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

(10) **Patent No.:** **US D857,020 S**

(45) **Date of Patent:** **** Aug. 20, 2019**

(54) **PIEZOELECTRIC ELEMENT**

(71) Applicant: **TDK CORPORATION**, Tokyo (JP)

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(73) Assignee: **TDK CORPORATION**, Tokyo (JP)

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

(21) Appl. No.: **29/585,434**

(22) Filed: **Nov. 23, 2016**

(30) **Foreign Application Priority Data**

May 25, 2016 (JP) 2016-011150

May 25, 2016 (JP) 2016-011151

(51) **LOC (12) Cl.** **14-02**

(52) **U.S. Cl.**
USPC **D14/435; D13/182**

(58) **Field of Classification Search**
USPC D14/435, 356, 242, 436, 433, 474, 240,
D14/496, 385, 358, 480.1-480.7;
(Continued)

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Primary Examiner — Susan Moon Lee

(74) *Attorney, Agent, or Firm* — Oliff PLC

(57) **CLAIM**

The ornamental design for a piezoelectric element, as shown and described.

DESCRIPTION

FIG. 1 is a front view of a first embodiment of a piezoelectric element of the present invention.

FIG. 2 is a rear view thereof.

FIG. 3 is a top plan view thereof.

FIG. 4 is a bottom view thereof.

FIG. 5 is a right side view thereof.

FIG. 6 is a left side view thereof.

FIG. 7 is a front perspective view thereof.

FIG. 8 is a rear perspective view thereof.

FIG. 9 is a sectional view taken along the line 9-9 of the FIG. 1 thereof.

FIG. 10 is a sectional view taken along the line 10-10 of the FIG. 1 thereof.

FIG. 11 is a sectional view taken along the line 11-11 of the FIG. 1 thereof.

FIG. 12 is a reference top plan view, wherein the semi-transparent parts are shown by light grey parts thereof.

FIG. 13 is a reference view showing the use state thereof.

FIG. 14 is a front view of a second embodiment of a piezoelectric element of the present invention.

FIG. 15 is a rear view thereof.

FIG. 16 is a top plan view thereof.

FIG. 17 is a bottom view thereof.

FIG. 18 is a right side view thereof.

FIG. 19 is a left side view thereof.

FIG. 20 is a front perspective view thereof.

FIG. 21 is a rear perspective view thereof.

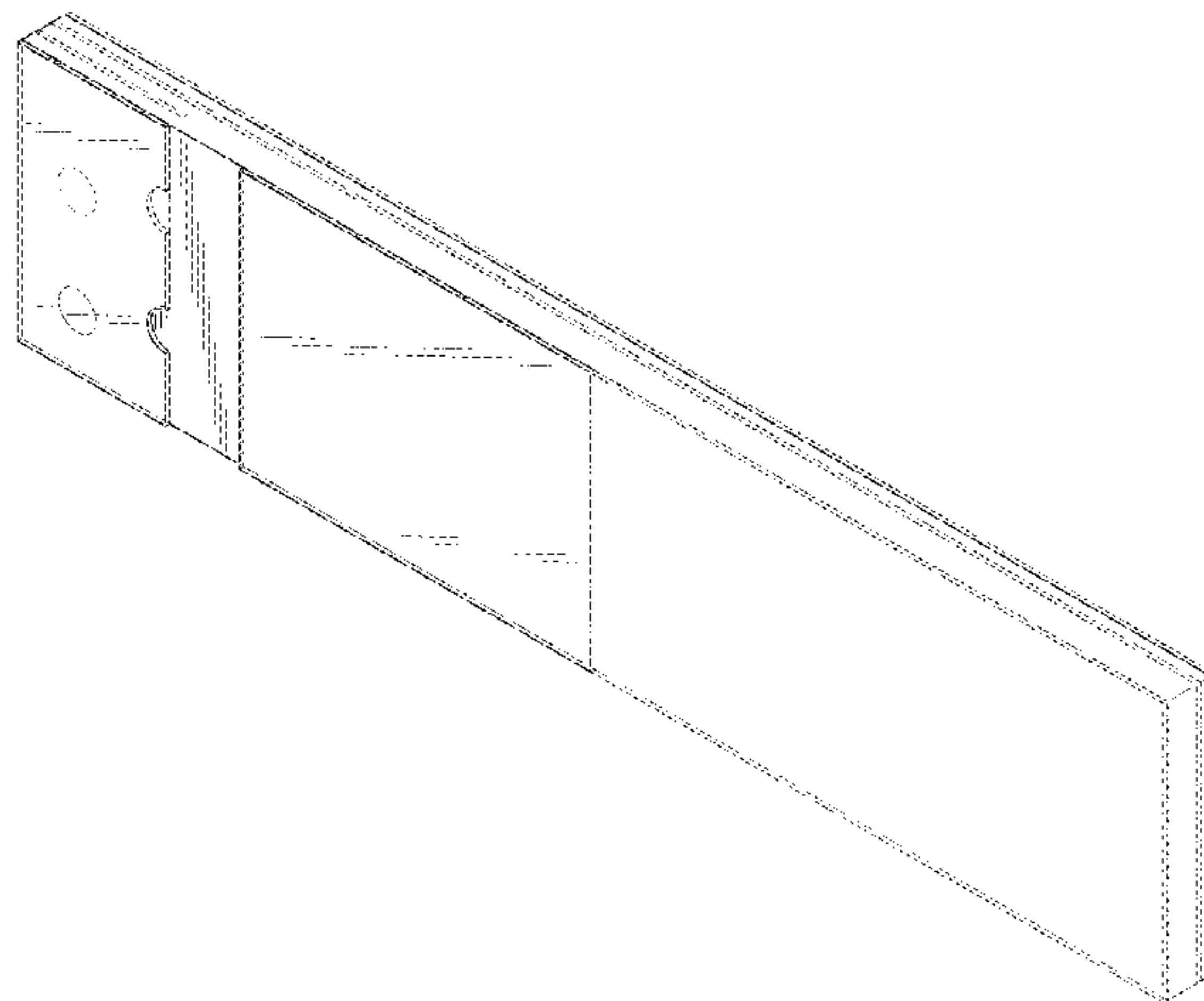
FIG. 22 is a sectional view taken along the line 22-22 of the FIG. 14 thereof.

FIG. 23 is a sectional view taken along the line 23-23 of the FIG. 14 thereof.

