(12) UK Patent Application (19) GB (11) 2 057 727 A

(21) Application No **8026005**
(22) Date of filing
8 Aug 1980
(30) Priority data
(31) **7271/79**
(32) **8 Aug 1979**
(33) **Switzerland (CH)**
(43) Application published
1 Apr 1981
(51) **INT CL³ G04B 37/11 37/05 37/10 39/02**
(52) Domestic classification
G3T A2B A2C A2D A2E
(56) Documents cited
EP 0006649 A
(58) Field of search
G3T
(71) Applicant
General Watch Co Ltd
Faubourg du Lac 6
CH-2500 Bienne
Switzerland
(72) Inventors
Walter Schaeren
Claude Ray
(74) Agents
Haseltine Lake & Co
Hazlitt House
28 Southampton Buildings
Chancery Lane
London
WC2A 1AT
England

(54) A watch case

(57) A watch case comprises a packing 6 of elastic material rendered integral with the inner surface portion of the case body 1 by the use of adhesive and pressure, the packing 6 covering at least the major part of said surface portion. An edge 7 of the packing 6 provides for elastic suspension of a movement 8.

The upper and lower parts of the packing 6 enable a rim 2 of watch glass 4 and a case back 3 to be fixed in water-tight manner. Lateral holes extending right through the packing 6 provide for the passage of control elements 10, in a water-tight manner. The packing is of natural or synthetic rubber; in manufacture, the case body surface is coated with adhesive, and the packing material is simultaneously shaped and bonded to the body in a high temperature press.

