No. 653,712.

Patented July 17, 1900.

S. P. THRASHER.

CLOCK.

(Application filed Mar. 6, 1897.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1

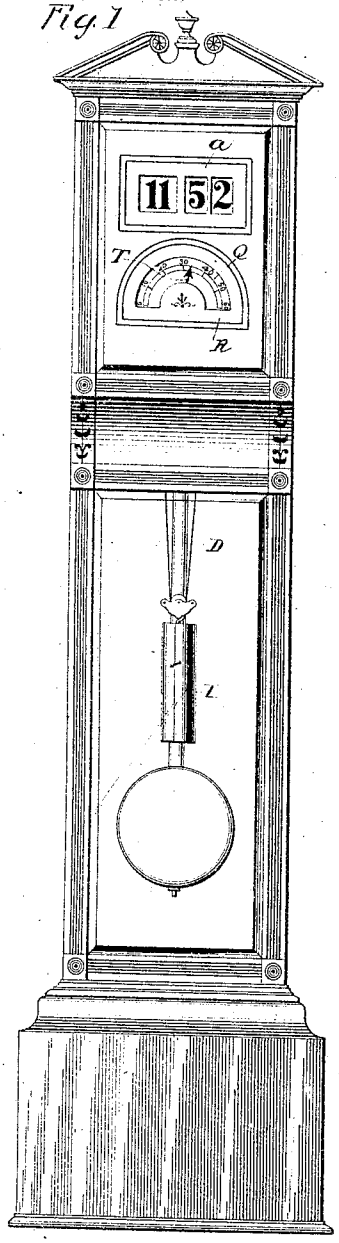
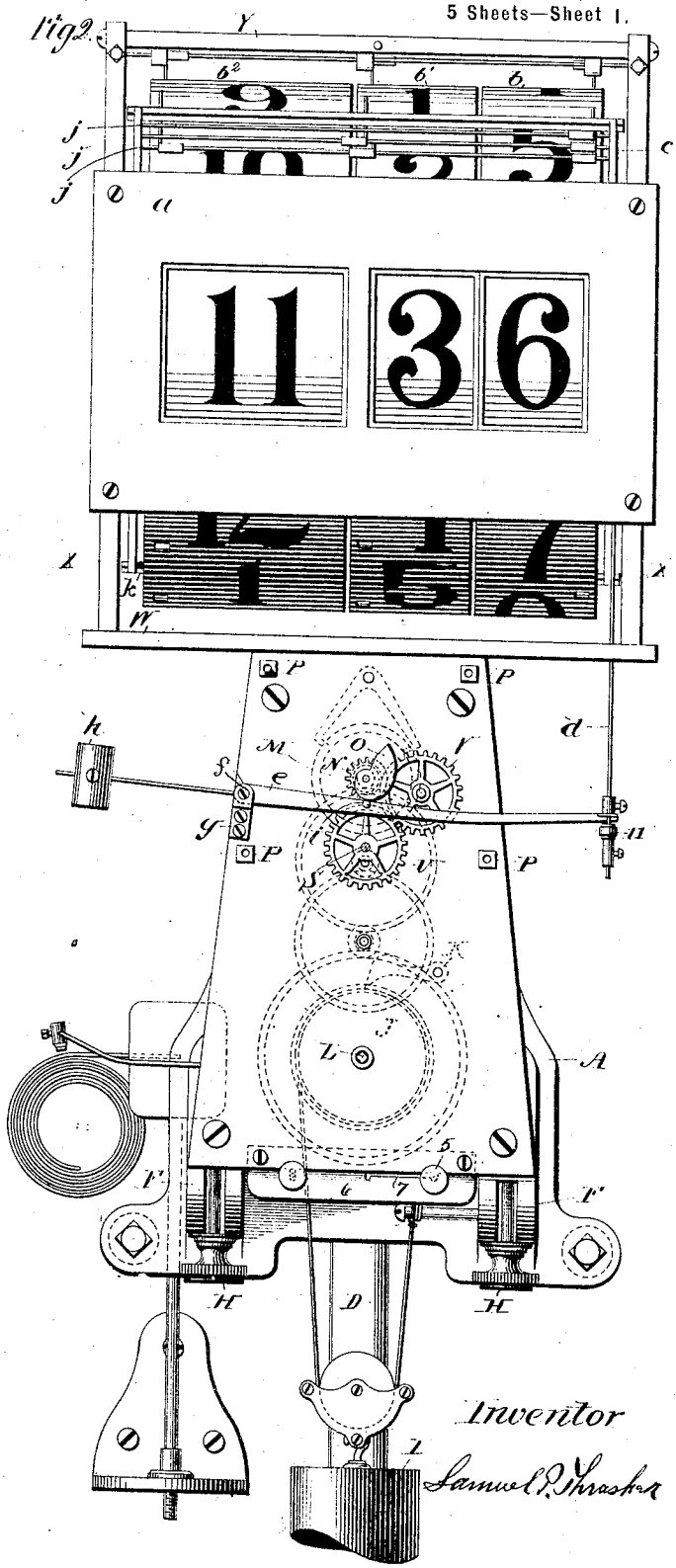


