Feb. 12, 1935. E. BOURQUIN 1,991,241

CYCLOMETER CLOCK

Filed July 6, 1933 2 Sheets-Sheet 1

Fig. 1.

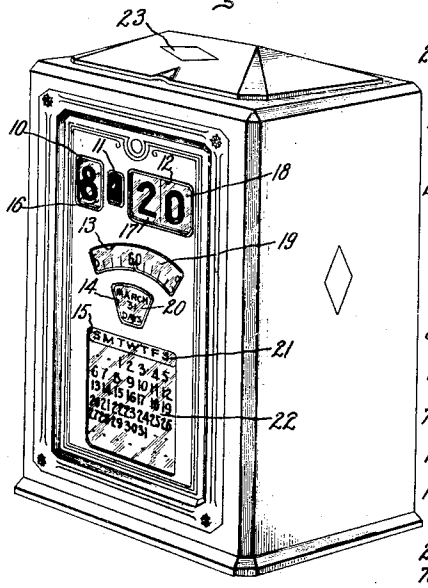


Fig. 2.

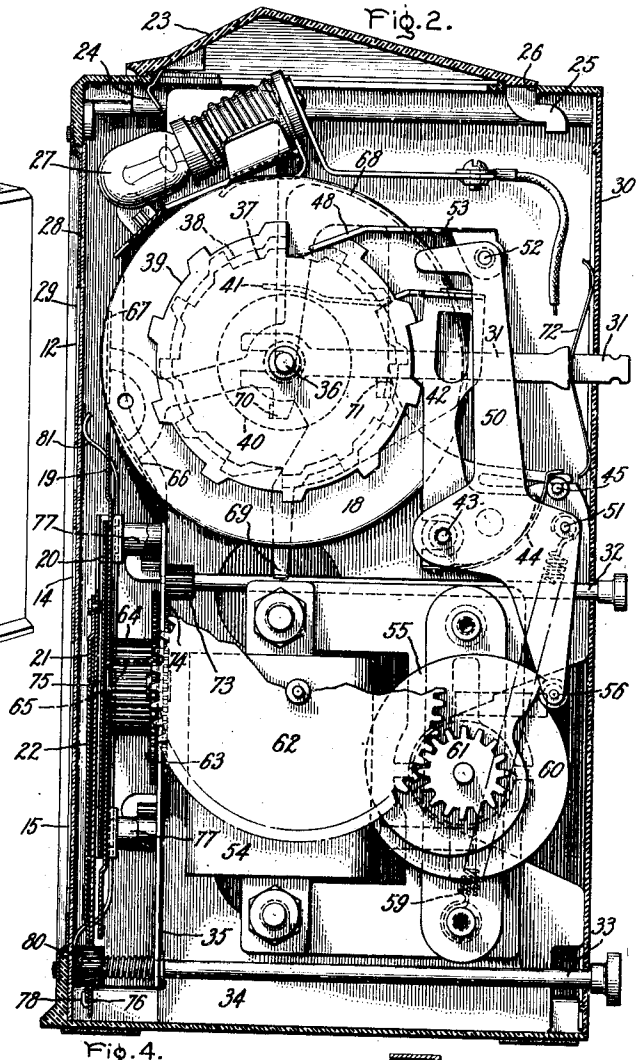


Fig. 3.

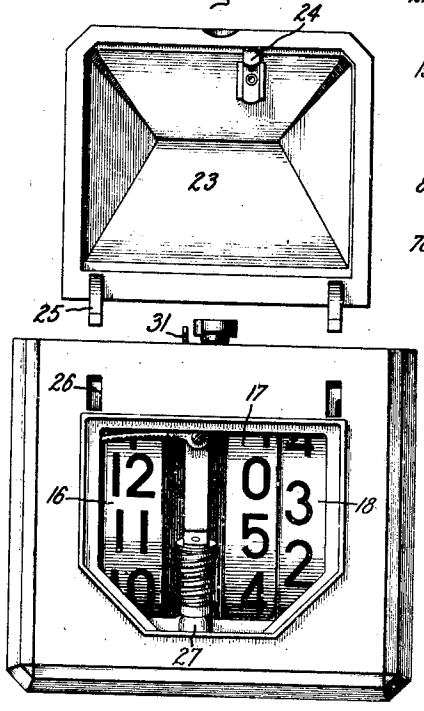


Fig. 4.

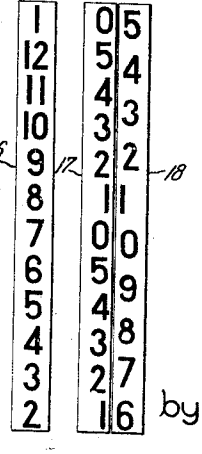
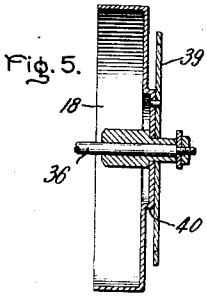


Fig. 5.



