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(71) Applicant *(for all designated States except US)*: **PRODUCTS UK LIMITED** [GB/GB]; The Offices of Perrins Limited, The Custom House, The Strand, Barnstaple Devon EX31 1EU (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **CAPON, Stephen** [GB/GB]; 106 Ditchling Road, Brighton Sussex BN1 4SG (GB).

(74) Agent: **GALLAFENTS LLP**; 27 Britton Street, London, Greater London EC1M 5UD (GB).

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(54) Title: PULL SWITCH APPARATUS

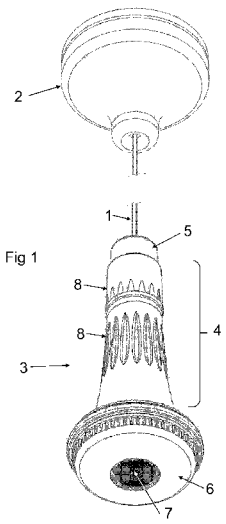


Fig 1

(57) Abstract: Pull switch apparatus is disclosed consisting of a pull switch (2) adapted to be mounted on a ceiling, a depending actuation cord (1) and, attached to the cord (1), a gripping member (2) in the form of a housing body (4), inside of which are a power source, an illumination device, and switch means connected to the power source and the illumination device. When the housing body (4) is moved or when the housing body (4) is approached by a person, the illumination device lights up to provide usually low level illumination. The apparatus is of particular value when the ceiling mounted pull switch (2) is in a bathroom or w.c. as the user at night does not have to actuate the ceiling switch in order to be able to see adequately.

WO 2010/041081 A1

PULL SWITCH APPARATUS

Description

[1] This invention relates to pull switch apparatus, particularly to ceiling mounted pull switches which are conventionally used for safety reasons in domestic rooms where there is installed plumbing, for example bathrooms and toilets.

[2] Such pull switches are actuated by the user grasping and pulling down on a cord depending from the switch housing which is mounted on the ceiling. When actuated in this way, they turn the light(s) in the room in question on or off.

[3] A problem arises, particularly in modern homes which are relatively space-constricted, that if the switch is actuated in the night time, when most of the accommodation is in darkness, the sudden illumination can easily cause others in the home to be disturbed, even to the extent of waking up. This can be very tiresome if one sleepless child who wishes to visit the bathroom or toilet then wakes another, or even others. But it is unusual for the child (or indeed adult) to close the door behind themselves before actuating the switch and flooding the area with light. Additionally, there may be a ventilation fan connected to the light circuit and adapted to turn on when the light is turned on, and this could be quite noisy and accordingly increase the risk of disturbing others, especially if it is arranged to continue operating for some time after the light is switched off.

[4] A further difficulty in such circumstances is that the normal illumination instantly destroys the dark adaptation of the persons eyes, so that when they have finished using the room, and switch the light off using the pull switch, they are wholly unsighted and cannot immediately see where they are going.

[5] It is well known to provide illumination to the actuating member of a pull switch. This enables the cord to be seen, for example at night, so that it can be easily actuated. Examples of such arrangements are disclosed in US 6315431B, GB-A-2191634, JP 60198003A, JP 11297119A and US 5454056A. However, all of these disclosures merely propose illuminating the graspable portion of the pull switch so that it can be easily found and then actuated. Doing so gives rise to the disadvantages mentioned above.

[6] According to the present invention there is provided pull switch apparatus consisting of a pull switch adapted to be mounted on a ceiling, a depending actuation cord, and, attached to the cord, a gripping member in the form of a casing having within it a power source, an illumination device, and switch means connected to the power source and the illumination device and adapted to cause the power source to be illuminated when the casing is moved or when the casing is approached by a person.

[7] Motion activated lamps are known in a variety of embodiments, for example for illu-

minating the area around a door on the approach of a person and for so-called 'security lights' designed to be mounted on the outside of buildings and to illuminate if a person approaches. Domestically, a variety of motion activated lamps is known, for example as described in US-A-2008/0094827 and US-B-6729740. Neither of these, however, is disclosed in combination with a pull switch. By combining the usually low intensity light source with the pull switch, which is located adjacent the entry door to a bathroom or toilet, the practical advantages obtained that the degree of illumination necessary is immediately provided to enable the person to see where they are going. This also contrasts with prior suggestions for bathroom night lights which use some other object in the bathroom, such as a soap dispenser (US-A-2007/0007304) or associated with the toilet itself (WO 95/25853) in order to provide the desired illumination.