FIG. 24 is a reference top plan view, wherein the semi-transparent parts are shown by light grey parts thereof; and,

FIG. 25 is a reference view showing the use state thereof. The broken lines depict unclaimed portions of the piezoelectric element, and thus form no part of the claimed design. The dot-dash chain lines depict boundaries of the claimed subject matter, and thus form no part of the claimed design.

1 Claim, 25 Drawing Sheets



(58) **Field of Classification Search**

USPC 360/294.4, 97.01, 685, 686, 752, 737,
 360/732, 784, 803; 439/135, 144,
 439/139-141, 147, 136, 638, 518, 131;
 365/51, 63, 131; 710/52, 300, 313;
 711/115, 103, 154, 161-162; 70/58;
 323/210; 713/186, 1; 382/124; 235/492;
 D13/147, 182, 121, 101, 184; 310/311,
 310/313 R, 313 A, 320, 323.06, 327, 328,
 310/344, 348, 351-353, 363-368, 314,
 310/340, 358; 252/62.9 R, 62.9 PZ
 CPC G06K 19/06196; G06K 19/072; G06K
 19/0721-0728; G06K 19/073; G06K
 19/07309; G06K 19/077; G06K
 19/07701; G06K 19/07715; G06K
 19/0772; G06K 19/07724; G06K
 19/07726; G06K 19/07728; G06K
 7/0021; G06F 21/77-80; G06F 21/85-88;
 G06F 21/00; G06Q 20/3229; G06Q
 20/34; G06Q 20/341; G06Q 20/346;
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 H05K 5/026; H05K 5/0256; H05K
 5/0265; H05K 5/0269; H05K 5/0273;
 H05K 5/0278; H05K 5/0282; H05K
 5/0286; H05K 5/0291; H05K 5/0295;
 H05K 5/03; H05K 5/04; H05K 5/06;
 H05K 5/061-069; H05K 7/00; H05K
 7/005; H05K 7/02; H05K 7/023; H05K
 7/026; H05K 2201/09745; H05K
 2201/09754; H05K 2201/09763; H05K
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 2201/10007; H05K 7/04; H05K 7/10;
 H05K 7/1418; H05K 7/142; H05K
 7/1405; H05K 7/1424; H05K
 7/1427-1439; H05K 7/1461; H05K
 7/1464-1474; H05K 7/1479; H05K
 7/1481; H05K 7/1485-1488; H04N
 2201/216; H01R 13/62933; H01R
 13/62905; H01R 13/6275; H01R 13/6395;
 H01R 13/62938; H01R 13/64; H01R
 13/645; H01R 13/6456; H01R 13/635;
 H01R 13/633; H01R 23/7005; H01R
 23/682; H01R 23/684; H01R 23/70;
 H01R 23/7068; H01R 23/7026; H01R
 31/065; H01R 27/02; H01R 2103/00;
 H01L 41/00; H01L 41/02; H01L 41/04;
 H01L 41/044; H01L 41/047; H01L
 41/0472; H01L 41/0474; H01L 41/0475;
 H01L 41/08; H01L 41/0805; H01L
 41/081; H01L 41/0815; H01L 41/0825;
 H01L 41/083; H01L 41/09; H01L
 41/0966; H01L 41/0471; H01L 41/053;
 H03H 9/02015; H03H 9/02228; H03H
 9/15; H03H 9/172; H03H 9/178; H03H
 2009/02251; G11B 5/4873; G11B 5/4833;
 F02M 51/0603

See application file for complete search history.

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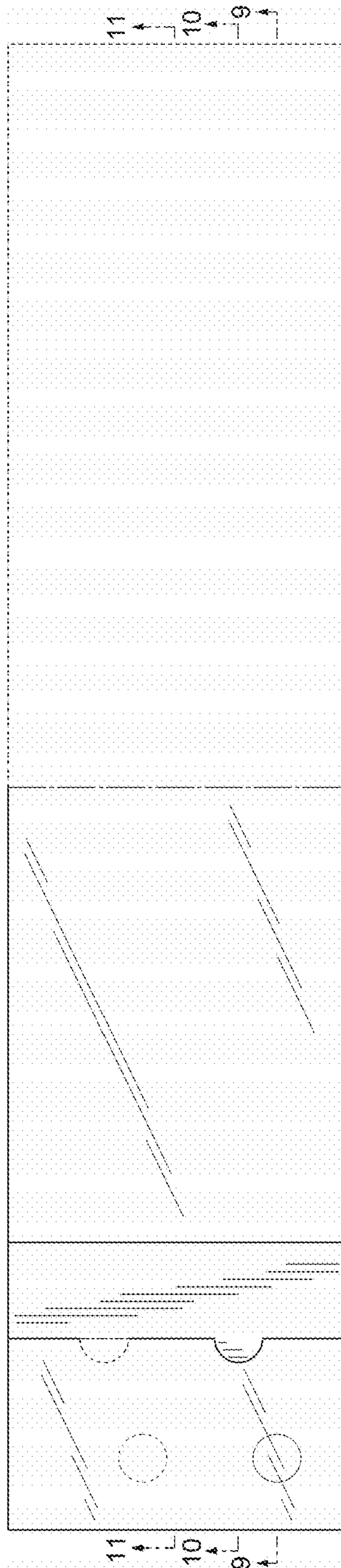


