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TIMEPIECE

The invention concerns a timepiece comprising a base part of soft material, in particular plastic material, and at least one element rigidly secured onto such base part.

The invention more specifically concerns securing means permitting attaching a multifunctional element, such as a bridge, onto a base part of plastic material forming a base plate.

In horology, securing means permitting rigid attachment of one part onto another, must be as compact as possible in order that the resulting assembly exhibit a space requirement reduced as much as possible. When the resulting assembly must be reliable and resist tearing away caused by strong stresses while the base part which forms the support is a plastic material or, more generally, of a material substantially softer than brass, most of the traditional securing methods cannot be used in a satisfactory manner.

The use of rivets is particularly suitable for the assembly of timepieces within the framework of high mass production.

Nevertheless, securing by metallic rivets is often impossible to practise when the base part, in particular the base plate which must receive such rivet, is of plastic material. Effectively, the pressure which must be exerted on the rivet in order to upset the head and to form the riveting is sufficient to deform the plastic material of the base plate in an unacceptable manner.

Another technique currently used for securing an element onto a base part of plastic material calls for

studs which are integral with the material of the base part, in particular the base plate of plastic material and which project normally to the surface of the latter. Such studs are introduced into corresponding holes formed in the element which it is desired to secure to the base part. Once the element is thus placed in the desired position on the said base part, the free ends of the studs are plastically deformed, for example by means of an ultrasonic technique in order to upset them and form a plastic riveting. The rivets produced by this technique being thus of plastic material, the assemblies obtained once again do not offer sufficient rigidity for certain applications.

Finally, the use of screws besides its relatively high cost price presents the drawback of not always enabling the obtention of sufficiently compact assemblies. Effectively, the heads of the screws form projecting portions going beyond the assembly.

A purpose of the present invention is to overcome the drawbacks of the prior art which have just been described in furnishing securing means exhibiting a relatively small space requirement capable of being put into place in a part of plastic material and permitting production of extremely rigid assemblies.

To this end, the invention has as objective a time-piece provided with securing means comprising a stud, one of the ends of which is driven or inserted into a hole in a part of plastic material and the other end of which is upset against the element to be secured in order to form a riveting. The hole formed in the part of plastic material is shaped so as to permit access to the driven in (or inserted) end of the stud by a tool in order to

form a support enabling riveting of said stud without the part of plastic material being subjected to damaging stresses.

A specific embodiment of the invention is set forth in a detailed manner hereinafter with the help of the attached drawings given by way of example, and in which :

- Figure 1 is a top view of a multifunctional element of a timepiece according to the invention secured onto the base plate of a watch movement;

- figure 2 is a perspective view of the multi-functional element taken according to arrow II of figure 1 and showing more specifically a releasing arm for a stem, and

- figure 3 is a cross-section taken along line III-III of figure 1 showing the securing means according to the present invention.

In referring to the annexed drawings, there will be described hereinafter a timepiece according to the invention, designated by the general reference H and comprising a base plate 1 shown schematically by its contour in interrupted mixed dashes.

As is seen on figure 1, the timepiece H includes a multifunctional element 2 of metal secured onto a base part 1 formed in this example by the base plate of an electronic movement. Base plate 1 which is formed of a plastic material such as P.P.S. (polyphenylsiloxane) or polycarbonate is obtained preferably by moulding while bridge 2 is obtained by stamping from a sheet of small thickness. As is seen on figure 3, base plate 1 includes two surfaces

referred to respectively as the upper surface 1a and lower surface 1b with reference to the position of base plate 1 such as shown on such figure, that is to say, in the position of use with the hands (not shown) directed towards the top. The functional element 2 is secured onto base plate 1 on its upper surface 1a, preferably with the help of studs of plastic material (not shown), integral with the material of base plate 1 and being riveted by ultrasonic means at the level of two holes 4 and 6 and by a stud (not shown) inserted at the level of hole 8 provided in element 2. Element 2 could be secured at such places by other means known to the man skilled in the art. The multifunctional element 2 further comprises a hole 10 provided in order to receive a first end 12 (referred to as upper end) of a securing stud 34 shown in detailed fashion on figure 3, such stud 34 being intended to provide a particularly rigid fastening at this place for element 2 on the base part or base plate 1 for reasons which will be understood hereinafter.