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Feb. 12, 1935. E. BOURQUIN 1,991,241

CYCLOMETER CLOCK

Filed July 6, 1933 2 Sheets-Sheet 2

Fig. 6.

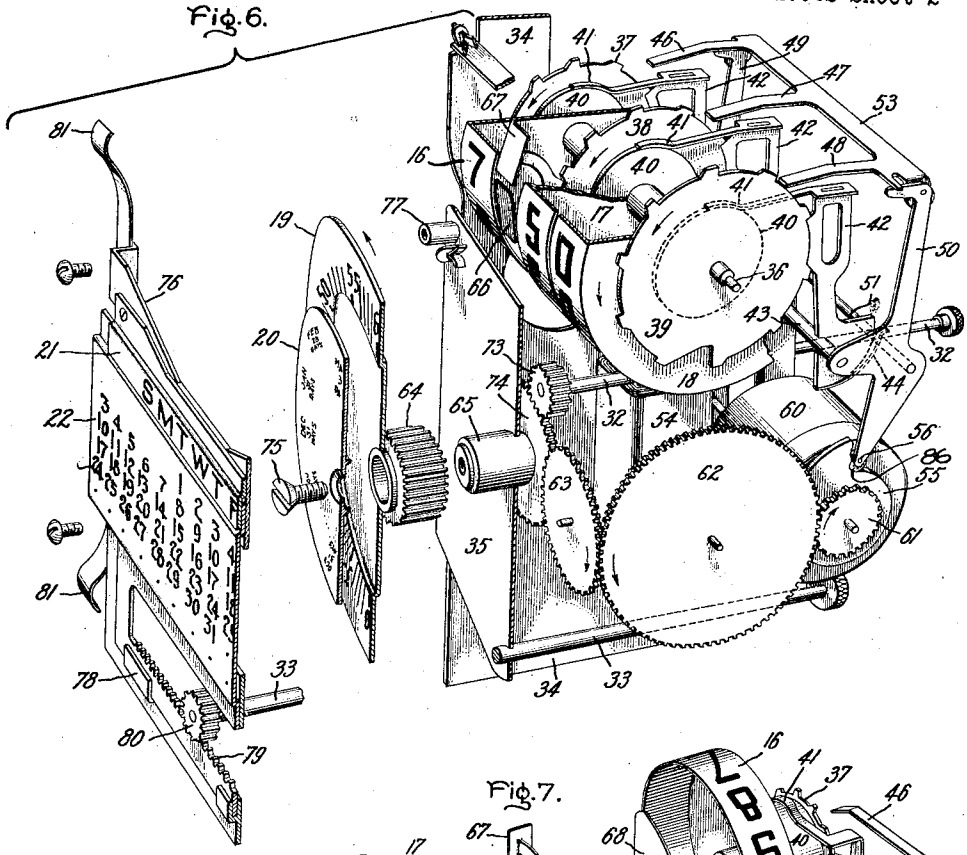
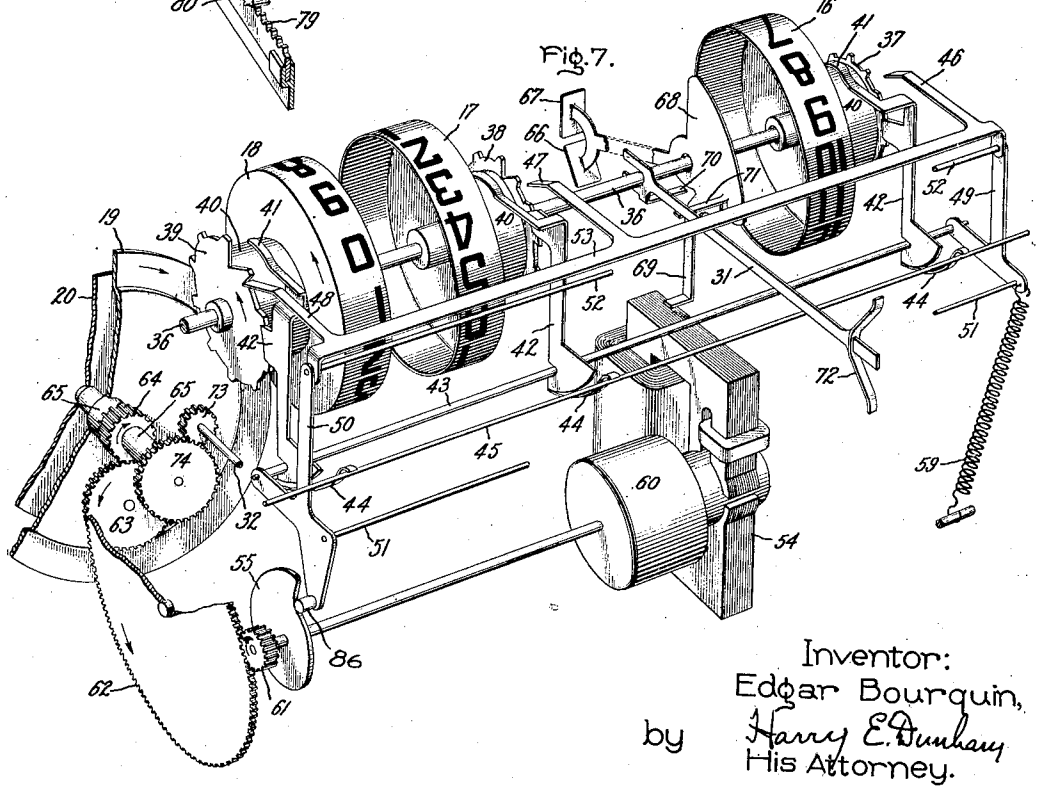


