DEVICE FOR INSURING THE TIGHTNESS OF A TIMEPIECE CASING

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References Cited
UNITED STATES PATENTS
3,376,701 4/1968 Greheski et al............. 58/90 B
3,485,036 12/1969 Feurer.......................... 58/90 B

FOREIGN PATENTS OR APPLICATIONS
1,111,103 7/1961 Germany......................... 58/90 B

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ABSTRACT

Waterproof winding stem for a watch comprising a hollowed-out crown containing a ring-shaped tightness fitting compressed between the crown and a cylindrical extension of the case, the tightness fitting being restrained by ring-shaped surface sections axially displaced from each other and a radial retention ring.

22 Claims, 7 Drawing Figures
DEVICE FOR INSURING THE TIGHTNESS OF A TIMEPIECE CASING

This invention concerns a device for insuring the tightness of a timepiece casing at the passage of a stem. A device of this type includes a part which is fastened to the casing, a movable part attached to the stem and a ring-shaped tightness fitting suited for undergoing an elastic deformation and fitted together with the mentioned parts around a cylindrical surface of one of them and in a ring-shaped bed of the other, in which it is held between ring-shaped surface sections located in this bed.

In order to assure the tightness of a winding crown around an integral tube of the casing, the author has already suggested the use of a tightness fitting which does not completely "cramp" the ring-shaped bed of the crown in which it is lodged and held by an encased disk; this formerly proposed tightness fitting had an approximately semicircular profile in which case the straight part of the profile encloses the tube and the round part of the profile sustains oblique pressure from the walls of the bed partly formed by the bottom of the bed in the body of the crown and partly by the interior surface of the encased disk. The tightness fitting of this previously known device was kept integral with the rotation of the tube when the crown was set into rotation with regard to it. However, the oblique pressure exerted on the round part of the profile of the tightness fitting which, in other respects, has numerous advantages, had the disadvantage to only be able to act on the elasticity of the tightness fitting in order to permit an easy eccentricity of the crown in regard to the tube. In fact, in view of the obliquity of the pressure in question, a variation of the dimensions of the pressure caused a variation of the axial tightening, and thus the eccentricity could only be tolerated to a relatively limited extent.

This oblique pressure also implied a relatively strong radial pressure which, since a tightening occurred which is a little too strong, on one hand, unfavorably increased the opposed resistance by the crown to a rotating movement which one wanted to give it, and on the other hand, could tend to cause a crushing, in fact, a rupture of the tightness packing. In other known tightness devices of the same type, a tightness packing is almost completely "crammed" in a bed of the crown, which results in many disadvantages, such as the unfitness to tolerate a certain eccentricity, a very strong resistance with respect to the rotation and especially a wear and a deformation which eventually in most cases caused ruptures or deteriorations of the tightness fitting.

It is one of the objects of this invention to furnish a tightening device of the type in question which does not have the above mentioned disadvantages and which is thus described as follows:

The mentioned tightness fitting has a profile the height of which in radial direction of its ring shape is approximately at least equal to its width in axial direction of its ring shape.

The mentioned ring-shaped surface sections of one of the parts which hold the tightness fitting, are at least approximately axially formed opposite, on both sides, of the fitting on which they exercise an axial holding pressure substantially free from the radial component, since the mentioned ring-shaped surface sections are defined on ring-shaped projections which stand out axially toward the fitting in order to only set up its axial holding between two opposite ring-shaped holding zones which are narrow with regard to the mentioned height of the profile of the fitting and beside which there remain non-holding zones, since the mentioned holding tends to cause an extension of this height.

The tightness fitting contains a radial retention ring arranged around at least one body of the elastically deformable fitting in order to restrain the mentioned radial expansion toward the outside so as to make it act in the direction of the interior against the mentioned cylindrical surface around which the mentioned fitting is engaged, while the mentioned ring is in direct contact with none of the mentioned parts.

The surfaces by which the mentioned fitting is held axially and the surface by which the mentioned fitting encloses the mentioned cylindrical surface having between them pressure and dimension relations which are such that, at the time of a relative rotation between the two mentioned parts, the mentioned tightness fitting remains integral in rotation with the part, the cylindrical surface of which it encloses.

Preferably, the mentioned ring-shaped surface sections axially hold the tightness fitting on the mentioned ring-shaped zones approximately opposite the center of the height of the profile of the fitting.

