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

(11) **EP 4 483 735 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.01.2025 Bulletin 2025/01

(21) Application number: **24180846.8**

(22) Date of filing: **07.06.2024**

(51) International Patent Classification (IPC):
A41D 13/018 *(2006.01)* ***A41D 27/08*** *(2006.01)*
A41D 13/01 *(2006.01)* *A41D 31/02* *(2019.01)*

(52) Cooperative Patent Classification (CPC):
A41D 13/018; A41D 27/08; A41D 13/01; A41D 31/02

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(30) Priority: **09.06.2023 IT 202300011853**

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

(72) Inventor: **Sheridan, David**
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 PROTECTION DEVICE**

(57) The present disclosure relates to a device (100, 200) which comprises an inflatable element (20), which is configured to be able to assume a deflated condition and an inflated condition and which has an internal surface facing an internal zone, i.e. facing the user in a condition of use, and an external surface facing a zone external with respect to the user.

Moreover, the wearable personal protection device (100, 200) further comprises an outer cover layer 30 arranged to cover, at least partially, the external surface.

In particular, the outer layer (30, 230) comprises one or more through-holes or openings (31, 231) configured to make visible, or exposed, the external surface of the inflatable element (20) from the outside of the personal protection device (100, 200).

The present disclosure relates furthermore to a method for giving a distinctive character to a personal protection device (100, 200).

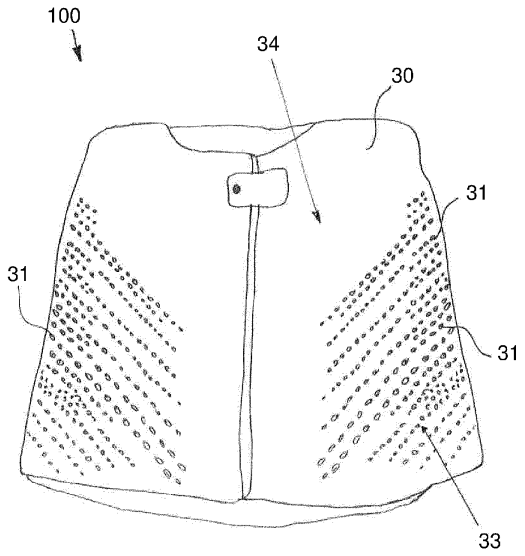

FIG. 1

EP 4 483 735 A1

Description

[0001] The present disclosure relates in general to a personal protection device. In particular, the present disclosure relates to a personal protection device of the wearable type comprising an inflatable element. The present disclosure relates furthermore to a method for giving a distinctive character to the personal protection device.

[0002] It is known to use personal protection devices configured to protect a user, for example from knocks, impacts or falls, by using an inflatable element, or airbag. In particular, the inflatable element is configured to be inflated so as to protect at least partially the user's body from a knock or impact.

[0003] Generally, the inflatable element is arranged underneath further layers, such as outer layers of the personal protection device or a garment which comprises the personal protection device. In fact, usually, the inflatable element is considered to be an element which modifies or worsens the aesthetic appearance of the personal protection device or the garment which comprises it and therefore it is usually covered or hidden underneath at least one layer which is more external.

[0004] The starting point of the present disclosure is the technical problem of providing a personal protection device which is able to satisfy the requirements mentioned above with reference to the prior art and which at the same time overcomes the preconceived idea that the aesthetic appearance is worsened.

[0005] This is achieved by means of a personal protection device and a method according to the respective independent claims. Secondary characteristics forming the subject of the present disclosure are defined in the corresponding dependent claims.

[0006] In particular, in accordance with the present disclosure, it is proposed to provide a personal protection device for protecting a user which is wearable device comprising an inflatable element, configured to be able to assume a deflated condition and an inflated condition. The inflatable element has an internal surface and an external surface, wherein in a condition of use the internal surface faces an internal zone on the user side and the external surface faces an external zone opposite to the user side. The personal protection device further comprises a cover layer configured to cover a first main part of said external surface. The cover layer comprises one or more through-holes or openings configured to make visible, or exposed, a remaining second smaller part of said external surface of the inflatable element from said external zone of said device. Basically, the first main part is a part which has a bigger surface area than the remaining second smaller part and, if it is considered that the first main part and the remaining second smaller part form the entire external surface, preferably the second smaller part, for example, may represent 10% to 30% of the total surface, even more preferably about 20% of the total surface.

