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

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(54) **CONTOURED FAN BLADE**

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(73) Assignee: **CARRIER CORPORATION**, Palm Beach Gardens, FL (US)

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

(21) Appl. No.: **29/619,641**

(22) Filed: **Sep. 29, 2017**

(51) **LOC (12) Cl.** ..... **23-04**

(52) **U.S. Cl.**  
USPC ..... **D23/413**

(58) **Field of Classification Search**  
USPC ..... D23/370-385, 411-414  
(Continued)

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

1,712,119 A \* 5/1929 Ray ..... F01D 5/141  
416/235  
2,238,749 A 4/1941 Peltier  
(Continued)

**FOREIGN PATENT DOCUMENTS**

CN 201241864 Y 5/2009  
CN 102022380 A 4/2011  
(Continued)

**OTHER PUBLICATIONS**

CMC Ventilazione, [online]; [retrieved on Sep. 29, 2017]; retrieved from the Internet <http://www.cmcventilazione.com/en/our-products/axial-fans-with-external-rotor-motor> CMC Ventilazione, "AX Axial Fans with External Rotor Motor," CMC Ventilazione, 2012, pp. 1-2.

(Continued)

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(57) **CLAIM**

We claim, the ornamental design for a contoured fan blade, as shown and described.

**DESCRIPTION**

FIG. 1 is a perspective view of a contoured fan blade, showing our new design;  
FIG. 2 is a top view of FIG. 1;  
FIG. 3 is a bottom view of FIG. 1;  
FIG. 4 is a side view of FIG. 1;  
FIG. 5 is cross-sectional view of FIG. 1 taken along line 5-2;  
FIG. 6 is a perspective view of a contoured fan blade of FIG. 1 in an air conditioning environment;  
FIG. 7 is an enlarged partial view of the contoured fan blade of FIG. 2;  
FIG. 8 is a cross-sectional view of the contoured fan blade of FIG. 7 taken along line 8-8;  
FIG. 9 is a cross-sectional view of the contoured fan blade of FIG. 7 taken along line 9-9;  
FIG. 10 is a radial cross-sectional view of the contoured fan blade of FIG. 7 taken along line 10-10;  
FIG. 11 is a radial cross-sectional view of the contoured fan blade of FIG. 7 taken along line 11-11; and,  
FIG. 12 is a radial cross-sectional view of the contoured fan blade of FIG. 7 taken along line 12-12.

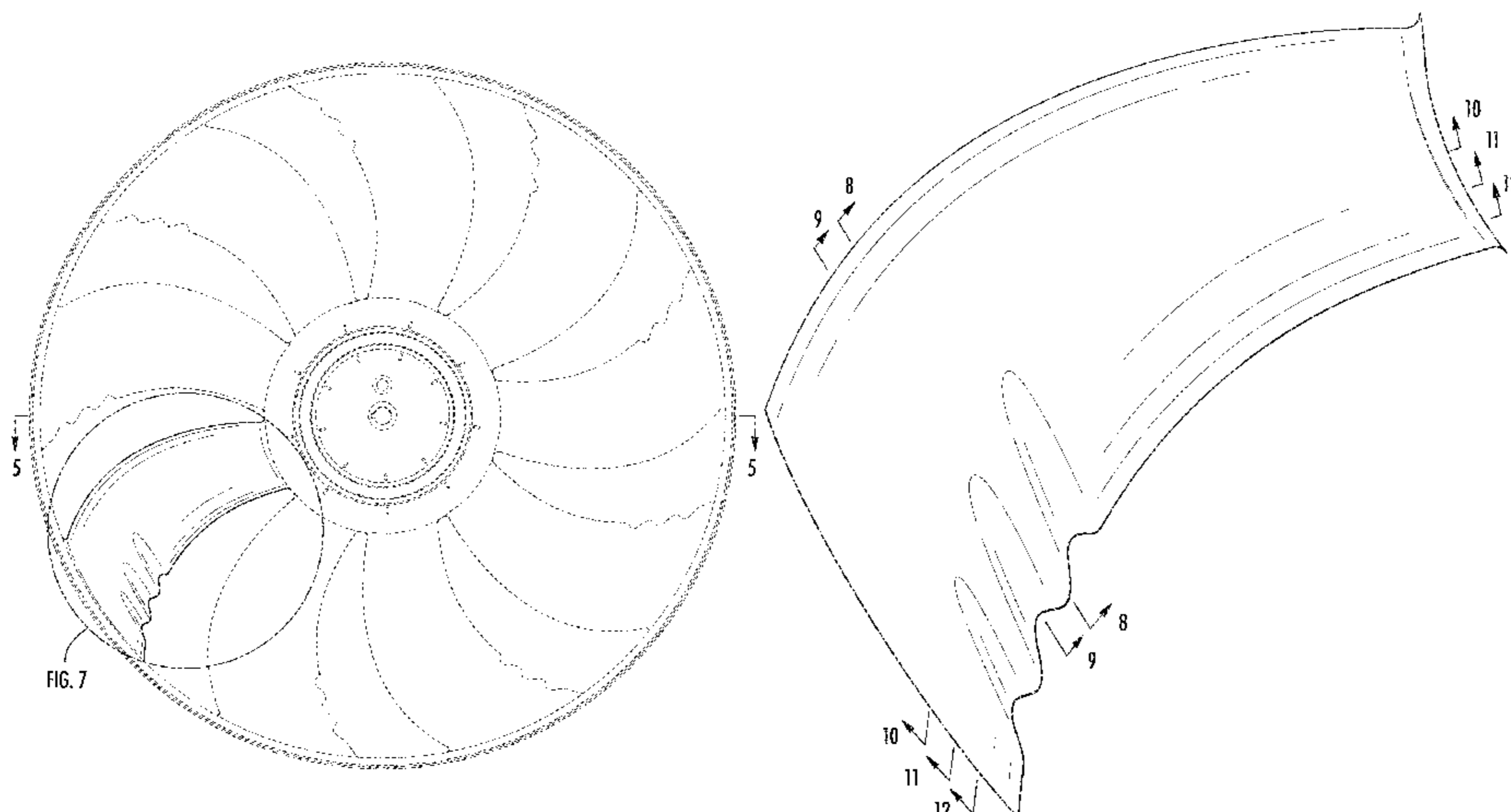
The broken lines are for environmental purpose only and form no part of the claimed design.

