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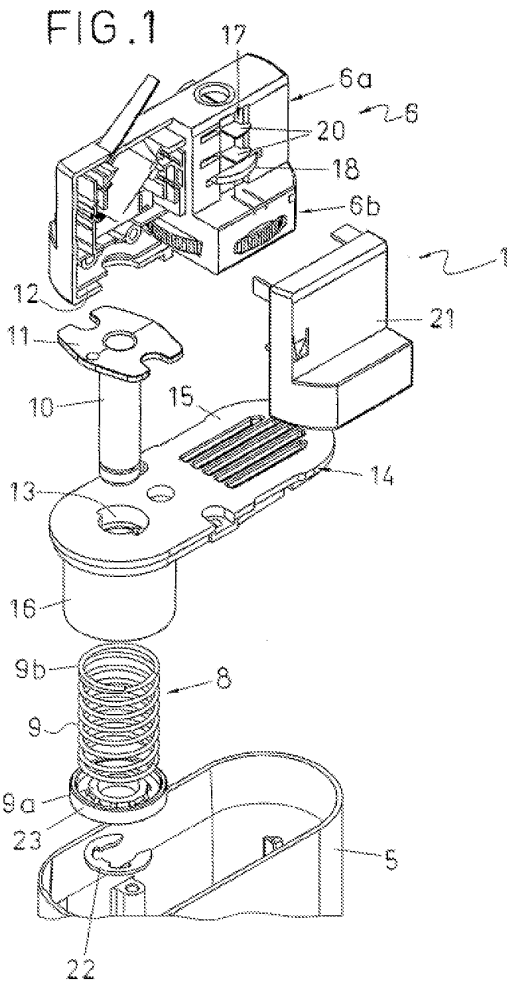
(71) Applicant: **Antares Iluminación, S.A.**
46190 Ribarroja (Valencia) (ES)

(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)

(54) SUSPENDED PROJECTOR

(57) The invention relates to a suspended projector including a projector (1), a case (5) housing electronic equipment and an adaptor (6) having an upper connection area (6a) inserted into the interior (3) of a rail (2) such that it can move along the length thereof and a lower area (6b) coupled to the projector (1). During operation, the device (1) is suspended form the rail (2) by the adaptor (6) and can be positioned along the length of same, said adaptor (6) being completely concealed with the lower area (6a) thereof housed in the casing (5) and the upper area thereof housed in the rail. The adaptor (6) can move longitudinally in relation to the casing (5) and elastic means (8) are provided in order to maintain the adaptor (6) housed inside said casing (5). In this way, mounting and removal operations are facilitated, with a good aesthetic finish being provided once the device (1) has been mounted by concealing the adaptor (6).



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Description

Field of the invention

[0001] The present invention relates to a projector device that, in working position, is suspended from a rail, normally fixed to the roof. The projector device of the invention can move alongside said rail to be adapted to illumination requirements.

[0002] More specifically, the projector device object of the invention comprises a projector, a casing housing the electronic equipment, and an adapter. The adapter is an element that, in said working position, is inserted in a guided way inside the rail and can slide along it to allow the displacement of the projector device in order to let it be adapted to the specific illumination requirements.

State of the art

[0003] In the technical illumination field, projector devices, mainly intended for inside illumination applications, that basically consist of a projector, which is coupled in an orientable way to a casing and an adapter, are known.

[0004] The adapter has a lower area that is attached to the casing, and an upper connecting area that is inserted inside a rail with the sliding possibility along it. To this end, the rail, typically in aluminium, has an interior profile with a configuration that is complementary to the configuration of the upper connecting area of the device adapter. This upper area of the adapter allows the electrical connection of the projector through the rail.

[0005] With this described configuration an orientable projector is obtained which is suspended from a rail and is able to slide along it, allowing for adaptation to the illumination necessities, as stated above. However, a drawback of these projector devices is that the lower area of the adapter can be seen as it is always outside the rail. This negatively affects the aesthetics of the whole, especially when several projector devices are arranged in a same rail, the adapter becoming an unattractive element.

Description of the invention

[0006] The present invention provides a projector device suspended from a rail, which solves the above-mentioned drawback regarding the state of the art and providing further advantages.

