.

6. Padding according to one or more of the preceding claims **characterized in that** it comprises a third layer (6') with a thickness of between 3 mm and 5 mm, density between 50 kg/m^3 and 80 kg/m^3 and a bearing capacity of about 19 kPa and an intermediate layer (5) interposed between said second layer (4') and said third layer (6') and consisting of a polyether-based, cross-linked and transparent polyurethane foam, having a density between 100 kg/m^3 and 120 kg/m^3, bearing capacity of about 19 kPa and thickness between 3 mm and 5 mm.

7. Padding according to claim 6 **characterized in that** said third layer (6') has a thickness of about 4 mm and a density of about 75 kg/m3 and said intermediate layer (5) has a density of about 110 kg/m3 and a thickness of about 4 mm.

8. Padding according to one or more of the preceding claims **characterized in that** said fourth layer (8,8') has a thickness between 3 mm and 6 mm, preferably 4 mm.

9. Padding according to one or more of the preceding claims, **characterized in that** said holes have a diameter between 2.0 mm and 3.5 mm and a center distance between 7 mm and 10 mm.

FIG. 1

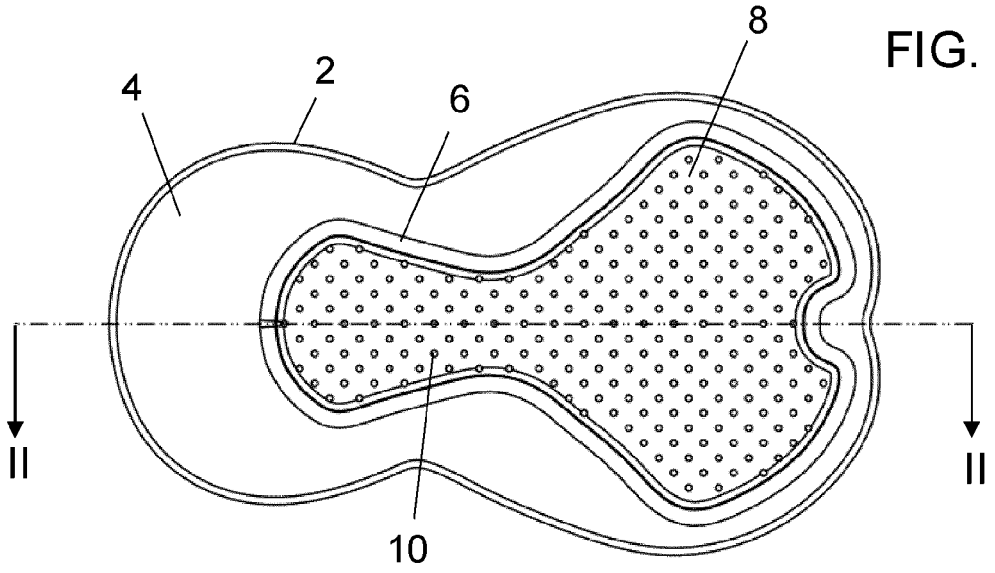


FIG. 2

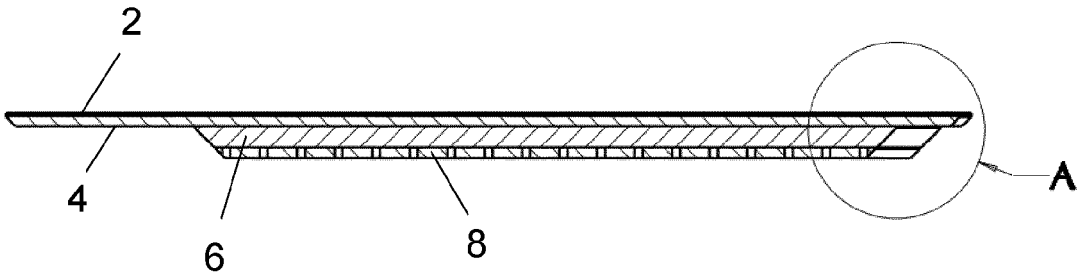


FIG. 3

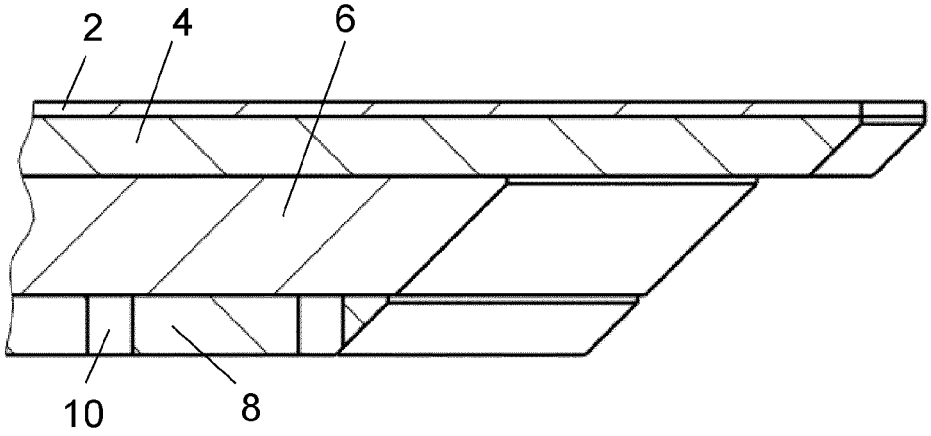


FIG. 4

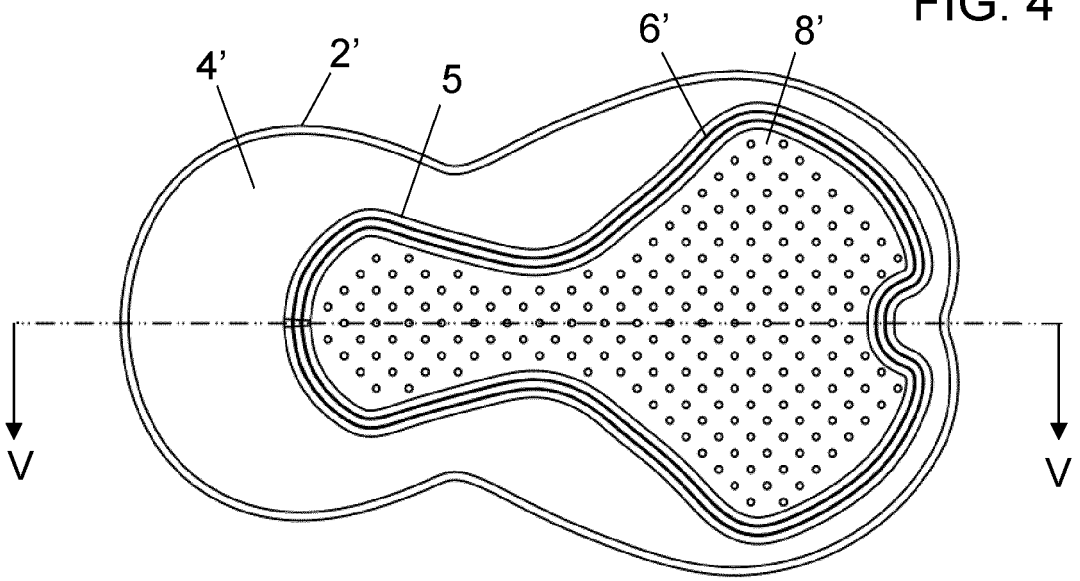


FIG. 5

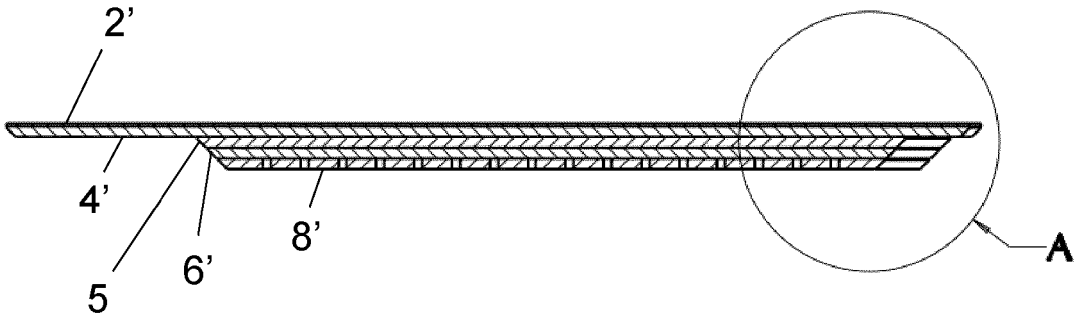
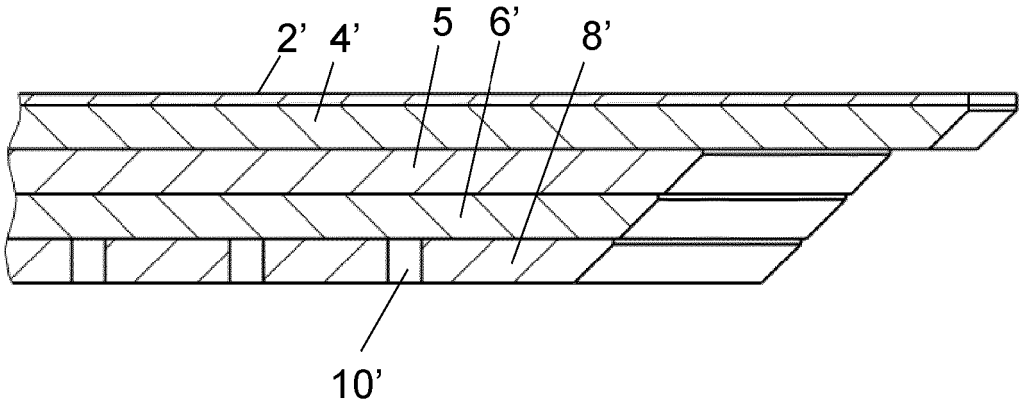


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 22 18 1139

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2019 105271 U1 (DOS CABALLOS GMBH [DE]) 4 October 2019 (2019-10-04) * paragraphs [0035], [0048]; claims; figures *	1-9	INV. A41D1/084
A	ES 2 350 146 A1 (TEO SPORT SRL [IT]) 19 January 2011 (2011-01-19) * claims; figures *	1-9	
A	EP 3 278 680 A1 (BIO-RACER NV [BE]) 7 February 2018 (2018-02-07) * claims; figures *	1-9	

TECHNICAL FIELDS SEARCHED (IPC)

A41D
A44C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 November 2022	Claudel, Benoît

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202019105271 U1	04-10-2019	NONE	
ES 2350146 A1	19-01-2011	NONE	
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- EP 3081103 A **[0004]**