to operate this lever I′, by means of a rod *a*, which is connected with the latter lever, but which passes up through a hole in the former one and is furnished with a knob *a′* above. The lever H, in its upward movement, coming in contact with the knob *a′*, raises the said rod *a*, and with it the lever and pawl; and in its downward movement it allows the lever I′, and its pawl I, and the rod *a*, to drop by their own weight, which is sufficient to make the click I, turn the wheel F, as far as permitted by a detent J, which is attached to the post A^x, said detent being raised from between the teeth of the said wheel to permit the necessary movement thereof by a projection *h*, on the lever I′, coming into contact with it as the said lever rises, and being allowed to drop again with the said lever as the latter descends. The wheel F, is only moved farther than the distance of a single tooth, at the termination of the months of less than thirty-one days, when it has to be moved the distance of one two or three teeth according as the month has thirty, twenty-nine or twenty-eight days, and such further movement is governed by the year wheel K, the leap year wheel L, the three shorter teeth of the wheel E and an arm J′, rigidly attached to the detent J.

The year wheel K, is made of a thin plate of brass or other metal and secured to one end of the month roller C, the circle of the said wheel being divided into twelve equal parts representing the months as shown in Fig. 6, and the divisions representing the seven months of thirty-one days being made to present themselves less prominently in the circumference of the wheel than those representing the shorter months, but all the latter including that representing the month of February being equally prominent. This wheel, rotating with the month roller, makes one twelfth part of a revolution at the end of every month and therefore completes its revolution every year.

The leap year wheel L, which is best shown in Fig. 7, has four teeth arranged at equal distances apart, viz., three *i*, *i*, *i*, of equal length and one *i**, which is shorter. It is arranged above the axis of and close to the side of the year wheel K, on a fixed stud *j*, secured in the post A^u, and has secured to it a spur gear *l*, which gears with a spur gear *k*, that is secured to the year wheel, the gear *l*, having four times the number of teeth that *k*, has, so that the leap year wheel L, makes precisely one revolution, while the year wheel K, makes four. The arrangement of the gearing is also such that when the division of the year wheel K, representing the month of February comes to the top, one of the teeth *i*, *i*, *i*, *i**, of the leap year wheel is presented directly over the center of that wheel, the short tooth *i**, being presented only during leap year. The extremity of the arm J′, of the detent J, is turned downward and is situated directly over the year wheel and leap year wheel and is provided with a step formed face *m*, *n*, the part *m*, of which is situated over the wheel K, and the part *n*, over the wheel L, and the said wheels constitute stops to the said arm J′, and thereby regulate the depth to which the detent enters between the teeth of the day of the month wheel F, when it falls to arrest the movement of that wheel. When one of the less prominent divisions of the year wheel representing a month of thirty-one days is presented upward the detent is allowed to drop down as low as the bottom of the teeth of the wheel E, and hence it will prevent the said wheel moving more than one tooth at a time and thirty one days will be indicated by the index *b*. When however one of the more prominent divisions representing a month of thirty days is presented the arm J′, is stopped by the wheel K, in a higher position and the detent prevented dropping so deeply into the wheel F, as to stop the shortest tooth marked 31, in Fig. 4, and representing the thirty-first day of the month, and hence through the twenty ninth and thirtieth teeth are stopped after the movements of the wheel which take place at the end of the twenty-eighth and the twenty ninth days, the thirty first tooth is allowed to pass the detent and the wheel goes on till the first tooth marked 1, in Fig. 4, arrives at the detent and the index *b*, arrives at one on the dial E.

During the month of February in other years than leap year, one of the longer teeth *i*, of the leap year wheel L, is presented under the arm J′, and the said arm is arrested by the said tooth in such a position that the detent will stop none but the full lengthed teeth of the wheel F, and hence in the movement of the said wheel which takes place at the end of the twenty-eighth day all three of the shorter teeth pass and the said wheel is not stopped till the tooth 1, arrives at the detent; but in February of leap year the shorter tooth *i**, of the wheel L, is presented to the arm and the detent allowed to fall so much lower that though it will not stop the thirtieth tooth it will stop the twenty ninth.

