

Title (en)  
ESCAPEMENT SYSTEM FOR A TIMEPIECE

Title (de)  
HEMMUNGSSYSTEM EINER UHR

Title (fr)  
SYSTEME D'ECHAPPEMENT POUR PIECE D'HORLOGERIE

Publication  
**EP 2585876 B1 20210217 (FR)**

Application  
**EP 11726830 A 20110622**

Priority  
• EP 10166938 A 20100622  
• EP 2011060511 W 20110622  
• EP 11726830 A 20110622

Abstract (en)  
[origin: EP2400352A1] The system (1) has a pallet (7) equipped with a fork intended to collaborate with a pin mounted on a plate (5). The pallet comprises a rod with an arm intended to accept pallet stones (21) so as to collaborate with an escapement wheel (23), where a part of the system is made of partially amorphous metal alloy or completely amorphous metal. The wheel, pallet and the pallet stones are respectively made of a partially amorphous metal alloy, where the pallet stones and the pallet are made of a single piece. The metal alloy is non-magnetic.

IPC 8 full level  
**G04B 15/14** (2006.01)

CPC (source: CN EP US)  
**G04B 15/00** (2013.01 - US); **G04B 15/14** (2013.01 - CN EP US)

Citation (opposition)  
Opponent : Mimotec/Rolex SA  
• EP 1596259 A1 20051116 - PREC ENGINEERING AG [CH]  
• EP 2189854 A1 20100526 - NIVAROX SA [CH]  
• TW 200936490 A 20090901 - NIVAROX SA [CH]  
• CH 696824 A5 20071214 - CHOPARD MANUFACTURE SA [CH]  
• EP 1879085 A1 20080116 - MANUF ET FABRIQUE DE MONTRES E [CH]  
• EP 2014748 A1 20090114 - NISSAN MOTOR [JP], et al  
• US 3826076 A 19740730 - TUETEP P  
• US 3146581 A 19640901 - WILHELM GARBE GEORGE FRIEDRICH  
• JP S54103730 A 19790815 - TOHOKU DAIGAKU KINZOKU ZAIRYO  
• JP S58126962 A 19830728 - TOHOKU DAIGAKU KINZOKU ZAIRYO  
• US 2006137778 A1 20060629 - MUNIR ZUHAIR A [US], et al  
• US 2009196125 A1 20090806 - TSUCHIYA KAZUHIRO [JP], et al  
• "Electrodeposition of Alloys principles and practice", 1 January 1963, ACADEMIC PRESS, article BRENNER A: "Structure as revealed by X-Ray", pages: 187 - 188, XP055878468  
• PUIPPE: "uv-liga microelectroforming", FSRM, 1 January 2005 (2005-01-01), pages 1 - 4, XP055878553  
• SCHWALLER P, ET AL: "Mechanical properties of small devices: from nanoindentation to reverse analysis", KOREA - SWITZERLAND JOINT SYMPOSIUM NEW MATERIALS AND PROCESS ISSUES IN MEMS AND NANO TECHNOLOGIES, 20 June 2002 (2002-06-20) - 20 June 2002 (2002-06-20), pages 1 - 11, XP055878476  
• BECHER, U. (INSTITUT FUR WERKSTOFFE (BOCHUM)) ET AL: "Electrodeposition of nickel-phosphorus alloys in microstructures.[Galvanische Abscheidung von Nickel-Phosphor-Legierungen in Mikrostrukturen.]", GALVANOTECHNIK, LEUZE VERLAG, vol. 86., no. 10., 1 January 1995 (1995-01-01), pages 3180 - 3186., XP002100153, ISSN: 0016-4232  
• KREYE H., ET AL.: "ELEKTROLYTISCH ABGESCHIEDENE NICKEL-PHOSPHOR-SCHICHTEN.", METALLOBERFLACHE., CARL HANSER VERLAG. MUNCHEN., DE, vol. 44., no. 02., 1 February 1990 (1990-02-01), DE , pages 63 - 66., XP000169314  
