

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,126,000



Date of Application and filing Complete Specification:

21 Aug., 1967.

No. 38507/67.

Application made in United States of America (No. 580,975) on
21 Sept., 1966.

Complete Specification Published: 5 Sept., 1968.

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Index at Acceptance:—G3 T(A7B, A7D).

Int. Cl.:— G 04 b 31/00.

COMPLETE SPECIFICATION.

Balance Bridge for Horological Instruments.

We, THE UNITED STATES TIME CORPORATION, a Corporation organized under the laws of the State of Connecticut, United States of America, of Waterbury, Connecticut, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a horological instrument and more particularly to an adjustable balance bridge in a watch.

The timekeeping ability of a watch or other horological instrument is dependent upon an oscillatory regulating member. In a watch, the regulating member is usually a balance wheel. The balance wheel is caused to oscillate by a mainspring or from power derived from an electric battery. The balance wheel is fixed to a staff which pivots in the frame plates of the watch or in bridges connected to the frame plates. The balance wheel staff usually rotates in jewelled bearings which provide a bearing surface for rotation and also restrict axial motion of the staff.

It is important that these bearings be axially adjusted. If the balance wheel staff has too much axial play, i.e., the staff is free to move too far axially, it may cause escapement failures and position errors in the watch rate and may even injure a bearing or the staff if the watch is subjected to shocks. If the staff is held too tightly, it may not be able to swing with a sufficiently large oscillation for good timekeeping and may waste power.

For these reasons, it has been a practice in watchmaking to provide that one of the members carrying a balance staff jewel be axially adjustable. This member is often

called the balance staff bridge and its end adjustment is often referred to as an end-shake adjustment.

Some of the inexpensive balance staff bridges provide a simple nut and screw arrangement. These arrangements may cause the watchmaker or watch repairer to injure one of the jewels by turning the screw too far. In addition, the screw may be turned in the course of using the watch by vibrations and shocks, causing the loss of the correct adjustment of the bridge.

It has also been proposed to provide watch balance staff bridges with a "positive" adjustment. In this type of adjustment there is some mechanism to lock the bridge in position after it has been adjusted. However, these mechanisms have been relatively expensive or difficult to manufacture.

It is the objective of the present invention to provide a balance bridge which is adjustable; which is positively locked in position after its adjustment; which is relatively inexpensive; and which is relatively simple for the watchmaker or watch repairer to adjust.

In accordance with the present invention, there is provided a horological instrument having a regulating member mounted on a staff, a frame member carrying a first pivot for the staff, and a bridge carrying a second pivot for said staff; means to axially adjust at least one end of said bridge relative to said frame plate, said adjustment means including an eccentric member having an eccentric head positioned between said bridge and said frame member; said eccentric member being rotatable to axially position said bridge, and a locking screw adjustably connecting said bridge and said frame member.

[Price 4s. 6d.]

The eccentric member provides an adjustable wedging action between the frame plate and the bridge. The watchmaker, to adjust the bridge, turns the eccentric member until the correct axial positioning is obtained, and then turns down the locking screw to lock the bridge in position against the eccentric head.

The invention will be further described with reference to the accompanying drawings, in which:—

Figure 1 is a side view of a first embodiment of the present invention;

Figure 2 is a top plan view of a portion of Figure 1 showing a portion of the bridge and frame plate enlarged;

Figure 3 is a partial side sectional view taken along line 3—3 of Figure 2;

Figure 4 is a top plan view of a second embodiment of the present invention showing a portion of the bridge and frame plate; and

Figure 5 is a partial side sectional view taken along line 5—5 of Figure 4.

The first embodiment of the present invention, shown in Figures 1 to 3, includes a frame plate 1 of a watch or other horological instrument. The frame plate 1 may itself be a tongue or bridge member of the main frame plate of the instrument, although usually it is itself one of the main frame plates of the instrument.

A balance bridge 2 is positioned over the frame plate 1. The bridge 2 including a top jewel bearing assembly 5 comprising a cylindrical bearing jewel 5a for journaling and a cap jewel (end stone) 5b for thrust. It is understood, however, that the bearings for the staff may be of other constructions. A balance wheel 3 is fixed on its staff 4 and is oscillated by a flat spiral return spring 4a. The balance wheel is either impulsed from a mainspring (not shown) or is itself part of an electrical motive system including a battery (not shown). The oscillation of the balance wheel 3 provides timekeeping regulation. The staff 4 is positioned between the top bearing jewel assembly 5 and a similar bottom jewel assembly 9 within the frame plate 1.

