2 Sheets—Sheet 1.

R. T. ANDREWS.

CALENDAR-CLOCK.

No. 173,572. Patented Feb. 15, 1876.

Fig: 1.

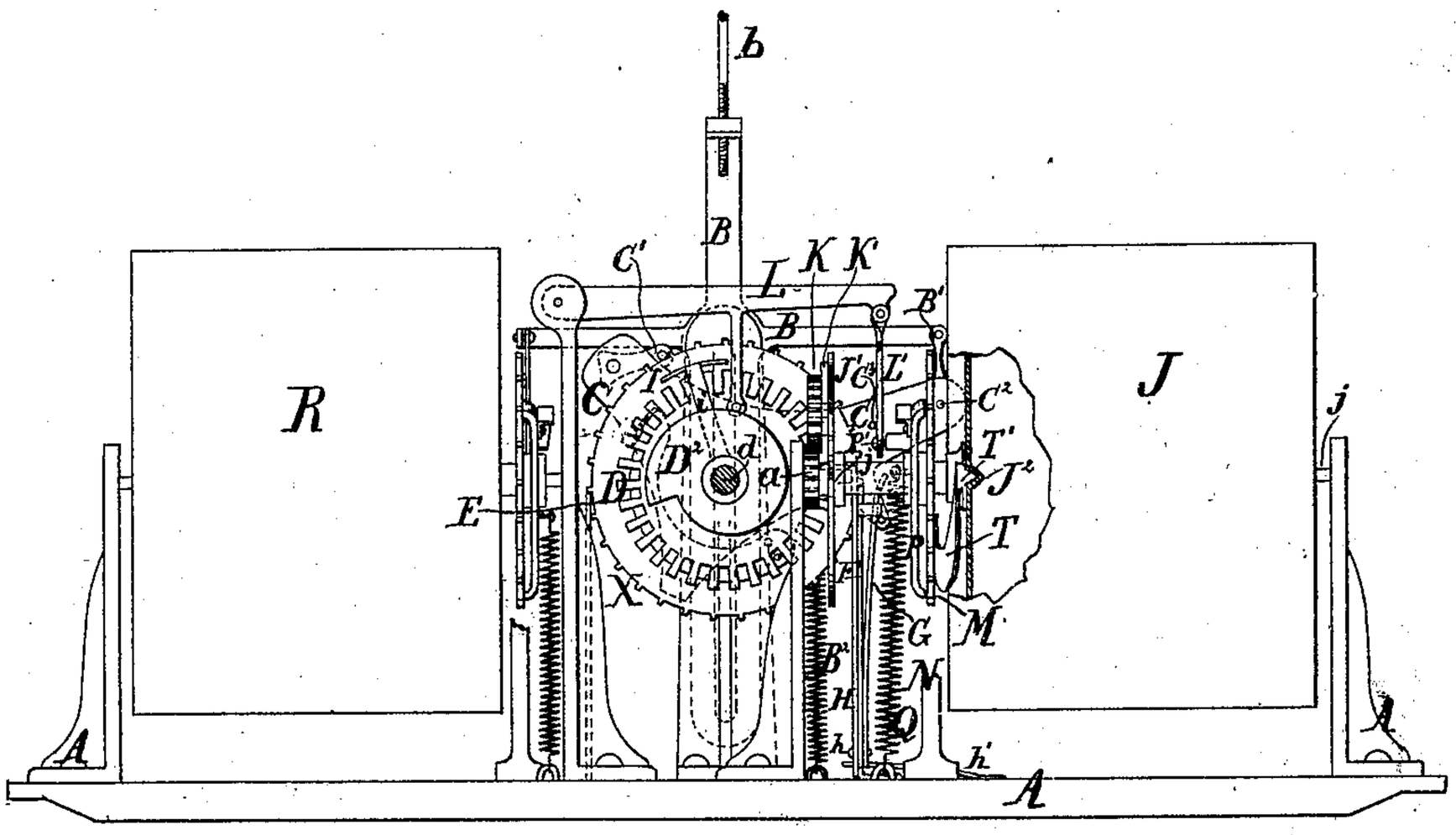
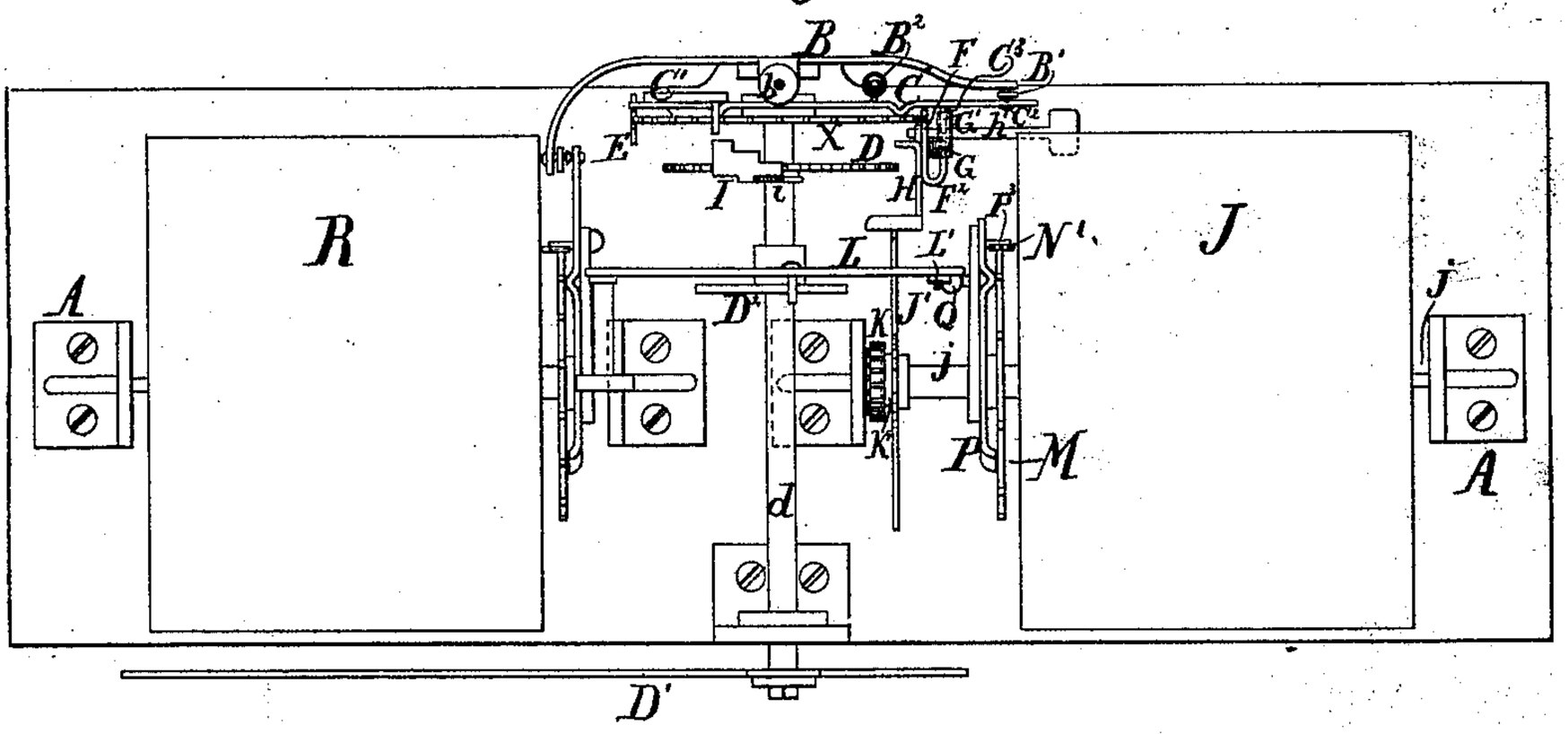


