

L. MILLER.
PARACHUTE DEVICE.
APPLICATION FILED DEC. 7, 1911.

1,037,959.

Patented Sept. 10, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

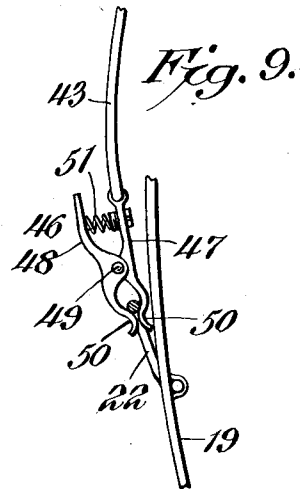
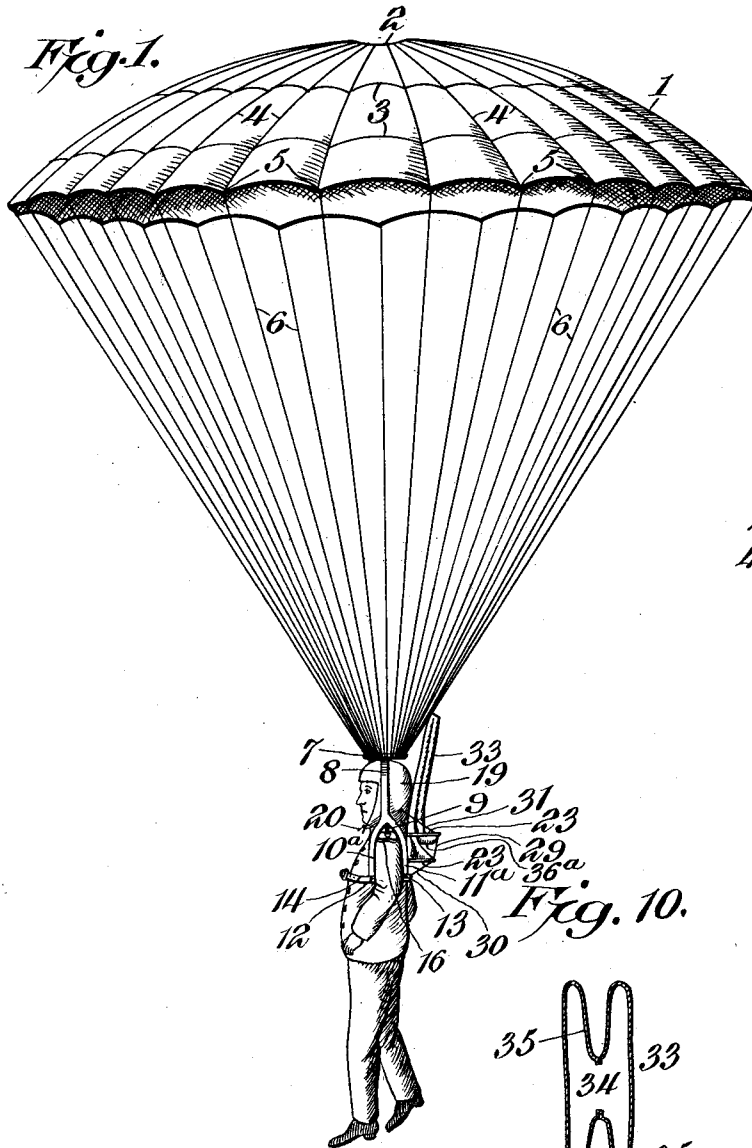
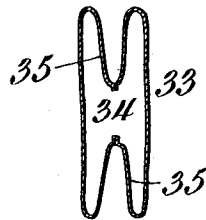
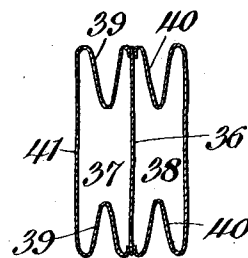


Fig. 11.



