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(54) **LIFE BUOY, ESPECIALLY FOR AVALANCHES**

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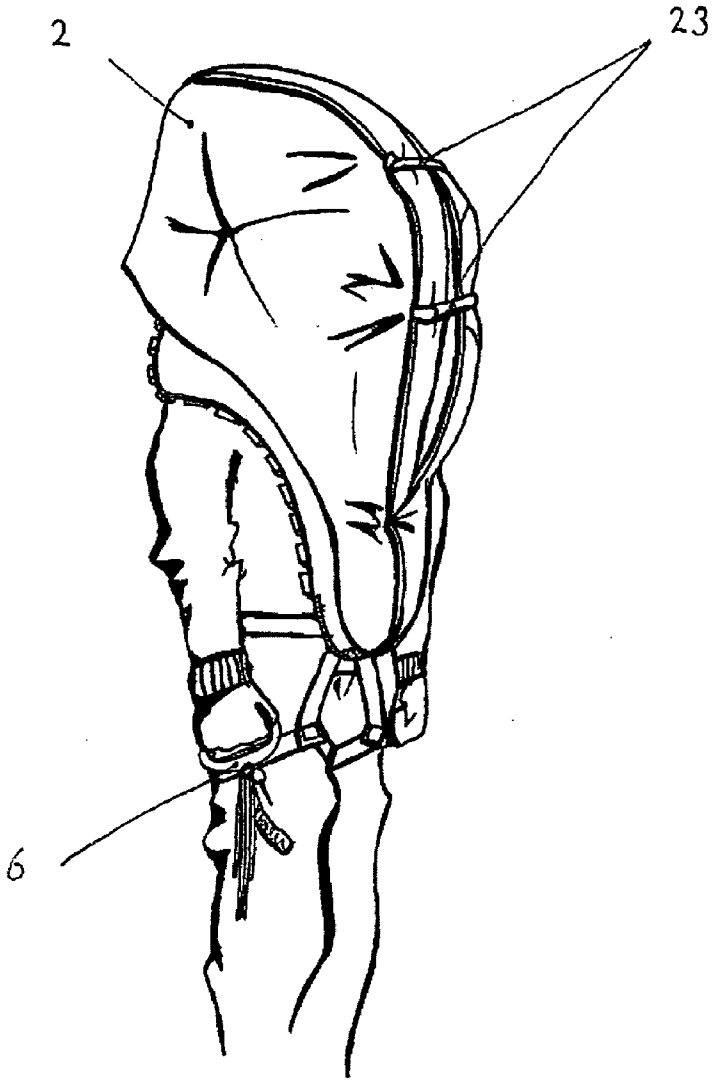
(57) **ABSTRACT**

The invention relates to a life buoy that can be used especially in the event of an avalanche, said life buoy comprising at least one envelope that can be inflated by inflation means including a pressurised gas generating cartridge and means for emptying the buoy. The envelope is a single compartment which completely surrounds the head of the user and covers at least part of the thorax of the user.



