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

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(54) **SEMICONDUCTOR MODULE**

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

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(30) **Foreign Application Priority Data**

Jun. 1, 2018 (JP) 2018-012139

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

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

(58) **Field of Classification Search**
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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
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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
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G02B 6/428;

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

D441,726 S * 5/2001 Sofue D13/182
6,521,983 B1 * 2/2003 Yoshimatsu H01L 25/072
257/678

(Continued)

OTHER PUBLICATIONS

Stegner et al., "New PrimePACK™ package to lever IGBT5",
PCIM Europe 2015, vol. 19 No. 21, May 2015, pp. 766-771.

Primary Examiner — Elizabeth J Oswecki

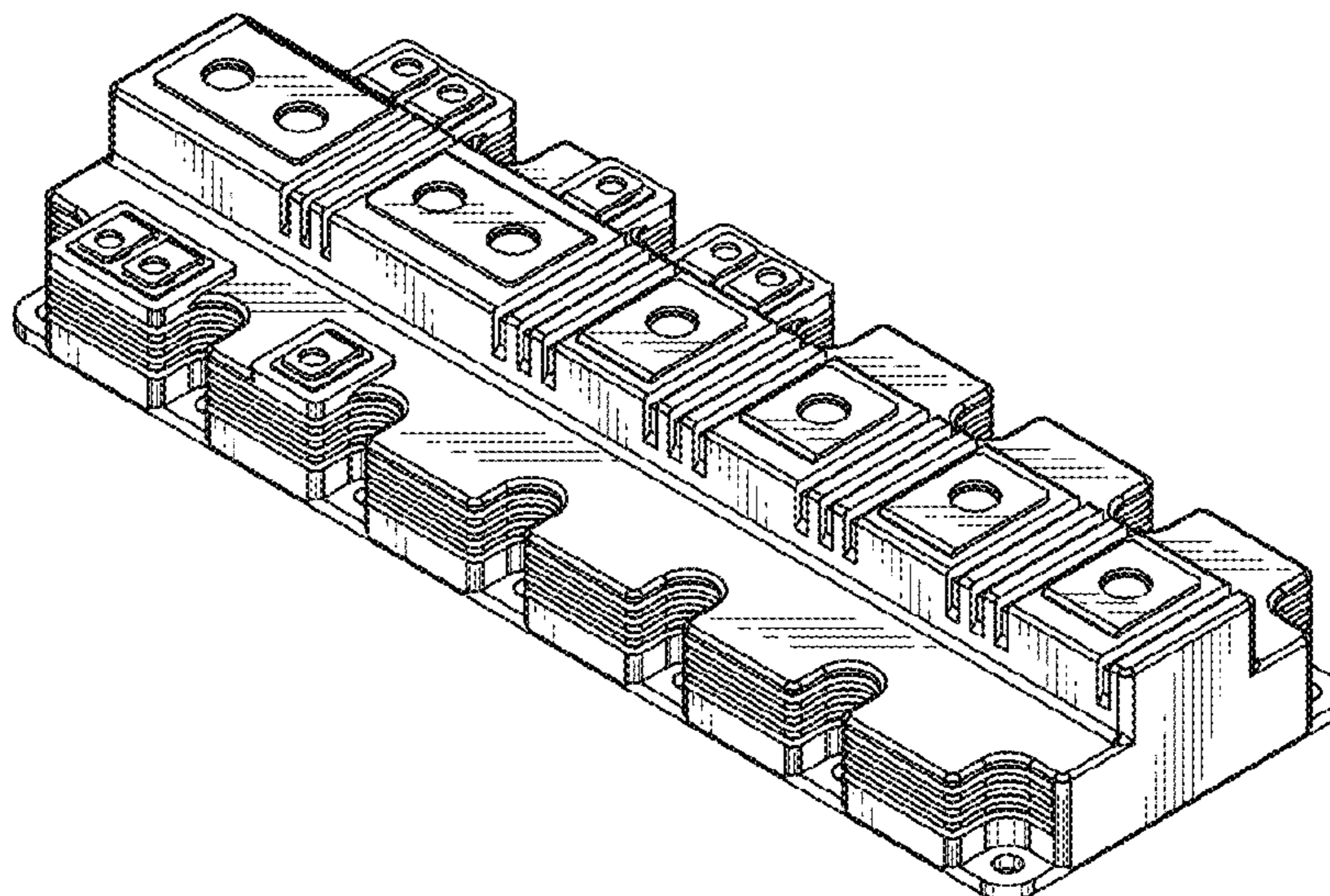
(57) **CLAIM**

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 top, front, and right side perspective view of the semiconductor module of FIG. 1; and,
FIG. 8 is a top, rear, and left side perspective view of the semiconductor module of FIG. 1.
The portions of the semiconductor module shown in broken lines form no part of the claimed design.

