



US00D983759S

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

(10) **Patent No.:** US D983,759 S  
(45) **Date of Patent:** \*\* Apr. 18, 2023

(54) **SEMICONDUCTOR MODULE**

(71) Applicant: **FUJI ELECTRIC CO., LTD.**,  
Kawasaki (JP)  
(72) Inventors: **Daiki Yoshida**, Matsumoto (JP);  
**Hikomichi Gohara**, Matsumoto (JP);  
**Shin Soyano**, Shiojiri (JP)  
(73) Assignee: **FUJI ELECTRIC CO., LTD.**,  
Kawasaki (JP)

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

(21) Appl. No.: **29/710,571**

(22) Filed: **Oct. 24, 2019**

(30) **Foreign Application Priority Data**

May 31, 2019 (JP) ..... 2019-11945

(51) **LOC (14) Cl.** ..... **13-03**

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

(58) **Field of Classification Search**

USPC ..... D13/182; 257/678, 684, 690, 691;  
361/679.01, 713, 728, 736, 760, 761, 772,  
361/775, 783, 820; 174/250, 253;  
438/15, 25, 26, 51, 55, 63, 64, 106  
CPC . H01L 21/00; H01L 2224/42; H01L 2224/43;  
H01L 2021/00; H01L 2021/02; H01L  
2021/04; H01L 21/4814; H01L 21/4846;  
H01L 21/4871; H01L 21/67144; H01L  
23/02; H01L 23/13; H01L 23/14;

(Continued)

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,347,160 A \* 9/1994 Sutrina ..... H01L 24/73  
257/691

D357,671 S \* 4/1995 Terasawa ..... D13/182  
(Continued)

**FOREIGN PATENT DOCUMENTS**

WO WO-2004105220 A2 \* 12/2004 ..... H01L 24/49

*Primary Examiner* — Elizabeth J Oswecki

(57) **CLAIM**

The ornamental design for a semiconductor module, as shown and described.

**DESCRIPTION**

FIG. 1 is a front view of a semiconductor module, showing our new design;

FIG. 2 is a rear view of the semiconductor module of FIG. 1;

FIG. 3 is a left side view of the semiconductor module of FIG. 1;

FIG. 4 is a right side view of the semiconductor module of FIG. 1;

FIG. 5 is a top view of the semiconductor module of FIG. 1;

FIG. 6 is a bottom view of the semiconductor module of FIG. 1;

FIG. 7 is a front, top, left side perspective view of the semiconductor module of FIG. 1;

FIG. 8 is another front, top, left side perspective view of the semiconductor module of FIG. 1;

FIG. 9 is a front, bottom and right side perspective view of the semiconductor module of FIG. 1;

FIG. 10 is a rear, top, and left side perspective view of the semiconductor module of FIG. 1;

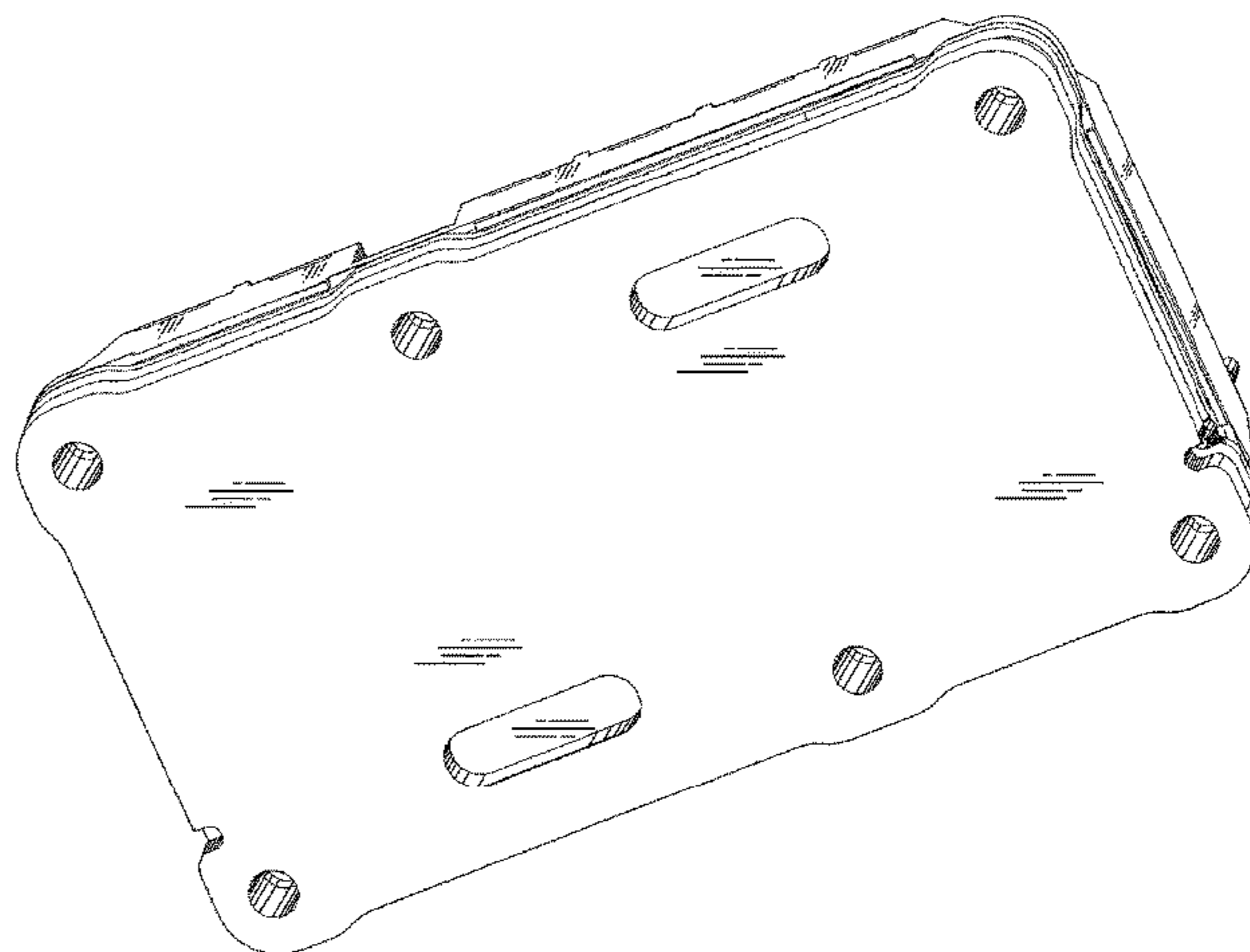
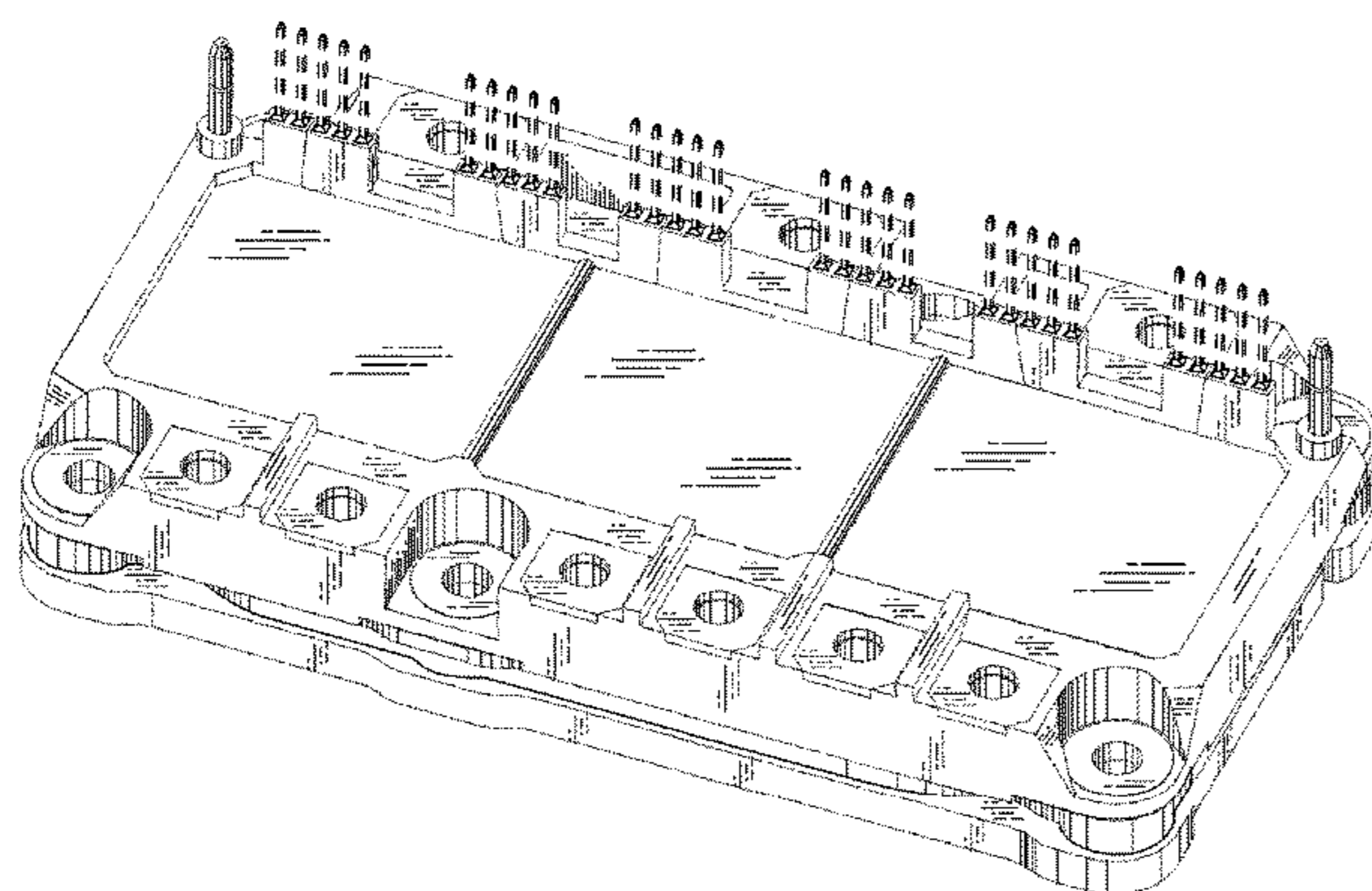
FIG. 11 is a rear, bottom, and right side perspective view of the semiconductor module of FIG. 1;

