S. L. VAN METER, Jr.
AERONAUTICAL SAFETY DEVICE.
APPLICATION FILED AUG. 8, 1913.

1,192,480.

Patented July 25, 1916.

5 SHEETS—SHEET 1.

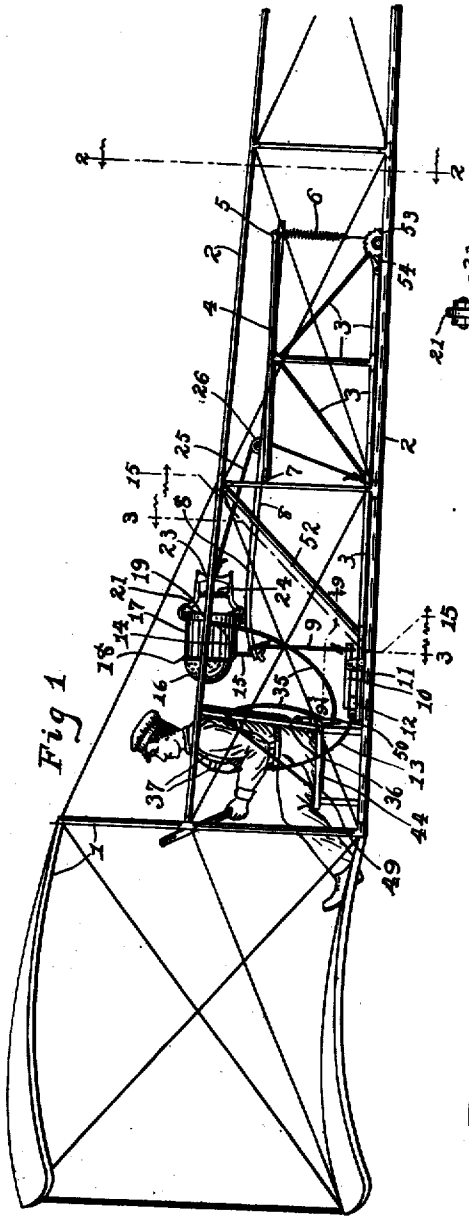


Fig 1

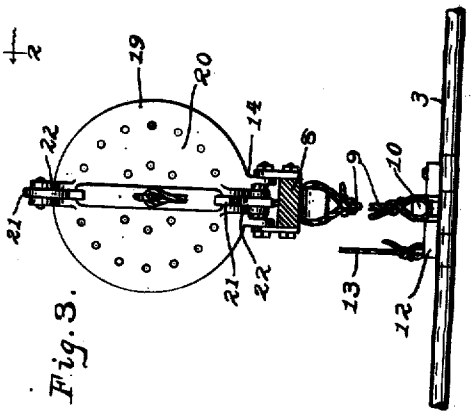


Fig. 3.

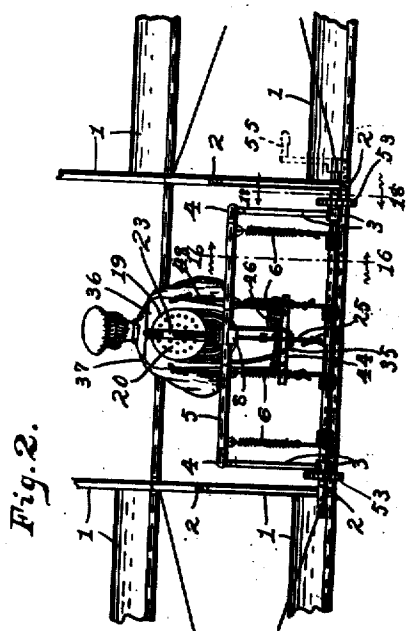


Fig. 2.

