

[54] **QUICK-RELEASE INFLATABLE ENVELOPE FOR LIFE JACKETS AND THE LIKE**

941,150 11/1963 Great Britain.....9/316

[72] Inventor: **Jean-Pierre Bel**, 14 Allee des Chalets 92, Chatillon-sous-Bagneux, France

Primary Examiner—Milton Buchler
Assistant Examiner—Paul E. Sauberer
Attorney—Linton & Linton

[22] Filed: **June 4, 1970**

[57] **ABSTRACT**

[21] Appl. No.: **43,393**

[52] U.S. Cl.....**9/342**

[51] Int. Cl.....**B63c 9/16**

[58] Field of Search.....9/342, 340, 329, 316, 314, 9/311; 24/205.11, 205.13

The envelope of the life jacket is provided with a zip fastener of which the two rows of connecting teeth are made of polymerized plastic material and are separated at the fastener end corresponding to the narrow end of the slide (i.e., at the end of the normal opening stroke of said slide) whereby the inflation of the inner article from the zone adjacent to said end will cause the gradual and automatic opening of the envelope which can subsequently be reclosed by effecting a complete stroke of the slide in both directions.

[56] **References Cited**

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The separated parts of the fastener are protected by a flap closed by a tape assembly including a "hook" tape associated with a "loop" tape.

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3 Claims, 5 Drawing Figures

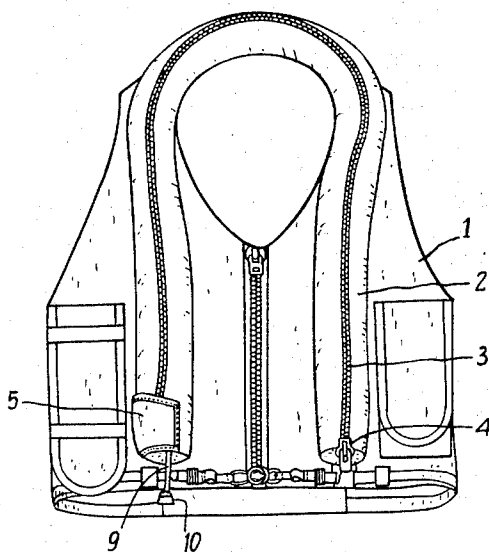


Fig. 1

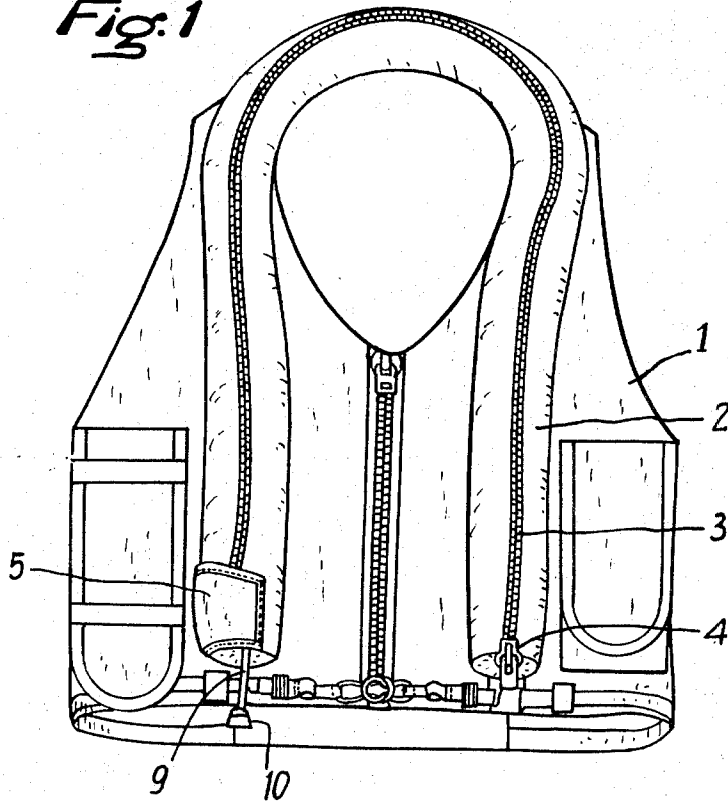
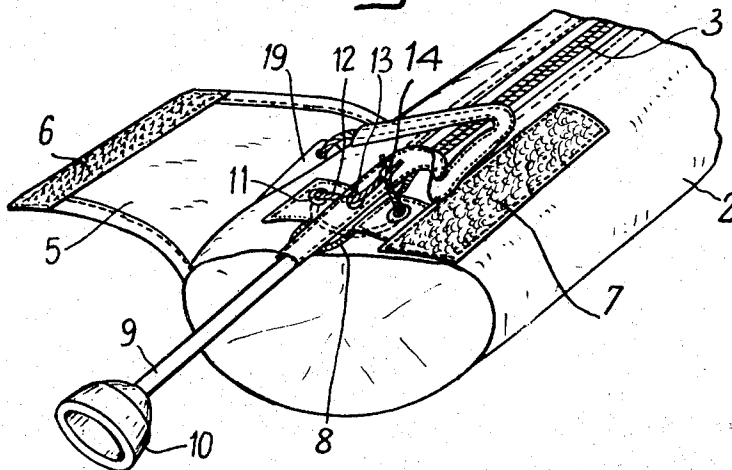