[8] Preferably the illumination device is one or more light emitting diodes. The diodes may be mounted in the casing in any convenient fashion and arranged to emit low-level light when actuated to illuminate the surrounding area softly. Because the user is in the dark, very low overall levels of illumination are sufficient to enable them to see what they are doing, but such levels are insufficient to cause any disturbance to others.

[9] The diodes may be protected from damage by being located behind a transparent or translucent window forming part of the casing.

[10] The power source within the casing is conveniently one or more battery cells, for example two or four AA or AAA size cells.

[11] Also within the casing is the switching mechanism. While this may be essentially mechanical if it consists of a motion detector, it is more reliable to use a solid state motion detector or proximity detection switch, as there are then no moving parts which might give rise to problems such as wear or sticking.

[12] While it is of no consequence in terms of the user if the device operates even in daylight conditions, the life of the power supply may be increased if the casing includes an on/off switch enabling the automatic illumination feature to be turned off during the day or if another light source such as the main room light is on, or includes means (normally a light sensitive or photo transistor) to detect the ambient or surrounding levels of light, and arranged to ensure that if there is sufficient daylight, or a main light within the room is switched on, then the switching mechanism will not operate.

[13] The shape of the casing may vary widely, but it is conveniently of a generally cylindrical shape which may be easily grasped and pulled down to operate the main illumination when needed. At night, simply moving it or putting a hand near it will cause the low level illumination to be provided from the casing. One end of the casing is adapted to receive the cord depending from the ceiling switch, for example taking

the form of a screw-on end cap with a central small hole through which the cord is passed and then knotted before the end cap is replaced on the end of the housing. Unscrewing the end cap may give access to the battery compartment(s), or the casing itself may be configured with an access hatch and battery compartment, or be separable into two parts to give access to one or more cavities for the receipt of the battery cells.

[14] In such embodiments, the end cap may incorporate a mechanism to enable quick release of the device from the cord to enable it to be used in an emergency as an emergency light, or as a safety light. This quick release mechanism could be in the form of a twist clip of two halves (either screwed together or incorporating a bayonet type fastening), one attached to the end cap, and one attached to the cord, or the end cap itself may be removable if not used as the cover for the battery compartment. This allows the device to be attached to, or released from the cord by a simple twisting action. When the device has been detached from the cord, it may be inconvenient, for example, if the user puts the device down, that the time circuit causes a loss of illumination, so the device may also include an override switch which acts to cause the device to emit light continuously.

[15] The invention is illustrated by way of example in the accompanying drawings, in which:

[16] Figure 1 is a perspective view of switching apparatus according to the present invention seen from below;

[17] Figure 2 is a perspective view from above of the lower part of the apparatus shown in Figure 1, separated into two parts;

[18] Figure 3 is a view similar to Figure 2 but showing the lower part of the apparatus separated at an alternative position;

[19] Figure 4 is a perspective view of half of the lower part of the apparatus shown in Figure 1, as if longitudinally bisected; and

[20] Figures 5 and 6 are perspective views of the two sides of a circuit board forming part of the apparatus.

[21] As shown in Figures 1 to 3 on a cord 1 depending from a ceiling switch 2 is a pull grip generally identified as 3. The pull grip 3 consists of a tapered generally cylindrical housing body 4 with an end cap 5 having a central hole through which cord 1 passes, and within which the end of cord 1 is knotted. The lower end of the housing carries a rotatable translucent or transparent cover 6 having a central portion in the form of a Fresnel lens 7.

[22] By grasping the pull grip 3 and pulling it downwards, ceiling switch 2 may be actuated in known fashion.