In an advantageously simple construction which also constitutes an object of the invention, the mentioned ring has a flat elongated profile and surrounds a body of the tightness fitting having the shape of an O-ring or the shape of a square-section or rectangular-section ring.

Another object of the invention is to furnish a technically more developed construction of the device in which the tightness fitting contains two fitting bodies made of an elastic material, the mentioned ring, made of metal or a plastic material which is harder than the bodies of the fitting, having a T-profile the foot of which returns radially toward the interior at least until it is at right angles with the ring-shaped holding zones, and the two mentioned bodies of the fitting being located on both sides of the foot of the T, each respectively under a wing of the profile in the T. The two bodies of the fitting can, in a simple way, have a rectangular or square profile having a height, in radial direction, which is superior or equal to their thickness, in axial direction, thus making it possible to obtain these bodies of the tightness fitting cheaply by cutting a sheet of the corresponding thickness.

It is another object of the invention to furnish a device for assuring the tightness of a time-piece casing at the passage of a stem which is characterized by the following:

An integral tube of the casing which projects from it and forms an exterior cylindrical surface,

a winding crown which is integrally movable with the mentioned stem and in which a bed is formed by a hollowing arranged coaxially in the body of the crown and which an encased disk closes laterally,

and a ring-shaped tightness fitting suited for undergoing an elastic deformation and engaged, on the one hand, around the mentioned cylindrical surface of the mentioned tube and, on the other hand, in the mentioned bed of the mentioned crown, while the mentioned tightness fitting has a profile the height of which, in radial direction of its ring shape is approximately at least equal to its width in axial direction of its ring
shape, and which is held between ring-shaped surface sections located in the mentioned bed, both by the bottom of the mentioned hollowing in the body of the crown and by the mentioned encased disk, and by the fact that:

the mentioned ring-shaped surface sections which hold the tightness fitting are at least approximately axially opposite, on both sides of the fitting on which they exercise an axial holding pressure substantially free of the radial component, the mentioned ring-shaped surface sections being defined by ring-shaped projections which stand out axially toward the fitting in order to only set up its axial holding between two opposed ring-shaped holding zones which are narrow with regard to the mentioned height of the profile of the fitting and next to which there exist non-holding zones since the mentioned holding tends to cause an extension of this height,

the tightness fitting contains a radial retention ring arranged around at least one body of the elastically deformable fitting in order to restrain the mentioned radial expansion toward the exterior so as to make it act in the direction of the interior against the mentioned cylindrical surface of the tube while the mentioned ring is in direct contact neither with the tube nor with the mentioned crown.

According to another object of the invention, the mentioned tightness fitting preferably contains two fitting bodies made of an elastic material, one of which has a circular profile and the other one of which has a rectangular profile, the height of each of the two profiles being greater than their thickness, the mentioned ring, made of metal or a plastic material which is harder than the body of the fitting having a T-profile the foot of which returns radially toward the interior at least until it is at right angles with the mentioned ring-shaped holding zones, and the two mentioned bodies of the fitting being located on both sides of the foot of the T, each respectively under a wind of the profile in the T.

In the case where the mentioned ring has a T-profile, it is also advantageous for the foot of this T-profile to contain, according to an object of the invention, at least on one side, triangular cut and aligned strips in order to, by penetration, hold in place a mentioned body of the fitting which has a rectangular profile, while the other side can also advantageously have a recess assisting the assembling of the mentioned ring with a mentioned body of the fitting having a circular profile.

This, just as the other characteristics and advantages resulting from the invention, will seem even more advantageous when one reads the following description which shows construction examples of the invention together with the drawing in which:

FIG. 1 shows a section of a tightness device of a winding crown around a tube, in a simple construction, the left and right parts of the figure showing two variants of this construction, on the left with a body of the tightness fitting having the shape of an O-ring, and on the right, with a body of the tightness fitting having the shape of a ring body with a rectangular profile.

FIG. 2, in a view similar to that of FIG. 1, shows another construction of a tightness device of a winding crown around a tube, the tightness fitting of which contains two bodies of the tightness fitting of rectangular section assembled under the wings of a ring with a T-profile.

FIG. 3 shows another construction of a tightness device of a winding crown around a tube, having the same general construction as the one according to FIG. 2 but containing two tightness bodies of different shapes.

FIG. 4, at a larger scale, shows a section of a winding crown provided with an encased disk which can be used in the constructions according to FIGS. 1 to 3.

FIG. 5 is a view similar to that of FIG. 4 showing how the winding crown, as a variant, can also be shaped.