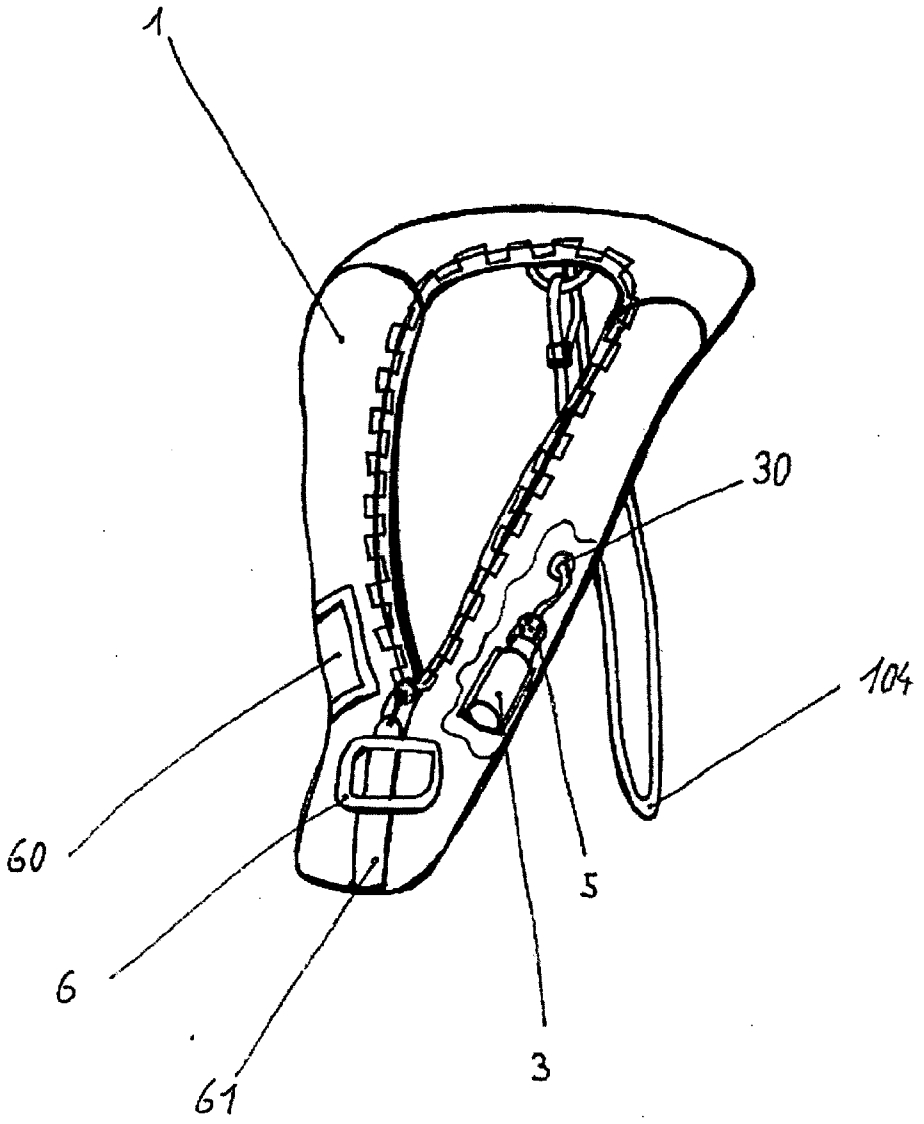


Fig. 1

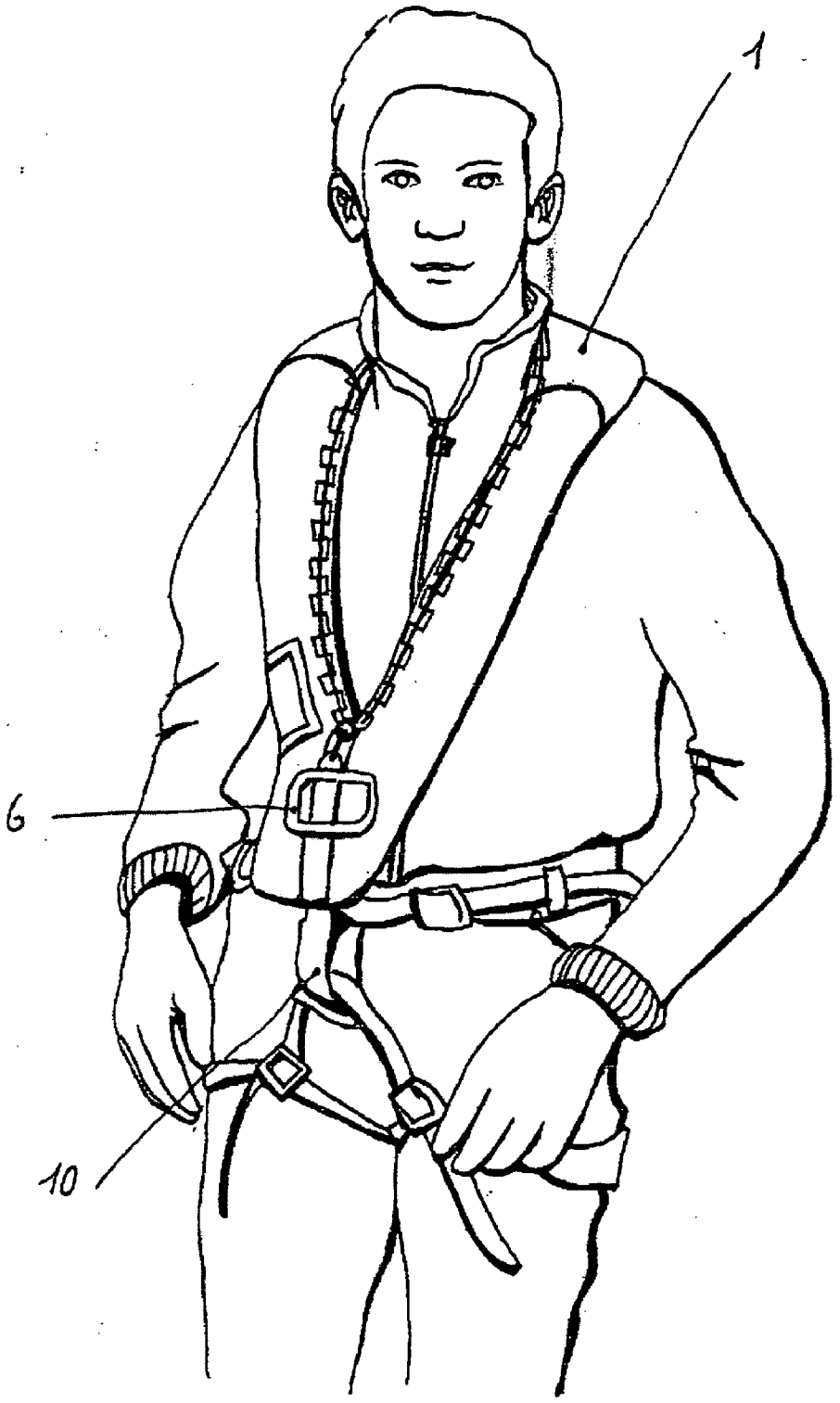


Fig. 2

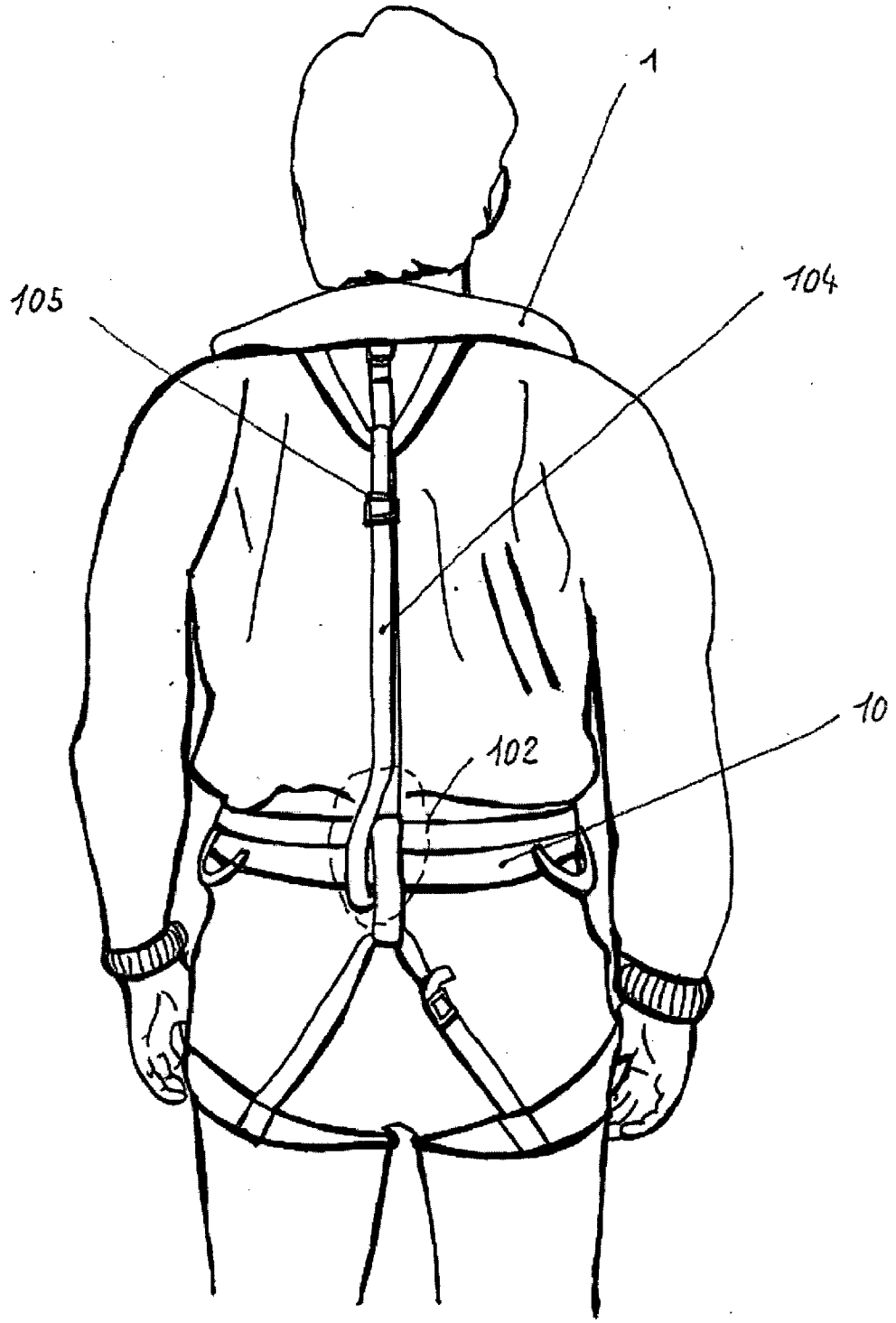


Fig. 3

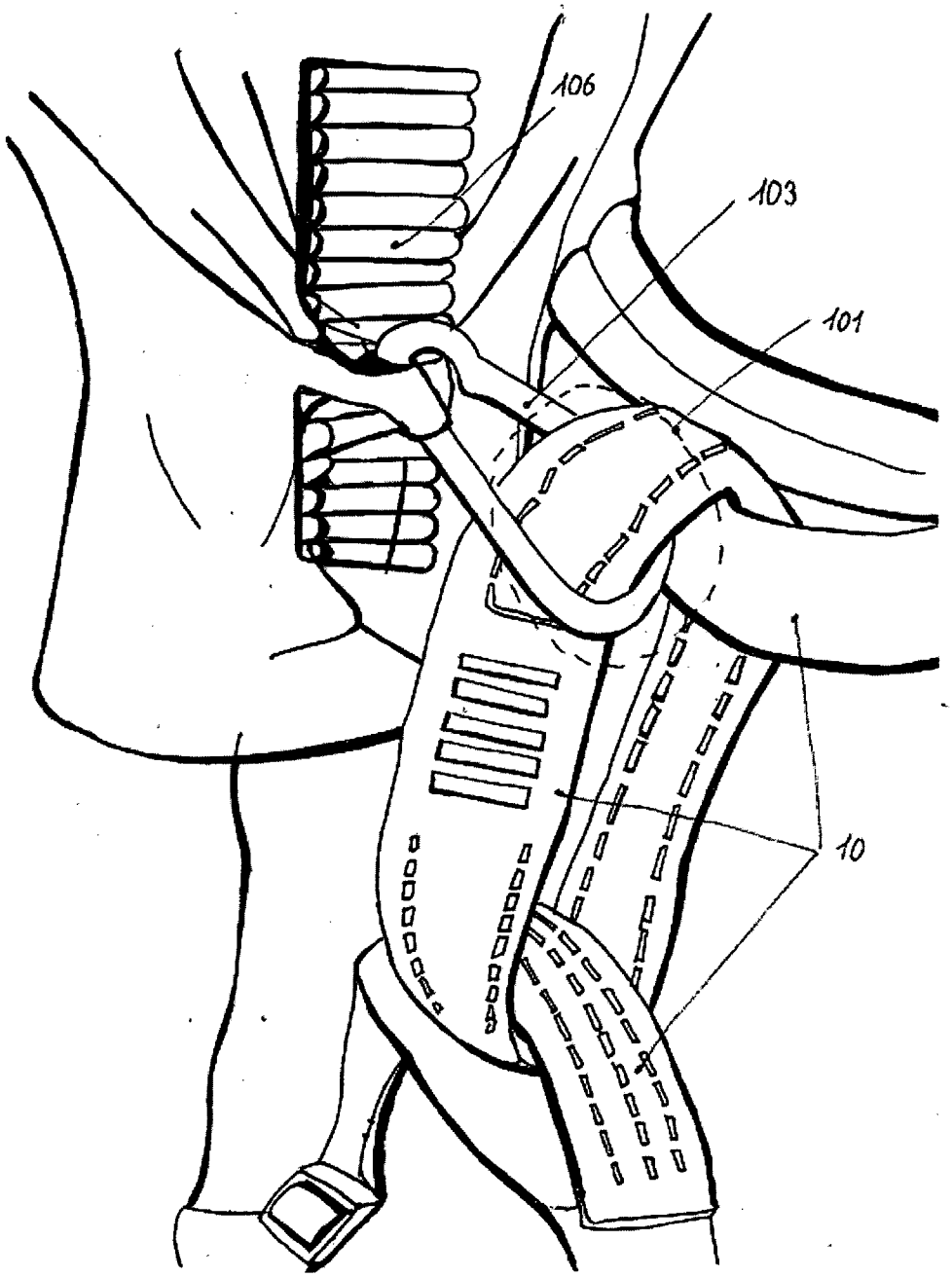


Fig. 3 bis

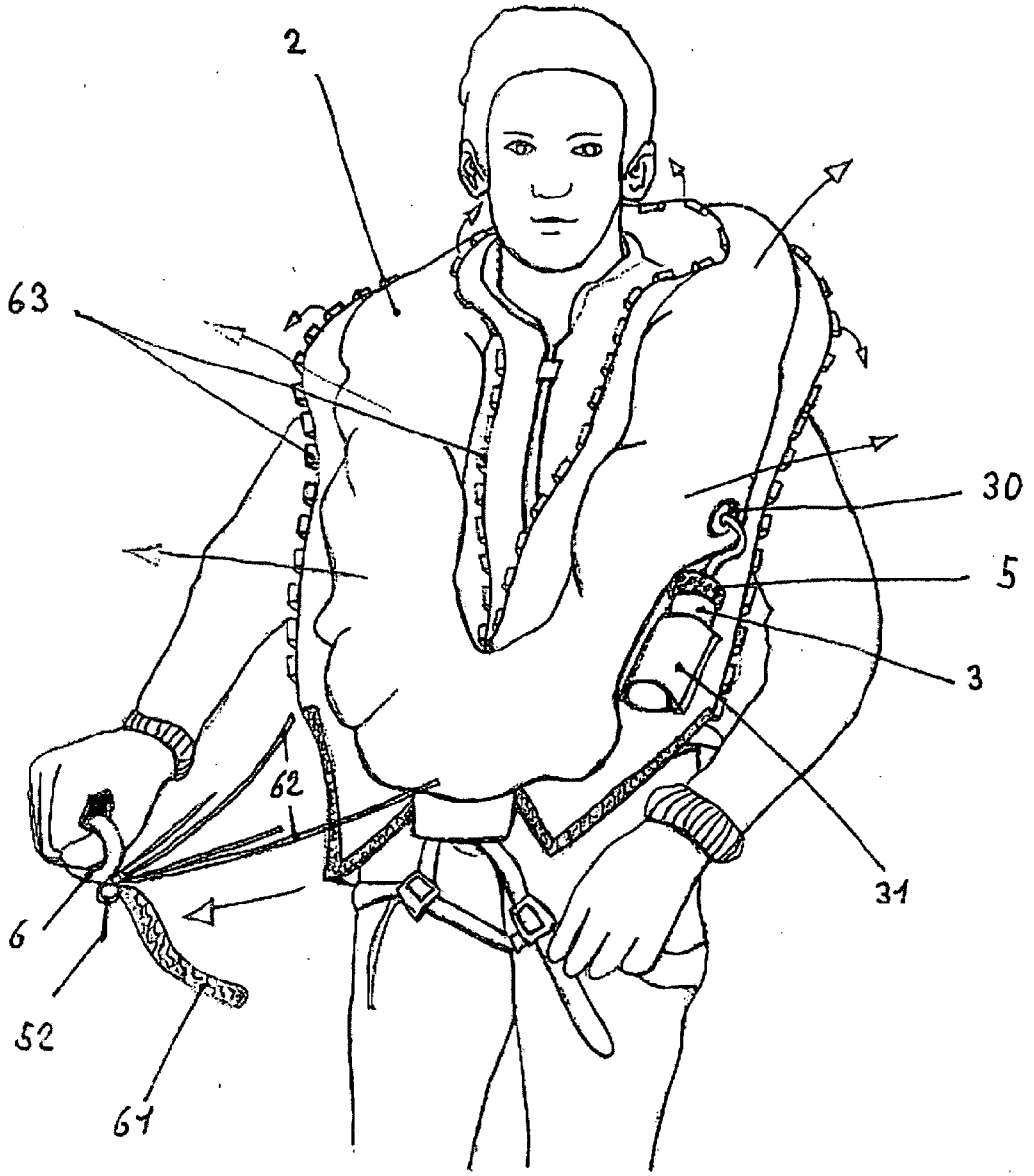


Fig. 4