Witnesses
Howard D. Orr.
r. J. Finer

Lee Miller, Inventor,

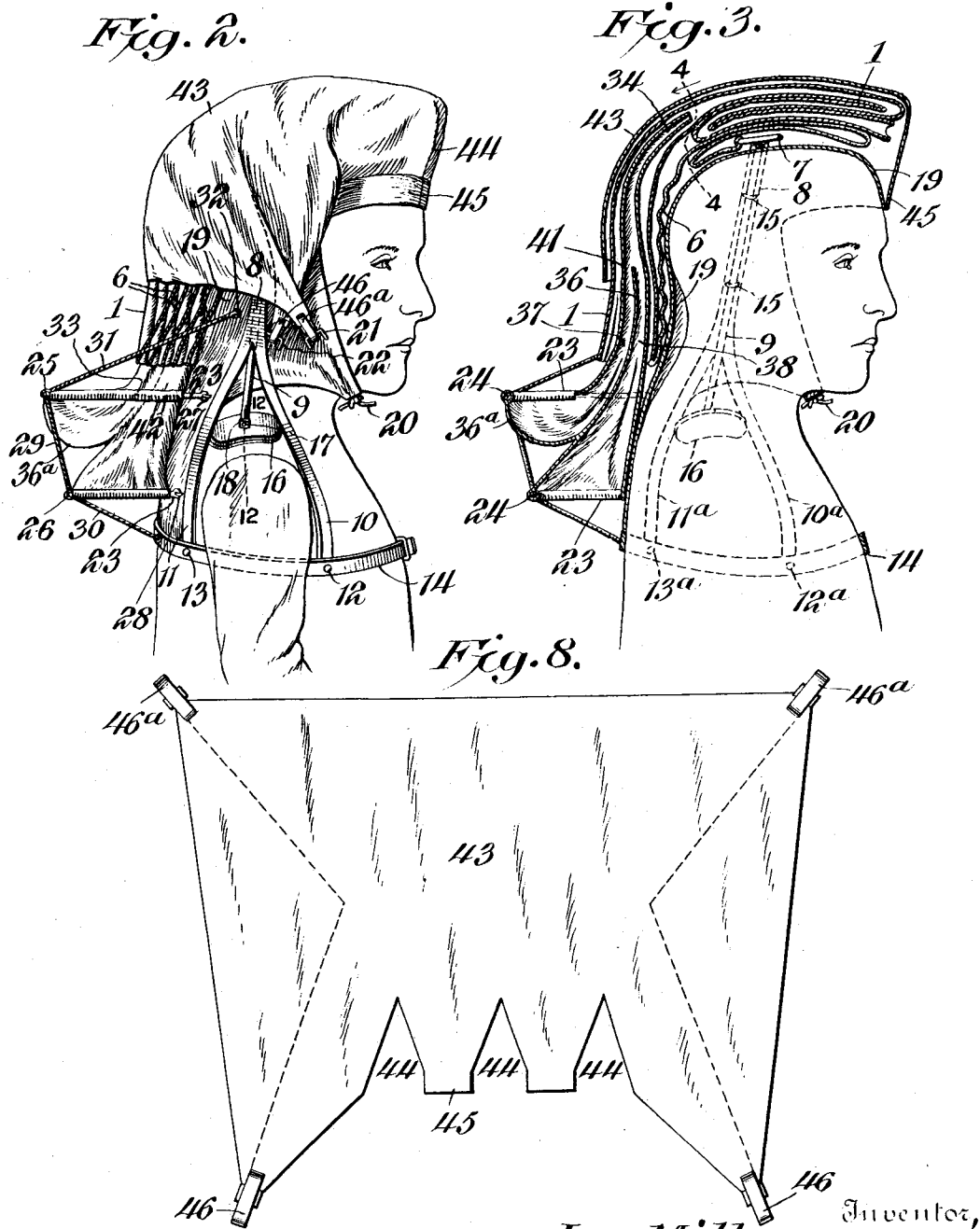
By E. J. Siggers
Attorney

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3 SHEETS—SHEET 2.



Witnesses
Howard D. Orr.
v. J. J. J.

Lee Miller,
By E. J. Siggers.
Attorney

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3 SHEETS—SHEET 3.

Fig. 4.

