

[54] **HERMETIC WATCH-CASE**
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 [22] Filed: **June 5, 1972**
 [21] Appl. No.: **259,692**

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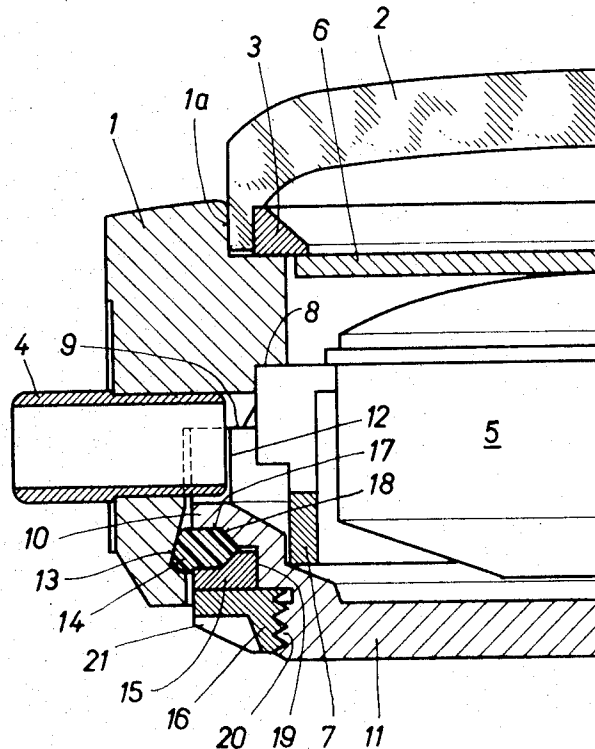
[30] **Foreign Application Priority Data**
 June 11, 1971 Switzerland.....8538/71
 [52] U.S. Cl.**58/90 R**
 [51] Int. Cl.**G04b 37/08**
 [58] Field of Search.....58/90 R, 88

[57] **ABSTRACT**

A hermetically sealed watch case in which the middle and the back define between them a groove for an elastic sealing ring. A rigid ring is provided to compress the elastic sealing ring and this ring is activated by a threaded piece, the threads of which are separated from the interior of this watch case so that the latter is protected from any fine cuttings resulting from turning the threaded piece.

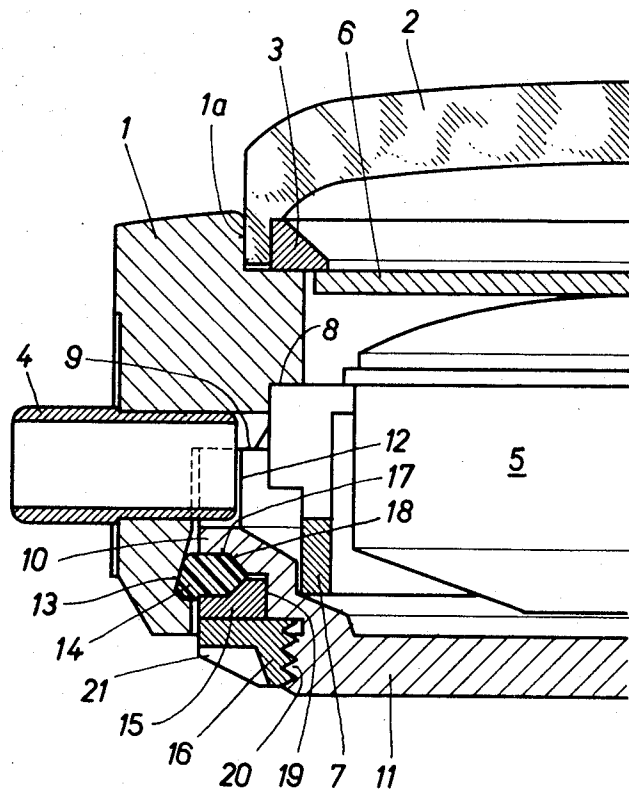
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8 Claims, 1 Drawing Figure



PATENTED MAR 27 1973

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HERMETIC WATCH-CASE

The object of the present invention is a hermetic watch-case comprising a middle, back provided with a lateral wall engaging the inside of the middle, and a hermetic joint located between back and middle and ensuring rigid, hermetic connection between back and middle.

