

PATENT SPECIFICATION

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- (21) Application No. 52227/74 (22) Filed 3 Dec. 1974
 (31) Convention Application No. 48/138 866 (32) Filed 5 Dec. 1973 in
 (33) Japan (JA)
 (44) Complete Specification published 18 May 1977
 (51) INT. CL.² G04B 39/00
 (52) Index at acceptance
 G3T A2B A2C

(19)



(54) WATERPROOF WATCH CASE

(71) We, KABUSHIKI KAISHA SUWA SEIKHOSA, a Japanese company of 3-4, 4-chome, Ginza, Chuo-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 relates to waterproof watch cases and to watches provided therewith.

According to one aspect of the present invention, there is provided a waterproof watch case comprising: a glass having a radially outer first surface and a radially outer second surface which is inclined relative to and which intersects said first surface; a ring; a bezel having a glass retaining portion, an inner diameter of which is less than the maximum diameter of the glass so that the bezel overlaps and is in contact with the second surface of the glass, a radially inner portion disposed adjacent to the ring, and a radially outer portion which engages a water-tight sealing element; a case body having a radially inner surface adjacent to the radially outer portion of the bezel and a transverse surface for supporting the sealing element; and gasket means disposed between and compressed radially by the glass, the bezel and the ring.

Grooves are preferably provided in said radially outer portion of the bezel and the radially inner surface of the case body to position correctly the sealing element therebetween.

According to a further aspect of the present invention, there is provided a watch having a waterproof watch case as recited above.

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

Figure 1 is a cross-section of part of a

conventional waterproof watch case;

Figure 2 is a cross-section of a part of a waterproof watch case according to the present invention; and

Figure 3, consisting of Figures 3(a), 3(b) and 3(c) illustrates, in cross-section, various forms of a gasket for the watch case of Figure 2.

In the following description the expressions "upper," "lower" etc refer to the directions as seen in the drawings.

Referring first to Figure 1 there is shown part of a conventional waterproof watch case in which a lower surface 1a of a glass 1 is bonded to a glass ring 2 by means of adhesive. A gasket 4 is compressed radially between a lower, radially outer peripheral surface of the glass ring 2 and the radially inner surface of the case body 3. The glass ring 2 is secured to the case body 3 by means of a friction fit between a bezel 5 and the case body 3.

In this conventional watch case, the water tightness between the glass and the glass ring is maintained only by the adhesive which bonds the two together and so the bond must be relatively strong and reliable. Accordingly, it is desirable to maximise the area over which the glass is bonded to the glass ring in order to achieve the required bond strength therebetween. However, in consequence, the adhesive used for the bonding is visible from the exterior of the watch case and unevenness, discolouration, and excess of adhesive spoils the external appearance of the watch case. Furthermore, because the adhesive plays an important part with regard to the water-tightness of the watch case and the securing of the glass to the glass ring, it must, when used, be subject to strict quality control.

After a watch having a watch case as illustrated in Figure 1 has been marketed, it is costly to exchange a broken or

damaged glass because it is necessary to replace not only the glass but also the glass ring since the technology involved in bonding the glass to the glass ring is so high that it cannot be performed by watch repairers, for example. Furthermore, since the glass is bonded to the glass ring, over a relatively large area, the distance between the radially inner surface of the glass ring and the radially outer extremity of the glass and the distance between the radially inner surface of the glass ring and the radially outer extremity of the bezel must be relatively large, requiring the case body to have a relatively large diameter adjacent to the glass ring. Thus a small sized watch case of this type cannot be easily produced.

In some other conventional waterproof watch cases, a gasket is disposed between a lower surface of a glass and an upper surface of a case body, and the gasket is compressed axially by securing the glass to the case body by means of a bezel and without use of adhesive. However, the external appearance of this type of watch case is unattractive because the gasket is visible through the glass and the outer diameter of the case body is necessarily large.

Referring now to Figure 2 there is illustrated a waterproof watch case according to the present invention. A glass 6, made of transparent material, has an annular radially outer peripheral first surface 6a which is almost parallel with the axis of the watch case. The glass 6 also has a radially outer peripheral second surface 6b which is inclined relative to and which intersects the first surface 6a at a predetermined angle. A bezel 7 has a glass retaining portion 7a at its upper end, the glass retaining portion having a radially inner surface whose diameter is less than the maximum diameter of the glass. Beneath the glass retaining portion 7a, the bezel is in contact with a gasket 9 housed in a groove defined by a radially inner wall 7b of the bezel 7 and the first surface 6a of the glass. The bezel has a radially inner portion 7c disposed adjacent to a ring 11 and which has a diameter greater than that of the glass retaining portion 7a and greater than that of the first surface 6a of the glass. Moreover, the bezel has a radially outer portion 7d which is in contact with a water-tight ring 10.

