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(12) **United States Design Patent**  
**Riker et al.**

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(54) **COLLIMATOR FOR A PHYSICAL VAPOR DEPOSITION CHAMBER**

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(\*\*) Term: **15 Years**

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(51) **LOC (12) Cl.** ..... **13-03**

(52) **U.S. Cl.**  
USPC ..... **D13/182**

(58) **Field of Classification Search**  
USPC ..... D13/182; D15/144, 144.1, 138; D7/667;  
204/298.11

(Continued)

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,401,675 A \* 3/1995 Lee ..... C23C 14/044  
257/E21.585  
5,624,536 A \* 4/1997 Wada ..... C23C 14/34  
204/192.12

(Continued)

**FOREIGN PATENT DOCUMENTS**

TW M267462 6/2005  
TW D117576 6/2007

(Continued)

**OTHER PUBLICATIONS**

U.S. Appl. No. 29/640,787, filed Mar. 16, 2018, Riker et al.

Search Report for Taiwan Design Application No. 107305407, dated Feb. 21, 2019, 2 pages.

*Primary Examiner* — Elizabeth J Oswecki

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(57) **CLAIM**

The ornamental design for a collimator for a physical vapor deposition chamber, as shown and described.

**DESCRIPTION**

FIG. 1 is a top perspective view of a first embodiment of a collimator for a physical vapor deposition chamber, showing our new 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 elevation view thereof;

FIG. 6 is a left side elevation view thereof;

FIG. 7 is a front elevation view thereof;

FIG. 8 is a back elevation view thereof;

FIG. 9 is a cross sectional view taken along line 9-9 in FIG. 3;

FIG. 10 is a cross sectional view taken along line 10-10 in FIG. 3;

FIG. 11 is a top perspective view of a second embodiment of a collimator for a physical vapor deposition chamber, showing our new design;

FIG. 12 is a bottom perspective view thereof;

FIG. 13 is a top plan view thereof;

FIG. 14 is a bottom plan view thereof;

FIG. 15 is a right side elevation view thereof;

FIG. 16 is a left side elevation view thereof;

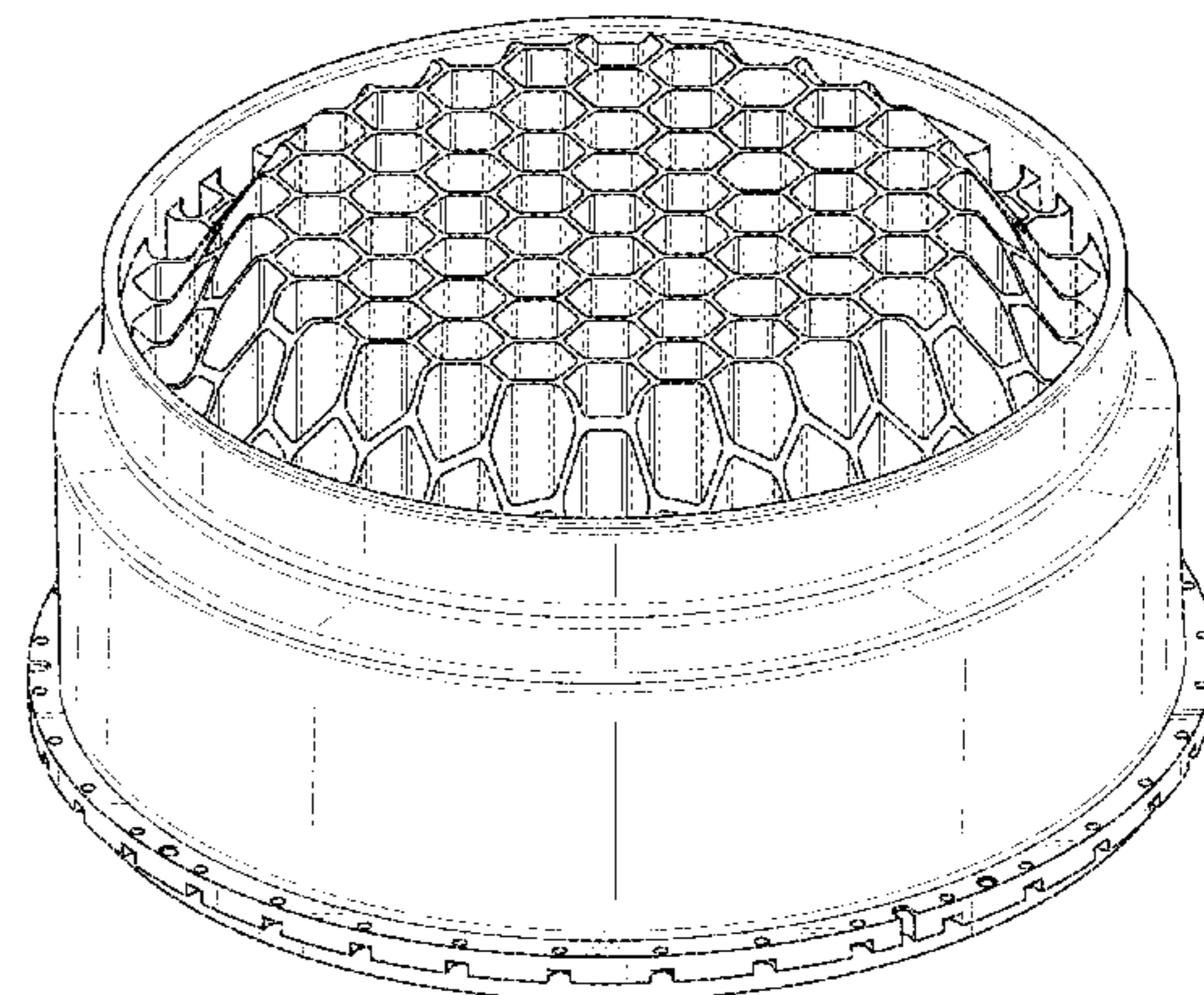
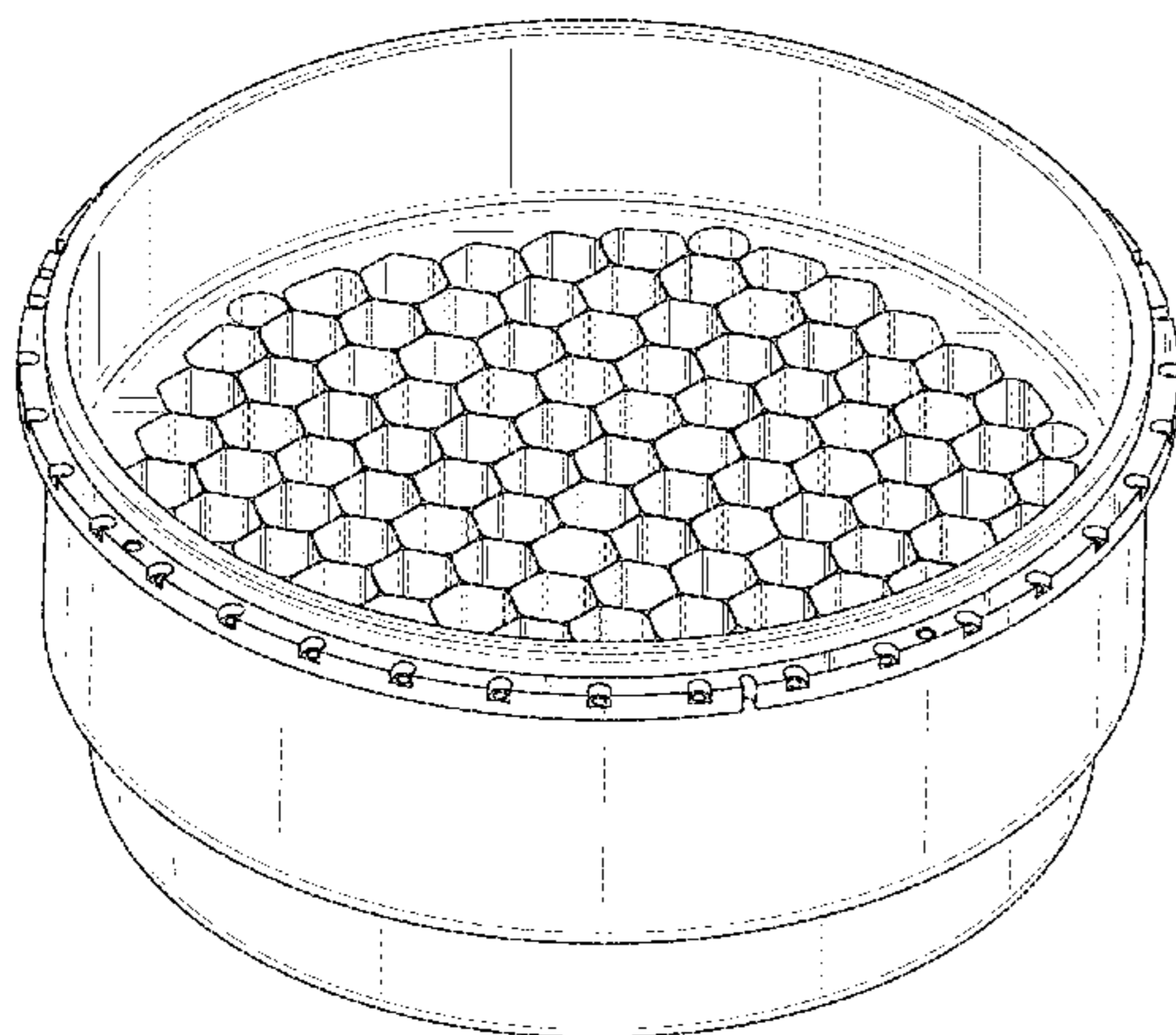
FIG. 17 is a front elevation view thereof;

FIG. 18 is a back elevation view thereof;

FIG. 19 is a cross sectional view taken along line 19-19 in FIG. 13; and,

FIG. 20 is a cross sectional view taken along line 20-20 in FIG. 13.

(Continued)



The dashed lines in the drawings represent unclaimed environment and form no part of the claimed design.

**1 Claim, 20 Drawing Sheets**

**(58) Field of Classification Search**

CPC .... H01J 37/3441; H01J 37/3447; H01J 37/34;  
C23C 14/34; C23C 14/04; C23C 14/042;  
C23C 14/044; C23C 14/046; C23C 14/35;  
C23C 14/3471; C23C 14/22

See application file for complete search history.

