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(54) **EAR DEVICE AND FACE MASK RETENTION COMPRISING SAID EAR DEVICE**

(57) An ear device comprising an upper part configured to be hooked over the intertragical notch, said upper part further comprising a surface area which is in contact with the inside part of the intertragical notch of a wearer's ear.

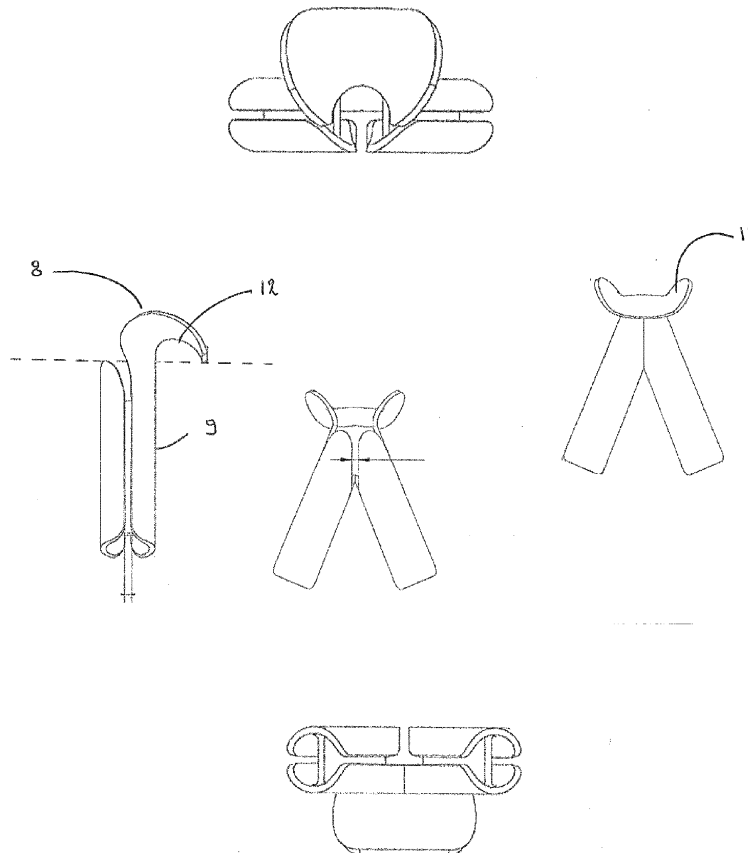


Fig. 2B

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Description

Field of the Invention

[0001] The present invention concerns an ear device and a face mask retention system comprising said ear device.

Background of the invention:

[0002] As is commonly known, wearing a face mask is often considered as cumbersome, uncomfortable and definitely not fashionable. This is even more pronounced in case a surgical mask is worn or when the face mask is worn for longer continuous periods of time. Most face masks are retained on a wearer's head by elastic loops designed to fit over a wearer's outer ear or alternatively, with straps designed to be tied over a wearer's head. While face masks with elastic loops fitting over a wearer's ear are easy and fast to put on, the elastic loops have the disadvantage that there is no suitable one size, fit all and hence, the length of the loops often needs to be adapted to fit a wearer, wherein such adaptation of the length in most cases results in a knot or a kind of length regulator is present over the outer ear of a wearer, which knot or regulator is a source of irritation for most people. If the loops are not adjusted, the mask often does not fit securely well along the face and openings such as major gaps or bag like formation are created and hence do not offer the full protection of the mask. Moreover, the elastic loops are sensitive to wear and to loss of elasticity thereby resulting in the need to, on a regular basis, (re-)adapt length of the loops in order to retain the face mask in position. Notwithstanding the need for adaptation of the loops, the most often complaints about face masks retained with elastic loops is that the elastic loops exert a pressure on the outer ear, especially at a backside of the outer ear, resulting in irritation of the skin at the contact points between the elastic loops and a wearer's skin and sometimes in pain at the outer ear or even headaches.

[0003] In addition, face masks with straps to be tied over a wearer's head are far more difficult to apply and remove the face masks with elastic loops and can be painful too when the wearer's hair gets stuck in the knot. Also the knot can loosen when wearing the face mask for longer periods such that the face mask does no longer snugly fits on a wearer's head and hence potentially loses its protection functionality.

[0004] Earplug type devices exist where a plug is brought into the ear canal and are typically used in hearing devices. These are not well suited for mass production since each has to be adapted to each user for the stable positioning and comfortable use. This is particularly due to the opening in the ear that the ear plug is brought into differs from person to person. Said ear plug will block the ear canal and appear uncomfortable to a user. Moreover the natural production of ear wax will not escape, thus necessitating flushing of the ear at regular

intervals.

[0005] Given the present and future threat of virus infections, there is a continued need for the use of efficient and effective masks and face coverings especially in those circumstances where social distancing cannot be achieved such as close contact services i.e. hospitals, hair dress saloons and the like where customers and staff will be required to wear these masks and face coverings. Both for the customer and service provider there is a need to be able to work either around the ear of the customer when performing the service needed or for the service provider to combine with other face intervening devices such as stethoscope and the like.

[0006] At the same time, mask retention system and ear buds such as android and apple earphones need to be compatible with wearing both a mask and ear buds at the same time. In addition there is a need for mask related ear devices which are well suited for use with mobile apparatuses and whereby the ear device should have a form that makes it easy to stow it in a pocket, bag or the like when not in use together with the mask.

[0007] It is clear from the above that there remains a need for a secure efficient and effective face mask retention system and ear devices which meet the above mentioned needs.

The objective of the present invention is to avoid these previously described disadvantages and limitation and simultaneously provide a further improvement in stability and comfortable attachment of an ear device with the possibility and necessity of further functionality such as a face mask retention system.

Summary of the Invention

[0008] The present invention is directed to an ear device comprising an upper part (8) configured to hook (Fig 2 A/B) over the intertragical notch of a wearer's ear.

[0009] According to another main embodiment, the present invention is directed to a face mask retention system comprising:

- a) ear device comprising an upper part configured to be hooked over the intertragical notch of a wearer's ear.
- b) the ear device comprising a lower part having one or more extended parts said extended parts configured to engage with one or more elastic members
- c) one or more elastic members configured for retaining the face mask on a wearer's head, said elastic members connected to and transferring a face mask retaining force to said upper part;

Description of the Figures

[0010]

Fig. 1 illustrates a face mask with a face mask retention system in accordance with the present inven-

tion

Fig 2 A illustrates an ear device in accordance with the present invention comprising an upper part and lower part with two extended parts

Fig. 2 B illustrates an ear device in accordance with the present invention comprising parts configured to provide clamping between the tragus and the anti tragus of a wearer's ear

Fig. 2 C illustrates an ear device in accordance with the present invention comprising a single extended part

Fig. 2 D/E illustrates elastic members and ear device in accordance with the present invention comprising an upper part and extended part which is connected and/or forms part of a strap comprising said elastic members (Fig 2 D) ;

Fig 2 F illustrates a lower part of the ear device as such comprising means to connect to the elastic members and means to connect to the upper part.

