

SPECIFICATION

Watch case

- 5 The present invention relates to a watch case and, although it is not so restricted, it relates more particularly to a non-circular watch case.

According to the present invention there is provided a watch case having a body comprising a

- 10 tubular portion, a back portion and a bezel portion; a watch glass which is supported by the bezel portion at one end of the watch case; and a connector member for connecting the tubular portion to the back portion or to the bezel portion; the connector member being mounted within said body and having a portion which extends axially of the body and which is non-removably secured to the back portion or to the bezel portion; and the connector member having a flange which extends radially
- 20 outwardly from the axially extending portion of the connector member, the flange having at least two projections which are respectively disposed in recesses of the tubular portion, whereby when the connector member is disposed in a first position,
- 25 each projection overlaps a surface of the respective recess so that the connector member cannot be removed from the tubular portion, the connector member being positionable in a second position in which at least one of the said projections does not
- 30 overlap a said surface so that the connector member can be removed from the tubular portion, movement of the connector member between the said first and second positions being constituted by linear side-ways movement radially of the watch case, resilient material being disposed in a space between the
- 35 connector member and the tubular portion so as to hinder movement of the connector member into the said second position.

- The bezel portion may be integral with or separate
- 40 from the tubular portion.

The said flange preferably extends from the end of the axially extending portion which is closest to the watch glass.

- The flange may be provided with two diametrically
- 45 spaced apart projections.

Each said surface may be at an angle not exceeding 45° to the main external surface of the back portion.

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

Figures 1(a), (b) and (c) are sectional views showing conventional watch case constructions,

- Figures 2(a) and (b)* are sectional views showing conventional embodiments of watch cases having
- 55 improved gasket holding means, and *Figure 2(c)* is a plan view of the back cover of another embodiment of a conventional watch case,

- Figures 3(a) and (b)* show how portions of a conventional watch case are deformed during
- 60 assembly,

Figure 4(a) is a sectional view showing a first embodiment of a watch case according to the present invention,

- Figures 4(b) and (c)* are plan views showing part of
- 65 the structure of *Figure 4(a)*, *Figure 4(b)* showing

peripheral beads and joint recesses of the said structure in a first position, and *Figure 4(c)* showing one of the peripheral beads engaging the respective joint recess when the parts are in a second position,

- 70 *Figures 5(a), (b), (c) and (d)* illustrate the manner of assembly of the case body member and the connector member of the watch case of *Figure 4(a)*,

Figure 6 is a fragmentary sectional view showing a joint portion of a second embodiment of a watch

- 75 case according to the present invention, *Figure 7(a) and (b)* are detailed sectional views of a joint portion of the structure shown in *Figure 4(a)*, and

- Figure 8* is a sectional view showing a third
- 80 embodiment of a watch case according to the present invention.

Terms such as "upper" and "lower", as used in the description below, are to be understood to refer to directions as seen in the accompanying drawings.

- 85 *Figure 1* shows typical non-water resistant watch construction of the conventional type. *Figure 1(a)* shows a basic non-water resistant watch construction wherein a watchglass 5 is secured by adhesives to a surface A of a bezel portion 1d of the body of the watch case, the bezel portion 1d being integral with a tubular portion or case body member 1 of the watch case body. The bezel portion 1d thus supports the watch glass 5 at one end (the "upper" end) of the watch case. The case body member 1 has
- 90 an inner circumferential wall 1c which is provided with joint recesses 1a for use in connecting the case body member 1 to a back portion or back cover 4. A connector member 2, which is mounted within the watch case body, is provided with a flange 2b which
- 95 extends radially inwardly so as to hold a movement 7 against an upper internal surface of the case body. The connector member 2 is also provided with projections 2a (referred to hereafter as peripheral beads) at a side wall 2f thereof, the connector
- 100 member 2 serving to connect the case body member 1 to the back cover 4. The connector member 2 is united to the back cover 4 at an internal surface 2g by brazing or the like, if such brazing is possible.

- The connector member 2 of the non-water
- 110 resistant watch construction shown in *Figure 1(b)* is the same as that of *Figure 1(a)* functionally but, in order to increase the design variety, a bezel 6, which is separate from the case body member 1, is secured to an upper face B of the case body member 1, and a glass 5 is secured to a surface A of the bezel 6.

