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(54) WATER-RESISTANT WATCH CASE

(71) We, KABUSHIKI KAISHA DAINI SEIKOSHA, a Japanese body corporate of 6-31-1, Kameido, Koto-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:-

- 5 This invention concerns a water-resistant watch case. 5
 According to the present invention there is provided a water-resistant watch case comprising a watch glass which is mounted inwardly of and retained within a case member, the or each side surface of the watch glass being sealed to the case member by a sealing ring which is disposed in contact with an internal surface of the case member, and a support ring 10 which is mounted inwardly of the case member, the support ring engaging and supporting the sealing ring and also engaging or being engageable with the watch glass to support the latter, the support ring having a circumferential projection or projections each of which is mounted in an internal groove in the case member. 10
 Preferably, the said internal surface is a surface beneath a shoulder in the case member.
 15 Preferably the support ring has two spaced apart circumferential projections which are respectively disposed in spaced apart second internal grooves in the case member. 15
 The support ring preferably has a sloping internal surface, the support ring being shaped substantially as a trapezium in cross section.
 Preferably the said shoulder of the case member completely overlies the sealing ring.
 20 The sealing ring is preferably compressed both axially and radially of the watch case. 20
 The watch case preferably comprises a case body which is connected to and is disconnectable from the case back, the said case member being constituted either by the case body or by a bezel which is mounted inwardly of and is connected to and is disconnectable from the case body.
 25 A second sealing ring is preferably disposed between the case back and either the bezel or the case body. 25
 The case body is preferably connected to the case back by a spring.
 The watch glass may have a non-circular shape.
 The invention also comprises a watch provided with a watch case as set forth above.
 30 The invention is illustrated, merely by way of example, in the accompanying drawings, in which:- 30
Figure 1 is a broken-away side elevation of a water-resistant watch case known to the Applicants,
Figure 2 is a perspective view, partly in section, of a first embodiment of a water-resistant 35 watch case according to the present invention, 35
Figure 3 is a broken-away sectional elevation, on a larger scale, of a part of the structure shown in *Figure 2*,
Figure 4 is a perspective view of a support ring which forms part of the watch case shown in *Figures 2* and *3*, and
 40 *Figure 5* is a broken-away sectional elevation of a second embodiment of a water-resistant watch case according to the present invention. 40
 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.
 In *Figure 1* there is shown a water-resistant watch case known to the Applicants, and 45 which is not within the scope of the present invention, the watch case comprising a watch 45

glass 11 which is mounted inwardly of and is retained within a bezel 1. The watch glass 11 is supported by a support ring 7, a sealing ring 10 being interposed between the lower surface 17 of the watch glass 11 and an upper surface 5 of the support ring 7. The sealing ring 10 seals the watch glass 11 to the support ring 7 so as to resist the ingress of water into the interior of the watch case.

The support ring 7, which has an outwardly extending flange 3, is provided with a circumferential projection 8 which is disposed within a respective internal recess 2 in the bezel 1. The support ring 7 is sealed to a case back 20 of the watch case by means of a sealing ring 22, the sealing ring 22 being disposed between a lower surface 19 of the flange 3 and an upper surface 21 of the case back 20. This construction resists the ingress of water between the support ring 7 and case back 20.

The flange 3 has an upper surface 22 which engages a flange 23 of a case body 24, the case body 24 being connected to and being disconnectable from the case back 20 by a spring 28.

In the Figure 1 construction, the sealing ring 10 is disposed underneath the transparent watch glass 11 and consequently can be seen therethrough, thus detracting from the appearance of the watch. Moreover, it is not practicable to deal with this problem by reducing the width ℓ_1 of the sealing ring 10 since if the width ℓ_1 is reduced below a predetermined figure an adequate degree of water resistance cannot be achieved. This means that it is essential to make the sealing ring 10 comparatively wide and this in turn means that the width ℓ_2 between the internal surface of the sealing ring 10 and the external side surface of the bezel 1 is fairly large, thus detracting from the appearance of the watch.

