

DESCRIPTION

The present invention relates to watch cases whose apparent parts are made of a hard material so as to avoid the risk of being scratched when worn on a wrist.

A first embodiment of such a watch case has been marketed with constant success since 1959. This embodiment is in particular described in Swiss patent specification 517963. The constant success of this kind of watch case is due in part to the particular shape of the cap that is shown in Figures 1 to 4 of the above specification and which protects the watch in a particularly effective manner.

However, the manufacture of these caps and the manner in which they are secured to an underlying middle have always ran into technical difficulties and many different constructions have been proposed for overcoming these difficulties.

The cap described in Swiss patent specification 517963 has an outer, possibly frusto-conical face and on the inside two stepped annular shoulders between which are cylindrical connecting surfaces. It is force-fitted over a correspondingly shaped portion of an underlying middle and glued.

According to Swiss patent specification 508925, filed in 1969, the cap is removably mounted by means of an elastic annulus over an underlying middle. To this end, it is formed with an inner groove.

Japanese utility model 1046157, also filed in 1969, suggests fixing two separate constituent parts of a case body with a malleable metallic element of annular shape sandwiched between the two parts.

Swiss patent specification 558040, filed in 1971, proposes still another arrangement by providing a cap having a planar underside in which are embedded tapped studs. The latter enable the cap to be secured to a shoulder on an underlying middle with screws.

Actually, only the arrangement disclosed in the first of the above-mentioned documents has been in constant use, despite the fact that it has always been difficult to achieve an even manufacturing standard.

On the other hand, it is known from Swiss patent application 17664/68 a watch case having a cap made of a hard material, which is fixed onto a middle through an annular fixing element interposed therebetween, said cap resting, through an annular planar edge arranged on a thicker portion, onto an annular radial shoulder arranged on the middle.

Recently, however, applicant has found that by giving such a cap a new shape, its manufacture and assembly on an underlying middle could be simplified to a large extent. Further a substantial reduction in the cap's internal stresses had the effect of reducing the likelihood of cracks occurring both during sintering and while wearing the watch.

The object of the invention is to improve watch cases having a cover of hard material and more particularly to reduce their cost price while increasing their reliability.

To this end, the watch case according to the invention is provided with the features set forth in claim 1.

An embodiment of the watch case provided by the invention will now be described with reference to the accompanying drawings, in which :

Figure 1 is an exploded perspective view, and in cross-section, of the main constituent parts of the casing;

Figure 2 is a partial top view of the casing;

Figures 3 and 4 are views, partly in cross-section, along the 6 o'clock - 12 o'clock axis and the 3 o'clock - 9 o'clock axis respectively, of a wrist watch provided with the casing shown in Figures 1 and 2; and

Figure 5 is a side view of the cap alone, in the direction of arrow V in Figures 1 and 4.

The watch case shown in Figure 3 has four main parts : an inner middle 1, a cap 2, a glass 3 and a back 4. Glass 3 and back 4 are conventional components whose structure need not be described in detail. Inner middle 1 and cap 2 have shapes such as to simplify manufacture and facilitate assembly.

Inner middle 1 is made of an easily machinable metal, e.g. stainless steel. It could also be made of another material, e.g. plastic material. The actual production technique resorted to will be suited to the material being used : profile-turning or stamping and final machining, molding, etc.

Inner middle 1 is designed to contain a movement 5, preferably of the analog type. It has a lower portion 6 and an upper portion 7. Lower portion 6 is solid with back 4. It surrounds and bears movement 5, in a conventional manner which will not therefore be described in greater detail. Upper portion 7 is ring-shaped with a planar top face 8, a cylindrical outer side face 9 and a slightly frusto-conical, inner side spacing face 10. This latter surface is limited at the bottom by a shoulder 11 intended to form flange and thus to maintain the outer edge portion of the dial borne by movement 5. In the adjoining regions of portions 6 and 7 and at the foot of surface 9 is provided a planar shoulder 13 whose circular outer edge also forms the top edge of an outer frusto-conical surface 14 forming a bearing surface for cap 2.