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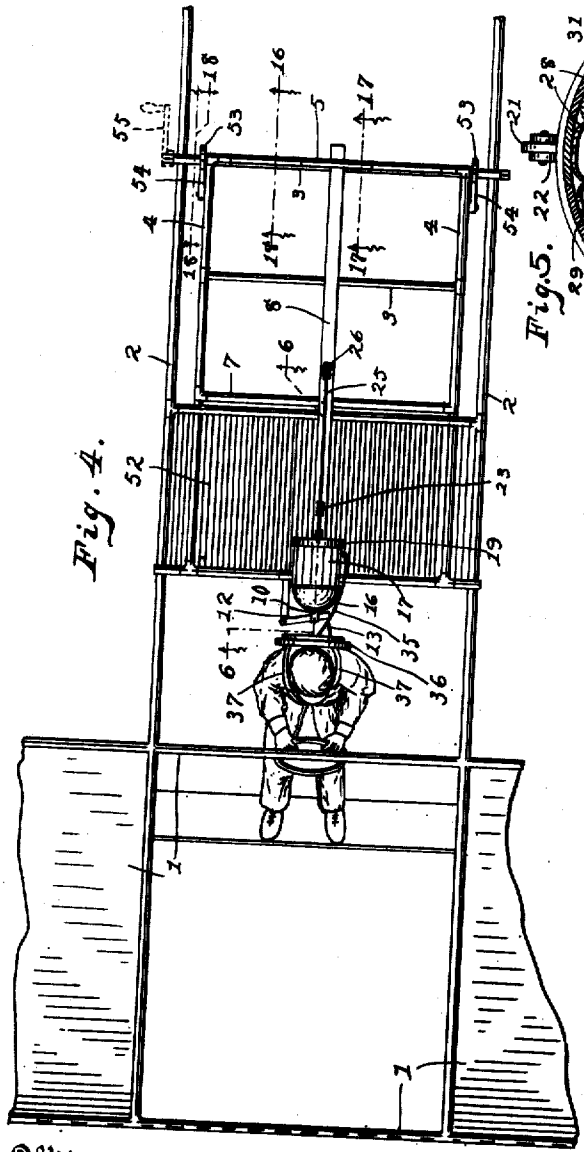


Fig. 4.

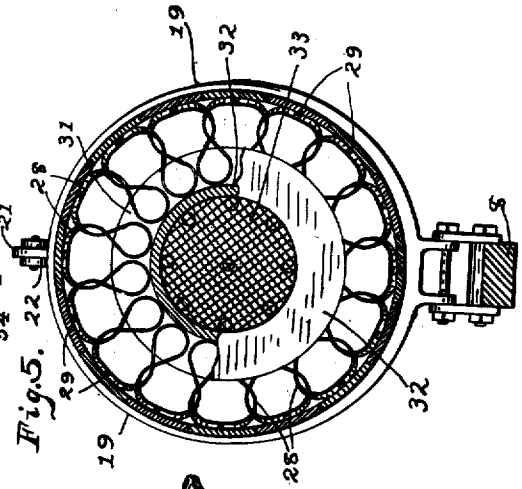


Fig. 5.

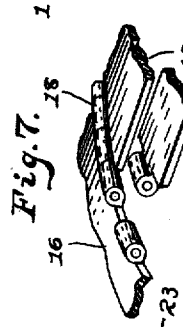


Fig. 7.

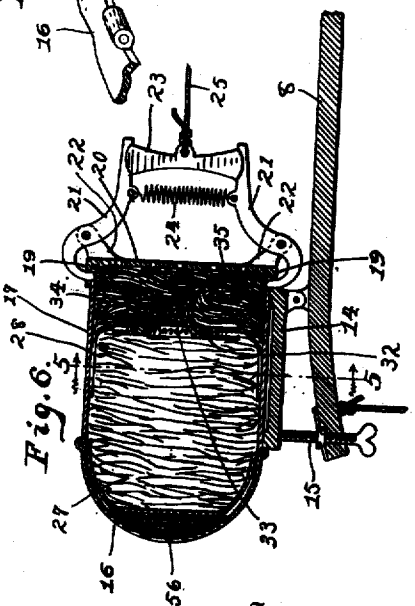


Fig. 6.

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5 SHEETS—SHEET 3.

Fig. 8.

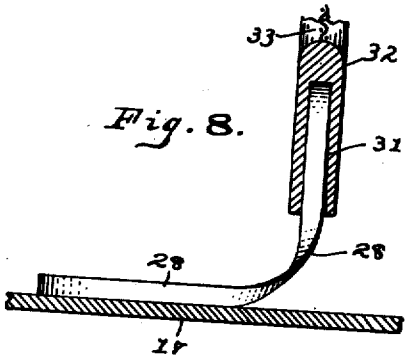


Fig. 14.

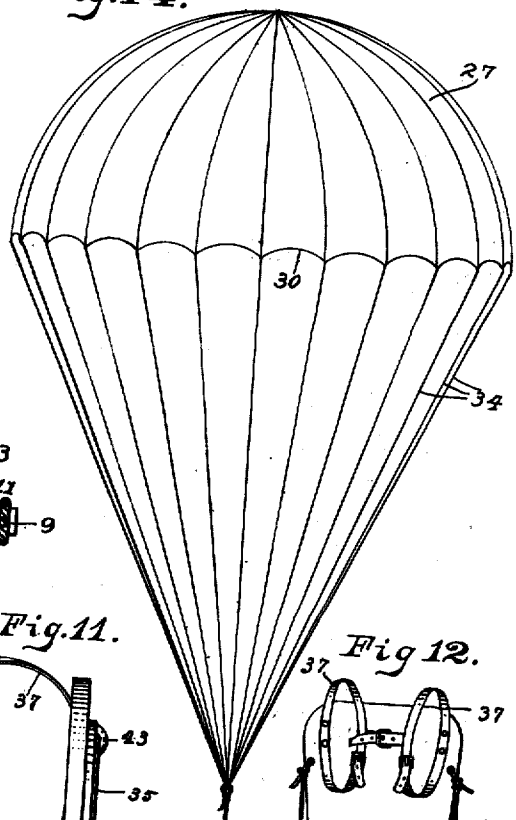


Fig. 9.

