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(12) **United States Design Patent** (10) **Patent No.:** **US D893,574 S**  
**Suzuki** (45) **Date of Patent:** **\*\* Aug. 18, 2020**

(54) **LASER BEAM REFLECTOR**

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

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(52) **U.S. Cl.**  
USPC ..... **D16/130**

(58) **Field of Classification Search**  
USPC ..... D16/130, 131, 136, 221, 223, 225, 232,  
D16/235, 248, 250; D10/46, 46.2, 47,  
D10/50, 57, 72, 74, 76, 78, 80, 100, 102,  
D10/103, 124, 125; D24/133, 137, 138,  
D24/127, 113; D13/180, 134  
CPC . F16B 2/06; F16B 2/10; F01D 21/003; G02B  
26/085

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

D175,401 S \* 8/1955 Gottshalk ..... D16/235  
D271,208 S \* 11/1983 Daggett ..... D16/230  
D276,240 S \* 11/1984 Bonnefoy ..... D16/225

(Continued)

**OTHER PUBLICATIONS**

Ushiro, Kosuke, et al., "Development and Verification for Next Generation System of Surrounding Environment Recognition Tech-

nology—Third Report: System Architecture of MEMS Scanning 3D Range Sensor—(Exhibit 1)", [http://www.jari.or.jp/Portals/0/resource/JRJ\\_q/JRJ20171103\\_q.pdf](http://www.jari.or.jp/Portals/0/resource/JRJ_q/JRJ20171103_q.pdf), Nov. 3, 2017.

(Continued)

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(57) **CLAIM**

The ornamental design for a laser beam reflector, as shown and described.

**DESCRIPTION**

FIG. 1 is a front view of a laser beam reflector of the present invention;

FIG. 2 is a rear view thereof;

FIG. 3 is a top plan view thereof;

FIG. 4 is a bottom plan view thereof;

FIG. 5 is a right side view thereof;

FIG. 6 is a left side view thereof;

FIG. 7 is a front, top plan and right side perspective view thereof;

FIG. 8 is a rear, top plan and left side perspective view thereof;

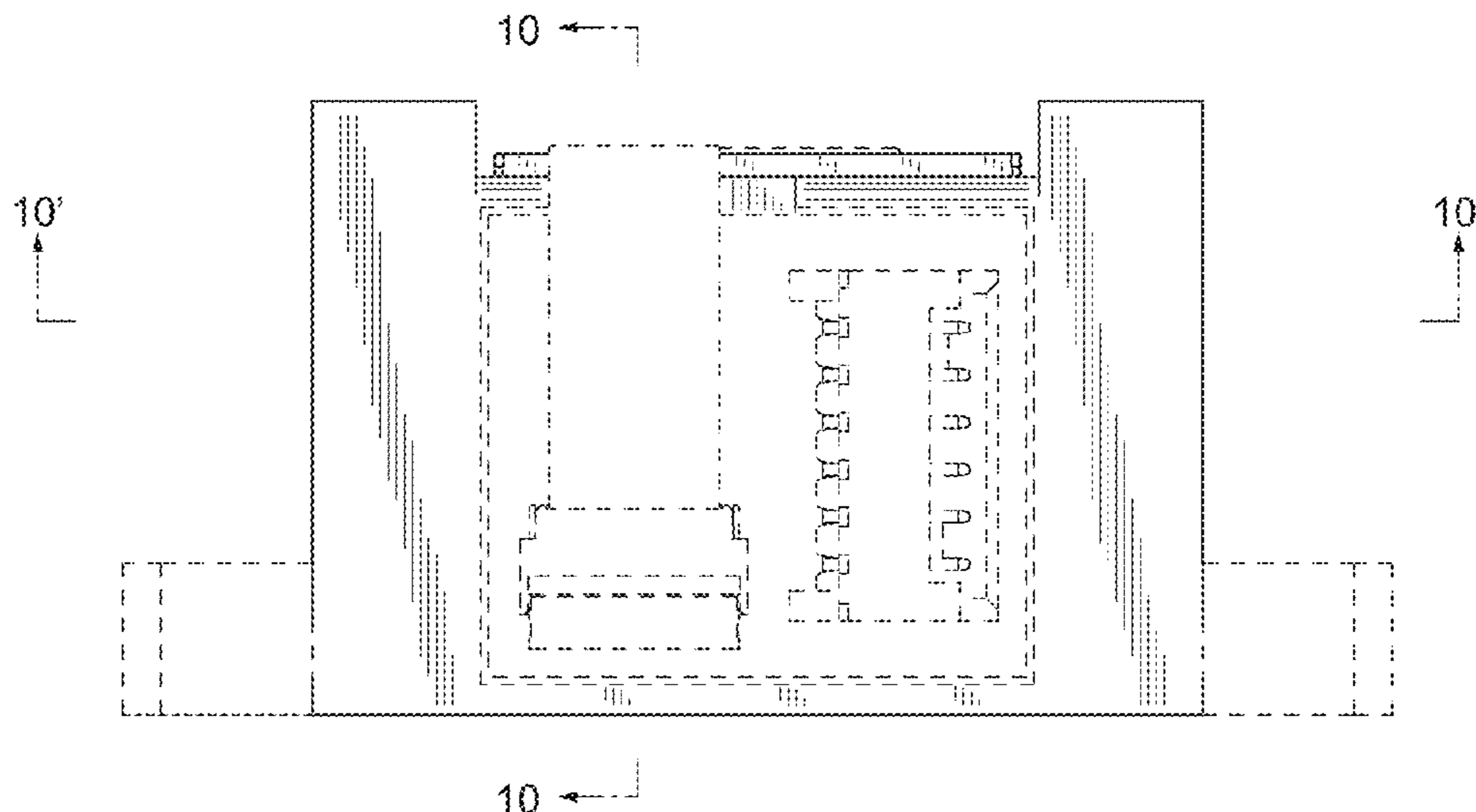
FIG. 9 is a cross-sectional view along the line 9-9 in FIG. 3;

FIG. 10 is an enlarged cross-sectional view along the line 10-10 in FIG. 1, in the area designated by 10'-10' in FIG. 1 and 10''-10'' in FIG. 3; and,

FIG. 11 is a rear, top plan and left side perspective view thereof in the state of use.

The features shown in evenly-dashed broken lines depict environmental subject matter only and form no part of the claimed design. The dot-dash broken lines in the drawings represent the bounds of the claimed subject matter, the dot-dash broken lines, themselves forming no part thereof.

