



US00D762253S

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

(10) **Patent No.:** **US D762,253 S**
(45) **Date of Patent:** **** Jul. 26, 2016**

(54) **FRICTION STIR WELDING TOOL**

FOREIGN PATENT DOCUMENTS

(75) Inventors: **Takeshi Ishikawa**, Yokohama (JP); **Ai Masuda**, Yokohama (JP); **Naoki Kawada**, Yokohama (JP); **Kenji Hashimoto**, Yokohama (JP); **Shigeki Matsuoka**, Yokohama (JP)

JP 2008-264806 A 11/2008
JP 2010-036247 A 2/2010

(Continued)

OTHER PUBLICATIONS

About FSW [online]. H.F.W., 2014 (Retrieved Apr. 10, 2014)
Retrieved From <URL: <http://hfwebster.com/about-hfw/about-fsw>>.*

(Continued)

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

Primary Examiner — Patricia Palasik

(21) Appl. No.: **29/411,890**

(74) *Attorney, Agent, or Firm* — Leydig, Voit & Mayer, Ltd.

(22) Filed: **Jan. 27, 2012**

(57) **CLAIM**

The ornamental design for a friction stir welding tool, as shown and described.

(30) **Foreign Application Priority Data**

DESCRIPTION

Jul. 29, 2011 (JP) D2011-017505
Jul. 29, 2011 (JP) D2011-017507
Jul. 29, 2011 (JP) D2011-017508

FIG. 1 is a front view of a friction stir welding tool of the present invention.

(51) **LOC (10) Cl.** **15-09**

FIG. 2 is a rear view of the friction stir welding tool of FIG. 1. FIG. 3 is a top plan view of the friction stir welding tool of FIG. 1.

(52) **U.S. Cl.**

USPC **D15/144**
CPC **H01T 13/12** (2013.01); **H01T 13/00** (2013.01)

FIG. 4 is a bottom view of the friction stir welding tool of FIG. 1.

(58) **Field of Classification Search**

USPC D15/126, 144, 144.1, 144.2
See application file for complete search history.

FIG. 5 is a right side view of the friction stir welding tool of FIG. 1.

(56) **References Cited**

U.S. PATENT DOCUMENTS

D231,834 S * 6/1974 Gulrich D15/144
D269,519 S * 6/1983 Braun D15/138
5,879,480 A * 3/1999 Hetzner C21D 1/09
148/525
6,037,559 A * 3/2000 Okabe B23K 11/115
219/118
6,204,475 B1 * 3/2001 Nakata B23K 26/1405
219/121.84

FIG. 6 is a left side view of the friction stir welding tool of FIG. 1.

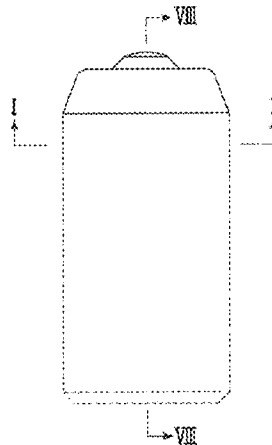
FIG. 7 is a perspective view of the friction stir welding tool of FIG. 1.

FIG. 8 is an enlarged VIII-VIII sectional view of the I-I portion of the friction stir welding tool of FIG. 1; and, FIG. 9 is a reference enlarged view of the II-II portion of the friction stir welding tool of FIG. 7.

The features shown in broken lines depict environmental subject matter only and form no part of the claimed design.

(Continued)

