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

(11) **EP 3 909 453 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
24.07.2024 Bulletin 2024/30

(21) Application number: **21172276.4**

(22) Date of filing: **05.05.2021**

(51) International Patent Classification (IPC):
A41D 13/11 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A41D 13/1107; A41D 13/1161

(54) TIGHT JOINT AND FIXATION CARRIER FOR PROTECTIVE MEDIUM MATERIALS

STRAFFES GELENK UND BEFESTIGUNGSTRÄGER FÜR SCHUTZMEDIUMMATERIALIEN

SUPPORT DE JOINT ET DE FIXATION ÉTANCHE POUR MATÉRIAUX DE MILIEU DE PROTECTION

(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

(30) Priority: **11.05.2020 TW 109115569**

(43) Date of publication of application:
17.11.2021 Bulletin 2021/46

(73) Proprietor: **Lee, Pei-En**
Taipei City (TW)

(72) Inventors:
- **LEE, Pei-En**
  Taipei City (TW)
- **Hannesschläger, Günther**
  4040 Linz (AT)
- **WEI, Ta-Hsiang**
  Taipei City (TW)
- **CHEN, Chung-Chen**
  Taipei City (TW)
- **WU, San-Tsun**
  Taipei City (TW)
- **HSIEH, Wen-he**
  Taoyuan City (TW)
- **SUN, Yu-Chieh**
  New Taipei City (TW)
- **TSAY, Kai-Lin**
  Taipei City (TW)

(74) Representative: **Wittmann, Günther**
Patentanwaltskanzlei Wittmann
Frans-Hals-Straße 31
81479 München (DE)

(56) References cited:
EP-A1- 3 178 525
US-A- 4 671 271
US-A1- 2015 352 382
WO-A2-2008/030831
US-A- 695 403

EP 3 909 453 B1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention generally relates to a tight joint and fixation carrier for protective medium materials; in particular, it relates to a tight joint and fixation carrier for protective medium materials which comprises a carrier body designed and manufactured based on the ergonomic features of a human head and capable of tightly jointing and fixing a protective medium material onto the mouth-nose area so as to achieve the objectives of high protection safety and wearing comfort thus further satisfying other various demands.

2. Description of Related Art

[0002] It is well-known that, in modern societies, in order to isolate polluted air, dusts or germs to ensure that the human respiratory system will not be infected, most people wear masks. In general, traditional masks mainly include a mask body and two belt bodies, with each belt body being fixed on both sides of the mask body in correspondence with the ears or head as the fixation tools, thus achieving the purpose of shielding the human mouth and nose from contact with the outside air.

[0003] However, according to known academic research, for the general or conventional flat mask designs, since the straps installed on the two sides are only hooked on the auricles, although the mask body can cover the mouth-nose area, it could be quite difficult to naturally provide complete and tight attachment to the face due to the 3-dimensional fluctuations and variances caused by the bones and muscles in the head of each person. Therefore, significant gaps may occur between the mask body and the skin, leading to obvious "Total Inward Leakage (TIL)" result which greatly reduces the protective safety effect of the mask.

[0004] Therefore, certain companies introduced three-dimensional masks, but, to increase the tight joint and fixation effects, this type of three-dimensional masks usually apply ear hooks to hook to the auricle or strong elastic bands to tightly attach to the rear side of the head, thus causing the mask body to be forced into the skin of the face and head. In this approach, although it can achieve a kind of temporary effect similar to sticking, this strong fixation to the ears or the rear side of the head may easily cause pain of discomfort on the face, ear, and head in case of wearing for a long time.

[0005] In addition, this type of three-dimensional masks are usually of fixed sizes and produced in large quantities, but because everyone's head and face shapes are different, especially the difference in terms of bone characteristics between different human races may become even greater, when the size of the mask cannot correspond correctly to the user's head and face characteristics, the mask will be strongly squeezed and embedded into the skin, thus leading to obvious discomfort and pain, and then causing skin damage. Actually, for users who must be protected for a longer duration of time (e.g., first-line medical care workers), such issues may bring significant discomfort and inconvenience in practice.

[0006] Moreover, most traditional mask body structures typically exhibit shielded designs, so when a user wearing a mask tries to interact and communicate with others, it may be inconvenient to let other people see the movement of the mouth in order to allow them to fully understand relevant emotional expressions. To effectively reduce the virus pandemic, people all over the world may need to wear protective masks for a long time, which will gradually cause difficulties and inconveniences in large-scale social interpersonal communication, indirectly alienate the psychological distance between people and undesirably reduce the sense of trust. Especially, in the service industries that need to communicate with customers directly and cordially for a longer time, the emotional reaction and feelings of each other during the interaction process may have a direct impact on their business brand image managements.

[0007] Currently, the general structures of protective masks cannot be correctly and tightly worn on the face or head to further meet the requirements of low total inward leakage, comfort, interpersonal communication, visual beauty or the like, as well as various demands for long-time wearing under the virus epidemic. Hence, taking the aforementioned issues together, if it is possible to design and produce a kind of protective masks which fit correctly and naturally on the 3-dimensional structure of the face according to the characteristics of the mouth-nose area of the user's head shape and face shape, and have a front frame opening allowing the combination with the intended protective medium material such that it can be applied with various types of protective medium materials (e.g., light-transmitting filters, non-light-transmitting filters, or other existing masks) based on user's demands, thereby allowing to be used in different environments under the condition of maintaining good tightness and long-term comfort, and also providing features of flexible use and replacement for protective medium materials having different characteristics; accordingly, the present invention should be an optimal solution therefore.

[0008] US 695,403 discloses an improved face protector or mask, comprising a body of flexible material having a central opening and above the same a nose-strap provided with a flexible piece of metal, which is adapted to conform closely to the nose of the wearer and retain in use the shape thus imparted to it, and the reticulated concavo-convex pieces of wire-netting covering the said opening, and sponge filling held therein.

[0009] US 4,671,271 discloses a protective facial mask covering the oral and nasal cavities. It slips over the user's head and comprises a single generally cylindrical, generally tubular, piece of an expandable impervious ma-

terial open at each end. Two diametrically opposed ear slots and an opening below and extending between the ear slots hold the mask in place and provide for better conformity to the user's head. A filtered breathing cannula on the interior of the mask allows air to enter the nasal cavity only.

SUMMARY OF THE INVENTION

[0010] The object of the present invention is achieved by a tight joint and fixation carrier according to claim 1 and a method according to claim 7. The depending claims relate to preferred embodiments.

[0011] The present invention discloses a tight joint and fixation carrier for protective medium materials which can be applied for fixedly positioning and tightly jointing a protective medium material in correspondence with the mouth-nose area of a human body, comprising: a carrier body, made of a flexible material and corresponding to the mouth and nose areas thereby surrounding to form a connection with the protective medium material and including a front frame body which has a front frame opening, wherein the upper edge of the front frame body is attached to the bridge of a nose, the wings of the nose and a cheekbone, while the lower edge of the front frame body is wrapped around the front part of the mandible, and the two sides of the front frame body extend from the cheekbone and the mandible towards the ear to form a lateral frame body having a lateral frame opening and an ear frame body having an ear frame opening, and then further extend from the ear frame opening towards a rear-neck part to form a rear-neck fixation component.

[0012] More specifically, the present invention can apply a 3-dimensional information extraction device to reconstruct the characteristics of the head and face of the human body and prepare the carrier body through a production equipment such that the carrier body conforms to the characteristics of the head and face in order to correctly enable tight joint and fixation onto the head and face.

[0013] More specifically, the ear frame opening is provided for allowing the ear to pass through in position so that the ear frame body is attached to the periphery of the ear.

[0014] More specifically, the carrier body is configured with a positioning groove at the ear frame body so as to allow the wire of an ear-worn device to be fixedly placed inside the positioning groove thereby enhancing the wearing stability of the ear-worn device.

[0015] More specifically, the rear-neck fixation component on the two sides of the carrier body can be wrapped around to the rear side of the neck and connected for fixed attachment to the neck by means of hook-and-loop fasteners, buttons, magnets, glue, latches or elastic band structures, etc.

[0016] More specifically, the protective medium material is made of a light-transmitting material or a non-light-transmitting material.

[0017] According to the present invention, an abutting push component extends from the front frame body of the carrier body facing the mouth-nose area, and a clipping layer is formed between the abutting push component and the inner side of the front frame body for placing the protective medium material in position, and the tip part of the abutting push component stretches through the front frame opening of the front frame body thus further pushing the protective medium material towards outside by means of the tip part of the abutting push component so as to keep away from the mouth-nose area.

[0018] More specifically, the present invention further comprises a medium material adapter which includes an inner fixation part and an outer fixation part, in which the inner fixation part can stretch through the front frame opening in order to be combined with the inner side of the front frame body, while the outer fixation part can be combined with a 3-dimensional protective medium material.

[0019] More specifically, the carrier body is made of thermoplastic elastomer, thermosetting polymer, polyethylene, thermoplastic, thermoplastic polyester elastomer, polylactic acid, polypropylene, polyurethane, synthetic fiber, gel, silicone, rubber, resin or other suitable materials having flexible characteristics.

[0020] More specifically, the front frame body and the lateral frame body of the carrier body are installed with a thickness reinforcement layer for enhancing the tight joint feature at the positions attaching to the bridge of the nose, the wings of the nose, the cheekbones and the mandible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Figure 1A shows a disassembled structural view for the structure of the tight joint and fixation carrier for protective medium materials according to the present invention.

Figure 1B shows an assembled structural view for the structure of the tight joint and fixation carrier for protective medium materials according to the present invention.

Figure 2 shows a lateral embodiment view for wearing the tight joint and fixation carrier for protective medium materials according to the present invention.