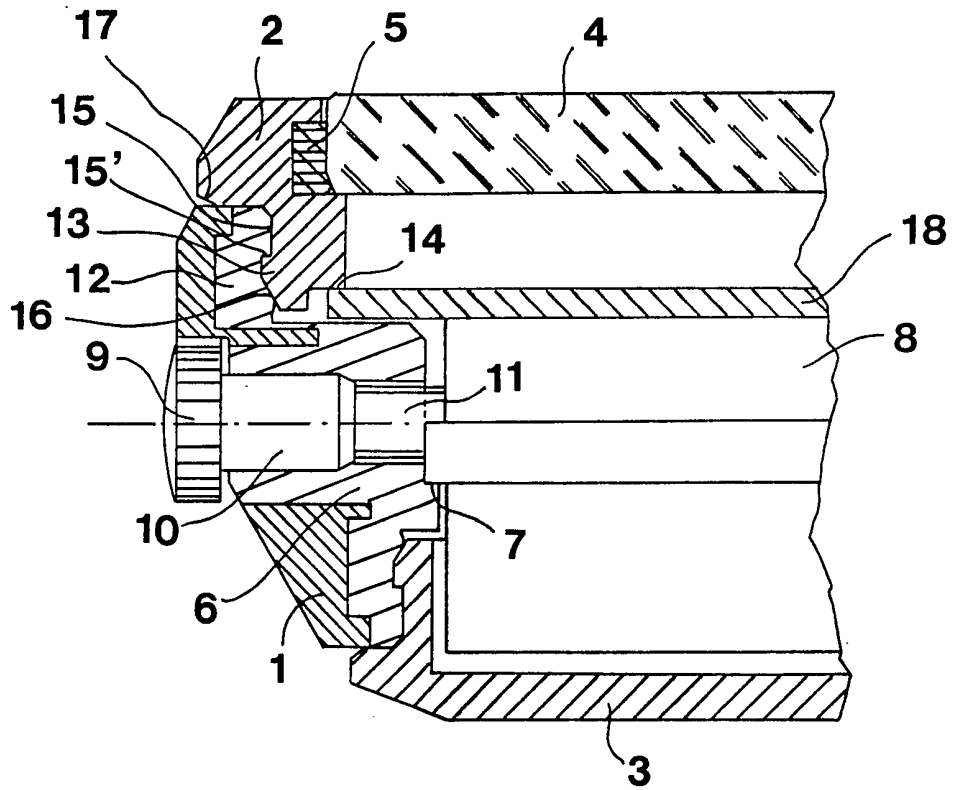

FIG.1

GB 2 057 727 A

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

2057727

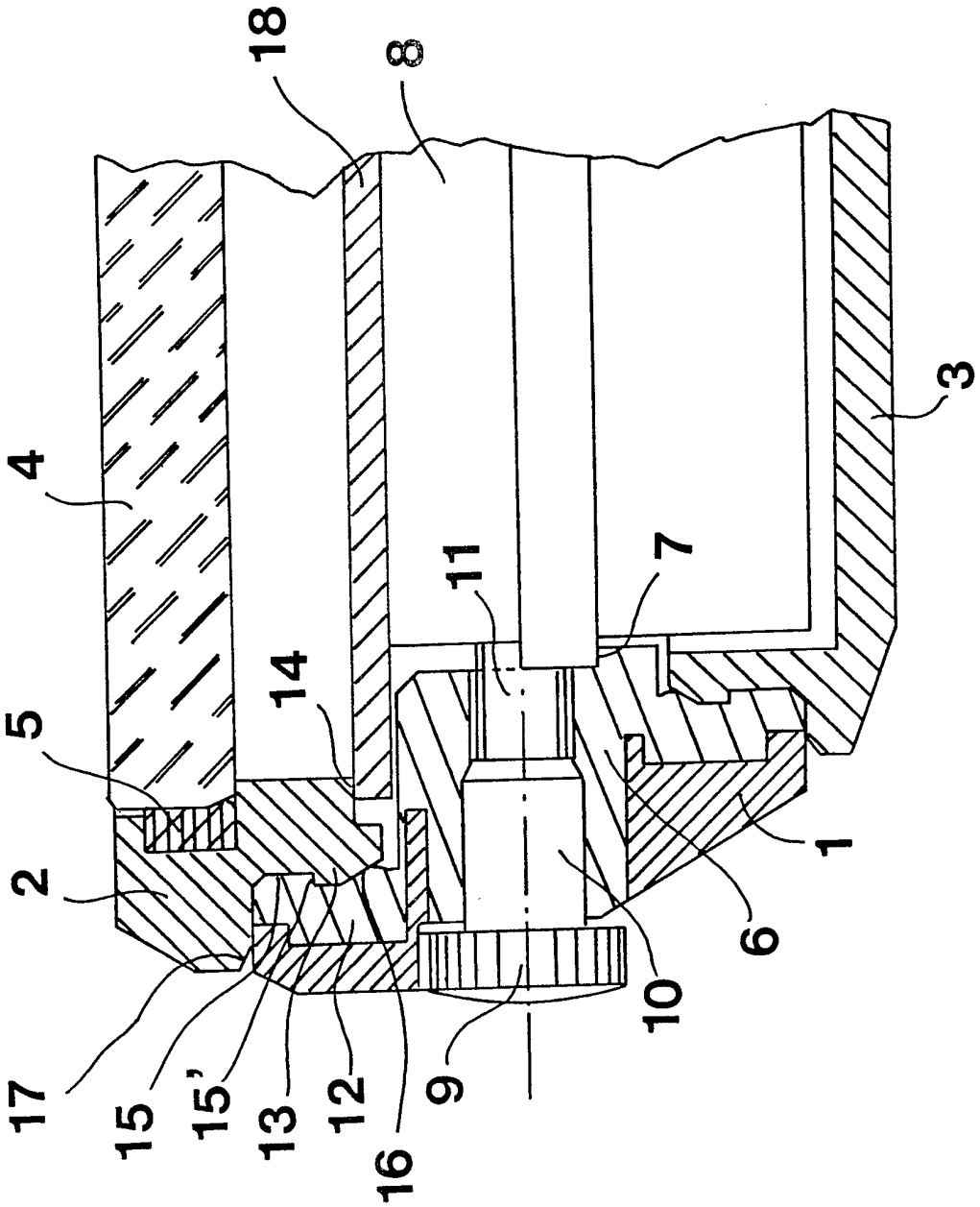

FIG.1

2057727

