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(54) **LIGHTING LAMP**

LEUCHTE

LAMPE

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## Description

**[0001]** The present invention relates to a lighting lamp, i.e. a lighting equipment used as a means of lighting objects and/or environments (indoor and/or outdoor).

**[0002]** The increasing diffusion of LED lamps is known, using as light sources light emission diodes.

**[0003]** The use of LEDs in the lighting sector, however, continues to have some drawbacks, mainly related to the intrinsic characteristics of this type of light source and primarily to their substantially pointed (or in any case very small) nature; in general, for most common applications, large and substantially homogeneous lighting surfaces are needed, so that a plurality of distributed LEDs and/or relatively complex and/or cumbersome optical systems need to be used, resulting in increased costs and complexity of the equipment.

**[0004]** One particular type of light-emitting diode is the so-called OLED. An Organic Light Emission Diode, (OLED) is a light-emitting diode (LED) having a flat electroluminescent emissive layer, formed of an organic film that emits light in response to the transit of electricity.

**[0005]** At present, the available OLEDs are not fully satisfactory for use as light sources in lighting equipment, both from the point of view of performance and from the point of view of complexity and construction costs.

**[0006]** Typically, an OLED has an essentially two-dimensional configuration, presenting itself as a flat panel.

**[0007]** Despite the relatively large emissive surface, the OLEDs currently available are not able to provide adequate lighting power, especially for ambient lighting.

**[0008]** On the other hand, in the field of lighting the search for technical solutions that also allow newly conceived forms and lighting effects to be achieved is constant, in this sector not only the purely functional aspect, but also the aesthetic and emotional component being fundamental.

**[0009]** WO2012099432A2 discloses a lighting apparatus comprising a rod; a plurality of movable blades connected to the rod and supporting light sources; the light sources may comprise both LED sources and OLED sources.

**[0010]** It is an object of the present invention to provide a lighting lamp which overcomes the drawbacks of the prior art referred to; in particular, an object of the invention is to provide a lighting lamp that is efficient in various modes of use, and also particularly easy to make and which also allows newly conceived forms and/or light effects to be obtained.

**[0011]** The present invention therefore relates to a lighting lamp as defined in the appended claim 1.

**[0012]** Further, preferred characteristics of the invention are indicated in the dependent claims.

**[0013]** The lighting lamp of the invention is a hybrid lamp, meaning that it comprises heterogeneous light sources: in particular, the lamp of the invention comprises solid state light sources of different types and specifically at least one LED and one or, preferably, several OLEDs.

**[0014]** According to the invention, the peculiarities of both types of light source are effectively exploited: the OLED sources, which have an extensive but low luminance surface, high chromatic yield and do not cause dazzling, are advantageously used for localized lighting, for example of work areas, and are associated with more powerful LED sources, able to ensure for example environmental lighting.

**[0015]** The lamp of the invention is also particularly simple to make and can be conformed in different ways to obtain original forms and/or light effects.

**[0016]** According to an important aspect of the invention, the OLED sources are not used simply to emit light, but also to control the light emitted by the lamp: by appropriately arranging the OLED sources, the emissive surfaces of the OLED sources also act to direct the light emitted by the other sources and concentrate it where desired.

**[0017]** If the emissive surfaces of the OLED sources are also reflective surfaces, the OLED sources can also be used as reflectors of the light emitted by the associated LED source.

**[0018]** Further characteristics and advantages of the present invention will become clear from the following description of a non-limiting example of an embodiment made with reference to the appended drawings, wherein:

- Figure 1 is a perspective bottom view of a lighting lamp according to the invention;
- Figures 2 and 3 are respectively a perspective bottom view and a perspective top view, with parts removed for clarity, of the lamp in figure 1.

**[0019]** In the appended drawings reference numeral 1 globally denotes a lighting lamp for lighting indoor and/or outdoor environments.

**[0020]** The lamp 1 extends along an axis A, also defining a light emission axis (along which at least part of the light emitted by the lamp 1 is directed) and comprises a support structure 2 and solid state light sources 3 supported by the support structure 2 and comprising at least one LED source 4 and at least one OLED source 5.

