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(54) Safety device against avalanches

(57) The invention relates to a safety device against avalanches, comprising a support (1), generally fastened to a trekking backpack, provided with means (2) for fastening to a user of the device (10), an inflatable balloon (3) and related means (4) for inflating the balloon (3), as well as extendible fastening means (5) interposed between the support (1) and the balloon (3), able to allow the balloon (3), once inflated, to rise freely whilst remaining attached to the support (1). The device (10) further comprises preferably an inflatable cushion (9) having at least two arms (12) with lateral development with respect to the user's body.

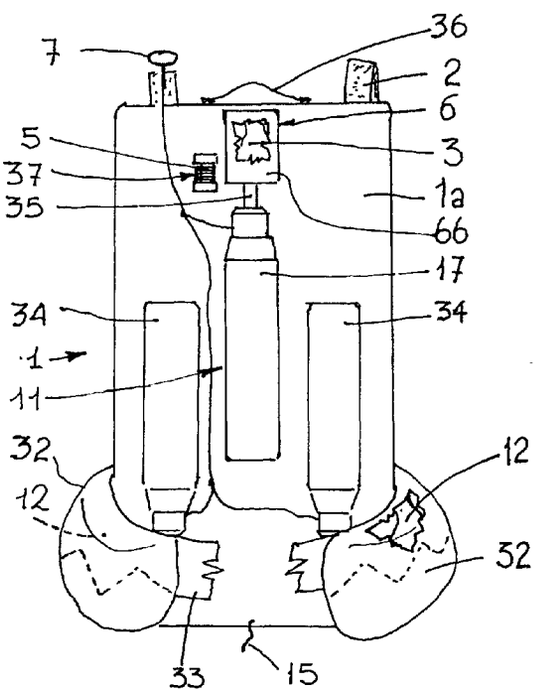

FIG. 2a

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Description

[0001] The present invention relates to a safety device against avalanches.

[0002] Amongst the most difficult disastrous events to predict, next to earthquakes and volcanic eruptions, are certainly classified avalanches and snowslides.

[0003] These phenomena, so painfully known especially to mountain dwellers, have been the subject of in-depth studies by numerous associations and foundations for several decades. The aim is both to increase awareness of the circumstances wherein avalanches may take place and consequently of the precautions to take during mountain treks, and to realise suitable tools to protect those who should become victims of avalanches.

[0004] In this case, it is above all advantageous to be able rapidly to signal one's position and avoid ending with one's head underneath the surface of the snow: one's chances for survival in such conditions decrease very rapidly.

[0005] In regard to the possibility of signalling one's position, during the Seventies the use was started of transceivers, radiometers, long-wave radars, which however did not allow a directional search and thus were of very limited usefulness. Subsequently, means employing electromagnetic waves were used, which had the advantage of being very accurate and usable by anyone, but also the drawbacks of being disturbed by random echoes, caused for instance by trees, rocks, posts, and of seeing their effectiveness greatly reduced in the presence of very wet snow.

[0006] More recently, pneumatic means have been taken into consideration to hold the victim of the avalanche afloat above the snow. One such example is European patent No. 83903179, on German priority of 6 October 1982, whose holder is Peter Aschauer. It pertains to a device comprising a large cushion, inflatable through the use of a rip cord and easy to insert, when deflated, into a backpack of substantially normal dimensions. It has been observed that such a cushion prevents a victim from being completely buried, and it also brakes the fall thereby preventing, with high probability, the victim from ending in the accumulation zone.

[0007] The main drawback of this device occurs when the victim is in the lower part of the avalanche and, more in general, derives from positioning the cushion behind the nape of the neck: in this way, in spite of the flotation, it tends to maintain the victim's head underneath itself and hence to orient it downwards.

[0008] The aim of the present invention therefore is to eliminate the aforementioned drawbacks. The invention, such as it is characterised by the claims, solves the problem of signalling one's position if one is swept away by an avalanche and simultaneously allowing to maintain one's head as high as possible with respect to the surface of the snow.

