Nov. 21, 1967 D. W. BRASHEAR 3,353,348

ELECTRIC WATCH CALENDAR MECHANISM

Filed Oct. 29, 1965 3 Sheets-Sheet 1

FIG.1a

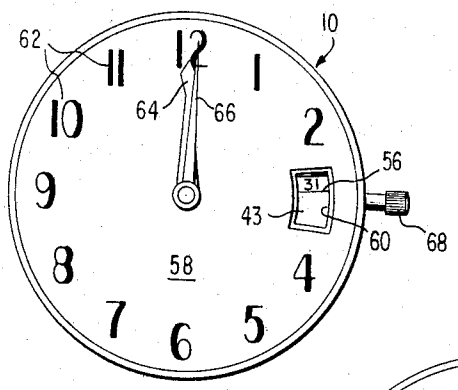


FIG.1b

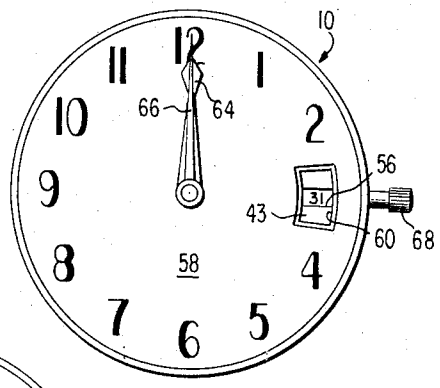


FIG.1c

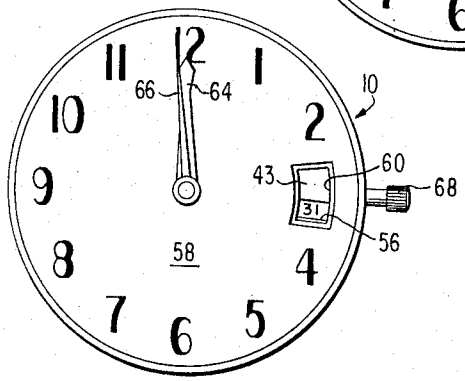
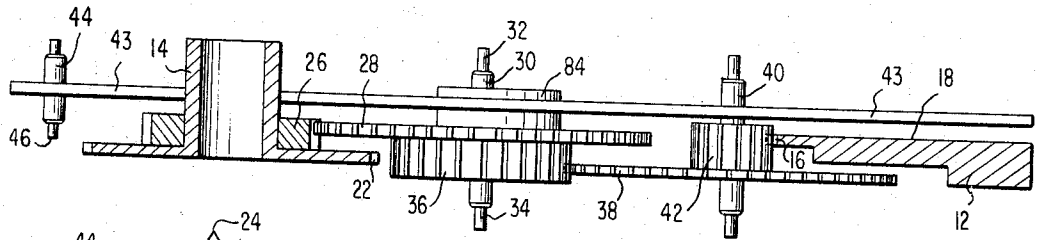


FIG.4



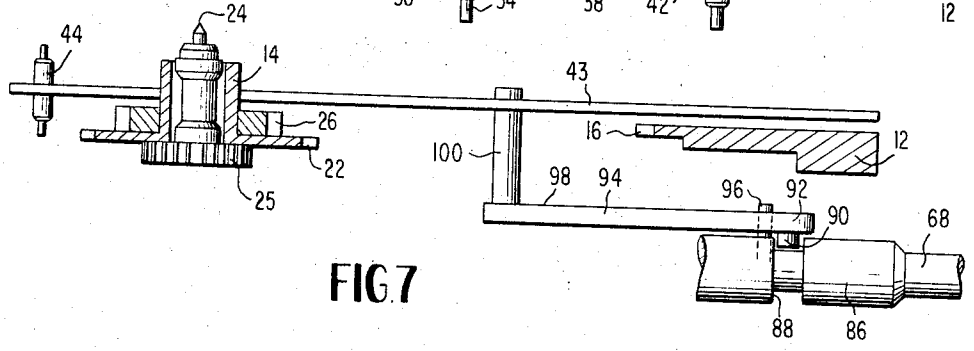


FIG.7

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Nov. 21, 1967 D. W. BRASHEAR 3,353,348