FIG. 12 is another rear, bottom, and right side perspective view of the semiconductor module of FIG. 1; and,

FIG. 13 is a cross sectional view taken along line 13-13 of FIG. 5, in which the internal structure is omitted.

The broken lines shown in the drawings represent portions of the semiconductor module that form no part of the claimed design.

**1 Claim, 13 Drawing Sheets**



(58) **Field of Classification Search**

CPC ..... H01L 23/147; H01L 2924/171; H01L 2924/1711; H01L 2924/1715; H01L 2924/17151; H01L 2924/181; H01L 2924/1811; H01L 2924/1815; H01L 2924/19042; H01L 2924/1905; H01L 2224/08054; H01L 23/58; H05B 41/14; H02B 6/4201; G02B 6/4256; G02B 6/4257; G02B 6/4261; G02B 6/4262; G02B 6/428; G02B 6/4281; H05K 1/14; H05K 1/141; H05K 1/142; H05K 1/144; H05K 1/18; H05K 1/181; H05K 1/182; H05K 1/026

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

D396,450 S \* 7/1998 Nishiura ..... D13/182  
 6,521,983 B1 \* 2/2003 Yoshimatsu ..... H01L 24/49  
 257/E25.031  
 D556,686 S \* 12/2007 Matsuo ..... D13/110  
 D587,662 S \* 3/2009 Soutome ..... D13/182  
 D606,951 S \* 12/2009 Soyano ..... D13/182  
 D653,633 S \* 2/2012 Soyano ..... D13/182  
 D653,634 S \* 2/2012 Soyano ..... D13/182  
 D686,174 S \* 7/2013 Soyano ..... D13/182  
 D689,446 S \* 9/2013 Soyano ..... D13/180

D759,604 S \* 6/2016 Yoneyama ..... D13/182  
 D762,185 S \* 7/2016 Muehlensiep ..... D13/182  
 9,418,975 B1 \* 8/2016 Yoneyama ..... H01L 25/072  
 D766,851 S \* 9/2016 Yoneyama ..... D13/182  
 D767,516 S \* 9/2016 Yoneyama ..... D13/182  
 D772,184 S \* 11/2016 Soyano ..... D13/182  
 D773,412 S \* 12/2016 Yoneyama ..... D13/182  
 D773,413 S \* 12/2016 Yoneyama ..... D13/182  
 D774,479 S \* 12/2016 Soyano ..... D13/182  
 D775,091 S \* 12/2016 Edenharter ..... D13/182  
 D775,593 S 1/2017 Edenharter et al.  
 D776,071 S \* 1/2017 Edenharter ..... D13/182  
 D790,491 S \* 6/2017 Hayashida ..... D13/182  
 D798,832 S \* 10/2017 Hayashida ..... D13/182  
 D799,439 S \* 10/2017 Hayashiguchi ..... D13/182  
 D814,431 S \* 4/2018 Matsumoto ..... D13/182  
 D814,433 S 4/2018 Soyano et al.  
 D864,884 S \* 10/2019 Yoneyama ..... D13/182  
 D888,673 S \* 6/2020 Furutani ..... D13/182  
 D903,612 S \* 12/2020 Soyano ..... D13/182  
 2001/0038143 A1 \* 11/2001 Sonobe ..... H01L 25/072  
 257/E25.012  
 2004/0227231 A1 \* 11/2004 Maly ..... H01L 25/072  
 257/E23.114  
 2010/0149774 A1 \* 6/2010 Matsumoto ..... H05K 3/308  
 361/783  
 2015/0185283 A1 \* 7/2015 Mittal ..... G01R 31/318547  
 714/731  
 2016/0276234 A1 \* 9/2016 Sugiyama ..... H01L 23/04