FIG. 1

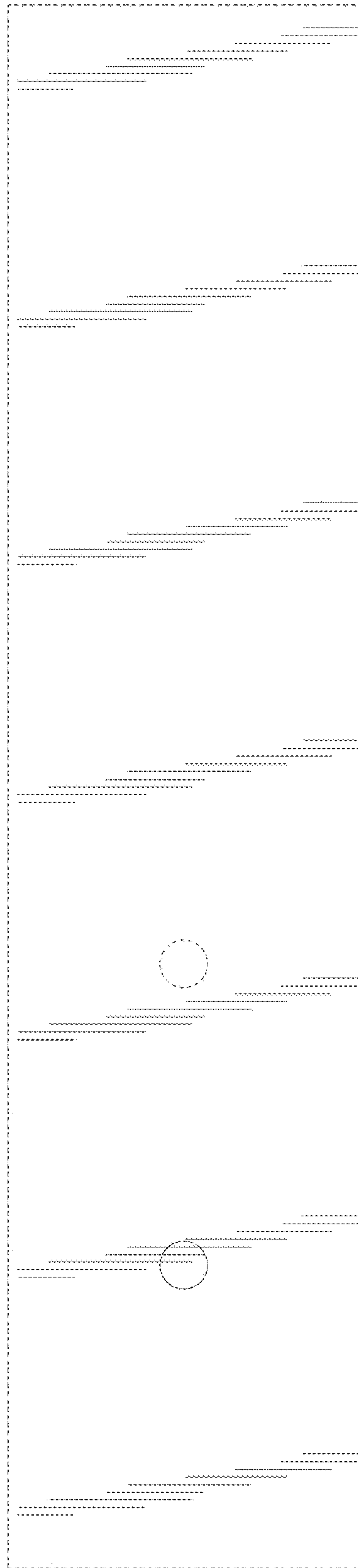


FIG. 2

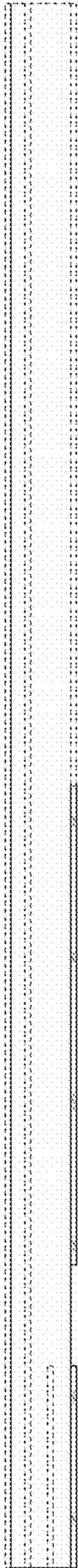


FIG. 3



FIG. 4

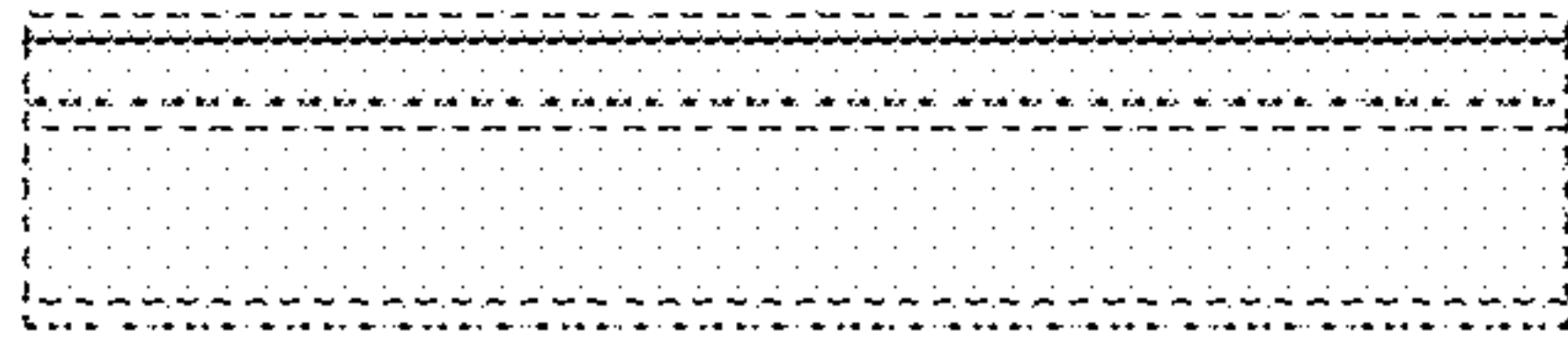


FIG. 5