**[0021]** The support structure 2 may have different shapes, also depending on the intended use or type of lamp 1: in the non-limiting example shown, the lamp 1 is a hanging lamp (ceiling lamp) and therefore the support structure 2 is shaped so as to be hung from a ceiling, but it is understood that the lamp 1 may be of a different type (free-standing, wall-mounted, table, etc.) and therefore the support structure 2 can be changed accordingly.

**[0022]** The support structure 2 comprises a base body 6, which supports the light sources 3.

**[0023]** In the absolutely non-limiting example illustrated, but not necessarily, the base body 6 comprises a central portion 7 arranged along the axis A and a plurality of arms 8 which project radially from the portion 7 and are angularly spaced from one another about the axis A and are fixed to respective suspension cables 9.

**[0024]** Advantageously, the base body 6 is made at least partly of a heat conductive material so as to perform also a thermal dissipation function of the heat generated by the light sources 3.

**[0025]** The light sources 3 include: a LED source 4 positioned, preferably along the axis A, on a top face 11 of the portion 7, facing upwards in use in the environment to be illuminated; and a plurality of OLED sources 5 arranged about the axis A and at least partially facing one another.

**[0026]** It is understood, however, that the support structure 2 may also support a plurality of LED sources 4 variously positioned and distributed.

**[0027]** The LED source 4 includes one or more LEDs, in particular so-called power LEDs, having performance such as to illuminate an environment, and is optionally associated with one or more optical elements 13.

**[0028]** In the non-limiting example illustrated, the optical elements 13 comprise a diffuser 13A, for example an opaline diffuser, facing the LED source 4 and elongated along the axis A, and a reflector 13B, for example a truncated conical or truncated pyramid reflector, which extends along and about the axis A and surrounds the LED source 4 (and also the diffuser 13A) and has a light output aperture 14 transverse to the axis A.

**[0029]** The reflector 13B is made in a partially reflective and partially transparent material: consequently, the light emitted by the LED source 4 is also distributed, in addition to exiting through the light output opening 14 along the axis A and upwards, about the axis A.

**[0030]** The reflector 13B protrudes radially, at least in part, beyond the base body 6, in particular beyond the central portion 7 of the base body 6 so that the light coming from the LED source 4 through the reflector 13B reaches, passing between the arms 8, the OLED sources 5, which also act as auxiliary optical elements for the control of the light emitted by the LED source 4.

**[0031]** The light sources 3 include at least one pair of OLED sources 5 substantially facing toward each other and arranged on opposite sides of the axis A and preferably symmetrical with respect to the axis A.

**[0032]** In the preferred embodiment illustrated, the light sources 3 include a plurality of OLED 5 sources arranged about the axis A and spaced angularly about the axis A and at least partially facing one another, having in particular respective emissive surfaces 15 facing one another so that the light emitted by the emissive surface 15 of each OLED 5 source impinges at least partially on the emissive surface 15 of at least another OLED source 5.

**[0033]** In the example shown (but not necessarily), the lamp 1 includes four OLED 5 sources arranged in pairs of OLED sources 5 facing each other. It is understood that the lamp 1 may include a different number of OLED sources 5 even differently arranged.

**[0034]** Each OLED source 5 is a two-dimensional light source having a two-dimensional emissive surface 15, extending along two orthogonal directions with dimensions in the order of several centimetres, for example at

least 5-10 cm or even more.

**[0035]** Each OLED source 5 comprises a thin, flat panel 16 substantially flat or curved and extending between a pair of opposite faces 17, 18; at least one of the faces 17, 18 defines the emissive surface 15.

**[0036]** In one embodiment, both faces 17, 18 of each OLED source 5 (or of some OLED sources 5) define respective emissive surfaces 15 of the OLED source 5; in other words, the OLED source 5 emits light from both opposite faces 17, 18 of the panel 16.

**[0037]** The OLED sources 5 project downwards (with reference to the normal position of use of the lamp 1 in the environment to be illuminated) from the base body 6 and delimit a light mixing chamber 20: the panels 16 of the OLED sources 5 constitute respective side walls, arranged about the axis A, of the chamber 20. The chamber 20 is not necessarily completely closed about the axis A, being delimited (as in the example shown) only partially by the OLED sources 5 (i.e. by the panels 16). The panels 16 are in fact spaced apart from one another.

**[0038]** The OLED sources 5 are joined to the base body 6 at respective upper ends 21 and present respective free end edges 22, delimiting an emission opening 23 of the chamber 20.