**(56) References Cited**

U.S. PATENT DOCUMENTS

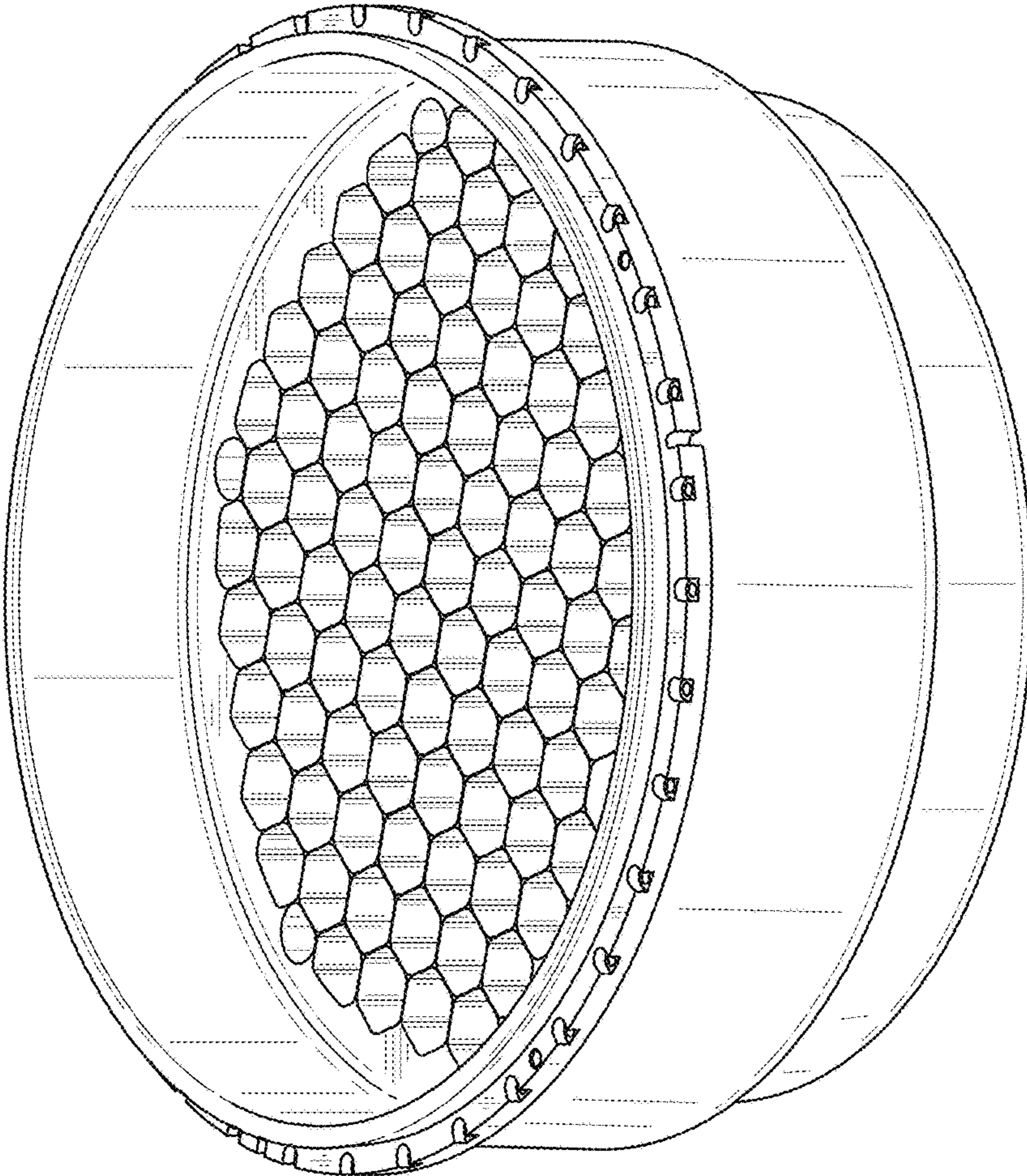
|              |      |         |             |       |               |             |
|--------------|------|---------|-------------|-------|---------------|-------------|
| 5,643,428    | A *  | 7/1997  | Krivokapic  | ..... | H01J 37/34    |             |
|              |      |         |             |       |               | 204/192.12  |
| 5,702,573    | A *  | 12/1997 | Biberger    | ..... | C23C 14/355   |             |
|              |      |         |             |       |               | 204/192.12  |
| 5,705,042    | A *  | 1/1998  | Leiphart    | ..... | C23C 14/046   |             |
|              |      |         |             |       |               | 204/192.12  |
| 5,958,193    | A *  | 9/1999  | Brugge      | ..... | H01J 37/3447  |             |
|              |      |         |             |       |               | 204/192.12  |
| 6,362,097    | B1 * | 3/2002  | Demaray     | ..... | C23C 14/34    |             |
|              |      |         |             |       |               | 257/E21.091 |
| D598,717     | S *  | 8/2009  | Jalet       | ..... | D7/667        |             |
| D660,645     | S *  | 5/2012  | Zandona     | ..... | D7/400        |             |
| D722,298     | S *  | 2/2015  | Saito       | ..... | D13/182       |             |
| D741,823     | S *  | 10/2015 | Tateno      | ..... | D13/182       |             |
| D746,647     | S *  | 1/2016  | Roaks       | ..... | D7/667        |             |
| D753,449     | S *  | 4/2016  | Liebowitz   | ..... | D7/667        |             |
| D759,603     | S *  | 6/2016  | Saito       | ..... | D13/182       |             |
| 9,543,126    | B2   | 1/2017  | Riker       |       |               |             |
| 9,892,890    | B2 * | 2/2018  | Bluck       | ..... | H01J 37/32779 |             |
| 9,960,024    | B2 * | 5/2018  | Riker       | ..... | H01J 37/3447  |             |
| D821,039     | S *  | 6/2018  | Owens, III  | ..... | D30/129       |             |
| D821,140     | S *  | 6/2018  | Mirchandani | ..... | D7/409        |             |
| 2003/0015421 | A1 * | 1/2003  | Cha         | ..... | H01J 37/3408  |             |
|              |      |         |             |       |               | 204/298.19  |

|              |      |         |              |       |               |            |
|--------------|------|---------|--------------|-------|---------------|------------|
| 2003/0029715 | A1 * | 2/2003  | Yu           | ..... | C23C 14/566   |            |
|              |      |         |              |       |               | 204/192.2  |
| 2004/0211665 | A1 * | 10/2004 | Yoon         | ..... | H01L 21/28518 |            |
|              |      |         |              |       |               | 204/298.01 |
| 2006/0249369 | A1 * | 11/2006 | Marangon     | ..... | C23C 14/046   |            |
|              |      |         |              |       |               | 204/192.1  |
| 2007/0228302 | A1 * | 10/2007 | Norman, Jr.  | ..... | H01J 37/34    |            |
|              |      |         |              |       |               | 250/505.1  |
| 2008/0121620 | A1 * | 5/2008  | Guo          | ..... | C23C 14/3464  |            |
|              |      |         |              |       |               | 216/67     |
| 2009/0308732 | A1 * | 12/2009 | Cao          | ..... | C23C 14/046   |            |
|              |      |         |              |       |               | 204/192.12 |
| 2009/0308739 | A1 * | 12/2009 | Riker        | ..... | H01J 37/34    |            |
|              |      |         |              |       |               | 204/298.11 |
| 2015/0114823 | A1 * | 4/2015  | Lee          | ..... | C23C 14/3471  |            |
|              |      |         |              |       |               | 204/192.12 |
| 2017/0117121 | A1   | 4/2017  | Riker et al. |       |               |            |

FOREIGN PATENT DOCUMENTS

|    |           |         |
|----|-----------|---------|
| TW | D122892   | 5/2008  |
| TW | M346018   | 12/2008 |
| TW | D129207   | 6/2009  |
| TW | 200938890 | 9/2009  |
| TW | D137192   | 10/2010 |
| TW | D153743   | 5/2013  |
| TW | D159673   | 4/2014  |
| TW | D159674   | 4/2014  |
| TW | D159675   | 4/2014  |
| TW | D159676   | 4/2014  |
| TW | D166552   | 3/2015  |
| TW | D169790   | 8/2015  |
| TW | D174341   | 3/2016  |
| TW | D174342   | 3/2016  |
| TW | D175852   | 5/2016  |
| TW | D175853   | 5/2016  |
| TW | D175855   | 5/2016  |
| TW | D176440   | 6/2016  |
| TW | D178698   | 10/2016 |
| TW | D180286   | 12/2016 |

