

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Calendar Timepiece

We, KABUSHIKI KAISHA DAINI SEIKOSHA, a Japanese company, of 47, 6-chome, Kameido-cho, Koto-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 calendar timepieces and although it is not so restricted, it will be described with reference to a calendar watch.

According to the present invention there is provided a calendar timepiece having a date ring, a date ring advancing mechanism including a member for driving the date ring, said member being pivotally connected to a lever, resilient means for biasing said member into engagement with the date ring, a rotary driving wheel having a cam slot, said wheel being adapted to be driven by the motion-work of the timepiece, a cam having an abrupt discontinuity in its contour and being connected to said driving wheel by a pin which is slidably engaged in said cam slot, said cam being also pivotally connected to said lever, and a cam follower adapted to engage and actuate said cam to cause the cam to rotate relatively to the driving wheel so as to produce a sudden movement of said lever once every 24 hours whereby to advance said date ring by one setting substantially instantaneously.

Preferably the timepiece is also provided with a day ring, a part of said lever being adapted to actuate said day ring, the arrangement being such that said sudden movement of said cam means causes said part simultaneously to displace said day ring.

In a preferred embodiment, a date setting mechanism is provided to operate independently of the date ring advancing mechanism.

The invention will be described, merely by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a plan view of a calendar watch in accordance with the present invention, but with the date setting mechanism omitted, and

Figure 2 is a cross-sectional view taken on the line X—X' of Figure 1.

Referring to the drawings, a calendar watch according to the present invention comprises an hour wheel 1 adapted to be driven by the motion-work of the watch. A driving wheel 3 provided with a cam slot 5 is arranged to make one complete rotation every 24 hours, the driving wheel 3 being connected to the hour wheel 1 through an intermediate gear wheel 2.

A cam 4 is freely pivoted on the stationary journal of the driving wheel 3 and is provided with a pin 6 which projects both above and below the cam 4, as seen in Figure 2. As can be seen, the cam 4 has the contour of a spiral, with an abrupt discontinuity at A. The lower end of the pin 6 passes through the aperture 5 of the driving wheel 3, and the upper end of the pin 6 engages a sliding lever 7.

The sliding lever 7 is provided with a cam slot 8 near its middle portion and a guiding pin 9 extending upward from a fixed base plate engages in the slot 8. The sliding lever 7 is further provided with a finger F adapted to engage a day star wheel 14 mounted rigidly on a day disc 15, the day disc 15 being adapted to carry indications of the days of the week in the well-known manner. Thus rotation of the day disc 15 will bring the appropriate indication of the day of the week under a dial window of the watch for observation, as is well known.

The watch of the present invention is also provided with a date ring 16 which carries

[Price 4s. 6d.]

the dates of the month and is provided with figures 1 to 31 in the well-known manner. The date ring 16 has internal toothing and a date finger 10 having an upstanding end portion C is adapted to engage the toothing to drive the date ring 16. The date finger 10 is pivoted on a pin 18 of the sliding lever 7, and the date finger 10 is arranged to be acted on by the biasing force of a spring 11 which is anchored at one end around a pin 20. A pin 19 provides a stop for the rotation of the date finger 10 about the pin 18. The pins 18, 19 and 20 are all fixed to the sliding lever 7.

A cam follower 12, located below the date ring 16, is biased to rotate in a clockwise direction, as seen in Figure 1, under the action of a spring 13 located in a recess of the base plate. The cam follower 12 is provided with an end portion B which is biased into engagement with the outer surface of the cam 4.

In order to maintain the date ring 16 and the day star wheel 14 in a stable position during operation of the device, two detent mechanisms are provided. The detent mechanism for the date ring 16 comprises a detent 22 with one end thereof engaging the toothing of the date ring 16 under the biasing action of a spring 21. The detent mechanism for the day star wheel 14 comprises a detent 24 having a free end biased to engage the toothing of the day star wheel 14, the biasing force being provided by a spring 23.

