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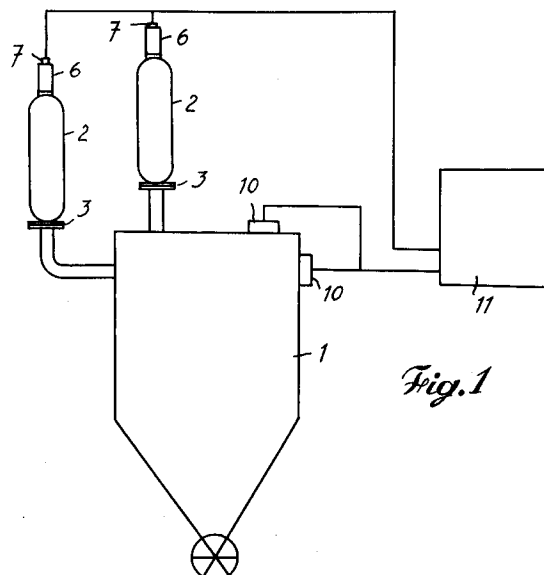
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B-2600 Antwerpen (Berchem) (BE)**(54) **Device for the suppression of industrial explosions.**

(57) Device for the suppression of industrial explosions in a holder (1) filled with dust, gas or vapour, where an unpressurized flame smothering agent is provided in an extinguisher cylinder (2), the extinguisher cylinder is provided with a gas generating cartridge (6) with igniter (7) and a perforated bottom (8) covered with a foil (9) for the pressurization and expulsion onto the ignition source in the holder (1) of the flame smothering agent and the breaking strength of the means of closure (3) which separates the extinguisher cylinder from the holder is less than the pressure with which the flame smothering agent is expelled.

*Fig.1***EP 0 669 144 A1**

The invention is for a device for the immediate suppression of a gas, vapour, or dust explosion in an installation or holder filled with any sort of dust gas, vapour or mixture.

For the suppression of such explosions the practice is known of using one or more extinguisher cylinders with an outlet covered by a breakable panel which is connected to the industrial installation or holder requiring protection. The extinguisher cylinders are filled with a flame smothering agent which is subject to very high pressure exerted by nitrogen. An explosive cutting charge with detonator is used to break the breakable panel of said outlet and permit the expulsion of the highly pressurized flame smothering agent, which charge is mounted underneath the breakable panel and is exploded by a control unit when an explosion is detected in the holder.

A major drawback of this is however that the flame smothering agent in the extinguisher cylinders is under high pressure, with the result that these are subject to the regulations on pressure vessels, which includes a requirement to make tests so that major costs must be incurred. Another disadvantage is that in order to maintain a virtually constant pressure in the extinguisher cylinders over a period of time these cylinders must remain free of leaks, which despite the good production and filling methods of these cylinders is not always possible. As a result it is sometimes necessary to replace leaking extinguisher cylinders, thus further raising the costs. A further disadvantage is that in order to use explosives to break the breakable panels and open the outlet of the extinguisher cylinders, the necessary permits must be applied for in order to apply the explosives on the installations requiring protection. Moreover the transport of explosives particularly when taking goods overseas, gives rise to numerous problems including high transport costs.

For this reason in some applications where the speed of opening of the outlet of the extinguisher cylinders is less critical, other means of opening than explosion are used. These techniques are far from always being applicable.

In order to overcome these disadvantages, the flame smothering agent in the extinguisher cylinders is according to the invention not subject to high pressure in advance and is very quickly pressurized in just a few milliseconds and expelled with speed onto the ignition source in the protected holder only upon the detection of an explosion, by the ignition of a gas-generating cartridge.

In order to achieve this a device has been realized in accordance with the main characteristic of the invention as described in claim 1 of the application.

By way of example and without being in any-way exhaustive, a more detailed description is given below of a selected embodiment of the device in accordance with the invention. This description refers to the attached drawing, in which :

fig. 1 shows a schematic diagram of the device;

fig. 2 shows an enlarged vertical cross-section of the cartridge which is mounted on an extinguisher cylinder.

In these figures can be seen holder 1 filled with a dust, gas, or vapour in which an exploding is to be feared. One or more extinguisher cylinders 2 are mounted on this holder, filled with a flame smothering agent not under high pressure, and which are separated by a closure, such as a breakable panel 3, from the holder. An opening 4 is provided by preference in the top of each extinguisher cylinder 2 in which a cartridge 6 with rapid gas generation and preferably made of metal is mounted in any way whatsoever. At the top the cartridge is provided with an ignition device 7. The bottom 8 of the cartridge is perforated and sealed off inside preferably by means of a metal foil 9. The holder 1 is provided with one or more explosion detectors 10 for the detection of an explosion in the holder. These explosion detectors pass on information to a control unit 11 which is in turn connected to the ignition devices 7 of the cartridges 6.

