

WRIST WATCH WITH A STRAP
HINGED TO THE CASE

The present invention concerns wrist watches, the bracelet of which is attached to the watch case by hinges.

By hinge is understood an articulated joint connecting two parts and comprising at least one first element fixed to one of the parts, at least one second element fixed to the other part, and at least one third element forming the axis of articulation.

In particular, the invention concerns a wrist watch including a case of plastic material comprising a back cover, a caseband and a crystal and a bracelet comprising two half bracelets, each attached by a first end to the case by means of a hinge. Each of the hinges comprises at least one first element fixed to the case, this element being pierced by a first hole, at least one second element fixed to the first end of the half bracelet, this second element being pierced with a hole open at both ends thereof, and an articulation axis engaged simultaneously in the first and second holes.

A watch of this type is described in French patent 1 578 023. It includes more precisely two pairs of attachment lugs, each pierced with a blind hole intended to receive bars enabling the association of the two half bracelets to the case which are neither described nor shown in the document.

If one refers to the drawings of this document, one is led to believe that a watch manufactured of plastic material may be manufactured in a manner identical to that of one having a case of metal, so small are the attachment lugs. Should however one employ the plastic watch case of this French patent, it appears that when

worn numerous cases will fail at the attachment lugs. This may be explained by the fact that the bracelet subjects the lugs via the attachment pin not only to pulling stresses, but likewise to bending stresses. The rupture of the lugs begins thus where the pin enters the holes of the latter and these beginnings of breakage rapidly degenerate into clear cracks since the plastic material in general has much less resistance to mechanical stresses than metal.

This invention has as its purpose to provide a wrist watch, the hinges of which connecting the bracelet to the watch case are compatible with the utilization of watch cases formed of plastic material.

This purpose is attained in a wrist-watch including:

- a watch case of plastic material comprising a bottom cover, a caseband and a crystal; and

- a bracelet of flexible material comprising two half bracelets each attached at one end to said case by means of a hinge and each having an inner surface destined to contact the wrist of a person wearing the watch and an outer surface opposite said inner surface, each of said hinges comprising:

- a) two first outer elements integrally formed with said case such elements being pierced by first holes,

- b) at least one second element fixed to said one end of the half bracelet, such second element being pierced by a second hole open at both extremities thereof, and

- c) a pivot axis simultaneously engaged in said first and second holes;

said hinge additionally comprising:

- d) on one hand at least one first intermediate element also integrally formed with the caseband and arranged in a manner such that there remains a gap between

two neighbouring elements this or these first intermediate elements being likewise pierced by first holes, the holes of all first elements being aligned and opening onto the lateral faces of these elements; and

e) on the other hand as many second elements as there are gaps between said first elements.

Certainly from Swiss patents 405 170 and 545 504 there are known watches of metal provided with link bracelets of which the fixation to the case corresponds to the above definition. In these documents the purpose sought after is above all aesthetic. Such watches include a bracelet of metal formed by means of a succession of links coupled to one another by hinges. Each hinge comprises n first elements integrally formed with one of the links and arranged in a manner such that there remains a gap between two first neighbouring elements and $n-1$ second elements integrally formed with the neighbouring link and respectively engaged in one of the gaps defined by the first element.

In order to obtain integration of the bracelet to the case as complete as possible, this latter includes fastening means for the bracelet having a structure identical to that of a link. In each of these arrangements such a structure of the case is desirable only when associated with a bracelet having links coupled likewise among themselves by hinges such as described hereinabove.

According to the presently preferred embodiment of the invention, each hinge comprises four first hinge elements integrally formed with the caseband of the watch case and three second hinge elements integrally formed with the half bracelet adjacent said hinge, all of these elements being pierced by a hole open at both ends, these holes being arranged in line and being traversed by a rectilinear pivot pin, this pin being driven into the holes of the

second elements while being loosely fitted in the holes of the first elements of the hinge.

The characteristics and advantages of the invention will be better understood through reading of the following description of one embodiment, such description being made with reference to the attached drawings in which:

- Figure 1 is a partial view from below of a wrist-watch according to one embodiment of the invention;
- figure 2 is a partial elevation view of the invention showing a vertical cross-section according to the plane A-A of figure 1;
- figure 3 is a view analogous to that of figure 2 showing a second angular position of the half bracelet relative to the case, and
- figure 4 is a view analogous to figure 2 showing a third angular position of the half bracelet relative to the case.

The wrist-watch shown in the drawings comprises a watch case 1 and a bracelet of which only a half bracelet 2 has been shown. The case 1 comprises a back cover 3a, a caseband-bezel 3b and a crystal 4.

