March 19, 1968 U. MAKIRI 3,373,558

CALENDAR CLOCK OR WATCH

Filed Aug. 30, 1965 3 Sheets-Sheet 1

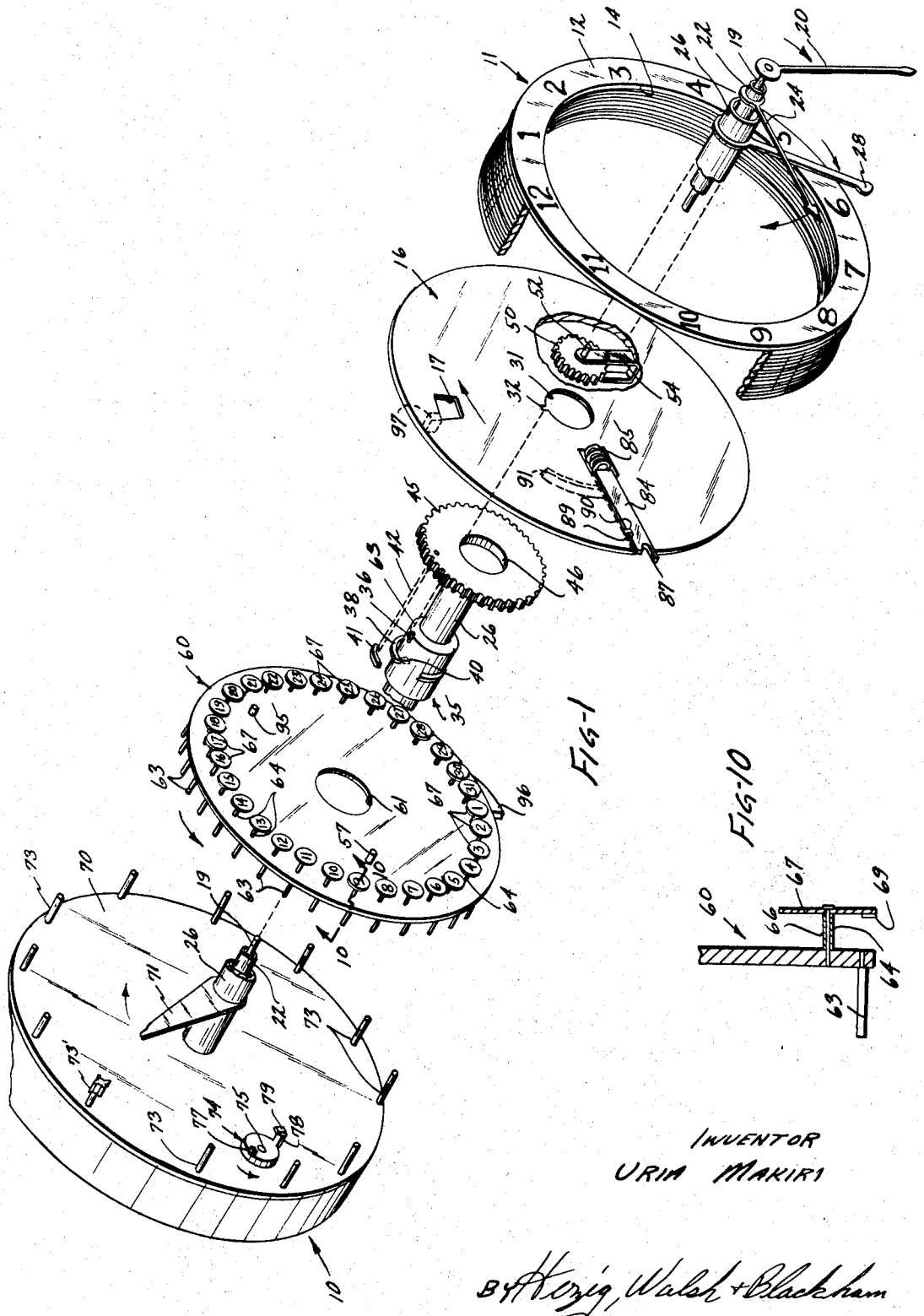

FIG-1

FIG-10

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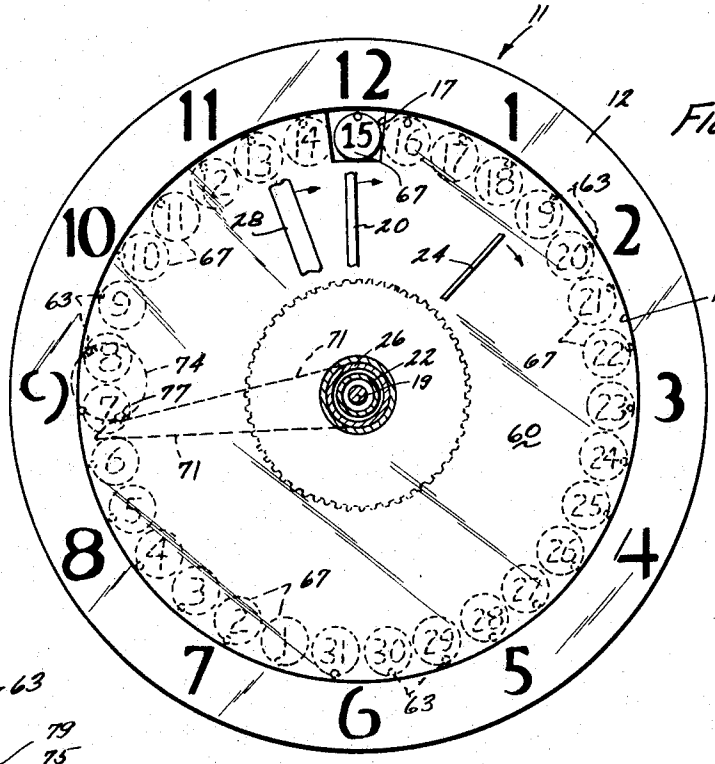