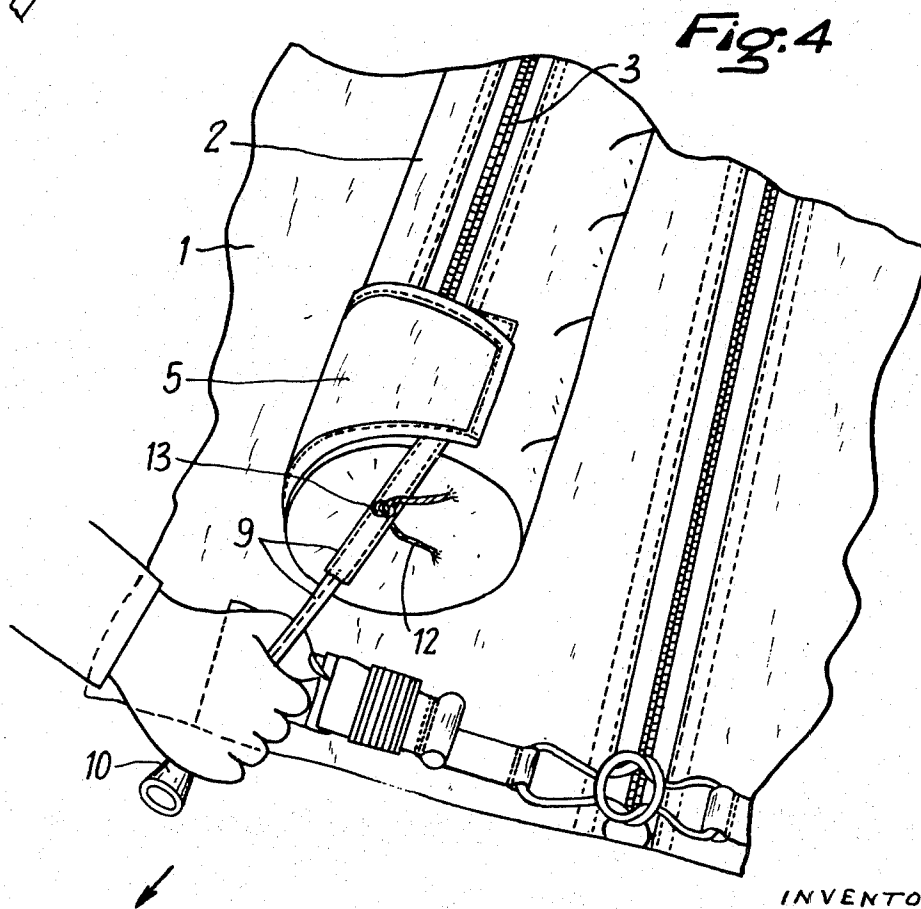
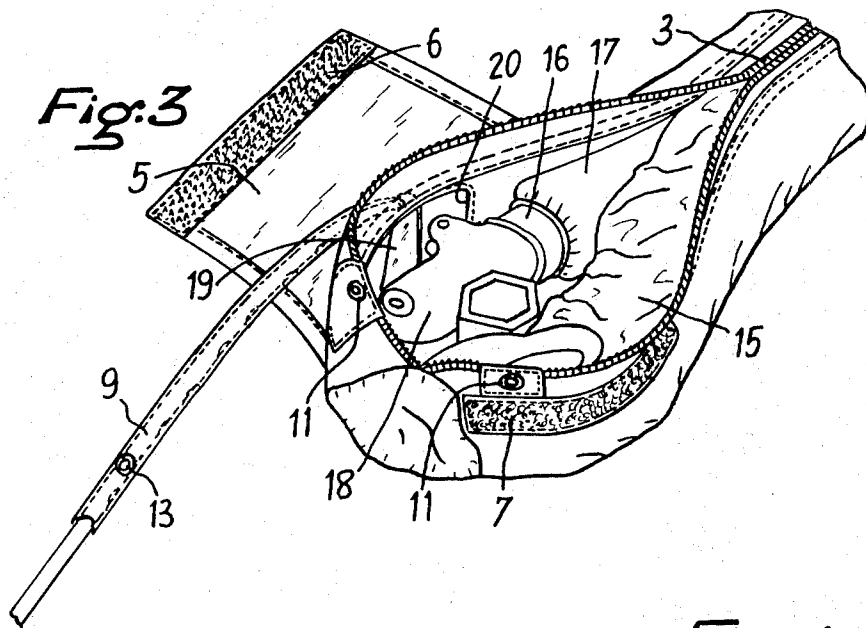
Fig. 2