[0007] Namely, preferably the one or more through-holes or openings pass through the cover layer but not through the entire personal protection device, namely the inflatable element covers the one or more through-holes or openings on the inside of the cover layer. The through-hole of the cover layer is completely closed by the surface of the inflatable element. The surface of the inflatable element therefore is continuous underneath the through-hole of the cover layer.

[0008] Preferably, the external surface of the inflatable element is continuous underneath the one or more through-holes or openings of the inflatable element.

[0009] Namely, preferably, said external surface of the inflatable element closes off an aperture or passage of the one or more through-holes or openings of the inflatable element.

[0010] Expressed in other words, the outer cover layer has a smaller region devoid of material (corresponding to the holes and corresponding in fact to the smaller part of the inflatable element) and a continuous bigger region which covers the inflatable element (and which covers correspondingly the main part of the inflatable element).

[0011] In other words, the smaller region which does not have material and corresponds to an absence of outer layer allows the inflatable element to be seen. Consequently, the outer cover layer may be characterized by a predefined distribution of "voids" such as to make the underlying inflatable element visible and give the device a characteristic aesthetic appearance and a distinctive character, which can be recognized by an external observer.

[0012] Namely the one or more through-holes or openings of the cover layer pass through the cover layer, while the one or more through-holes or openings are for example lined or covered by the inflatable element along the inner side of the cover layer, namely the surface of the cover layer facing the inflatable element. In other words, the one or more through-holes or openings are passages or slits through the cover layer but not through the inflatable element, which acts for example as covering or lining for the one or more through-holes or openings on the inner side of the cover layer, namely the surface of the cover layer facing the inflatable element.

[0013] Preferably, the external surface of the inflatable element has at least one colouring different from a colouring of said outer cover layer and said colouring of said external surface of the inflatable element is visible through said one or more through-holes or openings from the outside of said device. This allows the inflatable element to be better appreciated, and even more preferably it consists of a colouring which includes yellow, orange or red, namely bright and clearly visible colours.

[0014] Basically, preferably, the external surface is configured to create or is capable of creating a contrasting effect with respect to an external surface of the outer cover layer.

[0015] Preferably, the outer layer is a continuous layer, namely a kind of lining or covering, the main purpose of

which is to protect the inflatable element, for example to protect it from abrasion.

[0016] Preferably, the one or more through-holes or openings are distributed on said outer layer so as to form a design, a logo or a definite shape, namely to provide a special aesthetic effect, which may be even more greatly noticed, if there is a colour contrast or a warm colouring of the external surface.

[0017] Even more preferably, the one or more through-holes are located in a front or chest zone of said personal protection device.

[0018] The outer layer is preferably a layer separate from said inflatable element, namely is preferably the layer of a pocket, inside which the inflatable element is housed. This enables the inflatable element to be changed after an impact, namely to be exchanged with another inflatable element having a different colour.

[0019] Preferably, the one or more through-holes or openings are disposed on a first region of said outer layer, and wherein said outer layer further comprises a second region devoid of said one or more through-holes or openings. In other words, the holes are confined within the first region. In this way, the second region may maintain entirely its protective function.

[0020] For aesthetic purposes, said one or more holes or opening may have a circular or polygonal shape.

[0021] In order to contain the smaller part with holes of the outer cover layer. the one or more holes or openings have a diameter or an opening with small dimensions, for example preferably of between 1 mm and 4 mm, even more preferably between 2 mm and 3 mm.

[0022] The device according to the present disclosure may be an autonomous device, namely configured to allow said inflatable element to pass from the deflated condition to the inflated condition. The device therefore also comprises inflation means and a control unit for controlling the inflation of the inflatable element.

[0023] In accordance with the present disclosure a method for giving a distinctive character to a personal protection device is provided. The personal protection device is a wearable device and comprises an inflatable element, configured to be able to assume a deflated condition and an inflated condition, wherein said inflatable element has an internal surface and an external surface, wherein in a condition of use the internal surface faces an internal zone on the user side and the external surface faces an external zone opposite to the user side, and wherein said personal protection device further comprises an outer cover layer arranged to cover a main part of said external surface of the inflatable element, and wherein said method comprises making one or more through-holes or openings on the outer cover layer in such a way as to make visible, or exposed, a second a corresponding smaller part of said external surface of the inflatable element from said external zone.