[0009] One of the advantages obtained by means of the present invention consists essentially of the fact that sighting a victim is enormously facilitated. Moreover, buoyancy is increased, in particular locating it below head level.

[0010] The technical features of the invention, according to the aforesaid aims, can clearly be noted from the content of the claims reported below and its advantages will become more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which show an embodiment provided purely by way of non limiting example, wherein:

- Figure 1 schematically shows the invention in its condition of normal use;
- Figure 2 shows the invention in a first embodiment, substantially according to section II-II as per Figure 1;
- Figure 2a shows the invention in a preferred embodiment, substantially according to section II-II as per Figure 1;
- Figure 3 shows a longitudinal section of a detail of the invention before and after its activation;
- Figure 4 shows a front and side view of a detail of the invention.

[0011] The invention concerns a safety device against avalanches, comprising a support (1) provided with means for fastening (2) to a user of the device (10), an inflatable balloon (3) and related means (4) for inflating the balloon (3), able to allow the balloon (3), once inflated, to rise freely whilst remaining attached to the support (1).

[0012] In general, the support (1) is applied to a trekking backpack and the means for fastening (2) to the trekker comprise shoulder straps and/or belts. Inside the backpack, or, more in general, the support (1), a housing space (6) for the deflated balloon (3) is provided, hermetically sealed. When he/she finds him/herself in a danger situation, the trekker activates a command (7) to open the housing space (6) of the balloon (3), which, in the example shown in the figures, is a manual control (7) comprising a rip lever.

[0013] The activation of the manual command (7), in addition to opening the housing space (6) causes the balloon to be inflated and subsequently expelled. The means (4) for inflating the balloon (3) comprise at least one small gas tank (17) and a device (16) for opening it. The latter in turn comprises a spring-operated percussion pin (18), housed in a conduit (20) for the passage of the gas interposed between the gas tank (17) and the balloon (3), and a fork (19) inserted from outside through appropriate holes (21) of the aforesaid conduit (20) and connected to the manual command (7), which governs its activation. When the rip lever is pulled, the fork (19) disengages the conduit (20) and the spring-operated percussion pin punches a hole in the tank, thereby freeing the gas contained therein, as Figure 3 shows.

[0014] To prevent the gas from escaping through the

holes (21) freed by the fork (19), outside the conduit (20) a sealing device (22) is mounted, comprising a second spring (23) and a seal ring (24), also activated by the fork (19). When it is extracted, the second spring (23) thrusts the seal ring (24) against an enlargement (25) obtained on the outer surface of the conduit (20) obstructing the holes (21).

[0015] The extendible attachment means (5), for instance consisting of a plastic line provided with good tensile strength, unwind over their entire length thereby allowing the balloon to rise and remain above the surface of the snow, being visible even from a distance. The means (4) for inflating the balloon (3) can indifferently remain attached to the balloon (3) or to the support (1): in the latter case, shown also by way of example in

[0016] Figure 3, the device (10) comprises means (8) for releasing the balloon (3) from the means for inflating it. They comprise a foil (26), integral with the means (4) for inflating the balloon (3), which engages in a recess (27) obtained at the base of the balloon (3), on a rigid collar (28) integral whereto, a third spring (30) fastened to the foil (26), a holding pin (29) to maintain such spring compressed (30) and a non-rigid constraint (31), for instance a line, interposed between the balloon (3) and the pin (29). When the balloon (3) inflates, through the line it drags the pin (29) outside its seat, the spring (30) is free to extend and extracts the foil (26) from the recess (27), thereby allowing the balloon (3) to be freed from the means for inflating it.

[0017] Although not necessarily, the safety device (10) constituting the subject of the present patent is advantageously fitted with an inflatable cushion (9), comprising at least two arms (12) with lateral development with respect to the user's body, preferably provided with front projections, positioned below head level, to provide an additional upward thrust to the support, favouring its flotation.

