

Feb. 12, 1929.

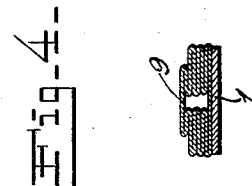
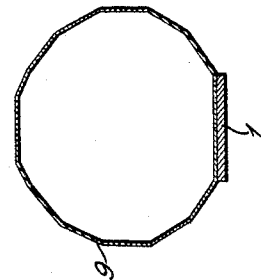
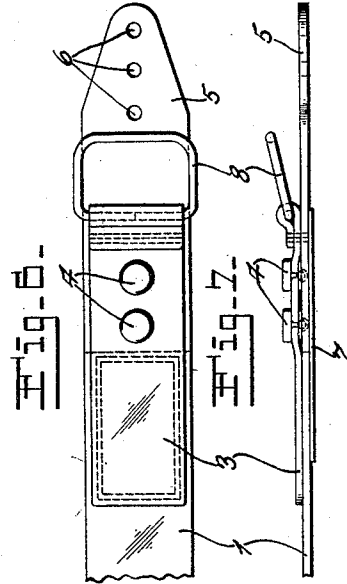
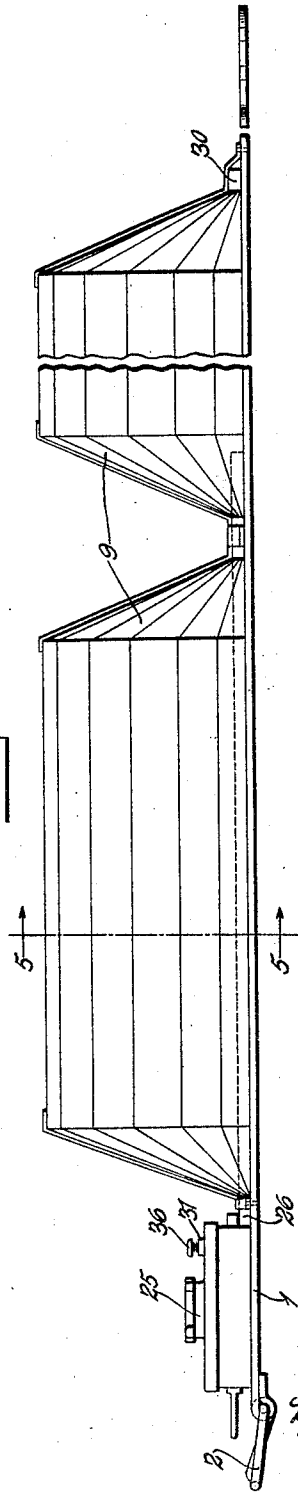
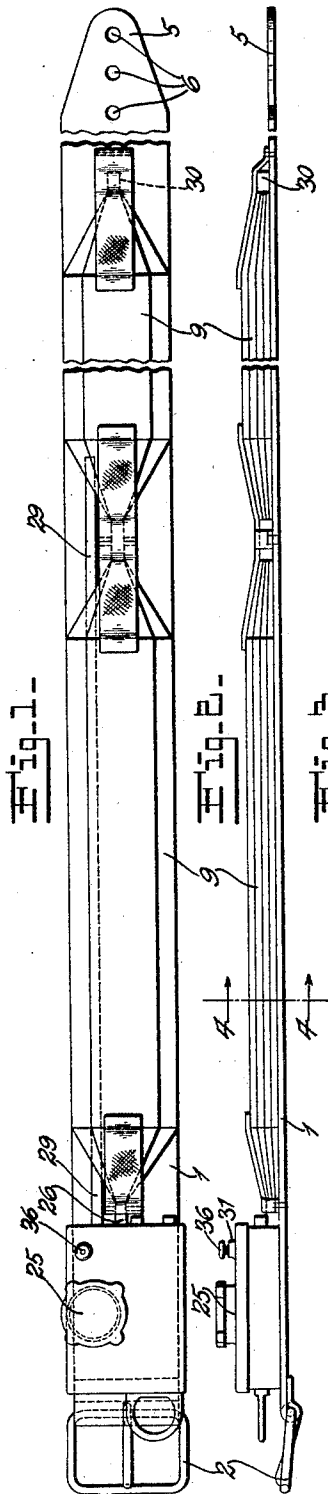
1,701,927

S. O. LANGE

GENERATOR

Filed Oct. 1, 1927

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 8.