\* cited by examiner



**FIG. 1**

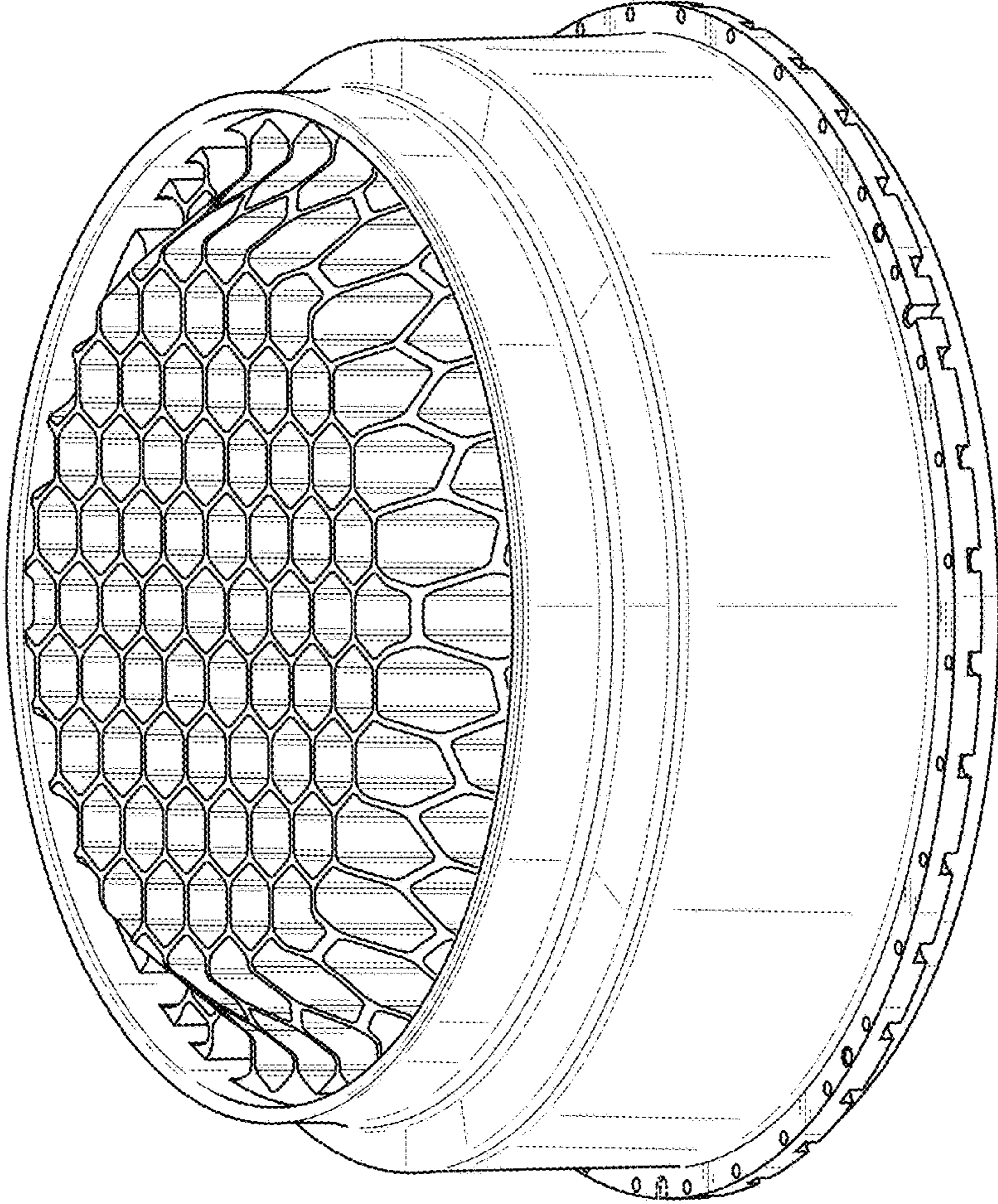


FIG. 2

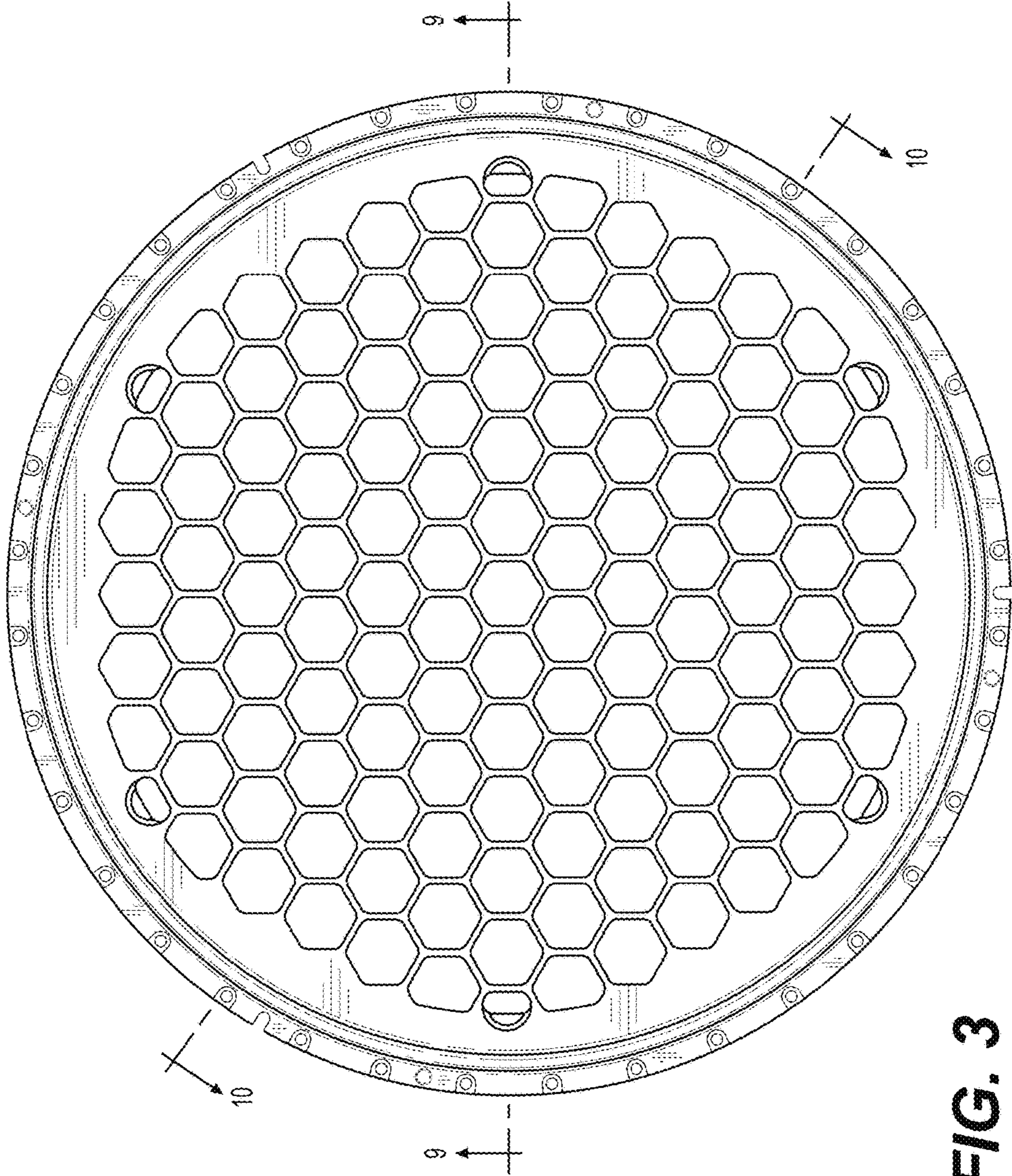
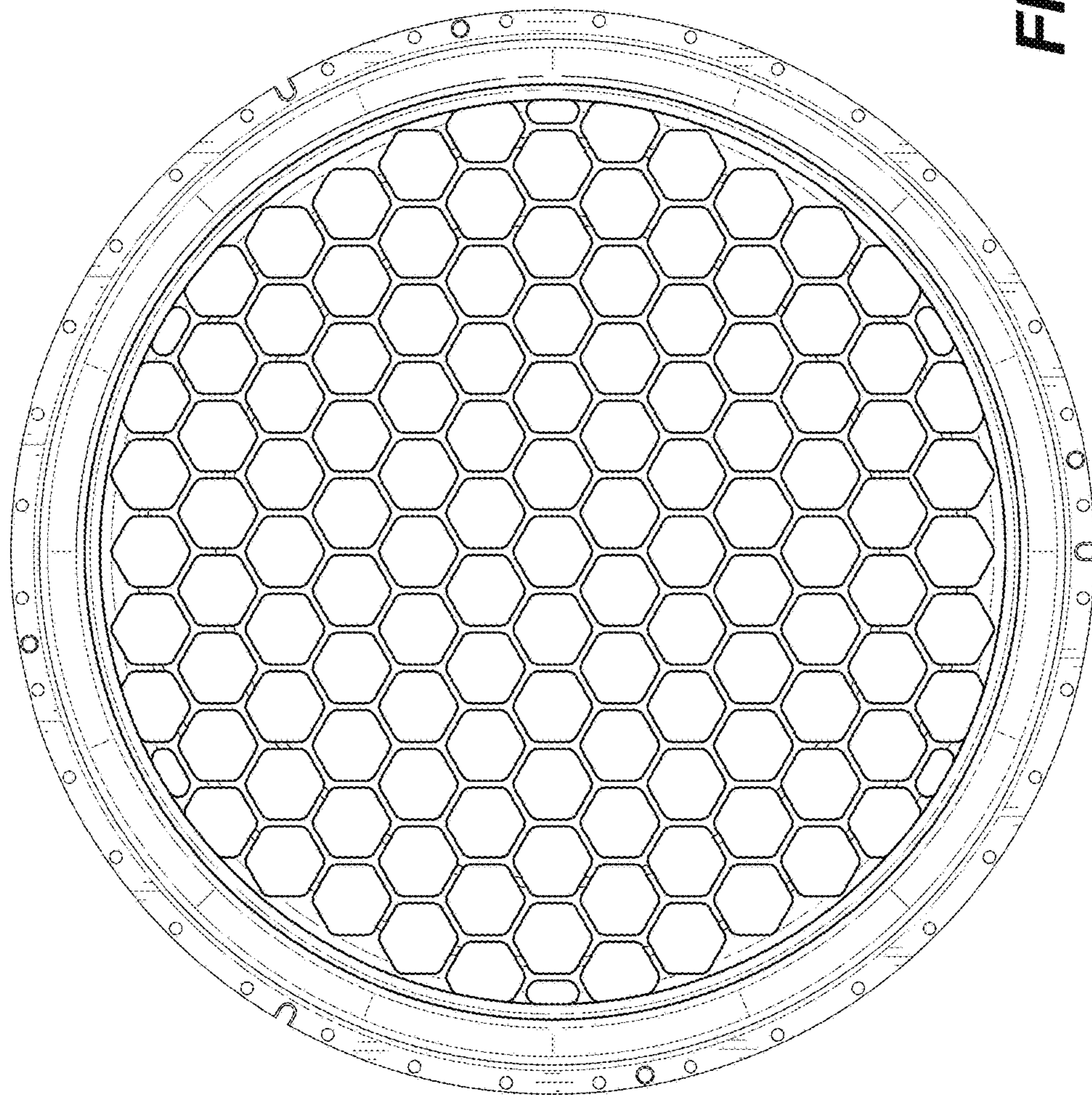
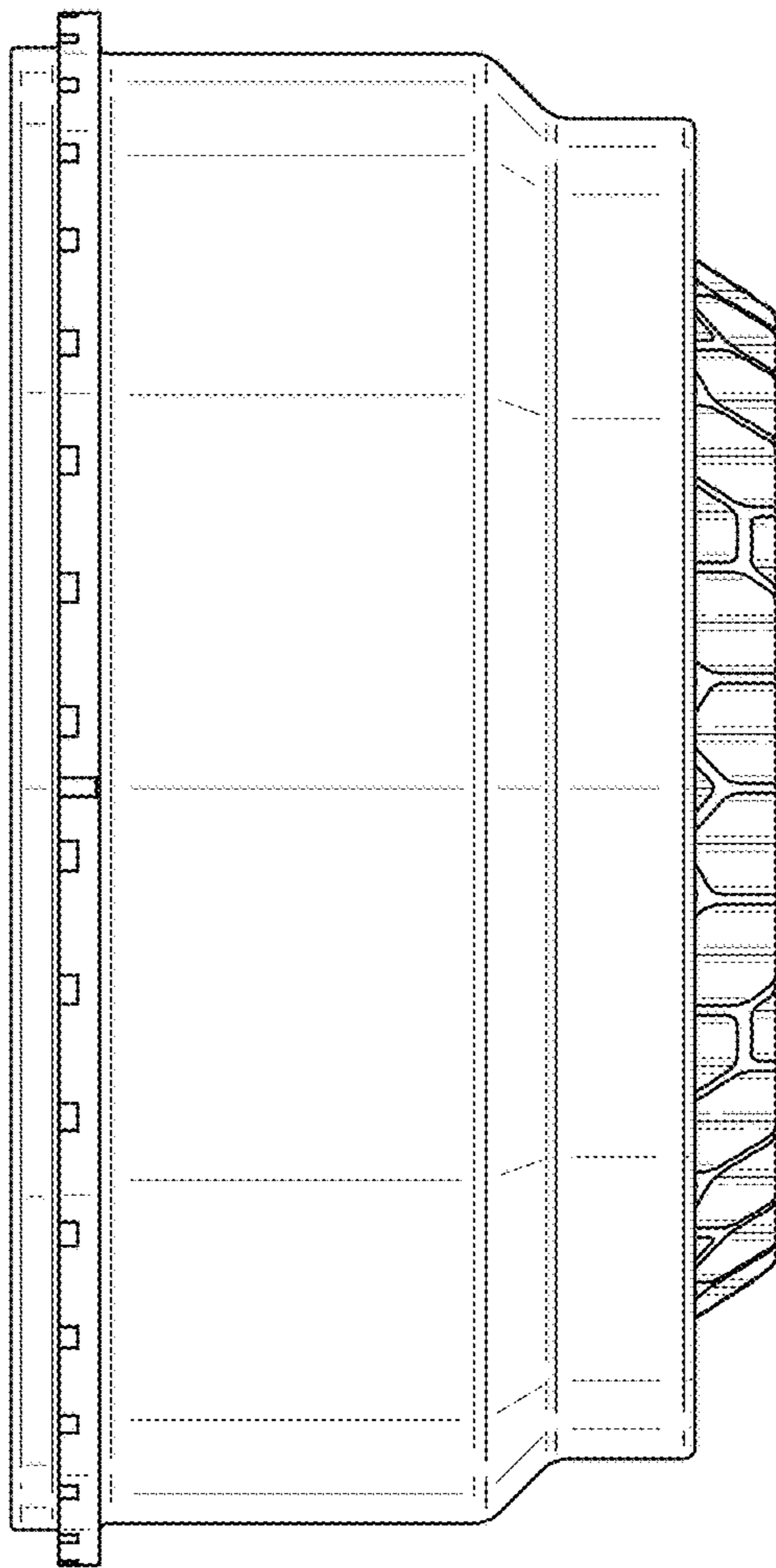