**1 Claim, 11 Drawing Sheets**



(56)

References Cited

U.S. PATENT DOCUMENTS

4,859,029 A \* 8/1989 Durell ..... G02B 5/3066  
359/629  
D304,952 S \* 12/1989 Fukuda ..... D16/225  
5,132,509 A \* 7/1992 Hayakawa  
5,629,790 A \* 5/1997 Neukermans ..... G02B 26/0841  
250/234  
6,002,507 A \* 12/1999 Floyd ..... G02B 26/0833  
359/201.1  
6,122,089 A \* 9/2000 Minamoto ..... G02B 26/105  
359/198.1  
6,128,122 A \* 10/2000 Drake ..... G02B 7/1821  
359/198.1  
6,154,522 A \* 11/2000 Cumings  
6,232,861 B1 \* 5/2001 Asada ..... B81B 3/0062  
335/222  
6,426,013 B1 \* 7/2002 Neukermans ..... B82Y 15/00  
216/24  
6,528,887 B2 \* 3/2003 Daneman ..... B81B 3/0008  
257/731  
RE38,437 E \* 2/2004 Floyd ..... G02B 26/0833  
359/201.1  
6,781,732 B2 \* 8/2004 Cho ..... B81B 3/0021  
359/224.1  
6,791,731 B2 \* 9/2004 Ryu ..... G02B 26/085  
359/200.7  
6,803,938 B2 \* 10/2004 Turner ..... B41J 2/471  
347/237  
D502,953 S \* 3/2005 Kerrod ..... D16/130  
6,897,990 B2 \* 5/2005 Yagi ..... G02B 26/085  
359/199.3  
6,900,925 B2 \* 5/2005 Kato ..... G02B 26/085  
348/E5.141  
6,903,818 B2 \* 6/2005 Cerni et al.  
6,924,915 B2 \* 8/2005 Hirose ..... B81B 3/0018  
310/36  
6,949,996 B2 \* 9/2005 Matsumoto ..... B81B 3/0062  
200/181  
7,012,737 B2 \* 3/2006 Iwasaki ..... G02B 26/085  
359/224.1  
D528,997 S \* 9/2006 Jung ..... D13/180  
7,224,507 B2 \* 5/2007 Kamiya ..... G02B 26/0833  
359/200.7  
7,230,743 B2 \* 6/2007 Matsuo ..... G02B 26/085  
359/200.7  
7,256,926 B2 \* 8/2007 Kamiya ..... G02B 26/0833  
359/224.1  
7,391,222 B2 \* 6/2008 Nishio ..... G02B 26/085  
324/658  
7,408,690 B2 \* 8/2008 Mizoguchi ..... G02B 26/085  
310/36  
7,605,965 B2 \* 10/2009 Tani et al.  
D689,209 S \* 9/2013 Donofrio ..... D13/180  
D725,051 S \* 3/2015 Kao ..... D13/180  
D740,240 S \* 10/2015 Chen ..... D13/180

9,258,486 B2 \* 2/2016 Hu ..... H04N 5/2328  
9,322,654 B2 \* 4/2016 Bockem  
D762,183 S \* 7/2016 Kim ..... D13/180  
9,453,721 B2 \* 9/2016 Akita et al.  
9,477,078 B2 \* 10/2016 Murata ..... H02K 33/16  
9,482,864 B2 \* 11/2016 Shimizu ..... G02B 26/085  
D777,121 S \* 1/2017 Panaccione ..... D13/180  
9,547,170 B2 \* 1/2017 Hino ..... G02B 26/105  
D778,849 S \* 2/2017 Maruyama ..... D13/180  
D782,425 S \* 3/2017 Ko ..... D13/180  
9,632,309 B2 \* 4/2017 Yasuda ..... G02B 26/085  
9,681,015 B2 \* 6/2017 Mizoguchi ..... H04N 1/036  
D791,963 S \* 7/2017 Orcutt  
9,729,038 B2 \* 8/2017 Takimoto ..... G02B 26/0816  
9,798,135 B2 \* 10/2017 Erlich ..... G02B 26/0833  
9,846,076 B2 \* 12/2017 Shibayama ..... G01J 3/26  
D807,945 S \* 1/2018 Otsuka ..... D16/235  
D813,692 S \* 3/2018 Dugarry ..... D10/46  
9,952,158 B2 \* 4/2018 Ito ..... G01N 21/658  
9,953,729 B2 \* 4/2018 Watari ..... G21B 3/006  
10,054,439 B2 \* 8/2018 Jensen et al.  
D829,580 S \* 10/2018 Hirose ..... D10/81  
D841,590 S \* 2/2019 Otsuka ..... D13/134  
D846,512 S \* 4/2019 Nishio ..... D13/180  
10,295,852 B2 \* 5/2019 Wada ..... G02F 1/1333  
10,330,923 B2 \* 6/2019 Hino ..... G02B 26/101  
D871,412 S \* 12/2019 Aprile et al.  
D876,525 S \* 2/2020 Sun ..... D16/237  
10,549,981 B2 \* 2/2020 Takimoto ..... B81B 3/001  
10,589,985 B2 \* 3/2020 Takimoto ..... B81B 7/0006  
10,591,719 B2 \* 3/2020 Byeman ..... H04N 9/3129

OTHER PUBLICATIONS

“Autonomous driving & ADAS (Exhibit 2)”, [http://www.hamamatsu.com/eu/en/community/optical\\_sensors/applications/autonomous\\_driving\\_adas/index.html](http://www.hamamatsu.com/eu/en/community/optical_sensors/applications/autonomous_driving_adas/index.html), Nov. 22, 2017.  
“Products (Exhibit 3)”, [http://www.hamamatsu.com/us/en/community/optical\\_sensors/photronics\\_west/products/index.html](http://www.hamamatsu.com/us/en/community/optical_sensors/photronics_west/products/index.html), Dec. 16, 2017.  
“Photograph (Exhibit 4-1)”, Hamamatsu Photonics K.K., Jan. 30 to Feb. 1, 2018.  
“Photonics West 2018 Technical Program (Exhibit 4-2)”, SPIE, Jan. 27 to Feb. 1, 2018.  
“Product Flyer MEMS mirror S13124-02H (Exhibit 4-3)”, Hamamatsu Photonics K.K., Jan. 30 to Feb. 1, 2018.  
“Product Flyer MEMS mirror S13989-01H (Exhibit 4-4)”, Hamamatsu Photonics K.K., Jan. 30 to Feb. 1, 2018.  
Sadaharo Takimoto, “Optical MEMS (MOEMS) Technology of Hamamatsu (Exhibit 5-1)”, Hamamatsu Photonics K.K., Apr. 25, 2018.  
“Photograph (Exhibit 5-2)”, Hamamatsu Photonics K.K., Apr. 25, 2018.  
“10th Anniversary MEMS Engineer Forum (MEF) 2018 Smart Society Driven by MEMS (Exhibit 5-3)”, MEMS 2018, Apr. 25 to 26, 2018.  
Office Action dated May 4, 2020 in related U.S. Appl. No. 29/668,518.

