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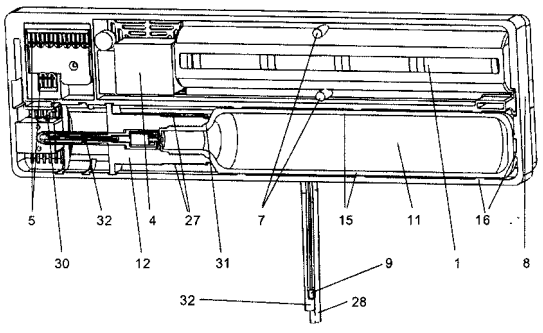
# (54) AUTOMATIC EXTINGUISHER FOR PROTECTING ELECTRICAL BOXES

(57) The invention relates to an automatic extinguisher usable mainly for protecting the electrical boxes of electrical equipment and machinery, consisting of a base (3) and a body (8) that are connected but separable, which facilitates and simplifies monitoring and maintenance operations. In the main operating mode, after fire is detected by a probe (9), preferably located inside the protected element, the circuit board (4) activates a solenoid (27) integrated into an actuator (12), which causes the mobile end (21) to make contact with the O-ring (19), which becomes worn owing to the high electric current circulating at the contact point, releasing the extinguishing agent (11) contained inside the container (15) and which reaches the inside of the protected element through the discharge tubes (32), extinguishing the fire and also causing tripping of the circuit breaker of the electrical boxes of the electrical equipment or protected machinery and activation of lighting means (13), optical indicators (14) and acoustic indicators (34). The circuit board (4) may then transmit information to other external elements connected thereto. If necessary, the circuit breaker of the protected element can be reset, to which end the cutout switch (23) will be manually pressed first, which will cut the cutout (22), thereby eliminating the short circuit at the contact point. The auxiliary or secondary operating mode is activated if the main operating mode fails, the aforementioned information being applicable except that the movement of the mobile end (21) is produced by the softening of the thermoflux element (25) owing to the heat produced by the fire. Alternatively, the solenoid (27) may be replaced by an electroflux element that will be placed between the mobile piston (18) and the O-ring (19), but so that it does not impede the subsequent movement of the mobile end (21), due care being taken to ensure that the electroflux element remains electrically isolated from the O-ring (19). An electric current being circulated by the circuit board (4) through said electroflux element will cause the softening thereof, allowing movement of the mobile piston (18) and therefore of the mobile end (21).

[Fig. 2]




EP 2 556 857 A1

## Description

### Technical Field

**[0001]** Literally, the invention with regard to the International Patent Classification (Eighth Edition).

A62C35/3 ( 136 ) Permanently-installed equipment ( A62C31/00, A62C2/08 ).
. ( 344 ) with containers for delivering the extinguishing substance.
.. ( 27 ) controlled by a signal from the danger zone.
... ( 72 ) with a finite supply of extinguishing material.
A62C3/16 ( 941 ) Fire prevention, containment or extinguishing specially adapted for particular objects or places.
( 609 ) in electrical installations, e.g. cableways.
A62C37/44 Control of fire-fighting equipment (heat-sensitive devices G01 K).
. ( 160 ) an actuating signal being generated by a sensor separate from an outlet device.
.. ( 137 ) only the sensor being in the danger zone.

**[0002]** The prior Technical Field classification is also valid for European Patent Classification.

### Background Art

**[0003]** In the current state of the art, the operating mode of automatic extinguishing systems is generally based on fire detection using temperature and smoke detectors or infrared/ultraviolet sensors, which send an actuating signal, directly or previously filtered via a control switchboard, to the activation device of the extinguishing device, which is generally composed of a mechanical solenoid electrovalve that enables the fire-extinguishing substance to be discharged.

**[0004]** Automatic fire extinguishers also function by means of mechanical devices which, due to the physical expansion process caused by the heat of the fire, actuate or release valves that discharge the fire-extinguishing substance.

**[0005]** In particular, references nearest to the proposed invention in the current state of the art include utility model DE 8913 487 U, which relates to an automatic fire extinguisher specially designed to protect electrical boxes basically composed of a sensor, preferably of smoke or temperature, an extinguishing element ($CO_2$ bottle) and a control centre which, when the sensors detect values that exceed a predefined threshold, opens a corresponding valve, releasing the extinguishing substance. The whole assembly is disposed within a casing that can be inserted inside the box being protected and can have the corresponding standard dimensions for insertion inside a standard rack system.

**[0006]** ES 1 045 478 relates to a Spanish utility model that discloses an automatic fire-extinguishing device for unmanned service stations and is basically composed of three parts. The first includes the detection element (thermal fuse) which, combined with a firing pin and under established load rating conditions, triggers the release of the $CO_2$ contained in a receptacle. This action causes the $CO_2$ to circulate through conduits towards the second element, which is composed by a bottle mainly containing an extinguishing substance, an electromechanical solenoid valve and a pressure gauge, causing the pressure gauge to open, which in turn releases the extinguishing substance contained in the receptacle, which is conveyed to the protected area. Lastly, the third element includes means for manually actuating the fire extinguisher, whether by actuating the solenoid valve or pressure gauge of the second element described. Additionally, the actuation device is connected to a control centre to which it sends a signal when it is actuated.

**[0007]** Lastly, JP 4049980 discloses an automatic fire extinguisher specially designed for electrical environments and which is mainly composed of a casing wherein an ultraviolet-type fire extinguisher, a smoke detector, an acoustic alarm, a control centre, a bottle containing an extinguishing substance and an actuator are disposed. The system is powered by a battery and, when fire is detected via a signal previously filtered by a control centre, the actuator is activated, releasing the fire-extinguishing substance. In addition, in this case means are established to inform of the fire hazard.