The month roller C, and the year wheel K, which it will be recollected is attached to that roller, derive motion, to the extent of one twelfth of a revolution at the end of every month from the snail cam D^z, before mentioned, on the arbor D, through the agency of a lever M, shown in Figs. 1, 2, and 3, a rod *p*, shown in Figs. 1 and 5, and a lever N, click P, and wheel Q, shown in Fig. 5, said wheel having twelve teeth, and being secured to the roller C, and the lever N, being fitted to work on the shaft *q*, of said roller, close to said wheel, and having

the click P, suspended from it by a pin *s*, in such a manner that as the said click rises with said lever it will slide over the teeth of the wheel Q, but that, as it descends with said lever it will engage between the teeth of and move the said wheel and with it the roller C. The lever M, works on a fulcrum in one of the posts A′, and is furnished with a rigid downwardly projecting leg M′, which rests upon the cam D′, and it is connected by the rod *p*, with the click lever N. The cam by its revolution raises the lever M, and with it the lever N, and the pawl, and when the abrupt step of the cam passes the end of the arm M′, the levers drop and the click moves the wheel Q suddenly. The roller C, is prevented moving too far by a detent R, which is raised to permit the necessary movement of the wheel Q, by a projection *r*, on the lever N, and let it fall again between the teeth as the lever descends; and the said wheel is prevented from being turned backward by a pawl S, which is raised by the action of the teeth themselves, in turning the right way.

The day of the week roller B, is operated by a lever N′, and click P′, (see Fig. 2) applied substantially like N and P, to operate on a toothed wheel Q′, secured on its shaft *q*′, said lever being operated by a rod *t*, which is operated upon every day by the lever H, in the same manner as the rod *a*, before described, and the said wheel Q′, has a detent R′, and a pawl S′, like R and S, applied to it to prevent its moving too far at a time or turning back, said detent being raised when the wheel is to be turned, by a projection *r*′, on the lever N′.

The wheel Q′, has fourteen (14) teeth and the roller B, has the days of two weeks inscribed upon it and hence the said wheel completes its revolution once in two weeks. The reason for this is that with a wheel of seven (7) teeth, which would be necessary if the roller only had the days of one week upon it, the click P′, could not be made to operate with the same degree of certainty.

We do not claim as our invention the day of the month wheel F, having three short teeth, as that is described in Letters Patent, No. 18,665. Neither do we claim the construction of the year wheel K, or the use of a quadrennially revolving wheel with four teeth, representing the four months of February in a bisextile term as these devices are represented in Letters Patent No. 15,637, combined in a different manner to that which we have described, but,

What we claim as our invention, and desire to secure by Letters Patent, is.

The employment of a year wheel K, and detached leap year wheel L, applied and operating together substantially as described, in combination with a detent J, or its equivalent and a wheel F, of the construction herein specified.

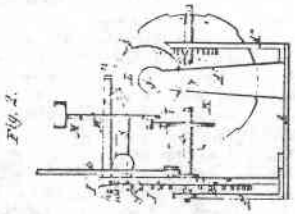
EUGENE M. MIX.
JAMES E. MIX.

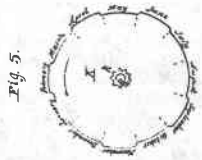
Witnesses:
LUCIUS C. MIX,
O. G. HOWARD.

# E. M. & J. E. Mix.

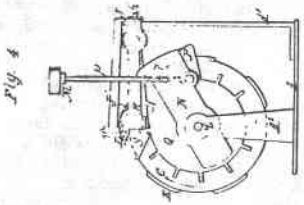
## Calendar Clock.

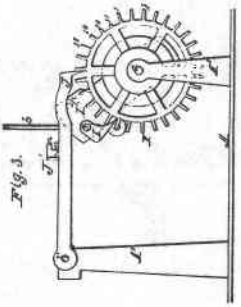
No. 34,613. Patented Mar. 4, 1862.

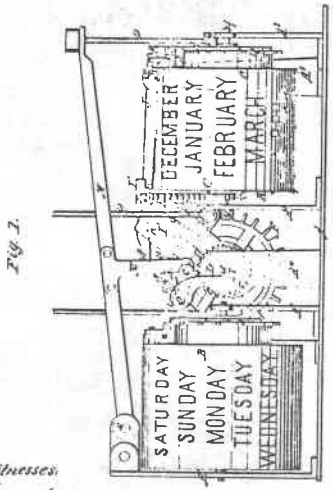




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# UNITED STATES PATENT OFFICE.

EUGENE M. MIX AND JAMES E. MIX, OF ITHACA, NEW YORK, ASSIGNORS TO WAIT T. HUNTINGTON AND HARVEY PLATTS.

## IMPROVEMENT IN CALENDAR-CLOCKS.

Specification forming part of Letters Patent No. 34,613, dated March 4, 1862.

*To all whom it may concern:*

Be it known that we, EUGENE M. MIX and JAMES E. MIX, both of Ithaca, in the county of Tompkins and State of New York, have invented a new and useful Improvement in Calendar-Movements for Clocks; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view of a calendar-movement having our invention applied. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a back view of the day-of-the-month wheel and the mechanism for operating it. Fig. 4 is an end view of the month-roller and the mechanism for operating it. Fig. 5 is a side view of the year-wheel. Fig. 6 is a side view of the four-year wheel.

Similar letters of reference indicate corresponding parts in the several figures.

