(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 649 879 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.05.2020 Bulletin 2020/20

(21) Application number: **19208045.5**

(22) Date of filing: **08.11.2019**

(51) Int Cl.:
A41D 13/018 *(2006.01)* ***B62J 27/00*** *(2020.01)*
A41D 13/015 *(2006.01)*

(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 RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **09.11.2018 IT 201800010217**

(71) Applicant: **Dainese S.p.A.**
36064 Colceresa (Vicenza) (IT)

(72) Inventor: **AZZOLIN, Andrea**
36064 Colceresa (Vicenza) (IT)

(74) Representative: **Manfrin, Marta et al**
Società Italiana Brevetti S.p.A.
Stradone San Fermo 21 sc. B
37121 Verona (VR) (IT)

(54) **PERSONAL PROTECTIVE DEVICE AND GARMENT INCLUDING SAID PROTECTIVE DEVICE**

(57) The present disclosure relates to a personal protective device (10) for protecting a portion of a user's body. The device comprises an inflatable member (12) intended to protect at least partially a zone of a user's body. The personal protective device (10) includes at least a first portion (20) of the inflatable member (12) and a second portion (21) of the inflatable member (12). The connecting device or structure (50) is arranged, and connects the first portion (20) of the inflatable member (12) and the second portion (21) of the inflatable member (12), on a side (I) intended to be directed towards the user.

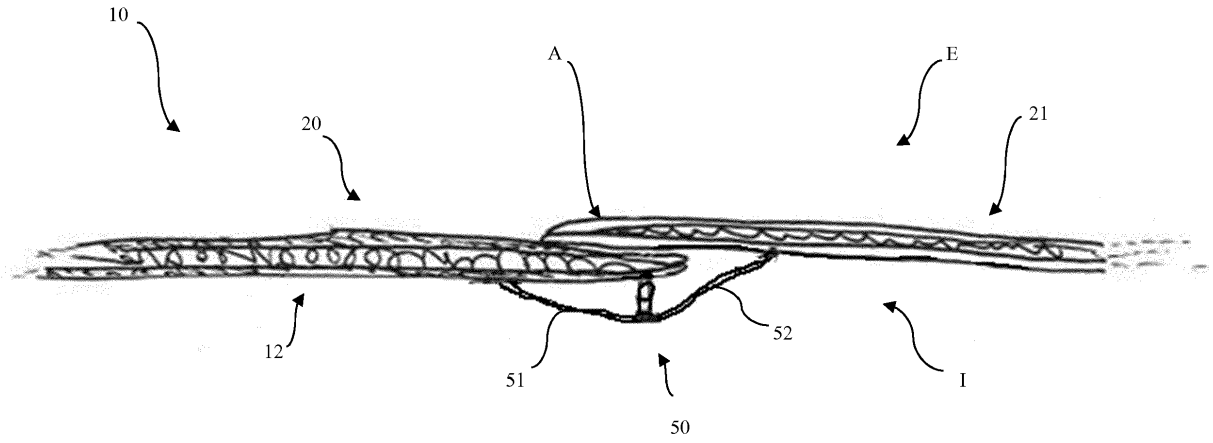

FIG. 3

EP 3 649 879 A1

Description

[0001] The present disclosure relates to a protective device for personal protection, preferably of the type which can be worn and including an inflatable member designed to protect from impacts and/or falls a user, for example a passenger or a rider of motorcycle or a horse rider during a horse race, or a similar user, during a sporting and/or working activity.

[0002] In recent years, following constant research into safety during all sporting activities, but more generally during all those dangerous activities practised in extreme conditions, or at high speeds, in particular in the motorcycle sector, there has been an increase in the number of protective devices which ae being offered with a view to providing both effective and practical protection preferably of an upper part of a user's body, by means of use of an inflatable member. When an impact, a sliding action or generally a fall occurs, the inflatable member is placed in fluid communication with a fluid source, such as a compressed-gas cylinder or a fluid generator.

[0003] During an impact, the inflatable member creates, around the part of the user's body, an air cushion which allows the user's body to be protected against impacts.

[0004] The present disclosure is based on the recognition by the inventor of the present patent application that the inflatable member normally has a shape or form which is similar to that of a vest or waistcoat so that it may be easily worn by a user or so that it may be associated with a garment. Alternatively, even if the inflatable member does not have the form of a waistcoat, the inflatable member may be curved so as to favour adaptation to a user's body. Consequently, the inflatable member has, like a normal jacket or article which can be worn, folded or curved zones so as to adapt to the anatomy of the human body.

[0005] At the same the inflatable member has, like a normal jacket, superficial discontinuities or interruptions, for example in a central zone of the chest. In these zones, the inflatable member may be closed by means of a zip associated directly with the inflatable member, or may be kept closed by the zip, or other closing device, of the jacket. Other zones where there are surfaces discontinuities or interruptions are, for example, those situated underneath the armpits along the sides.

