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[54] INFLATING APPARATUS

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[51] Int. Cl. B01j 7/00

[58] Field of Search ..... 23/281; 9/321; 114/54; 137/561; 102/39; 244/DIG. 2; 280/150 AB

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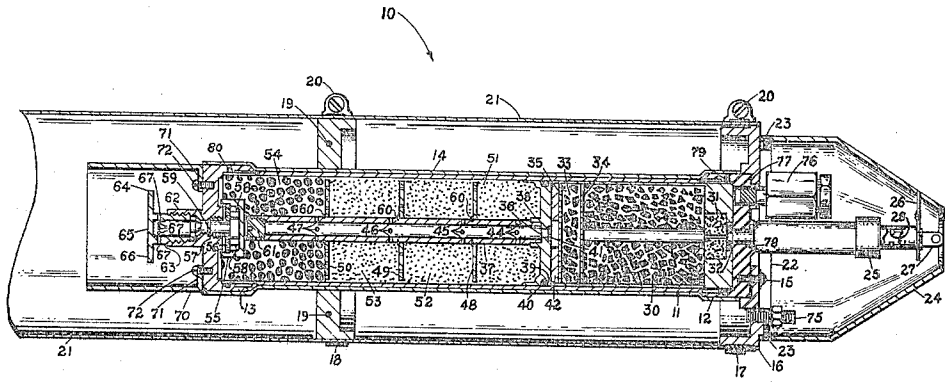
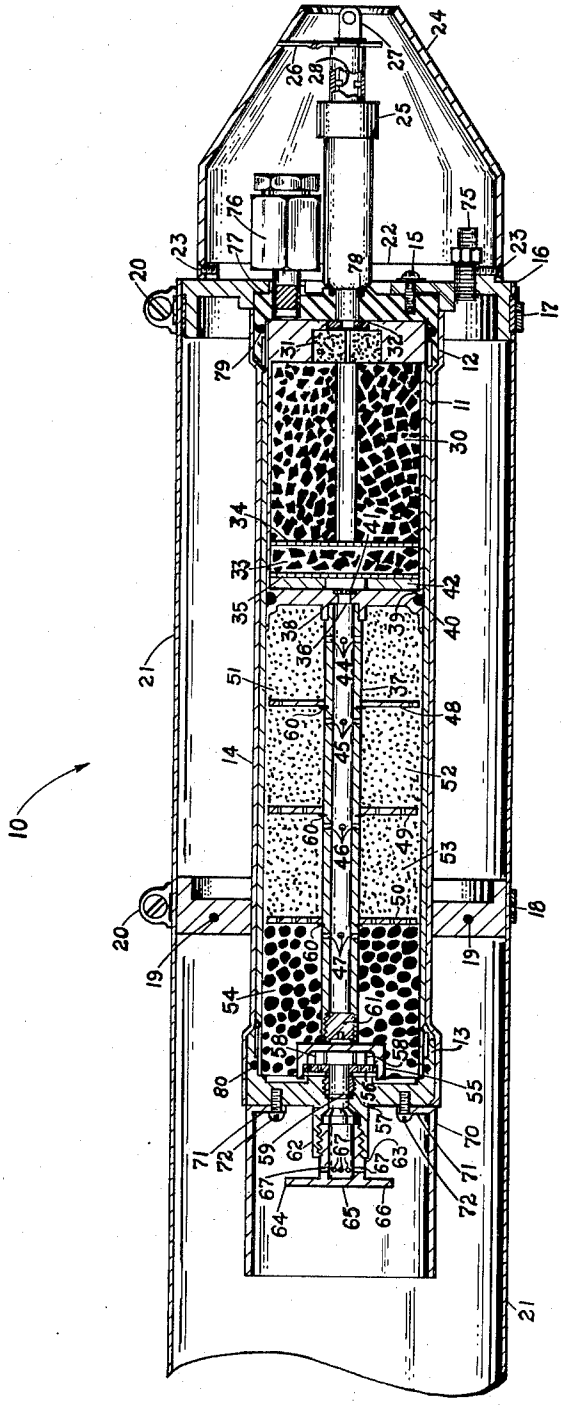
[57] ABSTRACT

A small and lightweight rapid gas inflating apparatus for inflating a paraglider with gas having a minimum of temperature and moisture content. A generated propellant gas is passed through a baffle plate, bed of charcoal for reduction in water vapor content, then radially dispersed through a coolant of ammonium carbonate and passed through a gas filtering anhydros body for absorption of water before being deflectively delivered in the parawing of the paraglider.

