

PATENT SPECIFICATION

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- (21) Application No. 2170/75 (22) Filed 17 Jan. 1975
(31) Convention Application No. 458 914 (32) Filed 8 April 1974 in
(33) United States of America (US)
(44) Complete Specification published 8 Sept. 1977
(51) INT. CL.² G04B 19/24
(52) Index at acceptance
G3T CIA

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(54) CALENDAR WATCH MECHANISM

(71) We, TIMEX CORPORATION, a Corporation organized under the laws of the State of Delaware, United States of America, of Waterbury 20, Connecticut, United States of America, 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:—

The present invention relates to watches and particularly to calendar watches having means coupled to the movement for indicating the day and date.

The prior art includes various mechanisms for indicating the day and date by means of day and date wheels which are driven by the watch drive means.

A problem arises in setting the day and date relative to each other in conventional day-date watches since either both the day and date wheels move together during setting, or a very complex and costly arrangement is required to prevent this problem.

Another disadvantage in many designs arises from the fact that the watch drive means is required to drive both the day and date wheels simultaneously to effect a change with the arrival of a new date.

It is an object of this invention to provide an improved calendar timepiece.

Another object of this invention is to provide an improved means wherein the day and date may be simply and readily set relative to each other in a calendar watch.

A further object of this invention is to provide an improved day-date calendar mechanism for time pieces wherein the load on the drive means caused by the day and date change is distributed to lessen the peak load.

According to one aspect of the present invention there is provided a calendar watch comprising drive means and including an

hour wheel coupled to the drive means to make a complete rotation every 12 hours, a date wheel coupled to the hour wheel and driven thereby to make a complete rotation every 24 hours, said date wheel including an upwardly projecting day tab and an upwardly projecting date tab, said day tab and said date tab projecting upwardly from the date wheel in planes which are substantially at right angles to each other, a day dial having indicia thereon and including a plurality of downwardly extending teeth spaced circumferentially thereon, one of said teeth being engaged by the day tab during each 24 hour period to rotate said day dial, and a date dial having indicia thereon and including a plurality of downwardly projecting internal teeth, one of said teeth being engaged by the date tab during each 24 hour period to rotate said date dial.

A suitable embodiment of the present invention is a day-date calendar watch including a date wheel having a pair of tabs extending upwardly therefrom at predetermined locations. The date wheel engages an hour wheel which is coupled to the watch drive means. As the date wheel rotates during the operation of the watch in each 24 hour interval, one of the tabs engages one of the teeth on the day dial and the other tab engages one of the teeth on the date dial. The mechanism is designed so that the load on the watch drive means is distributed with the date change loading the mechanism prior to midnight, and the day change loading the mechanism during a predetermined period after midnight. This requires substantially less power than prior designs involving simultaneous change. As a further advantage, when the hands are rotated counter-clockwise through midnight, the date indication does not change but the day indication reverts by one day. This permits setting of

the correct day and date relative to each other in an expeditious and inexpensive manner.

The above and other features and advantages of this invention may be seen from the following description when read in conjunction with the accompanying drawings wherein:—

Figure 1 is a top view of a calendar watch comprising a preferred embodiment of the invention, with portions of the watch cut away to illustrate the inter-relationship of parts;

Figure 2 is a top view of the watch with the day indicating means removed and portions cut away to illustrate the inter-relationship of parts;

Figure 3 is a cross-sectional view of the watch taken along the line 3-3 of Figure 1; and

Figure 4 is a cut-away perspective view showing a detail of the day-date advance mechanism.

Referring now to the drawings, a day-date calendar watch 10 has indicia 11 and 12 for indicating respectively the day and date, the indicia being visible through windows 13 and 14 in a dial 16. The day indicia 11 indicating the seven days of the week are located about a day dial 17 while the date indicia 12 indicating the thirty one days of a month are located about a date dial 18. The dials 17 and 18 lie in substantially the same plane and are mounted for rotation about a drive shaft or arbor 19, as will be described later in greater detail, with the smaller day dial 17 located internally of the date dial 18. The dials 17 and 18 are also coupled to a stem 21 and may be manually rotated thereby for setting the correct day and date.