**[0008]** It is known that in all extinction systems there is a permanent risk of leakage of the extinguishing substance contained therein, through its joints or valves, thus requiring constant attention to remain operational, making them excessively complex and expensive in terms of installation and maintenance, due to which they are seldom used in small installations or in domestic environments, but rather are almost exclusively destined for the protection of large or specific installations (public, with explosion risk and similar).

**[0009]** Additionally, human stress responses to fire often lead to hasty decisions, such as approaching the source of the fire without so much as a simple flashlight.

**[0010]** A large percentage of fires are of an electrical nature and, although automatic fire-extinguishing systems intervene to extinguish them, they do not act upon the electrical cause, therefore allowing the fire to break out again.

**[0011]** The proposed invention incorporates several advantages over current automatic fire-extinguishing systems.

**[0012]** On one hand, it is composed of two elements, interdependent but separable, which allows fast and easy installation, supervision, maintenance and replacement thereof and it can be used together with or independently from current automatic fire-extinguishing systems.

**[0013]** On the other hand, the use of joints or valves in the receptacle that contains the extinguishing substance has been eliminated, establishing an O-ring seal to prevent leakage of the extinguishing substance, although it allows fast weighing for eventual verifications and re-

placement of its batteries when necessary without need for tools.

**[0014]** It also disconnects the power supply from the protected electric box and machinery, preventing the fire from breaking out again and leaving the affected area lighted, thereby facilitating subsequent manual intervention.

## Disclosure of Invention

**[0015]** The proposed invention is composed of two interdependent but separable elements.

**[0016]** The first element, which we will call the base, is the baseboard being fixed around the device to be protected wherein the batteries, electrical connectors, probes, socket joint, extinguishing substance discharge tube and cable for interconnecting the described elements and for powering the device are housed.

**[0017]** The second element, which we will call the body, is the part that is coupled to the base when the system is in operating mode, and which we can separate therefrom. Said body houses the electrical connections, control board also including lighting and optical and acoustic signalling means, a bottle containing an extinguishing substance, an actuator with a dual actuator system, a socket joint, discharge tube of the extinguishing substance and cable for interconnecting the described elements. It must be noted that the control board also has interconnection means with other devices, such as alarm centres, domotic equipment, external optical and acoustic signalling and similar devices.

**[0018]** This construction solution is adopted to facilitate and simplify supervision and maintenance operations that must be carried out on said device, while facilitating assembly thereof.

**[0019]** Of all the aforementioned components, the batteries and the bottle containing the extinguishing substance are the only components that require greater attention and periodic control. The batteries must be replaced when they lose their charging capacity and the bottle requires supervision in order to determine whether it contains extinguishing substance.

**[0020]** Therefore and in an explicit manner, the batteries are disposed at the base so they can easily be accessed for verification and replacement thereof when necessary. Additionally, as the batteries are excluded from the device body, their replacement does not alter the weight thereof, due to which the presence of extinguishing substance in the bottle can be verified by simply weighing the body of the device.

**[0021]** In a complementary manner, the casing that forms the body has been designed to be easily disassembled in order to access its components in the event of possible alterations thereto, thereby achieving the double objective of accurate weighing control while guaranteeing the proper functioning of the device.

**[0022]** Construction solutions have also been adopted in order to prevent undue leakage of the extinguishing substance from the bottle that contains it, avoiding the use of joints or similar means in the actuator elements. More specifically, in the proposed invention, the bottle that contains the extinguishing substance is closed by a cap and sealed. The extinguishing substance is released when the cap is perforated by the actuator which, on striking the cap, causes the passage of a sufficient amount of electric current to erode it at the point of contact between the two elements, at which moment the extinguishing substance is released. This action, due to the electrical overcurrent produced, simultaneously causes the disconnection of the electrical protections of the protected electric box or machine, preventing the fire, once extinguished, to break out again.

**[0023]** It must be noted that the actuator intervenes in an electromechanical manner on receiving the order from the control board, but also has construction characteristics that allow it to act mechanically and automatically in case of failure of the control board or components on which it depends, i.e. batteries and sensor.

**[0024]** The autonomous lighting means and optical and acoustic signalling means with which the present invention has been equipped, intervene solidarily in the event the fire extinguisher is activated, lighting the area being protected and informing of the situation in order to facilitate human intervention, although these can also intervene in the absence of mains power.

**[0025]** In order to achieve the separation of the base and body of the device, means have been established that allow the disassociation of the components shared by the two elements, such as electrical wiring and the discharge tube of the extinguishing substance. For this reason, electrical connectors and linkable socket joints have been disposed in both the base and body.

**[0026]** The base must be installed next to the electric box or machine to be protected so as to confer full operating capacity. The discharge tube of the extinguishing substance and power cables of the device that will be connected to the protected elements emerge from the sensing probe. The cable for interconnecting other devices, such as alarm centres, domotic equipment, external optical and acoustic alarm signalling and similar devices will emerge from the base, if necessary.

## Brief Description of Drawings

**[0027]**

Figure 1. - Shows a general front perspective view of the base and its components.

Figure 2. - Shows a general perspective view of a longitudinal section of the front of the body, wherein its internal components can be observed. In this figure, the base and body are fitted into each other.

Figure 3. - Shows a general front perspective view of the exterior of the body. The base and body are fitted into each other.

Figure 4. - Shows a general front perspective view

of the interior of the body.

Figure 5. - Shows a rear perspective view of the exterior of the body. The base is not shown in this figure.

Figure 6. - Shows a detailed perspective view of a longitudinal section, wherein the different components of the actuator are shown.

Figure 7. - Shows a detailed perspective view of cross-section, wherein the different components of the actuator can be observed.

Figure 8. - Shows a detailed perspective view of a cross-section, wherein the power-off switch and disconnector can be observed.

## BEST MODE FOR CARRYING OUT THE INVENTION

**[0028]** In order to better understand the invention, following is a description of the main components of the device and general mode of operation thereof:

The batteries (1) are disposed on a baseboard (2) located at the base (3) which allows the batteries (1) to be extracted and facilitates replacement thereof. Their function is to supply power to the control board (4) in the absence of power supply.

