



US00D908645S

(12) **United States Design Patent** (10) **Patent No.:** **US D908,645 S**  
**Savandaiah et al.** (45) **Date of Patent:** **\*\* Jan. 26, 2021**

(54) **SPUTTERING TARGET FOR A PHYSICAL VAPOR DEPOSITION CHAMBER**  
(71) Applicant: **APPLIED MATERIALS, INC.**, Santa Clara, CA (US)  
(72) Inventors: **Kirankumar Neelasandra Savandaiah**, Karnataka (IN); **David Gunther**, San Jose, CA (US); **Siew Kit Hoi**, Singapore (SG)  
(73) Assignee: **APPLIED MATERIALS, INC.**, Santa Clara, CA (US)

*Primary Examiner* — Michael C Stout  
*Assistant Examiner* — Fritzgerald L Butac  
(74) *Attorney, Agent, or Firm* — Moser Taboada

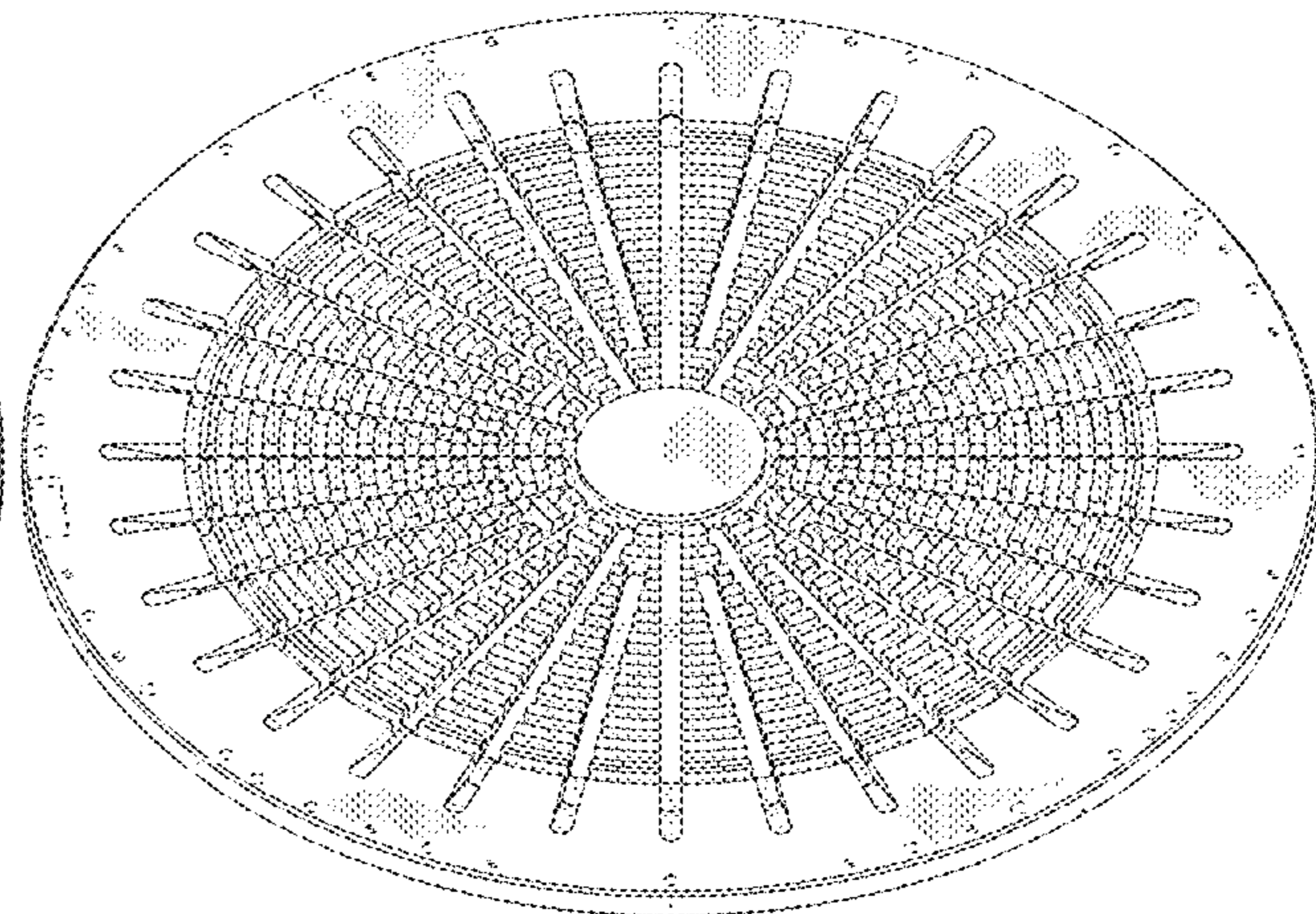
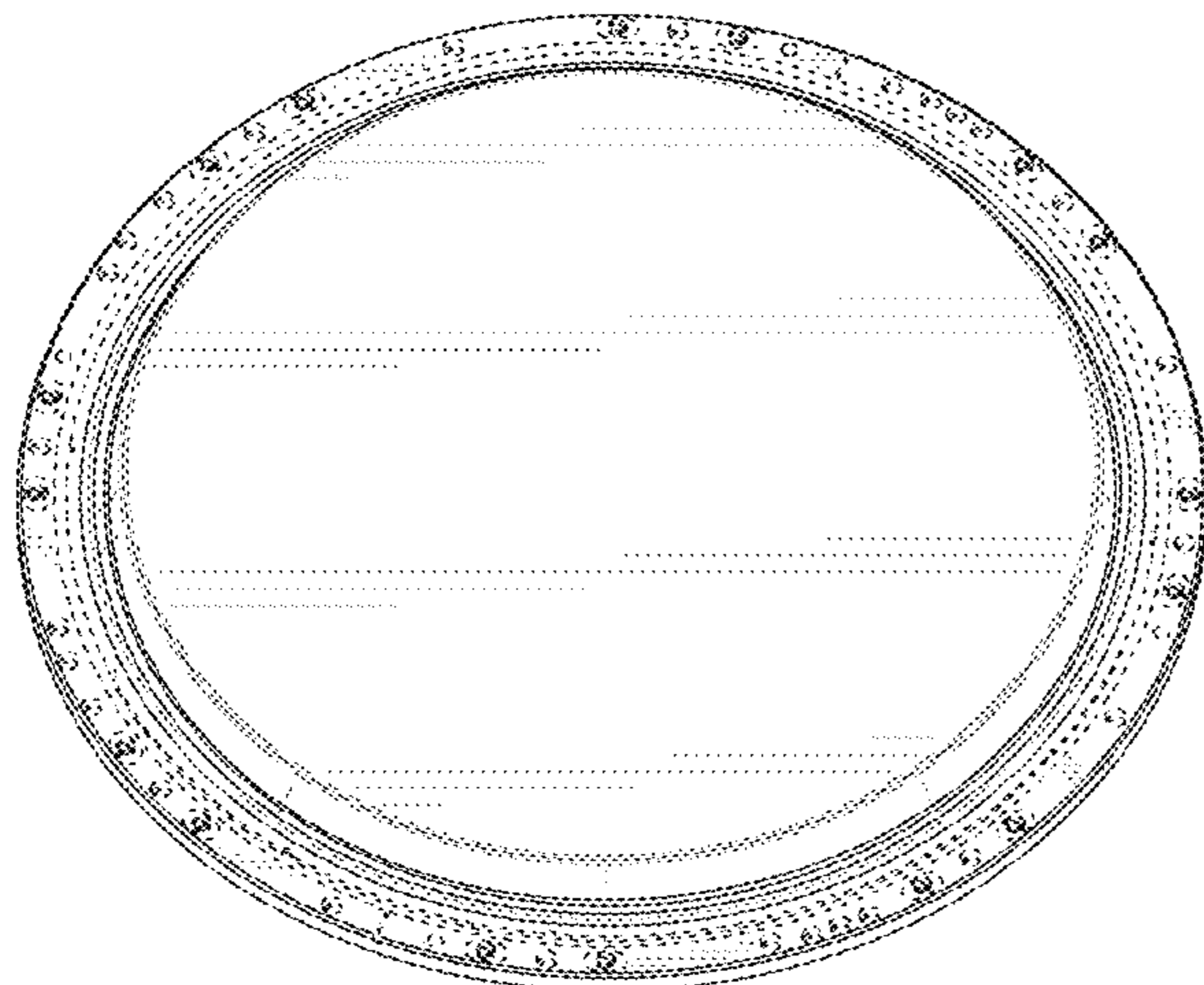
(\*\*) Term: **15 Years**  
(21) Appl. No.: **29/703,194**  
(22) Filed: **Aug. 26, 2019**  
(51) **LOC (13) Cl.** ..... **13-03**  
(52) **U.S. Cl.**  
USPC ..... **D13/182**  
(58) **Field of Classification Search**  
USPC ..... D13/182, 184, 199; D15/144.1, 144.2, D15/150, 199; D23/213  
(Continued)

