

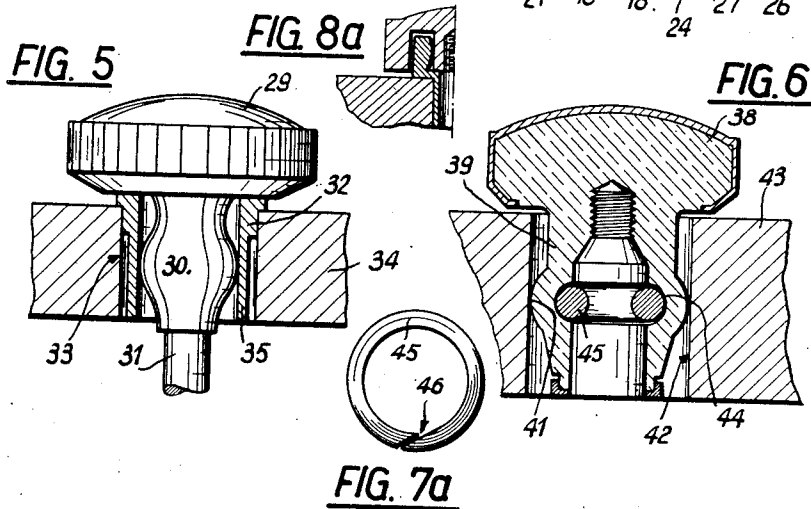
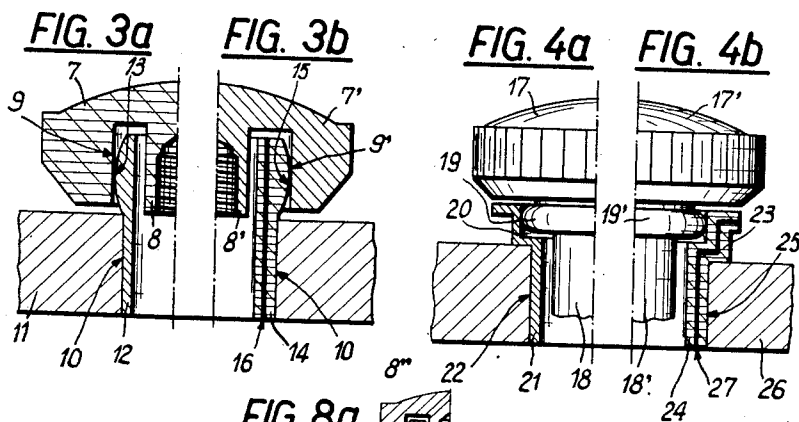
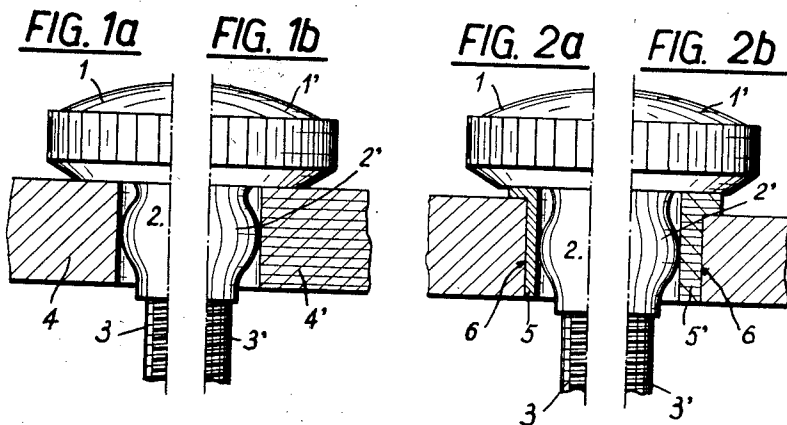
Sept 17, 1957

E. PIQUEREZ
FLUIDTIGHT TIMEPIECE

2,806,343

Filed Jan. 31, 1956

2 Sheets-Sheet 1



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E. PIQUEREZ
FLUIDTIGHT TIMEPIECE