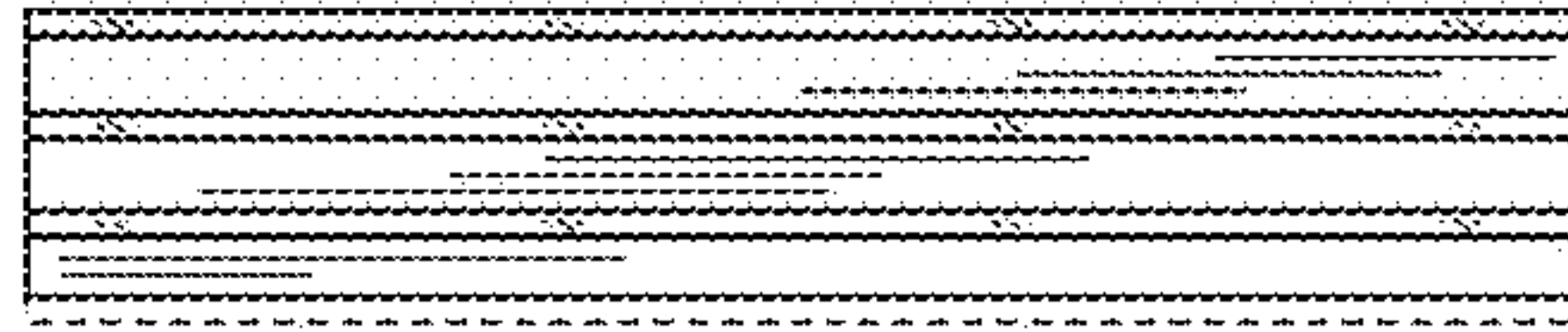


FIG. 6

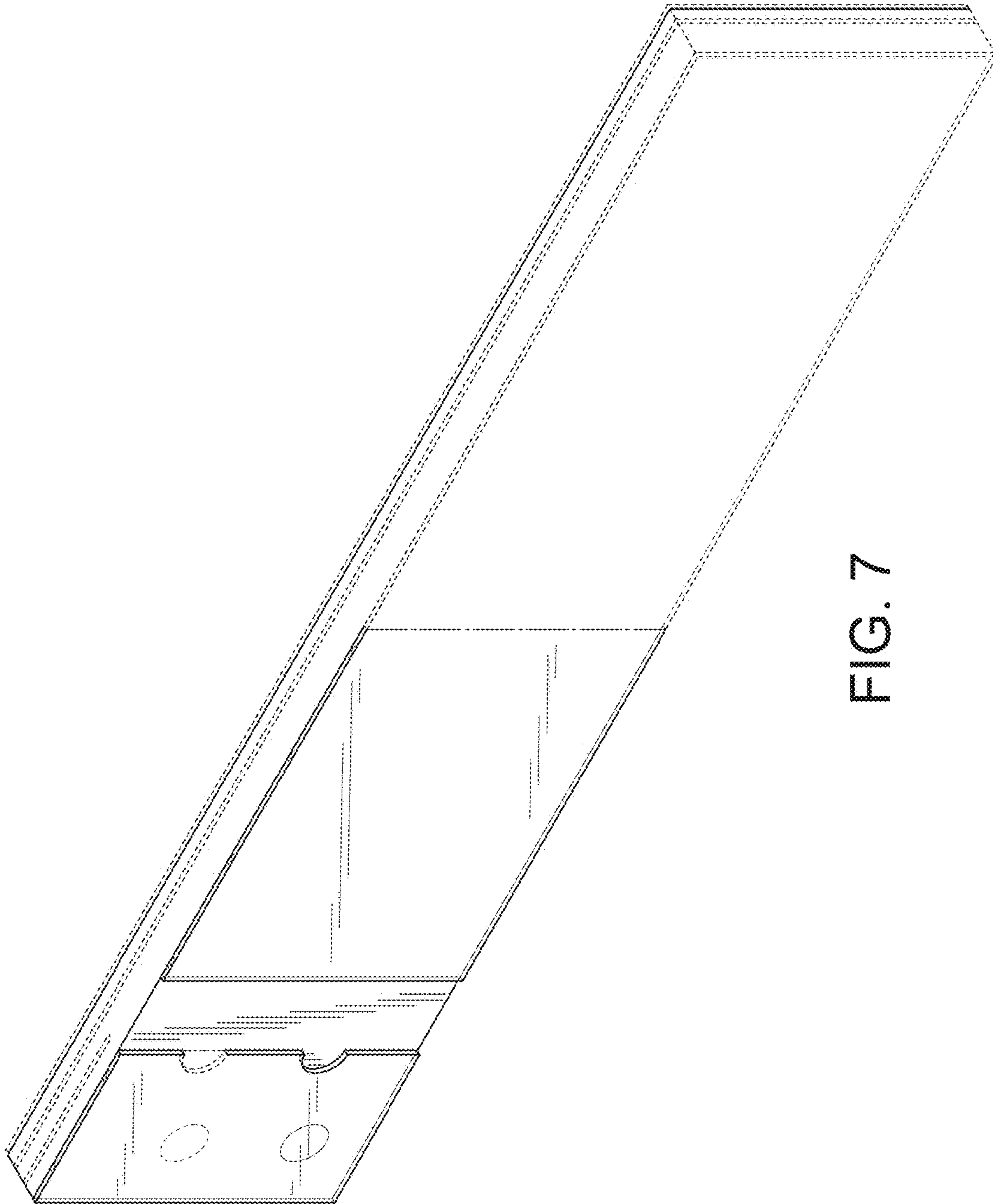


FIG. 7

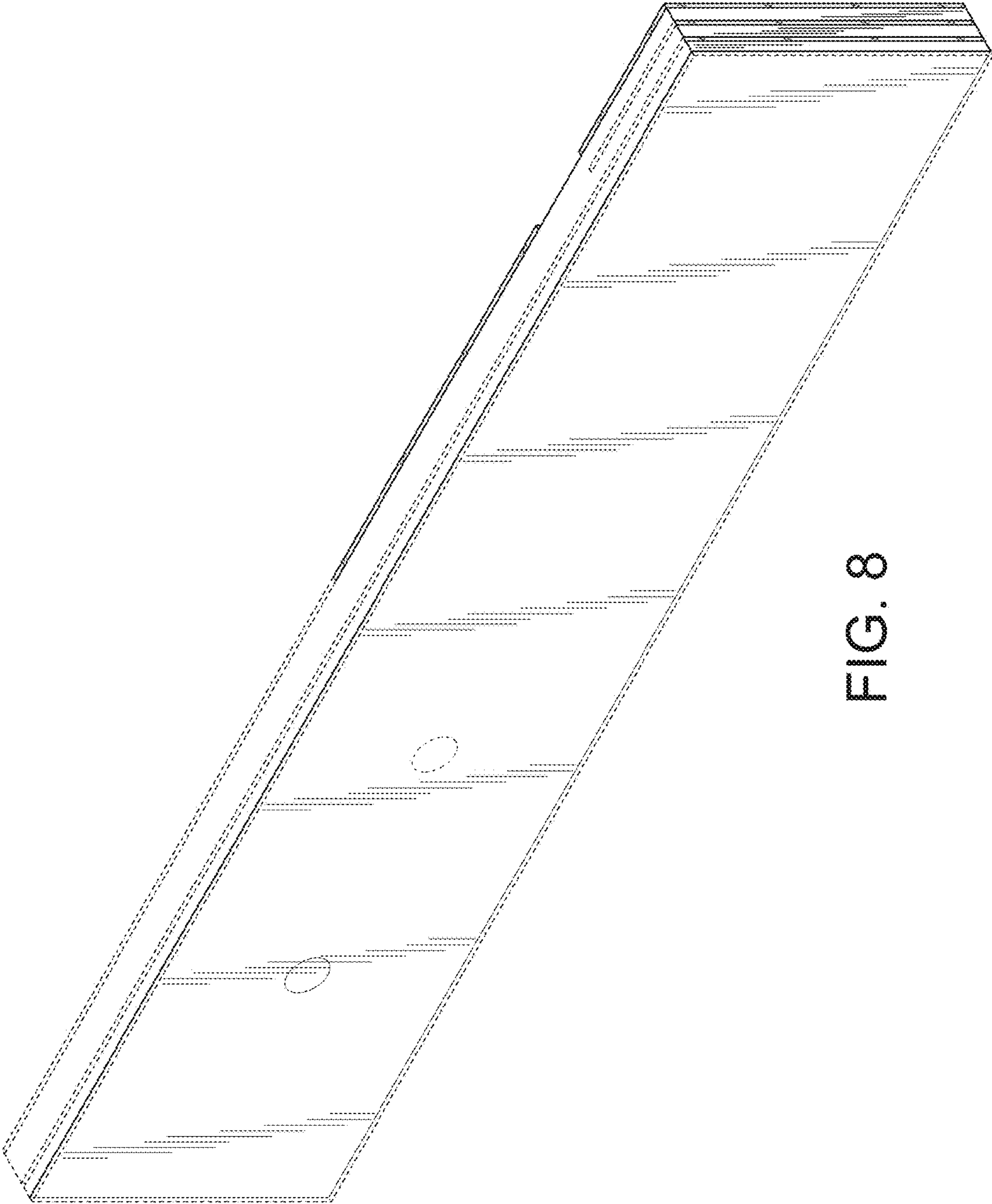


FIG. 8

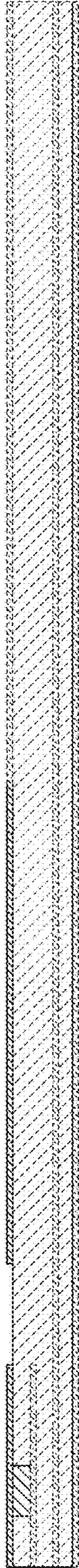


