March 15, 1966 J. H. REESE 3,240,006

CALENDAR TIMEPIECE

Filed Oct. 1, 1962 3 Sheets-Sheet 1

FIG. 1a

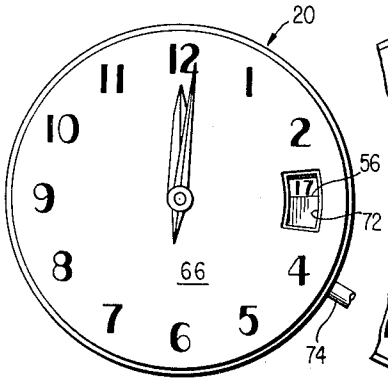


FIG. 1b

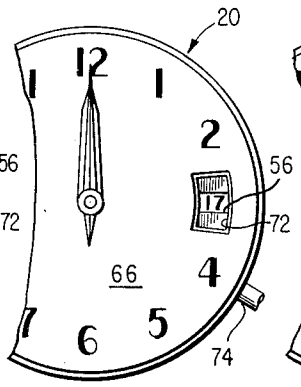


FIG. 1c

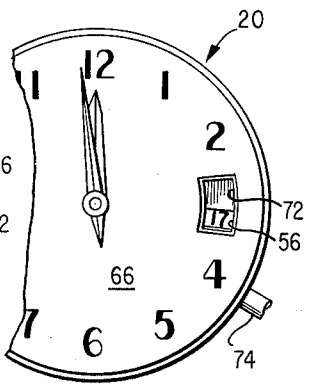
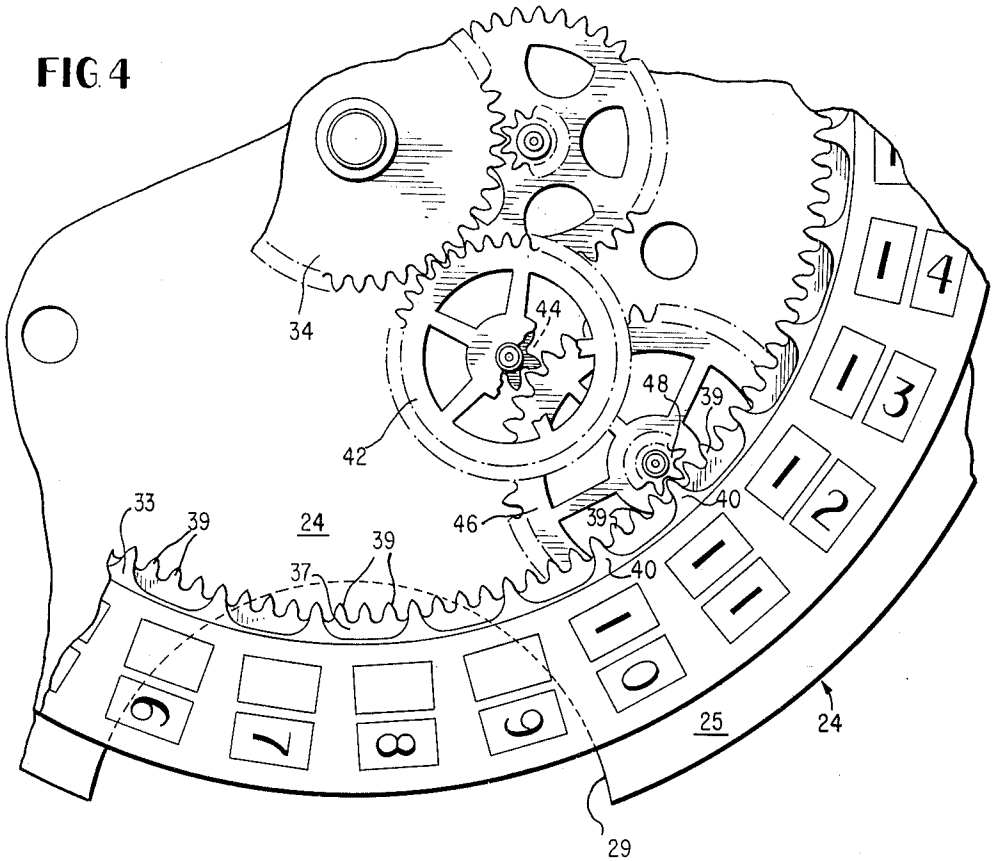