[0006] These superficial discontinuities or interruptions, however, represent vulnerable zones for protection of a user, precisely because the protection is not continuous. Moreover, in particular the zones of the chest and the sides are so-called "vital" zones for a user since these are zones where the vital organs may be at risk if suitable protection is not provided. Consequently, when inflated, the portions of the inflatable member where there are discontinuities, also because of the anatomical curvature of the aforementioned inflatable member, may move away from each other significantly. And the greater the curvature of the shape in particular in an inflated condition, the more the portions of the inflatable member in the region of the discontinuity will move away from each other in the inflated condition owing to the radius of curvature.

[0007] As a result the similarity in terms of form and shape of the inflatable member with a vest or waistcoat, or in any case the curved shape, if on the one hand it makes the inflatable member easier to wear, on the other hand it may negatively affect the protective capacity of the inflatable member, in particular in the region of superficial interruptions or discontinuities.

[0008] Moreover, the inventor of the present disclosure has recognized that, in some bags, in order to prevent superficial interruptions on the chest a personal protective device has been developed where the inflatable member includes at least two portions of the inflatable member which are superimposed so as to define a corresponding overmounting or overlapping zone and where a zip is associated with the two inflatable member portions in the overlapping zone. In this way, when the inflatable member is inflated, the two portions of the inflatable member may be superimposed or at least arranged side-by-side. Such a solution is known from international application WO2014199308A1 in the name of the Applicant.

[0009] A technical problem encountered by the inventor of the present disclosure lies in the fact that the solution proposed in WO2014199308A1, although advantageous from many points of view, is not entirely satisfactory for cases where the inflatable member has particular forms or forms which are adapted to the anatomy of the human body. In fact, in this case, the zip does not match the curvature of the human body. For example, if the inflatable member has a curvature in the zone of the zip, when inflation is performed, the zip is subject to excessive tension or must be designed with dimensions such as to withstand a significant movement away from each other of the inflatable member portions owing to the curvature of the two inflatable member portions.

[0010] In order to avoid or limit this problem according to an aspect of the present disclosure, a protective device according to the independent claim 1 is provided. Further aspects of the present disclosure are defined in the dependent claims and by a garment as defined in the respective claims.

[0011] The protective device according to the present disclosure includes an inflatable member intended to protect at least partially a zone of a user's body, the inflatable member comprising at least two inflatable member portions. The personal protective device includes at least one connecting device or structure associated with the first portion of the inflatable member and the second portion of the inflatable member and arranged on an inner side of the inflatable member, or side directed towards the user, of the first portion of the inflatable member and the second portion of the inflatable member, namely user side. In other words, the inflatable member has a curved shape or curved profile at least in an inflated condition,

and the connecting device or structure is arranged on an inner side or concave side of said curved shape or curved profile.

[0012] Preferably, when the device is a wearable device and the inflatable member has preferably the form of a waistcoat, or life jacket, or similar form, it defines a housing zone or an internal zone intended to house the body of a user. The connecting structure, such as a zip, Velcro fastener, or similar connecting structure, is arranged on a side of the inflatable member directed towards said housing zone, i.e. a zone which, when the device is worn, is directed towards the user.

[0013] The inflatable member portions may be portions of a single inflatable member or portions of two different inflatable members. These inflatable member portions may be terminal or end portions facing each other, or are adjacent, when the inflatable member is worn.

[0014] The connecting structure is arranged on the side of the inflatable member directed towards the internal zone or towards said zone for housing a user's body.

[0015] In other words, the connecting structure is fixed onto an inner side of the inflatable member and is hidden from view.

[0016] In other words again, the inflatable member has preferably, when worn, a side hidden from view on the outside and the connecting structure is arranged on this side which is hidden from view. The inflatable member portions in fact cover the connecting structure. It is to be understood that the connecting structure is accessible from an outer side of the protective device. For example, the connecting structure is accessible by displacing from the outside the two inflatable member portions which face each other.

[0017] The main advantage of having a connecting structure on the inner side is that, should the inflatable member, precisely because of the anatomy of the human body, have a greater curvature on the outer side (in fact on the outer side the inflatable member tends to have a greater radius of curvature), namely on the opposite side to where the user's body is situated, the connecting structure is not tensioned excessively, or the connecting structure must not be designed with larger dimensions or configured so as to compensate for a greater extension of the inflatable member on the outer side in the inflated condition. In other words, each inflatable member portion is associated with the connecting and closing structure on the inner side towards the user's body, so as to ensure stable closing of the two terminal or end portions of the inflatable member and without any tension or minimal tension of the connecting structure.

[0018] Preferably, in order to avoid superficial discontinuities, the two portions of a same inflatable member or of two inflatable members are also superimposed. Therefore, a first portion of the inflatable member and a second portion of the inflatable member are superimposed in a corresponding overmounting or overlapping area and the connecting structure connects on the inner side the two portions in the overmounting area. The connecting structure is therefore accessible by displacing the two areas of the inflatable member portions relative to each other in an overmounting condition.

