M. H. PADDOCK.

AUTOMATIC CALENDAR FOR TIME PIECES.

No. 177,879. Patented May 23, 1876.

Fig. 1.

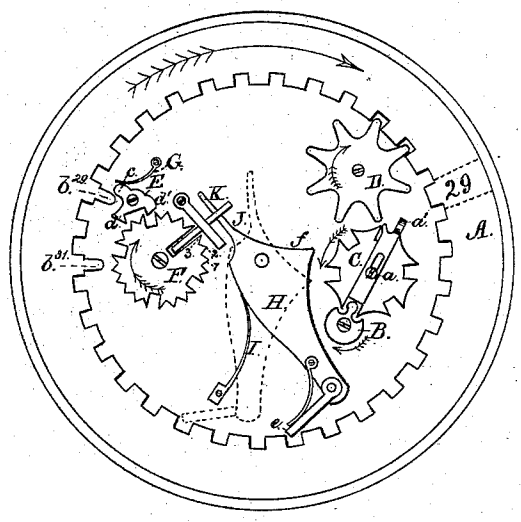


Fig. 2.

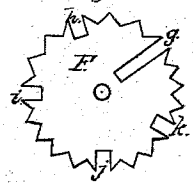
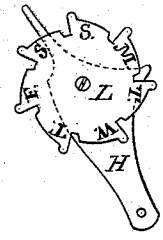


Fig. 3.



WITNESSES:

W. W. Hollingsworth

Solon C. Kemon

INVENTOR:

M. H. Paddock

BY Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

MINER H. PADDOCK, OF EAST CLARKSON, NEW YORK.

IMPROVEMENT IN AUTOMATIC CALENDARS FOR TIME-PIECES.

Specification forming part of Letters Patent No. **177,879**, dated May 23, 1876; application filed April 13, 1876.

To all whom it may concern:

Be it known that I, MINER H. PADDOCK, of East Clarkson, in the county of Monroe and State of New York, have invented a new and Improved Perpetual Automatic Calendar Attachment for Time-Pieces; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is an enlarged view of the devices, as applied to a watch, the same being located between the dial-face and the watch-movement, and the dial-face being removed. Fig. 2 is an enlarged view of the month-regulator or skip-wheel; Fig. 3, an enlarged view of the week-wheel placed upon the same fulcrum as skip-lever, and concentric with the watch.

This invention relates to a novel construction of automatic perpetual attachment for a calendar, which calendar is designed to be applied to a time piece, and so constructed as to be set from day to day through the winding-stem by the act of winding independently of the effect of the mainspring. The said calendar is arranged for the days, weeks, and months, and while being practically automatic is also perpetual—that is to say, the the mechanism is such as to compensate for the irregular number of days occuring in the different months by a system of skipping, whereby a single day-wheel of thirty-one subdivisions is made to indicate successively and in proper order the different number of days (twenty-eight, thirty, or thirty-one) as they occur in the successive months of the year.

In the drawing, Fig. 1 represents an enlarged view of the devices as applied to a watch, which devices are located just between the dial-face and the watch-movement. A represents an annular wheel having thirty-one notches upon its inner perimeter, and located near the outer edge of the watch, the same being known as the "day-wheel." B is a small disk upon the winding-stem, having a tooth which engages with and turns a stop-wheel. C is the stop-wheel which determines the number of revolutions of the winding-stem, and has a slide-bar, *a*, with tooth *a'*, which strikes an idle wheel, D, and communicates motion therethrough to the day-wheel A. The slide of this stop-wheel is so arranged as to be projected by the tooth of disk B, and while the slide strikes idle wheel D when moved in one direction it is struck upon the opposite end and driven back by the tooth of disk B during the last part of the operation of winding, and when the watch is running down does not strike the idle wheel in the reverse direction.