In this example, element 2 fulfils several functions. Among others, the portion of bridge 2 referenced by 14 on figure 1 covers over a winding (not shown) which is housed in a cavity (not shown) of base plate 1. Element 2 equally fulfils a function as electrical conductor since it includes a clamp 16 provided to be brought into contact by lateral support on the positive pole of a cell 18 (figure 3) which is housed in a cavity 19 (figure 3) formed in base plate 1. Element 2 includes two clamps 20 and 22 which are respectively connected to the casing of the quartz (not shown) and to the positive terminal of an electronic module (likewise not shown) which are thus coupled to the positive pole of cell 18. Element 2 further comprises an orifice 24 which serves to guide a dial train peg, element 2 thus also forming a guiding bridge for the wheel works. The hole 24 is formed at the center of a circular depression 26 of bridge 2. A second depression referenced

27 (figure 1) fulfils a support function for the minutes wheel. As is seen on figure 1 and in greater detail on figure 2, the multifunctional element 2 further includes a catch for a stem 29 (figure 1), such catch which bears the reference 28 being formed of a blade bent over at 90° relative to the main plane of the multifunctional bridge forming element 2. Catch 28 is provided in order to be brought into cooperation at its end with circular grooves (not shown) on stem 29 in order to assure the stable maintenance in different positions of the stem. At the side of catch 28 there is also formed on element 2 an arm 30 intended to permit the releasing of stem 29. When pressure is exerted on the release arm 30 in the sense of arrow D (figure 2), there results bending of element 2 forming the bridge in the region thereof situated between the release arm 30 and hole 8. This bending enables releasing of catch 28 from the circular grooves of stem 29. In such position, stem 29 can slide freely in order to be taken out of timepiece 1 or in order to be reintroduced into the latter, this operation being necessary each time that it is wished to introduce the timepiece into a case or remove it therefrom.

The stem releasing functions (arm 30) and guiding of the dial train peg (hole 24) being assured by two neighbouring parts arranged on the same element 2, the deformation of bridge forming element 2 produced by the operation of the release arm 30 may bring about a mechanical stress in the neighbourhood of orifice 24 which serves to guide the dial train peg. Furthermore, pulling on the stem during time setting, for example, also produces through catch 28 mechanical stresses in the neighbourhood of hole 24. Such stresses may bring about a displacement of the dial train peg and thus perturb operation of the timepiece H.

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24 and there is thus also a risk of displacement of hole 24 because of the pressure of cell 18 on clamp 16.

To prevent such risk and to assure that the guide hole 24 is not displaced from its position, there are employed particularly resistant securing means in order to secure bridge forming element 2 to base plate 1 in a rigid manner at the level of hole 10, that is to say, very close to the dial train peg guiding hole 24. Such particularly rigid securing means are the object of the present invention.

As is seen on figure 3, the securing means according to the invention include a stepped stud 34 which is anchored by force mounting or inserted, for example, by ultrasonic means at a second end 40, referred to as lower end, or driven into a through hole 32 in base plate 1. It will be understood that the expression "driven" is intended to include equally force fitting and ultrasonic insertion. The stepped stud 34 and more specifically the anchoring end 40 includes one or several circular grooves 36a in which penetrate respectively one or several flanges 36b in order to increase rigidity of the assembly. Flanges 36b are formed by plastic deformation of base plate 1 and in particular by plastic flow of its material during assembly of stud 34 in hole 32. The end 12 of stud 34 forms a rivet head which is upset against the element forming bridge 2 in order to form a riveting once the stud 34 has been driven into base plate 1 and after tool A has been put into place against the driven and emerging end 40 of stud 34. The through hole 32 also includes a hollow or counterbore 35 formed in the lower surface 1a of base plate 1 and forming an enlarged hollowed-out zone which is situated at its lower end. This configuration enables at the driven-in lower end 40 of stud 34 to emerge at the exterior of such hollow 34 without nevertheless projecting from the lower surface 1b of base plate 1 and

thus enables access thereto with a tool A, shown schematically on figure 3, directly to said end 40 of stud 34 which provides a rigid support on which stud 34 may be brought to rest at the tip by such driven-in end 40 during the riveting operation. It is seen from what precedes that the configuration of stud 34 and that of the through hole 32 enable exerting the necessary axial pressure on stud 34 to upset its upper end 12 and form the corresponding riveting, such stress being exerted directly on the two ends of stud 34 without causing the base plate 1 to be subjected to stresses. Furthermore, the stud 34 comprises preferably at least one shoulder 41 formed by the upper edge of a part 42 thereof constituted by a bulge proximate the head of rivet 12 and possessing a diameter greater than that of hole 10 in bridge 2, the shoulder 41 constituting an axial support on which the element forming bridge 2 is here brought to rest directly. With this arrangement the element forming bridge 2 is squeezed between the head of the rivet and the shoulder 41. Once the stud 34 has been driven into the through hole 32 and the upper end 12 of the stud riveted onto bridge 2, the element forming bridge 2 is secured in an extremely rigid manner onto base plate 1. Effectively, stud 34 is directly riveted onto the element forming bridge 2 while stud 34 itself is anchored in the base plate over a major portion of its length.

Stud 34 may also exhibit a second shoulder 43 formed by the lower edge of said enlarged portion or bulge 42 which thus constitutes a spacer which determines the spacing between the surface of the base element or base plate 1 and bridge 2 upon positioning the securing stud 34. The presence of shoulder 43 additionally permits, as is the case in the embodiment shown, to use stud 34 likewise to assure the securing of a second part 44 onto base plate 1. In this case, part 44 which for example is formed by a framework supporting the wheel train, not shown, is held

gripped between shoulder 43 and base plate 1.

The several remarks which follow have as purpose to facilitate forming the assembly which has just been described. Initially, the through hole 32 and the hollow 35 in the base part of plastic material 1 are preferably formed during moulding of said base part 1. On the other hand, at the moment of assembly of the elements, it is preferable to drive the end 40 of the securing stud 34 into the base plate before placing bridge 2 on the latter. Finally, the riveting operation is preferably accomplished last, once the multifunctional part 2 is in place resting on the surface 1a of the base plate and on shoulder 41 of the spacer 42. In order to permit accomplishment of this latter operation, a tool A is initially put into place against the emerging end 40 of stud 34 in order to provide the latter with a rigid support. Then the upper end 12 of stud 34 is upset in order to form the riveting.

CLAIMS

1. Timepiece comprising a base part (1) of plastic material, at least one element (2) secured onto the base part and securing means for the element (2) onto the base part (1), the securing means comprising at least one stud (34) having a first end (12) and a second end (40) and two substantially coaxial through holes (10, 32) formed respectively in said element (2) and in the base part (1), characterized in that the stud (34) is driven at its second end (40) into said through hole (32) of the base part (1) and in that its first end (12) is fitted into said hole (10) in the element (2) and is upset against said element (2) so as to form a rivet and in that the base part (1) is fashioned in a manner to permit access to the second end (40) of the stud (34) with a tool (A) to enable said riveting.

2. Timepiece according to claim 1, characterized in that the stud (34) includes at least one shoulder (41) exhibiting a diameter substantially greater than the diameter of the through hole (10) formed in said element (2) and on which said element (2) rests axially.

3. Timepiece according to claim 1 or 2, characterized in that the stud (34) includes at least one circular groove (36a) provided to cooperate with the interior surface of said through hole (32) in the base part (1).

4. Timepiece according to any of claims 1 to 3, characterized in that said through hole (32) includes an enlargement (35) at one of its ends in order to permit clearance around said second end (40) of the stud (34) and access thereto by a tool.

5. Timepiece according to any of claims 1 to 4, characterized in that it comprises at least one second



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element (44) provided with a hole receiving the stud (34) and in that the stud includes a bulge (42) which has a diameter greater than said hole formed in said second element (44) and the lower edge of which forms a shoulder (43) in order to grip said second element (44) between such second shoulder (43) of the stud (34) and said base part (1).

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