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(71) Applicant: **Antares Iluminación, S.A.**
46190 Ribarroja (Valencia) (ES)

(72) Inventor: **Martinez Weber, Federico**
46190 Ribarroja (Valencia) (ES)

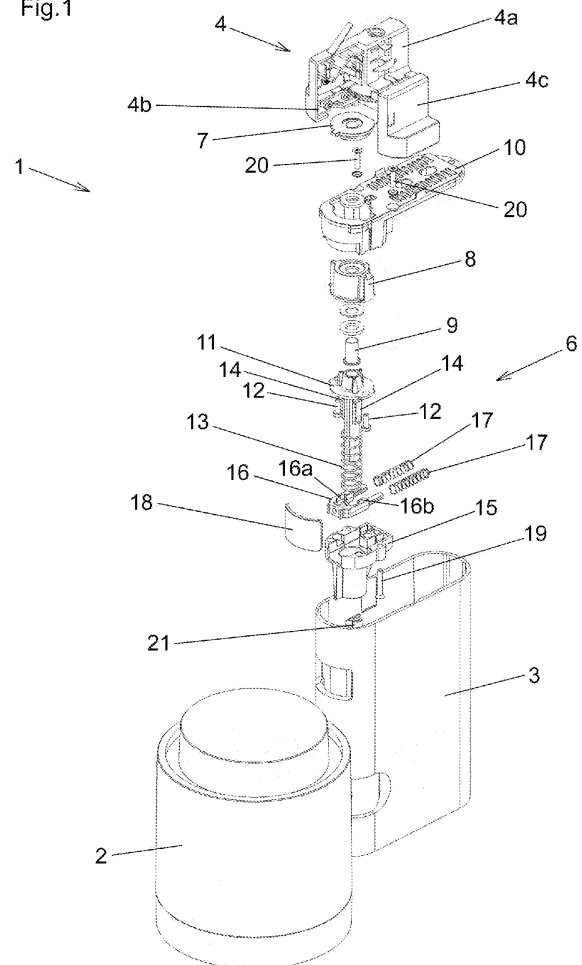
(74) Representative: **Gallego Jiménez, José Fernando**
BGA Patentes y Marcas
Av. Diagonal, 421,2
08008 Barcelona (ES)

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(54) **Suspended projector**

(57) The device (1) includes a projector (2), a casing (3) that houses electronic equipment in its interior, and an adapter (4) that has a top area (4a) of connection for its insertion inside the rail (5) which allows for the projector sliding along said rail, and a lower area (4b) attached to the projector device (1), so that, in operation, the projector device (1) is suspended from the rail (5) by means of said adapter (4) and can be arranged along it. The adapter (4) is completely concealed in its mounted position, where its lower area (4b) is housed in said casing (3), and can be moved longitudinally in relation to said casing (3) between said mounted position and a removal position, where the lower area (4b) of the adapter (4) is not housed in the casing (3). The device (1) includes automatic actuation means (6) for the longitudinal movement of said adapter (4) in relation to said casing (3) from the mounted position to the removal position.

Fig.1



Description

[0001] This invention relates to a suspended projector device.

BACKGROUND OF THE INVENTION

[0002] Projector devices, mainly intended for inside illumination applications, that basically consist of a projector, which is coupled in an adjustable way to a casing and an adapter, are known.

[0003] The adapter has a lower area that is attached to the casing, and a top connecting area that is inserted inside a rail allowing for the projector's sliding along said rail. To this end, the rail, typically in aluminium and attached to the ceiling, has an interior profile with a configuration which is complementary to the exterior configuration of the top connecting area of the device adapter. The adapter top area allows for the projector electrical connection through said rail.

[0004] Thanks to this configuration, an adjustable projector is obtained which is suspended from the rail and able to slide along it, allowing for adapting to illumination necessities.

[0005] The drawback of these devices is that the lower area of the adapter can be seen, as it is always outside the rail. This fact negatively affects the aesthetics of the whole, especially when several projector devices are fixed on the same rail, the adapter becoming an unattractive element.

