

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) TIMEPIECE MOVEMENT

(71) We, KABUSHIKI KAISHA SUWA SEIKOSHA, a corporation of Japan of 3-4, 4-chome, Ginza, Chuo-ku, Tokyo, Japan, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a timepiece movement.

According to the present invention, there is provided a timepiece movement having an axially movable stem engageable with a winding pinion, a winding mechanism including an adjustably positionable wheel which may be moved at an oblique angle to the axis of the stem so as to bring the adjustably positionable wheel into and out of engagement with the winding pinion, and resilient means urging the adjustably positionable wheel towards engagement with the winding pinion, the stem being axially movable into and out of a predetermined position in which the winding pinion drivingly engages the adjustably positionable wheel.

The stem preferably has a splined part which is engageable with and disengageable from the winding pinion, the splined part drivingly engaging the winding pinion when the stem is in the said predetermined position.

The winding pinion may be secured to a calendar changing wheel which is engageable with and disengageable from a calendar wheel on axial movement of the stem, the wheel being movable into a second position in which the winding pinion is out of driving engagement with the adjustably positionable wheel and in which the calendar changing wheel drivingly engages the calendar wheel.

The stem may have a time setting pinion secured thereon, the stem being movable into and out of a further position in which the time setting pinion drivingly engages a time setting mechanism, the stem, when in the

further position, having its splined part out of engagement with the winding pinion.

Means may be provided for releasably retaining the stem in any said position.

Resilient means may be provided for urging the winding pinion towards driving engagement with the splined part.

The winding mechanism may comprise a ratchet wheel which is windable by an automatic device, such winding of the ratchet wheel causing the adjustably positionable wheel to be out of driving engagement with the winding pinion.

The invention also comprises a timepiece provided with a timepiece movement as set forth above.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:—

Figure 1 is a broken-away plan view of a calendar wrist watch movement according to the present invention, the parts of the movement being shown in a first position thereof,

Figures 2 to 4 are plan views of the movement of Figure 1 with the parts thereof in respectively different positions, and

Figures 5 to 8 are broken-away sectional views respectively corresponding to the plan views of Figures 1 to 4 and showing the parts thereof in the said respectively different positions.

Terms such as "left" and "right" as used in the description below, are to be understood to refer to directions as seen in the drawings.

Referring to the drawings, a calendar wrist watch has a watch movement which includes an axially movable stem 11 which is movable into and out of a first, or winding position (shown in Figures 1 and 5) a second or date changing position (shown in Figures 2 and 6), and a third, or time setting, position (shown in Figures 3 and 7), by manually pushing the stem 11 inwardly of the watch

[Price 25p]

or pulling it outwardly thereof. The stem 11 is provided with three reduced diameter portions 12, 13, 14, the reduced diameter portions 12, 13 being separated by a projecting portion 15, and the reduced diameter portions 13, 14 being separated by a projecting portion 16 which is of larger diameter than the projecting portion 15. A spring member 17 has an inwardly turned flange 18 which is shown in Figures 1 and 5 as engaging the reduced diameter portion 12. When, however, the stem 11 is pulled outwardly, the flange 18 rides over the projecting portion 15 so as first to engage with the reduced diameter portion 13 and then, on further outward pulling of the stem 11, rides over the projecting portion 16 to engage with the reduced diameter portion 14. The engagement of the flange 18 with the reduced diameter portions 12, 13, 14 releasably retains the stem 11 in the first, second and third axial positions respectively of the stem 11.

The stem 11 has an axially splined part 21 which is engageable with and disengageable from axial splines (not shown) of an internally splined winding pinion 22. When the parts are in the first position shown in Figures 1 and 5, the splined part 21 of the stem 11 is in driving engagement with the winding pinion 22.

