



US00D981355S

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

(10) **Patent No.:** **US D981,355 S**
(45) **Date of Patent:** **** Mar. 21, 2023**

(54) **POWER SEMICONDUCTOR MODULE**

(71) Applicant: **ROHM CO., LTD.**, Kyoto (JP)
(72) Inventors: **Kotaro Shibata**, Kyoto (JP); **Hideki Sawada**, Kyoto (JP)
(73) Assignee: **ROHM CO., LTD.**, Kyoto (JP)
(**) Term: **15 Years**

(21) Appl. No.: **29/725,717**

(22) Filed: **Feb. 26, 2020**

(30) **Foreign Application Priority Data**

Aug. 29, 2019 (JP) 2019-019217
(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 2021/00;
H01L 2021/02; H01L 2021/04; H01L
21/4814; H01L 21/4846; H01L 21/4871;
H01L 21/67144; H01L 23/12; H01L
23/13; H01L 23/14; 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; G02B 6/4256; G02B
6/4257; G02B 6/4261; G02B 6/4262;
G02B 6/428; G02B 6/4281; H05K 1/14;
H05K

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,347,160 A 9/1994 Sutrina
5,471,089 A 11/1995 Nagatomo et al.
(Continued)

FOREIGN PATENT DOCUMENTS

JP 1536191 10/2015
JP 1536359 10/2015

(Continued)

OTHER PUBLICATIONS

Notice of Allowance issued for U.S. Appl. No. 29/725,275, dated Jul. 8, 2021, 20 pages.

(Continued)

Primary Examiner — Elizabeth J Oswecki
(74) *Attorney, Agent, or Firm* — Hamre, Schumann,
Mueller & Larson, P.C.

