(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 480 002 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
09.09.2009 Bulletin 2009/37

(51) Int Cl.:
F41H 9/04 *(2006.01)*

(21) Application number: **04447129.0**

(22) Date of filing: **24.05.2004**

(54) **Tear gas generating device**

Tränengaserzeugungsanlage

Dispositif générateur de gaz lacrimogène

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR

(30) Priority: **23.05.2003 BE 200300319**

(43) Date of publication of application:
24.11.2004 Bulletin 2004/48

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Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a tear gas generator comprising at least one container which contains an amount of a tear gas generating chemical compound in the solid state, the chemical compound causing irritation of at least one part of an eye upon contact, as disclosed in the preamble of the first claim. Such a tear gas generator is disclosed in US 2 730 482.

[0002] Tear gas is a term which in general is used to designate chemical compounds which even at small concentrations cause irritation of eye lids, tear-ducts and mucous membranes, in particular with human beings. Known products used to generate tear gas include chloro-acetophenone, ortho-chlorobenylidene malontril, dibenz(b,f)-1,4-oxazepin, oleoresin, capsaicin or pepper spray. The latter is not considered as a tear gas, but is rather an irritant product capable of inducing infections.

[0003] The afore-mentioned chemical compounds know various practical applications, for example in tear gas grenades used to e.g. suppress demonstrations and in protective safety devices for the interior of buildings. The known safety device comprises a capillary containing an amount of one or more of the afore-mentioned products, and an ignition mechanism. When activating the safety device, an ignation current for the pyrotechnical powder is produced, which induces an instant melting of the powder followed by evaporation. As the capillary explodes, tear gas escapes.

[0004] This known tear generator however presents the disadvantage that the tear gas yield based on the amount of powder present in the tear gas generating device is too low.

[0005] There is thus a need to a tear gas generator, with which the tear gas yield may be improved.

[0006] It is therefore the object of the present invention to provide a tear gas generator showing an improved tear gas yield.

[0007] This object is achieved with the present invention with a tear gas generator, which comprises at least one container, the container containing

- an amount of a tear gas generating chemical compound in the solid state,
- the chemical compound causing irritation of at least one part of an eye upon contact, a heating for causing evaporation of the chemical compound from the solid state to the gas phase, the tear gas generating compound in the gas phase causing irritation of at least one part of the eye and/or human soft membranes upon contact,
- an outlet for expelling the gas
- the heating comprising a top which protrudes into the container, at least part of the top being coated with the tear gas generating compound.

[0008] With the device of the present invention, the tear forming product is released in the form of gas, which allows optimizing tear generation upon contact with the eyes and /or human soft membranes, at a tear gas concentration below the acute toxicity of the product. An analysis of the problems associated with powdery tear forming products which contact the eye as a solid/liquefied particle, has shown that these products only produce an effect when there is a direct contact between the solid and the at least one part of the eye. With solid tear generating products the extent of the irritation has been found to be mainly determined by the area of the contact surface between the solid/liquefied particle and the eye part and/or human soft membranes contacted by it, and to a lesser extent by the amount of the product contacting the eyes. The total amount of product contacting the eyes and / or human soft membranes rather determines the acute toxicity of the product.

[0009] The thermal contact between the tear gas generating compound and the heating ensures maximum tear gas formation. An analysis of the problems associated with the known tear gas generating device has shown that evaporation of the powder following ignition is usually incomplete. Following ignition only part of the powder has been found to evaporate. The remainder of the powder is entrained as the tear gas leaves the device, powder having the lower tear inducing capacity.

[0010] The present invention offers the advantage that the risk to spreading of powder or solidified liquid particles in the environment may be minimized. This allows minimizing the risk to a belated evaporation of the powder as room temperature is raised for example following heating or sun rays, which would render the room unsuitable for human use for a too long period of time.

[0011] A preferred embodiment of this invention is characterized in that as a tear gas generating chemical compound, use is made of an amount of at least one aromatic ketone.

