

OSCILLATING WEIGHT FOR RECHARGING THE ENERGY SOURCE
OF A PORTABLE INSTRUMENT

FIELD OF THE INVENTION

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10 The present invention concerns an oscillating weight for a portable instrument whose movements in use set said oscillating weight in motion to drive, either an automatic winding device, for example that of a barrel spring of a timepiece movement, which will be taken by way of example below, or a generator able to recharge an electric energy source of any other portable instrument.

15 BACKGROUND OF THE INVENTION

In mechanical watches, for a long time devices have been proposed that avoid manual winding of the barrel spring owing to the movements of the wearer. CH Patent No. 142 511, published in 1930, is very representative of the solutions that were
20 already proposed at that time using an oscillating weight, with simple or dual action, whose pinion drives a reducer kinematic chain which will rewind the spring.

Numerous improvements have been made to this principle as regards the shape, the nature or placing of the weights, and their point of pivoting.

It was also very quickly realised that the efficiency of an oscillating weight for
25 automatic winding depends on the extent of activity of the wearer, but also and perhaps more importantly, on the initial impulse that it was given, for the balance movement to be able to be maintained thereafter by the ordinary movements of the wearer.

In order to create this initial impulse, without imposing excessive agitation of
30 the wearer, various solutions have already been proposed.

CH Patent No. 317 534 discloses a device wherein a semi-circular pendular element pivots between two plates of the main oscillating weight in order to create the initial impulse. In CH Patent No. 149 136, the initial impulse is provided by a moving load (mercury, steel ball, etc...) arranged in a housing formed inside the main
35 oscillating weight.

These constructions are relatively complicated and cumbersome, and have never, to the knowledge of the Applicant, been integrated into a timepiece movement released on the market.

SUMMARY OF THE INVENTION

It is thus an object of the present invention to overcome the drawbacks of the
aforecited prior art by providing an oscillating weight including a primary weight and a
5 secondary weight for giving the initial impulse, of simple and economical structure and
possibly adaptable with few alterations to an existing oscillating weight made in a
single piece.

The invention therefore concerns an oscillating weight, devised for causing an
initial impulse, subsequently maintained by the natural movements of the wearer,
10 while being of relatively simple and economical structure. It includes a primary
oscillating weight secured to an arbour driving a kinematic chain and at least one
secondary weight mobile relative to the primary weight for giving the initial impulse to
the primary weight by shocks. The invention is characterized in that the secondary
weight forms a part assembled from the exterior to the primary weight while being able
15 to have a travel that generates shocks on stop members arranged at the ends of
guide means located at the periphery of said primary weight. The following detailed
description will give, by way of example, various embodiments that all rely on the
same inventive concept.

20 BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the present invention will appear in the
following description of various embodiments, given by way of non-limiting illustration
with reference to the annexed drawings, in which:

- 25 - Figures 1, 2 and 3 show in perspective a first embodiment in three positions;
- Figure 4 is an exploded perspective diagram of the first embodiment viewed
from above;
- Figure 5 corresponds to Figure 4 in a bottom view;
- Figures 6, 7, 8 and 12 correspond to four other embodiments, and
- 30 - Figures 9, 10 and 11 show a cross-section along line VIII-VIII of Figure 8
variants of the connection between the primary weight and the secondary weight.

DETAILED DESCRIPTION OF ONE EMBODIMENT

35 Referring first of all to Figures 1 to 5 a first embodiment of an oscillating weight
according to the invention will be described hereinafter. Figure 1 shows the oscillating
weight at rest, i.e. when the user of a wristwatch fitted with such an oscillating weight

is not making any movement, or he has removed it from his wrist. It comprises two parts 10 and 20 that can move relative to each other. A first part, which will be designated the "primary mass" 10 hereinafter, is secured to the drive arbour 6 (represented only by the line of its axis) which includes in a known manner a pinion meshing with a kinematic chain to rewind a barrel spring or to drive a generator to recharge a battery.

Primary weight 10 is formed of an armature in a single piece including a securing ring 11 on arbour 6, and two arms 13a, 13b whose ends are joined by a fellow 14. The central part of primary weight 10 includes a recess 8 in the form of an annular sector which will allow the displacement of secondary weight 20.

Referring also to Figures 4 and 5, it can be seen that secondary weight 20 is made of two elements, a top element 22 and bottom element 24, assembled from the exterior on either side of fellow 14 by means of screws 23 or by any other equivalent securing means.

As can be seen more easily in Figure 5, a groove 21 is formed in the base of top element 22 to match the shape of fellow 14. Figure 5 also shows that bottom element 24 includes a thinned part 26 whose only function is to leave a little more space for the subjacent moving parts. It will also be observed that groove 21 could equally be formed in bottom element 24, if the latter had the "solid" shape shown in dotted lines.

It can also be seen that bottom element 24 includes apertures 28 arranged by fellow 14, separated therefrom by full or solid zones 27, which reduces the friction surface with said fellow 14. These full zones 27 and the surfaces of fellow 14 could also have a deposition or coating for improving tribological properties, such as a film of oil or grease, a molybdenum sulphide, DLC (diamond like carbon) or suchlike.

Figure 2 shows the displacement of secondary weight 20, even when the wearer makes a movement of small amplitude.

