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(54) TIMEPIECE WITH PUSHBUTTONS

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(57) **ABSTRACT**

The timepiece comprises at least one pushbutton **(9)**, at least one control member actuable by the pushbutton **(9)** and a device **(10)** for locking the pushbutton **(9)**, and is characterized in that the locking device **(10)** is arranged to permit the pushbutton **(9)** to occupy an unlocked axial position, from which it can be pressed to actuate the control member, and a locked axial position, nearer the interior of the timepiece than the unlocked axial position and in which the control member is not actuated.

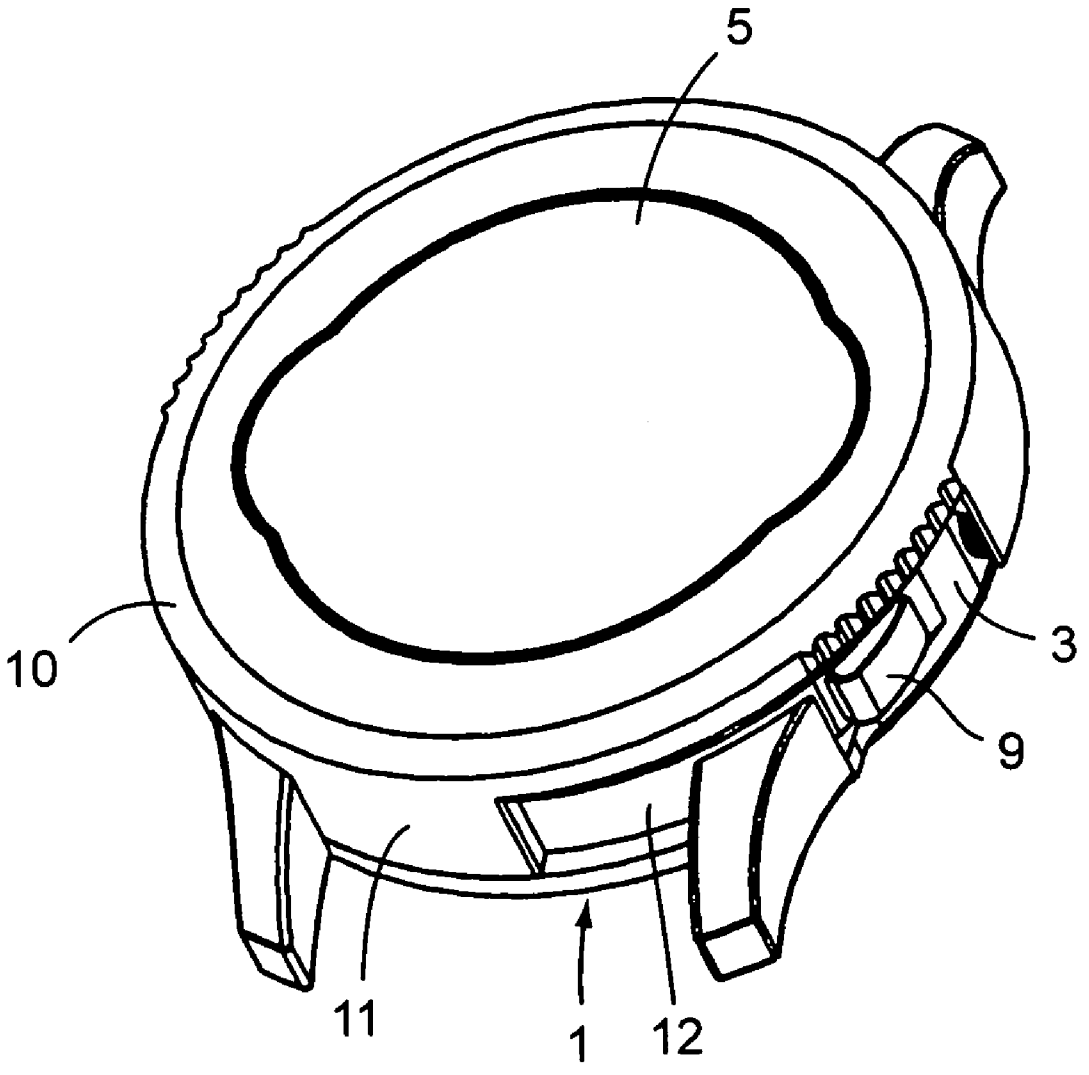

Fig. 1

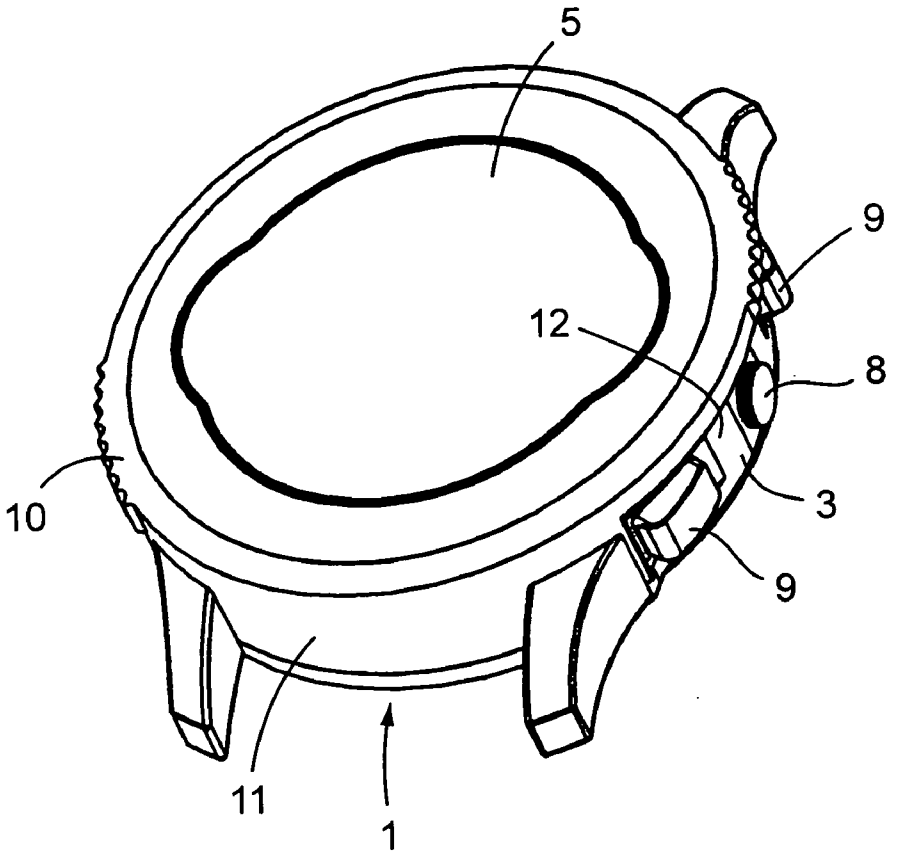

Fig. 2

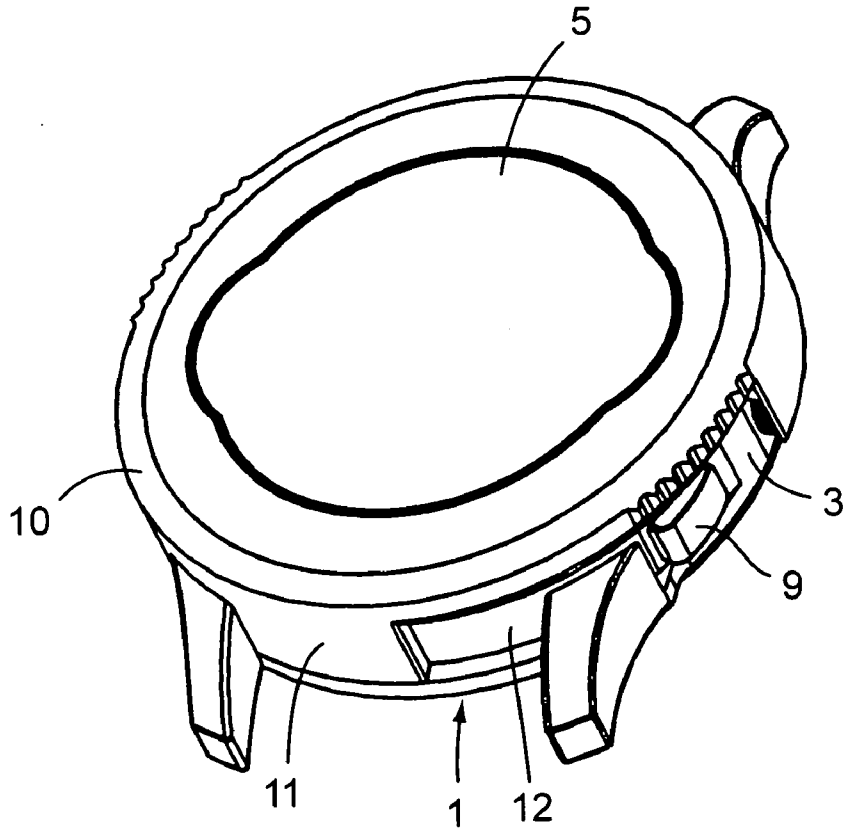

Fig. 3

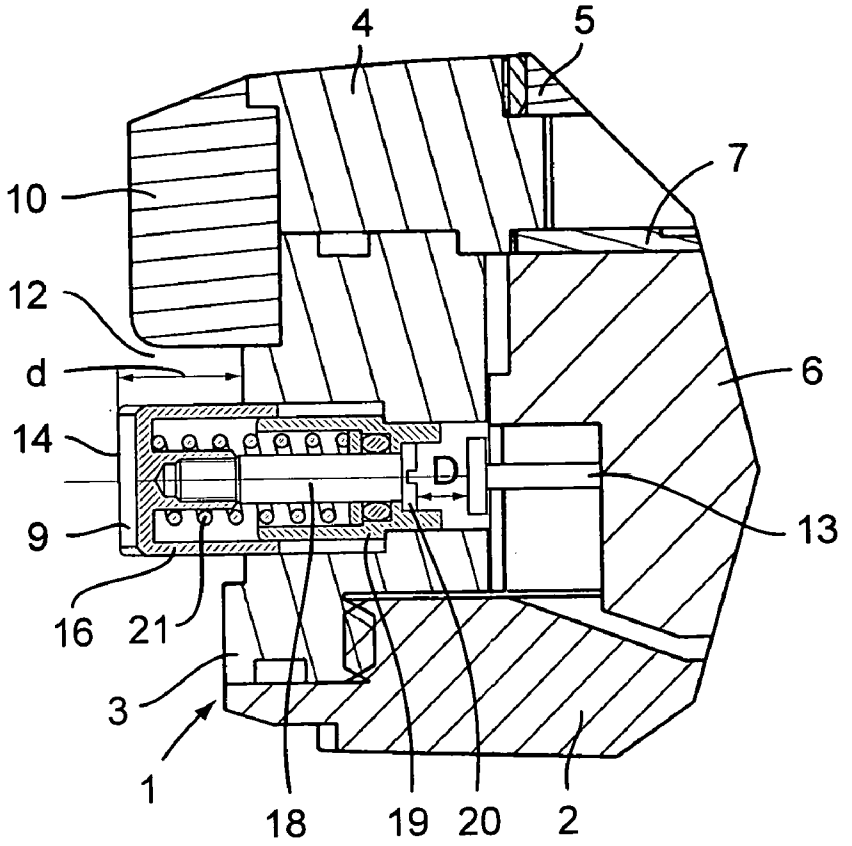
4
5
7
10
12
d
6
14
D
13
9
16
21
3
1
18
19
20
2

Fig. 4

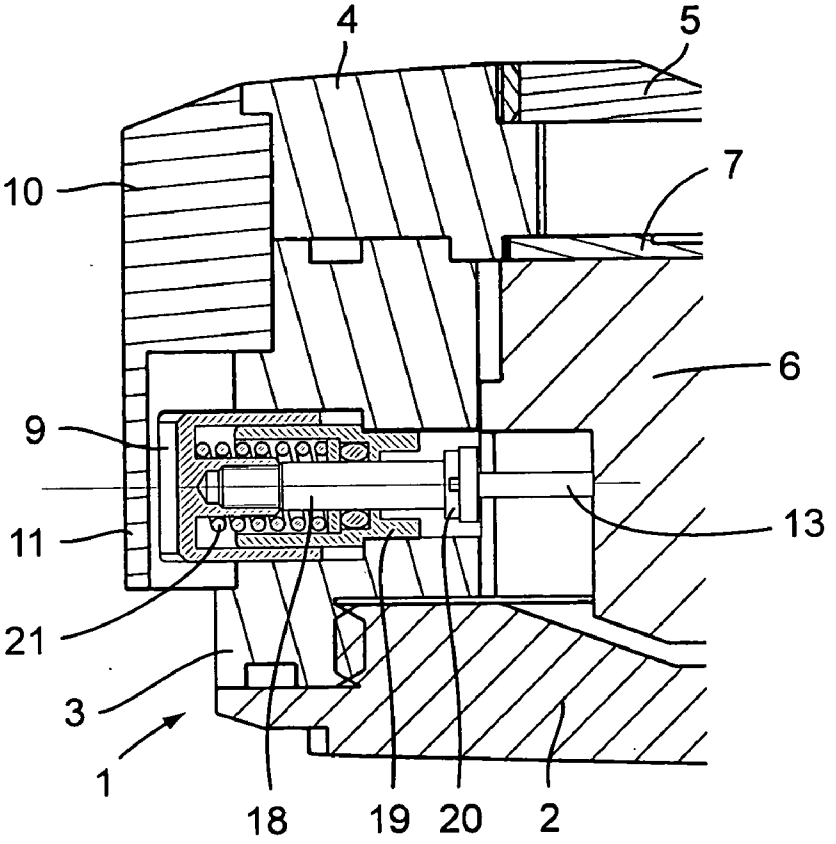
4
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Fig. 5