The shape of inner middle 1, in plan, is the same as that of cap 2 and frusto-conical surface 14 extends outwardly to the line that determines the contour of these parts. However, the reentrant spaces 15 between horns 16 and the reentrant space 17 at 3 o'clock for the crown are covered by an edge portion of cap 2.

Cap 2 is a part made of sintered hard metal. It comprises a thicker radially outer portion 18 of annular shape and a thinner radially inner portion 19 that forms an annular flange at the top of por-

tion 18. The latter is limited inwards by a circular cylindrical surface 20, downwards by an inner frusto-conical surface 21 having the same inclination as surface 14 and upwards by a frusto-conical surface 22 that is truncated at the level of the top surface 23 of flange 19.

The cap's side faces include two longitudinal surfaces 24 and 25 whose generatrices are parallel to the common axis a of surfaces 14, 20, 21 and 22 and two circular and coaxial cylindrical surface portions 26 and 27 whose axes coincide with common axis a. Surfaces 24 to 27 thus together define the rim of the watch, which is of rectangular shape with rounded sides, the longer sides of the rectangle being oriented in a direction substantially parallel to the 12 o'clock - 6 o'clock axis of the watch. Finally, two planar faces 28, adjacent to spaces 15, define a passage for a wristlet not shown, intended to be secured to horns 16.

As is apparent from Figures 3 and 4, the two constituent parts 1 and 2 of the watch case are fixedly fastened to one another by a ring 31 made of deformable material, e.g. an elastomer, engaged in the radial gap provided between coaxial surfaces 20 and 9. Heightwise positioning is achieved, by contact of surfaces 14 and 21. Gasket 31 may be glued.

The cap's manufacture is simplified by the fact that the only surfaces having to be machined to accurate dimensions are surfaces 20 and 21. They can be true ground by automatically operated means suitable for mass production. Surfaces 22 to 27 must be true ground and polished. However, they are planar, frusto-conical or cylindrical surfaces that are located on the outside of the case and whose dimensions are therefore not critical. In fact, even the size of the radial gap between surfaces 9 and 20 will bear substantial machining tolerances, made possible by the deformation of ring 31.

The main advantage of the described construction is its much greater reliability compared to the earlier constructions.

Indeed, referring to Figures 1, 3 and 4, it will be noted that inner frusto-conical surface 21 and outer frusto-conical surface 22 respectively of the cap's thicker por-

tion 18 have substantially the same inclination so that portion 18 is of substantially constant thickness throughout its length. As a result, because of this inclination and because of the parallel arrangement of inner axial surface 20 and outer axial surfaces 24, 25, 26 and 27, the thicker portion 18 of cap 2 has, viewed in longitudinal cross-section (along common axis a), the outline of a parallelogram.

This shape was found to avoid, to an exceptional extent, internal stresses during sintering and as a result the likelihood of cracks occurring .

Glass 3 may be secured in the opening defined by inner flange 19 by means of an intermediate sealing gasket 32 and bears on top face 8.

The above described watch case has a pleasing effect conveying an impression of thinness, compared to the watch case disclosed in Swiss patent specification 517963. Referring more particularly to Figure 5, it will be noted that the bottom edges 24a and 25a of the longer sides 24 and 25 of cap 2 are curved, i. e. in relation to the cap they have a concave shape. These bottom edges 24a and 25a and the corresponding top edges 24b and 25b delimit the surfaces of the longer sides 24 and 25 which define bands known as casebands.

Preferably, the two top edges 24b and 25b are parallel to the corresponding bottom edges 24a and 25a respectively so that the longitudinally extending, lateral casebands 24 and 25 each have a constant width and a curved appearance opening towards the bottom of the cap, this being the region closest to the wrist.

The shape of these edges and of the casebands is due to the geometric combination between the cap's longer sides which are circular and the frusto-conical shape of the inner and outer surfaces 21 and 22 of the cap's thicker portion 18.