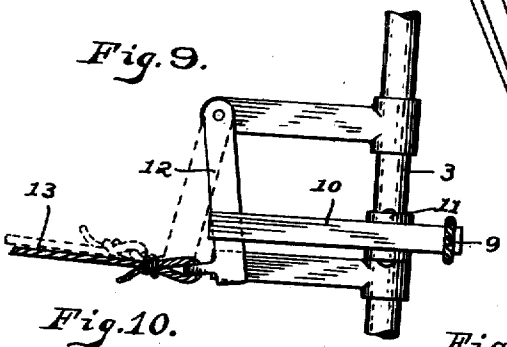


Fig. 10.

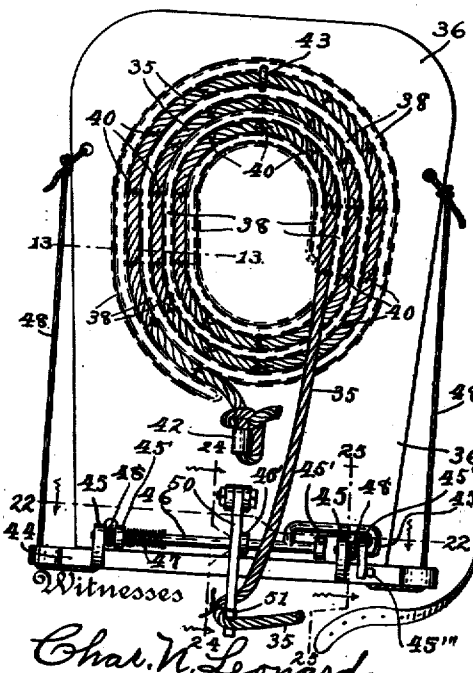


Fig. 11.

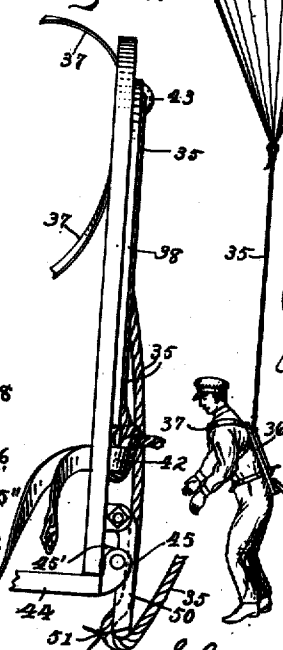


Fig 12.

Fig. 13.



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5 SHEETS—SHEET 4.

Fig. 15.

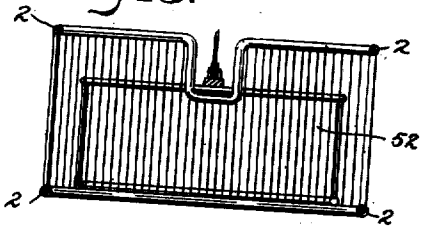


Fig. 17.

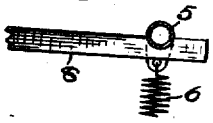


Fig. 18.

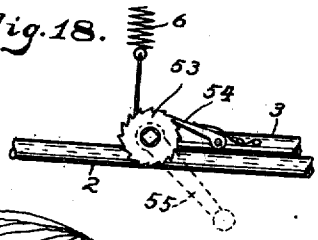


Fig. 16.

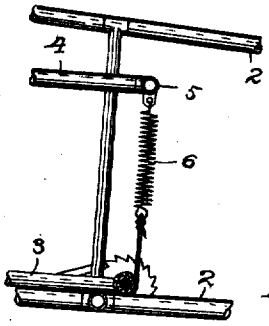


Fig. 19.

Fig. 20.

