



US00D672868S

(12) **United States Design Patent**  
**Williams**

(10) **Patent No.:** **US D672,868 S**

(45) **Date of Patent:** **\*\* Dec. 18, 2012**

(54) **WINGLET FOR FAN BLADE**  
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(US)

6,565,320 B1 5/2003 Surles et al.  
6,719,533 B2 4/2004 Bird  
6,776,578 B2 8/2004 Belady

(Continued)

(73) **Assignee:** **Delta T Corporation**, Lexington, KY  
(US)

**FOREIGN PATENT DOCUMENTS**

DE 3819145 12/1989

(Continued)

(\*\*) **Term:** **14 Years**

**OTHER PUBLICATIONS**

(21) **Appl. No.:** **29/412,912**

U.S. Appl. No. 11/046,341, filed Jan. 28, 2005, Aynsley.

(22) **Filed:** **Feb. 9, 2012**

(Continued)

(51) **LOC (9) Cl.** ..... **23-04**

(52) **U.S. Cl.** ..... **D23/413; D23/377**

(58) **Field of Classification Search** ..... D23/355,  
D23/370, 377, 379, 385, 386, 411, 413; 416/5,  
416/90 R, 191, 207, 210 R, 242, 243;  
366/330.1-330.4

See application file for complete search history.

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(57) **CLAIM**

The ornamental design for a winglet for fan blade, as shown and described.

