(No Model.)

2 Sheets—Sheet 1.

J. D. FAZEL.

PERPETUAL CALENDAR FOR WATCHES OR CLOCKS.

No. 563,268. Patented July 7, 1896.

Fig. 1.

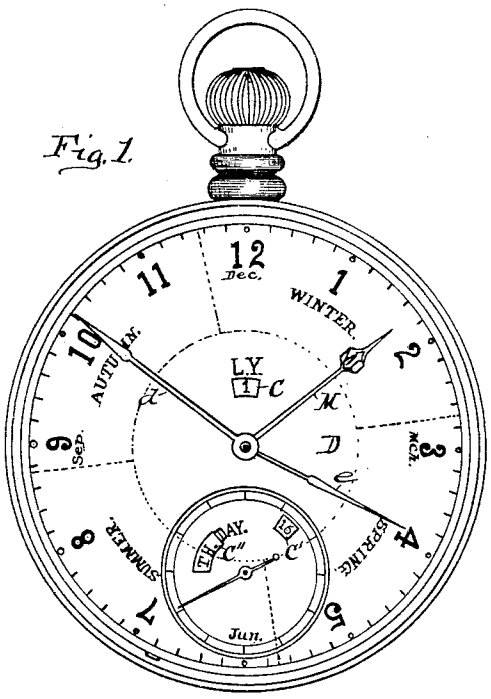


Fig. 2.

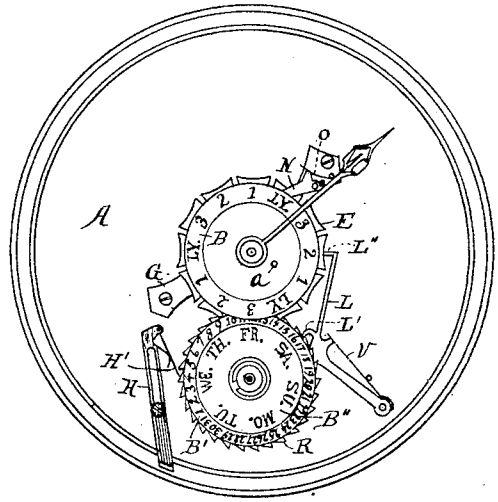


Fig. 3.

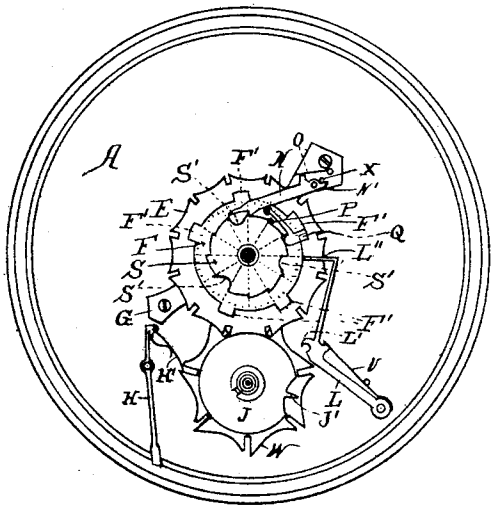
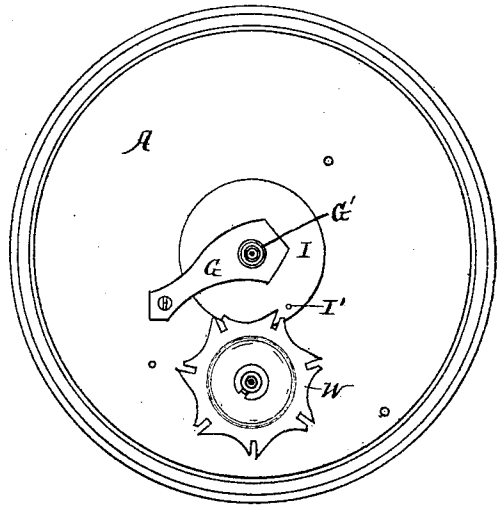


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

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PERPETUAL CALENDAR FOR WATCHES OR CLOCKS.

No. 563,268. Patented July 7, 1896.

Fig. 5.