**[0029]** The electrical connectors (5) are housed on the baseboard (6) located at the base (3) and over the control board (4). Their function is to interconnect the electrical wiring integrated within the device and, more specifically, that which joins the probe (9), the batteries (1) and the circuit breaker of the electric box or machine to be protected with the control board (4), allowing separation of the base (3) and body (8). It also complementarily interconnects the electrical wiring that joins the control board (4) with other devices.

**[0030]** The probe (9) is preferably housed in the interior of the device to be protected and is interconnected to the control board (4) by means of a cable. Its function is to detect fire, and transmit this hazard to the control board (4).

**[0031]** The socket joints (10) are integrated in the base (3) and in the body (8), forming part thereof. Their function is to interconnect the discharge tubes (32) of the extinguishing substance (11) integrated in the device, which join the actuator (12) and the protected electric box or machine so that the base (3) and the body (8) can become separated.

**[0032]** The control board (4) is housed in a baseboard (7) integrated in the body (8). It receives and filters information from the probe (9) and orders the actuator (12) and LEDs (13) to intervene if necessary. It also includes optical (14) and acoustic (34) signals to inform about the status of the device. It can be interconnected to other devices such as alarm centres, domotic equipment, external optical and acoustic signalling and similar devices to offer additional functions. It is equipped with a power-off switch (22) which is actuated by a button (23) designed to manually override the device in order to restore the power supply to the protected electric box or machine. It receives power through the feed cable (28).

**[0033]** The bottle (15) containing an extinguishing substance (11), which is sealed by means of an O-ring cap (19), is housed in a baseboard (16) disposed in the body (8). The actuator (12) is joined to this bottle (15), and is formed by a cylinder (17) composed of non-ferric material that contains a hollow moving piston (18) composed of ferromagnetic electrical-conductor material having its rear part open.

**[0034]** The front part of the moving piston (18) has three orifices (20). A moving point (21) passes through the central orifice, while the function of the two other orifices is to allow passage therethrough of the extinguishing substance (11). Said moving point (21) extends up to the moving magnet (24) contained in the moving piston (18). A hot-melt element (25) is disposed between the moving point (21) and the moving magnet (24) that prevents the moving point (21) from moving forward under normal conditions. In order to prevent the moving piston (18) from moving towards the O-ring cap (19), a washer (26) composed of ferromagnetic material has been disposed at the rear of the cylinder (17) to retain the moving piston (18), which is magnetised by the moving magnet (24) that it contains. The actuator is enclosed by a solenoid (27) that allows the moving cylinder (17) to move forward when activated, overcoming the opposition of the moving magnet (24) and washer (26) to said movement. Another possible situation is that the moving point (21) moves forward when the hot-melt element (25) is subjected to specific temperature conditions that cause it to soften, allowing the moving magnet (24) to move forward, which in turn pushes the moving point (21). Therefore, the function of the actuator (12) is to enable the moving point (21) to come into contact with the O-ring cap (19), whether by means of the action of the solenoid (27) on the moving piston (18) or autonomously on softening the hot-melt element (25), allowing the moving point (21) to move forward.

**[0035]** In an alternative design of the actuator (12) we would substitute the solenoid (27) for a hot-melt element that would be disposed between the moving piston (18) and the O-ring cap (19), but which would not prevent the moving point (21) from eventually moving forward, taking the necessary precautions so that the hot-melt element is electrically insulated from the O-ring cap (19) and connected to the control board (4). In this case it is not necessary to incorporate the washer (26) in the device.

**[0036]** Therefore, the base (3) is fixed next to the element to be protected. The probe (9), which is housed in within the base (3); the feed cable (28), which is connected to the general breaker of the element to be protected and, complementarily, the cable for interconnection with other devices, emerge from the base (3).

**[0037]** The body (8) is coupled to the base (3), both of which are fixed by the hooks (29). The body (8) is separable from the base (3) to facilitate supervision and maintenance operations.

**[0038]** The main mode of operation is as follows: the control board (4) analyses the data received by the probe (9) located in the interior of the protected element and, when the parameters that the control board (4) receives from the probe (9) are interpreted as a fire hazard, it activates the solenoid (27), which causes the moving piston (18) to move forward. This allows the moving point (21), which receives power from the control board (4) via the cable (30), after being successively conveyed through the discharge tube (32), cylinder (17), moving piston (18) and moving magnet (24), to come into contact with the O-ring cap (19), fed by the cable (31), generating electrical overcurrent at the point of contact between the moving point (21) and the O-ring cap (19), which erodes the O-ring cap (19).

**[0039]** On perforating the O-ring cap (19), the extinguishing substance (11) contained in the bottle (15) is released and conveyed through the orifices (20) of the moving piston (18), cylinder (17), discharge tubes (32) and socket joints (10) towards the interior of the protected electric box or machine, extinguishing the fire.

**[0040]** In order to facilitate the passage of the extinguishing substance (11) between the moving magnet (24) and the moving piston (18), grooves (33) have been made in the latter.

**[0041]** The orifices (20) made in the moving piston (18) are dimensioned so as to achieve a reduction in the pressure of the extinguishing substance (11) at the required level.

**[0042]** The secondary or auxiliary operating mode intervenes in the event of failure of the control board (4), probe (9), solenoid (27) or any component on which these depend and, in this case, the moving point (21) moves forward as a result of the softening of the hot-melt element (25).

**[0043]** The foregoing is valid for embodying the alternative design, except that when the control board (4) causes an electric current to circulate through the electro-melt element, interposed between the O-ring cap (19) and the moving piston (18), said electro-melt element will soften due to its physical properties, allowing the moving piston (18) to move forward which, on containing a moving magnet (24), is attracted by the O-ring cap (19).