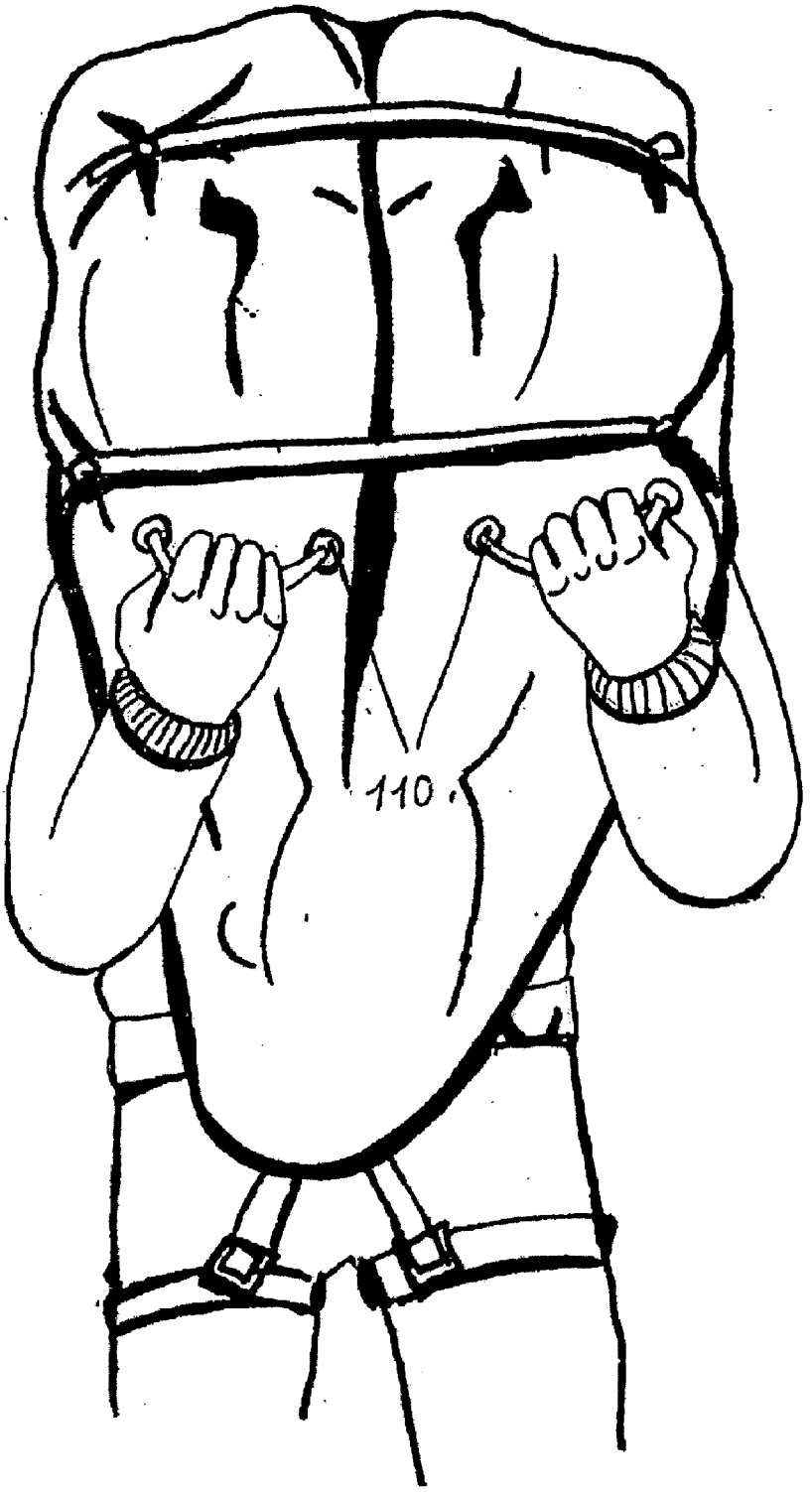


Fig. 5

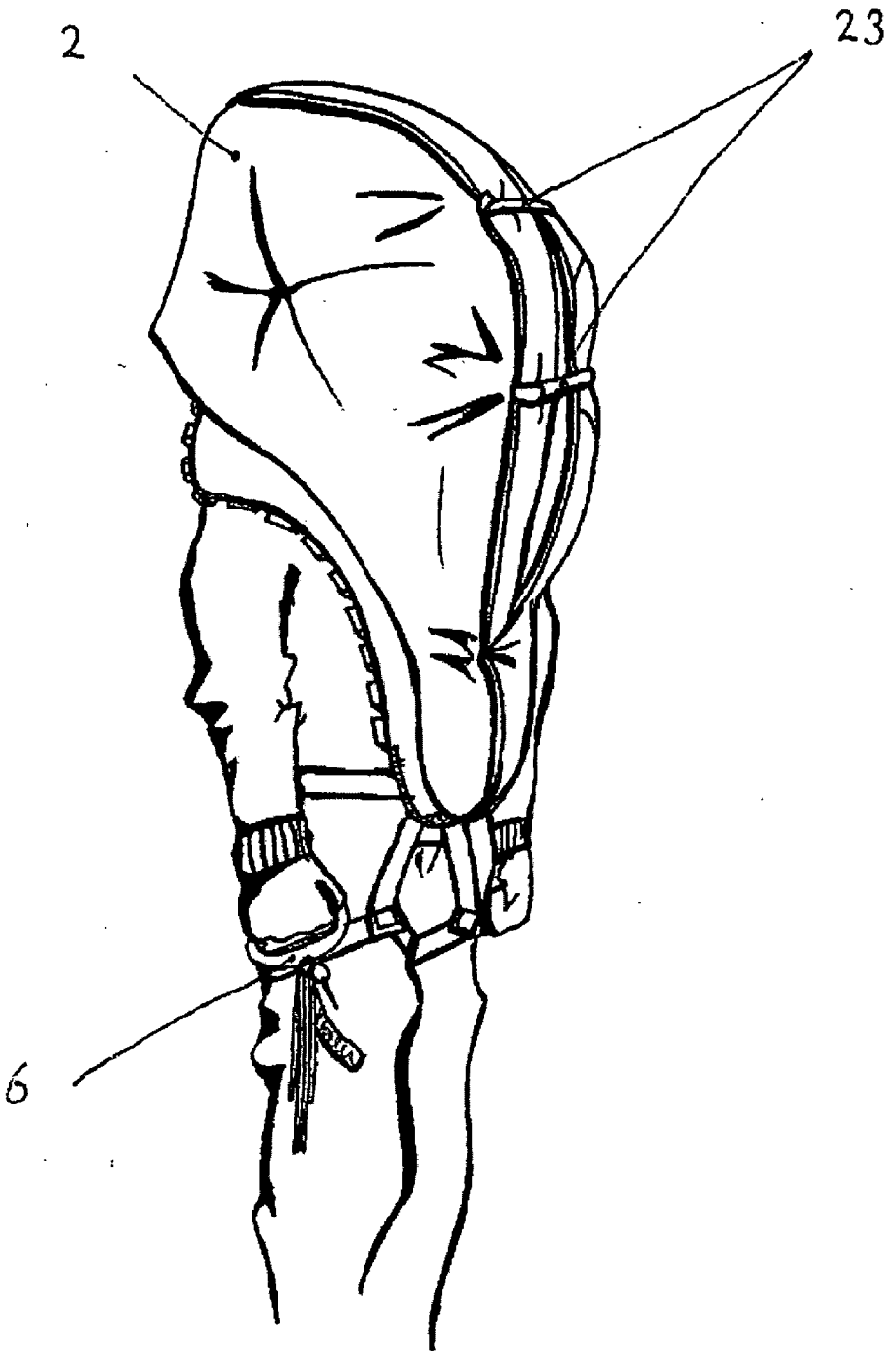


Fig. 5 bis

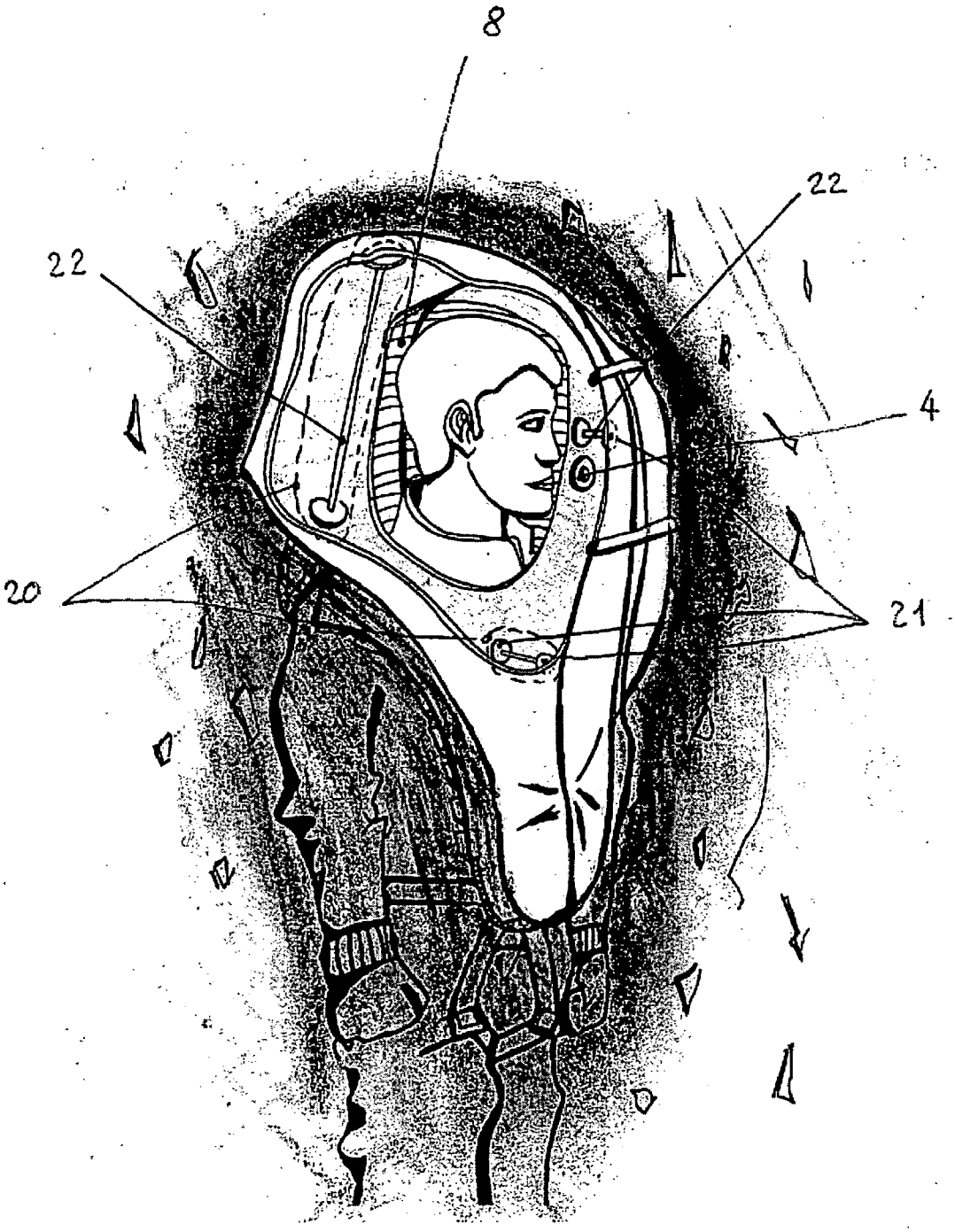


Fig. 6

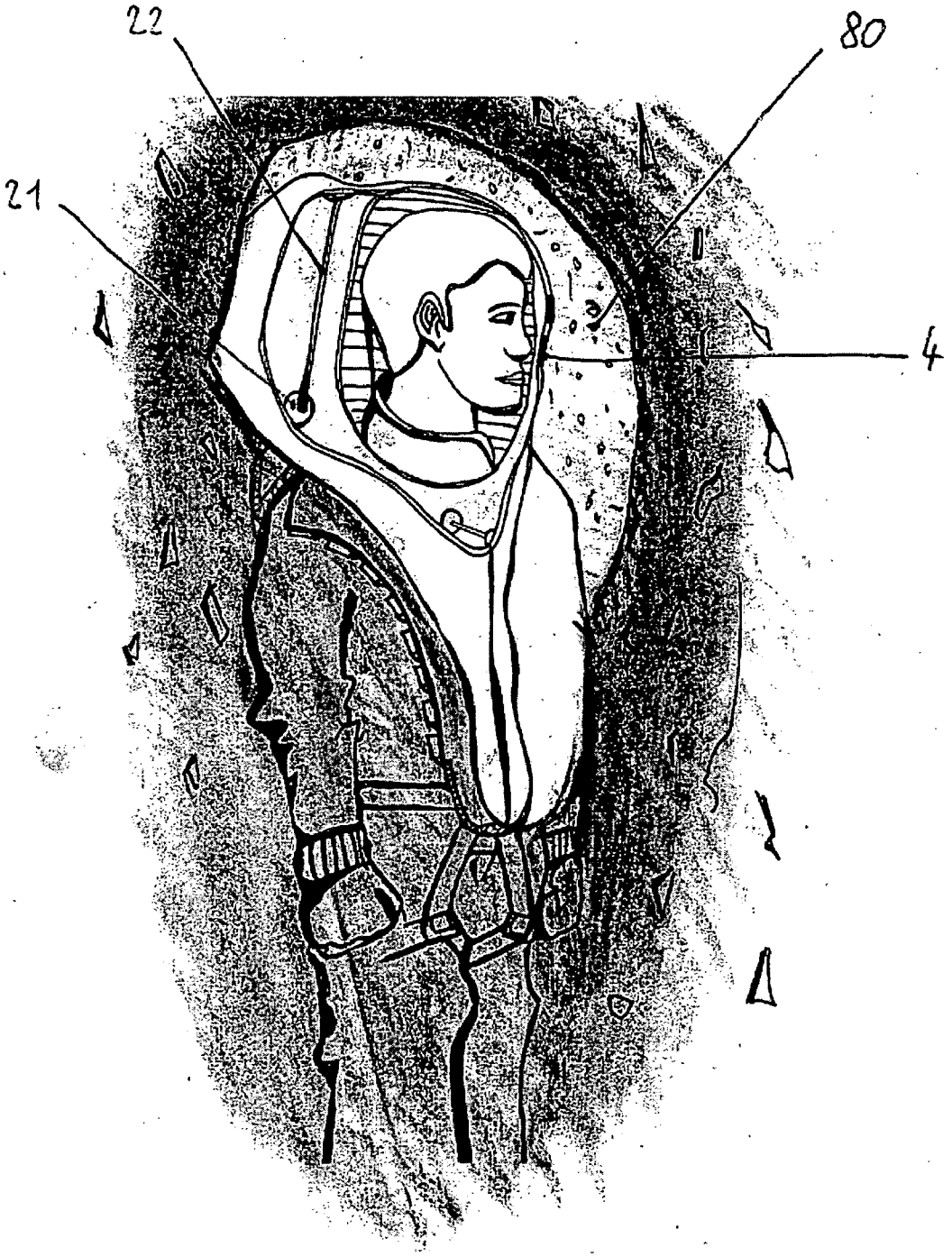


Fig. 7

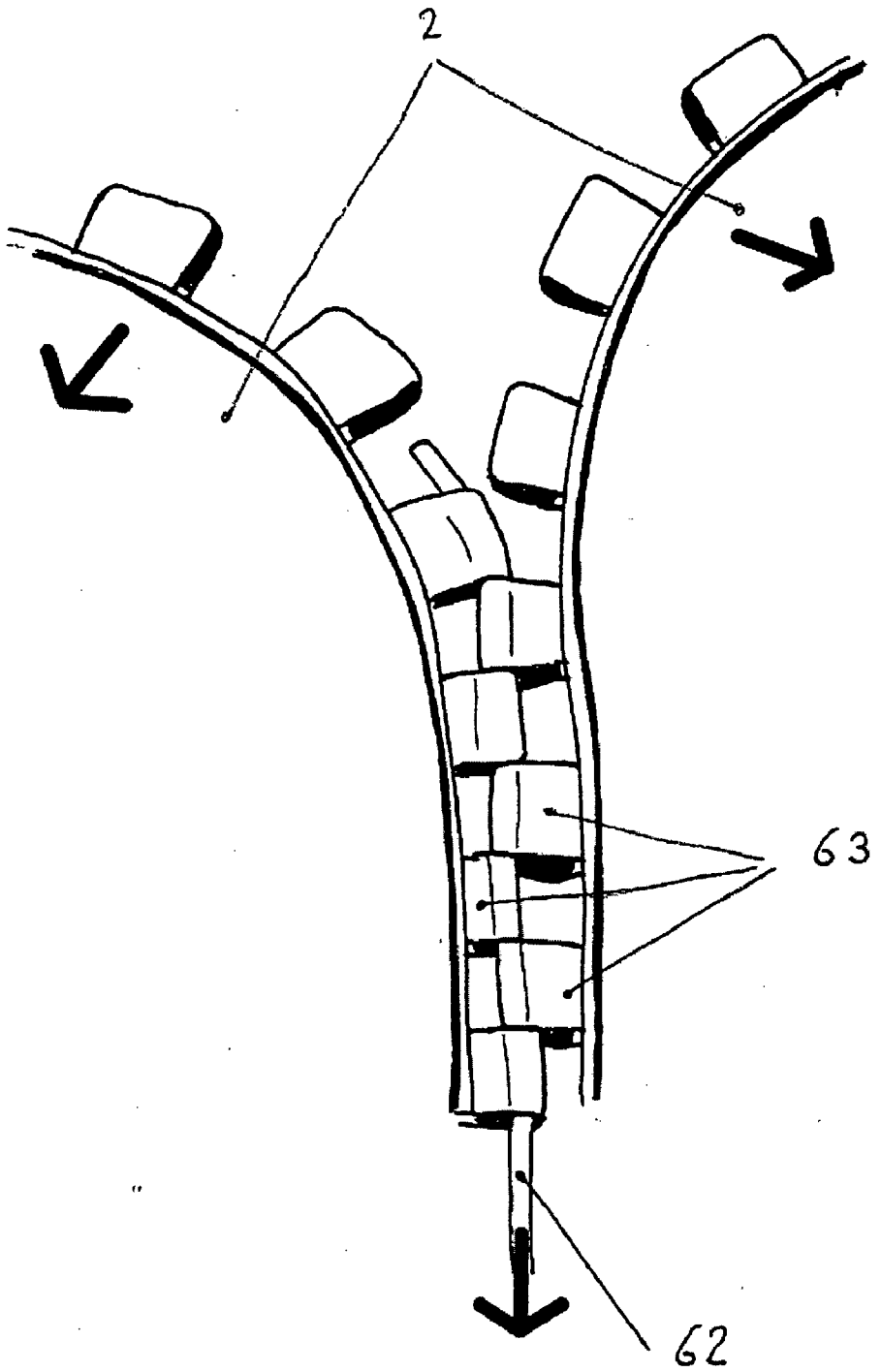


Fig. 8

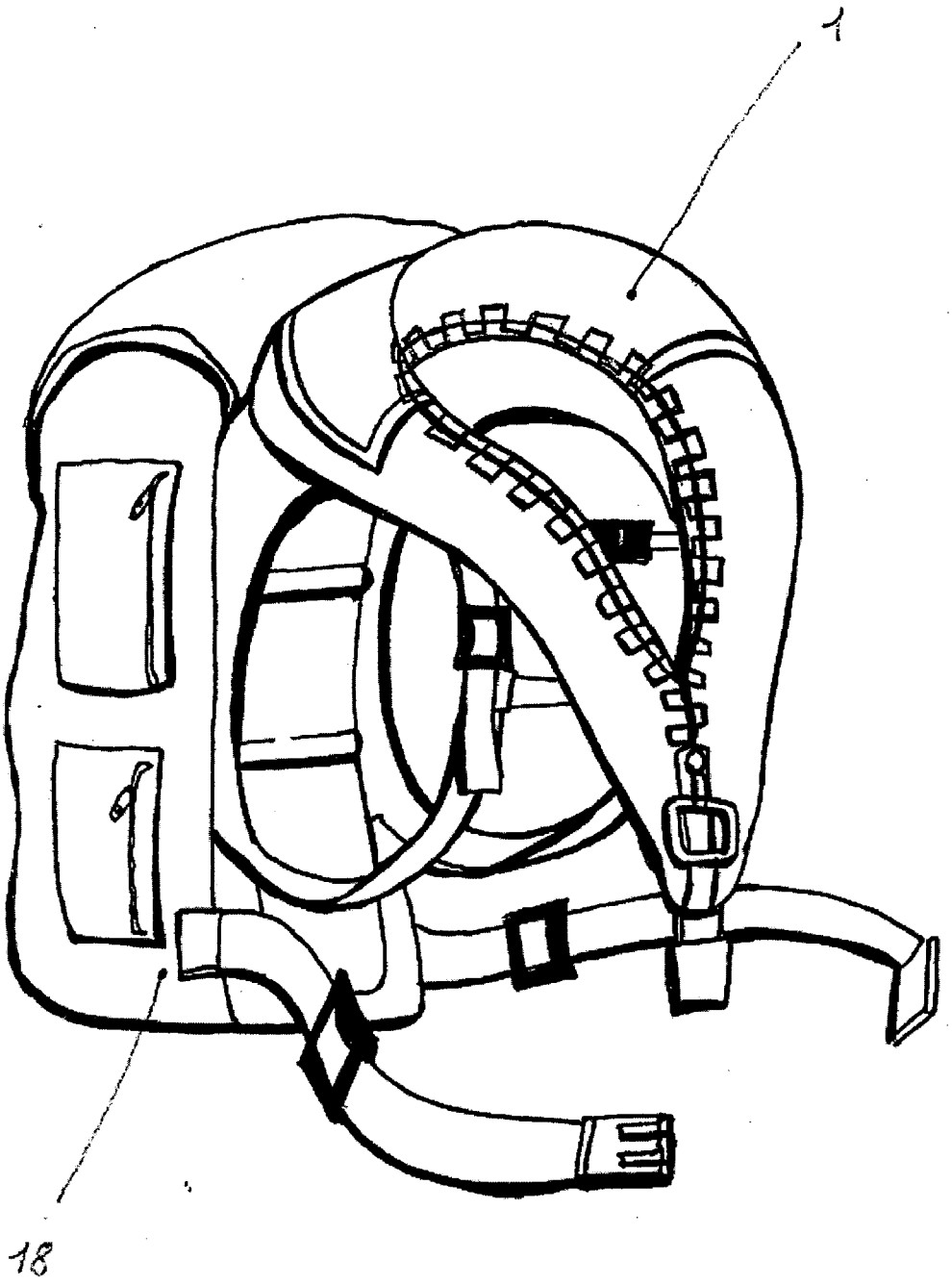


