

April 29, 1952

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2,595,172

WATCH CRYSTAL

Filed Aug. 2, 1946

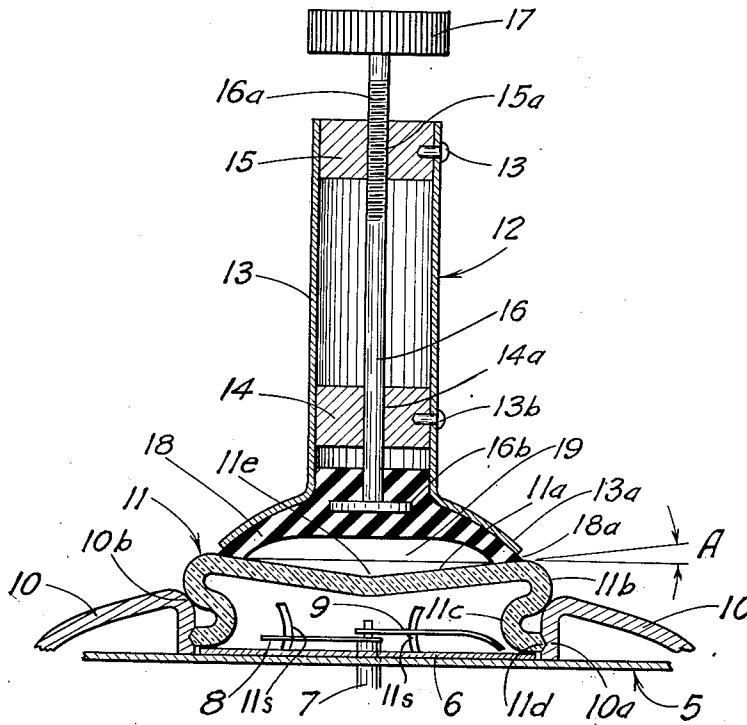


FIG. 1

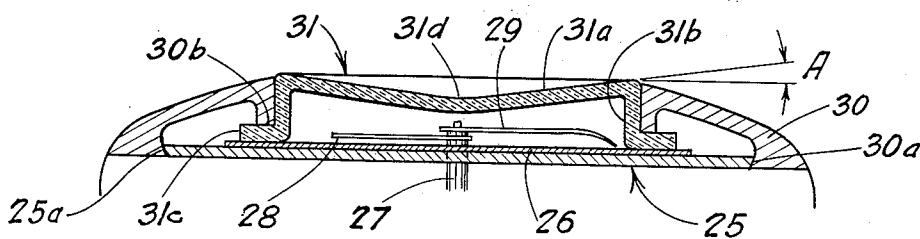


FIG. 2

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2,595,172

WATCH CRYSTAL

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Application August 2, 1946, Serial No. 687,863

5 Claims. (Cl. 58—91)

1

The present invention relates to watches and indicating instruments and more particularly to improved crystals and means for applying, retaining and removing such crystals from these instruments.

Considerable difficulty is frequently met with in reading the position of the hands of watches or clocks, or the pointing needles of other and similar instruments due to reflections and glare from the glass crystal surface. Under certain conditions, particularly when the light source is intense or concentrated, such as outdoors in bright sunlight, it is frequently necessary to move either the instrument or the reader's head, or both, before the dial and hands can be seen clearly through the crystal. In the case of pocket or wrist watches this difficulty can usually be overcome by tilting the watch until the reflected light no longer strikes the eyes, but this is not always convenient to do, particularly when the watch or instrument is fixed upon a wall or instrument panel.

This invention is more particularly directed toward reducing and eliminating the reflected light and glare from watch and instrument crystals. The applicant has found that a concave or conic crystal permits greater visibility and appreciably less glare than existing crystals under the same lighting conditions. The invention also resides in a novel crystal retention means as well as in an improved tool for flexing the crystal and facilitating its application and removal from its bezel or frame.

It is accordingly a major object of this invention to provide an improved unbreakable crystal for watches and other devices from which the glare and reflected light is materially reduced. It is a corollary object to provide a crystal which permits of improved visibility of the hands or indicating means without the necessity of tilting the watch or other device or changing the viewpoint of the observer. An additional object lies in an improved form of concave or conic crystal having a flexing retention edge which is readily and positively attached to a bezel. A further object resides in providing a simple vacuum producing tool for deforming or flexing the crystal such that it may readily be inserted within and removed from its retaining bezel.