FIG. 4



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CALENDAR TIMEPIECE

Filed Oct. 1, 1962 3 Sheets-Sheet 2

FIG. 2

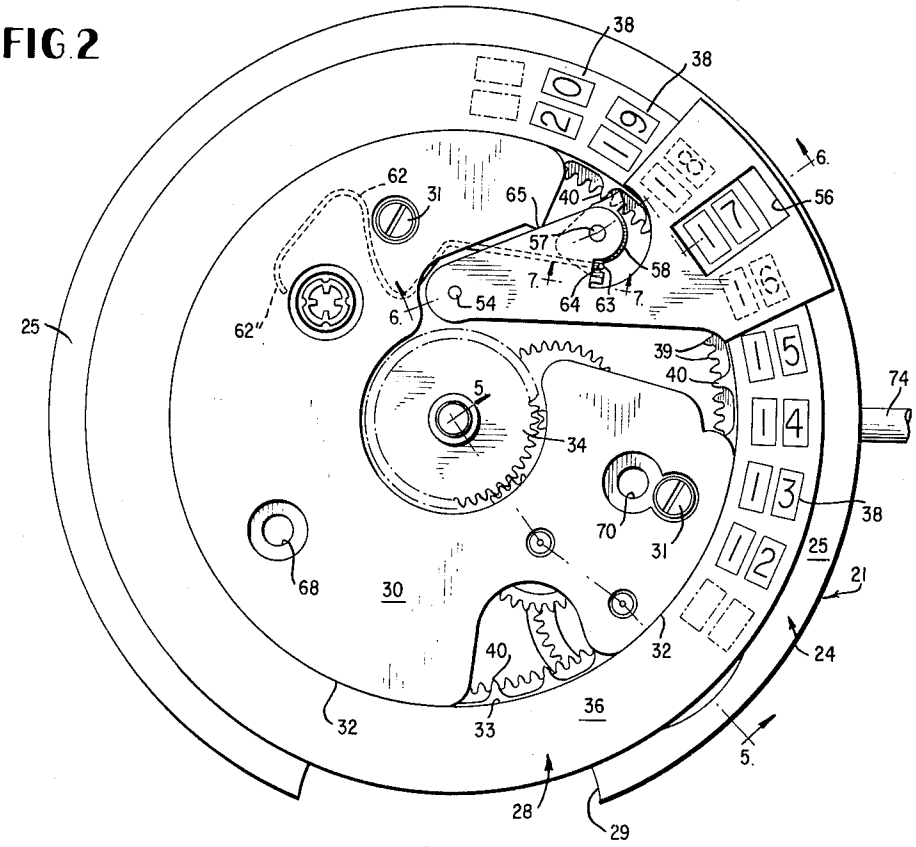
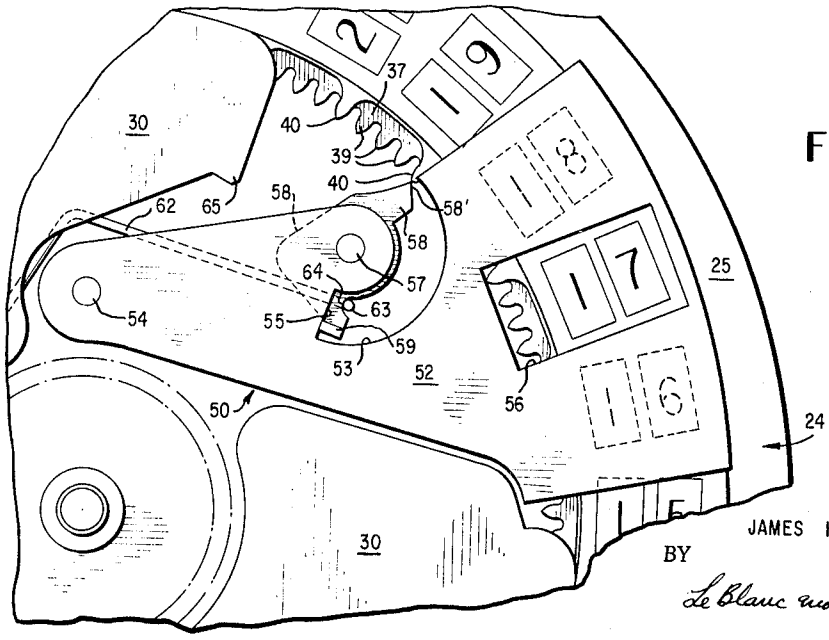


