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### MYSTERIOUS ROTATING BEZEL

The present invention concerns a rotating bezel particularly for a timepiece such as a wristwatch, a clock or an alarm clock with a mechanical or electronic movement. This rotating bezel can be termed "mysterious" in that the orientation of the indications carried by the bezel, such as alphanumerical signs, always remain the same, i.e. these indications are always legible in the same direction as the indications  
5 marked on the dial whatever the rotational angle imparted to the bezel.

In all the currently known wristwatches with a rotating bezel, for example diving watches, the indications are marked on the bezel in radial directions such that it is possible to read them properly only when an indication is brought to the 12 o'clock  
10 position, with the obvious risk of the figures 6 and 9 being confused at the moment of selection. A watch of this type, with the figures from 1 to 12 being the indications carried by the bezel, is shown in Figure 1.

However, there exists a Japanese Patent No. JP 2599334, which attempts to provide a solution to the aforementioned problem. In the proposed device, the  
15 principle of which is shown in Figure 2, the indications are carried by studs that are rotationally mobile in housings of the bezel, each stud having at its base a stem that is offset with respect to the axis of the stud. The stem is engaged in a circular groove of the same diameter as the circle described by the rotational axis of the studs, but whose centre is offset with respect to the centre of the dial by a distance equal to the  
20 distance between the rotational axis of each stud and the stem. For a rotation less than 180°, the indications maintain a vertical reading position. The 180° position (at 6 o'clock here) corresponds to an unstable position in which either a blockage can occur, which was observed by the inventors of the present invention, or rotation can continue beyond 180° still maintaining the vertical position, but also with the risk of  
25 creating a tipping movement causing the stems of two successive studs to come closer together as shown in Figure 2, at the 5 o'clock position. In order to overcome this drawback, the author proposes placing a washer at the base of the studs, through which the stems of the studs pass at regular intervals, said washer being driven in rotation at the same time as the bezel. This solution, which requires the use of an  
30 additional part, theoretically allows the desired object to be attained but, because of the contact surface of the washer on the edges of the groove, has the major drawback of considerably increasing friction, to such a point that no product known to the Applicant includes such a device.

The present invention provides a different solution, allowing the drawbacks of  
35 the aforecited prior art to be overcome by providing a rotating bezel having a reduced

number of parts to be assembled, and allowing the bezel to rotate freely, while still keeping the indications borne by the latter legible in the same direction.

The invention therefore concerns a rotating bezel comprising a ring able to rotate freely on a base in order to bring a selected indication opposite a determined  
5 mark of the base or a dial located at the centre of the bezel. The indications, alphanumerical characters, pictograms or other elements, are not directly marked on the ring but on the outer surface of studs that are each able to rotate freely about their axis of revolution in a housing arranged through the thickness of the ring and opening onto the base. Each stud includes on its lower part at least two stems of different  
10 dimensions, offset by the same distance from the axis of revolution of the studs, and having an angular offset less than  $180^\circ$ . When the bezel is driven in rotation, each stem is guided by a circular groove formed in the base and having a cross-section adapted to the dimensions of each stem, a radius equal to that of the circle described by the axis of revolution of the studs, the centres of each groove having, with respect  
15 to the centre of the dial, exactly the same arrangement as the stems with respect to the axis of revolution of the studs.

When the studs include only two stems, the stems must not be aligned on the same diameter, otherwise there would still be the risk, as in the aforecited prior art, of an unstable position in which the rotation of the bezel could be blocked, or beyond  
20 which a reversion of the rotational direction of the studs in their housing could occur. With the proposed construction, the grooves necessarily intersect and, in a way, create switches. According to the invention, in order for each stem to recognise the direction to take in a switch, the stems of each stud and correlatively the cross-sections of the grooves, have different dimensions, either in length, or in diameter, or  
25 both in length and diameter. Although each stud can only include two stems, tests have shown that the most satisfactory result is obtained with studs including three studs offset angularly by  $120^\circ$  and differentiated both by their length and their diameter.

