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(71) Applicant: **Battaglin, Federico**
35125 Padova (IT)

(72) Inventor: **Battaglin, Federico**
35125 Padova (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners
Via Meravigli, 16
20123 Milano (IT)

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(54) **SENSOR, PARTICULARLY FOR FIRE AND/OR INTRUSION PREVENTION**

(57) A sensor (10), particularly for fire and/or intrusion prevention, that comprises an electro-optical part (11) and a supporting base (12) for supporting the electro-optical part (11).

In the sensor (10), at least on the electro-optical part (11), there are one or more insect-repellent and/or rodent-repellent active ingredients.

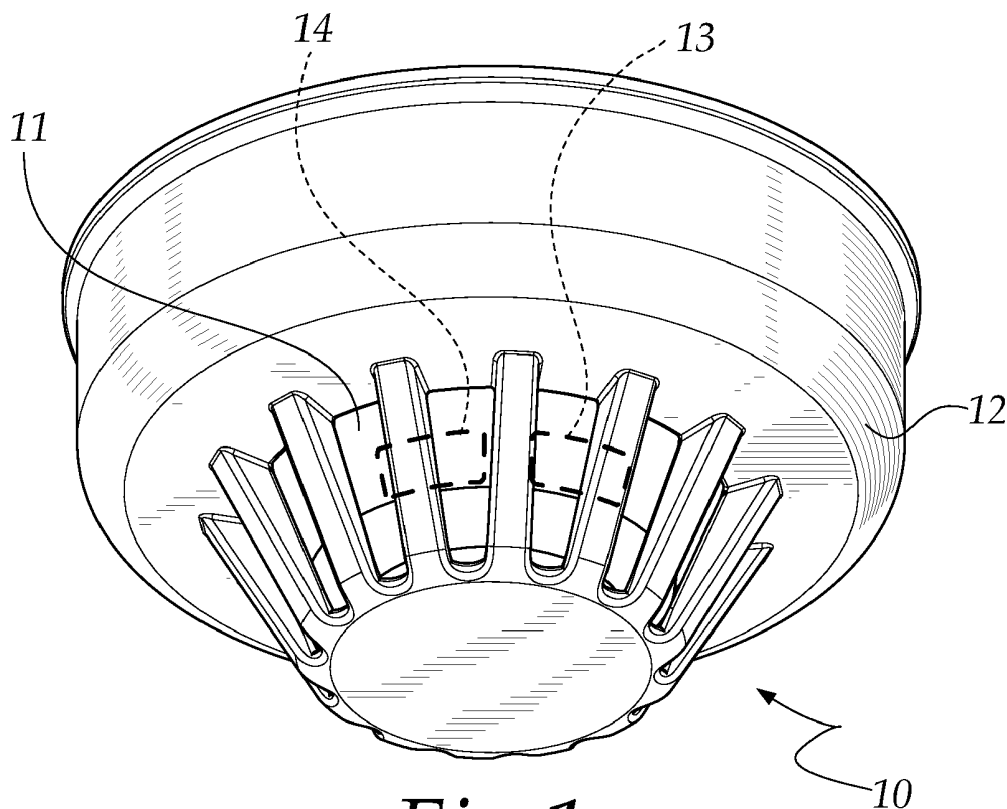


Fig.1

Description

[0001] The present invention relates to a sensor, particularly for fire and/or intrusion prevention.

[0002] A fire-prevention sensor is, effectively, a smoke sensor, i.e. an electronic device capable of detecting the presence of smoke in the environment in which it is installed and of sending an alarm signal upon passing one or more preset, or in any case programmable, thresholds.

[0003] The fire-prevention sensor used most widely is a pointed smoke sensor.

[0004] Detection of the presence of smoke is of the optical type and based on the "Tyndall effect".

[0005] The Tyndall effect is a phenomenon of light scattering owing to the presence of bodies and/or particles in the air.

[0006] Because of the Tyndall effect, therefore, if smoke particles are present, the incident light is reflected by them.

[0007] The pointed fire-prevention sensor, therefore, detects an increase in the reflection of a ray of light, which can be visible or invisible, in the presence of smoke, when the ray of light is reflected by the smoke particles.

[0008] By contrast, intrusion-prevention sensors are:

- infrared sensors, which detect the heat of bodies,
- microwave sensors, which use the "Doppler effect" to detect the presence and movement of a body in the environment in which they are installed.

