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(71) Applicant: **O&G RESEARCH & DEVELOPMENT AB** [SE/SE]; Box 5108, 102 43 STOCKHOLM (SE).

(72) Inventors: **OLSSON, Michael**; Tulegatan 24, lght 1601, 113 53 STOCKHOLM (SE). **GRÖNSTEDT, Rickard**; Artillerigatan 85, 115 30 STOCKHOLM (SE). **RYDLE, Mikael**; Tantogatan 45, 118 42 STOCKHOLM (SE).

(74) Agent: **NORÉNS PATENTBYRÅ AB**; Box 10198, 100 55 STOCKHOLM (SE).

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(54) Title: SAFETY DEVICE FOR A FIRE DETECTOR

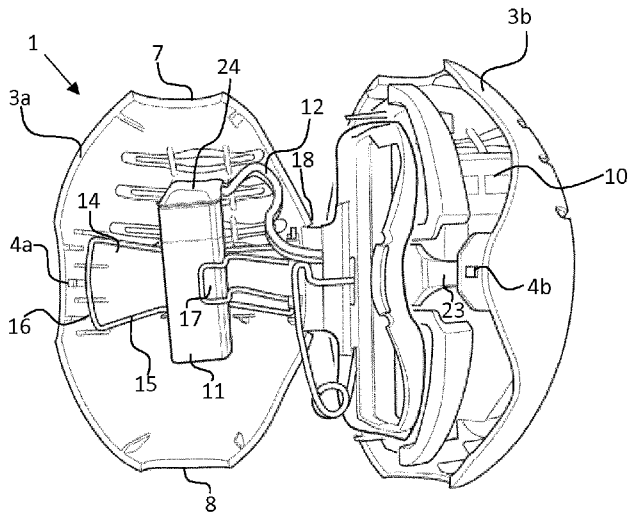

Fig. 4

(57) Abstract: There is provided a fire warning device that comprises a housing formed by two shell parts being connectable with a lock to form a closed housing, where the fire warning device comprises a friction anchoring device disposed in a passageway that extends between two mutually opposite ends of the closed housing, such as to enable the housing to be closed around a cable, rod or chain for suspending the fire warning device, the fire warning device comprising a fire sensor, said fire sensor being connectable to a battery to power the fire sensor, the fire warning device comprising a battery holder arranged to receive a battery with a predetermined size, and a safety device comprising a safety spring with a lock-block- ing part that is blocking the lock when there is no battery in the battery holder, thereby preventing the housing from closing, and where said lock-blocking part is removed from the lock when a battery is placed in the battery holder, to enable closing of the lock.

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Safety device for a fire detector

Field of the invention

This invention relates to a fire alarm, such as a smoke detector, in particular a smoke detector that can be attached to a cable, rod or a chain.

Background

Smoke detectors for household use are typically puck-shaped devices that are attached to the ceiling with the use of screws. Installation is somewhat cumbersome as holes must be drilled into the ceiling and the detector is then screwed into place. For the average homeowner it is somewhat cumbersome to stand on a ladder and work on the ceiling.

EP1038280 describes as innovative type of fire detector that can be attached to the cable of a hanging lamp. It consists of two shell parts that can be closed around the cable so that the smoke detector is suspended by the cable. This provides simple installation since it is not necessary to drill and screw into the ceiling.

It is important that a user is aware if there is no battery power in the fire alarm. Otherwise a user may think that the alarm is working although it really is not. For this reason, fire alarms often make a sound when the battery is approaching is end of life, indicating that the battery needs to be changed. However, it is also necessary to make a user aware that there is no battery at all in the device. Otherwise a user may install the device with no battery, which would be dangerous.

A second problem is that it should be easy to change the battery in the fire detector.

