

MOVABLE SHUTTER FOR A WATCH

Background of the Invention

5 The present invention refers to a movable shutter device, more particularly for a timepiece, according to the preamble of independent claims 1, 2, and 4.

10 Such a device is described in Swiss Patent No. CH-649,434 to the applicant. According to this document, the device comprises two lateral supports which are parallel to the 6:00-12:00 plane and are soldered to the corresponding surfaces of a rectangular middle part of a watch, each of said supports having a closed
15 groove extending around the intersection of said surface of the middle with the internal surface of the support. The shutter itself is formed of tubular elements which are connected to one another while the ends of these elements comprise pins which are guided
20 in said grooves, the shutter thus being displaceable on the crystal. The means of the device allow a relatively flat construction, and it is particularly intended for an upper-range wristwatch.

25 However, this prior art shutter has two types of drawbacks which sensibly reduce its interest.

30 Actually, when the wearer of the watch actuates the shutter by means of the button which is mounted on the first of said tubular elements in order to completely or partially cover or uncover the crystal, the shutter often tends to be jammed or to get stuck, depending on the precision of its adjustment. In any case, due to a premature wear of the ends (above-

mentioned pins 17 in CH-649,434 or rolls fitted thereon) of the tubular elements and of the support grooves, these drawbacks will occur more and more frequently.

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On the other hand, the displacement of the shutter in one direction or another, according to the movements of the wrist, is not controllable unless said shutter is locked: either the pins or rolls slide
10 in the grooves with a lot of play, so that undesired displacements will be frequent until the curtain is jammed; or said play is very small, so that the curtain will not be unduly displaced by the movements of the wrist, but it will be stuck even more quickly,
15 especially if the elements sliding on each other are of gold.

In any case, it is apparent that the function of the cited prior art shutter is unsatisfactory.

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Summary of the Invention

Thus, it is the object of the present invention to eliminate the above-mentioned drawbacks, i.e., on
25 one hand, to obtain a perfect and reliable sliding action of the curtain, so as to satisfy the highest demands of the customers and, on the other hand, correlatively to control said sliding action in such a manner that any undue displacement of the curtain is
30 excluded. Since the shutter device is more particularly intended for an upper range watch, it appears that the search for solutions becomes even more difficult as specific requirements have to be taken into account besides the general demands of miniaturization

(where the implementation of the same means generally involves increasing problems as its dimensions are reduced). In fact, at least two additional difficulties arise: the first one refers to the choice of materials, which cannot be arbitrary since certain rules have to be followed for this type of watch; the second one refers to the esthetic aspect since, while a perfect operation of the device is fundamental, it is equally important not only that its operation does not sacrifice the demands of that aspect but on the contrary, serves the latter while allowing to improve and vary the finishes at the lowest cost.

The object of the invention is attained by the characteristics defined in independent claims 1, 2, and 4, while the means defined in the dependent claims in turn allow to realize the invention according to preferred embodiments.

Brief Description of the Drawings

An embodiment of the device of the invention will now be described as a non-limiting example with reference to the appended drawings, wherein

Fig. 1 shows a perspective view of the watch case provided with the movable shutter device;

Fig. 2 shows a perspective view of the movable shutter;

Fig. 3 shows a cross-section according to the 3:00-9:00 plane of the watch including the movable shutter device;

Fig. 4 shows a front view (of the surface facing the inside of the watch) of a stretcher; and

5 Fig. 5 shows a plan view from above of the middle part with a stretcher.

Detailed Description of the Invention

10 Casing 1 with movable shutter device or supple curtain 2 is composed of a middle 4, a back cover 5 and of a crystal 13, said three elements enclosing a movement 11 to which a winding button 12 is connected, and the device itself comprising two stretchers 3,
15 shutter axles 21 which form the shutter and are interconnected by links 25, as well as bearings 24, a stop device 9, and a protective plate 6 (Figs. 1, 2, and 3).

20 With reference to Figs. 1 and 5, it appears that right-hand and left-hand stretchers 3, both of which are identical, extend beyond the middle part and are fixed thereto by screws 44.

25 Each stretcher 3 has the symmetrical form of an oblong handle with rounded ends (see Fig. 4). A recess 30 is limited by a surface 301 extending in the longitudinal direction and by two surfaces 302 which are perpendicular thereto. Surface 32, which faces
30 the interior of middle part 4, is provided with a guiding groove 33 consisting of a rectilinear portion 34 which is followed on either side by circular portions 35 giving each on recess 30. Finally, each stretcher is provided with two threaded bores 37 which

are disposed symmetrically with respect to the non-represented plane of symmetry, with two retaining holes 38 for the purpose of fixing the stop device discussed hereinafter, and with two blind holes 39 intended to receive the ends of a non-represented lug.

