

(19)



(11)

**EP 2 430 931 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**21.03.2012 Bulletin 2012/12**

(51) Int Cl.:  
**A41D 13/00 (2006.01)**

(21) Application number: **10176744.0**

(22) Date of filing: **15.09.2010**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
 GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO  
 PL PT RO SE SI SK SM TR**  
 Designated Extension States:  
**BA ME RS**

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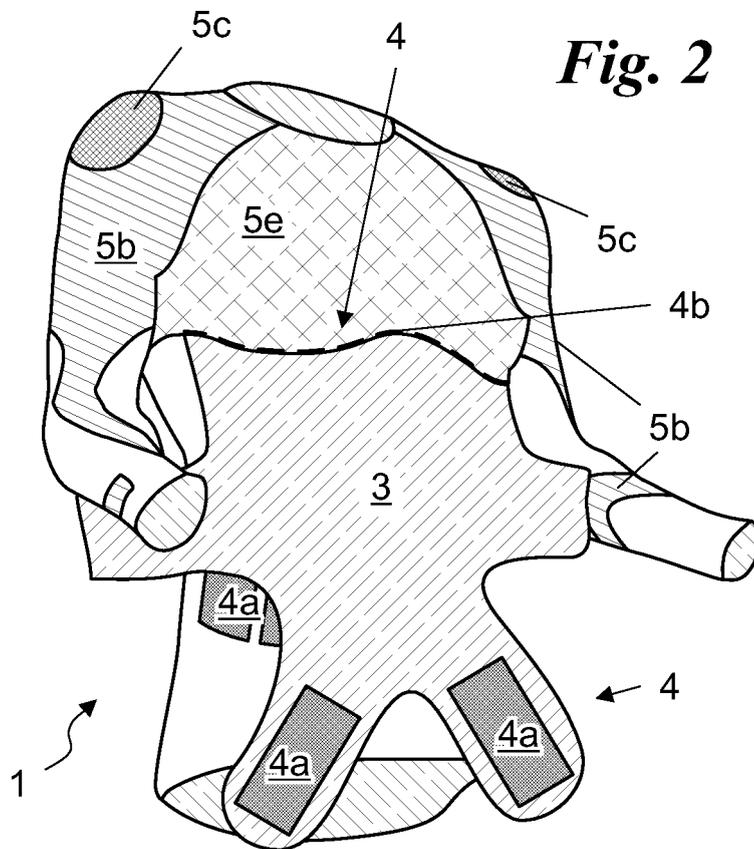
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(54) **Technical clothes**

(57) Provision is made for technical clothes (1) comprising an inner garment (2) suitable to adhere to a body portion of a user, at least one support brace (3) adapted

to support at least part of said body portion, and fastening means (4) for securing the support brace (3) to the inner garment (2).



**Fig. 2**

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## Description

**[0001]** The present invention relates to technical clothes of the type pointed out in the preamble of the first claim.

**[0002]** This type of clothes consists in a particular garment suitable for particular conditions that may cause traumas, sprains or other problems for the user. It has to protect the user against possible traumas and incorrect physical strains that can give rise to pain due to sprains. Said clothes, in addition to the above functions, must be suitable to allow a high mobility, i.e. must not represent a hindrance to the user's movements thereby enabling him/her to execute movements in a natural manner.

**[0003]** In conclusion, by the expression "technical clothes" it is identified an article of clothing used under situations that may be found both when performing a physical activity, such as skiing and motorcycling, and when working.

**[0004]** It is known that, among the different types of technical clothes, one of the most important one is that used in motorcycling. In this case, clothes comprise a motorcycling suit for covering almost the whole body and provide a sensation of comfort, and suitable passive-security elements secured to the suit and adapted to mitigate the negative effects of possible impacts.

**[0005]** In passive-security elements a back-protection is provided for the motorcyclist, which is usually made of a polymeric material and is adapted to mitigate the impact of the back on the asphalt following a fall, and the so-called "pads", i.e. components disposed at the elbows and knees and adapted to avoid traumas due to impacts or rubbing of the aforesaid body portions on the asphalt.

**[0006]** In addition, the suit is made of particular materials maintaining the user's body to an agreeable temperature allowing perspiration and air passage.

**[0007]** A further example of technical clothes exists in the winter sports field. In this case clothes not only ensure a good security degree, but must also protect the user against the low temperatures of the external environment. They therefore consist of a suit which is characterised by impermeability and a high coefficient of heat insulation.