[0018] In a preferred embodiment, shown here in Figure 4, these arms (12) are bent into a "U" shape to encompass the user's head. Moreover, they are provided with respective fastening means (13), such as Velcro surfaces, so positioned as to interact upon completion of the inflation of the cushion (9), in correspondence with the projections. Obviously, means (11) for inflating the cushion (9), for instance comprising a second small gas tank are used.

[0019] Given the dimensions of the cushion (9), the support (1) could also comprise two detachable parts (1a,1b), between which it is housed when deflated, which detach when the cushion (9) inflates, remaining attached to the part (1a) of the support (1) in contact with the user. There may also be a constraint (15), interposed between the parts (1a,1b) of the support (1), able to keep them joined also after the inflation of the cushion (9) and to prevent one of the two from being lost.

[0020] More in particular, a preferred embodiment provides for the cushion (9) to comprise two veritable independent arms (12), each housed in a pouch (32) of fabric which can be torn by ripping. Said pouches are advantageously realised in correspondence with the horizontal belt (33) of the backpack and each arm (12) comprises its own inflating tank (34), filled with carbon dioxide or other similar gas. What is important is for the material of the balloon (3) to be polyethylene, i.e. of the type usable for aerostatic balloons, very light and with minimum volume when deflated, but very resistant nonetheless. In this way, the balloon (3) can be reduced in an extremely small housing space (6), inside a small vertical cylinder (66), positioned at the top of the support (1), where a tear-off fabric (36) is provided. The cylinder (66) is placed in communication with its own tank (17), filled with helium, through a tube (35) which, upon activation of the manual command (7), allows the inflation of the balloon (3) which, automatically while it inflates, comes out of its containment cylinder (66), the tear-away fabric (36) having been ripped apart and, once inflated, starts its upward run, held only by the extendible attachment (5), collected in a simple and small spool (37) - see Figure 2a. In this embodiment, by the activation of the command (7) the three gas tanks (34 and 17) are activated together and both the fabrics of the pouches (32) and the fabric (36) are torn apart, which frees the balloon (3), at a single stroke. Lastly, the gas tanks are advantageously positioned vertically side by side, with the central one (17) oriented towards the polyethylene balloon (3) and the other two with their mouths facing downward and oriented towards the respective arms (12) to be inflated. This appears to be the solution that offers most guarantees, from the standpoint of safety as well as of the durability and lightness ofthe structure.

[0021] In practice, modifications and/or improvements are obviously possible without thereby departing from the scope of the claims that follow.

Claims

1. Safety device against avalanches, comprising a support (1) provided with means (2) for fastening to a user ofthe device (10), an inflatable balloon (3) and related means (4) for inflating the balloon (3), characterised in that it comprises extendible attachment means (5) interposed between the support (1) and the balloon (3), able to allow the balloon (3), once inflated, to rise freely whilst remaining attached to the support (1).

2. Device according to claim 1, characterised in that the support (1) comprises a housing space (6) for the deflated balloon (3), hermetically closed and in that the means (4) for inflating the balloon (3) comprise at least a gas tank (17) and a device (16) for opening it.

3. Device according to claim 2, characterised in that it

comprises a command (7) for opening the housing space (6) and for activating the means (4) for inflating the balloon (3).

4. Device according to claim 2 or 3, characterised in that the balloon (3) is made of polyethylene and is contained in a small vertical cylinder (66), placed at the top of the support (1), where a tear-away fabric (36) is provided, said balloon (3) being placed in communication, by means of a tube (35), with the underlying tank (17).

5. Device according to claim 1, characterised in that it comprises means (8) for releasing the balloon (3) from the means (4) for inflating the balloon (3).

6. Device according to claim 2, characterised in that the device (16) for opening the gas tank (17) comprises a spring-operated percussion pin (18), housed in a conduit (20) for the passage of gas interposed between the gas tank (17) and the balloon (3), and a fork (9), able to retain the spring-operated percussion pin (18) in retracted position until it is inserted in appropriate holes (21) of the conduit (20) and to allow its action, when it is extracted.

