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METHOD OF ASSEMBLING CRYSTALS IN WATCH BEZELS

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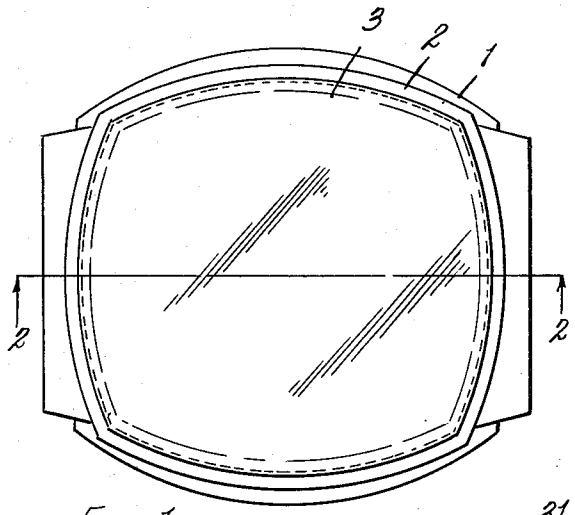


FIG. 1

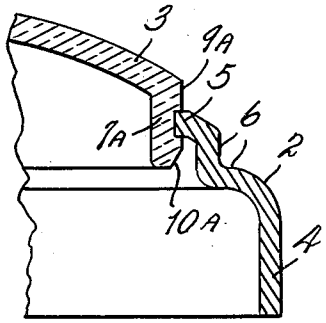


FIG. 3

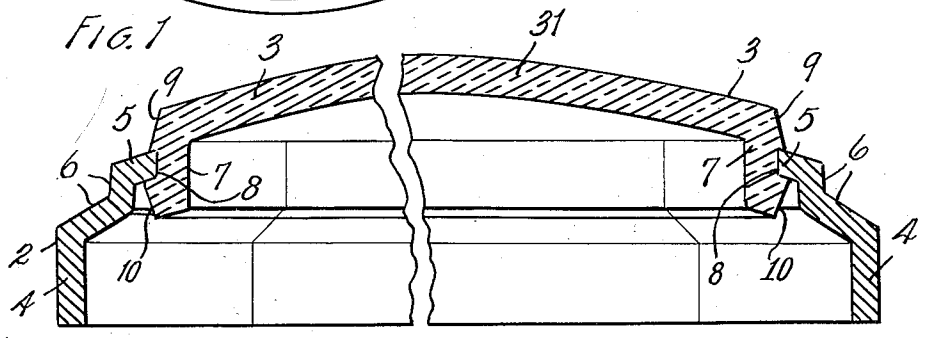


FIG. 2

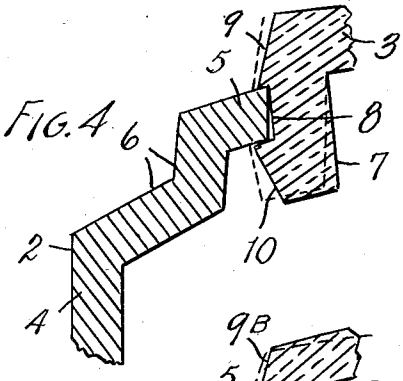


FIG. 4

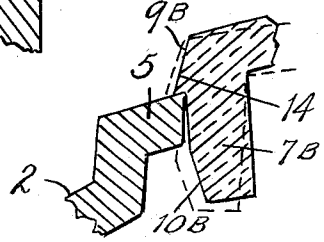


FIG. 5

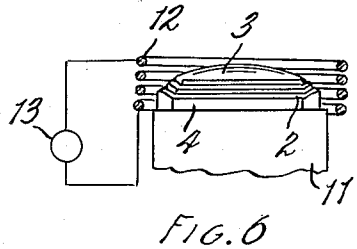


FIG. 6

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METHOD OF ASSEMBLING CRYSTALS IN WATCH BEZELS

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6 Claims. (Cl. 18—59)

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This invention relates to improvements in the method of assembling crystals in watch bezels.

The principal objects of this invention are:

First, to provide a watch crystal and bezel for holding the crystal on a watch which will effectively seal the crystal and bezel against the entrance of moisture and dirt.

Second, to provide a watch crystal and bezel assembly which may be easily assembled without producing visible scratches on the crystal.

Third, to provide a method of assembling an unbreakable watch crystal on a bezel so that the crystal cannot be lost.

Fourth, to provide a watch crystal which cannot be pushed against the face of the watch and damage the watch movement.

Fifth, to provide a method for inexpensively sealing a thermoplastic watch crystal to a bezel.

Other objects and advantages relating to the details and economies of the invention will be apparent from the following description and claims.

The drawings, of which there is one sheet, illustrate three forms of my watch crystal as assembled in a bezel and certain steps in the assembly thereof.

Fig. 1 is a plan view of a wrist watch case.

