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(54) **ELECTRONIC LUMINARY DEVICE WITH SIMULATED FLAME**

ELEKTRONISCHER LICHTKÖRPER MIT SIMULIERTER FLAMME

DISPOSITIF D'ÉCLAIRAGE ÉLECTRONIQUE AVEC FLAMME FACTICE

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(56) References cited:
WO-A1-96/25624 US-A- 5 924 784
US-A1- 2001 033 488 US-A1- 2003 035 291
US-A1- 2006 146 544 US-A1- 2007 242 259
US-A1- 2008 129 226 US-A1- 2011 127 914
US-A1- 2011 279 034

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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. In particular the present invention relates to a device according to the preamble of claim 1.

[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 flameless candles, for example the flameless candle of US 2011/7012914 A1, 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] In order to overcome these drawbacks of the prior art the invention is characterized by the features of claim 1.

[0005] 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 project light through the aperture onto the projection screen. A second source of light may be positioned below the upper surface and may 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 180. 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 (100) comprising:

a side wall (102) including an upper region and a lower region,
a base (150) engaged with the lower region of the side wall (102), and
an upper surface (106) extending from the upper region of the side wall (102) to form an upper recess (104), wherein the upper surface (106) includes an aperture (108);
a projection screen (110) extending upwardly from in the upper surface (106), and
a first source of light (120) positioned below the upper surface (106), wherein the first source of light (120) projects light through the aperture (108) onto the projection screen (110);
a second source of light (130) positioned below the upper surface (106), wherein the second source of light (130) projects light through the aperture (108) onto the projection screen (130); and
circuitry electrically (170) connected to the first source of light (120) and the second source of light (130), wherein the circuitry (170) independently controls intensities of the light projected by the first source of light (120) and the second source of light (130) onto the projection screen (110)

characterized in that the position of the projection screen (110) is fixed with respect to the position of the upper surface (106) so that the projection screen (110) does not move in physical space.

2. The device of claim 1, **characterized in that** positions of the first source of light (120) and the second source of light (130) are fixed with respect to the position of the projection screen (110).

3. The device of claim 1, **characterized in that** the projection screen (110) is flat.

4. The device of claim 1, **characterized in that** the projection screen (110) includes a concavity.

5. The device of claim 1, **characterized in that** the projection screen (110) comprises a flame shape.

6. The device of claim 1, **characterized in that** the projection screen (110) includes a convexity.

7. The device of claim 1, **characterized in that:**

the projection screen (110) includes a primary plane;

the first source of light (120) emits light including a beam axis and a beam width;

the beam axis of the first source of light (120) intersects the primary plane of the projection screen (110) at an angle between 20° to 40°;

the second source of light (130) emits light including a beam axis and a beam width; and

the beam axis of the second source of light (130) intersects the primary plane of the projection screen at an angle between 20° to 40°.

8. The device of claim 7, **characterized in that:**

the beam width of the light emitted by the first source of light (120) is between 30° to 35°; and the beam width of the light emitted by the second source of light (130) is between 30° to 35°.

9. The device of claim 1, **characterized in that:**

the first source of light (120) is positioned to project light through the aperture (108) onto a front side of the projection screen (110); and the second source of light (130) is positioned to project light through the aperture (108) onto a back side of the projection screen (110).

10. The device of claim 9, wherein the projection screen (110) comprises a translucent material that allows light from the first source of light (120) to penetrate to the back side of the projection screen (110) and allows light from the second source of light (130) to penetrate to the front side of the projection screen (110).

11. The device of claim 1, **characterized in that** the projection screen (110) is rigid.

12. The device of claim 11, **characterized in that** the projection screen (110) comprises plastic.

13. The device of claim 1, **characterized in that:**

the first source of light (120) is positioned to project light onto a front side of the projection screen (110) in a first area (122);

the second source of light (130) is positioned to project light onto the front side of the projection screen (110) in a second area (132); and the second area (132) is different than the first area (122).

14. The device of claim 13, **characterized in that** a portion of the first area (122) overlaps a portion of the second area (132).

