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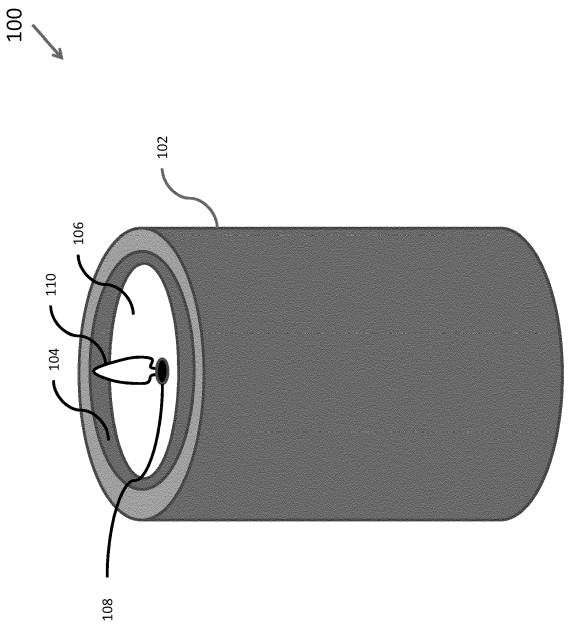
(54) ELECTRONIC LUMINARY DEVICE WITH SIMULATED FLAME

(57) A flameless candle may include a side wall including an upper region and a lower region, a base engaged with the lower region of the side wall, and an upper surface extending from the upper region of the side wall to form an upper recess. The candle may also include a projection screen extending upwardly through an aperture in the upper surface. The position of the projection screen is fixed with respect to a position of the upper surface. Two sources of light positioned below the upper surface may project light through the aperture onto the projection screen. Circuitry may electrically connect to the first source of light and the second source of light. The circuitry may independently control each of the sources of light.

FIGURE 1



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Description

BACKGROUND OF THE APPLICATION

[0001] Generally, this application relates to techniques for constructing flameless candles. Specifically, this application discloses techniques for simulating a candle flame.

[0002] Flameless candles may provide an illusion of a real (flamed) candle, but without the risk of fire damage. A real candle flame moves in physical space. In order to simulate such movement, some have used an element that also moves in physical space. Moving parts, however, may be undesirable for various reasons. For example, moving parts may tend to become damaged, such as during shipping, by mishandling, or by unintentional events.

[0003] Furthermore, flameless candles with moving parts may require additional components or systems to cause the moving parts to move. Such components or systems may include fans or magnetic systems. These components or systems may add cost to a flameless candle device

BRIEF SUMMARY OF THE APPLICATION

[0004] According to techniques of the application, a device may include a side wall, a base, and an upper surface. The side wall may have an upper region and a lower region. The base may be engaged with the lower region of the side wall. The upper surface may extend from the upper region of the side wall to form an upper recess.

[0005] The device may include a projection screen extending upwardly through an aperture in the upper surface. The position of the projection screen may be fixed with respect to the position of the upper surface. The projection screen may be flat or may have a concavity or convexity. The projection screen may have a general two-dimensional or three-dimensional appearance. The projection screen may be shaped like a flame. The projection may have a primary plane. The projection screen may be translucent. The projection screen may be formed from a material such as plastic, glass, or metal.

[0006] A first source of light may be positioned below the upper surface and may to project light through the aperture onto the projection screen. A second source of light may be positioned below the upper surface and may to project light through the aperture onto the projection screen. The positions of the first source of light and the second source of light may also be fixed with respect to the position of the projection screen.

[0007] The light from the first and second sources of light may be projected onto the front side of the projection screen or onto the front and back side of the projection screen. Light projected onto one side of the projection screen may penetrate through to the other side of the projection screen. Each of the sources of light may emit light with a beam axis and a beam width. One or more of the beam axes may intersect with the primary plane of the projection screen at an angle between 20° to 40°. One or more of the beam widths may be between 30° to 35°.

[0008] The sources of light may be positioned to project light onto different areas of the projection screen. These areas may be distinct or may overlap.

[0009] Circuitry may electrically connect to the first source of light and the second source of light. The circuitry may independently control intensities of the light projected by the first source of light and the second source of light.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

[0010]

FIG. 1 illustrates an electronic candle, according to techniques of the present application.

FIG. 2 illustrates a portion of an electronic candle, according to techniques of the present application.

