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Blair et al.

[11] **3,712,219**

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[54] AERIAL DISPERSAL OF CHEMICALS

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[73] Assignee: **The United States of America as represented by the Secretary of the Navy**

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[52] **U.S. Cl.** **102/7.2,** 102/6, 102/57

[51] **Int. Cl.**.....**F42b 25/16**

[58] **Field of Search**.....102/2, 6, 7.2, 57, 58

[56] **References Cited**

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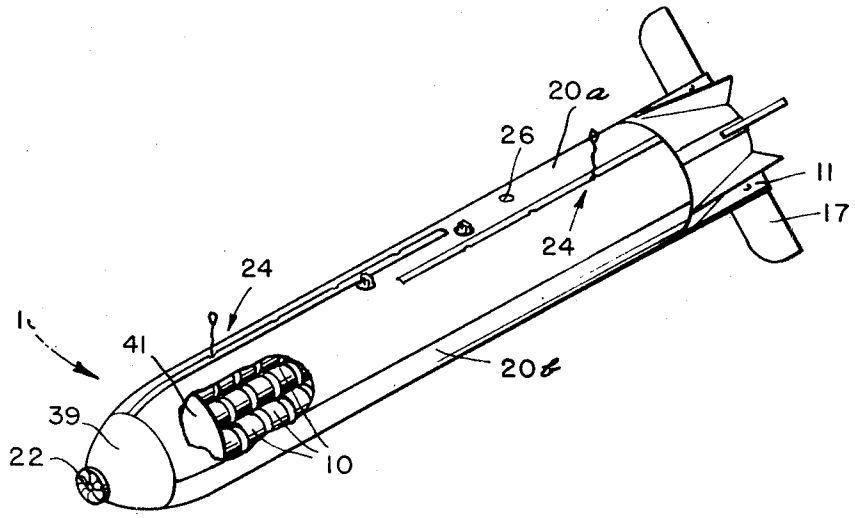
Primary Examiner—Samuel W. Engle

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[57] **ABSTRACT**

Chemical reactants are transported to a delivery site where they are mixed to form a desired compound and the compound is then dispersed in a plurality of discrete containers which are individually burst to release the compound.

3 Claims, 5 Drawing Figures



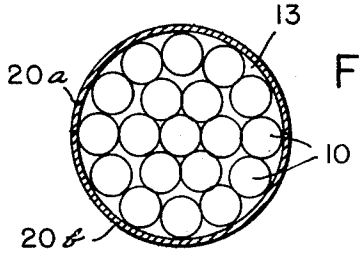


FIG. 1A.

FIG. 1.

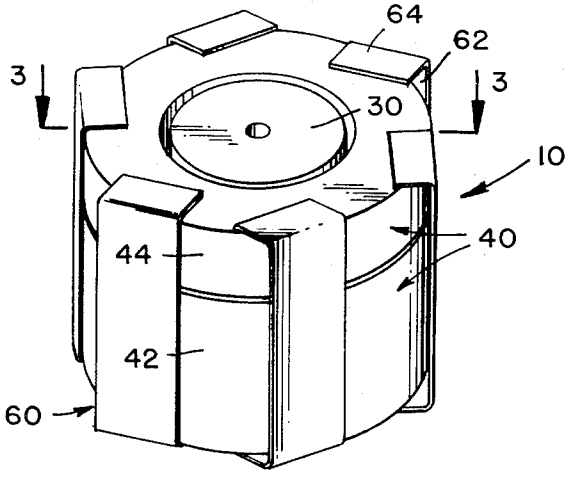


FIG. 2.