[0007] According to the invention, when the projector device is installed in the rail, the adapter is completely concealed, as its upper connection area is totally inserted inside the rail and the lower area is arranged completely housed inside the casing. In short, in operation, the adapter is always concealed, and only the rail, the casing and the projector are visible. The adapter concealing influences positively the aesthetics of the whole, especially when several projector devices are installed in a rail.

[0008] To allow for the mounting and removal operations of the projector device in the said rail, the adapter can be longitudinally moved in relation to the casing. In cooperation with this longitudinal movement of the adapter in relation to the casing, there are elastic means that tend to maintain the lower area of the adapter housed in the interior of the casing. In this way, to accomplish the operations of mounting and removal of the device above mentioned, the operator just has to separate the adapter from the casing by counteracting the action of said elastic means, by mounting and removing the whole apparatus in the rail in an effective, simple and comfortable way.

[0009] In an embodiment of the invention, the elastic means comprises a compression spring arranged inside the casing with a lower end attached to one portion of the same and an upper end operating against the lower area of the adapter. When the projector device is removed from the rail, the spring is pre-tensioned.

[0010] To carry out the longitudinal movement of the adapter in relation to the casing, there is a shaft housed inside the casing, and a spring externally encloses the said shaft. This shaft that is attached by its top end to the lower area of the adapter, allows for both rotation and displacement of the adapter in relation to the casing. This allows for the installation of the projector device in the rail in a very simple and quick way. The manipulation of the whole thing (rotation and displacement) can be carried out comfortably from the same casing.

[0011] To facilitate the movement of the whole apparatus, it is possible to have a guide lid covering the casing. This lid has an orifice that allows for the guided passage of the shaft when moving the adapter in relation to the casing.

[0012] There are also blocking means intended to prevent the adapter from falling from the rail in said mounted position. These blocking means can be, for example, a mechanical lock associated to the adapter that includes a cam that fits inside the rail profile. This lock includes a lever, and the cam is solidary assembled to said lever and to some electrical contacts arranged inside said rail.

[0013] With a suspended projector device like the one described according to the present invention it is possible to solve in an effective, inexpensive and simple way the aesthetic problem that this kind of projectors known to date from the prior art have. Furthermore, the adapter is a standard part, so the invention is applicable in a wide range of suspended projectors of this kind. Nevertheless, it is evident that the invention would be applicable also to other adapters used in this type of projectors.

[0014] Other objects, advantages and characteristics of the suspended projector device according to the invention will be clear from the description of a preferred embodiment of the invention. This description is given as a not limitative example and is illustrated in the enclosed drawings.

Brief description of drawings

[0015] In said drawings:

Figure 1 is a perspective exploded view of a suspended projector device according to the invention, in which the casing is partially shown;

Figure 2 is a perspective view of the adapter of the suspended projector device according to the invention; and

Figures 4 to 8 are perspective views of the projector device as in Figure 1 showing its mounting sequence in the rail.

Detailed disclosure of a preferred embodiment

[0016] Figures show a possible example of a suspended projector device according to the invention, which has been designated in its entirety by reference 1.

[0017] The projector device 1 is suspended, in the mounting position, in a three-phase rail in aluminium 2, which can be appreciated in Figures 3 to 8. The rail 2 has an inverted U shape cross-section with a grooved interior profile 3.

[0018] The suspended projector device 1 of the embodiment described according to the figures comprises of a projector 4 rotationally attached by means of an articulation 4a to a casing 5 housed inside an electronic equipment (not shown). The projector device 1 has also an adapter 6 in its top.

[0019] Said adapter 6, shown in detail in Figure 2 of the drawings, includes an upper connection area 6a that, in operation, is inserted in the interior 3 of the rail 2, in such a way that the adapter 6 can be placed along the rail 2. This upper connection area 6a includes some electrical contacts 20 (see figures 1 and 2), which, in operation, are inside the rail 2 and allow for the electrical contact between the device 1 and the rail 2 with independence of the relative position of both elements. There is a lid 21 attached to the upper connection area 6a of the adapter 6 and it conceals and protects the electrical connection coming from the electronic equipment.