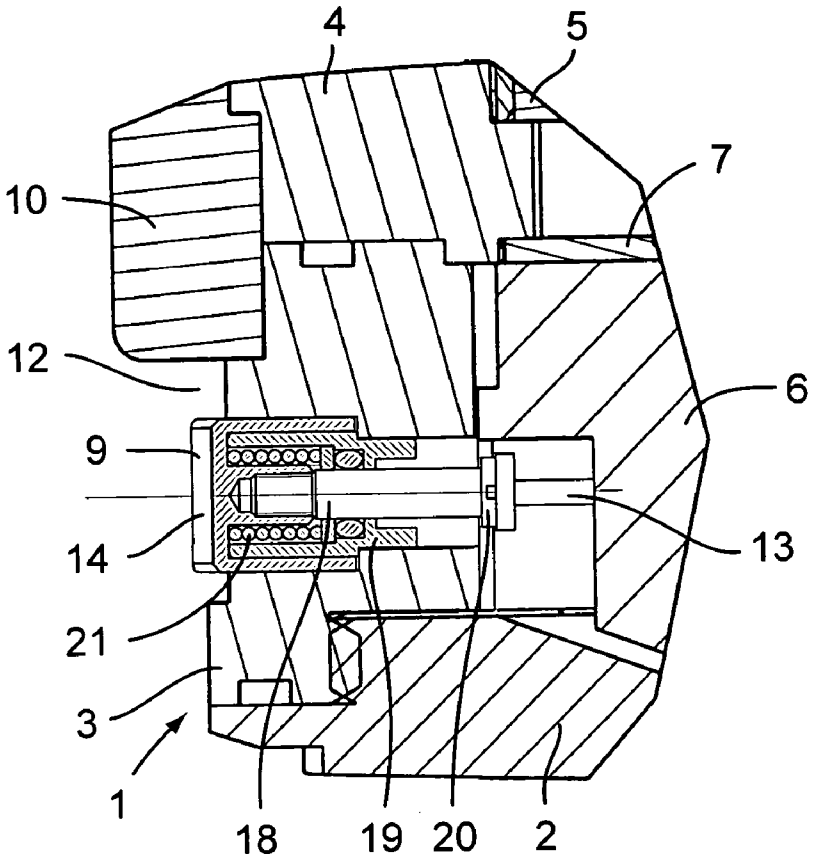


Fig. 6

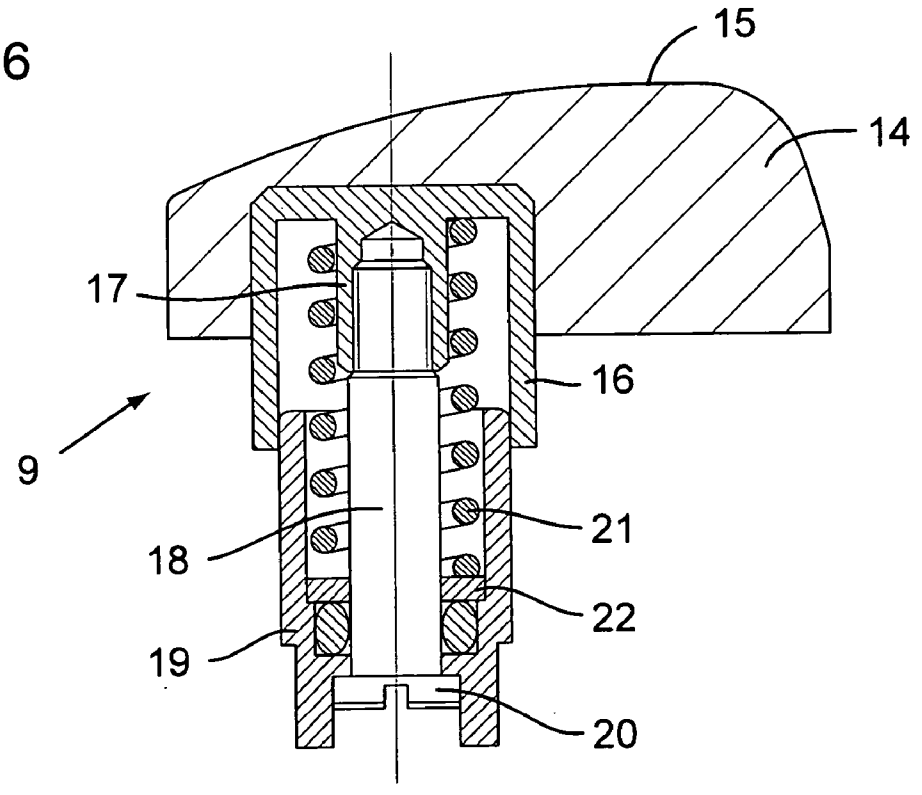


Fig. 7

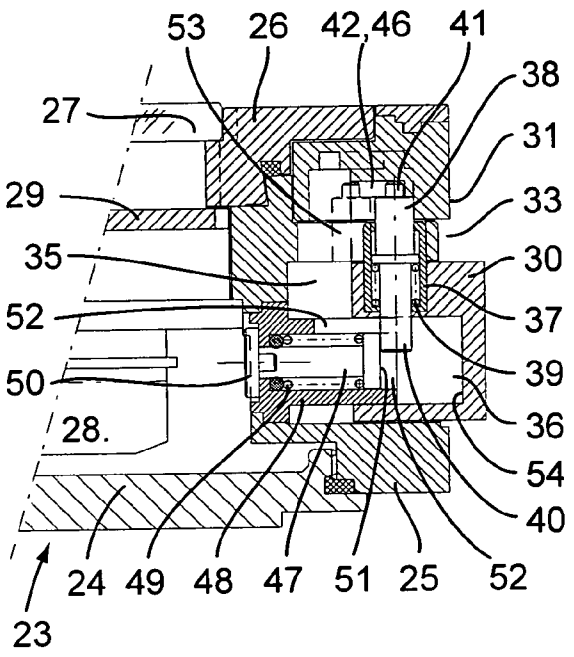


Fig. 8

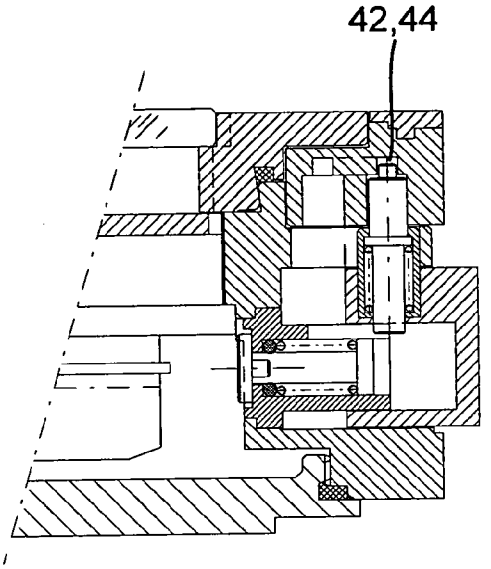


Fig. 9

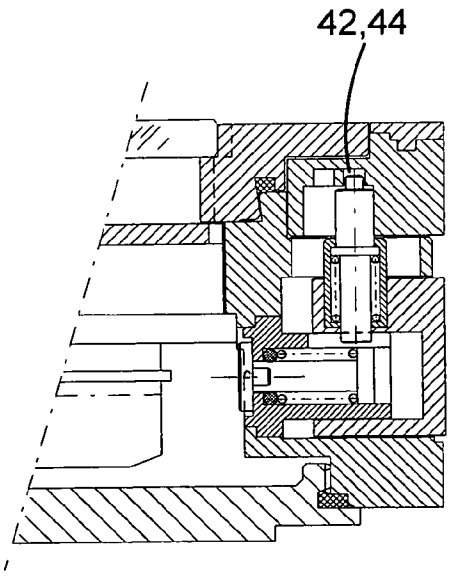


Fig. 10

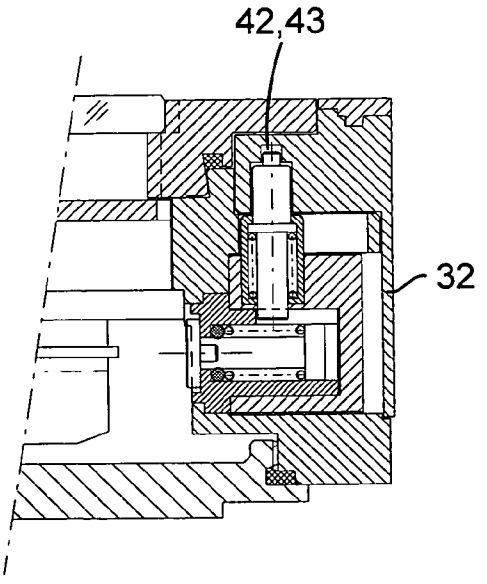


Fig. 11

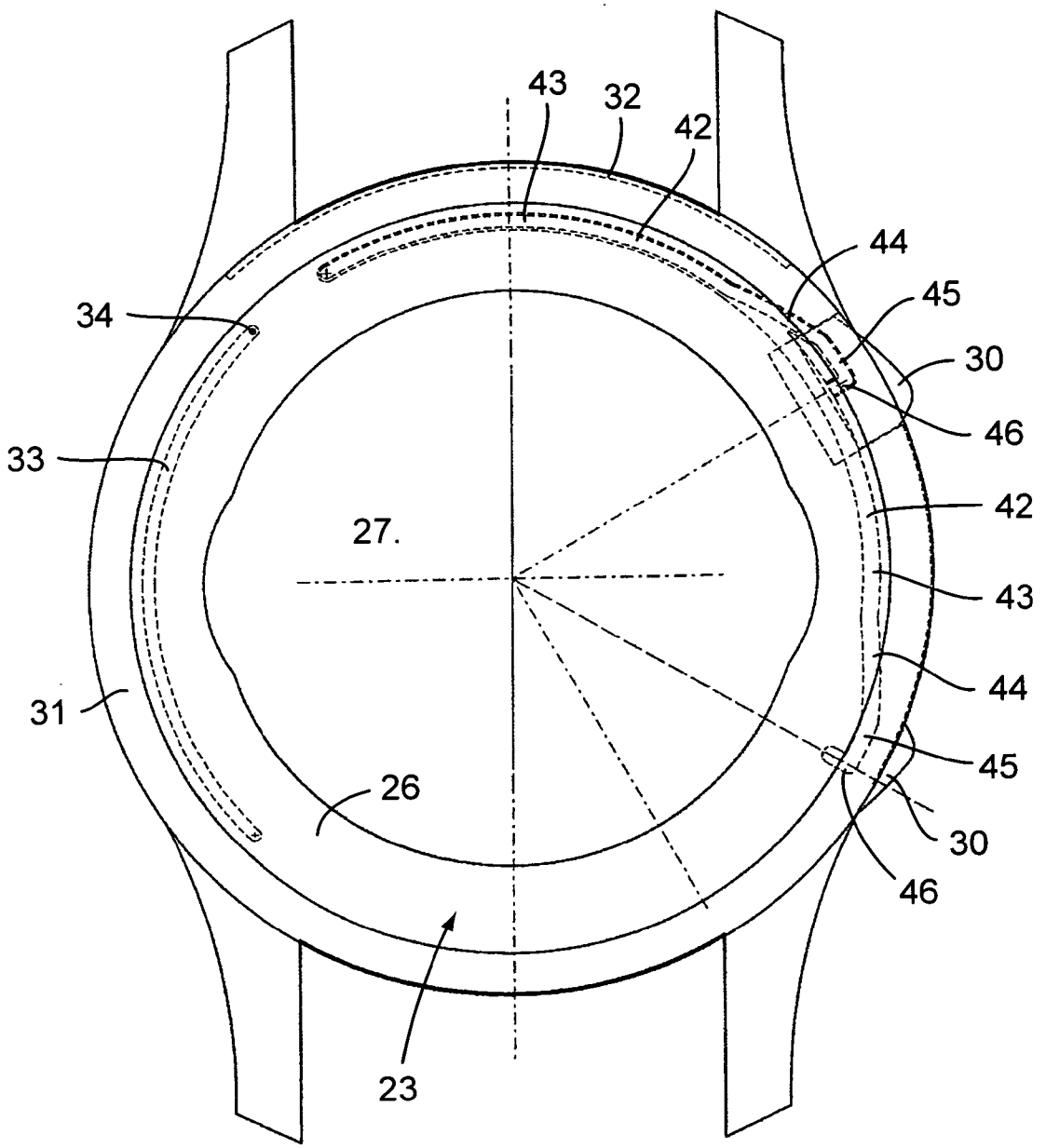


Fig. 12

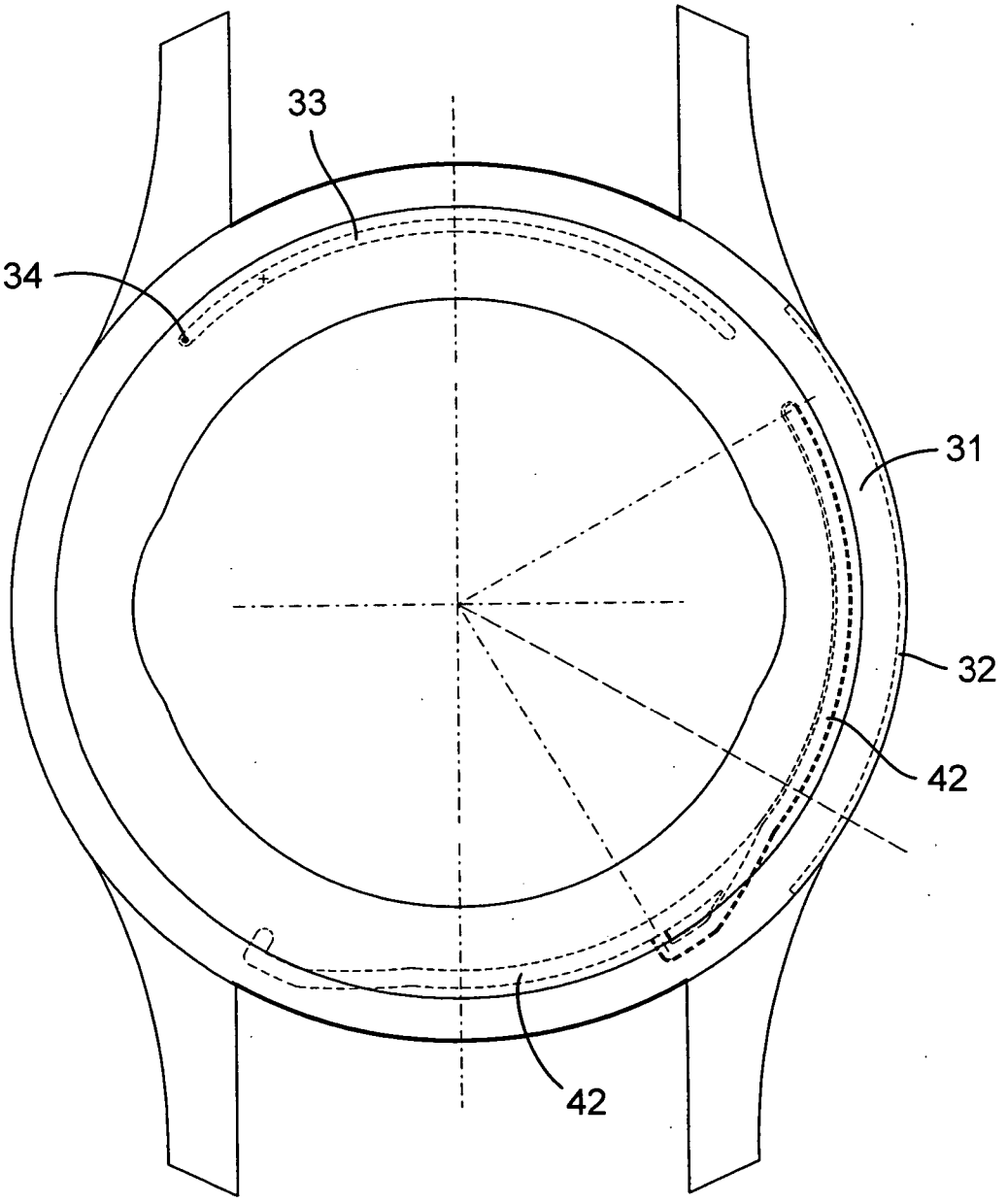


Fig. 13

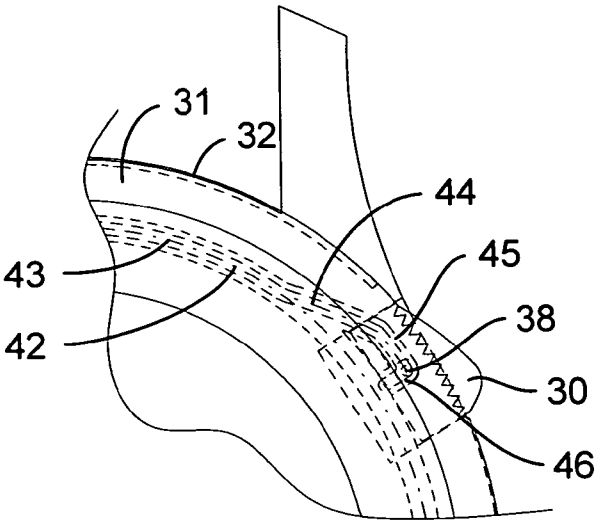


Fig. 14

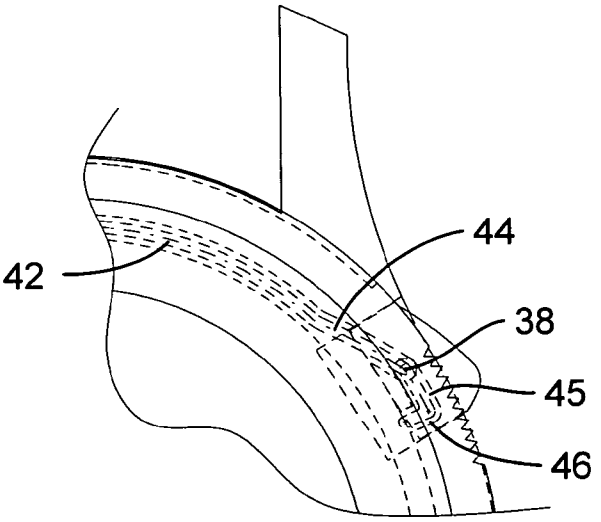
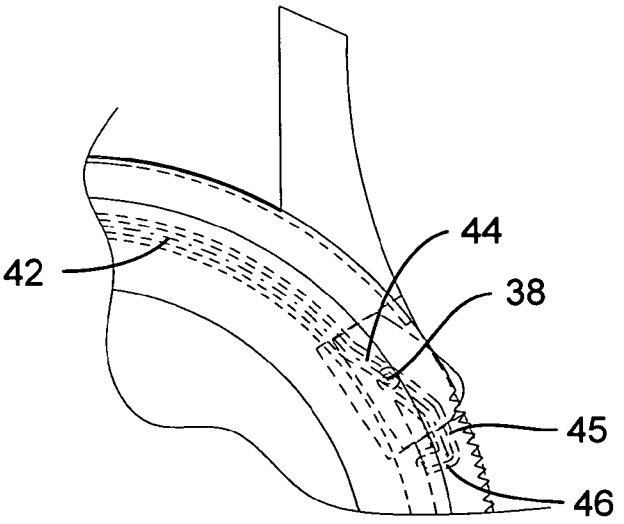


Fig. 15



TIMEPIECE WITH PUSHBUTTONS

[0001] The present invention relates to a timepiece comprising one or several pushbuttons, more particularly a timepiece comprising a device for locking the pushbuttons in a rest position so as particularly to avoid accidental actuation of these.

[0002] CH 567 300 discloses such a timepiece, in which the locking device is a rotatable bezel comprising over a portion of its circumference a ledge provided with a vertical wall in the form of an arc of a circle that can be placed facing the pushbuttons to conceal them. In this timepiece, the vertical wall in the form of an arc of a circle must have a large radius, which is to say be sufficiently distant from the wall of the frame from which emerge the pushbuttons, such that, when they are unlocked, the pushbuttons will be sufficiently visible and can thus be easily manipulated by the user. This increases the overall size and detracts from the appearance of the timepiece.

[0003] The present invention seeks to remedy this drawback and provides for this purpose a timepiece according to attached claim **1**, particular embodiments being defined in the dependent claims.