**[0039]** For example, the OLED sources 5 are connected to the base body 6 by respective joints 24, preferably articulated joints to allow the rotation of each OLED source 5, or of the respective panel 16, with respect to the base body 6, so as to vary the inclination of the OLED sources 5 and specifically of the respective emissive surfaces 15 relative to the axis A.

**[0040]** Preferably, the OLED sources 5 and therefore the respective emissive surfaces 15 are inclined relative to the axis A, and converge towards the base body 6 and diverge towards the emission opening 23.

**[0041]** The OLED sources 5 are arranged about the axis A and are substantially at least partially facing each other, the respective emissive surfaces 15 facing one another in the chamber 20, so that the light emitted by all the OLED sources 5 is mixed in the chamber 20 to then exit through the emission opening 23.

**[0042]** In particular, the OLED sources 5 are arranged so that the light emitted from each OLED source 5 impinges on the emissive surface 15 of one or more other OLED sources 5.

**[0043]** This way, the same OLED sources 5 also act as control elements of the light emitted by the lamp 1, in particular mixing the light of the different light sources 3 and directing the light to provide a predetermined light distribution.

**[0044]** In the example illustrated, the OLED sources 5 are arranged in pairs of OLED sources 5 substantially facing one another (although not necessarily parallel) and with the respective emissive surfaces 15 facing one another, so that the light emitted by each OLED source 5 strikes the emissive surface 15 of the other OLED source 5 facing it (and possibly also the others, possibly to a different extent).

**[0045]** A fraction of the light emitted by the LED source 4 and coming from the reflector 13B (partially transparent) also passes into the chamber 20 and exits through the emission opening 23, and/or strikes one of the faces 17, 18 or both.

**[0046]** The LED source 4 and the OLED sources 5 are in fact supported by the support structure 2 so that at least a fraction of the light coming from the LED source 4 and/or from an optical element 13 associated with the LED source 4 (in the present case, the reflector 13B), strikes one or both faces 17, 18 of at least one panel 16; consequently, at least a part of one or more emissive surfaces 15 of the OLED sources 5 are struck by at least a fraction of the light coming from the LED source 4 and/or the optical element 13 associated with the LED source 4, so that the OLED sources 5 also act as auxiliary optical elements to control the light emitted by the LED source 4.

**[0047]** When the respective OLED sources 5 are switched off, one or both faces 17, 18 of the panels 16 may also be reflective surfaces, in particular mirror surfaces.

**[0048]** For example, but not necessarily, the inner faces 17 (facing toward the chamber 20) are white and the outer faces 18 are reflective.

**[0049]** Optionally, the lamp 1 also comprises a diffuser body 25 (figure 1) which surrounds at least some of the light sources 3.

**[0050]** In the non-limiting example illustrated, the diffuser body 25 encloses all the light sources 3 and has only one opening 26 corresponding to the emission opening 23.

**[0051]** It is understood that the lighting lamp described and illustrated herein may be subject to modifications and variations without departing from the scope of the appended claims.

## Claims

1. A lighting lamp (1), extending along an axis (A) and comprising a support structure (2) and solid-state light sources (3) supported by the support structure (2); the light sources (3) comprising at least one LED source (4) positioned on a top face (11), facing upwards in use in the environment to be illuminated, of a portion (7) of a base body (6), which supports the light sources (3), of the support structure (2), and a plurality of OLED sources (5), projecting downwards, with reference to the normal position of use of the lamp (1) in the environment to be illuminated, from the base body (6) and arranged about the axis (A) and angularly spaced apart from one another about the axis (A) and at least partially facing one another to delimit a light mixing chamber (20); wherein the LED source (4) and the OLED sources (5) are supported by the support structure (2) in such a way that at least one fraction of light from the LED source (4) and/or from an optical element (13) associated with

the LED source (4) strikes at least a part of an emissive surface (15) of the OLED sources (5), so that the OLED sources (5) also act as auxiliary optical elements for controlling the light emitted by the LED source (4).

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2. The lighting lamp according to claim 1, wherein the light sources (3) include at least one pair of OLED sources (5) substantially facing toward each other and arranged on opposite sides of the axis (A) and symmetrical with respect to the axis (A).