The winding pinion 22 is engageable with and disengageable from an adjustably positionable wheel 23 which forms part of a winding mechanism of the watch movement. The adjustably positionable wheel 23 is mounted on a pin 24 which is slidably mounted in an aperture 25 in a bridge 26 and in an aperture 27 in a bridge 28, the bridges 26, 28 being disposed on opposite sides of and closely adjacent to the adjustably positionable wheel 23. The apertures 25, 27 are aligned, similarly shaped, elongated recesses having their centre lines at an oblique angle to the axis of the stem 11 so that the adjustably positionable wheel 23 is movable both axially and radially with respect to the stem 11 and thus into and out of a position in which it is in engagement with the driving pinion 22. A spring 31 urges the adjustably positionable wheel 23 towards engagement with the winding pinion 22.

The said winding mechanism comprises a ratchet wheel 32 which engages a wheel of a winding gear train (not shown). The arrangement is such that when the stem 11 is in the first position shown in Figures 1 and 5, clockwise rotation of the stem 11 by the hand of the user causes appropriate rotation of the ratchet wheel 32 so as to effect winding, while counterclockwise rotation of the stem 11 by the hand of the user is not transmitted to the winding gear train.

The winding pinion 22 is mounted at one

side of and is secured to a calendar changing wheel 33 which, on axial movement of the stem 11, is engageable with and disengageable from a calendar wheel 34. When the stem 11 is disposed in the first position shown in Figures 1 and 5, the calendar changing wheel 33 is disengaged from the calendar wheel 34, whereas when the parts are in the second position shown in Figures 2 and 6, the calendar changing wheel 33 drivingly engages the calendar wheel 34. The calendar wheel 34 may be a date, day, or month wheel.

The stem 11 has a time setting pinion 35 secured thereon, the stem 11 being movable into and out of the said third position in which the time setting pinion 35 drivingly engages a crown gear 36 of a time setting wheel 40 which is rotatably mounted on a plate 41.

The plate 41 has an aperture therein, one surface 42 of which is engageable with the calendar changing wheel 33 on appropriate positioning of the stem 11.

A spring 43 engages the winding pinion 22 so as to urge the latter, together with the calendar changing wheel 33, towards the right as seen in Figure 5 and thus towards a position in which the winding pinion 22 drivingly engages the splined part 21.

When the stem 11 is pushed inwardly as far as it will go into the first, or winding, position shown in Figures 1 and 5, so that the flange 18 engages with the reduced diameter portion 12, the splined part 21 drivingly engages the driving pinion 22, and the adjustably positionable wheel 23 is in engagement both with the driving pinion 22 and with the ratchet wheel 32. Thus clockwise rotation of the stem 11 will effect winding, the ratchet wheel 32 failing to transmit counterclockwise rotation of the stem 11. Counterclockwise rotation of the stem 11, in fact, causes the wheel 23 to be displaced within the apertures 25, 27 so that it is disengaged from the ratchet wheel 32.

In the said first position, however, the calendar changing wheel 33 is out of engagement with the calendar wheel 34 so that rotation of the stem 11 is not transmitted to the calendar wheel 34. Moreover, in the said first position, the time setting pinion 35 is out of engagement with the crown wheel 36 so that rotation of the stem 11 does not transmit rotation to the time setting mechanism.

If the watch has an automatic winding device (not shown) which effects winding of the ratchet wheel 32, the arrangement is such that the adjustably positionable wheel 23 is moved out of driving engagement with the winding pinion 22 whenever the ratchet wheel 32 is being wound automatically. Thus rotation of the ratchet wheel 32 is not transmitted to the stem 11.

In the second, or date changing, position of the stem 11 which is shown in Figures 2 and 6, the stem 11 is positioned such that the flange 18 engages in the reduced diameter portion 13. In this position of the parts, the splined part 21 is in driving engagement with the driving pinion 22, and the calendar changing wheel 33 is in driving engagement with the calendar wheel 34. However, calendar changing is not accompanied either by winding or by time setting, since the driving pinion 22 is axially removed from the adjustably positionable wheel 23, and since the time setting pinion 35 is axially removed from the crown wheel 36. Thus rotation of the stem 11 in either angular sense will effect corresponding rotation of the calendar wheel 34 only.

