

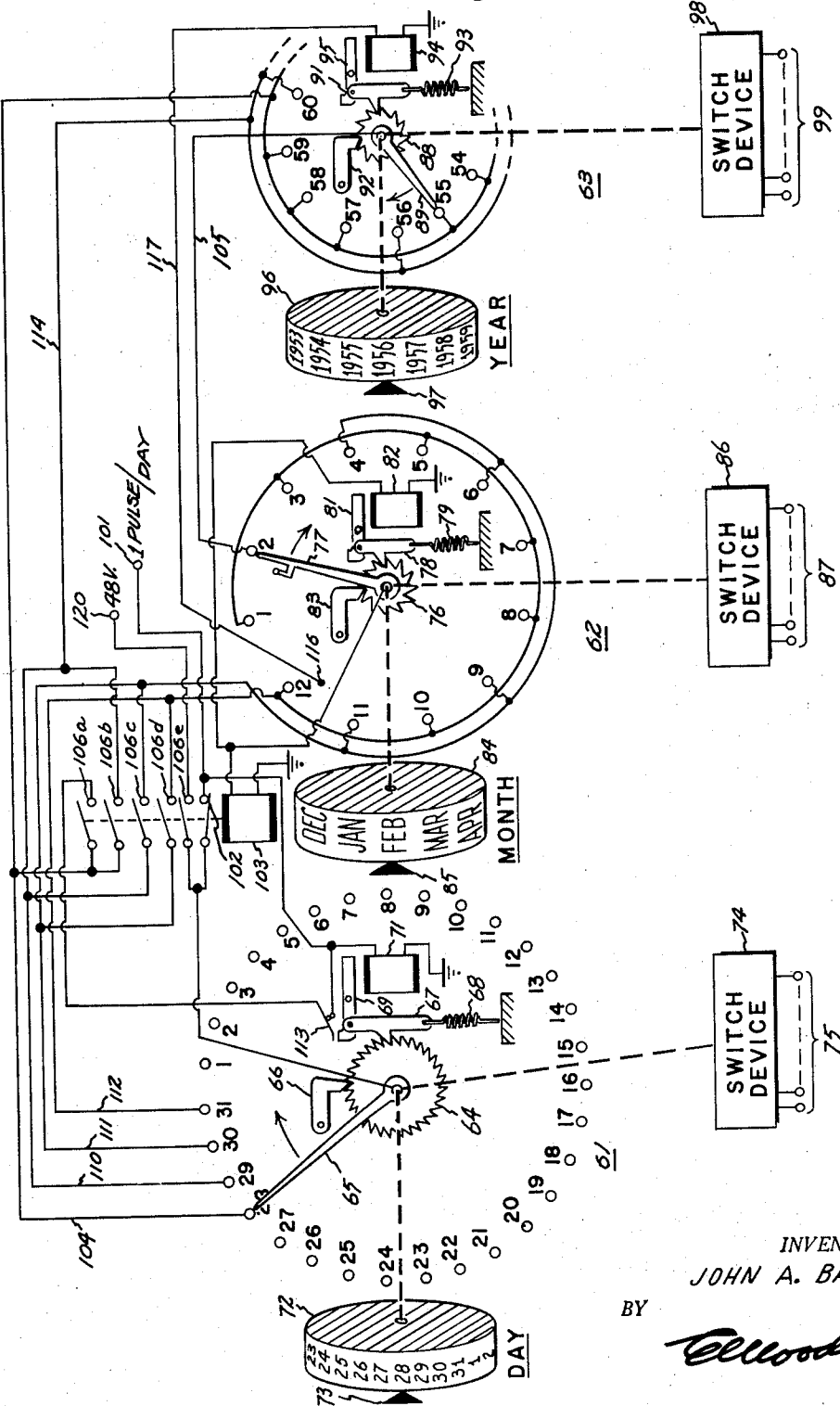
March 8, 1960

J. A. BAUER

2,927,418

CALENDAR CLOCK

Filed Aug. 9, 1956



INVENTOR.
JOHN A. BAUER

BY

Woodbury

1

2,927,418

CALENDAR CLOCK

John A. Bauer, San Fernando, Calif., assignor to Bendix Aviation Corporation, North Hollywood, Calif., a corporation of Delaware

Application August 9, 1956, Serial No. 603,146

3 Claims. (Cl. 58—5)

This invention relates to electrical calendar clocks capable of keeping time for periods of years and providing time-indicating electrical signals.

An object of this invention is to provide an improved electrical calendar clock which automatically accounts for the varying number of days in different months.