Fig. 9

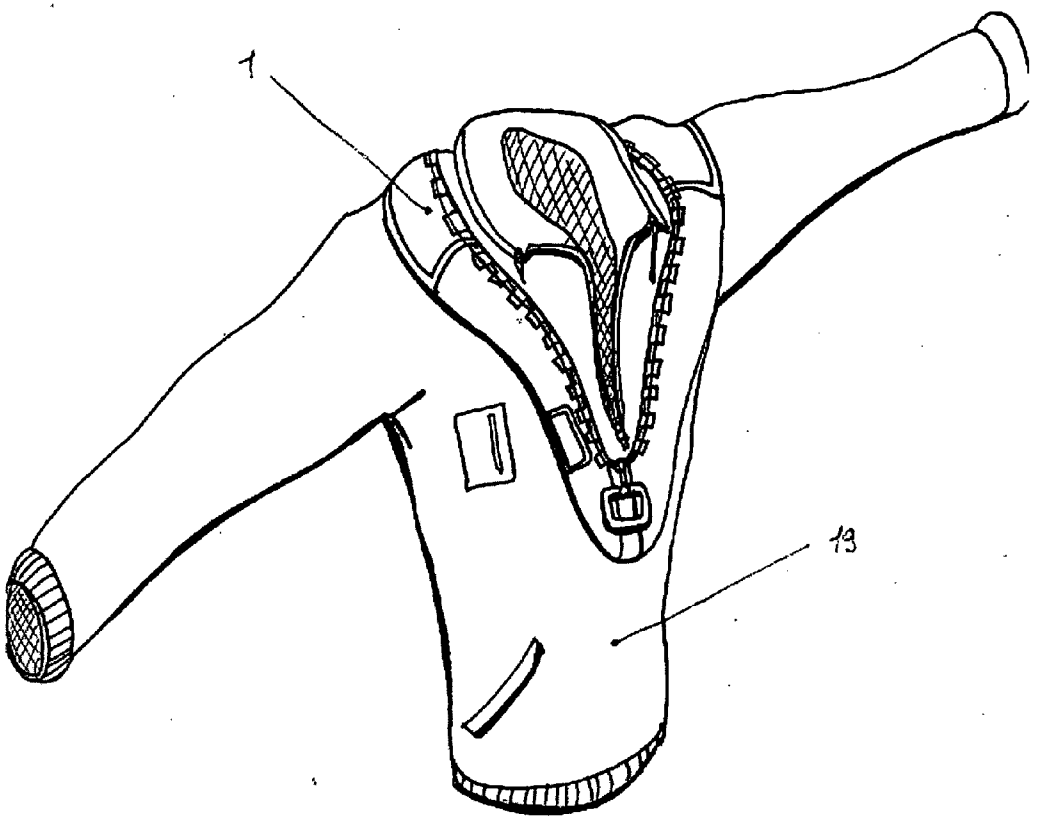


Fig. 10

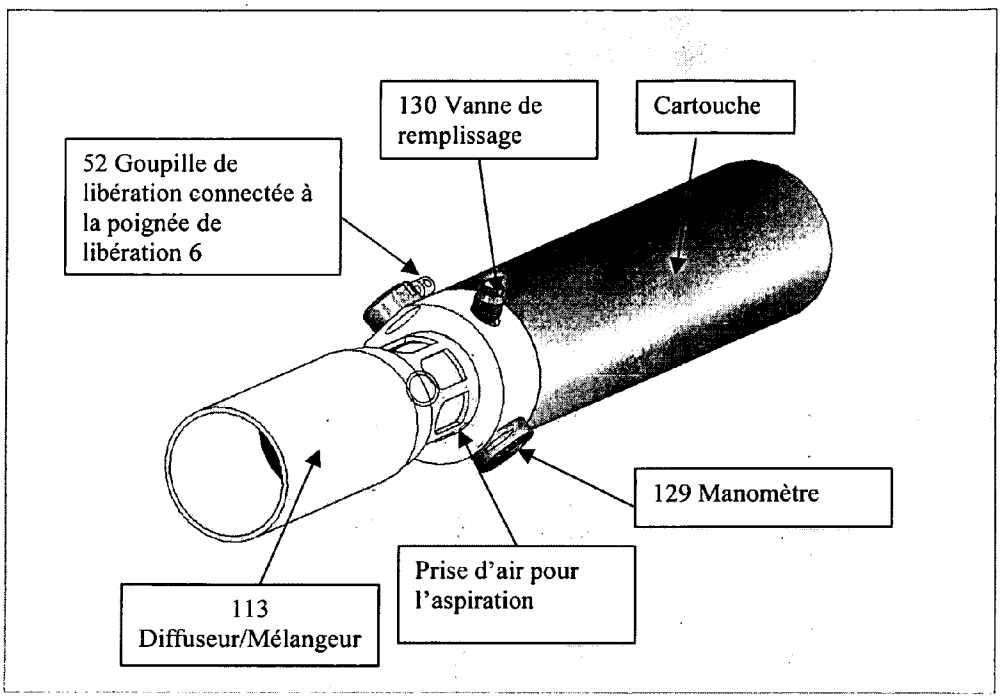

130 Vanne de remplissage
Cartouche
52 Goupille de libération connectée à la poignée de libération 6
129 Manomètre
Prise d'air pour l'aspiration
113 Diffuseur/Mélangeur

