April 16, 1968 D. J. ROGERS 3,377,795

CALENDAR SETTING MECHANISM FOR AN ELECTRIC WATCH

Filed March 11, 1966

FIG. 1

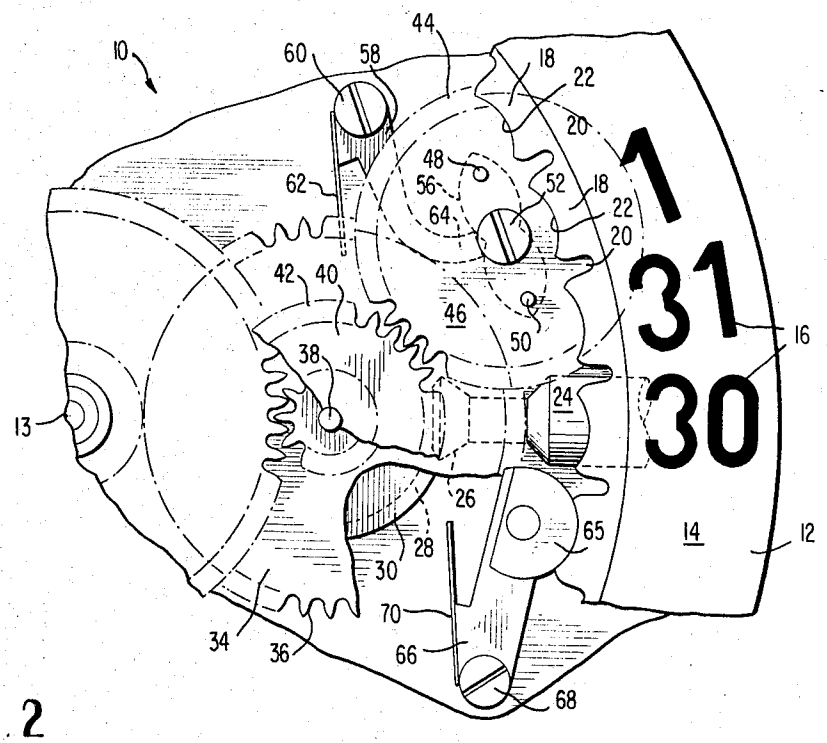


FIG. 2

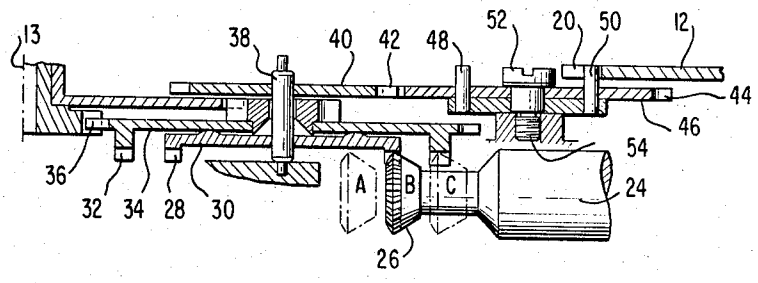
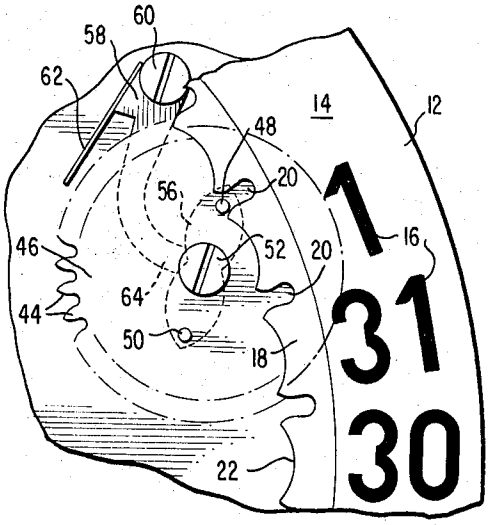


FIG. 3



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CALENDAR SETTING MECHANISM FOR AN ELECTRIC WATCH

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10 Claims. (Cl. 58—58)

This invention relates to a mechanical calendar or date ring setting mechanism for use in watches, clocks, and other timing devices having date indicating mechanisms. It is intended primarily for electric watch movements having or being adaptable to a three-position setting stem where the additional stem position is for manual date setting.

