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[54] GAS GENERATOR HOUSING 10 Claims, 2 Drawing Figs.

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[56] References Cited UNITED STATES PATENTS

676,814 6/1901 Feval..... 23/281
2,558,756 7/1951 Jackson et al. 23/281
2,561,094 7/1951 Chadwick..... 312/213 X

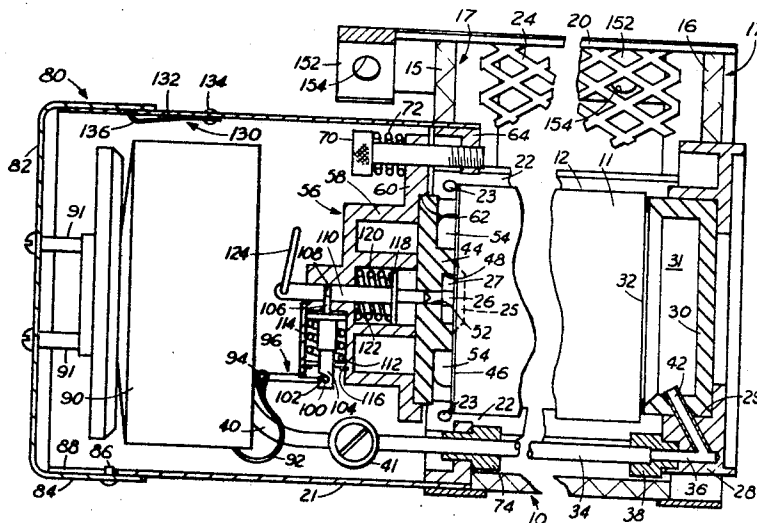
2,758,015 8/1956 Bovard et al..... 23/281
2,775,511 12/1956 Geffroy et al..... 23/281
2,781,506 2/1957 Harrison..... 312/213 X
2,983,588 5/1961 Bovard 23/281
3,158,153 11/1964 Bloom et al..... 128/142.2
3,419,361 12/1968 Bratton et al..... 23/281
3,443,907 5/1969 Mausteller..... 23/281
3,482,568 12/1969 Bovard 128/142.3
2,492,272 12/1949 Dauster 23/281 UX