As thus described, the devices are substantirlly the same as those described in the patent already granted me April 11, 1876, with the exception that the wheel D, here denominated as idle wheel, forms simply a connection with the day-wheel, while in the patent referred to it is made with seven teeth, and constitutes the week-wheel. The day-wheel A is provided with numbers on its face from 1 to 31, which pass successively beneath an opening in the dial-face, and show through. Projecting inwardly from the day-wheel are two teeth, b^{29} b^{31}, so designated because b^{29} strikes a projection on a pallet, E, when the twenty-ninth day shows through the opening in the dial, and b^{31} strikes the same projection when the thirty-first day shows through said opening. The pallet E is provided with a projection, *e*, which is struck by teeth b^{29} b^{31}, and has two operating faces, *d d'*, which engage with the month-regulator wheel F. This pallet E operates reversely from the pallet of an ordinary clock-escapement, in that it operates its wheel instead of being operated by it, the said pallet being moved in one direction by teeth b^{29} b^{31}, and in the opposite direction by spring G. The month-regulator wheel F carries an index-hand, which revolves once a year; but, instead of having twelve notches for the twelve months to move once from a single tooth and a single revolution of the day-wheel, it has twenty-three notches and moves two notches every month, except February, when it moves but one, which makes twenty-three movements in a year, there being two teeth upon the day-wheel for every thirty-one days. The wheel F is a skip-regulator, but I also give it the name month-regulator, because, while it regulates the skips for short months it may, by index-hand, indicate the month. The teeth b^{29} and b^{31}, or other means of moving skip-regulator, I call actuators of month-regulator. The wheel F, by

multiplying its circumference, may have a greater capacity and answer the same purpose as a skip-regulator. By multiplying its circumference capacity, as compared with its actuators, by four, the calendar may be adjusted for leap-year. The slots also of month-regulator may be supplemented by pegs or other equivalents. H is the skipping-lever, which is pivoted to the center of the watch. This lever carries a spring-seated pawl, *e*, at one end, which moves freely in one direction over the notches of the day-wheel, and when moved in the opposite direction engages with the notches and urges the day-wheel around one or three notches to produce the skip according to whether the month ends in twenty-eight or thirty days, and according to the length of the stroke which is made to correspond with number of days to be skipped or the odd ends of the month.

The skip-lever is pushed back ready for the spring-seated pawl to catch in the notch of the day-wheel by a spring, I, and when in this position a projection, *f*, of the lever is brought within the range of the tooth *a'* of bar *a* of the stop-wheel, through which devices, when in said position, motion is imparted to the skip-lever to move the day-wheel whenever the skip is to be made. To determine these different positions of the skip-lever, the month-regulator wheel F is provided with five slots or incisions, *g*, *h*, *i*, *j*, and *k*, of which *g* is three times the depth of all the rest, which are of uniform size. Upon the end of skip-lever H is arranged a slide-bar, J, which passes through a guide, K, and operates in the slots *g*, *h*, *i*, *j*, and *k*, and also upon the notches of the wheel F. The one deep slot, *g*, is for February, and allows slide-bar J to enter far enough to cause the other end of skip-lever to move back three notches upon the day-wheel, so that when the tooth *a'* of bar *a* in the process of winding strikes projection *f* the day-wheel is moved three notches, and a skip of three days made, to the 1st of March. The other slots, *h i j k*, are of one-third the depth of *g*, and are for the four months ending in thirty days, (April, June, September, and November.) When, therefore, the slide-bar J enters these, the opposite end of skip-lever is moved back one notch in the day-wheel, so that in winding at the ends of these months the tooth *a'* strikes projection *f* and moves up the day-calendar one extra day to the first of the following month.