ELECTRIC WATCH CALENDAR MECHANISM

Filed Oct. 29, 1965 3 Sheets-Sheet 2

FIG. 2

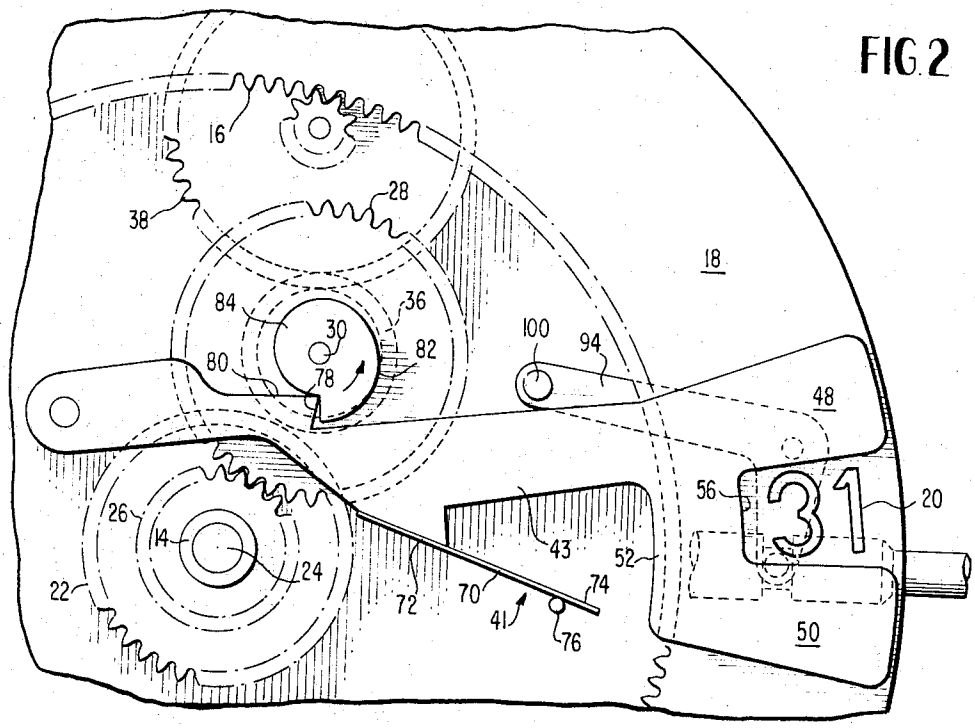
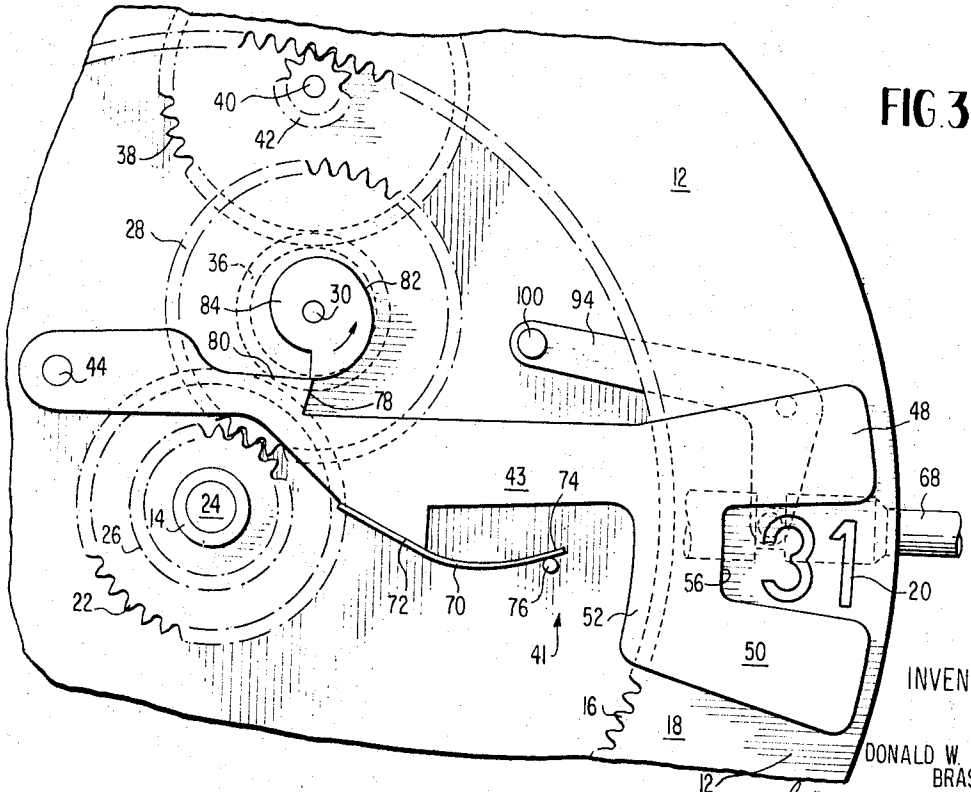


FIG. 3



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Filed Oct. 29, 1965 3 Sheets-Sheet 3

