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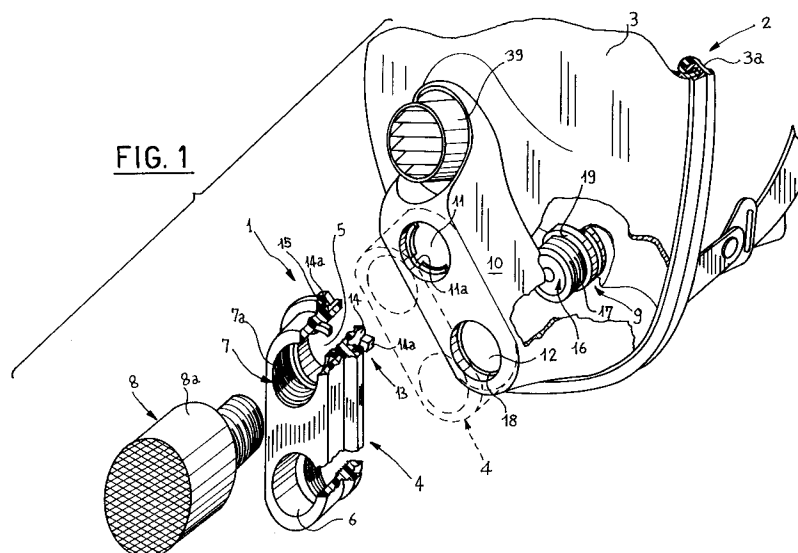
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**DE FR GB**(71) Applicant: **SEKUR S.p.A.**  
**Piazzale Cadorna, 5**  
**I-20123 Milan(IT)**(72) Inventor: **Cristiani, Andrea**  
**Via S. Severina, 25**  
**I-00178 Roma(IT)**  
Inventor: **Genova, Baldassare**  
**Via A. Vertunni**  
**I-00155 Roma(IT)**(74) Representative: **Giannesi, Pier Giovanni et al**  
**Pirelli S.p.A. Direzione Proprietà Industriale,**  
**Piazzale Cadorna 5**  
**I-20123 Milano(IT)**(54) **Interchangeable connecting sleeve for protection masks used for operating interventions in polluted environments.**

(57) The present invention relates to a connecting sleeve (1) of the type to be associated with protection masks (2) and comprising a main body (4) provided with an inspiration opening (5) and an expiration opening (6) disposed in mutual side by side relation. Formed on the inspiration opening (5) designed to engage either a filtering element (8a) or an air supply duct (8b, 8c) is a bayonet coupling (13) arranged to enable the removable engagement of

the main body (4) at one hole (11) formed in an anchoring portion (10) intended to be integral with the mask (2). A threaded fastening bush (17) optionally incorporating a single-acting valve (20) is engaged in the expiration opening (6) from the inside of the mask (2) through a second hole (12) of the anchoring portion (10), for fastening the main body (4) thereto.

**EP 0 511 592 A1**

The present invention relates to an interchangeable connecting sleeve for protection masks used for operating interventions in polluted environments.

It is known that protection masks are widely used in case of natural disasters, industrial accidents or any situation in which it is necessary to ensure the user's survival even when highly toxic substances - be they in the form of gases, aerosol or powders - are present in the environment.

The most common masks essentially comprise a rubber face-piece provided with a sealing lip arranged to act in abutment on the user's face, a transparent screen capable of permitting the user's vision, as well as a connecting sleeve associated with said face-piece and provided with an inspiration opening connected to an air supply, and an expiration opening to enable the expired air to be ejected.

Based on the operating typology adopted, three fundamental types of protection masks are currently distinguishable:

- an ambient-pressure mask;
- an overpressure mask;
- a closed-circuit-feed mask.

In ambient-pressure masks the operating principle is fundamentally based on the requirement of air from the surrounding atmosphere carried out by the inspiratory vacuum produced by the user within the mask.

In particular a filter is generally provided which is associated with the inspiration opening of the connecting sleeve and arranged to carry out the elimination of powders and/or gases from the air inspired by the mask's user. Sometimes, in place of said filter a duct is provided which connects the inspiration opening to an apparatus capable of supplying air on request having substantially the same pressure as the ambient one.

The air expired by the user is ejected from the expiration opening through a single-acting diaphragm valve offering a very weak resistance to the passage of air.

On the contrary, associated with each of the overpressure masks is a breathing apparatus capable of delivering air to a predetermined pressure.

In greater detail, said breathing apparatus is connected through a duct to the connecting sleeve inspiration opening. This duct is arranged so as to send air from the breathing apparatus to the mask as far as the inner mask pressure is substantially the same as the predetermined pressure of the air delivered from the breathing apparatus.

At this time the air introduced into the mask in this way can be inspired by the user and subsequently expired.

As a result, the expiration creates an increase in pressure within the mask which will bring about

the immediate opening of a single-acting valve associated with the expiration opening.

This valve is set so that it only opens when pressure in the mask exceeds the pressure value to which air is supplied by the breathing apparatus.

Finally closed-circuit-feed masks do not foresee the use of any single-acting valve and above all do not discharge the air expired by the user into the surrounding environment.

Actually in the last-mentioned type of mask a single opening is generally provided and it simultaneously acts as an inspiration opening and an expiration opening. The inspired and subsequently expired air is sent to the user and withdrawn therefrom through a duct connected to an oxygen breathing apparatus.

Shortly, said breathing apparatus by virtue of a cleaner cartridge and a plenum chamber, lends itself to carry out the filtering of the air expired by the user and enrich it with oxygen so that it can be continuously used by the same.

Also present on the market are protective masks adapted to be used, by virtue of appropriate expedients, according to at least two of the above specified operating typologies.

For example, there is a type of mask in which two single-operating expiration valves are present. One of the valves, arranged to operate when the mask is used at the atmospheric pressure, is mounted coaxially with the inspiration opening, whereas a second valve, set for operating under overpressure conditions, is disposed laterally on the mask face-piece.

When a filter for operation under ambient-pressure conditions is associated with the inspiration opening, the air expired by the user issues through the first expiration valve. When on the contrary the duct issuing from an overpressure breathing apparatus is connected to the inspiration opening, the passage of the expired air through the first valve is inhibited so that the air is forced to issue through the second valve.

In fact the duct connected to the inspiration opening is so shaped that it closes the outlet ports of the first valve.

