A. MORAWSKI.

CALENDAR.

APPLICATION FILED APR. 17, 1915.

1,190,789.

Patented July 11, 1916.

2 SHEETS—SHEET 1.

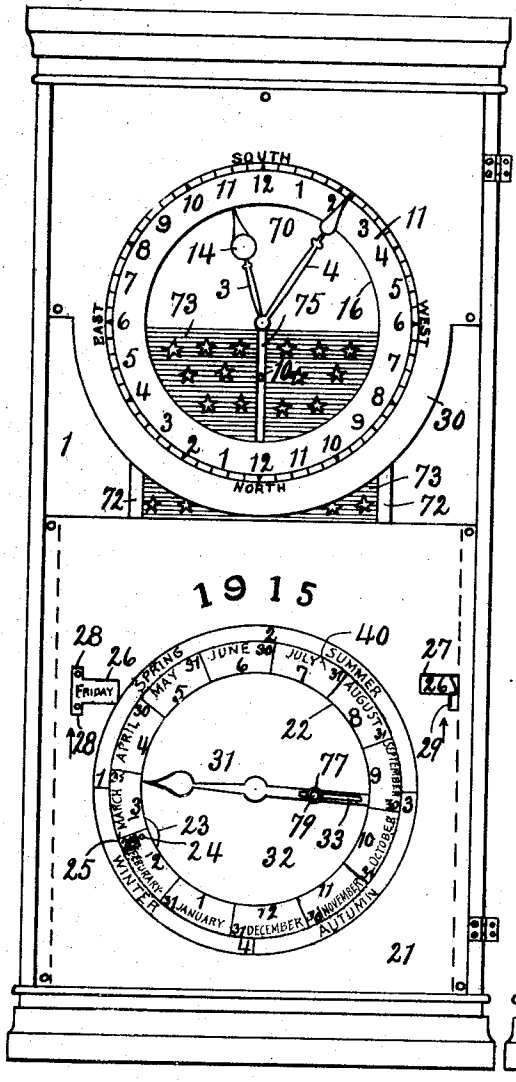


FIG. 1.

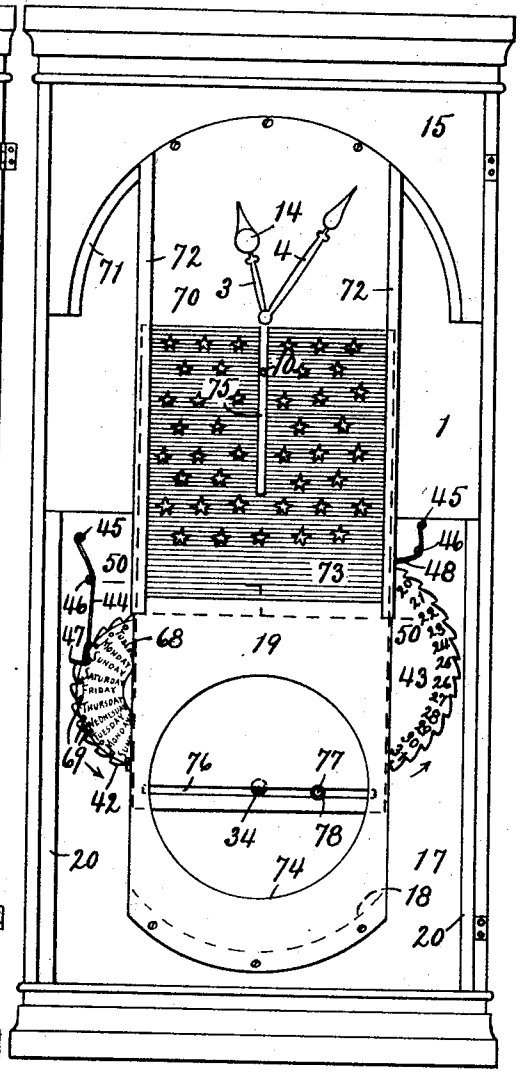


FIG. 2.



FIG. 3.

WITNESS

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2 SHEETS—SHEET 2.