1 Claim, 9 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

D451,113 S * 11/2001 Shintani D15/144
 7,416,102 B1 * 8/2008 Trapp B23K 20/1225
 228/112.1
 D582,950 S * 12/2008 Yamaguchi D15/144
 D714,372 S * 9/2014 Savill, Jr. D15/144
 D719,200 S * 12/2014 Hassan D15/144
 D720,784 S * 1/2015 Hassan D15/144
 D735,787 S * 8/2015 Hassan D15/144
 2003/0102355 A1 * 6/2003 Shepherd B23K 20/1265
 228/119
 2004/0041006 A1 * 3/2004 Masingale B23K 20/1265
 228/112.1
 2004/0050907 A1 * 3/2004 Dracup B23K 20/1255
 228/112.1
 2005/0279810 A1 * 12/2005 Stol B23K 20/1225
 228/112.1
 2006/0049234 A1 * 3/2006 Flak B23K 20/1275
 228/112.1
 2006/0157531 A1 * 7/2006 Packer B23K 20/1255
 228/2.1
 2007/0010083 A1 * 1/2007 Aoh B23K 20/004
 438/612
 2007/0119833 A1 * 5/2007 Briand B23K 26/06
 219/121.72
 2007/0280849 A1 * 12/2007 Fukuchi B23K 20/1255
 420/546
 2008/0011810 A1 * 1/2008 Burford B23K 20/1255
 228/2.1
 2008/0047222 A1 * 2/2008 Barnes B23K 20/1225
 52/693
 2008/0128053 A1 * 6/2008 Jansen B23K 26/1411
 148/400
 2008/0142572 A1 * 6/2008 Fujii et al. 228/114.5
 2008/0190907 A1 * 8/2008 Fujii et al. 219/137 WM
 2009/0090700 A1 * 4/2009 Sato et al. 219/117.1
 2009/0108050 A1 * 4/2009 Nagano B23K 20/1235
 228/112.1
 2009/0140027 A1 * 6/2009 Badarinarayan ... B23K 20/1265
 228/114.5
 2009/0166395 A1 * 7/2009 Nakata et al. 228/112.1
 2010/0089976 A1 * 4/2010 Szymanski B23K 20/122
 228/113
 2010/0167083 A1 * 7/2010 Park B23K 20/1225
 428/615
 2010/0200642 A1 * 8/2010 Burford B23K 20/1245
 228/112.1

2011/0008532 A1 * 1/2011 Feick B22D 17/2023
 427/135
 2012/0055977 A1 * 3/2012 Steel B23K 20/1255
 228/112.1
 2012/0273466 A1 * 11/2012 Peters B23K 9/188
 219/73
 2012/0325380 A1 * 12/2012 Kamoshida B23K 20/1275
 148/527
 2013/0106123 A1 * 5/2013 Carlson B23K 20/1265
 293/155
 2013/0112736 A1 * 5/2013 Kato B23K 20/125
 228/112.1
 2013/0136940 A1 * 5/2013 Lin B23K 9/025
 428/544
 2013/0240609 A1 * 9/2013 Sanders B21D 26/021
 228/114
 2013/0264373 A1 * 10/2013 Miyazaki B23K 20/1255
 228/2.1
 2013/0327813 A1 * 12/2013 Castillo B23K 20/1265
 228/102
 2014/0027412 A1 * 1/2014 Kato B21C 51/005
 219/121.61
 2014/0027496 A1 * 1/2014 Castillo B23K 20/12
 228/102
 2014/0166731 A1 * 6/2014 Seo B23K 20/122
 228/112.1
 2014/0207274 A1 * 7/2014 Ross B23K 20/1235
 700/207
 2014/0312099 A1 * 10/2014 Ederyd B23K 20/1255
 228/112.1
 2014/0367452 A1 * 12/2014 Dinda B23K 20/1225
 228/112.1
 2015/0021377 A1 * 1/2015 Rudd B23K 35/362
 228/198
 2015/0041521 A1 * 2/2015 Matsushita B23K 20/1225
 228/112.1
 2015/0115019 A1 * 4/2015 Pascal B23K 20/125
 228/112.1

FOREIGN PATENT DOCUMENTS

WO 01/85384 A1 11/2001
 WO 01/85385 A1 11/2001
 WO 2005/105360 A1 11/2005
 WO 2005/105361 A1 11/2005

OTHER PUBLICATIONS

Isikawa, T. et al., *ISIJ International*, (49), No. 6, (2009), pp. 897-901.

