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(54) **LIGHTING KIT AND SYSTEM**

(57) A kit for making a suspension lighting system, comprises at least one support rope (10) and at least one power cable (12), a plurality of anchoring elements (14) adapted to support said at least one support rope (10) and said at least one power cable (12), at least one connection joint (16) adapted to engage an intermediate portion of both the support rope (10) and the power cable (12) along two directions substantially orthogonal to each other so as to define a point of intersection between said support rope and said power cable.

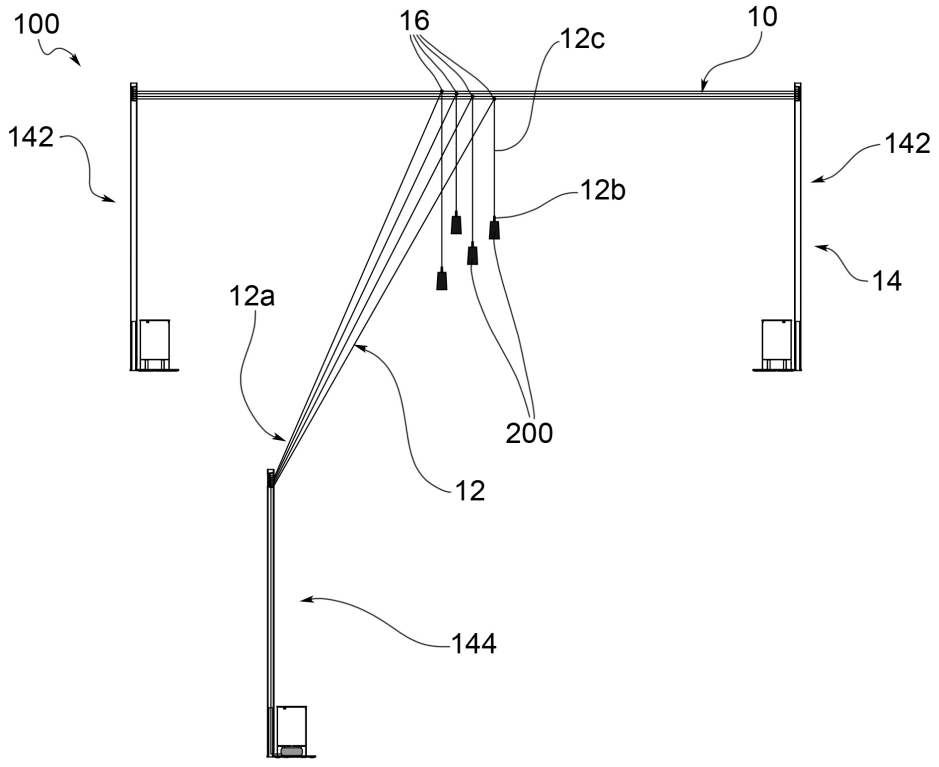


FIG.1

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Description

[0001] The present invention relates to a kit for making a suspension lighting system and a suspension lighting system made with such kit.

[0002] In the field of suspension lighting devices, the need is increasingly felt for flexibility and freedom of installation. In particular, it is desirable to allow the user to vary the height, the position or the number of light beams, for example, as a function of the area to be lit. Furthermore, offering a greater freedom of installation allows the user to install a lighting system independently of the structural features of the environment in which the lighting system is to be located, for example, independently of the presence of ceilings, walls, or other structural elements.

[0003] It is the object of the present invention to propose a kit for making a suspension lighting system capable of meeting such needs.

[0004] Such an object is achieved by a kit in accordance with claim 1 and by a suspension lighting system in accordance with claim 16. The dependent claims describe preferred or advantageous embodiments of the kit and of the lighting system in accordance with the invention.

[0005] The features and advantages of the kit and the lighting system according to the invention will in any case become apparent from the following description of preferred embodiments thereof, given by way of indication and not by way of limitation, with reference to the accompanying drawings, in which:

- Figures 1, 1a, 1b and 1c diagrammatically show the lighting kit according to the present invention, in a use configuration and in many embodiments;
- Figure 2 shows a perspective view of only the connection joint of the kit;
- Figure 3 shows an exploded perspective view of the connection joint of Figure 2;
- Figures 4, 4a and 4b show two perspective views and a sectional view of the connection joint in a use condition, respectively;
- Figure 5 shows an axial section of a support post for power cables or for support ropes;
- Figure 5a shows an axial section of the support post head of Figure 5;
- Figure 6 shows a plurality of rope tensioning elements be directly wall mounted;
- Figure 7 shows an exploded perspective view of an anchoring rosette for support ropes and of the corresponding cover;
- Figure 8 shows an exploded perspective view of an anchoring rosette for power cables and of the corresponding cover;
- Figure 9 shows an axial section of the support post head of Figures 5 and 5a, configured for anchoring support ropes;
- Figure 10 shows an axial section of the support post of Figures 5 and 5a configured for the support of power cables;
- Figure 10a shows an enlarged view of the support post of Figure 10;
- Figure 11 shows a plan view of an example of a lighting system in accordance with the invention;
- Figure 12 diagrammatically shows plan views of a series of examples of possible configurations of a lighting system in accordance with the invention;
- Figure 13 shows a perspective view of an example of a lighting system in accordance with the invention.

[0006] In the following description, all directional references (for example, top, bottom, upwards, downwards, left, right, towards the left, towards the right, at the top, at the bottom, above, below, vertical, horizontal, clockwise and counterclockwise) are used only for the purpose of identification to assist the reader in understanding the described embodiments and do not create any limitations, in particular as regards the position, the orientation, or the use of the described embodiments.

[0007] Conjunction references (for example, secured, coupled, connected, and the like) should be broadly construed and may include intermediate elements between a connection of elements and relative movement between elements. Therefore, the conjunction references do not necessarily imply that two elements are directly connected and in a fixed relationship to each other.

[0008] In a general embodiment, the kit for making a suspension lighting system comprises at least one support rope 10, at least one power cable 12, a plurality of anchoring elements 14, and at least one connection joint 16.

[0009] The anchoring elements 14 are adapted to support the support rope 10 and the power cable 12.

[0010] The connection joint 16 is adapted to engage an intermediate portion of both the support rope 10 and the power cable 12 so as to define a point of intersection between the support rope 10 and the power cable 12.

[0011] The support rope 10, the power cable 12, the anchoring elements 14, and the connection joint 16 are suitable for obtaining a suspended net-like support structure 100, in which the at least one connection joint 16 forms a knot of such suspended net-like support structure 100.

[0012] Suspended net-like support structure 100 means a structure having at least one node, obtained by the connection joint 16, supported by an interlacing between at least one support rope 10 and at least one power cable 12. The support rope 10 and the power cable 12, when supported by the anchoring elements 14, form the sides of the suspended net-like structure 100.

[0013] The anchoring elements 14, when installed, are spaced apart from one another so as to form the vertices of a polygon with at least three sides lying on a plane substantially parallel to the ground.

[0014] The suspended net-like support structure 100 is

adapted to support at least one suspension lamp 200. Each suspension lamp 200 is connectable to a distal end 12b of the power cable 12 which extends downwards, by gravity, from a respective connection joint 16.

[0015] In particular, in use, the support rope 10 supports the connection joint 16, which in turn supports the power cable 12 together with a respective anchoring element 14.

[0016] As it will be described below, by increasing the number of connection joints 16, power cables 12 and, optionally, support ropes 10, the kit in accordance with the invention allows to achieve a suspended net-like structure 100 capable of supporting and powering multiple suspension lamps 200.

[0017] Furthermore, by virtue of the possibility of varying the position of the connection joint or joints 16 along the at least one support rope 10 and/or along the at least one power cable 12, it is possible to select at will the position of the suspension lamp or lamps 200, as well as the height thereof from the ground.

[0018] In an embodiment, the connection joint 16 is provided with first clamping means 162 adapted to lock the connection joint 16 to the power cable 12 at a desired position along the power cable 12.

[0019] Furthermore, in one embodiment, the connection joint 16 is provided with second clamping means 164 adapted to lock the connection joint 16 to the support rope 10 at a desired position along the support rope 10.

[0020] Therefore, by virtue of the connection joint 16 having such features, it is possible to select, and subsequently to secure by means of the first and the second clamping means 162, 164, the point of intersection between the support rope 10 and the power cable 12, and therefore the position of the suspension lamp 200.

[0021] In one embodiment, in the connection joint 16, a substantially L-shaped cable passage 166 is obtained for the passage of the power cable 12. The cable passage 166 therefore guides the power cable 12 to substantially form an angle of 90°, so as to pass from a substantially horizontal direction, or a direction slightly inclined with respect to the ground, to a vertical direction for the support of a suspension lamp 200.

[0022] In an embodiment, the bend of the cable passage 166 is substantially located in the center of the connection joint 16.

[0023] In an embodiment, the cable passage 166 is intersected by a clamping hole 162', engaged by a clamping set screw 162", which is operable by a user to lock the power cable 12 at the connection joint 16.

[0024] In an embodiment, a rope groove 168, adapted to be engaged by the support rope 10, is obtained in the connection joint 16.

[0025] In a preferred embodiment, the rope groove 168 extends orthogonally with respect to the plane in which the cable passage 166 lies. Even more preferably, the rope groove 168 is obtained inside the substantially right angle formed by the two substantially orthogonal segments of the cable passage 166, i.e., below the segment of the cable passage which, in use, is substantially horizontal.

[0026] Therefore, in use, the power cable 12 intersects the support rope 10 passing over it. The support rope 10 therefore serves as a support element for the power cable 12.

[0027] It should be noted that the term "intersect", as used with reference to the support rope 10 and the power cable 12, is to be understood as meaning that the direction along which the power cable 12 extends intersects the straight line passing through the two anchoring points supporting the support rope 10, while the physical contact between the support rope 10 and the power cable 12 occurs by means of the connection joint 16.

