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.
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 forming an arc of a circle that can be placed facing the pushbuttons to conceal them. In this timepiece, the vertical wall 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 inclin-
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 coat 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.

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 has only a protective role (the pushbuttons 30 being held in locked position by the fingers 38coacting 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.

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 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 or 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).