FIG. 3



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CALENDAR TIMEPIECE

Filed Oct. 1, 1962

3 Sheets-Sheet 3

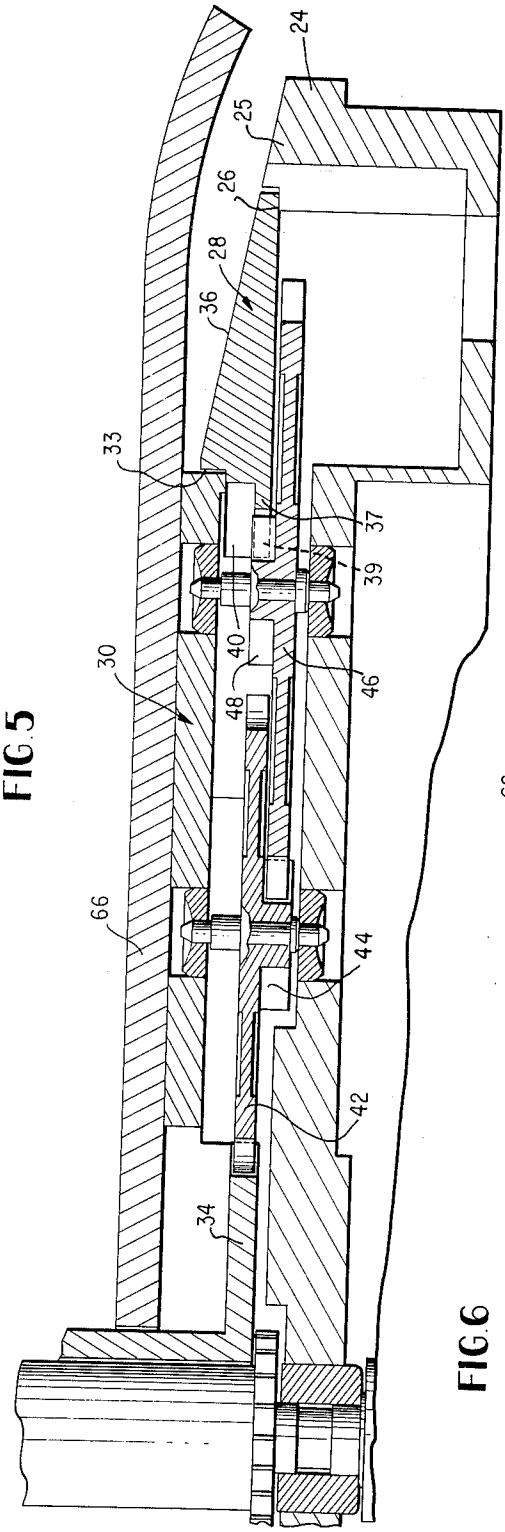

FIG. 5

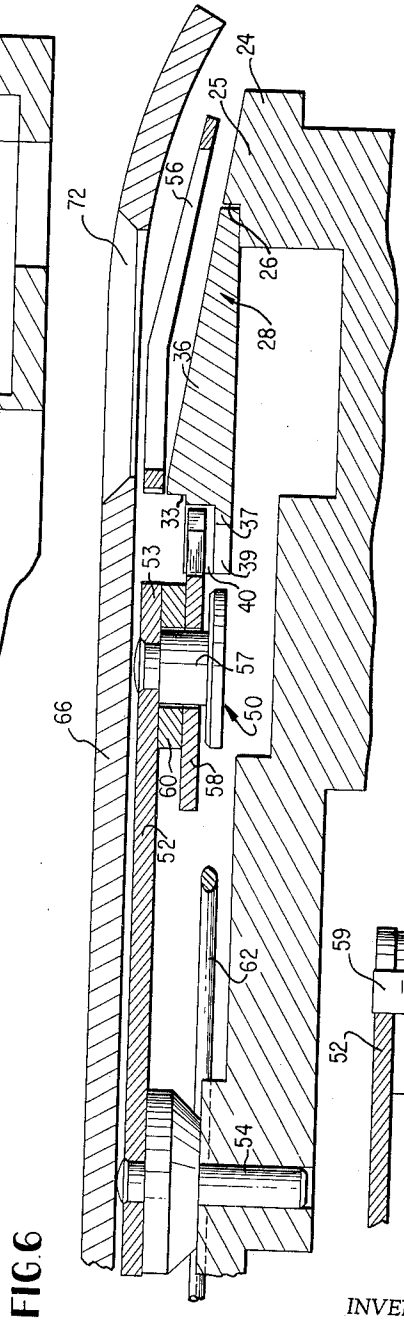

FIG. 6

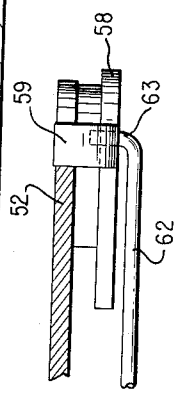

FIG. 7

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3,240,006

CALENDAR TIMEPIECE

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Filed Oct. 1, 1962, Ser. No. 227,160
7 Claims. (Cl. 58—58)

The present invention relates to a calendar timepiece and more particularly to a new improved calendar system especially adapted for use with electric wrist watches.

There are many existing timepiece calendar systems in which the movement of a watch or like timepiece is provided with a date bearing indicia means which is operated in timed relation to the hour wheel of the timepiece so as to indicate successive dtaes. 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 thirty-one equally spaced numbers which are successively exposed through a window in the dial as the disc is advanced 1/31st 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 1/31st 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 impose a quite high load on the source of power driving the dial train, and this load is more than existing electric 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 which are not in a full wind state.

Such prior calendar watch systems have other disadvantages. For example, the date ring can be turned in only one direction by manual operation of the usual crown and stem provided for setting the watch, whereby prolonged operation of the stem is necessary ot turn the calendar dial to expose a lower date number through the dial window.

It is a principal object of the present invention to provide a new improved calendar watch system which avoids the above discussed and other shortcomings of prior calendar watch systems, and can therefore be used in small battery-powered electric watches, or other types of watches which have insufficient power for the load imposed by the watch calendar systems heretofore available.

