No. 799,679. PATENTED SEPT. 19, 1905.

W. S. SHIRK.

CALENDAR CLOCK.

APPLICATION FILED JUNE 3, 1903.

3 SHEETS—SHEET 1.

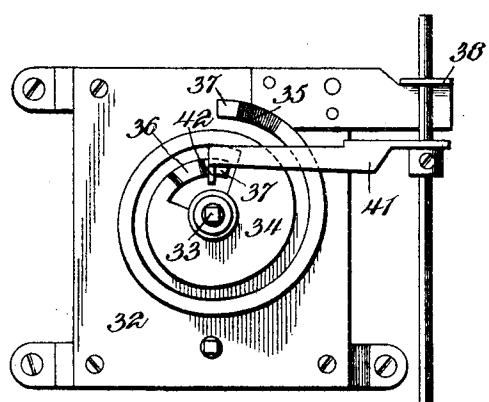


Fig. 1.

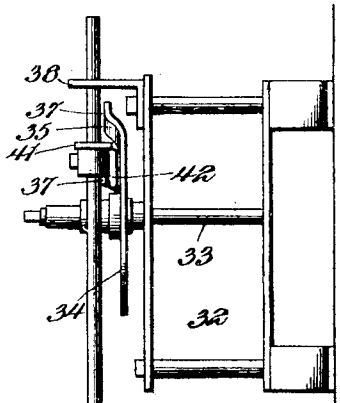
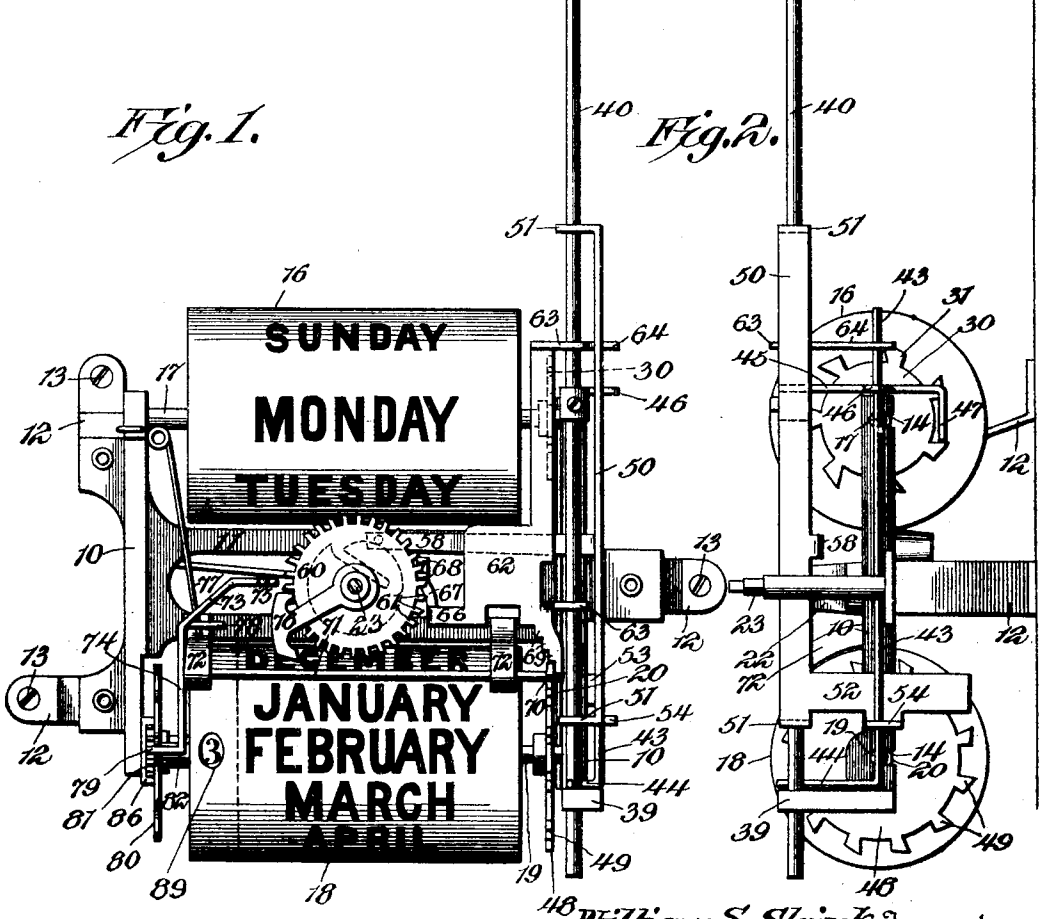


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

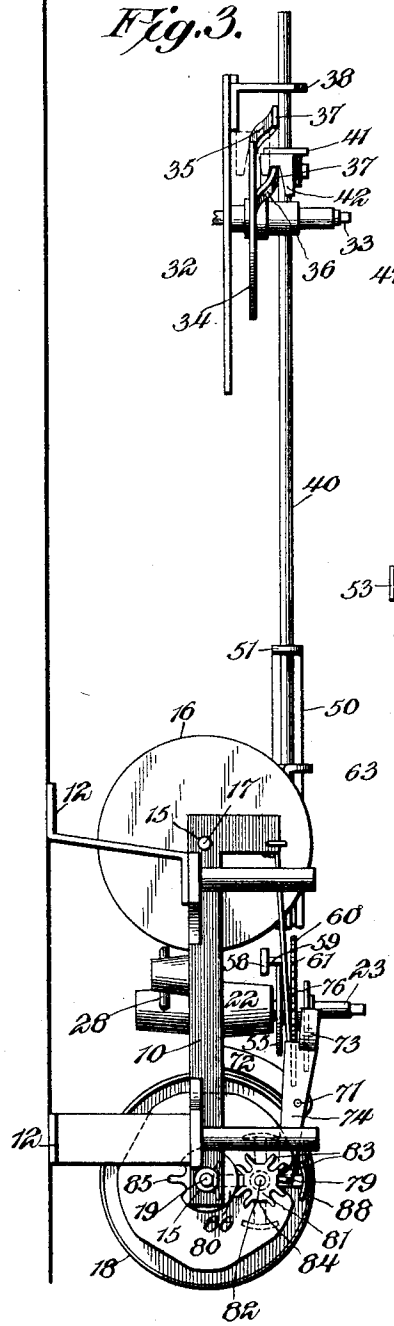


Fig. 4.

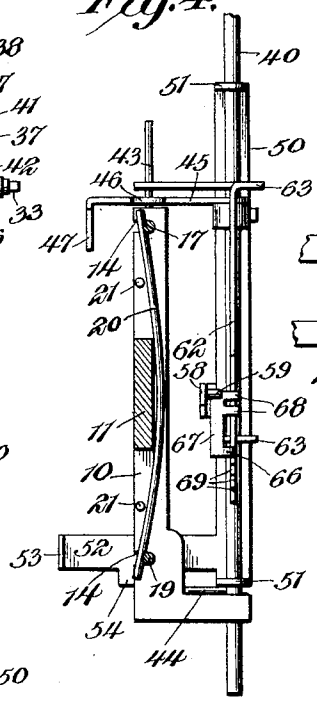


Fig. 5.