FIG. 6 is a perspective view showing a detail of the ring contained in the tightness fitting in the case of the construction according to FIG. 1 and FIG. 7 is a perspective view showing two details of the ring contained in the tightness fitting in the case of the construction according to FIG. 3.

FIG. 1 shows a winder crown 2 in the regular way screwed on a winder stem 4, in the interior of an integral tube 6 of the casing of a watch (not shown), the crown 2, in the known manner, showing a spout 14 which is inserted into the inside of the tube 6 to set up, in the usual manner, the integrality by the screwing of the crown 2 with the stem 4. In its part surrounding the tube 6, the body of the crown 12 contains a ring-shaped bed 18 in which a ring-shaped tightness fitting 8 is located (according to the variant of the left part of FIG. 1) or 8′ (according to the variant of the right part of FIG. 1). This tightness fitting, with a certain pressure, bears on the exterior surface 10 of the tube 6, and it is, in order to assure a suitable tightness pressure on this surface 10, arranged in a special way in the interior of the bed 18. The latter is placed in the crown 2 by means of a ring-shaped hollowing with a special profile laterally closed by an encased disk 16. The bottom of the hollowing contains, set up in the body 12 of the crown, a ring-shaped projection 20 advancing in the direction of the encased disk 16. With respect to it, this disk shows a ring-shaped projection 22 projecting into the direction of the ring-shaped projection 20 and facing it.

The ring-shaped surface sections 24 and 26 which are shown opposite each other respectively through the projection 20 and the projection 22, laterally, i.e., in axial direction and without radial component, hold an elastic body of the tightness fitting 28 (left variant) or 28′ (right variant) which thus receives a lateral holding pressure judiciously fixed approximately at the center of the height (i.e., of the radially measured dimension of the profile of the body of the fitting 28 or 28′).

There is reason for stating at this point that the body of the fitting 28 or 28′, the exact shape of which will be discussed in the following, is far from completely filling the bed 18, so that it can change form without causing a "cramming." The lateral holding which it undergoes tends to change its form by increasing its height. Since this body of the tightness fitting 28 or 28′ interiorly encloses the cylindrical surface 10 of the tube 6, its tendency to increase the height under the influence of the lateral holding would manifest itself, if no special measure is taken, by an increase of the exterior diameter of the body without the radial interior pressure against the cylindrical surface 10 being notably increased by this.

If this body of the fitting 28 or 28′ alone were to form the tightness fitting in the bed 18, its radial extension could, at the border, lead the peripheral surface to touch the lateral wall 19 of the bed 18, which one justly wants to avoid. The special construction of the tightness fitting 8 or 8′ is particularly intended to avoid these disadvantages, and for this purpose, contains a
ring 30, made of metal or possibly a plastic material which is considerably harder than the body of the fitting 28 or 28', and which surrounds the body of the fitting and prevents it from expanding against the exterior. The holding pressure by the ring-shaped surface sections 24 and 26 is manifested therefore by a tendency to increase the height exteriorly against the ring 30 and interiorly against the cylindrical surface 10 in a balanced manner. This tendency to increase the height is thus continued by the ring 30 and one in fact does not have a real radial expansion of the body of the tightness fitting 28 or 28', but only a deformation of it which is accompanied by a pressure against the cylindrical surface 10 of the tube 6, a pressure the value of which is determined by the pressure which the surface sections 20 and 22 exercise against the lateral ring-shaped zones opposite the body of the tightness fitting. One observes that the ring 30 is dimensioned in such a way as not to touch any part other than the body of the fitting which it encloses so that there would be no friction between the ring 30 and the body of the crown 12 or the encased disk. Besides, the shape which one has intentionally given to the projections 20 and 22 has the result that the surface holding sections 24 and 26 remain completely limited whatever the holding degree and the profile given the body of the fitting 28 or 28' outside the holding zones. The dimensioning of the projections 22 and the shape of the body of the fitting 28 or 28', taking into account the diameter of the cylindrical surface 10, are such that, when the crown 2 is set in rotation with regard to the tube 6, the body of the tightness fitting 28 or 28', and with it the ring 30, i.e., the entire tightness fitting 8 or 8', remains integral with the tube 6, the sliding being carried out with regard to the ring-shaped surface sections 24 and 26 of the projections 20 and 22. When the winder crown 2 is pulled axially with respect to the tube 6, typically in order to put the winder stem into the position to make a back adjustment in regard to the hour or the date, the tightness fitting slides naturally along the cylindrical surface 10 of the tube 6, out this sliding is not accompanied by a rotary movement so that possible dust or any residues cannot be "screwed" in, in the course of time, along the cylindrical surface 10 by passing under the tightness fitting. Besides, the sliding of the relatively small surface sections 24 and 26 against the body of the tightness fitting only implies a moderate resistance to the rotating movement of the crown and a device as it is shown in FIG. 1 permits a rotating movement of the crown which is extremely smooth and easy, much smoother in any case than the rotation of a crown tightened by the "cramming" of a tightness fitting and also smoother — without the quality of the tightness being affected by it — than in the case of a winder crown tightened by a seam with a semicircular profile and not rotating around the tube, considering at least the variation of the resistance which in such a device results in a possible eccentricity. The degree of tightening, already entirely satisfactory with a holding which only implies a weak resistance to the rotation, can naturally still be increased by an increase of the holding (gripping). Thus, by increasing the tightening of the holding until it implies a resistance to the rotation almost equal to that of a device of the usual type, one would be able to obtain a tightness of a very high value notably superior to that obtained in an ordinary device with a same resistance to the rotation.

