

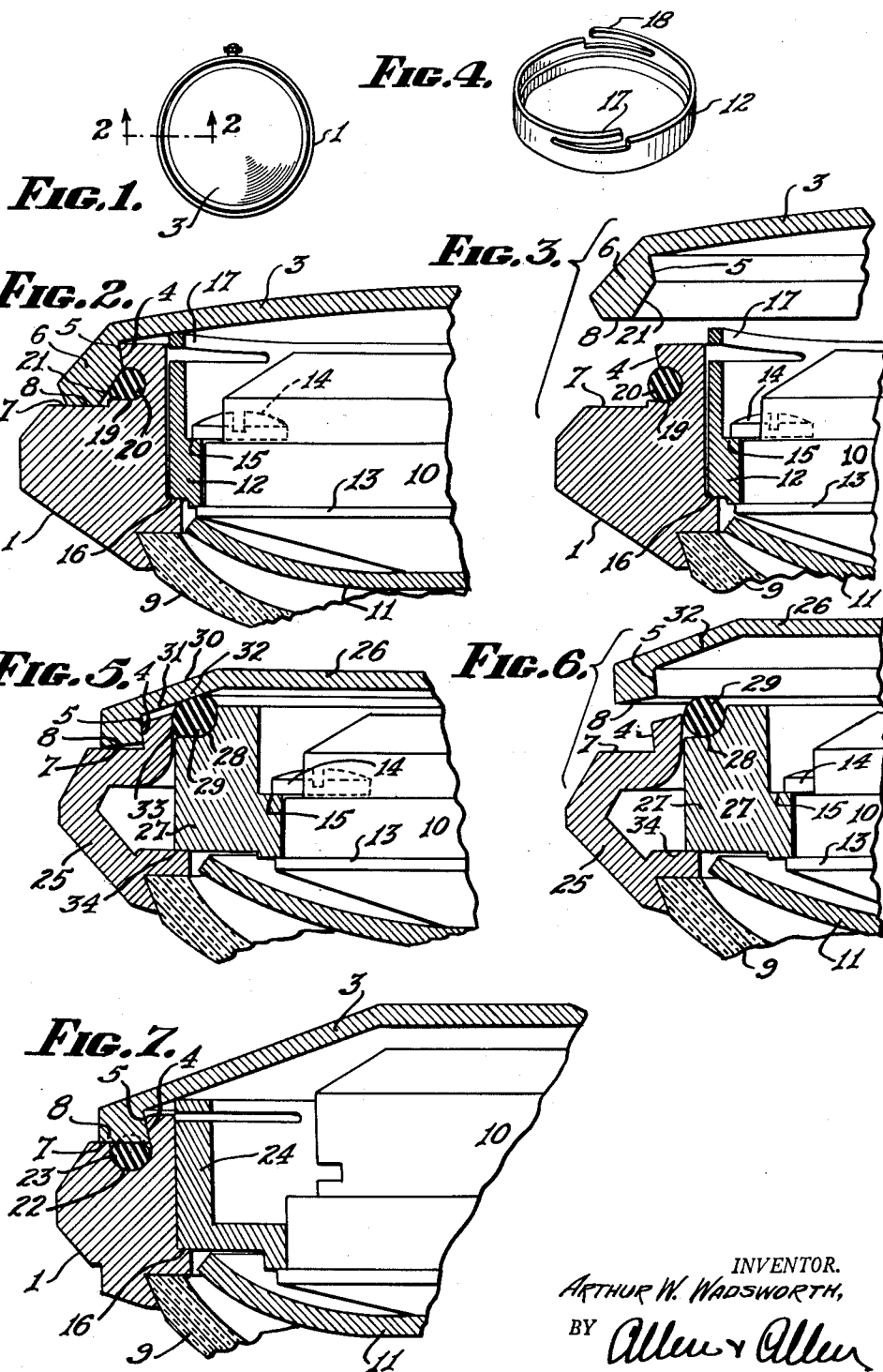
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SEALED WATCH CASE

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3,020,703

SEALED WATCH CASE

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My invention relates to the construction of watch cases which are sealed against external influences such as dust, air, moisture, water and the like. The practical art has devoted a great deal of time and attention to the provisions of sealed structures. It has been found that the accuracy and service life of the operating parts of a time-piece are greatly improved when the parts are protected by a sealed enclosure. Adequate means for effecting a seal at the point where the stem passes through a watch case have been developed, and form no limitation on the present invention. Ways have been found for mounting a watch crystal in a watch case in such fashion as to provide a dependable seal at the line of juncture of the crystal and case body. This likewise forms no limitation on the present invention, the structure hereinafter described and claimed being capable of use with any mode of crystal mounting or structure therefor.