[0028] In one embodiment, the rope groove 168 is also intercepted by a rope clamping hole 164', obtained in the connection joint 16, and engaged by a rope clamping set screw 164", operable by a user to lock the connection joint 16 in a desired position along the support rope 10.

[0029] In one embodiment, the connection joint 16 has a spherical shape and may be obtained in two halves screwed to each other.

[0030] The support rope 10 extends between a first rope end portion 10a and a second rope end portion 10b.

[0031] The power cable 12 has a first cable end portion 12a (or proximal end) adapted to be connected to an electrical power supply source and a second end 12b (or distal end) adapted to be connected to a suspension lamp 200.

[0032] In an embodiment, the plurality of anchoring elements 14 comprises at least one pair of rope anchoring elements 142. Each element of the pair of rope anchoring elements 142 is adapted to support one or more respective rope end portions 10; 10b of respective support ropes 10.

[0033] In other words, each rope anchoring element 142 may be adapted to support multiple support ropes 10. For example, the end portions of multiple support ropes 10 extend from a rope anchoring element 142, mutually superimposed on a vertical plane.

[0034] The plurality of anchoring elements 14 further comprises at least one cable anchoring element 144 adapted to support one or more first end portions 12a of cables of respective power cables 12.

[0035] In other words, each cable anchoring element 144 may be adapted to support multiple power cables 12. For example, the end portions 12a of multiple power cables 12 extend from a cable anchoring element 144, mutually superimposed on a vertical plane.

[0036] As anticipated above, the length of each support rope 10 and the length of each power cable 12 are selected so that, when the rope anchoring elements 142 and the cable anchoring element 144 are installed, preferably at a same, or similar, height from the ground and spaced apart from one another so as to form the vertices of a polygon with at least three sides, at least one support rope 10 extends between the elements of the pair of rope support elements 142 and at least one power cable 12

extends from the at least one cable support element 144, it intersects the support rope 10 so as to be supported by said support rope 10 and forms an end segment 12c which descends by gravity from the point of intersection with the support rope 10 so as to support a lamp 200 in a substantially central area with respect to the area of such polygon.

[0037] In a preferred embodiment, the anchoring elements 14 are provided with adjustment means adapted to allow the installer to adjust the length, and therefore the tension, of each support rope 10 and/or of each power cable 12, with respect to the total length of the support rope 10 and of the power cable 12.

[0038] Furthermore, in a preferred embodiment, at least some of the anchoring elements 14 are provided with accumulation means adapted to accumulate, in a position hidden from view, respective end segments of one or more support ropes 10 and/or of one or more power cables 14 exceeding a desired length.

[0039] In one embodiment, at least one of the anchoring elements 14 is a rope tensioning clamp 146 usable in combination with a dowel 148 for wall mounting the support rope (Figures 1b, 1c and 6).

[0040] Rope tensioning clamp 146, or wire tensioner, means a known device, usually used to tension a cable. The cable is passed through the rope tensioning clamp 146 and pulled until the desired tension is obtained. By releasing the cable, the latter locks and therefore maintains the desired tension. The part of excess cable exits from a rear or lateral passage of the rope tensioning clamp 146.

[0041] In an embodiment, at least one of the anchoring elements 14 is a support post 1400 having a post head 1402 adapted to receive and lock an end portion 10a; 10b; 12a of one or more support ropes 10 or of one or more power cables 12. In particular, one or more transverse holes 1404 are obtained in the post head 1402, i.e., orthogonal to the (vertical) axis of the post (Figures 5, 5a).

[0042] In the case of use of the support post 1400 as rope anchoring element 142, in each of such transverse holes 1404 a rope tensioning clamp 146 is inserted (Figure 9).

[0043] In an embodiment, on the rear side of the post head 1402, i.e., on the side opposite to the transverse holes 1404, a removable plate 1406 is obtained adapted to allow the installer to access the rear side of the rope tensioning clamps 146 to pull the support ropes 10. The excess rope portion, i.e., that exiting from the rear side of each rope tensioning clamp 146, may be collected inside the hollow body of the support post 1400.

[0044] In the case of use of the support post 1400 as cable anchoring element 144 (Figure 10, 10a), the post head 1402 may be provided, at each transverse hole 1404, with a cable locking clamp 188 adapted to lock a respective end portion 12a of a power cable 12 entering the respective transverse hole 1404.

[0045] Furthermore, a cable grommet 1408 may be contained in each transverse hole 1404.

[0046] Also in this case, the post head may be provided with a removable rear plate 1406 to allow access to the grommets 1408 from the inside of the post. In this case, each power cable 12 passes through the hollow body of the support post 1400 so as to be connected to an electrical power supply circuit. Such electrical power supply circuit may have an electrical connector positioned at the base of the support post 1400 for the connection to the power cables 12.

[0047] In an embodiment, the support post 1400 ends at the bottom with a flange to be cemented.

[0048] In an alternative embodiment shown in the drawings, the support post 1400 ends at the bottom with a support base 1410 provided with a container 1412 adapted to contain a counterweight, for example a bag of sand.

[0049] In the case of a support post 1400 for the power cables 12, the electrical power supply circuit, for example a power supply 1414 with the corresponding connector for the connection to the power cables 12, may further be contained, at least partially, in the container 1412.

[0050] In an embodiment, at least one of the anchoring elements 14 is a rosette 18 adapted to be wall mounted (Figures 7, 8).

[0051] In particular, the rosette 18 is a plate-like element adapted to anchor one or more support ropes 10 or to connect to one or more electrical terminals one or more power cables 12. The rosette 18 may be provided with a cover 182, in which holes 184 are obtained for the passage of the support ropes 10 or of the power cables 12.

[0052] When the rosette 18 is used as an anchoring element for one or more support ropes 10 (Figure 7), the rosette 18 is provided with a bracket 186 which supports one or more rope tensioning clamps 146.

[0053] When the rosette 18 is used as an anchoring element for one or more power cables 12, the rosette 18 is provided with a bracket 186 which supports one or more locking clamps 188, each of which is adapted to lock a respective end portion 12a of a power cable 12. Each power cable 12, once secured to the rosette 18 by means of a respective locking clamp 188, may therefore be electrically connected to an electric cable of an electrical power supply circuit (Figure 8).

[0054] In an advantageous embodiment, the bracket 186 of the rosette 18 has a first side 186', for example parallel to the wall to which the rosette is to be mounted, in which one or more plate holes 186a are obtained, adapted to contain respective rope tensioning clamps 146, and a second side 186", for example orthogonal to the first one, to which the locking clamps 188 are anchored.

[0055] In an embodiment, the rosette 18 is provided with a drum portion 189, for example formed by four comb-like sectors 189', about which an end portion 10a; 10b; 12a of at least one support rope 10 or of at least one power cable 12, exceeding the desired length and originating from a respective rope tensioning clamp or electric clamp, is adapted to be wound.

[0056] The kit described above allows achieving a suspension lighting system 300 which may support and feed one or more suspension lamps 200.

[0057] The suspension lighting system 300 therefore comprises the anchoring elements 14 installed in a raised position above the ground, preferably substantially at the same height, and spaced apart from one another so as to form the vertices of a polygon with at least three sides.

[0058] At least one support rope 10 extends between two rope anchoring elements 142.

[0059] At least one connection joint 16 is secured to the support rope 10, at a desired point of the support rope 10 suspended between the two rope anchoring elements 142.

[0060] At least one power cable 12 extends from a cable anchoring element 144 toward the support rope 10. The power cable 12 is also secured, at an intermediate segment thereof, to the connection joint 16. The power cable 12 forms an end segment 12c which descends by gravity from the connection joint 16, so as to support a respective suspension lamp 200.

[0061] During installation, by means of the rope tensioning clamps 146, the length of the portion or portions of support rope 10 suspended between two rope anchoring elements 142 is adjusted. The adjustment of such length is also reflected in an adjustment of the tension of the support rope when, in use, the support rope 10 supports at least one power cable 12 by means of one or more connection joints 16.

[0062] The portions of each rope exceeding the desired length may be accumulated inside the support posts 1400 or the rosettes 18.

[0063] As described above, also during the installation step, the position of the connection joint or joints 16 along each support rope 10 may be defined as desired by sliding each connection joint 16 along the respective support rope 10. After the desired position has been selected, the connection joint 16 is secured to the support rope 10 by means of, for example, the rope clamping set screw.

[0064] Each power cable 12 is made to pass and slide in the respective connection joint 16 so as to adapt the length of the power cable 12 to the distance between the respective cable anchoring member 144 and the connection joint 16, and so as to adjust the height from the ground of the suspension lamp 200. The power cable 12 is therefore secured to the connection joint 16, for example by means of the respective clamping set screw.

[0065] As shown in particular in Figures 1-1c, different anchoring elements 14 may be combined depending on the presence or absence of walls and/or the type of the walls themselves. For example, Figure 1 shows a lighting system (with four support ropes 10 and four power cables 12 for supporting four lamps 200) in which the anchoring elements consist of three support posts 1400, in the example shown in the Figure, provided with base 1410 with a container 1412 for counterweight.

[0066] Figure 1a shows a lighting system in which the anchoring elements consist of three rosettes 18.

[0067] Figure 1b shows a lighting system in which the anchoring elements 14 consist of a rosette 18 for the four power cables 12, and dowels 148 with rope tensioning clamps 146 for the four support ropes 10.

[0068] Figure 1c shows a lighting system in which the anchoring elements 14 consist of a support post 1400 for the four power cables 12 and dowels 148 with rope tensioning clamps 146 for the four support ropes.

[0069] Other combinations are clearly possible.

[0070] Furthermore, by increasing the number of the power cables 12 and/or of the support ropes 10, and hence of the respective anchor elements, several different configurations of the suspended net-like structure may be achieved.

[0071] For example, Figure 12 (a) diagrammatically shows a triangular configuration with two support ropes 10 and two power cables 12 for the support of two lamps.