[0012] Preferred aromatic ketones are acetophenones, in particular chloroacetophenon as with the latter there is a significant difference between (a) the concentration of the product causing detrimental irritation and (b) the lethal product concentration. Because of this difference the risk to undesired abuse may be minimised.

[0013] Chloroacetophenon, in particular omega chloroacetophenon, is a particularly useful compound as it combines a relatively low boiling point of only 247°C, with a significantly higher decomposition temperature of 350°C. Because of the low boiling point, little energy is needed to achieve the desired evaporation to the gas phase. The higher decomposition

temperature minimizes the risk to decomposition following a controlled temperature shot. The inventor has further observed that chloroacetophenon has a poor water solubility, which hampers removal through washing with water and that the irritation effect is enhanced upon contact with water and soap.

[0014] Another aromatic ketone suitable for use with the present invention is ortho-chlorbenzalmalononitrile, however this compound has a slightly higher melting and boiling point (respectively 93 and 317°C), and is water soluble. A further aromatic ketone suitable for use with the present invention is dibenz (b,f)-1,4 oxazepine.

[0015] A preferred embodiment of the tear gas generator of this invention which facilitates product storage, is characterised in that the chemical compound is present in the device in the form of a solid as in the powdery state corrosive properties of the product with respect to the container are the lowest.

[0016] Further preferred embodiments of the invention are disclosed in the dependent claims.

[0017] The present invention also relates to a container as claimed in claim 11.

[0018] The present invention further relates to a kit as claimed in claim 12.

[0019] The present invention additionally relates to an alarm device comprising the above described tear gas generator.

[0020] The present invention also relates to a method of generating a tear gas as described below in the figure description.

[0021] The invention is further illustrated in the appending figures and figure description.

[0022] Figure 1 is a schematic representation of the device of the present invention.

[0023] Figure 2 is a schematic representation of the container of the present invention.

[0024] As can be seen from figure 1, the tear gas generator 1 of the present invention comprises one or more containers or cartridges 2, 12 in which an amount of at least one tear generating product 5 is stored. However, if so desired to improve the irritation produced upon contact, a mixture of two or more tear generating compounds may be used. The tear generating compound is preferably present in the container as a solid powder. To achieve a dense packing, quick heating and high evaporation yield, the particle size of the powder is preferably as small as possible.

[0025] Each container or cartridge contains a heating 4, 14 for heating and causing evaporation of the tear generating compound 5, although embodiments may exist in which one single heating functions to heat two or more cartridges. The heating 4, 14 is preferably mounted into the container or cartridge 2, 12 as in that case optimum heat transfer to the tear generating compound may be guaranteed. To ensure optimum heat transfer, the heating is in direct thermal contact or in radiation contact with the tear gas generating powder. This may for example be achieved by means of a heating pin which protrudes into the container, the top 15 of the pin being coated with the tear generating compound 5. Thereby the powder is heated using conduction heating, which may be supplemented by heating through IR radiation. It is however also possible to use any heating ought suitable by the person skilled in the art, for example a heating wire or a resistor or a mantle heating or any other heating known to the person skilled in the art, for example micro-wave heating, induction heating or convection by means of a flowing hot gas. According to the present invention it is further possible to mix the tear gas generating powder with metal particles, following which the heating rat may be improved. In the embodiment shown in figure 2, the heating pin 4, 14 simultaneously functions as a cover or sealing for one end 7, 17 of the container 2, 12.

[0026] The opposite first end 6, 16 of the container 2, 12 is closed off by a removably mounted closure or sealing 8, 18. The container may take the form of a casing or envelope enveloping the heating 4, 14 and the tear gas generating compound, to improve thermal contact between the tear gas generating compound and the heating. The casing or envelope is further sealed by a cover or sealing 8, 18, with the purpose of (i) minimizing the risk to intrusion of dirt or any other unwanted contamination; (ii) maximizing vapour pressure within the cartridge. A practical embodiment of the sealing is for example a heat sensitive fleece, which is broken as the heating reaches a certain temperature, thus providing a direct outlet for the tear gas. The nature of the material of which the removable closure or sealing 8, 18 is made is not critical to the invention. The sealing 8, 18 will however usually be made of a material having a melting point or a decomposition temperature which is sufficiently below the evaporation temperature of the solid tear gas forming product. This ensures that the container 2, 12 is opened at a temperature below the evaporation temperature of the tear gas generating compound 5, thus optimizing production and expelling of tear gas from the container 2, 12.