[0024] Preferably, the protection device is that described in the preceding paragraphs.

[0025] Further advantages, characteristic features and modes of use forming the subject of the present disclosure will become clear from the following detailed description of embodiments thereof, provided by way of a non-limiting example.

[0026] It is in any case clear that each embodiment forming the subject of the present disclosure may have one or more of the advantages listed above; in any case it is not required that each embodiment should have simultaneously all the advantages listed.

[0027] Reference will be made to the figures of the attached drawings in which:

- Figure 1 shows a front view of a personal protection device according to the present invention;
- Figure 2 shows the front view of Figure 1 partly sectioned so as to show the inflatable element;
- Figure 3 shows a view, from an inner side and partly sectioned, of a personal protection device according to the present invention shaped like a garment.

[0028] With reference to the attached figures, an embodiment of a wearable personal protection device is denoted overall by the reference number 100.

"Wearable personal protection device" is understood as meaning a device which may be worn, namely placed on a user's body with a protective function, or which can be associated with or is designed to be associated with a garment or an undergarment, such as a motorcycling suit, a jacket, a t-shirt or a pair of trousers. Since it is a device which can be preferably worn, in the context of the present disclosure reference will be made for greater clarity to parts of the body which said protection device is intended to protect and in general to spatial references, such as above, below, inner and outer and similar references, which are to be understood in a non-limiting manner as though the device were being worn.

[0029] In the present case the personal protection device 100 has the form of a vest.

In particular, the device 100 comprises an inflatable element 20, which is configured to be able to assume a deflated condition and an inflated condition and which has an internal surface, not visible in Figures 1 and 2 and visible in Figure 3 and indicated by the reference number 21, facing an internal zone, i.e. facing the user in a condition of use, and an external surface 22 facing a zone external with respect to the user. More specifically, the inflatable element 20 is intended to protect at least partially a torso zone of the user. More precisely, in the embodiment shown, the inflatable element 20 includes chest parts each intended to be placed along a right-hand and a left-hand region of the chest, respectively, and a spinal or back portion intended to be placed along a back region which is centred on the user's backbone. The form of the inflatable element 20 and the technology used to make the inflatable element 20 are known to the person skilled in the art and are not further described. The modes of inflating the inflatable element 20 will be described in the description below.

[0030] Moreover, the personal protection device 100 further comprises an outer cover layer 30 arranged to cover a first main part of the external surface of the inflatable element 20, for example between 70% and 90% thereof. For example, the outer layer 30 may be an outer lining, which may form part of a cover which covers the entire inflatable element 20, also within the internal zone.

[0031] The inflatable element 20 is visible in Figure 2 where part of the cover layer 30 has been removed.

[0032] Basically, the inflatable element 20 may be housed inside a pocket. The outer layer 30 forms part of said pocket and may have, for example, an aesthetic covering function and/or protective function, for example for protecting the inflatable element 20 against abrasion.

[0033] In particular, the outer layer 30 comprises a plurality of through-holes or openings 31 configured to make visible, or exposed, a remaining smaller part of the external surface 22 of the inflatable element 20 from the outside of the personal protection device 100.

[0034] Consequently, the outer layer 30 has a smaller region devoid of material (corresponding to the holes) and a continuous bigger region which covers the inflatable element 20 (and which correspondingly covers the main part of the inflatable element 20).

[0035] Preferably, the external surface of the inflatable element 20 has at least one colouring different from a colouring of the outer cover layer 30 and the colouring of the external surface is visible through the one or more through-holes or openings 31 from the outside of the device 100. Namely the one or more through-holes or openings 31 allow the colouring of the external surface 22 of the inflatable element 20 to be seen from the outside of the personal protection device. For example, the colouring of the external surface 22 of the inflatable element 20 may be very clear or bright, or a warm colouring, for example fluorescent colouring, while the colouring of the outer layer 30 may be very dark, for example black. Basically there is a contrasting effect.

[0036] Preferably, the outer layer 30 is a continuous layer, namely does not have interruptions or cuts apart from the one or more through-holes or openings 31. Furthermore, preferably the one or more through-holes or openings 31 are distributed on the outer layer 30 so as to form a design, a logo or a definite shape. In other words, the one or more through-holes or openings 31 may form overall on the outer layer a shape, a design or a logo. In particular, the shape, design or logo may be more visible from the outside by means of the contrast between the colouring of the external surface 22 of the inflatable element 20 and on the other hand the colouring of the outer layer 30.

