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(12) **United States Design Patent** (10) **Patent No.:** **US D857,020 S**  
**Ohta et al.** (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**

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

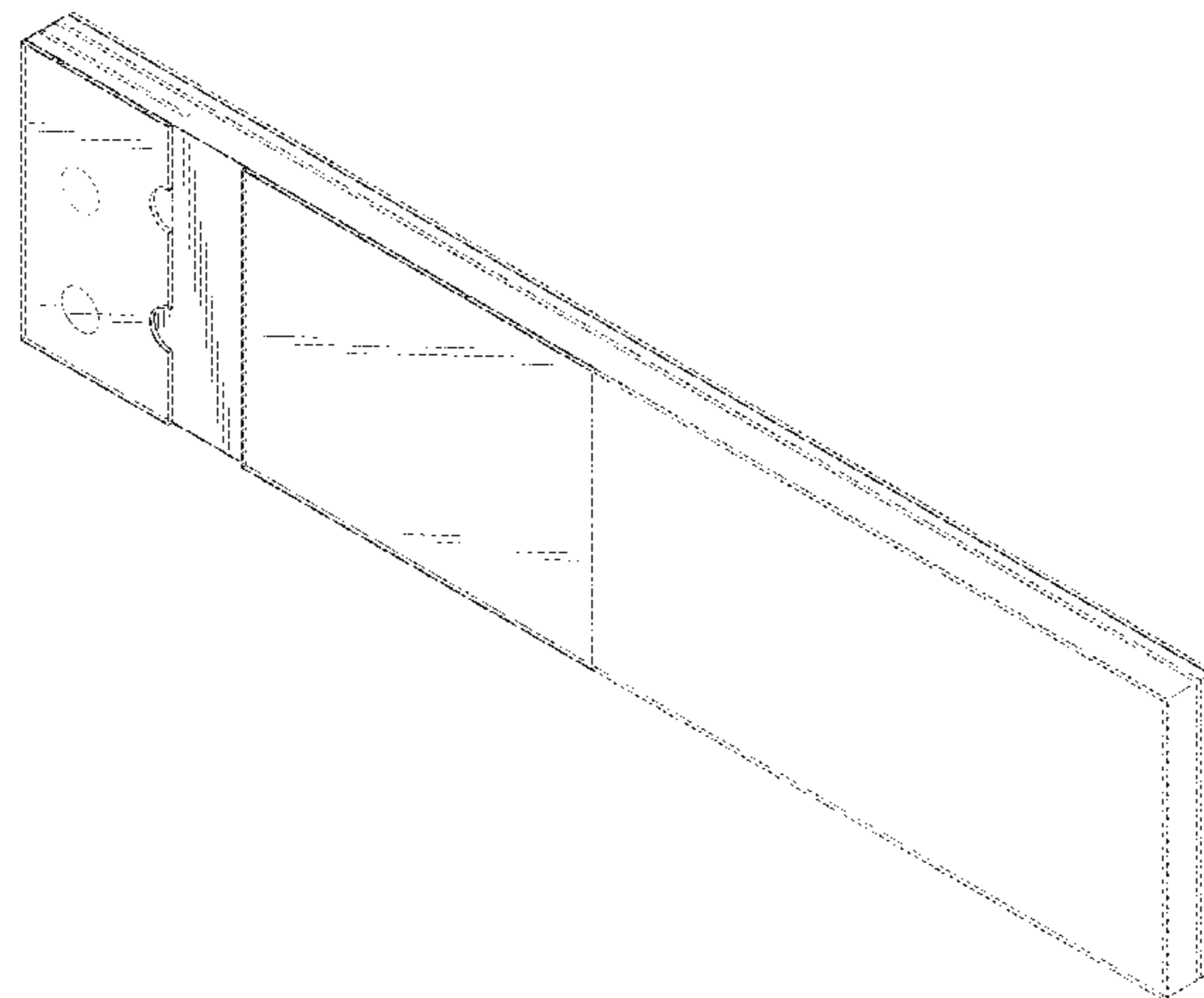
(57) **CLAIM**

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  
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 7/026; H05K 2201/09745; H05K  
 2201/09754; H05K 2201/09763; H05K  
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 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  
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 H01R 13/633; H01R 23/7005; H01R  
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 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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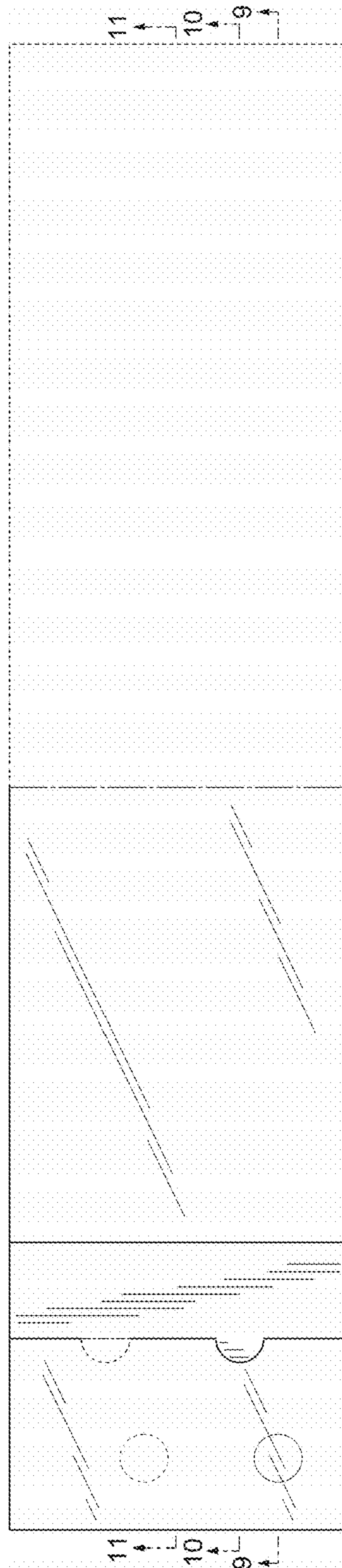