\* cited by examiner

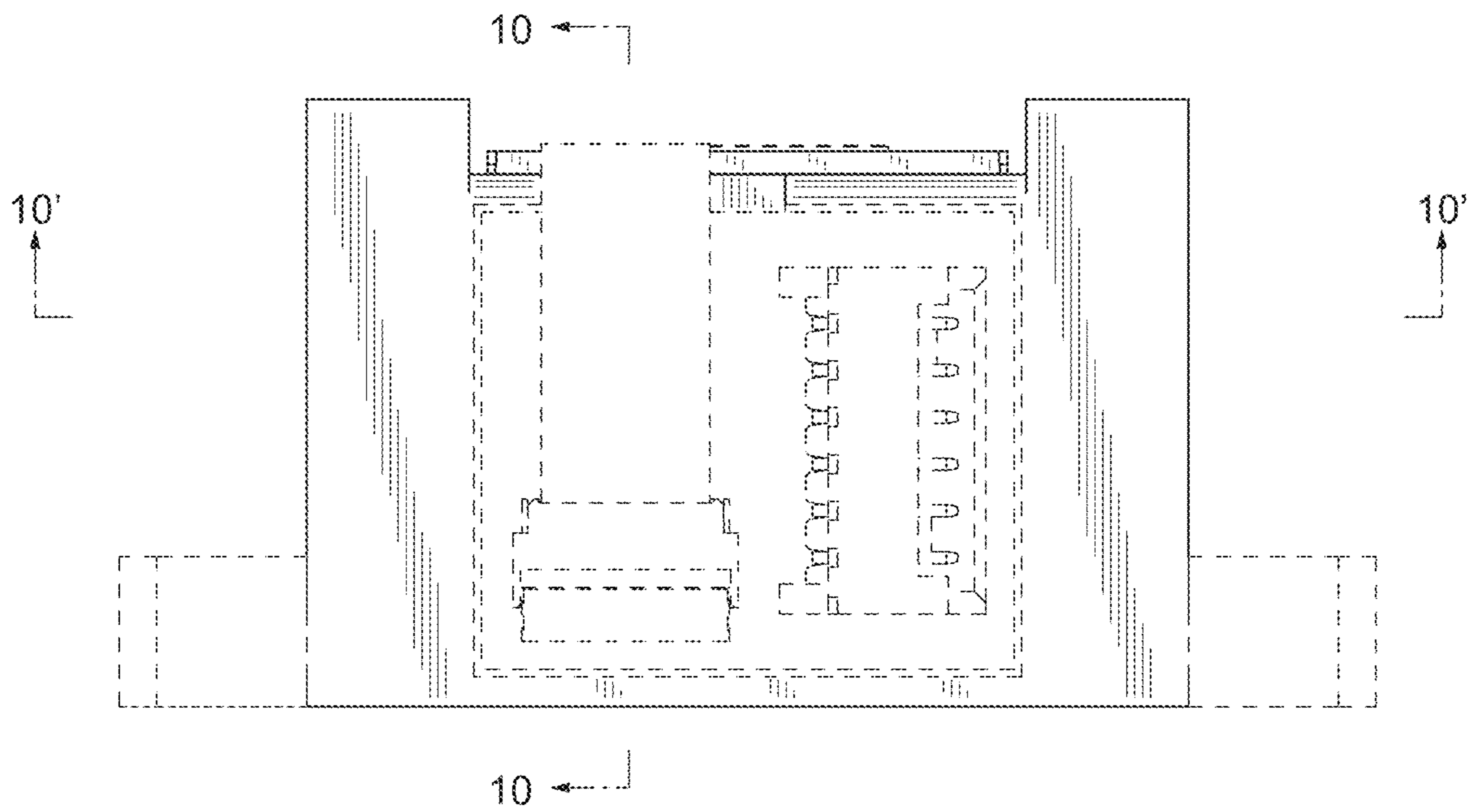


FIG. 1

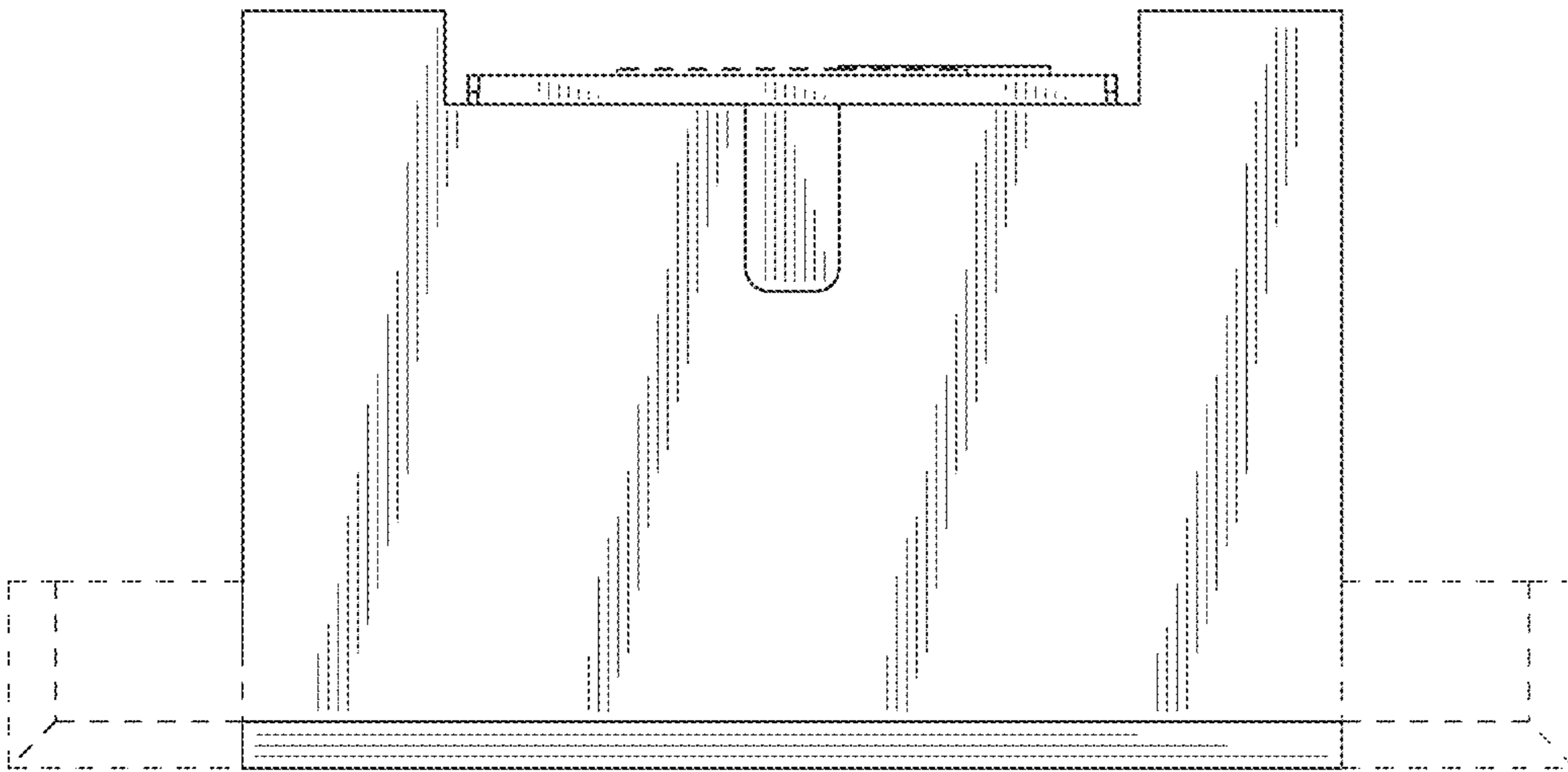