[0004] Other characteristics and advantages of the present invention will become apparent from a reading of the following detailed description, given with reference to the accompanying schematic drawings, in which:

[0005] **FIGS. 1 and 2** are perspective views showing a timepiece with pushbuttons according to a first embodiment of the invention, respectively in a condition in which the two pushbuttons are unlocked and in a condition in which one of the pushbuttons is locked;

[0006] FIGS. **3** to **5** are partial radial sectional views showing one of the pushbuttons respectively in the unlocked rest position, in the locked position, and in a position where it is actuating a control member;

[0007] **FIG. 6** is a sectional view of one of the pushbuttons seen from above;

[0008] FIGS. **7** to **10** are partial radial sectional views of a timepiece with pushbuttons according to a second embodiment of the invention, showing several positions of a pushbutton and of a locking device: in **FIG. 7**, the pushbutton is in the unlocked position; in **FIGS. 8 and 9** the locking device is locking the pushbutton; in **FIG. 10** the pushbutton is in the locked position;

[0009] **FIGS. 11 and 12** are plan top views of the timepiece according to the second embodiment of the invention, respectively in a condition in which the pushbuttons are unlocked and in a condition in which the pushbuttons are locked; and

[0010] FIGS. **13** to **15** are partial plan top views of the timepiece according to the second embodiment of the invention, showing the locking device and one of the pushbuttons in the same positions, respectively, as in FIGS. **7** to **9**.