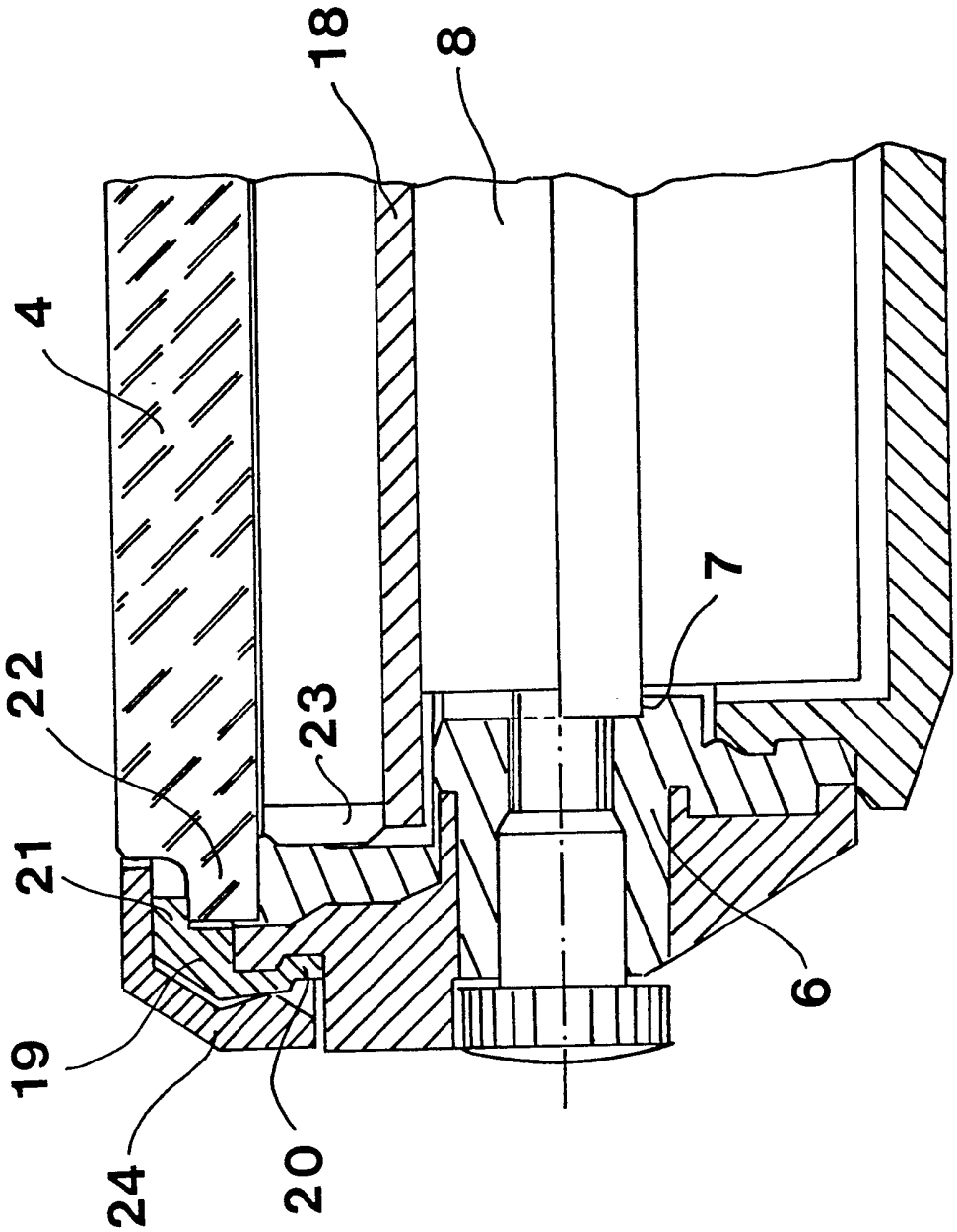

FIG. 2

2057727

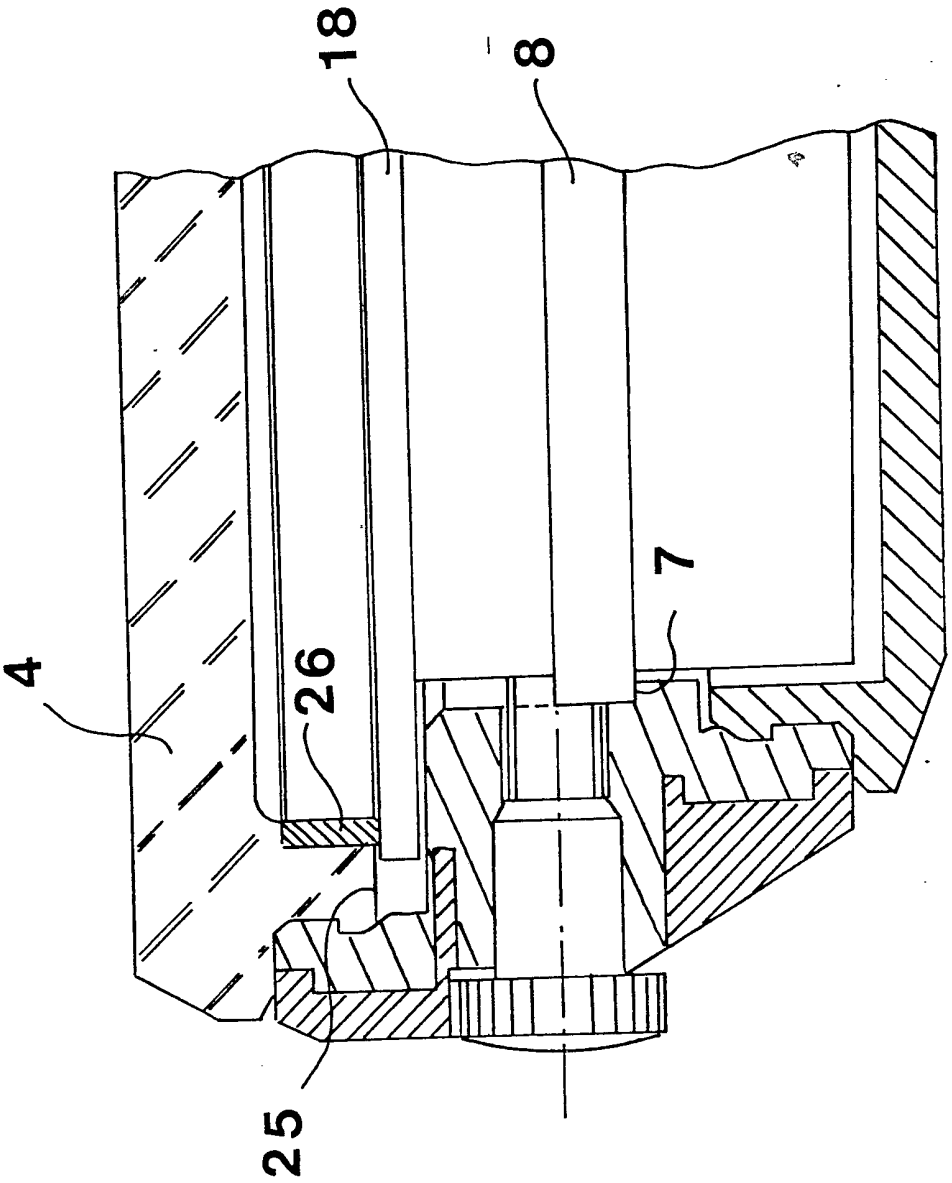

FIG.3

2057727

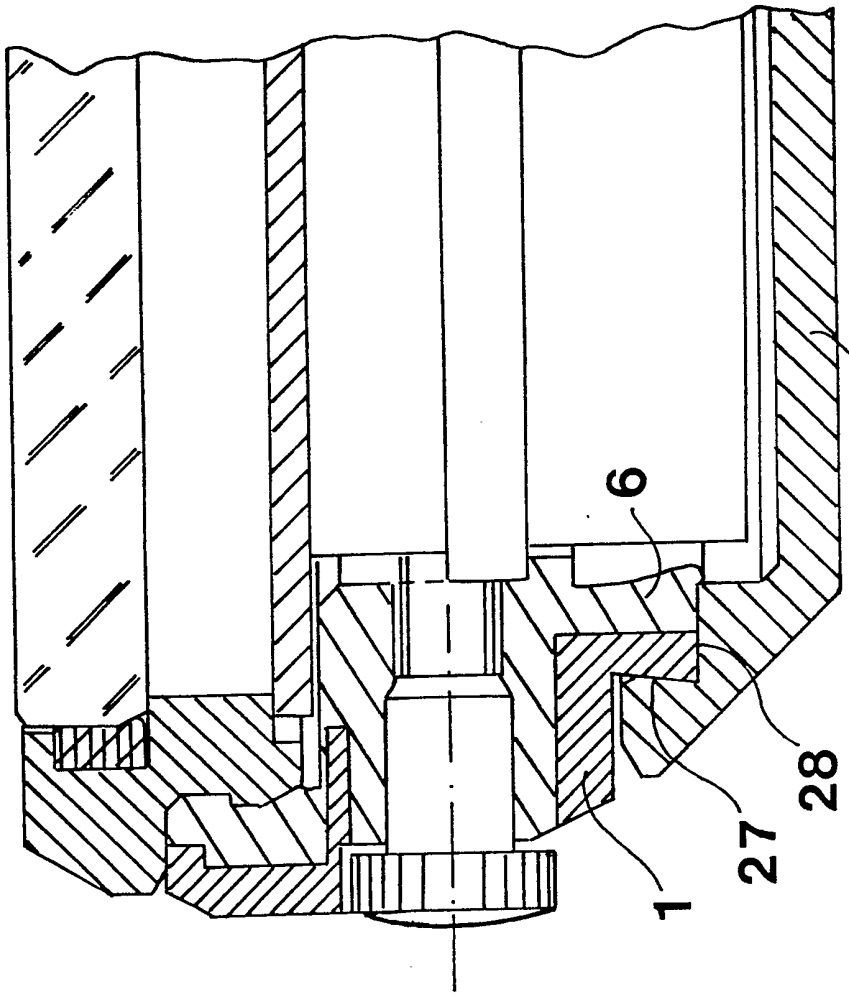

FIG. 4

2057727

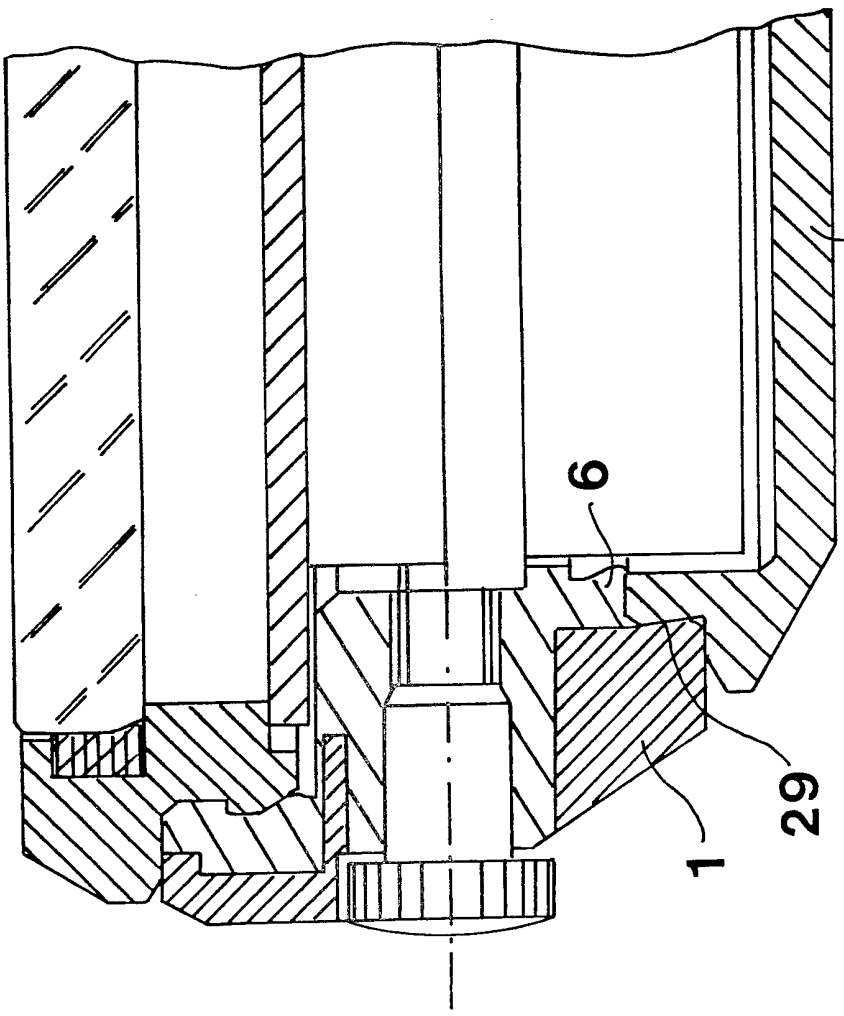

FIG.5

SPECIFICATION

A watch case

This invention relates to a watch case comprising about its periphery a lateral wall which defines an inner surface portion and an outer surface portion.