More particularly, it is an object of the present invention to provide a new improved calendar watch system which has a calendar date ring that is continuously engaged with and driven by the dial train over a 24 hour period, rather than for a short period like 3 hours each date, thereby reducing the power per hour for operating the date ring to a fraction (e.g., 1/8) of that required for existing calendar watch systems.

It is a related object of the present invention to even

further reduce the ratio of actual power per hour required to drive the watch calendar ring of the system of this invention compared to prior systems, by eliminating power losses characteristic of the relatively complicated cam system used in typical existing calendar watch arrangements.

It is another object of this invention to provide a new improved calendar watch system incorporating a novel shutter, dial, and calendar ring arrangement whereby the pertinent date number is entirely exposed through the watch dial window for a 24-hour period, with an instantaneous date advance at midnight.

It is a further object of this invention to provide a novel improved watch calendar system in which the date ring can be displaced in either direction by operation of the crown and stem to set the proper date numeral under the watch dial window, without jamming or locking any parts of the watch.

It is still another object of this invention to provide a novel and improved calendar watch system incorporating a novel geared date ring and cooperating shutter arrangement which is of simple, compact, and trouble-free construction. It is a related object to provide such a new improved calendar watch system utilizing a modified pillar plate and dial bridge arrangement which provide a track for the date ring and for mounting other operating components of the system.

