March 5, 1946. L. H. BROWN 2,395,843

WATCH

Filed March 16, 1944

Fig. 1.

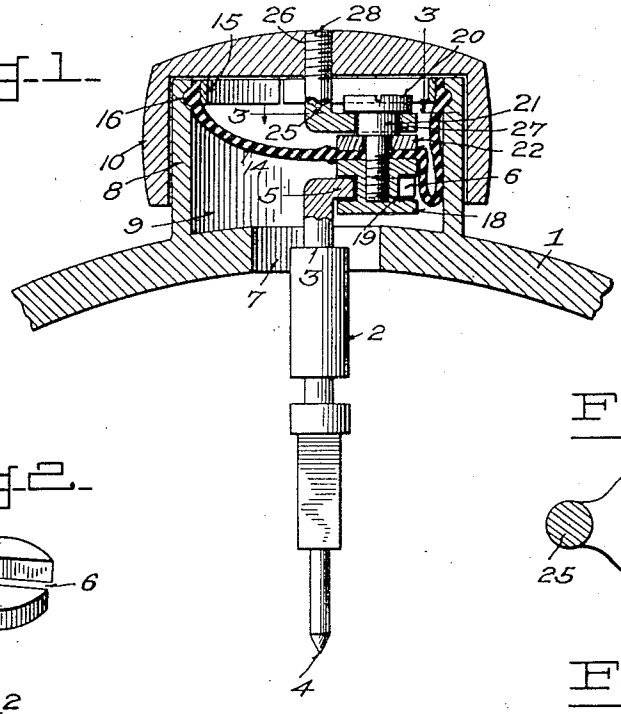


Fig. 2.

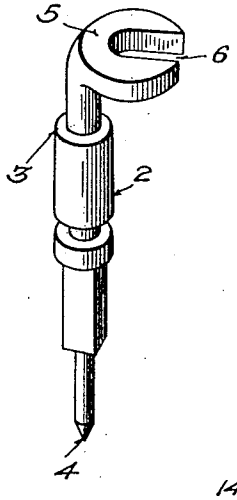


Fig. 3.

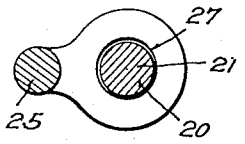


Fig. 5.

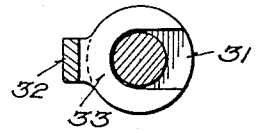
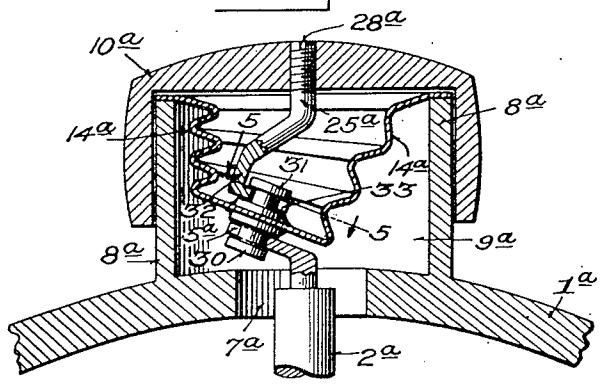


Fig. 4.



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UNITED STATES PATENT OFFICE

2,395,843

WATCH

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Application March 16, 1944, Serial No. 526,797

8 Claims. (Cl. 58—90)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The present invention relates to watches.

Among the objects of the invention is the provision of a stem winding and stem setting watch with means for preventing the entry of water, or ambient atmospheric air into the watch case by passage through the opening or openings through which the winding and setting means or stem passes through the case for operating the winding and setting wheels of the watch movement.

Means, already well known in the art are also used in connection with the present invention for securing the back cover and the bezel and crystal in air-tight and water-tight relationship with each other or with the ring or peripheral portion of the watch case. Such means, while finding utility in connection with the present invention, however, form no part of the present invention, and, therefore, do not require detailed disclosure in this written description.

The present invention finds especial utility in climates where there is high relative atmospheric humidity, or where changes in temperature are such as to cause the water moisture vapor in the ambient air in the watch case to precipitate upon the movements of the watch. In climates of high relative humidity, such as in the tropics, it will be appreciated that if the watch movements are not completely sealed in the watch case from entry of the said air, a lowering of temperature of the watch or of air therein, from any cause whatsoever, whether, for example by, atmospheric conditions or by cool water coming in contact with the watch, will be accompanied by precipitation of water moisture upon the movements of the watch, provided, of course, that the lowering of the temperature is sufficient to produce such precipitation. Such precipitation of water moisture upon and in the movements of the watch, even though slight in extent at each precipitation, causes rusting or corrosion of the watch movements, as has been found to be the case with watches in use in the armed forces of this country in the tropics and other parts of the world where high relative humidities either periodically or continually prevail.