[0011] With reference to **FIG. 1** to **6**, a timepiece according to a first embodiment of the invention, of the wristwatch type, comprises a watchcase **1** comprising a back **2**, a frame or middle part **3** and a bezel **4** carrying a crystal **5**. Within the case **1** is disposed a movement **6** supporting a dial **7**. A winding and setting crown **8** and pushbuttons **9** project radially from the edge wall of the case **1**. The pushbuttons **9** are located on opposite sides of the crown **8** and serve to actuate functions of the watch, such as starting and stopping a chronograph hand.

[0012] The watch according to the invention moreover comprises a locking device actuable by the user and permitting locking the pushbuttons **9** in a determined axial position to prevent their actuation and unlocking them when the user desires to use them. This locking device is preferably in the form of a rotatable bezel **10** having a vertical cylindrical wall **11** extending about the lateral external face of the frame **3** and having an opening **12**. The locking/unlocking of pushbuttons **9** takes place by rotating the bezel **10**. The pushbuttons **9** are said to be "locked" when they are concealed by the vertical cylindrical wall **11** and "unlocked" when they are facing the opening **12** of this wall **11** and hence are accessible to the user, who can then actuate them. In accordance with the present invention, and in contrast particularly to CH 567 300, the pushbuttons **9** have a different axial position according to whether they are locked or unlocked. In their unlocked axial position, the pushbuttons **9** emerge from the lateral external face of the frame **3** over a distance d sufficient to be easily visible and easily accessible to the user (see **FIG. 3**). In their locked axial position, the pushbuttons **9** are retracted into the wall of the frame **3** (**FIG. 4**), such that the internal diameter of the vertical cylindrical wall **11** of the rotatable bezel **10** which covers them can be relatively small.