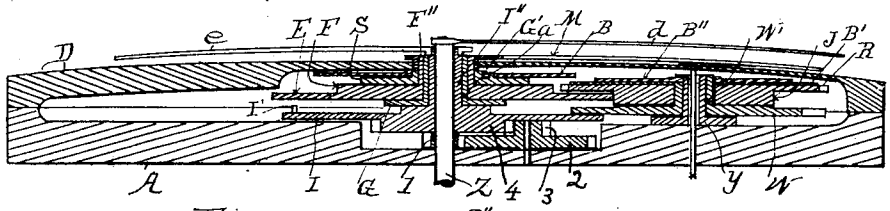

Fig. 6.

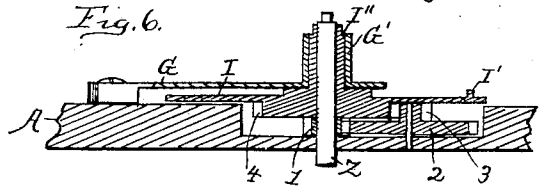

Fig. 7.

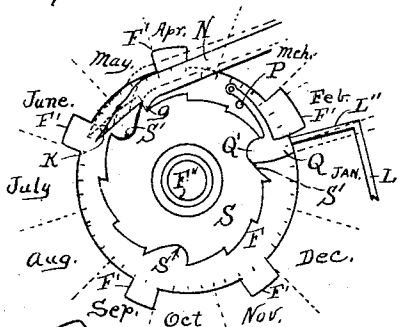

Fig. 8.

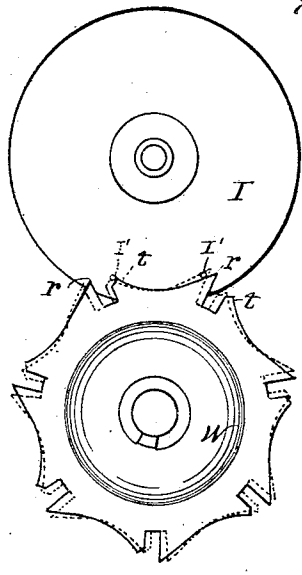

Fig. 9.

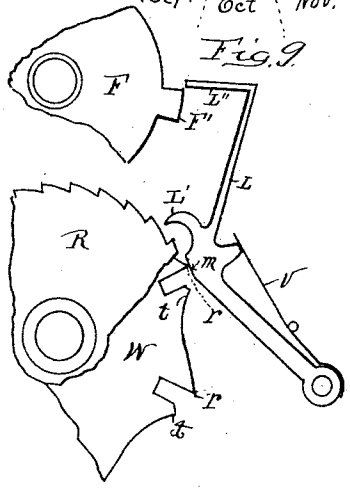

Fig. 10.

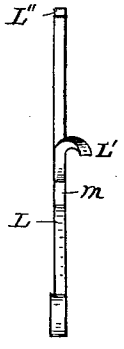

Fig. 11.

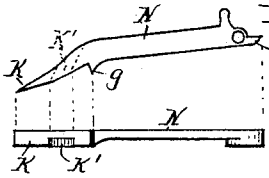

Fig. 12.

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UNITED STATES PATENT OFFICE.

JOHN D. FAZEL, OF WINFIELD, KANSAS.

PERPETUAL CALENDAR FOR WATCHES OR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 563,268, dated July 7, 1896.

Application filed March 6, 1893. Serial No. 464,830. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. FAZEL, a citizen of the United States of America, residing at Winfield, in the county of Cowley and State of Kansas, have invented certain new and useful Improvements in Perpetual Calendars for Watches or Clocks, of which the following is a specification, reference being had therein to the accompanying drawings, and the letters and figures of reference thereon, forming a part of this specification, in which—

Figure 1 is a face view of a watch provided with my improved calendar. Figs. 2, 3, and 4 are similar views of the same, having the face-dial of the watch removed and representing the calendar mechanism in different stages of completion; Fig. 5, a central cross-sectional view of the calendar mechanism of the watch and of the driving mechanism thereof, and also of the front plate and face-dial of the watch, taken as on a vertical line through Fig. 1; Fig. 6, a similar view of a portion of the said calendar mechanism and of a bridge for supporting other portions of the calendar mechanism; Figs. 7, 8, and 9 are detailed views of parts of the calendar mechanism, representing certain distinguishing characteristics of the same; and Figs. 10, 11, and 12 are detailed views of the spring-latch arms of the calendar mechanism.

This invention relates to certain improvements in perpetual calendars of mechanical structure designed as an attachment to watches or clocks; and it consists of certain novel mechanism which is actuated by the watch or clock movement to which it is attached and perpetually and automatically registers the calendar year, the month of the year, the number of the month in the year, the day of the month, and the day of the week, and indicates the seasons of the year; which improvements are fully set forth and explained in the following specification, and pointed out in the claims.