Figure 3, shows the shock produced at the end of travel of secondary weight 20, which will set primary weight 10 in motion.

Figure 6, shows a second embodiment which differs from the preceding one in that primary weight 10 is made with a separable fellow 14, and in that secondary weight 20 is made in a single piece with a circular path corresponding to groove 21 of the first embodiment. Secondary weight 20 may also be formed of two pre-assembled elements, for example by welding. This secondary weight 20 is fitted onto fellow 14, which is then fixed to the ends of arms 13a, 13b by means of screws 15, or by any other equivalent means.

Figure 7 shows a third embodiment wherein primary weight 10 is made in a

single piece and includes a circular sector 9 in which a slot 19 is formed, which acts as guide means for secondary weight 20. Secondary weight 20 is then made in two parts 22, 24 which are assembled by means of two screws 23 whose rods pass through slot 19. Circular sector 9 is shown as being solid, but it could also have an annular recess 8, as in the first embodiment.

Figure 8 shows a fourth embodiment wherein secondary weight 20 is guided by a recess 18 formed in the thickness of primary weight 10. Recess 18 and one part of secondary weight 20 slide into each other by means of a "dovetail" type assembly, the female part being formed by recess 18 as shown in Figure 9. Primary weight 10 includes a stop member 12a, 12b at each end of sector 9, one of these stop members 12a being secured by a screw 25. This allows secondary weight 20 to slide into recess 18, then to limit the travel thereof by adjusting stop member 12a. It can be seen that this is a particularly simple construction.

This dovetail assembly could also be achieved by inverting the male and female parts, as shown in Figure 10. The shape of the male and female parts could also be different from trapezoidal, for example an open circular shape as shown in Figure 11.

Figure 12 shows a fifth embodiment which differs from the preceding embodiments essentially in that the secondary weight is formed of two totally independent weights 20a, 20b. Primary weight 10 is made up of an armature formed by a ring 11 for securing to the drive arbour 6, said ring being extended by a single 13 joining the median part of a felloe 14 made in two parts 14a, 14b. Each part 14a, 14b forms guide means for secondary weights 20a, 20b which are mounted so as to slide thereon. The travel of secondary weights 20a, 20b is limited by stop members 12a, 12b held in the ends of semi-felloes 14a, 14b by screws 25.

Those skilled in the art could envisage other variants without departing from the scope of the present invention, already illustrated by several embodiments.

As a variant, primary weight 10 and secondary 20 have advantageously substantially the same weight.

CLAIMS

1. Oscillating weight mounted on a drive arbour (6) for the automatic winding of a spring or for driving a generator, formed of a primary oscillating weight
5 (10) secured to the drive arbour (6) and at least one secondary oscillating weight (20), which is mobile relative to the primary weight (10) to give the initial impulse to said oscillating weight, characterized in that the secondary weight (20) is formed by a part assembled from the exterior to the primary weight (10), while able to have a travel between two stop members (12a, 12b) of guide means (14, 18) located on the
10 periphery of the primary weight (10).

2. Oscillating weight according to claim 1, characterized in that the primary weight (10) is made up of an armature formed by a ring (11) for securing to the drive arbour (6) extended radially by two arms (13a, 13b) as far as a fellow (14) forming the guide means for the secondary weight (20) made in two elements (22, 24) assembled
15 on either side of the fellow (14), the ends of the arms (13a, 13b) forming the stop members (12a, 12b).

3. Oscillating weight according to claim 1, characterized in that the primary weight (10) is made in two parts formed on the one hand by a ring (11) for securing to the drive arbour (6) extended radially by two arms (13a, 13b), and on the other hand
20 by a fellow (14) secured to the ends of the arms (13a, 13b) after the secondary weight (20) has been assembled on said fellow (14), made in as single part, or pre-assembled prior to mounting, so as to slide on said fellow (14).

4. Oscillating weight according to claim 1, characterized in that the primary weight (10) the shape of a circular sector (9) provided with a slot (18) at the periphery
25 thereof to form the guide means for the secondary weight (20) made in two parts (22, 24) assembled on either side of the primary weight (10), by screws (23) passing through said slot (19).

5. Oscillating weight according to claim 1, characterized in that the guide means for the secondary weight (20) are formed by a recess (18) formed in the thickness of the periphery of the primary weight (10) by cooperation of complementary male and female profiles, said guide means including a stop member (12a, 12b) at each end, at least one stop member (12a) being removably mounted by means of a screw (25) to allow the secondary weight (20) to engage in the recess (18) of the primary weight (10).
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35 6. Oscillating weight according to claim 1, characterized in that the primary weight (10) is made up of an armature formed by a securing ring (11) on the drive arbour (6), extended radially by an arm (13) joining a median part of a fellow (14)

whose two parts (14a, 14b) form guide means for two secondary weights (20a, 20b), a stop member (12a, 12b) being secured to each end of the felloe (14) after the secondary weights (20a, 20b) have been assembled.

7. Oscillating weight according to claim 1, characterized in that the primary
5 weight (10) and the secondary weight (20) have substantially the same weight.

8. Wristwatch whose electrical or mechanical power source for the watch movement is driven by an oscillating weight according to any of the preceding claims.