Fig. 7.



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Edgar Bourquin,
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Patented Feb. 12, 1935

1,991,241

UNITED STATES PATENT OFFICE

1,991,241

CYCLOMETER CLOCK

Edgar Bourquin, Framingham, Mass., assignor to Warren Telechron Company, Ashland, Mass., a corporation of Maine

Application July 6, 1933, Serial No. 679,185

10 Claims. (58—125)

My invention relates to cyclometer type clocks, and in particular to such improvements therein as to make this type of clock commercially practicable. The arrangement is such that a universal calendar may be combined therewith without interference or increasing the size of the device.

Cyclometer clocks have long been proposed, but heretofore have not been made sufficiently practicable to be adopted commercially to any appreciable extent.

The present invention relates to improvements in this type of clock which insure reliability, low cost, compactness, ease of setting, quick advancement, and clear visibility of the time indications, and freedom from oiling and cleaning. The features of my invention which are believed to be novel and patentable will be pointed out in the claims appended hereto. For a better understanding of my invention, reference is made to the accompanying drawings, showing in Fig. 1 a perspective front view of a cyclometer calendar clock built in accordance with my invention; Fig. 2 is a sectional side view through the casing showing the interior mechanism; Fig. 3 is a top view of the clock showing how the cover of the casing may be removed to facilitate setting the time drums; Fig. 4 is a development showing the arrangement of the hour, 10 minute and minute indications on the corresponding drums; Fig. 5 is a sectional view through one of the numbered drums; Fig. 6 is a partially disassembled perspective view of the calendar setting features and their combination with the structure of the clock mechanism; and Fig. 7 is a perspective rear side view of the synchronous motor drive arrangement and of the motor field controlled signal, the parts being spread apart for illustration purposes.

Referring first to Fig. 1, this shows the general exterior appearance of the clock as equipped with the calendar arrangement. The front of the clock contains six windows numbered 10 to 15, respectively. The upper group of windows 10 to 13 expose clock indications, and the lower two windows expose calendar indications. Window 10 exposes the hour indications on a drum 16 reading from 1 to 12 as shown in Fig. 4, and it will be explained that this drum is advanced in steps once per hour by an amount and in a direction to consecutively expose the correct hourly indications of the time of day. Window 12 exposes the 10 minute indications on a drum 17, and the minute indications on a drum 18.

The drum 17, which we may call the 10 minute drum, has two consecutive sets of six indications, each reading from 0 to 5, and it will be explained that this drum is advanced step by step by an amount and in the proper direction every 10 minutes to make a complete rotation in two hours and to bring the consecutive indications thereon into view before the window to correctly indicate the 10 minute variations in time. By providing the two sets of indications on drum 17 they may be more advantageously spaced in comparison to the spacing of the indications on the other time drums than would otherwise be the case, and this also simplifies the drum advancing mechanism. The minute drum 18 has ten indications, reading from 0 to 9, and this drum is advanced step by step each minute to make a complete revolution in ten minutes, bringing the indications thereon before the window. The three drums are numbered to rotate downward as viewed from the front, and the advancing arrangement is such that the numbers appearing in the windows are in horizontal alignment. The time indication as shown in Fig. 1 is 8: 20, meaning twenty minutes after eight. The next change will produce the indication 8: 21, etc.

Between the windows 10 and 12 is a window 11 in which is exposed a signal having two colors—for instance, red and white. This signal is controlled by the field of the synchronous motor which drives the clock. When energy is being supplied to the motor the signal part appearing in the window will normally be white, but if the power fails the signal will automatically turn to red and it will stay red even though the power returns and the motor starts, until it is reset by hand as will be explained later. This signal thus serves to indicate failures in the source of supply and thus gives notice that the clock may need correction. The signal window is so placed between the hour and minute indications as to serve as the customary separation mark which is used between the hour and minute indications when time is indicated in this fashion.