FIG. 9

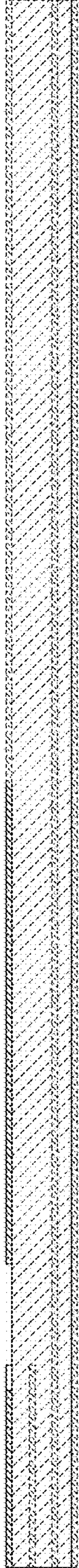


FIG. 10



FIG. 11

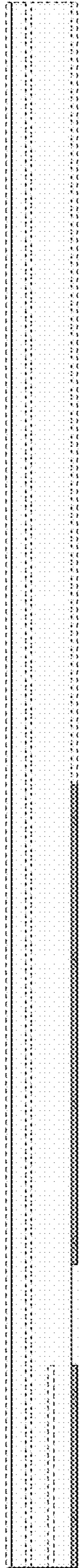


FIG. 12

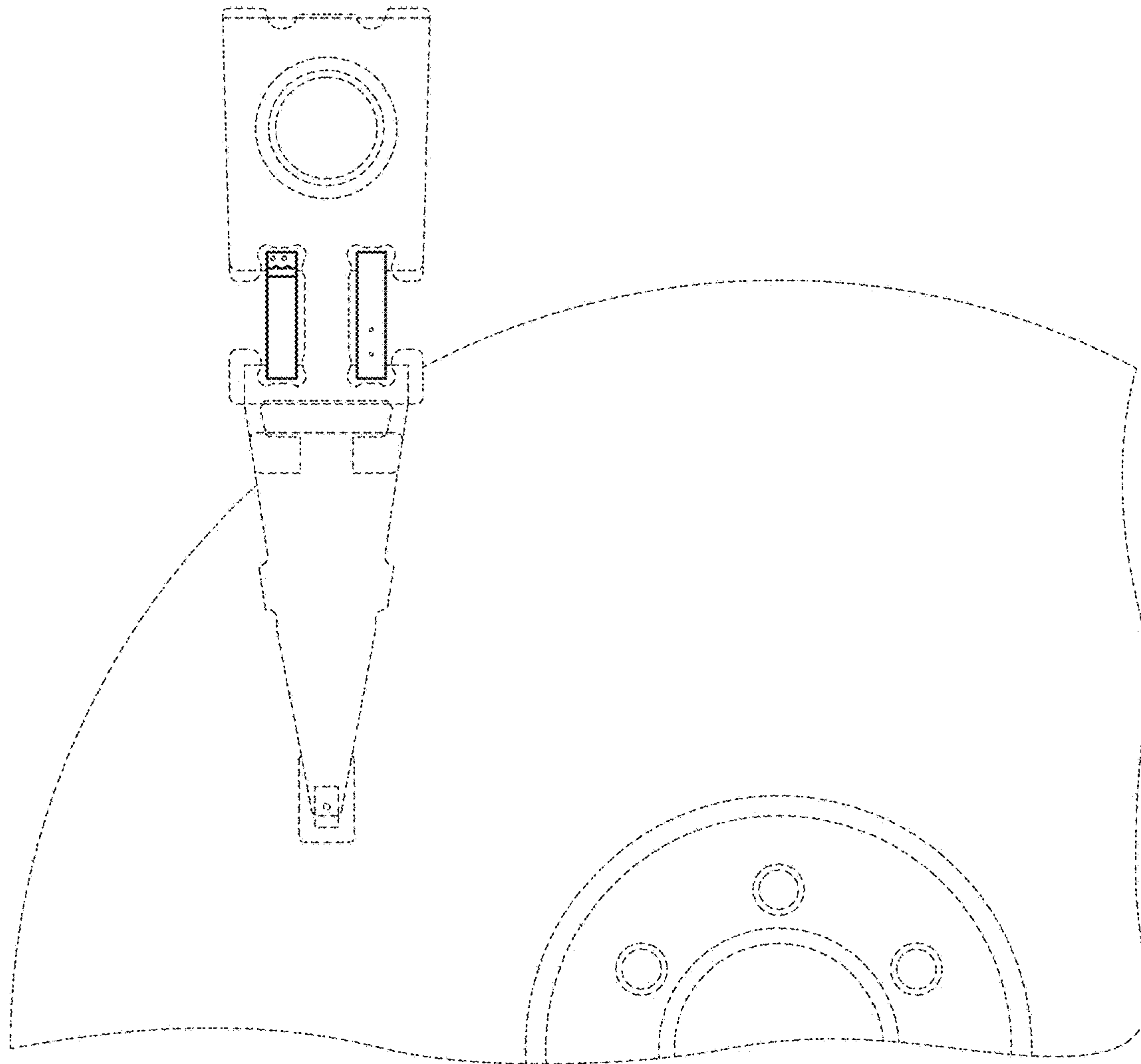


FIG. 13