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2 Sheets-Sheet 2

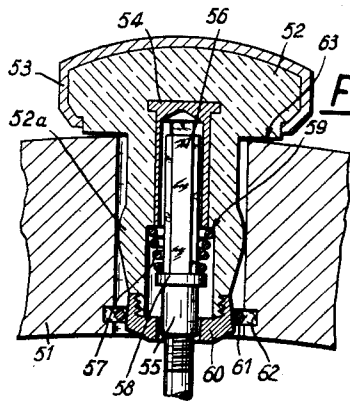


FIG. 7 FIG. 8

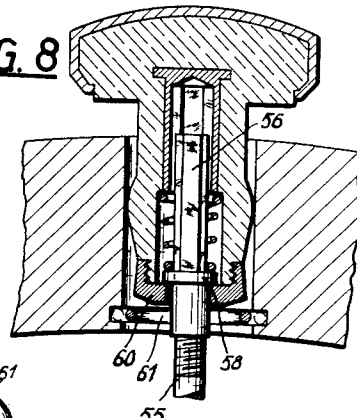


FIG. 9

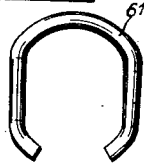


FIG. 10

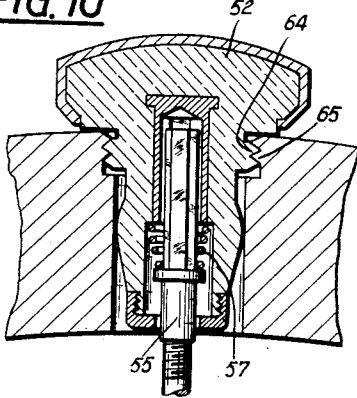


FIG. 11

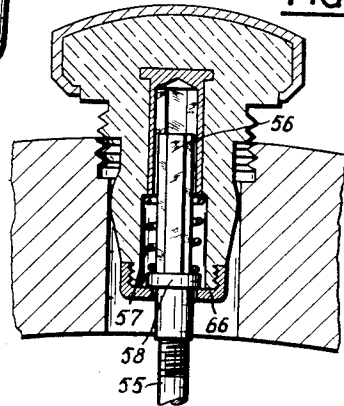


FIG. 12

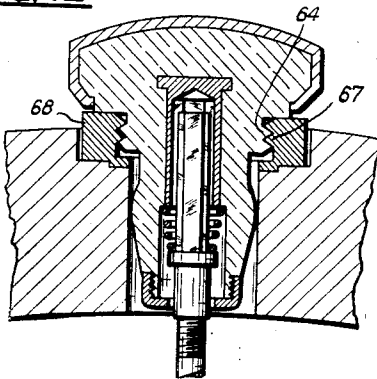
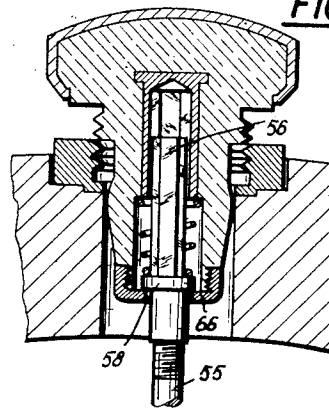


FIG. 13



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FLUIDTIGHT TIMEPIECE

Ervin Piquerez, Bassecourt, Switzerland

Application January 31, 1956, Serial No. 562,559

Claims priority, application Switzerland
February 10, 1955

13 Claims. (Cl. 58—99)

My invention has for its object a fluid-tight timepiece provided with means for controlling its movement, said means including a control member guided inside an opening in the case. According to my invention, said control member is in direct contacting relationship without the interposition of any fluidtight packing with the wall of said opening along a surface of revolution having an arcuate generating line which surface is formed on one of said cooperating parts, the control member and the wall of the opening.

Accompanying drawings illustrate by way of example various embodiments of the winding-up means according to my invention. In said drawings:

Figs. 1a and 1b are half elevational views of the first embodiment of two possible modifications to be considered therefor.

Figs. 2a and 2b are similar modifications for a second embodiment.

Figs. 3a, 3b and 8a are diametrical half sectional views of winding up means according to a third embodiment and to two modifications thereof.

Figs. 4a and 4b illustrate in half elevational view partly sectional views two modifications of a fourth embodiment.

Fig. 5 is an elevational partly sectional view of a fifth embodiment.

Fig. 6 is a cross-section of a sixth embodiment of my improved winding up means of which Fig. 7a shows a detail member.