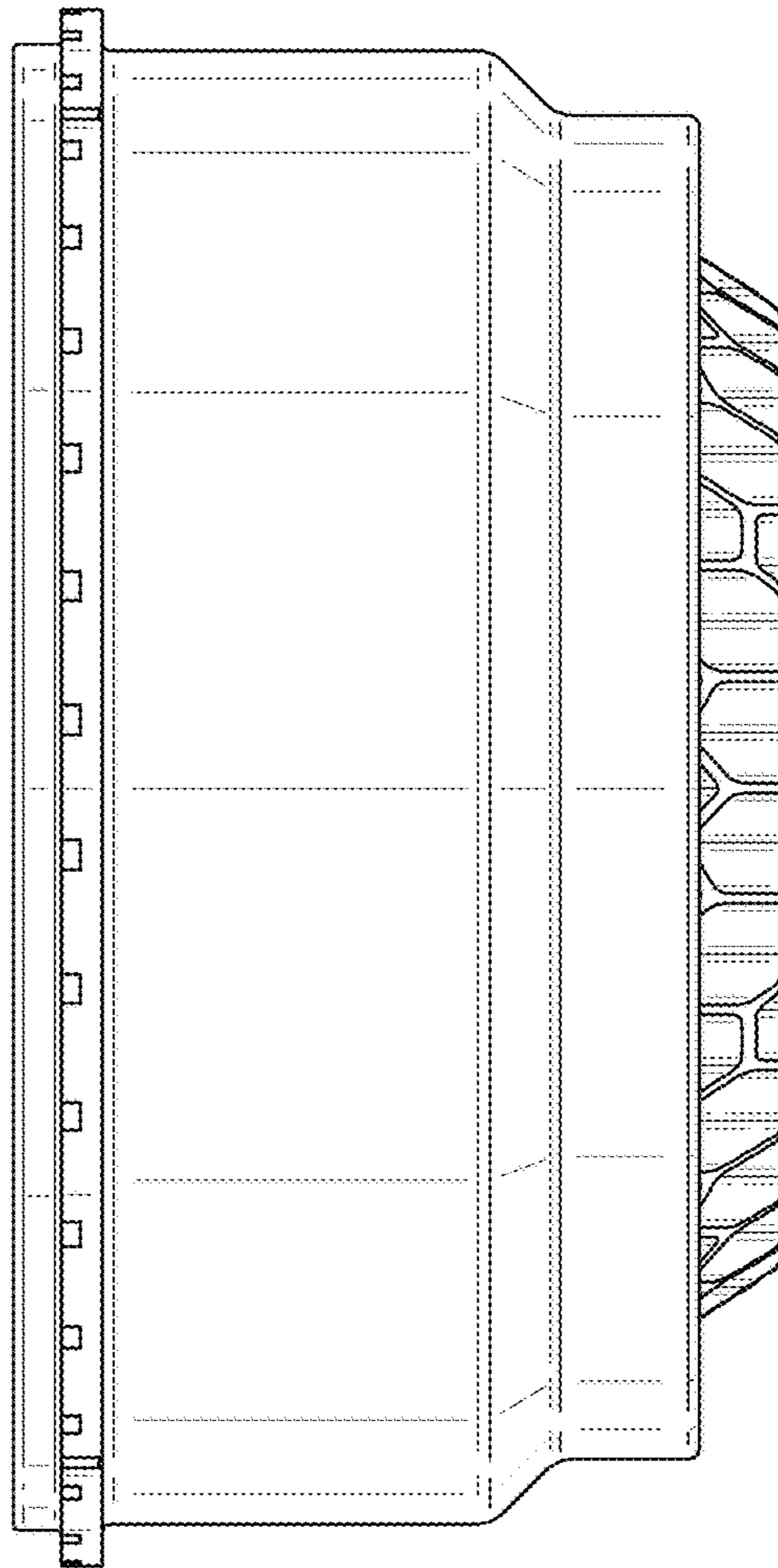
FIG. 3



**FIG. 4**

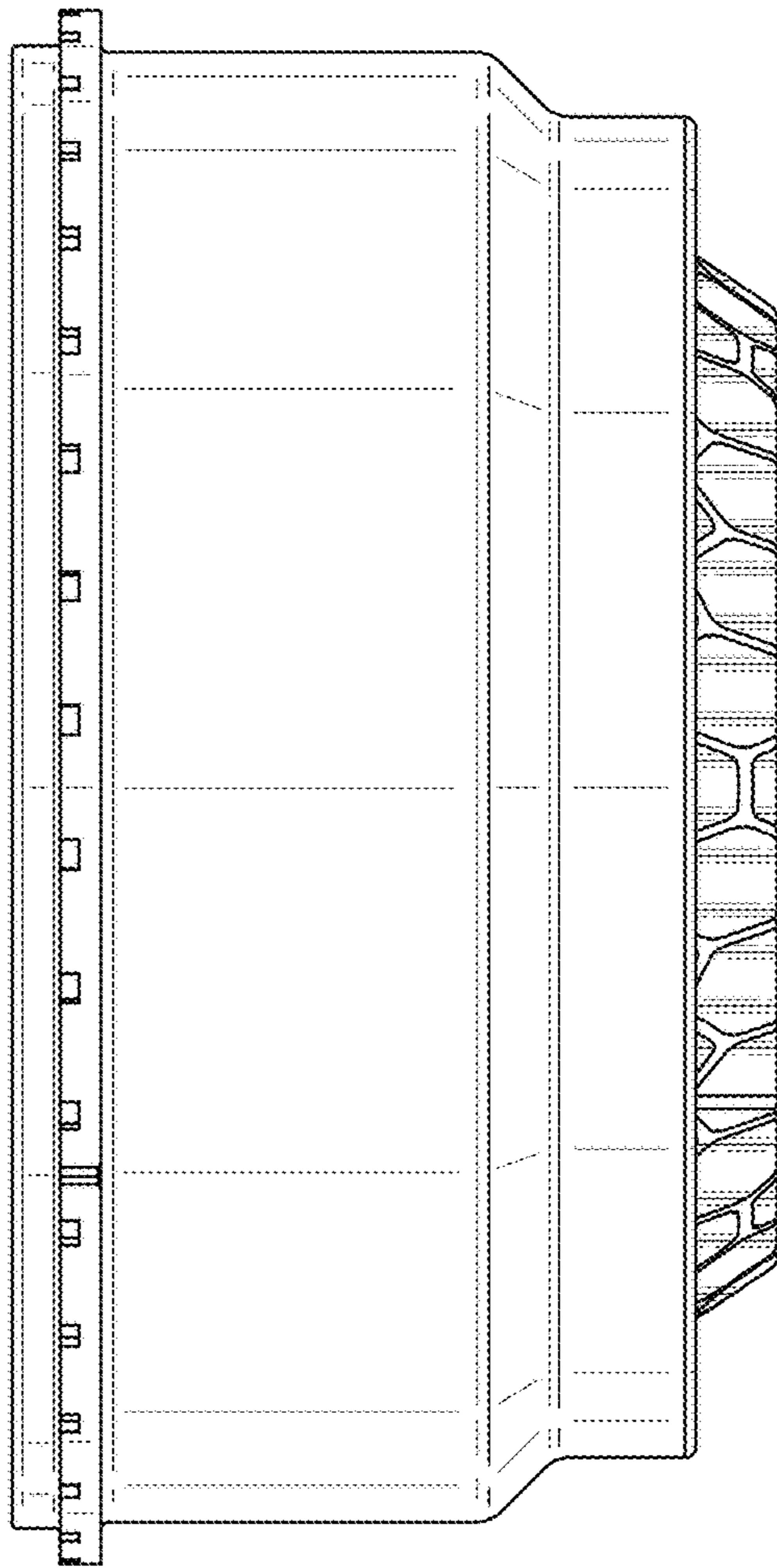


**FIG. 5**



**FIG. 6**





**FIG. 7**

