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(12) **United States Design Patent** (10) **Patent No.:** **US D906,268 S**
Mahajan et al. (45) **Date of Patent:** **** Dec. 29, 2020**

(54) **HEAT EXCHANGER FIN**

FOREIGN PATENT DOCUMENTS

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CN 102121798 7/2011
CN 102121798 A 7/2011

(Continued)

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OTHER PUBLICATIONS

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Oak Fin Dies, Fin Advertisement, First cached Jan. 24, 2017.
(https://www.burroak.com/documents/machines/OAK_Fin_Dies.pdf) (Year: 2017).*

(Continued)

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

Primary Examiner — April Rivas

(21) Appl. No.: **29/663,004**

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

(52) **U.S. Cl.**
USPC **D13/179**

(57) **CLAIM**

(58) **Field of Classification Search**
USPC D13/179, 182; D26/113, 138, 141;
D8/394, 354
CPC H05K 7/20409; H05K 7/20418; H05K
7/20509; F28F 3/025; F28F 3/00; F28F
3/086

The ornamental design for a heat exchanger fin, as shown
and described.

See application file for complete search history.

DESCRIPTION

(56) **References Cited**

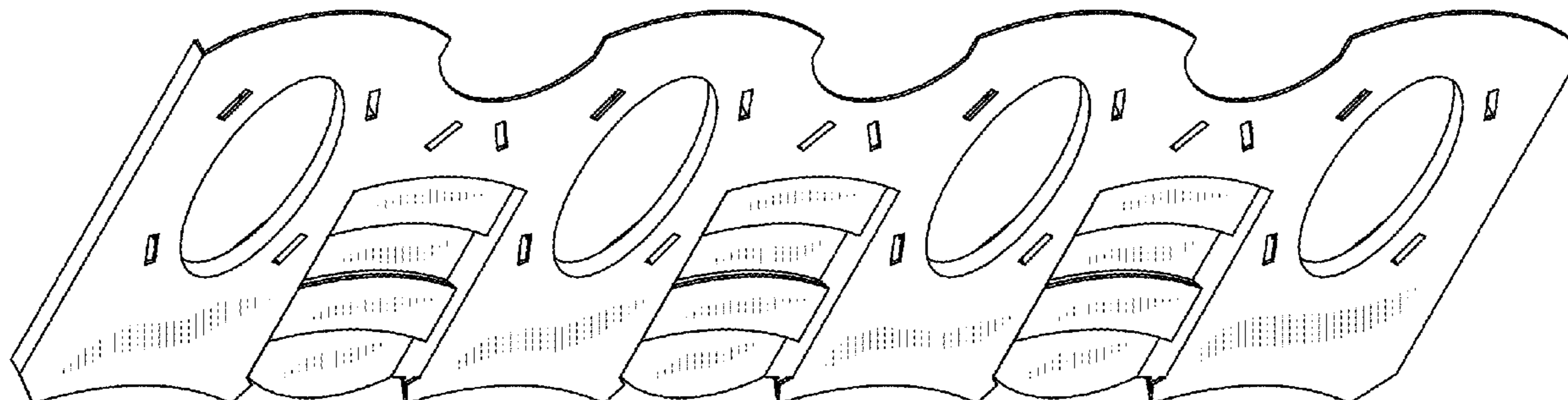
U.S. PATENT DOCUMENTS

4,545,428 A * 10/1985 Onishi F28F 1/325
138/38
4,705,105 A * 11/1987 Cur F28F 1/325
165/151
5,111,876 A 5/1992 Nash
5,582,244 A 12/1996 Helms et al.
5,636,685 A 6/1997 Gawve et al.
5,722,485 A * 3/1998 Love F28F 1/325
165/151
5,887,649 A 3/1999 Kim
6,125,925 A 10/2000 Obosu
6,530,425 B2 * 3/2003 Wehrmann F28D 9/005
165/166

FIG. 1 is a perspective view of our new design for a heat
exchanger fin installed with an array of heat exchanger fins
in a heat exchanger for a tankless water heater;
FIG. 2 is a top front perspective view of our new design for
a heat exchanger fin;
FIG. 3 is a bottom back perspective view thereof;
FIG. 4 is a left elevation view thereof;
FIG. 5 is a right elevation view thereof;
FIG. 6 is a front elevation view thereof;
FIG. 7 is a back elevation view thereof;
FIG. 8 is a top plan view thereof; and,
FIG. 9 is a bottom view thereof.
The broken lines shown in the figures illustrate the envi-
ronment in which the heat exchange fin is installed and form
no part of the claimed design.