The dash-dot lines are boundary lines delineating claimed subject matter within the dash-dot lines from unclaimed, unshaded subject matter outside of the dash-dot lines.

The dash dot dot lines are for purposes of indicated enlarged views in later Figures and form no part of the claimed design.

Also, references to "side," "top," "bottom," "front," and "back" in the Figure Descriptions are not necessarily meant to require any specific orientation of the article as viewed. A molded cover according to the claimed design may be used in any orientation.

**1 Claim, 11 Drawing Sheets**



(58) **Field of Classification Search**  
 CPC ..... F04D 25/088; F04D 29/38  
 See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

D131,271	S	2/1942	Collura	
4,089,618	A	5/1978	Patel	
5,088,665	A	2/1992	Vijgen et al.	
5,533,865	A	7/1996	Dassen et al.	
5,603,607	A *	2/1997	Kondo	F04D 29/384 416/228
6,280,144	B1	8/2001	Powers	
6,733,240	B2	5/2004	Gliebe	
6,872,048	B2	3/2005	Uselton et al.	
7,305,817	B2	12/2007	Blodgett et al.	
D564,653	S *	3/2008	Iwase	D23/413
D565,171	S *	3/2008	Lin	D23/413
D570,470	S *	6/2008	Suzuki	D23/413
7,815,418	B2	10/2010	Suzuki et al.	
D644,316	S *	8/2011	Spaggiari	D23/413
D665,492	S	8/2012	Romero Carreras	
8,491,270	B2 *	7/2013	Eguchi	F04D 29/681 416/235
8,512,004	B2	8/2013	Nakagawa et al.	
8,573,541	B2	11/2013	Sullivan et al.	
D700,312	S *	2/2014	Inada	D23/413
8,721,280	B2	5/2014	Nakagawa et al.	
8,827,649	B2 *	9/2014	Kang	F04D 29/384 416/183
8,915,717	B2	12/2014	Stephan et al.	
8,939,729	B2	1/2015	Hsieh et al.	
9,051,941	B2 *	6/2015	Kojima	F04D 19/002
9,121,294	B2	9/2015	Kray et al.	
D750,211	S *	2/2016	Arai	D23/379
D755,945	S *	5/2016	Arai	D23/379
9,392,737	B2	7/2016	Sanderson	
D773,632	S	12/2016	Panyasahabade	
10,082,286	B1 *	9/2018	Huang	F04D 29/005
10,400,604	B2 *	9/2019	Sawada	F24F 1/0029
D870,261	S *	12/2019	Teramoto	D23/413
D870,877	S *	12/2019	Teramoto	D23/413
D884,874	S *	5/2020	Meng	F04D 29/66 D23/413
2007/0031257	A1 *	2/2007	Suzuki	F04D 29/681 416/182
2009/0155076	A1	6/2009	Jarrah	
2010/0260608	A1 *	10/2010	Suzuki	F04D 29/34 416/204 R
2010/0272573	A1 *	10/2010	Bessho	B29C 45/0005 416/223 R
2011/0305579	A1	12/2011	Wood et al.	
2012/0061522	A1	3/2012	Sullivan et al.	
2013/0091888	A1	4/2013	Park et al.	
2013/0156592	A1	6/2013	Kray et al.	
2013/0323098	A1 *	12/2013	Ooya	F04D 29/326 417/410.1
2014/0003933	A1 *	1/2014	Inada	F04D 29/384 415/220
2014/0072435	A1	3/2014	Choi et al.	
2014/0338388	A1	11/2014	Kim et al.	
2015/0152875	A1	6/2015	Kamiya et al.	

2015/0330223	A1 *	11/2015	Choi	F04D 29/384 416/204 R
2016/0265556	A1	9/2016	Stadler et al.	
2017/0058917	A1 *	3/2017	McKinney	F04D 29/384
2018/0080468	A1 *	3/2018	Kim	F04D 29/681
2018/0238343	A1 *	8/2018	Nakashima	F04D 29/667
2018/0306034	A1 *	10/2018	Teramoto	F01D 5/141
2018/0355884	A1 *	12/2018	Sakoda	F04D 29/325
2018/0355885	A1 *	12/2018	Kim	F04D 29/667
2019/0024674	A1 *	1/2019	Loercher	F04D 29/384
2019/0072104	A1 *	3/2019	Froh	F04D 29/388
2019/0120253	A1 *	4/2019	Nakashima	F04D 29/667
2019/0170158	A1 *	6/2019	Azzouz	F04D 29/326
2019/0226492	A1 *	7/2019	Krishnaswami	F04D 29/384
2019/0301471	A1 *	10/2019	Wang	F04D 19/002
2020/0240431	A1 *	7/2020	Bushnell	F01D 5/141

FOREIGN PATENT DOCUMENTS

CN	102022381	A	4/2011
CN	103140684	A	6/2013
CN	204164038	U	2/2015
CN	204312401	U	5/2015
GB	791563	A	3/1958
JP	2000110785	A	4/2000
JP	3598900	B2	12/2004
JP	2005264803	A	9/2005
JP	5066835	B2	11/2012
JP	2015140741	A	8/2015
WO	2009054815	A1	4/2009
WO	2017036470	A1	3/2017

OTHER PUBLICATIONS

Elta Fans, [online]; [retrieved on Sep. 29, 2017]; retrieved from the Internet <https://www.eltafans.com/catalogue/building-services/ducted-inline/raptor-sda.html> Elta Fans, "Raptor SDA," Elta Fans, 2017, pp. 1-7.

MS Howe, "Aerodynamic noise of a serrated trailing edge," Journal of Fluids and Structures, 5(1), pp. 33-45, 1991, Abstract Only (pp. 1-2).

Tech-Critter, [online]; [retrieved on Sep. 29, 2017]; retrieved from the Internet Low Chem Lin, "Unboxing & Review: be quiet! Pure Wings 2," Tech Critter, Oct. 3, 2014, pp. 1-7. <http://www.tech-critter.com/2014/10/unboxing-review-be-quiet-pure-wings-2.html>.

