Feb. 3, 1970 W. W. REAVES ET AL 3,492,944

TWO COMPARTMENT THERMAL GENERATOR SPHERE

Filed April 4, 1968

Fig. 1

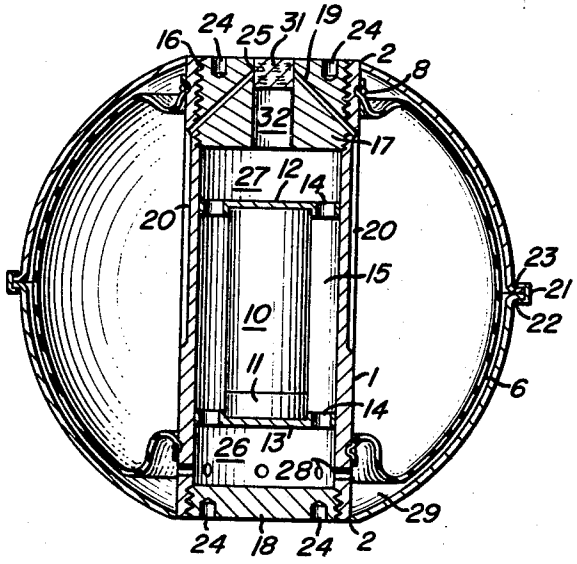


Fig. 2

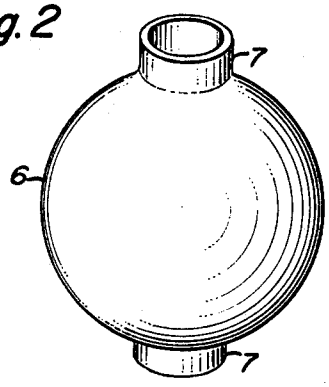


Fig. 3

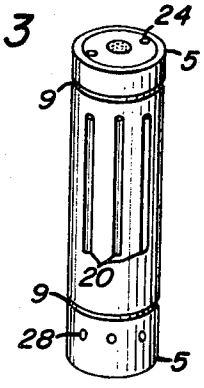
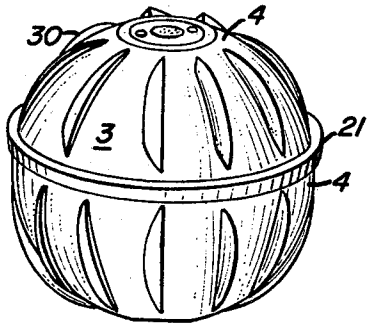


Fig. 4



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TWO COMPARTMENT THERMAL GENERATOR SPHERE

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ABSTRACT OF THE DISCLOSURE

Apparatus and method of dispersing an aerosol cloud comprising a fuel block located within a case means, a bladder means to contain the agent to be dispersed surrounding said fuel block within said case, generating gas from said fuel block after ignition thereof to exert pressure on said bladder means, and expelling the agent as an aerosol cloud as a result of the gas pressure exerted on the bladder means.

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.

Our invention relates to a device and method for dispersing insecticides and chemical warfare agents in the form of aerosols.

The importance of dispersing insecticides and chemical warfare agents as very small droplets or particles has been recognized. In the case of chemical warfare agents, this is true not only in regard to solid agents which must be very finely divided to effectively penetrate the nasal barriers, but also in regard to liquid agents when it is desired to set up an immediate high concentration of vapor in the initial cloud in order to produce casualties before the gas mask can be adjusted.

Numerous types of shells, bombs, and grenades for the dissemination of chemical warfare agents, such as the device set forth in U.S. Patent No. 3,117,521, have previously been devised. However, all of the prior art devices lacked the versatility to be adapted to a member of different requirements. For example, the use of different agents results in different operating conditions such as different internal pressures within the device, different temperatures, and different dispensing velocities. Such differences in operating conditions necessitated varying the container thicknesses, the number and diameter of vent holes, various sizes of dispensing orifices, etc. Obviously, this led to an inventory of several different devices to meet the needs of each of the many agents utilized. A further problem regarding the prior art devices existed on functioning in that the device had to be properly vertically positioned to expel agent and the device would not right itself when ejected from an aircraft, for example. Therefore, the need existed for a self-righting, universal device capable of being used for any agent, and our invention was conceived and reduced to practice to overcome the above problems.

A principal object of our invention is to provide a reliable means and method for dispersing insecticides and chemical warfare agents in the form of aerosols; said means and method being capable of utilizing any agent to be dispersed.