[0072] Figure 12 (b) diagrammatically shows a triangular configuration of the anchoring elements, but with four support ropes 10 and four power cables 12. The suspension ropes and the power cables have different tensions and/or length, so as to support four lamps in a substantially rectangular configuration.

[0073] Figure 12 (c) diagrammatically shows a rectangular configuration of the anchoring elements, i.e., formed by two rope anchoring elements and two cable anchoring elements. In this example, the lighting system comprises two support ropes 10 and four power cables 12. Each support rope 10 therefore supports two connection joints 16. The support ropes and the power cables have tensions and/or a length selected so as to support four lamps in a substantially linear configuration.

[0074] Figure 12 (d) diagrammatically shows a rectangular configuration of the anchoring elements, i.e., formed by two rope anchoring elements and two cable anchoring elements. In this example, the lighting system comprises three support ropes 10 and six power cables 12. Each support rope 10 therefore supports two connection joints 16. The support ropes and the power cables have tensions and/or a length selected so as to support six lamps in a substantially rectangular lighting configuration.

[0075] Figure 12 (e) diagrammatically shows a rectangular configuration of the anchoring elements, i.e., formed by two rope anchoring elements and two cable anchoring elements. In this example, the lighting system comprises four support ropes 10 and eight power cables 12. Each support rope 12 therefore supports two connection joints 16. The support ropes and the power cables have tensions and/or a length selected so as to support eight lamps in a substantially octagonal lighting configuration.

[0076] Naturally, innumerable further configurations of the lighting system are possible.

[0077] It is apparent that the lighting kit and the related lighting system allow the pre-established objects to be achieved.

[0078] The kit allows in particular the design of a lighting system with maximum freedom of installation and a clean and contemporary aesthetic.

[0079] By virtue of the support ropes and the multiple anchoring points, it is possible to achieve configurations tailored to each context, thus obtaining suspended luminous spaces, also without encumbrances and creating effects of great impact.

[0080] The elements of the kit may be manufactured with high mechanical resistance (IK07) and high degree of protection (for example IP65), so as to be employed in outdoor environments. For example, the support ropes may be made of braided steel, coated with a polyamide, for example PA12.

[0081] Those skilled in the art may make changes and adaptations to the embodiments of the lighting kit and system according to the invention or may replace elements with others which are functionally equivalent in order to meet contingent needs, without departing from the scope of the following claims. Each of the features described as belonging to a possible embodiment may be made irrespective of the other embodiments described.

Claims

1. A kit for making a suspension lighting system, comprising:

   - at least one support rope (10) and at least one power cable (12);
   - a plurality of anchoring elements (14) adapted to support said at least one support rope (10) and said at least one power cable (12);
   - at least one connection joint (16) adapted to engage an intermediate portion of both the support rope (10) and the power cable (12) along two directions substantially orthogonal to each other so as to define a point of intersection between said support rope and said power cable,

   the at least one support rope (10), the at least one power cable (12), the anchoring elements (14), and the at least one connection joint (16) being suitable for obtaining a suspended net-like support structure, wherein the at least one connection joint (16) forms a knot of said net-like support structure.

2. A kit according to claim 1, wherein the connection joint (16) is suitable to slide along both the support rope (10) and the power cable (12).

3. A kit according to claim 1 or 2, wherein the connection joint (16) is provided with first clamping means (162) adapted to lock the connection joint (16) to the power cable at a desired position along the power cable (12).

4. A kit according to any one of the preceding claims, wherein the connection joint (16) is provided with second clamping means (164) adapted to lock the connection joint to the support rope (10) at a desired position along the support rope (10).

5. A kit according to any one of the preceding claims, wherein in the connection joint (16) there are obtained a substantially L-shaped cable passage (166) for the passage of the power cable (12) and a rope groove (168) adapted to be engaged by the support rope (10), wherein said rope groove (168) extends orthogonally to the plane in which the cable passage (166) lies and so that, in use, the power cable (12) passes over the support rope (10).

6. A kit according to claims 3 or 4 and 5, wherein the first and/or second clamping means comprise a first clamping set screw (162") and/or a second clamping set screw (164"), the first clamping set screw being actuatable to intersect the cable passage (166), the second clamping set screw being actuatable to intersect the rope groove (168).

7. A kit according to any one of the preceding claims, wherein:
   the plurality of anchoring elements (14) comprises:

   - at least one pair of rope anchoring elements (142), wherein each of said rope anchoring elements (142) is suitable for supporting one or more respective end portions (10a; 10b) of one or more support ropes (10);
   - at least one cable anchoring element (144) adapted to support one or more first end portions (12a) of cables of respective power cables (12).

8. A kit according to any one of the preceding claims, wherein at least the rope anchoring elements (142) are provided with adjustment means adapted to adjust the length of the portion of rope (10) suspended between the respective rope anchoring elements (142).

9. A kit according to any one of the preceding claims, wherein at least some of the anchoring elements (14) are provided with accumulation means adapted to accumulate, in a position hidden from view, respective end segments of one or more support ropes and/or of one or more power cables exceeding a desired length.

10. A kit according to any one of the preceding claims, wherein at least one of the anchoring elements (14) is a rope tensioning clamp (146) adapted to be coupled to a dowel (148) for securing the support

rope to a wall.

11. A kit according to any one of the preceding claims, wherein at least one of the anchoring elements (14) is a support post (1400) having a post head (1402) provided with at least one rope tensioning clamp (146) for anchoring at least one support rope (10) or at least one locking clamp (188) for locking an end portion (12a) of at least one power cable (12) to be electrically connected to an electrical cable of a power supply circuit.

12. A kit according to the preceding claim, wherein the support post (1400) is provided at the bottom with a support base (1410) provided with a container (1412) adapted to contain a counterweight.

13. A kit according to any one of the preceding claims, wherein at least one of the anchoring elements (14) is a rosette (18) adapted to be wall mounted and provided with at least one rope tensioning clamp (146) for anchoring at least one support rope (10) or at least one locking clamp (188) adapted to lock an end portion (12a) of a respective power cable (12) to be electrically connected to an electrical cable of a power supply circuit.

14. A kit according to claim 13, wherein said rosette (18) is provided with a drum portion (189) about which at least one excess end portion of at least one support rope (10) or at least one power cable (12) is suitable to be wound.

15. A suspension lighting system, comprising a kit according to any one of the preceding claims, wherein:

- the anchoring elements (14) are installed in a raised position above the ground and spaced apart from one another so as to form the vertices of a polygon with at least three sides;
- at least one support rope (10) is supported by and extends between a pair of rope anchoring elements (142);
- at least one connection joint (16) is secured to the support rope (10), at a point of said support rope between the two rope anchoring elements (142);
- the at least one power cable (12) extends from a cable anchoring element (144) towards the support rope, the at least one power cable (12) being secured, in an intermediate segment thereof, to the connection joint (16) and forming an end segment (12c) which descends by gravity from the connection joint (16) so as to support a suspension lamp.