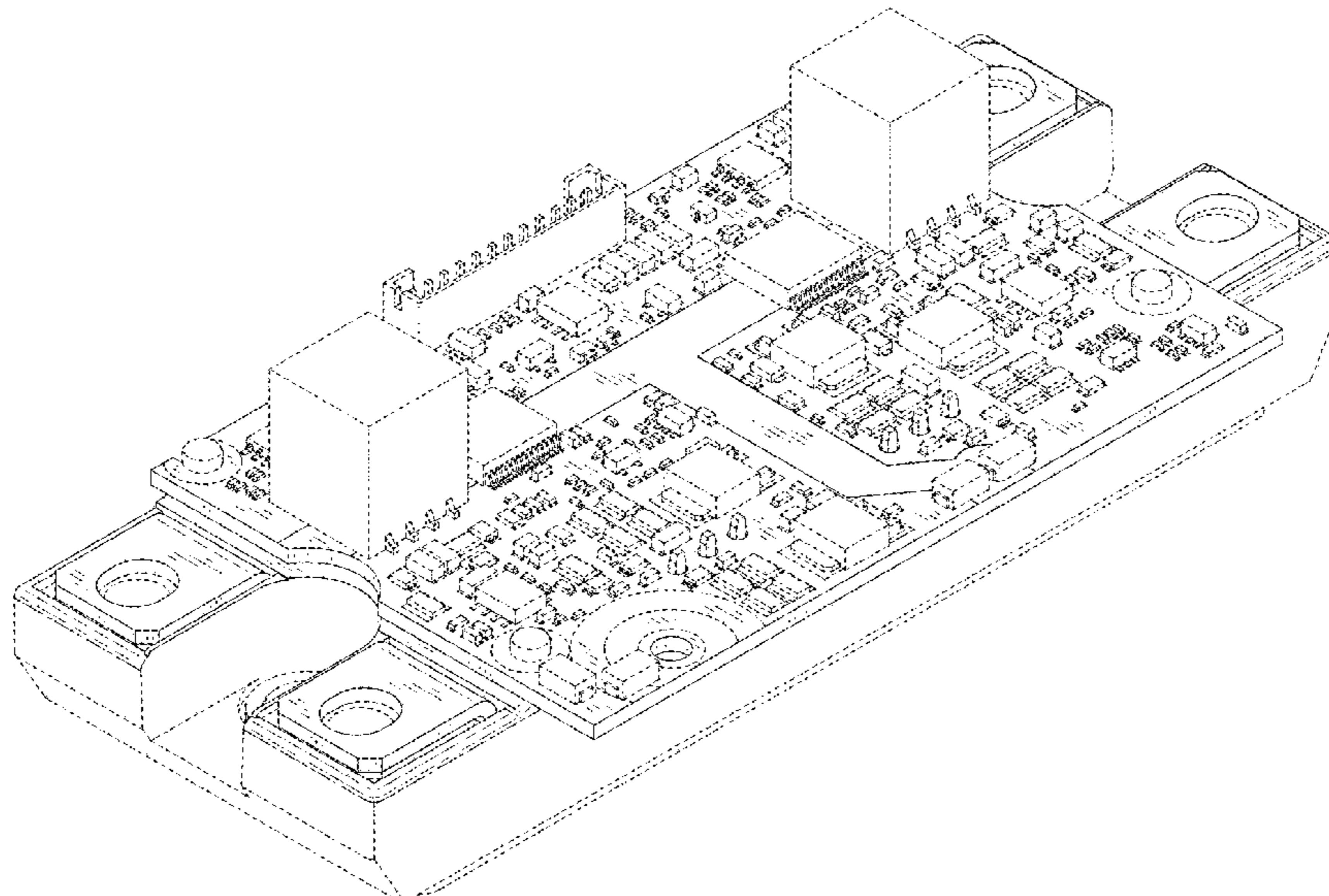
(57) **CLAIM**

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

DESCRIPTION

FIG. 1 is a front, top and left side perspective view of a power semiconductor module showing our new design; FIG. 2 is a front, bottom and left side perspective view thereof; FIG. 3 is a front view thereof; FIG. 4 is a rear view thereof; FIG. 5 is a top plan view thereof; FIG. 6 is a bottom plan view thereof; FIG. 7 is a right side view thereof; and, FIG. 8 is a left side view thereof. The even broken lines illustrate portions of the power semiconductor module that form no part of the claimed design. The dash-dotted lines denote the boundary of the claim and form no part of the claimed design.

1 Claim, 8 Drawing Sheets



(58) **Field of Classification Search**
 CPC 1/141; H05K 1/142; H05K 1/144; H05K
 1/18; H05K 1/181; H05K 1/182; H05K
 1/026; H02B 1/015; H02B 1/00
 See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,078,501	A	6/2000	Catrambone et al.	
6,774,465	B2	8/2004	Lee et al.	
D587,662	S *	3/2009	Soutome	D13/182
D699,693	S	2/2014	Otsuka et al.	
D704,671	S *	5/2014	Chen	D13/182
D710,319	S *	8/2014	Chen	D13/182
D748,595	S	2/2016	Bertalan et al.	
D754,084	S	4/2016	Kawase	
D762,185	S	7/2016	Muehlensiep et al.	
D762,597	S	8/2016	Bertalan et al.	
9,418,975	B1	8/2016	Yoneyama et al.	
D766,851	S	9/2016	Yoneyama et al.	
D772,184	S	11/2016	Soyano et al.	
9,504,154	B2 *	11/2016	Tada	H01L 24/01
D774,479	S	12/2016	Soyano et al.	
D775,091	S	12/2016	Edenharter et al.	
D775,593	S	1/2017	Edenharter et al.	
D776,071	S	1/2017	Edenharter et al.	