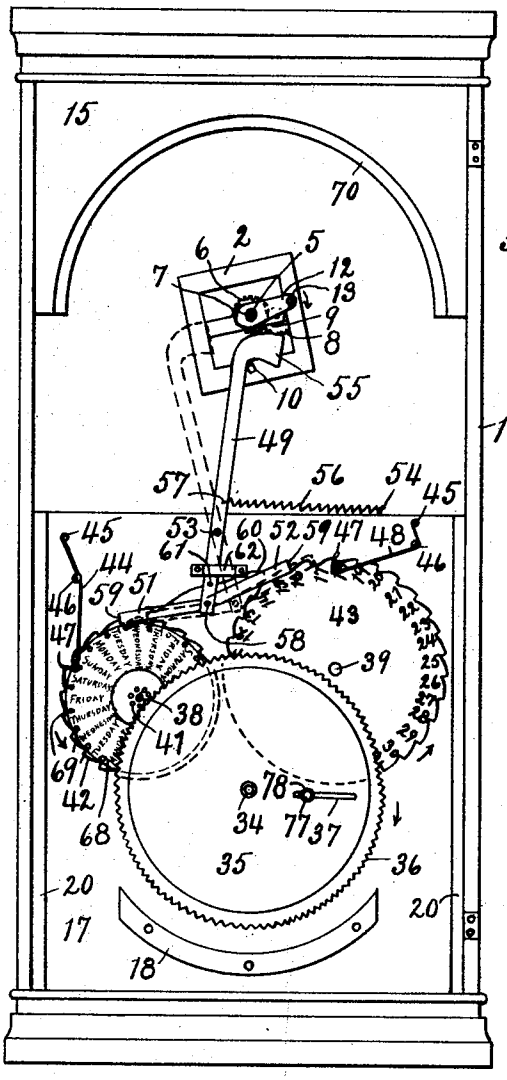


FIG. 4.

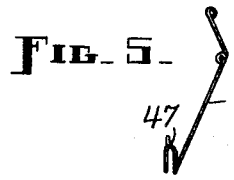


FIG. 5.

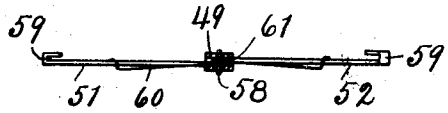


FIG. 6.

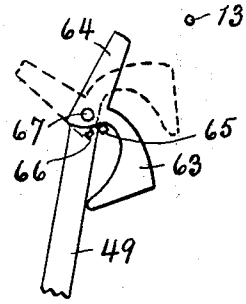


FIG. 7.



FIG. 8.

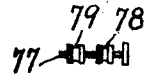


FIG. 9.

WITNESS

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UNITED STATES PATENT OFFICE.

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CALENDAR.

1,190,789. Specification of Letters Patent. Patented July 11, 1916.

Application filed April 17, 1915. Serial No. 22,019.

To all whom it may concern:

Be it known that I, ADOLF MORAWSKI, a subject of the Czar of Russia, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Calendar, of which the following is a specification.

My invention relates to improvements in calendars, of the so-called perpetual type, which are adapted to be operated by clock-works and designed to be embodied in or to form parts of clocks, and resides in certain peculiar means and mechanism actuated by clock-work for denoting, not only the months and days, but also the proportionate day and night portions of each twenty-four hours between midnight of one day and midnight of the next day, such means comprising, with the ordinary works and hands of the clock with which the calendar is incorporated, and either the customary twelve-hour dial or a special twenty-four hour dial, means to indicate the months and seasons, days of the week and days of the month, a sliding member, which may be termed a nocturnal slide, means to operate the movable parts once daily from or by said works of the clock, and such other parts and members as may be needed or desired to make the calendar complete and serviceable, all as hereinafter set forth.

The primary object of my invention is to produce an accurate clock calendar, which is comparatively simple in construction and operation, consisting as it does of few parts, inexpensive, and entirely practicable and efficient, to denote the month and day and show clearly the proportionate amounts of daylight and darkness each day, and the time when the sun rises and the time when it sets.

A further object is to provide a calendar of this kind that can be readily incorporated with a clock without requiring material change of the old clock members.

Provision is made in this calendar for readily making the necessary adjustments or changing the settings of such members as need at any time to be readjusted or reset.

Other objects and advantages will appear in the course of the following description.

A preferred form or embodiment of the invention, whereby I attain the objects and secure the advantages of the same, is illustrated in the accompanying drawings, and I will proceed to describe the invention with reference to said drawings, although it is to be understood that the form, construction, arrangement, etc., of the parts in various aspects are not material and may be modified without departure from the spirit of the invention.