**[0008]** Finally, like in the motorcycling field, particular passive-security elements can be provided which are suitable to absorb part of the impact due to a fall.

**[0009]** The known art mentioned above has some important drawbacks.

**[0010]** In fact, the technical clothes that have to obtain an appropriate heat insulation are characterised by a high thickness and therefore do limit the user's freedom of movement.

**[0011]** The difficulties in movement are further increased by the fact that these clothes greatly adhere to the user's body so that said user is obliged to execute unnatural movements.

**[0012]** In fact, in the regions of greater stress bandages are provided, i.e. very adherent wraps reducing the risk

of accidents but, on the other hand, also reducing movements.

**[0013]** It is pointed out that possible unnatural movements can give origin to traumas in the form of sprains or other similar injuries.

**[0014]** Another problem resulting from current technical clothes consists in the incapacity of same to support the user in his/her movements. In other words, they are unable to absorb part of the stresses that are applied to the user.

**[0015]** Another important disadvantage is represented by a poor sensation of comfort that is perceived with such clothes due to an inappropriate perspiration.

**[0016]** A further problem resides in the great arduousness of the operations required for wearing technical clothes.

**[0017]** Under this situation the technical task underlying the present invention is to conceive technical clothes capable of substantially obviating the mentioned drawbacks.

**[0018]** Within the scope of this technical task it is an important aim of the invention to conceive clothes enabling high freedom and ease of movement.

**[0019]** Another important aim of the invention is to supply the user with an appropriate support capable of following him/her in all movements and facilitating the resistance to stresses that are applied to said user.

**[0020]** A further important aim is to manufacture technical clothes that are able to give an agreeable feeling of comfort, that is to say to ensure an appropriate perspiration and an optimal temperature under any use condition.

**[0021]** The invention also aims at obtaining clothes that can be worn with ease.

**[0022]** The technical task mentioned and the aims specified are achieved by the technical clothes as claimed in the appended Claim 1.

**[0023]** Preferred embodiments are highlighted in the subclaims.

**[0024]** The features and advantages of the invention are clarified hereinafter by the detailed description of preferred embodiment thereof, with reference to the accompanying drawings, in which:

**Fig. 1a** is a view of clothes in accordance with the invention;

**Fig. 1b** is a second view of clothes in accordance with the invention;

**Fig. 2** shows a step of the process for manufacturing technical clothes;

**Fig. 3** shows a portion of the clothes;

**Fig. 4** is a second portion of the clothes;

**Fig. 5a** reproduces a second example of technical clothes according to the invention;

**Fig. 5b** is a second diagrammatic view of the technical clothes shown in Fig. 5a; and

**Fig. 6** represents a portion of the clothes shown in Fig. 5a.

**[0025]** With reference to the drawings, the technical clothes according to the invention are generally identified with reference numeral 1.

**[0026]** They comprise an inner garment 2 adapted to adhere to a portion of the user's body, at least one support brace 3 adapted to overlap and support at least part of the body portion contained in garment 2, and fastening means 4 adapted to secure the support brace 3 to garment 2. In particular, the fastening means 4 can be of two types: an adjustable type 4a in which they allow brace 3 to be fixed to garment 2 at a suitably extended area enabling said components to be mutually adjusted; a fixed type 4b, in which said means secures brace 3 to garment 2 at a given point, the diaphragmatic region for example (Fig. 4).

**[0027]** Preferably, the fixed fastening means 4b is obtained with a seaming, a hinge or other similar element. The adjustable fastening means 4a advantageously consists of Velcro or other similar element enabling the position of brace 3 to be varied relative to that of garment 2, and also allowing brace 3 to be maintained in a tensioned condition, ensuring a maximum adhesion between the elements constituting clothes 1.

**[0028]** The inner garment 2 and, in particular, the materials it is made of, are suitable to maintain the body to a constant temperature, offer an appropriate support to the joints and ensure a good perspiration of the regions covered with clothes 1. Advantageously, garment 2 contemplates the presence of a plurality of sectors suitably joined to each other and made of different materials so as to adapt the local features of garment 2 to the body portions on which it is disposed. Connection between said sectors is preferably obtained by means of seams, ultrasonic waves or other similar techniques.