Hermetic watch-cases are already known, in which back is connected to middle by a hermetic seal which is tightened by a ring, — itself screwed into a thread of the middle's wall —, against an inner shoulder of the middle. These are round watch-cases in which the cross-section of the hermetic ring is rectangular or triangular. In those known boxes, the hermetic ring is made of a material of relatively low elasticity and requires considerable tightening between fastening-ring and middle so as to be forced back inside. The ring screwed in the thread of the middle compresses the seal in centripetal fashion so it rests against the back's outer cylindrical wall or else so as to engage it in a groove of the back's wall.

This sealing system however has been little applied because offering no appreciable advantages with respect to the system presently being used, and in which the back is directly screwed into the middle's inside thread while axially compressing a seal between these two parts. These two prior systems suffer from common drawbacks: they require tapping the middle; they further require identical accuracy in machining case parts and neither can be used when the watch is other than round. Also, practice has shown that screwing a back or a steel ring into the middle's thread, the middle generally being brass, German silver or steel, little metal chips may detach from the thread and fall inside the case when being opened. Operation of a mechanical watch may suffer from such metal chips and recently it has been shown that their adverse effect upon electronic watches is larger yet.

Thus, the main object of this invention is to embody or ensure a hermetic watch-case with rigid connection between back and middle by means inherently simple and eliminating entirely the danger of metal chips entering the space holding the movement.

In order to achieve this goal, tapping or threading on or in the middle is eliminated. The watch-case according to the invention is characterized by the middle being provided on its inner side with a groove of triangular cross-section, of which the lower flank makes a larger angle with the case axis than the upper flank, by the back being provided with an oblique shoulder located opposite said groove and with a central threaded step, by a rigid ring being screwed in the back's thread, such ring being provided with a shoulder that is obliquely opposite and axially displaced toward the outside with respect to the back's oblique shoulder, by the joint being made of an elastic material which is forced back radially toward the outside by said shoulders when the ring is being screwed-in and is engaging said groove.

The rigid ring may be made of a single piece or of two parts. The single-piece embodiment applies often to round watches, whereas a two-piece embodiment allows applying the invention's concepts to watches of shapes other than circular.

The attached drawing shows an embodiment which is to be construed as merely an illustration according to the invention.

The single figure drawing shows in fragmentary axial section a watch-case according to the invention.

The watch-case shown in the drawing happens to be round, but the invention applies equally well to other shapes.

The middle 1 comprises a glass — or bezel notch 1a by means of a tensioning ring 3. The middle is provided with a radial opening through which is forced a tube 4 allowing passage to the winding stem. The movement is denoted by 5 and is provided with a dial 6 and further rests on a fitting circle 7. Casing is achieved through the case's back, the fitting circle's wall pressing against an inner shoulder 8 made in middle 1 and the periphery of dial 6 being in contact with the inner side of ring 3.

Middle 1 also is provided with another plane around shoulder 9 extending along the middle's periphery and directed towards the rear of the case, this shoulder being meant to support the edge of the cylindrical lateral wall 10 which is located at the periphery of back 11. Height-wise, this shoulder extends a little above the axis of tube 4; wall 10 is provided with a hollow 12 engaging the inner, projecting end of tube 4 during casing. Therefore back 11 is prevented from rotating about its axis when the two parts 1 and 11 are being assembled and fastened to one another.

This assembly arrangement comprises on one hand a V-groove 13 in the inner cylindrical side of middle 1 and below tube 4, and on the other hand a natural or synthetic rubber joint of circular shape, 14, preferably a toroidal seal, and finally a compression annulus 15 and a threaded ring 16. Seal 14, annulus 15 and ring 16 rest on the back 11. To that end, back 11 is provided on its outer lateral side with a first plane annular shoulder 17 which is limited on the inside by a shoulder 18 in the shape of a frustrum of a cone and a second shoulder or step 19 for guiding and centering annulus 15, which freely fits onto this step. As shown in the drawing, this annulus 15 has a cross-section symmetric with that of the lower part of wall 10 and its lower side is plane. This lower side rests on ring 16 which is screwed to a second step or shoulder 20 at the periphery of back 11. This latter step or shoulder is of lesser diameter than that of step or shoulder 19; it is provided with a thread. Ring 16 is provided with key-notches 21 along its entire circumference so that it may entirely screw onto thread 20 and thereby one compresses the toroidal seal 14 between the plane and frustrum-of-cone shoulders of annulus 15 and of wall 10.