The construction shown in Figure 1 also has the disadvantage that the support ring 7 is of complicated shape and is thus difficult and expensive to manufacture. Moreover, it is difficult to assemble and disassemble a unit comprising the watch glass 11, the bezel 1, the sealing ring 10, and the support ring 7. Consequently if any part, e.g. the watch glass 11, of this unit is damaged, it is necessary in practice to provide a complete new unit. This both increases the cost of the original manufacture of the watch case, and also increases the cost of carrying out any subsequent repair or after-service.

In Figures 2 to 4 there is shown a first embodiment of a water-resistant watch case according to the present invention. Referring to Figures 2 and 3, a water-resistant watch case of non-circular external appearance comprises a watch glass 41 of natural glass or other transparent material. The watch glass 41 is of substantially rectangular or other non-circular shape, the watch glass 41 being mounted radially inwardly of and being retained within a bezel 31. The bezel 31, which is substantially rectangular in plan, is provided, adjacent its upper end, with a radially inwardly extending shoulder 46 beneath a portion 31a of the bezel and is also provided adjacent its lower end and on each of two of its opposite sides with an internal groove 32. The bezel 31 is provided with an outwardly extending flange 33 which is mounted inwardly of and engages a flange 54 of a case body 53 from which, however, it may be disconnected when necessary. The flange 54 is an inwardly extending flange disposed at the upper end of the case body 53, the upper surface 55 of the flange 33 engaging the lower surface 49 of the flange 54. The case body 53 is connected to and disconnectable from a case back 50 by means of a spring 58 (Figure 2).

A support ring 37 for supporting the watch glass 41 is, as shown in Figure 4, substantially rectangular in plan and has a sloping internal surface 34, the support ring 37 being shaped substantially as a trapezium in cross section. The support ring 37 has a flat upper surface 35, a flat lower surface 36 and two spaced apart outwardly extending circumferential projections 38 which are respectively disposed in spaced apart internal grooves 32 in the bezel 31. As will be seen from Figure 4, the circumferential projections 38 are respectively disposed on opposite sides of the support ring 37.

If desired, however, a single circumferential projection 38 extending around all four sides of the support ring 37 and engageable in a single internal groove 32 could be provided. Alternatively, if desired, more than two spaced apart circumferential projections 38, and a corresponding number of separate internal grooves 32, could be provided.

Each of the side surfaces of the substantially rectangular watch glass 41 is sealed to the bezel 31 by a sealing ring 40 which is disposed immediately beneath the shoulder 46 of the bezel 31. The sealing ring 40 is radially compressed between each of the side surfaces 42 of the watch glass 41 and each of the internal surfaces 39 of the bezel 31 so that the watch glass 41 is sealed to the bezel 31. The upper surface 35 of the support ring 37 engages the lower surface 48 of the sealing ring 40 so as to compress the latter axially against the shoulder 46.

The shoulder 46 completely overlies the sealing ring 40 and thus prevents the latter from being seen when viewed from directly above the watch case. The internal surface 43 of the shoulder 46 has a diameter which is less than that of the maximum diameter of the watch glass 41 so as to ensure that the watch glass 41 cannot be removed from the watch case in the upward direction. The watch glass 41 has a sloping surface 44, while the shoulder 46 of the bezel 31 has a sloping surface 45 to assist the introduction of the watch glass 41 into the

bezel 31 from below.

The support ring 37 may either engage the lower surface 47 of the watch glass 41 or may be spaced therefrom, as shown in Figure 3, by a very small gap so as to be engageable with the surface 47 if the watch glass 41 should move downwardly.

5 A second sealing ring 52 is interposed between an upper surface 51 of the case back 50 and the lower surface 49 of the bezel 31. Thus the ingress of water between the bezel 31 and the case back 50 is resisted. 5

Mounted inwardly of the sealing ring 52 is a dial plate 56 which is itself mounted on a movement 57, the movement 57 being supported by a shoulder 59 of the case back 50.