Another solution to increase the versatility of use in the protection mask field envisages an expiration valve positioned under the inspiration opening, which valve is normally adapted to operate under ambient pressure conditions.

The duct for connection to the overpressure breathing apparatus has a bulge at one end thereof which is provided with spring devices that when the duct is fitted on the inspiration opening act on the diaphragm of the expiration valve setting the valve to operation under overpressure conditions.

It has been found that if the breathing system of a mask is taken down to three pieces (which

system is usually comprised of at least two parts) it is possible to achieve the replaceability both of the connection means arranged in the inspiration opening and the expiration means, so that the mask can be readily adapted to the different operating typologies in a completely safe manner.

Consequently the invention relates to an interchangeable connecting sleeve for protection masks used for operating interventions in polluted environments, of the type comprising an inspiration opening and an expiration opening disposed in mutual side by side relation and communicating with the inside of the protection mask; said connecting sleeve being characterized in that it consists of three distinct parts, said first part comprising:

- a main body provided with said inspiration opening and expiration opening;
- first engaging means disposed within said inspiration opening and designed to lock an air supply means close to and in communication with the inspiration opening;
- expiration means associated with said expiration opening for controlling the ejection from the mask of the air expired by the user;

said second part comprising:

- an anchoring portion designed to be irremovably fastened to the mask and exhibiting one through hole and a second through hole aligned with said inspiration and expiration openings respectively;

said third part comprising:

- fastening means acting between the main body and the first through hole to accomplish the detachable engagement of the main body to the anchoring portion;
- removable locking means for fastening the expiration means to the expiration opening via the second through hole of the anchoring portion and locking the main body to the anchoring portion at said second through hole.

Preferably, said fastening means comprises a bayonet coupling consisting of a ring nut carried by the main body coaxially with said inspiration opening and provided with at least a radially-extending engaging lug defining an undercut, said lug being designed to engage by axial fitting into a corresponding access housing formed on the circumferential edge of said first hole of the anchoring portion and to be locked against said circumferential edge as a result of an angular rotation of the main body about the axis of the inspiration opening.

In a preferred embodiment the detachable locking means comprises an externally threaded bush designed to be screwed into the expiration opening through the second hole of said anchoring portion, the expiration means being integrated in

said bush.

In the connecting sleeve in reference the main body coupled to the expiration means and first engaging means lends itself to be replaced, so as to adapt the protection mask to the different typologies of use.

It is another object of the present invention a protection mask for operating interventions in polluted environments, of the type comprising:

- an annular lip of elastomeric material such arranged that it exerts a tight seal around the user's face;
- a transparent screen sealingly engaged to the annular lip and extending over the user's face;
- a connecting sleeve exhibiting an inspiration opening and an expiration opening disposed in mutual side by side relation and communicating with the inside of the protection mask, said connecting sleeve being characterized in that it consists of three distinct parts, said first part comprising:
  - a main body provided with said inspiration opening and expiration opening;
  - first engaging means disposed within said inspiration opening and designed to lock an air supply means close to and in communication with the inspiration opening;
  - expiration means associated with said expiration opening for controlling the ejection from the mask of the air expired by the user;

said second part comprising:

- an anchoring portion designed to be irremovably fastened to the mask and exhibiting one through hole and a second through hole aligned with said inspiration and expiration openings respectively;

said third part comprising:

- fastening means acting between the main body and the first through hole to accomplish the detachable engagement of the main body to the anchoring portion;
- removable locking means for fastening the expiration means to the expiration opening via the second through hole of the anchoring portion and locking the main body to the anchoring portion at said second through hole.

Further features and advantages of the invention will become more apparent from the detailed description of a preferred embodiment of a panoramic protection mask for operating interventions in polluted environments, given hereinafter by way of non-limiting example with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view, partly interrupted, of the connecting sleeve in reference associated with a

- protection mask having a transparent screen extending over the whole user's face;
- Fig. 2 is an interrupted sectional view of the connecting sleeve and mask referred to in Fig. 1, taken along the plane of symmetry thereof;
- Fig. 3 is a rear view of the main body of the connecting sleeve in reference;
- Fig. 4 is an interrupted sectional view of the connecting sleeve of the invention associated with a protection mask provided with a rubber face-piece;
- Fig. 5 is an exploded partly sectional view of an alternative embodiment of the main body of the connecting sleeve which is arranged so as to adapt the protection mask to overpressure operation;
- Fig. 6 is an exploded sectional view of another alternative embodiment of the main body fitted to adapt the mask to a closed-circuit operation;
- Fig. 7 is a cross-sectional view of the transparent screen adopted in the mask as depicted in Fig. 2;
- Fig. 8 is a top view of said screen; and
- Fig. 9 is a front view of the screen shown in Figs. 7 and 8.

Referring particularly to Figs. 1, 2 and 4, an interchangeable connecting sleeve for protection masks to be used for operating interventions in polluted environments has been generally identified by reference numeral 1.

In the embodiment referred to in Figs. 1 and 2, the connecting sleeve 1 is associated with a protection mask 2 comprising a transparent screen 3 extending over the user's face and circumferentially connected to an annular lip 3a of elastomeric material designed to exercise a tight seal around the user's face.

In accordance with the present invention, the connecting sleeve is comprised of a main body 4 exhibiting an inspiration opening 5 and an expiration opening 6 disposed mutually in side by side relation.

Disposed within the inspiration opening 5 is first engaging means 7 designed to engage air supply means 8 close to and in communication with the inspiration opening, as better specified in the following.

The expiration opening 6 is adapted to receive and be coupled to expiration means 9 more clearly described in the following, which is adapted to control the ejection from the mask 2 of the air expired by the user.

Advantageously the main body 4 can be detachably engaged to an anchoring portion 10 rigidly

carried by the mask 2 and exhibiting one through hole 11 and a second through hole 12 disposed coaxially with the inspiration opening 5 and the expiration opening 6 formed in the main body 4 of the connecting sleeve 1.

The removable engagement between the main body 4 and anchoring portion 10 is achieved by fastening means 13 preferably consisting of a bayonet coupling 13.

The bayonet coupling 13 is comprised of a ring nut 14 provided on the main body 4 coaxially with the inspiration opening 5 and having at least one radially-extending engaging lug 14a defining an undercut.

In the embodiment under examination the engaging lugs 14a are four in number and are circumferentially distributed about the ring nut 14 being spaced apart through angles of 90°.