In this connection and as will be observed in Figure 1, inner frusto-conical surface 21 extends to the sides 24 and 25 of the middle 1 and it opens thereof. Thus, frusto-conical surface 21 and circular

surfaces 24 and 25 are contiguous and form common edges which are bottom edges 24a and 25a. Similarly, outer frusto-conical surface 22 is contiguous with side circular surfaces 24 and 25 and defines therewith top edges 24b and 25b.

Therefore, the curvature of the top edges 24b, 25b and of the bottom edges 24a, 25a is defined by the conicity of the surfaces 21 and 22 and by the radius of the longer sides 24 and 25.

Because the conicity of outer surface 22 is substantially the same as that of inner surface 21, each top edge 24b, 25b is substantially parallel to its associated bottom edge 24a, 25a.

Further, by selecting at least for inner surface 21 an angle at the apex of the cone of about 120° and a radius of curvature for the rounded longer sides 24 and 25 equal to double the distance between these sides and the center of the watch, it is possible to provide the bottom edges 24a and 25a with a curvature that is akin to that of the wearer's wrist. This curvature, which is particularly noticeable when the middle and the cap have contrasting colors, gives the impression that the watch has a thickness equal to that of the cap alone.



CLAIMS

1. Watch case comprising a coaxial assembly of two constituent parts, one being an inner middle (1) made of a machinable material and the other being a cap (2) made of a hard material covering the inner middle (1) and comprising a thicker portion (18), said inner middle (1) and the cap (2) comprising a first cylindrical surface (9) and a second cylindrical surface (20) respectively, said second surface (20) having a diameter greater than that of the first surface (9), such as to provide a radial gap between said surfaces, an annular fixing element (31) made of a deformable material being interposed between said surfaces, the cylindrical surface (20) of the middle (1) being arranged on a thicker portion (18) thereof which delimits said portion internally, said watch case being characterized in that the first cylindrical surface (9) is arranged on an upper portion (7) of the inner middle (1) which comprises a lower portion (6) onto which a first frusto-conical surface (14) extending under the first cylindrical surface (9), the cap (2) further comprising a second frusto-conical surface (21) having the same inclination as the first surface (14) and delimiting the thicker portion (18) downwardly, said frusto-conical surfaces (14, 21) being in contact with each other, so that the first surface (14) constitutes, under the annular fixing element (31), a frusto-conical bearing surface of the cap (2), which provides the heightwise positioning thereof on the inner middle (1).

2. Watch case according to claim 1, characterized in that a glass (3) is fitted to the cap (2) through an inner flange (19) having an annular shape, said flange being on the cap (2) and covering said fixing element (31), said glass (3) being engaged in an opening of said flange (19) by means of an intermediate sealing gasket (32).

3. Watch case according to claim 2, characterized in that said upper portion (7) of the inner middle (1) extends



partially beneath the peripheral edge portion of the glass (3) and directly beneath the inner flange of the cap (2).

4. Watch case according to one of the preceding claims, characterized in that the thicker portion (18) of the cap (2) is externally limited by an outer frusto-conical surface (22) having substantially the same inclination as the inner frusto-conical surface (21).

5. Watch case according to one of claims 1 to 4, characterized in that the cap (2) further has lateral surfaces (24 to 27) having generatrices that are parallel to the common axis (a) of the constituent parts formed by the inner middle (1) and the cap (2), said lateral surfaces (24 to 27) defining in plan a rectangular outline having rounded sides.

6. Watch case according to one of the preceding claims, characterized in that the thicker portion (18) has in longitudinal cross-section the outline of a parallelogram.

7. Watch case according to one of the preceding claims, characterized in that the second frusto-conical surface (21) delimiting innerly the cap (2) opens laterally of this cap (2), at least along the longitudinal sides thereof that are parallel to the 12 o'clock - 6 o'clock axis of the watch.

8. Watch case according to claim 7, characterized in that the second frusto-conical surface (21) and the surfaces (24, 25) of the longitudinal sides have common edges defining lower edges (24a, 25a) of the cap (2) which are of curved and concave shape, opening towards a wearer's wrist.