The window 13 exposes a small sector of a continuously and uniformly rotating seconds dial 19 graduated from 0 to 60 and which rotates in a direction to read up scale, i. e., the indications which appear in this window appear in the order 5—10—15, instead of 15—10—5. This dial is graduated clockwise and therefore rotates counter-clockwise and makes one revolution per minute. From the above it will appear that when

a person glances at this clock the exact time to the second will be clearly exposed to view. The manner in which the time is indicated by this clock makes it useful for the exact timing of short operations or processes, as, for example, by a physician in taking the pulse rate of a patient.

The calendar features are not operated from the clock motor, and may be omitted when desired. The features regarding the calendar which are here considered patentable relate to the manner in which the calendar is structurally combined with the clock to make a compact assembly without interference, while permitting the adjustable parts of the calendar to be reset from the back of the clock.

Window 14 exposes a portion of a rotatable dial 20 on which there is printed the names of the months and the normal number of days in the month, as shown in Fig. 1. Window 15 exposes a fixed plate 21 on which there is inscribed in their proper order the letters indicating the seven days of the week, and a horizontally adjustable calendar plate 22 of the universal type having the numbered days of the month so arranged that by horizontal adjustment of plate 22 with respect to the week day plate 21 any desired calendar combination may be obtained.

An important feature of the clock relates to the manner of setting the time drums. It will be appreciated that the simplest way to set these drums is to set each individually until the correct time appears in the windows 10 and 12. To avoid the use of three sets of setting mechanisms, I have arranged the casing so that the top 23 may be lifted or removed as shown in Fig. 3. This exposes the top portion of the three time drums 16, 17 and 18, so that setting is simply accomplished by individually rotating the drums in a forward direction with the fingers until the correct setting appears in the windows 10 and 12. The advancing mechanism between the time motor and drums is located beneath and to the rear of the drums and is otherwise arranged to permit this manual setting without interference, and hence complicated setting devices extending to the exterior of the casing are unnecessary. The cover or door is held snugly in place by a spring catch 24 at the front edge and a pair of extensions 25 integral with the cover which fit into holes 26 in the rear top portion of the main body of the casing. The extensions 25 and holes 26 serve as hinges for the cover and after opening the cover may be lifted off entirely if desired, although this is unnecessary to gain access to the drums. The indications are preferably illuminated by a small low voltage lamp 27 energized from the motor field, and access to this lamp may be had through the top door opening.

All of the windows are covered by a single pane of glass 28, which rests against the inside front cover of the casing 29, in which the various window openings are cut, as best shown in Fig. 2.

Extending through the rear cover 30 of the casing is a member 31 for setting the signal appearing in window 11, a shaft 32 for setting the name of the month dial 20, and a shaft 33 for setting the calendar plate 22. When the thumbnuts on the rear ends of shafts 22 and 33 are removed, the rear cover may be removed and the entire internal clock structure removed as a unit from the rear of the casing.

The assembly and manner of operation of the internal mechanism may best be seen from Figs. 2, 6 and 7. Two side plates, one of which is shown at 34 in Figs. 2 and 6, and a connecting front plate 35 support the clock mechanism. A large part of this supporting structure is removed or cut away in Fig. 6 to better expose the mechanism itself. The drums 16, 17 and 18 are rotatively mounted on a stationary shaft 36 which extends between and is fastened to the side plates, one of which is shown at 34. To each drum is secured its operating ratchet wheel. Thus, drum 16 has a ratchet wheel 37, drum 17 a ratchet wheel 38, and drum 18 a ratchet wheel 39. Between each drum and its ratchet wheel there is a reduced diameter portion 40 (see particularly Fig. 5 for the preferred form of construction). In Fig. 7 the parts are spread apart horizontally for the purposes of illustration, and the hub portions appear wider than they actually are. The space between a drum and its ratchet provides a space for guiding a finger 41. Each finger 41 is secured to a positioning and retaining pawl 42 for the ratchet wheel, and these pawls are individually pivoted on stationary shaft 43 extending between the side plates parallel to shaft 36, and these retaining pawls are lightly urged toward the ratchet wheels on which they rest by springs 44 fastened to the bottoms of the pawls 42 and retained under slight tension by having their rear ends rest against the inner side of a bar 45 extending between the clock plates parallel to shafts 36 and 43. For ease in assembly, the retaining pawls 42 are notched on the front sides to fit the shaft 43, and consequently these pawls may be inserted in place after the drums and rods 43 and 45 have been assembled. The pressure of springs 44 is such as to retain pawls 42 in place with the shaft 43 resting in the bottoms of the notches. The fingers 41, which are inserted between a ratchet wheel and its drum, retain the upper portions of the pawls in alignment with their respective ratchet wheels.