An important characteristic of the device described here, remarkable especially in regard to the construction according to the right part of FIG. 1 (a single, square or rectangular body of the fitting) and according to FIG. 2 (two square or rectangular bodies of the fitting) consists also of a considerable insensitivity with respect to an eccentricity. If one accepts that, at the moment when the winder crown 2 turns in regard to the tube 6, the distance between the projections 20 and 22 on one hand, and the cylindrical surface 10 of the tube 6, on the other hand, varies at a considerable proportion as a result of an eccentricity (always possible when the centering is carried out on a screw passage), one sees that no supplementary compression of the body of the tightness fitting will result from such a variation of positioning. The sliding of the surfaces 24 and 26 will occur only against the lateral ring-shaped zones of the body of the fitting; these will be replaced slightly in the radial direction, but, since the holding is exclusively axial and since the surfaces 24 and 26 are well limited in width, the holding force does not undergo a modification through this and one will not have a part of the tightness fitting which undergoes a compression which is higher than any other part of this fitting. Besides externally, the ring 30 always stays fixed with regard to the body of the fitting which it encloses; if there is any eccentricity, it is displaced more or less in the direction of the lateral surface 19 of the bed 18, but the provided play is sufficient (as one sees on the drawing) so that this displacement never results in a friction of the ring 30 against the wall 19. The same is true for the case of an axial eccentricity (imperfect machining of the bottom of the bed 18 or imperfect positioning of the encased disk 16); the ring 30 and the parts of the body of the fitting other than those which undergo the holding will be able to possibly come nearer or move slightly away from the bottom of the bed 18 or the encased disk 16, but it will never be able to make a contact (and thus a friction in the case of rotation) with these places. Thus it is shown that, from many points of view, the described tightening device proves to be very advantageous with regard to other tightening devices, notably to the winder crown for a timepiece.

At this point, the different variants and constructions for the tightness fitting shown in the illustration will be examined. According to the variant shown in the left part of FIG. 1, there is a single body of the fitting 28 formed by an O-ring and surrounded by a ring 30, preferably made of metal. It is shown that the profile of the O-ring becomes flat in contact with the surface 10 of the tube 6 and in contact with the ring 30. There thus already exists a slight tightening even in the absence of the holding by the projections 20 and 22. When this holding is established, and when the encased disk 16 is put in place, the circular profile changes shape in order to approximately take the course shown in the left part of FIG. 1. One especially notices that the surface which becomes flat in contact with the tube 6 is well plating even if a seam remains on the interior diameter of the O-ring in the unmounted state, because the flattening reduces this seam. It is also shown that this surface is relatively large in regard to the surfaces 24 and 26 of the projections. The construction according to the left part of FIG. 1 furnishes good results. One notices that, in order to encase the disk 16, a battue 32 is provided in the body 12 of the crown. The precision of this battue makes it possible to insure an optimal holding of the
on the right part of FIG. 1, one shows the body of the tightness fitting as being rectangular (approximately square); the slight deformation of the profile which one observes is due to the radial tightening, the introduction of the tube into the interior of the tightness fitting necessarily gives to this deformation the course shown in FIG. 1. The ring 30 is the same for the tightness fitting 8′ in the variant shown in the right part of FIG. 1, and the tightness fitting 8 in the variant shown in the left part of FIG. 1. The tightness fitting 8′, with the elastic body of rectangular section, is particularly adequate for compensating eccentricities. In view of the fact that even in the case of eccentricity, the height of the body of the fitting deformed by the holding does not have to vary, the tearing which occurs in the classical tightness fittings at the point where they change shape toward the interior, the tearing which occurs because of frequency variations of the radial dimensioning which the fitting must undergo because of the eccentricity, cannot occur in the described device; even if, as shown in FIG. 1, the elastic body of the tightness fitting 8 is engaged slightly under the internal cylindrical surface 25 of the crown, the absence of variations of radial dimension protect the body of the fitting from tearing. In the construction shown in FIG. 2, the general structure of the crown and the tube is the same as in the construction according to FIG. 1. But the tightness fitting is here constructed in a different manner and contains instead of the body 8 or 8′ and the ring with a flat profile 30, two rectangular or square bodies of the tightness fitting 36 and 38 surrounded by a ring 40 with a T-profile. The two tightness bodies 36 and 38 are located on both sides of the foot of the T-profile of the ring 40, under its wings. The construction according to FIG. 2 permits an easy manufacturing of the bodies of the fitting, which, being liable to be not very resistant to the deformations due to the consequence of the projections 20 and 22 bordered by a straight disengagement, the projections 58 and 60 formed on one side by coni