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3. The lighting lamp according to claim 1 or 2, wherein the OLED sources (5) have respective emissive surfaces (15) facing each other and are arranged so as that the light emitted by the emissive surface (15) of each OLED source (5) strikes at least partially the emissive surface (15) of at least another OLED source (5).

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4. The lighting lamp according to one of the preceding claims, wherein the OLED sources (5) have respective emissive surfaces (15) facing one another in the light mixing chamber (20), so that the light emitted by the OLED sources (5) is mixed in the light mixing chamber (20) and then exits through an emission opening (23).

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5. The lighting lamp according to claim 4, wherein the OLED sources (5) and the respective emissive surfaces (15) are inclined with respect to the axis (A) and diverge towards the emission opening (23).

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6. The lighting lamp according to one of the preceding claims, wherein the OLED sources (5) are supported by panels (16) having two opposite faces (17, 18), and one or more panels (16) have respective OLED sources (5) on each face (17, 18).

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7. The lighting lamp according to claim 6, wherein at least a fraction of the light from the LED source (4) and/or from an optical element (13) associated with the LED source (4) strikes one or both faces (17, 18) of at least one panel (16).

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8. The lighting lamp according to claim 6 or 7, wherein one or both faces (17, 18) of at least one panel (16) are also reflecting surfaces.

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9. The lighting lamp according to one of the preceding claims, wherein the OLED sources (5) are joined to the support structure (2) by respective articulated joints (24) to allow the rotation of each OLED source (5) with respect to the support structure (2), so as to adjust the inclination of the OLED sources (5).

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10. The lighting lamp according to one of the preceding claims, comprising a diffuser body (25) surrounding

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at least some light sources (3).

### Patentansprüche

1. Leuchte (1), die sich entlang einer Achse (A) erstreckt und umfassend eine Trägerstruktur (2) und Festkörperlichtquellen (3), die von der Trägerstruktur (2) getragen werden; die Lichtquellen (3) umfassen mindestens eine im Betrieb aufwärts in die zu beleuchtende Umgebung gerichtete LED-Quelle (4), die angeordnet ist an einer Oberseite (11) eines Abschnitts (7) eines die Lichtquellen (3) haltenden Grundkörpers (6) der Trägerstruktur (2), und mehrere OLED-Quellen (5), die in Bezug auf die Normalgebrauchsstellung der Lampe (1) in der zu beleuchtenden Umgebung von dem Grundkörper (6) nach unten vorstehen und um die Achse (A) angeordnet und um die Achse (A) winkelmäßig voneinander beabstandet und mindestens teilweise einander zugewandt sind, um eine Lichtmischkammer (20) abzugrenzen; wobei die LED-Quelle (4) und die OLED-Quellen (5) von der Trägerstruktur (2) derart getragen werden, dass mindestens ein Lichtanteil von der LED-Quelle (4) und/oder von einem der LED-Quelle (4) zugeordneten optischen Element (13) mindestens einen Teil einer emittierenden Fläche (15) der OLED-Quellen (5) trifft, so dass die OLED-Quellen (5) ebenfalls als optische Hilfselemente zum Steuern des von der LED-Quelle (4) emittierten Lichts wirken. 30
2. Leuchte nach Anspruch 1, wobei die Lichtquellen (3) mindestens ein Paar von OLED-Quellen (5) umfassen, die im Wesentlichen einander zugewandt und auf gegenüberliegenden Seiten der Achse (A) und symmetrisch in Bezug auf die Achse (A) angeordnet sind. 35
3. Leuchte nach Anspruch 1 oder 2, wobei die OLED-Quellen (5) jeweilige einander zugewandte, emittierende Flächen (15) aufweisen und so angeordnet sind, dass das Licht, das von der emittierenden Fläche (15) jeder OLED-Quelle (5) emittiert wird, mindestens teilweise die emittierende Fläche (15) von mindestens einer weiteren OLED-Quelle (5) trifft. 40
4. Leuchte nach einem der vorangehenden Ansprüche, wobei die OLED-Quellen (5) jeweilige emittierende Flächen (15) aufweisen, die einander in der Lichtmischkammer (20) zugewandt sind, so dass das von den OLED-Quellen (5) emittierte Licht in der Lichtmischkammer (20) gemischt wird und dann durch eine Emissionsöffnung (23) austritt. 50
5. Leuchte nach Anspruch 4, wobei die OLED-Quellen (5) und die jeweiligen emittierenden Flächen (15) in Bezug auf die Achse (A) geneigt sind und in Richtung der Emissionsöffnung (23) divergieren. 55

