

A PUSH MECHANISM FOR A TIME PIECE

Known push mechanisms for time pieces are generally of two types, one type being more particularly used in mechanical watches for controlling mechanically a function, a stopwatch, time resetting, quick adjustment, etc, and the other type being used in electronic watches, actuating an electrical contact.

The first type of mechanism for mechanical watches includes, in addition to the push piece and its stem, at least one hinged rocking mechanism on a bottom plate or a bridge, of which one end is subjected to the action of a return spring whereas the other cooperates with the member to be actuated. Quite frequently, the rocking mechanism itself is made at least of two hingedly connected parts.

The number of parts in these mechanisms is high, the shape of the rocking mechanism is generally complicated and the mounting of this mechanism necessitates skilled staff and is time consuming, since each part must be mounted, assembled, and adjusted and the functioning of the assembly must be controlled.

The mechanisms of the second type generally include a stem of a push piece subjected to the action of a return spring arranged concentrically with respect to this stem and actuating an electrical contact. This type of mechanism suffers two drawbacks, on the one hand, tightness between the watch case and the push piece is difficult to achieve owing to the presence of the return spring and, on the other hand, there is no "click" at the end of the travel of the push piece to indicate that the desired operation was effectively carried out.

There is known from document EP-B1-0.240.778 a push mechanism including a flat spring, having the general shape of a hair pin with arms of unequal lengths, guided and positioned on the bottom plate of the movement by several abutments or pins so that it may bend and that at least one of its arms may slide with respect to this bottom plate.

This spring includes in the vicinity of the end of its short arm a biasing member cooperating with a second biasing member car-

ried by the middle part of the other longer arm, of which the end actuates a contact.

The drawbacks of such a mechanism are that they are bulky, the positioning of the spring on the bottom plate is complicated, the lengthwise sliding of one part at least of the spring in operation and the inaccuracy in functioning and in particular at the moment of the "click" obtained by this mechanism.

The object of the present invention is a push mechanism for a mechanical or electronical time piece which is aimed at obviating the drawbacks of the existing mechanisms and which makes possible the easy positioning of the spring, which needs little room, which is highly reliable and accurate in operation, while at the same time being easily assembled, without requiring preciseness or trained staff and which is novel in the characteristic features set forth in claim 1.

The appended drawing illustrates schematically and by way of example a particular embodiment of the push mechanism of the invention.

Figure 1 illustrates a time piece provided with two push pieces.

Figures 2 and 3 are top views at a larger scale, of the push mechanism respectively in the rest position (retracted), and in the active position (depressed).

Figure 1 illustrates a time piece, for example a stopwatch, including a casing 1 provided with two push pieces 2, 3, which can actuate an electrical contact in the case of an electronic quartz-crystal watch or cause the mechanical actuation of a control member for a predetermined function in a mechanical movement.

The mechanism illustrated is mounted in a housing 4 provided in the middle part 5 of a watch case 1 and opening on its peripheral surface, as well as on its upper face 5a in contact with the lower face of the casing ring 6.

This mechanism includes a push piece or a push stem 7 mounted radially and slidably on the middle part 5 of the case. In the example illustrated, this assembling is achieved by means of pins

8, 9 which are fastened to the middle part of the case and engaged in slots 10, 11 of the push piece 7. An abutment 12 provided as a finger fastened to the middle part of the case is also engaged in the slot 10 and determines the rest or retracted position of this stem of the push piece 7.

In an alternate version, the push piece can include a conventional cylindrical stem sliding in a component of the watch casing. In this case, the abutment determining the position of the push piece can be carried by the case in a manner known per se.

Clearly, any known sealing device can be used to achieve a tight seal between the middle part 5 of the case, the casing ring 6 and the stem of the push piece 7.