Another object is to provide an improved electrical calendar clock in which both electrical signals and a visual display are provided to indicate time.

Other and more specific objects and features of the invention will appear from the description to follow.

The need often arises for a clock capable of providing both time-indicating electrical signals and a visual display. Such clocks may be incorporated in electrical systems wherein the time-indicating signals produced serve to control certain operations or identify certain intelligence. In such applications, the need to reset the clock each month to correct for the different number of days in different months and years is often troublesome.

The present invention provides an interconnecting system between various time-unit registers for activating the registers automatically with regard for the different number of days in different months. A full understanding of the invention may be had from the following detailed description with reference to the drawing.

The single figure of the drawing is a schematic diagram of a system incorporating the invention.

The drawings shows a day stepping-switch register 61, a month stepping-switch register 62, and a year stepping-switch register 63. The day register 61 includes a ratchet wheel 64 rotatively mounted on a common shaft with a brush 65. The brush 65 contacts successive day-indicating contacts from 1 to 31 as the ratchet wheel 64 is stepped in a clockwise fashion. A pawl 66 prevents the ratchet wheel 64 from moving in a counter-clockwise direction, and a pawl 67, mounted between a spring 68 and an arm 69, serves to move the ratchet wheel 64. To effect stepping of the ratchet wheel 64, the pivotally-mounted arm 69 is motivated by an electro-magnetic coil 71 to stress the spring 68 and position the pawl 67 in the next indentation in the ratchet wheel 64. With the de-energization of the coil 71, the spring 68 pulls the pawl 67 down to step the wheel 64 in a clockwise direction.

The shaft carrying the ratchet wheel 64 is mechanically connected to a dial 72 which is adapted to be rotated relative to a pointer 73 to indicate the day registered in the day register 61. Also connected to the ratchet wheel 64 is a mechanical switching device 74. The mechanical switching device 74 may take various forms and serves to derive signals at output terminals 75, which are indicative of the day registered by the register 61. One simple structure for the switching device 74 would be simply a brush rotatively mounted relative to thirty-one contacts connected to the output terminals 75, and means for energizing the brush such that a voltage would appear at a particular terminal to indicate a particular day of the month.

2

The month register 62 comprises a stepping switch somewhat similar to that utilized in the register 61; however, the register 62 has twelve month-indicating contacts, that is, one contact for each month of the year. A ratchet wheel 76 is rotatively mounted upon a common shaft with a brush 77. The ratchet wheel 76 is moved in a clockwise fashion by a pawl 78 which is mounted between a spring 79 and an arm 81. Movement of the ratchet wheel 76 occurs immediately after a coil 82 is de-energized in a manner similar to the motivation of the ratchet wheel 64. The ratchet wheel 76 is prevented from being moved in a counter-clockwise direction by a pawl 83. The ratchet wheel 76 is mechanically coupled to a dial 84 rotatively mounted relative to a pointer 85 in such a manner as to indicate the month currently registered by the register 62. A mechanical connection is also made between the ratchet wheel 76 and a switching device 86 which has output terminals 87, and which may operate in a manner similar to the switching device 74.

The year register 63 includes a ratchet wheel 88, mounted upon a shaft which also carries a brush 89. This shaft is stepped in a clockwise fashion by a pawl 91 such that the brush 89 is moved to contact different year-indicating contacts. Pawl 92 prevents the ratchet wheel 88 from moving in a counter-clockwise fashion. The pawl 91 is motivated to step the ratchet wheel 88 by a spring 93, which is stressed by an electro-magnetic coil 94 moving an arm 95. The coil 94 thus places the pawl 91 in the next recess of the ratchet wheel 88, such that when the coil 94 is de-energized, the ratchet wheel 88 is stepped by the spring 93. The ratchet wheel 88 is mechanically coupled to a dial 96 having a pointer 97, and to a switching device 98 having output terminals 99.

In the operation of the system, an electrical pulse is applied to a terminal 101 once each day. The terminal 101 is connected to the coil 71 and, therefore, once each day the coil 71 is energized to step the brush 65 to the next day-indicating contact. In this manner, the days of the month are counted off and registered until such time as the 28th day is reached.

After the day register 61 reaches the 28th day of the month, provision is made to sense the values registered by the month register 62 and the year register 63 to ascertain the number of days in the month. For example, if the month register 62 indicates the second month, i.e. February, and the year register does not indicate a leap year, then the day register 61 must move to indicate the first day of the third month, and not remain on the 28th, 29th, 30th, or 31st day-indicating contacts. In addition, the month register 62 must be stepped to indicate the next month.

