

**UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.**

IN THE MATTER OF

**CERTAIN ELECTRONIC CANDLE
PRODUCTS AND COMPONENTS
THEREOF**

Investigation No. 337-TA-_____

**COMPLAINT OF STERNO HOME, INC.
UNDER SECTION 337 OF THE TARIFF ACT OF 1930**

COMPLAINANTS

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PROPOSED RESPONDENTS

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TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	THE STERNO COMPLAINANTS	3
III.	PROPOSED RESPONDENTS – THE LIOWN RESPONDENTS	5
IV.	THE TECHNOLOGY AND PRODUCTS AT ISSUE	7
V.	THE ASSERTED PATENTS	10
A.	The '706 Patent	10
1.	Identification of the Patent and Claims at Issue.....	10
2.	Non-Technical Description of the '706 Patent	11
3.	Foreign Counterparts to the '706 Patent	11
B.	The '507 Patent	11
1.	Identification of the Patent and Claims at Issue.....	11
2.	Non-Technical Description of the '507 Patent	12
3.	Foreign Counterparts to the '507 Patent	12
C.	The '517 Patent	12
1.	Identification of the Patents and Claims at Issue	12
2.	Non-Technical Description of the '517 Patent	13
3.	Foreign Counterparts to the '517 Patent	13
D.	The '264 Patent	13
1.	Identification of the Patents and Claims at Issue	13
2.	Non-Technical Description of the '264 Patent	14
3.	Foreign Counterparts to the '264 Patent	14
VI.	UNLAWFUL AND UNFAIR ACTS OF PROPOSED RESPONDENTS.....	14
VII.	SPECIFIC INSTANCES OF UNFAIR IMPORTATION AND SALE	15
VIII.	HARMONIZED TARIFF SCHEDULE ITEM NUMBERS	17

IX.	LICENSES.....	17
X.	THE DOMESTIC INDUSTRY	18
	A. Technical Prong	18
	B. Economic Prong.....	18
XI.	RELATED LITIGATION	21
XII.	RELIEF REQUESTED.....	21

LIST OF EXHIBITS

Exhibit	Description
1	U.S. Patent No. 9,068,706 (Certified)
2	Copy of Each Assignment for 9,068,706 (Certified)
3	U.S. Patent No. 10,024,507 (Certified)
4	Copy of Each Assignment for 10,024,507
5	U.S. Patent No. 10,352,517 (Certified)
6	Copy of Each Assignment for 10,352,517 (Certified)
7	U.S. Patent No. 10,578,264 (Certified)
8	Copy of Each Assignment for 10,578,264 (Certified)
9	Declaration of Steve Pellegrini (Confidential)
10	Liown.com
11	Thelightgarden.com/moving-flame-candles
12	Printout of www.razimports.com/shop/search.aspx?ID:push
13	Printout of www.napahomeandgarden.com/sign-in/?returnURL=/candles-Lightli-Lightli-wick-+
14	Printout of www.bwtcshop.com/Products/lightli
15	Family tree for the 9,068,706 and 10,024,507 patents, including foreign applications
16	Family tree for the 10,352,517 and 10,578,264 patents, including foreign applications
17	Chart showing infringement of the 9,068,706 patent by Liown “Push Flame”
18	Chart showing infringement of the 10,024,507 patent by Liown “Push Flame”
19	Chart showing infringement of the 10,352,517 patent by Lightli “Wick to Flame”
20	Chart showing infringement of the 10,578,264 patent by Lightli “Wick to Flame”

Exhibit	Description
21	Documents showing purchase and delivery in the U.S. of “Wick to Flame” candle from “buds ‘n bloom”
22	Wick to Flame candle and packaging showing “Made in China”
23	Documents showing purchase and delivery in the U.S. of “Push Flame” candle from RAZ Imports care of Amazon.com
24	Push Flame candle and packaging showing “Made in China”
25	Chart showing practice of 9,068,706 patent by Sterno
26	Chart showing practice of 10,024,507 patent by Sterno
27	Chart showing practice of 10,352,517 patent by Sterno
28	Chart showing practice of 10,578,264 patent by Sterno
29	U.S. Patent No. 6,616,308

LIST OF APPENDICES

Appendix	Description
A	9,068,706 File History (Certified)
B	9,068,706 Cited Patents & Technical References
C	10,024,507 File History (Certified)
D	10,024,507 Cited Patents & Technical References
E	10,352,517 File History (Certified)
F	10,352,517 Cited Patents & Technical References
G	10,578,264 File History (Certified)
H	10,578,264 Cited Patents & Technical References

I. INTRODUCTION

1. Complainants Sterno Home Inc. (“Sterno Home”) and The Sterno Group Companies, LLC (“The Sterno Group”) (collectively, “The Sterno Complainants”) request that the United States International Trade Commission commence an investigation under Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 (“Section 337”), to remedy the unlawful importation into the United States, sale for importation into the United States, and/or sale within the United States after importation by the owner, importer, or consignee (or agents thereof), of certain electric flameless candle products and components thereof (collectively called “Accused Products”) that infringe valid and enforceable United States patents owned by Sterno Home.
2. The proposed respondents are: Shenzhen Liown Electronics Co., Ltd, Luminara Worldwide, LLC, and L&L Candle Company (“Respondents”).
3. Respondents have engaged in unfair acts in violation of Section 337 through and in connection with the unlicensed importation into the United States, sale for importation into the United States, and/or sale within the United States after importation of Accused Products and/or components thereof that infringe one or more claims of United States Patent Nos. 9,068,706 (“the ’706 patent”), 10,024,507 (“the ’507 patent”), 10,352,517 (“the ’517 patent”), and 10,578,264 (“the ’264 patent”), (collectively “the Asserted Patents”), as shown below:

Asserted Patent	Asserted Claims (Independent Claims asterisked)
9,068,706	1*, 2, 4, 5, 7, 11, 12, 13, 14
10,024,507	1*, 2, 4, 5, 7, 11, 12, 13, 14, 16
10,352,517	1*, 3, 4, 5, 6, 7, 9, 10, 11, 12

Asserted Patent	Asserted Claims (Independent Claims asterisked)
10,578,264	1*, 3, 4, 5, 6, 14*, 16, 17

4. A certified copy of the '706 patent is attached to this complaint as Exhibit 1. As shown in the certified copy of the recorded assignments for the '706 patent, Exhibit 2, Sterno Home owns all right, title, and interest in the '706 patent. An uncertified copy of the '706 patent prosecution history (Appendix A) and copies of technical references cited are also being submitted with this complaint (Appendix B). Certified copies will be submitted as soon as they are available due to the Covid-19 pandemic.
5. A certified copy of the '507 patent is attached to this complaint as Exhibit 3. As shown in the certified copy of the recorded assignments for the '507 patent, Exhibit 4, Sterno Home owns all right, title, and interest in the '507 patent. An uncertified copy of the '507 patent prosecution history (Appendix C) and copies of technical references cited are also being submitted with this complaint (Appendix D). Certified copies will be submitted as soon as they are available due to the Covid-19 pandemic.
6. A certified copy of the '517 patent is attached to this complaint as Exhibit 5. As shown in the certified copy of the recorded assignments for the '517 patent, Exhibit 6, Sterno Home owns all right, title, and interest in the '517 patent. An uncertified copy of the '517 patent prosecution history (Appendix E) and copies of technical references cited are also being submitted with this complaint (Appendix F). Certified copies will be submitted as soon as they are available due to the Covid-19 pandemic.
7. A certified copy of the '264 patent is attached to this complaint as Exhibit 7. As shown in the certified copy of the recorded assignments for the '264 patent, Exhibit 8, Sterno Home

owns all right, title, and interest in the '264 patent. An uncertified copy of the '264 patent prosecution history (Appendix G) and copies of technical references cited are also being submitted with this complaint (Appendix H). Certified copies will be submitted as soon as they are available due to the Covid-19 pandemic.

8. As required by Section 337(a)(2) and defined by Section 337(a)(3), a domestic industry in the United States exists and is well established, relating to articles covered by the Asserted Patents. Respondents' Accused Products have been imported into the United States.
9. The Sterno Complainants seek a permanent limited exclusion order, under 19 U.S.C. § 1337(d), excluding from entry into the United States all electric flameless candles and components thereof that are manufactured, imported, or sold by or on behalf of the Respondents, their affiliates, subsidiaries, successors, or assigns, that infringe one or more claims of the Asserted Patents.
10. The Sterno Complainants also seek permanent cease and desist orders, under 19 U.S.C. § 1337(f), directing each Respondent to cease and desist from activities including, but not limited to, importing, marketing, advertising, demonstrating, warehousing inventory for distribution, offering for sale, selling, distributing, servicing, repairing, maintaining, programming, updating, or using such Accused Products in the United States. Further, Sterno Complainants seek the imposition of a bond on any imports during the Presidential Review period.

II. THE STERNO COMPLAINANTS

11. The Sterno Complainants are part of a 100-year legacy in the United States, which has touched on nearly every moment of the American experience—from Girl Scout cookouts to battlefield foxholes to casual holiday parties to disaster relief to high-end catered events. Their roots in the U.S. date back to 1893 when S. Sternau & Co. began manufacturing high

quality houseware products and appliances in Brooklyn, New York. The Sterno Complainants have added to that legacy by providing in the United States a wide-array of products, from flameless candles to outdoor lighting.

12. Complainant The Sterno Group is a Delaware Limited Liability Corporation with a principal place of business at 1880 Compton Avenue, Suite 101, Corona, California. The Sterno Group is the 100% owner of Complainant Sterno Home.
13. Complainant Sterno Home is a corporation organized and existing under the laws of the Canadian province of British Columbia with a principal place of business at 1 Burbridge Street, Suite 101, Coquitlam, BC V3K 7B2, Canada.
14. Sterno Home is the successor in interest to the pioneer in the U.S. market for artificial, flameless candles, NII Northern International, Inc. (“Northern”). Northern invented the first, commercially successful electric flameless candle with a realistic flickering flame effect in 2001. That electric flameless candle is patented, U.S. Patent No. 6,616,308. (Exhibit 29). The electric flameless candle is known in the trade as the “black wick,” and was the first electric flameless candle to successfully incorporate a flickering LED light to realistically simulate a real flickering flame, by placing the LED light below the upper surface of the candle and allowing light to illuminate the candle from out of the top and sides of the candle.
15. Sterno Home has continued to innovate and improve its patented design for a realistic, solid state, flameless candle, and many of those improvements have resulted in additional patent grants in the United States and around the world.

16. Sterno Home's patents have generally been respected by the industry, and Sterno Home has licensed its patents to companies willing to compensate Sterno Home for access to that technology.
17. The Sterno Complainants' candles innovation creates realistic flickering flame effects without the disadvantages of moving components, which have large power requirements and shorter battery life and are prone to breakage in shipping and in use.
18. The Sterno Complainants' long involvement in the flameless candle business, commitment to innovation, and high quality has enabled the company to grow in the United State and abroad into a global leader in the manufacture and sale of electric flameless candles.
19. The Sterno Complainants investment in U.S. plant, equipment, personnel, and licensing in the flameless candle business are detailed in the confidential declaration of Steve Pellegrini, Exhibit 9C.

III. PROPOSED RESPONDENTS – THE LIOWN RESPONDENTS

20. Shenzen Liown Electronics, Luminara, Matchless Candle, and L&L Candle are collectively called "Liown," the "Liown Respondents," or "Respondents."
21. Respondent L & L Candle Company, LLC ("L&L") is a U.S. Delaware limited liability company with a principal place of business and headquarters at 621 Lunar Avenue, Brea, California 92821.
22. L&L is a Joint Venture between Luminara Worldwide, LLC ("Luminara") and Shenzhen Liown Electronics Co. Ltd. ("Liown Electronics").
23. Luminara and Liown Holdings, Inc. are the registered members of L&L.
24. A reasonable opportunity for discovery is likely to show that Liown Holdings, Inc. is either 100% owned and controlled by Liown Electronics, or is a past or current "doing business as" name for Liown Electronics.

25. In Investigation No. 337-TA-1195, Respondent L&L pleaded that L&L is a joint venture between Luminara and Liown Electronics.
26. Respondent Luminara is a limited liability company organized in Delaware with a principal place of business in Eden Prairie, Minnesota.
27. Respondent Shenzhen Liown Electronics Co. is a Chinese alien company with a principal place of business in China, at No. 7, Gongye 3rd Road, Shekou, Nanshan District, Shenzhen, Guangdong, 518067.
28. Liown Electronics makes the Accused Products in China. Those products are shipped and imported into the U.S. through a variety of channels that, on information and belief, include the L&L joint venture, Matchless Candle, Luminara, and distributors.
29. Liown Electronics also does business under the names “Liown Electronics” and “Liown” and operates a website “Liown.com.” That website lists a business address at 621 Lunar Ave, Brea, CA 92821. (*See* Exhibit 10.)
30. The L&L website lists “Lightli” as an L&L brand. The “Lightli” trademark is registered to Liown Electronics on the USPTO Trademark Database.
31. The members of the L&L joint venture are responsible for, contribute to, and control the joint venture, and each is liable for the acts of the other regarding the joint venture as well as the acts of the joint venture.
32. The Liown Respondents are collectively responsible for at least the design, manufacture, and shipping to the U.S. of the Accused Products, including flameless candles known as “Push Flame” and “Wick to Flame”, including mere colorable variations thereof.

33. The Liown Respondents make sales in the United States, at least in part, through distributors, some of whom may directly import the products at issue from Respondents for further sale in the United States.

IV. THE TECHNOLOGY AND PRODUCTS AT ISSUE

34. The Asserted Patents and Accused Products are directed to artificial flameless candles that simulate a realistic flame effect using LEDs and electronic components. See Commission Rule 210.10(b)(1).
35. The Accused Products are electric flameless candle products that typically include a plastic or wax or wax-coated shell with electronic components disposed therein. Exemplary views of the Accused Products are shown below:

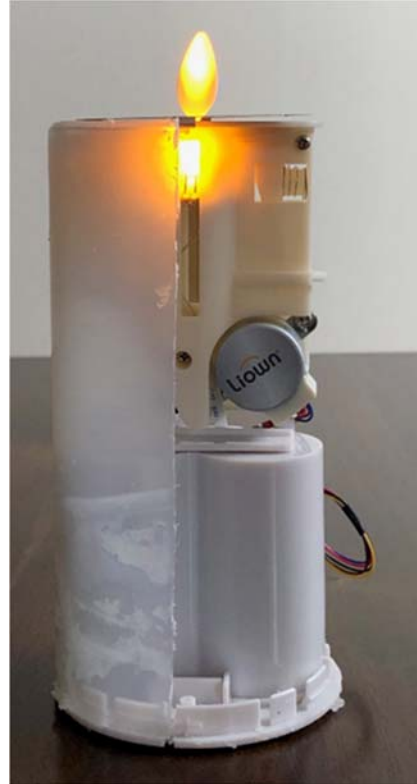
Push Flame Candle





Wick-to-Flame Candle





36. The inventions covered by the Asserted Patents all relate to flameless candles that render a simulated flame effect, including improving the realism in the simulation of the real, burning flame.
37. Under 19 C.F.R. § 210.12(a)(12), the Accused Products are certain of Respondents' electric flameless candles and/or components thereof that implement Sterno Home's patented technologies as claimed by the Asserted Patents.
38. Below is a summary table identifying which Accused Products from the Respondents infringe which specific claims of the Asserted Patents (asterisks indicate independent claims asserted):

Asserted Patent	Asserted Claims (Independent Claims asterisked)	Accused Products
9,068,706	1*, 2, 4, 5, 7, 11, 12, 13, 14	Push Flame Candle
10,024,507	1*, 2, 4, 5, 7, 11, 12, 13, 14, 16	Push Flame Candle
10,352,517	1*, 3, 4, 5, 6, 7, 9, 10, 11, 12	Wick-to-Flame Candle
10,578,264	1*, 3, 4, 5, 6, 14*, 16, 17	Wick-to-Flame Candle

V. THE ASSERTED PATENTS

A. The '706 Patent

1. Identification of the Patent and Claims at Issue

39. The Sterno Complainants assert U.S. Patent No. 9,068,706 in this investigation. The '706 patent, entitled "Electronic Luminary Device With Simulated Flame," was duly and legally issued on June 30, 2015. The '706 patent issued from U.S. Patent Application No. 13/789,624, filed March 7, 2013, and is therefore a "pre-AIA" application. The '706 patent claims priority to U.S. Patent Application 61/607,942, filed March 7, 2012. A certified copy of the '706 patent is provided with this complaint. (Exhibit 1.)
40. The '706 patent has 1 independent claim and 13 dependent claims. The Sterno Complainants assert independent claim 1 and dependent claims 2, 4, 5, 7, 11, 12, 13, and 14. (Exhibit 1.)
41. The '706 patent is due to expire on January 9, 2034.
42. Under Rule 210.12(c) of the Commission's Rules of Practice and Procedure, this Complaint includes (A) a certified copy and three additional copies of the prosecution

history of the '706 patent; and (B) four copies of each reference mentioned in the prosecution history of the '706 patent. (Appendices A, B).

2. Non-Technical Description of the '706 Patent¹

43. The '706 patent relates to an artificial candle that creates a realistic flickering flame effect using multiple LEDs that are independently controlled and shine on a fixed flame element.

3. Foreign Counterparts to the '706 Patent

44. A list of foreign counterparts is attached as Exhibit 15.

B. The '507 Patent

1. Identification of the Patent and Claims at Issue

45. The Sterno Complainants assert U.S. Patent No. 10,024,507 in this investigation. The '507 patent, entitled "Electronic Luminary Device with Simulated Flame" was duly and legally issued on July 17, 2018. The '507 patent issued from U.S. Patent Application No. 15/646,926, filed July 11, 2017. The '507 patent claims priority to U.S. Patent Application No. 61/607,942, filed on March 7, 2012, and is also a continuation application claiming priority through the asserted '706 patent. A certified copy of the '507 patent is provided with this complaint. (Exhibit 3).
46. The '507 patent has 1 independent claim and 18 dependent claims. The Sterno Complainants assert independent claim 1 and dependent claims 2, 4, 5, 7, 11, 12, 13, 14, and 16. (Exhibit 3).
47. The '507 patent is due to expire on March 7, 2033.

¹ The non-technical descriptions of the Asserted Patents give a general background of the inventions. The non-technical description is not intended for or should be used for purposes of patent claim interpretation. The non-technical description is made subject to and without waiver of The Sterno Complainants' right to argue that claim terms should be construed in a particular way under controlling law on claim interpretation and the relevant intrinsic and extrinsic evidence.

48. Under Rule 210.12(c) of the Commission's Rules of Practice and Procedure, this Complaint includes (A) a certified copy and three additional copies of the prosecution history of the '507 patent; and (B) four copies of each reference mentioned in the prosecution history of the '507 patent. (Appendices C, D).

2. Non-Technical Description of the '507 Patent

49. The '507 patent relates to an artificial candle that creates a realistic flickering flame effect using multiple LEDs that are independently controlled and shine on a fixed flame element.

3. Foreign Counterparts to the '507 Patent

50. A list of foreign counterparts is attached as Exhibit 15.

C. The '517 Patent

1. Identification of the Patents and Claims at Issue

51. The Sterno Complainants assert U.S. Patent No. 10,352,517 in this investigation. The '517 patent, entitled "Artificial Candle with Moveable Projection Screen Position" was duly and legally issued on July 16, 2019. The '517 patent issued from U.S. Patent Application No. 16/123,351, filed September 6, 2017. The '517 patent application claims priority to U.S. Patent application No. 62/555,154, filed on September 7, 2018. A certified copy of the '517 patent is provided with this complaint. (Exhibit 5).
52. The '517 patent has 1 independent claims and 14 dependent claims. The Sterno Complainants assert independent claim 1 and dependent claims 3, 4, 5, 6, 7, 9, 10, 11, and 12 in this investigation. (Exhibit 5).
53. The '517 patent is due to expire on September 6, 2038.
54. Under Rule 210.12(c) of the Commission's Rules of Practice and Procedure, this Complaint includes (A) a certified copy and three additional copies of the prosecution history of the

'517 patent; and (B) four copies of each reference mentioned in the prosecution history of the '517 patent. (Appendices E, F).

2. Non-Technical Description of the '517 Patent

55. In general terms, the '517 patent discloses a flameless candle that is switchable between “illuminated” and “extinguished” states. While in the “illuminated” state, the flame screen is in a first position with light shining on it. While in the “extinguished” state, the flame screen is stowed in a second position without light shining on it.

3. Foreign Counterparts to the '517 Patent

56. A list of foreign counterparts is attached as Exhibit 16.

D. The '264 Patent

1. Identification of the Patents and Claims at Issue

57. The Sterno Complainants assert U.S. Patent No. 10,578,264 in this investigation. The '264 patent, entitled “Artificial Candle with Moveable Projection Screen Position” was duly and legally issued on March 3, 2020. The '264 patent issued from U.S. Patent Application No. 16/460,761, filed July 2, 2019. The '264 patent claims priority to U.S. Patent Application No. 62/555,154, filed on September 7, 2018, and is also a continuation application claiming priority through the asserted '517 patent. A certified copy of the '264 patent is provided with this complaint. (Exhibit 7).
58. The '264 patent has 3 independent claims and 14 dependent claims. The Sterno Complainants assert independent claims 1 and 14 and dependent claims 3, 4, 5, 6, 16, and 17 in this investigation. (Exhibit 7),
59. The '264 patent is due to expire on September 6, 2038.
60. Under Rule 210.12(c) of the Commission's Rules of Practice and Procedure, this Complaint includes (A) a certified copy and three additional copies of the prosecution history of the

'264 patent; and (B) four copies of each reference mentioned in the prosecution history of the '264 patent. (Appendices G, H).

2. Non-Technical Description of the '264 Patent

61. In general terms, the '264 patent discloses a flameless candle that is switchable between “illuminated” and “extinguished” states. While in the “illuminated” state, the flame screen is in a first position with light shining on it. While in the “extinguished” state, the flame screen is stowed in a second position without light shining on it.

3. Foreign Counterparts to the '264 Patent

62. A family tree showing related patents in the '264 patent family is attached as Exhibit 16.

VI. UNLAWFUL AND UNFAIR ACTS OF PROPOSED RESPONDENTS

63. Upon information and belief, Respondents' Accused Products directly infringe, contributorily infringe, and/or induce the infringement of at least the asserted claims of the Asserted Patents. Discovery may reveal that Respondents infringe additional claims of the Asserted Patents.
64. The Respondents are not licensed under the Asserted Patents.
65. On information and belief, the Liown Respondents manufacture, assemble, package, test, and/or purchase the Accused Products outside of the United States, specifically, at least in China. The Liown Respondents then sell for importation, import into the United States, and/or sell within the United States after importation, the Accused Products, either directly or through distributors.
66. The Liown Respondents directly infringe the asserted claims by selling for importation, importing, and selling in the United States after importation electric flameless candles including, but not limited to, the Wick to Flame and Push Flame products. Claim charts

demonstrating how these representative Accused Products infringe are attached to the Complaint as Exhibits 17-20.

67. To the extent that the Liown Respondents import through distributors, the Liown Respondents induce infringement by distributors in the United States, who infringe by importing, offering for sale, and selling the accused products. The Liown Respondents have knowledge of the asserted patents by virtue of at least service of this Complaint and the accused products have no substantial non-infringing use.
68. Discovery may reveal additional infringing products, acts, and/or additional claims infringed by the Accused Products and the Liown Respondents. Sterno reserves all rights to amend its contentions, given any such later-discovered additional infringement.

VII. SPECIFIC INSTANCES OF UNFAIR IMPORTATION AND SALE

69. On information and belief, Respondents, or others on their behalf, manufacture the Accused Products in China or another country other than the United States and then import them into the United States, sell them for importation into the United States, and/or sell them after importation into the United States.
70. On information and belief, Respondent Liown Electronics owns and operate manufacturing facilities in or around Shenzhen, China, where they manufacture flameless candles for the Liown Respondents.
71. The Liown Respondents work with or facilitate importation through distributors, some of whom are identified below.
72. Lightsandbatteries.com LLC (“L&B”) is a Georgia corporation with a principal place of business in Georgia at 1600 Mall of Georgia Blvd, Buford, Georgia 30519.
73. L&B maintains a website <https://www.lightsandbatteries.com> offering Lightli branded “Wick to Flame” candles for sale to U.S. retailers. (See Exhibit 11.)

74. RAZ Imports Inc. (“RAZ”) is a Texas corporation with a principal place of business at 1020 Eden Road, Arlington, Texas 76001.
75. RAZ maintains a website at <https://www.razimports.com> offering Liown “Push Flame” candles for sale to U.S. retailers. (See Exhibit 12.)
76. Napa, LLC d/b/a Napa Home & Garden (“Napa”) is a Virginia limited liability company with a principal office at 3400 Corporate Way, Suite D, Duluth, Georgia 30096.
77. Napa maintains a website at <https://www.napahomeandgarden.com/rep-s-and-showrooms> offering at least Liown “Wick to Flame” candles for sale to U.S. retailers. (See Exhibit 13.)
78. Boston Warehouse Trading Corp. (“BWTC”) is a Massachusetts corporation with a principal place of business at 59 Davis Ave, Norwood, Massachusetts.
79. BWTC operates a website at <https://www.bwtcshop.com/Products/lightli> offering at least Liown’s catalog of candles for sale to U.S. Retailers. (See Exhibit 14.)
80. A Wick to Flame Candle from the Liown Respondents was purchased on or around April 22, 2020 from “buds ‘n bloom design studio”, a retailer in Bellevue, Wisconsin. *See* Exhibit 21.
81. Claim charts demonstrating how this Wick to Flame Candle infringes ’517 claims 1, 3, 4, 5, 6, 7, 9, 10, 11, and 12 and ’264 claims 1, 3, 4, 5, 6, 14, 16, and 17 are attached to the Complaint as Exhibits 19 and 20, respectively.
82. The product packaging of the Wick to Flame Candle and the candle itself are both labeled “MADE IN CHINA,” indicating that the accused product was manufactured and/or assembled in China. *See* Exhibit 22. The packaging and candle are also marked with Respondents “LIGHTLi” and “Liown” trademarks, and indicates it is “Manufactured and Distributed by L&L Candle.”

83. A “Push Flame” Candle from RAZ Imports was purchased on or around April 11, 2020, from RAZ Imports care of Amazon.com for delivery in the United States. *See* Exhibit 23.
84. Claim charts demonstrating how this Push Flame Candle infringes ’706 patent claims 1, 2, 4, 5, 7, 11, 12, 13, and 14 and ’507 patent claims 1, 2, 4, 5, 7, 11, 12, 13, 14, and 16 are attached to the Complaint as Exhibits 17 and 18 respectively.
85. The product packaging of the Push Flame Candle and the candle itself are both labeled “MADE IN CHINA,” indicating that the accused product was manufactured and/or assembled in China, and bears the “Liown” trademark of Respondents. *See* Exhibit 24. The “Liown” mark also appears on the circuit board. Exhibit 17 at p.7.
86. Discovery is expected to reveal additional specific acts of the Liown Respondents’ importation, sale for importation, and/or sale after importation of the Accused Products.

VIII. HARMONIZED TARIFF SCHEDULE ITEM NUMBERS

87. The articles subject to this complaint are classifiable under at least these headings and subheadings of the Harmonized Tariff Schedule of the United States: 9405.40.8440. In investigation 337-TA-1195, Complainant identified HTS number 8541.00.00. The identified HTS numbers are intended for illustrative purposes only and are not exhaustive of the products accused of infringement in this Complaint, nor are the HTS numbers indicated here intended to limit the scope of the Investigation or the scope of relief that Complainant is entitled to.

IX. LICENSES

88. To date, Sterno Home licenses another competitor (a third-party) on one or more of the Asserted Patents.

X. THE DOMESTIC INDUSTRY

89. A domestic industry has been established under 19 U.S.C. §§ 1337(a)(2) and (3) and Commission Rule 210.12(a)(6)(i).

A. Technical Prong

90. Claim charts demonstrating how exemplary Sterno Home electric flameless candles practice at least one claim of each of the '706, '507, '517, and '264 patents are attached as Exhibits 25-28.
91. Sterno Home's "iFlicker®" and "Mirage®" candles practice at least one claim of the '706 and '507 patents. Sterno Home's "Folding Flame®" candles practice at least one claim of the '517 and '264 patents.
92. Sterno Home's candles are therefore protected by the '706, '507, '517, and '264 patents, and a domestic industry for those articles exists.

B. Economic Prong

93. A domestic industry, under subparagraphs (A), (B), and/or (C) of Section 337(a)(3), exists by virtue of The Sterno Complainants' significant investment in plant and equipment, significant employment of labor and capital, and substantial investment in the exploitation of the Asserted Patents in the United States, including through product development, licensing, marketing, sales, and customer support. The Sterno Complainants' domestic activities and investments related to the articles protected by the Asserted Patents are described in the Confidential Declaration of Steve Pellegrini. (Confidential Exhibit 9C)
94. Certain of Sterno Home's electric flameless candles are protected by at least the '706, '507, '517, and '264 patents. Exhibits 25-28.
95. The domestic industry products account for a significant portion of the total Sterno flameless candle business in the United States. (Confidential Exhibit 9C at ¶ 9.)

96. A domestic industry as defined by 19 U.S.C. § 1337(a)(3)(A) exists in the United States with respect to The Sterno Complainants' "iFlicker[®]," "Mirage[®]" and "Folding Flame[®]" candle products by reason of The Sterno Complainants' significant investment in plant and equipment. As detailed in the declaration, The Sterno Complainants have made and are continuing to make significant investments in the United States related to the articles protected by the Asserted Patents. (Confidential Exhibit 9C.)
97. The Sterno Complainants have worldwide headquarters facilities in Corona, California. Exhibit 9C at ¶¶ 5, 11. At and from these facilities and other U.S. locations, the Sterno Complainants engage in product research and development, , review and analysis of prototypes, first production articles, competitive samples, review and analysis of design concepts, pricing and costing of components, packaging design and appearance, setting and enforcing performance specifications, quality analysis and assurance, testing, aesthetic product design, fragrance assessment, sales and marketing for Sterno's electric flameless candle business, which includes the domestic industry products. (*Id.* at ¶¶ 3, 5, 12, 25.) Engineering and product manufacturing for the Domestic Industry Products is managed, controlled and supervised by the head of innovation, who is located in Illinois. (*Id.* at ¶ 13.)
98. A domestic industry as defined by 19 U.S.C. § 1337(a)(3)(B) exists in the United States with respect to The Sterno Complainants' domestic industry candle products by reason of The Sterno Complainants' significant employment of labor and capital.
99. The Sterno Complainants have significant employment in the electric flameless candle business, which includes the domestic industry candle products. (*Id.* at ¶ 12.) In addition, the Sterno Complainants use U.S.-based engineering consultants, who work on electric flameless candles, including the domestic industry products. (*Id.* at ¶ 14.)

100. The Sterno Complainants make substantial expenditures on the marketing and development of electric flameless candle products in the U.S., in addition to the salaries of its employees, including expenditures for its facilities in Corona, California. (*Id.* at ¶¶ 12-26.)
101. A domestic industry as defined by 19 U.S.C. § 1337(a)(3)(C) exists in the United States with respect to in The Sterno Complainants' domestic industry products by reason of The Sterno Complainants' significant investment in the exploitation of the Asserted Patents, including licensing, engagement of U.S.-based market research firms, engagement of U.S.-based manufacturer sales representatives, and product exploitation efforts at U.S.-based trade shows and exhibits. (Exhibit 9C at ¶ 15-25.) Through considerable and continued investment in exploitation and enforcement, The Sterno Complainants have built a valuable and licensable patent portfolio for electric flameless candles; the value of licenses for patents in this portfolio, which includes the Asserted Patents, has been, and is, enhanced because The Sterno Complainants (and its predecessors-in-interest) proactively polices and enforces its patent portfolio in the U.S., including issuing cease-and-desist letters and filing infringement lawsuits, if needed. (Exhibit 9C at ¶¶ 15-18). In 2018, and as a direct result of enforcement and exploitation efforts, Sterno licensed its '706 and '507 patents, which are Asserted Patents in this Investigation. (*Id.*)
102. The Sterno Complainants continue to expand its investment in U.S. operations for its electric flameless candle business. In February of 2016, The Sterno Complainants acquired the electric flameless candle business of Northern, an electric flameless candle company in Canada, including its patent portfolio for electric flameless candles. After acquiring that business and bringing it to the United States, Sterno began moving electric flameless candle

operations to the United States, starting with executive management. (*Id.* at ¶ 26) As opportunities arise, Sterno is continuing to migrate flameless candle employment to the U.S., most recently, by moving supervision of engineering and product manufacturing to the United States in July of 2019. (*Id.* at ¶ 26.) As opportunities present themselves, Sterno evaluates them and continues to migrate jobs closer to U.S. customers when it makes sense to do so. (*Id.* at ¶ 26.) That continued evolution is only possible if Sterno's business is not eroded by infringing articles imported from overseas, including the Respondents' infringing products. (*Id.*).

XI. RELATED LITIGATION

- 103. None of the Asserted Patents has been or is the subject of any district court litigation.
- 104. None of the Asserted Patents has been or is the subject of a post-grant proceeding before the U.S. Patent and Trademark Office.
- 105. There has been no foreign court or agency litigation involving the Asserted Patents.
- 106. Sterno Home has asserted that the Accused Products made by the Liown Respondents infringe other U.S. patents owned by Sterno Home in the Central District of California, Civil Action No. 8:20-cv-00912.
- 107. L&L has asserted that Sterno Home and others infringe L&L patents directed to electric flameless candles in this industry in pending ITC Investigation No. 337-TA-1195.

XII. RELIEF REQUESTED

- 108. WHEREFORE, by reason of the foregoing, The Sterno Complainants respectfully request that the United States International Trade Commission:

- (a) Institute an immediate investigation, under Section 337, 19 U.S.C. § 1337(a)(1)(B)(i) and (b)(1), regarding violations of Section 337 based upon the manufacture, importation, sale for importation into the United States, and the offer for sale or sale after

importation into the United States of certain electric flameless candles and components thereof that directly infringe or induce or contribute to the infringement of one or more of the asserted claims of the Asserted Patents;

(b) Schedule and conduct a hearing pursuant to 19 U.S.C. § 1337 for the purposes of (i) receiving evidence and hearing argument concerning whether there has been a violation of 19 U.S.C. § 1337, and (ii) following the hearing, determine that there has been a violation of Section 337 of the Tariff Act of 1930;

(c) Issue a permanent, limited exclusion order under 19 U.S.C. § 1337(d)(1) excluding the entry for consumption into the United States, entry for consumption from a foreign trade-zone, or withdrawal from a warehouse for consumption all electric flameless candles and components thereof of Respondents that (i) directly infringe or induce or contribute to the infringement of one or more claims of the Asserted Patents and (ii) are manufactured, imported, or sold, by or on behalf, of Respondents, or any of their affiliates, parents, subsidiaries, other related business entities, successors, or assigns, for the remaining term of the Asserted Patents, except under license of Complainant or as provided by law;

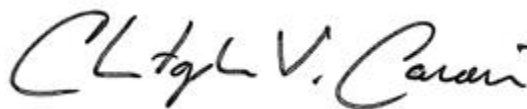
(d) Issue permanent cease and desist orders under 19 U.S.C. § 1337(f) directing Respondents and any of their principals, stockholders, officers, directors, employees, agents, licensees, distributors, controlled (whether by stock ownership or otherwise) or majority –owned business entities, affiliates, subsidiaries, successors and assigns from either directly engaging in or for, with or otherwise on behalf of Respondents, (A) marketing, advertising, demonstrating, distributing, warehousing inventory for distribution, importing, offering for sale, selling, supporting, or transferring (including the movement or shipment of inventory) in the United States any of Respondents’ electric flameless candles and components thereof that directly infringe or

induce or contribute to the infringement of one or more claims of the Asserted Patents; (B) soliciting U.S. agents or distributors for any of Respondents' electric flameless candles and components thereof that directly infringe or induce or contribute to the infringement of one or more claims of the Asserted Patent; (C) testing imported certain electric flameless candles and components thereof that directly infringe or induce or contribute to the infringement of one or more claims of the Asserted Patent; (D) aiding and abetting other entities in the importation, sale for importation, sale after importation, transfer or distribution of certain electric flameless candles and components thereof that directly infringe or induce or contribute to the infringement of one or more claims of the Asserted Patents; (E) operating certain electric flameless candles and components thereof that directly infringe or induce or contribute to the infringement of one or more claims of the Asserted Patent; and (F) supporting, servicing and/or repairing certain electric flameless candles and components thereof that directly infringe or induce or contribute to the infringement of one or more claims of the Asserted Patents;

(e) Impose a bond upon Respondent(s) who continue to import articles imported in such a manner as to constitute unlawful and unfair methods of competition and unfair acts and/or infringing articles during the 60-day-Presidential Review period per 19 U.S.C. § 1337(j); and

(f) Issue such other and further relief as the Commission deems just and proper based on the facts determined by the investigation and the authority of the Commission.

Respectfully submitted,

A handwritten signature in black ink, reading "Christopher V. Carani". The signature is written in a cursive, flowing style.

Christopher V. Carani
Gregory C. Schodde
Wilhelm L. Rao

July 15, 2020

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Companies, LLC*

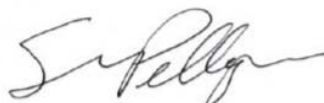
VERIFICATION OF COMPLAINT

I, Steve Pellegrini, declare, under 19 C.F.R. §§ 210.4 and 210.12(a), under penalty of perjury that the following statements are true:

1. I am the Chief Financial officer of the Complainants and am authorized by Complainants to verify and sign this complaint.
2. I have read the complaint and am aware of its contents.
3. The complaint is not being presented for any improper purpose, such as to harass or to cause unnecessary delay or needless increase in the cost of the investigation or related proceedings.
4. To the best of my knowledge, information and belief formed upon reasonable inquiry, the claims and legal contentions of this complaint are warranted by existing law or a good faith, non-frivolous argument for the extension, modification, reversal of existing law, or by the establishment of new law.
5. To the best of my knowledge, information and belief formed upon reasonable inquiry, the allegations and other factual contentions in the complaint have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on July 14, 2020



Steve Pellegrini
Chief Financial Officer

**UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.**

IN THE MATTER OF

**CERTAIN ELECTRONIC CANDLE
PRODUCTS AND COMPONENTS
THEREOF**

Investigation No. 337-TA-_____

STATEMENT OF PUBLIC INTEREST

Complainants, Sterno Home Inc. (“Sterno Home”) and The Sterno Group Companies, LLC (“The Sterno Group”) (collectively, “The Sterno Complainants”) submit this Statement of Public Interest with the Complaint under 19 C.F.R. § 210.8(b).

This proceeding involves the importation, sale for importation, and/or sale after importation into the United States of certain electronic candle products and components thereof that infringe U.S. Patent No. 9,068,706 (“the ’706 patent”), 10,024,507 (“the ’507 patent”), 10,352,517 (“the ’517 patent”), and 10,578,264 (“the ’264 patent”) owned by Sterno Home. Specifically, Complainants seek a limited exclusion order specifically directed to each Proposed Respondent and their subsidiaries, affiliates, agents, successors, and assigns covering the products and components thereof detailed in the Complaint (“Accused Products”). The Sterno Complainants also seek cease-and-desist orders against Proposed Respondents identified in the Complaint and a bond upon Proposed Respondents’ importation of infringing products.

Issuance of the requested remedial orders will provide effective relief in the face of ongoing and open patent infringement in the United States by the Proposed Respondents and anyone acting with them to import, sell for importation, and/or sell after importation products that infringe the patents-in-suit. The requested remedial orders would not have an adverse effect on public health and welfare in the United States, competitive conditions in the United States economy, the

production of like or directly competitive articles in the United States, or United States consumers. Protecting The Sterno Complainants' intellectual property rights and investment in domestic industry in the United States through the requested remedial orders will serve the public interest with little or no adverse effect on the public interest.

The Sterno Complainants respectfully request that the Commission decline to delegate the issue of public interest to the Administrative Law Judge. Issuance of the requested remedial orders will protect The Sterno Complainants' domestic market share and patent rights – a directive that aligns with the policy goals of Section 337. See *Certain Baseband Processor Chips and Chipsets, Transmitting and Receiving (Radio) Chips, Power Control Chips, and Products Containing Same, Including Cellular Telephone Handsets*, Inv. No. 337-TA-543, Comm'n Op. at 153-54 (June 19, 2007).

1. Explanation of how the articles potentially subject to the order are used in the United States

The Accused Products are electronic candle products and components thereof, which are marketed and sold for home and commercial decorative use.

2. Identification of any public health, safety, or welfare concerns in the United States relating to the requested remedial orders.

There are no health, safety, or welfare concerns at issue in this investigation. The candle products subject to exclusion are decorative articles for the home and excluding them will not deprive the public of products necessary for important health and welfare needs, and other electronic candle products would remain on the market.

3. The Sterno Complainants make like or directly competitive articles that are readily available and can replace the subject articles if they were to be excluded.

The Sterno Complainants invented and designed the type of candle products and components thereof at issue, and The Sterno Complainants sell the products under the "iFlicker",

“Mirage” and “Folding Flame” brand names. The products are readily available and could replace all of the Accused Products if such products were excluded.

4. The Sterno Complainants and third-party suppliers have the capacity to replace the volume of articles subject to the requested remedial orders in a commercially reasonable time in the United States

The Sterno Complainants and its manufacturers have the ability and capacity, in a commercially reasonable time, to replace the sales of all products subject to exclusion. U.S. customers would continue to have access to the products of at least one licensee.

5. The requested remedial orders would not adversely affect consumers.

The Sterno Complainants sell candle products and components thereof that can replace the Accused Products. Thus, United States consumers would continue to have many options when choosing flameless candle products and components thereof, and would not be adversely impacted by any remedial order issued as to the Accused Products.

Because no significant public interest concerns prevent the issuance of exclusion and cease-and-desist orders, The Sterno Complainants respectfully request that the Commission decline to delegate the issue of public interest to the Administrative Law Judge.

Respectfully submitted,

Dated: July 15, 2020

/s/ Christopher V. Carani

Christopher V. Carani

Gregory C. Schodde

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Counsel for Complainants,

Sterno Home Inc. and The Sterno Group

Companies, LLC

July 15, 2020

Via Electronic Filing

The Honorable Lisa R. Barton
Secretary to the Commission
U.S. International Trade Commission
500 E Street, SW, Room 112-A
Washington, DC 20436

Re: *Certain Electronic Candle Products and Components Thereof*
Inv. No. 337-TA-_____

Dear Secretary Barton:

Enclosed for filing on behalf of Complainants, Sterno Home Inc. (“Sterno Home”) and The Sterno Group Companies, LLC (“The Sterno Group”) (collectively, “The Sterno Complainants”) are the following documents in support of Sterno’s request that the Commission commence an investigation pursuant to Section 337 of the Tariff Act of 1930, as amended.

1. One (1) electronic copy of the verified Non-Confidential Complaint, Non-Confidential Exhibits, and the Public Interest Statement. (19 C.F.R. §§ 210.8(a)(1)(i), 210.8(b));
2. One (1) electronic copy of The Sterno Complainants’ letter and certification requesting confidential treatment for the Sterno Complainants’ Confidential Declaration of Steve Pellegrini, Exhibit 9C, with confidential information marked and a non-confidential copy. (19 C.F.R. §§ 210.5(d) and 201.6(b));
3. One (1) electronic certified copy of United States Patent Nos. 9,068,706 (“the ’706 patent”); United States Patent No. 10,024,507 (“the ’507 patent”); United States Patent No. 10,352,517 (“the ’517 patent”); United States Patent No. 10,578,264 (“the ’264 patent”); (collectively, the “Asserted Patents”) cited in the Complaint as Exhibits 1, 3, 5, and 7. (19 C.F.R. §§ 210.12(a)(9)(i));
4. One (1) electronic certified copy of each of the assignments for the Asserted Patents cited in the Complaint as Exhibits 2, 4 6, and 8. (19 C.F.R. §§ 210.12(a)(9)(ii)). Due to Covid19 delays, Exhibit 4 is not certified, a certified copy will be submitted as soon as it is available.
5. Certified Copies of the prosecution histories for the Asserted Patents included as Appendices A, C, E, and G to the Complaint. (19.C.F.R. §§ 210.12(c)(1)).



The Honorable Lisa R. Barton
July 15, 2020
Page 2

6. One (1) copy of patent and technical reference documents identified in each of the prosecution histories of the Asserted Patents, included in the Complaint as Appendices B, D, F, and H. (19.C.F.R. §§ 210.12(c)(2));

Please contact me with any questions regarding this submission. Thank you for your attention to this matter.

Sincerely,

/s/ Christopher V. Carani

Christopher V. Carani

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July 15, 2020

Via Electronic Filing

The Honorable Lisa R. Barton
Secretary to the Commission
U.S. International Trade Commission
500 E Street, SW, Room 112-A
Washington, DC 20436

Re: *Certain Electronic Candle Products and Components Thereof*
Inv. No. 337-TA-_____

Dear Secretary Barton:

Under Commission Rules 210.5(d) and 201.6(b)(1), Complainants, Sterno Home Inc. (“Sterno Home”) and The Sterno Group Companies, LLC (“The Sterno Group”) (collectively, “The Sterno Complainants”) respectfully request confidential treatment of the business information contained in The Sterno Complainants’ Declaration of Steve Pellegrini, Exhibit 9C.

The information contained in Exhibit 9C qualifies as confidential business information pursuant to Commission Rule 201.6(a) because:

- It is not available to the general public;
- The disclosure of such information would cause substantial harm to The Sterno Complainants and the competitive position of The Sterno Complainants; and
- Unauthorized disclosure of the information could impair the Commission’s ability to obtain information necessary to perform its statutory function.

Please contact me with any questions regarding this submission. Thank you for your attention to this matter.

Sincerely,

/s/ Christopher V. Carani

Christopher V. Carani

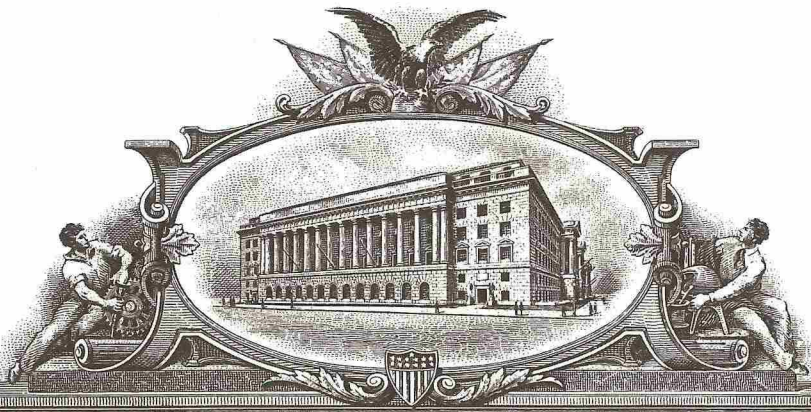
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Counsel for Sterno Home Inc. and The Sterno Group Companies, LLC

EXHIBIT 1

**Certified Copy of
United States Patent
No. 9,068,706**

U 8044039



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

May 14, 2020

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM
THE RECORDS OF THIS OFFICE OF:

U.S. PATENT: 9,068,706

ISSUE DATE: June 30, 2015

By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office



W. Montgomery
W. MONTGOMERY
Certifying Officer



US009068706B2

(12) **United States Patent**
Fournier et al.

(10) **Patent No.:** **US 9,068,706 B2**
(45) **Date of Patent:** **Jun. 30, 2015**

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

(71) Applicant: **WINVIC SALES INC.**, Markham (CA)

(72) Inventors: **Bernard Fournier**, Delson (CA);
Michael Toutant, Chateauguay (CA);
Jonathan Landry, Montreal (CA)

(73) Assignee: **Winvic Sales Inc.**, Markham, Ontario
(CA)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 308 days.

(21) Appl. No.: **13/789,624**

(22) Filed: **Mar. 7, 2013**

(65) **Prior Publication Data**

US 2014/0254148 A1 Sep. 11, 2014

(51) **Int. Cl.**
F21V 33/00 (2006.01)
F21S 9/02 (2006.01)
F21S 10/04 (2006.01)
F21S 6/00 (2006.01)
F21W 121/00 (2006.01)

(52) **U.S. Cl.**
CPC **F21S 9/02** (2013.01); **F21S 10/043**
(2013.01); **F21S 6/001** (2013.01); **F21W**
2121/00 (2013.01)

(58) **Field of Classification Search**
CPC **F21S 10/00**; **F21S 10/04**; **F21S 10/043**
USPC **362/392**, **249.02**, **812**, **810**
See application file for complete search history.

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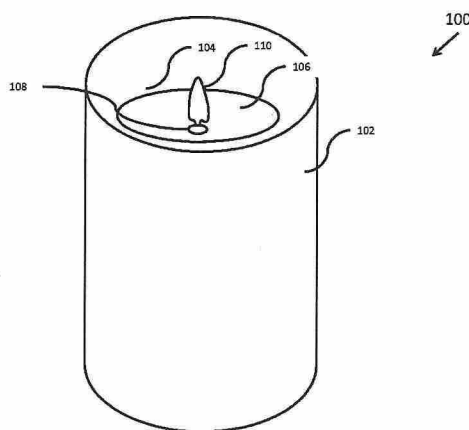
Primary Examiner — Ali Alavi

(74) *Attorney, Agent, or Firm* — McAndrews, Held &
Malloy, Ltd.

(57) **ABSTRACT**

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 posi-
tion 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.

14 Claims, 4 Drawing Sheets



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FIGURE 1

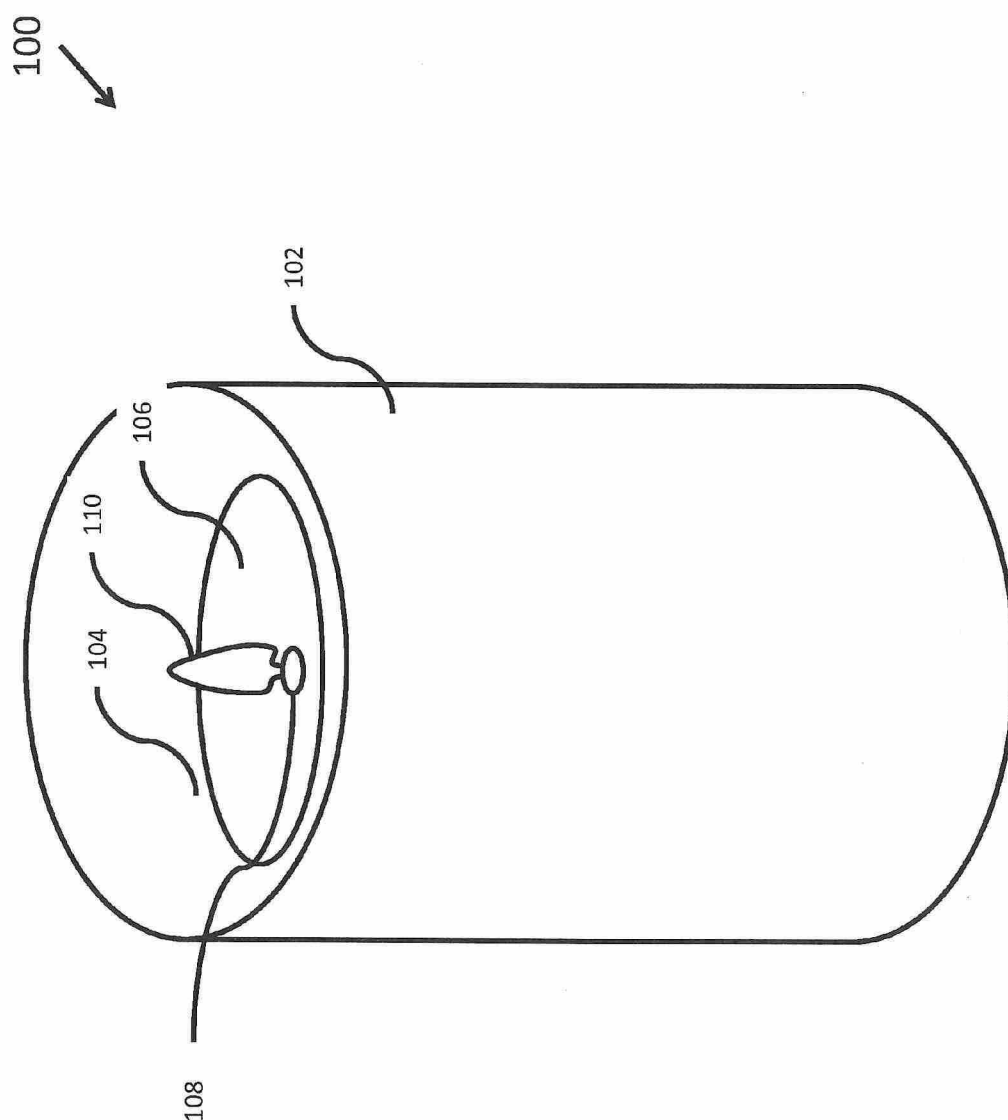


FIGURE 2

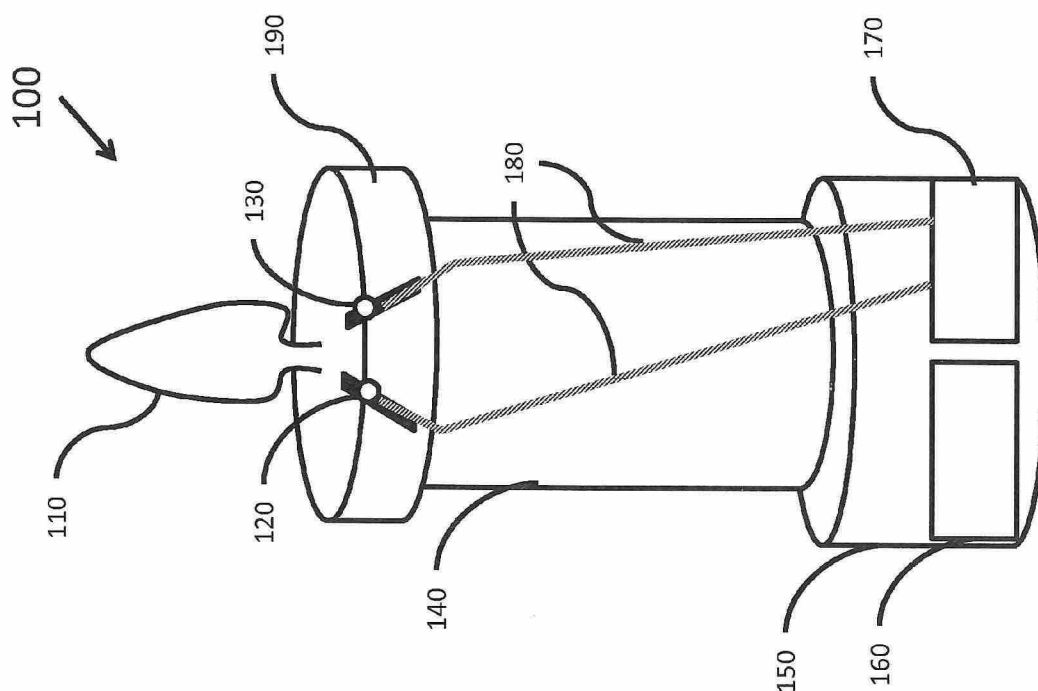
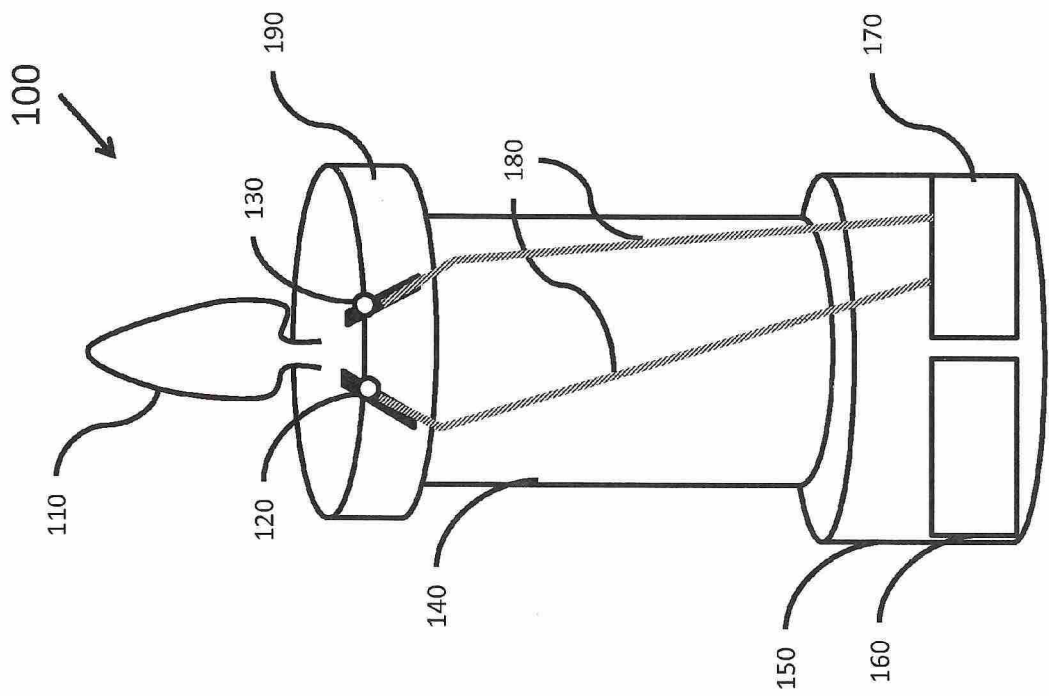
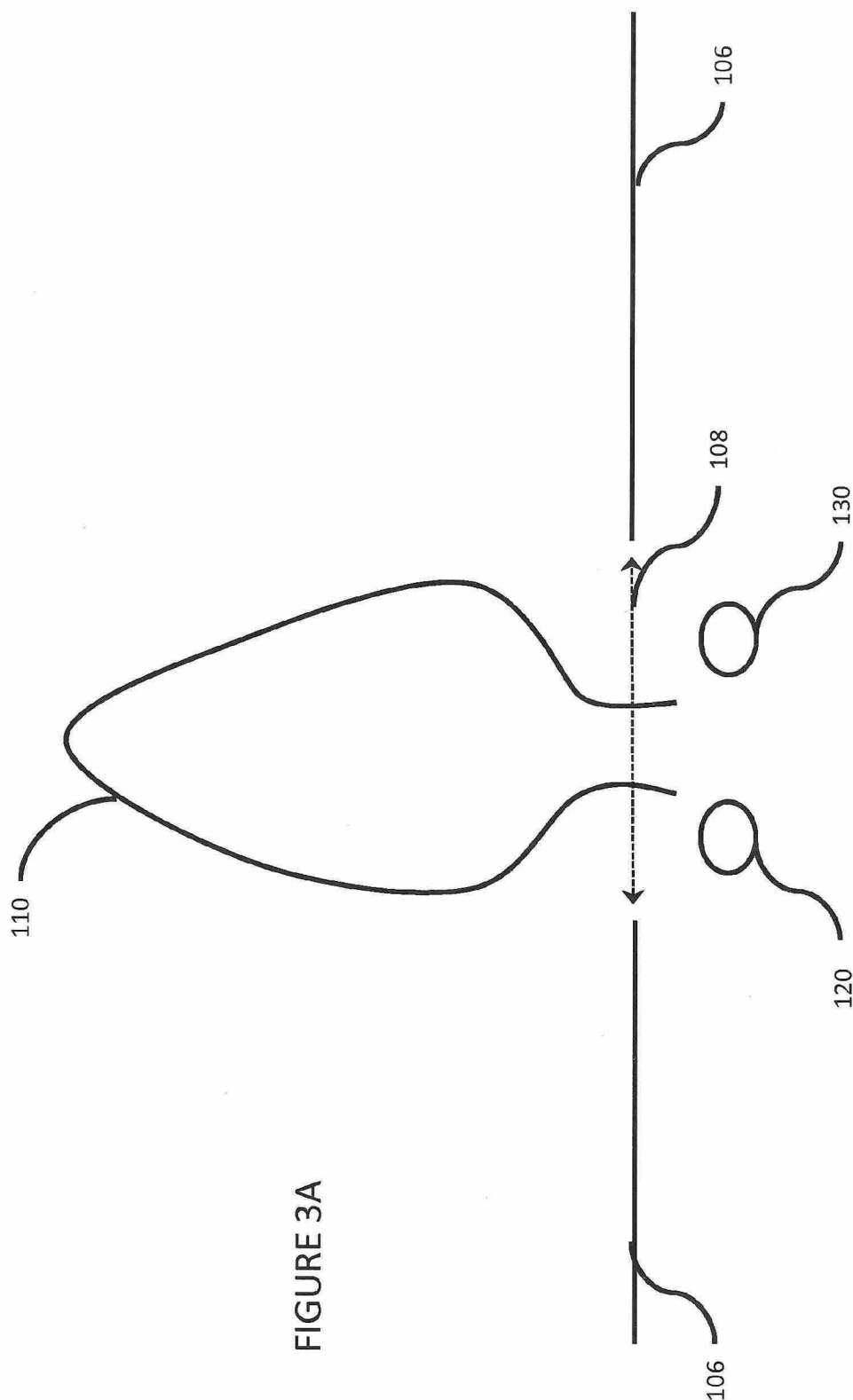


FIGURE 2





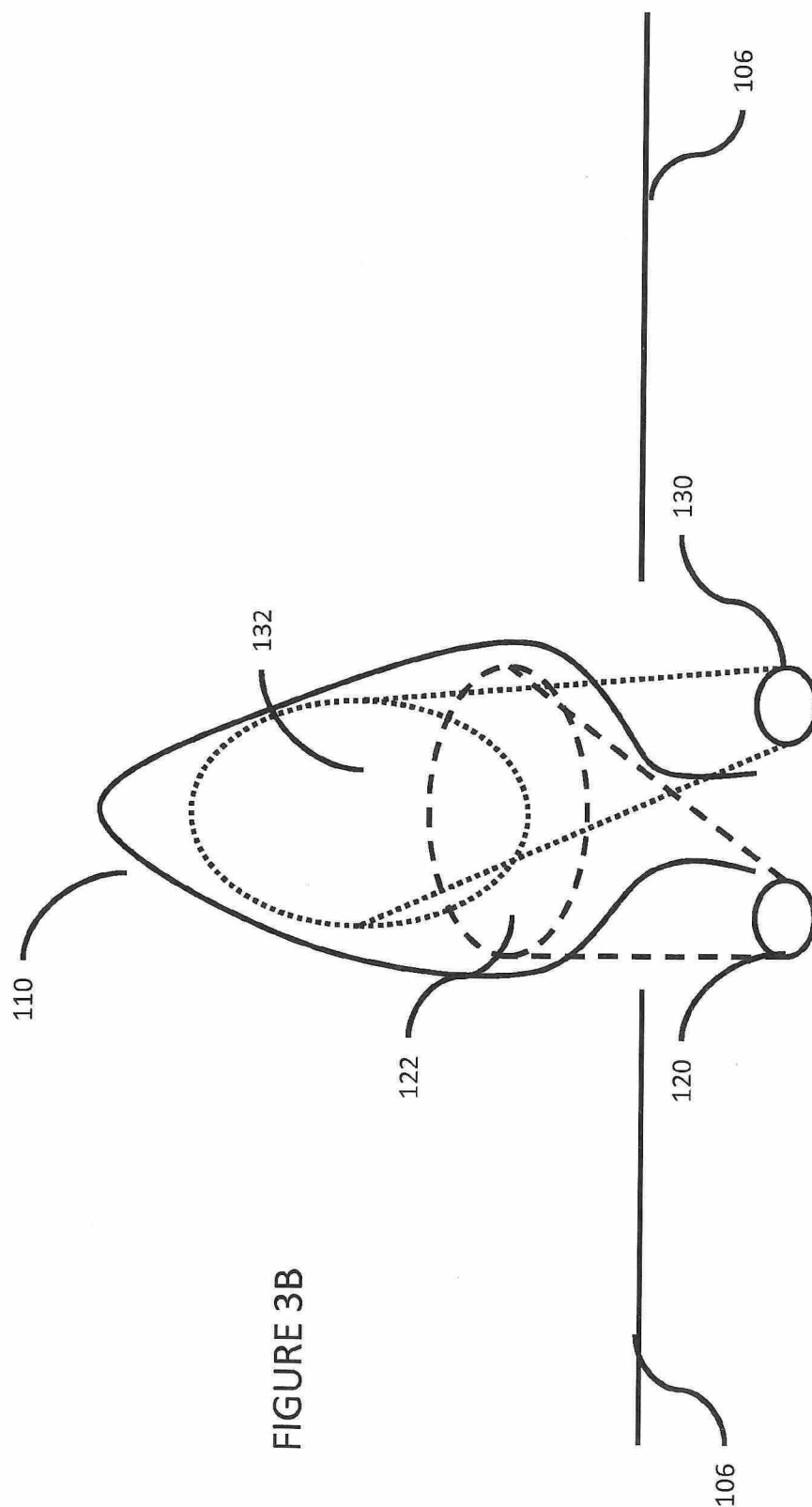


FIGURE 3B

1

**ELECTRONIC LUMINARY DEVICE WITH
SIMULATED FLAME****CROSS REFERENCE TO RELATED
APPLICATIONS**

This application claims priority to U.S. Patent Application Ser. No. 61/607,942 filed on Mar. 7, 2012, the entirety of which is herein incorporated by reference.

**FEDERALLY SPONSORED RESEARCH OR
DEVELOPMENT**

[Not Applicable]

JOINT RESEARCH AGREEMENT

[Not Applicable]

SEQUENCE LISTING

[Not Applicable]

BACKGROUND

Generally, this application relates to flameless candles. Specifically, this application discloses techniques for simulating a candle flame without use of moving parts.

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 or part that moves in physical space. Moving elements or 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, and may be subject to wear and tear on repeated use.

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.

SUMMARY

According to techniques of this application, a device includes a side wall, a base, an upper surface, a riser, an opaque disk, a projection screen, a first source of light, a second source of light, and circuitry. The side wall may have a minimum height, an upper region, and a lower region. The base may engage 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. The riser may extend upwardly away from the base. The opaque disk may be located at a top of the riser. The opaque disk may include a first tunnel and a second tunnel, wherein each of the tunnels has a top end and a bottom end and is diagonally oriented in both a vertical and a horizontal dimension and further oriented such that the bottom ends of the tunnels are further apart than the top ends of the tunnels.