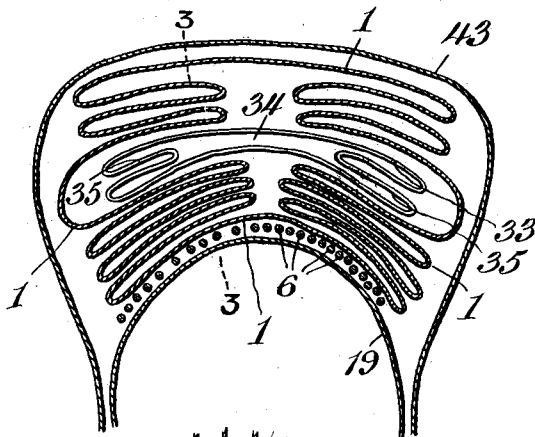


Fig. 5.

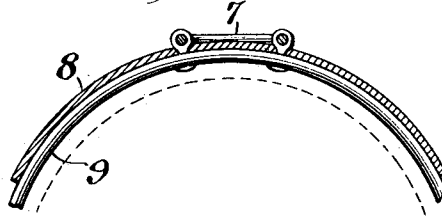


Fig. 12.

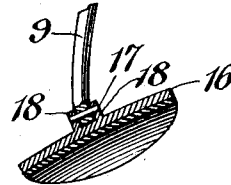


Fig. 6.

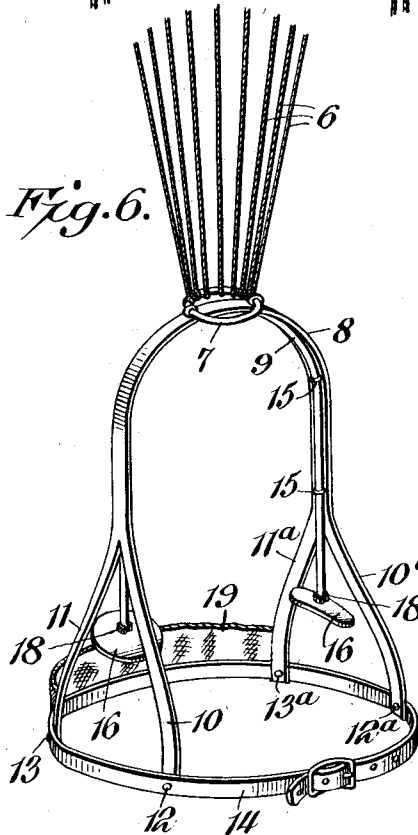
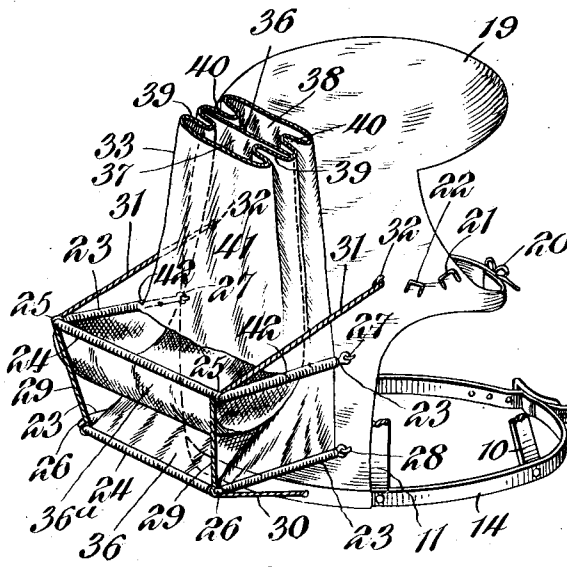


Fig. 7.



Lee Miller

Inventor

Witnesses
Howard D. Orr.

r. J. Miller

By

E. G. Siggers

Attorney

UNITED STATES PATENT OFFICE.

LEE MILLER, OF CHICAGO, ILLINOIS.

PARACHUTE DEVICE.

1,037,959.

Specification of Letters Patent.

Patented Sept. 10, 1912.

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To all whom it may concern:

Be it known that I, LEE MILLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Parachute Device, of which the following is a specification.