FIGS. 3A and 3B illustrate a projection screen and light sources, according to techniques of the present application.

[0011] The foregoing summary, as well as the following detailed description of certain techniques of the present application, will be better understood when read in conjunction with the appended drawings. For the purposes of illustration, certain techniques are shown in the drawings. It should be understood, however, that the claims are not limited to the arrangements and instrumentality shown in the attached drawings. Furthermore, the appearance shown in the drawings is one of many ornamental appearances that can be employed to achieve the stated functions of the system.

DETAILED DESCRIPTION OF THE APPLICATION

[0012] FIGS. 1-3B illustrate an electronic candle 100, according to techniques of the present application. As shown in FIG. 1, the electronic candle 100 may include a side wall 102 having an upper region and a lower region. A base 150 (see FIG. 2) may be engaged with the lower region of the side wall 102. An upper surface 106 may extend from the upper region of the sidewall 102 to form an upper recess 104. The upper recess 104 may have a variety of different shapes. The upper recess 104 may be shaped like a bowl or a portion of a bowl. For example, the upper region of the side wall 102 may have a varying height around the top perimeter of the electronic candle 100. The upper recess 104 may have a rounded or flat bottom surface. The upper recess 104 may have a smooth or textured bottom surface. The upper recess

104 may have a cylindrical shape.

[0013] A projection screen 110 may extend upwardly through an aperture 108 in the upper surface 106. The position of the projection screen 110 may be fixed with respect to the upper surface 106. Of course, an undue amount of force could cause the projection screen 110 to deflect or otherwise change position with respect to the upper surface 106. However, an anticipated movement of the electronic candle 100 (for example, picking up or putting down the candle, rotating the candle, or turning the candle upside down) may not influence the position of the projection screen with respect to the upper surface 106.

[0014] As shown in FIG. 2, the electronic candle 100 may include a base 150. The base 150 may accommodate batteries in a battery compartment 160. The base 150 may also accommodate circuitry 170. The battery compartment 160 and circuitry 170 need not be located in or around the base 150, and could be located at other areas of the electronic candle 100. For example, the circuitry 170 may be embedded in one or more of the sources of light 120, 130. The circuitry 170 and sources of light 120, 130 may receive power from one or more batteries in the battery compartment 160.

[0015] A riser 140 may extend upwardly from the base. Sources of light 120 and 130 may be located near or at the top of the riser 140. The sources of light 120, 130 may include a light-emitting diode ("LED") an incandescent bulb, or a laser. In certain configurations, a riser may not be necessary. For example, the sources of light may be embedded in other parts of the candle.

[0016] The projection screen 110 may extend upwardly from the riser 140. The projection screen 110 may be rigidly affixed to the riser 140 at or near the top of the riser 140. For example, the projection screen 110 may be integral with the riser 140. The projection screen 110 may be a separate portion rigidly attached to the riser 140 (for example, glued or attached at more than one place). By rigidly affixing the projection screen 110 with the riser 140, it may be possible to fix the position of the projection screen 110 with respect to the upper surface 106. There may be other ways to fix the positions of the projection screen 110 and the upper surface 106. For example, the projection screen 110 may be affixed to the upper surface 106 or to the sidewall 102 instead of the riser 140.

[0017] The projection screen 110 may be rigid. The projection screen 110 may be formed from one or more materials, such as glass, plastic, metal, or foil. Such material(s) may be at least partially reflective. The projection screen 110 may be opaque, semi-opaque, clear, frosted, or translucent. The projection screen 110 may have a mesh or other textured surface. The projection screen 110 may facilitate display of holographic images.

[0018] The surface of the projection screen 110 may be flat, concave, or convex. The surface of the projection screen 110 may be various combinations of flat, concave, and/or convex. The projection screen 110 may have a two-dimensional or three-dimensional appearance. The projection screen 110 may have a flame shape. Such a shape may be static, in that it does not change. The projection screen 110 may have one or more projection surfaces. For example, the projection screen 110 may have two projection surfaces - front and back. The projection screen 110 may have additional projection surfaces. For example, the projection screen 110 may have three or more surfaces, each receiving light from one or more sources of light. The projection screen 110 may have surfaces that wrap around to form a shape with substantial depth. For example, the projection screen 110 may have a three-dimensional shape resembling an actual candle flame. In such an example, sources of light may be located around the projection screen 110 and may project onto the projection screen 110.