FIG. 1

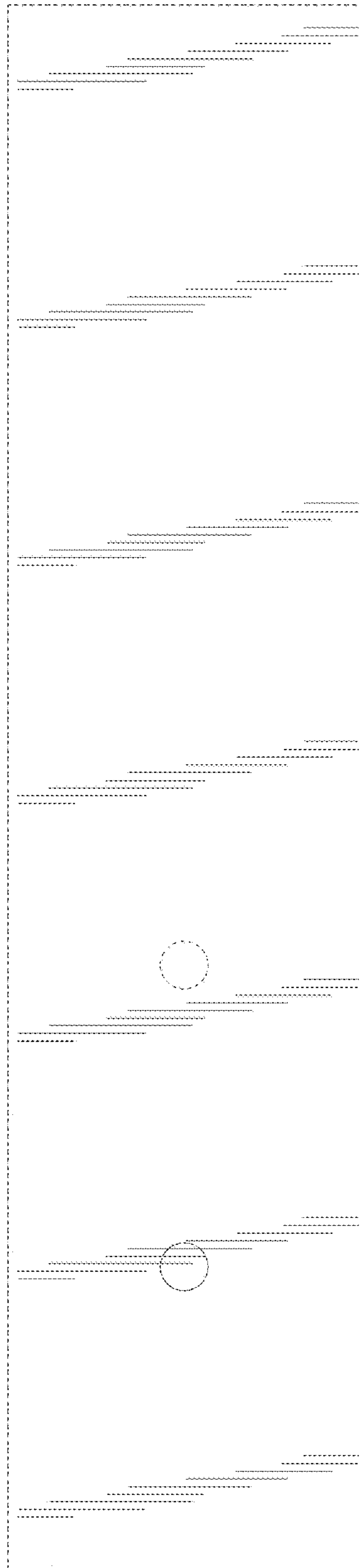


FIG. 2

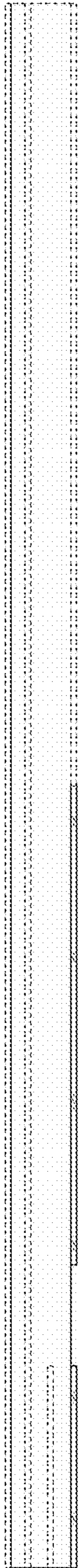


FIG. 3



FIG. 4

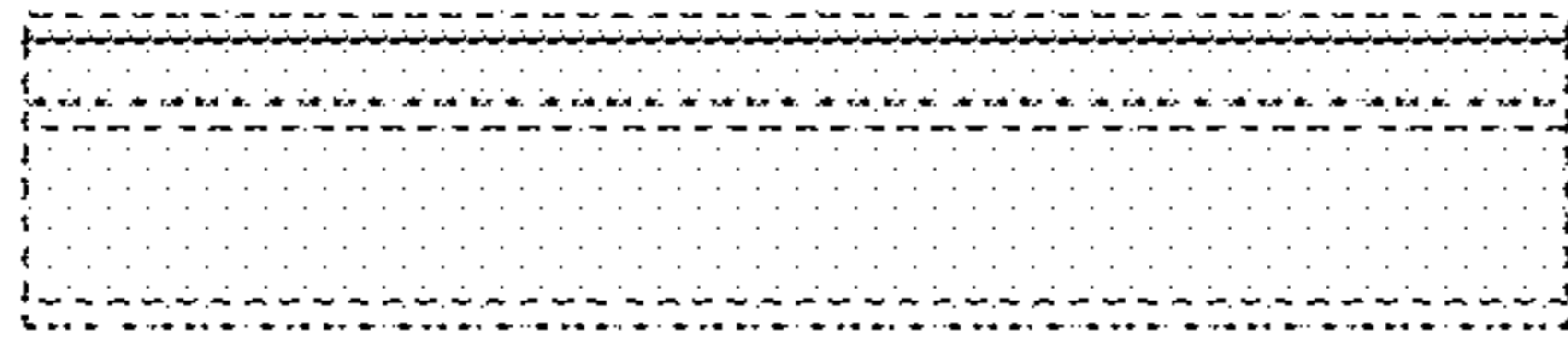