[0006] To avoid said drawback, there is a type of suspended projector device that allows for the longitudinal movement of the adapter, in relation to the casing, between two positions, a mounted position, where the adapter is totally concealed with its lower area housed in said casing, and a removal position, where the lower area of the adapter is not housed in the casing and is exposed. In the mounted position, thus, the adapter is not visible and the projector device has a much more suitable aspect when installed in the rail. To mount and remove the projector device from the rail, the device is moved into the removal position by moving the casing downwards, the lower area of the adapter being made visible.

[0007] The drawback of this last type of suspended projector device is that, as already explained, to put the projector in the removal position, it is necessary to pull the casing down against the force of a spring which keeps it joined to the adapter that is inserted in the rail and, next, to rotate it about ninety degrees in relation to the adapter. To overcome the force of the spring when pulling the casing, the operator must exert a great force, which can be uncomfortable for the user and even cause the rail to become detached from the ceiling.

DESCRIPTION OF THE INVENTION

[0008] The object of this invention is to solve the draw-

backs that the state of the art devices have, with a suspended projector device that includes a projector, a casing that houses electronic equipment in its interior, and an adapter that has a connecting top area for its insertion in the interior of a rail which allows for the projector sliding along said rail, and a lower area coupled to the projector device, so that, in operation, the projector device is suspended from the rail by means of said adapter and situated along it, said adapter remaining completely concealed in its mounted position, where its lower area is housed in said casing, and said adapter being able to move longitudinally in relation to said casing between its mounted position and a removal position, where the lower area of the adapter is not housed in the casing, characterized in that it includes automatic actuation means for the longitudinal movement from the mounted position to the removal position of said adapter in relation to said casing.

[0009] Thanks to these characteristics, a user can simply and rapidly fix the device according to the invention in a position where the adapter is visible so as to remove it from the rail or to carry out any other operation.

[0010] With the automatic actuation means of the device according to the invention having to pull the casing down or make any effort to make the adapter visible is avoided, so that the risks of the rail detachment from the ceiling and the disadvantages that the previous state of the art devices involve are avoided.

[0011] Preferably, the automatic actuation means include elastic means that tend to move said adapter away from said casing and actuation means of said elastic means away from the mounted position to the removal position.

[0012] Advantageously, the elastic means include a compression spring associated to the lower area of the adapter at one end and the casing at the other.

[0013] According to an embodiment of this invention, the actuation means of said elastic means include a push button.

[0014] Preferably, the push button is situated on the casing.

[0015] Advantageously, the push button is associated to a locking piece that includes two positions, a first position that corresponds to the mounted position of the device, and a second position that corresponds to the removal position of the device.

[0016] Preferably, in the first position, the locking piece is coupled to a piece that is associated to the lower part of the adapter, thus locking the longitudinal movement between the casing and the adapter and maintaining the spring compressed and, in the second position, the locking piece is uncoupled from the piece that is associated to the lower part of the adapter allowing for the longitudinal movement between the casing and the adapter and for the spring to extend by moving the casing and the adapter away.

[0017] Thanks to this configuration, the user can separate the casing and the adapter for the connection to

the rail by simply pushing a push button, without making any effort. Once the push button has been pushed, the spring automatically moves the casing, the adapter remaining visible. For the device to return to its mounted position again, one has to simply push the casing upwards, till the lower part of the adapter is housed again in the interior of said casing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] In order to facilitate the description of all the aforementioned, some drawings, where a practical embodiment of the invention is schematically represented, which is not to be considered limitative, are enclosed, wherein:

Figure 1 is an exploded view of the projector device according to the present invention;

Figures 2 to 5 are views showing a sequence of the operation of the projector device suspended from a rail installed on the ceiling.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0019] An embodiment of the projector device 1 of this invention is shown in the figures. The device 1 basically includes a light projector 2, a casing 3 and an adapter 4.

[0020] The projector 2 is attached to the casing 3 by means of an articulation that allows for convenient positioning. In its interior, the casing 3 houses the electronic equipment of the projector device 1 (not shown). The device 1 also includes an adapter 4 that is used to mount the projector 2 and the casing 3 in a three-phase rail 5 made in aluminium (see figures 2 to 5) that is attached to a ceiling. The rail has a U-shaped cross section, with a grooved interior profile.