FIG.5

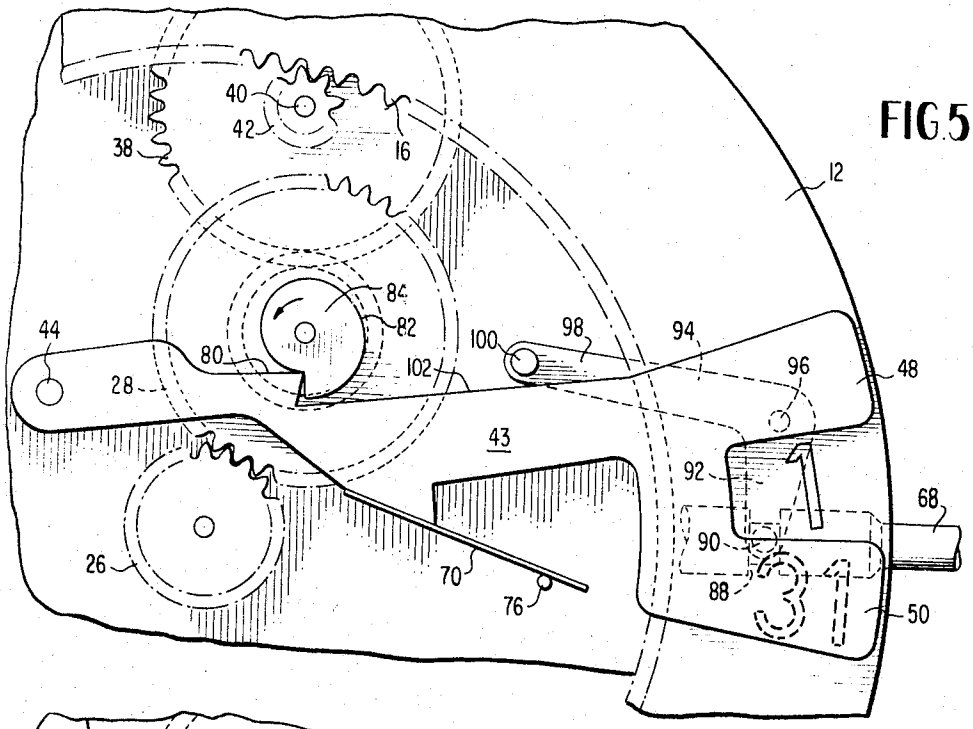
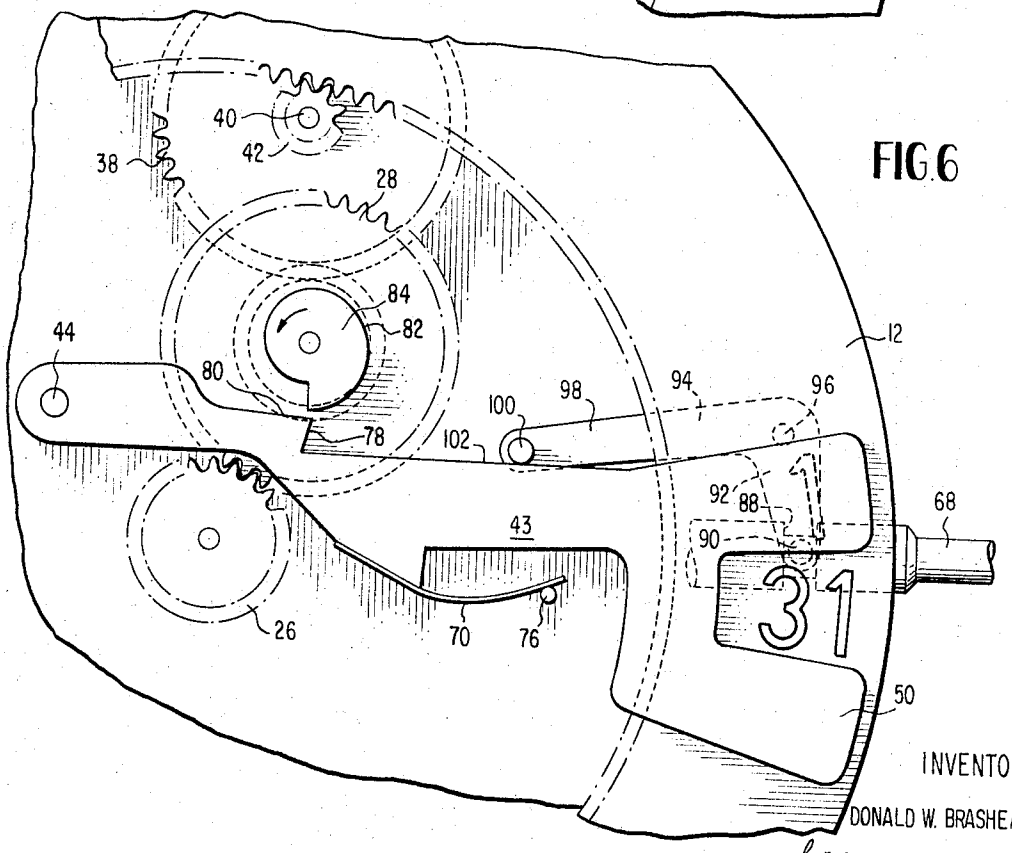


FIG.6



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United States Patent Office

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ELECTRIC WATCH CALENDAR MECHANISM

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Filed Oct. 29, 1965, Ser. No. 505,658
19 Claims. (Cl. 58—58)

ABSTRACT OF THE DISCLOSURE

The calendar timepiece has a calendar ring continuously driven from a dial train as to advance 1/31 of a revolution during each 24 hour period of watch operation. A shutter mechanism is continuously driven by a cam wheel in the dial train such that the shutter continuously follows advancing indicia on the calendar ring for twenty-four hours, whereupon a cam follower portion on the spring-biased shutter mechanism moves so that the shutter snaps back to the next following date and immediately begins to follow movement of the next date on the calendar ring. A two-position stem is provided which declutches the shutter mechanism from the dial train upon longitudinal movement of the stem from one position to another so that the calendar ring can be set in either direction by rotation of the stem.

The present invention relates to calendar timepieces, and more particularly to an improved watch-calendar mechanism particularly suited for use in electric watches.

Many calendar-timepiece systems exist in which the movement of the watch or like timepiece is provided with a date-bearing indicia ring or calendar ring operated in timed 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 ring is advanced 1/31 of a revolution each twenty-four hours by a mechanism interconnecting the calendar ring with the dial train of the watch.