[0019] Preferably, one or both the inflatable member portions are structured or configured so as to have a different expansion between an inner side directed towards the user and an outer side opposite to the inner side. Basically each inflatable member portion may be made using the technology described in the international patent application WO2017163196A1 in the name of the Applicant. Consequently, in the inflated condition one or both of the two inflatable member portions may have an inner side which is more rigid or less stretched (i.e. a side which yields less to inflation) and an outer side which is more inflated and therefore more stretched (i.e. a side which yields more to inflation). The connecting structure is fixed on the inner side, namely where the two inflatable member portions are more rigid and therefore flat and may be connected more easily.

[0020] The connecting structure may be arranged centred with respect to the zone to be protected, for example on the chest, in the centre of the chest so as to allow easy central opening/closing of the protective device. The two inflatable member portions may be superimposed, for example, also on the sides of a user, or in another part of the body.

[0021] Preferably, the connecting and closing structure comprises two panels, preferably made of soft material, such as fabric. Each of the two panels is fixed, for example sewn or glued, on one side to one of the two inflatable member portions, even more preferably, if overmounting is present, in a zone adjacent to the overlapping or overmounting area. The other side of the panel is free or movable, is directed towards the overmounting area and is provided with one of the two components of the zip or any other connecting structure. In this way, when the two inflatable member portions superimposed, the two panels are situated close together and may be connected, for example by means of a zip. Each of the two panels may be fixed in an intermediate zone between the overmounting area and a non-overmounting area of the inflatable member.

[0022] The two panels may be pieces or panels of cloth or fabric which extend along the inflatable member portions. These panels may be provided with a zip portion or other connecting device of the type able to be opened or reversed. In particular, a zip portion associated with a panel is connected in a reversible or temporary manner to a complementary zip portion associated with the other panel. Similarly a Velcro portion associated with a panel and a complementary portion of Velcro associated with the other panel may be connected together.

[0023] In particular, when inflation occurs, the two superimposed portions of the inflatable member move away momentarily from each other with a reduction or elimination of an mutual overmounting area. However, owing to the fact that the connecting structure is located on the inner side, and preferably the side which is flatter and

yields less to expansion or inflation, the connecting structure is tensioned to a small degree or minimally.

[0024] The inflatable member described above may be easily incorporated inside a garment, for example inside respective pockets of a garment. The garment may be structured so as to have pockets, or a single pocket, designed to receive the inflatable member. In this case, the connecting structure may be fixed not directly to the inflatable member, but on an inner side of the garment or on a lining, or for example be fixed directly or indirectly to the respective pocket or pocket portion which houses each inflatable member portion.

[0025] In other words, the connecting structure described above may be fixed to the garment so as to be indirectly connected to the inflatable member of the personal protection device, on the inner side, for example the inner lining of the garment.

[0026] In one embodiment, the inflatable member may be fitted externally, or lined, with a fabric suitable for clothing, and assume the appearance of a garment which may be worn on its own.

[0027] Further characteristic features and modes of use forming the subject of the present disclosure will become clear from the following detailed description of a number of preferred examples of embodiment thereof, provided by way of a non-limiting example. It is nevertheless evident that each embodiment may have one or more of the advantages listed above; in any case it is nevertheless not necessary that each embodiment should have simultaneously all the advantages listed.

[0028] Reference will now be made to the figures in the attached drawings in which:

- Figure 1 shows a front view of a protective device according to an embodiment of the present disclosure, in a condition where worn;
- Figure 2 shows a front view of a garment including a protective device according to an embodiment of the present disclosure, in a condition where worn;
- Figure 3 shows a cross-sectional view along the line III-III of the protective device according to Figure 1 in a deflated condition of the inflatable member;
- Figure 4 shows a cross-sectional view along the line III-III of the protective device according to Figure 1 in an inflated condition of the inflatable member;
- Figure 5 shows a cross-sectional view along the line V-V of the garment according to Figure 2.

[0029] With reference to the accompanying figures, the reference number 10 indicates a personal protective device according to the present disclosure in accordance with an embodiment of the present disclosure.

[0030] The personal protection device 10 comprises an inflatable member 12 which is designed to assume substantially a first rest condition or deflated condition and a second active condition or inflated condition. The modes of inflating the inflatable member 12 will be described in the description below. The active inflated condition may be assumed in the event of an impact, or a general danger, or may be assumed permanently so as to provide continuous protection.

[0031] In one embodiment of the present disclosure the inflatable member 12 is formed as a vest and is designed to surround an upper zone or the bust of a user's body.

[0032] The inflatable element 12, which may be made using the technology described in the patent application PCT/IB2009/055512 and in the patent application PCT/IT2009/000547, which are cited herein as a reference source in their entirety in the present disclosure, or may be made more preferably using the technology described in the patent application WO2016178143A1, or even more preferably in the patent application WO2017163196A1 PCT. In other words it consists preferably of an inflatable member with threads, formed by meshes and walls as described in these patent applications, and even more preferably with a curved configuration due to a varied expansion capacity between an inner side directed towards the user I and an outer side E.

