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(54) **Control Member for a Water-tight Watch**

(57) A control member such as a push button or winder for a thin water-tight watch has a tube 3 for fitting to the watch case, and a control rod 2 movable in the tube by a manually movable head 1 fixed to the rod.

Surrounding the tube axis is a sealing O-ring 7 making sealing contact with a surface of the tube. The ring is compressed axially between two annular surfaces of the head but is spaced radially from the head to permit slight sideways movement of the head without deforming the ring. The device shown is a pusher but a winder is also described.

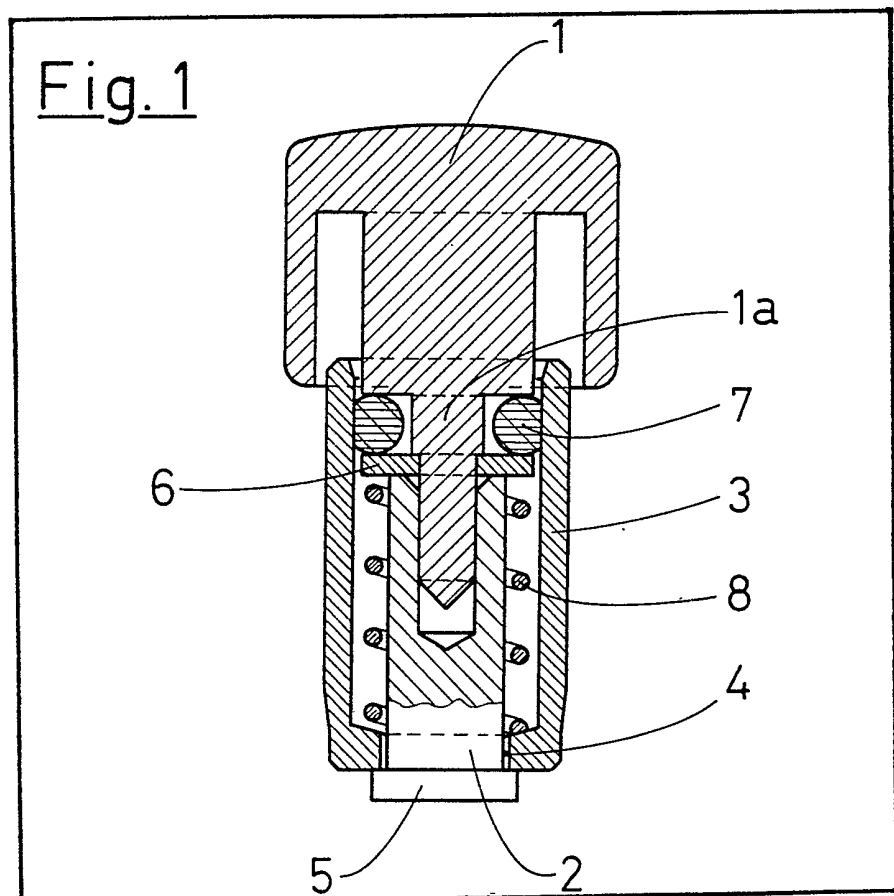
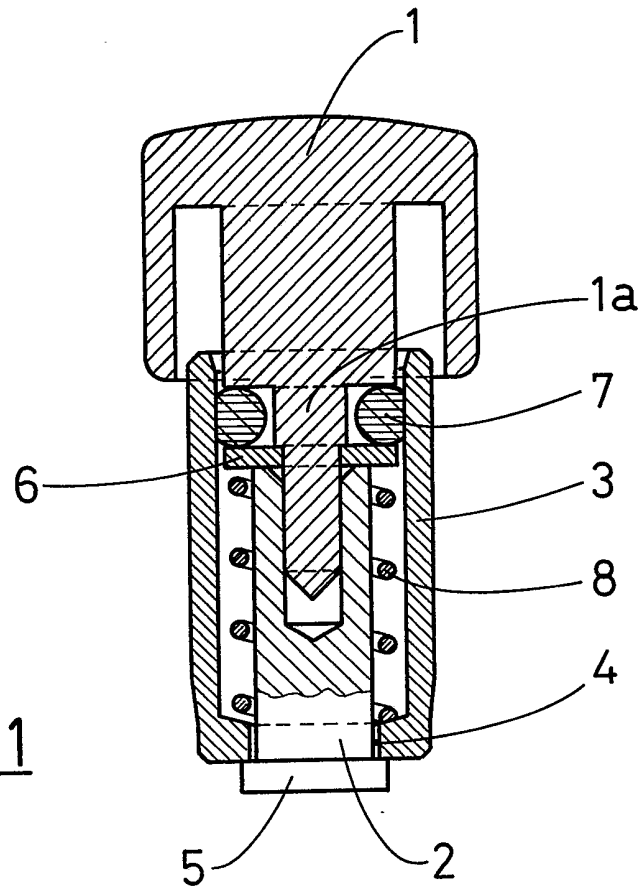
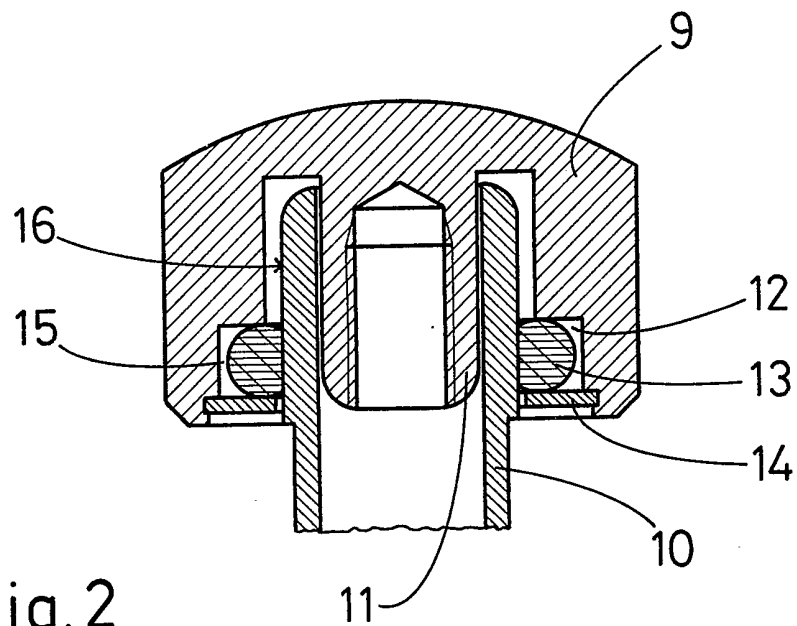


