(Model.) 3 Sheets—Sheet 1.

E. B. MILLER.

CALENDAR CLOCK.

No. 422,090. Patented Feb. 25, 1890.

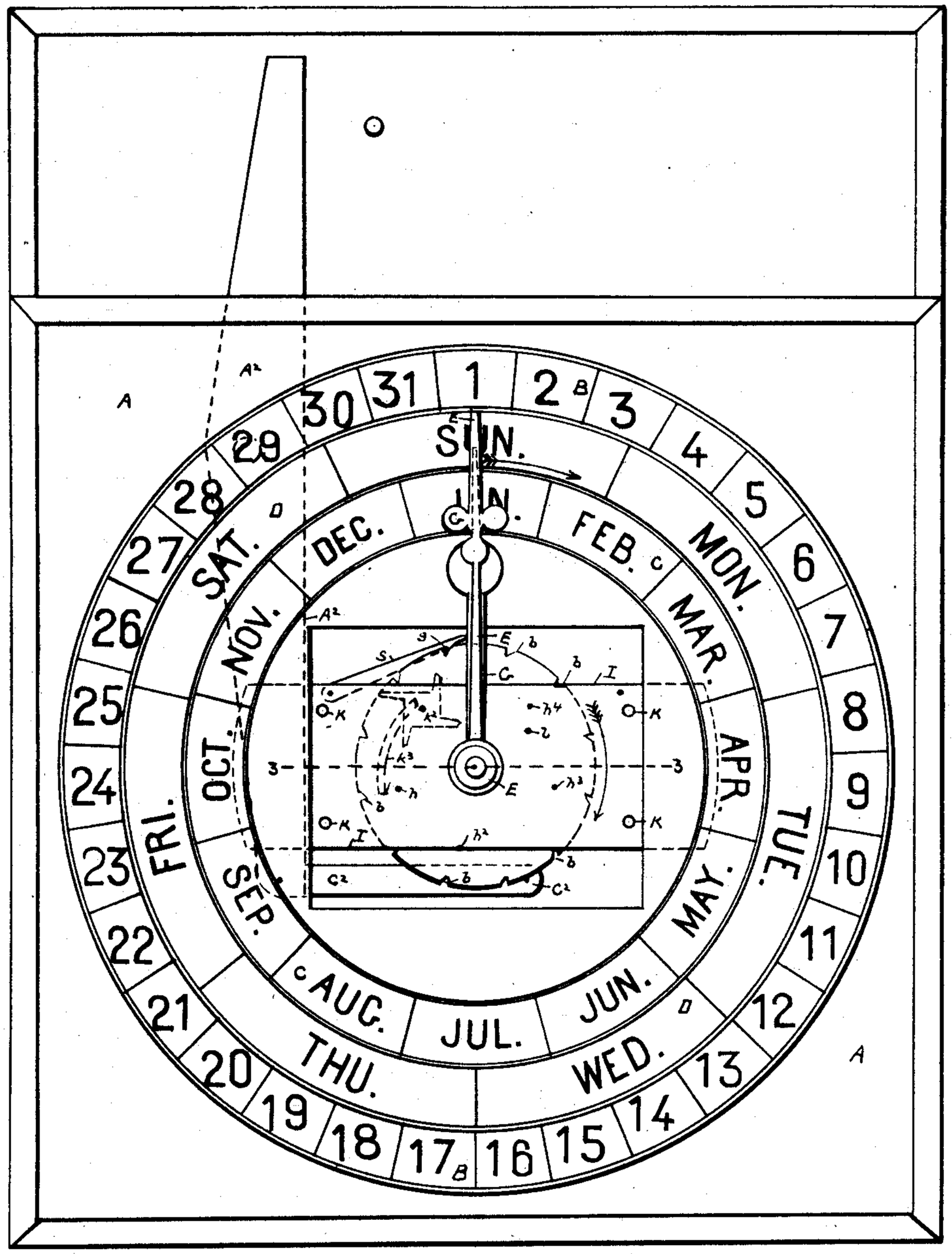

Fig. 1.

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(Model.) 3 Sheets—Sheet 2.

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CALENDAR CLOCK.

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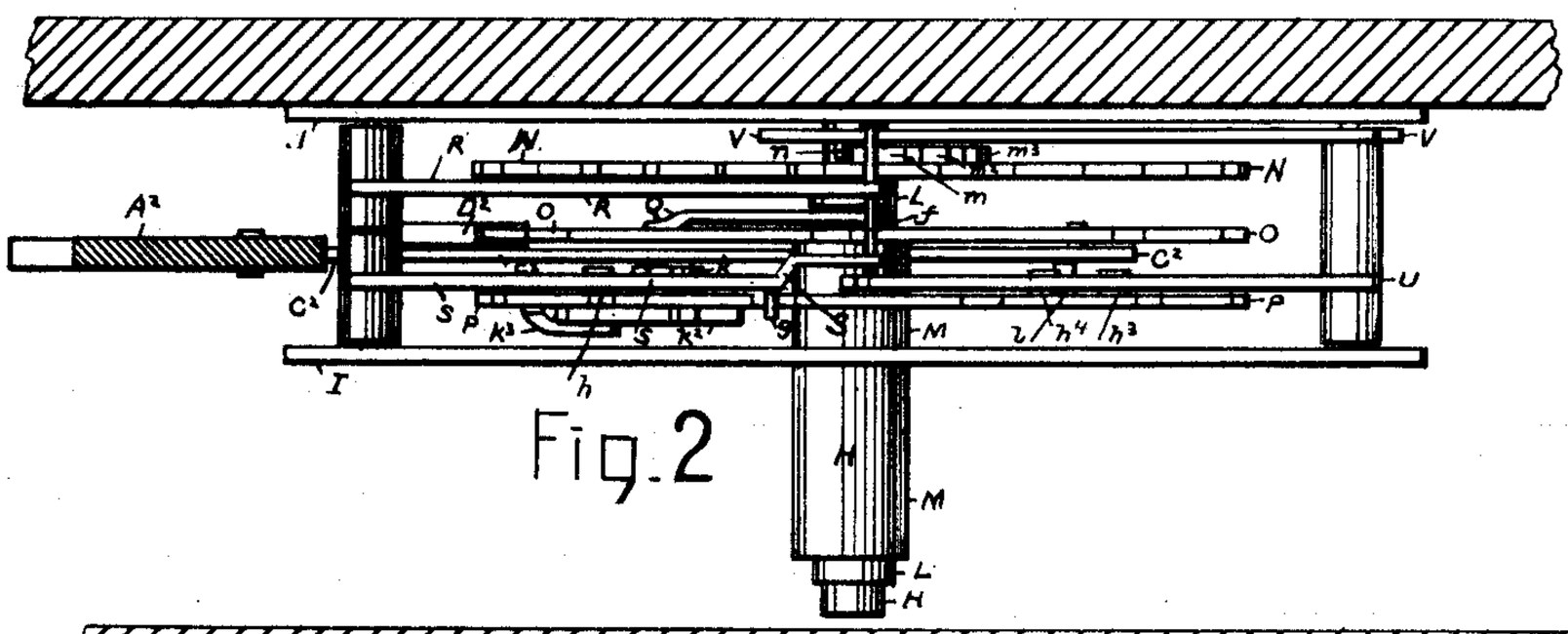

