



US00D838667S

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

(10) **Patent No.:** **US D838,667 S**
(45) **Date of Patent:** **** Jan. 22, 2019**

(54) **BUSBAR-LESS SOLAR CELL**

FOREIGN PATENT DOCUMENTS

(71) Applicant: **Flex Ltd.**, Singapore (SG)
(72) Inventors: **Lisong Zhou**, Fremont, CA (US);
Huaming Zhou, Wuxi Jiangsu (CN)

CN 102655030 A 9/2012
CN 202977481 U 6/2013

(Continued)

(73) Assignee: **FLEX LTD.**, Singapore (SG)

Primary Examiner — Daniel D Bui
(74) *Attorney, Agent, or Firm* — Weber Rosselli & Cannon LLP

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

(57) **CLAIM**

The ornamental design for a busbar-less solar cell, as shown and described.

(21) Appl. No.: **29/622,305**

DESCRIPTION

(22) Filed: **Oct. 16, 2017**

(51) **LOC (11) Cl.** **13-02**

(52) **U.S. Cl.**
USPC **D13/102**

(58) **Field of Classification Search**
USPC D13/101, 102, 118, 184, 199
CPC H02J 7/0042; H02J 7/0045; H02J 7/0052;
H01R 31/06; H01R 24/38; H01L 31/042;
H01L 31/045; H01L 31/046; H01L
31/048; H01L 31/05; H01L 31/052; H01L
31/0525; H02S 30/00; H02S 20/10; H02S
20/23; H02S 20/30; H02S 40/34; H02S
40/44; F24J 2/52; F03G 6/00
See application file for complete search history.

FIG. 1 is a top perspective view of the first embodiment of a busbar-less solar cell showing our new design;
FIG. 2 is a bottom plan view thereof;
FIG. 3 is a top plan view thereof;
FIG. 4 is an alternative bottom view of the busbar-less solar cell, according to the embodiment of FIG. 1 of the design
FIG. 5 is a right side elevation view thereof;
FIG. 6 is a left side elevation view thereof;
FIG. 7 is a back side elevation view thereof;
FIG. 8 is a top perspective view of the second embodiment of a busbar-less solar cell showing our new design;
FIG. 9 is a bottom view thereof;
FIG. 10 is a top plan view thereof;
FIG. 11 is a right side elevation view thereof;
FIG. 12 is a left side elevation view thereof;
FIG. 13 is a back side elevation view thereof; and,
FIG. 14 is a front elevation view thereof.

The broken lines shown are included for the purpose of illustrating a portion of the busbar-less solar cell that form no part of the claimed design.

Applicant reserves the right to amend the claimed invention by showing in solid lines any and all features or portions thereof originally shown in broken lines and/or by showing in broken lines any and all features or portions thereof originally shown in solid lines.