D785,577	S	5/2017	Kawase	
9,660,356	B1	5/2017	Nakamura	
D790,491	S	6/2017	Hayashida et al.	
D798,832	S	10/2017	Hayashida et al.	
D799,439	S	10/2017	Hayashiguchi	
D805,485	S	12/2017	Kawase	
D810,706	S	2/2018	Soyano et al.	
D827,591	S *	9/2018	Ikeda	D13/182
D847,103	S	4/2019	Sawada	
D847,104	S	4/2019	Sawada	
D858,467	S	9/2019	Sawada	
D864,132	S	10/2019	Sawada	
D875,058	S	2/2020	Sawada	
D883,240	S	5/2020	Fathauer	

D884,662	S *	5/2020	Itoh	D13/182
D887,998	S	6/2020	Krasnopolski et al.	
D887,999	S	6/2020	Chen	
D888,674	S	6/2020	Chen	
D892,754	S	8/2020	Beckedahl et al.	
10,777,473	B2 *	9/2020	Kodaira	H01L 23/053
10,784,214	B2 *	9/2020	Soyano	H01L 23/48
D903,611	S	12/2020	Sannai et al.	
D903,612	S	12/2020	Soyano et al.	
D904,325	S	12/2020	Omichi	
D909,319	S	2/2021	Nordeen	
D927,437	S *	8/2021	Shibata	D13/182
D934,188	S *	10/2021	Shibata	D13/182
D934,189	S *	10/2021	Shibata	D13/182
D934,190	S *	10/2021	Shibata	D13/182
D949,807	S *	4/2022	Wada	D13/182
D949,808	S *	4/2022	Maeda	D13/182
2001/0038143	A1	11/2001	Sonobe et al.	
2008/0142948	A1	6/2008	Matsumoto	
2014/0168900	A1	6/2014	Korich et al.	
2016/0190915	A1	6/2016	Horiuchi et al.	
2016/0276927	A1	9/2016	Das et al.	
2016/0284618	A1	9/2016	Tsukamoto et al.	
2016/0336245	A1	11/2016	Egusa et al.	
2016/0372392	A1	12/2016	Sakamoto	

FOREIGN PATENT DOCUMENTS

JP	1536360	10/2015
JP	1585830	9/2017
JP	1585831	9/2017
JP	1585962	9/2017
JP	1603793	5/2018
JP	1603980	5/2018
JP	1605558	6/2018

OTHER PUBLICATIONS

Ex Parte Quayle Action issued for U.S. Appl. No. 29/725,452, dated Jul. 20, 2022, 27 pages.