\* cited by examiner

FIG. 1

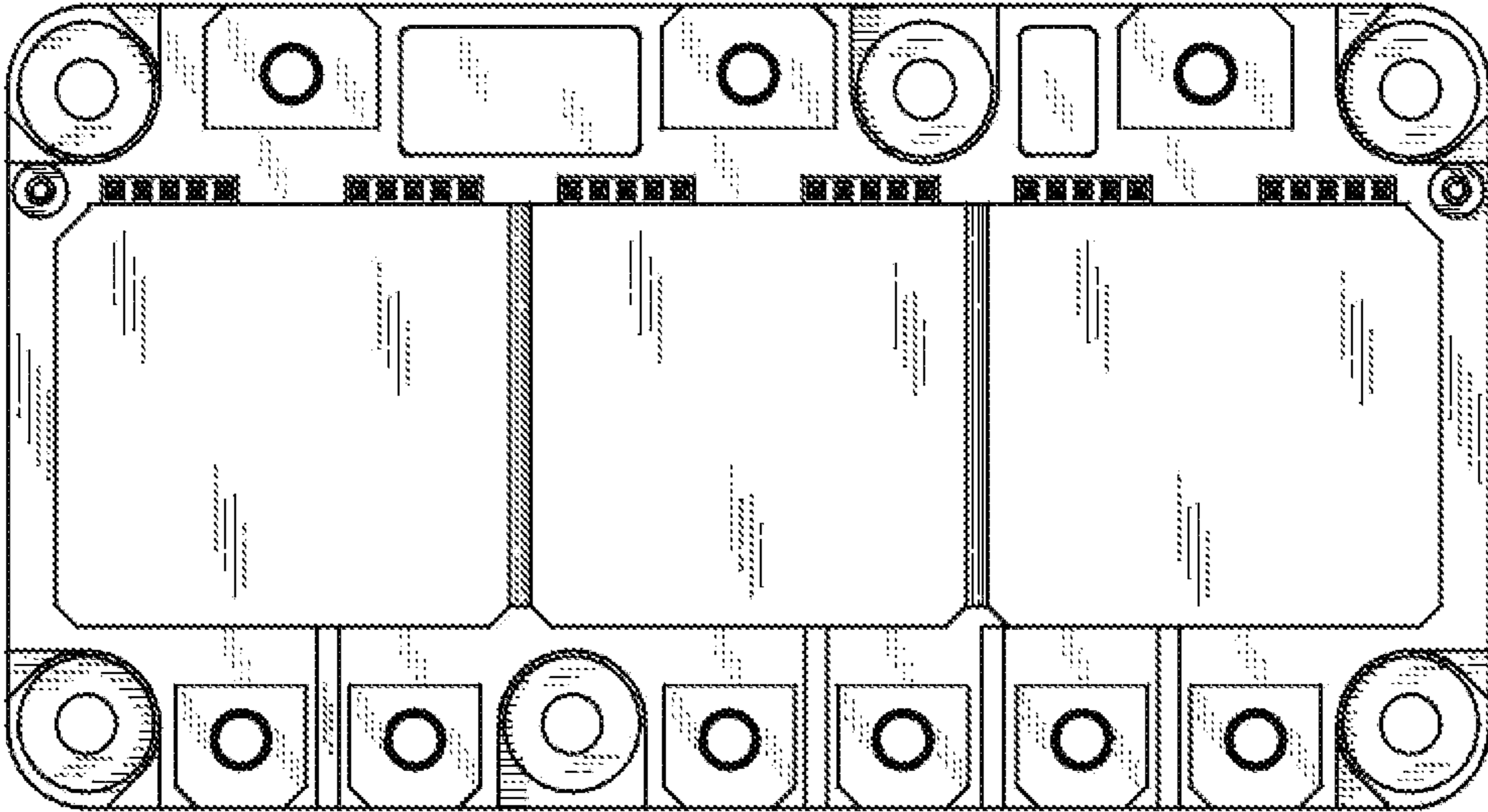


FIG.2

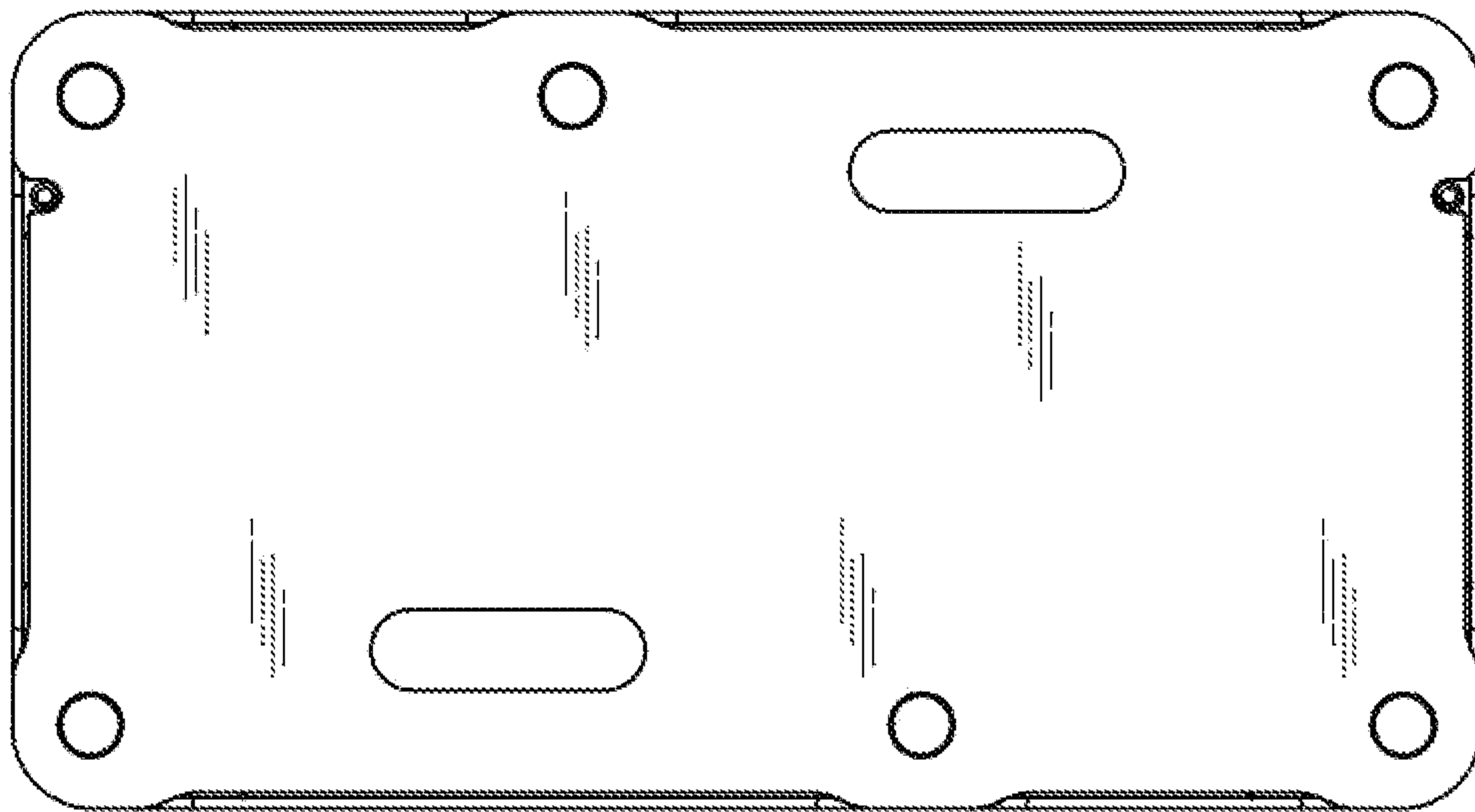