The invention also relates to a method of making such a watch case.

Conventional suspension means for a watch movement comprise one or more elastic rings arranged in a space formed by two mutually opposite grooves one in the inner face of the lateral wall and the other in the outer face of a ring carrying the movement. Swiss Patent No. 504,035 describes an encasing ring which is itself made of elastic material and which is generally annular in shape, resting on the entire periphery of the movement.

The encasing ring according to Swiss Patent No. 524,177 and its Parent Patent No. 502,633 is also made of a flexible and compressible material and comprises an outer annular projection extending between a base flange and the lateral wall rim to form a seal.

Swiss Patent No. 338,404 relates to an encasing ring of plexiglas for example which is rendered integral with the lateral wall by moulding. On account of the relative rigidity of the material used, the encasing ring does not allow elastic suspension of the watch movement and requires additional seals to make the watch case water-tight.

According to one aspect of the invention there is provided a watch case comprising about its periphery a lateral wall which defines an inner surface portion and an outer surface portion, wherein a major part at least of the inner surface portion of the lateral wall is covered by a packing of elastic material which has been rendered integral with said inner surface portion by the use of adhesive and pressure.

According to a further aspect of the invention there is provided a method of making a watch case comprising about its periphery a lateral wall which defines an inner surface portion and an outer surface portion, the method comprising the step of covering a major part at least of the inner surface portion of the lateral wall by a packing of elastic material which is rendered integral with said inner surface portion by the use of adhesive and pressure.

Preferably said step comprises the following subsidiary steps:

—the inner surface portion of the lateral wall is coated with adhesive;

—that part of the watch case which comprises the lateral wall is introduced into a chamber, the internal shape of the chamber defining with precision the position of that part of the watch case introduced therein;

—a predetermined volume of the elastic material is introduced into the chamber; and

—the chamber with its contents is placed in a press comprising a core of which the external shape has the desired internal shape of the packing, the press is actuated under heat and high pressure in such a way that the elastic material is compressed against the lateral wall, adheres to the coated inner surface portion and assumes its final form.

Preferably, the packing covers the inner surface over its entire periphery but not necessarily over its entire height. The movement may be placed on an edge formed by the packing, thus ensuring elastic suspension of the movement.

In the case of a three-piece watch case, the lateral wall is synonymous with the shoulder of the watch case. In this case, the packing may extend to the lower periphery and to the upper periphery of the shoulder, ensuring water-tight closure of the base and the rim of the watch case.

Lateral holes may be provided in the packing for the passage of the winding spindle and/or push buttons. The diameter of the holes is slightly smaller than that of the spindles extending through them so that the packing again performs the function of a seal.

The packing may also be responsible for fixing the rim or the base to the watch case. This aspect will be developed further-on in the description of the drawings.

The packing is made of an elastic material, such as natural or synthetic rubber. A predetermined quantity of the material may be placed with the lateral wall in a high-temperature press, the lateral wall being coated with a layer of adhesive and/or vulcanising agent. The action of the press causes the elastic material to flow and compresses it into its final shape whilst at the same time bonding it to the inner surface portion of the lateral wall.

Accordingly, in a preferred embodiment of watch case according to the invention, a single packing provides for elastic suspension of the movement and for completely water-tight closure of the watch case and the means for fixing the other components of the water case.

The accompanying drawings illustrate by way of example particular embodiments of watch case according to the invention. The variants illustrated are by no means exhaustive.

Figure 1 is a section through a first variant of watch case according to the invention comprising a mechanical or electronic movement;

Figure 2 is a section through a second variant;

Figure 3 is a section through a third variant;

Figure 4 is a section through a fourth variant; and

Figure 5 is a section through a fifth variant.

The watch case shown in Fig. 1 is basically a three-piece watch case comprising a lateral wall or shoulder 1, a rim 2 and a base 3. In

this case, a glass 4 is fixed to the rim 2 *via* a seal 5. It could also be fixed thereto by bonding, under pressure, by means of a notch or by any other suitable means.

In this example, a packing 6 completely covers the inner surface portion of the lateral wall 1 of the watch case. The packing 6 is rendered integral with the lateral wall 1 by vulcanisation and/or by adhesive and pressure.

The packing 6 is preferably made of a synthetic rubber material which is resistant to various factors and corrosive agents, such as oils, acids, vapours etc. The packing 6 is preferably affixed onto the watch case before the finishing operations. Accordingly the packing 6 has to be able to withstand cleaning agents, such as perchloroethylene. One possible material for the packing 6 is for example the material marketed under the name VITON by E.I. Du Pont de Nemours & Co (Inc.).

The packing 6 comprises a raised edge 7 acting as a support to the border of a movement 8. This raised edge 7 may be formed by a continuous ring or by a series of projections around the entire inner periphery of the packing 6.