In most of these systems the dial train is effectively disconnected from the calendar indicia ring or disc for about twenty-one 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 in driving engagement with the calendar ring, usually through a camming gear, so as to cause the calendar ring to advance 1/31 of a revolution. The calendar 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. The next date number is exposed for approximately twenty-one hours and is thereafter replaced by the following successive number when the calendar ring is again drivingly engaged with the dial train by the intermediate drive mechanism and thus displaced.

Most existing calendar-watch drive mechanisms 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 battery power source. Also, due to the relatively high power requirements of these prior watch-calendar systems, they present problems with so-called automatic or self-winding spring-driven watches when these watches are not in the full-wound state. In many cases additional disadvantages exist, including the fact that 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 to turn the calendar ring to expose a lower date number through the dial window.

In assignee's United States Patent No. 3,240,006, granted Mar. 15, 1966, there is disclosed an improved calendar timepiece overcoming many of the disadvantages of the earlier constructions. In the watch-calendar mechanism of the aforesaid copending application, a calendar date ring is continuously engaged with and driven by a dial train for a twenty-four hour period rather than for a short period like three 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 prior watch systems. In addition, the date number of that watch is entirely exposed through the watch dial window for a complete twenty-four-hour period, with a novel shutter arrangement providing an instantaneous date advance at or near midnight. Setting of the date ring in either direction is permitted.

While the watch of that application has proved very satisfactory and has significantly reduced the power necessary to drive the calendar mechanism, some wearers have objected to the fact that the calendar mechanism does not always operate exactly at the stroke of twelve midnight.

The present invention is directed to an improved calendar-timepiece mechanism which retains all the advantages of the structure set forth in the above-mentioned copending application, yet at the same time provides a simplified, inexpensive date mechanism which changes over in a reliable manner at or very near midnight of each date. As in assignee's previous construction, the date ring of the present invention is continuously driven through the watch gearing and this continuous drive is employed in conjunction with a shutter mechanism which is tripped to change the displayed date in a simple, efficient, effective and reliable manner at or very close to midnight of each twenty-four-hour day. An additional important feature of the present invention is the provision of a simple, inexpensive and reliable mechanism by which the date may be manually set in either direction through a simple manipulation of the watch-hand setting stem and crown.

It is therefore one object of the present invention to provide an improved calendar timepiece.

Another object of the present invention is to provide an improved electric calendar watch.

Another object of the present invention is to provide improved drive and setting mechanisms for an electric calendar watch.

Another object of the present invention is to provide an improved shutter trip mechanism for calendar watches.

Another object of the present invention is to provide a novel and improved calendar-watch system incorporating a gear-driven date or calendar ring and cooperating shutter arrangement which is simple, compact, and of trouble-free construction.

In the present invention, the calendar ring is provided with internal teeth and is continuously driven from the dial train of the watch so as to advance 1/31 of a revolution during each twenty-four-hour period of watch operation. Also provided is an improved shutter mechanism similarly continuously driven by a cam wheel in the dial train such that the shutter continuously follows the movement of the advancing indicia on the calendar ring. At or close to the exact stroke of midnight, a cam-follower portion of the shutter mechanism moves under the influence of a return spring from the radially outermost portion to the radially innermost portion of the dial-train-driven cam, so that the shutter substantially instantaneously snaps back to the

next following date and again immediately begins to follow the movement of the next date on the calendar ring.

An additional important feature of the present invention resides in the provision of a simplified and novel assembly for accurately and reliably setting the calendar ring to the desired date. This mechanism operates in conjunction with the cam-driven shuter and includes a conventional two-position watch setting stem which in a first position permits the watch to run in a normal manner but when set into a second position engages the dial train so that rotation of the setting stem by manual manipulation thereof, moves the gears of the dial train to set the hands of the watch in either direction. Connected at one end to the setting stem is a pivoted lever which carries at its other end a pin. During normal operation of the watch mechanism with the setting stem in the first position such that the setting or crown gear of the stem is disengaged from the dial train, the lever pin is slightly spaced from the calendar shutter. However, when the setting stem is moved into the second position in engagement with the dial train for setting the watch hands, the lever mechanism is pivoted about its support such that the pin which it carries bears against the shutter so as to move the cam-follower portion of the shutter away from its driving cam. In this position the shuter is completely disengaged from the dial train, and rotation of the setting stem not only acts to set the watch hands through manual rotation of the dial-train gears but, at the same time, makes it possible to set the calendar ring in either direction through this same dial-stem rotation because of the fact that the dial train is in continuous driving engagement with the internal gear of the calendar ring.