FIG. 2

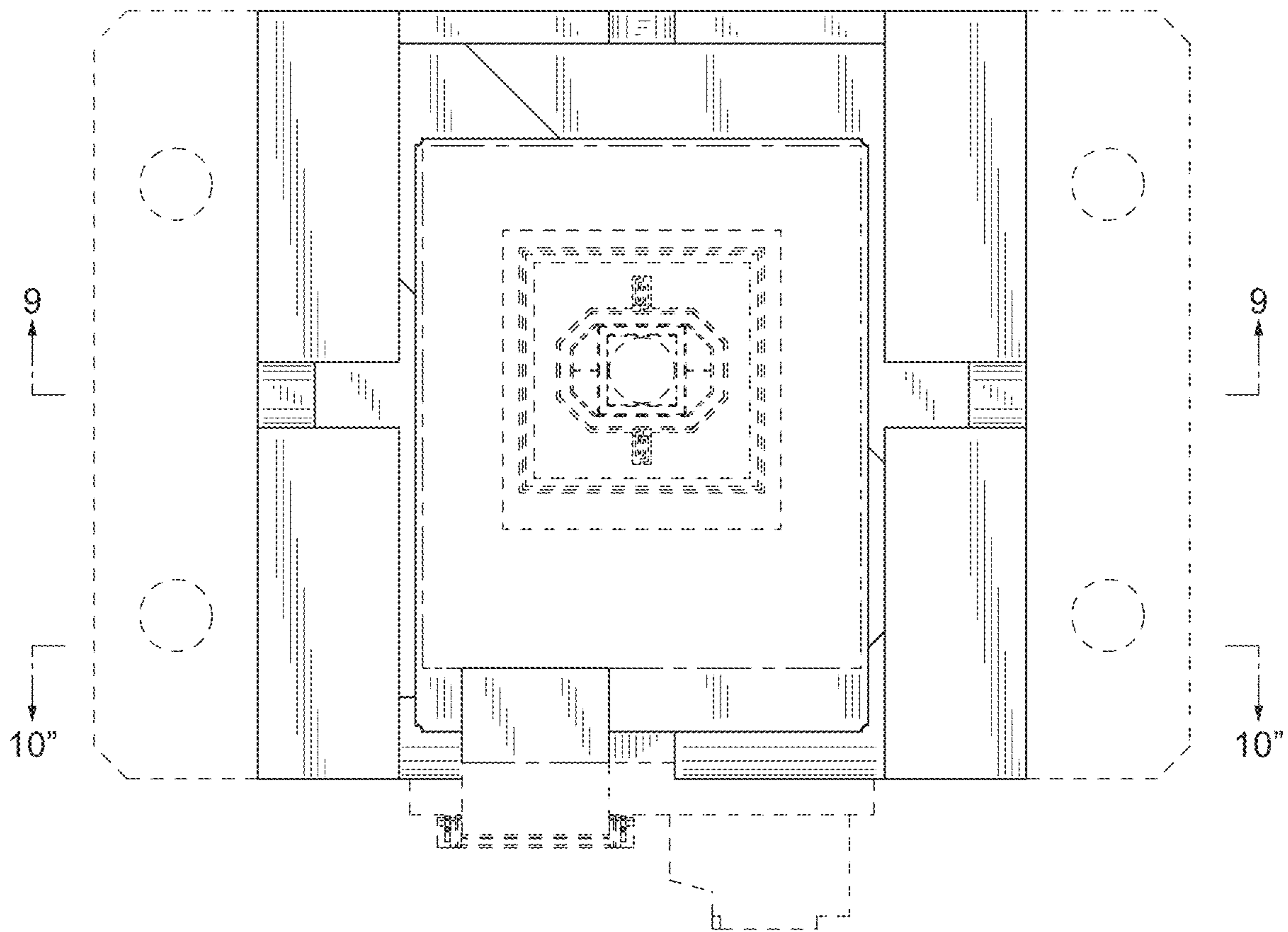


FIG. 3