Figs. 7 and 8 are two partly sectional elevational views for two operative positions thereof, of the seventh embodiment which includes manually operable means for selectively winding the movement and setting the hands of the timepiece.

Fig. 9 shows a detail of this seventh embodiment.

Figs. 10 and 11 are views similar to Figs. 8 and 9 and relate to an eighth embodiment including automatic winding up means and manually operable hand setting means.

Figs. 12 and 13 are views similar to Figs. 7 and 8 of a ninth embodiment.

Turning to the first embodiment illustrated in Figs. 1a and 1b, the control knob 1 of the winding up means is rigid with a rotula 2 inside which is coaxially screwed the actual winding up stem 3. The knob 1 and the rotula 2 form together the control member guided inside a cylindrical opening in the case band 4 of the case without the interposition of any fluidtight packing.

The shapes of the knob and rotula 1 and 2 or 1' and 2' are the same in Figs. 1a and 1b but in the modification illustrated in Fig. 1a the knob and rotula are made of plastic material and the case band of metal whereas in the case of Fig. 1b the knob and the rotula are made of metal and cooperate with the wall of an opening formed in a case band 4' made of plastic material.

In the second embodiment illustrated in Figs. 2a and 2b, the knob 1 of the winding up stem 3 and the rotula 2 are made of plastic material and are guided inside a

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metal tube 5 fitted in a cylindrical opening 6 provided in the case band assumed to be made of metal in the first modification shown in Fig. 2a while the second modification consists in inserting the knob 1' and the rotula 2' both made of metal inside a tube 5' of plastic material (Fig. 2b) housed inside the opening 6 of the case band.

In the first modification of the third embodiment (Fig. 3a) the winding up knob 7 of plastic material is rigid with a tapped sleeve 8 inside which is screwed the winding up stem which is not illustrated. This knob is provided with an annular cut of which the outer cylindrical wall 9 surrounding at a distance the sleeve 8 forms one of the cooperating joining surfaces between the knob and the case as described hereinafter. Inside a radial perforation 10 formed in the metal case band 11 is fitted a tube 12 of which a section projecting beyond the case band is shaped outwardly in the shape of a part spherical surface 13 in permanent uninterrupted contact with the cylindrical wall 9 of the knob. The uninterrupted contact between the parts 9 and 13 of which one is made of plastic material and the other of metal provides a fluidtight joint without resorting to any special fluidtight packing. In a modification, the tube may be provided inwardly with a part spherical projection which would then cooperate with the outer surface of the sleeve 8 instead of with the outer wall 9 of the annular cut.

In a further modification of the third embodiment as illustrated in Fig. 3b, the metal winding up knob 7' is provided with a tapped sleeve 8' for the winding up stem as precedingly. The knob 7' is also provided as precedingly with an annular cut the outer cylindrical wall of which 9' surrounds the sleeve 8' at a distance from the latter. However a tube of plastic material 14 is fitted in the radial perforation 10 of the metal case band. The projecting section 15 of said tube 14 outside the case band is provided as precedingly with a part spherical surface in uninterrupted contacting relationship with the cylindrical wall 9'. The tube of plastic material 14—15 is reinforced by means of an inner metal reinforcement 16 over which the plastic mass is moulded. Lastly, in the modification of Fig. 8a, the convex surface of the projecting section of the tube is formed on its inner wall for cooperation with the outer surface of the depending sleeve on the knob.

As to the fourth embodiment, Fig. 4a shows a first modification wherein the winding up knob 17 made of plastic material is provided, in its area of connection with the depending sleeve 18 to which is secured the winding up stem, with a tore-shaped bead 19 in contacting relationship with a cylindrical wall 20 forming the upper end of a stepped metal guiding tube 20—21 the main section of which is fitted in a radial opening 22 formed in a case band also made of metal. In the second modification of the fourth embodiment as illustrated in Fig. 4b, the knob 17' with its sleeve 18' and its tore-shaped bead 19' are made of metal; the bead 19' is in contact with the upper cylindrical section 23 of a stepped guiding tube 23—24 of plastic material fitted in a radial perforation 25 of the case band 22. The guiding tube of plastic material 23—24 carries both inside and outside the case band 26 a tubular reinforcing member over which the mass of plastic material is moulded.