[0009] The fire-prevention sensor has an electro-optical part.

[0010] The electro-optical part of the sensor comprises:

- one or more light transmitters,
- one or more light receivers.

[0011] This/these transmitter(s) and this/these receiver(s) are axially offset, and therefore there is no direct optical contact between the two.

[0012] Nowadays one construction type of fire-prevention sensor is substantially widespread.

[0013] There is also a second type which is not yet widespread on the market.

[0014] The first type of fire-prevention sensor is the sensor with an optical smoke analysis chamber, of the occulted labyrinthine type, i.e. protected from external light.

[0015] This fire-prevention sensor has a dome that protrudes with respect to the surface to which it is applied, inside which there is an optical smoke analysis chamber, which is occulted and labyrinthine to protect against the entry of external light, and a grille, which protects against the entry of objects, dirt and insects.

[0016] The zone made up of the transmitter, the receiver and the smoke detection area is contained in this optical chamber, which is labyrinthine in shape structure

in order to obstruct or minimize the entry of external light.

[0017] A protective grille obstructs and/or minimizes the entry of:

- insects,
- dust,
- dirt.

[0018] The light emitted by the transmitter can be:

- always present, for an always-on transmitter,
- pulsed, for a transmitter that is normally off and which switches on for a fraction of a second at regular time intervals.

[0019] Normally a smoke sensor is composed of two parts assembled together:

- the electro-optical part, containing the optical elements, the electronic board and connection elements,
- a supporting base, for supporting the electro-optical part, which comprises a containment tray, sliding or interlocking metallic tabs, and the required screws for the electrical wiring and the means for coupling to the electro-optical part.

[0020] The two parts generally are fitted together using bayonet coupling.

[0021] This allows ease of installation and removal of the electro-optical part from a distance, using a telescopic locking pliers.

[0022] Electrical contact through sliding and interlocking metallic tabs offers a reliability and lifetime that are inferior to those offered by an industrial-grade terminal board.

[0023] The smoke sensor is installed on the surface of the ceiling of the environment to be monitored.

[0024] This ceiling can be:

- real, i.e. constituted by masonry elements,
- virtual, i.e. constituted by a false ceiling composed of removable panels and/or plasterboard.

[0025] During operation of the sensor, two operating states can be distinguished:

- operation in the absence of smoke,
- operation in the presence of smoke.

[0026] In the absence of smoke, only a fraction of the light emitted by the transmitter reaches the receiver.

[0027] This makes it possible to run diagnostics on the smoke sensor for its correct operation and estimation of its life cycle, which is useful for the planning of maintenance.

[0028] But in the presence of smoke, a greater amount of light emitted by the transmitter reaches the receiver,

by virtue of reflection on the smoke particles.

[0029] This makes it possible to measure the amount of smoke present and trigger the reporting of a fire alarm, depending on the preset threshold or thresholds, or depending on dynamic thresholds.

[0030] It must be considered, however, that an increase in the reflection, and therefore the exceeding of the alarm threshold, can also be due to the presence of other factors:

- insects,
- dust,
- rodents,
- dirt.

[0031] In such cases, the alarm is in reality a false alarm.

[0032] Maintenance is adapted to minimize false alarms by cleaning the labyrinthine optical smoke analysis chamber.

[0033] In fact, the many blind corners in the labyrinthine optical smoke analysis chamber offer points for the build-up of dust and dirt (which for various reasons can move into the smoke analysis zone and lead to false alarms) and shelter for insects (butterflies, ants, termites, bees, flies etc.).

[0034] However, often access to the sensor is inconvenient and/or complicated, in that the latter can be arranged in:

- ceilings with heights in the order of tens of meters,
- removable false ceilings, but which are difficult to access,
- fixed false ceilings, but which are inaccessible.

[0035] In particular, while dust that builds up over time can be moved as a result of sudden air currents, but due to gravity it tends to be deposited on the bottom of the optical smoke analysis chamber and tends not to lead to false alarms, by contrast insects display unpredictable behavior and can find their way into the optical chamber and settle there, triggering false alarms.

[0036] Rodents also display unpredictable behavior and can pass close to the transmitter, triggering a false alarm.

[0037] The second type of fire-prevention sensor is a sensor with an optical smoke analysis chamber of the exposed type, i.e. exposed to external light.