Ziehl-Abegg, [online]; [retrieved on Sep. 29, 2017]; retrieved from the Internet Ziehl-Abegg, "MAXvent owlet," Ziehl-abegg.com, Sep. 29, 2017, pp. 1-3 <https://www.ziehl-abegg.com/us/en/product-range/ventilation-systems/axial-fans/maxvent-owlet/>.

International Preliminary Report on Patentability; International Application No. PCT/US2018/053136; International Filing Date: Sep. 27, 2018; dated Mar. 31, 2020; 6 pages.

International Search Report for International Application No. PCT/US2018/053136; Date of Completion: Jan. 4, 2019; dated Jan. 18, 2019; 6 Pages.

Written Opinion for International Application No. PCT/US2018/053136; International Filing Date: Sep. 27, 2018; dated Jan. 18, 2019; 7 Pages.

MS Howe, "Aerodynamic noise of a serrated trailing edge," Journal of Fluids and Structures, 5(1), 1991, pp. 33-45 (Full Article).

\* cited by examiner

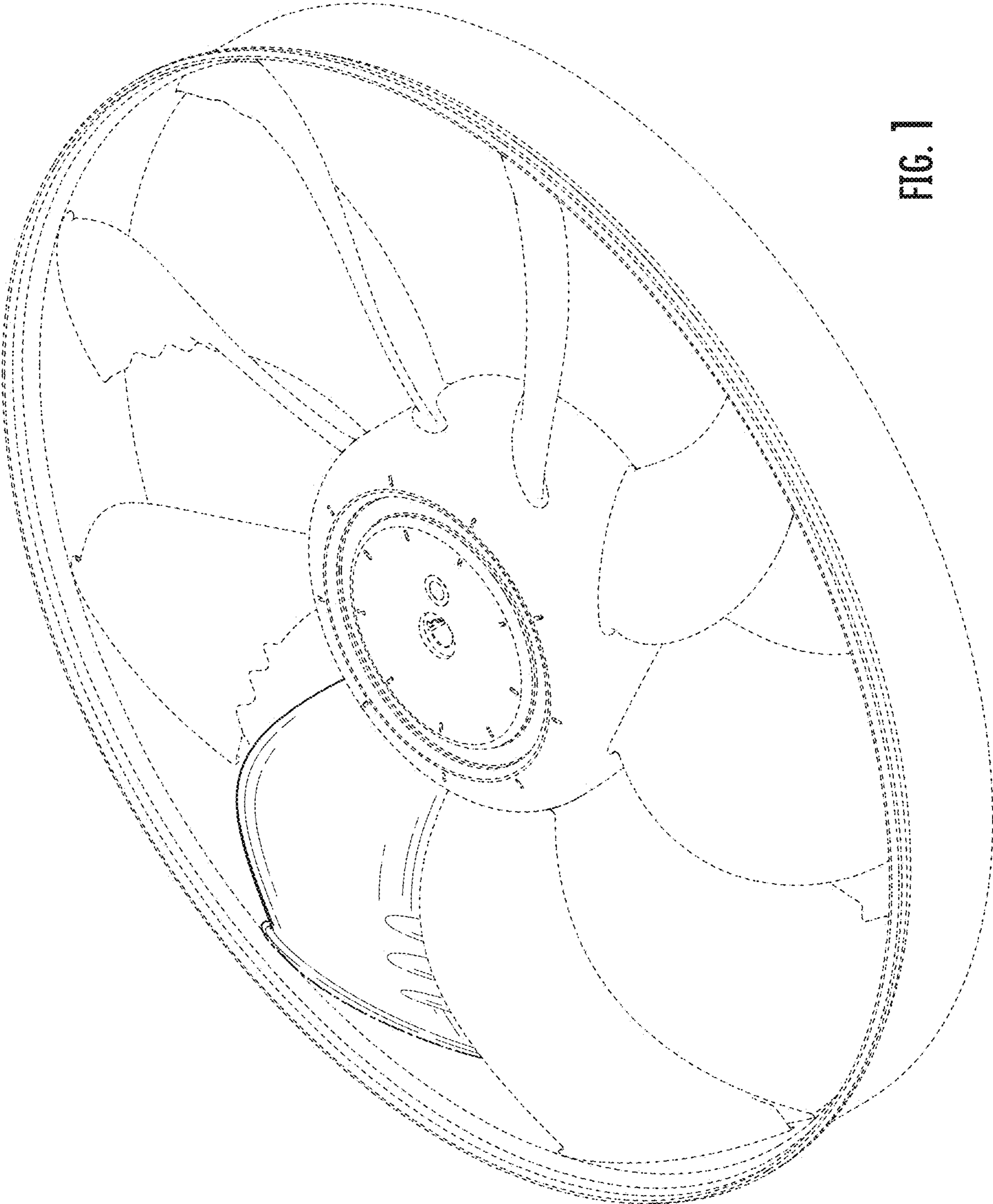


FIG. 1

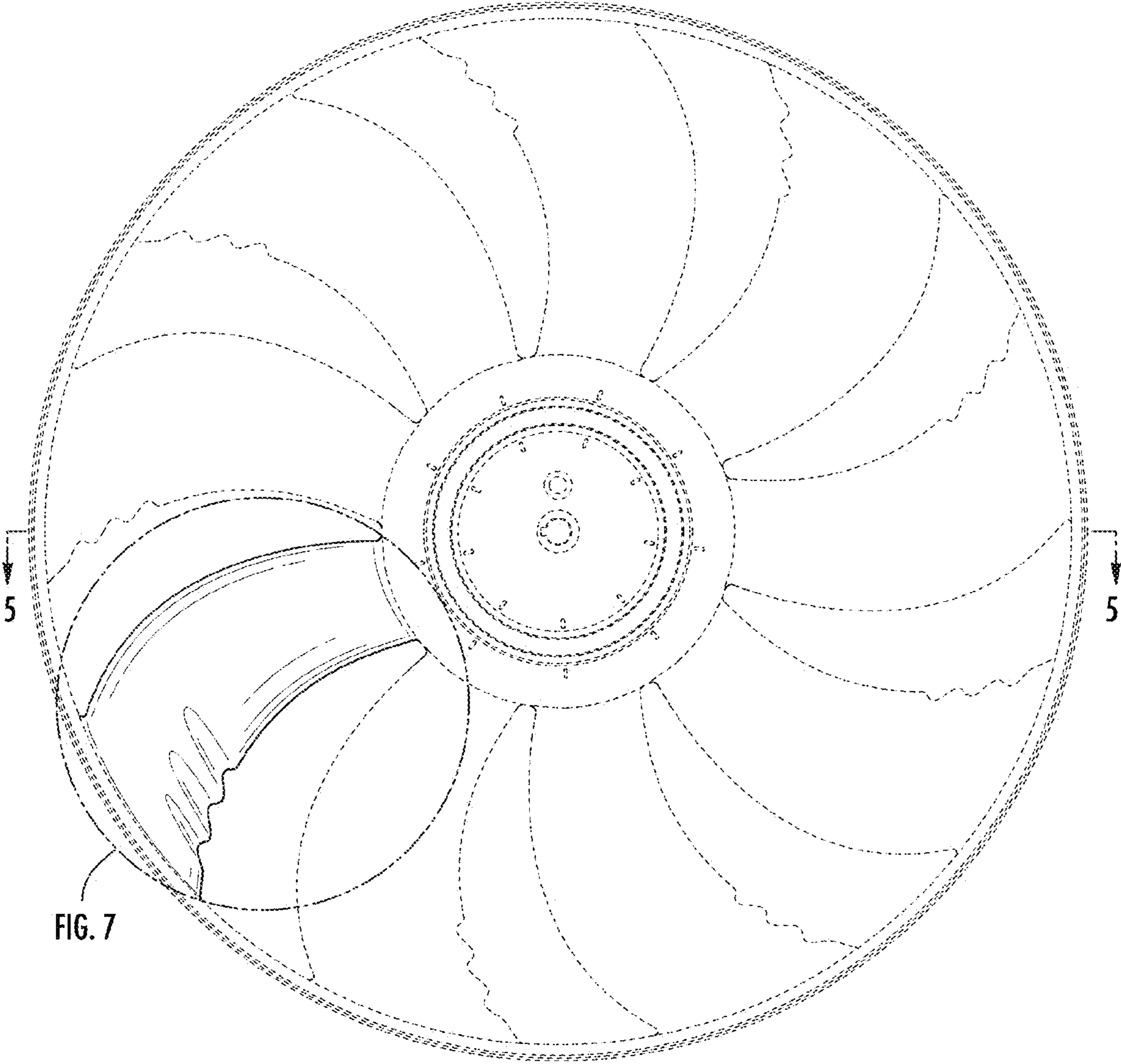


FIG. 2

