

[54] **CATALYST GENERATOR**

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[51] Int. Cl. .... **C06d 1/00**

[58] Field of Search.....102/31, 32, 39, 83, 102/90; 239/2; 252/305

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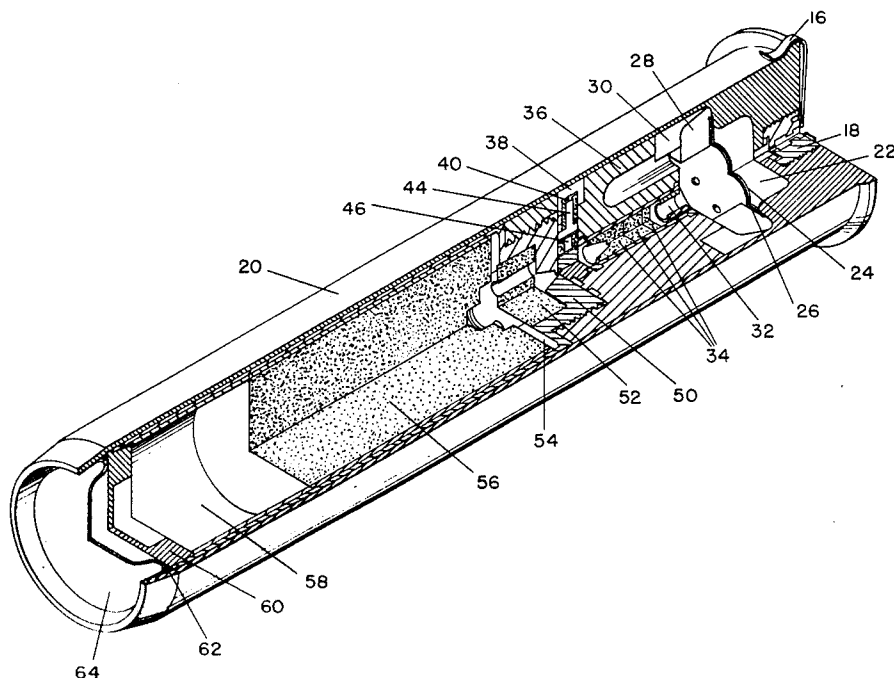
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[57] **ABSTRACT**

A catalyst generator cartridge for weather modification having a spring loaded slider for moving a detonator into alignment with the ignition chain only when the pyrotechnic has been ejected from the cartridge case. If the pyrotechnic remains in the cartridge case after an ejection charge has been fired, the cartridge case prevents the slider from aligning the detonator with the ignition chain, thereby preventing the detonator from eroding through an ignition blocking device and igniting the pyrotechnic. But, if the pyrotechnic is ejected from the cartridge case, the spring is permitted to move the slider, thereby aligning the detonator with the ignition chain and allowing the pyrotechnic to be ignited. Delay compositions are included to allow the pyrotechnic to reach a predetermined distance before it is ignited.

