

July 7, 1936.

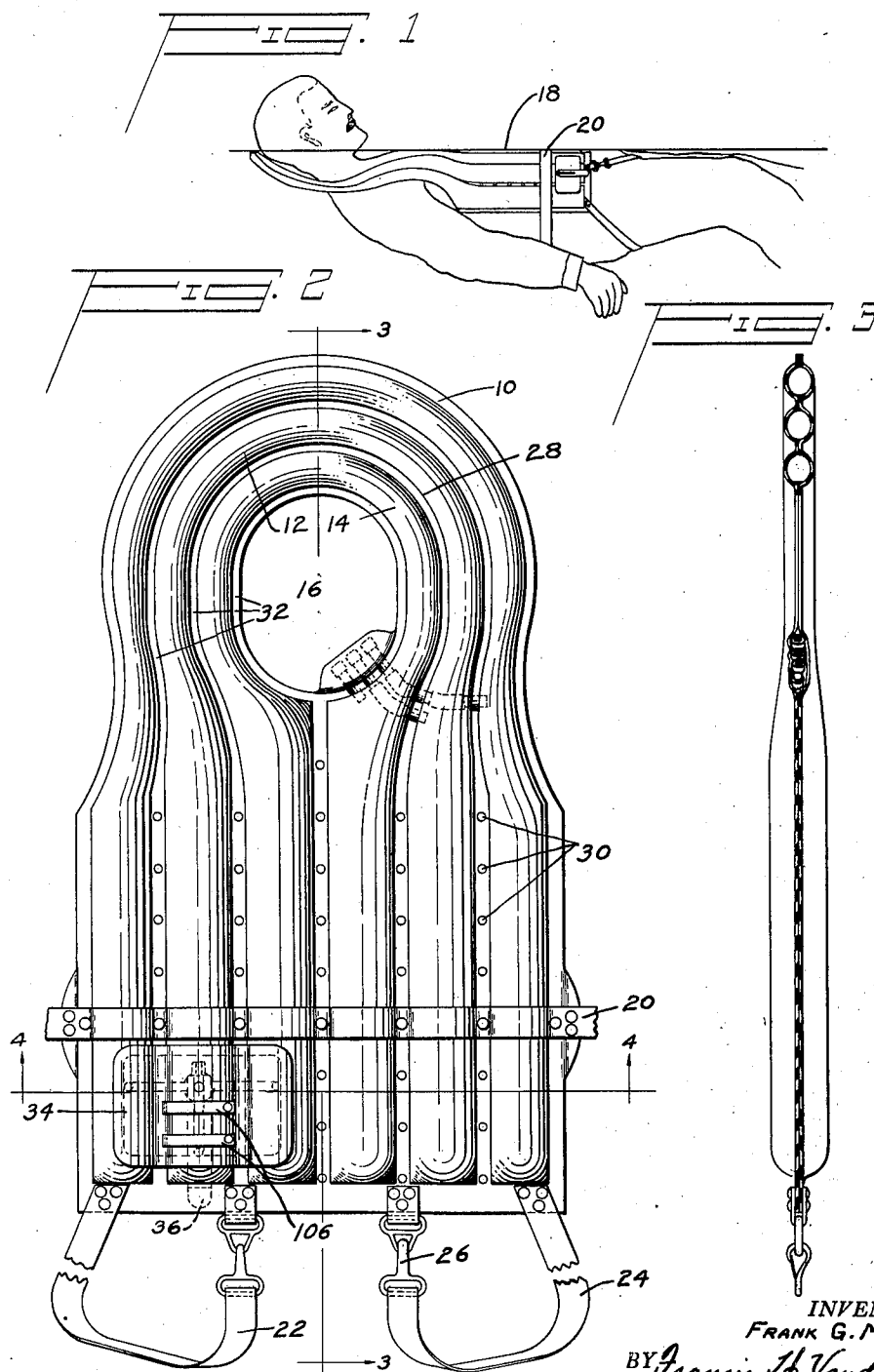
F. G. MANSON

2,046,335

FLEXIBLE INFLATED DEVICE

Filed April 29, 1932

3 Sheets-Sheet 1



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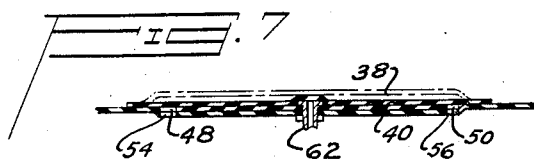