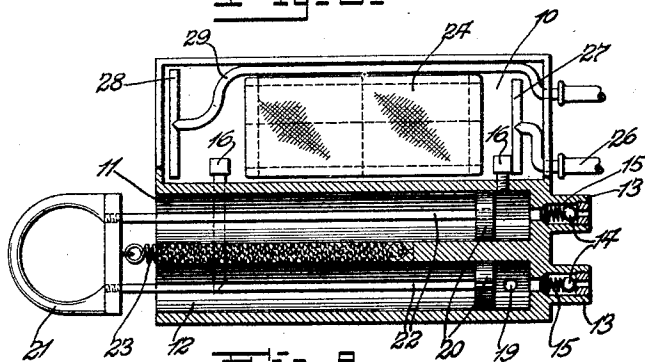


Fig. 9.

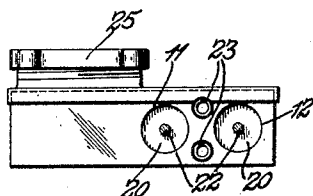


Fig. 10.

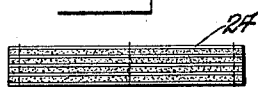


Fig. 11.

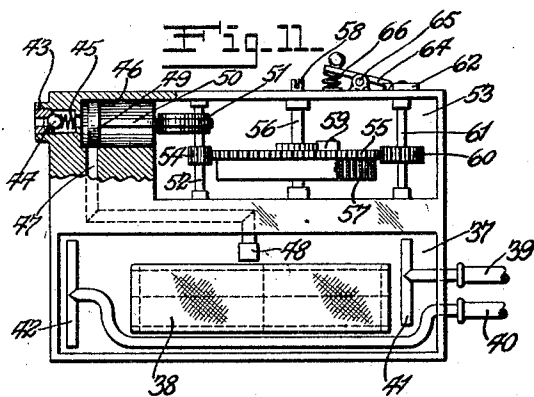


Fig. 12.

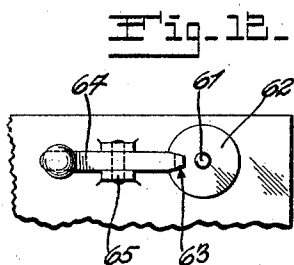
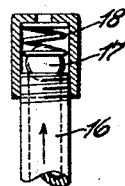
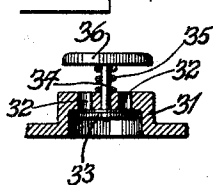


Fig. 13.



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UNITED STATES PATENT OFFICE.

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GENERATOR.

Application filed October 1, 1927. Serial No. 223,472.

This invention relates to generators for generating gas for use in life preservers and by appropriate variations as to proportions and other arrangements may also be applied for use on submarines and airplanes.

An object of the invention is to provide means for utilizing the principle of combining a solid substance with water to form a gas to inflate life preservers and other devices, especially under conditions where the formation of the gas is required or needed for emergency uses.

Other objects will appear from the following description, reference being made to the drawings, in which

Fig. 1 is an outer plan view of the invention applied to a life preserver belt.

Fig. 2 is a side elevation of the device with the gas compartments of the belt deflated.

Fig. 3 is a side elevation of the device with the gas compartments inflated.

Fig. 4 is a cross sectional view on the line 4—4 of Fig. 2.

Fig. 5 is a cross sectional view on the line 5—5 of Fig. 3.