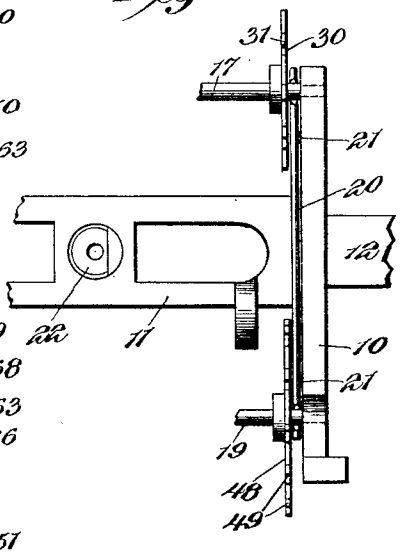


Fig. 6.

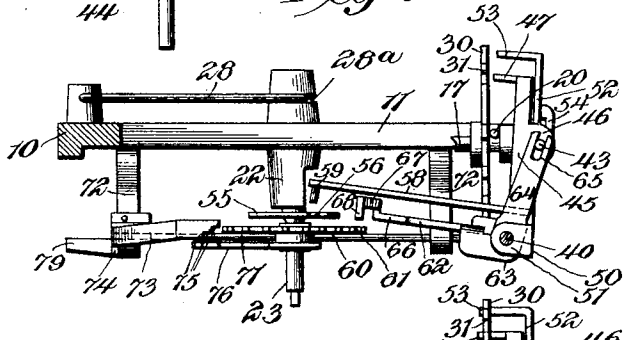
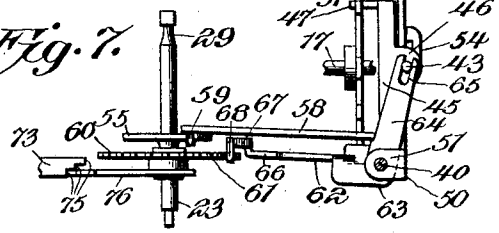


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 8.

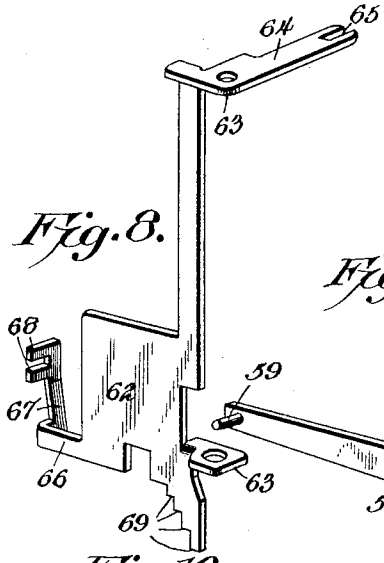


Fig. 9.

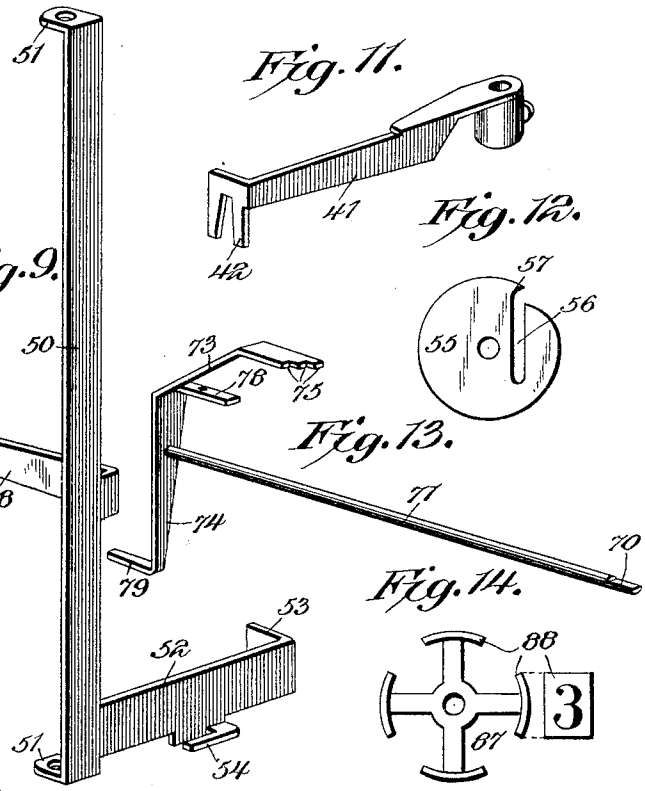


Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Fig. 10.

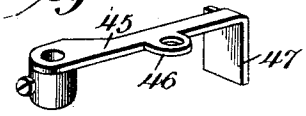


Fig. 16.

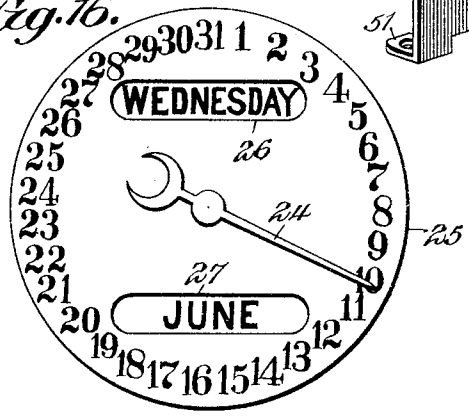
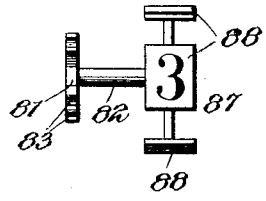


Fig. 15



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UNITED STATES PATENT OFFICE.

WILLIAM SNIDER SHIRK, OF ANDERSON, INDIANA.

CALENDAR-CLOCK.

No. 799,679. Specification of Letters Patent. Patented Sept. 19, 1905.

Application filed June 3, 1903. Serial No. 159,931.

To all whom it may concern:

Be it known that I, WILLIAM SNIDER SHIRK, a citizen of the United States, residing at Anderson, in the county of Madison and State of Indiana, have invented a new and useful Calendar-Clock, of which the following is a specification.

The present invention relates to improvements in calendar-clocks of that character in which a dial separate from the time-dial is employed, the day of the month being indicated by a pointer in connection with a circular series of thirty-one numbers on the dial. The names of the days of the week and of the months are printed on cylinders located in rear of the dial, said names appearing in their proper order through openings in the dial and the calendar being connected with and actuated by the time-movement of the clock.

Clocks of this description have been manufactured for many years; but in the present invention the ordinary and usual arrangement of the day and month cylinders has been departed from. In the clocks heretofore made the day-cylinder is located at the left of the center of the dial, while that of the month is disposed on the right.

In the present invention one of the objects is to provide mechanism which will permit the day and month cylinders being located, respectively, above and below the center of the dial. This arrangement permits of much larger cylinders, larger lettering, and larger openings in the dial, so that the names of the days and months can be seen and read much farther away than in the old style, wherein the length of the cylinders is limited to obtain sufficient space for the mechanism that lies between them.

The principal feature of the present invention resides in the means employed to transmit motion from the time-movement of the clock to the various indicators, whereby said indicators are advanced step by step, accurately indicating each day and date and making allowance for the months of different lengths and also for leap-years.

The advantageous features of the invention will be realized when the nature of said invention is fully understood.

The embodiment of the invention that is at present considered preferable is illustrated in the accompanying drawings and described in the following specification. An inspection of the claims hereto appended will clearly indicate, however, that the invention is not limited to the details of construction herein set forth, but that many modifications and changes may be made in the various elements.