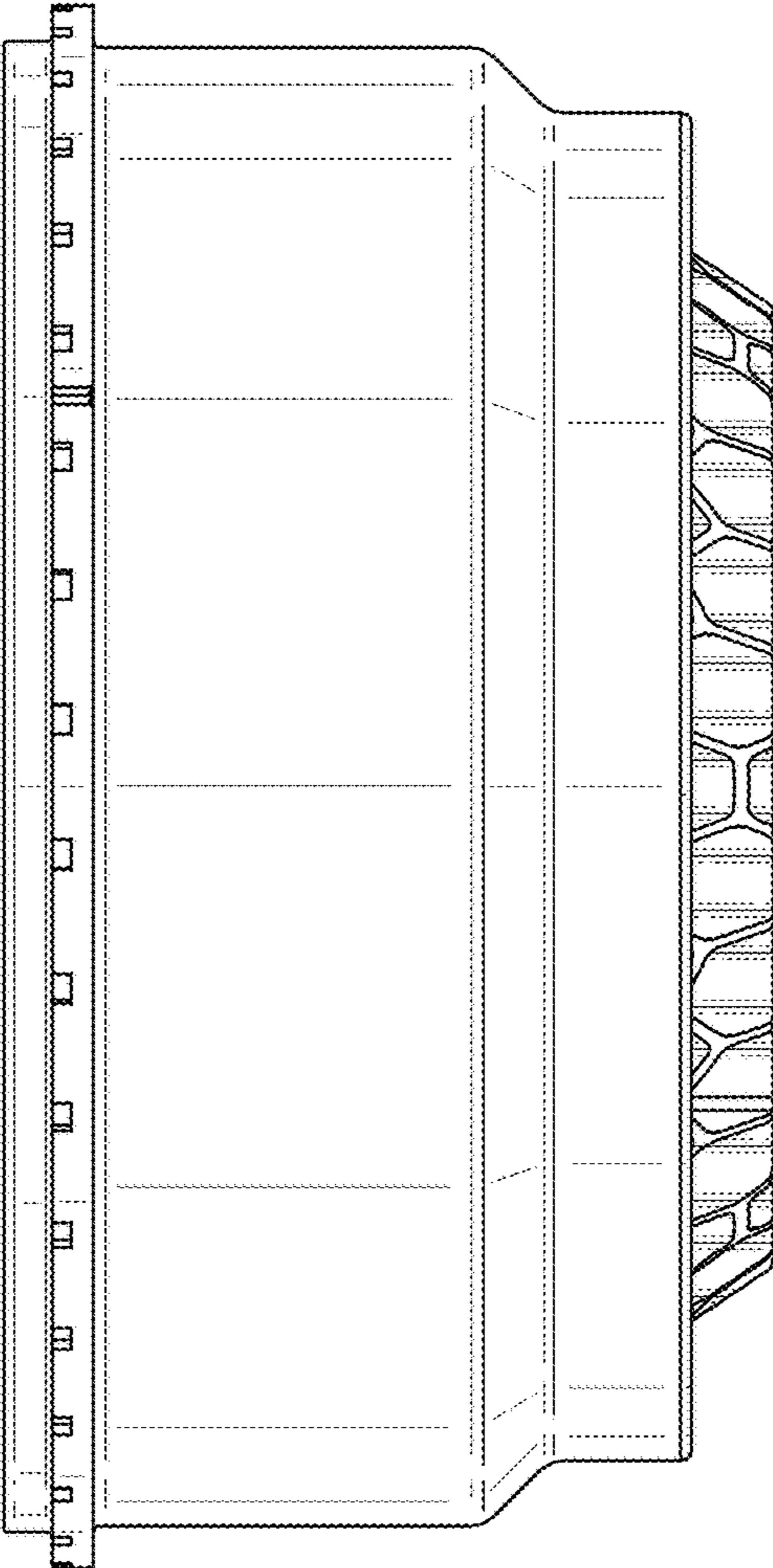


FIG. 8

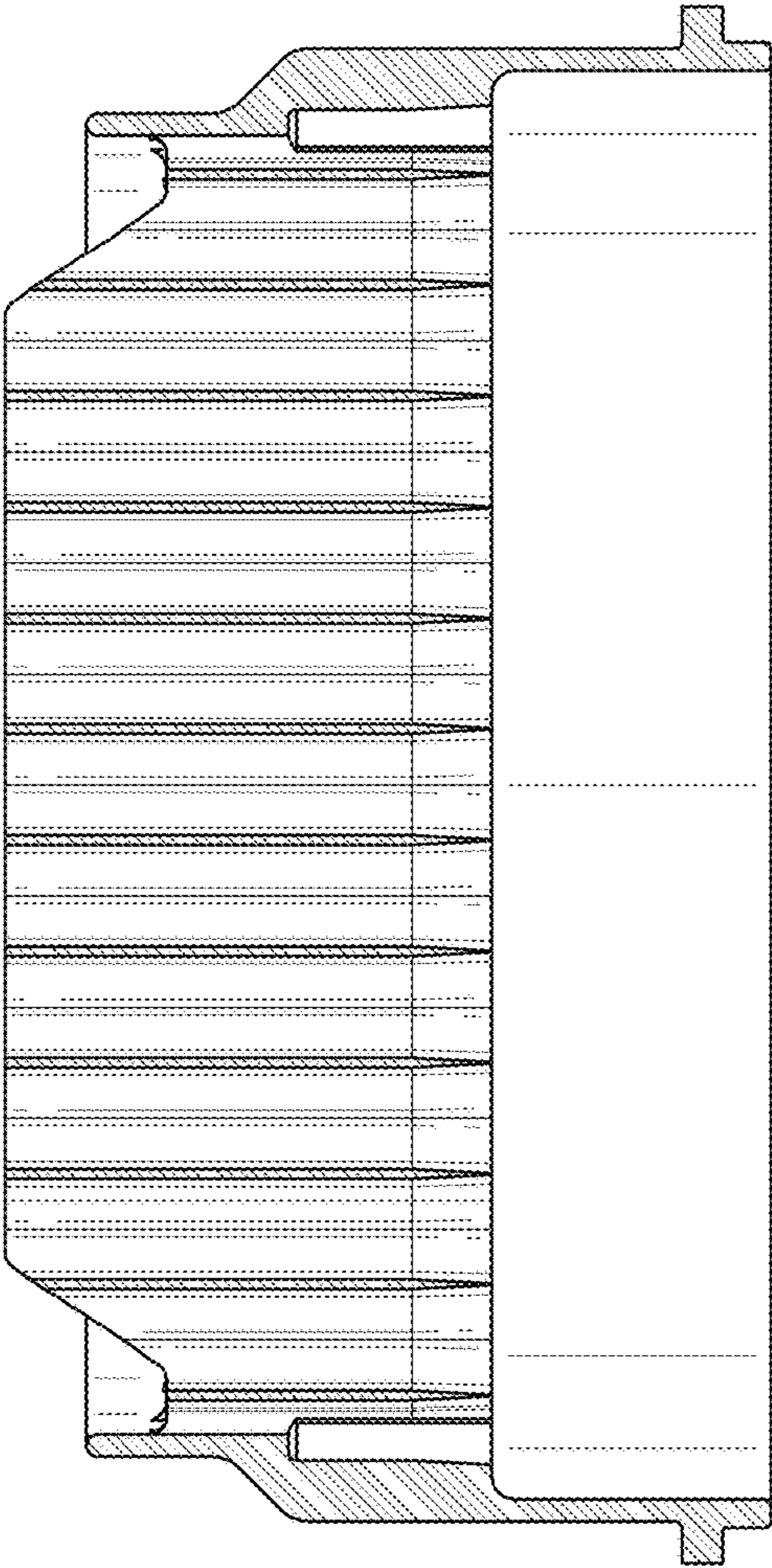
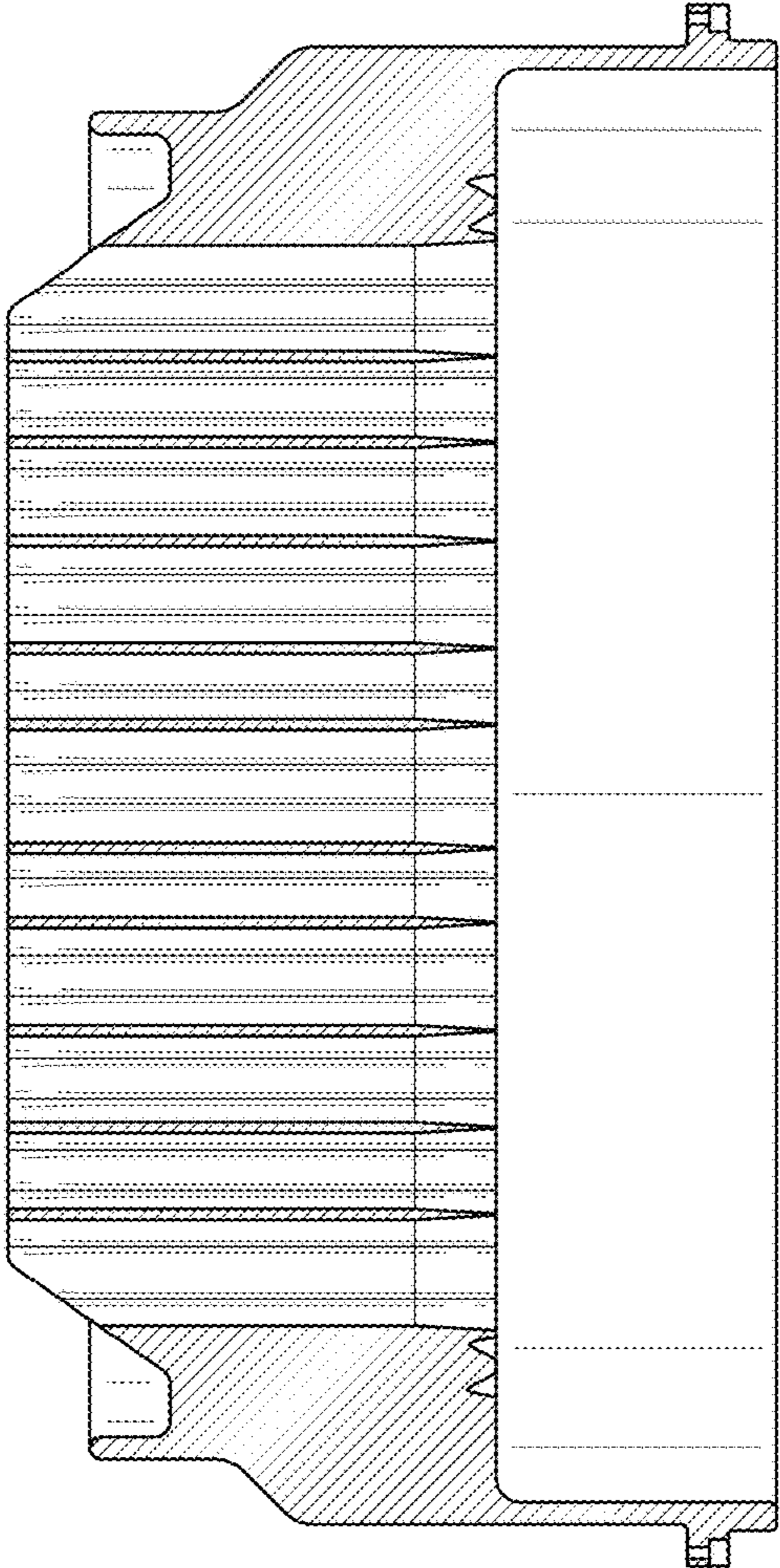
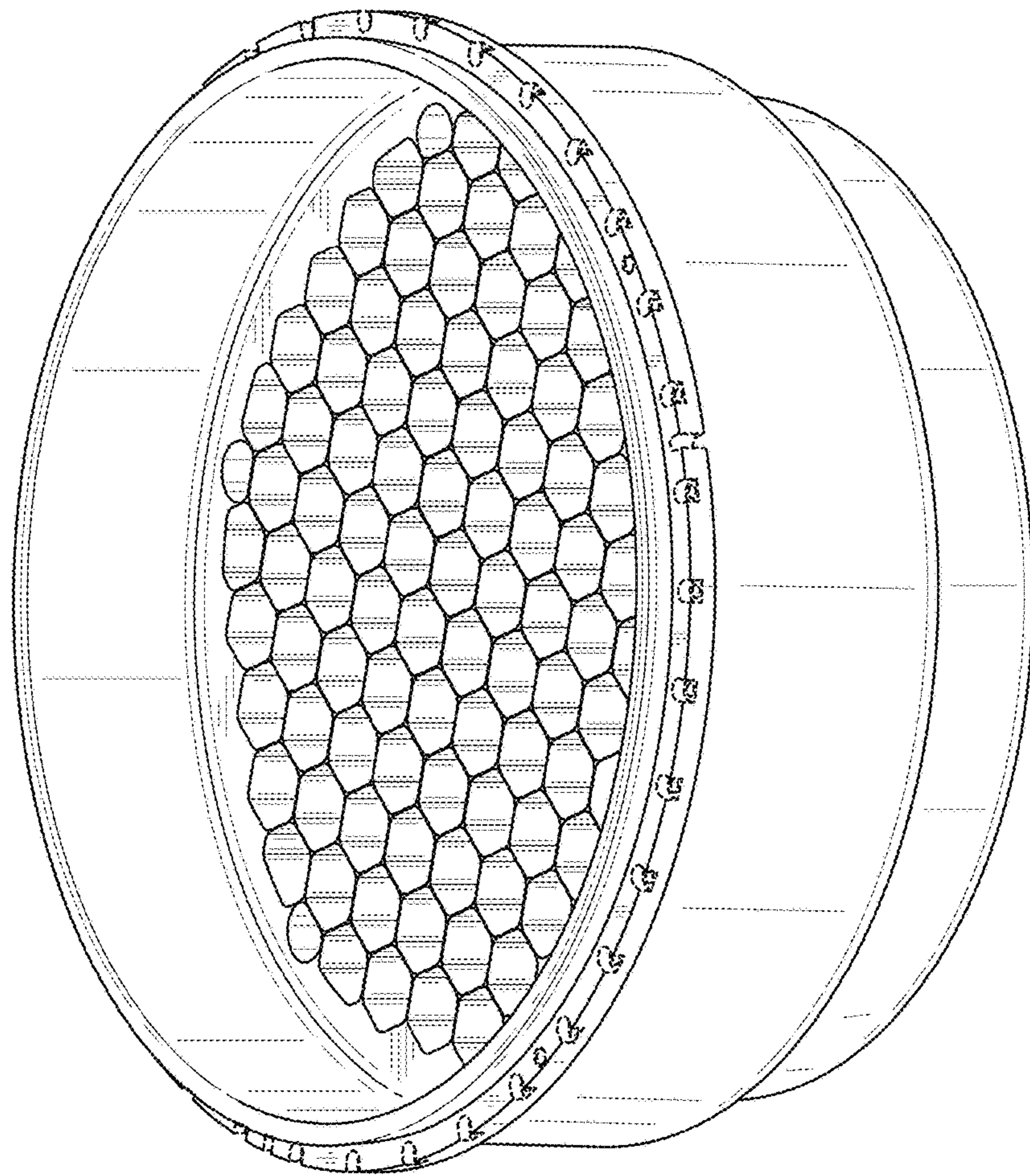