A shoulder 10 of the bridge 2 is used as a support member for one end of the bridge. The other end of the bridge is fixed, in conventional manner, with the adjustable end held in a cantilevered fashion. As an alternative, the other end may be free and the adjustable end may hold the bridge in a cantilevered manner. The bridge is free to move axially due to its inherent flexibility and the manner it is held at one end by means of the adjustment mechanism of the present invention. The shoulder 10 rests against the head 11 of an eccentric member 12. The eccentric member 12 has a top shank portion 30 having a slotted

portion 13, so that it may be rotated, and a bottom shank portion 14. The bottom shank portion 14 fits and pivots within a round hole 15 in the frame plate 1. The head 11, as is shown by the dotted lines in Figure 2, is eccentrically fixed to the shank portions 30 and 14. When the eccentric member 12 is rotated, more of its head portion 11 is brought either toward the balance staff or away from the balance staff. When the head 11 is rotated to its extreme position toward the staff (shown by dotted lines of Figure 2) it acts against shoulder 10, in a wedge-like manner, and axially raises the bridge 2 as far as it can be raised.

A tightening screw 16 is positioned within a cavity portion 21 of the balance bridge 2. The screw 16 has a head portion 22, a slot 17 for turning, a shank having an upper portion 18 having a smooth exterior face and a lower portion 19 having exterior screw threads. The screw threads of the lower portion 19 screw into the threads of a hole 20 in the frame plate 1. The screw 16 may, alternatively, have other forms. For example, a Phillips head may be used in place of slot 17. As another example, the shank may be threaded with exterior screw threads for its entire length, i.e., both upper portion 18 and lower portion 19.

After the eccentric member 12 has been turned so that the bridge 2 is axially adjusted, the watchmaker tightens down screw 16 to retain the assembly in positive locked position.

The embodiment shown in Figures 4 and 5 is similar in many respects to the embodiment of Figures 1 to 3, and similar parts are numbered the same.

In the embodiment of Figures 4 and 5 the eccentric member 42 consists of a head portion 41 having a slot 43 for its turning. The head is eccentrically fixed on a shank portion 44 of the eccentric member 42. The shank portion fits and pivots within a hole 45 in the frame plate 1. A bevelled shoulder 46 on the head 41 acts against shoulder 50 of bridge 2 to support and axially space the bridge.

Modifications may be made in the present invention within the scope of the subjoined claims. For example, the eccentric member may be constructed with a top shank portion 30, as in Figures 1 to 3, and without the bottom shank portion 14 which fits in hole 15. As another example, instead of one end of the bridge being fixed and the other adjustable, both ends may be adjustable utilising the adjusting mechanism of the present invention.

WHAT WE CLAIM IS:—

1. A horological instrument having a



The eccentric member provides an adjustable wedging action between the frame plate and the bridge. The watchmaker, to adjust the bridge, turns the eccentric member until the correct axial positioning is obtained, and then turns down the locking screw to lock the bridge in position against the eccentric head.

The invention will be further described with reference to the accompanying drawings, in which:—

Figure 1 is a side view of a first embodiment of the present invention;

Figure 2 is a top plan view of a portion of Figure 1 showing a portion of the bridge and frame plate enlarged;

Figure 3 is a partial side sectional view taken along line 3—3 of Figure 2;

Figure 4 is a top plan view of a second embodiment of the present invention showing a portion of the bridge and frame plate; and

Figure 5 is a partial side sectional view taken along line 5—5 of Figure 4.

The first embodiment of the present invention, shown in Figures 1 to 3, includes a frame plate 1 of a watch or other horological instrument. The frame plate 1 may itself be a tongue or bridge member of the main frame plate of the instrument, although usually it is itself one of the main frame plates of the instrument.