There exist many timepiece calendar systems in which the movement of a watch or like timepiece is provided with a date bearing indicia member which is operated in time relation to the hour wheel of the timepiece so as to indicate successive dates. In typical existing calendar watch systems, the dial side of the movement is provided with a calendar ring or disc that is rotatably mounted below the dial and bears 31 equally spaced numbers which are successively exposed through a window in the dial as the disc is advanced $\frac{1}{31}$ of a revolution each 24 hours, by means interconnecting the calendar ring with the dial train of the watch.

In existing calendar watch systems, the dial train is effectively disconnected from the calendar indicia ring or disc for about 21 hours, with the appropriate date number on the calendar ring being exposed through a window in the watch dial to indicate the date. In the remaining three hour period, the dial train is drivingly engaged with the calendar ring usually by a camming arrangement so as to cause the calendar ring to advance $\frac{1}{31}$ of a revolution. The dial ring is thus progressively moved in the remaining three hour period, which is usually around midnight, until the next date number is beneath the aforementioned dial window. That date number is exposed for the next 21 hours and is thereafter replaced by the next successive number when the calendar ring is again drivingly engaged with the dial train by the intermediate camming arrangement and thus displaced.

Such existing calendar watch systems are not completely desirable in that the date change takes place over a substantial period of time, i.e. approximately three hours, and for much of this time the numerals are not readily readable through the dial window. In addition, they impose a quite high load on the source of power driving the dial train and this load is more than existing electrical watch systems can bear with a compact long-lived power source. Also, due to the relatively high power requirements of such prior watch calendar systems, they are a problem with so-called automatic or self-winding spring driven watches when these watches are not in the full-wound state.

In order to overcome these and other disadvantages of prior constructions, I disclose in my copending application Ser. No. 533,512, entitled Watch Calendar Drive Mechanism and filed on even date herewith, a novel calendar ring indexing mechanism which combines the features of calendar ring drive and detenting in a single unitary assembly which imposes a very light load on the watch driving mechanism and for this reason is particularly suited to electric watches and other timepieces havng a limited power source. The indexing mechanism of that application is believed to be unique in that it combines all desirable calendar features in one mechanism which does not require excessive energy as do other calendar mechanism previously proposed. These desirable features include instantaneous date change, accuracy and repeatability in date change, accurate date positioning, calendar ring detenting (holding and releasing) and rapid calendar ring setting, all features being combined in a simple mechanism requiring little space and energy.

However, as with most known calendar ring constructions, the mechanism of the aforesaid copending application requires some provision in the timepiece for manually setting the calendar ring to the desired date. For example, if for some reason, the watch should stop running, it becomes necessary upon re-initiation of watch operation to reset the calendar ring so as to compensate for the elapsed time during which the watch was stopped. In addition, most calendar constructions incorporate an annular ring provided with date indicia in the form of 31 equally spaced numerals representative of the 31 days of the longest month of the year. At the ends of those months which in fact have less than 31 days, it is necessary for the wearer of the timepiece to advance the calendar ring from the last day of the month, i.e., for example from the numeral 30 for the end of September of the numeral 1 representative of the first day of the following month. Thus, it is apparent that even if the watch is continuously in proper operation, some provision must be made in the calendar mechanism for manually adjusting the calendar date at least at the end of certain months of the year.

The present invention is directed to a novel watch calendar setting mechanism which while adapted for use with all types of calendar ring drives and indexing systems is particularly suited for use in conjunction with the calendar ring drive mechanism disclosed in the aforesaid copending application. The setting mechanism of this invention is of simple and reliable construction requiring a minimum of instruction to the user and makes it possible to set the calendar ring completely independent of the position of the hands of the timepiece. Further, the mechanism of this invention has the advantage of enabling a calendar ring to be set in either a forward or reverse direction. To this end, it is particularly adapted to mechanisms employing a three-position setting stem wherein the setting stem of the timepiece is longitudinally movable from a normal or watch running position to one of two remaining positions, namely a hand setting position and a calendar ring setting position. In one embodiment, the device of the present invention provides a manual calendar index watch where the date ring may be indexed daily by the user instead of automatically by another mechanism. In this case, the setting mechanism of this invention provides a self-locking feature to restrain the calendar ring in the desired set position.

