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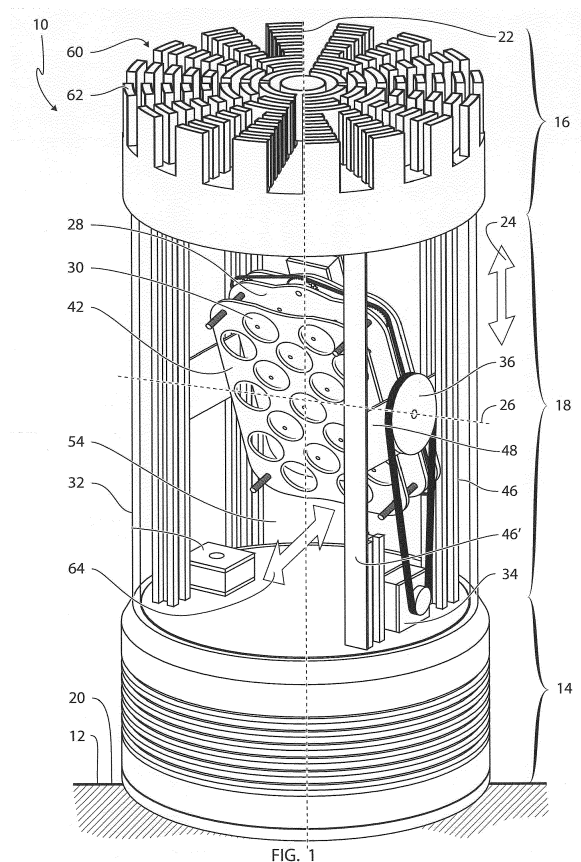
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(54) **ILLUMINATION DEVICE FOR MOUNTING ON A SHIP OR OFF-SHORE INSTALLATION OR PIER IN A NAUTICAL OR MARINE ENVIRONMENT**

(57) An illumination device (10) for mounting on a surface of a ship or off-shore installation or pier in a nautical environment comprising a bottom part (14), a top part (16) and an intermediate part (18). The intermediate (18) part is connected to the bottom (14) and top part (16) and is adapted to form a hermetic sealing of the illumination device (10). The intermediate part (18) defines a central vertical axis (22) and a horizontal axis (26) perpendicular to said vertical axis (22) and comprises a light source (28), which is rotatable around the central vertical axis (22) and/or around the horizontal axis (26). The illumination device further includes an external housing (32) for encapsulating the light source (28) as well as displacement means for rotating the light source (28) around the central vertical axis (22) and around the horizontal axis (26).



Description

FIELD OF THE INVENTION

[0001] The present invention concerns an illumination device for use or mounting in a ship or off-shore installation or pier in a nautical or marine environment. More particularly, the illumination device comprises a light source, preferably in the form of a light emitting diode (LED) panel, which is rotatable along a vertical and a horizontal axis and which is encapsulated by an external housing, preferably a cylindrical external housing.

BACKGROUND OF THE INVENTION

[0002] The use of illumination devices in a nautical or marine environment is well known in the art. Such illumination devices are normally adapted for mounting in a ship, where long-range and short-range illumination may be necessary to be included in one single illumination device. Apart from being able to accommodate such long-range and short-range lights, the illumination device should be capable of withstanding the highly corrosive and high-moisture nautical environment in order to protect the light source arranged in the device, such light source being typically light emitting diodes (LED), while at the same time being as simple and flexible as possible.

[0003] US 2018/0187879 A1 discloses such an illumination device adapted for mounting in a boat having a sealed environment for the lights contained therein. The illumination device can provide both long-range and short-range illumination by using high efficiency lights such as LED's. The LEDs are positioned in relatively small windows, which may be constructed to modify the distribution of the light as it is broadcast.

[0004] EP 2 536 975 discloses an illumination device including a moving head light fixture with a bucket-shaped head. In particular, the illumination device comprises a base, a yoke connected to and rotatable relative to the base, and a head connected to and rotatable relative to the yoke. The head comprises at least one light source generating a light beam.

[0005] The prior art illumination devices comprise many parts and lack sufficient flexibility by not being capable of rotating around a vertical and horizontal axis, while at the same time being hermetic enough to avoid the harsh conditions of the maritime environment, including the exposure to water.

SUMMARY OF THE INVENTION

[0006] It is therefore an object of the present invention to provide an illumination device which is compact by being able to incorporate long-range and short-range illumination in a single device.

[0007] It is another object of the present invention to provide an illumination device which is flexible by being able to move in several directions, at least around a ver-

tical and horizontal axis, as well as radially, yet at the same time being resistant to the harsh conditions of a maritime environment.

[0008] These and other objects are solved by the present invention.

[0009] Accordingly, there is provided an illumination device 10, 10' for mounting on a surface 12, 12' of a ship or off-shore installation or pier in a nautical environment comprising:

- a bottom part 14, 14';
- a top part 16, 16';
- an intermediate part 18, 18', which is connected to said bottom part 14, 14' and said top part 16, 16' and adapted to form a hermetic sealing of said illumination device 10, 10';

said intermediate part 18, 18' defining:

- a central vertical axis 22, 22' running along the length direction 24, 24' of said intermediate part 18, 18' and a horizontal axis 26, 26' perpendicular to said vertical axis 22, 22';

said intermediate part 18, 18' comprising:

- a light source 28, 28', 28", said light source 28, 28', 28" being rotatable around said central vertical axis 22, 22' and/or around said horizontal axis 26, 26';
- said illumination device 10, 10' further comprising:

- an external housing 32 running along the periphery of said intermediate part 18, 18' for encapsulating said light source 28, 28', 28", and
- displacement means for at least rotating said light source 28, 28', 28" around said central vertical axis 22, 22' and/or around said horizontal axis 26, 26'.