(56) **References Cited**

**DESCRIPTION**

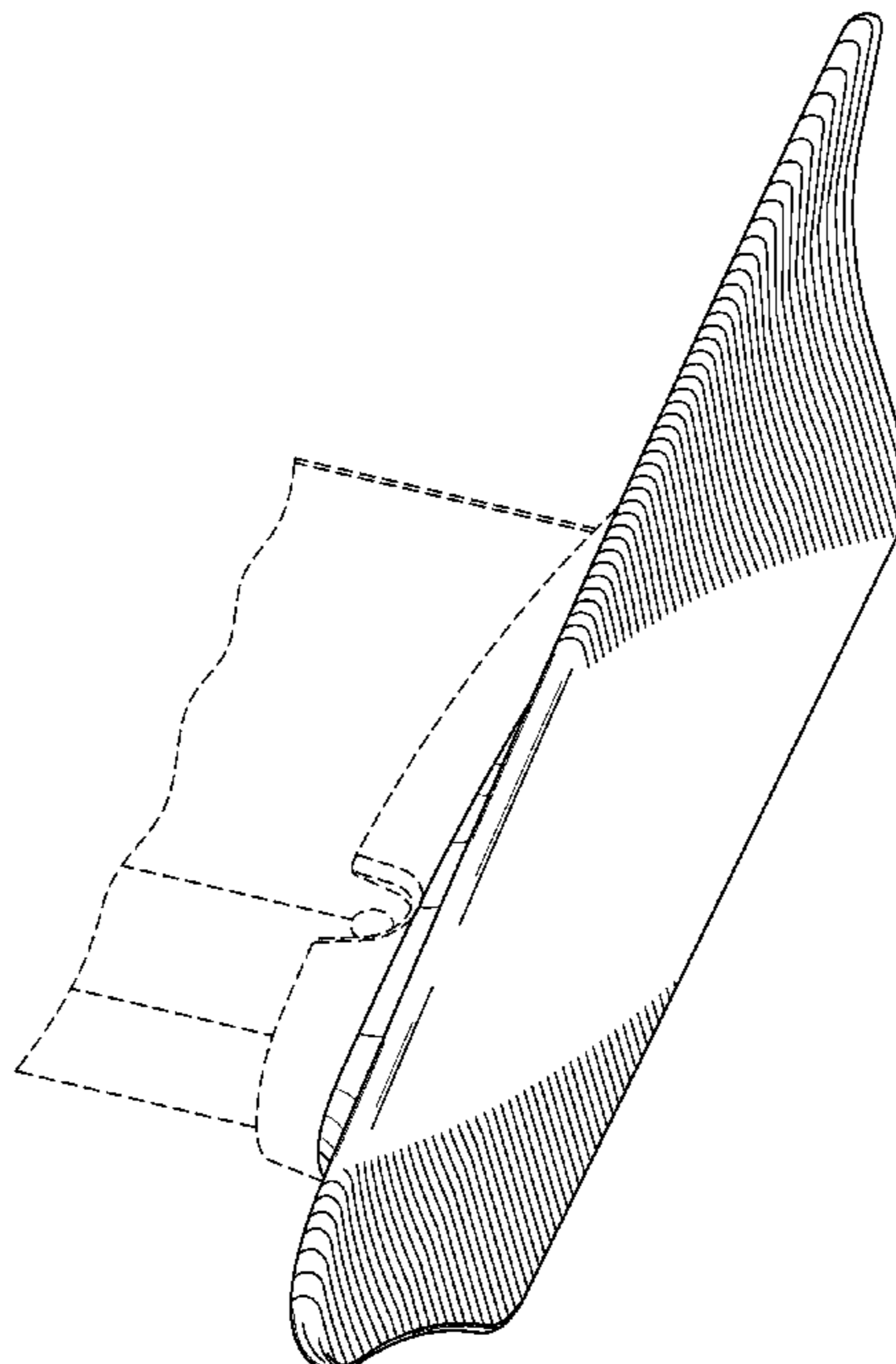
**U.S. PATENT DOCUMENTS**

|           |      |         |                 |           |
|-----------|------|---------|-----------------|-----------|
| 871,729   | A *  | 11/1907 | McChord, Jr.    | 416/207   |
| 1,041,913 | A    | 10/1912 | Tyson           |           |
| 2,014,032 | A    | 9/1935  | Sharpe et al.   |           |
| 3,524,712 | A    | 8/1970  | Keen et al.     |           |
| 4,662,823 | A    | 5/1987  | Cooke           |           |
| 4,968,216 | A    | 11/1990 | Anderson et al. |           |
| 5,226,783 | A    | 7/1993  | Mita            |           |
| 5,564,901 | A    | 10/1996 | Moore           |           |
| 5,725,355 | A    | 3/1998  | Crall et al.    |           |
| 5,823,480 | A    | 10/1998 | La Roche        |           |
| 6,039,541 | A    | 3/2000  | Parker et al.   |           |
| 6,161,797 | A    | 12/2000 | Kirk et al.     |           |
| 6,244,821 | B1   | 6/2001  | Boyd et al.     |           |
| 6,334,705 | B1 * | 1/2002  | Weetman         | 366/330.1 |
| 6,517,315 | B2   | 2/2003  | Belady          |           |

FIG. 1 is a top perspective view of the present invention;  
FIG. 2 is a bottom perspective view of the present invention;  
FIG. 3 is a top plan view of the present invention;  
FIG. 4 is a bottom plan view of the present invention;  
FIG. 5 is a left side elevational view of the present invention;  
FIG. 6 is a right side elevational view of the present invention;  
FIG. 7 is a front elevational view of the present invention; and,  
FIG. 8 is a rear elevational view of the present invention.

The broken lines showing a portion of a fan blade and a portion of a winglet mounting structure are included for the purpose of illustrating environmental structure and form no part of the claimed design.

**1 Claim, 8 Drawing Sheets**



U.S. PATENT DOCUMENTS

|              |      |         |                |           |
|--------------|------|---------|----------------|-----------|
| 6,884,034    | B1   | 4/2005  | Parker et al.  |           |
| 6,939,108    | B2   | 9/2005  | Boyd           |           |
| 7,284,960    | B2   | 10/2007 | Aynsley        |           |
| 7,401,974    | B2 * | 7/2008  | Himmelsbach    | 366/330.3 |
| D587,799     | S    | 3/2009  | Oleson         |           |
| 7,654,798    | B2 * | 2/2010  | Aynsley        | 416/191   |
| 7,934,907    | B2 * | 5/2011  | Aynsley et al. | 416/191   |
| D642,674     | S    | 8/2011  | Oleson         |           |
| 8,075,273    | B2 * | 12/2011 | Aynsley        | 416/191   |
| 8,079,823    | B2 * | 12/2011 | Aynsley        | 416/242   |
| 8,162,613    | B2 * | 4/2012  | Oleson et al.  | 416/210 R |
| 2003/0095864 | A1   | 5/2003  | Ivanovic       |           |
| 2008/0008596 | A1   | 1/2008  | Aynsley        |           |

FOREIGN PATENT DOCUMENTS

|    |                |        |
|----|----------------|--------|
| EP | 1 619 391      | 1/2006 |
| GB | 100134         | 3/1917 |
| GB | 946 794        | 1/1964 |
| GB | 2050530        | 1/1981 |
| GB | 2198190        | 6/1988 |
| WO | WO 2006/022812 | 3/2006 |