The projection screen may include a flame shape with a front side having convexity, relative to a source of light which projects upon it. The projection screen may extend upwardly from the opaque disk through an aperture in the upper surface and positioned off of a central axis of the aperture through the upper surface. The projection screen may include a fixed end and a free end. The fixed end of the projection screen may be

2

fixedly attached to the opaque disk, whereby the projection screen is fixed with respect to a position of the upper surface. The free end of the projection screen may be located at a height below the maximum or minimum height of the side-wall.

The first source of light may be positioned below the upper surface and configured to project light through the aperture onto the projection screen. The first source of light may be located at a fixed distance from the projection screen that is at least partially within the second tunnel such that a top end of the second source of light is located at a height below the top end of the second tunnel.

The second source of light positioned below the upper surface and configured to project light through the aperture onto the projection screen. The second source of light may be located at a fixed distance from the projection screen that is at least partially within the first tunnel such that a top end of the first source of light is located at a height below the top end of the first tunnel. The tunnels may have interior surfaces that encourage specular reflection or diffusion depending on the desired optical effect.

The circuitry may be electrically connected to the first source of light and the second source of light. The circuitry may be configured to independently control intensities of the light projected by the first source of light and the second source of light.

The projection screen may include a primary plane. The first source of light may emit light including a beam axis and a beam width. The beam axis of the first source of light may intersect the primary plane of the projection screen at an angle between 20° to 40°. The second source of light may emit light including a beam axis and a beam width. The beam axis of the first source of light may intersect the primary plane of the projection screen at an angle between 20° to 40°.

The beam width of the light emitted by the first source of light may be between 30° to 35°. The beam width of the light may be emitted by the second source of light is between 30° to 35°. The projection screen may include a translucent material that allows light from the first source of light to penetrate to the back side of the projection screen and may allow light from the second source of light to penetrate to the front side of the projection screen. The projection screen may have a static shape. The projection screen may be rigid. The projection screen may include plastic.

The first area may be offset from the second area along a vertical dimension. The first area may be offset from the second area along a horizontal dimension. The first source of light may be positioned to project light onto a front side of the projection screen in a first area, the second source of light may be positioned to project light through the aperture onto the front side of the projection screen in a second area, wherein the second area may be overlapping but different than the first area.

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.

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 screen may have a primary plane, but,

3

alternatively may be ovoid. The projection screen may be translucent. The projection screen may be formed from a material such as plastic, glass, or metal.

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.

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°.

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.

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

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 sources of light, according to techniques of the present application.

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

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.

A projection screen 110 may be adjacent to and/or extend upwardly through an aperture 108 in the upper surface 106.

4

The projection screen 110 may be offset with respect to or positioned off of a central axis of the aperture 108. 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.

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 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.

A riser 140 may extend upwardly away from the base 150. An opaque disk 190 may be located at a top of the riser 140. As shown in FIG. 2, the opaque may include two tunnels. The tunnels may each be diagonally oriented in a vertical dimension and/or a horizontal dimension. The tunnels may traverse the height of the opaque disk 190, creating an open path in the interior of the opaque disk, from the top to the bottom. The opaque disk 190 may substantially attenuate the intensity of light that is emitted through the portion of the sidewall 102 located below the opaque disk 190.

The sources of light 120 and 130 may be located near or at the top of the riser 140 or opaque disk 190. The sources of light 120, 130 may include a light-emitting diode ("LED") an incandescent bulb, or a laser. In certain configurations, a riser 149 or opaque disk 190 may not be necessary. For example, the sources of light 120, 130 may be embedded in other parts of the candle 100.

Each of the sources of light 120, 130 may be located at least partially within a respective tunnel. A given source of light may be located such that the top end of the source of light is located at a height below a top end of the given tunnel. In such a configuration, a tunnel may be employed to collimate a beam of light emitted by a source of light, thereby reducing the beam width of the beam of light.

The projection screen 110 may include a fixed end and a free end. The free end of the projection screen 110 may extend upwardly from the riser 140 or opaque disk 190. The fixed end of the projection screen 110 may be rigidly affixed to the riser 140 or opaque disk 190 at or near the top of the riser 140 or opaque disk 190. For example, the projection screen 110 may be integral with the riser 140 or opaque disk 190. The projection screen 110 may be a separate portion rigidly or fixedly attached to the riser 140 or opaque disk 190 (for example, glued or attached at more than one place). For example, the fixed end of the projection screen 110 may be part of a tab that is inserted into one slot (or one of a plurality of slots) in the riser 140 or opaque disk 190.

By rigidly or fixedly affixing the projection screen 110 with the riser 140 or opaque disk 190, 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.

5

The free end of the projection screen 110 may be located at a height above the base 150 of the candle. This height may be less than a minimum or maximum height of the sidewall 102. This may prevent the projection screen 110 from becoming damaged if the candle 100, for example, is turned upside down.

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.

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 and may be substantially convex around the perimeter of the three-dimensional projection screen (for example, bulbously shaped). In such an example, sources of light may be located around the projection screen 110 and may project onto the projection screen 110. In one example, when light is projected upwardly towards a convex projection screen 110, the illusion of a “hot spot” in a flame may be created.

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. As one way 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.

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. The intensities of each source of light 120, 130 may be adjusted by varying a pulse-code modulated signal or a pulse-width modulated signal provided to the given source of light 120, 130.

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. A sequence may include a repeating loop (for example, a 5-10 second loop). Such sequences may include frequencies that are out of phase from each other.

6

For example, one predetermined sequence may be applied to the source of light 120, and the same predetermined sequence may be applied to the source of light 130, but out of phase. As another example, a first predetermined sequence may be applied to the source of light 120 and second predetermined sequence may be synchronously applied to the source of light 130. The second predetermined sequence may result from filtering or adjusting the first predetermined sequence. Such filtering may include high-pass and low-pass filtering, and such adjusting may include attenuating the amplitudes of the first predetermined sequence.

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).

According to one example, it may be possible to provide a separate controller for each source of light 120, 130. Each separate controller may be integrated into an epoxy case that houses a light-emitting diode. The two separate controllers may be synchronized through a synchronization signal provided to each controller or between the controllers. For example, an additional lead may extend from the controller and to outside of the epoxy case. The additional leads from two LED assemblies may be connected together and a synchronization signal may be communicated between via this connection to enable synchronous operation.

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 onto the projection screen 110, which may be through the aperture 108. The positions of the sources of light 120, 130 may also be fixed with respect to the position of the projection screen 110.

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.

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. In the case of certain types of LEDs, such as amber LEDs, the beam widths may be between 10-20 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.

7

If the projection screen 110 is translucent, light projected onto one side may penetrate to the other side.

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.

According to one example, area 122 is offset from area 132. The approximate center of area 122 may be offset from the approximate center of area 132 by about 1-2 mm along a horizontal axis and by about 3-4 mm along a vertical axis.

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. The light may also be reflected at or within the upper surface 106. The light may also pass through the sidewall before reaching the viewer's eye.

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.

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.

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.

The invention claimed is:

1. A device comprising:

- a side wall including an upper region and a lower region;
- a base engaged with the lower region of the side wall;
- an upper surface extending from the upper region of the side wall to form an upper recess, wherein the upper surface includes an aperture;
- a projection screen, which does not move in physical space, wherein:
 - the projection screen extends upwardly from the upper surface; and

8

a position of the projection screen is fixed with respect to a position of the upper surface;

a first source of light positioned below the upper surface, wherein the first source of light projects light through the aperture onto the projection screen;

a second source of light positioned below the upper surface, wherein the second source of light projects light through the aperture onto the projection screen; and

circuitry electrically connected to the first source of light and the second source of light, wherein the circuitry independently controls intensities of the light projected by the first source of light and the second source of light onto the projection screen.

2. The device of claim 1, wherein positions of the first source of light and the second source of light are fixed with respect to the position of the projection screen.

3. The device of claim 1, wherein the projection screen is flat.

4. The device of claim 1, wherein the projection screen includes a concavity.

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

6. The device of claim 1, wherein the projection screen includes a convexity.

7. The device of claim 1, wherein:

the projection screen includes a primary plane;

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

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

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

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

8. The device of claim 7, wherein:

the beam width of the light emitted by the first source of light is between 30° to 35°; and

the beam width of the light emitted by the second source of light is between 30° to 35°.

9. The device of claim 1, wherein:

the first source of light is positioned to project light through the aperture onto a front side of the projection screen; and

the second source of light is positioned to project light through the aperture onto a back side of the projection screen.

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

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

12. The device of claim 11, wherein the projection screen comprises plastic.

13. The device of claim 1, wherein:

the first source of light is positioned to project light onto a front side of the projection screen in a first area;

the second source of light is positioned to project light onto the front side of the projection screen in a second area; and

the second area is different than the first area.

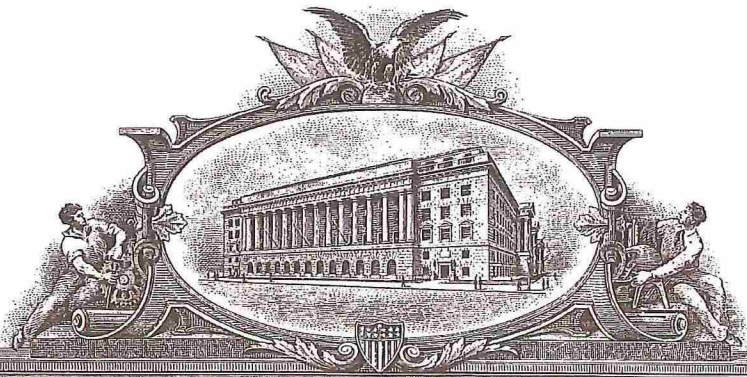
14. The device of claim 13, wherein a portion of the first area overlaps a portion of the second area.

* * * * *

EXHIBIT 2

**Certified Copy of each
Assignment for United
States Patent No.
9,068,706**

A 8044039



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UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 20, 2020

**THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE
RECORDS OF THIS OFFICE OF A DOCUMENT RECORDED ON
APRIL 23, 2013.**

**By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office**



Sylvia Holley
SYLVIA HOLLEY
Certifying Officer

STGR0025701

502321640 04/23/2013

PATENT ASSIGNMENT

Electronic Version v1.1

Stylesheet Version v1.1

SUBMISSION TYPE:	NEW ASSIGNMENT												
NATURE OF CONVEYANCE:	ASSIGNMENT												
CONVEYING PARTY DATA													
<table border="1"><thead><tr><th>Name</th><th>Execution Date</th></tr></thead><tbody><tr><td>Bernard Fournier</td><td>01/04/2013</td></tr><tr><td>Michael Toutant</td><td>04/09/2013</td></tr><tr><td>Jonathan Landry</td><td>04/09/2013</td></tr></tbody></table>		Name	Execution Date	Bernard Fournier	01/04/2013	Michael Toutant	04/09/2013	Jonathan Landry	04/09/2013				
Name	Execution Date												
Bernard Fournier	01/04/2013												
Michael Toutant	04/09/2013												
Jonathan Landry	04/09/2013												
RECEIVING PARTY DATA													
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Name:	Winvic Sales Inc.												
Street Address:	401 Bentley Street												
Internal Address:	Unit 1												
City:	Markham, Ontario												
State/Country:	CANADA												
Postal Code:	L3R 9T2												
PROPERTY NUMBERS Total: 1													
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Application Number:	13789624												
CORRESPONDENCE DATA													
Fax Number: 3127758100 <i>Correspondence will be sent via US Mail when the fax attempt is unsuccessful.</i> Phone: 312-775-8000 Email: mhmpto@mcandrews-ip.com Correspondent Name: McAndrews, Held & Malloy, Ltd. Address Line 1: 500 W. Madison Street Address Line 2: 34th Floor Address Line 4: Chicago, ILLINOIS 60661													
ATTORNEY DOCKET NUMBER:	02775-25100US02												
NAME OF SUBMITTER:	Andrew Bernard Karp												
Signature:	/Andrew Bernard Karp/												

PATENT

502321640

REEL: 030270 FRAME: 0257

OP \$40.00 13789624

STGR0025702

Date:

04/23/2013

Total Attachments: 4

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PATENT
REEL: 030270 FRAME: 0258

STGR0025703

ASSIGNMENT

File No.: 25100US02

Serial No.: 13/789,624

Inventors: Bernard Fournier
Michael Toutant
Jonathan Landry

Filing Date: March 7, 2013

In consideration of One Dollar (\$1.00) and other good and valuable considerations in hand paid, the receipt and sufficiency whereof are hereby acknowledged, each of the undersigned hereby assigns to **Winvic Sales Inc.**, a Canadian corporation, its successors and assigns, the entire right, title and interest in the invention or improvements of the undersigned disclosed in an application for Letters Patent of the United States, entitled: **"ELECTRONIC LUMINARY DEVICE WITH SIMULATED FLAME"** and identified as File No. **25100US02**, in the offices of **McANDREWS, HELD & MALLOY, LTD.**, and in said application and any and all other applications, both United States and foreign, which the undersigned may file, either solely or jointly with others, on said invention or improvements, and in any and all Letters Patent of the United States and foreign countries, which may be obtained on any of said applications, and in any continuation, continuation-in-part, divisional, re-examination, reissue or extension of such patents, and further assigns to said assignee the priority right provided by the International Convention.

Each of the undersigned hereby authorizes and requests the Commissioner of Patents and Trademarks to issue said Letters Patent to said assignee.

Each of the undersigned hereby authorizes and requests the attorneys of record in said application to insert in this assignment the filing date and serial number of said application when officially known.

Each of the undersigned warrants himself/herself to be the owner of the entire right, title and interest in said invention or improvements and to have the right to make this assignment, and further warrants that there are no outstanding prior assignments, licenses, or other encumbrances on the interest herein assigned.

For said considerations, each of the undersigned hereby agrees, upon the request and at the expense of said assignee, its successors and assigns, to execute any and all continuation, continuation-in-part, divisional, re-examination, extension, and substitute applications for said invention or improvements, and any necessary oath, affidavit or declaration relating thereto, and any application for the reissue, re-examination, or extension of any Letters Patent that may be granted upon said application, and any and all applications and other document for Letters Patent in foreign countries on said invention or improvements, that said assignee, its successors or assigns may deem necessary or expedient, and for the said considerations each of the undersigned authorizes said assignee to apply for patents for said invention or improvements in its own name in such countries where such procedure is proper and further agrees, upon the request of said

transactions involving such applications or patents, including the preparation and execution of preliminary statements, giving and producing evidence and performing any and all other acts necessary to obtain said Letters Patent, both United States and foreign, and vest all rights therein hereby conveyed in the assignee, its successors and assigns, whereby said Letters Patent will be held and enjoyed by the said assignee, its successors and assigns, to the full end of the term for which said Letters Patent will be granted, as fully and entirely as the same would have been held and enjoyed by the undersigned if this assignment had not been made.

B Fournier

Bernard Fournier

1/4/2013

Date

Ann Lambert

Witness

2/4/2013

Date

D. Brey

Witness

2/4/2013

Date

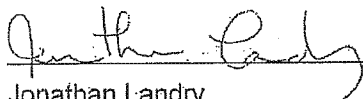
Michael Toutant
Michael Toutant

April 09 2013
Date


Pierre-Marc Tardif
Witness
PIERRE-MARC TARDIF
Patrick Lamontagne
Witness
Patrick Lamontagne

APRIL 09 2013
Date

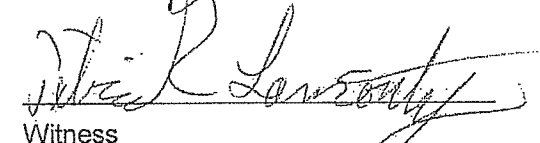
April 09 2013
Date


Jonathan Landry

APRIL 09, 2013
Date

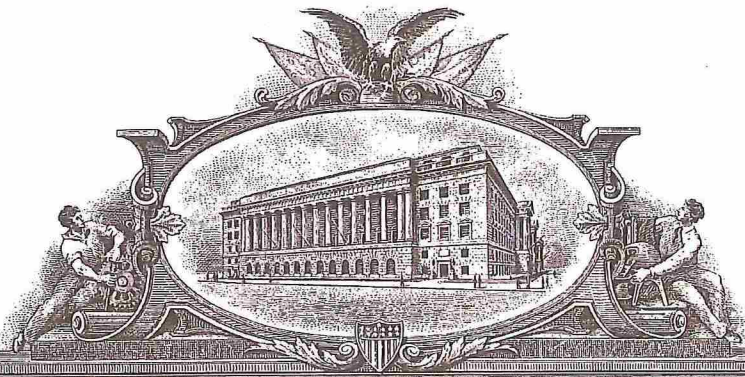

Witness
PIERRE-MARC TARDY

APRIL 09 2013
Date


Witness
Patrick Lamontagne

April 09 2013
Date

A 8044039



THE UNITED STATES OF AMERICA

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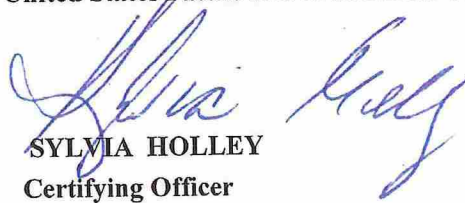
UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 20, 2020

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RECORDS OF THIS OFFICE OF A DOCUMENT RECORDED ON
OCTOBER 20, 2016.**

By Authority of the
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SYLVIA HOLLEY
Certifying Officer



PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT4105337

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	CHANGE OF NAME
SEQUENCE:	2

CONVEYING PARTY DATA

Name	Execution Date
1058825 B.C. LTD.	01/22/2016

RECEIVING PARTY DATA

Name:	NII NORTHERN INTERNATIONAL INC.
Street Address:	666 BURRARD STREET
Internal Address:	SUITE 1700, PARK PLACE
City:	VANCOUVER
State/Country:	CANADA
Postal Code:	V6C 2X8

PROPERTY NUMBERS Total: 53

Property Type	Number
Patent Number:	6616308
Patent Number:	7093961
Patent Number:	7360935
Patent Number:	7828462
Patent Number:	8157425
Patent Number:	8282251
Patent Number:	8562186
Patent Number:	8579461
Patent Number:	8618741
Patent Number:	8647147
Patent Number:	8662698
Patent Number:	8783888
Patent Number:	8840281
Patent Number:	8858043
Patent Number:	8878485
Patent Number:	8998461
Patent Number:	9039227
Patent Number:	9039233

504058671

PATENT
REEL: 040426 FRAME: 0833

Property Type	Number
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Patent Number:	9163798
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Patent Number:	9225077
Patent Number:	9261248
Patent Number:	D592995
Patent Number:	D616593
Patent Number:	D635710
Patent Number:	D640396
Patent Number:	D645406
Patent Number:	D645407
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Patent Number:	D668227
Patent Number:	D668228
Patent Number:	D675578
Patent Number:	D710039
Patent Number:	D734718
Patent Number:	D740462
Patent Number:	D742837
Patent Number:	D748839
Patent Number:	D751503
Application Number:	14848714
Application Number:	29553547
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Application Number:	14839578
Application Number:	14856079
Application Number:	14963957
Application Number:	15143065
Application Number:	10084272
Application Number:	90010884
Application Number:	90010980

CORRESPONDENCE DATA

Fax Number: (312)775-8100

PATENT
REEL: 040426 FRAME: 0834

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 312-775-8000
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Correspondent Name: MCANDREWS, HELD & MALLOY, LTD.
Address Line 1: 500 W. MADISON STREET
Address Line 4: CHICAGO, ILLINOIS 60661

ATTORNEY DOCKET NUMBER:	80382US01
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NAME OF SUBMITTER:	ANDREW B. KARP
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SIGNATURE:	/Andrew B. Karp/
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DATE SIGNED:	10/20/2016
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Total Attachments: 2

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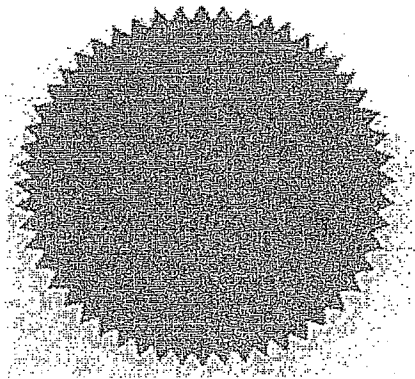


Number: BC1062406

**CERTIFICATE
OF
CHANGE OF NAME**

BUSINESS CORPORATIONS ACT

I Hereby Certify that 1058825 B.C. LTD. changed its name to NII NORTHERN INTERNATIONAL INC. on January 22, 2016 at 12:32 PM Pacific Time.



ELECTRONIC CERTIFICATE

*Issued under my hand at Victoria, British Columbia
On January 22, 2016*

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada

PATENT
REEL: 040426 FRAME: 0836

Date and Time: January 22, 2016 12:32 PM Pacific Time



BC Registry
Services

Mailing Address:
PO Box 9431 Stn Prov Govt
Victoria BC V8W 9V3
www.corporateonline.gov.bc.ca

Location:
2nd Floor - 940 Blanshard Street
Victoria BC
1 877 526-1526

Notice of Alteration

FORM 11
BUSINESS CORPORATIONS ACT
Section 257

Filed Date and Time: January 22, 2016 12:32 PM Pacific Time

Alteration Date and Time: Notice of Articles Altered on January 22, 2016 12:32 PM Pacific Time

NOTICE OF ALTERATION

Incorporation Number:

BC1062406

Name of Company:

1058825 B.C. LTD.

Name Reservation Number:

NR4930011

Name Reserved:

NII NORTHERN INTERNATIONAL INC.

ALTERATION EFFECTIVE DATE:

The alteration is to take effect at the time that this application is filed with the Registrar.

CHANGE OF NAME OF COMPANY

From:

1058825 B.C. LTD.

To:

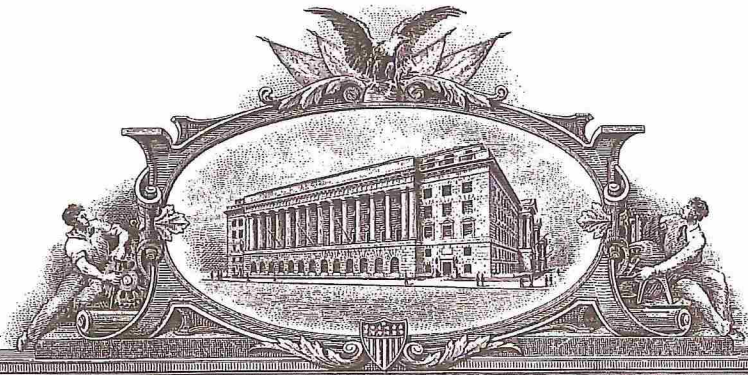
NII NORTHERN INTERNATIONAL INC.

RECORDED: 10/20/2016

PATENT 1062406 Page: 1 of 1
REEL: 040426 FRAME: 0837

STGR0025713

A 6044039



THE UNITED STATES OF AMERICA

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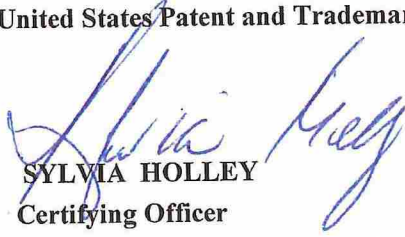
UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 20, 2020

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STGR0025714

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4105288

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	MERGER
EFFECTIVE DATE:	01/22/2016
SEQUENCE:	1

CONVEYING PARTY DATA

Name	Execution Date
1058825 B.C. LTD.	01/22/2016
NII NORTHERN INTERNATIONAL HOLDINGS INC.	01/22/2016
WINVIC SALES INC.	01/22/2016
NII NORTHERN INTERNATIONAL INC.	01/22/2016

RECEIVING PARTY DATA

Name:	1058825 B.C. LTD.
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Patent Number:	8840281
Patent Number:	8858043

504058622

PATENT
 REEL: 040425 FRAME: 0267

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Application Number:	14963957
Application Number:	15143065
Application Number:	10084272
Application Number:	90010884

PATENT
REEL: 040425 FRAME: 0268

Property Type	Number
Application Number:	90010980

CORRESPONDENCE DATA

Fax Number: (312)775-8100

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 312-775-8000

Email: dwilson@mcandrews-ip.com

Correspondent Name: MCANDREWS, HELD & MALLOY, LTD.

Address Line 1: 500 W. MADISON STREET

Address Line 4: CHICAGO, ILLINOIS 60661

ATTORNEY DOCKET NUMBER:	80382US01
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	10/20/2016

Total Attachments: 3

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Number: BC1062406

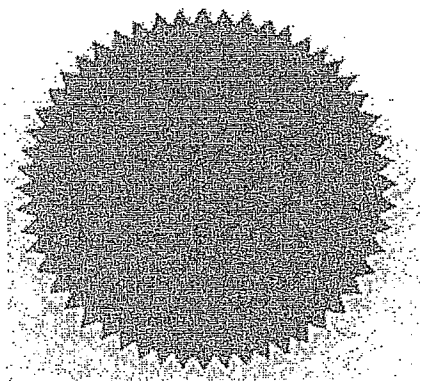
CERTIFICATE OF AMALGAMATION

BUSINESS CORPORATIONS ACT

I Hereby Certify that 1058825 B.C. LTD., incorporation number BC1058825, and NII NORTHERN INTERNATIONAL HOLDINGS INC., incorporation number C1062388, and NII NORTHERN INTERNATIONAL INC., incorporation number C1062393, and WINVIC SALES INC., incorporation number C1062401 were amalgamated as one company under the name 1058825 B.C. LTD. on January 22, 2016 at 12:29 PM Pacific Time.

*Issued under my hand at Victoria, British Columbia
On January 22, 2016*

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada



ELECTRONIC CERTIFICATE

PATENT
REEL: 040425 FRAME: 0270



BC Registry
Services

Mailing Address:
PO Box 9431 Stn Prov Govt
Victoria BC V8W 9V3
www.corporateonline.gov.bc.ca

Location:
2nd Floor - 940 Blanshard Street
Victoria BC
1 877 526-1526

Vertical Short Form Amalgamation Application

FORM 14
BUSINESS CORPORATIONS ACT
Section 275

CERTIFIED COPY

Of a Document filed with the Province of
British Columbia Registrar of Companies

CAROL PREST

FILING DETAILS:

Amalgamation Application for:
1058825 B.C. LTD.

Incorporation Number: BC1062406

Filed Date and Time: January 22, 2016 12:29 PM Pacific Time

Recognition Date and Time: January 22, 2016 12:29 PM Pacific Time as a result of an Amalgamation.

AMALGAMATION APPLICATION

The amalgamated company will adopt as its Notice of Articles, the Notice of Articles of the amalgamating holding corporation, 1058825 B.C. LTD., Incorporation No. BC1058825.

AMALGAMATION EFFECTIVE DATE:

The amalgamation is to take effect at the time that this application is filed with the Registrar.

AMALGAMATING CORPORATION(S) INFORMATION

Name of Amalgamating Corporation(s)	Incorporation Number in BC
1058825 B.C. LTD.	BC1058825
NII NORTHERN INTERNATIONAL HOLDINGS INC.	C1062388
NII NORTHERN INTERNATIONAL INC.	C1062393
WINVIC SALES INC.	C1062401

BC1062406 Page: 1 of 2
PATENT
REEL: 040425 FRAME: 0271

AMALGAMATION STATEMENT

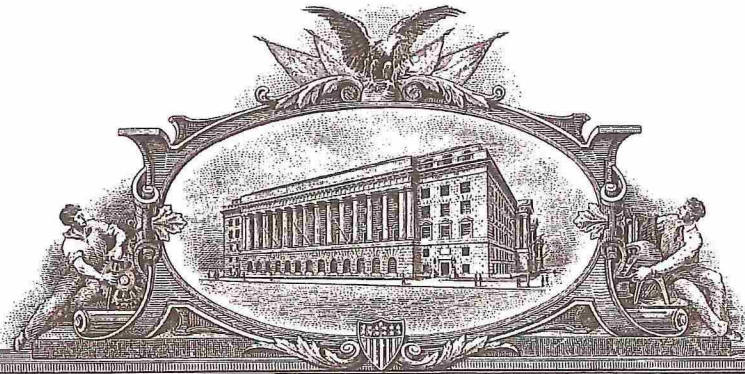
This amalgamation has been effected without court approval. A copy of all of the required affidavits under section 277(1) have been obtained and the affidavit obtained from each amalgamating company has been deposited in that company's records office.

RECORDED: 10/20/2016

BC1062406 Page: 2 of 2
PATENT
REEL: 040425 FRAME: 0272

STGR0025720

A 8044039



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 20, 2020

**THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE
RECORDS OF THIS OFFICE OF A DOCUMENT RECORDED ON
NOVEMBER 29, 2017.**

By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office



Sylvia Holley
SYLVIA HOLLEY
Certifying Officer

STGR0025721

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4708299

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	CHANGE OF NAME
CONVEYING PARTY DATA	
Name	Execution Date
NII NORTHERN INTERNATIONAL INC.	06/12/2017
RECEIVING PARTY DATA	
Name:	STERNO HOME INC.
Street Address:	666 BURRARD STREET
Internal Address:	SUITE 1700, PARK PLACE
City:	VANCOUVER
State/Country:	CANADA
Postal Code:	V6C 2X8
PROPERTY NUMBERS Total: 61	
Property Type	Number
Application Number:	09929843
Application Number:	10084272
Application Number:	90010980
Application Number:	10844075
Application Number:	11053397
Application Number:	11401139
Application Number:	12927645
Application Number:	13016570
Application Number:	13253432
Application Number:	13449100
Application Number:	13096424
Application Number:	13184724
Application Number:	13185149
Application Number:	13253436
Application Number:	14152430
Application Number:	14077736
Application Number:	14055544
Application Number:	14323369
Application Number:	14055403

Property Type	Number
Application Number:	13789624
Application Number:	13174153
Application Number:	13874089
Application Number:	14143877
Application Number:	14721697
Application Number:	14754077
Application Number:	14848714
Application Number:	15143065
Application Number:	15405810
Application Number:	14485912
Application Number:	62429123
Application Number:	62464613
Application Number:	62480819
Application Number:	62555154
Application Number:	62578765
Application Number:	14839578
Application Number:	15646926
Application Number:	29553547
Application Number:	29595545
Application Number:	29595548
Application Number:	15346475
Application Number:	15603223
Application Number:	15461167
Application Number:	29302060
Application Number:	29326475
Application Number:	29333482
Application Number:	29362431
Application Number:	29367381
Application Number:	29357721
Application Number:	29357722
Application Number:	29357723
Application Number:	29402055
Application Number:	29402056
Application Number:	29402057
Application Number:	29462567
Application Number:	29478066
Application Number:	29485680
Application Number:	29483104

PATENT
REEL: 044762 FRAME: 0391

Property Type	Number
Application Number:	29512517
Application Number:	29533318
Application Number:	29572318
Application Number:	29572320

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ATTORNEY DOCKET NUMBER:	NII-STERNO
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	11/29/2017

Total Attachments: 1
source=Certificate of Change of Name#page1.tif

PATENT
REEL: 044762 FRAME: 0392

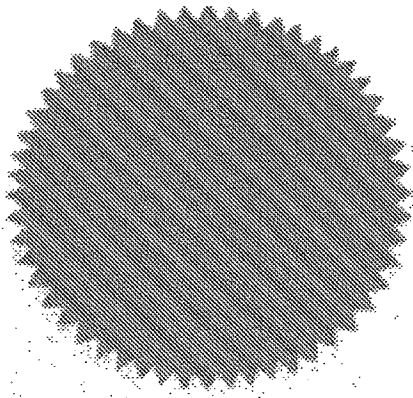


Number: BC1062406

CERTIFICATE OF CHANGE OF NAME

BUSINESS CORPORATIONS ACT

I Hereby Certify that NII NORTHERN INTERNATIONAL INC. changed its name to STERNO HOME INC. on June 12, 2017 at 03:55 PM Pacific Time.



ELECTRONIC CERTIFICATE

*Issued under my hand at Victoria, British Columbia
On June 12, 2017*

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada

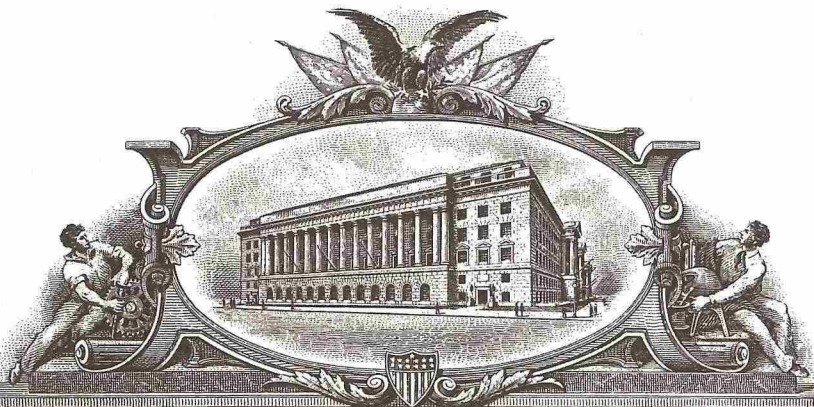
RECORDED: 11/29/2017

**PATENT
REEL: 044762 FRAME: 0393**

EXHIBIT 3

**Certified Copy of
United States Patent
No. 10,024,507**

U 8044039



THE UNITED STATES OF AMERICA

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

May 14, 2020

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM
THE RECORDS OF THIS OFFICE OF:

U.S. PATENT: 10,024,507

ISSUE DATE: July 17, 2018

By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office



W. Montgomery
W. MONTGOMERY
Certifying Officer



US010024507B2

(12) **United States Patent**
Fournier et al.

(10) **Patent No.:** **US 10,024,507 B2**
(45) **Date of Patent:** ***Jul. 17, 2018**

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

(71) Applicant: **NII NORTHERN INTERNATIONAL
INC., Vancouver (CA)**

(72) Inventors: **Bernard Fournier, Delson (CA);
Michael Toutant, Chateauguay (CA);
Jonathan Landry, Montreal (CA)**

(73) Assignee: **STERNO HOME INC., Vancouv
(CA)**

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

This patent is subject to a terminal dis-
claimer.

(21) Appl. No.: **15/646,926**

(22) Filed: **Jul. 11, 2017**

(65) **Prior Publication Data**

US 2018/0017223 A1 Jan. 18, 2018

Related U.S. Application Data

(63) Continuation of application No. 15/270,887, filed on
Sep. 20, 2016, which is a continuation of application
(Continued)

(51) **Int. Cl.**
F21V 33/00 (2006.01)
F21S 10/04 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC **F21S 10/043** (2013.01); **F21S 6/001**
(2013.01); **F21S 9/02** (2013.01); **F21V 23/003**
(2013.01);
(Continued)

(58) **Field of Classification Search**
CPC F21S 10/04; F21S 10/043; F21S 6/001;
F21S 9/02; F21L 4/00; F21L 15/02; F21L
23/003; F21W 2121/00; F21V 33/0028

See application file for complete search history.

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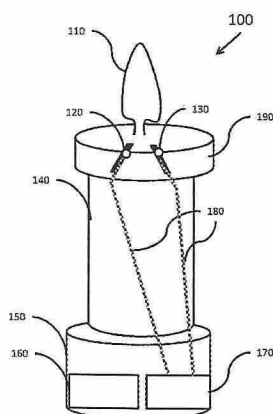
Primary Examiner — Ali Alavi

(74) *Attorney, Agent, or Firm* — McAndrews, Held &
Malloy, Ltd.

(57) **ABSTRACT**

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 sur-
face. 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.

19 Claims, 4 Drawing Sheets



Related U.S. Application Data

No. 14/754,077, filed on Jun. 29, 2015, now Pat. No. 9,447,937, which is a continuation of application No. 13/789,624, filed on Mar. 7, 2013, now Pat. No. 9,068,706.

(60) Provisional application No. 61/607,942, filed on Mar. 7, 2012.

(51) Int. Cl.

F21S 9/02 (2006.01)

F21S 6/00 (2006.01)

F21V 23/00 (2015.01)

F21W 121/00 (2006.01)

(52) U.S. Cl.

CPC *F21V 33/0028* (2013.01); *F21W 2121/00* (2013.01)

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FIGURE 1

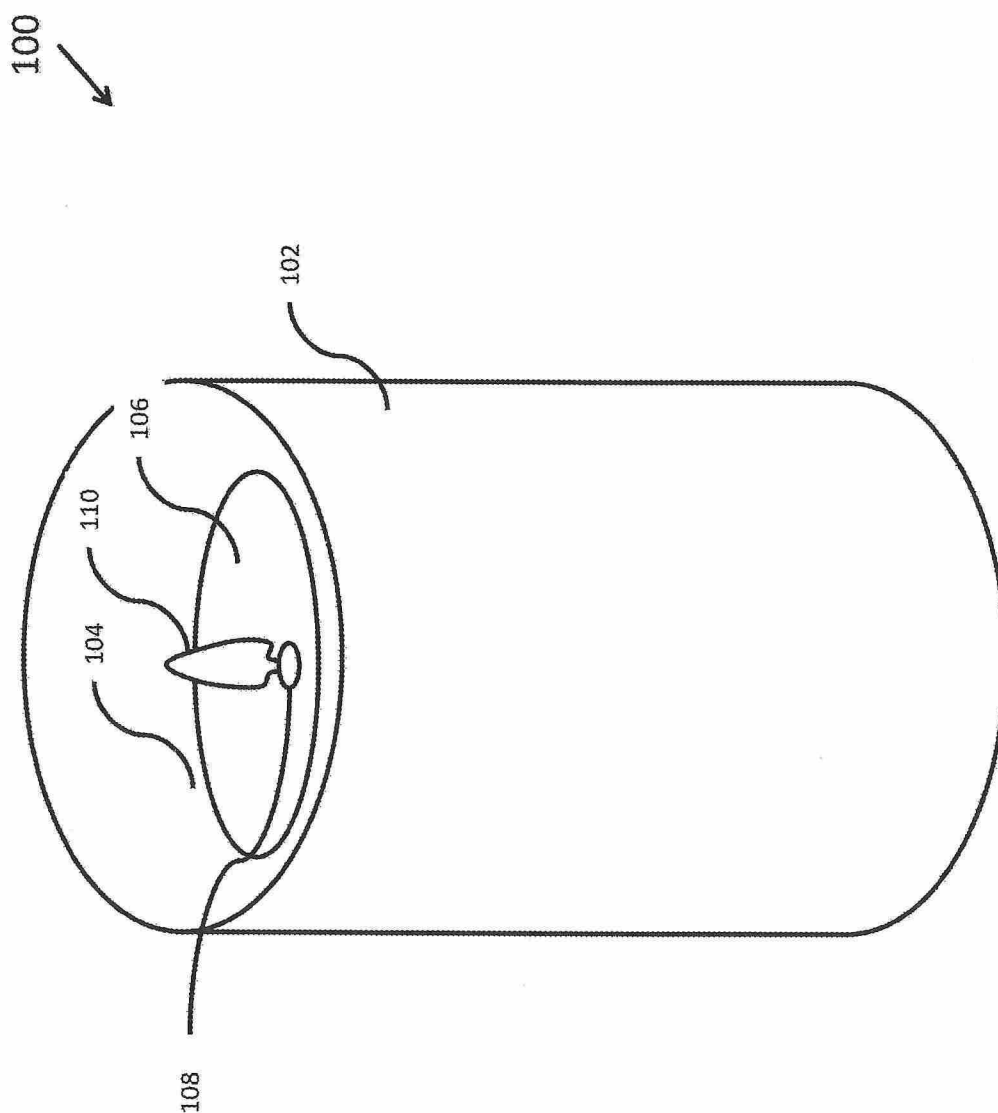
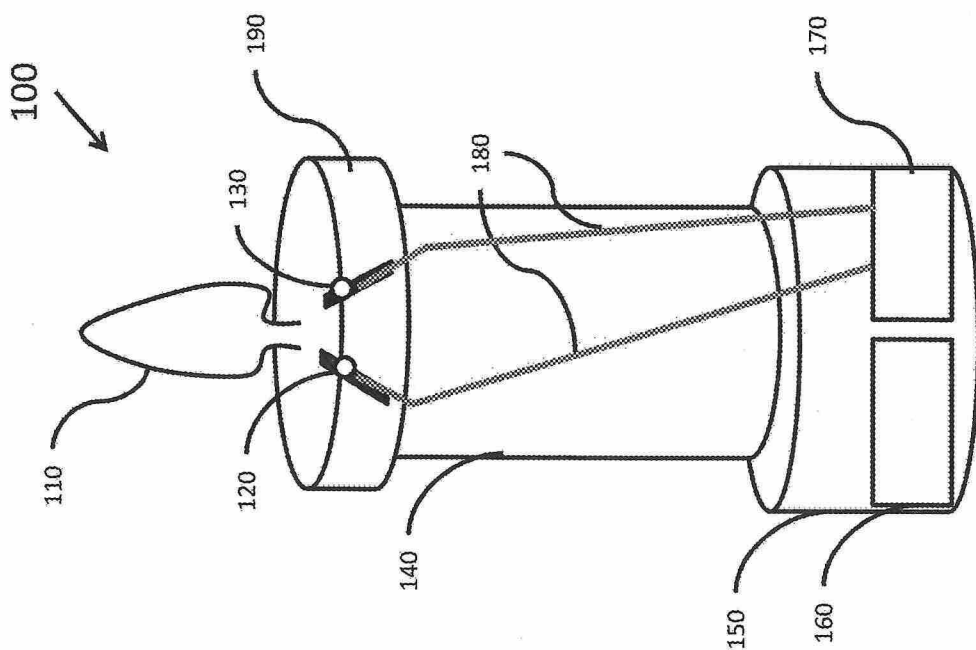


FIGURE 2



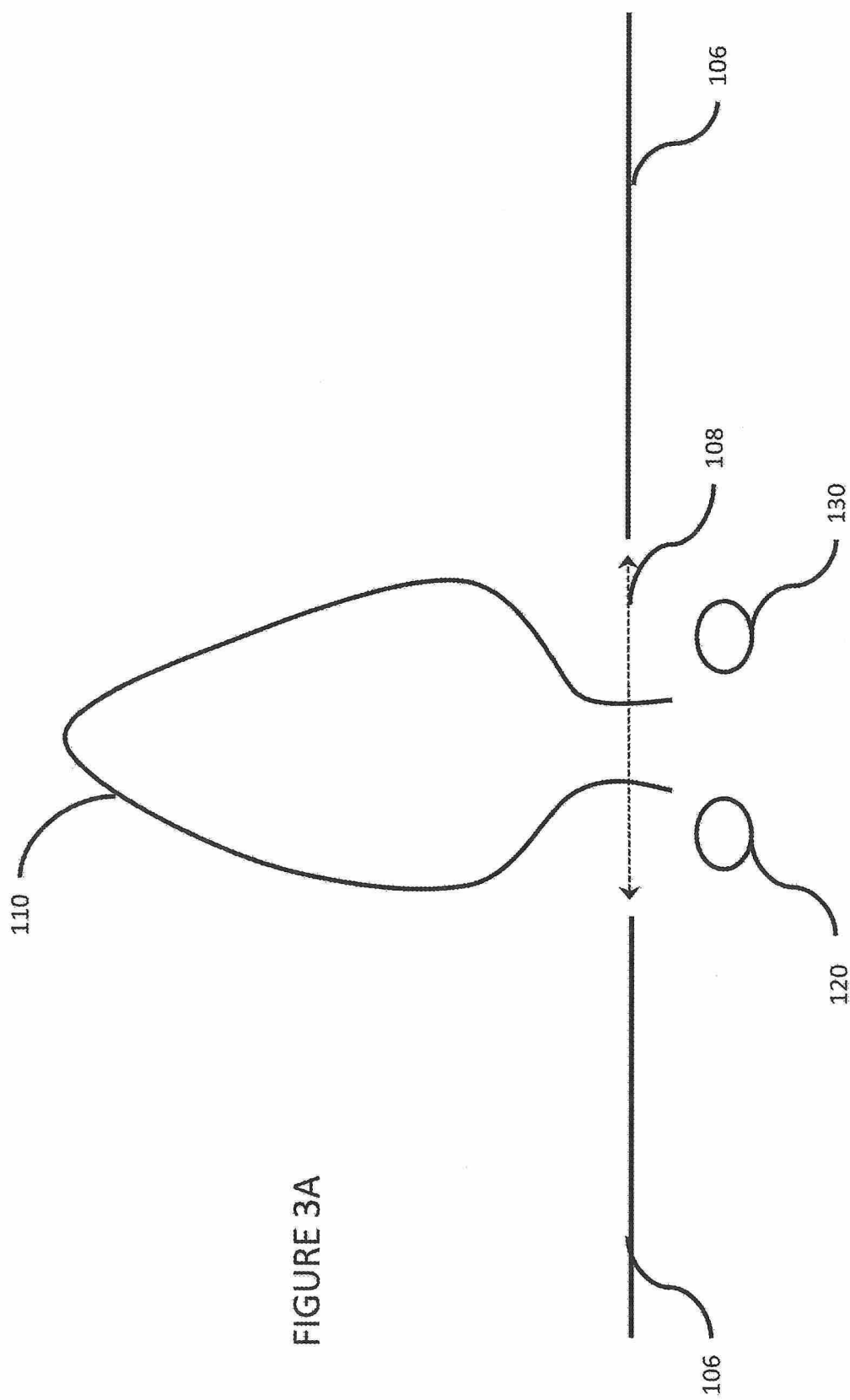


FIGURE 3A

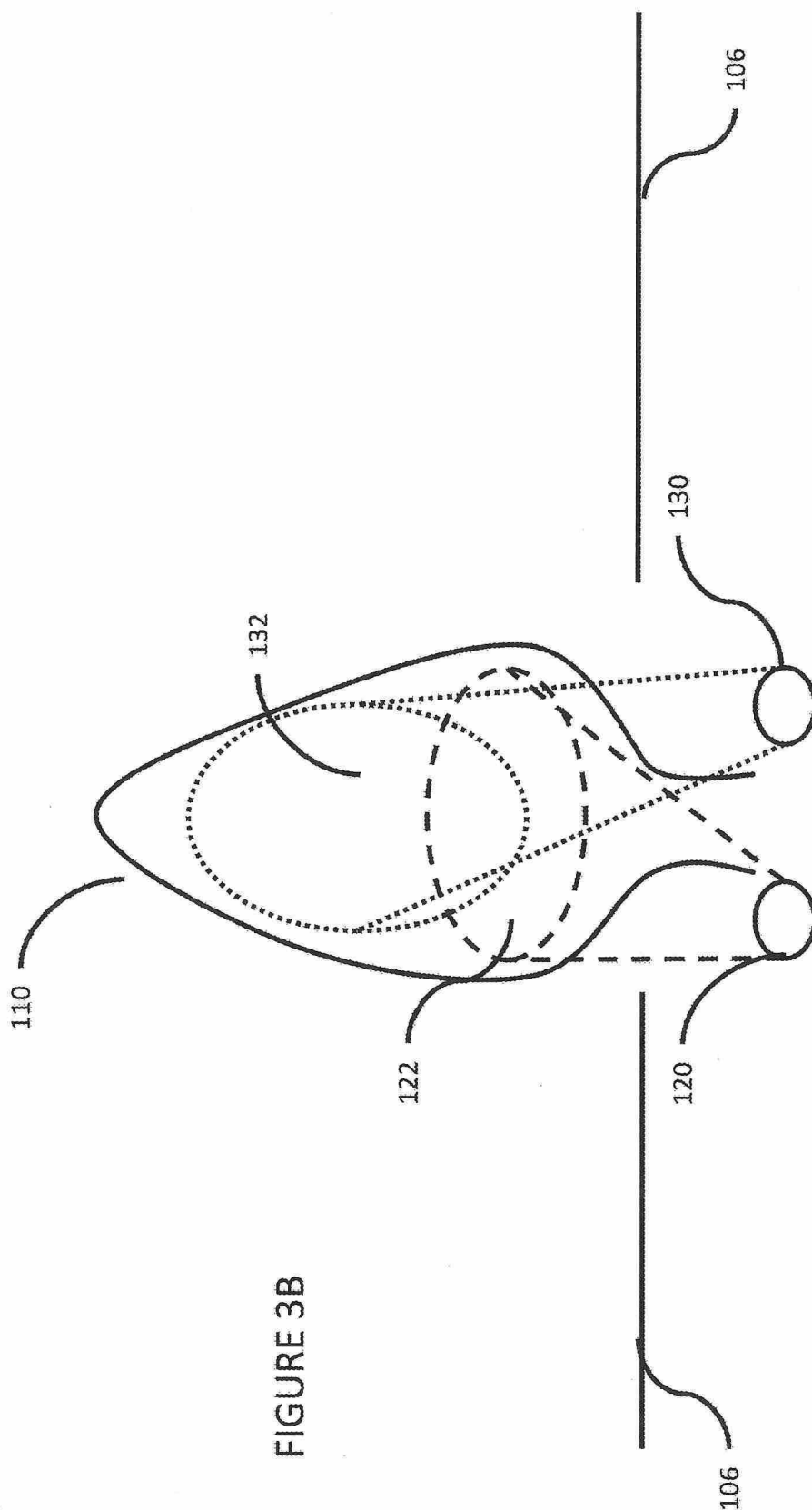


FIGURE 3B

1

**ELECTRONIC LUMINARY DEVICE WITH
SIMULATED FLAME****CROSS REFERENCE TO RELATED
APPLICATIONS**

This application is a continuation of U.S. patent application Ser. No. 15/270,887 filed on Sep. 20, 2016, which is a continuation of U.S. patent application Ser. No. 14/754,077 filed on Jun. 29, 2015 and issued as U.S. Pat. No. 9,447,937 on Sep. 20, 2016, which is a continuation of U.S. patent application Ser. No. 13/789,624 filed on Mar. 7, 2013 and issued as U.S. Pat. No. 9,068,706 on Jun. 30, 2015, and claims priority to U.S. Patent Application Ser. No. 61/607,942 filed on Mar. 7, 2012, the entireties of which are herein incorporated by reference.

**FEDERALLY SPONSORED RESEARCH OR
DEVELOPMENT**

Not Applicable

JOINT RESEARCH AGREEMENT

Not Applicable

SEQUENCE LISTING

Not Applicable

BACKGROUND

Generally, this application relates to flameless candles. Specifically, this application discloses techniques for simulating a candle flame without use of moving parts.

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 or part that moves in physical space. Moving elements or 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, and may be subject to wear and tear on repeated use.

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.

SUMMARY

According to techniques of this application, a device includes a side wall, a base, an upper surface, a riser, an opaque disk, a projection screen, a first source of light, a second source of light, and circuitry. The side wall may have a minimum height, an upper region, and a lower region. The base may engage 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. The riser may extend upwardly away from the base. The opaque disk may be located at a top of the riser. The opaque disk may include a first tunnel and a second tunnel, wherein each of the tunnels has a top end and a bottom end and is diagonally oriented in both a vertical and a horizontal dimension and further oriented such that the bottom ends of the tunnels are further apart than the top ends of the tunnels.

2

The projection screen may include a flame shape with a front side having convexity, relative to a source of light which projects upon it. The projection screen may extend upwardly from the opaque disk through an aperture in the upper surface and positioned off of a central axis of the aperture through the upper surface. The projection screen may include a fixed end and a free end. The fixed end of the projection screen may be fixedly attached to the opaque disk, whereby the projection screen is fixed with respect to a position of the upper surface. The free end of the projection screen may be located at a height below the maximum or minimum height of the sidewall.

The first source of light may be positioned below the upper surface and configured to project light through the aperture onto the projection screen. The first source of light may be located at a fixed distance from the projection screen that is at least partially within the second tunnel such that a top end of the second source of light is located at a height below the top end of the second tunnel.

The second source of light positioned below the upper surface and configured to project light through the aperture onto the projection screen. The second source of light may be located at a fixed distance from the projection screen that is at least partially within the first tunnel such that a top end of the first source of light is located at a height below the top end of the first tunnel. The tunnels may have interior surfaces that encourage specular reflection or diffusion depending on the desired optical effect.

The circuitry may be electrically connected to the first source of light and the second source of light. The circuitry may be configured to independently control intensities of the light projected by the first source of light and the second source of light.

The projection screen may include a primary plane. The first source of light may emit light including a beam axis and a beam width. The beam axis of the first source of light may intersect the primary plane of the projection screen at an angle between 20° to 40°. The second source of light may emit light including a beam axis and a beam width. The beam axis of the first source of light may intersect the primary plane of the projection screen at an angle between 20° to 40°.

The beam width of the light emitted by the first source of light may be between 30° to 35°. The beam width of the light may be emitted by the second source of light is between 30° to 35°. The projection screen may include a translucent material that allows light from the first source of light to penetrate to the back side of the projection screen and may allow light from the second source of light to penetrate to the front side of the projection screen. The projection screen may have a static shape. The projection screen may be rigid. The projection screen may include plastic.

The first area may be offset from the second area along a vertical dimension. The first area may be offset from the second area along a horizontal dimension. The first source of light may be positioned to project light onto a front side of the projection screen in a first area, the second source of light may be positioned to project light through the aperture onto the front side of the projection screen in a second area, wherein the second area may be overlapping but different than the first area.

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.

3

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 screen may have a primary plane, but, alternatively may be ovoid. The projection screen may be translucent. The projection screen may be formed from a material such as plastic, glass, or metal.

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.

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°.

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.

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

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 sources of light, according to techniques of the present application.

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

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

4

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.

A projection screen 110 may be adjacent to and/or extend upwardly through an aperture 108 in the upper surface 106. The projection screen 110 may be offset with respect to or positioned off of a central axis of the aperture 108. 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.

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 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.

A riser 140 may extend upwardly away from the base 150. An opaque disk 190 may be located at a top of the riser 140. As shown in FIG. 2, the opaque may include two tunnels. The tunnels may each be diagonally oriented in a vertical dimension and/or a horizontal dimension. The tunnels may traverse the height of the opaque disk 190, creating an open path in the interior of the opaque disk, from the top to the bottom. The opaque disk 190 may substantially attenuate the intensity of light that is emitted through the portion of the sidewall 102 located below the opaque disk 190.

The sources of light 120 and 130 may be located near or at the top of the riser 140 or opaque disk 190. The sources of light 120, 130 may include a light-emitting diode ("LED") an incandescent bulb, or a laser. In certain configurations, a riser 149 or opaque disk 190 may not be necessary. For example, the sources of light 120, 130 may be embedded in other parts of the candle 100.

Each of the sources of light 120, 130 may be located at least partially within a respective tunnel. A given source of light may be located such that the top end of the source of light is located at a height below a top end of the given tunnel. In such a configuration, a tunnel may be employed to collimate a beam of light emitted by a source of light, thereby reducing the beam width of the beam of light.

The projection screen 110 may include a fixed end and a free end. The free end of the projection screen 110 may extend upwardly from the riser 140 or opaque disk 190. The fixed end of the projection screen 110 may be rigidly affixed to the riser 140 or opaque disk 190 at or near the top of the riser 140 or opaque disk 190. For example, the projection screen 110 may be integral with the riser 140 or opaque disk 190. The projection screen 110 may be a separate portion rigidly or fixedly attached to the riser 140 or opaque disk 190 (for example, glued or attached at more than one place). For example, the fixed end of the projection screen 110 may be part of a tab that is inserted into one slot (or one of a plurality of slots) in the riser 140 or opaque disk 190.

5

By rigidly or fixedly affixing the projection screen 110 with the riser 140 or opaque disk 190, 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.

The free end of the projection screen 110 may be located at a height above the base 150 of the candle. This height may be less than a minimum or maximum height of the sidewall 102. This may prevent the projection screen 110 from becoming damaged if the candle 100, for example, is turned upside down.

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.

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 and may be substantially convex around the perimeter of the three-dimensional projection screen (for example, bulbously shaped). In such an example, sources of light may be located around the projection screen 110 and may project onto the projection screen 110. In one example, when light is projected upwardly towards a convex projection screen 110, the illusion of a “hot spot” in a flame may be created.

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. As one way 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.

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. The intensities of each source of light 120, 130 may be

6

adjusted by varying a pulse-code modulated signal or a pulse-width modulated signal provided to the given source of light 120, 130.

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. A sequence may include a repeating loop (for example, a 5-10 second loop). Such sequences may include frequencies that are out of phase from each other. For example, one predetermined sequence may be applied to the source of light 120, and the same predetermined sequence may be applied to the source of light 130, but out of phase. As another example, a first predetermined sequence may be applied to the source of light 120 and second predetermined sequence may be synchronously applied to the source of light 130. The second predetermined sequence may result from filtering or adjusting the first predetermined sequence. Such filtering may include high-pass and low-pass filtering, and such adjusting may include attenuating the amplitudes of the first predetermined sequence.

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).

According to one example, it may be possible to provide a separate controller for each source of light 120, 130. Each separate controller may be integrated into an epoxy case that houses a light-emitting diode. The two separate controllers may be synchronized through a synchronization signal provided to each controller or between the controllers. For example, an additional lead may extend from the controller and to outside of the epoxy case. The additional leads from two LED assemblies may be connected together and a synchronization signal may be communicated between via this connection to enable synchronous operation.

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 onto the projection screen 110, which may be through the aperture 108. The positions of the sources of light 120, 130 may also be fixed with respect to the position of the projection screen 110.

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.

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

7

light 120, 130 may be between 30-35 degrees. In the case of certain types of LEDs, such as amber LEDs, the beam widths may be between 10-20 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.

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.

According to one example, area 122 is offset from area 132. The approximate center of area 122 may be offset from the approximate center of area 132 by about 1-2 mm along a horizontal axis and by about 3-4 mm along a vertical axis.

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. The light may also be reflected at or within the upper surface 106. The light may also pass through the sidewall before reaching the viewer's eye.

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.

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.

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

8

particular techniques disclosed, but that they will include all techniques falling within the scope of the appended claims.

The invention claimed is:

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 the upper surface, wherein the position of the projection screen is fixed in relation to the upper surface;

a first source of light located below the upper surface and configured to project a first beam of light directly onto the projection screen without obstruction;

a second source of light located below the upper surface and configured to project a second beam of light directly onto the projection screen without obstruction; and

circuitry electrically connected to the first source of light and the second source of light, wherein the circuitry independently controls intensities of the first beam of light projected by the first source of light and the second beam of light projected by the second source of light.

2. The device of claim 1, wherein positions of the first source of light and the second source of light are fixed with respect to the position of the projection screen.

3. The device of claim 1, wherein the projection screen is flat.

4. The device of claim 1, wherein the projection screen includes a concavity.

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

6. The device of claim 1, wherein the projection screen includes a convexity.

7. The device of claim 1, wherein:

the projection screen includes a primary plane;

the first beam of light includes a first beam axis and a first beam width;

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

the second beam of light includes a second beam axis and a second beam width; and

the second beam axis intersects the primary plane of the projection screen at an angle between 20° to 40°.

8. The device of claim 7, wherein:

the first beam width is between 30° to 35°; and

the second beam width is between 30° to 35°.

9. The device of claim 1, wherein:

the first source of light is positioned to project light onto a front side of the projection screen; and

the second source of light is positioned to project light onto a back side of the projection screen.

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

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

12. The device of claim 11, wherein the projection screen comprises plastic.

13. The device of claim 1, wherein:

the first source of light is positioned to project light onto a front side of the projection screen in a first area;

the second source of light is positioned to project light onto the front side of the projection screen in a second area; and

the second area is different than the first area.

14. The device of claim 13, wherein a portion of the first area overlaps a portion of the second area.

15. The device of claim 1, wherein the projection screen includes a simulated wick.

16. The device of claim 1, wherein:

the circuitry is configured to control the intensity of the first beam of light using pulse-width modulation; and the circuitry is configured to control the intensity of the second beam of light using pulse-width modulation.

17. The device of claim 1, wherein the circuitry is configured to control at least one of a color of the first beam of light and a color of the second beam of light.

18. The device of claim 17, wherein the circuitry is configured to control the color of the first beam of light and the color of the second beam of light.

19. The device of claim 18, wherein the circuitry is configured to independently control the color of the first beam of light and the color of the second beam of light.

* * * * *

EXHIBIT 4

**Copy of each
Assignment for United
States Patent No.
10,024,507**

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4699064

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
SEQUENCE:	1
CONVEYING PARTY DATA	
Name	Execution Date
BERNARD FOURNIER	01/04/2013
MICHAEL TOUTANT	04/09/2013
JONATHAN LANDRY	04/09/2013
RECEIVING PARTY DATA	
Name:	WINVIC SALES INC.
Street Address:	401 BENTLEY STREET
Internal Address:	UNIT #1
City:	MARKHAM
State/Country:	CANADA
Postal Code:	L3R 9T2
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15646926
CORRESPONDENCE DATA	
Fax Number:	(312)775-8100
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	312-775-8000
Email:	mhmpto@mcandrews-ip.com
Correspondent Name:	MCANDREWS, HELD & MALLOY, LTD.
Address Line 1:	500 W. MADISON STREET
Address Line 2:	34TH FLOOR
Address Line 4:	CHICAGO, ILLINOIS 60661
ATTORNEY DOCKET NUMBER:	25100US05
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	11/21/2017
Total Attachments: 4	

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ASSIGNMENT

File No.: 25100US02

Serial No.: 13/789,624

Inventors: Bernard Fournier
Michael Toutant
Jonathan Landry

Filing Date: March 7, 2013

In consideration of One Dollar (\$1.00) and other good and valuable considerations in hand paid, the receipt and sufficiency whereof are hereby acknowledged, each of the undersigned hereby assigns to **Winvic Sales Inc.**, a Canadian corporation, its successors and assigns, the entire right, title and interest in the invention or improvements of the undersigned disclosed in an application for Letters Patent of the United States, entitled: **"ELECTRONIC LUMINARY DEVICE WITH SIMULATED FLAME"** and identified as File No. **25100US02**, in the offices of **McANDREWS, HELD & MALLOY, LTD.**, and in said application and any and all other applications, both United States and foreign, which the undersigned may file, either solely or jointly with others, on said invention or improvements, and in any and all Letters Patent of the United States and foreign countries, which may be obtained on any of said applications, and in any continuation, continuation-in-part, divisional, re-examination, reissue or extension of such patents, and further assigns to said assignee the priority right provided by the International Convention.

Each of the undersigned hereby authorizes and requests the Commissioner of Patents and Trademarks to issue said Letters Patent to said assignee.

Each of the undersigned hereby authorizes and requests the attorneys of record in said application to insert in this assignment the filing date and serial number of said application when officially known.

Each of the undersigned warrants himself/herself to be the owner of the entire right, title and interest in said invention or improvements and to have the right to make this assignment, and further warrants that there are no outstanding prior assignments, licenses, or other encumbrances on the interest herein assigned.

For said considerations, each of the undersigned hereby agrees, upon the request and at the expense of said assignee, its successors and assigns, to execute any and all continuation, continuation-in-part, divisional, re-examination, extension, and substitute applications for said invention or improvements, and any necessary oath, affidavit or declaration relating thereto, and any application for the reissue, re-examination, or extension of any Letters Patent that may be granted upon said application, and any and all applications and other document for Letters Patent in foreign countries on said invention or improvements, that said assignee, its successors or assigns may deem necessary or expedient, and for the said considerations each of the undersigned authorizes said assignee to apply for patents for said invention or improvements in its own name in such countries where such procedure is proper and further agrees, upon the request of said

transactions involving such applications or patents, including the preparation and execution of preliminary statements, giving and producing evidence and performing any and all other acts necessary to obtain said Letters Patent, both United States and foreign, and vest all rights therein hereby conveyed in the assignee, its successors and assigns, whereby said Letters Patent will be held and enjoyed by the said assignee, its successors and assigns, to the full end of the term for which said Letters Patent will be granted, as fully and entirely as the same would have been held and enjoyed by the undersigned if this assignment had not been made.

B. Fournier

Bernard Fournier

1/4/2013

Date

Man Lambert

Witness

2/4/2013


Date

D. Brey

Witness

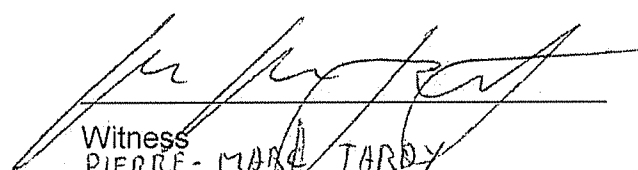
2/4/2013

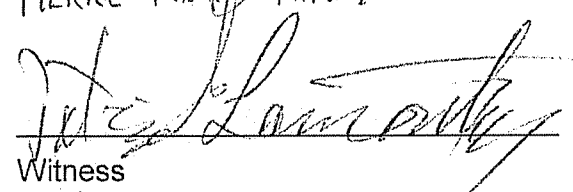
Date



Michael Toutant

April 09 2013
Date



Witness
PIERRE-MARC TARDIF


Witness
Patrick Lamontagne

APRIL 09 2013
Date

April 09 2013
Date

Jonathan Landry
Jonathan Landry

APRIL 09, 2013
Date

Pierre-Marc Tardy
Witness
PIERRE - MARC TARDY

APRIL 09 2013
Date

Patrick Lamontagne
Witness
Patrick LAMONTAGNE

April 09 2013
Date

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4699081

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	MERGER
EFFECTIVE DATE:	01/02/2016
SEQUENCE:	2

CONVEYING PARTY DATA	
Name	Execution Date
1058825 B.C. LTD.	01/22/2016
NII NORTHERN INTERNATIONAL HOLDING INC.	01/22/2016
WINVIC SALES INC.	01/22/2016
NII NORTHERN INTERNATIONAL INC.	01/22/2016

RECEIVING PARTY DATA	
Name:	1058825 B.C. LTD.
Street Address:	666 BURRARD STREET
Internal Address:	SUITE 1700, PARK PLACE
City:	VANCOUVER
State/Country:	CANADA
Postal Code:	V6C 2X8

PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15646926

CORRESPONDENCE DATA	
Fax Number:	(312)775-8100
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	312-775-8000
Email:	mhmpto@mcandrews-ip.com
Correspondent Name:	MCANDREWS, HELD & MALLOY, LTD.
Address Line 1:	500 W. MADISON STREET
Address Line 2:	34TH FLOOR
Address Line 4:	CHICAGO, ILLINOIS 60661

ATTORNEY DOCKET NUMBER:	25100US05
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	11/21/2017

PATENT

Total Attachments: 3

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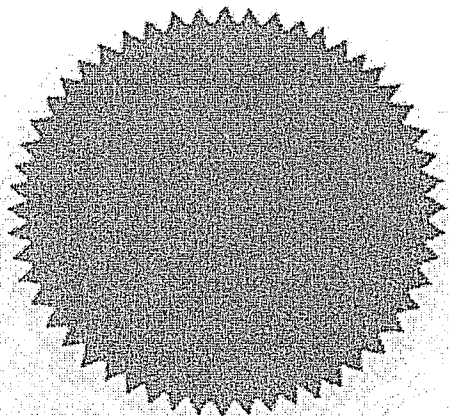


Number: BC1062406

CERTIFICATE OF AMALGAMATION

BUSINESS CORPORATIONS ACT

I Hereby Certify that 1058825 B.C. LTD., incorporation number BC1058825, and NII NORTHERN INTERNATIONAL HOLDINGS INC., incorporation number C1062388, and NII NORTHERN INTERNATIONAL INC., incorporation number C1062393, and WINVIC SALES INC., incorporation number C1062401 were amalgamated as one company under the name 1058825 B.C. LTD. on January 22, 2016 at 12:29 PM Pacific Time.