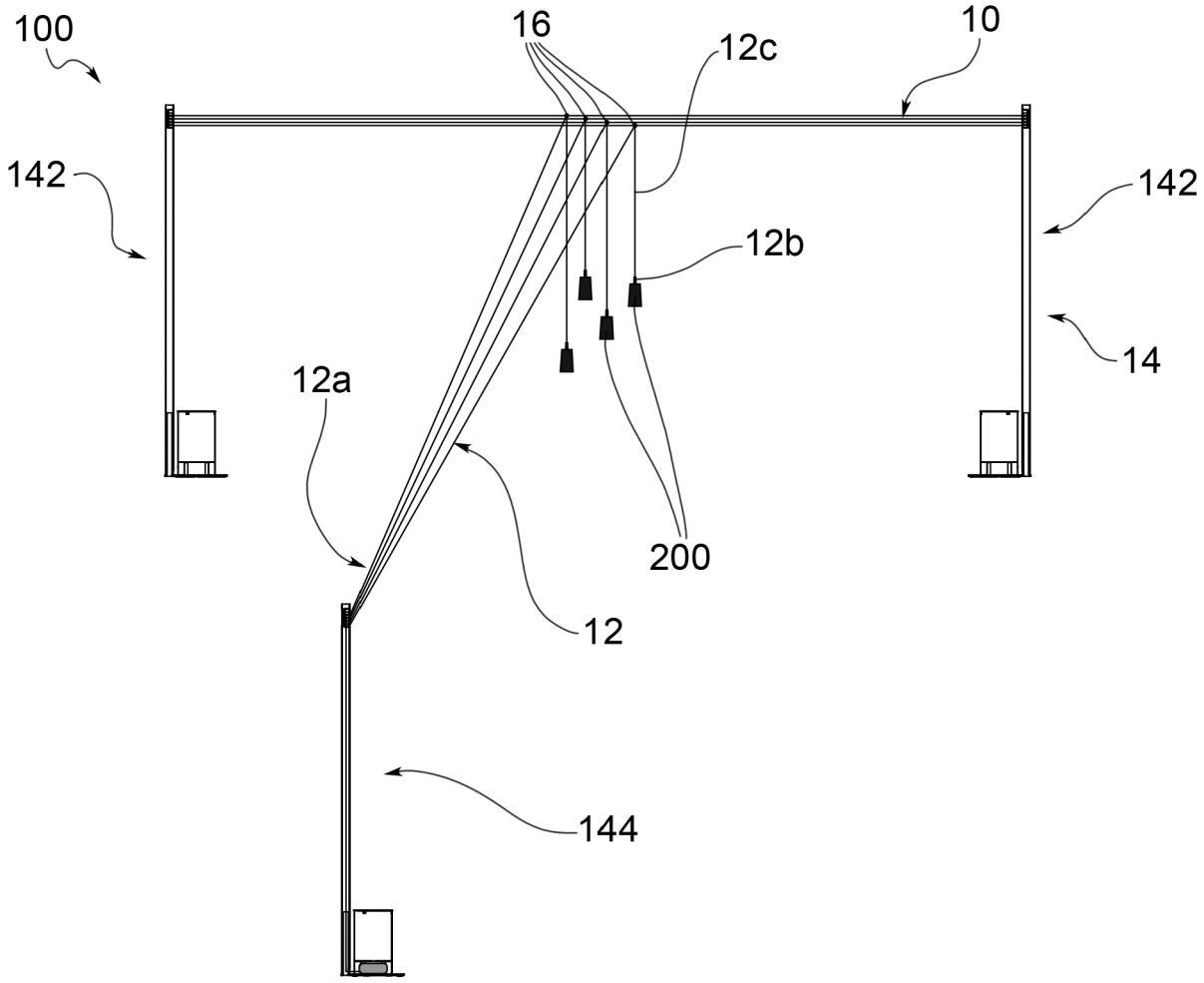

100
16
12c
10
142
142
12b
14
12a
200
12
144

FIG.1

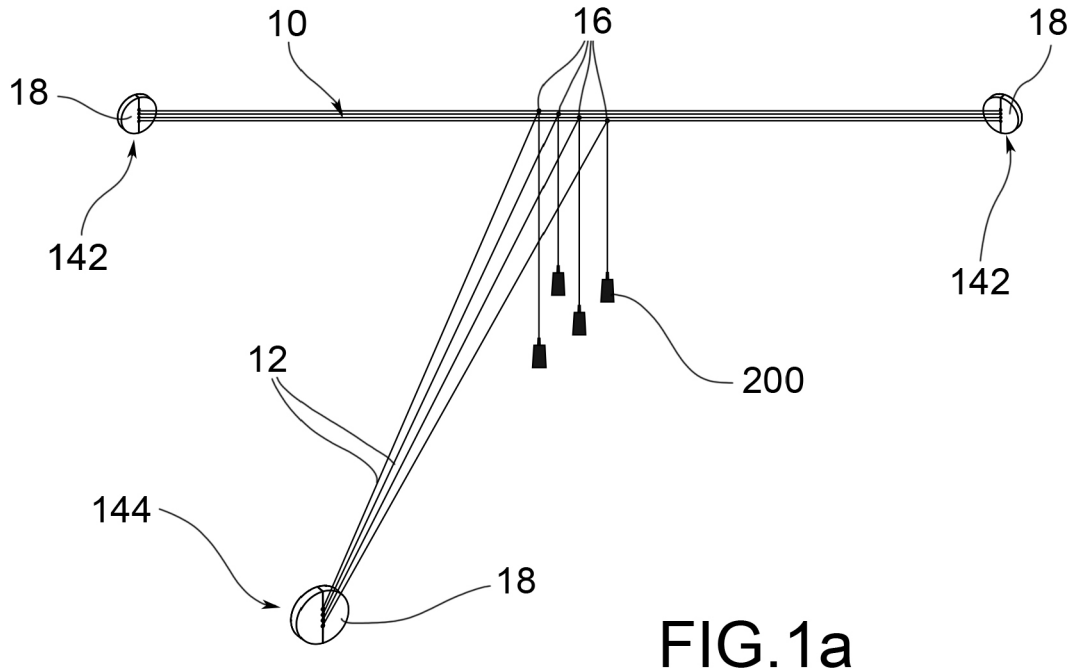

10
16
18
18
142
142
12
200
144
18

FIG.1a

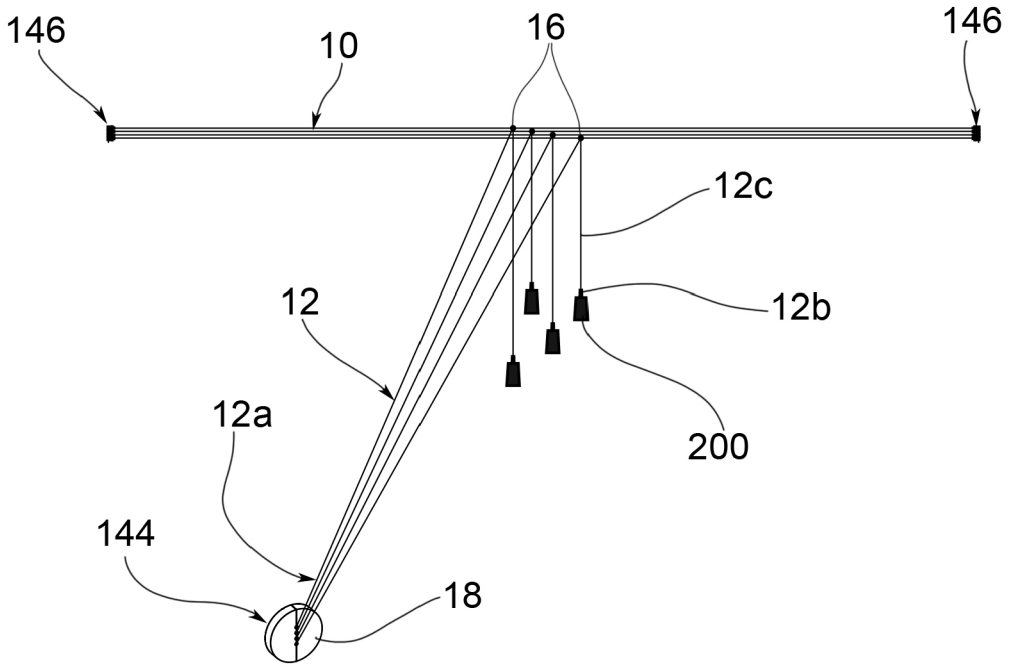


FIG.1b

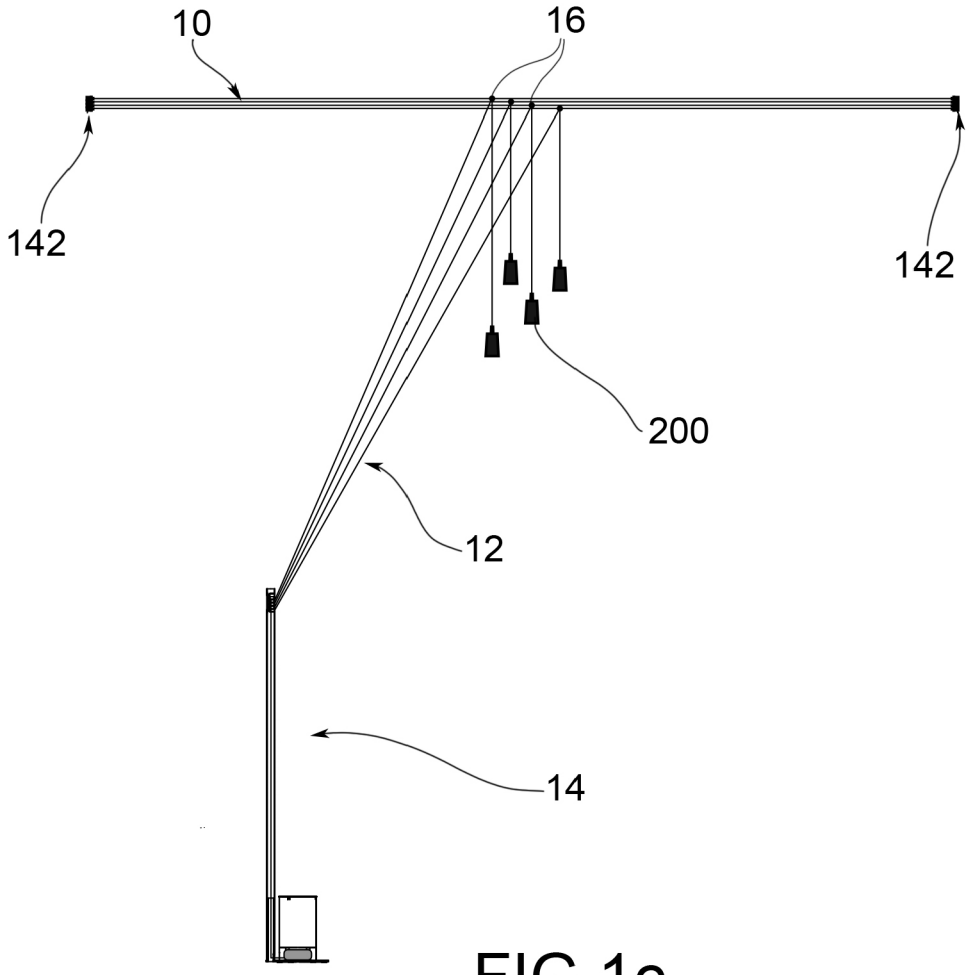


FIG.1c