A case body 8 of the watch case has a radially inner peripheral surface 8a adjacent to the radially outer portion 7d of the bezel, the water-tight ring 10 being in contact with the surface 8a. The case body 8 also has a transverse surface 8b which extends radially and is adjacent to the lower end of the bezel 7 and which supports the water-tight ring 10.

The gasket 9 is made of resilient material, e.g. synthetic rubber or synthetic resin, which is compressed radially between the first surface 6a of the glass the radially inner wall 7b of the bezel and the ring 11 to maintain water-tightness therebetween.

The water-tight ring 10 is made of synthetic rubber, synthetic resin or relatively hard material such as soft metal which is compressed radially between the radially outer portion 7d of the bezel and the surface 8a of the case body, to maintain water-tightness therebetween, as well as to secure the bezel 7 and the case body 8 together by friction by virtue of stresses within the water-tight ring 10 in the assembled watch case. The bezel 7 and the case body 8 are provided with grooves or serrations on their surfaces to position correctly the water-tight ring 10 therebetween, as shown in Figure 2.

The ring 11 has an upper surface 11a which engages the gasket 9, and a surface 11b adjacent the glass. The ring 11 is disposed radially inwardly of the radially inner portion 7c of the bezel 7 to enable it to be inserted between the glass 6 and the transverse surface 8b of the case body.

The watch case according to the present invention described above is assembled as follows. Firstly, the gasket 9 is inserted into the bezel 7 to contact the radially inner wall 7b thereof. Then the glass 6 is inserted upwardly through the bezel 7 until it engages the glass retaining portion 7a thereof and is in contact with the gasket 9; here is an interference fit between the first surface 6a of the glass and the radially inner surface of the gasket 9.

The gasket 9 preferably has any one of the shapes illustrated in Figures 2(a) to 3(c).

Next after the glass 6 is secured in the correct position, the water-tight ring 10 is fitted onto the radially outer portion 7d of the bezel. The ring 11 is engaged with the transverse surface 8b of the case body 8 substantially in the middle thereof and the water-tight ring 10 is forced into contact with the surface 8a of the case body 8 by means of pressure applied downwardly on the bezel. It is necessary to ensure that the upper surface of the ring 11 does not interfere with the bezel.

The water-tight ring 10 is an interference fit with the case body so that it may stick tightly to the latter and to the bezel to maintain water-tightness therebetween and to fasten the bezel to the case body. Moreover, the ring 11 has a surface 11b adjacent the glass, and has the surface 11a which stops the gasket 9 from being forced radially inwardly by the bezel 7. If the ring 11 is engaged with the bezel at the outset, assembly of the watch case is facilitated.

The gasket, if desired, may be L-shaped. The width of the surface 11b of the ring 11 can be minimised because its is required only to support the gasket 9. Further the surface 11b is not easily visible from the exterior of the watch case by virtue of the second surface 6b of the glass resulting in neat external appearance to the watch case.

Furthermore, the gasket 9 is not readily visible because it is disposed adjacent the radially outer extremity of the glass 6 and this too enhances the external appearance of the watch case.

The component parts of the watch case described above can be assembled very easily. The glass and the bezel can be secured together in a stable manner because no adhesive which requires complicated control, is utilised: thus a high reliable quality of manufacture is assured.

Additionally, the distance between the radially inner surface of the ring 11 and the radially outer extremity of the glass and/or the distance between the radially inner surface of the ring 11 and the radially outer extremity of the bezel 7 can be reduced. Therefore, the outer diameter of the watch case as a whole can be reduced relative to the inner diameter of the ring 11 and a small sized watch case can readily be made.

Having regard to the provisions of Section 9 of the Patents Act 1949, we direct attention to our Patent No. 1,369,369.

WHAT WE CLAIM IS:—

1. A waterproof watch case com-

prising: a glass having a radially outer first surface and a radially outer second surface which is inclined relative to and which intersects said first surface; a ring; a bezel having a glass retaining portion, an inner diameter of which is less than the maximum diameter of the glass so that the bezel overlaps and is in contact with the second surface of the glass, a radially inner portion disposed adjacent to the ring, and a radially outer portion which engages a water-tight sealing element; a case body having a radially inner surface adjacent to the radially outer portion of the bezel and a transverse surface for supporting the sealing element; and gasket means disposed between and compressed radially by the glass, the bezel and the ring.

2. A waterproof watch case as claimed in claim 1 in which grooves are provided in said radially outer portion of the bezel and the radially inner surface of the case body to position correctly the sealing element therebetween.

3. A waterproof watch case substantially as herein described with reference to and as shown in Figures 2 and 3 of the accompanying drawings.

4. A watch having a watch case as claimed in any preceding claim.

J. MILLER & CO.,
Chartered Patent Agents,

Agents for the Applicants,
296/302 High Holborn,
London WC1V 7JH.



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