[0027] The tear gas generator 1 may further contain an air or gas supply for supplying air or gas to the cartridge. The gas/air functions to dilute and entrain the tear gas into the room which is to be filled with it.

[0028] The device further contains an electric power generator for supplying energy to the heating 4, 14, for evaporating the tear gas forming powder.

[0029] When built into a safety device, either the safety device or the tear gas generator 1, may comprises a detector 9 for detecting any unwanted activity in its vicinity. As is schematically shown in figure 1, the detector 9 is coupled to a power control unit 10, for example an electric power control 10, for example an MCU. However any other power control device ought suitable by the person skilled in the art may be used. The detector 9 is provided to generate a signal when detecting any unwanted activity in the vicinity of the tear gas generator 1, which signal activates the power control 10. It is however also possible to provide means which allow direct activation of the power control 10. The power control 10 in turn is coupled to the electric power supply, which in turn is coupled to the heating 4, 14. The power control unit 10

functions to ensure that the energy supply rate is sufficiently high upon activation of the device, but also to limit the energy supply to the heating in view of minimizing the risk that the temperature of the heating exceeds a pre-set maximum temperature and of minimising the risk to decomposition of the powder.

[0030] The MCU may be designed to register the container or containers that have already been used, to select a particular container or to activate the containers in a particular order upon consecutive activations. The MCU is also designed to activate the heating 4, 14 of a particular container upon receiving a signal from the detector. The use of a time-controlled MCU, which de-activates the heating after a pre-set heating time has expired, allows minimizing the risk to over-heating the device or the tear gas generating compound.

[0031] The electric power control is preferably done using Pulse Width Modulation, in combination with a Power FET-transistor, as this provides optimum temperature control of the heating pin.

[0032] The shape of the container 2, 12 is not critical to the invention and will usually be chosen by the person skilled in the art taking into account the shape of the housing 11 into which it is to be mounted. The container 2, 12 may for example take the form of a substantially cylindrical container, one end of which is closed off by means of a closure 8, 18. The nature of the material of which the container 2, 12 is made is not critical to the invention. The container may for example be made of a plastic material, glass, metal, steel, stainless steel. It is however preferred to have the container made of stainless steel or nickel plated brass as this is the more inert and rigid material.

[0033] The container 2, 12 may be used as such. It is however also possible to provide a housing 11 comprising two or more containers 2, 12, the housing being removably connectable to the tear gas generator 1.

[0034] The tear gas generator 1 of this invention may further contain a fan or preferably a propellant gas to optimize spreading. It is however also possible to use a propellant gas, a compressed gas or a liquefied gas, for example HFC's or carbondioxide. Carbondioxide is preferred as it has a higher density as compared to air, following which the tear gas/ CO2 mixture forms a thick fog layer above the floor. Carbondioxide has been found to show good miscibility with the tear gas, and a high vapour pressure (approximately 50 Bar at 20°C), thus ensuring fast spreading of the tear gas - carbondioxide mixture over the room to be protected. In that way a single container may suffice to fill an entire room with tear gas in an even concentration.

[0035] In the table below, a comparison is made of the effect generated by three different solid tear generating compounds of this invention.

	(1)	(2)	(3)
TC50 eyes	0.3	0.004	0.004
TC50 respiratory tract	0.4	0.023	0.002
LC50	20-80	3.6-20	0.7
LCT50	14000	25000	no information

(1): chloroacetophenon
(2) : ortho-chlorobenzylidene malonitril
(3) dibenz(b,f)-1,4-oxazepine
all amounts are given as mg/m^3
TC 50 eyes : the minimum amount sensed by 50% of the test persons as a tear generating amount
TC50 respiratory tract: the minimum amount sensed by 50% of the test person in the respiratory tract an mucous membranes
LC50: the minimum amount sensed by 50% of the test persons as unbearable
LCT50: the amount at which there is a 50% risk to a lethal dosis (mg/m^3 and per minute).