Patentansprüche

1. Vorrichtung (100), aufweisend:

eine Seitenwand (102), die einen oberen Bereich und einen unteren Bereich aufweist,

eine Basis (150), die mit dem unteren Bereich der Seitenwand (102) in Eingriff steht, und

eine obere Oberfläche (106), die am oberen Bereich der Seitenwand (102) verläuft,

um eine obere Aussparung (104) zu bilden, wobei die obere Oberfläche (106) eine Öffnung (108) aufweist;

eine Projektionsfläche (110), die vom Inneren der oberen Oberfläche (106) aus nach oben verläuft, und

eine erste Lichtquelle (120), die unterhalb der oberen Oberfläche (106) positioniert ist, wobei die erste Lichtquelle (120) Licht durch die Öffnung (108) auf die Projektionsfläche (110) projiziert;

eine zweite Lichtquelle (130), die unterhalb der oberen Oberfläche (106) positioniert ist, wobei die zweite Lichtquelle (130) Licht durch die Öffnung (108) auf die Projektionsfläche (110) projiziert; und

eine Schaltung (170), die mit der ersten Lichtquelle (120) und der zweiten Lichtquelle (130) elektrisch verbunden ist, wobei die Schaltung (170) unabhängig eine Lichtintensität des Lichts steuert, das durch die erste Lichtquelle (120) und die zweite Lichtquelle (130) auf die Projektionsfläche (110) projiziert wird,

dadurch gekennzeichnet, dass die Position der Projektionsfläche (110) im Verhältnis zu der Position der oberen Oberfläche (106) festgelegt ist, so dass die Projektionsfläche (110) sich nicht im physikalischen Raum bewegt.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Positionen der ersten Lichtquelle (120) und der zweiten Lichtquelle (130) im Verhältnis zu der Position der Projektionsfläche (110) festgelegt sind. 5
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Projektionsfläche (110) flach ist.
4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Projektionsfläche (110) eine Innenwölbung beinhaltet. 10
5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Projektionsfläche (110) eine Flammenform aufweist. 15
6. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Projektionsfläche (110) eine Ausbauchung beinhaltet. 20
7. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass:**
- die Projektionsfläche (110) eine Primärebene beinhaltet; 25
- die erste Lichtquelle (120) Licht mit einer Strahlenachse und einer Strahlenbreite emittiert;
- die Strahlenachse der ersten Lichtquelle (120) die Primärebene der Projektionsfläche (110) in einem Winkel zwischen 20° und 40° kreuzt; 30
- die zweite Lichtquelle (130) Licht einschließlich einer Strahlenachse und einer Strahlenbreite emittiert; und
- die Strahlenachse der zweiten Lichtquelle (130) die Primärebene der Projektionsfläche in einem Winkel zwischen 20° und 40° kreuzt. 35
8. Vorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass:** 40
- die Strahlenbreite des durch die erste Lichtquelle (120) emittierten Lichts zwischen 30° und 35° liegt; und
- die Strahlenbreite des durch die zweite Lichtquelle (130) emittierten Lichts zwischen 30° und 35° liegt. 45
9. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass:** 50
- die erste Lichtquelle (120) so positioniert ist, dass sie Licht durch die Öffnung (108) auf eine Vorderseite der Projektionsfläche (110) projiziert; und 55
- die zweite Lichtquelle (130) so positioniert ist, dass sie Licht durch die Öffnung (108) auf eine Rückseite der Projektionsfläche (110) projiziert.
10. Vorrichtung nach Anspruch 9, wobei die Projektionsfläche (110) ein lichtdurchlässiges Material aufweist, das es dem Licht der ersten Lichtquelle (120) ermöglicht, die Rückseite der Projektionsfläche (110) zu durchdringen und es dem Licht der zweiten Lichtquelle (130) ermöglicht, die Vorderseite der Projektionsfläche (110) zu durchdringen.
11. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Projektionsfläche (110) starr ist.
12. Vorrichtung nach Anspruch 11, **dadurch gekennzeichnet, dass** die Projektionsfläche (110) Plastik aufweist.
13. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass:**
- die erste Lichtquelle (120) so positioniert ist, dass sie Licht auf eine Vorderseite der Projektionsfläche (110) in einem ersten Bereich (122) projiziert;
- die zweite Lichtquelle (130) so positioniert ist, dass sie Licht auf die Vorderseite der Projektionsfläche (110) in einem zweiten Bereich (132) projiziert; und
- sich der zweite Bereich (132) von dem ersten Bereich (122) unterscheidet.
14. Vorrichtung nach Anspruch 13, **dadurch gekennzeichnet, dass** sich ein Abschnitt des ersten Bereichs (122) mit einem Abschnitt des zweiten Bereichs (132) überschneidet.