Fig: 2.



Witnesses:

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S. Parkhurst

Inventor:

R. T. Andrews

by his attorney

T. L. Stetson

2 Sheets—Sheet 2.

R. T. ANDREWS.

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Fig: 3

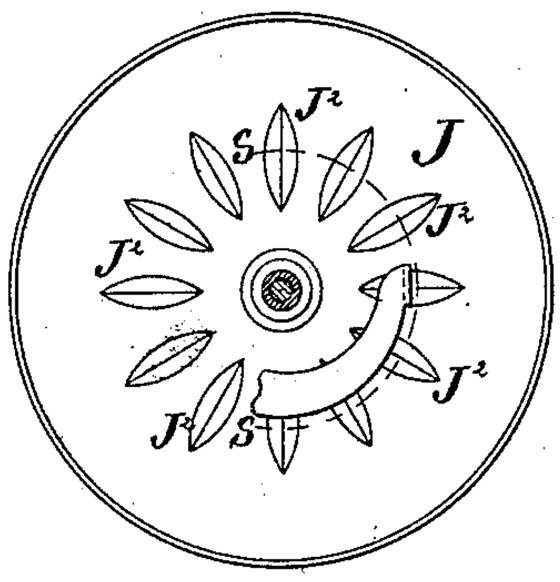


Fig: 4.

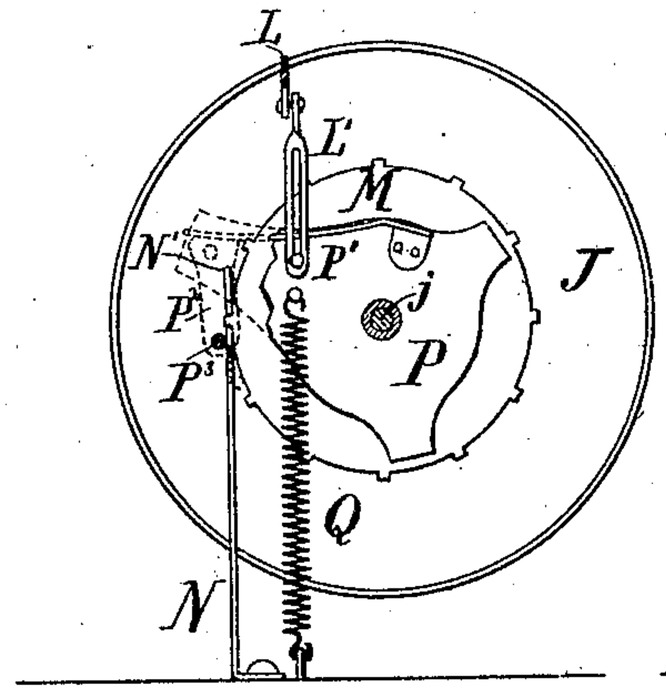


Fig: 5.

Fig: 4ª

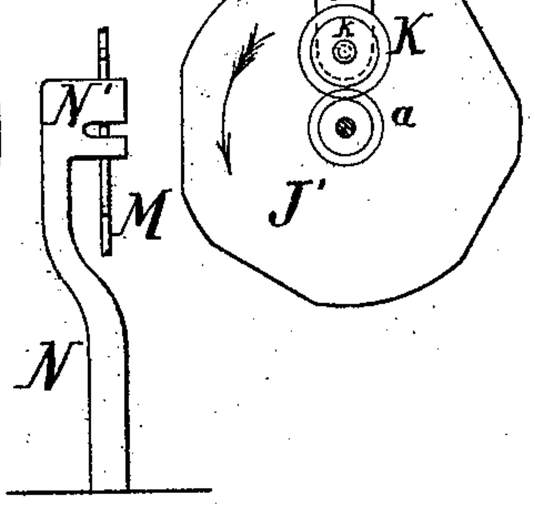


Fig: 8.

Fig: 6.