ELECTRONIC CERTIFICATE

Issued under my hand at Victoria, British Columbia

On January 22, 2016

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada

PATENT
REEL: 044495 FRAME: 0055



BC Registry
Services

Mailing Address:
PO Box 9431 Stn Prov Govt
Victoria BC V8W 9V3
www.corporateonline.gov.bc.ca

Location:
2nd Floor - 940 Blanshard Street
Victoria BC
1 877 526-1526

Vertical Short Form Amalgamation Application

FORM 14
BUSINESS CORPORATIONS ACT
Section 275

CERTIFIED COPY
Of a Document filed with the Province of
British Columbia Registrar of Companies

CAROL PREST

FILING DETAILS: Amalgamation Application for:
1058825 B.C. LTD.

Incorporation Number: **BC1062406**

Filed Date and Time: **January 22, 2016 12:29 PM Pacific Time**

Recognition Date and Time: **January 22, 2016 12:29 PM Pacific Time as a result of an Amalgamation.**

AMALGAMATION APPLICATION

The amalgamated company will adopt as its Notice of Articles, the Notice of Articles of the amalgamating holding corporation, 1058825 B.C. LTD., Incorporation No. BC1058825.

AMALGAMATION EFFECTIVE DATE:

The amalgamation is to take effect at the time that this application is filed with the Registrar.

AMALGAMATING CORPORATION(S) INFORMATION

Name of Amalgamating Corporation(s)	Incorporation Number in BC
1058825 B.C. LTD.	BC1058825
NII NORTHERN INTERNATIONAL HOLDINGS INC.	C1062388
NII NORTHERN INTERNATIONAL INC.	C1062393
WINVIC SALES INC.	C1062401

AMALGAMATION STATEMENT

This amalgamation has been effected without court approval. A copy of all of the required affidavits under section 277(1) have been obtained and the affidavit obtained from each amalgamating company has been deposited in that company's records office.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4699086

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	CHANGE OF NAME	
SEQUENCE:	3	
CONVEYING PARTY DATA		
	Name	Execution Date
	1058825 B.C. LTD.	01/22/2016
RECEIVING PARTY DATA		
Name:	NII NORTHERN INTERNATIONAL INC.	
Street Address:	666 BURRARD STREET	
Internal Address:	SUITE 1700, PARK PLACE	
City:	VANCOUVER	
State/Country:	CANADA	
Postal Code:	V6C 2X8	
PROPERTY NUMBERS Total: 1		
Property Type	Number	
Application Number:	15646926	
CORRESPONDENCE DATA		
Fax Number:	(312)775-8100	
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>		
Phone:	312-775-8000	
Email:	mhmpo@mcandrews-ip.com	
Correspondent Name:	MCANDREWS, HELD & MALLOY, LTD.	
Address Line 1:	500 W. MADISON STREET	
Address Line 2:	34TH FLOOR	
Address Line 4:	CHICAGO, ILLINOIS 60661	
ATTORNEY DOCKET NUMBER:	25100US05	
NAME OF SUBMITTER:	ANDREW B. KARP	
SIGNATURE:	/Andrew B. Karp/	
DATE SIGNED:	11/21/2017	
Total Attachments: 2		
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source=25100US04_Change_of_Name#page2.tif		

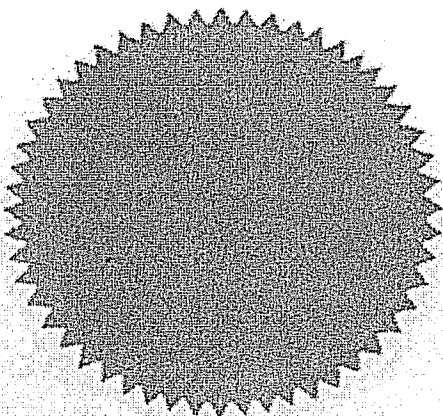


Number: BC1062406

**CERTIFICATE
OF
CHANGE OF NAME**

BUSINESS CORPORATIONS ACT

I Hereby Certify that 1058825 B.C. LTD. changed its name to NII NORTHERN INTERNATIONAL INC. on January 22, 2016 at 12:32 PM Pacific Time.



*Issued under my hand at Victoria, British Columbia
On January 22, 2016*

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada

ELECTRONIC CERTIFICATE

PATENT
REEL: 044189 FRAME: 0544

Date and Time: January 22, 2016 12:32 PM Pacific Time



BC Registry
Services

Mailing Address:
PO Box 9431 Stn Prov Govt
Victoria BC V8W 9V3
www.corporateonline.gov.bc.ca

Location:
2nd Floor - 940 Blanshard Street
Victoria BC
1 877 526-1526

Notice of Alteration

FORM 11
BUSINESS CORPORATIONS ACT
Section 257

Filed Date and Time: January 22, 2016 12:32 PM Pacific Time

Alteration Date and Time: Notice of Articles Altered on January 22, 2016 12:32 PM Pacific Time

NOTICE OF ALTERATION

Incorporation Number:

BC1062406

Name of Company:

1058825 B.C. LTD.

Name Reservation Number:

NR4930011

Name Reserved:

NII NORTHERN INTERNATIONAL INC.

ALTERATION EFFECTIVE DATE:

The alteration is to take effect at the time that this application is filed with the Registrar.

CHANGE OF NAME OF COMPANY

From:

1058825 B.C. LTD.

To:

NII NORTHERN INTERNATIONAL INC.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4780542

SUBMISSION TYPE:	CORRECTIVE ASSIGNMENT
NATURE OF CONVEYANCE:	Corrective Assignment to correct the SPELLING OF ASSIGNOR NII NORTHERN INTERNATIONAL HOLDING INC. previously recorded on Reel 044495 Frame 0053. Assignor(s) hereby confirms the ASSIGNMENT.
CONVEYING PARTY DATA	
Name	Execution Date
1058825 B.C. LTD.	01/22/2016
NII NORTHERN INTERNATIONAL HOLDINGS INC.	01/22/2016
WINVIC SALES INC.	01/22/2016
NII NORTHERN INTERNATIONAL INC.	01/22/2016
RECEIVING PARTY DATA	
Name:	1058825 B.C. LTD.
Street Address:	666 BURRARD STREET
Internal Address:	SUITE 1700, PARK PLACE
City:	VANCOUVER
State/Country:	CANADA
Postal Code:	V6C 2X8
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15646926
CORRESPONDENCE DATA	
Fax Number:	(312)775-8169
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	312-775-8000
Email:	mhmpto@mcandrews-ip.com
Correspondent Name:	MCANDREWS, HELD & MALLOY, LTD.
Address Line 1:	500 W. MADISON STREET
Address Line 4:	CHICAGO, ILLINOIS 60661
ATTORNEY DOCKET NUMBER:	25100US05
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	01/17/2018

Total Attachments: 6

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PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4699081

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	MERGER
EFFECTIVE DATE:	01/02/2016
SEQUENCE:	2

CONVEYING PARTY DATA	
Name	Execution Date
1058825 B.C. LTD.	01/22/2016
NII NORTHERN INTERNATIONAL HOLDING INC.	01/22/2016
WINVIC SALES INC.	01/22/2016
NII NORTHERN INTERNATIONAL INC.	01/22/2016

RECEIVING PARTY DATA	
Name:	1058825 B.C. LTD.
Street Address:	666 BURRARD STREET
Internal Address:	SUITE 1700, PARK PLACE
City:	VANCOUVER
State/Country:	CANADA
Postal Code:	V6C 2X8

PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15646926

CORRESPONDENCE DATA	
Fax Number:	(312)775-8100
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	312-775-8000
Email:	mhmpto@mcandrews-ip.com
Correspondent Name:	MCANDREWS, HELD & MALLOY, LTD.
Address Line 1:	500 W. MADISON STREET
Address Line 2:	34TH FLOOR
Address Line 4:	CHICAGO, ILLINOIS 60661

ATTORNEY DOCKET NUMBER:	25100US05
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	11/21/2017

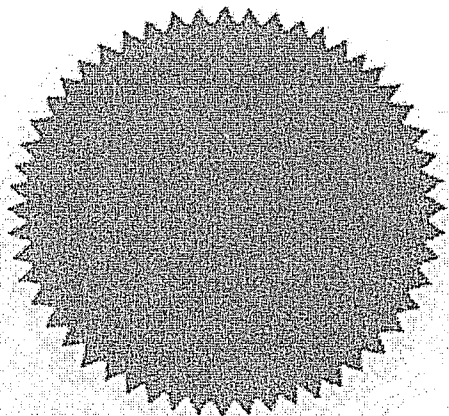


Number: BC1062406

CERTIFICATE OF AMALGAMATION

BUSINESS CORPORATIONS ACT

I Hereby Certify that 1058825 B.C. LTD., incorporation number BC1058825, and NII NORTHERN INTERNATIONAL HOLDINGS INC., incorporation number C1062388, and NII NORTHERN INTERNATIONAL INC., incorporation number C1062393, and WINVIC SALES INC., incorporation number C1062401 were amalgamated as one company under the name 1058825 B.C. LTD. on January 22, 2016 at 12:29 PM Pacific Time.



ELECTRONIC CERTIFICATE

Issued under my hand at Victoria, British Columbia

On January 22, 2016

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada

PATENT
REEL: 045085 FRAME: 0541



BC Registry
Services

Mailing Address:
PO Box 9431 Stn Prov Govt
Victoria BC V8W 9V3
www.corporateonline.gov.bc.ca

Location:
2nd Floor - 940 Blanshard Street
Victoria BC
1 877 526-1526

Vertical Short Form Amalgamation Application

FORM 14
BUSINESS CORPORATIONS ACT
Section 275

CERTIFIED COPY
Of a Document filed with the Province of
British Columbia Registrar of Companies

CAROL PREST

FILING DETAILS: Amalgamation Application for:
1058825 B.C. LTD.

Incorporation Number: **BC1062406**

Filed Date and Time: **January 22, 2016 12:29 PM Pacific Time**

Recognition Date and Time: **January 22, 2016 12:29 PM Pacific Time as a result of an Amalgamation.**

AMALGAMATION APPLICATION

The amalgamated company will adopt as its Notice of Articles, the Notice of Articles of the amalgamating holding corporation, 1058825 B.C. LTD., Incorporation No. BC1058825.

AMALGAMATION EFFECTIVE DATE:

The amalgamation is to take effect at the time that this application is filed with the Registrar.

AMALGAMATING CORPORATION(S) INFORMATION

Name of Amalgamating Corporation(s)	Incorporation Number in BC
1058825 B.C. LTD.	BC1058825
NII NORTHERN INTERNATIONAL HOLDINGS INC.	C1062388
NII NORTHERN INTERNATIONAL INC.	C1062393
WINVIC SALES INC.	C1062401

AMALGAMATION STATEMENT

This amalgamation has been effected without court approval. A copy of all of the required affidavits under section 277(1) have been obtained and the affidavit obtained from each amalgamating company has been deposited in that company's records office.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT4708299

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	CHANGE OF NAME	
CONVEYING PARTY DATA		
Name		Execution Date
NII NORTHERN INTERNATIONAL INC.		06/12/2017
RECEIVING PARTY DATA		
Name:	STERNO HOME INC.	
Street Address:	666 BURRARD STREET	
Internal Address:	SUITE 1700, PARK PLACE	
City:	VANCOUVER	
State/Country:	CANADA	
Postal Code:	V6C 2X8	
PROPERTY NUMBERS Total: 61		
Property Type	Number	
Application Number:	09929843	
Application Number:	10084272	
Application Number:	90010980	
Application Number:	10844075	
Application Number:	11053397	
Application Number:	11401139	
Application Number:	12927645	
Application Number:	13016570	
Application Number:	13253432	
Application Number:	13449100	
Application Number:	13096424	
Application Number:	13184724	
Application Number:	13185149	
Application Number:	13253436	
Application Number:	14152430	
Application Number:	14077736	
Application Number:	14055544	
Application Number:	14323369	
Application Number:	14055403	

Property Type	Number
Application Number:	13789624
Application Number:	13174153
Application Number:	13874089
Application Number:	14143877
Application Number:	14721697
Application Number:	14754077
Application Number:	14848714
Application Number:	15143065
Application Number:	15405810
Application Number:	14485912
Application Number:	62429123
Application Number:	62464613
Application Number:	62480819
Application Number:	62555154
Application Number:	62578765
Application Number:	14839578
Application Number:	15646926
Application Number:	29553547
Application Number:	29595545
Application Number:	29595548
Application Number:	15346475
Application Number:	15603223
Application Number:	15461167
Application Number:	29302060
Application Number:	29326475
Application Number:	29333482
Application Number:	29362431
Application Number:	29367381
Application Number:	29357721
Application Number:	29357722
Application Number:	29357723
Application Number:	29402055
Application Number:	29402056
Application Number:	29402057
Application Number:	29462567
Application Number:	29478066
Application Number:	29485680
Application Number:	29483104

Property Type	Number
Application Number:	29512517
Application Number:	29533318
Application Number:	29572318
Application Number:	29572320

CORRESPONDENCE DATA

Fax Number: (312)775-8100

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 312-775-8000

Email: dwilson@mcandrews-ip.com

Correspondent Name: MCANDREWS, HELD & MALLOY, LTD.

Address Line 1: 500 W. MADISON STREET

Address Line 4: CHICAGO, ILLINOIS 60661

ATTORNEY DOCKET NUMBER:	NII-STERNO
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	11/29/2017

Total Attachments: 1

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Number: BC1062406

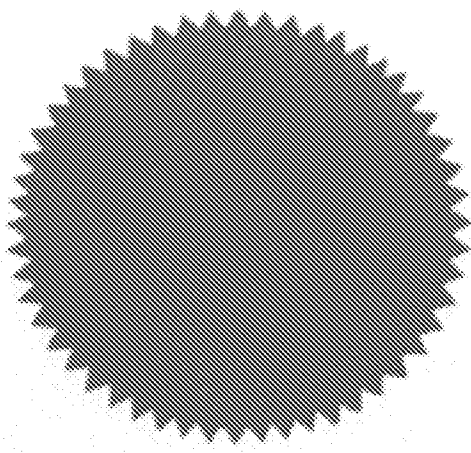
CERTIFICATE OF CHANGE OF NAME

BUSINESS CORPORATIONS ACT

I Hereby Certify that NII NORTHERN INTERNATIONAL INC. changed its name to STERNO HOME INC. on June 12, 2017 at 03:55 PM Pacific Time.

*Issued under my hand at Victoria, British Columbia
On June 12, 2017*

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada



ELECTRONIC CERTIFICATE

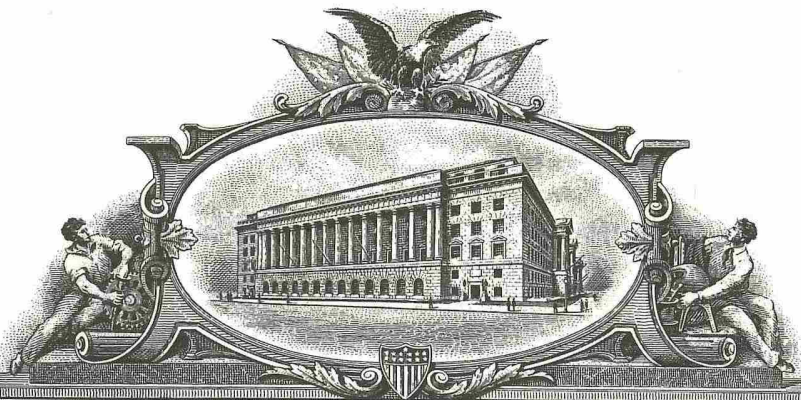
RECORDED: 11/29/2017

**PATENT
REEL: 044762 FRAME: 0393**

EXHIBIT 5

**Certified Copy of
United States Patent
No. 10,352,517**

U 8045180



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 21, 2020

**THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM
THE RECORDS OF THIS OFFICE OF:**

U.S. PATENT: 10,352,517

ISSUE DATE: July 16, 2019

**By Authority of the
Under Secretary of Commerce for Intellectual Property
and Director of the United States Patent and Trademark Office**




R GLOVER
Certifying Officer



US010352517B2

(12) **United States Patent**
Carpintero et al.

(10) **Patent No.:** **US 10,352,517 B2**
(45) **Date of Patent:** ***Jul. 16, 2019**

(54) **ARTIFICIAL CANDLE WITH MOVEABLE
PROJECTION SCREEN POSITION**

(71) Applicant: **Sterno Home Inc.**, Vancouver (CA)

(72) Inventors: **Carlos Carpintero**, Delson (CA);
Lucian Hurdac, Ste-Julie (CA); **Carl
Marinier**, Sainte-Catherin (CA)

(73) Assignee: **STERNO HOME INC.**, Vancouver
(CA)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

This patent is subject to a terminal dis-
claimer.

(21) Appl. No.: **16/123,351**

(22) Filed: **Sep. 6, 2018**

(65) **Prior Publication Data**

US 2019/0072251 A1 Mar. 7, 2019

Related U.S. Application Data

(60) Provisional application No. 62/555,154, filed on Sep.
7, 2017.

(51) **Int. Cl.**
F21S 6/00 (2006.01)
F21S 9/02 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **F21S 10/046** (2013.01); **F21S 6/001**
(2013.01); **F21S 9/02** (2013.01); **F21V 11/18**
(2013.01);

(Continued)

(58) **Field of Classification Search**
CPC . F21S 10/046; F21S 6/001; F21S 9/02; F21V
11/18; F21V 23/0442;

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

212,401 A 2/1879 Requa

643,493 A 2/1900 Fuller

(Continued)

FOREIGN PATENT DOCUMENTS

CN 2499694 Y 7/2002

CN 2562059 Y 7/2003

(Continued)

OTHER PUBLICATIONS

"12v ac party lights," thefind, retrieved from the Internet on Jan. 26,
2011. (4 pages).

(Continued)

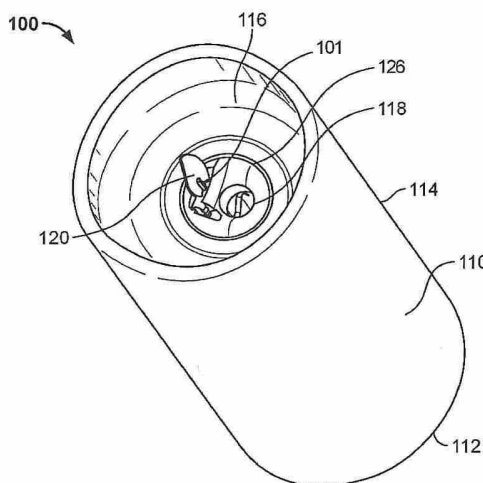
Primary Examiner — Mary Ellen Bowman

(74) *Attorney, Agent, or Firm* — McAndrews, Held &
Malloy, Ltd.

(57) **ABSTRACT**

A flameless candle includes: a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface; a light source positioned in the interior region of the candle body; a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force; and a projection screen. The projection screen is configured to receive the first mechanical force and responsively move to a first position and receive the second mechanical force and responsively move to a second position. When the projection screen is moved to the second position, the light source is automatically energized such that a light is emitted onto the projection screen. When the projection screen is moved to the first position, the light source is automatically de-energized such that the light is not emitted.

15 Claims, 8 Drawing Sheets



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F21V 23/04 (2006.01)
H05B 33/08 (2006.01)
H05B 37/02 (2006.01)
F21W 121/00 (2006.01)
F21Y 115/10 (2016.01)
- (52) **U.S. Cl.**
 CPC *F21V 23/0442* (2013.01); *H05B 33/0845*
 (2013.01); *H05B 37/0281* (2013.01); *F21W*
2121/00 (2013.01); *F21Y 2115/10* (2016.08)
- (58) **Field of Classification Search**
 CPC H05B 33/0845; H05B 37/0281; F21Y
 2115/10; F21W 2121/00
 See application file for complete search history.
- (56) **References Cited**
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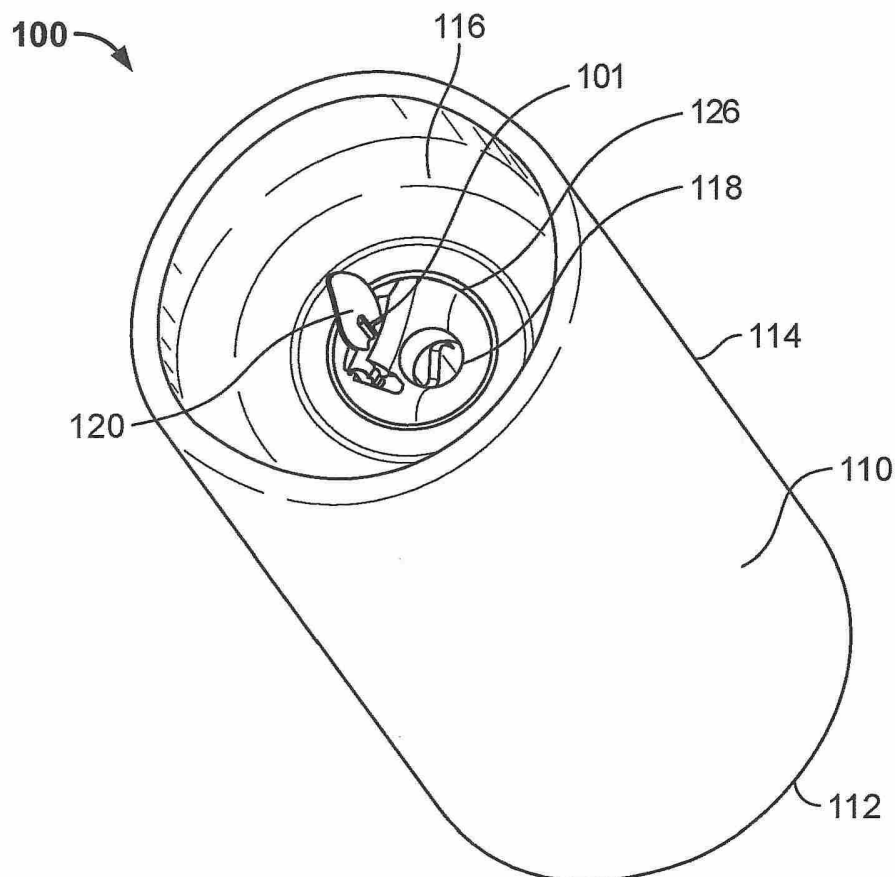


FIG. 1

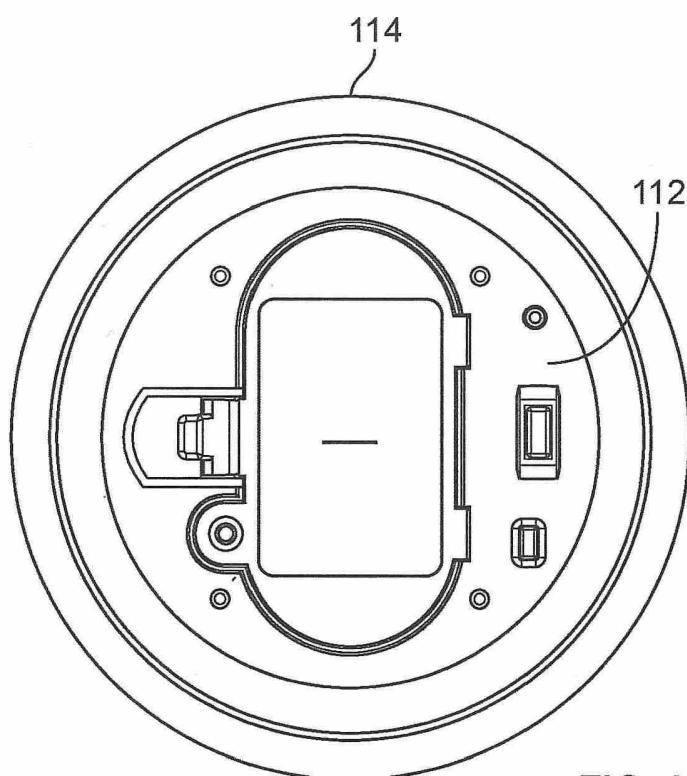


FIG. 2

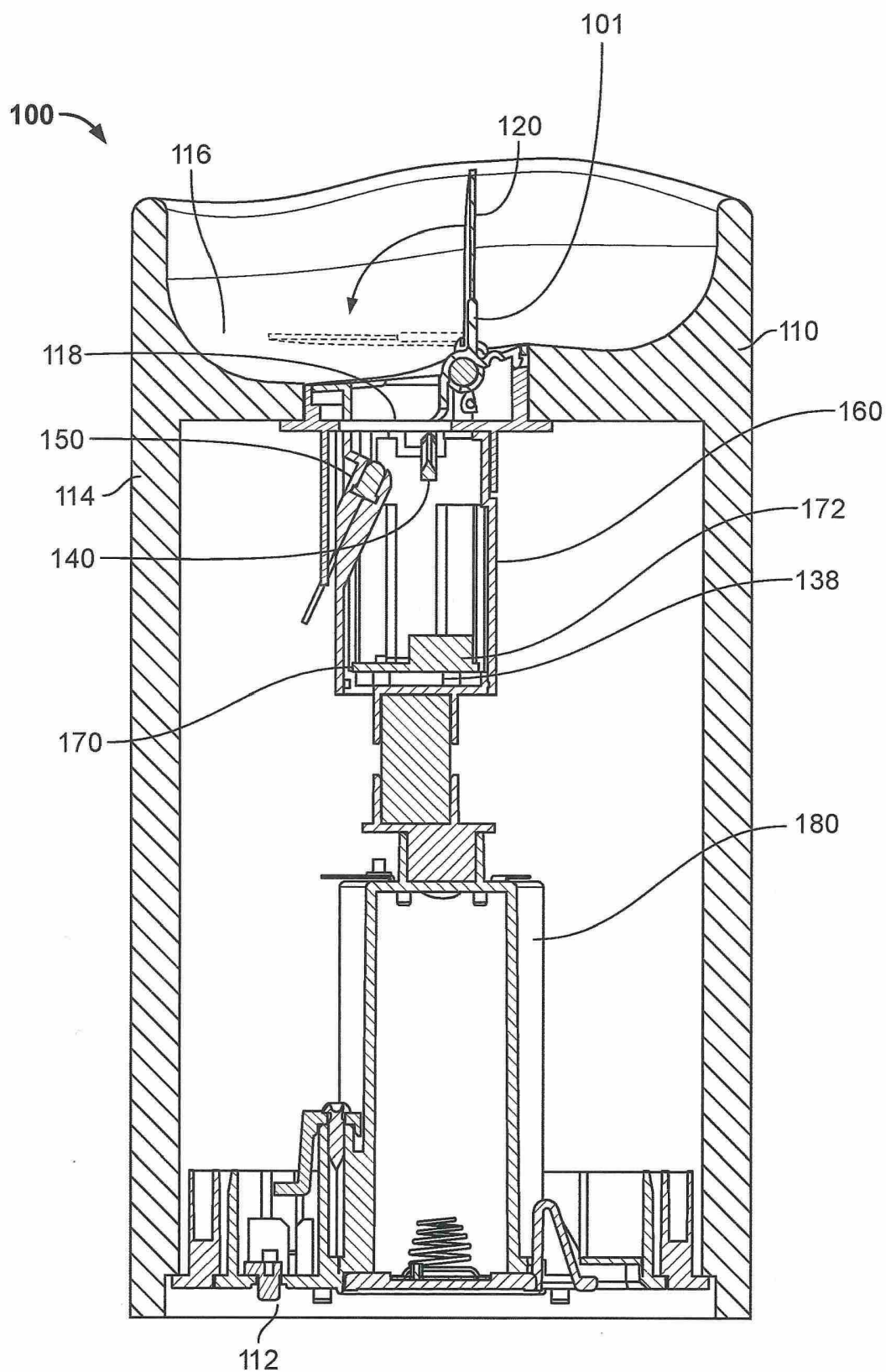


FIG. 3

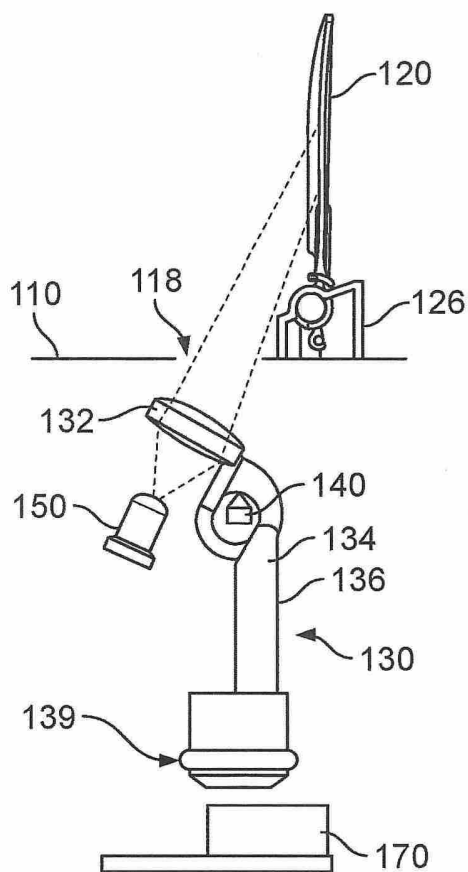


FIG. 4A

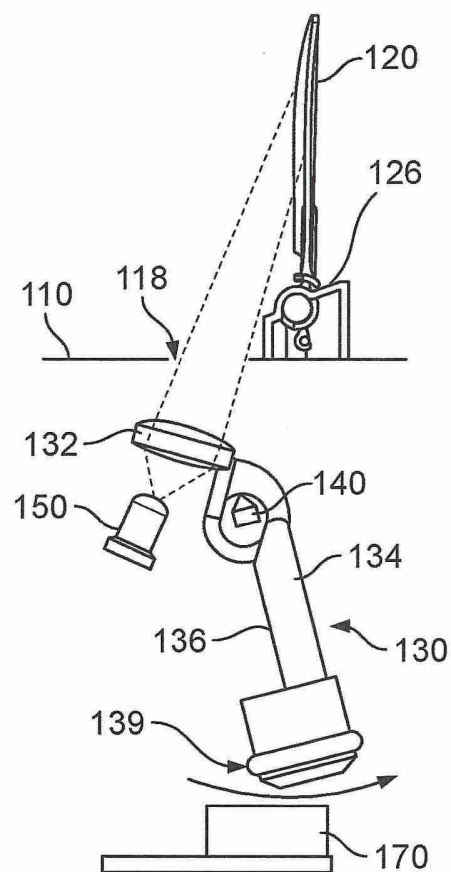


FIG. 4B

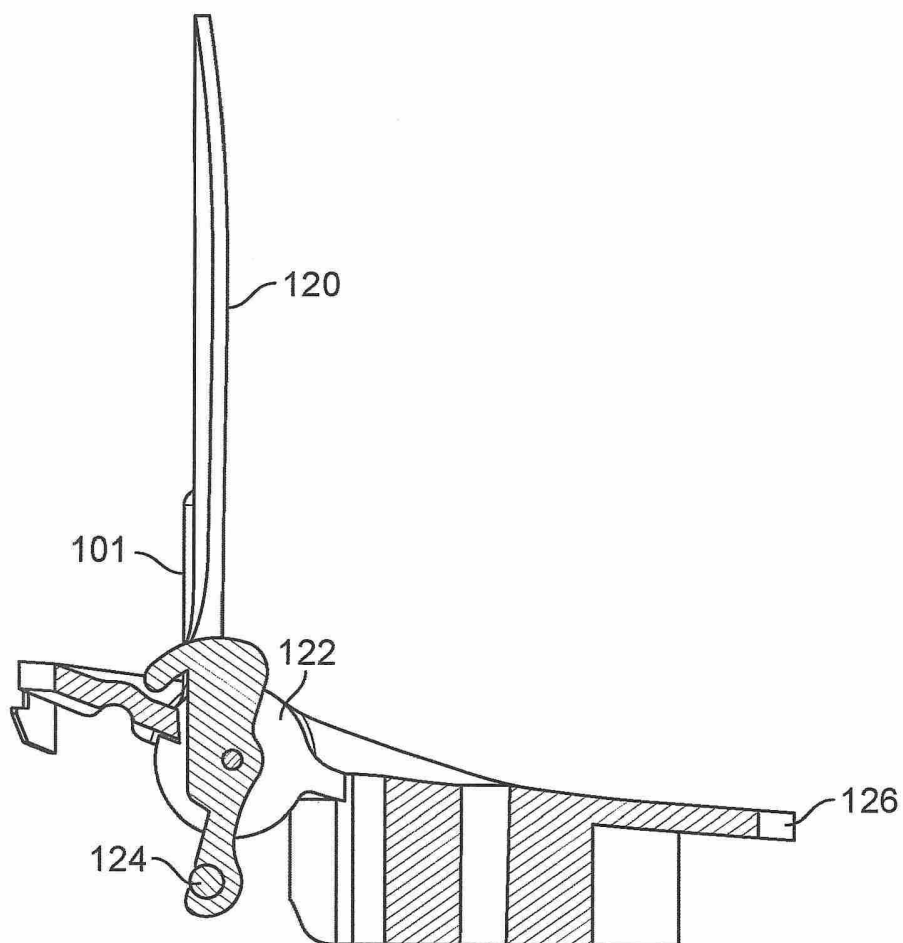


FIG. 5A

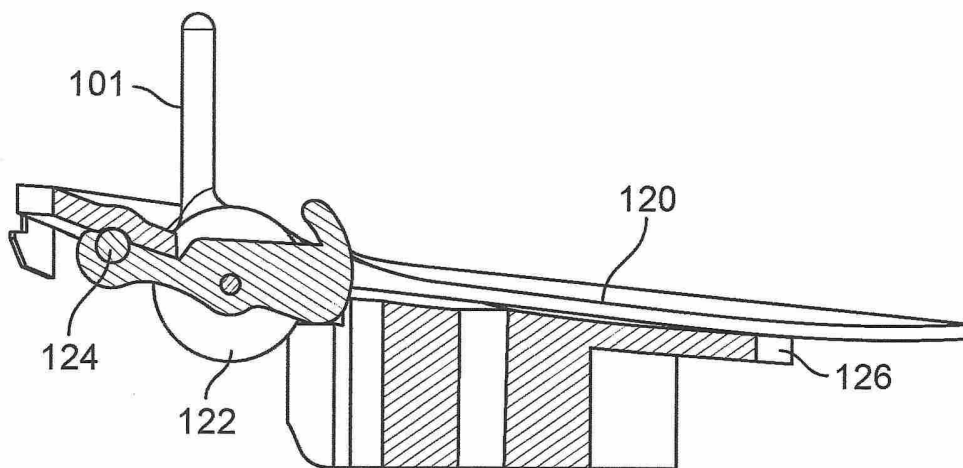


FIG. 5B

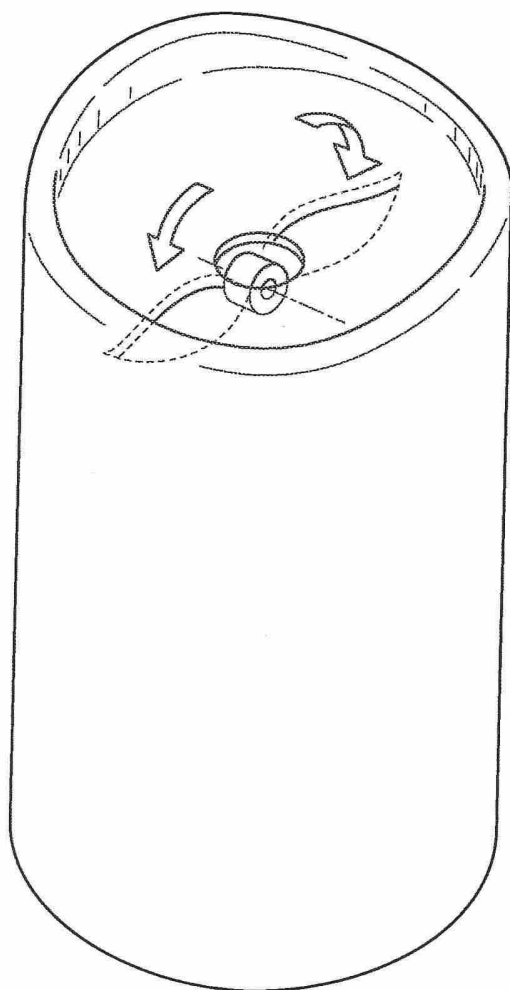


FIG. 6

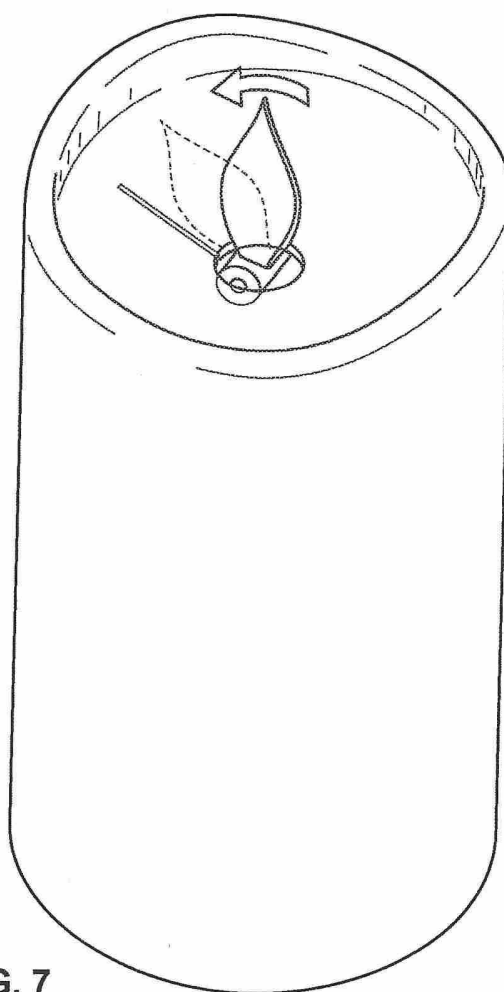


FIG. 7

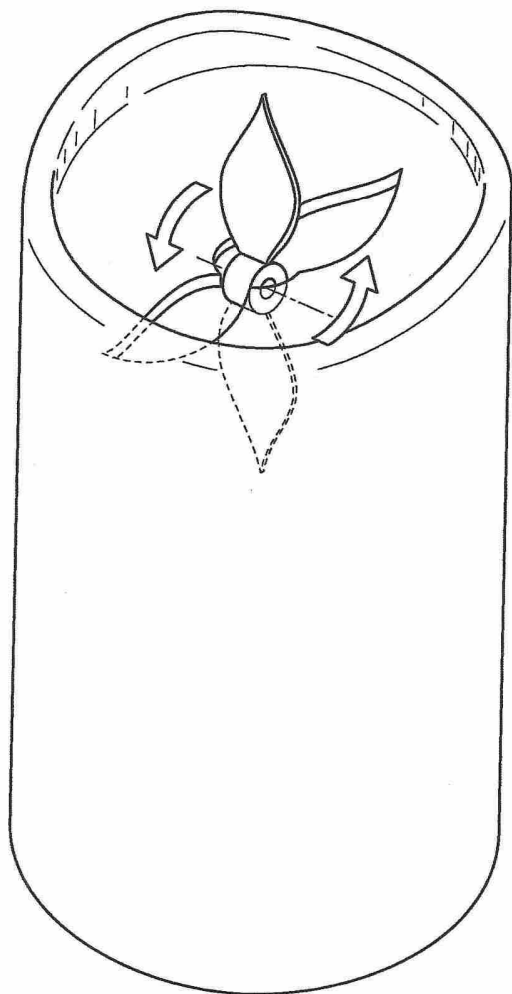


FIG. 8

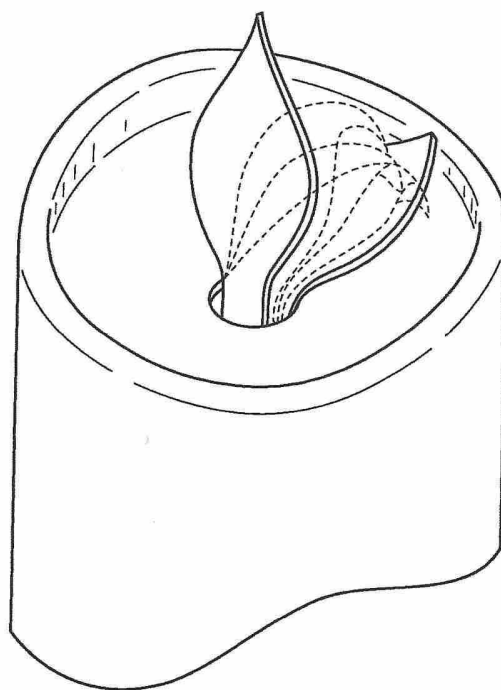


FIG. 9

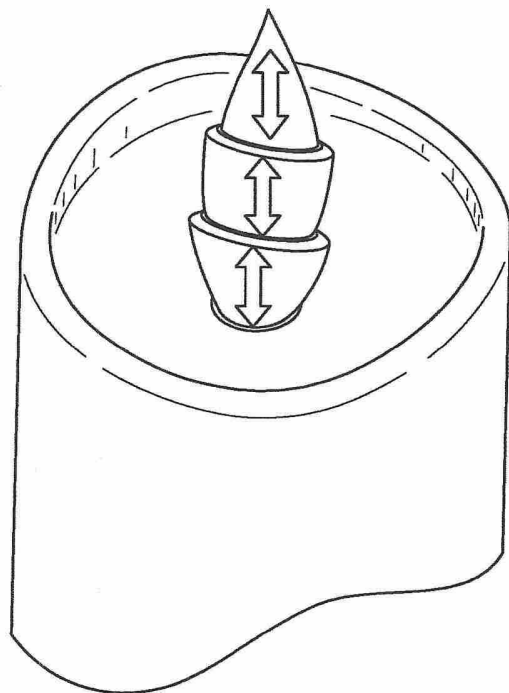


FIG. 10

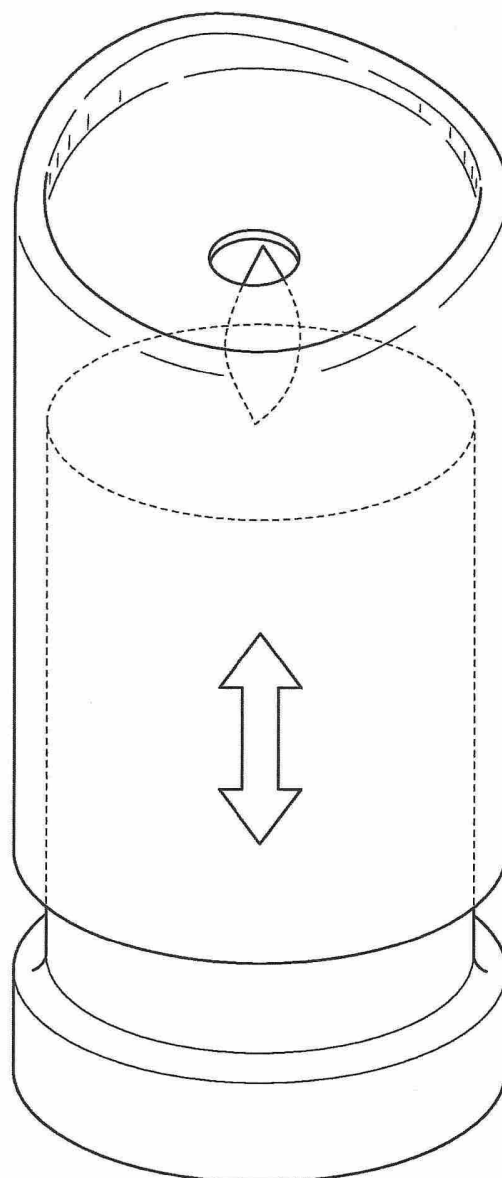


FIG. 11

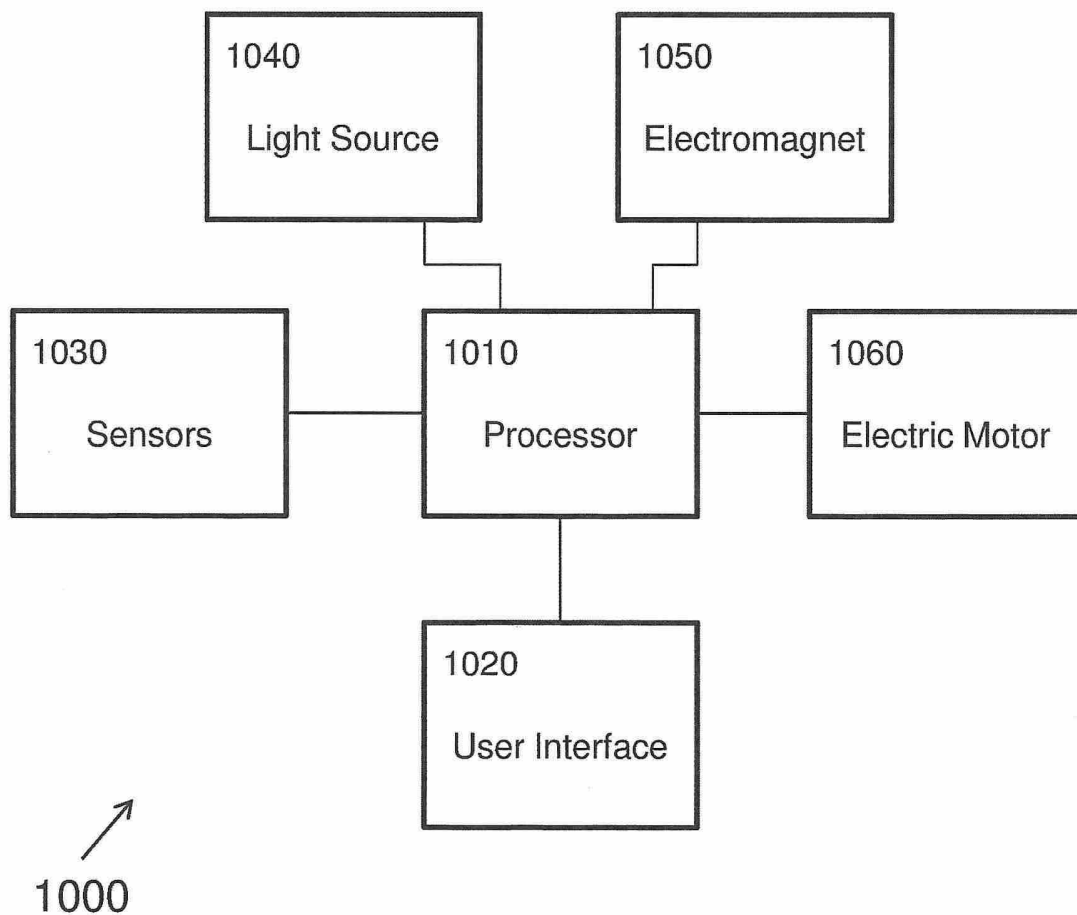


FIG. 12

1

ARTIFICIAL CANDLE WITH MOVEABLE PROJECTION SCREEN POSITION

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Prov. Pat. Appl. No. 62/555,154 filed on Sep. 7, 2018, the entirety of which is herein incorporated by reference.

BACKGROUND

Generally, this application relates to artificial (flameless) candles that use a non-flammable light source (such as one or more light-emitting diodes (LEDs)) to create the illusion of a flamed candle.

SUMMARY

According to certain inventive techniques, a flameless candle includes: a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface; at least one light source positioned in the interior region of the candle body; a force-inducing portion (e.g., an electrical motor or an electromagnet) configured to alternatively induce a first mechanical force and a second mechanical force; and a projection screen (e.g., one that includes a flame shape). The projection screen is configured to receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body and receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body. When the projection screen is moved to the second position, the at least one light source is automatically energized such that a light is emitted onto the projection screen. When the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.

According to one technique, a base of the candle is resting on a substantially horizontal surface: when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.

According to another technique, when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position. When the projection screen is in the first position, the projection screen may be within the interior region of the candle body.

According to one technique, the first mechanical force and the second mechanical force may be rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.

The candle may include an imitation wick extending upwardly from the upper surface of the candle body. The candle may include an ON/OFF actuator that, when actuated, causes the projection screen to transition between the first position and the second position. The candle may include a timer (e.g., a 24-hour timer) configured to periodically cause the projection screen to transition between the first position and the second position.

The candle may include a sensor to detect whether the projection screen is in the first position, wherein when the

2

sensor detects that the projection screen is in the first position, the at least one light source is turned OFF. The candle may include a sensor to detect whether the projection screen is in the second position, wherein when the sensor detects that the projection screen is in the second position, the at least one light source is turned ON. A moveable lens may be interposed between the at least one light source and the projection screen.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 illustrates a top perspective view of a flameless candle, according to certain inventive techniques.

FIG. 2 illustrates a bottom plan view of a flameless candle, according to certain inventive techniques.

FIG. 3 illustrates a cross-sectional side view of a flameless candle, according to certain inventive techniques.

FIGS. 4A and 4B illustrate a moving lens altering a beam of light projected onto a projection screen, according to certain inventive techniques.

FIG. 5A illustrates a projection screen of a flameless candle in an illuminated state, according to certain inventive techniques.

FIG. 5B illustrates a projection screen of a flameless candle in an extinguished state, according to certain inventive techniques.

FIGS. 6-11 illustrate different flameless candle designs, according to certain inventive techniques.

FIG. 12 is a block diagram of electrical components in a flameless candle, according to certain inventive techniques.

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

As disclosed herein, an inventive flameless candle is disclosed. The candle can be turned OFF and ON and/or transitioned between an illuminated state and extinguished state. When in the illuminated state, the projection screen may be positioned in a vertical position and plainly visible. At least one light source may project onto the projection screen, thereby creating the illusion of a candle with a lit flame. When the candle is placed in the extinguished state, the flame screen is repositioned such that it is not visible or is less visible. The light source may also be turned OFF. An artificial wick may remain visible, even when the candle is in the extinguished state, thereby maintaining the illusion of a conventional, extinguished candle.

FIGS. 1-5B illustrate different views of a flameless candle 100, according to certain inventive techniques. The flameless candle 100 includes a candle body 110 and a projection screen 120. The candle body 110 may have a base 112, an upper surface 116, and a sidewall 114 extending between the base 112 and the upper surface 116. The candle body 110 may form a hollow interior region. The candle 100 may resemble a pillar candle (as shown), a taper candle, a votive, a tea light, other decorative candles, or the like. The candle body 110 may be translucent or include translucent regions.

The translucence may be chosen so as to give the candle 100 the appearance of a conventional candle. Specifically, when light from a light source (e.g., one or more light-emitting components, such as LEDs) within the candle body 110 emanates through the sidewall 114 it may appear diffuse and have the character of light from a conventional candle. The candle body 110 may be formed of wax or plastic or other suitable material. When the candle body 110 is not formed of wax, it may include a waxen surface (for example, dipped in wax) to give the feel and translucent quality of real wax.

The upper surface 116 may include a concave recess (when viewed from above) to give the candle body 110 the appearance that the candle 100 has been used and some wax has been consumed by flame. The upper surface 116 may include an aperture 118. The aperture 118 may be located substantially along a primary axis in a vertical dimension of the candle body 110. The aperture 118 may allow light to pass from within the hollow interior region of the candle body 110 onto the projection screen.

The upper surface 116 may have a variety of different shapes. For example, the upper surface 116 may be shaped like a bowl or a portion of a bowl. Optionally, the upper surface 116 may include a flat bottom surface. The upper region of the sidewall 114 may have a varying height around the top perimeter of the candle 100. The upper surface 116 may form a backdrop whereby the rim of the sidewall 114 is higher in the back of the candle body 110 than it is in the front.

The projection screen 120 may be adjacent to, proximate to, and/or extend upwardly from (or through) the aperture 118 in the upper surface 116. The projection screen 120 may be offset with respect to or positioned off of a primary axis along a vertical dimension at which the aperture 118 is located.

The projection screen 120 may be made of plastic, wax, metal, or other suitable material. The projection screen 120 may be used with external light sources or for internally projected light—i.e., external and internal to the projection screen 120. For example, the projection screen 120 could have one or more light sources projecting light from below, thereby resulting in internally projected light. A light pipe may be employed to transfer the light from the light source to the projection screen 120 (either internally or externally to the projection screen 120). The projection screen 120 itself, or a portion thereof, may include a light pipe.

The projection screen 120 may include a flame shape. The projection screen 120 outer surface may have two faces, or three or more faces. The projection screen 120 may be round, spherical, cylindrical, egg shape or elliptical. When viewed from the front, the outer surface of the projection screen 120 may be convex, concave, flat, or irregular (for example, a mix of convex, concave, spherical, cylindrical, egg shape and/or flat regions). The projection screen 120 may include a portion or region that imitates a wick. Such a portion or region may be a painted region, a recessed region, or an aperture (i.e., a hole through the flame screen). The candle 100 may also include an artificial or imitation wick 101. The imitation wick 101 may extend upwardly from the upper surface 116 of the candle 100. The imitation wick 101 may always extend upwardly from the upper surface 116 of the candle 100, even when the candle 100 is turned OFF or placed in the extinguished state. This way, the candle 100 may maintain the illusion of a conventional candle, even when the light source 150 of the candle 100 are not generating or emitting any light. The projection screen 120 may include an aperture that is larger than an artificial wick 101, such that when the projection screen 120 is readily

apparent, it substantially surrounds the artificial wick 101, thereby enhancing the illusion of a conventional wick that is burning.

The projection screen 120 may have a flame shape as depicted. The projection screen 120 may have two outer surfaces (front and back, as depicted), or three or more outer surfaces. When viewed from the front, the front outer surface may be convex, concave, flat, or irregular (for example, a mix of convex, concave, and/or flat regions). The projection screen 120 may include a portion or region that imitates a wick. Such a portion or region may be a painted region, a recessed region, or an aperture (i.e., a hole through the projection screen 120).

The projection screen 120 may be textured, smooth, opaque, and/or translucent. According to one technique, the translucency of the projection screen 120 is selected such that an illusion of a flame appears on both the front and rear outer surfaces. The projection screen 120 may have different translucencies and/or textures on the front and back of the exterior surfaces of the projection screen 120. Also, different regions on the same surfaces may have different translucencies, textures, and/or thicknesses.

When the candle 100 is turned ON or is placed in an illuminated state (for example, as depicted in FIG. 5A), the projection screen 120 may be positioned in a substantially vertical orientation from a horizontal plane (e.g., normal, unslanted resting surface for the candle). The candle 100 may be placed in an illuminated state when the projection screen 120 is moved (i.e., has been moved, is still moving, or will immediately be moved as a result of the candle being turned ON or being placed into an illuminated state) into a substantially vertical position in reference to the upper surface. In the illuminated state, the angle of the projection screen 120 in reference to a horizontal plane may vary between 75 to 105 degrees and therefore be substantially vertical. When the candle 100 is turned ON or is placed in an illuminated state, the projection screen is maintained in a substantially vertical position by having its weight balanced toward the back of the candle and resting on a support step.

In the illuminated state, the light source 150 (which may include one or more light-generating elements, such as LEDs) may be ON. The illuminated state may begin as soon as there has been an instruction (e.g., actuation of a user interface control) to place the candle 100 in the illuminated state, even though the light source 150 may not yet be energized. The projection screen 120 may act as diffuser and/or as screen to reflect and/or diffuse the light from the light sources 150.

The projection screen 120 may be positioned in a substantially horizontal orientation when the candle 100 is turned OFF or otherwise placed in an extinguished state (for example, as depicted in FIG. 5B), whereby the light source 150 is OFF. Alternatively, the projection screen 120 can be positioned substantially below the upper surface 116. The candle 100 may not be illuminated (at least not above the upper surface 116), when the projection screen 120 is moved (i.e., has been moved, is still moving, or will immediately be moved as a result of the candle being turned OFF or being placed into an extinguished state) in the substantially horizontal position in reference to a horizontal plane or substantially below the upper surface 116. Illumination may cease before the projection screen 120 transitions from the substantially vertical to substantially horizontal orientation. When not illuminated, the angle of the projection screen 120 in reference to the horizontal plane may vary between 15 to -15 degrees (i.e., substantially horizontal). In the extinguished state, the light source 150 projecting through the

5

aperture 118 is OFF. Other light sources (e.g., user interface or internal illumination sources) may remain ON. When the candle 100 is turned OFF or is placed in an extinguished state, the projection screen 120 is maintained in a substantially horizontal position by having its weight resting on the upper surface 116 or other structure, such as projection screen substructure 126.

The projection screen 120 may be moved between the positions by a force-inducing portion, such as electric motor 122. The electrical motor 122 may be a DC coreless brush motor. Other possible force-inducing portions may include an electromagnet or a manually driven system that may include a push-button, lever, or other type of actuator mechanically coupled with the projection screen 120.

The projection screen 120 may be fixed by a barrel hinge or other kinds of suitable hinge to the upper surface 116 (or to a hinge-receiving/hinge-mounting portion that does not move with respect to the upper surface 116, such as projection screen substructure 126). Alternatively, the projection screen 120 could be coupled to a rail or a linear guided channel. The hinge may include a pivot to transfer a rotational force at a lower position of the projection screen 120. The rotational force may be supplied by a force-inducing portion, such as electric motor 122.

The pivoting portion of the hinge may be connected directly or indirectly to the force-inducing portion (e.g., electric motor 122). If the pivot portion of the hinge is indirectly connected to the force-inducing portion, the power transfer may be accomplished through gear(s) or pulley(s) or any other component(s) that may transfer rotational power from the force-inducing portion to the pivot portion of the hinge.

The projection screen 120 may extend the opposite side of the pivot portion of the hinge to balance the weight of the projection screen 120. A counterweight 124 may also be attached or coupled to the projection screen 120. Gravity contributed by the counterweight 124 and/or projection screen 120 extension may then be used as a contributing force to move the projection screen 120 between positions (e.g., substantially vertical and substantially horizontal).

The force-inducing portion may include an electrical motor 122, electromagnets or any other suitable source that may generate the rotational power required to move the projection screen 120 from the substantially horizontal position to/from the substantially vertical position or, alternatively, to/from a position substantially above or substantially below the upper surface 116.

The candle 100 may include various components in addition to the candle body 110 and the projection screen 120, such as: a projection screen substructure 126 attached (e.g., movably attached) or otherwise coupled to the projection screen 120; a moving portion 130; a supporting portion 140 that supports the moving portion 130; a light source 150 (for example, one or more LEDs); a module housing 160, including a light source securing portion; and an electromagnet and control circuitry 170. The aforementioned components may be included in a module. For example, the electromagnet and control circuitry 170 may be located within or outside of the module housing 160. The assembled module may be inserted through the underside of the candle body 110 and seated into the aperture 118 of the upper surface 116. The candle 100 may also include a battery compartment 180, batteries (for example, two "C" batteries as depicted), and a battery door. These components may be located, at least partially or substantially, within the hollow interior region of the candle body 110.

6

The projection screen substructure 126 may be configured to be inserted into the aperture 118 of the upper surface 116 (for example, inserted from underneath or from above the upper surface 116). For example, the projection screen substructure 112 may have a stair-step profile with a lower tier having a larger radius than an upper tier. The substructure 126 may have a generally circular profile (for example, the tier(s) may be generally circular) when viewed from above, or it may have other shapes such as ovate, square, rectangular, etc. The lower tier of the substructure 126 may act as a stop to prevent over-insertion of the substructure 126 into the aperture 118. The aperture 118 may have a stair-step profile complementary to that of the substructure 126 tiers. This may facilitate accurate seating of the substructure 126 into the aperture 118. Once properly seated, the upper surface of the upper tier may be flush with or slightly below the upper surface 116. The substructure 126 may be secured to the candle body by friction fit, wax, mechanical means (for example, the substructure 126 having anchoring portions that anchor into a waxy material on the upper surface 116), or other epoxy.

The projection screen substructure 126 may have an aperture such that light projected from below can be projected onto the projection screen 120. As shown, the projection screen 120 is offset and positioned off of a primary axis along a vertical dimension at which the aperture 118 is located. Specifically, the projection screen 120 extends from an upper surface of a rim of the upper tier of the substructure 126. When the substructure is seated in the aperture 118, the light passing through the aperture of the substructure 126 also passes through the aperture 118 of the upper surface 116. The substructure 126 may have one or more engaging portions that engage with portions that generally are below the substructure 126. For example, the lower tier of the substructure 126 may have two engaging portions (each having an aperture) that engages with complementary portions on the module housing 160 (for example, spring tabs), such that the substructure 126 becomes a portion (for example, top portion) of the module 160.

The supporting portion 140 may support the moving portion 130, such that the moving portion can move in three dimensions. The supporting portion 140 may include a U-shape or V-shape region. The supporting portion 140 may nest in, be seated in, or connect to the module housing 160. As shown, the module housing 160 includes two slots that receive opposite ends of the supporting portion 140. The projection screen substructure 126 may secure the supporting portion 140 in the module housing 160 by forming a top to the receiving slots. The supporting portion 140 may be substantially rigid. It may include a tapered edge in all of or a portion of the top surface of the supporting portion 160. The tapered edge may come to a relatively sharp point. The moving portion 130 may rest on the top-surface tapered edge of the supporting portion 140. By having a tapered edge, freer movement of the moving portion 130 may be facilitated. For example, the tapered edge may allow for less friction and less interference with the moving portion 130. The tapered edge may permit at least three degrees of freedom of the moving portion 130. The region of the moving portion 130 that rests on the supporting portion 140 may also have a tapered edge (for example, tapered in the opposite direction, such that a wider region is higher than the narrower region that contacts the supporting portion).

The moving portion 130 may include a lens 132 and an arm 134. The moving portion 130 may optionally include an intermediate region 136 (for example, including an annular shaped region with an aperture as depicted) between the lens

132 and the arm 134 (or the lens 132 and arm 134 may be directly connected). The moving portion 130 may also include a magnet 138 seated, positioned, or located on the arm 134 (for example, a lower region of the arm 134). In this context, and as generally used herein, the word "on" is broadly understood to mean attached to, positioned on/in, located on/in, or the like. The moving portion may optionally include a bumper 139.

The lens 132 may include a transparent material such as acrylic. The lens 132 may have two or more surfaces (for example, a top surface and bottom surface as illustrated). The surfaces may include concave regions, convex regions (as shown for both surfaces), flat regions, or have an irregular surface (for example, a combination of concave, convex, and/or flat regions). When viewed from the top or bottom, the lens may have a substantially round shape, or other shapes are possible, such as ovate, square, or the like. The surfaces may touch each other, or may be separated by a lateral region (as depicted). When the moving portion 130 is in a resting position, the lens 132 may have a diagonal orientation (for example, 25 to 55 degrees with respect to a horizontal plane). According to one technique, the angle is approximately 40 degrees. Even when the lens 132 is moved to a maximum or minimum amount, it may still have a diagonal orientation (for example, 12 to 68 degrees). According to one technique, when the resting angle is approximately 40 degrees, the minimal angle is approximately 27 degrees and the maximal angle is approximately 53 degrees.

The arm 134 may extend generally downwardly, and it may be sized and arranged to act as a counterbalance to the lens 132 to maintain the lens 132 at a desired orientation when the moving portion 130 is in a resting position. The arm 134 may have an enlarged or heavier region towards the bottom. The arm 134 may have an area that accepts the magnet 138. For example, the arm 134 may have a recess on a bottom surface that is sized to receive the magnet 138. The magnet may be glued and/or press fit to the arm 134. The magnet 138 may include a material such as nickel or a nickel alloy.

The intermediate region 136 may abut the lens 132 and the arm 134. The intermediate region 136 may define an angle between the lens 132 and the arm 134, such as between 45 and 75 degrees (although this orientation may be achieved without the intermediate region 136). According to one technique, the intermediate region 136 may define an angle of approximately 60 degrees between the lens 132 and the arm 134. The intermediate region 136 may include a region that contacts the supporting portion 140. Such a region may include an aperture (for example, generally annular in shape, as shown) that substantially encircles the supporting portion 140. Such an arrangement may prevent the moving portion 130 from being constrained in movement by the supporting portion 140 (for example, prevents the moving portion from falling down or around or even coming out of the candle 100). There is no requirement, however, that the intermediate region 136 or the moving portion 130 have such an aperture. Other shapes for engaging the supporting portion 140 may be possible, such as an arch, a notch having an inverted V-shape (for example, a notch having a wider cut-out angle than the angle of taper on the upper surface of the supporting portion 140), or the like.

The bumper 139 may absorb impact of the moving portion if it comes in contact with other objects, such as the module housing 160. The bumper 139 may include a compressible material, such as rubber or ethylene propylene rubber. The bumper 139 may prevent a sound from being

made when the moving portion 130 comes into contact with other objects. The bumper 139 may be located in a lower region of the moving portion 130, for example, on an enlarged region as shown in the figures. The bumper 139 may substantially or completely encompass such a region.

The light source 150 may include one or more light-emitting diodes (LEDs). The light source 150 may be selected to emit a color that resembles a color of a conventional candle flame. The lens 132 may also be colored to enhance or adjust the color of the projected light from the light source 150. For example, the lens 132 may include a colored region and an uncolored region (or it may be entirely colored or uncolored). In the example of a colored region, such a region may be blue in color (e.g., painted, printed, a sticker, colored epoxy, or the like). For example, areas on the rim of the lens 132 may be tinted or otherwise colored blue to cause the outer regions of the projected light to be bluish in color. When projected on the projection screen 120, this may enhance the illusion of a conventional candle flame.

The light source 150 may be arranged to generate a light having varying intensity (for example, to cause a flickering effect). The perceivable intensity of the light source 150 may vary by no more than $\pm 25\%$ of the average power as measured in lumens. By perceivable intensity, it is understood that this is the intensity recognizable by the human eye. The actual instantaneous power delivered to a light source 150 may be much more than 25%, such as for example by using pulse-width modulation techniques in which the power to a light source 150 is switched ON and OFF very rapidly.

The light source 150 may have a lens separate from lens 132. For example, the light source 150 may include a type of a conventional LED package that includes a lens where the light exits the package. The light source 150 may have an embedded circuit, such as one including a microprocessor and associated circuitry (e.g., an oscillator) that causes the flickering effect (or other effects, such as fade in/out, color changing, or the like). The light source 150 (independent of the lens 132 in the moving portion 130) may be configured to generate a beam of light having an associated beam-width—for example, a beam-width between 37 and 67 degrees. According to one technique, the beam-width is approximately 52 degrees.