(57) **CLAIM**  
We claim the ornamental design for a sputtering target for a physical vapor deposition chamber, as shown and described.

(56) **References Cited**  
**U.S. PATENT DOCUMENTS**  
5,320,728 A 6/1994 Tepman  
D351,450 S 10/1994 Maryska  
(Continued)  
**FOREIGN PATENT DOCUMENTS**  
CN 206573738 U 10/2017  
JP D1420846 8/2011  
(Continued)  
**OTHER PUBLICATIONS**  
U.S. Appl. No. 29/671,900, filed Nov. 30, 2018.  
(Continued)

**DESCRIPTION**  
FIG. 1 is a top perspective view of a sputtering target for a physical vapor deposition chamber, according to one embodiment of the novel design.  
FIG. 2 is a bottom perspective view thereof.  
FIG. 3 is a top plan view thereof.  
FIG. 4 is a bottom plan view thereof.  
FIG. 5 is a right side plan view thereof.  
FIG. 6 is a left side plan view thereof.  
FIG. 7 is a front view thereof.  
FIG. 8 is a back view thereof.  
FIG. 9 is an enlarged cross sectional view taken along line 9-9 in FIG. 4.  
FIG. 10 is a top perspective view of a sputtering target for a physical vapor deposition chamber, according to another embodiment of the novel design.  
FIG. 11 is a bottom perspective view thereof.  
FIG. 12 is a top plan view thereof.  
FIG. 13 is a bottom plan view thereof.  
FIG. 14 is a right side plan view thereof.  
FIG. 15 is a left side plan view thereof.  
FIG. 16 is a front view thereof.  
FIG. 17 is a back view thereof; and,  
FIG. 18 is an enlarged cross sectional view taken along line 18-18 in FIG. 13.  
The broken lines show portions of a sputtering target for a physical vapor deposition chamber which form no part of the claimed design.

**1 Claim, 12 Drawing Sheets**



(58) **Field of Classification Search**  
 CPC ..... H01L 21/0226; H01L 21/02263; H01L  
 21/02266; H01L 21/02269; H01L  
 21/02271; H01L 21/67742; H01L  
 2221/68363; H01L 2224/75186; H01L  
 2224/76186

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

D363,464 S 10/1995 Fukasawa  
 D376,744 S 12/1996 Eisenblatter  
 D381,030 S 7/1997 Tepman  
 D411,516 S 6/1999 Lmafuku et al.  
 D423,026 S 4/2000 Shimazu  
 6,086,725 A 7/2000 Abburi et al.  
 6,114,216 A 9/2000 Yieh et al.  
 D446,231 S 8/2001 Kuraoka et al.  
 6,390,905 B1 5/2002 Korovin et al.  
 6,659,850 B2 12/2003 Korovin et al.  
 D487,254 S 3/2004 Suenaga  
 D496,951 S 10/2004 Brasseur et al.  
 6,815,352 B1 11/2004 Tamura et al.  
 D503,729 S 4/2005 Leeuw et al.  
 D553,104 S 10/2007 Oohashi et al.  
 D557,226 S 12/2007 Uchino  
 D559,066 S 1/2008 Tano et al.  
 D559,993 S 1/2008 Nagakubo et al.  
 D559,994 S 1/2008 Nagakubo et al.  
 D562,856 S 2/2008 Hawley et al.  
 D570,310 S 6/2008 Sasaki  
 D571,383 S 6/2008 Ota et al.  
 D571,831 S 6/2008 Ota et al.  
 D571,833 S 6/2008 Ota et al.  
 D572,733 S 7/2008 Ota et al.  
 7,402,098 B2 7/2008 Severson et al.  
 D582,949 S 12/2008 Yamashita  
 D584,591 S 1/2009 Tano et al.  
 D592,029 S 5/2009 Tano et al.  
 D592,030 S 5/2009 Tano et al.  
 D600,660 S 9/2009 Sato  
 D600,989 S 9/2009 Tano et al.  
 D614,593 S 4/2010 Lee et al.  
 D616,389 S 5/2010 Takahashi  
 D616,390 S 5/2010 Sato  
 D633,452 S 3/2011 Namiki et al.  
 D649,126 S 11/2011 Takahashi  
 D669,509 S 10/2012 Krink et al.  
 8,371,904 B2 2/2013 Jindal et al.  
 D678,745 S 3/2013 Nguyen  
 8,398,833 B2 3/2013 Lee et al.  
 D683,806 S 6/2013 Dueck  
 D687,790 S 8/2013 Krishnan et al.  
 D687,791 S 8/2013 Krishnan et al.  
 D691,974 S 10/2013 Osada  
 D694,790 S 12/2013 Matsumoto et al.  
 D703,162 S 4/2014 Tamaso  
 D716,742 S 11/2014 Jang et al.  
 D724,553 S 3/2015 Choi et al.  
 D732,094 S 6/2015 Jussel et al.  
 D732,145 S 6/2015 Yamagishi et al.  
 D733,843 S 7/2015 Yamagishi et al.  
 D741,823 S 10/2015 Tateno et al.  
 D741,921 S 10/2015 Jarvius et al.  
 D750,728 S 3/2016 Kremer  
 D767,234 S 9/2016 Kirkland et al.  
 D769,200 S 10/2016 Fukushima et al.  
 9,475,996 B2 10/2016 Mandle  
 D770,992 S 11/2016 Tauchi et al.  
 D790,039 S \* 6/2017 Hawrylchak ..... D23/213  
 D790,041 S 6/2017 Jang et al.  
 D793,572 S 8/2017 Kozuka et al.  
 D794,753 S \* 8/2017 Miller ..... D23/213  
 D795,208 S 8/2017 Sasaki et al.

