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TITLE OF INVENTION
WRISTWATCH IN PLASTIC MATERIAL INCLUDING
A METALLIC REINFORCING ARMATURE USED AS BASEPLATE

The present invention concerns an ultra-thin wristwatch including a back cover-caseband and a crystal formed in plastic material, a movement, hands surmounting a dial and a metallic reinforcing armature sunk into the back cover-caseband and serving *inter alia* as attachment points for a bracelet.

Patent document CH-B-675 339 has already proposed a wrist-watch the caseband of which can be constituted of any non-metallic material, natural or synthetic. Such caseband exhibits a cylindrical housing in which a case sheltering a movement is secured by means of a toroidal elastic packing engaged on the one hand in an annular groove of the cylindrical housing and, on the other hand, in a peripheral groove of the case. The caseband is provided with a metallic armature to which a bracelet is brought for attachment.

The summary construction described hereinabove does not suit an ultra-thin watch, that is to say, a watch the thickness of which does not exceed approximately 4 millimeters. In effect, it will be understood that recourse to an independent case sheltering the entire movement, back cover and crystal included, such case having additionally to be secured to the caseband by a toroidal elastic packing, leads to a piece which is necessarily thick. On the other hand, the metallic armature proposed has here as purpose only to withstand the substantial forces exerted on the watch by the various tractions exerted by the bracelet and can in no way at the same time play the role of a baseplate as such is the case in the present invention which is to be described hereinbelow.

It is not indicated in the document cited hereinabove whether the described arrangement is suitable for a case formed of plastic material into which the metallic element



would be sunk by overmoulding of said material. One may nevertheless consider it so if reference is had for example to patent document CH-B-580 294 and FR-A-1 363 424 which both describe a reinforcing metallic insert sunk into a case injected in plastic material. In these documents however the insert in question is not used to retain a bracelet any more than it is used to serve as a base plate for a movement.

Thus, with the purpose of proposing an ultra-thin wrist-watch while taking inspiration from certain techniques forming a part of the state of the art, the present invention is original by the fact that the metallic reinforcing armature serves in addition as a base plate on which is secured at least one central stud around which pivots a cannon pinion bearing the minutes hand, a cannon wheel bearing the hours hand pivoting in turn on said cannon pinion.

The invention will now be understood upon reading the description which follows illustrated by the drawings showing an embodiment thereof.

- Figure 1 is a plan view from above of the watch according to the invention in which view the dial has been removed;

- figure 2 is a perspective view of the metallic reinforcing armature sunk in the case of the watch of figure 1;

- figure 3 is a cross-section along line III-III of figure 1;

- figure 4 is a cross-section along line IV-IV of figure 1;

- figure 5 is a cross-section along line V-V of figure 1 and

- figure 6 is a cross-section along line VI-VI of figure 1.

If one refers more specifically to figure 1 and figure 3, this latter being a cross-section along line III-III of figure 1, the ultra-thin wristwatch includes a back cover-caseband 7 and a crystal 8 formed of plastic

material. The watch also includes a movement 9 and hands 10, 11 surmounting a dial 12. The watch comprises above all a metallic reinforcing armature 13 sunk into the back cover-caseband 7, such armature serving *inter alia* as attachment points 14, 15 for a bracelet, not shown. The present invention is noteworthy in the sense that the metallic reinforcing armature 13 further serves as a base plate onto which is secured at least one central stud 16, the axis of which bears reference 1. Figure 2 shows such armature 13 exhibited in perspective, before it is moulded into the back cover-caseband 7. As is readily seen on figure 3, around the central stud 16 pivots a cannon pinion 17 which bears the minutes hand 10. Pivoting in turn on cannon pinion 17, figure 3 shows a wheel 19 with pipe 20 which bears the hours hand 11.

Thus, it is understood that armature 13, in addition to serving as reinforcement for the case and bracelet attachment as such was known from the prior art, is additionally used as base plate bearing at least the set of hands indicating the time. Such utilization is novel and is not known from prior time-pieces.