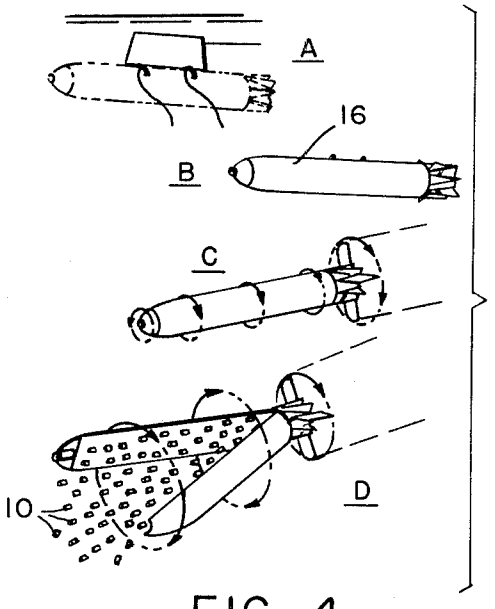


FIG. 4.

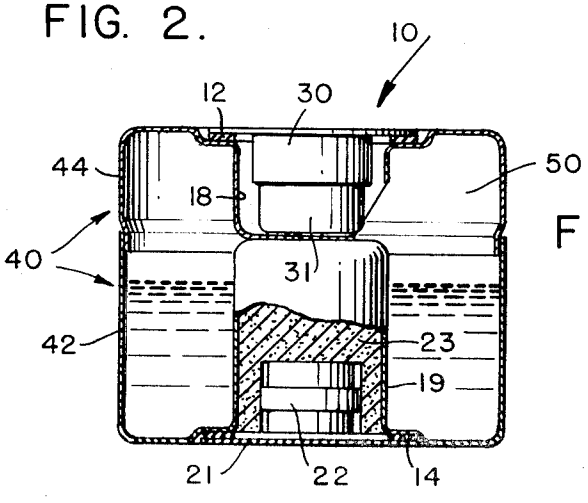


FIG. 3.

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AERIAL DISPERSAL OF CHEMICALS

The invention described herein may be manufactured and used by or for The Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

The aerial delivery and dispersion of chemicals for various purposes has been a subject for research for many years. Generally it has been difficult to transport a sufficient quantity of active chemical to a particular site and disperse the chemical sufficiently to economically and efficiently do the particular job which it was intended that the chemical accomplish. When a final chemical product has been prepared before hand, for example, it has been found that the mixture may lose a large amount of its potency before delivery or may present a hazard to the delivery vehicle and its occupants. Aerial delivery by spraying tends to inaccuracy, inefficiency and contamination of the vehicle. Other problems will come to mind to those researchers in the field who are confronted with the development of aerial dispersal devices.

In recent years a number of free fall, cluster type weapons have been developed. These cluster weapons generally comprise a bomb shaped clam shell type container which opens after release to dispense a plurality of bomblets which, theoretically, will disperse over a wide area. It is an adaptation of the cluster bomb technique to chemical delivery that forms the principle object of this invention.

SUMMARY OF THE INVENTION

A cluster weapon has been designed which will contain a plurality of bomblets having aerodynamic surfaces and capable of dispersion over a wide area when released. Each of the bomblets carries a certain amount of a first reactant material and the bomb shaped container is adapted to contain a second reactant material in the interstices between bomblets. Means is provided for forcing the second reactant into the bomblets just prior to release of the weapon to form the desired agent. When the bomblets are released, because of their aerodynamic qualities, they disperse over a wide area. During flight the bomblets are armed and, through a built-in time delay explosive mechanism, are detonated shortly after reaching the ground.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a cluster weapon for carrying out the present invention;

FIG. 1A is a diametral cross section of the device of FIG. 1;

FIG. 2 is a perspective view of a bomblet;

FIG. 3 is a cross sectional view of the bomblet of FIG. 2 taken along lines 3—3; and

FIG. 4 is a sketch series illustrating the operation of the weapon of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

As shown in FIG. 1 the cluster weapon **16** comprises a bomb like shell comprising two halves **20***a* and **20***b* and enclosing a plurality of bomblets **10**. The weapon is provided with a device **22** which spins off to effect separation of the two halves and, consequently, deployment of the bomblets. The weapon also comprises the usual arming wire devices **24**, umbilical connection **26**, and fins **17** and which fins are adapted to fold into shrouds **11**.