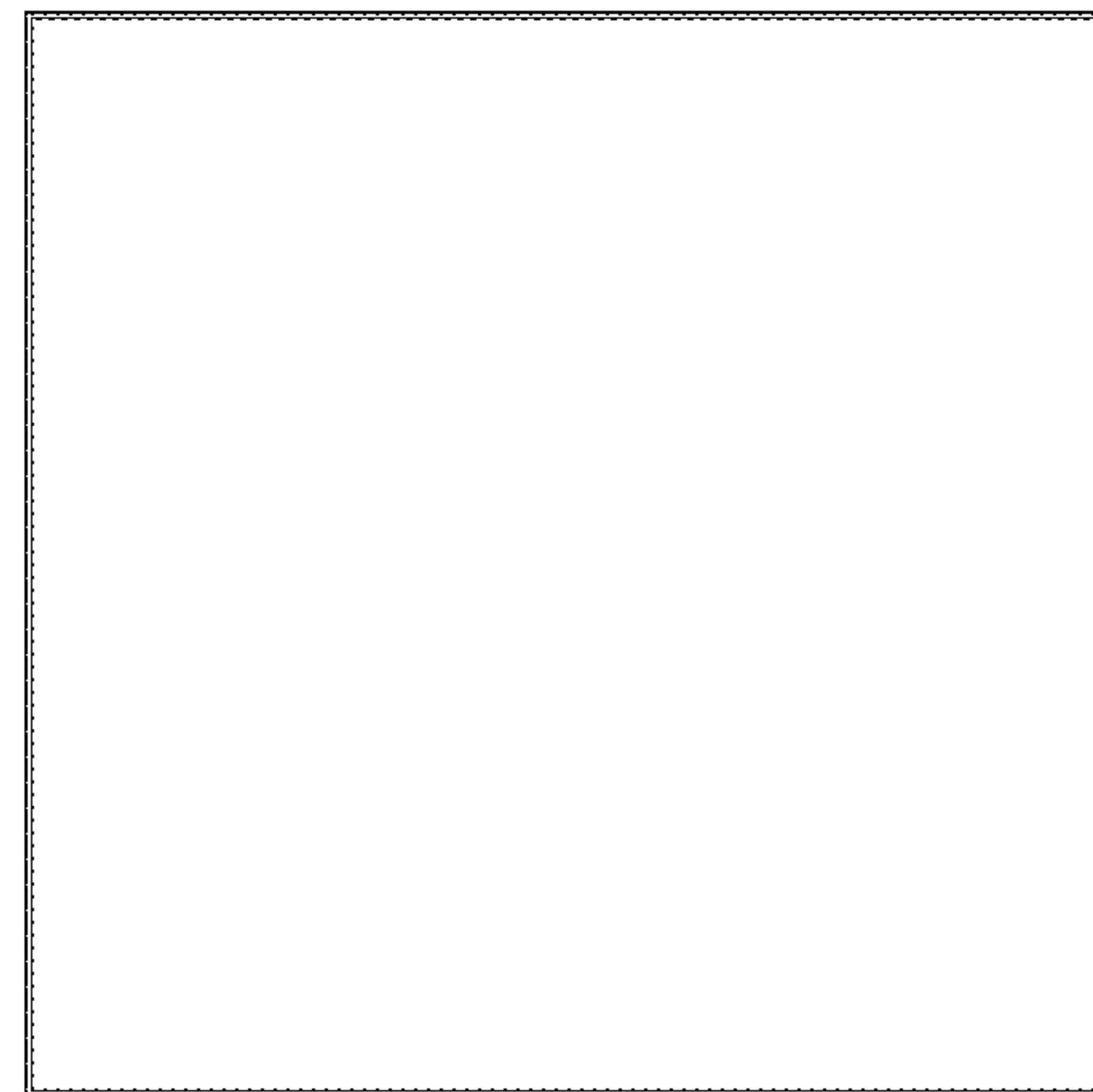
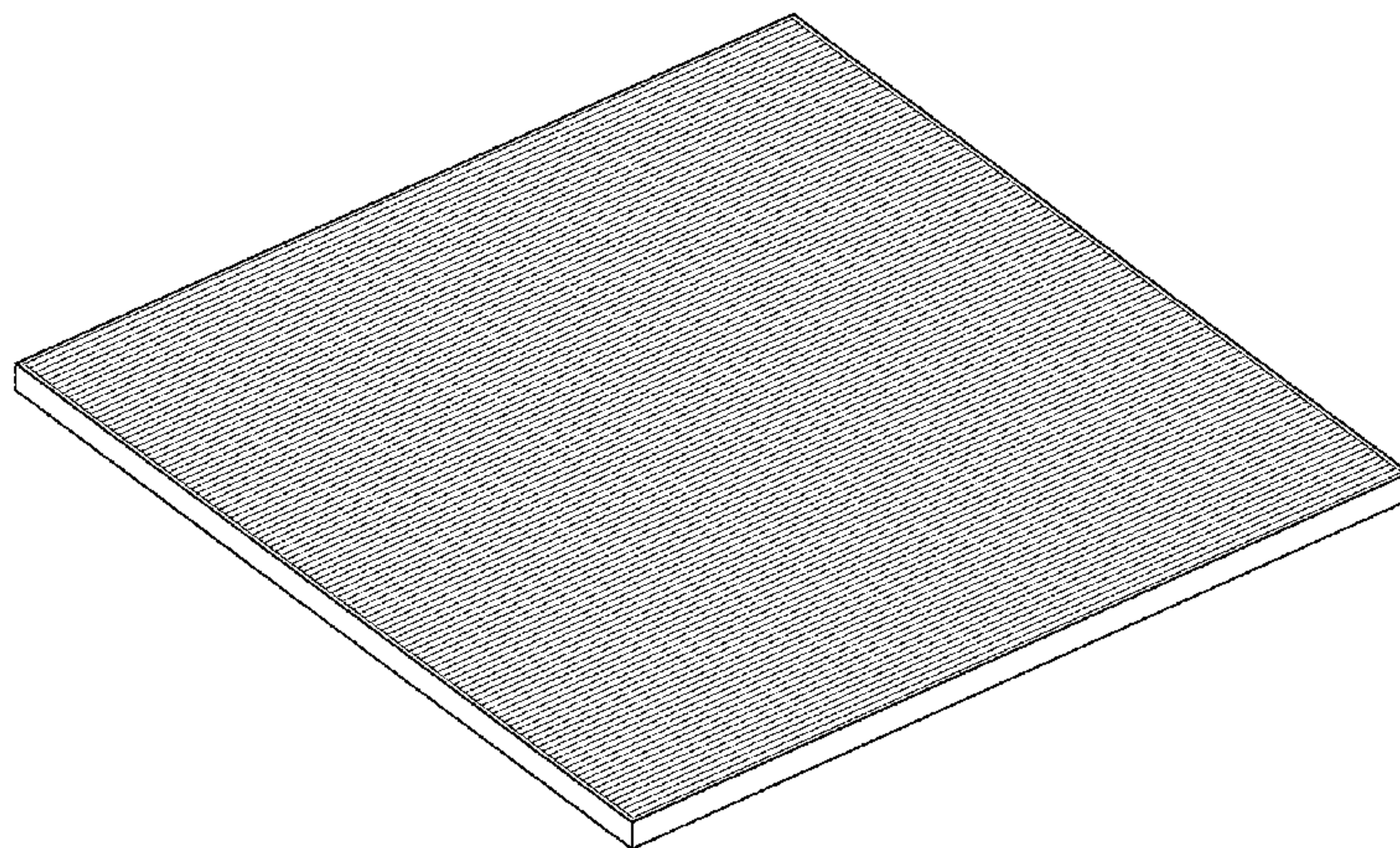
(56) **References Cited**