FIG. 5



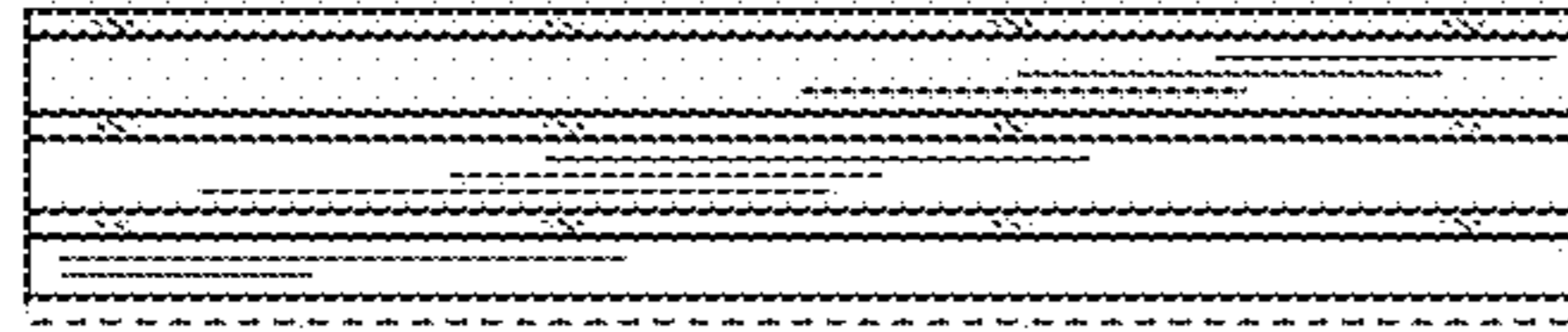


FIG. 6

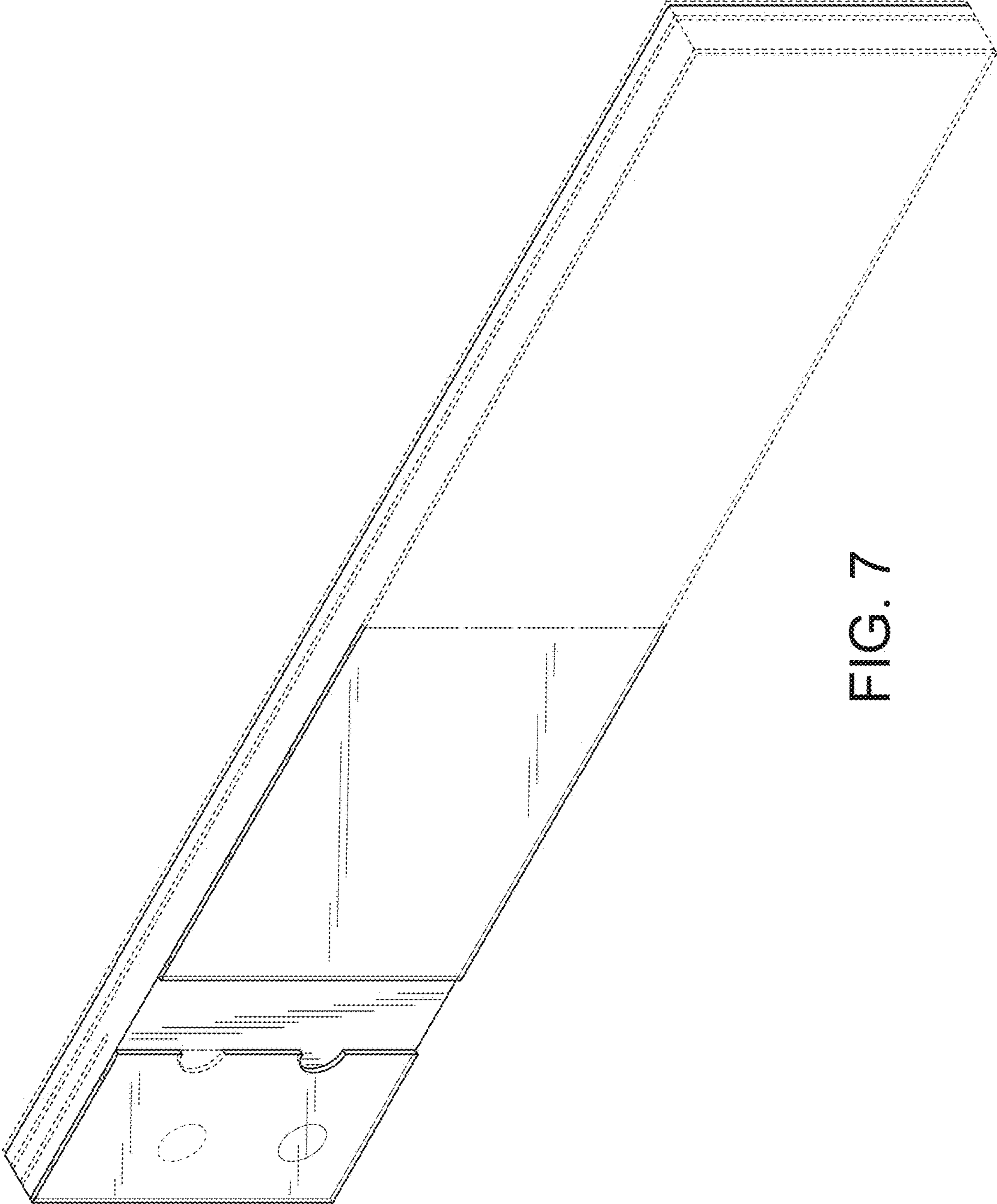


FIG. 7

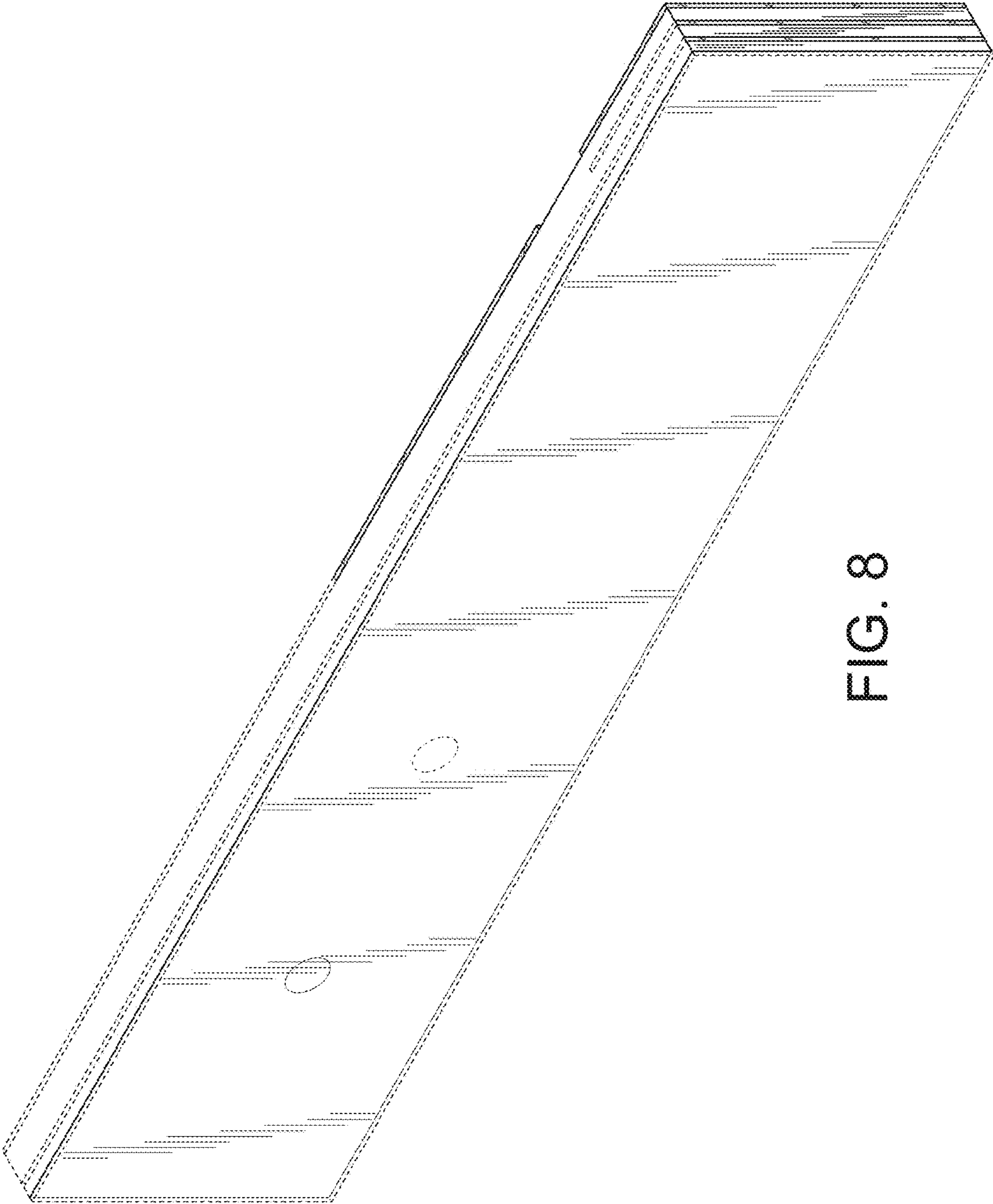