Other objects and advantages of the present invention will become apparent to those skilled in the art after reading the present description together with the accompanying drawings forming a part hereof, in which:

Fig. 1 is a sectional elevation of a preferred

2

form of my improved crystal as applied to a time-piece, showing the application tool in an operative position thereon; and

Fig. 2 is a similar cross-sectional elevation of another form of my improved crystal also applied to a time-piece.

Referring now to Fig. 1 the framework of a watch is indicated at 5 and has attached thereto a face or dial 6 on which numerals or other suitable indicia may be carried or indicated. It will be understood that this invention is equally applicable to any other indicating device or meter and in the case of watches or clocks there may also be provided supplementary means for indicating seconds, days, months or other information. The face 6 is suitably apertured to accommodate the usual shafts 7 to which are attached the hour and minute hands 8 and 9, respectively.

The case of the watch 5 is provided with a bezel or ring 10, having a rounded contact portion 10b, the bezel being attached to the watch framework by screw threads, a snap detent or other known means. The bezel 10 is provided with an inwardly opening V-groove or recess 10a which extends circumferentially around its open central portion in the region of the periphery of the dial face 6.

The crystal 11 is preferably formed from a single homogeneous piece of transparent flexible or semi-flexible material such as Lucite or Plexiglas (methyl methacrylate) or other unbreakable plastic composition, or glass. It comprises an outer conic concave viewing portion 11a and a circumferential beaded retaining portion 11b—11c. The concave conic or depressed central portion 11a is preferably formed such that its transparent viewing portion slopes inwardly and downwardly at which the angle A is from 7 to 10 degrees and is preferably flattened or rounded at what would otherwise be the recessed central apex at 11e. The circumferential bead 11b—11c is formed into a compound curve or S-shape with the initial bead 11b outwardly rounded and the second bead 11c inwardly rounded. The latter bead preferably terminates in an outwardly facing V-point 11d of a shape and diameter such that it engages the V-groove recess 10a in the bezel.

The applicator tool 12 comprises a tubular housing 13 having a lower flared or bell-mouthed portion 13a. Cylindrical guide blocks 14 and 15 are positioned within the tube 13, being axially retained therein by the rivets 13b passing through the wall of the tube. The lower guide

3

14 is bored at 14a to slidably receive the stem or rod 16 and the upper guide 15 is provided with an internally threaded portion at 15a to engage the threaded portion 16a of the stem. The latter is provided at its upper end with a thumb wheel 17, and at its lower end with a flange 16b adapted to be embedded within a rubber vacuum cup 18 having a beveled rim portion 18a. This rubber cup is formed such that its periphery makes sealing contact with the face of the crystal 11, is backed by the flared portion 13a of the tube, and defines a variable capacity vacuum or suction space 19 over the greater portion of the crystal surface. It will be understood that the latter may be of any suitable shape such as circular, oval, square or rectangular, although in the latter shapes the corners are preferably rounded.

When it is desired to remove the crystal 11 from the bezel 10 in Fig. 1 the thumb wheel 17 of the applicator 12 is first turned until the central portion of the rubber cup 18 is extended downwardly below its rim portion 18a. The latter is then preferably moistened and placed in sealing contact with the surface of the crystal in the position shown in Fig. 1. The thumb wheel is then rotated in the opposite direction through substantially the position shown in Fig. 1 wherein a vacuum space 19 is created between the cup 18 and the recessed portion of the crystal 11. Continued deformation of the cup and increased vacuum causes the apex portion 11e to rise, or the upper or intermediate portion 11a of the crystal to lift and flatten itself. As this occurs the upper bead 11b is caused to flex or deform, with its upper part moving outwardly and its lower part moving inwardly and upwardly as a result of its rolling contact with the rounded nose 10b of the bezel. This causes the lower bead 11c to be moved inwardly and upwardly and the V-edge 11d to be released from the V-groove recess 10a in the bezel. In this flexed or deformed condition of the crystal 11 it may readily be removed from the bezel 10 by upward movement of the tool 12 to which it adheres by the aforesaid suction effect. By a reversal of this procedure it will be understood that the crystal may be inserted into the bezel and released from the tool by rotation of the thumb wheel and the resulting reduction in the suction or vacuum effect. It will be understood that the homogeneous crystal may be made with a transparent viewing portion and an opaque or colored peripheral portion. In certain installations the deformation of the lower bead is improved by cutting a number of slots 11s through the wall vertically and radially, but in all cases the slots are preferably kept below the sealing contact along 10b. Due to the flexibility of the plastic crystal of substantially uniform thickness particularly the lower half of the slotted S-portion 11c, the upward pull exerted by the applicator 12 will cause the V-edge 11d to be pinched or constricted by the wedging effect of the upper slope of the V-recess 10a, and the crystal may then be lifted from within the bezel 10. The crystal may also be readily applied without the use of the applicator by manual pressure alone which constricts the diameter across the V-edge 11d until it snaps into the V-recess 10a due to the resilience of the portion 11c.

A modification of the improved glare-proof crystal, which does not require the use of a tool such as 12, is shown in Fig. 2. The watch framework 25 has attached thereto an indicia-bearing dial 26 apertured for the shaft assembly 27 carry-

4

ing the hands 28 and 29. A bezel, 30 preferably of metal, has an inner cylindrical or oval-shaped portion terminating in the end face 30b, and has an inwardly beveled part 30a which is adapted to engage the complementary beveled periphery 25a of the watch plate 25. The crystal 31 has a similar transparent viewing portion 31a which is conic and concave terminating in a rounded center portion 31d. The crystal 30 is formed with a cylindrical wall portion 31b which fits within the like cylindrical or oval-shaped wall portion of the bezel. The crystal 30 is also formed with an outwardly turned flange 31c which is engaged by the inner end 30b of the bezel and by which it is retained against the dial 26. As in the case of the crystal 11 shown in Fig. 1, the angle A is preferably from 7 to 10 degrees.

In order to apply the crystal 31 to the watch 25 it is first nested centrally within the bezel 30 such that their cylindrical or oval-shaped wall portions are telescoped within each other. The bezel 30 is then pressed down against the framework of the watch 25 co-axially with the face 26 until the beveled retaining edge 30a of the bezel is snapped over the outer edge 25a. The bezel and crystal combination is readily removed by the insertion of a knife blade or other sharp edge by means of which the retaining ring at the periphery of the bezel is pried or removed from the main case of the watch 25.

It will be obvious to those skilled in the art that the present invention is readily adapted to watches, clocks and a wide variety of indicating instruments and all such modifications both with respect to the general arrangement and the detailed form of the respective elements are intended to come within the scope and embrace of the invention as more particularly set forth in the appended claims.

I claim:

1. In a crystal for a watch having a bezel, a compound curved periphery on said crystal engageable with said bezel, said periphery having a plurality of radial slots and said crystal having a normally depressed portion adapted when flattened to cause disengagement of said periphery from said bezel.

2. In a crystal for a watch, or like instrument, having a retaining bezel having a groove, said crystal formed from a flexible transparent material, a flexible periphery of S-shaped cross-section formed on said crystal engageable with said retaining bezel groove, said periphery having a plurality of radial slots, and releasable from the bezel groove upon deformation of the central portion and periphery of said crystal.

3. In a watch or like instrument, a retaining bezel having a V-groove, a homogeneous semi-flexible crystal having a retaining periphery of S-cross-section, said periphery having a plurality of radial slots and a depressed central portion arranged in such manner that deformation of said periphery causes disengagement of said periphery from said bezel groove.

4. In a crystal for a watch or like instrument, said instrument having an inwardly facing V-shaped recess, a semi-flexible periphery on said crystal formed into an S-shaped cross-section a radially slotted free edge of which is arranged to engage said instrument recess by outward deformation of said S-shaped periphery.

5. In a watch or like instrument, a bezel having an inwardly facing groove, a crystal having a periphery of S-shaped cross-section, the inner

5

free edge of said crystal periphery engageable with said bezel groove, said inner free edge having a plurality of radially extending slots and flexibly disengageable from said detent upon deformation of the intermediate portion of said crystal.

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