U.S. PATENT DOCUMENTS

3,340,096 A 9/1967 Mann et al.
3,769,091 A 10/1973 Leinkram et al.
3,811,181 A 5/1974 Leinkram et al.
3,837,924 A 9/1974 Baron
4,040,867 A 8/1977 Forestieri et al.
4,617,421 A 10/1986 Nath et al.
4,877,460 A 10/1989 Flodl
5,096,505 A 3/1992 Fraas et al.

(Continued)

1 Claim, 6 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

5,547,516 A 8/1996 Luch
 5,575,861 A 11/1996 Younan et al.
 5,735,966 A 4/1998 Luch
 6,232,545 B1 5/2001 Samaras et al.
 6,414,235 B1 7/2002 Luch
 6,459,032 B1 10/2002 Luch
 D555,083 S * 11/2007 Sharma D13/102
 7,732,243 B2 6/2010 Luch
 7,740,497 B2 6/2010 Nightingale
 7,898,053 B2 3/2011 Luch
 7,898,054 B2 3/2011 Luch
 7,989,692 B2 8/2011 Luch
 7,989,693 B2 8/2011 Luch
 8,007,306 B2 8/2011 Nightingale et al.
 D644,986 S * 9/2011 Ross D13/102
 D644,987 S * 9/2011 Casler D13/102
 8,033,857 B2 10/2011 Nightingale et al.
 D662,040 S * 6/2012 Yang D13/102
 8,198,696 B2 6/2012 Luch
 8,242,351 B2 8/2012 Gibson et al.
 8,563,848 B1 10/2013 Wen et al.
 D699,176 S 2/2014 Salomon et al.
 D743,329 S * 11/2015 Aiken D13/102
 D762,163 S 7/2016 Parilla et al.
 D763,787 S 8/2016 Parilla et al.
 D781,230 S 3/2017 Gibson et al.
 D784,254 S 4/2017 Parilla et al.
 D788,027 S 5/2017 Gibson et al.
 2003/0121228 A1 7/2003 Stoehr et al.
 2007/0235077 A1 10/2007 Nagata et al.
 2008/0011350 A1 1/2008 Luch
 2008/0216887 A1 9/2008 Hacke et al.
 2008/0314433 A1 12/2008 Luch
 2009/0107538 A1 4/2009 Luch
 2009/0120484 A1 5/2009 Nightingale
 2009/0293941 A1 12/2009 Luch
 2010/0024881 A1 2/2010 Hacke et al.
 2010/0078058 A1 4/2010 Nightingale et al.
 2010/0108118 A1 5/2010 Luch
 2010/0175743 A1 7/2010 Gonzalez et al.
 2011/0067754 A1 3/2011 Luch
 2011/0126878 A1 6/2011 Hacke et al.
 2011/0168238 A1 7/2011 Metin et al.

2011/0186104 A1 8/2011 Shugar et al.
 2011/0186107 A1 8/2011 Gibson et al.
 2011/0197947 A1 8/2011 Croft
 2011/0240096 A1 10/2011 Maheshwari
 2011/0315196 A1 12/2011 Gibson et al.
 2012/0031461 A1 2/2012 Luch
 2012/0125391 A1 5/2012 Pinarbasi et al.
 2012/0167945 A1 7/2012 Shugar et al.
 2012/0167946 A1 7/2012 Maheshwari et al.
 2012/0167947 A1 7/2012 Battaglia, Jr. et al.
 2012/0167948 A1 7/2012 Marathe et al.
 2012/0171802 A1 7/2012 Luch et al.
 2012/0204938 A1 8/2012 Hacke et al.
 2012/0211052 A1 8/2012 Marathe et al.
 2012/0318318 A1 12/2012 Metin et al.
 2012/0318319 A1 12/2012 Pinarbasi et al.
 2012/0325282 A1 12/2012 Snow et al.
 2013/0032194 A1 2/2013 Gibson et al.
 2013/0068827 A1 3/2013 Akimoto
 2014/0102502 A1 4/2014 Luch et al.
 2016/0172515 A1 6/2016 Shugar et al.
 2016/0226438 A1 8/2016 Gibson et al.
 2016/0226439 A1 8/2016 Gibson
 2017/0301802 A1 10/2017 Gibson
 2017/0301821 A1 10/2017 Gibson et al.
 2017/0301822 A1 10/2017 Gibson et al.
 2017/0336105 A1 11/2017 Au