1 Claim, 8 Drawing Sheets



(58) **Field of Classification Search**

CPC 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

D476,959 S * 7/2003 Yamada D13/182
 D503,149 S * 3/2005 Teramae D13/110
 D587,662 S * 3/2009 Soutome 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
 8,526,199 B2 * 9/2013 Matsumoto H01L 23/04
 361/783
 D703,625 S * 4/2014 Lim D13/182
 D704,670 S 5/2014 Chen et al.
 D704,671 S 5/2014 Chen et al.
 D710,317 S 8/2014 Chen et al.
 D710,318 S 8/2014 Chen et al.
 D710,319 S * 8/2014 Chen D13/182
 D710,391 S 8/2014 Chu
 D748,595 S * 2/2016 Bertalan D13/182
 D754,084 S * 4/2016 Kawase D13/182
 D759,604 S * 6/2016 Yoneyama D13/182

D762,185 S * 7/2016 Muehlensiep D13/182
 D762,597 S * 8/2016 Bertalan D13/182
 9,418,975 B1 * 8/2016 Yoneyama H01L 25/18
 D766,851 S * 9/2016 Yoneyama D13/182
 D773,412 S * 12/2016 Yoneyama D13/182
 D774,479 S * 12/2016 Soyano D13/182
 D775,593 S * 1/2017 Edenharter D13/182
 D776,071 S * 1/2017 Edenharter D13/182
 D785,577 S * 5/2017 Kawase D13/182
 9,660,356 B1 * 5/2017 Nakamura H01R 4/30
 D790,491 S * 6/2017 Hayashida D13/182
 D798,832 S * 10/2017 Hayashida D13/182
 D799,439 S * 10/2017 Hayashiguchi D13/182
 D805,485 S * 12/2017 Kawase D13/182
 D814,433 S * 4/2018 Soyano D13/182
 D827,591 S * 9/2018 Ikeda D13/182
 D847,103 S * 4/2019 Sawada D13/182
 D847,104 S * 4/2019 Sawada D13/182
 D858,467 S * 9/2019 Sawada D13/182
 2001/0038143 A1 * 11/2001 Sonobe H01L 24/49
 257/690
 2004/0227231 A1 * 11/2004 Maly H01L 25/072
 257/724
 2008/0142948 A1 * 6/2008 Matsumoto H01R 4/04
 257/690
 2016/0190915 A1 * 6/2016 Horiuchi H01L 29/7393
 363/132
 2016/0284618 A1 * 9/2016 Tsukamoto H01L 23/055
 * cited by examiner