FIG. 3

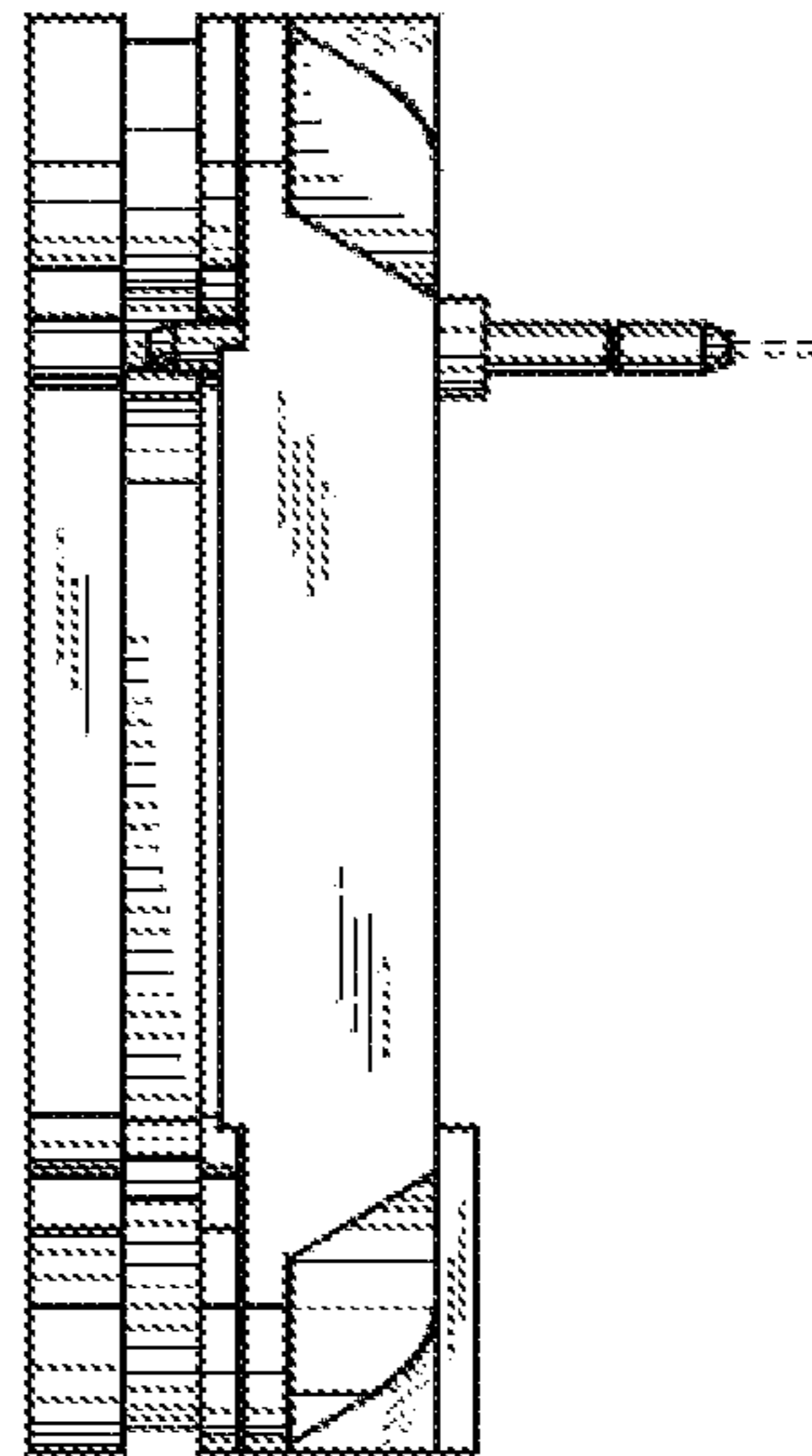


FIG.4

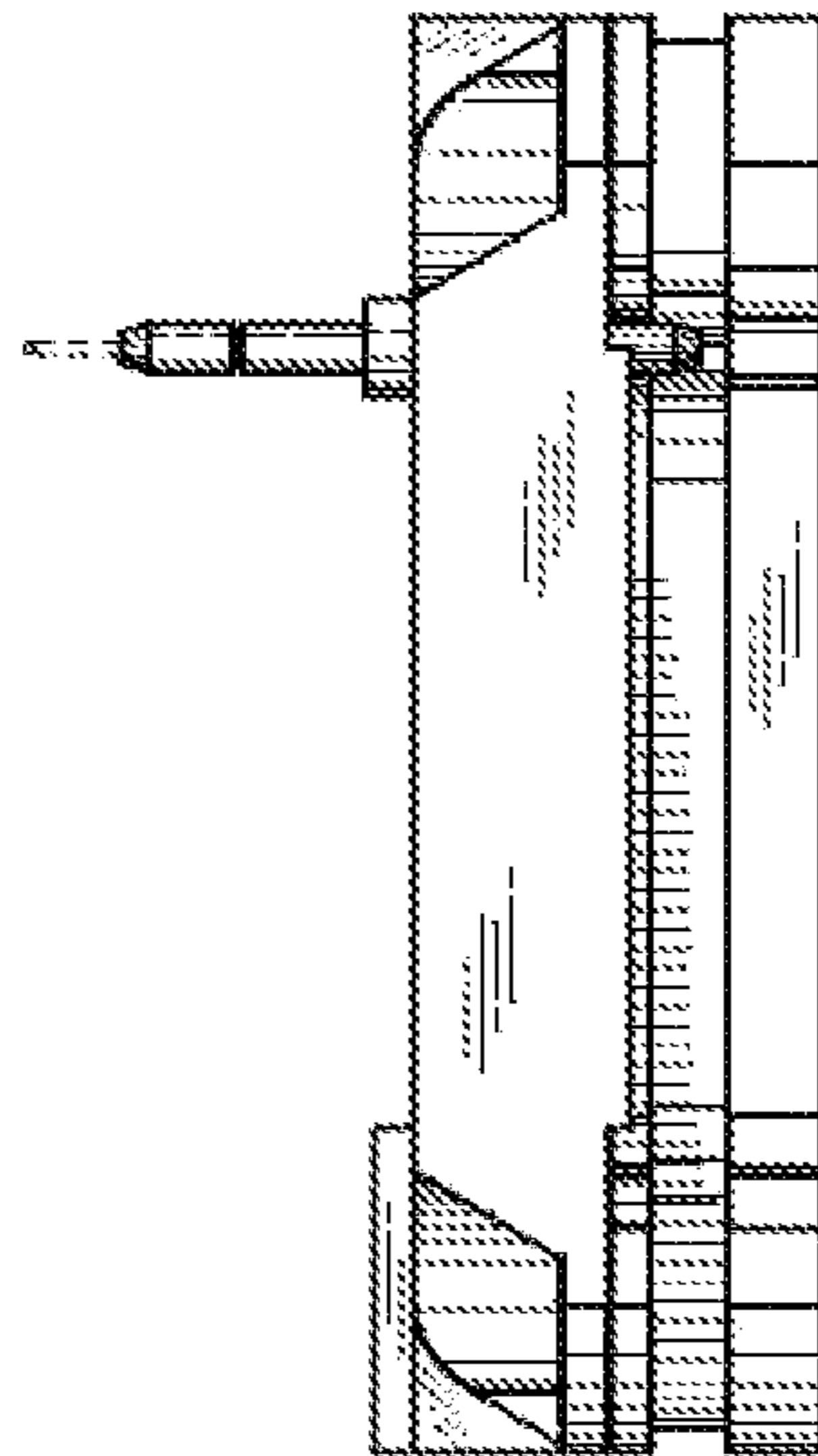


