

SPECIFICATION

WATCHCASE

This invention relates to watchcases, and more particularly to a watchcase of the type comprising a casebody composed of a caseband and a glass.

The use of non-deteriorating materials for various parts of watchcases, especially scratchproof hard materials, is known to entail numerous manufacturing problems. As there is an ever-increasing need for watchcases of this type in the watchmaking industry, particularly for wrist watches, several attempts have been made in recent years to facilitate the production of watchcases made of such materials.

However, since very hard materials are not easy to machine, there are difficulties in assembling the various parts of the case, above all if the appearance of the watchcase as a whole is to be as attractive as possible, which is usually a requirement.

In order to overcome these difficulties, my U.K. Patent No. 1,099,996 proposes that a one-piece combined caseband and back be assembled with a glass of mineral material by means of metal claws fixed to the frustoconical top surface of the casebody. Because this design requires the machining of delicate metal parts, the cost is relatively high. Moreover, this design lends itself only to round watches if fluid-tight fixation of the glass is to be ensured.

As disclosed in my U.S. Patent No. 3,719,038, another solution to the problem consists in producing the glass and the caseband of a watchcase in one piece and fixing a metal back thereto.

However, because it is desirable for aesthetic reasons to make the caseband opaque in order to hide the sides of the movement and the means for securing it, a slightly translucent material must be used, and the central portion of the casebody serving as the glass must be made thin enough so that the display members are visible through it. This design entails certain risks in that the thickness of the central "screen" portion must be reduced to such an extent that its strength is jeopardized. If it is sought to make it thick enough to ensure its sturdiness, it becomes difficult to tell the time through this thin translucent element.

The attempt has likewise been made to secure a transparent glass, e.g., a sapphire glass, permanently to a casebody of hard mineral or metallic material such as a metal carbide. For this purpose, U.S. Patent No. 3,911,670 proposes, for example, the use of an annular mounting of ductile steel, e.g., a nickel steel having a high nickel content. This mounting is gripped between the sapphire glass and the caseband of sintered material. The aim is to produce a rigid assembly, all the elements of which have substantially similar thermal-expansion coefficients in order to avoid the stresses which arise in the event of temperature variations. However, a drawback of this solution is that the steel mounting remains visible between

the glass and the sintered part of the caseband unless complicated shapes are given to both the caseband and the glass. Yet such shapes are scarcely compatible with the third structure of the objects in question.

Thus there is a need for a watchcase of the type initially mentioned which avoids the foregoing drawbacks and which is also compatible with attractive and yet reliable designs in which the means for securing the glass to the caseband do not include any visible metal element.

This need may be filled by utilizing recent contributions to the technology of glues and adhesives, and preferably the contributions to the technology of thin, adherent coatings are also utilized.

There is provided according to the present invention a watchcase comprising: a detachable metal back, an annular caseband having a top surface remote from said back, a bottom surface facing said back, and an outer surface, and a glass having an outer rim and a peripheral annular bottom surface cemented to said top surface of said caseband, said caseband and said glass being made of materials having similar harnesses and together forming a casebody having one or more facets, the or each facet extending partially over said outer surface of said caseband and partially over said outer rim of said glass.

Two preferred embodiments of the invention will now be described in detail with reference to the accompanying drawing, in which:

Figure 1 is an axial section through a watchcase in a first embodiment of the invention,

Figure 2 is a sectional view through a second embodiment, and

Figure 3 is a perspective view of the second embodiment.

The main part of the case shown in Figure 1 is a caseband 1; this is a hard solid part which may be made of various materials, e.g., corundum, lapis lazuli, onyx, a preferably sintered synthetic material such as a cermet, preferably of stone-like appearance, or sintered hard metal. The caseband 1 may also be of moulded material such as plastics or, if need be, of metal, especially a high-hardness alloy. As may be seen in Figure 1, the caseband 1 has an inner surface 2, the generatrices of which are straight and vertical. If the case is round, the inner surface 2 will be circular-cylindrical. However, the caseband 1 may equally well be rectangular or square. The top surface 3 of the caseband 1 is plane, but it may also be slightly conical in order to aid the centering of a glass 6. The top surface 3 comes in contact with the glass 6 and is secured thereto by adhesion, as will be explained below. Furthermore, the caseband 1 has a bottom surface 23, likewise plane, against which there rests a corresponding annular surface 24 of a back 8. Finally, the caseband 1 exhibits an outer side surface, the upper portion of which takes the form of plane facets 1a distributed along a frustoconical inclination, and the lower portion of which is a frustoconical surface 1b which may, as a variation, equally well be a circular-cylindrical

surface coaxial with the watchcase as a whole.