7. Device according to claim 6, characterised in that it comprises a sealing device (22), mounted outside the conduit (20) and constituted by a second spring (23) and by a sealing ring (24), activated by the fork (19) in such a way that when it is extracted the sealing ring (24) goes to bear against an external enlargement (25) of the conduit (20) thereby obstructing its holes.

8. Device according to claim 5, characterised in that said means (8) for releasing the balloon (3) from the means for inflating it comprise a foil (26) integral with the means (4) for inflating the balloon (3) and engageable in a recess (27) of a rigid collar (28) integral with the balloon (3), a third spring (30) fastened to the foil (26), a retaining pin (29), able to keep compressed said spring (30), and a non rigid constraint (31), interposed between the balloon (3) and the pin (29).

9. Device according to any one of the previous claims, characterised in that it further comprises a cushion (9) provided with at least two arms (12) with lateral development with respect to the user's body, able to be inflated by related means (11).

10. Device according to claim 9, characterised in that the support (1) comprises two detachable parts (1a, 1b) which detach when the cushion (9) inflates, said cushion (9) being attached to the part (1a) of the support (1) in contact with the user.

11. Device according to claim 10, characterised in that it comprises a constraint (15), interposed between the parts (1a,1b) of the support (1), able to keep them joined even after the cushion (9) has inflated.

12. Device according to claim 9 or 10 or 11, characterised in that said arms (12) are bent in the form of a "U" to encompass the user's body.

13. Device according to claim 12, characterised in that said arms (12) are provided with mutual fastening means (13).

14. Device according to claim 12 or 13, characterised in that it comprises a front projection (14), able to favour the flotation of the user of the device (10) above the surface of the avalanche.

15. Device according to any of the claims from 9 to 14, characterised in that the cushion (9) comprises two independent arms (12), each housed in its own pouch (32) of tearaway fabric and each inflatable by its own tank (34).

16. Device according to claim 15, characterised in that said pouches (32) are realised in correspondence with the horizontal belt (33) of the support (1).

17. Device according to claim 15 or 16, characterised in that said gas tank (17) for inflating the balloon (3) and the gas tanks (34) for inflating the cushion (9) are vertically positioned side by side and oriented towards the respective balloon (3) and arms (12) and all can be activated simultaneously from the same command (7), which also allows the removal both ofthe tear-away fabric (7) relating to the small vertical cylinder (66), and of the tear-away fabric of the pouches (32).