Summary of invention

In a first aspect of the invention there is provided a fire warning device that comprises a housing formed by two shell parts being connectable with a lock to form a closed housing, where the fire warning device comprises a friction anchoring device disposed in a passageway that extends between two mutually opposite ends of the closed housing, such as to enable the housing to be closed around a cable, rod or chain for suspending the fire warning device, the fire warning device comprising a fire sensor, said fire sensor being connectable to a battery to power the fire sensor, and a battery holder arranged to receive a battery with a predetermined size, and a safety device comprising a safety spring with a lock-blocking part that is blocking the lock when there is no battery in the battery holder, thereby preventing the housing from closing, and where said lock-blocking part is removed from the lock when a battery is placed in the battery holder, to enable closing of the lock. This a convenient way to arrange a battery safety device in this type of fire alarm.

The battery may press on the safety spring when it is placed in the battery holder. For example, the battery may urge the safety spring into a shell part thereby moving the lock-blocking part of the safety spring away from the lock when it is placed in the battery holder.

The battery holder may comprise a flexing hook that urges the battery into a predetermined position to lock the battery in the battery holder, and where the flexing hook and the safety spring is formed in one part. This is a particularly convenient to arrange the safety spring and the flexing hook. The spring may be a metal wire spring.

The look blocking part may comprise a metal wire loop that is urged against the interior of the shell.

In a second aspect of the invention there is provided a fire warning device that comprises a housing formed by two shell parts being connectable with a lock to form a closed housing, the fire warning device comprising a fire sensor, the fire warning device further

comprising a friction anchoring device disposed in a passageway that extends between two mutually opposite ends of the closed housing, such as to enable the housing to be closed around a cable, rod or chain for suspending the fire warning device, where the friction anchoring device can be closed around the cable, rod or chain separately from the housing. This has the advantage that that the housing can be opened while the device is still attached to the cable, chain or rod, and enables change of battery without moving the device from its place on the cable. Preferably, the housing is able to close around the friction anchoring device.

In one embodiment, the friction anchoring device may be a clamp comprising a first part and a second part, where the cable, rod or chain can be clamped between the first part and the second part, where the clamp can be opened and closed separately from the housing. The clamp and the housing may open in the same direction. The first and the second parts of the clamp may be urged together by a clamping spring.

One of the clamp parts may be fixed in relation to one shell part so that it does not move in relation to the shell part. This has the advantage of making it easier to open the clamp and the housing when attaching the device to a cable. It is preferred that a battery holder is located in the shell part that is not fixed together with the clamp part.

Drawings

The accompanying drawings form a part of the specification and schematically illustrate preferred embodiments of the invention, and serve to illustrate the principles of the invention.

Fig. 1 shows a fire warning device where the housing is open.

Fig. 2 shows the fire warning device where the housing is closed.

Fig. 3 shows a fire warning device without battery.

Fig. 4. shows a fire warning device with battery.

Figs. 5 and 6 are sections of a part of a fire warning device, with and without battery.

Fig. 7 is a section of a part of a fire warning device in the open state.

Fig. 8 is a section of a part of a fire warning device in the closed state.

Fig. 9 shows a metal spring.

Fig. 10 shows a metal spring in a shell part.

Detailed description

Figs. 1 to 10 shows one embodiment of a fire warning device. The fire warning device 1 comprises a housing 2 formed by two shell parts 3a 3b. The two shell parts are connected with hinge 18 and are connectable with a lock 4 formed by lock parts 4a 4b. Lock parts 4a 4b can reversibly attach to each other to form a closed housing 2. Lock parts 4a 4b may for example snap together. Lock parts 4a and 4b may be parts of shells parts 3a and 3b, respectively. Hence lock parts 4a and 4b may be integrated with shell parts 3a and 3b, respectively. Hence lock parts 4a and 4b may be formed together with shell parts 3a and 3b, for example by moulding. The fire warning device 1 comprises a friction anchoring device disposed in a passageway 6 that extends between two mutually opposite ends 7, 8 of the closed housing 2, such as to enable the housing 2 to be closed around a cable, rod or chain 9 (referred to as cable 9 herein) for suspending the device 1. The anchoring device may for example be a clamp 5 able to clamp onto the cable 9. Preferably the anchoring device is reversibly attached to cable 9. The fire warning device 1 can therefore easily be attached the cable 9, for example the cable 9 of a lamp that is suspended from a ceiling in the cable 9. Thereby, the device 1 is easy to install as it is not necessary to drill holes in the ceiling. It is also easy to remove the device 1 from the cable 9.