Our invention relates to the construction of the wheel generally known as the "day-of-the-month" wheel, carrying the index which denotes the day of the month upon the dial or calendar. This wheel has been variously constructed, and had various devices attached to it to provide for its making one thirty-first, two thirty-firsts, three thirty-firsts, or four thirty-firsts of a revolution at the expiration of every month, according as the month has thirty-one, thirty, twenty-nine, or twenty-eight days; but its construction and attachments have been generally either complicated or liable to get out of order.

Our invention consists in the construction of the wheel with three of its thirty-one teeth progressively shorter than the remaining twenty-eight, which are of uniform length, that by the use of a properly-operated click to move the wheel and a properly-controlled detent to stop it one, two, three, or four teeth, as may be required, may be caused to pass the detent at the expiration of the month, and so permit the movement of the day-of-the-month index from the position which indicates the number (31, 30, 29, or 28,) of the last day of one month to the position which indicates the number 1.

To enable others skilled in the art to apply our invention to use, we will proceed to describe it with reference to the drawings.

A is a bed-plate, to which are attached the posts which support the several parts of the calendar mechanism. *a* is the arbor of the day-of-the-month index, having the day-of-the-month wheel F fast on its rear end. The construction of this wheel is best shown in Fig. 3, in which the three shorter teeth are marked 29, 30, 31. The several teeth all form rigid portions of the wheel, and are at equal distances apart, and the bottoms of the spaces between them are all in a circle concentric to the axis of revolution. The twenty-ninth tooth is rather shorter, or projects not so much as the twenty-eight, which are of uniform length. The thirtieth is still shorter, and the thirty-first the shortest. The arbor *a* is fitted to work in bearings in two posts, $A^3$ and $A^4$. It has fast upon it, besides the wheel F and index, a ratchet-wheel, D, of thirty-one teeth, and a snail-cam, $D^2$, the latter for actuating the mechanism by which the movement of the month-roller C is effected, and the former having applied to it a pawl, *c*, Fig. 1, for preventing the day-of-the-month wheel F and its index from turning the wrong way, the said pawl being attached by a pin, $c^2$, to the post $A^4$ and a fixed stop, $c'$, being secured in the said post to prevent the pawl being lifted too high.

The day-of-the-month wheel F derives motion from a click, I, (best shown in Fig. 3,) that is suspended by a pin, *g*, from a lever, I', that is fitted to oscillate freely upon the arbor *a*. The said click, when it is moved upward with the said lever, passes freely over the teeth of the wheel F, but when it is moved downward engages between the teeth and turns the wheel. This lever I' has attached to it a rod, *b*, which is to be lifted up and allowed to descend again once in every twenty-four hours by mechanism deriving a continuous motion from the clock-movement. The said rod in its upward movement raises the lever I' and click I, and in its descent, which is permitted to take place quickly, its weight, or a weight applied to it for the purpose, produces the descent of the lever and click and causes them to turn the wheel F as far as permitted by a detent, J, which is attached by a pin, *h'*, to the post $A^5$; said detent being raised from between the teeth of the said wheel to permit the necessary movements of the said wheel by a projection, *h*, on the lever I' coming into contact with it as the said lever rises, and being allowed to drop again with the said lever

as the latter descends. The wheel F is only moved farther than the distance of a single tooth at the expiration of the month of less than thirty-one days, when it has to be moved the distance of two, three, or four teeth, according as month has thirty, twenty-nine, or twenty-eight days, and such farther movement depends upon the depth to which the point of the detent is allowed to fall between the teeth when the shorter teeth arrive opposite to it.

The means represented for controlling the position to which the detent is allowed to fall consist of the year-wheel K, the leap-year wheel, or, as it may be termed, the "February-wheel," L, and an arm, J', attached rigidly to the detent J. The year-wheel K is made of a thin plate of brass or other metal and secured to one end of the month-roller C, on whose periphery there are inscribed in twelve equal longitudinal divisions the names of the months, which are presented successively opposite to openings in the dial or front of the clock.

The circle of the said wheel K is divided into twelve equal parts, representing the twelve months of the year, as shown in Fig. 5, the divisions representing the seven months of thirty-one days being made to present themselves less prominently in the circumference of the wheel than those representing the shorter months, but all the latter, including the one representing the month of February, being equally prominent. This wheel K, rotating with the month-roller C, makes one-twelfth part of a revolution at the end of every month, and therefore completes its revolution every year.

