Nov. 20, 1934. H. AEGLER 1,981,297

SELF WINDING TIMEPIECE

Filed Jan. 6, 1933 2 Sheets-Sheet 1

Fig. 1

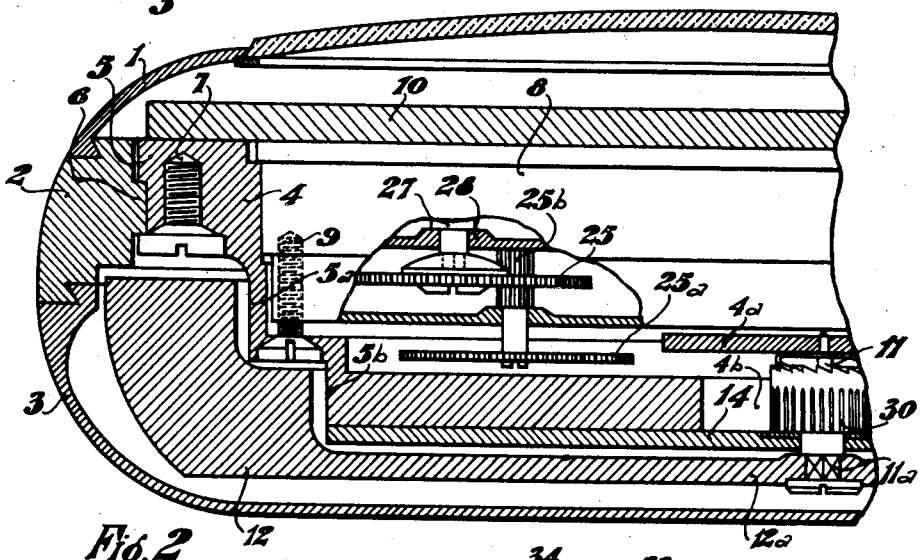


Fig. 2

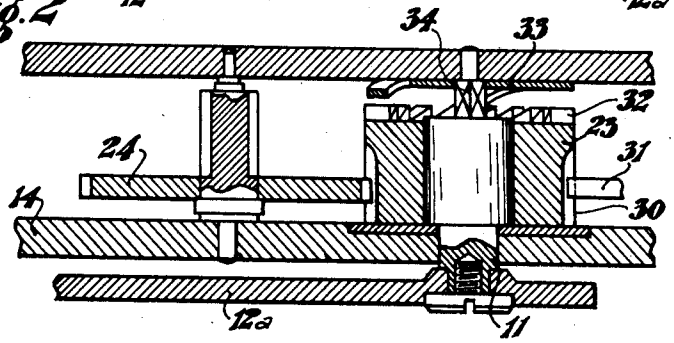
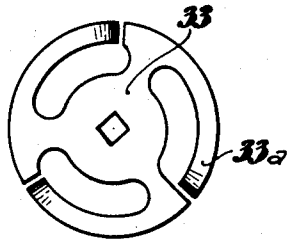


Fig. 3



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Nov. 20, 1934. H. AEGLER 1,981,297

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Filed Jan. 6, 1933 2 Sheets-Sheet 2