[0037] In yet other words, the smaller region of the outer layer 30 which does not have material and corresponds to an absence of outer layer allows the inflatable element 20 to be seen. Consequently, the outer layer 30 is characterized by a predefined distribution of "voids" such as to give the device a characteristic aesthetic appearance and a distinctive character which may be recognizable for an external observer.

[0038] It is to be understood that the outer layer 30 is an outer layer even if it were covered by another garment, for example temporarily.

[0039] Preferably, as can be seen in Figures 1 and 2, the one or more through-holes or openings 31 are arranged in a confined manner on a first region 33 of the outer layer 30, and the outer layer 30 further comprises a second region 34 devoid of the one or more through-holes or openings 31. Namely, in the second region 34 of the outer layer there are no through-holes or openings 31 and consequently the inflatable element 20 is not visible from the outside in the second region 34 of the outer layer 30. The outer layer 30 may therefore perform is protective function in its entirety.

[0040] Preferably, the one or more holes or openings 31 have a circular or polygonal shape.

[0041] Even more preferably, the one or more holes or openings 31 have a small diameter or openings, for example preferably of between 1 mm and 4 mm, even more preferably of between 2 mm and 3 mm.

[0042] Preferably, the device 100 comprises an inflation device (not shown) configured to allow the inflatable element 20 to pass from the deflated condition to the inflated condition. For example, the inflation device may contain a pressurized fluid.

[0043] Moreover, preferably the device 100 further comprises an electronic unit (not shown), configured to perform activation of the inflation device, and one or more sensors (not shown) configured to detect a danger situation for the user and to send data to the electronic unit. For example, the one or more sensors may be configured to detect a fall or impact condition of a user of the device 100.

[0044] The inflation device, the electronic unit and the sensors are known to a person skilled in the art and therefore will not be further described in the context of the present disclosure.

[0045] Preferably, the personal protection device 100 is a wearable device which is for example shaped as a vest and may be combined with another garment to form for example a jacket or other more complex garment. Preferably, the personal protection device 100 is placed over another garment, so that the outer layer 30 and the respective holes 31 are visible.

[0046] Alternatively, as shown in Figure 3, the personal protection device 200 may be formed as a more structured garment, like a heavier vest, and the outer cover layer 230 may be an outer layer 230 of the garment which has the holes 231. In this case also, the inflatable element 20 may be housed in a housing seat accessible by a user, for example on an inner side of the garment, as can be seen in Figure 3. The personal protection device 200 has the same characteristics as the personal protection device 100, which are therefore not repeated.

[0047] The present disclosure also relates to a method for giving a distinctive character to a personal protection

device 100 comprising an inflatable element 20, configured to be able to assume a deflated condition and an inflated condition. Furthermore, the inflatable element 20 has an internal surface facing an internal zone, i.e. a zone facing the user in a condition of use, and an external surface facing a zone which is external with respect to the user.

[0048] The method comprises:

- making one or more through-holes or openings 31, 231 on an outer layer 30, 230 configured to cover a first main part of the external surface of the inflatable element 20;
- arranging the outer layer 30, 230 so as to over at least partially the external surface of the inflatable element 20;

in such a way as to make visible, or exposed, a remaining second smaller part of the external surface of the inflatable element 20 from the outside of the personal protection device 100.

[0049] Namely, the outer layer 30, 230 has, formed thereon, one or more through-holes or openings 31, 231, for example so as to form a design, a shape or a logo, and the outer layer 30, 230 is arranged so as to cover at least partially the external surface of the inflatable element 20. In this way, the external surface of the inflatable element 20 is visible or exposed, over a second smaller part, when viewed from outside the device 100, by means of the one or more through-holes or openings 31, 231.

[0050] For example, the outer layer 30, 230 may be an outer lining, which may form part of a cover which covers the entire inflatable element, also within the internal zone.

[0051] Preferably the one or more through-holes or openings 31, 231 are provided on the outer layer 30 so as to form a design, a logo or a definite shape.