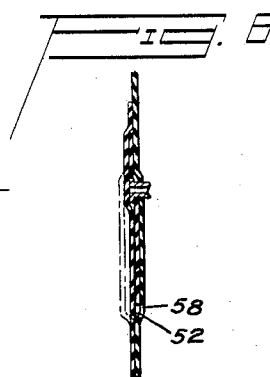
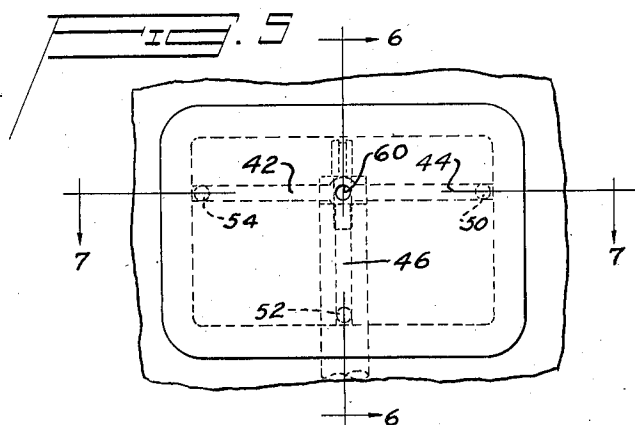
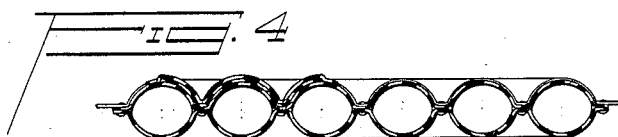
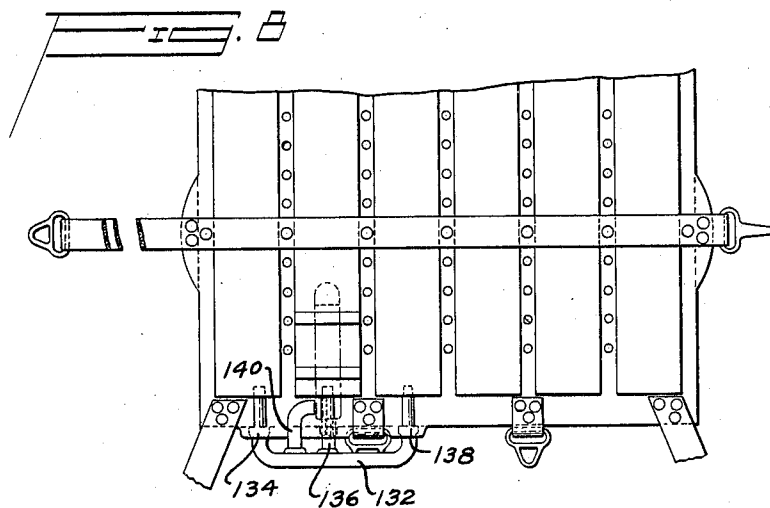
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FLEXIBLE INFLATED DEVICE