It is therefore one object of the present invention to provide a new and improved calendar ring setting mechanism for a timepiece.

Another object of the present invention is to provide a calendar ring setting mechanism particularly suited for use in electric watches.

Another object of the present invention is to provide a mechanism useable in setting a calendar ring of a timepiece completely independent of the timepiece indicating hands.

Another object of the present invention is to provide a calendar ring setting mechanism for a timepiece enabling the calendar ring to be set in either the forward or reverse direction.

Another object of the present invention is to provide a novel rotary pin setting mechanism for rapidly, accurately and reliably adjusting the position of a calendar ring when for some reason it no longer indicates the proper date.

In the present invention, the watch incorporates a setting stem carrying a pinion movable into three different positions. In the normal or run position, the pinion of the setting stem is disengaged from the remainder of the works and the watch runs in a normal manner. By moving the setting stem longitudinally into a first position where the setting stem engages a portion of the dial train, the stem may be manually rotated to set the hands of the watch or timepiece. In a third or intermediate position, the setting pinion engages the teeth of a geared wheel, whereby rotation of the setting stem acts through this geared wheel to rotate a cam wheel. Mounted on diametrically opposite sides of the rotational axis of the cam wheel are a pair of calendar ring setting pins, which are adapted to alternately engage in slots between teeth formed on the interior surface of the watch calendar ring. As the cam wheel rotates, these teeth alternately advance the calendar ring $\frac{1}{31}$ of a revolution or from one date to the next. A spring biased detent engaging a cam surface carried by the cam wheel acts to automatically return the cam wheel to a neutral position, such that the setting pins are disengaged from the calendar ring teeth.

In a modified embodiment, the positions of the pins are adjusted so that in the neutral position one of the pins remains engaged in a calendar ring tooth slot so as to provide a self-locking mechanism to restrain the calendar ring in the desired set position. This latter arrangement is particularly suited to a watch mechanism where the date ring is adapted to be manually indexed daily by the user of the watch.

These and further objects and advantages of the invention will be more apparent upon reference to the following specification, claims and appended drawings, wherein:

FIGURE 1 is a partial plan view of a portion of an electric watch mechanism constructed in accordance with the present invention showing the cam wheel in its neutral position;

FIGURE 2 is a vertical cross section through the setting mechanism of FIGURE 1; and

FIGURE 3 is a partial plan view similar to FIGURE 1 showing a modified setting pin arrangement for the calendar setting mechanism of this invention.

Referring to the drawings, the numeral **10** generally indicates a watch which may be any presently commercially available watch having a movement of suitable design. For example, the movement may be that used in the Model 505 Electric Watch of the Hamilton Watch Company, Lancaster, Pa., disclosed in Hamilton Service Bulletin #220, but modified to incorporate the watch calendar system of this invention as hereinafter amplified. Alternatively, the watch may be of the more recent type identified as Hamilton Electric Watch Model 510.

The watch movement includes a pillar plate which is provided on its dial side with an annular peripheral ring having an internal shoulder for seating the lower exterior portion of an annular geared calendar ring illustrated in the drawings at **12**. A dial train bridge is concentrically mounted on the dial side of the pillar plate and the circular edge portions of the dial train bridge and annular shoulder on the periphery of the pillar plate provide a track for the geared calendar ring **12** whereby the calendar ring is rotatable about the axis **13** of the center wheel of the watch. For a more detailed discussion of the mounting for the rotatable calendar ring **12** of this invention, reference may be had to assignee's copending application Ser. No. 227,160, filed Oct. 1, 1962, which is incorporated herein by reference.

Calendar or date ring **12** is provided on its upper face **14** with 31 equally spaced numerals **16** numbered successively from 1 to 31. The lower internal annular portion of the calendar ring **12** is provided with 31 internal gear teeth **18** uniformly spaced around the entire periphery of the calendar ring by slots **20**. The teeth are each provided with concave surfaces **22** for a purpose more fully described below.