INVENTOR
JEAN PIERRE BEL

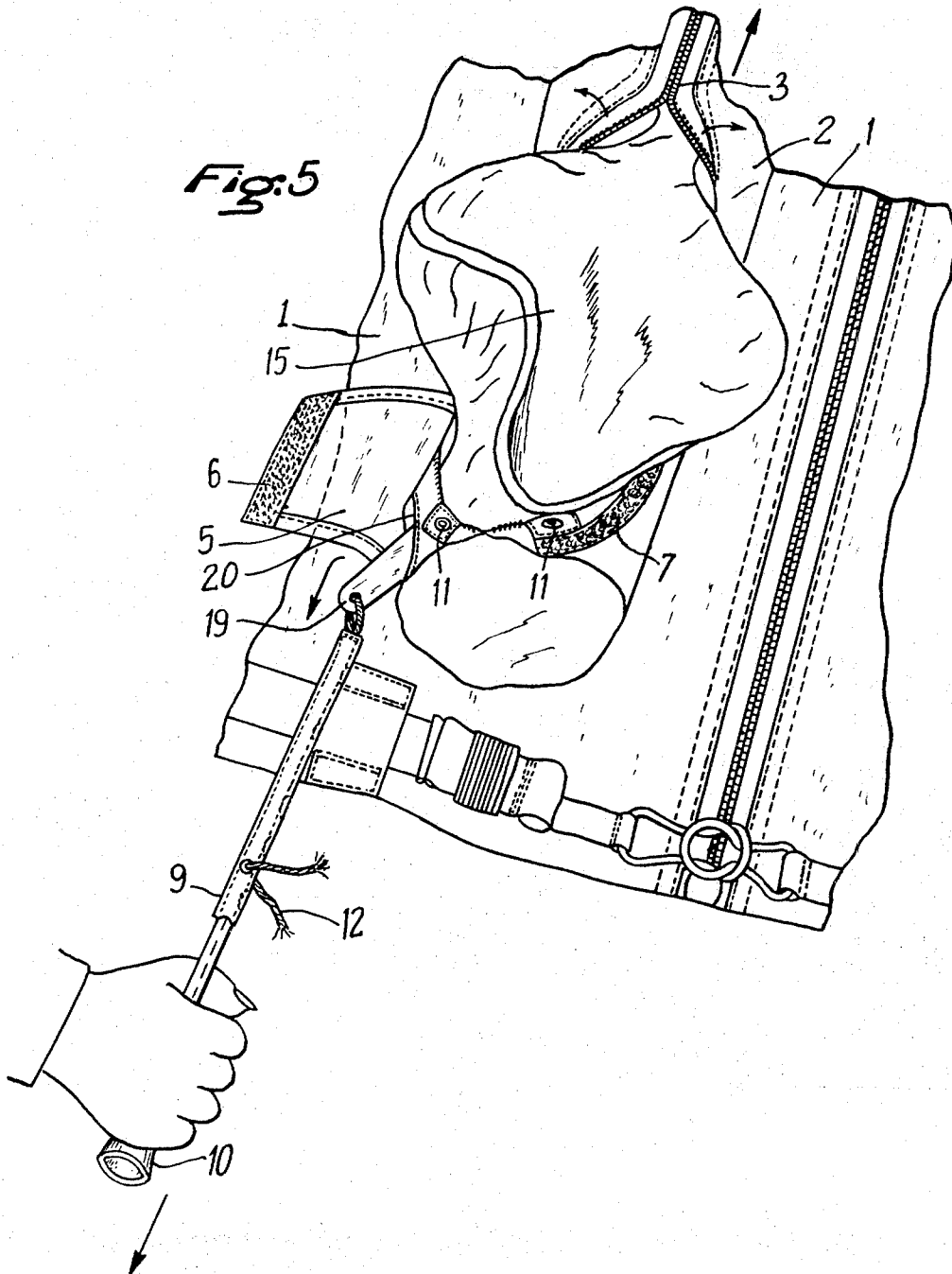
By

Linton and Linton
ATTORNEYS



INVENTOR
JEAN PIERRE BEL

By *Linton and Linton*
ATTORNEYS



INVENTOR
JEAN PIERRE BEL

By *Linton and Linton*
ATTORNEYS

QUICK-RELEASE INFLATABLE ENVELOPE FOR LIFE JACKETS AND THE LIKE

It is known, in life jackets and rescue appliances equipped with an inflatable bladder or the like, notably of the type inflatable by discharging a bottle containing gas under pressure, that it is generally necessary to dispose an empty or flat bladder within an envelope adapted to open very rapidly when the bladder is inflated.

It is also known to use a zip fastener actuated by means of a slide for closing these envelopes, but obviously the operation of a slide along a curved zip fastener of relatively great length, for example along a zip fastener passing behind the neck of the user, is attended by serious problems whereby the use of this zip fastener is scarcely satisfactory. Other closing means held by separate connecting means disposed at spaced intervals along the fastener or closure and adapted to be opened simultaneously by actuating a single control member have also been proposed heretofore but the simultaneous opening of these separate connecting means involves a complicated structure and on the other hand reclosing these means, after the inner bladder or like inflatable member has been deflated and folded up, constitutes a long and delicate operation.

The present invention is based on the discovery that it is possible, in the specific case of the envelope of an inflatable bladder or like body, to take advantage of the simplicity and efficiency of a zip fastener and also of the facility of reclosing same without requiring the pulling of the slide throughout the length of the zip fastener.

It is known that a zip or slide fastener of the type actuated by means of a slide comprises two rows of connecting elements secured along the two edges to be assembled, these elements being formed with retaining teeth adapted to become gradually and successively interlocked or released by pulling the corresponding slide in the proper direction. Under normal operating conditions the teeth are in mutual engagement throughout the length of the zip fastener on side of the narrow end of the slide, and on the opposite side they are separated on either side of a cross or transverse member interconnecting the two faces thereof. In the case of metal teeth, separating these teeth on the normally closed side will damage them and make the fastener inoperative for in this case the slide cannot engage the separated teeth with its narrow side and therefore these teeth cannot be brought together.

