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(54) **Equipment for transforming a lighting apparatus in an emergency lighting apparatus.**

(57) An equipment (12) for transforming a lighting apparatus in an emergency lighting apparatus, wherein the lighting apparatus includes a central body (10), placed to protect one or more light sources and a reflector, and one or two lateral removable heads (11), placed to close the central body (10), which incorporate a sealing element in order to assure an appropriate degree of protec-

tion and which can be exploited for the electrical wirings; in particular, the equipment accessory (12) is mounted in place of one or two lateral heads (11), so as to be interchangeable with them, assuring the operation of apparatus for emergency lighting, thanks to the fact of containing an electronic inverter (5) with its battery (4) and a further lighting source having self-contained LED (2).

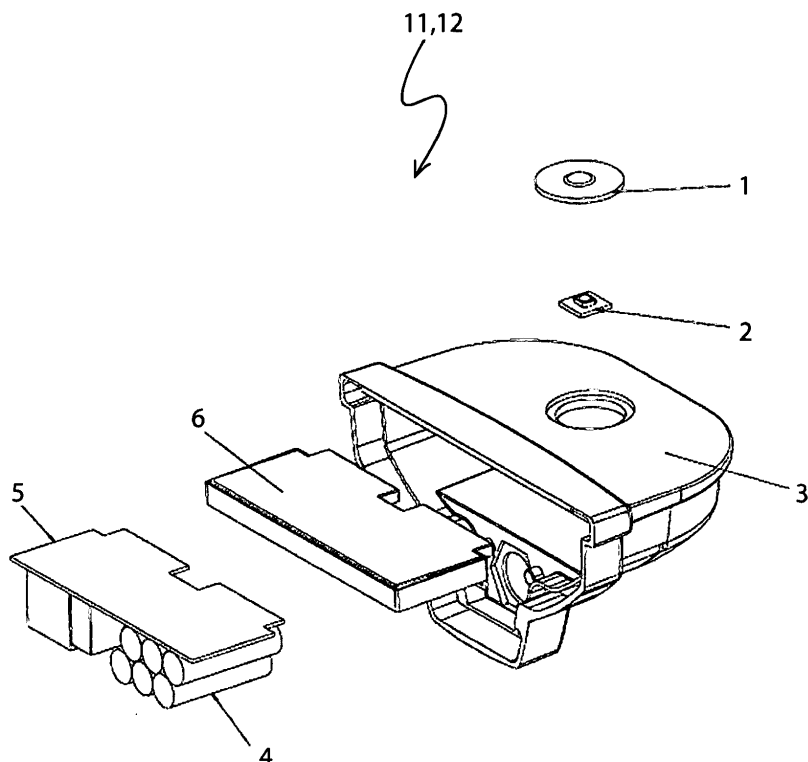


Fig.3

Description

[0001] The present invention relates generally to an equipment for transforming a lighting apparatus in an emergency lighting apparatus.

[0002] More particularly, the invention concerns a hardware system for the simple transformation of a lighting apparatus in an emergency lighting apparatus; it is actually a module which can be mechanically and electrically integrated into traditional lighting apparatuses, de facto transforming them into permanent or emergency lighting systems.

[0003] The system is particularly suitable for the use in pre-assembled ceiling light fixtures, of the watertight type, for watertight and anticorrosion environments and with fluorescent tubes, but it can be generally adopted even in lighting apparatuses of different kinds.

[0004] Currently, the functions for the emergency lighting are implemented in traditional lighting fixtures typically using special kits, normally known as "inverters", which are inserted into the original body of the lamp (ceiling light fixtures) and which generally include a casing, containing the electronic parts, a batteries pack, usually connected with the casing, through proper electrical wiring, and at least a LED or other device suitable to view the operation status of the system.

[0005] Therefore, a series of operations, not always simple or quick to be performed, are required for the electrical connection of the kit, such as:

- opening the lighting apparatus (ceiling light fixtures);
- identifying a useful space, if available, for the positioning of the casing of the inverter and the relative battery;
- providing the completion of appropriate fastenings for the two components (usually making some seats for the insertion of clamping screws) and placing the signaling LED in an easily visible point when the article is installed;
- changing the original wirings by interrupting, according to a precise scheme, the original connections among the lighting sources and the relative power supplier and inserting into the new path a series of new wirings for the connection of the inverter;
- checking the functionality of the whole;
- reassembling the lighting apparatus.