FOREIGN PATENT DOCUMENTS

CN 203242643 U 10/2013
 CN 203445139 U 2/2014
 CN 104201227 A 12/2014
 CN 104810412 A 7/2015
 CN 205609546 U 9/2016
 CN 205609547 U 9/2016
 CN 205609548 U 9/2016
 ES 1073379 U 12/2010
 JP 2013140841 A 7/2013
 WO 2012091781 A1 7/2012
 WO 2012091782 A1 7/2012
 WO 2012106003 A1 8/2012
 WO 2014/112424 A1 7/2014
 WO 2016123559 A1 8/2016

* cited by examiner

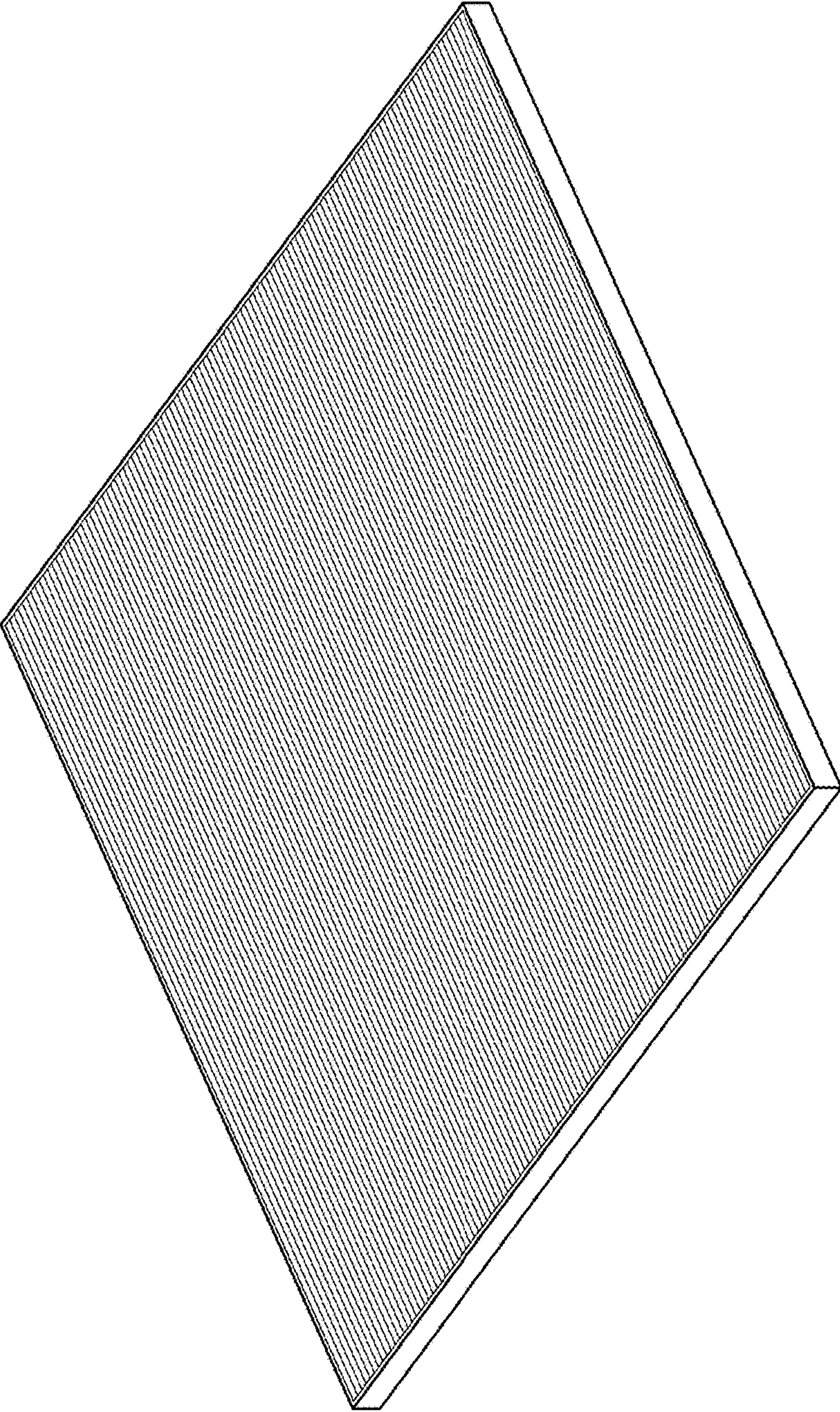


FIG. 1

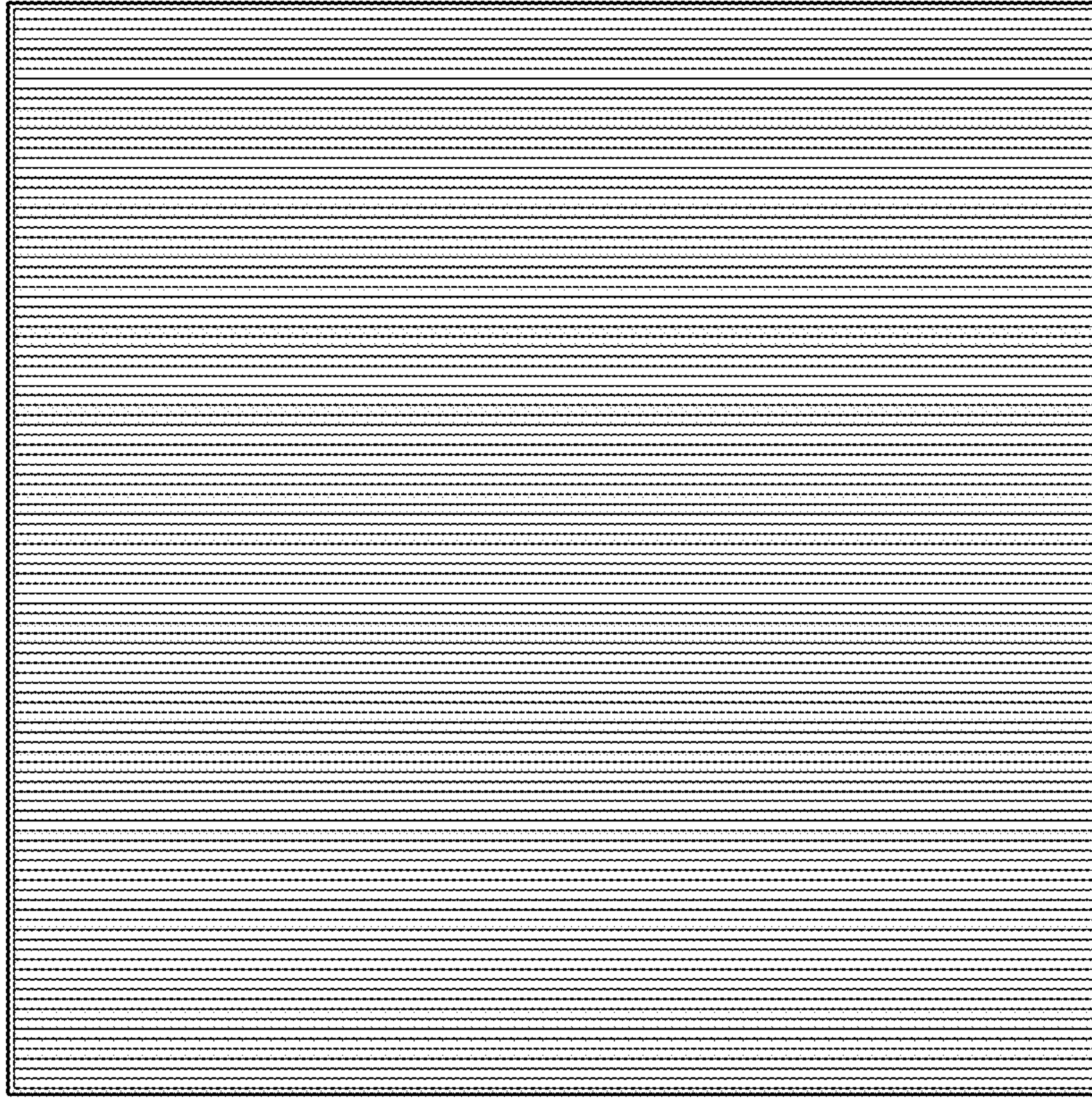


FIG. 3

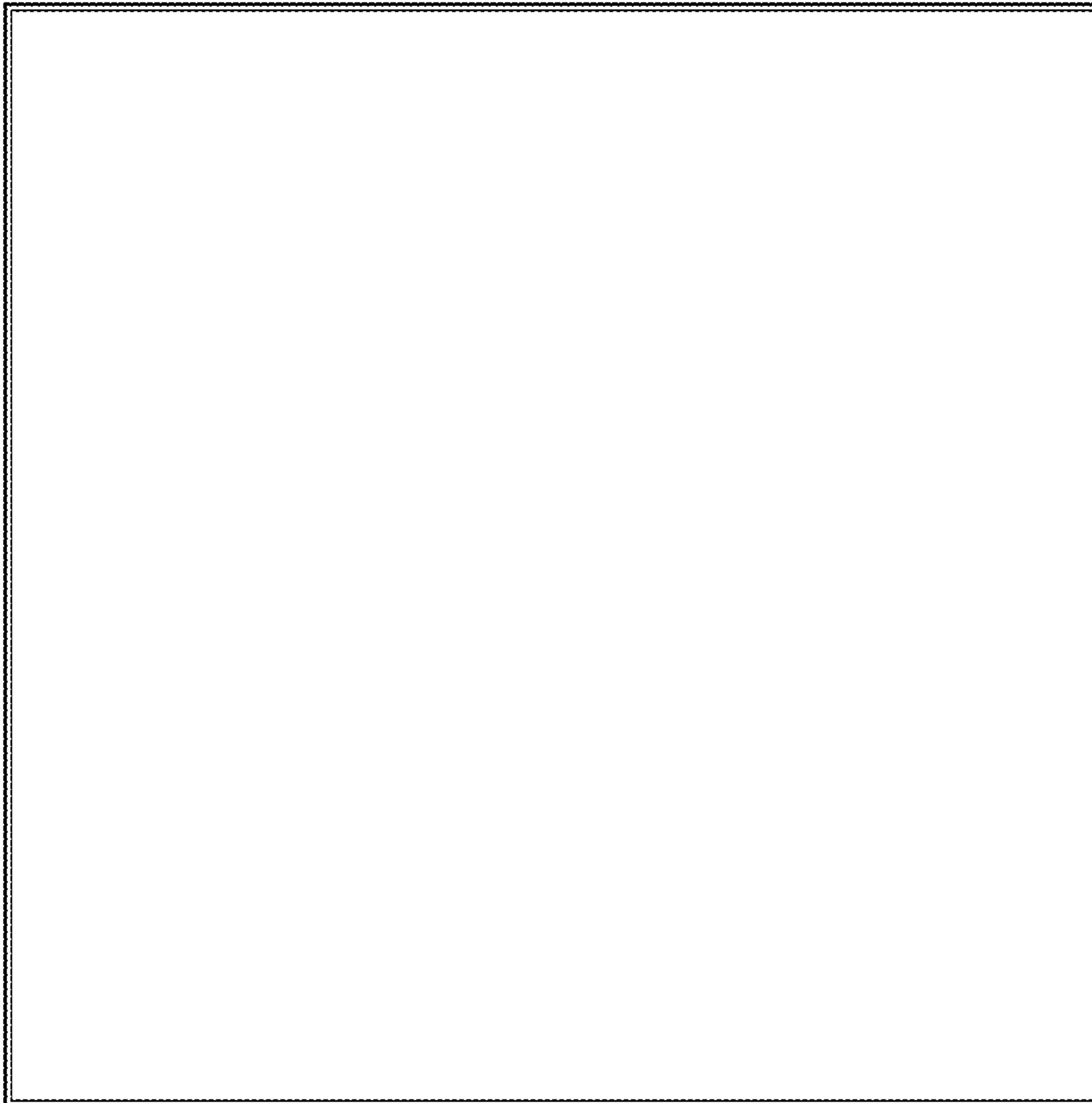


FIG. 2