Fig 3 illustrates the part of a human ear specifying the intertragical notch, the tragus and antitragus

Fig 4 A/B illustrates the face mask retention system in accordance with the present invention

Fig 5 illustrates the face mask in accordance with the present invention.

Detailed Description

[0011] According to a main aspect of the present invention, the present invention is directed to an ear device (Fig 2 A/B/C/D/E/F) comprising an upper part (1) configured to hook over the intertragical notch of a wearer's ear. According to one embodiment the ear device comprise a lower part (Fig 2A) comprising one or more extended parts such as one or more arm like extension(s) said extended parts configured to protrude from the ear.

[0012] According to yet a further embodiment, the lower part comprising two extended parts such as two arm like extensions (Fig 2 A/B) According to another embodiment, the arm like extensions comprises means openings/ slot configured for receiving the elastic members of a mask. According to a further embodiment, the arm like extensions comprises means for receiving and fastening the elastic members Fig 2 A/B/C).

[0013] According to a preferred execution, Fig 2 B/C the upper part comprises parts configured to clamp the ear device between the tragus and anti tragus of a wearer's ear.

[0014] The ear device in accordance of the present invention keeps the ear canal open towards the outer environment for improved comfort compared to a plug type of ear device which closes or blocks the ear canal. The upper part of the ear device of the present invention is configured and dimensioned such in that the device does not abut the auditory canal directly, allowing the formation of an opening between the auditory canal and the surroundings. The ear device comprises an upper part having a curvature C1C2C3 in such a way that the

upper part hooks over the intertragical notch when the ear device is positioned on the ear. The segments of curvature (C1 C3) and associated surface of the corresponding upper part is configured such to ensure contact surface of the ear unit placed over the notch providing support and stability and thereby increased comfort. In a particular execution, the curvature is segmented in three segments comprising segments C1 C2 and C3 (Fig 2A/B/C) whereby C1 defines an area which is in contact with the outer part of the intertragical notch; C2 defines an area which has a support function and makes contact onto the upper part of the intertragical notch whereas C3 defines an area which provides for the hooking function over the intertragical notch..

[0015] The upper part preferably comprises side parts configured to clamp between the tragus and the antitragus. More in particular, the present invention is directed to an ear device comprising an upper part configured to be hooked over the intertragical notch, said upper part further comprising a side part having a wing-like structure.

[0016] The upper part preferably comprises one or more side parts such as wings. In such case the ear device becomes a saddle like shape. According to a further embodiment, the ear device comprise a lower part (2) comprising one or more extended parts. Said extended parts may be arm like extensions which serve as guiding channels for the elastomeric members of the mask to be guided along the face such that optimal tension can be provided for overall efficiency and effectiveness of the mask retention system as a whole. Two arm like V-shaped extensions such as in Fig 1 are ideal in this respect.

[0017] Fig 2 A/B/C illustrates such an embodiment where the lower part exists of two extended parts. The extended parts form a V-shape thereby optimally guiding the elastomeric members through this V-pathway. The ear device of the present invention provides for an adjustable and fashionable way of wearing a mask. At the top of the lower part, an opening (Fig2 C) is formed at one side of the device at the point of the two extended parts connection thereby forming an access starting point for receiving and fastening the elastic members. The elastic members can then be pulled alongside and inside the guiding channels of the extended parts and turned around as many times needed to provide for the right tension and fitting of the mask. Alternatively, no turn arounds are necessary if the user himself shorten the elastic members prior to attachment by making a knot in the elastic members. The width and the length of the guiding channels of the extended parts and the internal dimensions of the extended parts may vary depending on the type and thickness of the elastic members and/or the wearer. The length of the extended parts and/or extended parts with increased internal dimension can compensate for different sizes of faces. The elastic members can be fully integrated into the extended parts leading to a fashionable aesthetically acceptable ear device. Pre-

ferred extended parts are in the form of a tube, being hollow with a baffle in the center of the tube (Fig 2 A/B/C)

[0018] According to one embodiment the ear device comprise a lower part (2) having one or more arm like extension(s) said arm like extension configured to protrude from the ear According to yet a further embodiment, the lower part comprising two arm like extensions. According to another embodiment, the arm like extensions comprises means openings/ slot configured for receiving the elastic members of a mask. According to another embodiment, the arm like extensions comprises means for fastening the elastic members such as the baffles for winding up the elastic members. According to yet another separate embodiment (Fig 2 F), the lower part of the ear device as such may further comprises means to connect to the elastic members and means to connect to the upper part. According to a further embodiment the ear device connects comprises means for engaging earbuds such as an earphone. The upper and lower part and the extended parts of the device in accordance with the present invention may form a single body or may be releasable attached to each other.

[0019] According to another main embodiment, the present invention is directed to a face mask retention system comprising:

- a) ear device comprising an upper part configured to be hooked over the intertragical notch of a wearer's ear.
- b) the ear device comprising a lower part having one or more extended parts said extended parts configured to engage with one or more elastic members
- c) one or more elastic members configured for retaining the face mask on a wearer's head, said elastic members connected to and transferring a face mask retaining force to said upper part;

whereby the one or more elastic members are connected to said lower part. By doing so the face mask retaining force biases the surface of the upper part against the intertragical notch.

[0020] In another main aspect, the present invention is directed to a face mask retention system comprising:

- a) an ear device comprising an upper part configured to be hooked over the intertragical notch of a wearer's ear.
- b) the ear device comprising a lower part having a single extension(s) said extension configured to connect with one or more elastic members
- c) one or more elastic members configured for retaining the face mask on a wearer's head, said elastic members connected to and transferring a face mask retaining force to said upper part;

wherein the one or more elastic members are connected to said lower part.

[0021] As illustrated in Fig. 1, 4A/B and 5, a face mask

is retained on a wearer's face by a face mask retention system according to the present invention.

[0022] The face mask is preferably made of a gauze or non-woven fabric and has a predominantly rectangular or trapezium like outline designed to cover both mouth and nose of a wearer. The material wherein the face mask is manufactured can be either elastic (=stretching) or non-elastic. The face mask has two longitudinal side edges, extending predominantly horizontally when correctly worn by a wearer that is in upright position and two transversal side edges extending between the longitudinal side edges. The gauze or non-woven fabric may have a multiple layer build-up and/or can comprise a pocket for receiving a filter element as is known in the art. Providing a pocket for receiving a filter element is especially desired for face masks made in an elastic gauze, as when putting the gauze under tension by stretching the material might result in increased pore sizes in the gauze. The face mask can be made in transparent material or comprise a transparent section, in particular to not block sight on a wearer's mouth.