However, in the case of polymerized plastic teeth, for example of a material known under the Trade Name of "Nylon," the relative flexibility of the teeth enables the slide to engage, in the normal direction corresponding to its opening action, abnormally separated teeth so as to cause these spaced teeth to resume their mutual interlocking condition within the wider portion of the slide under the normal action produced by the aforesaid cross member of said slide. Therefore, the abnormally separated teeth can thus be restored to their interlocked condition throughout the length of the fastener by moving the slide firstly in the normal opening direction, and then in the normal closing direction thereof.

The essential feature characterizing this invention consists in equipping the envelope of the inflatable

bladder with a zip fastener comprising two rows of connecting teeth of polymerized plastic material, of which the ends corresponding to the end of the slide stroke in the opening direction are initially separated. In the closed envelope position the slide is located at the opposite end. When the inner bladder is inflated, the reduced section of initially separated teeth extends gradually throughout the length of the zip fastener under the sole action of the inner pressure. In other words, inflating the bladder will automatically cause the two rows of teeth to separate throughout the length thereof, without requiring any other intervention. Moreover, when the bladder has been deflated and folded within the envelope, the envelope can be reclosed very easily by simply pulling the slide firstly in one and then in the other direction, and reserving again a small initial section with spaced teeth to permit another opening operation and another use of the inflatable bladder.

Since the initial section with separated teeth is a "priming" zone where the gradual separation of the two rows of teeth begins without operating the slide, it is preferable to protect this section in the closed envelope position and the present invention provides to this end a protection flap. If a bottle containing gas under pressure is used for inflating the bladder, this flap may be designed and arranged with a view to open automatically when pulling a control member normally retained by a tear-off string or yarn and adapted, during the end portion of the pull exerted thereon, to control an automatic bladder-inflating device associated with a capsule or bottle filled with gas under pressure. This protection flap is preferably closed by associating a "loop" tape with a "hook" tape, these two tapes adhering to each other by simple manual pressure and being separated by simply lifting one of them; a typical tape assembly of this character is known under the Trade Name of "Velcro." Thus, the flap will open automatically when the bladder begins to be inflated as a consequence of the full actuation of said control member.

In order to afford a clearer understanding of this invention a typical and exemplary form of embodiment thereof will now be described with reference to the attached drawing illustrating diagrammatically a life jacket equipped with the zip fastener control means of this invention. In the drawing:

FIG. 1 is a front view of the jacket;

FIG. 2 is a fragmentary perspective view showing the arrangement of the control pull member under the protection flap illustrated in its open position;

FIG. 3 is another fragmentary perspective view showing the interior of the envelope of which the zip fastener was partially opened without inflating the bladder in order more clearly to show the relative arrangement of the essential component elements;

FIG. 4 is a fragmentary perspective view showing the first consequence of a pull exerted on the control member, and

FIG. 5 is another similar fragmentary view showing the gradual inflation of the inner bladder after completing the actuation of said control member.

In the example illustrated in the drawing the invention is applied to a life jacket 1 provided with an inflatable bladder; this bladder, before its actual use, is normally folded within an envelope 2 of substantially tubu-