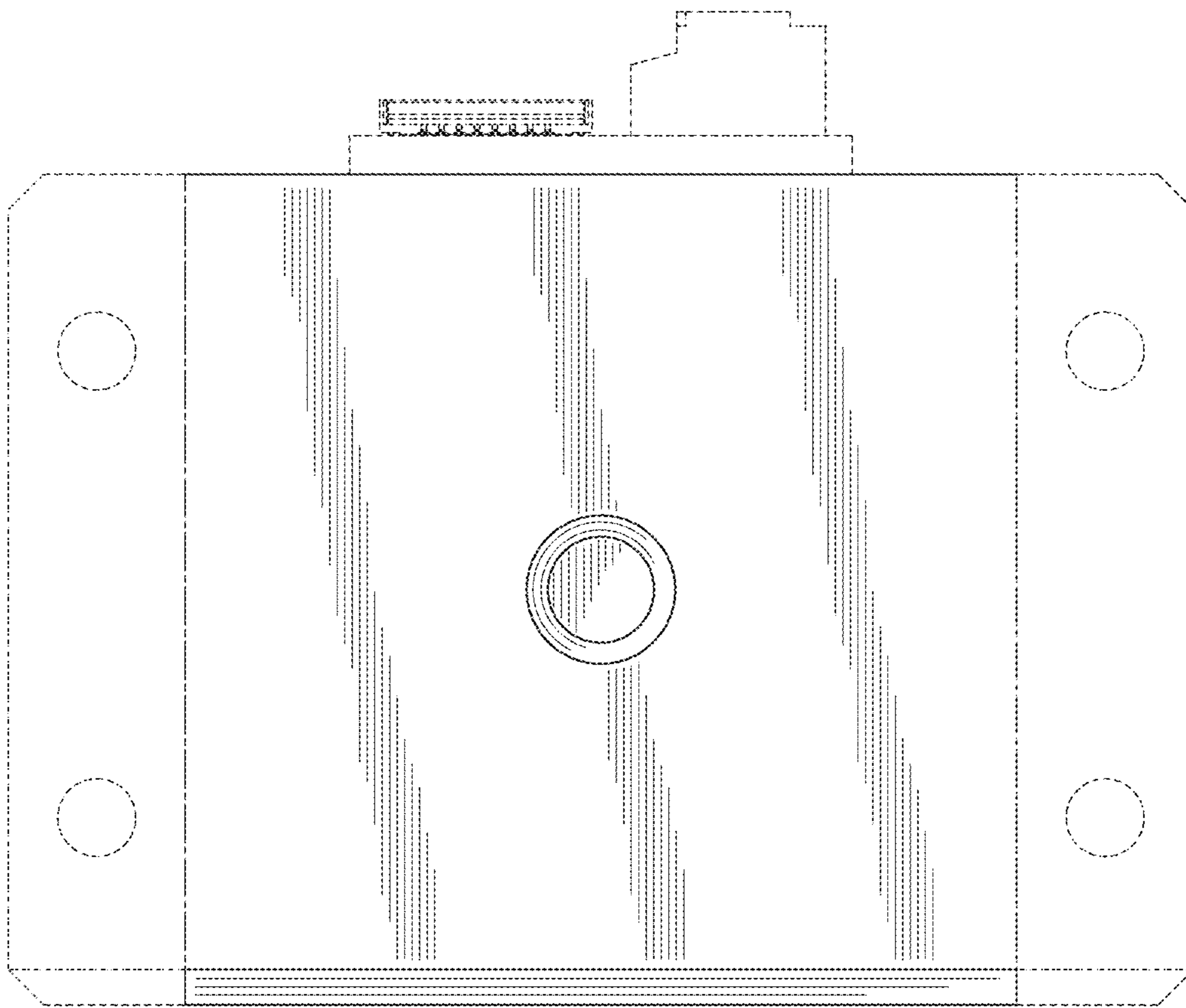


FIG. 4

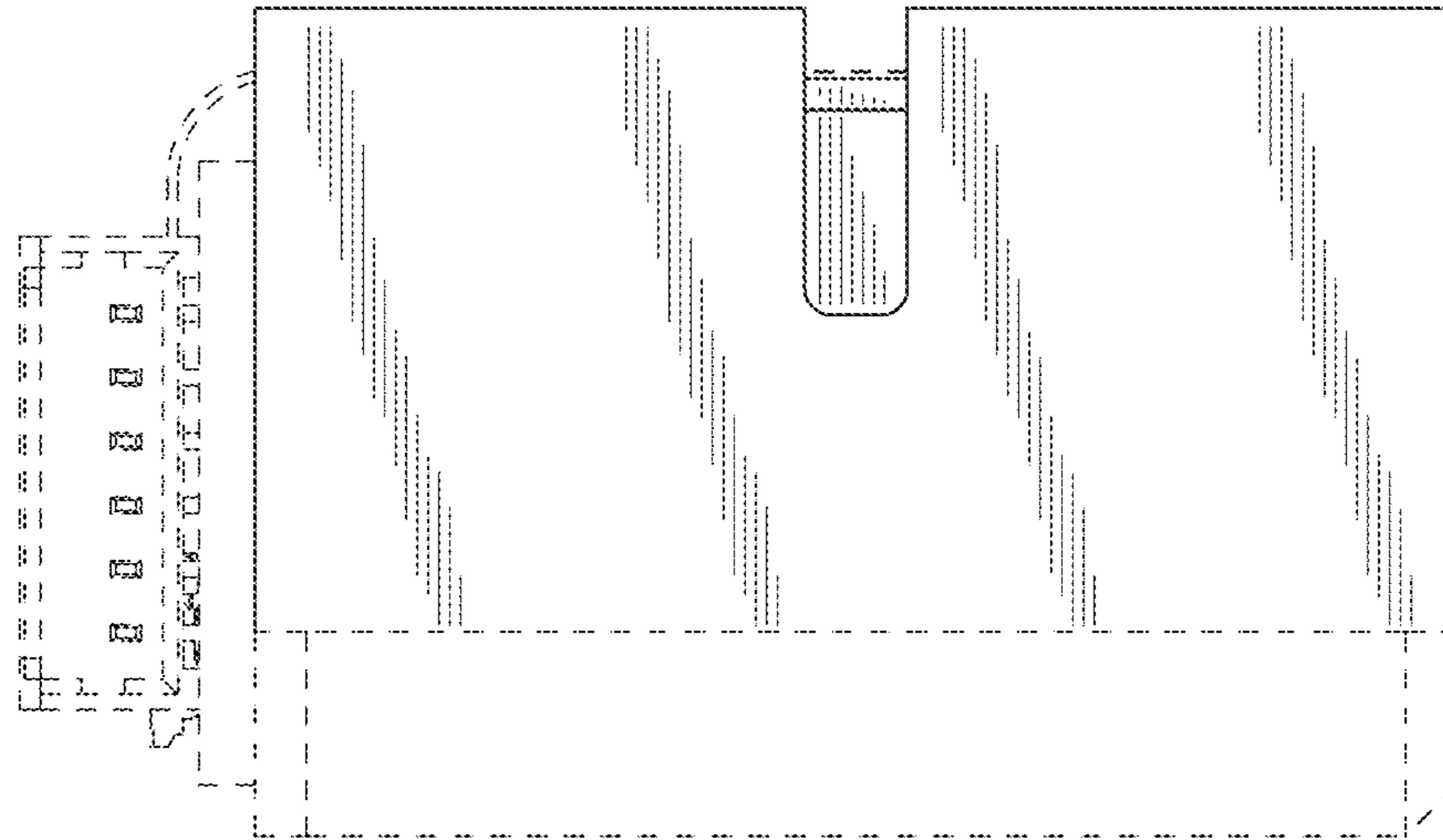


FIG. 5