The light source 150 may be mounted in the module housing 160. It may be secured, for example, with a light source securing portion. The light source 150 may be mounted at an angle, such as 50 to 80 degrees as measured from the horizontal plane. According to one technique, the light source is mounted at a 65 degree angle with respect to the horizontal plane. Such an angle may be measured from the horizontal plane to a central axis of the emitted beam of light. Thus, the light source 150 may be positioned to project light upwardly and diagonally, such that the light travels from the light source 150, through the lens 132, through the aperture 118 of the upper surface 116 of the candle body 110, and onto an outer surface of the projection screen 120. When viewed straight down from the top of the candle 100, the light source 150 and/or the lens 132 may not be visible through the aperture 118 (for example, these component(s) may not be located directly below the aperture. The light source 150 may be statically mounted as shown (i.e., the light source 150 does not move with respect to the candle body 110), or it may move (for example, vibrate or oscillate) by mechanical or electromagnetic means. The light source 150 and/or its package may be separated by a distance from the lens 132 (i.e., not abutting the lens 132).

A light pipe (for example, fiber optic or Lucite) may be used to provide flexibility in the positioning of the light source 150. The light pipe may receive light emitted from the light source 150 and project the light at an appropriate location. A prism may also be used to receive light projected from the light source 150 to alter the angle at which light is projected onto the projection screen 120. For example, a prism may bend light at a selected angle, such as 45 degrees.

The electromagnet 172 and control circuitry 170 may be positioned below the arm 134 of the moving portion 130, spaced by a distance. The electromagnet 172 may be driven by the control circuitry 170. The control circuitry 170 may also be electrically connected to the light source 150 and the user interface. The control circuitry 170 may be electrically connected or control and receive inputs from all electrical components in the candle 100. The control circuitry 170 may include a microprocessor that executes instructions to drive the electromagnet 172 and/or control the light source 150 in the specific manners described herein (for example, cause the light source 150 to flicker). The control circuitry 170 may also include other analog or digital components to control the operation of the candle 100, such as a state machine or oscillator to drive the electromagnet 172 and/or the light source 150. The control circuitry 170 may receive power from batteries.

The electromagnet 172 may include a wire coil. The coil may include wire or traces on a printed circuit board. The control circuitry 170 may alternately energize the electromagnet 172 positively (for example, a first polarity) and negatively (for example, a second polarity) such that it has alternating polarities over time. This may cause the electromagnet 172 to successively push (repel) and pull (attract) the magnet 138 over time, thereby causing the moving portion to move back and forth. The electromagnet 172 may be energized more than 50% of the time (either positively energized or negatively energized) when the moving portion 130 is in motion. The control circuitry 170 may include two or more modes (for example, the modes selectable through a user interface actuator like a switch or push-button) for driving the electromagnet 172. One mode may energize the electromagnet 172 to a lesser degree (less aggressive) and another mode may energize the electromagnet 172 to a greater degree (more aggressive). For example, the amount of current supplied to the electromagnet 172 by the control circuitry 170 may be smaller in the less aggressive mode and greater in the more aggressive mode. The amount of current supplied to the electromagnet 172 may vary gradually over time. For example, the amount of current supplied to the electromagnet 172 may be a sine wave over time—alternating between negative and positive currents to generate positive and negative magnetic polarities in the electromagnet 172.

A battery compartment 180 may house one or more batteries 182 (for example, two “C” batteries). A battery compartment door may releasably engage with the base 112 to secure and allow access to the batteries through one or more apertures in the base 112. The battery compartment 180 may be located below and may physically support the module or components thereof.

A user interface may be accessible at or through the base 112. The user interface may include one or more controls, such as switches, buttons, knobs, actuators, or other components. A user may interact with the user interface to control the operation of the candle. The user interface may be electrically connected to the control circuitry 170 and/or the batteries. For example, an ON/OFF switch may disconnect power from reaching the control circuitry 170, or the

status of such a switch may be sensed by the control circuitry 170 to cause it to shut down or restart operations of the candle 100. The user interface may include a timer control which is sensed by the control circuitry 170 to periodically shut down and restart (for example, 5 hours ON, and 19 hours OFF, or the like).

The user interface may include a control that adjusts the brightness or the flickering nature of the light source 150. The user interface may include a control that causes the color of the light source 150 to change—either to a new color statically, or by roaming through different colors (or ceasing roaming). The user interface may also include a control that adjusts, stops, or starts the movement of the moving portion 130 (for example, by adjusting the operation of the electromagnet 172 whereby the strength or pattern of energization may be altered). Generally, all of the features disclosed herein that relate to the operation of the candle 100 may be selectively activated, deactivated, or adjusted by interaction with components or actuators in the user interface. For example, if the candle 100 has a speaker and generates sound, the sound can be turned ON/OFF or the volume can be adjusted via user interface component(s). As another example, if the candle 100 includes a fan, user interface component(s) can cause the fan to turn ON/OFF and/or change the speed or direction of the fan.

The user interface may also include a control that places the candle 100 into an extinguished or illuminated state as described herein. The timer control may periodically place the candle 100 into an extinguished or illuminated state (for example, 5 hours illuminated, and 19 hours extinguished, or the like).

In addition to a user interface, some or all of the functionality disclosed herein can be affected through one or more wireless control modalities—for example, infrared, Bluetooth, WiFi, etc. A suitable remote would be able to send and/or receive signals through antenna(s) to control operations of the candle 100.

The candle 100 may operate in the following manner. A user may turn the candle 100 ON through a user interface positioned proximate the base 112. The projection screen 120 may move into a position corresponding to the illuminated state. The control circuitry 170 may provide power to the electromagnet 172 and/or the light source 150. Alternately, light source 150 may receive power independently from the control circuitry 170. The light source 150 may be selectively or intermittently energized (intermittently in a relatively quick manner, rather than normal ON/OFF user-initiated transitions of the light source 150) so as to provide a flickering effect as discussed above.

The energized light source 150 may emit a light beam having a central axis at an upward angle towards the projection screen 120. The angle may be 50 to 80 degrees as measured from the horizontal plane. According to one technique, the angle is 65 degrees with respect to the horizontal plane. The light travels from the light source 150, through the aperture 118 in the upper surface of the candle body 110, and onto the projection screen 120. The light beam may be refracted once or twice or even more times by the lens 132. As depicted, the light is refracted a first time when the light strikes the bottom surface of the lens 132 and a second time when the light strikes the top surface of the lens 132. The focal length of the altered light beam may vary as the moving portion 130 moves (thereby causing the distance and/or positioning between the light source 150 and the lens 132 to vary). This is depicted in FIGS. 4A and 4B. Both the position of the light beam on the projection screen 120 and the focal length may be altered as the moving

13

light source 150), an electromagnet 1050, and/or an electric motor 1060. The electromagnet 1050 and/or electric motor 1060 may suitably be replaced by other force-inducing components as described herein. The system 1000 may be powered by one or more batteries in the candle or by a power source located externally from the candle (e.g., transformer).

The processor 1010 may include one or more processors, and may be capable of executing machine-readable instructions. Such instructions and other data used in conjunction with processing by the processor 1010 may be stored in one or more memories (not shown)—e.g., RAM, ROM, Flash, EEPROM, etc. The processor 1010 may receive inputs from the user interface 1020 and/or the sensors 1030. The processor 1010 may control operation of the light source 1040, the electromagnet 1050, and/or the electric motor 1060.

The user interface 1020 (such as the one described above) may include controls, such as switches or other actuators, and the processor 1010 may detect actuation of these controls. One such control may indicate to the processor 1010 (through an input to the processor 1010) to put the candle into an illuminated state. According to another technique, such a control may switch power ON/OFF to the processor 1010, thereby turning the processor 1010 ON/OFF, accordingly. Further according to this technique, when the processor 1010 is first turned ON, it places the candle into an illuminated state. When the processor 1010 is turned OFF, the candle goes into an extinguished state.

In addition to the user interface 1020, some or all of the functionality disclosed herein can be affected through one or more wireless control modalities—for example, infrared, Bluetooth, WiFi, etc. A suitable remote (dedicated remote, smart phone, etc.) may be able to send and/or receive signals through antenna(s) to control operations of the candle. Messages received at the candle may be processed by processor 1010, which then causes the desired effect.

The processor 1010 may control the light source 1040 (one or more light-generating elements, such as LEDs), the electromagnet 1050, and/or the electric motor 1060. One or more of these components may be controlled as discussed above in conjunction with candle 100.

The sensors 1030 (one or more sensors) may include various types. For example, a heat sensor may detect heat source near the candle and trigger the transition to the illuminated state via the processor 1010. A sound sensor may detect specific sounds near the candle and trigger the transition to an illuminated or extinguished state via processor 1010.

According to one technique, one or more position sensor (e.g., mechanical contact switch) may detect the position of the projection screen. The status of such position sensor(s) may be detected by the processor 1010, thereby causing the candle to transition to an illuminated or extinguished state according to the position sensor. According to this technique, the projection screen may be moved manually to different positions, and the position sensor(s) may detect one or more of the different positions. After detection, the candle may transition via the processor 1010 to the illuminated or extinguished state. Upon no detection, the candle may transition to a different one of the illuminated or extinguished state. Optionally two position sensors may be employed, one that detects the first projection screen position (e.g., substantially vertical) and one that detects the second flame screen position (e.g., substantially horizontal).

FIGS. 6-11 illustrate alternative embodiment of a flameless candle. According to FIG. 6, the projection screen may have two different extinguished positions (e.g., two substantially horizontal positions). As depicted in FIG. 7 the pro-

14

jection screen may pivot substantially to the horizontal position or within the hollow region of the candle (e.g., through a slot as shown) along an axial dimension that is substantially 90 degrees from that shown in FIG. 6. As illustrated in FIG. 8, the projection screen may rotate (for example 180 or 360 degrees) so when it is in an extinguished state, the projection screen is in the interior hollow region of the candle body. As depicted in FIG. 9 the projection screen may be flexible and folds to a substantially horizontal position then its base is generally flat. When in the ON position the base of the projection screen may be curved, thereby bringing it into a substantially vertical position. As shown in FIG. 10, the projection screen may be telescoping, such that it collapses when in an extinguished state and extends upwardly when in an illuminated state.

As illustrated in FIG. 11, the projection screen may be static but still have two different positions with respect to the upper surface of the candle. This is by virtue of the candle body and the upper surface being moveable (e.g., upwardly and downwardly) with respect to the static projection screen. According to this embodiment, the projection screen may be substantially inside the candle body when the candle body is in an elevated position. Correspondingly, the projection screen may extend upwardly from the upper surface of the candle body when the candle body is in a downward position (i.e., the candle body is moved downwardly from the elevated position).

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. 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.

What is claimed is:

1. A flameless candle comprising:

a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;

at least one light source positioned in the interior region of the candle body;

a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;

a projection screen configured to:

receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and

receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body; and

wherein:

when the projection screen is moved to the second position, the at least one light source is automatically energized such that a light is emitted onto the projection screen; and

when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.

2. The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface: when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and

15

when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.

3. The flameless candle of claim 1, wherein the projection screen comprises a flame shape.

4. The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position.

5. The flameless candle of claim 4, wherein when the projection screen is in the first position, the projection screen is within the interior region of the candle body.

6. The flameless candle of claim 1, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.

7. The flameless candle of claim 1, wherein the force-inducing portion comprises an electrical motor.

8. The flameless candle of claim 1, wherein the force-inducing portion comprises at least one electromagnet.

9. The flameless candle of claim 1, further comprising an imitation wick extending upwardly from the upper surface of the candle body.

16

10. The flameless candle of claim 1, further comprising an ON/OFF actuator that, when actuated, causes the projection screen to transition between the first position and the second position.

11. The flameless candle of claim 1, further comprising a timer configured to periodically cause the projection screen to transition between the first position and the second position.

12. The flameless candle of claim 11, wherein the timer comprises a 24-hour timer.

13. The flameless candle of claim 1, further comprising a sensor to detect whether the projection screen is in the first position, wherein when the sensor detects that the projection screen is in the first position, the at least one light source is turned OFF.

14. The flameless candle of claim 1, further comprising a sensor to detect whether the projection screen is in the second position, wherein when the sensor detects that the projection screen is in the second position, the at least one light source is turned ON.

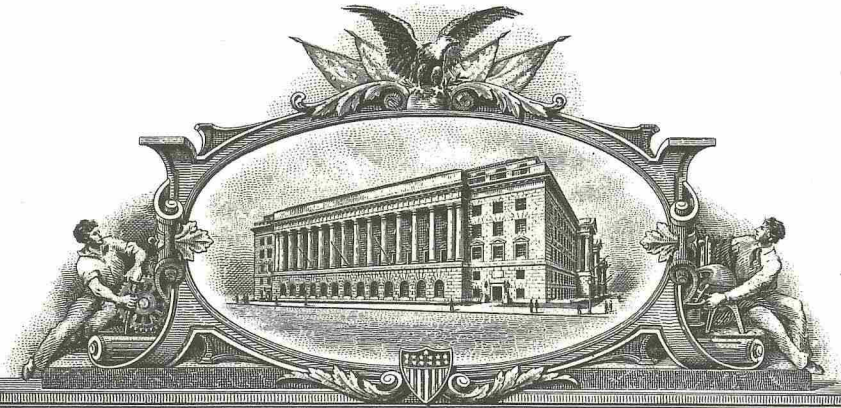
15. The flameless candle of claim 1, further comprising a moveable lens interposed between the at least one light source and the projection screen.

* * * * *

EXHIBIT 6

**Certified Copy of each
Assignment for United
States Patent No.
10,352,517**

A 8045180



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M. TARVER
Certifying Officer

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT5129310

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	CHANGE OF NAME
CONVEYING PARTY DATA	
Name	Execution Date
NII NORTHERN INTERNATIONAL INC.	06/12/2017
RECEIVING PARTY DATA	
Name:	STERNO HOME INC.
Street Address:	666 BURRARD STREET
Internal Address:	SUITE 1700, PARK PLACE
City:	VANCOUVER
State/Country:	CANADA
Postal Code:	V6C 2X8
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	16123351
CORRESPONDENCE DATA	
Fax Number:	(312)775-8100
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
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ATTORNEY DOCKET NUMBER:	62171US02
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	09/07/2018
Total Attachments: 1	
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PATENT
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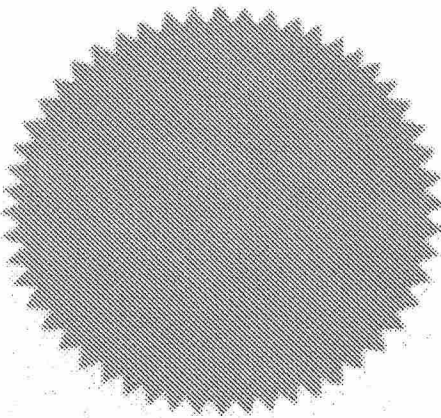


Number: BC1062406

CERTIFICATE OF CHANGE OF NAME

BUSINESS CORPORATIONS ACT

I Hereby Certify that NII NORTHERN INTERNATIONAL INC. changed its name to STERNO HOME INC. on June 12, 2017 at 03:55 PM Pacific Time.



ELECTRONIC CERTIFICATE

*Issued under my hand at Victoria, British Columbia
On June 12, 2017*

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada

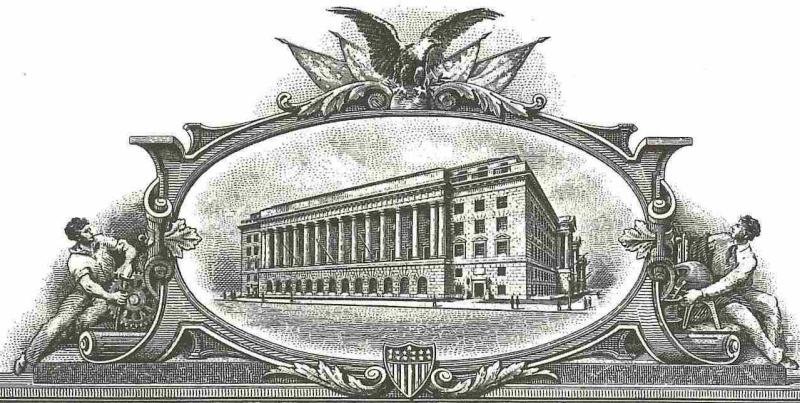
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PATENT
REEL: 046811 FRAME: 0255

EXHIBIT 7

**Certified Copy of
United States Patent
No. 10,578,264**

U 8045180



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May 21, 2020


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U.S. PATENT: 10,578,264

ISSUE DATE: March 03, 2020

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and Director of the United States Patent and Trademark Office**




R GLOVER
Certifying Officer



US010578264B2

(12) **United States Patent**
Carpintero et al.

(10) **Patent No.:** **US 10,578,264 B2**

(45) **Date of Patent:** ***Mar. 3, 2020**

(54) **ARTIFICIAL CANDLE WITH MOVEABLE PROJECTION SCREEN POSITION**

(71) Applicant: **Sterno Home Inc.**, Valcouver (CA)

(72) Inventors: **Carlos Carpintero**, Delson (CA);
Lucian Hurdac, Ste-Julie (CA); **Carl Marinier**, Sainte-Catherine (CA)

(73) Assignee: **Sterno Home Inc.**, Valcouver, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/460,761**

(22) Filed: **Jul. 2, 2019**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(Continued)

(51) **Int. Cl.**
F21S 10/04 (2006.01)
F21V 23/04 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **F21S 10/046** (2013.01); **F21S 6/001** (2013.01); **F21S 9/02** (2013.01); **F21V 11/18** (2013.01);

(Continued)

(58) **Field of Classification Search**
CPC . F21S 10/046; F21S 6/001; F21S 9/02; F21V 11/18; F21V 23/0442;

(Continued)

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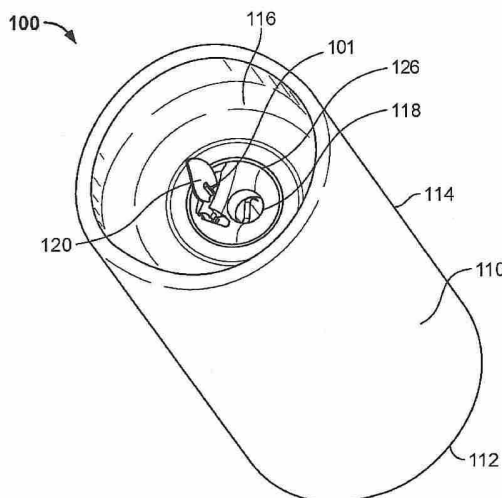
Primary Examiner — Mary Ellen Bowman

(74) *Attorney, Agent, or Firm* — McAndrews, Held & Malloy, Ltd.

(57) **ABSTRACT**

A flameless candle includes: a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface; a light source positioned in the interior region of the candle body; a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force; and a projection screen. The projection screen is configured to receive the first mechanical force and responsively move to a first position and receive the second mechanical force and responsively move to a second position. When the projection screen is moved to the second position, the light source is automatically energized such that a light is emitted onto the projection screen. When the projection screen is moved to the first position, the light source is automatically de-energized such that the light is not emitted.

17 Claims, 8 Drawing Sheets



Related U.S. Application Data

(60) Provisional application No. 62/555,154, filed on Sep. 7, 2017.

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F21V 11/18 (2006.01)

H05B 33/08 (2006.01)

H05B 37/02 (2006.01)

F21W 121/00 (2006.01)

F21Y 115/10 (2016.01)

(52) U.S. Cl.

CPC *F21V 14/06* (2013.01); *F21V 23/0442* (2013.01); *H05B 33/0845* (2013.01); *H05B 37/0281* (2013.01); *F21W 2121/00* (2013.01); *F21Y 2115/10* (2016.08)

(58) Field of Classification Search

CPC H05B 33/0845; H05B 37/0281; F21Y 2115/10; F21W 2121/00

See application file for complete search history.

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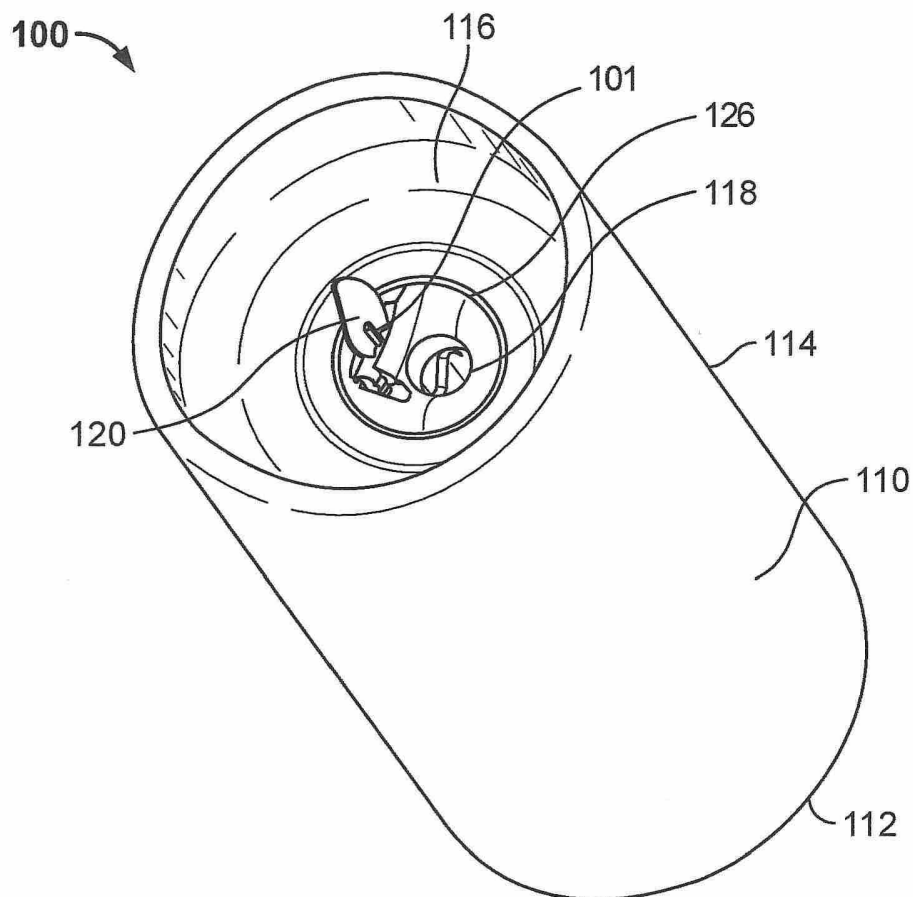


FIG. 1

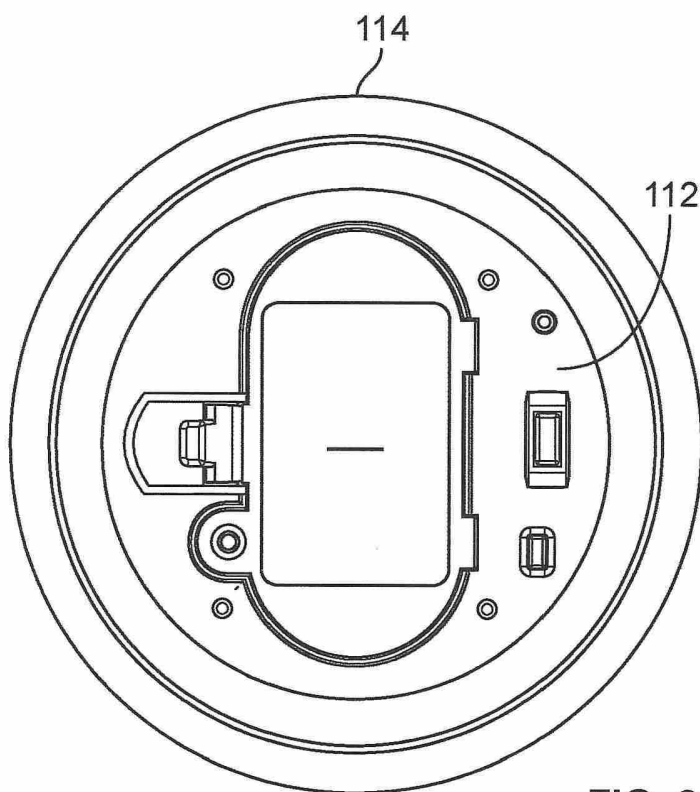


FIG. 2

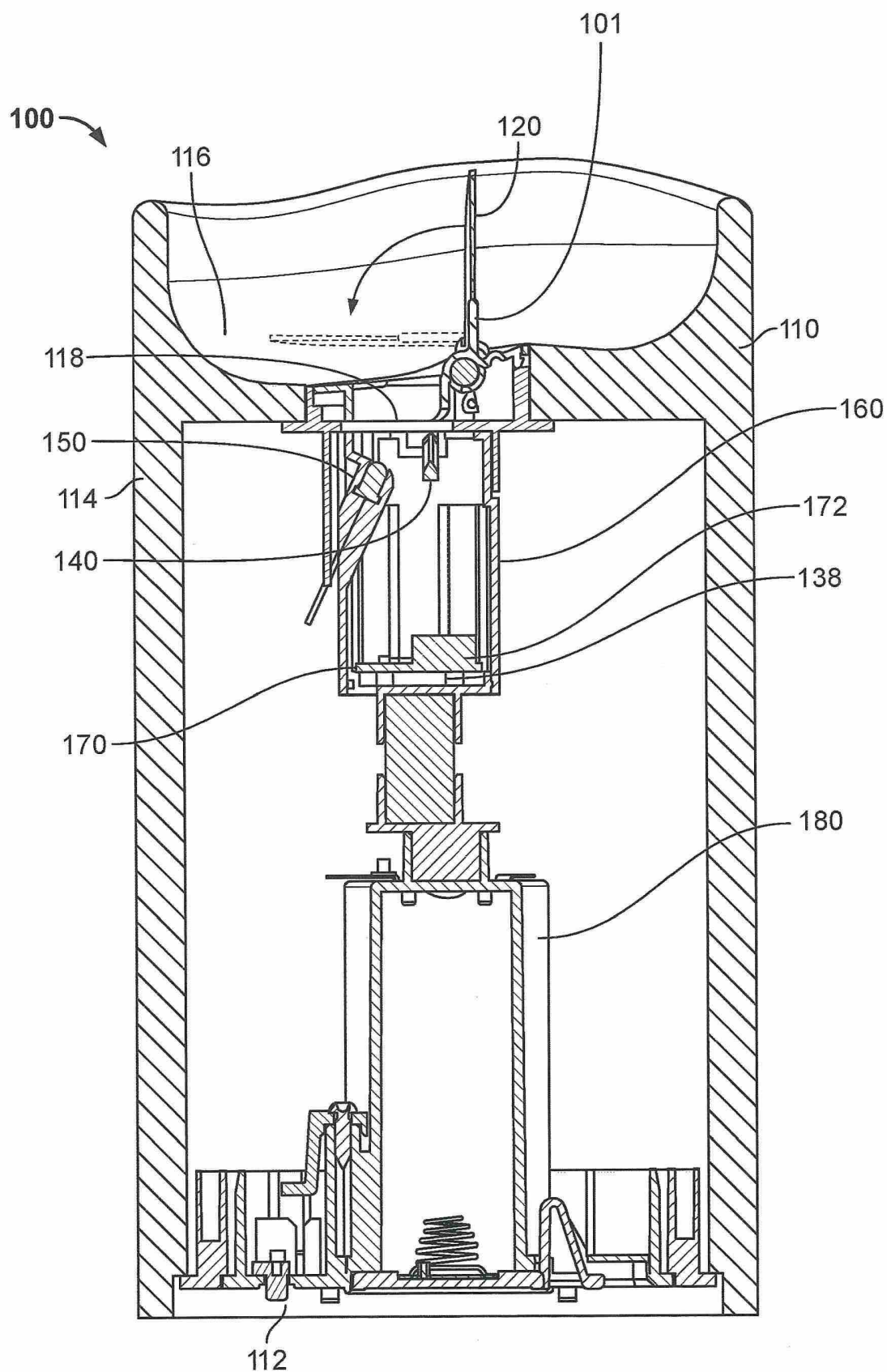


FIG. 3

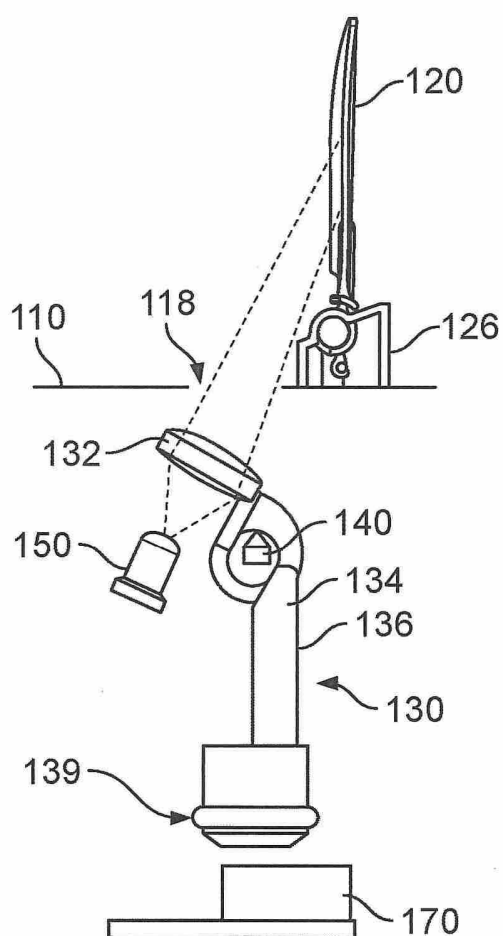


FIG. 4A

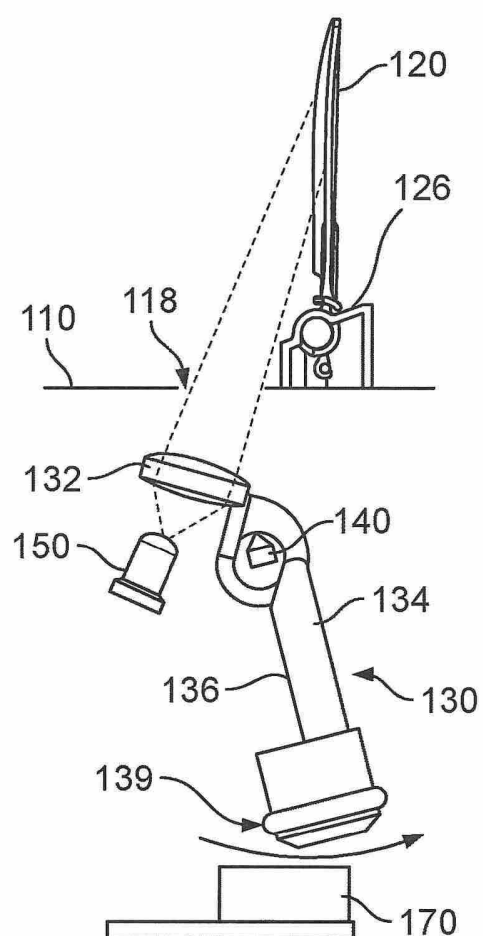


FIG. 4B

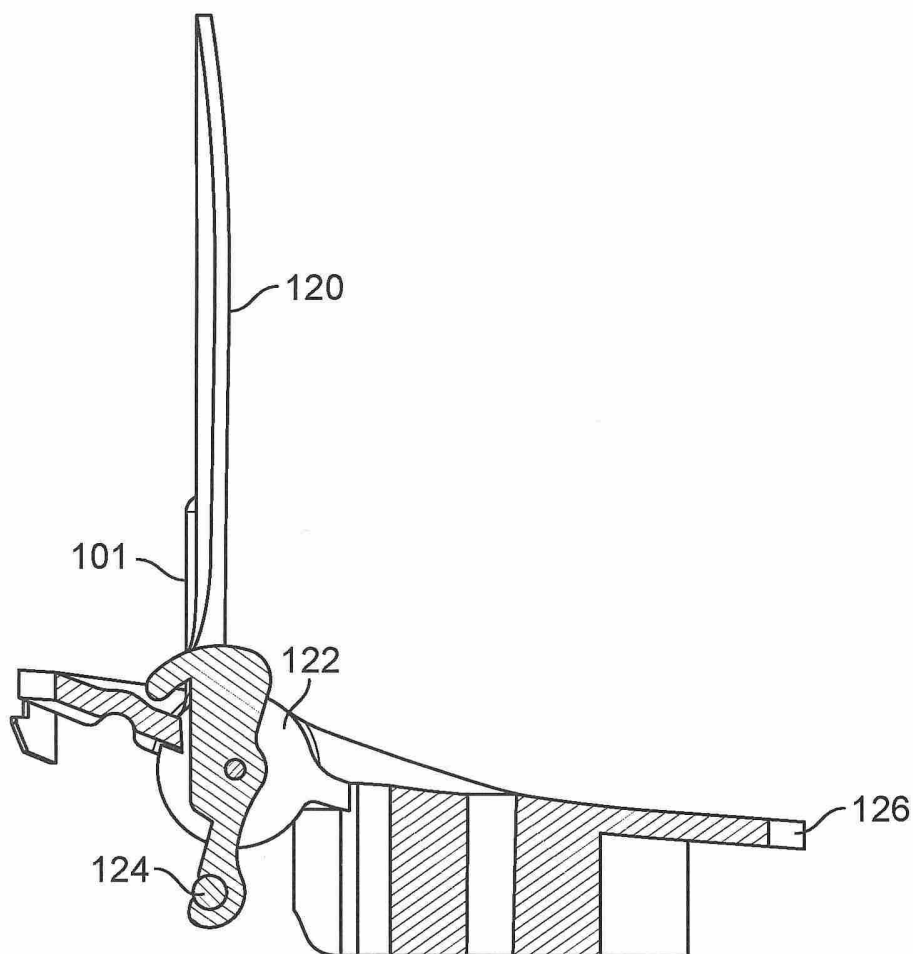


FIG. 5A

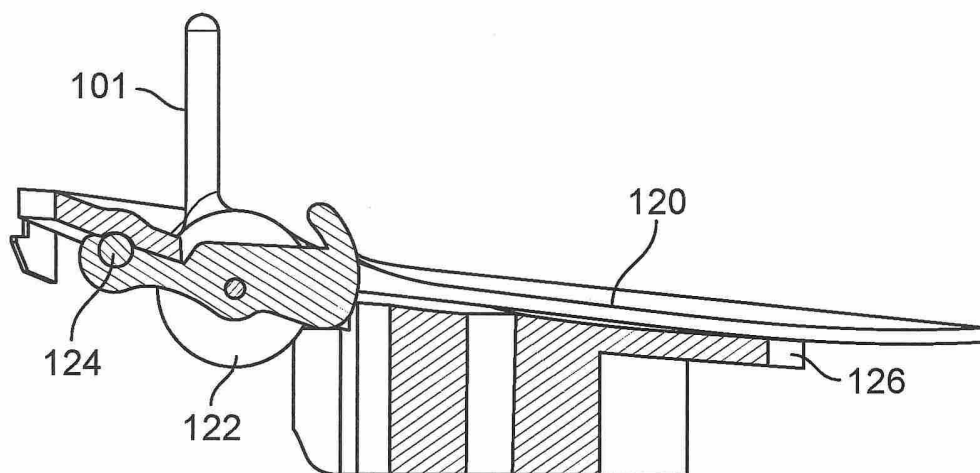


FIG. 5B

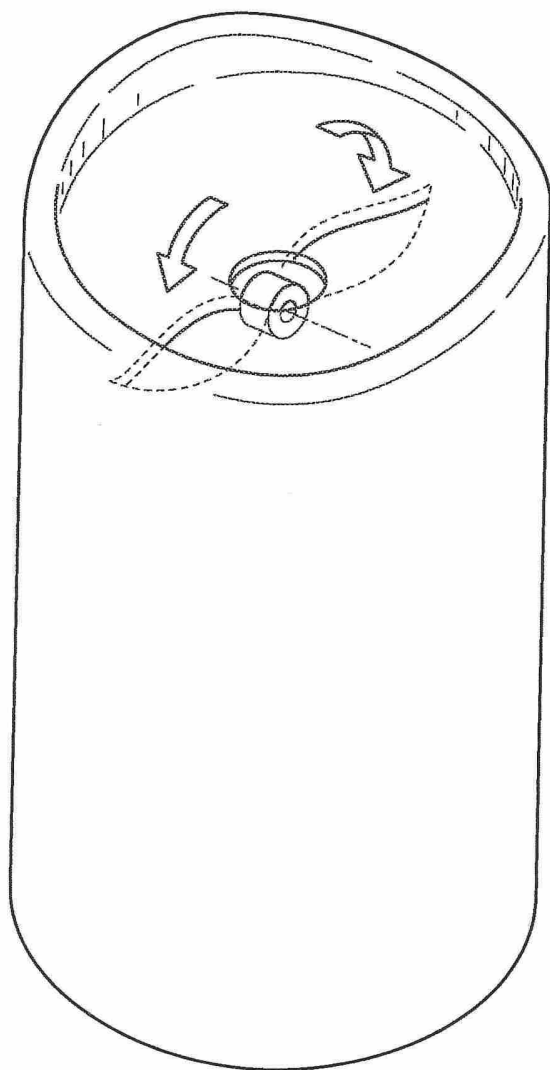


FIG. 6

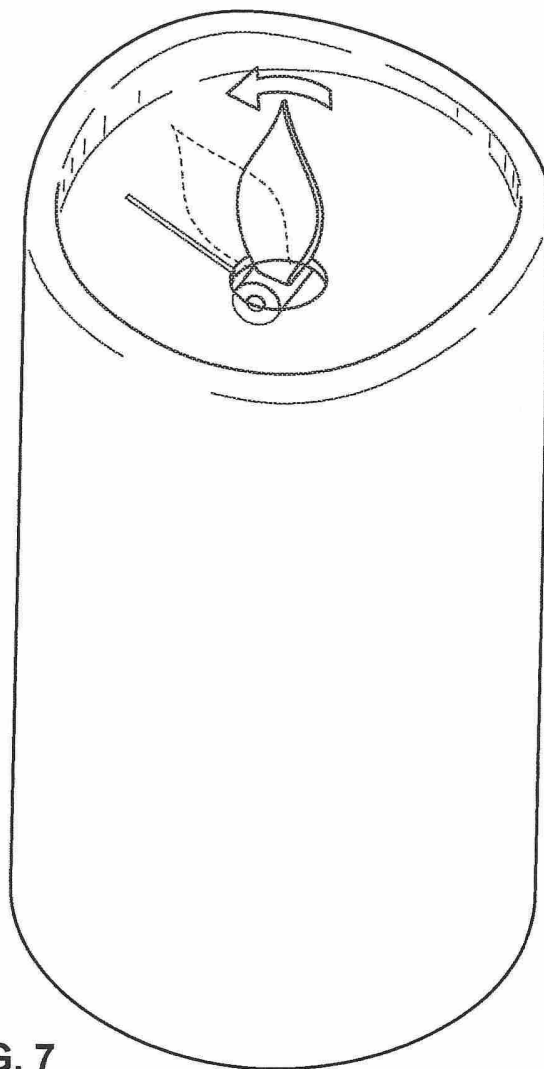


FIG. 7

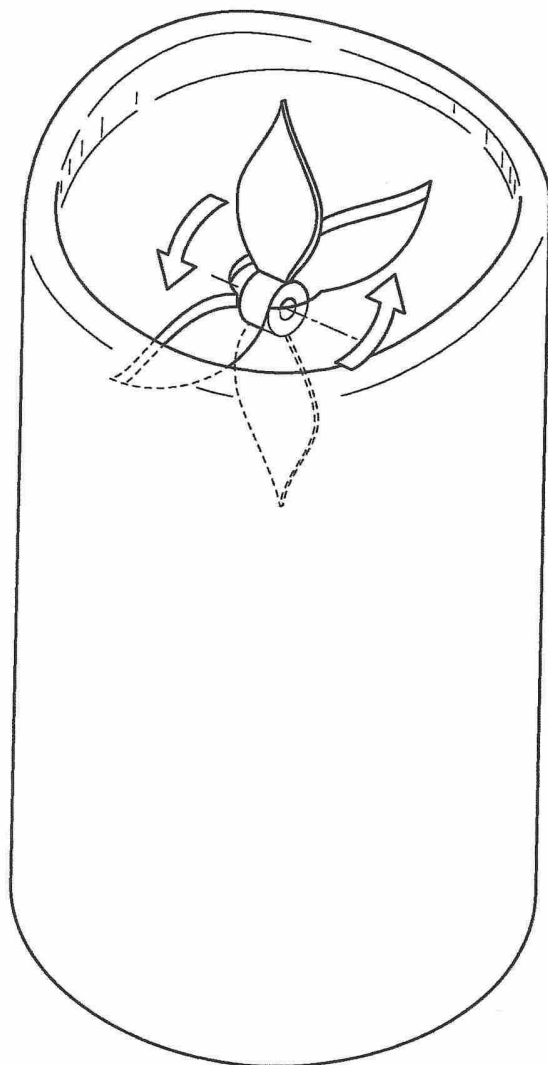


FIG. 8

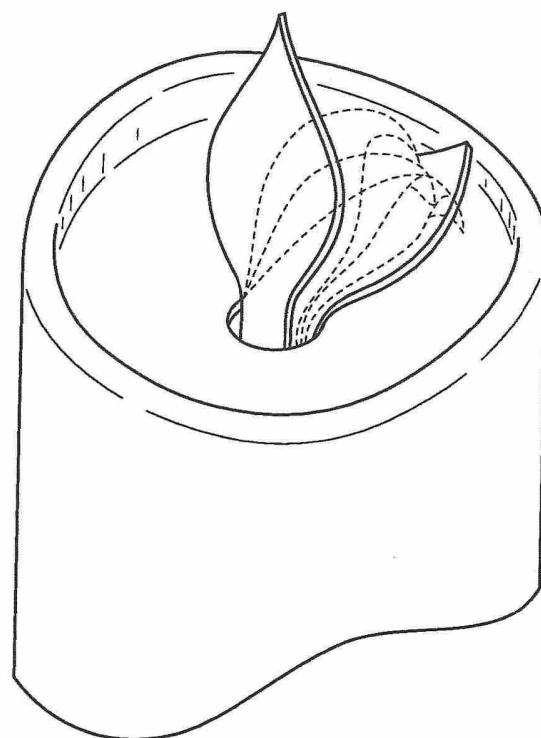


FIG. 9

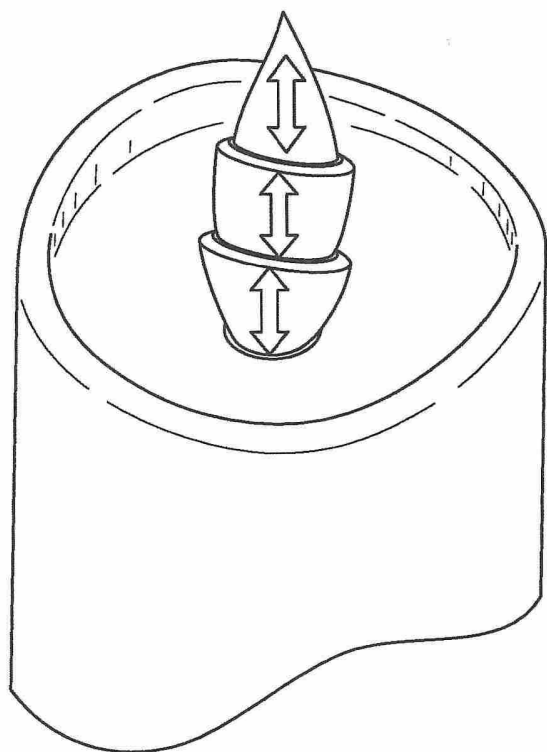


FIG. 10

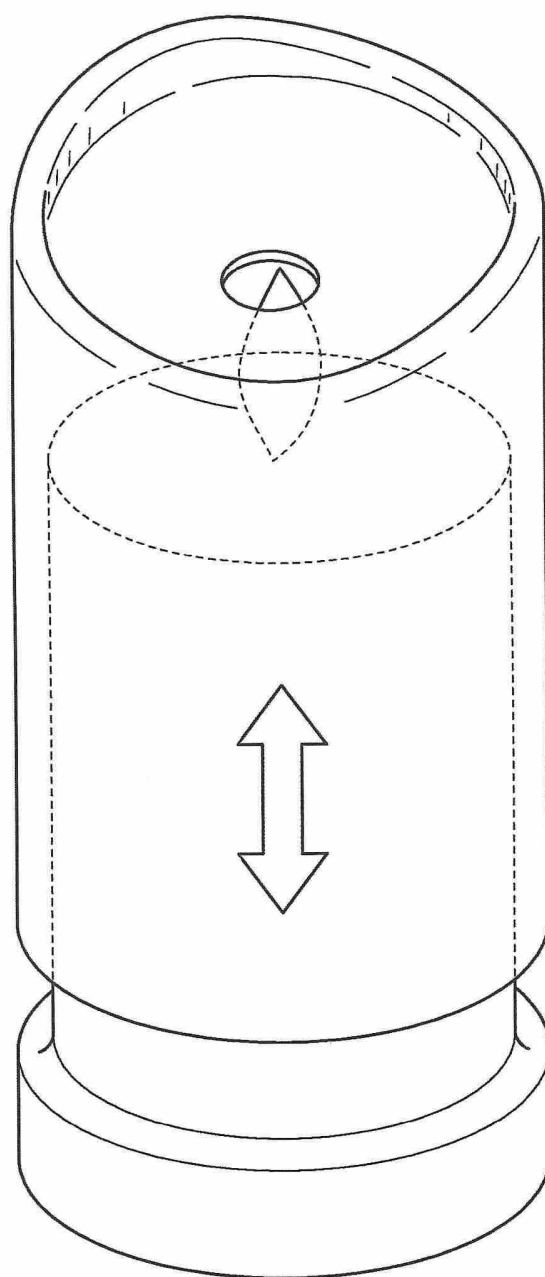


FIG. 11

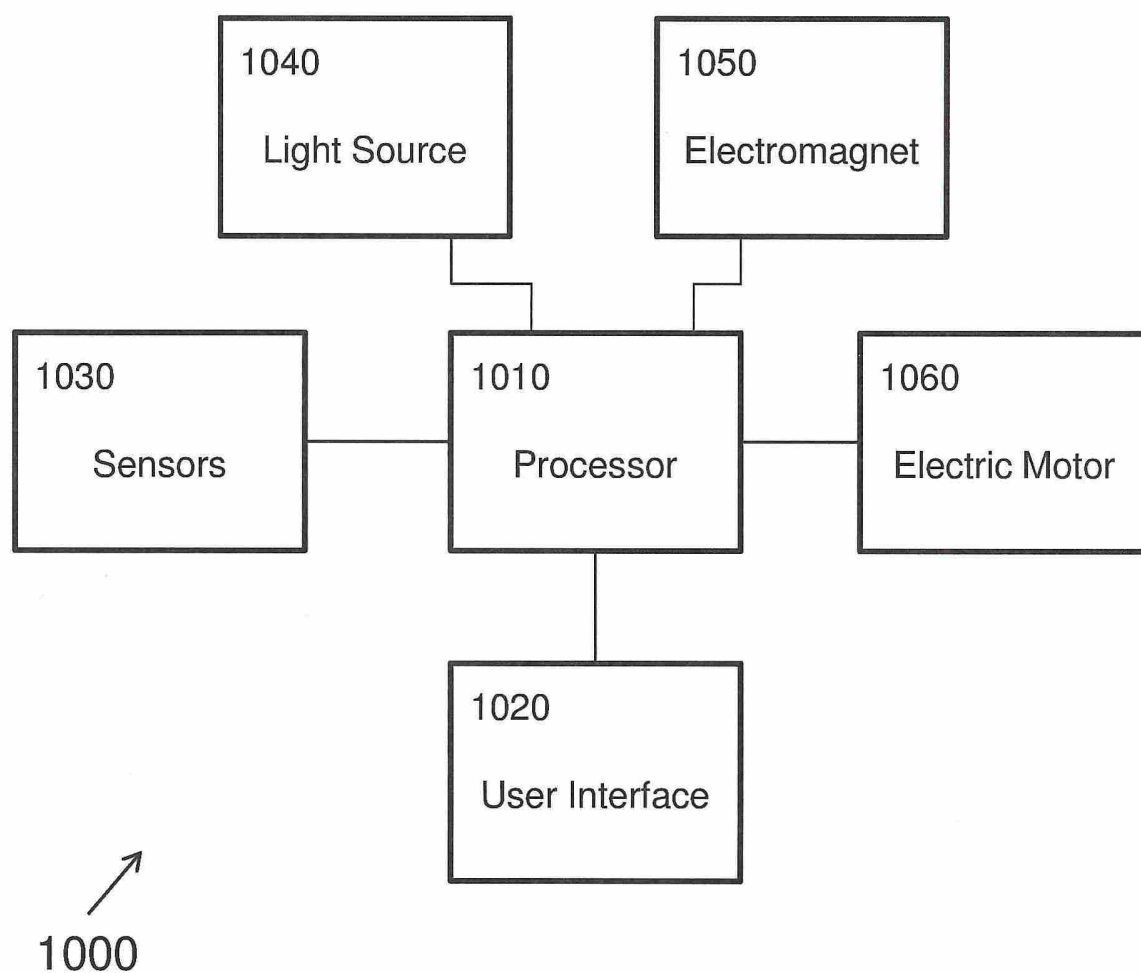


FIG. 12

1

ARTIFICIAL CANDLE WITH MOVEABLE PROJECTION SCREEN POSITION

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 16/123,351 filed on Sep. 6 2018, which claims the benefit of U.S. Provisional Patent Application No. 62/555,154 filed on Sep. 7, 2018, the entireties of which are herein incorporated by reference.

BACKGROUND

Generally, this application relates to artificial (flameless) candles that use a non-flammable light source (such as one or more light-emitting diodes (LEDs)) to create the illusion of a flamed candle.

SUMMARY

According to certain inventive techniques, a flameless candle includes: a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface; at least one light source positioned in the interior region of the candle body; a force-inducing portion (e.g., an electrical motor or an electromagnet) configured to alternatively induce a first mechanical force and a second mechanical force; and a projection screen (e.g., one that includes a flame shape). The projection screen is configured to receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body and receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body. When the projection screen is moved to the second position, the at least one light source is automatically energized such that a light is emitted onto the projection screen. When the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.

According to one technique, a base of the candle is resting on a substantially horizontal surface: when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.

According to another technique, when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position. When the projection screen is in the first position, the projection screen may be within the interior region of the candle body.

According to one technique, the first mechanical force and the second mechanical force may be rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.

The candle may include an imitation wick extending upwardly from the upper surface of the candle body. The candle may include an ON/OFF actuator that, when actuated, causes the projection screen to transition between the first position and the second position. The candle may include a timer (e.g., a 24-hour timer) configured to periodically cause the projection screen to transition between the first position and the second position.

2

The candle may include a sensor to detect whether the projection screen is in the first position, wherein when the sensor detects that the projection screen is in the first position, the at least one light source is turned OFF. The candle may include a sensor to detect whether the projection screen is in the second position, wherein when the sensor detects that the projection screen is in the second position, the at least one light source is turned ON. A moveable lens may be interposed between the at least one light source and the projection screen.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 illustrates a top perspective view of a flameless candle, according to certain inventive techniques.

FIG. 2 illustrates a bottom plan view of a flameless candle, according to certain inventive techniques.

FIG. 3 illustrates a cross-sectional side view of a flameless candle, according to certain inventive techniques.

FIGS. 4A and 4B illustrate a moving lens altering a beam of light projected onto a projection screen, according to certain inventive techniques.

FIG. 5A illustrates a projection screen of a flameless candle in an illuminated state, according to certain inventive techniques.

FIG. 5B illustrates a projection screen of a flameless candle in an extinguished state, according to certain inventive techniques.

FIGS. 6-11 illustrate different flameless candle designs, according to certain inventive techniques.

FIG. 12 is a block diagram of electrical components in a flameless candle, according to certain inventive techniques.

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

As disclosed herein, an inventive flameless candle is disclosed. The candle can be turned OFF and ON and/or transitioned between an illuminated state and extinguished state. When in the illuminated state, the projection screen may be positioned in a vertical position and plainly visible. At least one light source may project onto the projection screen, thereby creating the illusion of a candle with a lit flame. When the candle is placed in the extinguished state, the flame screen is repositioned such that it is not visible or is less visible. The light source may also be turned OFF. An artificial wick may remain visible, even when the candle is in the extinguished state, thereby maintaining the illusion of a conventional, extinguished candle.

FIGS. 1-5B illustrate different views of a flameless candle 100, according to certain inventive techniques. The flameless candle 100 includes a candle body 110 and a projection screen 120. The candle body 110 may have a base 112, an upper surface 116, and a sidewall 114 extending between the base 112 and the upper surface 116. The candle body 110 may form a hollow interior region. The candle 100 may resemble a pillar candle (as shown), a taper candle, a votive,

a tea light, other decorative candles, or the like. The candle body 110 may be translucent or include translucent regions. The translucence may be chosen so as to give the candle 100 the appearance of a conventional candle. Specifically, when light from a light source (e.g., one or more light-emitting components, such as LEDs) within the candle body 110 emanates through the sidewall 114 it may appear diffuse and have the character of light from a conventional candle. The candle body 110 may be formed of wax or plastic or other suitable material. When the candle body 110 is not formed of wax, it may include a waxy surface (for example, dipped in wax) to give the feel and translucent quality of real wax.

The upper surface 116 may include a concave recess (when viewed from above) to give the candle body 110 the appearance that the candle 100 has been used and some wax has been consumed by flame. The upper surface 116 may include an aperture 118. The aperture 118 may be located substantially along a primary axis in a vertical dimension of the candle body 110. The aperture 118 may allow light to pass from within the hollow interior region of the candle body 110 onto the projection screen.

The upper surface 116 may have a variety of different shapes. For example, the upper surface 116 may be shaped like a bowl or a portion of a bowl. Optionally, the upper surface 116 may include a flat bottom surface. The upper region of the sidewall 114 may have a varying height around the top perimeter of the candle 100. The upper surface 116 may form a backdrop whereby the rim of the sidewall 114 is higher in the back of the candle body 110 than it is in the front.

The projection screen 120 may be adjacent to, proximate to, and/or extend upwardly from (or through) the aperture 118 in the upper surface 116. The projection screen 120 may be offset with respect to or positioned off of a primary axis along a vertical dimension at which the aperture 118 is located.

The projection screen 120 may be made of plastic, wax, metal, or other suitable material. The projection screen 120 may be used with external light sources or for internally projected light—i.e., external and internal to the projection screen 120. For example, the projection screen 120 could have one or more light sources projecting light from below, thereby resulting in internally projected light. A light pipe may be employed to transfer the light from the light source to the projection screen 120 (either internally or externally to the projection screen 120). The projection screen 120 itself, or a portion thereof, may include a light pipe.

The projection screen 120 may include a flame shape. The projection screen 120 outer surface may have two faces, or three or more faces. The projection screen 120 may be round, spherical, cylindrical, egg shape or elliptical. When viewed from the front, the outer surface of the projection screen 120 may be convex, concave, flat, or irregular (for example, a mix of convex, concave, spherical, cylindrical, egg shape and/or flat regions). The projection screen 120 may include a portion or region that imitates a wick. Such a portion or region may be a painted region, a recessed region, or an aperture (i.e., a hole through the flame screen). The candle 100 may also include an artificial or imitation wick 101. The imitation wick 101 may extend upwardly from the upper surface 116 of the candle 100. The imitation wick 101 may always extend upwardly from the upper surface 116 of the candle 100, even when the candle 100 is turned OFF or placed in the extinguished state. This way, the candle 100 may maintain the illusion of a conventional candle, even when the light source 150 of the candle 100 are not generating or emitting any light. The projection screen

120 may include an aperture that is larger than an artificial wick 101, such that when the projection screen 120 is readily apparent, it substantially surrounds the artificial wick 101, thereby enhancing the illusion of a conventional wick that is burning.

The projection screen 120 may have a flame shape as depicted. The projection screen 120 may have two outer surfaces (front and back, as depicted), or three or more outer surfaces. When viewed from the front, the front outer surface may be convex, concave, flat, or irregular (for example, a mix of convex, concave, and/or flat regions). The projection screen 120 may include a portion or region that imitates a wick. Such a portion or region may be a painted region, a recessed region, or an aperture (i.e., a hole through the projection screen 120).

The projection screen 120 may be textured, smooth, opaque, and/or translucent. According to one technique, the translucency of the projection screen 120 is selected such that an illusion of a flame appears on both the front and rear outer surfaces. The projection screen 120 may have different translucencies and/or textures on the front and back of the exterior surfaces of the projection screen 120. Also, different regions on the same surfaces may have different translucencies, textures, and/or thicknesses.

When the candle 100 is turned ON or is placed in an illuminated state (for example, as depicted in FIG. 5A), the projection screen 120 may be positioned in a substantially vertical orientation from a horizontal plane (e.g., normal, unslanted resting surface for the candle). The candle 100 may be placed in an illuminated state when the projection screen 120 is moved (i.e., has been moved, is still moving, or will immediately be moved as a result of the candle being turned ON or being placed into an illuminated state) into a substantially vertical position in reference to the upper surface. In the illuminated state, the angle of the projection screen 120 in reference to a horizontal plane may vary between 75 to 105 degrees and therefore be substantially vertical. When the candle 100 is turned ON or is placed in an illuminated state, the projection screen is maintained in a substantially vertical position by having its weight balanced toward the back of the candle and resting on a support step.

In the illuminated state, the light source 150 (which may include one or more light-generating elements, such as LEDs) may be ON. The illuminated state may begin as soon as there has been an instruction (e.g., actuation of a user interface control) to place the candle 100 in the illuminated state, even though the light source 150 may not yet be energized. The projection screen 120 may act as diffuser and/or as screen to reflect and/or diffuse the light from the light sources 150.

The projection screen 120 may be positioned in a substantially horizontal orientation when the candle 100 is turned OFF or otherwise placed in an extinguished state (for example, as depicted in FIG. 5B), whereby the light source 150 is OFF. Alternatively, the projection screen 120 can be positioned substantially below the upper surface 116. The candle 100 may not be illuminated (at least not above the upper surface 116), when the projection screen 120 is moved (i.e., has been moved, is still moving, or will immediately be moved as a result of the candle being turned OFF or being placed into an extinguished state) in the substantially horizontal position in reference to a horizontal plane or substantially below the upper surface 116. Illumination may cease before the projection screen 120 transitions from the substantially vertical to substantially horizontal orientation. When not illuminated, the angle of the projection screen 120 in reference to the horizontal plane may vary between 15 to

5

-15 degrees (i.e., substantially horizontal). In the extinguished state, the light source 150 projecting through the aperture 118 is OFF. Other light sources (e.g., user interface or internal illumination sources) may remain ON. When the candle 100 is turned OFF or is placed in an extinguished state, the projection screen 120 is maintained in a substantially horizontal position by having its weight resting on the upper surface 116 or other structure, such as projection screen substructure 126.

The projection screen 120 may be moved between the positions by a force-inducing portion, such as electric motor 122. The electrical motor 122 may be a DC coreless brush motor. Other possible force-inducing portions may include an electromagnet or a manually driven system that may include a push-button, lever, or other type of actuator mechanically coupled with the projection screen 120.

The projection screen 120 may be fixed by a barrel hinge or other kinds of suitable hinge to the upper surface 116 (or to a hinge-receiving/hinge-mounting portion that does not move with respect to the upper surface 116, such as projection screen substructure 126). Alternatively, the projection screen 120 could be coupled to a rail or a linear guided channel. The hinge may include a pivot to transfer a rotational force at a lower position of the projection screen 120. The rotational force may be supplied by a force-inducing portion, such as electric motor 122.

The pivoting portion of the hinge may be connected directly or indirectly to the force-inducing portion (e.g., electric motor 122). If the pivot portion of the hinge is indirectly connected to the force-inducing portion, the power transfer may be accomplished through gear(s) or pulley(s) or any other component(s) that may transfer rotational power from the force-inducing portion to the pivot portion of the hinge.

The projection screen 120 may extend the opposite side of the pivot portion of the hinge to balance the weight of the projection screen 120. A counterweight 124 may also be attached or coupled to the projection screen 120. Gravity contributed by the counterweight 124 and/or projection screen 120 extension may then be used as a contributing force to move the projection screen 120 between positions (e.g., substantially vertical and substantially horizontal).

The force-inducing portion may include an electrical motor 122, electromagnets or any other suitable source that may generate the rotational power required to move the projection screen 120 from the substantially horizontal position to/from the substantially vertical position or, alternatively, to/from a position substantially above or substantially below the upper surface 116.

The candle 100 may include various components in addition to the candle body 110 and the projection screen 120, such as: a projection screen substructure 126 attached (e.g., movably attached) or otherwise coupled to the projection screen 120; a moving portion 130; a supporting portion 140 that supports the moving portion 130; a light source 150 (for example, one or more LEDs); a module housing 160, including a light source securing portion; and an electromagnet and control circuitry 170. The aforementioned components may be included in a module. For example, the electromagnet and control circuitry 170 may be located within or outside of the module housing 160. The assembled module may be inserted through the underside of the candle body 110 and seated into the aperture 118 of the upper surface 116. The candle 100 may also include a battery compartment 180, batteries (for example, two "C" batteries as depicted), and a battery door. These components may be

6

located, at least partially or substantially, within the hollow interior region of the candle body 110.

The projection screen substructure 126 may be configured to be inserted into the aperture 118 of the upper surface 116 (for example, inserted from underneath or from above the upper surface 116). For example, the projection screen substructure 126 may have a stair-step profile with a lower tier having a larger radius than an upper tier. The substructure 126 may have a generally circular profile (for example, the tier(s) may be generally circular) when viewed from above, or it may have other shapes such as ovate, square, rectangular, etc. The lower tier of the substructure 126 may act as a stop to prevent over-insertion of the substructure 126 into the aperture 118. The aperture 118 may have a stair-step profile complementary to that of the substructure 126 tiers. This may facilitate accurate seating of the substructure 126 into the aperture 118. Once properly seated, the upper surface of the upper tier may be flush with or slightly below the upper surface 116. The substructure 126 may be secured to the candle body by friction fit, wax, mechanical means (for example, the substructure 126 having anchoring portions that anchor into a waxy material on the upper surface 116), or other epoxy.

The projection screen substructure 126 may have an aperture such that light projected from below can be projected onto the projection screen 120. As shown, the projection screen 120 is offset and positioned off of a primary axis along a vertical dimension at which the aperture 118 is located. Specifically, the projection screen 120 extends from an upper surface of a rim of the upper tier of the substructure 126. When the substructure is seated in the aperture 118, the light passing through the aperture of the substructure 126 also passes through the aperture 118 of the upper surface 116. The substructure 126 may have one or more engaging portions that engage with portions that generally are below the substructure 126. For example, the lower tier of the substructure 126 may have two engaging portions (each having an aperture) that engages with complementary portions on the module housing 160 (for example, spring tabs), such that the substructure 126 becomes a portion (for example, top portion) of the module 160.

The supporting portion 140 may support the moving portion 130, such that the moving portion can move in three dimensions. The supporting portion 140 may include a U-shape or V-shape region. The supporting portion 140 may nest in, be seated in, or connect to the module housing 160. As shown, the module housing 160 includes two slots that receive opposite ends of the supporting portion 140. The projection screen substructure 126 may secure the supporting portion 140 in the module housing 160 by forming a top to the receiving slots. The supporting portion 140 may be substantially rigid. It may include a tapered edge in all of or a portion of the top surface of the supporting portion 160. The tapered edge may come to a relatively sharp point. The moving portion 130 may rest on the top-surface tapered edge of the supporting portion 140. By having a tapered edge, freer movement of the moving portion 130 may be facilitated. For example, the tapered edge may allow for less friction and less interference with the moving portion 130. The tapered edge may permit at least three degrees of freedom of the moving portion 130. The region of the moving portion 130 that rests on the supporting portion 140 may also have a tapered edge (for example, tapered in the opposite direction, such that a wider region is higher than the narrower region that contacts the supporting portion).

The moving portion 130 may include a lens 132 and an arm 134. The moving portion 130 may optionally include an

7

intermediate region 136 (for example, including an annular shaped region with an aperture as depicted) between the lens 132 and the arm 134 (or the lens 132 and arm 134 may be directly connected). The moving portion 130 may also include a magnet 138 seated, positioned, or located on the arm 134 (for example, a lower region of the arm 134). In this context, and as generally used herein, the word "on" is broadly understood to mean attached to, positioned on/in, located on/in, or the like. The moving portion may optionally include a bumper 139.

The lens 132 may include a transparent material such as acrylic. The lens 132 may have two or more surfaces (for example, a top surface and bottom surface as illustrated). The surfaces may include concave regions, convex regions (as shown for both surfaces), flat regions, or have an irregular surface (for example, a combination of concave, convex, and/or flat regions). When viewed from the top or bottom, the lens may have a substantially round shape, or other shapes are possible, such as ovate, square, or the like. The surfaces may touch each other, or may be separated by a lateral region (as depicted). When the moving portion 130 is in a resting position, the lens 132 may have a diagonal orientation (for example, 25 to 55 degrees with respect to a horizontal plane). According to one technique, the angle is approximately 40 degrees. Even when the lens 132 is moved to a maximum or minimum amount, it may still have a diagonal orientation (for example, 12 to 68 degrees). According to one technique, when the resting angle is approximately 40 degrees, the minimal angle is approximately 27 degrees and the maximal angle is approximately 53 degrees.

The arm 134 may extend generally downwardly, and it may be sized and arranged to act as a counterbalance to the lens 132 to maintain the lens 132 at a desired orientation when the moving portion 130 is in a resting position. The arm 134 may have an enlarged or heavier region towards the bottom. The arm 134 may have an area that accepts the magnet 138. For example, the arm 134 may have a recess on a bottom surface that is sized to receive the magnet 138. The magnet may be glued and/or press fit to the arm 134. The magnet 138 may include a material such as nickel or a nickel alloy.

