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(54) **Illuminated control knob**

(57) With the inventive illuminated burner control knob apparatus (A), in order to be able to show the position of the knob (1) which is used to open and close the gas valve (12) in gas burners both without approaching the product and even if there is not sufficient illumination

in the surroundings and to reduce the risk of leaving the valve (12) open, the light is spread over the knob (1). However, in order to reinforce the visual information perceived by the user, the brightness amount of the light is shown directly proportional to the amount of gas that passes through the valve.

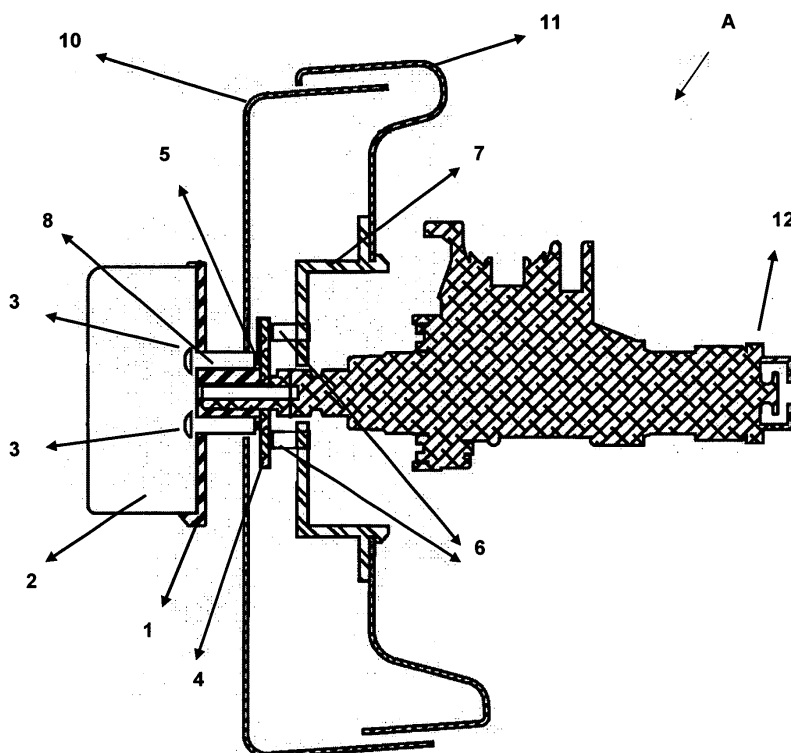


Figure - 1

Description

Technical Field

[0001] This invention is related to an apparatus which shows the location of the knobs that determine the amount of gas which comes out from the gas valve in gas burners with the help of the light of variable intensity.

Prior Art

[0002] In the present cookers, the gas outflow level is defined by matching the serigraphies made on the front panel, where the cooker knobs are positioned, by means of the physical properties of the knob, for example by means of a line which is put on the knob or the sharp tip of the knob. When seen from far away, the gas level selected can not be understood since not only the serigraphies are small but also the knobs have a symmetrical structure. In addition, when the knobs are left at "on" position by mistake, the absence of a system to warn user leads to home accidents.

[0003] In the prior art, in the patent document US5913414, the knob is illuminated with the help of a gear which has a sufficient transparency to reflect the light that comes from a light source installed on a circuit board at a certain angle. When the knob is turned to illuminate the serigraphies which are positioned on the edge of the knob, the rotating part provides an electric connection between the necessary points on the circuit board. However, in this system, the knob is not illuminated with variable light intensity.

[0004] In the patent document EP0276463, the light source which is positioned above and below the knob illuminates the serigraphies located around the knob by turning the knob. However, in this system, the gas outflow amount is not certain.

[0005] In the subject matter of invention of apparatus, instead of the indication lines which are located on the knob mentioned in the prior art, an indicator illuminated with light sources of which intensity varies directly proportional to gas level selection is used.