Referring to the drawings, A represents the front plate of the watch-movement.

Z represents the minute-hand post of the watch-movement, and D the watch-face dial, which dial bears the usual figures indicating the hours of the day, and has incorporated in its construction the usual seconds-hand dial, and is further provided with openings C, C′, and C″, through which the figures and characters denoting the calendar year, the day of the month, and the day of the week may be seen, and is further chambered in its under side to provide a more liberal space for the calendar mechanism.

1 represents a small gear-wheel fixed on hand-post Z, (see Figs. 5 and 6,) and drives a larger gear-wheel 2, which carries a second smaller gear-wheel 3, which wheel 3 drives a second gear-wheel 4, which is sleeved on post Z, said gear being of the usual construction in watches and clocks for properly reducing the speed of the hour-hand. Ordinarily, in watches and clocks, wheel 4 is provided with an extending sleeve, upon which the hour-hand is fixed; but in this construction said wheel is made as a part of, or fixed to, a disk I, which is provided with an extending sleeve I″, which carries the hour-hand *e* of the watch in the usual manner, while the minute-hand *d* is carried on post Z, also in the usual manner.

G represents an arm-bridge fixed at one end to plate A, and overreaches disk I at its opposite end portion, and is made with a flanged opening G′, which loosely surrounds the hand-sleeve I″. (See Fig. 6.)

Sleeved on the flange G′ of bridge G is a wheel E, made with twelve equidistant peripheral notches, as shown, and with curved portions between said notches, which curves are made reverse to the radial outline of the wheel, as also shown, and made as a part of or fixed to wheel E is a wheel F, which is made with periodical peripheral extending sections F′, and is provided with a pivoted section Q, which, when extended equal with sections F′, increases the circumferential distance of one of said sections F′, and when withdrawn is within the marginal limits of wheel F. Said wheel F is spaced into twelve equal parts or sectors, as indicated by radial dotted lines in Fig. 7, each such division or sector representing, in this structure, one month of the year, and all combined, the twelve months of the year, as represented in said figure, and each such one-twelfth division or sector is subdivided into four equidistant parts, as indicated by the marginal dots. The sections F′ of said wheel F are so disposed as to come within the limits of the described

sectors of the wheel or divisions representing the several months of the divisions representing the months which have less than thirty-one days, as will be observed by reference to Fig. 7.

Wheels E and F, jointly, are provided with an extending sleeve or hub-flange F″, (see Figs. 5 and 6,) which has fixed thereon a month-indicating pointer or hand M, which is arranged extending at and adjacent to the face-dial D, and is adapted to turn around, after the manner of a watch-hand, on a plane between the path of the seconds-hand and hour-hand of the watch. Sleeved on flange F″ of wheels E F, and adjacent said wheels, is a wheel S, which is made with twelve equidistant ratchet-teeth, as shown, and is further provided with three equidistant peripheral hollows S′, which wheel represents twelve calendar years, and as each fourth year, or three of the twelve years, is what is known as "leap-year," the wheel is provided with said hollows S′, representing said leap years, which feature of the calendar will be more fully explained hereinafter. The said wheel S is turned by the frictional contact thereof with wheel F and flange F″, when released, and is detained from turning by means of the spring latch-arm N, which is provided with a pawl-like detention *g*, which engages with the ratchet-teeth of the said wheel S, as shown, and is provided with a stop N′, which engages a stop-pin X, to prevent it bearing hard against wheel S, and is held yieldingly to its work by means of a spring *o*, and is further made with a nose-piece, (shown at K in Figs. 11 and 12,) and a distance from said nose with a cross-channel K′. The wheel F is so regulated in this mechanism as to make one complete turn each year and carries with it a pin P, (see Fig. 7,) which pin as the wheel is turned comes in contact, once each year, with the nose K of latch-arm N, and thereby actuates said arm to lift its detent *g* from engagement with the ratchet-tooth of wheel S, and thus holds said arm until the pin P rides along the said nose K and enters the cross-channel K′, which is a sufficient length of time to permit wheel S to turn one-twelfth way around, and which entrance of pin P in said cross-channel K′ releases said latch-arm, so it may again engage with a succeeding tooth of wheel S, and thus each year the wheel S is released and permitted to turn one section, or one one-twelfth way around, to register the calendar year, and to that end and purpose said wheel S has placed on its side adjacent the watch-face dial a calendar-year dial B, held to rotate with said wheel S by means of a pin *a* (see Figs. 2 and 5) of said wheel, arranged in a corresponding perforation of the said dial. The said dial thus arranged has marked thereon, as shown, characters representing leap-year, which are shown as "L. Y.," and figures representing the three calendar years between each two leap-year periods, which characters and figures are presented, in their consecutive order, so they may be seen at the face-dial opening C. If L. Y. appear at said opening, they represent that the year is leap-year. If 1 appears, it represents the year to be the first year after leap-year, &c.