The intermediate region 136 may abut the lens 132 and the arm 134. The intermediate region 136 may define an angle between the lens 132 and the arm 134, such as between 45 and 75 degrees (although this orientation may be achieved without the intermediate region 136). According to one technique, the intermediate region 136 may define an angle of approximately 60 degrees between the lens 132 and the arm 134. The intermediate region 136 may include a region that contacts the supporting portion 140. Such a region may include an aperture (for example, generally annular in shape, as shown) that substantially encircles the supporting portion 140. Such an arrangement may prevent the moving portion 130 from being constrained in movement by the supporting portion 140 (for example, prevents the moving portion from falling down or around or even coming out of the candle 100. There is no requirement, however, that the intermediate region 136 or the moving portion 130 have such an aperture. Other shapes for engaging the supporting portion 140 may be possible, such as an arch, a notch having an inverted V-shape (for example, a notch having a wider cut-out angle than the angle of taper on the upper surface of the supporting portion 140), or the like.

The bumper 139 may absorb impact of the moving portion if it comes in contact with other objects, such as the module housing 160. The bumper 139 may include a com-

8

pressible material, such as rubber or ethylene propylene rubber. The bumper 139 may prevent a sound from being made when the moving portion 130 comes into contact with other objects. The bumper 139 may be located in a lower region of the moving portion 130, for example, on an enlarged region as shown in the figures. The bumper 139 may substantially or completely encompass such a region.

The light source 150 may include one or more light-emitting diodes (LEDs). The light source 150 may be selected to emit a color that resembles a color of a conventional candle flame. The lens 132 may also be colored to enhance or adjust the color of the projected light from the light source 150. For example, the lens 132 may include a colored region and an uncolored region (or it may be entirely colored or uncolored). In the example of a colored region, such a region may be blue in color (e.g., painted, printed, a sticker, colored epoxy, or the like). For example, areas on the rim of the lens 132 may be tinted or otherwise colored blue to cause the outer regions of the projected light to be bluish in color. When projected on the projection screen 120, this may enhance the illusion of a conventional candle flame.

The light source 150 may be arranged to generate a light having varying intensity (for example, to cause a flickering effect). The perceivable intensity of the light source 150 may vary by no more than $\pm 25\%$ of the average power as measured in lumens. By perceivable intensity, it is understood that this is the intensity recognizable by the human eye. The actual instantaneous power delivered to a light source 150 may be much more than 25%, such as for example by using pulse-width modulation techniques in which the power to a light source 150 is switched ON and OFF very rapidly.

The light source 150 may have a lens separate from lens 132. For example, the light source 150 may include a type of a conventional LED package that includes a lens where the light exits the package. The light source 150 may have an embedded circuit, such as one including a microprocessor and associated circuitry (e.g., an oscillator) that causes the flickering effect (or other effects, such as fade in/out, color changing, or the like). The light source 150 (independent of the lens 132 in the moving portion 130) may be configured to generate a beam of light having an associated beam-width—for example, a beam-width between 37 and 67 degrees. According to one technique, the beam-width is approximately 52 degrees.

The light source 150 may be mounted in the module housing 160. It may be secured, for example, with a light source securing portion. The light source 150 may be mounted at an angle, such as 50 to 80 degrees as measured from the horizontal plane. According to one technique, the light source is mounted at a 65 degree angle with respect to the horizontal plane. Such an angle may be measured from the horizontal plane to a central axis of the emitted beam of light. Thus, the light source 150 may be positioned to project light upwardly and diagonally, such that the light travels from the light source 150, through the lens 132, through the aperture 118 of the upper surface 116 of the candle body 110, and onto an outer surface of the projection screen 120. When viewed straight down from the top of the candle 100, the light source 150 and/or the lens 132 may not be visible through the aperture 118 (for example, these component(s) may not be located directly below the aperture). The light source 150 may be statically mounted as shown (i.e., the light source 150 does not move with respect to the candle body 110), or it may move (for example, vibrate or oscillate) by mechanical or electromagnetic means. The light source

150 and/or its package may be separated by a distance from the lens 132 (i.e., not abutting the lens 132).

A light pipe (for example, fiber optic or Lucite) may be used to provide flexibility in the positioning of the light source 150. The light pipe may receive light emitted from the light source 150 and project the light at an appropriate location. A prism may also be used to receive light projected from the light source 150 to alter the angle at which light is projected onto the projection screen 120. For example, a prism may bend light at a selected angle, such as 45 degrees.

The electromagnet 172 and control circuitry 170 may be positioned below the arm 134 of the moving portion 130, spaced by a distance. The electromagnet 172 may be driven by the control circuitry 170. The control circuitry 170 may also be electrically connected to the light source 150 and the user interface. The control circuitry 170 may be electrically connected or control and receive inputs from all electrical components in the candle 100. The control circuitry 170 may include a microprocessor that executes instructions to drive the electromagnet 172 and/or control the light source 150 in the specific manners described herein (for example, cause the light source 150 to flicker). The control circuitry 170 may also include other analog or digital components to control the operation of the candle 100, such as a state machine or oscillator to drive the electromagnet 172 and/or the light source 150. The control circuitry 170 may receive power from batteries.

The electromagnet 172 may include a wire coil. The coil may include wire or traces on a printed circuit board. The control circuitry 170 may alternately energize the electromagnet 172 positively (for example, a first polarity) and negatively (for example, a second polarity) such that it has alternating polarities over time. This may cause the electromagnet 172 to successively push (repel) and pull (attract) the magnet 138 over time, thereby causing the moving portion to move back and forth. The electromagnet 172 may be energized more than 50% of the time (either positively energized or negatively energized) when the moving portion 130 is in motion. The control circuitry 170 may include two or more modes (for example, the modes selectable through a user interface actuator like a switch or push-button) for driving the electromagnet 172. One mode may energize the electromagnet 172 to a lesser degree (less aggressive) and another mode may energize the electromagnet 172 to a greater degree (more aggressive). For example, the amount of current supplied to the electromagnet 172 by the control circuitry 170 may be smaller in the less aggressive mode and greater in the more aggressive mode. The amount of current supplied to the electromagnet 172 may vary gradually over time. For example, the amount of current supplied to the electromagnet 172 may be a sine wave over time—alternating between negative and positive currents to generate positive and negative magnetic polarities in the electromagnet 172.

A battery compartment 180 may house one or more batteries 182 (for example, two “C” batteries). A battery compartment door may releasably engage with the base 112 to secure and allow access to the batteries through one or more apertures in the base 112. The battery compartment 180 may be located below and may physically support the module or components thereof.

A user interface may be accessible at or through the base 112. The user interface may include one or more controls, such as switches, buttons, knobs, actuators, or other components. A user may interact with the user interface to control the operation of the candle. The user interface may be electrically connected to the control circuitry 170 and/or

the batteries. For example, an ON/OFF switch may disconnect power from reaching the control circuitry 170, or the status of such a switch may be sensed by the control circuitry 170 to cause it to shut down or restart operations of the candle 100. The user interface may include a timer control which is sensed by the control circuitry 170 to periodically shut down and restart (for example, 5 hours ON, and 19 hours OFF, or the like).

The user interface may include a control that adjusts the brightness or the flickering nature of the light source 150. The user interface may include a control that causes the color of the light source 150 to change—either to a new color statically, or by roaming through different colors (or ceasing roaming). The user interface may also include a control that adjusts, stops, or starts the movement of the moving portion 130 (for example, by adjusting the operation of the electromagnet 172 whereby the strength or pattern of energization may be altered). Generally, all of the features disclosed herein that relate to the operation of the candle 100 may be selectively activated, deactivated, or adjusted by interaction with components or actuators in the user interface. For example, if the candle 100 has a speaker and generates sound, the sound can be turned ON/OFF or the volume can be adjusted via user interface component(s). As another example, if the candle 100 includes a fan, user interface component(s) can cause the fan to turn ON/OFF and/or change the speed or direction of the fan.

The user interface may also include a control that places the candle 100 into an extinguished or illuminated state as described herein. The timer control may periodically place the candle 100 into an extinguished or illuminated state (for example, 5 hours illuminated, and 19 hours extinguished, or the like).

In addition to a user interface, some or all of the functionality disclosed herein can be affected through one or more wireless control modalities—for example, infrared, Bluetooth, WiFi, etc. A suitable remote would be able to send and/or receive signals through antenna(s) to control operations of the candle 100.

The candle 100 may operate in the following manner. A user may turn the candle 100 ON through a user interface positioned proximate the base 112. The projection screen 120 may move into a position corresponding to the illuminated state. The control circuitry 170 may provide power to the electromagnet 172 and/or the light source 150. Alternately, light source 150 may receive power independently from the control circuitry 170. The light source 150 may be selectively or intermittently energized (intermittently in a relatively quick manner, rather than normal ON/OFF user-initiated transitions of the light source 150) so as to provide a flickering effect as discussed above.

The energized light source 150 may emit a light beam having a central axis at an upward angle towards the projection screen 120. The angle may be 50 to 80 degrees as measured from the horizontal plane. According to one technique, the angle is 65 degrees with respect to the horizontal plane. The light travels from the light source 150, through the aperture 118 in the upper surface of the candle body 110, and onto the projection screen 120. The light beam may be refracted once or twice or even more times by the lens 132. As depicted, the light is refracted a first time when the light strikes the bottom surface of the lens 132 and a second time when the light strikes the top surface of the lens 132. The focal length of the altered light beam may vary as the moving portion 130 moves (thereby causing the distance and/or positioning between the light source 150 and the lens 132 to vary). This is depicted in FIGS. 4A and 4B.

11

Both the position of the light beam on the projection screen 120 and the focal length may be altered as the moving portion 130 moves. Specifically, when the moving portion 130 is in a first position, the light beam will project onto a first region of the external surface of the projection screen 120. It will have a first focal length. When the moving portion 130 is in a second position, the light beam will project onto a second region of the external surface of the projection screen 120, and the beam may have a second focal length different from the first focal length. First and second focal points defining the respective first and second focal lengths may be located beyond the projection screen 120. In other words, the projection screen 120 may intersect the light beam(s) before the focal point(s). The first and second regions may overlap or may be completely different. The regions on the projection screen 120 may vary in a vertical and/or horizontal dimension. The size of the regions may vary.

The control circuitry 170 may drive the electromagnet 172 by turning it ON and OFF and/or by reversing its polarity. According to one technique, polarity is successively reversed to push and pull the magnet 138 in the moving portion 130. The rate of pushing and pulling may be greater than the natural oscillation period of the moving portion 130. For example, the natural oscillation period of the moving portion 130 may be approximately 500 ms while the rate of push or pull may be between approximately 1-4 s. Thus, the ratio of push or pull time to the natural oscillation period may be between 2:1 and 8:1. The superposition of these two frequencies may result in a modulating beat that induces a substantially erratic movement to the lens 132. The duty cycle of the push/pull may be approximately 50% or may be set so the push or pull cycle is longer than the other one. The electromagnet 172 may be energized according to a predetermined or pseudorandom pattern and may be driven according to execution of a software program accordingly (for example, to cause pushing or pulling or to selectively energize and deenergize the electromagnet 172).

The push/pull caused by the electromagnet 172 may be achieved by driving the electromagnet 172 with a wave, such as a sine wave, a square wave, a sawtooth wave, or the like. It may be possible to have more complicated driving waves, such as waves that are a combination of a plurality of frequency sine wave components. By generating and combining multiple sine waves, it may be possible to generate a more complex, natural effect with multiple "beats" due to the phase characteristics of the multiple sine waves.

In addition to moving the illuminated region about on the projection screen 120, the light source 150 may also flicker as discussed. The degree of flickering, however, may be limited such that flickering is apparent through the translucent candle body 110, but not on the projected light on the projection screen 120. By limiting the apparent flickering power, this can be achieved. For example, by limiting the difference between maximum-to-average and minimum-to-average flickering by no more than approximately 25% as measured in lumens may achieve this effect. For the example of a relatively smaller candle (for example, 1.75" diameter), intensity may vary between approximately 0.9-1.5 lumens. For the example of a relatively larger candle (for example, 4" diameter), intensity may vary between approximately 2.6-4.4 lumens.

There may be more than one light source 150 (for example, ones with different colors, such as one that is blue and another that is yellow) and/or more than one moving lens 132 that operate in similar fashions. For example, there

12

may be two light sources 150 and one lens 132. Light projected from one of these light sources 150 may be altered by the lens 132 and the other one may project directly onto the projection screen 120 without passing through a lens 132. As another example, both light sources 150 would project light through one lens 132 or through two respective lenses 132. According to yet another example, two or more lenses 132 may be arranged in series such that one beam of light passes through all of the lenses 132.

According to one technique, one light source 150 is positioned to project light onto a rear exterior surface of the projection screen 120 and another light source 150 is positioned to project light onto a front exterior surface of the projection screen 120. The light sources 150 may have different colors. The rearward light source 150 may project a blue light (either by virtue of being a blue LED, or by tinted lenses, coverings, etc.). The rearward light source 150 may project a non-moving beam of light onto the projection screen 120. The forward light source 150, by contrast, may project a light that is altered by a moving lens 132 as discussed above.

In addition to or in lieu of the electromagnet 172 and magnet 138 arrangement, the moving portion 130 may be driven by other mechanical means, such as, for example, driven air (a fan), a vibrating transducer, a spring, and/or one or more electric motors. Like the magnetic push/pull arrangement of the electromagnet 172 and magnet 138, motor(s) may physically push/pull the moving portion 130. Or such a motor arrangement may only push or pull the moving portion 130 and rely on its natural oscillation to fall back and move about. One technique for accomplishing motor-driven movement of the moving portion 130 is to have a motor shaft with a projection that contacts the moving portion 130. The shaft may rotate in one direction only, or may rotate both clockwise and counterclockwise. The projection would consequently push the moving portion 130 in only one direction when the shaft rotates in only one direction, or push the moving portion 130 in two directions when the shaft rotates both clockwise and counterclockwise.

According to another technique, several electromagnets (for example, at least three electromagnets) may be used to control the moving portion 130. The stator windings may generate a varying alternate magnetic field (for example, in response to being driven by a sine wave or a complex frequency with multiple sine wave components) to influence the magnet to make the arm move in multiple directions. Multiple outputs of a microprocessor or other suitable circuitry, for example, may be used for multiple H-bridge drivers to induce a variable-frequency alternating current into each of the motors' stator winding. The amplitudes of the movement in multiple directions may vary asynchronously, resulting in the induction of a variable beat (created by the combination of multiple frequencies). Such a frequency may be a lower frequency than the self-oscillating frequency of the moving portion 130. The lens 132 movements may be most of the time controlled by the servomotor driver and not by the self-oscillating period of the moving portion 130. The form of the shaft's bearings may also vary to provide an erratic movement.

According to other techniques, the candle 100 may play music and/or may be scented. The candle 100 may have a night-light control that, when actuated, causes the candle 100 to go into a low power mode, thereby emitting less light from the light source 150 than in the regular mode.

FIG. 12 illustrates a block diagram of an electrical system 1000 of an inventive flameless candle (e.g., candle 100), according to certain inventive techniques. The system 1000

13

may include a processor 1010, a user interface 1020, one or more sensors 1030, one or more light sources 1040 (e.g., light source 150), an electromagnet 1050, and/or an electric motor 1060. The electromagnet 1050 and/or electric motor 1060 may suitably be replaced by other force-inducing components as described herein. The system 1000 may be powered by one or more batteries in the candle or by a power source located externally from the candle (e.g., transformer).

The processor 1010 may include one or more processors, and may be capable of executing machine-readable instructions. Such instructions and other data used in conjunction with processing by the processor 1010 may be stored in one or more memories (not shown)—e.g., RAM, ROM, Flash, EEPROM, etc. The processor 1010 may receive inputs from the user interface 1020 and/or the sensors 1030. The processor 1010 may control operation of the light source 1040, the electromagnet 1050, and/or the electric motor 1060.

The user interface 1020 (such as the one described above) may include controls, such as switches or other actuators, and the processor 1010 may detect actuation of these controls. One such control may indicate to the processor 1010 (through an input to the processor 1010) to put the candle into an illuminated state. According to another technique, such a control may switch power ON/OFF to the processor 1010, thereby turning the processor 1010 ON/OFF, accordingly. Further according to this technique, when the processor 1010 is first turned ON, it places the candle into an illuminated state. When the processor 1010 is turned OFF, the candle goes into an extinguished state.

In addition to the user interface 1020, some or all of the functionality disclosed herein can be affected through one or more wireless control modalities—for example, infrared, Bluetooth, WiFi, etc. A suitable remote (dedicated remote, smart phone, etc.) may be able to send and/or receive signals through antenna(s) to control operations of the candle. Messages received at the candle may be processed by processor 1010, which then causes the desired effect.

The processor 1010 may control the light source 1040 (one or more light-generating elements, such as LEDs), the electromagnet 1050, and/or the electric motor 1060. One or more of these components may be controlled as discussed above in conjunction with candle 100.

The sensors 1030 (one or more sensors) may include various types. For example, a heat sensor may detect heat source near the candle and trigger the transition to the illuminated state via the processor 1010. A sound sensor may detect specific sounds near the candle and trigger the transition to an illuminated or extinguished state via processor 1010.

According to one technique, one or more position sensor (e.g., mechanical contact switch) may detect the position of the projection screen. The status of such position sensor(s) may be detected by the processor 1010, thereby causing the candle to transition to an illuminated or extinguished state according to the position sensor. According to this technique, the projection screen may be moved manually to different positions, and the position sensor(s) may detect one or more of the different positions. After detection, the candle may transition via the processor 1010 to the illuminated or extinguished state. Upon no detection, the candle may transition to a different one of the illuminated or extinguished state. Optionally two position sensors may be employed, one that detects the first projection screen position (e.g., substantially vertical) and one that detects the second flame screen position (e.g., substantially horizontal).

FIGS. 6-11 illustrate alternative embodiment of a flameless candle. According to FIG. 6, the projection screen may

14

have two different extinguished positions (e.g., two substantially horizontal positions). As depicted in FIG. 7 the projection screen may pivot substantially to the horizontal position or within the hollow region of the candle (e.g., through a slot as shown) along an axial dimension that is substantially 90 degrees from that shown in FIG. 6. As illustrated in FIG. 8, the projection screen may rotate (for example 180 or 360 degrees) so when it is in an extinguished state, the projection screen is in the interior hollow region of the candle body. As depicted in FIG. 9 the projection screen may be flexible and folds to a substantially horizontal position then its base is generally flat. When in the ON position the base of the projection screen may be curved, thereby bringing it into a substantially vertical position. As shown in FIG. 10, the projection screen may be telescoping, such that it collapses when in an extinguished state and extends upwardly when in an illuminated state.

As illustrated in FIG. 11, the projection screen may be static but still have two different positions with respect to the upper surface of the candle. This is by virtue of the candle body and the upper surface being moveable (e.g., upwardly and downwardly) with respect to the static projection screen. According to this embodiment, the projection screen may be substantially inside the candle body when the candle body is in an elevated position. Correspondingly, the projection screen may extend upwardly from the upper surface of the candle body when the candle body is in a downward position (i.e., the candle body is moved downwardly from the elevated position).

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. 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.

The invention claimed is:

1. A flameless candle comprising:

a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;

a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;

a projection screen configured to:
receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and
receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;

at least one light source configured to project a light onto the projection screen; and

wherein:

when the projection screen is moved to the second position, the at least one light source is automatically energized such that the light is emitted onto the projection screen; and

when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.

2. The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface:

15

when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and

when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.

3. The flameless candle of claim 1, wherein the projection screen comprises a flame shape.

4. The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position.

5. The flameless candle of claim 1, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.

6. The flameless candle of claim 1, wherein the force-inducing portion comprises an electrical motor.

7. The flameless candle of claim 1, wherein the force-inducing portion comprises at least one electromagnet.

8. A flameless candle comprising:

a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;

a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;

a projection screen configured to:

receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and

receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;

at least one light source configured to project a light onto the projection screen; and

wherein:

when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and

when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.

9. The flameless candle of claim 8, wherein the projection screen comprises a flame shape.

10. The flameless candle of claim 8, wherein when a base of the candle is resting on a substantially horizontal surface,

16

the projection screen is in a substantially vertical orientation when it is in both the first position and the second position.

11. The flameless candle of claim 8, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.

12. The flameless candle of claim 8, wherein the force-inducing portion comprises an electrical motor.

13. The flameless candle of claim 8, wherein the force-inducing portion comprises at least one electromagnet.

14. A flameless candle comprising:

a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;

a projection screen configured to:

receive a first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and

receive a second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;

at least one light source configured to project a light onto the projection screen; and

wherein:

when the projection screen is moved to the second position, the at least one light source is automatically energized such that the light is emitted onto the projection screen; and

when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.

15. The flameless candle of claim 14, wherein when a base of the candle is resting on a substantially horizontal surface:

when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and

when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.

16. The flameless candle of claim 14, wherein the projection screen comprises a flame shape.

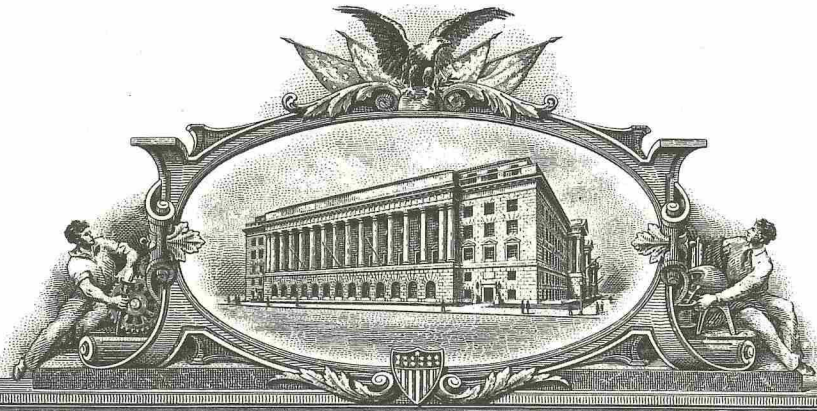
17. The flameless candle of claim 14, wherein when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position.

* * * * *

EXHIBIT 8

**Certified Copy of each
Assignment for United
States Patent No.
10,578,264**

A 8045180



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

May 29, 2020

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M. TARVER
Certifying Officer

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT5909531

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	CHANGE OF NAME
CONVEYING PARTY DATA	
Name	Execution Date
NII NORTHERN INTERNATIONAL INC.	06/12/2017
RECEIVING PARTY DATA	
Name:	STERNO HOME INC.
Street Address:	666 BURRARD STREET
Internal Address:	SUITE 1700, PARK PLACE
City:	VANCOUVER
State/Country:	CANADA
Postal Code:	V6C 2X8
PROPERTY NUMBERS Total: 2	
Property Type	Number
Application Number:	16741939
Application Number:	16460761
CORRESPONDENCE DATA	
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<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
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Address Line 2:	SUITE 3400
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ATTORNEY DOCKET NUMBER:	62171US03-62171US04
NAME OF SUBMITTER:	ANDREW B. KARP
SIGNATURE:	/Andrew B. Karp/
DATE SIGNED:	01/14/2020
Total Attachments: 1 source=Certificate of Change of Name_NII to Sterno#page1.tif	

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PATENT
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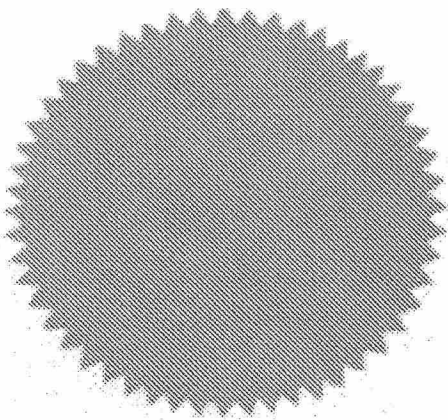


Number: BC1062406

CERTIFICATE OF CHANGE OF NAME

BUSINESS CORPORATIONS ACT

I Hereby Certify that NII NORTHERN INTERNATIONAL INC. changed its name to STERNO HOME INC. on June 12, 2017 at 03:55 PM Pacific Time.



ELECTRONIC CERTIFICATE

*Issued under my hand at Victoria, British Columbia
On June 12, 2017*

CAROL PREST
Registrar of Companies
Province of British Columbia
Canada

RECORDED: 01/14/2020

PATENT
REEL: 051506 FRAME: 0678

PUBLIC VERSION OF EXHIBIT 9C

**Declaration of Steve
Pellegrini**

PUBLIC VERSION

**UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.**

IN THE MATTER OF

**CERTAIN ELECTRONIC CANDLE
PRODUCTS AND COMPONENTS
THEREOF**

Investigation No. 337-TA-_____

██████████ DECLARATION OF STEVE PELLEGRINI

1. I am the Chief Financial Officer of The Sterno Group Companies, LLC and Sterno Home Inc. (collectively “Sterno”). I have personal knowledge of the facts set forth below, or have based my statements on information provided to me from the sources of information at Sterno that I regularly rely on in conducting business and making decisions for Sterno.
2. I have been the CFO of Sterno since October 2007. I have nineteen years of experience as the CFO of various private equity owned businesses.
3. The Sterno Group Companies, LLC, is composed of four subsidiaries, Sterno Home Inc., Rimports, LLC, Sterno Products, LLC, and Sterno Delivery, LLC. The Sterno Group is headquartered at 1880 Compton, Ave., Corona, California. Throughout the U.S., Sterno Group and its subsidiaries employ 475 full time equivalent people.
4. Among other things, Sterno designs, engineers, tests, conducts quality assurance, produces for sale, markets and sells electric flameless candles for a variety of lighting industries, including home décor. Sterno’s electric flameless candles are sold in the United States under a number of proprietary and private label brand names, including Mirage®, Mirage® Gold, Sterno Home®, Candle Impressions®, Folding Flame® and iFlicker®.

Sterno's Overall Business Related to the Domestic Industry Products

5. Starting with its headquarters in Corona, California, Sterno has substantial operations in the U.S. for its electric flameless candle business, including Domestic Industry Products. Those U.S. operations include product research and development, review and analysis of prototypes, first production articles, competitive samples, review and analysis of design concepts, pricing and costing of components, packaging design and appearance, setting and enforcing performance specifications, quality analysis and assurance, testing, aesthetic product design, fragrance assessment, sales and marketing for the Domestic Industry Products.
6. I understand that Sterno is asserting U.S. Patent Numbers 9,068,706 (“the ‘706 patent”), 10,024,507 (“the ‘507 patent”), 10,352,517 (“the ‘517 patent”), and 10,578,264 (“the ‘264 patent”) in the Investigation. (collectively “Asserted Patents”).
7. I understand that Sterno Home’s “iFlicker®,” “Mirage®” and “Folding Flame®” electric flameless candles are being asserted as domestic industry products in this Investigation. I will refer to these products collectively herein as the “Domestic Industry Products.”
8. Sterno’s accounting year (“Fiscal Year”) is the same as a calendar year, running January 1 to December 31.
9. In Fiscal Year 2019, Sterno’s net U.S. sales from electric flameless candles totaled approximately [REDACTED] net U.S. sales attributable to the Domestic Industry Products.

Sterno's Investments in Plant and Equipment

10. Sterno’s storied past in the U.S. extends back to 1893 when S. Sternau & Co. began manufacturing high quality houseware products and appliances in Brooklyn, New York.

PUBLIC VERSION

Through its U.S. operations, Sterno has continued to build upon those deep U.S. roots with its “best in class” electric flameless candles, including its Domestic Industry Products.

11. Sterno has operated at the Corona, California location since December 2012. The Corona facility contains approximately [REDACTED] [REDACTED] of the floor area of this facility is dedicated to the support of Sterno’s electric flameless candle business, including its Domestic Industry Products.

Sterno’s Employment of Labor and Capital

12. In the U.S., Sterno employs [REDACTED] for its electric flameless candle business, which includes the Domestic Industry Products. The U.S. employees’ collective salary and benefits in Fiscal Year 2019 was [REDACTED]
13. The hub for Sterno’s electric flameless candle business, which includes Domestic Industry Products, is located in the United States. The innovation hub conducts product research and development, review and analysis of prototypes, first production articles, competitive samples, review and analysis of design concepts, pricing and costing of components, packaging design and appearance, setting and enforcing performance specifications, quality analysis and assurance, testing, aesthetic product design, fragrance assessment sales and marketing for the Domestic Industry Products. Engineering and product manufacturing for the Domestic Industry Products is managed, controlled and supervised by the head of innovation, who is located in Illinois. Customer service activities include working with existing customers to satisfy their needs for products, including the Domestic Industry Products, receiving and dealing with customer feedback and questions are handled from the Corona, California location.

14. In addition to its own full time employees, Sterno employs U.S.-based engineering consultants on a project basis to support its electric flameless candle business, which includes the Domestic Industry Products. In Fiscal Year 2019, Sterno spent [REDACTED] [REDACTED] engineering consultants to support its Domestic Industry Products. Forward looking, Sterno plans to continue its practice of hiring U.S.-based engineering consultants to assist with projects related to its electric flameless candle business, which includes the Domestic Industry Products.

Sterno's Investments in the Exploitation of the Intellectual Property

15. For over a decade, Sterno Home (and its predecessor in interest) has invested significantly in steadfast enforcement and exploitation of its electric flameless candle patent portfolio in the U.S., including the Asserted Patents.
16. Through considerable and continued investment in exploitation and enforcement, Sterno Home has built a valuable and licensable patent portfolio for electric flameless candles; the value of licenses for patents in this portfolio, which includes the Asserted Patents, has been, and is, enhanced because Sterno proactively polices and enforces its patent portfolio in the U.S., including issuing cease-and-desist letters and filing infringement lawsuits, if needed.
17. For example, on May 17, 2020, Sterno Home filed suit against L&L Candle Company LLC and related entities in the United States District Court for Central District of California for infringement of several patents in Sterno's electric flameless candle portfolio. Sterno vigorously defends its intellectual property, which not only protects its electric flameless candle business but also enhances the license value of its electric flameless candle portfolio.

PUBLIC VERSION

18. In 2018, and as a direct result of enforcement and exploitation efforts, Sterno Home licensed its '706 and '507 patents, which are Asserted Patents in this Investigation, to [REDACTED] U.S. business that currently sells licensed electric flameless candles throughout the U.S. at large consumer-facing retailers, [REDACTED]. These licensed products practice one or more of the Asserted Patents. [REDACTED] has recently renewed its license from Sterno. In the fourth quarter of Fiscal Year 2019, the license [REDACTED] generated royalties [REDACTED].
19. Sterno also conducts U.S.-based consumer market research and market trend analysis on the electric flameless candle market, including the market for Domestic Industry Products, using [REDACTED]
[REDACTED], all in support of its U.S. electric flameless candle business.
20. In addition, Sterno contracts with U.S.-based manufacturer sales representatives across the United States to assist in sales and marketing of electric flameless candle products, including the Domestic Industry Products. Currently, Sterno has contracts with [REDACTED]
[REDACTED] in Fiscal Year 2019 and Sterno expects to spend an additional \$1,400,000 on those representatives in Fiscal Year 2020.
21. Sterno's electric flameless candles products, including Domestic Industry Products are sold to a range of customers from large consumer-facing retailers like Walmart, Target, Costco, Bed Bath & Beyond, Restoration Hardware, Pottery Barn, Crate & Barrel, Frontgate,

PUBLIC VERSION

Pier 1, Hobby Lobby, Meijer, Kroger, Cost Plus, Joann Stores. and Michael's, to small retailers and distributors throughout the U.S.

22. Sterno's U.S. advertising and marketing spending for its electric flameless candle products, including Domestic Industry Products, in Fiscal Year 2019 [REDACTED]. These amounts do not include the salaries of U.S employees already mentioned above, but do include investments in digital marketing, on-air marketing talent, POP, B-roll video, and brochures.
23. Each year, and as part of its marketing efforts, Sterno invests significant resources to exhibit, demonstrate, and sell its electric flameless candles, including the Domestic Industry Products, at trade shows held across the United States. Attendees come to trade shows to become familiar with new and existing products in the home goods industry, including electric flameless candles. Major U.S. trade shows usually last several days and require a significant capital outlay. Sterno's investments in trade shows in the U.S. relating to its electric flameless candles, including Domestic Industry Products, include rental of booth space, design and production of a professional display space, shipping of booth and equipment, samples or promotional items handed out, attendance fee and marketing materials specific to the event. Sterno's trade show spend on U.S. trade shows in Fiscal Year 2019 [REDACTED], not including salaries.
24. Attached to my declaration is a spreadsheet showing summary sales information for Sterno's electric flameless candles products, including Domestic Industry Products, extracted from Sterno's accounting systems.
25. Sterno continues to sell the Domestic Industry Products and other electric flameless candles. For Fiscal Year 2020, Sterno projects that [REDACTED]

attributable to the Domestic Industry Products.

Sterno's Future Plans for Additional Employment of Labor or Capital in the United States

26. Sterno continues to expand its investment in U.S. operations for its electric flameless candle business. Sterno acquired Northern International Inc. in February of 2016, and began moving flameless candle operations to the United States, starting with executive management. As part of that expansion effort, Sterno recently relocated a supervisory position for certain technical staff, which position was formerly in Canada, to the United States, in July of 2019. In addition to relocating this supervisory position, Sterno is actively considering moving the accompanying technical staff to the United States. However, Respondents' erosion of Sterno's flameless candle business, including that for the Domestic Industry Products, by and through its infringement of the Asserted Patents, is a significant deterrent to Sterno's expansion plans, including any relocation of certain technical staff to the United States.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.



Steve Pellegrini
July 14, 2020, Riverside County, CA

EXHIBIT 10

Liown.com web page



HOME ABOUT DESIGN MANUFACTURING CONTACT



A fully integrated business enterprise, Liown focuses on product development, full service manufacturing and global distribution services. We believe there are no boundaries in the pursuit of creativity. We strive to create marketing demand through innovation in every layer of the the lifecycle of a new product. We serve customers who need start-to-end production of their product. We are involved from concept development



and schematic electro circuit design to component production and systematic product assembly. With an understanding of our customers, consumers and the marketplace, we build long lasting relationships and together we enjoy a better life through innovation.



EXHIBIT 11

**Lightsand
batteries.com/moving-flame-
candles**

HOME

ABOUT US

CUSTOMER SERVICE

CONTACT US

CANDLE EDUCATION

CANDLE Q&A'S

FEEDBACK

(770) 662-8067
9:00am-5:00pm EST Mon-Fri

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QUALITY GUARANTEE
Only the highest quality & service.

SHOP BY CATEGORY

DECORATIVE LED LIGHTING

- Decorative LED Garland Lights
- Hanging Cords
- LED Light Bulbs
- Starbursts

WATER LANTERNS & GLOBES

- Birds
- Books
- Bunnies
- Christmas
- Dogs
- Easter
- Musical
- Nativity
- Picture Frames
- Santa
- Snowman
- Spring
- TVs

LED CANDLE FOUNTAINS

- Accessories
- Aqua Torch
- aquaflame
- Citronella & Essential Oils

Home > Categories > Wick-to-Flame



These pillar candles from LightLi® are touted as the most authentic flameless candles on the market. When turned off, the Wick-To-Flame candle displays an unlit wick. When turned on, the beauty of the Moving Flame® is revealed. The candle transforms with a simple touch of the top.

People are mesmerized by Wick-To-Flame. Once you see this candle transform before your eyes, you will have to have it. Wick-To-Flame addresses the need for an authentic candle appearance when the candle is off. Up to now, this has been the objection with flameless for some.

Wick-To-Flame features Moving Flame technology highlighted by a natural, dancing flame. The realistic look is further enhanced with an ivory wax body and a melted wax edge. Flameless candles are 100% worry-free; safe for kids, pets and late nights, and LightLi candles are programmable with state-of-the art manufacturing.

Wick-To-Flame has a run-time of 500 hours and is compatible with the LightLi advanced 5-feature remote control, ideal for turning multiple candles on and off with a single click. Wick-To-Flame can also be turned off by using the remarkable “blow out” feature: users can blow on the flame and the candle turns off, just like a traditional candle.

“The blow-out feature is simply amazing, and it shows the innovation that LightLi is known for. Wick-To-Flame is the premium candle on the market.



- Color Changing
- Embedded Designs
- Embossed, Damask & Fiber
- Everlasting Glow
- Gift Essentials
- Graduated Colors
- Outdoor
- Patio Essentials
- Remote Ready
- Seasonal
- Smooth Wax
- Textured Fresco Finish
- Thomas Kinkade Series

LED LIGHTED CRACKLE GLASS GLOBES

BRAND NAMES

- Aqua Torch
- aquaflame
- Patio Essentials
- Avalon
- Boston Warehouse
- Everlasting Glow
- FlameWave
- Gift Essentials
- LightLi
- LightsandBatteries.com
- Liown
- Luminara
- Matrixflame
- Matchless
- Mystique
- Radiance
- temp-tations by Tara
- Torchier
- Torchier Digital Flame Lanterns

ACCESSORIES

- Batteries
- Battery Eliminator Kits &



Sort By: Price: Low to High Go

10 per page Page 1 of 1

LightLi by Liown - Wick-to-Flame - Moving Flame - Flameless LED Candle - Indoor - Ivory Paraffin Wax - Remote Ready - 4" x 7"

List Price: \$69.99
Our Price: \$54.99
Savings: \$15.00



☐ Compare

This LightLi by Liown 4" x 7" wick-to-flame pillar flameless LED candle has a realistic moving flame and melted edges along the top. The candle is made of smooth ivory colored paraffin wax and features a 5-hour timer feature that can turn the candle "on" and "off" at the same time every day. The unique and patented wick-to-flame feature is touted as the most realistic flameless candle on the market. When turned off, the wick-to-flame candles displays an unlit wick. When turned on, the beauty of the LED moving flame is revealed. The candle is turned on and off by simply touching its top or by using the optional hand held remote control (sold separately). The wick-to-flame candle can also be turned off by using the remarkable blow-out feature. Simply blow on the flame and the candle turns off just like a traditional candle! The 5-hour timer mode can also be enabled by touching and holding the top of the candle for about 5 seconds until the LED blinks. This candle also has built-in receiver for the optional advanced 5-function hand-held remote control (sold separately). The optional advanced 5-function remote control allows you to control your candle's flame like never before - Bright/Dim, Flicker/Static, Fast/Slow, 4-Stage Timer, (4, 6, 8, 10-Hours) and On/Off. The candle runs on 2 x D batteries (sold separately) and has a 500-hour battery life (alkaline batteries). Since this candle is constructed of real paraffin wax, it's rated for indoor used and exposure to excessive heat and direct sunlight should be avoided.

[more info](#)

LightLi by Liown - Wick-to-Flame - Moving Flame - Flameless LED Candle - Indoor - Ivory Paraffin Wax - Remote Ready - 4" x 9"

List Price: \$79.99
Our Price: \$61.99
Savings: \$18.00



☐ Compare

This LightLi by Liown 4" x 9" wick-to-flame pillar flameless LED candle has a realistic moving flame and melted edges along the top. The candle is made of smooth ivory colored paraffin wax and features a 5-hour timer feature that can turn the candle "on" and "off" at the same time every day. The unique and patented wick-to-flame feature is touted as the most realistic flameless candle on the market. When turned off, the wick-to-flame candles displays an unlit wick. When turned on, the beauty of the LED moving flame is revealed. The candle is turned on and off by simply touching its top or by using the optional hand held remote control (sold separately). The wick-to-flame candle can also be turned off by using the remarkable blow-out feature. Simply blow on the flame and the candle turns off just like a traditional candle! The 5-hour timer mode can also be enabled by touching and holding the top of the candle for about 5 seconds until the LED blinks. This candle also has built-in receiver for the optional advanced 5-function hand-held remote control (sold separately). The optional advanced 5-function remote control allows you to control your candle's flame like never before - Bright/Dim, Flicker/Static, Fast/Slow, 4-Stage Timer, (4, 6, 8, 10-Hours) and On/Off. The candle runs on 2 x D batteries (sold separately) and has a 500-hour battery life (alkaline batteries). Since this candle is constructed of real paraffin wax, it's rated for indoor used and exposure to excessive heat and direct sunlight should be avoided.

[more info](#)

Accessories

Bluetooth App Connection
Cards

Cables

Fragrance Cartridges

Holders & Display Stands

Power Supplies & Chargers

Remotes

Taper Candle Cots

CATEGORIES ▼

3D Flame

Bluetooth App Enabled Smart
Candles

Wick-to-Flame

Bulbs

Coated & Textured

Damask & Fiber

Digital Flame

Distressed

Dripping Wax

Embedded Designs

Embossed

Flat Top

Fragrance Diffusing

Glass Containers

Glitter

Lanterns

Large Pillars

New Products

Night Lights

Non-Moving Flame

Novelty & Specialty

Ornaments

Outdoor

philoSophie's

Pillars

Primitive

Rechargeables

Rustic

RV Camping

Scratch & Dent

Seasonal

Sets

Tapers

Tealights

temp-tations by Tara

Thomas Kinkade

360-Degrees

Tri-Flames

Two-Tone

Unique Shapes

Unscented

Votives

Window Tapers

HANDCRAFTED PRODUCTS ▶

Cuffs, Sleeves & Holders

Custom Decals

Glitter & Embellished

Luminaries

Standard Decals

BATTERIES & CHARGERS ▶

Button

AAA

AA

C

D

9V

Lantern

Other

Lithium

Hearing Aid

Rechargeable

Battery Chargers

OTHER PRODUCTS ▶

Aquarium Lights

Bluetooth Speakers

Desk Lamps

Flashlights

LED Bulbs

Night Lights

Plant Grow Lights

Power Banks

Solar Products

USB Jump & Thumb Drives

COMPANY INFORMATION

- About Us
- Contact Us
- Customer Service
- Shoppe Location

MY ACCOUNT

- View Cart
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- Order Status

HELPFUL INFO

- Shipping
- Returns
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- Terms & Conditions

RESOURCES

- Candle Education
- Candle Q&A's

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EXHIBIT 12

**[www.razimports.com/shop/
search.aspx?ID:push](http://www.razimports.com/shop/search.aspx?ID:push)**

Search

(30) records found.

★ Best selling item. **NEW** New Item in the line. 🎥 Item has animation.



37065 ★

**3"X4" Push Flame
Ivory Pillar Candle**

[More Details →](#)



37066 ★

**3"X6" Push Flame
Ivory Pillar Candle**

[More Details →](#)



37067 ★

**3"X8" Push Flame
Push Flame Pillar
Candle**

[More Details →](#)



37068 ★

**3.5"X5" Push Flame
Ivory Pillar Candle**

[More Details →](#)



37069 ★

**3.5"X7" Push Flame
Ivory Pillar Candle**

[More Details →](#)



37070 ★

**3.5"X9" Push Flame
Push Flame Pillar
Candle**

[More Details →](#)



37071 ★

**3"X4" Push Flame
White Pillar Candle**

[More Details →](#)



37072 ★

**3"X6" Push Flame
White Pillar Candle**

[More Details →](#)



37073 ★

**3"X8" Push Flame
White Pillar Candle**

[More Details →](#)



37074 ★

**3.5"X5" Push Flame
White Pillar Candle**

[More Details →](#)



37075 ★

**3.5"X7" Push Flame
White Pillar Candle**

[More Details →](#)



37076 ★

**3.5"X9" Push Flame
White Pillar Candle**

[More Details →](#)



37077 ★

**3"X4" Push Flame
Red Pillar Candle**

[More Details →](#)



37078 ★

**3"X6" Push Flame
Red Pillar Candle**

[More Details →](#)



37079 ★

**3"X8" Push Flame
Red Pillar Candle**

[More Details →](#)



37080 ★

3.5"X5" Push Flame
Red Pillar Candle

[More Details →](#)

37081 ★

3.5"X7" Push Flame
Red Pillar Candle

[More Details →](#)

37082 ★

3.5"X9" Push Flame
Push Flame Pillar
Candle

[More Details →](#)



37083 ★

3.5"X5" Push Flame
Grey Chalky Pillar
Candle

[More Details →](#)



37084 ★

3.5"X7" Push Flame
Grey Chalky Pillar
Candle

[More Details →](#)



37085 ★

3.5"X5" Push Flame
Taupe Chalky Pillar
Candle

[More Details →](#)



37086 ★

3.5"X7" Push Flame
Taupe Chalky Pillar
Candle

[More Details →](#)



37087 ★

4"X5.5" Push Flame
Ivory Pillar Candle

[More Details →](#)



37088 ★

4"X7.5" Push Flame
Ivory Pillar Candle

[More Details →](#)



37096 ★

Push Flame Ivory



37089 ★

4"X9" Push Flame
Ivory Pillar Candle



**Push Flame Ivory
Pillar Candles with
Remote, Set/3**

[More Details →](#)

Ivory Pillar Candle

[More Details →](#)

37097 ★

**Push Flame Ivory
Pillar Candles with
Remote, Set/3**

[More Details →](#)



37108 ★

**1.5"X2" Push Flame
Set/2 Plastic Ivory
Tealight Ca**

[More Details →](#)



37098 ★

**Push Flame Red
Pillar Candles with
Remote, Set/3**

[More Details →](#)



37109 ★

**1.5"X4" Push Flame
Set/2 Plastic Ivory
Votive Cand**

[More Details →](#)

CORPORATE OFFICE

1020 Eden Road
Arlington, TX 76001

Phone: 833.299.1522

CUSTOMER SERVICE

Phone: 800.443.3540
Fax: 817.375.6208
raz@razimports.com

ATLANTA

AmericasMart
240 Peachtree St. NW, Suite 18-C-15
Atlanta, GA 30303

Phone: 404.521.9355
Fax: 404.521.9357

DALLAS

Dallas Market Center
2050 N Stemmons Freeway, Suite 340
Dallas, TX 75207

Phone: 214.745.1661
Fax: 214.747.1610

LAS VEGAS

World Market Center Las Vegas
455 S. Grand Central Pkwy, Suite C-0612
Las Vegas, NV 89106

Phone: 702.902.4294
Fax: 725.200.3831

EXHIBIT 13

**[www.napahomeandgarden.com](http://www.napahomeandgarden.com/sign-in/?returnURL=/candles-Lightli-Lightli-wick-+)
[/sign-in/?returnURL=/candles-
Lightli-Lightli-wick-+](http://www.napahomeandgarden.com/sign-in/?returnURL=/candles-Lightli-Lightli-wick-+)**

BARCLAY BUTERA
FLORICULTURE
FRESH
GRAY OAK
LIGHTLI
LIGHTLI Indoor
LIGHTLI Outdoor
LIGHTLI Remote
LIGHTLI Wick-To-Flame
RED CANDLES



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Password: [Forgot your password?](#)

☐

SIGN IN

☐

create an account

New to Napa? Hello - welcome - and thank you for finding us. To become a Napa customer, you must be a business with a Sales & Use Tax ID. Let's get started.

CREATE AN ACCOUNT

Sign In

existing customer & first time to our site?

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Napa account number:

EXPRESS REGISTER

Express Register

MARKET CALENDAR

REPS & SHOWROOMS

CATALOG REQUESTS

NEWS

MEDIA

CAREERS

Freight Rates

Terms & Conditions

Customer Service **888.893.2323**

Fax 770.255.2525

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Contact Us



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EXHIBIT 14

www.bwtcshop.com/Products/lightli



WHOLESALE CATALOGS

Please request a password to view and download our wholesale catalogs, by filling out the following:





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useful info

WORK...

at BW

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EXHIBIT 15

**Family tree for the
9,068,706 and
10,024,507 patents,
including foreign
applications**

ELECTRONIC LUMINARY DEVICE WITH SIMULATED FLAME

Country	Status	Application No.	Filed	Publication No.	Published	Patent No.	Granted.
Australia	ABANDONED	2012372764	10/23/2012			2012372764	09/01/2016
Australia	ABANDONED	2016216562	08/16/2016				
Brazil	ABANDONED	BR 1120140222134	10/23/2012				
Canada	ISSUED	2866846	10/23/2012			2866846	11/17/2015
China P.R.	ISSUED	2012800730291	10/23/2012	104272027 A	08/24/2016	ZL2012800730291	08/24/2016
China P.R.	ABANDONED	2016106426647	10/23/2012	CN106247201A	12/21/2016		
Germany	ABANDONED	602012026981.2	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Denmark	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
EPC	ENTRY INTO NATIONAL PHASE	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
EPC	ABANDONED	16205327.6	10/23/2012	3173689	05/31/2017		
Spain	ABANDONED	12870606.6	10/23/2012	2617513	01/14/2015	2823229	12/21/2016
Finland	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
France	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Great Britain	ISSUED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Hong Kong	ISSUED	15106332.7	10/23/2012	1205785A	08/24/2016	HK1205785	09/21/2018
Ireland	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Iceland	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Italy	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Mexico	ISSUED	MX/a/2014/010748	10/23/2012		04/17/2015	339650	06/02/2016
Mexico	ABANDONED	MX/x/2016/007107	10/23/2012				
Norway	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Portugal	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
Sweden	ABANDONED	12870606.6	10/23/2012	2823229	01/14/2015	2823229	12/21/2016
PCT	ENTRY INTO NATIONAL PHASE	PCT/US2012/061435	10/23/2012	2013/133867	09/12/2013		
PCT	ENTRY INTO NATIONAL PHASE	PCT/US2013/029730	03/07/2013	WO13/134574	09/12/2013		

EXHIBIT 16

**Family tree for the
10,352,517 and
10,578,264 patents,
including foreign
applications**

ARTIFICIAL CANDLE WITH MOVEABLE PROJECTION SCREEN POSITION

Country	Status	Application No.	Filed	Publication No.	Published	Patent No.	Granted
Canada	ISSUED	3016801	09/07/2018			3016801	04/28/2020
Great Britain	ISSUED	1814630.8	09/07/2018	GB2567953	05/01/2019	GB2567953 B	11/20/2019

EXHIBIT 17

**Chart showing
infringement of the
9,068,706 patent by
Liown "Push Flame"**

Infringement of U.S. Patent No. 9,068,706 by Liown (RAZ) Push Flame Candles

Claims	Liown (RAZ) Push Flame Candle
<p>[1.Pre] A device comprising:</p>	 The image shows the product packaging and a lit candle. On the left is a white rectangular box with a clear window showing the candle inside. The text on the box reads "PUSH FLAME", "UNSCENTED LED CANDLE", "3" x 4.5" OBLIQUE EDGE", and "Distributed By RAZ IMPORTS INC.". On the right is a white cylindrical candle with a flame, sitting on a dark surface.
<p>[1.A] a side wall including an upper region and a lower region;</p>	 The image shows two side-by-side views of the lit candle. In the left view, a red arrow points to the upper region of the side wall. In the right view, a red arrow points to the lower region of the side wall. Both views show the candle on a dark surface with a flame.

[1.B] a base engaged with the lower region of the side wall;



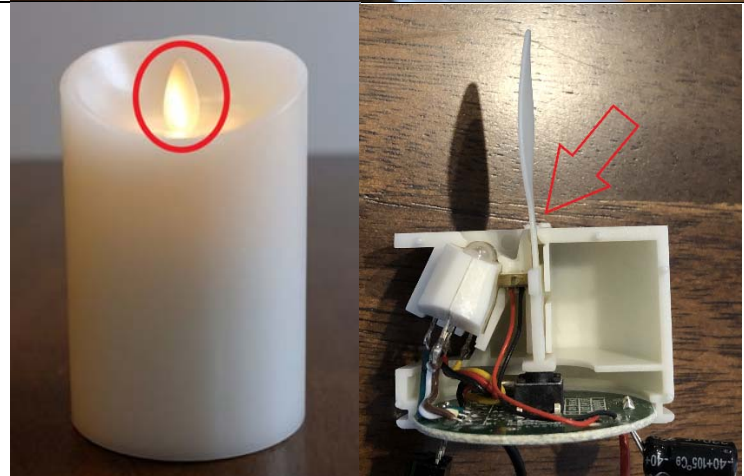
[1.C] an upper surface extending from the upper region of the side wall to form an upper recess, wherein the upper surface includes an aperture;



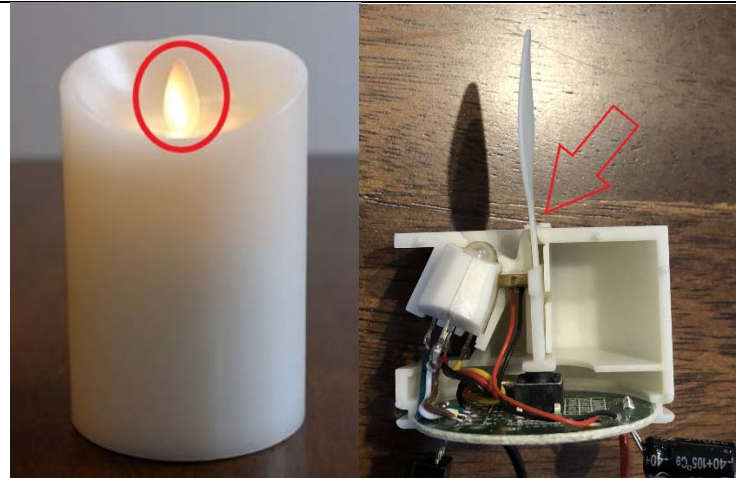
[1.D] a projection screen, which does not move in physical space, wherein:



[1.E] the projection screen extends upwardly from the upper surface; and



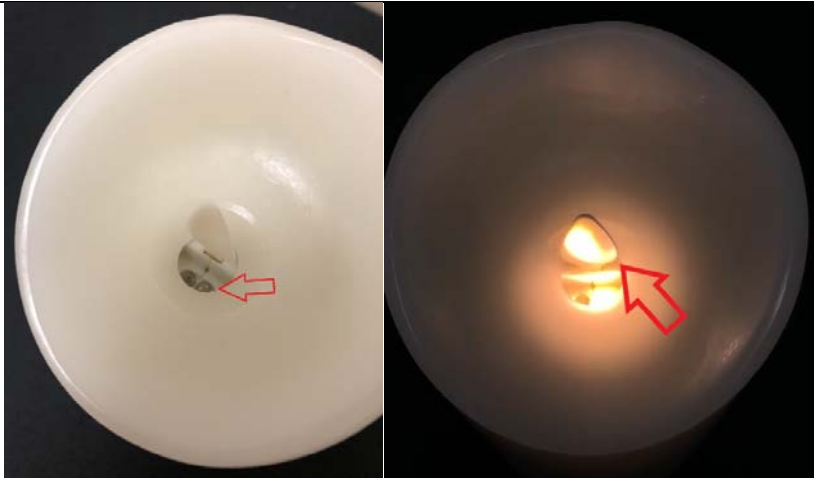
[1.F] a position of the projection screen is fixed with respect to a position of the upper surface;



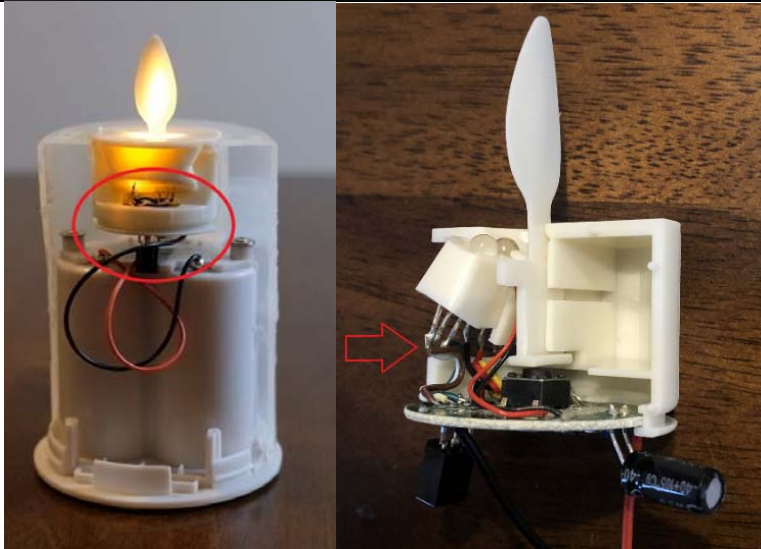
[1.G] a first source of light positioned below the upper surface, wherein the first source of light projects light through the aperture onto the projection screen;

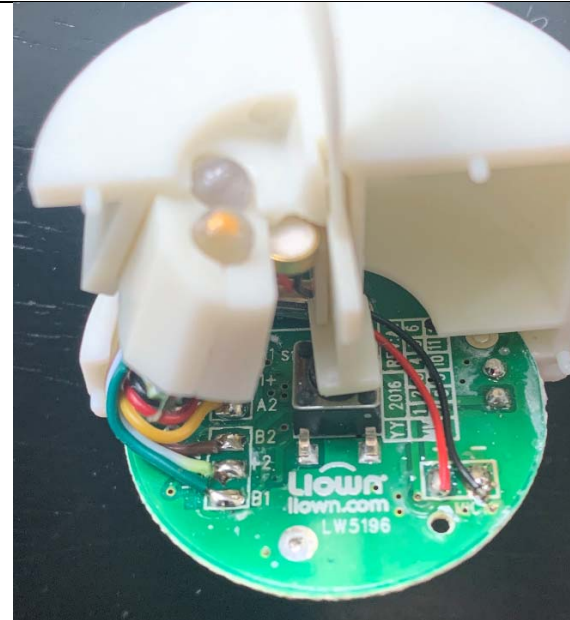


[1.H] a second source of light positioned below the upper surface, wherein the second source of light projects light through the aperture onto the projection screen; and

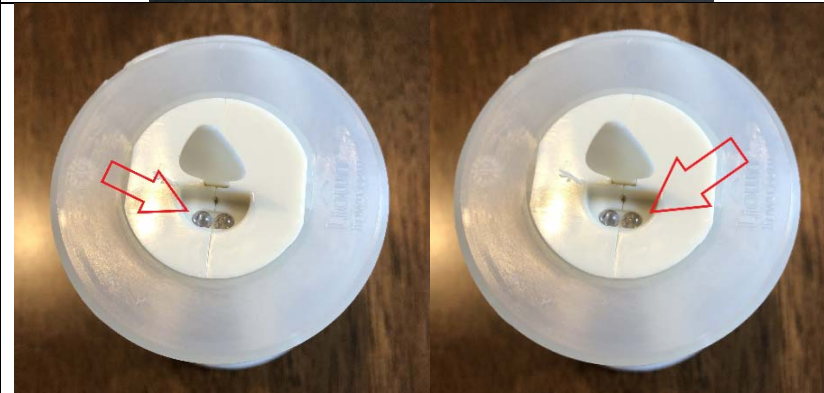


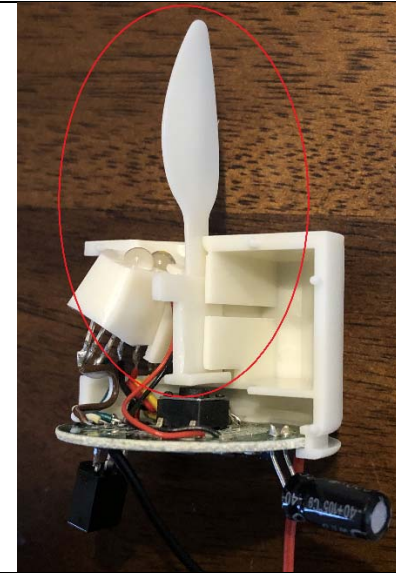
[1.I] circuitry electrically connected to the first source of light and the second source of light, wherein the circuitry independently controls intensities of the light projected by the first source of light and the second source of light onto the projection screen.



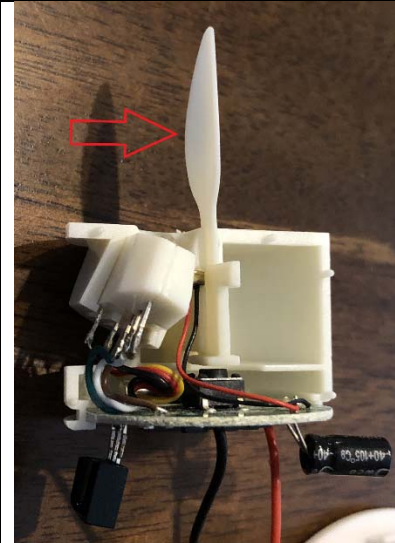


[2] The device of claim 1, wherein positions of the first source of light and the second source of light are fixed with respect to the position of the projection screen.





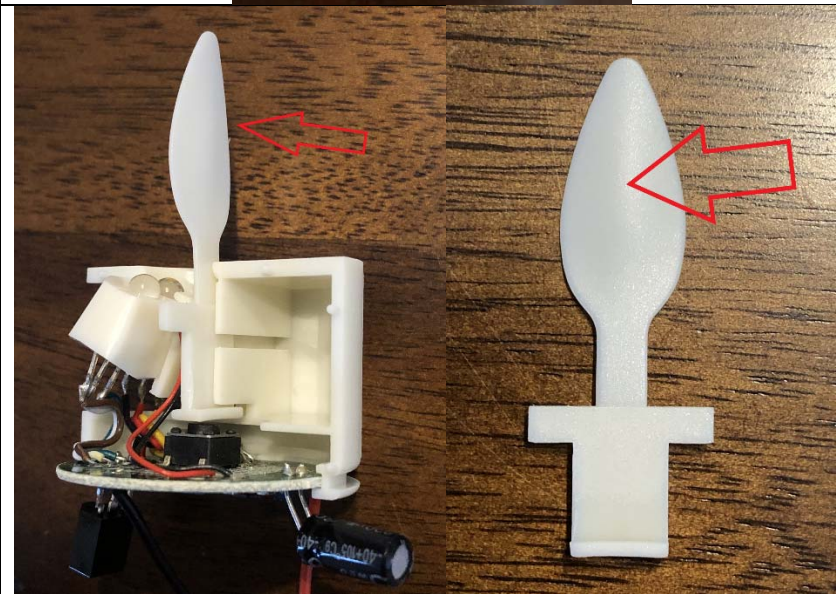
[4] The device of claim 1, wherein the projection screen includes a concavity.



[5] The device of claim 1, wherein the projection screen comprises a flame shape.



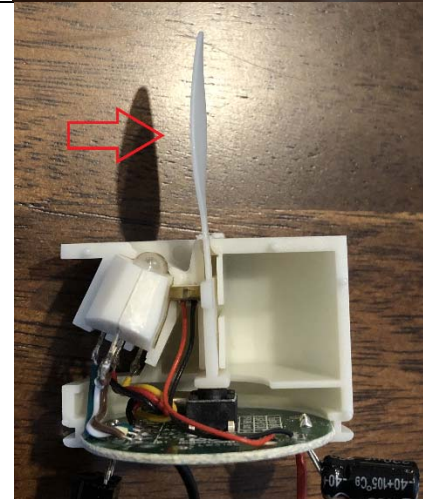
[6] The device of claim 1, wherein the projection screen includes a convexity.



[7.Pre] The device of claim 1, wherein:



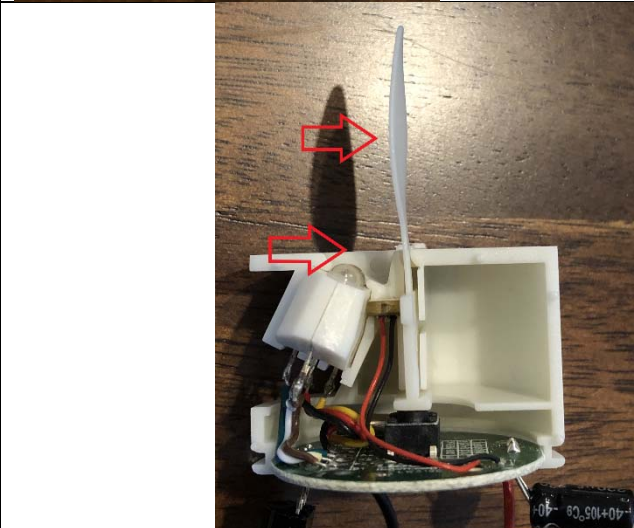
[7.A] the projection screen includes a primary plane;



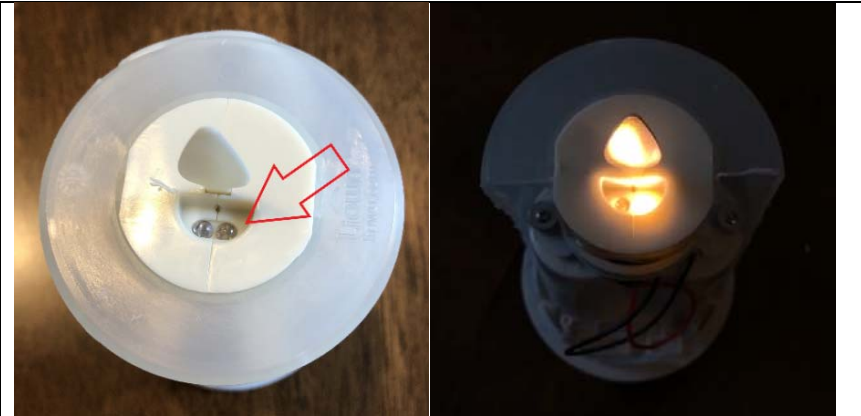
[7.B] the first source of light emits light including a beam axis and a beam width;



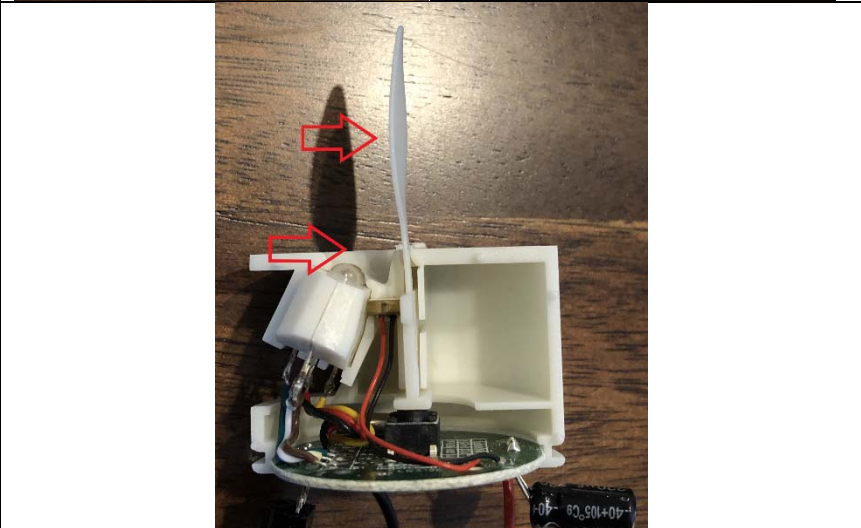
[7.C] the beam axis of the first source of light intersects the primary plane of the projection screen at an angle between 20° to 40° ;



[7.D] the second source of light emits light including a beam axis and a beam width; and



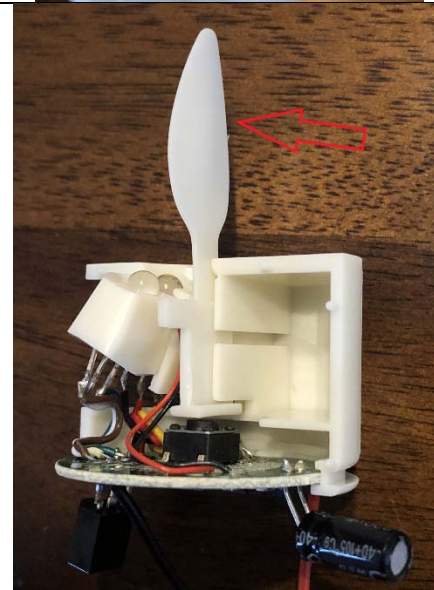
[7.E] the beam axis of the second source of light intersects the primary plane of the projection screen at an angle between 20° to 40° .