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

FIGURE 1*a* shows the dial face of an electric watch incorporating the new, improved calendar system of the present invention as it appears at 12:01 a.m. on the thirty-first day of the month;

FIGURE 1*b* is an illustration of the watch dial face similar to that of FIGURE 1*a*, showing how it appears at high noon on the thirty-first day of the month;

FIGURE 1*c* is an illustration of the watch dial face similar to FIGURES 1*a* and 1*b*, showing how it appears at 11:59 p.m. on the thirty-first day of the month;

FIGURE 2 is a partial plan view of a portion of the watch structures of FIGURES 1*a*–1*c*, illustrating the novel calendar-ring drive mechanism and shutter assembly of the present invention corresponding to the 12:01 a.m. position of the watch hands illustrated in FIGURE 1*a*;

FIGURE 3 is a view similar to FIGURE 2, with the drive mechanism and shutter mechanism moved to the 11:59 p.m. position corresponding to the position of the watch hands illustrated in FIGURE 1*c*;

FIGURE 4 is a composite vertical cross section through a portion of the dial train, illustrating the continuous-drive connection for the calendar ring;

FIGURE 5 is a partial plan view with parts in phantom illustrating the setting mechanism of the present invention in a first or normal position where the watch freely runs with the setting mechanism disengaged from the gear train;

FIGURE 6 is a view similar to that of FIGURE 5, with the setting stem in a second position and the shutter unclutched or disengaged from its drive cam so that the watch hands and calendar ring may be manually set in either direction by rotation of the setting stem; and

FIGURE 7 is a partial vertical cross section through the assembly of FIGURES 5 and 6, showing the clutch lever and setting stem connection.

Referring to the drawings, the reference numeral **10** generally indicates a watch which may be any presently commercially available watch having a movement of suitable design. By way of example only, the movement may

be that used in the Model 505 electric watch of the Hamilton Watch Company, Lancaster, Pa., disclosed in Hamilton Service Bulletin No. 220, but modified to incorporate the watch-calendar system of this invention as hereinafter set forth. Alternatively, the watch may be of the more recent type identified as Hamilton Electric Watch Model 510.

The watch movement of the present invention may be of the type disclosed in the aforementioned copending application S.N. 227,160, filed Oct. 1, 1962, and includes, as best seen in FIGURES 2 through 4, a calendar ring **12** mounted between the dial side of a pillar plate and a dial train bridge (neither of which are shown). The pillar plate and dial train bridge provide a track for the calendar ring **12** whereby the calendar ring is rotatable about the axis **24** of a center wheel or hour wheel **14** of the watch. For a more detailed discussion of the mounting arrangement for calendar ring **12** reference may be had to the aforementioned copending application S.N. 227,160, which is incorporated herein by reference. The annular indicia-carrying ring **12** is provided along its inner edge with gear teeth **16** of uniform size and shape, which teeth are equally spaced over the entire inner periphery of the calendar ring. The calendar ring **12** is further provided on its upper face **18** with thirty-one equally spaced numerals **20** numbered successively from 1 to 31.

Center wheel **14** is the hour wheel of the watch and is coupled to the remainder of the watch dial train in a conventional manner by the hour-wheel gear **22**. That is, the hour wheel **14** is coupled to the remaining portions of the watch train through the gear **22** in the conventional manner and makes one complete revolution every twelve hours. The central axis of the watch movement is indicated at **24** in FIGURE 4 as passing through the center of the hour wheel, and this also forms the central rotational axis for the calendar ring **12**. The hands of the watch are driven from the dial train in the usual manner and the dial train is concentric with a cannon pinion **25** provided for this purpose, as illustrated in FIGURE 7.

Hour wheel **14** is concentric with a calendar drive pinion **26** which is coupled to an intermediate gear **28** mounted on a staff **30**. The ends **32** and **34** of the staff **30** are received in suitable jewel bearings mounted in stationary portions of the watch movement so that the intermediate gear **28** rotates with the staff **30**. Also carried by staff **30** is an intermediate pinion **36** which meshes with the teeth of a calendar gear **38** similarly mounted for rotation with a second similar staff **40**. Rotatably mounted staff **40** also carries a calendar pinion **42** having teeth meshing with the internal teeth **16** of the calendar ring **12** such that rotation of pinion **42** with its rotatably mounted staff **40** drives the calendar ring **12** by way of teeth **16**. The step-down ratio of the gear coupling between hour wheel **14** and calendar ring **12** is such that the calendar ring **12** makes $\frac{1}{31}$ of a revolution about the central watch movement axis **24** during each twenty-four-hour period that the watch runs. Pinion **42** at all times engages the teeth **16** of the calendar ring so that the calendar ring is continuously driven from the watch movement and, more specifically, from the hour wheel **14** by way of the intermediate and drive gears and pinions described.

The calendar watch of this invention also includes a shutter assembly, generally indicated at **41** in FIGURE 2, which cooperates with the date ring **12** so that a certain date numeral **20** is entirely exposed for a twenty-four-hour period, at the end of which time the next successive date numeral is instantaneously exposed in a manner now to be explained.

Shutter assembly **41** includes a shutter **43** of elongated configuration, which shutter is pivotally mounted on a rotatable staff **44** to pivot about the pivot axis indicated at **46** in FIGURE 4. The shutter is provided with a pair of fingers **48** and **50** joined by a base portion **52**, which fingers are spaced to define a shutter window **56** for ex-

posing one of the indicia **20** on the date or calendar ring **12**. The window **56** is preferably of slightly larger size than the date indicia **20**, so that the date is fully and clearly exposed through the window **56**. The shutter **43** underlies the watch dial **58**, which in turn is provided with an arcuate window **60** of approximately the same width as shutter window **56** but approximately three times the arcuate length of the latter, as illustrated in FIGURES 1*a*, 1*b* and 1*c*. The watch dial itself is provided with the usual hour indicia **62**, and projecting through the dial are the drive shafts for the hour hand **64** and minute hand **66** which sweep over the dial. These hands may be manually set in a conventional manner by rotation of a setting stem **68** also illustrated in these figures.

