

TIMEPIECE COMPRISING A ROTATING BEZEL

The invention concerns a timepiece comprising a rotating bezel, upon which for example time related indications are marked.

More particularly, it concerns a timepiece of the wristwatch type comprising a case having a caseband, a back cover, a watch glass fixedly mounted on the caseband, and a rotating bezel of the aforementioned type, guided in rotation with respect to the watch glass and the caseband.

Wristwatches fitted with such a bezel are generally intended to be used for deep-sea diving and allow an elapsed or remaining period of time to be indicated. For this purpose and in order to avoid any inadvertent movement of the bezel during use, the bezel co-operates with ratchet means which are mounted on the watch glass and/or on the caseband and which allow a unidirectional rotational movement of the bezel, and holding the bezel in predetermined angular positions with respect to the watch dial.

Generally, the ratchet means comprise a steel spring with clicks which co-operate with a toothing arranged on the bezel. The bezel is held axially on the caseband by means of a steel wire spring which penetrates both a first groove arranged in a cylindrical surface of the caseband and a second groove of the bezel arranged facing the first. The caseband further comprises two shoulders arranged either side of the second groove, each of the shoulders co-operating with a corresponding shoulder of the bezel. In order to assure the sealing of the ratchet system, two sealing gaskets are inserted between the shoulders of the caseband and the bezel respectively.

A watch case having a bezel assembly structure of this type is disclosed in Patent CH 662 922.

According to this document, the centering of the bezel with respect to the caseband is achieved with the

aid of the wire spring arranged in the recess formed by the first and second grooves. However, for assembly and operating reasons, this spring is mounted with a certain radial play in relation to the caseband. This radial play allows a permanent rotational movement from the geometric centre of the bezel about the centre of the caseband, which results in inaccurate manipulation and gives an impression of average quality to the watch fitted therewith.

Furthermore, in order for the sealing gaskets to work as well as possible, it is necessary to make the various shoulders and grooves in a series of machining operations of the caseband and the bezel with very low manufacturing tolerances for the shoulders and grooves in relation to each other, typically in the region of several hundredths of a millimetre. However, such machining tolerances are practically impossible to respect with the conventional manufacturing machines for this type of item. With a conventional manufacturing technique, the bezel assembly structure bezel described in this document results either in too great a friction of the sealing gaskets on the caseband or the bezel and consequently difficult manipulation of the bezel, or too low a friction of the sealing gaskets and consequently too weak a hold of the bezel in a determined position, in particular in the case of a shock or suchlike. In the latter case, the effectiveness of the sealing gaskets is reduced. The intended use of this type of wristwatch means that it is frequently used in marine environments where there are numerous solid impurities such as sand, the grains of which can easily lodge between the bezel and the watch glass, or between the bezel and the caseband, and can block the rotational movement of the bezel and seriously damage the ratchet means.

A principal aim of the invention is thus to remedy the aforementioned disadvantages of the prior art by providing a timepiece comprising a rotating bezel associated with ratchet means and with means for holding

it on the caseband, and comprising an assembly structure of the bezel on the caseband which allows an efficient centering of the bezel with respect to the caseband and the watch glass and which gives the bezel a substantially constant rotation resistant torque, yet which is simple and economical to make via conventional manufacturing techniques in the field.

Another aim of the invention consists of providing a timepiece comprising a rotating bezel whose mechanism is protected against solid impurities and which can thus be used in any type of environment without affecting the proper functioning of the bezel.

The invention therefore concerns a timepiece comprising a case having a caseband, a back cover, a watch glass fixedly mounted on the caseband, a rotating bezel guided in rotation with respect to the watch glass and the caseband, means for holding said bezel on the caseband, and a ratchet mechanism associated with the bezel comprising a click spring co-operating with a toothing arranged in the bezel, characterised in that a sealing gasket is arranged above the ratchet mechanism between the bezel and the watch glass, said gasket assuring both the centering of the bezel with respect to the watch glass, and a friction restraint preventing the rotation of the bezel.

Thus, the arrangement of the gasket directly between the bezel and the watch glass allows a substantially constant rotation resistant torque of the bezel to be obtained, which if necessary may counterbalance the flexibility of the spring with clicks in the event that the clicks fail to assure sufficient retention of the bezel in its permitted rotational direction. Moreover, this particular arrangement of the gasket allows the bezel to be centred with respect to the watch glass and thus a very slight play to exist between these two components, thereby improving, on the one hand, resistance to the penetration of impurities and, on the other hand, the aesthetic appearance of the timepiece.

According to a particular embodiment of the invention, the caseband comprises a sleeve in its upper part and the holding means comprise a split ring in a plastic material, arranged in a first recess partially formed in the bezel and in the external surface of said sleeve when the bezel is in place on the caseband.

As a result of this structure, the axial holding of the bezel on the sleeve may thus be easily and economically achieved with the aid of a simple split ring.

According to an advantageous feature of the invention, the sleeve comprises in its upper external part a truncated surface which extends via a cylindrical part in which is arranged an annular radial groove, forming part of the first recess, in its middle part and via a shoulder in its lower part.

Thus the installation of the bezel on the sleeve and its axial holding can be simply achieved by placing the split ring in the groove of the bezel and then forcing the bezel onto the sleeve, the split ring spreading out when passing onto the conical surface. It will be noted in this regard that the dismantling of the bezel can easily be achieved by breaking the split ring.

Other advantages and characteristics of the invention will appear upon reading the detailed description which follows of an embodiment example given by way of illustrative and non limiting example with reference to the attached drawing in which:

- Figure 1 shows a partial cross-sectional view of a timepiece according to the invention;
- Figure 2 shows a partial top view of a spring with clicks used in the timepiece shown in figure 1, and
- Figure 3 is a partial side view of the spring with clicks of figure 2 showing more particularly a spring leaf forming a click.

Referring to the figures, a timepiece according to the invention, designated by the general reference 1, will be described hereinafter.

Timepiece 1 includes a case 2 comprising a caseband 4, a back cover 6 and a watch glass 8, and in which a movement 10 is housed, surmounted by a dial 12. In the example illustrated, caseband 4 and back cover 6 are made of a single metal piece.

Fixing horns 14, intended to allow the linking of the timepiece with a bracelet (not shown), are arranged on the caseband.

In this example, watch glass 8 is made of a plastic material and is directly fixed, via its lower peripheral part, onto a synthetic rim 16 of movement 10, by welding or gluing. Rim 16 is also gripped between two resting surfaces 18 and 20 respectively of caseband 4 and a sleeve 22 which is snap fitted via its lower lip 24 onto a shoulder of the caseband. A gasket 26 is inserted between rim 16 and surface 18 to assure the sealing of the case against the exterior. Watch glass 8 is thus fixed with respect to caseband 4.

Sleeve 22 comprises an internal cylindrical surface 28, followed by a shoulder forming surface 20 and a lower cylindrical surface widening slightly outwards and forming lip 24.

In its upper external part, sleeve 22 comprises a truncated surface 30 above a cylindrical part 32 in which an annular radial groove 34 is arranged. Lower down, sleeve 22 has a shoulder 37 in its middle part and ends in lip 24.

Timepiece 1 further comprises a rotating bezel 36, for example made of metal, which is guided in rotation with respect to watch glass 8 and caseband 4. Bezel 36 comprises a first cylindrical surface 38 opening onto a second cylindrical surface 40 which has a larger diameter than the first, an internal axial toothing 42 with serrated teeth, an annular radial groove 44 and an axial resting surface 46.

Watch glass 8 comprises a peripheral lateral face fitted with an annular groove 48 and a shoulder defining an axial resting surface 50. According to a feature of the

invention, the annular groove receives a sealing gasket 52 and is arranged substantially facing cylindrical surface 38. Annular groove 48 preferably has a circular section and gasket 52 is in the form of an elastomer toric gasket.

It will be noted that only the dimensions of annular grooves 40 and 48 must be controlled to obtain the desired compression of the gasket which can easily be achieved with the aid of conventional manufacturing techniques. As a result, the torque resisting the rotation of the bezel can be perfectly controlled.

Internal cylindrical surface 28 defines with said shoulder arranged in watch glass 8 a recess in which a spring with clicks or click spring 54 is arranged.

More precisely, annular click spring 54 rests on the axial surface of shoulder 50 and is held fixed in rotation, for example by being driven in, or glued onto the watch glass or with the aid of notches E provided in the spring and co-operating with catches or provided for this purpose in the lateral face of watch glass 8, or conversely.

Spring 54 comprises in the example illustrated in particular in figures 2 and 3, six clicks 56 having the shape of spring leaves able to flex axially and to co-operate with toothing 42 of bezel 36, thus forming the ratchet mechanism with which bezel 36 co-operates.

In the example illustrated, click spring 54 and more particularly, clicks 56, are made of a plastic material. This has the advantage of eliminating any risk of damaging toothing 42 of bezel 36 when the bezel rotates, in particular when the latter is made of a "soft" metal such as aluminium or an aluminium based alloy. Spring 54 is made for example of a plastic material having a high elastic limit and preferably between 160 and 200 MPa. By way of example, a 6.6 polyamide with 40% carbon fibre sold by the Hoechst company under the name of Celanese Nylon is perfectly suited.

Since the friction coefficient of the plastic material on the metal is by nature relatively slight, it

will be noted in this regard that the torque necessary to cause the bezel to rotate in the direction of rotation permitted by the clicks depends essentially upon the friction forces put into play between, on the one hand, watch glass 8 and sealing gasket 52 and, on the other hand the latter and bezel 36. Of course, click spring 54 can also be made of metal.

According to a feature of the invention, sealing gasket 52 is provided above the ratchet mechanism of bezel 36, so that the latter is protected from the penetration of any solid impurity able to damage such mechanism when bezel 36 rotates.

The centering of bezel 36 is achieved directly on watch glass 8, via sealing gasket 52. Thus, the clearance or play 58 between cylindrical surface 38 of bezel 36 and watch glass 8 may be very small and for example between 0.10 mm and 0.20 mm on the radius. The risk of foreign bodies entering into this gap is thus practically ruled out. Moreover, the centering of the bezel with the aid of the gasket allows any radial shake of the bezel to be virtually removed thus conferring an impression of high quality on the watch fitted with the bezel.

Bezel 36 also comprises axial holding means on caseband 4. These holding means comprise a split ring 60 arranged in a recess partially formed in bezel 36 and in the external surface of sleeve 22 when bezel 36 is in place on caseband 4. More precisely, split ring 60 is a ring made of plastic having a rectangular transversal section, its radial dimension being greater than its axial dimension and generally designated a "flat" elastic ring. A plastic material having a high shearing resistance will preferably be chosen for making the split ring. An identical material to that of the click spring is perfectly suitable.

The recess thus has a rectangular section and is formed by radial annular grooves 34 and 44 arranged respectively in sleeve 22 and in bezel 36, facing each other, split ring 60 being mounted in this recess so that

it extends, in its normal position illustrated in figure 1, both into groove 34 of the sleeve 22 and into groove 44 of bezel 36. It benefits however from a radial play allowing it to retract into groove 44 via elastic expansion.

To carry out the assembly of bezel 36 onto caseband 4, click spring 54 is firstly placed on surface 50 of watch glass 8, next sealing gasket 52 is installed in annular groove 48, then bezel 36 is engaged via pressure on sleeve 22, split ring 60 having previously been arranged in annular groove 44 of bezel 36 with a certain radial play. At this moment, the internal face of ring 60 comes into contact with truncated surface 30 and slides onto the latter spreading out elastically until it arrives facing groove 34 into which it can be released. Once released, split ring 60 extends partially into grooves 34 and 44 and axial surface 46 of the bezel comes practically into contact with the surface of shoulder 37 of the sleeve.

Once set in place, the bezel can only be dismantled via axial traction involving the breaking of the split ring. This inexpensive part can be replaced when the bezel is reassembled.

CLAIMS

1. Timepiece comprising a case (2) having a caseband (4), a back cover (6), a watch glass (8) fixedly mounted with respect to the caseband (4), a rotating bezel (36) guided in rotation with respect to the watch glass (8) and the caseband (4), means (60) for holding said bezel (36) on the caseband (4), and a ratchet mechanism (52, 54, 56) associated with the bezel (36) comprising a click spring (54, 56) co-operating with a tothing (42) arranged in the bezel (36), characterised in that a sealing gasket (52) is arranged above the ratchet mechanism (52, 54, 56) between the bezel (36) and the watch glass (8), said gasket assuring both the centering of the bezel with respect to the watch glass, and a friction restraint preventing the rotation of the bezel (36).

2. Timepiece according to claim 1, in which the caseband (4) comprises in its upper part a sleeve (22), characterised in that the holding means (60) comprise a split ring in a plastic material arranged in a first recess (34, 44) partially formed in the bezel (36) and in the external surface of said sleeve (22) when the bezel (36) is in place on the caseband (4).

3. Timepiece according to claim 2, characterised in that said sleeve (22) comprises in its upper external part a truncated surface (30) which is extended via a cylindrical part (32) in which is arranged an annular radial groove (34), forming a part of the first recess (34, 44), and via a shoulder (37).

4. Timepiece according to one of claims 2 or 3 in which the watch glass (8) comprises a lower part attached to the case, characterised in that said click spring (54, 56) is arranged in a second recess partially formed in the external periphery of the watch glass (8) and the internal surface (28) of the sleeve (22).

5. Timepiece according to one of claims 2 to 4, characterised in that the external periphery of the watch glass comprises a shoulder (50) on which said click spring



(54, 56) rests axially and in that the internal surface (28) of the sleeve (22) is cylindrical.

6. Timepiece according to claim 4 or 5, characterised in that the click spring (54, 56) is blocked in rotation on the watch glass (8) by means of catches.

7. Timepiece according to one of the preceding claims, characterised in that the watch glass (8) comprises, in its upper part, an annular groove (48) in which the gasket (52) is arranged and in that the gasket (52) co-operates with a cylindrical surface (40) of the bezel (36).

8. Timepiece according to one of claims 2 to 7, characterised in that the bezel (36) comprises an annular radial groove (44) forming a part of the first recess.

9. Timepiece according to claims 7 and 8, characterised in that the annular grooves (34, 44) of the bezel (36) and of the sleeve (22) have respectively a rectangular cross-section.

10. Timepiece according to claim 2, characterised in that said split ring (60) is a flat ring.

11. Timepiece according to one of the preceding claims, characterised in that the holding means (60) and the click spring (54, 56) are respectively made of a plastic material having a high elastic limit and shearing resistance.

12. Timepiece according to claim 2, characterised in that the sleeve (22) is mounted onto the caseband (4), preferably via a snap fitting assembly.

13. Timepiece according to one of the preceding claims, characterised in that the bezel (36) is made from aluminium.