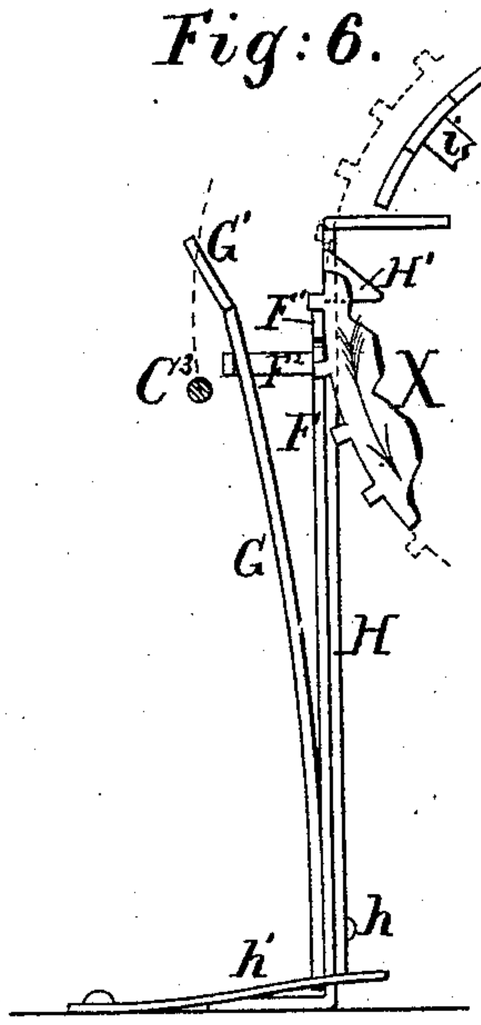
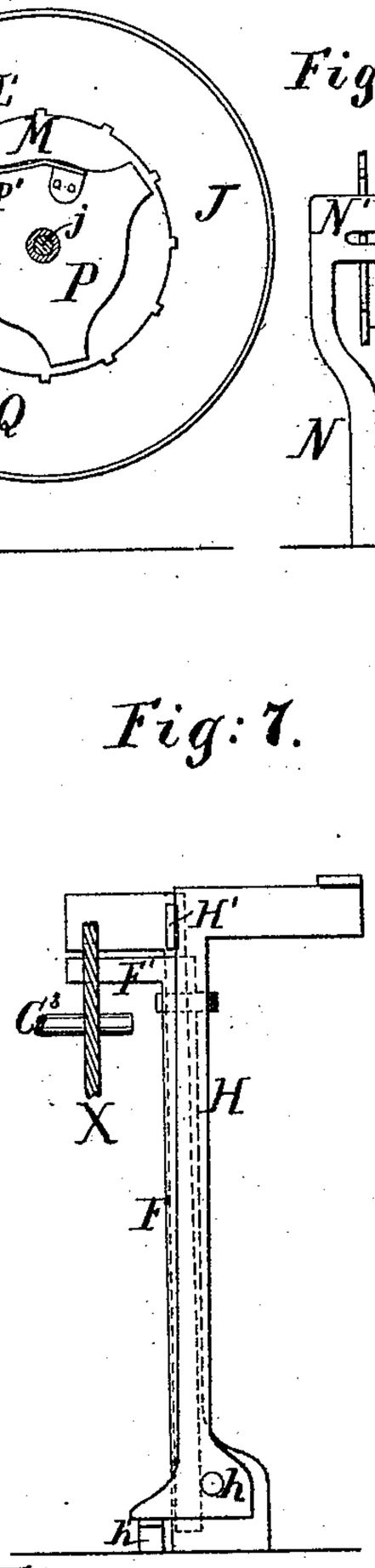


Fig: 7.



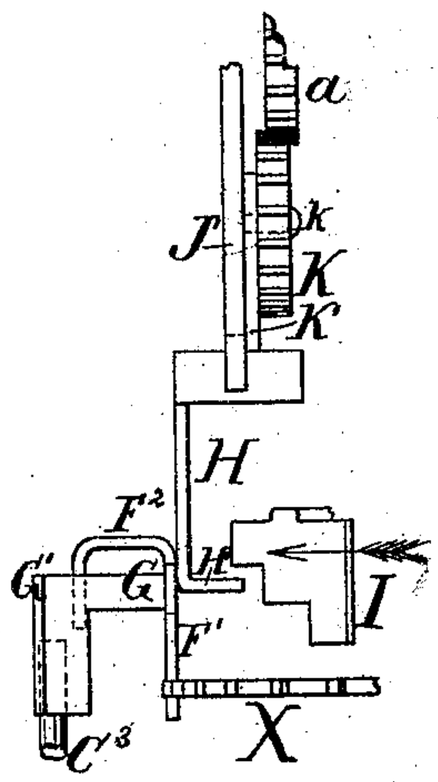
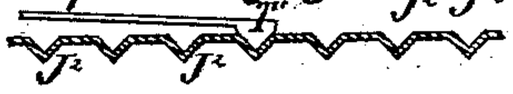


Fig: 9.