contact zone with the surface 10 of the tube 6, still improving the tightness conditions. A seam of a flexible and an elastic material having the profile of the body of the fitting 44 can be easily obtained commercially and the cutting of a sheet of a thin material for the body of the fitting so that the body 46 can be made at very little cost. The identity of all pieces other than the tightness fitting in the four variants or constructions which were discussed and in many other analogous constructions which are also possible, allows a good standardization of the manufacturing. The same pieces can be used in setting up relatively simple devices as those in FIG. 1, but also more developed ones as those of FIGS. 2 and 3. Again, the identity of the ring 40, 40′ between the two constructions according to FIGS. 2 and 3 permits a rationalization of the manufacturing, one and the same type of ring being able to be manufactured for the setting up of the two constructions of the device according to FIGS. 3 and 2.

FIG. 4, at a larger scale, shows the part of the device forming the winder crown without the presence of the tightness fitting. Here, one again finds the elements already described in connection with FIG. 1, and one sees in addition that the possibility has been considered to provide a supplementary seam 46 for the mounting of the encased disk. In fact, there is reason for also considering the tightness with regard to the possible passage of dust to the outside of the tightness fitting. If one considers the path of the passage having its entrance at the interior of the encased disk, one sees that two elastic pressure joints meet in order to reach through the exterior of the tightness fitting to the interior of the crown (and from there to the interior of the watch casing). These two successive tight joints certainly insure a tightness which is just as good as the pressure of the body of the fitting against the surface 10 of the tube. One may however fear that the dust or the water penetrates directly to the exterior of the tightness fitting, for instance between the ring 30 and the wall 19, through the encasing joint of the disk 16 in the body of the crown. This path of entry of the dust or the water would only involve a single zone of tight pressure, namely that which is established by the ring-shaped surface section 24. In order to avoid this risk, which in certain cases is perhaps not significant, one has provided, as shown in FIG. 4, the possibility of placing a fine tightness seam 48 between the encased disk 16 and the bottom of the batteau 32 arranged in the body 12 of the crown for encasing the disk 16.

In the illustration according to FIG. 4, one also sees something which is hardly visible in the illustrations of the FIGS. 1 to 3 which are at a smaller scale, namely that the edges of the projections 20 and 22 which border on the surfaces 24 and 26, are slightly rounded off or broken down in order not to cut the body of the tightness fitting against which they are passed. FIG. 4 also shows that the interior border of the projection 22, of the encased disk 16, can correspond with the central opening of this disk (drawing in solid lines) or be found in the withdrawal of this central opening (marked in mixed lines "V").

FIG. 5 shows a variant of the configuration of the part of the device forming the crown. According to this variant, the crown 52, which becomes essential to the body of the crown 54 and a spout 56, shows instead of the projections 20 and 22 bordered by a straight disengagement, the projections 58 and 60 formed on one side by coni
The holding surface sections 62 and 64 which in such a case show these projections are, in practice, rounded-off and, according to the material forming the bodies or body of the fitting, this configuration with rounded-off projections can have very good results. The bed 66 in which the tightness fitting is located has a slightly different shape but this is not of any consequence.