[0013] As can be seen in FIGS. **3** to **5**, the pushbuttons **9** are adapted each to coact with a respective control push member **13** within the watchcase **1**. Each pushbutton **9** comprises a head **14** (see **FIG. 6**) whose face **15** intended to receive a finger of the user is inclined, and a tube **16** driven into an internal recess of this head **14** and comprising an axial internal projection **17** into which is screwed a screw-threaded end of an axial rod **18**. Each pushbutton **9** is supported and guided by a tube **19** driven into a through bore of the frame **3** and open at its two ends. The rod **18** extends within the fixed tube **19** and its free end **20** is located facing the push member **13**. A return spring **21** is disposed about the projection **17** and the rod **18** between the bottom of the tube **16** and a ring **22** that bears against an annular internal shoulder of the fixed tube **19**.

[0014] In the unlocked axial position of the pushbuttons **9**, the free end **20** of the rod **18** is at a certain distance D from the control member **13** (**FIG. 3**). From this unlocked position, the pushbutton **9** can be pressed axially against the action exerted by its return spring **21** to actuate the control member **13** and thereby to control a function of the watch (**FIG. 5**). The movement which the pushbutton **9** then carries out is divided into two successive travels, a dead travel to cover the distance D which separates it from the control member **13**, and then a useful travel for pressing the control member **13**.