[0021] The adapter 4 includes a top part 4a, that is inserted in the rail 5 and is removable, so that the adapter 4 can be fixed along the rail 5 and locked at the desired position. The adapter top area 4a includes some electric contacts that, in operation, are inside the rail 5 and allow for the electrical contact between the device 1 and the rail 5 independent of the relative position of both elements. A side lid 4c conceals and protects the interior of the top area 4a of the adapter 4.

[0022] The adapter 4 also includes a lower part 4b, that is coupled to the rest of the projector device 1, as further described hereinafter. The adapter 4 and the rail 5 constitute standard elements for one skilled in the art, for this reason the operation and structure of the same will not be further explained.

[0023] The projector device 1 of this invention includes a mechanism of automatic actuation 6 that allows for the longitudinal movement of said adapter 4 in relation to said casing 3 between the mounted position and removal position of said device 1.

[0024] In this description, mounted position means a position where the top part 4b of the adapter 4 is housed

in the interior of the casing 3, so that the adapter 4 is totally concealed when the device 1 is mounted in the rail 5 and in operation (figure 2). Removal position means a position where the lower part 4b of the adapter 4 is located outside the casing 3 and is visible, allowing for mounting and removing the device 1 from the rail 5 (figures 3 to 5).

[0025] Next, the structure and the actuation of the mechanism of automatic actuation 6 of the device according to the invention 1 will be described.

[0026] With reference again to Figure 1, a connection washer 7 and an ejection bush 8 are joined by means of a rivet 9, with a washer between the same, that allows the connection washer 7 to rotate 180 degrees in relation to the bush 8. A guiding top lid 10 that covers the casing 3 is held between the connection washer 7 and the bush 8.

[0027] The connection washer 7 is attached to the lower part 4b of the adapter 4, that rotates 180 degrees solidarily with said connection washer 7. An ejection shaft 11 is attached by means of two screws 12 to the ejection bush 8.

[0028] A spring 13 is arranged by surrounding the lower end of the shaft 11, between two longitudinal ribs 14 of the shaft 11 and a lower cover 15. Said spring 13 tends to separate the group composed of the connection washer 7, the ejection bush 8, the rivet 9 and the shaft 11 in relation to the lower cover 15.

[0029] A locking piece 16 is mounted between the lower cover 15 and the shaft 11, by surrounding the ribs 14. Said locking piece 16 includes two columns each one being associated to its spring 17 and is attached to a push button 18 at its opposite end by means of a screw. The locking piece 16 and the spring 17 are mounted inside the cover 15, with capacity of lateral movement in relation to the same. The locking piece 16 tends to be laterally ejected thanks to the action of said springs 17.

[0030] The cover 15 is screwed to the lid 10 by means of two screws 19, so that the group of elements described is encapsulated. The lid 10, in turn, is attached to the casing 3 by means of two screws 20 that are screwed in some supports 21, completely closing the housing of the casing 3 that contains the transformer and the electrical wiring (not shown). The supports 21 are situated slightly under the top edge of the casing 3, so that the lid 10 and the top walls of the casing 3 conform another top accommodation for the lower part 4b of the adapter 4.

[0031] The power supply wires that transport the electric power from the rail 5 (not shown) pass across the interior of the connection washer 7, the ejection bush 8, the rivet 9 and the shaft 11 to the interior of the casing 3.

[0032] In this way, the mechanism of automatic actuation 6 is integrated in the projector device 1.

[0033] The operation of the mechanism of automatic actuation 6 of the device according to the invention 1 is explained in figures 2 to 5.

[0034] The device according to the invention 1 attached to the rail 5 in a mounted position is shown in

Figure 2. As can be seen, the adapter 4 is completely concealed, with its top 4a inserted in the rail 5 and its lower part 4b housed in the top of the casing 3. In this position, the locking piece 16 is located on the top edge of the longitudinal ribs 14 of the shaft 11, the springs 17 tend to move the piece 16 laterally towards the exterior, so that the top edge of the ribs 14 abuts against the narrowest part 16b of the piece 16. This makes the shaft 11 longitudinally held by the locking piece 16 and kept in the position closer to the cover 15, with the spring 13 in a condition of maximum compression.