[0019] The projection screen 110 may be of uniform color or may have different colors. For example, the projection screen 110 may be painted or patterned to show a simulated wick. In order to provide an illusion of a real candle flame, the projection screen 110 may have darker colors near an area where a wick would be expected. The projection screen 110 may have different colors (for example, blue, white, orange, or yellow) to simulate different flame temperatures and intensities as a viewer may expect in a real candle flame. The colors may be chosen in combination with light colors emitted from the sources of light 120, 130.

[0020] The sources of light 120, 130 may be electrically connected to circuitry 170 through one or more conductors 130. The circuitry 170 may include a processor and one or more computer-readable storage devices that store software instructions for execution by the processor. The circuitry 170 may independently control one or more different aspects of the light projected by the sources of light 120, 130. For example, the circuitry 170 may be capable of separately controlling the intensity or color for each source of light 120, 130.

[0021] The circuitry 170 may illuminate each source of light 120, 130 with different sequences of intensities. Such sequences may include random sequences, semi-random sequences, or predetermined sequences. Such sequences may include frequencies that are out of phase from each other. Sequences may be dynamically influenced by other factors or inputs. For example, an output signal from a light sensor (not shown) could be received by the circuitry 170, which may, in turn, adjust the intensity levels in sequences according to the light sensor output signal (for example, boost the intensities under higher light). As another example, an output signal from a sound sensor (not shown) could be received by the circuitry 170, which may, in turn, adjust the intensity levels in sequences according to the sound sensor output signal (for example, adjust the frequency of the intensity changes in response to the character of received sound).

[0022] As illustrated in FIG. 3A, the projection screen 110 extends upwardly through the aperture 108 in the upper surface 106. While not shown in this example, the

position of the projection screen 110 is fixed with respect to the upper surface 106. The sources of light 120, 130 may be positioned below the upper surface 106. They may be positioned and configured in such a manner to project light through the aperture 108 and onto the projection screen 110. The positions of the sources of light 120, 130 may also be fixed with respect to the position of the projection screen 110.

[0023] The projection screen 110 may have a primary plane. Such a plane may be substantially vertical and may generally face the direction of emitted light from the sources of light 120, 130. Even if the projection screen 110 is not entirely flat, it should be understood that the projection screen 110 still may have a primary plane.

[0024] Referring to FIG. 3B, each source of light 120, 130 may project light (either completely or partially) through the aperture 108 in the upper surface 106 and onto the projection screen 110. The light emitted from each source of light 120, 130 may radiate according to a beam width. For example, the beam widths for the light emitted from the sources of light 120, 130 may be between 30-35 degrees. The beam axis for the light emitted from each of the sources of light may intersect with the primary plane of the projection screen 110. Such an intersection may have an angle between 20-40 degrees. The sources of light 120, 130 may project light onto the same side or different sides of the projection screen 110. For example, the source of light 120 may project light onto the front side of the projection screen 110, while the source of light 130 may project light onto the back side of the projection screen 110. If the projection screen 110 is translucent, light projected onto one side may penetrate to the other side.

[0025] The source of light 120 may project light onto an area 122 on the projection screen 110. The source of light 130 may project light onto an area 132 on the projection screen 110. The areas 122, 132 may be coextensive, overlapping, or separate from each other. The areas 122 may have different or similar shapes. The shapes may be influenced by the beam width of projected light, angle of incidence of the beam axis with the primary plane of the projection screen 110, the distance of a source of light 120, 130 from the projection screen 110, the contour of the light-receiving surface of the projection screen 110, or by other factors. For example, it may be possible to provide lenses, apertures, or the like to form a beam of light having a particular shape. Such shape(s) may influence the shape of area(s) 122, 132.

[0026] At least some of the light emitted from the sources of light 120, 130 may be reflected off of the projection screen 110 and towards a viewer's eye. For example, the light may be reflected directly off of the projection screen 110 and to the viewer's eye without passing through any intervening materials.

[0027] As discussed above, the intensities or colors of each of the sources of light 120, 130 may be independently controlled by circuitry 170. Through such independent control, it may be possible to simulate a candle flame. For example, it may be possible to simulate the physical movement and varying intensity profiles of a candle flame without employing moving parts.