The fire warning device 1 comprising a fire sensor 10 which preferably is a smoke detector as is known in the art. The fire sensor 10 is connectable to a battery 11 to power the fire sensor 10 via cable 12. The cable 12 may be connectable to the battery 11 with connector 24. The fire sensor 10 is able to detect fire, for example by detecting heat or smoke, and then trigger a sound alarm to alert persons in the house.

The fire warning device 1 comprises a battery holder 13 arranged to receive a battery 11 with a predetermined size. Often a disposable battery such as a PP3 battery (often referred to as a "9-volt battery"), is used. Preferable battery holder 13 is be arranged to receive the battery 11 in a predetermined direction or position.

The housing 2 encloses the other parts of the device 1, including the friction anchoring device, fire warning sensor 10, battery 11, battery holder 13, cable 12, connector 24 and safety device 14. Preferably the housing 2 has apertures 27 as inlets for ambient air, thereby allowing smoke to come in contact with the fire detector 10. Clamp parts 20, 21 may have at least one aperture 25 for allowing of circulation of air inside the device 1.

The friction anchoring device may be of the type shown in EP1038280 which engages the cable 9 upon closing of the housing 2 (not shown in the Figs. 1-10). However, in a preferred embodiment, shown in Figs. 1-10, the friction anchoring device may be such that it can be closed around the cable 9 separately from the housing 2. The friction anchoring device may be a clamp 5 comprising a first part 20 and a second part 21, where the cable 9 is clamped between the first part 20 and the second part 21. The first 20 and second parts 21 of the clamp 5 may be urged together to a closed state by a spring 19. The clamp 5 can preferably be opened by hand. The clamp 5 may preferably have a hinge 22 that connects first part 20 and second part 21. In one embodiment the clamp 5 and the housing 2 opens in the same direction. Hinge 22 of clamp 5 and hinge 18 of housing 2 may be parallel.

Preferably the clamp 5 distributes force from spring 19 along a length of contact between clamp 5 and cable 9, where the cable 9 is kept straight. This prevents the formation of kinks in cable 9. It is also preferred that the anchoring device does not make it necessary for the cable 9 to turn or make kinks. Ugly kinks are prone to remain even after the device 1 is removed from the cable 9, in particular if the device 1 has been hanging on the cable 9 for a long time.

In one embodiment, one of the first part 20 and second part 21 of clamp 5 can be fixed in relation to one of shell 3a, 3b so that it does not move in relation to the shell part.

Attachment makes second clamp part 21 and shell part 3b behave as one part. Below it is described how second clamp part 21 is fixed in relation to shell part 3b, such that it cannot swing separately from shell part 3b. This simplifies installation, because the user can then open the clamp 5 by grabbing one shell 3b part with one hand and the other shell 3 and the clamp part 20 with the other hand and then pry the clamp 5 apart.

It is preferred that second clamp part 21 that is closest to the shell part 3b that does not comprise the battery holder 13 is attached to the shell part 3b. The fixation of clamp part 21 in relation to shell part 3b may be permanent. Clamp part 21 may be attached to shell part 3b in a suitable way. For example, this may be achieved with locking mechanism 23. Alternatively, one clamp part 21 can for example be glued together with the shell part 3b.

The fire warning device 1 may preferably further comprises a safety device 14 that prevents the closing of the housing 2 when there is no battery 11 installed in the battery holder 13. The safety device 14 comprises a safety spring 15 with a lock-blocking part 16 that is blocking the lock 4 when there is no battery 11 in the battery holder 13, thereby preventing the housing 2 from closing. The battery 11 may interact directly with the safety spring 15.