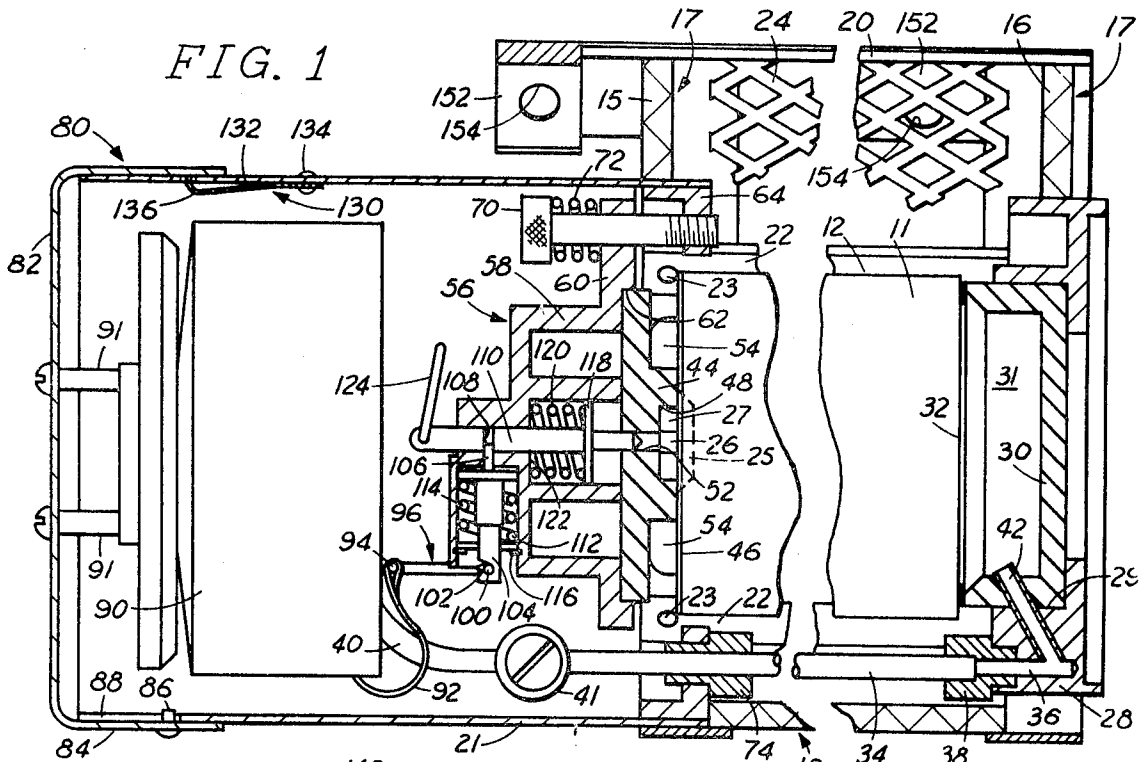
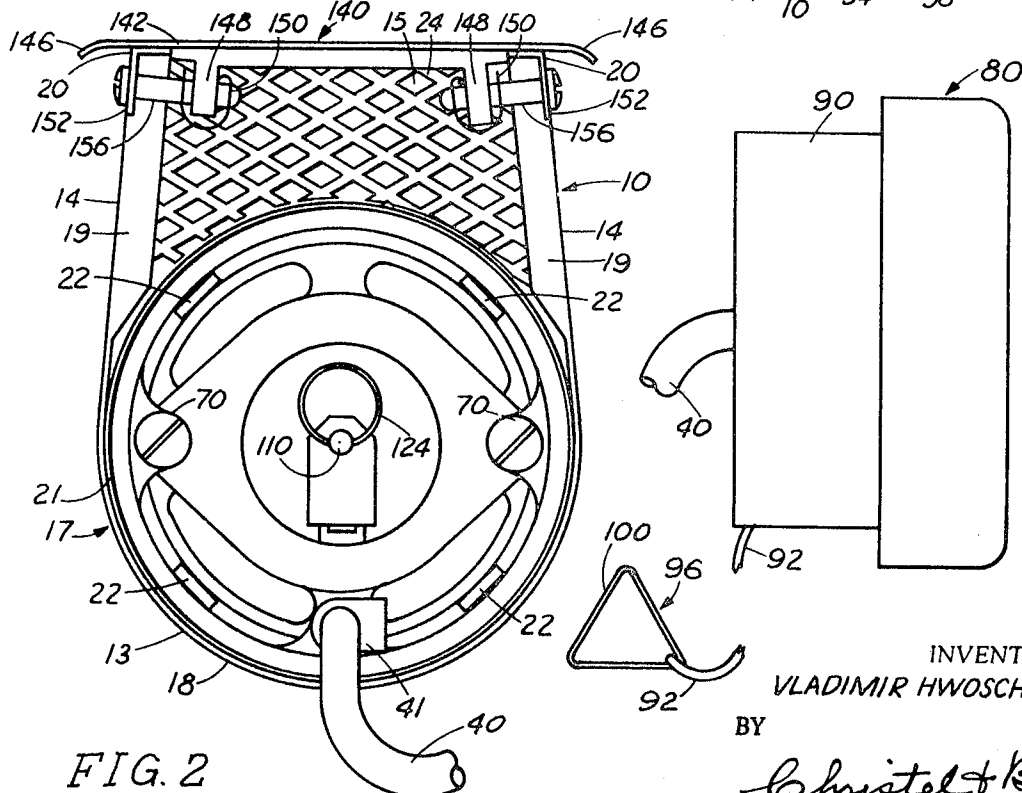
FOREIGN PATENTS

861,622 2/1961 Great Britain..... 23/281

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ABSTRACT: A housing for encasing a gas generator comprising a body formed of a metallic mesh having interconnected crossbars providing heat vent passages therebetween. Bearing support members of high-temperature plastic material are interposed between opposite ends of the generator and the housing. A mounting shield is spaced above the housing to deflect rising heat and direct it outwardly through the vent passages in the housing body.