[0023] In a first embodiment, the gauze or non-woven fabric has a predominantly rectangular outline or with a trapezium like outline wherein the longitudinal side edges extend substantially parallel and differ slightly in length. The face mask retention system in this case comprises elastic members connected to on the one hand, the face mask and on the other hand, the ear device of the present invention.

[0024] In a most basic execution, four elastic members are provided, each connected to, on the one hand, a different corner of the face mask and, on the other hand to the ear device in accordance of the present invention, wherein the elastic members connected to the corners of a same transversal edge of the face mask are connected to the same ear device in accordance with the present invention, thereby defining a two triangles, the angles of which are the corners of one transversal side edge and the connection between the concerned elastic members and the ear device.

[0025] The ear device can be either disposable and designed for single or limited use, or made more rigidly for multiple uses and are preferably made in pressed paper or a plastic material and have an outer surface, at least in zones such as C1 C2 C3 where the ear device is designed to contact human skin, that either has a very low surface roughness or is cushioned or coated with an elastic material with haptic feel.

[0026] The elastic members are connected (Fig 2 A B C) or do form part (Fig 2 E) of the extended parts of ear device. In accordance with the present invention, the lower part and extended parts members are dimensioned such that, when a wearer puts on the face mask with the ear device of the present invention, a force F_1 , shown in Fig.4, is exerted on the upper part of the ear device that extends substantially parallel to a length direction of the intertragical notch, in other words a force that biases the upper part of the ear device onto the intertragical notch,

said force thus acting against an upward tilting movement of the extended parts of the lower part of the ear device, which upward tilting movement is typically used to remove the ear device from a wearer's ear. The forces F_1 , applied on both ear device, results in maintaining forces F_2 on both sides of the face mask, thereby securing the face mask in place on the wearer's face, where the face mask is securely and efficiently held on a wearer's face by the face mask retention system with the ear device of the present invention.

[0027] The elastic members of the face mask retention system can be formed by four separate elastic members each connected to a corner of the face mask by sewing or by extending through a hole provided at a corner of the face mask.

[0028] Alternatively, as shown in 2 D, two elastic members can be provided, one extending along each longitudinal side edge of the face mask such that each elastic member defines a side edge of the two triangles formed by the face mask retention system. In such case, the elastic members can extend through a channel formed along each longitudinal side edge in the face mask or alternatively can be sewn to a longitudinal side edge of the face mask and create a physical connection between both earbuds. In such case, the elastic members can be connected directly to the lower part of the ear device of the present invention by a single extended part (Fig 2 C). Said extended part can then be connected such as fitted around or within the elastic member

[0029] For all embodiments disclosed supra, the ear device are compatible or can be further configured to comprise integrated speakers and headphones/(telephone), either wired or wireless with a Bluetooth connection.

References:

[0030]

1. Face mask
2. Top longitudinal edge of face mask
3. Bottom longitudinal edge of face mask
- 4a&b. Transversal side edges of face mask
5. Face mask retention system
6. Elastic members
7. Ear device
8. Upper part of the ear device
9. lower part of the ear device
- 10 adaptor piece (Fig 2 F)
- 11 wings
- 12 hook curvature C1 C2 C3
- 13 opening
- 14 guiding channel
- 15 slit
- 16 metal insert

[0031] The present invention is also directed to a face mask comprises two guides, one along each transversal

side edge, each guide defined by a pair of slits provided in the gauze or non-woven fabric of the mask and configured to receive an elastic loop therethrough.

[0032] Fig. 5 shows such an embodiment of the present invention, comprising a face mask preferably made of a gauze or non-woven fabric and having a predominantly rectangular or trapezium like outline designed to cover both mouth and nose of a wearer. The material wherein the face mask is manufactured can be either elastic (=stretching) or non-elastic. The face mask has two longitudinal side edges, extending predominantly horizontal when correctly worn by a wearer that is in upright position and two transversal side edges extending between the longitudinal side edges. The gauze or non-woven fabric may have a multiple layer build-up and/or can comprise a pocket for receiving a filter element as is known in the art. The face mask can be made in transparent material or comprise a transparent section, in particular not to block sight on a wearer's mouth.

[0033] According to this embodiment, the face mask comprises two guides, one along each transversal side edge, each guide defined by a pair of slits provided in the gauze or non-woven fabric of the mask and configured to receive an elastic loop therethrough. The elastic loops hereby correspond to two elastic members as defined supra in accordance with embodiments Fig 2 D and Fig 2 E, whereby the elastic members are connectable to one another two by two to provide said two elastic loops.

[0034] The above mentioned slits of each guide in the face mask are preferably positioned in a spaced apart setting, one proximate to each longitudinal side edge, whereby each elastic loop extends through one guide to obtain the aforementioned triangle when connected to an earbud. The face mask of the present invention is firmly hold close to the face due to the loops which holds down the side edges of the mask to the face. The elastic loops are hereby configured such that they can be opened to remove the loops from the guide as in a kit of parts, such that one pair of elastic loops can consecutively be used in combination with a multitude of face masks according to the present invention.

[0035] In case the face mask comprises only a single layer of material, the loops preferably extend through the guide such that the part of the loops situated between both slits of each guide, faces a wearer's face (=extends at a backside of the mask) and the remainder of the loops emerges to a front side of the mask, i.e. the visible side of the mask when correctly worn by a wearer, at the slits, from where the elastic members extend to the earbuds.

[0036] In case of a multiple layer build-up, the guide preferably extends between two consecutive layers of the mask, with the slits only extending through a outermost front layer, i.e. at the visible side of the mask when correctly worn by a wearer. In analogy with a single layer build-up of the mask, the part of the loops situated between both slits of each guide, extends between two consecutive layers of the mask and the remainder of the

loops emerges to a front side of the mask, i.e. the visible side of the mask when correctly worn by a wearer, at the slits, from where the elastic members extend to the ear-buds.

[0037] Depending on the material wherein the face mask is manufactured, it is ideal to reinforce the guides in the mask, either by adding reinforcement elements such as metal insert at the transversal edge of the mask or by a reinforced stitch line or by providing a tube between both slits of each guide, this to prevent unwanted deformation of the mask when the loops are under tension and ensure a good and comfortable fit of the face to a wearer's face.

