July 25, 1967 J. A. MYERS ET AL 3,332,348

NON-LETHAL METHOD AND MEANS FOR DELIVERING INCAPACITATING AGENTS

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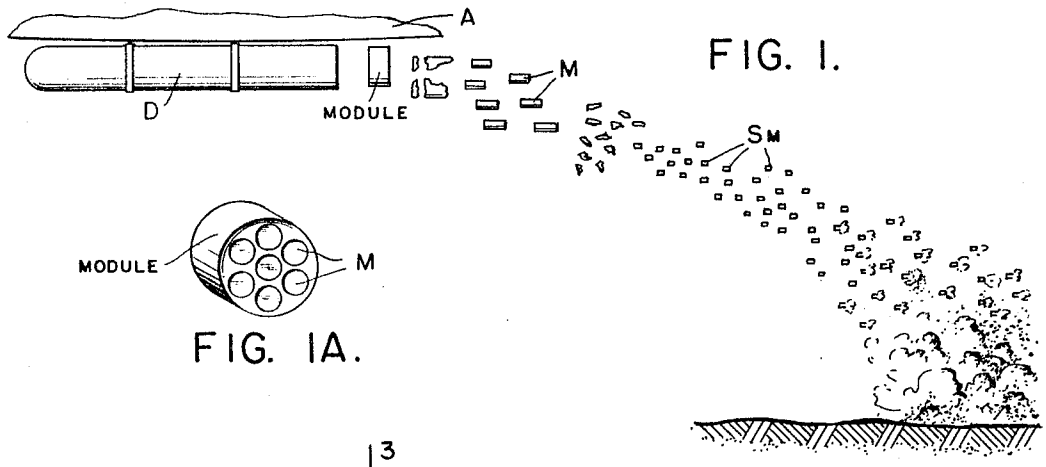


FIG. 1.

FIG. 1A.

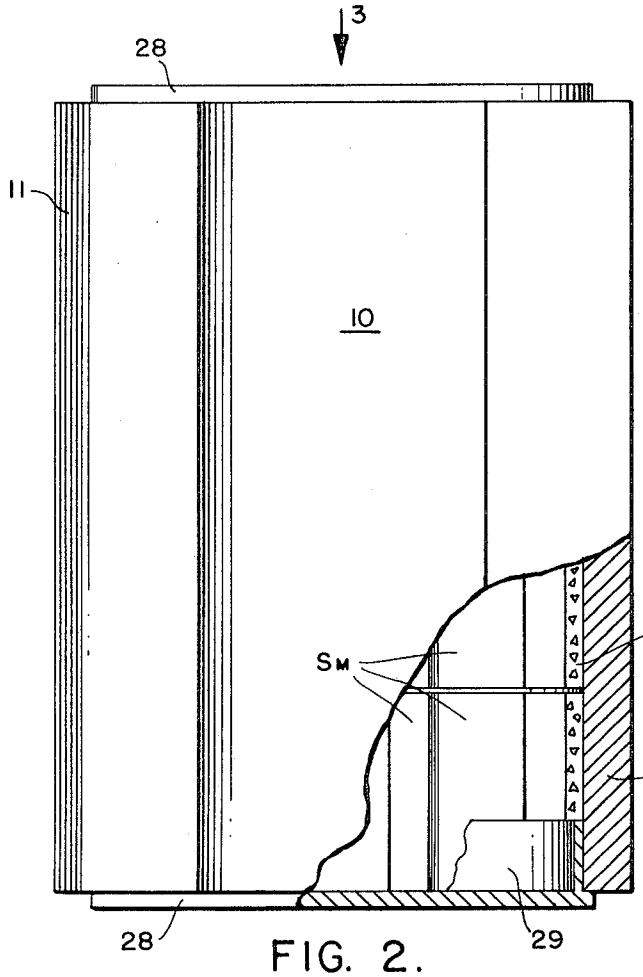


FIG. 2.

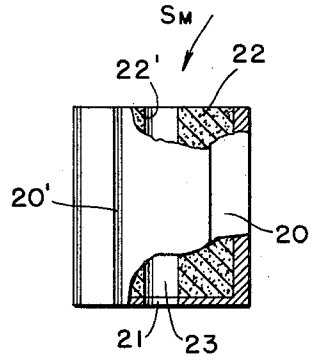


FIG. 5.