In the drawings, Figure 1 is a front elevation of the calendar and its connections with the time-movement of an ordinary clock, the dial of said calendar being removed. Fig. 2 is a view in elevation of one end of the calendar. Fig. 3 is a similar view of the opposite end. Fig. 4 is a vertical sectional view through the calendar. Fig. 5 is a detail front elevation of one end of the frame, showing the manner of mounting the cylinder-shafts. Fig. 6 is a top plan view of the mechanism, the upper cylinder being removed. Fig. 7 is a view similar to Fig 6, but showing the members in different relations. Fig. 8 is a detail perspective view of the auxiliary actuating device for the day-of-the-month indicator. Fig. 9 is a similar view of the auxiliary actuating device for the month-cylinder. Fig. 10 is a detail perspective view of the arm and dog which actuates the day-of-the-week cylinder. Fig. 11 is a similar view of the arm that transfers motion from the clock-movement to the master actuating device. Fig. 12 is a view of the detent employed. Fig. 13 is a detail perspective view of the stop and the elements carried thereby. Fig. 14 is an end elevation of the indicator for the trip. Fig. 15 is a side elevation of said trip and indicator. Fig. 16 is a view of the dial and pointer coacting therewith, also showing the arrangement of the days of the weeks and months.

Similar reference-numerals indicate corresponding parts in all the figures of the drawings.

In the embodiment illustrated a suitable frame is employed, comprising in the present instance upright bars 10, connected by a web 11. This frame is provided with suitable outstanding ears 12, having openings to receive fastening devices 13, by means of which the structure may be mounted within the casing of a clock. One of the upright bars 10 is provided contiguous to its upper and lower ends with open-sided seats 14, (illustrated more particularly in Fig. 4,) the other bar having openings 15 therein. A day-of-the week cylinder 16 is located between the upper end of the spaced bars 10 and is provided with a shaft 17, one end of this shaft being journaled in the upper opening 15, the other end detachably fitting in the seat 14. A month-cylinder 18 is located between the lower ends of the

spaced bars and has a shaft 19, one end of which is fitted in the lower opening 15, the other end being detachably journaled in the lower seat 14. The shafts are held in said seats by a retaining device in the form of a wire 20, that is passed across one face of the web 11 and has its ends extending across the open sides of the seats bearing against the shafts 17 and 19, so as to hold said ends in place and also acting as friction-brakes. Suitable inner pins 21 are preferably located on the bar 10 at the rear side of the retaining-wire to prevent any abnormal accidental movement of said wire. The upper cylinder is provided with the names of the days of the week, while the lower cylinder has imprinted thereon the names of the days of the month.

The web 11 is provided at its central portion with an enlarged boxing 22, projecting on opposite sides of the same, and in this boxing is journaled a shaft 23, carrying on its outer end a pointer 24, that is movable over the outer face of a dial 25, secured over the mechanism, as will be readily understood. This dial is illustrated in Fig. 16. The pointer 24 coacts with the circular series of figures representing different days of the month, said series being suitably imprinted on said dial. The dial is, furthermore, provided above and below the shaft 23 with sight-openings 26 and 27, through the upper of which may be seen the proper day of the week, while in the lower appears the month. The shaft 23 is held against longitudinal displacement by means of a spring-wire 28, attached at one end to the frame, as shown in Fig. 6, the other end passing through a slot 28^a in the rear of the boxing 22 and engaging in an angular groove or recess 29, formed in the rear end of the shaft 22 and illustrated in Fig. 7. This wire besides constituting a retaining device also serves as a brake to prevent the too free movement of the shaft.

The mechanism for operating the day-of-the-week cylinder.—Suitably attached to the shaft 17 of the day-of-the-week cylinder is a wheel 30, having seven teeth 31, corresponding to the number of days in the week, this toothed wheel being located at one end of the shaft and preferably in spaced relation to the cylinder. A suitable clock-movement of any well-known or desired construction is located above the calendar and is shown in outline at 32, this clock-movement having the usual hour-hand shaft 33. Upon said shaft is secured a convolute cam 34, said cam thus making one revolution every twelve hours. As there are two convolutions of the cam, (which is preferably in the form of a spiral,) it will thus take two revolutions, consuming twenty-four hours of time, for the full length of the spiral to pass a given radial line. The terminal portions of the convolutions are free and are outturned or offset, as shown at 35 and 36, the ends 37 thus being disposed outside the vertical plane of the main portion of the cam and being arranged in alinement. The frame of the clock-movement carries at one corner an outstanding ear 38, and the lower corresponding corner of the calendar-frame is also provided with an ear 39, said ears being arranged in alinement. In these ears is mounted a master actuating device in the form of a rod 40, that has a vertical longitudinal movement and is also capable of an oscillatory movement. Rigidly fastened to the upper portion of this actuating-rod is an offset arm 41, carrying at its free end a depending stirrup 42, that travels upon one edge of the cam 34, said edge constituting a track for this purpose. The lower end of the rod is provided with a key in the form of a wire 43, secured at one end to the rod, having a horizontal portion 44 extending therefrom and an upturned portion spaced from the rod 40 and disposed parallel thereto. The horizontal portion 44 is arranged to rest upon the lower ear 39, and thus constitutes a stop for limiting the downward movement of the rod 40. Rigidly attached to an intermediate portion of the master actuating-rod 40, contiguous to the end of the upper cylinder, is another offset arm 45, having an eye 46, through which the upper end of the key-wire 43 passes. The free end of the arm 45 has a depending outstanding dog 47. This dog coacts with the teeth 31 of the wheel 30, which wheel has already been described as being carried by the day-of-the-week-cylinder shaft.

The arrangement of the upper arm 41 and intermediate arm 45 is such that when the stirrup 42 is traveling on the main portion of the cam the dog 47 is out of engagement with the teeth of the wheel and the rod can move vertically without interference. When the rod has been raised to its upward limit, the turning of the cam brings the angled or offset portion of the spiral against the inside of the front prong of the stirrup, and consequently the arm 41 is swung outwardly, thus oscillating the rod and swinging the intermediate arm 45 inwardly, so that the dog 47 will be disposed above one of the teeth 31. The end of the cam soon after passes from beneath the bottom of the stirrup 42, and the stirrup, arm, and rod drop of their own weight to their lowest limit, said stirrup taking a position astride of the outturned inner terminal of the spiral in front of its angular portion, as illustrated in Figs. 1, 2, and 3. When the rod 40 drops, it will also be apparent that the intermediate arm 45 will move with it and the dog engaging the tooth beneath will turn the wheel and the day-cylinder sufficiently to bring the name of the succeeding day into position behind the sight-opening of the dial. In its lowermost position the dog is located between two of the wheel-teeth, as illustrated in Fig. 2, preventing the momentum of the cylinder from carrying it further than it should go. After this

operation the continued motion of the cam soon causes the stirrup to ride inwardly upon the main portion of the track, thereby disengaging the dog 47 from between the teeth, and the upward journey of the rod is again commenced. This movement takes place once every twenty-four hours, and the hands of the clock are so set that the rod drops at each midnight.

