Sept. 3, 1935. G. L. HENRY 2,013,386

SELF WINDING WATCH

Filed May 3, 1934 2 Sheets-Sheet 1

Fig. 1

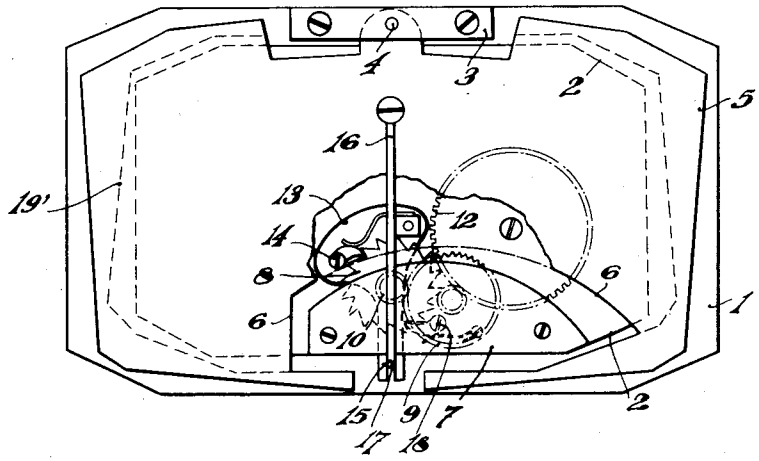

Fig. 2

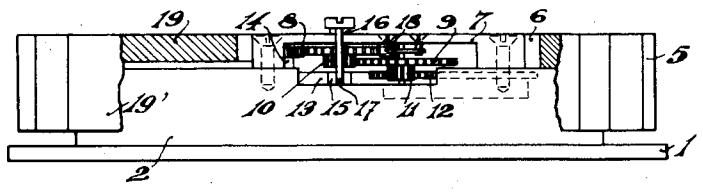

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Fig. 3

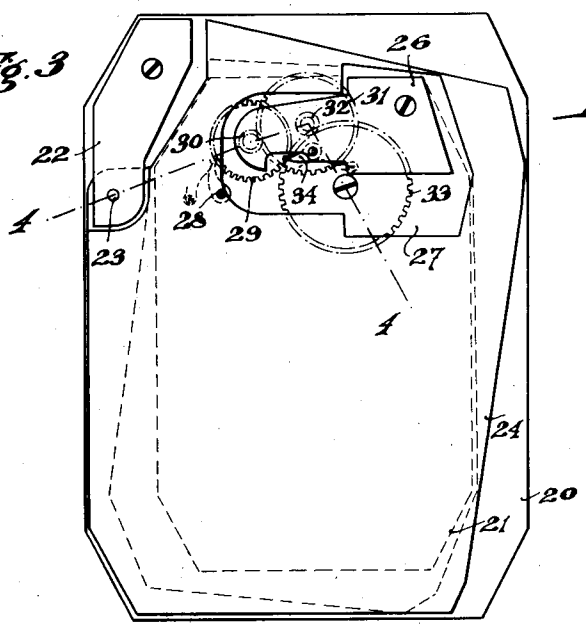


Fig. 4

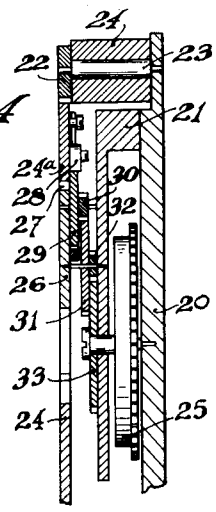


Fig. 7

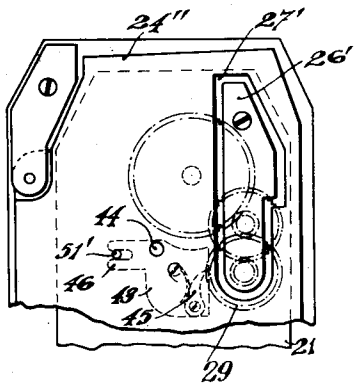
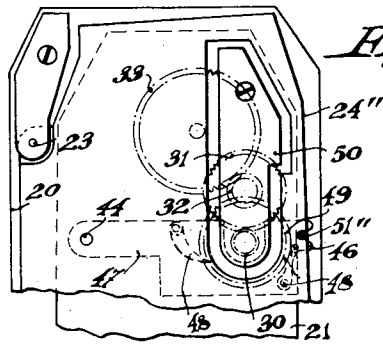