• KOCH JENS: "Test Rolex Milgauss", WATCH TIME, 1 August 2008 (2008-08-01), pages 1 - 8, XP055878484  
• ANONYMOUS: "Le calibre Rolex 3135", SERVATEMPUS, 1 January 2012 (2012-01-01), pages 1 - 36, XP055878512, Retrieved from the Internet <URL:http://ekladata.com/MQ2hhWlvO5Z3twDBr0Wzqbntf5sQ/Rolox3135.pdf> [retrieved on 20220113]  
• ANONYMOUS: "test rolex oyster perpetual milgauss 2008", WATCHTIME, 1 January 2008 (2008-01-01), pages 1 - 4, XP055878533  
• ANONYMOUS: "Escapement - Wikipedia", WIKIPEDIA, 6 June 2010 (2010-06-06), pages 1 - 22, XP055878542, Retrieved from the Internet <URL:https://en.wikipedia.org/wiki/Escapement> [retrieved on 20220113]  
• ANONYMOUS: "Liquidmetal - Wikipedia", WIKIPEDIA, 1 December 2021 (2021-12-01), pages 1 - 5, XP055878543, Retrieved from the Internet <URL:https://en.wikipedia.org/wiki/Liquidmetal> [retrieved on 20220113]  
• TELFORD M: "The case for bulk metallic glass", MATERIALS TODAY, ELSEVIER, AMSTERDAM, NL, vol. 7, no. 3, 1 March 2004 (2004-03-01), AMSTERDAM, NL , pages 36 - 43, XP002359139, ISSN: 1369-7021, DOI: 10.1016/S1369-7021(04)00124-5  
• DEFROSSEZ LEOPOLD: "L'Echappement libre a ancre des montres", THÉORIE GÉNÉRALE DE L'HORLOGERIE, 1 January 1952 (1952-01-01), pages 1 - 13, XP055878548, [retrieved on 20220113]  
Opponent : Vulkam  
• US 3146581 A 19640901 - WILHELM GARBE GEORGE FRIEDRICH  
• EP 1696153 A1 20060830 - NAMIKI PRECISION JEWEL CO LTD [JP], et al  
• DE 102006018738 B3 20070906 - KIENINGER UHRENFABRIK GMBH [DE]  
• CH 612308 A3  
• FLEURY ET AL.: "Tribological properties of bulk metallic glasses", MATERIALS SCIENCE AND ENGINEERING, vol. 375-377, 2004, pages 276 - 279, XP004605331, DOI: 10.1016/j.msea.2003.10.065  
• KELTON K F, ET AL: "First X-Ray Scattering Studies on Electrostatically Levitated Metallic Liquids: Demonstrated Influence of Local Icosahedral Order on the Nucleation Barrier", PHYSICAL REVIEW LETTERS, vol. 90, no. 19, 1 May 2003 (2003-05-01), pages 1 - 4, XP055867215  
• VAN DE MOORTELE BERTRAND: "Etude par spectroscopie mécanique et microscopie électronique en transmission de la stabilité thermique de verres métalliques massifs : effets de la décomposition et de la nanocristallisation", THÈSE L'INSTITUT DES SCIENCES APPLIQUÉES DE LYON, 1 January 2002 (2002-01-01), pages 1 - 146, XP055867222

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

DOCDB simple family (publication)

**EP 2400352 A1 20111228**; CN 103026303 A 20130403; CN 105319939 A 20160210; CN 105319939 B 20180213; EP 2585876 A1 20130501;  
EP 2585876 B1 20210217; HK 1219545 A1 20170407; JP 2013529779 A 20130722; JP 5657107 B2 20150121; US 2013148480 A1 20130613;  
WO 2011161193 A1 20111229

DOCDB simple family (application)

**EP 10166938 A 20100622**; CN 201180031085 A 20110622; CN 201510772543 A 20110622; EP 11726830 A 20110622;  
EP 2011060511 W 20110622; HK 16107517 A 20160628; JP 2013515896 A 20110622; US 201113703837 A 20110622