* cited by examiner

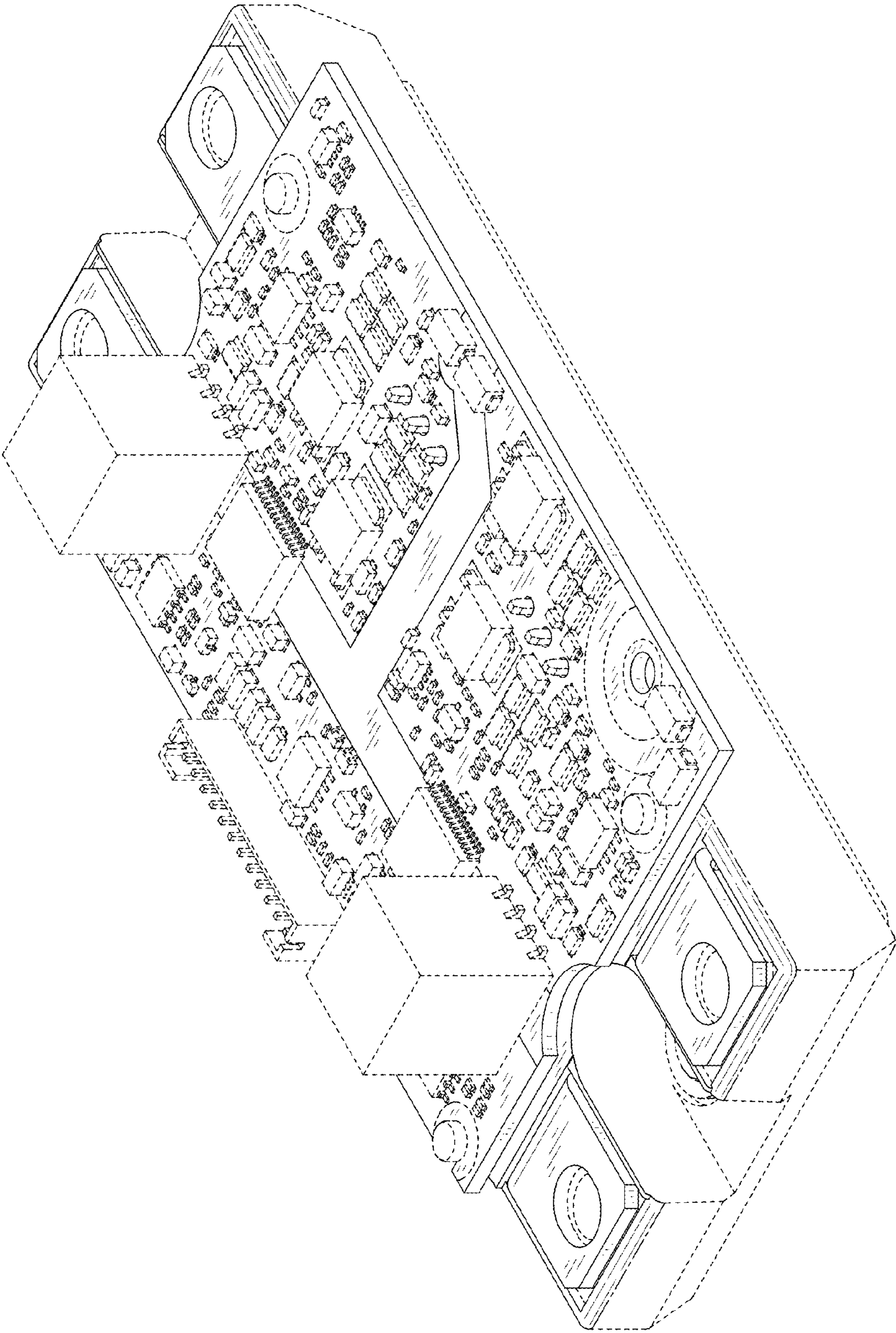


FIG.1