**[0029]** Alternatively, connection between the sectors can be obtained through heatsealing. In this case said connection is made of a fabric ribbon placed at the junction region between two sectors and adapted to be heatsealed with said two sectors.

**[0030]** Therefore, the different sectors are characterised by different coefficients of elasticity and transpiration capacity, so as to ensure an appropriate support and a great comfort to the body portion covered with said garment. In particular, almost all sectors are preferably made of elastic material in order to ensure a perfect adhesion of garment 2 to the user's body. In addition, this material is ladder-proof so that its features can remain unchanged in time.

**[0031]** This material consists of a fabric obtained on weaving machines having a loom of the type for ladder-proof working and made up of a first elastic thread, Lycra for example, and a second anelastic thread, such as polyamide microfibre, which extend substantially together and in the same direction, with an advantageous periodicity of two stitches and forming preferably open loops. In greater detail, the elastic fabric is present in a percentage included between 15% and 35%, while the anelastic fabric between 85% and 65%. Preferably, this

material is a Sensitive<sup>®</sup> fabric, produced by Eurojersey.

**[0032]** In the body regions characterised by a greater heat exchange, such as the abdomen, in garment 2 thermal sectors 5a are provided which are made of materials enabling the user's body to be maintained to an ideal temperature. Sectors 5a are adapted to store or release heat balancing the human body's temperature and therefore avoiding overheating or cooling. Sectors 5a enable perspiration or a sensation of cold to be avoided and increase the user's sensation of comfort.

**[0033]** At the joints, such as the shoulder, supporting sectors 5b are provided the materials of which ensure an appropriate containment of the joints, therefore avoiding incorrect motions of the body that could cause traumas in the form of sprain to the joint. In addition the materials constituting sectors 5b are of such a nature that they advantageously bind up a body portion exerting a proprioceptive skin stimulation.

**[0034]** This bandage allows sectors 5b to exert a beneficial action on muscles. In other words, sectors 5b, exerting pressure on the skin, apply controlled stresses on joints, which stresses through stimulation of the neuromotor system, enable the motor and postural control to be improved.

**[0035]** In addition, in an inner garment 2 impact sectors 5c can be provided which are adapted to mitigate a possible fall and advantageously placed at the body portions that are more frequently submitted to impact, such as the upper part of the shoulders or the knees. In particular, the impact sectors 5c can be made of a material capable of instantaneous stiffening, i.e. materials that, if submitted to a shock, instantaneously become stiff while remaining flexible during normal operation.

**[0036]** The support brace 3 is adapted to at least partly wrap part of garment 2 and more specifically at least one joint, such as one shoulder or knee, performing a containment action thereon. It is therefore made of an elastic material of high strength and, in particular, the above described Sensitive<sup>®</sup> fabric. In greater detail, brace 3 is made of a bonded material, i.e. the Sensitive Bonded<sup>®</sup> fabric, in which coupling of two or more layers, of Sensitive fabrics in particular, is provided.

**[0037]** The support brace 3 is worn after wearing the inner garment 2 and is secured thereto by the aforesaid fastening means 4. In particular, it has adjustable fastening means 4a enabling a rigid locking between said two components adjusting the position of brace 3 relative to garment 2. This adjustment, also due to the elasticity of brace 3, allows said brace to be advantageously stretched so that it is able to perfectly adhere to the user and wrap part of his/her body.

**[0038]** Finally, brace 3 can be provided with at least one pad 3a made of a colloidal material and positioned at the body parts that are most submitted to fatigue stresses, such as the clavicle and knee. In detail, pad 3a is placed internally of brace 3 so that, when the user wears brace 3, it exerts an advantageous pressure allowing the pad 3a to be pressed, in order that said pad

by exerting pressure on the body helps in keeping a correct position and relaxes the tissues.

**[0039]** Shown in Figs. 1-6 are possible non-limiting examples of the technical clothes 1.

**[0040]** In the first case, Figs. 1 a and 1 b, clothes 1 are represented which consist of a vest characterised by a first level made up of the inner garment 2 and a second level made up of the support brace 3.