In a partial perspective view, FIG. 6 shows that mainly in the case of the construction according to the left part of FIG. 1, but in a manner which would not be troublesome in the construction according to the right part of FIG. 1, the ring 30 contains a circular groove 70 in which the preliminary setting up of the body of the tightness fitting 28 can take place in a particularly easy manner. This body of the fitting 28, if it is engaged in the groove 70 does not run the risk of disengaging itself from the ring 30 in the course of the handling. The presence of the groove 70 also prevents a possible lateral sliding of the ring 30 which could possibly create an undesirable friction against the bottom of the hollowing 18 or the encased disk 16.

FIG. 7 shows a particularly advantageous method of forming the ring 40 of the tightness fitting 42 according to FIG. 3. Here also, it must be noted that this same construction is also suitable for the ring of the other constructions which use a ring of a similar profile, i.e., for the ring 40 of the fitting 34 of the construction according to FIG. 2. FIG. 7 shows that one can advantageously cut in the foot of the T-profile of the ring 40' triangular strips 72 which are set up at right angles with this foot, in order to keep in place through penetration an elastic body of the fitting of rectangular profile, such as the body 46 or one of the bodies 36 and 38. Besides, the part of the ring 40' which forms the foot of the T-profile, shows on the opposite side to it where the triangular strips 72 are set up a hollowing or ring-shaped groove 74 which assists the placing of the round or oval body of the fitting 46 against the foot of the T-profile and under the wing of this profile. The construction shown in FIG. 7 for the ring 40, 4' with a T-profile facilitates the preliminary assembly and the keeping assembled of the body of the fitting and the ring which form the tightness fitting, typically the fitting 42 of the construction according to FIG. 3 but also the tightness fitting 34 of the construction according to FIG. 2.

It must also be noted that in the case of the construction according to FIG. 1, right part, or according to FIG. 2, it could be advantageous, in certain cases, especially in view of shortening the device which is usually longer when the crown should be able to be pulled by several notches, to make the body of the fitting 28' or 36 come as far as possible toward the back (side of the encased disk). For this purpose, the ring-shaped surface section 26 of the projection would be able to be slightly obliquely cut in order to establish a thinning down of the side bordering the central opening of the encased disk and to thus make the body of the fitting come almost as far as into this opening in order to be able to shorten the tube 6, while still insuring the tightness when the crown is pulled to the maximum toward the exterior. Such a slight obliquity or more precisely conicity of the ring-shaped surface section 26, independent from the fact that the surface section 27 which is opposite it remains exactly at right angles in the axial direction or is also made slightly conical in order to remain parallel to the surface section 26, this would not keep less axial the tightening of the holding, as long as the zone of the body 28' or 36 on which the pressure is made, continues to be, in the non-deformed state of the body, at right angles in the axial direction and parallel to the opposite zone which receives the pressure of the surface section 24. This case would, in fact, not at all be comparable with that of an oblique or conical surface supporting itself on a semi-circular profile, because here, with a square or rectangular profile, contrary to the case of a semicircular profile, a radial displacement (due for example to an eccentricity) of the surface section 26 — even slightly conical — in regard to the body of the fitting, will by no means cause a variation of the tightening of the holding.

What is claimed is:

1. Device for insuring the tightness of a timepiece casing at the passage of a stem, containing: a part which is fixed to the casing, a part which is movable and attached to the stem and a ring-shaped tightness fitting suited for undergoing an elastic deformation and fitted together with said parts around a cylindrical surface of one of them and in a ring-shaped bed of the other, in which it is held between ring-shaped surface sections located in this bed, wherein said tightness fitting has a profile the height of which in radial direction of its ring shape is approximately at least equal to its width in axial direction of its ring shape, said ring-shaped surface sections of one of the parts which grip the tightness fitting, are at least approximately axially formed opposite both sides of the fitting on which they exercise an axial gripping pressure substantially free from any radial component, said ring-shaped surface sections being defined on ring-shaped projections which stand out axially toward the fitting in order to only set up the axial gripping between two opposite ring-shaped grip-zones which are narrow with regard to said height of the profile of the fitting and beside which there remain no-grip-zones, said gripping tending to cause a radial extension of said height, the tightness fitting is provided with a radial retention ring arranged around at least one elastically deformable fitting-body in order to restrain said radial expansion outwardly so as to make it act inwardly against the mentioned cylindrical surface around which said fitting is engaged, said retention ring being in direct contact with neither of said parts, the surfaces by which said fitting is held axially and the surface by which said fitting encloses said cylindrical surface having between them such a pressure and dimension relationship when a relative rotation occurs between the two said parts, said tightness fitting remains fixed in rotation with the cylindrical surface which it encloses.