If reference is again made to figure 2, it is determined that the armature or base plate 13 bears horns 14 and 15 located at 6 o'clock and 12 o'clock arranged to receive in bores 14' and 15' bars which are not shown and around which strands of a bracelet come to be linked. Figure 2 also shows that the armature 13 includes raised edges 21, here diametrically opposed edges. Such raised edges pursue two purposes, initially that of stiffening armature 13 and next that of serving as support, at least partially, for dial 12. If reference is had to figures 3, 4 and 6, it is seen in effect that an outer edge 22 of dial 12 rests on the raised edge 21 of armature 13. As a variant, it is provided that edges 21 and 22 be secured to one another, on the one hand in order to enable the angular positioning of the dial and, on the other hand, to rigidify the case as a very compact assembly. This edges-

to-edges attachment can be brought about for example by means of laser welding.

There will now be described a non-limiting embodiment of the wristwatch made according to the invention. For this, reference will be had to the plan view of figure 1 as well as to the cross-sections taken from such figure and explicitly to figures 3, 4, 5 and 6.

Apart from the central wheel set 1 mounted for rotation on stud 16, itself fixed onto armature 13, there are also found other wheel sets making up movement 9 supported by the same armature, such wheel sets being rotatively mounted on studs. Rotatably mounted onto a stud 30 is found a wheel 31 driving wheel 32 fixed to the cannon pinion 17, itself driving the minutes hand 10. A pinion 33 fixed to wheel 31 drives wheel 19 with pipe 20 on which is fitted the hours hand 11. Stud 30 is fixed onto armature 13 as is the central stud 16, for example by riveting, screwing or welding. It can be imagined that stud 16, as well as the others moreover, is integrally obtained when moulding the back cover-caseband 7 with armature 13. The stud is then of plastic material around which the various wheel sets are mounted for rotation.

Wheel 31 and pinion 33 form wheel set 2 which is driven by pinion 34 of a wheel set 6 which further includes a wheel 35, itself driven by pinion 36 of a motor wheel set 5 comprising a magnetized rotor 37. As is well shown on figure 4, wheel sets 5 and 6 include pivots turning in bearings formed on the one hand in the plastic material of the back cover 7 and, on the other hand, in a bridge 38. For example, concerning wheel set 6, the lower bearing is formed by a bore 39 formed in a bushing 40 filling up an opening 41 in armature 13. The bushing 40 is obtained during the injection of the back cover 7. The motor wheel set 5 is pivoted in the same manner as wheel set 6 by means of a bushing 51. As shown by figure 5, magnet 37 is surrounded by a stator 42 coupled to a core 43 on which a coil 44 is wound.

Two other studs are fixed onto armature 13 as is seen on figures 2 and 6. There is stud 45 on which turns wheel set 4 made up by a pinion 46 and a wheel 47. Pinion 46 is driven by the sliding pinion 48 when the stem 49 is drawn out for time setting of the watch. There is also stud 50 on which turns wheel set 3 which drives wheel 31 already cited. These two studs are directly fixed onto the armature in the same manner as are studs 30 and 50 already described.

Thus, to summarize what has already been said hereinabove, the armature or baseplate 13 is used in the embodiment taken as example to support not only the central wheel set 1, but other wheel sets, either by means of studs 30, 45, 50 or by means of bearings formed in the bushings 40 and 51 moulded into bores in the base plate 13.

In the wristwatch taken as example, the back cover-caseband 7 and crystal 8 are formed of heat-weldable thermoplastic materials. For example, caseband 7 is formed in a material chosen from the group comprising acryl butadiene styrene (ABS) and the crystal is formed of a transparent acrylic resin (PMMA). Means are provided for assembling crystal 8 and caseband 7, such means comprising a localized zone 23 formed by a mixture of said thermoweldable materials between themselves (see figures 4, 5 and 6). The interested reader will read with profit a description of this technique in the patent document EP-B-0 101 663 (US-A-4 558 957). It is thus not necessary to expound here at greater length on this procedure.

However, since the watch which is sought to be produced here is ultra thin, that is to say, of a total thickness less than about 4 mm, it will concern the utilization of a very thin crystal as well, at least in the central zone 25 covering the hands 10 and 11, the peripheral zone 24 being thicker. In order to stiffen crystal 8, it is foreseen to fit it out with an annular reinforcing rib 26 as is seen in the cross-sections of figures 3, 4, 5 and 6. As these figures show it, it is

provided that such rib 26 bears on dial 12 which is in dished form. There is thus avoided contact between the crystal and the dial in the thick portion of such crystal which avoids scratching the dial. It will also be observed that in order to avoid sinking in of crystal 8, stud 16 is in contact with the lower face of said crystal according to an embodiment already described in this patent document CH-B-639 812.

To terminate, it will be noted that the dial in dished form pursues two purposes: initially that of rendering it stiffer and next that of arranging the thick components of the watch, namely the motor elements (figures 4 and 5), the time setting mechanism (figure 6) and the power cell, the location 60 of which is seen on figure 2, under its peripheral zone. It is to be noted that a dial in dished form has been described in patent document CH-B-620 081.

Thus, the construction which has just been described enables the proposal of an ultra-thin wristwatch of plastic material, the rigidity of which is quite as good as if the case had been formed of metal.

CLAIMS

1. Ultra-thin wristwatch including a back cover-caseband (7) and a crystal (8) formed in plastic material, a movement (9), hands (10, 11) surmounting a dial (12) and a metallic reinforcing armature (13) sunk into the back cover-caseband (7) and serving, *inter alia*, as attachment points (14, 15) for a bracelet, characterized by the fact that said metallic reinforcing armature (13) additionally serves as base plate on which is secured at least one central stud (1, 16) around which pivots a cannon pinion (17) carrying the minutes hand (10), a cannon wheel (19, 20) carrying the hours hand (11) in turn pivoting on said cannon pinion (17).

2. A wristwatch according to claim 1, characterized by the fact that the metallic armature (13) bears horns (14, 15) located at 6 o'clock and 12 o'clock arranged to receive bars around which bracelet strands are linked and edges (21) raised at a right angle at 3 o'clock and 9 o'clock on which the outer edge (22) of the dial (12) rests partially.

3. A wristwatch according to claim 2, characterized by the fact that the outer edge (22) of the dial (12) and the raised edges (21) of the metallic armature (13) are fastened to one another.

4. A wristwatch according to claim 1, characterized by the fact that the metallic armature (13) additionally bears the various wheel sets (2, 3, 4, 5, 6) composing the movement (9),

5. A wristwatch according to claim 1, characterized by the fact that the back cover-caseband (7) and the crystal (8) are formed of heat weldable plastic materials and that means are provided for assembling the crystal and the back cover-caseband, such means comprising a localized zone (23) constituted by a mixture of the heat weldable materials among themselves.

6. A wristwatch according to claim 1, characterized by the fact that the crystal (8) exhibits a peripheral



zone (24) thicker than the central zone (25) covering the hands (10, 11) and that at the origin of the peripheral zone (24) is found an annular reinforcing rib (26) arranged to come to bear on the dial (12).



Fig.1

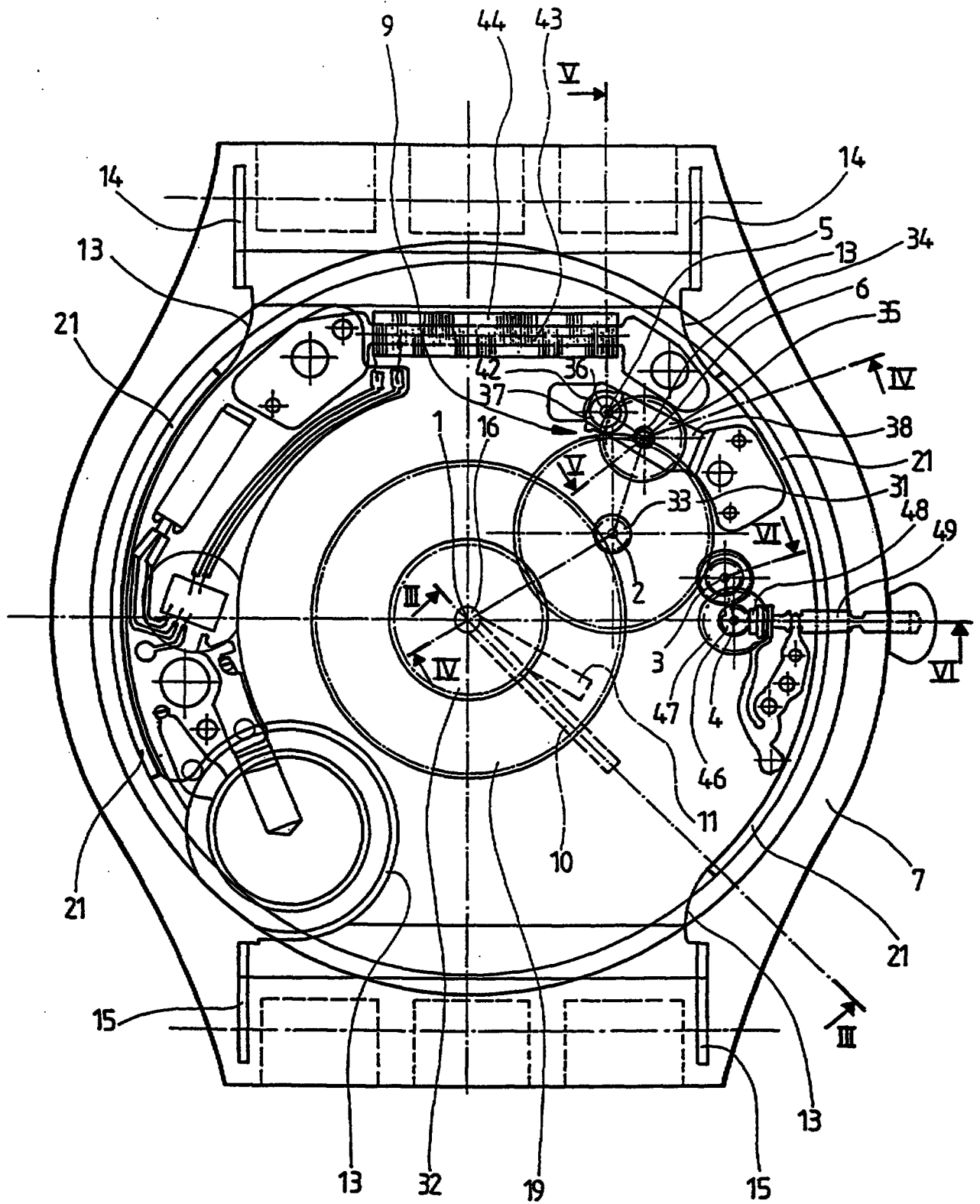


Fig.2

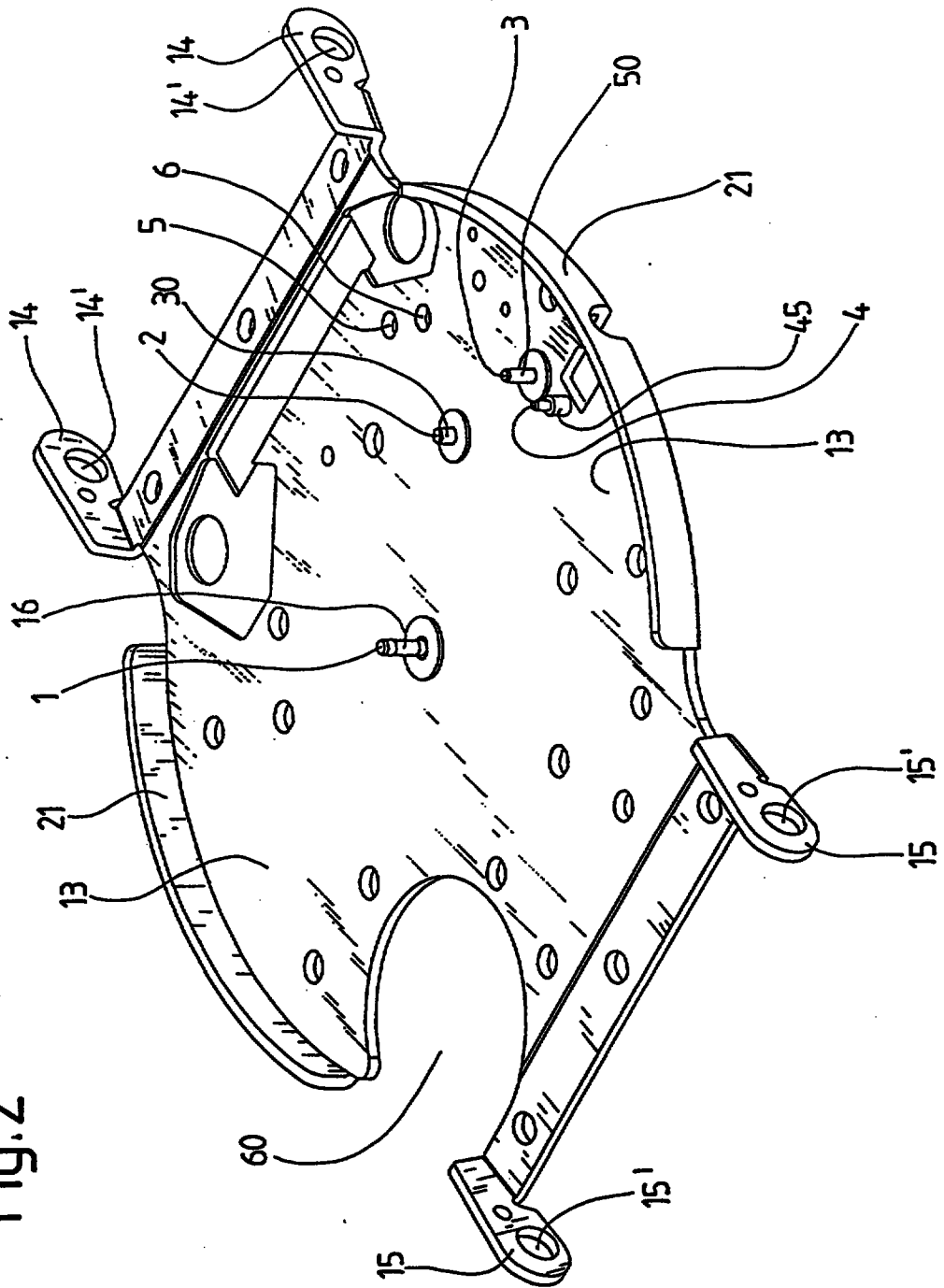


Fig. 3

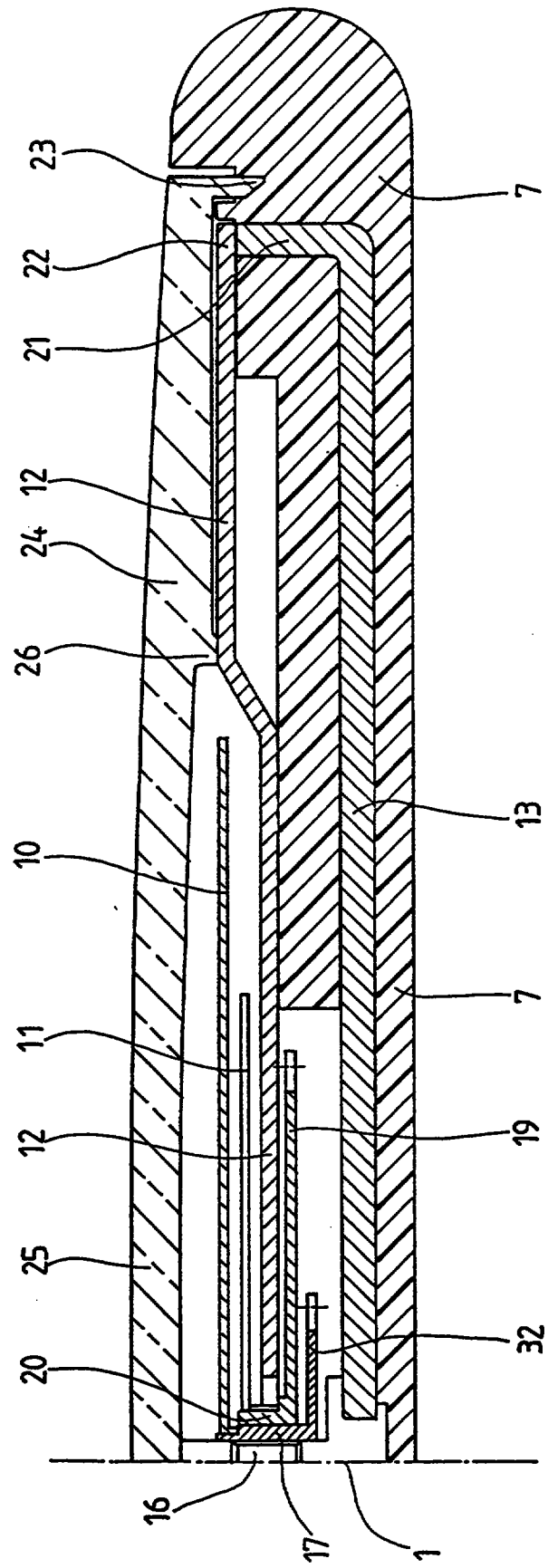


Fig. 4

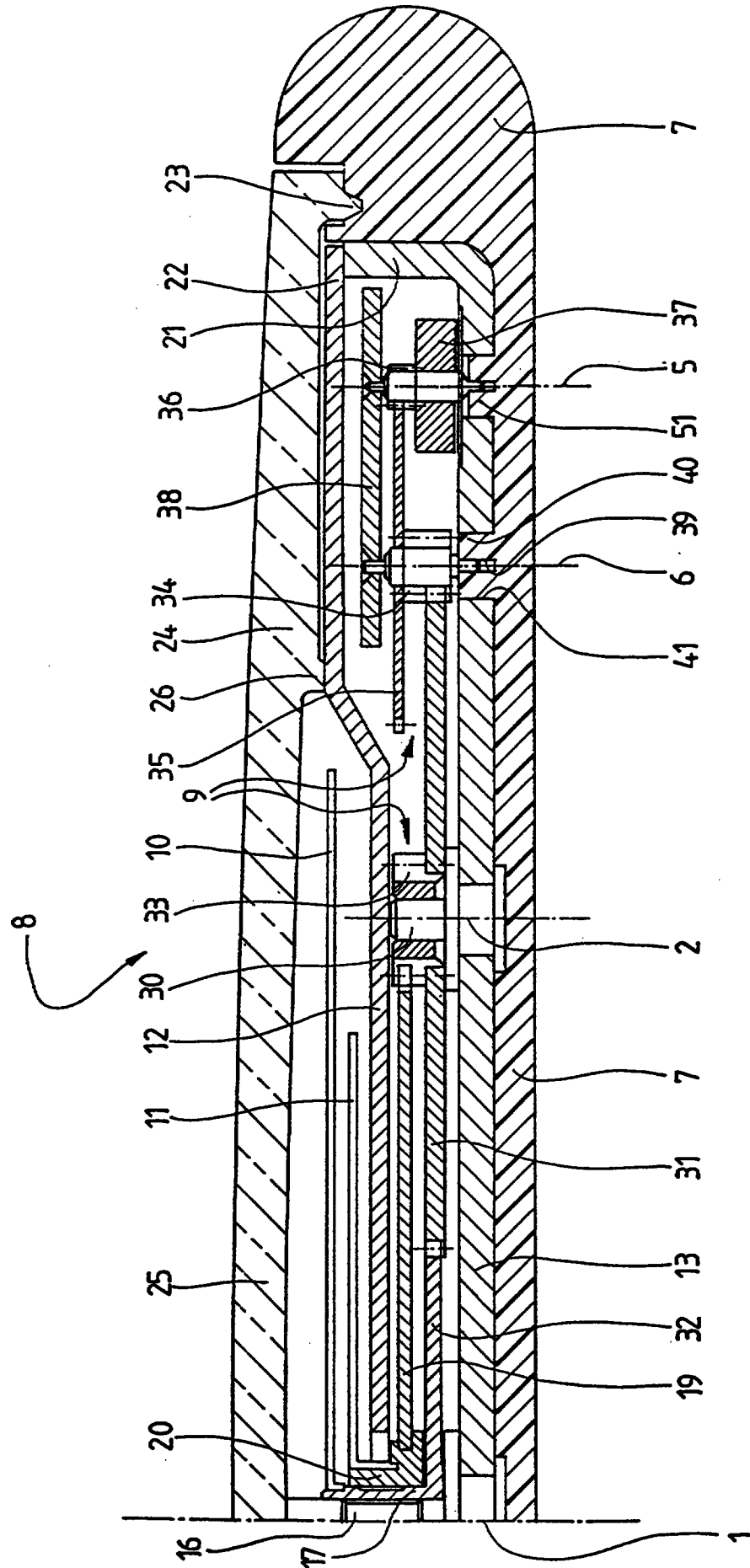
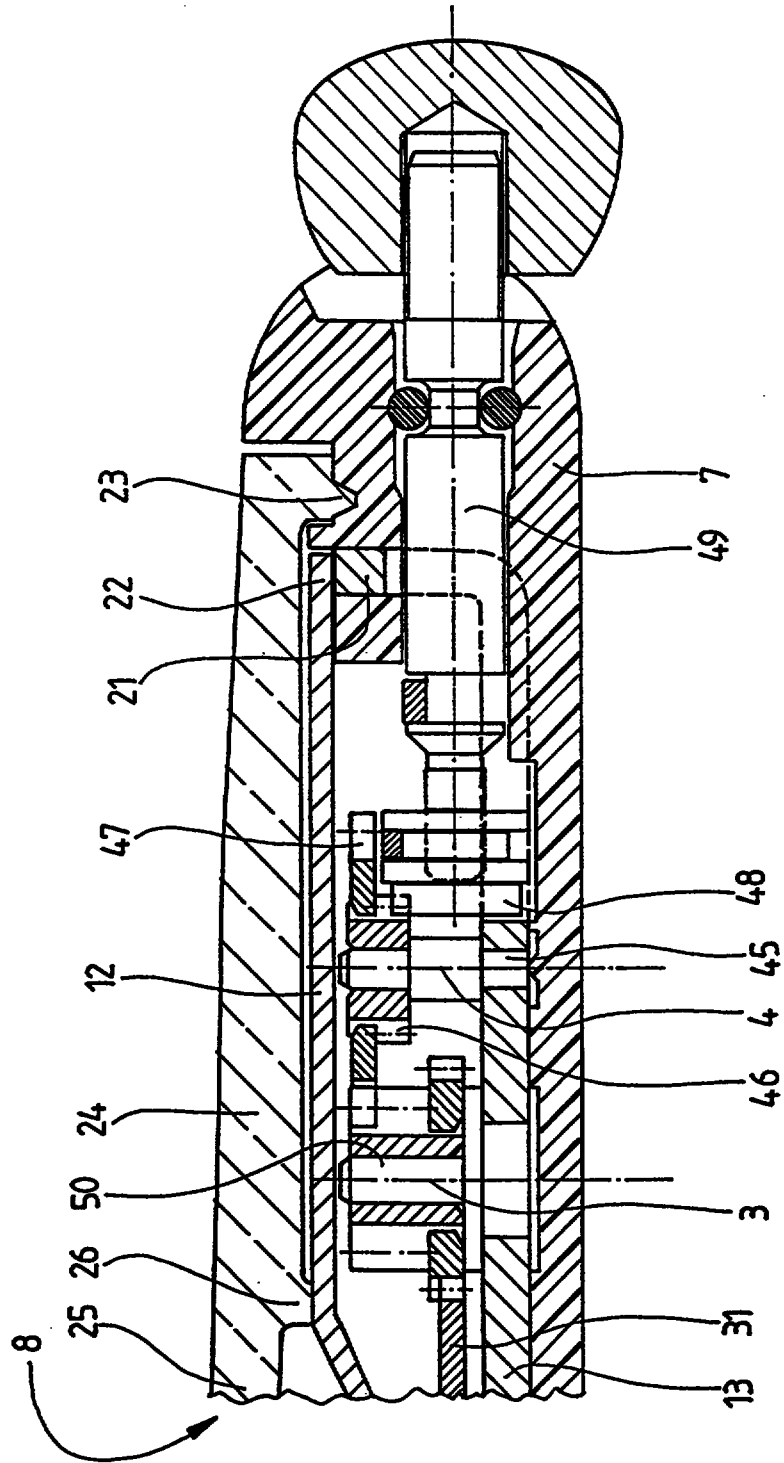


Fig. 6



ABSTRACT OF THE DISCLOSURE

**TITLE OF INVENTION: WRISTWATCH IN PLASTIC MATERIAL INCLUDING
A METALLIC REINFORCING ARMATURE USED AS BASEPLATE**

This ultra-thin wristwatch includes a back cover-caseband (7) and a crystal (8) in plastic material. The case is reinforced by a metallic armature (13). Such armature, in addition to serving as fastening point for a bracelet, is used as baseplate on which is secured at least one central stud (16) around which pivot the hours (11) and minutes (10) hands.

Figure 3 should accompany the abstract when published.

would be sunk by overmoulding of said material. One may nevertheless consider it so if reference is had for example to patent documents CH-B-580 294 and FR-A-1 363 424, which both describe a reinforcing metallic insert sunk into a case injected in plastic material. In these documents, however, the insert in question is not used to retain a bracelet any more than it is used to serve as a base plate for a movement.

Thus, with the purpose of proposing an ultra-thin wrist-watch while taking inspiration from certain techniques forming a part of the state of the art, the present invention is original by the fact that the metallic reinforcing armature serves in addition as a base plate on which is secured at least one central stud around which pivots a cannon pinion bearing the minutes hand, a cannon wheel bearing the hours hand pivoting in turn on said cannon pinion.

The invention will now be understood upon reading the description which follows illustrated by the drawings showing an embodiment thereof.

- Figure 1 is a plan view from above of the watch according to the invention in which view the dial has been removed;

- figure 2 is a perspective view of the metallic reinforcing armature sunk in the case of the watch of figure 1;

- figure 3 is a cross-section along line III-III of figure 1;

- figure 4 is a cross-section along line IV-IV of figure 1;

- figure 5 is a cross-section along line V-V of figure 1 and

- figure 6 is a cross-section along line VI-VI of figure 1.

If one refers more specifically to figure 1 and figure 3, this latter being a cross-section along line III-III of figure 1, the ultra-thin wristwatch includes a back cover-caseband 7 and a crystal 8 formed of plastic