Fig.1Fig.2

SPECIFICATION

Control Member for a Water-tight Watch

This invention relates to a control member for a water-tight watch.

5 The control member is of a type comprising a head integral with a control rod and mounted on or in a tube intended to be fixed to a watch case, and an annular packing disposed between the head and the wall of the tube. 5

Numerous constructions of control members of the above described type are known, whether the latter relate to a push rod, corrector or winder. It is common to all these constructions that the annular packing, generally constituted by an O-ring seal, is compressed radially between the tube and the centre of the head (see for example Swiss Patent 581,340) or between the tube and an auxiliary ring (see French Patent 2,235,414). Hitherto, such an arrangement has always seemed necessary for ensuring the seal between the head and the tube. 10

The introduction of increasingly thinner watches has caused the problem of manufacturing control members, in particular push rods or correctors which can be fitted on very shallow cases. The problem particularly occurs of manufacturing a push rod having a tube whereof the diameter is less than 2 mm and more precisely a diameter of 1.70 mm. On constructing a push rod according to the prior art, which satisfied the standards relating to water-tightness, it was found that the push rod was unusable owing to the frictional forces of the packing, which frictional forces become equal to or greater than the force of a return spring. The use of a more powerful spring which was theoretically possible, although giving rise to another problem in view of the extremely small space for housing the latter and thus limiting the diameter of the wire of the spring to a dimension of the order of 0.15 mm, proves in practice to be a useless solution for two reasons. The first is the danger of separation of the head from the control rod by spring pressure, the head and control rod being usually force fitted together. The second is the excessive difficulty the user experiences in view of the very small surface area of the head and the painful pressure exerted on the user's finger when the user attempts to actuate the push rod by pressing on the head. Admittedly, lubrication of the packing is able to reduce the friction, but only constitutes a palliative whereof the effect lasts for a short duration. Finally, it has been proved that it is virtually impossible to force fit known control members of the aforesaid type into the watch case without this resulting in a certain buckling, i.e. misalignment of the head and the rod with respect to the tube. The consequence of this misalignment may be the separation of the packing from the head or tube, the effect of which is to reduce or even destroy the effectiveness of the seal when the packing is exclusively compressed radially between the tube and head. This drawback could be eliminated by increasing the compression of the packing, but the effect of this measure is to further increase the frictional forces. In French Patent 2,235,414, it was proposed to remedy this drawback by fitting the annular packing between the tube and a cylindrical ring which was free radially in the head, the packing being compressed radially between the tube and the ring. However, this solution requires an additional part and considerable hollowing-out of the head and its fitting is delicate. 15 20 25 30 35

An object of the invention is to provide a simple solution to the aforescribed problem by providing a water-tight control member which can be constructed to very small dimensions and is therefore particularly suited for extra flat watches. 40

According to the invention there is provided a control member for a water-tight watch, comprising a head integral with a control rod and mounted on or in a tube for fixing to a watch case, an annular packing disposed between the head and the wall of the tube, the annular packing being compressed axially on both sides, and said packing being fitted with radial clearance between the packing and the head so that the head is able to move radially relative to the tube without causing deformation of the packing. 45

This control member has made it possible to achieve the aforesaid object in an unexpected manner.