- 115 In the water resistant watch construction shown in *Figure 1(c)*, an annular stepped portion 1b is provided at the lower end of the case body member 1 where it contacts the back cover 4 in order to provide a recess for interposing a gasket 8
- 120 therebetween so as to prevent the penetration of water. Another way of holding the gasket 8 is to arrange that the annular stepped portion is provided in the back cover 4. In this construction, however,
- 125 since the gasket 8 is compressed in the vertical direction of the back cover 4 and the case body member 1, i.e. axially of the case, sufficient compressive power cannot be obtained if the joint comprising the peripheral beads is weak. Moreover, the number of manufacturing processes involved is
- 130

increased by the need to provide the stepped portion 1b of the case body member 1.

Further, since the gasket 8 is disposed around the external periphery of the connector member 2 when assembled, the gasket 8 cannot be held securely at this time, and assembly is thus difficult.

Various kinds of devices have therefore been conventionally devised as shown in Figures 2(a), 2(b), 2(c) in order to hold the gasket firmly. Namely, since a circular back cover can be entirely machined by a lathe, a gasket holding recess E1 can be machined by a lathe so as to extend all around the periphery of the gasket, as shown in Figure 2(a). Alternatively, in the case of a non-circular back cover, a gasket holding recess E2 can be machined by a deformation cutting machine and milling machine all around the external periphery of the connector member as shown in Figure 2(b), or a gasket holding recess E3, similar to the gasket holding recess E2 shown in Figure 2(b), can be machined only at corner portions of a non-circular connector member which can be machined in a lathe to be circular as shown in Figure 2(c).

However, in case of a non-circular back cover, the number of manufacturing processes have been thereby increased and the gasket could not be satisfactorily held in position. Moreover, as mentioned above, in the case of an annular bezel of circular shape, the latter was fixed to the case body member by interconnecting joint engaging portions thereof which were machined by a lathe, while in the case of a non-circular bezel, the bezel 6 was united to the case body member 1 by adhesives, caulking and the like as shown in Figure 1(b). Accordingly, since the bezel 6 was non-removably fixed to the case body member 1, the movement 7 had to be assembled from the back cover side after removing the back cover 4. The construction shown in Figure 1(b) has been applied widely to various designs and has been highly regarded. However, since the movement was assembled from the back cover side, movements and dials having larger external diameters than the back cover 4 could not be assembled and so the design of the watch has been restricted thereby.

As shown in Figures 3(a) and 3(b), the conventional joint comprising the peripheral beads 2a and recesses 1a was deformable in various ways in accordance with the relative strength of the case body member 1 and the connector member 2. When the plate thickness W of the case body member 1 was comparatively small as shown in Figure 3(a), the case body member 1 could be radially outwardly deformed, and the case body member 1 and the connector member 2 were arranged to be assembled and dis-assembled as indicated in Figure 3(a). When the plate thickness W of the case body member 1 was comparatively great and it could not be easily deformed, the connector member 2 was deformable radially inwardly as indicated by an arrow, and the case body member 1 and the connector member 2 were arranged to be assembled and dis-assembled as indicated in Figure 3(b). However, the conventional joint construction which relies on such deformation has various disadvantages, as follows.

In the construction of Figure 3(a), since the assembly involved deforming the case body member 1 radially outwardly at the back cover side, the case body member 1 tended to be levered away from the glass 5 so that the surface A was liable to be removed from the latter. As a result, the glass 5 and the surface A were separated if the adhesion therebetween was weak, or the glass 5 could be broken if the adhesion therebetween was strong and the glass 5 was thin and weak.

In the construction of Figure 3(b) in which the case body member 1 was not deformed and the connector member 2 was deformed radially inwardly, the portion C of the flange 2b dug into and clamped the movement 7 so that the movement 7 was damaged.

If the connector member 2 was strengthened so as not to be deformed, the peripheral beads 2a were chipped off since neither the case body member 1 nor the connector member 2 could be deformed, and as a result the joint therebetween could not be relied on.

As illustrated above, the conventional joint construction which relies on radial deformation seems very simple but actually involves very strict controls over the glass adhesion, the diameter of the movement, the shape of the peripheral beads, and the thickness of the case body member and of the connector member.