Fig. 2 is a fragmentary cross sectional view through the crystal and bezel along the line 2—2 in Fig. 1.

Fig. 3 is a fragmentary cross sectional view of a modified form of crystal and bezel.

Fig. 4 is an enlarged fragmentary cross sectional view showing one step in the assembly of my crystal and bezel.

Fig. 5 is a view similar to Fig. 4 showing a third form of my crystal and its method of assembly.

Fig. 6 is an elevational view illustrating conventionally a step in the assembly of my crystal and bezel.

The drawings illustrate a watch case 1 having a bezel 2 arranged to be secured to and support a crystal 3. As is more particularly shown in the cross sectional views the bezel 2 is provided with a rearwardly extending flange 4 arranged to be snap fitted to the ring of the watch case in the usual fashion and a radially inwardly extending flange 5 arranged to engage the crystal. Preferably the flange 5 slopes slightly forwardly of the crystal opening. The drawings illustrate a case and bezel of quadrilateral contour having curved sides but obviously other contours and other decorative flange and shoulder arrangements such as the shoulders 6 may be devised. The bezel has no reflector portion.

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The crystal 3 is made of unbreakable plastic material having thermoplastic properties and is preferably provided with an outwardly convex lens section 31, the periphery of which is provided with a rearwardly turned flange 7. The outer surface of the flange 7 defines a groove 8 extending around the periphery of the crystal and the outer surface of the flange 7 is beveled radially inwardly as at 9 and 10 away from the edges of the groove so that the crystal shown in Figs. 2 and 4 may be pressed into the opening defined by the flange 5 of the bezel either from the inside or outside of the bezel. The crystal shown in Fig. 3 is beveled on one side of the groove only at 10A.

The crystal 3 and the opening in the flange 5 of the bezel are preferably so proportioned in their unstressed and initially prepared stage that when the crystal is pressed into the bezel it will be slightly flexed or placed under strain and assume the position shown in full lines in Fig. 4 in which the flange 7 is compressed radially inwardly of the bezel so that the inner surface of the flange 5 does not seat accurately with the bottom of the groove 8 in the crystal. I then place the bezel and crystal on a suitable support 11 as shown in Fig. 6 within the coils 12 of an induction heater. When the coils 12 are energized with a high frequency current from the alternator 13, the metal of the bezel is heated sufficiently by induction by well known principles to soften the plastic of the flange 7 so that the stresses in the crystal cause the flange to expand into the final position shown in Fig. 2 and by the dotted lines in Fig. 4 and cause the plastic of the crystal to be sealed tightly to the flange 5 of the bezel. After thus sealing the crystal to the bezel it is obviously impossible for the crystal to be shaken or jarred from the bezel and impossible for dirt or moisture to enter the watch case between the crystal and bezel.

In the modified form of crystal and bezel shown in Fig. 3 the flange of the crystal is beveled only as at 10A and arranged to be inserted into the bezel from the outside, it being impractical to press the straight edge 9A outwardly from the inside of the bezel. The example of this crystal shown in Figs. 2 and 4 may be pressed inwardly or outwardly through the bezel opening but I prefer to press the crystal inwardly since any scratches which may occur on the beveled edges 10 and 10A are then concealed within the bezel leaving the outside of the crystal unmarred. In each form of the crystal the grooves on the crystal flange engage the bezel so that it is impos-

sible to press the crystal inwardly against the face of the watch and thus damage the movement.

I have thus described two highly practical commercial embodiments of my crystal and bezel together with the steps for assembling them. A third form of my crystal assembly is illustrated in Fig. 5. The flange 7B on this crystal is beveled to the rear as at 10B and preferably but not necessarily provided with a shoulder 14 forming a stop to limit the distance the crystal may be pressed through the bezel flange 5 from the front. The front edge of the crystal flange may be beveled or not as desired as shown at 9B.

Aside from the shoulder 14, which is optional, the outside of the crystal flange is ungrooved in its initially prepared form. When the crystal is pressed into the bezel it is stressed and bowed into the position shown in an exaggerated manner in full lines in Fig. 5. When the bezel is heated as previously described localized heat and pressure will be applied to the crystal along the inner edges of the bezel flange. The crystal will become sufficiently plastic along its line of contact with the bezel to flow around the edges of the bezel flange and assume the position shown by the dotted lines in Fig. 5. The crystal and bezel thus form their own tongue and groove sealing connections.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of assembling a watch crystal and bezel which comprises the steps of providing a metallic bezel having a radially inwardly projecting flange defining a crystal opening, providing a crystal of thermoplastic material having a domed lens portion with a rearwardly extending flange formed therearound, forming a radially outwardly opening groove in said crystal flange completely therearound and forming outer surfaces on said flange sloping radially inwardly from said groove with the radially outer edges of said surfaces and the base of said groove of slightly larger radial dimension than the corresponding radial dimension of said opening, pressing said crystal inwardly through said opening until said bezel flange registers with the said groove and with said crystal in stressed condition, and subjecting said bezel and crystal to induction heating to cause said crystal flange to be softened and sealed to said bezel flange and to relieve the stressed condition of said crystal, said induction heating being applied circumferentially exteriorly of the bezel and crystal flanges to facilitate softening of the thermoplastic material only where said flanges contact.

2. The method of assembling a watch crystal and bezel which comprises the steps of providing a metallic bezel having a radially inwardly projecting flange defining a crystal opening, providing a crystal of thermoplastic material having a domed lens portion with a rearwardly extending flange formed therearound, forming a radially outwardly opening groove in said crystal flange completely therearound and forming outer surfaces on said flange sloping radially inwardly from said groove with the radially outer edges of said surfaces and the base of said groove of slightly larger radial dimension than the corresponding radial dimension of said opening, pressing said crystal outwardly through said opening until said bezel flange registers with the said groove and with said crystal in stressed condition, and subjecting said bezel and crystal to induction heating to cause said crystal flange to be softened and sealed to said bezel flange and to relieve the stressed condition of said crystal.

3. The method of assembling a watch crystal and bezel which comprises the steps of providing a metallic bezel having a radially inwardly projecting flange defining a crystal opening, providing a crystal of thermoplastic material having a domed lens portion with a rearwardly extending flange formed therearound, forming a radially outwardly opening groove in said crystal flange completely therearound and forming an outer surface sloping radially inwardly from an edge of said groove with the radially outer edge of said surface and the base of said groove of slightly larger radial dimension than the corresponding radial dimension of said opening pressing said crystal and said surface through said opening until said bezel flange registers with the said groove and subjecting said bezel and crystal to heating to cause said crystal flange to be softened and sealed to said bezel flange.

4. The method of assembling a watch crystal and bezel which comprises the steps of providing a bezel having a radially inwardly projecting flange defining a crystal opening, providing a crystal of thermoplastic material having a domed lens portion with a rearwardly extending flange formed therearound, forming a radially outwardly extending shoulder on the outside of said crystal flange and completely therearound and forming an outer surface sloping radially inwardly from said shoulder with the inner edge of said shoulder of greater radial dimension than the corresponding radial dimension of said flange, pressing the sloping surface of said crystal through said opening until said bezel flange seats against said shoulder, and subjecting said bezel and crystal to heating to cause said crystal flange to be softened and sealed to said bezel flange, said heat being applied to said bezel and crystal flanges circumferentially thereof and adjacent thereto to facilitate softening the thermoplastic material of the crystal flange only where said flanges contact.

5. The method of assembling a watch crystal and bezel which comprises the steps of providing a bezel having a crystal opening, providing a crystal of thermo-plastic material having a lens portion and a rearwardly turned flange therearound, said crystal flange in its initially prepared form having an outer portion of slightly larger diametrical measurement than the corresponding diametrical measurement of said crystal opening and a beveled surface sloping radially inwardly from said outer portion, said crystal flange also having a shoulder opening toward said beveled portion, pressing said bevel portion of said flange through said opening to mutually and oppositely stress said bezel and crystal and seat said bezel against said shoulder, and subjecting said bezel and crystal to heat with the greatest intensity at and adjacent the circumference of the bezel opening and crystal flange to cause said crystal flange to be plasticized and deformed only at and closely adjacent the edge of the bezel opening.

6. The method of assembling a watch crystal and bezel which comprises the steps of providing a bezel having a crystal opening, providing a crystal of thermoplastic material having a lens portion and a rearwardly turned flange therearound, said crystal flange in its initial prepared form having an outer portion of slightly larger diametrical measurement than the corresponding diametrical measurement of said crystal opening, pressing said flange through said opening to

mutually and oppositely stress said bezel and crystal, and subjecting said bezel and crystal to heat with the greatest intensity at and adjacent the circumference of the bezel opening and crystal flange to cause said crystal flange to be plasticized and deformed only at and closely adjacent the edge of the bezel opening.

OTTO A. STARKE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,133,780	Ames	Mar. 30, 1915
1,216,636	Wehinger	Feb. 20, 1917
1,288,309	Wachter	Dec. 17, 1918
1,668,336	Porter	May 1, 1928
1,964,886	Lindhe	July 3, 1934
1,981,334	Schmalz	Nov. 20, 1934
2,048,556	McArthur	July 21, 1936
2,059,867	Hinds	Nov. 3, 1936
2,125,316	Ronci	Aug. 2, 1938
2,186,451	Dutcher	Jan. 9, 1940
2,308,189	Marti	Jan. 12, 1943
2,386,820	Spencer	Oct. 16, 1945
2,437,947	Falkoff	Mar. 16, 1948

FOREIGN PATENTS

Number	Country	Date
100,735	Great Britain	Nov. 30, 1916
204,004	Switzerland	July 1, 1939
774,880	France	Oct. 1, 1934