Other features and advantages of the invention will appear during the following  
30 description, given solely by way of example, and made with reference to the annexed drawings, in which:

- Figure 1 shows a top view of a wristwatch having a rotating bezel according to the prior art;

- Figure 2 shows the mechanism of another wristwatch with a rotating bezel  
35 according to the prior art;

- Figures 3 and 3bis show top views of a wristwatch with a rotating bezel according to the invention in two different positions;

- Figure 4 shows the mechanism of the rotating bezel according to the invention;

- Figure 5 is a perspective diagram, seen from below, of a stud of the rotating bezel; and

5       - Figure 6 is a side diagram along the arrow VI of Figure 4.

Figures 1 and 2 correspond to the prior art explained in the preamble and will thus not be described further.

Figure 3 shows, by way of example a wristwatch wherein the top part of the middle part 1 is provided with a rotating bezel 2 bearing indications 20 represented by  
10 the figures 1 to 12 which are, as can be seen, all legible in the same direction, namely in the same direction as the time indications carried by a dial 3 for an analogue time display, closed by a crystal 5. Figure 3bis shows this same wristwatch after bezel 2 has been rotated in the direction indicated by the arrow to bring the figure 12 to the place previously occupied by the figure 5. As can be seen, all the figures remain  
15 legible in the same direction, owing to the arrangement explained in more detail hereinafter with reference to Figures 4, 5 and 6.

Figure 4 shows, on a larger scale, the wristwatch of Figure 3 wherein it has been assumed that ring 4 of bezel 2 is transparent, and only one indication 20 corresponding to the figure 12 has been shown in four positions at 12 o'clock, 9  
20 o'clock, 6 o'clock and 5 o'clock. With reference also to Figure 6, in which all the constituent elements are also assumed to be transparent, it can be seen that the indications are carried by the top part 9a of a stud 10 kept free in rotation about its axis 10a in a housing 30 arranged through the thickness of ring 4, whose opening on the side of middle part 1 is closed by a circular base 6 having at least one extension 8  
25 allowing it to be immobilised in rotation on middle part 1. Lower part 9b of stud 10, which has a larger diameter, forms with top part 9a a shoulder 9c allowing stud 10 to be held in housing 30, after ring 4 has been snap fitted onto middle part 1, for example by means of a raised portion 4a co-operating with a groove 1a of the middle part. In order to control the rotation of the bezel an annular spring 7 forming a catch is  
30 preferably inserted between ring 4 and base 6 outside the path described by the lower surface of studs 10. Thus, when a rotational movement is imparted to the bezel, studs 10 are also driven and their rotational axis 10a describes a circle 18 of radius R. With reference also to Figure 5, it can be seen that lower part 9b of studs 10 is provided with three studs 11, 13 and 15 freely engaged in annular grooves 12, 14 and 16  
35 formed in base 6, and having the same radius R as that of circle 18 described by the axis of studs 10. Stems 11, 13 and 15 are offset with respect to the axis of revolution 10a of studs 10 by the same distance d, and are offset with respect to each other, in

the example shown, by an angle of  $120^\circ$ , although other angular offsets may be selected without departing from the scope of the present invention. Another feature of the invention is that all the stems have to have different dimensions. Indeed, by increasing the number of stems, and thus the number of guide grooves, a new  
5 difficulty is created, in that the centres 12a, 14a and 16a of grooves 12, 14 and 16 are offset with respect to the centre of dial 3 in an identical configuration to that of the stems such that said grooves intersect each other again forming switches 19 (a single reference in Figure 4 for the sake of clarity).