In a preferred embodiment the safety spring 15 interferes with a lock part 4a 4b of the shell part 3a 3b for example lock part 4a of shell part 3a where the battery holder 13 is located. The lock-blocking part 16 of safety spring 15 moves away from the lock part 4a when a battery 11 is placed in the battery holder 13, to enable closing of the lock 4.

The safety device 14 may be configured so that the battery 11 presses on the safety spring 15 when the battery 11 is placed in the battery holder 13. The battery 11 thereby urges the lock-blocking part 16 of the safety spring 15 away from the lock 4, for example lock part 4a or 4b. When the battery 11 is removed, the lock blocking part 16 of safety spring 15 moves towards lock 4 and interferes with lock 4 so that it cannot be closed.

Thus, when a battery 11 is placed in the battery holder 13, the device 1 can be closed around a lamp cable 9, but when there is no battery 11 in the battery holder 13, the housing 2

cannot be locked in the closed position and remains open. If device 1 has a friction anchoring device that closes separately from housing (such as a clamp 5, described above) the device 1 can still be attached to cable 9, in its open state, but housing 2 cannot be closed. The fact that the open (non-closable) device 1 hangs visible on the cable 9 provides a reminder to the user to install a battery 11 in the device 1.

In another embodiment (not shown in Figs. 1-10) closing of the lock 4 of housing 2 is necessary for attaching the device 1 to the cable 9, and the friction anchoring device cannot be closed independently of the housing 2. Here, the device 1 cannot be attached to the cable 9 without installing a battery 11. This also provides a safety warning to the user.

The lock-blocking part 16 may be a metal wire loop that is urged against the interior of the shell 3a. Figs. 5 and 7 show how the lock blocking part 16 rests against lock part 4a thereby preventing lock part 4b to snap into place. Placing the battery 11 in the battery holder 13 forces spring 15 into shell 3a, thereby causing lock blocking part 16 away from lock part 4a as seen in Figs 6 and 8. This allows lock part 4a to snap together with lock part 4b to close the housing 2.

Thus safety spring 15 may have a first position where the lock 4 cannot be closed and a second position where the lock 4 can be closed, and where the insertion of the battery 11 into the battery holder 13 causes the safety spring 15, in particular lock blocking part 16, to move from the first position to the second position, and where removal of the battery 11 causes the safety spring 15, in particular lock blocking part 16, to move from the second position to the first position.

The battery holder 13 may comprise a flexing hook 17 that urges the battery 11 into a fixed position. Battery holder 13 may also comprise battery supports 26. In the embodiment shown in Figs. 1 to 10 battery 11 is clamped between flexing hook 17 and battery supports 26, thereby urging safety spring 15 into shell 3a. Flexing hook 17 and battery support 26 are preferably adapted to the predetermined size and shape f the battery 11. The flexing hook

and the battery support are preferable arranged to interact and to maintain the battery removably fixed in a pre-determined orientation.

The flexing hook 17 and the safety spring 15 may be made in one spring piece 28 , made by for example a metal wire. In Figs. 1 to 10 flexing hook 17 and safety spring 15 is made by one spring piece 28 of metal wire. Fig. 9 show the metal wire spring piece 28 that constitutes spring 15 (with lock-blocking part 16) and flexing hook 17. The metal wire provides flex for spring 15 and flexing hook 17. Spring piece 28 also comprises holding part 29 that maintains the spring piece in the correct orientation and position the shell part 3a. Holding part 29 can be made to interact with spring piece holding part 30 (fig 10) which may be formed as integrated parts of shell part 3a.

While the invention has been described with reference to specific exemplary embodiments, the description is in general only intended to illustrate the inventive concept and should not be taken as limiting the scope of the invention. The invention is generally defined by the claims.