FIG. 8

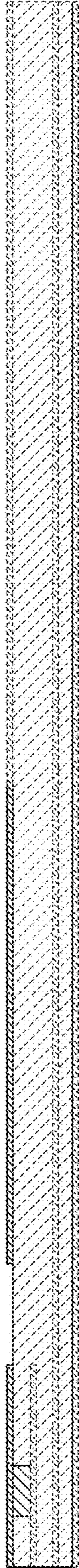


FIG. 9



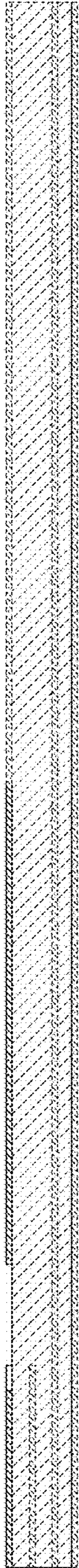


FIG. 10



FIG. 11

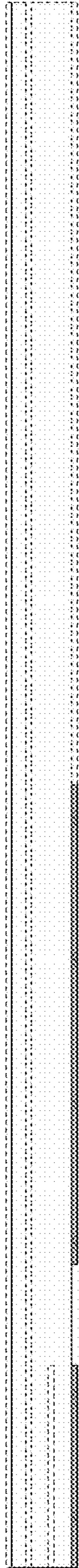