Fig. 2

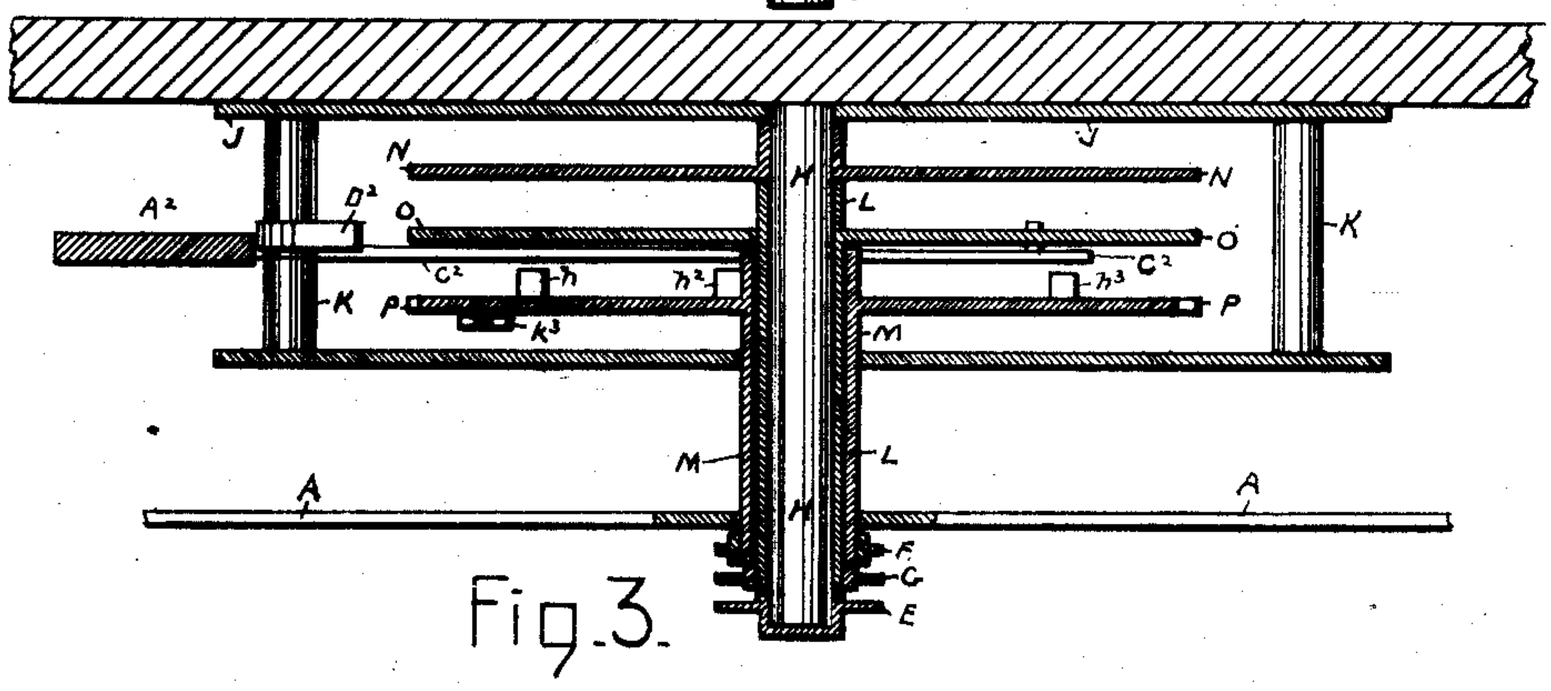

Fig. 3.

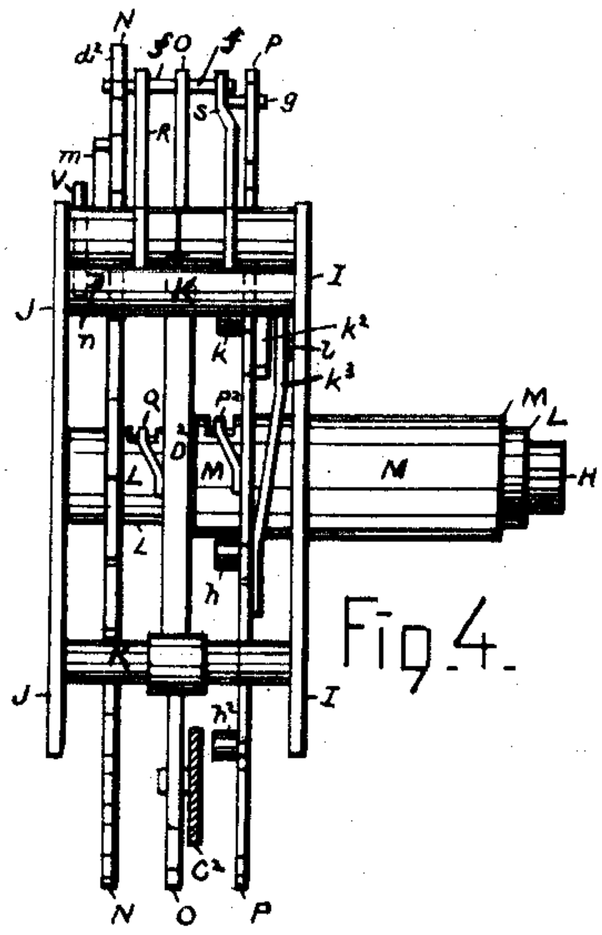

Fig. 4.

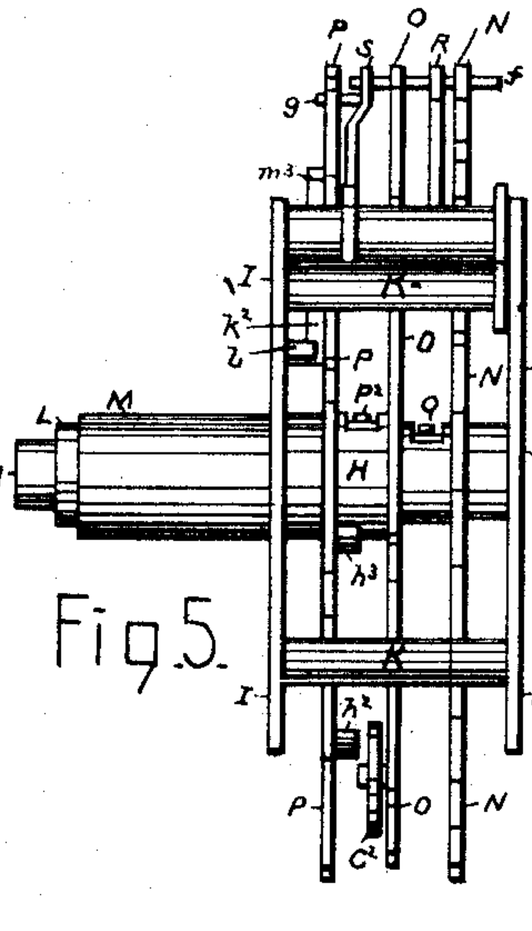

Fig. 5.