[0006] In the present invention, the light sources were positioned on the rear of the front panel and placed on a double-sided circuit board. The contact surfaces with electric conductivity which are positioned on the other side of this circuit board are in connection with the light sources. The circuit board has a capability to turn with the control knob. The voltage applied on the springs which touch the contact surfaces on the rear surface of the circuit board and the variable resistance values between the contact surfaces lead the light sources to spread light of different intensity as the knob turns. In other words, the light intensity is ensured to vary directly proportional to the amount of gas that passes through the valve. In this apparatus, turning the circuit board together with the knob and detaching the knob from the apparatus easily for cleaning purposes are ensured. In

addition to these, in order to transmit the light which is spread from the light sources without scattering to the desired area, the light spreader transparent block and the light transmitters which are located on the knob are produced from the same material and preferably integrally. In order to spread the light equally inside this block, there are voids, which serve as the divergent lens, at the same direction with the light transmitter. In addition, in order to allow the light to be scattered homogenously over the transparent block, the outer surfaces of the transparent block and the light transmitter were sand-blasted.

Aim of the invention

[0007] An aim of this invention is to ensure the light spreading over the knob in order to be able to show the position of the knob which is used to open and close the gas valve in gas burners both without approaching the product and even if there is not sufficient illumination in the surroundings and to reduce the risk of leaving the valve open.

[0008] Another aim of the invention is to show the amount of gas that passes through the valve in a directly proportional manner with the brightness amount of the light spread in order to reinforce the visual information perceived by the user.

[0009] Another aim of the invention is to ensure the perception of the position of the knob even from far by means of the long and thin edged structure of the light spreading block which is placed on the knob.

Description of the Drawings

[0010] The illuminated control knob is shown in the attached drawings, wherein:

Fig. 1 is a side sectional view of the illuminated control knob apparatus.

Fig. 2 is a disassembled perspective view of the illuminated control knob apparatus.

Fig. 3 is a rear view of the circuit board which is used in the illuminated control knob apparatus.

Fig. 4 is a side view of the transparent block.

[0011] The parts in the figures are numbered one by one and the corresponding terms of these numbers are given below.

- Control knob apparatus (A)
- Control knob (1)
- Transparent block (2)
- Void (3)
- Circuit board (4)
- Light source (5)
- Contact Spring (6)
- Mounting plate (7)
- Light transmitter (8)

Hole (9)
 Front panel (10)
 Rear panel (11)
 Gas valve (12)
 Hole (13)
 Inner contact region (14)
 Outer contact region (15)
 Contact surface (14a)
 Contact surface (15a)

Disclosure of Invention

[0012] With the illuminated control knob apparatus (A) which is shown in fig. 1 and 2, in order to be able to show the position of the control knob (1) which is used to open and close the gas valve (12) in gas burners both without approaching the product and even if there is not sufficient illumination in the surroundings and to reduce the risk of leaving the valve (12) open, the light spreading is ensured over the control knob (1). However, in order to reinforce the visual information perceived by the user, the brightness amount of the light is shown directly proportional to the amount of gas that passes through the valve (12).

[0013] The illuminated control knob apparatus (A) of which disassembled perspective view is provided in fig. 2 comprises a gas valve (12) which is fitted into the holes (9) on the burner front panel (10); a control knob (1) which is used to turn this valve (12); a circuit board (4) which is attached to the adjusting shaft of the gas valve (12) and can turn with the knob (1); a rear panel (11) which is located inside the oven body, behind the front panel (10); a mounting plate (7) which is fitted to this panel (11); holes (13) on the mounting plate (7) into which the gas valve (12) is fitted; contact springs (6) with electric conductivity which are secured to the mounting plate (7) and provide the electric connection to the apparatus (A). One end of said contact springs (6) are secured to the mounting plate (7) and the other ends thereof contact with the rear surface of the circuit board (4) in a free manner. The control knob apparatus (A) also comprises a transparent block (2) which is developed for light spreading, light transmitters (8) which are formed on this block (2) and voids (3) which serve as divergent lens. These parts of which details are explained below are also shown in fig. 4.