FIG. 4

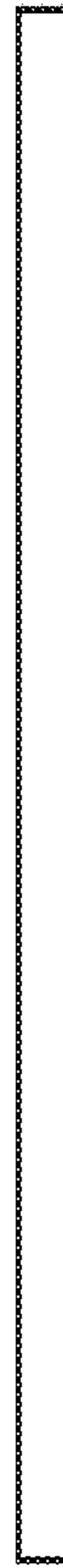


FIG. 5

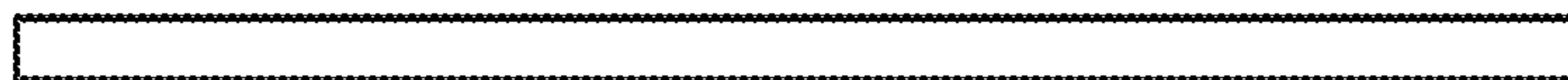


FIG. 6

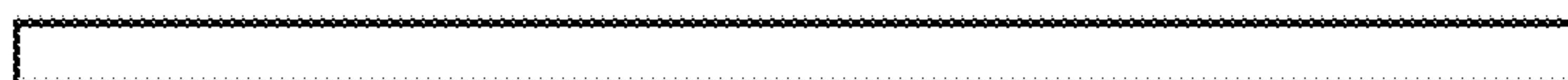


FIG. 7