[0036] The invention further relates to a kit of two or more containers 2, 12 containing an amount of a tear gas generating chemical compound 5 in the solid state, the chemical compound causing irritation of at least one part of an eye upon contact; and an outlet for expelling the gas from the container 2, 12, the kit being removably attachable to the heating and the tear gas generator. Thereby, the containers 2, 12 may be received into a housing 19 to facilitate mounting.

Claims

1. A tear gas generator (1) comprising at least one container (2, 12) which contains an amount of a tear gas generating

chemical compound (5) in the solid state, the chemical compound causing irritation of at least one part of an eye upon contact, the container further containing a heating (4, 14) for causing evaporation of the chemical compound (5) from the solid state to the gas phase, the tear gas generating compound in the gas phase causing irritation of at least one part of the eye and/or human soft membranes upon contact, and the container further containing an outlet for expelling the gas from the container and the tear gas generator, **characterized in that** the heating comprises a top (15) which protrudes into the container (2, 12), at least part of the top being coated with the tear gas generating compound (5).

2. A tear gas generator as claimed in claim 1, **characterised in that** as the tear gas generating compound (5) use is made of at least one aromatic ketone or a mixture of two or more of those.

3. A tear gas generator as claimed in claim 1 or 2, **characterised in that** as the tear gas generating compound (5) use is made of at least one acetophenon or a mixture of two or more of those.

4. A tear gas generator as claimed in any one of claims 1-3, **characterised in that** as the tear gas generating compound (5) use is made of chloroacetophenon.

5. A tear gas generator as claimed in any one of claims 1-4, **characterised in that** the tear gas generating compound (5) is present in the form of a solid.

6. A tear gas generator as claimed in any one of claims 1-5, **characterised in that** the container (2, 12) comprises a first end (6, 16) made of a material having a melting point below the evaporation temperature of the tear gas generating compound (5), and a second end (7, 17) comprising the heating (4, 14).

7. A tear gas generator as claimed in any one of claims 1-6, **characterised in that** the tear gas generator comprises a detector (9), which is coupled to a power control (10), the power control (10) in turn being coupled to the heating (4, 14), the detector being provided to detect any unwanted activity in the vicinity of the tear gas generator (1), to generate a signal upon detecting such unwanted activity which activates the power control (10), the power control (10) being provided to generate a signal to activate the heating (4, 14) upon activation by the detector (9).

8. A tear gas generator (1) as claimed in any one of claims 1-7, **characterised in that** the tear gas generator (1) comprises a housing (11), the at least one container (2, 12) being removably attachable to the housing (11).

9. A tear gas generator (1) as claimed in any one of claims 1-8, **characterised in that** the tear gas generator (1) comprises a plurality of containers (2, 12) which are mounted into a housing (19) the housing being removably attachable to the tear gas generator (1).

10. A tear gas generator as claimed in any one of claims 1-9, **characterised in that** as the power control (10) use is made of a MCU, which is provided to de-activates the heating after a pre-set heating time has expired.

11. A container (2, 12) containing an amount of a tear gas generating chemical compound (5) in the solid state, the chemical compound causing irritation of at least one part of an eye upon contact; a heating (4, 14) for causing evaporation of the chemical compound from the solid state to the gas phase, the heating comprising a top (15) which protrudes into the container (2, 12), at least part of the top being coated with the tear gas generating compound (5); and an outlet for expelling the gas from the container (2, 12) for use with the tear gas generator of any one of claims 1-104.