Figure 3 shows a view for wearing the tight joint and fixation carrier for protective medium materials according to the present invention, in combination with the non-light-transmitting protective medium material.

Figure 4 shows a view for wearing the tight joint and fixation carrier for protective medium materials according to the present invention, in combination with the light-transmitting protective medium material.

Figure 5A shows an embodiment view for the struc-

ture of the positioning groove in the tight joint and fixation carrier for protective medium materials according to the present invention.

Figure 5B shows an embodiment view for the use of the positioning groove in the tight joint and fixation carrier for protective medium materials according to the present invention.

Figure 6A shows a view for the structure of the tight joint and fixation carrier for protective medium materials according to the present invention, in combination with the abutting push component.

Figure 6B shows a view for wearing the tight joint and fixation carrier for protective medium materials according to the present invention, in combination with the abutting push component.

Figure 7A shows a view for the structure of the medium material adapter in the tight joint and fixation carrier for protective medium materials according to the present invention.

Figure 7B shows a view for wearing the tight joint and fixation carrier for protective medium materials according to the present invention, in combination with the 3-dimensional protective medium material.

Figure 8 shows a view for the structure of the thickness reinforcement layer in the tight joint and fixation carrier for protective medium materials according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Initially referring to Figures 1A, 1B and 2, it can be seen that the tight joint and fixation carrier for protective medium materials according to the present invention comprises a carrier body 1 which corresponds the mouth-nose area of the human body of a user thus surrounding to form a front frame body 11 contacting the protective medium material 2, wherein the front frame body 11 includes a front frame opening 111 and the protective medium material 22 is combined to the inside or outside of the front frame body 11 by means of bonding, inlaid, latching or wrapping and can cover the front frame opening 111.

[0023] It can be also seen that the upper edge of the front frame body 11 is attached to the bridge and the wing parts of the nose, while the lower edge thereof is wrapped at the front portion of the mandible; in addition, the lateral frame bodies 12 on the two sides of the front frame body 11 further respectively extend towards the ears on the two lateral sides along the cheekbone and the two sides of the mandible to form a lateral frame body 12 having a lateral frame opening 121 and an ear frame body 13 having an ear frame opening 131, wherein each ear frame opening 131 is set up correspondingly to the ear thereby allowing the ear to pass through the opening for appropriate placement so as to make the ear frame body 13 attach around the periphery of the ear.

[0024] In addition, it can be observed that the ear frame opening 131 further extends towards the rear side of the neck to form a rear-neck fixation component 14 and, after having fixedly connecting such two surrounding rear-neck fixation components 14 around the neck, it is possible to let the user stably wear the carrier body 1. Besides, it should be noticed that the present invention previously applied a 3-dimensional extraction device to rebuild the profile characteristics of a user's head and face, and further operated a manufacture equipment to prepare and produce the carrier body 1 completely matching the extracted profile characteristics of the user's head and face, so, when the user correctly wears the carrier body 1 made by means of the aforementioned processes, the carrier body 1 can be tightly and correctly attached to the bridge and the wings of the nose, cheekbones and cover the mandible, so as to achieve the best tight joint, close fixation as well as the comfortable and cozy experiences for the user's face and head contour. Also, when applied in conjunction with various functional protective medium materials or existing masks, this can greatly increase the overall protective safety and wearing comfort.

[0025] It can be also understood that the carrier body according to the present invention may be made of thermoplastic elastomer, thermosetting polymer, polyethylene, thermoplastic, thermoplastic polyester elastomer, polylactic acid, polypropylene, polyurethane, synthetic fiber, gel, silicone, rubber, resin or any other suitable materials having flexible characteristics, and such materials can be easily cleaned and reused.

[0026] Additionally, as shown in Figure 3, the protective medium material 2 may be a non-transparent material, and the type of the protective medium material 2 may be a flat soft mask or filter material, or a 3-dimensional mask or filter material.

[0027] Or alternatively, also as shown in Figure 4, the protective medium material 2 may be a transparent material, and the type of the protective medium material 2 may be a flat soft mask or filter material, or a 3-dimensional mask or filter material; meanwhile, an air flow filter valve 31 may be installed on the protective medium material 2 thereby allowing the airflow to go in and out and be filtered between the inside and outside of the protective medium material 2.

[0028] With respect to the human head and face parts, the carrier body 1 according to the present invention exhibits the following design features:

(1) Designed for tight joint at mouth-nose area:

(a) The inner side of the upper edge in the front frame body 11 according to the present invention can be completely attached to the bridge and wings of nose and extend to the cheekbones on both sides, such that, upon wearing it, the protective medium material 2 can be tightly attached and sealed on the bridge and wings of the nose as well as the front frame opening without leaving gaps therein between so as to pre-

vent the intrusion of pollutants from outside; in addition, the water vapor generated when breathing may be also difficult to diffuse and rise up between the user's glasses and eyes, and will not produce water mist on the lenses.

(b) Besides, the inner side of the lower edge in the front frame body 11 is wrapped around the front part of the mandible of the human body such that pollutants can not enter from the lower edge of the front frame body 11.

(2) Designed for leaving blank on cheeks:

(a) It can be understood that the purpose of the lateral frame opening 121 according to the present invention is about leaving blank to reduce the weight, and also can prevent the dampness, discomfort and allergies issues on the face that may possibly occur in case of wearing the lateral frame body 12 for a long time.

(b) Leaving blank for space at the lateral frame opening 121 allows that, when the user speaks, the muscles of the cheek do not need to exert too much force for opening the mouth to overcome the surface elastic (pulling) force coming from the lateral frame 12.

(3) Designed for vertical fitting at ears:

(a) The ear frame opening 131 according to the present invention allows the ear to pass through upon wearing, and the ear frame body 13 can be wrapped in fitting around the vertical surface of the head near the ear part, so that the present invention does not need to rely on the reaction force on the auricle to fix the carrier body 1 thus largely enhancing the comfort experience and durability when wearing and also preferably reserving space for wearing earphones, earrings or other accessories.

(b) Moreover, as shown in Figures 5A and 5B, the carrier body 1 is configured with a positioning groove 132 around the periphery of the ear frame opening 131 thereby allowing the wire 51 of an ear-worn device 5 to be fixedly accommodated in the positioning groove 132 in order to improve the wearing stability of the ear-worn device 5; therefore, upon wearing the carrier body 1, it will help to fix the wired ear-worn device, and is particularly helpful for safety and practical convenience in usage scenarios such as cycling, driving, sports etc.

(4) Designed for rear-neck fixation:

(a) The rear-neck fixation component 14 according to the present invention extends around from the ear frame body 13 on both sides towards the lower rear direction to the rear side of the neck, which can reduce the influence on the beauty of the user's hairstyle due to the pressure exerted by the bandage.

(b) The rear-neck fixation component 14 can be fixedly connected by means of a connection part 141 (e.g., hook-and-loop fasteners, buttons, magnets, glue, latches or elastic band, or similar structures etc.) so that the user can quickly and conveniently put on and take off and also place the carrier body 1 in the correct position of the head.

(c) In addition, the use of the rear-neck fixation component 14 can further lessen the hooking pressure and discomfort co-existing upon wearing conventional masks which need to hook on the auricle.

[0029] As shown in Figures 6A and 6B, it can be seen that an abutting push component 15 extends from the front frame body 11 of the carrier body 1 facing the mouth-nose area, and a clipping layer 17 is formed between the abutting push component 15 and the inner side of the front frame body for placing the protective medium material 2 in position, and the tip part 151 of the abutting push component 15 stretches through the front frame opening 111 of the front frame body 11 thus further pushing the protective medium material 2 towards outside by means of the tip part 151 of the abutting push component 15 so as to keep away from the mouth-nose area.

[0030] Next, as shown in Figure 7A, it is possible to make the front frame body 11 be combined with a medium material adapter 16 which includes an inner fixation part 161 and an outer fixation part 162, as shown in Figure 7B, and it can be observed that the inner fixation part 161 can pass through the front frame opening 111 to join with the front frame body 11 by means of bonding, inlay, latching or covering methods or the like, while the outer fixation part 162 may be jointed with a 3-dimensional protective medium material 4 (e.g., a 3-D mask or 3-D filter material) by means of bonding, inlay, latching or covering methods or the like. Accordingly, this structure can help convert the specific opening shape of the 3-dimensional protective medium material 4 itself into a condition well integrated with the carrier body 1, retaining the original protective ability of the 3-dimensional protective medium material 4, and also greatly Improving the reliability of tight joint and fixation upon using the 3-dimensional protective medium material 4 as well as the comfort during long-time wearing.

[0031] Furthermore, as shown in Figure 8, it can be appreciated that the carrier body 1 can be provided with a thickness reinforcement layer 18 at the positions corresponding to the bridge and the wings of the nose, the cheekbones, and the mandible, in which the thickness reinforcement layer 18 can strengthen the adhesion stability to the bridge and the wings of the nose, the cheekbones, and the mandible in contact with the carrier body

1, and also can help enhance the closure effect of the protective medium material 2 and the medium material adapter 16 to the mouth-nose areas.

[0032] Compared with other conventional technologies, the tight joint and fixation carrier for protective medium materials according to the present invention provides the following advantages:

(1) According to professional medical research, when wearing a mask as a Personal Protection Equipment (PPE), the core key to its protective effects in practice may be: a. "Total Inward Leakage (TIL)", b. "Filter Penetration (FP)", in which the former is mainly determined by the degree of sealing completeness between the mask body structure and the user's head; regarding to this, the present invention is designed to reconstruct the profile characteristics of the human head and face by means of the 3-dimensional information extraction device and prepare a tight joint and fixation carrier for the protective medium material which can be closely attached to the 3-dimensional features of the personal head and face, such that, upon wearing the carrier body, there is no need to apply excessively strong external force, and it can be naturally and correctly fixed and tightly jointed to the user's head and face. In this way, not only can it achieve great "Total Inward Leakage" results, it also significantly solves the discomfort and skin damage issues caused by general fixed-size masks after being worn for a long time.