Intermediate of its ends, shutter **43** carries an elongated, flat leaf spring **70** secured at one end **72** to the shutter and bearings at its other end **74** against a stationary pin **76** suitably mounted in the watch movement. Also provided on the shutter intermediate its ends is a stepped portion **78** forming a cam-follower surface **80** adapted to bear against and follow the outer cam surface **82** of a rotary cam **84**. This cam **84** is mounted for rotation on shaft **30** with intermediate gear **28** and pinion **36**. This shaft, due to the 2-to-1 step-down ratio provided by pinion **26** and gear **28**, makes one complete revolution every twenty-four hours of watch running time.

Setting stem **68** is positioned beneath the calendar ring **12**, preferably at the three-o'clock position of the watch. The setting stem is of conventional construction and normally carries a crown gear (not shown) adapted to be moved into engagement with a portion of the dial train such that rotation of the setting stem rotates the hands **64** and **66** through the dial train in a conventional manner. When the stem is moved inwardly from an outer setting position to an inner neutral or normal operating position, the crown gear is disengaged from the watch train and the watch is free to run in a normal manner.

As best seen in FIGURES 5–7, the watch stem **68** is provided at its inner enlarged end **86** with an annular groove **88**. Captured and retained in this groove is the end of a circular pin **90** projecting laterally from the lower arm **92** of a setting lever **94**. This lever is pivoted to the watch movement at **96** and is provided with a longer arm **98** underlying the shutter and having at its extreme inner end an upwardly projecting pin **100** which intercepts the plane of movement of shutter **43**. In normal operation, the edge of pin **100** is slightly spaced from the adjacent edge **102** of the shutter **43**, as illustrated in FIGURE 5.

During normal operation, setting stem **68** is in the innermost position illustrated in FIGURE 5, disengaged from the watch train and with the lever **94** pivoted to its upper position, as illustrated in that figure, with the pin **100** clear of adjacent edge **102** of the shutter. At this time, the calendar ring **12** is continuously driven from hour wheel **14** through the gears and pinions carried by shafts **30** and **40** and by way of calendar pinion **42** meshing with internal teeth **16** on the date ring. At the same time, shutter **43** is urged by spring **70** bearing against post or pin **76** such that the cam-follower surface **80** on the shutter engages the cam surface **82** of the rotating cam. The curvature of cam surface **82** is selected such that as the follower surface **80** rides up on the cam, it causes the shutter to pivot about axis **46** so that the window **56** between arms **48** and **50** of the shutter follow one of the indicia **20** on the calendar ring. At or very close to the stroke of midnight, cam **84** completes one full revolution in the direction of the arrow in FIGURES 2 and 3 and the tip of the step **78** on the shutter moves from the position illustrated in FIGURE 3 back to the position illustrated in FIGURE 2—i.e., the cam-follower surface **80** moves from its radial outermost point on the cam to the radially innermost point on the convolute cam surface **82**. This return-action of the shutter is under the influence of spring **70** which causes the shutter to rapidly jump at the stroke of midnight from the previous reference numeral to the next reference numeral, so that this latter numeral is now exposed through the window **56** of the shutter. Then during the subsequent twenty-four-hour period, the cam **84** causes the shutter to pivot and move along with the indicia on the ring **12** so that this indicia is continuously exposed through the window **60** of the dial **58**, the length of this latter window being of sufficient length to fully expose the indicia numeral through the entire twenty-four-hour period.

In the event that the watch has been stopped, a new month follows a month with less than thirty-one days; or if for some other reason it is desirable to adjust the date on the watch, this adjustment may be simply and readily effected by means of the setting stem **68**. To accomplish manual setting of the calendar ring, it is only necessary that the setting stem **68** be pulled longitudinally outwardly from the first position illustrated in FIGURE 5, indicative of normal operation, to a second radially outer position, illustarted in FIGURE 6, indicative of the setting position for the watch. This outward movement of the setting stem **68** causes the lever **94** to rotate about pivot **96** to bring pin **100** into engagement with the edge **102** of the shutter. The lengths of the lever arms are chosen such that the pivotal movement of the lever is sufficient to move the shutter **43** against the bias of spring **70** clear of the cam surface **82** of cam **84** irrespective of the rotary position of the cam. As a result, the shutter mechanism is completely free of the watch drive when the stem is in its outermost position, as illustrated in FIGURE 6, and the stem may be manually rotated in either direction to effect the desired calendar adjustment. The lever **94** acts as a clutch to disengage the shutter from the cam and hence the watch gearing. By rotating the hands of the watch through twenty-four hours, in a conventional manner, the operation of the gearing coupling the dial train of the watch to the calendar ring will simultaneously cause the ring to be manually rotated from one day to the next. Further adjustments of the date may be effected by further rotation of the calendar ring in either direction. Similarly, smaller adjustments in the position of the calendar ring can be made, if desired, by setting the hands of the watch through a period of less than twenty-four hours. Irrespective of the amount of adjustment, both the calendar ring and the watch hands will utilmately assume the appropriate position, since they are at all times intercoupled by means of the gear train and the intermediate and drive gears previously described. The only requirement for preserving this relationship is the initial positioning of the cam **84** during watch assembly such that the cam-follower portion of the shutter passes over the stepped portion of the cam at a time when the watch hands indicate twelve o'clock (or midnight in the case of a twenty-four-hour-watch). Once this initial relationship is established between the cam setting and that of the watch hands, it is maintained throughout the life of the watch due to a continuous and constant connection of the cam, watch hands and calendar ring to the dial train of the watch.