The winding up stem 29 in the fifth embodiment illustrated in Fig. 5 is made of plastic material and includes a rotula shaped section 30 into which is screwed axially a winding up stem 31. The rotula 30 lies in uninterrupted contacting relationship with cylindrical inner wall of a metal tube 32 the upper end of which is secured in a radial perforation provided in the case band 34. Throughout the major part of its height, the tube 32 has an outer diameter which is smaller than that of

said perforation 33, wherethrough the rotula 30 may assume a slight lateral shifting as provided through elastic deformation of this thin walled section 35 of the tube 32—35.

The winding up knob 38 in the sixth embodiment illustrated in Figs. 6 and 7a is made of plastic material and includes a sleeve 39 the inner end of which is tapped for engaging the threaded winding up stem which is not illustrated. Said sleeve 39 is provided at mid-height with an enlarged section 41 in the shape of a solid of revolution, said enlarged section being in contact with the cylindrical wall of a radial perforation 42 formed in the metal case band 43. At the level of said section 41, the sleeve 39 is provided along its inner surface with a groove 44 which serves for housing an expanding spring 45 constituted by a ring slotted obliquely throughout its breadth as shown in Fig. 7a. Said spring exerts an outward pressure on the sleeve 39, which leads to the production of an uninterrupted contacting pressure between the outer surface of the enlarged section 41 and the inner wall of the perforation 42. This arrangement allows compensating for the wear between the contacting parts and it ensures thus a durable fluidtightness.

Of course, instead of a single spring, it is possible to resort to a plurality of springs or again to a spring of a different shape.

In all the embodiments described, the fluidtightness between the knob and a section of the case is ensured through the direct contact without insertion of a fluidtight packing between a surface of revolution and a cylindrical surface, one of said surfaces belonging to a metal member and the other to a member of plastic material. This shaping of the cooperating surfaces allows a slight angular shifting between the winding up knob and the section of the winding up stem guided inside the movement of the watch or the like timepiece.

In Figs. 7 and 8, the winding up knob 52 serving both for winding up and time setting purposes is made of plastic material and is provided with an enlarged section 52a forming a joint with the wall of the opening in the watch case 51. This knob is protected outwardly by a metal cover 53 and is rigid with a metal socket 54 fitted inside its bore, the inner section of said socket being polygonal. 55 designates the time setting and winding up stem which is fitted in the usual manner inside the timepiece movement and terminates outwardly with an extension 56 engaging the socket 54 and of which the polygonal cross-section matches the inner section of the socket. Thus, the knob 52 may slide over the stem 55 while rotating in unison therewith. 57 designates a spring bearing on the one hand against a stop 58 on the stem and on the other hand against a bearing 59 on the knob inside the bore of the latter. Furthermore, the last convolution of said spring engages radially the inside of the enlarged section of the knob and urges the latter outwardly against the wall of the case. Lastly, a ring 60 is secured to the lower end of the knob and the cross-section of the outer wall of said ring 60 in an axial plane is in the shape of a wedge for cooperation with a resilient member 61 housed inside a groove 62 formed in the inner wall of the opening provided in the case for the passage of the knob. Said resilient clamping member 61 is shown separate in Fig. 9. The knob 52 may occupy either its operative position as illustrated in Fig. 7 where the bearing surface 63 on the knob facing the outer surface of the case is shown as engaging the latter to form a further joint with the latter. It is held in said position by the resilient member 61 just referred to which holds then the ring 60 through engagement with its upper surface.

When the knob is drawn outwardly, it is brought into the position illustrated in Fig. 8 for which the ring 60 has snapped past and is released with reference to the resilient member 61; it now engages the underside of the stop 58 provided on the stem 56. Thus, it is possible

to draw the knob with the stem still further outwardly first into its winding up position and then into its time setting position.

The embodiment illustrated in Figs. 10 and 11 differs from that precedingly described only because the knob 52 and the stem 55 serve solely for time setting purposes while the winding up is performed automatically. The knob is held in its inoperative position illustrated in Fig. 10 by a thread 64 formed on its outer periphery and engaging a short tapping 65 formed in the opening in the case through which the winding up means extend. When it is desired to set the timepiece right, it is sufficient to unscrew the knob with reference to said tapping; the spring 57 urges it then outwardly and brings the ring 66 screwed over the lower end of the knob into engagement with the underside of the stop 58 on the stem as in the preceding case. The knob may then be drawn outwardly into its time setting position.