(2) The present invention is designed to include an opening at the mouth-nose area that can be jointed with the protective medium material, thereby allowing to flexibly match the protective medium materials having different characteristics in response to different environmental requirements, so that "Filter Penetration" of the user's mask can be between high breathing resistance (i.e., high filter safety) and low breathing resistance (low filer safety) in order to offer a chance to obtain more balanced and comfortable choice and effect.

(3) The carrier body according to the present invention is made of flexible materials and can be also cleaned and used repeatedly, which provides a high degree of protection, practicality, convenience and economic benefits for users who may be required to wear masks for a long duration of time, such as medical craws, police, and counter service personnel; meanwhile this may also greatly reduce the consumptions of long-term massively produced raw materials of disposable masks during the global epidemic prevention period, and the secondary environmental pollution issues collaterally caused by waste.

(4) The protective filter material utilized in the present invention may provide light-transmitting properties, so it can break through shielding limitation of conventional masks, and other people can see the user's facial expressions and smiles; in this way, even under the social distance restriction of physical contact, it can help social interpersonal communication and shorten the psychological distance.

(5) The carrier body according to the present invention can be fixedly and tightly attached to the user's head and face, so it can reserve the space required for objects regularly worn on the face and head without being interfered by wearing the mask thus maintaining the normal usage of such personal items (e.g., the nose and ear frames of eyeglasses, earphones, earrings, hats, hair accessories, etc.), which helps keep the external image and perception required by the user in daily lives and work.

Major Component Symbol Description

[0033]

1	Carrier Body
11	Front Frame Body
111	Front Frame Opening
12	Lateral Frame Body
121	Lateral Frame Opening
13	Ear Frame Body
131	Ear Frame Opening
132	Positioning Groove
14	Rear-Neck Fixation Component
141	Connection Part
15	Abutting Push Component
151	Tip Part
16	Medium Material Adapter
161	Inner Fixation Part
162	Outer Fixation Part
17	Clipping Layer
18	Thickness Reinforcement Layer
2	Protective Medium Material
31	Air Flow Filter Valve
4	3-Dimensional Protective Medium Material

5 Ear-Worn Device

51 Wire

6 User

Claims

1. A tight joint and fixation carrier for protective medium materials, applied for fixedly positioning and tightly jointing a protective medium material in correspondence with the mouth-nose area of a human body, comprising:

   a carrier body (1), made of a flexible material and corresponding to the mouth and nose areas thereby surrounding to form a connection with the protective medium material (2) and including a front frame body (11) which has a front frame opening (111), wherein the upper edge of the front frame body (11) is attached to the bridge of a nose, the wings of the nose and a cheekbone, while the lower edge of the front frame body (11) is wrapped around the front part of the mandible, and the two sides of the front frame body (11) extend from the cheekbone and the mandible towards the ear to form a lateral frame body (12) having a lateral frame opening (121) and an ear frame body (13) having an ear frame opening (131), and then further extend from the ear frame opening (131) towards a rear-neck part to form a rear-neck fixation component (14), wherein an abutting push component (15) extends from the front frame body (11) of the carrier body (1) facing the mouth-nose area, and a clipping layer (17) is formed between the abutting push component (15) and the inner side of the front frame body (11) for placing the protective medium material (2) in position, and the tip part of the abutting push component (15) stretches through the front frame opening (111) of the front frame body (11) thus further pushing the protective medium material (2) towards outside by means of the tip part of the abutting push component (15) so as to keep away from the mouth-nose area; and
   wherein the lateral frame opening (121) is designed for leaving blank on cheeks.

2. The tight joint and fixation carrier for protective medium materials according to Claim 1, wherein the ear frame opening (131) is provided for allowing the ear to pass through in position so that the ear frame body (13) is attached to the periphery of the ear.

3. The tight joint and fixation carrier for protective medium materials according to Claim 1, wherein the carrier body (1) is configured with a positioning groove at the ear frame body (13) so as to allow the wire (51) of an ear-worn device (5) to be fixedly placed inside the positioning groove (132) thereby enhancing the wearing stability of the ear-worn device (5).

4. The tight joint and fixation carrier for protective medium materials according to Claim 1, wherein the rear-neck fixation component (14) on the two sides of the carrier body (1) can be wrapped around to the rear side of the neck and connected for fixed attachment to the neck by means of hook-and-loop fasteners, buttons, magnets, glue, latches or elastic band structures, etc.

5. The tight joint and fixation carrier for protective medium materials according to Claim 1, wherein further comprising a medium material adapter (16) which includes an inner fixation part (161) and an outer fixation part (162), in which the inner fixation part (161) can stretch through the front frame opening (111) in order to be combined with the inner side of the front frame body (11), while the outer fixation part (162) can be combined with a 3-dimensional protective medium material (4).

6. The tight joint and fixation carrier for protective medium materials according to Claim 1, wherein the front frame body (11) and the lateral frame body (12) of the carrier body (1) are installed with a thickness reinforcement layer (18) for enhancing the tight joint feature at the positions attaching to the bridge of the nose, the wings of the nose, the cheekbones and the mandible.

7. Method of manufacturing the tight joint and fixation carrier according to any one of claims 1 to 6,

   - reconstructing the characteristics of the head and the face of a human body by a 3-dimensional information extraction device; and
   - preparing the carrier body (1) through a production equipment such that the carrier body (1) conforms to the characteristics of the head and face in order to correctly enable tight joint and fixation onto the head and face.

Patentansprüche

1. Dichter Verbindungs- und Befestigungsträger für Schutzmedium-Materialien, der zum festen Positionieren und dichten Verbinden eines Schutzmedium-Materials in Übereinstimmung mit dem Mund-Nasen-Bereich eines menschlichen Körpers verwendet wird, umfassend:

einen Trägerkörper (1), der aus einem flexiblen Material hergestellt ist und dem Mund- und Nasenbereich entspricht und diesen dadurch umgibt, um eine Verbindung mit dem Schutzmediummaterial (2) zu bilden, und der einen vorderen Rahmenkörper (11) aufweist, der eine vordere Rahmenöffnung (111) aufweist, wobei die obere Kante des vorderen Rahmenkörpers (11) an dem Nasenrücken, den Nasenflügeln und einem Wangenknochen befestigt ist, während der untere Rand des vorderen Rahmenkörpers (11) um den vorderen Teil des Unterkiefers gewickelt ist, und die beiden Seiten des vorderen Rahmenkörpers (11) sich von dem Wangenknochen und
dem Unterkiefer in Richtung des Ohrs erstrecken, um einen seitlichen Rahmenkörper (12) mit einer seitlichen Rahmenöffnung (121) und einen Ohrrahmenkörper (13) mit einer Ohrrahmenöffnung (131) zu bilden, und sich dann weiter von der Ohrrahmenöffnung (131) in Richtung eines hinteren Halsteils erstrecken, um eine hintere Halsfixierungskomponente (14) zu bilden,
wobei sich eine anstoßende Druckkomponente (15) von dem vorderen Rahmenkörper (11) des Trägerkörpers (1) in Richtung des Mund-Nasen-Bereichs erstreckt und eine Klemmschicht (17) zwischen der anstoßenden Druckkomponente (15) und der Innenseite des vorderen Rahmenkörpers (11) ausgebildet ist, um das Schutzmediummaterial (2) in Position zu bringen, und der Spitzenteil der anstoßenden Druckkomponente (15) sich durch die vordere Rahmenöffnung (111) des vorderen Rahmenkörpers (11) erstreckt, wodurch das Schutzmediummaterial (2) mittels des Spitzenteils der anstoßenden Druckkomponente (15) weiter nach außen gedrückt wird, um vom Mund-Nasen-Bereich entfernt zu bleiben; und
wobei die seitliche Rahmenöffnung (121) so gestaltet ist, dass sie die Wangen freilässt.

2. Dichter Verbindungs- und Befestigungsträger für Schutzmedium-Materialien nach Anspruch 1, wobei die Ohrrahmenöffnung (131) dafür vorgesehen ist, das Ohr in einer Position durchzulassen, so dass der der Ohrrahmenkörper (13) an der Peripherie des Ohrs befestigt ist.

3. Dichter Verbindungs- und Befestigungsträger für Schutzmedium-Materialien nach Anspruch 1, wobei der Trägerkörper (1) mit einer Positionierungsnut am Ohrrahmenkörper (13) ausgestaltet ist, so dass der Draht (51) einer am Ohr getragenen Vorrichtung (5) fest in der Positionierungsnut (132) platziert werden kann, wodurch die Tragestabilität der am Ohr getragenen Vorrichtung (5) verbessert wird.

4. Dichter Verbindungs- und Befestigungsträger für Schutzmedium-Materialien nach Anspruch 1, wobei die hintere Halsbefestigungskomponente (14) an den beiden Seiten des Trägerkörpers (1) um die Rückseite des Halses gewickelt und zur festen Befestigung am Hals mittels Klettverschlüssen, Knöpfen, Magneten, Klebstoff, Riegeln oder elastischen Bandstrukturen usw. verbunden werden kann.

5. Dichter Verbindungs- und Befestigungsträger für Schutzmedium-Materialien nach Anspruch 1, wobei er ferner einen Medienmaterialadapter (16) umfasst, der ein inneres Befestigungsteil (161) und ein äußeres Befestigungsteil (162) aufweist, wobei sich das innere Befestigungsteil (161) durch die Vorderrahmenöffnung (111) erstrecken kann, um mit der Innenseite des Vorderrahmenkörpers (11) kombiniert zu werden, während das äußere Befestigungsteil (162) mit einem 3-dimensionalen Schutzmedium-Material (4) kombiniert werden kann.