8 Claims, 1 Drawing Figure

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INFLATING APPARATUS

The invention described herein may be manufactured, used, and licensed by or for the Government for governmental purposes without the payment to us of any royalty thereon.

This invention relates to inflating apparatus, and more particularly, to a gas generator secured in the inlet of an inflatable structure.

It is an object of the invention to provide an inflating arrangement for an inflatable structure which is small and lightweight.

Another object of the invention is to provide such an arrangement in which inflating gas is rapidly delivered with a minimum of temperature and moisture content.

A further object of the invention is to provide such an arrangement which is safe and reliable, and in which the inlet gas is controlled and delivered at low velocity.

These and other objects, features and advantages will become more apparent from the following description and accompanying drawing which is an elevational sectional view of a preferred inflating apparatus embodying the principles of the invention.

The inflating apparatus, shown generally at 10, includes a propellant tube 11 that is externally threaded adjacent both ends to secure thereto the head cap 12 and end cap 13 both of which are centrally apertured for a purpose to be described. An asbestos insulator 14 covers the sidewalls of the tube 11 and caps 12, 13. Secured to head cap 12 by a plurality of screws 15 is a centrally apertured cylindrical mounting bracket 16 the peripheral surface of which is suitably recessed to accommodate seal ring 17. The forward portion of tube 11 is mounted in a pair of split cylindrical bracket portions 18 which are secured together on assembly by a plurality of appropriate screws 19. Suitable clamps 20, 20 secure the tube supporting mounting brackets 16, 18 in longitudinally spaced relationship within a predetermined flexible material or parawing portion 21 of the inflatable or paraglider structure (not shown).

Secured to the rearwardly extending annular flange 22 on bracket 16, as by a plurality of suitable screws 23, is a conically shaped protector 24 for certain elements of the initiator 25 which is threadedly secured in the central aperture of head cap 12. Until the safety pin 26 is withdrawn through an appropriate opening (not shown) in the protective cone 24, the operationally required retraction of the initiator firing pin 27 is precluded. Within the initiator 25, pressure gas leakage rearwardly therethrough is prevented by O-ring seal 28 carried by the firing pin.

Cylindrical propellant body 30 has a central passage and is located in tube 11 forwardly adjacent the centrally apertured igniter 31. A plurality of boron potassium nitrate pellets 32 are positioned intermeidate the igniter 31 and the head cap 12. Preferably, a cellulose nitrate base adhesive and sealing compound secures the pellets 32 to the igniter 31 and also the igniter to the propellant body 30. A loose coconut charcoal bed 33 substantially fills the space located between a pair of longitudinally spaced baffle members 34, 35 each of which has a plurality of orifices to pass generated propellant gas to the hollow gas rod 37 as will be described from the burning propellant body 30 that had been ignited by the initiator actuated igniter 31.

Hollow gas rod 37 has an externally threaded rearward end which is secured against a blow-out or rupture disc 36 in the forwardly opening hub portion 38 of the centrally apertured support member 39. Support member 39 carries a peripheral O-ring seal 40 and has a rearwardly opening recess larger than its central passage to accommodate or seat with a press fit the plurally orificed plate or ring 41. A ring-shaped or annular spacer 42 is positioned intermediate baffle plate 35 and support member 39. The hollow gas rod 37 has a plurality of longitudinally spaced groups of peripherally spaced lateral openings 44, 45, 46, 47 and between each pair of adjacent groups is positioned a plurally apertured annular baffle plate 48, 49, 50. The baffle plates 48, 49, 50 on assembly are positioned by appropriate rings 60 and define respective compartments each containing a coolant of ammonium carbonate 51, 52, 53 and a forwardmost compartment that is substantially filled with a gas filtering anhydros body 54 of DRIERITE for absorption of water from the substantially cooled gases passing from the lateral openings in hollow rod 37 through the sintered filter unit 55. Filter unit 55 includes a sintered filter press-fitted on a plurally orificed member 56 having a central passage therethrough and an externally threaded hub portion 57 that is secured against rupture disc 59 which is seated in the end cap 13. Rearwardly extending segmental protrusions 58 integral with member 56 function as a spacer with lateral passages. Set screw or threaded plug 61 is secured in the forward end of the hollow gas rod 37 to seal off or preclude gases entering the filter 55 without having passed through the anhydros body 54.