**[0044]** The electrical overcurrent produced when the moving point (21) and O-ring cap (19) come into contact provokes the actuation of the circuit breaker of the protected element, at which moment the electric box or machine has no power supply. Simultaneously, the control board (4) that is fed by the batteries (1) activates the LEDs (13), the LED signalling light (14) and acoustic alarms (34) which alert of the situation. Optionally, this situation can be transmitted to other devices interconnected with the control board (4).

**[0045]** The device has a power-off switch (23) which, on being actuated, disables the disconnector (22). This action eliminates the short-circuit between the moving point (21) and the O-ring cap (19), activating the circuit breaker that feeds the protected device.

## Claims

1. Automatic fire-extinguishing practicable device , mainly for the protection of electric boxes and machinery, **characterised in that** it comprises energy storage means (1), optical (14) and acoustic (34) signalling means, at least one probe (9) that transmits information to the control board (4), which in turn filters the data and, upon detection of certain parameters, activates the actuator (12), which releases the extinguishing substance (11) contained in a receptacle (15), breaking the O-ring cap (19) that closes it and establishes the O-ring seal, whereupon said extinguishing substance (11) is conveyed to the protected element through one of the discharge tubes (32) and by, comprising a base (3) and a body (8), dependent but separable to facilitate and simplify operations of monitoring, maintenance and replacement ,in which the various components are housed; and by comprising means causing the disconnection of breaker of the protected element and autonomous lighting means (13) in the event of detection of a fire or in absence of the mains supply.

2. Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** The actuator (12) comprises a cylinder (17) of non-ferromagnetic material which contains a hollow moving piston (18) of ferromagnetic material and having an open back, holding the front of the moving piston (18) at least two holes (20), housing one of them a moving tip (21), the rest of them having the function to allow the passage through them of the extinguishing agent (11), with grooves (33) in the mobile piston (18) to facilitate the passage of said extinguishing substance (11) extending the moving tip (21) to the moving magnet (24) contained in the moving piston (18); including a washer (26) of ferromagnetic or magnetic material in the back of the cylinder (17) that prevents the advance of the plunger (18) towards the O-ring cap (19)) which retains the moving piston (18) which is movable magnetized due to the magnet it contains, including a solenoid (27) which actuates the movable cylinder (17) when in operation, overcoming the opposition of the moving magnet (24) and washer (26) moving allowing contact between the sliding end (21) and O-ring cap (19).

3. Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 2, **characterised in that** a hot-melt element (25) is disposed between the moving point (21) and the moving magnet (24) that prevents the moving point (21) from moving forward under normal conditions, but which allows it to move forward under certain temperature conditions, on softening the hot-melt element (25).

**4.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claims 2 and 3, **characterised in that** the solenoid (27) and the washer (26) are substituted for an electro-melt element, interposed between the O-ring cap (19) and the moving piston (18), wherethrough the control board (4) causes an electric current to circulate via cables, thereby softening it due to its physical properties, allowing the moving piston (18) to move forward which, on containing a moving magnet (24), is attracted by the O-ring cap (19).

**5.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claims 2 to 4, **characterised in that**, when the moving point (21) comes into contact with the O-ring cap (19), said O-ring cap is ruptured due to the electrical overcurrent produced at that point, releasing the extinguishing substance (11).

**6.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claims 2 to 4, **characterised in that**, when the moving point (21) comes into contact with the O-ring cap (19), the electrical overcurrent produced activates the circuit breaker of the protected element, interrupting the power supply to facilitate the extinction of the fire and prevent it from breaking out again.

**7.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 2, **characterised in that** the orifice (20) that houses the moving point (21) is disposed in the central shaft of the moving piston (18).

**8.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 3, **characterised in that** the hot-melt element (25) is composed of any material having the physical property of softening as the temperature increases and, more specifically, of plastic, rubber, wax or paraffin.

**9.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 4, **characterised in that** the electro-melt element is a hot-melt material mixed with any semi-conductor and, more specifically, a mixture of hot-melt material such as plastic, rubber, wax or paraffin with a semi-conductor such as cadmium, boron, aluminium, gallium, indium, silicon, germanium, phosphorus, arsenic, antimony, sulphur, selenium, tellurium, carbon, graphite or coal.

**10.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** the cabling required to join the electrical components of the base (3) and the body (8), or with external devices, is carried out by means of electrical connectors (5) that are disposed in the baseboard (6) and the control board (4), and are duly aligned, enabling the separation of the base (3) from the body (8) for the purpose of carrying out supervision and maintenance operations.

**11.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** the discharge tubes (32) of the base (3) and the body (8) are interconnected by means of socket joints (10) integrated in the base (3) and the body (8), and are duly aligned, enabling separation thereof for the purpose of carrying out supervision and maintenance operations.

**12.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** the base (3) and the body (8) are joined by mechanical, magnetic or electromagnetic means and, more specifically, by hooks, screws, magnets or solenoids.

**13.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim to 1, **characterised in that** the electricity storage means (1) are housed in the baseboard (2) disposed at the base (3), allowing easy replacement thereof and avoiding alteration of the weight of the body (8).

**14.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** the body (8) must be designed to prevent it from being easily disassembled, to prevent its components from being exposed therefore avoiding possible alterations thereto, thereby obtaining the double objective of achieving accurate weighing of the body (8), in order to determine the presence of the extinguishing substance (11) in the receptacle (15), while guaranteeing the proper functioning of the various components.

**15.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** it is installed next to the element to be protected and, more specifically, on the element to be protected.

**16.** Automatic fire-extinguishing practicable device,

mainly for the protection of electric boxes and machinery, according to claims 5 and 6, **characterised in that** actuating a power-off switch (23) disables the disconnector (22), eliminating a short-circuit between the moving point (21) and the O-ring cap (19), resetting the circuit breaker that protects the protected electric box or machine.