6. Dichter Verbindungs- und Befestigungsträger für Schutzmedium-Materialien nach Anspruch 1, wobei der vordere Rahmenkörper (11) und der seitliche Rahmenkörper (12) des Trägerkörpers (1) mit einer dicken Verstärkungsschicht (18) versehen sind, um das Merkmal der dichten Verbindung an den Stellen zu verstärken, die am Nasenrücken, den Nasenflügeln, den Wangenknochen und dem Unterkiefer ansetzen.

7. Verfahren zur Herstellung des dichten Verbindungs- und Befestigungsträger nach einem der Ansprüche 1 bis 6,

- Rekonstruktion der Merkmale des Kopfes und des Gesichts eines menschlichen Körpers durch eine 3-dimensionale Informationsextraktionsvorrichtung; und
- Herstellen des Trägerkörpers (1) durch eine Produktionsanlage, so dass der Trägerkörper (1) den Eigenschaften des Kopfes und des Gesichtes entspricht, um eine korrekte feste Verbindung und Fixierung auf dem Kopf und dem Gesicht zu ermöglichen.

Revendications

1. Support de jonction étanche et de fixation pour matériaux de milieu de protection, appliqué pour positionner de façon ferme et de manière fixe et pour joindre de manière étanche un matériau de milieu de protection en correspondance avec la zone de bouche-nez d'un corps humain, comprenant :

un corps de support (1), réalisé en un matériau souple et correspondant aux zones de bouche

et de nez et de ce fait, les entourant pour former une connexion avec le matériau de milieu de protection (2) et incluant un corps de structure avant (11) qui comporte une ouverture de structure avant (111), dans lequel le bord supérieur du corps de structure avant (11) est lié au pont d'un nez, aux ailes du nez et à un os zygomatique, tandis que le bord inférieur du corps de structure avant (11) est enveloppé autour de la partie avant de la mandibule, et les deux côtés du corps de structure avant (11) sont étendus depuis la joue et la mandibule en direction de l'oreille pour former un corps de structure latérale (12) comportant une ouverture de structure latérale (121) et un corps de structure d'oreille (13) comportant une ouverture de structure d'oreille (131), puis sont ensuite étendus depuis l'ouverture de structure d'oreille (131) en direction d'une partie arrière du cou pour former un composant de fixation sur l'arrière du cou (14), dans lequel un composant de poussée pour venue en butée (15) est étendu depuis le corps de structure avant (11) du corps de support (1) de manière à faire face à la zone de bouche-nez, et une couche d'attache (17) est formée entre le composant de poussée pour venue en butée (15) et le côté interne du corps de structure avant (11) pour placer en position le matériau de milieu de protection (2), et la partie d'extrémité du composant de poussée pour venue en butée (15) est étirée au travers de l'ouverture de structure avant (111) du corps de structure avant (11), d'où ainsi une poussée supplémentaire exercée sur le matériau de milieu de protection (2) en direction de l'extérieur au moyen de la partie de pointe du composant de poussée pour venue en butée (15) de manière à assurer un maintien à distance de la zone de bouche-nez ; et
dans lequel l'ouverture de structure latérale (121) est conçue pour laisser les joues libres.

2. Support de jonction étanche et de fixation pour matériaux de milieu de protection selon la revendication 1, dans lequel l'ouverture de structure d'oreille (131) est ménagée pour permettre, en position, le passage au travers de l'oreille de telle sorte que le corps de structure d'oreille (13) soit lié sur la périphérie de l'oreille.

3. Support de jonction étanche et de fixation pour matériaux de milieu de protection selon la revendication 1, dans lequel le corps de support (1) est configuré de manière à comporter une rainure de positionnement au niveau du corps de structure d'oreille (13) de manière à permettre la mise en place de façon ferme et de manière fixe du fil (51) d'un dispositif porté sur ou dans l'oreille (5) à l'intérieur de la rainure de positionnement (132), ce qui améliore la stabilité en termes de port du dispositif porté sur ou dans l'oreille (5).

4. Support de jonction étanche et de fixation pour matériaux de milieu de protection selon la revendication 1, dans lequel le composant de fixation sur l'arrière du cou (14) sur les deux côtés du corps de support (1) peut être enveloppé autour du côté arrière du cou et connecté pour sa liaison de façon ferme et de manière fixe sur le cou au moyen de moyens de fixation à boucles et crochets, de boutons, d'aimants, de colle, de moyens de fermeture par verrouillage ou de structures à base de bande élastique, etc.

5. Support de jonction étanche et de fixation pour matériaux de milieu de protection selon la revendication 1, comprenant en outre un adaptateur de matériau de milieu (16) qui inclut une partie de fixation interne (161) et une partie de fixation externe (162), dans lequel la partie de fixation interne (161) peut être étirée au travers de l'ouverture de structure avant (111) afin d'être combinée avec le côté interne du corps de structure avant (11), tandis que la partie de fixation externe (162) peut être combinée avec un matériau de milieu de protection en trois dimensions (4).

6. Support de jonction étanche et de fixation pour matériaux de milieu de protection selon la revendication 1, dans lequel le corps de structure avant (11) et le corps de structure latérale (12) du corps de support (1) sont installés avec une couche de renforcement d'épaisseur (18) pour améliorer la caractéristique de jonction étanche au niveau des positions de liaison sur le pont du nez, les ailes du nez, les os zygomatiques et la mandibule.

7. Procédé de fabrication du support de jonction étanche et de fixation selon l'une quelconque des revendications 1 à 6, comprenant les étapes suivantes :

- la reconstruction des caractéristiques de la tête et du visage d'un corps humain au moyen d'un dispositif d'extraction d'information en trois dimensions ; et
- la préparation du corps de support (1) par l'intermédiaire d'un équipement de production de telle sorte que le corps de support (1) soit conforme aux caractéristiques de la tête et du visage afin de permettre de manière correcte une jonction étanche et une fixation sur la tête et le visage.