12. A kit of two or more containers (2, 12) containing an amount of a tear gas generating chemical compound (5) in the solid state, the chemical compound causing irritation of at least one part of an eye upon contact; a heating (4, 14) for causing evaporation of the chemical compound from the solid state to the gas phase, the heating comprising a top (15) which protrudes into the container (2, 12), at least part of the top being coated with the tear gas generating compound (5); and an outlet for expelling the gas from the container (2, 12), the kit being removably attachable to the tear gas generator as claimed in any one of claims 1-10.

13. A kit as claimed in claim 12, **characterised in that** the containers (2, 12) are received into a housing (19).

14. An alarm device comprising the tear gas generator as claimed in any one of claims 1-10.

Patentansprüche

1. Tränengas-Erzeugungsvorrichtung (1), welche mindestens einen Behälter (2, 12) umfasst, welcher eine Menge einer Tränengas erzeugenden chemischen Verbindung (5) im festen Zustand enthält, wobei die chemische Verbindung durch Kontakt zu einer Reizung mindestens eines Teils eines Auges führt, der Behälter ferner eine Heizung (4, 14) enthält, um die Verdampfung oder Sublimation der chemischen Verbindung (5) aus dem Festzustand in die Gasphase zu bewirken, wobei die Tränengas erzeugende Verbindung in der Gasphase durch Kontakt zu einer Reizung mindestens eines Teils des Auges und/oder der menschlichen Weichmembranen führt, und der Behälter ferner einen Auslass zum Ausstoßen des Gases aus dem Behälter und der Tränengas-Erzeugungsvorrichtung enthält, **dadurch gekennzeichnet, dass** die Heizung ein Oberteil (15) umfasst, welches in den Behälter (2, 12) hineinragt, wobei mindestens ein Teil des Oberteils mit der Tränengas erzeugenden Verbindung (5) beschichtet ist.

2. Tränengas-Erzeugungsvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** als Tränengas erzeugende Verbindung (5) mindestens ein aromatisches Keton oder ein Gemisch aus zwei oder mehreren von diesen verwendet wird.

3. Tränengas-Erzeugungsvorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** als Tränengas erzeugende Verbindung (5) mindestens ein Acetophenon oder ein Gemisch aus zwei oder mehreren von diesen verwendet wird.

4. Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** als Tränengas erzeugende Verbindung (5) Chloracetophenon verwendet wird.

5. Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Tränengas erzeugende Verbindung (5) in Form eines Feststoffs vorliegt.

6. Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** der Behälter (2, 12) ein erstes Ende (6, 16) umfasst, welches aus einem Material hergestellt ist, das einen Schmelzpunkt unterhalb der Verdampfungs- oder Sublimationstemperatur der Tränengas erzeugenden Verbindung (5) aufweist, und ein zweites Ende (7, 17) umfasst, welches die Heizung (4, 14) umfasst.

7. Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** die Tränengas-Erzeugungsvorrichtung einen Detektor (9) umfasst, welcher an eine Spannungsregelung (10) gekoppelt ist, wobei die Spannungsregelung (10) wiederum an die Heizung (4, 14) gekoppelt ist, wobei der Detektor dafür bereitgestellt wird, jede unerwünschte Aktivität in Nachbarschaft der Tränengas-Erzeugungsvorrichtung (1) zu erfassen und nach dem Erfassen einer solchen unerwünschten Aktivität ein Signal zu erzeugen, welches die Spannungsregelung (10) aktiviert, wobei die Spannungsregelung (10) dafür bereitgestellt wird, nach der Aktivierung durch den Detektor (9) ein Signal zur Aktivierung der Heizung (4, 14) zu erzeugen.

8. Tränengas-Erzeugungsvorrichtung (1) nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** die Tränengas-Erzeugungsvorrichtung (1) ein Gehäuse (11) umfasst, wobei der mindestens eine Behälter (2, 12) abnehmbar an dem Gehäuse (11) anzubringen ist.

9. Tränengas-Erzeugungsvorrichtung (1) nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** die Tränengas-Erzeugungsvorrichtung (1) mehrere Behälter (2, 12) umfasst, welche in einem Gehäuse (19) angebracht sind, wobei das Gehäuse abnehmbar an der Tränengas-Erzeugungsvorrichtung (1) anzubringen ist.

10. Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** als Spannungsregelung eine MCU verwendet wird, welche bereitgestellt wird, um die Heizung zu deaktivieren, nachdem eine vorher eingestellte Heizzeit abgelaufen ist.

11. Behälter (2, 12) zur Verwendung mit der Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 10, welcher eine Menge einer Tränengas erzeugenden chemischen Verbindung (5) im festen Zustand enthält, wobei die chemische Verbindung durch Kontakt zu einer Reizung mindestens eines Teils eines Auges führt; eine Heizung (4, 14) zum Bewirken der Verdampfung oder Sublimation der chemischen Verbindung aus dem Festzustand in die Gasphase enthält, wobei die Heizung ein Oberteil (15) umfasst, welches in den Behälter (2, 12) hineinragt, wobei mindestens ein Teil des Oberteils mit der Tränengas erzeugenden Verbindung (5) beschichtet ist; und einen Auslass zum Ausstoßen des Gases aus dem Behälter (2, 12) enthält.

12. Satz aus zwei oder mehr Behältern (2, 12), welche eine Menge einer Tränengas erzeugenden chemischen Verbindung (5) im festen Zustand enthalten, wobei die chemische Verbindung durch Kontakt zu einer Reizung mindestens eines Teils eines Auges führt; eine Heizung (4, 14) zum Bewirken der Verdampfung oder Sublimation der chemischen Verbindung aus dem Festzustand in die Gasphase enthalten, wobei die Heizung ein Oberteil (15) umfasst, welches in den Behälter (2, 12) hineinragt, wobei mindestens ein Teil des Oberteils mit der Tränengas erzeugenden Verbindung (5) beschichtet ist; und einen Auslass zum Ausstoßen des Gases aus dem Behälter (2, 12) enthalten; wobei der Satz abnehmbar an der Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 10 anzubringen ist.

13. Satz nach Anspruch 12, **dadurch gekennzeichnet, dass** die Behälter (2, 12) in einem Gehäuse (19) aufgenommen werden.

14. Alarmvorrichtung, welche die Tränengas-Erzeugungsvorrichtung nach einem der Ansprüche 1 bis 10 umfasst.

Revendications

1. Générateur de gaz lacrymogène (1) comprenant au moins un récipient (2, 12) qui contient une quantité d'un composé chimique générateur de gaz lacrymogène (5) à l'état solide, le composé chimique provoquant une irritation d'au moins une partie d'un oeil lors du contact, le récipient contenant en outre un élément chauffant (4, 14) pour provoquer l'évaporation du composé chimique (5) de l'état solide à l'état gazeux, le composé générateur de gaz lacrymogène à l'état gazeux provoquant une irritation d'au moins une partie de l'oeil et/ou des membranes humaines molles lors du contact, et le récipient contenant en outre une sortie pour expulser le gaz du récipient et du générateur de gaz lacrymogène, **caractérisé en ce que** l'élément chauffant comprend un dessus (15) qui fait saillie dans le récipient (2, 12), au moins une partie du dessus étant enduite avec le composé générateur de gaz lacrymogène (5).

2. Générateur de gaz lacrymogène tel que revendiqué dans la revendication 1, **caractérisé en ce qu'**il est fait usage comme composé générateur de gaz lacrymogène (5) d'au moins une cétone aromatique ou d'un mélange de deux ou de plus de deux de celles-ci.

3. Générateur de gaz lacrymogène tel que revendiqué dans la revendication 1 ou 2, **caractérisé en ce qu'**il est fait usage comme composé générateur de gaz lacrymogène (5) d'au moins un acétophénone ou d'un mélange de deux ou de plus de deux de ceux-ci.

4. Générateur de gaz lacrymogène tel que revendiqué dans l'une quelconque des revendications 1 - 3, **caractérisé en ce qu'**il est fait usage comme composé générateur de gaz lacrymogène (5) de chloroacétophénone.

