

PATENT SPECIFICATION

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(54) TIMEPIECE MOVEMENT

(71) We, KABUSHIKI KAISHA SUWA SEIKOSHA, a Japanese company 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 e.g. for a wristwatch.

Timepiece movements are known having two hour hands which may respectively be set to indicate the time prevailing in two different time zones, the term "time zones" being used in this specification in a broad sense as including, inter alia, different localities one of which observes "daylight saving" or "summertime" while the other does not. Watches of this kind are known generally as "world time watches" and as a result of the developments of the aeroplane, and by reason of the popularity of foreign tours, watches of this kind have become increasingly common.

Such watches, however, have been provided in the past with two winding crowns for correcting the two different time indications, and this has meant that they have had to be made of a special construction differing substantially from that of a conventional watch.

According to the present invention, there is provided a timepiece movement having a calendar member, an hour hand, a minute hand, and a rotatable stem which is movable axially into and out of a first position in which the hour hand and minute hand are simultaneously corrected on predetermined rotation of the stem, the stem also being movable axially into and out of a second position in which rotation of the stem in one angular sense adjusts the hour hand by a predetermined step with respect to the minute hand and in which rotation of the stem in the opposite angular sense adjusts the calendar member.

The stem is also preferably movable axially into and out of a third position in which the movement may be wound.

Drive means are preferably provided for driving the minute hand, and a slipping clutch device by means of which the said hour hand is drivingly connected to the drive means.

The said hour hand may be a second hour hand of a movement which comprises first and second hour hands for respectively indicating the time prevailing in two different time zones, the first hour hand being rotatable at all times in unison with the minute hand.

Thus the present invention reduces the number of necessary component parts of the timepiece movement.

The first hour hand may, for example, be set to indicate the time in one's own country or in one's own town, while the second hour hand may be set to indicate the time in some other locality.

The first and second hour hands may have adjacent relatively rotatable portions, one of the said portions having twelve or twenty-four equi-angularly spaced apart apertures therein, and the other of said portions having at least one pin which is moved into and out of each said aperture on predetermined operation of the stem, resilient means being provided for urging the or each said pin into a said aperture.

Thus the said portion of the second hour hand may mesh with a wheel which is rotatable by operation of the said stem.

The invention also comprises a timepiece, such as a wristwatch, 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 timepiece movement according to the present invention,

Figure 2 is a broken-away plan view of a

part of the movement shown in Figure 1, and

Figure 3 is a broken-away cross-sectional view of structure shown in Figure 2.

5 Referring to the drawings, a wrist watch has a case 10 within which is mounted a movement which comprises a first hour hand 11, and a second hour hand 12 which are movable (by means described below) over a common dial 13. The first hour hand 11 (together with a minute hand and a seconds hand which are not shown in the drawings) is provided for indicating the time in a given time zone such as one's own home town, while the second hour hand 12 is provided for indicating the time in a different time zone.

10 The first hour hand 11 is secured to one end of a tubular member 14 having an integral flange or wheel 15 at its end remote from the first hour hand 11. The flange 15 is provided with external gear teeth (not shown) which mesh with a minute wheel train (not shown) so that the first hour hand 11 (together with the said minute and seconds hands) is positively driven by the driving mechanism (not shown) of the watch. The tubular member 14 is mounted concentrically, and is rotatable about, a cannon pinion 16.

20 The second hour hand 12 is secured to one end of a tubular member 20 which is provided, at its end remote from the second hour hand 12, with a flange or wheel 21 which is disposed immediately adjacent to and above the flange 15. The tubular member 20 is mounted concentrically about, and is rotatable with respect to, the tubular member 14.

30 The flanges 15, 21 are mounted inwardly of the dial 13. An annular dished spring 22 has a radially inner portion which engages the upper surface of the flange 21 and a radially outer portion which engages the lower surface of the dial 13. The flange 21 is thus resiliently urged towards engagement with the flange 15.

35 The flange 21 is provided with one or more recesses 23 in its lower surface, and is preferably provided, as shown, with three such recesses which are spaced from each other by intervals of 120°. Wedged in each of the recesses 23 is a pin 24 having a conical surface 25 which projects beneath the lower surface of the flange 21.

40 The conical surface 25 of each pin 24 is adapted to enter any one of twelve (or if desired twenty-four) equi-angularly spaced apart apertures 26 in the flange 15. The pins 24 are normally urged by the spring 22 into respective apertures 26 and, when so located, any rotation transmitted to the flange 15 (and hence the first hour hand 11) by the said minute wheel train will be transmitted to the flange 21 and hence to the

second hour hand 12. However, the flange 21 is provided with external gear teeth which mesh with those of a correction transmitting wheel 27. Thus when the correction transmitting wheel 27 is rotated, by means described below, the flange 21, and hence the second hour hand 12, will be rotated about the tubular member 14 which will be held stationary by the said minute wheel train. Thus by rotating the correction transmitting wheel 27 sufficiently to move the pins 24 to their next adjacent positions, the time indicated by the second hour hand 12 will be adjusted with respect to that indicated by the first hour hand 11 (which will not be moved at all) either by one hour, it twelve apertures 26 are provided, or by half an hour, if twenty-four apertures 26 are provided.