FIG.5

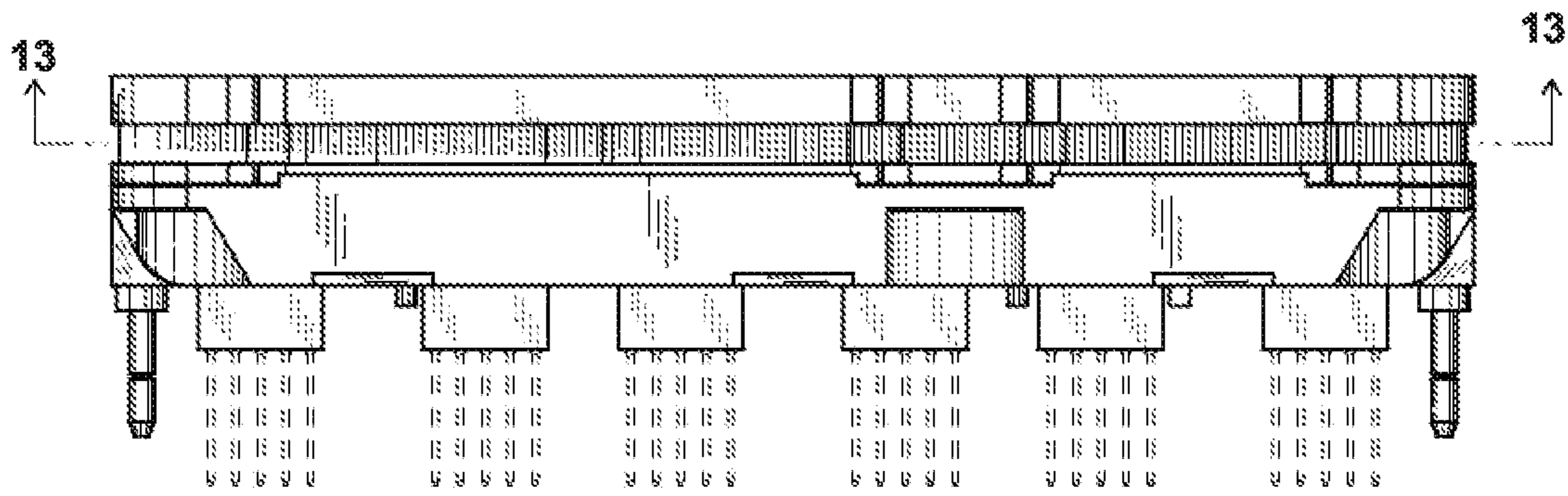


FIG.6

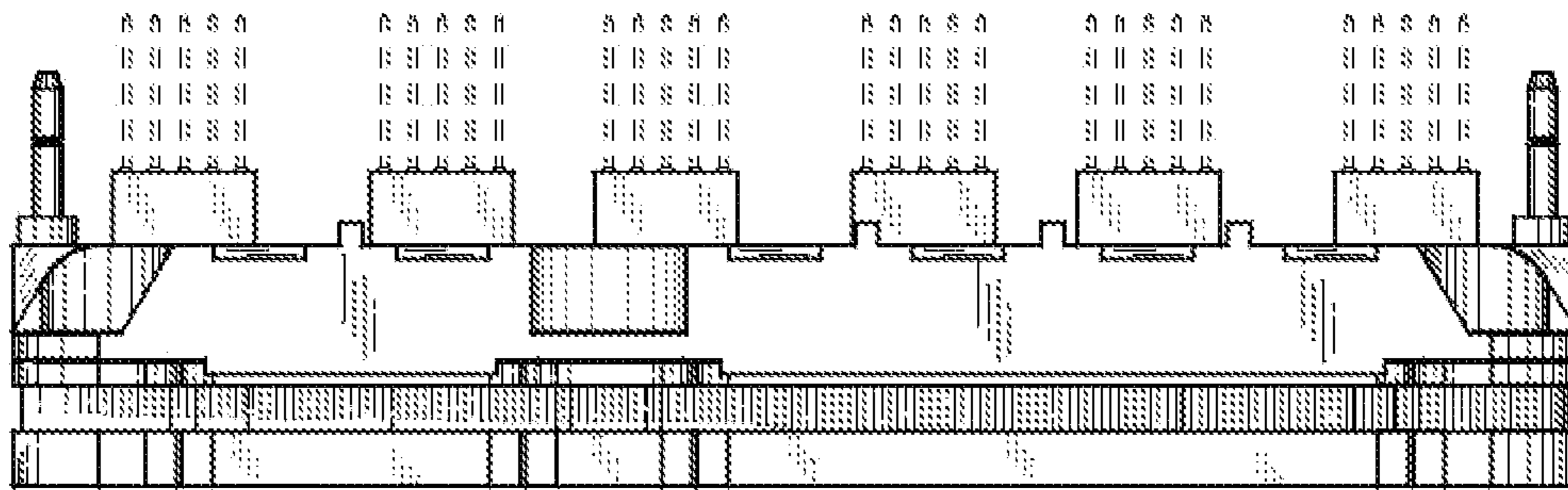