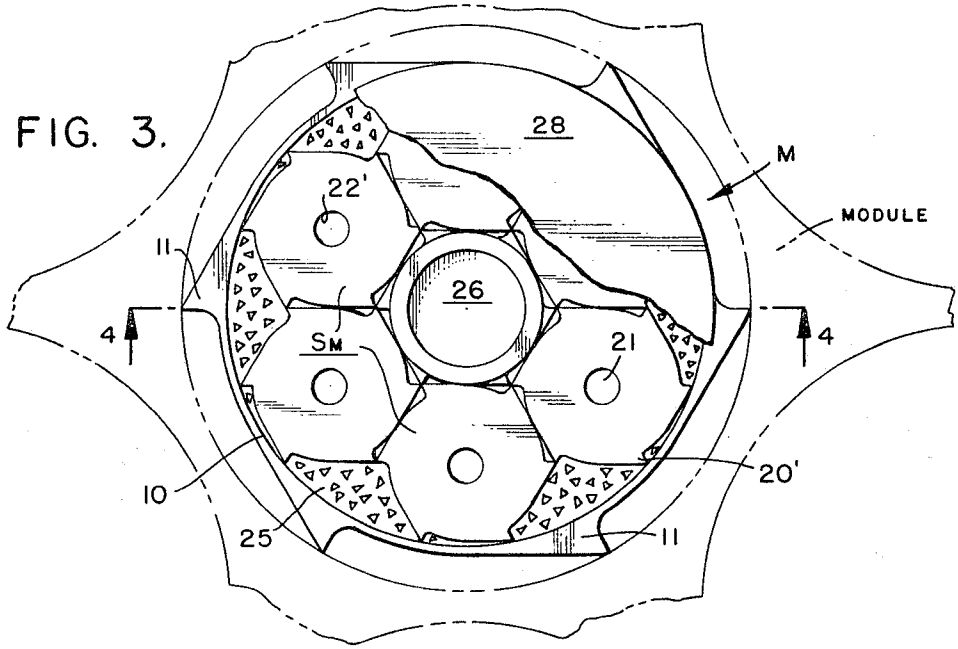
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FIG. 3.



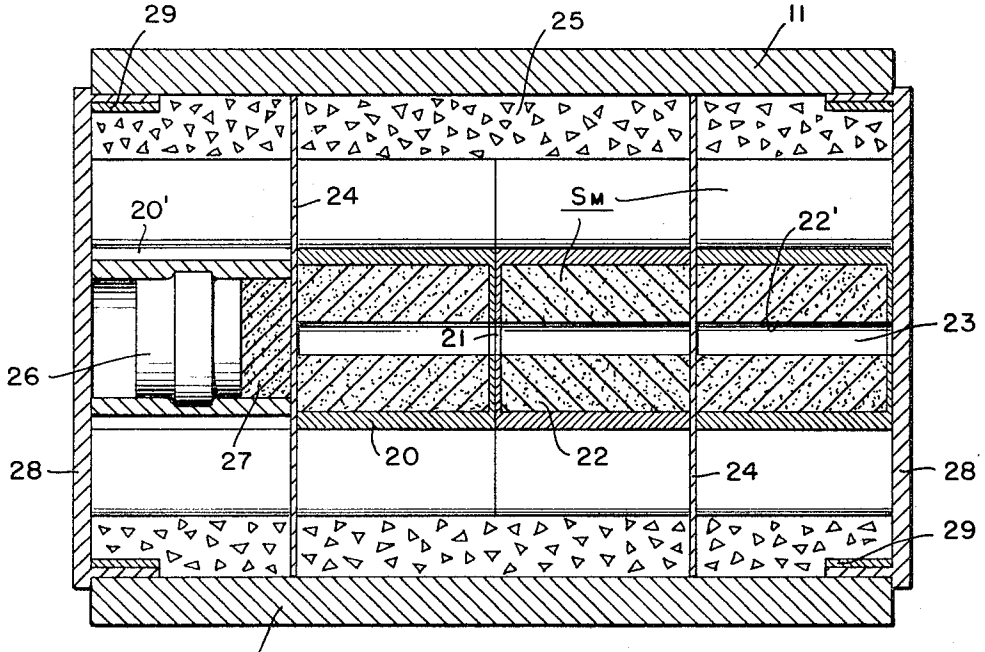


FIG. 4.

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NON-LETHAL METHOD AND MEANS FOR DELIVERING INCAPACITATING AGENTS

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2 Claims. (Cl. 102—6)

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.