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3 Sheets-Sheet 2



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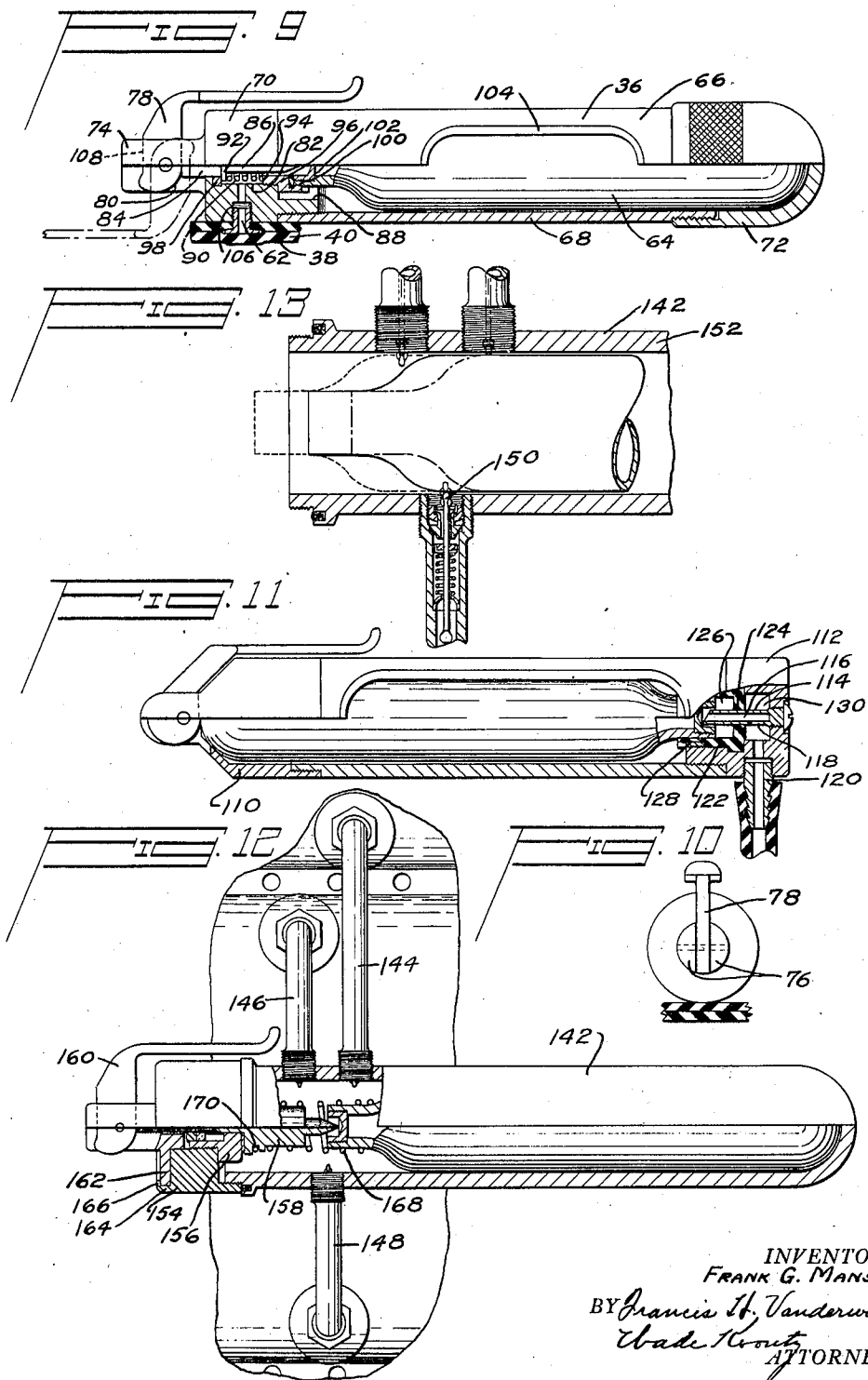
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FLEXIBLE INFLATED DEVICE

Filed April 29, 1932

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,046,335

FLEXIBLE INFLATED DEVICE

Frank G. Manson, Dayton, Ohio

Application April 29, 1932, Serial No. 608,269

5 Claims. (Cl. 9-17)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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

5 This invention relates to flexible hollow articles, such as life preservers, boats, mattresses and the like, that are provided with cells or compartments which when pneumatically inflated constitute a supporting or buoyant medium for the
10 user of the article and has for one of its objects to provide a new and improved article of this character in which each cell is capable of independent inflation for partly or wholly supporting the user and is so arranged with respect to another that it will give a stable or equally balanced support irrespective of whether the other
15 cell or cells is or are inflated.

A further object of my invention is to provide in a device of this character a novel valve arrangement with respect to the cells or compartments for simultaneously inflating the same and for preventing communication between the several compartments.

25 Another object of my invention is to provide in a device of this character a novel gas supply means having a casing provided with a plurality of valves corresponding to the number of compartments and a gas containing cylinder disposed within said casing and arranged with respect to
30 said valves so that one or more of said valves may be actuated successively to progressively, first one and then another, or simultaneously deflate two or more of said compartments.