Revendications

1. Dispositif (100) comprenant :

une paroi latérale (102) incluant une région supérieure et une région inférieure,
une base (150) engagée avec la région inférieure de la paroi latérale (102), et
une surface supérieure (106) s'étendant depuis la région supérieure de la paroi latérale (102) pour former un évidement supérieur (104), dans lequel la surface supérieure (106) inclut une ouverture (108) ;
un écran de projection (110) s'étendant vers le haut depuis l'intérieur de la surface supérieure (106), et
une première source de lumière (120) positionnée en dessous de la surface supérieure (106), dans lequel la première source de lumière (120) projette de la lumière à travers l'ouverture (108) sur l'écran de projection (110) ;
une seconde source de lumière (130) positionnée en dessous de la surface supérieure (106),

- dans lequel la seconde source de lumière (130) projette de la lumière à travers l'ouverture (108) sur l'écran de projection (130) ; et une circuiterie (170) connectée électriquement à la première source de lumière (120) et à la seconde source de lumière (130), dans lequel la circuiterie (170) commande indépendamment des intensités de la lumière projetée par la première source de lumière (120) et par la seconde source de lumière (130) sur l'écran de projection (110),
- caractérisé en ce que** la position de l'écran de projection (110) est fixe par rapport à la position de la surface supérieure (106) de sorte que l'écran de projection (110) ne se déplace pas dans l'espace physique.
2. Dispositif selon la revendication 1, **caractérisé en ce que** des positions de la première source de lumière (120) et de la seconde source de lumière (130) sont fixes par rapport à la position de l'écran de projection (110).
 3. Dispositif selon la revendication 1, **caractérisé en ce que** l'écran de projection (110) est plat.
 4. Dispositif selon la revendication 1, **caractérisé en ce que** l'écran de projection (110) inclut une concavité.
 5. Dispositif selon la revendication 1, **caractérisé en ce que** l'écran de projection (110) comprend une forme de flamme.
 6. Dispositif selon la revendication 1, **caractérisé en ce que** l'écran de projection (110) inclut une convexité.
 7. Dispositif selon la revendication 1, **caractérisé en ce que** :

l'écran de projection (110) inclut un plan primaire ;
la première source de lumière (120) émet de la lumière incluant un axe de faisceau et une largeur de faisceau ;
l'axe de faisceau de la première source de lumière (120) coupe le plan primaire de l'écran de projection (110) selon un angle compris entre 20° et 40° ;
la seconde source de lumière (130) émet de la lumière incluant un axe de faisceau et une largeur de faisceau ; et
l'axe de faisceau de la seconde source de lumière (130) coupe le plan primaire de l'écran de projection selon un angle compris entre 20° et 40°.
 8. Dispositif selon la revendication 7, **caractérisé en ce que** :

la largeur de faisceau de la lumière émise par la première source de lumière (120) est comprise entre 30° et 35° ; et
la largeur de faisceau de la lumière émise par la seconde source de lumière (130) est comprise entre 30° et 35°.
 9. Dispositif selon la revendication 1, **caractérisé en ce que** :