Fig. 11

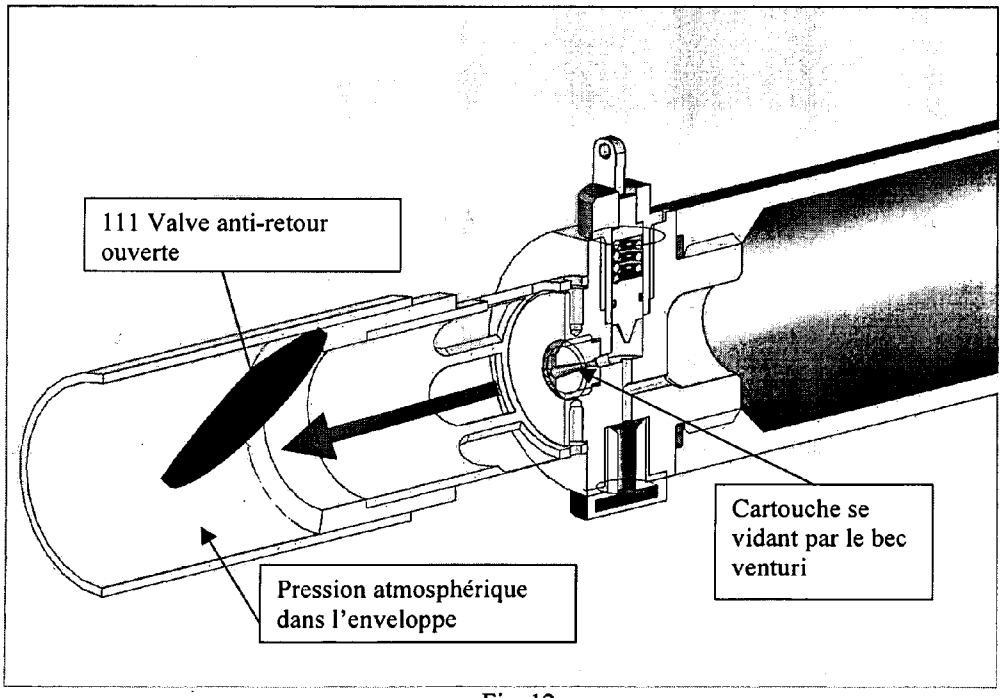

111 Valve anti-retour ouverte
Cartouche se vidant par le bec venturi
Pression atmosphérique dans l'enveloppe

Fig. 12

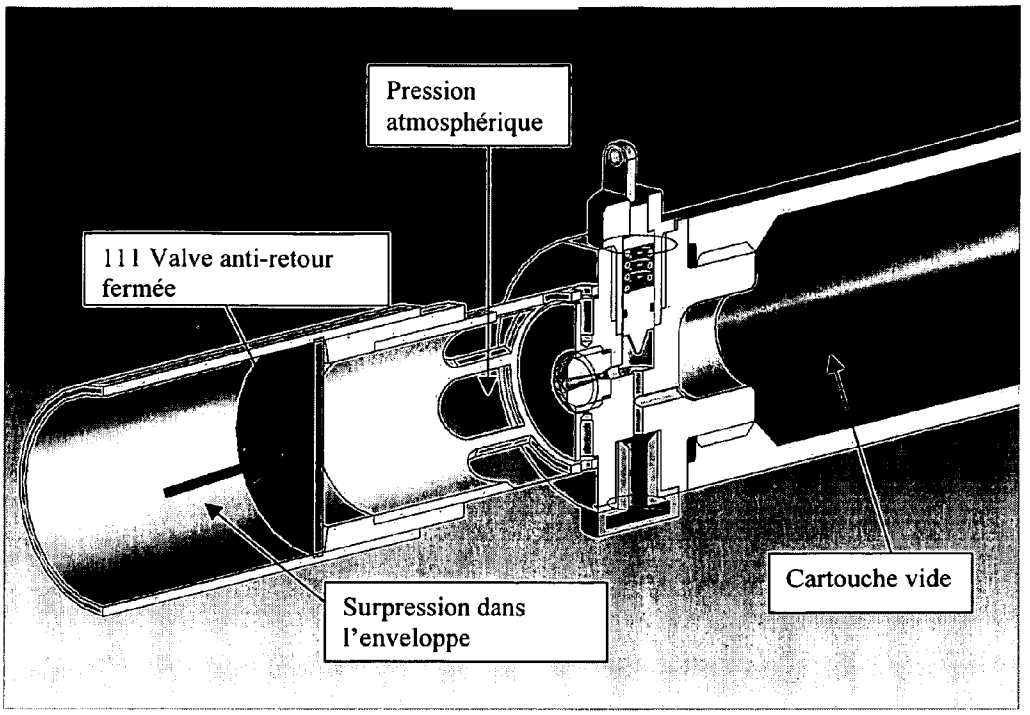


Fig. 13

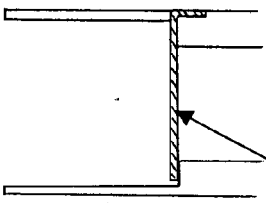


Fig. 14

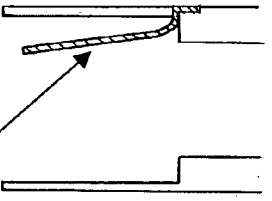


Fig. 15

112 Charnière

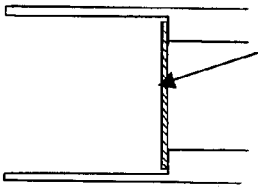


Fig. 16

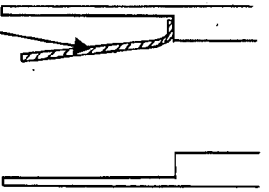


Fig. 17

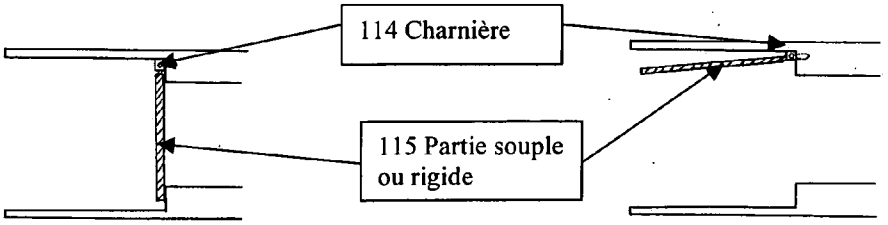


Fig. 18

Fig.19

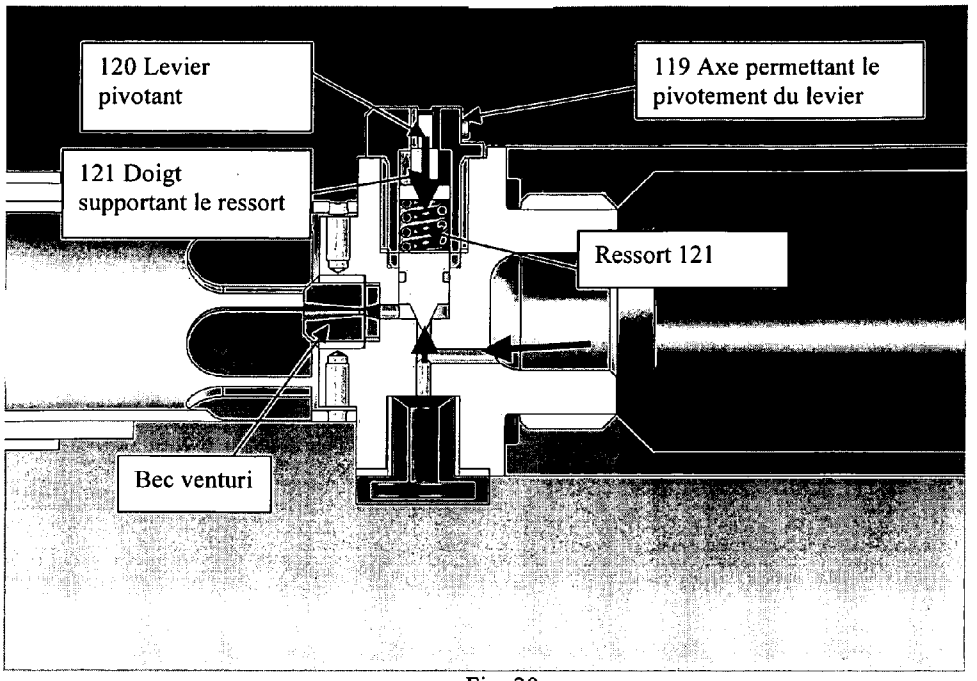

120 Levier pivotant
119 Axe permettant le pivotement du levier
121 Doigt supportant le ressort
Ressort 121
Bec venturi

Fig. 20

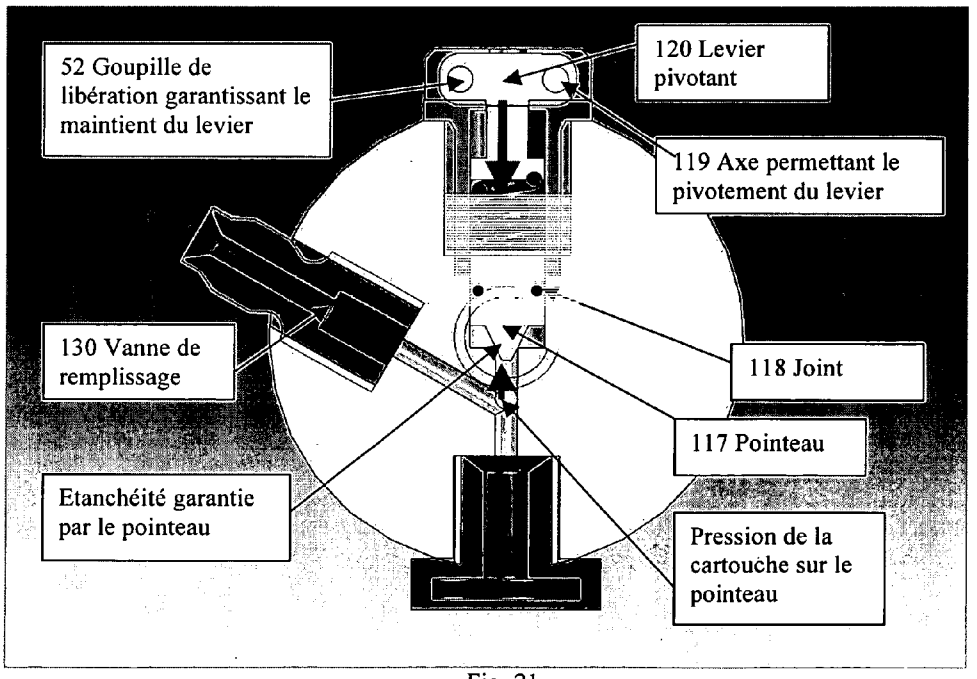

52 Goupille de libération garantissant le maintient du levier
120 Levier pivotant
119 Axe permettant le pivotement du levier
130 Vanne de remplissage
118 Joint
117 Pointeau
Etanchéité garantie par le pointeau
Pression de la cartouche sur le pointeau