It is still another object of this invention to provide such an improved calendar watch system which achieves the foregoing objects and advantages and can be utilized, with a minimum of appropriate modifications, in existing battery powered electric watch designs and also in existing automatic spring powered watches and other timepieces.

Other objects and advantages of the present invention will be apparent from the following description and appended claims and also the accompanying drawings wherein:

FIGURE 1A shows the dial face of a watch (electric) incorporating the new improved calendar system of the present invention, as it would appear at 12:01 a.m. on the 17th of the month;

FIGURE 1B is a partial showing of the watch dial face similar to that of FIGURE 1A showing how it would appear at 12:00 noon on the 17th of the month;

FIGURE 1C is a partial showing of the watch dial face similar to FIGURES 1A and 1B, showing how it would appear at 11:59 p.m. on the 17th of the month;

FIGURE 2 is a plan view of the dial side of an electric watch movement incorporating the calendar system of the present invention, the watch dial being removed, and operating portions of the watch calendar system being shown as they would be at 12:01 a.m. on the 17th of the month;

FIGURE 3 is an enlarged fragmentary plan view of part of the dial side of the watch, similar to FIGURE 2 but showing operating elements of the calendar system as they would be at 11:59 p.m. on the 17th of the month;

FIGURE 4 is a fragmentary plan view of the internal dial side of the movement of a watch incorporating the calendar system of this invention (the dial bridge and components mounted thereon as shown in FIGURES 2 and 3 being removed from the view of FIGURE 4);

FIGURE 5 is partial vertical section of a watch incorporating the calendar system of this invention, looking along line 5—5 in FIGURE 2 but with FIGURE 5 also showing a section of the watch dial;

FIGURE 6 is a fragmentary vertical section of part of the calendar watch looking along line 6—6 in FIGURE 2; and

FIGURE 7 is a fragmentary vertical section showing

part of the spring operated date ring shutter subassembly, looking along line 7—7 in FIGURE 2.

Referring to the drawings, the numeral **20** generally indicates a watch which may be any presently commercial 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, Pennsylvania, disclosed in Hamilton Service Bulletin No. 220, but modified to incorporate the watch calendar system of this invention as hereinafter amplified.

The watch movement, generally indicated by numeral **21**, includes a pillar plate **24** which is provided on its dial side with an annular peripheral ring **25** having an internal shoulder **26** for seating the lower exterior portion of an annular geared calendar ring **28**. It is noted that annular ring **25** and shoulder **26** of the pillar plate **24** need not extend for an entire 360 degrees around the periphery of the watch movement **21**, and in fact are partially cut away as at **29** for the purpose of receiving a small battery to power watch **20**. Also, the pillar plate **24** may be otherwise cut away, recessed, and apertured to accommodate other working parts of the watch as desired, as for example, in the aforementioned Hamilton 505 electric watch shown in Hamilton Service Bulletin 220. Such details of construction not related to the present invention as such are not described herein since they will be apparent to those skilled in the art in light of the present disclosure.

A dial train bridge **30** having a configuration shown especially in FIGURE 2 is concentrically mounted on the dial side of pillar plate **24** by means of bridge screws **31**, with bridge steadying pins (not shown) on the underside of bridge **30** as desired. It will be noted that dial train bridge **30** has partial circular edge portions **32**; these are adapted to be received within an annular shoulder **33** formed on the upper dial face side of calendar ring **28**. Thus, the circular edge portions **32** of dial train bridge **30** and annular shoulder **26** on the periphery of pillar plate **24** provide a track for the geared calendar ring **28**, whereby calender ring **28** is rotatable about the axis of center wheel **34** of watch **20**.

Calendar or date ring **28** is provided on its upper face **36** with thirty-one equally spaced numerals, numbered successively from 1 to 31 as shown in FIGURES 1–4. The lower internal annular portion **37** of calendar ring **28** is provided with 124 internal gear teeth **39**. Every fourth one of these internal gear teeth is extended in width to provide thirty-one equally spaced "high teeth" **40** which extend above the level of teeth **39** as is especially apparent from FIGURES 4, 5 and 6.