The last embodiment illustrated in Figs. 12 and 13 differs from that just disclosed only because the thread 64 on the knob cooperates with a tapping 67 formed in a separate annulus fitted inside the opening in the case band.

What I claim is:

1. In a fluidtight timepiece, the combination of a hand-operable control member for a movement, a case enclosing said movement, including means providing for the passage of the control member through said case in direct fluidtight contacting relationship with a wall of said means, one of the cooperating parts, the control member and said means, being of plastic material and one of the cooperating surfaces on said parts being in the shape of a surface of revolution having an arcuate generating line.

2. In a fluidtight timepiece, the combination of a hand-operable control member of plastic material for a movement, a case enclosing said movement, including an opening with a metal wall providing for the passage of the control member through said case in direct fluidtight contacting relationship with said metal wall, one of the cooperating surfaces of the control member and of said means in the case being in the shape of a surface of revolution having an arcuate generating line.

3. In a fluidtight timepiece, the combination of a hand-operable control member of metal for a movement, a case enclosing said movement including an opening with a wall of plastic material providing for the passage of the control member through said case in direct fluidtight contacting relationship with said wall of plastic material, one of the cooperating surfaces of the control member and of said wall in the case being in the shape of a surface of revolution having an arcuate generating line.

4. In a fluidtight timepiece, the combination of a hand-operable control member for a movement including a part spherical section, a case enclosing said movement including means on the case providing for the passage of the control member through said case along a cylindrical surface engaging directly and fluidtightly the part spherical section of the control member, one of the cooperating parts, the control member and said means being of plastic material.

5. In a fluidtight timepiece, the combination of a case including a case band provided with a radial perforation of a cylindrical shape, a guiding tube fitted in said perforation and including over a portion of its height inside the case perforation a thinner section with a slight radial clearance with reference to the latter, a stem adapted to control a movement and a knob controlling said stem and including a section extending through the opening defined by the guiding tube and having a surface in the shape of a surface of revolution with an arcuate generating line engaging directly in fluidtight contacting relationship the inner surface of the opening in the thinner section of the tube, one of the cooperating parts, the knob section and the tube, being made of plastic material.

6. In a fluidtight timepiece, the combination of a case including a case band provided with a radial perforation,

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a cylindrical guiding sleeve fitted inside the perforation of the case band and including an outwardly projecting section a lateral surface of which is in the shape of a portion of a sphere, a stem adapted to control a movement inside the case and extending through the opening in the sleeve and a knob rigid with said stem and provided with an axial cylindrical recess capping the extension of the sleeve and a lateral surface of which is in direct fluidtight contacting relationship with the spherical portion of the latter, one of the cooperating parts, the knob and the sleeve being of plastic material.

7. In a fluidtight timepiece, the combination of a case including a case band provided with a radial perforation, a cylindrical guiding sleeve fitted inside the perforation of the case band and including an outer stepped section provided with an inner cylindrical surface, winding up means extending through the sleeve and adapted to control a movement inside the case, a knob controlling said winding up means and including on the transverse side of said knob facing the sleeve a tore-shaped section in direct fluidtight contacting relationship with the cylindrical bearing surface of the stepped section of the sleeve, one of the cooperating parts, the knob and the sleeve being made of plastic material.

8. In a fluidtight timepiece including a case provided with an opening extending through it, the provision of means adapted to control a movement inside the case, a knob fitted on said means extending through the opening in the case and including a section of plastic material having a surface engaging directly the inner wall of the opening in the case and provided with an inner recess, one of the cooperating surfaces on the case opening and on the knob section being cylindrical and the other being of revolution, and a spring housed inside said last mentioned recess and urging elastically the said knob section outwardly to make said cooperating surfaces bear fluidtightly against each other.

9. In a fluidtight timepiece including a case provided with an opening extending through it and a movement enclosed inside the case, the combination of a stem extending through the opening in the case and controlling the movement, a knob including an outer larger section adapted to engage the outer surface of the case round the opening therein for an inner inoperative position of the knob and a tubular inner section fitted over the stem in angularly rigid relationship therewith, adapted to slide over said stem and having an outer surface in direct contacting relationship with the inner wall of the opening of the case, one of the cooperating surfaces on the opening of the case and on the tubular section being cylindrical and the other being of revolution, means adapted to reasonably hold the knob in its inner inoperative position, a stop rigid with the stem, a stop on the inner end of the knob adapted to impinge against the stop on the stem during the outward movement of the knob, and elastic means urging said stops against each other when the knob is released with reference to the first mentioned means to allow simultaneous movement of the knob and stem.