The invention relates to aerial life saving devices of the parachute type, and has for its object the provision of a device which can be worn as a part of the clothing of aviators operating aeroplanes, balloons, and the like, or those engaged as steple jacks at lofty elevations, and subject to danger from falling.

A further object of the invention is to provide, in connection with the parachute, for the automatic and rapid expansion of the same regardless of the position assumed by the wearer in his fall.

Another object of the invention is the combination, in such a device of a size sufficient to support the heaviest man, of the necessary elements to effect its automatic operation in such manner as to entail the least burden because of the weight and the least interference with the movements of the person so equipped.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing materially the advantages of the invention.

In the drawings:—Figure 1 represents an elevation of the invention in use. Fig. 2 is a side elevation of the device as carried by the aviator. Fig. 3 is a vertical longitudinal section of the device as worn, taken on the line 3—3 of Fig. 4. Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 3. Fig. 5 is a sectional detail showing the connection between the parachute ring and harness. Fig. 6 is a perspective view of a portion of the harness with the hood removed. Fig. 7 is a similar view showing the ducts and hood but with the yoke removed. Fig. 8 is a development of the outer case. Fig. 9 is a detail of the friction clamp. Fig. 10 is a transverse section through the duct in its upper

portion. Fig. 11 is a similar view, taken through the duct in its lower portion. Fig. 12 is a detail section on the line 12—12 of Fig. 2.

Referring to the drawings which are illustrative in character and represent the preferred embodiment of the invention, the reference numeral 1 designates a parachute body, which is the segment of a sphere and has a diameter of about fifteen feet with a depth of from three to five feet. The body is provided at the top with an opening 2 of sufficient size to allow a slight escape of air therethrough to prevent oscillation, and it is also provided with circumferential and radial reinforcing cords 3 and 4. At the outer termini 5 of the radial cords, supporting cords 6 are attached in the usual manner, these supporting cords converging to a connection with the attaching ring 7.

The parachute thus far described is of the usual construction except that it is necessary in order to adapt it for use in this connection to make the same of a special quality of silk, which shall have the least weight consistent with the required strength. I have found it advantageous to use a silk weighing about 2.6 ounces to the square yard and have resistance to rupture of about thirty-two pounds per inch. Material of this sort in a parachute having a diameter of fifteen feet, as stated, weighs about three and one half pounds complete.

The parachute ring 7 is riveted upon its opposite sides, as shown in Figs. 5 and 6 through the flexible strap 8 to the rigid yoke 9, the said strap divided in its lower portion into branches 10 and 11 united at 12 and 13 to a belt 14, adapted to encircle the aviator immediately beneath the arms. Upon the opposite side of the ring the strap is likewise divided into portions 10^a and 11^a secured to the belt at 12^a and 13^a. The yoke 9 extends downwardly in parallel relation to the strap 8 and secured thereto at spaced intervals by the fastenings 15. Each arm of the yoke has loosely mounted on its lower end the shoulder pads 16, which are pivoted to the said yoke by a pivot pin 17, passing through the lower end of the yoke and ears 18 upstanding from the pads. These pads are preferably cup-shaped and lined with a yielding material.

The adjustment of the various parts of the strap and yoke is such that when the strap

14 encircles the body beneath the arms and the pad 16 rests upon the shoulders, the arch of the yoke and the supported ring will be spaced above the head, thus cooperating with the hinged mounting of the pads to enable the wearer to move his head freely, the weight of the device being supported upon the shoulders rather than upon the neck.

19 represents the usual tightly fitting hood worn by aviators and arranged to envelop the head with the exception of the face, and is shown as secured beneath the chin by the lacing cords 20. This hood is arranged beneath the strap 8 and the yoke 9 and is provided in its cheek portions with ears 21 and 22 serving a purpose, which will be hereafter described.

The hood with its attachments and the belt, strap and yoke constitute a harness by means of which the parachute device is attached to and supported by the body of the wearer. Upon the rear of this harness and preferably upon a downward extension of the hood overlying the wearer's shoulders is supported a frame composed of rigid horizontal side members 23 and horizontal rear members 24, the rear members jointed at 25 and 26 to the respective side members, and the side members pivoted at 27 and 28 to the rear portion of the hood. Elastic cords 29 connect the upper and lower members of the frame at the junction points of the rear and side members, while elastic cords 30 extend from the junction points of the lower frame members to the rear portion of the belt and elastic cords 31 extend from the junction points of the upper frame members to the hood, connecting therewith at a point 32 adjacent the ears of the wearer.