Witnesses:

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S. Parkhurst

Inventor:

R. T. Andrews

by his attorney

T. L. Stetson

UNITED STATES PATENT OFFICE.

RANDAL T. ANDREWS, OF THOMASTON, CONNECTICUT, ASSIGNOR TO THE SETH THOMAS CLOCK COMPANY, OF SAME PLACE.

IMPROVEMENT IN CALENDAR-CLOCKS.

Specification forming part of Letters Patent No. **173,572**, dated February 15, 1876; application filed January 22, 1876.

To all whom it may concern:

Be it known that I, RANDAL T. ANDREWS, of Thomaston, Litchfield county, in the State of Connecticut, have invented certain Improvements relating to Calendar-Clocks, of which the following is a specification:

There is a large class of calendar-clocks in which a hand moving on a dial indicates the day of the month, while the name of each month is conspicuously shown on one cylinder, and each day of the week is shown on another cylinder, which cylinders are revolved step by step. My experiments have been made on this class, and my invention is intended more especially therefor, though some of the improvements may also apply to calendars of other kinds.

I have introduced improved means for holding the several wheels against disturbing influences, and for setting them just sufficiently at liberty, and for just sufficiently moving them at the proper times. I have also devised improved means for the jump-over motion at the ends of the months which have less than thirty-one days, and for allowing for leap-year. I have also provided improved means for allowing the several shafts to be set forward and backward, as required in any case, moving in each case just enough of the mechanism to preserve the correct relation of the parts, and without disturbing the connected clock-work.

The following is a description of what I consider the best means of carrying out the invention:

The accompanying drawings form a part of this specification.

Figure 1 is a front elevation of the entire apparatus, omitting the lettering on the cylinders, which will be understood, and a portion of one being broken away to show the action of a spring which engages therewith. Fig. 2 is a plan view of the whole. The remaining figures show parts detached. Fig. 3 is an end view of the month-of-the-year cylinder, with a portion of a spring which engages therewith. Fig. 4 shows the wheel on which said spring is mounted, and the lever by which motion is communicated thereto, with a peculiar spring-pawl for holding and releasing it. The principal portion of a pawl carried on that lever is shown in dotted lines. A side pin on that pawl, which is the effective portion thereof, is shown in strong lines. Fig. 5 shows a cam-wheel mounted on the month-of-the-year shaft, and also a planet-wheel and cam carried thereon, with outlines of the gearing by which the cam-wheel is turned. They represent a peculiar spring-pawl and connections, which control the day-of-the-month wheel. Fig. 6 shows an edge view of the pawl. Fig. 7 shows a face view thereof. Fig. 8 shows a plan view of the same parts; and Fig. 9 is a diagram representing a section on the curved line S S in Fig. 3, as it would appear if straightened. It shows the action of a peculiar spring which engages certain parts, referred to above. Fig. 4^a is a face view of the pawl shown in Fig. 4.

Similar letters of reference indicate like parts in all the figures.

There is a day-of-month shaft partially turned each day by a reciprocating slide worked by a clock. The day-of-the-month shaft gives motion at the end of each week to a day-of-the-week cylinder, and at the end of each month to a month-in-the-year cylinder.

Referring to the drawings, A is the fixed frame-work. A clock, (not represented,) acting through the rod *b*, slide B, link B^1, receiving-pin C^2, contractile-spring B^2, and acting-pin C^3, gives, by the vibration of the lever C and its attached pawl C^1, a step-by-step rotation, one step per day to the day-of-the-month wheel X, which has thirty-one teeth or points, and carries a shaft, *d*, with an index or hand, D^1, pointing to figures on a dial. (Not shown.) E is a fixed spring-pawl, which engages with each tooth or point of the wheel X, and prevents any return movement. A further spring-pawl, peculiarly formed of several delicate parts, engages successively with the several points on the wheel X, and prevents a forward motion in any case, except as it is, for the time being, forcibly lifted and held. F is the main body of this pawl, formed with a side head, F^1, and a hook, F^2. A long and flexible spring, G, having an inclined side head, G′, is loosely inclosed in this hook or cage. On the side of the daily-rocked lever C is a pin, C^3, which, as