[0033] The inflatable member 12 includes a first inflatable member portion 20 and a second inflatable member portion 21. This first inflatable member portion 20 and second inflatable member portion 21 are terminal or end portions of the inflatable member 12 and are preferably partially superimposed. In other words, the first inflatable member portion 20 and second inflatable member portion 21 are portions arranged at the free ends of the inflatable member 12.

[0034] An overlapping area A corresponds to a central zone of the chest.

[0035] It is to be understood that only one overlapping area may be provided in the chest zone or in another zone of a user's body.

[0036] Consequently, in an embodiment of the present disclosure such as that shown in the figures, the first portion 20 and the second portion 21 of the inflatable member 12 are end portions situated in the chest region of a user. It should also be pointed out that, taking into account the overmounting or overlapping area A, the first portion 20 and the second portion 21 have in fact free ends in the overmounting area and may be easily displaced.

[0037] According to one aspect of the present disclosure, the personal protective device 10 includes one or more connecting and closing devices or structures 50 associated with the first portion 20 of the inflatable member and second portion 21 of the inflatable member on an inner side I directed towards the user, preferably in the overlapping area A. The connecting device or structure 50 is a zip-type structure, for example in the overlapping area A.

[0038] In particular, it is pointed out that the first portion 20 of the inflatable member and second portion 21 of the inflatable member are each associated with a part of the connecting structure 50 which is connected to the complementary part of the connecting structure 50 so as to

ensure stable closing of the first portion 20, inflatable member and second portion 21 of the inflatable member, on an inner side I directed towards the user. The inner side directed towards the user, although it is more awkward to reach for the user, is however that side where the inflatable member extends has a smaller radius of curvature so as to surround the body of the user. In order to make access easier, the connecting structure 50 is configured so as to be accessible from the outer side E, preferably by displacing the two superimposed ends of the respective portions 20, 21 of the inflatable member 12.

[0039] In one embodiment, such as that shown in the figures, the connecting structure 50, such as that which is situated on the user's chest, comprises two flaps or panels made of soft material 51, 52 such as fabric. Each of the two flaps 51, 52 is fixed, for example stitched or glued to one of the two portions 20, 21 of the inflatable member 12 in a zone adjacent to the overlapping or overmounting area A. These panels may also extend over the whole of the inflatable member 12, lining it on the inner side I.

[0040] In this way, when the two portions 20, 21 of the inflatable member 12 are superimposed, the two panels 51, 52 are situated close and may be connected together. The two panels 51, 52 may be pieces or panels of fabric or cloth which extend over an entire length of the portions 20, 21 of the inflatable member 12, such as to allow a continuous connection between the two portions 20, 21. These panels 51, 52 may be provided at respective ends with a zip portion 53, 54 or other connecting device of the type which can be opened or reversed. A zip portion associated with a panel 51 is connected in a reversible or temporary manner to a complementary zip portion associated with the other panel 52 so as to form the connecting structure 50.

[0041] The assembly consisting of the connecting structure 50 and the panels 50, 52 may be understood as being a single zip structure.

[0042] Consequently, the two inflatable member portions 20, 21 may be superimposed, for example, on the chest of a user, on the inner side I of the inflatable member, and the connecting structure 50 may be arranged in the centre of the chest on the user side so as to allow central opening/closing of the protective device 10.

[0043] It is also pointed out that the inflatable member 12 described above may be easily incorporated inside a garment, such as a jacket 100 (Figure 2 and Figure 5), for example inside respective pockets 80, 81 of a garment, wherein each pocket is intended to receive a respective inflatable member portion 20, 21. The pockets 80, 81 may also be understood as being portions of a single pocket which is present on the inner side, or user side, of the garment. The pockets may also be understood as being a lining which lines only internally the inflatable member.

[0044] The garment 100 may be designed with a structure having pockets 80, 81 which each contain a respective portion 20, 21 of the inflatable member 12 and are superimposed in the same way as the inflatable member. More particularly, each pocket 80, 81 has an inner wall which acts as an inner lining and an outer wall which acts as a visible surface of the garment.

[0045] The connecting structure 50 is connected to the pockets 80, 81 as in the preceding embodiment, by means of fabric panels or similar connecting means 51, 52. The connecting structure 50 is therefore connected to the internal lining of the respective pocket which houses the inflatable member.

[0046] It should be noted that, as mentioned above, preferably the inflatable member is made using the technology described in the aforementioned patent application WO2017163196A1. Consequently, one or each of the two portions 20, 21 of the inflatable member has in the inflated condition one side which is more inflated, expanded and/or curved, directed towards the outside E, and a more rigid, flat or less inflated side on the inner side I. Owing to the fact that the connecting structure 50 is arranged on the inner side I directed towards the user, the two portions which form the connecting structure 50, for example the two zip portions, may be connected to the flatter sides of the two portions 20, 21. The connecting structure 50 may therefore be subject to less tensioning during inflation.