The present invention relates generally to non-lethal chemical dispensers, and more particularly to a device which may be mass-dropped or delivered as a cluster from aircraft, in a non-lethal manner, for saturating a given personnel-populated area with a selected non-lethal incapacitating or chemical agent.

In many instances it becomes necessary to utilize incapacitating agents, such as tear gas, for example, against personnel, which may include a mixture of both friendly and unfriendly personnel, actively engaged in undesired activities. These situations may arise in the areas of civil disorders and insurgency as well as in open warfare. In situations wherein insurgents are involved, it becomes difficult to distinguish between insurgents and those individuals owing allegiance to a duly constituted state or its police force. In simple civil disorder, it often becomes necessary to quell civilian riots. These situations require the use of techniques wherein lethal weapons cannot be employed due to the inherent probability that the innocent and State forces may be injured or killed along with the disorderly personnel. Consequently, in many areas it becomes necessary to employ non-lethal means delivered in a non-lethal manner for temporarily incapacitating combatants, without regard to their allegiance, in order that physical control may be imposed and order established.

It has heretofore been the common practice to utilize grenade mortars, and the like, of a type which are adapted to fire activated gas generating canisters into a group of combatants for causing the participants to disperse. However, this frequently leads to increased anger and/or to further violence due to an inability to properly saturate a wide area in a timely manner for effectively incapacitating the combatants.

Prior to the present invention, aerial chemical dispensing techniques have failed to satisfy the existing needs, due to several inherent disadvantages. For example, if an aerial spray-tank is utilized, a limited selected area normally cannot be properly saturated at ground level due to dispersion of the chemical before it becomes effective. On the other hand, if activated canisters are air-dropped into a group or mass of participating combatants the canisters must necessarily be of a large mass and consequently act as lethal missiles capable of developing undesired force as they fall to the ground. If the canisters comprise a mass insufficient for developing a lethal force, the canisters tend to "burnout" before they reach the ground, or shortly thereafter, without performing their function of incapacitating the combatants. Further, it will be appreciated that uniform and widespread dispersion is required of any system, utilized under these circumstances, in order for a practically selected area to be uniformly saturated with a selected incapacitating agent. Therefore, techniques which utilize parachutes also fail to fulfill existing needs, due in part to a lack of control over the pattern and location of grenade impact, as the overall size of the grenades or canisters and the time required for effecting a delivery thereof impose undesired limitations on the use of such techniques in delivering certain chemical agents.

It is therefore the purpose of the present invention to provide an aerial technique and device for effectively saturating a given personnel-populated area with incapacitating agents in a non-lethal manner.

Briefly, the instant invention employs self-dispersing munitions or bomblets formed of a lightweight frangible material filled with submunitions or chemical disseminators each containing a deflagrating compound which develops a cloud of selected gas or the like when activated. The munitions each include means for imparting lateral displacement to the munition as it is caused to descend in initial free-fall descent so that a large group of the munitions may be dropped from a single aircraft and caused to undergo widespread dispersion. Further, each munition includes means for simultaneously igniting the deflagrating compound of the submunitions contained therein and initiating a fragmentation of the munition at a preselected altitude, whereby the ignited submunitions may be released for terminal free-fall descent. Each submunition is of a mass which is insufficient for developing a determinable lethal force sufficient for inflicting serious injury to personnel struck by the activated falling disseminators or submunitions. The submunitions, or disseminators, further include means which impart aerodynamic drag and lateral dispersion thereto, after the release thereof, so that the disseminators may be caused to impact in a widespread pattern over a selected area to develop a chemical cloud of substantially uniform density throughout the selected area.

An object of the instant invention is to provide a method and means for delivering and disseminating a non-lethal chemical gas in a non-lethal mode over a personnel-populated area.

Another object is to provide a means for delivering relatively small and activated chemical dispensers from airborne vehicles in a manner which substantially obviates personnel casualties resulting from delivery of the dispensers at impact areas.

A further object is to provide a method and means for controlling mob-violence.

Yet a further object is to provide a method and means for incapacitating personnel without inflicting serious bodily harm thereto.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIG. 1 comprises a schematic view illustrating an operation utilizing the method and device of the instant invention;

FIG. 1A comprises a perspective view of the module shown in the schematic view of FIG. 1.

FIG. 2 comprises a partially sectioned side elevation of the munition of the instant invention;

FIG. 3 comprises a partially sectioned end view of the munition of FIG. 2, illustrating an arrangement for the submunitions disposed therein, and its disposition within a given module;

FIG. 4 comprises a cross-sectional view of the munition of FIG. 3, taken generally alonge lines 4—4 of FIG. 3; and

FIG. 5 comprises a partially sectioned side elevation of one of the submunitions of FIGS. 1 through 4.