When the explosion detectors 10 detect an explosion in the holder 1, this is communicated at lightning speed to the control unit 11, which in turn sets off the ignition device 7 of each cartridge. As a result the pyrotechnical mixture 5 in each cartridge is ignited and gas is generated in a very short space of time as a result of which the pressure in the cartridge increases very quickly so that the foil 9 in the cartridge is destroyed and the gas exerts within a very short period of time of ± 5 ms a pressure of nearly 60 bar on a content of for example ± 4 kg in each extinguisher cylinder 2. As result the flame smothering agent exposed to high pressure breaks through the breakable panel 3 of each extinguisher cylinder and the flame smothering agent is powerfully ejected on the ignition source to be extinguished in the holder. Here it is pointed out that each breakable panel 3 is selected in such a way that its breaking strength is less than the pressure exerted by the fire smothering agent, so that the breakable panels used for closing off extinguisher cylinders which are not initially under high pressure can be of a lighter construction than the known breakable panels used in known fire extinguishing installations.

It goes without saying that the cartridge can be any suitable sort and dimensions which generates sufficient gas in a short period of time and that these cartridges can be mounted in any suitable

position on the extinguisher cylinder. Furthermore it goes without saying that the perforations provided in the bottom of the cartridge may have any suitable form and dimensions whatsoever, depending on the purpose for they are used.

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7. Device pursuant to claim 1, characterized by the fact that the ignition device (7) of the cartridge (6) is connected to the control unit (11) to which the explosion detectors (10) are connected.

Claims

1. Device for the suppression of industrial explosions in a holder (1) filled with dust, gas or vapour whereby use is made of at least one extinguisher cylinder (2) filled with a flame smothering agent and mounted on the holder, a means of closure (3) installed between the extinguisher cylinder and the holder, an explosive agent for the opening of the closure and the expelling at high pressure of the flame smothering agent on the source of ignition to be extinguished in the holder, at least one explosion detector (10) mounted on the holder, and a control unit (11) for receiving the information passed on by the explosion detector and igniting the explosive agent, characterized by the fact that an unpressurized flame smothering agent is contained in the extinguisher cylinder (2), that the extinguisher cylinder is provided with a gas generating cartridge (6) with igniter (7) and perforated bottom (8) covered by foil (9), for the generation of high pressure and the expulsion of the flame smothering agent on the ignition source in the holder (1), and that the breaking strength of the closure (3) is less than pressure at which the flame smothering agent is expelled.
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2. Device pursuant to claim 1, characterized by the fact that the cartridge (6) with the perforated bottom (8) is installed in an opening (4) provided in the top of the extinguisher cylinder (2).
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3. Device pursuant to claim 1, characterized by the fact that the cartridge (6) has a metal casing.
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4. Device pursuant to claim 1, characterized by the fact that the cartridge (6) is a gas cartridge.
5. Device pursuant to claim 1, characterized by the fact that the cartridge (6) is a cartridge containing a propellant.
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6. Device pursuant to claim 1, characterized by the fact that the foil (9) which covers the perforated bottom (8) of the cartridge (6) is made of metal.
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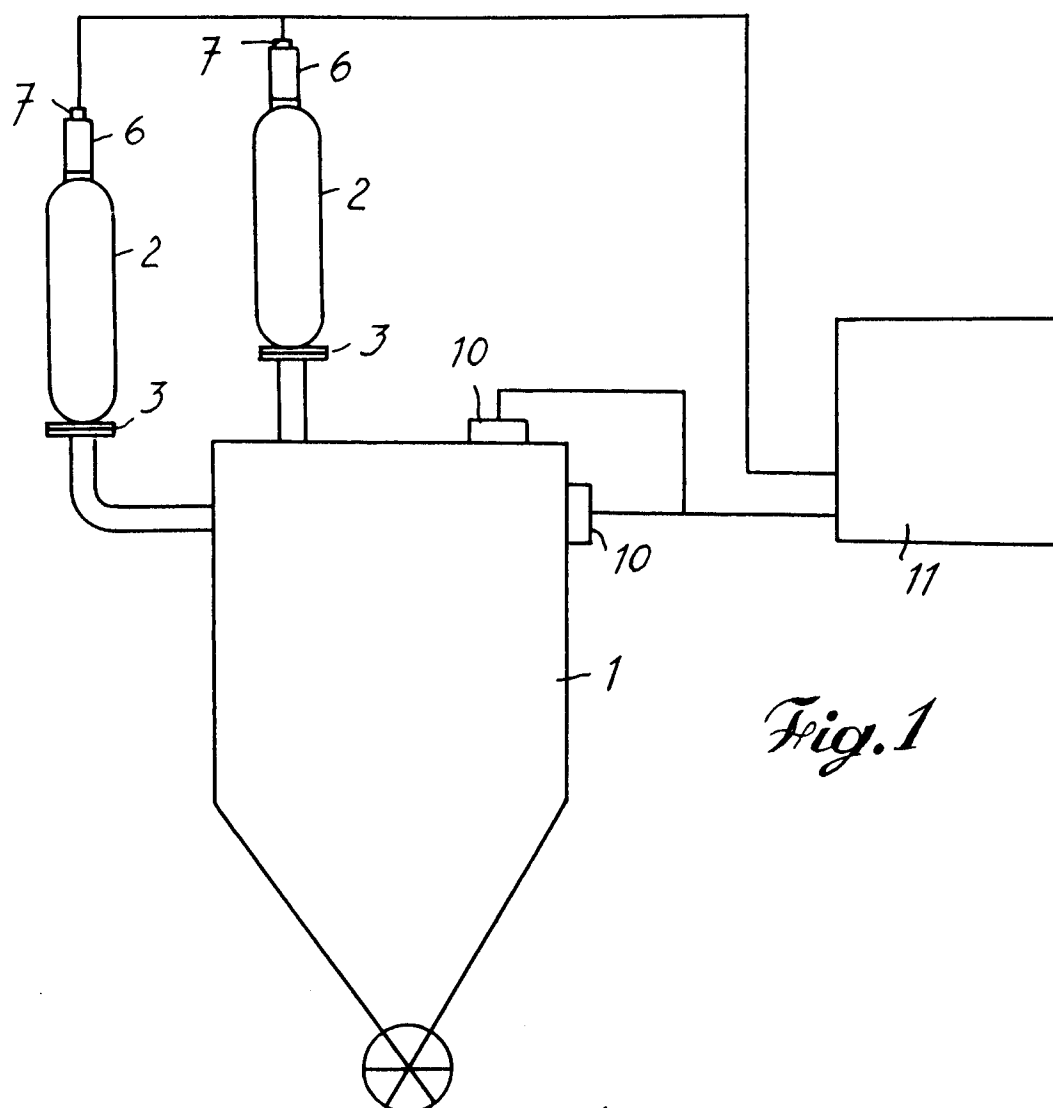