**3 Claims, 2 Drawing Figures**



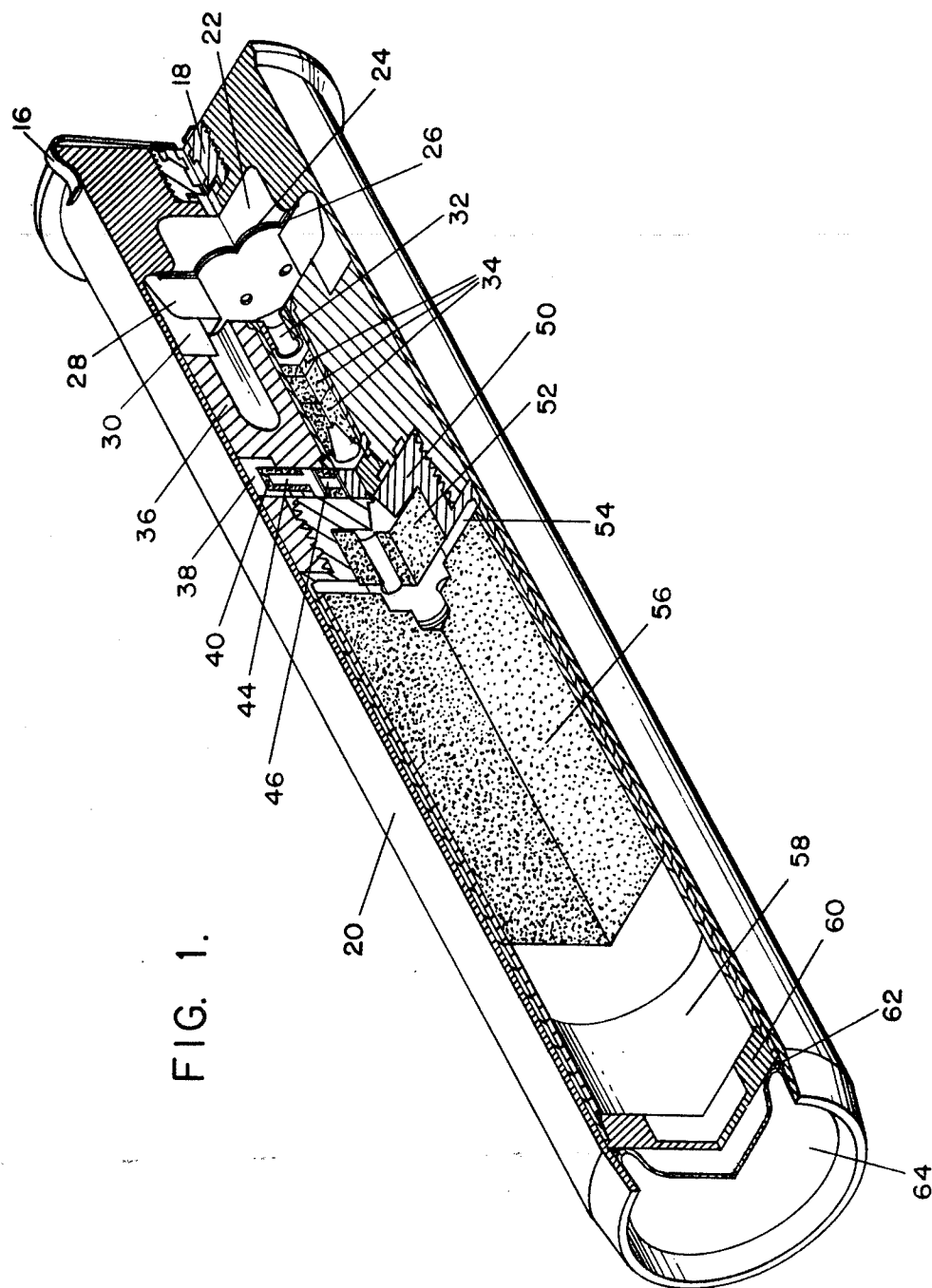


FIG. 1.