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GAS GENERATOR HOUSING

BACKGROUND OF THE INVENTION

This invention relates to gas generator assemblies and, more particularly, to a housing for packaging an oxygen-generating candle¹⁰ and auxiliary breathing equipment.

Gas generators comprising oxygen-evolving chlorate candles mounted in canisters are known and offer certain advantages over cylinders of oxygen under pressure. However, these generators produce intense heat during combustion and heat the container in which they are encased to intolerable elevated temperatures. Accordingly, it is desirable to provide a strong, durable housing of a long useful life for adequately supporting the generator therein and effectively dispersing the heat generated thereby into the ambient atmosphere within tolerable limits.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved gas generator housing and mounting having an expanded metal construction for rapidly venting and dissipating heat.

It is another object of this invention to form the foregoing from an expanded metal mesh material having good conduction properties to rapidly transfer heat from the combustion area.

It is still another object of the present invention to provide a mounting construction capable of uniformly distributing heat within tolerable limits.

It is also an object of this invention to provide the foregoing housing with a chamber permitting cross ventilation therethrough.

Generally speaking, the present invention provides a housing mounting construction for a gas generator, such construction being formed of a metallic mesh, such as perforated or expanded metal, comprising interconnected crossbars defining spaces or vent passages therebetween. Bearing support members preferably formed of a material of low thermal conductivity and stable under a wide range of temperatures are interposed between the ends of the generator and the housing to insulate the housing from the intense heat generated at the ends of the generator during combustion. A chamber is provided in said housing to permit cross ventilation therethrough. A mounting shield is positioned above the housing to deflect heat and direct it through the housing vent passages.

The foregoing and other objects, advantages and characterizing features of the present invention will become clearly apparent from the ensuing detailed description of certain illustrative embodiments thereof, taken together with the accompanying drawings wherein like reference numerals denote like parts throughout the various views.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. 1 is a longitudinal sectional view of a housing construction of the present invention for encasing an oxygen-generating candle and other breathing apparatus; and

FIG. 2 is an end elevational view of the housing of FIG. 1 attached to a mounting shield, the end cover being removed from the housing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, there is shown a preferred form of a housing of the present invention, generally designated 10, for encasing a disposable gas generator 12, and other breathing apparatus, hereinafter described. Housing 10 is formed of a metallic mesh, such as perforated or expanded metal having a semicircular cylindrically shaped portion 13 partially surrounding said generator 12 in spaced relation therewith and terminating at opposite sides in a pair of upright slightly converging sidewalls 14 (FIG. 2). sidewalls 14 extend longitudinally between end walls 15 and 16, also formed of a metallic mesh, such as perforated or expanded metal, for ex-

ample. Although housing 10 preferably is formed of aluminum, it should be appreciated that any metal of a lightweight construction having similar heat conduction properties may be employed within the purview of this invention.

A frame construction is provided for the expanded metal housing and comprises a pair of end brackets generally designated 17, of a substantially U-shaped configuration in end elevation (FIG. 2), each having a semicircular bight portion 18 and a pair of opposite legs 19. A pair of elongated bars 20 are integrally formed with the free ends of legs 19 and extend in a direction normal to said legs.

Projecting axially outwardly from end wall 15 of housing 10 is an extension 21 of a generally cylindrical configuration forming the forward end of housing 10 as viewed in FIG. 1. Although extension 21 may be composed of any suitable heat resisting material, it is preferable to form extension 21 of a filament-wound epoxy comprising glass filaments bonded with epoxy. Extension 21 is releasably secured to housing 10 by a plurality of rods 22 having openings 23 for receiving suitable fasteners (not shown) extending radially through housing 10 and extension 21. The other ends of rods 22 are releasably secured to the right end of housing 10 (as viewed in FIG. 1) by suitable fasteners (not shown). Although preferably four rods 22 are used as shown in FIG. 2, more or less than four such rods can be employed within the purview of this invention.