Consider now that the day register 61 is in a state wherein the brush 65 dwells upon the 28th day-indicating contact and that the month registered is February. With the occurrence of the next pulse at the terminal 101, the coil 71 will be energized to move the pawl 67 into the next recess of the ratchet wheel 64. Note, however, that the ratchet wheel 64 does not move until the coil 71 is de-energized. The pulse from the terminal 101 also causes a current to pass through a pair of normally-closed contacts 102 (of a relay 103) to the brush 65, then through the 28th day-indicating contact, and a line 104 to the 55th year-indicating contact of the year register 63. From the 55th year-indicating contact, this current passes through the brush 89, and a line 105 to the 2nd month-indicating contact of the month register 62. The brush 77 dwells upon the 2nd month-indicating contact during the month of February; therefore, the current passes through the brush 77 to energize the coil 82 and relay 103. With the energization of the coil 82, the pawl 78 is advanced to the next recess of the ratchet wheel 76

such that the ratchet wheel 76 will be advanced when the coil 82 is de-energized.

With the energization of the relay 103, the normally-closed contacts 102 are opened and normally-open contacts 105 are closed. This transfers connection of the brush 65 from the input pulse terminal 101 to a voltage supply terminal 120 to maintain the coil 82 and relay 103 energized as long as the described circuits thereto from brush 65 remain closed.

At the end of the daily pulse applied to the terminal 101, the coil 71 is de-energized and the brush 65 is moved to the 29th day-indicating contact. A current then passes through the closed contacts 106e to the brush 65, through the 29th day-indicating contact, to the line 110. The contacts 106a, 106b, 106c, and 106d are now closed to interconnect the lines 104, 110, 111, and 112 and further to connect these lines to the coil 71 through contacts 113 which are closed when the coil 71 is not energized. Thus, the current passing to the line 110 from the 29th day-indicating contact will energize the coil 71 to move the pawl 67 into the next recess of the wheel 64. As soon as this coil 71 is energized, the contacts 113 will be opened and the coil will be de-energized. The brush 65 is thus successively stepped past the 29th, 30th, and 31st day-indicating contacts to the 1st day-indicating contact. This resets it for the new month.

When the brush 65 leaves the 31st day-indicating contact, the current path through which the coil 82 and relay 103 are energized is broken. The coil 82 is thus de-energized and allows the pawl 78 to step the ratchet wheel 76 one position, thereby shifting the brush 77 onto the 3rd month-indicating contact. De-energization of the relay 103 isolates the lines 104, 110, 111, and 112 by opening the normally-open contacts 105 and connects the brush 65 to the pulse source terminal 101 through the normally-closed contacts 102.

In this manner, the system senses that the month is February, that the year is not a leap year, and therefore, that day register 61 must reset after counting to twenty-eight. If the year registered by the year register 63 is a leap year, e.g. 1956, then the day register must count twenty-nine days before resetting. In this event, when the brush 65 dwells upon the 28th day-indicating contact, the line 104 will not be connected to the line 105 through the brush 89, and the coil 82 and relay 103 will not be energized. However, when the brush 65 is stepped to dwell upon the 29th day-indicating contact, a current flows from the terminal 101 through the contacts 102, the brush 65, the line 110, the line 114, the 56th year-indicating contact, the brush 89, the line 105, and the brush 77, to energize the coil 82 and the relay 103. Once this coil and this relay are energized, then at the end of the daily pulse, the day register 61 will be stepped until it registers the first day of the month and the month register 62 will be advanced one step just as previously described.

Upon the occurrence of a thirty-day month, the brush 65 must dwell for a day upon the 30th day-indicating contact. After the 30th day of a thirty-day month, a pulse will appear at the terminal 101 to set up a current through the contacts 102, the brush 65, the line 111, and the brush 77, to energize the coil 82 and the relay 103. Energization of the relay 103 causes the day register 61 to step (after the end of the daily pulse) until it indicates the first day of the month, and energization of the coil 82 steps the month register to the next month.

Thirty-one day months are handled by the registers 61 and 62 as follows. When the brush 65 dwells upon the 31st day-indicating contact, the next pulse received at the terminal 101 forms a current in the line 112 which passes to the month-indicating contacts of the month register 62 which are representative of thirty-one day months. When the brush 77 dwells upon a thirty-one day month-indicating contact, a current passes through the brush 77 to energize the coil 82 and the relay 103 to effect the return of the day register 61 to indicate the 1st day of the next

month, and to step the month register 62 to indicate the next month.