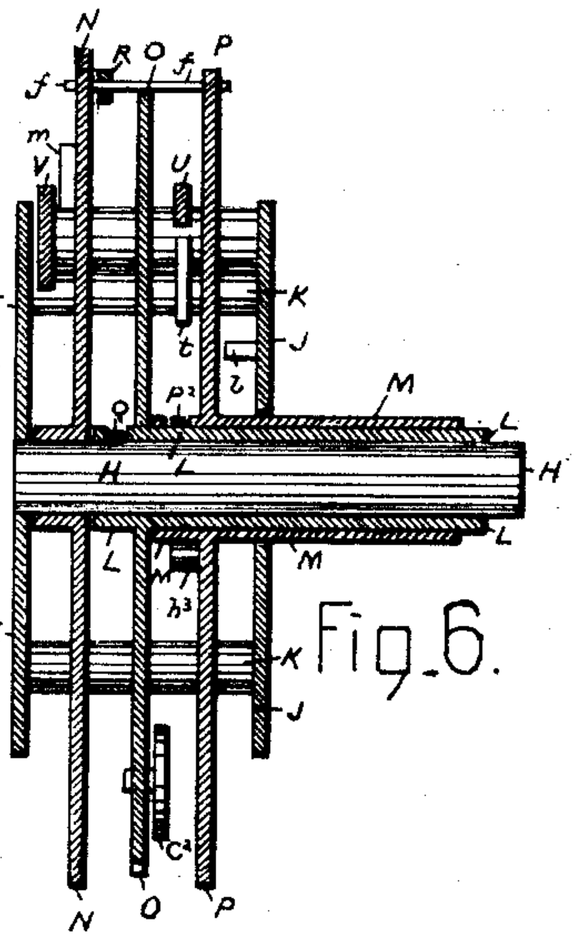

Fig. 6.

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No. 422,090. Patented Feb. 25, 1890.

Fig. 7.

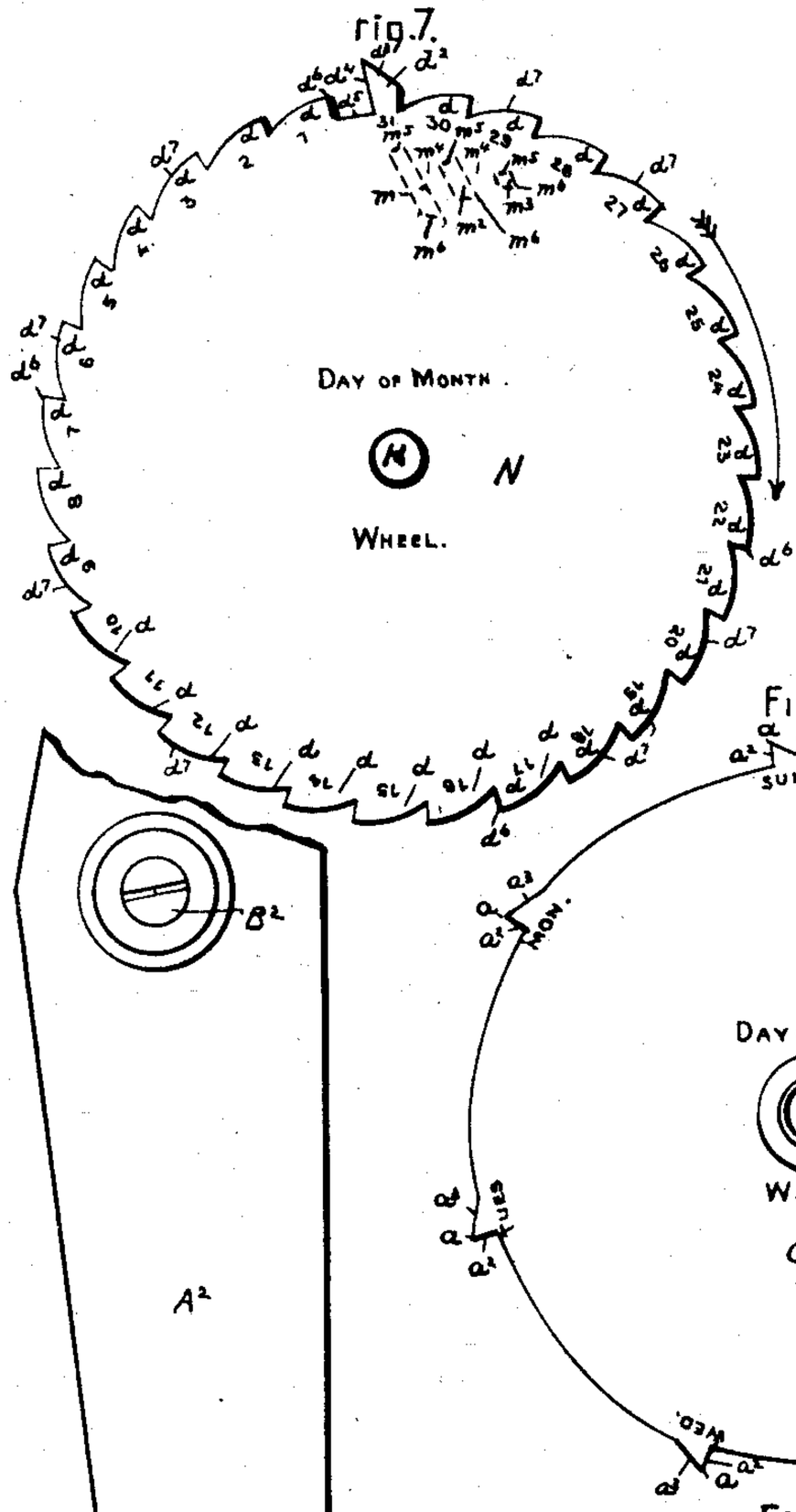


Fig. 8.