[0028] More than two sources of light may be used. For example, three sources of light may be projected onto one side of the projection screen 110. Each of these sources of light may be independently controlled, such as by the techniques discussed above. As another example, four sources of light may be used. Two of the sources may project light onto one side of the projection screen 110 and the other two sources may project light onto another side of the projection screen 110.

[0029] It will be understood by those skilled in the art that various changes may be made and equivalents may be substituted without departing from the scope of the novel techniques disclosed in this application. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the novel techniques without departing from its scope. For example, while an electronic candle has been primarily disclosed, similar techniques could be applied to other luminary devices, such as wall sconces, lanterns, paper candles, or tiki torches. Therefore, it is intended that the novel techniques not be limited to the particular techniques disclosed, but that they will include all techniques falling within the scope of the appended claims.

Claims

1. A device for simulating a flame, comprising:

a side wall including an upper region and a lower region;
an upper surface extending from the upper region of the side wall toward a central axis of the device, wherein an upper recess is formed at least in part by the upper surface;
a projection screen arranged to extend upwardly from an aperture in the upper surface;
a first source of light located below the upper surface and configured to project a first beam of light through the aperture onto the projection screen;
a first lens configured to alter the first beam of light; and

circuitry configured to control an intensity of the first source of light.

2. The device of claim 1, further comprising:

a second source of light located below the upper surface and configured to project a second beam of light through the aperture onto the projection screen;
a second lens configured to alter the second beam of light; and

wherein the circuitry is further configured to independently control the intensity of the first beam of light and the intensity of the second beam of light.

3. The device of claim 2, wherein the first source of light is positioned to project light onto a front side of the projection screen thereby defining a first area, the second source of light is positioned to project light through the aperture onto the front side of the projection screen thereby defining a second area, wherein the second area is overlapping but different than the first area.

4. The device of claim 1, wherein the projection screen comprises a flame-shape.

5. The device of claim 1, wherein the projection screen is offset from a central axis of the aperture through the upper surface.

6. The device of claim 1, wherein the projection screen is rigid.

7. The device of claim 1, wherein the upper recess is formed at least in part by the upper surface and a portion of the side wall.