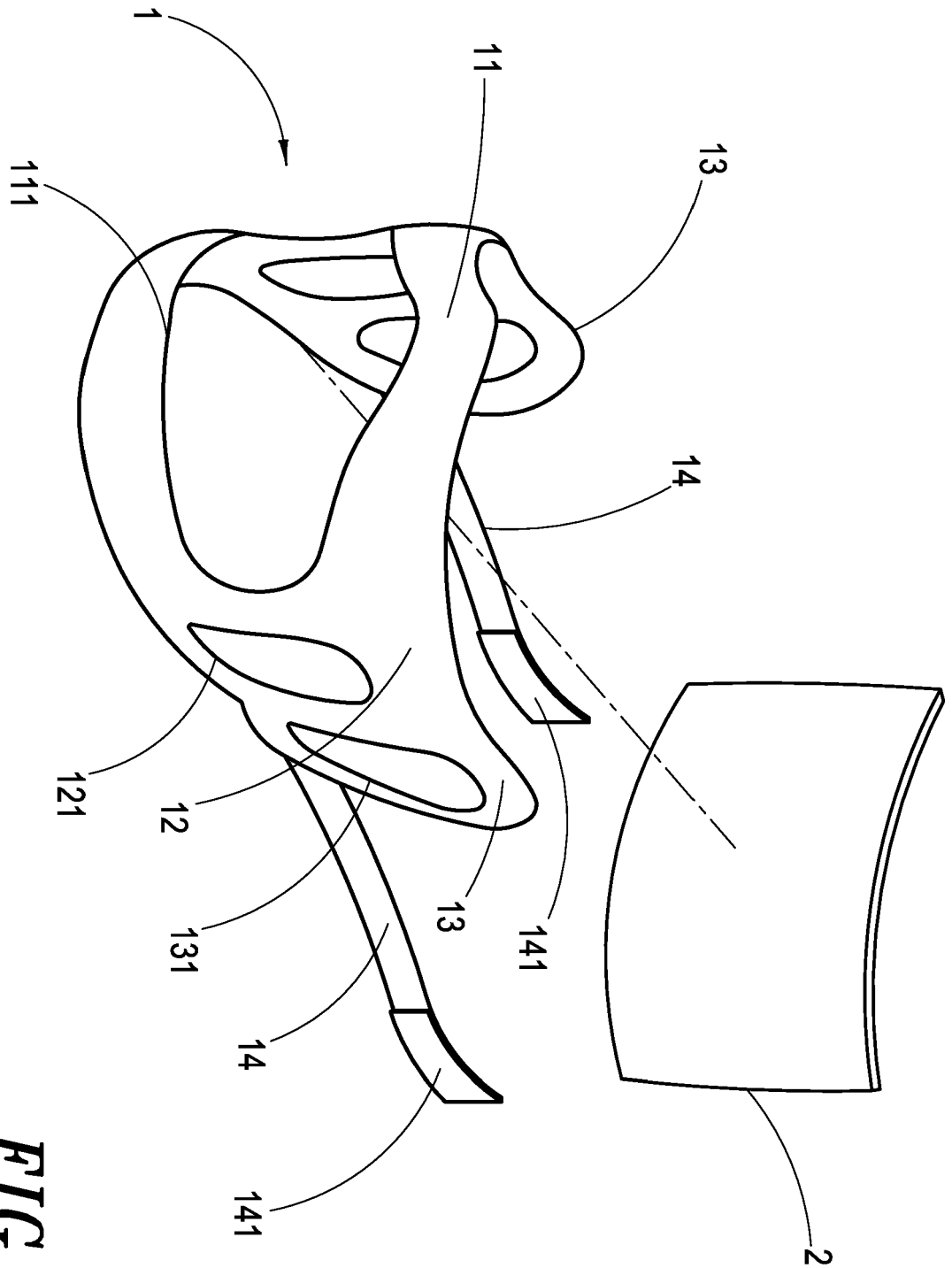

FIG. 1A

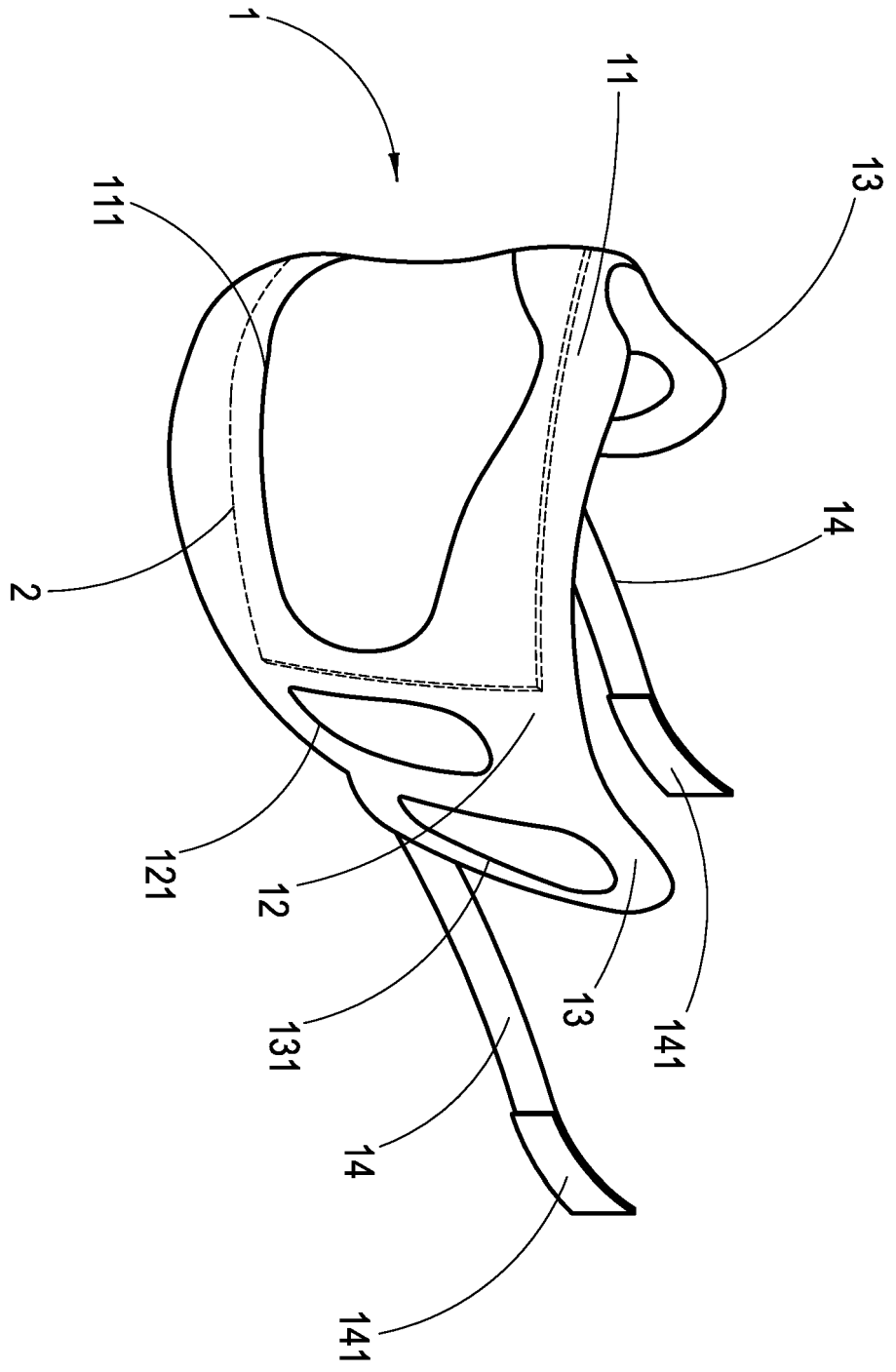

FIG. 1B

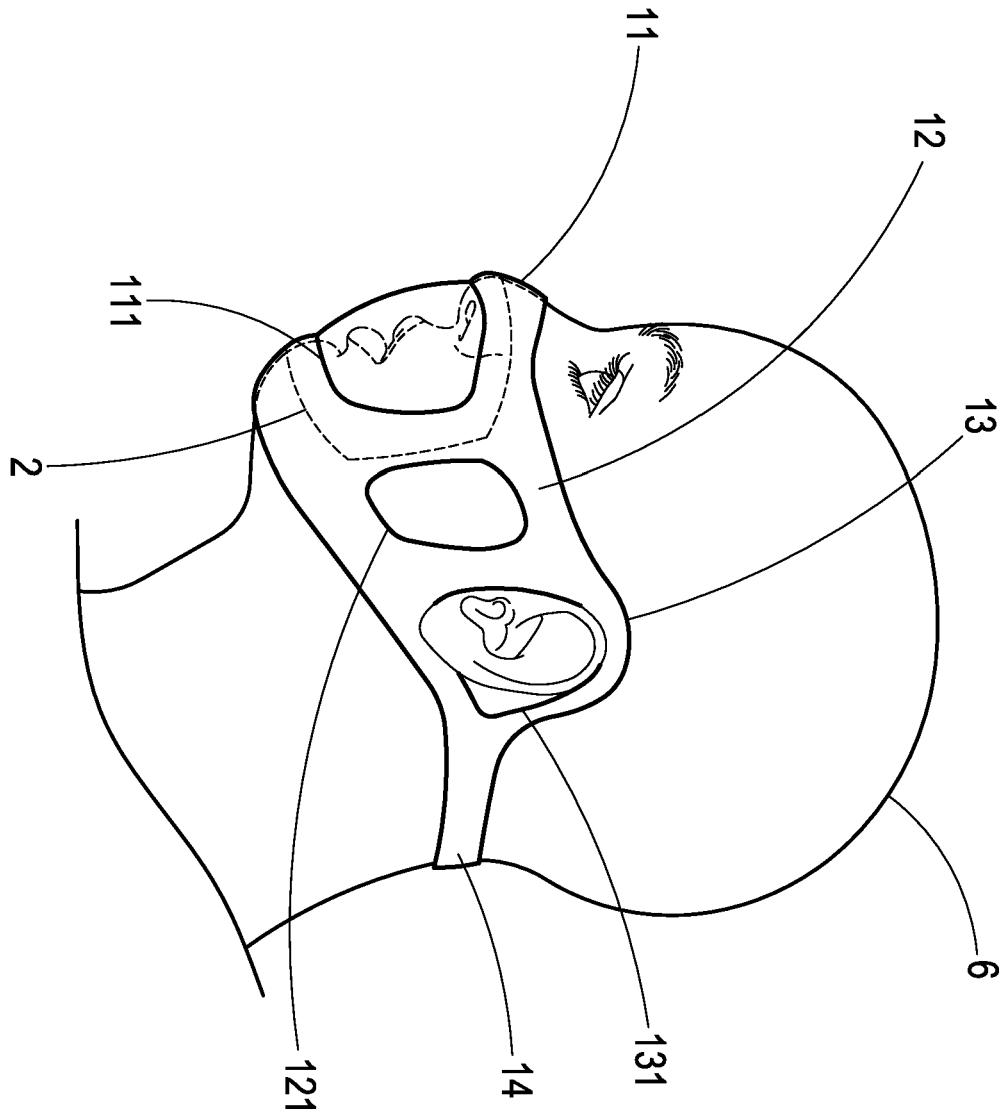

FIG.2

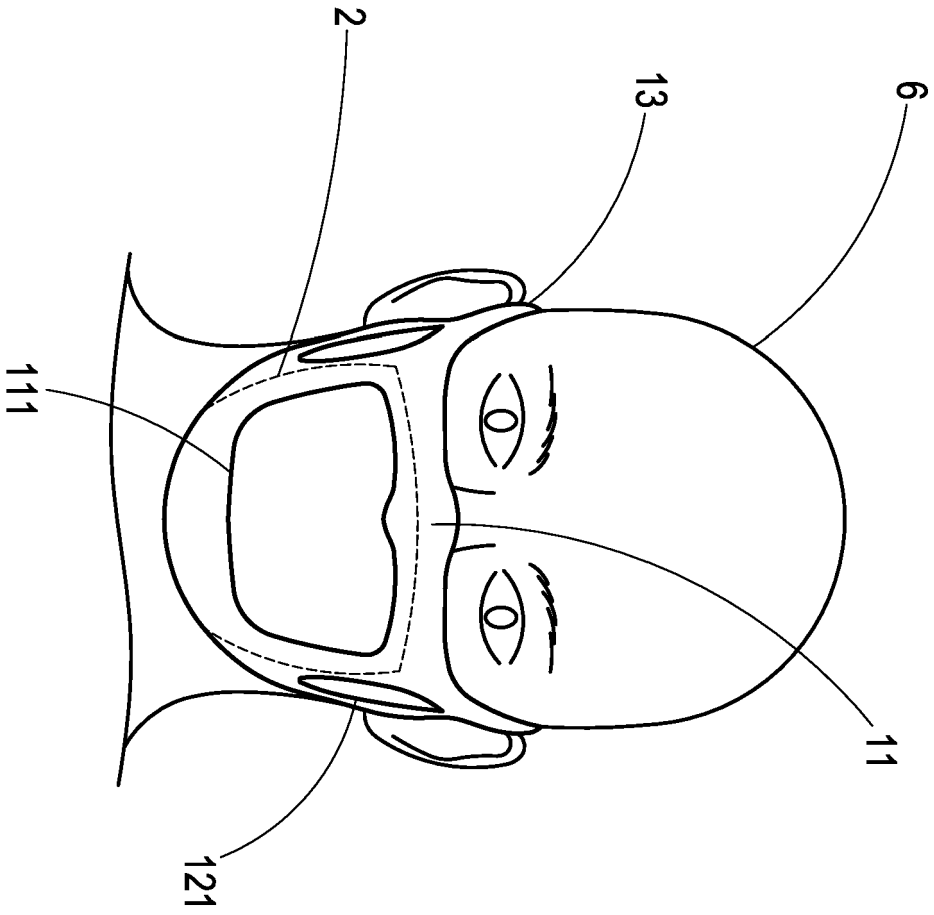