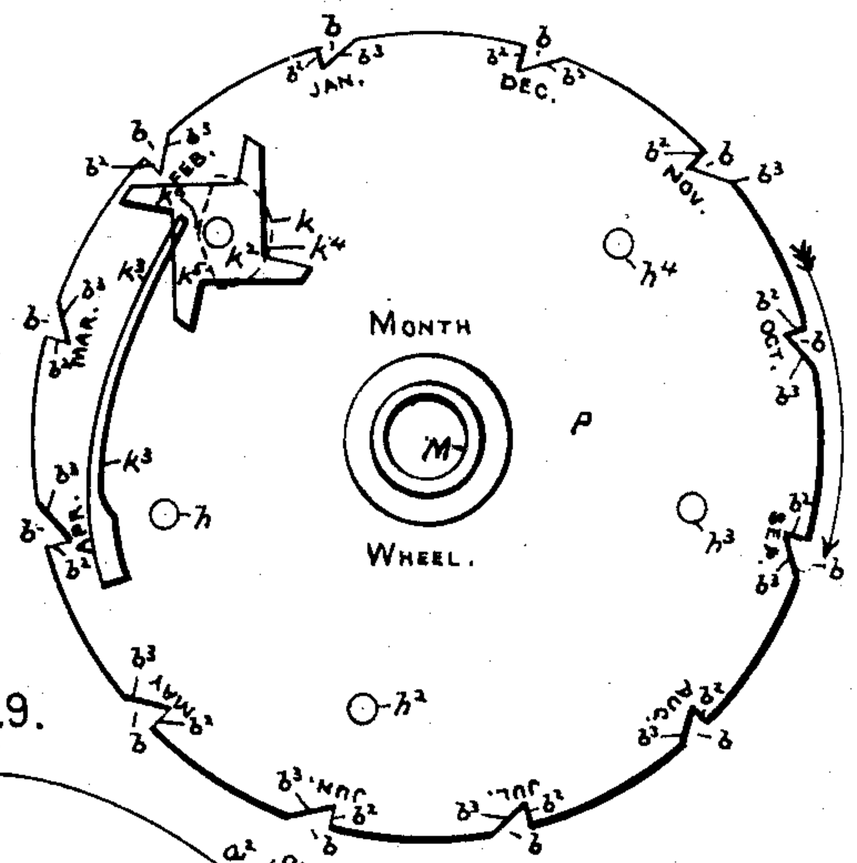


Fig. 9.

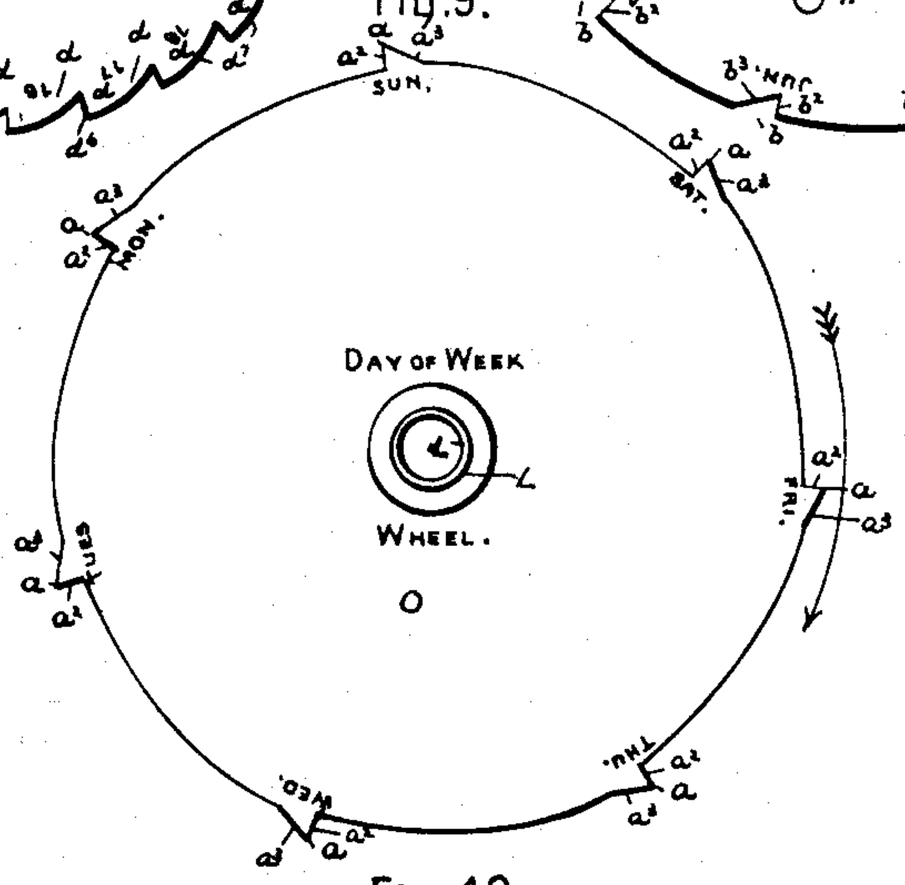
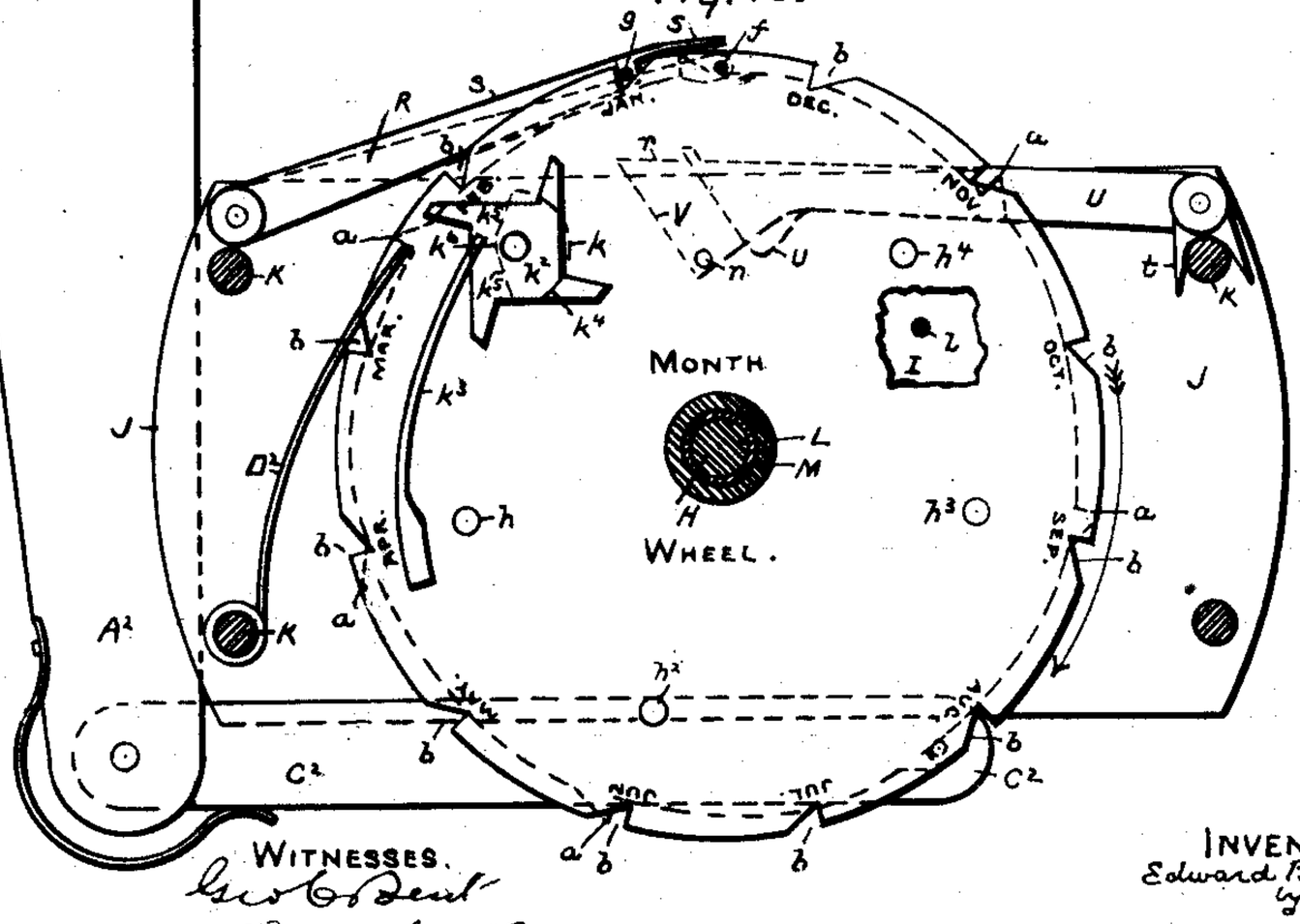


Fig. 10.