In the embodiment illustrated in Figure 1, two holes 4 pass through the caseband 1 for receiving screws 5, the heads of which are sunk in flared upper end portions of the holes 4 and immobilized there by cementing. Provision might also be made for three or four holes 4 and a like number of screws 5. The caseband 1 also includes a radial bore through which a control stem may pass. This control stem bears a crown 25 (Figure 3), and the caseband 1 may be equipped with a metal tube coaxial with the stem and cooperating with a gasket fitted on the crown 25, as in conventional water-resistant watches.

The glass 6, which completes the case-body shown in Figure 1, is of sapphire and is either flat top and bottom or made so that the peripheral zone on its underside matches the top surface 3 of the caseband 1. In either case, the peripheral zone on the underside of the glass 6 bears an extremely thin coating 7 of metal, e.g., gold, deposited by the process of chemical vaporization. By this process, well known to those skilled in the art, a thin coating of particularly strong adherence can be deposited on a smooth surface of a part such as the glass 6. The coating will be just thick enough to make the annular peripheral zone of the glass 6 opaque. As a modification, this opaque peripheral zone might be produced by incorporating metallic or other particles in the glass. If the coating 7 is used, it is essential that it be particularly adherent since it forms the intermediary for fixing the glass 6 to the caseband 1. As may be seen from the drawing, the metal coating 7 of the glass 6 covers the plane surface 3 of the caseband 1, and these two surfaces are bonded to one another by cementing. Because of the coating 7, both the heads of the screws 5 and the cement are invisible. As a further modification, it would be possible to use an opaque cement, either with or without the coating 7.

In order to render the resultant case-body more attractive, the side surfaces of the glass 6 and the caseband 1 are machined together after cementing of the glass by grinding the facets 1a extending over both the rim of the glass 6 and the outer surface of the caseband 1. Thus a perfect join is obtained between the two parts, and the interface is invisible. Moreover, since the screws 5 are cemented to the caseband 1, the composite assembly formed by the caseband 1 and the glass 6 is like a single piece, to which the back 8 may easily be attached.

The back 8 comprises a preferably metal plate 11, with a shallow recess 12 machined in its inside surface, and an annular wall 13 of brass or some other metal, which is adapted to the dimensions of a movement 14 intended to be fitted in the case. The wall 13 constitutes a support ring for the movement 14; it may be soldered or cemented by its lower edge to the bottom of the recess 12, leaving at its periphery a space in the form of an annular groove for holding a gasket 15. When the wall 13 is soldered or cemented to the back 8, it ensures the rigidity of the latter, so that

the thickness of the portion of the plate 11 beneath the recess 12 may be reduced to a minimum.

As may be seen in Figure 1, the plate 11 includes amply dimensioned apertures 9 for receiving the ends of the screws 5 and allowing for expansion of the back 8. The back 8 may be fixed by means of nuts 10 which, after being affixed to the screws 5, are sunk within the entry recesses 9a of the apertures 9.

The plate-bead 22 of the movement 14 supports the latter on the upper rim of the wall 13. The movement 14 may be cased within the back 8, then fitted in the case-body 1, 6. For completing the fixing operation, it is preferable to use a casing-ring 16 which is adapted to the dimensions of the inner surface 2 of the caseband 1 and which extends in height from the plate-bead 22 to the level of the underside of the glass 6. The casing-ring 16 will rest beneath and against the opaque coating 7, which will be made wide enough to extend over part of the interior of the caseband 1, thus hiding both the casing-ring 16 and the periphery of a dial 17. The height of the casing-ring 16 will naturally be such that sufficient hand-fitting space is left between the dial 17 and the under side of the glass 6.

The flat plate 11 constituting the main part of the back 8 will comprise means for attaching a watchband, e.g., horns 18. In a case having a round caseband 1, the plate 11 might be either round or square.

Other transparent materials might equally well be used for the glass 6 instead of sapphire or mineral glass, heat-treated or not. In any event, the materials chosen for the glass 6 and the caseband 1 should have hardnesses as similar as possible and the coefficients of expansion should likewise be as similar as possible. The glass 6 is of transparent material and the caseband 1 of opaque material. If so desired, the material of the glass 6 may be slightly tinted in the same shade as the caseband 1, with the glass 6 being sufficiently transparent so that the hands beneath it may be clearly seen. If the caseband 1 is of ceramic or plastics material, the material chosen for the glass 6 should likewise meet the conditions of hardness and coefficient of thermal expansion mentioned above.