Longitudinally movable through the watch case is a setting stem **24** which is rotated in a conventional manner to set the hands of the watch. This setting stem carries at its inner end a setting pinion **26** adapted to be moved longitudinally to one of three different positions, labeled positions A, B, C, respectively in FIGURE 2. The A and C positions are illustrated in dashed lines in FIGURE 2, while the B position for the setting pinion **26** is illustrated in solid lines in that figure. Position A is the fully in position where the setting pinion rests during normal operation of the watch completely disengaged from any moving parts. Position B is an intermediate position where the setting pinion **26** engages with the contrate teeth **28** of a rotary wheel **30** for calendar ring setting and position C is the fully out position where the setting pinion **26** engages with the contrate teeth **32** of the minute wheel **34** forming a portion of the dial train or drive train for the watch hands. The minute wheel is connected to the remainder of the dial train by the peripheral teeth **36**.

Wheel **30** is mounted upon a rotary staff **38** journalled in suitable bearings on stationary portions of the watch movement. Also carried by rotary staff **38** is a wheel **40** having peripheral teeth **42** meshing with similar teeth **44** on a cam wheel **46**. Cam wheel **46** carries a pair of upwardly extending pins **48** and **50** with pin **50** as illustrated in FIGURE 2 engaged in one of the slots **20** between the calendar ring gear teeth **18**. Cam wheel **46** is rotatable about a screw **52** having threads **54** for mounting the screw in a stationary portion of the watch frame.

Positioned beneath cam wheel **46** but secured thereto for rotation with the cam wheel about screw **52** is a cam **56** having an outline somewhat resembling that of a figure eight, as shown by the dashed lines in FIGURE 1. Engaging the surface of cam **56** is the arm of a cam follower **58** rotatably mounted for pivotable movement on a screw **60**. Cam follower **58** is biased by a flat spring **62** such that the end **64** of the cam follower arm is biased into engagement with the surface of cam **56**.

Finally, the device of the present invention is provided with a combination calendar ring drive and detent of the type more fully shown and described in previously mentioned copending application Ser. No. 533,512, filed on even date herewith. That combination detent and drive assembly includes a circular segment **65** whose outer surface closely engages the concave surface **22** on one of the calendar ring teeth **18**. The circular segment is mounted on a pivoted arm **66** which is pivoted to a stationary portion of the watch movement at **68** and biased to bring the circular surface of segment **65** into contact with concave surface **22** of one of the calendar ring teeth by a flat spring **70**.

In operation, setting pinion **26** is placed in position B such that rotation of stem **24** drives wheel **30** through the engagement of contrate teeth **28** with the teeth of the setting pinion **26**. This rotation is transmitted by wheel **30** through staff **38** and wheel **40** to the cam wheel **46** causing pins **48** and **50** to forceably drive calendar ring **12** by way of tooth slots **20**. When rotation ceases and the setting stem is released, cam follower **58** through the action of its spring **62** rotates cam **56** to the position illustrated in FIGURE 1, or to a diametrically opposite position in the event that manual indexing is only partially completed, so as to insure that neither of the pins **48** or **50** remains in engagement with the calendar tooth slots where they might otherwise interfere with the normal periodic calendar indexing. The calendar teeth detenting mechanism including circular segment **65** assures that the calendar ring will complete movement to the proper position in the event that the setting stem **24** is prematurely released. Depending upon the direction in which setting stem **24** is rotated, the calendar ring **12** can be indexed by the mechanism shown in either direction and this manual setting or indexing is completely independent of any movement of the watch hands, since when the setting pinion **26** is in position B, it is disengaged from the dial train. The

dial train and indicating hands may be independently set by moving the setting stem to position C and then rotating it in the appropriate direction.

FIGURE 3 shows a modified construction with like parts bearings like reference numerals. In FIGURE 3, the positions of the cam 56 and the pins 48 and 50 are adjusted with respect to follower 58 so that the rest or neutral position of the cam plate 46 is such that one of the pins such as setting pin 48 remains in a tooth slot 20. Thus, when the setting stem is released by the watch wearer, the cam 56 in FIGURE 3 is returned by the cam follower 58 to the position illustrated in that figure or to a diametrically opposite position where pin 50 is in the slot 20. In this way, the setting pins provide a self-locking mechanism to restrain the calendar ring 12 in the desired set position. The construction illustrated in FIGURE 3 is particularly suited for a calendar watch of any type wherein the date ring 12 is adapted to be indexed daily by the user of the watch rather than automatically driven or stepped as in the embodiment illustrated in FIGURES 1 and 2, by a separate drive mechanism operating off of the dial train of the watch.