In Figures 4 to 8, there are therefore shown various embodiments of watch cases according to the present invention.

The embodiment of Figures 4(a)-4(c) is similar to the conventional construction shown in Figure 1 and will not therefore be described in detail, like reference numerals indicating like parts. In the case of the construction of Figure 4, however, a case ring 3 is provided in order to hold the movement 7 to the back cover 4 since the L-section connector member 2 of the Figure 4 construction is not provided with the radially inwardly extending flange 2b. The case ring 3 does not therefore form part of the joint between the case body member 1 and the back cover 4.

The connector member 2 of Figures 4(a) and 4(b) is provided with a flange 2c which extends radially outwardly from the upper end (i.e. the end closest to the watch glass 5) of an axially extending portion 2h of the connector member 2, the axially extending portion 2h being non-removably secured to the back cover 4 by brazing, adhesion, welding or the like. Diametrically oppositely disposed parts of the flange 2c are provided with the peripheral beads 2d which are disposed in the joint recesses 1a, the case body member 1 being provided with the joint recesses 1a at places corresponding to the positions of the peripheral beads 2d.

As indicated above, in the watch cases shown in Figures 1(a)-1(c), the case body member 1 and the connector member 2, to which the back cover 4 is joined, are connected by deforming the case body member 1 or the connector member 2. Moreover, it is in order to ensure that the case body member 1 and the connector member 2, with the back cover 4 attached thereto, do not move axially, that the peripheral beads 2a of the connector member 2 and

the joint recesses 1a of the case body member 1 are provided. However, in the construction shown in Figure 4(a), the joint recesses 1a are deeper than, i.e. extend radially outwardly of the peripheral beads 2d of the connector member 2. S1 and S2 are the radial overlaps between the radially outermost portions of the peripheral beads 2d and the inner circumferential wall 1c of the case body member 1. P1 and P2 are adjustable clearances between the radially outermost portions of the joint recesses 1a and the radially outermost portions of the peripheral beads 2d. Although S1 and S2 are ordinarily the same, it is possible to arrange that one is deliberately larger than the other in order to prevent the joint between the case body member 1 and the connector member 2 from shifting in one direction.

The adjustable clearances P1 and P2 are determined by the relative dimensions of the peripheral beads 2d and the joint recesses 1a or by the relative dimensions of the external shape of the flange 2c and the internal shape of the case body member 1 in the direction of the joint axis X.

In Figure 4(a) the gasket 8 is shown as being interposed between the case body member 1 and the back cover 4, and when the gasket 8 is removed therefrom as shown in Figure 4(b), the connector member 2 can be moved in the direction of the joint axis X by adjusting the clearances P1 or P2. It is not necessary to rely on movement in the direction of the Y axis which is at right angles to the joint axis X. The distance through which the connector member 2 can be moved in the arrow X' direction and the X axis is P2, and the distance through which it can be moved in the arrow -X' thereof is P1, the actual distances depending upon the values of the radial overlaps S1, S2 and the clearances P1, and P2.

(1) When $P1 \geq S2$, if the back cover 4 is moved in the direction of the -X arrow, the interference is 0 and the joint between the parts 1, 2 can be separated.

(2) When $P1 < S2$, if the back cover 4 is moved in the direction of the -X arrow, the effective interference is $(S2 - P1)$ and the said joint cannot be separated.

(3) When $P2 \geq S1$, if the back cover 4 is moved in the direction of the arrow X', the interference is 0, and the said joint can be separated.

(4) When $P2 < S1$, if the back cover 4 is moved in the direction of the arrow X', the effective interference is $(S1 - P2)$ and the said joint cannot be separated.

Thus the connector member 2 is movable radially (i.e. linearly sideways) of the watch case between a first position, shown in Figure 4(a), in which each of the projections 2d overlaps the lower surface of the respective recess 1a so that the connector member 2, and back cover 4 attached thereto, cannot be removed from the case body member 1, and a second position, shown in Figure 4(c), in which one of the projections 2d does not overlap its said surface so that the connector member 2 can be removed from the case body member 1.

If either P1 or P2 is 0, the connector member 2 cannot be moved respectively in the direction of the arrow -X' or the arrow X'. Consequently, the joint

can be separated without deforming the case body member 1 and the connector member 2 by arranging that $P1 \geq S2$ or $P2 \geq S1$. However, without interposing the gasket 8, the back cover can be easily moved and the joint separated.