OTHER PUBLICATIONS

U.S. Appl. No. 11/046,593, filed Jan. 28, 2005, Aynsley.  
 U.S. Appl. No. 11/777,344, filed Jul. 13, 2007, Aynsley.  
 U.S. Appl. No. 11/858,360, filed Sep. 20, 2007, Aynsley.  
 U.S. Appl. No. 11/860,888, filed Sep. 25, 2007, Aynsley et al.  
 U.S. Appl. No. 60/589,945, filed Jul. 21, 2004, Aynsley.  
 U.S. Appl. No. 60/892,339, filed Mar. 1, 2007, Oleson.  
 U.S. Appl. No. 60/972,890, filed Sep. 17, 2007, Oleson.  
 U.S. Appl. No. 60/975,230, filed Sep. 26, 2007, Scherer et al.  
 U.S. Appl. No. 60/978,860, filed Oct. 10, 2007, Aynsley et al.  
 U.S. Appl. No. 61/025,852, filed Feb. 4, 2008, Toy.  
 Airfoil Design: HVLS dated Dec. 9, 2002.  
 A Fan for All Seasons, Bell & Howell Information and Learning, American Society of Mechanical Engineers, Mechanical Engineering, vol. 121(12), pp. 58-60.  
 Screenshots from <http://www.b737.org.uk>, printed on May 2004.  
 Screenshots from [oea.larc.nasa.gov](http://oea.larc.nasa.gov), printed May 2004.  
 Screenshots from Penn State Engineering website, printed May 2004.  
 Boeing 747-400 Twin-Aisle Jet Airliner, USA, Screenshot from <http://www.aerospace-technology.com/projects/747/7473.html>, printed on Aug. 11, 2008.  
 747-400, Screenshot from [http://www.boeing.com/commercial/747family/pf/pf\\_exterior.html](http://www.boeing.com/commercial/747family/pf/pf_exterior.html), printed on Aug. 11, 2008.  
 General Exterior Arrangement 737, Screenshot from [http://www.boeing.com/commercial/737family/pf/pf\\_exterior.html](http://www.boeing.com/commercial/737family/pf/pf_exterior.html), printed on Aug. 11, 2008.  
 Image: Winglet and nav light arp.jpg, Screenshot from [http://en.wikipedia.org/wiki/Image:Winglet\\_and\\_nav\\_light\\_arp.jpg](http://en.wikipedia.org/wiki/Image:Winglet_and_nav_light_arp.jpg), printed Aug. 11, 2008.

KC-135A in flight—closeup of winglet with attached tufts, Screenshot from <http://www.dfrc.nasa.gov/gallery/Photo/KC-135/Small/EC79-11481.jpg>, printed Aug. 11, 2008.  
 KC-135A in flight-winglet study, EC79-11314, Screenshot from <http://www.dfrc.nasa.gov/gallery/Photo/KC-135/Small/EC79-11314.jpg>, printed Aug. 11, 2008.  
 KC-135A in flight-winglet study, EC79-11484, Screenshot from <http://dfrc.nasa.gov/gallery/Photo/KC-135/Small/EC79-11484.jpg>, printed Aug. 11, 2008.  
 Montoya, L.C., KC-135 Winglet Flight Results, NASA Dryden Flight Research Center, pp. 145-156.  
 NASA—NASA Dryden Technology Facts-Winglets, Screenshot from <http://www.nasa.gov/centers/dryden/about/Organizations/Technology/Facts/TF-2004-15-D>, printed on Aug. 11, 2008.  
 Winglet detail, Screenshot from <http://upload.wikimedia.org/wikipedia/commons/5/53/Wingletdetail.jpg>, printed on Aug. 11, 2008.  
 Wingtip device, Screenshot from [http://en.wikipedia.org/wiki/Wingtip\\_device](http://en.wikipedia.org/wiki/Wingtip_device), printed Aug. 11, 2008.  
 EPO Search Report dated Aug. 21, 2006 for Application No. EP 05250653.2.  
 EPO Search Report dated Aug. 22, 2006 for Application No. EP 05250654.0.  
 EPO Search Report dated Jul. 1, 2008 for Application No. EP 05250632.2.  
 EPO Search Report dated Jul. 1, 2008 for Application No. EP 05250653.2.  
 EPO Search Report dated Jul. 1, 2008 for Application No. EP 05250654.0.  
 Dairy Notes, University of California Cooperative Extension (May 1999).  
 Fairbank, W.C. et al., A Large Paddle Fan for Livestock Cooling Canadian Society of Agricultural Engineering (Jun. 1989).  
 International Search Report dated Aug. 19, 2005 for Application No. PCT/US05/02703.  
 International Search Report and Written Opinion dated Jun. 24, 2008 for Application No. PCT/US2008/055266.  
 Jain et al., Experimental Investigation of the Flow Field of a Ceiling Fan, ASME Heat Transfer/Fluids Engineering Summer Conference; Paper No. HT-FED-2004-56226 (Jul. 2004).  
 Notice of Allowance dated Jun. 4, 2007 for U.S. Appl. No. 11/046,341.  
 Office Action dated Jan. 23, 2007 for U.S. Appl. No. 11/046,341.  
 Office Action dated Jan. 25, 2007 for U.S. Appl. No. 11/046,593.  
 Office Action dated May 14, 2007 for U.S. Appl. No. 11/046,593.  
 Written Opinion dated Aug. 19, 2005 for Application No. PCT/US05/02703.  
 Technical Guide: Commercial Industrial & Special Application Ceiling Fans.