It will be noted that the length of the teeth on the retaining pawls, measured in a circumferential direction, is the same as the spacing between the adjacent rear and front portions of the teeth in the ratchet wheels. These pawls are so shaped to prevent backward rotation and resist forward rotation of the ratchet wheels and the drums to which the ratchet wheels are fastened, and serve to exactly position the rotative positions of the drums in any one of a plurality of different positions corresponding to the number of teeth in the ratchet wheels. These positions are such as to exactly align the numbers on the drums in their respective windows.

When a drum is rotatively urged forward, either by the fingers, as in setting, or by the advancing mechanism yet to be described, the retaining pawl 42 and the brake finger 41 are lifted against the spring tension at 44 and allow the drum to rotate.

The means for normally advancing the drums comprises the three advancing pawls 46, 47 and 48 carried by a light framework consisting of the two end pieces 49 and 50 and connecting bars 51 and 52. This framework is pivoted to the stationary shaft 43, and the strip 53 integral with the three advancing pawls is pivoted at the top portion of this framework about bar 52. A self-starting synchronous motor 54 rotates a cam 55 one revolution per minute in the direction indicated by the arrow. A pin 56 on the pawl advancing framework carries a roller 86 which rides on the cam surface and reciprocates the

framework and advancing pawls to the extent necessary to advance the drums a distance of one ratchet tooth at a time. A light spring 59 maintains the cam follower in contact with the cam and serves to retract the advancing pawls as permitted by the position of the cam. The ratchet wheels 37 and 38 for advancing the hour and 10 minute drums each have twelve teeth, while ratchet wheel 39 for the minute drum has ten teeth, corresponding in each case to the number of spaced indications on said drums. The ratchet wheels have different diameters, wheel 37 being the smallest and wheel 39 the largest, as best shown in Fig. 2. Only one of the steps or depressions between the teeth in the larger ratchet wheel 39 is cut deep enough for the unitary advancing pawl structure to drop down far enough to engage in advancing relation with the teeth in the smaller ratchet wheels, and only two diametrically opposite steps or depressions in the intermediate size ratchet wheel 38 are cut deep enough for the advancing pawl 47 to engage in advancing relation with the small ratchet wheel 37. These more deeply cut places in ratchet wheels 38 and 39 are shown in alignment at the top in Fig. 2, and wheel 38 has another deeply cut notch diametrically opposite this point. When the pawl 48 engages in any one of the shallow notches in its ratchet wheel, the pawls 46 and 47 ride over the teeth in their ratchet wheels without engaging. Due to this arrangement it will be evident that the 10 minute drum 17 will only be advanced one notch for each revolution of the minute drum 18, or every ten minutes, and that the hour drum 16 will only be advanced a notch for each half revolution of the 10 minute drum 17, or every hour. The throw of the advancing pawls is slightly greater than that necessary to advance the ten tooth wheel 39 one notch at a time. The position of the retaining pawl 42 for the larger ten-toothed ratchet wheel 39 is such that it engages slightly lower down on its ratchet wheel than for the other two retaining pawls on the smaller twelve-tooth ratchet wheels 37 and 38, and as a result when the two or the three wheels are advanced together, the advancing pawl for the larger wheel engages first and advances its wheel $\frac{1}{10}$ minus $\frac{1}{12}$ of a revolution before the other wheel or wheels are advanced with it. In this way it is possible to simultaneously advance the minute wheel $\frac{1}{10}$ revolution and one or both of the other wheels $\frac{1}{12}$ revolution by the desired exact amount by the same advancing mechanism. This explains the main reason why it is desirable to have two sets of numbers on the 10 minute drum in order that the distance it is advanced is the same as the hour drum and not greatly different from the minute drum. It will be evident that some other more complicated mechanism would be required if it were necessary to advance the 10 minute drum $\frac{1}{6}$ revolution every 10 minutes.

As a result of the arrangement described, the minute drum is advanced one step or $\frac{1}{10}$ revolution every minute, the 10 minute drum is advanced $\frac{1}{12}$ revolution every 10 minutes, and the hour drum $\frac{1}{12}$ revolution every hour, and their indications are exactly positioned in the windows. Only a single cam and unitary advancing pawl arrangement is required.

It will be noted that the rise in cam 55 is nearly radial and that the cam rotates in a direction to cause the cam follower to ride upward over the rise. It differs from the most usual cam arrangement, where the rise is gradual and the drop or step is abrupt. Here the rise is abrupt and the drop gradual. This means that the advancing of a drum from one indication to the next is very quick and that even the minute drum remains stationary for the greater portion of the minute interval between advancing operations while the pawls are being slowly retracted. The advancing mechanism and the drums themselves are made as light as possible in order to reduce inertia effects in starting and stopping to a minimum. This reduces wear and noise. Suitable provisions are provided to prevent the drums and pawls from sliding axially on their shafts.