An inflater 33 of flexible material is arranged at the rear of the hood and extends from a point above the crown of the hood to the space embraced within the frames. This inflater in its upper portion has a single channel 34 with its walls composed of flexible material, the side walls 35 folded longitudinally, bellows-like, in order to render the same extensible laterally when inflated. In the lower portion this inflater is divided longitudinally by a membrane 36, which separates the interior of the duct into two channels 37 and 38, the side walls of which are longitudinally folded at 39 and 40. At the lower end portion within the frame the membrane is extended to a connection with the lower rear frame member, and the edge walls 40 of the channel nearest the head are secured to the lower side members of the frame, thus making of the said frame a rigid distending device holding the mouth of the inflater open and flared downwardly. The rear wall 41 of the inflater at its lower end is connected at 42 to the upper

side members of the frame and thence extending across the frame, while the membrane at a point above its lower edge carries an extension 36^a curved upwardly and connected to the rear upper member of the frame, thus forming a distended upwardly turned flaring mouth for the rear channel of the inflater.

It will be observed that upward currents of air will enter the forward channel of the inflater in its lower portion and thence traverse the upper channel of the same, the action of the air thereon tending to press the membrane to the rear and prevent return currents through the rear channel, whereas downward currents of air will enter the upwardly flaring mouth of the rear channel, passing to the single channel of the upper portion and tending to press the membrane forward so as to close the front channel. This provision is intended to meet the conditions present during a fall, directing the relative upward rush of air into and through the inflater whether the wearer falls head first or feet first.

The parachute body is arranged to be folded bellows-fashion along the arcs of the great circles passing through the apex, as shown in Fig. 4. It is then folded endwise together with the cords 6 alongside the upper extension of the inflater 33 without folding the latter, and as thus folded is laid upon the yoke 9 above the head.

A case 43 is provided, which is composed of a body portion of substantially the shape shown in Fig. 8, having one side incut and provided with gores 44 stitched together to form the bands 45 to fit the forehead, the body being provided at its four corners with friction clamps 46 and 46^a, each of which consists of two members 47 and 48 pivoted at 49 and arranged to grip with their jaws 50 the ears 21 heretofore referred to as carried by the hood 19, said jaws pressed together by the spring 51. The case thus formed is placed above the folded parachute, the band drawn across the forehead and the two front clamps 46 engaged with the ears 22, the rear portion of the case is then drawn forward to envelop the rear portion of the folded parachute and inclosed inflater and the clamps 46^a attached to the ears 21, thus protecting the folded parachute from disarrangement by air currents met with from in front during travel through the air in a normal manner.

The equipment of the aviator when ready for flight is represented in Fig. 2, from which will be seen that no interference is presented to the free movements of the wearer and the appearance is not such as to excite particular attention from observers. If the aviator thus equipped falls from the balloon or aeroplane, or from other high elevations feet foremost the resultant up-

wardly rushing air currents will enter the forward duct of the inflator expanding its bellows-like sides to their full capacity and discharging, as will be seen from Fig. 3, into the folds of the parachute above his head. If he falls head first, the upwardly rushing air will enter the rear duct acting in like manner to extend the walls to the full capacity of the said duct and discharging at the same point into the folded parachute. The expansion of the duct walls exerts an outward pressure upon the case more than sufficient to release the clamps 46^a from the ears 21 and the expansion of the folded parachute will release the clamps 46 from the ears 22, thus throwing off the enveloping case and freeing the parachute, which being rapidly expanded by the intrushing air assumes the position shown in Fig. 1 and supports the weight of the man. The capacity of the inflator is such that the parachute will be fully extended within the first few yards of descent, so that if the elevation is sufficient to cause material injury, the parachute will expand and break the fall. If the distance is not sufficient to allow the parachute to expand, the arrangement of the same upon the head of the wearer will serve as a cushioning device to prevent injury from contact with the ground or from parts of the machine striking the head of the person.