A balance bridge 2 is positioned over the frame plate 1. The bridge 2 including a top jewel bearing assembly 5 comprising a cylindrical bearing jewel 5a for journaling and a cap jewel (end stone) 5b for thrust. It is understood, however, that the bearings for the staff may be of other constructions. A balance wheel 3 is fixed on its staff 4 and is oscillated by a flat spiral return spring 4a. The balance wheel is either impulsed from a mainspring (not shown) or is itself part of an electrical motive system including a battery (not shown). The oscillation of the balance wheel 3 provides timekeeping regulation. The staff 4 is positioned between the top bearing jewel assembly 5 and a similar bottom jewel assembly 9 within the frame plate 1.

A shoulder 10 of the bridge 2 is used as a support member for one end of the bridge. The other end of the bridge is fixed, in conventional manner, with the adjustable end held in a cantilevered fashion. As an alternative, the other end may be free and the adjustable end may hold the bridge in a cantilevered manner. The bridge is free to move axially due to its inherent flexibility and the manner it is held at one end by means of the adjustment mechanism of the present invention. The shoulder 10 rests against the head 11 of an eccentric member 12. The eccentric member 12 has a top shank portion 30 having a slotted

portion 13, so that it may be rotated, and a bottom shank portion 14. The bottom shank portion 14 fits and pivots within a round hole 15 in the frame plate 1. The head 11, as is shown by the dotted lines in Figure 2, is eccentrically fixed to the shank portions 30 and 14. When the eccentric member 12 is rotated, more of its head portion 11 is brought either toward the balance staff or away from the balance staff. When the head 11 is rotated to its extreme position toward the staff (shown by dotted lines of Figure 2) it acts against shoulder 10, in a wedge-like manner, and axially raises the bridge 2 as far as it can be raised.

A tightening screw 16 is positioned within a cavity portion 21 of the balance bridge 2. The screw 16 has a head portion 22, a slot 17 for turning, a shank having an upper portion 18 having a smooth exterior face and a lower portion 19 having exterior screw threads. The screw threads of the lower portion 19 screw into the threads of a hole 20 in the frame plate 1. The screw 16 may, alternatively, have other forms. For example, a Phillips head may be used in place of slot 17. As another example, the shank may be threaded with exterior screw threads for its entire length, i.e., both upper portion 18 and lower portion 19.

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Modifications may be made in the present invention within the scope of the subjoined claims. For example, the eccentric member may be constructed with a top shank portion 30, as in Figures 1 to 3, and without the bottom shank portion 14 which fits in hole 15. As another example, instead of one end of the bridge being fixed and the other adjustable, both ends may be adjustable utilising the adjusting mechanism of the present invention.

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- regulating member mounted on a staff, a frame member carrying a first pivot for the staff, and a bridge carrying a second pivot for said staff; means to axially adjust at least one end of said bridge relative to said frame plate, said adjustment means including an eccentric member having an eccentric head positioned between said bridge and said frame member; said eccentric member being rotatable to axially position said bridge, and a locking screw adjustably connecting said bridge and said frame member.
2. A horological instrument according to Claim 1 wherein said eccentric member includes a shank portion to which said eccentric head is eccentrically fixed, and there is a hole in said frame member within which said shank portion is rotatably received.
3. A horological instrument according to Claim 2 wherein the eccentric head is slotted so that the eccentric member may be rotated.
4. A horological instrument according to Claim 1 wherein said eccentric member includes a shank portion to which said eccentric head is eccentrically fixed, and there is a hole in said bridge within which said shank portion is rotatably received.
5. A horological instrument according to Claim 4 wherein the shank portion has a top slot whereby the eccentric member may be rotated.
6. A horological instrument according to any one of the preceding claims, wherein the locking screw consists of a screw having a slotted head, a shank integral with said head and having a top smooth exterior portion and a screw threaded bottom portion.
7. A horological instrument according to Claim 6, wherein said screw head fits within a cavity in the bridge, said top portion of the shank rotates in a hole in said bridge, and said lower portion is threaded into threads in a hole in said frame member.
8. A horological instrument according to any one of Claims 1 to 5, wherein the locking screw consists of a screw having a shank and a head, said shank being threaded for substantially its entire length.
9. A horological instrument according to any one of the preceding claims, wherein said regulating member is a balance wheel and the instrument is a watch.
10. A horological instrument substantially as hereinbefore described with reference to Figures 1 to 3 or Figures 4 and 5 of the accompanying drawings.
- STEVENS, LANGNER, PARRY
& ROLLINSON,
Chartered Patent Agents,
Agents for the Applicants.