* cited by examiner

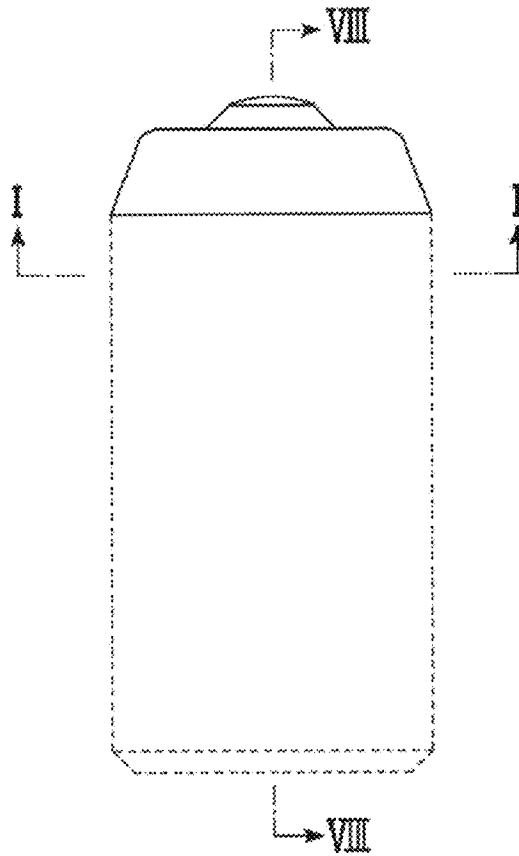


FIG. 1

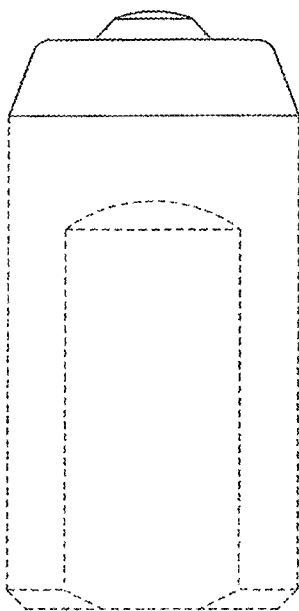


FIGURE 2

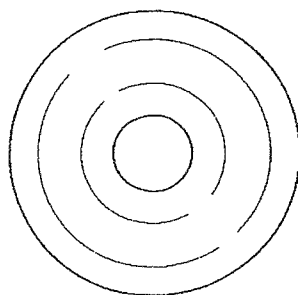


FIGURE 3

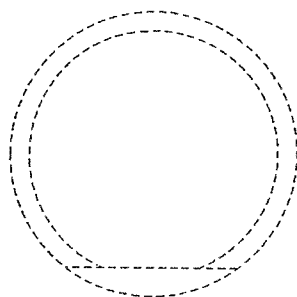


FIGURE 4