It is apparent from the above that the present invention provides a simplified and reliable arrangement for accurately setting the date indicating mechanism of a timepiece. Important features of the present invention include the provision of a three-position setting stem and setting assembly wherein the calendar ring can be adjusted to a new position independently of the watch hands. A further important feature of the present invention includes the provision of an arrangement whereby the setting mechanism will accurately index the calendar ring in either direction. The system is particularly adapted to a three-position setting stem and wherein the calendar index mechanism has a detenting type positioning device, which will permit forceably rotating the calendar ring in one or both directions. In mechanisms having or where it is desirable to have a unidirectional setting mechanism, the opposite setting direction can be avoided in the present invention by placing a unidirectional ratchet on any of the setting mechanism wheels or on the calendar ring itself.

While the system of the present invention has been described in conjunction with its use in electric watches, it is adapted to all types of calendar drive systems, and the embodiment illustrated in FIGURE 3 is particularly suited to a calendar system wherein the calendar ring is daily indexed by the watch wearer or user. It makes possible independent calendar adjustment while maintaining proper synchronism between the calendar drive and the dial train of the watch. It is useable in conjunction with the low load system of previously mentioned copending application Ser. No. 533,512, filed on even date herewith, and is particularly adapted to electric watch constructions where the power supply in the form of a small compact battery is limited.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A calendar setting mechanism for a timepiece comprising movable date indicating means, means rotatably mounted for setting said date indicating means to a new date, manually operable means coupled to said rotatably mounted means for rotating the latter, and cam means for automatically returning said rotatable means to a predetermined rest position.

2. A setting mechanism according to claim 1 wherein said setting means is free of said date indicating means in said rest position.

3. A setting mechanism according to claim 1 wherein said date indicating means comprises a calendar ring having a plurality of spaced slots, said setting means including at least one pin receivable in one of said slots to move said calendar ring.

4. A setting mechanism according to claim 4 wherein said pin is rotatable through 360°.

5. A calendar setting mechanism for a timepiece comprising movable date indicating means, rotatable means for manually setting said date indicating means to a new date, and cam means for automatically returning said rotatable means to a predetermined rest position, said setting means acting to lock said date indicating means against movement in said rest position.

6. A calendar setting mechanism for a timepiece comprising movable date indicating means, rotatable means for manually setting said date indicating means to a new date, and cam means for automatically returning said rotatable means to a predetermined rest position, said date indicating means comprising a calendar ring having a plurality of spaced slots, said setting means including at least one pin receivable in one of said slots to move said calendar ring, and said pin being rotatable in either direction to advance said calendar ring in either direction.

7. A calendar setting mechanism for a timepiece comprising movable date indicating means, rotatable means for manually setting said date indicating means to a new date, and cam means for automatically returning said rotatable means to a predetermined rest position, said date indicating means comprising a calendar ring having a plurality of spaced slots, said setting means comprising a pair of pins including at least one pin receivable in one of said slots to move said calendar ring, a rotatable setting stem longitudinally movable into three separate running, hand setting and calendar setting positions, and means coupling said stem to said pins when said stem is in the calendar setting position.

8. A setting mechanism according to claim 7 wherein said pins are mounted on a rotatable plate, a cam rotatable with said plate, and cam follower means bearing on said cam for returning said plate to a predetermined rest position.

9. An electric watch comprising a calendar ring having a plurality of date indicia thereon and a plurality of uniformly spaced slots, a rotatable plate having a pair of pins spaced on opposite sides of the rotational axis of said plate and adapted to be alternately received in successive ones of said slots, a cam rotatable with said plate, a rotatable setting stem longitudinally movble into three separate running, hand setting, and calendar setting positions, means coupling said stem to said plate when said stem is in said calendar setting position, and cam follower means bearing on said cam for returning said pins to a predetermined rest position.

10. A watch according to claim 9 including detent means resiliently urged into engagement with said calendar ring.

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