[0035] ***When a user wants to remove the device 1 from the rail 5 or to carry out any other operation, he/she pushes the push button 18 (figure 3). When pushing the push button 18, the same laterally moves the locking piece 16 in the direction opposite to the force which is exerted by the springs 17. This makes the narrowest part 16b of the piece 16 also move laterally, so that the ribs 14 of the shaft 11 can pass through a wider part 16a of the piece 16, and the shaft 11 can move longitudinally in relation to said piece 16. In this way, the cover 15 and the piece 16 move down thanks to the action of the spring 13. Accordingly, when the user pushes the push button 18, the group made by the casing 3 and the projector 2 of the device 1 moves down automatically in relation to the adapter 4, by letting the lower part 4b of the same, that was housed in the top of the casing 3 in the mounted position, become exposed.

[0036] As shows in Figure 4, in the removal position, the casing 3 can rotate 180 degrees relative to the adapter 4 (90 degrees in one direction or in the opposite direction) so as to provide access to the fastening means of the adapter 4 to the rail 5 and other elements of the adapter 4 (not shown in detail). In this way, by operating a fastening lever 22, the adapter 4 can be released from the rail 5, and the projector device 1 can easily be removed or situated in another location along the rail 5 (figure 5).

[0037] In order to reinstall the device 1 to the rail 5, the process disclosed is repeated in reverse. Once the adapter 4 is coupled to the rail 5, the casing 3 is rotated 90 degrees, in order to align with the adapter 4, and pushed upwards, by moving also the cover 15 and the locking piece 16 upwards, and by compressing the spring 13. When the locking piece 16 is located on the top edge of the ribs 14 of the shaft 11, said locking piece 16, along with the push button 18, is moved again laterally towards the exterior thanks to the action of the springs 17, till its narrowest part 16b locks the ribs 14 of the shaft 11 again, keeping the projector device 1 in the mounted position.

[0038] As can be seen, the device 1 of the invention can be removed from the rail 5 quickly and easily. It is necessary just to push the push button 18 so that the casing 3 is moved automatically downwards, leaving the lower part 4b of the adapter 4 exposed. Thanks to the mechanism of automatic actuation 6 of the projector device 1 of this invention, the drawbacks of the prior art devices are overcome. It is no longer necessary for the

user to pull the casing 3 down against the elastic force of a spring to put the device 1 in its removal position, avoiding in this way the discomfort that it involves and the risk of the rail 5 detaching from the ceiling.

[0039] Although in this description, reference has been made to a specific embodiment of the device according to the invention 1, other configurations within the scope of the invention defined in the following claims are possible. For example, a lever or other similar device could be used instead of a push button 18 for the actuation of the spring 13 from the mounted position to the removal position. Likewise, the push button 18 could be situated in another location of the casing 3 for easier access, or even on another piece of the device 1.

Claims

1. Suspended projector device (1) including a projector (2), a casing (3) that houses electronic equipment in its interior, and an adapter (4) that has a top area (4a) of connection for its insertion inside a rail (5) which allows for the projector sliding along said rail, and a lower area (4b) attached to the projector device (1), so that, in operation, the projector device (1) is suspended from the rail (5) by means of said adapter (4) and can be arranged along it, said adapter (4) being completely concealed in its mounted position, where its lower area (4b) is housed in said casing (3), and said adapter (4) being able to be moved longitudinally in relation to said casing (3) between said mounted position and a removal position, where the lower area (4b) of the adapter (4) is not housed in the casing (3), **characterized in that** it includes automatic actuation means (6) for the longitudinal movement of said adapter (4) in relation to said casing (3) from the mounted position to the removal position.
2. Device (1), according to claim 1, **characterized in that** the automatic actuation means (6) include elastic means (13) that tend to move said adapter (4) away in relation to said casing (3) and actuation means (18) of said elastic means (13) to move the adapter from the mounted position to the removal position.
3. Device (1), according to claim 2, **characterized in that** the elastic means include a compression spring (13) associated to the lower area (4b) of the adapter at one end and associated to the casing (3) at the other end.
4. Device (1), according to claim 2 or 3, **characterized in that** the actuation means of said elastic means (13) include a push button (18).
5. Device (1), according to claim 4, **characterized in**

that the push button (18) is situated in the casing (3).

6. Device (1), according to claim 4 or 5, **characterized in that** the push button (18) is associated to a locking piece (16) that includes two positions, a first position that corresponds to the mounted position of the device (1), and a second position that corresponds to the removal position of the device (1). 5
7. Device (1), according to claim 6, **characterized in that,** in the first position, the locking piece (16) is attached to a piece (11) associated to the lower part (4b) of the adapter (4) by locking the longitudinal movement between the casing (3) and the adapter (4) and by keeping the spring (13) compressed and, in the second position, the locking piece (16) is released from the piece (11) associated to the lower part (4b) of the adapter (4) allowing for the longitudinal movement between the casing (3) and the adapter (4) and allowing for the spring (13) to extend by moving the casing (3) and the adapter (4) away. 10 15 20

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Fig.1

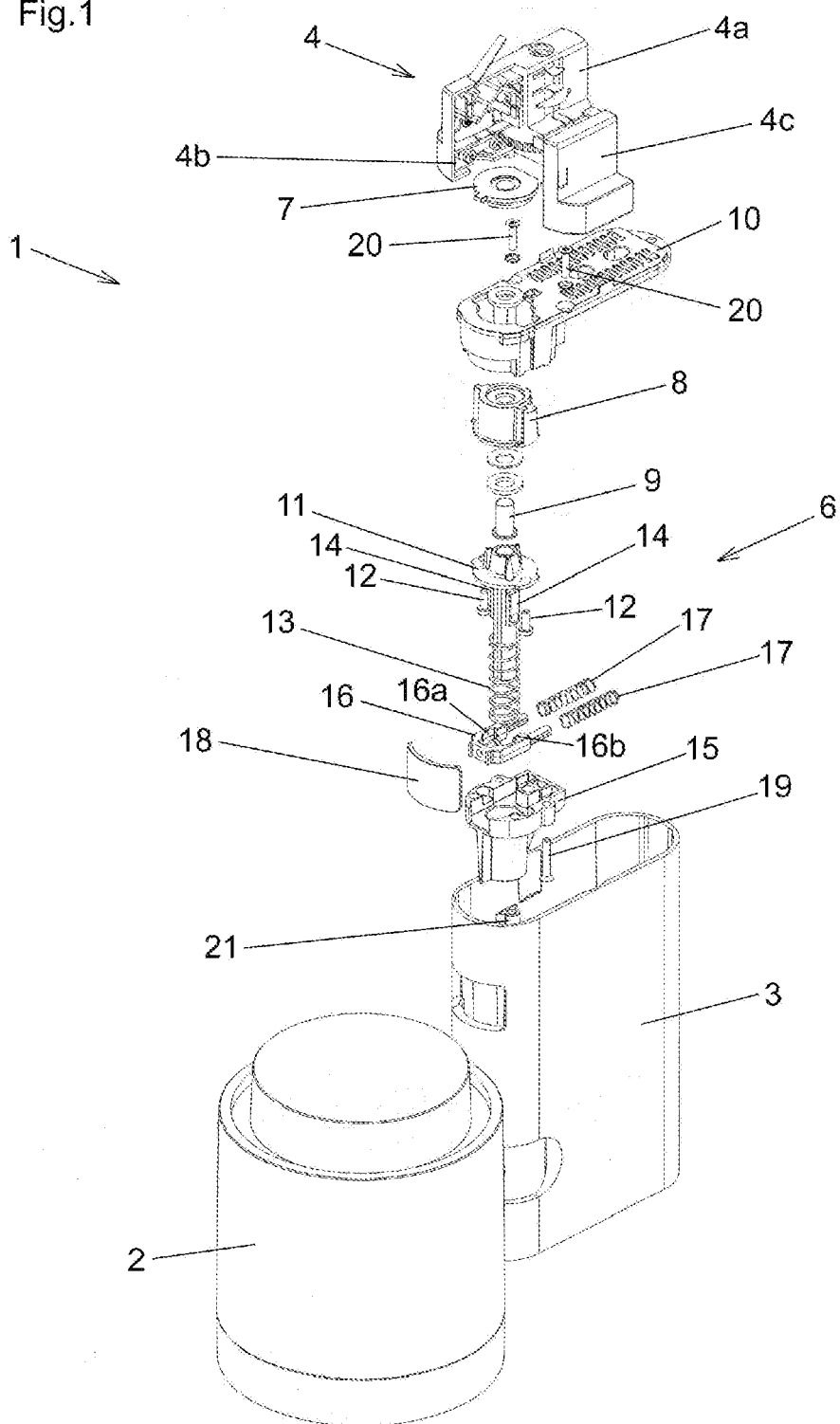


Fig.2

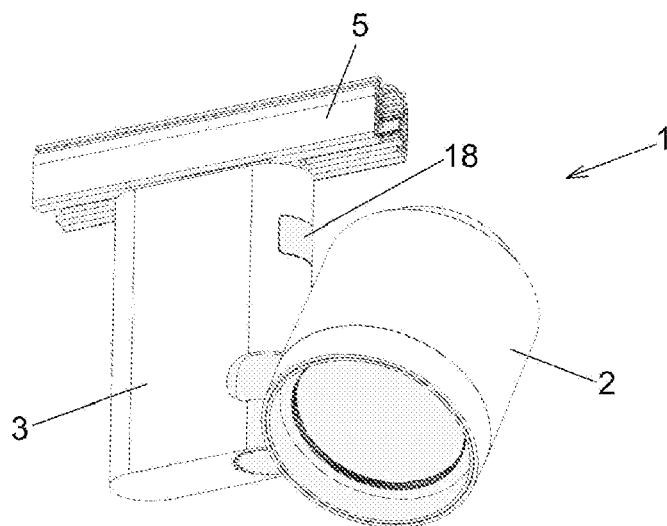


Fig.3

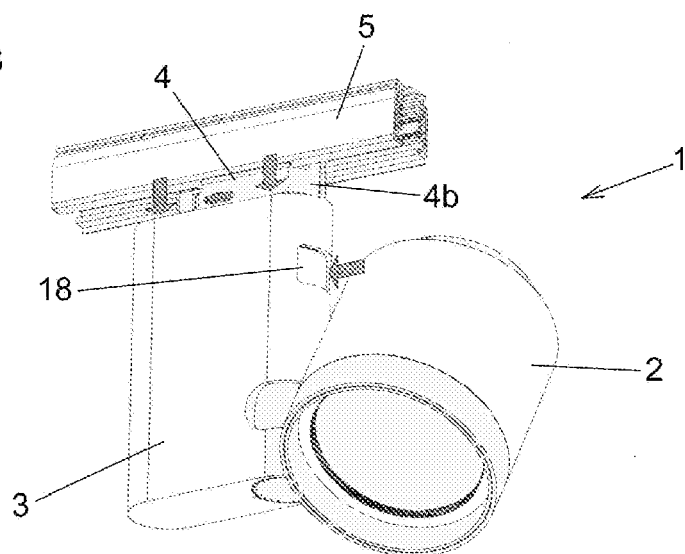


Fig.4

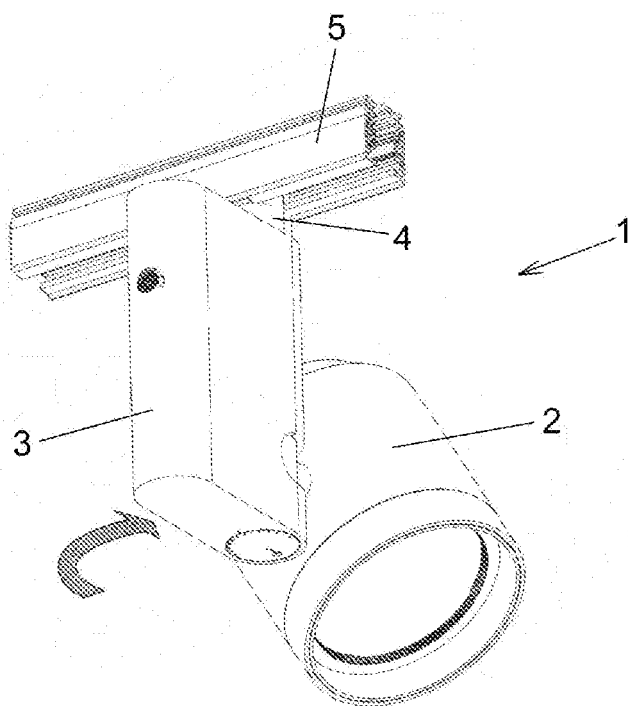


Fig.5

