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Maeda et al.

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[54] WATCH MOVEMENT CONSTRUCTION

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **58/7**, 58/59

[51] **Int. Cl.** **G04b 13/00**, G04b 33/00

[58] **Field of Search** ..... 58/7, 59, 139, 140 R

[56] **References Cited**

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Primary Examiner—George H. Miller, Jr.

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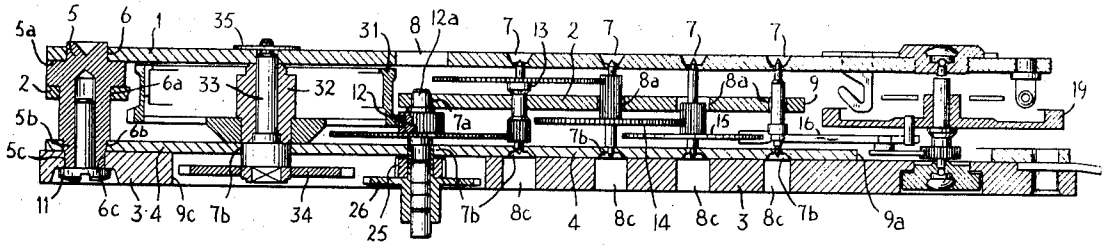
[57] **ABSTRACT**

A watch movement construction wherein two bridges and two frame plates for bearing or accommodating a plurality of the movement elements wherein the bridges and frame plates are held apart in fixed relative positions by two spacers and bridge screws threaded into the spacers. The bridges and frame plates are made flat and are provided at predetermined positions with cut-outs or mount holes for easy assembly of the construction and for receiving the staffs of rotary members of the construction. The cut-outs and mount holes can be formed by simple pressing or drilling operations.