Y is a stand-sleeve, fixed upon plate A, surrounding the seconds-hand post of the watch, and thus provides a bearing for a wheel W, which wheel is arranged on a plane immediately above that of disk I and overreaches said disk, and is made with seven peripheral notches, as shown, and with peripheral curves between said notches, as shown, and is turned intermittently by means of the pin I′, of disk I, by reason of said pin, during one turn of disk I, following the curve of wheel W at a section part way between two peripheral notches, as indicated by full lines in Fig. 8, and as the pin I′ moves about at the latter portion of said curved section of wheel W, it engages against said curved part of the wheel, owing to an abruptness of the curve, (shown at *t*,) causing wheel W to be partially turned, as indicated by dotted lines in said figure, which turns a point *r* of wheel W to such a position as to extend across the path of pin I′ of disk I, so that a succeeding turn of disk I will cause its pin to engage wheel W in a peripheral notch, and thus, by the action of said disk, turn wheel W one-seventh way around each time disk I makes two complete turns, the first turn of the disk bringing its pin I′ to engage wheel W to trip or set it so a succeeding turn of the disk will bring the pin to engage a notch and complete the movement. The wheel W, having the seven notches, represents the seven days of the week. The disk I, being turned about at equal speed with the hour-hand of the watch, makes one complete turn each twelve hours, and each twenty-four hours moves wheel W one-seventh way around.

Wheel W is provided with a hub-flange or extending sleeve W′, which has fixed to its upper or extending end, and carried about with it, as wheel W is turned, a day-dial B″, which has printed or marked thereon abbreviations of the names of the seven days of the week, which are so disposed as to be presented in consecutive order at opening C″ of face-dial D, where they may be seen in their relative order.

Sleeved on hub-flange W′ of wheel W, between said wheel and dial B″, are two wheels J and R, which may be made in one part, but if not so made they are secured together and, when turned, turn together, the wheel J being made with a plane periphery, excepting at one section, where it is cut away and provided at such cut-away section with a centrally-arranged and radially-extending tooth J′. The said wheel is so located that its plane periphery turns in a sectional peripheral hollow or curve of wheel E, as shown in Fig. 3, and during each complete turn of wheel J its cut-away section will be brought adjacent wheel E, and its tooth J′ will engage in a pe-

ripheral notch of wheel E, and thereby turn said wheel E one-twelfth way around at each such engagement of tooth J′ of wheel J, which is permitted by the cut-away portion of wheel J, and during the time between such engagements wheel E is locked against turning by the plane periphery of wheel J, which is at all such times in a peripheral hollow or curve of the wheel E. Wheel R is in form a ratchet-wheel and has about its periphery thirty-one teeth, a tooth for each day of a month of months having thirty-one days, and is held from turning by means of a spring latch-arm L, which has a latch-hook L′, which engages with said wheel-teeth, as shown in Fig. 2. When wheel R is released, it, together with wheel J, is turned at such times when wheel W and the dial B″ thereof turns, caused by the frictional contact of wheel W and dial B″ with said wheels J and R. Wheel R has fixed to its side a dial B′, bearing figures representing the thirty-one days of a month, in consecutive order, which figures are so arranged that they may be seen through the opening C′ of face-dial D, each figure in its periodical order. (See Fig. 1.)

The manner of releasing wheel R, so it may turn, is as follows: When wheel W is turned each twenty-four hours, one of the points *r* of said wheel W is brought to engage a section *m* of latch-arm L, which engagement action forces back the arm L and lifts the hook L′ thereof from engagement with wheel R, (see Fig. 9), the section *m* of arm L being of sufficient length so the arm-hook L′ will be held from wheel R a sufficient length of time to permit wheel R to turn the distance of one tooth when the point *r* of wheel W rides off said section *m* and permits the spring *v* of arm L to actuate said arm and again bring the hook L′ to engage a succeeding tooth of wheel R, which particular mode of operation occurs once each twenty-four hours, in all months having thirty-one days, thus each day releasing wheel R, so it may move a sufficient distance around to properly register the days of the month in their consecutive order. Latch-arm L is further provided with a detent-foot L″, as shown, which is arranged to engage with the periphery of wheel F.