In the drawings, in which like numerals designate like parts throughout the several views, Figure 1 is a front elevation of a clock and calendar which embody the invention as aforesaid, the door being omitted; Fig. 2, a similar elevation without the clock and month dials; Fig. 3, a detail of the February disk; Fig. 4, a front elevation of the interior mechanism and parts after the nocturnal slide and the guide therefor have been removed; Fig. 5, a perspective view of one of the detents used with the ratchet wheels; Fig. 6, a top plan of the pawls and spring for said ratchet wheels, the operating lever to which said pawls are pivotally attached being in cross section; Fig. 7, a detail of the operating lever employed when the ordinary twelve-hour dial is retained, only the upper terminal portion with the movable head and dog being shown; Fig. 8, a cross section taken on lines 50—50, looking down, in Fig. 2, and, Fig. 9, an enlarged side elevation of the screw and thumb-nuts used in connection with certain of the disks and the slide.

I may utilize, in connection with this invention, any suitable clock case, as 1, and any ordinary clock movement or clock-work the latter being represented at 2, in Fig. 4. Included with the clock movement 2 are the hour and minute hands 3 and 4, respectively, and of said movement I show the hour-hand sleeve 5 provided with the gear 6, the minute-hand spindle 7, the gear 8 and pinion 9 which drive said gear 6 and said hour-hand, and the winding spindle 10. The only change involved in these clock-work parts is in the gear 8, which has twice the number of teeth that it would have ordinarily, since a twenty-four hour dial 11 is used, instead of the usual twelve-hour dial. The latter dial, such as is to be found on nearly all clocks and watches in use at the present time, may be retained, however, and in that event the gear 8 will not be changed at all. The clock-work operates or functions in the manner well understood by those skilled in the art. I add to the clock-work movement 2 an arm 12 which is provided at its free

end with a forwardly-projecting pin 13. The arm 12 is mounted on the sleeve 5 to rotate therewith. The hour hand 3 is provided at 14 with a representation of the sun.

The dial 11 is on a plate 30 which is secured to an arched backing 15 in the case 1 at the top, and is cut out in the center, as shown at 16, in Fig. 1. The dial plate 30 is so arranged that the spindle 7 is in the center of the opening 16. The dial 11, which is around the opening 16, consists of two sets of numerals from 1 to 12, so arranged that one 12 is at the top and the other 12 at the bottom, and said dial is divided by graduation marks into sixty spaces for the minutes in one hour. The minute hand 4 travels over the aforesaid marks, and the hour hand 3 moves past the aforesaid numerals. The numerals from 6 to 6 on the upper half of the dial 11 denote the day time, and the corresponding numerals on the lower half of the dial the night time. When the hour hand points to the left-hand 6, it is 6 o'clock in the morning, and, when said hand points to the right-hand 6, it is 6 o'clock at night. The upper 12 denotes midday, and the lower 12 denotes midnight. The position of the hands in the first view indicate that it is nearly six minutes past 11, a. m.

On the plate 30, at the bottom of the vertical diameter of the dial 11, is the word "North" and at the top of said diameter the word "South," while at the left- and right-hand ends of the horizontal diameter of said dial are the words "East" and "West," respectively. Thus the sun 14, as it is carried around by the small hand 3, follows the course of the real luminary, or rather the symbolical east by south to west course laid down on the dial 11.

In the lower part of the case 1 is a backing 17 having on its face near the bottom an arcuate support 18 for the base of a guide section 19, and at the sides supports 20—20 for a dial plate 21. The plate 21 is secured to the supports 20, which latter are of sufficient depth to leave ample room for the parts which are behind said dial. The plate 21 has a central opening 22 therein, and has the four seasons and the twelve months arranged thereon around said opening to form a dial 40, the seasons and months both being presented by name and number. The center of the opening 22 is directly under or in the same vertical plane with the spindle 7. The arrangement of the graduation marks on this dial is such that the first day of spring is at the left-hand end of the horizontal diameter of the dial, and is marked 1 with the word "Spring" following; the first day of summer is at the top of the vertical diameter of said dial, and is marked 2 with the word "Summer" following; the first day of fall is at the right-hand end of said horizontal diameter, and marked 3 with the word "Autumn" following; and the first day of winter is at the bottom of said vertical diameter, and is marked 4 with the word "Winter" thereafter. The season mark 1 is adjacent to the dial space for March, but near the upper end of such space, and the other season marks are in correspondingly proper relation to the months of June, September, and December, the spaces for the twelve months being arranged approximately equidistantly around the opening 22 and containing in each the name of the respective month and the number of the same.