Contrary to what one would have expected, the radial clearance of the packing does not substantially reduce the water-tightness, it has been possible to maintain sealing effects up to pressures of 20 atmospheres. 50

When the control member is in the form of a push rod it may be actuated normally without excessive pressure, and the return spring fulfils its function perfectly.

As a corollary, the radial clearance also provides another important advantage. This is that misalignment is tolerable if it is less than the clearance, so that it is not necessary to have very strict tolerances for a housing recesses containing the packing, the packing itself and for the assembly forming the push rod as a whole. Manufacturing cost can be reduced and assembly of the push rod is facilitated. 55

In fact, the packing is no longer compressed radially, since the clearance allows it to move freely radially, so that the pressure which it exerts on the tube no longer depends on the compression force of the packing, which depends on its dimensions, but solely on the material forming the packing. It is thus possible to allow greater tolerances as regards the dimensions of the packing. 60

These advantages also apply to a control member in the form of a winder or button rim which of necessity must be able to rotate and slide.

The invention will now be further described, by way of example, with reference to the accompanying drawing in which:—

Figure 1 is an axial sectional view of a push rod formed according to the invention, and

Figure 2 is an axial sectional view of a winder formed according to the invention.

5 The push rod illustrated in Figure 1 comprises a head 1 force fitted in a rod 2 on a tube 3 intended to be force fitted in a side of a watch case. The completely assembled push rod is driven into the case by striking the head 1. The rod 2 passes through the tube through an end hole 4 and has a boss 5 which bears against an end of the tube. At its other end, the rod 2 bears against a washer 6 and holds the washer against a boss on the head. With another boss on the head 1, the washer 6 forms a housing 10 for an annular packing 7 of the O-ring seal type. When assembled, the inner diameter of the annular packing 7 is greater than the diameter of a central part 1a of the head surrounded by the packing in order to leave a radial clearance. On the other hand, the packing 7 is compressed axially between the head and the washer 6. Mounted inside the tube 3 is a helical spring 8 which is under compression between the bottom of the tube 3 and the washer 6 and keeps the boss 5 on the rod in abutment with 15 the end of the tube 3. With the exception of the packing, all the parts are made of metal. Since the packing 7 is able to move radially before assembly, it is preferable to lubricate the packing in order to facilitate its automatic centering at the time of assembly of the push rod.

For example dimensions of the push rod may be as follows:

20	diameter of the head:	2.30 mm	20
	outer diameter of the tube:	1.70 mm	
	diameter of the wire constituting the spring:	0.15 mm	
	radial clearance of the O-ring seal:	0.1 to 0.2 mm	

25 It should also be noted that the hole 4 at the end of the tube may be smaller than in previously known constructions of push rod. This decrease in the size of the hole facilitates manufacture, and is possible because the hole no longer has to allow for misalignment of components during assembly of the push rod in Figure 1, the effect of such misalignment being accommodated by the radial clearance at the packing.

30 In a modification which is not illustrated, the housing for the packing 7 may be constituted by a groove obtained by hollowing-out the part 1a of the head, which makes it possible to dispense with the washer 6.

The same construction can be used for a screwed corrector, in this case the tube comprises a screw thread and a splined part providing engagement for a screwing tool. In this case, the head stops in the vicinity of the tube.

35 Figure 2 illustrates a winder dome 9 which constitutes the head fitted on a tube 10. A centre part 11 of the dome 9 has an internal screw thread to engage a winder rod (not shown). The dome 9 comprises a recess 12 in which an O-ring seal 13 is disposed. This seal is held by a washer 14 fixed in the dome. The O-ring seal 13 is fitted with radial clearance 15 in the dome and surrounds the tube 10 thus deforming the O-ring elastically. The O-ring 13 compressed axially between the washer and the bottom of the recess 12, which compression ensures a fluid tight sealing effect. Outer surface 16 of the 40 tube is smooth to facilitate rotation and sliding of the O-ring seal 13 on the tube.

The outer diameter of the tube part having surface 16 is, for example, 2.00 mm.

Claims

45 1. A control member for a water-tight watch, comprising a head integral with a control rod and mounted on or in a tube for fixing to a watch case, an annular packing disposed between the head and the wall of the tube, the annular packing being compressed axially on both sides, and said packing being fitted with radial clearance between the packing and the head so that the head is able to move radially relative to the tube without causing deformation of the packing.

2. A control member as claimed in claim 1, in which said radial clearance is at least 0.1 mm.

50 3. A control member as claimed in claim 2, forming a push rod and further comprising a helical return spring disposed between the head and an end of the tube, said spring being formed of wire, and the diameter of the wire being less than or equal to 0.15 mm.

4. A control member for a water-tight watch, substantially as hereinbefore described with reference to Figure 1 or Figure 2 of the accompanying drawing.