(Continued)

1 Claim, 7 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

6,786,274	B2	9/2004	Bemisderfer	
D573,112	S *	7/2008	Xu	D13/179
D699,690	S *	2/2014	Hsu	D13/179
9,638,476	B2	5/2017	Kerler et al.	
D802,543	S *	11/2017	Hwang	F28D 15/0275
				D13/179
D819,578	S *	6/2018	Su	D13/179
D858,466	S *	9/2019	Vance	D13/179
2003/0000686	A1 *	1/2003	Kester	F28F 1/325
				165/151
2011/0120681	A1	5/2011	Seo et al.	
2016/0245594	A1 *	8/2016	Berthelot	F28F 1/20
2016/0273850	A1	9/2016	Okamoto et al.	
2017/0276440	A1 *	9/2017	Kenworthy	F28F 1/32
2019/0285359	A1 *	9/2019	Mahajan	F28F 9/013

FOREIGN PATENT DOCUMENTS

DE	10227930	A1	1/2004
EP	0188314	A2	7/1986
ES	2200112	T3	3/2004

ES	2219276	T3	12/2004
FR	2866698	A1	8/2005
FR	2958027	A1	9/2011
JP	63210596	A	9/1988
JP	08170890	A	7/1996
JP	1998089873	A	4/1998
JP	2001147087	A	5/2001

OTHER PUBLICATIONS

HTPM, "Fins", Cached on Aug. 20, 2018. (<http://www.wx-hi-tech.com/product.asp?id=3>) (Year: 2018).*

Office Action and Search Report for Chilean Patent Appl. N° 2019-00638 dated Jan. 14, 2020 (12 pages).

Tiwari S, et al. Heat Transfer Enhancement in Cross-flow Heat Exchangers using Oval Tubes and Multiple Delta Winglets. International Journal of Heat and Mass Transfer. 2003;(46):2841-2856. ISSN 0017-9310.

Perez et al; An Experimental Study of Heat Transfer Enhancement using Vortex Generators in a Finned Elliptical Tube; Ingeniería Energética, 2016:XXXVII(3):165-175, Sep./Dec., ISSN 1815-5901.