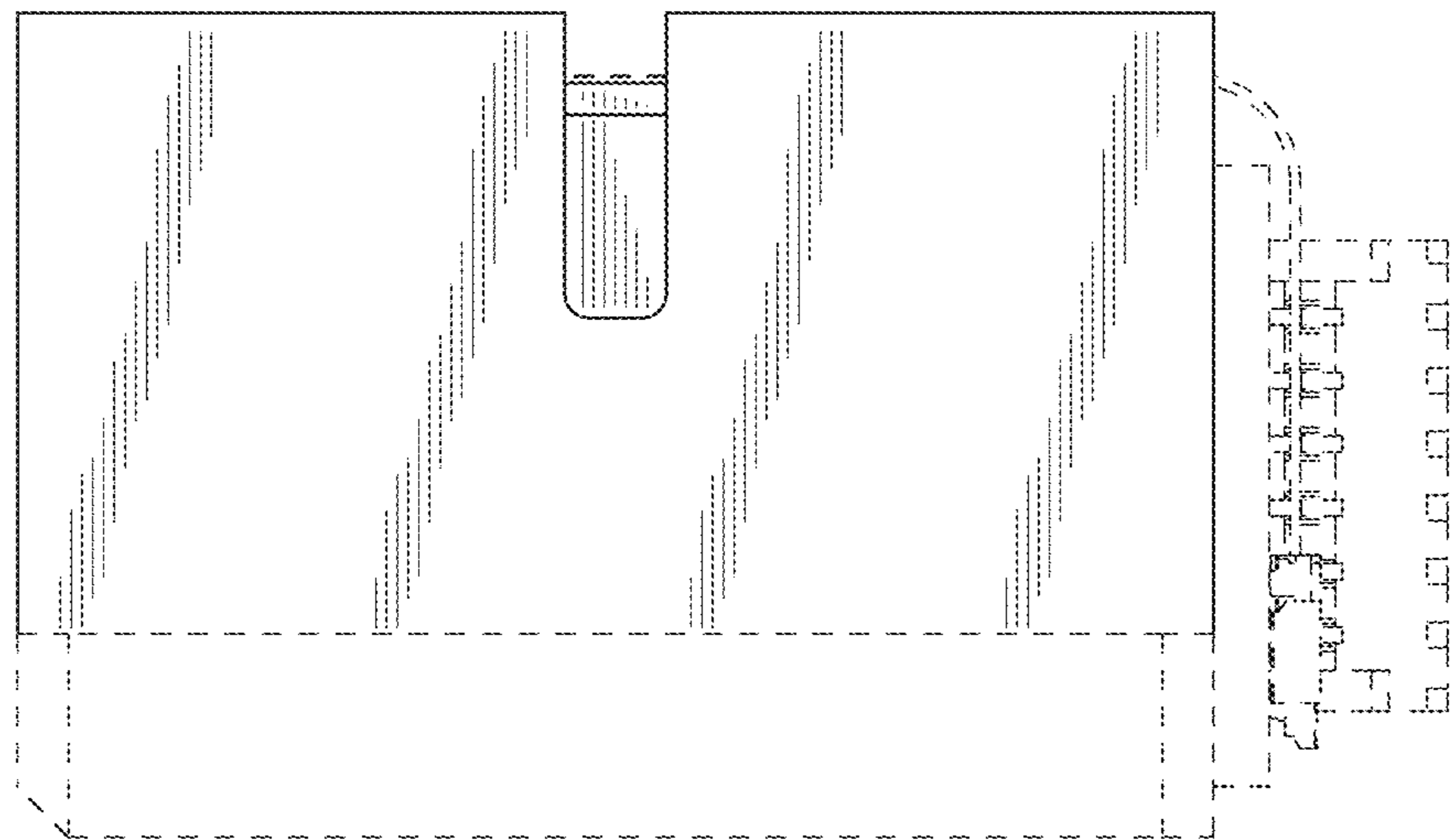


FIG. 6



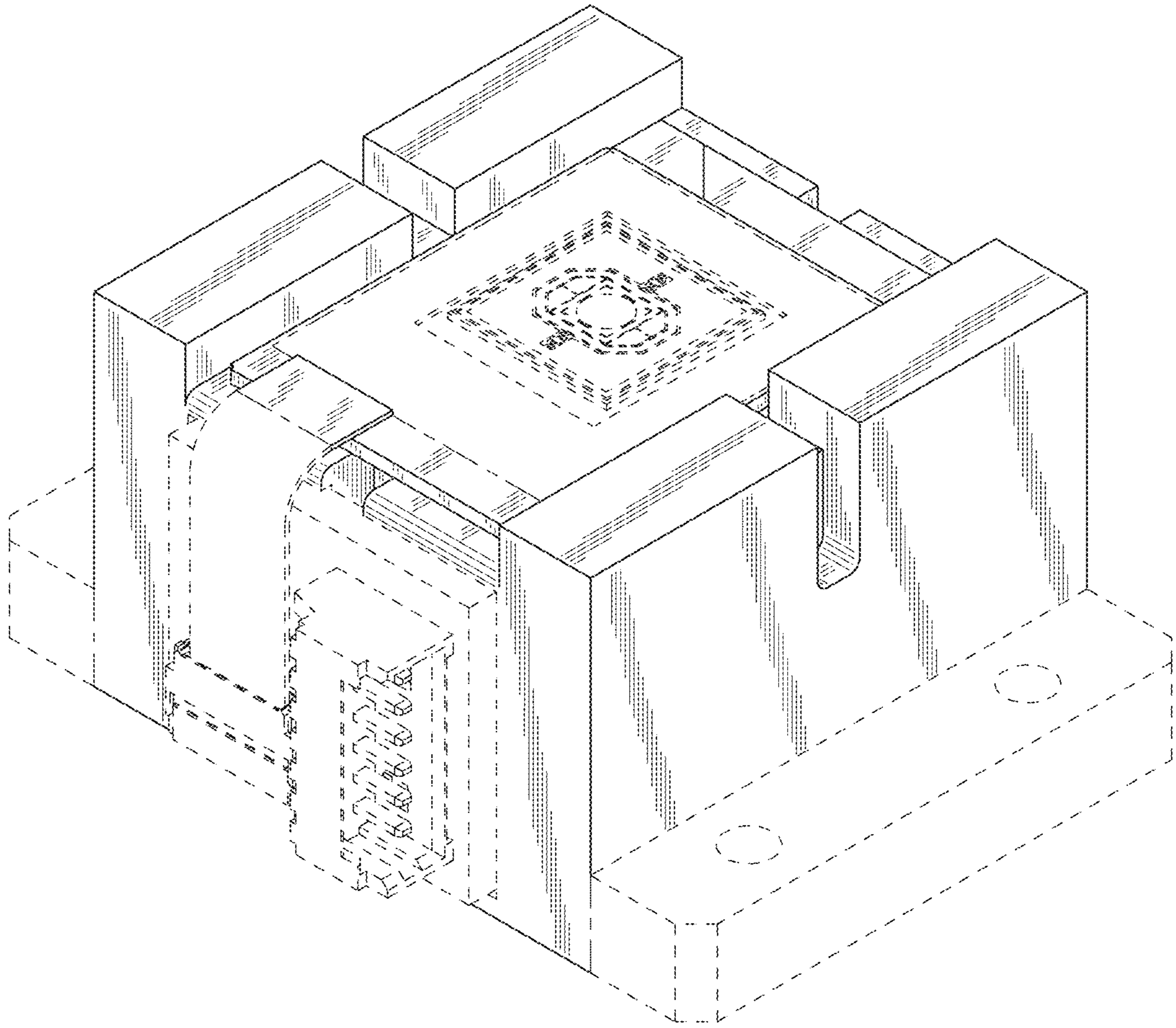


FIG. 7