Fig. 21

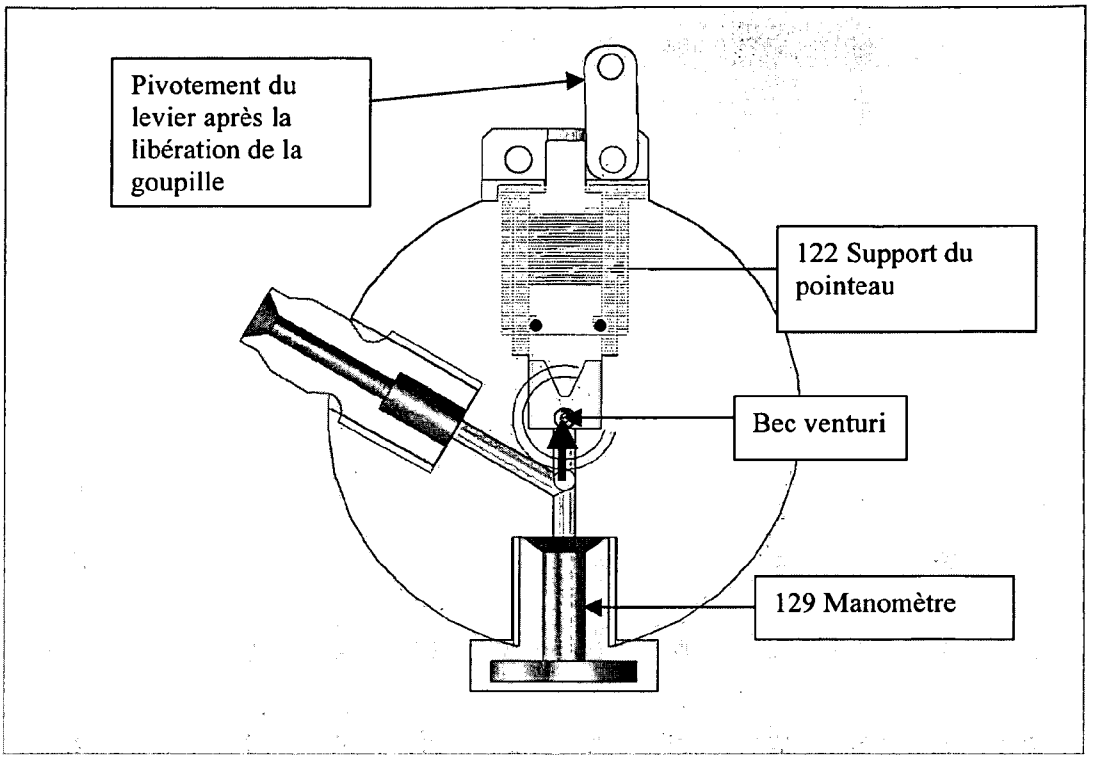

Pivotement du levier après la libération de la goupille
122 Support du pointeau
Bec venturi
129 Manomètre

Fig. 22

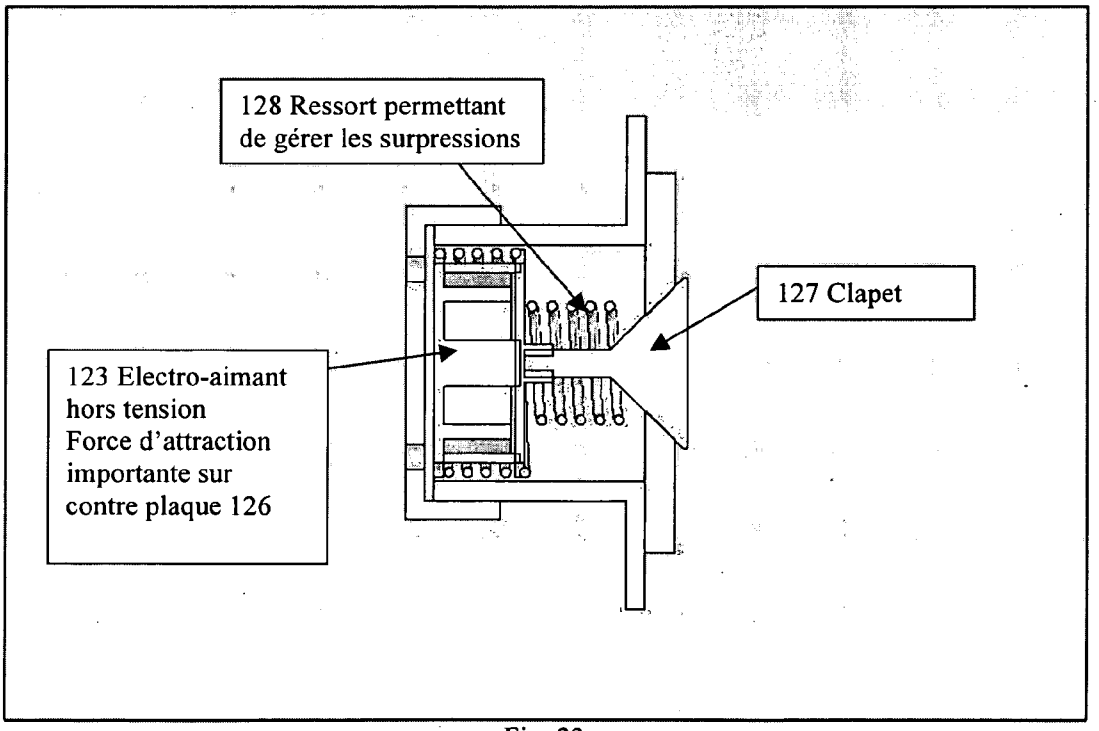

128 Ressort permettant de gérer les surpressions
127 Clapet
123 Electro-aimant hors tension Force d'attraction importante sur contre plaque 126

Fig. 23

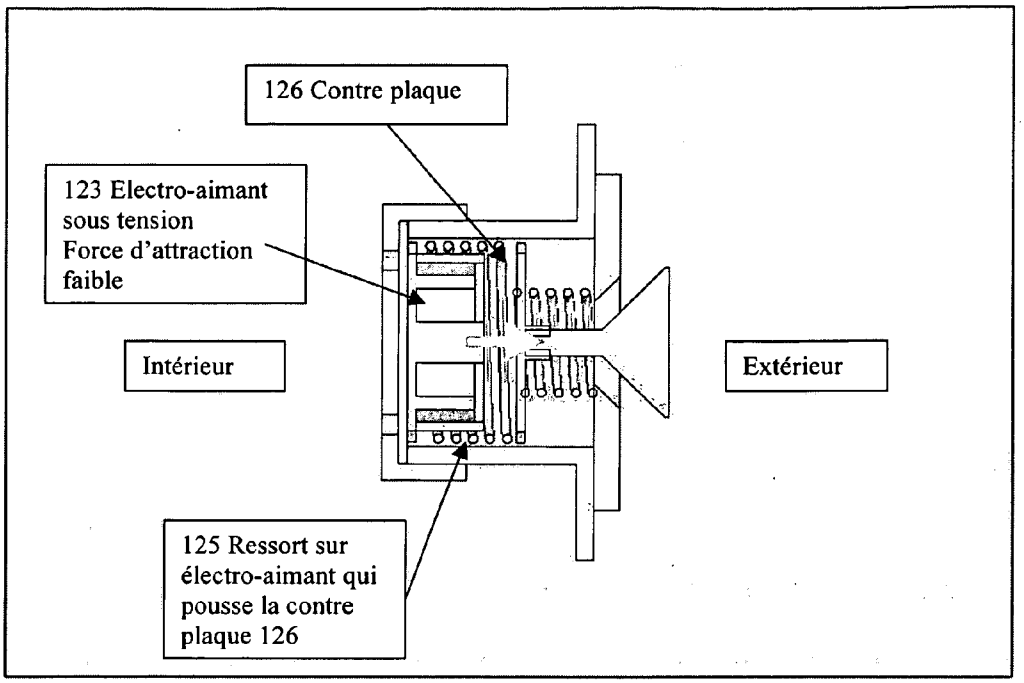

126 Contre plaque
123 Electro-aimant sous tension Force d'attraction faible
Intérieur
Extérieur
125 Ressort sur électro-aimant qui pousse la contre plaque 126

Fig. 24

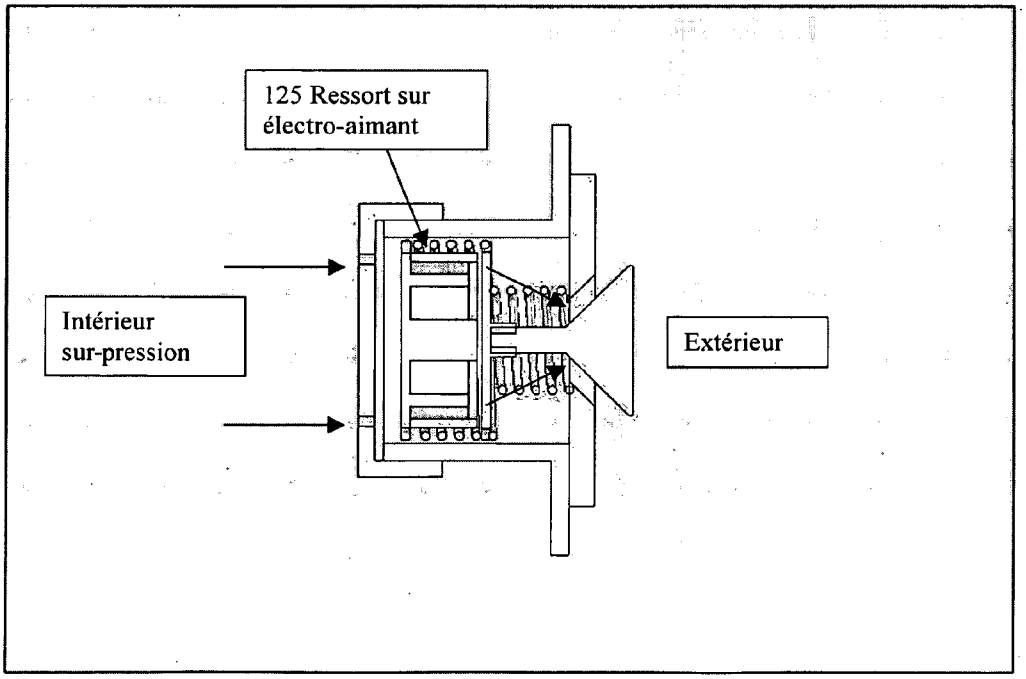

125 Ressort sur électro-aimant
Intérieur sur-pression
Extérieur

Fig. 25

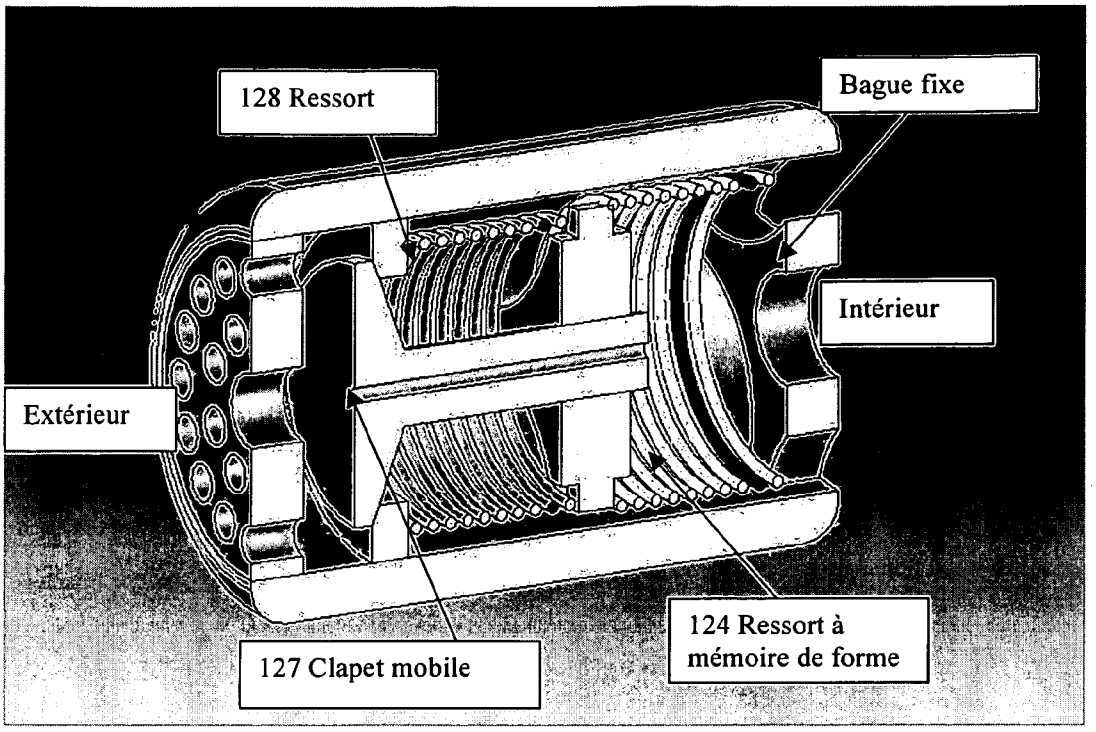

128 Ressort
Bague fixe
Intérieur
Extérieur
124 Ressort à mémoire de forme
127 Clapet mobile

Fig. 26

LIFE BUOY, ESPECIALLY FOR AVALANCHES

FIELD OF THE INVENTION

[0001] The present invention relates to a life jacket, particularly for avalanches. Specifically, the present invention relates to an avalanche life jacket being a single bag that can be inflated by a system of release of gas when activated by the user.