[0010] Hence, the light source in the illumination device is rotatable around two axes and at the same time it is encapsulated in an external housing which is preferably transparent, and which hermetic construction, with the top and bottom part, prevents the intrusion of water. The light source may be in the form of discharge lamps, a halogen source, discharge lamps, light emitting diodes (LED), or combinations thereof. Preferably, the light source is LED, since this is the light source with the highest efficiency. The illumination device is mounted relative to the sea water level and is preferably remotely controlled, e.g. by a joystick, so that the focus of light is on the water surface.

[0011] In an embodiment of the invention, said intermediate part 18, 18' comprises light refraction means, preferably in the form of a lens 30, 30', 30". Preferably, said refraction means are also rotatable around said central vertical axis 22, 22' and/or around said horizontal axis 26, 26'.

[0012] In another embodiment of the invention, said surface (12) defines a horizontal plane (20). While the

surface in principle may be tilted, it is preferred that the surface is planar and horizontal, thus defining a horizontal plane. By "horizontal" is meant parallel to the axis 26, as shown in e.g. Fig. 1. Upon mounting the illumination device, a plate may constitute the horizontal part, and the plate may be welded to the structure, which is to support the illumination device.

[0013] The plate may be welded to the ship, or for instance welded to the forward mast, or monkey island, i.e. the place on the ship which is located at the top most accessible height, or near the aft mast or platform.

[0014] The illumination device and plate may be fixed together by e.g. screws, i.e. the plate for example has four holes in the plate and bottom part of the illumination device which the screws is screwed into.

[0015] In another embodiment of the invention, said light source 28 is provided as a LED-panel 38 having arranged therein a number of individual LED lights 40, and said light-refracting means 30 is provided as a lens panel 42 having arranged therein a number of individual lenses 44, each being adapted to cooperate with a corresponding LED-light 40 of said LED-panel 38. Preferably, the individual lenses are paired with the corresponding LED-lights. The lenses in the lens panel may therefore be arranged in the same manner as the arrangement of the LED-lights in the LED-panel, thus enabling efficient focus of the emitted light.

[0016] In another embodiment of the invention, said external housing 32 is at least partly cylindrical, where cylindrical is defined by having an equal cross-section running along the length direction of said intermediate part. Preferably, the external housing may be a transparent cylindrical shell made of for example plastic, which may be sandwiched between the bottom part and top part (in a tower-like structure); these three items encapsulating the light source.

[0017] By "at least partly cylindrical" is meant that a first portion along the length direction of the intermediate part is cylindrical, while the remaining part is not necessarily cylindrical, but may take any other suitable geometrical form.

[0018] The term "cylindrical" itself as defined above means that the perimeter of a cross-section along the horizontal axis of the external housing at any given point along the length direction of the intermediate part, this being circular (as in the figures), or polygonal such as a square, is invariant. The cylindrical shape, preferably along the whole length direction of the intermediate parts, provides simplicity of construction and appeals to the user.

[0019] The span created by the rotational displacement around said vertical axis may be a full rotation, i.e. 360° or even more, e.g. 600°. Yet, in another embodiment of the invention said external housing 32 is transparent, preferably transparent only along the span created by the rotational displacement around said vertical axis 22 of said intermediate part 18 and wherein said span corresponds to said rotational displacement being up to

270°, preferably up to 180°. This may prevent blinding deck personnel in case the span covers part of the deck.

[0020] In another embodiment of the invention, said displacement means comprises a first set of displacement means for rotating said light source 28 around said horizontal axis 22, and a second set of displacement means for rotating said light source 28 around said vertical axis 24. Said displacement means comprises drive means and transmission means. Thus, the first displacement means comprises first drive means and first transmission means, while the second displacement means comprises second drive means and second transmission means. This enables independent operation of the rotational movement of the LED-panel, thus providing flexibility in the operation of the illumination device. In a particular embodiment, said first set or second set of displacement means comprises drive means, such as a motor, and transmission means, such as a cogwheel. The cogwheel is connected to the motor via a belt, thus enabling the rotation of the cogwheel and thereby the light source, e.g. a LED-panel.

[0021] In another particular embodiment, said bottom part or said top part comprises said second displacement means for rotating at least said light source around said vertical axis. Said second displacement means comprises separate drive means and transmission means, i.e. second drive means and second transmission means. The second displacement means may thus cause the rotation around the central vertical axis like in a carrousel. For instance, the displacement means may be arranged inside the bottom part and rotate the intermediate part containing the light source, as well as the external housing. Alternatively, the external housing may be stationary. The top part may rotate together with the intermediate part.

[0022] In a particular embodiment, said first set of displacement means comprises first drive means (34, 34') and first transmission means 36, 36', and said first drive means 34, 34' and/or first transmission means 36, 36' are included in said intermediate elongated part 18. Thereby, the illumination device becomes more compact and simple.

[0023] In another embodiment of the invention, said first and second displacement means are included in said intermediate part 18. Thereby, the illumination device becomes even more compact and simple.

[0024] In another embodiment of the invention, said intermediate part (18) comprises: a frame including at least a pair of pillars 46, 46', said pillars 46, 46' extending along the length direction 24 of said intermediate part 18 (along the axis of the part-cylinder), a yoke 48 connecting said pair of pillars 46, 46' and adapted for accommodating/supporting said first transmission means 36 and for engaging with said LED-panel 38 and thereby providing its displacement around said horizontal axis 26. The pillars, together with the yoke running perpendicular to the pillars, enables the provision of integrity and support to the whole structure of the illumination device in a simple

and elegant manner.