[0038] This kind of smoke sensor is substantially flat, slightly in relief with respect to the surface on which it is applied.

[0039] This type of smoke sensor is more recent than the sensor with an occulted chamber, and uses innovative electro-optical elements, algorithms used for contact sensors, and higher-performance processing units than in the previous type of sensor, all of which make it possible to support a greater complexity of software for analyzing the data received by the optical receiver, to filter

out external light (natural or artificial) and other intermittent optical phenomena (regular or irregular) that interfere with the light emitted by the transmitter.

[0040] This known art also presents the drawback of not being immune to the movement of insects and/or rodents, which can trigger false alarms.

[0041] In a similar manner, anti-intrusion sensors are also prone to generating false alarms caused by the presence and/or transit of insects and/or rodents.

[0042] In order to control the problem, nowadays it is possible to disinfest the environment surrounding the sensor for example by application of an anti-insect and/or anti-rodent spray.

[0043] However, such known art has drawbacks:

- the disinfestation does not last long over time and, once the effect of the spray has faded, the problem of the presence and movement of insects and/or rodents proximate to and/or inside the sensor can return and as a consequence also the problem of the false alarms associated with them;
- application of the spray could alter the efficacy of detection of phenomena, compromising the sensor itself and the product certifications if any.

[0044] The aim of the present invention is to provide a pointed sensor, particularly for fire and/or intrusion prevention, which is capable of improving the known art in one or more of the above mentioned aspects.

[0045] Within this aim, an object of the invention is to provide a sensor, particularly for fire and/or intrusion prevention, that keeps insects and/or rodents away, at least from its electro-optical part, thus preventing the generation of false alarms.

[0046] Another object of the invention is to provide a sensor, particularly for fire prevention, that prevents insects from finding their way into the smoke analysis chamber and settling there.

[0047] Another object of the invention is to provide a sensor, particularly for fire and/or intrusion prevention, that keeps insects and/or rodents away, at least from its electro-optical part, thus preventing the generation of false alarms, for a time interval in the order of several years.

[0048] A further object of the present invention is to overcome the drawbacks of the background art in an alternative manner to any existing solutions.

[0049] Another object of the invention is to provide a sensor, particularly for fire and/or intrusion prevention, that is highly reliable, easy to implement and of low cost.

[0050] This aim and these and other objects which will become better apparent hereinafter are achieved by a sensor, particularly for fire and/or intrusion prevention, comprising an electro-optical part and a supporting base for supporting said electro-optical part, characterized in that at least on said electro-optical part there are one or more insect-repellent and/or rodent-repellent active ingredients.

[0051] Further characteristics and advantages of the invention will become better apparent from the detailed description that follows of a preferred, but not exclusive, embodiment of the sensor, particularly for fire and/or intrusion prevention, according to the invention, which is illustrated for the purposes of non-limiting example in the accompanying drawings wherein:

- Figure 1 shows a sensor, particularly for fire and/or intrusion prevention, according to the invention.

[0052] With reference to the figures, a sensor, particularly for fire and/or intrusion prevention, according to the invention, is generally designated by the reference numeral 10.

[0053] In the example shown in the figure, the sensor 10 is a fire-prevention sensor with the optical smoke analysis chamber exposed.

[0054] However, in other embodiments, not shown in the figures, the sensor 10 can be a fire-prevention sensor with a protruding dome, with an occulted optical smoke analysis chamber, and/or an anti-intrusion sensor.

[0055] The sensor 10 comprises:

- an electro-optical part 11,
- a supporting base, 12 for supporting the electro-optical part 11.

[0056] The electro-optical part 11 comprises:

- at least one transmitter 13 of light,
- at least one receiver 14 of light,
- a microprocessor, not shown in the figures, and/or another programmable device, also not shown in the figures, for managing the sensor 10, which is connected both to the transmitter 13 and to the receiver 14.

[0057] One of the peculiarities of the sensor 10 consists in that at least on the electro-optical part 11 there are one or more insect-repellent and/or rodent-repellent active ingredients.

[0058] In the present description the term "insect-repellent" also means anti-termite.

[0059] In this manner, insects and/or rodents are kept away at least from the electro-optical part 11 and false alarms are not generated.

[0060] In some embodiments the sensor 10 comprises one or more insect-repellent and/or rodent-repellent active ingredients not only on the electro-optical part 11, but also on the supporting base 12.