**17.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim1, **characterised in that** the probe (9) is a temperature, smoke, infrared, ultraviolet or ionisation probe that will eventually have wireless transmission capacity through the use of radio waves, ultrasound, infrared, ultraviolet or similar means.

**18.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 17, **characterised in that** the probe (9) is disposed in the interior of the element to be protected.

**19.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim1, **characterised in that** the extinguishing substance (11) can be any material capable of extinguishing a fire and, more specifically, carbon dioxide, ABC powder and/or specific metals or halogenated hydrocarbons.

**20.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** the control board (4) is electronic and is fed by the mains and, failing that, by the electricity storage means (1).

**21.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** the control board (4), in the event of a fire or absence of mains power, activates the autonomous lighting means (13) and optical and acoustic signalling means (14).

**22.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 21, **characterised in that** the acoustic signalling means (34) are any means capable of emitting sound and, more specifically, alarm bells or loudspeakers.

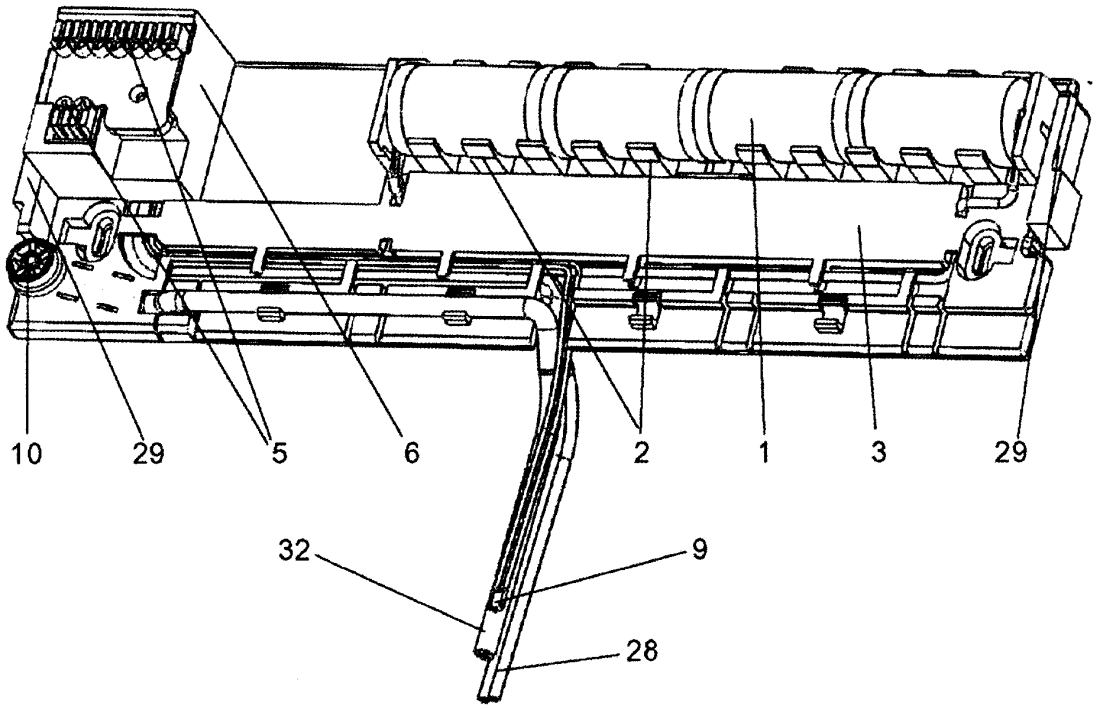
**23.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 21, **characterised in that** the lighting means (13) and optical signalling means (14) are any means capable of emitting light and, more specifically, light bulbs, fluorescent tubes or LEDs.

**24.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 1, **characterised in that** the control board (4), in the event of a fire, optionally transmits this situation to other devices interconnected therewith, such as alarm centres, domotic equipment, external optical and acoustic signalling and similar devices.

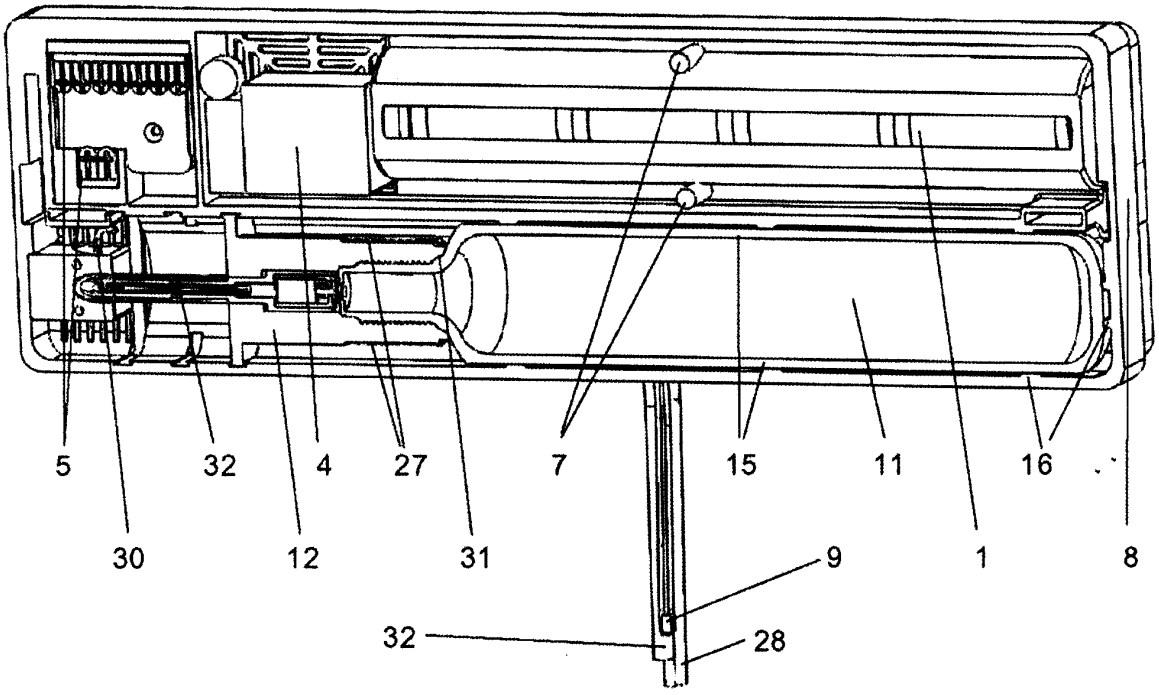
**25.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claim 24, **characterised in that** the transmission of the fire hazard alert is transmitted via electrical wiring or wirelessly by any means that will allow it and, more specifically, using radio waves, infrared or ultraviolet.