The number of days in each month may be represented by numerals placed at the end of each month space in the dial 40.

In order to provide for the extra day in February every fourth year, I employ a disk 23, which bears on its face the numerals 28 and 29, and pivot said disk at 24 to the dial plate 21, in position to have one of said numerals show through an opening 25 cut in said plate at the upper end of the February space of the dial 40, such end being the end of the dial month. The periphery of the disk 23 projects into the opening 22 and can be conveniently reached with the finger for the purpose of turning said disk on the pivot 24, whenever it is necessary to change the numeral showing through the opening 25, such change being required at the beginning and ending of every leap-year. The numerals 28 and 29 on the disk 23 may be duplicated or repeated one or more times, if desired, so as to decrease the amount of rotation necessary to change from one numeral to the other.

The plate 21 bears the year numerals above the dial 40, which must, of course, be changed annually. The manner of making the annual changes above referred to is not material so far as the present invention is concerned.

A day-of-the-week opening 26 is made in the plate 21 at the left of the upper part of the dial 40, and a day-of-the-month opening 27 is made in said plate at the right of said upper part of said dial. The left-hand end of the opening 26 is increased vertically, extending both up and down, as shown at 28—28, and the right-hand end of the opening 27 has a downward extension 29—see Fig. 1.

A pointer 31, which in the present case is delineated on a disk 32, is provided for the dial 40, and an intermittent motion is imparted to disk and pointer by the clock-work 2, and intervening mechanism presently to be described, the movement being in the same direction as that of the clock hands. The pointer 31 is for the purpose of indicating the months and seasons and therefore is caused to make one complete revolution annually. There is a radial slot 33 in the disk

32, such slot being in the same diameter with the pointer 31, for reasons which will presently appear.

Central to the opening 22, and, therefore, in the same vertical plane with the spindle 7, is a stud 34 which projects forwardly from the backing 17, and mounted to rotate on said stud is a disk 35 which has peripheral teeth 36. There is a radial slot 37 in the disk 35. The slot 37 is similar to the slot 33 and their positions relative to the axial centers of their respective disks 32 and 35 are also similar. Two more studs 38 and 39 project from the backing 17, and upon the former, which is at the left of the vertical center of the case 1 and above the horizontal center of the disk 35, a pinion 41 is mounted to rotate, such pinion intermeshing with the teeth 36 and being the driving member for said disk. The pinion 41 is rotatably attached to a ratchet-wheel 42, which is mounted behind said pinion on the stud 38, and is partially behind the disk 35. The movement of the ratchet-wheel 42 and the pinion 41 is from right to left, so that the disk 35 is driven from left to right. The stud 39 is on the side of the vertical center of the case 1 which is opposite to that upon which the stud 38 is located, and a little higher than said stud 38, and mounted to rotate on said stud 39 is a second ratchet-wheel 43. The ratchet-wheel 43 is larger than the ratchet-wheel 42, and like the latter is partially behind the disk 35. The movement of the ratchet-wheel 43 is also from right to left.

A spring detent 44 is provided for the ratchet-wheel 42 to prevent movement thereof except in the direction above noted. The detent 44 has one end attached to a stud 45 set in the backing 17, is coiled around another stud 46 also set in said backing, and has at its free end a hook 47 to engage the teeth of the ratchet-wheel 42. A spring detent 48 is provided for the ratchet-wheel 43, which detent is very similar to the detent 44, being supported on and by additional studs 45 and 46 and having a hook 47.

The actuating mechanism for the ratchet-wheels 42 and 43 comprises, with the clockwork 2 and the arm 12, a spring-pressed lever 49, and two spring-pressed pawls 51 and 52. The lever 49 occupies an approximately vertical position, and is pivotally mounted above the lower end on a stud 53 which projects forwardly from the backing 17. The lever 49 has a head 55 which is normally retained, by a spring 56, in the path of the pin 13 carried by the arm 12. The spring 56 has one end fastened at 54 to the upper edge of the backing 17 and the other end fastened at 57 to the lever 49, and said spring normally retains said lever in contact with the winding spindle 10, which may serve as a stop for the lever. The inner ends of the pawls 51 and 52 are pivoted at 58 to the base of the lever 49, and the outer ends of said pawls are provided with hooks 59 to engage the teeth of the ratchet-wheels 42 and 43. The pawl 51 extends to the left into engagement with the ratchet wheel 42, and the pawl 52 extends to the right into engagement with the ratchet-wheel 43. A spring 60 is coiled around a pin 61 carried by the lever 49, and extends to the right and left to engage with its ends the upper edges of the pawls and press them downward into engagement with the ratchet-wheels. A combined guide and stop member 62 may be attached to the backing 17 over the lower terminal portion of the lever 49, and said member may be utilized to relieve the spindle 10 from the strain of said lever when at rest.