it sinks, engages with the head G′ of the spring G, forcing it outward against the hook F^2, and then forces the pawl F out of engagement with the wheel X. The latter is then at liberty to turn forward so long as the pawl F is thus held away. The pin C^3, in passing and forcing outward the short head G′, is only able to hold the adjacent head F^1 away long enough to allow one of the teeth or points to pass. On the upward motion of the pin C^3 it slips past the inclined head G′, springing it inward and producing no effect. At the termination of those months which contain less than thirty-one days there must be a jump-over motion.

My pawl F involves, in addition to its other duties, a capacity to perform important functions in such jump-over motion.

H is a lever, capable of being moved laterally. It is set on the pivot *h* on the spring-pawl F, and thus admits of being moved across the motion of the latter but lying always close to its inner face, so that it is ready at any time to be pushed by any suitable agency, and made to act flatwise against the pawl F.

On the shaft *d* is fixed an arm, *i*, which, on its outer extremity, presents a face, I, of an approximately triangular figure—that is to say, it has one side straight, and one side or front formed in steps or offsets, and a rear side cut square across. Its form is shown in Figs. 2 and 8. In some positions of the lever H this face I engages with it, and in its passage holds the spring-pawl F out of engagement with the wheel X. When this occurs, it allows the wheel X to turn farther, and causes more than one tooth to pass. This is the jump-over motion for the short months. It may be long or short. Its close is determined by the rear edge of the face I, and consequently the period of letting go is not affected by any lateral swinging of the lever H; but the period of its commencement depends on which of the steps in the face I the bearing-surface on the lever H is presented to, and this depends upon the position of the lever H. J is the month-of-the-year cylinder fixed on the shaft *j*, and receiving a step-by-step motion, through the aid of the snail D^2 and its connections. Fixed on the shaft *j* is a cam-wheel, J^1, cut away at different portions of its periphery, corresponding to the short months.

The lever H is formed of stout sheet metal, with two edges bent, as shown in Fig. 8. One bend may be of any form to afford a good bearing against the narrow cam-wheel J′. The other, H′, should present an inclined edge to receive the proper step in the face I, and to cause the lever H and its connections to be held away by the passage thereof. The lever H is pressed gently edgewise against the wheel J^1 by the force of the spring *h*′, so that it changes its position edgewise for each successive change from a long to a short month, and back again. When the wheel J^1 is in certain positions, where one of the fullest portions of its periphery is presented to the lever H, it will hold the latter so far away that the face I passes, without touching, the lever H. On certain other months a leaner portion of the periphery of J^1 is presented, and the lever H is pushed over a less distance, and is consequently touched by the last step of the face I. In such case it causes the wheel X to make a short step forward, or jump-over of one extra tooth or point after thirty days have passed.

In one position of the wheel J^1—that corresponding to February—the lever H is allowed to come considerably farther over, and the bearing edge or ridge H′ will be presented to the face I. This will ordinarily cause the wheel X to make a long jump-over of three points after the twenty-eight days have passed. On leap-years the lever H should be pushed over to an intermediate distance, so that the second step in the face I will be the one which is effective, and must thus act after twenty-nine days. I effect this by partly filling up the deep depression for February on those years.

K is a planet-wheel, carried on a stud, *k*, fixed on the side of the wheel J^1 under the deep depression. K′ is a cam-piece carried on the wheel K, and revolving with it. When this cam K′ is presented to the exterior of the wheel J^1 it partially fills the deep depression in the periphery of the latter corresponding to February, and by partly filling it up holds the lever H over to an intermediate extent, and makes the length of that month twenty-nine days instead of, as usual, twenty-eight. The wheel K gears into a fixed wheel, *a*, its number of teeth having such a ratio to the number of teeth in the wheel K, that when K has revolved four times it brings the cam K′ again to the outside of the wheel J^1, at the time that it is passing its point of contact with the lever H. During the intermediate three passages past that point the cam-piece K′ is presented in other parts of its revolution, and is of no effect.