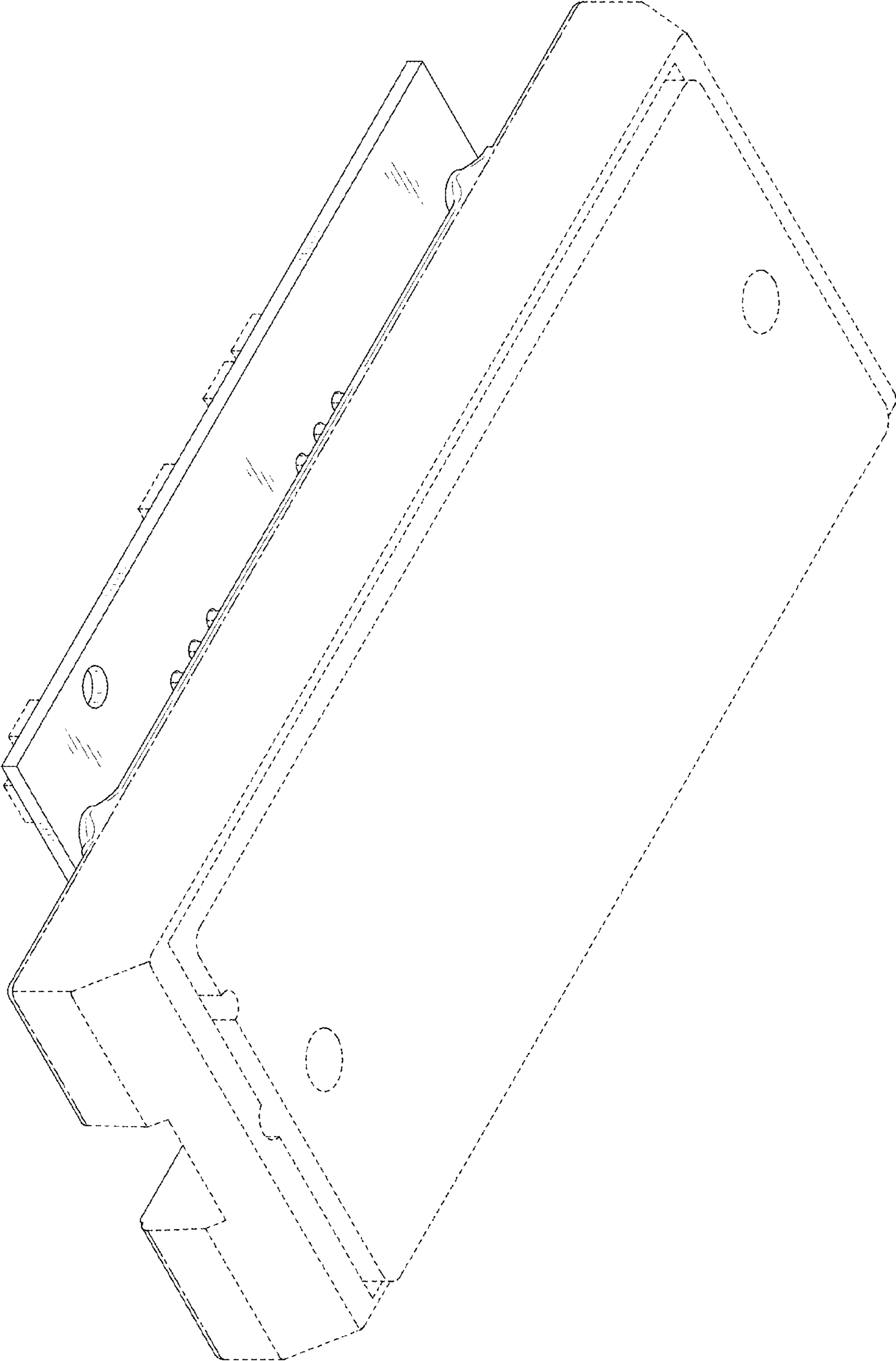


FIG.2

FIG.3

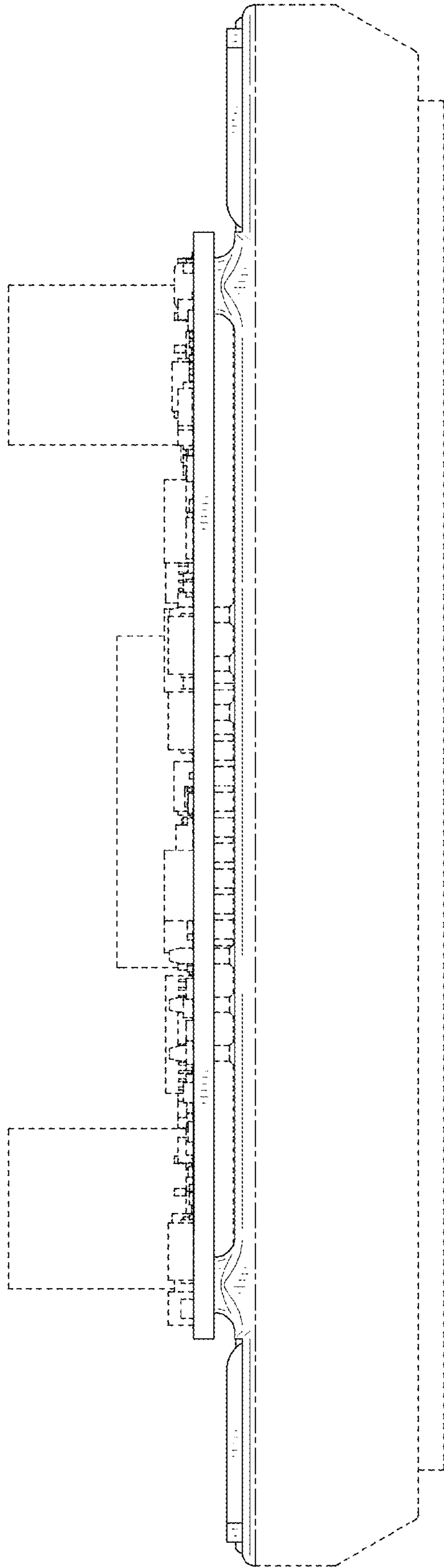


FIG.4