At each revolution of the arm 12, and, therefore, once in every twenty-four hours, the pin 13 encounters the head 55 and carries it to the left, the lever 49 swinging against the resiliency of the spring 56, on the pivot 53 until the parts are disposed as indicated by dotted lines in Fig. 4, when said pin passes away from said head and releases said lever to said spring. When the lever 49 is actuated by the pin 13, the base of said lever swings to the right and moves the pawls 51 and 52 in the same direction to carry their hooks 59 into engagement with the next teeth to the right on the two ratchet-wheels, the spring 60 yielding for that purpose and said ratchet-wheels being at this time held by their detents, and consequently, as soon as said pin clears the head 55 and the spring 56 acts to return said lever to its former position, each of said ratchet-wheels is caused to make that part of a revolution that is equal to the distance between two of the teeth thereon, and to rotate the disk 35, through the medium of the pinion 41, one three-hundred-and-sixty-fifth of a revolution. The timing of the mechanism is such that the pin 13 releases the head 55 at the hour of midnight or when the hand 3 points to the bottom 12 and the hand 4 to the top 12 on the dial 11.

When a twelve-hour dial is used I provide the lever 49 with a movable head 63 having a dog 64, and with stops 65 and 66, as shown in Fig. 7. The head 63 is pivoted at 67 to the lever 49 at the upper end thereof, and the stops 65 and 66 project from said lever under said head. Normally the head 63 rests on the stop 65, with the dog 64 standing up in the path of the pin 13. At the first revolution of the arm 12, the pin 13 encounters the dog 64, throws it over to the left as far as the stop 66 permits, and so swings the head 63 up into the path of said pin, the parts then standing as represented by dotted lines in Fig. 7. At the next revolution of the arm 12, the pin 13

contacts with the head 63 and causes the lever 49 to be actuated against the force of the spring 56 in precisely the same manner as before, the release of said lever taking place when the hour hand has twice traveled around over the face of the clock and arrived for the second time at the numeral 12 in the twelve-hour dial. The dog 64 is heavy enough to counterbalance the head 63, when the parts are rocked out of supporting relation with the stop 65 into such relation with the stop 66, and while said head is up in waiting position for the pin 13. The lever 49 is returned to normal position, by the spring 56, with sufficient force or suddenness to throw the head 63 off of the stop 66 and over onto the stop 65 again.

Mounted on the stud 38, between the ratchet-wheel 42 and the pinion 41, is a disk 68, which bears three sets of the names of the days of the week arranged in regular order from left to right. These names of the days of the week are designed to appear, one at a time, at the opening 26, behind which the disk 68 operates. The disk 68 is held between the ratchet-wheel 42 and the pinion 41 with sufficient force to carry said disk around with said ratchet-wheel, but not so tightly that said disk can not be adjusted on said ratchet-wheel. To this end the disk 68 is provided with a series of openings or holes 69 arranged around the same just inside of the outer edge and in position to pass behind the opening 26 and its extensions 28. By introducing the point of a pencil or other implement through the lower extension 28 into the hole 69 exposed therethrough, adjacent to a name exposed through the opening 26, and moving said point upwardly into the upper extension 28, the disk 68 is rotated far enough to expose the name which precedes the other. In this way any of the seven different names may be brought into view at the opening 26. The dial 68 should be moved from left to right when adjusted, provided it is not desired to disturb the ratchet-wheel 42 which is prevented from moving in that direction by both the detent 44 and the pawl 51. The adjustment or readjustment of the disk 68, independently of the ratchet-wheel 42, is required at such times as the exposed day of the week and day of the month do not agree.