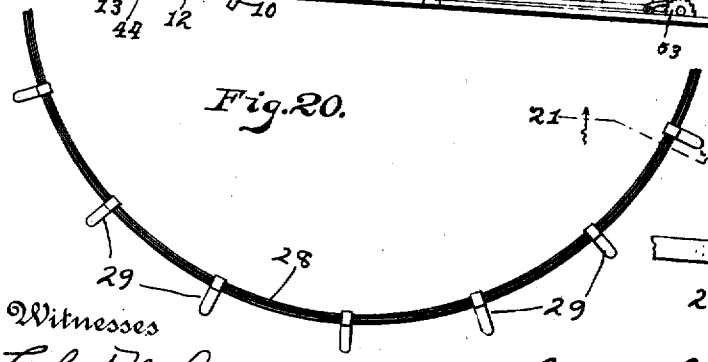
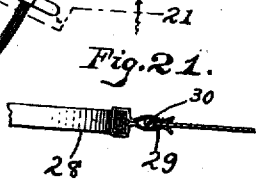


Fig. 21.



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5 SHEETS—SHEET 5.

Fig. 22.

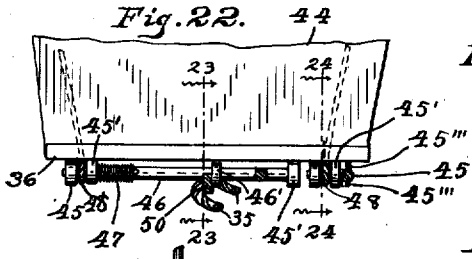


Fig. 23.

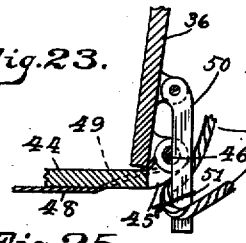


Fig. 24.

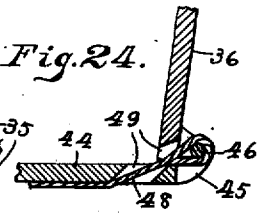


Fig. 25.

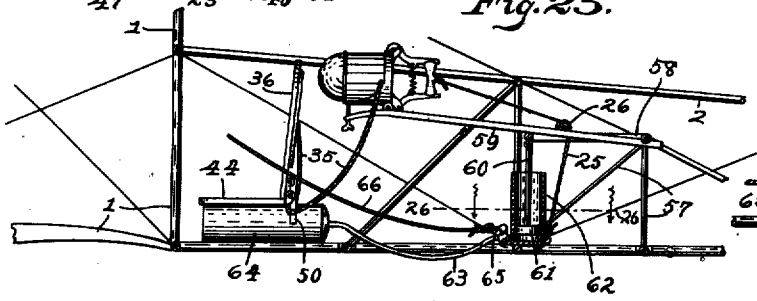


Fig. 26.

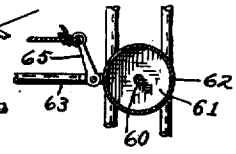


Fig. 27.

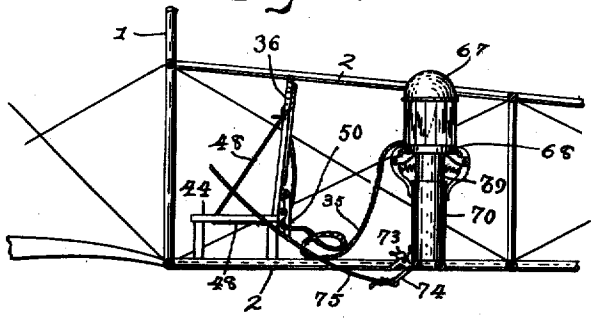


Fig. 28.

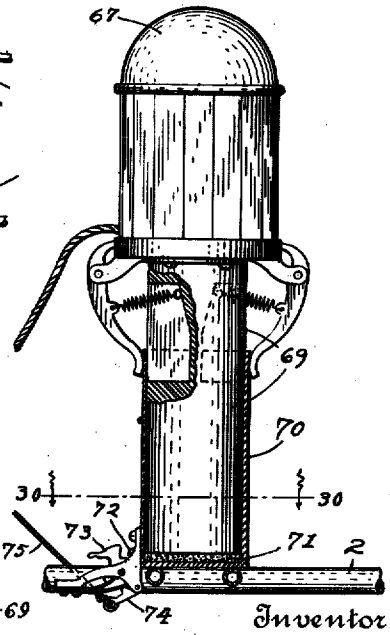


Fig. 29.

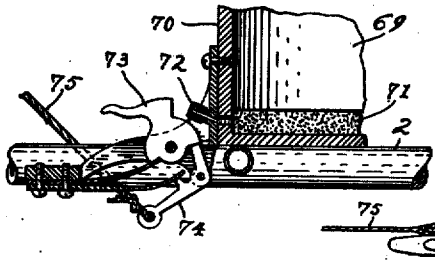
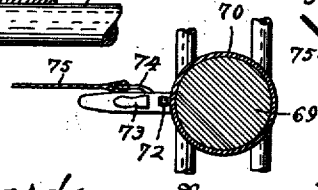


Fig. 30.



