

This invention relates to an assembly consisting of a wristlet comprising at least one band having at least one end made of a first thermoplastic material, of a watch-case element made of a second thermoplastic material having a melting temperature greater than that
5 of the first thermoplastic material, and of means for securing the end of said band to said watch-case element.

The invention also relates to a method of making such an assembly.

In the assembly described in patent application GB-A-2115944, the case's glass is integral with a cylindrical wall that surrounds the space
10 intended for the watch's movement.

The glass and wall are made, together, by injecting a transparent thermoplastic material into an appropriate mould.

The assembly's wristlet is also integral with a bezel that surrounds the glass's cylindrical wall.

15 The wristlet and bezel are made, together, by injecting another thermoplastic material into a mould into which the glass has first been placed.

Because the wristlet must be flexible, the melting temperature of the thermoplastic material from which it is made, and that of the bezel,
20 is lower than that of the material from which the glass and its cylindrical wall are made. It is indeed necessary for this to be so to prevent the glass and its cylindrical wall from becoming deformed during injection of the wristlet and bezel.

As a result of this however, the adherence between the bezel and
25 the glass's cylindrical wall, insofar that there is any, is insufficient to mechanically connect, in a safe manner, the bezel and the glass.

The cylindrical wall of the glass must therefore be provided with protuberances intended to be embedded into the material of the bezel to improve the mechanical connection between the bezel and glass.

30 However, the presence of these protuberances complicates the making of the mould into which the glass and its cylindrical wall are to be injected.

Besides, these protuberances decrease the cross-section of the

wristlet where the latter surrounds them, thereby decreasing its resistance to pull.

In the assembly described in patent application GB-A-1555848, the ends of the wristlet intended to be connected to the case each comprise a portion of increased thickness that is placed in a recess formed in the rear portion of the middle. These portions of increased thickness are maintained in these recesses by the case's back cover which is secured to the middle.

Making this assembly thus involves, besides the steps of making the wristlet, the middle and the back cover, assembly operations for these three elements.

In the arrangement described in patent application DE-A-1807125, the case's middle is entirely surrounded by a rib of circular cross-section that is connected thereto by an intermediate strip of reduced thickness.

The wristlet of this assembly, which is of one piece and which is made separately from the case, has an opening surrounded by a hollow bead for receiving the above-mentioned rib.

Making this assembly thus also involves, besides the steps of making the case and the wristlet, an assembly operation for these two elements.

This assembling operation, which involves deforming the bead to enable the rib surrounding the middle to be inserted into it, is possible because the wristlet is made of a flexible material. But, because of this flexibility, relatively little force is needed on the case to separate it from the wristlet. There is thus some risk of losing the case should the latter become accidentally parted from the wristlet.

Patent application WO-A-82/04016 describes a method of fluid-tightly assembling a pipe made of polyvinyl chloride to a container made of a polyolefin polymer, these being materials that cannot be welded or bonded directly to one another.

This method involves bonding to the pipe a sleeve consisting of an inner tube made of a material that can be bonded to polyvinyl chloride

and of an outer tube made of a material having a low melting temperature.

The sleeve is then inserted into the container's spout and the assembly is then heated to a temperature such that the material of the
5 outer tube will melt and adhere to the spout.

The application of such a method to the manufacture of an assembly consisting of a watch-case and of a wristlet can hardly be envisaged because of its complexity.

One object of the present invention is to propose an assembly
10 comprising a watch-case element and a wristlet whose manufacture requires no assembling step such as those needed to produce the assemblies described in patent application GB-A-1555848, DE-A-1807125 and WO-A-82/04016 mentioned earlier, and wherein the mechanical connection between the watch-case element and the wristlet is brought about
15 without it being absolutely necessary to provide this watch-case element with protuberances as in patent application GB-A-2115954 also mentioned earlier.

This object is achieved by the assembly defined by the accompanying claim 1.

20 Another object of the present invention is to propose a method of making such an assembly.

This object is achieved by the method defined in the accompanying claim 9.