The ratchet-wheel 43 is the day-of-the-month indicator disk, and bears thereon just within its teeth the numerals 1 to 31, inclusive, in regular order and reading from left to right. There are thirty-one ratchet-teeth on the wheel or disk 43. As said disk is intermittently rotated by the pawl 52, arm 12 and intervening parts, one numeral after another thereon is exposed through the opening 27, behind which the ring of numerals is adapted to pass, while the disk teeth are adapted to pass behind the right-hand end of such opening and the extension 29. A point is introduced into the extension 29 and under the exposed tooth of the ratchet-wheel 43, and moved upwardly, when it is desired to set or reset said ratchet-wheel, the latter then being partially rotated in the direction normal to it, and the teeth clicking or slipping past both the detent 48 and the pawl 52. The movement permitted the ratchet-wheel, by means of a point introduced into the opening 27, is equal to the distance between two teeth. It is required that the ratchet-wheel 43 be changed by this means and in this manner for each month that has less than thirty-one days therein. When the month has the full complement of days, the ratchet-wheel 43 makes a complete revolution by thirty-one steps, or a tooth for each day, and then passes on automatically to the first day of the next month, but, when there are only thirty days or twenty-eight or twenty-nine days in a month, said ratchet-wheel must be advanced by hand from the last day of one month to the first day of the next. Resetting is also required when the clock is set in motion after having been stopped for twenty-four hours or more.

Some of the week-day names on the disk 68 and some of the day-of-the-month numerals on the ratchet-wheel 43 are hidden by the disk 35 in Fig. 4. The week-day names are twice repeated on the disk 68, in order that manual adjustment may be effected quickly, and for the purpose of increasing the number of teeth on the ratchet-wheel 42 and so reducing the length of the stroke of the pawl 51, there being, of course, as many teeth as there are names. Nevertheless, the number of such names or sets of names and of the associated teeth might be either reduced or increased.

The guide section 19 is supplemented by a guide section 70, which latter is fastened at the top to an inset part 71 of the backing 15. The section 19 is hollow, and the bottom of the section 70 fits into the top of said section 19, and said section 70 has its longitudinal edges turned over to form lateral guide flanges 72—72, the front side and the ends of said section 19 being cut away to receive the bases of said flanges. The sections 19 and 70 constitute a guide for a nocturnal slide 73, which is moved up and down in such guide, within the bottom section and behind the flanges 72 of the top section. The guide formed by the sections 19 and 70 is in front of most of the operating parts, but the spindle 7 and sleeve 5 project through the section 19, so that the hands 3 and 4 are forward of said section, the spindle 10 projects through said section, and the indicator disk 32 is in front of the section 70. There are openings in the front and back

sides of the hollow section 19, directly in front of the disk 35, as indicated at 74, in Fig. 2.

The slide 73 has a central longitudinal slot 75 therein, at the top, to accommodate said slide to the spindle 10 and the sleeve 5, and a horizontal slot 76 therein near the bottom. The face of the upper portion of the slide 73 should be dark to represent night, and may be studded with stars, while that portion of the face of the guide section 70 that is or may be exposed through the opening 16 should be light to represent day.

A screw 77, with its head behind the disk 35, extends forward through the slot 37 in said disk, the slot 76 in the slide 73, and the slot 33 in the disk 32, and two thumb-nuts 78 and 79 are respectively used on said screw, for the purpose of holding said screw in place and supporting or engaging said slide, and of securing said disk 32 to said disk 35. The edges of the slot 37 are tightly held between the head of the screw 77 and the thumb nut 78, and said thumb-nut is in the slot 76, while the edges of the slot 33 are tightly held between said thumb-nut and the thumb-nut 79. As the disk 35 revolves it carries around with it the disk 32, and causes the slide 73 to reciprocate, the screw and the two thumb-nuts binding the disks together, and the thumb-nut 78 traveling in the horizontal slot 76. The slots 37 and 33 are provided so that the screw 77 can be set at the right point in the slot 76 to give to the slide 73 the required amount of up and down movement, or, in other words, to time the upper edge of said slide to the dial 11, and to admit readily of adjustment in case of need.

On the 21st day of December, which is the shortest day in the year, the slide 73 should be at its highest point and permit to be exposed through the opening 16 the maximum area of that which represents darkness and the minimum area of that which represents daylight; on the 21st day of June, which is the longest day in the year, said slide should be at its lowest point and permit to be exposed through said opening the minimum area of "darkness" and the maximum area of "daylight"; and on the 21st day of September and the 22nd day of February, which are days having equal portions of daylight and darkness, said slide should, upon each of those days, be in the intermediate position, with the upper edge thereof coinciding with the axial center of said opening, and permitting to be exposed equal areas of "darkness" and "daylight." The upper edge of the slide 73 is horizontal, and said edge indicates on the dial 11, approximately the time when the sun rises and the time when it sets each day, the time of rising being at the left and the time of setting at the right.