[0006] To this end, figure 1 attached shows the rear view of the reflector of a lighting apparatus with two fluorescent lighting sources of 58

[0007] Watt each, while figure 2 attached shows the rear view of the reflector of the same apparatus in the emergency lighting version, where the new electrical wirings, as well as the inverter IN and the batteries pack B are visible.

[0008] All the operations mentioned above, apart from some laboriousness, involve a substantial uncertainty about the final result of the electrical wiring and can create

conflicts of responsibility in the unfortunate event of accidents caused by malfunctions.

[0009] Furthermore, changing the original lighting apparatus, beyond possible conflicts of responsibility between the manufacturer of the lighting apparatus, the manufacturer of the emergency lighting kit and the installer who makes the change, may irreversibly affect the performances of the original apparatus.

[0010] Finally, altering the wiring can easily generate serious problems of turning on of the lighting sources, particularly when they are formed by gas discharge lamps or fluorescent tubes, as well as alteration of the electromagnetic radiations, which actually makes the apparatus, although functioning, not complying with the electrical regulations in force.

[0011] For all these reasons, the major emergency lighting apparatuses manufacturers prefer to directly provide the embodiments equipped with the kit and the wiring of the emergency version, in order to make properly done electrical connections and in order to certify the overall performances resulting from the apparatus.

[0012] However, mostly for watertight fluorescent tubes ceiling light fixtures, some following serious limitations are still present.

[0013] First of all, the temperatures inside the ceiling light fixture are generally very high (typically they exceed 60°C), due to the heat generated by the lamps and the relative power suppliers, and thus hardly compatible with the use of batteries packs (even if of specific type); it follows that, at the best, the useful life of the batteries and the electronic circuits of the inverter will be reduced (life is halved every 10°C of temperature increase; for instance, 4 years at 45°C become 2 years at 55°C, which lower to 1 year at 65°C).

[0014] Moreover, the useful life of the light source (lamp) is compromised during the emergency operation, due to the non-compliance with the operating parameters of the aforesaid source, since, during the emergency operation, energy is supplied by a battery having a limited capacity (for size constraints) and, therefore, not allowing to provide the nominal power of the lamp (for example, in a watertight ceiling light fixture of 58 Watt, in ordinary operation each lamp is usually fed at 58 Watt, while in emergency operation the inverter provides 5-6 Watt, thus about 10% of the nominal power); the circuits used in the inverter, for reasons related to the transformation efficiency and costs, do not provide pre-heating systems of the cathodes and, therefore, with powers so limited, the average life of the lamp can be reduced even to 100 hours of operation, against the nominal 12.000-15.000 hours.

[0015] Finally, the problems of turning on at low temperatures is evident, always due to the reduced energy available to the lamp, as it is evident that the manufacturer is obliged to produce specific product versions (standard lighting apparatus and emergency lighting apparatus), actually doubling the number of products to manage, with relative logistic problems arising from it and

respective costs for the end user.

[0016] Purpose of the present invention is, therefore, to overcome the drawbacks complained, creating an equipment for transforming a lighting apparatus in an emergency lighting apparatus, which allows the manufacturer to significantly reduce the number of lighting products to be managed, thus limiting the costs of construction and operation.

[0017] Other purpose of the present invention is to provide an equipment for transforming a lighting apparatus in an emergency lighting apparatus, which allows to avoid turning on problems at low temperatures, while keeping an excellent useful life of the batteries packs and lighting sources, even during the emergency operation.

[0018] Another purpose of the present invention is to create an equipment for transforming a lighting apparatus in an emergency lighting apparatus, which has an excellent quality/price ratio and presents an extreme ease and speed of construction and installation of the equipment and maintenance of the lamps and/or the electronic control circuits.

[0019] Further purpose of the present invention is to create an equipment for transforming a lighting apparatus in an emergency lighting apparatus, which allows to carry out simple wirings and various arrangements of the lighting apparatuses, during their installation.