The packing 6 also comprises transverse holes which extend right through it for the passage of winding spindles of mechanical movements (as shown) or spindles or push buttons of electronic movements for example (not shown). To guarantee complete watertightness, the diameter of the holes is smaller than the external diameter of the spindles passing through them. Thus, in the specific example of Fig. 1, a winding wheel 9 is integral with a tube 10, the tube 10 being fixed to a winding spindle 11. The external diameter of the tube 10 is slightly greater, before insertion, than that of the hole in the packing 6 so that a permanent compressive force is applied over the entire circumference of the hole on the tube 10 when inserted in the hole, thus ensuring water-tightness between the outside and inside of the watch case in the vicinity of the winding wheel 9. It is pointed out the the tube 10 is long enough to ensure water-tightness, even in its withdrawn position.

In the particular case illustrated in Fig. 1, the hole in the packing 6, the spindle 11 and the tube 10 define the angular position of the movement 8 in the watch case. Centering and vertical positioning are defined by the edge 7.

To obtain optimal anchorage of the packing 6 on the inner surface poriton of the lateral wall 1 of the watch case, recesses 12 are provided, being formed by milling over the entire inner periphery of the lateral wall 1. The recesses 12 increase the vulcanisation or adhesive surface of the packing 6 on the inner surface portion of the lateral wall 1. They also form a key for attaching or anchoring the packing 6 to this inner surface portion. Alternatively, the inner surfaces of the lateral wall 1 could equally well be smooth. The recesses 12 do, however, make it easier to fix the rim 2 and the base 3 to the lateral wall of the watch case, as will be seen hereinafter.

In the particular case illustrated in Fig. 1, the vulcanised or adhered packing 6 is also responsible for fixing the rim 2 of the glass 4, as well as the base 3.

Since the manner in which the rim 2 and the base 3 are fixed is the same, the following description will be confined to the case of the rim 2, the case of the base 3 being able to be deduced by analogy.

The rim 2 comprises a lower ring 13 which is integral therewith. This ring 13 is limited by an outer peripheral surface, a lower edge 14 and an inner surface.

The outer peripheral surface of the ring 13 comprises a groove 15 followed by an inclined surface 16. The intersection of the groove 15 with the inclined surface 16 results in an angle or ledge 15′.

Before the rim 2 is fixed to the lateral wall 1, the inner contour of the packing 6 (which at its upper end is essentially cylindrical in profile) is slightly below the outer contour defined by the ledge 15′ of the outer peripheral surface of the lower ring 13.

To fix the rim 2 to the lateral wall 1 of the watch case, it is sufficient to place the rim 2 on the lateral wall 1 with—if necessary (in the case of a shaped case for example)—the appropriate orientation and then to fit the rim 2 into position by applying a vertical pressure to the whole. The inclined surface 16 slides onto the packing 6 and radially compresses it. After passing through the ledge 15′, the packing 6 may expand again (partly or completely, depending on the internal diameter of the groove 15) and remains attached to the same ledge 15′. It has been found that only a blow of excessive strength is sufficient to release the rim 2 from the watch case at one stroke because the ledge 15′ has to overcome the friction of the packing 6 over the entire height engaged.

After fixing, the upper part of the packing 6 fills the gap between the lateral wall 1 and the lower ring 13 of the rim 2. The inclined surface 16 of said lower ring 13 is driven into the packing 6 which is thus compressed. Ejection of the rim 2 is prevented by the ledge 15′ engaging in the packing 6. Where the lateral wall 1 is provided with recesses 12, as in Fig. 1, the ledge 15′—to disengage itself—has to overcome even greater compression of the packing during the passage of the upper edge of the lateral wall 1.

To obtain better sliding during introduction, the inclined surface 16 is preferably rounded. Alternatively it may also assume the form shown in Fig. 1 which is characterised by the first conical inclined portion followed by a cylindrical portion, the generatrices of the

cylinder being substantially parallel to the direction of the depressing movement. Accordingly, the ledge 15' does not offer any resistance in the positioning direction, but only in the direction in which the rim 2 is removed.

To disengage the rim 2, a prolonged and adequate tractive force has to be applied. This may be done for example by introducing a blade into a gap 17 between the rim 2 and the lateral wall 1 and by applying a twist which lifts the rim 2, preferably in steps at different points of the periphery.

A similar method of fixing the rim 2 or the base 3 to the watch case is described in Swiss Patent Application No. 8513/78.

It will be noted that the described fixing device or method is applicable to watches of any shape just as well as to circular watches. The fixing device or method makes the watch case completely water-tight by virtue of the large contact surface between the packing 6 and the inclined surface (s) 16.

In the watch case shown in Fig. 1, the lower ring 13 is also responsible for the stability of the movement 8 inside the case. Its lower edge 14 supports a dial 18 integral with the movement 8 and prevents any inadvertant rocking or disengagement in the upward direction. It will also be noted that the movement 8 is completely suspended in the elastic packing 6 and is thus protected against any shocks, irrespective of the direction of impact, shocks from below being absorbed through the rim 2. The inner surface of the lower ring 13 of the rim 2 delimits the opening of the dial below the glass 4.

The elastic material of the packing 6 is fixed to the inner surface portion of the lateral wall 1, i.e. the shoulder of a three-piece watch case, by the process commonly known as vulcanisation and/or by use of adhesive and pressure.