la première source de lumière (120) est positionnée pour projeter de la lumière à travers l'ouverture (108) sur un côté de face de l'écran de projection (110) ; et
la seconde source de lumière (130) est positionnée pour projeter de la lumière à travers l'ouverture (108) sur un côté de dos de l'écran de projection (110).
 10. Dispositif selon la revendication 9, dans lequel l'écran de projection (110) comprend un matériau translucide qui permet à la lumière provenant de la première source de lumière (120) de pénétrer le côté de dos de l'écran de projection (110) et permet à la lumière provenant de la seconde source de lumière (130) de pénétrer le côté de face de l'écran de projection (110).
 11. Dispositif selon la revendication 1, **caractérisé en ce que** l'écran de projection (110) est rigide.
 12. Dispositif selon la revendication 11, **caractérisé en ce que** l'écran de projection (110) comprend du plastique.
 13. Dispositif selon la revendication 1, **caractérisé en ce que** :

la première source de lumière (120) est positionnée pour projeter de la lumière sur un côté de face de l'écran de projection (110) dans une première zone (122) ;
la seconde source de lumière (130) est positionnée pour projeter de la lumière sur le côté de face de l'écran de projection (110) dans une seconde zone (132) ; et
la seconde zone (132) est différente de la première zone (122).
 14. Dispositif selon la revendication 13, **caractérisé en ce qu'une** portion de la première zone (122) chevauche une portion de la seconde zone (132).

