May 31, 1955 F. FENGLER 2,709,333

CRYSTAL FOR NON-CEMENTED MOUNTING IN WATCH CASE BEZEL

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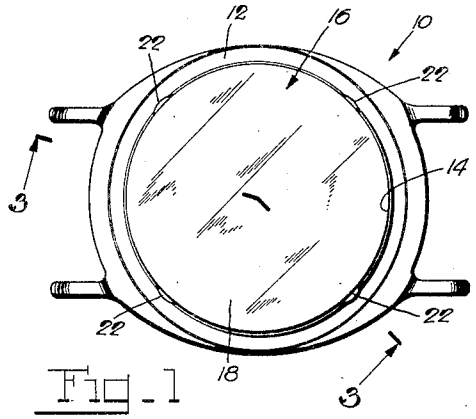


Fig. 1

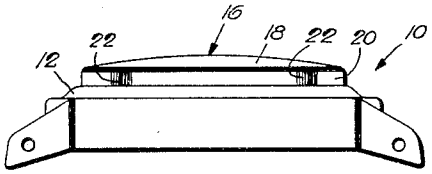


Fig. 2

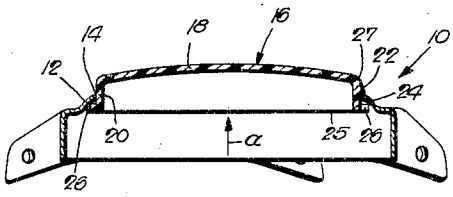


Fig. 3

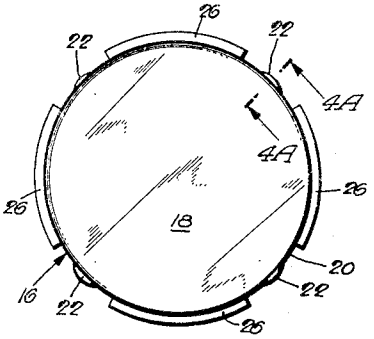


Fig. 4

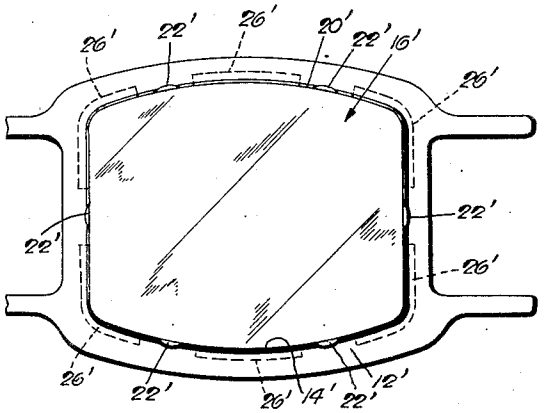


Fig. 5

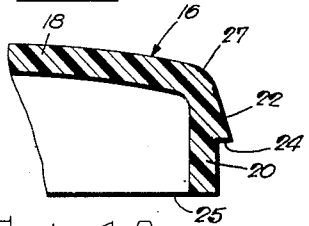


Fig. 4A

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CRYSTAL FOR NON-CEMENTED MOUNTING IN WATCH CASE BEZEL

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5 Claims. (Cl. 58—91)

This invention relates to crystals for indicators in general, and for timepieces such as watches in particular.

Crystals for timepieces, and especially for wrist watches, are customarily cemented in the usual apertures in the bezels of the watch cases. However, while crystals thus cemented in place are generally satisfactory, their mounting with cement has some serious drawbacks. Thus, crystals must accurately fit in the bezel apertures of watch cases as an imperative requirement to becoming cemented therein with any degree of security and in dustproof fashion. The average watchmaker or repairman will ordinarily endeavor to comply with this requirement by choosing from an available supply of crystals one which will best fit in an intended bezel aperture. However, with tolerances of crystals being as they are, it happens frequently that the best available crystal fits the bezel aperture with less than the required accuracy, but is nevertheless cemented therein, with the result that the crystal may soon become loose and fall from the bezel. The task of accurately fitting a bezel aperture with a crystal from an available supply of crystals becomes even more difficult when the bezel aperture is non-circular in shape, in which case one has to content also with slight variations in the shape of the crystals in addition to the usual tolerances in their size. The further task of applying cement to a chosen crystal and placing the latter in the intended bezel aperture requires dexterity and experience on the part of a watchmaker or repairman, and his further attention is usually required after the cement is dry when he may test the crystal for the security of its mounting and also remove unsightly excess cement, if any. Further, even if modern non-breakable plastic crystals originally fit accurately, and are securely cemented, in the bezels of watch cases, they will shrink, with age, to such an extent that they are no longer dustproof and eventually fall out of the bezels in which they are mounted.

Accordingly, it is a primary object of the present invention to provide a crystal which may be mounted in a bezel without encountering any of the aforementioned difficulties.

Thus, it is an object of the present invention to provide a crystal which may be mounted in the usual bezel aperture of a watch case, for instance, without the use of any cement whatever.

It is another object of the present invention to have provisions on a crystal for its ready interlock with the edge of the usual bezel aperture of a watch case so that its mounting in the bezel is far more secure than that of a cemented-in crystal.

It is a further object of the present invention to have the aforementioned interlock provisions on a somewhat resilient crystal so that the latter may be mounted instantaneously by simply forcing the same into the bezel aperture of a watch case until it snaps into self-locking relation with the edge of the bezel aperture.

Another object of the present invention is to provide crystals which may have a relatively wide range of tolerances, and which are nevertheless securely mountable in the bezel apertures of watch cases in the aforementioned forced fashion.

A further object of the present invention is to make the somewhat resilient crystals of slightly larger size than the bezel apertures for which they are intended, so that the crystals will in their mounted condition be slightly stressed and, accordingly, have a tight and dustproof fit in the respective bezel apertures.

It is another object of the present invention to provide a somewhat resilient crystal of this type which may be intended for a bezel aperture of any shape, and which will, when being mounted in the aforementioned manner, conform to and fit accurately and in dustproof fashion in the bezel aperture despite slight variations in the shapes of the crystal and bezel aperture.

It is a further object of the present invention to provide a crystal of this type which may be mounted in the aforementioned manner without requiring any special skill or special tools, so that persons other than watchmakers or repairmen may successfully perform the task.

It is still another object of the present invention to provide a crystal of this type which lends itself to simple molding and, accordingly, to efficient mass production at low cost.

Further objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a front view of a watch case with a mounted crystal in which the present invention is embodied;

Fig. 2 is a side view of the same watch case;

Fig. 3 is a section taken on the line 3—3 of Fig. 1;

Fig. 4 is a front view of the crystal alone;

Fig. 4A is an enlarged fragmentary section taken on the line 4A—4A of Fig. 4; and

Fig. 5 is a front view of a differently shaped watch case with a mounted crystal which also embodies the present invention.

Referring to the drawings, and more particularly to Figs. 1 to 3 thereof, the reference numeral 10 designates a watch case, in this instance a wrist watch case, having an integral bezel 12 which is provided with the usual aperture 14 for the reception of a crystal 16. The watch case itself forms no part of the present invention and may be conventional in every respect. The present invention is embodied in the crystal, and the same may be used with equal advantage in bezels which are separate from or integral with cases of timepieces in general and watches in particular. Accordingly, the invention will hereinafter be described with reference to the bezel of a watch case regardless of whether or not the bezel is separate from or integral with the case.

The instant crystal 16 is of the non-breakable kind, i. e., it is made of a suitable transparent plastic. The crystal 16, which in this instance is formed to fit in the circular aperture 14 in the bezel 12, is dish-shaped (Fig. 3) and comprises a web or bottom portion 18 and a projecting rim portion 20. Formed integrally with the rim portion 20 of the crystal are a plurality, in this instance four, angularly spaced wedge-shaped outward projections 22, each of which terminates in a shoulder 24 at some distance from the open end 25 of the rim portion 20 (see also Fig. 4A). More particularly, the wedge projections 22 slant outwardly from the periphery of the rim portion 20, and preferably from the smooth merger 27 of the latter and the web portion 18 of the crystal (Fig. 4A). The rim portion 20 of the crystal is further provided at its open end 25 with a plurality of integral flange-like outward projections 26 which in this instance

alternate with the wedge projections 22 (Fig. 4). Of course, the flange-like projections 26 could, if desired, be formed continuous with each other in a single annular flange on the rim portion 20 of the crystal. In any event, the number and spacing of the projections 22 and 26 should be such as to afford a stable support for the crystal in the bezel. The wall thickness of the preferably molded plastic crystal 16 is substantially uniform throughout, and is such as to render the crystal somewhat resilient, especially in the web or bottom portion 18 thereof.

In mounting the instant crystal 16, the same is merely forced from the inside of the bezel 12 in the direction of the arrow *a* into the aperture 14 therein, by applying an outward force to the crystal with a suitable tool or tools, or even by hand. In thus forcing the crystal 16 into the bezel aperture 14, the wedge projections 22 on the crystal will react with the bezel aperture in resiliently flexing the web portions 18 of the crystal sufficiently to permit the wedge projections to pass through and finally clear the bezel aperture (Fig. 3). When the wedge projections 22 clear the bezel aperture 14 on forced insertion of the crystal into the latter, the web portion 18 of the crystal is permitted to recover, with the result that the rim portion 20 of the crystal will expand and the flange projections 26 and shoulders 24 of the wedge projections 22 of the crystal will become securely interlocked with the bezel 12 (Fig. 3). Accordingly, the mounting of the instant crystal 16 in the bezel 12 requires no cement whatever, and is accomplished by merely forcing the crystal into the bezel aperture until it snaps into the described interlock with the bezel.

In order to provide a tight and dustproof fit between the crystal 16 and the bezel aperture 14, the diameter of the crystal is preferably slightly larger than that of the bezel aperture. With the crystal thus slightly larger than the bezel aperture, the web portion 18 of the crystal will, in the mounted condition of the latter, be held under a slight permanent stress which is sufficient to hold the rim portion 20 against the edge of the bezel aperture 14 with sufficient force to accomplish the objective of dustproof closure of the bezel aperture. In order to facilitate the forced insertion of the crystal 16 into the bezel aperture 14, the web portion 18 of the crystal is flat, or is preferably formed slightly convex outwardly as shown in Figs. 2 and 3.

The instant crystal 16 is particularly advantageous in that no cement whatever is required for its mounting. As compared to the task of cementing a crystal in a bezel aperture, the mounting of the instant crystal 16 is instantaneous and requires hardly any skill, it being merely necessary to force the crystal into the bezel aperture until it becomes self-locked therein. The interlock of the mounted crystal 16 with the bezel 12 is also far more secure than the mounting of a cemented crystal, and shrinkage of the instant crystal with age, or differential expansion of the crystal and bezel under heat, will not adversely affect the secure mounting of the crystal. The forced engagement of the rim portion 20 of the crystal with the bezel aperture 14, in consequence of the described slight oversize of the crystal as compared to the bezel aperture and the resulting permanent stress in the web portion 18 of the mounted crystal, further affords a dustproof seal between the crystal and the bezel aperture. The wedge projections 22 on the crystal, which are exposed to view in the mounted condition of the latter, are preferably narrow (Fig. 4) and also cross-sectionally curved, so that they are hardly noticeable and in nowise unsightly. As compared to cemented crystals which have to fit fairly accurately in the bezel apertures for which they are intended in order to achieve their mounting with any degree of security, the instant crystal may, by virtue of its resilient mount in the bezel aperture, have relatively wide tolerances. The instant crystal may also readily be molded. In this connection, the provision of the projections 22 and 26 on the rim portion 20 of the crystal in the preferred fashion so that they do not overlap each other, makes it possible to mold crystals of this type efficiently and at low cost in a simple two-part mold, as will be readily understood. Further, the circumferentially spaced relation of the projections 22 and 26 on the rim portion 20 of the crystal is further advantageous in that it leaves the rim portion 20 sufficiently resilient to engage the bezel aperture 14 with an equal force throughout.

Fig. 5 shows a modified crystal 16' which differs from the previously described crystal 16 primarily by its different shape. Thus, the crystal 16' is, in this instance, generally oblong in outline so as to fit in a correspondingly shaped aperture 14' of a bezel 12'. The crystal 16' is dish-shaped similarly as the crystal 16, and has on its rim portion 20' spaced integral wedge projections 22' which terminate in shoulders bearing against the bezel 12' on the outside thereof. The crystal 16' is on its rim portion 20' further provided with spaced integral flange projections 26' which bear against the bezel 12' on the inside thereof. While circular crystals, such as the previously described crystal 16, will usually fit accurately in circular bezel apertures, non-circular crystals, such as the oblong crystal 16', are more apt to deviate slightly in shape from that of the bezel apertures for which they are intended. However, the web and rim portions 18' and 20' of the crystal 16' are sufficiently resilient to permit such slight deformation without harm of the crystal as is required in order that the latter may fit accurately and in dustproof fashion in a bezel aperture which is shaped slightly different than the crystal.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

What is claimed is:

1. A crystal and non-cemented mounting therefor in the aperture of a bezel, comprising a transparent cover of slightly resilient material having a web portion and an integral depending rim portion fittedly received in said bezel aperture, said rim portion having a first set of circumferentially spaced integral projections slanting wedge-like outwardly therefrom and terminating in shoulders, respectively, overlapping and bearing against the bezel at the outside thereof, and another set of circumferentially spaced integral flange-like outward projections overlapping and bearing against the bezel at the inside thereof.

2. A crystal and non-cemented mounting therefor as set forth in claim 1, in which the projections of one set are spaced from the projections of the other set circumferentially of said rim portion.

3. A crystal and non-cemented mounting therefor as set forth in claim 1, in which the projections of said first set are identical and few in number and their combined width circumferentially of said rim portion of the cover is only a small fraction of the circumferential dimension of said rim portion, and the projections of said other set extend circumferentially of said rim portion between successive projections, respectively, of said first set without overlapping the latter projections.

4. A crystal for cement-less mounting in the aperture of a bezel, comprising a transparent cover of slightly resilient material having a web portion and an integral depending rim portion adapted for fitted reception in the bezel aperture, said rim portion having a first set of circumferentially spaced and axially extending integral projections slanting wedge-like outwardly therefrom and terminating in shoulders, respectively, and another set of circumferentially spaced integral flange-like outward projections facing said shoulders and being spaced therefrom axially of said rim portion, the projections of said first

set being adapted to react with the bezel opening in resiliently flexing said web portion on forced insertion of the cover into the bezel opening, and said shoulders and flange-like projections being adapted to interlock with the bezel when the cover is inserted therein.

5. A crystal as set forth in claim 4, in which the projections of one set are spaced from the projections of the other set circumferentially of said rim portion.

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