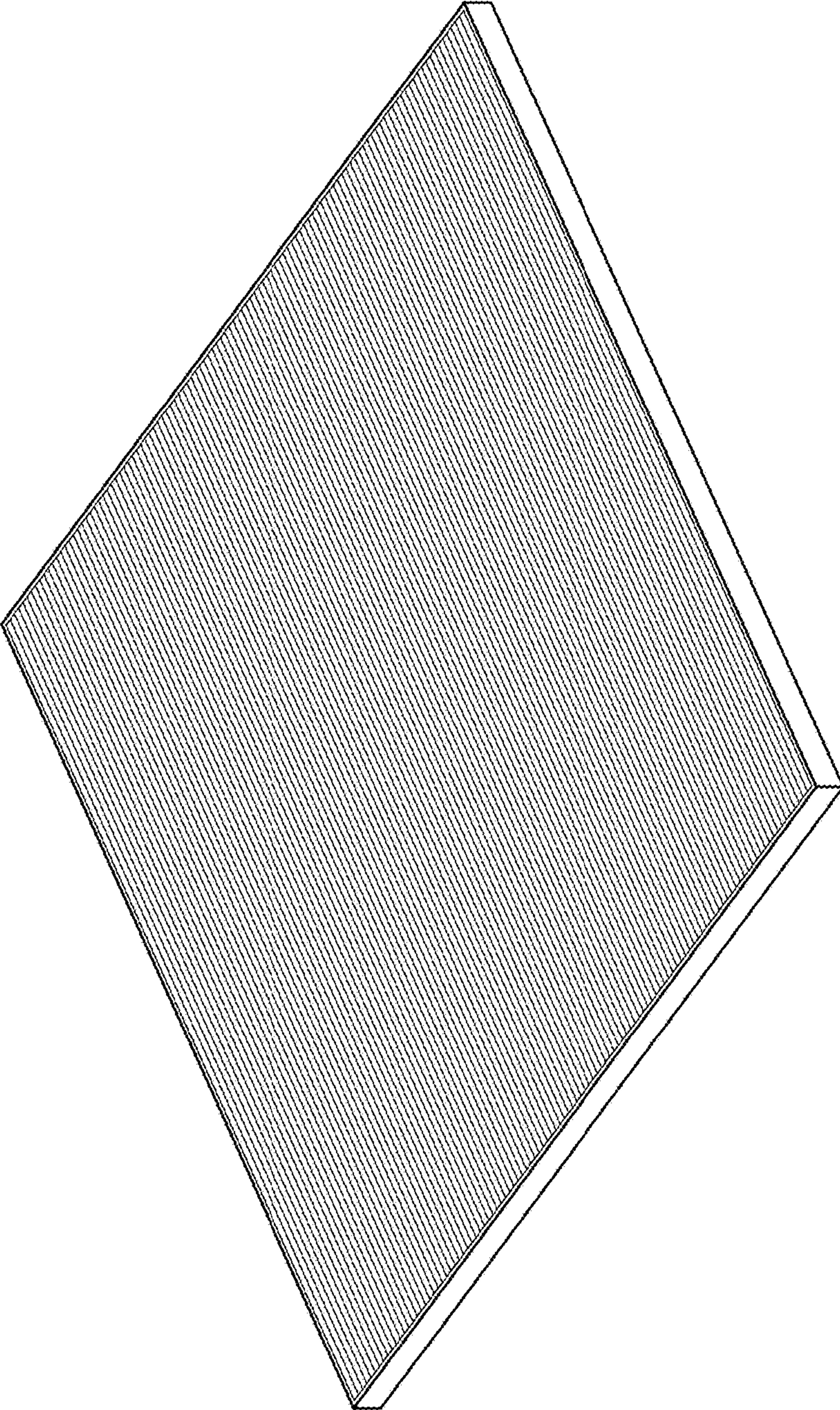


FIG. 8

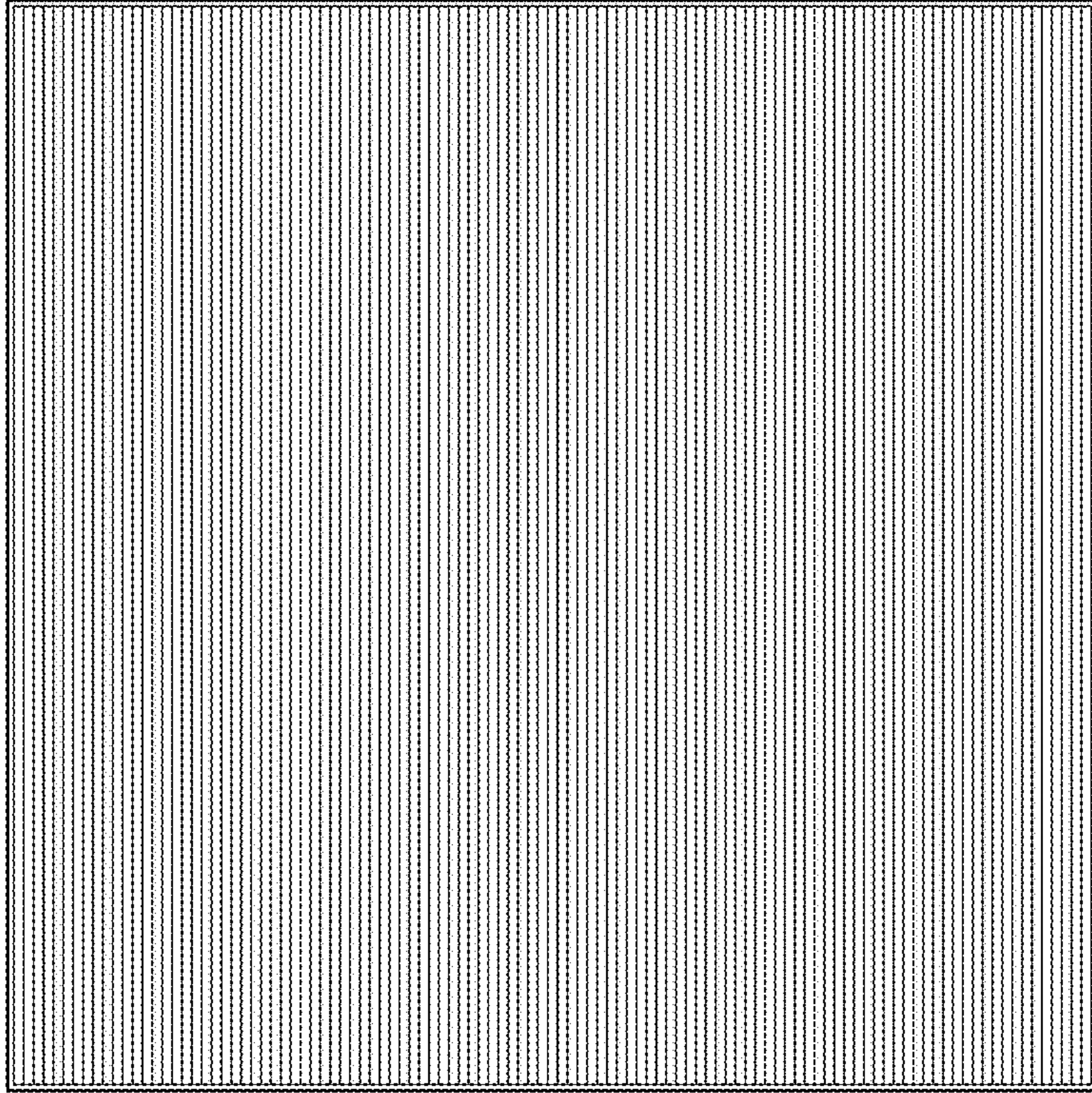


FIG. 10

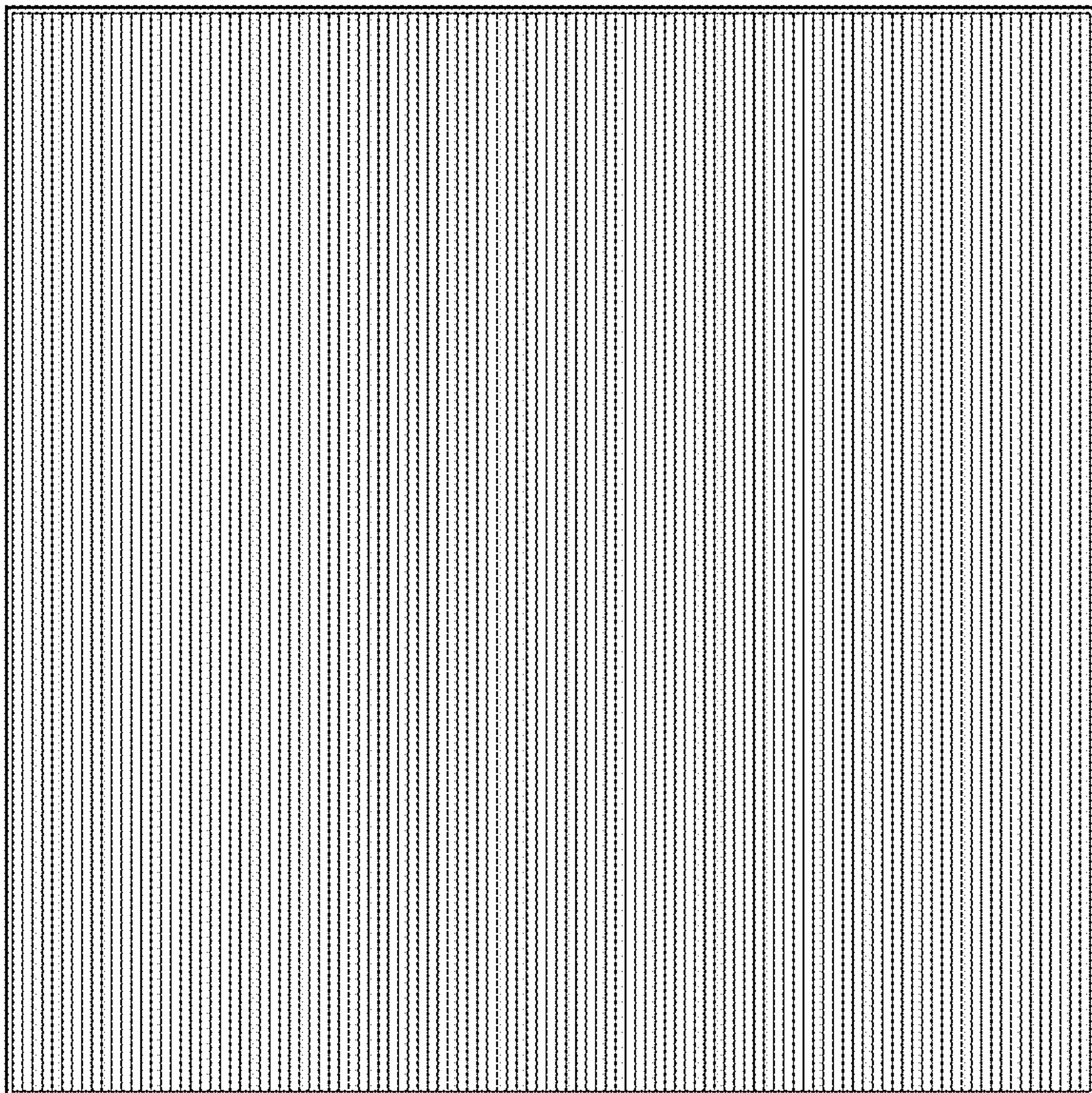


FIG. 9



FIG. 11



FIG. 12



FIG. 13



FIG. 14