[0020] These and other purposes, according to the present invention, are achieved by creating an equipment for transforming a lighting apparatus in an emergency lighting apparatus in accordance with the attached claim 1; further technical specific and detailed features are contained in the subsequent claims.

[0021] Advantageously, the invention allows to significantly reduce the temperature which develops on the sensitive components, such as batteries and inverters, thanks to the position defined externally the heat source, with additional undoubted advantages in terms of useful life, particularly for the batteries, which will assure the minimum life of four years, as required by the law in force.

[0022] Moreover, the photometric performances obtained with a dedicated source are optimized for the specific operation of the emergency lighting; indeed, the light is directed where most useful, regardless of the optical configuration of the original lamp, maximizing the efficiency thereof.

[0023] Still advantageously, there are no problems of average life of the light source, since, firstly, the auxiliary LED assures a virtually infinite emergency operation and, secondly, the primary light source is not damaged by a possible emergency operation and will assure the nominal useful life.

[0024] Finally, there are no problems related either to the cold operation or to electromagnetic compatibility, but there is the possibility of doubling the level of illumination, at least in emergency lighting conditions, and a perfect view of the signaling LED of the operation status of the apparatus is obtained.

[0025] Additional features and advantages of an

equipment for transforming a lighting apparatus in an emergency lighting apparatus, according to the present invention, will be more evident from the following description, referring to a preferred and illustrative, but not limited, embodiment and the attached drawings in which:

figure 1 shows a rear view of the reflector of a lighting apparatus of traditional type,

figure 2 shows a rear view of a reflector of an emergency lighting apparatus of traditional type;

figure 3 is an exploded perspective view of an equipment for transforming a lighting apparatus in an emergency lighting apparatus, carried out according to a preferred, but not limiting, embodiment of the present invention;

figure 4 is a partial perspective view of a lighting apparatus in emergency lighting version, according to the present invention;

figure 4A is a partial and exploded perspective view of the lighting apparatus shown in figure 4, according to the invention;

figure 5 is a partial perspective view of a lighting apparatus according to the present invention;

figure 5A is a partial and exploded perspective view of the lighting apparatus of figure 5, according to the invention;

figure 6A is a complete perspective view of a lighting apparatus, according to the present invention;

figure 6B is a complete perspective view of a first embodiment of an emergency lighting apparatus, according to the present invention;

figure 6C is a complete perspective view of a second embodiment of an emergency lighting apparatus, according to the present invention.

[0026] With reference to the figures mentioned, the equipment for transforming a lighting apparatus in an emergency lighting apparatus, which is the object of the present invention, consists of an autonomous module, which can be advantageously combined with watertight fluorescent tubes ceiling light fixtures, which exploit in particular the constructive characteristics thereof.

[0027] The ceiling light fixtures in question are composed, specifically, of a metallic and glass central body 10, which protects the fluorescent light sources and the reflector, and two removable lateral heads 11, closing the central body 10, which incorporate respective seal elements, suitable to assure an appropriate degree of protection, and exploitable for the electrical wiring.

[0028] The equipment or module 12, suitable to transform a lighting apparatus in an emergency lighting apparatus, which is the object of the invention, actually replaces one of the original heads 11, assuring the operation of emergency equipment, thanks to the use of an inverter, with related batteries pack, and a LED light source, which are contained inside the module or head 12.

[0029] The new closing head 12 thus obtained guarantees the original degree of protection, assuring at the

same time a proper functionality in emergency condition, as the system of sealing and closing of the new head 12 reproduces that one of the original head 11, thereby assuring also a perfect interchangeability of the heads 11, 12.

[0030] The new closing head 12, which actually is the autonomous module suitable to transform the lighting apparatus in an emergency lighting apparatus, basically consists of an outer casing 3, connected with the central body 10 of the lighting apparatus and made preferably of aluminum die-casting, within which an internal protective cover 6 is inserted, which contains an electronic circuit (inverter) 5 to which a batteries pack 4 is associated.

[0031] Furthermore, an auxiliary optical unit 2, containing a signaling LED, on which a lens 1 is positioned, is fixed to the outer casing 3.

[0032] In this way, thanks to the use of an auxiliary optical system independent from the original source, problems arising from the interconnection of the two systems of ordinary and emergency lighting are solved, which actually become completely independent, although part of a single equipment, obtained combining the original central body 10 with the replacement head 12.