It has thus seemed necessary to have grooves able to guide a single type of  
10 stem either as a function of its length, or as a function of its diameter, or preferably as a function of both of these parameters. By way of example for a stud whose lower part 9b has a diameter of 6 mm, all the stems are offset by a distance  $d = 2$  mm, stem 11 having a diameter of 0.5 mm and a length of 1 mm, stem 13 respectively 0.75 mm and 0.75 mm, and stem 15 respectively 1 mm and 0.5 mm. Given the stresses that are  
15 nonetheless exerted on stems 11, 13 and 15, studs 10 and stems 11, 13 and 15 are preferably made entirely of metal, for example brass. Ring 4 and base 6 are, conversely, preferably made of a plastic material allowing the desired shape to be easily obtained and offering the advantage of reducing friction. If middle part 1 is also made of a plastic material, it is possible to omit base 6 and form grooves 12, 14 and  
20 16 directly in the top surface of said middle part 1.

The invention is not limited to the embodiment that has just been described, or to a horological application. Indeed, there may be a different number of studs, for example only four studs to mark the four cardinal points in a compass-watch or six studs to mark the decompression stops in a diver's watch. Having three stems per  
25 stud corresponds to the preferred embodiment, but one could, as indicated at the beginning, have only two studs with a different angular offset to  $180^\circ$ , or conversely, four stems, which would not however bring any obvious advantage technically.

A rotating bezel of the type that has just been described can also be useful for any type of measuring dial, such as the dials of an aeroplane instrument panel, or  
30 those of a domestic appliance.

## CLAIMS

1. Rotating bezel (2) allowing the same reading direction to be kept for the indications (20) carried by a ring (4) able to rotate freely on a base (6) to which it is affixed to bring a selected indication (20) opposite a determined marking of the base (6) or of a dial (3), characterized in that the indications (20) are marked on the outer  
5 surface of studs (10) each kept free in rotation about their rotational axis (10a) in a housing (30) provided through the thickness of the ring (4) and opening onto the base (6), each stud (10) including in its lower part (9b) at least two stems (11, 13, 15) of different dimensions, offset by the same distance from the rotational axis (10a) of the studs (10), and having an angular offset of less than 180°, each stem (11, 13, 15)  
10 being guided during rotation of the bezel (2) by a circular groove (12, 14, 16) formed in the base (6) and having a cross-section adapted to the dimensions of each stem (11, 13, 15), a radius equal to that of the circle (18) described by the rotational axis of the studs, the centres (12a, 14a, 16a) of each groove (12, 14, 16) having, with respect to the centre of the dial, exactly the same arrangement as the stems (11, 13, 15) with  
15 respect to the rotational axis (10a) of the studs (10).
2. Rotating bezel according to claim 1, characterized in that the stems (11, 13, 15) have different lengths.
3. Rotating bezel according to claim 1, characterized in that the stems (11, 13, 15) have different diameters.
- 20 4. Rotating bezel according to claim 1, characterized in that the stems (11, 13, 15) have both different lengths and different diameters.
5. Rotating bezel according to claim 1, characterized in that each stud (10) includes three stems (11, 13, 15).
6. Rotating bezel according to claim 5, characterized in that the three stems  
25 (11, 13, 15) have an angular offset of 120°.
7. Rotating bezel according to claim 1, characterized in that the ring (4) and the base (6) are made of a plastic material, and the studs (10) and the stems (11, 13, 15) are made of metal.
8. Rotating bezel according to claim 1, characterized in that an annular  
30 spring (7) forming a catch is further inserted between the ring (4) and the base (6), outside the path described by the lower surface of the studs (10).
9. Timepiece characterized in that it includes a rotating bezel (2) according to any of the preceding claims
10. Timepiece according to claim 9, characterized in that the base (6) of the  
35 bezel (2) is snap fitted onto the top surface of the middle part (1).

11. Timepiece according to claim 9, characterized in that the base (6) of the bezel (2) is integral with the middle part (1).

12. Timepiece according to claim 9, characterized in that the indications (20) carried on the studs (10) are time indications, such as the figures from 1 to 12.