The mechanism for operating the month-cylinder.—The rod 40, above described, has been termed the "master actuating device," for the reason that all of the movements depend upon the same. This is the case with the month-actuating device, which will now be described. The shaft 19, carrying the month-cylinder, is provided at the end contiguous to the rod 40 with a wheel 48, having twelve peripheral teeth 49, corresponding to the number of months in a year. An auxiliary actuating device is slidably mounted upon the rod 40, this device being in the form of a longitudinally-disposed bar 50, having ears 51 at its ends through which the rod passes. The bar has at its lower end an offset arm 52, provided at its free end with an inturned dog 53, coacting with the teeth 49 of the wheel 48. As already stated, this device has a sliding movement with relation to the rod 40; but it is secured so that it must necessarily oscillate with the rod. To this end the arm 52 has a hook portion 54, which embraces the key-wire 43, as shown in Fig. 2, said hook portion being slidable upon the key. The lower ear 51 of the upright bar 50 rests upon the horizontal portion 44 of the key-wire, and thus when the rod is elevated by the movement of the cam the auxiliary actuating device will be raised with it. Furthermore, during this elevation the dog 53 is out of engagement with the teeth 49; but when the rod is oscillated said dog is moved into coactive relation with the teeth, this movement being similar to the movement of the dog 47. It will therefore be apparent that when the auxiliary actuating device is in its highest position the dog will be located above one of the teeth 49, and when the master actuating-rod 40 drops, the auxiliary actuating device will likewise drop, thereby revolving the month-cylinder sufficiently to bring the name of the succeeding month into position behind the sight-opening of the dial. As said month-cylinder is required to move but once a month, means are employed to prevent the auxiliary actuating device from dropping to turn the cylinder except at midnight on the last day of the month. This mechanism is as follows: Centered on the shaft 23 of the pointer is a circular detent-disk 55, which revolves with said shaft, this disk having a tangentially-disposed slot 56 extending into the same from one edge nearly to the opposite edge. At the upper end of the slot is an overhanging beak 57. An offset arm 58 extends from an intermediate portion of the upright bar 50 in rear of the disk and terminates near the center thereof. The free end of this bar carries a pin 59, said pin being parallel to the shaft 23. The pin is so arranged that when the auxiliary actuating device is elevated and the dog 53 lifted above the toothed wheel said pin 59 will be disposed above the edge of the detent-disk. Therefore when the rod 40 drops the auxiliary device will also drop until the pin 59 rests upon the detent-disk, this detent-disk supporting the auxiliary device and preventing the actuation of the month-cylinder. When the continued movement of the cam 34 again oscillates the rod, the auxiliary device, as already described, will be oscillated with it, so that the dog 53 will be moved out of coacting relation with the toothed wheel and simultaneously the pin 59 will be withdrawn from the edge of the detent. As soon as this disengagement takes place the auxiliary actuating device drops without touching the toothed wheel. This will all be apparent by reference to Fig. 6. The position of the detent-disk on the shaft is such that on the last day of each month the opening or slot lies in the path of the pin, and therefore when the rod drops the pin will pass into the slot and the auxiliary device will immediately descend. The result is that the dog 53 will engage the adjacent tooth 49 and revolve the cylinder. The momentum of said cylinder, however, does not carry the same beyond its proper position, as the dog 53 will be located between two of the teeth. The beak located at the outer end of the slot is provided for the purpose of preventing the pin entering said slot the second time before it is moved far enough out of the path of the pin at midnight of the first day of the month.

The mechanism for operating the day-of-the-month indicator.—The shaft 23 has already been described as carrying the pointer for indicating the days of the month upon the dial. This shaft is provided with a wheel 60 having thirty-one peripheral teeth 61. Another auxiliary actuating device moves this wheel, and consequently the pointer. The present actuating device is in the form of a plate 62, having ears 63, which are slidably mounted upon the master actuating-rod 40. This plate also has at its upper end an offset arm 64, the free end of which is bifurcated, as shown at 65, and embraces the key-wire 43. The result of this arrangement is that while the auxiliary actuating-plate 62 is freely slidable with respect to the main rod it must oscillate therewith. The plate has an arm 66, preferably, though not necessarily, provided with an upstanding finger 67, which has offset spaced teeth 68, that coact with the teeth 61 of the wheel. The upper ear 63 normally rests upon the arm 45 where it is secured to the rod. It is believed that the operation of this auxiliary actuating device will be clearly understood. When the rod is raised, the plate

62 will of necessity be raised with it, and during this elevation the teeth 68 will be out of engagement with the teeth 61 of the wheel. At the upper end of its movement the rod is oscillated, as already described, and consequently the teeth 68 will be moved into coacting engagement with certain of the teeth 61. When the rod drops, the plate will likewise descend, consequently turning the wheel 60 and the pointer 24. This movement by revolving the shaft will also operate the detent-disk 55, so that the slot thereof will coact with the pin 59 at the proper time.

Provision is made whereby the thirty-one toothed day-of-the-month wheel 60 is caused to move forward the space of two teeth at the end of a thirty-day month, three teeth at the end of a twenty-nine-day month, and four teeth at the end of a twenty-eight-day month, so that the pointer shall properly indicate the first day of every month following a month of less than thirty-one days. This provision is as follows: The lower end of the plate 62 is formed into a series of four inverted steps 69, and the bottom step normally rests on the flattened end 70 of a stop-rod 71, said flattened end being located in the path of movement of the plate and limiting said movement. This rod is longitudinally slidable in bearings 72, forming a part of the frame, and it also has a rocking movement in said bearings. The height of the steps 69 corresponds to the distance between the points of the wheel-teeth. It will therefore be apparent that if the stop-rod is moved lengthwise to the left the distance of the width of one space when the calendar is operated the plate 62 will drop until the second step rests on the flattened end 70, and consequently the wheel 60 will be turned the space of two teeth. If the rod is moved to the left a distance of the width of two or three steps, the wheel will in like manner be turned a space of three or four teeth. A strip is secured to and supported by the end of the rod 71 opposite the flattened portion 70, this strip thus forming oppositely-extending fingers 73 and 74. The upper finger 73 is bent so that its free end will be substantially parallel to the rod 71, and said end is formed into three steps 75, the width of these steps corresponding to the width of the steps at the lower end of the plate 62. The steps 75 are constructed to coact with a cam 76, secured to the shaft 23 in advance of the wheel 60; but they are normally held out of the path of movement of said cam by means of a spring 77, secured at its upper end to one of the spaced bars 10 of the frame, the lower end engaging in an eye 78, forming a part of the finger 73. The spring not only serves to turn the finger 73, or, in other words, rock the rod, but it also constitutes means for holding and urging the rod longitudinally toward the steps 69 of the actuating device.

The depending finger 74 has an offset-terminal 79 located parallel to the stop-rod and pressed by the spring 77 against the edge of a cam-wheel 80, secured to the shaft 19, that supports the month-cylinder, said cam-wheel being located on the end of the shaft opposite the toothed wheel 48 and being shown in Figs. 1 and 3. This cam-wheel is so formed that when the thirty-one-day months make their advent the lower end of the finger is thrown outwardly, which throws the upper finger backwardly far enough to place the steps 75 thereof out of the path of movement of the cam-arm, which at the end of the month passes close to said steps. (See in this connection Fig. 6.)