* cited by examiner

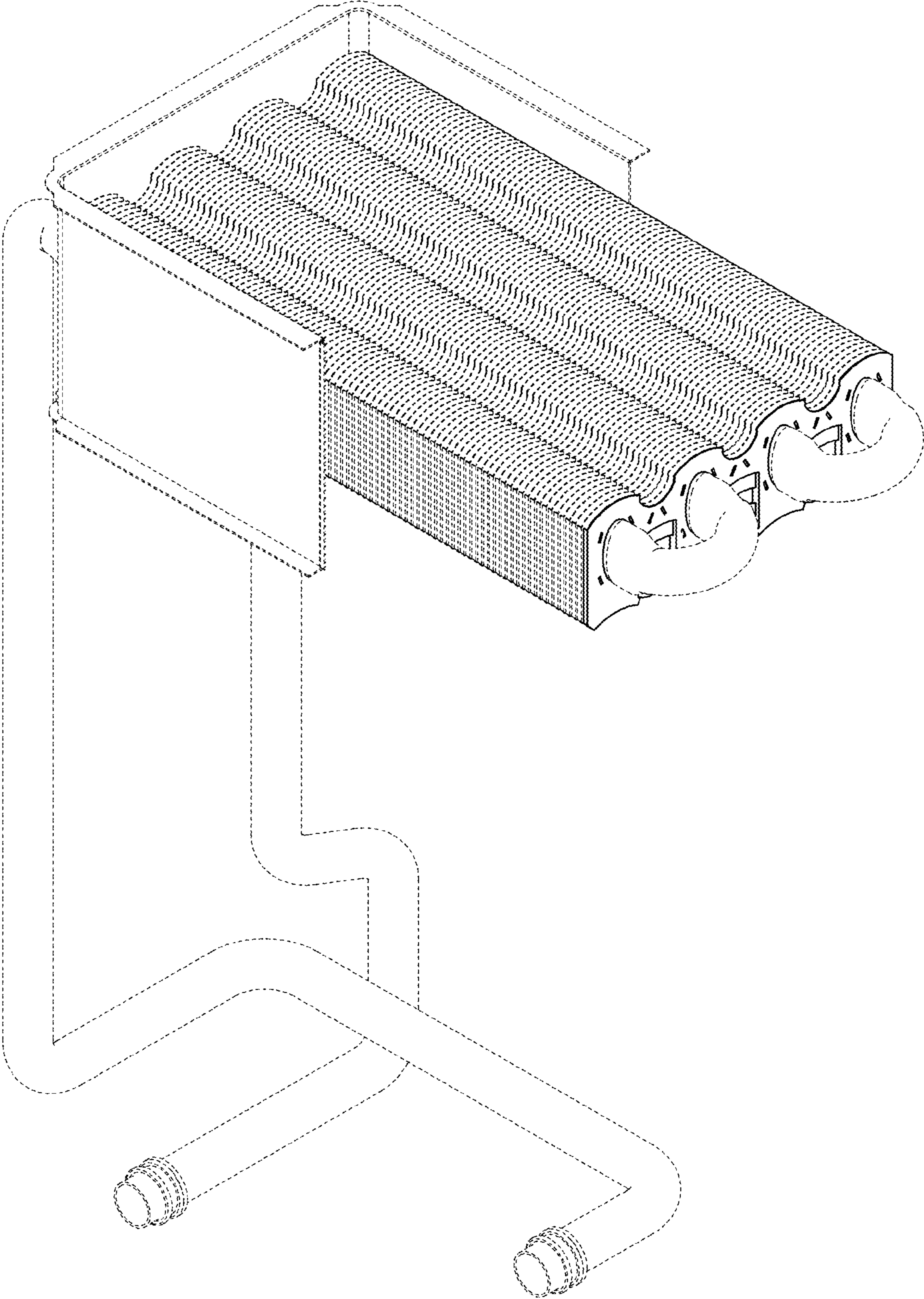


FIG. 1

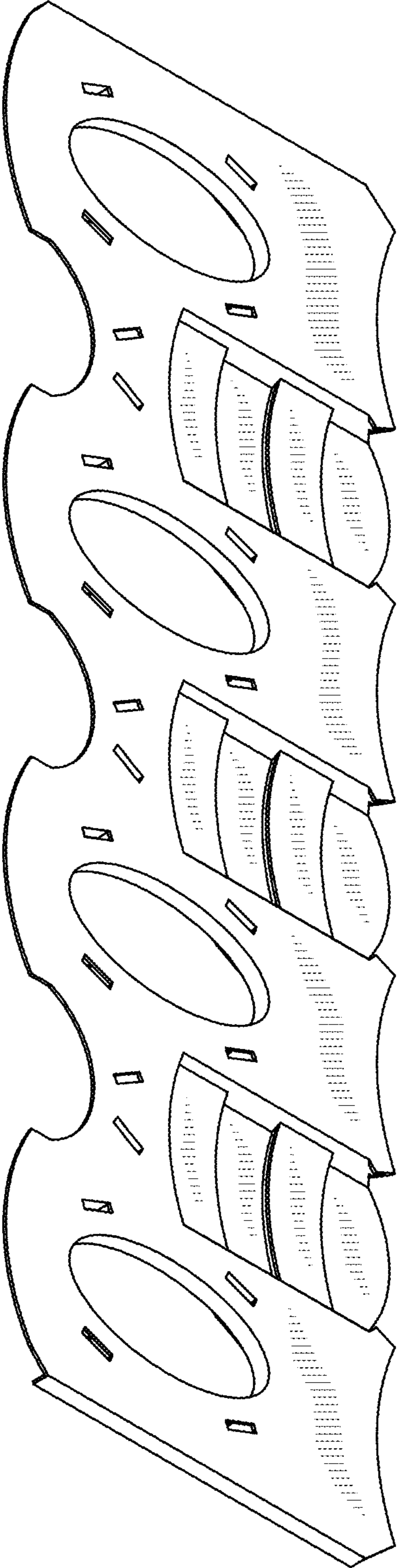


FIG. 2