**26.** Automatic fire-extinguishing practicable device, mainly for the protection of electric boxes and machinery, according to claims 13 and 20, **characterised in that** the electricity storage means (1) are any means capable of storing electric power and, more specifically, batteries or electrical capacitors.

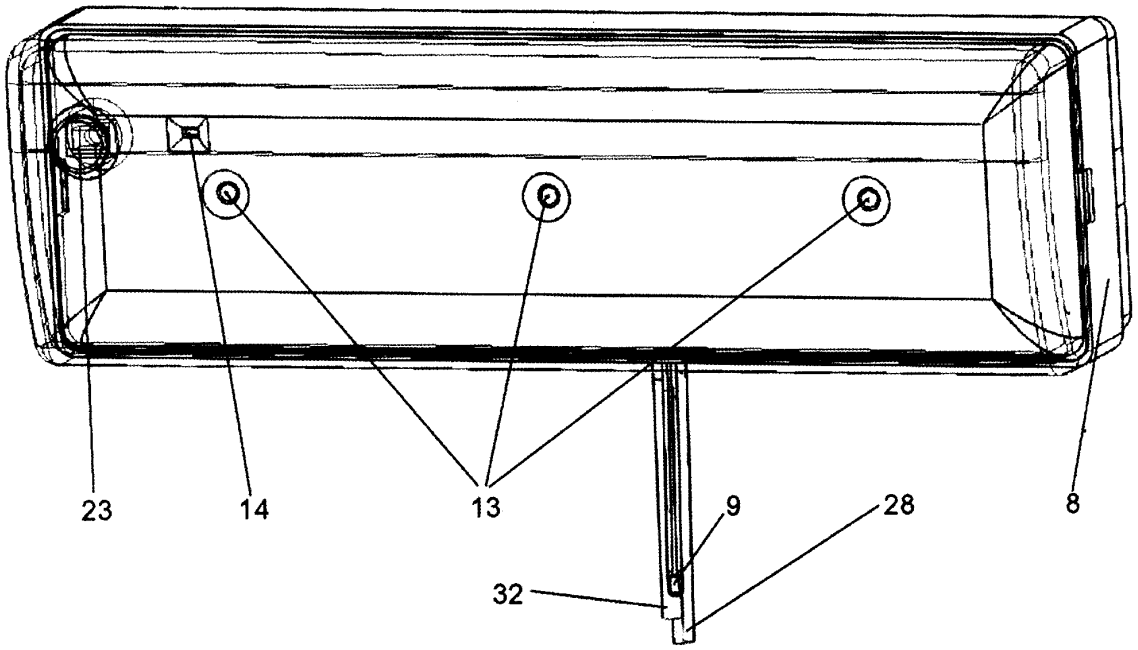
[Fig. 1]



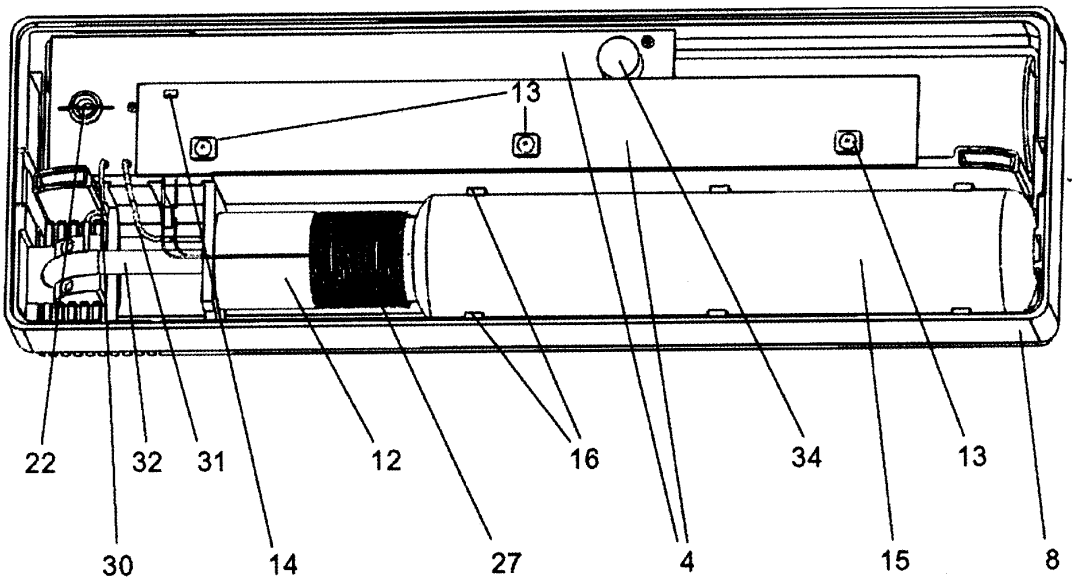

[Fig. 2]