The watch 10 also includes a second hand 22, a minute hand 23 and an hour hand 24 coupled to arbor 19 in a conventional manner to indicate time as the drive means (not shown) activates the arbor 19. The minute hand 23 is coupled to the arbor 19 through pipe 26. The hour hand is mounted on a pipe 27. An hour wheel 28 is mounted about a lower enlarged portion 29 of the pipe 27 and engages a pinion 33 mounted on a shaft 34 which extends upwardly from a bridge member 36. A gear 37 on the lower portion 38 of pipe 26 is in mesh with a gear 35 fixed to the pinion 33 to drive the hour wheel 28 through a complete rotation every twelve hours.

The lower hour pipe portion 29 also includes gear means 31 which engages date wheel 32 to effect a 2:1 speed reduction so that the date wheel 32 rotates at one revolution per day. The date wheel 32 is mounted for rotation about a supporting means 39 which, in turn, is supported by a

member 41. The date wheel 32 includes a pair of precisely positioned tabs 42 and 43 extending upwardly therefrom to engage date dial teeth 44 and day dial teeth 46 respectively lying in substantially the same plane. The date dial teeth 44 are located about the inner periphery of date dial 18 and extend downwardly therefrom. There are thirty one teeth 44 representing the maximum number of days in a month. One of said teeth 44 is engaged by the date wheel tab 42 to advance the date indicia 12 slowly prior to midnight. The date 12 advances for about 1/3 pitch prior to midnight under the restraining action of a spring member 48 and jumps the remainder or 2/3 pitch at midnight as the shoulder portion 49 of the spring 48 slips over the engaged tooth 44. Thus, the tooth configuration is designed so that, in combination with the associated mechanism, a date change occurs in a predetermined manner.

The day dial 17 includes seven teeth 46, which correspond to the days of the week, projecting downwardly from the dial 17 to be engaged by tab 43. The date wheel tab 43 engages and drives one of the teeth 46 every twenty four hours to effect a day change in the window 13. The engaged tooth 46 is driven against the restraining action of a spring member 52 in a manner whereby the day indicia starts advancing slowly after midnight and jumps one-half pitch at about 12.40 a.m.

This action is effected by the tooth design in combination with the associated elements of the mechanism including the tab arrangement. Thus, the date change loads the watch calendar mechanism prior to midnight and the day change comes into play after midnight. This lessens the peak load on the mechanism.

The day dial 17 and the date dial 18 are supported by member 58 within the watch 10. Both the day dial 17 and the date dial 18 including their respective teeth 46 and 44 may be moulded from plastics material. Other elements of the watch 10 appear in the drawings, but since they are conventional and not germane to the invention, they have not been described in detail.

The correct day and date may be readily set relative to each other. When the hands 23 and 24 are manually rotated counter-clockwise through midnight, the date indication does not change but the day indication reverts by one day. As can be noted from Figure 2, the date tab 42 is positioned on the date wheel 32 so that the leading edge engages a rearwardly sloping face 54 of a date dial tooth 44 to advance the date. When the date wheel 32 is rotated clockwise upon counter-clockwise rotation of the hands, the tab 42 slips over

the sloping front faces of the date dial teeth 44 so that the tab fails effectively to engage the teeth and the date dial is not moved whereby the date indication remains the same. On the other hand, the day tab 43 which is positioned on the date wheel 32 to engage a day dial tooth 46, contacts said tooth both in a forward and reverse direction due to the substantially evenly sloped configuration of the tooth faces 55 and 56. Thus, the day change occurs when the hands 23 and 24 are rotated counter-clockwise

More specifically, the teeth 46 of the day dial 17 lie in substantially the same plane as the teeth 44 of the date dial 18. This is possible since the tab 42 on the date wheel 32 engaging the date dial 18 during its rotation passes in the plan view behind one of the day dial teeth 46. It may also be observed that the tabs 42 and 43 lie in planes which are substantially at right angles to each other. As a final point, the tab arrangement is rather economical since the tabs 42 and 43 may be merely punched or formed upwardly from the date wheel 32 eliminating the necessity of numerous additional parts of a precise nature to effect the day and date change.