It is apparent from the above that the present invention provides an improved calendar-watch system and particularly an improved shutter trip mechanism 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 or very close to midnight. The cam and cam-follower assembly for actuating the shutter mechanism is a relatively simple, inexpensive construction; takes up a minimum of space; and provides for very reliable operation wherein the date change occurs accurately and repeatedly at the desired hour.

A further important feature of the present invention in addition to the novel shutter-trip in conjunction with a

continuous calendar-ring drive, is the provision of a novel simplified and inexpensive ararngement for manually setting the calendar ring in either direction to the desired date. This is accomplished through the action of a simple clutch in the form of a pivoted lever member connected to the conventional two-position setting stem of the electric watch, which lever acts to lift the cam-follower portion of the shutter free of the cam during periods when the watch hands, and hence the calendar ring, are being reset to the desired position. This system completely obviates the necessity for sometimes advancing the calendar ring through as much as almost an entire month, which is the case with some systems wherein the calendar ring may only be set in a single direction. Again, the calendar-ring setting mechanism is of simple, inexpensive and reliable construction and does not significantly add to the cost, number of components, or space required in the watch structure.

While the invention has been described in conjunction with small battery-powered electric watches, it is apparent that the calendar mechanism of the present invention is applicable to all types of watches, clocks and other timepieces. It finds particular utility in timepiece systems wherein the available power is limited, and which for this reason advantageously employ a continuous drive to the calendar ring, with its accompanying substantial reduction in required power. Furthermore, it is possible to modify the stem **68** to provide three positions—i.e., separate hand and calendar-ring setting positions in addition to the normal running position—so that the calendar ring can be manually set without turning the watch hands.

The ivention 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. In a calendar timepiece, the improvement comprising rotatable calendar means having data indicia thereon, means for continuously rotating said calendar means having a window overlying a portion of said calendar means, cam means operably connected to said calendar rotating means for movement relative to said calendar means and arranged in controlling relation to said shutter means for moving said shutter means in synchronism with said calendar means during substantially all of each 24-hour period and clutch means engageable against said shutter means for disengaging said shutter means from said cam means during setting of said calendar means.

2. In a calendar timepiece, the improvement comprising rotatable calendar means having date indicia thereon, means for continuously driving said calendar means at a rate such that it advances one indicia per day, shutter means having a window overlying a portion of said calendar means, cam means operably connected to said calendar-rotating means for moving relative to said calendar means and arranged in controlling relation to said shutter means for moving said shutter means in synchronism with said calendar means during substantially all of each day, cam-follower means on said shutter means, and means coupled to said shutter means resiliently urging said cam-follower means against said cam means.

3. A device according to claim **2** including a setting stem and means responsive to longitudinal movement of said setting stem for disengaging said cam-follower means from said cam means.

4. In a calendar timepiece, the improvement comprising a calendar ring having date indicia thereon, means in said timepiece for continuously driving said calendar ring at a rate of $\frac{1}{31}$ of a revolution per day, shutter means pivotally mounted in said timepiece and having a window overlying a portion of said calendar ring, a continuously-driven rotatable cam in said timepiece operably connected to said calendar ring drive means for movement relative to said calendar ring, and means resiliently urging said shutter against said cam whereby said shutter pivots to follow the movement of said calendar ring during each day.

5. In a calendar timepiece, the improvement comprising a calendar ring having date indicia thereon, means in said timepiece for continuously driving said calendar ring at a uniform speed, a shutter having a window at one end overlying a portion of said calendar ring, means pivotally mounting the other end of said shutter in said timepiece, a continuously-driven rotatable cam in said timepiece, said cam having a convolute cam surface with a stepped portion joining the radially innermost and outermost portions of said cam surface, and means resiliently urging said shutter against said cam surface.

6. A device according to claim **5** including means for driving said cam in synchronism with said calendar ring whereby said window advances with an indicium on said calendar ring until said shutter passes over said stepped portion of said cam surface from said radially outermost portion to said radially innermost portion.

7. A device according to claim **6** including a setting stem in said timepiece, a lever pivotally mounted in said timepiece and having one end coupled to said setting stem, the other end of said lever being movable into engagement with said shutter to remove said shutter from said cam surface.

8. A calendar timepiece comprising a timepiece movement having an hour wheel, a calendar ring bearing a series of date indicia rotatably mounted on said movement, means for continuously rotating said calendar ring in proper timed relation to said hour wheel, a shutter having a window overlying a portion of said calendar ring, a single rotatable cam on said movement bearing against said shutter for advancing said shutter within an indicium on said calendar ring during the greater portion of each day, and means for continuously rotating said cam in proper timed relation to said hour wheel such that said cam completes one revolution for each twenty-four revolutions of said hour wheel.