FIG.1

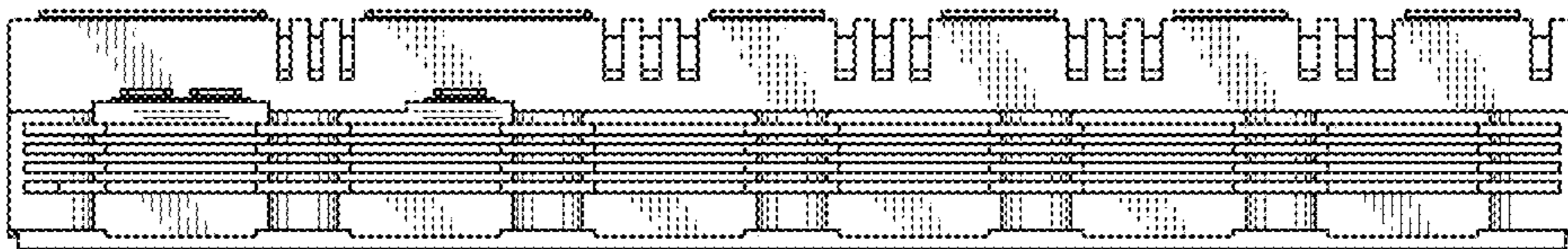


FIG.2

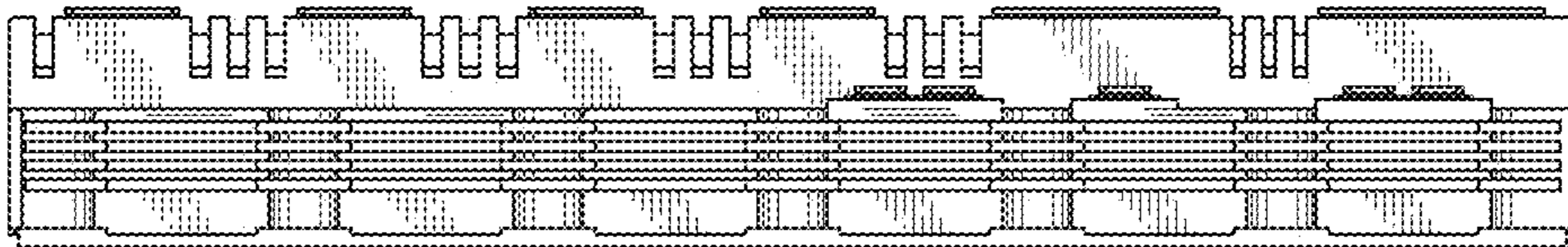