FIG.3

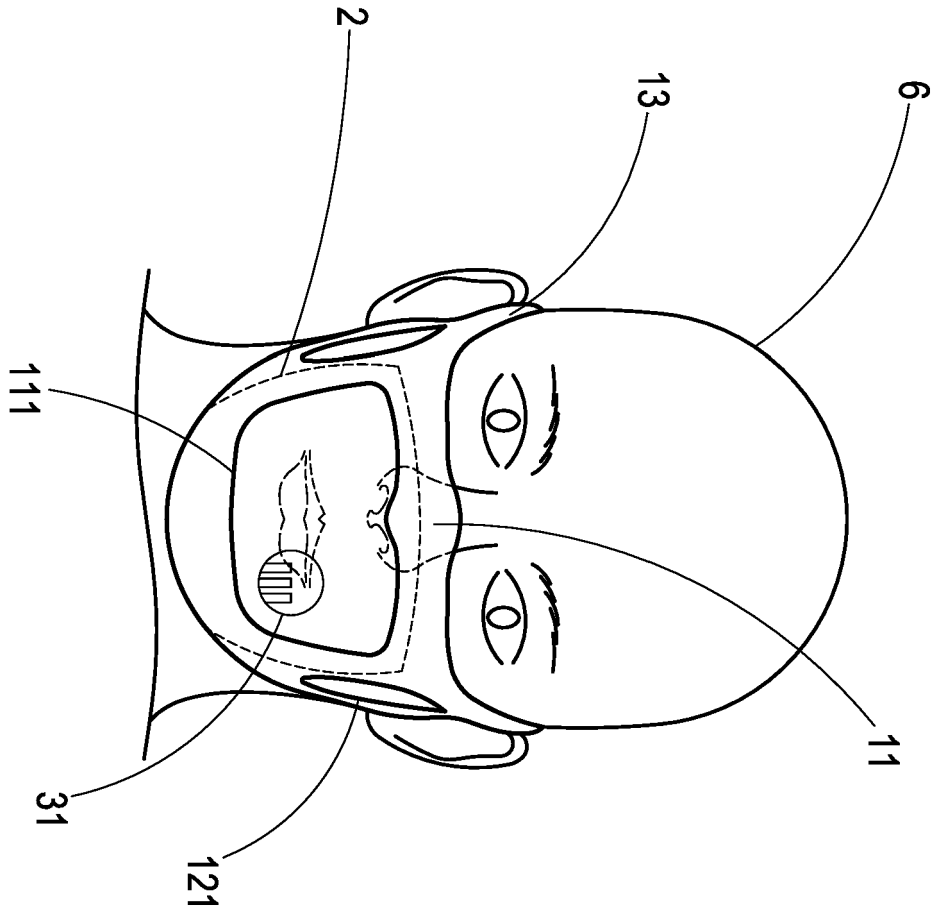

FIG. 4

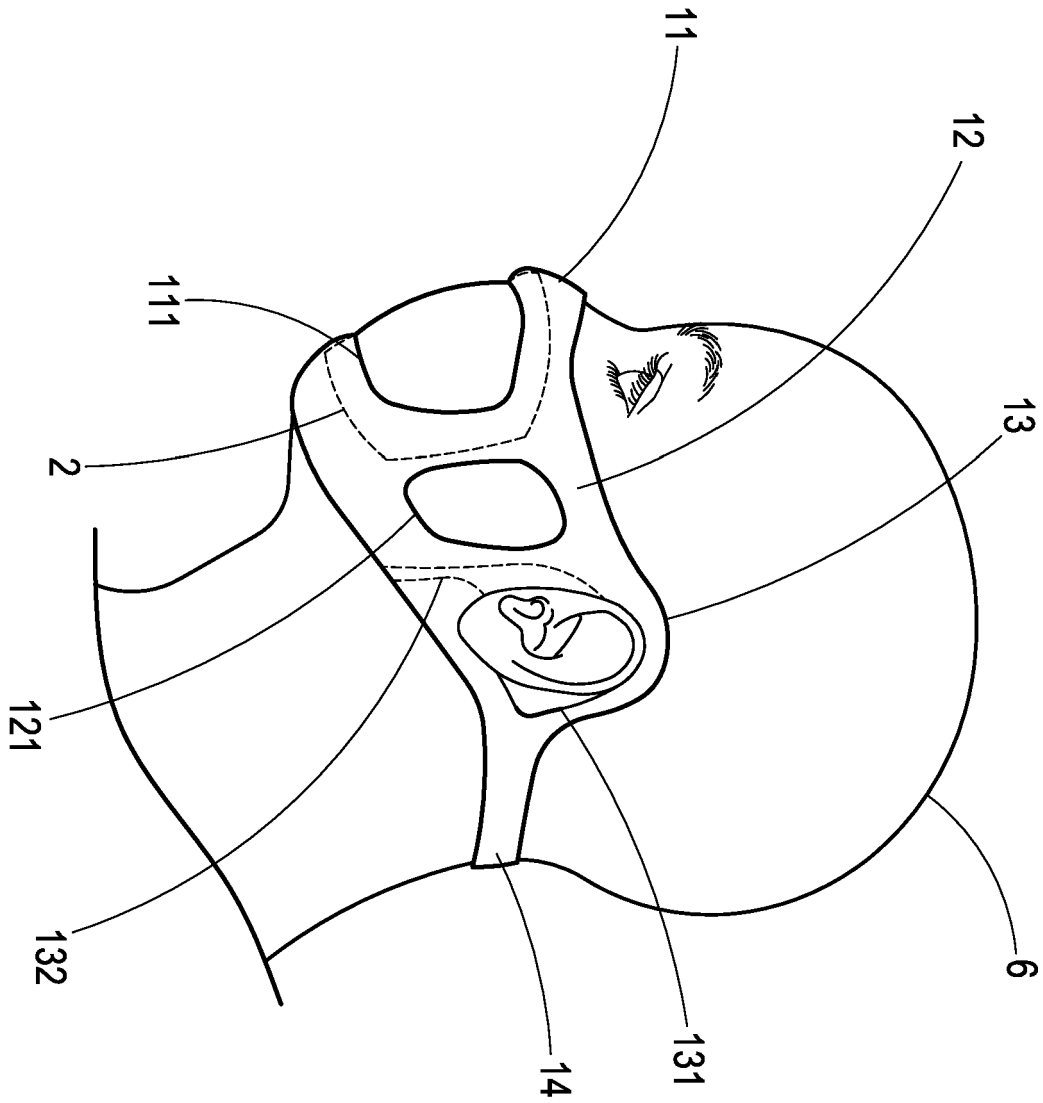

FIG.5A

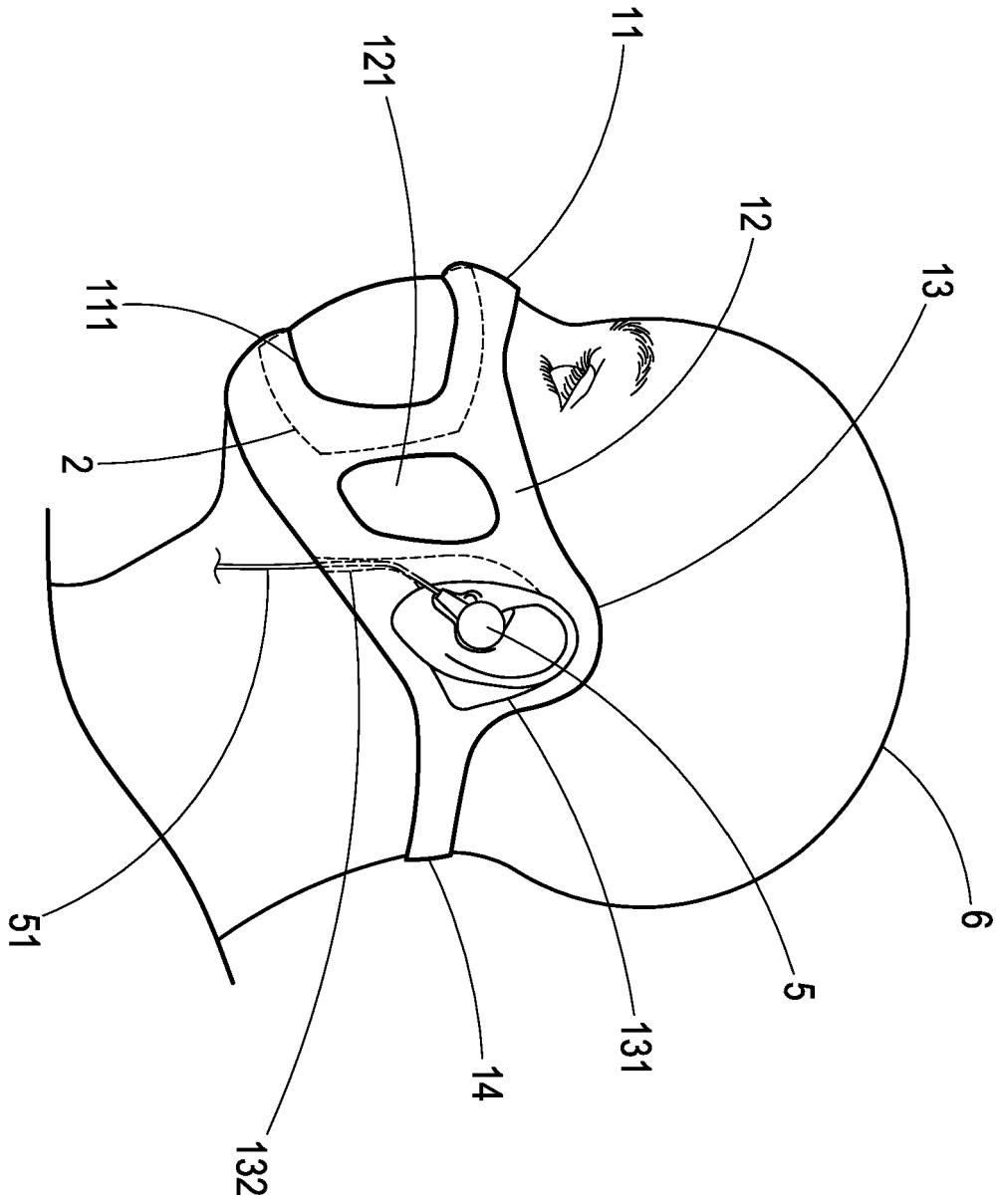

FIG.5B