9. A calendar timepiece comprising a timepiece movement having an hour wheel, a calendar ring bearing a series of date indicia rotatably mounted on said movement, a shutter pivoted in said timepiece and having a window overlying a portion of said calendar ring, means for continuously rotating said calendar ring in proper timed relation to said hour wheel, said means including internal gear teeth on said calendar ring and a gear train having a proper reduction ratio interconnecting said calendar-ring gear teeth and said hour wheel, a rotatable cam in said timepiece, gear means coupling said hour wheel and said cam for continuously driving said cam in proper timed relation to said calendar ring, said cam having a convolute cam surface with a stepped portion joining the radially innermost and outermost portions of said cam surface, and means resiliently urging said shutter against said cam surface.

10. A calendar timepiece comprising a calendar ring having a series of date indicia thereon, means in said timepiece for continuously driving said calendar ring at a rate of one revolution every thirty-one days, a shutter pivoted in said timepiece and having a window overlying a portion of said calendar ring, a single rotatable cam in said timepiece bearing against said shutter, said cam having a cam surface curved to pivot said shutter such that said window follows an indicium on said calendar ring for one day and then pivots back to the next indicium, and means in said timepiece for driving said cam in synchronism with said calendar ring.

11. A calendar timepiece comprising a calendar ring having a series of date indicia thereon, means in said

timepiece for continuously driving said calendar ring at a rate of one revolution every thirty-one days, a shutter pivoted in said timepiece and having a window overlying a portion of said calendar ring, a rotatable cam in said timepiece bearing against said shutter, said cam having a cam surface curved to pivot said shutter such that said window follows an indicium on said calendar ring for one day and then pivots back to the next indicium, means in said timepiece for driving said cam in synchronism with said calendar ring, a setting stem in said timepiece for setting said calendar ring, said setting stem having a run position and a set position, and means responsive to movement of said setting stem from said run to said set position for disengaging said shutter from said cam.

12. A timepiece according to claim **11** wherein said stem is rotatable to set both said calendar ring and the hands of said timepiece.

13. A timepiece according to claim **12** wherein said stem is longitudinally movable between said run and setting positions, and said disengaging means comprises a lever for lifting said shutter off said cam.

14. A calendar timepiece comprising a timepiece movement having an hour wheel, a calendar ring bearing a series of data indicia rotatably mounted on said movement, a shutter pivoted in said timepiece and having a window overlying a portion of said calendar ring, means for continuously rotating said calendar ring in proper timed relation to said hour wheel, said means including internal gear teeth on said calendar ring and a gear train having a proper reduction ratio interconnecting said calendar-ring gear teeth and said hour wheel, a rotatable cam in said timepiece, gear means coupling said hour wheel and said cam for continuously driving said cam in proper timed relation to said calendar ring, said cam having a convolute cam surface with a stepped portion joining the radially innermost and outermost portions of said cam surface, means resiliently urging said shutter against said cam surface, a rotatable setting stem in said timepiece longitudinally movable from a run to a setting position, and means responsive to longitudinal movement of said stem for disengaging said shutter from said cam.

15. A timepiece according to claim **14** wherein said stem is rotatable in either direction to set said timepiece.

16. A timepiece according to claim **15** wherein said disengaging means comprises a pivoted lever having one end coupled to said setting stem and its other end engageable with said shutter to lift said shutter off said cam surface.

17. In a calendar timepiece, the improvement comprising a calendar ring having date indicia thereon, means in

said timepiece for continuously driving said calendar ring at a rate of $\frac{1}{31}$ of a revolution per day, shutter means pivotally mounted in said timepiece and having a window overlying a portion of said calendar ring, a continuously-driven rotatable cam in said timepiece, and means resiliently urging said shutter against said cam whereby said shutter pivots to follow the movement of said calendar ring during each day; said cam being provided with a convolute cam surface joined by a stepped portion whereby at the end of each calendar day said shutter moves over said stepped portion and returns to its initial position.

18. A calendar timepiece comprising a timepiece movement having an hour wheel, a calendar ring bearing a series of date indicia rotatably mounted on said movement, means for continuously rotating said calendar ring in proper timed relation to said hour wheel, a shutter having a window overlying a portion of said calendar ring, a rotatable cam on said movement bearing against said shutter for advancing said shutter with an indicium on said calendar ring during the greater portion of each day, and means for continuously rotating said cam in proper timed relation to said hour wheel; said continuous rotating means including gearing on said calendar ring and a gear train having a proper reduction ratio interconnecting said calendar ring and said cam with said hour wheel.

19. A calendar timepiece comprising a timepiece movement having an hour wheel, a calendar ring bearing a series of date indicia rotatably mounted on said movement, means for continuously rotating said calendar ring in proper timed relation to said hour wheel, a shutter having a window overlying a portion of said calendar ring, a rotatable cam on said movement bearing against said shutter for advancing said shutter with an indicium on said calendar ring during the greater portion of each day, and means for continuously rotating said cam in proper timed relation to said hour wheel; said timepiece including a setting stem and clutch means operative upon longitudinal movement of said setting stem to disengage said shutter from said cam.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,353,348 November 21, 1967

Donald W. Brashear

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 25, for "shuter" read -- shutter --; column 7, line 2, for "ararngement" read -- arrangement --; line 32, for "ivention" read -- invention --; line 61, for "moving" read -- movement --.

Signed and sealed this 29th day of April 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents