

Title (en)  
Horological movement comprising a flat hairspring

Title (de)  
Uhrwerk umfassend einen flachen Spiralfeder

Title (fr)  
Mouvement horloger comportant un spiral plat

Publication  
**EP 2175328 A2 20100414 (FR)**

Application  
**EP 10151818 A 20040202**

Priority  
• EP 04707219 A 20040202  
• EP 03075362 A 20030206  
• EP 10151818 A 20040202

Abstract (en)  
The movement has a balance-hairspring resonator comprising a hairspring (10) formed of a plate with a succession of turns. An end of an inner curve (11) is fixed to an axle (9) of a balance. An end of an outer curve (14) is fixed to a balance-coq or to a piece of the balance-coq. The turns are formed by a single band from the inner curve to the outer curve, where the inner curve presents Grossmann type geometry. A portion of the outer curve presents a section larger than that of a plate forming other turns. The turns are made of metal, metal alloy or monocrystalline/polycrystalline silicon.

Abstract (fr)  
Le spiral (10) comporte des spires de section rectangulaire ( $h \times e$ ), dont le pas  $p$  et/ou l'épaisseur  $e$  peut varier depuis la courbe à l'intérieur (11) jusqu'à la courbe à l'extérieur (14), ou dont l'enroulement peut s'écarter du tracé d'une spirale parfaite. La courbe à l'intérieur (11) peut en outre être prolongée par une rondelle autobloquante (17) permettant une fixation sans jeu du spiral sur l'axe du balancier. Le spiral est fabriqué par photolithographie et croissance galvanique, ou par micro-usinage d'un matériau amorphe ou cristallin, tel qu'une plaquette de silicium.

IPC 8 full level  
**G04B 17/06** (2006.01); **G04B 17/34** (2006.01); **G04D 3/00** (2006.01)

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Citation (applicant)  
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**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

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