35 A still further object of my invention is to provide in a gas supply device of this character provided with a sealed gas cylinder or capsule, means for puncturing said capsule, said means including a piercing plunger and yieldable means cooperating therewith for automatically withdrawing the same to permit the emission of the
40 gas from the capsule, the piercing plunger being manually actuated for controlling the gas supply.

My invention consists in further and other features of novelty hereinafter fully described and
45 claimed.

For purposes of illustration I have shown my invention as applied to a life-preserving waist.

Referring to the drawings:

50 Fig. 1 is a side elevation showing a life-preserver attached to the wearer and the position that both wearer and life-preserver assume when supporting the wearer in water;

Fig. 2 is a front elevation of the life-preserver
55 showing the leg and body attaching straps bro-

ken away and an automatic inflating device in dotted outline;

Fig. 3 is a central vertical section of the preserver;

Fig. 4 is a horizontal section taken on the
line 4-4 of Fig. 2;

Fig. 5 is an enlarged detail view of the valve arrangement of the inflating device shown in Fig. 2;

Fig. 6 is a vertical section taken on the
line 6-6 of Fig. 5 showing the upper wall of the vertical panel extended when inflating the cells or compartments;

Fig. 7 is a horizontal section taken on the
line 7-7 of Fig. 5, showing the upper wall of the horizontal channels extended when inflating the cells;

Fig. 8 is a fractional view in front elevation of the preserver showing a variation in the valve arrangement and in the automatic inflating device;

Fig. 9 is a quarter sectional enlarged view of the automatic inflating device shown in Fig. 2 with operating lever being shown in operated position in dotted outline;

Fig. 10 is an end view looking from left to right of Fig. 9;

Fig. 11 is a quarter-sectional enlarged view of the inflating device shown in Fig. 8;

Fig. 12 is a fractional detail view with parts in section of a further modification of the inflating device; and

Fig. 13 is a fractional sectional view of the casing in Fig. 12 and showing the three different positions of the gas container in deflating the
preserver.

In constructing the life-preserver that embodies my invention and which is of apron-like construction I employ a sheet of cloth or fabric having a coating of uncured rubber on one side and cut therefrom two pieces of material of the same form and size substantially as shown in Fig. 2 of the drawings. These two pieces are superposed with their rubber surfaces adjoining and are preferably placed in a mold for vulcanizing the adjoining rubber surfaces along corresponding areas to provide a series of spaced joints forming therebetween a plurality of substantially parallel disposed compartments 10, 12 and 14 of inverted U-shape, each of said compartments being symmetrically arranged with respect to the longitudinal axis of the apron and non-communicative with another so that puncture or deflation of any or all but one will not disturb the stability that the apron affords when in use. An opening 16
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of suitable size is provided at the upper end portion of the apron so as to pass the same over the head of the wearer, the body portion 18 being disposed in front of the wearer and secured to him by a body strap 20 that is attached across the front of the apron by rivets or the like at the joints between the compartments. Leg straps 22 and 24 are also provided for securing the apron to the wearer, each strap being fixedly attached at one end to a side and at the bottom edge of the apron, and detachably connected at the other end by a detachable connection 26 to the front bottom edge of the apron. This opening is substantially completely surrounded by the innermost U-shaped compartment 10 and partially so by the remaining compartments so that the portions of the compartments above the opening will, when inflated, extend upwardly and bear against the head of the wearer. Thus the body portion of the waist will tend to turn the wearer on his back when in the water and the head portion 28 will at such times be in a position to support the head above the surface. The apron is provided with perforations 30 along the joints 32 for ventilation.