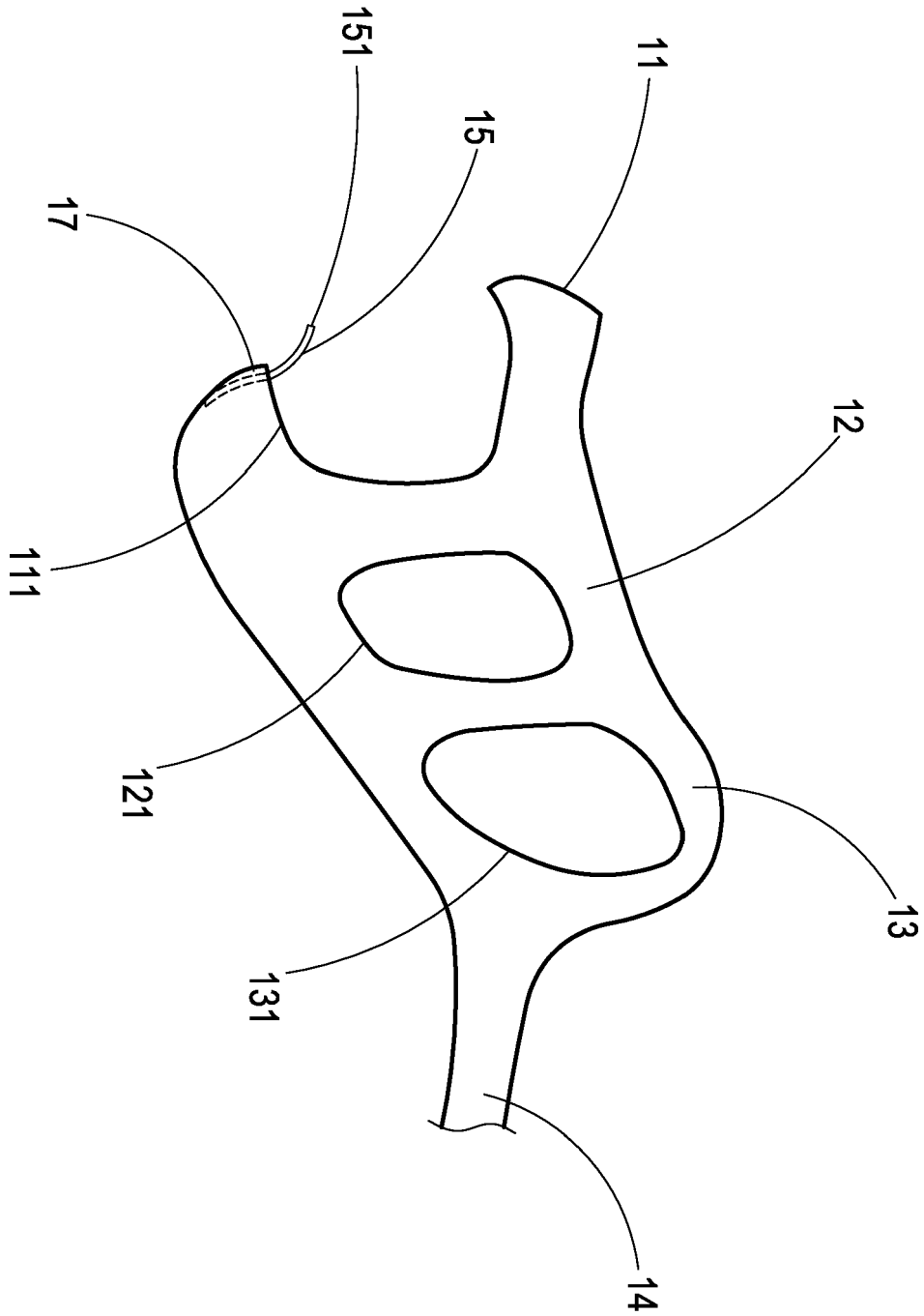

FIG. 6A

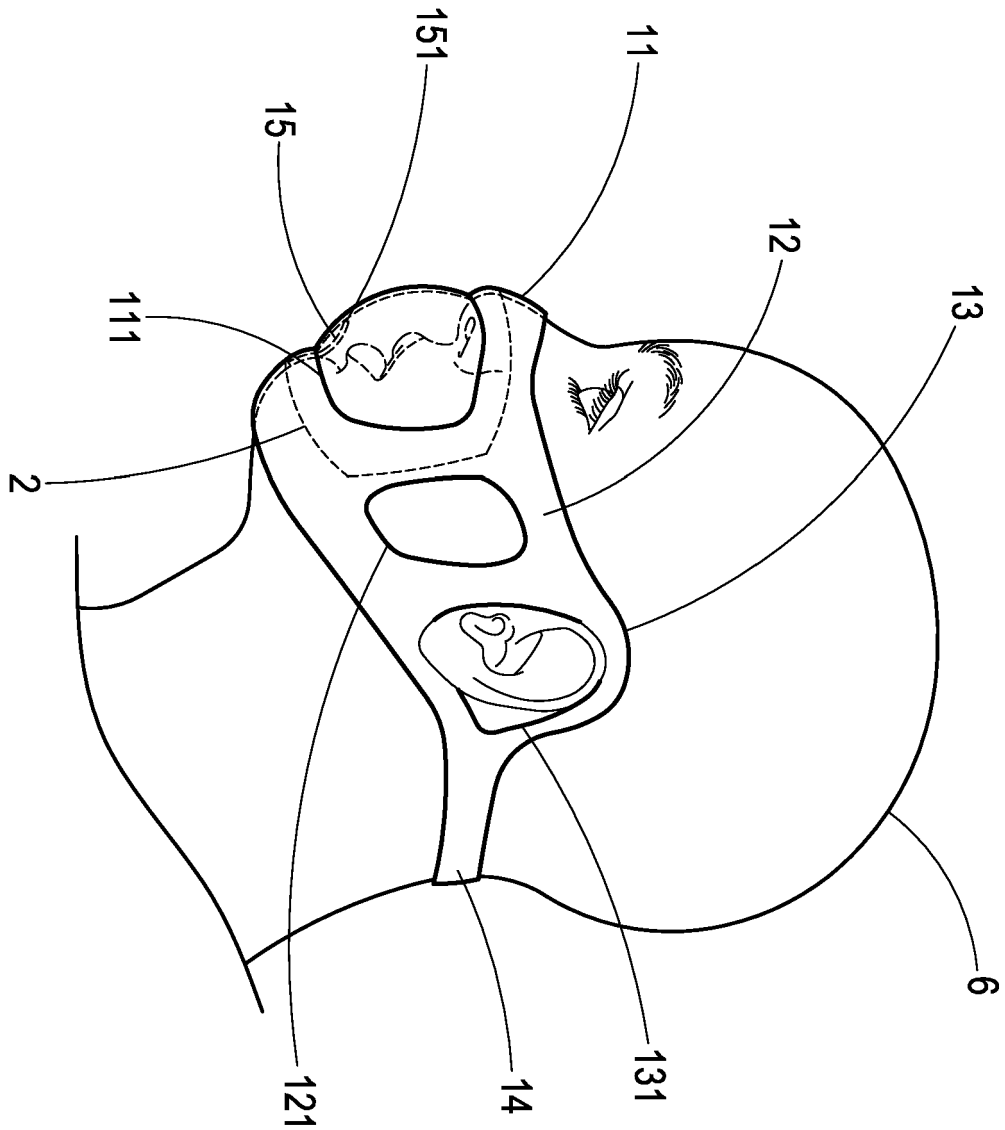

FIG.6B

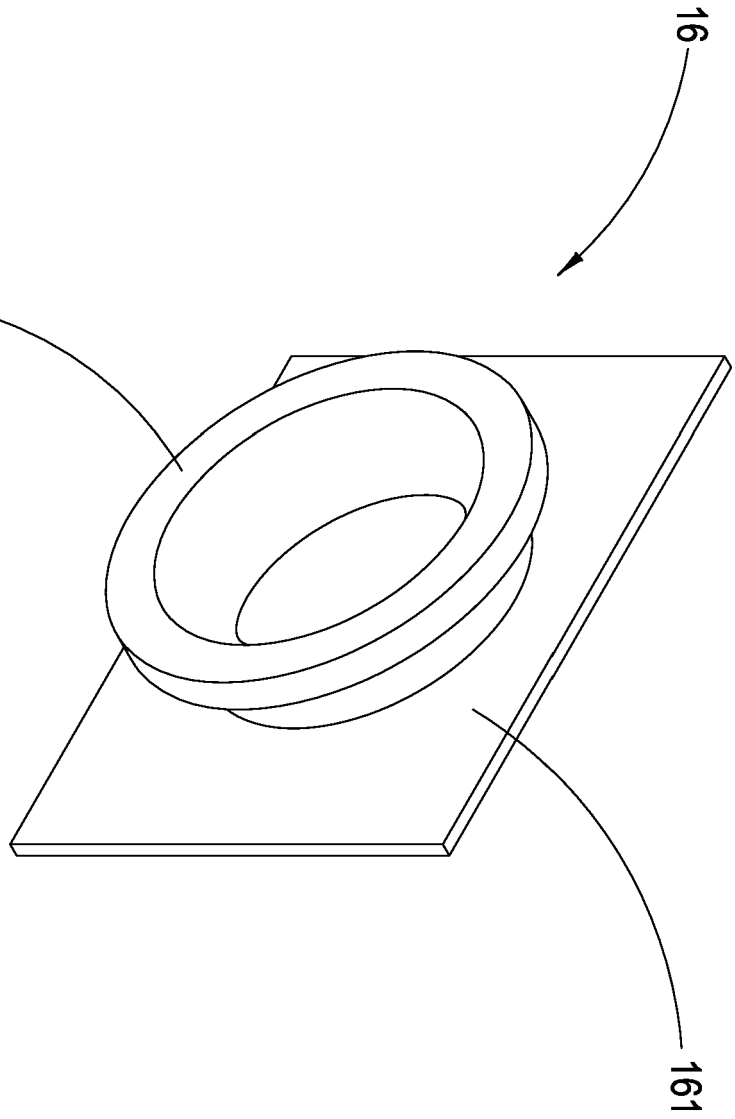

FIG. 7A

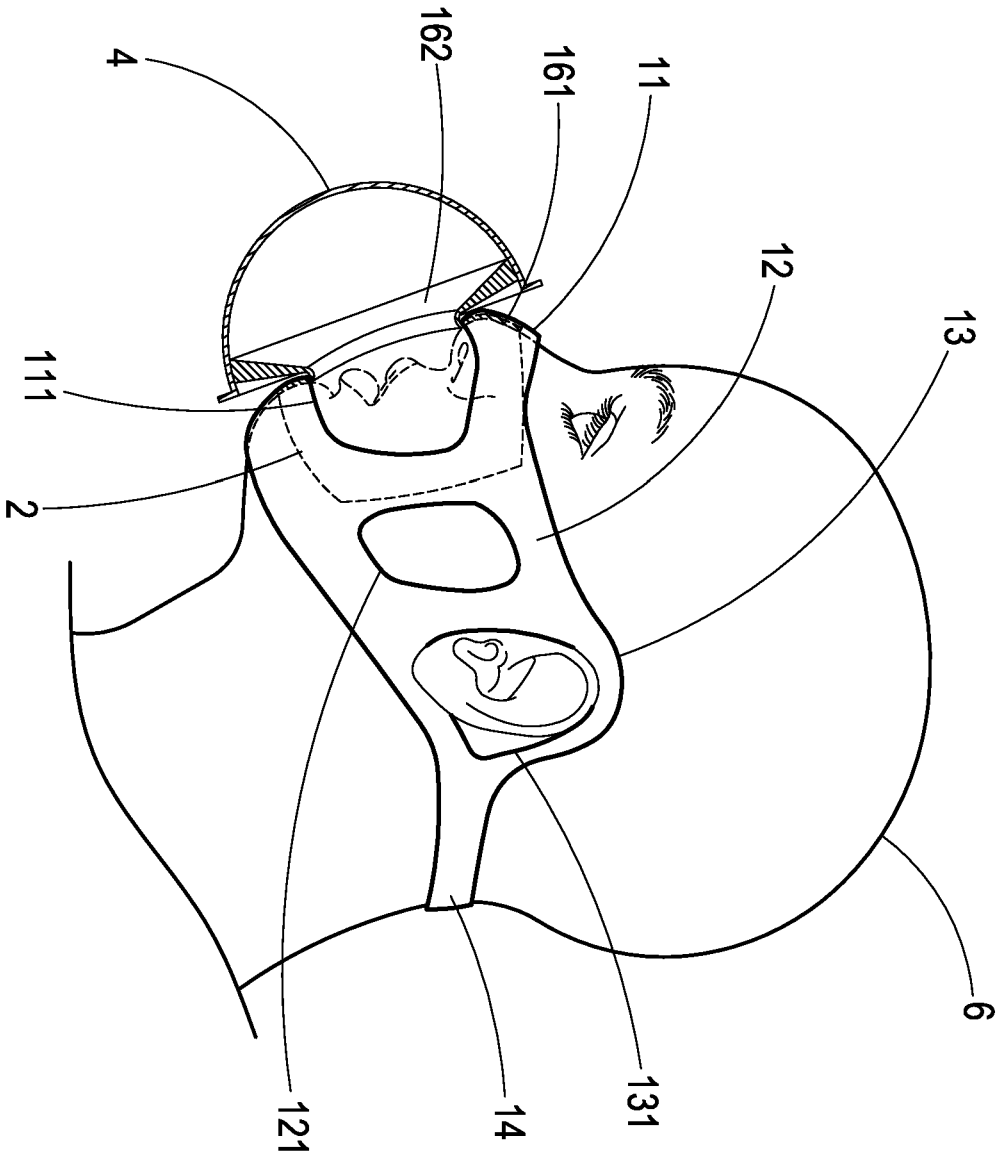