Other objects and advantages of the present invention will become
25 apparent from the description about to be made with the help of the drawing, in which :

Figure 1 is a partial and diagrammatic plan view of part of one example of an assembly according to the invention;

Figures 2 to 6 are views in diagrammatical and partial longitudinal
30 nal section of part of various forms of construction for the assembly of Figure 1;

Figures 7 and 8 are, respectively, a plan view and a side view in longitudinal section, both partial and diagrammatic, of a modified form

of wristlet for the assembly of Figures 1 to 6;

Figures 9 and 10 are, respectively, a plan view and a side view in longitudinal section, both partial and diagrammatic, of another modified form of wristlet for the assembly of Figures 1 to 6;

5 Figure 11 is a diagrammatic plan view of a clasp that can be combined with the wristlets of Figures 1 to 10; and

Figures 12 and 13 are respectively sections along lines A-A and B-B of the clasp of Figure 11.

The assembly 1 diagrammatically and partially shown in Figure 1
10 comprises a watch-case element 2 and a wristlet having two bands referenced 3 and 4.

Element 2 may simply form the middle of the case. Or it may form the middle and the back cover of the case. This latter possibility is depicted by the chain dotted line in Figure 2.

15 Element 2 has means for fixing the watch movement and the watch-glass and, where appropriate, the back cover of the case. These means may be of any kind and will not be described here.

Element 2 shown in Figures 2 to 5 comprises two portions referenced 5 and 6 which closely surround the ends 3a and 4a of bands 3 and
20 4 respectively. Bands 3 and 4 are fast with portions 5 and 6 and cannot become detached therefrom.

Wristlet bands 3 and 4 are made, in a manner that will be described later, of a first thermoplastic material which has the property of being flexible at the usual temperatures of use. Such a material may
25 belong, for instance, to the class of thermoplastic elastomers. Good results have been obtained with the material sold by the firm ATOCHEM of Serquigny (France) under the trade name of PEBAX (registered mark).

Case element 2 is made, in a manner that will also be described later, of a second thermoplastic material which has the property of
30 being solid at the usual temperatures of use and, in addition, of having a melting temperature greater than that of the first plastic material. This second plastic material may, for instance, be a polyamide resin of the kind sold by the firm ATOCHEM, referred to above, under the

trade name of RILSAN (registered mark).

Assembly 1 may be manufactured in a most simple way. This manufacture consists in first injecting the plastic material selected to form bands 3 and 4 into an appropriately shaped mould at a temperature equal to or greater than its melting temperature. This injection operation may be performed simultaneously for bands 3 and 4, or separately.

During a second stage, the plastic material selected to form case element 2 is moulded over the ends of bands 3 and 4 produced during the first stage. This over moulding operation is achieved by injecting this plastic material into a second mould, having a hollow shape like case element 2, at a temperature equal to or greater than its melting temperature.

During this latter injection operation, the material forming the ends of bands 3 and 4 is heated to a temperature greater than its melting temperature by the second plastic material which comes into contact therewith, and melts at least superficially.

In the region where the two molten materials are in contact, there is formed a layer consisting of an intimate mixture, or even a kind of alloy, of these two plastic materials.

Once cooled, the layer provides a mechanical bond between bands 3 and 4 and case element 2 which therefore become solid with one another.

In a modified constructional form of the assembly of Figures 1 and 2 and which is shown in Figure 3, the ends 3a and 4a of bands 3 and 4 that are surrounded by portions 5 and 6 respectively of element 2 are formed with protuberances 7 and 8 respectively. Protuberances 7 and 8 are disposed in recesses 7a and 8a respectively formed in portions 5 and 6 of element 2.

Protuberances 7 and 8 may have any shape, e.g. that of transverse ribs which fully surround bands 3 and 4 or which are located only over a part of the periphery of bands 3 and 4. Recesses 7a and 8a formed in portions 5 and 6 of case element 2 have of course a shape corresponding to that of the protuberances.

In another modified constructional form of the assembly of Figures

1 and 2 and which is shown in Figure 4, portions 5 and 6 of case element 2 have protuberances 9 and 10 respectively which are disposed in recesses 9a and 10a respectively formed each in one end of bands 3 and 4.

What has been said above about the shape and the arrangement of protuberances 7 and 8 and of the corresponding recesses 7a and 8a shown in Figure 3 also applies to protuberances 9 and 10 and to recesses 9a and 10a of Figure 4.

The above described protuberances and recesses have the effect of reinforcing the bond between bands 3 and 4 and case element 2. When such protuberances and such recesses are provided, the range of plastic materials that may be used to produce assembly 1 widens as it is no longer necessary for the materials to adhere to each other as in the case of Figures 1 and 2.

In a modified constructional form of the assembly 1 of Figure 3 and which is shown in Figure 5, bands 3 and 4 respectively have protuberances 11 and 12 similar to protuberances 7 and 8 in Figure 3. Protuberances 11 and 12, however, have a thickness such that they become visible on at least one of the surfaces of case element 2. The shape of the visible part of protuberances 11 and 12 being freely selectable, the latter therefore also have an aesthetic effect, in addition to their reinforcing action on the bond between bands 3 and 4 and case element 2.

In another modified constructional form of the assembly 1 of Figures 1 and 2 and which is shown in Figure 6, bands 3 and 4 are joined by a common portion 13 such as to form only a single member with the latter. Common portion 13 is fully surrounded by the material of case element 2.

The shape of common portion 13 may be selected very freely. When case element 2 includes the back cover, as in the case of Figure 6, common portion 13 may for instance be rectilinear and have the same width as bands 3 and 4.

When case element 2 only comprises the case middle, common portion 13 may for example be divided into a pair of parts extending through the thickness of the case middle on opposite sides of the opening

intended to accommodate the watch movement. This latter arrangement has not been illustrated.

Common portion 13, in the case of the Figure 6 arrangement, may clearly also have one or more protuberances similar to protuberances 7, 8, 11 or 12 in Figures 3 and 5, with case element 2 then comprising corresponding recesses. Similarly, case element 2 may have one or more protuberances similar to protuberances 10 in Figure 4, with common portion 13 then comprising corresponding recesses. These various possibilities have not been illustrated.

10 All of the modified constructional forms of assembly 1 that have been described above with reference to Figures 3 to 6, and other modified constructional forms that may be imagined, may of course be manufactured using exactly the same process as that described above in the case of the assembly 1 shown in Figures 1 and 2. The protuberances,
15 such as protuberances 7, 8, 11 or 12, or the recesses, such as recesses 9a and 10a, are obtained by imparting the required shape to the mould used for injecting the first plastic material, and the corresponding recesses and protuberances respectively are automatically produced during injection of the second plastic material.

20 In another modified constructional form of the assembly 1 of Figures 1 and 2 and which is shown in Figures 7 and 8, wristlet band 3 comprises a core portion 3' and decorative portions 14 of generally annular shape that closely surround core portion 3' over part of its length. Decorative portions 14 are spaced from one another such that
25 core portion 3' is visible between them.

Decorative portions 14 are solid with core portion 3' and cannot therefore move in relation thereto.

Decorative portions 14 are made of the same material and at the same time as case element 2. To achieve this it suffices suitably to
30 shape the mould used for the injection of the second plastic material. The presence of decorative portions 14 therefore practically does not increase the cost price of assembly 1 but helps to give it a pleasing appearance.

Band 3 clearly may only have a single decorative portion 14. Similarly, band 4 may also have one or more decorative portions similar to portions 14 described above.

Decorative portions 14 may be of any shape and size and may even differ from one portion 14 to the next. Additionally, the core portions of bands 3 and 4 may comprise, at those locations where they are surrounded by decorative portions 14, one or more protuberances similar to protuberances 7, 8, 11 or 12 in Figures 3 and 5. Similarly, decorative portions 14 may each comprise one or more protuberances similar to protuberances 9 and 10 in Figure 4. Decorative portions 14 and the core portions of bands 3 and 4, respectively, then comprise the corresponding recess(es). These modified constructional forms are not illustrated.

In the modified constructional form of wristlet shown in Figures 9 and 10, the core portion 3' of band 3 comprises protuberances 15 disposed along the opposite sides of decorative portions 14.

As in the various constructional forms above, protuberances 15 may be of any shape and may either fully or partly surround the core portion 3' of band 3. Similarly, protuberances 15 may contact the decorative portions only along part of the side surfaces thereof.

Protuberances 15 help to anchor decorative portions 14 to the core portion 3' of band 3 and also to give assembly 1 a pleasing appearance.

Wristlet band 4 clearly may also have protuberances similar to protuberances 15 of Figures 9 and 10.

Additionally, band 3 and/or band 4 may have other protuberances disposed between protuberances 15, for only purely aesthetic purposes. One such protuberance is shown in chain-dotted lines at 16 in Figures 9 and 10.

The modified constructional forms shown in Figures 7 to 10 clearly may be combined with any of the constructional forms of assembly shown in Figures 1 to 6.

The various components described above, in particular case

element 2, clearly may have shapes other than that shown in Figures 1 to 8. Also, the whole or a part of the outer surface of bands 3 and 4, of case element 2 and of decorative portions 14 may not be smooth, e.g. rough or grooved.

5 In all of the constructional forms of Figures 1 to 10 described above, the wristlet of assembly 1 according to the invention could be associated with a clasp of any known kind for the purpose of connecting the ends of bands 3 and 4 that are not connected to case element 2.

10 In the case of an assembly 1 according to the invention, such a clasp of a known kind suffers however from the drawbacks of having to be manufactured separately from the assembly 1 and of having to be secured to the wristlet of the assembly in a separate fitting operation. Further, known clasps have an appearance that does not blend in well with the appearance of the assembly 1 according to the invention.

15 Figures 11 to 13 show a clasp that does not suffer from these drawbacks and which may be combined to advantage with any of the constructional forms of wristlet described above.

20 The clasp 17 has a fixed element 18 of which a portion closely surrounds and is solid with the end of band 3, and a movable element 19. Fixed element 18 and movable element 19 are pivotally connected by a pin 20 and thus form a kind of hinge.

25 Elements 18 and 19 further have engageable portions 21 and 22 located opposite pin 20 and have shapes such that element 19 remains firmly hooked on element 18 when clasp 17 is in its closed state. These shapes are moreover such that engageable portions 21 and 22 may be separated to enable clasp 17 to be opened and again to be hooked to one another when clasp 17 has to be closed once more.

30 The shape of the engageable portions 21 and 22 will not be described here as it may be fairly freely chosen. It should however be noted that for the hooking and separation of elements 18 and 19 to be possible, one of them at least should be sufficiently resilient, at least in the region of engageable portions 21 and 22. This resiliency may be achieved by suitably selecting the material used to produce the relevant

element and the shape of this element in the region of the engageable portions.

When clasp 17 is in its closed state, there remains in its central part a cavity 23 which is open at the end of clasp 17 remote from band 3. The walls of elements 18 and 19 that define cavity 23 comprise recesses 24 and 25, respectively, in facing relationship, which in the present instance have the shape of parallel grooves extending perpendicularly to the general direction of the length of band 3.

The end of band 4 comprises protuberances 26 having a shape adapted to the shape of recesses 24 and 25, i.e. parallel ribs in the present case extending perpendicularly to the general direction of the length of band 4. Protuberances 26 are designed to cooperate with recesses 24 and 25 to retain the end of band 4 in clasp 17 when the latter is closed.

The use of clasp 17 is very simple and will be readily apparent from the drawings and the above explanations. It will therefore not be described in detail here.

The end of band 3 that is surrounded by a portion of element 18 of clasp 17 may comprise one or more protuberances similar to protuberances 7, 8, 11 or 12 in Figures 3 and 5. Similarly, the portion of element 18 that surrounds the end of band 3 may comprise one or more protuberances similar to protuberances 9 and 10 in Figure 4. Element 18 or band 3 is then formed with the corresponding recess(es). These latter two constructional forms have not been illustrated.

These protuberances and recesses serve of course to reinforce the bonding action between clasp 17 and band 3.

Elements 18 and 19 of clasp 17 may be produced at the same time and in the same material as case element 2 and, when provided, as decorative elements 14. For this it suffices to give the moulds being used the required shapes.

What has been said above about the shape and the state of the outer surfaces of case element 2 and of decorative portions 14 also applies to the other surfaces of clasp 17.

It should be noted that pin 20 connecting elements 18 and 19 and the portions of the latter with which pin 20 cooperates may be done away with and replaced by a thin blade of the same plastic material as that of these elements. This thin blade is of course made at the
5 same time as elements 18 and 19 and is integral therewith. The thickness of this blade should be chosen sufficiently thin to be flexible and enable relative motion of elements 18 and 19.

The various constructional forms discussed above for clasp 17 have not been illustrated.

10 Various other modifications may be made to the assembly according to the invention described above.

In particular its aspect may readily be modified by selecting other thermoplastic materials for its manufacture, or by simply modifying the colour of one of the materials or both.

15 This aspect may also be modified by changing the shape of the moulds used for the injection of the plastic materials.

Further, the assembly according to the invention is well suited to mass production so that its cost price may be kept quite low.



CLAIMS

1. An assembly consisting of a wristlet comprising at least one band (3, 4) having at least one end (3a, 4a) made of a first thermoplastic material, of a watch-case element (2) made of a second thermoplastic material having a melting temperature greater than that of said first thermoplastic material, and of means for securing said end (3a, 4a) to said watch-case element (2), characterized in that said watch-case element (2) has a portion (5, 6) surrounding at least said end (3a, 4a) of said band (3, 4), and that said securing means comprise a layer of an intimate mixture of said first and second thermoplastic materials disposed between said portion (5, 6) of said watch-case element (2) and said end (3a, 4a) of said band (3, 4) and mechanically connecting said end (3a, 4a) to said element (2).
2. An assembly according to claim 1, characterized in that said band (3, 4) has a protuberance (7, 8, 11, 12) on said end (3a, 4a) of said band (3, 4) which engages in a recess (7a, 8a) formed in said portion (5, 6) of said element (2).
3. An assembly according to claim 1, characterized in that said element (2) has a protuberance (9, 10) which engages in a recess (9a, 10a) formed in said end (3a, 4a).
4. An assembly according to claim 1, characterized in that said band (3, 4) comprises a core portion (3') made of said first thermoplastic material and a decorative element (14) made of said second plastic material, which surrounds said core portion (3') over part of its length and which is solid therewith.
5. An assembly according to claim 4, characterized in that core portion (3') has a protuberance which engages in a recess formed in said decorative element (14).
6. An assembly according to claim 4, characterized in that said decorative element (14) has a protuberance which engages in a recess formed in said core portion (3').
7. An assembly according to claim 1, wherein the wristlet comprises two bands (3, 4), characterized in that said bands (3, 4) are



united into a single component by a common portion (13) located wholly within the material of said element (2).

8. An assembly according to claim 1, wherein the wristlet comprises first (3) and second (4) bands, characterized in that it further comprises
5 a clasp (17) made of said second thermoplastic material, which includes means for retaining the free end of said second band (4) and which has at least a portion that surrounds the free end of said first band (3) and solid with said first band (3), and in that it comprises a second layer of an intimate mixture of said first and second thermoplastic materials
10 disposed between said portion of said clasp (17) and said free end of said first band (3).

9. A method of making an assembly according to claim 1, comprising making at least said end (3a, 4a) of said band (3, 4) by injecting said first thermoplastic material into a first mould and making said
15 watch-case element (2) by injecting said second thermoplastic material into a second mould, characterized in that said second thermoplastic material is injected over said end (3a, 4a) of said band (3, 4), previously made, such that said first thermoplastic material of said end (3a, 4a) will melt at least superficially and will intimately mix with said second
20 thermoplastic material to form said layer of an intimate mixture of said first and second thermoplastic materials.