The leap-year or February wheel L, which is best shown in Fig. 6, has four teeth arranged at equal distances apart—viz., three, *i i i*, of equal length, and one, *i**, which is shorter. It is arranged above the axis of and close to the side of the year-wheel K on a fixed stud, *j*, secured in the post $A^2$, and has secured to it a spur-gear, *l*, which gears with a spur-gear, *k*, that is secured to the year-wheel, the gear *l* having four times the number of teeth that *k* has, so that the leap-year wheel L makes precisely one revolution while the year-wheel K makes four. The arrangement of the gearing is also such that when the division of the year-wheel K representing the month of February comes to the top one of the teeth *i i i i** of the leap-year wheel is presented directly over the axis of that wheel, the short tooth *i** being presented only during the leap-year.

The extremity of the arm J' of the detent J is turned downward, and is situated directly over the year-wheel and leap-year wheel, and is provided with a step-formed face, *m n*, (see Fig. 1,) the part *m* of which is situated over the wheel K and the part *n* over the wheel L; and the said wheels constitute stops to the said arm J', and thereby regulate the position to which the detent falls and the depth to which it enters between the teeth of the day-of-the-month wheel F when it falls to arrest the movement of that wheel. When one of the less prominent divisions of the year-wheel, representing a month of thirty-one days, is presented upward the detent is allowed to drop down as low as the bottom of the teeth of the wheel F, and hence it will prevent the said wheel moving more than one tooth at a time, and thirty-one days will be indicated by the day-of-the-month index. When, however, one of the more prominent divisions, representing a month of thirty days, is presented the arm J' is stopped by the wheel K in a higher position and the detent prevented dropping so deeply between the teeth of the wheel F as to stop the shortest tooth, marked 31 in Fig. 3, and representing the thirty-first days of the long months; and hence, though the twenty-ninth and thirtieth teeth are stopped after the movements of the wheel which take place at the end of the twenty-eighth and the twenty-ninth days, the thirty-first tooth is allowed to pass the detent and the wheel goes on till the first tooth (marked 1 in Fig. 3) arrives at the detent and the index indicates the number 1 on the calendar or dial. During the month of February in other years than leap-year one of the three longer teeth *i* of the leap-year wheel L is presented under the arm J', and the said arm is arrested by falling on the top of the said tooth in such a position that the detent will stop none but the full-length teeth of the wheel F, and hence in the movement of the said wheel which takes place at the end of the twenty-eighth day all three of the shorter teeth pass, and the said wheel is not stopped till the tooth 1 arrives at the detent; but in February of leap-year the shorter tooth *i** of the wheel L is presented to the arm and the detent allowed to fall so much lower that, though it will not stop the thirtieth tooth, it will stop the twenty-ninth.

The means of operating the rod *b* must be such as to permit the click I to be raised over four of the teeth of the wheel F. On all days but the first day of a month ensuing after a month of less than thirty-one days the said click requires to be raised over one tooth only; but on the first days of the months ensuing after months of thirty days it requires to be raised over two teeth, and on the 1st of March in all years but leap-year over three teeth.

The month-roller C, to which, it will be recollected, the year-wheel K is attached, has its journals supported in bearings in the posts $A^2$ and $A^7$. It derives motion to the extent of one-twelfth of a revolution at the end of the month from the snail-cam $D^2$, before mentioned, on the arbor *a*, through the agency of a lever, M, (shown in Figs. 1, 2, and 4,) a rod, *p*, (shown in Figs. 1 and 4,) and a lever, N, click I', and wheel Q, (shown in Fig. 4,) the said wheel Q having twelve teeth and being secured to the roller C, and the lever N being fitted to work on the shaft *q* of said roller close to the said wheel, and having the click I' suspended from it by a pin, *s*, in such a manner that as the

said click rises with said lever it will slide over the teeth of the wheel Q, but that as it descends with said lever it will engage between the teeth of and move the said wheel and with it the roller C. The lever M works on a fulcrum, *r*, secured to one of the posts A′, which contain the bearings of the journals of the day-of-the-week wheel B, and is furnished with a rigid downwardly-projecting leg, M′, which rests upon the cam D′, and it is connected by the rod *p* with the click-lever N. The cam, by its revolution, raises the lever M, and with it the lever N and the pawl, and when the abrupt step of the cam passes the end of the arm M′ the levers drop and the click moves the wheel Q suddenly. The roller C is prevented moving too far by a detent, R, which is raised to permit the necessary movement of the wheel Q by a projection, *r*, on the lever N and let fall again between the teeth as the lever descends, and the said wheel is prevented from being turned backward by a pawl, S, which is raised by the action of the teeth themselves in turning the right way.

What we claim as our invention, and desire to secure by Letters Patent, is—

The day-of-the-month wheel F, having three of its thirty-one teeth progressively shorter than the remaining twenty-eight, and applied to operate substantially as herein specified.

EUGENE M. MIX.
JAMES E. MIX.

Witnesses:
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JABEZ B. SCOTT.

# H.B. Horton,

## Calendar Clock.

No. 47,306. Patented Apr. 18. 1865.