Referring to the first view, it will be seen that it is nearly six minutes past eleven o'clock in the forenoon, of Friday, March 26th, 1915; that spring has just commenced; and that the sun rises shortly before 6 a. m. and sets shortly after 6 p. m., thus making the day a little longer than the night, as clearly shown by the part of the slide 73 which is exposed through the opening 16. When the hand 4 points to the upper 12 in the dial 11, and the hand 3 to the lower 12 in said dial it is midnight, and the pin 13 carried by the arm 12 passes away from the head 55, having rocked the lever 49 in such a way as to cause the pawls 51 and 52 to engage the next teeth to the right on the ratchet-wheels 42 and 43, respectively, and so releases said lever to the spring 56. Said spring at once acts to return the lever 49 to initial position, and to cause the pawls 51 and 52 to actuate to the left the ratchet-wheels 42 and 43 one notch or tooth each. The movement thus imparted to the ratchet-wheel 42 is transmitted, through the pinion 41, to the disk 35, and the latter is given one three-hundred-and-sixty-fifth of a revolution to the right, with the result that the indicator disk 32, which is securely attached to said disk 35, is actuated with the latter to move the indicating end of the pointer 31 nearer to the end of the March space on the dial 40, and the further result that the slide 73, which rides on the thumb-nut 79, is carried a little lower. "Saturday" now appears at the opening 26, and "27" at the opening 27, and the upper edge of the slide 73 is a little lower than on the preceding day. These changes take place or are repeated every time the clock registers the hour of midnight. After the hour of midnight on the 21st day of June, the screw 77 will begin to ascend on the left side of the vertical diameter of the disk 35 and to elevate the slide 73, and, after the corresponding hour on the 21st day of December, said screw will begin again to descend on the right side of said diameter and to carry said slide downward.

No manual resetting of the ratchet-wheel 43 is required, provided the clock runs continuously, until the end of April or the first of May, when said ratchet-wheel must be moved two notches to bring the first day numeral into view, the manual change being required for each short month, as previously explained.

If the day of the week and the day of the month are in agreement, complete resetting of the parts may be effected by moving the minute hand to reset the clock, but this method would generally consume too much time to be practical, except in the event the clock had been stopped for a comparatively short period only and near the approach to the midnight hour.

From the foregoing it is clear that the

clock movement operates elements which indicate progressively throughout the year and throughout succeeding years, besides the hours and minutes and the course of the sun, the proportionate parts of the days and nights and the times of the rising and setting of the sun, the seasons and months, the days of the weeks, and the days of the months.

When the slide 73 indicates by its position either day which has equal parts of daylight and darkness, the pointer 31 should be directed either to the dividing line between winter and spring or that between summer and autumn on the dial 40, and to this end the slot 33 for the screw 77 is located in the longitudinal center of said pointer. On either of the above-mentioned days, the slots 33 and 37 are horizontally disposed and in parallel relationship with the slot 76.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a calendar, a twenty-four hour dial divided into right and left sections of twelve hours each, a clock movement and hands, and means positively operated by said movement in both directions to separate the space outlined by said dial into proportionate day and night parts.

2. In a calendar, a twenty-four hour dial divided into right and left sections of twelve hours each, a clock movement and hands, and a sliding member, positively operated by said movement in both directions to separate the space outlined by said dial into proportionate day and night parts, said member being adapted to indicate on said dial, with the edge thereof that cuts across the same, the times of the rising and setting of the sun.

3. In a calendar, an hour dial, a sliding member adapted to separate the space outlined by said hour dial into proportionate day and night parts, a clock movement, and means positively to operate said sliding member in both directions from said clock movement.

4. In a calendar, an hour dial, a sliding member adapted to separate the space outlined by said dial into proportionate day and nights parts, a rotary member, connections between said rotary member and said sliding member, a second rotary member provided with means to actuate said first-mentioned rotary member, a clock movement, and means to actuate said second rotary member from said clock movement, whereby said sliding member is positively operated in both directions.