FIG.7

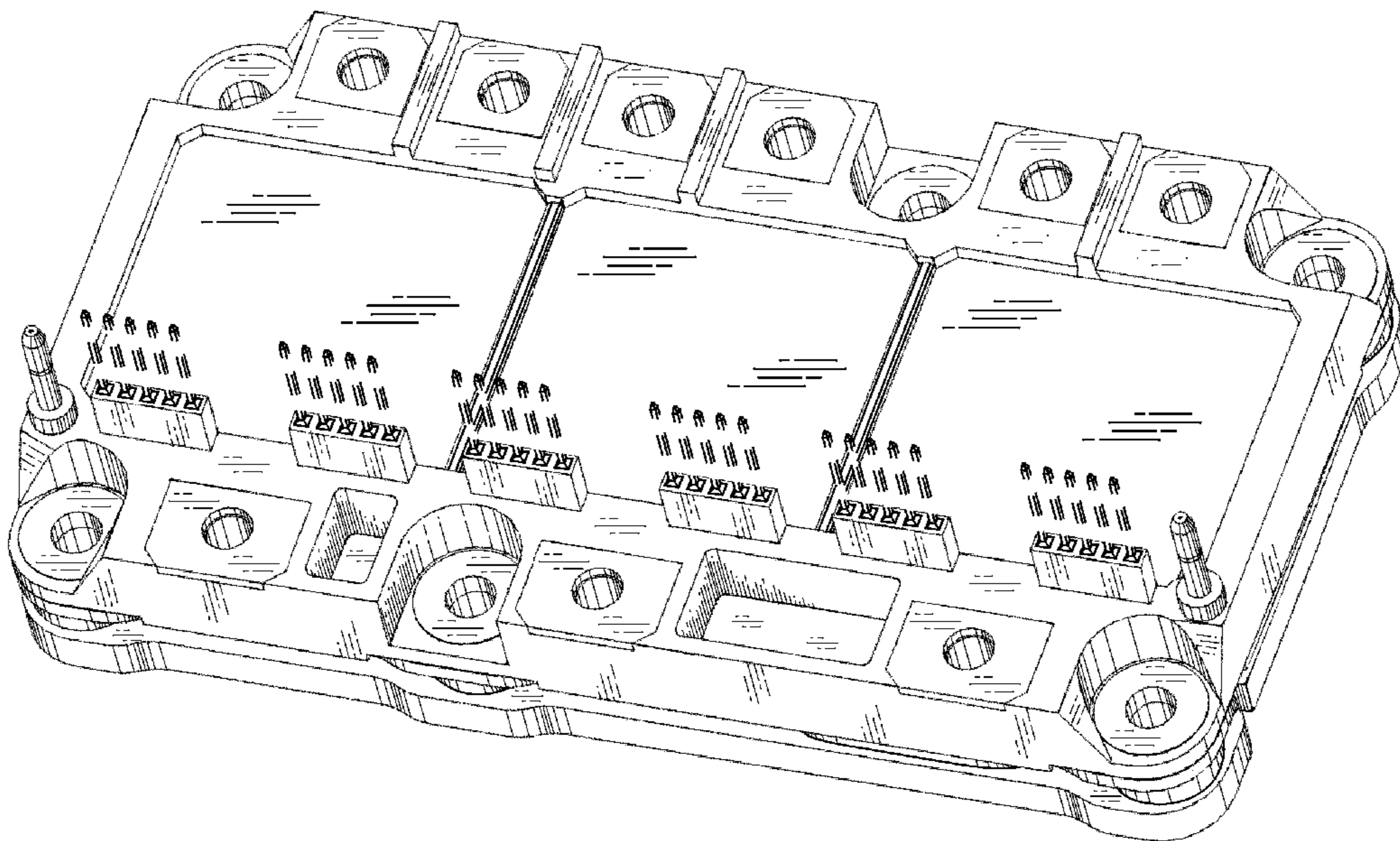


FIG.8

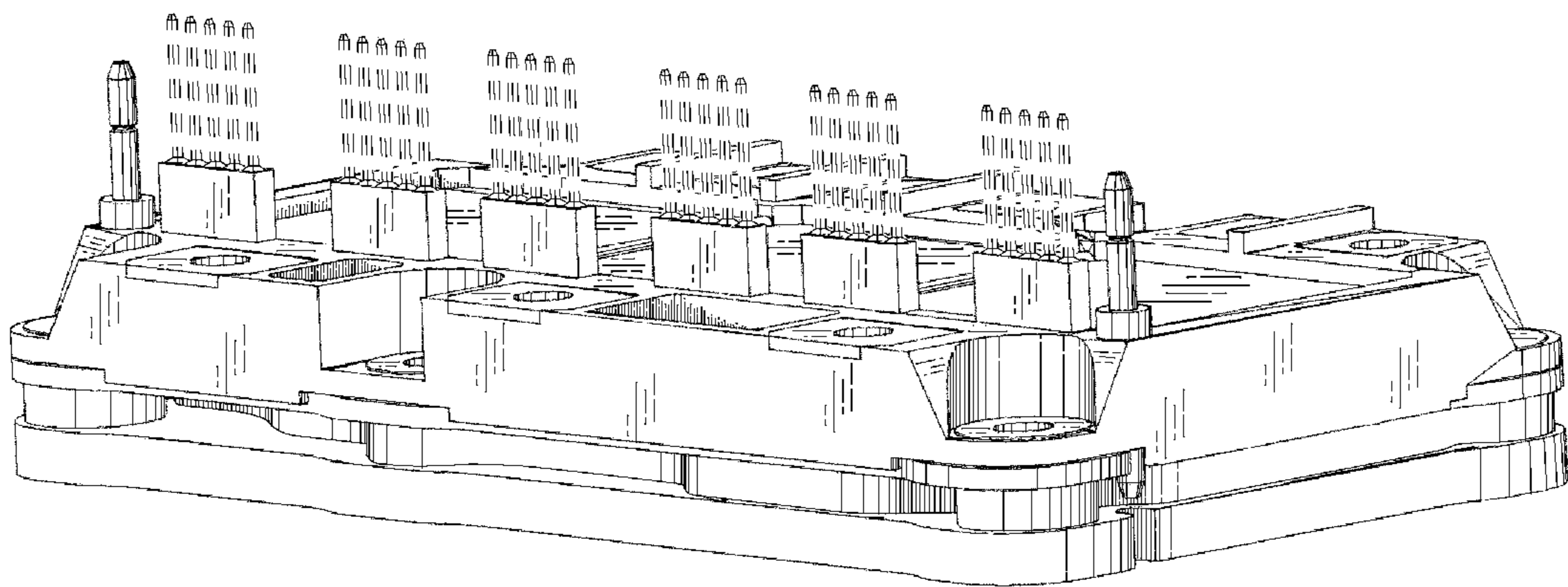