Turning now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 a bomb rack portion of an aircraft A having mounted thereon a dispenser D, of the type more particularly described in copending application Ser. No. 415,828, filed Dec. 3, 1964. It suffices to understand that the dispensers D serve to eject a plurality of modules, designated MODULE,

formed of a frangible material, of a type which is subject to being broken-up by an impinging airstream, containing a plurality of self-dispersing bomblets or munitions M. The munitions M are subsequently fragmented to release submunitions S*m*. The submunitions S*m* ignite and then disperse, as they fall in a free-fall, giving off an incapacitating agent in the form of a gas to thus effectively saturate a given target area with a cloud of gas of uniform density.

Each munition M, FIG. 2, includes a thin walled tubular shell **10** formed of a lightweight frangible material, such as plastic, for example. The outer surface of the shell **10** is provided with a plurality of parallel, longitudinally directed, and laterally extending fins **11**, commonly referred to as spin-up vanes. Each of the fins **11** is provided with a camber which serves to impart a rate of rotation to the associated munition M and cause the munitions to be laterally displaced as they descend in an initial free-fall mode, after the break-up of the module. This rate of rotation also may be utilized to arm the munitions in a manner as will hereinafter be more fully set forth.

The submunitions S*m* each comprise a cup-shaped container or dispenser **20** formed of thin, lightweight container material, such as aluminum, for example, having one end open while the other is closed, except for a concentric opening **21**, better shown in FIGS. 4 and 5. Each container **20** is provided with a plurality of external fins **20'**, FIG. 3, similar to fiins **11**, in design and purpose, and is filled with a solidified deflagrating compound **22**, which is of a type deemed suitable for sustaining combustion in order to give off a desired gas. Extending through the solidified compound **22**, and in coaxial alignment with opening **21**, there is a cylindrical opening **23**. Hence, it is to be understood that each submunition S*m* includes a concentrically aligned cylindrical opening extending therethrough, and being partially defined by the solidified deflagrating compound **22**. If desired, each cylindrical opening may be coated with an ignition compound **22'** to assist in igniting the compound **22**. The particular compound utilized as an ignition compound may be varied so long as it is compatible with the other compounds employed.

The submunitions S*m* are "stacked" in pairs of adjacent layers within the munitions M in a manner such that the cylindrical openings of the submunitions of the adjacent layers are coaxially aligned. The containers **20** of one layer, of the pairs of adjacent layers, are inverted with respect to the containers **20** of the other layer in a manner such that the open ends of the containers **20** of one layer of the pair of layers are caused to face the open end of the containers **20** of the other or adjacent layer of the pair, as more clearly illustrated in FIG. 4. Arranged between the open ends of the containers of the adjacent layers is a flat sheet **24** formed of a combustible compound or composition. Surrounding each of the submunitions *Sm* of each layer there is a solid ordnance composition **25** or combustible compound. Hence, it will be appreciated that when the composition **25**, or a sheet **24** is ignited, an ignition "flash" is projected through the openings **23** for igniting the coating **22'** and ultimately the composition **22**. Here again, it will be appreciated that the various compounds employed may be varied, as found desirable, and is deemed to be within the purview of the art.

Mounted within each munition is a spin-arm fuze **26**, which is of a type suitable for aligning a firing-mechanism once the munition is rotated at a given rate, and is also well-known in the art. Disposed in alignment between one sheet **24** and the fuze **26** there is an ordnance booster charge of a type which will explode in response to an activation of the fuze **26**, and subsequently initiate a combustion of the adjacent sheet of ordnance material **24**.

In order to seal the munition M, there is provided at each end thereof a flanged cap **28** secured in place by an internal expansion lock ring **29**, which serves to engage the flange of the adjacent cap **28** and force it outwardly into a locking and sealing engagement with the adjacent wall **10**. However, various means may be employed to seal the ends of the munitions M.