[0052] The subject-matter of the present disclosure has been described hitherto with reference to its embodiments. 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. Wearable personal protection device (100, 200) for protecting a user, said wearable personal protection device (100, 200) being a wearable device and comprising an inflatable element (20), configured to be able to assume a deflated condition and an inflated condition, wherein said inflatable element (20) has an internal surface and an external surface, wherein in a condition of use the internal surface faces an internal zone on the user side and the external surface faces an external zone opposite to the user side, and wherein said wearable personal protection device (100, 200) further comprises an outer cover layer (30, 230) arranged to cover a first main part of said external surface, and wherein said outer layer (30, 230) comprises one or more through-holes or openings (31, 231) configured to make visible, or exposed, a remaining second smaller part of said external surface of the inflatable element (20) from said external zone of said device (100, 200), wherein said first part is bigger than said second part.

2. Wearable personal protection device (100, 200) according to the preceding claim, wherein said external surface of the inflatable element (20) is continuous underneath the one or more through-holes or openings (31, 231) of the inflatable element (20).

3. Wearable personal protection device (100, 200) according to the preceding claim, wherein said external surface of the inflatable element (20) closes off an aperture or passage of the one or more through-holes or openings (31, 231) of the inflatable element (20).

4. Wearable personal protection device (100, 200) according to the preceding claim, wherein said external surface has at least one colouring different from a colouring of said outer cover layer (30, 230) and said colouring of said external surface is visible through said one or more through-holes or openings from the outside of said device (100, 200).

5. Wearable personal protection device (100, 200) according to claim 2, wherein said colouring includes yellow, orange or red, or is a fluorescent colour.

6. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said external surface is configured to create or is capable of creating a contrasting effect with respect to an outer surface of said outer cover layer (30, 230).

7. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said outer layer (30, 230) is a continuous layer and said one or more through-holes or openings (31, 231) determine an absence or void of said continuous layer.

8. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said one or more through-holes or openings (31, 231) are distributed on said outer layer (30, 230) so as to form a design, a logo or a definite shape.

9. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said outer layer is a layer separate from said inflatable element, or part of a pocket, said pocket being adapted to receive said inflatable element.

10. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said one or more through-holes or openings (31, 231) are disposed on a first region of said outer layer (30, 230), and wherein said outer layer (30, 230) further comprises a second region devoid of said one or more through-holes or openings (31, 231).

11. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said one or more holes or openings (31, 231) are circular or polygonal in shape.

12. Wearable personal protection device (100, 200) according to the preceding claim, wherein said one or more holes or openings (31, 231) have a diameter or an opening of between 1 mm and 4 mm, preferably of between 2 mm and 3 mm.

13. Wearable personal protection device (100, 200) according to one of the preceding claims, comprising an inflation device configured to make said inflatable element (20) pass from the deflated condition to the inflated condition and further comprising an electronic unit, configured to perform activation of said inflation device, and one or more sensors configured to detect a danger situation for the user and to send data to said electronic unit.

14. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said second smaller part represents for example 10% to 30% of the inflatable element external surface, preferably 20% of the inflatable element external surface.

15. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said wearable personal protection device (100, 200) is structured like a garment.

16. Wearable personal protection device (100, 200) according to one of the preceding claims, wherein said wearable personal protection device (100, 200) is shaped as a vest.

17. Wearable personal protection device (100, 200) according to any one of the preceding claims, wherein the one or more through-holes are located in a front or chest zone of said wearable personal protection device (100, 200).

18. Garment in combination with a wearable personal protection device (100, 200) according to any one of the preceding claims, wherein said wearable personal protection device (100, 200) is placed over said garment.

19. Method for giving a distinctive character to a wearable personal protection device (100, 200) for the protection of a user, said wearable personal protection device (100, 200) being a wearable device and comprising an inflatable element (20), configured to be able to assume a deflated condition and an inflated condition, wherein said inflatable element (20) has an internal surface and an external surface, wherein in a condition of use the internal surface faces an internal zone on a user side and the external surface faces an external zone opposite to the user side, and wherein said wearable personal protection device (100, 200) further comprises an outer cover layer (30, 230) arranged to cover a first main part of said external surface, and wherein said method comprises:

- making one or more through-holes or openings (31, 231) on the outer layer in such a way as to make visible, or exposed, a remaining second smaller part of said external surface of the inflatable element (20) from said external zone, wherein said first part is bigger than said second part.

20. Method according to the preceding claim, wherein the wearable personal protection device (100, 200) is the device according to one of the preceding claims 1 to 17.