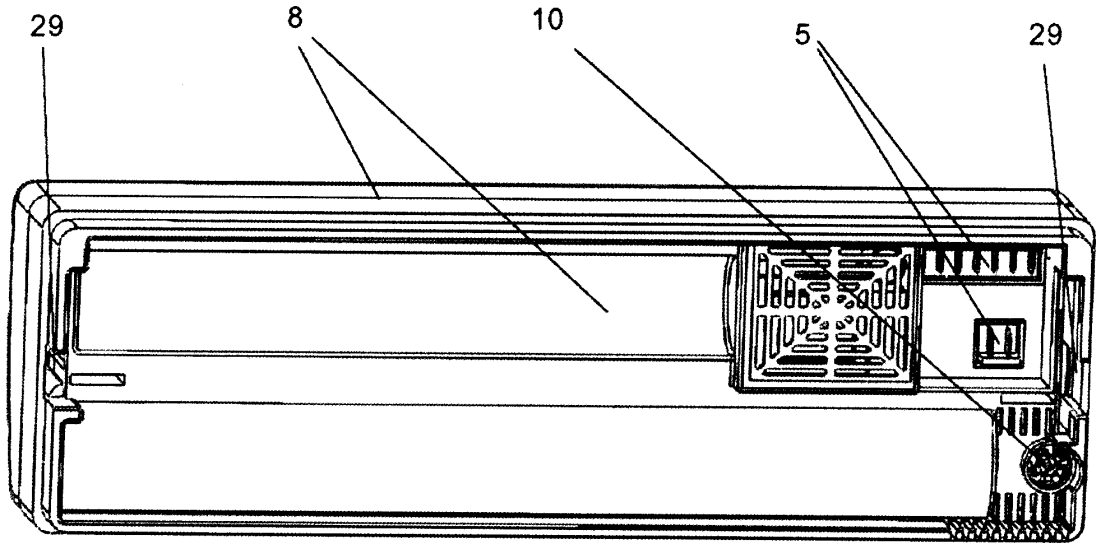
[Fig. 3]



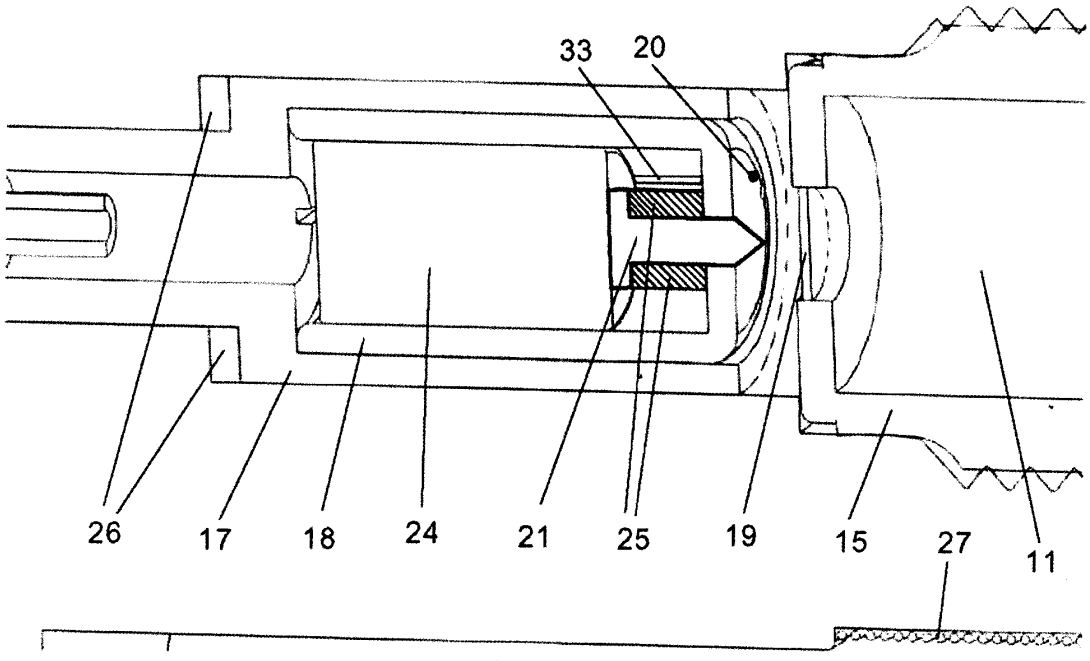

[Fig. 4]