lar configuration, which is secured to the jacket through any suitable and known means. This envelope 2 follows approximately the contour of the jacket's collar, along the wearer's neck, and its two side portions extend downwards on the front of the jacket. This envelope is closed along nearly its entire length by a zip fastener 3 comprising two rows of interlocking teeth or like connecting elements of polymerized plastic material. In FIG. 1 the envelope is shown in its closed condition and the slide 4 of zip fastener 3 is located near the zip fastener end corresponding to the end of the closing stroke of said slide. In the example illustrated this end of the zip fastener is on the left-hand side of the jacket (i.e.; on the right-hand side of FIG. 1 showing the jacket 1 in front elevational view). At the opposite end of the zip fastener 3 the two rows of teeth or like connecting elements are separated along a relatively short section which is not visible in FIG. 1 since it is covered by a protection flap 5 hingedly attached to one side of the envelope 2; this flap 5 carries along the edge of its inner face the "hook" tape 6 of the hook and loop tape assembly or "Velcro" tape mentioned in the foregoing. This flap 5 is illustrated in its open position in FIG. 2 showing the "loop" tape 7 attached to the edge of the envelope 2 which is opposite to the one supporting the flap 5. In this FIG. 2 the reference numeral 8 designates the ends of the two rows of teeth or like connecting elements separated along a relatively short terminal section of zip fastener 3.

The inflation of the inner bladder and the automatic opening of the protection flap 5 are obtained by simply pulling a flexible control member 9 formed at its free or outer end with a suitable handle or like grip 10.

To facilitate the understanding of the mounting and mode of operation of the essential component elements of the present invention, reference will first be made to FIG. 3 in which it is assumed that, by separating the rows of teeth of the zip fastener 3 in the direction away from the initial separation zone, the envelope 2 was partially opened, so as to display the elements contained in this envelope, while the control member 9 is released from its mounting position illustrated in FIG. 2. In FIG. 3 it will be seen that in the fastener portion wherein the rows of teeth are partially separated, each one of the marginal portions of envelope 2 carries an eyelet 11 in which, in the mounted position, a tear-off yarn 12 is engaged, this yarn 12 extending as well through an eyelet 13 formed in control member 9 and being tied for instance at 14. Through the thus widened opening of the envelope as shown in FIG. 3 one sees one end of the inner inflatable bladder 15 which is advantageously rolled up within the envelope 2 and connected to the outlet nozzle of the capsule 16 containing carbon dioxide gas under pressure, this capsule 16 being disposed within a bag or like cover 17. The capsule 16 is closed by a thin disk so that when this disk is perforated the carbon dioxide gas can flow into the inflatable bladder according to a well known arrangement. This perforation is controlled by means of a perforating device 18 carried by the capsule 16 and provided with a perforating lever 19 emerging from the envelope through a side aperture 20 adapted in the mounting position shown in FIG. 1 to be covered by the aforesaid protection flap 5. Attached to the end of lever 20 is the driving end of control member 9.

In the assembled position, that is, in the position obtaining when the life jacket is worn by the user, the bladder 15 is deflated and connected within the envelope 2 to the carbon dioxide gas capsule 16 from which it is isolated by the thin disk to be perforated. This bladder 15 is for example rolled up within the envelope 2 of which the zip fastener 3 is closed throughout its length except for a short initial section 8 wherein the two rows of teeth or like connecting elements are separated, the slide 4 of this zip fastener being disposed at the opposite end thereof, with its narrow side directed towards the zip fastener 3. The tear-off yarn 12 is properly positioned as explained in the foregoing (see FIG. 2) with the upper or driven end of control member 9 folded under the flap 5, the latter being eventually closed by pressing the portion thereof provided with the "hook" tape 6 against the "loop" tape 7 carried by the envelope 2 (FIG. 1).