5. Générateur de gaz lacrymogène tel que revendiqué dans l'une quelconque des revendications 1 - 4, **caractérisé en ce que** le composé générateur de gaz lacrymogène (5) est présent sous la forme d'un solide.

6. Générateur de gaz lacrymogène tel que revendiqué dans l'une quelconque des revendications 1 - 5, **caractérisé en ce que** le récipient (2, 12) comprend une première extrémité (6, 16) réalisée dans une matière ayant un point de fusion inférieur à la température d'évaporation du composé générateur de gaz lacrymogène (5) et une deuxième extrémité (7, 17) comprenant l'élément chauffant (4, 14).

7. Générateur de gaz lacrymogène tel que revendiqué dans l'une quelconque des revendications 1 - 6, **caractérisé en ce que** le générateur de gaz lacrymogène comprend un détecteur (9) qui est couplé à une commande de puissance (10), la commande de puissance (10) étant à son tour couplée à l'élément chauffant (4, 14), le détecteur étant prévu pour détecter une quelconque activité indésirable à proximité du générateur de gaz lacrymogène (1), pour générer un signal lors de la détection d'une telle activité indésirable qui active la commande de puissance (10), la commande de puissance (10) étant prévue pour générer un signal pour activer l'élément chauffant (4, 14) lors de l'activation par le détecteur (9).

8. Générateur de gaz lacrymogène (1) tel que revendiqué dans l'une quelconque des revendications 1 - 7, **caractérisé en ce que** le générateur de gaz lacrymogène (1) comprend un logement (11), ledit au moins un récipient (2, 12) pouvant être attaché de manière amovible au logement (11).

9. Générateur de gaz lacrymogène (1) tel que revendiqué dans l'une quelconque des revendications 1 - 8, **caractérisé en ce que** le générateur de gaz lacrymogène (1) comprend une pluralité de récipients (2, 12) qui sont montés dans

un logement (19), le logement pouvant être attaché de manière amovible au générateur de gaz lacrymogène (1).

10. Générateur de gaz lacrymogène tel que revendiqué dans l'une quelconque des revendications 1 - 9, **caractérisé en ce que** la commande de puissance (10) utilisée est une MCU, qui est prévue pour désactiver l'élément chauffant après qu'un temps de chauffe prédéfini s'est écoulé.

11. Récipient (2, 12) contenant une quantité d'un composé chimique générateur de gaz lacrymogène (5) à l'état solide, le composé chimique provoquant une irritation d'au moins une partie d'un oeil lors du contact ; un élément chauffant (4, 14) pour provoquer l'évaporation du composé chimique de l'état solide à l'état gazeux, l'élément chauffant comprenant un dessus (15) qui fait saillie dans le récipient (2, 12), au moins une partie du dessus étant enduite avec le composé générateur de gaz lacrymogène (5), et une sortie pour expulser le gaz du récipient (2, 12) à utiliser avec le générateur de gaz lacrymogène de l'une quelconque des revendications 1 - 10.

12. Ensemble de deux ou plus de deux récipients (2, 12) contenant une quantité d'un composé chimique générateur de gaz lacrymogène (5) à l'état solide, le composé chimique provoquant une irritation d'au moins une partie d'un oeil lors du contact ; un élément chauffant (4, 14) pour provoquer l'évaporation du composé chimique de l'état solide à l'état gazeux, l'élément chauffant comprenant un dessus (15) qui fait saillie dans le récipient (2, 12), au moins une partie du dessus étant enduite avec le composé générateur de gaz lacrymogène (5), et une sortie pour expulser le gaz du récipient (2, 12), l'ensemble pouvant être attaché de manière amovible au générateur de gaz lacrymogène tel que revendiqué dans l'une quelconque des revendications 1 - 10.

13. Ensemble tel que revendiqué dans la revendication 12, **caractérisé en ce que** les récipients (2, 12) sont reçus dans un logement (19).

14. Dispositif d'alarme comprenant le générateur de gaz lacrymogène tel que revendiqué dans l'une quelconque des revendications 1 - 10.