FIG. 12

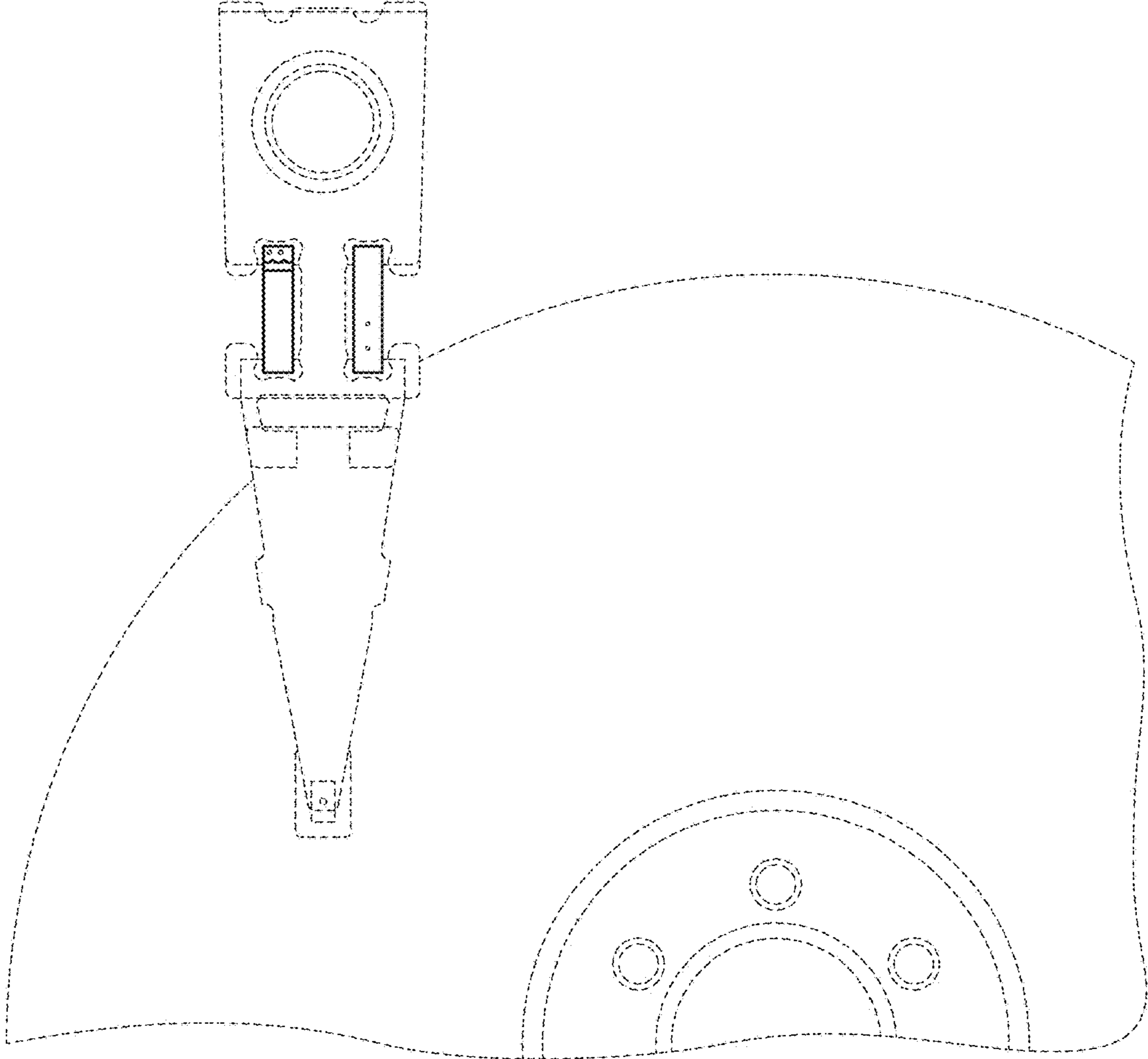


FIG. 13



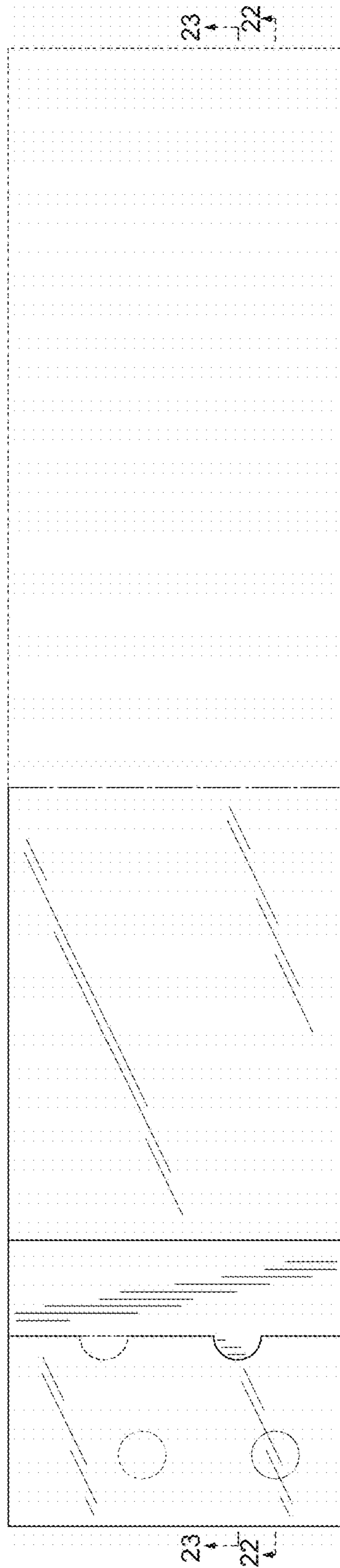


FIG. 14

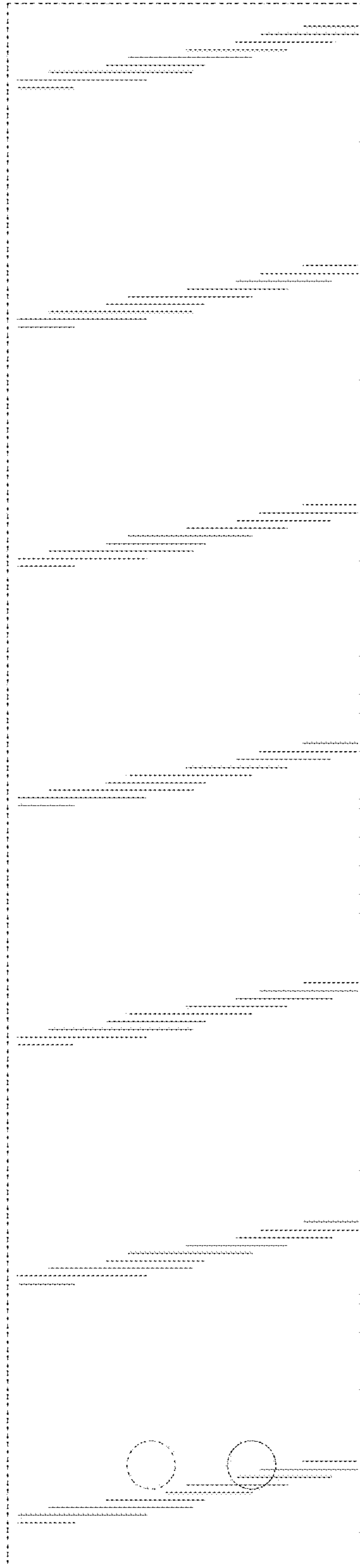