D796,458 S 9/2017 Jang et al.  
 D797,067 S \* 9/2017 Zhang ..... D13/182  
 D797,691 S 9/2017 Joubert et al.  
 D798,248 S \* 9/2017 Hanson ..... D13/182  
 D801,942 S \* 11/2017 Riker ..... D13/182  
 D808,349 S 1/2018 Fukushima et al.  
 D810,705 S 2/2018 Krishnan et al.  
 D813,181 S 3/2018 Okajima et al.  
 D825,504 S \* 8/2018 Zhang ..... D13/182  
 D825,505 S \* 8/2018 Hanson ..... D13/182  
 D830,435 S 10/2018 Wakisaka et al.  
 D830,981 S 10/2018 Jeong et al.  
 D836,572 S \* 12/2018 Riker ..... D13/182  
 D837,755 S \* 1/2019 Riker ..... D13/182  
 D839,224 S 1/2019 Yamaki et al.  
 D846,514 S 4/2019 Yoshida et al.  
 D851,613 S \* 6/2019 Johanson ..... D13/182  
 10,442,056 B2 10/2019 Namiki et al.  
 D868,124 S \* 11/2019 Riker ..... D15/144  
 D869,409 S \* 12/2019 Riker ..... D13/182  
 D877,101 S \* 3/2020 Johanson ..... D13/182  
 10,662,520 B2 \* 5/2020 West ..... B08B 3/12  
 D888,903 S \* 6/2020 Gunther ..... D23/269  
 D891,382 S \* 7/2020 Koppa ..... D13/182  
 D893,441 S \* 8/2020 Rao ..... D13/199  
 D894,137 S \* 8/2020 Johanson ..... D13/184  
 10,811,232 B2 \* 10/2020 Srikantaiah ..... H01J 37/32559  
 2004/0149567 A1 8/2004 Kosyachkov  
 2005/0152089 A1 7/2005 Matsuda et al.  
 2005/0193952 A1 9/2005 Goodman et al.  
 2007/0076345 A1 4/2007 Bang  
 2008/0173541 A1 7/2008 Lee et al.  
 2008/0308416 A1 12/2008 Allen et al.  
 2009/0260982 A1 10/2009 Riker et al.  
 2010/0096261 A1 4/2010 Hoffman et al.  
 2010/0108500 A1 5/2010 Hawrylchak et al.  
 2010/0170786 A1 7/2010 Wang et al.  
 2012/0033340 A1 2/2012 Roy et al.  
 2013/0316628 A1 11/2013 Jang et al.  
 2014/0261180 A1 9/2014 Yoshidome et al.  
 2015/0170888 A1 6/2015 Riker et al.  
 2015/0357169 A1 12/2015 Yuan et al.  
 2016/0002776 A1 1/2016 Nal et al.  
 2016/0002788 A1 1/2016 Nal et al.  
 2016/0035547 A1 2/2016 Johanson et al.

FOREIGN PATENT DOCUMENTS

JP D1421157 8/2011  
 JP D1422692 9/2014  
 TW 223429 5/1994  
 TW 223430 5/1994  
 TW D146490 4/2012

OTHER PUBLICATIONS

U.S. Appl. No. 29/639,953, filed Mar. 9, 2018.  
 U.S. Appl. No. 29/690,617, filed May 9, 2019.  
 U.S. Appl. No. 29/629,062, filed Dec. 11, 2017.  
 Search Report for Taiwan Design Application No. 106301373 dated Jun. 20, 2017.  
 Search Report for Taiwan Design Application No. 107305358 dated Feb. 21, 2019.  
 Search Report for Taiwan Design Application No. 1077303086 dated Jul. 6, 2018.  
 Sputtering Targets, posted at Angstrom Sciences, posting date May 5, 2016. Site visited Apr. 1, 2019. URL. <<https://web.archive.org/web/20160505015447/https://www.angstromsciences.com/sputtering-targets>> (Year: 2016).  
 Sputtering Targets for LSis, posted at JX Nippon Mining & Metals, posting date Mar. 22, 2016. Site visited Apr. 1, 2019, URL: <[https://web.archive.org/web/20160322055046/http://www.nmm.jx-group.co.jp/english/products/04\\_supa/target\\_adv.html](https://web.archive.org/web/20160322055046/http://www.nmm.jx-group.co.jp/english/products/04_supa/target_adv.html)> (Year: 2016).