8. The device of claim 1, wherein the projection screen does not move with respect to the upper surface.

FIGURE 1

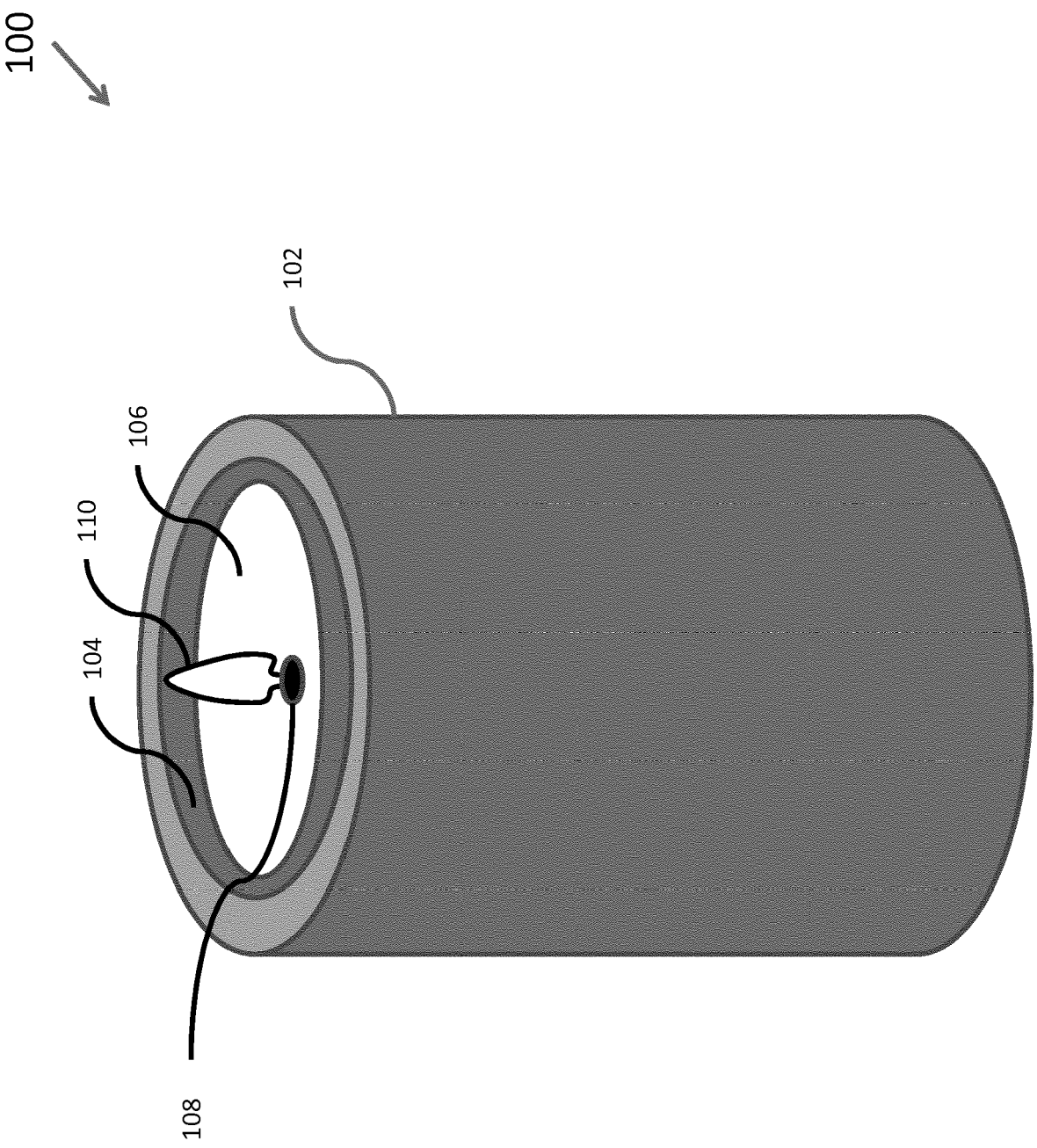


FIGURE 2

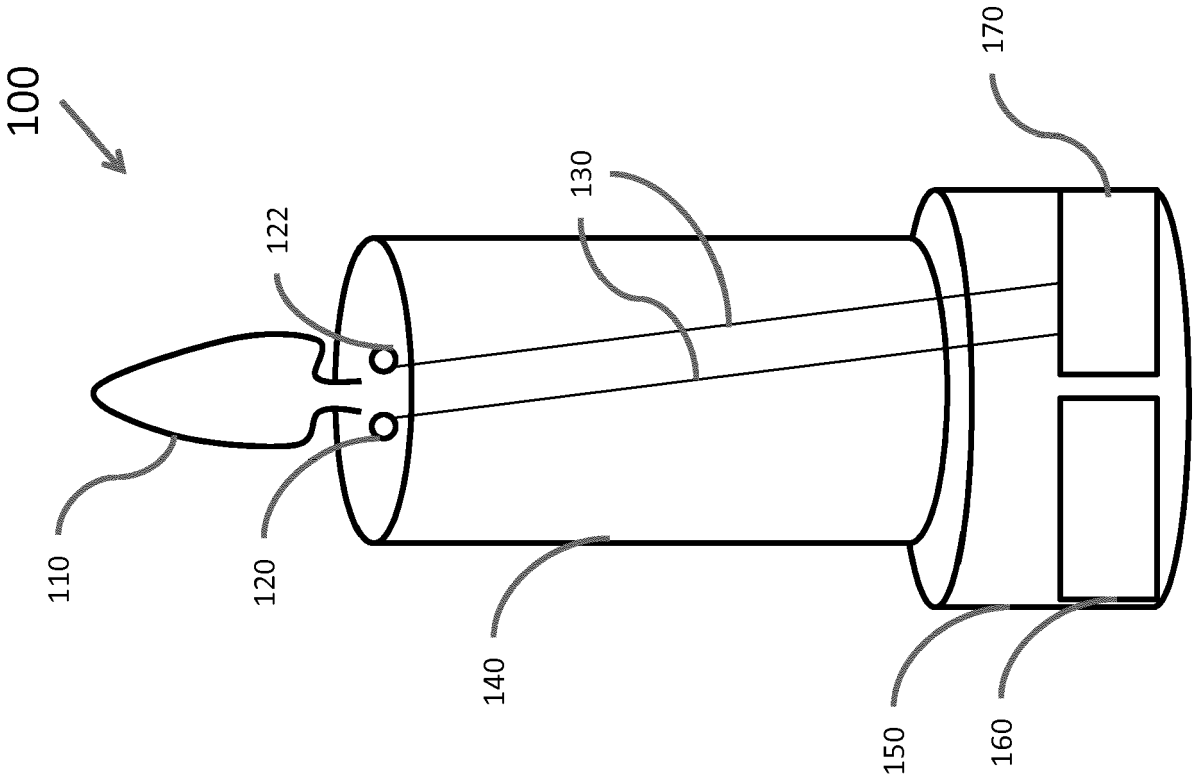


FIGURE 3A

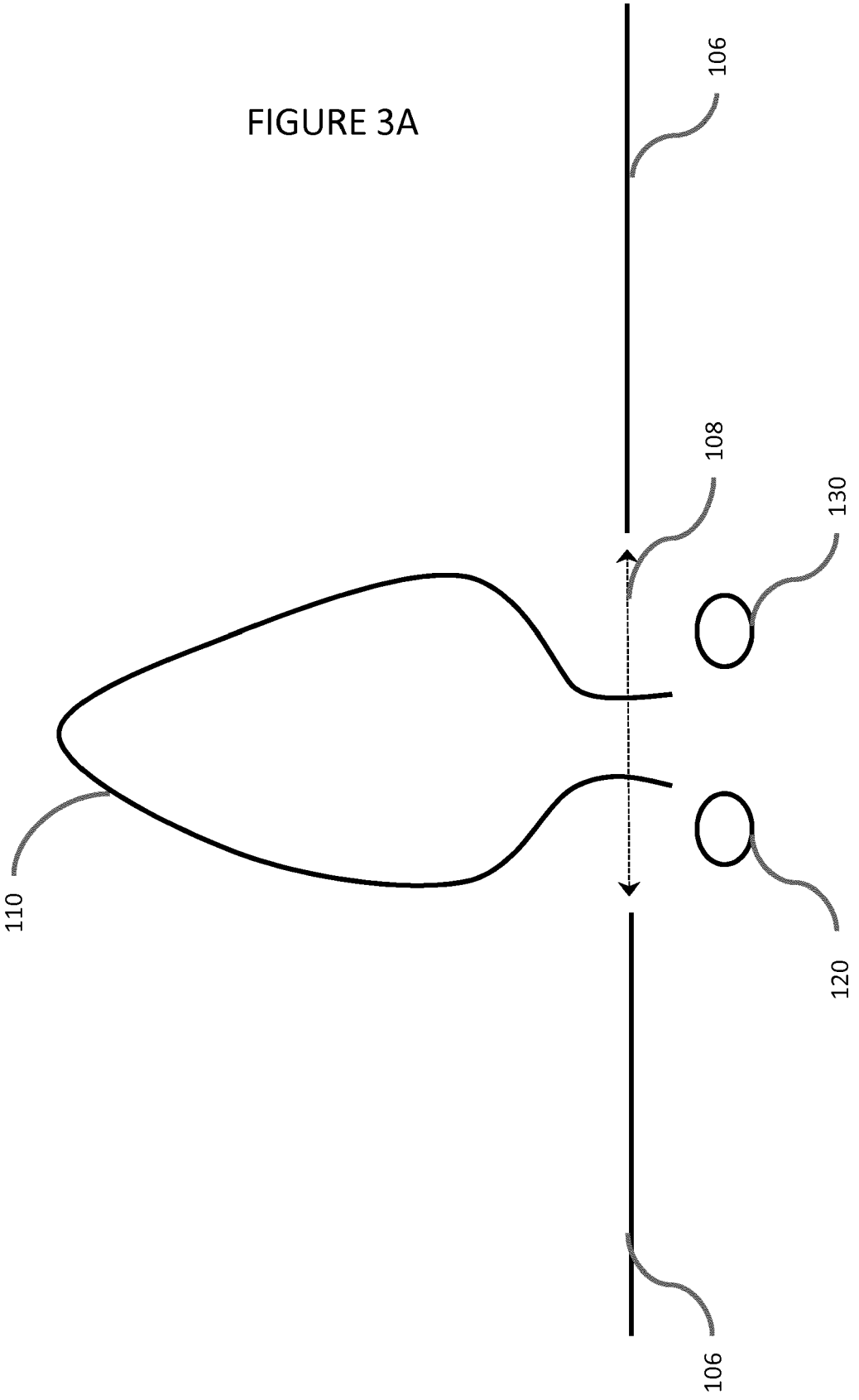