[0015] To lock the pushbuttons **9**, the user rotates the bezel **10** in the direction corresponding to the direction of positive inclination of the face **15** of the pushbuttons **9**, namely, in the illustrated example, clockwise, such that the vertical cylindrical wall **11** of the bezel **10** coacts with this inclined face **15** to press the pushbuttons **9** against the action exerted by the return spring **21**. The internal diameter of the vertical cylindrical wall **11** of the rotatable bezel **10** and the incli-

nation of the face **15** of the pushbuttons **9** are selected such that the travel of the pushbuttons **9** caused by the rotation of the bezel **10** will be less than or equal to the distance D. Thus, the locking of the pushbuttons **9** leads to bring in these latter toward the respective control members **13**, possibly until the pushbuttons **9** come into contact with the control members **13** as shown in **FIG. 4**, but without giving rise to actuation of the control members **13**. The pushbuttons **9** are held in their locked position by the vertical cylindrical wall **11** which, at the same time, conceals and protects them. To unlock the pushbuttons **9**, it suffices to rotate the bezel **10** in the other direction. As soon as they face the opening **12**, the pushbuttons **9** will be pressed outwardly from the case **1** by their spring **21**.

[**0016**] Referring to FIGS. **7** to **15**, a timepiece according to a second embodiment of the invention comprises a watchcase **23** comprising a back **24**, a frame or middle part **25** and a bezel **26** bearing a crystal **27**. Within the case **23** is disposed a movement **28** and a dial **29**. A winding and setting crown (not shown) and pushbuttons **30** project radially from the edge wall of the case **23**.

[**0017**] The timepiece according to this second embodiment comprises moreover a rotatable bezel **31** having over a portion of its circumference a vertical wall **32** in the form of an arc of a circle adapted to come into a position facing the pushbuttons **30**, to conceal and protect them, when these latter are in the locked position. A groove **33** in the form of an arc of a circle (see **FIGS. 11, 12**) coaxial with the rotatable bezel **31** and the case **23** and having an angular extent corresponding to that of the vertical wall **32**, is formed in the upper face of a portion of the horizontal annular wall of the rotatable bezel **31** located below the fixed bezel **26**. This groove **33** receives a pin **34** secured to the fixed bezel **26** to limit the angular movement of the rotatable bezel **31**. Ball detents can be provided at the ends of the groove **33** to lock, in coaction with the pin **34**, the rotatable bezel **31** in one or the other of its two end positions.

[**0018**] As shown in FIGS. **7** to **10**, the pushbuttons **30** are disposed in a cavity **35** of the frame **25** and comprise a recess **36** in their internal face turned inwardly of the case **23**. The pushbuttons **30** also comprise in their upper wall a vertical through bore opening into the recess **36** and in which is driven a guide tube **37**. This guide tube **37** is traversed over all its length by a cylindrical vertical finger **38**, free axially and in rotation relative to the tube **37** and subject to the action of a compression spring **39** disposed between a lower internal annular shoulder of the tube **37** and a substantially central annular rib of the finger **38**. The lower end **40** of the finger **38** projects outside the tube **37** to emerge into the recess **36** of the pushbutton **30**. The upper end **41** of the finger **38** projects outside the tube **37** to coact with a groove **42** formed in the lower face of the horizontal annular wall of the rotatable bezel **31**. This upper end **41** is held permanently in the groove **42** by pressure exerted on the finger **38** by the spring **39**.

[**0019**] The grooves **42** associated respectively with the fingers **38** of the pushbuttons **30** are shown in **FIGS. 11 and 12**. These two grooves **42** comprise successively, in a clockwise direction, a long portion **43** in the form of an arc of a circle coaxial with the rotatable bezel **31** and the case **23**, an intermediate portion **44** deviating from the axis of the case **23** from the long portion **43**, a short portion **45** in the form of an arc of a circle coaxial with the rotatable bezel **31** and the case **23**, and a short end portion **46** oriented radially relative to the axis of the case **23** and defining an elbow with the short portion **45**. The long portions **43** of the two grooves **42** meet at the transition between the long portion **43** and the intermediate portion **44** of the groove **42** located clockwise upstream. The depth of each groove **42** is constant over all the length of the long portion **43** and the intermediate portion **44**. This depth is also constant over all the length of the radial portion **46** but is smaller in the radial portion **46** than in the portions **43**, **44**. The depth of the groove **42** over the short portion **45** decreases progressively from the intermediate portion **44** to the radial portion **46** so as to make the variation of depth of the groove **42** continuous between these portions **44**, **46**.

[**0020**] Referring again to FIGS. **7** to **10**, it will be seen that each pushbutton **30** faces a horizontal control push member **47** engaged in a horizontal guide tube **48** whose first end is driven in a through bore of the frame **25** and the second end is received in the recess **36** of the pushbutton **30**. This control member **47** is subject to the action of a compression spring **49** in the tube **48** and, in the rest position, is retained in this tube **48** by a first one, **50**, of its ends opposite the pushbutton **30** and abutting against the external face of the first end of the tube **48**, the second end **51** of the control member **47** being, like that of the tube **48**, located in the recess **36**. The tube **48** has, on the side of its second end, a notch **52** of square shape extending partially horizontally, in an upper portion of the cylindrical wall of the tube **48**, and partially vertically, in the plane wall of the tube **48** defining the aforementioned second end of this latter. This notch **52** receives the lower end **40** of the finger **38**.

[**0021**] The rotatable bezel **31** and the fingers **38** with their compression spring **39** form together a device for locking the pushbuttons **30**, operating in the following manner.

[**0022**] When the vertical wall **32** of the rotatable bezel **31** does not face the pushbuttons **30** (**FIGS. 7, 11** and **13**), the lower end **40** of the finger **38** faces the vertical plane face **51** defining the aforementioned second end of the control member **47**, and is more particularly in contact or almost in contact with the vertical plane face **51**, in the vertical portion of the notch **52** of the tube **48**, and the upper end **41** of the finger **38** is in the radial portion **46** of the groove **42**. In this unlocked position, in which the pushbuttons **30** are easily visible and readily accessible, each pushbutton **30** can be pressed by the user to actuate the corresponding control member **47**. The actuation of the control member **47** will then be effectuated by the finger **38** pressing the face **51** of the control member **47**, this finger **38** being secured to the pushbutton **30** in the axial direction of the pushbutton **30**. During this movement of the assembly of the pushbutton **30**—finger **38**—control member **47**, the upper end **41** of the finger **38** will be guided in the radial portion **46** of the groove **42**. **FIG. 7** shows at reference **53** and in dotted line the position of this finger **38** at the end of the pressing of the control member **47**. As soon as the force of pressure exerted on the pushbutton **30** has ended, the compression spring **49** will return the aforementioned assembly **30**, **38**, **47** into its initial axial position.