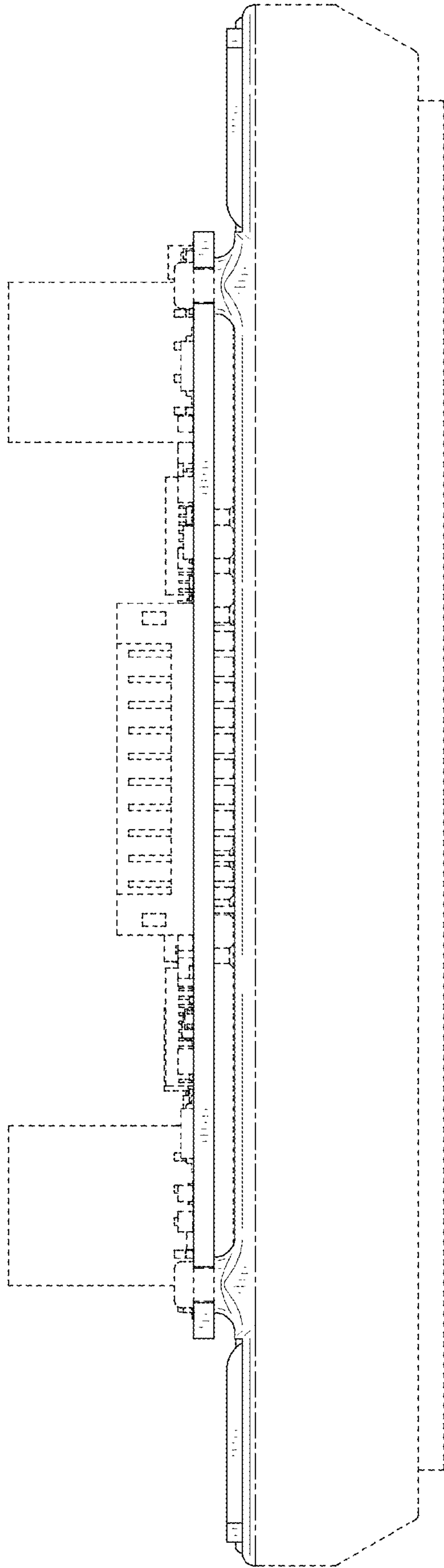
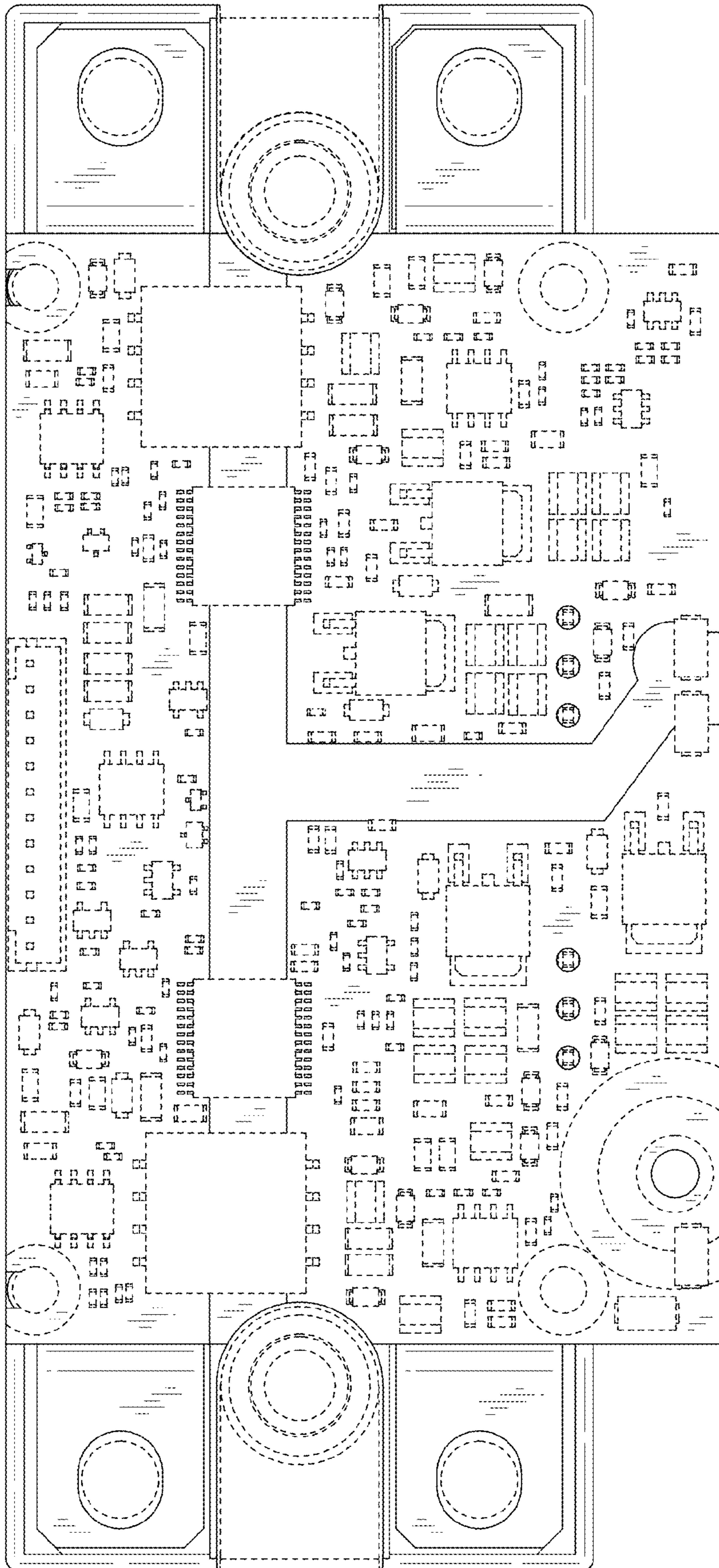


