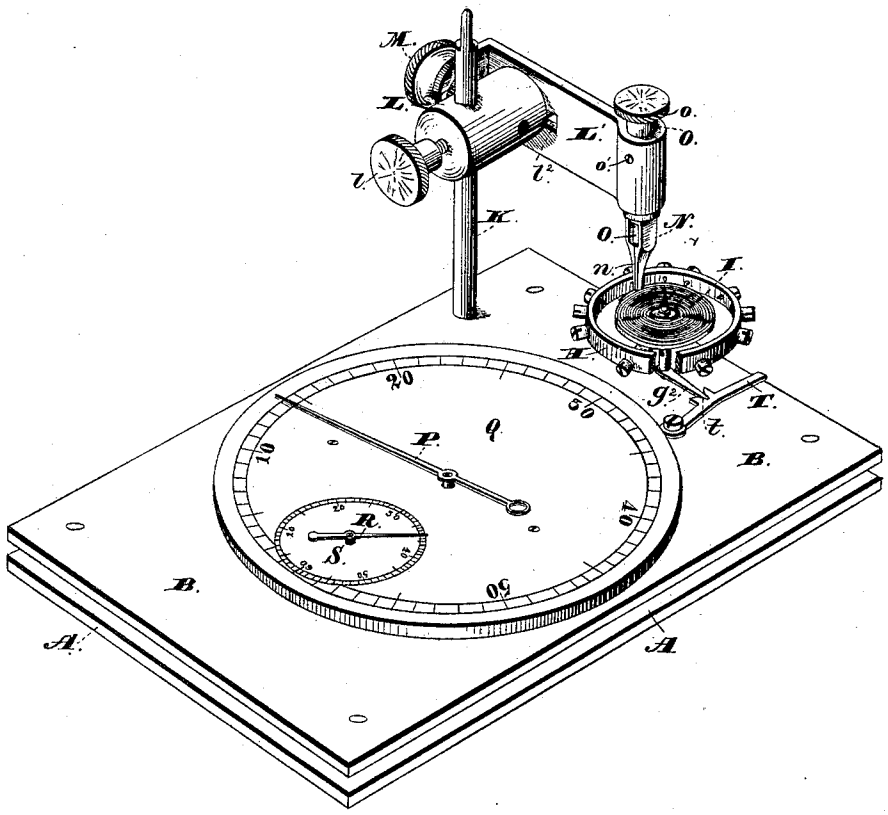
(No Model.) 2 Sheets—Sheet 1.

H. J. EISEN.

MECHANISM FOR TIMING BALANCES.

No. 339,051. Patented Mar. 30, 1886.

Fig. 1.



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Inventor:
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H. J. EISEN.

MECHANISM FOR TIMING BALANCES.

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Fig. 2.

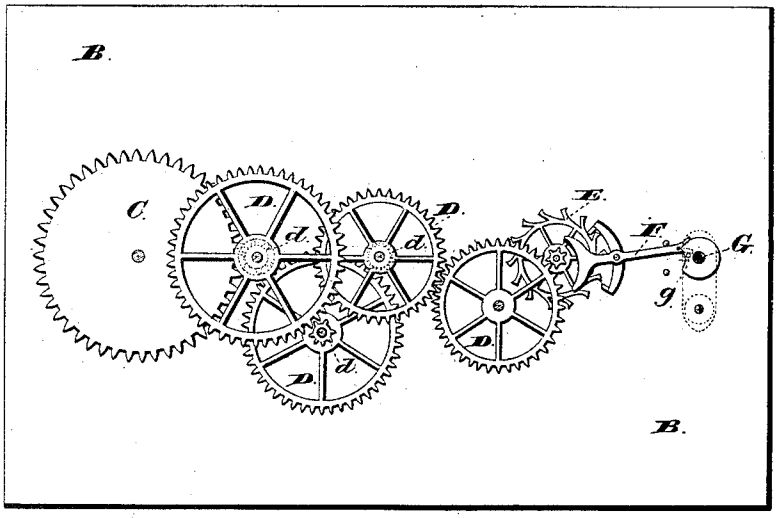


Fig. 4.



Fig. 3.

Fig. 5.

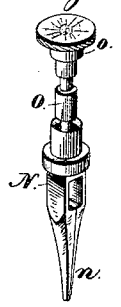
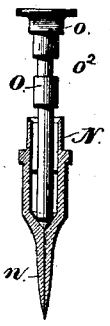


Fig. 6.