In the third, or time setting, position which is shown in Figures 3 and 7, the flange 18 is disposed in the reduced diameter portion 14, while the time setting pinion 35 is in driving engagement with the crown wheel 36 such that rotation of the stem 11 clockwise or counterclockwise will result in corresponding rotation of the time setting wheel 40, movement of the time setting wheel 40 being transmitted to a minute gear train (not shown).

In the said third position, however, the surface 42 of the plate 41 engages the calendar changing wheel 33 so as to prevent the latter, together with the driving pinion 22, from being moved towards the right and consequently removes the driving pinion 22 from engagement with the splined part 21. Thus, although at this time the calendar changing wheel 33 continues to engage the calendar wheel 34, rotation of the stem 11 does not effect movement of the calendar wheel 34. Winding is also not effected in the said third position both because of the lack of engagement between the splined part 21 and the driving pinion 22, and because the latter is also out of engagement at that time with the adjustably positionable wheel 23.

When the stem 11 is once again pushed inwardly, i.e. towards the left, so as to bring the flange 18 into engagement with the reduced diameter portion 12, if at this time the splined part 21 is not appropriately aligned with the internal splines of the driving pinion 22, the movement of the stem 11 towards the left will cause the driving pinion 22 to push the adjustably positionable wheel 23 towards the left against the action of the spring 31. This is illustrated in Figures 4 and 8. Thus, the adjustable positioning of the wheel 23, together with the use of the spring 31, ensures that no damage is done to the parts at this time. Appropriate rotation, however, of the stem 11 permits the splined part 21 to engage with the internal splines of the driving pinion 22 so that the parts can then be located in the

first position shown in Figures 1 and 5.

As will be appreciated, the watch movement shown in the accompanying drawings enables the functions of winding, time setting, and date changing to be effected by means of a comparatively simple mechanism which employs relatively few parts and in which the risk of breakage when winding is to be effected is avoided.

WHAT WE CLAIM IS:—

1. A timepiece movement having an axially movable stem engageable with a winding pinion, a winding mechanism including an adjustably positionable wheel which may be moved at an oblique angle to the axis of the stem so as to bring the adjustably positionable wheel into and out of engagement with the winding pinion, and resilient means urging the adjustably positionable wheel towards engagement with the winding pinion, the stem being axially movable into and out of a predetermined position in which the winding pinion drivingly engages the adjustably positionable wheel.

2. A timepiece movement as claimed in claim 1 in which the stem has a splined part which is engageable with and disengageable from the winding pinion, the splined part drivingly engaging the winding pinion when the stem is in the said predetermined position.

3. A timepiece movement as claimed in claim 1 or 2 in which the winding pinion is secured to a calendar changing wheel which is engageable with and disengageable from a calendar wheel on axial movement of the stem, the stem being movable into a second position in which the winding pinion is out of driving engagement with the adjustably positionable wheel and in which the calendar changing wheel drivingly engages the calendar wheel.

4. A timepiece movement as claimed in claim 2 in which the stem has a time setting pinion secured thereon, the stem being movable into and out of a further position in which the time setting pinion drivingly engages a time setting mechanism, the stem, when in the further position, having its splined part out of engagement with the winding pinion.

5. A timepiece movement as claimed in any preceding claim comprising means for releasably retaining the stem in any said position.

6. A timepiece movement as claimed in claim 2 comprising resilient means for urging the winding pinion towards driving engagement with the splined part.

7. A timepiece movement as claimed in any preceding claim in which the winding mechanism comprises a ratchet wheel which is windable by an automatic device, such winding of the ratchet wheel causing the

In the second, or date changing, position of the stem 11 which is shown in Figures 2 and 6, the stem 11 is positioned such that the flange 18 engages in the reduced diameter portion 13. In this position of the parts, the splined part 21 is in driving engagement with the driving pinion 22, and the calendar changing wheel 33 is in driving engagement with the calendar wheel 34. However, calendar changing is not accompanied either by winding or by time setting, since the driving pinion 22 is axially removed from the adjustably positionable wheel 23, and since the time setting pinion 35 is axially removed from the crown wheel 36. Thus rotation of the stem 11 in either angular sense will effect corresponding rotation of the calendar wheel 34 only.

