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[54] **TEAR GAS ELEMENT**

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[58] **Field of Search**.....102/6, 64, 65, 66, 87

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[57] **ABSTRACT**

This invention relates to an irritant agent element such as a tear gas element which can be used for temporarily disabling persons at the target site with a minimum of risk of physical injuries and mechanical damage. The element comprises a tear gas cartridge containing tear gas-producing bodies and detonator and combustion means for deflagrating said tear gas-producing bodies, the feature of the invention residing in the provision of an envelope of resilient, readily deformable material surrounding said cartridge. Channels are provided in the envelope for the emanation of the tear gas from the cartridge.

8 Claims, 2 Drawing Figures

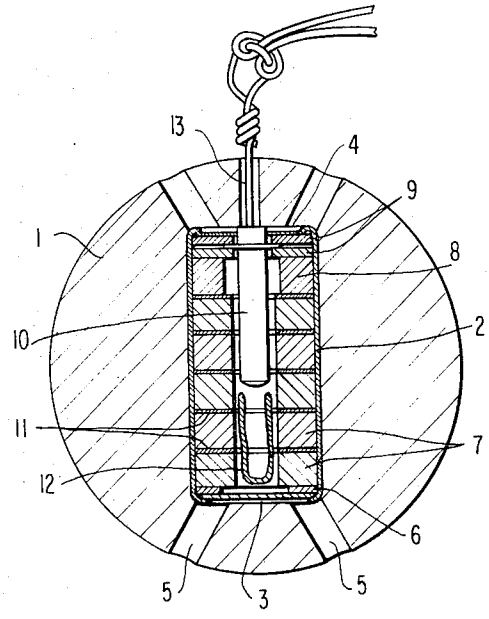


FIG. 1

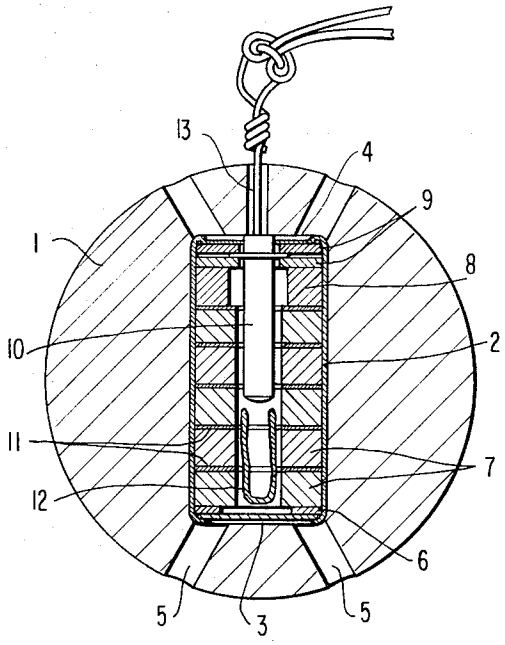
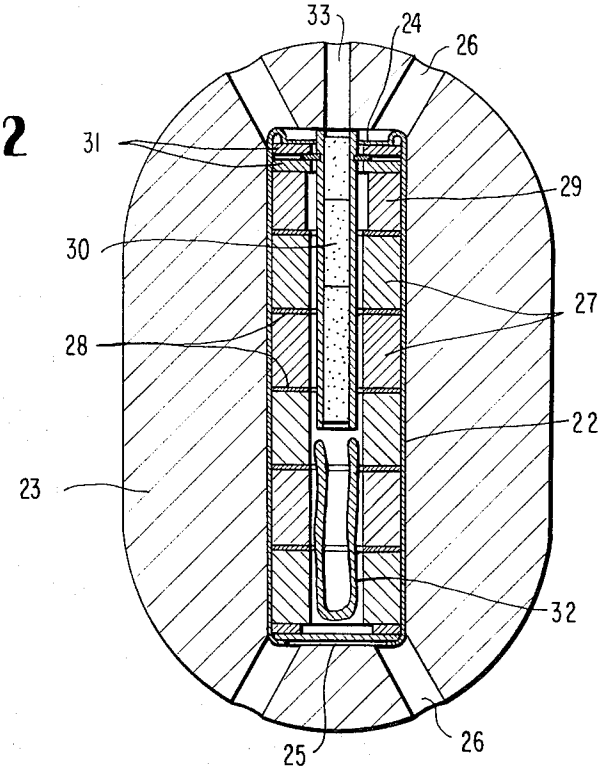


FIG. 2



TEAR GAS ELEMENT

BACKGROUND OF THE INVENTION

This invention relates to an irritant agent element. More particularly, it relates to a tear gas element wherein the element is surrounded by a resilient, readily deformable envelope.