The expanded aluminum mesh construction comprises a plurality of interconnected cross bars 24 integrally formed and providing spaces therebetween which serve as vent passages for rapidly dissipating the heat generated by the combustion of generator 12. Although the interconnected bars are preferably diagonally oriented to form parallelogram spaces, it should be understood that they can be oriented in any arrangement desired so long as they define sufficiently large vent passages.

Generator 12 can be of the type comprising a canister 11 substantially filled with an inner body composition capable of evolving oxygen upon burning. By way of example, the composition can consist of a consolidated body having uniformly distributed therethrough an alkali chlorate or perchlorate which generates oxygen upon combustion, a finely divided oxidizable material such as iron powder for burning and supplying part of the heat needed for combustion, a binder such as inorganic glass fibers or steel wool for holding the mass together and aiding in the even decomposition of the chlorate or perchlorate, and barium peroxide or like chlorine fixes for chemically eliminating traces of chlorine gas released during thermal breakdown of the chlorate or perchlorate. Such oxygen candle compositions are known and form no part of the present invention per se. The body composition can be press-molded or cast to form a cylinder having an ignition area 25 in the form of a truncated cone disposed at the upper-outer end thereof. Ignition area 25 comprises the foregoing composition enriched with a metal powder, such as iron, to provide a concentrated area of intense heat when ignited. The candle body can be encased within an insulating envelope (not shown) interposed between the canister and the candle body. An igniter percussion cap 26 is mounted centrally of the candle against ignition area 25 and is maintained in position by means of an annular retainer 27 secured to the top of canister 11.

Housing 10 is provided with a bottom cap 28 bonded or otherwise fixedly secured to end wall 16 of housing 10 and is provided with a recess 29 for receiving a cup-shaped member 30 defining a plenum chamber 31 and having bearing surfaces for supporting generator 12. Member 30 is formed of a heat-insulating plastic material which has low thermal conductivity and is stable under a wide range of temperatures, such as Teflon for example, to insulate housing 10 from the heat of combustion of generator 12 and to provide an adequate bearing support for generator 12 under combustion conditions. A gasket 32 is interposed between the bottom or inner end of oxygen candle 12 and the bearing surfaces of member 30. An elongated delivery tube 34 extends parallel to generator 12 within housing 10 and has one end connected to a passage 36 in bottom cap 28 by means of a coupling member 38 mounted

in cap 28. The other end of delivery tube 34 is connected to a flexible delivery hose 40. A laterally extending conduit 42 mounted in member 30 and cap 28 connects chamber 31 with passage 36. A suitable relief valve 41 is connected to delivery tube 34 for controlling the flow of oxygen through tube 34.

A retainer 44, carrying a gasket 46 on its inner surface in engagement with the top or outer end of generator 12, is provided with a recess 48 for receiving retainer 27. Retainer 44 is provided with an aperture 52 for receiving and guiding a firing pin therethrough. Retainer 44 is formed of the same material as member 30 to insulate aluminum housing 10 from the heat generated by the ignition of candle 10 and is provided with lateral passages 54 for dissipating the heat generated thereby. Thus, generator 12 is supported at its opposite ends by member 30 and retainer 44, both formed of a good heat-resistant material to insulate housing 10 from the heat of combustion of generator 12 and to adequately support the same under combustion conditions.

An end cap 56 is provided for detachably securing generator 12 in place and comprises a depending skirt 58 having an outwardly radially extending flange 60. A recess 62 is provided in flange 60 for accommodating the peripheral edges of retainer 44. An annular retainer ring 64 is bonded or otherwise fixedly secured to housing 10. Cap 56 is releasably attached to ring 64, as by means of clamping screws 70 (only one of which is shown in FIG. 1), extending through openings in flange 60 and threadably received in retainer ring 64. Springs 72 are disposed about screws 70 between the heads thereof and flange 60 to provide bearing loads against end cap 56 and apply an inward force on generator 12. A fitting 74 is mounted in retainer ring 64 for receiving delivery tube 34 and maintaining the same in spaced relation relative to oxygen candle 12.