70 During such rotation of the tubular member 20, the conical shape of the surfaces 25 will enable the pins 24 to be forced out of the apertures 26 in which they were located and to enter into the next adjacent aperture. Such movement will thus cause relative axial movement between the tubular members 14, 20, such relative axial movement being permitted by the spring 22.

75 Thus the pins 24 and apertures 26 constitute a slipping clutch device which normally ensures that the drive which is positively applied from the driving mechanism of the watch to the first tubular member 14 is also transmitted to the second tubular member 20 and hence to the second hour hand 12, but which permits the second hour hand 12 to be adjusted by any whole number of hour or thirty-minute steps with respect to the first hour hand 11 without affecting the time indicated by the latter. A stepwise adjustment of this kind is described and claimed in our Patent No. 1,330,261.

80 The watch is provided, externally of the case 10, with a crown 29 provided at the outer end of a single stem 30. The stem 30 is rotatable both clockwise and counterclockwise and is axially movable into and out of a radially outer position, an intermediate position, and a radially inner position. In the radially outer position (not shown), rotation of the stem 30 in either angular sense will effect (by means not shown) corresponding adjustment of the said seconds and minute hands and of the first hour hand 11, and will also effect, via the slipping clutch device constituted by the parts 24, 26, similar adjustment of the second hour hand 12.

85 When the stem 30 is disposed in its said intermediate position, which is that shown in Figure 1, clockwise rotation of the stem 30 will effect adjustment of an annular calendar wheel 31 such for example, as a date indicator. Counterclockwise rotation of the stem 30 when in the said intermediate

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position, will, however, as described below, effect rotation of the correction transmitting wheel 27 and will thus cause the second hour hand 12 to be adjusted without corresponding adjustment of the first hour hand 11 and of the said minute and seconds hands.

When the stem 30 is in the said inner position, clockwise rotation of the stem 30 will effect winding of a mainspring (not shown) of the watch movement.

The stem 30 has a recess 32 in which is located an arm 33 of a setting lever 34, the latter being pivoted about a pivot 35. The setting lever 34 engages a setting wheel lever 36 which is pivoted at 37.

A spring 38 is provided to urge the setting wheel lever 36 to rotate clockwise, and thus into engagement with the setting lever 34.

The setting wheel lever 36 carries a setting wheel 40 which meshes with a clutch wheel 41 mounted on the stem 30. The setting wheel 40 also meshes with a correcting wheel 42 which is capable of being moved into mesh with internal teeth 43 of the calendar wheel 31, and also into mesh with the correction transmitting wheel 27. The correcting wheel 42 is provided with a spindle 44 which is freely movable in a slot 45 in the setting wheel lever 36.

The arrangement is such that when the stem 30 is disposed in the said intermediate position, the clutch wheel 41 will engage a squared part 46 of the stem 30 so as to be driven thereby on rotation of the stem 30. Thus rotation of the stem 30, when in the intermediate position, will drive the setting wheel 40 and hence the correcting wheel 42. Since the spindle 44 of the correcting wheel 42 is freely movable in the slot 45, clockwise rotation of the setting wheel 40 will cause the correcting wheel 42 to be driven radially inwardly to mesh with the correction transmitting wheel 27. Consequently when the stem 30 is in the intermediate position and the stem 30 is rotated counterclockwise, the correcting wheel 42 engages the correction transmitting wheel 27 and thus effects adjustment of the second hour hand 12 with respect to the first hour hand 11.

However, if the stem 30 is rotated clockwise, the setting wheel 40 will be rotated counterclockwise and this will force the correcting wheel 42 to move into engagement with the teeth 43 of the calendar wheel 31 so as to effect adjustment of the latter.

Since the watch shown in the drawings involves the use of only one winding crown or stem, a smart looking watch may be made whose design allows for considerable variation and also involves relatively few parts. Moreover, since water can often get into a watch along the stem, the provision of only a single stem improves the degree to

which the watch can be made waterproof.

In the case of a high precision watch, such as a quartz crystal watch, the wearer has only to pull the stem from the inner position to the intermediate position in order to adjust the second hour hand when travelling abroad. Since, in such a high precision watch, it will rarely be necessary to correct the time indicated by the first hour hand and by the minute and second hands, a stronger spring resistance may be provided in respect of moving the stem from the intermediate to the outer position than in moving the stem from the inner to the intermediate position. Thus the movement of the stem from the intermediate to the outer position can be made twice or three times as difficult as the movement of the stem from the inner to the intermediate position.

If the watch should become slightly inaccurate the simplest way to adjust the seconds hand to the exact second required is to stop the balance wheel (not shown) or the minute wheel train (by means not shown). Correction of the seconds hand will then also correct both the first hour hand and the second hour hand. Thus when the user goes to a district where the time differs from his own, the second hour hand may be put to the correct time without stopping the seconds hand, and the watch will therefore read the absolutely correct time.