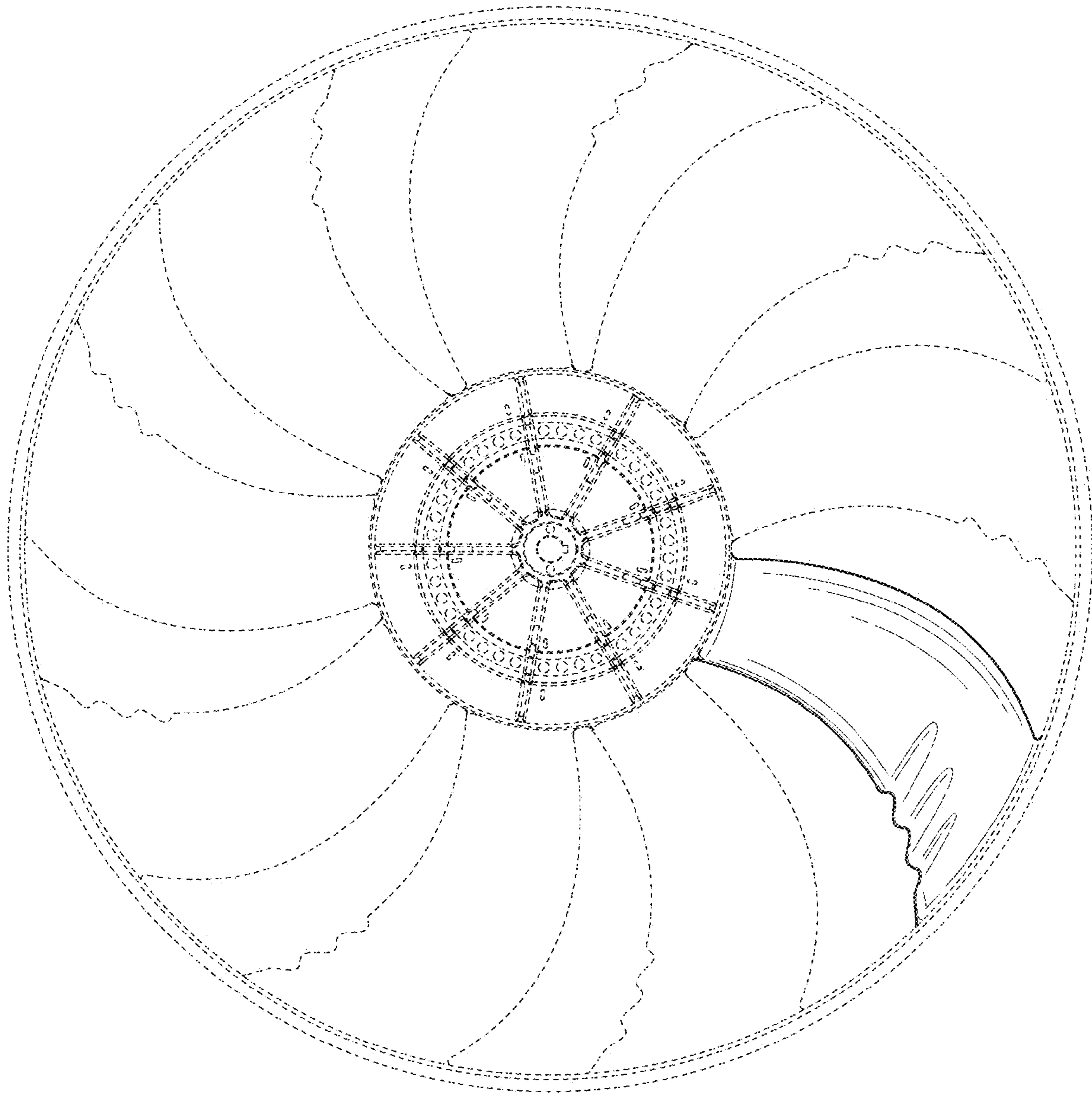


FIG. 3

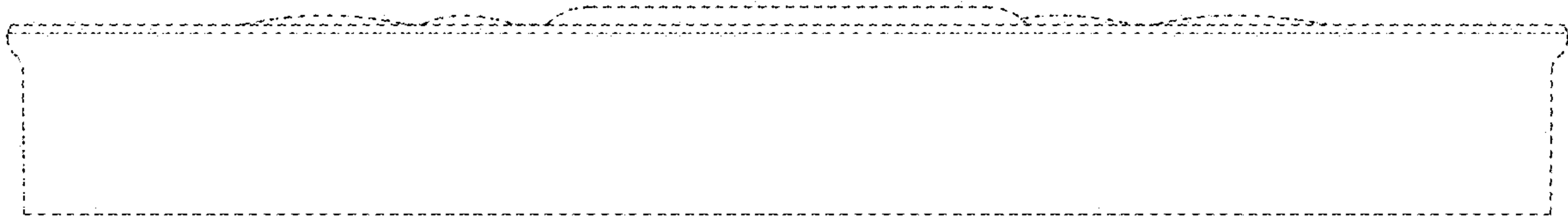


FIG. 4

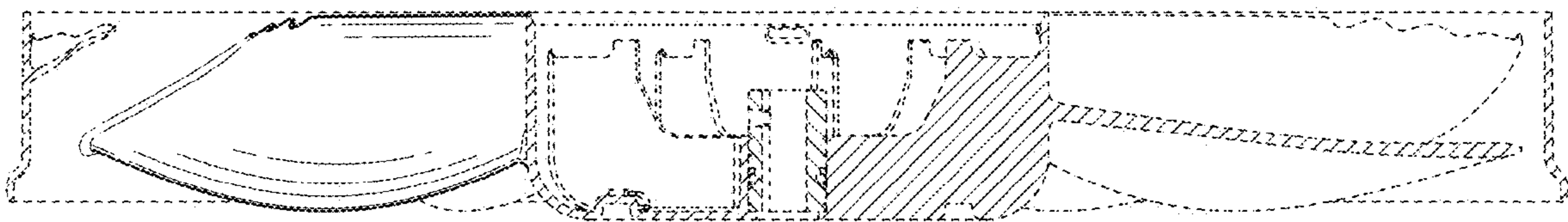


FIG. 5

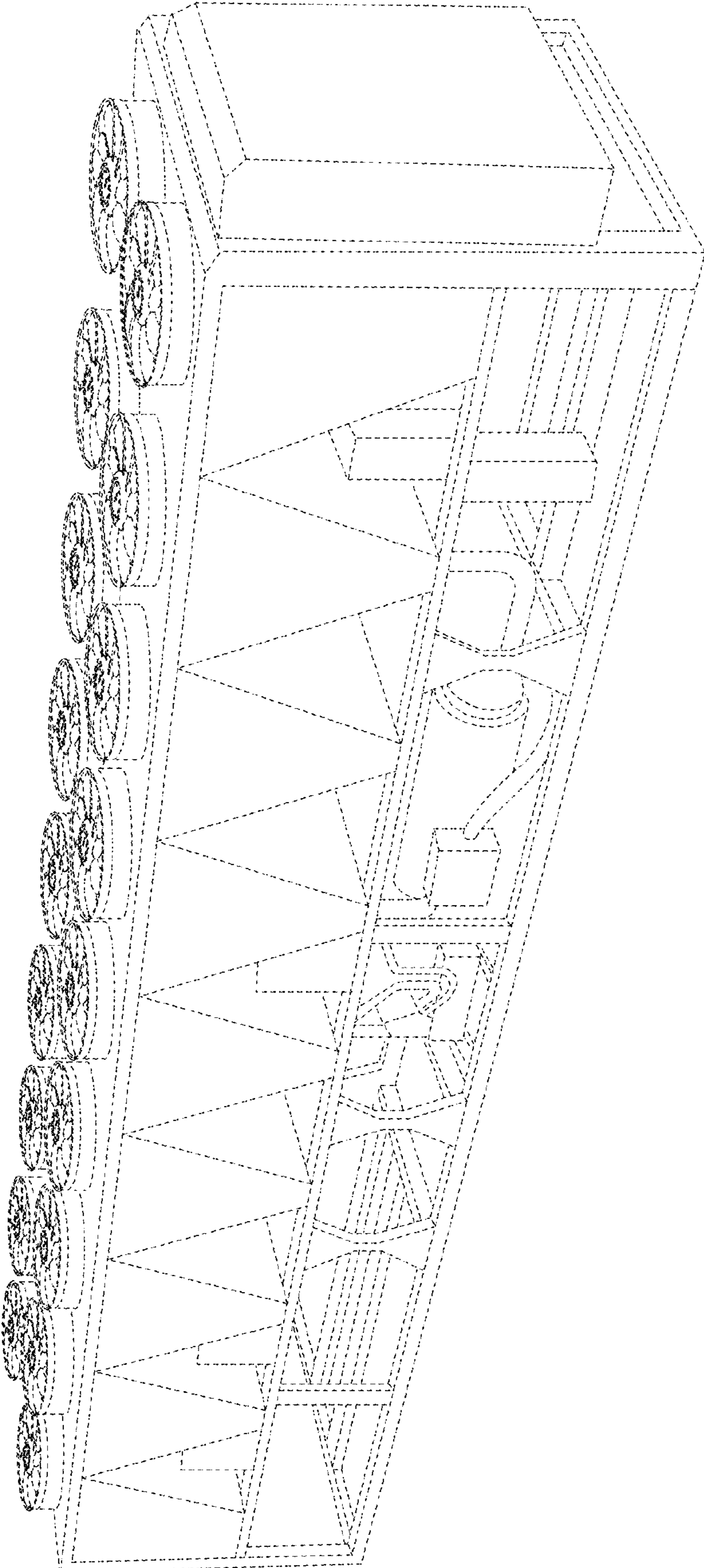


FIG. 6

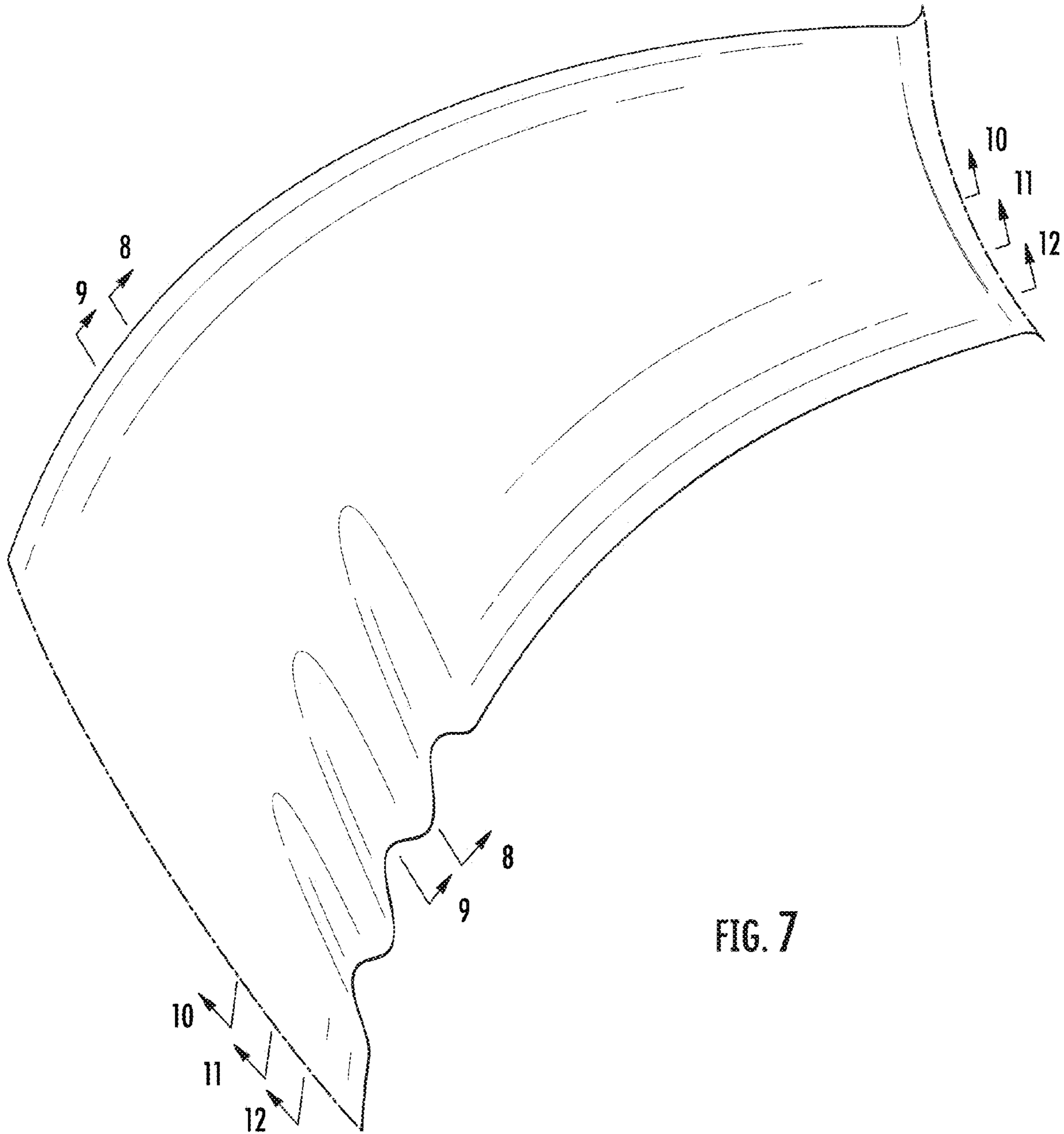


FIG. 7