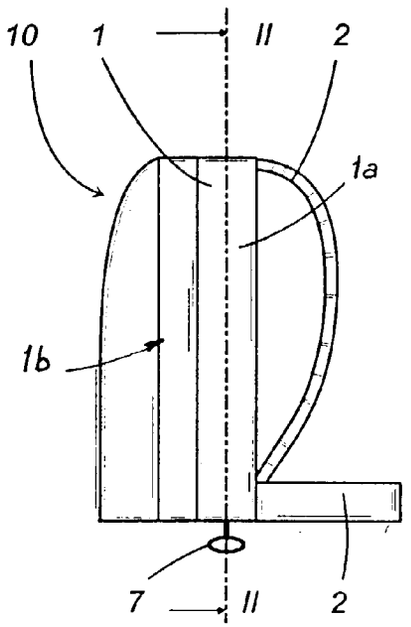


FIG. 1

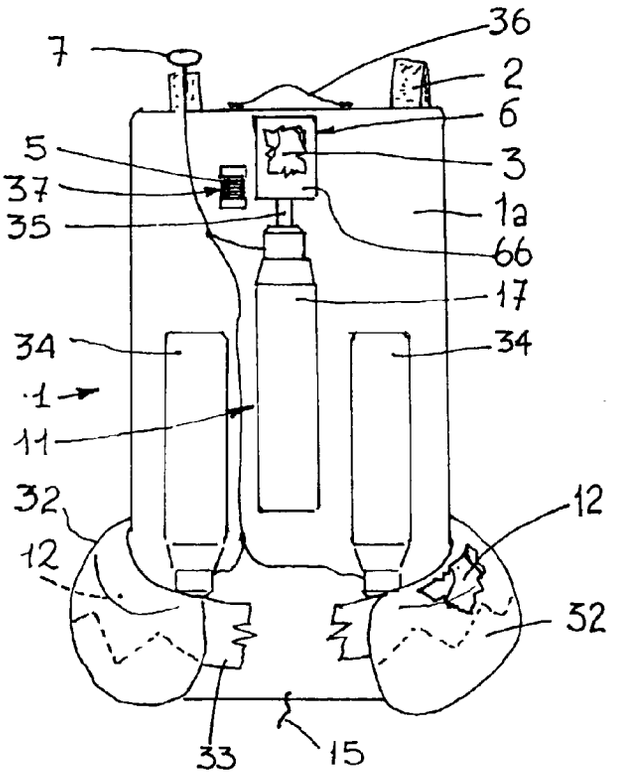


FIG. 2a

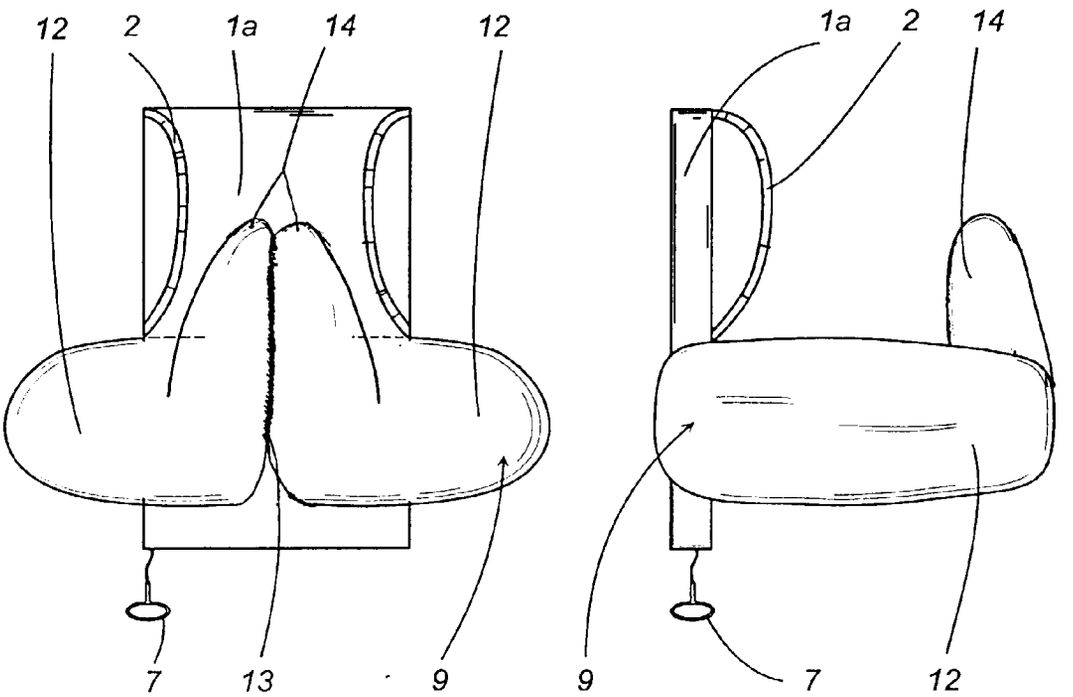
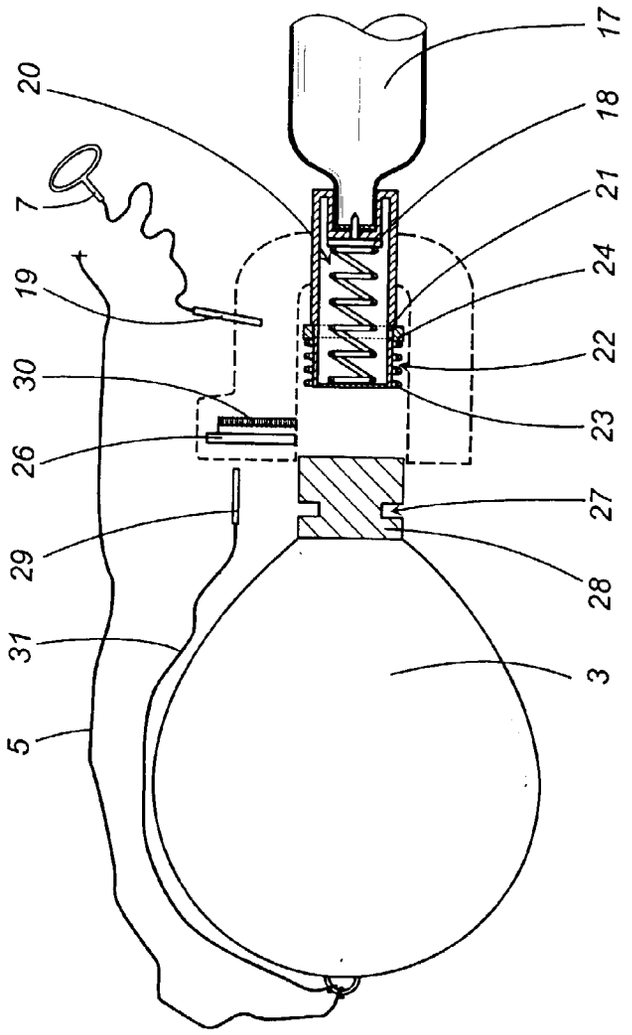