21. Method according to the preceding claim, wherein the wearable personal protection device (100, 200) is placed over a garment so that said cover layer (30, 230) is visible.

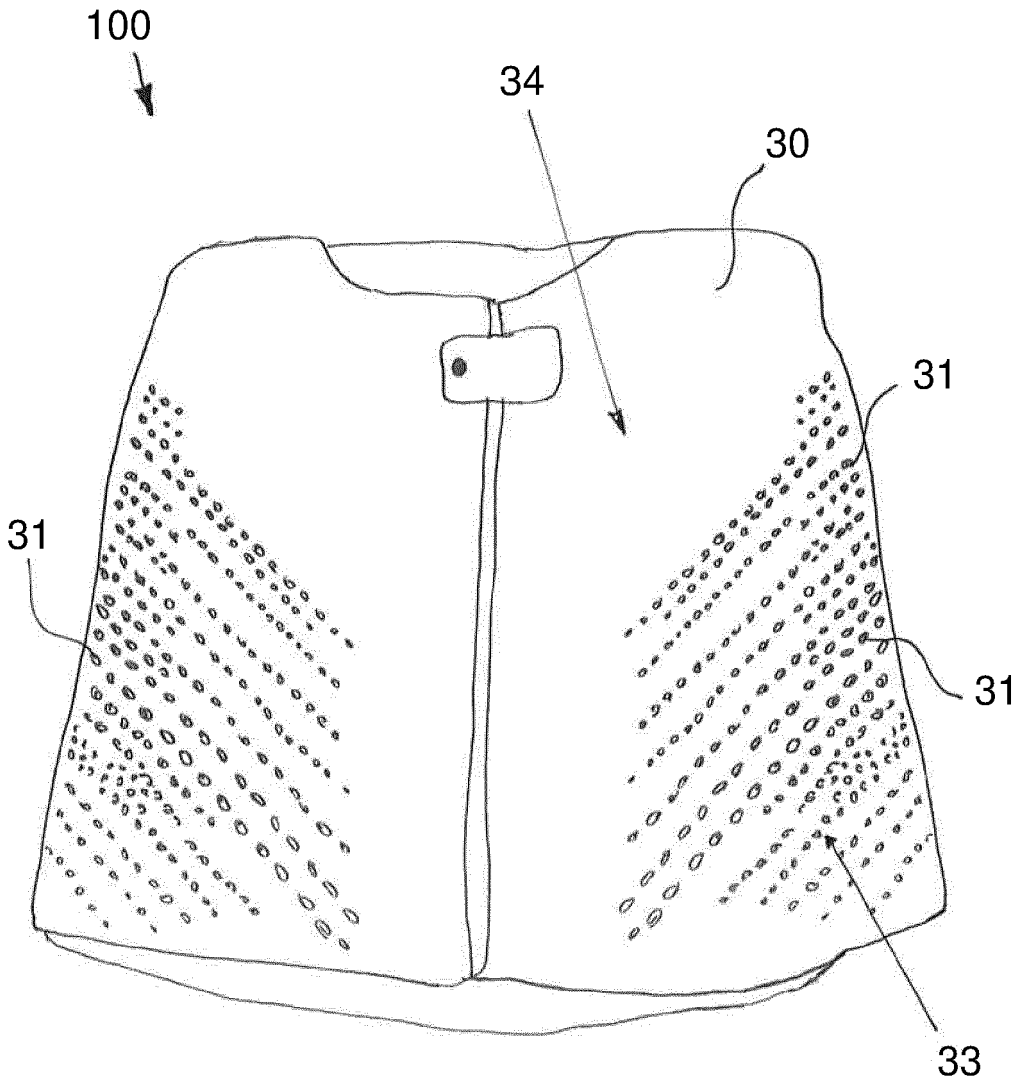

FIG. 1

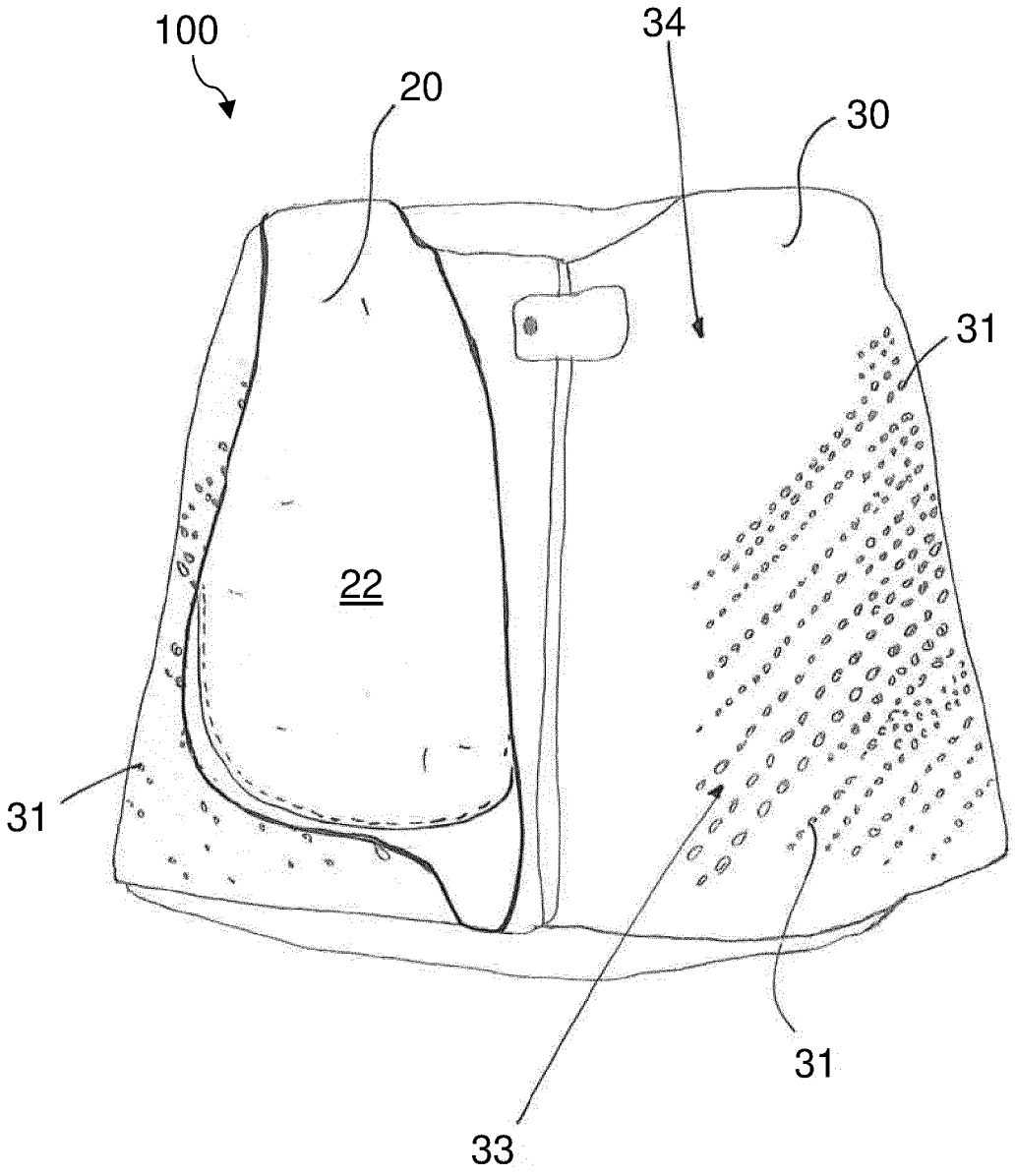

FIG. 2

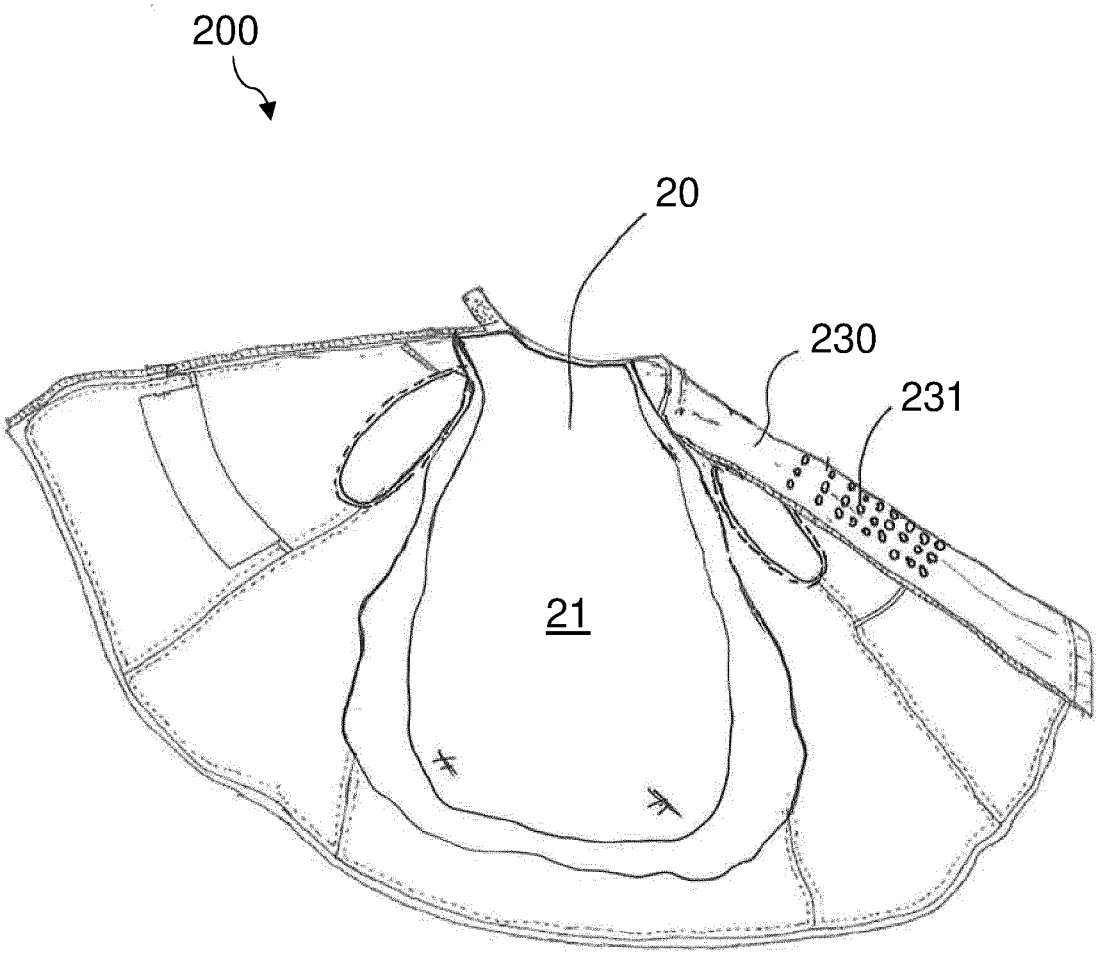

FIG. 3

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 18 0846

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	US 2021/360993 A1 (MAZZAROLO GIOVANNI [IT]) 25 November 2021 (2021-11-25) * abstract; figures 1-3, 8 * * paragraphs [0038] - [0057], [0067] - [0070] *	1-21	INV. A41D13/018 A41D27/08 ADD. A41D13/01