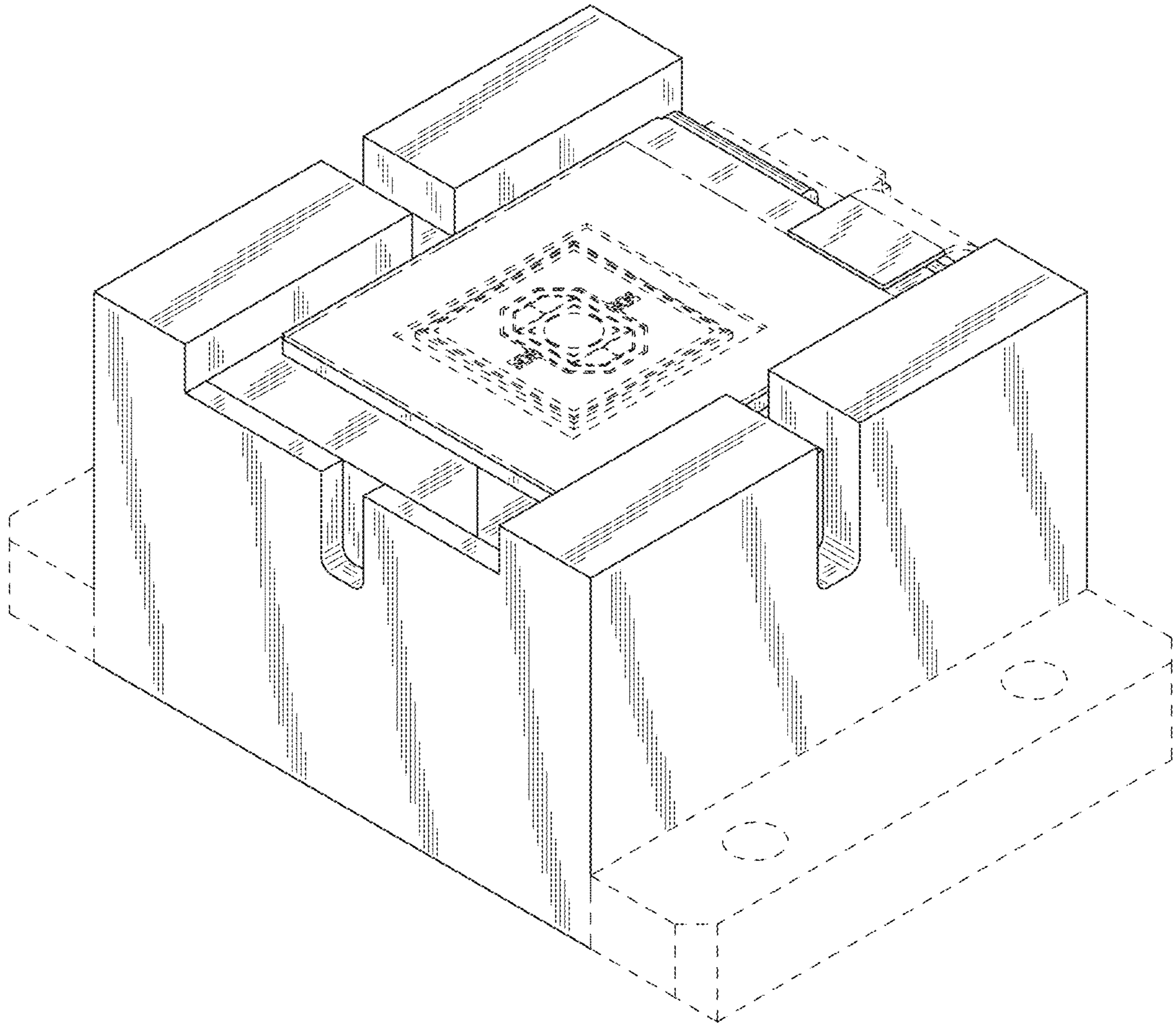


FIG. 8

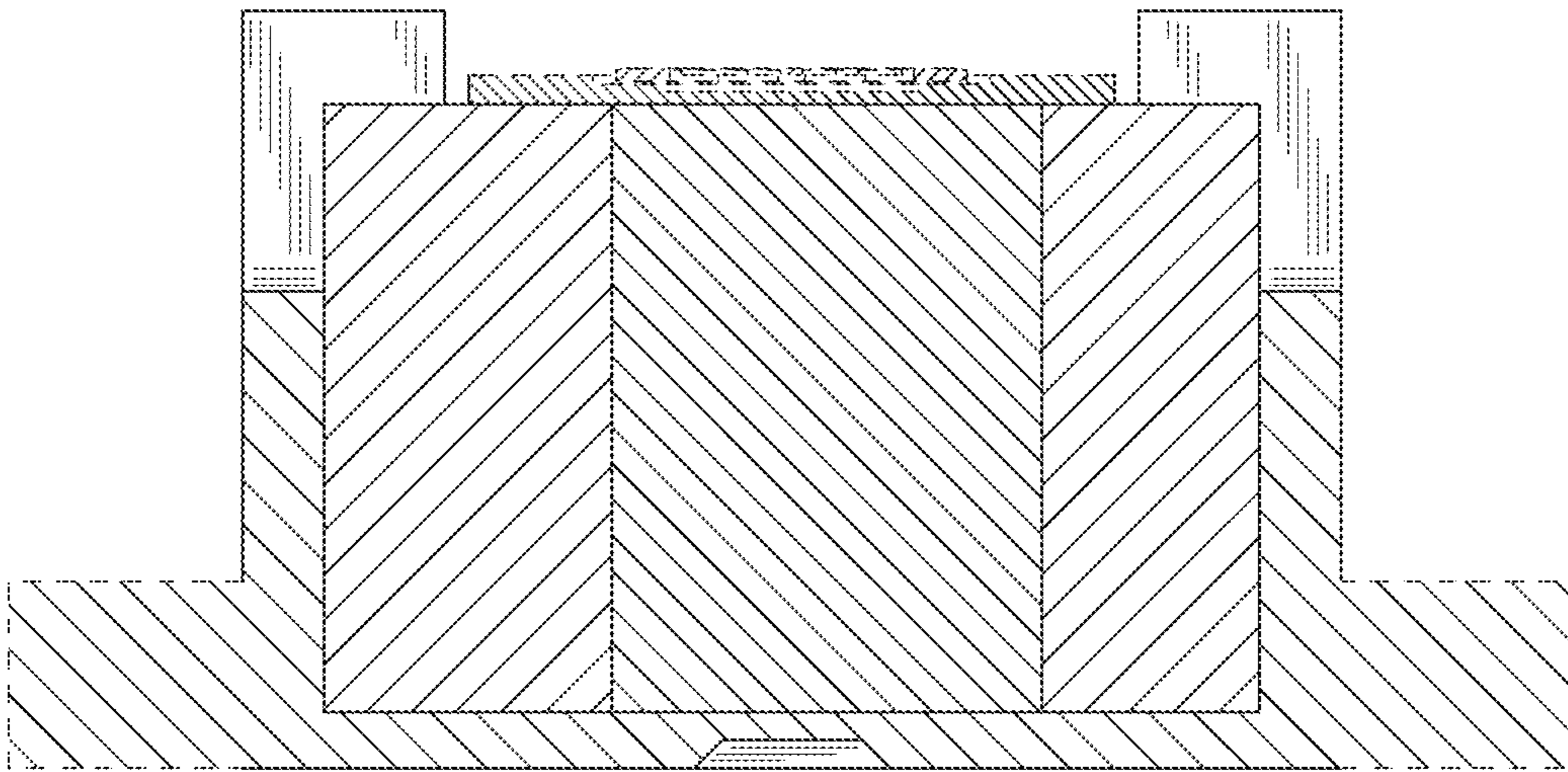


FIG. 9