During a thirty-day month the lower finger 74 rests in a depression provided in the cam 80, causing the first step 75 of the upper finger 73 to lie in the path of movement of the cam 76, as illustrated in Fig 7, and when the calendar is operated at midnight on the thirtieth or last day of the month the cam 76 engages the step 75 and pushes the finger 73 and the stop-rod 71 to the left the distance of the width of one of the steps 69 on the lower end of the plate 62, moving said rod 71 out of the path of the last step 69. The dropping of the plate 62 is thus stopped by the second step 69 striking the stop-rod 71, and the wheel 60 is consequently moved forward the space of two teeth 61. When such movement has taken place, the pointer 24 will of course indicate the first day of the next month. The cam 76 has by this time moved clear of the step end of the finger 73, and when the plate 62 has been again elevated by the action of the cam 34 so that its steps 69 clear the stop-rod 71 the latter, under the pressure of the spring 77, will resume its normal position in the path of the lower step 69.

When February of twenty-eight days comes in, the lower offset terminal 79 of the finger 74 enters a deep depression in the cam-wheel 80, throwing the last step 75 in the path of the cam, as indicated in Fig. 3. Said cam is so formed that it engages this step at midnight on the twenty-eighth day of the month and throws it the distance of the width of three of the steps, moving the stop-rod a corresponding distance. The actuating device therefore drops to its lowest position, advancing the wheel, and consequently the pointer, the space of four teeth.

To provide for a leap-year February of twenty-nine days, a combined gear member and trip 81 is employed attached to a shaft 82, journaled in the cam-wheel 80 and extending into the adjacent end of the month-cylinder 18. The shaft 82 is located in line with the feed depression of the cam, and the trip is provided with four sets of teeth 83. Three of the spaces between these sets of teeth are cut out sufficiently so as not to interfere with the offset end 79 of the finger; but the fourth space is partially closed, as shown at 84, so that when this portion is moved across the de-

pression it will partially cover the same. The trip revolves with the cam and also upon its own axis. This latter movement is accomplished once every year by means of a tooth 85, forming a part of a disk 86, that is secured to the adjacent bar 10, said tooth 85 coacting with the steps of the teeth 83. With this combination of parts it will be seen that upon every revolution of the cam-wheel the trip will be turned one-fourth of a revolution, and said trip will therefore make one full revolution once in every four years. Upon this fourth turn the portion 84 will bridge the February depression in the cam, and therefore the terminal 79 of the finger 74 cannot go to the inner end of the depression. Consequently the upper finger is so held that the second or middle step 75 is located in the path of movement of the cam, and at midnight on the twenty-ninth of February, when the calendar is operated, this cam engages the finger, throwing it and the rod to the left the distance of the width of two of the steps 69, permitting the plate to drop so as to advance the wheel the space of three teeth. The pointer will therefore indicate on the dial the first of the succeeding months.

The end of the month-cylinder adjacent to the mechanism just described is recessed, as shown in Fig. 3 and indicated in Fig. 1, and the shaft 82 of the trip extends into said recess, being journaled in the inner end of the cylinder. This shaft carries a segmental wheel 87, having face-plates 88, each carrying a number, said numbers running from one to four, inclusive. The wheel is located within the recess of the month-cylinder and the face-plates are arranged to appear successively in rear of a sight-opening 89, located in the end of the cylinder and connecting with the recess, said sight-opening being located in line with the word "February," as illustrated in Fig. 1. The numbering is so arranged that when the number "1" appears it indicates the first year after leap-year, "2" the second, and "3" the third, while "4" indicates the leap-year. This arrangement is convenient in setting the calendar when it is not known how the different indicators are disposed with reference to leap-year.

Before closing the description it is desired to point out the following important advantages which this structure has: In the first place the day-of-the-week and the month cylinders are located with relation to the remaining elements so that they can be made much larger. The parts or elements are very simple in construction and comparatively few in number. This will be evident by referring to the different detail views showing the elements separated. In this structure there are no pawls, clicks, or similar devices that easily become displaced and damaged. The cam employed on the hour-hand shaft is easily mounted and takes the place of a twenty-four-hour cam and an extra gear of two wheels to run it, thus doing away with a number of parts and the friction incident thereto. One of the most important features, however, resides in the combination and disposition of parts which entirely disassociates the actuating mechanism from the indicators during the upward movement of the master-rod. By this disassociation the cylinders and pointer are entirely free, so that they can be independently moved by hand in either direction, and thus easily set by an unskilled person. At the same time they will not move accidentally, for, as already described, during the actuation they are positively stopped in their proper positions, and when the mechanism is disconnected the retaining devices serve as brakes. In all other calendars with which I am acquainted this adjustment of parts is obtained by special arrangements requiring considerable manipulation. The indicator employed in connection with the month of February is also an important feature. By simply turning the month-cylinder forward or backward to February the figure exposed will indicate where to set the cylinder so that the leap-year February will properly appear in due season. Heretofore this manipulation has been a task that the average clock buyer was not equal to.

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

1. In a clock-calendar, the combination with movable indicating means, of reciprocatory mechanism movable from a set position for periodically actuating the indicating means and returnable to said set position after such actuation, a time-movement, and a rotating device revolved by the time-movement and automatically disconnecting said mechanism from the indicating means after the actuation of said indicating means and prior to the return movement of said actuating means toward its set position to permit the said indicating means being freely moved in either direction.

2. In a clock-calendar, the combination with an indicator having a wheel provided with teeth, of an actuating device carrying a dog that engages between the teeth to move the wheel a predetermined distance and prevent an abnormal movement thereof, said actuating device also having a movement to carry the dog transversely of the sides of the wheel and teeth and from between said teeth after such movement, and automatic means including the time-movement of a clock for positively effecting the said reciprocatory and oscillatory movements of the actuating device, said means maintaining the dog disengaged from the teeth during its movement in one direction.

3. In a clock-calendar, the combination with an indicator, of a toothed wheel connected to

the indicator and located in a substantially vertical plane, an actuating device movable in the plane of the wheel and in engagement with the teeth of the wheel to lock the same against abnormal movement, said device also having a movement transversely of the plane of the wheel to disengage the teeth thereof. a time-movement, and means operated by the time-movement for automatically effecting the said transverse movement of the device.

4. In a clock-calendar, the combination with an indicator, of a toothed wheel connected to the indicator and located in a substantially vertical plane, an actuating device movable from a set position downwardly in the plane of the wheel and in engagement with the teeth thereof, said device also having a movement transversely of the plane of the wheel to disengage the teeth thereof, and an upward movement outside the plane of said wheel and to its set position, a time-movement, and means operated by the time-movement for automatically effecting the said movement of the device.

5. In a clock-calendar, the combination with indicating means, of a reciprocatory actuating device having an oscillatory movement at the ends of its reciprocatory movement and coacting with the indicating means to move the same at intervals and disassociating from the indicating means between such intervals, a time-movement and means operated by the time-movement for automatically effecting the said reciprocatory and oscillatory movements of the actuating device.

6. In a clock-calendar, the combination with revoluble indicating means, of a reciprocatory and oscillatory actuating device having an element movable into and out of engagement with the indicating means to move the same, a time-movement, and a device operated by the time-movement for effecting both the reciprocation and oscillation of the actuating device.