10. In a fluidtight timepiece including a case provided with an opening extending through it and a movement enclosed inside the case, the combination of a stem extending through the opening in the case and controlling the movement and a knob including an outer larger section adapted to engage the outer surface of the case round the opening therein for an inner inoperative position of the knob and a tubular inner section fitted over the stem in angularly rigid relationship therewith, adapted to slide over said stem and having an outer surface in direct contacting relationship with the inner wall of the opening of the case, one of the cooperating surfaces on the opening of the case and on the tubular section being cylindrical and the other being of revolution, said knob engaging threadedly a short section of the opening in the case to releasably hold the knob in its inner

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inoperative position, a stop rigid with the stem, a stop on the inner end of the knob adapted to impinge against the stop on the stem during the outward movement of the knob, and elastic means urging said stops against each other when the knob is released with reference to its threaded engagement to allow simultaneous movement of the knob and stem.

11. In a fluidtight timepiece including a case provided with an opening extending through it and a movement enclosed inside the case, the combination of a stem extending through the opening in the case and controlling the movement, a knob including an outer larger section adapted to engage the outer surface of the case round the opening therein for an inner inoperative position of the knob and a tubular inner section fitted over the stem in angularly rigid relationship therewith, adapted to slide over said stem and having an outer surface in direct contacting relationship with the inner wall of the opening of the case, one of the cooperating surfaces on the opening of the case and on the tubular section being cylindrical and the other being of revolution, a wedge shaped member carried by one of the cooperating surfaces on the opening in the case and on the tubular section of the knob, a clamping member carried by the other cooperating surface and adapted to engage the outer surface of the wedge shaped member to releasably hold the knob in its inner inoperative position and to release said wedge-shaped member when the knob is drawn out into its operative position against the action of said clamping member, a stop rigid with the stem, a stop on the inner end of the knob adapted to impinge against the stop on the stem during the outward movement of the knob, and elastic means urging said stops against each other when the wedge-shaped member is released with reference to the clamping member to allow simultaneous movement of the knob and stem.

12. In a fluidtight timepiece including a case provided with an opening extending through it and a movement enclosed inside the case, the combination of a stem extending through the opening in the case and controlling the movement, a knob including an outer larger section adapted to engage the outer surface of the case round the opening therein for an inner inoperative position of the knob and a tubular inner section fitted over the stem in angularly rigid relationship therewith, adapted to slide over said stem and having an outer surface in direct contacting relationship with the inner wall of the opening of the case, one of the cooperating surfaces on the opening of the case and on the tubular section being cylindrical and the other being of revolution, means adapted to releasably hold the knob in its inner inoperative position, a stop rigid with the stem, a stop on the inner end of the knob adapted to impinge against the stop on the stem during the outward movement of the knob, and elastic means housed inside the tubular section of the knob, urging said stops against each other when the knob is released with reference to the first mentioned means to allow simultaneous movement of the knob and stem, said elastic means also urging outwardly the tubular section of the knob against the surface of the opening in the case.

13. In a fluidtight timepiece including a case provided with a cylindrical opening extending through it and a movement enclosed inside the case, the combination of a stem extending through the opening in the case and controlling the movement, a knob including an outer larger section adapted to engage the outer surface of the case round the opening therein for an inner inoperative position of the knob and a tubular inner section fitted over the stem in angularly rigid relationship therewith, adapted to slide over said stem and having an outer surface of revolution round the axis of the stem and the generating line of which is arcuate, said surface engaging in direct contact relationship the inner wall of the opening of the case, said knob threadedly engaging a short section of

the opening in the case to be held thereby in its inner inoperative position, a stop rigid with the stem, a stop on the inner end of the knob adapted to impinge against the stop on the stem during the outward movement of the knob and elastic means housed inside the tubular section of the knob urging said stops against each other when the knob is released with reference to its threaded engagement to allow simultaneous movement of the knob and stem, said elastic means also urging outwardly the tubular section of the knob against the surface of the opening in the case.

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