FIG.3

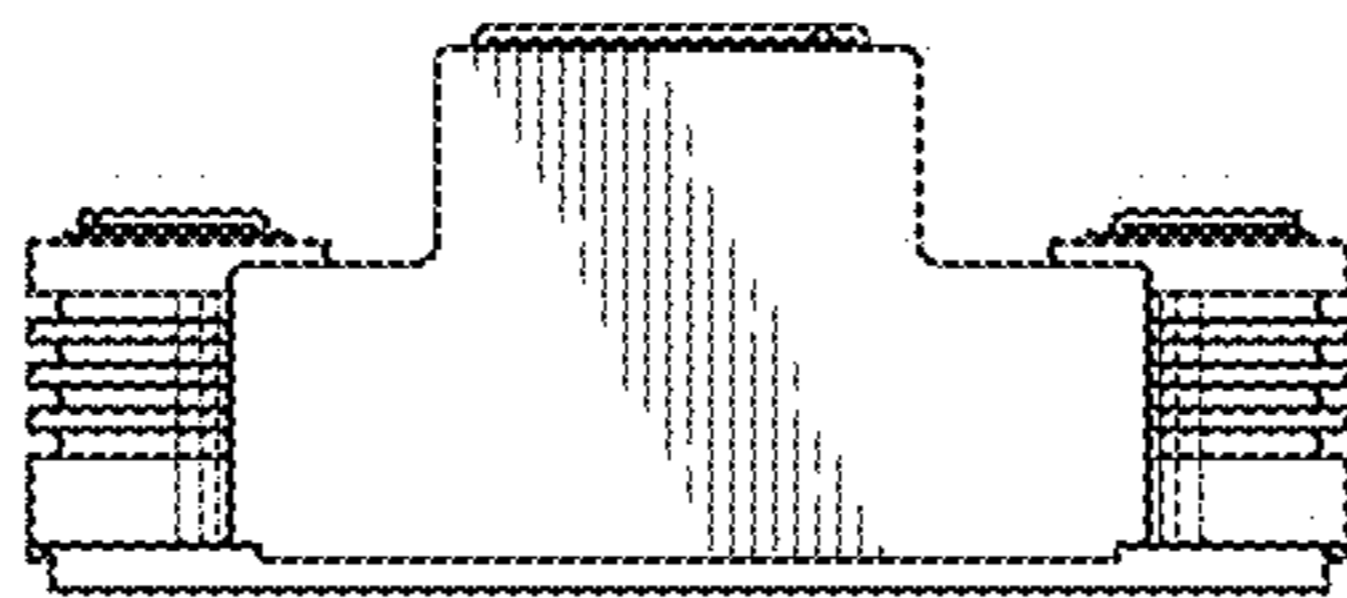


FIG.4

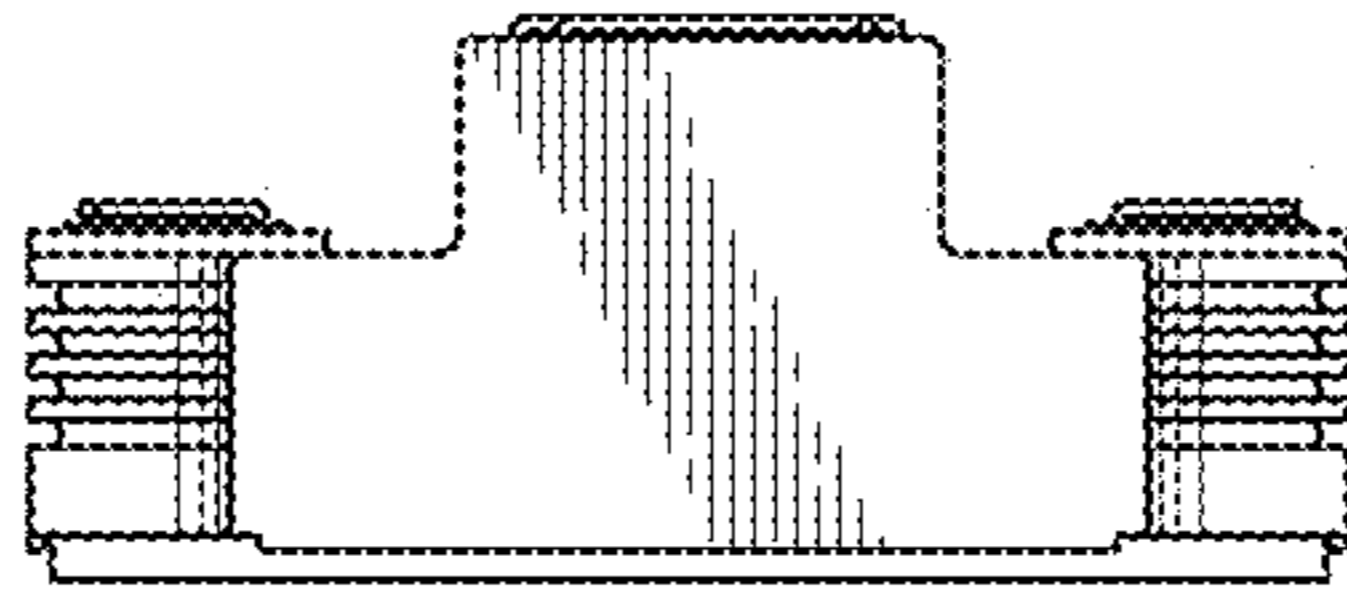