WHAT WE CLAIM IS:—

1. A timepiece movement having a calendar member, an hour hand, a minute hand, and a rotatable stem which is movable axially into and out of a first position in which the hour hand and minute hand are simultaneously corrected on predetermined rotation of the stem, the stem also being movable axially into and out of a second position in which rotation of the stem in one angular sense adjusts the hour hand by a predetermined step with respect to the minute hand and in which rotation of the stem in the opposite angular sense adjusts the calendar member.

2. A timepiece movement as claimed in claim 1 in which the stem is movable axially into and out of a third position in which the movement may be wound.

3. A timepiece movement as claimed in claim 1 comprising drive means for driving the minute hand, and a slipping clutch device by means of which the said hour hand is drivingly connected to the drive means.

4. A timepiece movement as claimed in any preceding claim in which the said hour hand is a second hour hand of a movement which comprises first and second hour hands for respectively indicating the time prevailing in two different time zones, the first hour hand being rotatable at all times in unison with the minute hand.

position, will, however, as described below, effect rotation of the correction transmitting wheel 27 and will thus cause the second hour hand 12 to be adjusted without corresponding adjustment of the first hour hand 11 and of the said minute and seconds hands.

When the stem 30 is in the said inner position, clockwise rotation of the stem 30 will effect winding of a mainspring (not shown) of the watch movement.

The stem 30 has a recess 32 in which is located an arm 33 of a setting lever 34, the latter being pivoted about a pivot 35. The setting lever 34 engages a setting wheel lever 36 which is pivoted at 37.

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The arrangement is such that when the stem 30 is disposed in the said intermediate position, the clutch wheel 41 will engage a squared part 46 of the stem 30 so as to be driven thereby on rotation of the stem 30. Thus rotation of the stem 30, when in the intermediate position, will drive the setting wheel 40 and hence the correcting wheel 42. Since the spindle 44 of the correcting wheel 42 is freely movable in the slot 45, clockwise rotation of the setting wheel 40 will cause the correcting wheel 42 to be driven radially inwardly to mesh with the correction transmitting wheel 27. Consequently when the stem 30 is in the intermediate position and the stem 30 is rotated counterclockwise, the correcting wheel 42 engages the correction transmitting wheel 27 and thus effects adjustment of the second hour hand 12 with respect to the first hour hand 11.

However, if the stem 30 is rotated clockwise, the setting wheel 40 will be rotated counterclockwise and this will force the correcting wheel 42 to move into engagement with the teeth 43 of the calendar wheel 31 so as to effect adjustment of the latter.

Since the watch shown in the drawings involves the use of only one winding crown or stem, a smart looking watch may be made whose design allows for considerable variation and also involves relatively few parts. Moreover, since water can often get into a watch along the stem, the provision of only a single stem improves the degree to

which the watch can be made waterproof.

In the case of a high precision watch, such as a quartz crystal watch, the wearer has only to pull the stem from the inner position to the intermediate position in order to adjust the second hour hand when travelling abroad. Since, in such a high precision watch, it will rarely be necessary to correct the time indicated by the first hour hand and by the minute and second hands, a stronger spring resistance may be provided in respect of moving the stem from the intermediate to the outer position than in moving the stem from the inner to the intermediate position. Thus the movement of the stem from the intermediate to the outer position can be made twice or three times as difficult as the movement of the stem from the inner to the intermediate position.

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WHAT WE CLAIM IS:—

1. A timepiece movement having a calendar member, an hour hand, a minute hand, and a rotatable stem which is movable axially into and out of a first position in which the hour hand and minute hand are simultaneously corrected on predetermined rotation of the stem, the stem also being movable axially into and out of a second position in which rotation of the stem in one angular sense adjusts the hour hand by a predetermined step with respect to the minute hand and in which rotation of the stem in the opposite angular sense adjusts the calendar member.

2. A timepiece movement as claimed in claim 1 in which the stem is movable axially into and out of a third position in which the movement may be wound.

3. A timepiece movement as claimed in claim 1 comprising drive means for driving the minute hand, and a slipping clutch device by means of which the said hour hand is drivably connected to the drive means.

4. A timepiece movement as claimed in any preceding claim in which the said hour hand is a second hour hand of a movement which comprises first and second hour hands for respectively indicating the time prevailing in two different time zones, the first hour hand being rotatable at all times in unison with the minute hand.



5. A timepiece movement as claimed in claims 3 and 4 in which the first and second hour hands have adjacent relatively rotatable portions, one of the said portions having twelve or twenty-four equi-angularly spaced apart apertures therein, and the other of said portions having at least one pin which is moved into and out of each said aperture on predetermined operation of the stem, resilient means being provided for urging the or each said pin into a said aperture.

6. A timepiece movement as claimed in claim 5 in which the said portion of the second hour hand meshes with a wheel

which is rotatable by operation of the said stem.

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

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

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