The embodiment illustrated in Figure 2 is similar to that of Figure 1 in that it also comprises a glass 6 having an opaque peripheral zone 7 formed on the underside by vacuum-vaporization of a metal deposit, and a caseband 1 having an inner surface 2 without notches or undercuts. The inner surface 2 may also be metallized. A back 8 is also constituted in the same way as in the first embodiment.

However, the caseband 1 does not include holes 4 passing completely through it, but rather cavities 19 produced by ultrasonic machining by grinding, or by electroerosion. The cavities 19 have flat bottoms and slightly frustoconical, inwardly flaring sidewalls. They open out at their smaller end into the likewise plane bottom surface of the caseband 1 and accommodate tapped bushings 20 for receiving screws 21 which are inserted through

apertures 9 in the back 8 and then tightened from the back. The heads of the screws 21 are sunk in the entry recesses 9a of the apertures 9.

In this embodiment as well, the back 8 is made up of a plate 11 and a wall or support-ring 13. These two parts may be produced separately from one another, and the groove for receiving the gasket 15 may be made in the annular surface surrounding the recess 12. The movement 14 is likewise secured within the back 8 by a casing-ring 16, the inner surface of which extends to the top of the hand-fitting space.

If the choice of materials allows, or if it is desired to make the caseband 1 as rigid as possible by limiting its outside dimensions, shoulders may be formed in the inner surface of the caseband 1 for guiding the movement 14 or for supporting the edge of the dial 17.

The design described lends itself not only to conventional round watchcases but also to thin watchcases which are rectangular, square, or of other shapes.

The horns 18 form part of the back 8 and are provided with holes for inserting the ends of the attachment bars of the watchband. The watchband may also be combined with the back in one piece, in which case it forms a continuation of the latter.

It will also be noted that the caseband 1, instead of being of opaque material, may equally well be made of a transparent or translucent base material and be treated by metallic or other vapor-depositing to make its inner surfaces opaque. Even if plastics materials are used to make the caseband 1, e.g. polyethylene or the thermoplastic synthetic resin sold under the trademark "Plexiglas", adherent metal coatings may be applied to the inner surfaces.

CLAIMS

1. A watchcase comprising:
 - 40 a detachable metal back,
 - an annular caseband having a top surface remote from said back, a bottom surface facing said back, and an outer surface, and
 - 45 a glass having an outer rim and a peripheral annular bottom surface cemented to said top surface of said caseband,
 - said caseband and said glass being made of

materials having similar hardnesses and together forming a casebody having one or more facets, the or each facet extending partially over said outer surface of said caseband and partially over said outer rim of said glass.

2. A watchcase as claimed in Claim 1, wherein said top surface of said caseband is plane or slightly conical, said peripheral annular bottom surface of said glass being of a shape complementary to that of said caseband top surface.

3. A watchcase as claimed in Claim 1 or Claim 2, wherein said peripheral bottom surface of said glass bears an opaque coating extending inwardly at least to the space within said annular caseband.

4. A watchcase as claimed in any one of the preceding claims, wherein said glass is cemented to said caseband by an opaque cement.

5. A watchcase as claimed in any one of the preceding claims, wherein said glass and said caseband are of materials having similar coefficients of thermal expansion.

6. A watchband as claimed in any one of the preceding claims, wherein said glass is of sapphire or mineral glass, said caseband being of ceramic material, cermet or sintered material.

7. A watchcase as claimed in any one of the preceding claims, wherein said glass and said caseband are of plastics material.

8. A watchcase as claimed in any one of the preceding claims, further comprising two or more screws securing said back to said case-body.

9. A watchcase as claimed in any one of the preceding claims, further comprising an annular wall disposed within said caseband and in contact with said back for supporting a watch movement.

10. A watchcase in accordance with Claim 9, wherein said annular wall is soldered or cemented to said back.

11. A watchcase as claimed in Claim 9 or Claim 10, as dependent on Claim 3, wherein said annular caseband has a single inner surface generated by a straight vertical line, said annular wall cooperating for the support of said watch movement with a casing-ring resting against said glass in the region of said opaque coating.

12. A watchcase substantially as hereinbefore described with reference to the accompanying drawings.

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