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(54) WINDING STEM AND BEARING ASSEMBLY FOR A TIMEPIECE

(71) We, KABUSHIKI KAISHA DAINI SEIKOSHA, a Japanese company of 31-1, 6-Chome, Kameido, Koto-ku, Tokyo, Japan, 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:—

This invention concerns a winding stem and bearing assembly for use in a timepiece, and a timepiece movement provided with such an assembly.

Conventional winding stem and bearing assemblies for use in a timepiece, such for example as a watch, have included a winding stem bearing plate which was milled to provide two holes, namely a horizontal hole for the winding stem itself and a square hole to receive a winding pinion carried by the winding stem. Thus the conventional winding stem bearing assembly required two milling steps which made the cost of the assembly high. Moreover, the winding stem-bearing plate was made of metallic material, with the result that it was necessary to lubricate the bearing surface and this was difficult to arrange satisfactorily.

According to the present invention, there is provided a winding stem and bearing assembly for use in a timepiece comprising a winding stem having larger and smaller diameter portions, a bearing block having cavities therein of larger and smaller diameters which respectively engage and support the larger and smaller diameter stem portions to prevent movement of each said portion in three orthogonal directions, and support means secured to the bearing block for engaging and supporting the larger and smaller diameter stem portions to prevent movement of each stem portion in a fourth orthogonal direction.

Thus in the case of the present invention, it is possible if desired to make the bearing block of plastics material thus promoting ease of manufacture, while the construction is such as to assist assembly.

The support means preferably comprises a plate which engages the larger diameter stem portion, said plate carrying a bearing

pin which engages the smaller diameter stem portion.

The plate may be disposed on one side of the bearing block, a bridge being disposed on the opposite side thereof, the bearing block having an opening therein in which is disposed means for securing the plate and the bridge to the bearing block.

The winding stem may have a flange which is engaged by a portion of a setting lever, the said portion of the setting lever passing through an aperture in the said plate. The setting lever may be mounted on a setting lever pin which is disposed in a hole in the bearing block.

The bearing block may be provided with a further cavity in which is disposed a winding pinion carried by the winding stem.

The invention also comprises a timepiece movement provided with an assembly as set forth above.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:—

Figure 1 is a plan view of a bearing forming part of a winding stem bearing assembly according to the present invention.

Figure 2 is a side view of the bearing shown in Figure 1.

Figure 3 is a cross sectional view taken on the line III—III of Figure 1.

Figure 4 is a top plan view of a watch movement provided with a bearing assembly according to the present invention.

Figure 5 is a bottom plan view of the movement of Figure 4.

Figure 6 is a cross-sectional view taken on the line VI—VI of Figure 4.

Figure 7 is a cross-sectional view taken on the line VII—VII of Figure 6, and

Figure 8 is a cross-sectional view taken on the line VIII—VIII of Figure 6.

Referring to the drawings, a watch movement 10 comprises a barrel and train-wheel bridge 11, a winding stem bearing 12 which is an injection moulding of a plastics material, a plate 13, and a plate 14, the plate 13 being disposed on one side of and in contact with the bearing 12 and the bridge 11 being disposed in contact with the oppo-

site side thereof. The bearing 12 has an opening 15 therein in which there is fixedly secured a hollow metal pin 16. The pin 16 has threaded portions 20, 21 at opposite ends thereof into which are screwed internally threaded bushes 22, 23 respectively. Threaded into the bush 22 is a screw 24 which passes through a hole 25 in the bridge 11. Threaded into the bush 23 is a screw 26 which passes through aligned holes 27, 28 in the plates 13, 14 respectively. The screws 24, 26, bushes 22, 23, and pin 16 serve collectively to secure the bridge 11, bearing 12, and plates 13, 14 together. The bridge 11 is also secured to the plates 13, 14 by studs 29.

The bearing 12 is in the form of a block having projections 30, 31 which are respectively received in holes 32, 33 in the bridge 11.

The bearing 12 has cavities 34, 35 of larger and smaller diameter respectively, the cavities 34, 35 respectively engaging a larger diameter portion 36 and a smaller diameter portion 37 of a rotatable and longitudinally movable winding stem 38.

As shown in Figure 7, the larger diameter cavity 34 has surfaces 40, 41, 42 which respectively engage and support the larger diameter stem portion 36 in three orthogonal directions, i.e. from the top and from the left and right hand sides as viewed in Figure 7. Similarly, as seen in Figure 8, the smaller diameter cavity 35 has surfaces 43, 44, 45 which respectively engage and support the smaller diameter stem portion 37 in the same three orthogonal directions.

As shown in Figures 6 and 7, the plate 13 engages the larger diameter stem portion 36 to prevent movement of the latter in a fourth orthogonal direction, while as shown in Figures 6 and 8 the plate 13 carries a bearing pin 46 whose upper surface 47 engages and supports the smaller diameter stem portion 37 to prevent movement of the latter in the fourth orthogonal direction.

The bearing 12 is provided with a tapered hole 50 in which is disposed a setting lever pin 51. Mounted on the setting lever pin 51 is a setting lever 52 having a bent upturned end 53. The main portion of the setting lever 52 is disposed externally of the plate 13, but the end 53 extends through an aperture 54 in the plate 13. The winding stem 38 has a flange 55 which is engaged by the end 53. The setting lever 52 is prevented from becoming disengaged from the setting lever pin 51 by means of a setting lever holder spring 60.

The bearing 12 is also provided with a cavity 56 in which is disposed a winding pinion 57 carried by the winding stem 38.

The bearing assembly shown in the drawings is assembled as follows. The projections 30, 31 of the bearing 12 are pressed into the

holes 32, 33 in the bridge 11, and the latter is then fixed to the bearing 12 by means of the pin 16, threaded bush 22, and screw 24.

The setting lever pin 51 and the winding pinion 57 are then inserted into the hole 50 and the cavity 56 respectively, after which the winding stem 38 is inserted. The plates 13, 14 are appropriately positioned, and the upturned lever end 53 is then inserted through the aperture 54 in the plate 13, the central portion of the setting lever 52 being pressed onto the setting lever pin 51.

The plate 13 is then secured to the bearing 12, together with the plate 14 and the spring 60, by means of the screw 26, the screw 26 being tightened in the bush 23, with the result that the setting lever 52 and setting lever holder spring 60 are fixed to the plates 13, 14.

Finally, the bearing pin 46 is pressed into the plate 13 to support the smaller diameter stem portion 37.

Thus the construction shown in the drawings, while simple, provides a stable horizontal support for the winding stem. Moreover, the upturned end 53 prevents the winding stem 38 from being pulled out of the movement. At the same time, the construction of the bearing 12 enables it to be injection moulded from plastics materials which do not require lubrication and which, of course, obviate the need for milling steps.

WHAT WE CLAIM IS:—

1. A winding stem and bearing assembly for use in a timepiece comprising a winding stem having larger and smaller diameter portions, a bearing block having cavities therein of larger and smaller diameters which respectively engage and support the larger and smaller diameter stem portions to prevent movement of each said portion in three orthogonal directions, and support means secured to the bearing block for engaging and supporting the larger and smaller diameter stem portions to prevent movement of each stem portion in a fourth orthogonal direction.

2. An assembly as claimed in claim 1 in which the support means comprises a plate which engages the larger diameter stem portion, said plate carrying a bearing pin which engages the smaller diameter stem portion.

3. An assembly as claimed in claim 2 in which the plate is disposed on one side of the bearing block, a bridge being disposed on the opposite side thereof, the bearing block having an opening therein in which is disposed means for securing the plate and the bridge to the bearing block.

4. An assembly as claimed in claim 2 or 3 in which the winding stem has a flange which is engaged by a portion of a setting lever, the said portion of the setting lever



site side thereof. The bearing 12 has an opening 15 therein in which there is fixedly secured a hollow metal pin 16. The pin 16 has threaded portions 20, 21 at opposite ends thereof into which are screwed internally threaded bushes 22, 23 respectively. Threaded into the bush 22 is a screw 24 which passes through a hole 25 in the bridge 11. Threaded into the bush 23 is a screw 26 which passes through aligned holes 27, 28 in the plates 13, 14 respectively. The screws 24, 26, bushes 22, 23, and pin 16 serve collectively to secure the bridge 11, bearing 12, and plates 13, 14 together. The bridge 11 is also secured to the plates 13, 14 by studs 29.

The bearing 12 is in the form of a block having projections 30, 31 which are respectively received in holes 32, 33 in the bridge 11.

The bearing 12 has cavities 34, 35 of larger and smaller diameter respectively, the cavities 34, 35 respectively engaging a larger diameter portion 36 and a smaller diameter portion 37 of a rotatable and longitudinally movable winding stem 38.

As shown in Figure 7, the larger diameter cavity 34 has surfaces 40, 41, 42 which respectively engage and support the larger diameter stem portion 36 in three orthogonal directions, i.e. from the top and from the left and right hand sides as viewed in Figure 7. Similarly, as seen in Figure 8, the smaller diameter cavity 35 has surfaces 43, 44, 45 which respectively engage and support the smaller diameter stem portion 37 in the same three orthogonal directions.

As shown in Figures 6 and 7, the plate 13 engages the larger diameter stem portion 36 to prevent movement of the latter in a fourth orthogonal direction, while as shown in Figures 6 and 8 the plate 13 carries a bearing pin 46 whose upper surface 47 engages and supports the smaller diameter stem portion 37 to prevent movement of the latter in the fourth orthogonal direction.

The bearing 12 is provided with a tapered hole 50 in which is disposed a setting lever pin 51. Mounted on the setting lever pin 51 is a setting lever 52 having a bent upturned end 53. The main portion of the setting lever 52 is disposed externally of the plate 13, but the end 53 extends through an aperture 54 in the plate 13. The winding stem 38 has a flange 55 which is engaged by the end 53. The setting lever 52 is prevented from becoming disengaged from the setting lever pin 51 by means of a setting lever holder spring 60.

The bearing 12 is also provided with a cavity 56 in which is disposed a winding pinion 57 carried by the winding stem 38.

The bearing assembly shown in the drawings is assembled as follows. The projections 30, 31 of the bearing 12 are pressed into the

holes 32, 33 in the bridge 11, and the latter is then fixed to the bearing 12 by means of the pin 16, threaded bush 22, and screw 24.

The setting lever pin 51 and the winding pinion 57 are then inserted into the hole 50 and the cavity 56 respectively, after which the winding stem 38 is inserted. The plates 13, 14 are appropriately positioned, and the upturned lever end 53 is then inserted through the aperture 54 in the plate 13, the central portion of the setting lever 52 being pressed onto the setting lever pin 51.

The plate 13 is then secured to the bearing 12, together with the plate 14 and the spring 60, by means of the screw 26, the screw 26 being tightened in the bush 23, with the result that the setting lever 52 and setting lever holder spring 60 are fixed to the plates 13, 14.

Finally, the bearing pin 46 is pressed into the plate 13 to support the smaller diameter stem portion 37.

Thus the construction shown in the drawings, while simple, provides a stable horizontal support for the winding stem. Moreover, the upturned end 53 prevents the winding stem 38 from being pulled out of the movement. At the same time, the construction of the bearing 12 enables it to be injection moulded from plastics materials which do not require lubrication and which, of course, obviate the need for milling steps.

WHAT WE CLAIM IS:—

1. A winding stem and bearing assembly for use in a timepiece comprising a winding stem having larger and smaller diameter portions, a bearing block having cavities therein of larger and smaller diameters which respectively engage and support the larger and smaller diameter stem portions to prevent movement of each said portion in three orthogonal directions, and support means secured to the bearing block for engaging and supporting the larger and smaller diameter stem portions to prevent movement of each stem portion in a fourth orthogonal direction.

2. An assembly as claimed in claim 1 in which the support means comprises a plate which engages the larger diameter stem portion, said plate carrying a bearing pin which engages the smaller diameter stem portion.

3. An assembly as claimed in claim 2 in which the plate is disposed on one side of the bearing block, a bridge being disposed on the opposite side thereof, the bearing block having an opening therein in which is disposed means for securing the plate and the bridge to the bearing block.

4. An assembly as claimed in claim 2 or 3 in which the winding stem has a flange which is engaged by a portion of a setting lever, the said portion of the setting lever



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passing through an aperture in the said plate.

- 5 5. An assembly as claimed in claim 4 in which the setting lever is mounted on a setting lever pin which is disposed in a hole in the bearing block.

- 10 6. An assembly as claimed in any preceding claim in which the bearing block is provided with a further cavity in which is disposed a winding pinion carried by the winding stem.

7. An assembly as claimed in any preceding claim in which the bearing block is made of plastics material.

8. A winding stem and bearing assembly 15
for use in a timepiece substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

9. A timepiece movement provided with an assembly as claimed in any preceding 20
claim.

J. MILLER & CO.,
Agents for the Applicants,
Chartered Patent Agents,
262 High Holborn,
London, WC1V 7EF.

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