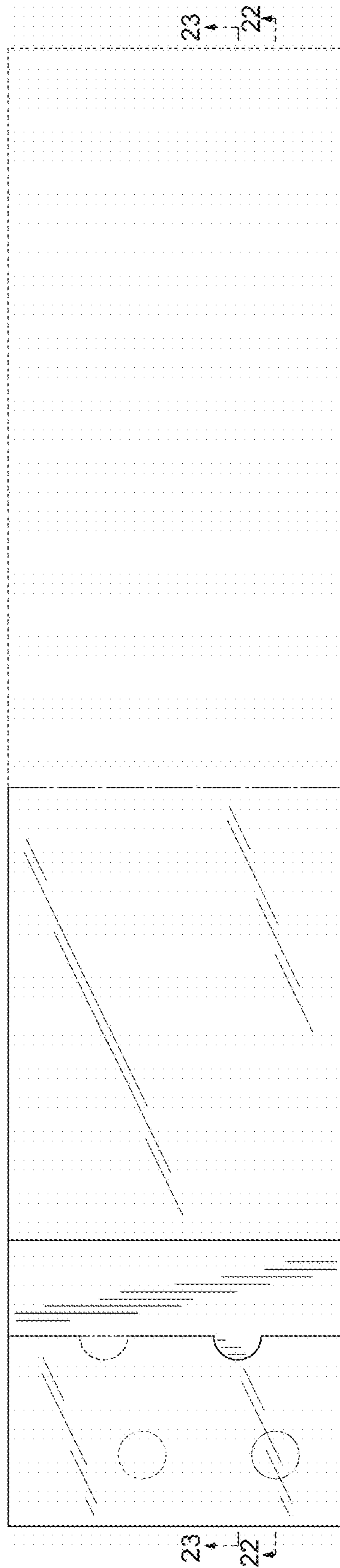


FIG. 14

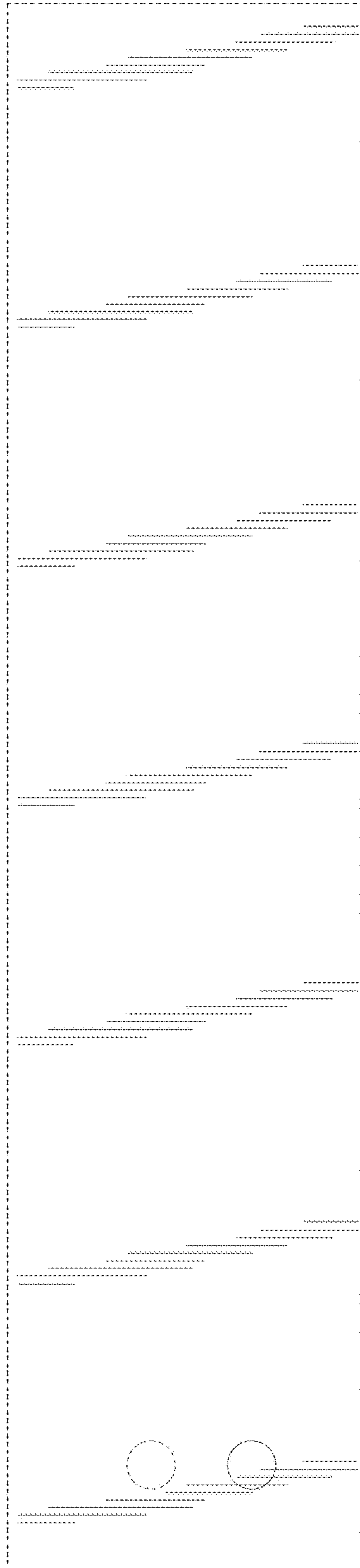


FIG. 15

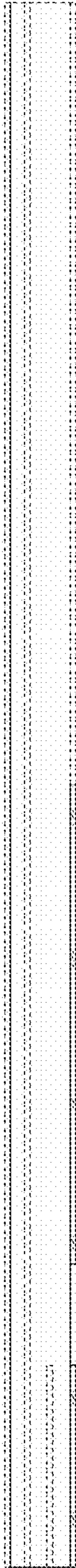


FIG. 16



FIG. 17