[0020] The adapter 6 has a lower area 6b, see figure 2, that is attached to the projector device 1, which will be further described hereinafter. In the lower area 6b of the adapter 6 there is a wheel 6c to select the phase of the rail 2 through which the electric current goes.

[0021] With this configuration, when the whole is mounted for its operation, as shown in Figure 8, the projector device 1 is suspended from the rail 2 by means of the adapter 6, the said adapter 6 being completely concealed. That happens because the upper connection area 6a of the adapter 6 is completely inserted into the interior 3 of the rail 2 and the lower area 6b of the adapter 6 is completely housed into the interior of the casing 5. In this way, in the operating position, only the rail 2, the casing 5 and the projector 4 can be seen from the outside. This allows for better aesthetics of the whole, especially when several projector devices 1 are installed in a same rail 2.

[0022] To allow for the mounting and removal operations of the projector device 1 in the rail 2, the adapter 6 can be longitudinally moved in relation to the casing 5, in other words, in the direction indicated by the arrow 7, as shown in figures 4, and 7 of the drawings.

[0023] In the exemplar embodiment described according to the figures, particularly Figure 1 of the drawings, the suspended projector device 1 includes elastic means 8 intended to maintain the lower area 6b of the adapter 6 housed into the interior of the casing 5. These elastic means 8 comprise a compression spring 9 that is arranged into the interior of the casing 5. Particularly, the spring 9 is attached with a lower end 9a to a casing part 5 by means of a safety ring 22 and with an upper end 9b in contact with the lower area 6b of the adapter. In said lower end 9a of the spring 9 there is an abutting ring 23 aimed to assure a good seat for the spring 9. When the projector device 1 is removed from the rail 2, the spring 9 is pre-tensioned.

[0024] To carry out the mounting and removal operations of the device 1, the operator simply separates the adapter 6 from the casing 5 against the spring action 9, mounting or removing the whole apparatus in or from the rail 2. These operations will be further described hereinafter regarding Figures 4 to 8.

[0025] To carry out said longitudinal movement of the adapter 6 in relation to the casing 5 of the device 1, there is a shaft 10 in the interior of the casing 5, as can be appreciated in Figure 1. The spring 9 externally encloses the shaft 10, which has an upper end with an widened flat area 11 which is rotationally housed in a cavity 12 formed in the interior of the lower area 6b of the adapter, as shown in Figure 1.

[0026] This configuration allows for the rotation (arrow 12 in Figure 6) and the displacement (arrow 7 in Figures 4 and 7) of the adapter 6 in relation to the casing 5, which enables the installation of the projector device 1 in the rail 2 in a very simple and quick way. To execute the rotation 12 and displacement 7 movements, the operator simply takes the casing 5 of the whole apparatus and makes it to rotate and displace as above indicated.

[0027] In the shown embodiment, particularly in the exploded view of Figure 1, the device 1 includes also a guide lid 13 that covers the casing 5. This guide lid 13 serves to facilitate the movement of the whole apparatus. To this end, said lid 13 has a configuration defined by a flat portion 14 with an orifice 15 that extends down into a cylindrical area 16. The orifice 15 allows for the guided passage of the shaft 10 when moving the adapter 6 in relation to the casing 5 in the direction indicated by said arrows 7 and 12 (displacement and rotation, respectively). It is also possible to have a bush inside said cylindrical area 16 of the lid 13 to improve the shaft guiding 10.

[0028] The safety ring 22 above-mentioned keeps the

whole apparatus consisting of the shaft 10, the spring 9, the lid 13 and the abutting ring 23 joined.

[0029] As shown in Figures 1 and 2, the device 1 has also blocking means 17 to prevent the adapter 6 from falling from the rail 3 in the mounted position shown in Figure 8. In the embodiment shown, the blocking means comprise a mechanical lock associated to the adapter 6. This mechanical lock includes a cam 18 that fits in the interior of the profile 3 of the rail 2 and a lever 19. The cam 18 is solidary to said lever 19 and the electrical contacts 20 (see Figures 1 and 2) that, in operation, are inside said rail 2.