Tear gas weapons are well known in the art. They are designed to be thrown by hand or to be transported to their site of deployment by means of suitable firing devices. The distances which can be traversed in the latter case are between about 20 meters and several hundred meters. The tear gas elements or articles comprise a metallic or plastic sleeve, case or jacket having several permeable areas from which the tear gas can emanate after triggering by means of a suitable detonator, for example, a friction primer or a percussion primer. The substance producing the tear gas is contained in the tear gas element in solid form and develops the tear gas during combustion. The tear gas escapes spontaneously therefrom because of the thus-developed pressure.

Tear gas elements are employed solely for the purpose of temporarily disabling persons at the target site. However, no damage or injuries are normally to be caused thereby. This cannot be accomplished with the conventional tear gas cartridges, especially when they are fired either by a gun or by special firing devices. Rather, when larger firing distances are involved, there is the serious danger that persons can be injured or that property damage can result. However, even in the case of throw-type tear gas projectiles, there is the danger of injury to persons. For this reason, it is often necessary to handle such projectiles very carefully and, in many cases, they cannot be thrown to hit the desired target, because the dangers to persons present at that site are too grave.

One of the objects of the present invention is to provide a solution to the problem of providing a tear gas element which, when used, does not cause any mechanical damage or physical injuries.

Another object of the invention is to provide a tear gas element which emanates tear gas to force persons to leave a specific locality without causing other dangers.

A further object of the invention is to provide tear gas elements which overcome the disadvantages and deficiencies of those employed in the prior art.

These and other objects and advantages of the present invention will become apparent to those skilled in the art from a consideration of the following specification and claims, taken in conjunction with the accompanying drawings.

SUMMARY OF THE INVENTION

In accordance with the present invention, the above objectives are met by surrounding the tear gas originator, i.e., the tear gas-producing substance or lacrimator, in the tear gas element with a resilient, readily deformable envelope, cover, jacket, casing or sheath. This embodiment makes it possible to substantially mitigate the impact or shock effects of a thrown tear gas projectile or a tear gas shell, i.e., a fired tear gas projectile. The sheathing envelope is made of a foam material, foam rubber or a similar resilient material. A particularly convenient shape for the tear gas element, especially for throw-type devices, is obtained if the envelope has a substantially spherical configuration.

One of the preferred embodiments of the tear gas element of the invention, and one which is preferably useful for being fired from suitable firing devices, is where the envelope has a hemispherical shape on two oppositely disposed sides with a cylindrical part interposed therebetween, i.e., cylindrically shaped with hemispherical end portions. With this shape, it is possible to obtain a guidance of the projectile within the barrel of the firing device, such as a gun, by means of the cylindrical portion while retaining the advantage of the rounded shape for preventing injuries or damage. In this form of use, the tear gas element can also be cushioned on the side pointing in the firing direction by means of a softer material than that provided on the side on which the propellant pressure is effective and which is, accordingly, exposed to a high mechanical and thermal stress.

In a further advantageous embodiment of the invention, a friction igniter or fuse is threadedly inserted in an opening of the tear gas element provided with an internal thread and is arranged in such a manner that, after removing the metallic head and activating the friction primer, no metallic parts project toward the outside of the envelope or sheath.

In another embodiment of the invention, the tear gas element contains a time fuse or fuse train embedded in the cushion. The effect of tear gas elements can be considerably enhanced if these elements can still travel after being ignited, since this feature makes it possible to provide a wider scattering and improved dissipation of the tear gas. For this reason, the tear gas element can additionally be provided with bursting or explosive charges which propel the elements anew after impact, causing them to move around to various localities.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be explained in greater detail with reference to the drawings, in connection with two particular embodiments.

FIG. 1 shows a tear gas throw element with a friction fuze; and

FIG. 2 shows a tear gas projectile with a time fuze.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The cushion 1 of the tear gas throw element according to FIG. 1 has a spherical shape. The tear gas cartridge 2 is embedded in this cushion. The cartridge has a cylindrical configuration and is provided with perforated plates 3 and 4, preferably of sheet metal or a suitable synthetic resin, at the front ends (end faces) thereof, making it possible for the tear gas to escape after the device has been triggered. The cylindrical part of the cartridge 2 consists essentially of a shell made of metal or a synthetic resin and is impermeable to gas. From the end faces of the cartridge 2, channels 5 radiate outwardly to the outside through the cushion 1, the latter consisting essentially of a foam material of, for example, a synthetic resin, such as foamed polystyrenes or foamed polyurethanes or foam rubber, as described above, or a similar resilient substance, so that the developing tear gas can escape therefrom.