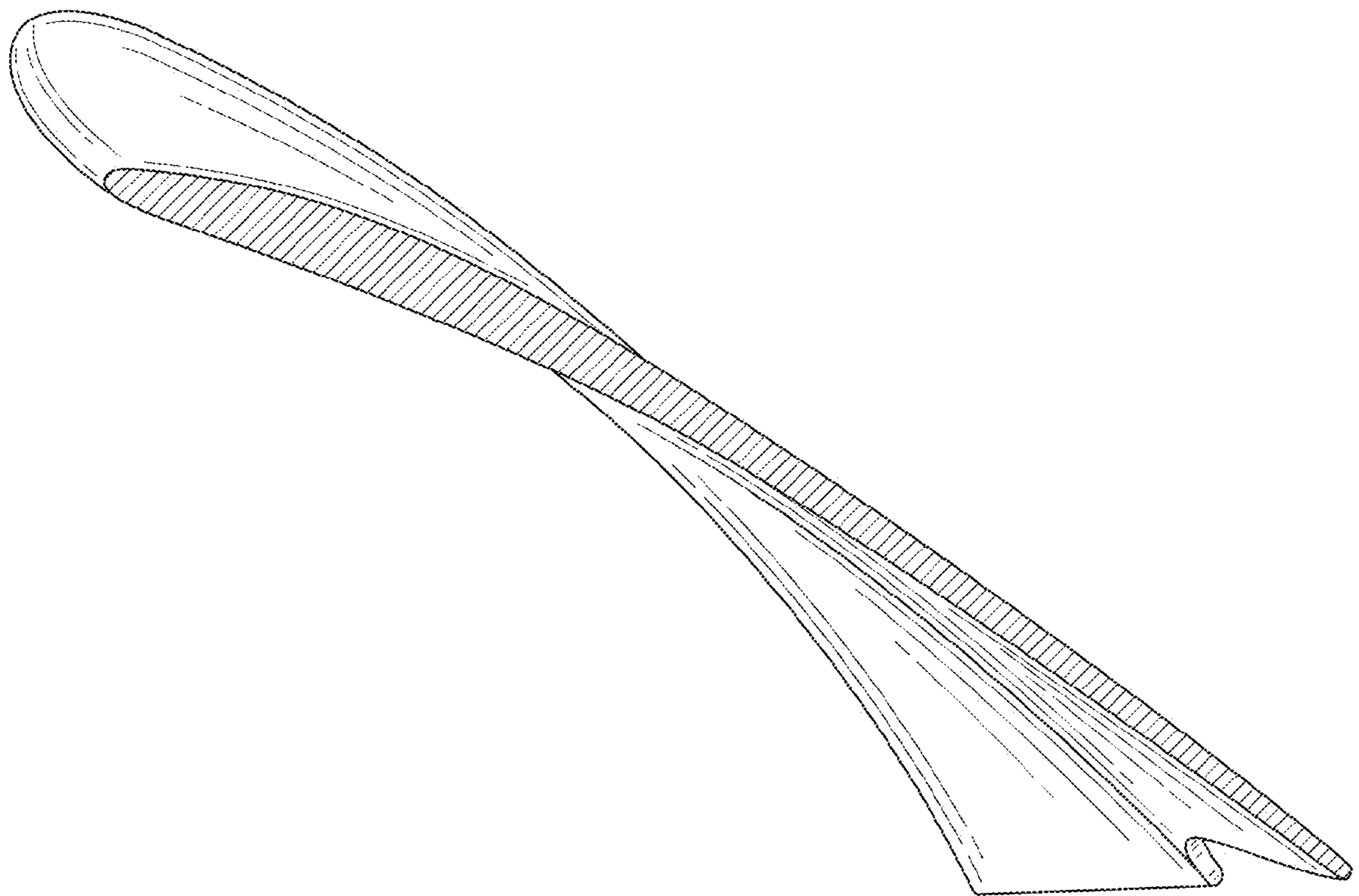


FIG. 8

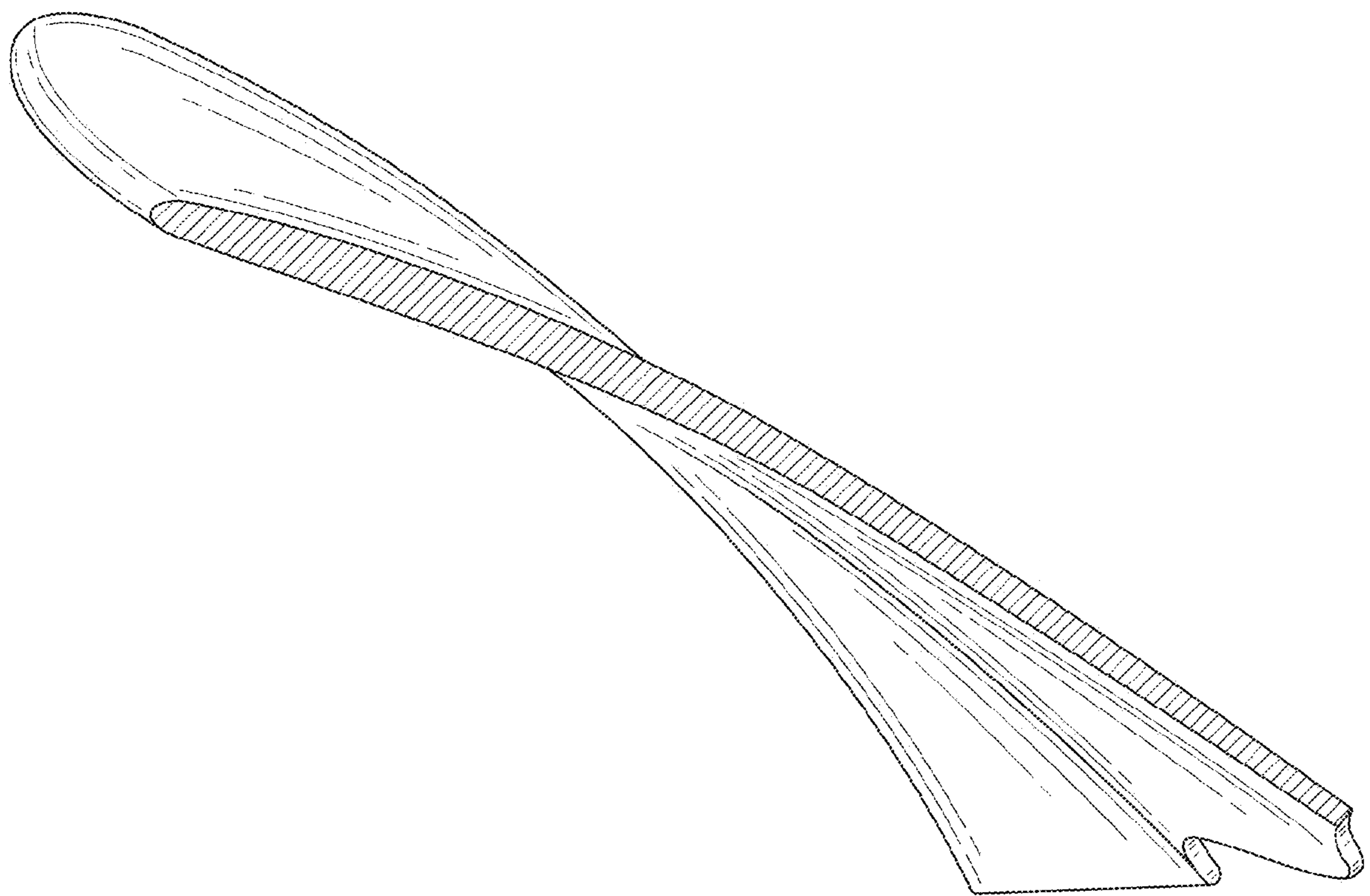


FIG. 9

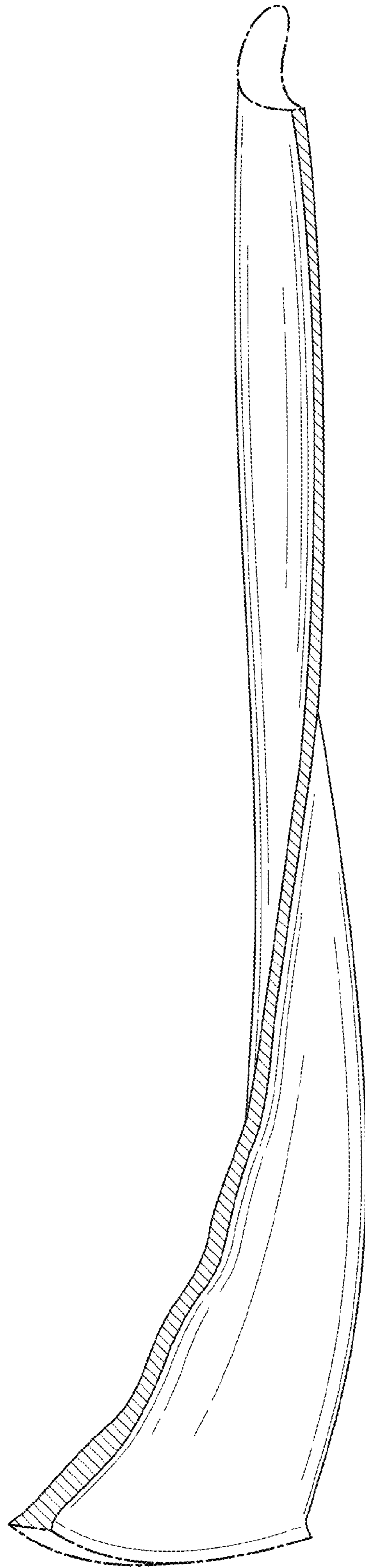


FIG. 10

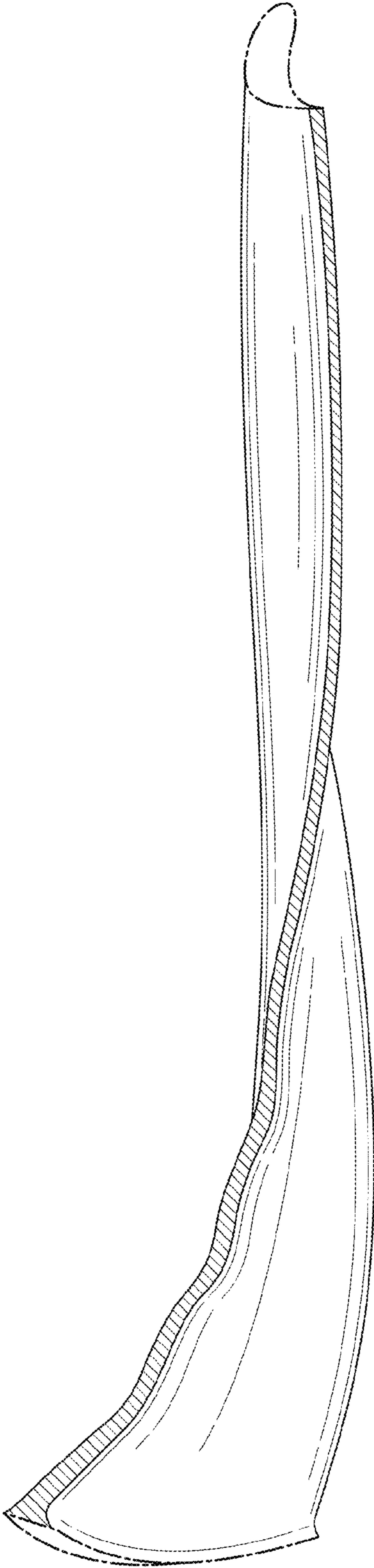


FIG. 11

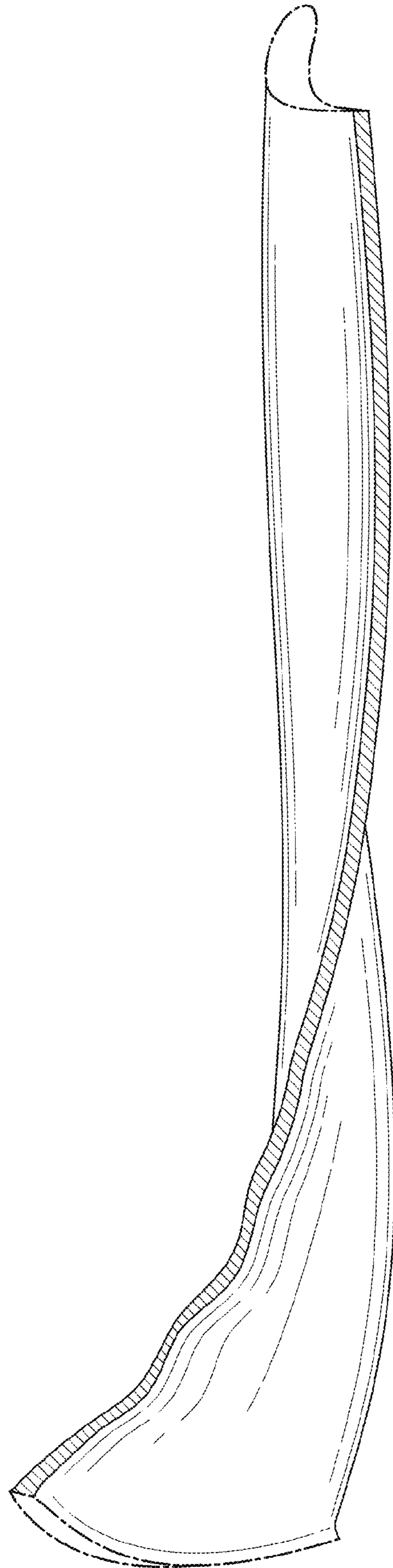


FIG. 12