FIG.9

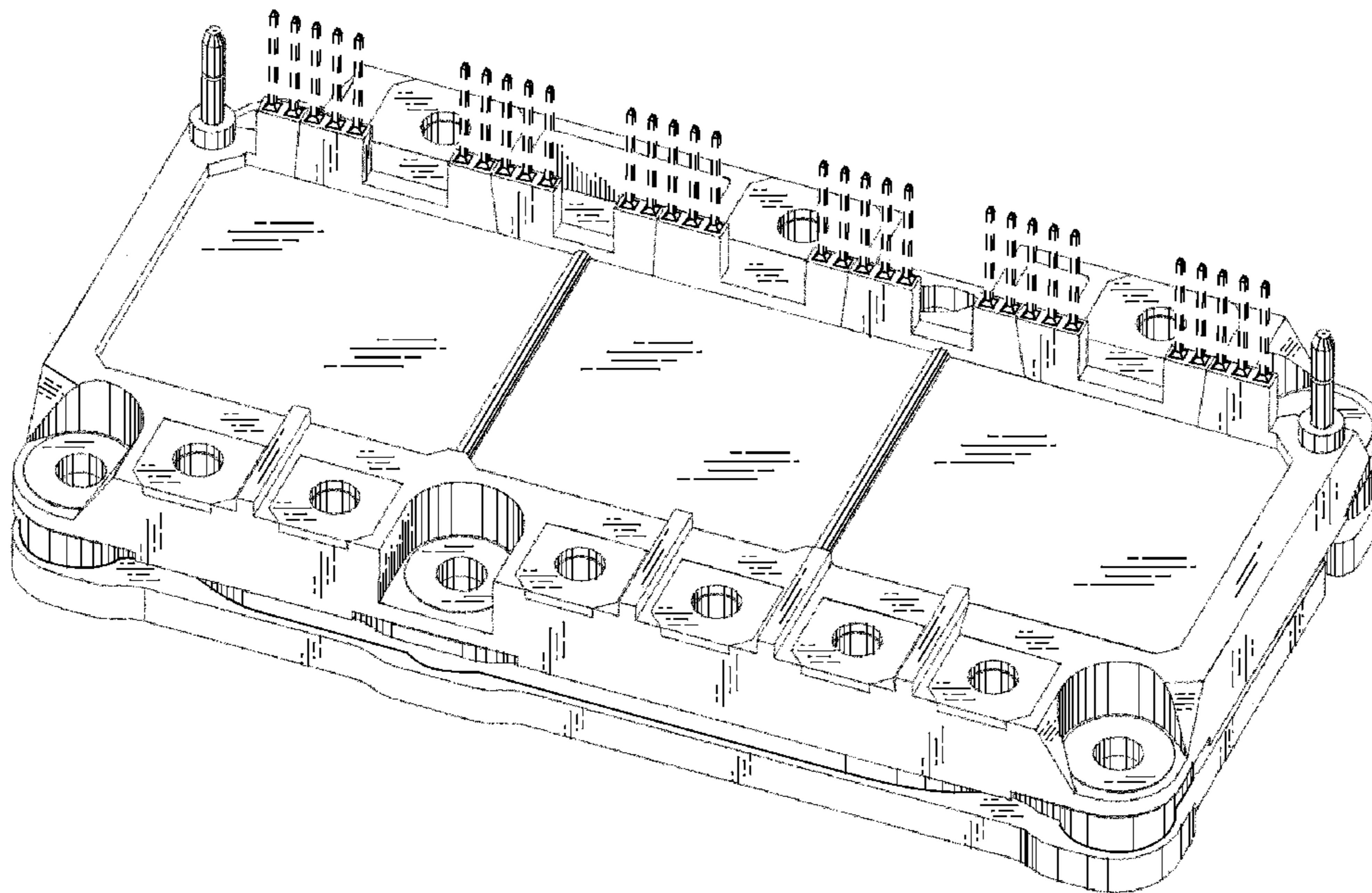


FIG. 10

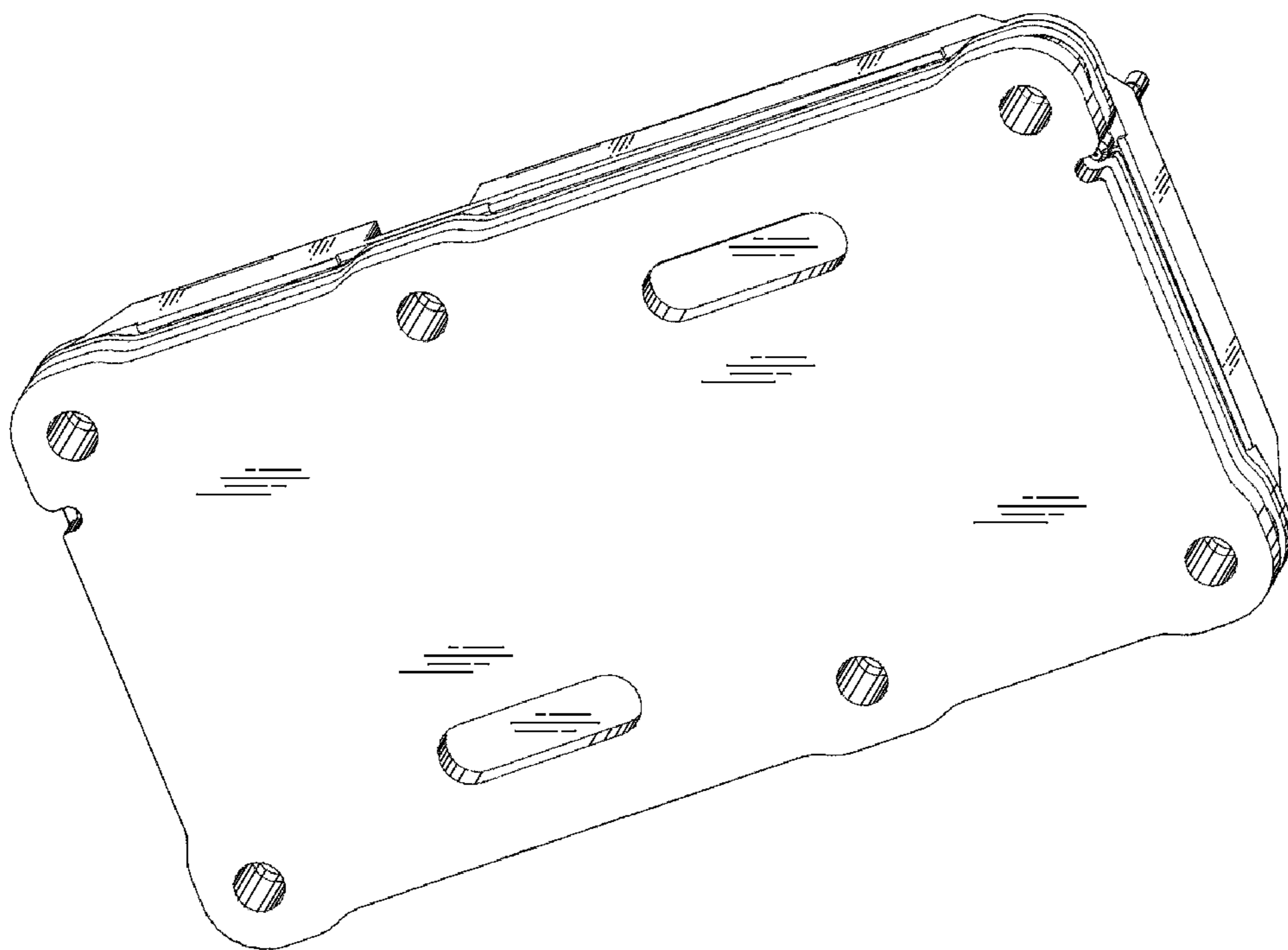


FIG.11