FIG-2

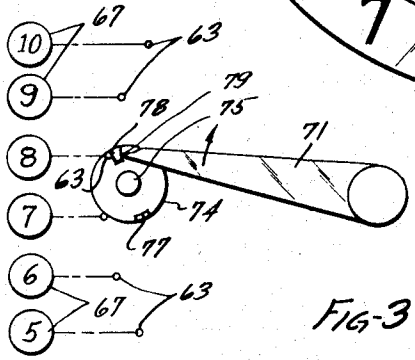

FIG-3

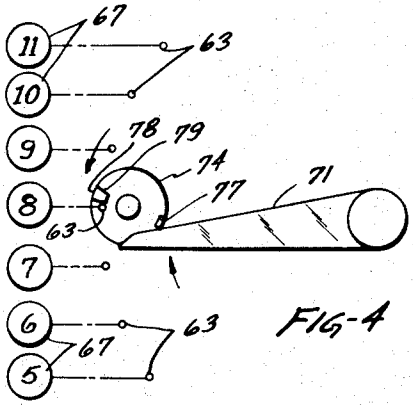

FIG-4

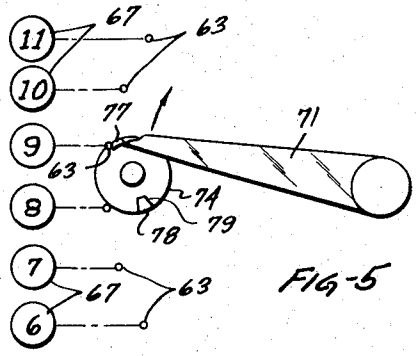

FIG-5

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CALENDAR CLOCK OR WATCH

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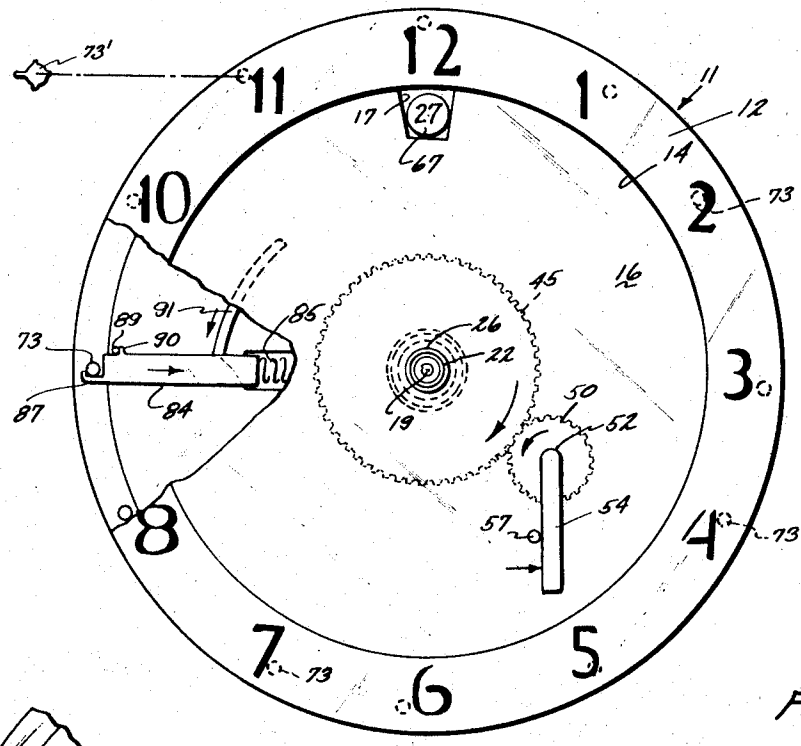


FIG-6

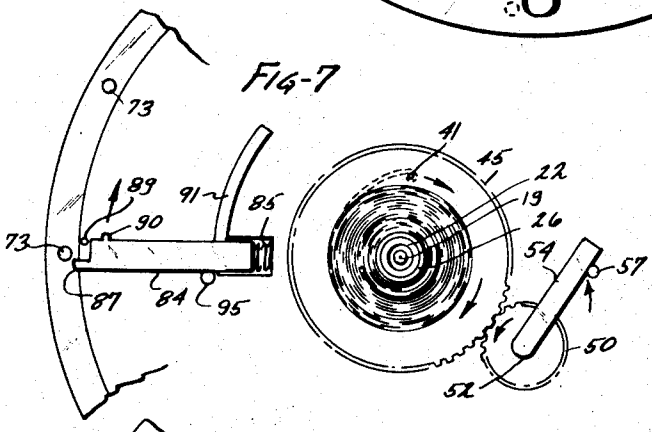


FIG-7

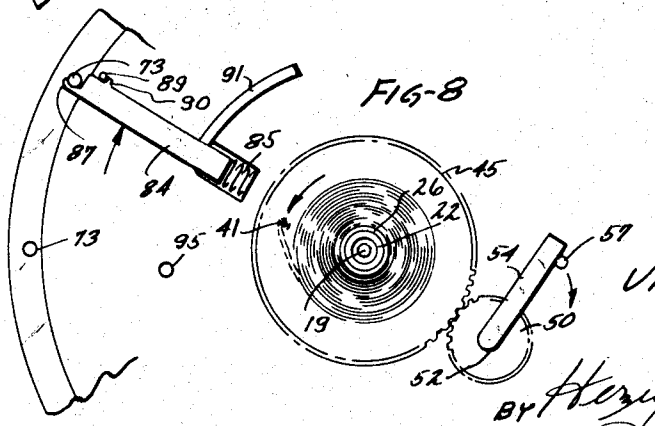
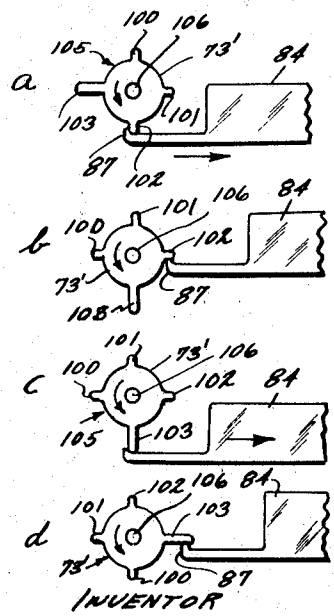


FIG-8

FIG-9



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CALENDAR CLOCK OR WATCH

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ABSTRACT OF THE DISCLOSURE

The device is a calendar clock which indicates the time and date irrespective of the number of days in a month including leap year when February has twenty-nine days.

A rotor is driven one step per month and has means to indicate one of the twelve hour numerals as the month, the indication being by way of a window positioned adjacent the hour numeral.

A second rotor is roted one step a day and positions a numeral to be exposed by the window in an upright position wherever the window is positioned.