FIG. 15

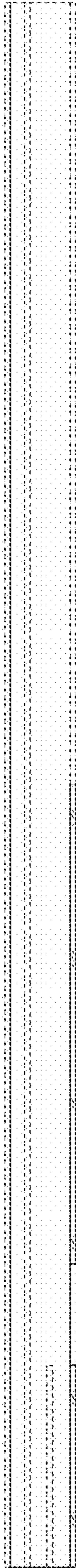


FIG. 16



FIG. 17



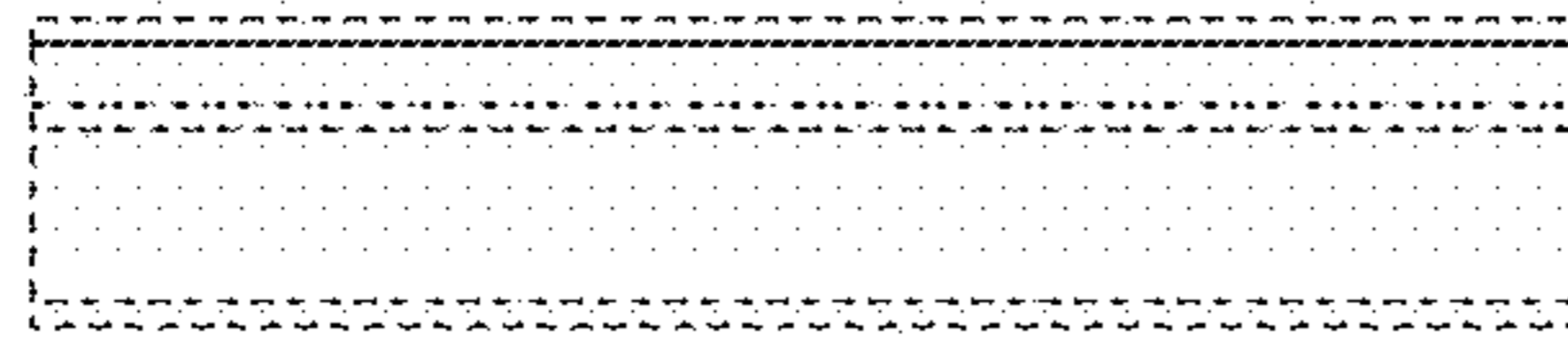


FIG. 18