7. In a clock-calendar, the combination with a revoluble indicator having a wheel provided with fixed teeth, of a reciprocatory and oscillatory actuating device carrying a rigidly-mounted dog movable into and out of engagement with the teeth of the wheel upon the oscillation of said device, a time-movement, and automatic means operated by the time-movement for reciprocating the device and also oscillating the same to positively carry the dog into and out of such engagement.

8. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a reciprocatory and oscillatory actuating device carrying a dog that is movable into and out of engagement with the wheel to move the same step by step, a time-movement, and a device carried and operated by the same movement for reciprocating the device and oscillating the same to move it into and out of engagement with the wheel.

9. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a longitudinally-reciprocatory rod having an oscillatory movement on its longitudinal axis, a dog that oscillates with the rod and is movable into and out of coaction with the wheel, and means separate from the toothed wheel for automatically effecting the oscillatory and reciprocatory movements of the rod.

10. In a clock-calendar, the combination with an indicator having a toothed wheel, of an actuating device having a longitudinal reciprocatory movement and an oscillatory movement on its longitudinal axis, a dog carried by the actuating device and coacting with the wheel, and automatic means independent of the teeth of the wheel for oscillating the device.

11. In a clock-calendar, the combination with indicator means, of a vertically-reciprocatory actuating device having an oscillatory movement on its longitudinal axis, said device being movable into and out of coaction with and moving the indicator means, and means connected with the time-movement of a clock and engaging the actuating device for automatically causing the combined movements of said actuating device.

12. In a clock-calendar, the combination with indicator means, including a toothed wheel, of a vertically-reciprocatory actuating device having an oscillatory movement on its longitudinal axis, said device being movable into and out of coaction with the toothed wheel to move said wheel upon its downward movement, and automatic means separate from the teeth of the wheel for oscillating the actuating device, elevating the same, and releasing it to permit said device to gravitate and move the wheel.

13. In a clock-calendar, the combination with an indicator having a toothed wheel, of a vertically-reciprocating actuating device having an oscillatory movement on its longitudinal axis, a dog carried by the device and movable into and out of engagement with the wheel upon the oscillation of said device, and a cam having an engagement with the device to oscillate and reciprocate the same.

14. In a clock-calendar, the combination with the shaft of a clock-movement, of a convolute cam having offset terminals, a calendar-movement including a toothed wheel, a reciprocatory and oscillatory actuating device, a dog attached to the device and movable into and out of engagement with the wheel, and an arm mounted upon the device and having its free terminal traveling on the cam and movable upon the offset terminal thereof to oscillate and reciprocate the actuating device.

15. In a clock-calendar, the combination with the shaft of a clock-movement, of a convolute cam mounted upon the shaft and having offset terminals disposed in substantially the same plane, a calendar-movement including a toothed wheel, a reciprocatory and oscillatory actuating-rod, an offset arm rigidly at-

tached to the rod and having a dog at its free end that is movable into and out of engagement with the teeth of the wheel, and another offset arm rigidly attached to the rod and having at its free end a stirrup that travels upon the convolute cam and is movable from one offset terminal to the other.

16. In a clock-calendar, the combination with a calendar-movement including a toothed wheel, of a clock-movement shaft located above the calendar-movement, a convolute cam carried by the shaft and having offset terminals, an upright actuating-rod having a vertical longitudinal and an oscillatory movement, an offset arm attached to the lower portion of the rod and having a dog that is movable into and out of engagement with the teeth of the wheel, and another offset arm attached to the upper end of the shaft and having its free end engaging the convolutions of the cam, said end traveling upon the offset terminals and automatically dropping from the upper to the lower.

17. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of an actuating device movable into and out of coöperative relation with the teeth of the wheel for moving said wheel, holding means engaging the actuating device when the same is in coöperative relation to said teeth to prevent the movement of the device and the consequent actuation of the indicator, said means and device being relatively movable to permit the disengagement of the latter from the former to allow said actuating device to operate the wheel, and automatic mechanism including a time movement for effecting the movement of the actuating device.

18. In a clock-calendar, the combination with a revoluble indicator, of an actuating device for the indicator movable into and out of engagement with the same, and holding means engaging the actuating device when in coaction with the indicator to prevent the movement of the device and the consequent actuation of the said indicator, said means and device being relatively movable to permit their disengagement and the consequent movement of the device and actuation of the indicator thereby.

19. In a clock-calendar, the combination with a revoluble indicator, of an actuating device for the indicator movable into and out of coaction with the same, automatic mechanism for moving the actuating device in one direction when out of such coacting relation, and automatic holding means for engaging the actuating device to prevent the movement of the same in the other direction after its reengagement with the indicator, said holding means being disassociated from the actuating device at intervals to permit the movement of the device and the consequent actuation of the indicator.

20. In a clock-calendar, the combination with a revoluble indicator, of a reciprocatory actuating device having an oscillating movement on its longitudinal axis, and automatically-operated mechanism for positively oscillating the device, moving it longitudinally in one direction and releasing said device to permit its automatic movement in an opposite direction.

21. In a clock-calendar, the combination with a revoluble indicator, of a longitudinal reciprocatory actuating device having an oscillating movement on its longitudinal axis, automatically-operated mechanism for longitudinally moving and swinging the device in one direction and releasing said device to permit its automatic longitudinal movement in an opposite direction, and means for holding the device against such automatic reciprocation, said means and device being relatively movable to permit the automatic disengagement and the consequent reciprocation of said device.

22. In a clock-calendar, the combination with a revoluble indicator, of a longitudinal reciprocatory and transversely-oscillatory actuating device, automatically-operated mechanism for longitudinally moving and swinging the device in one direction and releasing said device to permit its automatic longitudinal movement in an opposite direction, and means for holding the device against such automatic reciprocation, said actuating device being automatically movable out of engagement with the holding means.

23. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a reciprocatory and oscillatory actuating device movable into and out of engagement with the wheel, automatically-operated mechanism for moving the device and engaging the same with the wheel, and means engaging the device for holding the same against movement after such engagement.

24. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a reciprocatory and oscillatory actuating device movable into and out of engagement with the wheel, automatically-operated mechanism including a time movement for effecting the oscillation and reciprocation of the device and thereby moving the same into coaction with the wheel, and automatically-operated means normally located in the path of movement of the actuating device for preventing the movement of such device and the consequent actuation of the wheel, said means periodically moving out of the path of movement of the actuating device to permit the actuation of the wheel.

25. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a reciprocatory and oscillatory actuating device movable into and out of engagement with the wheel, mechanism for mov-

ing the device and engaging the same with the wheel after such movement, and a revoluble disk located in the path of movement of the actuating device.

26. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a reciprocatory and oscillatory actuating device movable into and out of engagement with the wheel, mechanism for moving the device and engaging the same with the wheel after such movement, and a revoluble disk having a slot, said disk being located in the path of movement of the actuating device.

27. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a reciprocatory and oscillatory actuating device movable into and out of engagement with the wheel, automatically-operated mechanism for moving the device and engaging the same with the wheel, and holding means located in the path of movement of the actuating device to prevent the operation thereof and the consequent actuation of the wheel, said actuating device being movable out of engagement with both the wheel and the holding means and being furthermore disassociated from the holding means at intervals while the same is in coöperative relation with the wheel to permit the operation of said wheel.

28. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a movable detent, a reciprocatory and oscillatory actuating device having offset portions simultaneously movable into operative relation with the wheel and to a position in line with the detent, and means for automatically moving the detent to carry the same at predetermined intervals out of line with the device to permit the free movement of the same.

29. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a movable detent, and a reciprocatory and oscillatory actuating device having offset portions simultaneously movable into operative relation with the wheel and to a position in line with the detent, said detent having a slot that is movable into alinement with the offset portion coacting therewith.

30. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of an oscillatory actuating device having a reciprocatory movement longitudinally of its axis of oscillation and provided with a dog that is movable into and out of engagement with the wheel upon its oscillation, and automatically-operated means separate from the wheel for successively reciprocating the actuating device and oscillating the same at the ends of its reciprocatory movement to move the dog into and out of engagement with the wheel.

31. In a clock-calendar, the combination with a month-indicator cylinder having a toothed wheel, of a revoluble day-indicator having a detent revoluble therewith, and a movable actuating device coacting with the toothed wheel of the cylinder, said detent being located in the path of movement of the actuating device to normally hold the same against movement.

32. In a clock-calendar, the combination with a month-indicator cylinder having a toothed wheel, of a revoluble day-indicator having a detent rotatable therewith, and a movable actuating device coacting with the toothed wheel, said device being movable into and out of engagement with said wheel and the detent.

33. In a clock-calendar, the combination with a rotatable month-indicator cylinder having a toothed wheel at one end, of a revoluble shaft carrying a day-pointer, a detent-disk mounted on the shaft and revoluble therewith, said disk having a slot, a reciprocatory and oscillatory actuating device having an offset dog coacting with the toothed wheel, an offset arm carrying a pin, said dog and pin being respectively movable into and out of engagement with the toothed wheel and disk, and means for moving the actuating device.

34. In a clock-calendar, the combination with a revoluble indicator, of a master actuating device having a reciprocatory movement, and an auxiliary actuating device coacting with the indicator, said auxiliary device having a slidable engagement with the master device.

35. In a clock-calendar, the combination with a revoluble indicator, of a master actuating device having a reciprocatory and an oscillatory movement, and an auxiliary actuating device coacting with the indicator, said auxiliary device having a slidable engagement with the master device and being oscillated thereby.

36. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a master actuating device having a reciprocatory and an oscillatory movement, and an auxiliary actuating device oscillated by the master device and having an independent slidable movement, said auxiliary device being provided with a dog that is movable into and out of engagement with the wheel upon its oscillation.

37. In a clock-calendar, the combination with a revoluble indicator having a toothed wheel, of a master actuating device having a reciprocatory and oscillatory movement, a key carried by the master device, and an auxiliary actuating device slidably mounted upon the master device and engaging the key, said auxiliary device having a dog that coacts with the wheel.

38. In a clock-calendar, the combination with a revoluble indicator having a toothed

wheel, of a reciprocatory and oscillatory master actuating device, a key secured to the master device and having a portion disposed parallel to and spaced therefrom, an auxiliary actuating device slidably mounted on the master device and having an offset portion slidably engaging the key, and a dog carried by the auxiliary device and coacting with the wheel of the indicator.

39. In a clock-calendar, the combination with a revoluble cylinder having a toothed wheel, of an upright longitudinally-movable master actuating-rod, a bar having offset ears slidably mounted on the rod, an offset arm carried by the bar and coacting with the teeth, and a key secured to the rod and slidably engaging the offset arm.

40. In a clock-calendar, the combination with a month-indicator cylinder, of a day-of-the-week cylinder and a revoluble shaft carrying a day-of-the-month pointer, toothed wheels carried by the cylinders, a longitudinally-reciprocating master-rod having an oscillatory movement, a key carried by the rod, an offset arm attached to the rod and coacting with the toothed wheel of the day-of-the-week cylinder, a bar longitudinally slidable upon the rod and having an offset arm coacting with the toothed wheel of the month-cylinder, said bar having a slidable engagement with the key of the rod, a revoluble detent mounted on the day-of-the-month shaft, and another offset arm carried by the bar and having a pin that is movable into and out of engagement with the disk.

41. In a clock-calendar, the combination with a movable indicator, of an actuating device for the indicator, movable means engaging the actuating device for stopping said actuating device at different points to vary the amount of the movement of the indicator, and mechanism for automatically effecting the elevation of said means.

42. In a clock-calendar, the combination with a rotatable indicator, of a vertically-reciprocating actuating device therefor, movable means located in the path of movement of said device to vary the limit of the downward movement thereof, and automatically-operated mechanism for effecting the movement of the actuating device and the said varying means coacting therewith.

43. In a clock-calendar, the combination with a revoluble indicator, of an actuating device for the indicator, and a movable stop located in the path of movement of the actuating device for stopping said device at different points in its movement, a time movement, and means operated by the time movement for effecting the movement of the stop.

44. In a clock-calendar, the combination with a revoluble indicator, of an actuating device for the indicator, a movable stop located in the path of movement of the actuating device for stopping said device at different points in its movement, and mechanism for automatically moving the stop.

45. In a clock-calendar, the combination with a revoluble indicator, of an actuating device for the indicator, and a movable stop coacting with the device for limiting the movement thereof, one of said coacting elements having a series of steps arranged to be respectively engaged by the other to vary the amount of movement of the indicator.

46. In a clock-calendar, the combination with a revoluble indicator, of an actuating device for the indicator having a series of steps, and a stop movable into line with the different steps.

47. In a clock-calendar, the combination with a rotatable shaft having a pointer, of a toothed wheel carried by the pointer, and a longitudinally reciprocating and oscillating actuating device movable into and out of engagement with the wheel.

48. In a clock-calendar, the combination with a rotatable shaft having a pointer, of a toothed wheel carried by the shaft, and a longitudinally reciprocating and oscillating actuating device including a plate having a rigidly-connected offset arm carrying a dog that is movable into and out of engagement with the wheel.

49. In a clock-calendar, the combination with a shaft carrying an indicator, of a wheel mounted on the shaft, an actuating device engaging the wheel for moving the same, a movable stop engaging the actuating device for limiting the movement of the same, and a cam for moving the stop.

50. In a clock-calendar, the combination with a shaft carrying an indicator, of a wheel mounted on the shaft, an actuating device engaging the wheel for moving the same, a movable stop for limiting the movement of the actuating device, and a cam carried by the shaft for moving the stop.

51. In a clock-calendar, the combination with a shaft carrying an indicator, of a wheel mounted on the shaft, an actuating device engaging the wheel for moving the same and having a plurality of steps, a movable stop for limiting the movement of the actuating device and coacting with the steps thereof, and a cam carried by the shaft for moving the stop.

52. In a clock-calendar, the combination with a shaft carrying a pointer, of a toothed wheel mounted on the shaft, a vertically moving and oscillating master-rod, means for moving the rod, and an auxiliary actuating device having a slidable engagement with the rod and being oscillated thereby, said device coacting with the wheel and being movable into and out of engagement therewith.

53. In a clock-calendar, the combination with a movable indicator, of an actuating device therefor, a movable stop engaging the actuating device for limiting the movement of the same, means for moving the stop, said means

being normally disassociated therefrom, and mechanism for moving the stop and operating means into coacting relation.

54. In a clock-calendar, the combination with a movable indicator, of an actuating device therefor, a movable stop having a sliding and a rocking movement, means for sliding the stop, and mechanism for rocking the stop to move the same into and out of coacting relation with the sliding means.

