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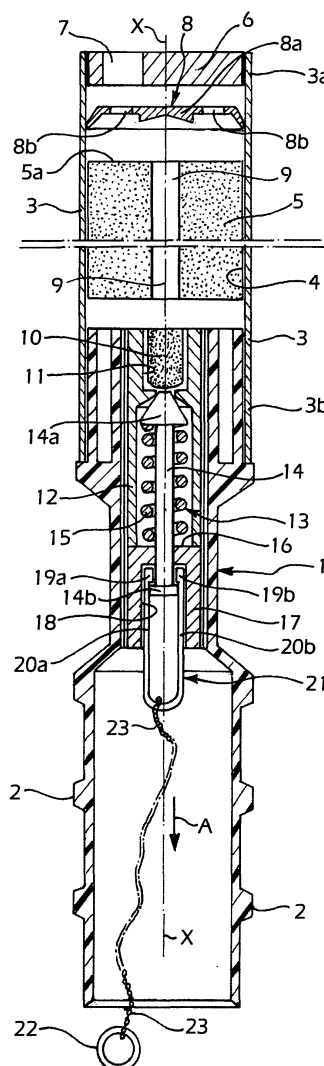
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(54) **A portable aerosol fire-extinguisher**

(57) A portable fire-extinguisher comprises a metal casing (3) with an internal chamber (4) for housing a charge (5) of a solid substance which can be transformed, at a predetermined temperature, into an aerosol with flame-extinguishing properties. A delivery opening (7) puts the chamber (4) into communication with the exterior. An explosive starting capsule (10), associated with a striker mechanism (13), is provided for triggering the reaction of the extinguishing charge (5).



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Description

[0001] The present invention relates to a portable aerosol fire-extinguisher of the type comprising a hollow casing defining in its interior a chamber for housing a solid substance which can be transformed, at a predetermined temperature, into an aerosol with flame-extinguishing properties, and which can be discharged in aerosol form through an opening which puts the chamber housing the extinguishing charge into communication with the exterior. A portable fire-extinguisher of the above-mentioned type is known, for example, from patent publication WO-00/37142.

[0002] In devices of this type, an electrical resistor, supplied by batteries, via a switch, is provided for triggering the transformation of the extinguishing charge from solid to aerosol. Fire-extinguishers of the above-mentioned type have a disadvantage which is connected with the limited endurance of the batteries over time. As is known, batteries in fact become discharged after a number of months and, unless the user remembers to replace them periodically, there is a risk that the fire-extinguisher will not operate when required because the batteries are discharged.

[0003] The object of the present invention is therefore to provide a portable aerosol fire-extinguisher of the type specified at the beginning, addressing principally the problem of ensuring reliability of operation over time and the capacity to be activated very quickly when required.

[0004] These and other objects and advantages which will be understood better from the following description are achieved, according to the invention, by a portable aerosol fire-extinguisher having the characteristics defined in the appended claims.

[0005] The structural and functional characteristics of a preferred but non-limiting embodiment of a portable fire-extinguisher according to the invention will now be described; reference is made to the appended drawing which is a schematic view showing a portable fire-extinguisher according to the invention in axial, longitudinal section.

[0006] With reference to the drawing, a portable fire-extinguisher comprises a supporting body 1 which is made of plastics material and is shaped so as to form a hollow handle portion 2, and an elongate tubular casing 3 with a distal end 3a and a proximal end 3b which is fixed to the plastics body 1. A chamber 4 is defined inside the hollow casing 3 for a charge 5 of a solid substance which can be transformed, at a predetermined temperature, into an aerosol with flame-extinguishing properties.

[0007] The chemical and physical characteristics of the extinguishing charge 5 are not relevant *per se* for the purposes of an understanding of the invention and will not therefore be described in detail herein. By way of indication, the extinguishing charge is a compacted mixture comprising potassium nitrate, a binding resin, and an organic oxidizing agent.