\* cited by examiner

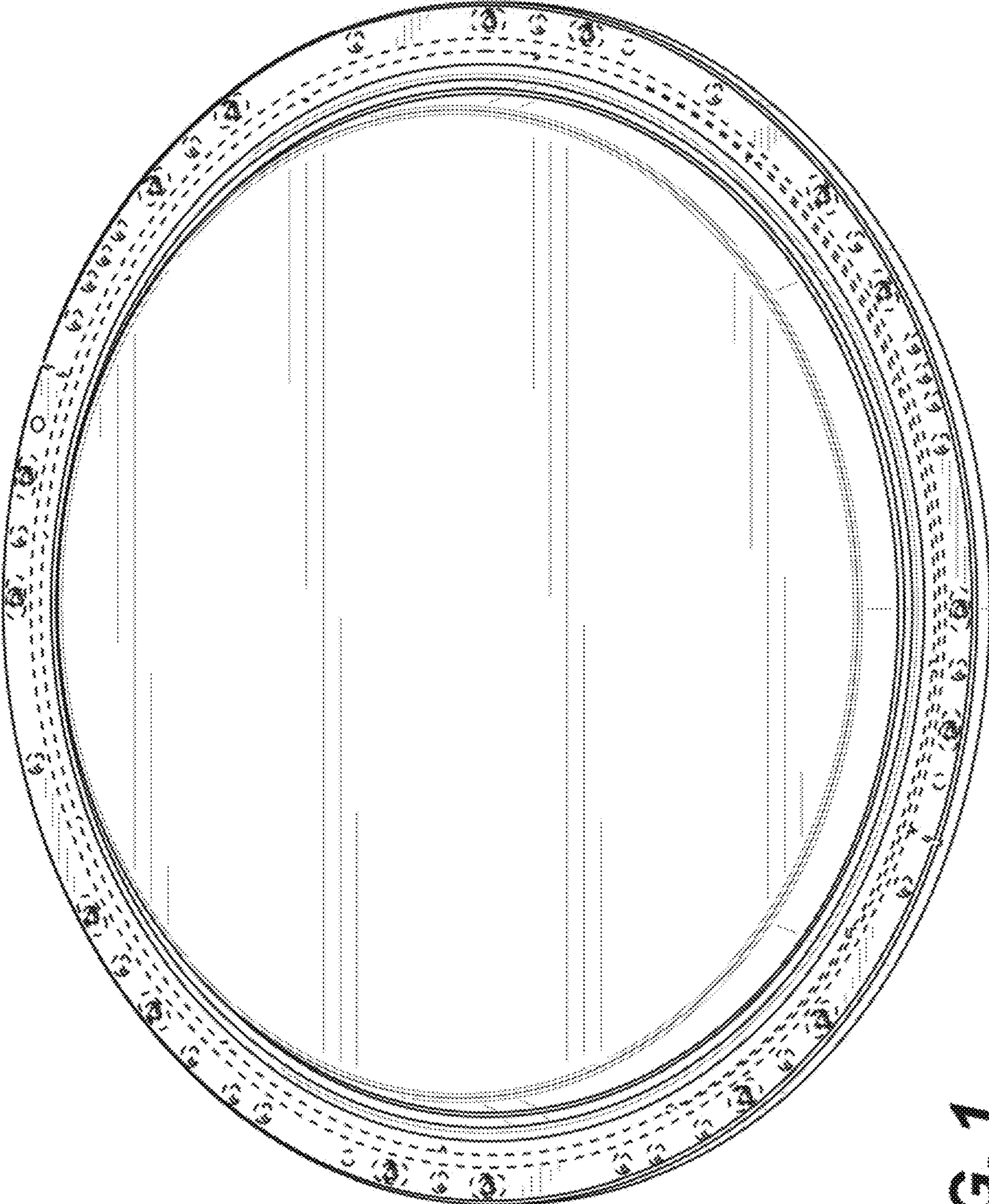


FIG. 1

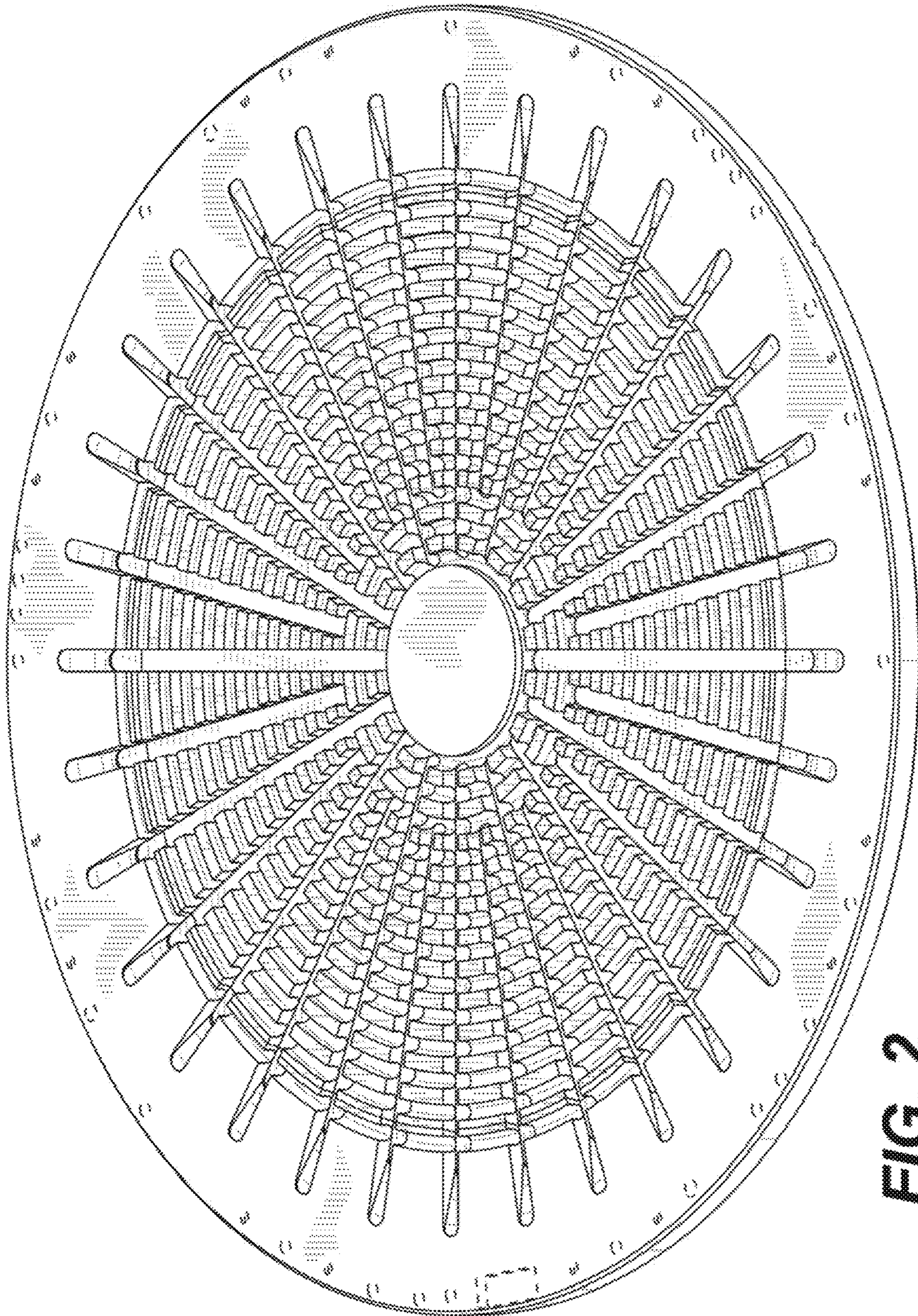