5 Middle part 4 of generally rectangular shape (Figs. 1 and 5) comprises two lateral flanks 41 extending in the direction of the 6:00-12:00 plane and
10 two adjacent grooves 42 (see also Fig. 3) whose width corresponds to the thickness of stretchers 3. Thus, on both sides of the middle part, a stretcher 3 is fitted to the internal surface 421 of flank 41 and into groove 42, the length of recess 30 of the
15 stretcher corresponding to that of groove 42.

The back cover, which is only shown in cross-section in Fig. 3, also has a generally rectangular form and precisely fits under middle part 4 to which
20 it is fixed by means of screws (not shown), the middle being provided on its underside (not referenced) with four bores 45 (Fig. 5).

Protective plate 6 consists of a rectangular
25 plate whose edges are bent at 90° and parallel to the 6:00-12:00 plane, said edges engaging in two corresponding grooves 51 which are milled in the underside of the back cover. Protective plate 6 is fastened in these grooves of back cover 5 by welding or cement-
30 ing.

By this precisely effected modular arrangement, two closed circuits for the guidance of the shutter are obtained which face each other. Each circuit ex-

tends in a plane which is parallel to the 6:00-12:00 plane and, in a way, surrounds the middle, the two circular groove portions 35 of stretchers 3 being followed by a rectilinear groove portion 63 which is opposed and parallel to groove 34 of stretcher 3 and formed, on one hand, by a flat portion 52 of back cover 5, and on the other hand, by a flat portion 61 and a surface 62 (which is perpendicular to flat portion 61) of protective plate 6 (Figs. 1 and 3).

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The supple shutter is composed of juxtaposed shutter axles 21 whose number is of course a function of their diameter and of the dimensions of the casing. Axles 21, which are preferably made of a single piece, comprise a shutter cylinder 211 both ends of which are followed by a connecting axle 212 whose length corresponds to twice the thickness of a connecting link 25 (see Fig. 3), and by a bearing axle 213 whose length corresponds to the thickness of a roller 24. Axles 21 are assembled on both sides by means of two adjacent rows of connecting links 25 which are fitted on connecting axles 212 and mutually offset in the present example by one step: the internal row of links 25 allows to form a succession of shutter axle pairs while the external row allows, on account of said offset arrangement, to connect said pairs to one another. As appears in Fig. 2, the two end portions of the external row of links are each completed by a half-link consisting of a ring 26.

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Finally, an independent roller 24 of a very hard material having a very high self-lubrifying capacity is mounted on each one of the two bearing axles. According to the described embodiment, rollers 24 are

formed of rubies, whose properties fulfill these requirements.

5 The shutter is thus displaceable above crystal 13
(see Fig. 1), in such a manner as to cover the latter
or to leave it completely or partially apparent, as
desired, the actuation being facilitated by a shutter
button 27. The maximum displacement is limited by a
known stop device 9 which is formed of a series of
10 stop axles which are similar or identical to shutter
axles 21, said stop device comprising an opening abut-
ment 202 (indicated in Fig. 1, but invisible since it
is located on the back cover side) and a closing abut-
ment 201, located on the dial side, which may
15 cooperate with button 27 on the first shutter axle of
the movable shutter in order to allow to lock the lat-
ter in the closed position. Stop device 9 is con-
nected to the stretchers by known means which are not
described, e.g. by engagement of the ends of the stop
20 axles in blind holes 38 of stretchers 3 (Fig. 3).

 The shutter is maintained in any position as
desired by the wearer, regardless of the movements of
the wrist, by means of a brake device 7 (Fig. 2). The
25 latter comprises a tubular element 72 having the same
length as cylinders 211, which completely encloses an
elastic member 73 (in the present example a worm
spring) and partly encloses two brake axles 71 which
are disposed on either side of said spring 73. Each
30 brake axle 71 comprises a sliding axle 711 whose
diameter corresponds to the internal diameter of tube
72, said sliding axles being followed on one side by a
spring axle 714 engaging in spring 73, the latter
resting on the shoulder which is formed by the dif-

ference in diameter of axles 711 and 714 and, on the other side, by a connecting axle 712 and a bearing axle 713 which are equivalent to connecting axles 212 and to bearing axles 213, respectively. This device
5 is preferably mounted in the front section of the shutter, i.e. near the shutter axle which is provided with button 27. It is understood that elastic member 73 permanently acts upon the two brake axles 711, the latter in turn acting upon ruby rollers 24 A which in
10 this manner press against the surfaces of grooves 33 in stretchers 3 which are parallel to the 6:00-12:00 plane. Of course, the characteristics of elastic member 73 will be selected and defined in function of the desired braking force resulting from said pressure.