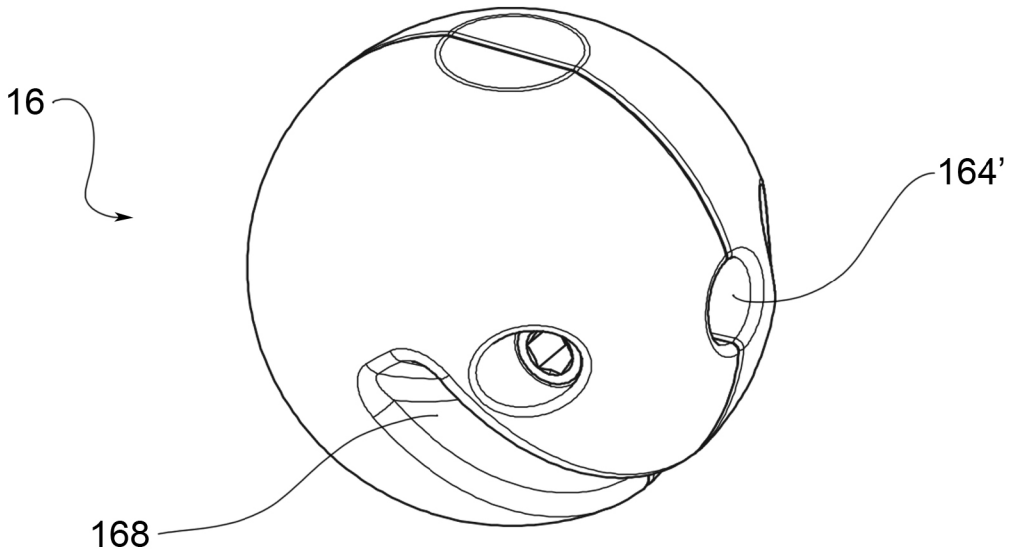


FIG.2

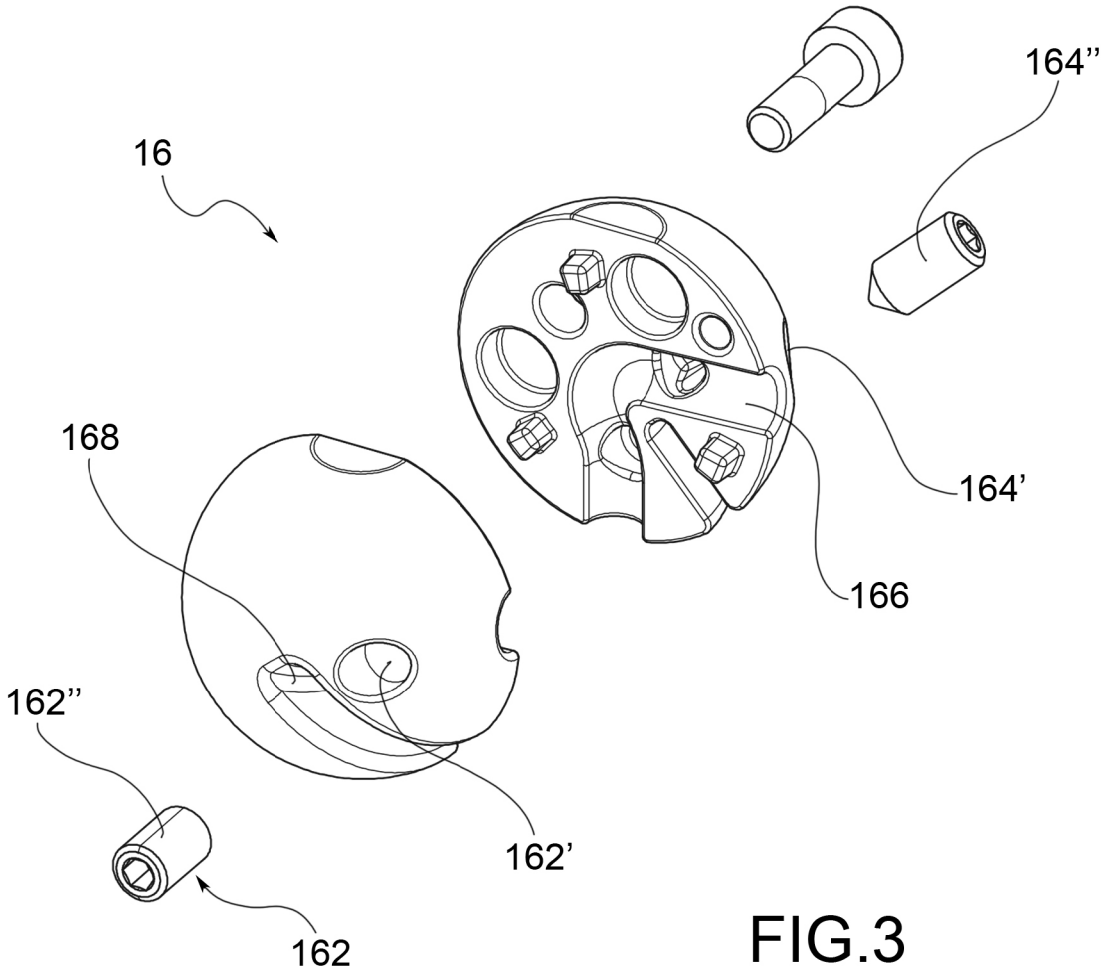


FIG.3

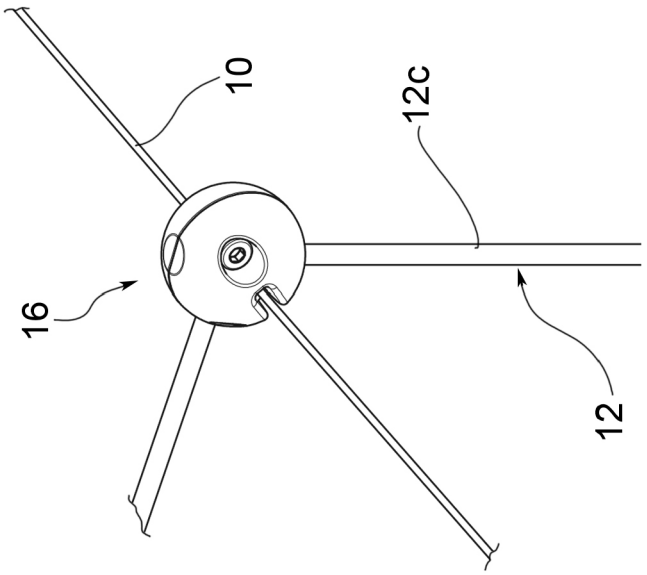


FIG.4a

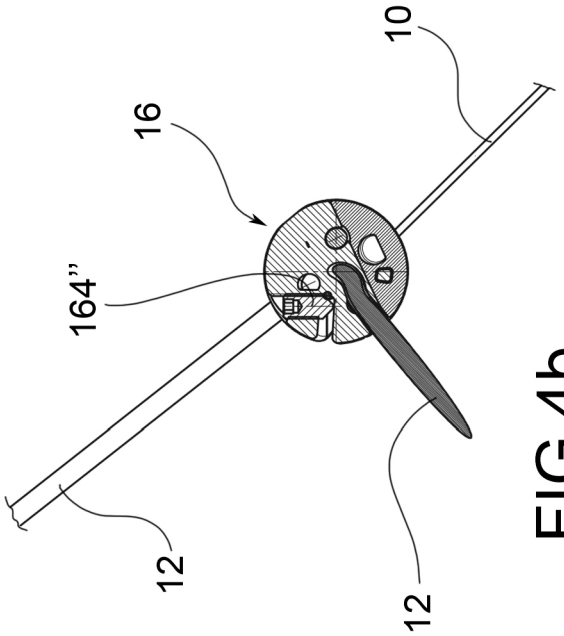


FIG.4b

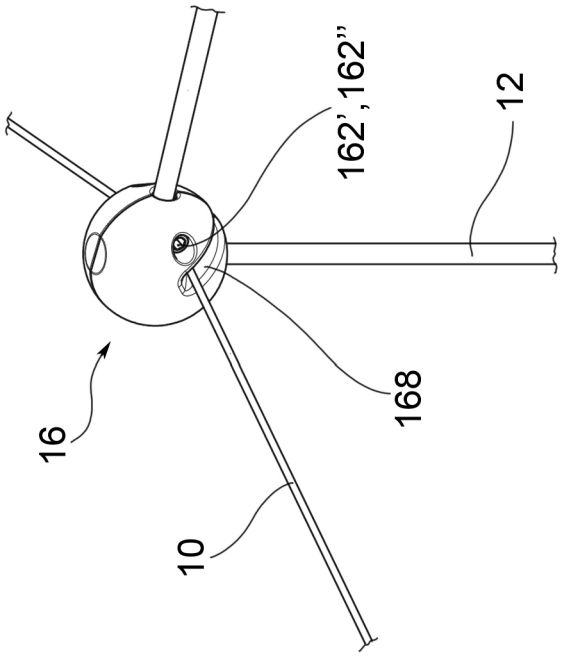


FIG.4

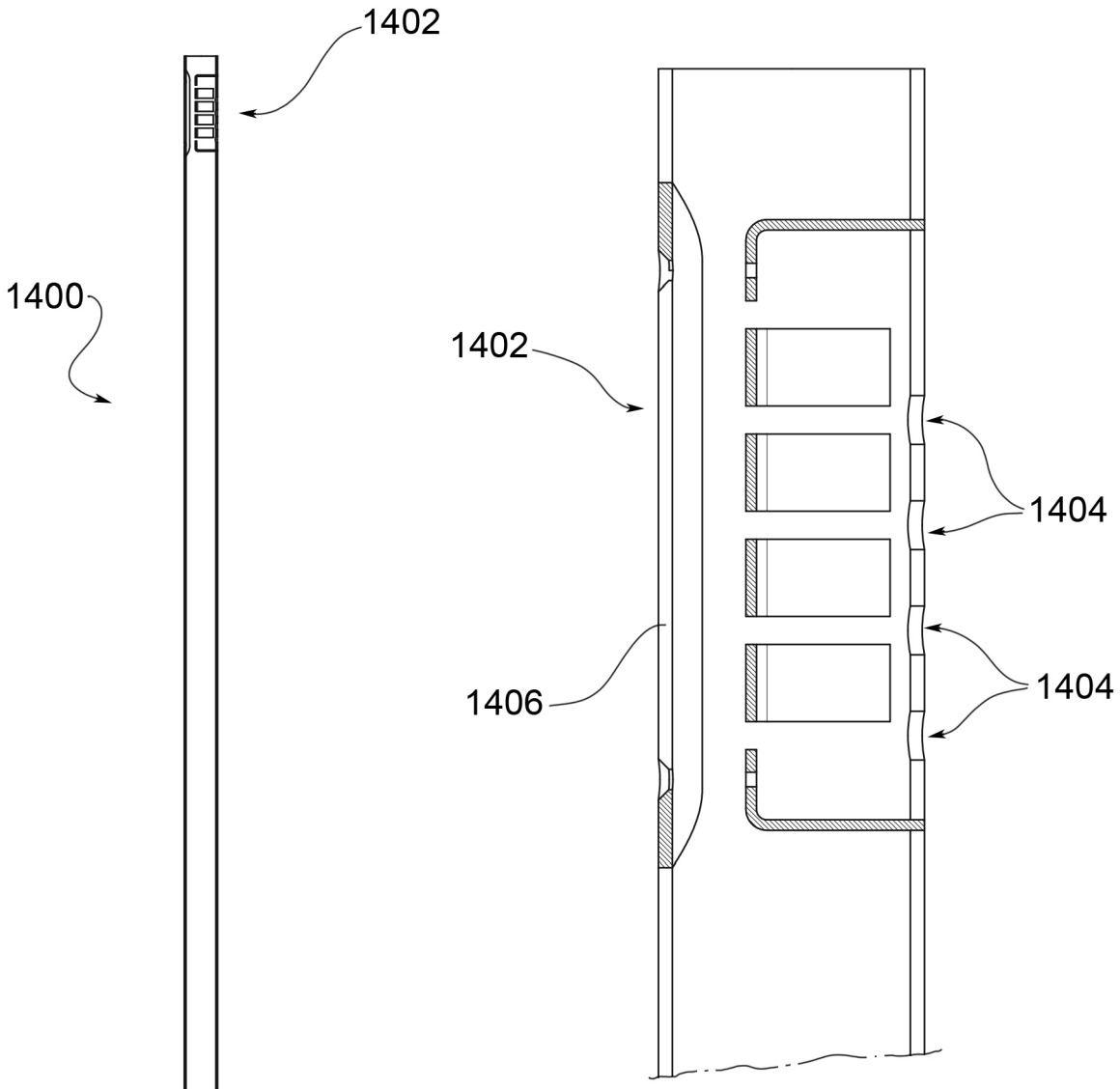


FIG.5a