When the wearer is in an emergency position and must use the inflatable bladder, it is only necessary for him to pull sharply the control member 9 by means of the handle 10, and the successive steps of this single operation are clearly shown in FIGS. 4 and 5. The first consequence of the tractive effort exerted on the control member is that the tear-off yarn 12 is broken (FIG. 4), the function of this yarn consisting simply in preventing the device from operating in case of an accidental, light pulling of the control member. When the yarn 12 has thus been broken the pull member 9 is tensioned and under these conditions it actuates the lever 19, thus causing the perforation of the disk inserted between the gas-filled chamber of capsule 16 and the bladder 15, in the vicinity of the short end section 8 of the initially separated rows of teeth of zip fastener 3. Thus, the carbon dioxide gas expands and penetrates into the bladder via a suitable union provided to this end, and the bladder is gradually inflated from the portion thereof adjacent said initial separation section 8. As a consequence of the increasing pressure set up in the bladder the protection flap 5 opens automatically and is folded sidewise (FIG. 5), and at the same time the expanding bladder exerts on the interconnected ends of the teeth forming the rows of interlocking elements of zip fastener 3 an action tending to separate these rows; thus, the gradual opening of envelope 2 takes place easily and automatically, as shown in FIG. 5 illustrating the initial phase of this gradual opening. The envelope opens gradually throughout the length of zip fastener 3, up to slide 4, and the bladder 15 can expand fully around the wearer's neck and down to the opposite end (i.e., on the left-hand side of the jacket).

When the bladder 15 has performed its intended function and has subsequently become useless, it is deflated by opening a suitable valve (not shown), so that it can be flattened completely and rolled up for reclosing the envelope 2. To reclose this envelope it is necessary firstly to move the slide 4 throughout the length of the zip fastener to the section 8 where the initial partial opening is to be formed. During this movement, corresponding to a normal zip fastener opening stroke, the teeth engage the slide 4 through the small end thereof and are thus momentarily caused to be interlocked, but they are immediately separated as they emerge from the slide 4 of which the stroke was apparently useless, although in fact the point of mutual in-

terlocking engagement of the teeth has thus been brought from the normal position of the slide (FIG. 1) to the edge of the section 8 of initial separation. After this preliminary operation, the slide 4 is returned to its position shown in FIG. 1 so as to restore the mutual engagement of the teeth in the usual fashion and close the envelope 2 except in said initial section 8.

Of course, if the life-jacket has to be prepared for another use, care must be taken, before reclosing the envelope, to replace the empty carbon dioxide gas capsule 16 with a filled one and to properly connect this new capsule to the bladder 15.

Although this invention has been described with reference, by way of example, to the specific application thereof to a life jacket, it will readily occur to those conversant with the art that this example should not be construed as limiting the invention since the invention is applicable to any other inflatable article when it is desired to obtain the gradual automatic and quick opening thereof.

What I claim is:

1. A quick-opening envelope for an inflatable article comprising an elongated envelope having a longitudinal slit, an inflatable article positioned in and extending longitudinally of said envelope, a capsule filled with gas under pressure being positioned in said envelope, control means connecting said capsule to said inflatable article and capable of being operated to discharge said gas from said capsule to said inflatable article, a zip fastener attached to said envelope along said slit and having a slide capable of closing said zip fastener and

thereby said slit, the teeth of said zip fastener being of a polymerized plastic material, said slide of said zip fastener being capable of closing the major portion of said zip fastener when moved to one end of said zip fastener while leaving a portion of the opposing teeth of said zip fastener disengaged at the other end of said zip fastener, a control member connected to said control means for operating the same, said envelope having a pair of openings each on an opposite side of said slit adjacent said other end of said zip fastener and a tear-off yarn extending through and between said envelope openings and connected to said control member whereby a pull on said control member breaks said tear-off yarn and operates said control means inflating said article which opens said zip fastener along said envelope slit to said slide.

2. A quick-opening envelope for an inflatable article as claimed in claim 1 including a flap attached at one end to said envelope at one side of said zip fastener other end and capable of extending over said envelope openings and tear-off yarn and means detachably connecting the other end of said flap to said envelope on the other side of said zip fastener.

3. A quick-opening envelope for an inflatable article as claimed in claim 1 including a life jacket having at least a front portion and neck opening and said envelope being attached to said life jacket around said neck opening providing a collar and down said front portion.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,681,801 Dated August 8, 1972

Inventor(s) Jean-Pierre Bel

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet, insert -- [73] Assignee: Aerazur Constructions Aeronautiques, Issy-les-Moulineaux (Hauts-de-Seine), France, a corporation of France -- .

Signed and sealed this 15th day of May 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents