Oct. 5, 1937. J. R. PUTNAM 2,094,960

BALANCE WHEEL MOUNTING FOR TIMEPIECES

Filed July 14, 1936

Fig. 1.

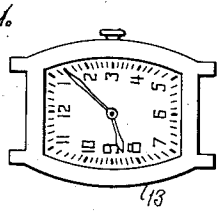


Fig. 2.

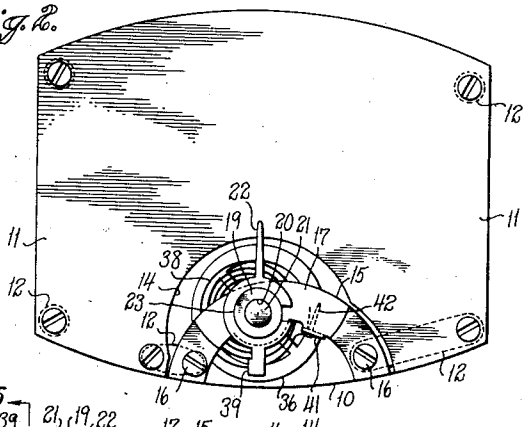


Fig. 3.

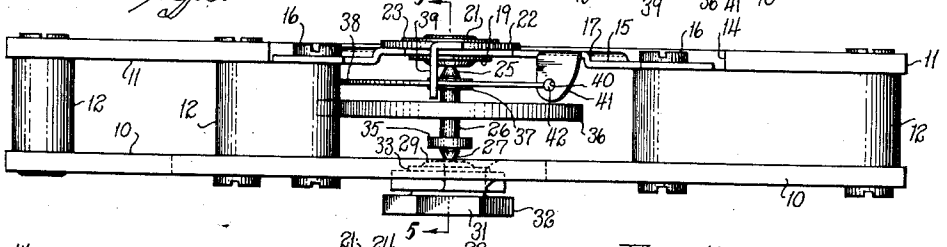


Fig. 4.

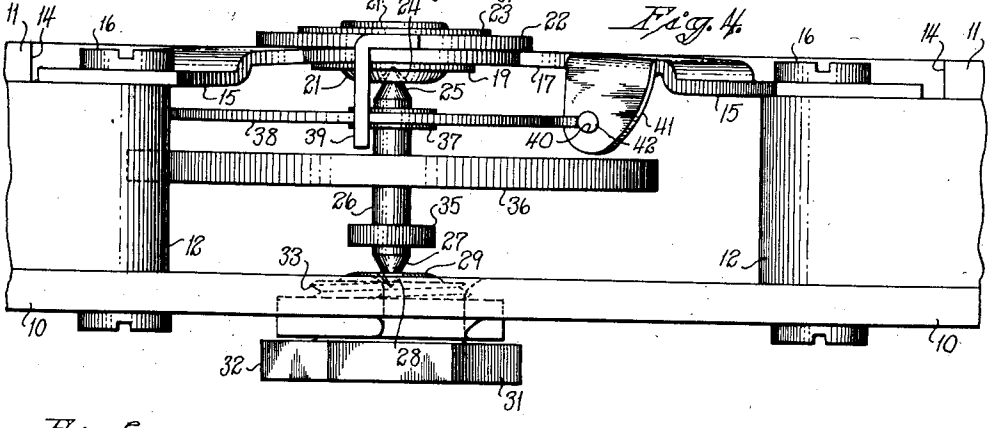


Fig. 5.

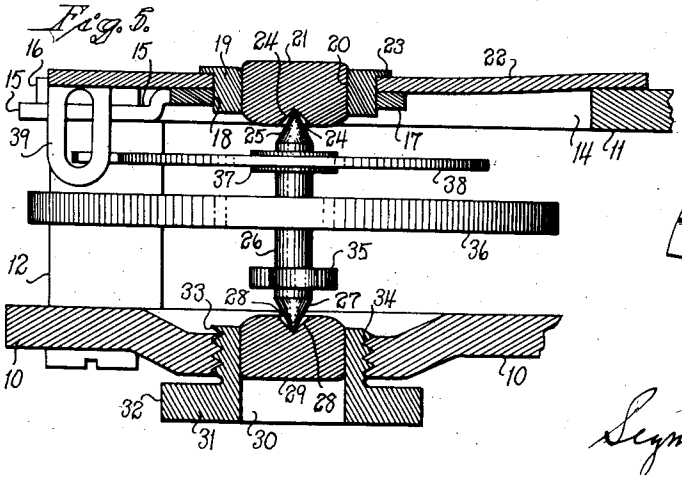
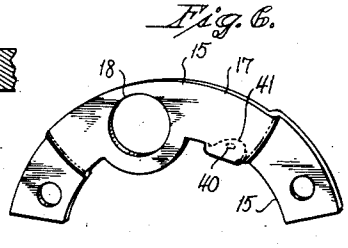


Fig. 6.



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Patented Oct. 5, 1937

2,094,960

UNITED STATES PATENT OFFICE

2,094,960

BALANCE-WHEEL MOUNTING FOR TIMEPIECES

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Application July 14, 1936, Serial No. 90,468

4 Claims. (Cl. 58—104)

This invention relates to an improvement in mounting-means for use in time pieces such as watches and the like, and relates in particular to means for mounting the balance-wheel units of such time pieces.

One of the objects of the present invention is to provide a superior mounting for the balance-wheels of timepieces of such character as will safeguard the delicate trunnions of the balance-staff against injury.

Another object is to provide superior means for mounting the balance-wheel unit of a timepiece whereby the adjustment of the bearings for the balance-staff may be readily and conveniently effected with minimum danger of jamming the balance-staff.

With the above and other objects in view, as will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawing and appended claims, the present invention includes all features disclosed therein which are novel over the prior art.

In the accompanying drawing:

Fig. 1 is a front-face view of a watch in which the present invention is embodied;

Fig. 2 is a rear-face view of the movement unit with the time train and certain escapement features omitted;

Fig. 3 is an edge view thereof on a larger scale;

Fig. 4 is a view similar to Fig. 3 with portions of the movement unit broken away and the bridge-member shown as markedly flexed;

Fig. 5 is a broken transverse sectional view taken on the line 5—5 of Fig. 3; and

Fig. 6 is a perspective view of the balance-wheel-sustaining bridge-member.

The particular watch structure herein chosen for the illustration of the present invention includes a front movement-plate 10 and a complementary rear movement plate 11 extending parallel to each other and held in spaced relationship by means of a plurality of pillars 12 in the usual manner of timepiece construction. The movement unit may be enclosed in a suitable case 13 as indicated in Fig. 1.

The rear movement-plate 11 has one of its edges deeply notched to provide a gap 14 through which a balance-wheel unit may be installed. Extending across the gap 14, just referred to, is an arcuate balance-wheel-sustaining bridge-member 15, preferably formed of relatively thin spring brass so as to have yielding characteristics for the purpose as will hereinafter appear. The respective opposite ends of the bridge-member 15 are secured in place to two of the pillars 12 by means of screws 16.

Intermediate its respective opposite ends the bridge-member 15 is formed with an outwardly offset portion 17 having a bushing receiving opening 18 therein for the reception (with a drive-fit) of a bushing 19 preferably formed of brass or other suitable material of relative softness. Mounted in the central opening 20 of the said bushing 19 (also with a drive-fit) is a thrust-bearing 21 formed of hardened steel or other suitable bearing material.

As before noted, the bushing 19 has a drive-fit in the opening 18 in the bridge-member 15 so as to hold the thrust-bearing 21 in place, and, in addition, the said bushing serves as a pivot for a regulator 22 which is free to turn on the said bushing and which is held in place against outward displacement by an annular-flange 23 with which the said bushing is formed.

In its inner face the thrust-bearing 21, above referred to, is provided with a conical bearing-recess 24 into which fits the rear conical bearing-terminal or trunnion 25 of a balance-staff 26. The balance-staff 26 is preferably formed, in accordance with the usual practice, of a glass-hard steel (although other materials may be used if desired) and is provided at its forward end with a conical bearing-terminal or trunnion 27 fitting within a conical bearing-recess 28 formed in the inner face of a thrust-bearing 29 substantially corresponding to the thrust-bearing 21 before referred to. The thrust-bearing 29 is mounted (with a drive-fit) in an axial-passage 30 formed in a bushing 31 which latter includes a polygonal flange like portion 32 and an externally-threaded tubular-shank 33. The tubular-shank 33 of the bushing 31 is tightly threaded into a threaded-aperture 34 formed in the front movement-plate 10 as clearly illustrated in Fig. 5.

The balance-staff 26 which, as before described, is supported at its respective opposite ends for oscillating movement in the thrust-bearings 21 and 29 has rigidly mounted upon it an impulse-collar 35, a balance-wheel 36 and a hair-spring collar 37. The collar 37, just referred to, mounts a usual spiral hair-spring 38 having its outer reach extended through a loop-shaped hair-spring guide 39 carried by the regulator 22. The outer end of the hair-spring 38 is passed through an aperture 40 in a finger 41 bent downwardly from the bridge-member 15, and is locked in the said aperture by means of an anchor-pin 42.

After the parts have been initially assembled, it is necessary to properly adjust the spacing be-

tween the complementary thrust-bearings 21 and 29 in order that the balance-staff 26 may be properly seated in the bearing-recesses 24 and 28. In effecting this adjustment, the balance-wheel unit, including the balance-staff 26 and the balance-wheel 35, may be oscillated, and the bushing 31 may then be threaded into the front movement-plate 10 until the axial forces applied to the balance-wheel are sufficient to check its oscillation. The bushing 31 may now be backed off a predetermined part of a revolution to sufficiently free the balance-staff 26 to permit it to oscillate in a normal manner.

It is mainly during the adjusting operation above referred to that the balance-wheel-sustaining bridge-member 15 performs its function of guarding the delicate and brittle trunnions 25 and 27 of the balance-staff from injury.

When the thrust-bearing 29 is forced inwardly by turning the bushing 31 as above described the instant that the axial pressure thus applied to the balance-staff 26 exceeds a predetermined point, the bridge-member 15 opposite the bushing 31 will yield as shown in Fig. 4, before damage can be done to the trunnions 25 and 27 of the balance-staff 26. Even relatively inexperienced adjusters will immediately sense the point at which the bushing 31 has been threaded into the movement-plate 10 to a degree sufficient to flex the bridge-member 15. Thus, the adjuster despite haste incident to piecework will be prevented from injuring the trunnions 25 and 27 of the balance-staff owing to the resiliency of the bridge-member 15.

Furthermore, in the event that the watch should be dropped either edgewise or back-face down, the resilient bridge-member 15 will serve, under all but the most violent conditions, to prevent the breakage of the trunnions of the balance-staff.

From the foregoing, it will be seen that by means of the present invention not only is injury to the balance-staff guarded against but adjustments may be made with much greater rapidity and facility than with prior constructions since the adjuster need not be fearful that the bearings will be subjected to injury at the instant that the balance-staff is pinched between the complementary thrust-bearings 21 and 29.

Furthermore, by means of the present invention the number of timepieces rejected, owing to faulty performance of the balance-wheel units, is so greatly reduced as to be almost negligible.

The invention may be carried out in other specific ways than that herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiment is therefore to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A balance-wheel mounting for timepieces, including in combination: a movement structure having a pair of spaced-apart movement-plates; a balance-wheel located in a plane intermediate said movement-plates; a balance-staff for the said balance-wheel; a balance-staff-sustaining bridge-member secured to the said movement structure and located adjacent one of the said movement-plates and having a degree of resiliency materially greater than the same so as to be yieldable with respect thereto; and a thrust-bearing for each of the respective opposite ends of the said balance-staff; one of the said thrust-bearings being carried by the said balance-staff-sustaining bridge-member and yieldable therewith, the other thrust-bearing being carried by the movement structure, and one of the said thrust-bearings being adjustable in a direction axially of the said balance-staff to flex the said bridge-member.

2. A balance-wheel mounting for timepieces, including in combination: a movement structure having a pair of spaced-apart movement-plates; a balance-wheel located in a plane intermediate said movement-plates; a balance-staff for the said balance-wheel; a balance-staff-sustaining bridge-member of arcuate form secured to the said movement structure and located adjacent one of the said movement-plates and having a degree of resiliency materially greater than the same so as to be yieldable with respect thereto; and a thrust-bearing for each of the respective opposite ends of the said balance-staff; one of the said thrust-bearings being carried by the said balance-staff-sustaining bridge-member and yieldable therewith, the other thrust-bearing being carried by the movement structure, and one of the said thrust-bearings being adjustable in a direction axially of the said balance-staff to flex the said bridge-member.

3. A balance-wheel mounting for timepieces, including in combination: a movement structure having a pair of spaced-apart movement-plates; a balance-wheel located in a plane intermediate said movement-plates; a balance-staff for the said balance-wheel; a balance-staff-sustaining bridge-member secured to the said movement structure and located adjacent one of the said movement-plates and having a thickness greatly less than the thickness of the adjacent movement-plate so as to have a degree of resiliency materially greater than the same so as to be yieldable with respect thereto; and a thrust-bearing for each of the respective opposite ends of the said balance-staff; one of the said thrust-bearings being carried by the said balance-staff-sustaining bridge-member and yieldable therewith, the other thrust-bearing being carried by the movement structure, and one of the said thrust-bearings being adjustable in a direction axially of the said balance-staff to flex the said bridge-member.

4. A balance-wheel mounting for timepieces, including in combination: a movement structure having a pair of spaced-apart movement-plates; a balance-wheel located in a plane intermediate said movement-plates; a balance-staff for the said balance-wheel; a balance-staff-sustaining bridge-member of arcuate form secured to the said movement structure and located adjacent one of the said movement-plates and having a thickness greatly less than the thickness of the adjacent movement-plate so as to have a degree of resiliency materially greater than the same so as to be yieldable with respect thereto; and a thrust-bearing for each of the respective opposite ends of the said balance-staff; one of the said thrust-bearings being carried by the said balance-staff-sustaining bridge-member and yieldable therewith, the other thrust-bearing being carried by the movement structure, and one of the said thrust-bearings being adjustable in a direction axially of the said balance-staff to flex the said bridge-member.

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