10 The watch case shown in Figures 2 to 4 is assembled by mounting the sealing ring 40 within the recess 46 of the bezel 31, introducing the watch glass 41 into the lower end of the bezel 31, and moving it upwardly therein to the position shown in Figure 3, and inserting the support ring 37 into the lower end of the bezel 31 and moving it into the position shown in Figure 3 in which the circumferential projections 38 are engaged in internal grooves 32. 10

15 The relative resilience of the parts permits this assembly to be effected and when it is completed the upper surface 35 of the support ring 37 engages the lower surface 48 of the sealing ring 40, and optionally also engages the lower surface 47 of the watch glass 41 whereby to provide a compact sealed unit of the parts 31, 37, 40, 41. The provision of this unit simplifies assembly of the remaining part of the watch case and also simplifies the substitution of this unit, if damaged, by another such unit. 15

20 The sealing ring 52, in addition to providing water resistance, also absorbs impact between the support ring 37 and the bezel 31 if the watch glass 41 is subjected to an impact or to shock. 20

25 In Figure 5 there is shown a second embodiment of a water-resistant watch case according to the present invention which is generally similar to that of the watch case of Figures 2 to 4 and which for this reason will not be described in detail, like reference numerals indicating like parts. 25

However, in the Figure 5 construction which is of a non-circular external appearance, a separate bezel 31 is not provided and, instead, the case body 53 is provided with a bezel portion 31*b*. 30

As will be appreciated, in the embodiments of the invention shown in the drawings, the bezel portion 31*a* completely overlies the sealing ring 40 and thus prevents the latter from being seen when viewed directly from above the watch case, whereby the appearance of the latter is improved. Moreover, in contrast to the arrangement shown in Figure 1, the sealing ring 40 is not disposed in contact with the lower surface 47 of the watch glass 41 and consequently the width of the upper surface 35 of the support ring 37 merely needs to be adequate to support the watch glass 41. This in turn means that the width ℓ between the outer surface of the main portion of the bezel 31 and the bottom of the inner surface 34 of the support ring 37 can be reduced, whereby to improve the appearance of the watch case. 35

40 It will also be noted that the constructions shown in Figures 2 to 4 and in Figure 5 involve the use of a support ring 37 whose shape is simpler than that of the support ring 7 of the Figure 1 construction. Furthermore, in the case of the said constructions, the other parts of the watch case can be of conventional shape, whereby to reduce manufacturing costs. The unit comprising the bezel 31, support ring 37, sealing ring 40 and watch glass 41 can easily be assembled and disassembled, thus rendering after-service easier and less expensive. 40

45 We make no claim herein to a watch case as claimed in our prior British Patent No. 1,502,049. 45

Subject to this disclaimer:-

WHAT WE CLAIM IS:-

50 1. A water-resistant watch case comprising a watch glass which is mounted inwardly of and retained within a case member, the or each side surface of the watch glass being sealed to the case member by a sealing ring which is disposed in contact with an internal surface of the case member, and a support ring which is mounted inwardly of the case member, the support ring engaging and supporting the sealing ring and also engaging or being engageable with the watch glass to support the latter, the support ring having a circumferential projection or projections each of which is mounted in an internal groove in the case member. 55

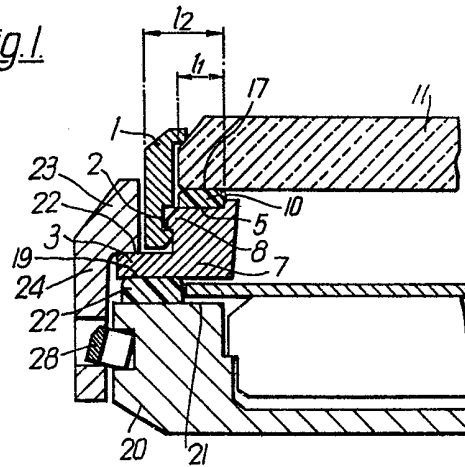
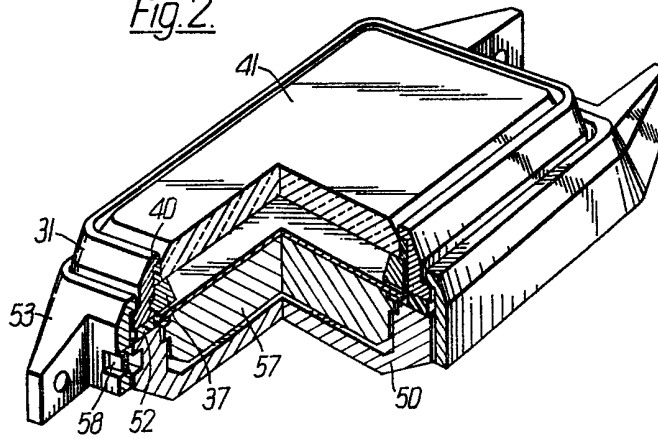
2. A watch case as claimed in claim 1 in which the said internal surface is a surface beneath a shoulder in the case member.