Therefore, as shown in Figure 4(a), the gasket 8, which is made of a resilient material having elastic stability, is introduced into the space between the L-shaped connector member 2, the back cover 4 and the inner circumferential wall of the case body member 1, so that any shifting of the back cover 4 in the direction of the joint axis is restricted. Thus the resilient material of the gasket 8 both hinders movement of the connector member 2 into the Figure 4(c) position in which the connector member 2 can be removed from the case body member 1, and also hinders the ingress of water therebetween.

Since the resilient material of the gasket 8 has a very large elastic deformability in comparison with metals, the peripheral beads 2d can be introduced into the joint recesses 1a without deforming the case body member 1 or the connector member 2 by force.

Figures 5(a)-5(d) illustrate the connection between the case body member and the connector member when the resilient material of the gasket 8 (or, if desired, more than one gasket) is interposed therebetween. In Figure 5(a), the peripheral bead (or, if desired, beads) at the Q side of the back cover are disposed adjacent to the corresponding joint recesses with the gasket 8 therebetween. At this stage, however, the respective peripheral bead cannot be introduced completely into the respective joint recess by reason of the interposition of the gasket portion 8Q. Then if the back cover at the P side is pushed in the direction of the arrow A', the gasket portion 8Q at the Q side is compressed and, as shown in Figure 5(b), there is a clearance $(P1 - S1)$ at the P side. When the back cover is pushed up as indicated by an arrow B', the parts assume the positions as shown in Figure 5(c). When the external force in the direction of the arrow A' is released, the back cover is moved in the direction of the arrow C' by the resilience of the gasket portion 8Q. Finally, as shown in Figure 5(d), the case body member and back cover are fixed in a position in which the compression of the gasket portion 8P on the P side is equal to that of the gasket portion 8Q on the Q side.

Thus by assembling the parts as shown in Figures 5(a)-5(d), the clearances are completely taken up by the resilient material 8, and therefore the case body member and the back cover are not deformed at all.

Figure 6 is a fragmentary sectional view of another embodiment of the present invention which is generally similar to that of Figure 4(a) and which for this reason will not be described in detail, like reference numerals indicating like parts.

In the case of the Figure 6 construction, however, a contact surface 1S of the joint recess 1a of the case body member 1, which contacts the flange 2c is at angle θ of not more than 45° to the main external surface of the back cover 4. Moreover, the radial length ℓ and the plate thickness t of the flange 2c are such that the flange 2c can be elastically displaced in the axial direction of the watch case, this being achieved by making the length ℓ larger than the

plate thickness t .

Figures 7(a) and 7(b) are fragmentary sectional views showing the joint portion of the case body member and the back cover of the Figure 4(a)

- 5 construction in which, since the plate thickness t of the length ℓ of the joint flange 2c can have any value, in order to move the flange 2c in the direction of the double headed arrow shown in Figure 7a, a clearance p ($p > 0$) should strictly speaking be
- 10 provided between the surface 1t of the joint recess 1a and the adjacent surface of the flange 2c.

In a completely assembled watch, the clearance p is provided between the surfaces of the case body member 1 and the back cover 4 which contact each

15 other as shown in Figure 7(b), since a movement is incorporated in the watch.

A clearance p between 0.1 and 0.2mm is out of the question because too wide a clearance damages the water resistance of the watch since the gasket 8

20 extrudes therethrough. Moreover, a high class watch should not have such a clearance.

In Figure 6 therefore, the clearance p is arranged to be 0 by providing the contact surface 1S at the angle θ and by arranging that the flange length ℓ is larger

25 than the plate thickness t , so that the peripheral beads 2d contact the sloping surface 1S at an appropriate point. In the embodiment illustrated in Figure 6, an almost ideal joint is obtained by arranging that the angle $\theta = 15^\circ$, the flange length ℓ

30 $= 0.4$ to 0.5 mm, and the plate thickness $t = 0.3$ to 0.35 mm.