Fig. 4

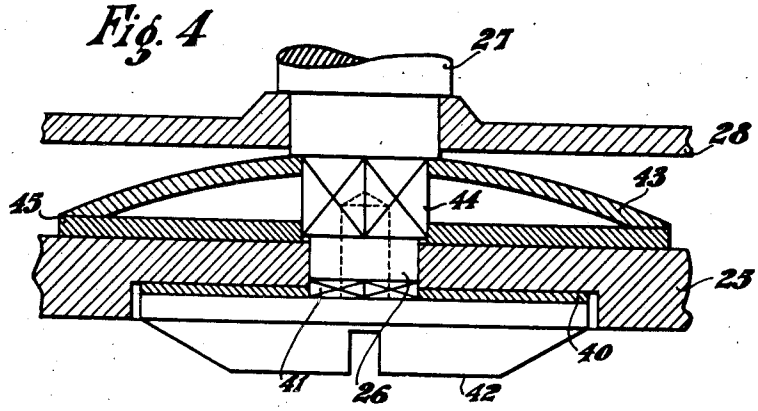


Fig. 5

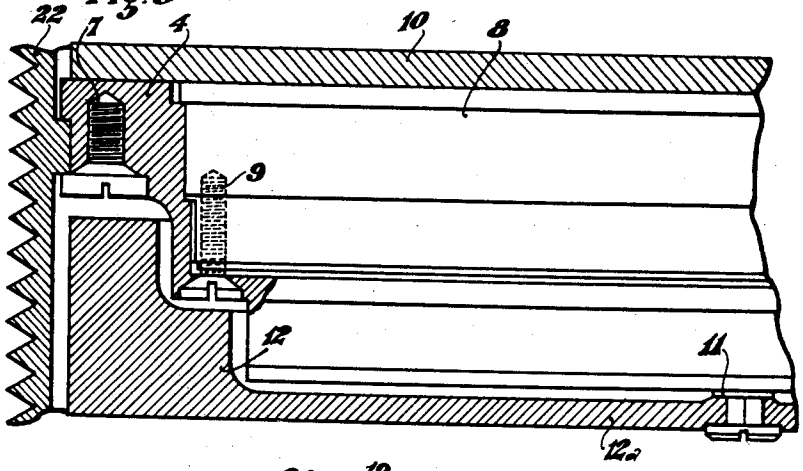
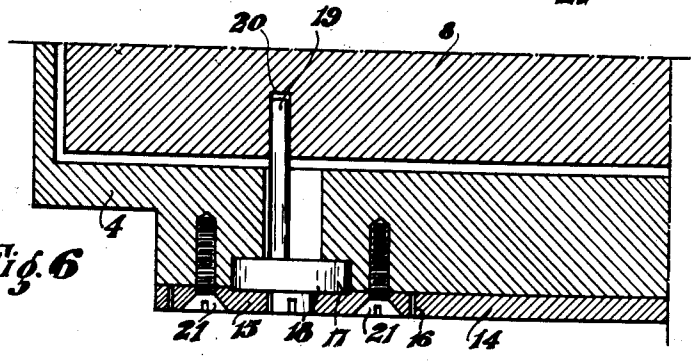


Fig. 6



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Patented Nov. 20, 1934 1,981,297

UNITED STATES PATENT OFFICE

1,981,297

SELF-WINDING TIMEPIECE

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Application January 6, 1933, Serial No. 650,567
In Switzerland January 14, 1932

5 Claims. (Cl. 58—82)

This invention relates to self-winding timepieces of the type in which the driving spring is tensioned by means of an oscillatory pendulum.

It is an object of the invention to provide a timepiece and more particularly a pocket or a wrist watch of the above type in which the various parts are arranged in such relationship to each other so as to permit the use of a relatively heavy pendulum weight without substantially increasing the size of the timepiece over those having an ordinary stem winding mechanism.

A further object is the provision of an inner cage member carrying the movement, the dial, the winding train and the pendulum forming together a single compact unit adapted to be fixed as a whole to the case of the timepiece.

Another object is the provision of means connected to the winding pendulum for actuation of the winding train and rendering the train sensitive to extremely small movements of oscillation of the pendulum.

A still further object is the provision of simple but effective means to prevent overwinding of the driving spring.

These and other objects will appear from the following detailed description, reference being had to the accompanying drawings in which,

Figure 1 is a fragment of a section through a watch according to the invention;

Figure 2 is a section through a part of the winding mechanism;

Figure 3 is a plan view of a detail thereof;

Figure 4 is a section through another detail;

Figure 5 is a sectional view of a modified watch;

Figure 6 is a section through a device for centering the watch movement in its supporting member.

The watch represented in Figs. 1 to 4 comprises a case having a bezel 1, a case band 2 and a back 3.