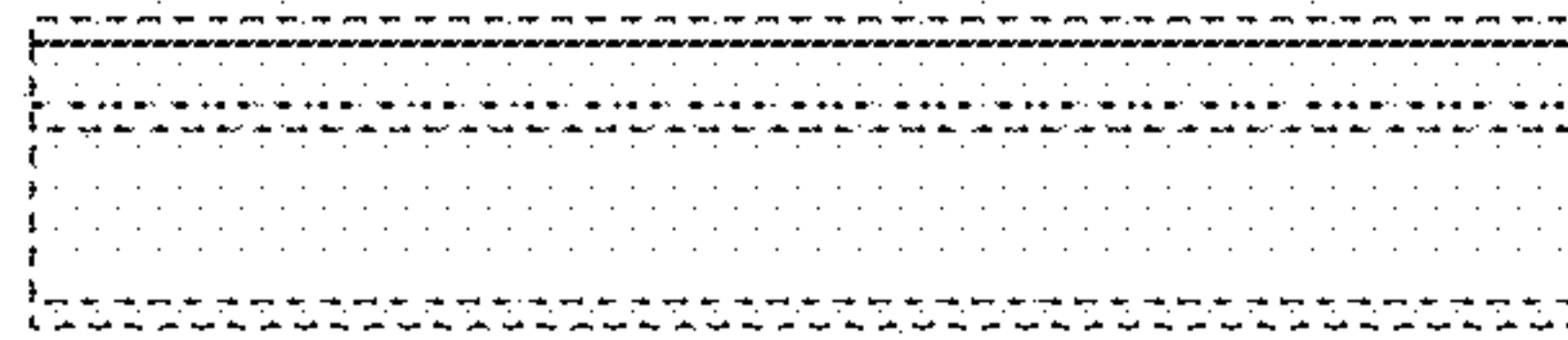


FIG. 18

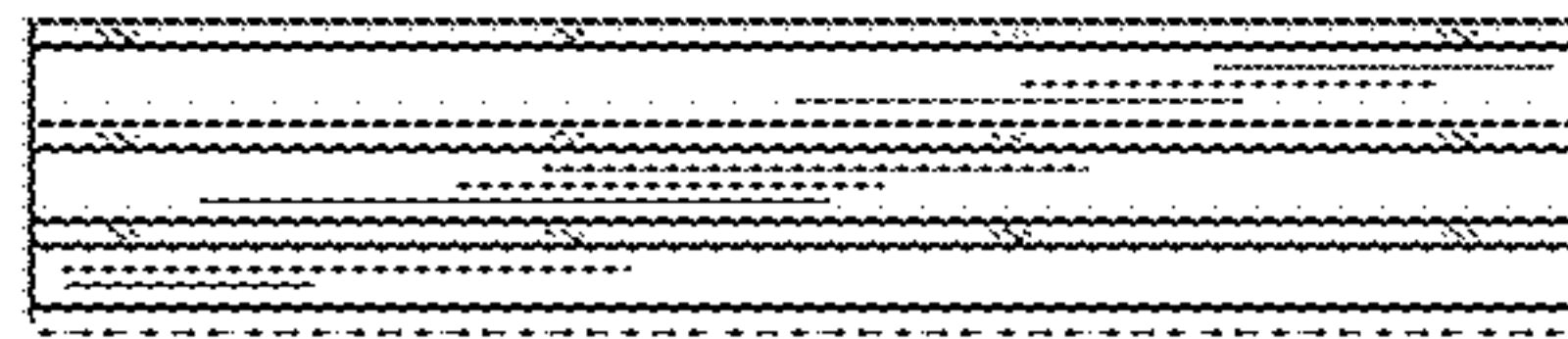


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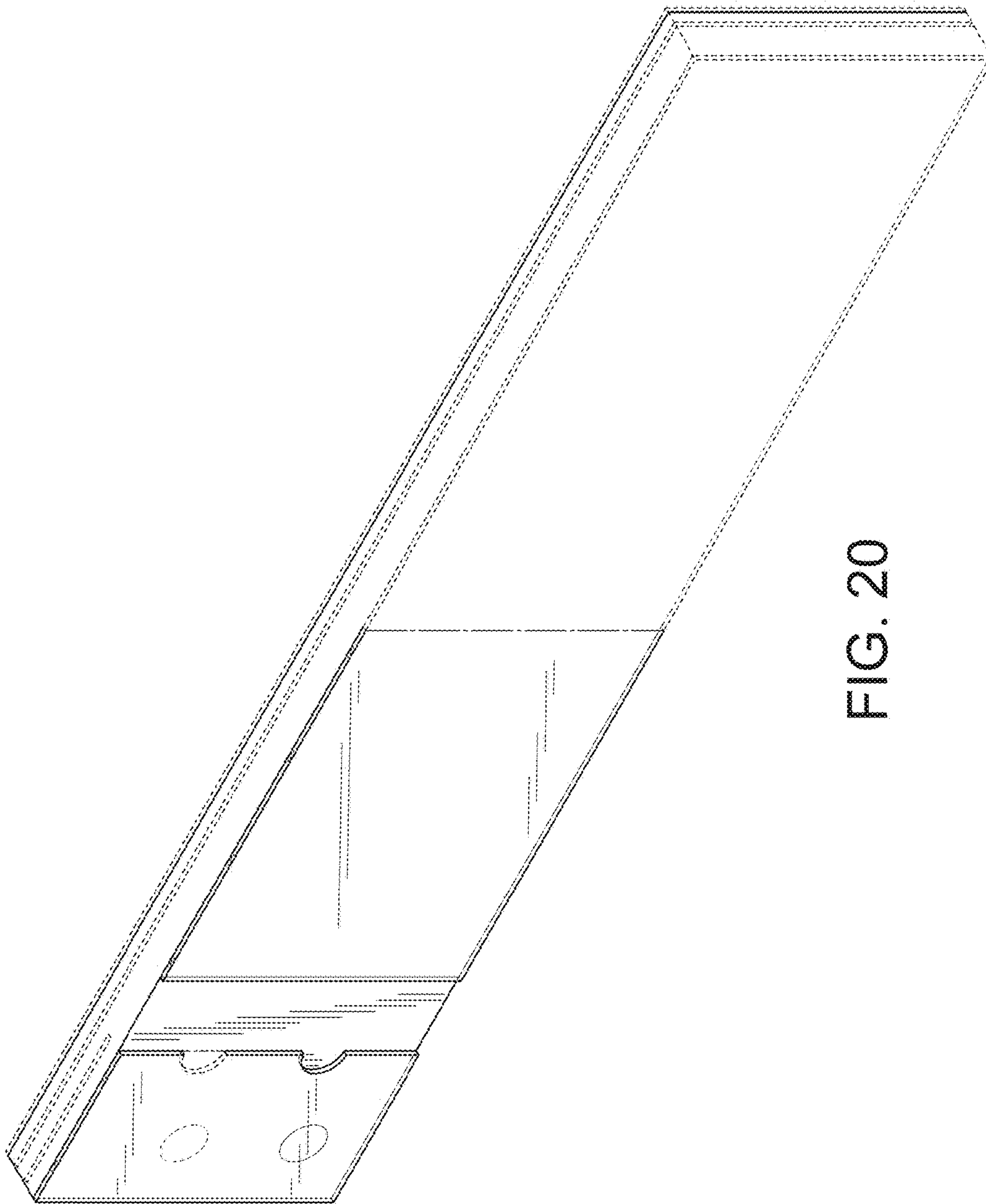