The rotor indicating the month cooperates with twelve stops positioned one-twelfth of a revolution apart. The rotor is released from a stop by the mechanism which moves one step a day. The stops are positioned so that release takes place after a predetermined number of days determined by the number of days in a month. Means are provided between the rotor which moves in increments of one-twelfth of a revolution, and the rotor which moves one step a day so that when the one rotor moves to indicate a new month, the rotor indicating the day moves back to its starting position with the numeral one (1) exposed in the window.

The said stops include a special stop for February so configurated that for the month of February in a leap year, the movement to the next month occurs after twenty-nine days rather than at twenty-eight.

This invention relates to a timepiece which is in the form of a calendar clock or watch, that is a timepiece which indicates the calendar date as well as the time of day. It indicates the month and the day of the month as well as the time of day.

An ordinary watch or clock is graduated in hours from one to twelve to indicate the hour of the day, whether a.m. or p.m. Since there are also twelve months in the year, this invention utilizes hourly graduations on the dial of the clock or watch to also indicate the month of the year. A dial is provided in combination with a window to indicate the day of the month and this window is arranged to be positioned at one of the hourly graduations, the particular one being that one which indicates the month of the year. Thus, in this manner the usual hour and minute hands indicate the time while the window in combination with the dial for the day of the month indicates the day of the month, and the month of the year.

Means are provided to rotate the dial indicating the day of the month, one step a day. The window is provided in a rotor which is rotated one step a month, to indicate the month of the year, with the window at the same time exposing the correct day of the month.

The device incorporates particular means to accommodate it to the months having other than thirty days, i.e., months having thirty-one days and also February, having twenty-eight days and in a leap year, twenty-nine days. In this way, the device accurately indicates the date irrespective of the number of days in the month or whether or not the year happens to be a leap year.

Another object is to provide a simplified calendar clock wherein the hour numerals of the clock are utilized to indicate the month of the year. A corollary object is to accomplish this purpose while at the same time providing means to indicate the day of the month at a position adjacent to the hour numeral which is indicating the month of the year.

Another object of the invention is to provide a calendar clock or timepiece as in the foregoing having mechanism to accommodate the movements to months having other than thirty days so that the movement accurately indicates the month of the year irrespective of the number of days in the preceding month. A further object is to provide means whereby the movement accommodates itself to leap years wherein February has twenty-nine days so that the month is properly indicated where the preceding month has twenty-nine days.

Another object is to provide a movement as referred to in the foregoing wherein the indication of the month is by way of a window in a rotor or dial which window is positioned adjacent to an hour numeral so as to indicate the month of the year with a second dial carrying numerals positioned opposite the window to indicate the day of the month.

Another object is to provide means as in the foregoing object wherein the window indicating the month is moved in steps, once a day, and at the end of the month is moved to place the numeral 1 opposite the window irrespective of the number of days in the month.

Another object is to provide improved and simplified mechanisms for achieving the objects and results as referred to in the foregoing.

Further objects and additional advantages of the invention will become apparent from the following detailed description and annexed drawings wherein:

FIGURE 1 is a perspective exploded view illustrating the parts of a preferred form of the invention;

FIGURE 2 is a plan view of the face of the device indicating the dials which indicate the time and date;

FIGURE 3 is a detail schematic view illustrating the operation of the date indicating dial.

FIGURES 4 and 5 are views similar to FIGURE 3 indicating the operation.

FIGURE 6 is a plan view of the face of the device showing the operation of the dial indicating mechanism.

FIGURES 7 and 8 are schematic detail views indicating the operation of the date indicating mechanism;

FIGURE 9 is a group of detail views indicating the operation of the mechanism which accommodates the device to indicating the date in months having other than thirty days.

FIGURE 10 is a detail sectional view taken along line **10—10** of FIGURE 1.

Referring now more in detail to FIGURE 1 of the drawings, the device comprises a clock movement which is in a cylindrical housing **10**. Numeral **11** designates a casing which fits over the housing **10**, this casing having a ring-shaped face part **12** having on it the hour numerals one to twelve. This face part has an opening **14** behind which is a rotatable disc **16** having a window **17** in it.

The clock movement has a center second hand shaft **19** having on it a second hand **20**. This shaft is within a tubular shaft or arbor **22** which is the minute hand shaft having on it a minute hand **24**. This shaft is within another tubular shaft or arbor **26** which is the hour hand shaft having on it the hour hand **28**.