End cap 13 has a forwardly opening hub portion 62 that is internally threaded for securement of the mating external threads on the cylindrical tubular portion 63 of deflector 64 that is located within and spaced from deflector tube 70 and has a closed forward end wall 65 which includes a radial extension or outwardly directed annula flange 66. The deflector tubular portion 63 has a plurality of lateral passages 67 rearwardly adjacent flange 66 for directing cooled propellant gas toward the internal surface of deflector tube 70 that has inwardly directed rearmost flange means 71 containing appropriate apertures for screws 72 that secure the deflector tube to the end cap 13. Cooled propellant gas is thus delivered through deflector tube 70 forwardly through the parawing portion 21 of the inflatable paraglider.

Air valve 75 has depressible valve stem (not shown) for deflating the paraglider when desired. Threadedly mounted in head cap 12 is an excessive pressure relief unit 76, containing a suitable rupture disc, to automatically exhaust pressure gas from propellant tube 11 should an emergency occur. Sealing gasket 77 seals the connection of the head cap 12 with the mounting bracket 16 and pressure relief unit 76. Appropriate O-ring seals 78, 79, 80 render the gas generating system leak-proof.

Various modifications, changes or alterations may be resorted to without departing from the scope of the invention as defined in the appended claims.

We claim:

1. In an inflating apparatus for an inflatable device having longitudinally spaced mounting brackets for securing a gas generating tube in a predetermined flexible material portion of said inflatable device,

a centrally apertured head cap secured to the rearmost mounting bracket and containing a rearmost end portion of said tube,

an igniter in said tube rearmost end portion adjacent said head cap, said igniter being fired upon actuation of an initiator,

a centrally apertured propellant body in said tube forwardly adjacent said igniter,

a centrally apertured support member having an internally threaded forwardly opening hub portion and a peripheral O-ring seal in engagement with a mid-length portion of said tube,

a charcoal bed intermediate said propellant body and support member,

a longitudinally extending hollow gas rod secured in said support member hub portion and having a plurality of longituidinally spaced groups of peripherally spaced lateral openings,

an annular baffle member between a pair of each of said openings and extending laterally outward from said rod toward said tube and defining a plurality of annular compartments,

each of said compartments on the rearward side of each baffle being substantially filled with a coolant of ammonium carbonate, the forwardmost compartment being substantially filled with a gas filtering anhydros body for absorption of water,

a plug secured in the forward end of said gas rod,

an end cap secured to the forward end of said tube and defining a wall of said forwardmost compartment, said end cap having a forwardly opening internally threaded hub portion and a central passage in fluid communication with the interior of said end cap hub portion,

a filter unit secured in said end cap central passage and located adjacent said anhydros body and forward of said plug,

a deflector tube having inwardly extending rearmost flange means,

means securing said tube flange means against said end cap, and

a deflector secured in said end cap hub portion and located within and spaced from said deflector tube, said deflector having a hollow tubular portion terminating in a forwardmost closed end wall, said tubular portion having a plurality of lateral passages for directing cooled propellant gas toward the internal surface of said deflector tube.

2. The structure in accordance with claim **1** wherein each of said baffle members has a plurality of openings to fluidly communicate each compartment with each adjacent compartment.

3. The structure of claim **2** wherein an annular spacer is located intermediate said support member and said charcoal bed.

4. The structure of claim **3** wherein said charcoal bed includes a pair of longitudinally spaced plurally orificed baffle members and loose coconut charcoal substantially filling the space therebetween.

5. The structure according to claim **4** wherein a plurally orificed ring is positioned in a rearward surface of said support member and extends across its central aperture.

6. The structure of claim **5** wherein said deflector had an outwardly directed annular flange extending radially toward said deflector tube, said deflector tube being located forwardly adjacent said deflector lateral passages.

7. The structure of claim **6** wherein a protective cone is secured to said rearmost mounting bracket, and an initiator is secured in the central aperture of said head cap.

8. The structure according to claim **7** wherein clamp means surround each of said mounting brackets and secure therebetween respective portions of said inflatable device flexible material.

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