Claims

1. An ear device comprising an upper part configured to be hooked over the intertragical notch, said upper part further comprising a surface area which is in contact with the inside part of the intertragical notch of a wearer's ear.
2. An ear device in accordance to claim 1 whereby said upper part further comprises side parts configured to clamp between the tragus and the antitragus
3. An ear device in accordance with claim 1-2 whereby said side parts is wing like structure.
4. An ear device in accordance with claim 1-3 said ear device comprising a lower part (2) comprising one or more extended parts
5. An ear device according to claim 4 where said extended parts are arm like extension(s) said arm like extension configured to protrude from the ear
6. An ear device according to claim 5 comprising two arm like extensions
7. An ear device in accordance with claims 4-6 whereby the extended parts comprise means for receiving and fastening the elastic members of a mask.
8. An ear device according to claim 4 whereby the extended part is connected or forms part of a strap comprising the elastic members
9. An ear device according to claims 1-8 whereby said upper part has a curvature C1 C2C3, whereby C1 defines an area which is in contact with the outer part of the intertragical notch; C2 defines an area which has a support function and makes contact onto the upper part of the intertragical notch whereas C3 defines an area which provides for the hooking function over the intertragical notch.

10. An ear device according to claims 4-9 whereby at the top of the lower part, an opening is formed at one side of the device at the point of the two extended parts connection thereby forming an access starting point for receiving and fastening the elastic members.

11. A face mask retention system comprising:

- a) ear device comprising an upper part configured to be hooked over the intertragical notch of a wearer's ear.
- b) the ear device comprising a lower part having one or more extended parts configured to engage with one or more elastic members
- c) one or more elastic members configured for retaining the face mask on a wearer's head, said elastic members connected to and transferring a face mask retaining force to said upper part;

wherein the one or more elastic members are connected to said lower part.

12. A face mask retention system comprising in accordance with claim 11 wherein the one or more elastic members are connected to said lower part, such that the face mask retaining force biases the surface of the upper part against the intertragical notch
13. A face mask retaining system in accordance with claims 11-12 whereby said upper part further comprises side parts configured to clamp between the tragus and the anti tragus of a wearer's ear.

14. A face mask retention system comprising:

- a) ear device comprising an upper part configured to be hooked over the intertragical notch of a wearer's ear.
- b) the ear device comprising a lower part (2) comprising one or more extended parts whereby the extended part is connected or forms part of a strap comprising the elastic members
- c) one or more elastic members configured for retaining the face mask on a wearer's head, said elastic members connected to and transferring a face mask retaining force to said upper part.

15. A face mask retention system in accordance to claim 11-14 whereby said face mask comprises two guides, one along each transversal side edge, each guide defined by a pair of slits provided in the gauze or non-woven fabric of the mask and configured to receive an elastic loop therethrough.

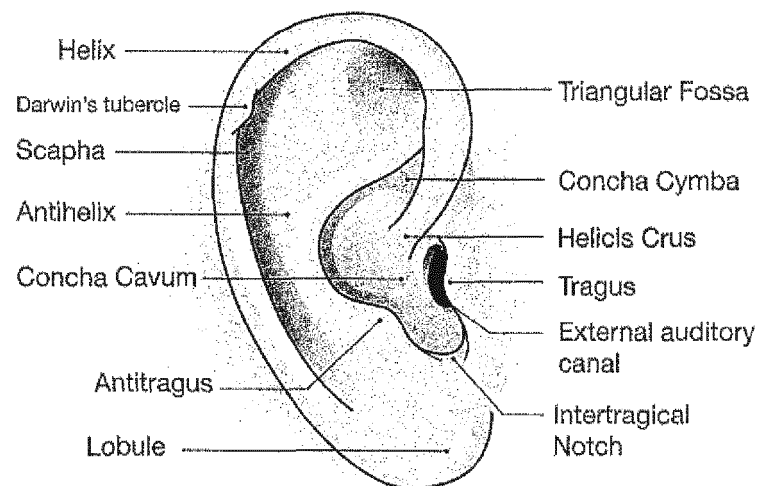
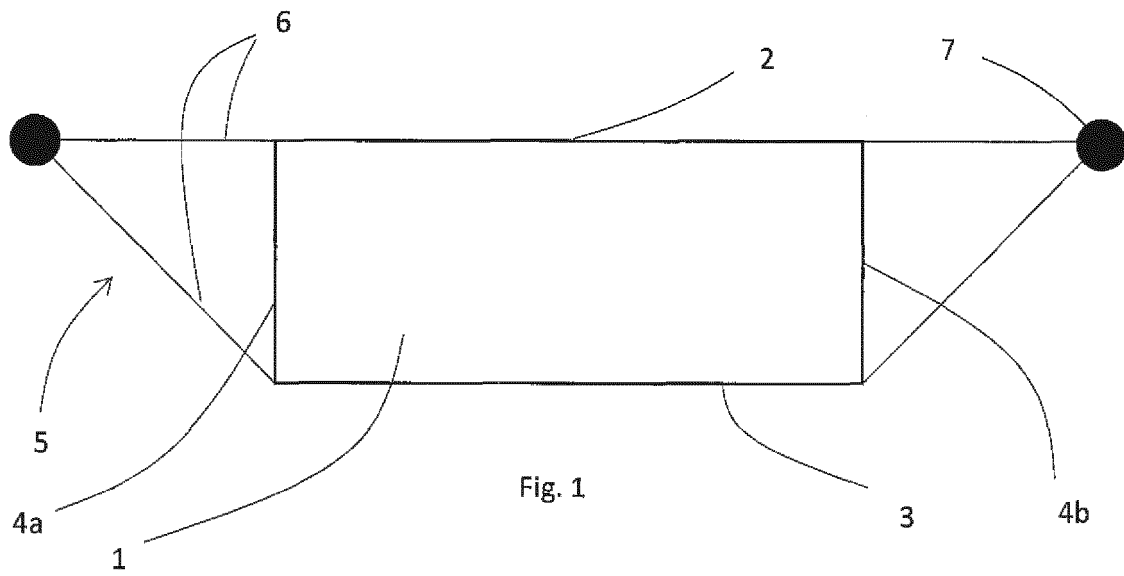