FIG. 2

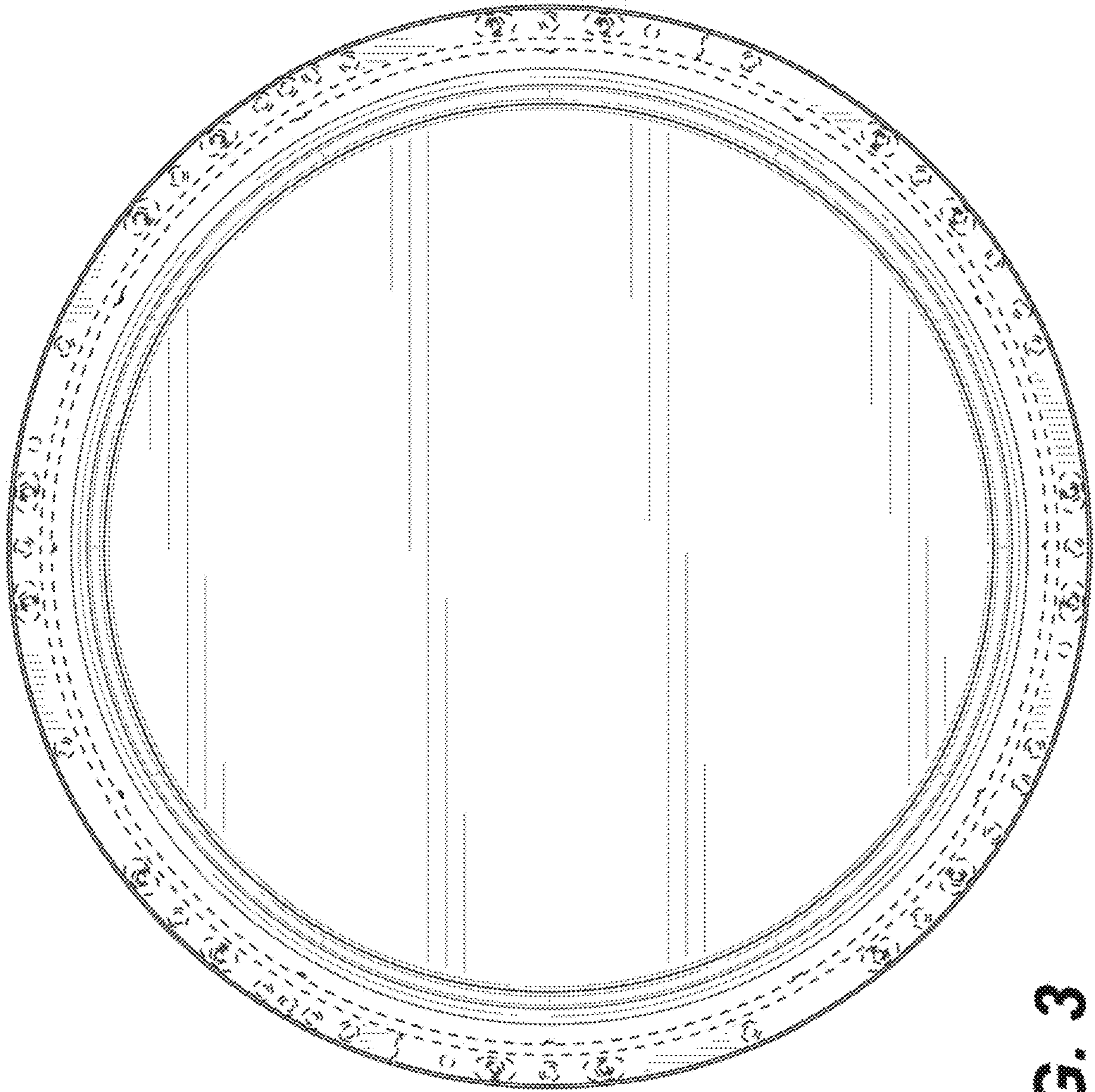
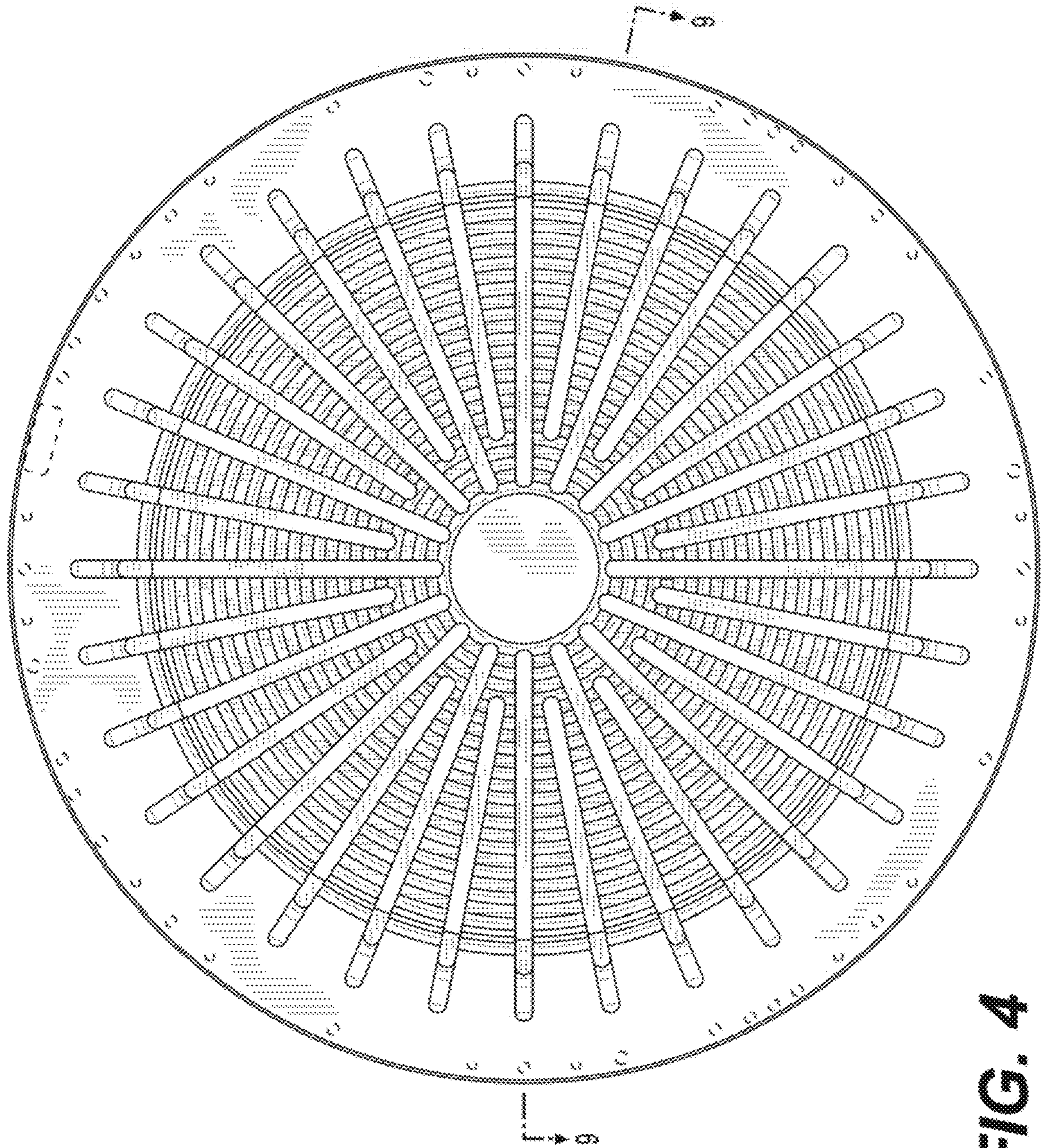