Figs. 6 and 7 are detail views showing the construction permitting extension of the length of the belt when applied to use.

Fig. 8 is a view partly in section showing the interior construction of a form of generator.

Fig. 9 is an end elevation of the generator, the piston rods being in section.

Fig. 10 is a side elevation of a package of solid substance combinable with water to form a gas.

Fig. 11 is a view similar to Fig. 8 showing the modified construction of the generator.

Fig. 12 is a detail view showing a latch device for holding the mechanism of Fig. 11 in condition for operation.

Fig. 13 is an enlarged sectional view of a valve for releasing pressure from the generator.

Fig. 14 is a detail view of a valve controlling the admission of water to the generator.

The life preserver belt in connection with which I have shown the embodiment of the present invention comprises a flexible belt 1 having a buckle 2 attached to one end. To the opposite end of the belt a section 3 of belt material is attached for engagement by means of glove fastener clasps or the like 4 with a separate piece 5 of belt material having holes 6 for engagement with the usual tongue of the buckle 2. This separate belt section 5

is permanently connected with the end of the belt 1 only by a strip 7 of elastic material. By this construction and arrangement the belt section 5 may be secured to the end of the belt 1 by means of the strip 3 and the fasteners 4 forming a non-elastic belt designed and adapted to be worn around the waist. When required to use the belt the fasteners 4 may be easily released by engaging a ring 8 on the free end of the strip 3 and pulling the same to effect separation of the fasteners 4, thus permitting the elastic section 7 to function and the length of the belt to be increased so that the belt can be raised to encircle the chest of the wearer.

To the outer side of the belt 1 a number of inflatable gas compartments 9 are secured. These compartments are made of flexible impervious material and, when not in use, are folded bellows-like flat against the belt 1, but, when charged with gas from the generator, expand fully.

The type of generator designed and adapted is specially for use in connection with belts comprising a housing including a compartment 10 and a pair of parallel non-communicating cylinders 11 and 12 (Fig. 8). Each of the cylinders 11 and 12 is provided with a water inlet 13 from which air is normally excluded by valves 14 held in closed positions by springs 15. From the cylinder 11 a valve controlled inlet is provided to one end of the compartment 10 and from the cylinder 12 a valve controlled inlet is provided to the opposite end of said compartment. Each of these inlets comprises a passage 16 opening from the respective cylinders into the compartment 10 and having a valve 17 pressed to closed position by a spring 18 and arranged to yield under the pressure of water when water is admitted to the cylinders 11 and 12. Communication from the end of the cylinder 12 near the valve 14 to the compartment 10 is through a passage 19 in the wall of the housing. As shown the passage 19 opens into the cylinder 12 near the outlet 13.

A piston 20 is mounted in each of the cylinders 11 and 12. These pistons are connected with a handle 21 by rods 22. Springs 23 connecting the handle 21 with the housing of the generator normally hold the pistons 20 near the water inlets 13, but leaving the opening to the passage 16 from the cylinder 11 and the opening to the passage 19 between the pistons 20 and the ends of the cylinders 11 and 12, respectively.

A package 24 of an appropriate substance which, when combined with water, forms a gas is contained in the compartment 10. Thus, when the handle 21 is manipulated to draw the pistons 20 in a direction away from the valves 14, the pressure of water from the outside will open the valves 14 admitting water to the cylinders 11 and 12 and thence to the compartment 10. In the compartment 10 the water combines with the package of substance 24 to form a gas. A package 24 is insertable in the compartment 10 through an opening to said compartment normally closed by a cap 25.

From one end of the compartment 10 a tube 26 opens into the adjacent gas compartment 9 and also extends through the compartment 9 into the other compartment 9. The end of the tube within the compartment 10 opens into a cross tube 27 which is open at both ends, so that the gas generated in the compartment 10 passes therefrom to the gas compartments 9. Similarly, the opposite end of the compartment 10 has a cross tube 28 thereon opening into a tube 29 which extends to and opens into one of the compartments 9. As shown, one of the compartments 9 is equipped with a pressure release valve 30 (Figs. 2 and 3) constructed similarly to the valve shown in Fig. 14 and arranged to open when the pressure in the gas compartments 9 rises above a predetermined maximum; but to close automatically when the pressure is reduced to the predetermined maximum.