Fig. 8



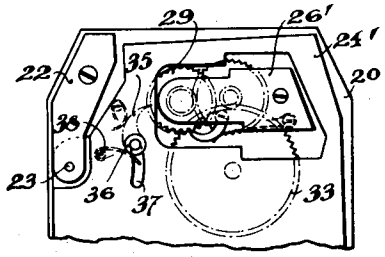


Fig. 5

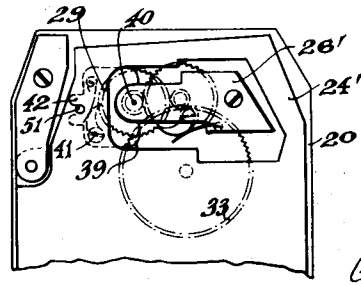


Fig. 6

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UNITED STATES PATENT OFFICE

2,013,386

SELF-WINDING WATCH

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Application May 3, 1934, Serial No. 723,775
In Switzerland May 8, 1933

7 Claims. (Cl. 58—82)

The present invention relates to self-winding watches and more particularly to wrist watches wherein winding of the main spring is effected by means of an oscillatory weight or pendulum.

The object of the invention is the provision of a watch of the above type in which the winding weight is disposed relative to the watch movement so as to obtain a relatively long radius of oscillation and so as to be able of making the weight relatively heavy without unduly increasing the thickness or the diameter of the watch.

Several constructional embodiments of a self-winding watch are illustrated by way of example in the accompanying drawings in which

Figure 1 is a plan view of a wrist watch movement as seen from the side of the bridges and provided with winding means according to the invention, the winding weight being partly broken away.

Figure 2 is an elevation of this movement, partly drawn in section.

Figure 3 is a plan view of a wrist watch movement provided with a modified arrangement of winding means according to the invention.

Figure 4 is a section along the line 4—4 of Fig. 3.

Figures 5 to 8 show each a plan view of a modified form of winding means.

The wrist watch movement shown in Figures 1 and 2 comprises a movement plate 1 on which are mounted the bridges and the wheelwork of the movement generally indicated at 2. The plate 1 is slightly larger than the area covered by the bridges and wheel work 2 and carries adjacent to its periphery an additional bridge 3 carrying a pin 4 on which a winding weight 5 is rotatably mounted for effecting an oscillatory to-and-fro movement. The center of oscillation 4 of the weight 5 is situated on the transverse axis of the watch. The weight 5 has the shape of a shallow cup having a bottom 18 which covers the top of the bridge work 2, and a side wall 19' surrounding the contour of the block 2, while leaving however the necessary clearance around the block that the weight can effect its oscillatory movement. Bottom 19 of the weight 5 is provided with an opening 6 within which is disposed a bridge 7 fixed to the movement block 2. This bridge 7 serves for mounting a ratchet wheel 8, a gear wheel 9 meshing with a pinion 10 turning with the ratchet 8, and a pinion 11 turning with the wheel 9 and meshing with the gearing 12 of the main spring barrel. A lever 13 is also disposed beneath the bridge 7 and is mounted on the axis of the ratchet 8 for effecting a limited movement of oscillation. This lever 13 carries a pawl 14 coacting with the ratchet 8 and is provided with a forked end 15. A spring blade 16 is secured with one end on the weight 5 while the opposite end 17 is bent downwardly at right angles to engage in the fork 15 of the lever 13. A retaining pawl 18 prevents rotation of the ratchet 8 in one direction.