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UNITED STATES PATENT OFFICE.

EDWARD B. MILLER, OF ORANGE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ALBERT F. ROBBINS, OF SAME PLACE.

CALENDAR-CLOCK.

SPECIFICATION forming part of Letters Patent No. 422,090, dated February 25, 1890.

Application filed February 19, 1889. Serial No. 300,505. (Model.)

To all whom it may concern:

Be it known that I, EDWARD B. MILLER, of the town of Orange, in the county of Franklin, State of Massachusetts, have invented certain new and useful Improvements in Calendar Attachments for Clock-Movements, of which the following is a full, clear, and exact description.

This invention relates to a mechanism to be combined with and run from a clock-movement for the purpose of indicating from day to day the changes in day of week and month and the month as they regularly occur.

The mechanism of this invention is composed of three concentric wheels, which are fixed on separate and concentric axles respectively circumferentially divided corresponding to the number of days of the week and of the longest month in a year. The day-of-week wheel is turned step by step of equal length, seven in all, and makes a full turn once a week. The day-of-month wheel is turned step by step and makes a full turn once every month of whatever number of days—for months of thirty-one days, thirty-one steps of equal length; for months of thirty days, thirty steps of equal length and then a continuous step of a length equal to that of two of its separate steps; for month of February, twenty-eight days, twenty-eight steps of equal length and then a continuous step of a length equal to that of four separate steps, and for month of February, twenty-nine days, twenty-nine steps of equal length and then a continuous step of a length equal to that of three separate steps; and the month-wheel is turned step by step of equal length, twelve in all, and makes a full turn once a year. The day-of-week wheel is the actuating-wheel, and it is moved at the expiration of each day by the clock mechanism, as stated, one step, carrying with it, as stated, on each movement the day-of-month wheel one step, and also at the expiration of each month the month-wheel one step, and at all other times the day-of-month and month wheels are stationary. The day-of-month and month wheels have each a click or pawl to engage them after each of their movements stated, and the click of day-of-month wheel is released from the wheel by the operation thereon of the day-of-week wheel, and the click of the month-wheel is released from the wheel by the operation thereon of day-of-month wheel, and after being released by the day-of-week wheel, as stated, and at the expiration of months having less than thirty-one days, both clicks are further held released to allow of the movement of the day-of-month wheel, as stated, by means which consist of five lugs on month-wheel, four fixed and one of sector shape and rotatory thereon, a stationary lug suitably located to turn said sector-lug one-quarter round in every full turn of the wheel, three cams on day-of-month wheel, and two pawls moving as one, one for said lugs and to be worked thereby, and the other for said cams and to be worked thereby, and severally combined and arranged otherwise so as to hold the click of day-of-month and month wheels disengaged from both wheels beyond the time of their disengagement therefrom by the operation solely of the day-of-week wheel, and thereby to allow a movement of day-of-month wheel for months of thirty and twenty-eight and twenty-nine days, all as has been referred to.

In the drawings forming part of this specification the improved calendar attachment of this invention for clock-movements or other suitable mechanisms is illustrated.

Figure 1 is a face view of the dial, its hands for indicating, in co-operation with its graduated spaces suitably marked, the days of week and month and the month, also the improved operative mechanism for moving the hands at the dial, and of a casing inclosing the whole. Fig. 2 is a plan view, enlarged, of the operative mechanism. Fig. 3 is a horizontal section, enlarged, line 3 3, Fig. 1, of the operative mechanism for dial-hands. Figs. 4 and 5 are elevations, enlarged, at opposite ends of Figs. 2 and 3. Fig. 6 is a central vertical section, Figs. 2 and 3. Figs. 7, 8, and 9 are views, respectively, of day-of-month, month, and day-of-week wheels. Fig. 10 is a front elevation, enlarged, of the several wheels combined and in working position.

In the several views all parts are shown in

their respective positions at the beginning of a year, month, and week, and a year in which February has twenty-eight days.

In the drawings, A is the dial-plate, suitably incased. The dial has three separate concentric annular divisions, the outer B thirty-one, (31,) the inner C twelve, (12,) and the intermediate or middle D seven, (7.) The thirty-one divisions of outer space B, beginning at the top and running to the right, are marked with figures 1 to 31, both inclusive, in regular order, corresponding to the number of days of the longest month, the twelve divisions of the inner space C, beginning at the top and at its space-division, which is in line with and under division marked "1" of day-of-month spaces B, and running to the right, are marked with the names of the months, January to December, both inclusive, in regular order, and the seven divisions of the intermediate or middle space D, beginning at the top and at its space-division in line with and between space-divisions of outer and inner spaces B C, marked, respectively, "1" and "Jan.," and running to the right, are marked with the names of the days of the week, Sunday to Saturday, both inclusive, in regular order.

E, F, and G are dial pointers or hands, and the hand E is for the day-of-month spaces B, the hand F for the month-spaces C, and the hand G for the day-of-week spaces D. The hands E, F, and G turn about a common axial line concentric with the center of the dial-spaces B C D and coincident with the axis of the horizontal arbor H, carrying day-of-month hand E. The arbor H projects from and passes loosely through the dial, and its inner end turns in a vertical plate J of a fixed frame composed of plate J and a parallel vertical plate I, which is in front of and separated from it. These plates I J are joined at their corners by posts or pillars K, and all combined constitute the support for the operative calendar mechanism of this invention.

L is a sleeve concentrically surrounded and turning on arbor H, and M is a sleeve concentrically surrounding and turning on sleeve L. Both sleeves L M project from and pass loosely through and to the back of dial A, and also through the front plate I of frame-support I J, and the sleeve M turns in said front plate.

N is a vertical circular wheel fixed on and concentric with the arbor H and located in front of the back plate J of said frame-support I J.

O is circular wheel on and concentric with sleeve L, and P is a circular wheel fixed on and concentric with sleeve M. The wheel O of sleeve L is between the wheels N P and in front of the wheel N of arbor H, and the several wheels N O P are located in the open space between the front plate I and back plate J of the frame-support I J. The middle wheel O has a spring-arm Q, at one end secured to it and at the other end free and bearing on and in frictional contact with the arbor H, and the front wheel P has a spring-arm P^2, at one end secured to it and at the other end free and bearing on and in frictional contact with the sleeve L of middle wheel O, all so arranged that, unless otherwise restrained, if the middle wheel O is turned either both the back and front wheels N P or the back wheel N will turn as one with it, as will hereinafter appear.