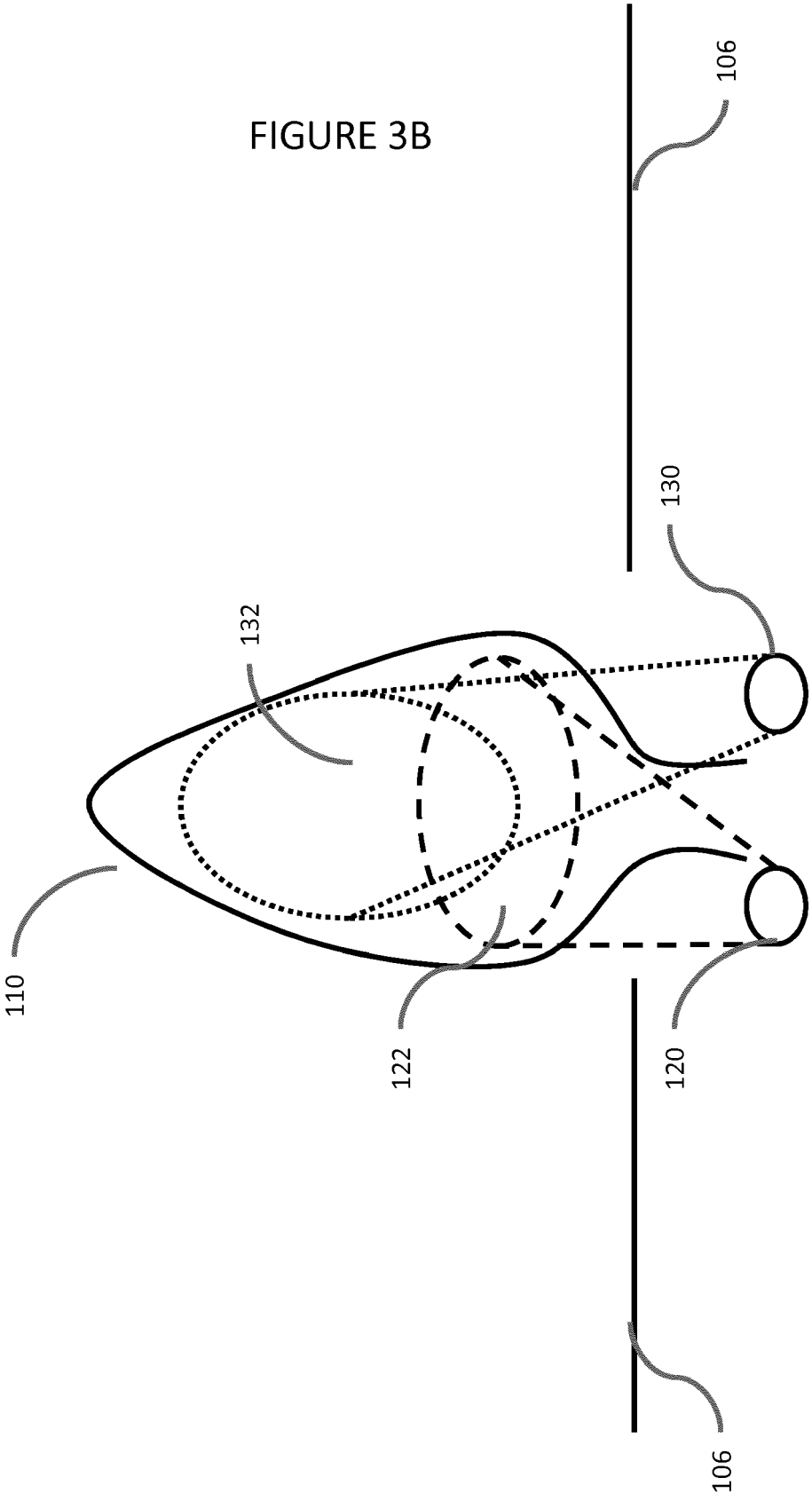


FIGURE 3B



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EUROPEAN SEARCH REPORT

Application Number
EP 16 20 5327

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TECHNICAL FIELDS SEARCHED (IPC)

F21V
F21S
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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	9 February 2017	Sacepe, Nicolas

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 20 5327

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