Fig. 2.



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Geo. W. Ledyard.

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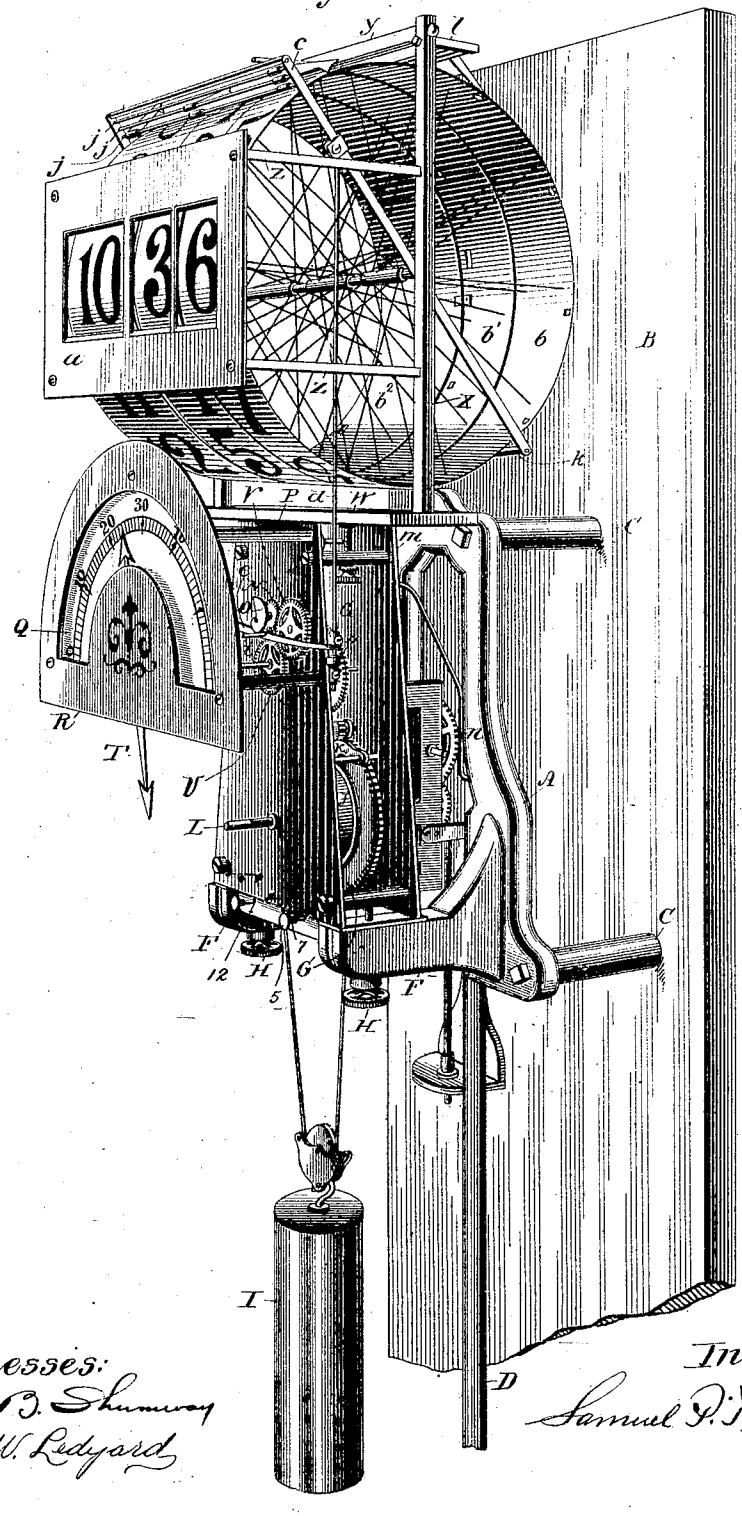
(No Model.) 5 Sheets—Sheet 2.

