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(54) SELF-WINDING WATCH

(71) We, KABUSHIKI KAISHA DAINI SEIKOSHA, a Japanese company, of 31-1, 6-chome, Kameido, Koto-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a self-winding watch, and more particularly, though not exclusively, it attempts to provide a thin self-winding watch in which the oscillating movement of an oscillating weight is transmitted to a mainspring winding gear train in a manner which is less prone to suffer from wear in use than hitherto known transmissions.

According to the present invention, there is provided a self-winding watch including an oscillating weight which is mounted for oscillation on a bearing, a rotatable race of which is formed on a radially outer surface thereof with gear teeth which mesh with a rotary gear wheel, the said gear wheel having an integral eccentric axle which is engaged by a pawl device for movement with the said axle, the pawl device in operation unidirectionally driving a ratchet wheel which forms part of a mainspring winding gear train.

Preferably the bearing is a ball bearing, said rotatable race being its outer race.

The pawl device may be a bifurcated lever.

The invention will now be described, merely by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a schematic plan view of part of a known self-winding watch,

Figure 2 is a sectional view of the mechanism shown in Figure 1,

Figure 3 is a schematic plan view of part of a self-winding watch in accordance with the present invention, and

Figure 4 is a sectional view taken along the line A-A' of Figure 3.

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Referring first to Figures 1 and 2 which illustrate a known self-winding watch, an oscillating weight or rotor 5 is mounted for rotation on a ball bearing comprising a rotatable inner race made up of two parts 1 and 2 respectively, a stationary outer race 4 and balls 3 in rolling contact between the inner and outer races.

A shaft 9 is mounted within the inner race of the ball bearing, the shaft 9 having a slotted screw head 20. As shown in Figure 2, below the shaft 9 a pin 19 is secured to the part 2 of the inner race such that the stem of the pin 19 is eccentric with regard to the longitudinal axis of the shaft 9. The stem of the pin 19 engages a bifurcated pawl lever 8 the free ends 8a, 8b of which respectively engage ratchet teeth on diametrically opposite sides of a ratchet wheel 11. The teeth of the ratchet wheel 11 are formed so that the arms of the pawl lever 8 will drive the wheel 11 in one angular sense only.

Fixed to the outer race 4 is a bridge member 18, the bridge 18 being adapted to support the wheel 11 through a shaft 22 connecting the two members. Mounted coaxially and for rotation with the ratchet wheel 11 is a pinion 12 which is in meshing engagement with a toothed wheel 13 adapted to be mounted on a square shaft, the wheel 13 forming part of the winding gear train (not shown) for the mainspring (not shown) of the watch. The lower end (as viewed) of the shaft 22 is journaled in a plate 10.

It will be appreciated from this description given of a known self-winding watch that there are limits in making this watch thinner owing to the presence of the bridge 18. Moreover, the use of the pin 19 presents the possibility of wear where that pin engages with the pawl 8 and thus in time the transmission of the oscillating movement of the rotor 5 is liable to suffer from inaccuracies.

Turning now to the present invention illustrated in Figures 3 and 4, wherein cor-

responding parts have been given the same reference numbers, the oscillating weight or rotor 5 is shown as being mounted for rotation with an outer race 4 of a ball bearing which includes an inner race having two separate parts 1 and 2, and balls 3 in rolling contact between the inner races and the outer race. Within the inner races 1 and 2 is an axle 9 fixed to a plate 10, the axle 9 being tapped to engage with the inner races.

The outer race 4 of the ball bearing is provided on its outer periphery with gear teeth which are adapted to mesh with a gear transmission wheel 6 on which is integrally mounted an eccentric axle 7. Mounted on the axle 7 is a pawl lever 8 having two bifurcated arms 8a and 8b the free ends of which are respectively adapted to engage with diametrically opposite ratchet teeth on a ratchet wheel 11. A pinion 12 is integral with the ratchet wheel 11 and is in mesh with a gear wheel 13 adapted to be mounted on a square shaft and forming part of a winding gear train (not shown) for the mainspring (not shown) of the watch. The plate 10 is apertured to receive a hollow shaft 16 within which is disposed a screw 17a to secure the ratchet wheel 11 and the pinion 12 directly to the plate 10.

It will be appreciated that when the oscillating weight or rotor 5 oscillates, this movement will be transmitted to the outer ring 4 and thus to the wheel 6 geared thereto. Movement of the wheel 6 will rotate the eccentric axle 7 to move the arms 8a and 8b of the pawl lever so as to rotate the ratchet wheel 11 and the pinion 12 in one angular sense only. Rotation of the pinion 12 will be transmitted to the wheel 13 to wind up the mainspring.

Comparing this preferred embodiment of

this invention with that discussed in connection with Figures 1 and 2, it will be plain that the bridge member 18 has been eliminated and the ratchet wheel 11 is supported directly on the plate 10 by means of the hollow shaft 16.

Accordingly, the self-winding watch of the embodiment of Figures 3 and 4 may be made thinner and the means of transmitting the movement of the rotor 5 to the gear wheel 13 is less prone to suffer from wear resulting from use.

WHAT WE CLAIM IS:—

1. A self-winding watch including an oscillating weight which is mounted for oscillation on a bearing, a rotatable race of which is formed on a radially outer surface thereof with gear teeth which mesh with a rotary gear wheel, the said gear wheel having an integral eccentric axle which is engaged by a pawl device for movement with the said axle, the pawl device, in operation, unidirectionally driving a ratchet wheel which forms part of a mainspring winding gear train.

2. A watch as claimed in claim 1 wherein the bearing is a ball bearing, said rotatable race being its outer race.

3. A watch as claimed in claim 1 or 2 wherein the pawl device is a bifurcated pawl lever.

4. A self-winding watch substantially as hereinbefore described with reference to and as shown in Figures 3 and 4 of the accompanying drawings.

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