5. The combination, in a calendar, with an apertured dial member, clock-work, and an operating member which travels around with the hour-hand sleeve of said clock-work, of a spring-pressed lever arranged with one end in the path of said operating member, and provided at the other end with a pawl, a ratchet-wheel engaged by said pawl, a rotary member, means to actuate said rotary member from said ratchet-wheel, a slide extending into the space behind the aperture in said dial member, and connecting means between said rotary member and said slide, whereby the latter is caused to travel up and down with the slow intermittent motion imparted thereto by said rotary member.

6. The combination, in a calendar, with an apertured dial member, clock-work, and an operating member which travels around with the hour-hand sleeve of said clock-work, of a spring-pressed lever arranged with one end in the path of said operating member, and provided at the other end with a pawl, a ratchet-wheel engaged by said pawl, a pinion attached to said ratchet-wheel, a rotary toothed member engaged by said pinion, members forming a guide, a slide in said guide and extending into the space behind the aperture in said dial member, and connecting means between said rotary member and said slide, whereby the latter is caused to travel up and down with the slow intermittent motion imparted thereto by said rotary member.

7. The combination, in a calendar, with an apertured dial member, clock-work, and an operating member which travels around with the hour-hand sleeve of said clock-work, of a spring-pressed lever arranged with an end in the path of said operating member, and provided at the other end with a pawl, a ratchet-wheel engaged by said pawl, a pinion attached to said ratchet-wheel, a rotary toothed member engaged by said pinion, said rotary member being provided with a crank-pin element, a slide which extends into the space behind the aperture in said dial member, said slide having a horizontal slot therein to receive said crank-pin element, and guide means for said slide.

8. The combination, in a calendar, with clock-work, an operating member which travels around with the hour-hand sleeve of said clock-work, and a dial, of a spring-pressed lever arranged with one end in the path of said operating member, and provided at the other end with a pawl, a ratchet-wheel engaged by said pawl, a pinion attached to said ratchet-wheel, a rotary toothed member engaged by said pinion, and an indicator, for said dial, secured to said rotary member.

9. The combination, in a calendar, with an apertured dial member, clock-work, an operating member which travels around with the hour-hand sleeve of said clock-work, and a second dial member, of a spring-pressed lever arranged with one end in the path of said operating member, and pro-

vided at the other end with a pawl, a ratchet-wheel engaged by said pawl, a pinion attached to said ratchet-wheel, a rotary toothed wheel engaged by said pinion, a slide which extends into the space behind the aperture in said first-mentioned dial member, means to connect said slide with said rotary member and cause said slide to be reciprocated once at each revolution of said rotary member, guide means for said slide, and an indicator, for said second dial, secured to said rotary member.

10. The combination, in a calendar, with an apertured dial member, clock-work, an operating member which travels around with the hour-hand sleeve of said clock-work, and a second dial member, of a spring-pressed lever arranged with one end in the path of said operating member, and provided at the other end with a pawl, a ratchet-wheel engaged by said pawl, a pinion attached to said ratchet-wheel, a rotary toothed member engaged by said pinion, said rotary member having a radial slot therein, a slide which extends into the space behind the aperture in said first-mentioned dial member, said slide having a horizontal slot therein, guide means for said slide, an indicator for said second dial member, said indicator having a radial slot therein, and means passing through the aforesaid slots to engage and cause to be operated said slide, and to secure said indicator to said rotary member.

11. The combination, in a calendar, with clock-work, an operating member which travels around with the hour-hand sleeve of said clock-work, and dial members having openings therein, of a slide adapted to operate in the space behind the opening in one of said dial members, ratchet-wheel indicator members adapted to operate behind openings in the other of said dial members, an indicator for the dial on the second of said dial members, a rotary member, means operatively to connect said slide with said rotary member and to secure said indicator to said rotary member, a spring-pressed lever arranged with one end in the path of said operating member, and provided at the other end with pawls extending in opposite directions into engagement with said ratchet-wheel members, and means to drive said rotary member from one of said ratchet-wheel members.

12. The combination, in a calendar, with clock-work, and dial members having openings therein, of a slide adapted to operate in the space behind the opening in one of said dial members, rotary indicator members adapted to operate behind openings in the other of said dial members, an indicator for the dial on the second of said dial members, a rotary member, means to operatively connect said slide with said rotary member and to secure said indicator to said rotary member, means to drive said rotary member from one of said indicator members, and means to actuate intermittently said indicator members from said clock-work.

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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."