FIG. 3



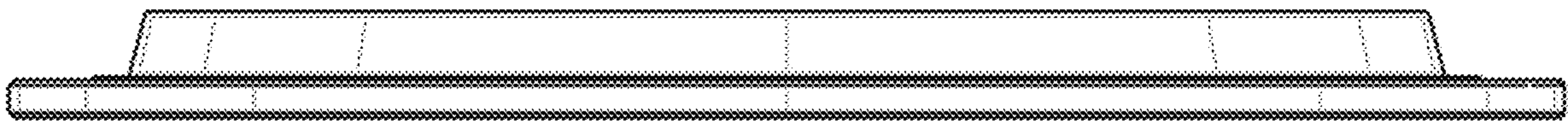
**FIG. 4**



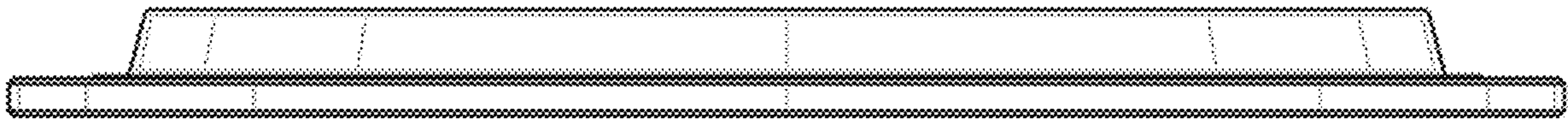
**FIG. 5**



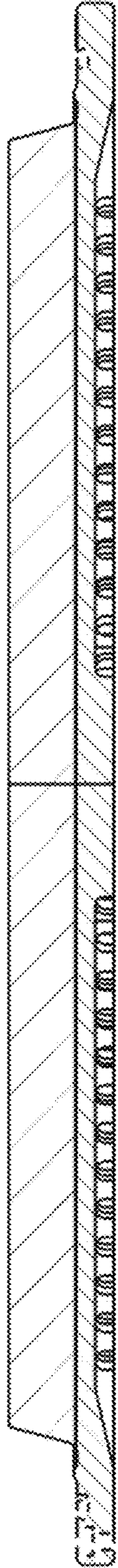
**FIG. 6**



**FIG. 7**

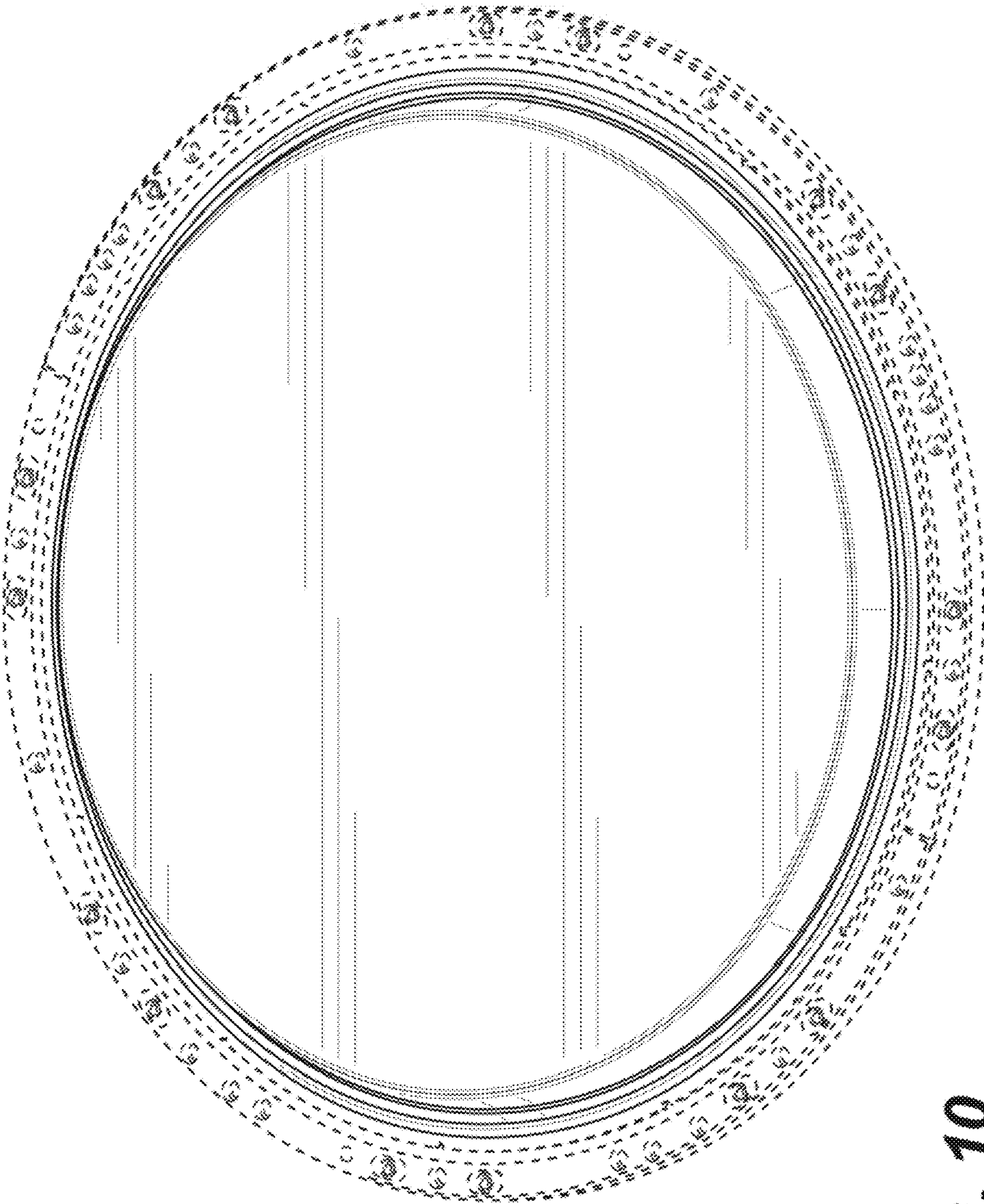


**FIG. 8**

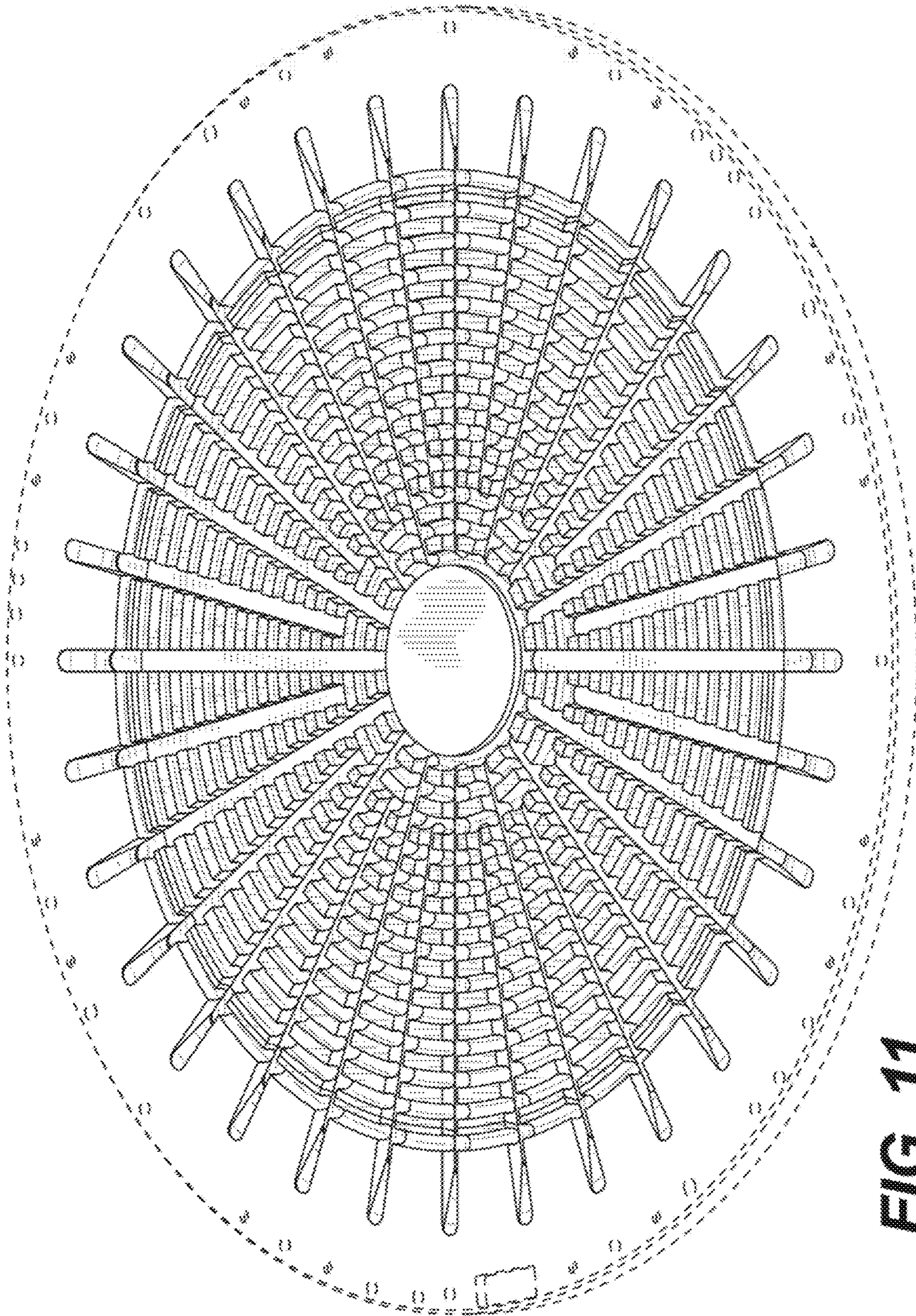


**FIG. 9**





**FIG. 10**



**FIG. 11**

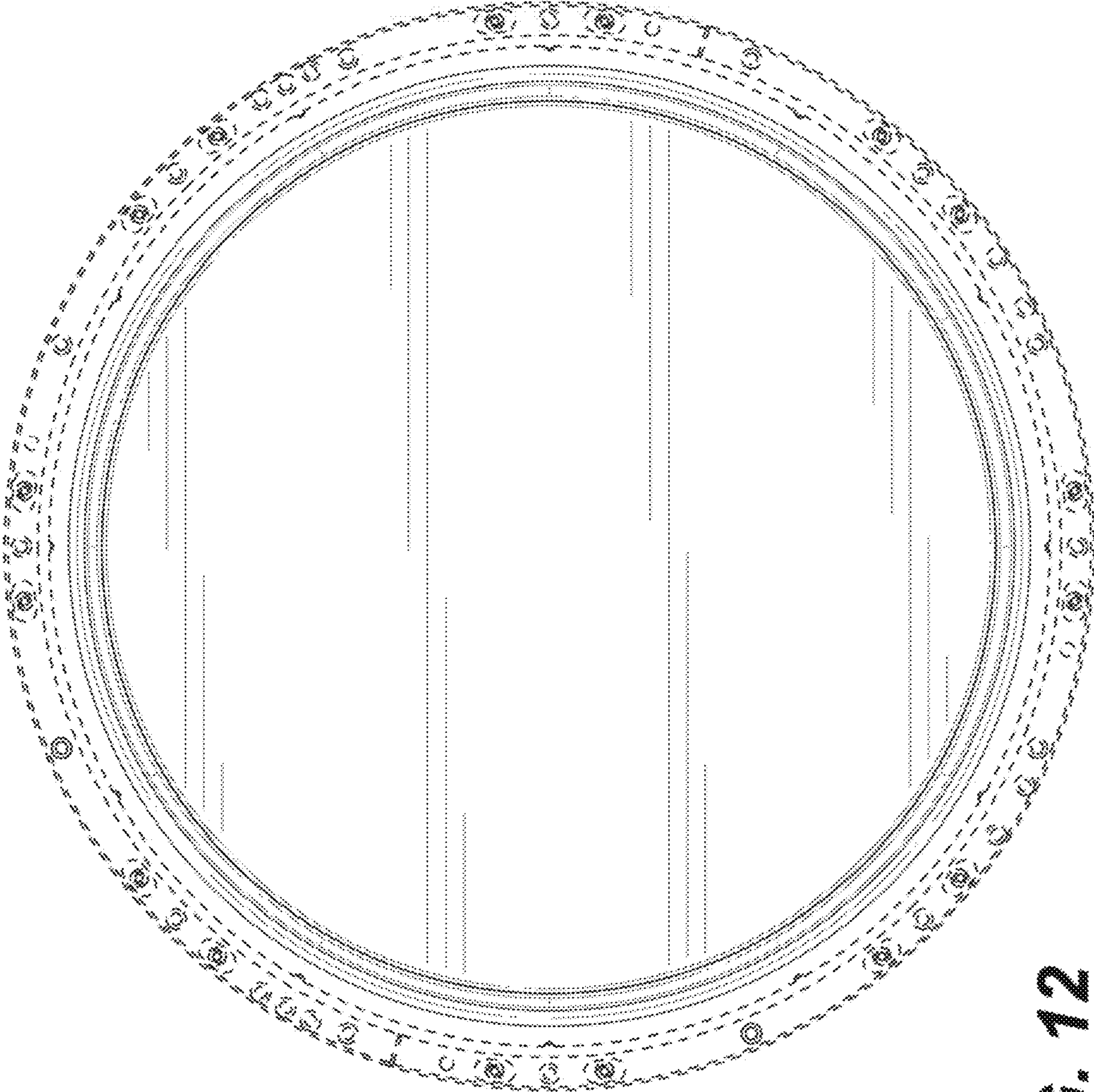


FIG. 12

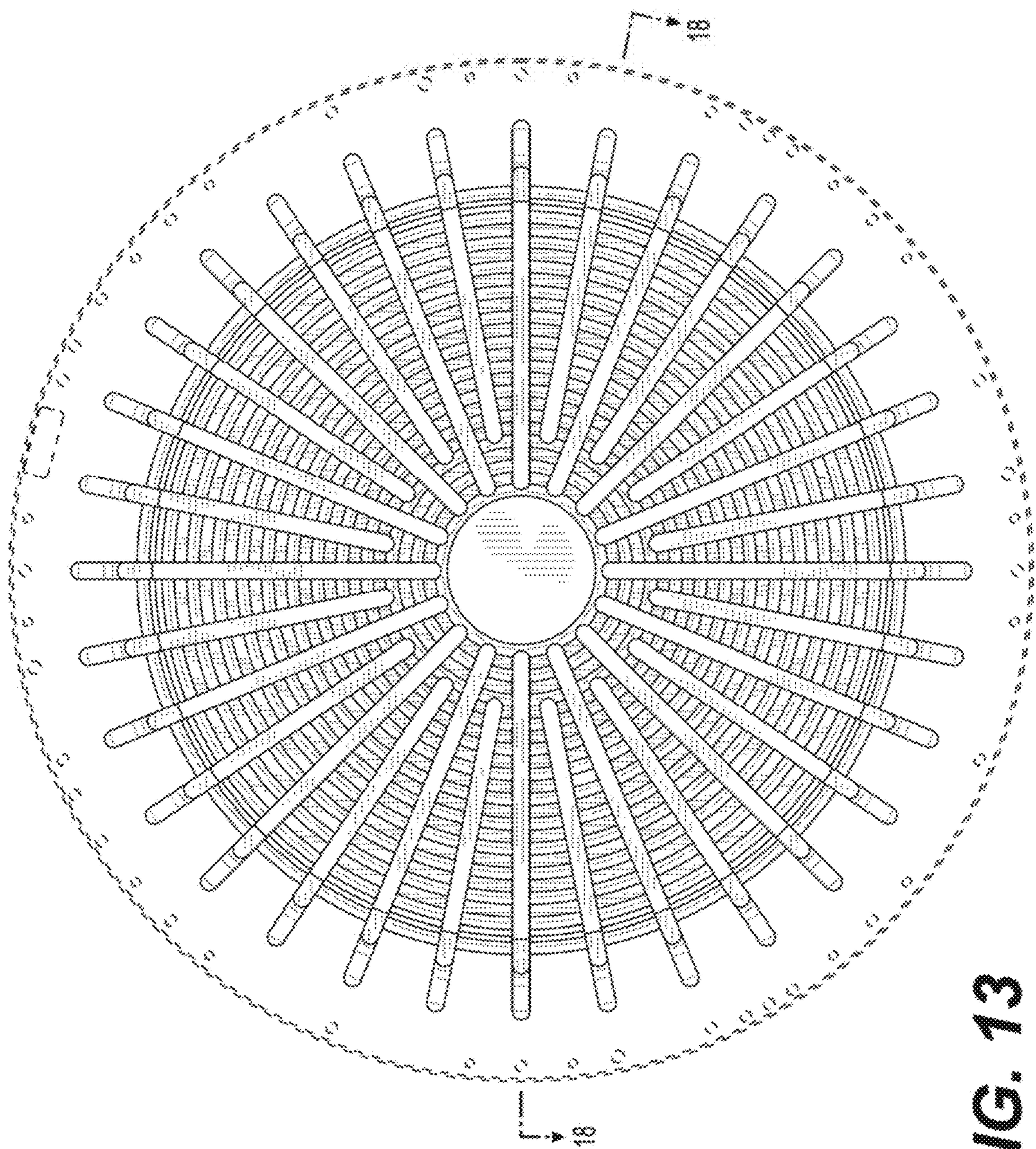
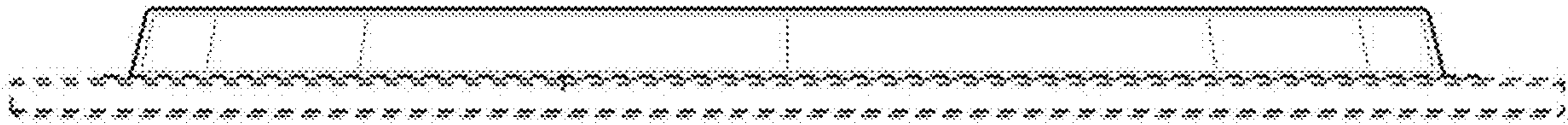