CLAIMS

1. A fire warning device (1) that comprises a housing (2) formed by two shell parts (3a, 3b) being connectable with a lock (4) to form a closed housing (2), where the fire warning device (1) comprises a friction anchoring device (5) disposed in a passage-way (6) that extends between two mutually opposite ends (7, 8) of the closed housing (2), such as to enable the housing (2) to be closed around a cable, rod or chain (9) for suspending the fire warning device (1), the fire warning device (1) comprising a fire sensor (10), said fire sensor (10) being connectable to a battery (11) to power the fire sensor (10), and a battery holder (13) arranged to receive a battery (11) with a predetermined size, and a safety device (14) comprising a safety spring (15) with a lock-blocking part (16) that is blocking the lock (4) when there is no battery (11) in the battery holder (13), thereby preventing the housing (2) from closing, and where said lock-blocking part (16) is removed from the lock (4) when a battery (11) is placed in the battery holder (13), to enable closing of the lock (4).

2. The device of claim 1 where the battery (11) presses on the safety spring (15) when it is placed in the battery holder (13).

3. The device of claim 1 or 2 where the battery (11) urges the safety spring (15) into a shell part (2a, 2b) thereby moving the lock-blocking part (16) of the safety spring (15) away from the lock (4) when it is placed in the battery holder (13).

4. The device of claims 1-3 where the battery holder (13) comprises a flexing hook (17) that urges the battery (11) into a predetermined position to lock the battery (11) in the battery holder (13) , and where the flexing hook (17) of the battery holder (13) and the safety spring (15) of the safety device (14) is formed in one part.

5. The device of claim 4 where the flexing hook (17) clamps the battery between the flexing hook (17) and a battery support (26).

6. The device of any one of claims 1 – 5 where the safety spring (15) is a metal wire spring.

7. The device according to claim 6 where the lock-blocking part (16) comprises a metal wire loop that is urged against the interior of the shell.