I have so regulated the calendar-movement that, upon the twenty-eighth day of each month, wheel J will engage its tooth J′ with a notch of wheel E and commence, on that day, the one-twelfth turn of the wheel E, and during months having thirty-one days said movement of wheel E becomes intermittent during a period of four days by reason that the wheels J R can make but a partial turn each day. During such months the position of wheel F is such that the detent-foot L″ of arm L will not engage an extending section F′, but the said wheel will daily make a partial turn, so that at the conclusion of the fourth day after wheel E commences its monthly movement, wheel F will have turned the distance of one hereinbefore-described sector, or one-twelfth way around, and hence the dial B′ will consecutively register the thirty-one days of the month.

I have further regulated the calendar-movement so that, during months having but thirty days, wheel F will be turned so a sector thereof bearing an extending section F′ will be brought to such position as to be engaged by detent-foot L″ of arm L, which sections F′, occupying but a portion of such sectorial peripheries, permit the free action of said detent-foot L″, during a period of two days, being the twenty-eighth and twenty-ninth days of such month, but the action of said foot is deterred on the thirtieth day by reason of wheel F, having then been turned to bring a section F′ thereof under foot L″, thus holding said foot from moving to the periphery of wheel F, and thereby holding the hook L′ of arm L, disengaged from wheel R, so its movement may be continued the distance of two teeth, thus passing the thirty-first day of wheel R, so the first day of the succeeding month will register, which action likewise continues the movement of wheel F and moves the section F′ beyond the path of foot L″, so the foot may again engage the periphery of wheel F and thereby permit arm-hook L′ to engage and hold wheel R subject to the next move.

I have further regulated the calendar-movement so that, during all years except leap-years, the pivoted section Q of wheel F will be held by its part Q′, riding on the periphery of wheel S, so as to extend jointly with an extending section F′, as represented in Fig. 3, and thus together with said section F′ fully occupy the division-sector of the wheel F, which sector represents the month of February, and hence when said sector is brought in the path of detent-foot L″ of arm L, the hook L′ of said arm is held from engagement with wheel R from the twenty-eighth notch of the wheel R, the time when such movement commences each month, during the time said wheel moves the distance of four teeth, thus passing the twenty-ninth, the thirtieth, and the thirty-first days, and at the conclusion of such movement bring said section F′ Q of wheel F beyond the path of detent-foot L″, so said foot may again move in and engage the periphery of wheel F, and thereby bring hook L′ to engage the teeth of wheel R and hold said wheel so the first day of the succeeding month will register.

I have further regulated the calendar-movement so that each fourth-year wheel S will have been released and permitted to turn to such position so the part Q′ of the pivoted section Q of wheel F will move back into a hollow S′ of wheel S, and thereby decrease the size of the sectorial-extending section of the sector of wheel F, representing February, so that during February of each leap-year, which is each fourth calendar year, the detent-foot L″ of arm L may have one free movement after it has commenced movement on the twenty-eighth day of the month before it

is deterred by said wheel-section F', and thereby is permitted to register the twenty-ninth day of February each leap-year. By such construction and arrangement of mechanism disk I drives the day-wheel W and day-dial B'' thereof. The frictional contact with wheel W and dial B'' drives wheels J and R and the dial B' of wheel R. When wheel R is released by latch-arm L, wheels E and F are driven by wheel J, and, when not in the act of driving, said wheel J holds said wheels E F locked against movement, and the frictional contact with wheel F and the hub-flange F'' drives wheel S, and the calendar-year dial B thereof, when the wheel S is released by latch-arm N, and as the impartation of movements are periodical, as described, and of the character named and shown, the calendar perpetually and automatically registers the calendar time, positively registering the calendar year, regarding leap-year as a time of beginning, at the dial-opening C', the month of the year by the position of hand M on the watch-face dial, regarding the figures "1" to "12" of the dial as representing the months of the year, the day of the month at the dial-opening C', the day of the week at dial-opening C'', so long as the watch-movement is in operation; and, further, by reference to the watch-dial, as shown in Fig. 1, it will be observed that the said dial is divided into sectors, each sector representing a regular season of the year—viz., spring, summer, autumn, and winter, as represented in said figure—and the position of the hand M, in addition to indicating the month of the year, indicates the season of the year, and when passing from one said sectorial division of dial D to another indicates the change of the season.