[0025] In another embodiment of the invention, said illumination device 10 comprises: a substantially horizontal plate 50, 50' provided at either end of said intermediate part 18 and which is in direct communication with the bottom part 14 or the top part 16, said intermediate part 18 defining an internal region 54, said horizontal plate 50' being provided with an inlet 52 for air intake into said internal region 54 and an outlet 56 for leaving air out from said internal region 54, a blower 58 for injecting air into said internal region 54 through said inlet 52 for air intake, thereby cooling said internal region 54. This embodiment provides a simple solution to the problem of removing heat generated by the LED-lights. The space of such internal region allows for the circulation of the air and thus for appropriate heat transfer.

[0026] The internal region is also spacious enough, as it will be apparent to a skilled person, so as to permit the displacement or movement of the LED-panel and lens panel not only around the vertical axis defined by the intermediate part, but also in the radial direction, i.e. towards the perimeter wall of the external housing, thus again enabling high flexibility during operation of the illumination device. An additional blower for the injection of air directly into the centre portion of the LED-panel may also be provided.

[0027] In another embodiment of the invention, said top part 16 or said bottom part 14 is provided with heat sinks 60, preferably in the form of a plurality of fins 62, for receiving air from said outlet 56, thereby dissipating heat generated by said light source 28 within said internal region 54. Hence, the fins further improve the dissipation of the heat away from the illumination device.

[0028] In another embodiment of the invention, said illumination device 10 comprises additional displacement means for moving said lens panel 42 in a radial direction 64, said displacement means comprising additional drive means 66 and transmission means 68, said additional drive means 66 being a motor 66 and said additional transmission means 68 including a set of cogwheels 70 adapted to cooperate with a set of screws 72 connectable to said lens panel 42, said screws 72 preferably being located along the periphery of said lens panel 42 and along the periphery of said LED-panel 38. Hence, additional flexibility and efficiency, in the way the light is focused, is obtained. The radial distance of the lens panel with respect to the LED-panel may be controlled independently, and as the lens panel moves away from the LED-panel, better air circulation is also allowed, thereby also improving heat transfer.

[0029] In another embodiment of the invention, said bottom part 14 and/or said top part 16 is provided with a groove 74 arranged along the perimeter of respectively said bottom part 14 and/or said top part 16, and which groove 74 is adapted for receiving an adhesive and engaging with either end of said intermediated elongated part 18, thereby fixing said top part 16 and/or bottom part 14 to said intermediate part 18. This enables a simple

and quick, hermetic, i.e. no water intrusion, construction of the illumination device.

[0030] In another embodiment of the invention, two or more sets of a light source 28', 28" and light-refracting means 30', 30" are arranged along the length direction 24' of the intermediate part 18', said light source being provided as a LED-panel 38', 38". Thereby, a greater number of LED-lights may be arranged in a very compact form in a single illumination device.

[0031] In another embodiment of the invention, wherein each LED-panel 38', 38" are independently rotatable relative to said surface 12' or said bottom part 14', around said central vertical axis 22' or said horizontal axis 26, 26", a higher flexibility is enabled during operation of the illumination device.

[0032] The illumination device may be part of a system including a joystick and a monitor showing a map with the present vessel having the illumination device. The map may include up to two nautical miles of the area surrounding the vessel.

[0033] The system may be configured such that the illumination device may light up an area of the water surface which is fixed relative to the ship, for example the water surface around the bow or stern of the ship may be illuminated irrespective of how the ship turns or rolls. Such a guidance system may include a processing unit and a memory having a set of instructions for running such an automatic mode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034]

FIG. 1 shows a perspective view of the illumination device according to a particular embodiment of the present invention including a LED-panel and a lens panel.

FIG. 2 shows an exploded view of the LED-panel and lens panel as well as corresponding additional displacement means.

FIG. 3 shows the illumination device according to the invention including particular details of the blower, inlet and outlet for air at the top part.

FIG. 4 shows the illumination device according to the invention including grooves provided in the top and bottom part.

FIG. 5 shows another embodiment of the illumination device according to the invention including two sets of LED-panels.

DETAILED DESCRIPTION

[0035] With reference to the particular embodiment of Fig. 1, the illumination device 10 is mounted on a surface

12 of a ship or off-shore installation or pier. The surface 12 defines a horizontal plane 20. The illumination device 10 includes a bottom part 14, a top part 16 and an intermediate, elongated, part 18, which is connected to the bottom part 14 and top part 16. The intermediate part 18 defines a central vertical axis 22, which runs along the length direction 24 of the intermediate part 18, and a horizontal axis 26 which is perpendicular to the vertical axis 22. The intermediate part 18 includes also a light source 28, e.g. as a plurality of individual LED-lights 40, and light-refracting means in the form of a lens 30, e.g. as a plurality of individual lenses 44, each being adapted to cooperate with a corresponding LED-light 40. The light source 28, which is rotatable around the vertical axis 22 and/or around the horizontal axis 26, is here provided as a LED-panel 38, while the light-refracting means 30 is provided as a lens panel 42 (see also Fig. 2).

[0036] The illumination device 10 further includes an external housing 32, which runs along the periphery of the intermediate part 18. The external housing 32, which is preferably transparent and cylindrical, encapsulates the light source 28 and light-refracting means 30, and its hermetic construction with the top 16 and bottom part 14 prevents the intrusion of water from the surrounding environment.

[0037] The intermediate part 18 comprises a frame including pillars 46 extending along the length direction 24. A yoke 48 connects the pillars and accommodates the first transmission means 36, thereby engaging with the LED-panel 38 for its displacement around the horizontal axis 26. The rotation of at least the light source 28 (the light-refraction means 30 is also rotatable) around the horizontal axis 26 is effected by first displacement means comprising first drive means 34, e.g. a motor, and first transmission means 36, e.g. a cogwheel, through a belt or chain as shown in the figure.

[0038] The top part 16 is provided with heat sinks 60 in the form of a plurality of fins 62 for receiving air from said outlet 56 (see Fig. 3), thereby dissipating heat generated by the light source 28 within the internal region 54.