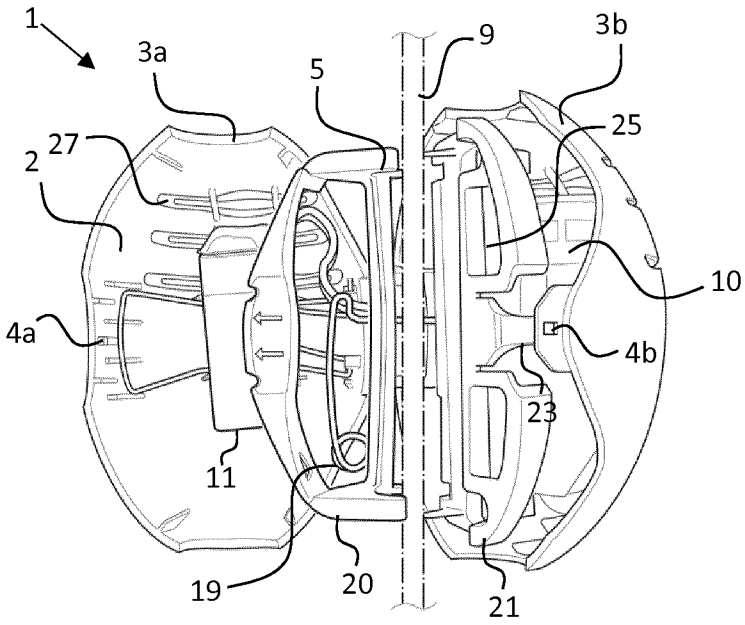


Fig. 1

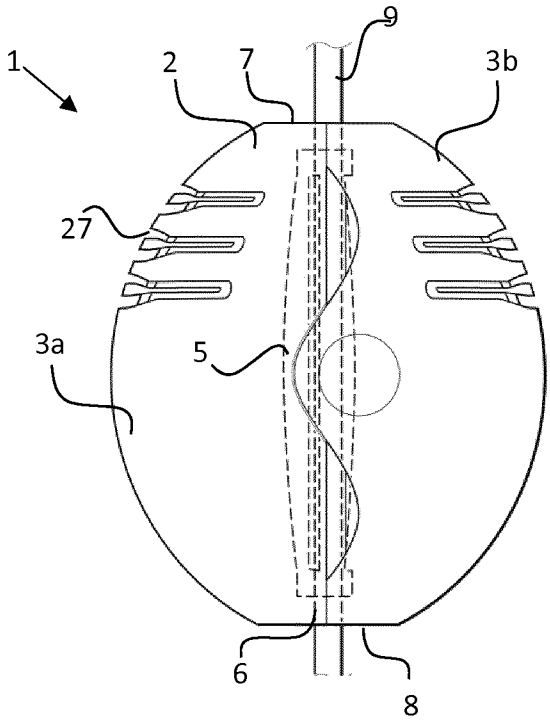
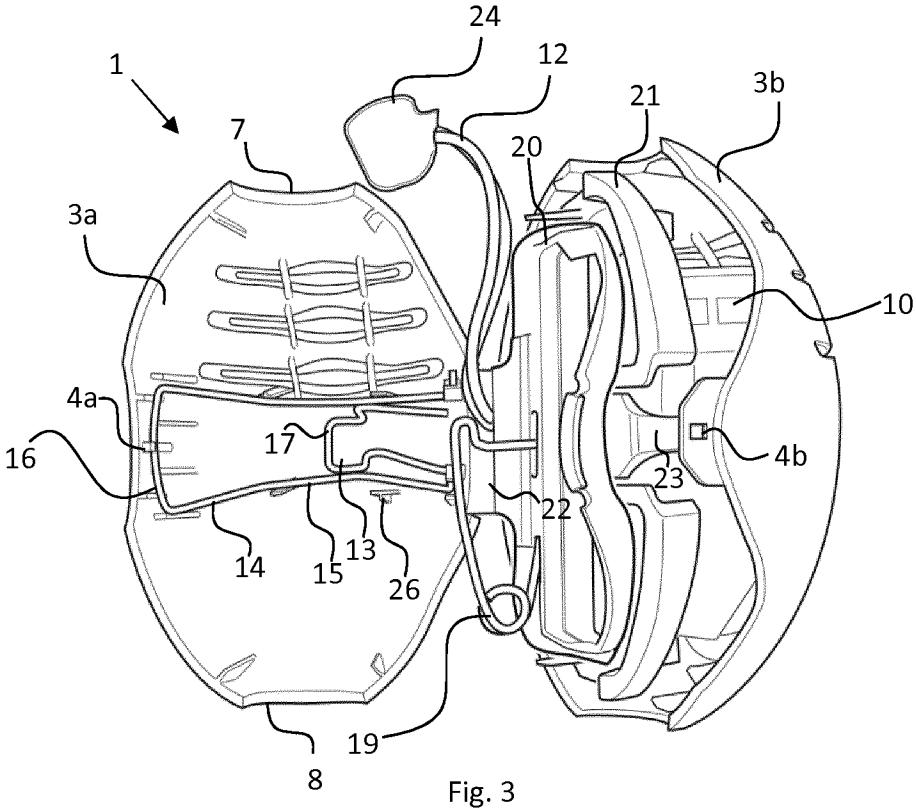