[0061] Such active ingredients are in the form of liquid and/or spray and/or solids.

[0062] In the present description the term "solids" also refers to powders.

[0063] In particular these active ingredients also comprise nanoparticles of insect-repellent and/or rodent-repellent substances, such as for example compounds

based on metals, aromatic compounds, acrylic polymers.

[0064] In the present description the term "aromatic compounds" means organic compounds that contain one or more aromatic rings in their structure.

[0065] In particular, some of these active ingredients are, for example, based on titanium, such as:

- those known by the trade name "TITANIUM Q" and/or "TITANIUM Q2" and/or "TITANIUM Q3" of the L&G Holding company;
- those known by the trade name "OnCap® Aversive Masterbatch" of the PolyOne company.

[0066] Other insect-repellent and/or rodent-repellent active ingredients are for example those known by the trade names "REPELA® FOR RODENTS" and/or "REPELA® FOR INSECTS" and/or "REPELA® COMBI" of the Aversion Technologies Inc. company.

[0067] In particular, these active ingredients are present with a maximum content by weight and/or volume of 20%, depending on whether they are in the form of liquid, spray or solids.

[0068] Such active ingredients ensure a lifetime even of the order of several years and this also makes it possible to reduce and/or eliminate the maintenance necessary for the removal of any insects.

[0069] Furthermore, the presence of these active ingredients and their lifetime makes it possible to prevent the risk of deposit of insect excrement, at least on the electro-optical part 11, at the same time eliminating the need for a subsequent removal thereof.

[0070] Also, the presence of these active ingredients and their lifetime makes it possible to eliminate potential false alarms caused by the presence of excrement or of one or more dead insects.

[0071] In particular, it is possible to provide the sensor 10 by incorporating one or more insect-repellent and/or rodent-repellent active ingredients in the material with which at least the electro-optical part is provided.

[0072] In an embodiment, the sensor 10 comprises such insect-repellent and/or rodent-repellent active ingredients incorporated and/or embedded in the material of which at least the electro-optical part 11 is made.

[0073] For example, it is possible to add these insect-repellent and/or rodent-repellent active ingredients in liquid and/or solid form in the base plastic material used in the molding of the electro-optical part 11 and/or of the supporting base 13.

[0074] In practice it has been found that the invention fully achieves the intended aim and objects by providing a sensor, particularly for fire and/or intrusion prevention, keeps insects and/or rodents away, at least from its electro-optical part, thus preventing the generation of false alarms.

[0075] With the invention a sensor is devised, particularly for fire prevention, which prevents insects from finding their way into the optical smoke analysis chamber and settling there.

[0076] Furthermore, with the invention a sensor is provided, particularly for fire and/or intrusion prevention, that keeps insects and/or rodents away, at least from its electro-optical part, thus preventing the generation of false alarms, for a time interval in the order of several years.

[0077] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

[0078] In practice the materials employed, provided they are compatible with the specific use, and the contingent dimensions and shapes, may be any according to requirements and to the state of the art.

[0079] The disclosures in Italian Patent Application No. 102019000022440 from which this application claims priority are incorporated herein by reference.

[0080] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A sensor (10), particularly for fire and/or intrusion prevention, comprising an electro-optical part (11) and a supporting base (12) for supporting said electro-optical part (11), **characterized in that** at least on said electro-optical part (11) there are one or more insect-repellent and/or rodent-repellent active ingredients.
2. The sensor (10) according to claim 1, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are embedded and/or incorporated in the material of which at least said electro-optical part (11) is made.
3. The sensor (10) according to one or more of the preceding claims, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are added in liquid and/or solid form to the base plastic material used in the molding of said electro-optical part (11) and/or of said supporting base (13).
4. The sensor (10) according to one or more of the preceding claims, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are in the form of liquid and/or spray and/or solids.
5. The sensor (10) according to one or more of the preceding claims, **characterized in that** said one or

more insect-repellent and/or rodent-repellent active ingredients comprise nanoparticles of insect-repellent and/or rodent-repellent substances.