The tear gas cartridge 2 is of a conventional construction. A spacer disk 6 is disposed behind the perforated metal sheet 3 on the end face side. This spacer disk keeps the individual annular solid bodies 7, which generate tear gas during their burning, compressed together. An elastic spacer piece 8 is disposed on the side opposite the disk 6, followed by two disks 9 for clamping the friction fuse 10 as well as the perforated disk or plate 4. The friction fuse 10 is provided with a continuous flange for clamping between the disks 9. These disks 9, as well as the spacer disk 8, are fashioned such that the developing gases can escape without any large amount of obstacles toward the perforated disk 4 and the channels 5. Furthermore, the diameter of the cylinder 10 is adapted to the internal diameters of the annular solid bodies 7 in such a manner that there is sufficient space between the two components to allow the gases to pass therethrough. The individual solid disks 7 are separated from one another in the axial direction by intermediate layers 11.

The cylindrical friction fuze 10 extends axially to approximately the center of the tear gas cartridge 2. In the still remaining cavity, a flammable substance 12 is inserted which, after ignition, combusts uniformly. From the detonator 10, a fuze cord 13 leads to the outside through a corresponding channel in the cushion material. The ignition is effected in a conventional manner by pulling at the cord 13, whereby the powder present in the fuze 10 and thus also the disks 7 of solid material are caused to deflagrate.

In FIG. 2, a tear gas element is shown in projectile shape. It comprises the cylindrical tear gas cartridge 22, encompassed by a likewise cylindrical body 23 of foam material, the ends of which are, however, of hemispherical configuration. Perforated plates 24 and 25 are also inserted in the end faces of the cartridge 22. Channels 26 lead from said plates toward the outside through the cushion body 23.

As in the case of the previously described embodiment, the solid bodies 27 generating the tear gas during combustion are of annular shape and are separated from one another by intermediate layers 28. The fixed support for these solid bodies is effected by the spacer tube 29 made of an elastic material. The detonator 30 is affixed between the two clamping disks 31 by means of a clamping ring, in such a manner that the gases can escape laterally past the detonator through the perforated disk 24. Furthermore, the portion of the cavity which is not filled by the detonator 30 is filled with a readily flammable material 32. As mentioned above, a time fuze 30 is employed, the time fuze being ignited by the firing gases. These gases arrive, through the channel 33 extending in the axial direction, at the tear gas cartridge 22 and, thus, at the detonator or fuze 30.

The cushion layer employed in accordance with the present invention has, in general, a thickness of at least 3 mm. at the front and rear ends thereof, whereas it can be thinner in the cylindrical zone.

In addition to the possibilities of using a friction fuze or a time fuze, described herein with reference to the specific embodiments, it is also possible to employ, within the scope of this invention, other fuzes, primers or detonators, for example, percussion fuzes which trigger the evolution of tear gas only upon impingement of the rubber or foam material element at the target site.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included herein.

It is claimed:

1. An irritant agent element comprising a cartridge containing at least one irritant agent-producing body and detonator and combustion means for deflagrating said irritant agent-producing body, said cartridge being essentially completely surrounded by an envelope of resilient, readily deformable material such that no portion of the cartridge protrudes from the envelope in the operative condition, said envelope containing at least one channel for the emanation of the irritant agent from said cartridge, and said cartridge serving for supporting said envelope.

2. An irritant agent element in accordance with claim 1, wherein said envelope consists essentially of a foam rubber or a foamed synthetic resin.

3. An irritant agent element in accordance with claim 1, wherein said envelope is essentially spherically-shaped.

4. An irritant agent element in accordance with claim 1, adapted for firing as a projectile, wherein said envelope is cylindrically shaped with hemispherical end portions.

5. An irritant agent element in accordance with claim 1, wherein a friction fuze is threadedly inserted in an opening provided with an internal thread and being disposed in said cartridge, said fuze being arranged such that no metallic parts project to the outside of said envelope after removing the metallic head and pulling off the friction fuze.

6. An irritant agent element in accordance with claim 1, wherein said cartridge contains a time fuze which does not project outside said envelope, a channel being provided to the outside of said envelope from said fuze.

7. An irritant agent element in accordance with claim 1, wherein said cartridge contains additional propellant charges, whereby the irritant agent element is propelled anew after impact causing it to move around.

8. An irritant agent element in accordance with claim 4, wherein the thickness of said envelope at the hemispherical end portions is at least 3 mm.

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