A	EP 3 498 117 A1 (DAINESE SPA [IT]) 19 June 2019 (2019-06-19) * abstract; figures * * paragraphs [0030] - [0033], [0040] *	1-21	A41D31/02
A	US 2023/001879 A1 (DAINESE LINO [IT]) 5 January 2023 (2023-01-05) * abstract; figures * * paragraphs [0053], [0072] *	1-21	

TECHNICAL FIELDS SEARCHED (IPC)
A41D B62J A63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 November 2024	Contreras Aparicio

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 24 18 0846

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.

12-11-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2021360993 A1	25-11-2021	CN 113194772 A	30-07-2021
		EP 3890536 A1	13-10-2021
		JP 2022517905 A	11-03-2022
		JP 2024061846 A	08-05-2024
		KR 20210097778 A	09-08-2021
		US 2021360993 A1	25-11-2021
		WO 2020115137 A1	11-06-2020
EP 3498117 A1	19-06-2019	EP 3498117 A1	19-06-2019
		EP 3918935 A1	08-12-2021
US 2023001879 A1	05-01-2023	CN 114980766 A	30-08-2022
		EP 4072364 A1	19-10-2022
		EP 4378338 A2	05-06-2024
		ES 2976045 T3	22-07-2024
		JP 2023505721 A	10-02-2023
		US 2023001879 A1	05-01-2023
		WO 2021116931 A1	17-06-2021