[11] The device of claim 1, wherein the projection screen is rigid.



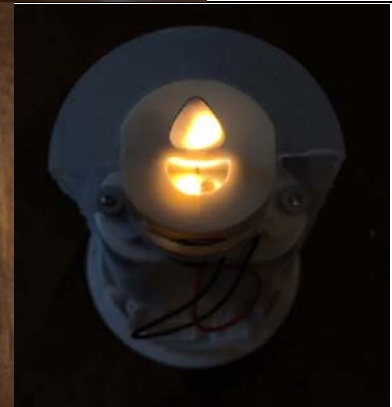
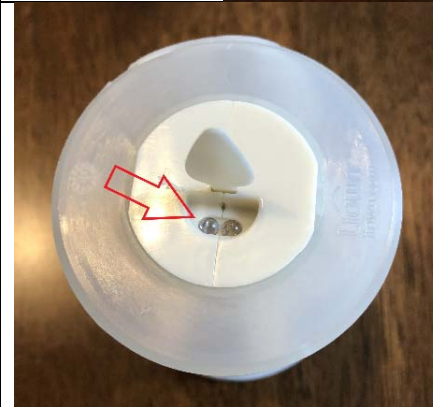
[12] The device of claim 11, wherein the projection screen comprises plastic.



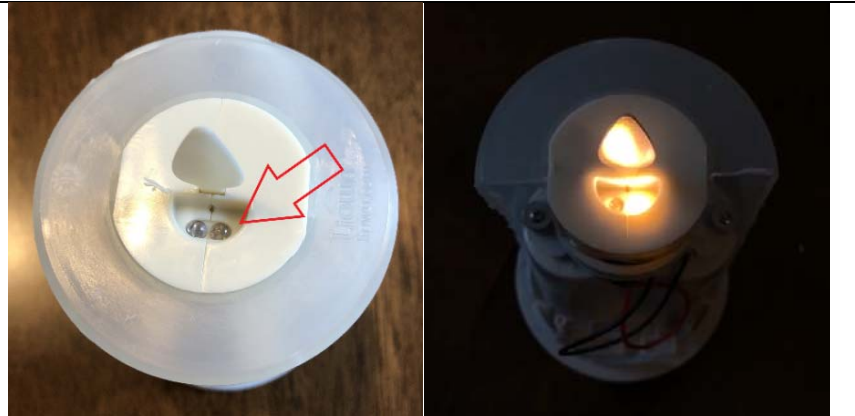
[13.Pre] The device of claim 1, wherein:



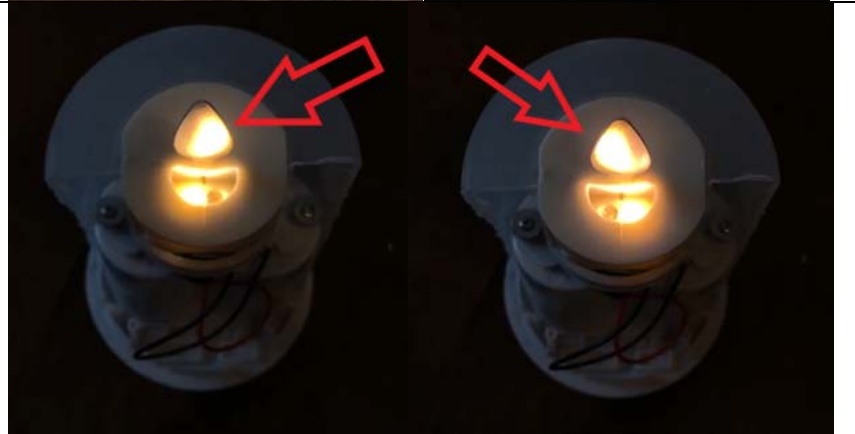
[13.A] the first source of light is positioned to project light onto a front side of the projection screen in a first area;



[13.B] the second source of light is positioned to project light onto the front side of the projection screen in a second area; and



[13.C] the second area is different than the first area.



[14] The device of claim 13, wherein a portion of the first area overlaps a portion of the second area.

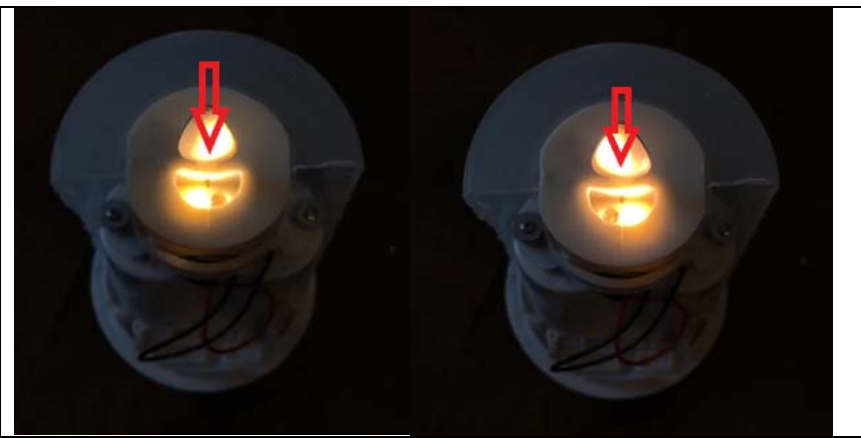
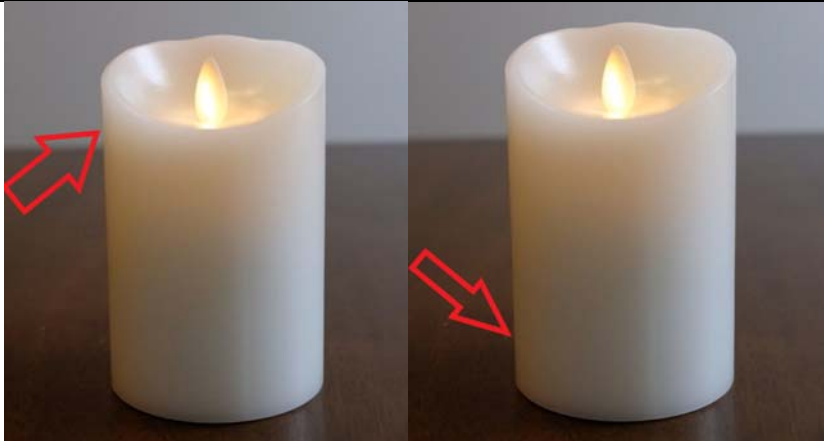


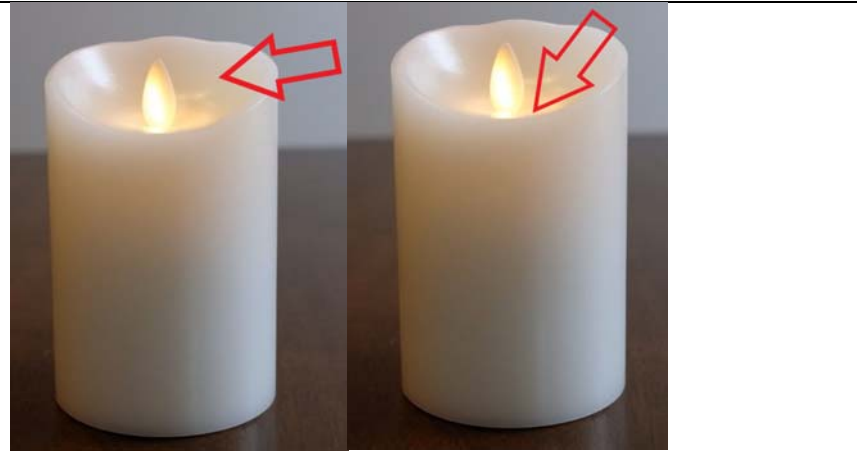
EXHIBIT 18

**Chart showing
infringement of the
10,024,507 patent by
Liown "Push Flame"**

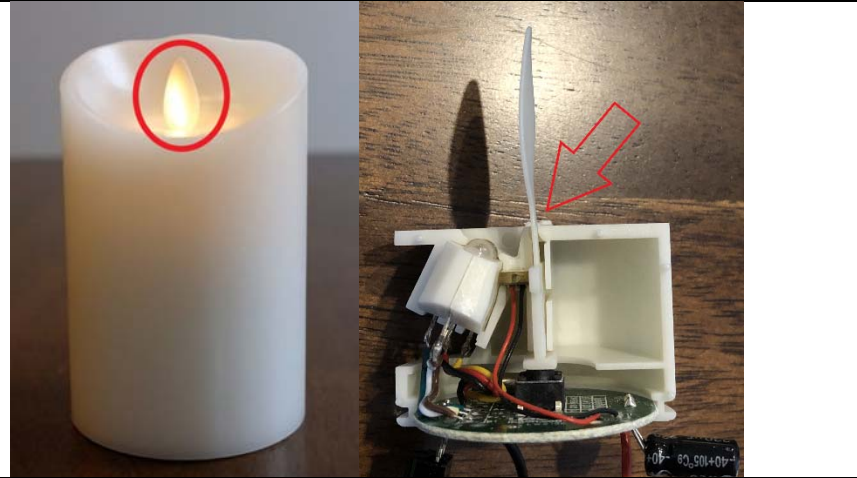
Infringement of U.S. Patent No. 10,024,507 by Liown (RAZ) Push Flame Candles

Claims	Liown (RAZ) Push Flame Candle
<p>[1.Pre] A device for simulating a flame, comprising:</p>	 The image shows the product packaging and a lit candle. On the left is a white rectangular box with a black border around the text "PUSH FLAME" and "UNSCENTED LED CANDLE". Below this, it says "3"x 4.5" OBLIQUE EDGE" and "Distributed By RAZ IMPORTS INC.". On the right is a white, cylindrical candle with a flame, sitting on a dark surface.
<p>[1.A] a side wall including an upper region and a lower region;</p>	 The image shows two views of the lit candle. On the left, a red arrow points to the upper region of the side wall. On the right, a red arrow points to the lower region of the side wall. Both candles are sitting on a dark surface.

[1.B] 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;



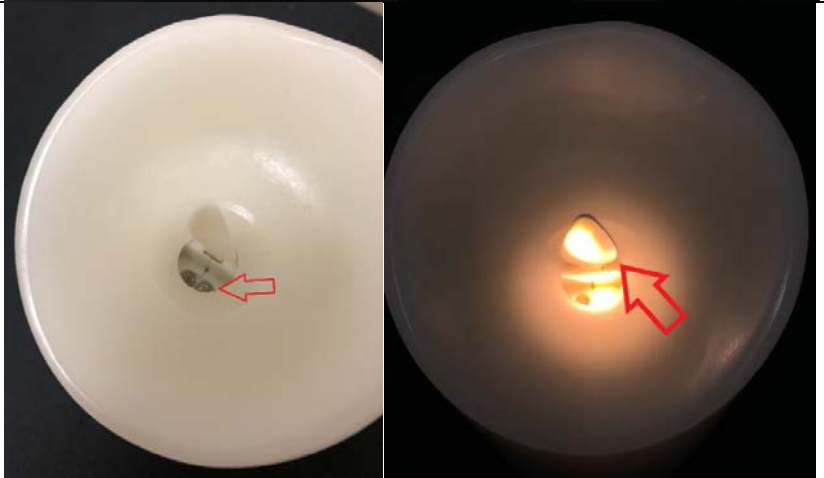
[1.C] a projection screen arranged to extend upwardly from the upper surface, wherein the position of the projection screen is fixed in relation to the upper surface;



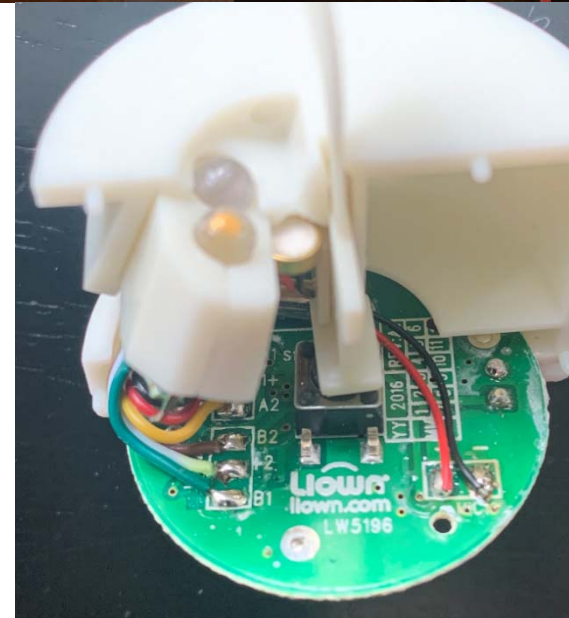
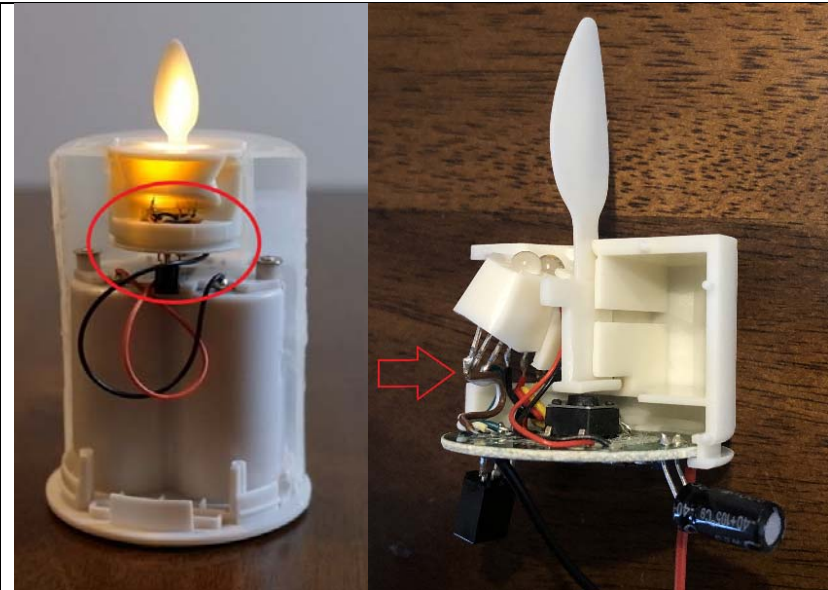
[1.D] a first source of light located below the upper surface and configured to project an first beam of light directly onto the projection screen without obstruction;



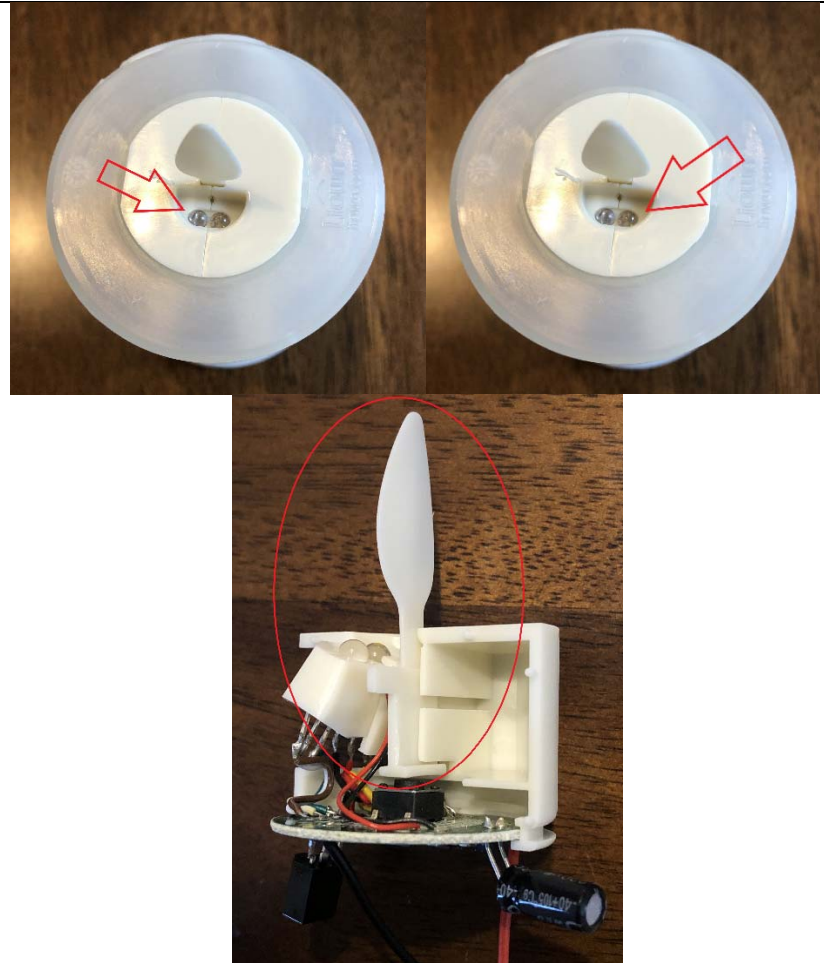
[1.E] a second source of light located below the upper surface and configured to project a second beam of light directly onto the projection screen without obstruction; and



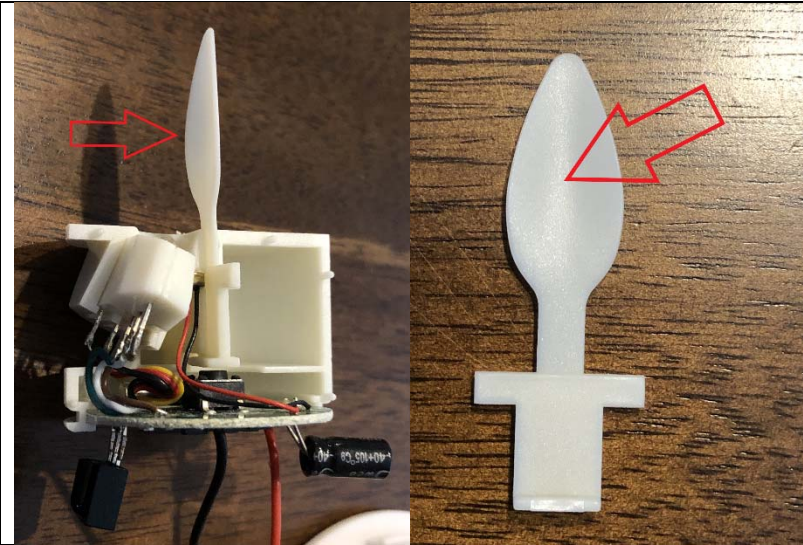
[1.F] circuitry electrically connected to the first source of light and the second source of light, wherein the circuitry independently controls intensities of the first beam of light projected by the first source of light and the second beam of light projected by the second source of light.



[2] The device of claim 1, wherein positions of the first source of light and the second source of light are fixed with respect to the position of the projection screen.



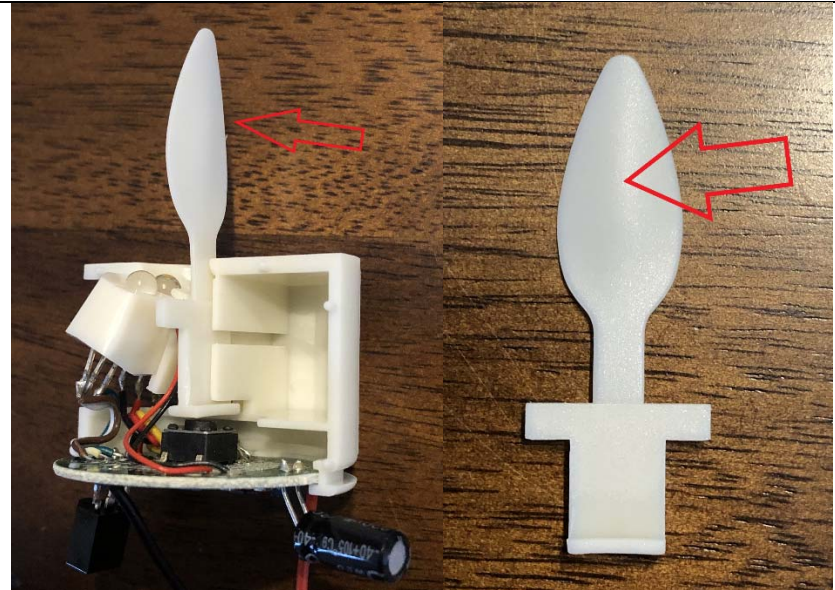
[4] The device of claim 1, wherein the projection screen includes a concavity.



[5] The device of claim 1, wherein the projection screen comprises a flame shape.



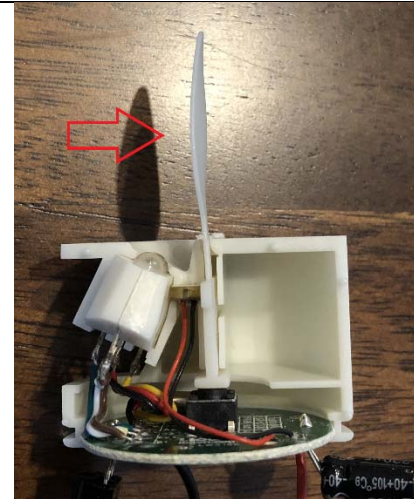
[6] The device of claim 1, wherein the projection screen includes a convexity.



[7.Pre] The device of claim 1, wherein:



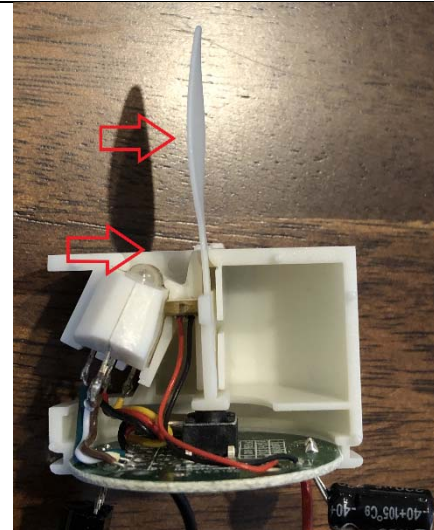
[7.A] the projection screen includes a primary plane;



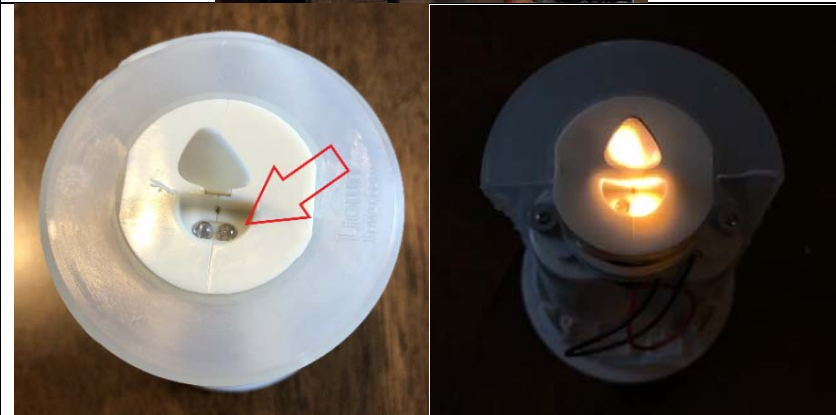
[7.B] the first beam of light includes a first beam axis and a first beam width;



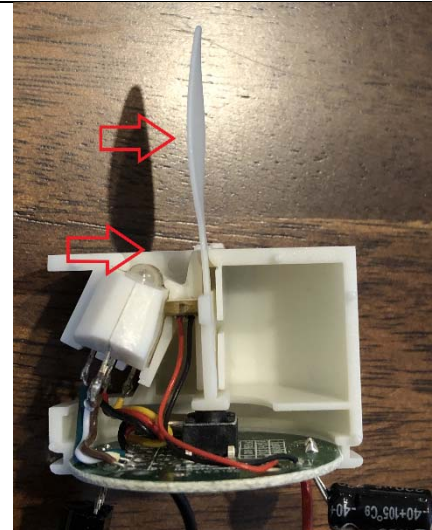
[7.C] the first beam axis of the first beam of light intersects the primary plane of the projection screen at an angle between 20° to 40° ;



[7.D] the second beam of light includes a second beam axis and a second beam width; and



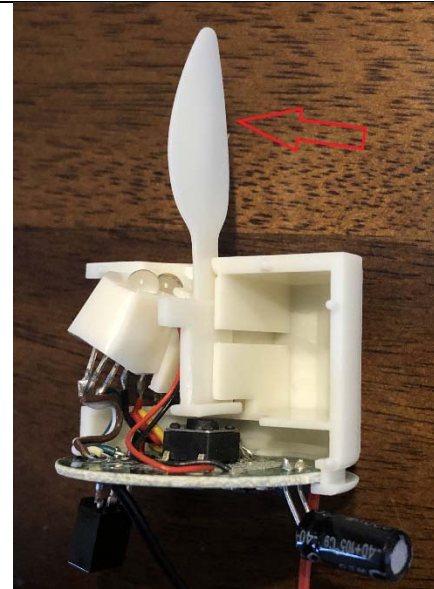
[7.E] the second beam axis intersects the primary plane of the projection screen at an angle between 20° to 40°.



[11] The device of claim 1, wherein the projection screen is rigid.



[12] The device of claim 11, wherein the projection screen comprises plastic.



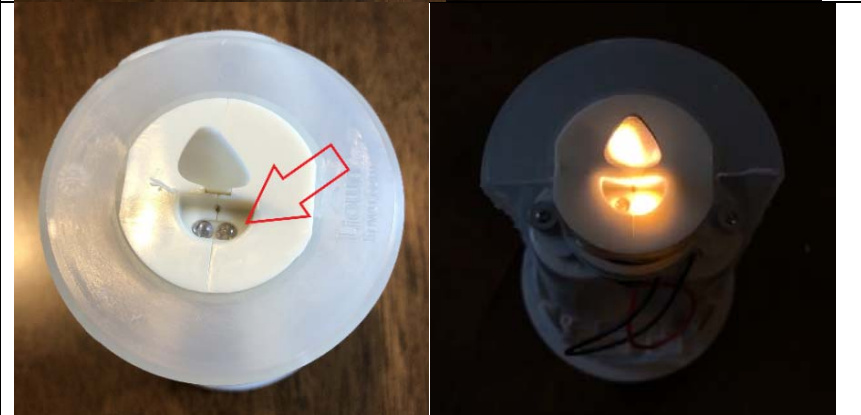
[13.Pre] The device of claim 1, wherein:



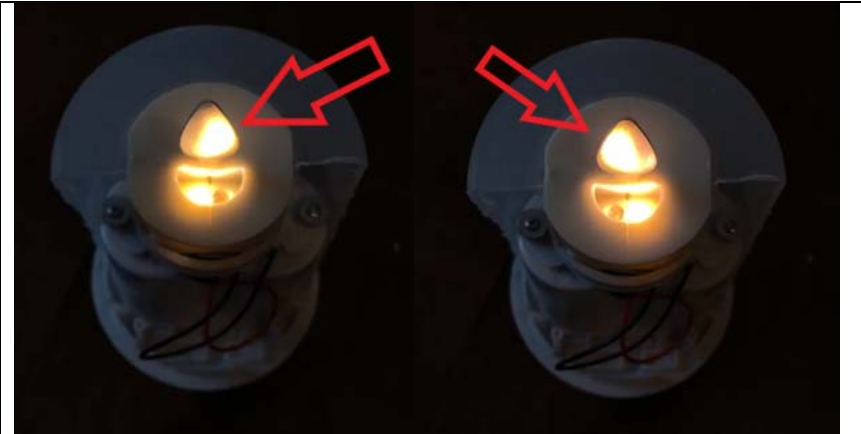
[13.A] the first source of light is positioned to project light onto a front side of the projection screen in a first area;



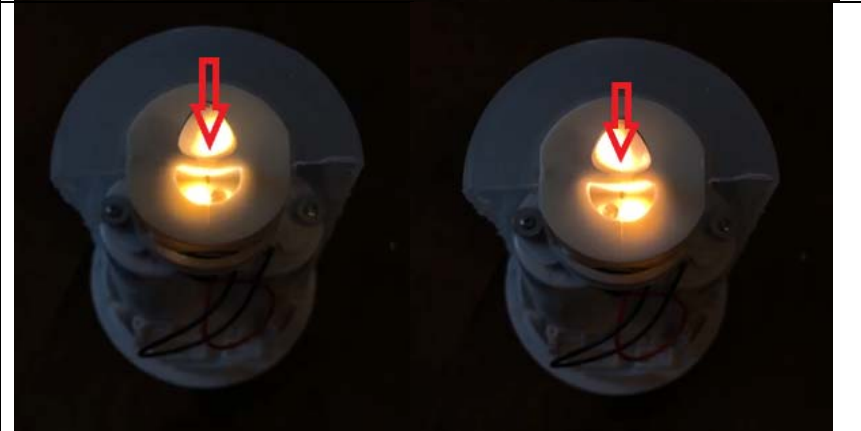
[13.B] the second source of light is positioned to project light onto the front side of the projection screen in a second area; and



[13.C] the second area is different than the first area.



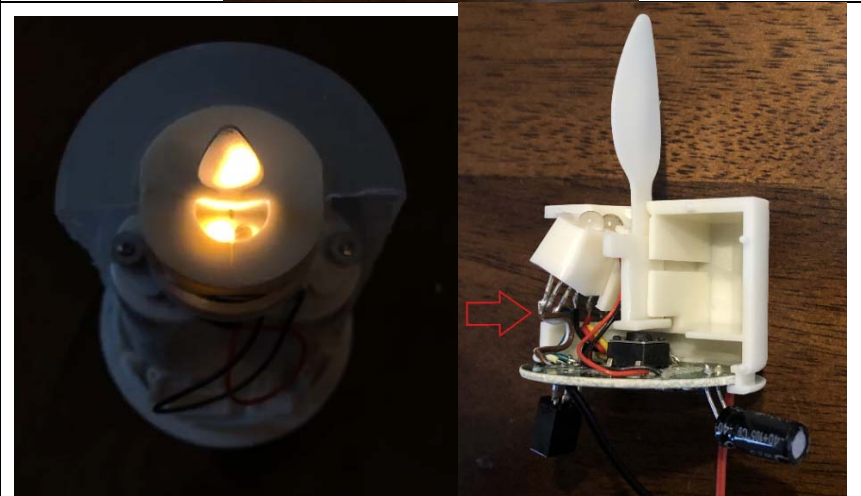
[14] The device of claim 13, wherein a portion of the first area overlaps a portion of the second area.



[16.Pre] The device of claim 1, wherein:

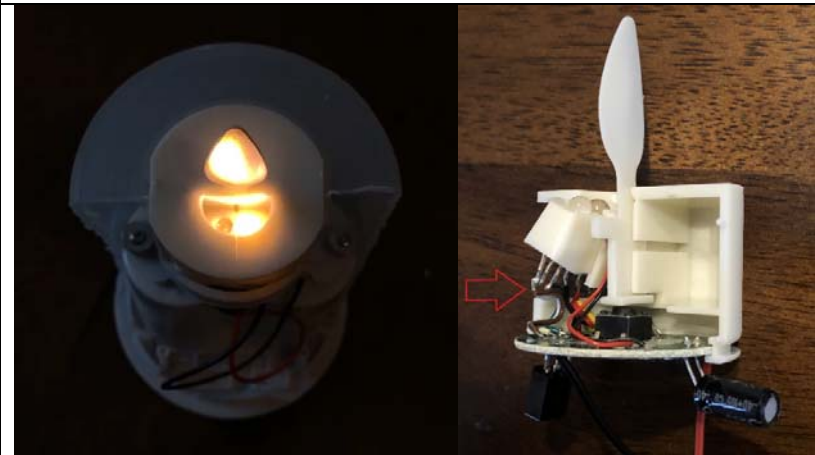


[16.A] the circuitry is configured to control the intensity of the first beam of light using pulse-width modulation; and





[16.B] the circuitry is configured to control the intensity of the second beam of light using pulse-width modulation.



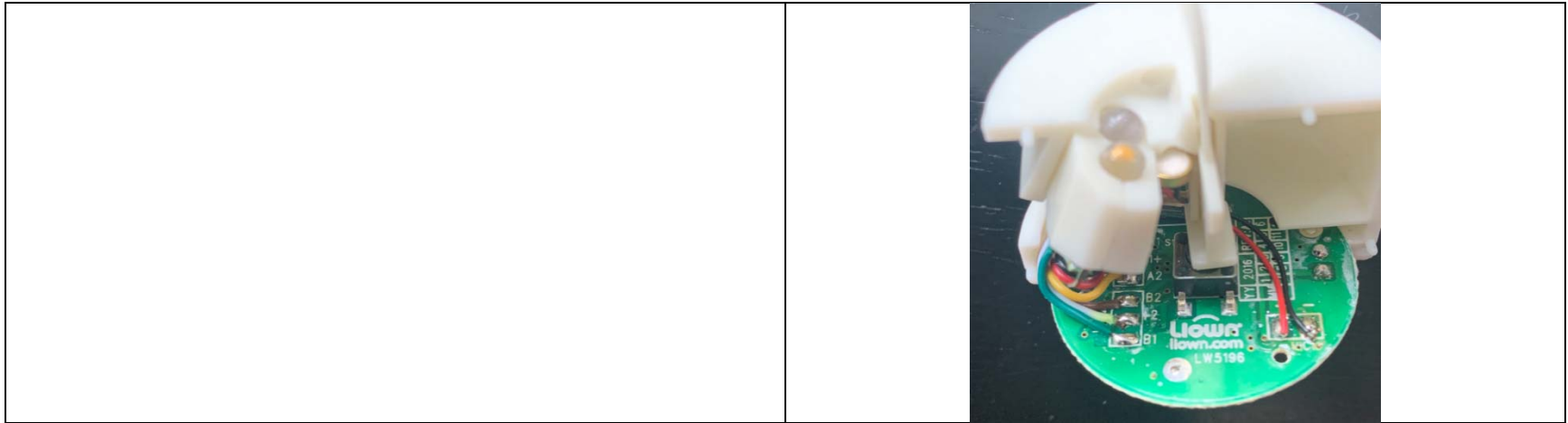


EXHIBIT 19

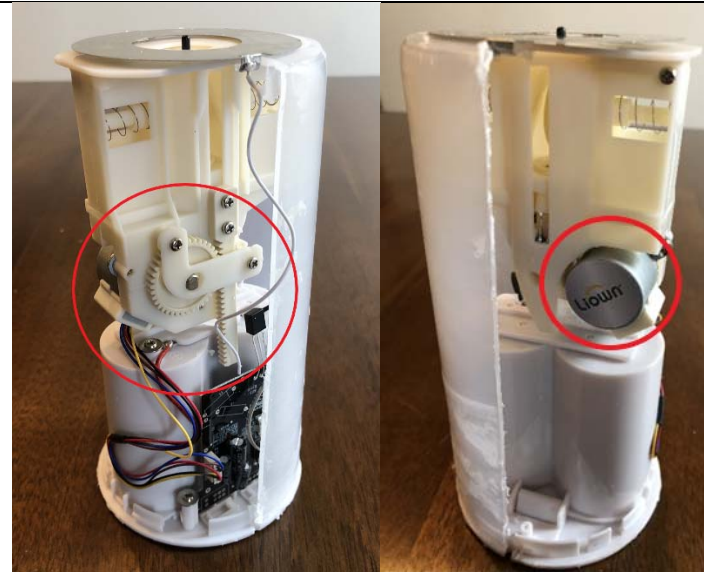
**Chart showing
infringement of the
10,352,517 patent by
Lightli “Wick to Flame”**

Infringement of U.S. Patent No. 10,352,517 by Wick-to-Flame Candles

Claims	Wick-to-Flame Candle
<p>[1.Pre] A flameless candle comprising:</p>	 <p>The image shows the product packaging for 'LIGHTLI MOVING FLAME' on the left, which is a white cylindrical candle with a blue label. The label includes the text 'LIGHTLI', 'MOVING FLAME', 'Flameless LED candle with hand-poured wax 3.8" x 7.2"', 'WICK-TO-FLAME', 'REALISTIC WHEN ON', and 'REALISTIC WHEN OFF'. To the right of the packaging is a photograph of the same candle, which is lit, showing a realistic flame.</p>
<p>[1.A] a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;</p>	 <p>The image shows the internal mechanism of the candle on the left, which is a white cylindrical body with a blue label. The mechanism includes a motor, gears, and a wick. On the right is a photograph of the same candle, which is lit, showing a realistic flame. A red arrow points to the top of the candle, indicating the location of the wick and the flame.</p>

	
<p>[1.B] at least one light source positioned in the interior region of the candle body;</p>	

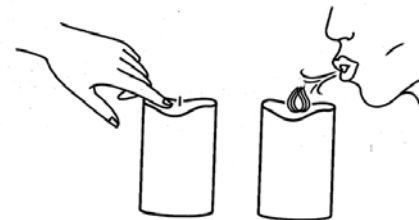
[1.C] a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;



CANDLE OPERATION

Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.

Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.



[1.D] a projection screen configured to:

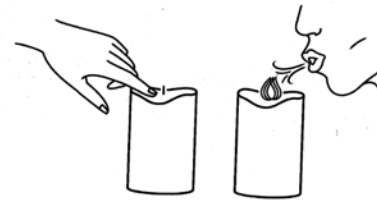


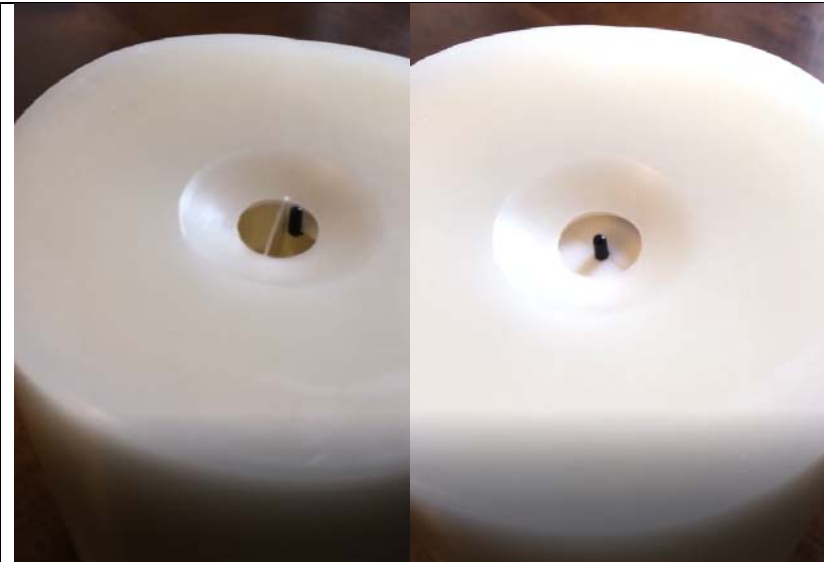
[1.E] receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and

CANDLE OPERATION

Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.

Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.



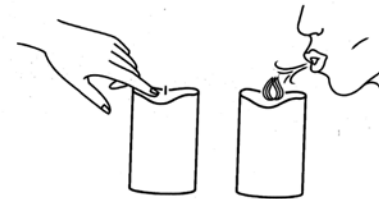


[1.F] receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body; and wherein:

CANDLE OPERATION

Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.

Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.





[1.G] when the projection screen is moved to the second position, the at least one light source is automatically energized such that a light is emitted onto the projection screen; and



[1.H] when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.



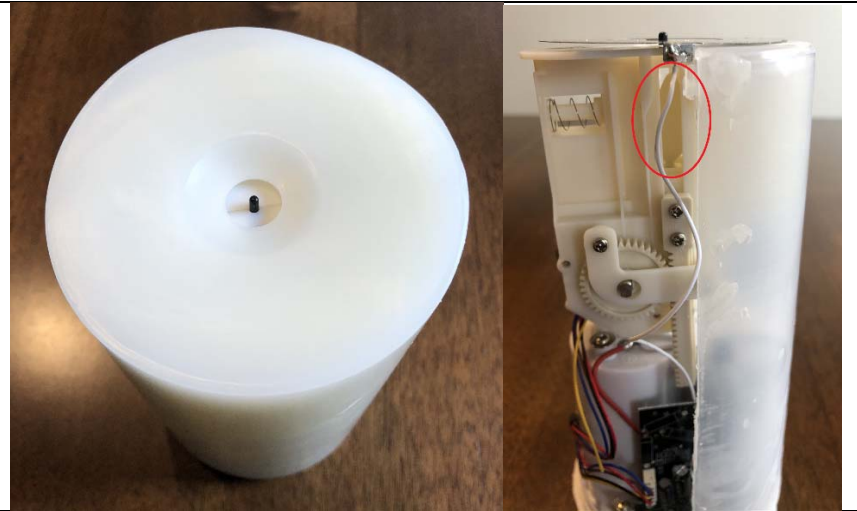
[3] The flameless candle of claim 1, wherein the projection screen comprises a flame shape.



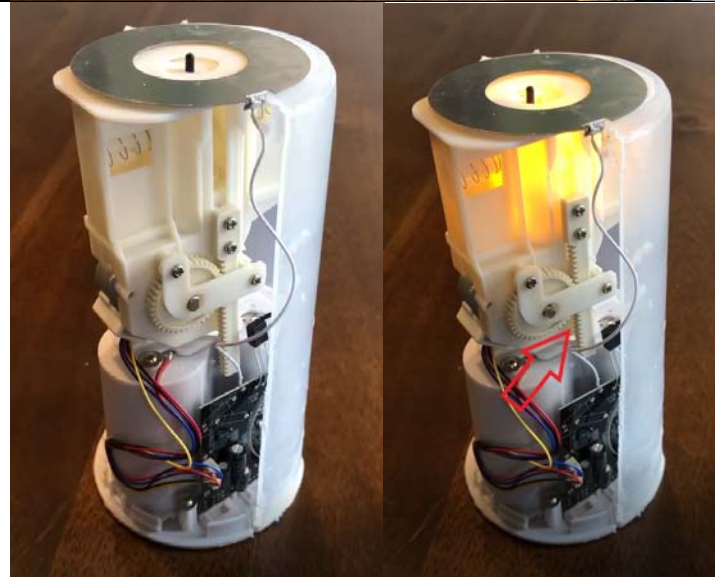
[4] The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position.

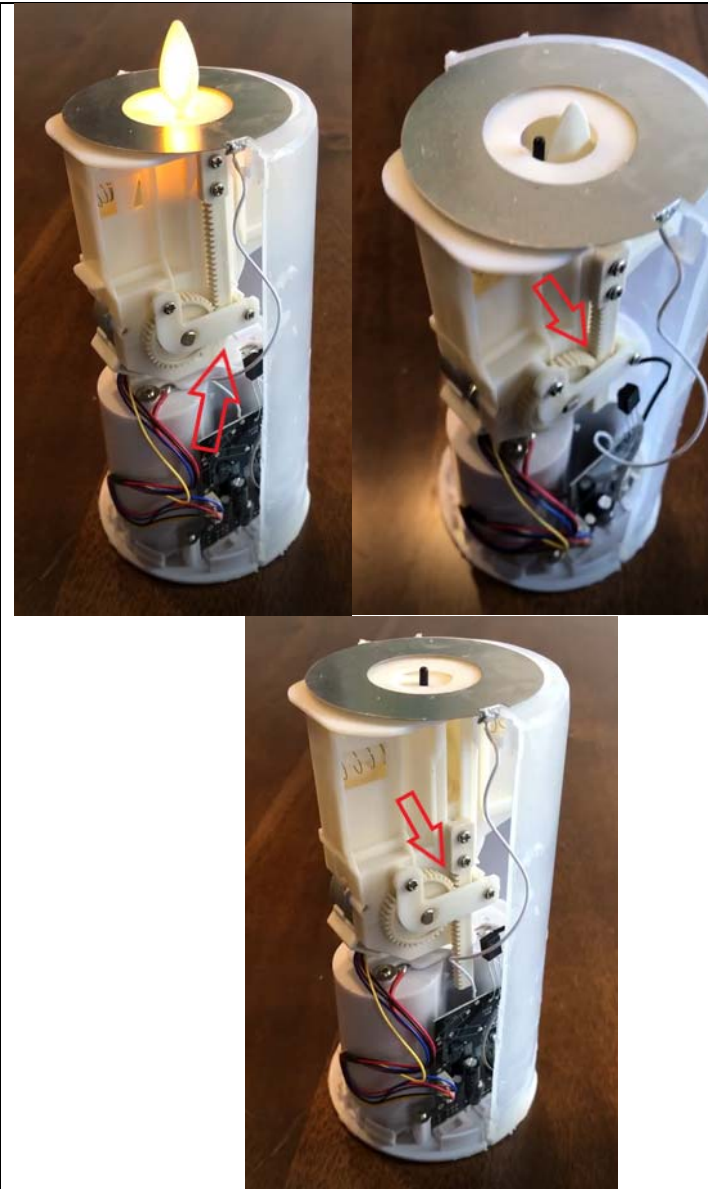


[5] The flameless candle of claim 4, wherein when the projection screen is in the first position, the projection screen is within the interior region of the candle body.

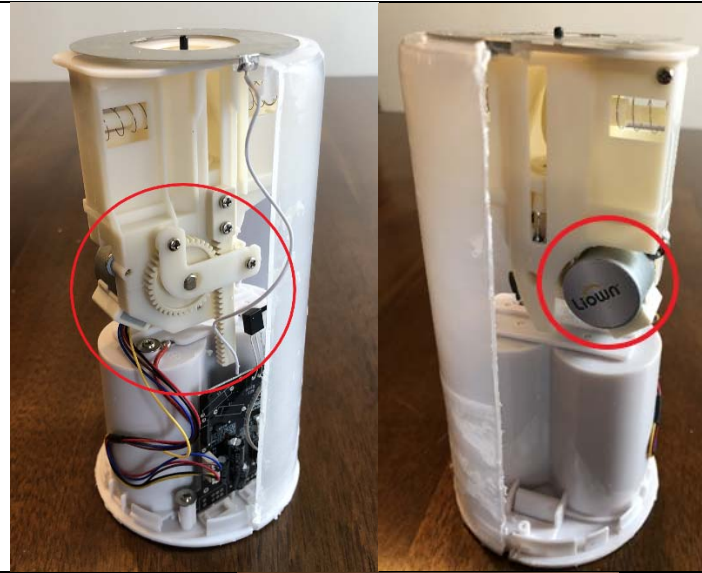


[6] The flameless candle of claim 1, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.





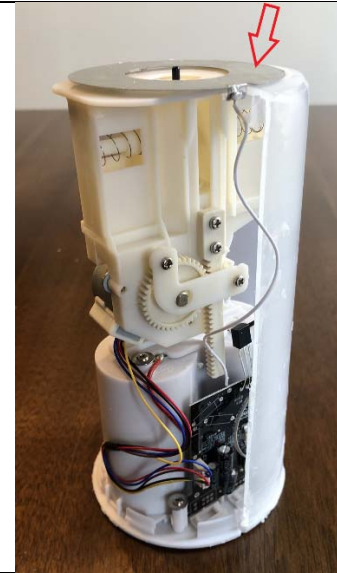
[7] The flameless candle of claim 1, wherein the force-inducing portion comprises an electrical motor.



[9] The flameless candle of claim 1, further comprising an imitation wick extending upwardly from the upper surface of the candle body.



[10] The flameless candle of claim 1, further comprising an ON/OFF actuator that, when actuated, causes the projection screen to transition between the first position and the second position.



[11] The flameless candle of claim 1, further comprising a timer configured to periodically cause the projection screen to transition between the first position and the second position.

TO SET THE TIMER

1. Turn candle ON by touching top.
2. With candle now ON, touch top again and hold finger firmly for 5 seconds. The light will flash two times indicating the timer is now set. Candle will now automatically turn ON at the same time each day. It will run for 5 hours, then turn OFF for 19 hours.

[12] The flameless candle of claim 11, wherein the timer comprises a 24-hour timer.


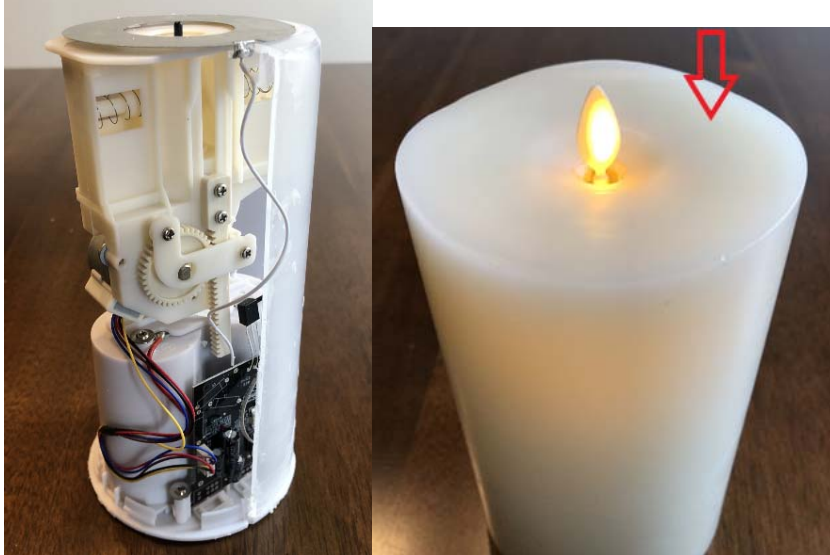
TO SET THE TIMER

1. Turn candle ON by touching top.
2. With candle now ON, touch top again and hold finger firmly for 5 seconds. The light will flash two times indicating the timer is now set. Candle will now automatically turn ON at the same time each day. It will run for 5 hours, then turn OFF for 19 hours.

EXHIBIT 20

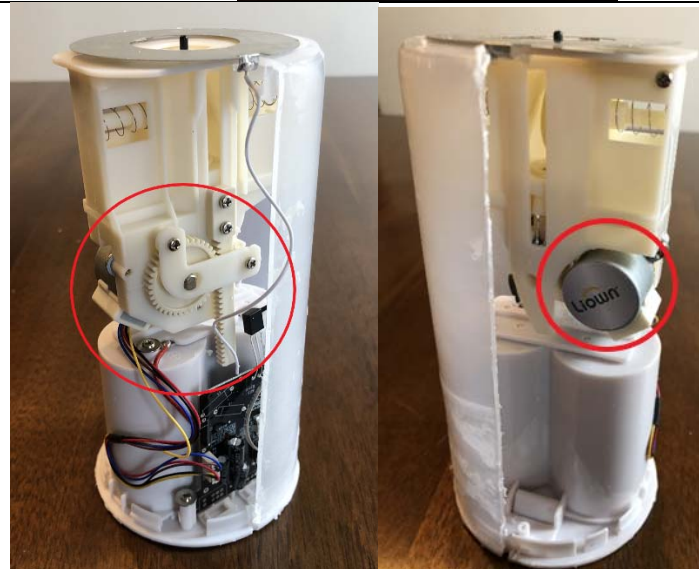
**Chart showing
infringement of the
10,578,264 patent by
Lightli “Wick to Flame”**

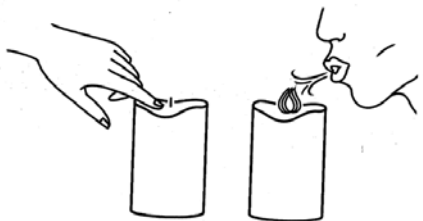

Infringement of U.S. Patent No. 10,578,264 by Wick-to-Flame Candles

Claims	Wick-to-Flame Candle
<p>[1.Pre] A flameless candle comprising:</p>	 The image shows the product packaging for 'LIGHTLI MOVING FLAME' on the left, which is a white cylindrical candle with a blue label. The label includes the text 'LIGHTLI', 'MOVING FLAME', 'Flameless LED candle with hand-poured wax 3.8" x 7.2"', 'WICK-TO-FLAME', 'REALISTIC WHEN ON', and 'REALISTIC WHEN OFF'. To the right of the packaging is a photograph of the same candle, which is lit, showing a realistic flame.
<p>[1.A] a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;</p>	 The image shows the internal mechanism of the candle on the left, which is a white cylindrical body with a cutaway revealing the internal components, including a battery, a circuit board, and a mechanical assembly. To the right is a photograph of the same candle, which is lit, with a red arrow pointing to the upper surface of the candle body.



[1.B] a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;



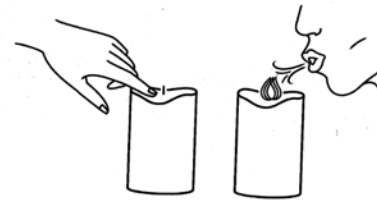
	<div> <h3>CANDLE OPERATION</h3> <p>Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.</p> <p>Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.</p>  </div>
<p>[1.C] a projection screen configured to:</p>	

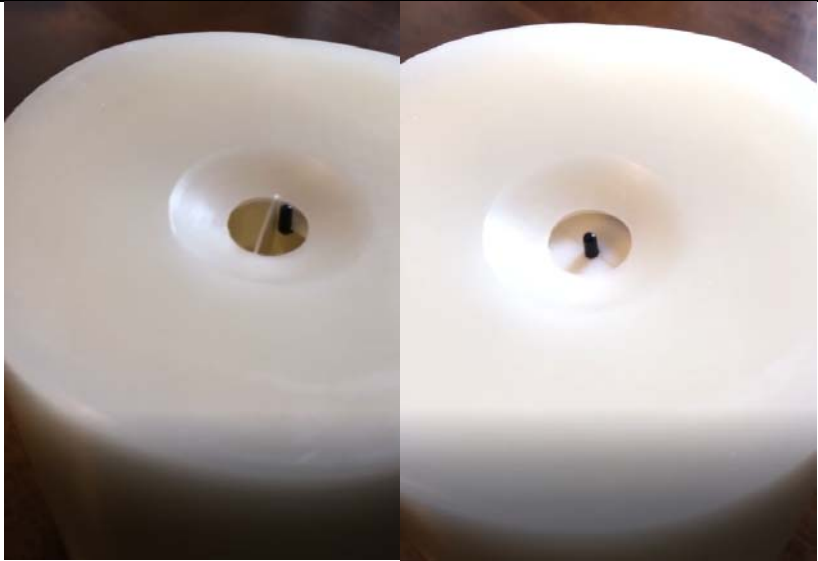
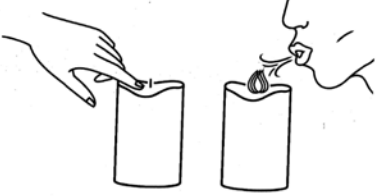
[1.D] receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and

CANDLE OPERATION

Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.

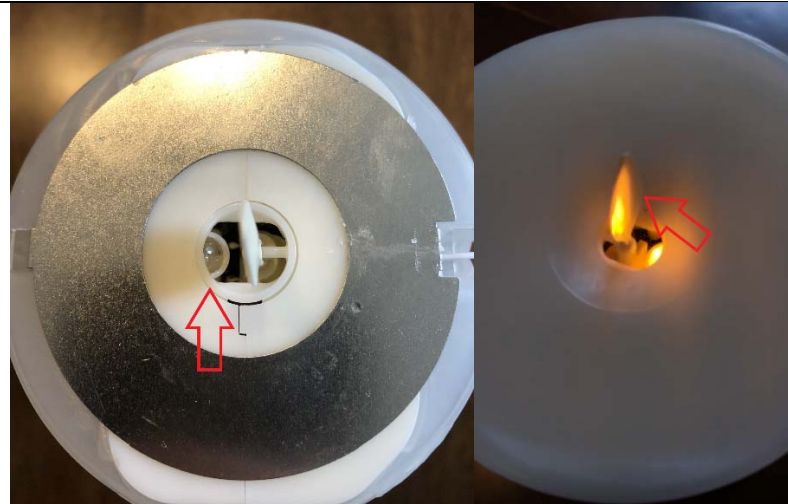
Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.



	
<p>[1.E] receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;</p>	<div> <h3>CANDLE OPERATION</h3> <p>Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.</p> <p>Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.</p>  </div>



[1.F] at least one light source configured to project a light onto the projection screen; and wherein:



[1.G] when the projection screen is moved to the second position, the at least one light source is automatically energized such that the light is emitted onto the projection screen; and



[1.H] when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.



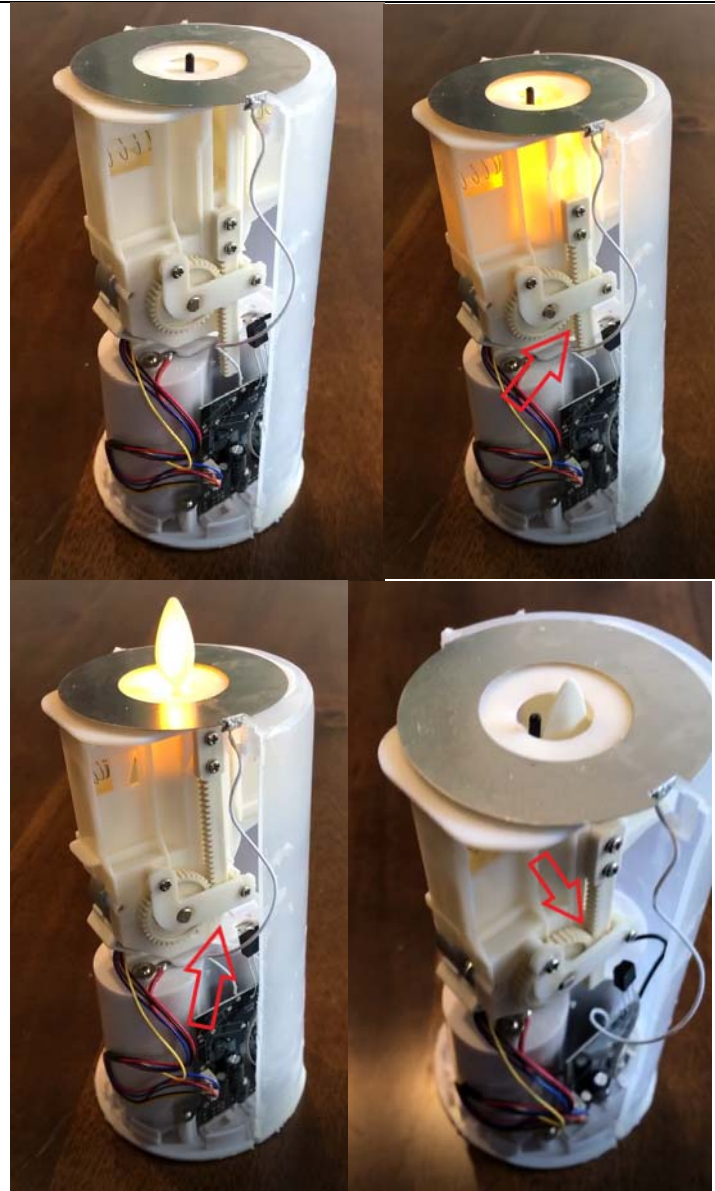
[3] The flameless candle of claim 1, wherein the projection screen comprises a flame shape.

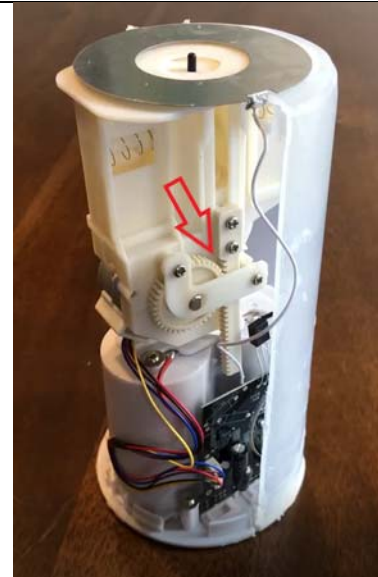


[4] The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position.

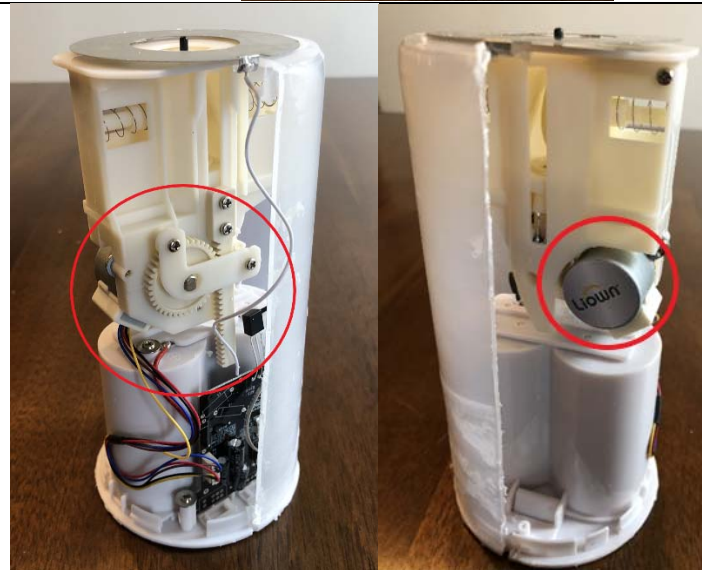


[5] The flameless candle of claim 1, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.





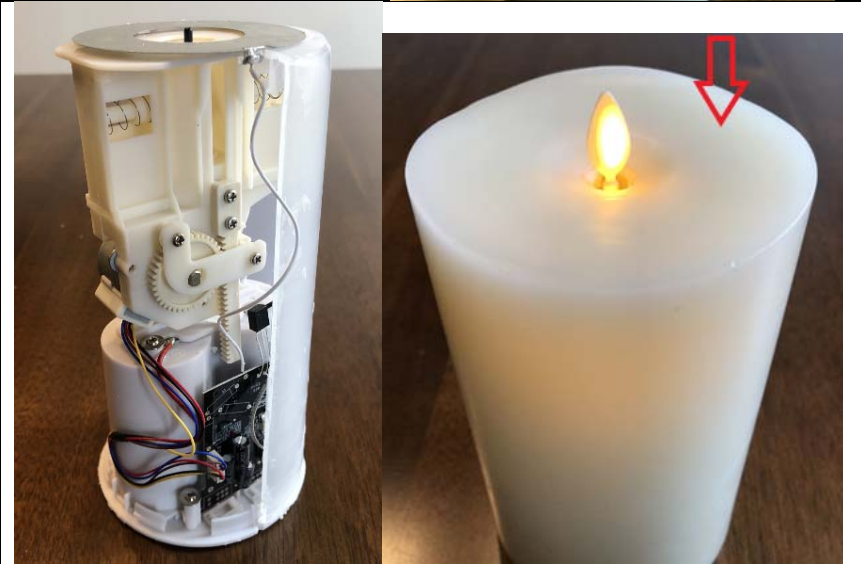
[6] The flameless candle of claim 1, wherein the force-inducing portion comprises an electrical motor.





[14.Pre] A flameless candle comprising:



[14.A] a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;



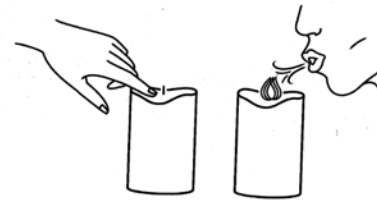
			
<p>[14.B] a projection screen configured to:</p>			

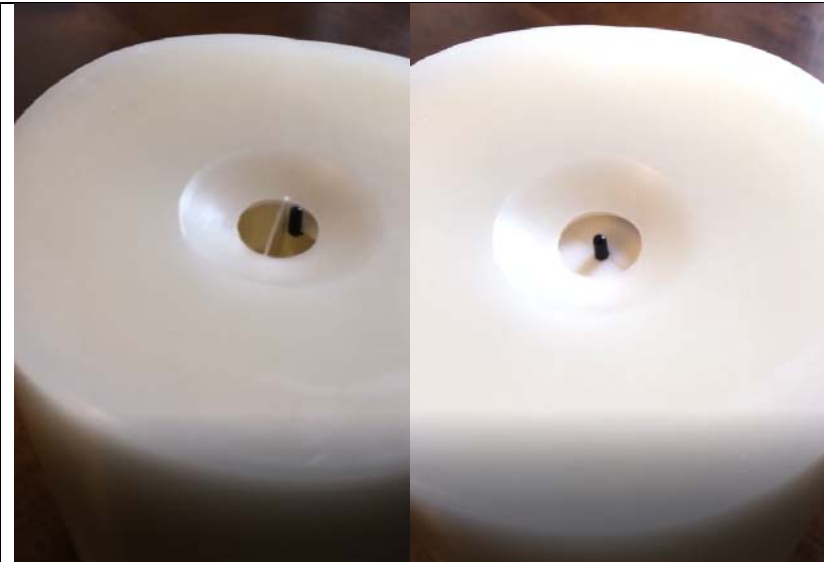
[14.C] receive a first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and

CANDLE OPERATION

Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.

Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.



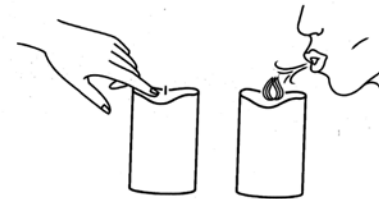


[14.D] receive a second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;

CANDLE OPERATION

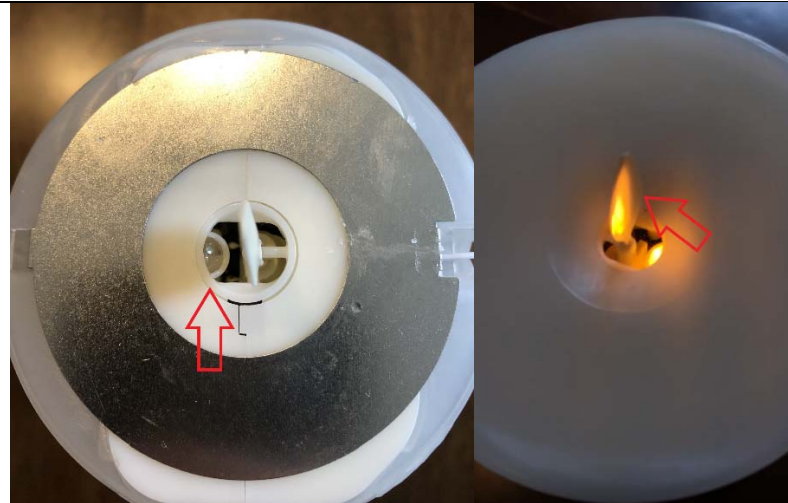
Turn candle on by firmly touching the top of the candle, close to the center. Touch to turn ON. Wick will retract and the Moving Flame will emerge with light. Touch again to turn OFF (Fig. 2). Moving Flame will retract and wick will rise again for OFF setting.