The arbor H and its inner and outer surrounding sleeves L M carry, respectively, the hands E G F of the dial, and their wheels N O P respectively correspond and belong to the day-of-month spaces B, week-day spaces D, and month-spaces C of dial A. These wheels are all of equal diameter, and for convenience of designation are hereinafter to be called: the back wheel N of arbor H, "day-of-month" wheel; the middle wheel O of inner sleeve L and one next surrounding arbor H, "day-of-week" wheel, and front wheel P of outer sleeve M and one next surrounding inner sleeve L, "month-wheel," and the hands of each wheel "day-of-month" hand E, "day-of-week" hand G, and "month-hand" F, respectively.

The perimeter or edge of day-of-week wheel O, Fig. 9, has seven equidistant projecting teeth a, each a right-angle triangle with one a^2 of its two sides forming the right angle coincident with a radial line of the wheel, and between the teeth the edge of the wheel is outwardly rounding in a continuous curve, which at its end joining the inclining side or hypotenuse a^3 of a tooth is at the greatest distance and at its opposite end at the least distance from the axis of the wheel. The side a^2 of each tooth radial with the wheel is its holding side, as will hereinafter appear.

The perimeter or edge of month-wheel P, Fig. 8, has twelve similar equidistant acute angular notches b. Each angular notch b has one b^2 of its sides coincident with a radial line of the wheel, and this side is its holding side, and its opposite and inclining side b^8 runs in a direction opposite to that of the inclining side or hypotenuse a^3 of the triangular teeth a of day-of-week wheel O.

The perimeter or edge of day-of-month wheel N, Fig. 7, has thirty-one equidistant ratchet-teeth d d^2, and thirty teeth d are similar and the remaining one d^2 is extended outward beyond the teeth at each side of it and with an edge d^3 outwardly inclining and in the same direction as the hypotenuse a^3 of teeth of day-of-week wheel, and meeting at an acute angle an edge d^4, which is at an inclination to a radial line of the wheel and in a direction inward and toward said edge d^3, and forms one and the forward wall of a square-sided notch d^5, and said outward extension of tooth d^2 makes up tooth thirty-one of the wheel and together embrace a portion of the perimeter equal to that of each of the other thirty teeth d. The holding side d^6 of

each of the thirty ratchet-teeth d is coincident with a radial line of the wheel, and the back d^7 of each of the same teeth outwardly rounds and extends from the outer end of one to the inner end of the next tooth and in a direction opposite to that of the hypotenuse or inclining side a^3 of the angular teeth of the day-of-week wheel and in the same direction as the inclining side b^3 of the angular notches b of month-wheel P.

The wheels N O P each and all when operated turn in the direction of the arrow represented in the drawings.

R S are two gravity clicks or pawls, which at one end are both independently fulcrumed on a common fixed horizontal pin T of the frame-support I J. These clicks are located at the left hand of the wheels N O P. The click R at rest is between the day-of-month wheel N and day-of-week wheel O, and is engaged by a horizontal cross-pin f at its outer end and projecting from its opposite sides with a ratchet-tooth d of and rests on the day-of-month wheel N, and thus engaged the wheel is held against, while the day-of-week wheel O is free for forward movement and the cross-pin of the click stands across its edge back of the holding side a^2 of its angular tooth a, which is in line with or directly opposite to the tooth next forward—that is, the tooth of the day-of-month wheel N with which the pin f of click is engaged. As day-of-week wheel O is turned in a forward direction its angular tooth a next back of the ratchet-tooth d of the day-of-month wheel with which click R is engaged, working on the cross-pin of the click, lifts the click sufficiently to disengage its cross-pin from the ratchet-tooth of the day-of-month wheel, and, thus freeing the day-of-month wheel N, it then, because of the frictional connection of it with the sleeve L of day-of-week wheel O, turns and moves forward with the day-of-week wheel, the click during the meantime, by its cross-pin f resting on the edge of day-of-month wheel, extending between the ratchet-tooth from which it was just disengaged and the ratchet-tooth next backward of it, and finally engages said next backward tooth, on which the forward movement of the day-of-month and day-of-week wheels is arrested, and both wheels then remain stationary until the day-of-week wheel is again moved forward. This forward movement of day-of-week wheel is step by step, and each movement covers one-seventh or one division-space of its perimeter, and in each instance it is accomplished from the movement of a clock or other suitable mechanism once in every twenty-four hours, and at twelve m.—as, for illustration, by suitable means, such as hereinafter described, operated on by the clock-movement at that hour, and, as so operated, working on and turning said day-of-week wheel at each operation a length of its perimeter equal to one-seventh of its whole length. The click S at its outer end portion has a horizontal cross-pin g projecting from one side and across the notched edge of the month-wheel P, and, with the click and also the wheel P at rest, said cross-pin is engaged with a notch of the wheel, thus holding the wheel against forward movement. This click S extends forward beyond its pin g, engaging the wheel P, and across and over the portion of the pin f of the click R, engaging day-of-week wheel O, and so from the increased lift of click R of the day-of-week and day-of-month wheels caused, by the travel under the cross-pin f of said click of the outward-extended tooth d^2, tooth thirty-one, of the day-of-month wheel, the click S will also be lifted sufficiently to disengage its pin g from the notch b of the month-wheel with which it was engaged, and thus the month wheel is released to be turned in a forward direction with the day-of-week and day-of-month wheels. On the continued turning of the day-of-month wheel its outward-extended tooth d^2 finally passes from under and escapes from the cross-pin f of the click R, leaving it and the click S both free to drop onto their respective wheels and to come into engagement, the click R with the ratchet-tooth, one, next in order to ratchet-tooth, thirty-one, of day-of-month wheel, and the click S with the notch of the month-wheel next in order to the notch from its engagement with which it was released, as just stated, thus arresting the movement of these wheels, the movement of day-of-week wheel being also then stopped.

The turning of the day-of-week, day-of-month, and month wheels in conjunction, as above described, is secured from the frictional contact of the axles, to wit: the arbor H and the inner and outer sleeves L M of said wheels one with another, secured by the spring-arms Q P^2 in their bearing thereon, as before explained.