55. In a clock-calendar, the combination with a movable day-of-the-month indicator, of an actuating device therefor, a movable stop coacting directly with the actuating device for limiting the movement of the same, means for moving the stop, said means being normally disassociated therefrom, a month-indicator, and mechanism carried by the month-indicator for moving the stop and operating means into coacting relation.

56. In a clock-calendar, the combination with a movable day-of-the-month indicator, of an actuating device therefor, a movable stop located in the path of movement of the actuating device for limiting the movement of the same, means attached to the day-of-the-month indicator for moving the stop, said means and stop being normally disassociated, a month-indicator, and mechanism carried by the month-indicator for moving the stop and operating means into coacting relation.

57. In a clock-calendar, the combination with a movable indicator, of an actuating device therefor, a movable stop for the actuating device, said stop being provided with a plurality of steps, a cam coacting with the steps for moving the stop, and means for moving the different steps into the path of movement of the cam.

58. In a clock-calendar, the combination with a movable indicator, of an actuating device for the indicator having a plurality of steps, a stop for limiting the movement of the actuating device; said stop coacting with the different steps and also having a plurality of steps, a cam coacting with the steps of the stop, and means for moving the different steps into coacting relation with the cam.

59. In a clock-calendar, the combination with an indicator, of an actuating device for the indicator having a plurality of steps, a stop coacting with the different steps of the actuating device, means for positively moving the stop in one direction, and a spring for moving the stop in the opposite direction.

60. In a clock-calendar, the combination with a rotatable shaft carrying a day-of-the-month pointer, a toothed wheel mounted on the shaft, an actuating device engaging the wheel for moving the same, said device having a series of steps, a rod coacting with the steps and having a longitudinal and a rocking movement, oppositely-extending fingers carried by the rod, one of said fingers being provided with a plurality of steps, a cam carried by the shaft and coacting with the steps of the finger, said steps being normally out of the path of movement of the cam, a spring for holding the finger in one position, a rotatable month-indicator, and a cam-wheel carried by the indicator and coacting with the other finger on the stop to move the different steps of the first-mentioned finger into the path of movement of the cam.

61. In a clock-calendar, the combination with a movable day-of-the-month indicator, of a movable month-indicator, and governing mechanism for controlling the movement of the day-of-the-month indicator, said mechanism including a cam carried by the month-indicator and a finger coacting therewith, a trip movably mounted on the cam and coacting with the finger, and an indicator for designating the position of the trip.

62. In a clock-calendar, the combination with a movable day-of-the-month indicator, of a revoluble month-indicator cylinder, and governing mechanism for controlling the movement of the day-of-the-month indicator, said mechanism including a cam movable with the month-indicator cylinder, a finger coacting with the cam, a revoluble trip movably mounted on the cam and coacting with the finger, and an indicator movably mounted in the cylinder for designating the position of the trip.

63. In a clock-calendar, the combination with a movable day-of-the-month indicator, of a revoluble month-indicator cylinder having a sight-opening, and governing mechanism for controlling the movement of the day-of-the-month indicator, said mechanism including a cam rotatable with the month-indicator cylinder, a finger coacting with the cam, a spindle journaled in the cam, a trip-disk carried by the spindle and coacting with the finger and indicator, and plates mounted on the shaft within the cylinder and being movable across the sight-opening thereof.

64. In a clock-calendar, the combination with a supporting-frame, of upper and lower cylinders journaled in the frame, said cylinders carrying toothed wheels at corresponding ends, a vertically-reciprocating and oscillatory primary actuating device extending across the ends of the cylinders having the wheels, a dog rigidly attached to the device and movable into and out of engagement with one of the wheels, means for effecting the reciprocation and oscillation of the device, and a secondary actuating device slidably mounted on and oscillated with the primary actuating device, said supplemental device having a dog coacting with the other wheel for moving the same at intervals.

65. In a clock-calendar, the combination with a supporting-frame, of a dial covering the same and having upper and lower openings therethrough, upper and lower cylinders journaled on the frame behind the openings

in the dial, said cylinders carrying toothed wheels at corresponding ends, a shaft journaled on the frame between the cylinders and carrying a pointer operating over the dial, a vertically-reciprocating and oscillatory actuating-rod extending across the ends of the cylinders having the wheel, a cam for effecting the reciprocation and oscillation of the rod, a dog rigidly attached to the rod and movable into and out of coaction with one of the wheels, and vertically reciprocating and oscillating means mounted on the rod and coacting with the other wheel and the shaft for effecting the movements thereof.

66. In a clock-calendar, the combination with a frame comprising spaced bars and a bar connecting the same, one of said spaced bars having open-sided seats, of indicator-cylinders having shafts journaled in the spaced bars, one of the ends of each shaft being located in a seat, and a combined brake and retaining-wire extending across the connecting bar and bearing against the shafts adjacent to the seats.

67. In a clock-calendar, the combination with a dial having an opening, of a month-indicator exposed through the opening, a leap-year indicator also exposed through the opening, said indicators being relatively movable and means for automatically operating said indicators.

68. In a clock-calendar, the combination with a month-indicator cylinder, of a leap-year indicator revolubly mounted on the month-indicator cylinder and exposed through the face of the latter.

69. In a clock-calendar, the combination with a month-indicator cylinder having a recess and an opening in its face that communicates with the recess, of a leap-year indicator journaled in the recess and having indicator-numerals that are successively exposed through the opening in the cylinder-face.

70. In a clock-calendar, the combination with a movable month-indicator, of a leap-year indicator movably mounted on the said month-indicator, means for moving the month-indicator, and means for moving the leap-year indicator upon the month-indicator.

71. In a clock-calendar, the combination with a month-indicator cylinder having the names of the months designated thereon, of a leap-year indicator movably mounted on the month-indicator alongside the February designation, means for revolving the month-cylinder, and means for moving the leap-year indicator once during each revolution of the month-indicator cylinder.

72. In a clock-calendar, the combination with a revoluble indicator-cylinder, of another indicator movably mounted on said cylinder eccentric to its axis of revolution, and means for moving the cylinder and indicator.

73. In a clock-calendar, the combination with a time-movement, of an indicator, an actuating device for operating the indicator, and means operated by the time-movement and coacting with the actuating device for automatically and successively effecting the following operations of said device, namely, releasing the same from a set position to operate the indicator, disengaging the device from the indicator, elevating the device when disengaged, and returning the device to a set position in operative relation to the indicator.

74. In a clock-calendar, the combination with a time-movement, of an indicator, an actuating device for operating the indicator, and means operated by the time-movement and coacting with the actuating device for automatically and successively effecting the following operations of said device, namely, the releasing of the same from a set position to operate the indicator, disengaging the device from the indicator, returning the device after such disengagement to said set position in operative relation to the indicator and maintaining the device disengaged from the indicator during such return movement.

75. In a clock-calendar, the combination with indicating means, of an actuating device coacting therewith and having a reciprocatory movement and an oscillatory movement, a motor, and a cam actuated by the motor and connected to the device, said cam positively effecting both the reciprocatory and oscillatory movements of the actuating device.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM SNIDER SHIRK.

Witnesses:

CLINTON C. HADLEY,

E. LE CLERC SMITH.