[23] End cap 5 is connected to the upper portion of body 4 via a bayonet connection, so it may be disconnected from body 4 as shown in Figure 2. Body 4 consists of two parts

threaded together. Gripping formations 8 on body 4 enable the two parts to be easily separated or reassembled. When separated, as shown in Figure 3, access to a battery compartment is provided.

[24] At the bottom of the casing behind the cover 6, which may be clear or tinted, are four LEDs. Within the casing is a circuit and batteries arranged so that if the casing is moved, or if someone approaches it, the LEDs are supplied with current and light is emitted from cover 6. By rotating the cover, an internal switch may be actuated to cause the LEDs to illuminate continuously. The range of rotation is shown by the two spaced moulded markings 9 on the cover and these can be registered with a moulded bead 10 on the bottom of body 4 at the limits of rotational movement of the cover 6.

[25] Referring now to Figure 4, this shows the detailed configuration of the various parts, viz: end cap 5, main body 4 and cover 6. It also shows a circuit board assembly 14 including a motion sensor 15 and LEDs 16, and fixing screws 17 holding assembly 14 to the lower part of body 4. Located inside body 4 are four battery cells 18. The threaded connection between the two parts of body 4 is denoted 19.

[26] The motion sensor 15 is a pyroelectric infrared sensor (PIR) which detects relative motion (within a radius of about 2 metres) due to altering heat states such as that caused by a person moving within the locality of the device.

[27] The 'range of vision' of sensor 15 is wide as it sits just above Fresnel lens 7.

[28] The triggering of sensor 15 causes a change in logic state within an integrated electronic circuit 22 mounted on the circuit board assembly.

[29] The circuit board assembly is shown in more detail in Figures 5 and 6, with the tracks omitted for clarity. In addition to the components noted above, the board carries a sprung leaf 20 and cooperating contact post 21, battery contact studs 22, and a photo-electric light sensor 23.

[30] When sensor 15 detects incoming IR radiation, it causes the integrated circuit 22 to operate via solid state switching to supply a continuous current to the light- emitting diodes 16 so that they illuminate the area around the device.

[31] A timer circuit within the IC 22 will switch off the LEDs after a period of about 30 seconds of detecting no motion sensed by the PIR (when in the dark) and also within a period of up to 30 seconds of the detection of daylight or an additional light source such as the main room light being switched on by sensors 23. If this happens in the dark and while a user is still near the device, it can be reactivated by a simple movement within its 2 metre range e.g. by waving a hand.

[32] If the unit is to be used as an emergency light, it may be detached from cord 1 by undoing the bayonet connection between the upper part of body 4 and cap 5 (leaving cap 5 on cord 1 so the cord can still be pulled down to operate switch 2 if desired), and cap 6 swivelled so that an internal formation 26 (shown in Figure 4) abuts spring leaf

20 and moves it into contact with post 21 to cause the LEDs 16 to illuminate continuously until cap 6 is swivelled back.

Claims

[1] 1 Pull switch apparatus consisting of a pull switch adapted to be mounted on a ceiling, a depending actuation cord, and, attached to the cord, a gripping member in the form of a casing having within it a power source, an illumination device, and switch means connected to the power source and the illumination device and adapted to cause the power source to be illuminated when the casing is moved or when the casing is approached by a person.

[2] 2 Pull switch apparatus according to Claim 1 wherein the illumination device is one or more light emitting diodes.

[3] 3 Pull switch apparatus according to Claim 2 wherein the diodes are located behind a transparent or translucent window forming part of the casing.

[4] 4 Pull switch apparatus according to any one of Claims 1 to 3 wherein the power source consists of one or more battery cells.

[5] 5 Pull switch apparatus according to any one of the preceding Claims and wherein the casing includes a switching mechanism comprising a solid state motion detector or proximity detection switch to cause the illumination device to operate.

[6] 6 Pull switch apparatus according to any one of the preceding Claims and wherein the casing includes an on/off switch enabling the actuation of the illumination device to be turned off.

[7] 7 Pull switch apparatus according to any one of the preceding Claims wherein the casing is of a generally cylindrical shape which may be easily grasped and pulled down to operate the pull switch.