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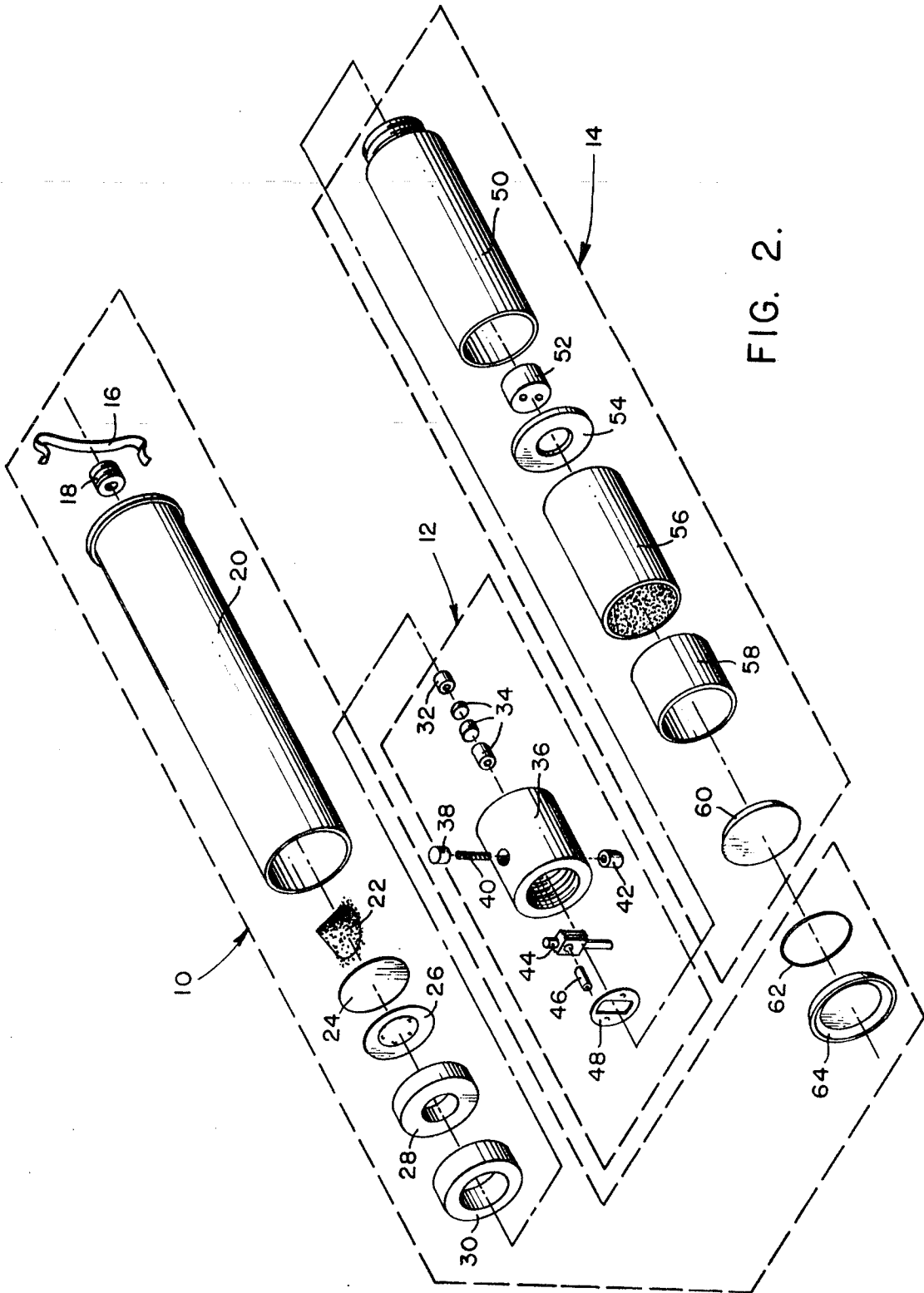


FIG. 2.

## CATALYST GENERATOR

## GOVERNMENT INTEREST:

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 invention relates to the field of weather modification in which clouds are seeded by grain assemblies such as silver iodide and, in particular, the cartridges to be shot at the clouds from an aircraft.

The prior devices ignite the pyrotechnic upon firing the cartridge ejection charge. If the pyrotechnic sticks in the cartridge case a fire might result when the grain assembly is ignited, causing possible injury and damage to nearby personnel and property.

## BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1 is a perspective view of the invention; and FIG. 2 is an exploded perspective view of the invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT:

Referring to FIGS. 1 and 2, the catalyst generator cartridge comprises an ejector 10, an ignition safety 12, and a pyrotechnic 14.

Ejector 10 has a primer shunting clip which is removed prior to firing, an electric primer 18, a cartridge case 20, two grams of black powder 22, a paper disk 24, a primer shield 26, a primer spacer 28, and an obturator 30. When fired, the electric primer 18 ignites the black powder 22 which burns through the paper disk 24 and the primer shield 26, and flashes through the hole in the spacer 28, obturator 30 and a retaining ring 32.

The ignition safety 12 has retaining ring 32, a delay composition 34, a fuze housing 36, a spring retaining cup 38, a spring 40, a bushing 42, a slider 44, a detonator 46, and a slider spacer 48. By the time a spark from the ejector flashes through the hole in the obturator 30 and the retaining ring 32, and ignites the delay composition 34, the ignition safety 12 and the pyrotechnic 14 should have been ejected from the cartridge case 20. The retaining ring 32 encourages delay composition 34 to ignite detonator 46 by preventing heat from escaping back through obturator 30.

If the ignition safety 12 and the pyrotechnic 14 are ejected, a plunger on slider 44 is pushed through bushing 42 by spring 40 allowing slider 44 to align detonator 46 with delay composition 34. Thereby, delay composition 34 ignites detonator 46 which in turn erodes through a web on the rear of charge case 50 and ignites the pyrotechnic 14. If, however, they are not, the plunger on slider 44 cannot be pushed through bushing 42 by spring 40 because of the proximity of the inner surface of cartridge case 20. Therefore, slider 44 is prevented from aligning detonator 46 with delay composition 34. Hence, as a result, detonator 46, although ignited, will be aligned with a thicker portion of the surface on the rear of charge case 50 through which it cannot erode to ignite pyrotechnic 14.