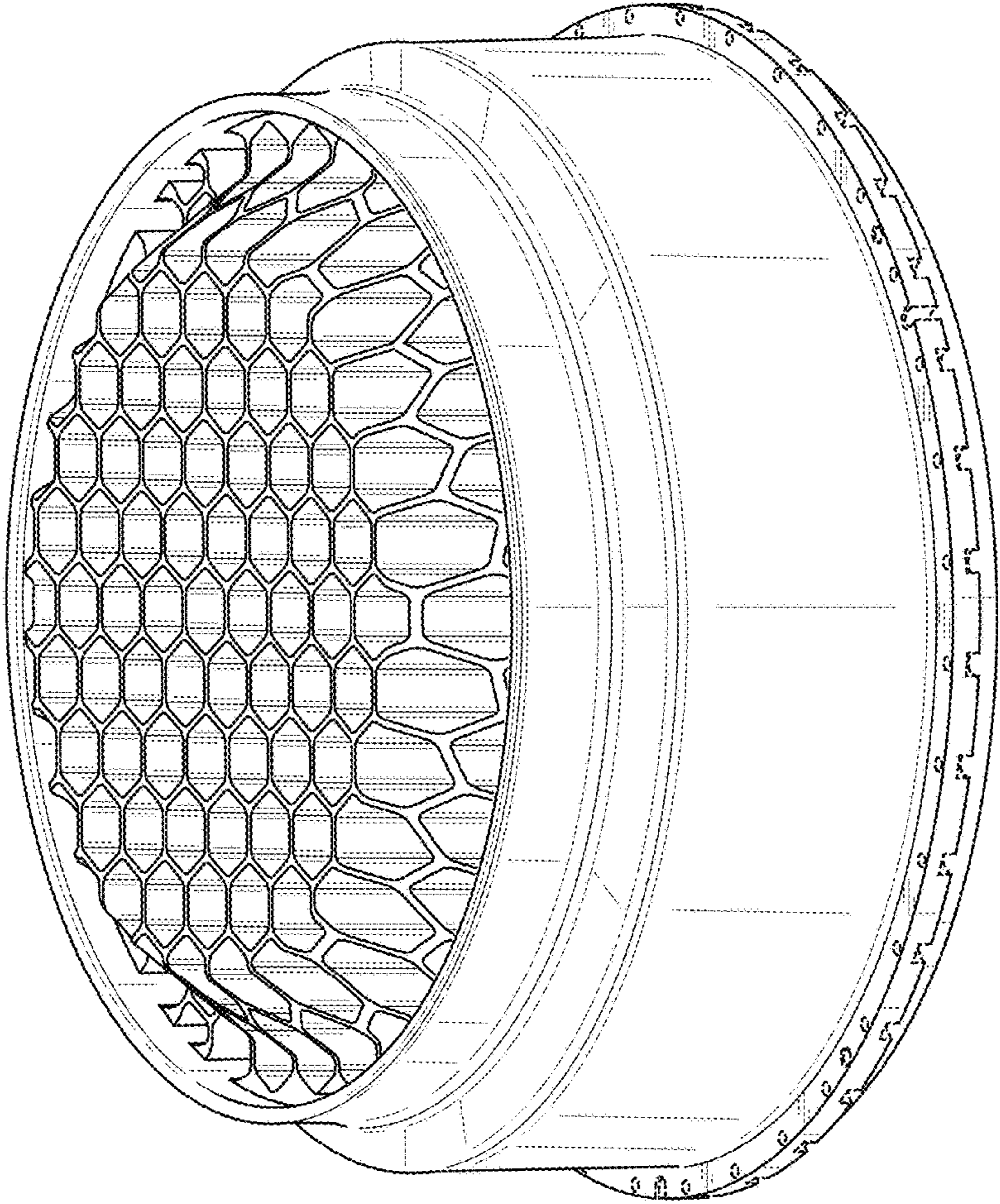
FIG. 9



**FIG. 10**



**FIG. 11**



**FIG. 12**

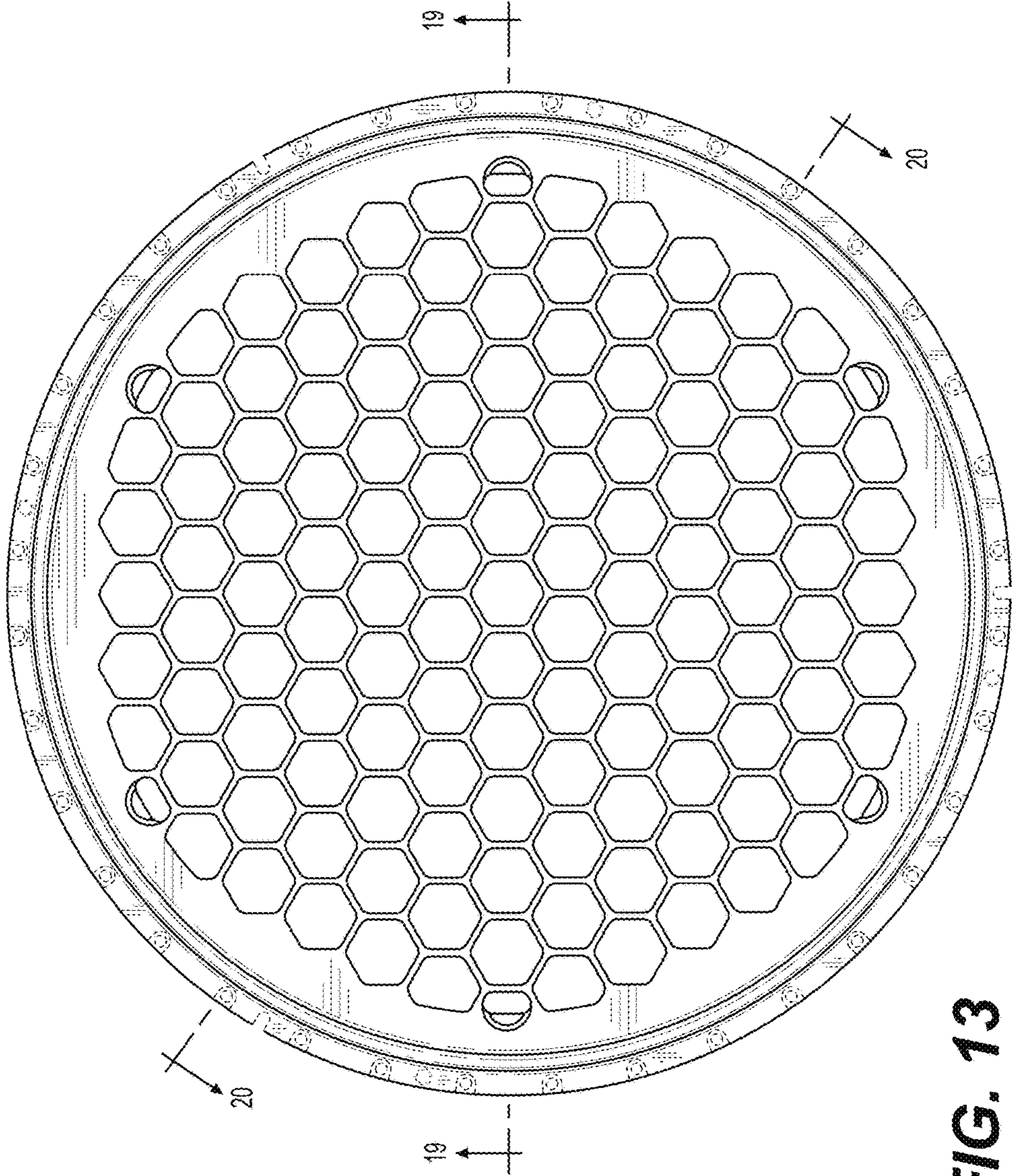