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Finally, protective plate 6 may be designed as a grating or perforated, in such a manner as to reproduce a logo or a denomination, e.g. the name of the manufacturer or any other sign. It is easily conceivable that the view of the shutter, i.e. of
20 cylinders 211 (which may be adorned with precious stones, as the case may be) passing behind the grating or the perforation produces an esthetic effect of the most refined sort.

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The advantages of the device of the invention, as compared to the cited prior art, are easily established:

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First, in said prior art shutter, the supports provided with the closed circuit groove were welded onto the middle part. In addition to the imprecision of the welding, its high temperature had the effect of softening the material and modifying the geometry of

the parts involving, as mentioned in the introduction,
the risk of wear of the shutter, or that of getting
stuck or jammed. Conversely, according to the inven-
tion, the supports in the form of stretchers are
5 mounted by screwing. Hence, in the first place, they
have a higher hardness, whereby the risk of wear is
considerably reduced and the precision is increased,
and secondly, the access of the mount is simplified
due to the disassembling capacity, and finally, the fin-
10 ish can be more elaborate.

Further, the ends of the curtain which are in
contact with the grooves are no longer made of gold.
In fact, the cylindrical rolls attached to the pins
15 were quickly deformed, so that the operation was less
and less satisfactory and more and more irritating.
Thanks to the ruby rollers - rubies being character-
ized by a great gliding capacity and a high wear
resistance - the quality of the sliding action is op-
20 timum and remains constant.

Finally, the arrangement of a brake device, which
is all the more necessary the better the quality of
the sliding action, allows to effectively ensure that
25 the curtain is maintained in any desired position.
Besides, this device is integrated in the shutter, so
that it is visible in no way and does not disturb the
appearance of the whole.



Claims

1. A movable shutter device, more particularly
for a timepiece having a middle part (4) provided with
5 a crystal (13) and a back cover (5), the device comprising a protective plate (6), two lateral supports
which extend in parallel to the 6:00-12:00 plane and
are provided with a groove which is milled in their
internal surface facing the crystal, and cylindrical
10 shutter axles whose end portions are guided on either
side in said supporting grooves and connected to each
other on both sides by means of two adjacent rows of
connecting links (25) which are arranged on said
axles, said two rows, i.e. the internal one and the
15 external one, being offset with respect to each other
at least one step, and each link (25) uniting at least
two adjacent shutter axles; the shutter formed by said
axles being displaceable above the crystal due to said
guiding of the axle ends, on one hand, in such a man-
20 ner as to be able to cover said crystal or to leave it
completely or partially visible and, on the other
hand, slidable between the back cover (5) and the pro-
tective plate (6), the maximum displacement being
limited by a stop device (20) consisting of cylinders
25 which are similar or identical to the shutter axles,
said stop device (20) comprising an opening abutment
(202) and a closing abutment (201), the latter being
capable of cooperating with a shutter button (27)
which is arranged on the first cylinder at the front
30 of the movable shutter and allows to lock the latter
in the closed position, wherein said supports are in
the form of stretchers (3), said middle part comprises
two lateral flanks (41) which are parallel to the
6:00-12:00 plane, as well as two seats (42) extending



in the same direction, said stretchers being mounted onto the top of the middle part in said seats and fastened to the flanks of said middle by fastening means (44), and wherein the guiding groove (33) milled in each stretcher is open and comprises a rectilinear portion (34) which is followed on both sides by a respective circular portion (35) which gives on a groove (63) whose profile is at least analogous to the rectilinear portion (34) of said groove (33), said profile being formed, on one hand, by the surfaces (61, 62) of the protective plate and, on the other hand, by a flat portion (52) of the underside of the middle part which is opposed and parallel to the surface (61) of the protective plate.