By the operation of parts as just above explained the day-of-month and month wheels under the forward turning of the day-of-week wheel are moved so as to indicate by their respective hands at the dial the next day of the week in regular order to the day of the week previously indicated, the next month in regular order to the month previously indicated, and the first day of said month, the month previously indicated having had thirty-one days. In other words, while the day-of-week wheel is moving to indicate by its hand at the dial the day of the days of the week next in order to the day previously indicated by it thereat, the month-wheel is moved to indicate by its hand at the dial the month next in regular order to the month previously indicated thereat and which month had thirty-one days, and the day-of-month wheel is moved to indicate at the dial by its hand the first day of the month then indicated at the dial by the hand of month-wheel. This change of day-of-month hand at the dial from 31 to 1, as also the other changes of the same hand on the dial at the day-of-month spaces for the other days of

the same month, are secured from the lifting of the click R from engagement of a ratchet-tooth of the day-of-month wheel thereon as said day-of-week wheel is turned, and the change of the month-hand at the dial for each change of month from a month having thirty-one days is secured from the lifting of the clicks R and S, caused by the action thereon of an angular tooth of the day-of-week wheel in conjunction with the action of the outwardly-extended ratchet-tooth d^2, thirty-one of the day-of-month wheel, during the meantime the day-of-week wheel having moved through a length of its perimeter equal to one-seventh of the full length thereof and the month-wheel having moved through a length of its perimeter equal to one-twelfth of the full length thereof.

h h^2 h^3 h^4 are four round lugs attached to and projecting from the back and located at equal distances from the axis of month-wheel P, and each axially in a radial line of the holding side b^2 of a notch b of the wheel, and severally in radial lines with the notches thereof, representing and corresponding to a calendar month (April, June, September, and November) having thirty days.

k is a sector-lug at the back of and having a concentric arbor which passes through and turns in the month-wheel P, and on the front of the wheel has a four radially pronged or armed dog k^2, the several arms of which are at equal distances apart, and as a whole the lug k and its dog k^2 are confined against accidental turning by the pressure of a spring-arm k^3, which at one end bears on it and at its other end is fixed to the month-wheel P. The axis of the sector-lug k is at the same distance from the axis of month-wheel P as that of the axes of the round lugs h h^2 h^3 h^4, and it is coincident with a radial line of the holding side b^2 of the notch b of the month-wheel, representing and corresponding to the calendar month February, having in every fourth or leap year twenty-nine and in all other years twenty-eight days. The sector-lug has a semicircular arc k^4 of a greater radius than the radius of the round lugs h h^2 h^3 h^4, and opposite thereto it has a straight side k^5 in two sections, each running from an end of the arc toward each other and in directions to intersect and meet at an obtuse angle k^6, and which angle is coincident with a radial line of the lug midway of its arc, and with this radial line of the lug coincident with a radial line of the wheel and the obtuse angle k^6 of the lug toward the axis of the wheel the angle k^6 of the lug is at a less distance from the axis of the wheel than that of the axes of the round lugs.

l is a lug fixed on and projecting from the back of front plate I of the frame-support I J. This lug l is in a position as the month-wheel P turns forward and when the notch of said wheel corresponding to February is forward and out of engagement with the cross-pin g of click S to work on the arm of the dog k^2 of the sector-lug k then in position therefor, and thus to turn said sector-lug a quarter round once for and during each complete turn of the month-wheel. The sector-lug k makes a complete turn in every four complete turns of the month-wheel. Again, the sector-lug is arranged so that for each February having twenty-eight days its arc face will be presented or in position and for each February having twenty-nine days its straight face will be presented or in position, as the month-wheel P moves forward for placing its February notch out of and placing its March notch into engagement with the cross-pin g of click S to work on and lift the outer end of a dog-lever U, fulcrumed on a fixed horizontal cross-pin of frame I J at right of wheels N O P, and otherwise suitably located therefor, and this dog-lever is also similarly worked on and lifted by the round lugs of the month-wheel, and all as and for a purpose which will hereinafter appear.

m m^2 m^3 are three straight and parallel rib-projections of different lengths located on the back of day-of-month wheel N, and between the middle rib m^2 and the ribs m m^3 at each side is an open space m^4, and both spaces are of equal width. The rib projections are severally oblique to radial lines of the wheel, and their ends m^5 are at the greatest but at an equal distance from the axis of the wheel, and respectively in divisions thirty-one, thirty, and twenty-nine of the day-of-month wheel, and their opposite ends m^6 are at the least and unequal distances from the axis of the wheel, and respectively in divisions thirty, twenty-nine, and twenty-eight of the wheel. The rib m is the longest, the rib m^3 is the shortest, and the rib m^2 is longer than rib m^3, but shorter than rib m, and thus located, as described, the rib m^2 has its end portion m^6 extending beyond the same end m^6 of rib m, and the rib m^3 has its same end portion m^6 projecting beyond the same end m^6 of rib m^2, all as and for a purpose which will hereinafter appear.

V is a dog-lever, which is a part of and moves with the dog-lever U, lifted by the action of the round lugs h h^2 h^3 h^4 and sector-lug k of month-wheel on the dog U, as has been stated. The dog V is lifted and lowered in common with the dog U, and vice versa. Again, the dog V has a horizontal lug projection n crossing the vertical plane of and in position to be acted on by the cam-ribs of the day-of-month wheel N. The upper edge r of dog V is under the cross-pin f of the click R, and as the dog is lifted it works by this edge against the under side of said cross-pin, and thus lifts the click R, all as and for a purpose which will hereinafter appear. Furthermore, the dog V in its normal position and in working is between the day-of-month wheel N and the back plate J of frame I J, and the dog U in its normal position and in working is between the day-of-week and month wheels O P, and both dogs are supported in this posi-

tion by the rest of their arm *t* on a corner pillar K of the frame I J.

In the turning of the month-wheel, as before explained, each lug $h\ h^2\ h^3\ h^4$ of the wheel in regular order and successively works on and lifts the dog U, and sufficiently to place the lug *n* of its companion dog V in position as the day-of-month and month wheels continue their movement for the inclined rib-cam *m* of division thirty-one of the day-of-month wheel to strike the lug *n* of dog V and thereby to lift it, and through it the click R, to a height to allow the outward-projected ratchet-tooth thirty-one of the day-of-month wheel to pass under it, on which, as appears from the description before given, the month-wheel is released and day-of-week and day-of-month wheels all turn as one until by the final escape of the cam-rib *m* lug *n* of dog V, the dog, and also the clicks R and S, are released to drop, the dog V to its normal position of rest, the click R to its rest on day-of-week and day-of-month wheels, and click S on month-wheel with a notch of which it finally comes into engagement, and also the click R with the ratchet-tooth one of the day-of-month wheel, thus arresting the further movement of both said wheels, the movement of day-of-week wheel also being at the same time stopped.

By the operation of parts just above explained the day-of-month and month wheels under the forward turning of the day-of-week wheel are moved so as to indicate by their respective hands at the dial the next day of the week in regular order from the day of the week last indicated, the next month in regular order from the month last indicated, and the first day of said month, the month previously indicated having had thirty days. In other words, while the day-of-week wheel is moving to indicate by its hand at the dial the day of the days of week next in order to the day just previously indicated by it thereat the month-wheel is moved to indicate by its hand at the dial the month next in regular order to the month previously indicated by it thereat, and which month had thirty days, and the day-of-month wheel is moved to indicate by its hand at the dial the first day of the month then indicated by the hand of the month-wheel at the dial. This change of day-of-month hand at the dial from 30 to 1, the other changes at the dial of same hand and of the month-hand being secured, as before explained, is secured by a continuous movement of the wheel carrying the said day-of-month hand, and which is allowed and produced by the conjoined operation of a lug $h\ h^2\ h^3\ h^4$ of the month-wheel and of the longest inclined cam-rib *m* of day-of-month wheel on dogs U V, and through dog V on click R of day-of-month and day-of-week wheels, during the meantime the day-of-week wheel having moved through a length of its perimeter equal to one-seventh of the full length thereof and the month-wheel having moved through a length of its perimeter equal to one-twelfth of the full length thereof. Again, in each turn of the month-wheel, as explained, the sector-lug *k* works on and lifts the dog U, and thereby lifts the companion dog V, in every respect similarly to the operation of the lugs $h\ h^2\ h^3\ h^4$, and otherwise the wheels are moved and changes of their respective dial-hands are made as has been just above described, but differing in these respects that in each year for the month of February having twenty-eight days the arc side k^4 of the sector-lug is the operating or working part and in each year for the month of February having twenty-nine days the obtuse angle k^6 of the sector-lug is its operating or working part, from all of which, first, for a February of twenty-eight days the lug *n* of the dog V is placed in position to be acted on by the rib projection m^3 of the day-of-month wheel, under the operation of which the dog V is lifted to the same height as it was and has been explained by the action of the rib projection *m*, and maintained at that height whilethe middle and end ribs $m^2\ m$ in regular order act on it, and from the latter *m* of which it finally escapes as before; and, second, for a February of twenty-nine days the lug *n* of the dog V is placed in position to be acted on by the middle rib projection m^2 of day-of-month wheel, under the operation of which the dog V is lifted to the same height as before and maintained at that height while the end rib *m* passes under and acts on it, and from the latter of which it finally escapes as before.

By the operation of parts as just explained for each February of twenty-eight days the day-of-month wheel, having its click R released from its ratchet-tooth, twenty-eight, corresponding to the twenty-eighth day of the month, is moved continuously, and finally arrested by the engagement of its click with its ratchet-tooth, one, corresponding to the first day of the month, March, next following, and for each February of twenty-nine days the day-of-month wheel, after having its click R released from its ratchet, twenty-nine, corresponding to the twenty-ninth day of the month, is moved continuously, and finally arrested by the then engagement of its click with its ratchet-tooth, one, corresponding to the first day of the month, March, next following, and in both cases the day-of-month hand is placed at the division of day-of-month spaces B marked "1," in representation of the first day of the month, and the other hands are also placed, as before, at the divisions of the month-spaces C marked "March," and at the division of the day-of-week spaces D representing the day of the week next in order to that previously indicated by the day-of-week hand G before the month-hand F was changed from division "February" to "March" and the day-of-week hand G was changed from either "28" or "29," as the case may be, as has been described. The sector-lug *k*, for its respective operation on

the dog U in accordance with the days which February has, as above described, is placed in its proper working position by the action of the stationary lug *l* of frame I J on the armed dog k^2, making part of said sector-lug *k*, as before explained.

From the above description it is plain that the day-of-week wheel O is, as it were, the driving or actuating wheel of the mechanism. In the practical application of the mechanism this wheel is to be turned step by step, seven steps completing one full turn, and at the expiration of each day—that is, at twelve o'clock p. m.—and it is operated at that time in any proper manner from the movement of a clock or other suitable mechanism through suitable contrivances connecting said wheel O and the clock or other mechanism. These connecting contrivances between the wheel O and a clock-movement constitute no part of this invention, and obviously they may be of any suitable character, construction, and arrangement, and, as shown in the drawings, A^2 is a vertical lever, which is fulcrumed at B^2 on a stationary support, and at its upper end is to be suitably connected with the clock-movement to be positively moved forward and backward once in every twenty-four hours or day and at twelve p. m., and for the balance of the day to remain stationary.

C^2 is a spring-pawl, which at one end is fulcrumed on the lower end of the lever A^2 and at its opposite end has a pin D^2 to engage a tooth at the under side of the day-of-week wheel, and so on each throw of the lever, thereby to secure a turn of the wheel one step of its step-by-step-movement and the movement of the hand of said wheel from one day to another of the seven spaces of the day-of-week spaces D of the dial. This movement of the day-of-week wheel otherwise operates, as fully described, to secure, as the days, weeks, and months go on, and through the appropriate hands, the indication thereby of said changes.

It is manifest that the mechanism of this invention is automatic in every respect, and, properly operated, it is perpetual.

In lieu of the dial-hands dial disks or rings suitably spaced and marked may be used, and preferably they should be severally inclosed in a casing having openings located so as to expose at one time only one of each of the separate marked spaces of each disk or ring. A substitution of dial disks or rings for dial-hands, such as above stated, is common and well known, and needs no particular illustration or description.

D^2 is a spring-pawl fixed at one end to a pillar K of frame I J to engage at its free end an angular tooth *a* of day-of-week wheel O for holding it against turning in the wrong or a backward direction.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A day-of-week wheel O, having an axle and seven separate equidistant angular teeth, a day-of-month wheel N, having an axle and thirty-one separate equidistant ratchet-teeth, one outwardly extended, and a month-wheel P, having an axle and twelve separate equidistant notches, and the several wheels concentric and suitably supported and having frictional contact, so as to turn with and separate from each other, in combination with a click R for day-of-week and day-of-month wheels and a click S for month-wheel, the former disengaged from day-of-month wheel by action thereon of day-of-week wheel and the latter disengaged from month-wheel by the action thereon of outwardly-extended tooth of day-of-month wheel, substantially as described, for the purpose specified.

2. A day-of-week wheel O, having an axle and seven separate equidistant angular teeth, a day-of-month wheel N, having an axle and thirty-one separate equidistant ratchet-teeth, one outwardly extended, and a month-wheel P, having an axle and twelve separate equidistant notches, and the several wheels and axles concentric and suitably supported and having frictional contact, so as to turn with and separate from each other, a click R, resting on day-of-week and day-of-month wheels and engaging the latter and disengaged therefrom by action on it of the teeth of day-of-week wheel, a click S, resting on and engaging month-wheel and disengaged therefrom by action of click R on it as said click R is acted on by the outwardly-extended tooth of day-of-month wheel, four fixed lugs *h* h^2 h^3 h^4 of and at equal distances from the center of month-wheel, a sector rotatory lug *k* of month-wheel having its arc and chord sides both at distances from center of month-wheel greater than that of said lugs *h* h^2 h^3 h^4, and the chord at a lesser distance than the arc and having four equidistant radial arms k^2, a stationary lug *l* to work on arms k^2 of and thus to rotate the sector-lug *k* quarter round once in every complete turn of said month-wheel, pawl-levers U and V, moving as one and fulcrumed on a fixed support, and the pawl U arranged to work on said lugs *h*, h^2, h^3, h^4, and *k* of month-wheel, and cams *m* m^2 m^3 on day-of-month-wheel to work on pawl-lever V, suitably arranged therefor, and also to work on click R of day-of-week wheel, substantially as described, for the purpose specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

E. B. MILLER.

Witnesses:
ALBERT W. BROWN,
GEO. C. BENT.