The inner surface portion of the lateral wall 1 or at least the part to which the packing 6 is to adhere is coated with a vulcanising or adhesive binder. The lateral wall 1 is placed in an enclosure of which the interior is provided with chicanes co-operating for example with the tips of the lateral wall 1, enabling the lateral wall 1 to be positioned with precision in the enclosure. The lateral wall 1 is thus perfectly centred and oriented in relation to its external dimensions in the chamber. A predetermined quantity of the elastic material is also placed inside the lateral wall 1. Although the elastic material may be formed by any suitable synthetic elastomer or rubber, excellent results have been obtained with du Pont's VITON.

The chamber is placed in a high-temperature press (the temperature may be in the range from 250°C to 300°C, depending on the material used) and the elastic material is compressed under high pressure for a few minutes with the core of the press, the external shape of the core being the internal shape of the final packing 6. The elastic material, for example in the form of a solid cylindrical section, flows and fills the empty space between the core and the lateral wall 1. The packing 6 thus forms a continuous element, enabling any excess of material at one point to be transported by flow to other points where there is a lack of material. The elastic material thus fills all the gaps between the lateral wall 1 and the core. The packing 6 adheres to the inner surface of the lateral wall 1 by virtue of the previous application of binder.

In the particular case of Fig. 1, the interior of the chamber also comprises a horizontal cylindrical rod guaranteeing the opening required for the passage of the control spindle 11 and the wheel tube 10. The chamber may also comprise a solid cylindrical projection, the projection extending upwards from the base of the chamber to the first edge of the packing 6, this first edge being the lower level of the edge 7. Accordingly, the solid core of the press would only descend until it comes into contact with said edge 7 which defines the final shape of the packing 6 at its upper end. In that case, the core only comprises cylindrical sections narrowing downwards, providing for better distribution of the elastic material in the cavity. It is pointed out that the successive cylindrical sections of the core, like the cylindrical projection, are circular or shaped according to the shape of the movement.

In the case of a two-piece (base-lateral wall and rim) watch, the chamber does not of course have the solid cylindrical projection. In this case, the interior of the base may be coated with a layer of adhesive so that it is the entire interior of the watch case which is covered by the packing 6.

The dimensional tolerances of the packing 6 achieved with this method are very close and may be of the order of twenty microns. Accordingly, one of the major advantages of the invention as described is that it enables the cost price of watch cases to be reduced. The interior of the watch case no longer has to keep to very severe tolerances, the important dimensions (centering, internal diameters, size of the edge 7) being defined by the packing 6 which may be formed with the most rigorous tolerances. This advantage is more manifest, the harder the constituent material of the watch case, the precision machining of hard materials being correspondingly more onerous.

Watch cases of hard material are understood to be for example cases of stainless steel and even cases of sintered metals, ceramics etc. The part of hard material could be formed for example by a lateral wall-rim to which the base could be fixed in the same way as described above.

The watch cases shown in Figs. 2 to 5 are possible variants of a watch case according to the invention.

The watch case shown in Fig. 2 is distinguished from that shown in Fig. 1 by the configuration of the rim and the upper part of the lateral wall 1.

A detached rim 19 is cemented, welded, rivetted or screwed to the upper part of the watch case. Fig. 2 shows the case of a detached rim 19 fixed by rivetting lateral pins 20 in a groove in the outer surface portion of the lateral wall. The detached rim 19 also comprises a lateral protuberance 21 directed inwards which may be continuous or interrupted in the form of projections.

The lateral protuberance 21 holds the glass 4 or a flange 22 of the glass 4. The glass fits into the upper edge of the packing 6. In this particular case, vulcanisation or adhesion stops just short of the upper edge. A ring 23 rests on the dial and delimits the visible part of the dial through the glass 4.

Accordingly, the method by which the glass is fixed in position is as follows:

In the case of a detached rim 19 having a continuous lateral protuberance 21, the procedure is commenced by placing the ring 23 on the dial 18 and then the glass on the packing 6 after which the assembly is fixed by the detached rim 19 which is cemented, screwed or otherwise fixed to the lateral wall. As the detached rim 19 is adjusted on the lateral wall 1 of the watch case, the glass 4 compresses the packing 6 which, by expanding, exerts a lateral pressure and transmits vertical force to the flange 22, thus ensuring a definitive positioning of the movement.

In the case of a detached rim 19 having an interrupted lateral protuberance 21 in the form of projections, the detached rim 19 is fixed to the shoulder by rivetting, cementing, etc. after which the movement is placed in position and the ring 23 is positioned on the dial 18. In this case, the periphery of the glass 4 comprises notches corresponding to the projections of the detached rim 19. The glass 4 is placed freely on the packing 6, positioning the notches in the glass 4 opposite the projections of the detached rim 19. A pressure is applied to the glass 4, compressing the packing 6 until the glass 4 (or the flanges 22 of the glass remaining between the notches) is below the lower level of the protuberances 21, after which the flange 22 is engaged below the protuberance 21 by a rotary or translatory mofement along the glass.

Once again, the compression of the packing 6 causes it to expand and entrains the ring 23. A slight gap is left between the ring 23 and the lower surface of the glass 4, enabling the glass to be engaged without gripping. The ring 23 ensures the stability of the movement 8. If it were to knock against the glass 4 in consequence of a shock, this slight displacement would be insufficient to overcome the forces of friction with the packing 6 and it would return into position. It is pointed out that, in this case, the detached rim 19 may be rendered integral with the lateral wall 1.

