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Timepiece and, in particular, a wrist watch

The object of the present invention is a timepiece and, in particular, a wrist watch, comprising a display means for hours, of the so-called "incremental" type and a display means for minutes of the "resetting" type.

The objective of the invention is to provide a control mechanism for the two display means in such a timepiece which be reliable, simple and effective.

This objective is met by virtue of the means defined in claim 1.

The annexed drawing illustrates, by way of example, an embodiment of the object of the invention.

Fig. 1 is a perspective view of a wrist watch.

Fig. 2 is a perspective view of a part of the control mechanism for the display means of the watch shown in fig. 1, at an enlarged scale.

Fig. 3 is a perspective view, from a different angle, of the mechanism shown in fig. 2, at the same scale as in fig. 2, certain components of this mechanism being deleted, for sake of clarity of the drawing.

Fig. 4 is a plan view of the mechanism as shown in fig. 3, at a scale intermediate between those of fig. 2 and fig. 3.

Fig. 5 is a cross-sectional view taken along line V-V of fig. 4, at an enlarged scale.



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Fig. 6 is a perspective view of a detail of the control mechanism of the display means of the watch shown in fig. 1, at an enlarged scale, and

Fig. 7 is a plan view of an indicator member for this watch, substantially at the same scale as that of fig. 1.

The watch shown in fig. 1 and designated generally by 1, includes a minute hand 2 pivoting at the center of the piece and which moves along a scale 3 of sixty divisions indicating minutes, and having the shape of a sector of a circle extending over more than 180°, carried by the dial plate, designated by 4, and bearing the numerals 5 from 0 to 60.

The dial plate 4 has at six o'clock a window 6 through which are to be seen numerals 7 giving the hour of the day, carried by a disk 8 for indicating the hour of the day, which disk is shown separate in fig. 7.

The driving mechanism for the hand 2 and for the hour disk 8 is carried by a frame consisting of a circular base plate 9 and of a bridge 10. This frame provides an independent module which is affixed to the movement of the watch, of which the mechanism plate is indicated by 11 (fig. 5). The mechanism includes a spirally shaped cam 12 press fitted on a cannon 13a carried by the cannon pinion designated by 13. The spirally shaped cam 12 is housed in an elongated opening 14 provided in the base plate 9 of the frame of the mechanism.

The latter includes a main tilting member 15 pivotally mounted at 16 on the plate 9 and which carries, mounted pivotally at 17, a pawl 18 which is provided with a pin 19 extending through a hole of said tilting member and which is biased by the return spring 20 affixed at 21

to the tilting member. The pawl 18 is housed, as is the cam 12, in the opening 14 of the plate 9. The tilting member 15 is subjected to the action of a return spring 22, affixed to the base plate 9, which functions to maintain the tilting member engaged via its pawl 18, against the spirally shaped cam 12.

As it rotates, at the rate of one full rotation per hour, the tilting member 15 is lifted progressively by the cam 12, which causes its rotation in the counter clockwise direction, to fall back instantly, once each hour, when the nose, designated by 12a (fig. 4) of the cam 12, drives over the pawl 18.

The tilting member 15 exhibits an extension 15a, toothed at 23, and forming a rake engaged with the pinion, designated by 24, of a movement, of which the wheel, designated by 25, rotates between the plate of the mechanism 9 and the bridge 10. The wheel 25 of the movement 24-25 is engaged with an intermediate wheel 26, which also rotates between the plate 9 and the bridge 10, and which is engaged with the minute wheel 27 integral with a shaft 27a pivotally mounted in the bridge 10, at the center of the movement. The minute hand 2 is carried by said shaft 27a.

During the slow displacements of the tilting member 15 produced by the spirally shaped cam 12, the rake 23 drives the shaft 27a via a train of gears as described above, to move the hand 2 progressively along the scale 3 of the dial 4. The gear ratio was selected in such a manner that, the slow displacement of the tilting member 15 having a duration of one hour, since the spirally shaped cam 12 is integral with the minute wheel 13 of the movement, the hand 2 take sixty minutes to

cover the full scale 3, of sector 5 graduated in minutes from "0" to "60". The instant when the hand 2 reaches numeral "60" of the scale 5 graduated in minutes, corresponds to the point of time when the nose 12a of the cam 12 rides over the pawl 18 of the tilting member 15. The latter then falls instantly back, under the effect of its return spring 22, which brings the minute hand 2 facing numeral "0" of the scale 5 graduated in minutes.

Accordingly, the minutes display is of the so-called "reseting" type.

One should note that the presence of the pawl 18 positioned between the spirally shaped cam 12 and the tilting member 16 makes it possible to reset time manually by a backward motion without causing any damage to the mechanism, the pawl 18 assuming at that time a retracted position, against the action of its return spring 20, by the action of the nose 12a of the cam 12 abutting against it.

One can also note that the minute wheel 27 is subjected to the action of a resilient return member designed for preventing any spontaneous reseting of the minute hand 2, which could be brought about by looseness in any set of gears of its drive train.

This return mechanism includes a toothed or rake shaped sector 28 (figs. 2, 3 and 4)) subjected to the action of a return spring (not illustrated) which is engaged with a pinion (not illustrated in the drawing) situated beneath the wheel 29, with which it is integral, and which is in turn engaged with the minute wheel 27. The latter is thus biased, in the same direction, by the return spring of the rake 28,

thus preventing the accidental resetting of the minute hand 2.