[0008] A metal plug 6 is fixed at the distal end 3a of the tubular metal casing 3 and forms a delivery opening or nozzle 7 which puts the internal chamber 4 into communication with the exterior. Preferably, both the casing 3 and the plug 6 are made of metal, for example, aluminium. Directly on the inner side the plug 6, there is a perforated metal diaphragm 8 with a solid central portion 8a and one or more lateral holes 8b the purpose of which will be explained below.

[0009] The extinguishing charge 5 is shaped so as to form a longitudinal duct or passage 9. Terms indicating directions and orientations such as "longitudinal" and "transverse" or "radial" are intended to be understood herein with reference to the longitudinal central axis X of the fire-extinguisher, unless indicated otherwise. Similarly, terms such as "front" and "rear" refer to the distal portion and to the proximal portion of the fire-extinguisher, respectively, with reference to the normal condition of use in a user's hands.

[0010] The longitudinal passage 9 puts the distal end 5a of the aerosol-forming charge 5 into communication with the central portion of the fire-extinguisher where, according to the invention, an explosive-capsule starting device is provided. An explosive capsule 10 is held in a front compartment 11 formed by a tubular insert 12 mounted centrally inside the supporting body 1. A firing mechanism, generally indicated 13, comprises a striker element 14 with an enlarged head 14a housed coaxially inside the insert 12 and a striker-operating spring 15, interposed between the head 14a and a reaction surface 16 which is oriented transversely relative to the principal longitudinal axis of the fire-extinguisher. The reaction surface 16 is formed by a cup-shaped body 17 which is housed in the supporting body 1, to the rear of and adjacent the insert 12. The cup-shaped body 17 forms a cavity 18 which is open at the rear.

[0011] A resilient, fork-shaped retaining element 21 at least partially housed in the rear cavity 18 of the cup-shaped body 17 has two arms 20a, 20b which can open out resiliently and the free ends 19a, 19b of which are engaged in a hooking arrangement against an enlarged portion 14b formed at the proximal or rear end of the striker 14. The arms 20a, 20b are held in the parallel condition illustrated in the drawing by the wall of the rear cavity 18.

[0012] The operating principle of the fire-extinguisher is based on the chemical reaction which, when triggered by the starting device constituted by the explosive capsule 10 and by the striker mechanism 13, brings the mixture of potassium salts to a temperature of about 300°C, giving rise to an exothermic reaction which produces an aerosol suspension of particles of extremely small particle size; these particles, which are discharged from the chamber 4 through the nozzle 7 owing to the pressure which accompanies the reaction, are spread over the source of a fire, inhibiting the combustion-supporting effect of oxygen and suffocating the propagation of the fire.

[0013] The fire-extinguisher according to the invention operates as follows. When the user sees the need, he grips a gripping ring 22 and pulls the fork-shaped element 9, by means of a cord 23, in the direction indicated by the arrow A in the drawing. The element 9 moves backwards, sliding along the cavity 18, withdrawing the striker element 14 by means of the hooked ends 19a, 19b and compressing the spring 15. When these ends emerge from the rear cavity 18, the arms 20a, 20b snap apart, releasing the enlarged rear end 14b of the striker which is acted on by the spring and returns sharply to the initial position shown in the drawing, striking the starting capsule 10, which explodes. The small flare resulting from the explosion of the capsule 10 is propagated through the duct 9 in the extinguishing charge, reaches the flame-diffuser diaphragm 8 and is reflected thereby, so as to be radiated against the distal end portion 5a of the extinguishing charge 5, triggering its chemical reaction. The aerosol fluid produced by the combustion of the extinguishing charge is discharged energetically from the hole 7a in the delivery plug and can be directed towards the fire.

[0014] As will be appreciated, the effectiveness of the fire-extinguisher according to the invention can be guaranteed for much longer periods of time than in conventional fire-extinguishers of the type discussed in the introductory portion of the present description and the fire-extinguisher does not require any maintenance or periodic checks.