FIG.5

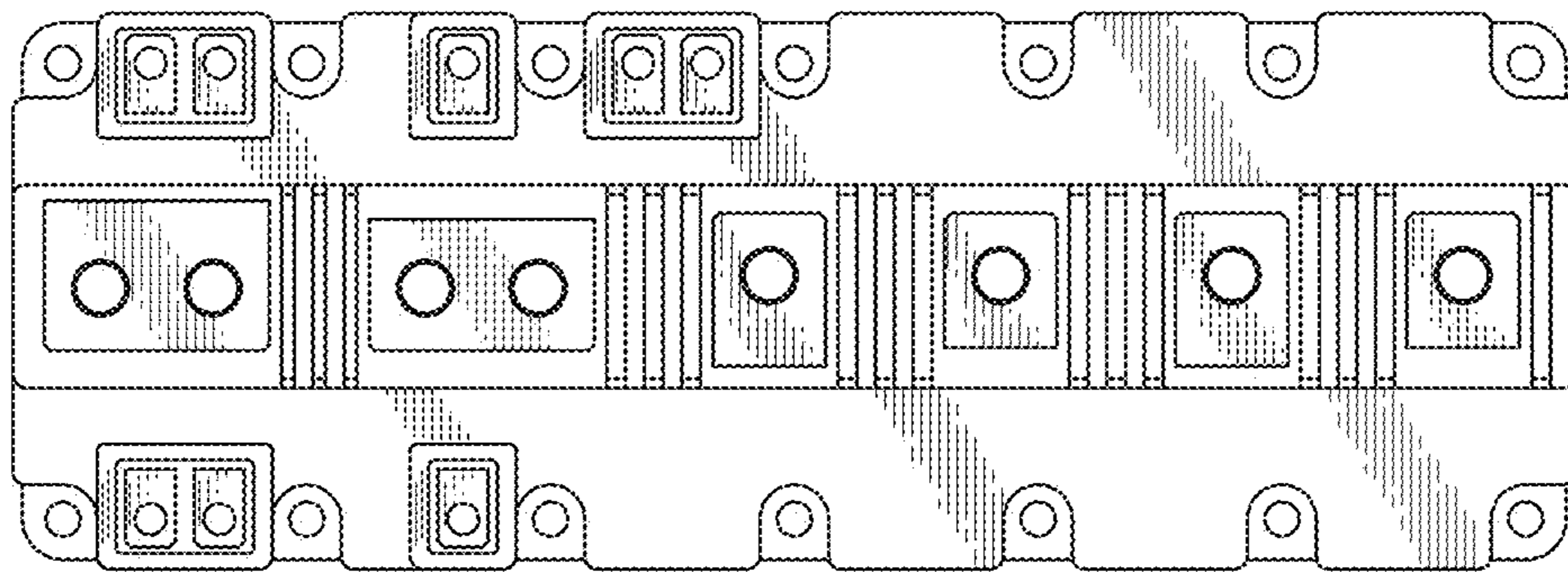


FIG.6