The dimensions of the different described parts and notably of ring and annulus 15 are such that the whole forming the back of the case may be cased in the middle when ring 16 is sufficiently loosened for seal 14 to assume its natural toroidal shape. When the upper edge of lateral wall 10 presses against shoulder 9, the seal will be at the same height as groove 13. In this position, screwing of ring 16 forces the seal 14 radially outwards so that it enters groove 13 of which the lower flank is more at a slant than the upper. Because of this difference in slant of the groove's flanks, the seal is subjected to a reaction force with upward directed radial component. Thus, the more ring 16 is being tightened,

the more the seal is forced into the groove and the more the back 11 presses against shoulder 9.

In this manner a perfectly hermetic assembly or fastening is achieved, which furthermore is very easy to carry out. One of the advantages in the described device or scheme consists in rendering superfluous any highly accurate fitting or adjustment between the back's dimensions and those of the middle's rear. Therefore, one may stock up backs provided with their rings and seals and make use of those case components when sealing different kinds of middles. Machining middles thereby is rendered much simpler, and the same applies to the backs. Another advantage consists in threaded ring 16 — which is used for tightening — being entirely outside the seal so that metal chips will not enter the case's inside. This feature is of particular interest with regard to cases housing electric or electronic watch movements. If necessary, the back's lateral wall may serve as a magnetic shield.

In another form of embodiment, annulus 15 might be eliminated or made in one piece with ring 16. However, as shown in the drawing, such annulus allows vigorous tightening of the ring 16 without danger the seal be dragged along.

Finally, another advantage of the described device or arrangement consists in its smaller size. The annular seal 14 together with its fastening means 17, 15, 16 require no greater volume than would be the fastening parts in a conventional arrangement comprising a back directly screwed into the middle with a seal interposed. Lastly, it will be observed that for the described embodiment, tightening the back against the middle's shoulder 9 by compressing the very elastic, toroidal seal 14 at the same time fastens circle 7 in-between a frustrum-of-cone shoulder and another shoulder 8 of the middle.

What is claimed is:

1. A hermetic watch-case comprising a middle, a back provided with a lateral wall engaging or entering the middle's inside, a seal of elastic material, said middle being provided on its inner side with a groove of tri-

angular cross-section of which the lower flank makes a larger angle with the case axis than does the upper flank, said back being provided with an oblique shoulder located opposite said groove as well as with a central threaded area, a rigid ring in threaded engagement with the back's threaded area, said ring being provided with an oblique shoulder that is opposite and axially displaced outwards with respect to the back's oblique shoulder, said seal being radially forced outward by said shoulders when the ring is being screwed inwardly and enters said groove, said elastic seal isolating the interior of the watch from any cuttings resulting from the mutual engagement of the threads in the threaded area.

2. A watch-case according to claim 1, in which the middle and the back are circular in shape and said back and ring shoulders are of frusto conical shape.

3. A watch-case according to claim 2, in which the seal is made of a highly elastic material in the shape of a torus.

4. A watch-case according to claim 1, in which said rigid ring is made up of two annular parts of which one is screwed to the back and of which the other makes up said oblique shoulder, those two parts being separated along a plane which is normal to the case axis.

5. A watch-case according to claim 4, thus characterized that the back is provided with a shoulder or step of cylindrical shape, for the purpose of guiding the rigid ring, between its thread and its oblique shoulder.

6. A watch-case according to claim 1, in which the back's wall presses against an internal shoulder of the middle.

7. A watch-case according to claim 6, in which there is an internal projection at the middle and the periphery of the back wall defines a hollow which engages said internal projection of the middle in order to prevent any rotation of the back with respect to the middle.

8. A watch-case according to claim 7, further comprising a winding stem guiding tube, said projection being the inner end of said tube.

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