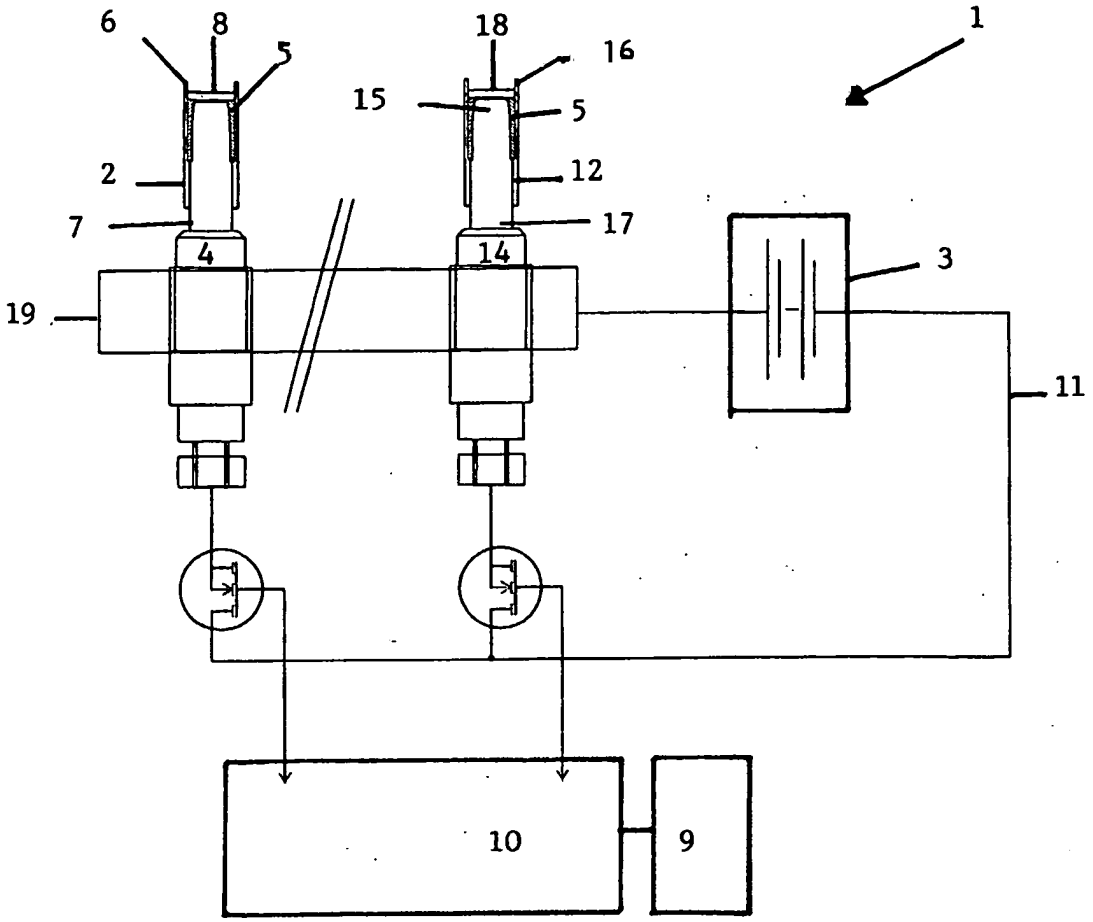

FIG. 1

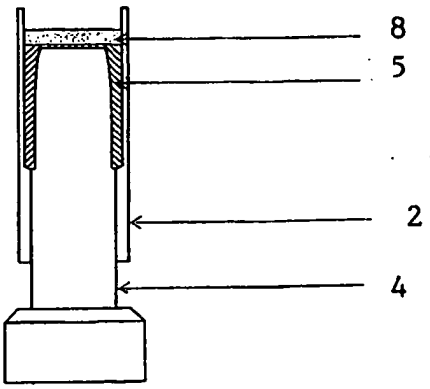

FIG. 2

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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