Fig. 1

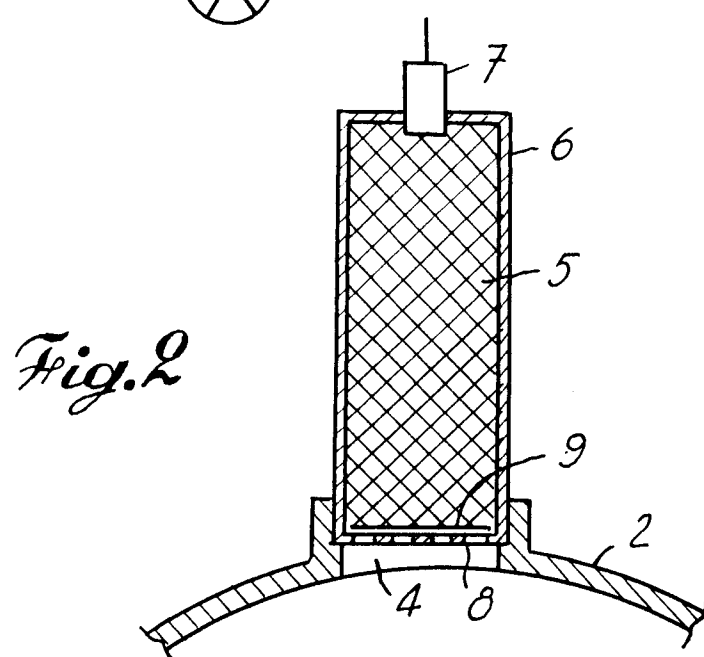


Fig. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 0098

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y A	US-A-2 713 391 (BUCKHOLTZ) 19 July 1955 * column 1, line 50 - column 2, line 63 * ---	1-3,5,6 7 4	A62C3/04 A62C35/02
Y A	US-A-4 637 473 (GILLIS) 20 January 1987 * column 2, line 46 - column 4, line 49; figures * -----	7 1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A62C F42D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 May 1995	Examiner Triantaphillou, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			