In Fig. 2 I have shown by way of illustration one manner of accomplishing my novel valve arrangement whereby the several compartments may be simultaneously inflated and whereby communication between the several compartments is prevented. In accordance with this embodiment I provide a multiway valve unit 34 that is positioned at the lower left-hand portion of the apron and cemented to the front surface thereof, where it is conveniently arranged for use with an automatic inflating device 36 hereinafter described. The valve may be constructed from the same material used in the making of the apron, but preferably I employ a sheet of elastic material, such as rubber sheeting, from which two pieces 38 and 40 are cut of suitable form and size and are secured together by superposing one above the other and either cementing or vulcanizing the contacting surfaces at such areas as to provide three conduits or channels 42, 44 and 46, preferably arranged in the form of a T. These channels are normally held closed by the inherent tension of the material and furthermore by the pressure exerted thereagainst when the compartments are inflated, as shown in Fig. 4. The piece 40 is provided with openings 48, 50 and 52 at the ends of the channels 42, 44 and 46 respectively, which openings coincide with openings 54, 56 and 58 formed in the outer wall of the corresponding compartments 10, 12 and 14, whereby communication may be established between each compartment and its corresponding channel. The outer piece 38 has an opening 60 at the point of intersection of the several channels to receive a threaded nipple 62 for the purpose hereinafter described.

For automatically inflating the several compartments simultaneously, I provide the inflating device 36, heretofore referred to, such as shown in Fig. 9. This device comprises a readily replaceable gas supply container 64 of well-known construction disposed within a casing 66 and a manually operated plunger mechanism for breaking the seal of the container. The casing consists of a tubular body portion 68, that is internally threaded at one end and externally threaded at the other to which complementarily threaded end portions of a head 70 and a cap 72 are secured respectively. The head has integrally formed thereon a yoke 74 and pivoted between the arms 76 thereof is a

manually operated lever 78 that is formed with a cam surface 80 at its pivoted end. The head is also provided with a central bore 82 which serves as a guide for the stem 84 of a piercing plunger 86 and a counterbore 88 concentric with said central bore to provide sufficient clearance for a coil spring 90 that is seated against a flange 92 on the plunger and against the face end 94 of a valve seat 96 for yieldingly urging the plunger outwardly, there being interposed between the flange 92 of the plunger and the flange 94 a washer 98 for effecting an airtight joint at that point. Disposed within a counterbore formed in the seat 96 is a rubber washer 100 against which the nozzle of the container is seated under pressure exerted by the cap 72 so that when the seal 102 of the container is broken by the piercing point of the plunger the gas will be prevented from escaping through the body portion which, as shown, is provided with a plurality of longitudinal openings 104 for the purpose of lightening the casing and also to observe if there is contained within the casing a gas supply container without removing the cap. The head 70 is also provided with a side bore 106 opening into the counterbore and is threaded to receive the threaded end of nipple 62. The inflating device is held in place on the waist by this threaded connection with the nipple and by a pair of straps 108 that are suitably secured to the waist. The configuration of the cam 80 is such that as the lever is moved from its normal position to its operating position, as shown in Fig. 9, the plunger will be actuated by the cam and the seal of the gas container will be pierced, there being a flat 108 formed on the cam so as not to interfere with the automatic returning of the plunger in the operated position of the lever by the action of spring 90.

Fig. 11 shows a variation of the valve arrangement. This inflating device is similar in construction to that described above with the following exceptions: The operating lever is attached to the cap 110 instead of the head 112 so that in the normal operative position thereof the lever is actuated downward for opening the container instead of upward as is the case in the above-described device. Furthermore, the piercing member 114 is rigidly secured to the head 112 and is provided with a central opening 116 and a side opening 118 in the wall thereof so as to establish communication with a nipple 120 without removing the piercing element from the container. In this instance a rubber sealing member 122 is formed with two concentric central openings 124 and 126 to receive in airtight engagement the opposing ends of the piercing member and gas container respectively. The sealing member is retained within said head by a threaded ring member 128 and forms with the inner walls of the head a practically airtight chamber 130.

In accordance with the valve arrangement of this embodiment I provide in place of the valve unit 34 a rubber manifold 132 having three branches or conduits 134, 136 and 138 extending upwardly and in communication with the compartments 10, 12 and 14 respectively. Each branch is provided with a tube made of hard material and is secured to the marginal lower edge of the apron by interposing the same between the rubber surfaces of the sheets prior to vulcanization thereof. Each tube is provided with a one-way valve, such as the well-known tire valve, as shown in Fig. 13, so as to prevent communication between the several compartments. The 75

manifold is also provided with an exterior branch 140 that extends upwardly and is attached to the nipple 120 that is threaded into the head 112 of the casing, as shown in Fig. 11.