FIG. 20

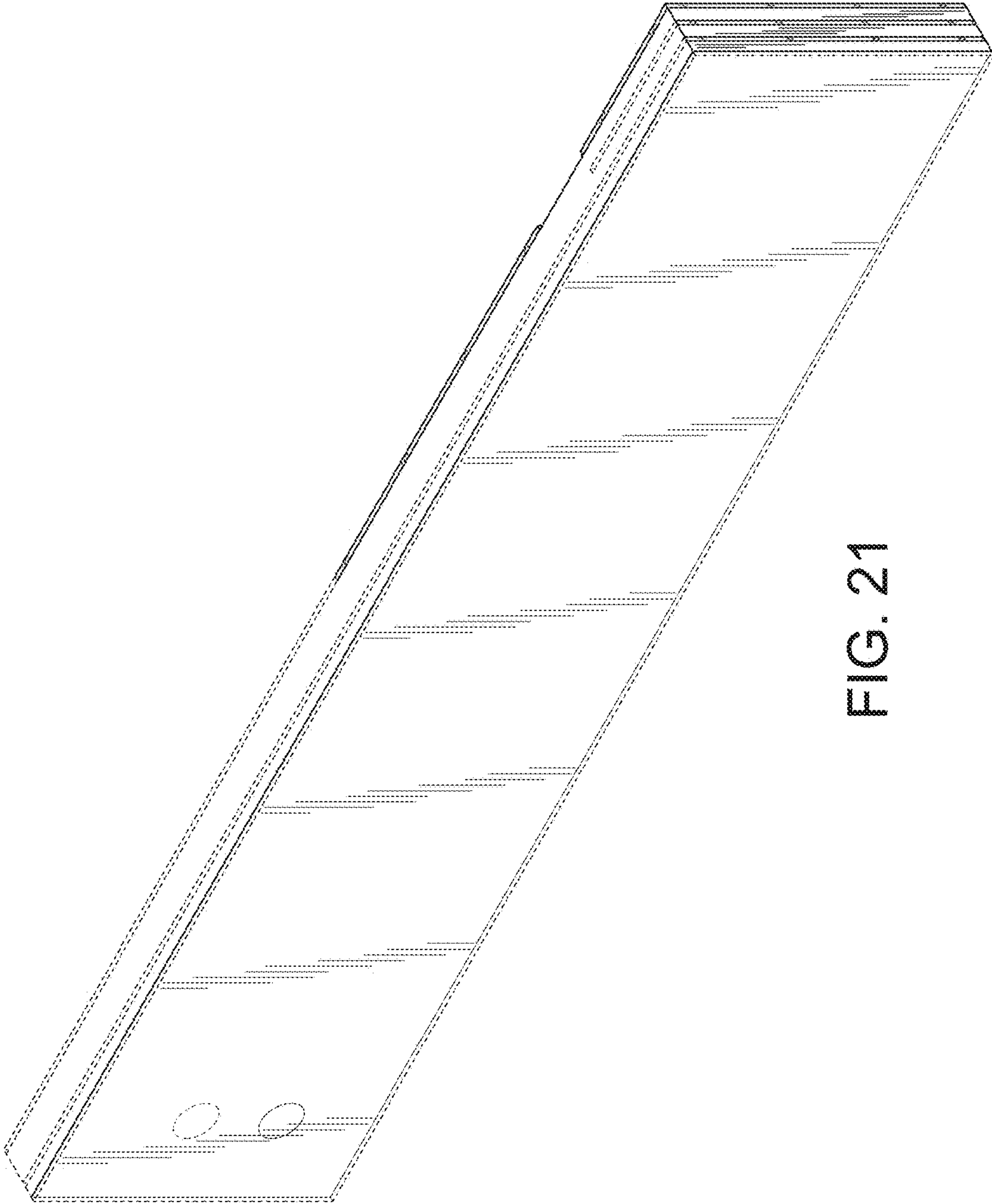


FIG. 21

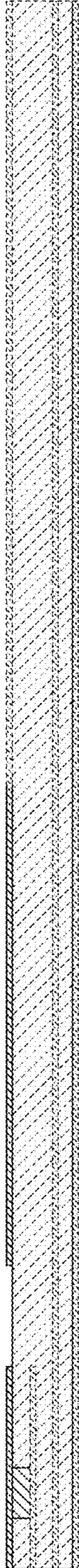


FIG. 22

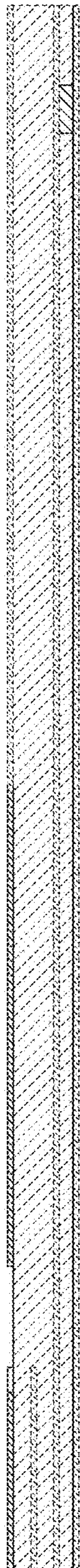


FIG. 23



FIG. 24

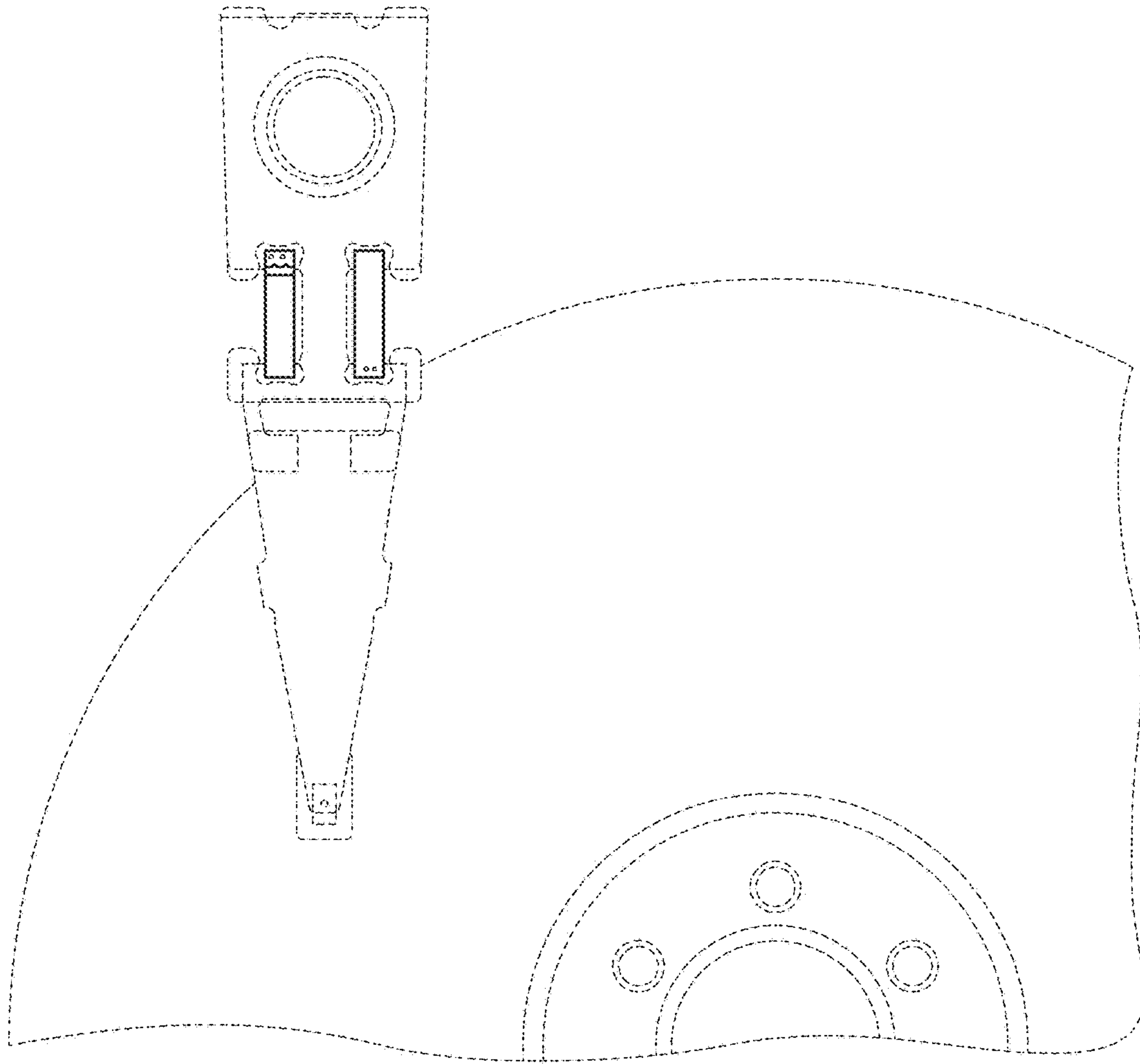


FIG. 25