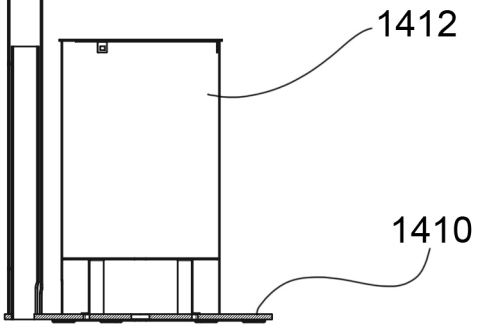


FIG.5

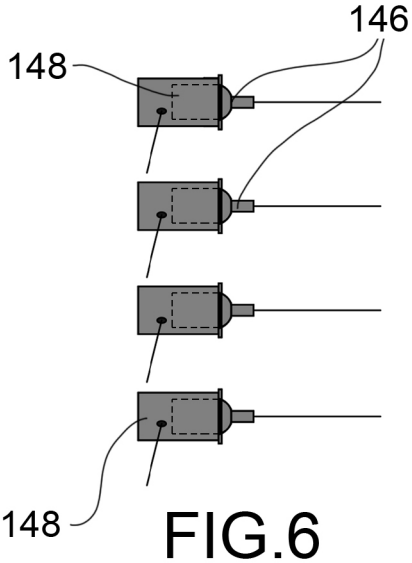


FIG.6

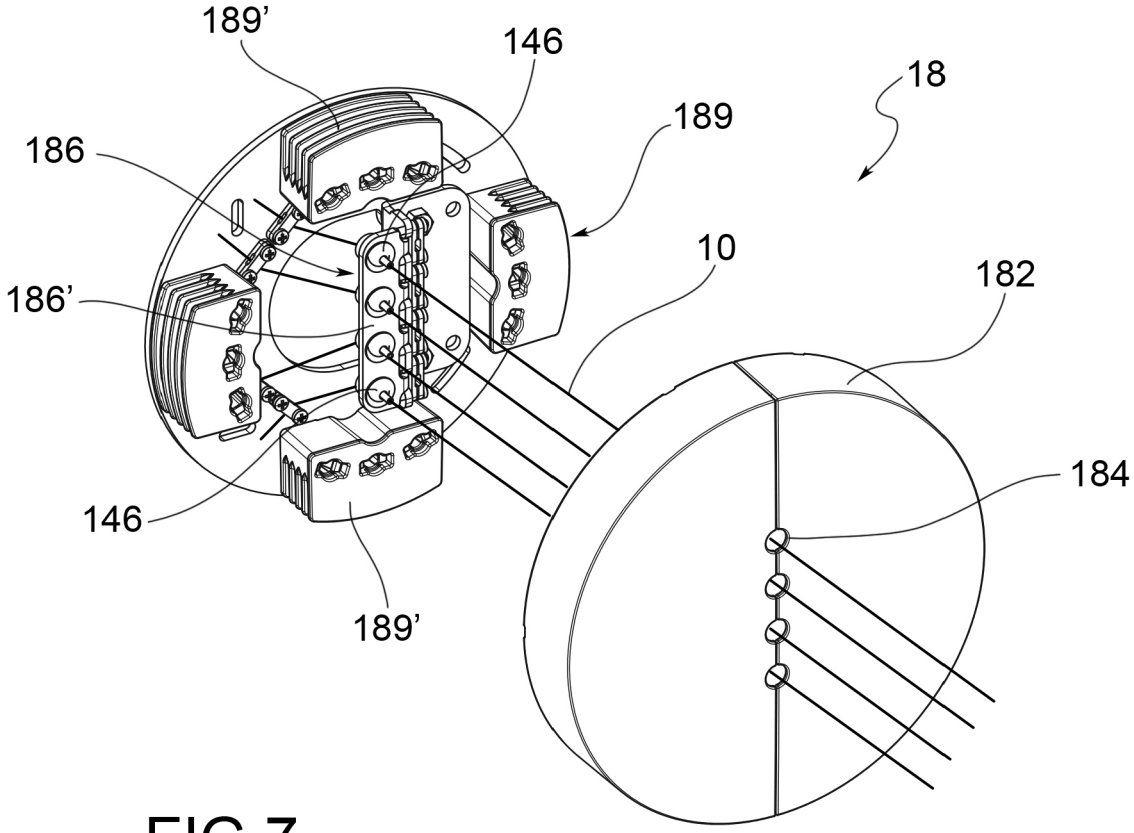

189'
146
18
189
186
10
182
186'
184
146
189'

FIG.7

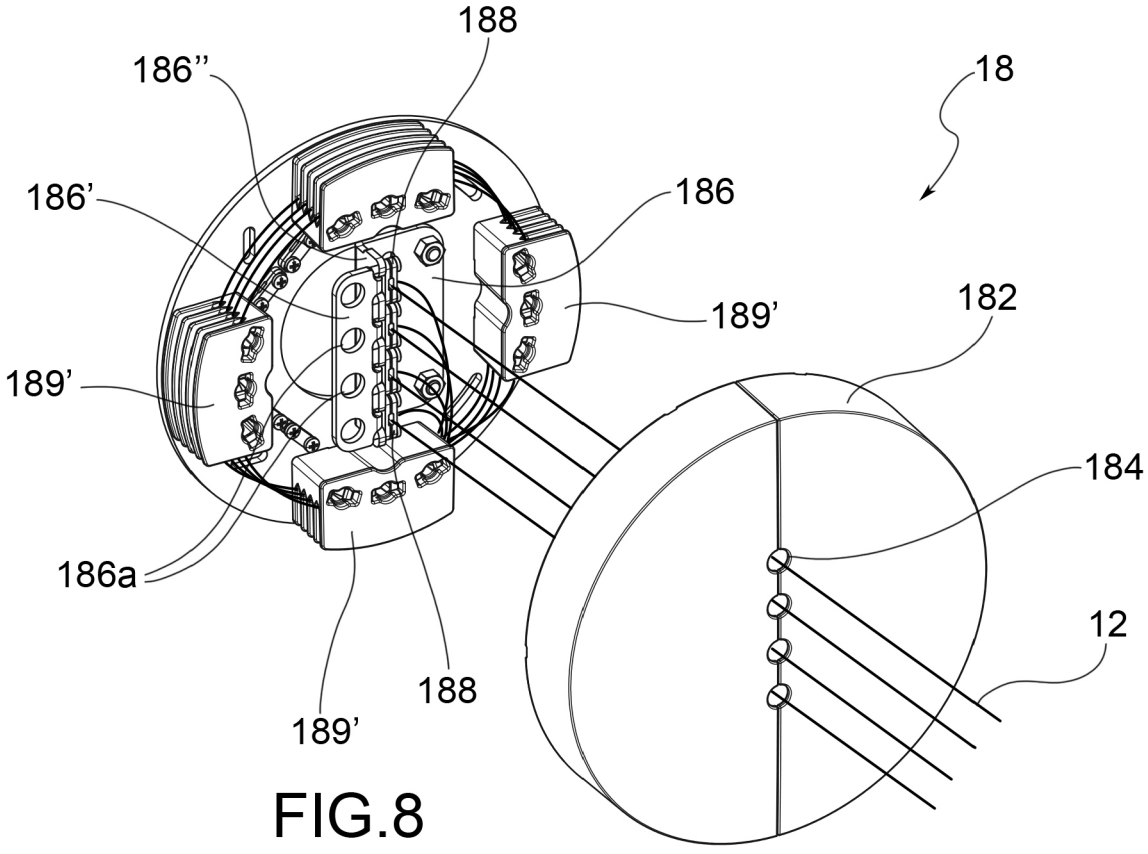

188
186''
18
186'
186
189'
182
189'
184
186a
12
188
189'