Center wheel **34** is the hour wheel and is rotatably mounted on the pillar plate **24** and a train side bridge forming part of movement **21**, in conventional manner. The hour wheel gear **34** drives an intermediate gear wheel **42** which is rotatably mounted in bearings in pillar plate **24** and dial bridge **30**; and the pinion **44** associated with gear wheel **42** drives a second intermediate gear wheel **46**, which has an associated pinion **48** drivingly engaging the gear teeth **39** of date ring **28**. Thus, the date ring **28** is driven clockwise in FIGURES 1–4 by the hour wheel **34** through the reduction gears and pinions **42, 44, 46, 48**; and the gear ratios are such that the date ring **28** makes one revolution in thirty-one days while the hour wheel **34** makes sixty-two revolutions in thirty-one days. The hour wheel **34** is driven at the proper rate by suitable watch mechanism such as that of the above mentioned Hamilton 505 electric watch in a manner apparent to those skilled in the art in light of the disclosure herein.

Referring especially to FIGURES 2, 3 and 6, calendar watch **20** of this invention also includes a shutter subassembly generally indicated at **50** which cooperates with the date ring **28** so that a certain date numeral **38** is entirely exposed for a 24-hour period, at the end of which the next successive date numeral is instantaneously exposed, as will now be explained.

The shutter assembly **50** comprises a main shutter plate **52** having non-rotatably secured thereto a pin or arbor member **54** which is pivotally mounted in an aperture in pillar plate **24**. The main shutter plate **52** has a rectangular aperture or shutter window **56** which overlies the numeral face **36** of date ring **28** and is of such size as to expose a particular date numeral **38** disposed below shutter window **56**, but not the adjacent date numerals (as shown particularly in FIGURES 2 and 3). Shutter subassembly **50** also has non-rotatably mounted thereon an arbor **57** on which there is pivotally mounted a pawl or "click" **58** having a configuration as shown in FIGURES 2, 3 and 6, with a suitable annular spacer washer **60**.

A wire tension spring **62** having a configuration as shown in FIGURE 2 is provided below the dial bridge **30**, with one end **62'** being suitably anchored in pillar plate **24**, and its other end **63** being bent so that it is secured by tension in a recess **64** in click **58**. Spring end **63** is positioned between click arbor **57** and a lug **59** which projects laterally from the main portion of click **58**, as shown in the drawings, whereby tension spring **62** biases the click **58** clockwise in FIGURES 2 and 3 so that lug **59** normally engages edge **55** of cut-out **53** in main shutter plate **52**, thus limiting the clockwise movement of click **58**. As will be apparent from FIGURES 2 and 3, the force of spring **62** also thereby applies to the main shutter plate **52** a counterclockwise moment about its pivotal mounting arbor **54**, and this counterclockwise motion is limited by a projection **65** on dial bridge **30**.

Dial **66** is mounted on the dial train bridge **30** in any suitable manner, as by a pair of dial feet (not shown) which are inserted in dial train bridge aperture **68** and **70**. The dial **66** is provided with a date window **72** which is radially positioned to overlie date ring **36** and is approximately twice as long as shutter window **56** and date numerals **38**. (It is noted that watch **20** is disclosed as having only an hour and minute hand. However, as will be apparent to those skilled in the art in the light of the disclosure herein, watch **20** incorporating the calendar system of this invention can be provided with a second hand in usual manner, as for example, in the aforementioned Hamilton Model 505 electric watch.)