Witnesses

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AERONAUTICAL SAFETY DEVICE.

1,192,480. Specification of Letters Patent. Patented July 25, 1916.

Application filed August 8, 1913. Serial No. 783,729.

To all whom it may concern:

Be it known that I, SOLOMON L. VAN METER, Jr., a citizen of the United States, residing at Lexington, Fayette county, and State of Kentucky, have invented and discovered certain new and useful Improvements in Aeronautical Safety Devices, of which the following is a specification.

My invention relates to parachute attachments for aeroplanes and its objects are to provide means which shall act to automatically cast into the air a parachute attached to the body of the aviator on the release of the actuating mechanism, to provide effective power means for effecting the above action, to provide means for insuring the prompt opening of the parachute when thus thrown into the air, to provide means for lessening the shock imparted to the body of the aviator when the parachute has caught the air, to provide means for inclosing the parachute when it is mounted upon the aeroplane in connection with means for holding such inclosing means in closed position and for immediately releasing the same when the parachute is discharged from the aeroplane, to provide means for holding the operator in his seat and means for guarding the aviator against contact with the aeroplane as he is separated therefrom by the separation of the parachute and the aeroplane and generally to improve the construction of a device of this class. With these ends in view, my invention is embodied in preferable form in the device hereinafter described and illustrated in the accompanying drawings.

In these drawings, Figure 1 is a side view in elevation of an aeroplane showing my device applied thereto; Fig. 2 is a section on line 2—2 of Fig. 1; Fig. 3 is a section on line 3—3 of Fig. 1; Fig. 4 is a top plan view; Fig. 5 is a section, partly broken away on line 5—5 of Fig. 6; Fig. 6 is a central section through the inclosing hood for the parachute; Fig. 7 is a detail perspective of part of the inclosing hood; Fig. 8 is a detail section of the parachute expanding spring; Fig. 9 is a detail plan view of part of the releasing means for the power mechanism; Fig. 10 is a rear view in elevation of the back of the seat and rope attaching member; Fig. 11 is an edge view of the part shown in Fig. 10; Fig. 12 is a perspective view of the attaching back plate and harness; Fig. 13 is a detail section on line 13—13 of Fig. 10; Fig. 14 is a side view showing the parachute in active position; Fig. 15, a front view in elevation of the guard member for the aviator; Fig. 16 is a detail vertical section of a part of the frame and power mechanism; Fig. 17 is a side view in elevation, partly in section, of the upper rear end of the power mechanism; Fig. 18 is a detail view of the lower part of the power mechanism; Fig. 19 is a side view in elevation, showing the device just after the parachute has been cast off from the aeroplane; Fig. 20 is a detail top plan view of part of the parachute expanding spring, after the same has been fully expanded; Fig. 21 is a vertical detail section on line 21—21 of Fig. 20; Fig. 22 is a detail plan of part of the back of the seat of the aviator; Fig. 23 is a detail section on line 23—23 of Fig. 22; Fig. 24 is a detail section on line 24—24 of Fig. 22; Fig. 25 is a side elevation, partly in section of a modified form of the power means illustrated in Fig. 1; Fig. 26 is a horizontal detail section on line 26—26 of Fig. 25; Fig. 27, a side view in elevation of another modified form of power means for casting the parachute; Fig. 28 is an enlarged view partly in section of the device shown in Fig. 27; Fig. 29 is an enlarged detail view of the lower part of Fig. 28 and Fig. 30 is a detail cross section on line 30—30 of Fig. 28.

Referring to the drawings, 1 is an aeroplane which is here shown as of the bi-plane type, although it is obvious that the invention may be applied to aeroplanes of other types. Fixed on the rearwardly extending frame 2 of the aeroplane is a framework body 3 and pivotally supported on the central crossbar of this frame work is the central bar of a substantially rectangular casting member 4 to the rear bar of which are secured several vertical power-exerting springs 6, the lower ends of which are secured to the rear cross arm of the frame 3, as shown in Fig. 2. The front cross arm 7 of the casting member which in the case of the form of the device illustrated in Figs 1 to 24 inclusive may be denominated a catapult, is adapted to bear against the underside of a parachute carrier consisting preferably of a hickory bar 8. The rear end of this bar passes under the rear cross bar 5 of the catapult, whereby when the catapult is released, its springs 6 will cast the parachute carrier upwardly into the air. The extreme forward end of member 8 is connected by means of a rope 9 or other flexible con-

necting member to the catch lever 10 which is pivoted at 11 on the frame 3. The front end of this lever is engaged on its under side by a trigger 12 (see Fig. 9). This trigger is connected to a rope or other flexible member 13, the forward end of which is within convenient reach of the aviator, whereby when a cord 13 is pulled forwardly, the catch lever 10 will be permitted to fly down at its rear end under the tension to which the carrier 8 is constantly subjected, owing to the pull of the springs 6, whereby the carrier is released and the catapult is permitted to cast the same.

Pivotally mounted on the carrier 8 is a bracket 14 (see Fig. 6) which may be adjusted vertically by means of a set screw 15, extending through a carrier member. Resting on this bracket is a parachute inclosing hood which is preferably of metal and which comprises an upper solid dome-shaped portion 16 perforated with air holes and a lower cylindrical portion consisting of slats 17 which by means of hinges 18 connecting them to the dome are adapted to swing outwardly to permit the free escape of the parachute therefrom. The object of the adjustable bracket is to permit the hood to be set out at an inclined angle to the carrier so that when the latter is discharged the hood will be thrown rearwardly or forwardly as desired whichever serves to more effectually clear the aeroplane. To hold the slats of the hood in position, the lower ends thereof are set within a flange 19 of an annular plate 20 and hooked levers 21 are adapted to enter perforations in this flange and in opposite slats for the purpose of holding the hood and the plate 20 locked together. These levers are pivoted on lugs 22 projecting from the under side of the plate 20. The lower arms of the levers are adapted to be held normally apart so as to keep the upper ends in engagement with the hub and flange by means of a releasable bridge piece 23, while a spring 24 connected to said arms serves to draw the lower ends together and thus releases the upper ends from the flange and hood when the bridge 23 has been withdrawn from its engagement with the arms. A releasing cord 25 is connected to the bridge member and extends over a pulley 26 which is mounted on the parachute carrier 8. The cord extends down through an aperture in this carrier and is fixed at its lower end to a suitable eye on the frame 3. When the carrier is thrown upwardly by the catapult a tension will be exerted on this cord 25 which will pull the spacing bridge 23 away from engagement with the arms of the hooked members thus permitting the release of the members from the hood.

The plate 20 is perforated to permit the entrance of air thereto. This plate in conjunction with the expanding hood constitutes the inclosing means for the parachute 27 which in Fig. 6 is shown as inclosed within the hood, the connecting ropes thereof being shown as at the bottom of the hood and resting on the plate 20.

Adapted to be releasably attached to the parachute at its throat is a parachute expanding member consisting of an annular spring or series of flat springs laid together and designated by the reference character 28. (See Figs. 5, 6, 8, 20 and 21.) This spring member in expanded form is illustrated in Figs. 20 and 21. At intervals around the circumference are spring clips 29 which are adapted to loosely engage the circumferential cord 30 attached to the parachute 27 at approximately the throat of the parachute. This expanding spring is of less diameter than the parachute and is adapted to expand the throat of the parachute outwardly and upon the further distention of the parachute, owing to its catching the air, the cord surrounding the throat of the parachute will be carried outwardly and released from the spring clips, thus disengaging the parachute from the expanding spring.

The spring member 28 is adapted to be confined within the inclosing hood with the slats of such hood exerting a tension upon the spring so that upon the release of the slats the spring will be permitted to expand circumferentially. To this end this spring is bent into the form of loops as shown in Fig. 5 and the inner ends of these loops are adapted to be inserted within and held by the walls of an annular groove 31 (see Figs. 5, 6 and 8), formed in a ring 32 which is adapted to lie loosely within the hood, being held therein by the pressure of the springs. The outer ends of the loops thus formed are adapted to be bent outwardly and held in such upright bent position by the pressure of the slats 17 of the hood when these slats are locked in closed position. (See Figs. 6 and 8). When the slats are released these loops will first spring downwardly from an upright position to a horizontal position and then the expanding force of the spring will uncoil the loops expanding the spring readily, until it assumes the form shown in Figs. 20 and 19. The grooved ring 32 is preferably provided with a central mesh body 33.

The connecting cords 34 of the parachute 27 are attached at their lower ends to a supporting rope 35. This rope is attached to the aviator through a shock absorbing member which comprises a back plate 36 adapted to bear against and support the back of the aviator and provided with a suitable attaching harness 37. The rope 35 is adapted to enter and lie in a convolute groove formed on a plate by ridges 38 in a suitable body

39, see Fig. 13. The rope is adapted to be held in these grooves by means of frangible fastening means, such as twine or cord 40 which is disposed at intervals around the grooves and is adapted to pass through perforations 41, formed in the plate and over the rope. When tension is exerted on the rope, owing to the release of the parachute and its engagement with the air, these cords and the groove will serve as shock absorbing means tending to limit the force of the suspending action imparted to the aviator, the series of frangible twines serving to successively break as the rope is uncoiled. The supporting rope is rigidly secured to the belt which passes through the plate, see Fig. 11, or other connecting means 42 on the lower part of the plate and passes through a ring 43 at the upper part thereof.

The plate 36 constitutes a removable back for the seating support of the aviator. To this end the seat 44 is provided with ears 45 (see Fig. 10) which is engaged by a bifurcated rod 46 mounted on the back 36 by ears 45′ one end of which rod projects into a perforation in one of the ears 45 from the inner side of said ear and the other end of which rod is extended upwardly and enters a perforation in the opposing ear from the opposite side. The right hand ear 45′ has a projection 45″ extending into line with a pin 45‴ on the seat. A spring 47 tends to throw the rod 46 to the right, looking at Fig. 10, so as to release said rod from the lugs or ears carried by the seat. Ropes 48 are connected to the upper part of the plate 36 and pass down through perforations 49 in the seat and in the plate (see Figs. 1, 23 and 24) and the lower ends of these ropes are attached to the rod 46 whereby the back plate is steadied and held in upright position. A pivoted trigger 50 is mounted on the back of the plate 36 and the supporting rope 35 is adapted to be detachably or breakably tied to this trigger by means of a piece of twine 51. The trigger engages a notch in the rod 46 and thereby serves to hold the rod from disengagement with the ears on the seat against the pressure of the spring 47. An ear 46′ on the rod braces the trigger. When the parachute has been discharged and the supporting rope 35 is tautened, it will lift the trigger 50 so as to release the rod 46 and permit the latter to be moved to the right and thus disengage the connection between the back and the seat and supporting rope 48.

To guide the aviator as he is separated from the aeroplane and to prevent him from coming in contact with the frame of the machine, a backwardly inclined wire guard frame 52 is provided (see Fig. 15 and Fig. 4). This guard frame is mounted behind the seat of the aviator and slants upwardly and rearwardly so that should he be drawn backwardly from the aeroplane, he will be guarded against coming in contact with the frame work of the machine to his rear.

In order to adjust the tension of the springs 6 which are adapted to throw the catapult 4, the rear cross rod of the frame 3 is made rotatably adjustable in its sockets and the ends of the springs are fastened to ropes which are coiled around the same. Both ends of this cross rod may be provided with ratchets 53, adapted to be engaged by suitable springs pressed by pawls 54 while the one end of the rod or shaft is provided with a turning handle 55 by rotating which the tension of the springs 5 may be increased.

The operation of the device above described is as follows:—Upon the destruction or damage to the aeroplane or upon the desire of the aviator to descend by parachute for other reasons, the aviator pulls the releasing cord 13, which releases the trigger 12 from the catch lever 10, whereupon the force of the springs 6 will pull down the rear end of the catapult 4, forcibly throwing up the front end and thus casting the parachute carrier upwardly and rearwardly, at the same time the tension exerted by the carrier on the rope 25 will release the bridge trigger 23, thus permitting the spring 24 to draw the outer ends of the hooks 21 toward one another, thereby disconnecting the plate 20 from the hood, and unlocking the hood. The hood rests loosely on the bracket 14 and when the carrier is thrown into the air, the hood will also be thrown from the bracket and carrier by the propulsive force of the carrier. The plate 20 is connected only to the hood and this connection is solely through the hooks 21, hence when the carrier is cast into the air, the plate 20 will pull away from the same. The hinged slats of the hood when thus released from the plate 20 are forced outwardly by the downward movement of the loops of the spring member 28, thus opening the hood and facilitating its separation from the parachute inclosed thereby. The separation of the hood from the parachute is further quickened by means of a coiled spring 56 which is adapted to be confined between the inner surface of the top of the hood and the top of the parachute when the latter is within the hood. The loops of the expanding spring 28 will first assume a horizontal position and will then quickly and violently expand radially carrying outwardly the throat of the parachute in circumferential form. As the parachute catches the air it will be further distended and the throat thereof will be detached from the clips 29 on the spring. The position of the parts after the discharge of the parachute from the aeroplane is shown in Fig. 19 in which it

will appear that the expanding spring, the hood and the supporting ring are all immediately separated from the parachute upon the discharge of these parts from the aeroplane. As the supporting rope becomes taut, owing to the filling of the parachute with air, it will release or raise the trigger 50, permitting the separation of the back from the seat in the manner heretofore described and the supporting rope will then gradually break the shock absorbing twines 40 until the rope has unwound and brought up against its fastening means 42, whereupon the aviator will be suspended as shown in Fig. 14.

In Fig. 25 is shown the modification of the means of casting the parachute into the air. In this form of the device a frame 57 mounted on the aeroplane is provided and a movable frame or catapult member 58 is mounted on this fixed frame with its rear end pivoted thereon and its front end movable. The front rod of this front frame extends under the parachute carrier member 59. The rear end of the member 59 extends under the rear end of the frame 57. The front arm of the movable frame 58 bears upon the upper end of a piston rod 60 carried by a piston 61 movable in a cylinder 62. This cylinder is connected by means of a pipe 63 to a vessel 64 adapted to contain compressed air or other gas under pressure. A cock 65 controls this pipe 63 and a releasing rope 66 is connected to this cock and adapted to open the same to permit the rush of the gas under pressure to the cylinder. By this construction it will be seen that by the admission of a charge of gas under pressure to the cylinder that the piston thereof will be forced upwardly thus forcibly driving upward the front end of the frame 58 and thereby casting the parachute carrier 59 and the parachute upwardly and rearwardly.

In Figs. 27 to 30 inclusive, there is shown another modified form of the power means for casting the parachute. In this arrangement an expanding hood 67 of substantially the same construction as that shown in the device first described is employed and the parachute is contained therein. The bottom plate 68 with which this hood engages and which corresponds to plate 20 of the device of Fig. 1 is fixed to a piston member 69, consisting of a long solid cylinder which fits within a hollow cylinder 70 and is adapted to rest upon or near a charge of powder or other explosive 71, in the bottom of the cylinder 70. A primer 72 is adapted to fire this charge of explosive and this primer is ignited by a percussion hammer 73 which is controlled by a trigger 74, connected to a pull cord 75 within convenient reach of the aviator. In this arrangement when the aviator pulls the cord 75 the explosive charge within the cylinder 70 will be exploded, thus discharging the piston cylinder 69 and the hood carried thereby.

Having thus described my invention what I claim is:—

1. In an aeronautical safety device, in combination with a parachute and an inclosing member therefor to confine the parachute and hold it folded, releasable means to lock the inclosing means, a supporting member for the inclosing means detachably mounted on the aeroplane and power means operable to exert force upon the supporting member for casting the same from the aeroplane upon actuation thereof, substantially as described.

2. In an aeronautical safety device, in combination with a parachute, inclosing means therefor, carrying means for said inclosing means, a lever for casting said carrying means from the aeroplane, said lever supporting said carrying means at one end thereof away from the aeroplane, power means attached to and adapted to operate said lever and means controlled by the aviator for releasing said power means, substantially as described.

3. In an aeronautical safety device, in combination with a parachute, an inclosing hood therefor having a continuous portion at one end thereof adapted to receive the upper end of the parachute, said hood having outwardly and circumferentially expanding portions at the other end thereof operable to suddenly release the parachute, spring means bearing against the free extremities of said portions to positively expand the same, means for holding said portions closed and means for releasing said holding means, substantially as described.

4. In an aeronautical safety device, in combination with a parachute, an inclosing hood therefor comprising a body portion forming one end of the hood and pivoted slats forming the side of the hood, means to hold said slats closed and means to release said holding means, substantially as described.

5. In an aeronautical safety device, in combination with a parachute, a parachute expanding spring, means to confine said parachute and spring within a limited space, means to release said confining means and automatically detachable connections between said parachute and expanding spring, substantially as described.

6. In an aeronautical safety device, in combination with a parachute, an expanding spring of less diameter than the parachute clips on said spring adapted to detachably engage the lower border of said parachute, means within which said parachute and spring are confined, said means operable to exert a pressure on the spring while said parts are thus confined, and

means to release said confining means, substantially as described.

7. In an aeronautical safety device, in combination with a parachute, a slatted hood for containing said parachute, means engaging the ends of said slats, hooked arms operable to hold said slats and means together, means to exert pressure on said arms to hold them in operative position and means to release them from the slats, substantially as described.

8. In an aeronautical safety device, in combination with a parachute, supporting means for said parachute mounted on the aeroplane, means for automatically casting said parachute from the aeroplane and a guard member placed to the rear of the aviator to guard him in his separation from the aeroplane, substantially as described.

9. In an aeronautical safety device, in combination with a parachute, a seat and a back therefor, said back being attached to the body of the aviator and detachably secured to said seat, a flexible connecting member between the parachute and back, and means actuated by the flexible connecting member for releasing said back from the seat as the connecting member becomes taut when the parachute is cast free from the aeroplane.

In witness whereof, I have hereunto set my hand and seal at Lexington, Fayette county, Kentucky, June, A. D. nineteen hundred and thirteen.

SOLOMON LEE VAN METER, JR. [L. S.]

Witnesses:

H. P. DOOLITTLE,

A. C. RICE.

EXTENSION OF PATENT.

Patent No. 1,192,480. Granted July 25, 1916.

SOLOMON LEE VAN METER, JR.

The above entitled patent has been extended, under the provisions of the Act of May 31, 1928, for eight years, five months and twenty-one days from the expiration of the original term thereof.

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