[**0023**] To lock the pushbuttons **30**, the user rotates the bezel **31** in a clockwise direction until it reaches its position shown in **FIG. 12** in which the pushbuttons **30** are concealed

and protected by the vertical wall **32** of the bezel **31**. During this movement of rotation of the bezel **31**, the upper end **41** of the finger **38** is guided by the groove **42** and passes successively into the short portion **45**, into the intermediate portion **44**, then into the long portion **43** of the groove **42**. The mobility in rotation on itself of the finger **38** facilitates passing the transitions between these different portions **43-45** of the groove **42**.

[0024] The passage of the upper end **41** of the finger **38** in the short portion **45** has the effect of retracting the finger **38**, which is to say moving it upwardly such that its lower end **40** will no longer face the pressure face **51** of the control member **47** but will be at the horizontal portion of the notch **52** of the tube **48** (**FIGS. 8 and 14**). The passage of the upper end **41** in the intermediate portion **44** permits moving horizontally the finger **38** and hence the pushbutton **30** inwardly of the case **23** (**FIGS. 9, 10** and **15**). During this passage in the intermediate portion **44**, the lower end **40** of the finger **38** is guided in this horizontal portion of the notch **52** and the bottom **54** of the recess **36** of the pushbutton **30** approaches the tube **48** and the control member **47**. It will however be noted that the depth of this recess **36** is sufficiently great that, in the completely retracted position of the pushbutton **30** (**FIG. 10**), this latter will not be in contact with the pressure face **51** of the control member **47** and thus cannot actuate it. The passage of the upper end **41** of the finger **38** in the long portion **43**, finally, serves to terminate the rotation of the bezel **31** such that the vertical wall **32**, which here has only a protective role (the pushbuttons **30** being held in locked position by the fingers **38** coacting with the grooves **42**), completely covers the pushbuttons **30** (**FIGS. 10 and 12**). To unlock the pushbuttons **30**, the user need only rotate the bezel **31** counterclockwise such that the fingers **38** and the pushbuttons **30** have the reverse movements of those described above.

[0025] The present invention has been described above only by way of example. It is clear that modifications could be made without departing from the scope of the invention. In particular, the rotatable bezel could be replaced by a ring mounted about the lateral external face of the frame. Furthermore, in the second embodiment, the protective wall **32** could be omitted.

1. Timepiece comprising at least one pushbutton (**9**; **30**), at least one control member (**13**; **47**) actuable by the pushbutton and a device (**10**; **31**, **38**) for locking the pushbutton, characterized in that the locking device is arranged to permit the pushbutton (**9**; **30**) to occupy an unlocked axial position, from which it can be pressed to actuate the control member (**13**; **47**), and a locked axial position, nearer the interior of the timepiece than the unlocked axial position and in which the control member(**13**;**47**)is not actuated.

2. Timepiece according to claim 1, characterized in that the locking device comprises a protective wall (**11**; **32**) covering at least in part the pushbutton (**9**; **30**) when this latter is in the locked axial position.

3. Timepiece according to claim 2, characterized in that the locking device is a rotatable member (**10**) having said protective wall (**11**), this rotatable member (**10**) being arranged such that, during its rotation in a predetermined direction, the protective wall (**11**) will coact with an inclined face (**15**) of the pushbutton (**9**) to bring the pushbutton (**9**) from its unlocked axial position to its locked axial position, the protective wall (**11**) serving also to hold the pushbutton (**9**) in its locked axial position.

4. Timepiece according to claim 3, characterized in that the rotatable member (**10**) is a bezel.

5. Timepiece according to claim 3 er **4**, characterized in that in the unlocked axial position, the pushbutton (**9**) is separated from the control member (**13**) by a determined distance (D), and in that the travel of the pushbutton (**9**) for the passage from its unlocked axial position to its locked axial position is less than or equal to this determined distance (D).

6. Timepiece according to claim 1 or 2, characterized in that the locking device comprises a retractable member (**38**) secured to the pushbutton (**30**) in the axial direction of the pushbutton (**30**) and a member (**31**) for driving this retractable member (**38**), the retractable member (**38**) having a first end (**40**) which, in the unlocked position of the pushbutton (**30**), faces a pressure face (**51**) of the control member (**47**) thereby permitting the retractable member (**38**) to actuate the control member (**47**) under the action of a pressure exerted on the pushbutton (**30**), and which, in the retracted position of the retractable member (**38**), no longer faces the pressure face (**51**) of the control member (**47**) thereby permitting movement of the retractable member (**38**) and of the pushbutton (**30**) inwardly of the timepiece by the drive member (**31**) without actuating the control member (**47**) for locking the pushbutton (**30**).

7. Timepiece according to claim 6, characterized in that the drive member (**31**) is a rotatable member comprising a groove (**42**) with which a second end (**41**) of the retractable member (**38**) coacts, this second end (**41**) being held in the groove (**42**) by resilient means (**39**) acting on the retractable member (**38**), the groove (**42**) having a shape permitting guiding the second end (**41**) of the retractable member (**38**) during rotation of the rotatable member (**31**) in a determined direction to retract the retractable member (**38**) and then to move it toward the interior of the timepiece.

8. Timepiece according to claim 7, characterized in that the rotatable member (**31**) is a bezel.

9. Timepiece according to claim 4, characterized in that in the unlocked axial position, the pushbutton (**9**) is separated from the control member (**13**) by a determined distance (D), and in that the travel of the pushbutton (**9**) for the passage from its unlocked axial position to its locked axial position is less than or equal to this determined distance(D).

10. Timepiece according to claim 2, characterized in that the locking device comprises a retractable member (**38**) secured to the pushbutton (**30**) in the axial direction of the pushbutton (**30**) and a member (**31**) for driving this retractable member (**38**), the retractable member (**38**) having a first end (**40**) which, in the unlocked position of the pushbutton (**30**), faces a pressure face (**51**) of the control member (**47**) thereby permitting the retractable member (**38**) to actuate the control member (**47**) under the action of a pressure exerted on the pushbutton (**30**), and which, in the retracted position of the retractable member (**38**), no longer faces the pressure face (**51**) of the control member (**47**) thereby permitting movement of the retractable member (**38**) and of the pushbutton (**30**) inwardly of the timepiece by the drive member (**31**) without actuating the control member (**47**) for locking the pushbutton (**30**).

* * * * *