WHAT WE CLAIM IS:—

1. A calendar watch comprising drive means and including an hour wheel coupled to the drive means to make a complete rotation every 12 hours, a date wheel coupled to the hour wheel and driven thereby to make a complete rotation every 24 hours, said date wheel including an upwardly projecting day tab and an upwardly projecting date tab, said day tab and said date tab projecting upwardly from the date wheel in planes which are substantially at right angles to each other, a day dial having indicia thereon and including a plurality of downwardly extending teeth spaced circumferentially thereon, one of said teeth being engaged by the day tab during each 24 hour period to rotate said day dial, and a date dial having indicia thereon and including a plurality of downwardly projecting internal teeth, one of said teeth being engaged by the date tab during each 24 hour period to rotate said date dial.

2. A calendar watch in accordance with Claim 1 wherein the day dial and the date dial lie in substantially the same plane.

3. A calendar watch in accordance with Claim 1 or Claim 2 wherein the teeth of the day dial lie in substantially the same plane as the teeth of the date dial.

4. A calendar watch in accordance with Claim 3, wherein said date tab is located closer to the periphery of the date wheel than the day tab.

5. A calendar watch according to any

one of the preceding claims, wherein the date tab is arranged to engage the date dial to load the drive means prior to midnight and the day tab is arranged to engage the day dial to load the drive means after midnight whereby the loading on the watch drive means due to the day and date changes is distributed to lessen the peak loading.

6. A calendar watch in accordance with Claim 5, wherein the watch further includes separate resilient restraining members one engaging the teeth of the day dial and the other engaging the teeth of the date dial, and wherein the teeth of the date dial are dimensioned to engage the date tab and be advanced for about 1/3 pitch prior to midnight and to overcome the respective resilient member and to jump the rest of the pitch at midnight, and the teeth of the day dial are dimensioned to engage the day tab and be advanced after midnight for 1/2 pitch and then to overcome the respective resilient member and to jump the rest of the pitch prior to 1:00 a.m.

7. A calendar watch in accordance with any one of the preceding claims further including manual setting means, coupled to the date wheel, and wherein the day dial may be engaged by the day tab during a manual setting operation to effect a day change by movement of said dial in a reverse direction and wherein the date dial is not effectively engaged by the date tab when the date tab is moved in a reverse direction so that the day and date may be readily set relative to each other.

8. A calendar watch in accordance with Claim 7 wherein the teeth of the day dial have a predetermined configuration to be engaged by the day tab during a setting operation in a reverse direction and during normal operation of the watch in a forward direction, and the teeth of the date dial have a predetermined configuration to be engaged by the date tab during normal operation of the watch in a forward direction and to be not effectively engaged when the date tab is moved in a reverse direction during a setting operation.

9. A calendar watch in accordance with Claim 7 or Claim 8, wherein the day dial includes seven teeth corresponding to the days of the week, said teeth extending downwardly and having substantially evenly sloped faces which are engaged by the day tab to be rotated in a forward direction during normal operation of the watch and being capable of being rotated in a reverse direction by the day tab to effect a day change during a setting operation.

10. A calendar watch in accordance with Claim 9, wherein the date dial includes thirty one internal teeth correspond-

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the sloping front faces of the date dial teeth 44 so that the tab fails effectively to engage the teeth and the date dial is not moved whereby the date indication remains the same. On the other hand, the day tab 43 which is positioned on the date wheel 32 to engage a day dial tooth 46, contacts said tooth both in a forward and reverse direction due to the substantially evenly sloped configuration of the tooth faces 55 and 56. Thus, the day change occurs when the hands 23 and 24 are rotated counter-clockwise

More specifically, the teeth 46 of the day dial 17 lie in substantially the same plane as the teeth 44 of the date dial 18. This is possible since the tab 42 on the date wheel 32 engaging the date dial 18 during its rotation passes in the plan view behind one of the day dial teeth 46. It may also be observed that the tabs 42 and 43 lie in planes which are substantially at right angles to each other. As a final point, the tab arrangement is rather economical since the tabs 42 and 43 may be merely punched or formed upwardly from the date wheel 32 eliminating the necessity of numerous additional parts of a precise nature to effect the day and date change.