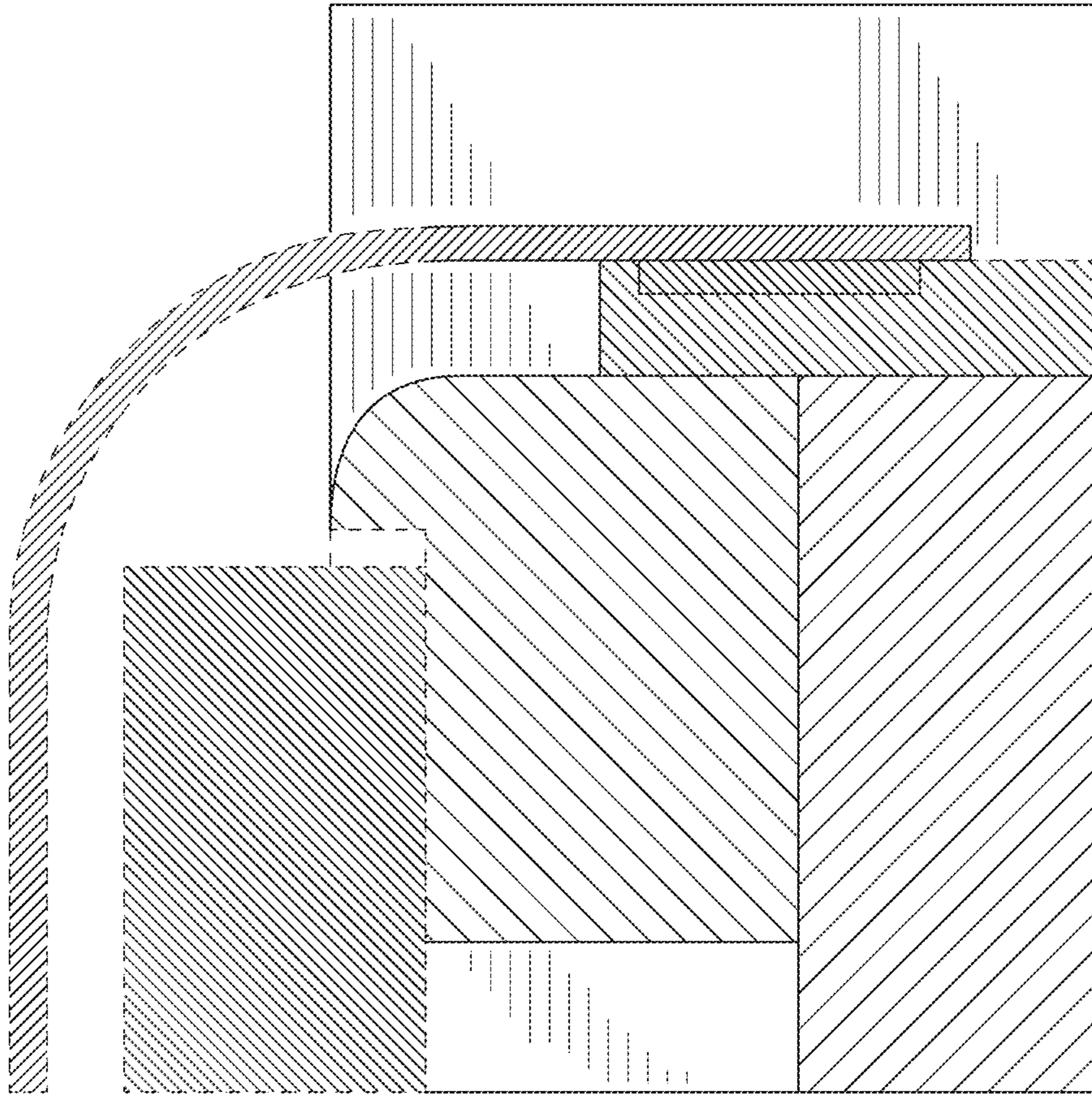


FIG. 10

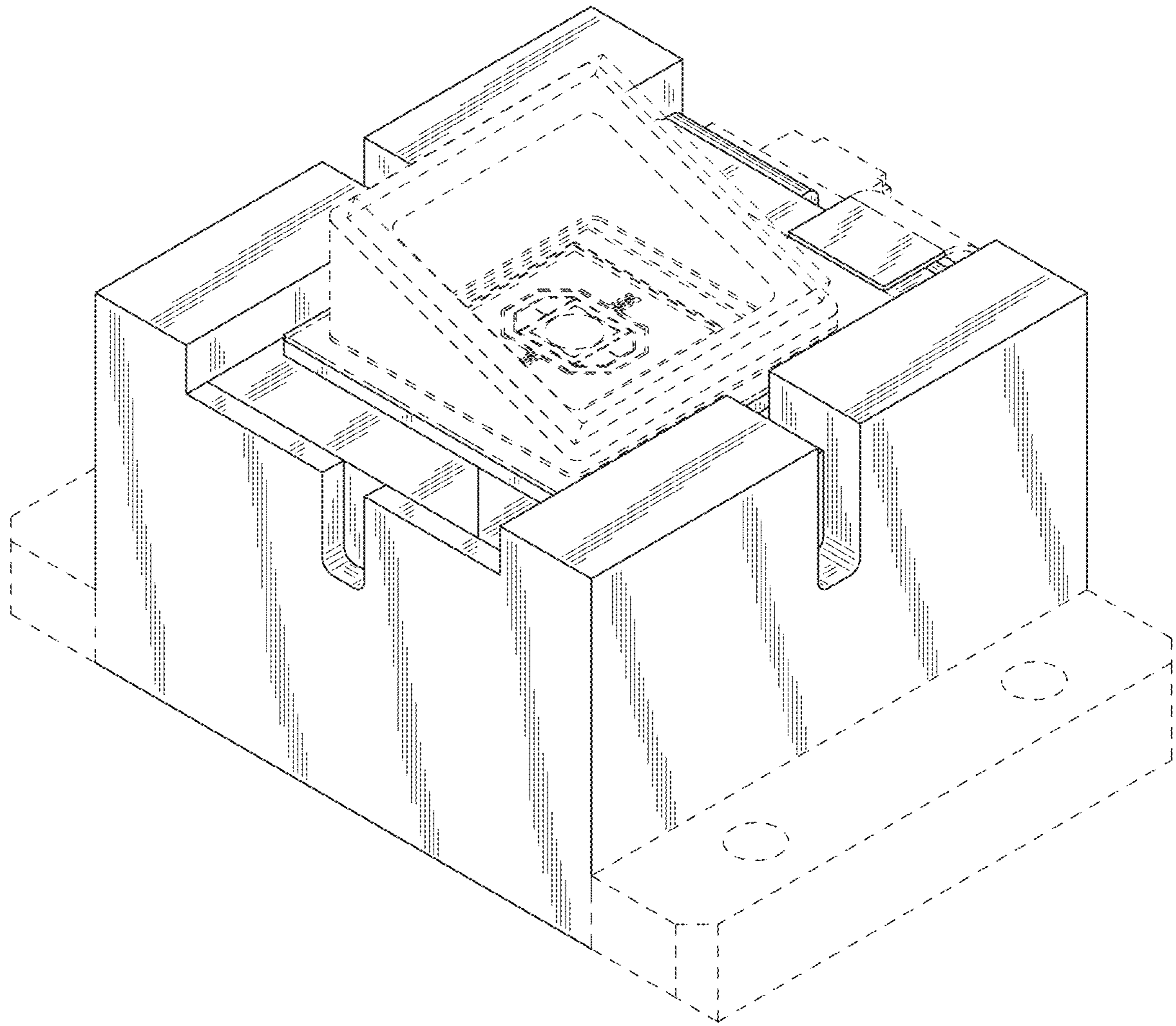


FIG. 11