An end cover 80 is adapted to close the upper end of housing 10 and comprises a body portion 82 having a cylindrical wall 84 depending therefrom which fits snugly over extension 21. A pin 86 extending radially inwardly from cover 80 is received in a slot 88 of extension 21 for accurately orienting cover 80 relative to housing 10 and generator 12. Extension 21 of housing 10 encases breathing equipment comprising an oral-nasal mask 90 with delivery hose 40 connected thereto and auxiliary equipment (not shown) such as particulate and chemical filters, seals, and a reservoir bag. Such breathing equipment is provided in a compact kit form within extension 21 at the outer end of housing 10 and is connected to cover 80 as by means of studs 91 for example. When cover 80 is pulled from extension 21, the auxiliary equipment also is withdrawn thereby from within extension 21 and used in accordance with instructions printed either on the outer surface of cover 80 or on a decal attached to the outer surface of cover 80.

An elongated actuating lanyard 92 is connected at one end to mask 90 and is provided with a loop 94 at its other end encircled about a triangular clip 96 having one of its legs 100 received in an inclined slot 102 in a release pin 104. An axial projection 106 of release pin 104 is received in an opening 108 of firing pin 110 and is biased into engagement therewith by means of a spring 112 held in position between a collar 114 mounted on pin 104 and a retaining ring 116. Firing pin 110 is provided with a collar 118 and a compression spring 120 is mounted on firing pin 110 between collar 118 and a shoulder 122 provided in an inner bore of end cap 56. The upper end of firing pin 110 is provided with a ring 124 to facilitate lifting of firing pin 110 against the bias of spring 120 in order to cock the firing mechanism.

Warning means are provided for indicating that the unit has been used or tampered with, such means comprising a pair of diametrically opposed spring detents 130 (only one is shown in FIG. 1) mounted within extension 21 each having an elongated body portion 132 attached at its one end to extension 21 as by means of a rivet 134. The other end of body portion 132 has a tongue 136, the free end thereof normally disposed in an opening provided in extension 21 and biased against the inner surface of wall 84. If the cap is partially shifted axially out-

wardly or removed, tongue 136, due to the bias of body portion 132, will project radially outwardly of extension 21. The extension of tongue 136 outwardly of extension 21 can be readily noticed by an observer to indicate that end cover 80 has been shifted or tampered with. Moreover, end cover 80 cannot be replaced without first depressing tongue 136 inwardly of extension 21.

The packaged housing unit is attached to a mounting support, such as can be provided beneath passenger seats in an aircraft for example. An elongated reflection shield 140 is secured to the underside of a passenger seat by any suitable means. Shield 140 comprises a body 142 secured to a supporting surface and laterally spaced skirt portions 146 inclined downwardly from the lateral edges of body 142. Paired projections 148 spaced longitudinally of shield 140 and depending therefrom are provided with fastener receiving means 150. Elongated bars 20 of the housing frame are provided with mounting brackets 152 having openings 154 therein to receive fasteners 156 therethrough. Fasteners 156 are of the quarter-turn easy-disconnect type and are cooperable with fastener receiving means 150 for releasably securing housing 10 to the mounting support.

In use, end cover 80 is removed from extension 21 carrying with it mask 90 and other associated breathing apparatus. Mask 90 is placed over the wearer's nose and mouth. As mask 90 is removed from housing 10, lanyard 92 carried thereby is stretched taut to pull clip 96 and move release pin 104 axially against the bias of spring 112 to remove projection 106 from opening 108 of firing pin 110. The force of spring 120 drives firing pin 110 against igniter cap 26 to ignite the same and initiate combustion of generator 12. Thus, without changing positions in an emergency situation, a passenger can remain seated and reach under his seat to remove end cover 80 with one hand and in one sweep of the arm place mask 90 over his nose and mouth while initiating ignition of generator 12.