The engaging lugs 14a are designed to engage into corresponding access housings 11a formed on the circumferential edge of said first hole 11 of the anchoring portion 10 and circumferentially distributed on said edge being spaced apart through angles of 90°.

The necessary tightness between the inspiration opening 5 and the first through hole 11 is achieved by one ring of elastomeric material 15.

The connecting sleeve 1 further comprises removable locking means 16 for fastening the expiration means 9 to the expiration opening 6 via the second through hole 12 of the anchoring portion 10 and lock the main body 4 to the anchoring portion at said second through hole.

Said removable locking means preferably consists of a threaded bush 17 to be screwed down in the expiration opening 6 from the inside of the mask 2.

A second ring of elastomeric material 18 ensures the tight seal between the circumferential edge of the second through hole 12 and a circumferential projection 19 exhibited by the threaded bush 17.

In accordance with the present invention different main bodies are provided to be supplied as equipment for one and the same mask 2, which bodies are adapted to be individually and selectively engaged to the anchoring portion 10 in combination with specific air supply means 8 and expiration means 9, so as to adapt the mask to the different operating typologies.

Referring particularly to the embodiment shown in Figs. 1, 2 and 4, the connecting sleeve 1 is arranged to adapt the mask 2 to an ambient-pressure operation.

In this case the first engaging means 7 consists of a thread 7a adapted to engage a filtering element 8a forming the air supply means 8. The expiration means 9 consists of a mere single-acting

diaphragm valve, not shown as known per se and conventional, integrated in the threaded bush 16 and arranged to offer a weak resistance to the air outflow expired from the inside of the mask 2.

Shown in Fig. 5 is the main body 4, the air supply means 8 and expiration means 9 that must be associated with the mask 2 when the latter is to operate under overpressure conditions.

In this case the first engaging means 7 is made of a thread 7b different from thread 7a in Fig. 1 and suitable for engagement with a duct 8b leading off to a conventional breathing apparatus supplying air to a predetermined pressure.

The expiration means 9 is in turn comprised of a single-acting valve 20 such set that it enables the air expired by the user to reach the expiration opening 6 only when the pressure value of the expired air exceeds said predetermined pressure value.

Briefly, said valve 20 consists of a dish 21 elastically pressed by a spring 22 against the circumferential edge 23 of an outflow port 24 for the expired air.

Shown in Fig. 6 is the main body 4, the air supply means 8 and expiration means 9 to be used in order to arrange the mask 2 to operate as a closed-circuit-feed mask.

In this embodiment the main body 4 is designed both to send the air expired by the user to air recycling means and take therefrom the enriched air to be subsequently inspired by the user.

For the purpose the inspiration opening 5 of the main body 4 is closed by one wall 30 at the end facing the user's face and communicates through a connecting port 31 with the expiration opening 6.

The expiration opening 6 is in turn closed at the end opposite the one facing the user's face by a second wall 32.

The first engaging means 7 consists of a threaded bush 26 disposed coaxially within the inspiration opening 5 and supported therein by at least a spoke 27 integral with the main body 4. The bush 26 lends itself to be operatively engaged by a threaded element 28 associated with a duct 8c connected to recycling means consisting of an oxygen breathing apparatus not shown as known per se and conventional.

In this case the expiration means 9 merely consists of an outflow port 29 formed in the threaded bush 17.

Referring to Fig. 2, the anchoring portion 10 of the connecting sleeve 1 is of one piece construction with the transparent screen 3 of the mask 2.

Preferably, as more clearly shown in Figs. 7, 8 and 9, the transparent screen 3 extends so as to completely cover the user's face.

In greater detail, the screen 3 has a toroidal

configuration defined by an arc of a circle of radius R and centre C rotating through an angle  $\beta$  of predetermined amplitude about a substantially vertical axis of rotation Y.

The screen 3 has a downwardly tapering shape substantially in the form of an isosceles triangle the base side of which is substantially rectilinear and defines the upper edge of the screen, whereas the oblique sides have a curvilinear extension, the three sides being joined to each other by wide-radius rounded portions.

Referring particularly to Fig. 4, the connecting sleeve shown therein is conceived so that it may be associated with a mask 2 provided with a traditional rubber face-piece 33.

In this case the anchoring portion 10 consists of a plate-like element 34 provided with a perimetric groove 35 in which the face-piece 33 is engaged through a clamping band 36.

Shown in Figs. 2 and 4 is a half-mask sealingly engaged to the threaded bush 17 and arranged to exercise a tight seal around the user's nose and mouth. The half-mask 37 can be provided with one or more single-acting valves 37 enabling the air inspired by the user to enter. Identified by 39 is a conventional transmitter.

After describing the invention mainly from a structural point of view, it can be easily understood that the main body 4 of the connecting sleeve 1 lends itself to be replaced in the mask 2 in order to enable the mask to be used according to differently-operated respiratory systems while ensuring a regular operation.

In fact should the user for example wish to adopt an overpressure breathing apparatus in place of an ambient-pressure filtering element 8a, he only needs to replace the main body 4 shown in Fig. 1 with the main body 4 as depicted in Fig. 5.

First of all it is necessary to disengage the half-mask 37, if present, from the threaded bush 17, subsequently carrying out the unlocking and removal of the main body 4 from said bush.

More particularly, the bush 17 after being untightened and therefore disengaged from the expiration opening 6, is withdrawn rearwardly from the second hole 12 of the anchoring portion 10.

At this time the main body 4 of the connecting sleeve 1 can be angularly rotated according to the axis of the inspiration opening 5 in order to axially align the four lugs 14a with the four access housings 11a.

The main body thus disengaged can be removed from the mask 2 by axial disconnection of the lugs 14a from the access housings 11a.

The mask 2 is now ready to receive the new main body 4 depicted in Fig. 5 the association of which with the mask will enable the latter to operate in overpressure conditions.

Obviously the mounting of the new main body 4 and related expiration means 9 will be achieved following a reverse order with reference to the above description.

Likewise, it is possible to carry out the replacement of the ambient-pressure operating main body 4 with a main body 4 having a closed-circuit feed.

The use of different main bodies each integrating specific threads or other devices for connection with the particular air supply and expiration means ensures that a given supply means - be it a filtering element, an overpressure-operating breathing apparatus or an oxygen-recycling breathing apparatus - will never be connected to the mask in combination with an inappropriate expiration means.