[0039] With reference to Fig. 2, internal parts of the intermediate part 18 of the illumination device 10 of Fig. 1 are shown. A light source 28 is provided in the form of a LED-panel 38 having a plurality of individual LED-lights 40. A first set of displacement means comprising first drive means 34 and first transmission means 36 are connected directly to the LED-panel 38 for providing its rotation around the horizontal axis 26. The LED-panel 38 cooperates directly with light refraction means 30 in the form of a lens panel 42 having arranged therein a plurality of individual lenses 44, each being adapted to cooperate with a corresponding LED-light 40. The lens panel 42 is connected by screws 72, so that the lens panel can move away from the LED-panel so as to better provide focus. Additional displacement means for moving the lens panel 40 in a radial direction 64 (i.e. towards the periphery of the external housing 32) is provided. The additional displacement means comprises additional drive means 66,

e.g. an additional motor, and additional transmission means 68 comprising a plate holding additional individual cogwheels 70, and which are connected by a belt or chain as shown in the figure. The cogwheels 70 are adapted to cooperate with a set of screws 72 located along the periphery of the lens panel 42, while the LED-panel is fixed in place (without radial movement) to said plate of transmission means 68 by separate means such as bolts (not shown).

[0040] Fig. 3 shows the illumination device of Fig. 1 or 2, where the possible rotations or movements are shown by the arrows. A substantially horizontal plate 50, 50' is provided. The intermediate part 18, more specifically the external housing 32 arranged therein, defines an internal region 54, which is spacious enough for inter alia enabling the rotation of the LED and lens panels. Intense heat from the LED lights 40 is generated, yet it is efficiently removed since the horizontal plate 50 is provided with an inlet 52 for air intake, i.e. an air inlet, into the internal region 54, and an air outlet 56 for leaving air out from the internal region 54. A blower 58 injects the air into the internal region 54 through air inlet 52, which is then extracted after cooling the panels via air outlet 56. An additional blower 76 (see Fig. 2) is provided to provide more cooling air at the central portion of the LED-panel 38 through a dedicated central aperture or hole, as also shown in Fig. 2. At the bottom part, electronics, such as a printed circuit board (78), is suitably adapted.

[0041] With reference to Fig. 4, the bottom part 14 or top part 16 is provided with a groove 74 arranged along their perimeter. The groove 74 is adapted for receiving an adhesive and engaging with either end of said intermediate elongated part 18, thereby fixing said top part 16 or bottom part 14 to said intermediate part 18.

[0042] With reference to Fig. 5, an illumination device 10' is shown in which two sets of light source 28' 28" and light-refracting means 30' 30" are arranged along the length direction 24' of the intermediate part 18'. The light source is provided as LED-panels 38' 38". Each LED-panel 38' 38" may be independently rotatable relative to the surface 12' or the bottom part 14', around a central vertical axis 22' or around a horizontal axis 26, 26". Here, a common drive means 34', for instance a motor, drives the transmission means 36', 36".

List of parts:

[0043] Prime ' or primes " in the figures for a given reference numeral represent different realizations of the same part.

- 10 illumination device
- 12 surface of a ship or off-shore installation or pier
- 14 bottom part
- 16 top part
- 18 intermediate part
- 20 horizontal plane
- 22 central vertical axis

24 length direction of intermediate part
 26 horizontal axis
 28 light source
 30 lens(es)
 32 external housing
 34 first drive means
 36 first transmission means
 38 LED panel
 40 LED light
 42 lens panel
 44 individual lenses
 46 pillars
 48 yoke
 50 horizontal plate
 52 air inlet
 54 internal region
 56 air outlet
 58 blower
 60 heat sinks
 62 fins
 64 radial direction - towards periphery of external housing
 66 additional drive means
 68 additional transmission means
 70 additional cogwheels
 72 screws
 74 grooves
 76 additional blower
 78 electronics / Printed Circuit Board (PCB)

Claims

1. An illumination device (10, 10') for mounting on a surface (12, 12') of a ship or off-shore installation or pier in a nautical environment comprising:

- a bottom part (14, 14');
 - a top part (16, 16');
 - an intermediate part (18, 18'), which is connected to said bottom part (14, 14') and said top part (16, 16') and adapted to form a hermetic sealing of said illumination device (10, 10');

said intermediate part (18) defining:

a central vertical axis (22, 22') running along the length direction (24, 24') of said intermediate part (18, 18') and
 a horizontal axis (26, 26') perpendicular to said vertical axis (22, 22');

said intermediate part (18, 18') comprising:

a light source (28, 28', 28''), said light source (28, 28', 28'') being rotatable around said central vertical axis (22, 22') and/or around said horizontal axis (26, 26');

said illumination device (10, 10') further comprising:

- an external housing (32) running along the periphery of said intermediate part (18, 18') for encapsulating said light source (28, 28', 28''), and
 - displacement means for at least rotating said light source (28, 28', 28'') around said central vertical axis (22, 22') and/or around said horizontal axis (26, 26').

2. An illumination device (10, 10') according to claim 1, wherein said intermediate part (18) comprises light refraction means, preferably in the form of a lens (30, 30', 30'').

3. An illumination device (10, 10') according to any preceding claim, wherein said surface (12, 12') defines a horizontal plane (20, 20').

4. An illumination device (10, 10') according to any preceding claim, wherein
 said light source (28, 28', 28'') is provided as a LED-panel (38) having arranged therein a number of individual LED lights (40),
 said light refracting means (30, 30', 30'') being provided as a lens panel (42) having arranged therein a number of individual lenses (44), each adapted to cooperate with a corresponding LED-light (40) of said LED-panel (38, 38', 38'').

5. An illumination device (10, 10') according to any preceding claim, wherein said external housing (32) is at least partly cylindrical, where cylindrical is defined by having an equal cross-section running along the length direction of said intermediate part.

6. An illumination device (10, 10') according to any preceding claim, wherein said external housing (32) is transparent, preferably transparent only along the span created by the rotational displacement around said vertical axis (22) of said intermediate part (18), and wherein said span corresponds to said rotational displacement being up to 270°, preferably up to 180°.

7. An illumination device (10, 10') according to any preceding claim, wherein said displacement means comprises:

a first set of displacement means for rotating said light source (28) around said horizontal axis (26), and
 a second set of displacement means for rotating said light source (28) around said central vertical axis (22).

8. An illumination device (10, 10') according to claim 7, wherein said first set of displacement means comprises first drive means (34, 34') and first transmission means (36, 36'), and wherein said first drive means (34, 34') and/or first transmission means (36,

36") are included in said intermediate elongated part (18).

9. An illumination device (10, 10') according to claim 7 or 8, said intermediate part (18) comprising:

a frame including at least a pair of pillars (46, 46'), said pillars (46, 46') extending along the length direction (24) of said intermediate part (18), and
a yoke (48) connecting said pair of pillars (46, 46') and adapted for accommodating said first transmission means (36) and for engaging with said LED-panel (38) and thereby providing its displacement around said horizontal axis (26).

10. An illumination device (10, 10') according to any preceding claim, comprising:

a substantially horizontal plate (50, 50') provided at either end of said intermediate part (18) and which is in direct communication with the bottom part (14) or the top part (16), said intermediate part (18) defining an internal region (54), said horizontal plate (50, 50') being provided with an inlet (52) for air intake into said internal region (54) and an outlet (56) for leaving air out from said internal region (54), and
a blower (58) for injecting air into said internal region (54) through said inlet (50) for air intake, thereby cooling said internal region (54).

11. An illumination device (10, 10') according to claim 10, wherein said top part (16) or said bottom part (14) is provided with heat sinks (60), preferably in the form of a plurality of fins (62), for receiving air from said outlet (56), thereby dissipating heat generated by said light source (28) within said internal region (54).

12. An illumination device (10, 10') according to any preceding claim, comprising additional displacement means for moving said LED-panel (38) in a radial direction (64), said displacement means comprising additional drive means (66) and transmission means (68), said additional drive means (66) being a motor (66), and said additional transmission means (68) including a set of cogwheels (70) adapted to cooperate with a set of screws (72) connectable to said lens panel (42), said screws (72) preferably being located along the periphery of said lens panel (42) and along the periphery of said LED-panel (38).

13. An illuminating device (10, 10') according to any preceding claim, wherein said bottom part (14) and/or said top part (16) is provided with a groove (74) arranged along the perimeter of respectively said bottom part (14) and/or said top part (16), and which

groove (74) is adapted for receiving an adhesive and engaging with either end of said intermediated elongated part (18), thereby fixing said top part (16) and/or bottom part (14) to said intermediate part (18).

14. An illuminating device (10') according to any preceding claim, wherein two or more sets of a light source (28', 28'') and light refracting means (30', 30'') are arranged along the length direction (24') of the intermediate part (18'), said light source being provided as a LED-panel (38', 38'').

15. An illuminating device (10, 10') according to claim 14, wherein each LED-panel (38', 38'') is independently rotatable relative to said surface (12') or said bottom part (14'), around said central vertical axis (22') or said horizontal axis (26, 26'').

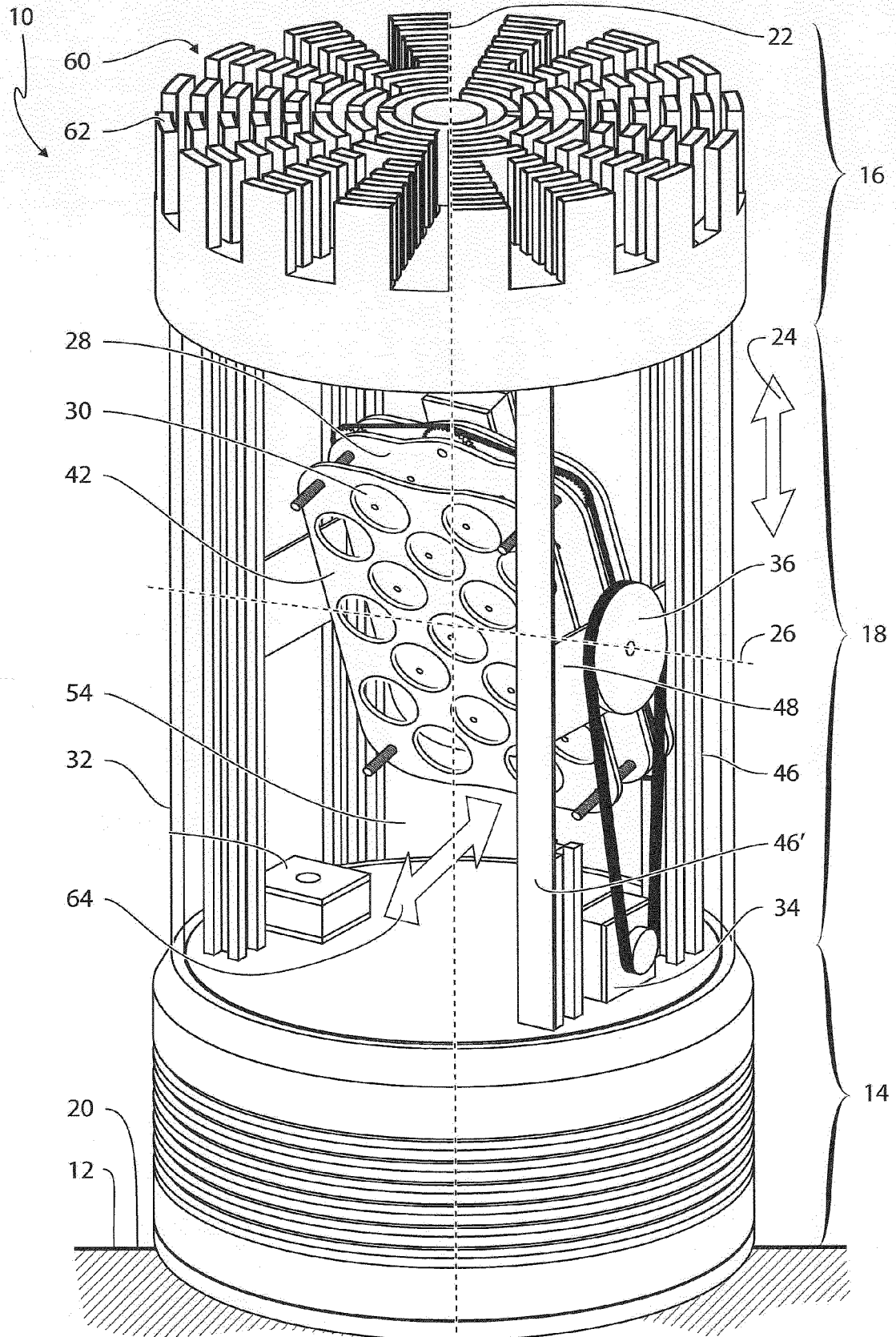


FIG. 1

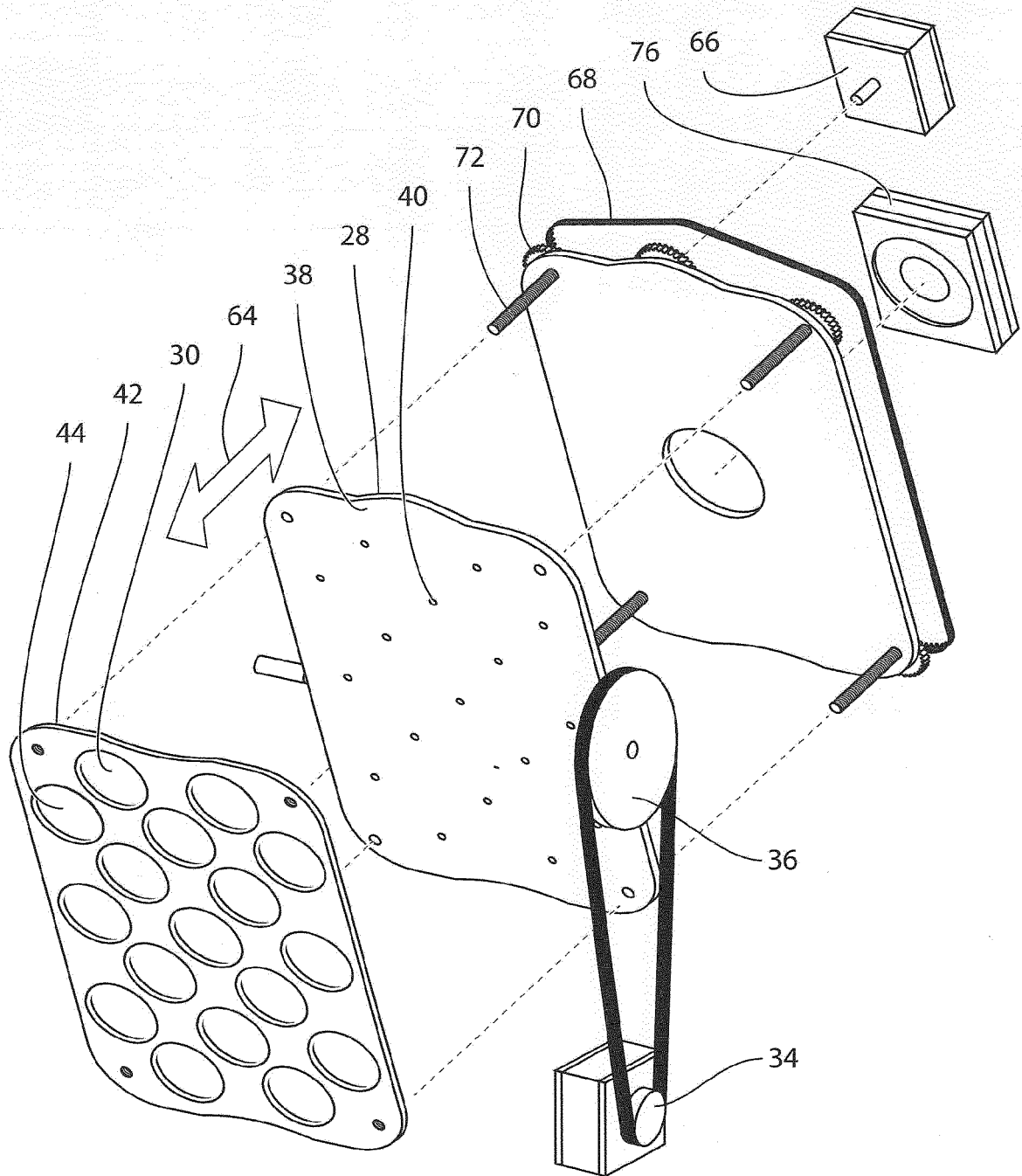


FIG. 2

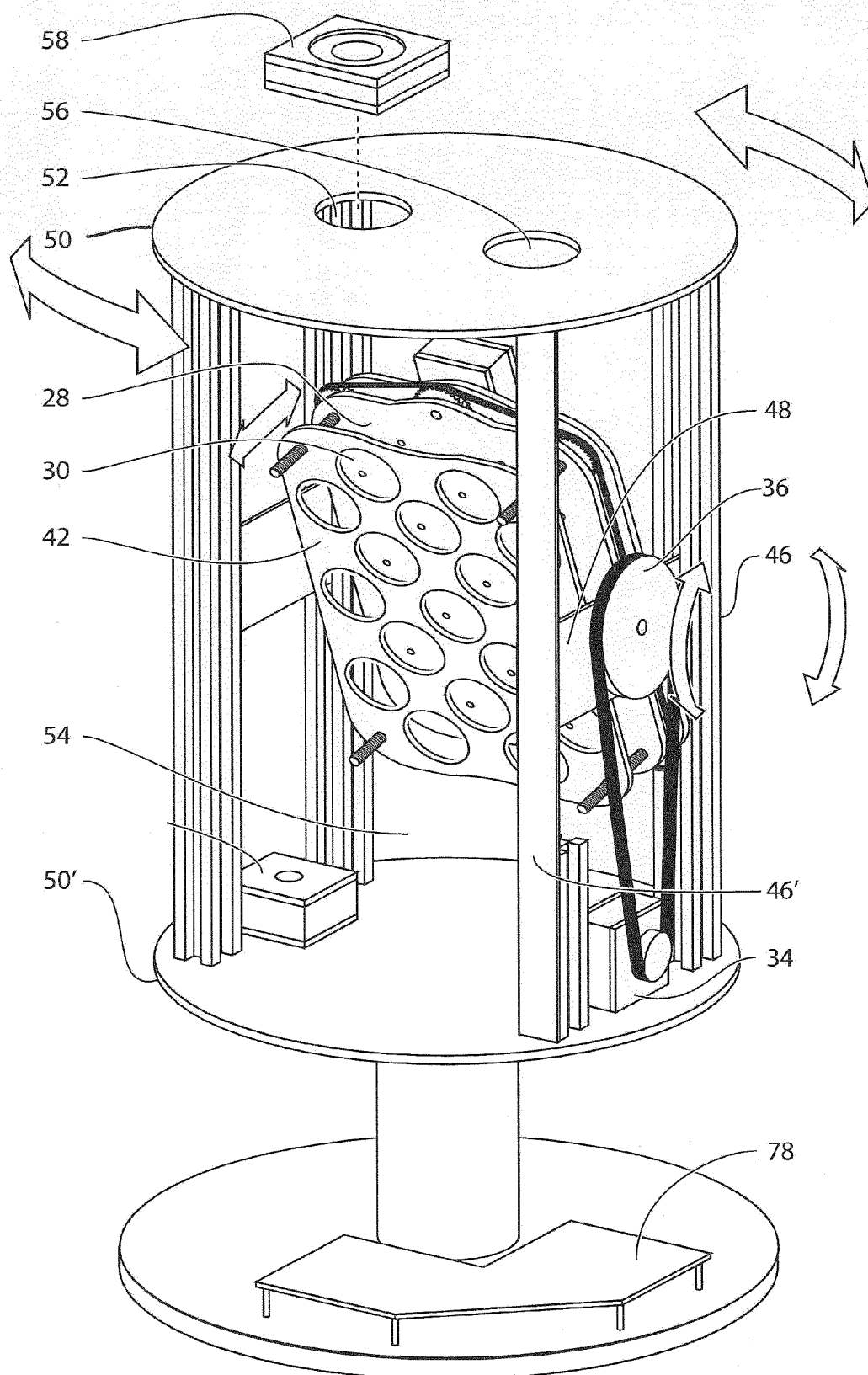


FIG. 3

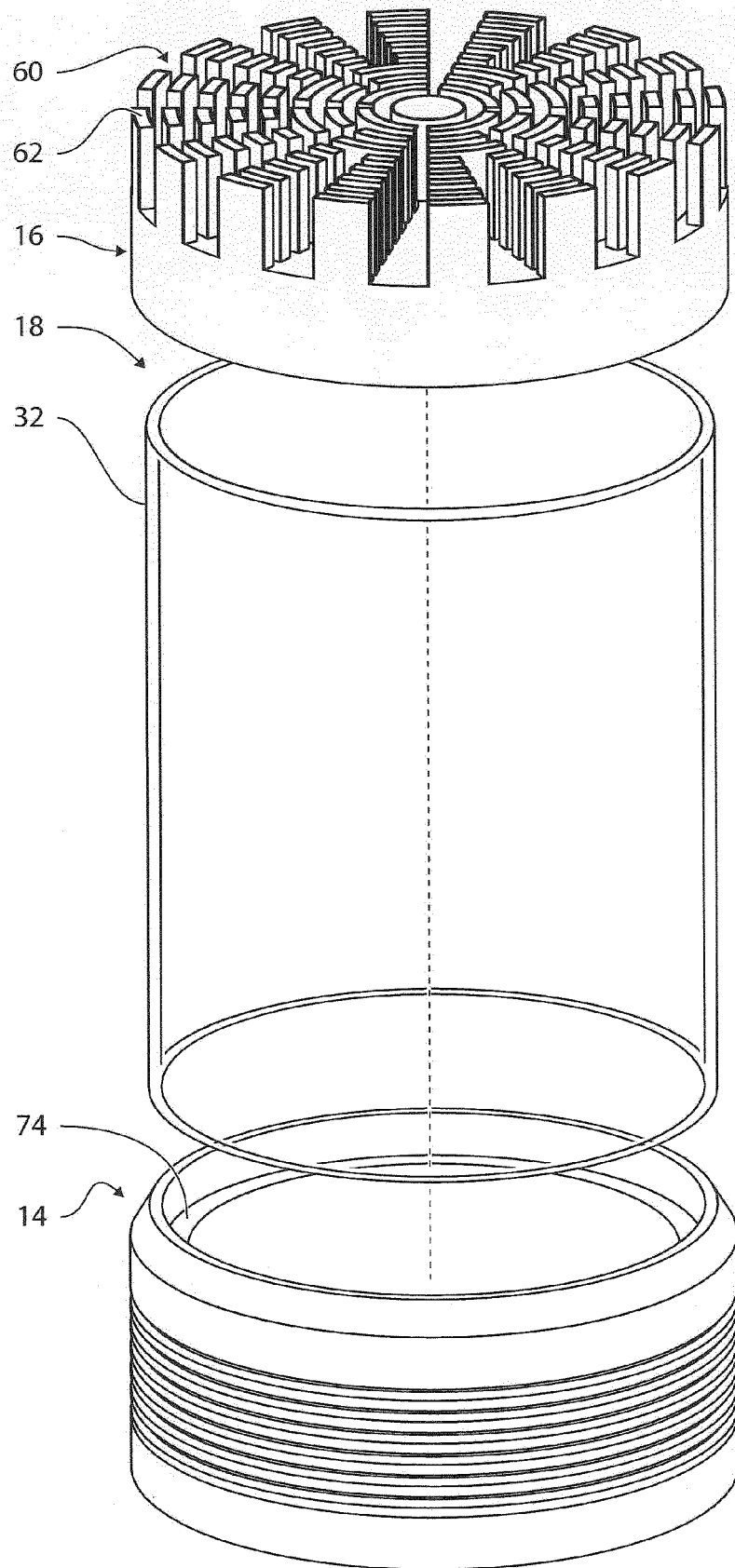


FIG. 4

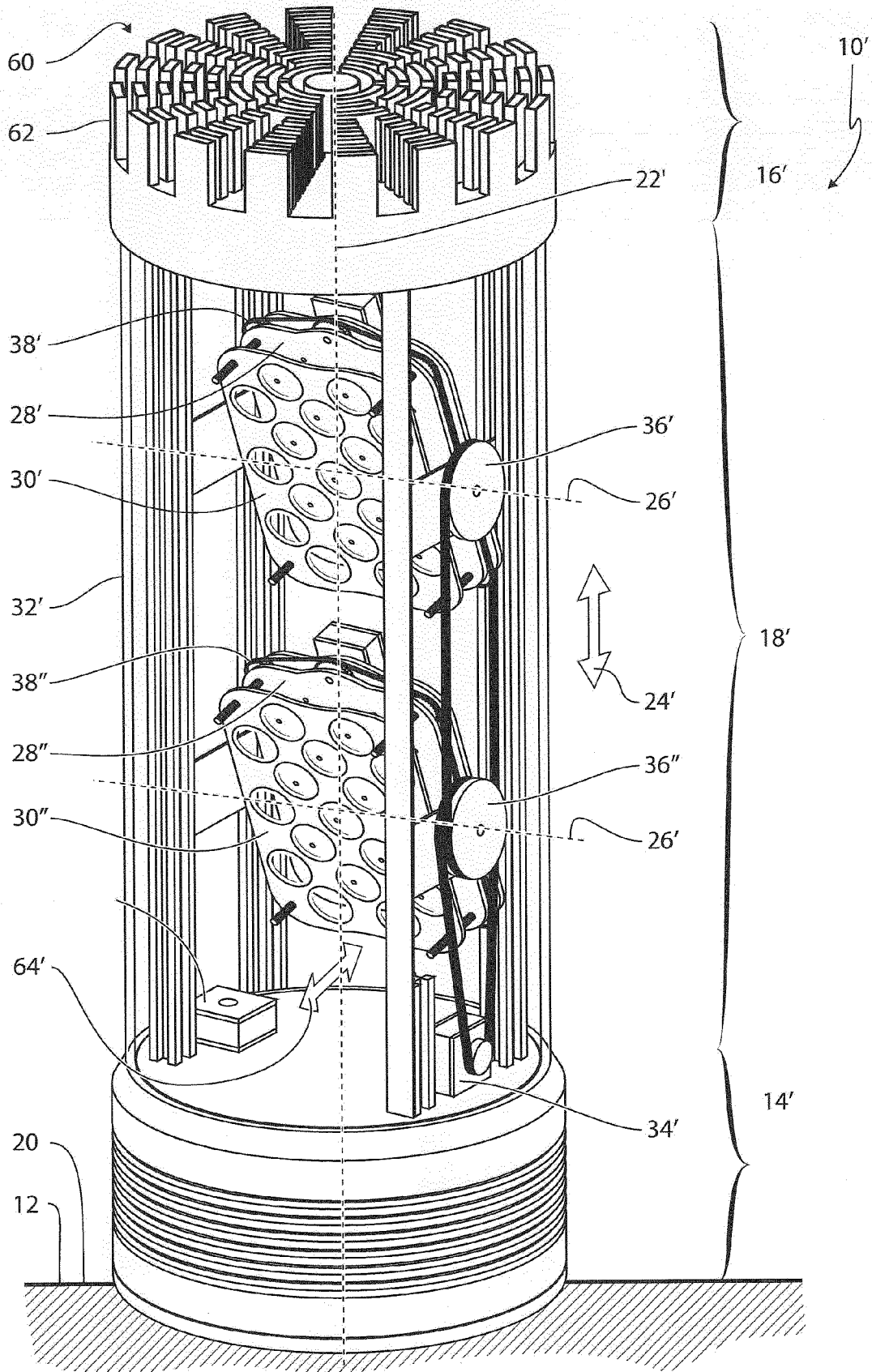


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 19 18 4704

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 8 201 974 B1 (SMITH KEVIN M [US] ET AL) 19 June 2012 (2012-06-19) * figures 1,7,15,26,27 * * column 2, line 59 - column 3, line 48 * * column 5, line 6 - line 20 *	1-15	INV. F21V21/15 F21S8/00 B63B45/02 F21V17/02 F21V31/00
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A	US 2019/093859 A1 (PEARD YVAN [FR]) 28 March 2019 (2019-03-28) * figures 12,13 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) F21S B63J B63B F21V F21W F21Y
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 23 September 2019	Examiner Dinkla, Remko
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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