The operation of the device is as follows. As will be appreciated, the driving wheel 3 will make one complete rotation every 24 hours, and since the spring 13 biases the cam follower 12 into engagement with the cam 4, the spring 13 will be gradually stressed by flexure owing to the shaping of the cam 4. Moreover, because of the engagement of the pin 6 in the lever 7, the latter will be displaced relatively to the pin 9 engaged in the cam slot 8. The motion of the sliding lever 7 will thus cause the finger F to make one complete closed path of movement shown in dotted lines in Figure 1, the direction of movement being indicated by the arrow p. Simultaneously, the portion C of date finger 10 will also describe a complete closed path of movement the direction of which is shown in dotted lines in Figure 1 by arrow s.

It will be appreciated that as the hour wheel rotates in the direction shown by a dotted line arrow k, the gear 2 will rotate in the direction shown by the arrow l and the driving wheel 3 will rotate in the direction of the arrow m. This latter rotation will also cause the rotation of the cam 4 and the time will be reached when the portion B of the cam follower 12 will be opposite the portion A of the cam 4. As has been stated above, at the portion A there is a sudden discon-

tinuity in the shape of the surface of the cam, and when the cam portion A has rotated past the portion B of the cam follower, a sudden rotational movement of the cam 4 will result. This sudden movement of the cam 4 will also cause a sudden movement of the portion C of the date finger 10 so as to engage the latter with the teeth of the date ring 16 and produce a sudden displacement of the date ring. The two positions of the portion C are indicated in dotted lines in Figure 1 by the positions D and E respectively. Thus the date ring 16 will be advanced suddenly by one setting.

Simultaneously with the sudden movement of the cam 4 and the date finger 10, the finger F on the slide lever 7 will also execute a sudden movement, changing its positions from that shown at G to that shown at H. This sudden movement of the finger F will therefore rotate the day star wheel 14 and accordingly the day disc 15 will also be moved substantially instantaneously. Thus it will be seen that the advance of the dates and days is substantially instantaneous. It will also be noted that after these instantaneous changes, both the portion C of the date finger 10 and the finger F of the sliding lever 7 are located between the teeth of the date ring and the day star wheel respectively and thus the date ring 16 and the day disc 15 will be prevented from advancing by two settings instead of one.

It will further be appreciated that since the date finger 10 is arranged to be acted on by the biasing force of the spring 11, an independent date setting mechanism (not shown) can be provided to correct the date at any time independently of the automatic day and date advancing mechanism and moreover without any damage thereto. This can be done even if the portion C of the finger 10 is located between two adjacent teeth of the date ring 16.

It will be appreciated that the driving mechanism for the day and date rings of a calendar watch described above will ensure that the day and date will always jump from one setting to the next simultaneously and substantially instantaneously rather than gradually and thus provide accurate readings for the day and date at all times and will prevent the appearance of two simultaneous indications appearing in the dial window of the watch.

WHAT WE CLAIM IS:—

1. A calendar timepiece having a date ring, a date ring advancing mechanism including a member for driving the date ring, said member being pivotally connected to a lever, resilient means for biasing said member into engagement with the date ring, a rotary driving wheel having a cam slot, said wheel being adapted to be driven by the

the dates of the month and is provided with figures 1 to 31 in the well-known manner. The date ring 16 has internal toothing and a date finger 10 having an upstanding end portion C is adapted to engage the toothing to drive the date ring 16. The date finger 10 is pivoted on a pin 18 of the sliding lever 7, and the date finger 10 is arranged to be acted on by the biasing force of a spring 11 which is anchored at one end around a pin 20. A pin 19 provides a stop for the rotation of the date finger 10 about the pin 18. The pins 18, 19 and 20 are all fixed to the sliding lever 7.

A cam follower 12, located below the date ring 16, is biased to rotate in a clockwise direction, as seen in Figure 1, under the action of a spring 13 located in a recess of the base plate. The cam follower 12 is provided with an end portion B which is biased into engagement with the outer surface of the cam 4.

In order to maintain the date ring 16 and the day star wheel 14 in a stable position during operation of the device, two detent mechanisms are provided. The detent mechanism for the date ring 16 comprises a detent 22 with one end thereof engaging the toothing of the date ring 16 under the biasing action of a spring 21. The detent mechanism for the day star wheel 14 comprises a detent 24 having a free end biased to engage the toothing of the day star wheel 14, the biasing force being provided by a spring 23.