In other words, a filtering element can be only and exclusively mounted to the main body in which the expiration opening is adapted to engage a single-acting diaphragm valve.

Likewise, an overpressure breathing apparatus can be only connected to a main body designed to engage a single-acting valve set to a predetermined pressure value. An oxygen-recycling breathing apparatus will be able to be associated only with a main body the expiration opening of which is connected to the inspiration opening.

The above operating aspects comply with all the European regulations as well with the regulations of other countries relating to safety in use for protection masks.

The invention facilitates the mounting and servicing operations of the various mask components.

By adopting a mask having a transparent screen of toroidal form the anchoring portion of the connecting sleeve in question is of one piece construction therewith and a very wide visual field can be ensured without involving, on the other hand, phenomena of optical distortion.

Many modifications can be made to the embodiment of the invention as described, without however departing from the scope of the inventive idea.

## Claims

1. An interchangeable connecting sleeve for protection masks used for operating interventions in polluted environments, of the type comprising an inspiration opening (5) and an expiration opening (6) disposed in mutual side by side relation and communicating with the inside of the protection mask (2); said connecting sleeve being characterized in that it consists of three distinct parts, said first part comprising:
  - a main body (4) provided with said inspiration opening and expiration opening;
  - first engaging means (7) disposed within said inspiration opening (5) and designed

to lock an air supply means (8) close to and in communication with the inspiration opening;

- expiration means (9) associated with said expiration opening (6) for controlling the ejection from the mask of the air expired by the user;

said second part comprising:

- an anchoring portion (10) designed to be irremovably fastened to the mask (2) and exhibiting one through hole (11) and a second through hole (12) aligned with said inspiration (5) and expiration (6) openings respectively;

said third part comprising:

- fastening means (13) acting between the main body (4) and the first through hole (11) to perform the detachable engagement of the main body (4) to the anchoring portion (10);
- removable locking means (16) for fastening the expiration means (9) to the expiration opening (6) via the second through hole (12) of the anchoring portion (10) and locking the main body (4) to the anchoring portion at said second through hole (12).

2. A connecting sleeve according to claim 1, characterized in that said first engaging means (7) comprises a thread (7a, 7b) formed within the inspiration opening (5) of said main body (4).
3. A connecting sleeve according to claim 1, characterized in that said first engaging means (7) comprises a threaded bush (2&9 disposed coaxially within the inspiration opening (5) and supported by at least a spoke (27) integral with the main body (4).
4. A connecting sleeve according to claim 1, characterized in that said air supply means (8) comprises a duct (8b, 8c) arranged to bring an unpolluted air supply into communication with the inside of the mask (2).
5. A connecting sleeve according to claim 1, characterized in that said air supply means (8) comprises a filtering element (8a) adapted to clean the surrounding ambient air before its passing through the inspiration opening (5).
6. A connecting sleeve according to claim 1, characterized in that said expiration means (9) comprises a single-acting valve (20) adapted to enable the air expired by the user to pass from the inside of the mask (2) to the expiration

opening (6) of the main body (4).

7. A connecting sleeve according to claim 6, characterized in that said single-acting valve (20) is set to a predetermined pressure value enabling the air expired by the user to pass from the inside of the mask (2) to the expiration opening (6) when the expired air pressure value exceeds said predetermined pressure value. 5 10
8. A connecting sleeve according to claim 1, characterized in that said fastening means (13) comprises a bayonet coupling. 15
9. A connecting sleeve according to claim 8, characterized in that said bayonet coupling (13) consists of a ring nut (14) carried by the main body (4) coaxially with said inspiration opening (5) and provided with at least a radially-extending engaging lug (14a) defining an undercut, said lug (14a) being designed to engage by axial fitting into a corresponding access housing (11a) formed on the circumferential edge of said first hole (11) of the anchoring portion (10) and to be locked against said circumferential edge as a result of an angular rotation of the main body (4) about the axis of the inspiration opening (5). 20 25 30
10. A connecting sleeve according to claim 9, characterized in that said ring nut (14) is provided with four radially-extending engaging lugs (14a) circumferentially distributed according to angles of 90 degrees. 35
11. A connecting sleeve according to claim 1, characterized in that four access housings (11a) circumferentially distributed according to angles of 90 degrees are formed on the circumferential edge of the first hole (11) of the anchoring portion (10). 40
12. A connecting sleeve according to claim 1, characterized in that said removable locking means (16) comprises an externally threaded bush (17) designed to be screwed down into the expiration opening (6) through the second hole (12) of said anchoring portion (10), the expiration means (9) being integrated in said bush (17). 45 50
13. A connecting sleeve according to claim 1, characterized in that said expiration opening (6) communicates with a duct (8c) designed to send the air expired by the user to recycling means. 55
14. A connecting sleeve according to claim 13, characterized in that said duct (8c) is associated with recycling means for withdrawing the enriched air therefrom which air will be subsequently inspired by the user.
15. A connecting sleeve according to claim 14, characterized in that said duct (8c) is arranged both to send the air expired by the user to said expired air recycling means and to withdraw therefrom the enriched air to be subsequently inspired by the user.
16. A connecting sleeve according to claim 15, characterized in that said inspiration opening (15) is closed at the end facing the user's face and communicates with said expiration opening (6) which is closed at the end opposite that facing the user's face.
17. A connecting sleeve according to claim 1, characterized in that at least a seal ring (15, 18) of elastomeric material is interposed between the inspiration opening (5) and first hole (11) and the expiration opening (6) and second hole (12) of the main body (4) and anchoring portion (10) respectively.
18. A connecting sleeve according to claim 1, characterized in that said anchoring portion (10) is of one piece construction with a transparent screen (3) of said protection mask (2).
19. A connecting sleeve according to claim 1, characterized in that said anchoring portion (10) consists of a plate-like body (34) exhibiting a perimetric groove (35) designed to sealingly receive a face-piece (33) of said protection mask (2).
20. A connecting sleeve according to claim 18, characterized in that said transparent screen (3) has a toroidal configuration defined by an arc of a circle rotating through an angle of predetermined amplitude about a substantially vertical axis.
21. A protection mask for operating interventions in polluted environments, of the type comprising:
  - an annular lip (3a) of elastomeric material such arranged that it exerts a tight seal around the user's face;
  - a transparent screen (3) sealingly engaged to the annular lip (3a) and extending over the user's face;
  - a connecting sleeve (1) exhibiting an inspiration opening (5) and an expiration opening (6) disposed in mutual side by

side relation and communicating with the inside of the protection mask (2), said connecting sleeve consisting of three distinct parts, said first part comprising:

- a main body provided with said inspiration opening and expiration opening;
- first engaging means (7) disposed within said inspiration opening (5) and designed to lock an air supply means (8) close to and in communication with the inspiration opening, and expiration means (9) associated with said expiration opening (6) for controlling the ejection from the mask (2) of the air expired by the use,

characterized in that said connecting sleeve further comprises:

- an anchoring portion (10) fastened to the mask (2) and exhibiting one through hole (11) and a second through hole (12) aligned with said inspiration and expiration openings (5 and 6) respectively;
- fastening means (13) acting between the main body (4) and the first through hole (11) to accomplish the removable engagement of the main body (4) to the anchoring portion (10);
- removable locking means (16) for fastening the expiration means (9) to the expiration opening (6) via the second through hole (12) of the anchoring portion (10) and locking the main body (4) to the anchoring portion (10) at said second through hole (12).

**22.** A mask according to claim 21, characterized in that said anchoring portion (10) is of one piece construction with the transparent screen (3).

**23.** A mask according to claim 21, characterized in that said anchoring portion (10) consists of a plate-like element (34) provided with a perimetric groove (35) designed to sealingly receive a face-piece (33) sealingly interposed between the transparent screen (3) and said annular lip (3a).

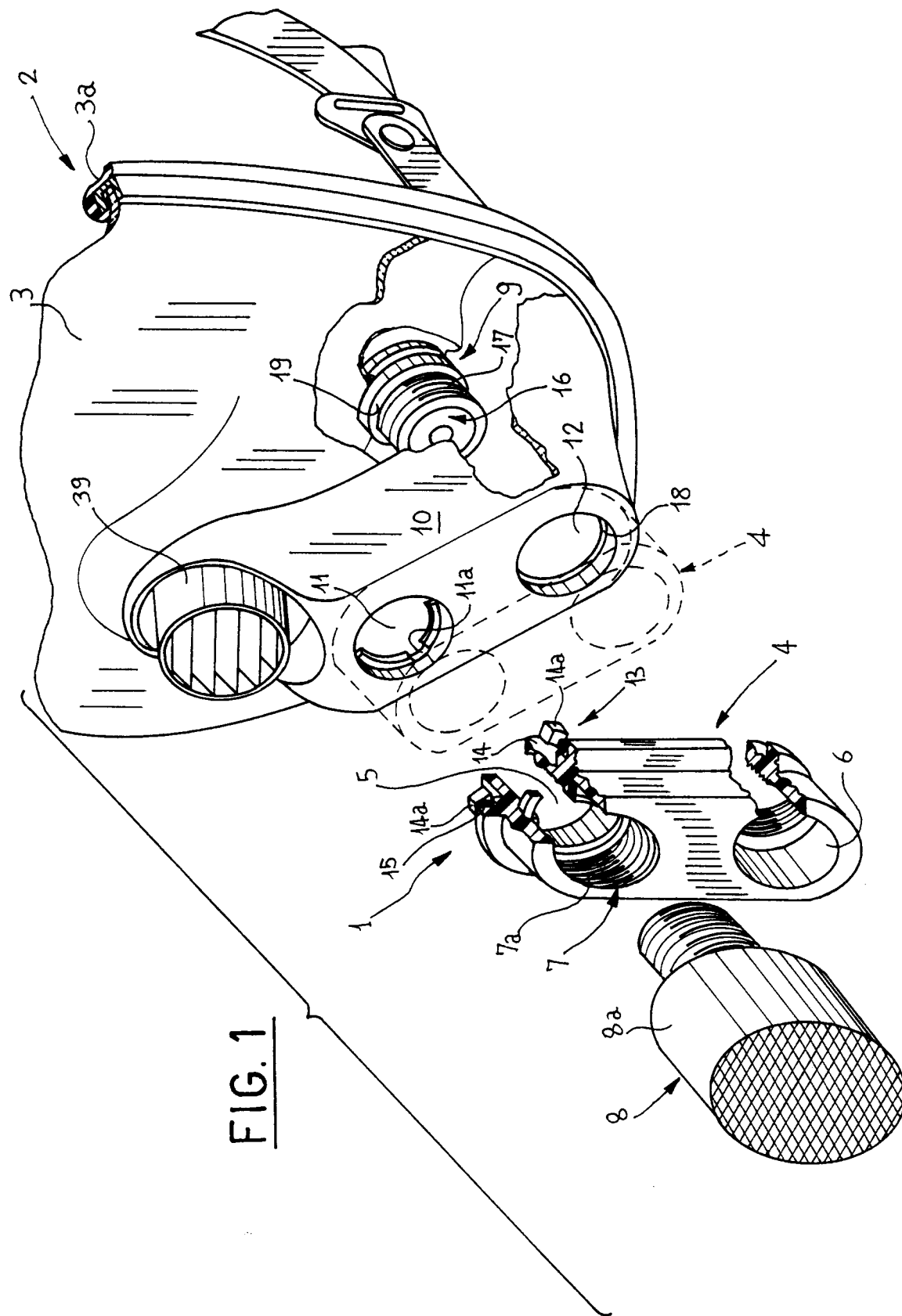
**24.** A mask according to claim 21, characterized in that said transparent screen (3) extends by its upper edge as far as the top of the user's forehead, its lower edge going as far as under the user's chin.