I provide a sufficient reserve power to operate the jump-over, as follows: The spring B^2 is long, and capable of great retraction, and the link B^1 is slotted to allow of much lost motion. At each elevation of the slide B the link B^1 acts on the pin C^2, and lifts that end of the lever C far above the lowest position to which it is capable of sinking. The movement by one tooth at a time does not much lower it. But when the face I touches the lever H, and, forcing it into contact with the spring-pawl F, holds it longer away from the wheel X, the latter is gently, but certainly, turned by the contractile force of the spring B^2 to the full extent of the respective jump-over.

The pawl which holds and liberates the month-of-the-year shaft *j* has important points of resemblance to that which holds and releases the day-of-the-month wheel X, but is simpler. The motion from the snail D^2, lever

L, and link L′, which occurs at the end of each month, is communicated through the aid of the pin P^1, lever P, and pawl P^2, having a side pin, P^3, to the wheel M, which is mounted on the shaft *j*, and has twelve equidistant points, which are engaged and held successively in a cavity in the head N′ of the simple spring-pawl N. The spring-head N′ stands with its upper edge flaring outward from the periphery of the wheel M. At each elevation of the lever P the side pin P^3, which is a part of the pawl P^2, moves upward.

The form of the spring-head N′ is such that in performing that movement the pin P^3 is guided outward, and yields outward easily, and travels idly up without inducing any effect; but when, at the termination of a month, the snail D^2 suddenly drops the lever L and the connected lever P, and consequently the pin P^3 moves downward under the contractile force of the spring Q, the form of the spring-head N′ guides the pin P^3 under it, and makes it effective to turn the wheel M one-twelfth of a revolution—that is to say, the pawl-pin P^3 in performing the downward motion first lifts the spring-head N′ out of contact with its previously-engaged point on the wheel M, then itself engages with the same point, and presses it strongly downward, and thus turns the wheel M a little. It then liberates the pawl-head N′, and as soon as the wheel M is sufficiently turned the head N′ engages with the succeeding point thereon, and all is again firmly held stationary, showing the name of the incoming month. The day-of-the-week cylinder R is similarly held and released, and is turned by a link from the slide B.

The wheel M is not immovably fixed on the shaft *j*, but those parts are ordinarily caused to rotate in unison through the intervention of a spring, T, having a peculiar point, T′, fixed on the wheel M, and adapted to engage and hold with considerable force in any one of the twelve indentations J^2 in the end of the month-of-the-year cylinder J. The force of the spring T is sufficient to gently hold its double beveled end T′, engaged with such one of the recesses J^2 as is presented to it, and thus to compel J to turn with M; but when, for any reason, I wish to adjust or set the cylinder J backward or forward, and apply force for that purpose, the double beveled point T′ of the spring T is disengaged from the given recess. Then the cylinder J may be turned without resistance until the point T′ drops into the next recess J^2, where it will again hold with considerable force. If the cylinder J is turned still farther the same is repeated and the cylinder is arrested successively in the positions to exhibit the name of each month until the right month is reached; and with each change of position it induces a corresponding change of the wheel J^1, which is immovable on the shaft *j*, and consequently the length of each month is preserved through all the changes of position. So, also, the wheeel X is not fast on the shaft *d*, but communicates motion to a wheel, D, which latter is immovably fixed thereon. The motion is communicated from X to D by means of a spring similar in construction, and in the form of its double beveled point to the spring T T′ before described, and its point similarly engages in the recesses in the wheel D. The shaft *d* and its attached wheel D, index D^1, and snail D^2 may be turned in either direction by a sufficient force, without turning the wheel X and its attachments, or disturbing the relation of the latter to the clock. The day-of-the-week cylinder R is also equipped with a spring-pawl, with a double beveled point engaging in recesses, and may be similarly set forward or back, with a similar tendency to remain set only where a name will be rightly presented.

Some of the details may be variously modified without entirely defeating the objects of the invention. Thus, for example, the narrow bearing-ridge H′ may be fixed directly upon the pawl F, which it is to hold away, but in such case the entire pawl F must be capable of being shifted laterally, and it would require more force and render the mechanism less firm and reliable. So, also, weights may be used, instead of the springs, to move the several parts, but I prefer the whole, as shown.