In assembly, the individual, open-ended containers **20** are substantially filled with a deflagrating composition **22** of a type selected upon the basis of the specific gas to be generated as the composition is burned. A cylindrical opening **23** is formed through each filled container. The walls thereof are then coated with a layer or coating **22'** of pyrotechnic material, which may be flash-ignited for initiating the composition **22**. The thus formed submunitions S*m* are then deposited in inverted layers and confined within the walls **10** of the munitions M. A selected ordnance composition **25** is then placed in the interstice about the submunitions S*m*. The layers are arranged in a manner such that the open ends of the submunitions S*m* of the endmost layers are directed inwardly while the submunitions of the adjacent layers are directed outwardly, as illustrated in FIG. 4. A flat sheet **24** of an ordnance material is arranged between the layers or the open ends of the submunitions S*m*. A spin-arm fuze **26** and a booster charge **27** is disposed and arranged within one endmost layer of submunitions S*m* in an abutting relationship with one of the sheets **24**. The ends of the thus assembled munitions M are now sealed by caps **28**.

The assembled munitions M are now inserted into preformed modules in order that they may be mass-dropped from an airborne vehicle over a selected target area. Once the modules are ejected for free-fall from an aircraft, the impinging airstream acting thereon causes the modules to disintegrate for releasing the munitions M, FIG. 1. The airstream now impinges on fins **11** and serves to impart a rate of rotation to the munitions M, about the longitudinal axis thereof. Since the rate of rotation may be approximately determined for a given distance of free-fall displacement, the spin-arm fuze **26** may be adjusted to align the firing-train thereof at approximately a predetermined altitude for thus arming the fuze. Once the fuze **26** is armed it is initiated by any suitable means, such as a spring-loaded mechanism, for example. When the fuze **26** is initiated, the booster charge **27** fires downwardly against the adjacent sheet **24** and through the coaxially aligned openings **23**. As the sheet **24** is initiated it "flashes" outwardly for initiating the composition **25** and "flashes" downwardly through the remaining openings **23**. As the sheet **24** "flashes" through the openings **23**, the coating **22'** is ignited, whereupon the deflagrating composition **22** is ignited in response thereto. It will be appreciated that all of the sheets **24** are ultimately and substantially simultaneously initiated, whereupon all of the submunitions S*m* of each munition M may be simultaneously activated. In response to the gases generated by the firing of the pyrotechnic material throughout each munition M, the walls **10** thereof tend to disintegrate or fracture into very small masses, whereby the initial portion of free-fall for the munitions M is thus terminated. As the walls **10** disintegrate the activated submunitions S*m* are released from the munition M for terminal free-fall descent. As the fins **20'** of the submunitions S*m* are acted upon by the inherently present airstream, the submunitions S*m* have a rate of rotation imparted thereto. This rotation imparts a widespread lateral dispersion of the submunitions S*m* as they descend in terminal free-fall descent. Further, the airstream acting on the fins **20'** serves to impose an aerodynamic drag upon the falling submunitions S*m*, consequently, the force with which the submunitions S*m* strike the impact area may be determined and controlled. Hence, the impact force may be restrained to a non-lethal level, particularly since lethal force has been determined through experimentation.

It is to be understood that the submunitions S*m* are activated at an altitude which is suitable for affording a continued burning of the deflagrating compound at ground level. Therefore, a low-lying, uniform cloud of gas may

be established over the target or impact area without inflicting serious injury to personnel located therewithin.

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. A free fall chemical agent dispensing device, comprising;

(a) a cylindrical bomblet shell formed of low density material having a plurality of longitudinally extending angularly spaced vanes extending from its outer surface so constructed to impart aerodynamic drag and dispersion to the shell and to spin it about its longitudinal axis,

(b) a plurality of parallel layers of agent disseminators disposed within the shell, each layer comprising a plurality of disseminators grouped around a central disseminator, the disseminators being of a shape like that of the shell and having like fins for imparting aerodynamic drag and spin thereto to increase their dispersion,

(c) each disseminator being substantially filled with a deflagrating chemical adapted to produce a non-lethal gas,

(d) a spin-arm fuse within the shell adapted to initiate a booster charge when the shell reaches a certain spin speed, and

(e) pyrotechnic material disposed between said layers and in void spaces around the periphery of the layers, forming burster charges and an ignition train between the booster charge and disseminators, for explosively rupturing the shell, dispersing the disseminators, and igniting the deflagrating material in each disseminator.

2. A dispersing device in accordance with claim 1 wherein each disseminator is provided with an axially extending aperture into which an ignition flash from the pyrotechnic material may be projected.

References Cited

UNITED STATES PATENTS

2,476,973	7/1949	Gillon	102—7.2 X
2,959,127	11/1960	Weinert	102—66 X

FOREIGN PATENTS

146,887	7/1931	Switzerland.

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