When the weight 5 oscillates owing to movements of the wrist of the person wearing the watch, the spring blade 16 acts first like a rigid member and moves with the weight 5 to impart a corresponding movement of oscillation to the lever 13. The pawl 14 then drives the ratchet wheel 8 and the movement of the ratchet is transmitted by the wheels 10, 9, 11, 12 to the main spring which it thus winds up. When the spring is fully energized and its resistance against being further wound-up is greater than the tension of the spring blade 16, this blade stops to move with the weight 5 but yields and the lever 13 stays immobile.

Since the winding weight 5 has the shape of a cup partly enclosing the proper watch movement, this weight can be made relatively heavy without undue increase of the thickness of the watch. In wrist watches of a narrow rectangular shape, the weight 5 can be made without its two transverse end walls, so that the bottom 19 of the weight does not reach beyond the movement block 2 and does not increase the length of the watch. Since the center of oscillation of the weight is situated at the periphery of the movement plate 1 and outside of the movement block 2, the axis 4 can have a length equal to the entire height of the movement, the mounting of the weight is easy to perform, and the radius of oscillation is great. The described winding means can be utilized with ordinary existing watch movements; only a larger movement plate has to be used and an additional bridge 7 must be mounted on the movement.

In the modification shown in Figures 3 and 4, the movement plate 20 carries the usual block of bridges 21 and an additional bridge 22 carrying a pin 23 on which is rotatably mounted a winding weight 24. This weight is cup-shaped as described with reference to Figs. 1 and 2 and completely surrounds the block 21. The bottom 24*a* of the cup-shaped weight 24 is provided with an opening 27 surrounding a bridge 26 mounted on the block 21. A pawl 28 is mounted on the inner face of the bottom 24*a* of the weight and coacts with a ratchet wheel 29 mounted between the bridge 26 and the block 21. A pinion 30 fixed to the ratchet 29 meshes with a wheel 31 having a pinion 32 meshing with the gear wheel 33 of the spring barrel 25. A retaining pawl 34 prevents rotation of the ratchet wheel 29 in one direction. It will be seen that upon an oscillating movement of the weight 24, the pawl 28 will impart a step by step movement to the ratchet 29 and this movement will be transmitted to the winding wheel 33.

Figure 5 shows a modification in which the general disposition of the parts is the same as in Fig. 3. The driving pawl 35 however is mounted on a

slide 36 engaged in a slot 37 provided in the weight 24', and a spring 38 normally maintains the slide at one end of the slot. When the main spring is fully wound-up, the pawl 35 does not drive the ratchet 29 any more which is mounted between the bridge 26' and the plate 20, but the slide 36 will move along the slot 37 against the action of the spring 38.

In the modification shown in Fig. 6 the driving pawl 41 is mounted on a lever 39 rotatably mounted on the axis 40 of the ratchet wheel 29. The lever is provided with a fork 42 engaging a pin 51 carried by the winding weight 24'. When the weight 24' oscillates, the pin 51 transmits the movement of the weight to the lever 39 and the pawl 41 drives the ratchet wheel 29 mounted between the bridge 26' and the plate 20. The pin 51 can be rigid, or it may be made yielding, so that after the main spring is fully wound-up, the pin yields and does not transmit any movement to the lever 39.

In Figure 7 the driving pawl 45 is mounted on a lever 43 rotatably mounted on a pin 44 carried by the watch movement 21. The lever 43 is provided with a fork 46 engaging a pin 51' carried by the weight 24''. The pawl 45 coacts again with a ratchet 29 mounted between a bridge 26', disposed in an opening 27' provided in the weight 24'', and the watch movement 21.