It will be understood that if the man when he starts to fall is in full possession of his faculties, he need not wait for the automatic release of the hood but may snatch it off with his hand. If, however, he is panic stricken or is affected with mountain sickness causing unconsciousness, the duct will work automatically and with certainty. With the inflator capacity illustrated and found advantageous by test the lateral pressure upon the walls of the inflator caused by the intrushing air currents and acting to release the outer case rapidly increases with the descent from a pressure of slightly more than a half pound to the square foot at the end of a fall of five feet; three pounds at the end of twenty feet; ten pounds at the end of seventy-five feet, and fourteen pounds at the end of one hundred feet, from which it will be seen that the disengagement of the friction clamps from the ears 21 and 22 and the consequent release of the hood and expansion of the parachute is certain to follow a fall whatever be the initial position of the aviator.

The provision of the elastic connection of the frame-work with points above and below the same and at each side thereof, guards against the breaking of said frame-work by striking against obstructions while being worn, the elastic cords yielding to an extent sufficient to prevent breaking of the frame which might otherwise result.

What is claimed is:—

1. In a device of the class described, the combination with a foldable parachute having suspension cords, and a harness arranged to be attached to the body of the aviator and to the suspension cords, of an inflator comprising an air duct having expansible walls and discharging within the folds of the parachute, a case enveloping the collapsed inflator, and detachable means securing the case in position.

2. In a device of the class described, the combination with a foldable parachute having an attaching ring for suspension cords, of a harness arranged to be attached to the aviator's body and to the ring and supporting the folded parachute above the head, and an inflator carried by the harness and comprising an upwardly tapering duct having expansible walls and terminating within the folds of the parachute, a case enveloping the parachute and inflator, and releasable means connecting the case to the harness.

3. In a device of the class described, the combination with a foldable parachute having suspension cords, and a harness arranged for attachment to the body of the wearer, said harness comprising a belt passing beneath the arms, flexible members extending from the belt on each side and above the head to a connection with the suspension cords, and rigid members supported upon the shoulders and extending above the head beneath the folded parachute, of an inflator comprising an air duct having expansible walls and discharging within the folds of the parachute, a case enveloping the collapsed inflator, and detachable means securing the case in position.

4. In a device of the class described, the combination with a foldable parachute having a central upper vent, suspension cords, and an attaching ring, a harness arranged to be attached to the body of the aviator and comprising a belt, straps connected to said belt and extending from each side thereof above the head to a connection with the ring, pads to overlie the shoulders, a rigid yoke bearing upon the pads and extending above the head beneath the ring as a support for the folded parachute, a hood enveloping the head and extending downwardly over the shoulders, of an inflator mounted in substantial vertical position upon the rear depending portion of the hood and extending from the lower portion thereof to a point above the crown and within the folds of the parachute, said inflator having extensible normally collapsed walls, a case enveloping the parachute and inflator, and a releasable connection between the case and the hood.

5. In a device of the class described, the combination with a foldable parachute hav-

ing a central upper vent, suspension cords, and an attaching ring, a harness arranged to be attached to the body of the aviator and comprising a belt, straps connected to said belt and extending from each side thereof
 5 above the head to a connection with the ring, pads to overlie the shoulders, a rigid yoke bearing upon the pads and extending above the head beneath the ring as a support for the folded parachute, a hood enveloping the
 10 head and extending downwardly over the shoulders, of an inflator mounted upon the rear of the harness and comprising an air duct extending in a substantially vertical direction and discharging within the folds of
 15 of the parachute, said duct having normally collapsed extensible walls and provided in its lower portion with a longitudinally extending membrane dividing said duct into two channels, one having a downwardly
 20 opened flared mouth and the other having an upwardly turned flared mouth, a case enveloping the hood and inflator, and a releasable connection between the case and the harness.