2. Device according to claim 1 wherein said ring-shaped surface sections axially grip the tightness fitting on said ring-shaped zones approximately opposite the middle of the height of the profile of said fitting.

3. Device according to claim 1, wherein the tightness fitting contains a fitting-body made of an elastic material and having a profile at least approximately of a straight quadrilateral shape, said fitting-body being surrounded by said ring, which is made of metal or a plastic material harder than said fitting-body and which
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11 shows an axially elongated profile corresponding to the thickness, axially-measured of the fitting-body.

4. Device according to claim 1 wherein said tightness fitting contains a fitting-body made of an elastic material, formed by an O-ring and surrounded by said ring, which is made of a metal or a plastic material which is harder than the body of the fitting and has an axially elongated profile.

5. Device according to claim 4 wherein said ring contains, in its interior cylindrical surface, a circular hollowing assisting its assembling with said fitting-body formed by the O-ring in order to constitute the whole tightness fitting.

6. Device according to claim 1 wherein said part which is fixed to the casing is a tube, the exterior surface of which forms said cylindrical surface enclosed by the tightness fitting, said part which is movable and attached to the stem being a winder crown in which said bed is formed by a hollowing provided in the body of the crown and laterally enclosed by an inset washer while the tightness fitting is located therein, said ring-shaped surface sections being presented by both the bottom of said hollowing in the body of the crown and said inset washer.

7. Device according to claim 6 wherein the body of said crown is provided with a battue against the bottom of which said inset washer is fastened in order to insure an exact mutual positioning of said two ring-shaped surface sections.

8. Device according to claim 7 wherein a tightness seam of small thickness is arranged at the bottom of said battue in order to tighten the assembling of said inset washer on the body of the crown.

9. Device according to claim 1 wherein the tightness fitting contains two fitting-bodies made of an elastic material, said ring, made of metal or a plastic material harder than said fitting bodies, having a T-profile, the foot of which returns radially toward the interior at least up to the level of said ring-shaped gripping zones, and said two fitting-bodies being located on both sides of the foot of the T, each respectively under a wing of the T-profile.

10. Device according to claim 9 wherein said two fitting-bodies have profiles, the height of which is rectangular at least equal to the thickness.

11. Device according to claim 9 wherein one of said two fitting-bodies has a circular profile whereas the other one has a rectangular profile, the height of each of these two profiles being greater than their thickness.

12. Device according to claim 11 in which said bed is formed by a ring-shaped hollowing laterally closed by an inset washer, wherein the fitting-body with the circular profile is located on that of the sides of the T-profile of the ring which is directed toward the inset washer whereas the fitting-body with the rectangular profile is located on the other side, directed toward the bottom of said hollowing.

13. Device according to claim 9 wherein the foot of the T-profile of said ring is provided with triangular strips which are cut out of it and set up to keep in place, by means of penetration, at least one of said fitting-bodies, which has a rectangular profile.

14. Device according to claim 13 wherein the foot of the T-profile of said ring is provided on one side with triangular strips set up to maintain one of said fitting-bodies which has a rectangular profile, and on the other side with a groove assisting the assembling of this ring with the other of said fitting-bodies which has a circular profile.

15. Device for assuring the tightness of a timepiece casing at the passage of a stem containing an integral tube of the casing which projects from it and forms an exterior cylindrical surface, a winding crown which is integrally movable with the mentioned stem and in which a bed is formed by a hollowing arranged coaxially in the body of the crown and laterally closed by an inset washer and a ring-shaped tightness fitting suited for undergoing an elastic deformation and engaged, on the one hand, around the mentioned cylindrical surface of said tube and, on the other hand, in said bed of said crown, said tightness fitting having a profile the height of which in radial direction of its ring shape is at least approximately equal to its width in axial direction of its ring shape and being gripped between ring-shaped surface sections located in said bed, both by the bottom of said hollowing in the body of the crown and by said inset washer, and wherein said ring-shaped surfaces which grip the tightness fitting, are at least approximately axially opposite, on both sides of the fitting on which they exercise an axial gripping pressure substantially free from any radial component, said ring shaped surface sections being defined by ring-shaped projections which stand out axially toward the fitting in order to only set up its axial gripping between two opposed ring-shaped grip-zones which are narrow with regard to said height of the profile of the fitting and next to which there exist no-grip zones, said gripping pressure tending to cause an extension of said height, the tightness fitting contains a radial retention ring arranged around at least one is provided with elastically deformable fitting-body in order to restrain said radial expansion outwardly so as to make it act inwardly against said cylindrical surface of the tube, while said ring is in direct contact neither with the tube nor with said crown, nor with said inset washer.