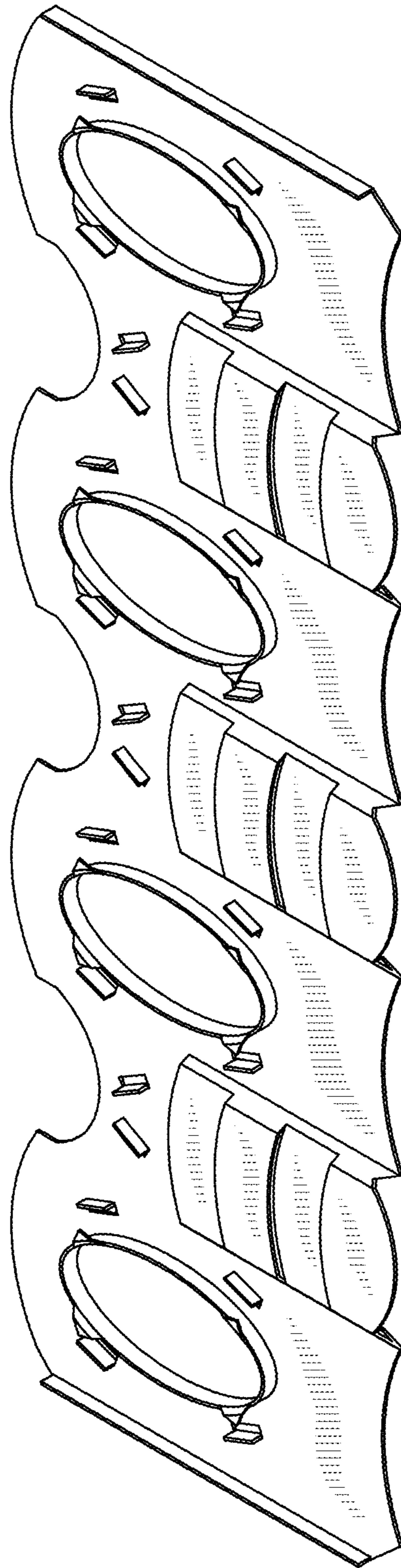


FIG. 3

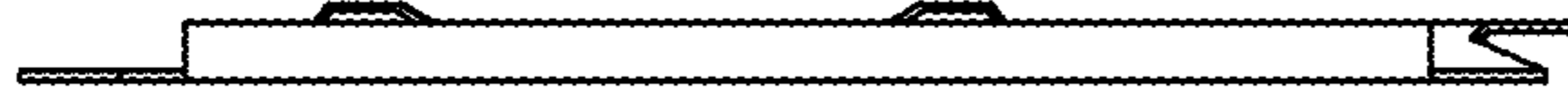


FIG. 5

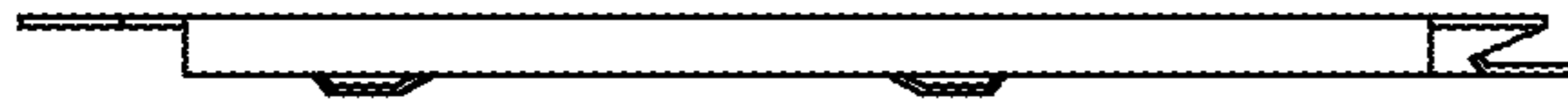