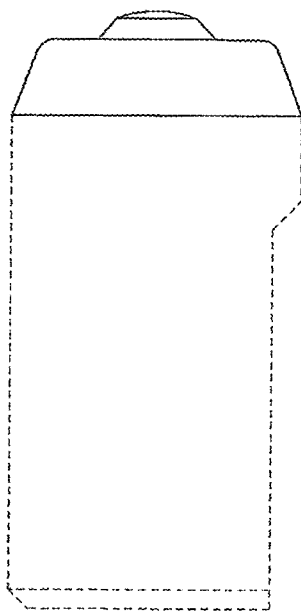


FIGURE 5

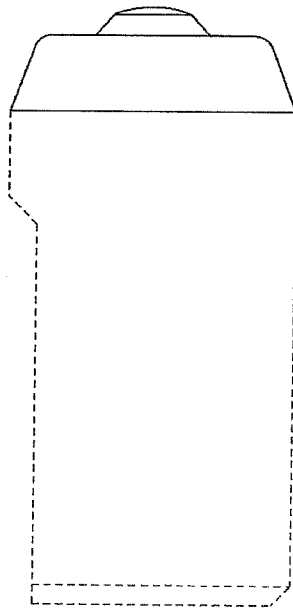


FIGURE 6

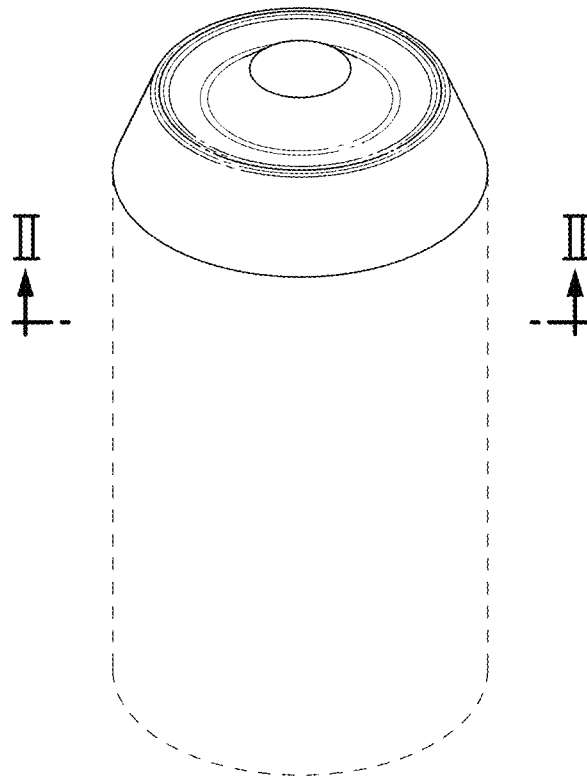


FIG. 7

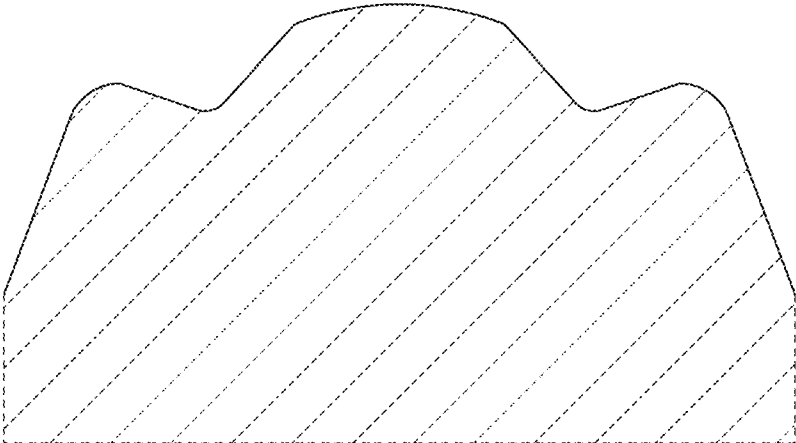


FIG. 8

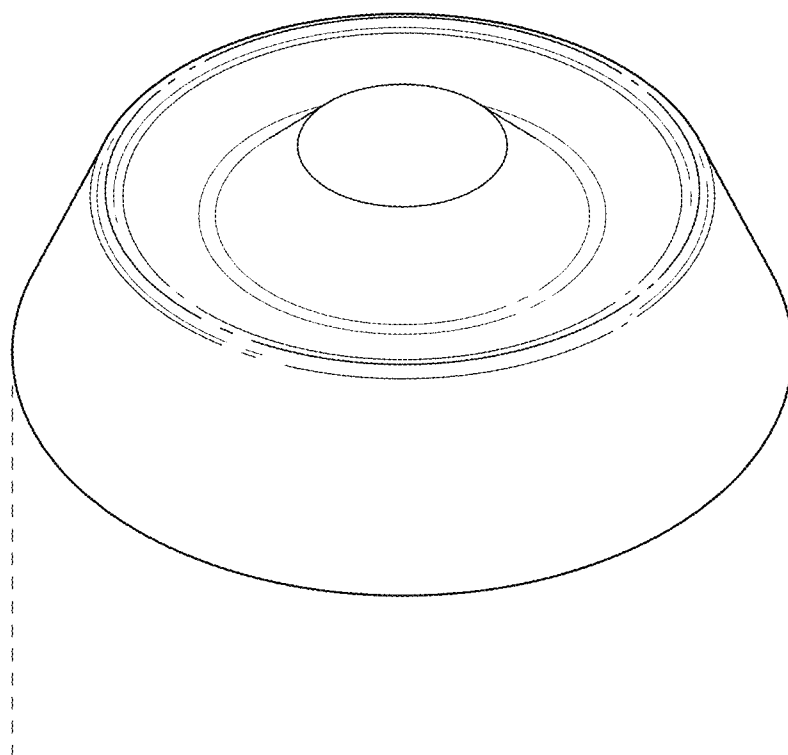


FIG. 9