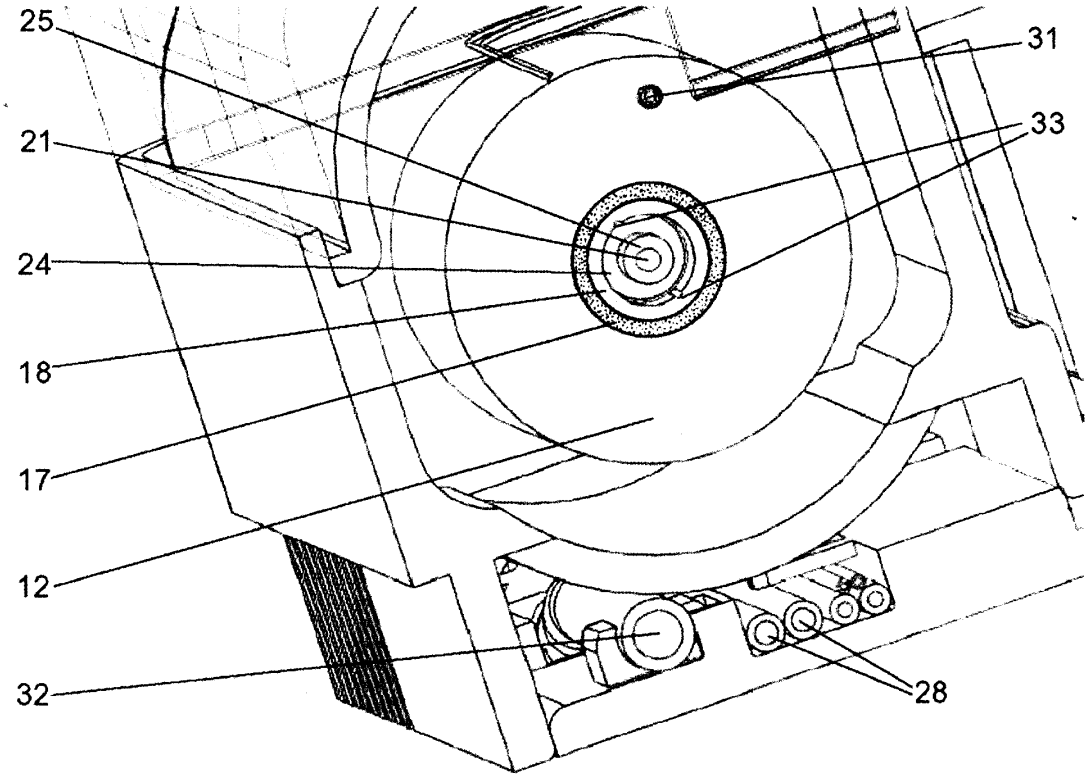
[Fig. 5



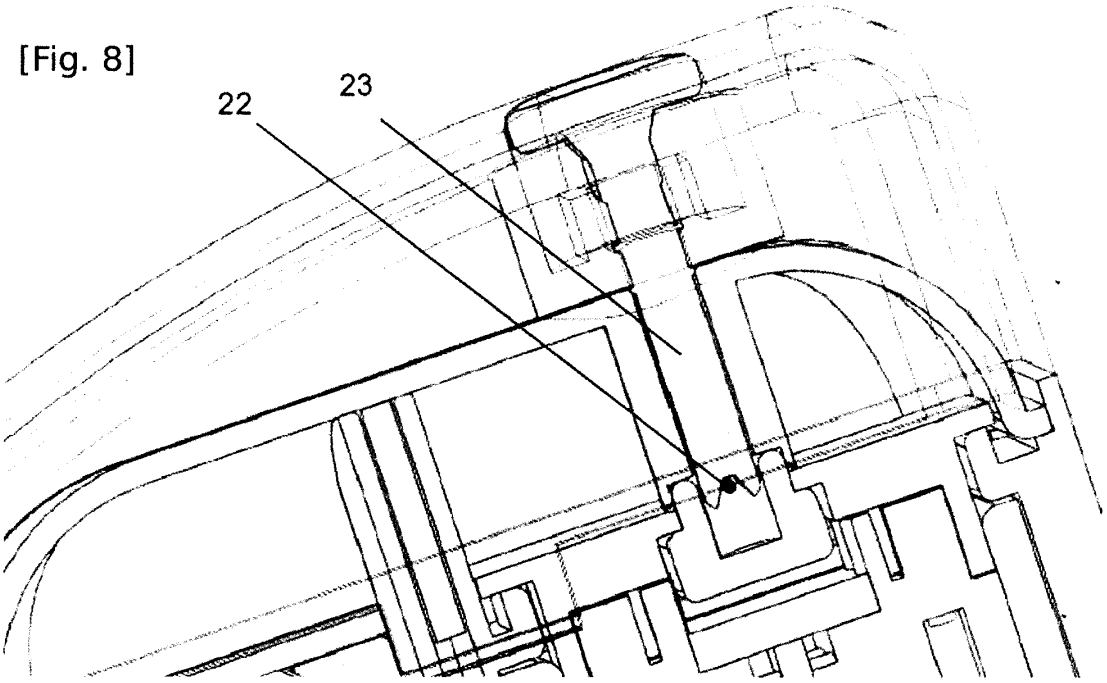

[Fig. 6]



[Fig. 7]




[Fig. 8]



# INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2011/070212

A. CLASSIFICATION OF SUBJECT MATTER

**See extra sheet**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A62C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | ES 1066142 U (PICATOSTE NAVARRO) 16/12/2007, Pages 2-4; figure 1 | 1, 10-15, 17-26 |
| Y | DE 8913487 U1 (IRS INDUSTRIE RATIONALISIERUNGS SYSTEME GMBH) 01/03/1990, Pages 8-10; figures 1-3 | 1, 10-15, 17-26 |
| A | JP 2004201961 A (SANTEKKUSU KK) 22/07/2004, figure 1 & abstract from DataBase EPODOC. Retrieved in EPOQUE; AN: JP-2002375056-A | 1 |
| A | US 4711307 A (ROSEN) 08/12/1987, column 2-3; figures 1-3 | 1 |

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 15/06/2011 | **(05/08/2011)** |
| Name and mailing address of the ISA/<br><br>OFICINA ESPAÑOLA DE PATENTES Y MARCAS<br>Paseo de la Castellana, 75 - 28071 Madrid (España)<br>Facsimile No.: 91 349 53 04 | Authorized officer<br>J. Hernández Cerdán<br><br><br>Telephone No. 91 3495339 |

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## INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2011/070212

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of documents, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US 5551517 A (ARSENAULT ET AL.) 03/09/1996, column 2; figure 1 | 1 |
| A | JP 4049980 A (TOKYO BOUSAI SETSUBI KK) 19/02/1992, Figures 1, 5-6 & abstract from base of datos EPODOC. Retrieved in EPOQUE; AN: JP-15410590-A | 1 |

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ES2011/070212

| Patent document cited in the search report | Publication date | Patent family member(s) | Publication date |
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International application No.

PCT/ES2011/070212

CLASSIFICATION OF SUBJECT MATTER

***A62C3/16*** (2006.01)
***A62C35/13*** (2006.01)
***A62C37/48*** (2006.01)

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## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- DE 8913487 U **[0005]**
- ES 1045478 **[0006]**
- JP 4049980 B **[0007]**


### Non-patent literature cited in the description


- International Patent Classification **[0001]**