I provide a valve to release pressure from the compartment 10 in order to prevent excessive inflation of the device should the automatic valve 30 fail to function properly. As shown, the outer wall of the compartment 10 has an outward extension 31 provided with openings 32 (Fig. 13). A valve 33 is attached to the inner end of a stem 34 and is normally held in position to close the openings 32 by a spring 35. A button or handle 36 is attached to the outer end of the stem 34 and constitutes means for actuating the stem to open the valve 33.

In Figs. 11 and 12 a variation in the construction of the generator is shown. This generator comprises a housing having a compartment 37 containing a package 38 of an appropriate substance combinable with water to form a gas. From the respective ends of the compartment 37 tubes 39 and 40 form passages for conducting the gas from the compartment 30. The tubes 39 and 40 have cross tubes 41 and 42 on their inner ends respectively.

One end of the housing has a water inlet 43 normally closed by a valve 44 yieldingly held in closed position by a spring 45. The inlet 43 opens into a cylinder 46 from which a passage 47 leads through the wall of the body of the housing to a valve-controlled outlet 48, the construction and arrangement

of which is the same as that shown in Fig. 14. A piston 49 in the cylinder 46 is normally held at the end of its stroke toward the valve 44, thus holding air under compression in the cylinder 46 and preventing the valve 44 from opening. The rod 50 of the piston is strapped to an eccentric 51 on a rotary rod or shaft 52 in a compartment 53 formed in the housing. This shaft 52 is normally locked or latched in position to hold the piston 49 toward the valve 44, as explained. A pinion 54 on the rod or shaft 52 meshes with a large gear 55 rotative on a shaft 56. A spring 57 has one end attached to the gear 55 and the opposite end attached to the shaft 56. The outer end of the shaft 56 is provided with a key engageable portion 58 whereby the shaft may be rotated to wind the spring 57 while the gear 55 is held from turning, as presently explained. A ratchet device 59 prevents the shaft 56 from being rotated by the spring 57, but permits said shaft 56 to be turned in a direction to widen the spring. The gear 55 meshes with a pinion 60 attached to a spindle 61 which extends through the outer side wall of the compartment 53 and has a disc 62 attached thereto and provided with a notch or recess 63 near its periphery. A latch 64 is mounted on a pivot 65 and actuated by a spring 66 to engage in the notch or recess 63 and thus prevent the spring 67 from operating the mechanism. When it is desired to admit water to the compartment 37 the latch 64 is released from the disc 62 thus permitting the spring 57 to operate the mechanism whereby the piston 49 is moved in a direction away from the valve 44, thus reducing the pressure at the inner side of the valve 44 below the outside pressure sufficiently to permit the valve 44 to be opened by pressure of water against said valve. Since the package 38, when combined with water, forms a gas it is apparent that gas will be generated in the compartment 37 as a result of the admission of water into said compartment.

After the device has been used the spring 57 may be rewound and the mechanism latched in proper operative position wherein the piston 49 is near the valve 44 preventing said valve from opening in normal use until the latch 64 is released.

From the foregoing it is apparent that my invention is applicable to many uses and that the construction and arrangement of the parts may be varied widely as required by the different uses to which it is to be applied. I contemplate such variations and do not restrict myself unessentially in any particular, but what I claim and desire to secure by Letters Patent is:—

1. A device of the character described comprising a compartment containing a solid substance combinable with water to form a gas and having a water inlet passage, a valve controlling said passage, means for holding

said valve closed, a device movable to position to permit said valve to open under pressure of water to admit water to said compartment, and means for conducting gas from said compartment.