[0014] The circuit board (4) is preferably in the form of a disc and is secured to the adjusting shaft of the gas valve (12) by means of a hole in the middle thereof. The control knob (1) is also secured to the same shaft and when it is turned in order to make a gas adjustment, the knob (1) and the board (4) turn in equal amount. In order to prevent the circuit board (4) not to disengage from said shaft in the assembled state of the apparatus (A), the diameter of the circuit board (4) should be kept higher than the diameter of the hole (9) which is located on the burner front panel (10).

[0015] Each contact spring (6) touches two different conductive surfaces on the circuit board. When a voltage is applied to the springs, the resistance values between

these two different surfaces vary as the circuit board turns and a light spreading of different intensity is ensured from the light sources which are in connection with these resistances. In an exemplary embodiment of the invention which is shown in the attached drawings, one of the contact springs (6) touches a surface (14) in the inner contact region on the rear surface of the circuit board (4) which is shown in fig. 3 and the other contact spring touches the surfaces (14a, 15a) on the outer contact region (15).

The inner contact region (14) is the circular region in the middle of the circuit board (4). The outer contact region (15) is located around the inner contact region (14). Inside the inner contact region (14), there is a contact surface (14a) with electric conductivity in the form of a circle piece. On the outer contact region (15), there is a contact surface (15a) with electric conductivity in the form of a similar circle piece. One of these said contact surfaces (14a, 15a) is of multi-piece shape where there are small interruptions therebetween and the other one is of continuous single-piece shape. As an example in fig. 3, the outer contact surface (15a) is shown as multi-piece and the inner contact surface (14a) is shown as single-piece. In order to control the burner flame, when the gas valve (12) is turned with the help of the control knob (1), the circuit board (4) also turns. During this turn, one of the springs (6) touches the inner contact surface (14a) and the other one touches the outer contact surface (15a). As the circuit board (4) turns, the resistance value between each piece of the multi-piece contact surface (15a) and the single piece contact surface (14a) varies. The voltage applied to the springs (6) and this varying resistance values lead the light sources (5) which are located on the circuit board (4) front surface and connected to the contact surfaces (14a, 15a) to spread light of different intensity. For example, while they are allowed to spread less light when the gas valve (12) is opened slightly, they can be allowed to spread more light when it is more opened.

[0016] In another exemplary embodiment of the invention, the contact surfaces are formed as continuous. In order to provide different resistance values between the different points where the springs (6) touch the conductive contact surfaces on the board (4), the material property of the contact surfaces is exploited. In such an embodiment, the contact surfaces are made of carbon-based conductive composite or alloy. In this way, the desired resistance difference is formed between the beginning and the ending points of the contact surface (by means of the inner resistance of the material itself) and this resistance value varies linearly throughout the surface. This method is also used in potentiometers. In other words, a light spreading of different intensity can also be ensured from the light sources (5) with the use of a special potentiometer, which is associated with the springs (6), on the circuit board (4).

[0017] On the one end, the control knob (1) is used to adjust the amount of gas that comes out from the gas valve (12); on the other hand it is used to direct the light

that comes from the light sources (5) towards the outside and onto the front panel (10). For this directing process, a transparent block (2) which is fitted into the channel formed inside the control knob (1) is used. The transparent block (2) of which side view is provided in fig. 4 has a thin edged prismatic structure and at least one light transmitter (8) portion which extends outwards as a protrusion from one surface thereof such that it fits into said channel and extends from one side of the knob (1) to the other. The light transmitter (8) is an extension of the transparent block (2) and its end portions are located in the front of the light sources (5). The light which is spread from the source (5) is directed towards the inside of the transparent block (2) by means of the transmitter (8). Through at least one void (3) which serves as divergent lens in the region where the light transmitter (8) and the transparent block (2) are combined, the homogenous scattering of the light that comes from the transmitter (8) inside the transparent block (2) and the proper illumination of the block (2) are ensured. In addition, since the block (2) is of thin edge, the block (2) indicates a certain direction and in this way, when the control knob (1) is turned, it is understood also from far that in which position the knob (1) is. Besides, the light intensity which varies as the knob (1) is turned provides separate visual information to the user. In a preferred embodiment of the invention, the light transmitters (8) are positioned such that they illuminate the around of the hole (9) on the front panel (10). Thus, the illumination of the front panel (10) can also be provided with the light transmitters (8). In addition, for homogenous scattering of the light over the transparent block (2), the outer surfaces of the transparent block (2) and the light transmitter (8) were sandblasted. Alternatively for homogenous light scattering, it is also possible to obtain these parts with a semi-transparent material of proper homogeneity instead of sandblasting the transparent block (2) and the light transmitter (8).

Claims

1. An illuminated control knob apparatus (A), which provides the light spreading over the control knob in order to be able to show the position of the control knob which is used to open and close the gas valve in gas burners both without approaching the product and even if there is not sufficient illumination in the surroundings and to reduce the risk of leaving the valve open, comprising a gas valve (12) which is fitted into the holes (9) on the burner front panel (10); a control knob (1) which is used to turn this valve (12); a circuit board (4) which is attached to the adjusting shaft of the gas valve (12); a rear panel (11) which is located inside the oven body, behind the front panel (10); a mounting plate (7) which is fitted to this panel (11); holes (13) on the mounting plate (7) into which the gas valve (12) is fitted; contact springs (6) with electric conductivity which are secured to the mounting plate (7) and provide the electric connection to the apparatus (A) and of which one ends thereof are secured to the mounting plate (7), **characterized in that** the other ends of said springs (6) contact with two different conductive surfaces on one side of the circuit board (4) which can turn with the knob (1); in order to allow the spread of light of different intensity from light sources (5) on the board (4) according to the turn amount of the knob, when a voltage is applied to the springs (6), there are variable resistances between these two different contact surfaces based on the points to which springs touch (6); the light spread from the light sources (5) which are in connection with these resistances is given to outside over a transparent block (2) which is located on the knob (1).
2. An illuminated control knob apparatus (A) according to claim 1, wherein the transparent block (2) which is fitted into the channel formed inside the control knob (1) has a thin edged prismatic structure.
3. An illuminated control knob apparatus (A) according to claim 2, wherein the transparent block (2) has a structure so as to extend from one side of the knob (1) to the other.
4. An illuminated control knob apparatus (A) according to claims 1-2, wherein the transparent block (2) has at least one light transmitter (8) portion which extends outwards as a protrusion from one surface thereof and the end portions of the light transmitter (8) are located in the front of the light sources (5).
5. An illuminated control knob apparatus (A) according to claims 1 and 4, wherein in order to allow the homogenous scattering of the light that comes from the light transmitter (8) inside the transparent block (2) and the proper illumination of the block (2), there is at least one void (3) which serves as divergent lens in the region where the light transmitter (8) and the transparent block (2) are combined.
6. An illuminated control knob apparatus (A) according to claim 5, wherein in order to allow the homogenous scattering of the light over the transparent block (2), the outer surfaces of the transparent block (2) and the light transmitter (8) were sandblasted.
7. An illuminated control knob apparatus (A) according to claim 5, wherein in order to allow the homogenous scattering of the light over the transparent block (2), the transparent block (2) and the light transmitter (8) are made of a semi-transparent material of proper homogeneity.
8. An illuminated control knob apparatus (A) according

to claim 1, wherein inside an inner circular contact region (14) of the circuit board (4), there is a contact surface (14a) with electric conductivity in the form of a circle piece, on an outer contact region (15) thereof, there is other contact surface (15a) with electric conductivity in the form of a similar circle piece and one of these said contact surfaces (14a, 15a) is of multi-piece shape where there are small interruptions therebetween and the other one is of continuous single-piece shape.

9. An illuminated control knob apparatus (A) according to claim 1, wherein in order to allow the formation of the contact surfaces on the board (4) continuously, the contact surfaces are made of carbon-based conductive composite or alloy.
10. An illuminated control knob apparatus (A) according to claim 9, wherein said contact surfaces on the board (4) are made in the form of a potentiometer.
11. An illuminated control knob apparatus (A) according to claim 4, wherein the light transmitters (8) are positioned such that they illuminate the around of the hole (9) on the front panel (10).

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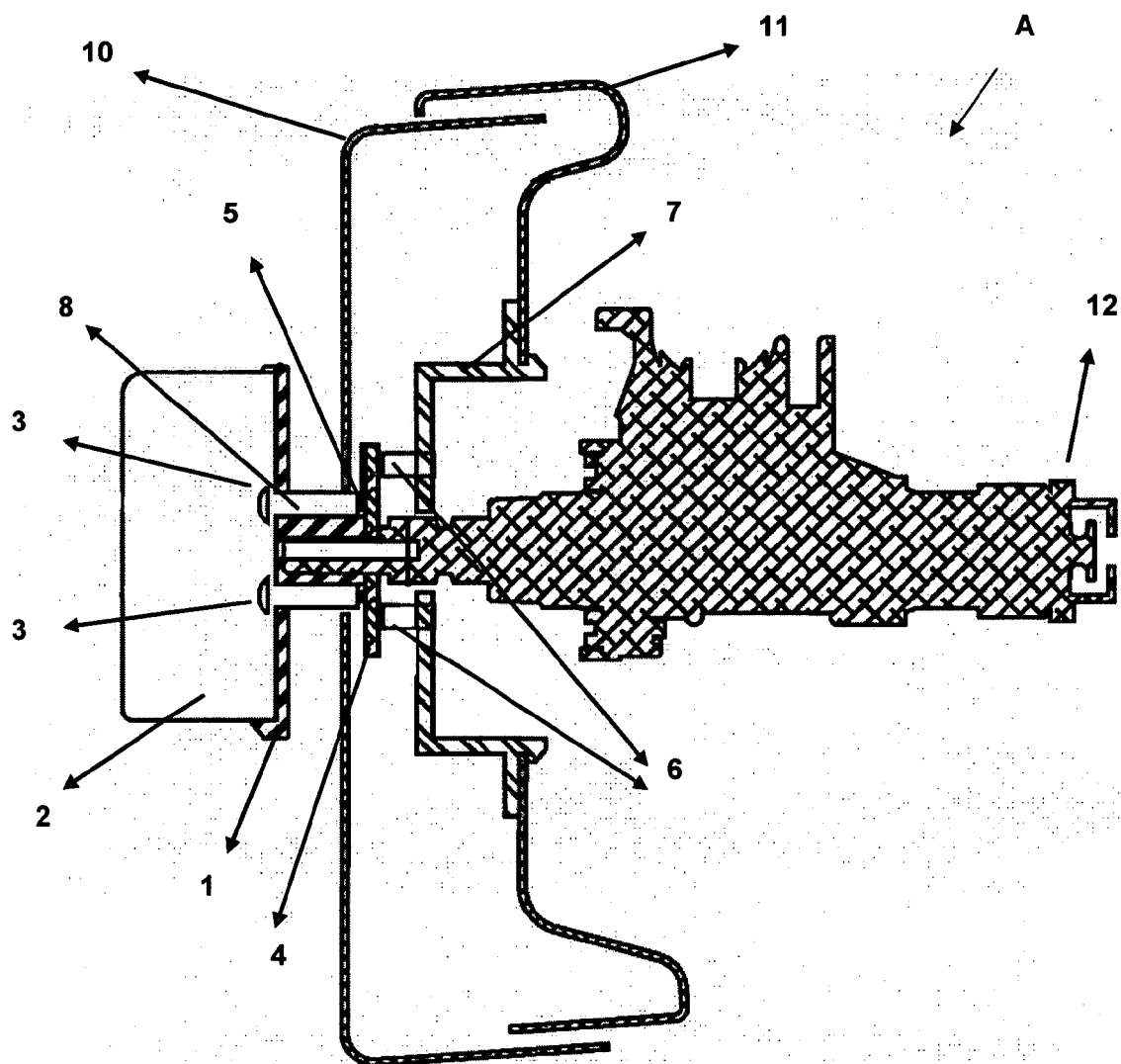


Figure - 1

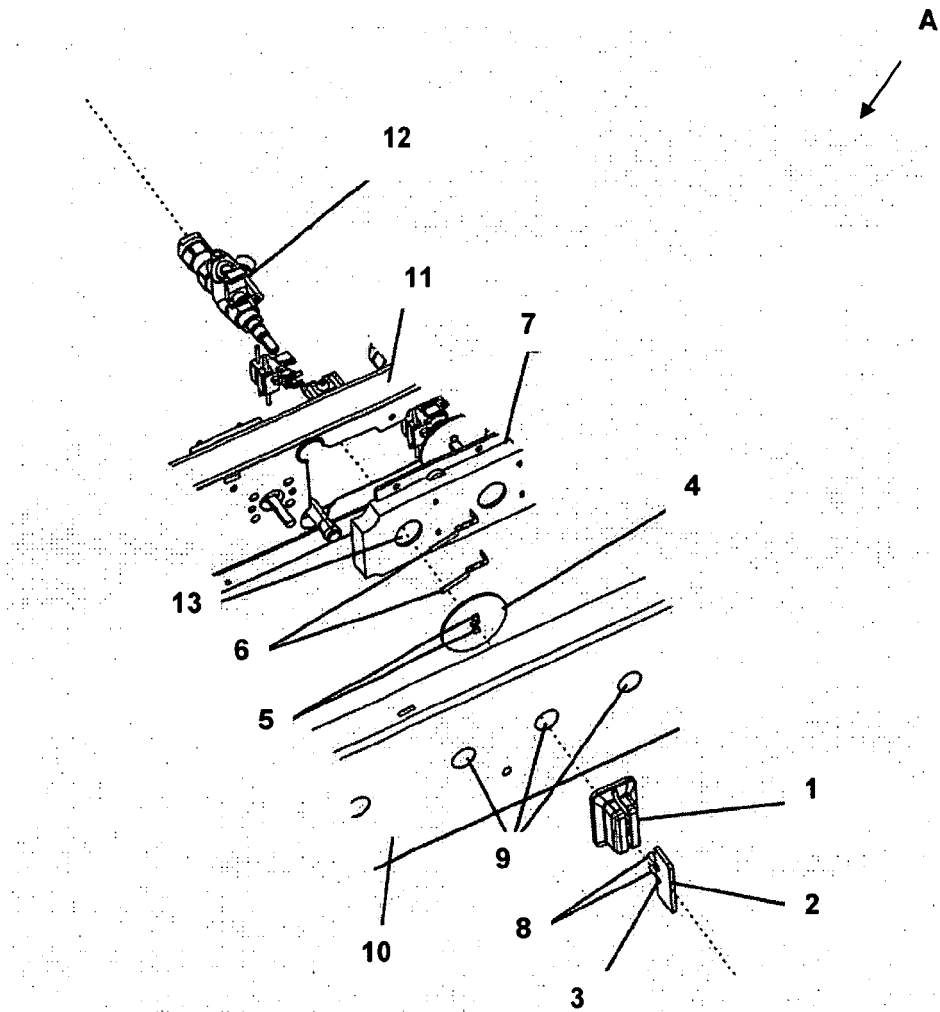


Figure - 2

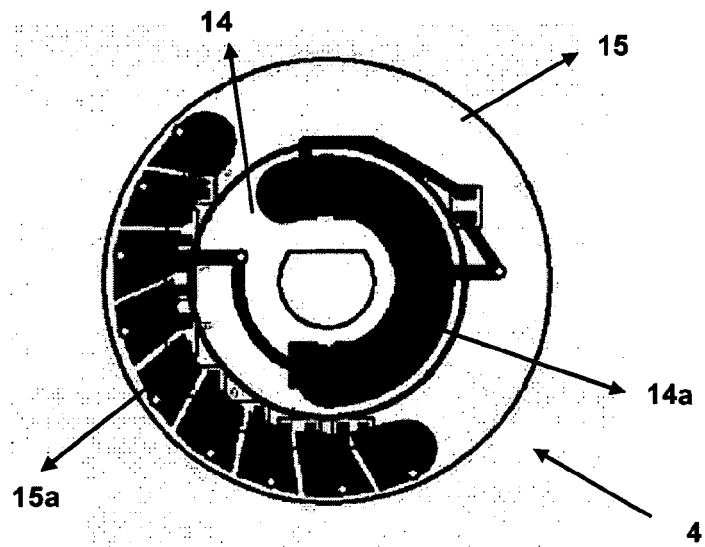


Figure - 3

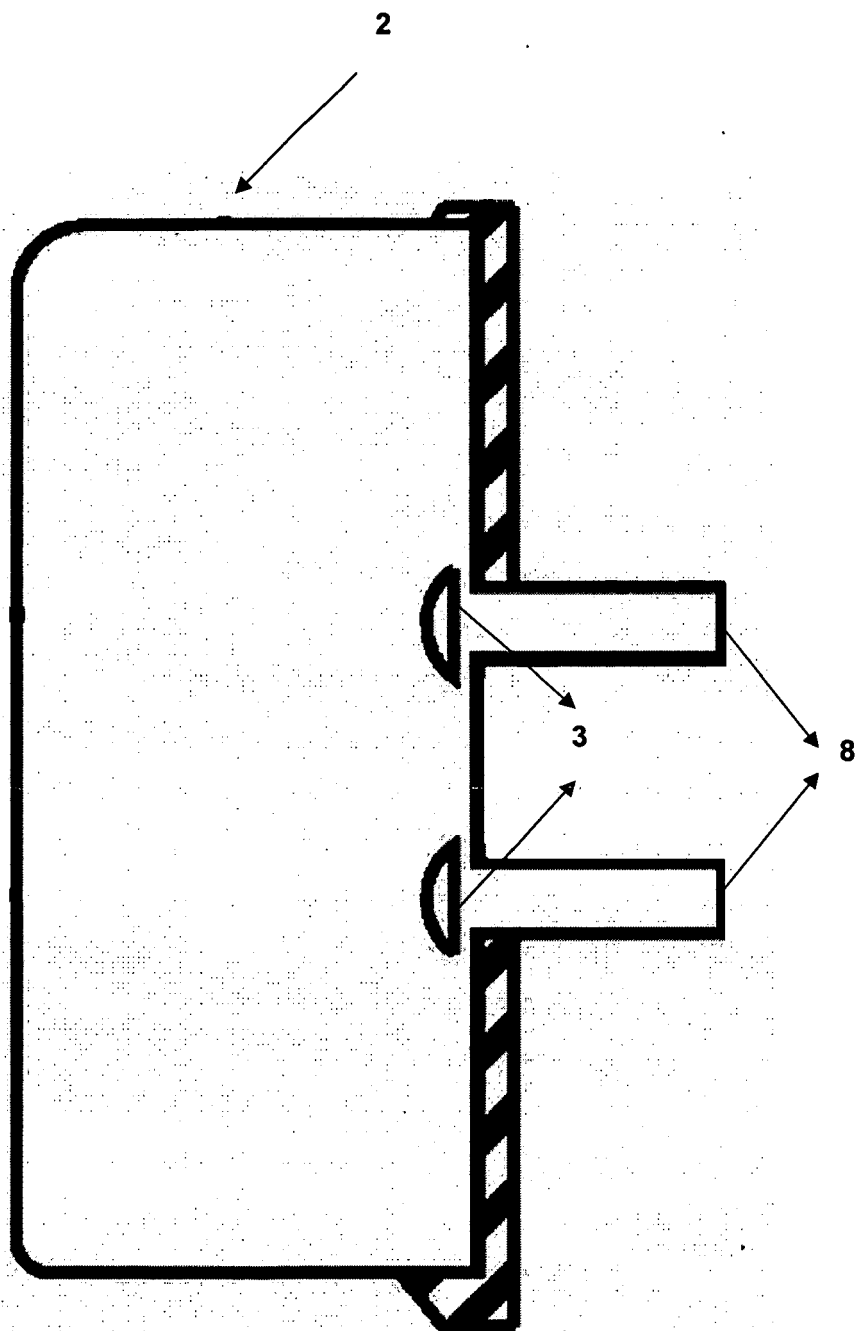


Figure – 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 2659

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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 14 March 2007	Examiner Nieto, José Miguel
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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The members are as contained in the European Patent Office EDP file on
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