FIG. 13

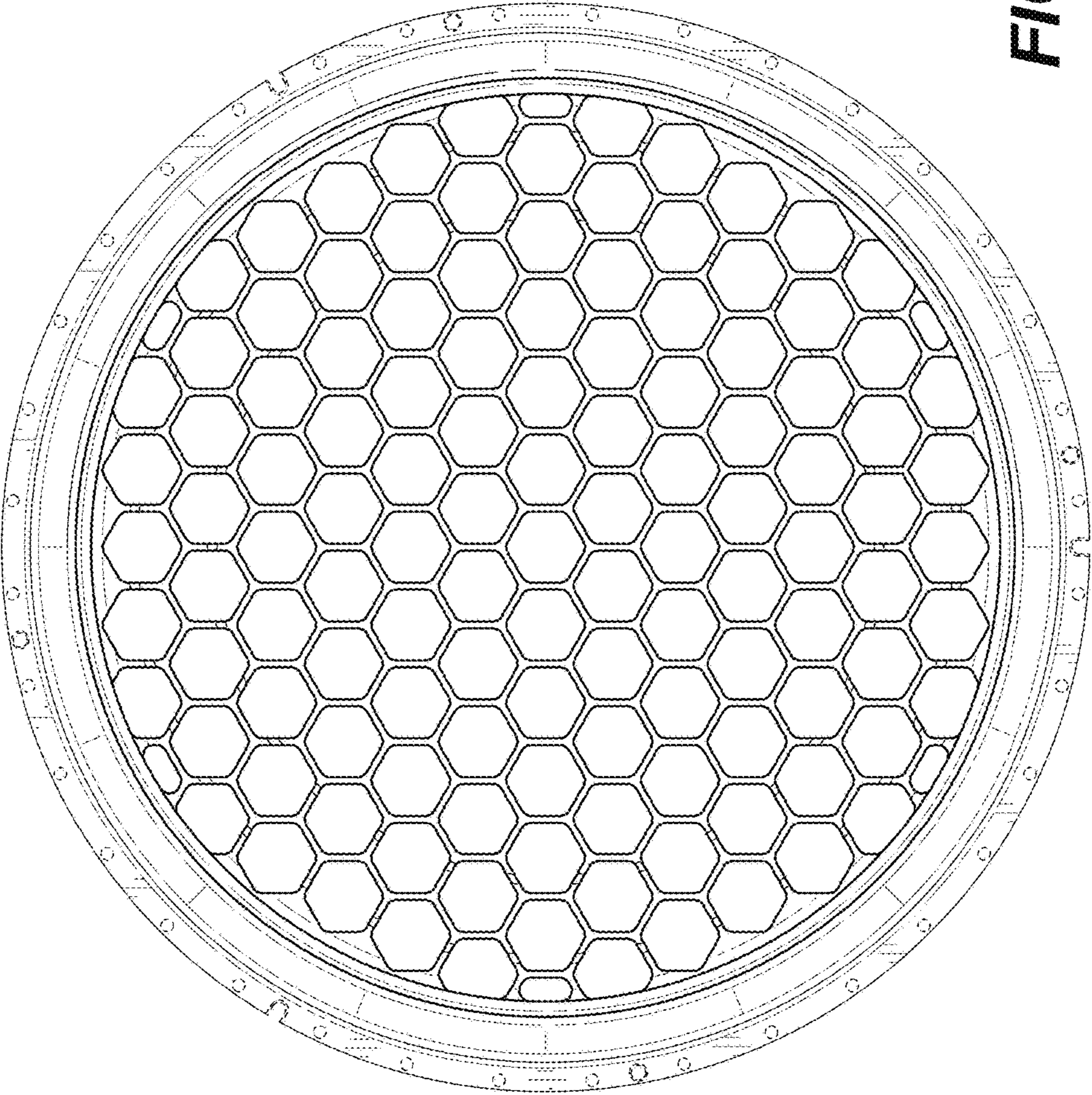
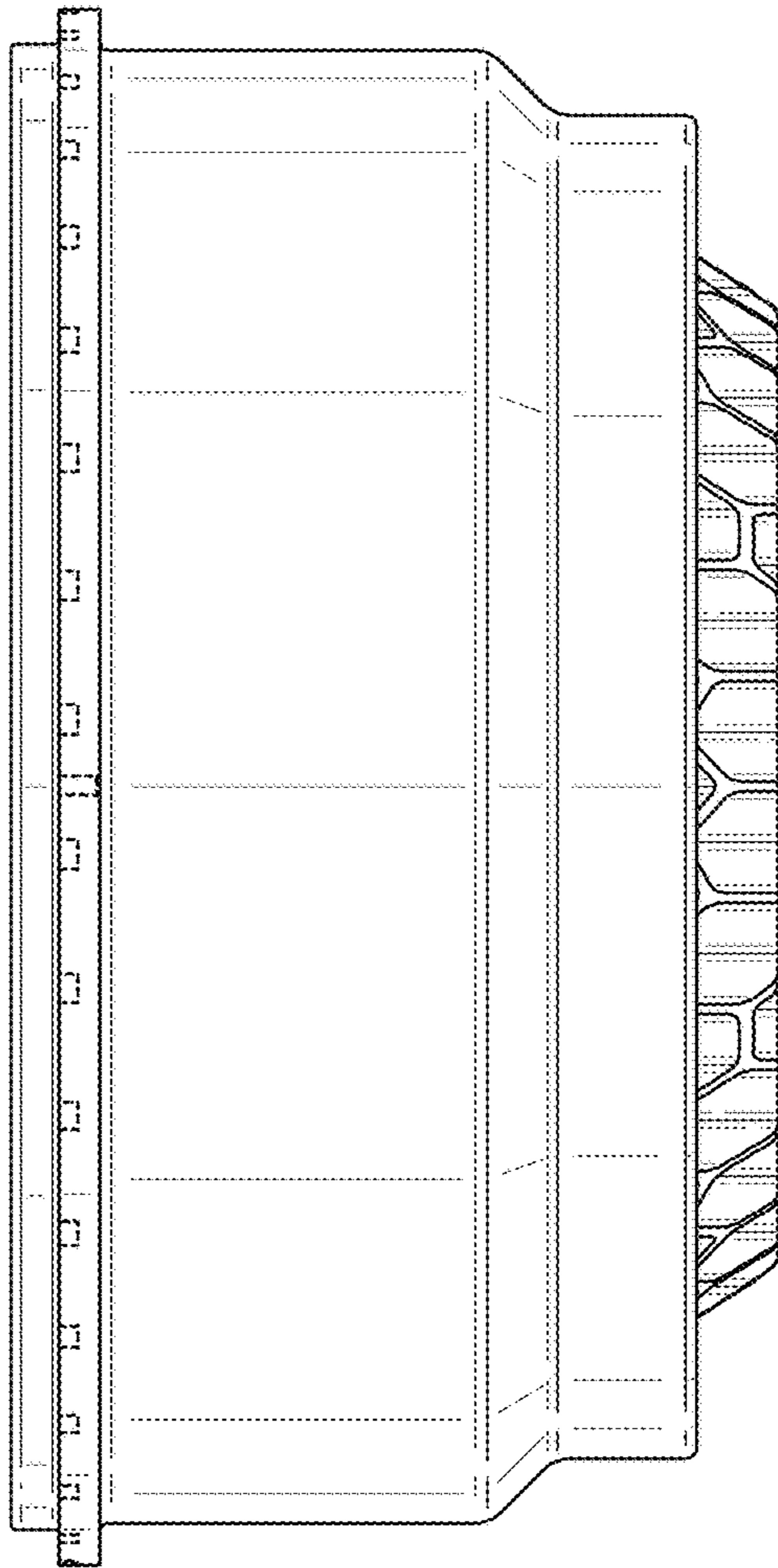
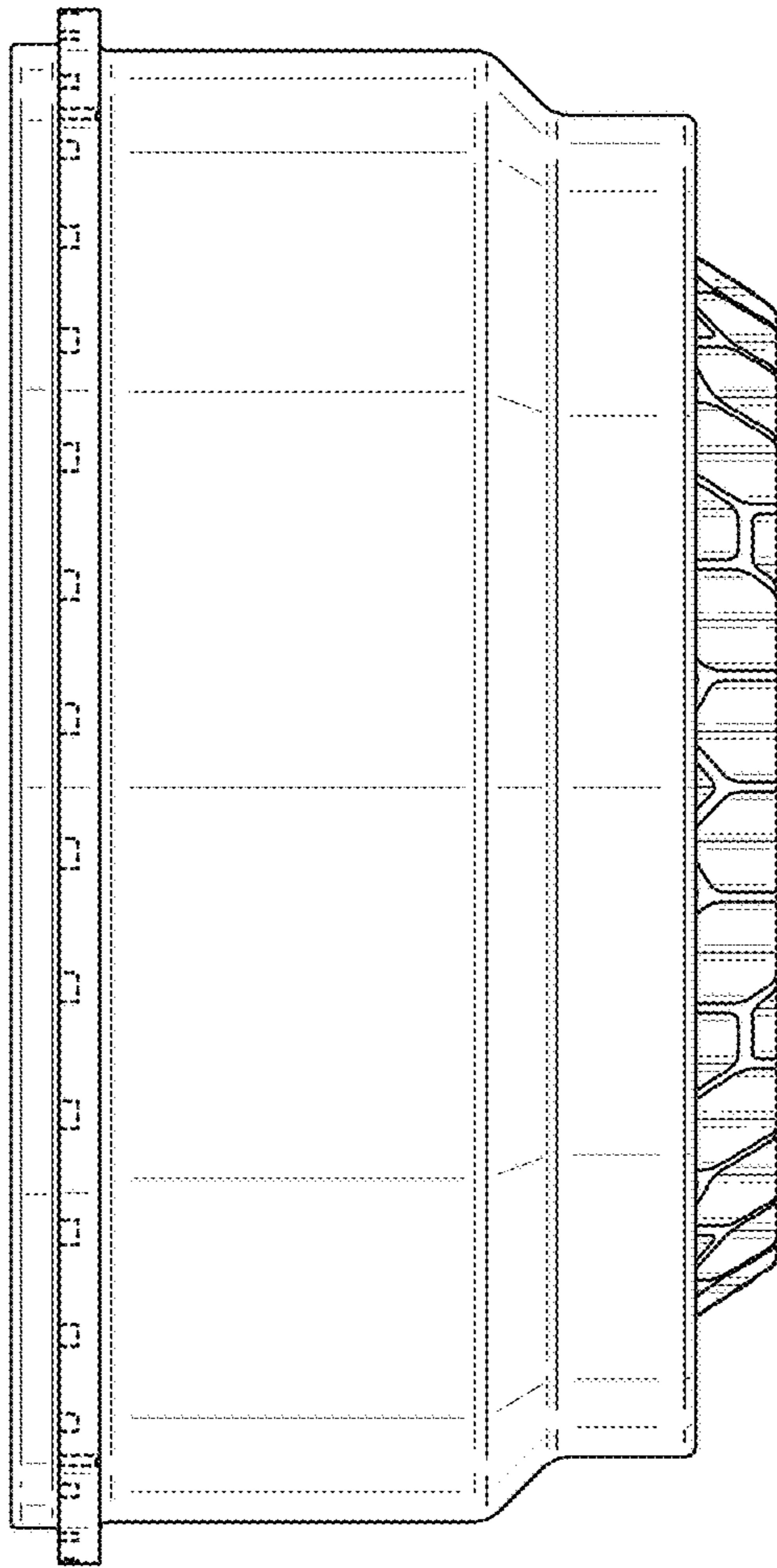