[0033] It is thus possible to create a new equipment starting from an original or traditional lighting apparatus, combining to such an apparatus an equipment which can be managed independently and can be also used on different types of lighting apparatuses (ceiling light fixtures of 58 Watt, 36 Watt, 18 Watt, etc.), always and however guaranteeing the same electrical performances and compliance with the law in force.

[0034] From the description made, the technical features of the equipment for transforming a lighting apparatus in an emergency lighting apparatus, according to the present invention, are clear, as well as the resulting benefits.

[0035] In particular, they are represented by the following aspects:

- containment of the temperature on the sensitive components of the emergency module, such as batteries packs and inverters, thanks to the position of the same, externally with respect to the heat source, with consequent advantages in terms of average useful life;
- optimized photometric performances for the specific operation of emergency lighting, regardless of the optical configuration of the original lamp;
- operation virtually endless of the auxiliary LED in emergency lighting conditions and nominal duration of the primary light source (which is not damaged by a possible emergency operation);
- no problem of cold operation and/or electromagnetic compatibility;
- possibility of doubling the emergency lighting level, by replacing both the heads 11 with the module 12;
- perfect visibility of the LED of signaling of the operation state of the equipment.

[0036] It is, finally, clear that several other variations may be made to the equipment in question, without for this reason going out of the novelty principles inherent to the inventive idea, as it is clear that, in the practical implementation of the invention, materials, shapes and sizes of the details illustrated may be any depending on the requirements and the same may be replaced with others technically equivalent.

Claims

1. Equipment (12) for transforming a lighting apparatus in an emergency lighting apparatus, wherein said lighting apparatus includes a central body (10), which is placed to protect one or more light sources and at least one reflector, and at least one lateral removable head (11), which closes the central body (10) and which incorporates one or more sealing elements to assure an appropriate degree of protection and which can be used for electric connections, **characterized in that** said equipment (12) is provided in place of said at least one lateral head (11) and has said one or more sealing elements and is interchangeable with said at least one lateral head (11).
2. Equipment (12) as claimed in claim 1, **characterized in that** said emergency lighting apparatus consists of at least one sealed ceiling light fixture with one or more fluorescent tubes.
3. Equipment (12) as claimed in claim 1, **characterized in that** said equipment (12) coincides with at least one of said lateral heads (11) of the lighting apparatus and essentially includes at least one shaped outer casing (3), that is connected to the main body (10) of the lighting apparatus, where at least one internal protective cover (6) is inserted, which contains an electronic circuit (5) connected to an inverter, to which at least one battery (4) is connected.
4. Equipment (12) as claimed in claim 3, **characterized in that** said shaped outer casing (3) is fixed to an optical unit (2), which contains at least one signaling LED diode, on which at least one lens (1) is positioned, in order to maintain independent the optical systems of the lighting apparatus and of the emergency lighting apparatus.
5. Equipment (12) as claimed in claim 2, **characterized in that** said ceiling light includes at least one fluorescent tube of 58 Watts or of 36 Watts and/or of 18 Watts.

Fig.1 PRIOR ART

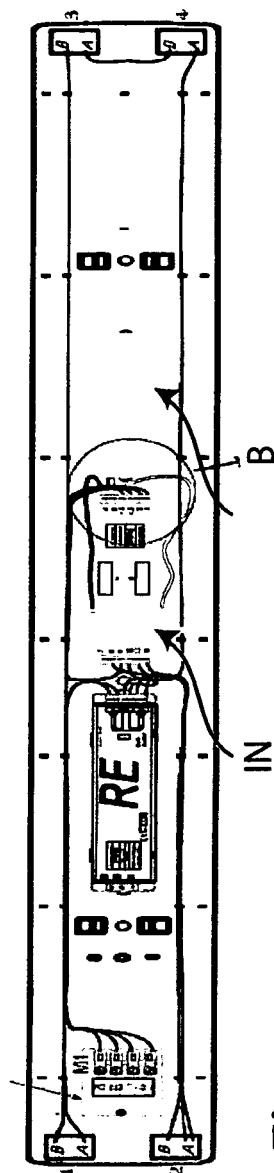
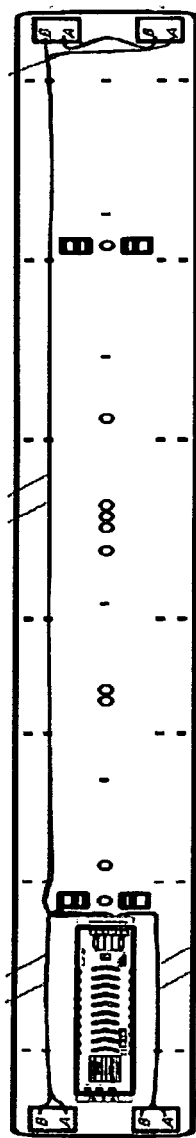


Fig.2 PRIOR ART

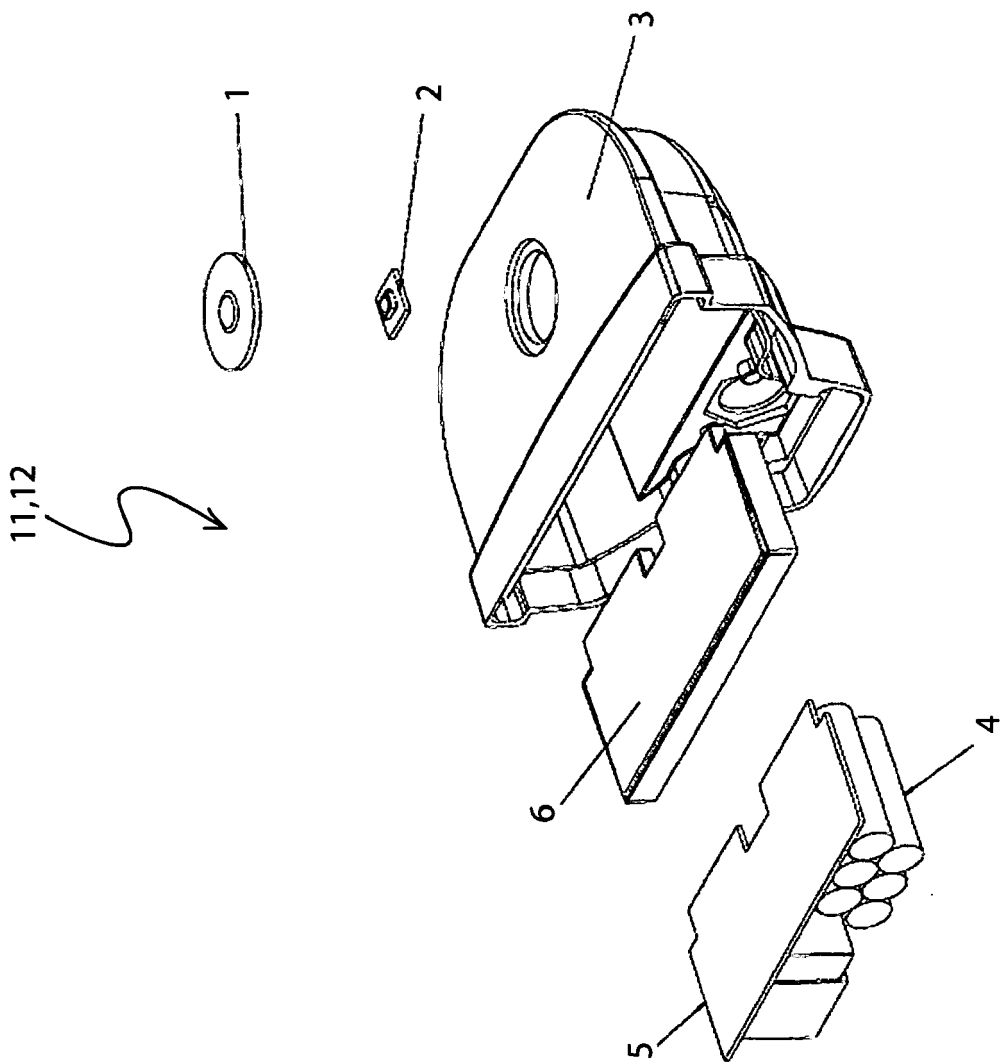