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2. A movable shutter device, more particularly for a timepiece having a middle part (4) provided with a crystal (13) and a back cover (5), the device comprising a protective plate (6), two lateral supports which extend in parallel to the 6:00-12:00 plane and are provided with a groove which is milled in their internal surface facing the crystal, and cylindrical shutter axles whose end portions are guided on either side in said supporting grooves and connected to each other on both sides by means of two adjacent rows of connecting links (25) which are arranged on said axles, said two rows, i.e. the internal one and the external one, being offset with respect to each other at least one step, and each link (25) uniting at least two adjacent shutter axles; the shutter formed by said axles being displaceable above the crystal due to said guiding of the axle ends, on one hand, in such a manner as to be able to cover said crystal or to leave it completely or partially visible and, on the other

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hand, slidable between the back cover (5) and the protective plate (6), the maximum displacement being limited by a stop device (20) consisting of cylinders which are similar or identical to the shutter axles, said stop device (20) comprising an opening abutment (202) and a closing abutment (201), the latter being capable of cooperating with a shutter button (27) which is arranged on the first cylinder at the front of the movable shutter and allows to lock the latter in the closed position, wherein each one of said shutter axles (21) is formed of a cylinder (211) which is followed on either side by a connecting axle (212) and by a bearing axle (213) on which an independent roller (24) of a noble material having a very high hardness and a very high self-lubrifying capacity is arranged.

3. The movable shutter device of claim 2, wherein said rollers (24) are made of rubies.

4. A movable shutter device, more particularly for a timepiece having a middle part (4) provided with a crystal (13) and a back cover (5), the device comprising a protective plate (6), two lateral supports which extend in parallel to the 6:00-12:00 plane and are provided with a groove which is milled in their internal surface facing the crystal, and cylindrical shutter axles whose end portions are guided on either side in said supporting grooves and connected to each other on both sides by means of two adjacent rows of connecting links (25) which are arranged on said axles, said two rows, i.e. the internal one and the external one, being offset with respect to each other at least one step, and each link (25) uniting at least two adjacent shutter axles; the shutter formed by said



axles being displaceable above the crystal due to said guiding of the axle ends, on one hand, in such a manner as to be able to cover said crystal or to leave it completely or partially visible and, on the other hand, slidable between the back cover (5) and the protective plate (6), the maximum displacement being limited by a stop device (20) consisting of cylinders which are similar or identical to the shutter axles, said stop device (20) comprising an opening abutment (202) and a closing abutment (201), the latter being capable of cooperating with a shutter button (27) which is arranged on the first cylinder at the front of the movable shutter and allows to lock the latter in the closed position, wherein a brake device (7) is provided which is accommodated in a hollow shutter axle (72).

5. The movable shutter device of claim 4, wherein said hollow cylinder (72) is preferably provided at the front of the shutter, near the button (27).

6. The movable shutter device of claim 4 or 5, wherein said brake device comprises an elastic member (73) which is accommodated in the center portion of said hollow cylinder and acts upon two brake axles (71), the latter having a shoulder and acting in turn on rubies (24 A) in such a manner as to press against the surfaces of the grooves (33) in the stretchers (3) which are parallel to the 6:00-12:00 plane.

7. The movable shutter device of claim 6, wherein the characteristics of said elastic member can



be chosen in function of the desired braking force resulting from said pressure.

5 8. The movable shutter device of any one of claims 1 to 7, wherein each one of said shutter axles (21) consisting of a shutter cylinder and of two following connecting and bearing axles is preferably made of a single piece.

10 9. The movable shutter device of any one of claims 1 to 8, wherein said middle part (4) and the back cover (5) are rectangular or square in shape, and wherein said two elements are connected to each other by fastening means.

15 10. The movable shutter device of any one of claims 1 to 9, wherein said connecting links (25) of each row connect the shutter cylinders two by two on each side, each link having the form of an "eight",
20 and wherein the internal row is offset one step with respect to the external row, the first and the last link, preferably of the external row, being a ring (26).

25 11. The movable shutter device of any one of claims 1 to 10, wherein the elements forming said stop device (20) are arranged between the mutually opposed circular groove portions (35) of (the) stretchers.

30 12. The movable shutter device of any one of claims 1 to 11, wherein said shutter button (27) is adapted to snap in with said closing abutment.



13. The movable shutter device of any one of claims 1 to 12, wherein said protective plate (6) is perforated or in the form of a grid.

5 14. The movable shutter device of any one of claims 1 to 13, wherein all component parts are made of noble materials.

10 15. A timepiece, more particularly a wristwatch, having the characteristics of any one of claims 1 to 14.

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