As indicated above, watches with air tight back covers and air tight bezels and crystals are known, but so far as I am aware no one heretofore has provided means in combination with a watch winding and setting stem which entirely prevents air, water and dust from entering the watch case by passage around the winding and setting stem or through the opening in the case, or peripherical portion thereof, through which the winding and setting stem passes for operating the winding or setting wheels.

The present invention is applicable to stem winding and setting watches in which longitudinal motion of the winding and setting stem is used as a preparatory movement for accomplishing setting. The invention is applicable either to watches of the type in which the winding stem is pulled radially outwardly as a preparatory step to setting or to types of watches in which the winding and setting stem is pushed inwardly in setting. In the drawing accompanying and forming part of this written description, the invention is shown applied to type of watches in which the winding and setting stem is pulled outwardly in setting.

Two embodiments of the invention are illustrated in the accompanying drawing, in which:

Figure 1 is a central partial sectional view of one embodiment of the invention, said view being taken through the winding and setting means parallel to the face of the watch, the movements of the watch being omitted since the details of their construction form no part of the present invention;

Figure 2 is a perspective view of a part of the winding and setting means illustrated in Fig. 1;

Figure 3 is a sectional view on the line 3—3 of Fig. 1;

Figure 4 is a sectional view similar to Fig. 1 of another modification of the invention;

Figure 5 is a sectional view on the line 5—5 of Fig. 4;

In consideration of the views of the drawing, it is to be appreciated that the parts of the watch illustrated therein are shown magnified in dimensions for the sake of clearness of illustration.

Referring to Fig. 1 of the drawing, the numeral 1 indicates the watch case or part thereof in which the movements of the watch are contained. The part designated by the numeral 1 may be the ring or circumferential part of a watch case with which the bezel and the back cover of the watch engage, or it may be a rearwardly extending flange portion of the bezel within which the back cover of the watch fits with a sliding fit or within which the back cover screws for water tight closing. The part 1 therefore may be referred to as the rim of the watch, and this term rim is intended to include circular, square or oblong rims and rims of any shape or construction.

Referring to Figs. 1 and 2, the numeral 2 indicates the winding and setting stem, which in its innermost position transmits rotary motion to the winding wheels and which in its outermost

position transmits rotary motion to the setting wheels, it being understood, as indicated above, that the watch, of which a portion only is illustrated, belongs to the type in which the winding and setting stem is pulled outwardly in setting.

Winding and setting stem 2 from the position indicated by the numeral 3 to the position indicated by the numeral 4 represents conventional construction in a winding and setting stem which pulls out for setting. In accordance with the present invention, however, this conventional winding stem is modified in construction above the position indicated by the numeral 3. This modification consists in a bifurcated portion 5 which forms part of the winding and setting stem above the position 3 of the conventional structure comprised between positions 3 and 4. The bifurcations of portion 5 of the winding and setting stem extend outwardly at substantially right angles to the longitudinal axial direction of the winding and setting stem 2, and define a slot 6.

Referring more particularly to Fig. 1, the rim 1 is provided with an opening 7 through which the winding and setting stem 2 is inserted into the watch case for operating the winding and setting wheels of the watch movement. Soldered, or otherwise hermetically attached to the rim 1 around the opening 7 is tubular element 8, the purpose of which is to provide a chamber 9 centrally above the opening 7 and a bearing for the crown 10, which fits over and around the tubular element 8.

A diaphragm 14 of flexible material impervious to air and water extends across the interior of member 8 for preventing the entry of air or water through the tubular member 8 into that part of the chamber 9 between the diaphragm and the opening 7. The diaphragm may, for example, be constructed of rubber. It extends with some slack across the interior of tubular member 8, and to this end may be formed with a cup or cup-like shape, or other suitable shape, in order to permit the rotational and longitudinal motion of the winding and setting, as hereinafter more fully appears. Diaphragm 14 is secured around the interior of tubular member 8 by a split expansion ring 15, which presses the material of the diaphragm into a groove 16 which passes completely around the interior of tubular member 8 near the top thereof. A suitable water proof and water vapor-proof adhesive or cement is also applied in the groove 16 in order to cause the diaphragm to adhere to the metal walls of the groove. This manner of attachment of the diaphragm to the tubular element 8 may be varied so long as the connection between the diaphragm and tubular member is such as to prevent the passage of air and water.

Numeral 18 indicates a nut with a circumferential groove 19 within which fits the bifurcations 5 of winding and setting stem 2. This nut is located below the diaphragm 14 as shown in Fig. 1, and is secured thereto by means of a screw 20 which has a shouldered portion 21. A washer 22 surrounds the screw below the shouldered portion 21. The screw 20 passes through a central opening in the diaphragm and engages with the nut 18 below the diaphragm. The shouldered portion 21 of the screw presses the washer 22 against the diaphragm when the screw 20 and nut 18 are screwed together, whereby the diaphragm is hermetically clamped between the nut 18 and the washer 22.

An L-shaped arm or crank 25 is, at one end, provided with screw threads which engage in corresponding screw threads in an opening 26 passing centrally through the top of the crown 10 and axially thereof. The other end of the arm or crank 25 is provided with a circular opening 27 which accommodates the shouldered portion 21 of the screw 20 in such a manner as to permit relative rotary motion therebetween.

The bifurcated portion 5 of winding and setting stem 2 straddles the reduced portion of nut 18, the two bifurcations fitting in the groove 19 in such a manner as to permit relative motion between them.

A kerf or nick 28 is provided at the exterior end of arm 25 to hold it from rotation by a screw driver when the crown 10 is screwed upon it.

Upon consideration of Fig. 1 the operation of the invention will now be apparent. The cup-shaped diaphragm 14, or the slack therein, permits the crown 10 to be rotated either in a setting or winding operation. Rotation of the crown 10 rotates arm 25. The rotation of arm 25 causes the screw 20 to revolve about an axis which coincides with the longitudinal axis of the winding and setting stem 2. This revolution of screw 20 also causes revolution of the bifurcated portion 5 of the winding and setting stem 2 owing to the fact that the bifurcated portion straddles the reduced portion of the nut 18. The rotation of bifurcated portion 5 produces rotation of winding and setting stem 2 either for winding or setting. The slack in diaphragm 10 permits the above described rotation as well as enables the winding and setting stem to be moved outwardly longitudinally of its axis in setting.

In setting, the crown 10 is pulled outwardly, whereupon the arm 25 pulls against the head of screw 20 because the head of screw 20 is larger than the opening 27 in arm 25. This pulling motion is communicated to the winding and setting stem 2 owing to the fact that the bifurcated portion thereof fits within the groove 19 of the nut 18. The winding and setting stem 2 is returned to the winding position by pressing the crown inwardly, which inward motion is communicated by the arm 25, washer 22, grooved nut 18 and bifurcated arm 5 to winding and setting stem 2.

Fig. 4 illustrates an embodiment of the invention in which a metal bellows, for example a Sylphon bellows, is employed as the diaphragm of flexible water and air impervious material. In this view the rim 1*a*, tubular member 8*a* and crown 10*a* are constructed and arranged in the same way as corresponding parts 1, 8 and 10 of the modification illustrated in Fig. 1. In the modification of the invention shown in Fig. 4, the winding and setting stem 2*a* is constructed in the same way as the winding and setting stem 2 in Figs. 1 and 2, except that the bifurcated portion 5*a* is inclined upwardly with relation to the longitudinal axis of the winding and setting stem instead of being at a right angle thereto.

The Sylphon bellows 14*a* depends in the chamber 9*a* of tubular member 8*a*, being soldered to the upper end of the tubular member 8*a* in a gas and water tight joint, whereby the passage of air or water into the chamber 9*a* and opening 7*a* is prevented.

Two lugs 30 and 31, each provided intermediate their ends with a circumferential groove, are secured, as by soldering or brazing, opposite each other on opposite sides of the bottom of Sylphon bellows 14*a* and at about the mid-point of the bottom.

A hooked arm or finger 25*a*, at one end, is in

screw thread engagement with the top of the crown at its center. The hooked portion 32 of the arm 25a is provided with a bifurcated portion 33. The bifurcated portion 5a of the winding and setting stem 2a and the bifurcated portion 33 of arm 25a respectively straddle the reduced portions at the base of the grooves in lugs 30 and 31. The straight part of the arm 25a and winding and setting stem 2a are in axial alignment.

The nick 28a is provided at the exterior end of arm 25a for the same purpose as nick 28 in the embodiment of the invention illustrated in Fig. 1.

From the foregoing description of the structure of the modification illustrated in Fig. 4, its mode of operation will be apparent. When the crown 10a is rotated, winding and setting stem 2a is rotated, and when crown 10a is pulled outwardly and pushed inwardly respectively before and after setting, winding and setting stem 2a is moved outwardly and inwardly.

I claim:

1. A watch comprising a case having a rim and an opening in said rim, a chamber on said rim around said opening, a rotatable and longitudinally movable winding and setting stem extending into said case and passing through said opening into said chamber, a flexible diaphragm impervious to water and air extending across said chamber and preventing the passage of water and air through said chamber, a crown for said watch, and means for transmitting rotary and axial motion of said crown to said winding and setting stem through said diaphragm.

2. A watch comprising a case, a tubular member carried by said case, a rotatable and longitudinally movable winding and setting stem extending into said tubular member from within said case; a flexible diaphragm extending across said tubular member, fixedly attached in air-tight and water-tight relationship with said tubular member and wholly sealing the said tubular member against the passage of air and water therethrough, said flexible diaphragm being disposed between the ambient atmosphere and said rotatable and longitudinally movable winding and setting stem; rotatable and longitudinally movable means on the ambient atmosphere side of said diaphragm extending into said tubular member, and means connecting said last mentioned rotatable and longitudinally movable means hermetically through said flexible diaphragm with said rotatable and longitudinally movable winding and setting stem for imparting motion of the former to the latter.

3. A watch comprising a case, a tubular member carried by said case, a rotatable and longitudinally movable winding and setting stem extending into said tubular member from within said case, a Sylphon bellows extending across said tubular member, fixedly attached in air-tight and water-tight relationship with said tubular member and wholly sealing the said tubular member against the passage of air and water therethrough, said Sylphon bellows being disposed between the ambient atmosphere and said rotatable and longitudinally movable winding and setting stem; rotatable and longitudinally movable means on the ambient atmosphere side of said bellows extending into said tubular member, and means connecting said last mentioned rotatable and longitudinally movable means hermetically through said bellows with said rotatable and longitudinally movable winding and setting stem for imparting motion of the former to the latter.

4. A watch comprising a case, a rotatable and longitudinally movable winding stem in said case, said case having an opening; means for rotating and longitudinally moving said stem comprising a flexible diaphragm, impervious to air and water, in fixed sealing engagement with fixed parts defining said opening, whereby the passage of air and water through said opening is wholly blocked; means operable from the exterior of said case for providing rotary motion and longitudinal motion for said winding stem, and means affording a fixed seal with respect to said diaphragm for transmitting to the said winding stem the said rotary and longitudinal motions.

5. A watch comprising a case having an opening therein, a rotatable and longitudinally movable winding stem in said case, a flexible diaphragm impervious to air and water extending across and blocking said opening and fixedly attached to parts of said case around said opening thereby wholly sealing said opening against the passage of air and water therethrough into said case, rotatable and longitudinally movable means on the exterior side of said diaphragm, and means for transmitting the motions of said last-mentioned means through said diaphragm to said winding stem without impairing the action of said diaphragm to wholly seal the said opening against the passage of air and water therethrough.

6. A watch comprising a case having an opening therein, a rotatable and longitudinally movable winding stem in said case, a flexible diaphragm impervious to air and water extending across and blocking said opening and fixedly attached in airtight and watertight relationship with parts about said opening, rotatable and longitudinally movable means carried by said case exteriorly of said diaphragm, and means fixedly attached to said diaphragm for transmitting the motions of said rotatable and longitudinally movable means to said rotatable and longitudinally movable winding stem in said case.

7. A watch comprising a case having a rim and an opening therein, wall means defining a chamber adjacent to and connecting with said opening, a rotatable and longitudinally movable winding and setting stem in said case and extending through said opening into said chamber, a flexible diaphragm impervious to air and water in fixed sealing engagement with said wall means and wholly blocking the passage of air and water through said chamber, means operable from the exterior of said case for providing rotary motion and longitudinal motion for said winding stem, and means affording a fixed seal with respect to said diaphragm for transmitting to said winding stem the said rotary and longitudinal motions.

8. A watch comprising a case having an opening therein, a flexible diaphragm impervious to air and water hermetically sealing said opening, a rotatable and longitudinally movable winding stem on the side of said diaphragm towards the interior of the watch case, rotatable and longitudinally movable winding and setting means for the watch on the exterior side of said diaphragm, and means for communicating the motions of said winding and setting means to said flexible diaphragm and from said flexible diaphragm to said winding and setting stem to rotate it and longitudinally move it without destroying the hermetic seal provided by said flexible diaphragm.

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