The structure of sealed watch cases has hitherto been relatively complex and expensive. In some constructions a back element was affixed to a case body element by means of screws with the interposition of gasket means. This not only made the disassembly of the case less convenient and more time consuming, but also impaired the appearance of the structure to some extent. In other types the number of parts was increased, the outer case portion and the back having a threaded engagement such as to clamp the various parts together, with the interposition of gaskets as required. Such constructions tended to be more bulky and less decorative; and normally they required use of special tools for disassembly. Prior to the vogue of the sealed watch case it was a common practice to provide a back which had a snap-on engagement with the watch case body. This type of construction was economical, allowed somewhat greater freedom in watch case design, and made it very easy to remove the back when repairs were required. Attempts in the past to provide an adequate seal in a watch case having a snap-on cover or back have not, however, resulted in dependable hermetic seals.

It is an object of the present invention to provide a simple and economical construction capable of providing a dependable hermetic seal in a watch case while employing a snap-on back or cover which may be readily removed when desired. It is an object of my invention to provide hermetic sealing means which are positively actuated by coacting parts of a watch case body and a snap-on back or cover so as to provide a dependable seal so long as the normal interaction of the parts provides an engagement sufficient to hold the cover or back in place. It is an object of my invention to provide a hermetic sealing element which does not interfere with the normal engagement of a watch case body and a snap-on cover, which is readily and inexpensively renewed, and which will serve adequately and positively to maintain a tight condition of the watch case so long as the cover remains in position.

These and other objects of my invention, which will be set forth hereinafter, or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that structure and arrangement of parts of which I shall now describe certain exemplary embodiments. Reference is made to the accompanying drawings wherein:

FIGURE 1 is an elevational view of a watch case having a snap-on cover.

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FIGURE 2 is a partial sectional view through a watch, related to the section line 2-2 of FIGURE 1.

FIGURE 3 is a similar partial sectional view of exploded character showing the structure with the back removed.

FIGURE 4 is a perspective view of one form of works-retaining ring which I may employ.

FIGURE 5 is a partial sectional view showing a modified form of the invention.

FIGURE 6 is a similar view of exploded character showing the watch with the back removed.

FIGURE 7 is a partial sectional view of a watch showing yet another embodiment of my invention.

Briefly, in the practice of my invention, I have found that I can attain the objects noted above in a watch case having a body and a snap-on back or cover where, as is usual in such constructions the back has an annular rim, with a slightly undercut portion, the watch case having also a coacting rim with a slightly undercut portion, the sizes of the two rims being such that the rim of the back must be slightly expanded in order to pass over the rim of the body, and where the coaction of the two undercut portions is such as to maintain the engagement of the parts and to urge the rim of the back element toward the case body. I accomplish this by providing a groove of semicircular configuration in, or in connection with, the case part at a position offset from the coacting undercut surfaces aforesaid. At this groove, or recess, I locate a continuous band or annulus of resilient substance, the band having a circular cross section. The groove being semicircular, it follows that a part of the band or annulus will project from it; and I provide on the back or cover another surface, angularly related to the said undercut portion, and so positioned as to contact and distort the cross section of the band or annulus when the cover or back is in the "on" position. In this way the effective metal-metal engagement of the back and body is not interfered with or modified in any way, but an efficient and dependable seal is attained between the back and body in ways which will hereinafter be more fully described.

Referring to the accompanying drawings, in FIGURE 1, I have indicated a watch case having a body 1 and a snap-on back or cover 3. While FIGURE 1 illustrates a case and back of circular contour, it should be understood that the invention is not so limited. Snap-on backs or covers may be provided for watch cases having a wide variety of shapes such as ovals, rectangles and various polygonal figures, including styles in which the back and at least the coacting rim portion of the watch case are curved out of a simple plane. In all of these styles the snap-on engagement may be provided, and will function as described above.

In FIGURES 2 and 3 I have indicated the watch case body 1 as having an undercut, snap-on surface 4, and the back 3 as having a snap-on undercut surface 5, the latter being formed in a rim member 6. The nature of the snap-on engagement will be evident from FIGURE 2; and the coaction of the surfaces 4 and 5 is such as to urge the rim of the back downwardly as illustrated in that figure. To limit the downward motion of the rim 6, it is usual to provide an abutment or anvil surface 7 on the watch case body and a coacting surface 8 on the rim of the watch case.

In FIGURES 2 and 3 the watch crystal 9 is shown as engaged directly with the watch case body. Other modes of engagement may be practiced without departing from the spirit of the invention. The watch works are indicated at 10 and the dial of the watch at 11. The watch works are in this instance mounted in a retaining ring 12, a flange 13 on the works abutting one end of the retaining ring and a series of screws 14 attached to the works frame engaging a shoulder 15 on the retaining

ring, as shown. In assembling the watch, the works-retaining ring 12 is designed to be held against a shoulder 16 on the case body, in this particular instance. To accomplish this, the ring 12 as most clearly illustrated in FIGURE 4 may be provided with a plurality of spring fingers 17 and 18 which will abut against the back element 3 when it is in position.

In practicing my invention, I provide the case body 1 with a groove of generally semicircular configuration, 19. This groove, in the particular embodiment, is located between the undercut surface 4 of the case body and its anvil surface 7. In the groove 19 I place the resilient band element 20 which, as has been said, is of circular cross section. The relationship of parts is such that the uncompressed band will have a portion projecting beyond the confines of the groove 19 as most clearly shown in FIGURE 3. The size of the band is preferably such that it must be slightly stretched when positioned in the groove 19 so that it will stay in place.

A semicircular groove is inexpensive and easy to machine or otherwise form in the watch case body. A resilient band of circular cross section is likewise inexpensive to produce. It is not difficult to position in the groove; and various parts of the band may be twisted with respect to other parts without impairing the efficiency of the band in producing a seal. The seal formed is not dependent on the accurate positioning of a band having a special cross sectional contour, and indeed, the seal is likely to be improved rather than otherwise by such variations in position as may be occasioned by the removal and replacement of the band.

Various resilient materials may be employed for the band 20, including the natural rubbers and the synthetic rubbers of the butadiene-styrene and butadiene-acrylonitrile types and mixtures of them, these substances being cured to a resilient, flexible and elastic condition. In some instances those elastomers which are cured by polymerization in the presence of sulfur may be found less desirable by reason of the effect of the sulfur on metals of which the watch case may be made. In general, I prefer to employ an elastomer such as neoprene (chloroprene) which is not cured by means of sulfur. The chloroprenes are sufficiently elastic and resilient to serve my purpose, and are highly resistant to oxidation and to oils and greases.

I provide between the undercut surface 5 and the abutment surface 8 of the rim of the back a surface 21 angularly related to both, as will be apparent. The surface 21 is so located that, when the back is in place on the watch case, the surface 21 will intersect the normal cross sectional contour of the band 20. As a consequence, when the back is in place, the surface 21 of its rim produces a distortion of the band 20 as clearly illustrated in FIGURE 2. This distortion involves substantial radial compression of the band and therefore produces a tight and dependable hermetic seal without in any way disturbing the coaction of the undercut surfaces 4 and 5, or the abutment and anvil surfaces 8 and 7. The back element remains, however, readily removable from the watch case by the normal prying operation when it becomes necessary to effect repairs. The resilience of the band is such that replacement of the back will re-establish the seal; at the same time the resilient band 20 is inexpensive and easily replaceable as desired.

A modified construction is shown in FIGURE 7 where like parts have been given like index numerals and do not require redescription. Here the mating undercut surfaces 4 and 5 of the body and back are arranged and coact as before described. A groove 22 for the band is in this instance formed essentially in the anvil surface 7 of the watch case body, but preferably does not occupy the full width of the anvil surface. The resilient and elastic band 23 has an uncompressed diameter such as to enable it to extend above the level of the anvil surface as shown in dotted line; and the abutment surface 8 of the rim of

the back in this instance distorts and compresses the band, forming the seal.

The works-mounting ring 24, as shown in FIGURE 7, is again held between the shoulder 16 and the case back, with the use of spring fingers as previously described.

It is, nevertheless, sometimes desirable to provide for holding the works-mounting ring in place by the resilient means used to effect the seal, and this also can be accomplished in the practice of my invention. In FIGURES 5 and 6 the body 25 of the watch case is provided with the undercut surface 4 and the back 26 is provided with the undercut surface 5 coacting as before. The body has the anvil surface 7 and the back, the abutment surface 8. The works-mounting ring is indicated at 27. I have shown an annular groove 28 formed in the works-mounting ring. An upwardly projecting portion of the case body (bearing the undercut surface 4) is so related to this groove as to form in effect one side of it in the embodiment shown. It will be clear to the skilled worker in the art that the groove could, if desired, be formed partly in the works-retaining ring and partly in the metal of the case body. The resilient ring is indicated in FIGURES 5 and 6 at 29.

In the embodiment of these figures, the surfaces 5 and 8 are contiguous on the back, and the surfaces 4 and 7 are contiguous on the case body. But the back has a slantwise disposed marginal portion 30 which, within, forms a surface 31 angularly related to the undercut surface 5; and when the back is in position as shown in FIGURE 5 this surface compresses the resilient ring 29. Thus, a seal is formed against the back at 32 and against the body at 33, and additionally the works-mounting ring 27 is urged into the watch case so that its end abuts against a shoulder 34 on the case. The works 10 may be held in position as before described, with an angular abutment 13 engaging the end of the ring 27 and a series of screws 14 engaging an inner shoulder 15 on the ring.

It is characteristic of my construction that the seal is effected wholly inside the watch case and specifically inside the line of contact of the stop surfaces 7 and 8 of the body and the cover member. In this way I avoid the use of a gasket member any portion of which is visible from the outside of the watch case, impairing its general appearance. Further, my seal and the resilient and elastic ring used to form it are protected to a great and useful extent from outside influences. The connection between the cover member and the body, which holds these parts in assembly, is not made through the resilient ring, so that plastic flow of the resilient ring, if it occurs, will not affect the tightness of the engagement.

It will be clear that modifications may be made in my invention without departing from the spirit of it. Having described my invention in certain exemplary embodiments what I claim as new and desire to protect by Letters Patent is:

1. In a sealed watch case construction, a body, a works-retaining ring in said body, at least one of said last named members having a groove formed therein with a portion against which an elastic band may be engaged in tensioned condition, a cover member having snap-on relationship with said body, said cover member having a back terminating in a peripheral portion the inner side of which consists of three contiguous angularly related surfaces, the outermost of said three surfaces being a stop surface and a second of said surfaces being a rim surface, said body having a first surface which is a stop surface mating with the stop surface of said cover and a second surface which is a trim surface mating with the rim surface of said cover member, said rim surfaces being undercut relative to their respective stop surfaces so as to urge said stop surfaces toward each other, and a continuous resilient elastic band located in said groove under tension and partially projecting therefrom, the third surface of said cover peripheral portion being juxtaposed to said band and positioned to distort and compress said

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band when said cover member is in position, whereby to effect a tight seal, said body having an abutment for restraining movement of said works-retaining ring in one direction, said works-retaining ring being resiliently restrained by said cover against movement in an opposite direction, said groove being formed in said works-retaining ring, said body having a peripheral flange projecting beyond the stop surface of said body, the inner surface of said flange projecting beyond the bottom of said groove and adjacent thereto so as to form a side for said groove, the said third surface of said cover member acting to compress and distort said resilient band both against said works-retaining ring and the inner surface of said flange.

2. In a sealed watch case construction, a body, a works-retaining ring in said body, at least one of said last named members having a groove formed therein with a portion against which an elastic band may be engaged in tensioned condition, a cover member having a snap-on relationship with said body, said cover member having a back lying in a general plane and terminating in a peripheral portion the inner side of which consists of three contiguous angularly related surfaces, the outermost of said three surfaces being a stop surface and a second of said surfaces being a rim surface, said body having a first surface which is a stop surface mating with the stop surface of said cover and a second surface which is a rim surface mating with the rim surface of said cover, said rim surfaces being undercut relative to their re-

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spective stop surfaces so as to urge said stop surfaces toward each other, and a continuous resilient elastic band located in said groove under tension and partially projecting therefrom, a surface of said cover peripheral portion being juxtaposed to said band and positioned to distort and compress said band when said cover member is in position, whereby to effect a tight seal, said last mentioned surface being positioned at a substantial angle to the plane of said back, said body having an abutment for restraining movement of said works-retaining ring in one direction, said works-retaining ring being resiliently restrained by said cover member against movement in the opposite direction, said groove being formed in said works-retaining ring, the said third surface of said cover peripheral portion lying innermost and in position to contact and compress said resilient band.

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