Fig. 2


24
12
1
21
3b
7
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8

Fig. 3

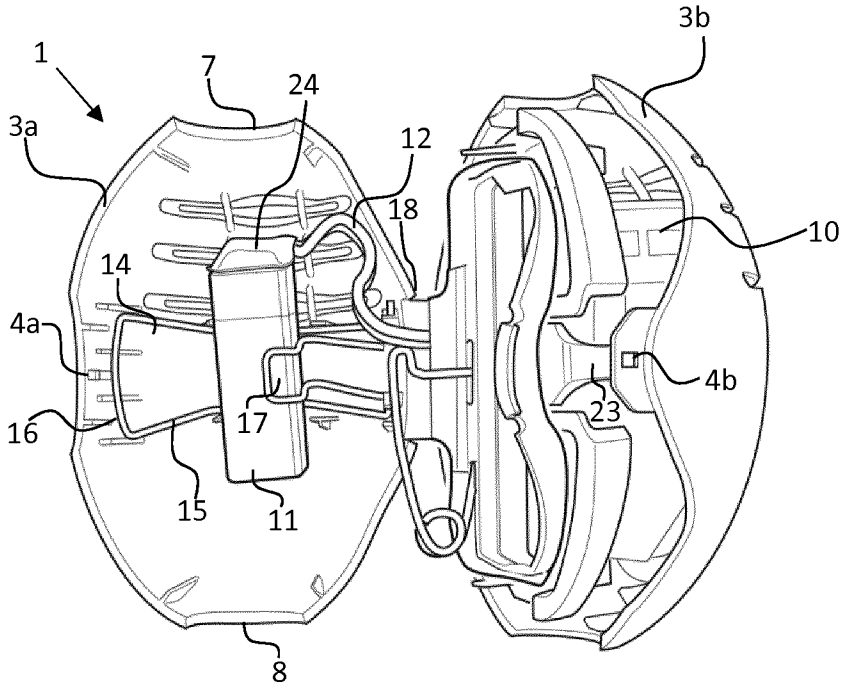
3b
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Fig. 4