[0015] It is intended that the details of construction of the fire-extinguisher may be varied widely with respect to those described and illustrated. For example, the selection to form the passage duct in the central portion of the extinguishing charge constitutes a preferred selection but is certainly not essential for the purposes of the implementation of the invention. In particular, the passage 9 could alternatively be arranged in a lateral position rather than a central position, at the interface between the explosive charge and the metal casing 3, for example, by the formation of a longitudinal groove along one side of the extinguishing charge 5 and/or by suitable shaping of the casing 3. Moreover, the selection to form the fire-extinguisher in a manner such that the reaction which produces the aerosol starts in the distal portion of the extinguishing charge also constitutes a preferred selection since it enables the temperatures to be lower in the region closer to the handle, in comparison with an alternative configuration in accordance with which the triggering reaction would start in the immediate vicinity of the explosive capsule 10 and the aerosol would reach the nozzle 7 by being propagated through the passage 9. Finally, in an alternative embodiment (not shown), the diffuser diaphragm 8 may be eliminated and its functions may be performed by the internal surface of the delivery plug 6.

Claims

1. A portable aerosol fire-extinguisher, comprising:

- a casing (3) with an internal chamber (4) for housing a charge (5) of a solid substance which can be transformed, at a predetermined temperature, into an aerosol with flame-extinguishing properties,
- at least one delivery opening (7) which puts the chamber (4) into communication with the exterior, and
- starting means for triggering the reaction of the extinguishing charge (5),

characterized in that the starting means comprise:

- an explosive starting capsule (10), and
- a striker mechanism (13) associated with the explosive capsule (10).

2. A fire-extinguisher according to Claim 1, **characterized in that** the striker mechanism (13) comprises:

- a striker element (14) cooperating with a resiliently loadable operating means (15), and
- a releasable retaining means (21) which can:

engage the striker element (14) or the resilient means (15) in order to hold the striker element (14) in a position spaced from the explosive capsule (10) against the force of the resilient element (15), and be released to allow the resilient element (15) to bring the striker element (14) into contact with the explosive capsule (10).

3. A fire-extinguisher according to Claim 1, **characterized in that** the striker mechanism (13) comprises:

- a striker element (14) cooperating with a resiliently loadable operating means (15), and
- a releasable retaining means (21) which can adopt selectively

a first position in which it is engaged with the striker element (14) or with the resilient means (15) in order to hold the striker element (14) in a position spaced from the explosive capsule (10), against the force of the resilient element (15), and

a second position in which it is disengaged from the striker element (14) or from the resilient element (15) to allow the resilient element (15) to bring the striker element (14) into contact with the explosive capsule (10).