[0030] To install the suspended projector device 1 in the rail 2 we start from the removed position shown in Figure 3 of the drawings, where the device 1 is with the adapter 6 outside the rail and the spring 9 is pre-tensioned, in other words, exerting a force that tends to bring the adapter 6 towards the casing 5. In this position, the lever 19 of the blocking means is in the unlock position, that is to say, with the cam 18 and the contacts 20 housed inside the upper connection area 6a of the adapter 6. The device 1 is then placed in the three-phase rail 2 and the lever is operated 19 in the direction indicated by the arrow 24, as shown in Figure 4, to draw the cam 18 and the contacts 20 out from the upper connection area 6a of the adapter 6 in order to block and connect the device 1 in the rail 2 and the lever 19 is in the state shown in Figure 5. Subsequently, the casing 5 is rotated as indicated by the arrow 12 in order to align it to the rail 2, as shown in Figure 6, and consequently to the adapter 6. In this alignment position of the casing 5, the adapter 6 and the rail 2, the force exerted by the spring 9 forces the casing 5 to move upwards as indicated by the arrow 7 (Figure 7), in such a way that the lower area 6b of the adapter 6 is housed into the interior of the casing 5 and the entire adapter 6 is concealed. The device 1 ends in the state shown in Figure 8, the operator aligning the position of the projector 4 in the desired direction in relation to the casing 5 by means of its articulation 4a.

[0031] Although the present invention has been disclosed in the patent specification and illustrated in the enclosed drawings referring to its preferred embodiment, the suspended projector device object of the invention is susceptible to several changes without departing from the scope of the protection defined in the following claims.

Claims

1. Suspended projector device (1) comprising a projector (4), a casing (5) housed inside the electronic equipment and an adapter (6) that has an upper connection area (6a) inserted into the interior (3) of a rail (2) with possibility of sliding along it, and a lower area (6b) attached to the projector device (1), in such a way that, in operation, the projector device (1) is suspended from the rail (2) by means of said adapter (6) and can be moved along it, **characterized in that**, in the mounted position, the said adapter (6) is totally concealed, with its lower area (6a) housed in said casing (5) and said adapter (6) can be moved longitudinally in relation to the said casing (5) to allow for mounting and removal operations of the projector device (1) in the rail (2).

2. Suspended projector device (1) according to claim 1, **characterized in that** it comprises elastic means (8) that tend to keep said adapter (6) housed in the interior of said casing (5).

3. Suspended projector device (1) according to claim 1 or claim 2, **characterized in that** said elastic means (8) comprise a compression spring (9) with an end (9a) attached to the casing (5) and the opposite end (9b) of the spring (9) operating against the lower area (6b) of the adapter (6).

4. Suspended projector device (1) according to any of the previous claims, **characterized in that** it comprises a shaft (10) housed in the interior of said casing (5), externally enclosed by the spring (10), allowing for both the rotation and the displacement of the adapter (6) in relation to the casing (5).

5. Suspended projector device (1) according to any of the previous claims, **characterized in that** the casing (5) comprises a lid (13) having an orifice (15) for the guided passage of the shaft (10).

6. Suspended projector device (1) according to any of the previous claims, **characterized in that** it comprises blocking means (18, 19) that prevent the adapter from falling from the rail (2) in the mounted position.

