



DEVICE FOR SECURING A DIAL IN A WATCHCASE

The present invention concerns a device for securing a dial in a watchcase, or any other timepiece to enable the watch movement and the dial to be pre-assembled before mounting the other exterior watch parts. The invention concerns more particularly a device of this type in which the dial is secured to the casing ring.

5 A large number of devices have already been proposed for immobilising a dial on, or between, the constituent elements of a watchcase. Many devices concern clamping the dial between one or more lower elements, such as a plate, a casing ring or a middle part, and one, or more upper elements, such as a flange, a crystal or a bezel. These types of devices are well suited to manual assembly, but are less
10 satisfactory for automatic or semi-automatic assembly, where pre-assembly of the movement, dial and display device is desirable before the exterior watch elements are assembled.

Several solutions have been proposed to achieve the above object. It is for example possible to screw the dial at two or three points on the bottom of the plate or
15 on the casing ring. Japanese Patent Application No. 1467/96 proposes a bolt connection at the centre with a passage for the hand pipes. US Patent No. 4,320,483 discloses a magnetic coupling device between the dial and the plate.

Among the other solutions which have given rise to numerous variants, the principle consisting in providing feet secured to the lower surface of the dial should be
20 cited, said feet being immobilised in a lower element of the case by welding, screwing or locking. As regards locking, European Patent No. 0 465 988 may be cited wherein each foot of the dial is locked into the plate by a post riveted in proximity thereto.

According to a simpler solution, disclosed in Swiss Patent No. 485 259, the dial feet are bonded inside housings arranged in the casing ring. One could even envisage
25 an even simpler embodiment wherein the dial has no feet and wherein the bonding is done directly on the upper surface of the casing ring. All cases necessitate a product that can bond both the material of the dial and that of the casing ring, or of any other lower connecting element. This is most often the case, but it sometimes happens that it is impossible to find such a product in particular when the casing ring is a synthetic
30 material for which no adhesive with sufficient adhesion currently exists.

The object of the present invention is thus to provide a simple and economic assembly of a dial with a lower element of a watchcase, in particular a casing ring, using an adhesive material.

The invention therefore concerns a device for securing a dial onto a lower
35 element of a case intended to accommodate a watch movement, or onto a lower

element contained therein. The device is characterised in that the lower element includes at least two through passages each having a first part on the dial side separated from a second part on the opposite side by a neck portion, the whole of their first part and at least a portion of the second part of said passages being filled
5 with an adhesive material having a strong power of adhesion to at least the material forming the lower face of the dial.

As will be seen in the following detailed description, the neck portion may be obtained in different ways. In a preferred embodiment, the first and second parts of the through passages form paths with their generators perpendicular to the general
10 plane of the case, i.e. to the dial itself. These paths evidently have a contour fitted to the space available for arranging the through passages through the lower element.

According to another embodiment, the axes of the first and second parts of the through passages form a broken line.

In order to facilitate pre-assembly of the dial to the movement, the lower
15 element is preferably the casing ring or radial extensions of the bottom of the plate of the watch movement. The device according to the invention is particularly advantageous when the dial is secured onto casing ring. Indeed, one of the materials most commonly used to make casing rings is a polyoxymethylene, marketed by Duport under the trademark Delrin® because of its very low friction coefficient, which
20 facilitates the assembly operations. Unfortunately, this material is excessively difficult, not to say impossible, to bond. The device according to the invention thus enables its tribological qualities to be used to advantage while allowing bonding with a dial, which does not require any particular conformation, such as feet to secure it.

Other features and advantages of the present invention will appear more
25 clearly upon reading the following detailed description of an example embodiment given by way of non-limiting illustration with reference to the annexed drawings, in which:

- Figure 1 shows a top view of a chronograph watch with a rectangular dial;
- Figure 2 shows in half cross-sections through the 12 o'clock – 6 o'clock line,
30 along the arrows II-II of Figure 1, the assembly of the dial and the casing ring; and
- Figures 3 to 6 show variants of the through passages visible in Figure 2.

Figure 1 shows a chronograph watch whose case has a rectangular middle part 1 in which the upper closing elements (crystal, bezel or extension of the middle part) are not shown. Middle part 1 is provided with horns 2 allowing a wristband 4 to
35 be secured thereto. For ease of comprehension, it has also been assumed that rectangular dial 3 is transparent.

The chronograph watch includes, in a conventional manner, a crown 5, for example for setting to the correct time an analogue display by means of hour-minute hands 6a and 6b and small seconds hand 6c on a dial at 6 o'clock. The chronograph function is controlled by two push buttons 7a, 7b, the display of the measured times
5 being achieved by means of a centre second hand 8, a minute counter 9a and a tenth of a second counter 9b. The movement which drives the time display and the chronograph function will not be described as it does not form part of the invention and could be any movement known to those skilled in the art. In most cases, the movement is a round calibre housed in a casing ring 10. The term "casing ring" is
10 used by extension given that the outer contour is of rectangular shape to match the inner contour of middle part 1. This construction thus leaves four dead zones 11 which will be used to secure the dial as explained hereinafter also with reference to Figure 2.

The left part of this cross-section is shown prior to securing dial 3 and the right part after bonding by means of an adhesive material 19 also forming a plug. As can
15 be seen, each through passage 12 includes two parts. A first part 13 forming an orifice 14 on the side of dial 3; a second part 17 is connected to the first and forms a neck portion 15.

In the embodiment shown in Figure 2, the generators of the inner surfaces of each part are perpendicular to dial 3 and orifice 14 has a smaller section than the
20 section of the second part such that neck portion 15 is in fact formed by an edge between first part 13 and second part 15.