This mechanism further includes a spring 13, also placed in the housing 4 of the middle part 5 of the case, biasing against the bottom of this housing and against the end of the stem of the push piece 7. This spring 13 is contained in a plane and seen from above, has a shape closed on itself, one of its ends 14 being in contact with the stem of the push piece 7 and carrying a rounded tip or beak 19 cooperating with the edge of its other end 15.

The edge of this end 15 of the spring forms a cam having two end of travel abutments 16, 17, and two recesses 18, 19a spaced by a lift 20.

In the example illustrated, the spring 13 is seated against the bottom of the housing 4 of the middle part 5 of the case, at two points 21, 22 and it is furthermore positioned by a cylindrical abutment 23 integral with the middle part of the case, designed for cooperation with certain parts 24, 25 of the inner edge of the spring 13, situated respectively between the two abutment points 21, 22 and between the abutment point 22 and the end 14 of the spring.

The mounting of this mechanism is extremely simple, the stem of the push piece 7 is slid over the pins 7, 8 and the abutment 12, then the spring 13 is arranged around the cylindrical abutment 23, its end 14 in contact with the end of the stem of the push piece 7. Finally, the casing ring is fastened to the middle part of the case. This mounting necessitates neither any fastening, nor

any adjustment and requires the positioning of only two pieces.

In an alternate version of the mechanism described, the spring 13 and the cylindrical abutment 23 can be placed in a housing which is provided in the movement itself, i. e. a bridge or a bottom plate of this movement, or in a bezel. As to the push piece 7, it remains mounted in the case, the middle part of the case or the casing ring. Thus, in such a version, the main components of the mechanism, the push piece 7 and the spring 13, remain identical to those described previously and cooperate in the same manner but are mounted on different components of the watch.

The functioning of the mechanism described is as follows :

In the position of rest, illustrated in figure 2, the stem of the push piece 7 is maintained by the action of the spring 13 in position against the abutment 12 and the beak 19 of the end 14 of the spring 13 is situated in the recess 19, close to the end of travel abutment 16 of the end 15 of said spring.

When the user pushes the stem of the push piece 7, he causes a displacement of the end 14 of the spring, of which the beak 19, cooperating with the lift 20, displaces resiliently the end 15 of the spring, which necessitates a determined increasing biasing force. Then the beak 19 passes the top of the lift 20 and the end 15 of the spring 13 returns under the effect of its resiliency, while remaining in contact with the beak 19, but the biasing force decreases suddenly to a value which is substantially close to zero. Then, the beak 19 abuts against the abutment 17, preventing any subsequent displacement of the stem of the push piece 7 (figure 3).

This functioning simulates very precisely the action of the conventional mechanical push piece and produces a click indicating to the user that the function was carried out as required.

In the present case, the end 14 of the spring carries one of the contacts of a switch (not illustrated) of which the other end finds itself on its fixed trajectory of a bridge or a bottom plate. During the motion of the end 14 of the spring, the switch is closed and ensures the actuation of the desired function.

In a mechanical watch, the end 14 or 15 of the spring can

control a mechanical function.

When the user releases the pressure on the stem of the push piece 7, the resilient energy stored in the spring 13 causes the return of the end 14 of the spring up to the position illustrated in figure 2. The strength thus stored in the spring under the action of the push piece 7 must be sufficient for the beak 19 to pass over the lift 20 while moving the end 15 of the spring 13.

Generally, the spring 13 is rectangular in cross-section, but could be in alternate versions square, round or of any other shape. Also, the shape viewed in plane of the spring 13 can vary, the important thing being that its free ends cooperate together to achieve the purpose aimed at. The keeping in position of this spring 13 by the central abutment 23 could also be achieved differently, by means of several abutments or other members. What is important is that the spring 13 must be positioned by simple placement without any operation of adjustment or fastening.

The shapes of the housing 4 and of the stem of the push piece 7 can be modified at will without affecting the design and the functioning of the mechanism.