FIG.1

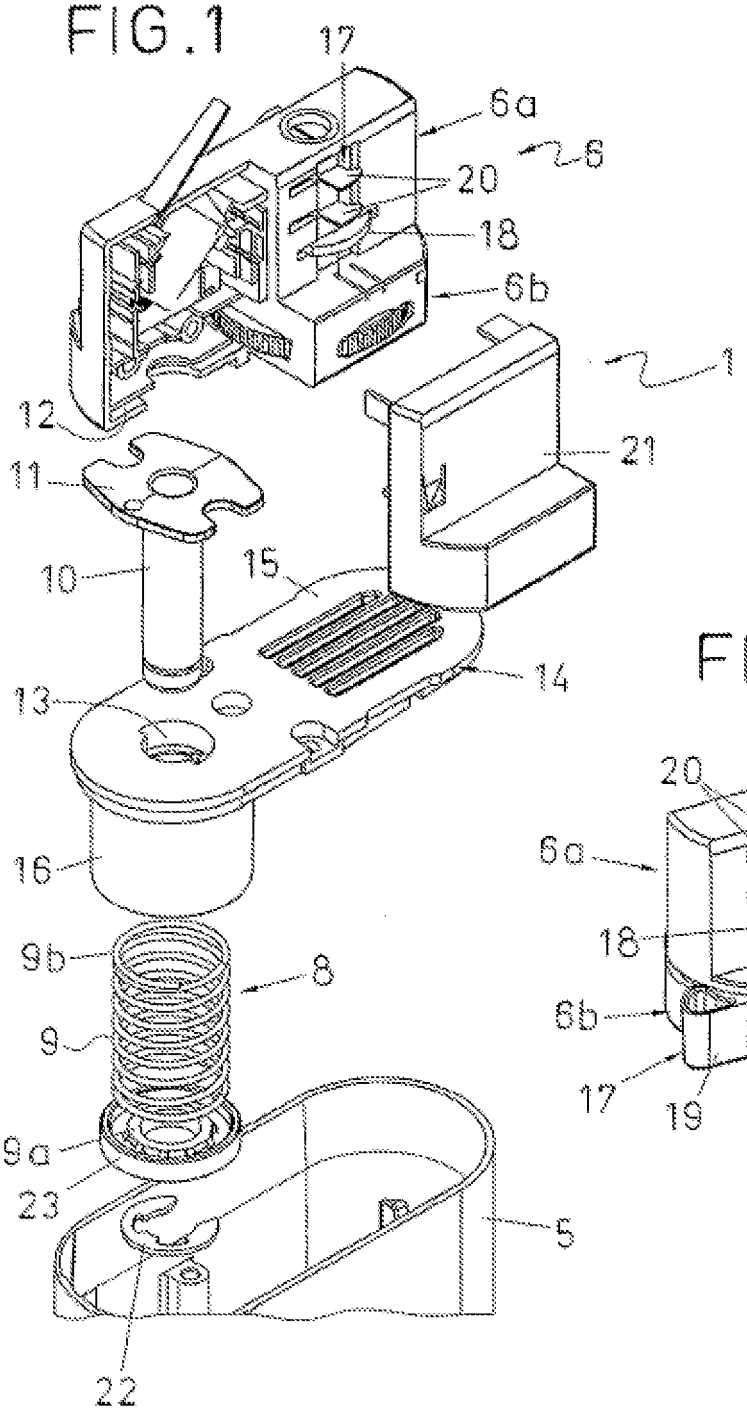
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FIG.2

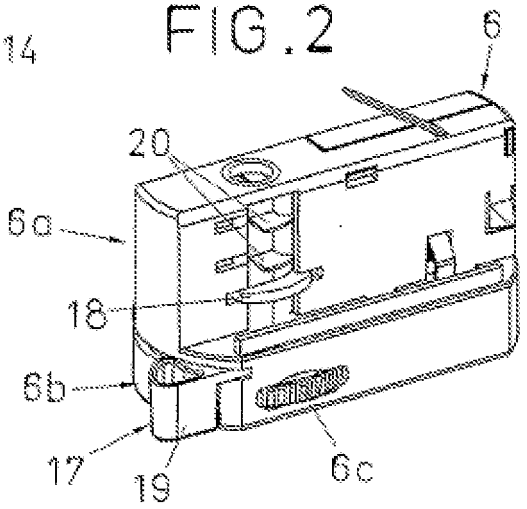
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FIG.5