[8] 8 Pull switch apparatus according to any one of the preceding Claims wherein one end of the casing is in the form of a screw-on end cap adapted to receive the cord depending from the pull switch with a central small hole through which the cord passes.

[9] 9 Pull switch apparatus according to Claim 8 wherein unscrewing the end cap gives access to a battery compartment.

[10] 10 Pull switch apparatus according to any one of the preceding Claims in which the casing includes an end cap to which the actuation cord is attached and a mechanism enabling the quick release of the casing from the cord to enable its use in an emergency as an emergency light or torch, or as a safety light.

[11] 11 Pull switch apparatus according to Claim 10 wherein the mechanism is in the form of a twist clip of two halves, either screwed together or incorporating a bayonet type fastening, one attached to the end cap, and one attached to the cord.

[12] 12 A pull switch handle consisting of an elongate casing means at one end of the

casing for attaching to a pull switch, and means at the other end of the casing for emitting light, and the casing having within it a power source, a detector adapted to detect when the casing is moved or when the casing is approached by a person and switch means connected to the power source, the detector and the light emitting means and adapted to cause the light emitting means to emit light when the detector is actuated.

[13] 13 A pull switch handle according to Claim 12 wherein the light emitting means is one or more light-emitting diodes.

[14] 14 A pull switch handle according to Claim 12 or 14 wherein the casing includes means to disable the actuation of the means for emitting light when the ambient illumination around the device exceeds a certain level.

[15] 15. A pull switch handle according to any one of Claims 12 to 13 and including switch means to enable the means for emitting light to be operated independently of ambient lighting conditions or motion or proximity detection.