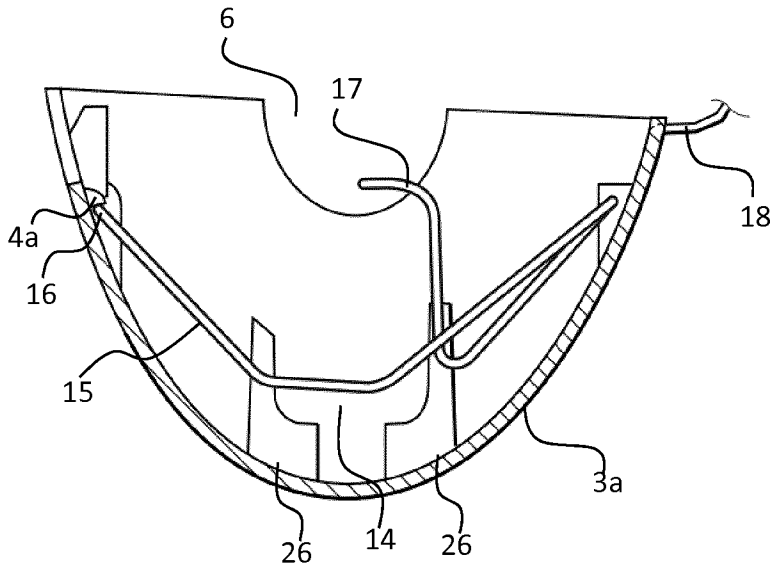

Fig. 5

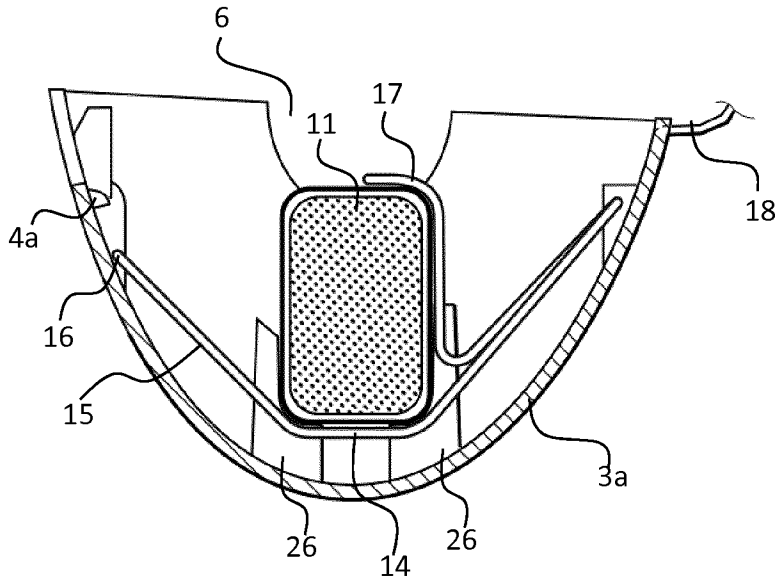

Fig. 6

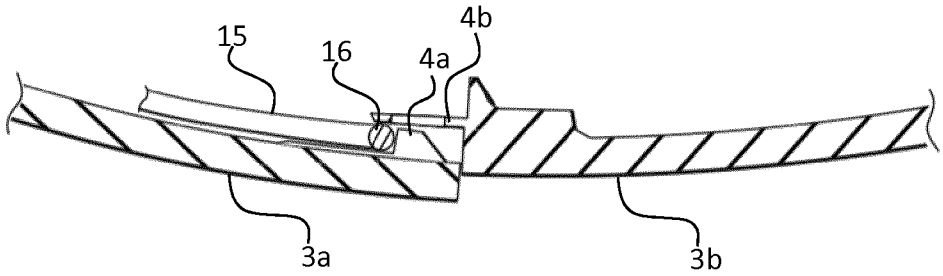

Fig. 7

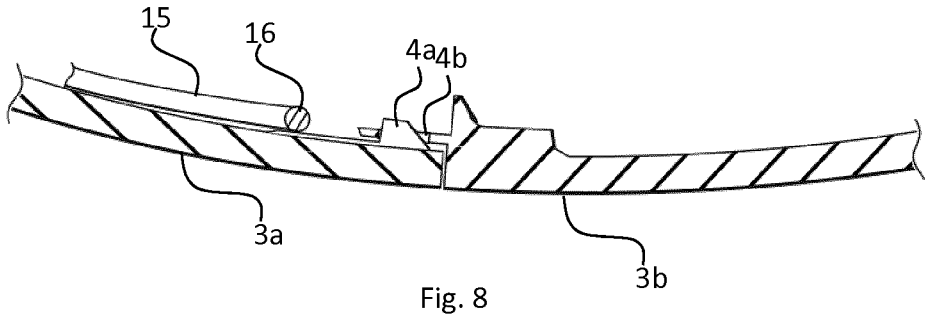

Fig. 8

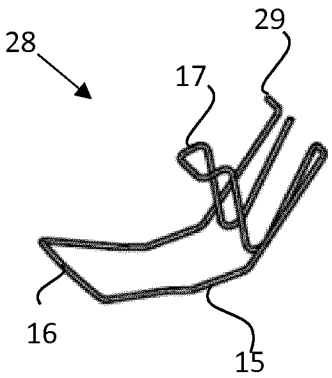

Fig. 9

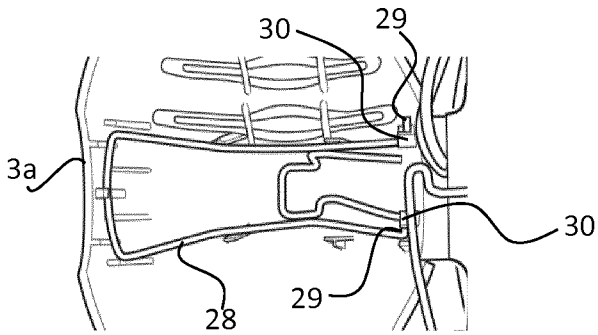

Fig. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/078937

A. CLASSIFICATION OF SUBJECT MATTER
INV. G08B17/113 G08B29/18
ADD.

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)
G08B

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)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 1 768 075 A1 (TOPHAT APS [DK]) 28 March 2007 (2007-03-28) paragraph [0032] - paragraph [0034]; figures 5,6,7	1-7
A	US 5 820 406 A (HETHERINGTON MICHAEL WARNETT [CA]) 13 October 1998 (1998-10-13) column 3, line 43 - column 4, line 27; figures 3A,3B	1-7
A	US 4 881 063 A (FAWCETT KEITH [IE]) 14 November 1989 (1989-11-14) the whole document	1-7

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
11 December 2019	03/01/2020

Name and mailing address of the ISA/	Authorized officer
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1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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