FIG. 4

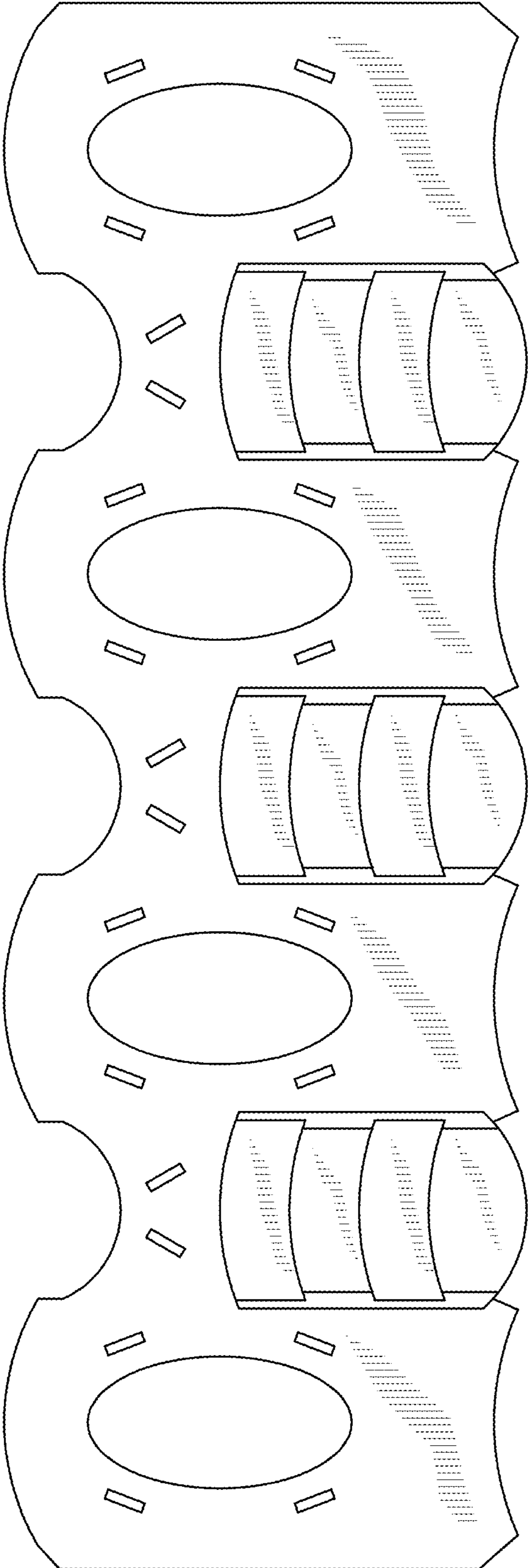


FIG. 6

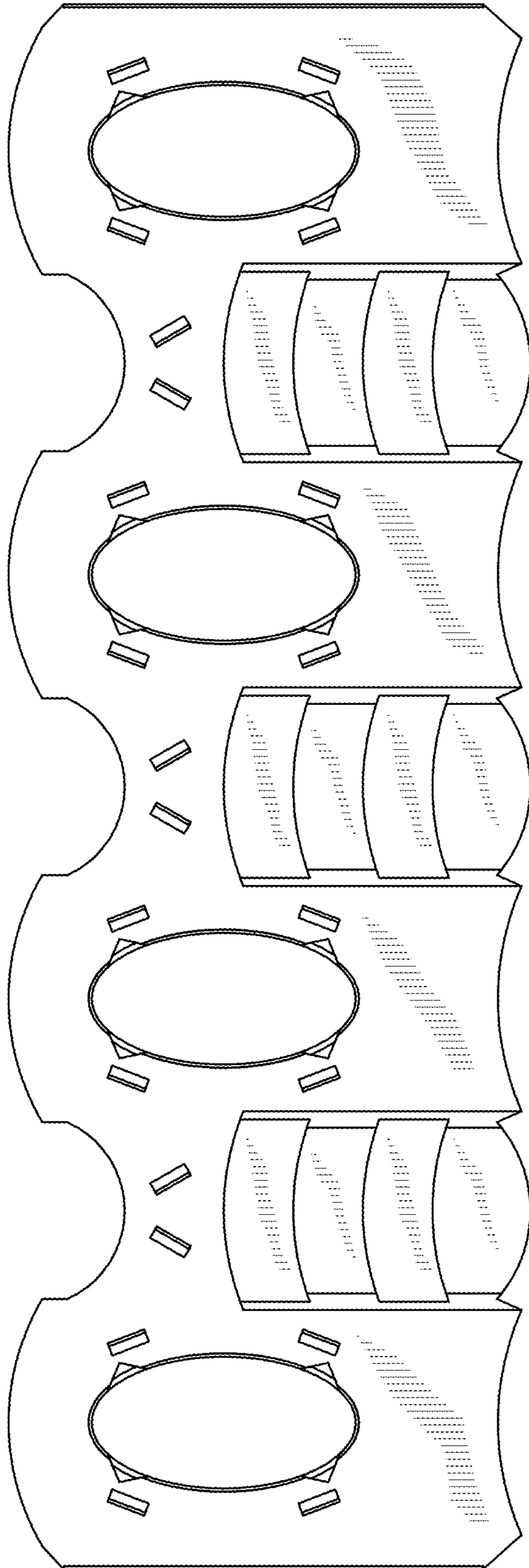


FIG. 7



FIG. 8



FIG. 9