

No. 645,657.

Patented Mar. 20, 1900.

E. AVILA.  
WATCH REGULATOR.  
(Application filed Oct. 9, 1899.)

(No Model.)

Fig. 1.

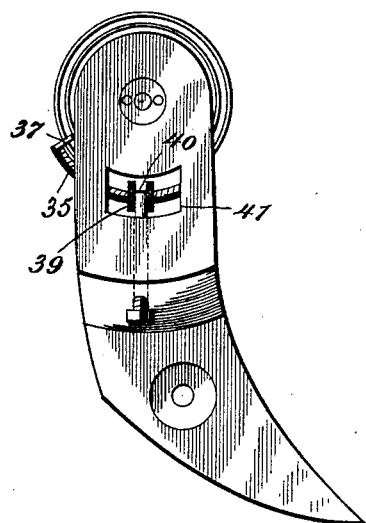


Fig. 2.

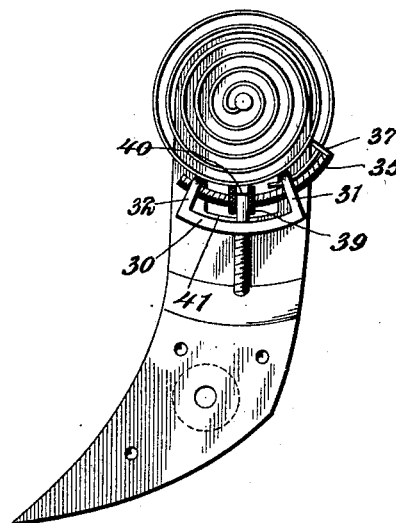
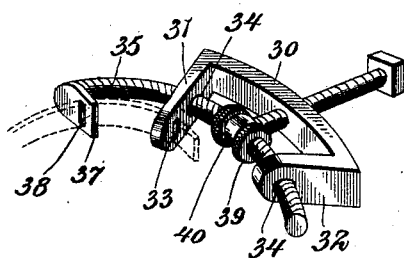


Fig. 3.



Witnesses

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# UNITED STATES PATENT OFFICE.

ENRIQUE AVILA, OF TOLUCA, MEXICO.

## WATCH-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 645,657, dated March 20, 1900.

Application filed October 9, 1899. Serial No. 733,037. (No model.)

*To all whom it may concern:*

Be it known that I, ENRIQUE AVILA, a citizen of the Republic of Mexico, residing at Toluca, in the State of Mexico and Republic  
5 of Mexico, have invented a new and useful Watch-Movement, (patented in Mexico April 11, 1899, No. 1,467,) of which the following is a specification.

My invention relates to improvements in  
10 watch-movements; and it has for its object to provide a simple construction of regulator by which the hair-spring is prevented from catching in other parts of the movement and becoming disarranged, so that its tension will  
15 affect the timekeeping qualities of the watch, such regulator being capable of a minute adjustment for slightly varying the tension of the hair-spring, and thereby accurately regulate the speed of the movement:

20 With these ends in view the invention consists in the novel combination of devices and in the construction and arrangement of parts, which will be hereinafter described and claimed.

25 In the drawings, Figure 1 is an enlarged view of the balance-bridge looking at the same in top plan with the improved regulator supported thereon. Fig. 2 is an under or bottom plan view of the balance-bridge and  
30 the hair-spring, representing the regulator applied in operative relation thereto. Fig. 3 is a detail perspective view of the regulator detached from the balance-bridge, the dotted line representing a fragment of the hair-  
35 spring.

The same numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

My invention contemplates a novel construction of the regulator by which I am able  
40 to dispense with the usual lever or finger that is employed to vary the tension of the hair-spring, said lever of ordinary construction having regulator-pins which are engaged with  
45 the outer coil of the hair-spring near the free end thereof. It is well known by those skilled in the art that the hair-spring is displaced sometimes from engagement with the regulator-pins by jarring the watch, and this end of  
50 the hair-spring is liable to be caught in a coil of the spring itself or in another part of the watch-movement. Hence the operative length

of the spring is varied and the timekeeping qualities of the watch are affected. According to my invention the regulator is constructed to confine or hold the free end of the  
55 hair-spring, and this regulator has a shiftable member which is adjustable concentric with the axis of the balance-staff and is engaged with the outer coil of the hair-spring at a point  
60 to one side of its engagement by its fixed regulator member, whereby adjustment of the shiftable regulator member along the length of the hair-spring formed by the outer coil  
65 varies the operative length of the hair-spring itself, so that the tension of the spring may be regulated to a nicety. The fixed element of the regulator is a curved plate 30, having the arms 31 32 at its ends, and this plate is  
70 secured to the balance-bridge on the under side thereof and in the horizontal plane of the hair-spring, said plate lying concentric with the axis of the balance-staff. The arms  
75 31 32 are extended from the curved plate to lie in positions radial to the balance-staff, and in one arm of said plate which constitutes the fixed regulator member is a slot or  
opening 33, adapted to receive and confine the free end of the hair-spring. The two arms  
80 of the plate are furthermore provided with circular openings 34, in which is loosely or slidably fitted the curved screw 35, which constitutes the movable member of the regulator. This screw is curved in an arc of a  
85 circle, and it is supported by the regulator-plate member 30 in a position concentric with the axis of the balance-staff. The screw is provided with fine male threads to make it resemble a micrometer-screw, and it is slidably supported in the guide-openings 34 of  
90 the plate, so as to be movable endwise or longitudinally therein in a path concentric with the axis of the hair-spring. The curved screw is provided at one end with an off-  
95 standing arm 37, which arm has a transverse opening or slot 38, which loosely receives the outer coil of the hair-spring in order that the movable member of the regulator may engage  
100 adjustably with said outer length of the hair-spring at a point at one side of the point where the hair-spring is engaged with the fixed regulator member. This micrometer-threaded endwise-movable curved screw is engaged by a non-traveling nut 39, which is

arranged between the arms 31 32 of the fixed regulator-plate 30, and said nut is provided with an annular groove 40, into which extends one end of a stop-screw 41. Said screw 5 is mounted in the regulator-plate 30 and is extended through the bridge for its head to be readily accessible, whereby the screw is loosely engaged with the nut for the purpose of swiveling and holding the same against 10 traveling movement with the screw 35 and at the same time permitting the nut to be turned, so as to adjust the screw endwise. It is evident that the endwise-movable screw may be shifted a minute distance for its arm 38 to 15 slide on the outer coil of the hair-spring a slight distance in order to vary the tension of the hair-spring, and this endwise-adjustment of the screw is easily and quickly effected by rotating the nut 39, which is held 20 by its screw against traveling with the regulator-screw. The balance-bridge is provided with a slot 41 over the non-traveling nut of the shiftable regulator-screw, said slot permitting the watchmaker to have ready access 25 to the nut for the purpose of shifting the curved screw 35 to regulate the watch-movement.

From the foregoing description it will be seen that the outer end of the hair-spring is 30 confined by a fixed member of the regulator normally in its working position, so that it cannot be jarred out of place by a shock on the watch-movement, and as the shiftable regulator-screw is movable endwise around 35 the hair-spring the outer coil thereof may be varied in length more or less in order to vary the tension of the spring and regulate the running of the watch.

Changes may be made in the form and portion of some of the parts while their essential features are retained and the spirit of 40 the invention embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

Having thus described the invention, what I claim is—

1. In a watch-movement, the combination 50 with a hair-spring, of a fixed regulator member provided with an arm having a guide-opening and having the free end of the hair-

spring fixed to it, and a shiftable regulator member passing through the said guide-opening and slidably connected with the outer coil of the hair-spring, substantially as and 5 for the purpose described.

2. In a watch-movement, the combination with a hair-spring, of a fixed regulator member provided with arms having guide-openings, one of the arms having the outer end 6 of the hair-spring fixed to it, a curved shiftable member mounted in the said guide-openings and extending beyond the fixed regulator member and slidably connected with the outer coil of the hair-spring, and means for 6 moving the shiftable member lengthwise in a plane concentric with the hair-spring, substantially as described.

3. In a watch-movement, the combination with a hair-spring, of a fixed regulator member provided with arms having guide-openings, one of the arms having the outer end 7 of the hair-spring fixed to it, the curved screw constituting the shiftable member of the regulator and mounted in the said guide-openings 7 and slidably connected with the outer coil of the hair-spring, a nut located between the arms and engaging the screw and adapted to move the same lengthwise, and a clamping device swiveling the screw and securing 8 the same in its adjustment, substantially as described.

4. In a watch-movement, the combination with a slotted bridge, and a hair-spring, of a fixed regulator member mounted on the 8 bridge and provided with arms having guide-openings, the outer end of the hair-spring being secured to one of said arms, a curved screw mounted in the said guide-openings 9 and slidably connected with the outer coil of the hair-spring, the grooved nut engaging the curved screw, and the clamping-screw projecting into the groove of the nut and swiveling the latter and securing the same in its adjusted position, substantially as described. 9

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ENRIQUE AVILA.

Witnesses:

C. H. ELEY ASSAMONTS,  
MANUEL ZARATE.