The synchronous motor 54 may be of the type described in United States Letters Patent No. 1,495,936, May 27, 1934, Warren, assigned to the same assignee as the present invention. Such a motor has an inclosed gear casing 60 containing gears for reducing the motor speed to one revolution per minute, and gives ample torque to operate the clock mechanism described without falling out of synchronism.

The second dial is driven from the same motor through a 1 to 1 ratio gear train comprising gears 61, 62, 63 and 64. Gears 63 and 64 are on the front side of plate 35, as shown in Fig. 2. Gear 62 extends through a slit in plate 35 and meshes with gear 63 at right angles. Gear 64 with the second disc 19 secured to its forward end rotates on a hub 65. When the parts are assembled, the zero graduation point on the second dial 19 is positioned opposite window 13 when the cam 65 is positioned to just finish advancing the minute drum so that the beginning and ending of a minute as indicated on the second dial will coincide with the quick advancement of the minute drum.

It will be apparent by following through the directions of rotation of the gears, the second dial will rotate in a direction opposite to that in which it is graduated, so that the seconds may be read off dial 19 as they accumulate during each minute. If it is desired, the retaining pawl 42 for the minute ratchet wheel 39 may be allowed to drop into its positioning notch between the teeth with a slight click, to give an audible indication of the passing of each minute at substantially the instant the 0 indication on the second dial passes the center of the window 13, thus audibly marking the beginning and ending of each minute. This may be desirable for clocks used in laboratories or physicians' offices, as it will assist in timing short operations without necessarily watching the clock. This click may be emphasized or reduced by properly shaping the retaining pawl and adjusting the tension of the spring 44, and if desired the retaining pawl may be provided with a small resiliently mounted hammer which strikes against a small gong or tuning fork to strike the minutes or the hours.

The signal which appears in the window 11 is best shown in Fig. 7. It comprises the red and white signal plates 66 and 67, respectively, mounted on the forward end of an arm extending from a member 68 pivoted to the shaft 36 between the hour and 10 minute drums. The member 68 is preferably cut from a thin sheet of magnetic material having an integral finger 69 extending downward in proximity to the field magnet of the synchronous motor 54. The rear sector-shaped portion of member 68 normally overbalances the weight of the signal arm

and rotates the red plate 66 upward in front of window 11 (Fig. 1), at which time the lower edge of sector 68 comes against a finger 70 on the setting member 31 and prevents further rotation. When the field of motor 54 is energized, setting member 31, which extends through the rear wall of the clock casing may be pulled back slightly to rotate the white signal 67 downward in front of window 11 and to bring arm 69 into close proximity to the motor field, which holds the signal in this position until the motor is deenergized. A horizontal finger 71 cut from sector 68 now rests against the under side of setting member 31 and helps position the signal in this position. The setting member is provided with a spring element 72 which rests against the inside wall of the casing as shown in Fig. 2 to bias member 31 forward when it is released after setting the signal. This removes finger 70 away from the lower edge of sector 68, so that the signal is free to operate and indicate red in case of a failure of the voltage supply to motor 54 and the magnetic release of the arm 69.

When a calendar is combined with the clock, the month dial 20 is fastened on the forward end of hub 65 and the hub is made rotatable from shaft 32 through gears 73 and 74. Dial 20 is secured to the hub 65 by a screw 75, and is suitably spaced in front of the second disc 19 to allow the latter to rotate freely. The month dial is of less diameter than the second dial so that windows 14 and 13 in which these dials appear are concentrically arranged but without visual interference. By turning the shaft 32 from the rear of the clock any one of the twelve months of the year may be indicated in window 14.

The remainder of the calendar is supported in a framework 76 which in turn is supported from the front portion of the clock-holding structure by bolts passing through suitable spacing collars, one of which is shown at 77, outside the periphery of the second dial 19. The framework 76 for the calendar may be thus supported at its four corners as indicated in Fig. 2. The top and bottom of framework 76 is provided with horizontal guides, the top one comprising the plate 21 on which letters indicating the days of the week appear. The lower guide is indicated at 78. Inserted between these guides is the horizontally adjustable date plate 22. The lower portion of this plate contains a horizontal opening having a gear rack 79 cut in its lower edge. Meshing with this rack is a gear wheel 80 secured to shaft 33 extending to the rear of the clock and by which plate 22 may be adjusted horizontally. Data for a universal calendar are marked on this plate, and all necessary monthly calendar combinations may be made to appear in the window 15. The calendar will be changed by hand once a month to expose the correct current calendar indications.