In considering the operation of the devices as thus described, it will be necessary to bear in mind the following facts: first, that for twenty-eight days—a number common to every month—the slide *a* with tooth *a'* has no co-operation with the projection *f* of skip-lever H, and is entirely independent of the same, the calendar A being turned directly through idle wheel D. For the odd ends of the months, however, over and above twenty-eight days, the tooth *a'* co-operates with skip-lever to produce the skip for a short month. Second, the month-regulator wheel contains twenty-three notches, of which the five slots are regarded as five of the twenty-three notches. Of these notches there are two for every month, except February, which has but one, and the relative arrangement of the slots with respect to the intervening notches is the same as the relative arrangement of the five months of twenty-eight and thirty days to the other months, which other months, being of thirty-one full days, require but a complete revolution of the day-wheel A for their fulfilment without bringing into operation the skipping devices. Third, the movement of slide-bar J from one to the other of the small notches of the wheel F is effected by the action of the pallet E, which vibrates from teeth b^{29} b^{31} and spring G. As the pallet vibrates, the face *d'* strikes the inclined edge of a notch in wheel F, and turns it half a notch, and then the face *d* strikes upon the same side of another notch, and, by moving wheel F another half of a notch, completes one whole notch. As the pallet thus operates the wheel F the notches pass beneath the end of slide J, which recedes with spring-pressed skip-lever H, and the bar J thus successively enters the different notches by sliding up the incline faces of the same, resting at end of movement on apex of tooth.

Operation in detail: We will suppose it to be January 1, the bar J resting upon the apex of tooth 1. Upon the 29th of the month, b^{29} deflects pallet E, and moves wheel F half a notch, causing bar J to enter the notch between teeth 1 and 2. After b^{29} passes the pallet, spring G causes pallet to move back, which motion gives the remaining half of the movement to wheel F, and the slide J rests upon the apex of tooth 2. Now, upon the 31st day of the month, b^{31} strikes pallet E, and, by turning wheel F, brings slide J between the teeth 2 and 3. After b^{31} passes, spring G forces the pallet back and completes the movement, bringing bar J upon the apex of tooth 3. The bar J remains in this position, upon the apex of tooth 3 for the 28th day of February. Now, when No. 29 of February appears upon the winding of the watch for that day, b^{29} strikes the pallet, and, as it urges the wheel F half a movement, bar J enters the deep February slot *g*. The effect of this is to lock wheel F and arrest the remaining half of the movement of the pallet which would be produced by the action of the spring G.

As bar J enters slot *g* it allows spring I to throw back skip-lever H until its pawl passes three notches on the day-wheel A, which brings the projection *f* within range of tooth *a'*. Now, as the winding is continued, the tooth *a'* of slide *a* of stop-wheel C strikes projection *f* and causes the pawl *e* of skip-lever to move up day-wheel A three notches over what will be the 29th, 30th, and 31st of February to the 1st of March, thus producing the skip. Now, the bar J being out of slot *g*, and the wheel F free to move, the spring G forces the pallet in the

opposite direction, completing its arrested movement, which urges the wheel F half a notch, and allows bar J to rest outside of the February slot, upon the first tooth upon the opposite side of the February slot as upon a shoulder. As the days of March now progress the slide J moves from notch to notch, as already described, until it reaches the thirty-day months, when tooth b^{31} operates to produce the same result as that just described, except that the slots *h*, *i*, *j*, and *k* are only one-third as deep as the February slot *g*, and consequently the day-wheel is moved but one notch.

Having thus described the main part of my invention, I would have it understood that I do not confine myself to the precise construction and arrangement shown, as they may be varied in certain particulars without departing from my invention—as, for instance, instead of using a twenty-three notched month-wheel and two teeth, b^{29} b^{31}, I may use a greater number of notches or a greater number of teeth. I may also make the month-regulator wheel F double, and have one of the wheels contain the notches and the other the slots. Instead, also, of using a pallet to move the month-regulator wheel, which pallet is in the nature of a double-acting lever, I may use a single-acting lever, and so construct the regulator-wheel as to still produce the same general result.

It will be seen, as so far described, there has been no reference to a week-wheel. This latter (represented by L) I locate upon the fulcrum of the skip-lever, concentric with the watch, and have its seven teeth project far enough to be struck by the tooth *a'* of bar *a* in the stop-wheel every day when the watch is wound. This week-wheel is lettered near its periphery with the days of the week, which show through an opening in the dial-face, or the latter may have a smaller concentric week-dial, and the week-wheel provided with an index-hand.