FIG. 4

FIG. 3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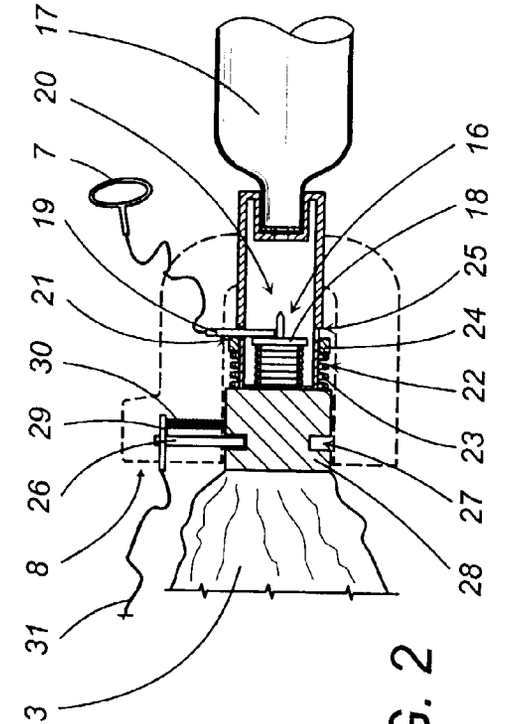
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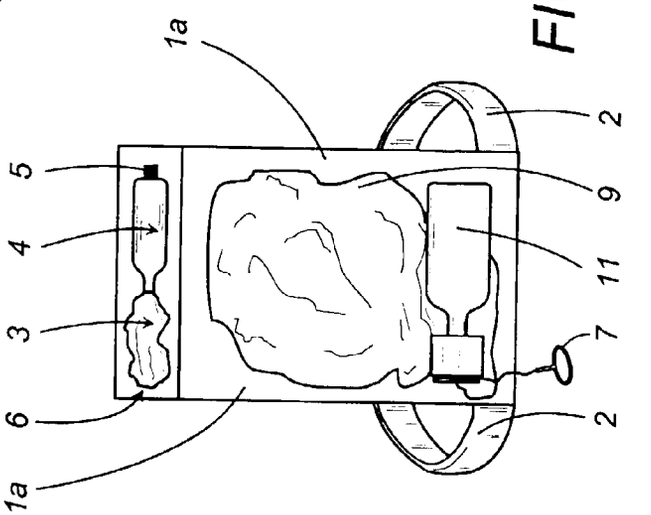
FIG. 2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