6. The sensor (10) according to one or more of the preceding claims, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are compounds based on metals and/or aromatic compounds and/or acrylic polymers.
7. The sensor (10) according to one or more of the preceding claims, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are based on titanium.
8. The sensor (10) according to the preceding claim, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are:
 - those known by the trade name "TITANIUM Q" and/or "TITANIUM Q2" and/or "TITANIUM Q3" of the L&G Holding company,
 - and/or those known by the trade name "On-Cap® Aversive Masterbatch" of the PolyOne company.
9. The sensor (10) according to one or more of the preceding claims, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are those known by the trade names "REPELA® FOR RODENTS" and/or "REPELA® FOR INSECTS" and/or "REPELA® COMBI" of the Aversion Technologies Inc. company.
10. The sensor (10) according to one or more of the preceding claims, **characterized in that** said one or more insect-repellent and/or rodent-repellent active ingredients are present with a maximum content by weight and/or volume of 20%.

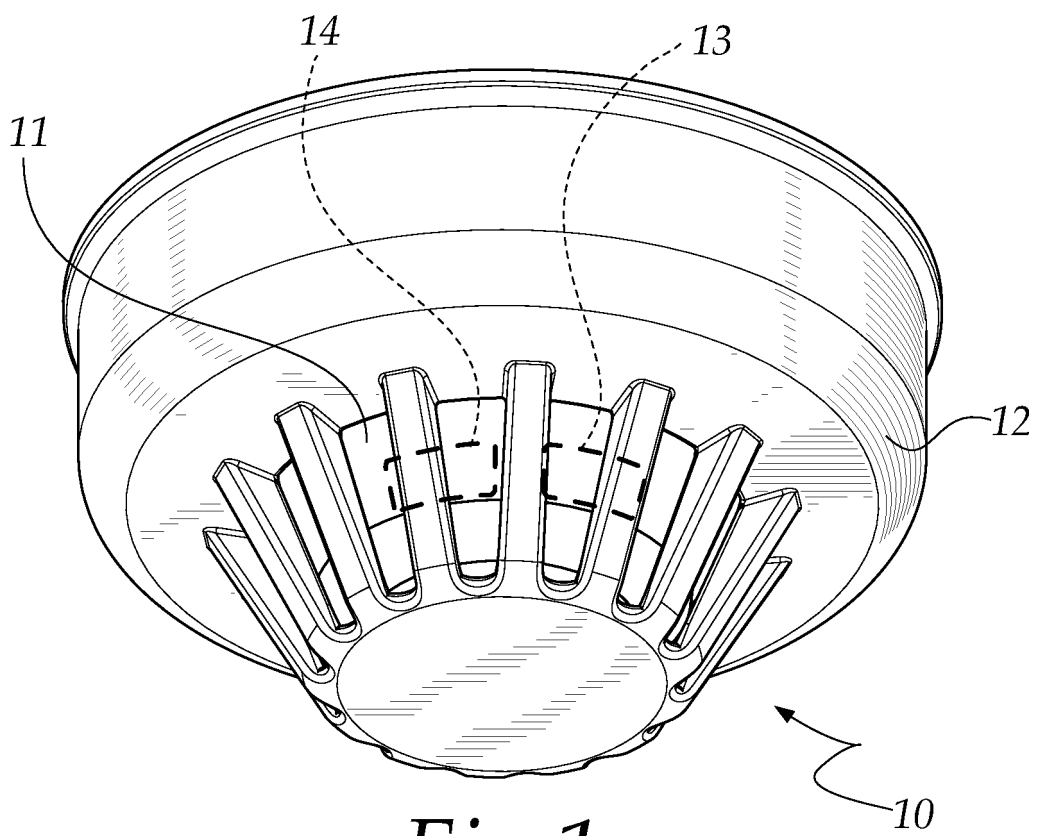


Fig.1



EUROPEAN SEARCH REPORT

Application Number
EP 20 21 0282

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X	EP 1 688 898 A1 (HOCHIKI CO [JP]) 9 August 2006 (2006-08-09) * paragraph [0001] * * paragraph [0023] * * paragraph [0041] * * paragraph [0058] * * paragraph [0097] * * claim 14 * * figures 1,3 *	1-10	INV. G08B13/18 G08B13/24 G08B17/103 G08B17/113 G08B29/18
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A	WO 2015/185463 A1 (BSH HAUSGERÄTE GMBH [DE]) 10 December 2015 (2015-12-10) * page 1, lines 23-26 * * page 3, lines 23-24 * * page 4, line 34 - page 5, line 22 *	5-9	
			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 March 2021	Examiner Meister, Mark
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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