Pyrotechnic 14 has a charge case 50, an ignition composition 52, an ignition spacer 54, a grain assembly 56, a charge spacer 58, a charge case cover 60, an "O"

ring 62, and a cartridge cap 64. When detonator 46 has been moved into position by slider 44 and is ignited it will erode through an aluminum webbing on the rear end of charge case 50 and ignite the ignition composition 52. Ignition composition 52 in turn ignites the grain assembly 56 which then becomes an ice forming catalyst removing moisture from the clouds and causing precipitation.

Most of the structural elements of the cartridge may be made of any suitable material, such as, for example, a lightweight metal or plastic.

A brief resume of the operation of the invention is as follows: Upon firing, and electric primer 18 ignites the powder 22 ejecting the ignition safety 12 and the pyrotechnic 14 from the cartridge case 20. As the ignition safety 12 and the pyrotechnic 14 begins to move the cartridge case cap 64 is forced from its seat in the end of cartridge case 20, thereby allowing the charge case 50 to move freely out of the cartridge 20. When the slider 44 moves past the lip of cartridge case 20 spring 40 forces the slider 44 to align the detonator 46 with delay composition 34, which has been ignited by a spark from the powder 22, and the thin web portion on the rear of charge case 50. Thereby, the detonator 46, when ignited, is in position to erode through the thin web portion and ignite composition 52 which in turn ignites the grain assembly 56. If, however, the slider does not pass the lips of the charge case 20, the path between the delay composition 34 and the ignition composition 52 remains blocked by the web portion of charge case 50 even though detonator 46 will be ignited, thereby preventing the ignition composition 52 from being ignited. The charge case 20 is designed to be strong enough to withstand the force of the expanding gases without rupturing.

The invention has the advantage that unless the ignition safety 12 is ejected from the cartridge case 20 the pyrotechnic 14 will not be ignited, and therefore, will not be dangerous.

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 catalyst generator cartridge for cloud seeding comprising:
  - a pyrotechnic;
  - an ejector having a propellant for propelling said pyrotechnic into a cloud mass to be seeded and comprising a cartridge case from which said pyrotechnic is to be ejected when said propellant is ignited; and
  - ignition safety means positioned between said ejector and said pyrotechnic for preventing the ignition of said pyrotechnic until after said pyrotechnic has been ejected from said cartridge case;
- wherein said pyrotechnic comprises;
  - a grain assembly which, when ignited, produces nuclei, wherein said nuclei are ice-forming catalysts,
  - an ignition composition, ignitable by said ignition safety, for igniting said grain assembly,
  - an annular ignition spacer positioned between said ignition safety and said grain assembly,
  - a charge spacer positioned adjacent said grain assembly, and

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a cylindrical charge case closed at one end and having a removable charge case cover at the other end, and slideable within said cartridge case, for containing said ignition composition, said ignition spacer, said grain assembly, and said charge spacer; 5  
wherein the central portion of said closed end has a reduced thickness from that of the peripheral portion of said closed end.

2. The cartridge of claim 1 wherein said ignition 10 safety means comprises:  
a delay composition;  
a retaining ring;  
a spring moveable slider containing a detonator ignitable by said delay composition, wherein said detonator is positioned out of alignment with said central portion of said closed end so that said detonator will not ignite said ignition composition when said cartridge case contains said ignition safety means; 15  
a spring for moving said detonator into alignment with said central portion of said closed end after said ignition safety means is ejected from the cartridge case such that said detonator, when ignited, will erode through said central portion of said 25

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closed end and ignite said ignition composition; and  
a fuze housing slidable within said cartridge case for containing said retaining ring, said delay composition, said slider, said detonator and said spring.

3. The cartridge of claim 2 wherein said ejector further comprises:  
an electric primer for igniting said propellant;  
a paper disc positioned adjacent said propellant;  
a primer shield positioned adjacent said paper disc;  
an annular primer spacer positioned adjacent said primer shield;  
an annular obturator positioned between said primer spacer and said ignition safety means;  
such that said propellant when ignited by said electric primer, will burn through said paper disc, erode through said primer shield, flash through the hole in said primer spacer, said obturator, and said retaining ring, and ignite said delay composition;  
wherein said cartridge case contains said electric primer, said propellant, said paper disc, said primer shield, said primer spacer, said obturator, said ignition safety means and said pyrotechnic.

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