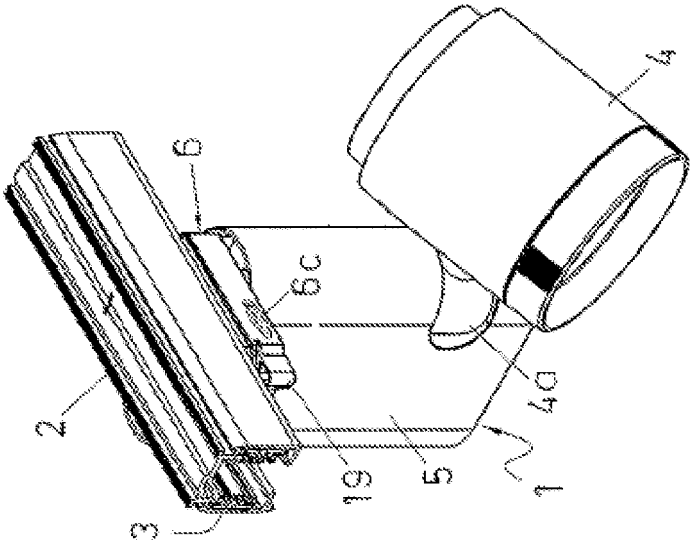


FIG.4

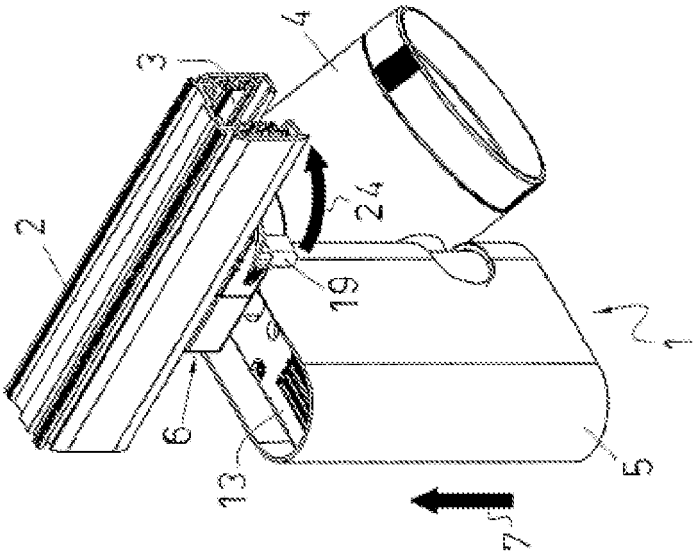


FIG.3

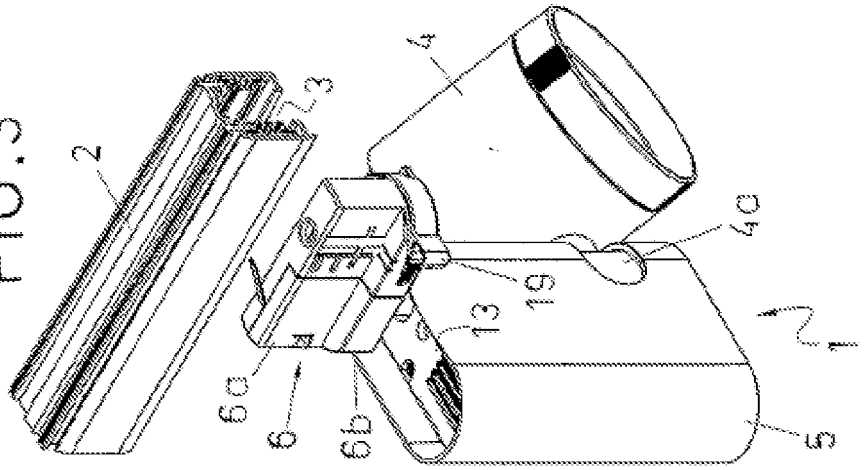


FIG.8

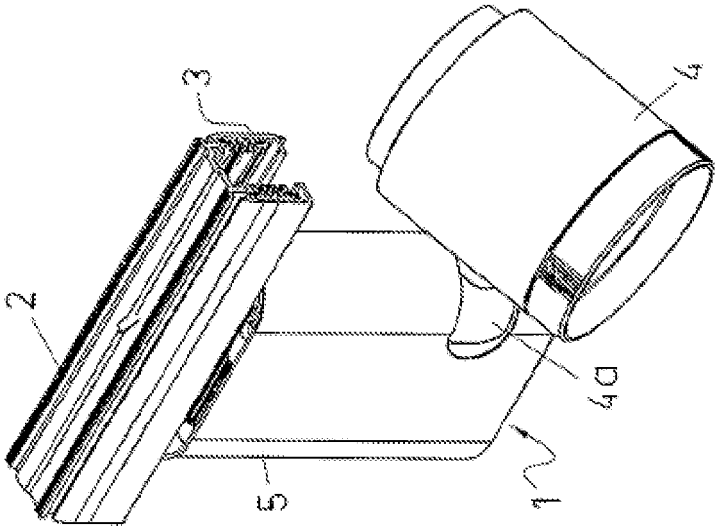


FIG.7

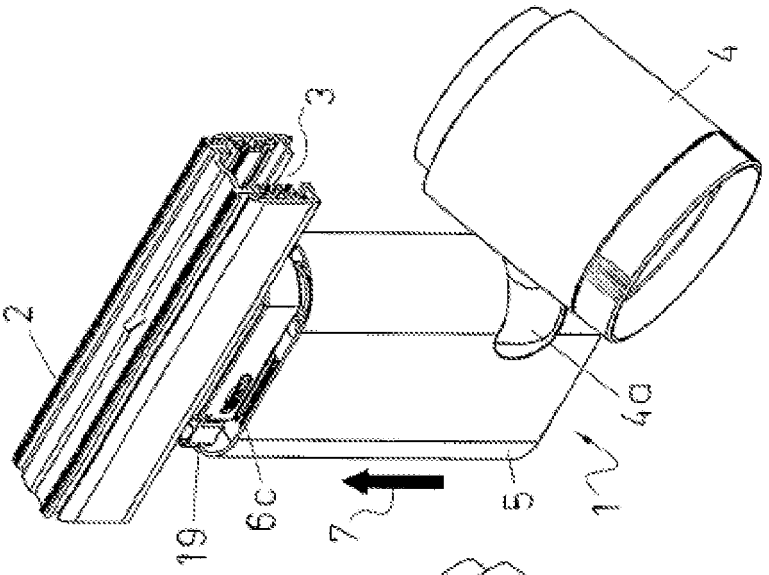
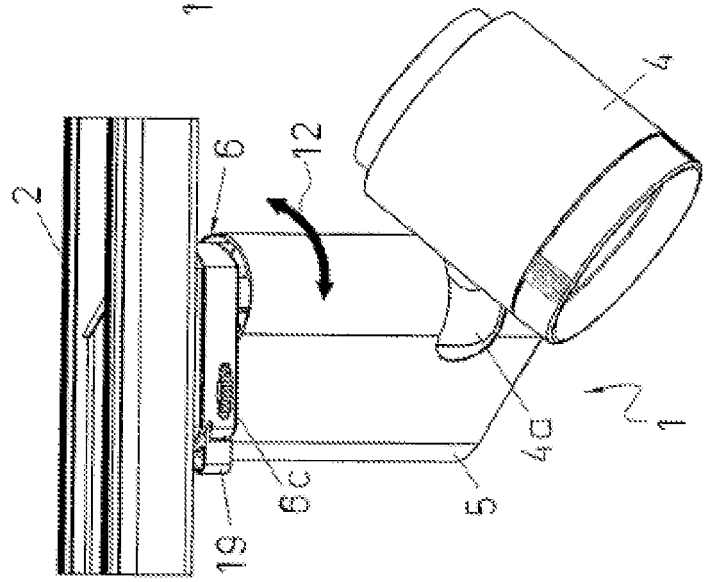


FIG.6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2006/000066

A. CLASSIFICATION OF SUBJECT MATTER

F21V 21/34 (2006.01)

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)

F21V+, H01R+

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)

CIBEPAT, EPODOC, WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4190309 A (GLASS IRVING J) 26.02.1980, column 3, line 67 - column 4, line 55; figures.	1-6
A	US 3596226 A (MELTZER JACK A) 27.07.1971, column 2, lines 13-50; figures 2-4.	1-6
A	US 4814953 A (DISTASIO JOSEPH) 21.03.1989, column 4, line 48 - column 5, line 2; figure 2.	1
A	US 4676567 A (MOUCHI DANIEL E) 30.06.1987, the whole document	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 May 2007 (29.05.07)	06 June 2007 (06.06.07)
Name and mailing address of the ISA/ S.P.T.O.	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/ ES 2006/000066

US4190309A A	26.02.1980	NONE	----------
US3596226A A	27.07.1971	NONE	----------
US 4814953 A	21.03.1989	US 4731710 A CA 1305115 C	15.03.1988 14.07.1992
US4676567A A	30.06.1987	NONE	----------

Form PCT/ISA/210 (patent family annex) (April 2005)