Whether the calendar is included or not, I prefer to provide resilient members, indicated at 81, extending from the front portion of the removable clock work assembly on both sides of the clock and near the top and bottom, which, when the clock assembly is inserted into the casing, will press against the inside of the glass window pane 28 to resiliently hold the glass snugly against the inside front wall of the casing and keep out dust. No additional glass retaining means is then necessary, and the various indications are brought close to their respective windows. The arrangement is such that when the rear cover is fastened in place additional securing means are not needed to hold the clock mechanism firmly in its casing.

Detail modifications not inconsistent with the foregoing description and employing the novel principles of my invention are intended to be included within the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A cyclometer clock and casing therefor, said casing containing two longitudinally aligned windows, an hour indicating drum rotatively mounted in said casing back of one of said windows, minute indicating drums rotatively mounted in said casing back of the other of said windows, a synchronous motor in said casing for effecting rotation of said drums to display the correct time of day in said windows when the motor is normally energized, a signal device for indicating that the motor has been deenergized and that therefore the drums may need resetting, and a third window in said casing for displaying said signal, said last mentioned window being positioned between the first two mentioned windows and serving as a separation mark to set apart the hour and minute indications displayed.

2. A cyclometer type clock and casing therefor, three horizontally aligned windows in said casing, means in said casing for exposing hour indications in the left-hand window and for exposing minute indications in the right-hand window, a synchronous electric motor for moving the hour and minute exposing means past their windows to indicate the time of day when the motor is normally energized, a signal in said casing having two display positions in the central window, and means subject to the control of said motor when energized to cause said signal to move from one display position to the other display position when said motor is deenergized.

3. A cyclometer type clock and casing therefor, the casing having a pair of longitudinally aligned windows, means in said casing for exposing the hour indications in one of said windows and the minute indications in the other of said windows, a self-starting synchronous electric motor in said casing for advancing said indication exposing means past said windows to indicate the time of day, a third window between the first mentioned windows, a signal device in said casing having two different display positions in said third window, means responsive to the field of the electric motor for retaining said signal in one display position when the motor is energized and the signal is moved to such position, means for automatically moving said signal to the other display position when the motor is deenergized, and manual means operated from the exterior of the casing for moving the signal from the last mentioned to the first mentioned position.

4. In a cyclometer clock, a plurality of time indicating drums, a ratchet wheel for each drum, a single pawl member directly cooperating with the ratchet wheel on each drum for advancing said drums in steps to bring different time indications thereon into alignment to indicate the time of day, a cam for reciprocating the pawl member, a synchronous motor for driving said cam at a uniform speed of one revolution per minute, said cam directly advancing said pawl

member and shaped to cause the advancing operation of said pawl member to be completed in a few seconds by energy received directly from the synchronous motor, once for each complete rotation of said cam.

5. In a cyclometer clock, a plurality of time indicating drums, a ratchet wheel for each drum, a single pawl member directly cooperating with the ratchet wheel on each drum for advancing said drums in step and at different rates, a cam for advancing and retracting said pawl member, a self-starting synchronous motor for driving said cam at a uniform speed, said cam directly advancing said pawl member and shaped to quickly advance and slowly retract the pawl member once per minute, the pawl advancing operation receiving its operating energy through said cam directly from said motor.

6. A cyclometer clock comprising hour, ten minute and minute indicating drums rotatively mounted on the same axis, a ten-toothed ratchet wheel for advancing the minute drum, twelve toothed ratchet wheels for advancing the ten minute and hour drums, respectively, the wheel for the minute drum having a larger diameter and the wheel for the hour drum having a smaller diameter than the wheel for the ten minute drum, an integral pawl member having three similar fingers for cooperation with the teeth on the three ratchet wheels, means for advancing and retracting said pawl member a sufficient distance to advance the minute drum $\frac{1}{10}$ revolution each minute, only one of the notches between the teeth in the minute ratchet wheel being cut deep enough to allow the pawl fingers to engage in advancing relation with the ten minute and hour ratchet wheels, and only two diametrically opposite notches in the ten minute ratchet wheel being cut deep enough for a pawl finger to engage in advancing relation with the hour wheel, whereby said pawl member reciprocating to advance the minute drum $\frac{1}{10}$ revolution per minute also advances the ten minute drum $\frac{1}{12}$ revolution each tenth operation and the hour drum $\frac{1}{12}$ revolution each 60th operation, and individual stop pawls for said ratchet wheels for definitely positioning the drums in their various relative positions.