Fig. 3

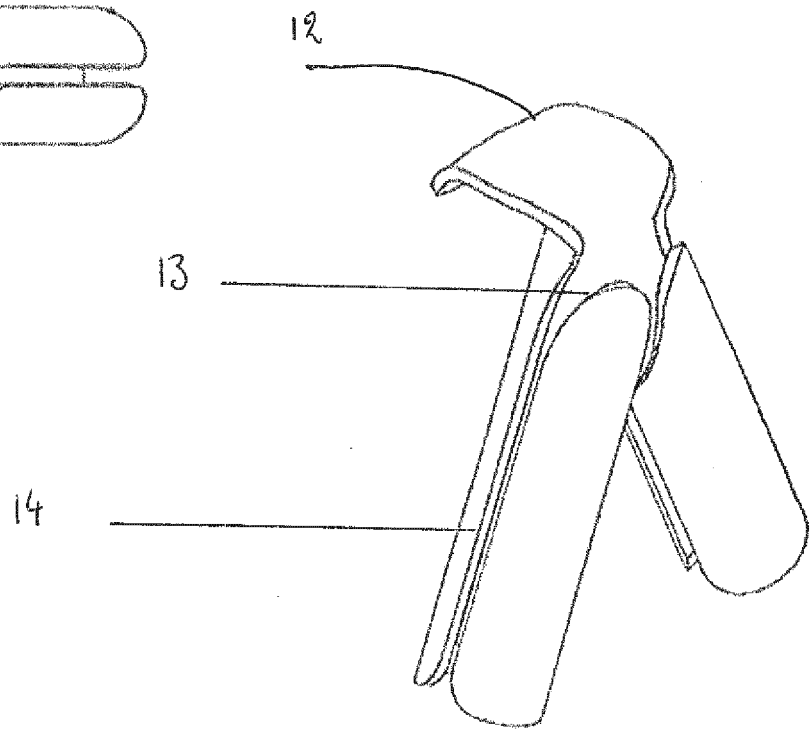
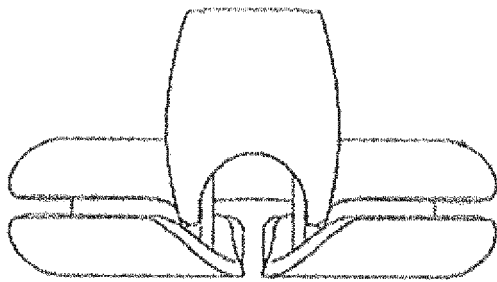
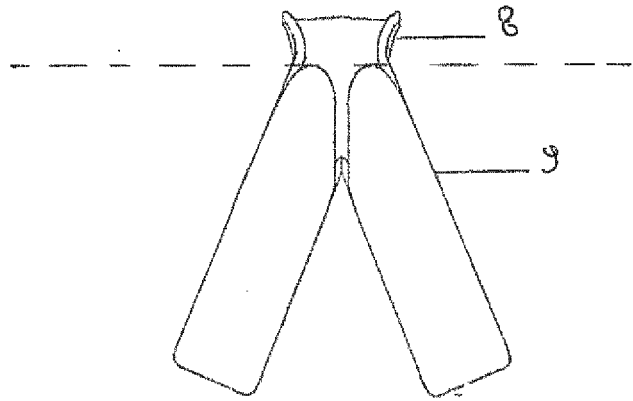
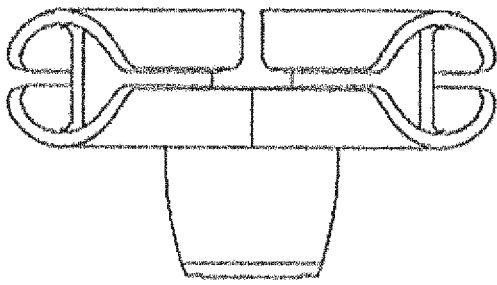