Operation.—As the hour wheel **34** is rotated clockwise by the operating portion of watch movement **21**, the date ring **28** is caused to turn at the proper rate clockwise in the aforementioned track formed by the edges of pillar plate **24** and dial bridge **30**, due to the intermediate gear train **42, 44, 46, 48** which drives the date ring gear teeth **39**. Referring especially to FIGURE 2, which shows the date mechanism at 12:01 a.m. on the 17th of the month, the tooth **58'** of click **58** engages the "high" tooth **40** of calendar ring **28** so that the main shutter plate **52** is caused to pivot clockwise around its arbor **54** against the tension of spring **62** as the calendar ring **28** moves clockwise. The shutter window **56** is thereby caused to move along with the date ring **28** so that a certain date numeral is exposed through window **56** from just after 12:00 midnight until about 11:59 p.m. on the same date; and during this time tooth **58'** of click **58** progressively slides from the base to the crest of the engaged high tooth **40** until click tooth **58'** is in the position shown in FIGURE 3. The click tooth **58'** can now slip past tooth **40**, and spring **62** quickly pivots the main shutter plate **52** counterclockwise until it strikes projection **65** on dial train plate **30**, whereafter the next succeeding high tooth **40** of date ring **28** immediately engages click tooth **58'**. The main shutter plate **52** is again caused to be displaced clockwise with the date window **56** moving along with the next date numeral during the next twenty-four hour period.

Thus, in the calendar system of this invention, the appropriate date number on the calendar ring is entirely exposed for a twenty-four hour period by the shutter

window **56** because the latter advances in step with the date number, and the shutter subassembly **52** is returned by light spring tension to its starting position substantially instantaneously, thereby exposing the next suceeding date number at midnight. Accordingly, the proper date is exposed through the dial window **72** as illustrated in FIGURES 1A, 1B and 1C, which show the date numeral for the 17th of the month at 12:01 a.m., 12:00 noon and 11:59 p.m., respectively. At 12:01 a.m. the next day, the numeral 18 would appear in place of 17 as shown in FIGURE 1A.

The watch movement **21** is provided with a conventional crown and stem arrangement for rotating the hour wheel **34** to set the hour and minute hands; for example, the corresponding mechanism of the aforementioned Hamilton Model 505 electric watch can be used, with the stem **74** preferably at the 4:00 o'clock position as shown in the drawings, so that the dial date window **72** may be at the 3:00 o'clock position. The rotation of stem **74** to set the hour and minute hands causes rotation of the date ring **28** through hour wheel **34**, gear train **42, 44, 46, 48**, and the date ring gear teeth **39** so that the desired date numeral can be exposed through shutter window **56** and dial window **72**. It will be noted that since the click **58** of shutter subassembly **50** is pivotally mounted with a biasing spring **62** to retain it in normal operating position, the date ring **28** may be moved counterclockwise as well as clockwise without jamming any of the usual stem operated hour wheel setting mechanism, shutter subassembly **50**, or any other parts of watch movement **21**. Thus, date ring **28** may be set for the first day of the month when the preceding month was less than 31 days, through operation of the crown and stem. Also, in the event the watch has not been running (e.g., when on display), and it is necessary to set the date ring to a few days earlier than the date exposed through the shutter and dial windows, the date ring can be turned counterclockwise to set it; without this feature it might be necessary to wind the date ring clockwise with as many as 60 revolutions of the hour wheel **34**, as is the case with typical calendar watch system heretofore available.

It will be apparent from the foregoing that the present invention provides a new improved calendar watch system particularly useful in small battery powered electric watches, in which the calendar date ring is continuously in engagement with and driven by the dial train over a twenty-four hour period, thus reducing operating power per hour, with the pertinent date number being entirely exposed through the watch dial for the involved twenty-four hour period and with an instantaneous date advance at midnight. It will further be apparent that the present invention avoids serious shortcomings of prior calendar watch systems and achieves important advantages in construction, mode of operation and result, as discussed earlier in this application.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are 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 timepiece comprising: a timepiece movement including a pillar plate with a dial train bridge mounted thereon, part of said pillar plate and dial train bridge being formed to provide an annular track, and said movement including an hour wheel; an annular calendar ring rotatably mounted in said track between said pillar plate and said dial train bridge, said calendar ring having a series of successive numerals thereon for indicating days of the month; means for continuously displacing said calendar ring in timed relation to operation of said hour wheel; movable shutter means pivotably mounted on part of said movement and including a portion defining a window overlying a part of said date ring, said window having an arcuate length approximately equal to the height of respective date indicating numerals on said calendar ring; means associated with said calendar ring for causing said shutter means to pivot so that said shutter window moves along with said date ring to expose a certain date numeral therethrough during a given date; and means for causing said shutter means to change position with respect to said calendar ring so as to substantially instantaneously expose the next successive date numeral thereon through said shutter window.

