Title (en)

Balance-spring resonator spiral

Title (de)

Spiralfeder der Resonatorunruh

Title (fr)

Spiral de résonateur balancier-spiral

Publication

EP 1655642 A2 20060510 (FR)

Application

EP 06003086 A 20040202

Priority

- EP 04707219 A 20040202
- EP 03075362 A 20030206
- EP 06003086 A 20040202

Abstract (en)

The hairspring has a center curve (11) with an end including a self-locking washer forming a collet. The washer has a triangular contour (19) in its center to allow fixing of the hairspring to a shaft of a balance wheel. An external contour of the washer is closed and an inner wall of the contour (19) has a series of discrete elastic zones that are defined by openings (18) formed across the washer at right side of the zones.

IPC 8 full level

G04B 17/34 (2006.01); **G04B 17/06** (2006.01); **G04D 3/00** (2006.01)

CPC (source: EP KR US)

G04B 17/066 (2013.01 - EP KR US); **G04B 17/34** (2013.01 - US); **G04B 17/345** (2013.01 - EP KR US); **G04D 3/0041** (2013.01 - EP KR US); **G04D 3/0069** (2013.01 - EP KR US)

Citation (applicant)

- CH 465537 A 19690115 - BERTHOUD LOUIS WILLIAM [CH]
- GB 1020456 A 19660216 - E T A A G EBAUCHES FABRIK
- US 209642 A 18781105
- US 4571661 A 19860218 - HOSHINO SHIGEO [JP]
- US 5576250 A 19961119 - DIEM BERNARD [FR], et al
- US 4661212 A 19870428 - EHRFELD WOLFGANG [DE], et al
- US 2001038803 A1 20011108 - MORALES ALFREDO M [US], et al
- C. HARENDT: "Wafer bonding and its application to silicon-on-insulator fabrication", TECHNICAL DIGEST MNE'90, vol. 90, pages 81 - 86

Cited by

EP2104007A1; WO2009115463A1; EP4224257A1; CN105299113A; EP1921516A1; EP2390732A1; CN102906646A; EP1921518A1; EP1921517A1; EP2322996A1; CN103930837A; WO2008135817A3; WO2011147782A1; WO2013045706A3; WO2009115470A1; EP2400351A1; US8439557B2; US7438465B2; US7572050B2; US8636403B2; US9342053B2; EP2104008A1; US8523426B2; US7575369B2; WO2014146842A1; DE212014000091U1; EP2104006A1; US9459589B2; EP2105807A1; US8296953B2; US8622611B2; WO2013045706A2; US8491182B2; US9411314B2; EP2104005A1; EP2485095A1; EP2595005A1; WO2013072158A1; US8550699B2; DE212012000207U1; EP3181939B1; EP3181938B1; EP3181940B1

Designated contracting state (EPC)

CH DE FR GB IT LI

DOCDB simple family (publication)

EP 1445670 A1 20040811; AT E486304 T1 20101115; CN 100435044 C 20081119; CN 1745341 A 20060308; DE 602004023518 D1 20091119; DE 602004029762 D1 20101209; EP 1593004 A2 20051109; EP 1593004 B1 20101027; EP 1655642 A2 20060510; EP 1655642 A3 20060927; EP 1655642 B1 20091007; EP 2175328 A2 20100414; EP 2175328 A3 20110330; EP 2175328 B1 20140730; HK 1084737 A1 20060804; JP 2006516718 A 20060706; JP 2013015534 A 20130124; JP 5122073 B2 20130116; JP 5389999 B2 20140115; KR 20050098881 A 20051012; TW 200426547 A 20041201; US 10444706 B2 20191015; US 2006055097 A1 20060316; US 2015277382 A1 20151001; US 2019107809 A1 20190411; WO 2004070476 A2 20040819; WO 2004070476 A3 20041223

DOCDB simple family (application)

EP 03075362 A 20030206; AT 04707219 T 20040202; CN 200480003387 A 20040202; DE 602004023518 T 20040202; DE 602004029762 T 20040202; EP 04707219 A 20040202; EP 06003086 A 20040202; EP 10151818 A 20040202; EP 2004000931 W 20040202; HK 06104914 A 20060425; JP 2005518308 A 20040202; JP 2012202260 A 20120914; KR 20057014243 A 20050803; TW 93102542 A 20040204; US 201514681535 A 20150408; US 201816210811 A 20181205; US 54464405 A 20050805