Fig. 3.



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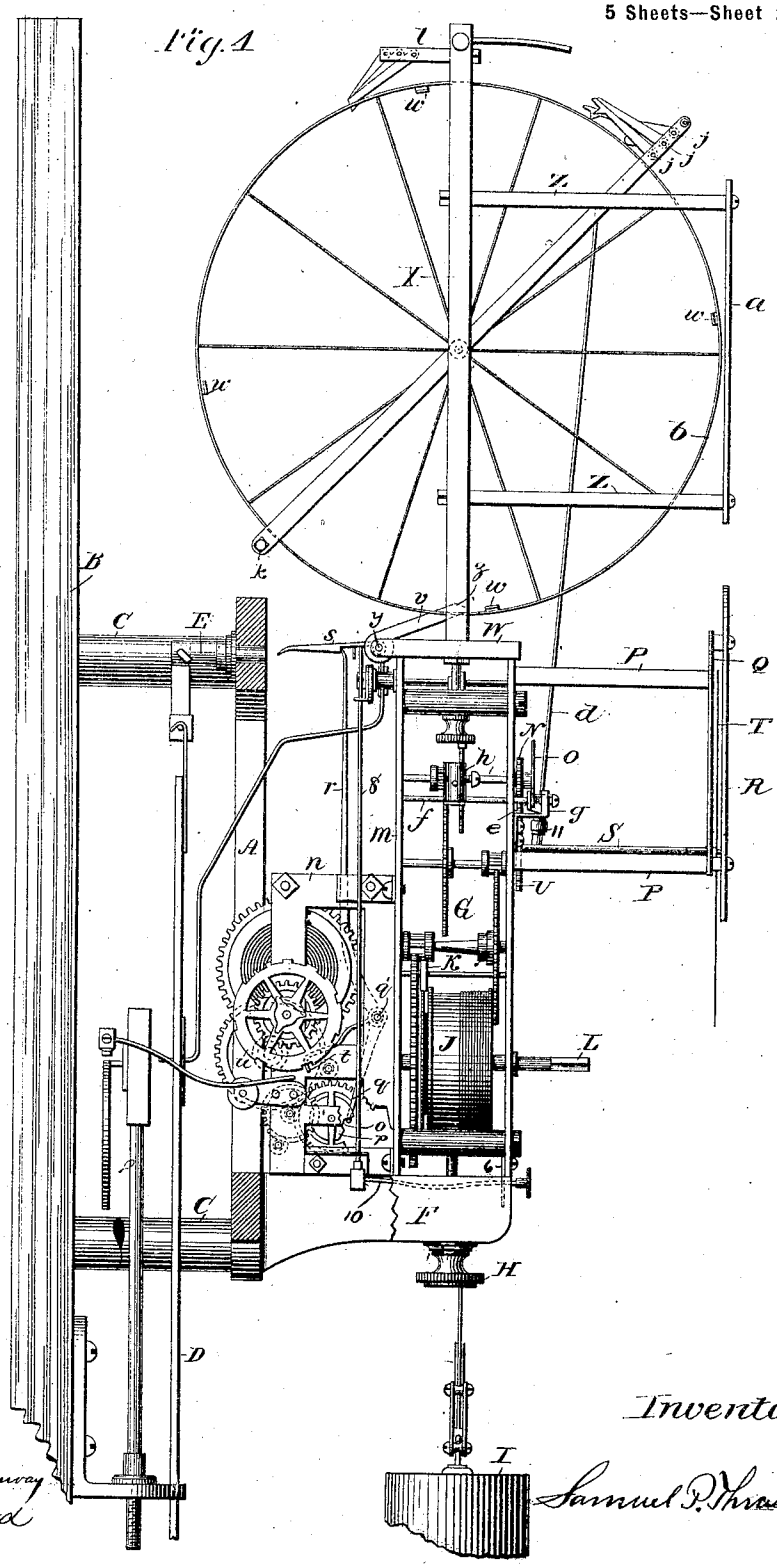
(No Model.) 5 Sheets—Sheet 3.