Figure 3 shows a variant wherein the first and second parts 13, 17 are exactly in line with each other, the neck portion being formed by a rib 15a separating the two parts.

25 Figure 4 shows another variant wherein the generators of the first and second parts 13, 17 are oblique and move away from the direction perpendicular to dial 3 from an edge 15b forming the neck portion.

The generators of first part 13 could of course be perpendicular to the plane of dial 3, or even be in line with the generators of second part 17, as shown in Figure 5,
30 the neck portion then being formed by edge 15c of orifice 14.

According to a slightly different variant shown in Figure 6, it can be seen that the axes of first parts 13 and second parts 18 of through passages 12 are not parallel but instead form a broken line, so that the neck portion is formed by the inflection point between the two axes. In the example shown, these two axes are perpendicular
35 and the second part of the through passage has an orifice which opens out onto one side of the casing ring. In this embodiment, it is clear that the material filling the

passage forms a "plug", as soon as it fills a portion of the second part of the through passage, whatever the respective sections of the first and second parts.

With the configurations which have just been described, a perfectly flat dial 3, including only holes for the passage of the arbours for the hands, may be secured by bonding by inserting a material 19 with a strong power of adhesion to at least the inner surface of dial 3, into through passages 12. The quantity of adhesive material 19 inserted has to be such that it fills all of first part 13 of through passage 12 and overflows beyond neck portion 15 into second part 17. Adhesive material 19 is chosen so that it is liquid when applied, and solid at ambient temperature to form, in a way, a plug which is impossible to remove, even if said material 19 has low or zero power of adhesion to the walls of through passage 12, as is the case when casing ring 10 is made of Delrin®. Adhesive material 19 is for example selected from the range of hot-melt materials including in particular polyamides, polyesters and polyurethane's. Thermosetting materials or epoxy type adhesives may also be used.

With a rectangular dial through passages 12 have a substantially triangular shaped section. For an oval-shaped dial the section will be bean-shaped. If a round dial is used the section of orifice 14 will have to be smaller, but it is possible to increase the number of through passages 12; it may then be advantageous to connect all the lower parts by an annular feed.

Instead of securing dial 3 onto casing ring 10, it can be secured, in accordance with the same method that has just been described, onto another lower element such as the bottom of the movement plate or an extension thereof. The only difference will lie in the depth of through passages 12. The method according to the invention may have an advantage even if one knows materials capable of adhering to a metal, for example that used for the bottom of the plate. It is in fact well known that the force of adhesion to a metal depends on the precautions taken as to the surface-finish, and that it may be necessary to use an adhesive primer, expensive operations for the final product, without however guaranteeing the durability of adhesion which, for a metal, depends very much on the ambient conditions and especially humidity levels.

Those skilled in the art may also envisage other variants without departing from the scope of the present invention.

CLAIMS

1. Device for securing a dial (3) onto a lower element of a case intended to accommodate a watch movement, or onto a lower element (10) contained therein, characterised in that the lower element (10) includes at least two through passages (12) each having a first part (13) forming an orifice (14) on the dial (3) side separated
5 from a second part (17,18) by a neck portion (15), the whole of the first part and at least a portion of the second part of said passages (12) being filled with an adhesive material (19) having a strong power of adhesion to at least the material forming the lower face of the dial (3).
2. Securing device according to claim 1, characterised in that the orifices of
10 the through passages (12) are located on the top face on the dial side and on the opposite bottom face of the lower element (10).
3. Securing device according to claim 2, characterised in that the inner surfaces of the first and second parts (13, 17) of the through passages (12) have generators perpendicular to the dial (3) delimiting, on the dial side, an orifice (14) of
15 smaller section than the section of the orifice on the opposite side, the neck portion (15) being formed by a shoulder created between the first and second parts (13, 17).
4. Securing device according to claim 2, characterised in that at the junction between the two parts (13, 17) of the through passages (12) the section of the first part (13) is less than the section of an immediately lower zone in the second part (17)
20 of each through passage (12), whatever the orientation of the generators of the first and second parts with respect to a direction perpendicular to the dial (3).
5. Securing device according to claim 2, characterised in that the neck portion (15) is merged with the edge of the orifice on the dial (3) side.
6. Securing device according to claim 1, characterised in that the axes of
25 the first parts (13) and second parts (18) form a broken line.
7. Securing device according to claim 1, characterised in that the lower element (10) including the through passages is a casing ring.
8. Securing device according to claim 1, characterised in that the lower element (10) including the through passages (12) is formed by a plate bottom or by
30 extensions thereof extending radially beyond the movement.
9. Securing device according to claim 1, characterised in that the adhesive material (19) is selected from among thermomelt or thermosetting compounds, and adhesive materials, for example of the epoxy type.

10. Securing device according to claim 1, characterised in that the adhesive material (19) has a low or zero power of adhesion to the material forming the lower element (10).

11. Device for securing a dial (3) in a shaped case, intended to
5 accommodate a circular watch movement held in place by a casing ring (10) whose outer contour matches the inner contour of the case, characterised in that the casing ring includes four through passages each having a first part on the dial side of smaller section than the section of the second part on the opposite side, the whole of the first part and at least a portion of the second part of said through passages being filled
10 with an adhesive material having a strong power of adhesion to the material forming the lower face of the dial.

12. Securing device according to claim 11, characterised in that the case is rectangular and in that the through passages are located in dead zones substantially at the 1 o'clock, 5 o'clock, 7 o'clock and 11 o'clock positions.

13. Securing device according to claim 11, characterised in that the adhesive
15 material has a low or zero power of adhesion to the material forming the casing ring.