A similar method of fixing the glass to a watch case is described in Swiss Patent Application No. 7702/78.

A decorative rim 24 provides an aesthetic appearance for the assembly and, if necessary, strengthens the rivetting of the detached rim 19.

The watch case shown in Fig. 3 is distinguished from that shown in Fig. 1 again at the upper level. The glass 4 comprises a lower ring 25 which was previously part of the rim. The lower ring 25 is strengthened by a ring 26 which supports the dial 18 of the movement 8, holding the movement on the protuberance 7 and concealing the upper part of the packing 6.

In Fig. 4, it is the manner in which the base is fixed which is different in relation to Fig. 1. In Fig. 4, the base 3 is formed by a known pressure base with an external flange 27 comprising a ledge 28 supporting the lower edge of the packing 6 and thus ensuring the impermeability of the joint.

Fig. 5 is a variant of Fig. 4 in which the pressure base 3 comprises an inner flange 29 instead of an outer flange. Impermeability is again ensured by compression of the packing 6 over the entire periphery.

A watch case according to the invention is not necessarily a three-piece watch case. It could equally well be a one-piece case with a base-lateral wall and rim. This is because, in all the examples illustrated, the base only performs a closing function to the exclusion of any other function, such as fixing the movement for example. Its presence can only be justified in practice in that its facilities battery changes in the case of electronic movements or avoids the construction of an interrupted spindle for example. In this case, the packing could—but does not have to—cover the inner part of the base as well. Alternatively, the packing no longer has to ensure imperviousness between the shoulder and the base and could therefore stop short of the base.

A watch case as described and according to the invention thus has the major advantage of offering, through a single vulcanised and/or adhered packing of economic construction, a case which enables its constituent elements to be fixed in a simple manner: the rim and/or the base, a shockproof case and a waterproof case, making the passages with all the outer control elements water tight. In addition, the described embodiments of the invention enable the cost price of watch cases, particularly cases of hard material, to be considerably reduced.

CLAIMS

1. A watch case comprising about its periphery a lateral wall which defines an inner surface portion and an outer surface portion, wherein a major part at least of the inner surface portion of the lateral wall is covered by a packing of elastic material which has been rendered integral with said inner surface portion by the use of adhesive and pressure.

2. A watch case as claimed in claim 1, wherein the elastic material is a synthetic rubber.

3. A watch case as claimed in claim 1 or 2, wherein the packing comprises an edge to act as a support to the periphery of a movement.

4. A watch case as claimed in any one of the preceding claims, which comprises an upper rim with a lower ring portion having an outer contour which lies within an upper part of said inner surface portion of said lateral wall, and compressed packing substantially fills a region between said outer contour of said lower ring portion and said upper part of the inner surface portion of said lateral wall.

5. A watch case as claimed in any one of the preceding claims, which comprises a base with an upper ring portion having an outer contour which lies within a lower part of said inner surface portion of said lateral wall, and compressed packing substantially fills a region between said outer contour of said upper ring portion and said lower part of the inner surface portion of said lateral wall.

6. A watch case as claimed in any one of claims 1 to 4, which is a two-piece case made up of said lateral wall with a base, and an upper rim.

7. A watch case as claimed in any one of the preceding claims, wherein said packing comprises at least one lateral hole extending right through the packing, the or each hole is traversed by a control element between the exterior of the watch case and a movement of the watch, and before insertion of the or each control element the diameter of the associated hole was smaller than the diameter of the control element, thus making the hole watertight.

8. A watch case as claimed in any one of the preceding claims, which comprises a glass directly fixed under pressure onto said packing.

9. A watch case as claimed in claim 4, or any one of claims 5 to 8 when appended to claim 4, wherein said lower ring portion supports a dial integral with a watch movement, thus fixing the position of the movement in the case.

10. A watch case substantially as hereinbefore described with reference to Fig. 1, or Fig. 1 as modified in accordance with any one of Figs. 2 to 5, of the accompanying drawings.

11. A method of making a watch case comprising about its periphery a lateral wall which defines an inner surface portion and an outer surface portion, the method comprising the step of covering a major part at least of the inner surface portion of the lateral wall by a packing of elastic material which is rendered integral with said inner surface portion by the use of adhesive and pressure.

12. A method according to claim 11, wherein said step comprises the following subsidiary steps:

—the inner surface portion of the lateral wall is coated with adhesive;

—that part of the watch case which comprises the lateral wall is introduced into a chamber, the internal shape of the chamber defining with precision the position of that part of the watch case introduced therein;

—a predetermined volume of the elastic material is introduced into the chamber; and

—the chamber with its contents is placed in a press comprising a core of which the external shape has the desired internal shape of the packing, the press is actuated under heat and light pressure in such a way that the elastic material is compressed against the lateral wall, adheres to the coated inner surface portion and assumes its final form.

13. A method of making a watch case substantially as hereinbefore described.

14. A watch case which has included in its manufacture a method as claimed in claim 11, 12 or 13.

15. A watch case as claimed in any one of claims 1 to 10 or 14, or a method as claimed in claim 11, 12, or 13, wherein the lateral wall is made of hard material.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd.—1981.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.