[0047] Consequently, the inflatable element in the inflated condition has, on the outer side E, two humps or two curved profiles arranged side-by-side or slightly superimposed and, on the inner side, two substantially flat profiles arranged side-by-side or slightly superimposed and connected together. Consequently, when the inflatable element 12 is inflated, the two portions 20, 21 move away from each other with a greater degree of expansion on the outer side E. In fact, the overall extension of the protective device increases on the outer side E more than on the inner side I and, owing to the special feature of the present invention, with a minimum effect in terms of tension on the connecting structure 50.

[0048] With regard to inflation, in order to perform inflation of the inflatable member 12, in the event of a sudden fall and/or sliding and/or an impact involving a user or a vehicle being ridden, the protective device 10 is designed to cooperate with special activation means (not shown) which are operationally connected to the cylinder (not shown) containing compressed cold gas, such as helium. The cylinder may be provided with a respective shut-off valve (not shown).

[0049] Alternatively, the inflation fluid source may comprise gas generators preferably of the pyrotechnical or other hybrid type or other types known according to the state of the art.

[0050] Opening of the shut-off valve of each inflation cylinder is preferably controlled by a control unit depending on detection of the state of the vehicle/rider system; for example said control unit may implement a system for predicting the fall which allows early identification of the fall event and a reliable prediction of this by means

of accelerometer sensors fixed to the vehicle (or rider) and a unit for processing the signals produced by said sensors.

[0051] Alternatively, the device according to the present disclosure may also be applied using an activation cable connected to a vehicle ridden by a user, which cable activates inflation of the inflatable member following the movement of the user away from the vehicle, following a fall or a sudden impact. Use of a cable is employed in particular in the horse-riding sector.

[0052] In any case the aforementioned activation and inflation means may be integrated in the protection device according to the present invention or located on the outside thereof.

[0053] It should also be noted that the activation modes, although being an aspect of particular importance for effective operation of the device, will not be further described in greater detail since they are methods which are essentially already known to a person skilled in the art of protection of an individual from sudden impacts.

[0054] The subject-matter of the present disclosure has been described hitherto with reference to preferred embodiments thereof. It is to be understood that other embodiments relating to the same inventive idea may exist, all of these falling within the scope of protection of the claims which are attached below.

Claims

1. Protective device (10) for protecting a portion of a user's body, said device comprising an inflatable member (12) intended to protect at least partially an area of a user's body, wherein the protective device (10) includes at least a first portion (20) of the inflatable member (12) and a second portion (21) of the inflatable member (12) and a connecting device or structure (50) connecting the first portion (20) of the inflatable member (12) and the second portion (21) of the inflatable member (12), **characterized in that** the connecting device or structure (50) is arranged on an inner side (I) intended to be directed towards the user, or user side, and/or wherein
the inflatable member has a curved shape or curved profile at least in an inflated condition, and the connecting device or structure (50) is arranged on an inner or concave side (I) of said curved shape or curved profile.

2. Protective device (10) according to claim 1, wherein the first portion (20) of the inflatable member (12) and the second portion (21) of the inflatable member (12) are superimposed in a corresponding overlapping or overmounting area (A), and wherein the connecting device or structure (50) connects the first portion (20) of the inflatable member (12) and the second portion (21) of the inflatable member (12) on said inner side (I) of the inflatable member (12) and in the overlapping area (A), or in the region of said overlapping area (A).

3. Protective device (10) according to claim 1, wherein the connecting device or structure (50) is arranged on an inner side (I) of the inflatable member (12) and connects directly or indirectly the first portion (20) of the inflatable member (12) and the second portion (21) of the inflatable member (12).

4. Protective device (10) according to any one of the preceding claims, wherein the first portion (20) and/or second portion (21) of the inflatable member (12) have a greater resistance to expansion on said inner side (I) intended to be directed towards the user than an opposite outer side (E) with respect to the user.

5. Protective device (10) according to any one of the preceding claims, wherein the protective device (10) is a wearable device and the inflatable member has the form of a vest, or life jacket, or other wearable form, and defines a housing zone or an internal zone intended to house the body of a user, and the inner side (I) for said connecting structure (50) is on a side directed towards said housing zone or internal zone.

6. Protective device (10) according to any one of the preceding claims, wherein said opposite or outer side (E) of the first portion (20) and/or the second portion (21) of the inflatable member (12) has a more curved profile than said inner side (I) intended to be directed towards the user.

7. Protective device (10) according to any one of the preceding claims, wherein the connecting structure (50) comprises two panels, made of soft material, wherein one of the two panels (51, 52) is fixed or connected, on one side, directly or indirectly, to one (20, 21) of the two portions of the inflatable member (12) and, on the other side, faces the other of the two portions of the inflatable member (12).

8. Protective device (10) according to claim 7, wherein each of the two panels (51, 52) is a piece or panel of fabric or cloth that is connected, directly or indirectly, to the respective first portion (20) of the inflatable member (12) or second portion (21) of the inflatable member (12).

9. Protective device (10) according to any one of the preceding claims, wherein the connecting structure (50) is accessible from an outer side (E), preferably by displacing the first portion (20) and/or the second portion (21) of the inflatable member (12).

10. Protective device (10) according to any one of the

preceding claims, wherein the connecting structure (50) is arranged on a chest zone of the protective device (10).

11. Protective device (10) according to any one of the preceding claims in combination with claim 2, wherein the first portion (20) and the second portion (21) have free ends in the overmounting zone (A) and can be easily displaced.

12. Garment (100) including, or in combination with, a protective device according to any one of the preceding claims.

13. Garment (100) according to claim 12, wherein said connecting device or structure (50) is fixed to or associated with an inner lining or inner side of the garment, and indirectly associated with the first portion (20) of the inflatable member (12) and with second portion (21, 31) of the inflatable member (12).

14. Garment (100) according to claim 12 or 13, wherein the first portion (20) of the inflatable member (12) and the second portion (21, 31) of the inflatable member (12) are housed inside a respective first pocket (80) and second pocket (81) of the garment (100) and wherein said connecting device or structure (50) is fixed on an inner side of the respective first pocket (80) and second pocket (81) of the garment.