7. A cyclometer clock mechanism comprising hour, ten minute, and minute indicating drums, each provided with ratchet wheels and all rotatively mounted on the same axis, the minute ratchet wheel having ten equally spaced teeth and the other ratchet wheels each having twelve equally spaced teeth, an integral advancing pawl member having three similar fingers cooperating with the teeth in the three ratchet wheels, means for quickly advancing and slowly retracting said pawl member once per minute a sufficient distance to advance the minute drum $\frac{1}{10}$ revolution, the relation of the teeth and depressions between the teeth in the three ratchet wheels with respect to the positions of the pawl fingers cooperating therewith being such that the minute wheel is advanced $\frac{1}{10}$ revolution for each advancing operation, the ten minute wheel is advanced $\frac{1}{12}$ revolution each 10th advancing operation, and the hour wheel is advanced $\frac{1}{12}$ revolution each 60th advancing operation of the pawl member, the pawl fingers riding over the teeth in the ten minute and hour ratchet wheels without engagement for the remaining advancing operations in each case, and individual stop pawls for each ratchet wheel for limiting the rotative movements to the amounts specified above and exactly positioning the corresponding drums in their different rotative positions.

8. A cyclometer clock including a casing, hour, ten minute, and minute indicating drums rotatively mounted in said casing on a common axis, horizontally aligned windows in said casing for displaying individual indications on said drums, a self-starting synchronous motor having a terminal shaft operating at one revolution per minute, a cam and a gear on said shaft, an integral pawl member rocked by said cam and cooperating with ratchet teeth on said drums, to advance said drums in quick steps, the hour drum $\frac{1}{12}$ revolution every hour, the ten minute drum $\frac{1}{12}$ revolution every ten minutes, and the minute drum $\frac{1}{10}$ revolution every minute, to display the time of day in hour and minutes in said windows, a disc having a peripheral side portion graduated in a continuous circular scale from zero to sixty seconds rotatively mounted in said casing, a sector shaped window for displaying about $\frac{1}{6}$ of said scale, and means for connecting said disc in driving relation with the gear on the motor shaft so that the disc will be driven at the rate of one revolution per minute in a direction opposite to that in which its scale is graduated.

9. A cyclometer clock and casing therefor, hour, ten minute, and minute time indicating drums rotatively mounted on a common axis in said casing, a pair of horizontally aligned windows for displaying hour and minute indications on said drums, a self-starting synchronous motor in said casing, a terminal shaft therefor, a cam and gear on said shaft, a pawl and ratchet mechanism operated from said cam and operating upon said drums for advancing the same in quick steps, the hour drum $\frac{1}{12}$ revolution per hour, the ten minute drum $\frac{1}{12}$ revolution every ten minutes, and the minute drum $\frac{1}{10}$ revolution every minute, to display the time of day in hours and minutes in said windows, a signal in said casing and a display window therefor located between the first mentioned windows and constituting a mark to set apart the hour and minute indications displayed, said signal being controlled by said motor to indicate its stoppage by reason of its having been deenergized, a disc having a peripheral side portion graduated in a continuous circular scale from zero to sixty seconds, rotatively mounted in said casing, a sector shaped window for displaying a limited portion of said scale, and means for connecting said disc in driving relation with the gear on the motor shaft so that the disc will be driven at the rate of one revolution per minute in a direction opposite to that in which its scale is graduated and so that the end portions of its scale will be displayed in synchronism with the advance of the minute drum.

10. A cyclometer calendar clock and casing therefor comprising hour, ten minute, and minute time indicating drums mounted upon a horizontal axis in the upper portion of said casing, windows in the upper front wall of said casing for displaying indications on said drums to indicate the time of day in hours and minutes, a constant speed motor located in said casing beneath said drums, a cam driven by the motor, a pawl and ratchet mechanism connected between said cam and drums and extending to the rear of said drums for advancing the drums in steps at the proper times and in the proper

amounts to cause the correct time of day to be displayed thereby, a disc rotatively mounted in parallel spaced relation to the front wall of said casing beneath the aforementioned windows, said disc having a graduated sixty second scale in a circle on the front peripheral portion, a sector shaped window in the casing opposite the upper portion of said scale, gearing between the motor and disc for driving the latter at one revolution per minute, a smaller disc mounted parallel to, in front of, and on the same axis as the second disc, said smaller disc having the months of the year indicated about its front peripheral portion and comprising a part of a universal calendar, a window in the front wall of the casing beneath the sector shaped window for displaying the upper month indication on the smaller disc, and a shaft extending to the rear to which said smaller disc is secured for rotatively adjusting the same, said shaft serving as a hub bearing for the seconds disc.

EDGAR BOURQUIN.

CERTIFICATE OF CORRECTION.

Patent No. 1,991,241. February 12, 1935.

EDGAR BOURQUIN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 18, for "1934" read 1924: and page 6, line 12, claim 10, for "second" read seconds; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of March, A. D. 1935.

Leslie Frazer

(Seal) Acting Commissioner of Patents.

CERTIFICATE OF CORRECTION.

Patent No. 1,991,241. February 12, 1935.

EDGAR BOURQUIN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 18, for "1934" read 1924: and page 6, line 12, claim 10, for "second" read seconds; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of March, A. D. 1935.

Leslie Frazer

(Seal) Acting Commissioner of Patents.