FIG. 14

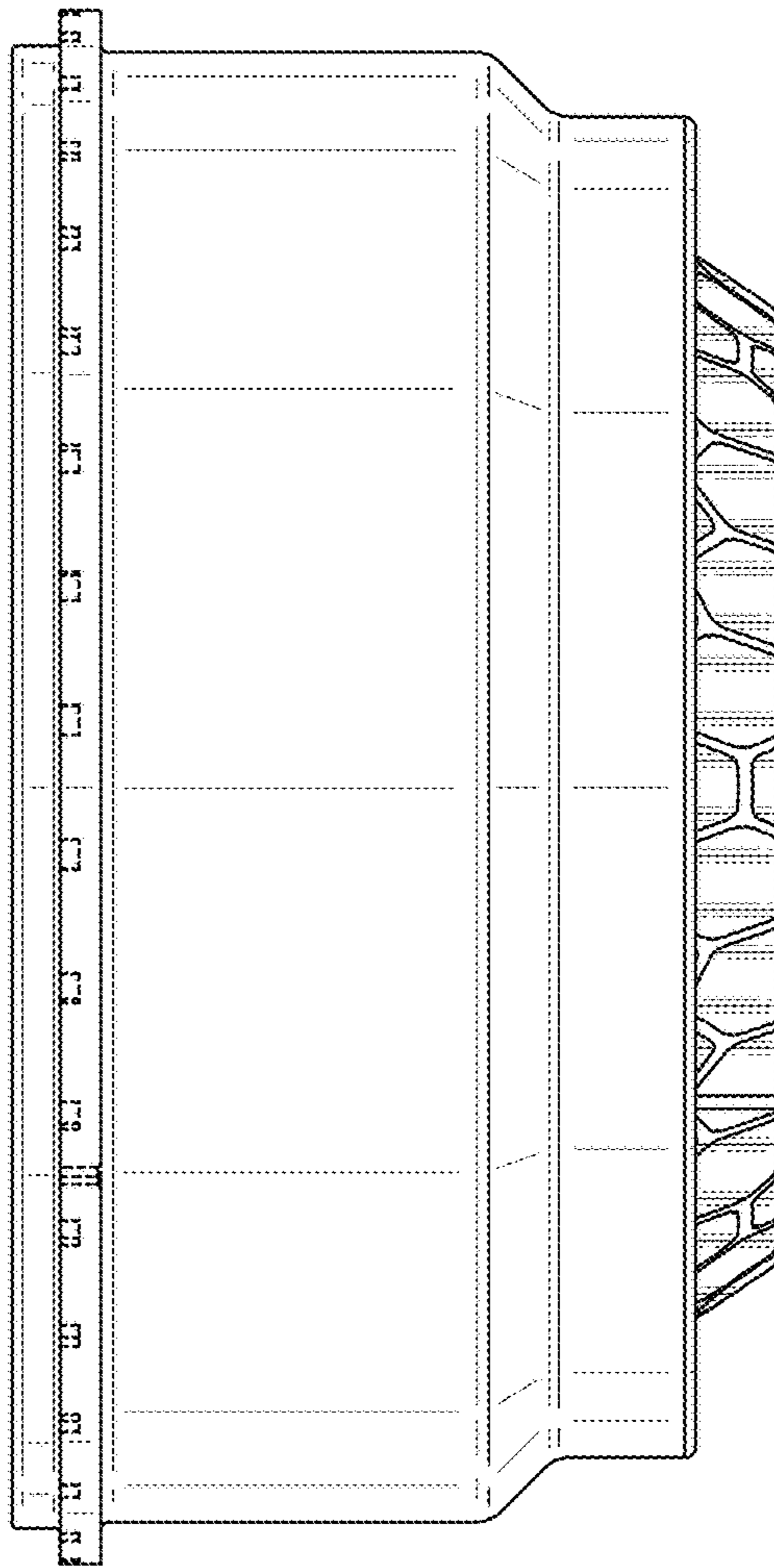




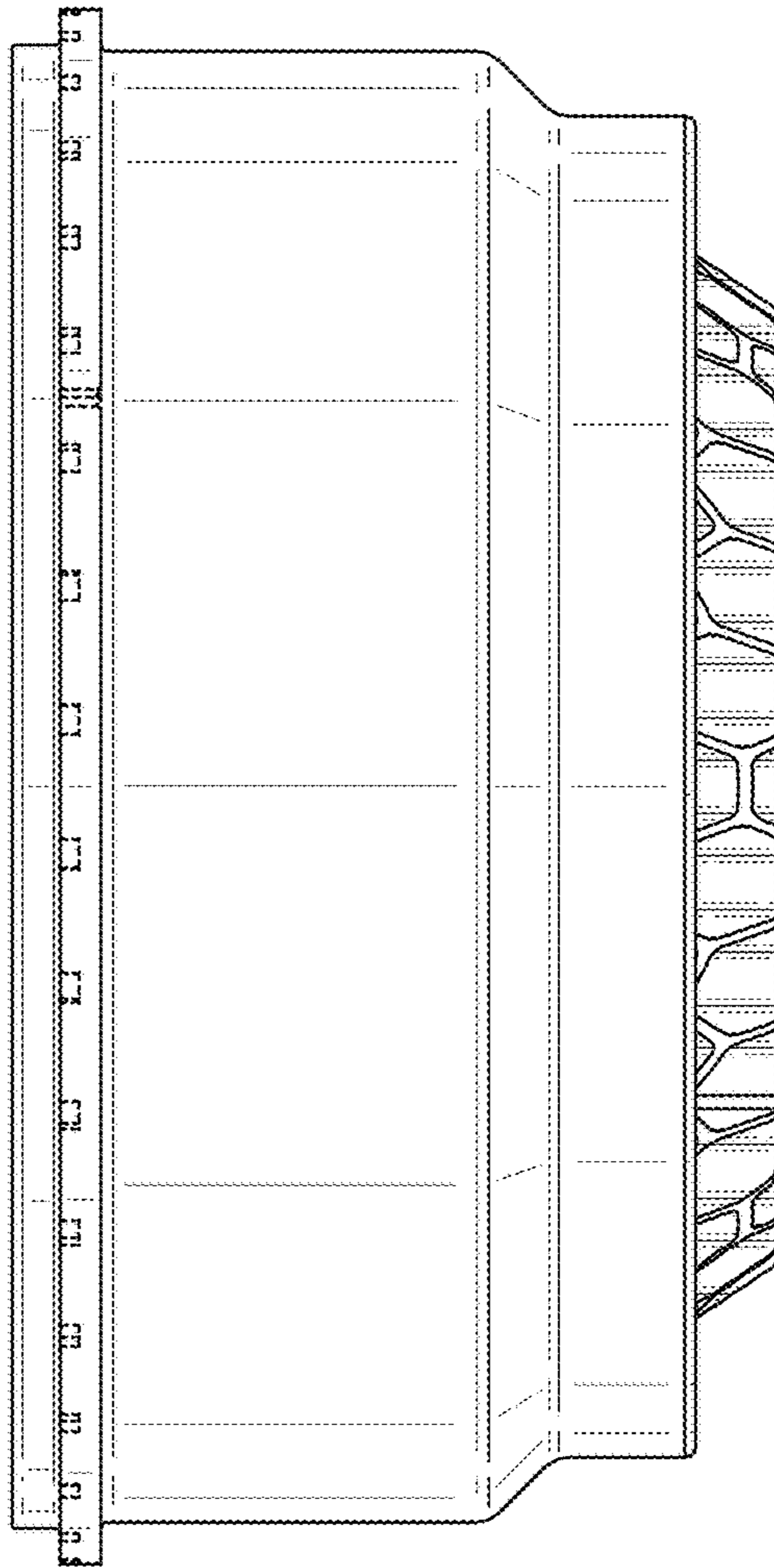
**FIG. 15**



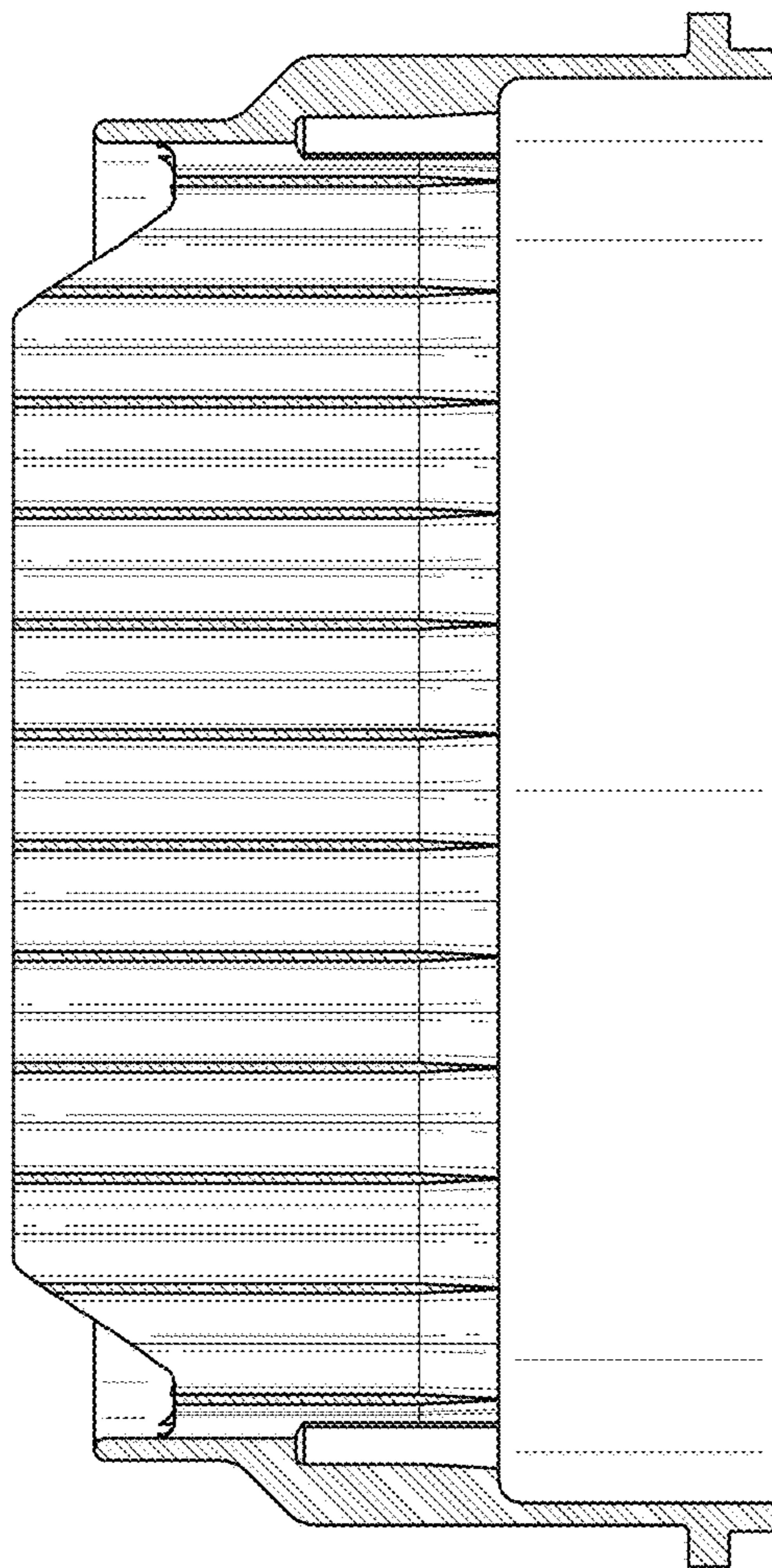
**FIG. 16**



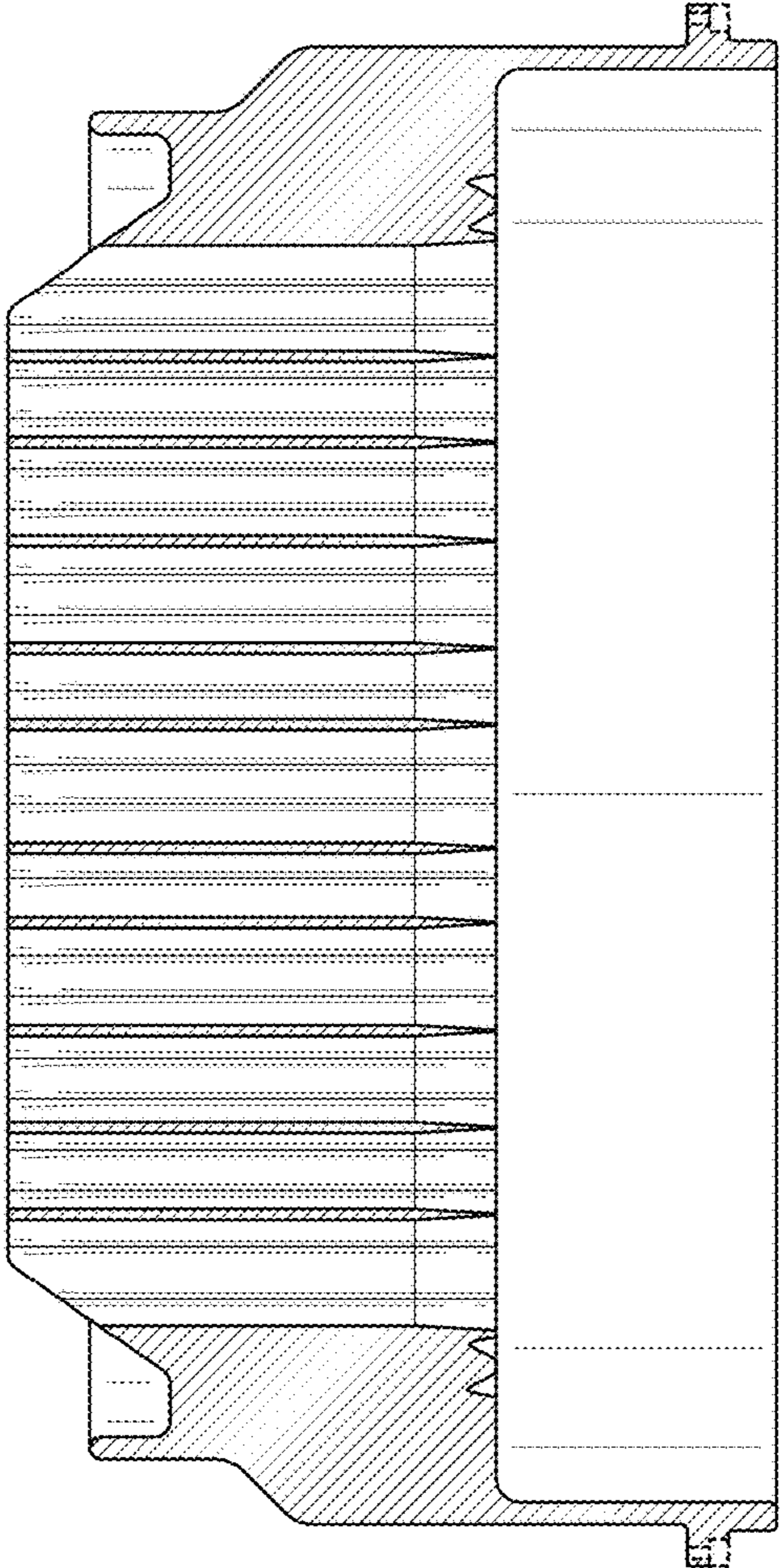
**FIG. 17**



**FIG. 18**



**FIG. 19**



**FIG. 20**