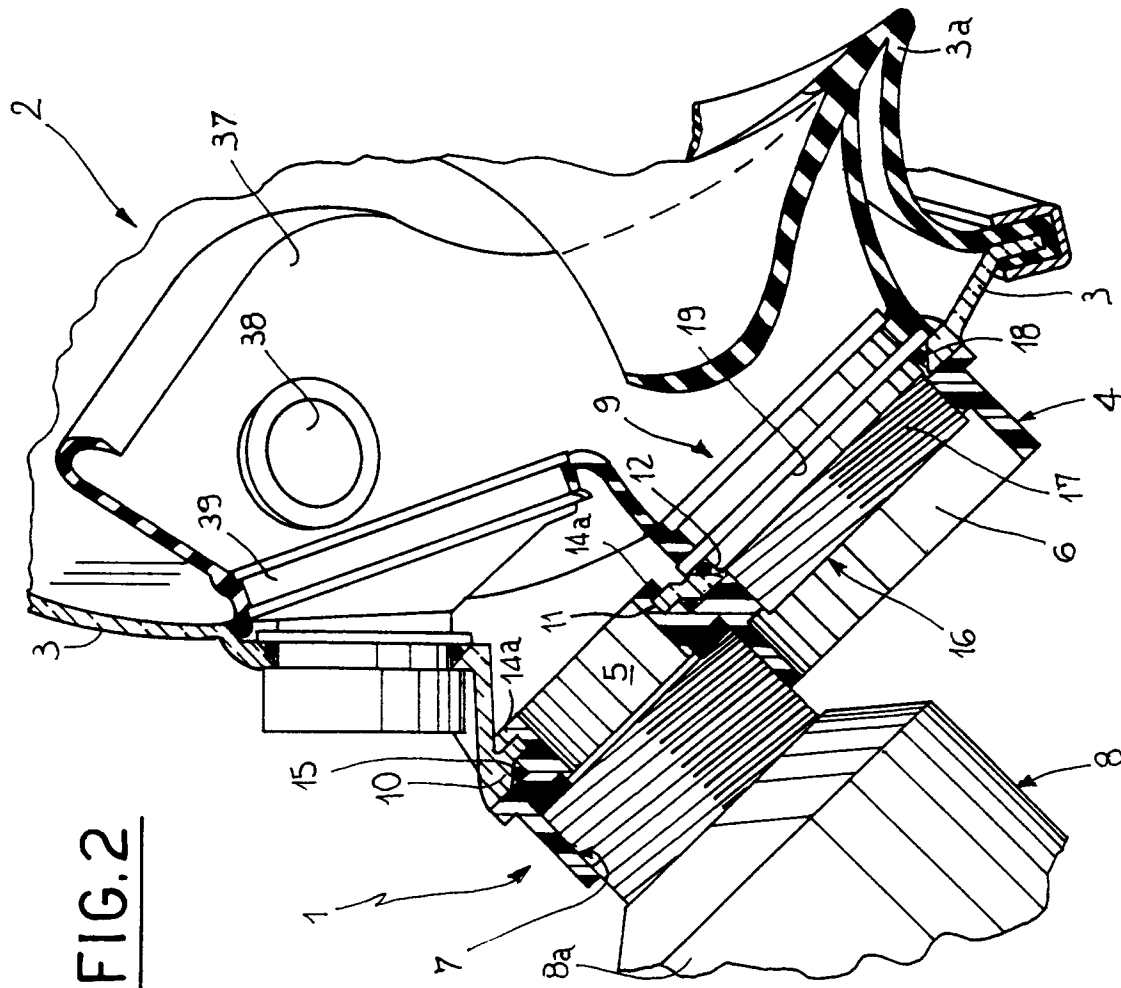
**25.** A mask according to claim 24, characterized in that said transparent screen (3) has a toroidal configuration defined by an arc of a circle rotating through an angle of predetermined amplitude about a substantially vertical axis of rotation.

**26.** A mask according to claim 24, characterized in that said transparent screen (3) has a downwardly tapering shape.

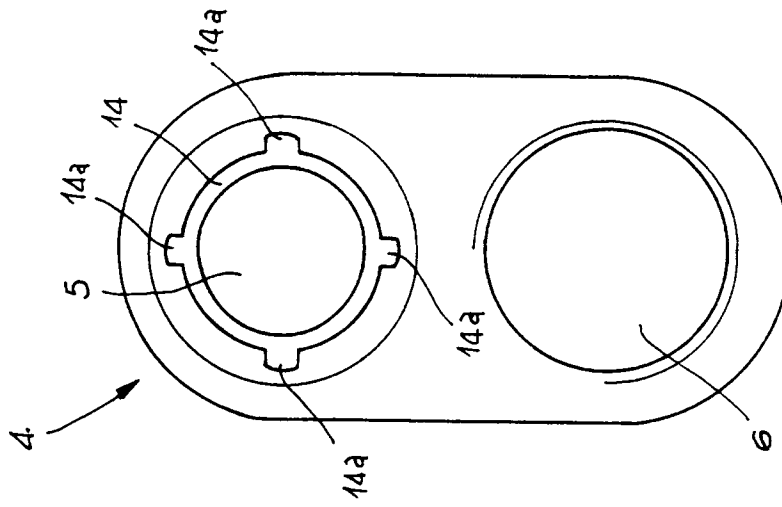
**27.** A mask according to claim 26, characterized in that said transparent screen (3) is in the form of an isosceles triangle the base side of which is substantially rectilinear and defines the upper edge, whereas the oblique sides have a curvilinear extension, the three sides being joined to each other by wide-radius rounded portions.