4 Claims, 7 Drawing Figures



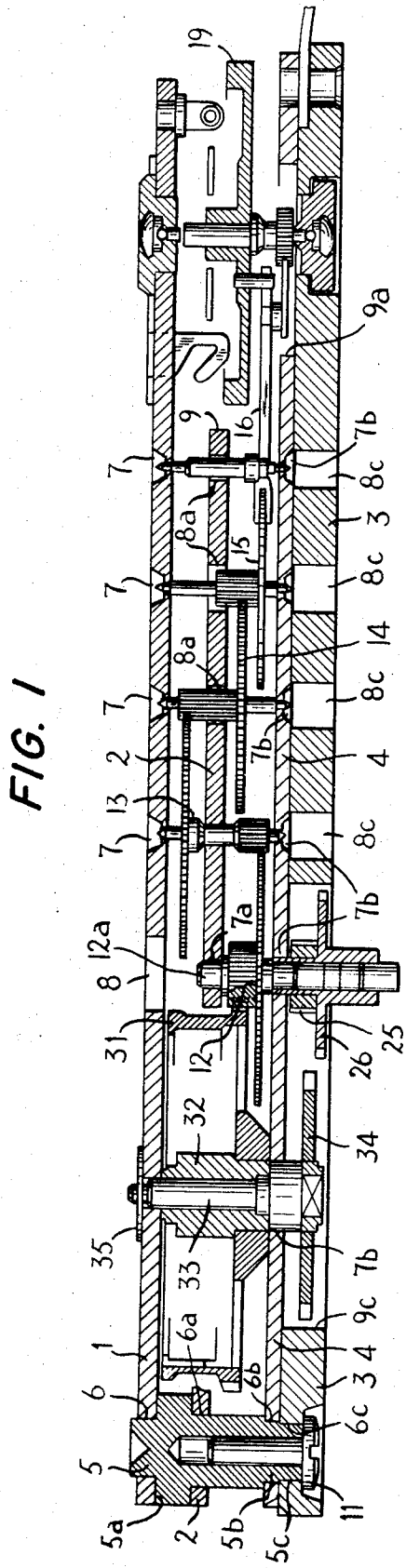


FIG. 1

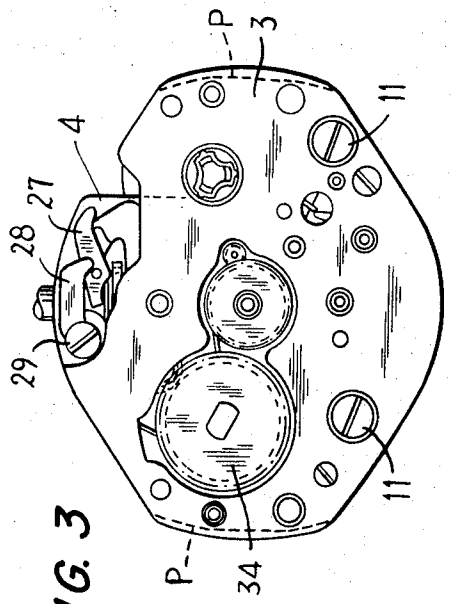


FIG. 3

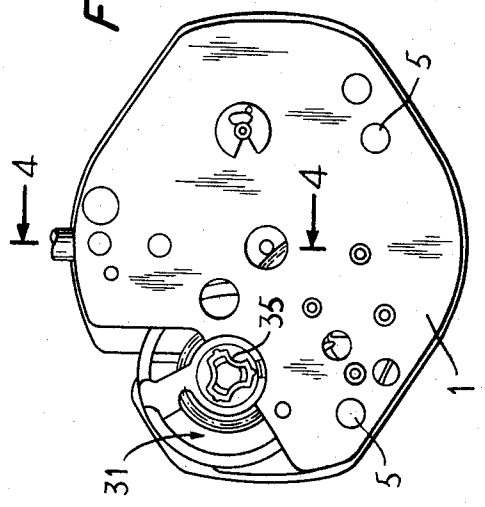


FIG. 2

2 Sheets-Sheet 2

FIG. 4

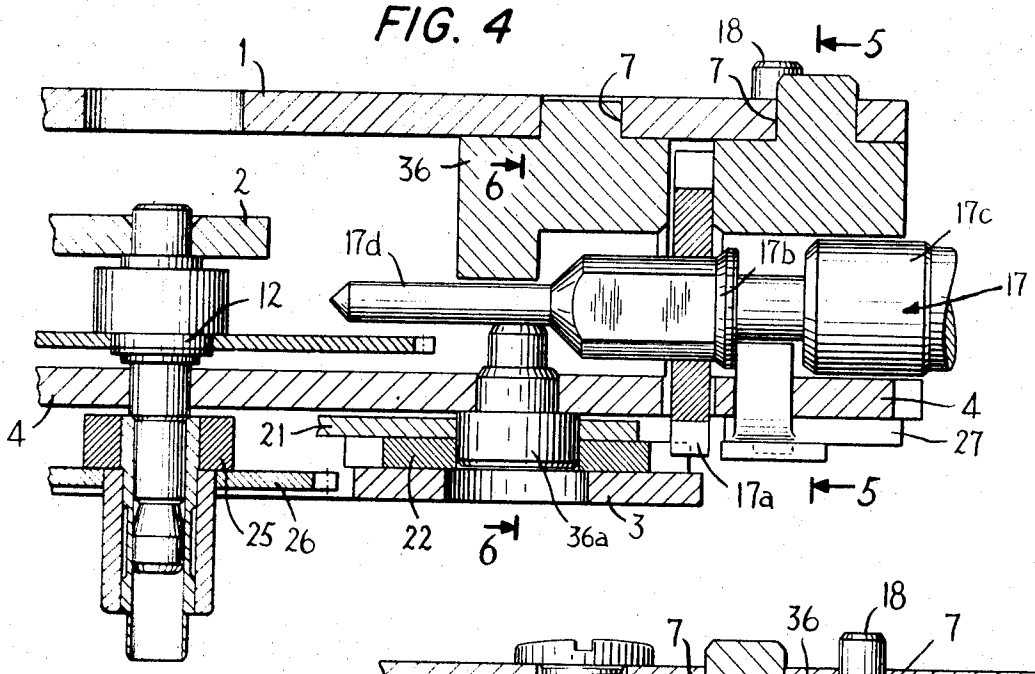
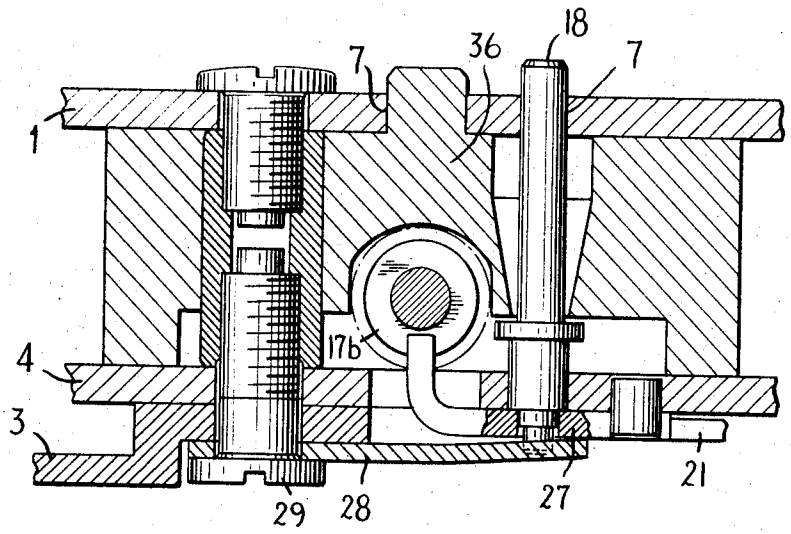