A further object of our invention is to provide a reliable means and method for dispersing insecticides and chemical warfare agents in the form of aerosols; said means and method being capable of righting itself when ejected from an aircraft.

Other objects of our invention will be obvious or will appear from the specification hereinafter set forth.

FIGURE 1 is a cross sectional view of our assembled device.

FIGURE 2 is a view of the agent bladder for our device.

FIGURE 3 is a view of the fuel container for our device.

FIGURE 4 is a view of our assembled device showing the aluminum case.

Our invention and FIGURES 1–4 will now be described in detail as follows:

As shown in FIGURE 1, hollow steel fuel container **1** is fixedly mounted within an aluminum case **3** by any conventional fastening means such as welding at interface **2** between the edge of the hole in each hemisphere **4** of container **3** and edge **5** of the fuel container or by providing each end of the fuel container with threads (not shown in the drawing) and fastening within case **3** by nut means (not shown in the drawing). While container **1** is shown in cylindrical configuration in the drawing, the shape can be changed to suit one's needs. Prior to mounting container **1** within case **3**, container **1** is inserted within hollow bladder **6**, as shown in FIGURE 2, and ends **7** of the bladder are fastened to container **1** by any conventional hose clamping means such as metal band **8** located to secure bladder **6** within annular groove **9** of container **1**. Bladder **6** is made of rubber or any elastomeric material compatible with the agent utilized. Fuel block **10** mounted within container **1** is any conventional gas producing fuel ignited by conventional fuze **11**. See U. S. Patent No. 3,117,521 regarding the use of gas producing fuels and the fuze therefor. Block **10** is held within container **1** by mount **12** welded within container **1** and spring loaded movable mount **13**. Mounts **12** and **13** are provided with ports **14** for the escape of gas from chamber **15** after ignition of the fuel. Female thread means **16** are provided in each end of container **1** for the insertion of plugs **17** and **18** therein to prevent the loss of agent contents during storage. Plug **17** is provided with a plurality of channels **19** radially arranged and at an angle of approximately 50 degrees from the horizontal so as to connect with channels **20** in container **1** when plug **17** is fully inserted within container **1**, as shown in FIGURE **1**, to provide a means to eject the agent from our device on ignition. The diameter and configuration of channels **19** can be designed within the skill of the art to any desired exit velocity of the particular agent utilized. Plug **17** is designed to permit making a series of plugs having different sizes and configurations of channels **19** to permit interchange as required, depending on the particular agent to be dispersed. Also, the number of such channels can be adjusted within the skill of the art depending on the volume of the agent to be dispersed. Hemispheres **4** are held together by any conventional fastening means, such as channel **21** clamped on flanges **22**, as shown in FIGURE 1. A gasket **23** is provided between flanges **22** to avoid agent leakage. Plugs **17** and **18** are provided with recesses **24** to insert a tool, not shown in the drawing, therein for the insertion and removal of the plugs.

After our device has been assembled as described above, liquid agent is inserted into bladder **6** through channels **19** and **20** by means of a hypodermic needle. After the desired amount of agent has been inserted, channels **19** are sealed at ends **25**, as shown in FIGURE 1, by a low melting alloy such as Wood's metal; friction fit blow out plug **31**, a cork or rubber stopper, is inserted in void **32** to seal off compartment **27** outlet to the atmosphere; and the device is stored until needed.

To activate the device, fuze **11** is ignited by any conventional means such as a squib or primer which in turn

ignites fuel block **10**. On ignition of fuel block **10**, gas is produced which passes from chamber **15** through ports **14** into chambers **26** and **27**. The heat of the gas in chamber **27** is sufficient to melt the Wood's metal in ends **25** of channels **19** to permit the free flow of agent from our device and the pressure of the gas blows out plug **31**. The gas in chamber **26** flows to space **29**, between bladder **6** and case **3**, by means of ports **28**. The gas pressure causes bladder **6** to collapse and push the agent contained therein through channels **20** and **19** and void **32** to be expelled into the atmosphere as an aerosol cloud. Bladder **6** can be designed within the skill of the art to any desired volume. Case **3** is provided with conventional aerodynamic stabilizer surfaces **30** to insure that our device rights itself irrespective of the attitude acquired on activation.

It is obvious that other modifications can be made of our invention, and we desire our invention to be limited only by the scope of the appended claims.