In FIG. **2** a bomblet **10** is shown in perspective to illustrate the attachment of the vanes or fins **60**. The vanes comprise a web **62** and turned down ends **64**. These vanes **60** are fastened to each end of the body **40** and at a slight angle to the side walls of the body to form a pocket. The body **40** comprises two cup shaped sections **44**, **42** which together form a hollow enclosure.

In FIG. **2** it may be seen that the housing **40** also comprises central depressions in the cup shaped members **44** and **42**. These cup shaped depressions are concentric and their bottoms are contiguous to separate the enclosure into an annular chamber **50** and two inner concentric chambers **18**, **19**. The chamber **18** in member **44** contains a valve **30** which allows fluid to be forced into the annular chamber **50**. The chamber **19** in member **42** contains an explosive **23** and fuze **22**. The fuze **22** and explosive **23** are sealed in the chamber **19** by means of a plate **21** and washer **14**. The chamber **18** is closed by a flange on the body of valve **30** which is seated on a washer **12**.

For a more detailed description of the bomblet, reference may be had to copending application Ser. No. 699,759, filed 16 Jan. 1968 by James E. Blair for a Chemical Disbursing Vehicle.

As shown in FIG. **4**, the weapon **16** is carried on a conventional bomb rack of an aircraft (View A). When the weapon is released, arming wires **24** are pulled, actuating the release of the fins **17** from the shrouds **11** and also the release of the propeller shaped fastener **22** on the forward end of the weapon. The fins **17** are biased so that, when they are released from shroud **11** they spring out to the position shown in FIG. **1**. The fins are so positioned as to cause the weapon to spin as shown in View C of FIG. **4**. As the weapon moves forward and spins, aerodynamic forces act upon member **22** causing its relative rotation in the opposite direction. Rotation of member **22** results in its removal and, because it secures the halves **20***a*, **20***b* of the weapon together, the halves separate as shown in View D of FIG. **4**. When the weapon opens as described above, the spinning action causes an initial distribution of the bomblets **10**.

As more particularly pointed out in the above described copending application, the bomblets **10** are aerodynamically shaped and are provided with fins **62** and, normally, will assume a glide angle of about 10° to 15°. As the bomblets glide to earth the fins **62** cause the bomblet to spin with sufficient speed to arm a spin actuated fuze **22** which, in a preferred embodiment, has a built-in time delay mechanism causing the bomblet to explode a short time after reaching the ground.

When the bomblets are packed in the shell of weapon **16**, they are partially filled with a liquid reactant as shown in FIG. **3**. Being cylindrical, the bomblets fit into the body of the weapon with a space **13** remaining between the bomblets and the walls of the container. The container has liquid-tight bulkheads **41** fore and aft and the space **13** is filled with a second reactant to complete the weapon assembly. Just prior to delivery of the weapon from the aircraft the space **13** may be

pressurized from the aircraft, through an umbilical connection at **26**, thus forcing the second reactant through the valves **30** in bomblets **10** and spraying the second reactant into the open portion of chamber **50** to mix with the first reactant. Since the chemical to be dispersed is often toxic, this procedure enables the storage and transportation of chemical reactants with greater safety to handling and operating personnel.

From the foregoing it will be readily seen and appreciated that we have provided a method for aerial dispersal of chemicals which is highly efficient, is compatible with modern aerial delivery techniques and which accomplishes its mission with a high degree of safety.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. The method of dispersing a chemical product including the steps of:

a. packaging a first substance in relatively small packages;

b. providing a relatively large container;

c. packing a plurality of said small packages of said first substance in said container so that space is extant between packages;

d. filling said space with a second substance;

e. transporting said container, with said substances so packaged, to a dispersal site;

f. forcing said second substance into said packages so that said second substance will mix with said first substance to form a desired chemical product;

g. discharging said container for distribution of said packages; and

h. individually and independently exploding said packages.

2. The method of claim **1** wherein said first and second substances are reactive and said product is a toxicant.

3. The method of claim **1** wherein said first and second substances are relatively non-toxic liquids and said product is a toxicant.

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