WHAT WE CLAIM IS:—

1. A calendar watch comprising drive means and including an hour wheel coupled to the drive means to make a complete rotation every 12 hours, a date wheel coupled to the hour wheel and driven thereby to make a complete rotation every 24 hours, said date wheel including an upwardly projecting day tab and an upwardly projecting date tab, said day tab and said date tab projecting upwardly from the date wheel in planes which are substantially at right angles to each other, a day dial having indicia thereon and including a plurality of downwardly extending teeth spaced circumferentially thereon, one of said teeth being engaged by the day tab during each 24 hour period to rotate said day dial, and a date dial having indicia thereon and including a plurality of downwardly projecting internal teeth, one of said teeth being engaged by the date tab during each 24 hour period to rotate said date dial.

2. A calendar watch in accordance with Claim 1 wherein the day dial and the date dial lie in substantially the same plane.

3. A calendar watch in accordance with Claim 1 or Claim 2 wherein the teeth of the day dial lie in substantially the same plane as the teeth of the date dial.

4. A calendar watch in accordance with Claim 3, wherein said date tab is located closer to the periphery of the date wheel than the day tab.

5. A calendar watch according to any

one of the preceding claims, wherein the date tab is arranged to engage the date dial to load the drive means prior to midnight and the day tab is arranged to engage the day dial to load the drive means after midnight whereby the loading on the watch drive means due to the day and date changes is distributed to lessen the peak loading.

6. A calendar watch in accordance with Claim 5, wherein the watch further includes separate resilient restraining members one engaging the teeth of the day dial and the other engaging the teeth of the date dial, and wherein the teeth of the date dial are dimensioned to engage the date tab and be advanced for about 1/3 pitch prior to midnight and to overcome the respective resilient member and to jump the rest of the pitch at midnight, and the teeth of the day dial are dimensioned to engage the day tab and be advanced after midnight for 1/2 pitch and then to overcome the respective resilient member and to jump the rest of the pitch prior to 1:00 a.m.

7. A calendar watch in accordance with any one of the preceding claims further including manual setting means, coupled to the date wheel, and wherein the day dial may be engaged by the day tab during a manual setting operation to effect a day change by movement of said dial in a reverse direction and wherein the date dial is not effectively engaged by the date tab when the date tab is moved in a reverse direction so that the day and date may be readily set relative to each other.

8. A calendar watch in accordance with Claim 7 wherein the teeth of the day dial have a predetermined configuration to be engaged by the day tab during a setting operation in a reverse direction and during normal operation of the watch in a forward direction, and the teeth of the date dial have a predetermined configuration to be engaged by the date tab during normal operation of the watch in a forward direction and to be not effectively engaged when the date tab is moved in a reverse direction during a setting operation.

9. A calendar watch in accordance with Claim 7 or Claim 8, wherein the day dial includes seven teeth corresponding to the days of the week, said teeth extending downwardly and having substantially evenly sloped faces which are engaged by the day tab to be rotated in a forward direction during normal operation of the watch and being capable of being rotated in a reverse direction by the day tab to effect a day change during a setting operation.

10. A calendar watch in accordance with Claim 9, wherein the date dial includes thirty one internal teeth correspond-

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ing to the days of a month, said teeth extending downwardly and having rearwardly extending faces which are engaged by the date tab to be rotated in a forward direction during normal operation of the watch and forward faces which are not effectively engaged by the date tab during movement of the tab in a reverse direction during a setting operation so that the date may be

set relative to the day.

11. A calendar watch substantially as hereinbefore described with reference to the accompanying drawings.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1977.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.