16. Device according to claim 15, wherein said tightness fitting contains a fitting-body which is made of an elastic material, formed by an O-ring, and surrounded by said retention ring, which is made of a metal or a plastic material harder than said fitting-body and has an axially elongated profile.

17. Device according to claim 15 wherein the tightness fitting contains two fitting-bodies made of an elastic material and having a profile which has at least approximately a straight quadrilateral shape, the height of which is at least equal to the thickness, said retention ring made of metal or a plastic material harder than the fitting-bodies, having a T-profile the foot of which returns radially toward the interior at least up to the level of said ring-shaped grip zones, and the said two fitting-bodies being located on both sides of the foot of the T, each respectively under a wing of the T-profile.

18. Device according to claim 15 wherein said tightness fitting contains two fitting-bodies made of an elastic material, one of them having a circular profile and the other one having a rectangular profile, the height of each of said two profiles being larger than their thickness, said retention ring, made of metal or of a plastic material is harder than said fitting-bodies, having a T-profile the foot of which returns radially toward
the interior at least up to the level of said ring-shaped grip-zones, and said two fitting-bodies being located on both sides of the foot of the T, each respectively under a wing of the T-profile.

19. Device according to claim 15 wherein the tightness fitting has a body made of an elastic material, with a profile at least approximately of a straight quadrilateral shape, said body being surrounded by said retention ring which is made of metal or a plastic material harder than said body and has a profile which is axially elongated corresponding to the thickness, measured axially, of said body.

20. Device according to claim 19 wherein said ring-shaped surface sections axially grip the tightness fitting on said ring-shaped zones opposite approximately to the middle of the height of the profile of the fitting.

21. Device for assuring the tightness of a timepiece casing at the passage of a stem containing a tube integral with said casing and which projects from it in order to form an exterior cylindrical surface, a winder crown which is integrally movable with said stem and the body of which forms a bed which is laterally closed by an inset washer, a ring-shaped tightness fitting suited for undergoing an elastic deformation and engaged around said cylindrical surface of said tube and in said bed of said crown, said tightness fitting being held by gripping between ring-shaped surface sections located in said bed at the bottom thereof and at said inset washer, and wherein said ring-shaped surface sections which hold and grip the tightness fitting are axially opposite on both sides of the fitting on which they exert an axial holding and gripping pressure substantially free from any radial component, said ring-shaped surface sections being defined by ring-shaped projections which stand out axially toward the fitting in order to only set up its axial gripping between two opposed ring-shaped grip-zones which are narrow with regard to said height of the profile of the fitting, said gripping tending to cause an extension of this height, wherein said tightness fitting contains two fitting-bodies made of an elastically deformable material, and a radial retention ring, made of metal or of a plastic material harder than the fitting-bodies, said ring having a T-profile, the wings of which are arranged around said fitting-bodies in order to restrain said radial expansion toward the outer axial direction so as to make it act toward the inner axial direction against said cylindrical surface of the tube, the foot of the T-profile of said retention ring returning radially toward the inner direction between said two bodies at least until it is at the height of said ring-shaped grip-zones, triangular strips being cut and set up in said foot in order to keep in place, by penetration, at least one of said two fitting-bodies.

22. Device according to claim 21 wherein said foot of the T-profile of said ring is provided on one side with said triangular strips set up for maintaining one of said fitting-bodies which has a rectangular profile, and on the other side with a groove assisting the assembling of this ring with the other of said fitting-bodies which has a circular profile.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,863,438 Dated February 4, 1975

Inventor(s) Rene Soguel

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:
Col. 3, line 39, "wind" should read --wing--.
Col. 7, line 6, "tightening," should read --tightening;--.
Col. 9, line 41, "4'", should read --40'--.

Signed and sealed this 15th day of July 1975.

(SEAL)
Attest:
RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks
UNITED STATES PATENT OFFICE
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Col. 7, line 6, "tightening," should read --tightening;--.
Col. 9, line 41, "45", should read --40'--.

Signed and sealed this 15th day of July 1975.

(SEAL)
Attest:

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