The disc **16** has a center opening **31** having a keyway **32**. The disc is mounted on a collar or sleeve **35** on the shaft **26**. The sleeve **35** has a key **36** which engages in the keyway **32** in disc **16**. Numeral **38** designates a clock type spring, one end of which is attached to the sleeve **35** as shown at **40** and the other end of which

as shown at 41 is attached to a stem 42, the other end of which stem is secured to a gear 45 having a center opening 46, this gear being freely rotatable about the shaft 26. Gear 45 meshes with a gear 50 which gear is on a shaft or stem 52 supported by the disc 16. The gear 50 has an extending arm or yoke 54, as may be seen in FIGURE 6, which can be rotatably driven by a pin 57 which pin extends from another disc 60 as shown in FIGURE 1. This disc has a center opening 61 and it is journalled to rotate about the shaft 26. On the back side of this disc are thirty-one axially extending pins as designated at 63. On the front side of this disc are thirty-one axially extending pins as shown at 64. FIGURE 10 illustrates the relationship of the pins 63 and 64. On each pin 64 is a rotatable sleeve 66 on the end of which is a disc as shown at 67 and on the disc 67 appears one of the numbers from one to thirty-one as may be seen in FIGURE 1. At the bottom of the disc 67 is a weight 69. Gravity acts on the weight to rotate the disc 67 so that as the disc 60 is rotated the disc 67 is held in a position in which the number appearing thereon is upright when viewed.

The housing 10 has a face 70 as shown in FIGURE 1. Adjacent to this face is a rotatable arm 71 which is on the hour hand shaft 26 so that it makes one revolution every twelve hours. The face 70 has twelve unequally angularly spaced pins 73. Numeral 74 designates a disc journalled on a pin 75 extending from the face 70. This disc has a short extending arm 77 and a longer extending arm 78 with an offset portion 79. The arm 71 cooperates with the extending arms on the disc 74 to rotate it and the longer arm 78 cooperates with the extending pins 63 on the disc 60 to rotate this disc so that each day a successive number on a disc 67 is rotated into position to appear behind the window 17 in the disc 16. This operation is illustrated more clearly in FIGURES 3 to 5. The arm 71 rotates twice in twenty-four hours in a clockwise direction as shown in FIGURES 3, 4 and 5. As it rotates it engages the extending prongs or fingers 77 and 78. As shown in the figures, it rotates the disc 74 in a counterclockwise direction. When the arm 71 engages one of the projections 77 or 78 it rotates the disc 74 through 180° so that in twenty-four hours the disc 74 is rotated through a complete revolution. When the disc 74 is rotated through one complete revolution, the longer pin or projection 78 will pick up one of the pins 63 on the disc 60 to rotate the disc 60 one step in a counterclockwise direction as may be observed in FIGURE 2. Thus, once each day the disc 60 is rotated one step to cause the next successive number on this disc to appear behind window 17 to indicate the day of the month. The disc 16 carrying the window 17 is rotated one step once a month in a clockwise direction, so that the window 17 appears adjacent one of the numerals on the face 12 of housing 11 to thereby indicate the month of the year.

The manner in which the disc 16 and window 17 are moved in steps will next be described. Carried on the disc 16 is an axially movable plunger or stem 84 which can move inwardly against a coil spring 85, At its end it is notched to provide an extending finger as shown at 87. Outward axial movement of the plunger 87 is limited by a stop pin 89 on disc 16 cooperating with a shoulder or abutment 90 on the plunger 84. The plunger 84 has an extending arcuate projection 91 which cooperates with a pin 95 on the face of disc 60. At the twenty-seventh day of the month, for example as indicated in FIGURE 6, the pin 95 begins to engage the arcuate projection 91 to begin moving the plunger 84 in an inward axial direction. The finger 87 at the end of this plunger is normally in engagement with one of the pins 73 on the face 70 of the housing 10. This normally holds the disc 16 against rotation.