[0002] The present invention also relates to the mechanisms used for inflating and deflating this life jacket. These various mechanisms are there to optimize the use and reduce the weight of the systems used for such airbags inflated by a pyrotechnic air generator or a compressed air cartridge.

PRIOR ART

[0003] Various devices such as EP 0 957 994 B1; U.S. Pat. No. 6,270,386 B1; EP 0 123 684 B1; EP 0 957 995 B1; EP 0 723 790 A2 have already been described. The inflated bag/bags of these devices has/have several functions. The main functions are flotation and protection, but protection in these devices only partially covers the body or the head. In addition, for the device U.S. Pat. No. 6,270,386 B1, the bag is coupled to a cap or a mesh whose function is to protect the top of the head and of the airways. These various devices use an integrated harness/baldrick for their attachment to the user.

[0004] The device U.S. Pat. No. 6,270,386 B1, using a cover in order to place the folded bag therein, uses an opening mechanism which is fully opened by the inflation and during the latter. This method uses the energy of the pressurized receptacle to open the cover and reduces its efficiency. Specifically, the inflation time of this method is approximately 9 seconds.

[0005] The devices EP 0 723 790 A2, U.S. Pat. No. 6,270,386 B1 using a valve or "mouth-bite" must be triggered by the user or are used in a fixed position (open or closed). Consequently an intervention of the user is obligatory.

[0006] Apart from the two patents EP 0 957 994 B1 and EP 957 995 B1 which give a description of their various inflation systems making the use of their airbag credible, the other patents have often described the used mechanisms badly or not at all.

[0007] Therefore, the devices EP 0 957 994 B1 and EP 957 995 B1 use the nonreturn valve placed in a suction chamber which surrounds the venturi nozzle or ejector. This suction chamber makes it possible to channel the suction to the nonreturn valve. The latter, in the presence of suction, descends and allows the ambient air to enter the chamber and then enter the diffuser or mixer that are connected to the bag. This method complicates the manufacture of the system because it is necessary to create a suction chamber to channel the suction and protection for the nonreturn valve on the outside which prevents the latter being opened inadvertently (for example, by the pressure of the snow pressing thereon).

[0008] The devices EP 0 957 994 B1, EP 957 995 B1 use a metal membrane for closing their gas cartridge. The latter, struck and perforated by a needle or a spike, will allow the gas cartridge to be emptied. The use of this system requires onboard potential energy to perforate the membrane.

[0009] The devices EP 0 957 994 B1; U.S. Pat. No. 6,270,386 B1; EP 0 123 684 B1; EP 0 957 995 B1; EP 0 723 790 A2 use a gas cartridge to inflate their airbag but do not have the visual or tactile possibility to check how full it is before its use.

DESCRIPTION OF THE INVENTION

[0010] Because of the earlier problems and disadvantages of the various devices, the present invention allows the user to increase his chances of survival and to reduce the weight of the assembly.

[0011] Consequently, the present invention, through its shape and simplified mechanisms, makes it possible to reduce the components or diminish the energy carried or improve the functions of the airbag.

[0012] The innovative step of the avalanche life jacket when compared with the other devices lies in the fact that none of the predecessors solved the problem of asphyxia during the avalanche. Specifically, this bag, made in a single compartment, completely surrounds the head and covers the thorax. Once inflated, a cavity is created around the face of the user which makes it possible to breathe during its use and prevents direct contact with the snow. In addition, it provides effective protection against the various impacts that the avalanche could cause. This single-compartment bag simplifies manufacture and reduces the weight. Our predecessors did not offer complete protection of the head and protection of the thorax. The idea of a cap or mesh coupled to the bag proposed by U.S. Pat. No. 6,270,386 B1 to protect the top of the head does not offer as good a protection as an air cushion as used for the rest of the head.

[0013] In addition, the avalanche life jacket when compared with the other devices is characterized in that the jacket is attached directly to the standard harness/baldrick of the user. Accordingly, another harness or other devices having the function of keeping the bag on the user become unnecessary. The weight reduction is a very important element for this type of device.

[0014] In addition, the avalanche life jacket when compared with the other devices is characterized in that the bag/cover opens fully when the release grabhandle has been pulled. Our system uses the principle of a hinge release grabhandle already used in parachuting. To prevent too long a travel, three or four hinge cables will be used for the release grabhandle. Specifically, the release movement of the grabhandle must be as short as possible to reduce the amplitude of the movement and be as fast as possible. This system of early opening of the bag/cover makes it possible to save energy and gain many seconds for inflation.

[0015] In addition, the avalanche life jacket when compared with the other devices that use a valve or a "mouth-bite" is characterized in that an automatic deflation valve will trigger depending on the opening system (delay timer or pressure sensor to determine the difference of altitude). The two systems are triggered by pulling out the release grabhandle. This principle of automating the deflation of the bag arises from the fact that the user will perhaps not be able to do it on his own for various reasons:

- **[0016]** Being unconscious
- **[0017]** Wearing a helmet with chin strap
- **[0018]** Having the mouth obstructed by goggles, the snow or other elements

[0019] In the first phase, of approximately 90 seconds, the user breathes in the cavity that has been created inside the bag. This chamber is created, when the bag inflates, by shaped ribs formed by two patches cemented to the bag and by an elastic

element connecting them together. The second phase which is the automatic deflation of the bag brings breathable air to the user and creates a vital space which will perhaps allow him to move. The inflation of the bag and the sudden stopping of the avalanche may generate an internal pressure which may exceed the pressure admissible by the bag. This possible overpressure is released by this same automatic deflation valve.

[0020] The innovation also relates to a nonreturn valve for an airbag. When compared with the other devices, it is characterized in that none of the predecessors used a nonreturn valve placed in the mixer or diffuser and therefore in the actual axis of the air flow coming out of the venturi nozzle or ejector. The latter makes it possible to greatly simplify the geometry while reducing the weight, because this construction avoids the manufacture of a suction chamber and a grill to protect against it being opened inadvertently. Specifically, its innovative position is possible when using a nonreturn valve offering practically no resistance in the inflation direction but allowing it to be closed at the end of inflation. This nonreturn valve may be used both for pyrotechnic inflation systems or for those using a compressed gas cartridge.

[0021] In addition, the innovation relates to a mechanism for opening and closing the cartridge for the airbag. When compared with the other devices, it is characterized in that none of the predecessors used a needle for closing and opening the gas cartridge. Such a needle allows multiple use without having to change component. In addition, the opening mechanism uses no onboard potential energy for the opening, such as a compressed gas as in EP 0 957 994 B1 and EP 957 995 B1. The orifice of the cartridge is locked by a needle which is pressed against the latter with the aid of a balanced spring. The instantaneous opening of the orifice, in the knowledge that under the needle there is pressurized air, is achieved by a weak force which unbalances the mechanical system maintaining the balance between the spring and the needle.

[0022] In addition, the innovation relates to the mechanism of a visual or tactile telltale element connected to the cartridge for the airbag. When compared with the other devices, it is characterized in that none of the known devices used a visual or tactile telltale system attached to the cartridge that told us the level of gas before its use.

[0023] Finally, an automatic deflation valve for the airbag, when compared with the other devices that use a valve/"mouth-bite" placed opposite the user that is triggered by sucking thereon. This new proposed mechanism is characterized by its being produced with the aid of an electromagnet or a shape-memory spring which allows the automatic opening of the deflation valve after a delay predetermined by the manufacturer or by the immobilization of the user. The immobilization may occur after a fall or an avalanche; it will be determined by acceleration or atmospheric pressure sensors.

DESCRIPTION OF AN EMBODIMENT

Brief Description of the Figures

[0024] FIG. **1** shows a front view in perspective of the avalanche life jacket of the present invention;

[0025] FIG. **2** shows a user wearing the avalanche life jacket of FIG. **1**;

[0026] FIGS. **3** and **3***b* is show the front and rear attachment points of the avalanche life jacket of FIG. **1** on the harness/baldrick of the user;

[0027] FIG. **4** shows the avalanche life jacket of FIG. **1** with the release grabhandle pulled out of its initial location;

[0028] FIGS. **5** and **5***b* is show the avalanche life jacket of FIG. **1** once inflated in perspective and once inflated from the front;

[0029] FIG. **6** shows a side section of the avalanche life jacket of FIG. **1** once inflated and covered by snow; this section allows us to see the small cavity around the head of the user and a formed rib which retains the shape of the bag, and the position of the automatic deflation valve;

[0030] FIG. **7** shows a side section of the avalanche life jacket of FIG. **1** once deflated and covered by snow; this section allows us to see the space (**80**) around the head and the thorax of the user;

[0031] FIG. **8** shows a view of the hinge system with a cable of the release grabhandle used for the avalanche life jacket of FIG. **1**;

[0032] FIG. **9** shows the avalanche life jacket of FIG. **1** incorporated into a backpack;

[0033] FIG. **10** shows the avalanche life jacket of FIG. **1** incorporated into a standard jacket;

[0034] FIG. **11** shows a section in perspective of a method of manufacturing the cartridge and the suction system of the present invention;

[0035] FIG. **12** shows a section in perspective of a method of manufacturing the open nonreturn valve of the present invention;

[0036] FIG. **13** shows a section in perspective of a method of manufacturing the closed nonreturn valve of the present invention;

[0037] FIG. **14** shows a section of a method of manufacturing the nonreturn valve in a single piece, closed position (screwed or bonded);

[0038] FIG. **15** shows a section of a method of manufacturing the nonreturn valve in a single piece, open position (screwed or bonded);

[0039] FIG. **16** shows a section of a method of manufacturing the nonreturn valve in a single piece, closed position (screwed or bonded);

[0040] FIG. **17** shows a section of a method of manufacturing the nonreturn valve in a single piece, open position (screwed or bonded);

[0041] FIG. **18** shows a section of a method of manufacturing the nonreturn valve having a mechanical portion and a flexible or rigid portion to obstruct the opening. Open position (screwed or bonded);

[0042] FIG. **19** shows a section of a method of manufacturing the nonreturn valve having a mechanical portion and a flexible or rigid portion to obstruct the opening. Closed position (screwed or bonded);

[0043] FIG. **20** shows a section of a method of manufacturing the system for opening and closing the cartridge of the present invention;

[0044] FIG. **21** shows a section of a method of manufacturing the system for opening and closing the cartridge of the present invention in the closed position;

[0045] FIG. **22** shows a section of a method of manufacturing the system for opening and closing the cartridge of the present invention in the open position;

[0046] FIG. **23** shows a section of a method of manufacturing an automatic deflation valve system using an electromagnet coupled to an overpressure system, closed position;

[0047] FIG. **24** shows a section of a method of manufacturing an automatic deflation valve system using an electromagnet coupled to an overpressure system, position opened by the electromagnet;

[0048] FIG. **25** shows a section of a method of manufacturing an automatic deflation valve system using an electromagnet coupled to an overpressure system, position opened by an overpressure in the bag;

[0049] FIG. **26** shows a section of a method of manufacturing an automatic deflation valve system using a shape-memory spring coupled to an overpressure system, closed position.