FIG.5



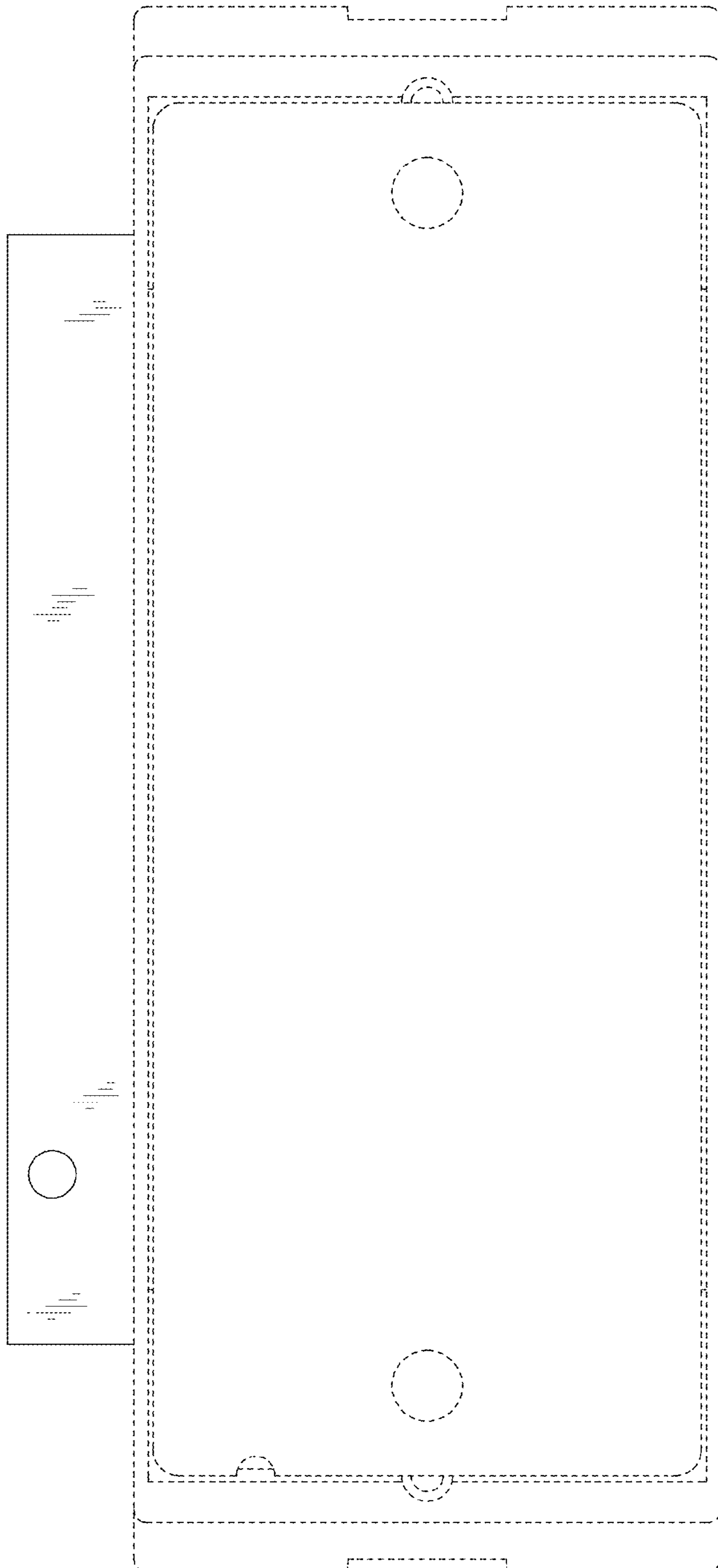
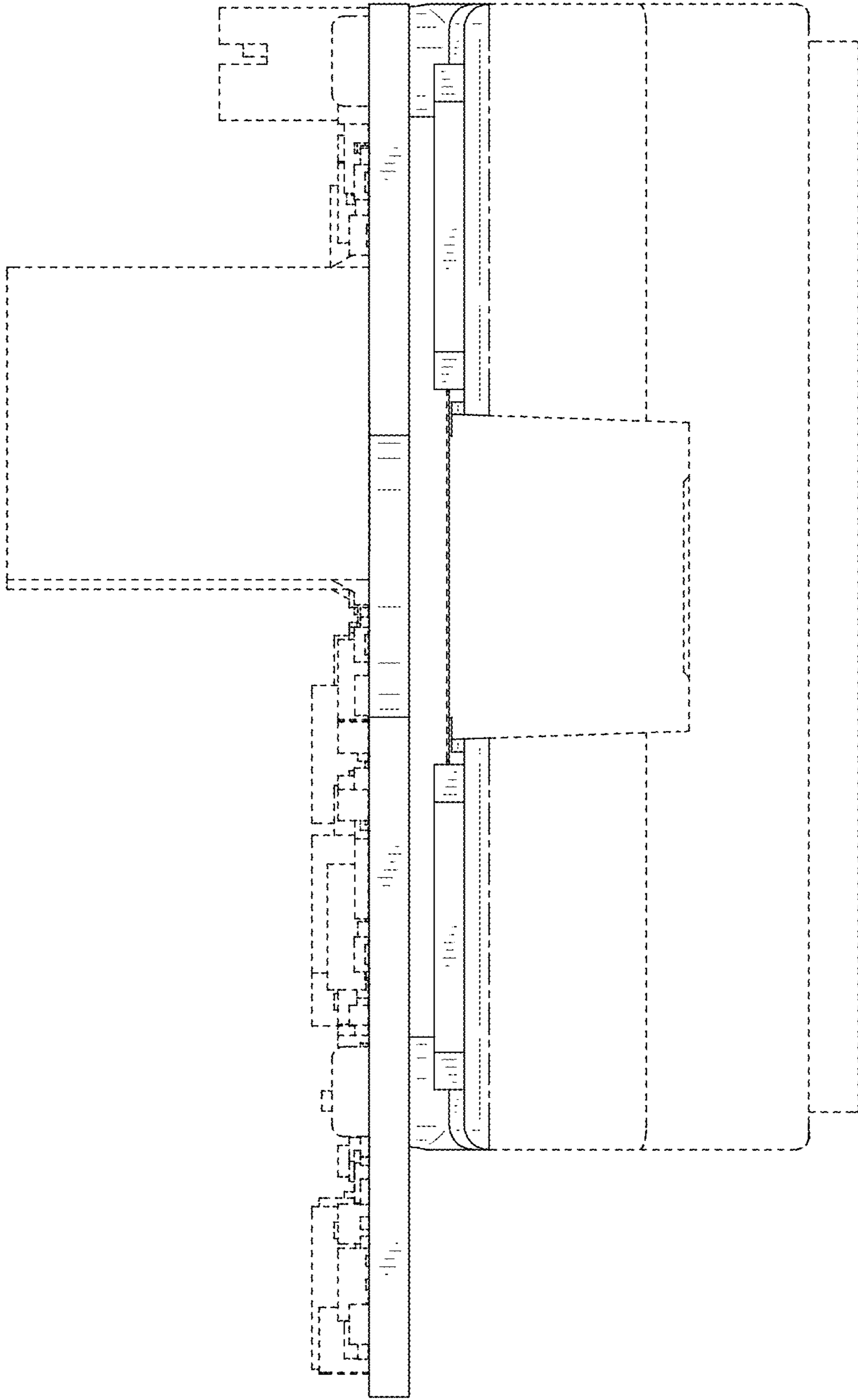