At the time pin 95 begins to engage projection 91, the pin 57 on disc 60 picks up the arm 54 attached to

gear 52 and rotates it. This rotates the gear 45 which winds up the spring 38 to load it. The gears rotate in a direction as indicated by the arrows. See FIGURE 6. The sleeve 35 is at this time held by the disc 16 which is being held by the plunger 84 having engagement with one of the pins 73. At the end of thirty days, that is for a thirty-day month, the cam 95 has moved plunger 84 inwardly far enough to disengage the end finger 87 from the pin 73. Disc 16 is now free to rotate. The spring 38 now unwinds rotating sleeve 35 and disc 16 one step in a clockwise direction until finger 87 engages the next pin 73. Window 17 is thus moved to the next numeral on face 12. At the same time spring 38 urges gears 45 and 50 in the opposite direction. Arm 54 is now driven clockwise and disc 60 is moved clockwise until abutment 96 meets stop 97 on disc 16 adjacent window 17. Abutment 96 is adjacent numeral 1 on disc 60 and stop 97 is adjacent window 17 in disc 16. Thus, at the end of the month, whether the month has 28, 29, 30, or 31 days, the numeral 1 on discs 60 is brought opposite window 17 to be exposed therethrough.

Whether or not a month has thirty days, thirty-one days, twenty-eight days or twenty-nine days, at the end of the month, the window 17 will be moved to the next hour numeral on face 12. This is accomplished by providing for a variation in the number of days at the end of which the arm 84 releases from a pin 73. This is accomplished by having the pins 73 positioned at variable distances from the center or axis. That is, for months having thirty-one days, i.e., the months other than February, September, April, June and November, the pins 73 are closer to the center or axis so that the arm 84 will not be released until at the end of thirty-one days, at which time the numeral 1 will be moved opposite the window 17. On the other hand, for months having thirty days, the pins 73 are slightly farther out so that the arm 84 will release sooner, that is at the end of thirty days to move the numeral 1 to a position opposite the window 17. The pin 73 identified by the numeral 73' for February has a special position and configuration to accommodate for February having twenty-eight days and additionally, to accommodate for February during leap year having twenty-nine days. The pin 73' is farther out radially than any of the other pins to normally release at the end of twenty-eight days in February so as to move the numeral 1 opposite the window 17 at the end of twenty-eight days normally. However, in a leap year, February having twenty-nine days, the action of moving the numeral 1 opposite the window 17 takes place at the end of twenty-nine days. This is accomplished in the following manner. The pin 73' is made to have a configuration as shown in FIGURE 9. It has three extending projections, 100, 101 and 102 spaced ninety degrees apart and one longer projection, 103. This pin is in the form of a rotatable member 105 on a pivot or stem 106. The finger 87 on the end of arm 84 engages with the extending projections on the member 105. Each year at the end of February when the arm 84 disengages from or is released by the member 105, the finger 87 by engagement with an extending projection rotates the member 105 through ninety degrees. At the end of four years the longer projection 103 is in a position to be disengaged by the finger 87 as shown in FIGURE 9 and it is sufficiently longer than the other projections so as to delay the release of arm 84 until the end of twenty-nine rather than twenty-eight days. This may be observed in FIGURE 9. Therefore in leap year, the month of February having twenty-nine days is accommodated for, the numeral 1 not being moved to a position opposite to the window 17 until the end of twenty-nine days. It can be observed therefore that the invention provides a calendar clock which indicates the date as well as the time of day, the date being indicated by using the hour numerals of the clock. Furthermore, the device automatically accommodates itself to the number of days in a month including the variation of the number of days

in February, which is twenty-nine days in a leap year. Accordingly, the correct time and date are indicated by the clock perpetually as long as power is supplied to the clock. The source of power supply may of course, be any type of power such as mechanical or atomic power or any other type of power, preferably one that is perpetually active to drive the mechanisms.

Thus, once each month, irrespective of the number of days in the month, disc **16** is moved one-twelfth of a revolution to place window **17**, and abutment **97**, adjacent the next hour numeral on face **12**. Then each day disc **60** is rotated one step, to bring the next day numeral behind window **17** to be exposed. Then at the end of the month, irrespective of the number of days in the month, disc **60** is rotated in reverse (i.e. clockwise direction) to bring stop **96** against abutment **97** which places the numeral 1 on disc **60** behind window **17** to be exposed. Then when disc **60** begins moving again, counterclockwise, in steps stop **96** moves away from abutment **97**.