\* cited by examiner

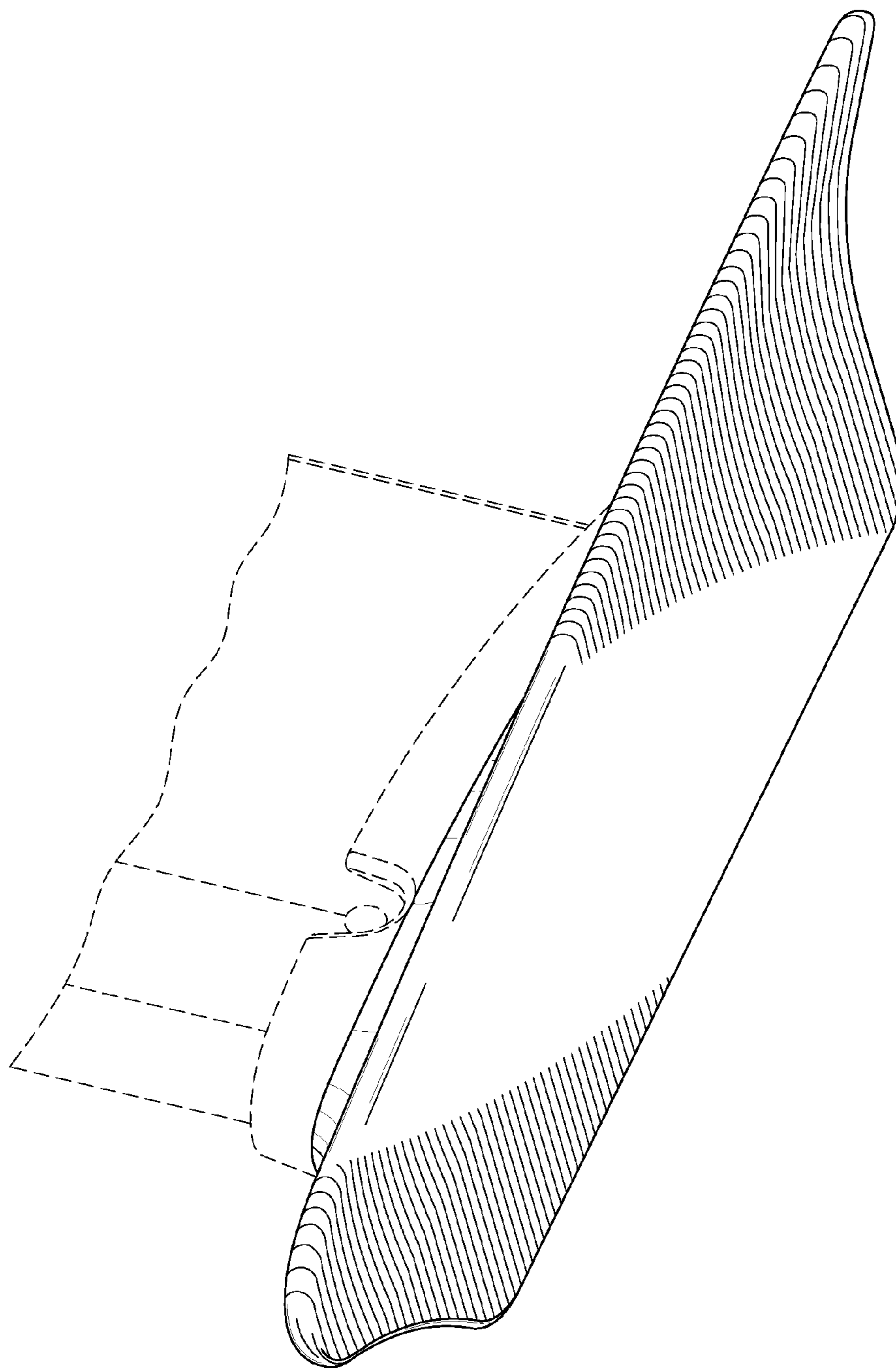


Fig. 1