Some of the advantages due to certain features of the invention may be separately enumerated:

First, by reason of the fact that my slide B, worked by the clock, has a connection, B^1, capable of allowing more motion than usual to the lever C, and to the connected day-of-the-month wheel X, I am able conveniently to reserve power ready to work the latter to the full extent allowed by the jump-over mechanism.

Second, by reason of the fact that the pawl F, which holds and releases the day-of-the-month wheel X, has a connected side head, G′, of just sufficient width actuated by each descent of the pin C^3, I am able conveniently to liberate and allow one tooth or point only to pass at each ordinary descent, while holding all the parts firmly at all other periods.

Third, by reason of the fact that the side head G′ is not fixed on the pawl F but is formed or mounted on a spring, G, inclosed with limited freedom within a rigid attachment, F^2, the side head yields easily inward and outward to a certain limited extent, and allows the use of a pin C^3 rigidly connected to its lever C, with the pawl C′ at a distant point, and thus affords more room for the mechanism necessary for the jump-over.

Fourth, by reason of the face I, revolved with the day-of-the-month shaft *d*, and of the bearing edge or ridge H′, adapted to receive the face I, and hold away the pawl F, and of the cam-wheel J^2, revolved with the month-of-the-year shaft *j*, and adapted to shift the bearing H′ laterally each month, I am able conveniently to hold the pawl F out of engagement with the wheel X for a long or

short jump-over motion, after the pin C^3 has performed its function of passing one tooth only.

Fifth, by reason of the cross moving-lever H and its actuating-spring *h'*, I am able to move laterally the bearing H', which receives the contact with the face I without requiring to move the pawl F, and thus to avoid strain and friction.

Sixth, by reason of the pawl N, with its flared side head N', and of the pin P^3, carried on the operating-pawl P^2, I am able with few parts to reliably hold and release the wheel M, and to induce the proper single step forward at each reciprocation.

Seventh, by reason of the planet-wheel K and cam K', operated as shown, I am able, by simple and reliable means, to partly fill the deepest depression in the cam-wheel J^1 on leap-year, and thus to conveniently induce the proper shortening of the jump-over at the end of February on those years.

Eighth, by reason of the loose wheel M and fast wheel or cylinder J, and of the spring T on one end of the series of depressions J^2, and of the double bevel T' on the other, and of the engaging parts, I am able to allow the several parts to be set forward or back without disturbance of the other parts, carrying just so much therewith as is necessary to maintain the correct relations, and without liability of coming to rest in intermediate or half-adjusted positions.

I claim as my improvements in calendar-clocks—

1. The connection B^1, adapted to allow a greater motion than usual of the lever C, pawl C^1, in combination with such lever and with the day-of-the-month wheel X, arranged to reserve power for the jump-over motion, as specified.

2. The side head G', connected with the holding and releasing pawl F, in combination with the vibrating lever C, pawl C^1, pin C^3, and wheel X, as specified.

3. The spring G, carrying the side head G', and inclosed, as shown, within the hook or strap F^2, in combination with the wheel X, lever C, pawl C^1, and pin C^3, as specified.

4. The face I, cam-wheel J^1, and pawl F, with the bearing-ridge H', in combination with the wheel X, as set forth.

5. The lever H, carrying the bearing-ridge H', and capable of moving transversely on the pawl F, in combination with the cam-wheel J^1, and day-of-the-month wheel X, as and for the purposes specified.

6. The pawl N, with its side head N', in combination with the reciprocating pin P^3 and cam-wheel M, as specified.

7. The planet-wheel K and cam K', revolved around the wheel *a*, in combination with the cam-wheel J^1, and with the piece H and its connections for changing the jump-over motion every fourth year, as herein specified.

8. In combination with the indicating means J and the actuating mechanism L and its connections, the connecting spring-piece T T' engaging in recesses J^2, adapted to allow the setting forward and back by step-by-step motion, as and for the purposes herein set forth.

In testimony whereof I have hereunto set my hand this 10th day of January, 1876, in the presence of two subscribing witnesses.

RANDAL T. ANDREWS.

Witnesses:

FRANKLIN B. TAYLOR,

A. P. BRADSTREET.