FIG.8

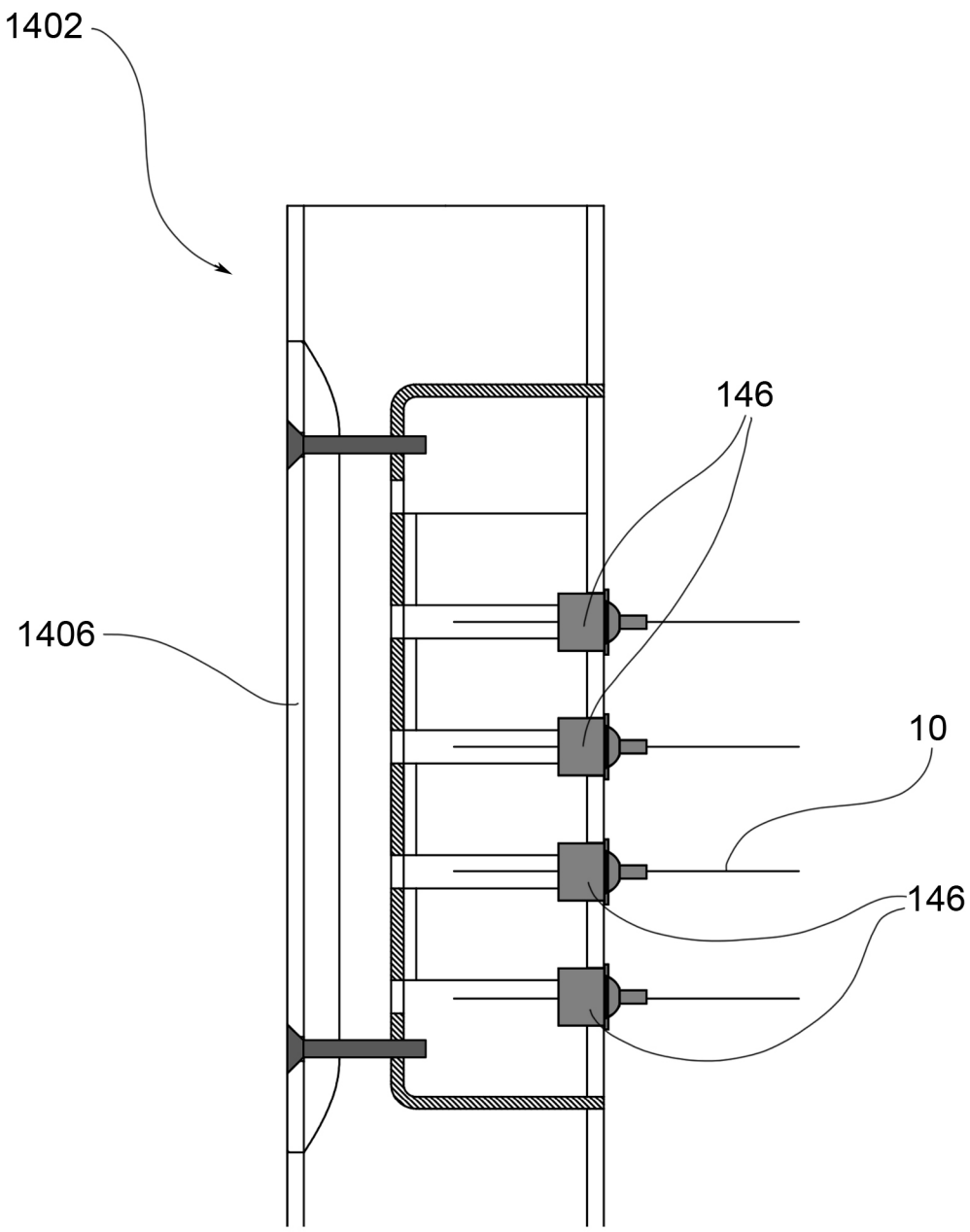


FIG.9

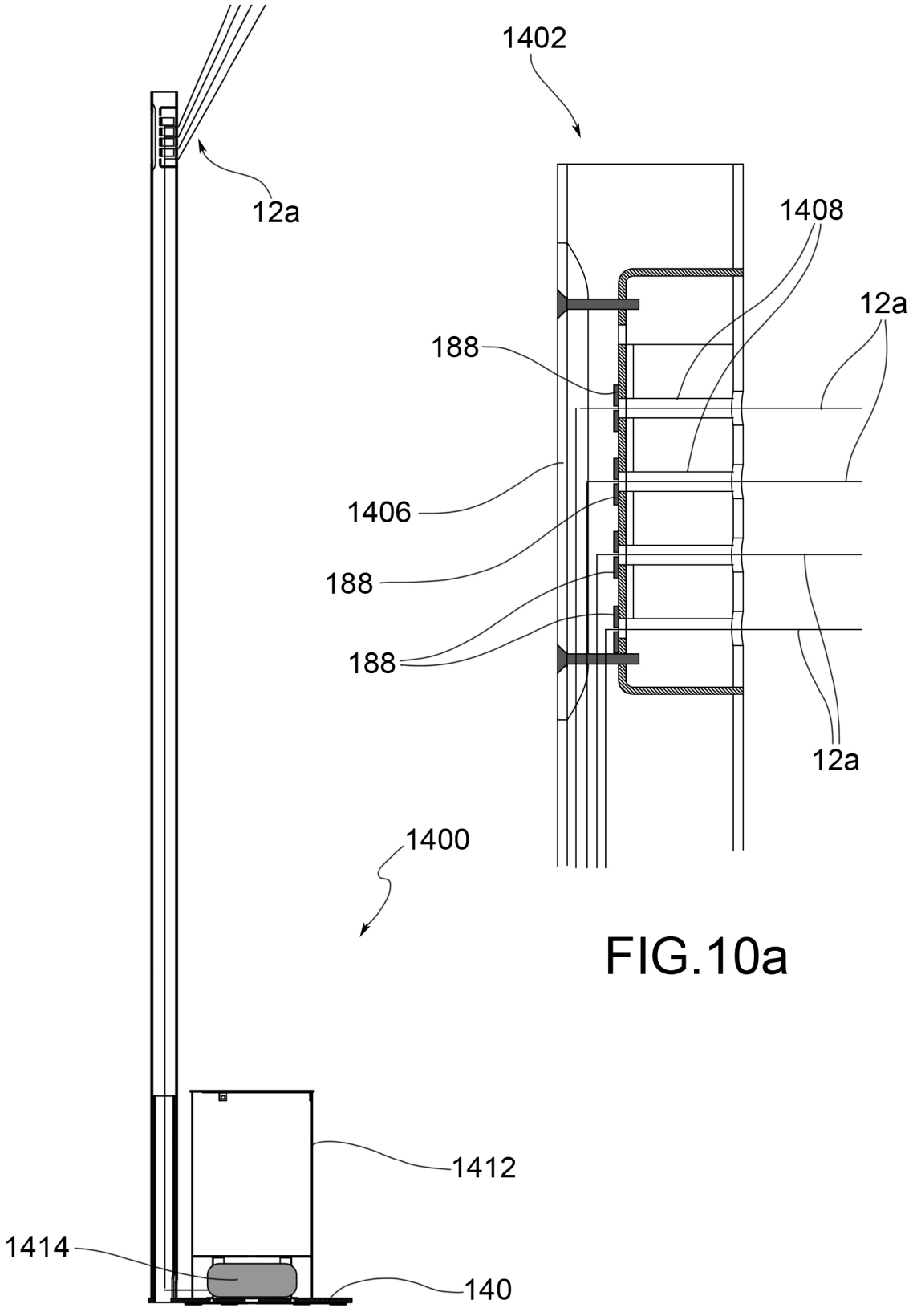


FIG.10a

FIG.10

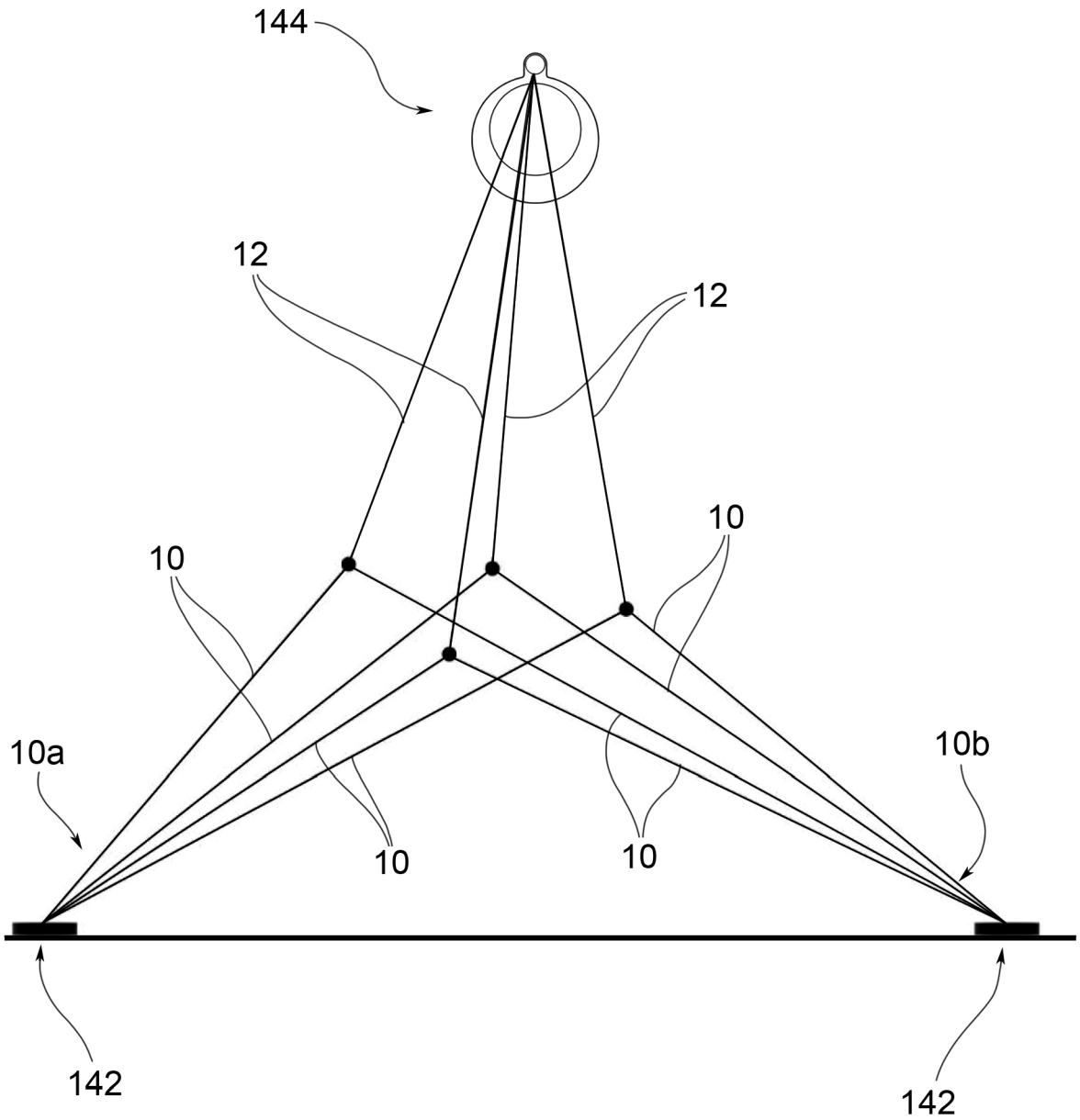


FIG.11

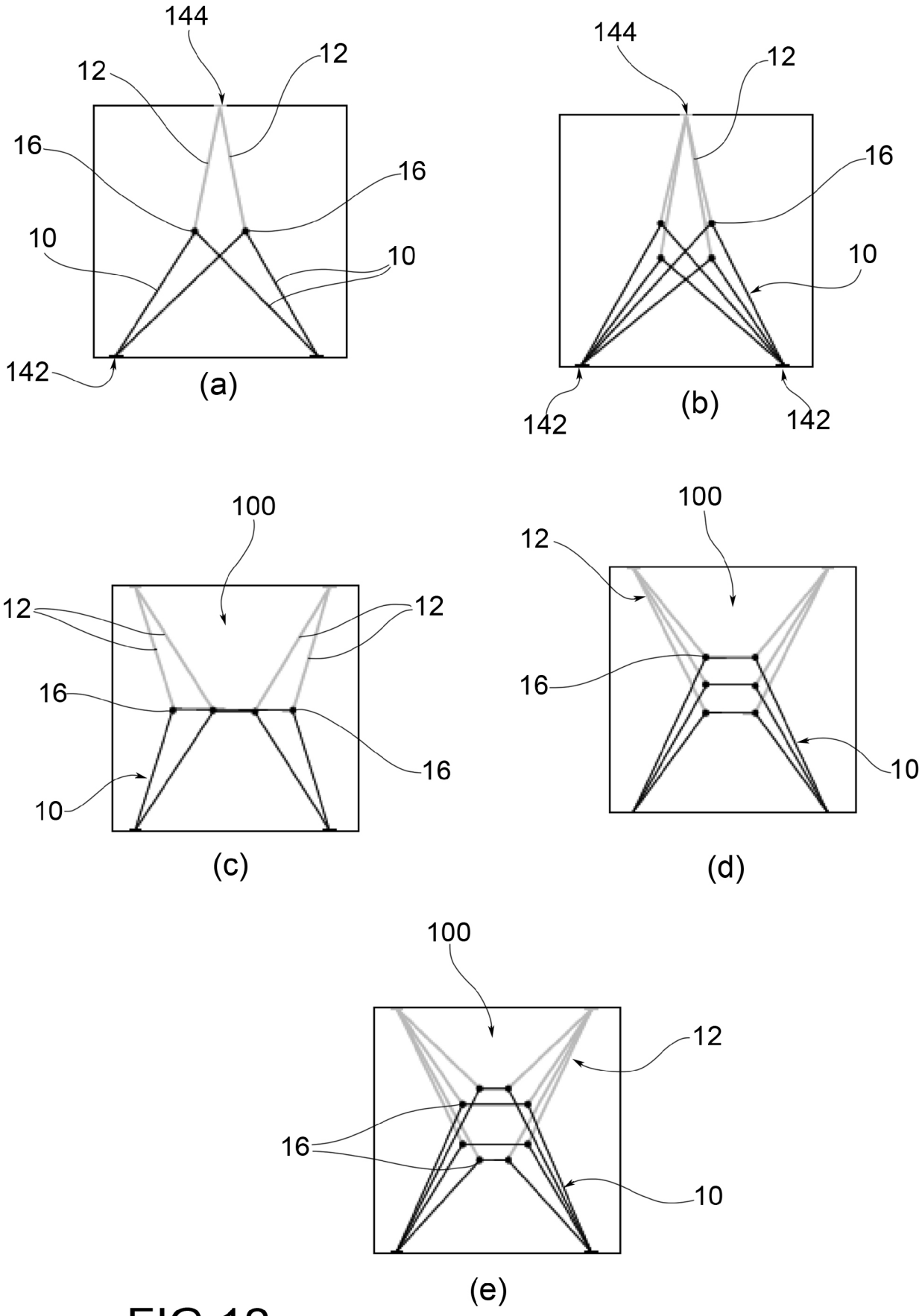

144
12
12
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16
10
10
142
(a)
144
12
16
10
142
142
(b)
100
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10
(c)
100
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16
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(d)
100
12
16
10
(e)

FIG.12

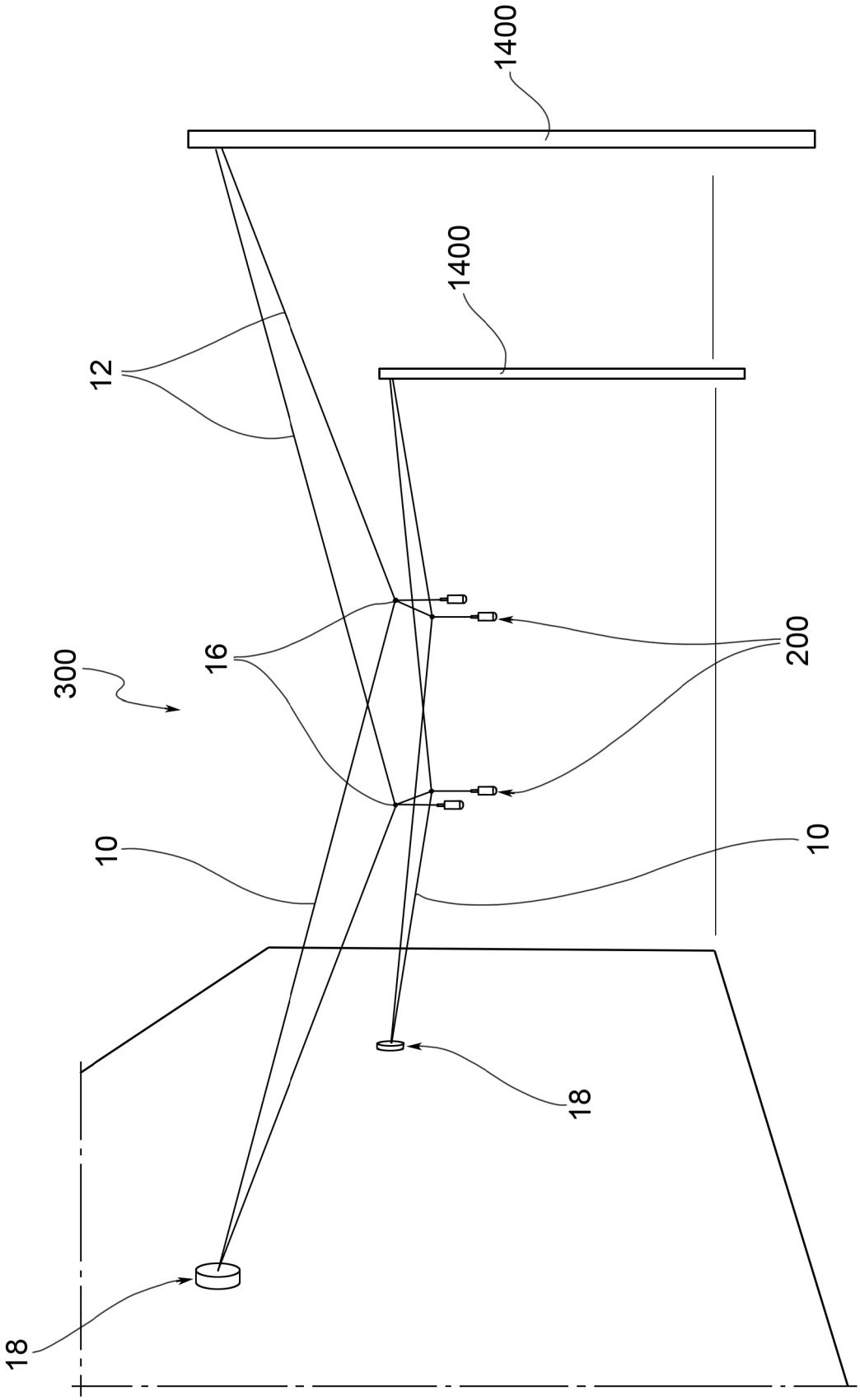


FIG.13

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EUROPEAN SEARCH REPORT

Application Number
EP 26 16 8907

DOCUMENTS CONSIDERED TO BE RELEVANT

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X Y	US 5 025 357 A (MAURER INGO [DE]) 18 June 1991 (1991-06-18) * column 1, line 63 - column 2, line 43 * * figures 1-5 *	1,2,7,8, 10,11,15 9,13,14	INV. F21S8/06 F21S2/00 F21V21/008
X	US 2020/400289 A1 (KRIEGER THOMAS [DE]) 24 December 2020 (2020-12-24) * paragraph [0029] - paragraph [0034] * * figures 4-16 *	1-4,7	ADD. F21V21/38 F21V23/00
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 August 2026	Soto Salvador, Jesús

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