

Title (en)
Hairspring with two spiral springs with improved isochronism

Title (de)
Spirale mit zwei Spiralfedern mit verbessertem Isochronismus

Title (fr)
Spiral à deux ressort-spiraux à isochronisme amélioré

Publication
EP 2613206 A1 20130710 (FR)

Application
EP 12194292 A 20121126

Priority
EP 12150230 A 20120105

Abstract (en)
The spring (1) has hairsprings (3, 5) comprising curves extending in planes, where each curve has continuously variable pitch. The curves are symmetrical relative to a straight line (A) parallel to the planes, and pass through a median projection plane (P) of an attachment element (4). Each curve is arranged such that specific relation is zero to reduce displacements of center of mass during contraction and expansion. Each hairspring has H-shaped counterweights (8, 8', 9, 9') to compensate for unbalance formed by a mass of the element and personalize anisochronism slope of the balance spring. The specific relation includes a moment of the balance spring of order n, length of the balance spring and curvilinear abscissa along the balance spring to the power of n and parameterization of the balance spring by the abscissa. The balance spring is formed from silicon and includes a part coated with silicon dioxide.

Abstract (fr)
L'invention se rapporte à un spiral (1) comportant un premier ressort-spiral (3) dont la courbe s'étend dans un premier plan et dont la spire interne (6) comporte une virole (10), un deuxième ressort-spiral (5) dont la courbe s'étend dans un deuxième plan parallèle au premier plan, une attache (4) solidarissant la spire externe du premier ressort-spiral (3) à la spire externe du deuxième ressort-spiral (5) afin de former un spiral (1) double en série. Selon l'invention, la courbe du premier ressort-spiral (3) et la courbe du deuxième ressort-spiral (5) comportent chacune un pas continûment variable et sont symétriques par rapport à une droite (A) parallèle aux premier et deuxième plans et passant par le plan médian de projection (P) de l'attache (4) et chaque ressort-spiral (3, 5) comporte en outre au moins deux contrepoids (8, 8', 9, 9') afin de compenser le balourd formé par la masse de l'attache (4) et personnaliser la pente d'anisochronisme du spiral (1). L'invention concerne le domaine des pièces d'horlogerie.

IPC 8 full level
G04B 17/06 (2006.01)

CPC (source: EP US)
G04B 17/063 (2013.01 - US); **G04B 17/066** (2013.01 - EP US)

Citation (applicant)
• EP 2184652 A1 20100512 - MONTRES BREGUET SA [CH]
• EP 2196867 A1 20100616 - MONTRES BREGUET SA [CH]
• EP 2105807 A1 20090930 - NIVAROX SA [CH]

Citation (search report)
• [AD] EP 2105807 A1 20090930 - NIVAROX SA [CH]
• [A] EP 2104006 A1 20090923 - NIVAROX SA [CH]

Cited by
EP3181940B1; EP3181938B1

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