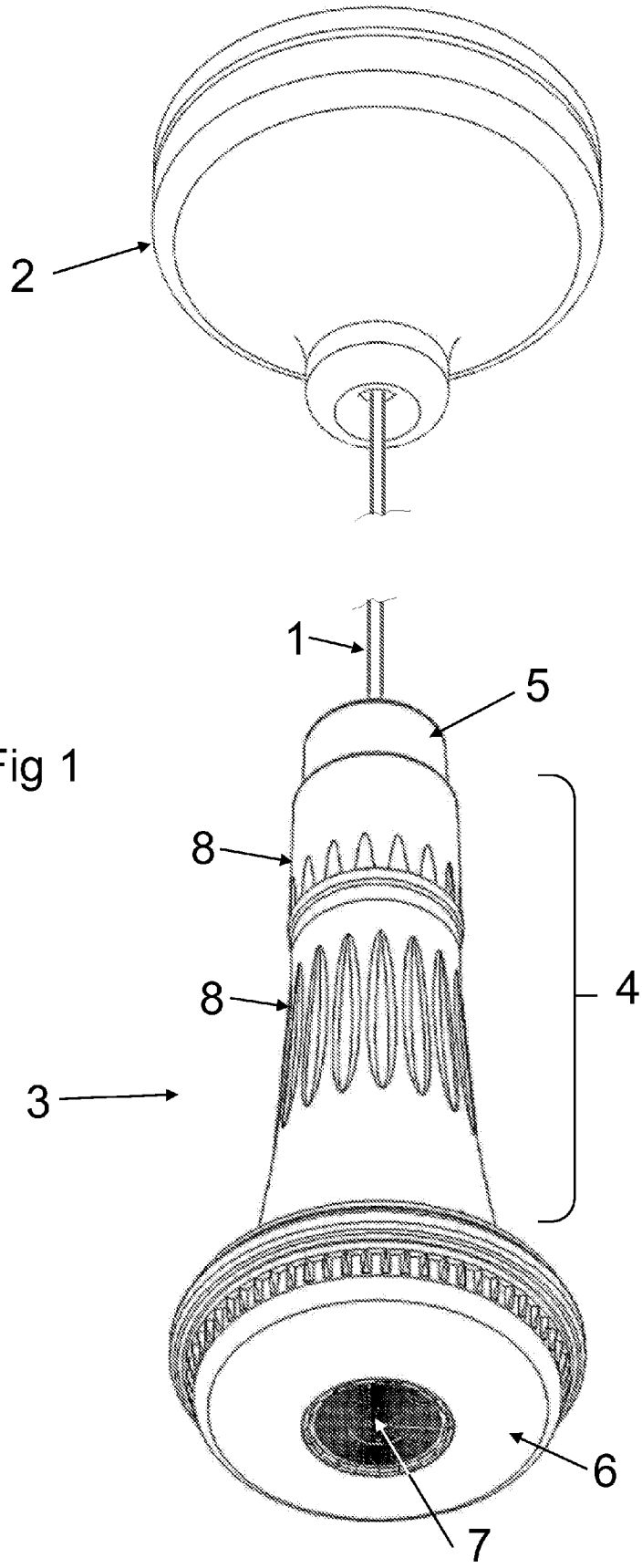


Fig 1

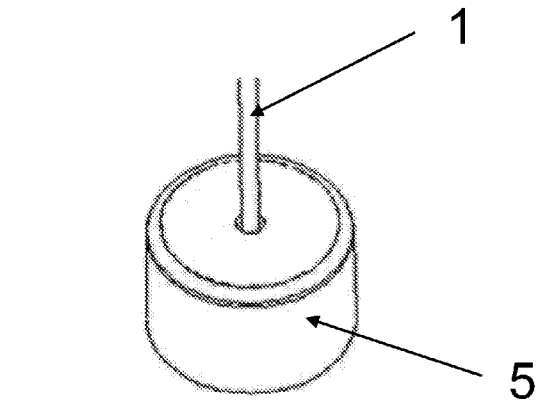


Fig 2

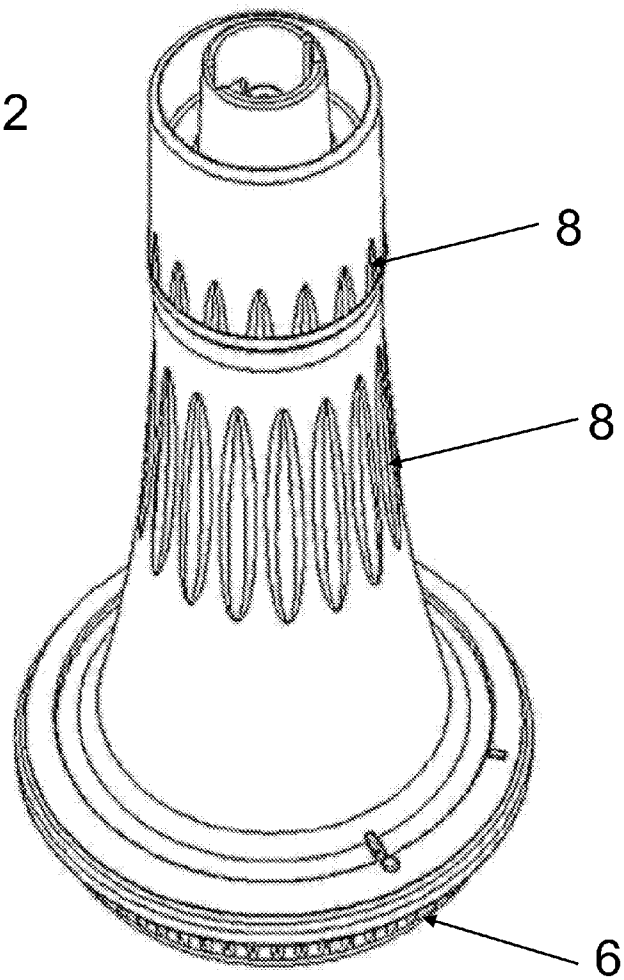


Fig 3

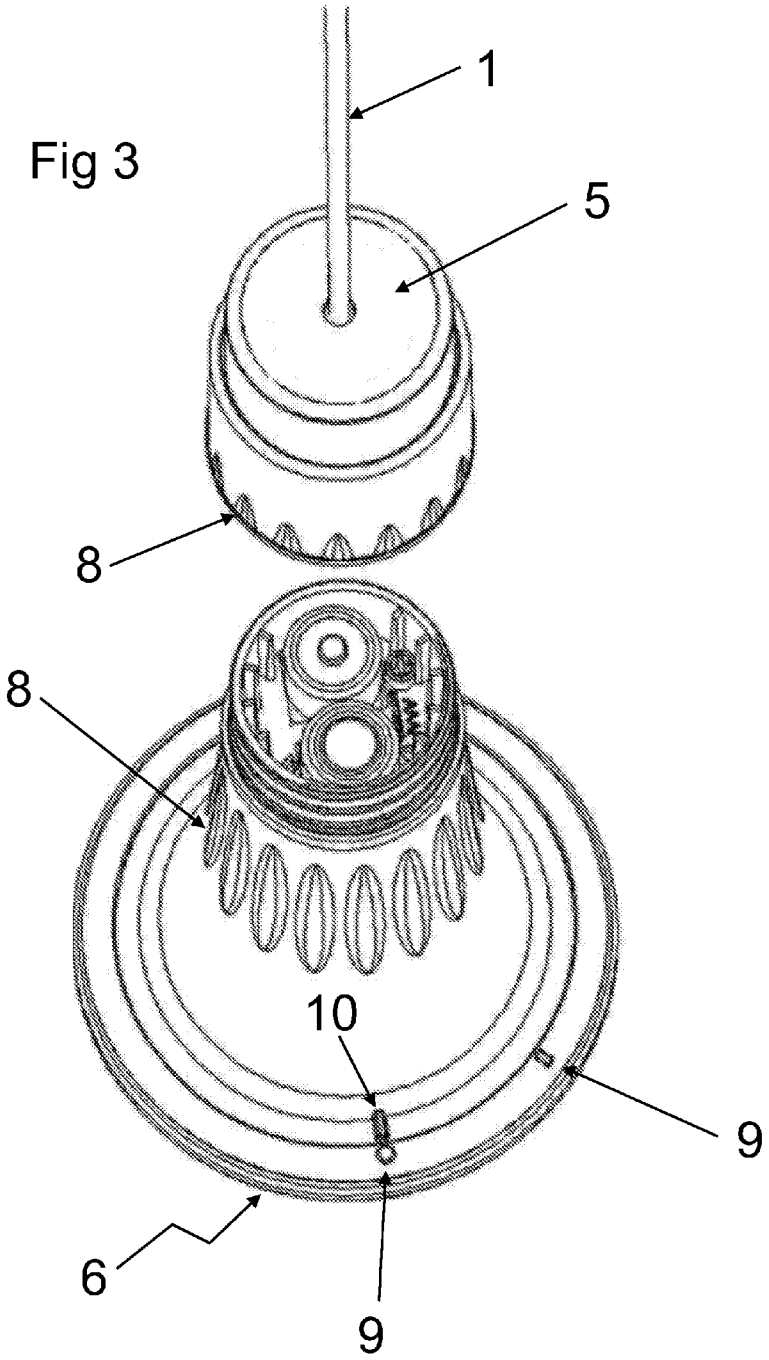


Fig 4

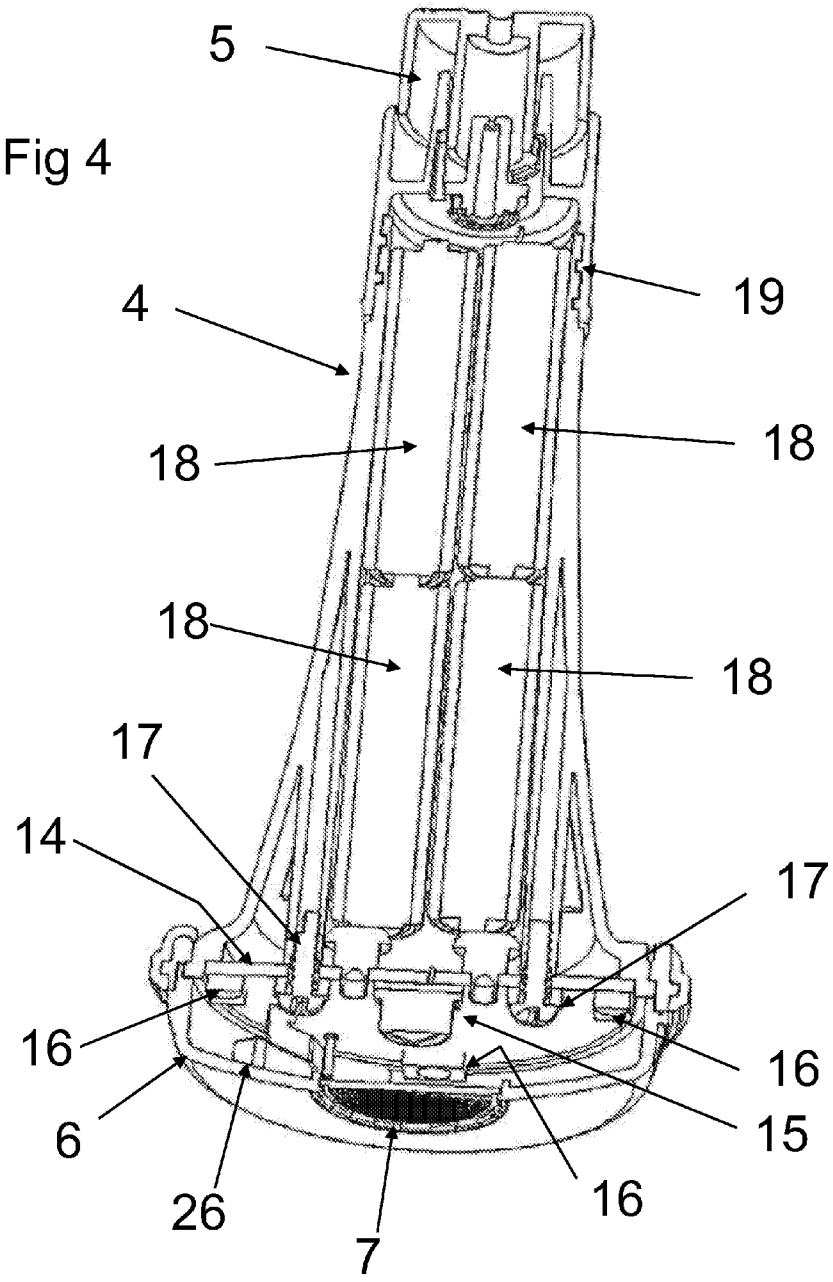


Fig 5

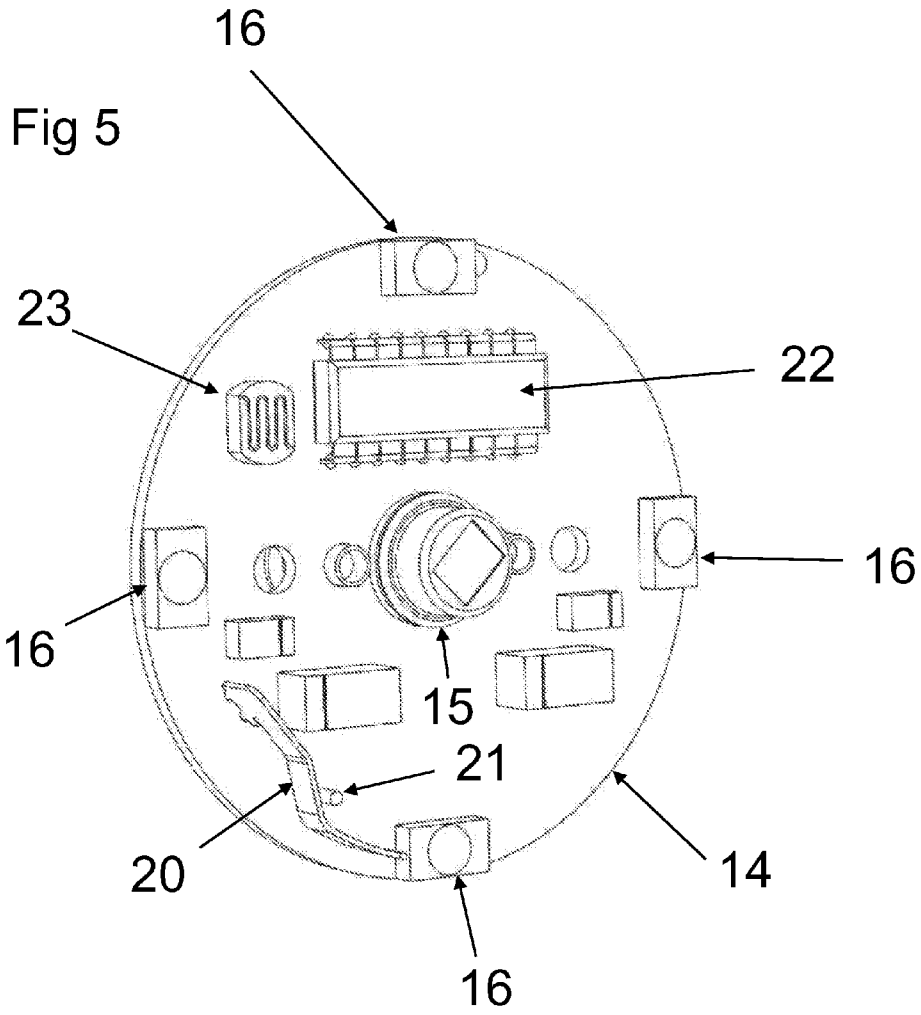
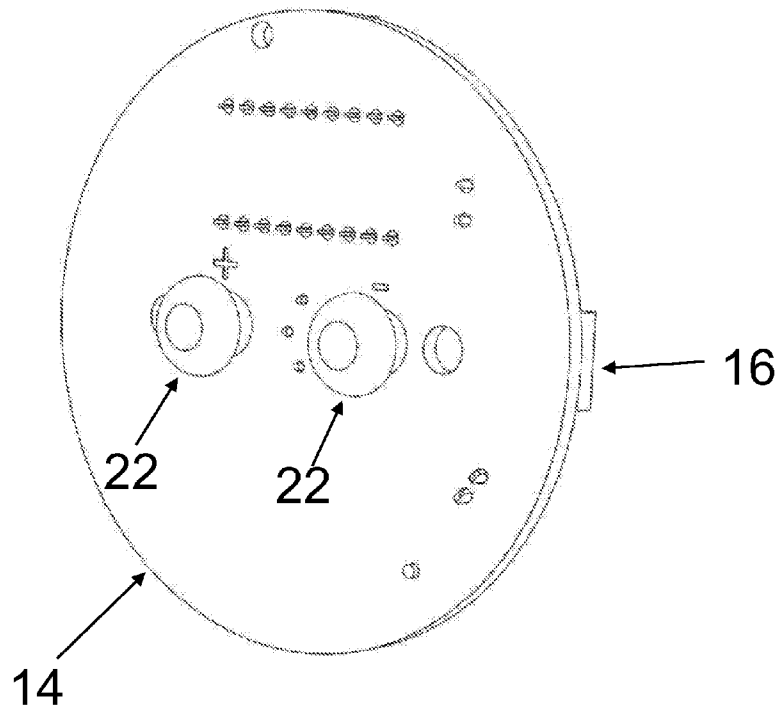


Fig 6



INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2009/051348

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01H3/02 H01H9/18 H01H17/08 F21S8/06 F21S9/02
F21V21/03 F21V23/04

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)
H01H F21S F21V

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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 191 634 A (KORD LITE LIMITED) 16 December 1987 (1987-12-16) cited in the application abstract; figure 2	1,12
A	JP 60 198003 A (NISHIYAMA FUMIO) 7 October 1985 (1985-10-07) cited in the application figures	1,12
A	DE 73 37 037 U (GOSLAR) 22 May 1974 (1974-05-22) the whole document	1,12
A	DE 16 36 660 U (AUG NEIMKE FA [DE]) 3 April 1952 (1952-04-03) page 2; figure 1	1,12

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
29 January 2010	10/02/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Findeli, Luc

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2009/051348

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 05 057720 U (-) 30 July 1993 (1993-07-30) figures -----	1,12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2009/051348

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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JP 60198003 A	07-10-1985	NONE	
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