5 A further variation of my invention is shown in Figs. 12 and 13 in which the valve arrangement is similar to that shown in Fig. 11 except that the casing 142 in which the gas container is disposed constitutes a manifold from which three channels or branches in the form of tubular members 144, 146 and 148 extend laterally, then downwardly and are connected to the compartments 10, 12 and 14 respectively. Each tube has at its open end that communicates with the casing, a tire valve such as shown in Fig. 13. The outer ends of the plungers 150 of these valves extend slightly within the casing so that after the compartments are inflated the same may be actuated successively or two or more simultaneously. The casing 142 consists of a body portion 152 and a head 154 secured thereto by a threaded connection. This head is provided with a central threaded bore to receive a guide 156 for seal piercing member 158. To prevent leakage from the casing, which in this instance is not provided with the longitudinal openings, I provide a packing gland of well-known construction around the plunger and within the central bore. The operating lever 160 is similar to that described in connection with Fig. 9 and is pivoted to a yoke that is made integral with a circular flange 162. This flange is received within a complementary groove 164 in the head and retained therein by crimping a flange 166 thereover. A coil spring 168 fits over the opposing ends of the container and piercing member and has one end secured within a groove 170 formed on the piercing member and the other end in frictional engagement with the neck portion of the gas container. It will readily be obvious from the above that the coil spring serves to remove the piercing point of the plunger from the container after puncturing same and due to frictional engagement with the neck portion of the container it will withdraw the container from the casing when the head is detached from the body portion. There is but a slight clearance between the outer wall of the container and the inner wall of the casing so that each air valve plunger will be actuated successively as the container is being removed with a consequent deflation of the several compartments.

Having thus described my invention what I desire to secure by Letters Patent is:—

55 1. In a life preserver a head portion normally disposed in back of the wearer's head and a body portion normally positioned in front of the wearer, a plurality of symmetrically arranged longitudinally disposed air compartments extending continuously from both sides of the body portion substantially into the head portion, said compartments being symmetrically arranged with respect to the longitudinal axis of said preserver,

so as to provide a buoyant supporting medium for the head and body of the wearer, the center of buoyancy of which is above the center of buoyancy of the wearer's body, said head portion being actuated upwardly in supporting position by inflating said compartments and means for inflating said compartments each of said compartments being isolated from communication with the others and being symmetrically arranged with respect to the wearer's body in a manner such that when inflated will independently render the wearer substantially stable in the horizontal floating position.

2. In an inflatable life preserver formed of two layers of flexible material in superposed relation 15 and having a body portion and a head portion with a suitable opening enclosed by said portions to receive the head of the wearer, a plurality of isolated compartments of substantially U-shape, each U having the bight thereof disposed one within another and symmetric with respect to the longitudinal axis of the head and body portions and means for inflating said compartments.

3. In combination with an inflatable device 25 having a plurality of isolated gas compartments of a manifold having a casing provided with a plurality of outlets corresponding in number to said compartments, a valve disposed within each outlet, said valve having a plunger extending into said casing, and means disposed within said casing and adapted to cooperate with the plunger for opening said valves and thereby emit gas from said compartments.

4. In combination with an inflatable device 35 having a plurality of isolated gas compartments of a manifold having a casing provided with a plurality of outlets corresponding in number to said compartments, a valve disposed within each outlet, said valve having a plunger extending into said casing, and a gas container disposed within said casing and adapted to actuate said plunger when being removed from the casing for opening said valves and thereby emit gas from said compartments.

5. An inflatable device for use as a support for a person, comprising an inflatable body the center of buoyancy of which is above the center of buoyancy of the person, and formed from at least two layers of material superposed one above the other and secured together to produce a plurality of gas receiving compartments each including a head supporting portion and side portions in continuation of said head portions symmetrically arranged about a longitudinal 55 plane passing through said centers of buoyancy, each compartment being isolated from communication with the others and so arranged that when inflated will independently render the wearer of said device substantially stable in the horizontal floating position.

FRANK G. MANSON.