FIGURE 1

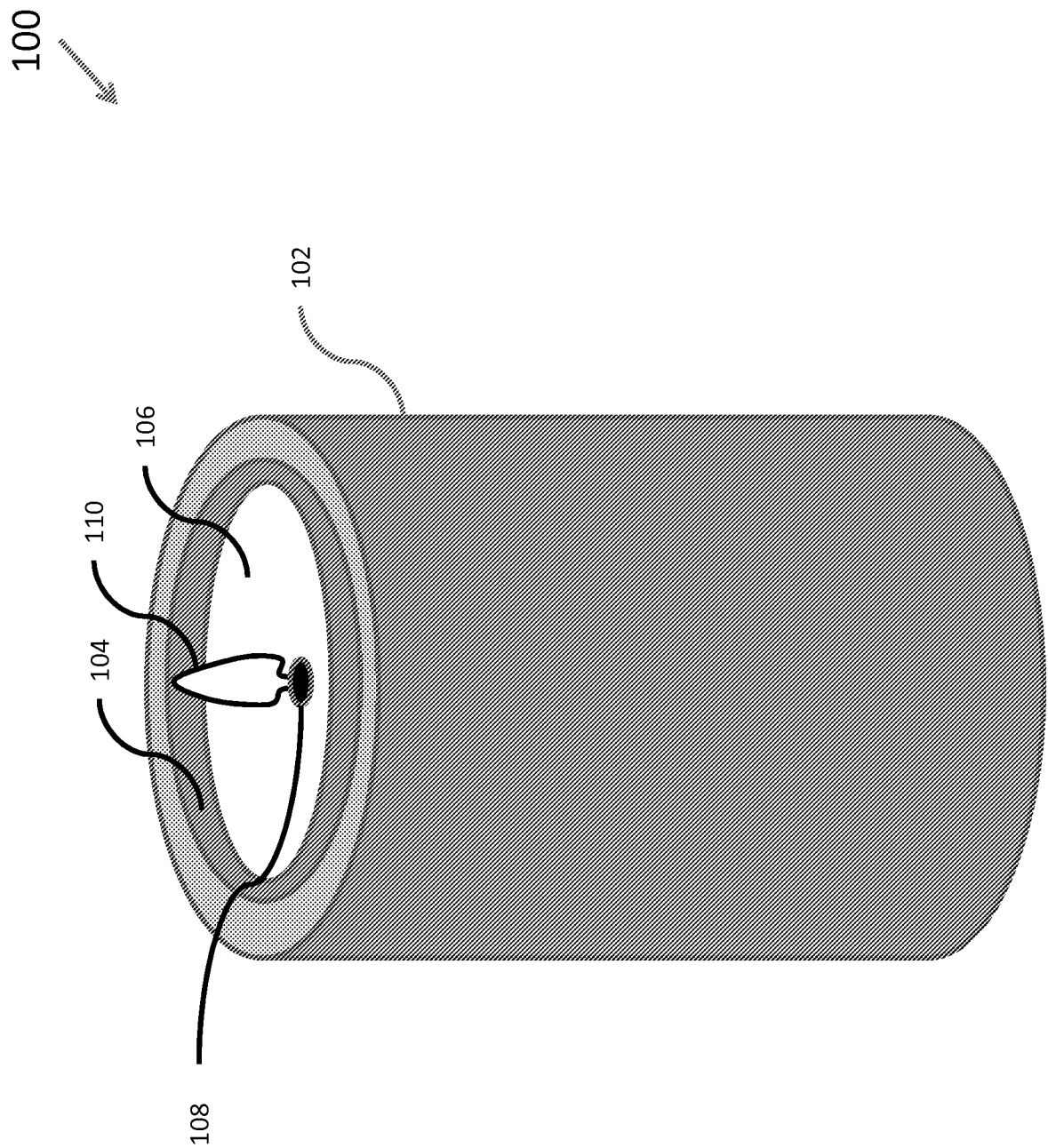
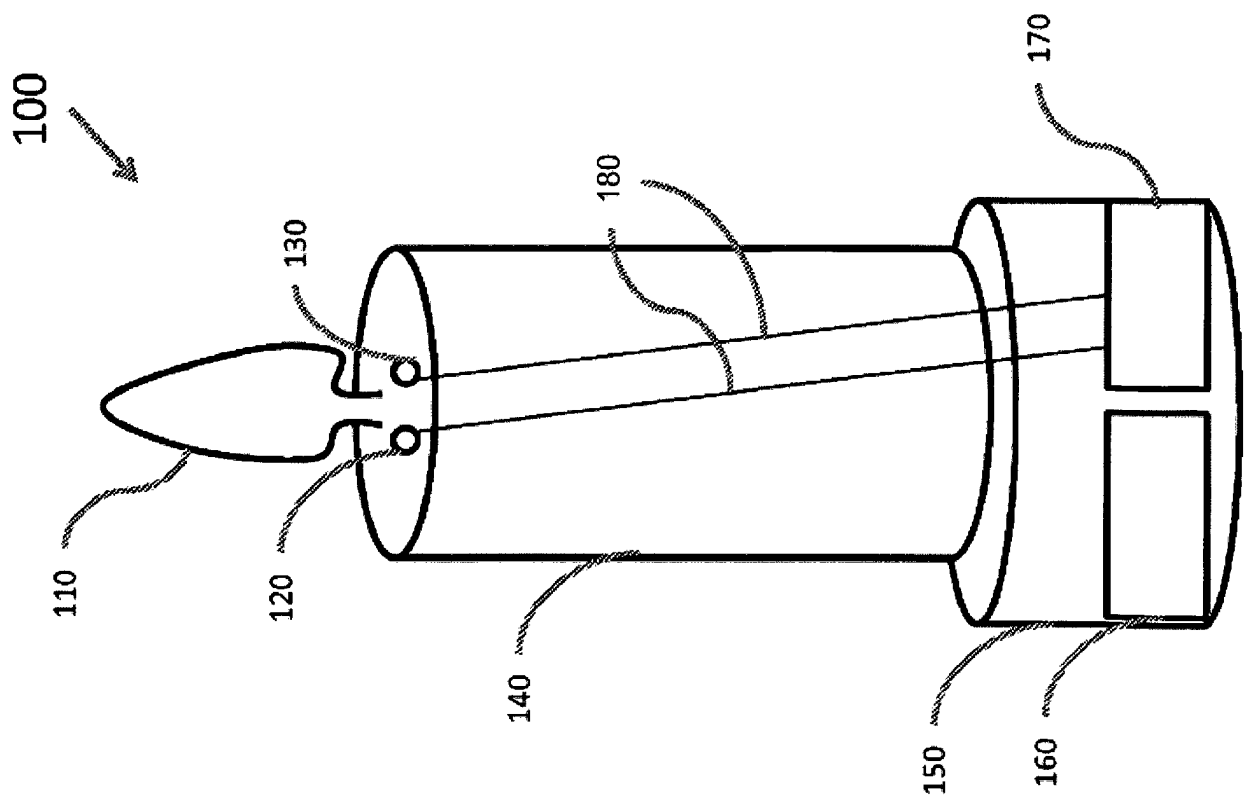