FIG. 7B

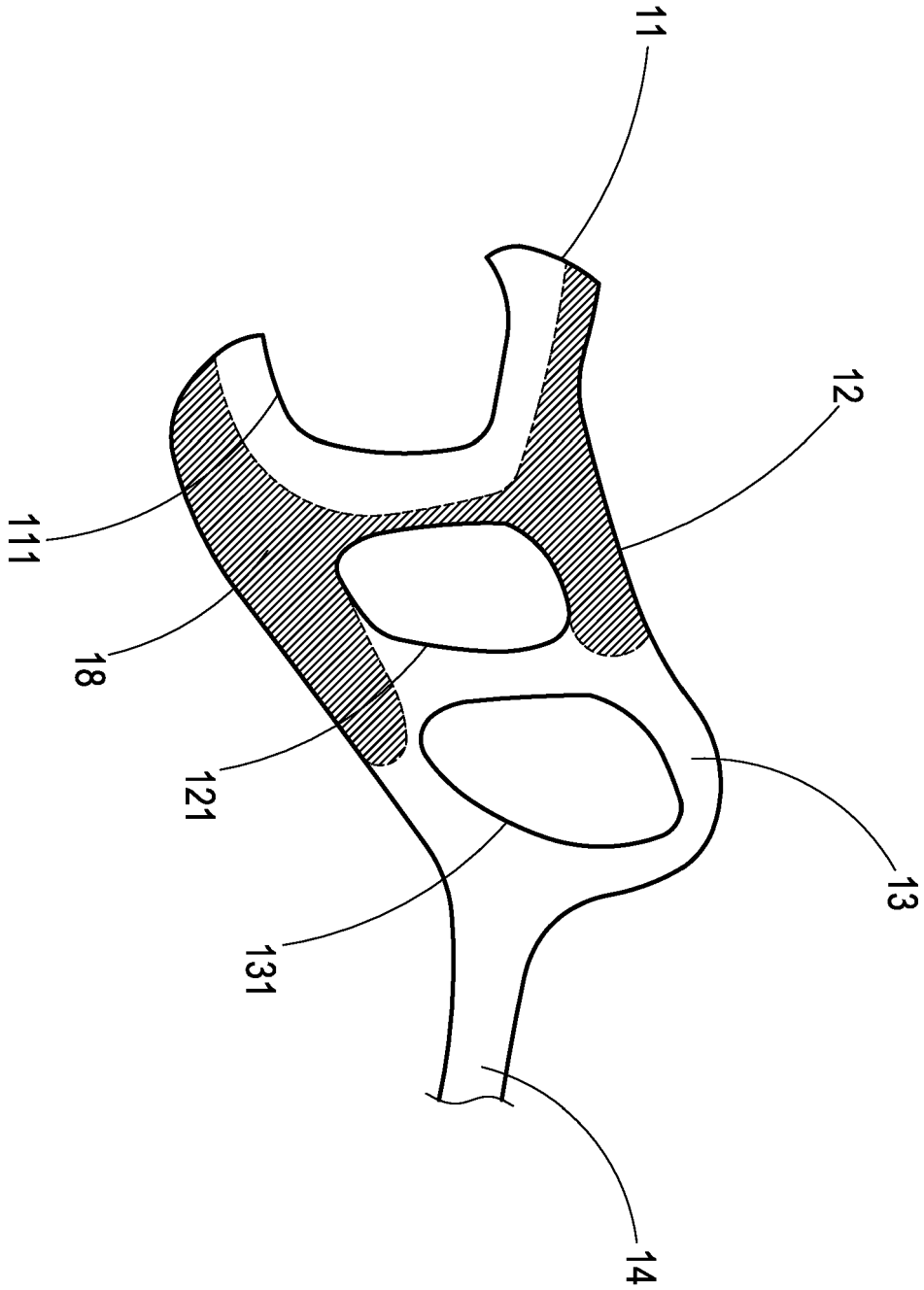

FIG.8

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

- US 695403 A **[0008]**
- US 4671271 A **[0009]**