60 3. A watch case as claimed in claim 1 or 2 in which the support ring has two spaced apart circumferential projections which are respectively disposed in spaced apart internal grooves in the case member. 60

65 4. A watch case as claimed in any preceding claim in which the support ring has a sloping internal surface, the support ring being shaped substantially as a trapezium in cross section. 65

5. A watch case as claimed in any of claims 2-4 which the said shoulder of the case member completely overlies the sealing ring.
6. A watch case as claimed in any preceding claim in which the sealing ring is compressed both axially and radially of the watch case.
- 5 7. A watch case as claimed in any preceding claim in which the watch case comprises a case body which is connected to and is disconnectable from a case back, the said case member being constituted either by the case body or by a bezel which is mounted inwardly of and is connected to and is disconnectable from the case body. 5
- 10 8. A watch case as claimed in claim 7 in which a second sealing ring is disposed between the case back and either the bezel or the case body. 10
9. A watch case as claimed in claim 7 or 8 in which the case body is connected to the case back by a spring.
- 10 10. A watch case as claimed in any preceding claim in which the watch glass has a non-circular shape.
- 15 11. A water-resistant watch case substantially as hereinbefore described with reference to and as shown in Figures 2 to 4 or in Figure 5 of the accompanying drawings. 15
12. A watch provided with a watch case as claimed in any preceding claim.

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Fig. 1.*Fig. 2.*

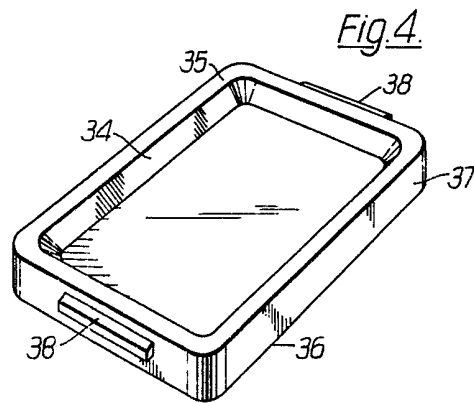
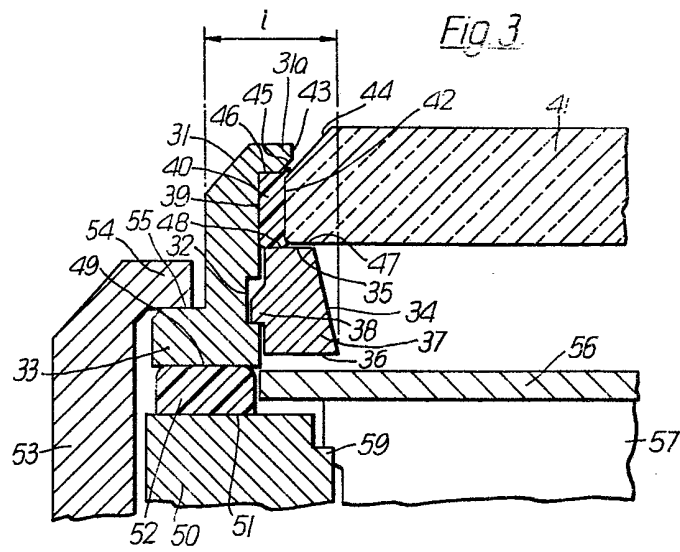


Fig. 5