2. A calendar timepiece as defined in claim **1** further comprising a dial face on said movement, a portion of said dial face defining a window radially positioned to overlie the date numerals on said calendar ring, said dial window having an arcuate length approximately twice the height of the respective date numerals on the calendar ring, said shutter window and a certain date numeral exposed therethrough moving from adjacent the counterclockwise edge of said dial window to adjacent the clockwise edge of said dial window during a twenty-four hour period, with the shutter window returning to adjacent the counterclockwise edge of said dial window when the next date numeral is exposed.

3. A calendar timepiece as defined in claim **2** including spring means for biasing said shutter means counterclockwise and stop means on said dial train bridge for limiting counterclockwise movement of said shutter means so as to properly position said shutter window adjacent the counterclockwise edge of said dial window when the shutter changes position to expose the next successive date numeral through the shutter window.

4. A calendar timepiece comprising: a timepiece movement including a pillar plate with a dial train bridge mounted thereon, part of said pillar plate and dial train bridge being formed to provide an annular track, and said movement including an hour wheel; an annular calendar ring rotatably mounted in said track between said pillar plate and said dial train bridge, said calendar ring having a series of successive numerals thereon for indicating days of the month; said calendar ring having a plurality of gear teeth totalling in number a multiple of the number of date numerals on said calendar ring; means drivingly connecting said hour wheel with said calendar ring gear teeth for continuously displacing said calendar ring in timed relation to the operation of said hour wheel; said calendar ring also including equally spaced teeth in the same number as the number of date numerals on said calendar ring; a shutter member pivotably mounted on part of said movement with a portion thereof defining a window overlying part of said date ring, said window having an arcuate length approximately equal to the height of respective date indicating numerals on said calendar ring; pawl means on said shutter member for successively engaging one of said equally spaced teeth so that movement of said calendar ring causes said shutter member to pivot so that said shutter window moves along with said date ring to expose a certain date numeral therethrough during a given date, said shutter member being pivoted at a location so that said pawl will disengage from the one of said equally spaced teeth on said calendar ring, with means for thereupon causing said shutter member to be displaced so that said pawl engages the next successive equally spaced tooth on said calendar ring, thus substantially instantaneously changing the date numeral on said calendar ring exposed through said shutter window.

5. A calendar timepiece as defined in claim **4** wherein said calendar ring has thirty-one equally spaced numerals numbered from 1 to 31, each adapted to successively move below said shutter window, and also has thirty-one of said equally spaced pawl-engaging teeth each of which is

formed as an extension of one of said first-mentioned calendar ring gear teeth.

6. A calendar timepiece as defined in claim 4 wherein said pawl is pivotally mounted on said shutter member with means for limiting its motion in the general direction of the motion of said calendar ring during watch operation, and further comprising spring means anchored on said watch movement with a part thereof engaging a portion of said pawl so as to bias the pawl in the direction of motion limited by said stop means and also bias said shutter member about its pivotal mounting in substantially the opposite direction; and stop means on said movement for limiting the movement of said shutter member in said opposite direction so as to properly position said shutter window with respect to the numerals on said calendar ring with said pawl engaging the next of said equally spaced teeth after the pawl has been disengaged from the preceding of said equally spaced teeth.

7. A calendar timepiece as defined in claim 6 further comprising a dial face on said movement, a portion of said dial face defining a window radially positioned to overlie the date numerals on said calendar ring, said dial window having an arcuate length approximately twice the

height of the respective date numerals on the calendar ring, said shutter window and a certain date numeral exposed therethrough moving from adjacent the counterclockwise edge of said dial window to adjacent the clockwise edge of said dial window during a twenty-four hour period, with the shutter window returning to adjacent the counterclockwise edge of said dial window when the next date numeral is exposed by the action of said spring when said pawl disengages from the one of said equally spaced teeth associated with the preceding date numeral.

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