Consideration will now be directed to the sequence of events which occur as the clock changes the year registered. During the last day of December, the brush 65 of the day register 61 dwells upon the 31st day-indicating contact, and the brush 77 of the month register 62 dwells upon the 12th month-indicating contact. With the occurrence of a pulse at the terminal 101, a current flows from the terminal 101 to energize the coil 71, causing the pawl 67 to be moved into the next recess of the ratchet wheel 64. The pulse at the terminal 101 also causes a current to flow through the normally-closed contacts 102, through the brush 65, and the line 112 to the 12th month-indicating contact of the month register. From this contact, the current passes through the brush 77 to energize the coil 82 and the relay 103. With the energization of the coil 82, the pawl 78 is moved into the next recess of the ratchet wheel 76. Thus, both the coils 71 and 82 are energized. The energization of the relay 103 closes the contacts 105e and a current flows from the voltage source through the contacts 106e to hold the coil 82 and the relay 103 energized. As this holding current passes through the brush 77, it also passes to a contact 116 upon which the brush 77 dwells during December. The current passing through the contact 116 passes through the line 117, and energizes the coil 94. Therefore, at this instant, all of the coils 71, 82, and 94 are energized and the pawls 67, 78, and 91 have each been moved into the next recess of the ratchet wheel with which they are associated. Then, at the end of the pulse on terminal 101, the coil 71 is de-energized and the spring 68 steps the brush 65 to contact the 1st day-indicating contact in the register 61. As brush 65 leaves the 31st day-indicating contact, the coils 82 and 94 and the relay 103 are de-energized, allowing the springs 79 and 93 to advance the month and year registers one position. In this manner, the year register 63 is stepped from one year to the next.

It is to be understood that additional registers may be coupled to the registers shown to indicate smaller units of time, as hours and minutes. These registers, however, are required only to count identical recurring time cycles, and sensing interconnections between such registers are not required.

It may thus be seen that this invention provides a calendar clock system capable of providing time-indicating electrical signals and a visual display in which automatically accounts for the variation in days of different calendar months.

Although for the purpose of explaining the invention a particular embodiment thereof has been shown and described, obvious modifications will occur to a person skilled in the art, and I do not desire to be limited to the exact details shown and described.

I claim:

1. A calendar clock comprising: a day register means operable step by step, and means for operating it at the end of each day for registering the days of a month; month register means operable step by step for registering the months of a year; year register means operable step by step for registering successive years; means controlled jointly by said day and month register means and responsive to the settings thereof to advance said month register means one month and reset said day register means to the first day of the month at the end of 30 days in the 30-day months of the year, and at the end of 31 days in the 31-day months of the year; means controlled jointly by said day, month and year register means and responsive to the settings thereof to reset the day register means to the first day of the month and advance said month register means one month at the end of 29 days in the month of February in a leap year, and at the end of 28 days in the month of February in a non-leap year; and means controlled by said month register means and responsive

5

to the setting thereof to advance said year register means one year in response to advance of said month register means from the month of December to the month of January; said month register means comprising a switch for preparing a first energizing circuit, a second energizing circuit, and a third circuit, respectively, in any said 31-day month positions, any said 30-day month positions and said February position, respectively; said year register means comprising a switch for selectively extending said third circuit to form a fourth energizing circuit in leap year positions and a fifth energizing circuit in non-leap year positions; said day register means comprising a self-stepping motor and a switch for selectively completing said first, second, fourth and fifth energizing circuits in the 31-day, 30-day, 29-day and 28-day positions, respectively, of said day register means; and means responsive to completion of any said energizing circuit to actuate said self-stepping motor to advance said day register into first day position.

2. Apparatus according to claim 1 in which said means for operating said day register means comprises said motor and a source of daily pulses, and said last-mentioned means comprises: a relay connected for actuation by a daily pulse over any said energizing circuit; means includ-

6

ing a current source for holding said relay over any said energizing circuit; said relay having contacts closed by actuation of the relay to connect said source to said self-stepping motor over said day register switch in each of said 28, 29, 30 and 31-day positions, whereby said day register is advanced to first day position in response to the daily pulse next following completion of any one of said energizing circuits.

3. Apparatus according to claim 1 in which said means controlled by said month register means to advance said year register means comprises a stepping motor in said year register means and auxiliary switch means associated with said month register switch for connecting said first energizing circuit to said year register stepping motor in the December position of said month register means.

References Cited in the file of this patent

UNITED STATES PATENTS

20	2,076,676	Sigo	Apr. 13, 1937
	2,355,903	Blount	Apr. 15, 1944
	2,543,983	Ostline	Mar. 6, 1951

FOREIGN PATENTS

837,710	France	Nov. 18, 1938
---------	--------	---------------