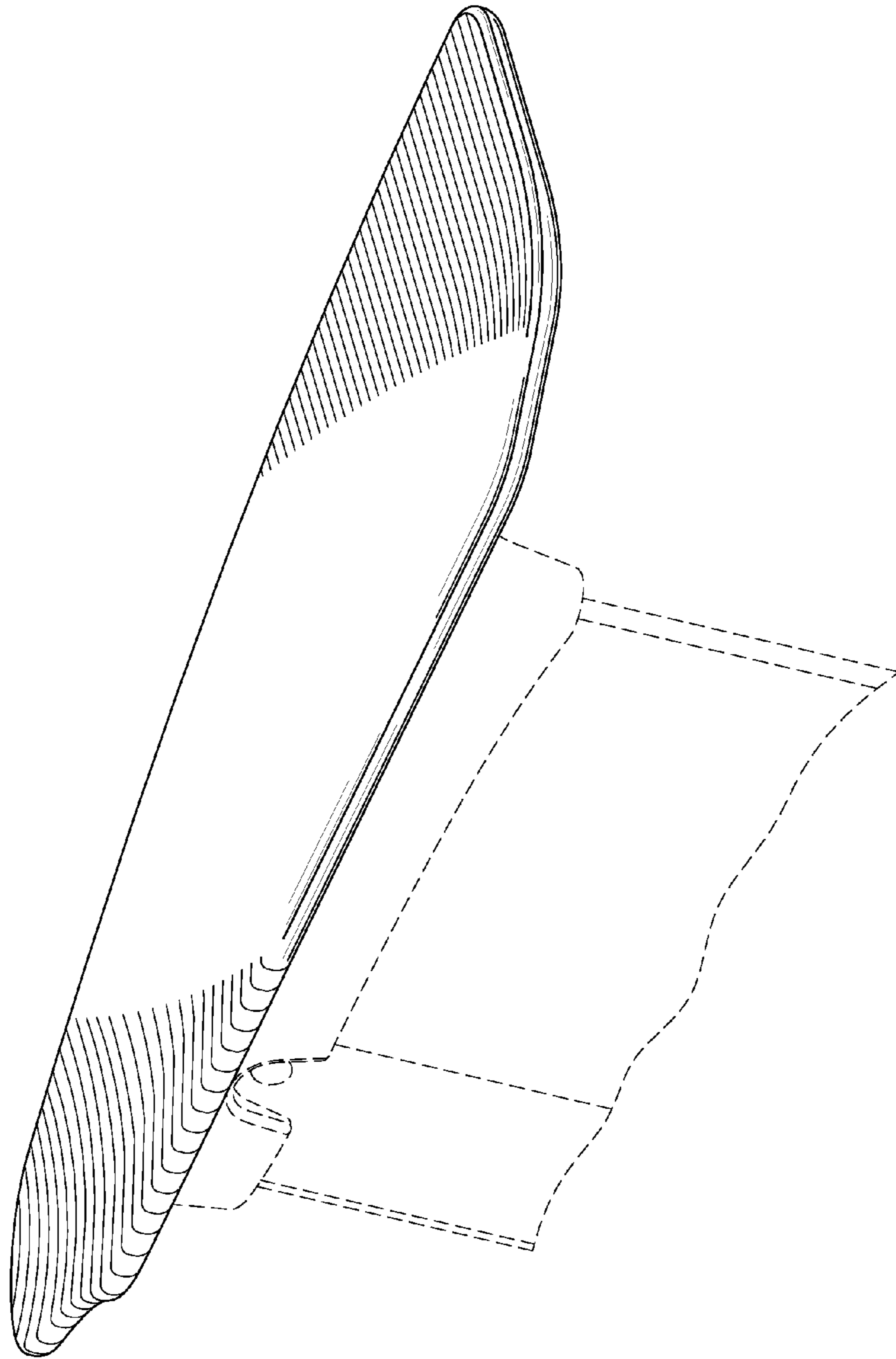


Fig.2



Fig.3

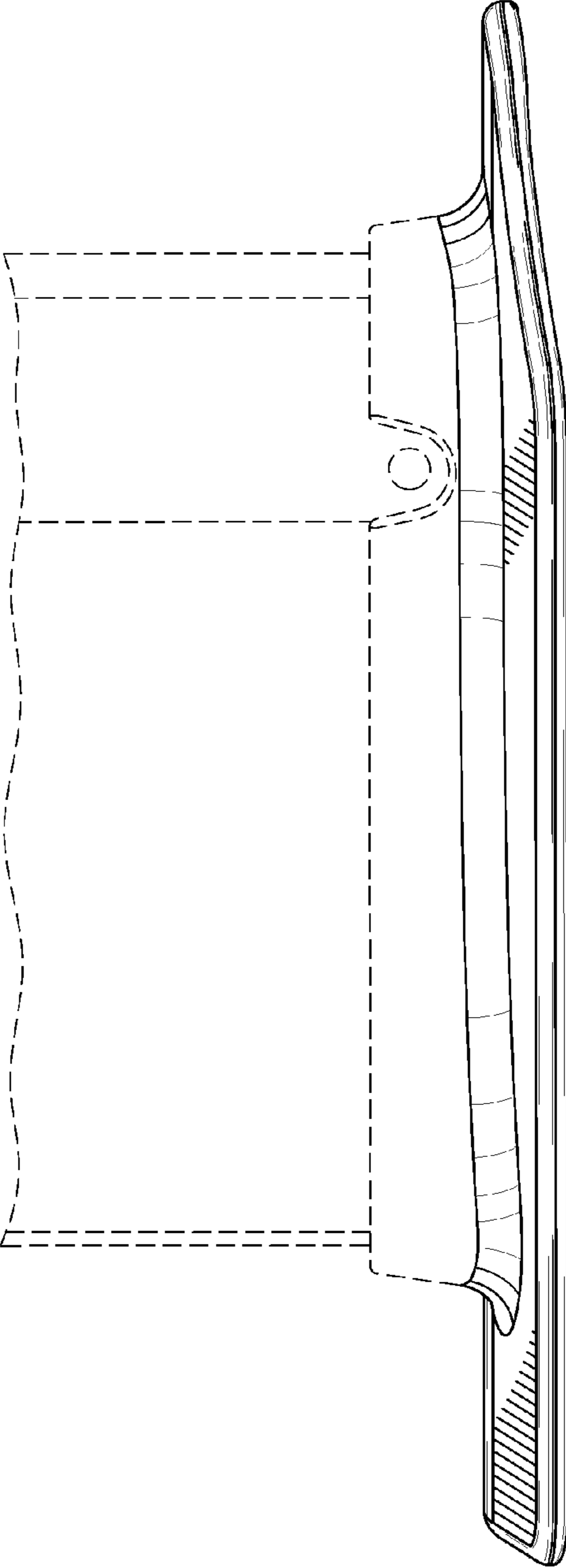


Fig.4

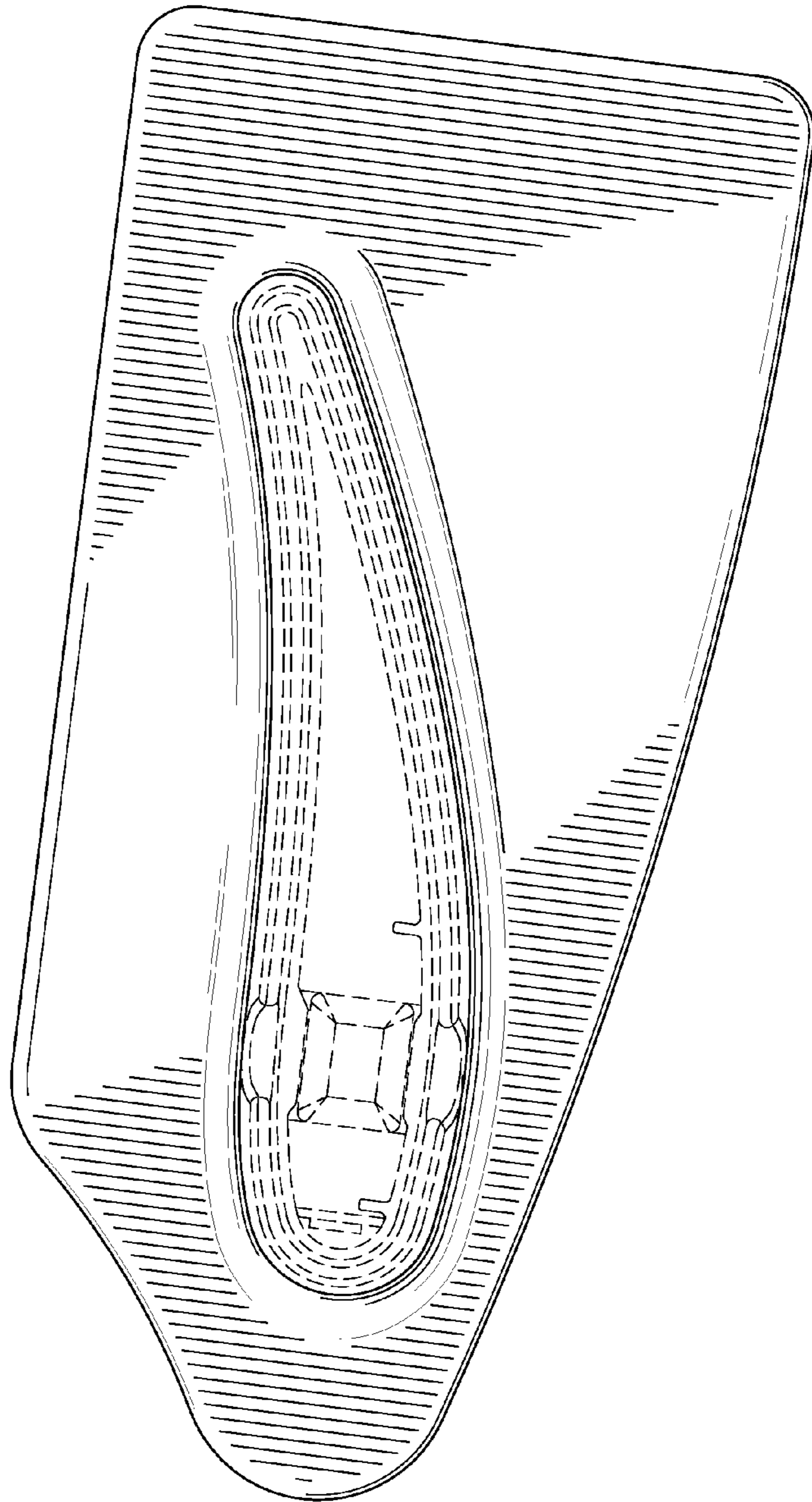


Fig.5

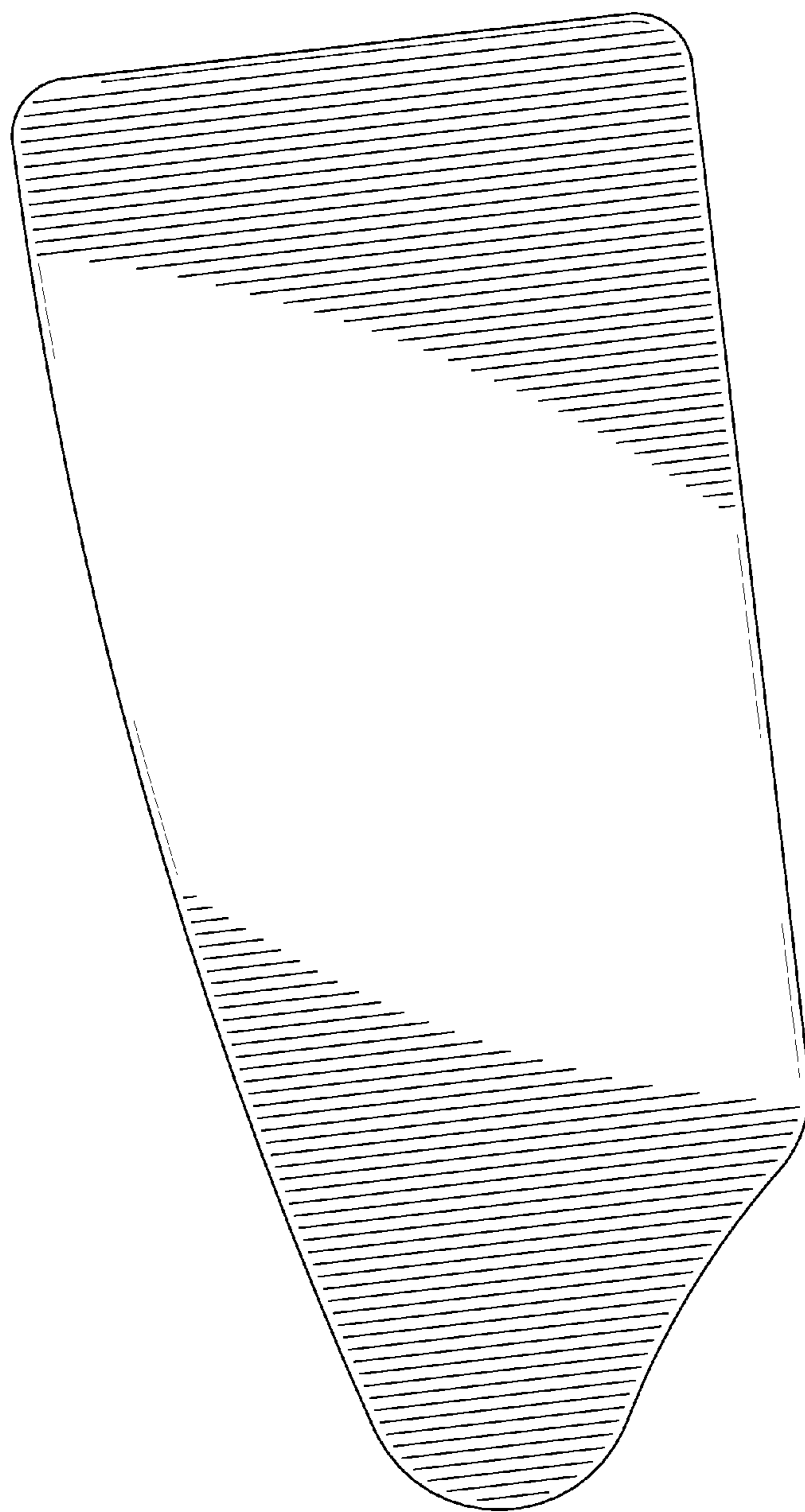


Fig.6



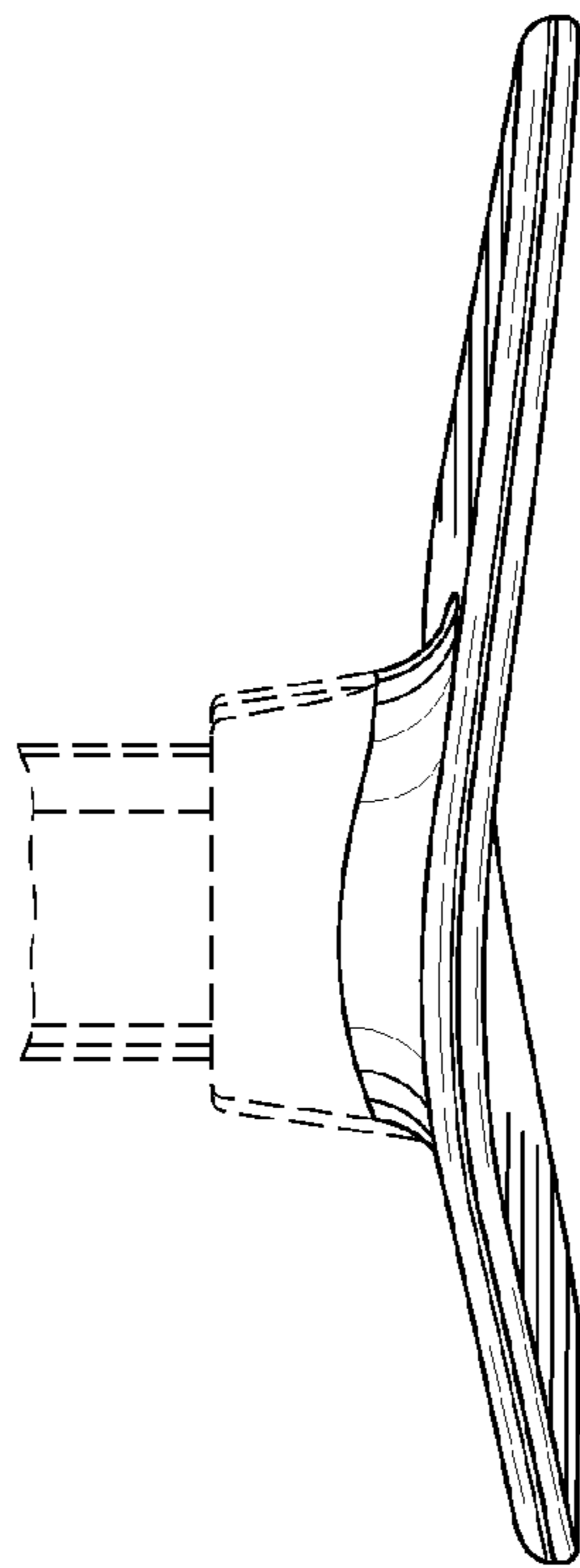


Fig.7

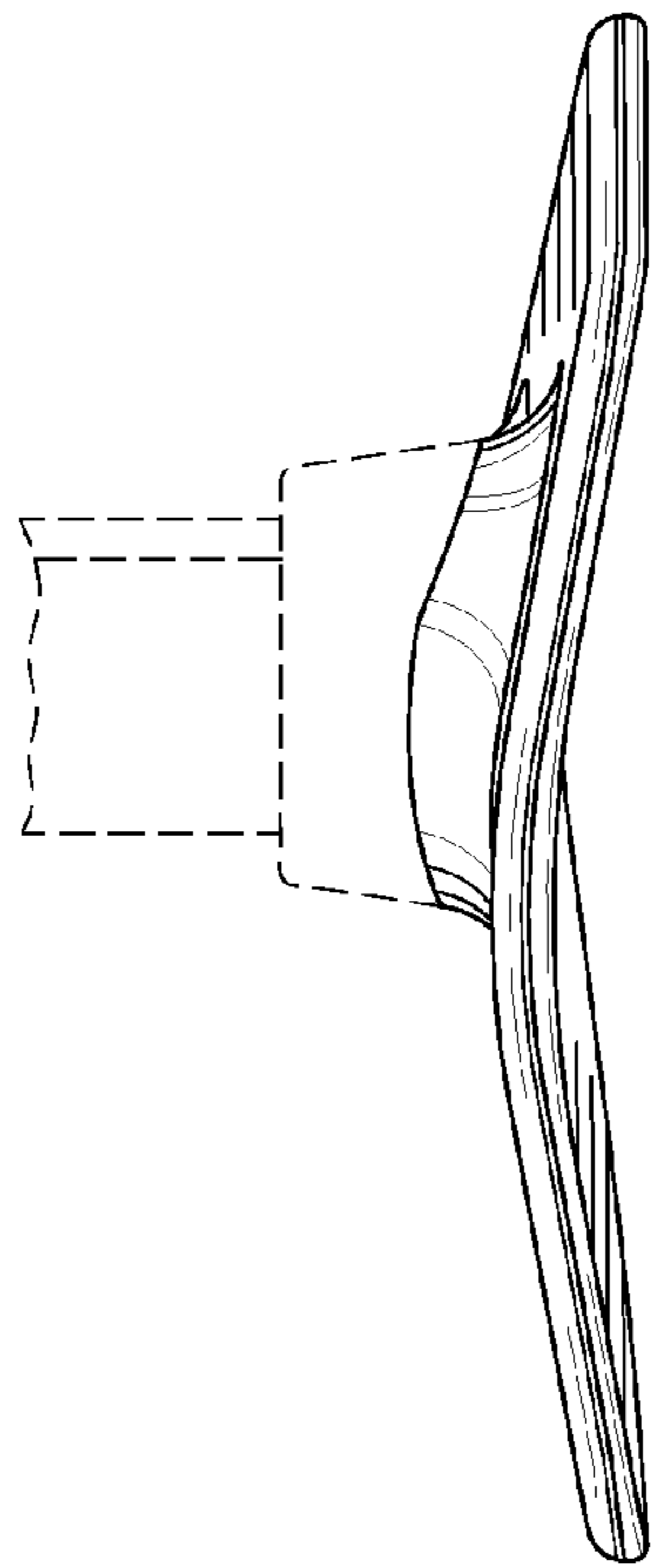


Fig.8