To provide for an irregularity arising from a failure to wind the watch for a day the idle wheel D, and also the week-wheel, are provided with means for independently adjusting the day and week calendar to correct such neglect, which adjustment can also be made use of for the extra day of leap-year.

The actuators b^{29} b^{31} mark off, respectively, twenty-eight and thirty regular divisions, corresponding to twenty-eight and thirty days, which two numbers of days are the greatest number days common to the months, the first when all the months, including February, are taken into consideration, and the second when the eleven months, without February, are taken into consideration. Hence the actuators determine a measurement or division of days common to all the months to be adjusted, which measurement is represented upon wheel A. The wheel F has its circumference divided into notches and slots, according to the order and number of days left of the twelve months in their order after the common parts of twenty-eight and thirty days mentioned above have been eliminated. These odd ends or remnants in their order are represented on the wheel by notches and slots, and occupy the wheel. The wheel was constructed to represent the odd ends or remnants after said elimination is determined by the remnants, and hence I say the wheel F represents the odd ends or remnants of the months. The wheel is notched against the actuators b^{29} b^{31} in such way that, in the revolution of the wheel F by the actuators, each proper remnant is brought again into combination with the part of month from which it was separated, each remnant in succession, till the twelve months of the year, with their proper number of days each, are reproduced. In this revolution of the wheel containing the remnants the slots representing the end of the short months produce a motion to cause skips for short months; and hence I say the remnants of the months, as described above, are used in effecting the skips for short months.

Having thus described my invention, what I claim as new is—

1. In an automatic perpetual calendar, a device, b^{29} b^{31}, or equivalent, in combination with a wheel representing the greatest division of days common to all the months, as described, and adapted at proper time to move the skipping devices, for purposes set forth.

2. The wheel F, or equivalent, having its circumference divided to represent, in their proper order, the odd ends or remnants of the months, substantially as and for purpose set forth.

3. The wheel F, having its circumference divided into notches relatively proportioned to actuators b^{29} and b^{31}, so as to revolve once a year, and provided with slots corresponding to and arranged in the order of the short months, in combination with a slot-bar, J, or equivalent, for the purpose set forth.

4. The wheel A, having an established measurement of thirty-one days, and provided with two teeth, b^{29} and b^{31}, or their equivalent, one of which is located to operate for the short month of February, and the other for the thirty-day months of April, June, September, November, to effect the skipping of the calendar to first of succeeding month, substantially as described.

5. The skipping-lever H and the notched wheel A, having teeth b^{29} and b^{31}, combined with suitable intervening skip-producing mechanism, to regulate the number of days to be skipped, substantially as described.

6. The combination of annular calendar A with the skipping-lever H, adapted to operate the calendar A at one end, and be operated by said calendar A at the other, through a suitable intervening skip-producing mechanism, substantially as described.

7. The month-regulator wheel F, having slots of different depth, corresponding relatively to the different number of days to be

skipped at end of short months, to regulate the movement of the skipping-lever, for purpose described.

8. The wheel F, having twenty-three notches, in combination with the day-wheel, having two teeth, b^{29} b^{31}, and a pallet or double-acting lever, E, as and for purpose described.

9. The skipping-lever H, in combination with the notched day-wheel, as and for purpose described.

10. The combination of the notched day-wheel A, having teeth b^{29} b^{31}, the pallet E, the wheel F, twenty-three notched and slotted, as described, and the skipping-lever H, carrying slide-bar J, substantially as and for purpose described.

11. The skipping-lever H, adapted to operate the day-wheel, in combination with the slide *a* of the stop-wheel or its equivalent, for the purpose of effecting the skip through the winding of the time-piece.

12. The seven-toothed week-wheel L, pivoted upon the same fulcrum with the skip-lever, and combined with the slide of the stop-wheel, as and for purpose described.

MINER H. PADDOCK.

Witnesses:
CHAS. A. PETTIT,
SOLON C. KEMON.