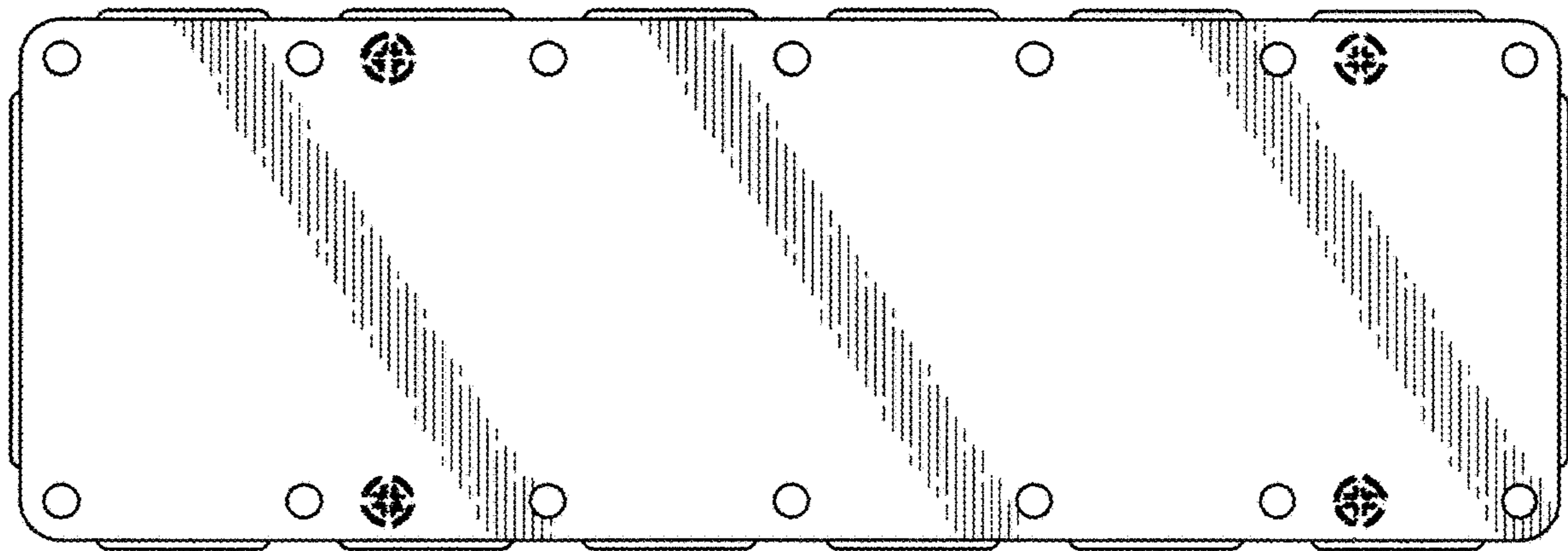


FIG.7

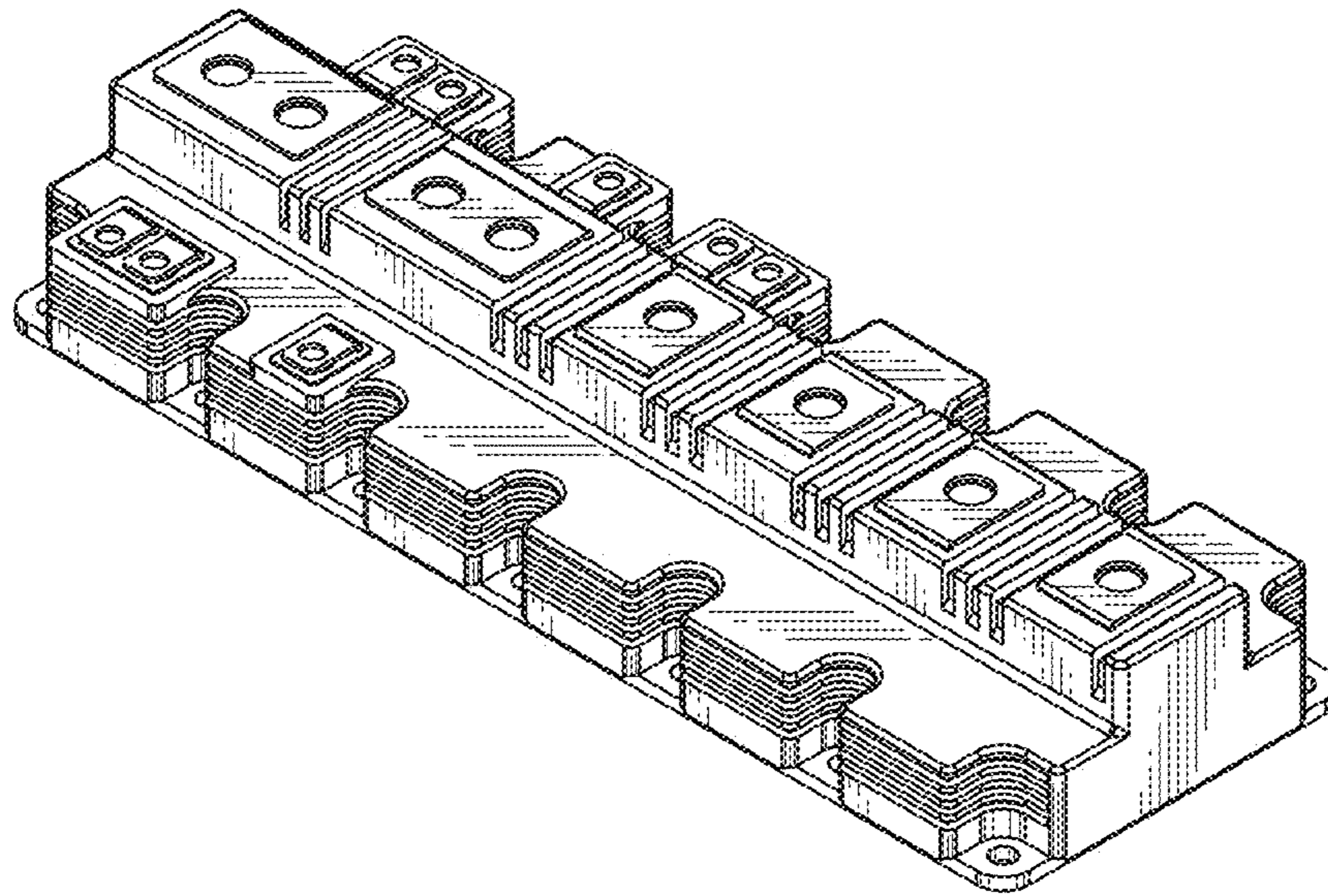


FIG.8