FIGURE 2



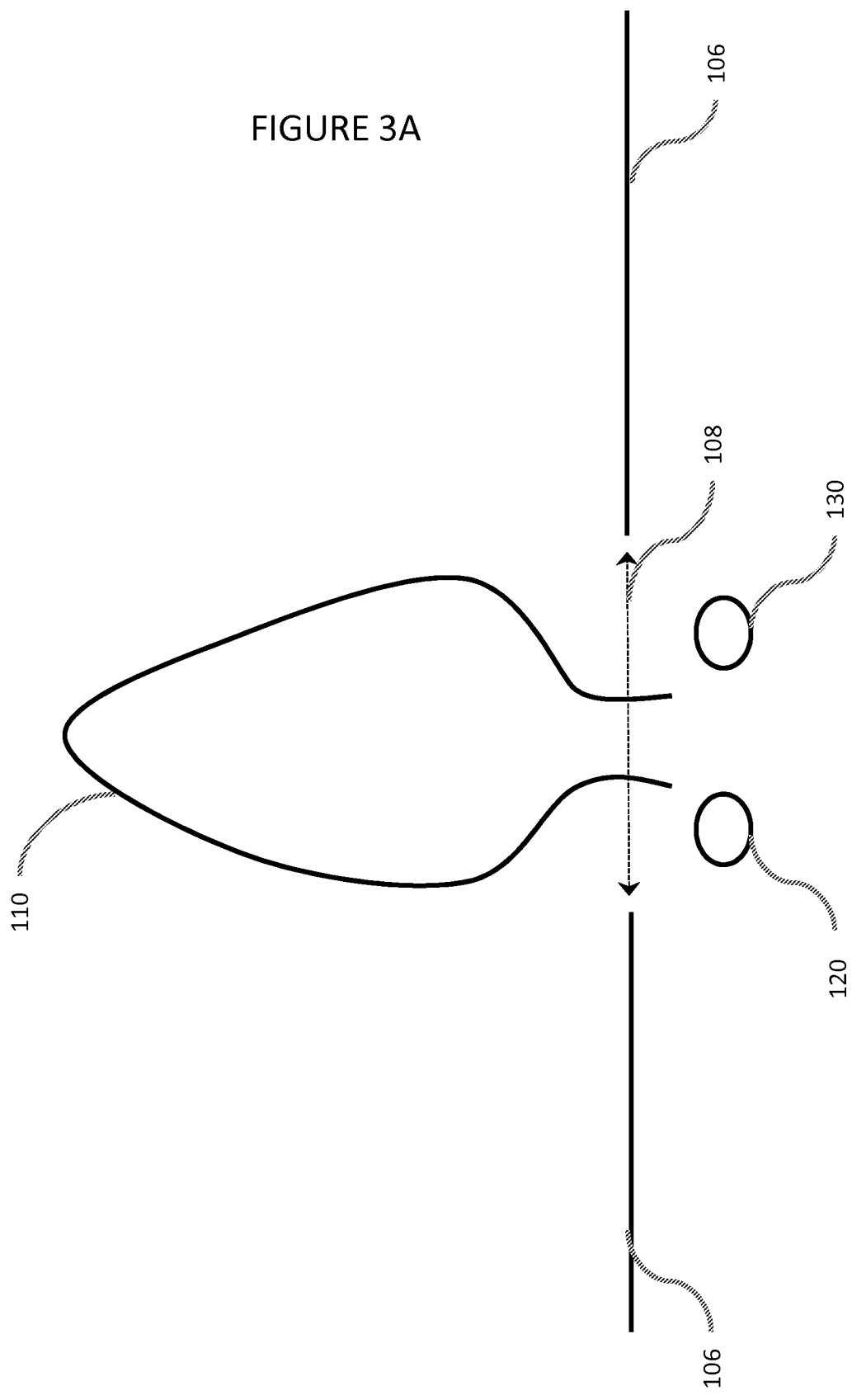
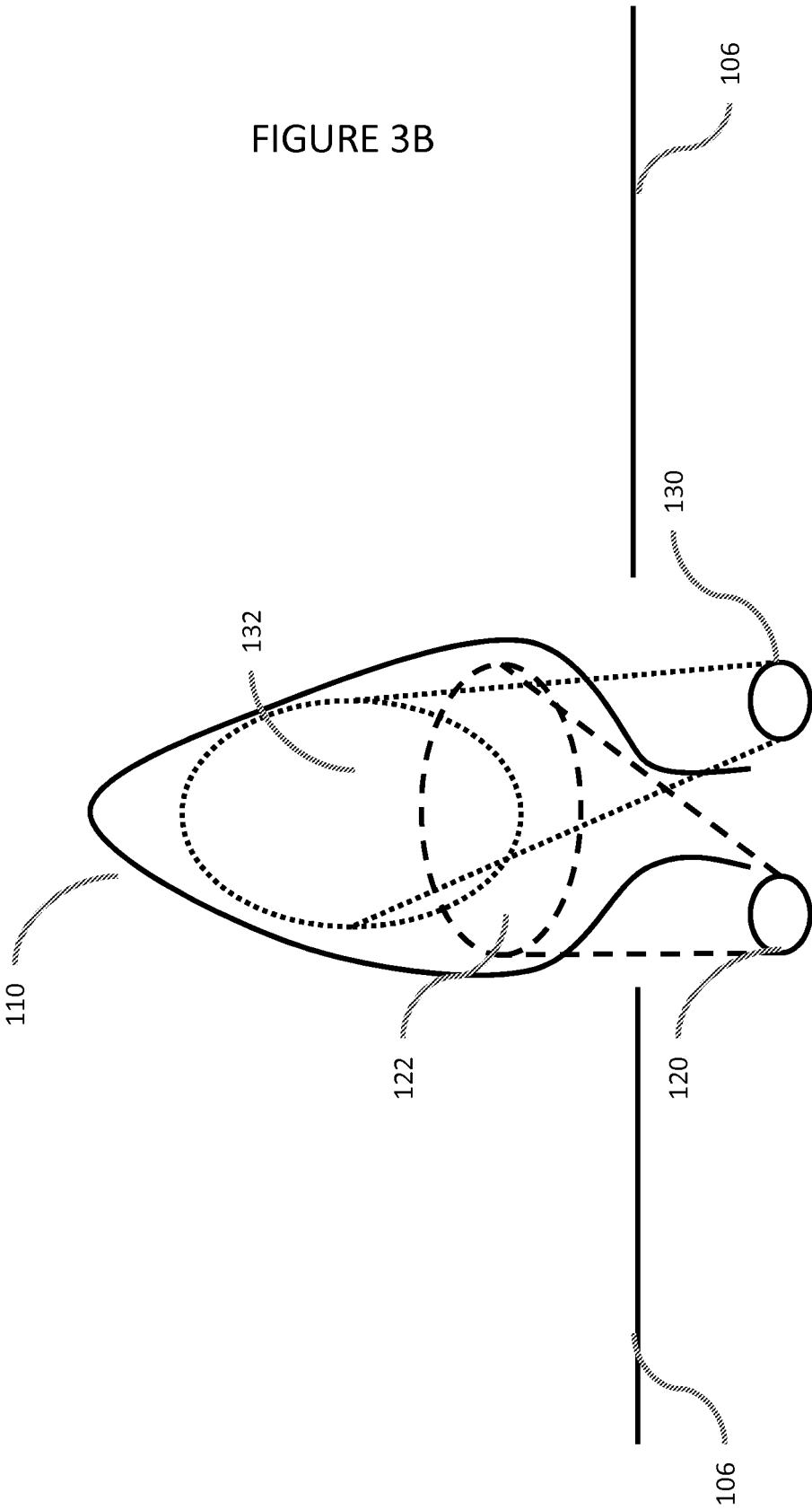


FIGURE 3B



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20117012914 A1 [0002]