2. A device of the character described comprising a compartment containing a solid substance combinable with water to form a gas and having a water inlet passage, a valve controlling said passage, means for holding said valve closed, a device movable to position to permit said valve to open under pressure of water to admit water to said compartment, means for conducting gas from said compartment, and an inflatable compartment for receiving the gas.

3. A device of the character described comprising a belt including elastic and non-elastic sections, means for holding the non-elastic sections in a relationship to prevent extension of the elastic section, a device for releasing said means to permit extension of the elastic section of the belt, an inflatable gas compartment attached to the belt, and means for generating and admitting gas to said compartment.

4. A device of the character described comprising a belt including elastic and non-elastic sections, means for holding the non-elastic sections in a relationship to prevent extension of the elastic section, a device for releasing said means to permit extension of the elastic section of the belt, an inflatable gas compartment attached to the belt, means for generating and admitting gas to said compartment, and means for preventing the pressure of the gas from exceeding a predetermined maximum.

5. A device of the character described comprising a compartment, a solid substance in said compartment combinable with water to form gas, means for admitting water to opposite ends of said compartment to combine with said solid substance to create gas, and tubes opening into the opposite ends of said compartment for conducting gas from said compartment.

6. A device of the character described comprising a gas receiving compartment, a gas generating compartment having a water inlet passage, a solid substance in said generating compartment combinable with water to form a gas, a valve controlling said passage, a device movable to position to prevent said valve from opening under pressure of water below a desired maximum and also movable to position to permit said valve to open under said pressure of water to admit water to said generating compartment, and means for conducting gas from said generating compartment to said receiving compartment.

7. A device of the character described comprising a gas receiving compartment, a gas generating compartment having a water inlet passage, a solid substance in said generat-

ing compartment combinable with water to form a gas, a valve controlling said passage, a device movable to position to prevent said valve from opening under pressure of water below a desired maximum and also movable to position to permit said valve to open under said pressure of water to admit water to said generating compartment, means for conducting gas from said generating compartment to said receiving compartment, and means for preventing pressure of gas in said generating compartment from exceeding a predetermined maximum.

8. A device of the character described comprising a gas receiving compartment, a gas generating compartment having a water inlet passage, a solid substance in said generating compartment combinable with water to form a gas, a valve controlling said passage, a device movable to position to prevent said valve from opening under pressure of water below a desired maximum and also movable to position to permit said valve to open under said pressure of water to admit water to said generating compartment, means for conducting gas from said generating compartment to said receiving compartment, a manually operative valve for preventing pressure of gas in said generating compartment from exceeding a predetermined maximum, and automatic means for preventing pressure of gas in said receiving compartment from exceeding a predetermined maximum.

9. A device of the character described comprising a housing, a gas generating compartment in said housing, a cylinder in said housing having a water inlet passage and having a passage for admitting water to said compartment, a valve controlling said inlet passage, and a piston in said cylinder movable to a position to maintain pressure against said valve to prevent said valve from opening under a definite pressure of water.

10. A device of the character described comprising a housing, a gas generating compartment in said housing, a cylinder in said housing having a water inlet passage and having a passage for admitting water to said compartment, a valve controlling said inlet passage, a piston in said cylinder movable to a position to maintain pressure against said valve to prevent said valve from opening under a definite pressure of water, and means for moving said piston to a position to relieve pressure against said valve and permit said valve to open under said definite pressure of water.

11. A device of the character described comprising a belt, a gas generating compartment on said belt having a water inlet passage, a valve mounted in said passage, means for preventing opening of said valve by definite pressure of water from the outside, and a device for operating said means to permit

said valve to open under said definite pressure of water from the outside.

12. A device of the character described comprising a belt, a gas generating compartment on said belt having a water inlet passage, a valve mounted in said passage, means for preventing opening of said valve by definite pressure of water from the outside, a

device for operating said means to permit said valve to open under said definite pressure of water from the outside, and means for preventing the pressure of gas in said compartment from exceeding a predetermined maximum. 10

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