Alternatively, turn OFF candle by blowing on the flame, just like you would blow out a traditional burning flame candle.





[14.E] at least one light source configured to project a light onto the projection screen; and wherein:



[14.F] when the projection screen is moved to the second position, the at least one light source is automatically energized such that the light is emitted onto the projection screen; and



[14.G] when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.



[16] The flameless candle of claim 14, wherein the projection screen comprises a flame shape.



[17] The flameless candle of claim 14, wherein when a base of the candle is resting on a substantially horizontal surface, the projection screen is in a substantially vertical orientation when it is in both the first position and the second position.



EXHIBIT 21

**Documents showing
purchase and delivery
in the U.S. of “Wick to
Flame” candle from
“buds ‘n bloom”**

From: buds 'n bloom design studio <info@budsnbloom.com>

Date: Fri, Apr 24, 2020 at 9:55 AM

Subject: A shipment from order #14326 has been delivered

To: [REDACTED]

buds 'n bloom design studio

ORDER #14326

Your order has been delivered



Haven't received your package yet? [Let us know](#)

[View your order](#)

or [Visit our store](#)

UPS® tracking number: [1Z363A3A0132104070](#)

Items in this shipment



LIGHTLi Wick-to-Flame LED Candle - 3.8" x 7.2" x 2


If you have any questions, reply to this email or contact us at info@budsnbloom.com

4/22/20


“Receipt for product samples of Liown Wick-to-Flame candles”

Invoice to 51966US01

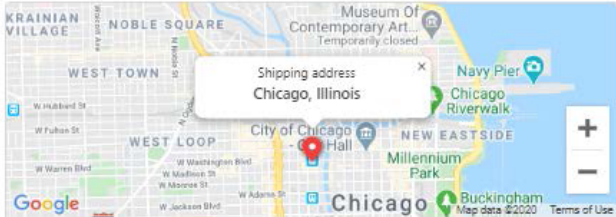
Approved: [REDACTED]



inspired • original • creative
(920) 338-0509




Order #14326
[REDACTED]




Shipping address
Chicago, Illinois

Your order is confirmed
You'll receive a confirmation email with your order number shortly.

Order updates
You'll get shipping and delivery updates by email.

 Track order with Arrive

 Get shipping updates by text

Customer information

Contact information
[REDACTED]

Shipping address
[REDACTED]
Chicago IL 60661
United States
[REDACTED]

Shipping method
UPS Next Day Air Saver


Payment method
[REDACTED] - \$ 179.02

Billing address
[REDACTED]
Chicago IL 60661
United States
[REDACTED]

☐ Save my information for a faster checkout

Need help? [Contact us](#)

Continue shopping

²

LIGHTLi Wick-to-Flame LED Candle -
3.8" x 7.2" \$ 138.00

Subtotal

\$ 138.00

Shipping

\$ 41.02

Total

USD \$ 179.02

Proof of Delivery

Dear Customer,

This notice serves as proof of delivery for the shipment listed below.

Tracking Number

1Z363A3A0132104070

Weight

0.30 LBS

Service

UPS Next Day Air®

Shipped / Billed On

04/22/2020

Delivered On

04/24/2020 9:43 A.M.

Delivered To

CHICAGO, IL, US

Received By

CARMEN

Left At

Front Desk

Thank you for giving us this opportunity to serve you. Details are only available for shipments delivered within the last 120 days. Please print for your records if you require this information after 120 days.

Sincerely,

UPS

Tracking results provided by UPS: 06/09/2020 6:53 P.M. EST

EXHIBIT 22

**“Wick to Flame” candle
and packaging showing
“Made in China”**

!71H917



LIGHTLi

Designed in USA,

Engineered & hand-poured in China.

MADE WITH PRIDE BY LIOWN

Ideas and inspiration await at lightlicandles.com

Patent: lightlicandles.com/patents

Moving Flame" and Smart Flame" are trademarks of Liown, registered in the USA.

Made in China



LIGHTLi

MOVING
FLAME

Flameless LED candle
with hand-poured wax
3.8" x 7.2"

WICK-TO-FLAME



REALISTIC
WHEN ON



REALISTIC
WHEN OFF



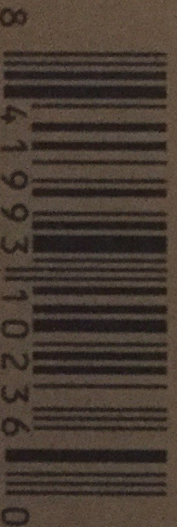
LIGHTLI

The Inventor of the Modern Candle™

Manufactured and Distributed by L&L Candle Company. All Lightli® trademarks are owned by Liown® and are used under license.

Moving Flame™ and Smart Flame™ are trademarks of Liown, registered in the USA.

Made in China



Made in China

www.lightlicandles.com



LU5416

LIGHTLi



TOUCH
ON/OFF

Use 2 "D" Batteries



REMOTE
READY

Patent: www.LightLicandles.com/patents

LightLicandles.com

Made in China

EXHIBIT 23

**Documents showing
purchase and delivery
in the U.S. of “Push
Flame” candle from
RAZ Imports care of
Amazon.com**

Final Details for Order #112-5996177-6037810

[Print this page for your records.](#)

Order Placed: April 10, 2020
Amazon.com order number: 112-5996177-6037810
Order Total: \$84.73

Shipped on April 11, 2020

Items Ordered

1 of: Raz Imports Push Flame Ivory Pillar Candles with Remote, Set of 3 - 2D - Flameless Lighting Accent and Battery Operated Flickering Light Source with Timer - Fake Candles for Living Room and Bedroom

Sold by: Lucky_13_Trading ([seller profile](#))

Condition: New

Price

\$79.75

Shipping Address:

CHICAGO, IL 60625-1401
United States

Shipping Speed:

One-Day Shipping

Payment information

Payment Method:

MasterCard | Last digits: [REDACTED]

Billing address

CHICAGO, IL 60625-1401
United States

Item(s) Subtotal: \$79.75

Shipping & Handling: \$0.00

Total before tax: \$79.75

Estimated tax to be collected: \$4.98

Grand Total:\$84.73

Credit Card transactions

MasterCard ending in [REDACTED] April 11, 2020:\$84.73

To view the status of your order, return to [Order Summary](#).

Order Details

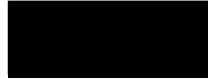
Ordered on April 10, 2020 | Order# 112-5996177-6037810

[View or Print invoice](#)

Shipping Address

[REDACTED]
CHICAGO, IL 60625-1401
United States

Payment Method



Order Summary

Item(s) Subtotal:	\$79.75
Shipping & Handling:	\$0.00
Total before tax:	\$79.75
Estimated tax to be collected:	\$4.98
Grand Total:	\$84.73

▼ [Transactions](#)

Delivered Apr 12, 2020

Package was left inside the residence's mailbox



Raz Imports Push Flame Ivory Pillar Candles with Remote, Set of 3 - 2D - Flameless Lighting Accent and Battery Operated Flickering Light Source with Timer - Fake Candles for Living Room and Bedroom

Sold by: Lucky_13_Trading

Return eligible through May 31, 2020

\$79.75

Condition: New



Buy it again

[Return or replace items](#)

[Share gift receipt](#)

[Leave seller feedback](#)

[Write a product review](#)

[Archive order](#)

EXHIBIT 24

**Push Flame candle and
packaging showing
“Made in China”**



BLOW
OUT

Liown

Use 2 "D" Batteries

www.Liown.com/patents/

Designed by Liown. Assembled in China.

liown.com



REMOTE
READY



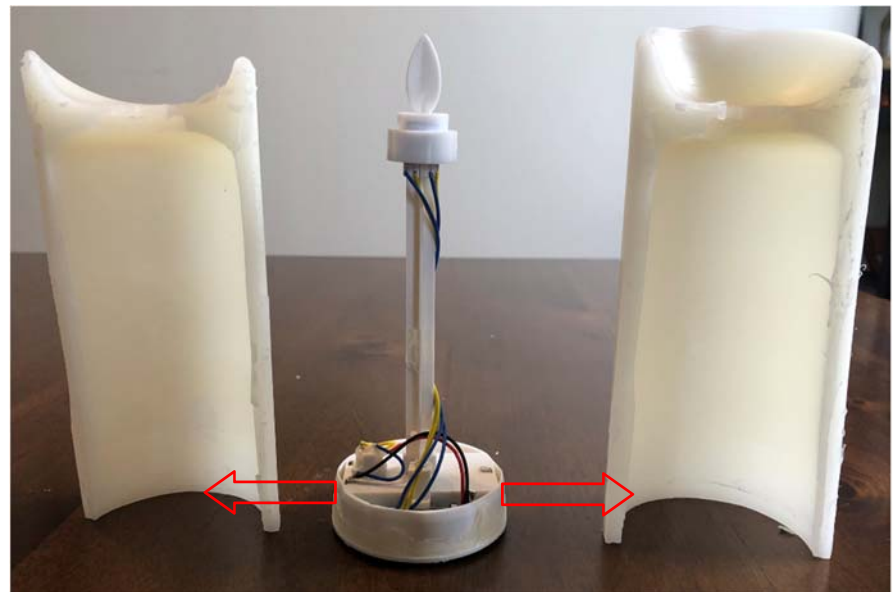
EXHIBIT 25

**Chart demonstrating how
exemplary Sterno Home electric
candles practice at least one
claim of the 9,068,706 patent by
Liown "Push Flame"**

Practice of U.S. Patent No. 9,068,706 by Sterno Mirage iFlicker Candles

Claims	Mirage iFlicker Candle
<p>[1.Pre] A device comprising:</p>	
<p>[1.A] a side wall including an upper region and a lower region;</p>	

[1.B] a base engaged with the lower region of the side wall;



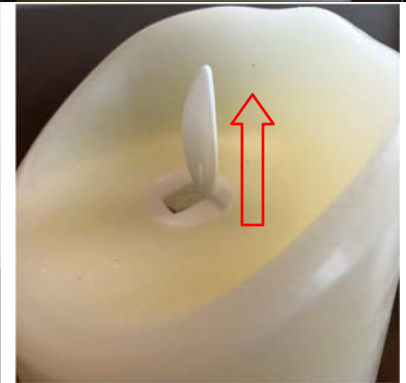
[1.C] an upper surface extending from the upper region of the side wall to form an upper recess, wherein the upper surface includes an aperture;



[1.D] a projection screen, which does not move in physical space, wherein:



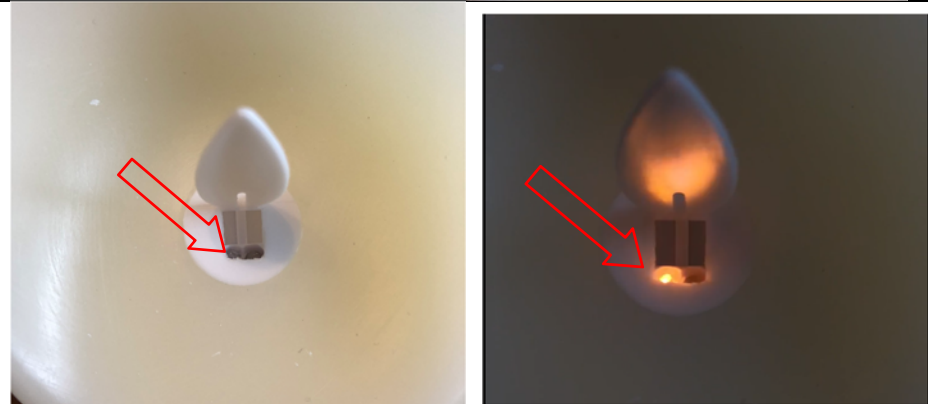
[1.E] the projection screen extends upwardly from the upper surface; and



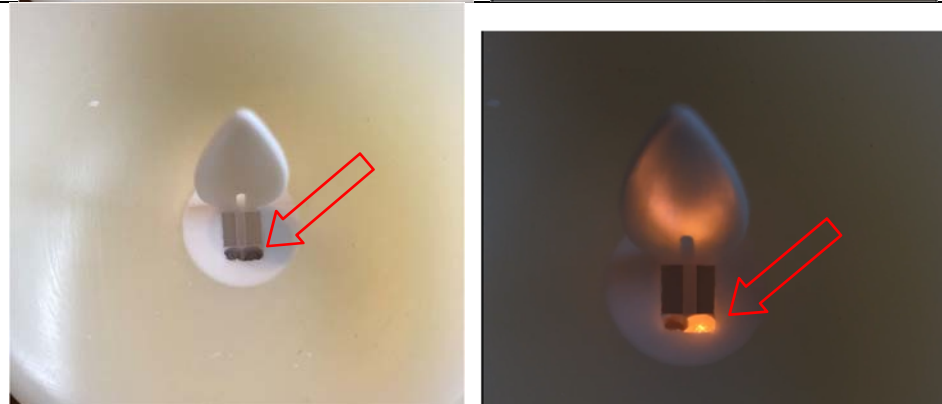
[1.F] a position of the projection screen is fixed with respect to a position of the upper surface;



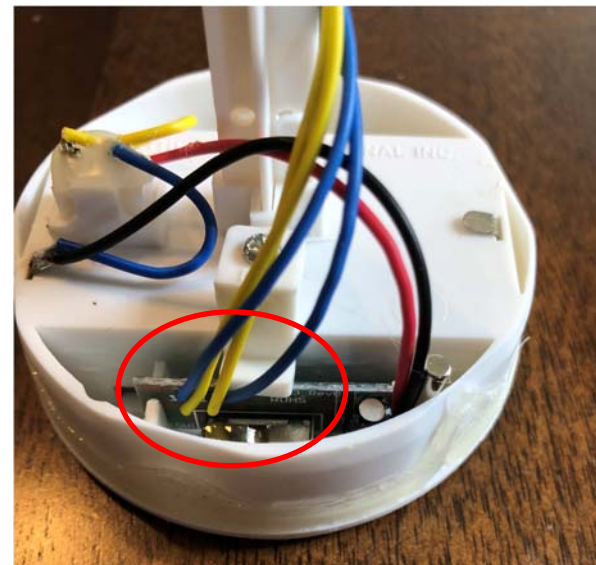
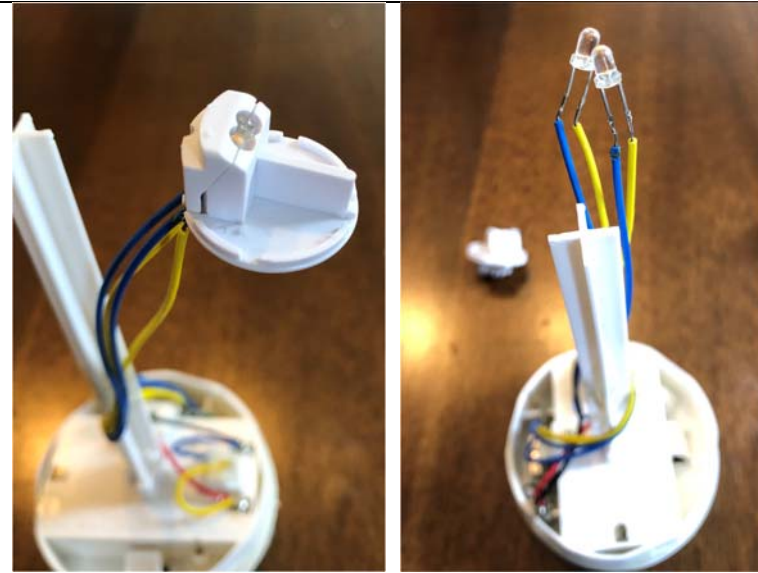
[1.G] a first source of light positioned below the upper surface, wherein the first source of light projects light through the aperture onto the projection screen;



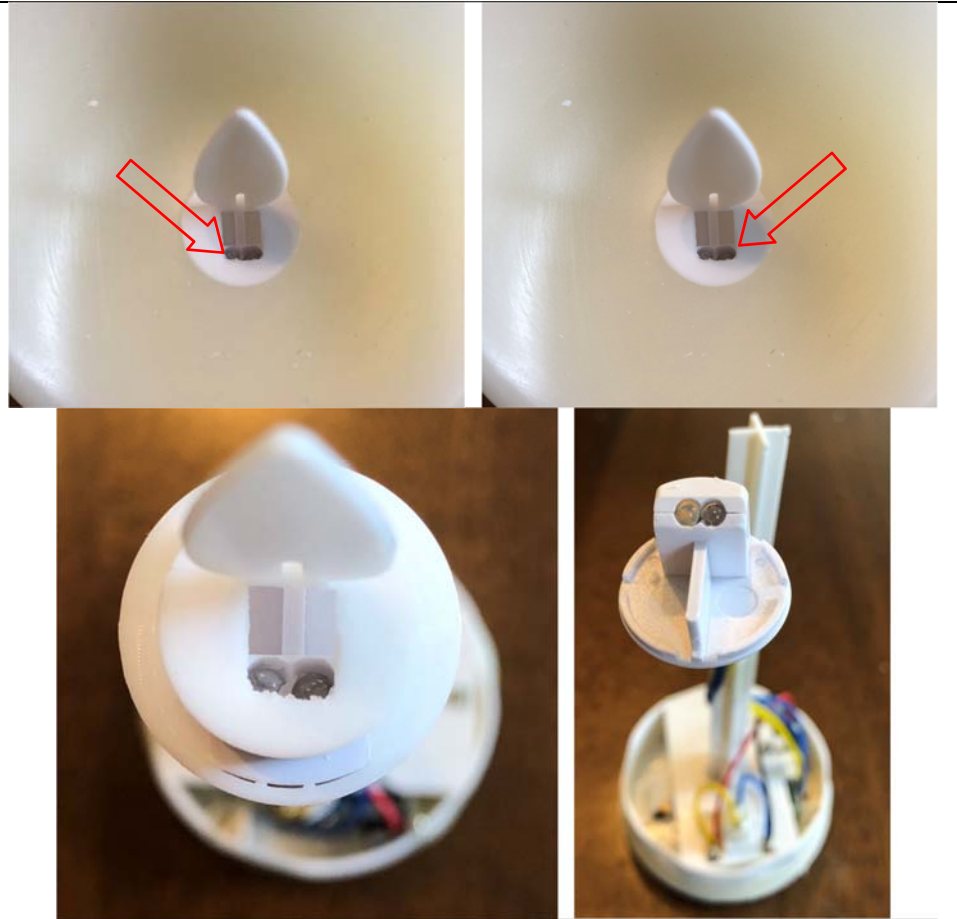
[1.H] a second source of light positioned below the upper surface, wherein the second source of light projects light through the aperture onto the projection screen; and



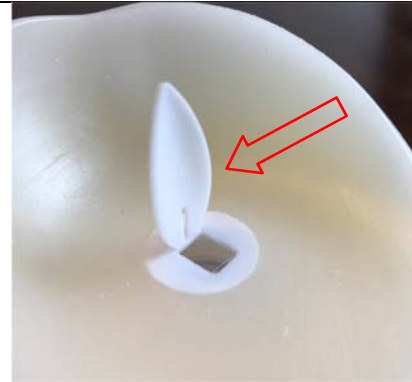
[1.I] circuitry electrically connected to the first source of light and the second source of light, wherein the circuitry independently controls intensities of the light projected by the first source of light and the second source of light onto the projection screen.



[2] The device of claim 1, wherein positions of the first source of light and the second source of light are fixed with respect to the position of the projection screen.



[4] The device of claim 1, wherein the projection screen includes a concavity.



[5] The device of claim 1, wherein the projection screen comprises a flame shape.



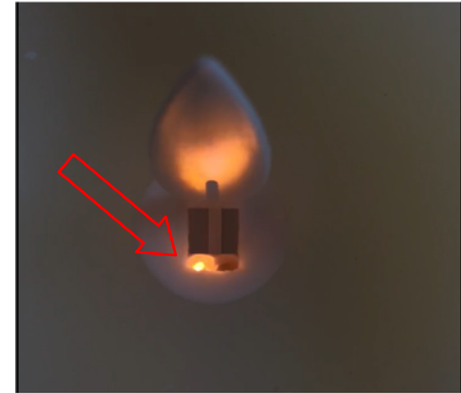
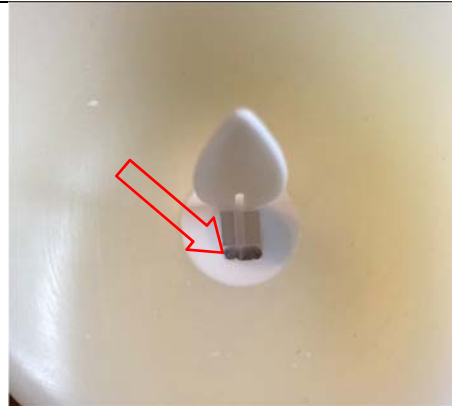
[7.Pre] The device of claim 1, wherein:



[7.A] the projection screen includes a primary plane;



[7.B] the first source of light emits light including a beam axis and a beam width;

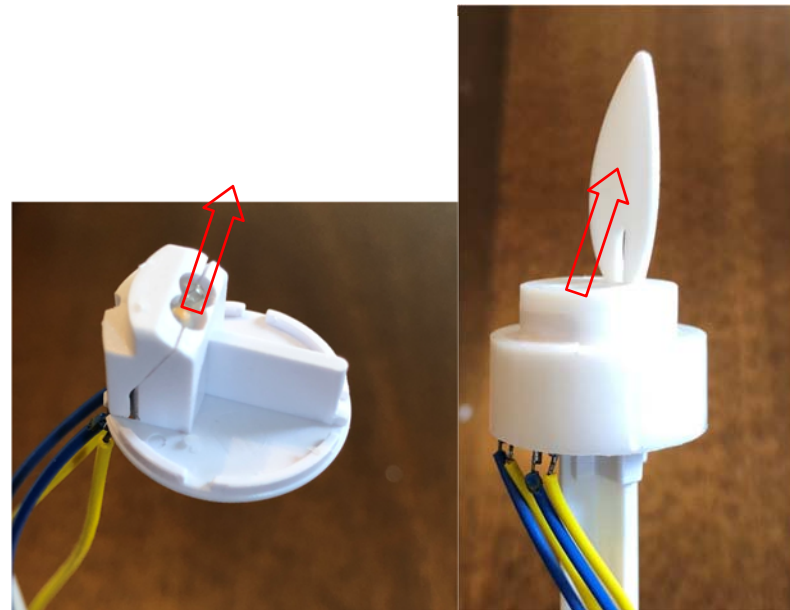
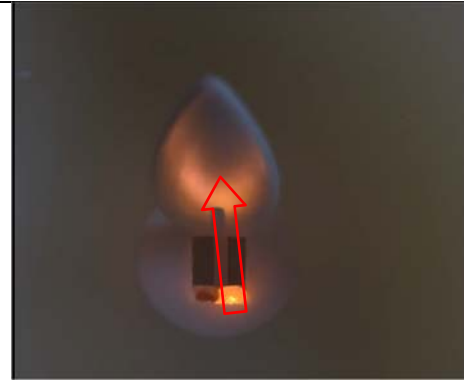




[7.C] the beam axis of the first source of light intersects the primary plane of the projection screen at an angle between 20° to 40° ;



	
<p>[7.D] the second source of light emits light including a beam axis and a beam width; and</p>	

[7.E] the beam axis of the second source of light intersects the primary plane of the projection screen at an angle between 20° to 40° .

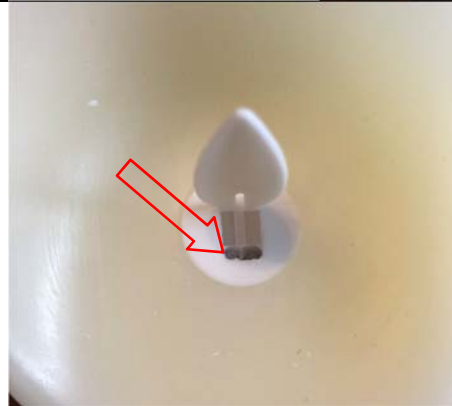


<p>[11] The device of claim 1, wherein the projection screen is rigid.</p>			
<p>[12] The device of claim 11, wherein the projection screen comprises plastic.</p>			

[13.Pre] The device of claim 1, wherein:



[13.A] the first source of light is positioned to project light onto a front side of the projection screen in a first area;



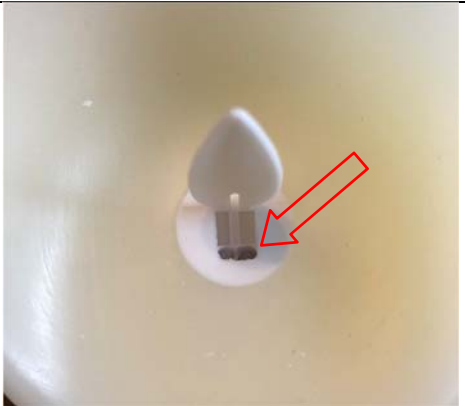


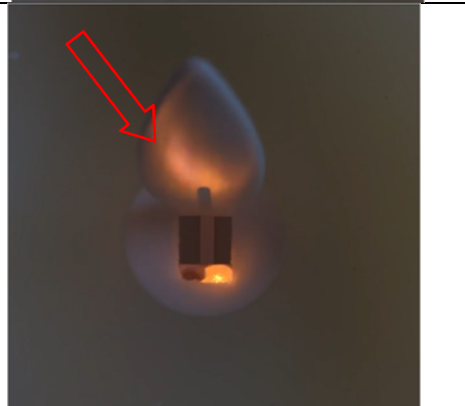
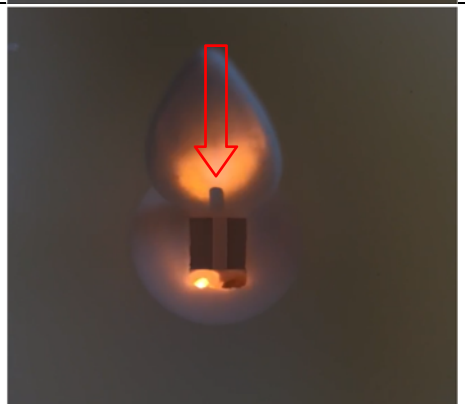
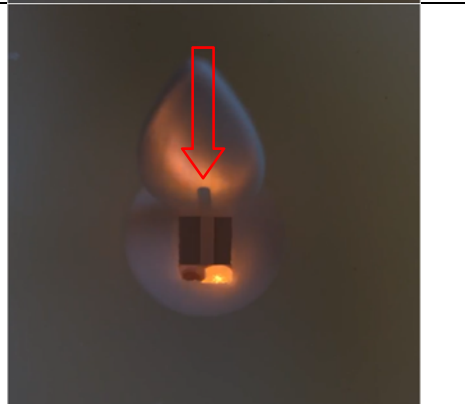

<p>[13.B] the second source of light is positioned to project light onto the front side of the projection screen in a second area; and</p>		
<p>[13.C] the second area is different than the first area.</p>		
<p>[14] The device of claim 13, wherein a portion of the first area overlaps a portion of the second area.</p>		

EXHIBIT 26

**Chart demonstrating how
exemplary Sterno Home electric
candles practice at least one
claim of the 10,024,507 patent
by Liown "Push Flame"**

Practice of U.S. Patent No. 10,024,507 by Sterno Mirage iFlicker Candles

Claims	Mirage iFlicker Candle
<p>[1.Pre] A device for simulating a flame, comprising:</p>	
<p>[1.A] a side wall including an upper region and a lower region;</p>	

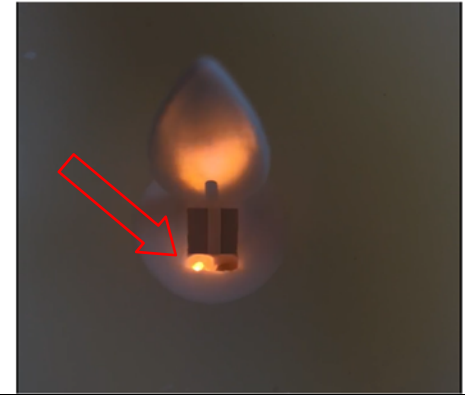
[1.B] an upper surface extending from the upper region of the side wall toward a central axis of the device, wherein an upper recess is formed at least in part by the upper surface;



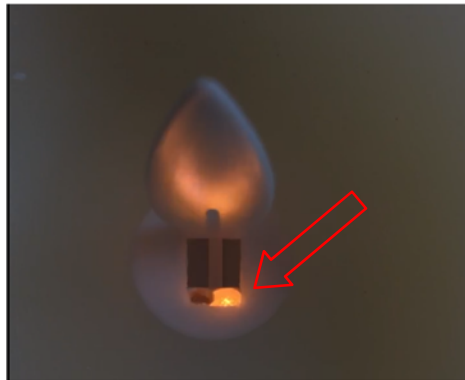
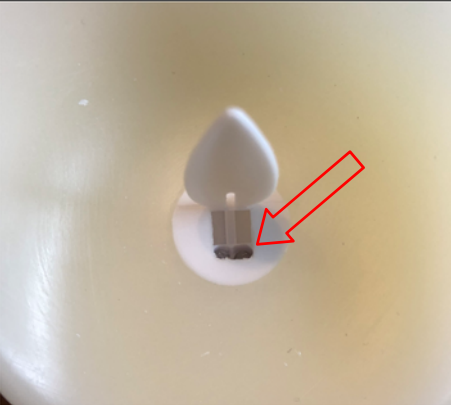
[1.C] a projection screen arranged to extend upwardly from the upper surface, wherein the position of the projection screen is fixed in relation to the upper surface;



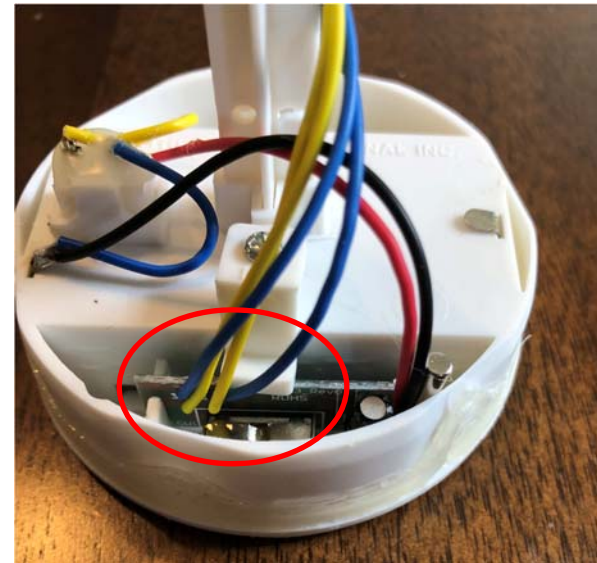
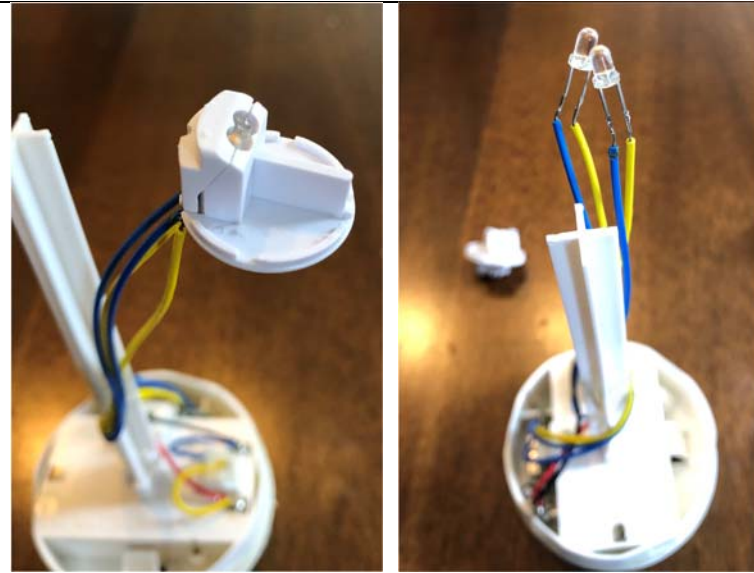
[1.D] a first source of light located below the upper surface and configured to project an first beam of light directly onto the projection screen without obstruction;



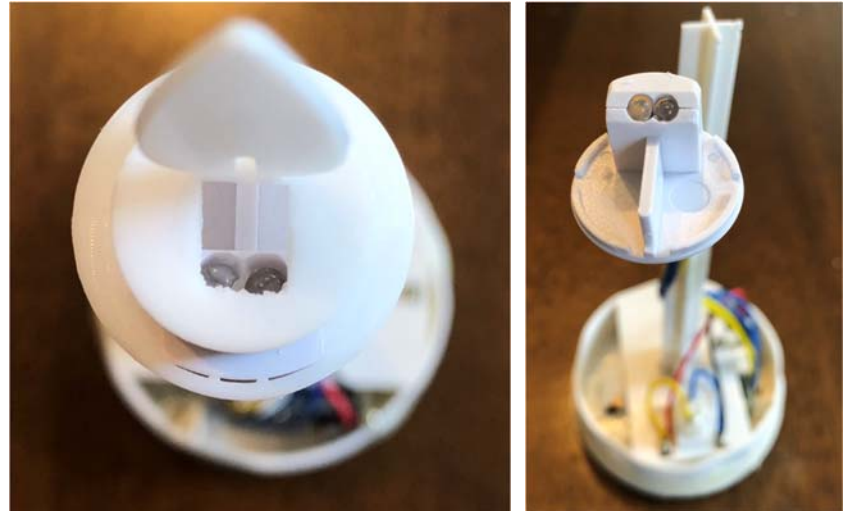
[1.E] a second source of light located below the upper surface and configured to project a second beam of light directly onto the projection screen without obstruction; and



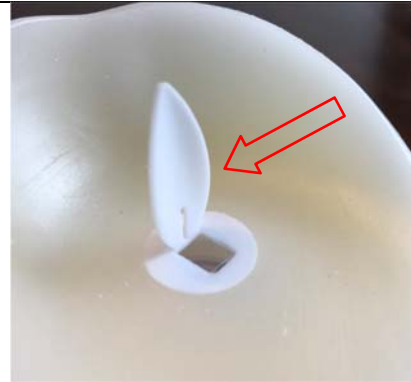
[1.F] circuitry electrically connected to the first source of light and the second source of light, wherein the circuitry independently controls intensities of the first beam of light projected by the first source of light and the second beam of light projected by the second source of light.



[2] The device of claim 1, wherein positions of the first source of light and the second source of light are fixed with respect to the position of the projection screen.



[4] The device of claim 1, wherein the projection screen includes a concavity.



[5] The device of claim 1, wherein the projection screen comprises a flame shape.



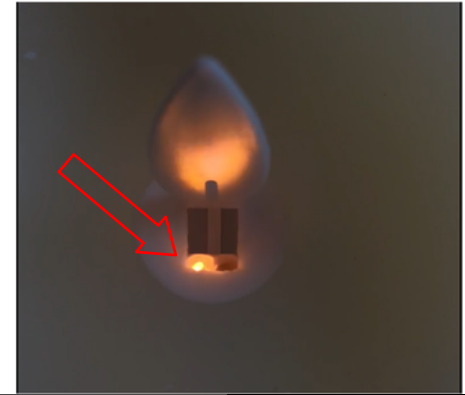
[7.Pre] The device of claim 1, wherein:



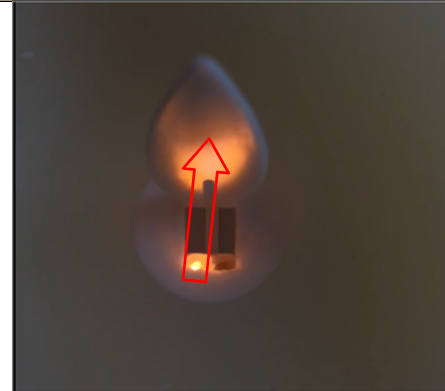
[7.A] the projection screen includes a primary plane;

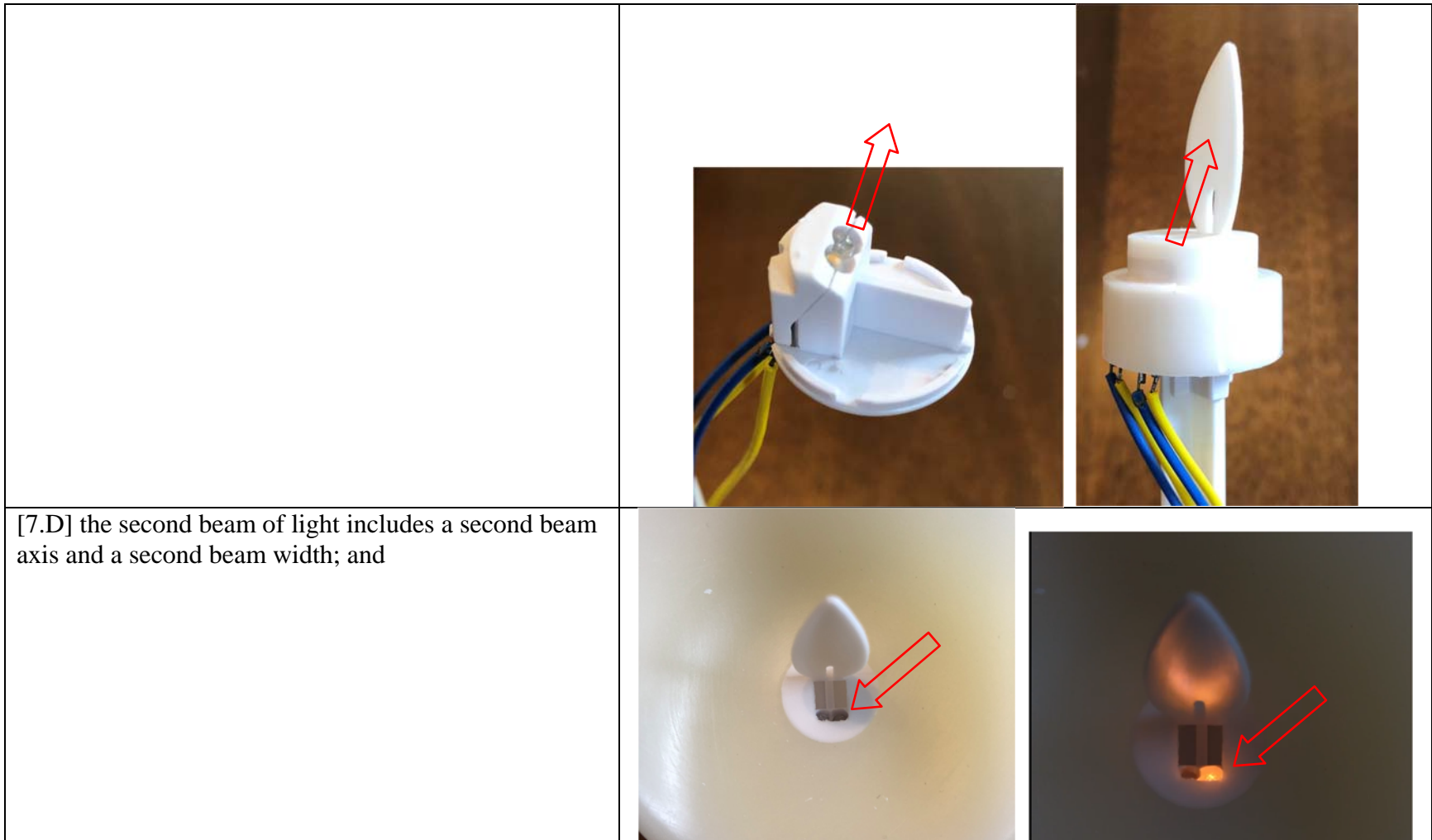


[7.B] the first beam of light includes a first beam axis and a first beam width;

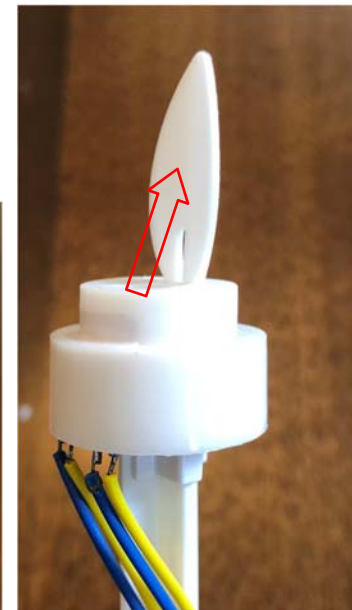
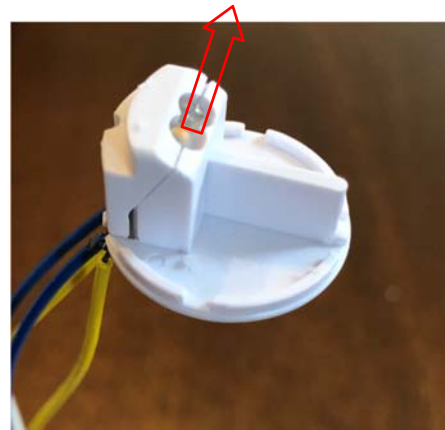
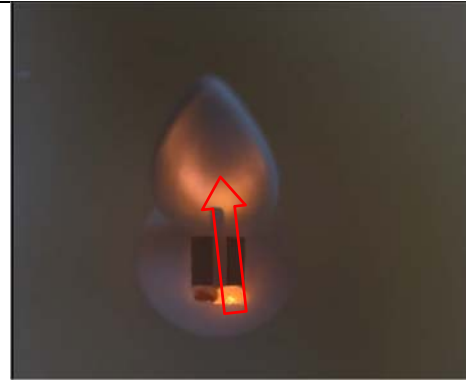




[7.C] the first beam axis of the first beam of light intersects the primary plane of the projection screen at an angle between 20° to 40° ;





[7.E] the second beam axis intersects the primary plane of the projection screen at an angle between 20° to 40° .

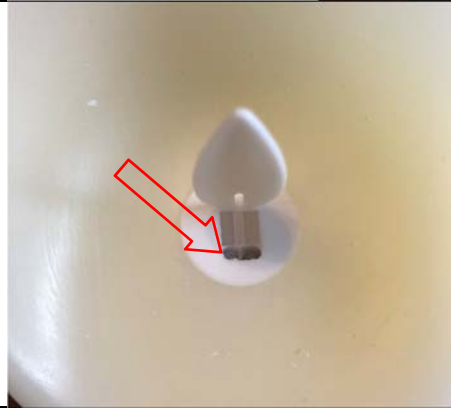




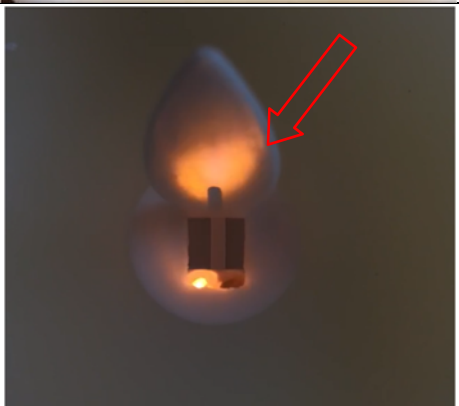
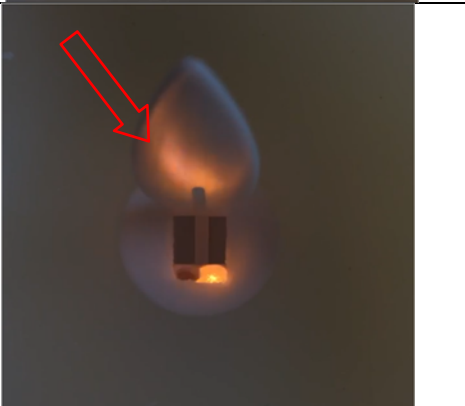
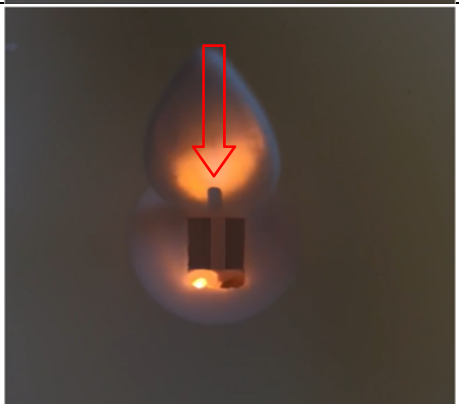
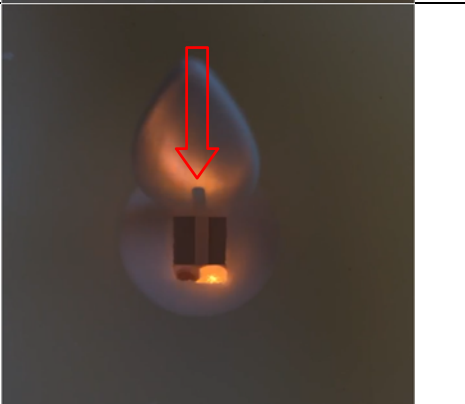
<p>[11] The device of claim 1, wherein the projection screen is rigid.</p>			
<p>[12] The device of claim 11, wherein the projection screen comprises plastic.</p>			



[13.Pre] The device of claim 1, wherein:



[13.A] the first source of light is positioned to project light onto a front side of the projection screen in a first area;



<p>[13.B] the second source of light is positioned to project light onto the front side of the projection screen in a second area; and</p>		
<p>[13.C] the second area is different than the first area.</p>		
<p>[14] The device of claim 13, wherein a portion of the first area overlaps a portion of the second area.</p>		

<p>[16.Pre] The device of claim 1, wherein:</p>			
<p>[16.A] the circuitry is configured to control the intensity of the first beam of light using pulse-width modulation; and</p>			


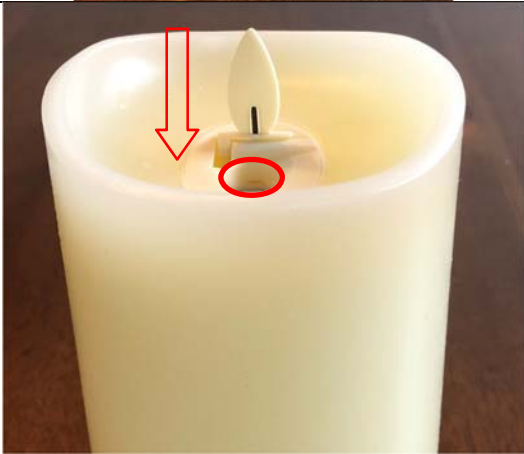
[16.B] the circuitry is configured to control the intensity of the second beam of light using pulse-width modulation.

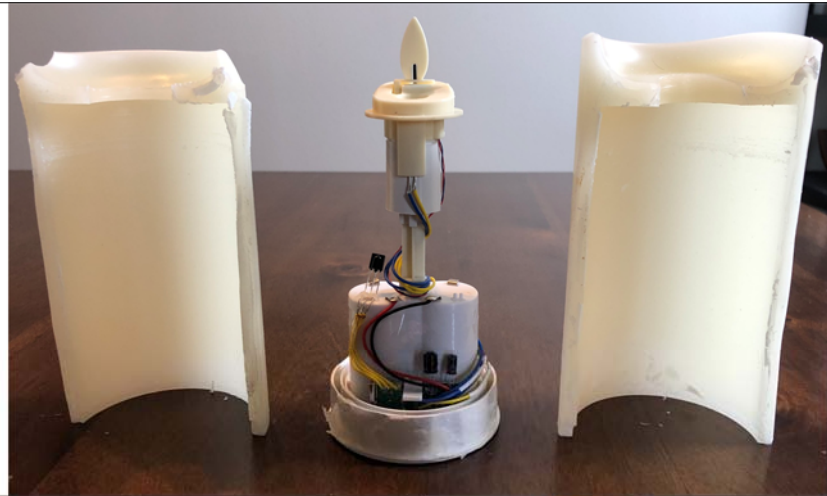


EXHIBIT 27

**Chart demonstrating how
exemplary Sterno Home electric
candles practice at least one
claim of the 10,352,517 patent
by Lightli "Wick to Flame"**

Practice of U.S. Patent No. 10,352,517 by Sterno Folding Flame Candles

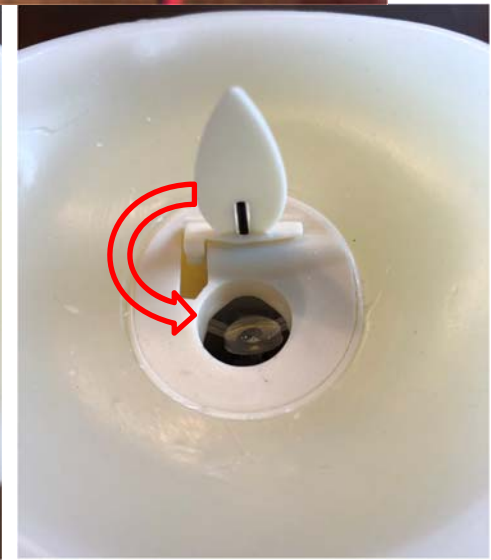
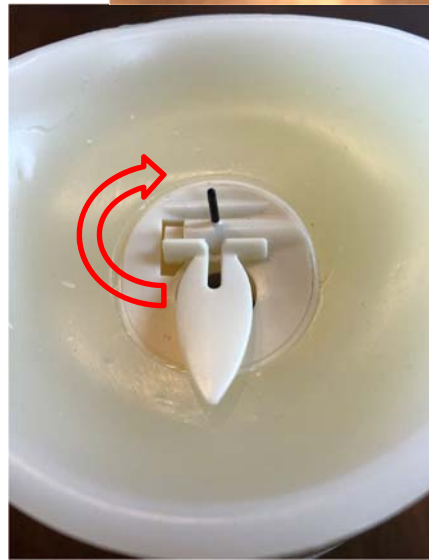
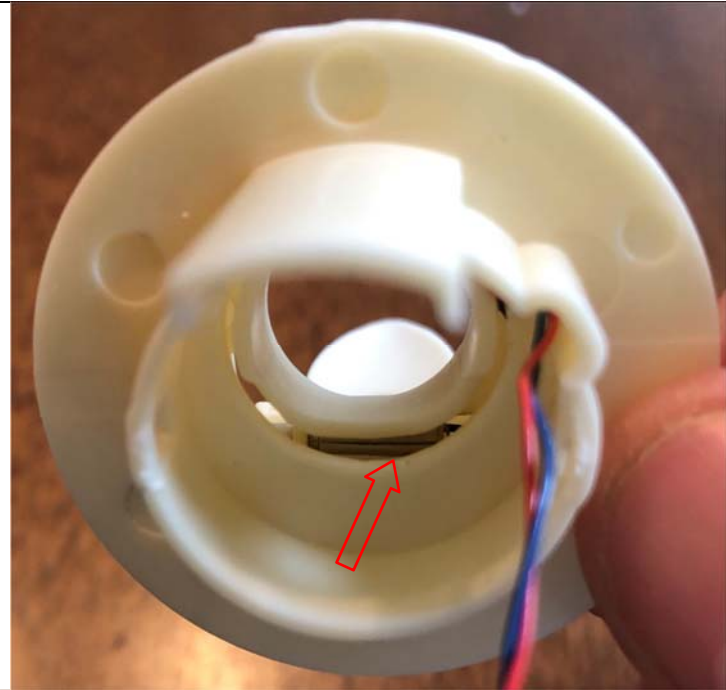
Claims	Folding Flame Candle
<p>[1.Pre] A flameless candle comprising:</p>	
<p>[1.A] a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;</p>	



[1.B] at least one light source positioned in the interior region of the candle body;



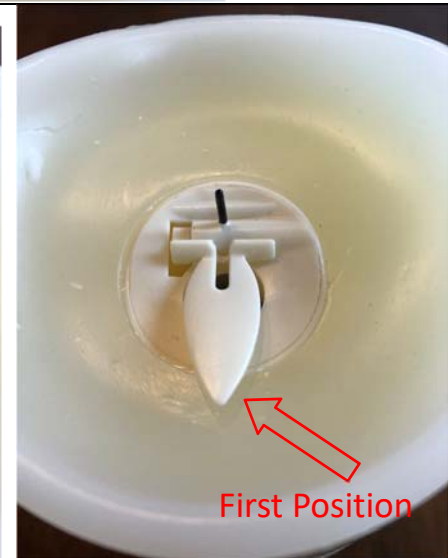
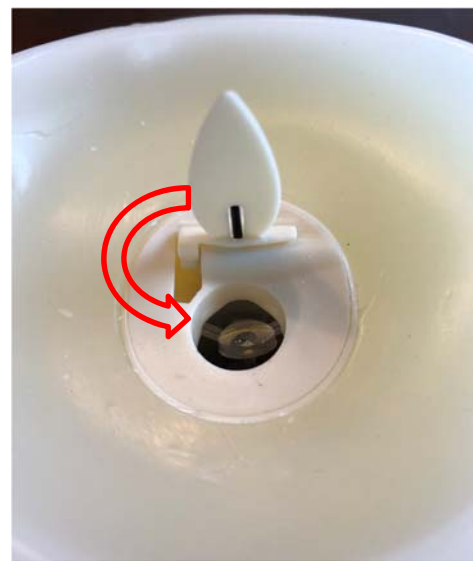
[1.C] a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;



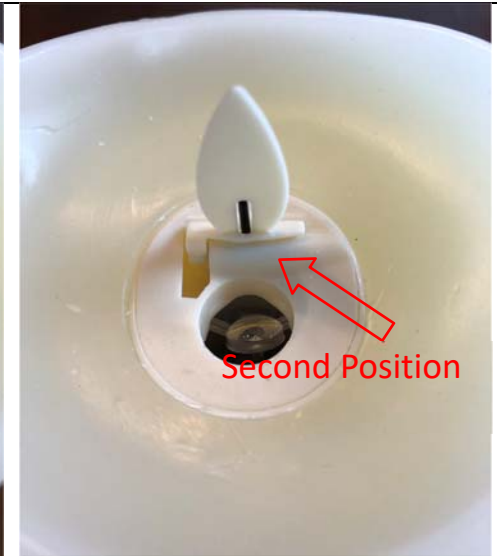
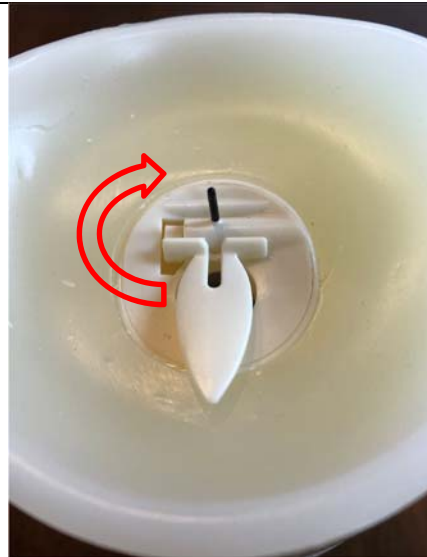
[1.D] a projection screen configured to:



[1.E] receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and



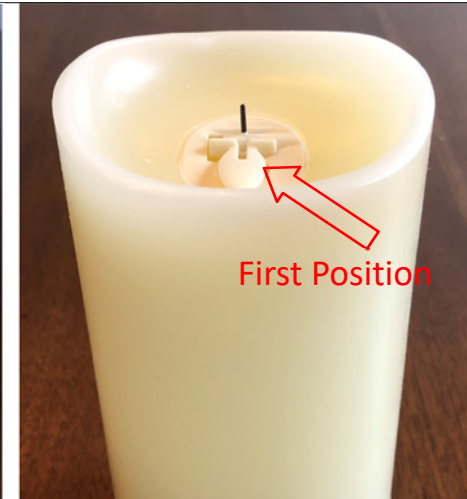
[1.F] receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body; and wherein:



[1.G] when the projection screen is moved to the second position, the at least one light source is automatically energized such that a light is emitted onto the projection screen; and



[1.H] when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.



[2] The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface:



[2.A] when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and



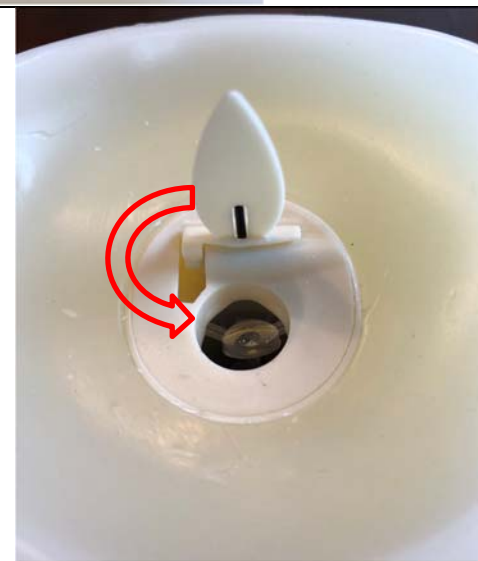
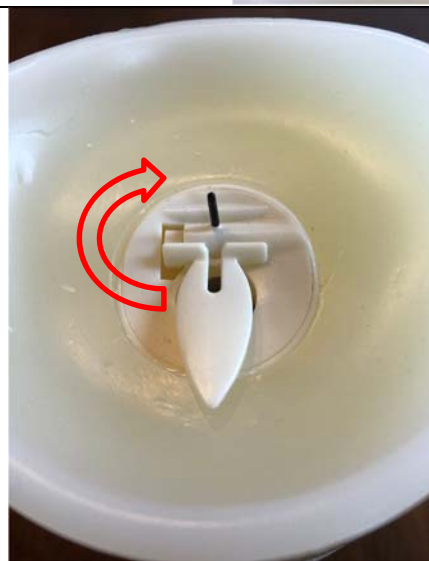
[2.B] when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.



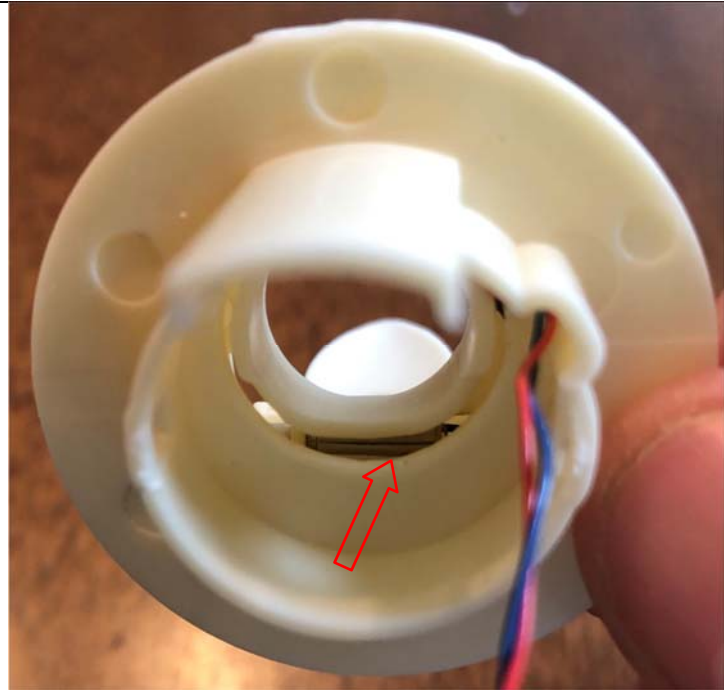
[3] The flameless candle of claim 1, wherein the projection screen comprises a flame shape.



[6] The flameless candle of claim 1, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.



[7] The flameless candle of claim 1, wherein the force-inducing portion comprises an electrical motor.



[9] The flameless candle of claim 1, further comprising an imitation wick extending upwardly from the upper surface of the candle body.



[10] The flameless candle of claim 1, further comprising an ON/OFF actuator that, when actuated, causes the projection screen to transition between the first position and the second position.



[11] The flameless candle of claim 1, further comprising a timer configured to periodically cause the projection screen to transition between the first position and the second position.



REMOTE CONTROL OPERATION FEATURES

Press **ON** button to turn candle on and press **OFF** button to turn candle off.

Press **Low Light** button to dim the candle light effect and Press **High Light** to return to optimum brightness.

To activate **DELAY START**, Press **2, 4, 6** or **8 hrs** button while candle is off. Candle will blink once to indicate **DELAY START** is set. Candle will then turn on in 2, 4, 6 or 8 hours from when the button is selected and remain on until the candle is turned off.

To activate remote **TIMER**, press only **4, 6, 8** or **10 hrs** button while candle is on for selected number of hours, and stay on before automatically turning off. Candle will blink twice to indicate **TIMER** is set. Once set, the candle will turn on at the same time everyday as when first activated, and turn off automatically in selected hours.

To activate **TIMER** and **DELAY START** select desired number of hours you wish to delay the timer and activate the candle. With candle in off mode, press **DELAY START** **2, 4, 6** or **8 hrs** button. Candle will blink once. Then press **TIMER 4, 6, 8** or **10 hrs** button. Candle will blink twice. Both **DELAY START** and **TIMER** features are now set and will automatically go on and off at the same time everyday.

To clear any **TIMER** and/or **DELAY START** settings press the **OFF** button.



NOTE: After a period of time, if the candle does not respond using the remote control unit, it is recommended that the candle's batteries be changed.

[12] The flameless candle of claim 11, wherein the timer comprises a 24-hour timer.



REMOTE CONTROL OPERATION FEATURES

Press **ON** button to turn candle on and press **OFF** button to turn candle off.

Press **Low Light** button to dim the candle light effect and Press **High Light** to return to optimum brightness.

To activate **DELAY START**, Press **2, 4, 6** or **8 hrs** button while candle is off. Candle will blink once to indicate **DELAY START** is set. Candle will then turn on in 2, 4, 6 or 8 hours from when the button is selected and remain on until the candle is turned off.

To activate remote **TIMER**, press only **4, 6, 8** or **10 hrs** button while candle is on for selected number of hours, and stay on before automatically turning off. Candle will blink twice to indicate **TIMER** is set. Once set, the candle will turn on at the same time everyday as when first activated, and turn off automatically in selected hours.

To activate **TIMER** and **DELAY START** select desired number of hours you wish to delay the timer and activate the candle. With candle in off mode, press **DELAY START** **2, 4, 6** or **8 hrs** button. Candle will blink once. Then press **TIMER 4, 6, 8** or **10 hrs** button. Candle will blink twice. Both **DELAY START** and **TIMER** features are now set and will automatically go on and off at the same time everyday.

To clear any **TIMER** and/or **DELAY START** settings press the **OFF** button.



NOTE: After a period of time, if the candle does not respond using the remote control unit, it is recommended that the candle's batteries be changed.

[15] The flameless candle of claim 1, further comprising a moveable lens interposed between the at least one light source and the projection screen.