The spring 13 is preferably included within a rectangle and at rest (figure 2), the two sides carrying the free ends of the spring touch this rectangle at one point, while the two other sides touch it at two points. The shape and the exact dimensions of the spring 13 depend in particular upon the strength of functioning desired for the push piece, which must be the closest possible to that of the existing mechanical push pieces.

The material of which the spring 13 is made is steel, for example of the "Durmico" type, currently used in such applications. The dimensions of the rectangle surrounding the spring 13 are in the order of 3.5 mm by 2.5 mm, its thickness and its average length being in the order of several tenths of a millimeter. Despite the very small dimensions of this spring, its reliability is high and it can withstand at least several tenths of thousands of actuations.

It is clear that in one embodiment, one can do away with the central abutment 23 integral with the middle 5a part of the case,

the positioning of the spring being ensured only by the shape of the housing 4 and the abutting of its end 14 against the stem of the pusher piece 7.

Thus, in this embodiment, the mechanism of the push piece or the mechanism actuated by the push piece consists of a single piece, the spring. Whatever may be the manner in which this mechanism is constructed, it only carries one single moving piece, the spring 13.

The mechanism is extremely compact. The fastening of the spring is easy and does not necessitate an accurate positioning. Actually, the spring is simply laid into a recess and maintained by a single central abutment. The distance of travel is defined precisely by the spring itself, i. e. by the coming of the beak 19 in contact with the abutments 16, 17. There is no dead travel, since the ends 14 and 15 of the spring are permanently in contact. As there is no sliding motion but only a very short displacement of the beak 19 with respect to the end 15, the frictions are limited to a strict minimum, as well as the wear and one obtains a lesser actuation force.

This mechanism is thus very simple, cheap, easy and immediate to assemble and requires no adjustment. It can furthermore be mounted on the case of the watch, on the bezel or on the movement of the watch, which makes its use easy for the designer of a model.



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CLAIMS

1. Mechanism for actuating a control member of an electrical or mechanical watch or time piece by means of a push piece (7) which can occupy a first rest position as well as a second pushed position, mechanism constituted by a shaped plan spring in only one part, characterized by the fact that the spring (13) is closed on itself and that one of the ends (14) of the spring (13) is in permanent contact with the stem of the push piece (7) sliding into the watch case (5), by the fact that this end (14) of the spring (13) comprises a beak (19) in permanent contact with the lateral internal face of the other end (15) of the spring (13), internal face which comprises two ends abutments (16,17) as well as a lift (20) separating two recesses (18,19a), and by the fact that the arm of the spring opposite to the one the end of which is carrying the beak (19) is in permanent contact in two points (21,22) with the wall of a housing (4) provided in the watch case (5) and receiving this spring (13).

2. Mechanism according to claim 1, characterized by the fact that the spring (13) is placed in a housing (4) provided in a member (5) of the watch, the movement, the bezel, the middle part of the case, the casing ring or the watch case.

3. Mechanism according to claim 1 or 2, characterized by the fact that at rest state of the spring (13) the beak



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(19) of its first end (14) rests against a first abutment (16) located at the extremity of the other end (15) of the spring (13).

4. Mechanism according to claim 3, characterized by the fact that in active position the beak (19) of the first end (14) of the spring (13) is located in the recess (18) adjacent to the second abutment (17) of the other end (15) of the spring (13) and that when it is released it comes back through its own resiliency into its rest position.

5. Mechanism according to claim 4, characterized by the fact the side of the spring adjacent to the one which is terminated by the beak (19) comprises a central portion presenting the shape of a U extending inwardly of the spring.

6. Mechanism according to one of the preceeding claims, characterized by the fact that it comprises at least one abutment or pin (23) fastened with a member of the watch and extending into the central void of the spring (13).

7. Mechanism according to claim 6, characterized by the fact that the spring (13) enters into contact in two distinct points (24,25) with said abutment or pin (23).

8. Mechanism according to one of the preceeding claims, characterized by the fact that the spring (13) has a rectangular or square cross section.