The tilting member 15 carries a second pawl, designated by 30, pivotally mounted upon the same by means of a shank screw 31 and cooperating with the branches 32a of a star wheel 32, having 12 branches and carrying, press fitted thereon, an hour disk 8, which in turn is press fitted on the outer ring 33 of a ball bearing of which the central part, designated by 34, is affixed by screws 35 to the bridge 10, at the center of the movement. The pawl 30 carries a pin 36 with which cooperates a return spring 37 affixed to the tilting mechanism 15.

The mechanism further includes a tilting member 38 pivotally mounted on the plate of the frame 9 by means of a shank screw 39 and which is subjected to the action of a return spring 40 affixed at 41 to the plate 9. The tilting member 38 has two arms, of which one designated by 38a, is designed for cooperating with the branches 32a of the star wheel 32, to ensure the stability of the twelve incremental positions, at each one of which one of the numerals of the hour dial 7 appears in the window 6 of the display. At each instantaneous falling back of the tilting member 15, its pawl 30 biases one of the branches 32a of the star wheel 32, to displace the same in the clockwise direction until one of the branches 32a has overtaken the end of the arm 38a of the tilting member 38.

The mechanism further includes a double safety device preventing, in the case of a shock to the hour disk 8, an erratic displacement, by one increment or more.

To this end, the pawl 30 carries a pin 42 engaged in a slot 42

which is made in the plate 9 of the frame and which has the shape of an arc of a circle, of which the center coincides with the center of rotation 16 of the tilting member 15. In the case of a shock, tending to displace the star wheel 32, the pawl 30 will thus form a lock, its pin 42 abutting against the internal wall of the slot 43, which prevents the star wheel to move in an erratic manner.

When the tilting member 15 arrives close to the end of its slow travel produced by the spirally shaped cam 12, approximately ten minutes before its instantaneous falling back, the minute hand 2 then being approximately opposite numeral 50 of the scale 5 graduated in minutes, the pin 42 of the pawl 30 engages in the rectilinear end part, designated by 43a of the slot 43, which forms an angle relative to the main part of the slot, which is arc shaped. The pawl 30 is then free to move and is ready to cooperate with the star shaped wheel at the coming instantaneous falling back of the tilting member 15.

Another locking device then operates in place of that provided by the pawl 30, ensured by the second arm of the incremental tilting member 38, designated by 38b, which ends by a head 38c with which cooperates a protrusion 15b carried by the tilting member 15. The branch 38a of the incremental tilting member 38 is thus kept rigidly on the trajectory of the branches 32a of the star wheel 32, locking the same against the effects of possible shocks. At the point of time when the tilting member 15 proceeds to its instantaneous falling back, its protrusion 15b leaves the head 38c of the arm 38b of the tilting member 38, releasing the latter which can then function normally as an incremental member.

If, during this same period of about ten minutes before the instantaneous falling back of the tilting member 15, a shock tending to return the star wheel 32 in the backward direction is received, the part 38a of the incremental tilting member 38 being engaged with the star wheel, the latter is prevented from moving backwards.

The locking of the star wheel is thus complete, in both directions.

It should be noted that the control mechanism of the display means of the watch described and illustrated forms a single element carried by the plate 9 and the bridge 10, which can be placed on any type of watch movement, without having to subject the same to any transformation.

## CLAIMS

1. Timepiece, particularly a wristwatch, comprising a star wheel (32) secured to an hours indicating member (8) in engagement with a positioning jumper (38), a yoke (15) on which a drive pawl (30) is pivoted, a return spring (37) for elastically keeping this pawl in a position in which it is in engagement with the star wheel (32), a rotating snail cam (12) driven at the rate of one revolution per hour, a spring (22) for pressing the said yoke (15) against the said rotary cam (12) and a train of gears between the said yoke (15) and a moving member (27) secured to a minutes indicating member (2), characterized in that the said drive pawl (30) comprises an element (42) in engagement with a stop surface (43) shaped to lock the said drive pawl (30) in the position in which it is in engagement with the star wheel (32), over a determined portion of the trajectory described by the said yoke (15) and to release it over the remaining portion of the trajectory of this yoke (15), this yoke comprising an element (15b) for locking the said positioning jumper (38), the trajectory portion described by this locking element (15b) integrally with the movement of the said yoke (15) during the unlocking of the said star wheel (32) by the said drive pawl (30) corresponds to the locking of the said positioning jumper (38) by the said locking element (15b).

2. Timepiece according to Claim 1, characterized in that the said yoke (15) bears a second pawl (18) mounted so that it can pivot and a return spring (20) for keeping this second pawl (18) in a position of engagement with the said rotary snail cam (12) when the latter rotates in the direction of driving of the said yoke (15) and allowing this second pawl (18) to pivot against the pressure of the said return spring (20) when the said cam (12) rotates in the opposite direction.

3. Timepiece according to one of the preceding claims,  
characterized in that the said yoke (15) comprises a  
toothed sector (23) in engagement with a pinion (24)  
belonging to a train of gears (25-27) leading to the said  
5 minutes indicating member (2).

4. Timepiece according to one of the preceding claims,  
characterized in that the moving part (27) bearing the  
minutes indicating member (2) is associated with an  
10 elastic return device (28, 29) to eliminate the lash in  
the said train of gears (25-27).