6. Leuchte nach einem der vorangehenden Ansprüche, wobei die OLED-Quellen (5) von Paneelen (16) mit zwei gegenüberliegenden Flächen (17, 18) getragen werden und eine oder mehrere Paneele (16) jeweilige OLED-Quellen (5) auf jeder Fläche (17, 18) aufweisen. 5
7. Leuchte nach Anspruch 6, wobei mindestens ein Lichtanteil von der LED-Quelle (4) und/oder von einem der LED-Quelle (4) zugeordneten optischen Element (13) eine oder beide Flächen (17, 18) mindestens einer Paneele (16) trifft. 10
8. Leuchte nach Anspruch 6 oder 7, wobei eine oder beide Flächen (17, 18) mindestens einer Paneele (16) ebenfalls reflektierende Flächen sind. 15
9. Leuchte nach einem der vorangehenden Ansprüche, wobei die OLED-Quellen (5) mit der Trägerstruktur (2) durch jeweilige Gelenkverbindungen (24) verbunden sind, um die Drehung jeder OLED-Quelle (5) in Bezug auf die Trägerstruktur (2) zu ermöglichen, um die Neigung der OLED-Quellen (5) einzustellen. 20
10. Leuchte nach einem der vorangehenden Ansprüche, umfassend einen Streukörper (25), der mindestens einige Lichtquellen (3) umgibt. 25

### Revendications

1. Lampe d'éclairage (1), s'étendant le long d'un axe (A) et comprenant une structure de support (2) et des sources de lumière à semi-conducteurs (3) supportées par la structure de support (2) ; les sources de lumière (3) comprenant au moins une source LED (4) positionnée sur une face supérieure (11), tournée vers le haut à l'usage dans l'environnement devant être éclairé, d'une partie (7) d'un corps de base (6), qui supporte les sources de lumière (3), de la structure de support (2), et une pluralité de sources OLED (5), se projetant vers le bas, par rapport à la position normale d'utilisation de la lampe (1) dans l'environnement devant être éclairé, depuis le corps de base (6) et disposées autour de l'axe (A) et espacées angulairement les unes des autres autour de l'axe (A) et se faisant au moins partiellement face pour délimiter une chambre de mélange de lumière (20) ; dans laquelle la source LED (4) et les sources OLED (5) sont supportées par la structure de support (2) de manière à ce qu'au moins une fraction de la lumière provenant de la source LED (4) et/ou d'un élément optique (13) associé à la source LED (4) frappe au moins une partie d'une surface émissive (15) des sources OLED (5), de telle sorte que les sources OLED (5) agissent également comme des éléments optiques auxiliaires pour contrôler la lumière émise 35

- par la source LED (4).
2. Lampe d'éclairage selon la revendication 1, dans laquelle les sources de lumière (3) comportent au moins une paire de sources OLED (5) sensiblement tournées l'une vers l'autre et disposées sur des côtés opposés de l'axe (A) et symétriques par rapport à l'axe (A). 5
  3. Lampe d'éclairage selon la revendication 1 ou 2, dans laquelle les sources OLED (5) ont des surfaces émissives respectives (15) se faisant face et sont disposées de manière à ce que la lumière émise par la surface émissive (15) de chaque source OLED (5) frappe au moins partiellement la surface émissive (15) d'au moins une autre source OLED (5). 10 15
  4. Lampe d'éclairage selon une des revendications précédentes, dans laquelle les sources OLED (5) ont des surfaces émissives respectives (15) se faisant face dans la chambre de mélange de lumière (20), de telle sorte que la lumière émise par les sources OLED (5) est mélangée dans la chambre de mélange de lumière (20) et sort ensuite par une ouverture d'émission (23). 20 25
  5. Lampe d'éclairage selon la revendication 4, dans laquelle les sources OLED (5) et les surfaces émissives respectives (15) sont inclinées par rapport à l'axe (A) et divergent vers l'ouverture d'émission (23). 30
  6. Lampe d'éclairage selon une des revendications précédentes, dans laquelle les sources OLED (5) sont supportées par des panneaux (16) ayant deux faces opposées (17, 18), et un ou plusieurs panneaux (16) ont des sources OLED respectives (5) sur chaque face (17, 18). 35
  7. Lampe d'éclairage selon la revendication 6, dans laquelle au moins une fraction de la lumière provenant de la source LED (4) et/ou d'un élément optique (13) associé à la source LED (4) frappe une ou les deux faces (17, 18) d'au moins un panneau (16). 40
  8. Lampe d'éclairage selon la revendication 6 ou 7, dans laquelle une ou les deux faces (17, 18) d'au moins un panneau (16) sont également des surfaces réfléchissantes. 45
  9. Lampe d'éclairage selon une des revendications précédentes, dans laquelle les sources OLED (5) sont reliées à la structure de support (2) par des charnières articulées respectives (24) pour permettre la rotation de chaque source OLED (5) par rapport à la structure de support (2), de manière à régler l'inclinaison des sources OLED (5). 50 55
  10. Lampe d'éclairage selon une des revendications