I have provided, as shown in Figs. 2 and 3, a device other than the regular calendar-movement for turning the day-wheel W should it become necessary to regulate the calendar time, caused by the stopping of a watch or otherwise, which I have represented in two forms. However, the form shown in Fig. 2 I deem the best, and consists of a slide H, attached to plate A by a screw-stud in a slot thereof, and further guided by resting at one end in a recess in the rim of plate A, and held down at that place by the placing of watch-dial D, and made with one end extending beyond the said dial, so it may be grasped and pulled out, and pivotally connected to its inner end is spring-arm H', adjusted with its free end bearing against a notch-shoulder of wheel W, as indicated in Fig. 3, and when the slide is pulled out said spring-arm will push against said wheel-shoulder and turn the wheel W, the distance of pull being sufficient to turn wheel to one-seventh way around, which operations may be repeated and thus turn the wheel W, and by its movement regulate the calendar time.

In Fig. 3 the part H is shown as being pivoted instead of sliding, and may be turned on its pivot by pushing sidewise on its outer extending end, and thereby perform the same functions as when arranged as the slide.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is as follows:

1. In combination with a watch or clock movement, the disk, provided with the pin, and driven by the watch or clock movement; the peripherally-notched and curved-faced wheel driven periodically by said disk and carrying therewith a dial representing the days of the week; the wheels frictionally driven by said periodically-driven wheel and dial, and provided with a dial representing the days of the month; the latch-arm for holding said frictionally-driven wheels from movement during certain periods of time; the wheels periodically driven by one of said frictionally-driven wheels, one of which is provided with periodically-arranged extending sections disposed about its periphery and adapted to be engaged by a detent-foot of said latch-arm and arranged carrying a hand at the face of the watch-dial to indicate the month of the year, the wheel frictionally and periodically driven by one of said wheels, and provided with peripheral teeth and hollows, and adapted to govern the actuation of a pivoted peripheral section of its drive-wheel and further provided with a dial representing the calendar year; the latch-arm for detaining the movement of said wheel and dial, and the means for actuating said latch, substantially as and for the purpose specified.

2. The watch or clock calendar comprising a positive-driven wheel adapted to impart movement intermittently, at stated intervals of time to a wheel carrying a dial for registering the day of the week; an intermittently and frictionally driven wheel carrying a dial for registering the days of the month; an intermittently and periodically actuated device for holding and releasing said frictionally-driven wheel; an intermittently and periodically driven wheel provided with peripheral sectional extensions and adapted to be engaged by said holding and releasing device for governing the registration of the days of the month and carrying an indicating-pointer or hand for indicating the months of the year and the number of the month in the year; a periodically and frictionally driven wheel for governing the actuation of a device for governing the registration of the days of the months of February, and provided with a dial registering the calendar years, and a periodically-actuated device for holding and releasing said wheel and dial, substantially as specified.

3. In the calendar described in combination with the wheel F, provided with the peripheral sectional extensions F', and the pivoted section Q, of the wheel S, provided with the equidistant peripheral teeth and

hollows, arranged to be engaged by said pivoted section Q, in the manner substantially as and for the purpose specified.

4. In the calendar-movement described, in combination with the toothed wheel R, and wheel F, and the sectionally-pointed wheel W, the spring latch-arm L, provided with the latch-hook L′, and detent-foot L″, substantially as and for the purpose specified.

5. In the calendar-movement described in combination with the wheels W and R, the spring latch-arm L, provided with the latch-hook L′, substantially as and for the purpose specified.

6. In the calendar-movement described in combination with the toothed wheel S, the spring latch-arm N, provided with the flat nose K, and cross-channel K′, and adapted to be actuated, to release said wheel periodically by engagement therewith of a pin carried by a wheel of the calendar-movement, in the manner substantially as and for the purpose specified.

7. In the calendar-movement described, in combination with the wheels W and R, the spring latch-arm L, provided with the latch-hook L′, adapted to engage with the teeth of said wheel R, and with the plane section *m*, adapted to be periodically engaged by the points of wheel W, for disengaging said hook from said teeth, substantially as specified.

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