From the foregoing, those skilled in the art will observe that the invention as described herein achieves and realizes all of the objects and advantages as stated in the foregoing, as well as having many additional advantages tht are apparent from the detailed description. The invention utilizes in a novel and unique way the numbers on a clock dial or face indicating the hours to also indicate the months of the year. Accordingly, in a very effective and unique way, a calendar timepiece is realized which indicates the date as well as the time of day.

The foregoing disclosure is representative of a preferred form of the invention and is intended to be interpreted in an illustrative rather than a limiting sense, the invention to be accorded the full scope of the claims appended hereto.

I claim:

1. A calendar timepiece having numerals thereon indicating the hours of the day, and indicating means for indicating the date, including means to indicate one of the twelve hour numerals as the month of the year, means for indicating the day of the month at a position adjacent to the numeral indicating the month of the year, said means for indicating the day of the month comprising a rotor bearing window for exposing a numeral, said window being positionable adjacent to the numeral that indicates the month of the year, another rotor carrying numerals to indicate the day of the month and means whereby said rotor is rotated to position a numeral indicating the day of the month opposite said window, means driven by the timepiece movement for rotating said other rotor one step a day, mechanism whereby at the end of a predetermined number of days determined by the number of days in a month the said other rotor is operated to position the numeral 1 to be exposed by said window, said mechanism comprising spring means for driving the other rotor, means to wind the spring in response to step-by-step movement of the rotor, means to release the spring means for driving the rotor in a reverse direction at the end of a predetermined number of days, and stop means to stop the said order in a position wherein the numeral 1 is positioned opposite said window to be exposed therethrough.

2. A calendar timepiece having numerals thereon indicating the hours of the day, including means movable closely adjacent to said numerals to indicate any one of the twelve hour numerals as the month of the year, said indication being the sole indication of the month and indicating means for indicating the day of the month at substantially the same positions that said movable means indicates the month of the year.

3. A device as in claim **2** wherein the said means for indicating the day of the month comprises a rotor having numerals, said movable means having a window for exposing a numeral on said rotor to indicate the day of the month, the position of the window indicating the month of the year.

4. A device as in claim **3** wherein said rotor carries members with the said numerals thereon having means whereby at each exposed position the numeral is positioned upright.

5. A device as in claim **3** including means for rotating said rotor one step a day to position a numeral indicating the day of the month opposite the said window.

6. A device as in claim **3** wherein said rotor carries numerals from 1 through 31, and means whereby after a predetermined number of days determined by the number of days in a month the said rotor is operated angularly in a reverse direction relative to said movable means having the window to position the numeral one (1) to be exposed by the said window.

7. A calendar timepiece including means for indicating the month of the year, said means comprising a rotor and stop means providing twelve equally angularly spaced positions of said rotor for indicating the twelve months of the year, means movable one step a day by the timepiece and means whereby after a predetermined number of days said means movable one step a day releases said rotor and causes it to be driven substantially one-twelfth ($\frac{1}{12}$) of a revolution for indicating the next month.

8. A device as in claim **7** wherein said means comprising the said rotor includes a radially movable member cooperable with said stops and releasable therefrom by radial movement, said stops being positioned at different radial distances from the center or axis depending upon the number of days in different months and mechanism whereby said means movable one step a day moves said radially movable member inwardly so that the time of angular movement of said rotor is dependent upon the elapsing of a predetermined number of days.

9. A device as in claim **8** wherein said mechanism comprises means whereby at the end of a month said means movable one step a day is rotated in a reverse direction back to a starting position.

10. A device as in claim **7** having means for accommodating said timepiece to months having other than thirty days, said accommodating means comprising a radial arm associated with said rotor, stop members cooperating with said radial arm, means for releasing said arm from said stop members at the end of a predetermined number of days whereby to advance said rotor to the next monthly indication, said stop members having radial positions adjusted in accordance with the number of days in a particular month so that said release occurs in accordance with the number of days in a particular month.

11. A device as in claim **10**, having further means to accommodate the actuation of said timepiece to leap years wherein February has twenty-nine days, said stop members including a stop member for the month of February, said stop member being in the form of a rotor having four extending projections including one long projection, said radial arm having an end finger cooperable with said projections whereby upon release of said radial arm said rotary member is rotated through ninety degrees so that at the end of four years the said longer projection is in a position to cooperate with said radial arm, the said longer projection causing the said release to occur at the end of twenty-nine days in a leap year.

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