In the embodiment of Figure 8, in which reference numerals corresponding to those used in Figure 4(a) indicate like parts, the watch case is provided with a

35 bezel 6 which is separate from the case body member 1 and is connected thereto by an L-shaped connector member 12. A watch glass 5 is secured in a recess in the bezel 6 by known means such as adhering, indentation and the like. The L-shaped

40 connector member 12 has an axially extending portion which is non-removably secured to the bezel 6 by brazing or the like.

The connector member 12 has a flange 12c which extends radially outwardly from the axially

45 extending portion of the connector member 12, the flange 12c having at least two peripheral beads (not shown) which are respectively disposed in the recesses 1a of the case body member 1. A gasket 8 is provided with a resilience which restricts the

50 movement of the bezel 6 in the horizontal direction and also prevents the ingress of water. The case body member 1 is provided with the joint recesses 1a at positions corresponding to the peripheral beads of flange 12c. The design considerations

55 affecting the flange 12c, the joint recesses 1a, the clearances and the like in the Figure 8 construction are the same as in the case of the corresponding parts of the Figure 4(a) construction. The manner in which the bezel 6 can be joined to and removed from

60 the case body member 1 in the Figure 8 construction is the same as in the case of the back cover 4 and the case body member 1 of the Figure 4(a) construction.

The back cover 4 in Figure 4(a) would normally be made of metal although it is occasionally made of

65 plastics. Since the bezel 6 in the Figure 8

construction is provided with the glass 5 which is very fragile, deformation of the bezel 6 can damage the glass when the bezel 6 is connected to the case body member 1. Namely, when the bezel 6 is joined

70 to the case body member 1 by means of the conventional peripheral beads, relative deformation of the bezel 6 has the same effect as the relative deformation between the case body member and the back cover in the Figure 3 construction so that

75 the glass is occasionally separated from the bezel or is occasionally cracked.

In the Figure 8 construction, however, since the bezel 6 is not deformed during assembly, there is no risk that the glass 5 will crack when the bezel 6 is

80 secured to or removed from the case body member 1.

Accordingly, a watch case according to the present invention as illustrated in Figures 4-8 has a number of advantages, as follows.

85 Undesirable deformations of the case body member, the back cover, the bezel and the like which occur during assembly can be avoided and the water resistance can be improved since the gasket 8 resists the ingress of water.

90 Because the case body member, the back cover, the bezel and the like are not deformed, the thickness of the case body member, the back cover, the bezel, the glass and the like can be reduced, and therefore the variety of design can be increased.

95 The connector members 2, 12 can be pressings, and the peripheral beads 2c, 12c can be punched out at the time of forming the external shape of the connector member. Therefore the shape of the beads and the like can be predetermined.

100 By making the connector member separately, the portions of the back cover, the bezel and the like adjacent the gasket can be produced by pressing, which is highly productive, and therefore enables costs to be reduced.

105 CLAIMS

1. A watch case having a body comprising a tubular portion, a back portion and a bezel portion; a watch glass which is supported by the bezel portion at one end of the watch case; and a connector member for connecting the tubular portion to the back portion or to the bezel portion; the connector member being mounted within said body and
- 110 having a portion which extends axially of the body and which is non-removably secured to the back portion or to the bezel portion; and the connector member having a flange which extends radially outwardly from the axially extending portion of the
- 115 connector member, the flange having at least two projections which are respectively disposed in recesses of the tubular portion, whereby when the connector member is disposed in a first position, each projection overlaps a surface of the respective
- 120 recess so that the connector member cannot be removed from the tubular portion, the connector member being positionable in a second position in which at least one of the said projections does not overlap a said surface so that the connector member
- 125 can be removed from the tubular portion, movement
- 130



plate thickness t .

Figures 7(a) and 7(b) are fragmentary sectional views showing the joint portion of the case body member and the back cover of the Figure 4(a)

5 construction in which, since the plate thickness t of the length ℓ of the joint flange 2c can have any value, in order to move the flange 2c in the direction of the double headed arrow shown in Figure 7a, a clearance p ($p > 0$) should strictly speaking be
10 provided between the surface 1f of the joint recess 1a and the adjacent surface of the flange 2c.

In a completely assembled watch, the clearance p is provided between the surfaces of the case body member 1 and the back cover 4 which contact each other as shown in Figure 7(b), since a movement is
15 incorporated in the watch.