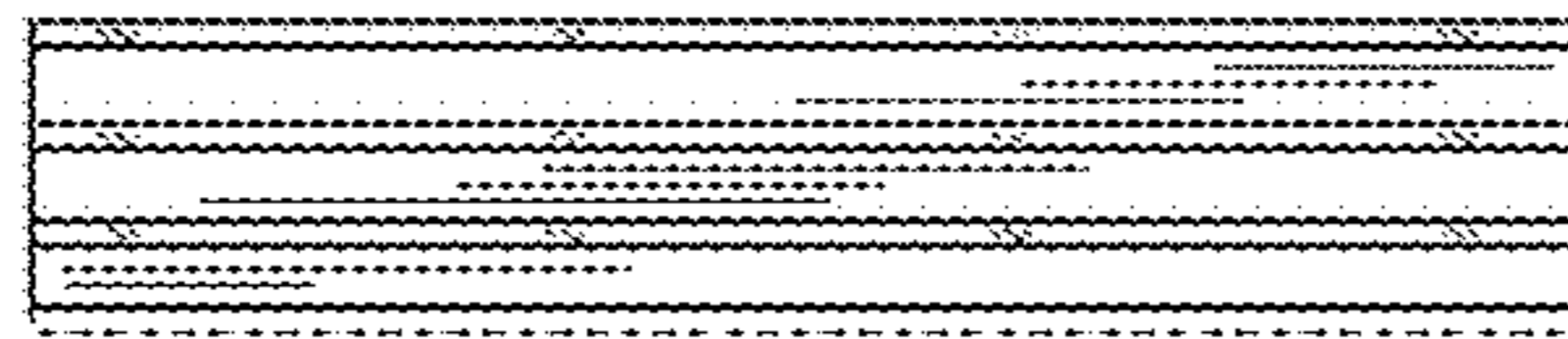


FIG. 19

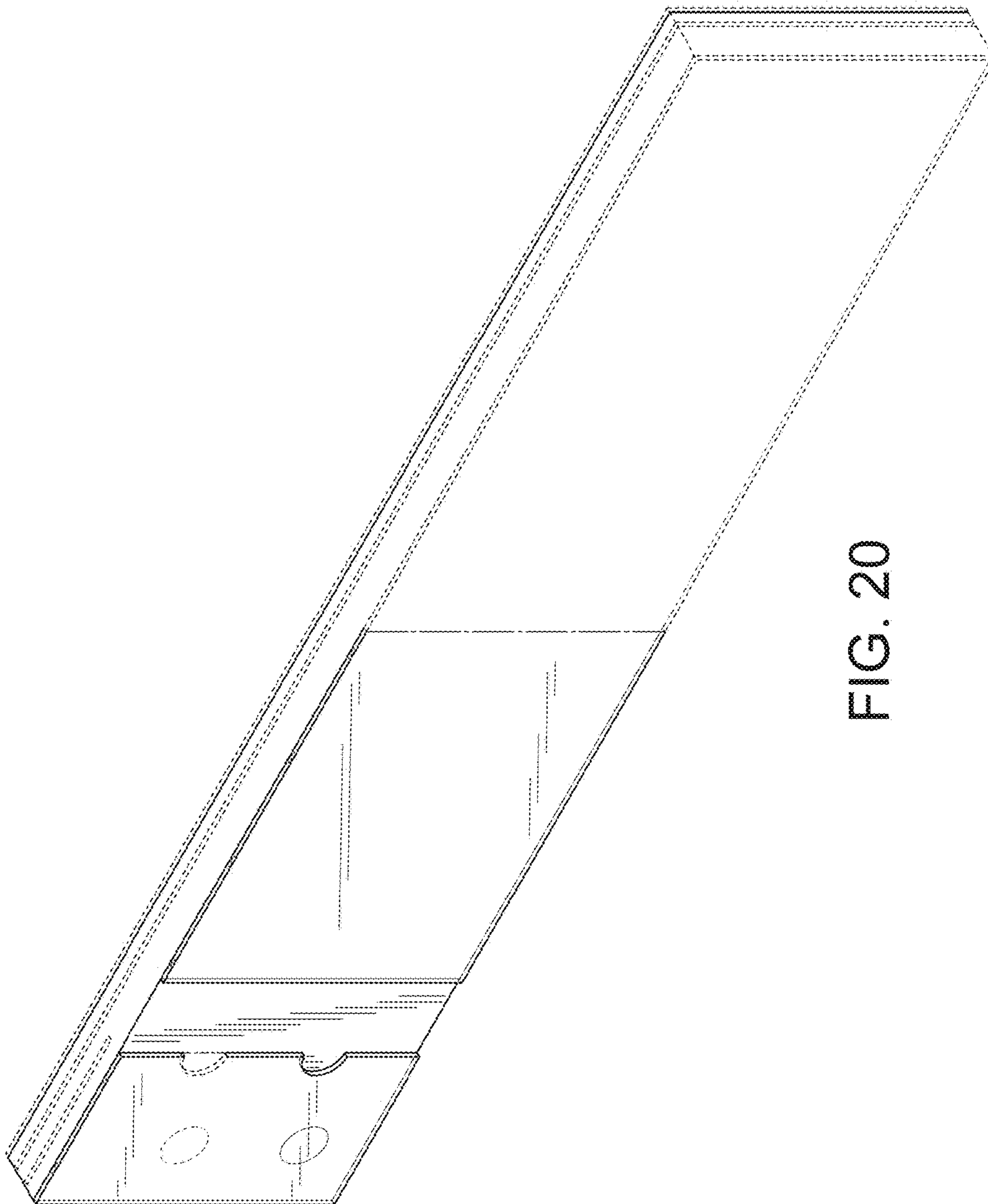


FIG. 20

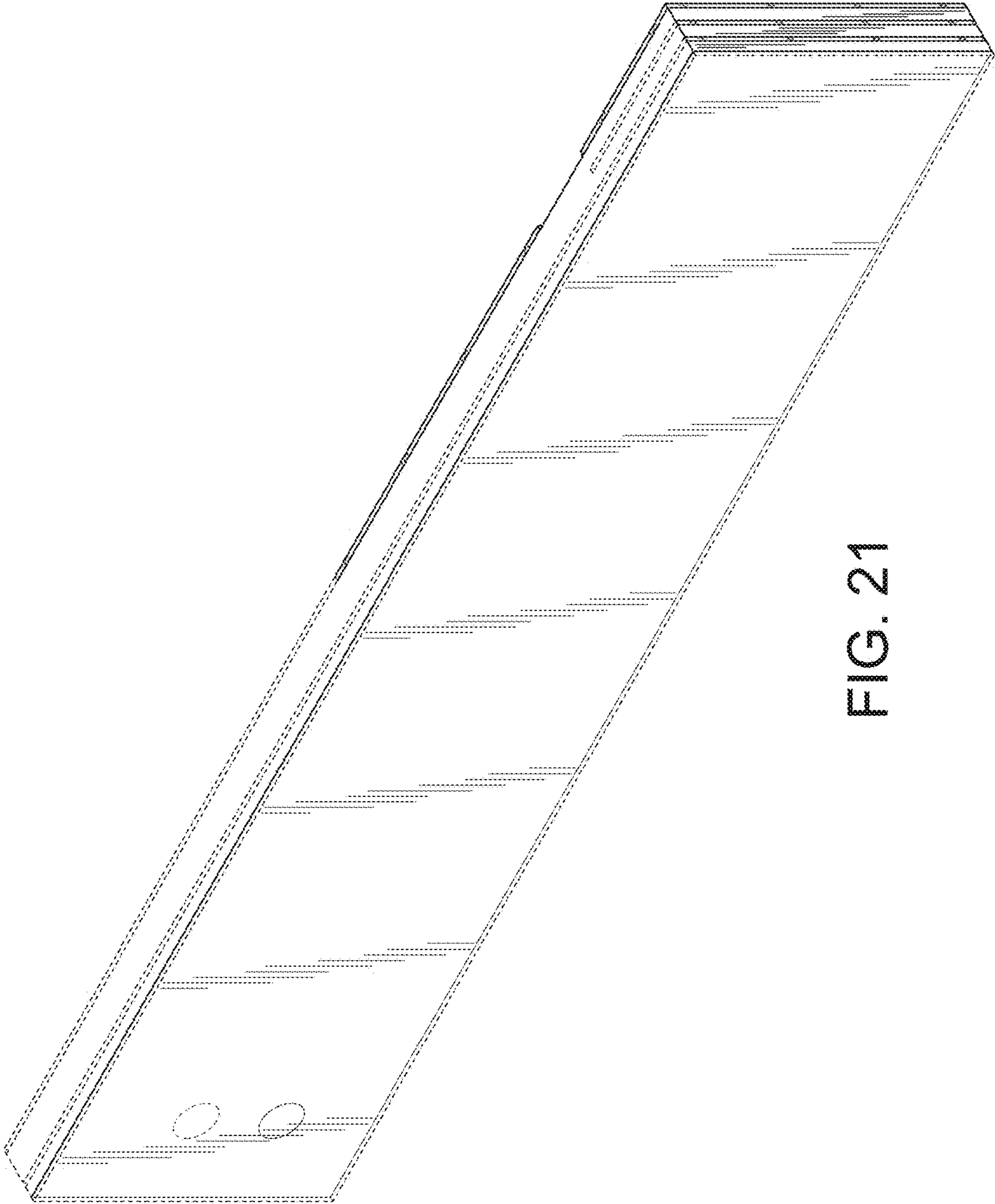


FIG. 21



