

Title (en)
Mechanical oscillator with tuning fork for clock movement

Title (de)
Mechanischer Stimmgabel-Oszillator für Uhrwerk

Title (fr)
Oscillateur mécanique à diapason pour mouvement horloger

Publication
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Application
EP 14167078 A 20140505

Priority
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Abstract (en)
[origin: WO2015169708A2] The present invention relates to a wristwatch comprising a mechanical clock movement with a resonator of the tuning fork type. The oscillator preferably comprises a material A having low internal friction. In the oscillator of the invention, undesired symmetric oscillations are avoided, for example, through the choice of the materials from which the tuning fork is made. According to preferred embodiments, the stem and/or fixing of the oscillator comprises a material having internal friction that is greater than that of said material A, so that the quality factor Q2 of the symmetric oscillations is reduced, unlike the quality factor Q1 of the antisymmetric oscillation mode.

Abstract (fr)
Montre bracelet comportant un mouvement horloger mécanique avec un résonateur du type diapason. L'oscillateur comprend de préférence un matériau A à frottement interne faible. Dans l'oscillateur de l'invention, les oscillations symétriques non-souhaitées sont évitées, par exemple, par le choix des matériaux dont le diapason est fabriqué. Selon des modes de réalisations préférées, la tige et/ou la fixation de l'oscillateur comporte un matériau ayant un frottement interne plus important que celui dudit matériau A, de façon que le facteur de qualité Q 2 des oscillations symétriques soit diminué, contrairement au facteur de qualité Q 1 du mode d'oscillation antisymétrique.

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Citation (applicant)

- US 2971323 A 19610214 - MAX HETZEL
- US 3208287 A 19650928 - KAZUO ISHIKAWA, et al
- EP 2466401 A1 20120620 - ASGALIUM UNITEC SA [CH]
- US 3447311 A 19690603 - BEYNER ANDRE, et al
- WO 2013045573 A1 20130404 - ASGALIUM UNITEC SA [CH], et al
- P. ONG: "Little known facts about the common tuning fork", PHYS. EDUC., vol. 37, 2002, pages 540 - 542
- ANDRES CASTELLANOS-GOMEZ; NICOLAS AGRAIT; GABINO RUBIO-BOLLINGER: "Forcegradient-induced mechanical dissipation of quartz tuning fork force sensors used in atomic force microscopy", ULTRAMICROSCOPY, vol. 111, no. 3, 2011, pages 186 - 190, XP028144940, DOI: doi:10.1016/j.ultramic.2010.11.032
- CLARENCE ZENER: "Internal Friction in Solids", PROCEEDINGS OF THE PHYSICAL SOCIETY, vol. 52, 1940, pages 152 - 166
- HSI-PING LIU; LOUIS PESELNICK: "Internal Friction in Fused Quartz, Steel, Plexiglass, and Westerley Granite From 0.01 to 1.00 Hertz at 10-8 to 10-7 Strain Amplitude", JOURNAL OF GEOPHYSICAL RESEARCH, vol. 88, 10 March 1983 (1983-03-10), pages 2367 - 2379
- ILAN VARDI: "Le facteur de qualité en horlogerie mécanique", BULLETIN DE LA SOCIÉTÉ SUISSE DE CHRONOMÉTRIE, vol. 75, 2014, pages 53 - 61

Citation (search report)

- [XA] FR 2106507 A1 19720505 - SUWA SEIKOSHA KK
- [XA] FR 1421123 A 19651210 - CENTRE ELECTRON HORLOGER
- [A] CH 435122 A 19661215 - LONGINES MONTRES COMP D [CH]

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