FIG. 6

FIG.7



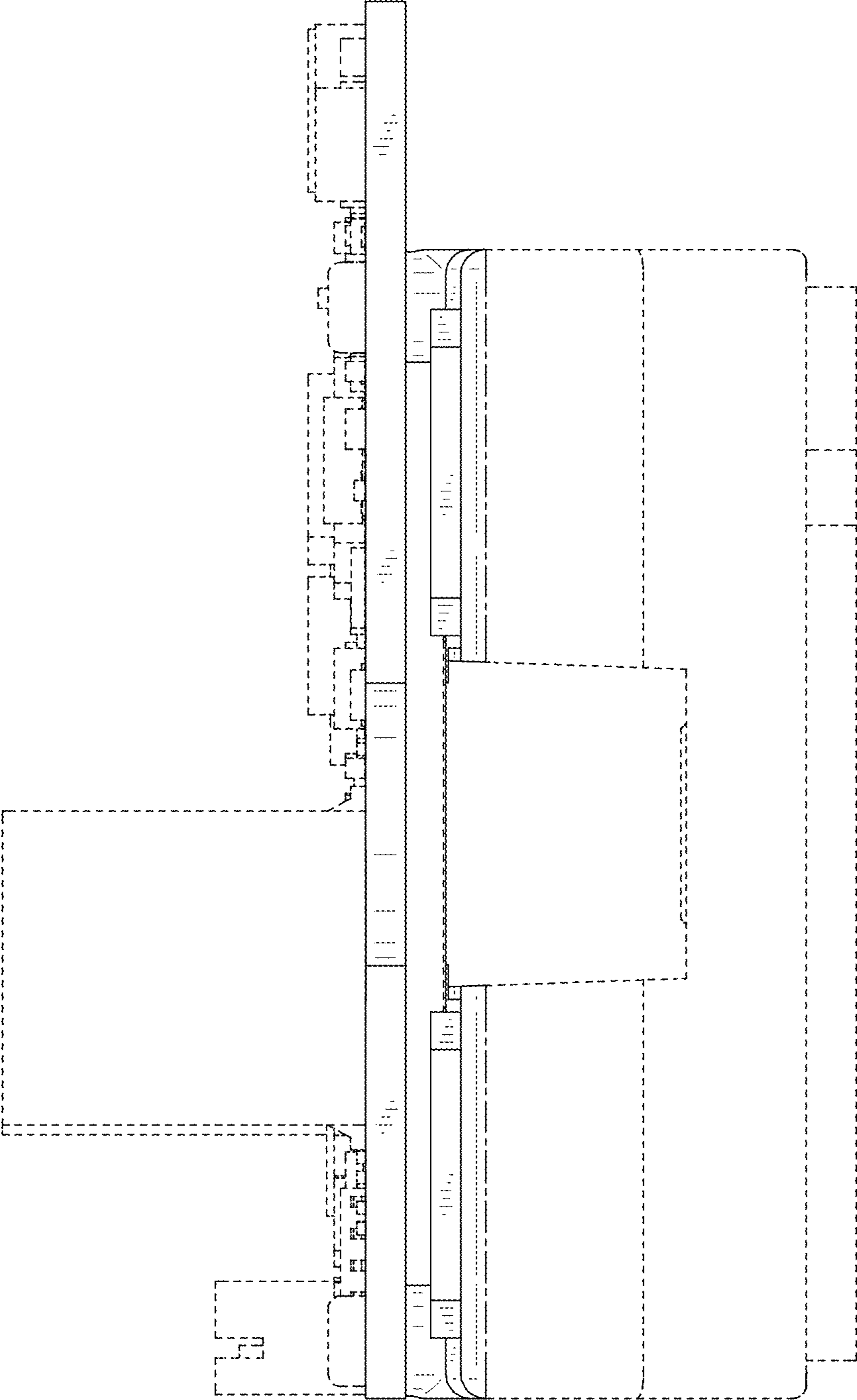


FIG.8