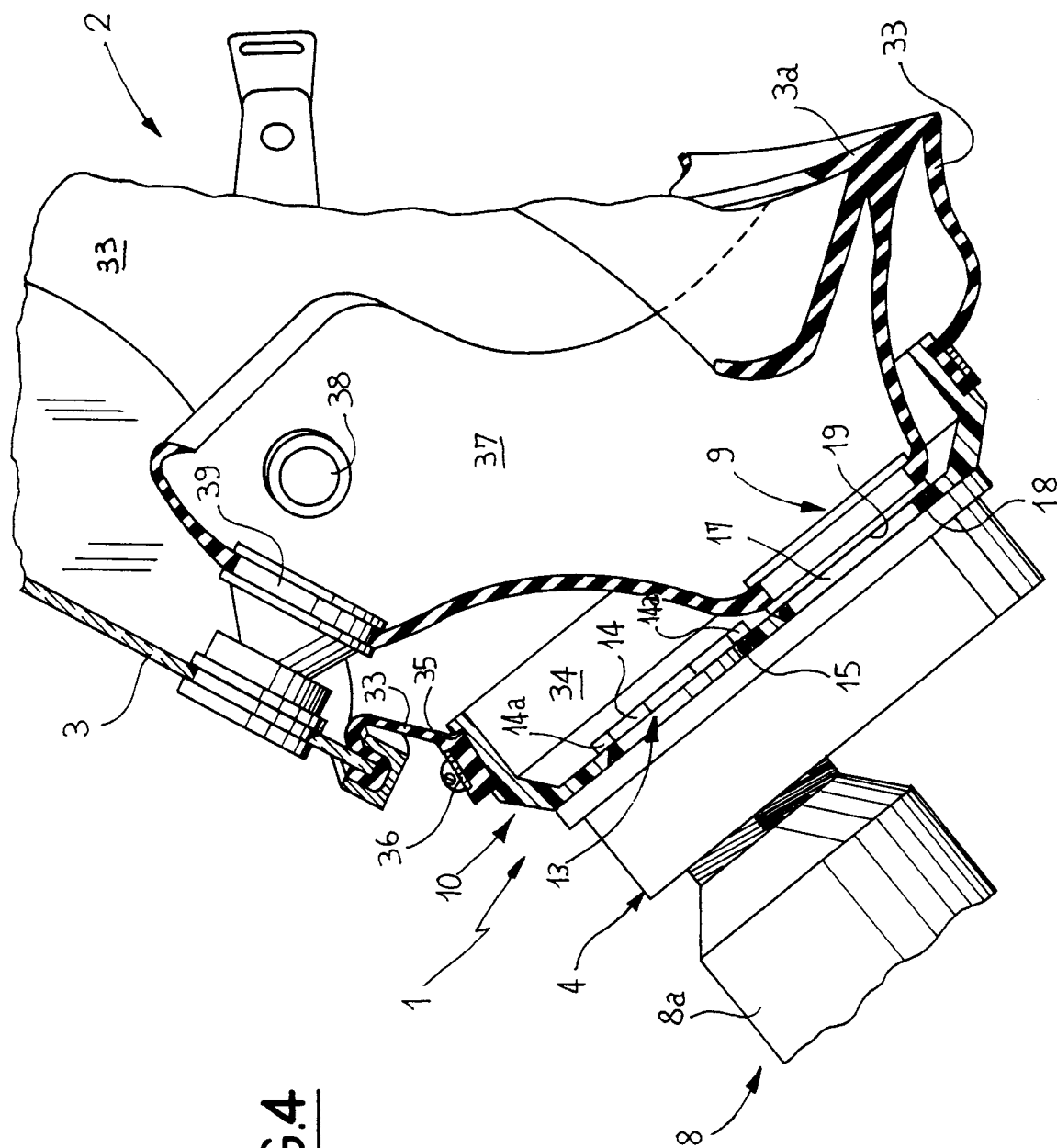




**FIG. 2**



**FIG. 3**



**FIG. 4**

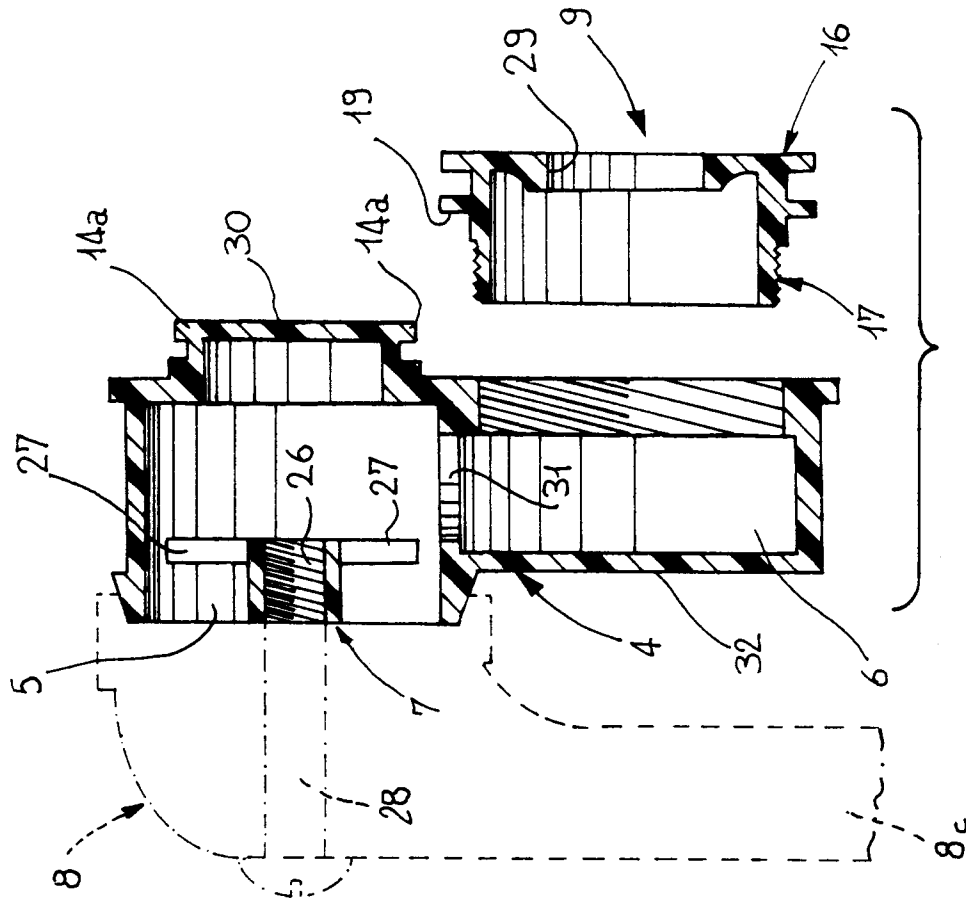


FIG. 5

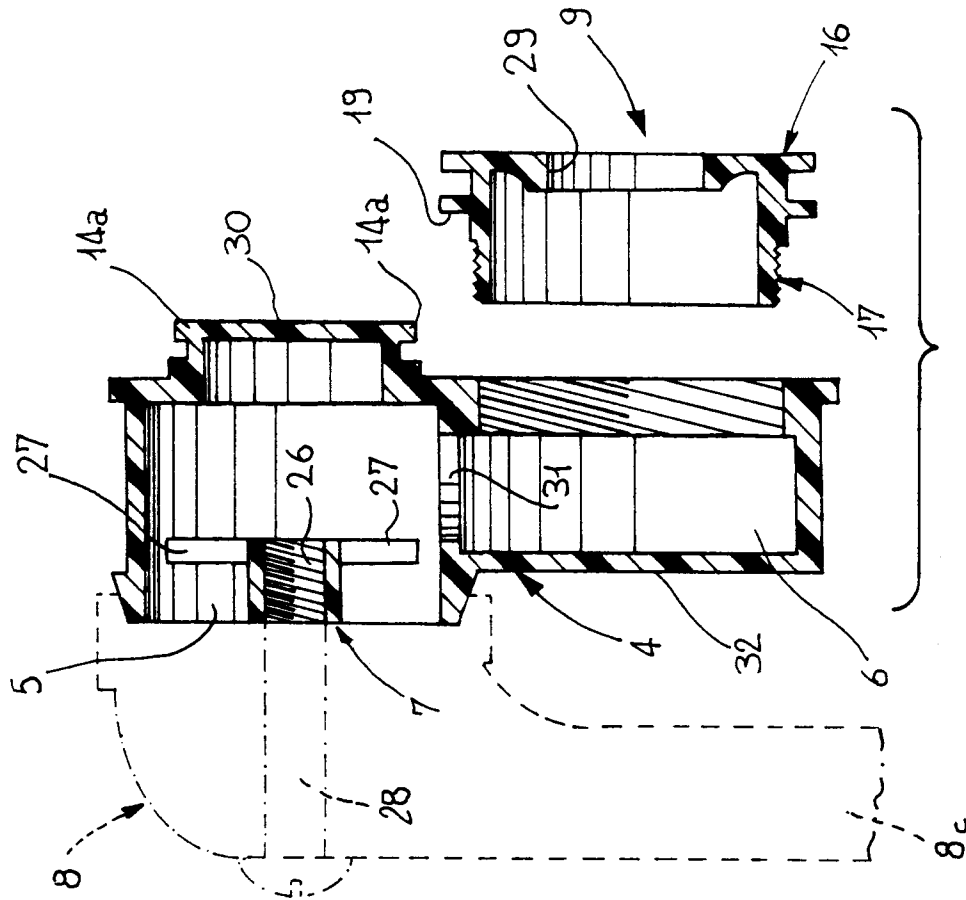


FIG. 6

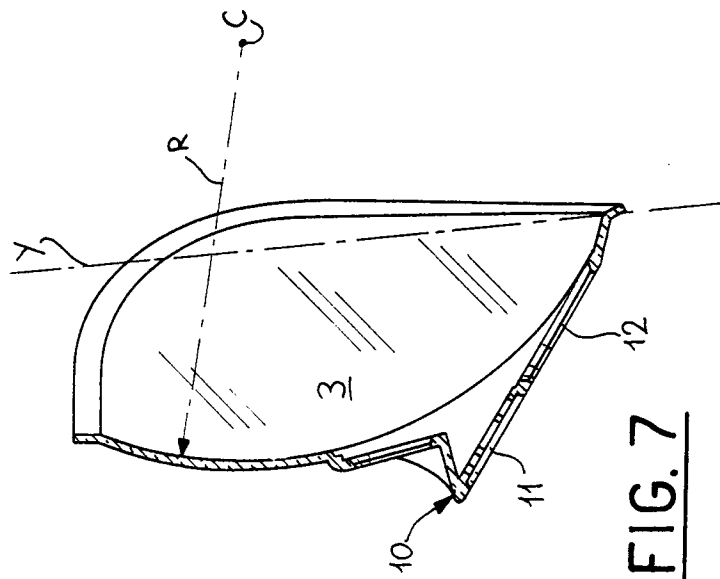


FIG. 9

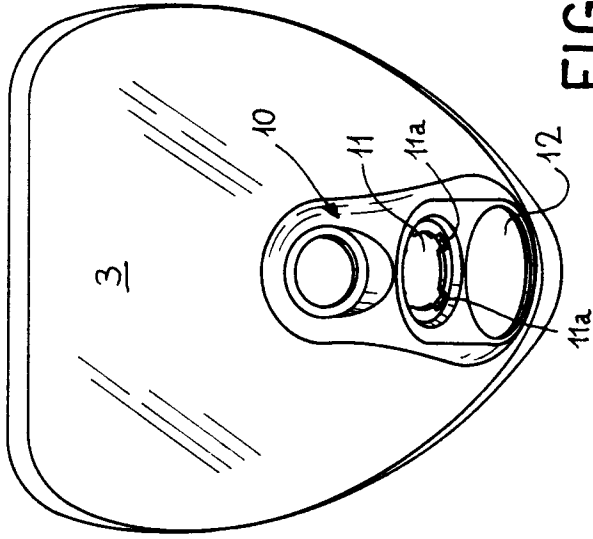
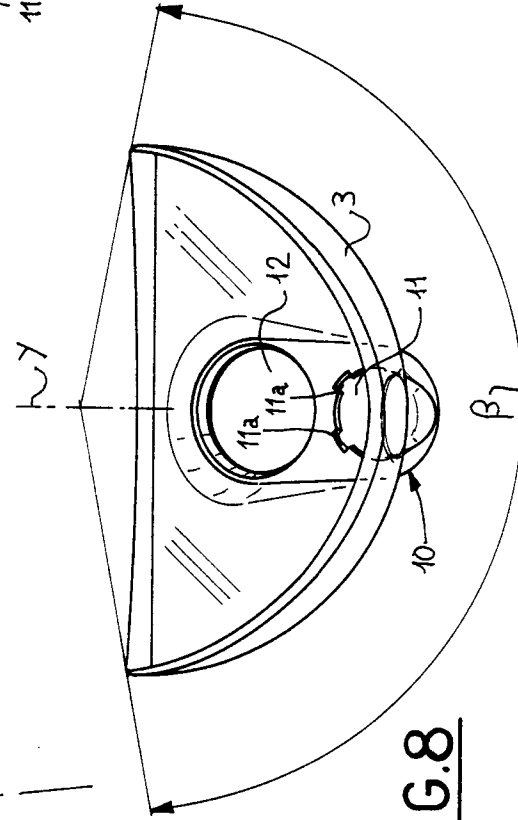


FIG. 8





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 92 10 6983

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-C-629 801 (DRÄGERWERK) * claim 1; figures * ---	1,21	A62B9/04
A	GB-A-1 553 437 (DCA) * claim 1; figures * ---	1,21	
A	DE-C-567 505 (DRÄGERWERK) * claim 1; figures * ---	1,21	
A	DE-C-701 632 (RIEGER) * figures * -----	1,21	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A62B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 JULY 1992	Examiner WALVOORT B.W.
<b>CATEGORY OF CITED DOCUMENTS</b>			
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	