précédentes, comprenant un corps diffuseur (25) entourant au moins certaines sources de lumière (3).

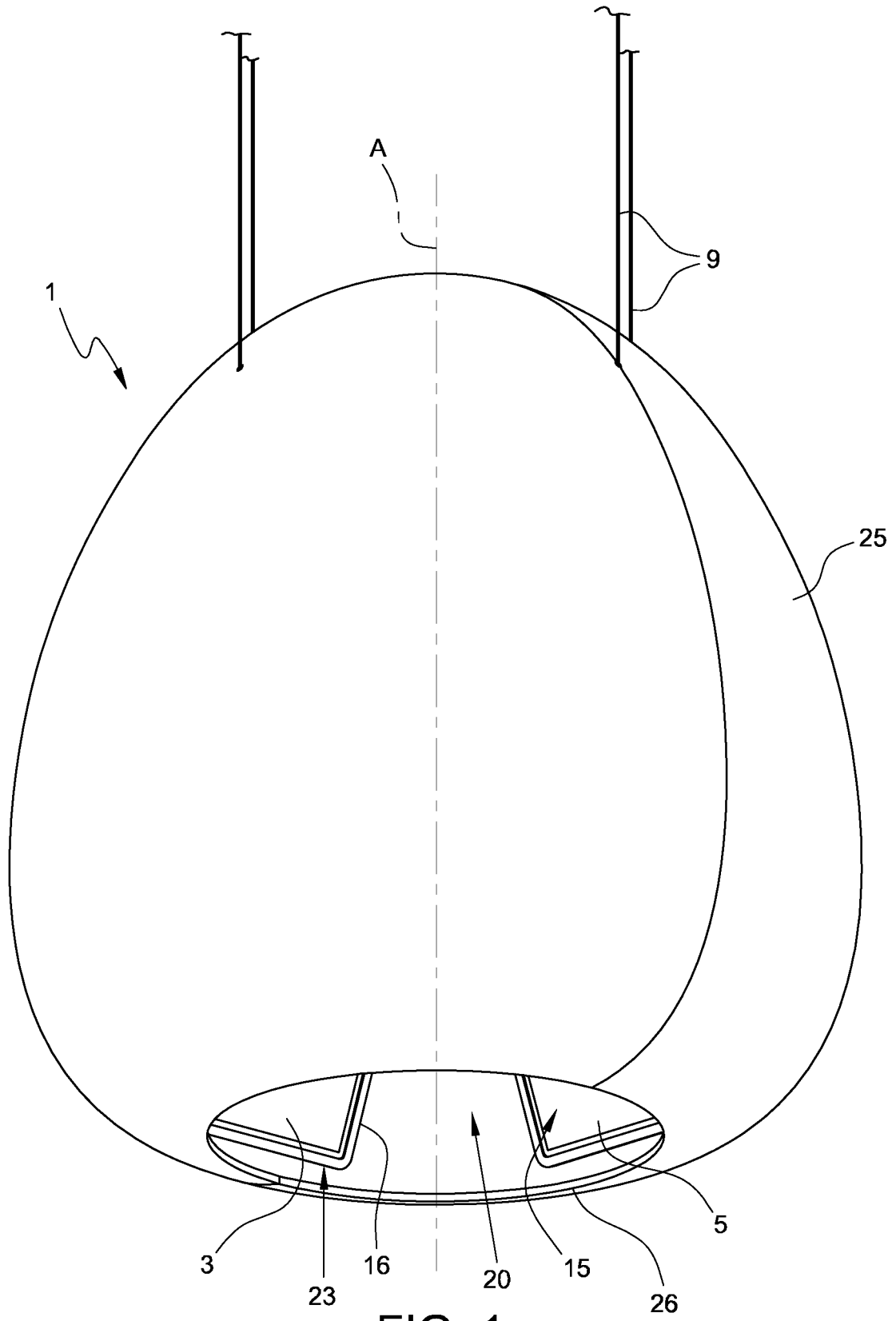


FIG. 1

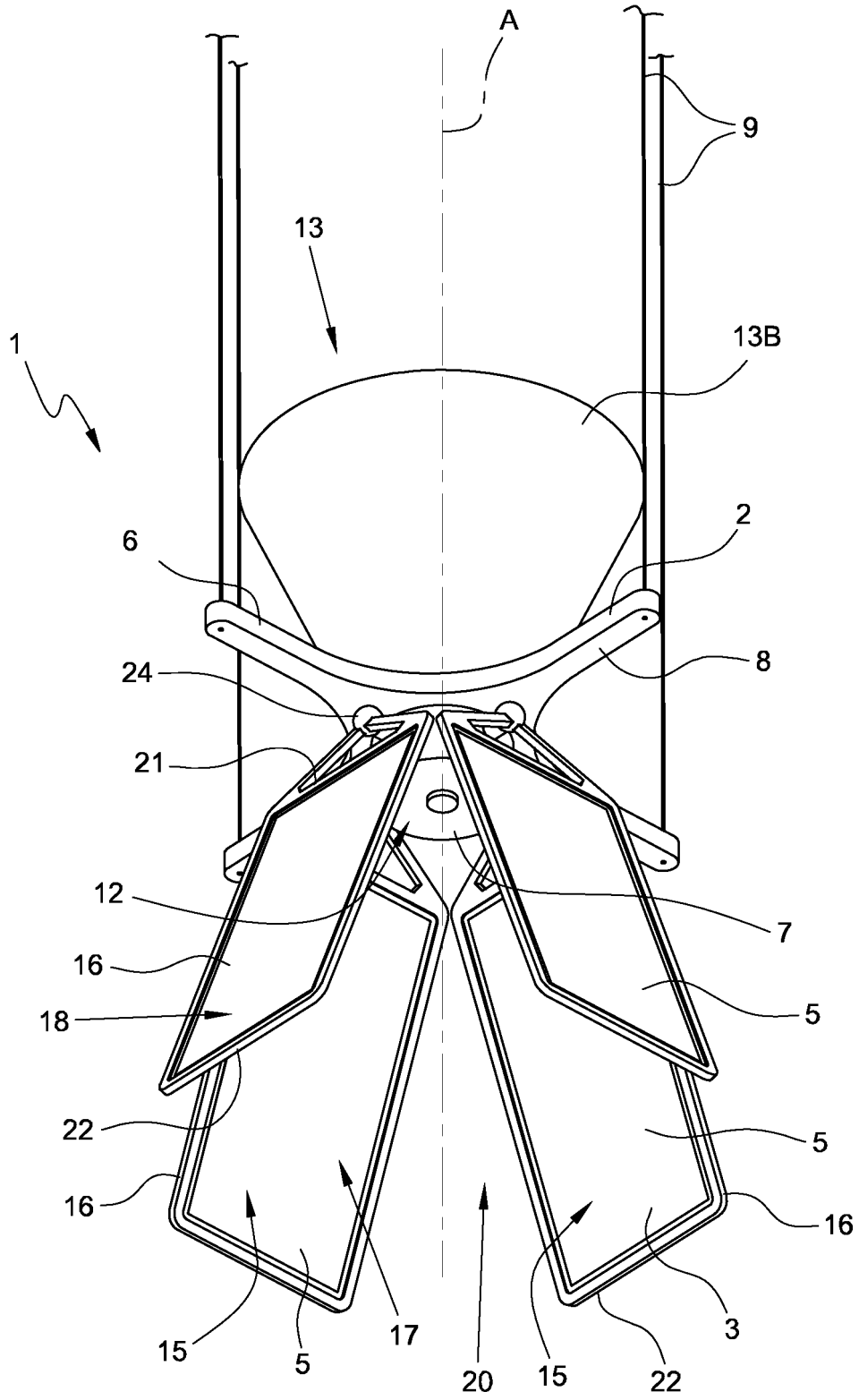


FIG. 2



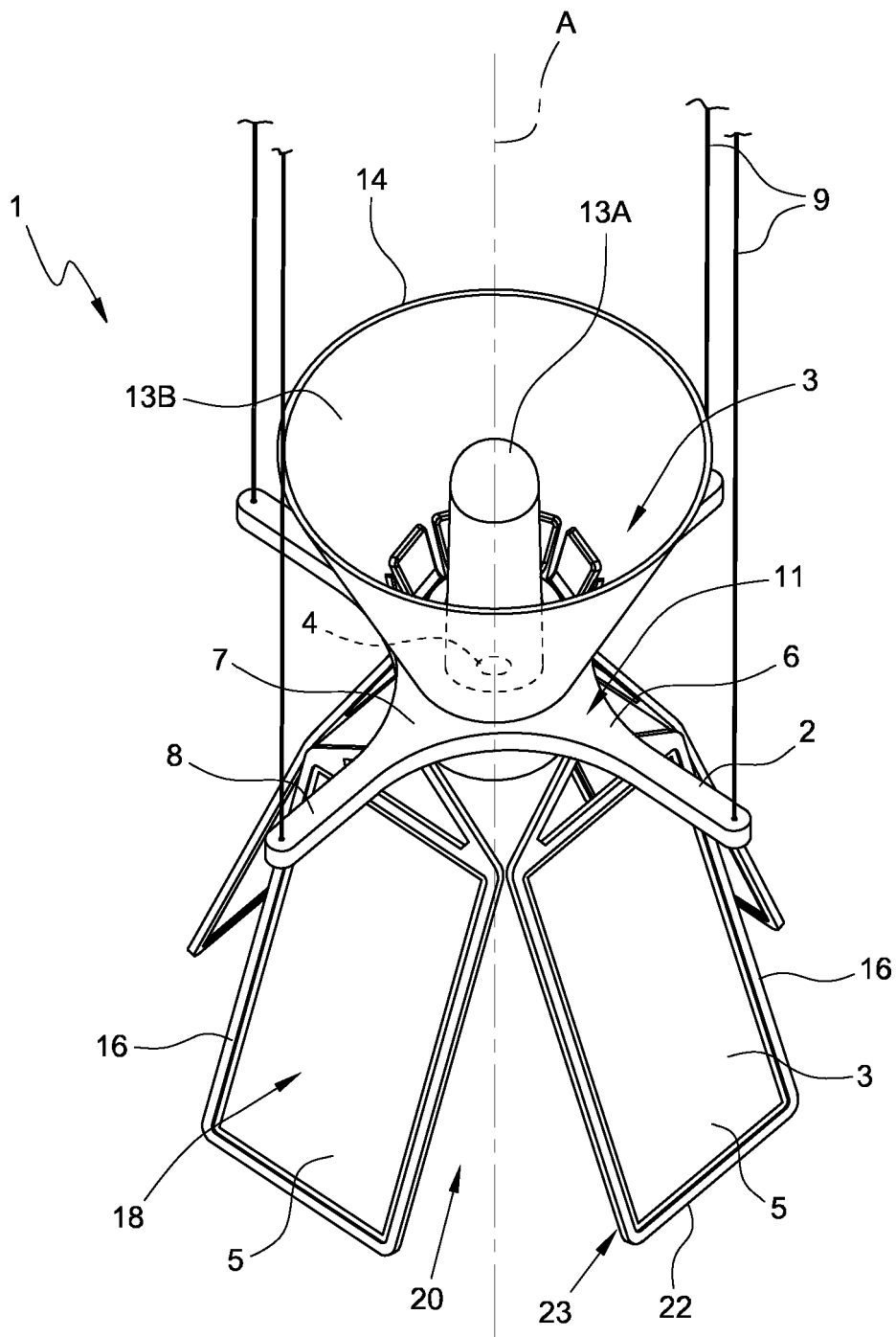


FIG. 3

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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