6. In a device of the class described, the combination with a foldable parachute having a central upper vent, suspension cords, and an attaching ring, a harness arranged
 30 to be attached to the body of the aviator and comprising a belt, straps connected to said belt and extending from each side thereof above the head to a connection with the ring, pads to overlie the shoulders, a
 35 rigid yoke bearing upon the pads and extending above the head beneath the ring as a support for the folded parachute, a hood enveloping the head and extending downwardly over the shoulders, of a frame-
 40 work mounted upon the rear of the harness, an inflator consisting of an air duct extending in a substantially vertical direction from said frame and discharging within the folds of the parachute, said air duct
 45 having extensible walls open at both ends, the lower end opening downwardly and distended by the frame-work, and a case enveloping the folded parachute and the collapsed inflator, and a detachable connection
 50 between the case and the harness.

7. In a device of the class described, the combination with a foldable parachute having a central upper vent, suspension cords, and an attaching ring, a harness arranged
 55 to be attached to the body of the aviator and comprising a belt, straps connected to said belt and extending from each side thereof above the head to a connection with the ring, pads to overlie the shoulders, a
 60 rigid yoke bearing upon the pads and extending above the head beneath the ring as a support for the folded parachute, a hood enveloping the head and extending downwardly over the shoulders, of a jointed
 65 frame-work pivotally mounted at the rear

of the harness, elastic stays connecting the jointed frame members with the harness, an inflator comprising an air duct extending from said frame-work upwardly in a
 70 substantially vertical direction and discharging within the folds of the parachute, said air duct having normally collapsed extensible walls terminating below in an outwardly flaring mouth distended by the
 75 frame, a case enveloping the folded parachute and collapsed air duct, ears attached to the hood, and friction clamps connecting the case to the ears.

8. In a device of the class described, the combination with a foldable parachute having a central upper vent, suspension cords, and an attaching ring, a harness arranged
 80 to be attached to the body of the aviator and comprising a belt, straps connected to said belt and extending from each side thereof above the head to a connection with the ring, pads to overlie the shoulders, a
 85 rigid yoke bearing upon the pads and extending above the head beneath the ring as a support for the folded parachute, a hood enveloping the head and extending downwardly over the shoulders, of a frame-work
 90 pivotally mounted upon the rear of the harness and comprising upper and lower frame members, an inflator comprising an air duct extending in a substantially vertical direction from the frame-work and discharging
 95 within the folds of the parachute, said air duct having normally collapsed extensible walls and in its lower portion provided with a longitudinally extending membrane dividing said duct into two channels, the
 100 lower portion of the membrane and the side walls of the forward channel connected to and distended by the lower frame member, the said membrane also provided with an extension attached to the rear side of the
 105 upper frame member and the rear wall of the rear channel extending transversely of the frame-work to present between the membrane extension and rear walls, an upwardly directed flaring mouth for the rear
 110 channel, a case enveloping the folded parachute and the upper portion of the collapsed inflator, and detachable clamps connecting the four corners of the said case to the harness.

9. In a device of the class described, the combination with a foldable parachute having a central upper vent, suspension cords, and an attaching ring, a harness arranged
 120 to be attached to the body of the aviator and comprising a belt, straps connected to said belt and extending from each side thereof above the head to a connection with the ring, pads to overlie the shoulders, a rigid yoke
 125 bearing upon the pads and extending above the head beneath the ring as a support for the folded parachute, a hood enveloping the head and extending downwardly over the
 130

shoulders, of a frame-work pivotally mounted in the rear of the harness and comprising upper and lower jointed frame members, an elastic connection between said frame members, and elastic stays connecting the joints of the said members and the harness above and below and laterally of their pivotal connection of said frame, and an inflator comprising an air duct extending from said frame in a substantially vertical direction and discharging within the folds of the parachute, said air duct having normally collapsed extensible walls and provided in its lower portion with separate mouths, one distended by the upper frame

members and opening upwardly and the other distended by the lower frame members and opening downwardly, a case arranged to envelop the folded parachute and the upper collapsed portion of the inflator, and a detachable connection between the said case and the harness.

In testimony, that I claim the foregoing, as my own, I have hereto affixed my signature in the presence of two witnesses.

LEE MILLER.

Witnesses:

C. H. KEEBER,
C. C. THIEL.