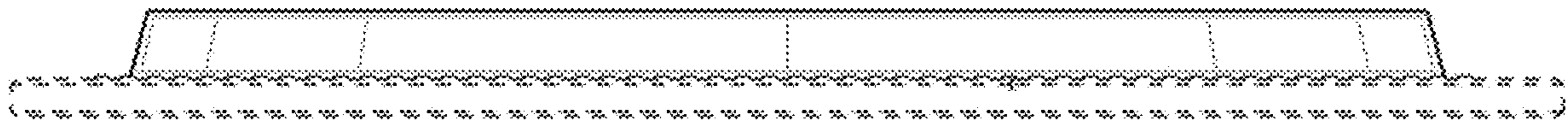


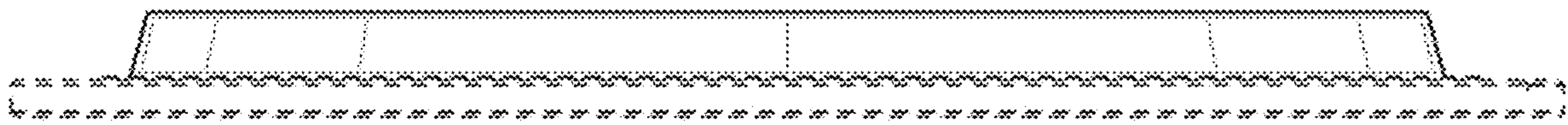
FIG. 13



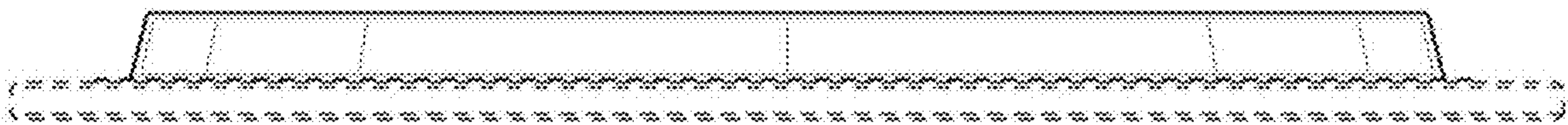
**FIG. 14**



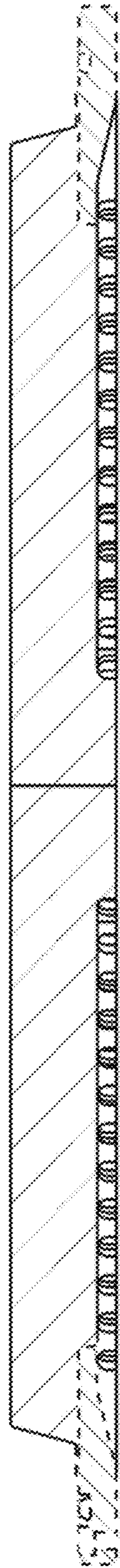
**FIG. 15**



**FIG. 16**



**FIG. 17**



**FIG. 18**