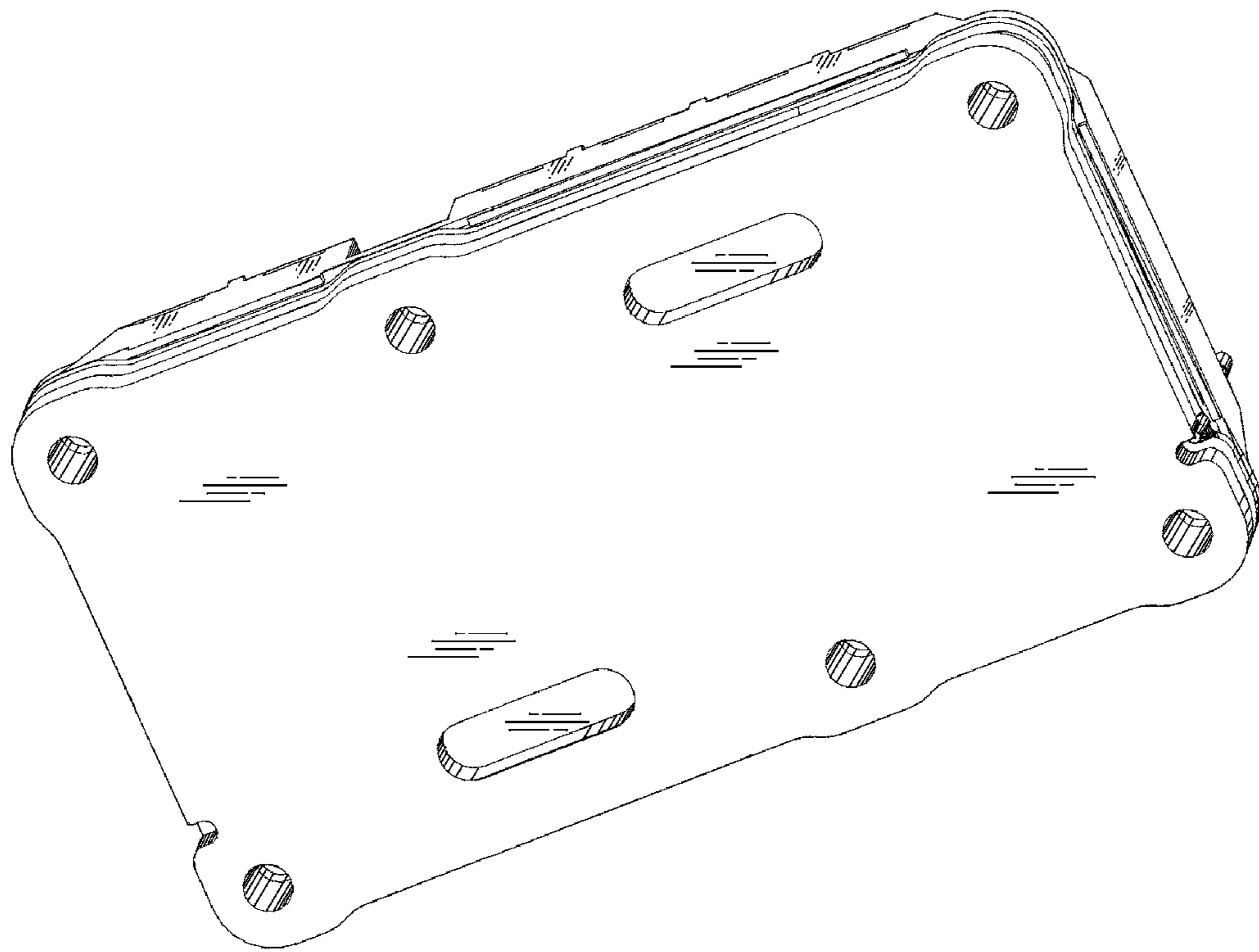




FIG.12

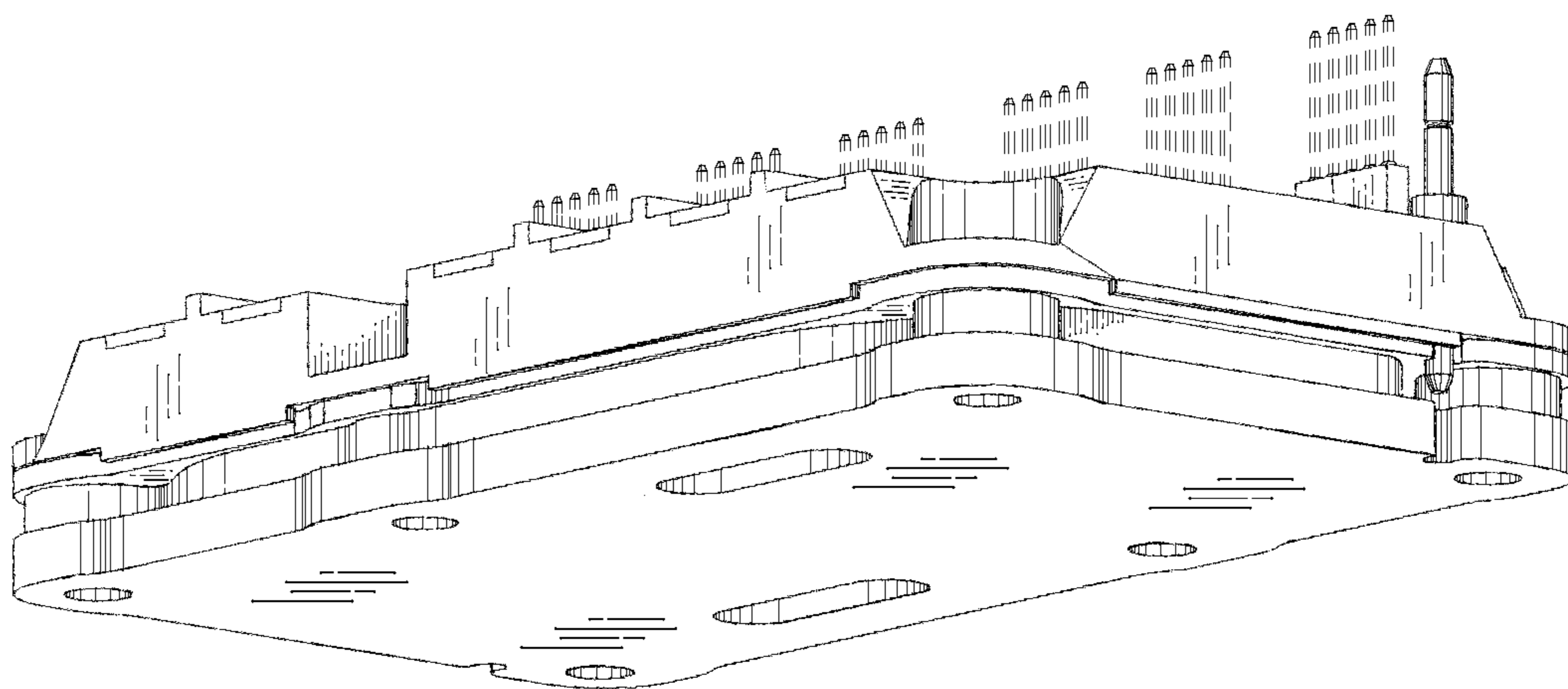


FIG.13