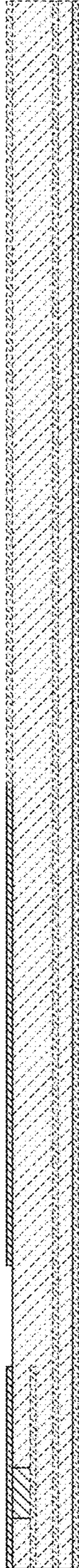


FIG. 22

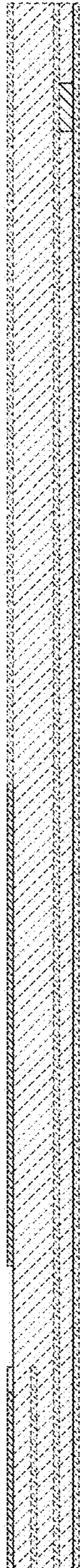


FIG. 23



FIG. 24

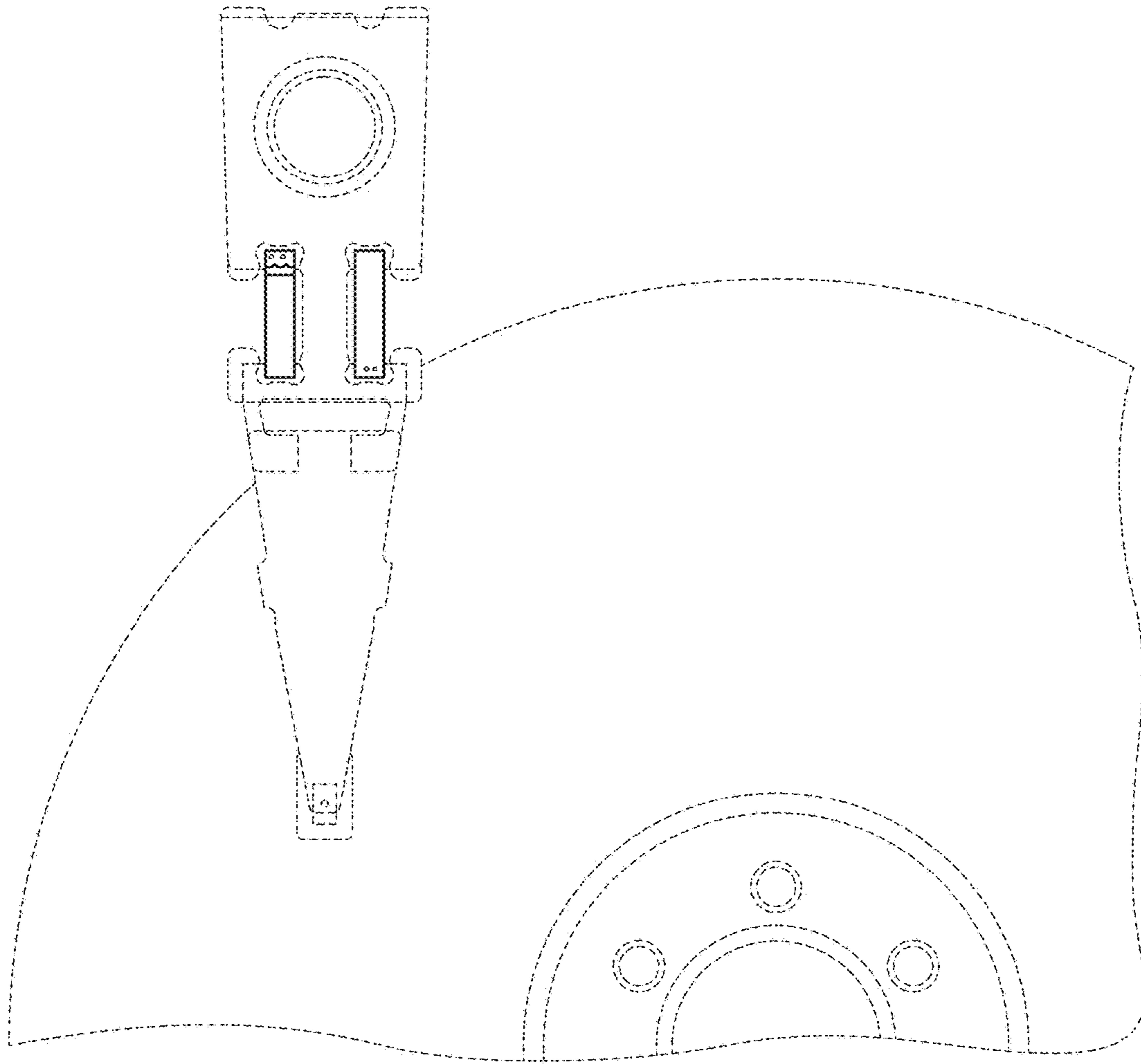


FIG. 25