As oxygen is produced by burning generator 12, it escapes through chamber 31, conduit 42, passage 36, delivery tube 34 and hose 40 through the breathing apparatus into mask 90. As hereinbefore mentioned the breathing apparatus can include a particulate filter and a chemical filter so that clean oxygen issues directly into mask 90. The oxygen candle can be of the type having a 30-minute duration featuring a four-stage ignition, full flow operation at the mask within 2 seconds after actuation, a minimum of 4.7 liters per minute oxygen flow for the first 3 minutes followed by a smooth transition from 4.5 liters per minute to a minimum of 2.7 liters per minute for the remainder of the 30-minute duration. With end cover 80 removed, used generators can be easily replaced by simply unscrewing bolts 70 from retainer ring 64 and removing end cap 56 and retainer 44.

From the foregoing, it is seen that the present invention fully accomplishes its intended objects and provides a strong durable housing for expendable gas generators. The housing is formed of a metallic mesh comprising interconnected crossbars which provide heat vent passages therebetween. The heat produced by the combustion of generator 12 is conveyed to housing 10 by radiation and convection. Some of the heat passes through the vent passages of the housing and is dissipated into the ambient atmosphere. Simultaneously, a transfer of heat is effected by conduction through crossbars 24 into the vent passages. Any heat rising upwardly toward the supporting mount will be reflected by shield 140 and directed downwardly and outwardly through the vent passages between the interconnected crossbars of sidewalls 16. The space between sidewalls 14 and end walls 15, 16 of housing 10 above generator 12 defines a chamber for permitting cross ventilation therethrough thereby further augmenting rapid dissipation of heat generated by the combustion of generator 12.

An illustrative embodiment of this invention having been disclosed, it is to be understood that this has been done by way of illustration only.

I claim:

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1. In combination: a gas generator, a housing for said gas generator having a body of generally U-shaped configuration in cross section having a semicircular shaped portion and a pair of spaced, parallel, opposite sidewalls formed integrally with said semicircular shaped portion, said body having end walls joined to opposite ends of said sidewalls, said body being formed of a metallic mesh having a plurality of interconnected crossbars defining spaces therebetween, and means at opposite ends of said body supporting said gas generator within said body in spaced relation thereto.

2. A housing according to claim 1 wherein said supporting means are formed of a material having low thermal conductivity and stable under a wide range of temperatures.

3. A housing according to claim 1 wherein said metallic mesh is formed of a metal having high thermal conductivity.

4. A housing according to claim 3 wherein said metal is aluminum.

5. In combination: a gas generator; a housing for said gas generator comprising a body having a semicircular shaped portion overlying the bottom and sides of said generator and a pair of spaced sidewalls; said semicircular portion and said sidewalls of said body being formed of a metallic mesh having a plurality of interconnected crossbars forming vent passages; a shield; said sidewalls having edges engaging said shield; said sidewalls spacing said generator from said shield and defining

a chamber therebetween for permitting cross ventilation therethrough.

6. A housing according to claim 5 wherein said body has end walls formed of a metallic mesh having a plurality of interconnected crossbars forming vent passages.

7. A housing according to claim 5 together with means at opposite ends of said body supporting a gas generator within said body in spaced relation thereto.

8. A housing according to claim 7 wherein said supporting means are formed of a material having low thermal conductivity and stable under a wide range of temperatures.

9. In combination with a gas generator, a housing comprising: a body having opposite sidewalls and end walls, said sidewalls being formed of a metallic mesh having a plurality of interconnected crossbars defining spaces therebetween, a gas generator, means at opposite ends of said body supporting said gas generator within said body in spaced relation thereto, an extension projecting axially outwardly from one of said end walls and having an open end, a cover for closing said open end, and means connected to said end cover for igniting said generator upon displacement of said end cover.

10. A housing according to claim 9 wherein said extension is formed of wound glass filaments bonded with epoxy.

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