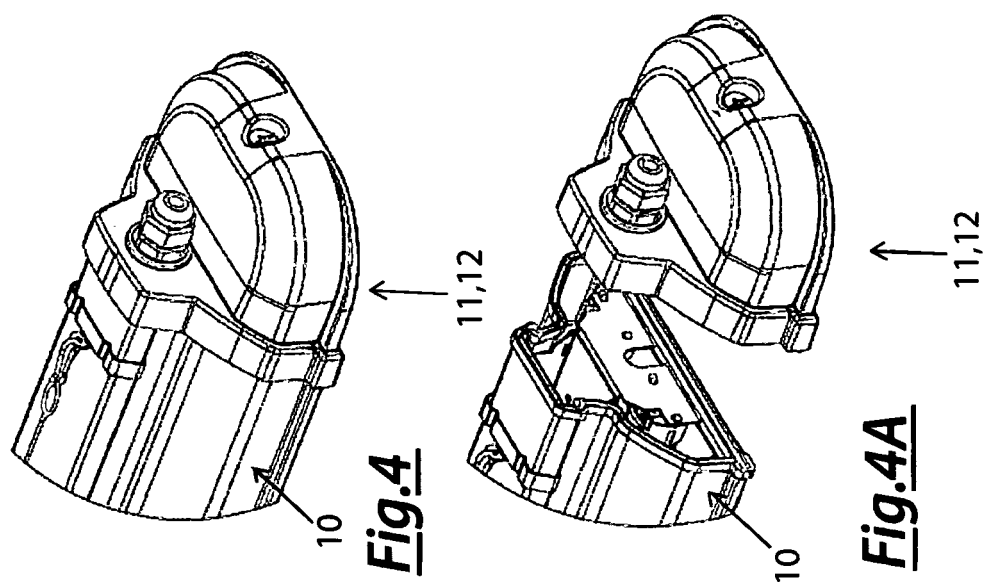
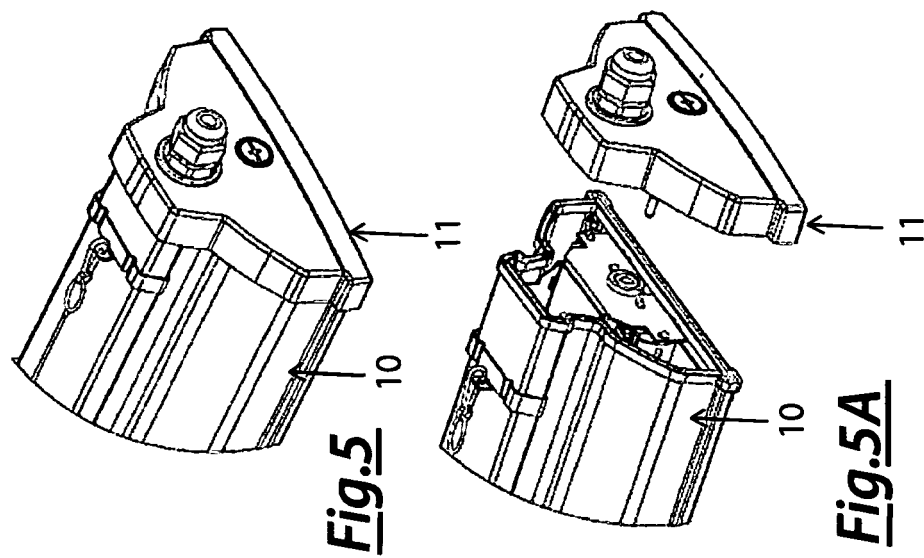


Fig.3



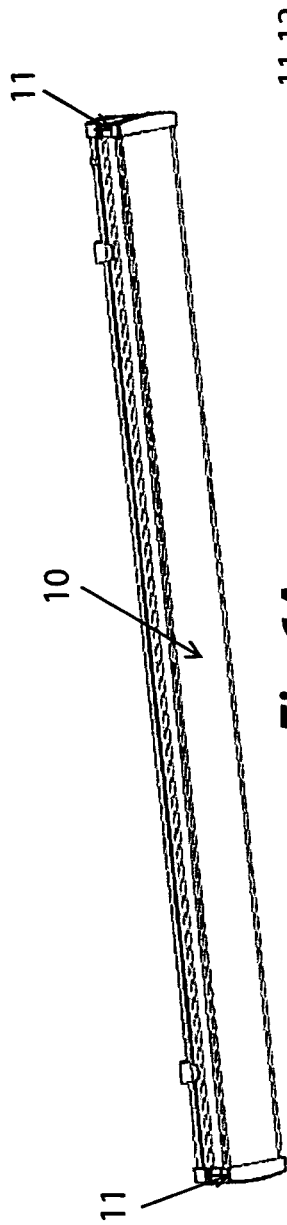


Fig. 6A

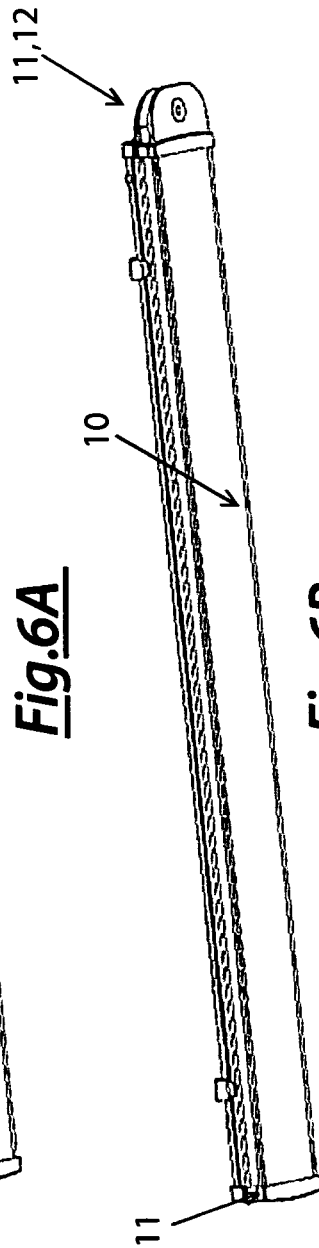


Fig. 6B

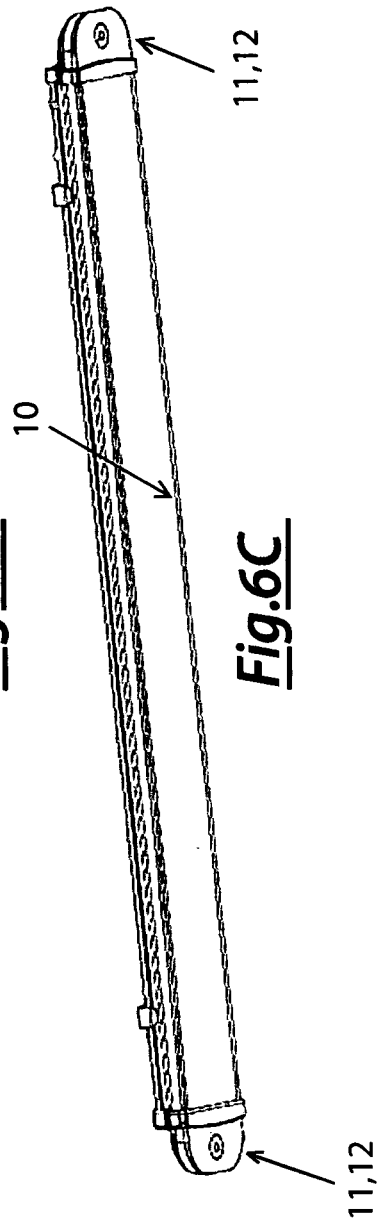


Fig. 6C



EUROPEAN SEARCH REPORT

Application Number
EP 10 42 5104

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 10 2004 006005 A1 (ZUMTOBEL AG DORNBIRN [AT]) 21 July 2005 (2005-07-21) * paragraph [0005] - paragraph [0044]; figures 1-3 *	1-5	INV. F21S9/02
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F21S F21L
Place of search		Date of completion of the search	Examiner
Munich		8 June 2010	Arboreanu, Antoniu
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 42 5104

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08-06-2010

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