**[0041]** In this particular case, a plurality of sectors fastened to each other is provided in brace 2, shown in Fig. 3, said sectors being positioned as follows: the thermal sector 5a wraps the low abdomen, the lower part of the back and the arms extremities; two supporting sectors 5b wrap the part of the bust adjacent to the shoulder, the shoulder itself and part of the arm; the two impact sectors 5c surround the upper part of each shoulder. In particular the thermal sector 5a is made of Sensitive Power<sup>®</sup>240 fabric, in which the elastic thread and the anelastic one are respectively present in percentages of about 20% and 80%, with a weight of 240 g/m<sup>2</sup>. The supporting sector 5b is made of sensitive Bonded<sup>®</sup> 328 fabric, in which the elastic thread and the anelastic one are respectively present in percentages of about 28% and 72% with a weight of 328 g/m<sup>2</sup>.

**[0042]** Finally, to ensure an agreeable sensation of comfort, elastic sectors 5d are provided which are adapted to avoid an excessive body constraint, and perspiring sectors 5e suitable to ensure an optimal perspiration.

**[0043]** The elastic sectors 5d are strips of fabric characterised by high elasticity and advantageously placed at the diaphragmatic region so as to promote perspiration. These sectors 5d are preferably made of Sensitive<sup>®</sup> fabric and, in particular, Sensitive soft<sup>®</sup> fabric, in which the elastic thread and the anelastic one are respectively present in percentages of about 28% and 72% with a weight of 171 g/m<sup>2</sup>.

**[0044]** The perspiring sectors 5e are arranged at the body portion adapted to be subsequently covered with brace 3 and are characterised by a high perspiration so that an excessive heat accumulation is not generated due to brace 3 overlapping garment 2. Sectors 5e are advantageously positioned at the chest and the armpits and are preferably made of perforated Lycra.

**[0045]** Finally, as shown in Fig. 1a, the inner garment 2 comprises a compartment 2a formed in the rear portion thereof at the backbone and adapted to receive a back-protection 6 located on the body back. The back-protection 6 is able to absorb a possible shock suffered by the back avoiding injuries to the backbone. Finally the compartment 2a is of the open type, i.e. it allows easy pulling out of the back-protection from garment 2 and introduction therein.

**[0046]** Brace 3, shown in Fig. 4, substantially has a shape similar to that of a T-shirt, but it advantageously covers only the abdomen portion above the diaphragmatic region. Due to this shape, breathing is not hindered and an easy movement of the limbs is ensured, which limbs would be otherwise bothered by the brace itself

due to an excessive wrapping.

**[0047]** In addition, brace 3 is advantageously provided with two pads 3a placed at the shoulder blade and more specifically, on the acromion, as shown in Fig. 1 b.

**[0048]** In this particular case, fastening of brace 3 to garment 2 is ensured both by the adjustable fastening means 4a and the fixed fastening means 4b. In more detail, the fixed fastening means 4b, as shown in Fig. 2, secures the support brace 3 to garment 2 in the part overlying the diaphragmatic region, while the adjustable fastening means 4a is suitable to carry out fastening at the abdomen.

**[0049]** In the other example, shown in Figs. 5a, 5b and 6, clothes 1 consist of trousers substantially made up of the inner garment 2 and of two support braces 3 adapted to wrap at least the portion adjacent to the knees. In this case the thermal sector 5a also performs the function of support and is therefore preferably made of Sensitive Bonded<sup>®</sup> 328 fabric. This sector 5a is preferably formed with bands adapted to surround the rear portion of the thigh, the calf and almost the whole knee. The rest of the garment is made of Sensitive Power<sup>®</sup> 240 or other material suitable to ensure a good adhesion of the garment and a sufficient transpiration capability.

**[0050]** Finally, in the inner garment 2 at each knee, an impact sector 5c can be provided which is adapted to avoid the knees being affected by traumas due to fall.

**[0051]** Each support brace 3 shown in Fig. 6 advantageously has a lower ring-shaped portion, adapted to surround the calf, a central portion adapted to surround the knee and an upper portion for partly surrounding the upper part of the leg. In detail, the upper portion has fixed fastening means 4b for securing the brace to garment 2 at the lower part of the bust, as shown in Figs. 5a and 5b. Finally, each brace 3 has a pad 3a adapted to come into contact with the lower part of the knee.

**[0052]** Use of the technical clothes described above as regards structure is the following. First, the user wears the inner garment 2 and afterwards brace 3 which is finally secured to garment 2 by the fastening means 4. In particular, the technical clothes shown in Figs. 1a-4 are used in this manner.

**[0053]** First the user wears the inner garment 2 having brace 3 secured at the diaphragmatic region. Then the support brace 3 is worn and secured to garment 2. In particular the user, after wearing the brace, sets brace 3 in traction so as to ensure a perfect adhesion of said brace to garment 2 and to the body. Once said condition has been obtained, brace 3 is secured to garment 2 by the releasable fastening means 4a.

**[0054]** In the example in Figs. 5a-6, the user wears garment 2 and then slips braces 3 on one by one. In particular, the lower ring-shaped portion comes into contact with the calf and then the user, due to the fixed fastening means 4b, secures said brace to garment 3. Alternatively, the user can wear braces 3 simultaneously with the inner garment 2.

**[0055]** The invention comprises a new process for

manufacturing the technical clothes 1. First, an inner garment 2 is provided. In particular, garment 2 is advantageously disposed on a suitable structure, such as a dummy, or alternatively directly on the user. This arrangement allows garment 2 to be fully laid down in order to make the following operations easier.

**[0056]** When this first step of the process has been completed, at least one support brace 3 is superposed on at least part of the inner garment 2. Thus the structure appears to be covered with garment 2 which in turn is partly covered with brace 3.

**[0057]** Finally the process is terminated by releasingly securing the two components together by means of the releasable fastening means 4a. In particular, brace 3, due to the particular materials it is made of, appears to be taut and is caused to adhere to almost the whole garment portion covered with it.

**[0058]** The invention enables important advantages to be achieved.

**[0059]** In fact, the technical clothes 1 offer a high freedom and facility of movement. In particular, the advantageous use of Sensitive<sup>®</sup> fabrics ensures a great flexibility and comfort to the individual garment components.

**[0060]** In addition, the Sensitive<sup>®</sup> fabrics, due to their particular features, are able to offer an appropriate support to the user's body in all movements thereof.

**[0061]** Specifically, the double coating ensured by overlapping brace 3 and garment 2 and the almost perfect adhesion between said two elements defines an elastic structure that is also characterised by a high containment capability allowing traumas resulting from an incorrect movement of a joint to be avoided.

**[0062]** In addition, the containment action exerted in particular by Sensitive<sup>®</sup> Power and Sensitive<sup>®</sup> Bonded fabrics counteracts the muscle oscillation and ensures a greater movement accuracy.

**[0063]** A further advantage is represented by the easy wearing of clothes 1.

**[0064]** Also advantageous is the presence of the impact sectors 5c made of a material offering an instantaneous stiffening while being flexible during normal use, so that said sectors enable the user to carry out easy movements, but on occurrence of an impact, they become stiff allowing the impact energy to be distributed and therefore traumas to be avoided.

**[0065]** Furthermore, the particular materials constituting the technical clothes 1 offer an ideal perspiration and an almost ideal inner temperature.

**[0066]** Moreover, use of Sensitive<sup>®</sup> fabrics allows technical clothes 1 to be obtained that are characterised by a more reduced thickness and therefore greater comfort and mobility.

**[0067]** Another important advantage resides in the heatsealing operations carried out for joining two or more sectors together. The obtained heatseals are in fact able to ensure a high Young's modulus at the seal and therefore a high elasticity to said junction.

**[0068]** The invention is susceptible of variations falling

within the inventive idea. All of the details can be replaced by equivalent elements and the materials, shapes and sizes can be of any nature and magnitude.

## Claims

1. Technical clothes (1) comprising an inner garment (2) adapted to adhere to a body portion of a user, and **characterised in that** they comprise at least one support brace (3) adapted to support at least part of said body portion and fastening means (4) suitable to secure said at least one support brace (3) to said inner garment (2), and **in that** said support brace (3) is suitable to be worn through a relative motion with respect to said inner garment (2) after said inner garment (2) has been worn by said user.
2. Clothes (1) as claimed in one or more of the preceding claims, wherein said fastening means (4) comprises adjustable fastening means (4a) suitable to enable said support brace (3) to be adjusted to said inner garment (2).
3. Clothes (1) as claimed in one or more of the preceding claims, wherein said fastening means (4) comprises fixed fastening means (4b) adapted to secure said support brace (3) to said inner garment (2) at a given point.
4. Clothes (1) as claimed in one or more of the preceding claims, wherein in said inner garment (2) sectors are provided which are made of different materials in order to ensure a great sensation of comfort to said body portion.
5. Clothes (1) as claimed in claim 4, wherein at least one of said sectors is made up of a fabric having a first elastic thread and a second anelastic thread which extend substantially together and in the same direction.
6. Clothes (1) as claimed in claim 4, wherein at least one of said sectors is formed with a material capable of instantaneous stiffening.
7. Clothes (1) as claimed in one or more of the preceding claims 4-6, wherein said sectors are joined together by heat-sealing.
8. Clothes (1) as claimed in one or more of the preceding claims, wherein said at least one support brace (3) is formed with a plurality of layers of a fabric having a first elastic thread and a second anelastic thread which extend substantially together in the same direction.
9. Clothes (1) as claimed in one or more of the preced-

ing claims, including a compartment (2a) adapted to enable removal and insertion of a back-protector.

10. Clothes (1) as claimed in one or more of the preceding claims, wherein said at least one support brace (3) comprises at least one pad (3a) made of a colloidal material. 5
11. A process for manufacturing technical clothes (1) consisting in providing an inner garment (2), and superposing at least one support brace (3) on at least part of said inner garment (2) and **characterised in that** part of said at least one brace (3) is releasably secured to said inner garment (2) making almost the whole of said at least one brace (3) adhere to said inner garment (2). 10 15

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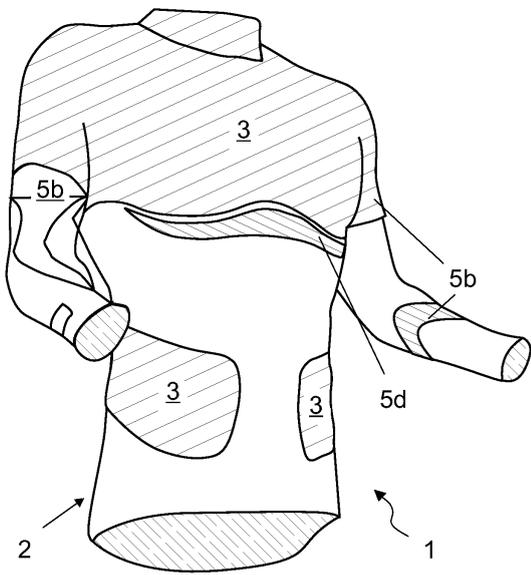
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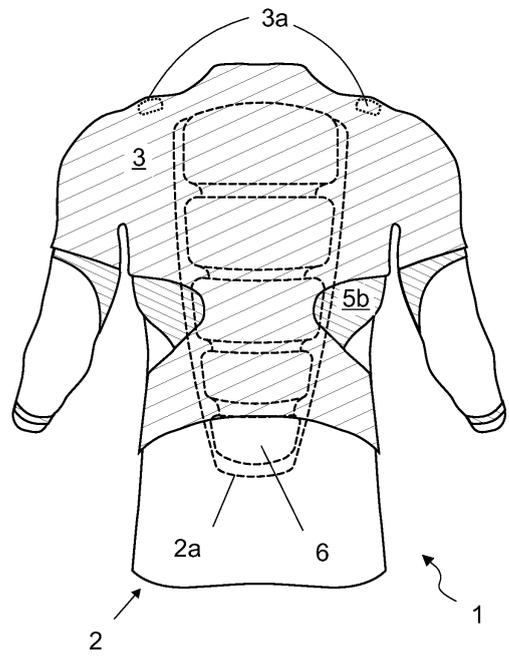
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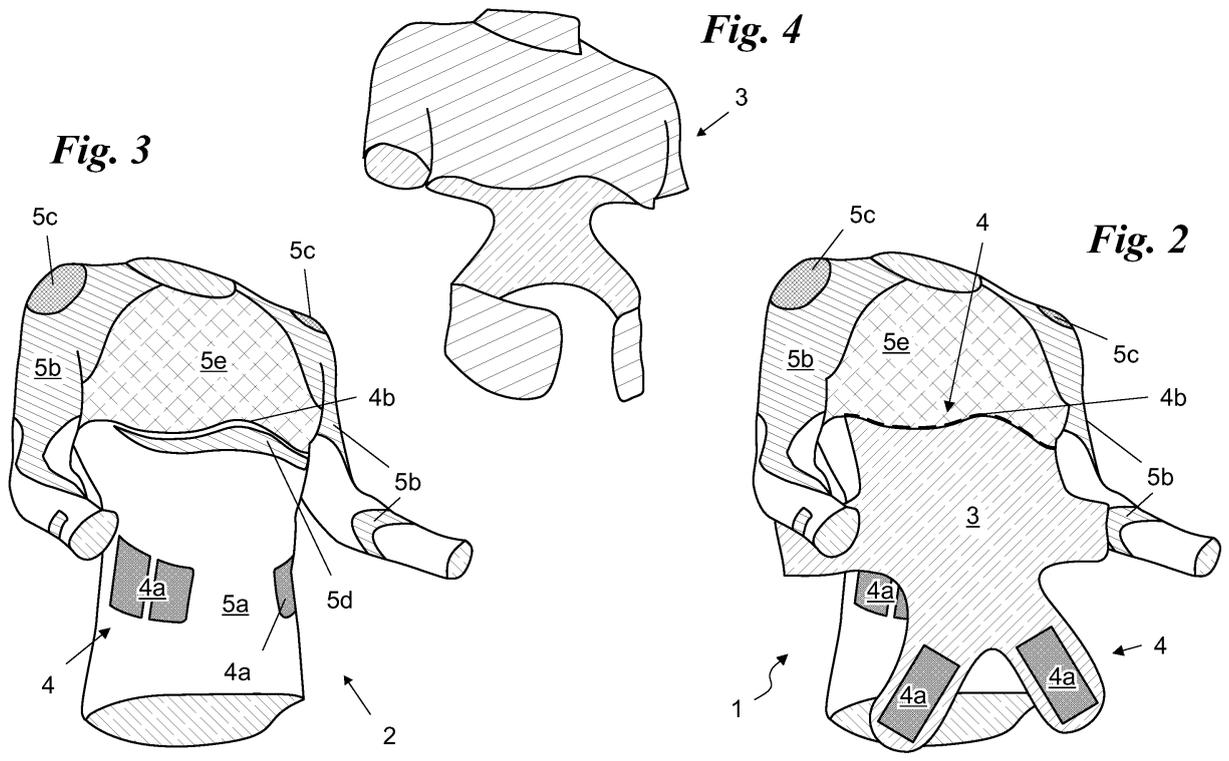
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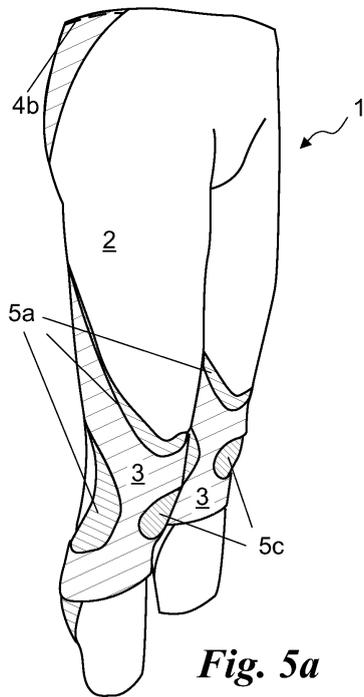


*Fig. 1a*

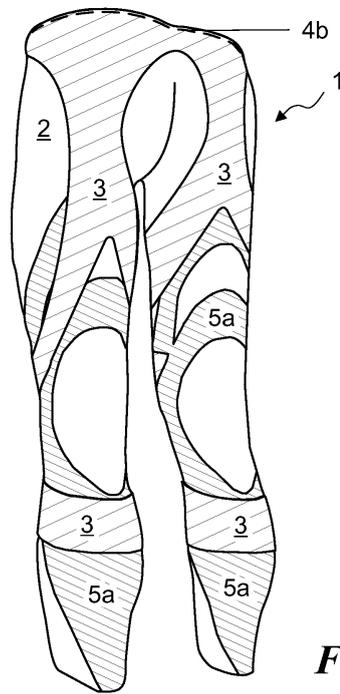


*Fig. 1b*

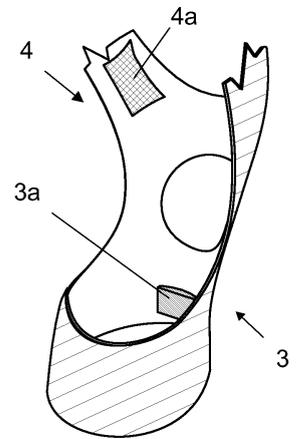




**Fig. 5a**



**Fig. 5b**



**Fig. 6**



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Application Number  
EP 10 17 6744

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Place of search		Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		& : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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