A clearance p between 0.1 and 0.2mm is out of the question because too wide a clearance damages the water resistance of the watch since the gasket 8
20 extrudes therethrough. Moreover, a high class watch should not have such a clearance.

In Figure 6 therefore, the clearance p is arranged to be 0 by providing the contact surface 1S at the angle θ and by arranging that the flange length ℓ is larger
25 than the plate thickness t , so that the peripheral beads 2d contact the sloping surface 1S at an appropriate point. In the embodiment illustrated in Figure 6, an almost ideal joint is obtained by arranging that the angle $\theta = 15^\circ$, the flange length ℓ
30 = 0.4 to 0.5mm, and the plate thickness $t = 0.3$ to 0.35mm.

In the embodiment of Figure 8, in which reference numerals corresponding to those used in Figure 4(a) indicate like parts, the watch case is provided with a
35 bezel 6 which is separate from the case body member 1 and is connected thereto by an L-shaped connector member 12. A watch glass 5 is secured in a recess in the bezel 6 by known means such as adhering, indentation and the like. The L-shaped
40 connector member 12 has an axially extending portion which is non-removably secured to the bezel 6 by brazing or the like.

The connector member 12 has a flange 12c which extends radially outwardly from the axially
45 extending portion of the connector member 12, the flange 12c having at least two peripheral beads (not shown) which are respectively disposed in the recesses 1a of the case body member 1. A gasket 8 is provided with a resilience which restricts the
50 movement of the bezel 6 in the horizontal direction and also prevents the ingress of water. The case body member 1 is provided with the joint recesses 1a at positions corresponding to the peripheral beads of flange 12c. The design considerations
55 affecting the flange 12c, the joint recesses 1a, the clearances and the like in the Figure 8 construction are the same as in the case of the corresponding parts of the Figure 4(a) construction. The manner in which the bezel 6 can be joined to and removed from
60 the case body member 1 in the Figure 8 construction is the same as in the case of the back cover 4 and the case body member 1 of the Figure 4(a) construction.

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90 Because the case body member, the back cover, the bezel and the like are not deformed, the thickness of the case body member, the back cover, the bezel, the glass and the like can be reduced, and therefore the variety of design can be increased.

95 The connector members 2, 12 can be pressings, and the peripheral beads 2c, 12c can be punched out at the time of forming the external shape of the connector member. Therefore the shape of the beads and the like can be predetermined.

100 By making the connector member separately, the portions of the back cover, the bezel and the like adjacent the gasket can be produced by pressing, which is highly productive, and therefore enables costs to be reduced.

105 CLAIMS

1. A watch case having a body comprising a tubular portion, a back portion and a bezel portion; a
110 watch glass which is supported by the bezel portion at one end of the watch case; and a connector member for connecting the tubular portion to the back portion or to the bezel portion; the connector member being mounted within said body and having a portion which extends axially of the body
115 and which is non-removably secured to the back portion or to the bezel portion; and the connector member having a flange which extends radially outwardly from the axially extending portion of the
120 connector member, the flange having at least two projections which are respectively disposed in recesses of the tubular portion, whereby when the connector member is disposed in a first position, each projection overlaps a surface of the respective
125 recess so that the connector member cannot be removed from the tubular portion, the connector member being positionable in a second position in which at least one of the said projections does not overlap a said surface so that the connector member
130 can be removed from the tubular portion, movement



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of the connector member between the said first and second positions being constituted by linear sideways movement radially of the watch case, resilient material being disposed in a space between the connector member and the tubular portion so as to hinder movement of the connector member into the said second position.

2. A watch case as claimed in claim 1 in which the bezel portion is integral with the tubular portion.

10 3. A watch case as claimed in claim 1 or 2 in which the said flange extends from the end of the axially extending portion which is closest to the watch glass.

4. A watch case as claimed in any preceding claim in which the flange is provided with two diametrically spaced apart projections.

5. A watch case as claimed in any preceding claim in which each said surface is at an angle not exceeding 45° to the main external surface of the back portion.

6. A watch case as claimed in any preceding claim in which the radial length of the flange is greater than the thickness of the flange.

7. A watch case substantially as hereinbefore described with reference to and as shown in Figure 4(a), or in Figure 6, or in Figure 8 of the accompanying drawings.