According to this example, the back cover 3a and the caseband-bezel 3b of the case 1 are formed in a single piece 3, this being hereinafter designated as the body of the case and made of plastic material. The crystal 4 is in this example made of transparent plastic material and is fastened onto the caseband-bezel 3b in a fluid tight manner.

Advantageously, there will be employed in order to obtain the body of case 3 one of the three following plastic materials: that which is known under the name ABS (acrylic butadiene styrene), that known under the name ASA (acrylic

styrene acrylester) and that which is known under the name SAN (styrene acrylic nitrile) and the crystal 4 may be formed from an acrylic transparent resin such as that known under the tradename Plexiglas. The half bracelet 2 may be formed either from an elastomer or from a plastic material such as PVC (polyvinyl chloride).

As may be seen from the drawings, half bracelet 2 is attached to watch case 1 by a hinge 5. Hinge 5 comprises two first intermediate elements 6I and two first outer elements 6E which together form four first elements 6 moulded together with the body of case 3, elements 6 being arranged in a spaced-out fashion and each being pierced by a hole 7 of circular cross-section open at both extremities, the holes 7 being all of the same diameter and being mutually aligned. The hinge 5 furthermore comprises three second elements 8 moulded integrally with bracelet 2, each element 8 being respectively engaged in a gap 9 remaining between two first neighbouring elements 6. Each element 8 is pierced by a hole 10 of circular cross-section open at both ends; holes 10 are aligned among themselves and when the elements 8 are placed in gaps 9, they are likewise aligned with holes 7 of the first hinge elements 6. A rectilinear metallic pin 11 of circular cross-section traverses aligned holes 7 and 10 to form the pivot axis of the hinge. In order to avoid the application of any tangential stress to the first hinge elements 6, the stem 11 is driven into holes 10 while being loosely engaged in holes 7.

With the purpose of concealing the elements 6 and 8 of the hinge, there may be provided on the caseband-bezel 3b, on the crystal side 4 thereof, a covering wall 3c dimensioned to cover over said elements when viewed from above.

The covering wall 3c, integrally moulded with the body of case 3, joins together the first hinge elements 6

and contributes thus to improve the mechanical resistance of these latters. The covering wall 3c exhibits a free edge 3d and is disposed at a position remote from the center 1a of the watch case 1. This free edge 3d is substantially flush with the extremity 6a of the hinge elements 6 situated remote from the center 1a of the watch case.

As may be seen from figures 2 to 4, each second hinge element 8 exhibits transversally to hole 10, a cross-section of which the periphery is composed of a first portion 12 in the form of an arc of a circle centered on the geometric rotation axis 5a of hinge 5, a rectilinear portion 13 substantially perpendicular to the general plane 2a of the half bracelet 2, a second portion 14 in the form of an arc of a circle likewise centered on axis 5a and a second planar portion 15 constituting the prolongation of the lower face 2b of the half bracelet 2. The lower face 2b is that which is intended to come into contact with the wrist of the wearer of the wrist-watch.

The first portion 12 in the form of an arc of a circle exhibits a radius R substantially equal to the distance separating the geometrical axis 5a of the hinge 5 and the free edge 3d of the covering wall 3c. Thanks to such special dimensioning, there is avoided the unattractive prospect of a gap remaining between elements 8 and edge 3d. The first part 12 in the form of an arc of a circle is connected by a smooth curve 16 with the upper face 2c of the half bracelet 2. At its opposite end, the portion 12 in the form of an arc of a circle is connected to the substantially rectilinear portion 13.

The second portion 14 in the form of an arc of a circle exhibits a radius r less than that of the radius R of part 12. This radius r is substantially equal to the distance between the geometrical axis 5a of hinge 5 and a face 17 of

the caseband 3b which face bounds, in the direction toward the center of the case 1, each gap 9. The second portion 14 in the form of an arc of a circle is connected on the one hand to the first rectilinear portion 13 and on the other hand to the second rectilinear portion 15 of the cross-section of an element 8. These rectilinear portions 13 and 15 are spaced from the geometric axis 5a by a distance substantially equal to r. Finally, according to the example shown, the two portions in the form of an arc of a circle 12 and 14 of the cross-section of an element 8 each extend over an angle substantially equal to 90° .

Thanks to this particular form of the hinge elements 8 and as shown on the drawings to that of the walls bounding spaces 9, half bracelet 2 may be pivoted relative to watch case 1 through a maximum angle of 90° from a first extreme position shown on figures 1 and 2 in which position the half bracelet extends parallel to the general plane 1b of the case 1 and substantially aligned therewith to a second extreme position shown on figure 4 for which the half bracelet extends substantially perpendicular to said general plane 1b. The half bracelet 2 is stopped in its first extreme position by the planar face corresponding to the rectilinear portion 13, this planar face coming to abut face 17. The second extreme angular position of the half bracelet 2 is blocked by the planar face corresponding to the rectilinear portion 15, this planar face coming to abut face 17.

As may be well understood, the invention is not limited to the embodiment which has just been described having reference to figures 1 to 4, but may be extended to any other embodiment coming within the framework of the principle defined by the claims annexed to the present description. In particular it would not be necessary that pin 11 be driven into holes 10 of the elements 8 of the hinge,

but could be simply maintained axially in such holes 10 by any appropriate means. The pin 11 may, for example, exhibit in its sections housed in holes 10, a diameter less than that of the portions engaged in holes 7 of the first hinge elements 6. If, in addition, holes 10 have a diameter less than that of the sections 11 of the pin 11, the annular steps thus formed between the parts of different diameter of pin 11, serve as means axially blocking said pin 11 relative to the second hinge elements 8.

CLAIMS

1. Wrist watch including:

- a watch case (1) of plastic material comprising a bottom cover (3a), a caseband (3b) and a crystal (4); and
- a bracelet of flexible material comprising two half bracelets (2) each attached at one end to said case (1) by means of a hinge (5) and each having an inner surface (2b) destined to contact the wrist of a person wearing the watch and an outer surface (2c) opposite said inner surface, each of said hinges comprising:
 - a) two first outer elements (6E) integrally formed with said case (1) such elements being pierced by first holes (7)
 - b) at least one second element (8) fixed to said one end of the half bracelet (2), such second element being pierced by a second hole (10) open at both extremities thereof, and
 - c) a pivot axis (11) simultaneously engaged in said first and second holes;
said hinge additionally comprising:
 - d) on one hand at least one first intermediate element (6 I) also integrally formed with the caseband (3b) and arranged in a manner such that there remains a gap (9) between two neighbouring elements (6 E or 6 I) this or these first intermediate elements (6 I) being likewise pierced by first holes (7), the holes of all first elements (6) being aligned and opening onto the lateral faces of these elements (6); and
 - e) on the other hand as many second elements (8) as there are gaps (9) between said first elements (6).



2. Wrist watch according to claim 1 characterized in that said pivot axis (11) is freely engaged in said first holes (7) while being axially retained relative to the second elements (8) of the hinge.
3. Wrist watch according to claim 2 characterized in that the second elements (8) of the hinge are formed of plastic material and in that said pivot axis (11) is force driven into at least one of said second holes (10).
4. Wrist watch according to any of claims 1 to 3 characterized in that said first hinge elements (6) are interconnected by a covering wall (3c) integrally formed with the caseband (3b) such wall being located on the same side as the crystal (4) and being dimensioned to cover said first hinge elements (6) as seen from above.
5. Wrist watch according to claim 4 characterized in that said covering wall (3c) exhibits a free edge (3d) located remote from the center (1a) of said watch case (1), in that each of said second hinge elements (8) exhibits transversally to the second hole (10) a straight cross-section, the periphery of which exhibits on the side adjacent said outer surface (2c) of the half bracelet (2) a first portion in the form of an arc of a circle (12) centered on the geometric rotation axis (5a) of the hinge (5) and having substantially as radius (R) the distance between said rotation axis and said free edge (3d) of said covering wall (3c), in that at least one of said second elements (8) furthermore exhibits abutment means (13, 15) cooperating with counter abutment means (17) of the watch case (1) so as to determine a first and a second utmost position of rotation of the half bracelet (2) relative to the case (1), such two utmost positions being angularly spaced from one another by a certain angle and in that said arc of a circle (12) exhibits an opening angle at least equal to said certain angle.



6. Wrist watch according to claim 1 characterized in that there are two intermediate hinge elements (6) provided.
7. Wrist watch according to claim 1 characterized in that said back cover (3a) and said caseband (3b) of the watch case (1) form a single piece (3) of plastic material.
8. Wrist watch according to any of claims 1 to 7 characterized in that said caseband (3b) is formed from one of the following plastic materials:
ABS (acrylic butadiene styrene), ASA (acrylic styrene acrylester), SAN (styrene acrylic nitrile).
9. Wrist watch according to any of claims 1 to 8 characterized in that the crystal (4) of the watch case (1) is formed of plastic material and is fastened in a water tight manner onto said caseband (3b).
10. Wrist watch according to any of claims 1 to 9 characterized in that said second hinge elements (8) are integrally formed with the half bracelet (2).