The operation of the device is as follows. As will be appreciated, the driving wheel 3 will make one complete rotation every 24 hours, and since the spring 13 biases the cam follower 12 into engagement with the cam 4, the spring 13 will be gradually stressed by flexure owing to the shaping of the cam 4. Moreover, because of the engagement of the pin 6 in the lever 7, the latter will be displaced relatively to the pin 9 engaged in the cam slot 8. The motion of the sliding lever 7 will thus cause the finger F to make one complete closed path of movement shown in dotted lines in Figure 1, the direction of movement being indicated by the arrow p. Simultaneously, the portion C of date finger 10 will also describe a complete closed path of movement the direction of which is shown in dotted lines in Figure 1 by arrow s.

It will be appreciated that as the hour wheel rotates in the direction shown by a dotted line arrow k, the gear 2 will rotate in the direction shown by the arrow l and the driving wheel 3 will rotate in the direction of the arrow m. This latter rotation will also cause the rotation of the cam 4 and the time will be reached when the portion B of the cam follower 12 will be opposite the portion A of the cam 4. As has been stated above, at the portion A there is a sudden discontinuity in the shape of the surface of the cam, and when the cam portion A has rotated past the portion B of the cam follower, a sudden rotational movement of the cam 4 will result. This sudden movement of the cam 4 will also cause a sudden movement of the portion C of the date finger 10 so as to engage the latter with the teeth of the date ring 16 and produce a sudden displacement of the date ring. The two positions of the portion C are indicated in dotted lines in Figure 1 by the positions D and E respectively. Thus the date ring 16 will be advanced suddenly by one setting.

Simultaneously with the sudden movement of the cam 4 and the date finger 10, the finger F on the slide lever 7 will also execute a sudden movement, changing its positions from that shown at G to that shown at H. This sudden movement of the finger F will therefore rotate the day star wheel 14 and accordingly the day disc 15 will also be moved substantially instantaneously. Thus it will be seen that the advance of the dates and days is substantially instantaneous. It will also be noted that after these instantaneous changes, both the portion C of the date finger 10 and the finger F of the sliding lever 7 are located between the teeth of the date ring and the day star wheel respectively and thus the date ring 16 and the day disc 15 will be prevented from advancing by two settings instead of one.

It will further be appreciated that since the date finger 10 is arranged to be acted on by the biasing force of the spring 11, an independent date setting mechanism (not shown) can be provided to correct the date at any time independently of the automatic day and date advancing mechanism and moreover without any damage thereto. This can be done even if the portion C of the finger 10 is located between two adjacent teeth of the date ring 16.

It will be appreciated that the driving mechanism for the day and date rings of a calendar watch described above will ensure that the day and date will always jump from one setting to the next simultaneously and substantially instantaneously rather than gradually and thus provide accurate readings for the day and date at all times and will prevent the appearance of two simultaneous indications appearing in the dial window of the watch.

WHAT WE CLAIM IS:—
1. A calendar timepiece having a date ring, a date ring advancing mechanism including a member for driving the date ring, said member being pivotally connected to a lever, resilient means for biasing said member into engagement with the date ring, a rotary driving wheel having a cam slot, said wheel being adapted to be driven by the



5 motion-work of the timepiece, a cam having
an abrupt discontinuity in its contour and
being connected to said driving wheel by a
pin which is slidably engaged in said cam
slot, said cam being also pivotally connected
to said lever, and a cam follower adapted
to engage and actuate said cam to cause the
cam to rotate relatively to the driving wheel
so as to produce a sudden movement of said
10 lever once every 24 hours whereby to advance
said date ring by one setting substantially
instantaneously.

15 2. A calendar timepiece as claimed in
claim 1 wherein the timepiece is also pro-
vided with a day ring, a part of said lever
being adapted to actuate said day ring, the
arrangement being such that said sudden

movement of said cam means causes said
part simultaneously to displace said day ring.

3. A calendar timepiece as claimed in 20
claim 1 or 2 wherein a date setting mecha-
nism is provided to operate independently of
the date ring advancing mechanism.

4. A calendar timepiece substantially as 25
hereinbefore described with reference to and
as shown in the accompanying drawings.

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