A cup-shaped member 4 is disposed within the watch case and is provided with a stepped outer periphery. The first step of this periphery is formed by a circular shoulder 5 which bears on a circular projection 6 provided on the case band. Screws 7 are screwed into the member 4 and the heads of these screws coact with the lower face of the projection 6 and bear against this face to secure the member 4 to the case band. Any ordinary watch movement 8 may be placed in the interior of the member 4. The movement may be centered in the member 4 by the usual known means such as a pin carried by one of the parts and engaging in a hole provided on the other part, such means having not been shown. The movement 8 is secured to the member 4 by means of screws 9.

Above the movement 8 is disposed the dial 10. This dial is not fixed to the movement but extends across the open top of the member 4 and is fixed to the face of this member and may be provided to this effect with the usual, not represented dial feet engaging into the member 4. The bottom of the member is covered by a plate 14. A shaft 11 is rotatably mounted between this plate and a wall 4a of the member 4. The shaft 11 is provided with a square portion 11a on which is mounted the arm 12a of the winding pendulum 12. This oscillatable weight 12 extends over two steps 5a and 5b of the member 4 and extends in plan view over an arc of substantially 180°, the inner periphery of the pendulum 12 closely conforming to the external periphery of the member 4. The step 5 of the member 4 is utilized for securing the member 4 to the case band.

The bottom of the member 4 is pierced with an opening 4b in which is disposed a part of the train connecting the pendulum 12 to the spring barrel. As shown in Figs. 2 and 3, this train comprises a wheel 23 loose on the shaft 11 and provided with two sets of teeth, one being an ordinary set of teeth 30 on the periphery of the wheel cooperating with a pawl 31 and meshing with a wheel 24 which is operatively connected, by a number of not represented wheels, to the wheel 25a. The other set of teeth of the wheel 23 is provided at the upper face of this wheel and comprises saw teeth 32. Above these teeth is disposed a ring 33 mounted on a square portion 34 of the shaft 11 and from which are cut three yielding blades 33a the free ends of which are curved down to coact with the teeth 32 in the manner of pawls. The pawls are so arranged relative to the teeth that when one pawl abuts against the face of a tooth, the end of the second pawl is positioned at one third of the height of a tooth, and the third pawl is positioned at two thirds of the height of a tooth.

The purpose of this disposition is that the pendulum needs to oscillate through an angle only corresponding to one third of the distance between two succeeding teeth 32 in order to impart a rotation to the shaft 11.

When the pendulum oscillates, it drives in one direction of rotation, the wheel 23 by the intermediary of the teeth 32 and the pawls 33a, while in the other direction of rotation the wheel 23 is held immobile by the pawl 31 and the pawls 33a slide over the teeth 32. The wheel 23 is operatively connected to the spring barrel by the intermediary of the winding train, and when the wheel turns, the main spring is wound up. Owing to the above mentioned disposition of pawls 33a and teeth 32 a small oscillation of the pendulum is sufficient to impart a winding movement to the spring barrel. Any desired number of pawls 33a can obviously be provided.

The wheel 25*a* is connected to a pinion 25*b* meshing with a wheel 25 loosely mounted on a journal 26 of the spring barrel shaft 27 (Fig. 4) mounted between the movement plate and a bridge 28. Below the bridge 28, the barrel shaft 27 is provided with two square portions 41 and 44 situated on either side of the journal 26. The wheel 25 is maintained on its place by means of a plate 40 engaged on the square portion 41 of the shaft and by a screw 42 screwed into the shaft and of which the head bears on the plate. As the plate turns with the barrel shaft, there is no danger that the screw might become loose, as it could happen if the screw head would bear against the wheel 25. A resilient washer 43 is provided with a central aperture by means of which it is engaged on the square portion 44 of the shaft. The central portion of the washer bears against a shoulder on the shaft 27 and the edge of the washer presses a friction disc 45 also engaged on the square 44, against the toothed wheel 25.

A nonrepresented pawl may be provided to prevent rotation of the shaft 27 in one direction and to permit only its rotation for winding. Owing to the friction disc 45 the friction surface is increased and the pressure of the washer is evenly distributed over the surface of the wheel 25. The wheel 25 drives the shaft 27 in one direction by the intermediary of the washer and friction disc as long as the friction between the disc and the wheel is stronger than the tension of the barrel spring. When the tension of the spring has reached a predetermined value, the shaft, washer and friction disc stop to turn while the wheel 25 keeps on turning relative to the friction disc.

In the modification shown in Fig. 5 the member 4 is not directly fixed to the case band of the watch case but is secured to a dust proof band 22. This band is provided with an external screw thread to which may be screwed a bezel and a combined back and case band which can be circular or of any other shape as is used for wrist watches. This dust proof band could also be integral with the member 4. In order to center the watch movement in the member 4 there can be used a device represented in Fig. 6. This device comprises a steel washer 15 placed within an opening 16 of the plate 14. An eccentric member 17 is disposed in a recess in the bottom of the member 4, the face 18 of the disc 17 projecting slightly beyond the bottom face of the member 4. The disc 17 carries a finger 19 penetrating into an opening 20 provided in the movement 8. Normally the steel washer 15 is pressed against the disc 17 by means of two screws 21 screwing into the member 4. When these screws are loosened, the disc 17 can be turned so that the finger 19 moves the movement 8 into the exact position relative to the member 4.

I claim:—

1. A self-winding timepiece comprising a case having a bezel, a case band and a back, a cup-shaped member within the case, said member having a bottom, an open top and a stepped cylindrical wall, a movement mounted within said cup-shaped member, a dial extending across the open top and secured to the first step of the cylindrical wall of said member, said first step carrying means for securing said member to the case band, a winding pendulum including an arm mounted on the bottom of said member and a weight oscillatable between the cylindrical stepped wall of the cup-shaped member and the case and having its face adjacent the cup-shaped member closely conforming to the stepped wall of said member.

2. A self-winding timepiece comprising a case having a bezel and a back, a cup-shaped member within the case and secured thereto, said member having a bottom, an open top and a cylindrical wall shaped to provide a free space between the member and the back of the case, a movement carried within said cup-shaped member, a dial extending across the open top and fixed to said member, a winding pendulum mounted on the bottom of said cup-shaped member for oscillation within said space between the member and the back of the case, a shaft mounted on the bottom of said member and actuated by said pendulum, a winding shaft, a wheel loosely mounted on the winding shaft, a train of wheels connecting said wheel to said shaft actuated by the pendulum, and a spring washer inserted between the winding shaft and the wheel loose on the winding shaft, said washer turning with the winding shaft and having its periphery exerting pressure on said loose wheel.

3. A self-winding timepiece comprising a case having a bezel and a back, a cup-shaped movement supporting member within the case, said member having a bottom wall and an open top, a dial extending across the open top of said member, and a winding pendulum mounted on the bottom wall of said member for oscillatory movement on the outside of said cup-shaped member between the bottom wall thereof and the back of the case.

4. A self-winding timepiece comprising a case having a bezel and a back, a cup-shaped movement supporting member within the case, said member having a bottom wall, an open top and a stepped cylindrical wall, a dial extending across the open top of said member and secured to the member, an arm mounted on the bottom wall of said member for oscillatory movement on the outside of said cup-shaped member between the bottom wall thereof and the back of the case, and a winding weight carried by one end of said arm and situated between the stepped cylindrical wall of the cup-shaped member and the case, said weight having its face adjacent the stepped wall of said member closely conforming to the shape of the stepped wall.

5. A self-winding timepiece comprising a case having a bezel and a back, a cup-shaped movement supporting member within the case, said member having a bottom wall and an open top, a dial extending across the open top and secured to the member, a winding pendulum mounted on the bottom wall of said member for oscillatory movement on the outside of the member between the bottom wall thereof and the back of the case, a shaft actuated by the winding pendulum, a wheel loosely mounted on said shaft and provided with two sets of teeth, a winding train operatively connected with one set of teeth of said wheel, and a spring washer mounted for movement with said shaft, said washer being cut out to form a plurality of yieldable pawls coacting with the other set of teeth of said wheel to drive the wheel in one direction of rotation only upon oscillation of the pendulum.

HERMANN AEGLER.