Fig. 2A

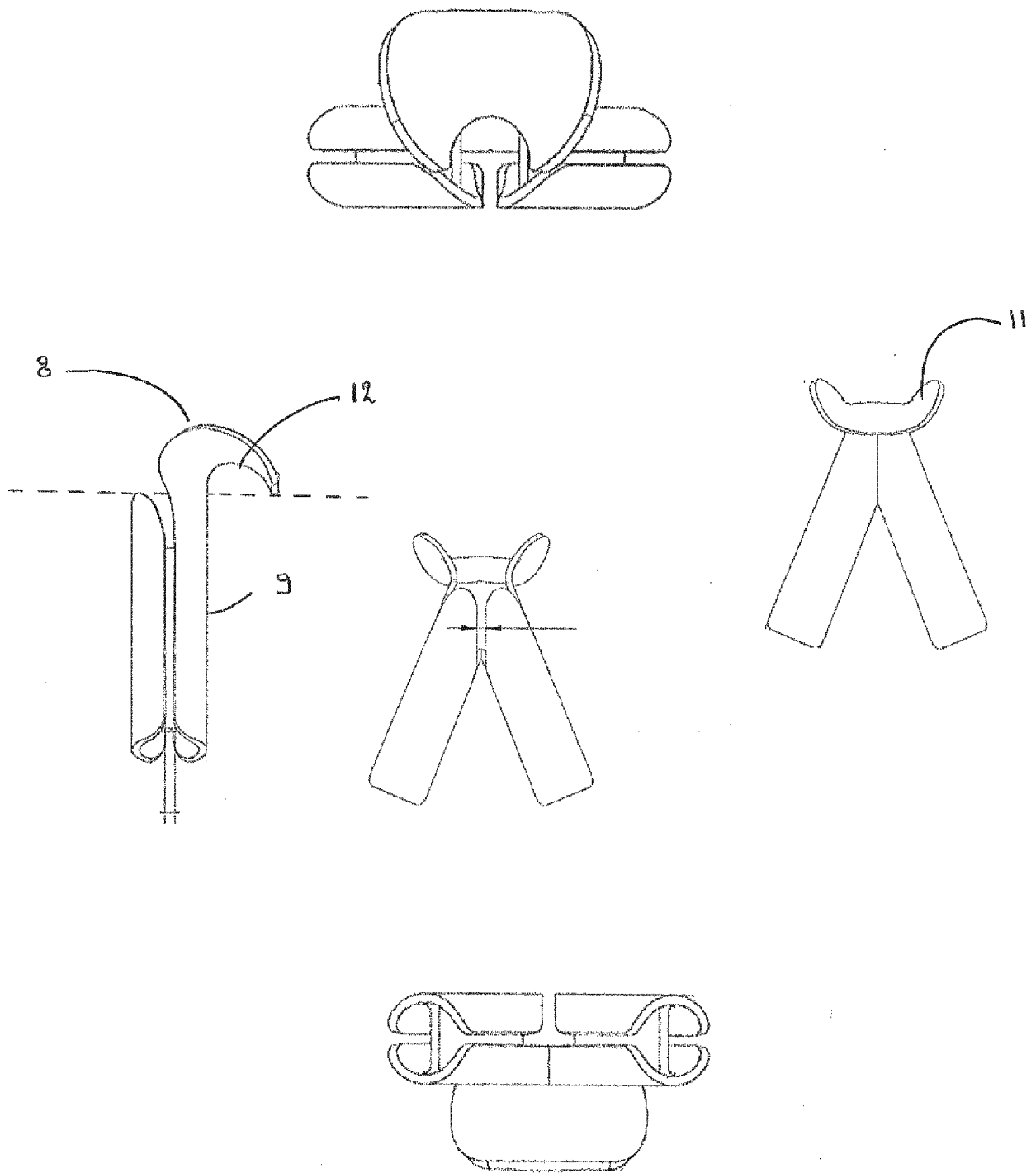


Fig. 2B

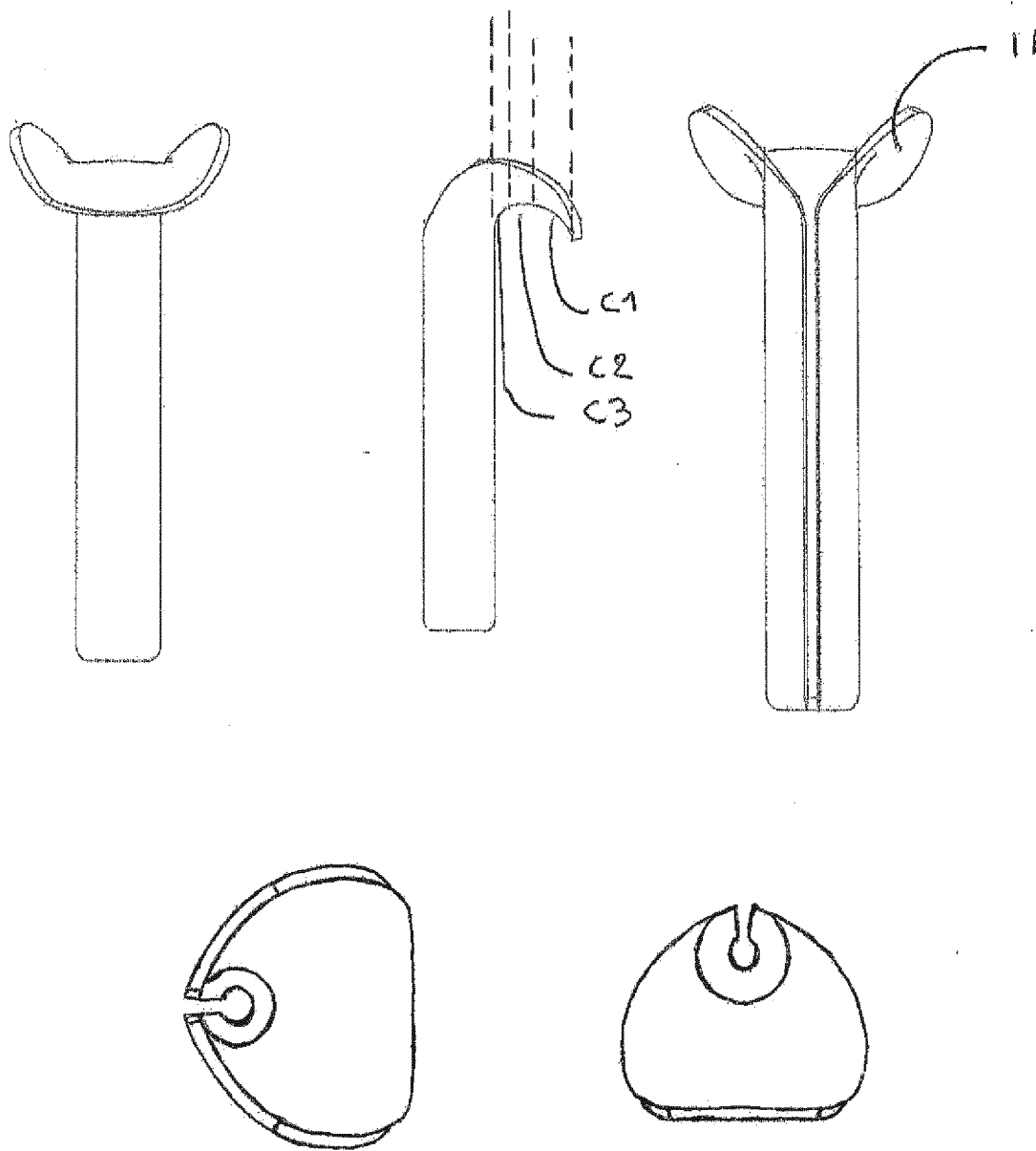


Fig. 2C

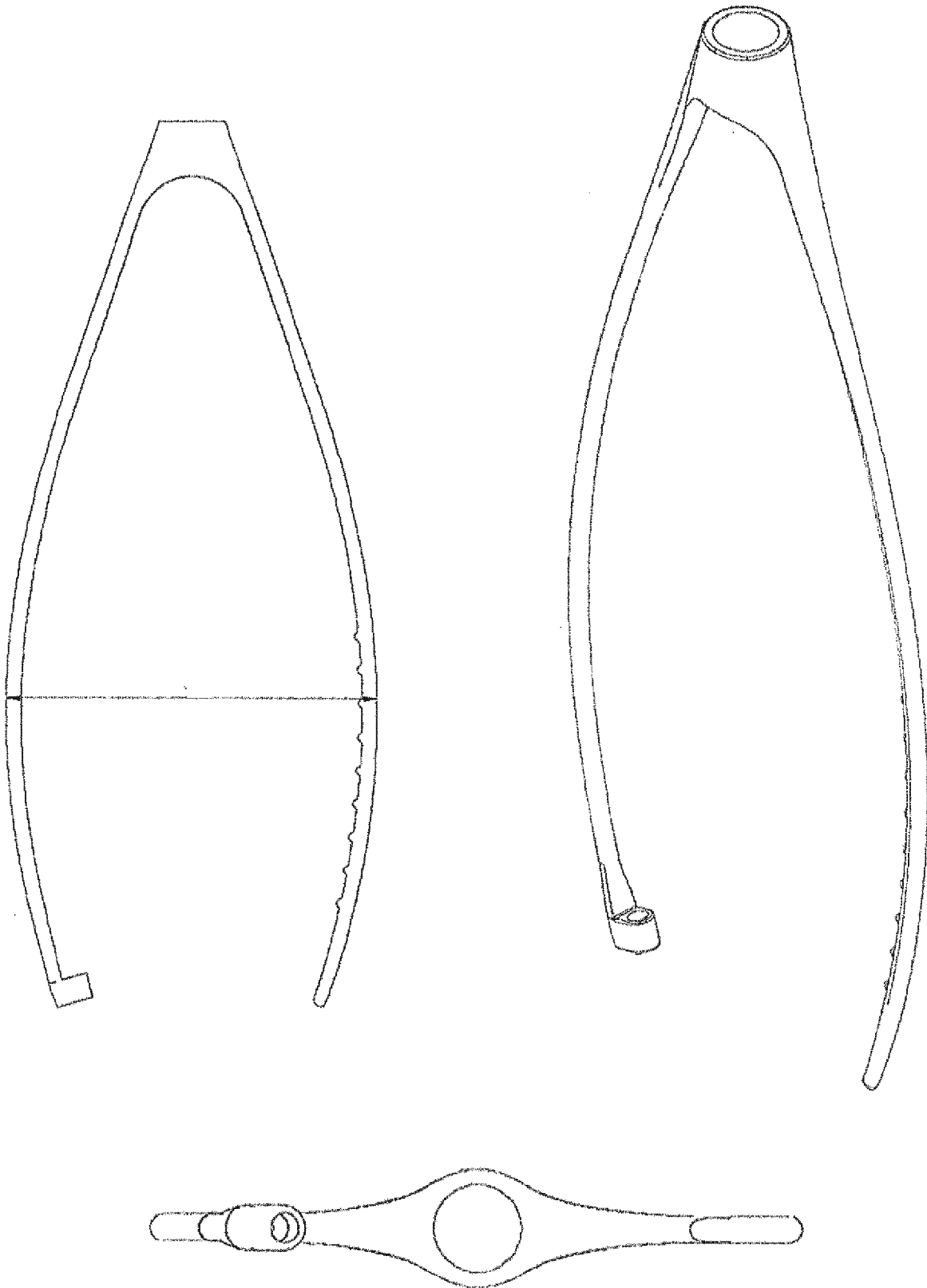


Fig. 2D

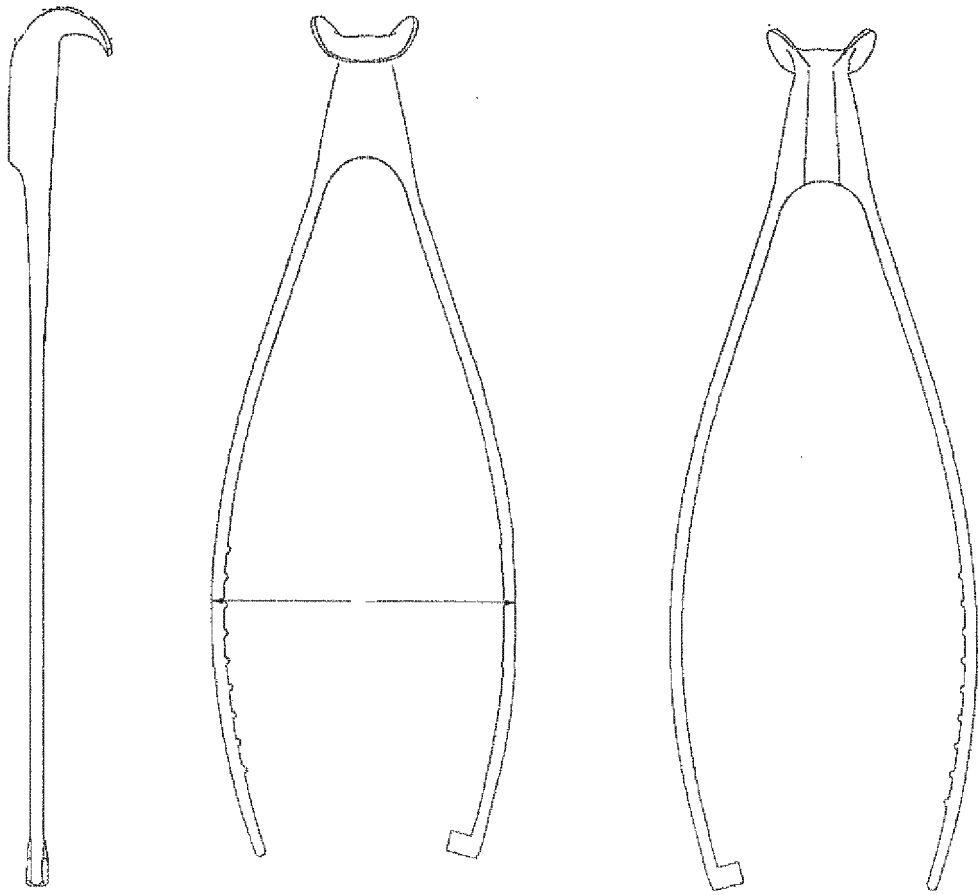


Fig. 2E

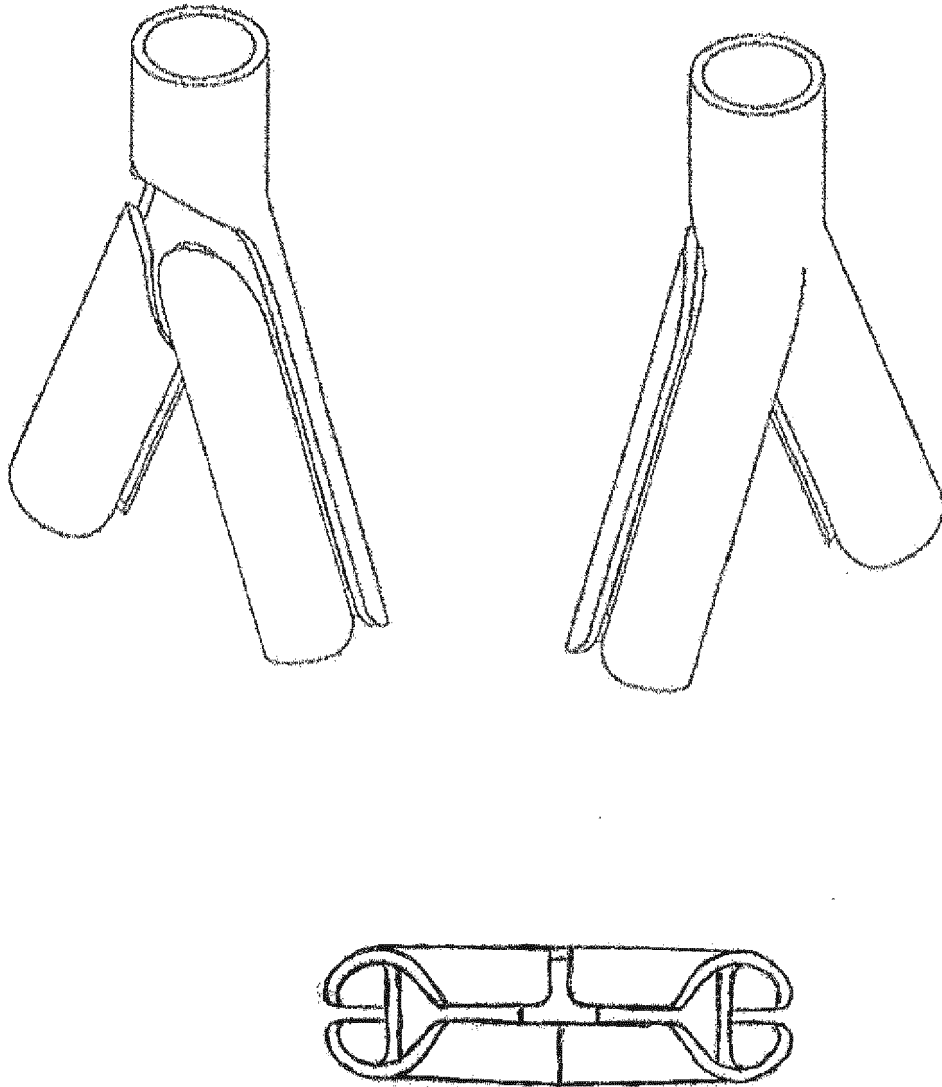