We claim:

1. An apparatus for disseminating an aerosol cloud comprising a case; stabilizer surfaces located in the outer wall of said case, said surfaces being adapted to right the apparatus irrespective of attitude on activation; a fuel container fixedly mounted within said case; an upper mount fixedly supported within said fuel container; a lower movable spring loaded mount located within said fuel container and below said upper mount, the bottom surface of said upper mount and the top surface of said lower mount and the inside wall of said fuel container forming a first compartment means; a fuel block means located within said fuel container between said upper and lower mounts, said block being adapted to generate gas on activation thereof; means for igniting said fuel block means; a first plug means fixedly mounted within one end of said fuel container, said first plug means being adapted to be removed therefrom, the bottom surface of said first plug means and the top surface of said upper mount and the inside wall of said fuel container forming a second compartment means; a second plug means fixedly mounted within the end of said fuel container opposite to that end wherein said first plug means is mounted, the top surface of said second plug means and the bottom surface of said lower mount and the inside wall of said fuel container forming a third compartment means; a void means located in the center of said first plug means in communication with the said second compartment means and the environment outside of said case; a friction fit third plug means located in said void means adjacent to the upper surface of said first plug means and adapted to seal off said void during storage and to be ejected by gas pressure means on activation of said fuel block; a plurality of first port means located in said upper mount in communication with said second compartment means and said first compartment means; a plurality of second port means located in said lower mount in communication with said first compartment means and said third compartment means; bladder means surrounding said fuel container and within said case, said bladder being fixedly mounted at each end of said fuel container; a fourth compartment means formed between the inner wall of said bladder means and the outer wall of said fuel container, said fourth compartment means being adapted to contain agent to be disseminated; a fifth compartment means formed between the outer wall of said bladder means and the inner wall of said case, said fifth compartment means being adapted to contain gas to insert pressure on the outer wall of said bladder means; a plurality of first channel means located in the outer wall of said fuel container in communication with said fourth compartment means; a plurality of second channel means located within said first plug means in communication with said void and said first channel means; a fourth plug means located in the extremity of said second channel means adjacent said third plug means, said fourth plug means being adapted to prevent loss of agent during storage and to be melted on activation of said fuel block; a plurality of third port means located in said fuel container adjacent to said second plug means, said third port means being in communication with said third compartment means and said fifth compartment means; and means for the insertion and removal of said first and second plug means.

2. The apparatus of claim **1** wherein said case comprises a pair of hemispheres having means being adapted to fixedly join said hemispheres together.

3. The apparatus of claim **2** wherein each member of the hemisphere pair is joined by a weld means at the annular periphery in the horizontal plane of said hemisphere to each end of the fuel container.

4. The apparatus of claim **2** wherein said hemisphere joining means comprises an annular flange member located at the annular periphery in the horizontal plane of each member of said hemisphere pair.

5. The apparatus of claim **4** wherein an annular gasket is disposed between the flange members to form a sandwich closure member.

6. The apparatus of claim **5** wherein said closure member is fixedly joined by a channel shaped clamp.

7. The apparatus of claim **1** wherein said fuel container is cylindrical in configuration;

8. The apparatus of claim **1** wherein said upper mount is an annular ring welded to said fuel container at the outer periphery of said ring.

9. The apparatus of claim **8** wherein the fuel block is cylindrical in configuration.

10. The apparatus of claim **1** wherein female thread means are located in each end of said fuel container, said thread means being adapted to fixedly mount said first and second plug means.

11. The apparatus of claim **1** wherein said bladder means is any elastomeric material compatible with the agent being dispersed.

12. The apparatus of claim **1** wherein said fourth plug means is Wood's metal.

13. The apparatus of claim **1** wherein the outer surface of said first and second plug means is provided with male thread means, said male thread means being adapted to mate with the female thread means of said fuel container.

14. The apparatus of claim **1** wherein said means for insertion and removal of said first and second plug means is a plurality of recess means located in the outer surfaces of said first and second plug means, said recess means being adapted to receive a tool therein for said insertion and removal.

15. The apparatus of claim **1** wherein said igniting means is a fuze.

References Cited

UNITED STATES PATENTS

2,372,264	3/1945	Firth	102—6
2,808,114	10/1957	Parker et al.	169—28
3,170,398	2/1965	Paulson et al.	102—6
3,238,143	3/1966	Ainsley et al.	102—65 X

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U.S. Cl. X.R.

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