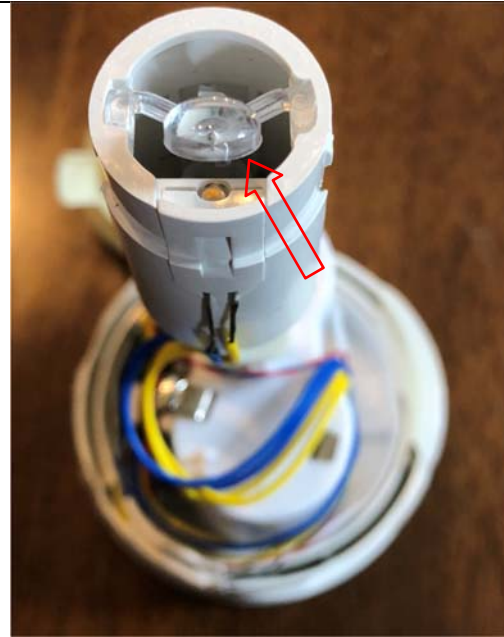

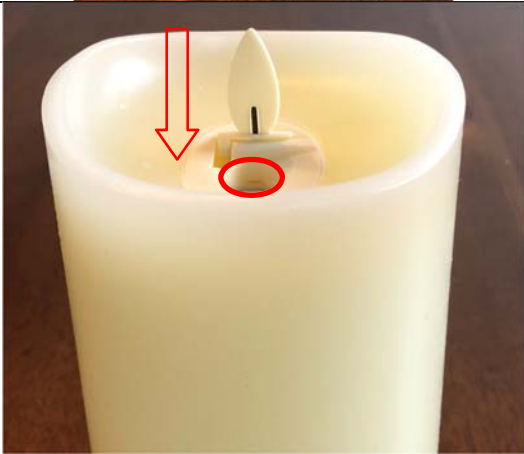
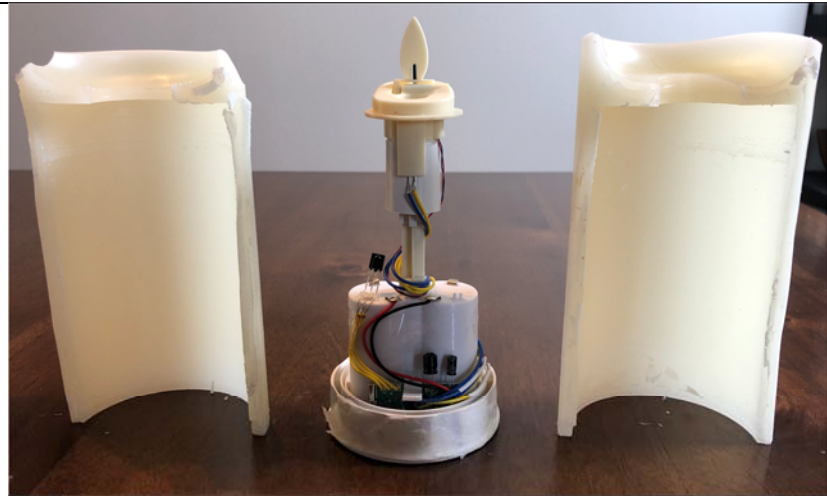


EXHIBIT 28

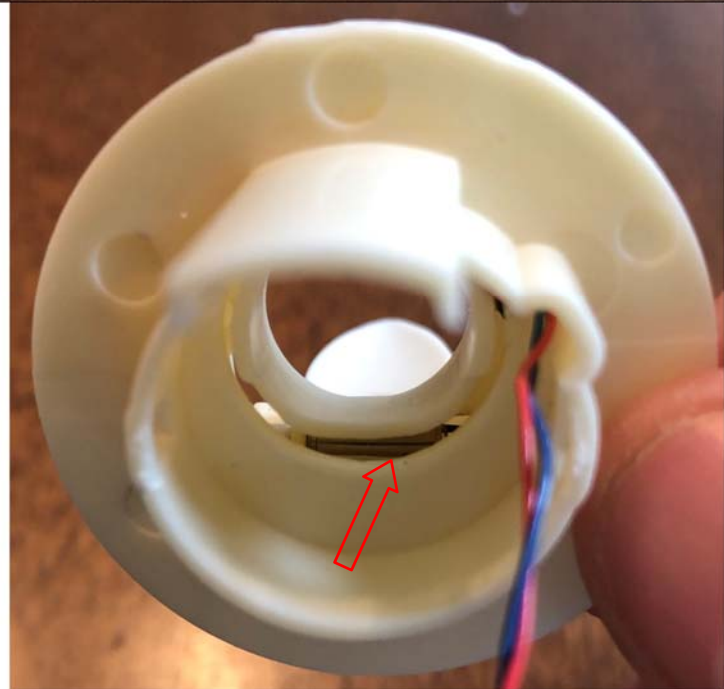
**Chart demonstrating how
exemplary Sterno Home electric
candles practice at least one
claim of the 10,578,264 patent
by Lightli "Wick to Flame"**

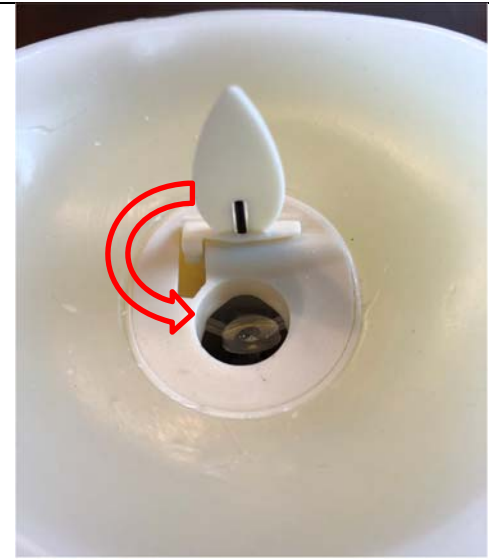
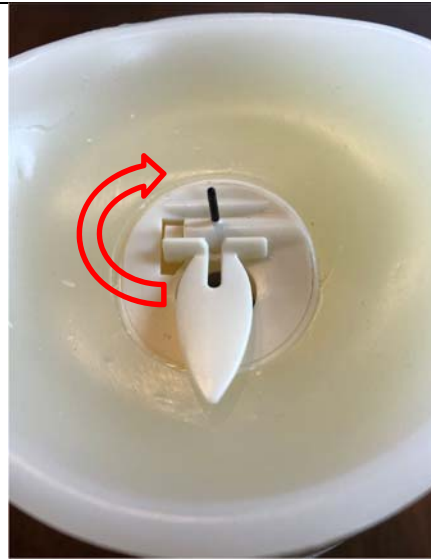
Pratice of U.S. Patent No. 10,578,264 by Sterno Folding Flame Candles

Claims	Folding Flame Candle
<p>[1.Pre] A flameless candle comprising:</p>	
<p>[1.A] a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;</p>	



[1.B] a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;

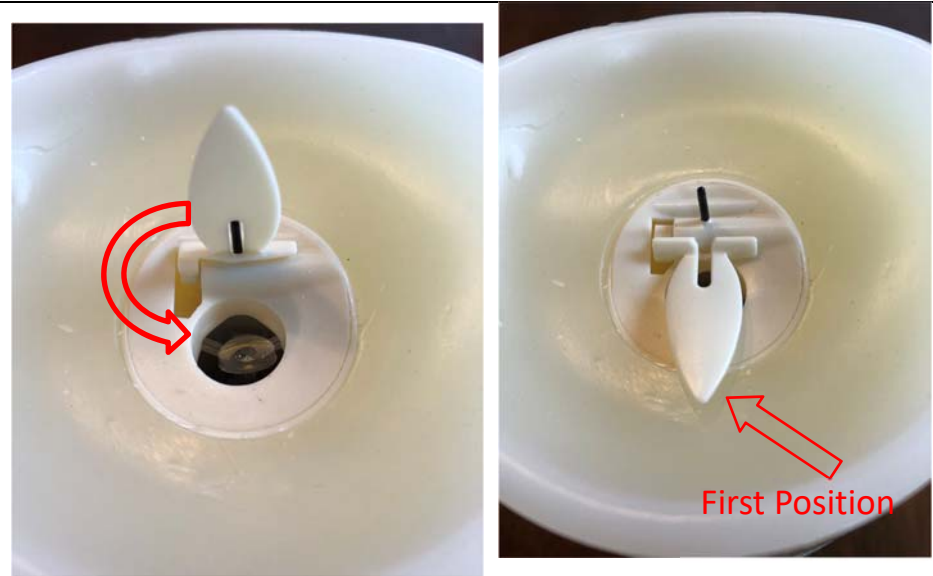




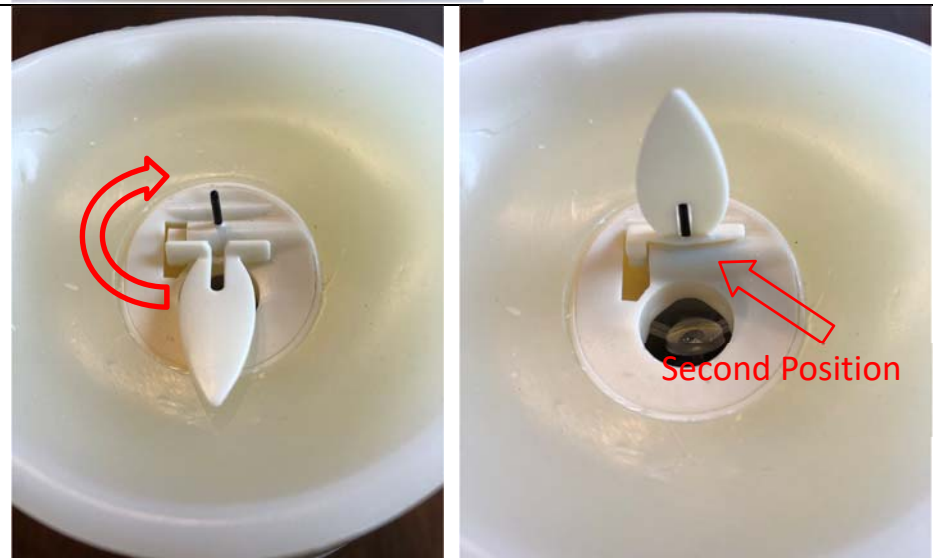
[1.C] a projection screen configured to:



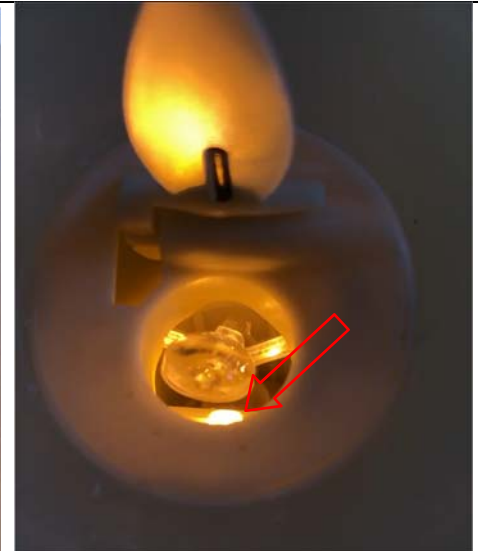
[1.D] receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and



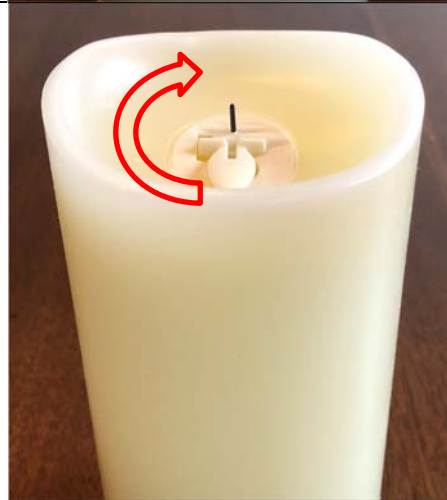
[1.E] receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;



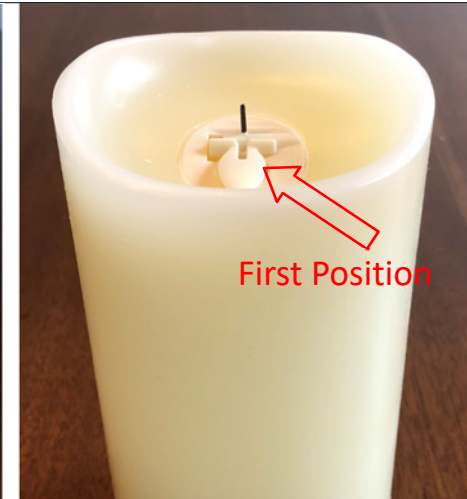
[1.F] at least one light source configured to project a light onto the projection screen; and



[1.G] wherein: when the projection screen is moved to the second position, the at least one light source is automatically energized such that the light is emitted onto the projection screen; and



[1.H] when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.



[2] The flameless candle of claim 1, wherein when a base of the candle is resting on a substantially horizontal surface:



[2.A] when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and



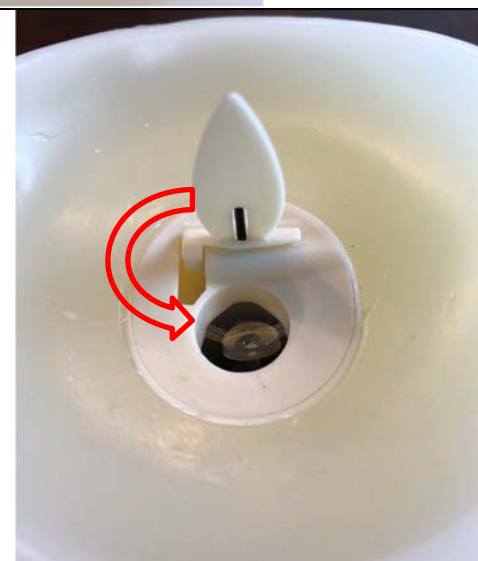
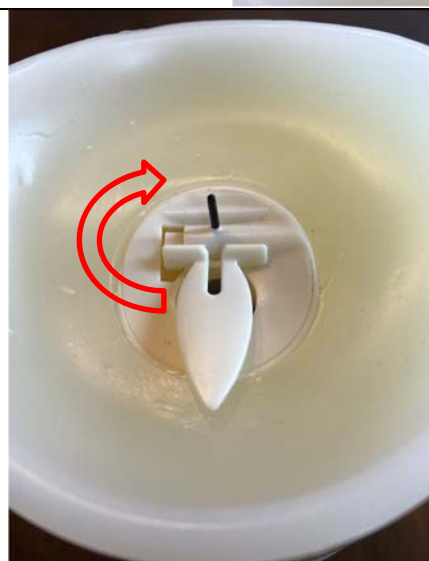
[2.B] when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.



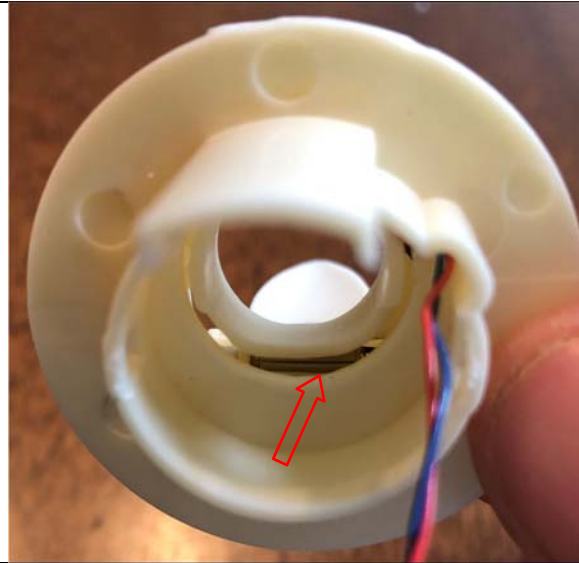
[3] The flameless candle of claim 1, wherein the projection screen comprises a flame shape.



[5] The flameless candle of claim 1, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.



[6] The flameless candle of claim 1, wherein the force-inducing portion comprises an electrical motor.



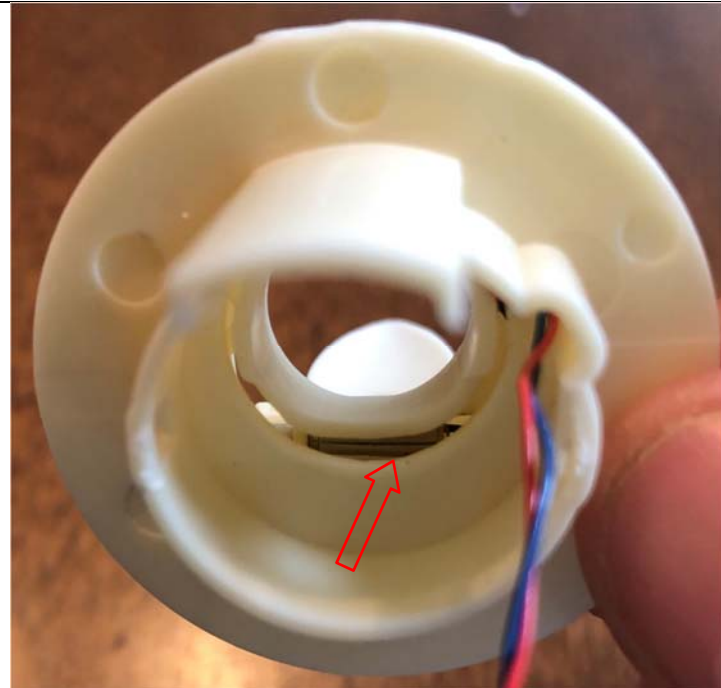
[8.Pre] A flameless candle comprising:

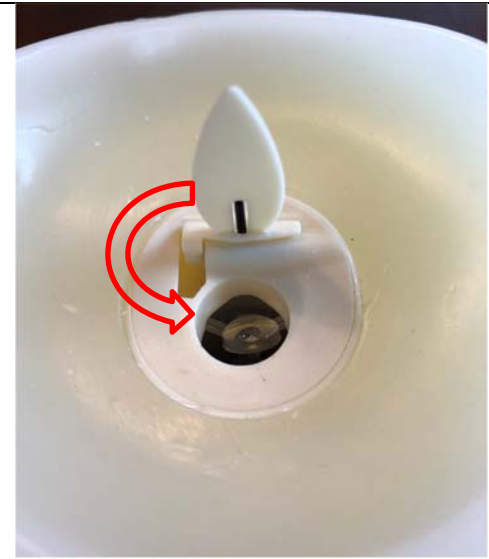
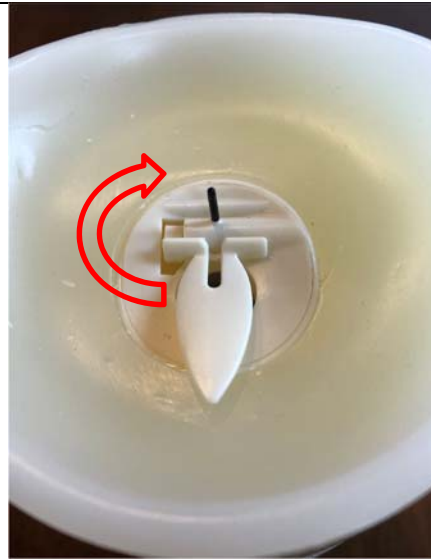


[8.A] a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;



[8.B] a force-inducing portion configured to alternatively induce a first mechanical force and a second mechanical force;

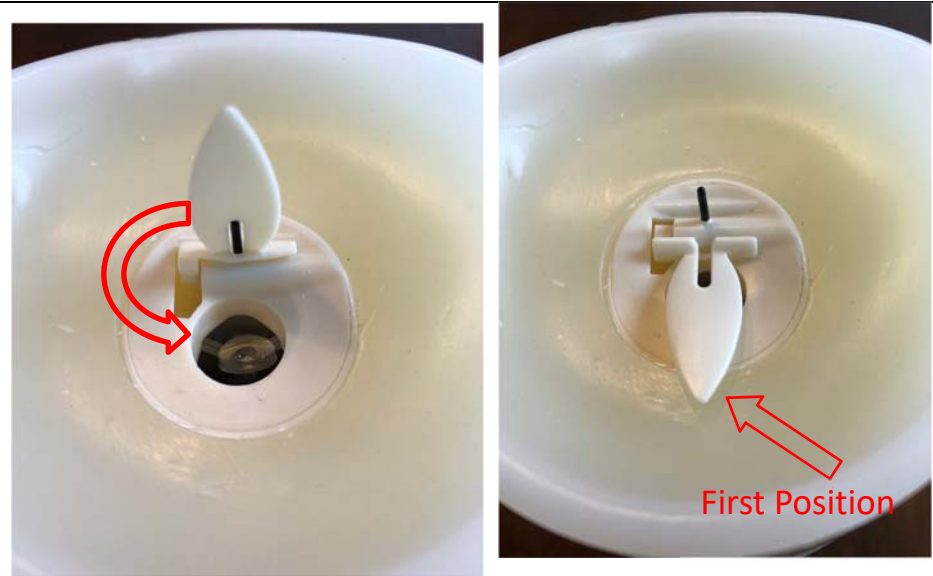




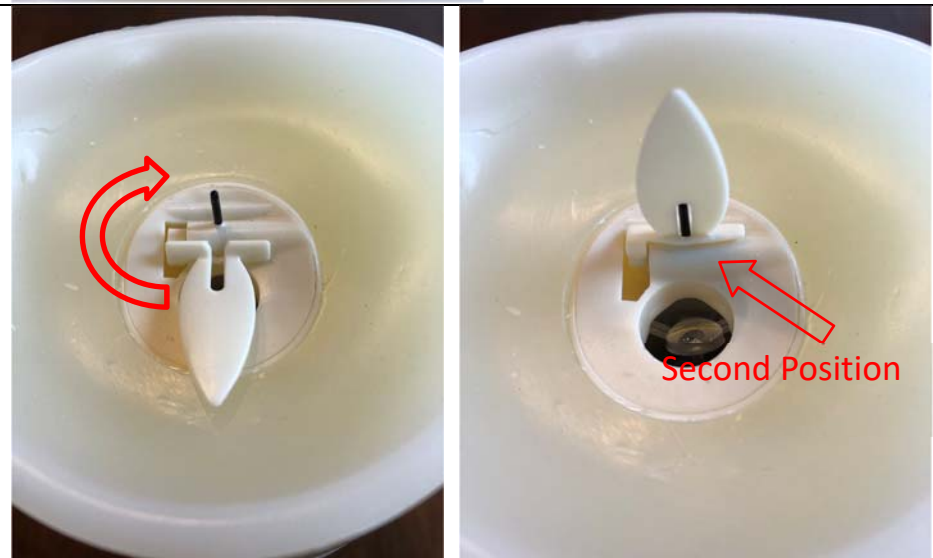
[8.C] a projection screen configured to:



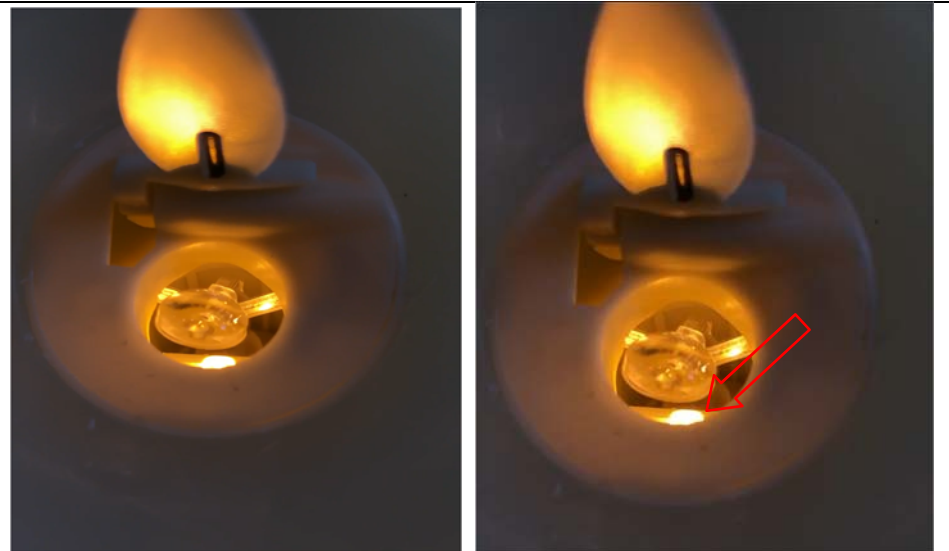
[8.D] receive the first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and



[8.E] receive the second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;



[8.F] at least one light source configured to project a light onto the projection screen; and



[8.G] wherein: when the projection screen is in the first position, the projection screen has a substantially horizontal orientation; and



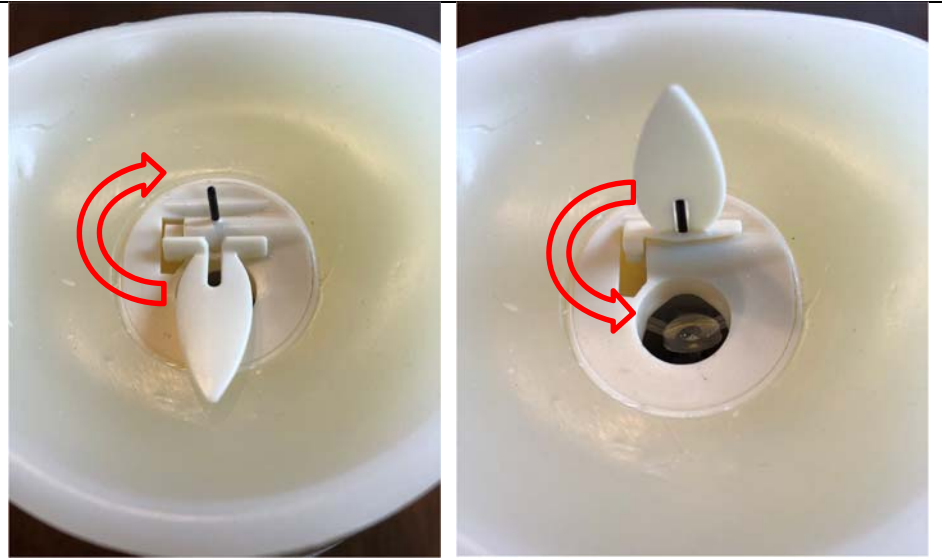
[8.H] when the projection screen is in the second position, the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.



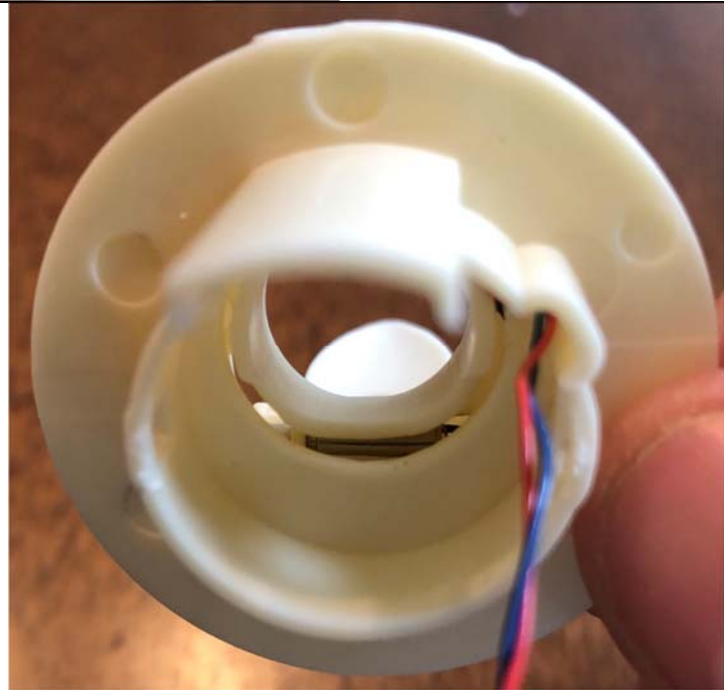
[9] The flameless candle of claim 8, wherein the projection screen comprises a flame shape.



[11] The flameless candle of claim 8, wherein the first mechanical force and the second mechanical force are rotational forces provided to the projection screen such that the projection screen moves between the first position and the second position.



[12] The flameless candle of claim 8, wherein the force-inducing portion comprises an electrical motor.



[14.Pre] A flameless candle comprising:

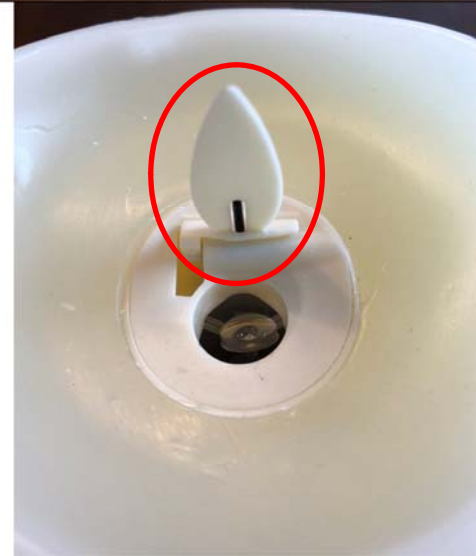


[14.A] a candle body forming an interior region, wherein the candle body includes an upper surface and an aperture in the upper surface;

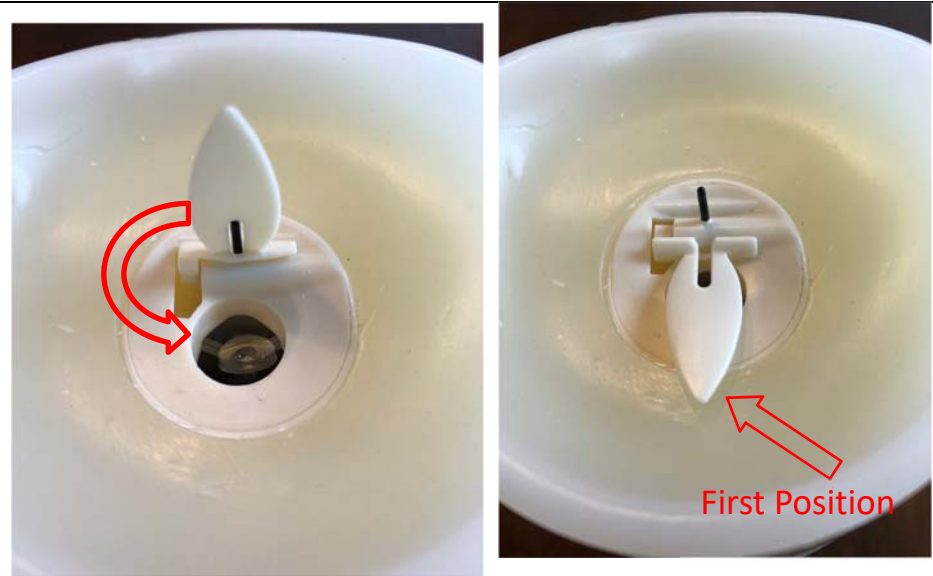




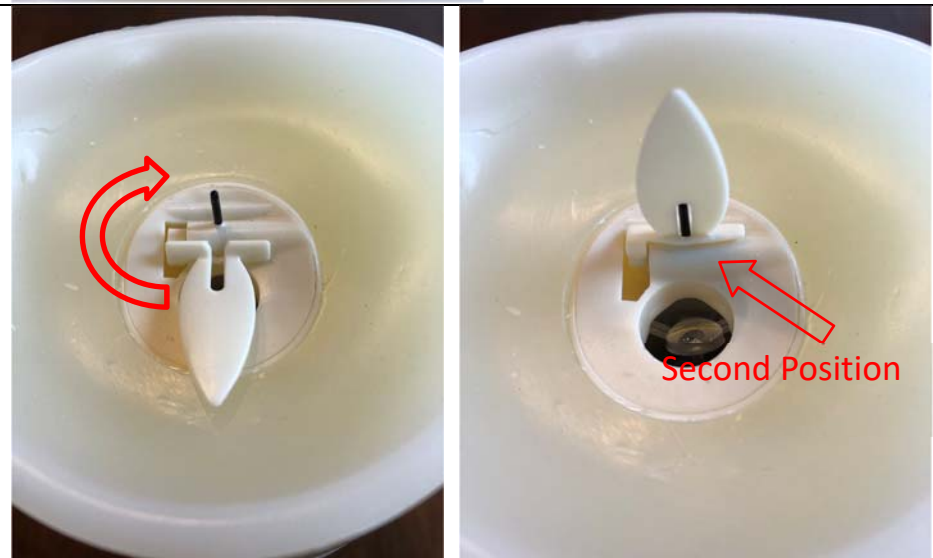
[14.B] a projection screen configured to:



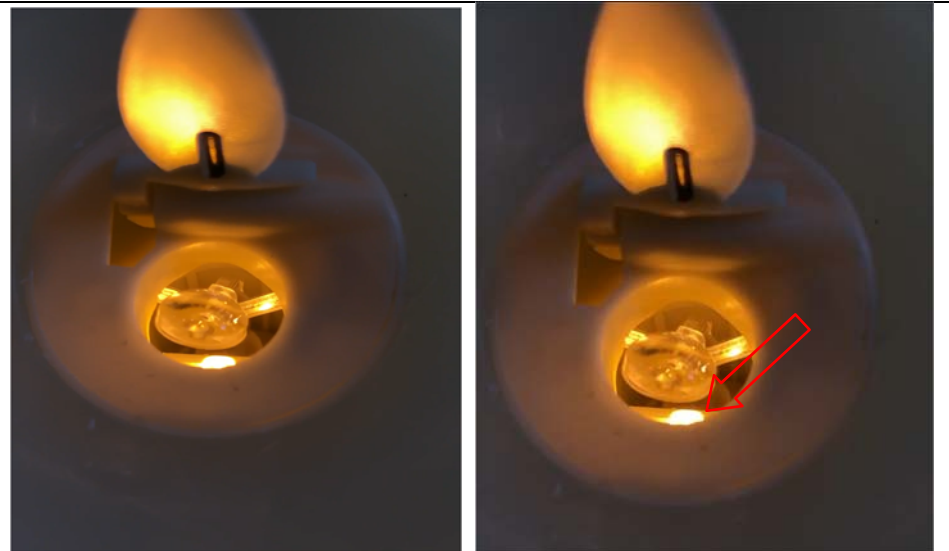
[14.C] receive a first mechanical force and responsively move to a first position with respect to the upper surface of the candle body; and



[14.D] receive a second mechanical force and responsively move to a second position with respect to the upper surface of the candle body;



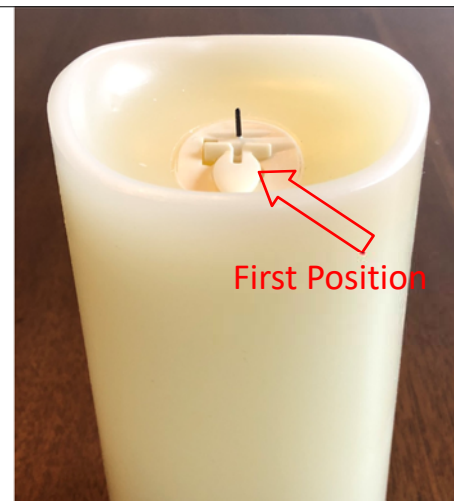
[14.E] at least one light source configured to project a light onto the projection screen; and



[14.F] wherein: when the projection screen is moved to the second position, the at least one light source is automatically energized such that the light is emitted onto the projection screen; and



[14.G] when the projection screen is moved to the first position, the at least one light source is automatically de-energized such that the light is not emitted.



[15] The flameless candle of claim 14, wherein when a base of the candle is resting on a substantially horizontal surface:



[15.A] when the projection screen is in the first position the projection screen has a substantially horizontal orientation; and



[15.B] when the projection screen is in the second position the projection screen has a substantially vertical orientation and extends upwardly from the upper surface of the candle body.



[16] The flameless candle of claim 14, wherein the projection screen comprises a flame shape.



EXHIBIT 29

**United States Patent
No. 6,616,308**



US006616308B2

(12) **United States Patent**
Jensen et al.

(10) **Patent No.:** **US 6,616,308 B2**
(45) **Date of Patent:** **Sep. 9, 2003**

(54) **IMITATION CANDLE**

(75) Inventors: **Bradford B. Jensen**, Saint Joseph, MI (US); **Roger D. Bentley**, Coloma, MI (US); **Kim I. McCavit**, Saint Joseph, MI (US)

(73) Assignee: **Jenesis International, Inc.**, Stevensville, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/929,843**

(22) Filed: **Aug. 14, 2001**

(65) **Prior Publication Data**

US 2003/0035291 A1 Feb. 20, 2003

(51) **Int. Cl.⁷** **F21V 11/00**

(52) **U.S. Cl.** **362/351; 362/392; 362/190**

(58) **Field of Search** **362/351, 392, 362/810, 800, 190**

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Primary Examiner—Alan Cariaso

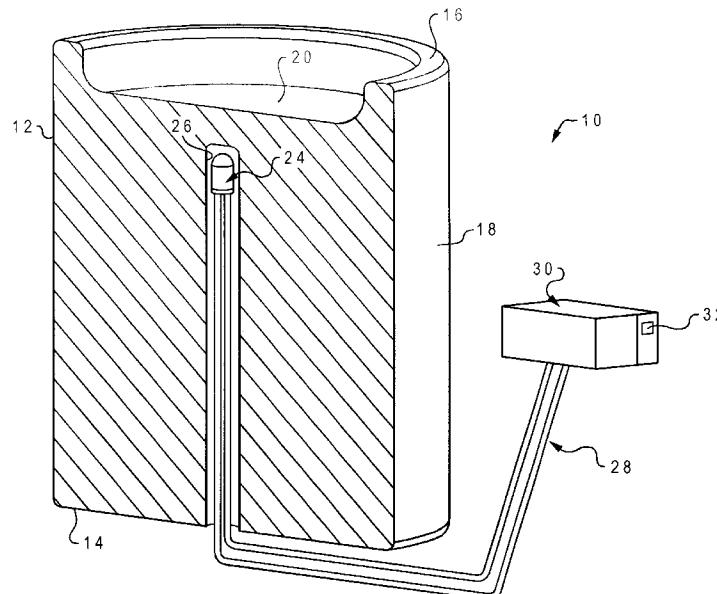
Assistant Examiner—Ismael Negron

(74) *Attorney, Agent, or Firm*—Paul W. O'Malley; Susan L. Firestone

(57) **ABSTRACT**

An imitation candle is made from a translucent material having light transmissive properties similar to paraffin. The imitation candle is shaped to appear reduced by burning. An LED, or similar high intensity light source, is set in a cavity within the imitation candle. The LED preferably produces amber light to better resemble the color of candle light. The imitation candle diffuses the light emitted from the LED to create a warm, natural looking glow. Light emission levels from the LED are varied in a pseudo-random manner to simulate the flicker of candle light.

9 Claims, 4 Drawing Sheets



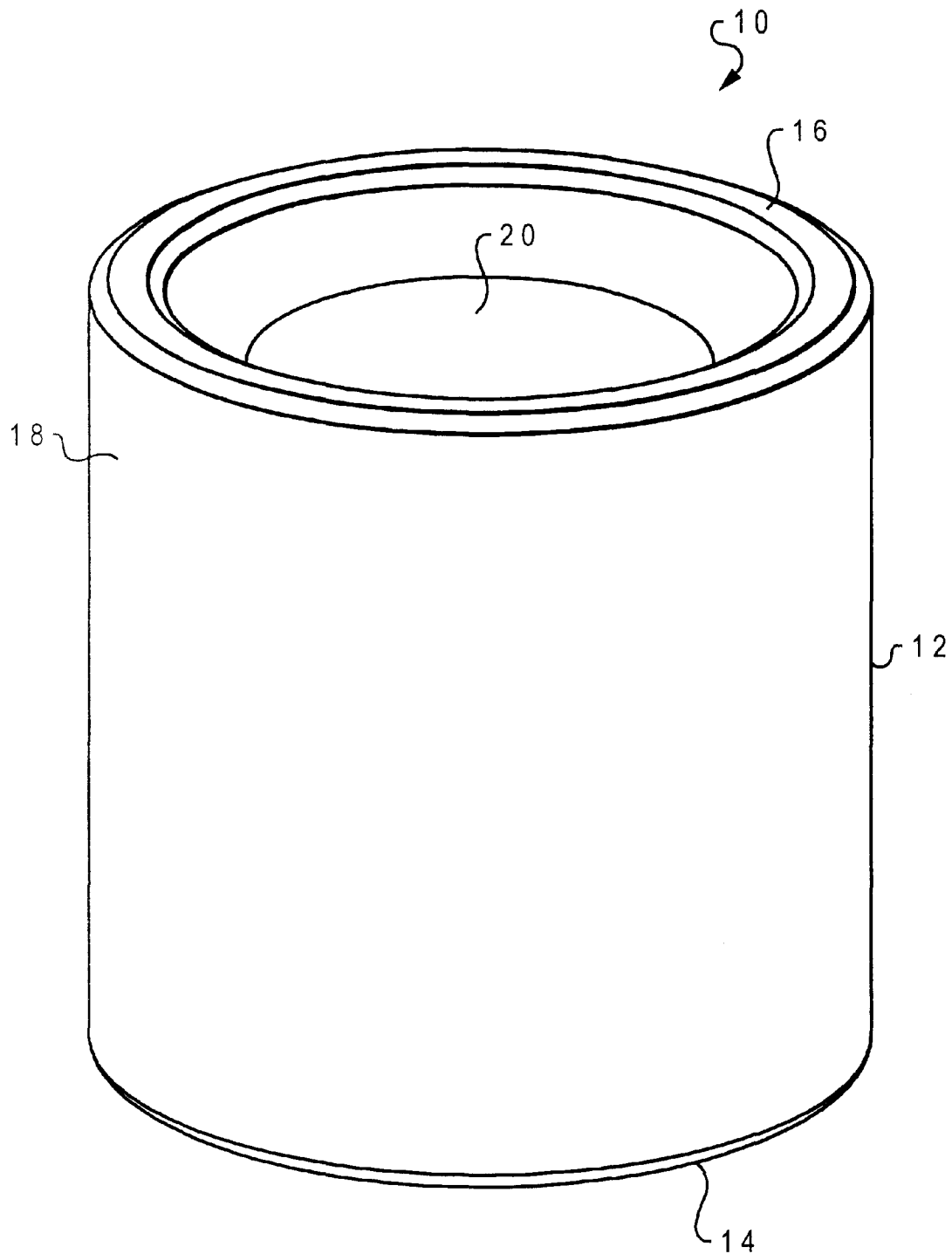
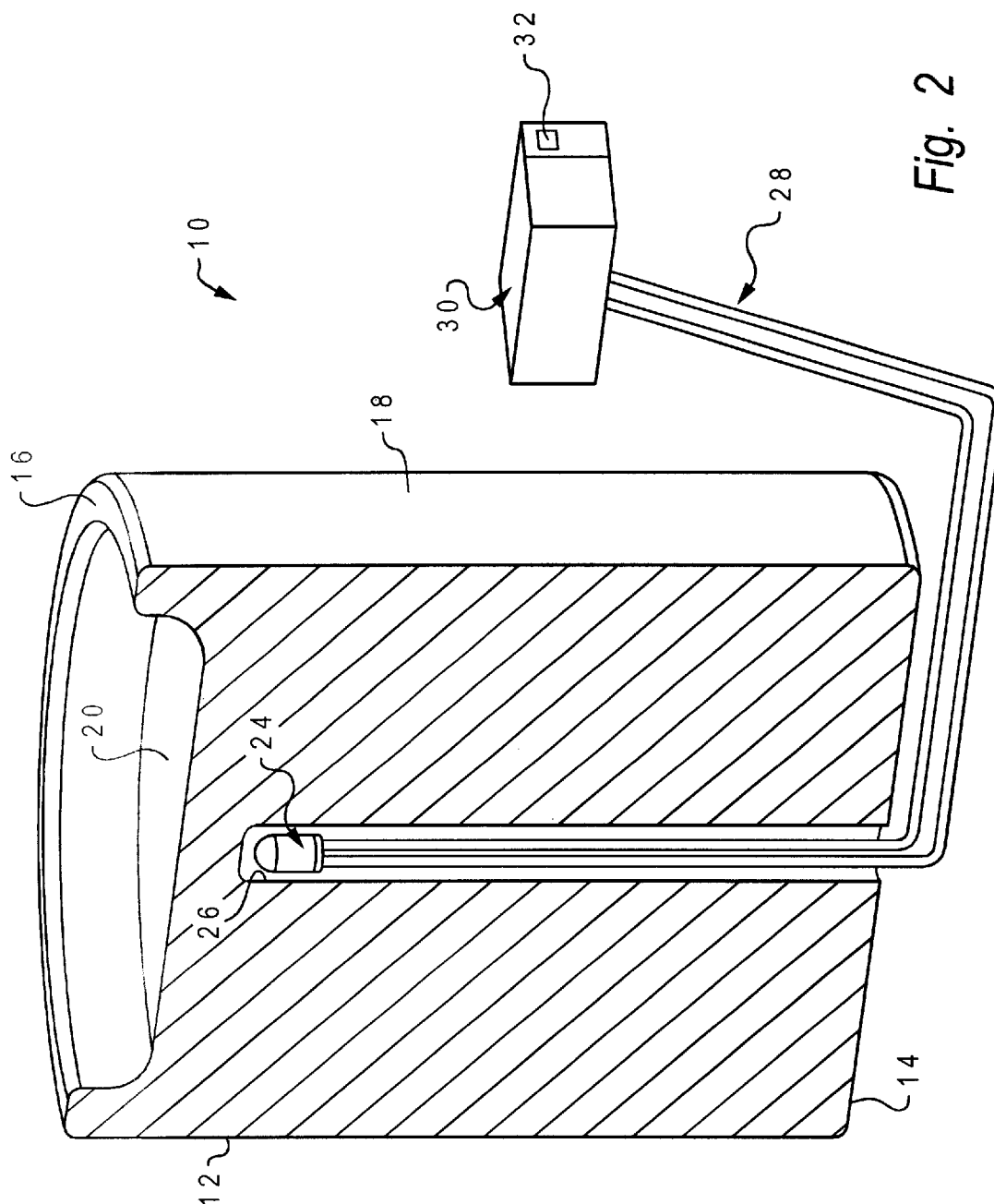


Fig. 1



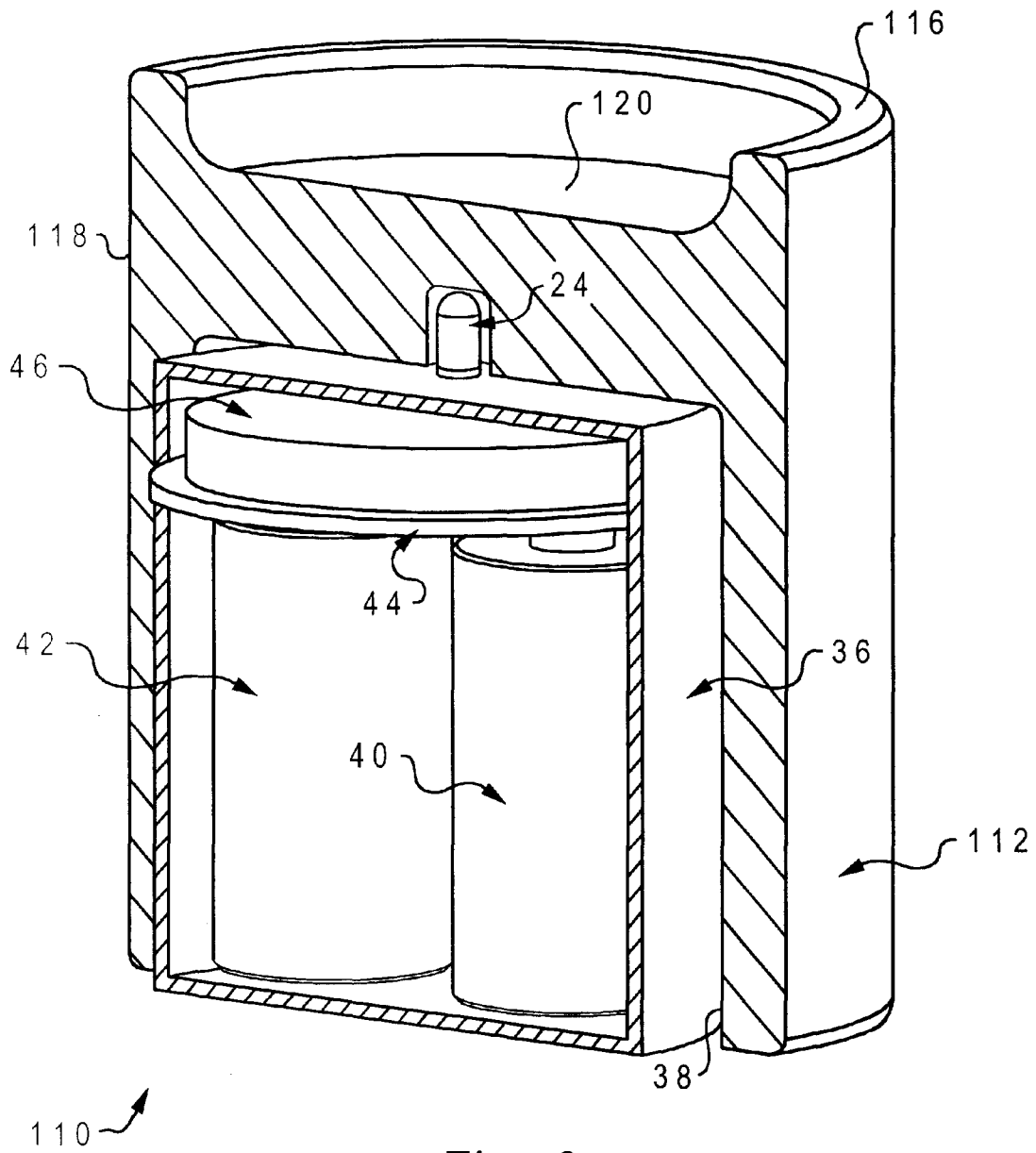
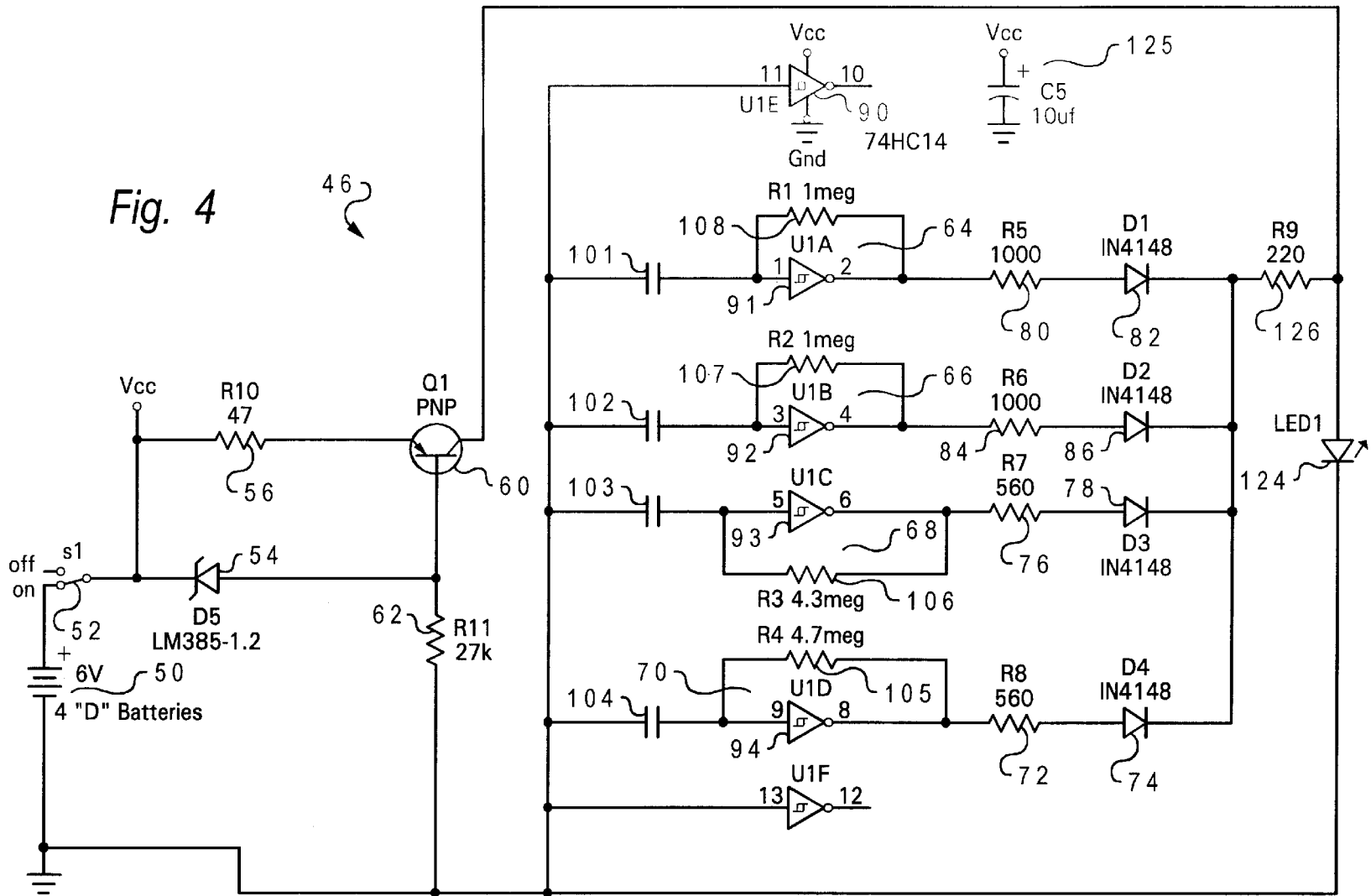


Fig. 3



IMITATION CANDLE

BACKGROUND TO THE INVENTION

1. Field of the Invention

The present invention relates to low level luminaries and more particularly to an imitation candle used primarily for ornamentation and establishing ambience.

2. Description of the Problem

Many people find candle light pleasant. The flickering of light and movement of shadows across a floor or on a nearby wall can be almost hypnotically soothing. As a result, candles have remained popular for generations since the invention of more practical electrical lighting, especially for decorative and mood setting purposes. This has remained so notwithstanding the hazard posed by open flames and the consequent danger of household fires. Few people consider it safe to leave a lit candle unattended.

Consequently, numerous manufacturers have attempted to meet a demand for a candle like luminary using electrical illumination. There are many imitation candles available that use incandescent lamps or LED's as a light source. While these address people's concern with the open flame, most try to implement the appearance of a realistic flame using a specially shaped bulb or lens that is exposed to view. Typically, the bulb or lens sits on top of a thin cylindrical sleeve, which is shaped and colored to resemble a candle. The results are typically disappointing, especially when these devices are not illuminated. The visible, flame shaped artificial light source makes the imitation candle as a whole appear artificial. The result can look more like a caricature of a candle than a real candle. The color of incandescent light can leave something to be desired in many candles as well.

The use of frosted glass cylinders around incandescent light sources to diffuse light is known. Such products are pleasant and popular. However, the light produced by an incandescent source can be quite broad, and the top of the lamp must be open to allow heat to escape. Another product, sold by Eternalight, Inc. of Cortaro, Ariz., provides a plurality of LEDs arranged on a base inside a frosted glass cylinder. A computer is used to control current supplied the LEDs to change the color and intensity of the light emitted to give an artificial flame shape and motion and to vary the intensity of the artificial flame. A similar product is sold by Norrex Enterprises, Inc. of Blauvelt, N.Y. In both cases the products place the artificial flame above a base. A frosted glass cylinder, open at the top, is then set on the base. The appearance is intended to be of a candle inside a glass lamp.

Candles of course do not all come in one shape or size. While a classical image of a candle is of a long, thin, tapering rod, which stands upright in a candle stick and which leaves its flame exposed as it burns down, many candles come as a relatively short to circumference block or cylinder which is self supporting. Such candles commonly leave the outer wall of the candle intact as the candlewick burns down. When this happens, the candle flame is no longer visible when viewed from the side. This results in a diffuse, flickering glow visible through the paraffin wall of the candle.

SUMMARY OF THE INVENTION

One object of the invention is to provide an electrical candle that provides realistic candle like light.

Another object of the invention is to provide an electrical candle that presents a realistic appearance when the candle is not lit.

Yet another object of the invention is to provide an imitation candle that uses a light-sensing device to turn the light source off during the day.

Still another object of the invention is to provide a flicker circuit that provides three or more distinct light levels that vary in a pseudo-random manner to provide a realistic variation in light output akin to a candle flame being disturbed by gentle air currents. A realistic flicker provides one more subconscious cue that the candle is real.

Yet another object of the invention is to provide a luminary that gives a very realistic representation of a broad, self supporting candle that has burned down to the point where the flame is not visible.

These and other objects are achieved as is now described. The imitation candle of the present invention hides the light source within the body of the luminary which gives the body a glow in much the same way that a real wax candle glows when illuminated by a depressed flame. There is no shaped imitation flame to betray the fact that the candle is not real. The light source is preferably a light emitting diode enclosed within the translucent material forming the body of the luminary. The translucent material surrounds the light emitting diode on the sides and top at least to an extent necessary to make direct viewing of the light emitting diode inconvenient. The light emitting diode is positioned near the top of the body so that the top is brighter than the lower parts of the candlestick, which again simulates the appearance of a real candle. Placing the light emitting diode near the top also creates a hot spot of light that can be seen in the translucent material when viewed from above. Recessing the top within the side walls presents the appearance of a candle that has already been burning for some length of time. The body of the imitation candle can be made from real wax to further enhance the imitation candle's realism. Alternatively, frosted glass or plastic materials may be used.

The invention provides an imitation candle having a body made from a translucent material having optically transmissive properties similar to candle paraffin. In a preferred embodiment the body of the imitation candle has a relatively large base or circumference relative to its height and is self supporting. The candle body is shaped to simulate a candle which has partially burned down, for example by forming a depression into an upper surface of a cylindrical candle body. A light emitting body, or similar small, high intensity light source, is set in a cavity enclosed within the translucent material. An emission color, such as amber, is selected for the LED to produce a light similar in color to candle light. The translucent material of the candle body diffuses the light emitted from the LED to create a warm, natural looking glow. When viewed from the side, the result is a very close approximation to a real candle when the wick has burned down to the point that the flame is not directly visible. The LED is preferably placed near the top of the translucent material but centered horizontally. The thinner material directly above the LED causes less diffusion of the light and produces a high intensity area of light that simulates the appearance of a candle flame when the candle is viewed from above.

The LED is preferably a super bright LED. Power consumption is low enough at low illumination levels that reasonable lifetimes can be achieved using batteries as a power source. Alternately, a wall-cube style power supply could be used to supply power and eliminate the need periodically to replace batteries. Alternately, rechargeable batteries can be used in conjunction with a solar cell or other recharging means. A simple circuit using multiple oscillators

running at nearly the same frequency creates a realistic, pseudo-random flicker for light emitted by the LED. A simple light sensing device can be used to turn the LED off during daylight hours and extend battery life in battery operated versions of the candle.

Additional effects, features and advantages will be apparent in the written description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a preferred embodiment of the imitation candle of the invention.

FIG. 2 is a partial cutaway view of an embodiment of the invention.

FIG. 3 is a partial cutaway view of a preferred embodiment of the invention.

FIG. 4 is a circuit schematic for a luminary of the preferred embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings and in particular to FIG. 1 a preferred embodiment of the invention will be described. An imitation candle 10 includes a body 12 with a horizontal lower surface 14 on which it rests, an upper surface 16 and a cylindrical vertical side wall 18 between the lower and upper surfaces. Imitation candle 10 is preferably sized to resemble a self supporting candle having a relatively large circumference compared to its height. Slender, tapering bodies resembling classical candles, and other shapes, are possible and such configurations are within the scope of the invention, but embodiments using such shapes may not provide as esthetically a pleasing appearance in use due to the expectation that a flame be visible. While imitation candle 10 is illustrated as being cylindrical, other horizontal cross sectional shapes are possible, such as rectangular, as well as irregular shapes. Upper surface 16 includes an indented or depressed central region 20, which is preferably shaped to resemble a top portion of candle which has been reduced by melting to feed a flame supported from a central wick.

FIG. 2 shows a preferred embodiment of the invention in a cutaway view. A light source body 24 preferably emits light from a small area, which is preferably achieved by incorporating a super bright light emitting diode (LED). Light source body 24 is placed near the surface forming depressed central region 20 in a cavity 26 which extends from the lower horizontal surface 14 of body 12 to a point just below the upper surface 16. The material forming body 12 is preferably relatively thick and translucent and is shaped to resemble a candle that has been burning long enough to have burned away the inner portion of the wax (here depressed central region 20). The material can be wax, frosted glass, or plastic and is chosen to diffuse the light from the light source body 24 so that, when viewed from the side, the light is evenly scattered and provides a fairly evenly distributed glow. Pigments added to relatively clear plastics or glass with frosted surfaces should also produce satisfactory results, although wax is preferred.

The light intensity on cylindrical vertical sidewall 18 of the candle body 12 will be roughly proportional to the square of the distance between the light source body 24 and the surface. The thickness of material directly above the light source body 24 can be selected to generate a 'hot spot' of fairly intense light that is similar in size to the diameter of a real candle's flame. This hot spot imitates the candle flame that would normally be visible if a real candle is viewed from the top. Generally though, light source body 24 is positioned so as not to be conveniently directly viewable from outside of body 12. In other words, optically diffusing material is preferably interposed between a casual viewer and the light source body 24 from most if not all directions.

Light source body 24 is connected to a remote power source 30 by leads 28. Remote power source 30 may be taken to be a conventional step down power supply which may be plugged into a household wall socket. Alternatively, a source of power may be provided by an internal battery. A switch 32, which may be manually activated, timer based, light sensitive, or even accept remote control commands, may be incorporated into the power supply. The remote power source 30 would typically be hidden in a base designed to look like a typical candle stand or it could be disguised as, or hidden in, another decorative element. The housing for remote power source 30 preferably includes a flicker circuit (described below) to cause the LED in the light source body 24 to vary in brightness in a pseudo-random manner to simulate the flickering of a real candle flame. Yet another option is to provide a solar cell that charges one or more rechargeable batteries.

FIG. 3 shows an alternative embodiment of the invention in which an imitation candle 110 incorporates a replaceable battery inside candle body 112. Light source body 24 incorporates a super bright LED as described above. A battery housing 36 is enclosed in an enlarged lower cavity 38 and holds two batteries 40 and 42 used as a power source. A printed circuit board 44 and light source energization circuit 46 are positioned in the housing 36. Embodiments of the invention using a single cell with a step up power supply can be used to save space in small candles. Additional cells or larger batteries can be used in large candles. The exterior configuration of body 112 of imitation candle 110 is generally similar to imitation candle 10, with a depressed central region 120 set in an upper surface 116, and a cylindrical vertical side wall 118.

FIG. 4 illustrates representative energization electronics 46 for driving an LED 124. A power source 50 is provided by four size D batteries. Different power sources can be used depending upon desired battery life or the desired brightness to be obtained from the LED. As mentioned above, alternatives include combinations of solar cells and rechargeable batteries or an outside line source of power. LED 124 is preferably provided in a Global Opto G-L202YTT-T amber light emitting diode package. Energization electronics may be switched on and off using a switch 52 which is attached at one pole to the positive terminal of battery 50. Switch 52 may be a photosensitive device, such a photosensitive transistor. Battery 50 also supplies V_{CC} within energization electronics 46.

LEDs have a constant voltage drop when conducting current and the intensity of light emission from an LED is controlled by varying the current sourced to the LED. Accordingly, the LED energization circuit 46 sources a varying amount of current to LED 124. The first major element of energization circuit 46 is a base current source provided by zener diode 54, resistors 56 and 62, and a PNP transistor 60, which sources current to the load, here a light

emitting diode **124**. The voltage source provided by battery **50** is connected to the transistor **60** emitter by resistor **56** and to base of the transistor by reverse oriented zener diode **54**. The transistor is assured of being constantly biased on by the voltage drop set by the reverse breakdown voltage of zener diode **54** as long as battery voltage remains the minimum required for zener breakdown operation. Thus transistor **60** sources current to the load through which the current returns to ground. As a result LED **124** always produces a minimum level of light output when the device is on.

Variation in light output is effected by variably increasing the current supplied to LED **124**. A hex inverter, such as a SN74HC14N hex inverter, available from Texas Instruments of Dallas, Tex., is used to implement several parallel oscillators or clocks. All of the oscillators are identically constructed though external component values may be altered. In the preferred embodiment 4 of 6 available inverters (**91–94**) are used with resistors (**105–108**) providing feedback from the outputs of the inverters to the inputs. Capacitors **101–104** are connected from the inputs of inverters **91–94** to set the operating frequency of the oscillators. The connection of V_{CC} to the inverters is represented for inverter **90** (U1E) only but is identical for each of inverters **91–94**.

Oscillators **68** and **70** are designed to be low frequency oscillators running at approximately 2 Hz. Oscillators **68** and **70**, formed using inverters **94** and **93**, can use similar timing components to run at approximately a 10% difference in frequency. The 10% difference in frequency prevents oscillators **68** and **70** from synchronizing with each other or drifting past one another too slowly. Low frequency oscillators **68** and **70** provide current to the LED **124** through series connected resistors and forward biased diodes **76** and **78**, and **72** and **74**, respectively, to a summing junction. As a result, current flow through LED **124** is increased from the minimum set by the current source formed by PNP transistor **60** pseudo-randomly. When either of oscillators **68** or **70** is high, it supplies extra current to LED **124** and the LED becomes slightly brighter. When both of oscillators **68** and **70** are high, a third, higher level of current is supplied to the LED **124**. The three current levels (both high, only one high, or both low) provide three brightness levels that can be selected by the choice of values for resistors **76** and **72** and the current from the current source. As long as the two oscillators are not synchronized, the three brightness levels will vary in a pseudo-random manner as the oscillators drift. Loose component tolerances are acceptable as contributing to the degree of randomness in current sourced to LED **124**.

In some applications oscillators **68** and **70** may be set to have as great as a 2:1 variation in frequency. The rate at which the oscillators drift past one another is consequential to the appearance of the luminary.

In the preferred embodiment oscillator **66**, formed using inverter **92**, operates at about 8 Hz. and provides two more current levels. Three parallel current sources allow for a total of six brightness levels. Again the output from the inverter is fed through a series connected resistor **84** and forward biased diode **86** to a summing junction and then by resistor **126** to LED **124**. The value chosen for resistor **84** is higher than for resistors **78** and **74** with the result that oscillator **66** makes a smaller current contribution to LED **124** than oscillators **68** and **70**. This contributes still more to the impression of randomness in the light output of LED **124** by providing that changes in light output occur in differing sized steps. Oscillator **64**, formed using inverter **91**, is also set to run at about 8 Hz. The resistance of resistor **80** is comparable to that of resistor **84** so that oscillator **64** contributes a current comparable to the current supplied by

oscillator **66**. The current from inverter **91** is routed to LED **124** by resistor **80** and diode **82** to the summing junction and then by resistor **126**. A capacitor **125** may be connected between V_{CC} and ground to short circuit noise to ground preventing circuit noise from causing the oscillators to synchronize with one another.

As shown, two of the gates of the hex inverter are not used, but these gates could be used to create two more oscillators with outputs driving additional candles using multiple LEDs or supplying additional current levels to a single LED.

The invention provides an imitation candle that provides realistic candle like light while retaining a candle-like appearance when unlit. The light produced by the invention has a multitude of light levels that vary in a pseudo-random manner to provide variation in light output akin to a candle flame being disturbed by gentle air currents. The imitation candle of the invention can be readily used with decorative light fixtures that would typically use a candle, while sparing the user from the need of periodically cleaning the fixture of wax. The imitation candle can also serve as a stand alone luminary or it can be readily used in a variety of fixtures, such as outdoor landscape lights, patio lights, solar powered lights, night lights, etc.

While the invention is shown in only one of its forms, it is not thus limited but is susceptible to various changes and modifications without departing from the spirit and scope of the invention.

What is claimed is:

1. An ornamental illumination apparatus comprising:

a light diffusing body having permanent exterior surfaces including an upper surface with a depressed center section which appears reduced by melting;
a cavity within the light diffusing body; and
a small high intensity light source disposed within the cavity to illuminate from below the bottom of the depressed center section more brightly than the other surfaces of the light diffusing body.

2. An ornamental illumination apparatus as claimed in claim 1, wherein the light diffusing body further comprises a lower surface and the light diffusing body is self supporting on the lower surface.

3. An ornamental illumination apparatus as claimed in claim 2, wherein the light diffusing body is made of candle wax.

4. An ornamental illumination apparatus as claimed in claim 2, wherein the small high intensity light source is a super bright light emitting diode having a predominant emission color of amber.

5. An ornamental illumination apparatus as claimed in claim 4, further comprising:

an energization circuit connected to the light emitting diode having a plurality of oscillators contributing varying portions of an energization current to the light emitting diode;
a power source;
the plurality of oscillators connectable to the power source, each oscillator being tuned to oscillate at a different frequency; and
a summing junction combining the outputs of the plurality of oscillators to produce a pseudo-random variation in the energization current.

6. An ornamental illumination apparatus as claimed in claim 5, further comprising a second cavity and wherein the power source is a replaceable battery positionable in the second cavity.

7

7. An ornamental illumination apparatus as claimed in claim 5, wherein the power source is a wall socket compatible power supply.

8. An imitation candle comprising:

an optically translucent body shaped and sized to resemble a candle of sufficient diameter to support a depressed flame while leaving its outer walls intact;

a light source disposed within the optically translucent body having a light emission point at an anticipated location for the depressed flame where it cannot be conveniently directly viewed from outside the optically translucent body;

a power supply; and

a flicker energization signal generator connected between the power supply and the light point source for delivering a varying energization signal to the light source.

8

9. An imitation candle as claimed in claim 8, further comprising:

the light source being a super bright light emitting diode;

the flicker energization signal generator having a plurality of oscillators tuned to run at nearly the same frequency and to drift with respect to one another to produce component signals for a pseudo-random flicker energization signal; and

a summer combining the components of the pseudo-random flicker energization signal and connected to apply the pseudo-random flicker energization signal to the super bright light emitting diode.

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Exhibit 1
Exhibit 2
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TITLE	
Exhibit 5	
Exhibit 6	
Exhibit 7	
Exhibit 8	
Exhibit 9	
Exhibit 10	
Exhibit 11	
Exhibit 12	
Exhibit 13	
Exhibit 14	
Exhibit 15	
Exhibit 16	
Exhibit 17	
Exhibit 18	
Exhibit 19	
Exhibit 20	
Exhibit 21	
Exhibit 22	
Exhibit 23	
Exhibit 24	
Exhibit 25	
Exhibit 26	
Exhibit 27	
Exhibit 28	
Exhibit 29	

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