Fig. 2F

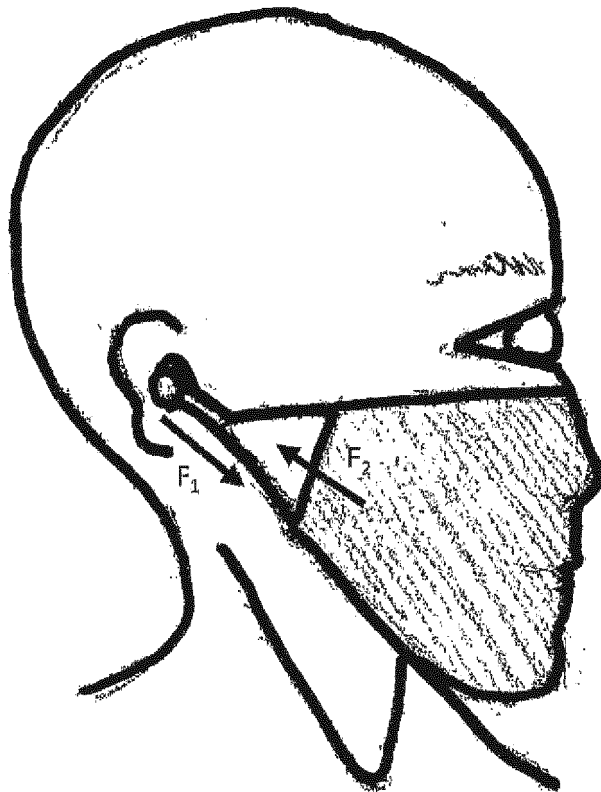


Fig. 4a

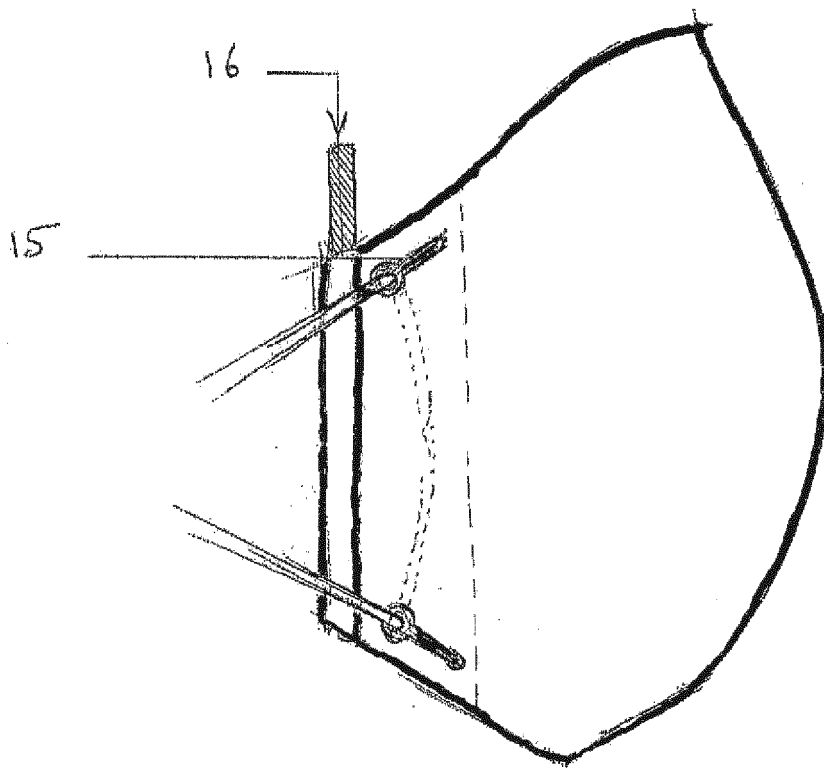
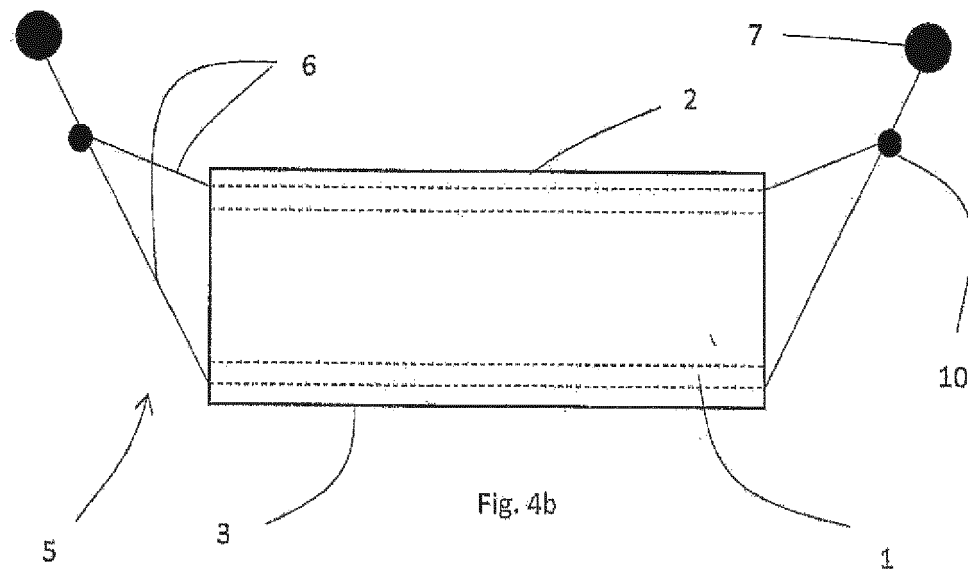


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 21 16 5613

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			H04R A44C A41D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 August 2021	Examiner Borowski, Michael
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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