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UNITED STATES PATENT OFFICE.

HERMANN JOSEPH EISEN, OF WATERBURY, CONNECTICUT, ASSIGNOR TO THE WATERBURY WATCH COMPANY, OF SAME PLACE.

MECHANISM FOR TIMING BALANCES.

SPECIFICATION forming part of Letters Patent No. 339,051, dated March 30, 1886.

Application filed December 18, 1883. Serial No. 115,118. (No model.)

To all whom it may concern:

Be it known that I, HERMANN JOSEPH EISEN, of Waterbury, in the county of New Haven, and in the State of Connecticut, have invented certain new and useful Improvements in Mechanism for Timing Balances; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of my device as arranged for use. Fig. 2 is a plan view of the operating mechanism, the covering-plate being removed. Fig. 3 is an elevation of the front end of said device. Fig. 4 is an enlarged perspective view of the upper end of the arbor for engaging the balance-wheel arbor. Fig. 5 is a like view of the holder for the hair-spring, separated from the other mechanism; and Fig. 6 is a central longitudinal section of the same.

Letters of like name and kind refer to like parts in each of the figures.

The design of my invention is to enable the length of a hair-spring to be approximately determined previous to the insertion of the balance-wheel within the watch; and to this end said invention consists, principally, in an apparatus for determining the proper length of hair-springs for watches, composed of a spring-driven time-train having a balance-wheel arbor which is adapted to receive and engage axially with one end of the arbor of an ordinary balance-wheel, in combination with means for confining the outer coil of the hair-spring in a fixed position, substantially as and for the purpose hereinafter specified.

It consists, further, in an apparatus for determining the proper length of hair-springs for watches, in which the arbor that corresponds to the usual balance-wheel arbor is adapted at one end to receive and engage with the lower end of a balance-wheel arbor, and is provided with a radial arm that may be engaged by a stop, whereby said engaging arbor is locked in a central position with relation to its vibrations, substantially as and for the purpose hereinafter shown.

It consists, further, in the means employed for engaging the outer end of the hair-spring which is being adjusted to length, substantially as and for the purpose hereinafter set forth.

It consists, further, in the means employed for adjusting the hair-spring clamp to position, substantially as hereinafter shown and described.

It consists, finally, in the apparatus as a whole, its several parts being combined in the manner and for the purpose substantially as hereinafter specified.

In the annexed drawings, A represents the bottom plate, and B the top plate, of my apparatus, which plates are arranged in parallel lines, and are held in relative position with their inner faces separated about one-fourth of an inch by pillars in the usual manner.

Between the plates A and B is an ordinary time-train, which consists of a spring-barrel, C, intermediate wheels and pinions, D and *d*, respectively, an escape-wheel, E, a pallet-lever, F, and an arbor, G, that is provided with the usual roller-pin, *g*, and corresponds to the ordinary balance-wheel arbor, but is without such wheel. The upper end of the arbor G, which extends above the plate B, is provided with an axial opening, *g'*, that extends downward about one-eighth of an inch, and for such distance is split longitudinally, so as to permit the sections of such portion to be sprung apart by the insertion of the lower end of the arbor *h* of a balance-wheel, H, within said opening, and by their inward spring to hold said arbor *h* firmly in an upright position. As thus arranged, the arbor G forms an extension of the arbor *h*, so that the latter, with its wheel H, forms, practically, a portion of the time-train, and if provided with a hair-spring, I, and means for confining the outer end of said spring in place, completes said train and forms of the same an operative mechanism. The outer end of said hair-spring is held by the following means, viz:

Secured within and extending upward from the plate B, at one side of the arbor G, is a round stud, K, upon which is journaled a head, L, that may be raised or lowered or turned thereon, and when adjusted to place may be

secured in position by means of a set-screw, *l*. Upon the end of said head opposite to said set-screw is a bar, L′, which is secured in place by means of a screw, *l′*, that passes through a horizontal longitudinal slot, l^2, and enables said bar to be moved longitudinally within certain limits. Such longitudinal adjustment is effected by means of a screw, M, which is journaled within the rearwardly-bent end of said bar, and has its inner portion contained within a threaded opening in the contiguous portion of said head L, so that by turning said screw in one direction said bar will be moved outward, while a rotation of said screw in the opposite direction will cause an inward movement of said bar.

At the inner end of the bar L′ is provided a cylindrical boss, l^3, which within its lower end contains a part, N, that at its upper end is cylindrical and hollow, and below the same forms tweezers *n*, which are adapted to grasp and by inward spring hold the outer end of a balance-spring, I. Said tweezers are opened for the purpose of inserting a spring by means of a pin, O, which passes downward through said boss and through the hollow upper portion of said tweezers and has its lower pointed end in position to be forced between the jaws of said part whenever moved slightly downward. The upper end of said pin is provided with a head, *o*, and its longitudinal motion is limited by means of a screw, *o′*, which passes inward through the wall of said boss and has its inner end contained within a circumferential groove, o^2, that is provided in said pin.

As thus constructed, the apparatus is used as follows, viz: A balance-wheel, H, is placed in position with its arbor *h* resting in and held by the arbor G, as before described, after which the head L is turned and the bar L′ adjusted until the holder N is directly over the outer coil of the hair-spring I. The balance-wheel is now turned until the outer end of its said hair-spring is beneath said holder, which latter is then opened by a downward pressure upon the pin O, and said spring end placed between its jaws, which are then permitted to close together and clasp the former. If now the balance-wheel is caused to vibrate, its movements will be the same as when in position in a watch, and by noting the number of its vibrations within any predetermined time the variations, if any exist, can be corrected by changing the position of the hair-spring within the clamp or holder N, after which the surplus spring may be removed and the balance placed in the watch for which it is intended.

In order that the movements of the balance-wheel may be recorded and its rate readily compared with correct time, a hand, P, is attached to one of the arbors of the train and caused to travel over a suitable graduated dial, Q, by which means the movement of the time-train is shown by seconds, while another hand, R, is attached to another slower-moving arbor and caused to record minutes upon a suitably-spaced dial, S. As thus arranged, if the operator notes the positions of said hands when a balance commences to vibrate, and again after the expiration of a predetermined period, a comparison of their movements with the movements of the hands of a correct time-piece will at once show the rate of said balance.

In removing a balance or in placing another in position the arbor G is liable to be turned so as to cause it to be out of beat. To prevent such occurrence, a radial arm, g^2, is secured to said arbor just above the plate B in such position as to cause it to vibrate to equal distances each way from a point opposite to the holder N, and at such point is pivoted a bar, T, which may be moved inward until a notch, *t*, within its edge engages with the outer end of said arm and locks the same in place.

If the locking-bar T is caused to engage with the arm g^2 before removing a balance-wheel, and is only released after another balance-wheel is in position, the balance-arbor will always be in beat and the train ready to operate.

Having thus fully set forth the nature and merits of my invention, what I claim is—

1. An apparatus for determining the proper length of hair-springs for watches, composed of a spring-driven time-train having a balance-wheel arbor which is adapted to receive and engage axially with one end of the arbor of an ordinary balance-wheel, in combination with means for confining the outer coil of the hair-spring in a fixed position, substantially as and for the purpose specified.

2. An apparatus for determining the proper length of hair-springs for watches, in which the arbor, that corresponds to the usual balance-wheel arbor, is adapted at one end to receive and engage with the lower end of a balance-wheel arbor, and is provided with a radial arm that may be engaged by a stop, whereby said engaging arbor is locked in a central position with relation to its vibrations, substantially as and for the purpose shown.

3. As a means for fastening the outer end of a hair-spring, the holder N, having the spring-jaws *n*, in combination with the push-pin O, which is adapted to pass between and separate said jaws, substantially as set forth.

4. As a means for supporting and adjusting the spring-holder N, the head L, adapted to fit over and be secured upon the stud K, the bar L′, secured upon said head and made longitudinally adjustable by means of the screw M, and provided with the boss l^3, for the reception of said holder, said parts being combined in the manner substantially as shown and described.

5. The hereinbefore-described apparatus, in which are combined a time-train provided with indicating-hands, a permanent balance-

wheel arbor adapted to receive and contain the lower end of the arbor of the balance-wheel to be tested, means, substantially as shown, for confining the outer end of the hair-spring, and means for locking said permanent arbor in a central position, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 8th day of December, A. D. 1883.

HERMANN JOSEPH EISEN.

Witnesses:

GEO. E. TERRY,

EDW. T. MERRIMAN.