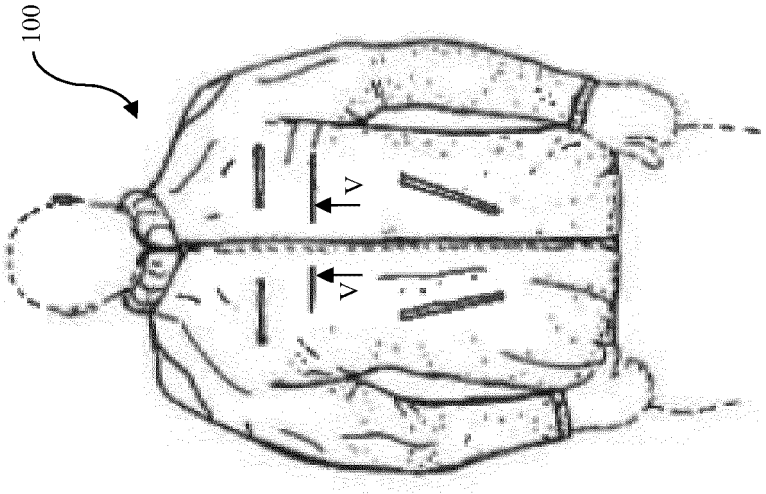

FIG. 2

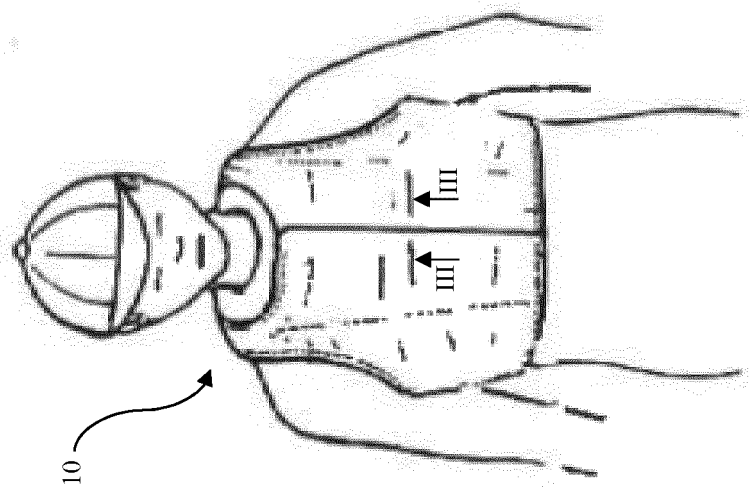

FIG. 1

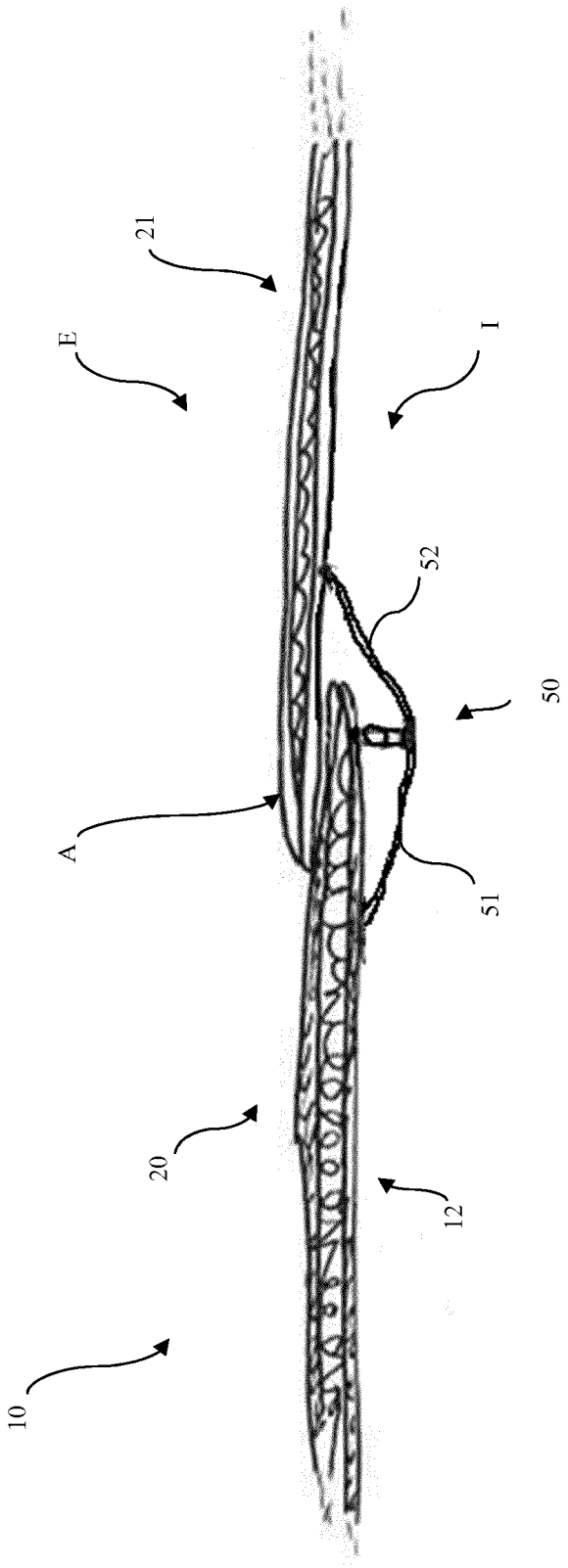

FIG. 3

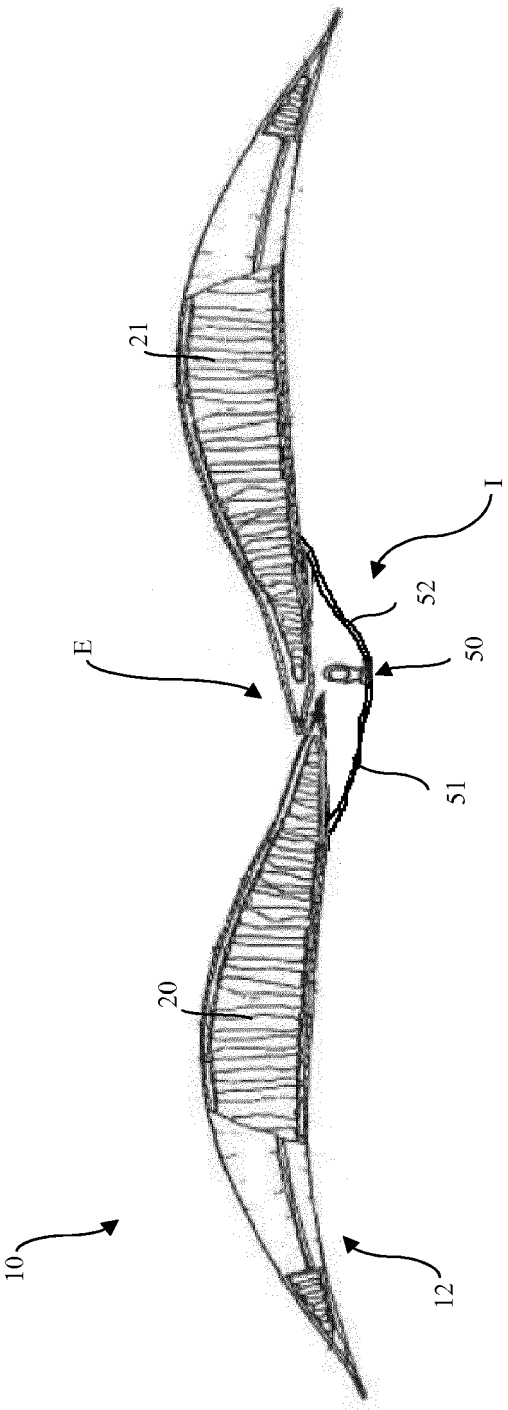

FIG. 4

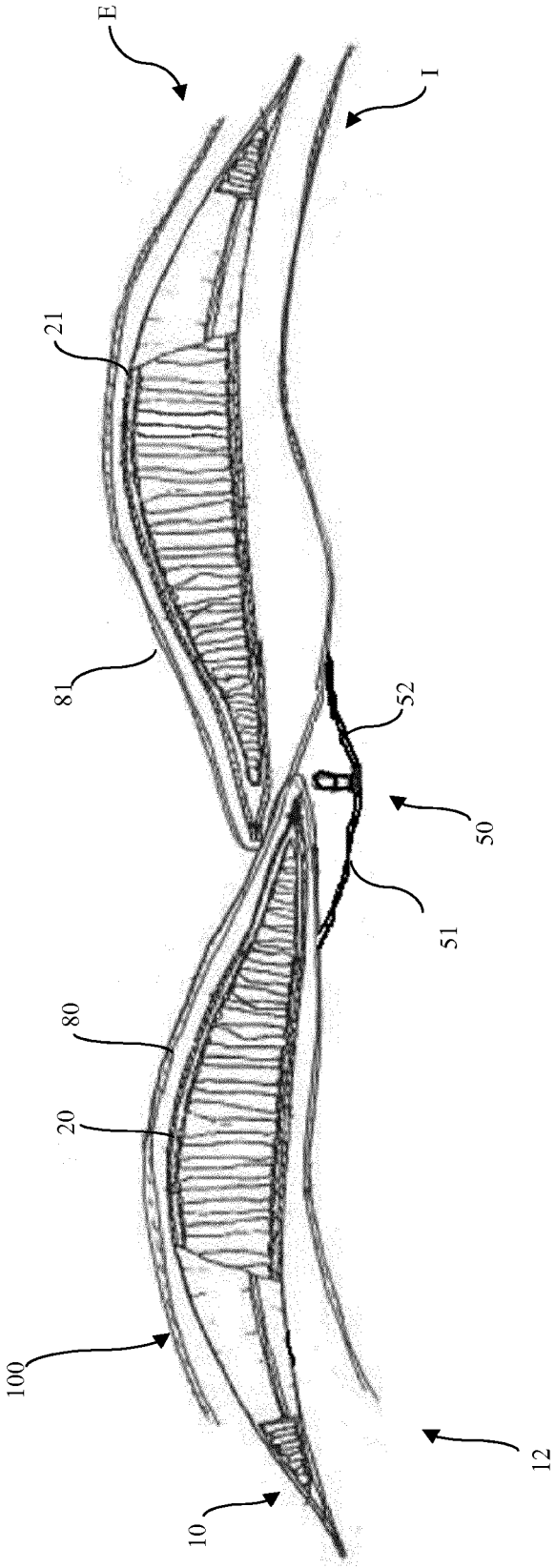

FIG. 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 20 8045

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 956 026 A2 (HELITE [FR]) 23 December 2015 (2015-12-23) * the whole document *	1,3-10, 12-14	INV. A41D13/018 B62J27/00 A41D13/015
X	WO 2009/047733 A2 (DAINESE SPA [IT]; PRETTO PAOLO [IT]) 16 April 2009 (2009-04-16) * figures *	1	
X	JP 2010 125992 A (HONDA MOTOR CO LTD; HONDA ACCESS KK) 10 June 2010 (2010-06-10) * figures *	1,3,5, 7-10,12, 13	
X	WO 2011/148353 A1 (FRENI BREMBO SPA [IT]; LAVEZZI ROBERTO [IT]; THEVENOT GERARD [FR]) 1 December 2011 (2011-12-01) * figures 9,10 *	1,5,6,12	
A,D	WO 2014/199308 A1 (DAINESE SPA [IT]) 18 December 2014 (2014-12-18) * figures *	1,2	

TECHNICAL FIELDS SEARCHED (IPC)

A41D
B62M
B62J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 March 2020	Debard, Michel

CATEGORY OF CITED DOCUMENTS

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

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

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 20 8045

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-03-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2956026 A2	23-12-2015	EP 2956026 A2	23-12-2015
		GB 2510859 A	20-08-2014
		WO 2014125368 A2	21-08-2014
WO 2009047733 A2	16-04-2009	AT 535163 T	15-12-2011
		EP 2217103 A2	18-08-2010
		WO 2009047733 A2	16-04-2009
JP 2010125992 A	10-06-2010	JP 5113731 B2	09-01-2013
		JP 2010125992 A	10-06-2010
WO 2011148353 A1	01-12-2011	EP 2575517 A1	10-04-2013
		IT 1400486 B1	11-06-2013
		WO 2011148353 A1	01-12-2011
WO 2014199308 A1	18-12-2014	EP 3007572 A1	20-04-2016
		EP 3287026 A1	28-02-2018
		JP 2016526612 A	05-09-2016
		US 2016081403 A1	24-03-2016
		WO 2014199308 A1	18-12-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2014199308 A1 **[0008] [0009]**
- WO 2017163196 A1 **[0019] [0046]**
- WO IB2009055512 W **[0032]**
- IT 2009000547 W **[0032]**
- WO 2016178143 A1 **[0032]**
- WO 2017163196A1 A **[0032]**