In Figure 8, a lever 47 is rotatably mounted on the pin 44 carried by the watch movement 21. This lever carries two driving pawls 43 coacting with the ratchet wheel 49 carried by a bridge 50 fixed to the movement 21. The lever 47 is again provided with a fork 46 engaging a pin 51'' carried by the winding weight 24'', which is rotatably mounted on the movement plate at the point 23. Upon oscillation of the weight 24'' in one direction, the pin 51'' will impart a corresponding movement to the lever 47 and one of the pawls 48 will drive the ratchet wheel 49 in a certain direction of rotation.

Upon oscillation of the weight and the lever in opposite direction, the second pawl 48 will still drive the ratchet wheel 49 in the same direction. The ratchet wheel 49 is connected, as before, by means of a gear train 30, 31, 32 to the winding wheel 33.

It will be seen in Figs. 3 to 6 that the center of oscillation of the winding weight is moved out of the transverse axis of the watch towards the side of the watch which will be adjacent the side of the arm when the watch is carried by the wrist. The opening 27 of the winding weight and therefore the driving pawl are disposed in proximity of the center of oscillation. This arrangement provides the advantage that the winding weight exerts a powerful action on the driving pawl.

I claim:—

1. In a self-winding watch, a watch movement including a winding gear train, an oscillatory winding weight pivotally mounted adjacent one edge of the movement, said weight forming a shallow cup having a bottom covering substantially the entire back of the watch movement and having side walls substantially surrounding the contour of the movement, and an oscillatory pawl connected to the winding weight and adapted to work the ratchet of the winding gear train.

2. In a self-winding watch, a watch movement including a winding gear train, an oscillatory winding weight pivotally mounted adjacent one edge of the movement, said weight forming a shallow cup having a bottom covering substantially the entire back of the watch movement and having side walls substantially surrounding the contour of the movement, said bottom of the winding weight being provided with an opening, a movement bridge disposed in said opening and carrying a portion of said winding gear train, and an oscillatory pawl connected to the winding weight and adapted to work the ratchet of the winding gear train.

3. A self-winding wrist watch comprising a watch movement including a winding gear train, an oscillatory winding weight pivotally mounted adjacent one edge of the movement, the center of oscillation of the weight being situated approximatively on a line drawn through the center of the watch movement and extending parallel to the longitudinal axis of the arm of the person wearing the watch, said weight forming a shallow cup having a flat bottom covering substantially the entire back of the watch movement and having side walls substantially surrounding the contour of the movement, and a pawl operatively connected to the winding weight to effect a to-and-fro movement upon oscillation of the winding weight, said pawl being adapted to work the ratchet of said winding gear train.

4. A self-winding watch comprising a watch movement including a winding gear train, an oscillatory winding weight pivotally mounted adjacent one edge of the watch movement, said weight forming a shallow cup having a flat bottom covering substantially the entire back of the watch movement and having side walls substantially surrounding the contour of the movement, said bottom of the winding weight being provided with an opening, a bridge disposed within said opening and fixed to the watch movement, said bridge carrying a portion of the winding gear train, and a pawl operatively connected to the winding weight and adapted to work the ratchet of the winding gear train.

5. A self-winding watch as defined in claim 4 wherein said pawl is carried by the bottom of the winding weight and coacts with the ratchet of the winding gear train carried by said bridge.

6. A self-winding watch as defined in claim 4, wherein said pawl is slidably mounted relative to the winding weight, and a spring acting on the pawl to normally maintain the pawl in driving relation with the ratchet of the winding gear train.

7. A self-winding watch comprising a watch movement including a winding gear train, an oscillatory winding weight pivotally mounted adjacent one edge of the watch movement, said weight forming a shallow cup having a flat bottom covering substantially the entire back of the watch movement and having side walls substantially surrounding the contour of the movement, said bottom of the winding weight being provided with an opening, a bridge disposed within said opening and fixed to the watch movement, said bridge carrying a portion of the winding gear train, a lever pivotally mounted on the watch movement, means operatively connecting said lever to the winding weight whereby said lever will oscillate upon an oscillatory movement of the winding weight, and a pawl carried by said lever and adapted to work the ratchet of said winding gear train.

GEORGES LOUIS HENRY.