[0050] This avalanche life jacket **1** consists of a single chamber. The cloth employed for the bag may be a polyamide 6.6 or Cordura cloth with a coating of PU or PVC or other polymers. The PU or PVC coating makes it possible to have a suitable gas seal and to be able to cement the cloth. The features of this cloth must be stretch-resistance and abrasion-resistance. The bag can be assembled in various ways: sewn, cemented.

[0051] The shape of the jacket is maintained by a system of shaped ribs **20** inside the bag. The shaped ribs **20** are simplified to the extreme to minimize the weight and production time. The shaped ribs **20** are patches **21** cemented or sewn onto the bag and an elastic element **22** that links them together.

[0052] There are two PU/PVC valves that are cemented or screwed to the bag, the inflation valve **30** and the automatic deflation valve **4**. The first **30** is positioned on the outside of the bag; it will be connected to the cartridge assembly **3** and to the venturi nozzle system **5**. The second **4** is cemented or screwed in front of the airways of the user and will make it possible to supply the latter with air when it deflates.

[0053] This avalanche life jacket **1** is directly attached to the harness/baldrick **10** of the user. There are two quick attachment points which allow a quick fitting and size adjustment. The first point **101** is on the front of the baldrick and the second point **102** is connected to the harness/baldrick **10** at the back. The attachment to the first point **101** may be a quick snap hook **103** made of aluminum or stainless steel which holds the loop of the harness/baldrick **10** with one of the loops of the bag **106** which could be provided for this purpose. The attachment of the second point **102** is an adjustable strap **104** with a fastening buckle **105** made of aluminum. The adjustable strap **104** may be made of nylon; it connects the harness/baldrick **10** and the bag of the avalanche life jacket **1**.

[0054] Triggering is manual. In the normal position, the release grabhandle **6** plays the role of a hinge **63** between the two edges of the bag **2** or of the cover which closes it on itself and is held by the strands **62** passing through the loops **63**. It is protected against inadvertent opening by a storage pocket **60** closed with velcro that is opened when the risk of an avalanche becomes more pronounced. On the other hand, once the release grabhandle **6** has been pulled, the bag opens of its own accord.

[0055] Once the bag is inflated, it creates for itself a small cavity **8** around the head of the user. This small cavity **8** allows the user to breathe for the duration of the avalanche. This period lasts approximately 90 to 120 seconds or until the victim is immobilized which will give the instruction to the automatic deflation valve **4** to open fully. In addition, pulling out this grabhandle **6** ensures the release of the mechanism to open the pressurized air cartridge **3** allowing the jacket to inflate. This function is carried out by a connection between the grabhandle **6** and the pin **52**.

[0056] The inflated avalanche life jacket **1** completely protects the airways of the user against asphyxia. It also protects the head and the thorax of the user against injury due to falls, rocks, ice, snow, etc. In addition, during an avalanche, the avalanche life jacket **1** improves flotation in the avalanche or in another environment such as water. Therefore, the avalanche life jacket **1** increases the user's chances of staying on the surface.

[0057] To ensure that the bag remains closed, various possibilities may be envisaged. Here are two examples; the first is to place halyards **23** between the two portions of the bag which prevents the latter from opening. The closure principle is simple; the more you inflate, the more the halyards will want to tighten and therefore keep the life jacket closed. These halyards **23** could be of various widths or diameters. The second possibility could be used alone or could reinforce the halyards **23** with a series of strips of the velcro® type on both sides of the opening of the bag. This series of velcro®-type strips would perhaps not be continuous in order to provide the user with the possibility of breathing through the various orifices.

[0058] There are two handles **110** on the outer sides of the bag which could be used by the user to keep his upper limbs close to the bag.

[0059] At the end of the approximately two-minute time delay or after the immobilization of the user, the bag deflates automatically through the automatic deflation valve **4** which ventilates the chamber **8**. The deflation is optimized by the elastic elements **22** under tension which play the role of shaped ribs **20** in the inflated phase. By deflating, the bag creates a space **80** around the user which takes the strong pressure on the thorax away from him and allows him perhaps to move. The air from the bag allows the user to reduce the risks of asphyxia during this period.

[0060] The means of inflating the jacket are described below and with reference to FIGS. **11** to **26**.

[0061] The nonreturn valve **111** may be made according to two different designs, either in a single piece **112** or by a mechanical system, hinge **114** as an example, with a flexible or rigid portion **115** which obstructs the orifice. In the first case, the material used provides the flexibility necessary to replace the mechanical hinge and allow the air flow to pass on one side while being rigid enough to retain it once the inflation of the bag is complete. The second case is an assembly of several components allowing the same functions. The materials used for the flexible portion may be rubber, PU, PVC or any other polymers or else cloth coated with PU, PVC or any other polymers or material which gives it flexibility. The rigid portion of the second case may be made of metal or plastic or rigid polymer.

[0062] The diffuser or mixer **113** may have a crank on the end before entering the bag; it could allow the attachment of the nonreturn valve **111** and the protection of the latter against any malfunction. The nonreturn valve **111** or its hinge may be attached by clamping or bonding or screwing or swaging onto the bearing surface of the crank of the diffuser or mixer **113** provided for this purpose.

[0063] The mechanism for opening and closing the cartridge FIGS. **11**, **21**, **22**, is made of a metal alloy, or even a high-strength alloy (example: aluminum, brass, titanium) which allows a good compromise between weight and mechanical strength.

[0064] The needle **117** pressed on the orifice of the cartridge ensures the seal. The force exerted by the needle **117** on the orifice comes either from a spring **121** or from a mechanism that is able to release instantaneously. This spring **121** or this mechanism may use for their release a release pin **52** which may be mounted so as to take only a very small portion of the force applied to the needle **117**. This mechanism FIGS. **11**, **21**, **22**, has the advantage that the force to be applied to the pin **52** to move it out of its housing is weak, because there is a force-reduction system using a pivoting lever **120** and a retention spindle **119**.

[0065] There must also be a seal between the needle **117** and the needle support **122** during deflation. This can be done by a sealing system on the needle **117** or on the needle support **122**. This sealing system may be an O-ring seal **118**. This embodiment gives a nonlimiting example of the multiple possibilities of mechanisms that can arise from the use of a needle.

[0066] A manometer **129** FIG. **11** is attached to the cartridge or connected to it. This miniaturized manometer **129** FIG. **11** allows the pressure to be read. In this manner, before each use, the user can check the pressure of his cartridge and if necessary have it recharged. In addition, there is a filler valve **130** on the endpiece of the cartridge which will allow it to be refilled once the closure mechanism has been latched.

[0067] The mechanism for opening the automatic deflation valve **4** for the airbag is achieved with the aid of an electromagnet **123** or a shape-memory spring **124**.

[0068] The two mechanisms will open thanks to a microcontroller. The microcontroller is triggered by manually pulling out the release grabhandle **6** or by another system during the fall or avalanche. The microcontroller may be fitted with a time delay for the predetermined time or with acceleration sensors or else pressure sensors to determine the immobilization of the user. It is supplied by batteries which have an extensive range of use.

[0069] Once the instruction is given by the microcontroller, the mechanism for opening the automatic deflation valve **4** will engage in a different manner depending on the system used.

[0070] During the few seconds following the connection of the shape-memory spring **124**, it will play the role of a resistance. It will heat up by Joule effect obtained by short-circuiting the system. Then, once the transition temperature is obtained, it will lengthen until it opens the element **127** of the automatic deflation valve **4**. The means necessary to obtain such an operation are known per se in the prior art.

[0071] The electromagnet **123**, once connected, will greatly reduce its force of attraction on the counterplate **126**. Consequently, the spring **125** placed on the electromagnet will be able then to expel the counterplate **126** on the side of the valve element **127** and in this manner open it.

[0072] The assembly with a shape-memory spring (FIG. **26**) and the assembly with an electromagnet in FIG. **23** are coupled to another spring **128** which makes it possible to manage the overpressures of the bag. The spring **128** is attached between the valve element and the orifice of the automatic valve. It keeps the pivoting valve element closed. Through-holes allow the pressure of the bag to press on the pivoting valve element **127**. If the internal pressure of the bag applied to the inner surface of the valve element generates too great a force, the force of the spring **128** will be insufficient to keep the valve element closed and it will open.

[0073] Although various embodiments of the invention have been described, these descriptions are provided in order to be simply nonlimiting illustrations of the invention and variations are possible. For example, the jacket may be made of a transparent material.

[0074] In addition, the use of the jacket is not limited to avalanches, but other applications are possible, for example as a jacket for floating in the water.

[0075] Therefore, it will be evident to those skilled in the art that modifications may be made to the incorporations as described without departing from the scope of the claims defined below.

1. A life jacket that can be used particularly during an avalanche, comprising at least one bag that can be inflated by inflation means including a pressurized gas cartridge and means of emptying the jacket, characterized in that the bag is made in a single compartment and in that it completely surrounds the head of the user and covers at least a portion of the thorax of the user.

2. The jacket as claimed in claim **1**, characterized in that a cavity/chamber is created in front of the airways of the user at the time of inflation and during its use, allowing him to breathe.

3. The jacket as claimed in claim **2**, wherein the cavity/chamber is kept closed by halyards connecting the two sides of the bag.

4. The jacket as claimed in claim **1**, wherein the cavity/chamber is created by a system of shaped ribs giving the maximum footprint to the bag during inflation and being able to make the emptying of the bag easier at the appropriate time.

5. The jacket as claimed in claim **3**, wherein the shaped ribs consist of cloth patches, coated for cementing, cemented or stitched to the bag and connected together by an elastic element or another system able to have the same function.

6. The jacket as claimed in claim **1**, characterized in that the jacket is attached directly to a standard hardness/baldrick worn by the user or by using the straps and the belt of a backpack for the integrated version.

7. The jacket as claimed in claim **1**, characterized by a system for rapid opening of the bag/cover which allows accelerated deployment of the bag before its inflation.

8. The jacket as claimed in claim **6**, wherein the opening system comprises at least one release grabhandle attached to at least a first cable connected to an element for triggering the inflation system.

9. The jacket as claimed in claim **7**, characterized by the said grabhandle that is connected to at least a second separation cable passing through loops distributed along a cover or on the actual bag of the jacket which play the role of a hinge so as to release the bag and allow it to open fully of its own accord by inflation when said cable is removed from the loops.

10. The jacket as claimed in claim **8**, wherein said second separation cable is formed of several independent strands.

11. The jacket as claimed inclaim **1**, wherein the inflation means comprise a venturi nozzle, a venturi-effect diffuser/mixer and a nonreturn valve characterized in that the nonreturn valve is placed in the diffuser/mixer, directly in the axis of the air flow, making it possible to close the bag once inflated, said valve offering no resistance to the gas flow arriving in the bag.

12. The jacket as claimed in claim **10**, wherein the nonreturn valve is made in a single piece or comprises a pivoting mechanism with a flexible or rigid portion which obstructs the passage of air and prevents its return through the diffuser/mixer.

13. The jacket as claimed in claim **1**, wherein the compressed gas cartridge interacts with a needle valve as a closure and opening of the gas cartridge, said needle valve comprising an instantaneous release mechanism the needle as a trigger element of the inflation system.

14. The avalanche life jacket as claimed in one of the preceding claims, characterized in that it comprises an automatic system for regulating the emptying of the bag by a variable automatic overpressure valve which allows the user to be supplied with air and the bag to be automatically emptied after a predetermined time.

15. The jacket as claimed in claim **1**, wherein the regulating system comprises at least one electromagnet or a shape-memory spring which allows the valve to open automatically after a predetermined delay.

16. The jacket as claimed in claim **1**, wherein the delay is predetermined by the manufacturer or by the immobilization of the user, after a fall or an avalanche, by means of a pressure sensor.

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