FIG. 5



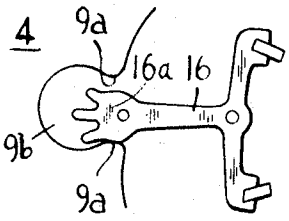


FIG. 7

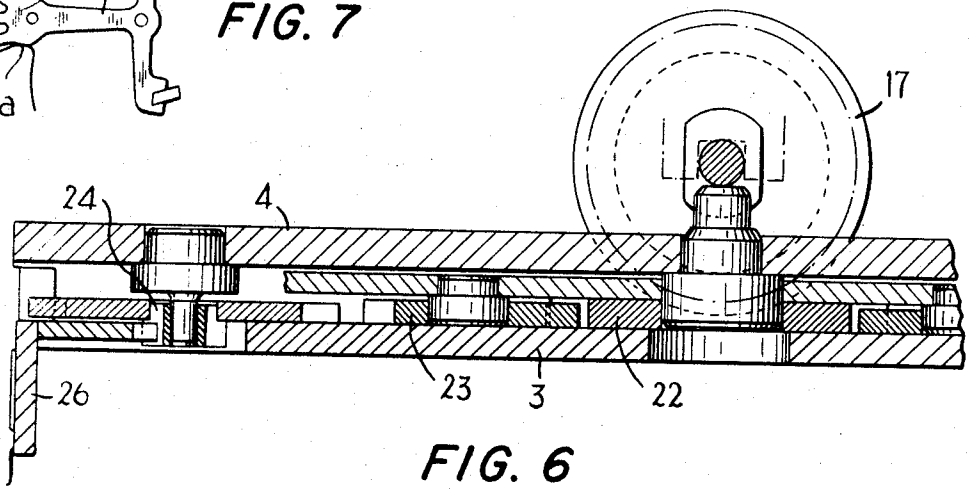


FIG. 6

WATCH MOVEMENT CONSTRUCTION

BACKGROUND OF THE INVENTION

This invention relates generally to watches and more particularly to a simple watch movement construction which is assembled with ease and wherein staffs of gear train or other staffs are carried on frame plates and bridges spaced apart by spacers.

Conventional watches have been constructed in such a manner that the balance wheel, a pallet fork and gear trains are usually accommodated in a space formed between a frame plate and bridges spaced apart by suitable spacers with one end of each staff bearing on the frame plate and the other end thereof bearing on a bridge. The frame plate and bridge each has its surface drilled and polished in a milling process and set off so as to accommodate the pallet fork or other mechanical elements of the watch. Moreover, the frame plate or bridge is bored to receive screws or pins in order to fix back gear trains after assembling the frame plate and bridge. These machining steps disadvantageously result in precise and complex machining of the parts and the expenditure of much working time.

SUMMARY OF THE INVENTION

A principal object of the present invention is to provide an improved watch movement construction eliminating the abovementioned drawbacks and capable of being easily and assuredly assembled.

A watch construction according to the present invention comprises two bridges and two frame plates. The bridges and frame plates are made of flat plates and provided at predetermined positions with cut-out portions or mount holes for bearing elements of the watch and to allow easy access for assembly of the construction.

The bridges and frame plates are easily made by molding press or by automatic lathing tools. The bridges are fixed spaced at predetermined distances, by spacers, so that the watch movement construction according to the present invention makes it easy to position or carry the elements of the watch movement eliminating the use of any particular jigs or the requirement of turning over the movement.

The two spacers are constructed with flat surfaces normal to a longitudinal axis thereof. These flat surfaces are axially spaced and the two bridges and two frame plates rest on respective flat surfaces and extend generally parallel. The outermost bridge and outermost frame plate are provided with openings into which the spacers extend. The flat surfaces are spaced axially on the spacers determining the spacing among the bridges and frame plates and therebetween.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned objects and features of the present invention will be more fully described in connection with the accompanying drawings in which:

FIG. 1 is a schematic longitudinal sectional view showing a watch movement construction according to the present invention;

FIG. 2 and FIG. 3 are perspective plan and bottom or backside views respectively of the watch movement construction of FIG. 1;

FIG. 4 is a fragmentary section view taken on a section line 4—4 of FIG. 2;

FIG. 5 is a fragmentary section view taken on a section line 5—5 of FIG. 4;

FIG. 6 is a fragmentary section view taken on a section line 6—6 of FIG. 4; and

FIG. 7 is an explanatory diagrammatic view illustrating the relationship between a second plate and a fork pallet of the watch movement in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIGS. 1–3, there is shown a watch construction wherein first and second bridges 1 and 2 define spaces into which mechanical parts of the watch are accommodated. The bridges and frame plates 3, 4 are provided with mount holes 6, 6*a*, 6*b*, and 6*c*, into which is inserted a spacer 5 fixing the bridges and frame plates at predetermined distances therebetween. In this embodiment, two spacers 5 are provided to assure the stable attachment of the bridges and plates as shown in FIG. 2. Moreover, the bridges and frame plates are provided at predetermined positions with holes 7, 7*a* and 7*b* functioning as bearings for the staffs of the gears and with cut-out portions 8, 8*a*, and 9, 9*a* for housing the mechanical elements.

The spacers 5 have at one end a flanged portion 5*a* engaging with the first and second bridges 1 and 2 and being axially thick enough to separate one from the other. Further, the spacers have at the other end a smaller diameter portion 5*b* loosely engaging with a hole 6*b* of the second frame plate 4 and a smaller diameter portion 5*c* also loosely engaging with a hole 6*c* of the first frame plate 3, and has threaded bore at its central portion to receive a correspondingly threaded screw 11 for fixing the plates. Screws 11 fix the frame plates 3 and 4 together with the spacers 5.

According to the embodiment of the present invention, a balance wheel 19 with its staff is carried on bearing means each mounted on the first bridge 1 and the first frame plate 3. A pallet fork 16 reciprocated by the balance wheel 19 is carried on the first bridge 1 and the second frame plate 4. The second frame plate 4 has a cut-away portion 9*b* for housing therein a top portion 16*a* of a pallet fork 16. The edges 9*a* of the cut-away portion also act as stop members for limiting the angular movement of the pallet fork 16 (FIG. 7). The gear trains, that is, an escapement wheel 15, and third and fourth wheels 13, 14 with their staffs are also rotatably carried on the first bridge 1 and the second frame plate 4.

According to the present invention, mechanical parts of the watch are assembled in the following steps to constitute the watch movement construction. First, the spacer 5 is inserted into the mount hole 6 provided on the first bridge 1 and is caulked thereto. The second bridge 2 has inserted into it the spacer through the hole 6*a* thereof to the extent that the second bridge 2 rests against the flanged portion 5*a* of the spacer so as to be spaced from the first bridge 1. Prior to the abovementioned step, the third wheel 13 is mounted on the first bridge 1.

Next, a bearing block 36 for rotatably bearing a winding stem 40 in a cavity thereof is secured to the first bridge 1 with its integral projections 36*a* and 37*b* fixed into the bearing openings 7 as shown in FIG. 4. After finishing the above steps, the fourth wheel 14, the escapement wheel 15, and the fork pallet 16 are mounted through the second bridge 2 on the first

bridge 1, while the center wheel 12 is mounted on the second bridge 2. The winding stem 17 and a setting lever pin 18 are set at predetermined positions respectively, as shown in FIGS. 4 and 5 and these are assembled with the bearing block 36 before it is mounted on the assembly.

The second frame plate 4 is then mounted by inserting into the mount hole 6*b* thereof the portion 5*b* of the spacer 5 and by setting each staff of the gear train on the corresponding bearing mount. After setting the second frame plate 4, the balance wheel 19 is mounted. Next, a clutch lever 21 is mounted on the second frame plate 4 with a crown wheel 22 as shown in FIG. 4. A minute wheel 24 is then disposed on a predetermined position, as shown in FIG. 6, and its pivot is press fitted into an opening in the plate 4. After the mount hole 6*c* of the first frame plate 3 has inserted the spacer 5 thereinto and the first frame plate 3 has the staffs fitting into the corresponding bearing mounts, a bridge screw 11 is threaded into a threaded bore of the spacer to fix the first and second frame plates 3 and 4, respectively.

An hour wheel pinion 25 is mounted on the staff of the center wheel 12 and an hour wheel 26 is also mounted thereto. Next, a setting lever 27 is inserted through a cut-away in the plate 4 and holds a lever pin 18 in place and is secured by a setting lever spring which is fixed to the first frame plate 3 by a screw 29 threaded into an internally threaded sleeve as shown in FIG.5. The setting lever pin is mounted in the bearing 36 before mounting thereof on the plate 4. A barrel drum 31 is inserted laterally of the bridges and plates and is set at a predetermined position between the first bridge 1 and the second frame plate 4 as shown in FIGS. 1 and 2.

The winding stem bearing block 36 may be made of plastic as an integral, precision injection molded unit that has accurately molded cavities and openings therein for receiving those members of the watch movement that it carries. The winding stem 17 is assembled with the bearing 36 in a cavity thereof prior to mounting of this bearing on the bridge and plate. The winding stem extends axially out of the bearing 36 and the assembly shown in the drawings.

In assemblying the winding stem bearing the winding stem is inserted into its cavity through a winding stem pinion 17*a* that is received in its own cavity in the bearing 36 and has a central opening provided with internal surfaces complementary to those of the winding stem that drives it.

The winding stem 17 is provided with a collar 17*b* and a portion 17*c* spaced axially from the collar and has a major diameter. The setting lever 27 has a bent portion that extends through a cut-out in the plate 4 into the cavity of the winding stem and is disposed between the collar 17*b* and the portion 17*c* of major diameter so that it maintains the winding stem from moving axially outwardly of the bearing.

An innermost end postion 17*d* of the winding stem is supported for rotation by a bearing pin 36*a* extending into the cavity of the winding stem. This bearing pin 36*a* is inserted into position through an opening in the plate 4 and is held therein.

Finally a rachet wheel 34 is inserted in a barrel staff 32, the axle 33 of which is in turn fixed to the first bridge 1 by a spring keeper or E-ring 35.

The watch movement construction according to the present invention has many advantages or features over the conventional ones as follows: the second bridge 2 is assuredly maintained spaced apart from the first bridge 1 while the second frame plate 4 is also maintained spaced apart from the first frame plate 3 by the spacers 5 with the first and second frame plates 3, 4 both fixed to the spacer 5 by the bridge screws 11. The cut-out portions can be formed by changing the configurations of the first and second frame plates 3 and 4 as shown by dotted lines P in FIG. 3. The clutch lever 21 is included between the first and second frame plates 3,4. The first frame plate 3 also functions as a spring for the clutch lever 21 (FIG. 4). The assembling of the complete barrel drum 31, with the ratchet wheel 34 may be taken apart without any disturbance of the remaining parts. It is possible to easily clean the watch movement (FIGS. 1 and 2). The provision of the hole 8 allows the second hand pinion to be connected to the staff 12*a* of the center wheel 12 and makes easy the power transmission to the minute and hour hands (FIG. 1). No surface machining, bending, off-setting or milling are required thereby saving much time. The provision of holes 8*a* on the second bridge 2 for the fourth wheel 14, the escapement wheel 15, and the pallet fork 16 prevent the inclination of these wheels during assembling and makes easy the assembling thereof (FIG. 1). Cut-out portion 9 provided on the second frame plate 4 serves as limiting means for limiting the oscillation of the pallet fork 16, thereby dispensing with the conventional banking pins. The back gear train is assembled without turning over the movement because the assembling can be always carried out with the bridges down.

What we claim and desire to secure by Letters Patent is:

1. A watch movement construction comprising, two flat bridges and two flat frame plates, two separate spaced spacers each having bearing surfaces axially spaced thereon on which the two bridges and the two frame plates bear individually and are held spaced apart extending generally parallel, each bridge and each frame plate having cut-outs in predetermined places including some of which are in registry to provide access to a space therebetween and having a plurality of spaced bearing openings for receiving therein respective staffs of a plurality of rotatable elements of a watch movement, each spacer having a threaded bore, and a threaded screw holding an outermost one of the frame plates on said spacer.

2. A watch movement construction according to claim 3, including a pallet fork oscillatable on said outermost frame plate, and said outermost frame plate having a cut-out within which said pallet fork oscillates, and the surfaces defining the cut-out being disposed to limit the amplitude of oscillation of said pallet fork.

3. A watch movement construction according to claim 1, in which said outermost frame plate is provided with a plurality of mount holes for use as bearings for staffs of gears of a back gear train.

4. A watch movement construction according to claim 1, in which said spacers each have a longitudinal axis and said bearing surfaces are flat and disposed in planes substantially normal to the longitudinal axis thereof, and said bearing surfaces are disposed axially spaced on the longitudinal axis at axial distances determining desired axial spacing of said bridges and said frame plates.

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