In the third, or time setting, position which is shown in Figures 3 and 7, the flange 18 is disposed in the reduced diameter portion 14, while the time setting pinion 35 is in driving engagement with the crown wheel 36 such that rotation of the stem 11 clockwise or counterclockwise will result in corresponding rotation of the time setting wheel 40, movement of the time setting wheel 40 being transmitted to a minute gear train (not shown).

In the said third position, however, the surface 42 of the plate 41 engages the calendar changing wheel 33 so as to prevent the latter, together with the driving pinion 22, from being moved towards the right and consequently removes the driving pinion 22 from engagement with the splined part 21. Thus, although at this time the calendar changing wheel 33 continues to engage the calendar wheel 34, rotation of the stem 11 does not effect movement of the calendar wheel 34. Winding is also not effected in the said third position both because of the lack of engagement between the splined part 21 and the driving pinion 22, and because the latter is also out of engagement at that time with the adjustably positionable wheel 23.

When the stem 11 is once again pushed inwardly, i.e. towards the left, so as to bring the flange 18 into engagement with the reduced diameter portion 12, if at this time the splined part 21 is not appropriately aligned with the internal splines of the driving pinion 22, the movement of the stem 11 towards the left will cause the driving pinion 22 to push the adjustably positionable wheel 23 towards the left against the action of the spring 31. This is illustrated in Figures 4 and 8. Thus, the adjustable positioning of the wheel 23, together with the use of the spring 31, ensures that no damage is done to the parts at this time. Appropriate rotation, however, of the stem 11 permits the splined part 21 to engage with the internal splines of the driving pinion 22 so that the parts can then be located in the

first position shown in Figures 1 and 5.

As will be appreciated, the watch movement shown in the accompanying drawings enables the functions of winding, time setting, and date changing to be effected by means of a comparatively simple mechanism which employs relatively few parts and in which the risk of breakage when winding is to be effected is avoided.

WHAT WE CLAIM IS:—

1. A timepiece movement having an axially movable stem engageable with a winding pinion, a winding mechanism including an adjustably positionable wheel which may be moved at an oblique angle to the axis of the stem so as to bring the adjustably positionable wheel into and out of engagement with the winding pinion, and resilient means urging the adjustably positionable wheel towards engagement with the winding pinion, the stem being axially movable into and out of a predetermined position in which the winding pinion drivingly engages the adjustably positionable wheel.

2. A timepiece movement as claimed in claim 1 in which the stem has a splined part which is engageable with and disengageable from the winding pinion, the splined part drivingly engaging the winding pinion when the stem is in the said predetermined position.

3. A timepiece movement as claimed in claim 1 or 2 in which the winding pinion is secured to a calendar changing wheel which is engageable with and disengageable from a calendar wheel on axial movement of the stem, the stem being movable into a second position in which the winding pinion is out of driving engagement with the adjustably positionable wheel and in which the calendar changing wheel drivingly engages the calendar wheel.

4. A timepiece movement as claimed in claim 2 in which the stem has a time setting pinion secured thereon, the stem being movable into and out of a further position in which the time setting pinion drivingly engages a time setting mechanism, the stem, when in the further position, having its splined part out of engagement with the winding pinion.

5. A timepiece movement as claimed in any preceding claim comprising means for releasably retaining the stem in any said position.

6. A timepiece movement as claimed in claim 2 comprising resilient means for urging the winding pinion towards driving engagement with the splined part.

7. A timepiece movement as claimed in any preceding claim in which the winding mechanism comprises a ratchet wheel which is windable by an automatic device, such winding of the ratchet wheel causing the



adjustably positionable wheel to be out of driving engagement with the winding pinion.

8. A timepiece movement substantially as hereinbefore described with reference to 5 and as shown in the accompanying drawings.

9. A timepiece provided with a timepiece movement as claimed in any preceding claim.

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