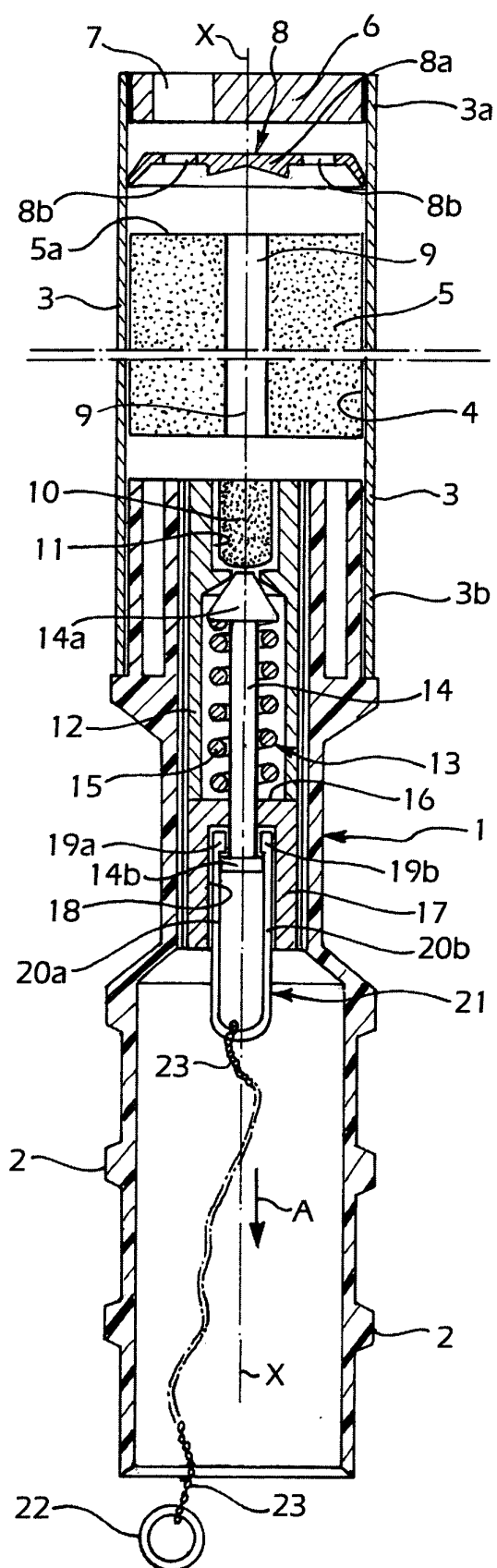
4. A fire-extinguisher according to Claim 2 or 3, **characterized in that** the releasable retaining means

(21) is connected to a manual gripping means (22, 23) and comprises at least one hooking portion (19a, 19b) for engaging the striker element (14) and for moving the striker element (14), by means of the manual gripping means (22, 23), to a position spaced from the explosive capsule (10), against the force of the resilient element (15).

5. A fire-extinguisher according to Claim 2, **characterized in that** the releasable retaining means (21) is associated with a manual gripping means (22, 23), preferably of the cord type, extending through a hollow handle (2) fixed to a proximal end of the metal casing (3).
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6. A fire-extinguisher according to Claim 3 and 4, **characterized in that**, in the first, engaged position, the hooking portion (19a, 19b) of the releasable retaining means (21) is housed slidably in a cavity (18) inside the fire-extinguisher in a condition in which it is resiliently loaded against the cavity wall, and **in that**, in the second position, the hooking portion (19a, 19b) is extracted from the cavity (18) and is disengaged from the striker element (14).
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7. A fire-extinguisher according to Claim 6, **characterized in that** the releasable retaining means (21) is a resilient, fork-shaped element with two arms (20a, 20b) which can open out resiliently, each of which arms has a hooking portion (19a, 19b) engaged with the striker element (14), and which arms are housed slidably in the cavity (18) in a condition in which they are resiliently loaded against the cavity wall.
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8. A fire-extinguisher according to any one of Claims 2 to 7, **characterized in that** the resiliently loadable operating means is a spring (15) interposed between the head (14a) of the striker element and a fixed reaction surface (16).
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9. A fire-extinguisher according to any one of the preceding claims, **characterized in that** the explosive capsule (10) is disposed in a proximal region of the fire-extinguisher, and **in that** at least one longitudinal passage (9) puts the region of the explosive capsule (10) into communication with the region of the delivery opening (7).
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10. A fire-extinguisher according to Claim 9, **characterized in that** the passage (9) is formed centrally in the extinguishing charge (5).
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11. A fire-extinguisher according to Claim 9 or 10, **characterized in that** the extinguishing charge (5) has a distal end portion (5a), and **in that**, in front of the outlet of the passage (9), there is a surface (8a) which can reflect a flame emerging from the passage (9) against the distal end portion (5a) of the
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extinguishing charge (5) in order to initiate aerosol formation.

12. A fire-extinguisher according to any one of the preceding claims, **characterized in that** the extinguishing charge (5) is a compacted mixture comprising potassium nitrate, a binding resin, and an organic oxidizing agent.





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5365

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		25 August 2004	Neiller, F
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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