Fig. 1



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(No Model.) 5 Sheets—Sheet 4.

Fig. 5.

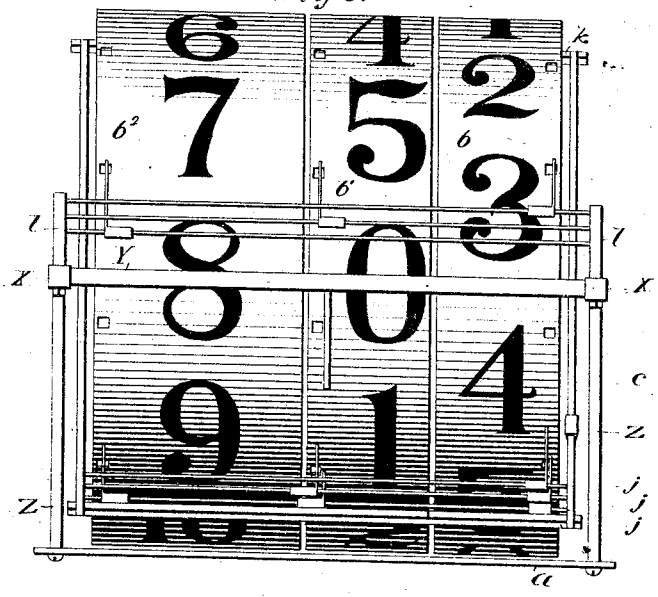
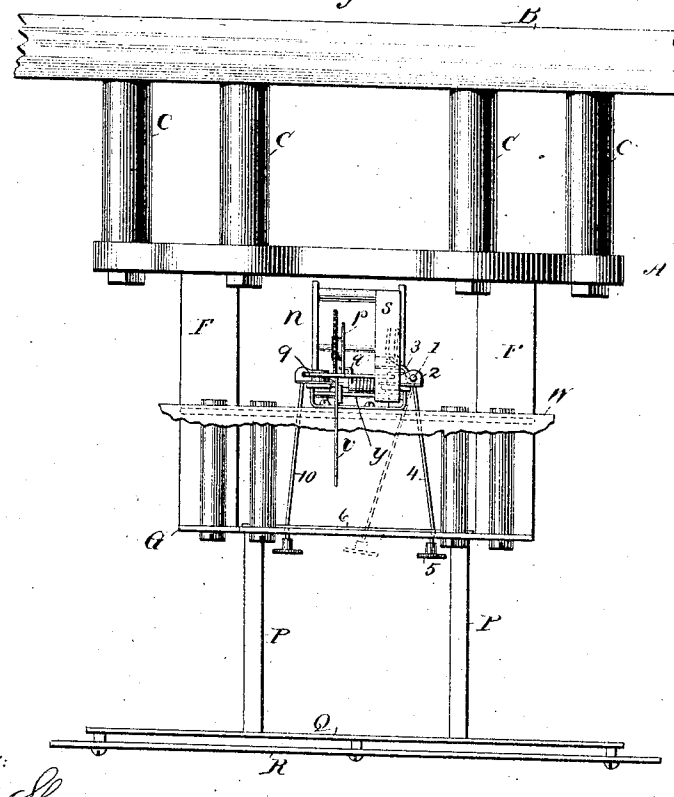


Fig. 6



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(No Model.) 5 Sheets—Sheet 5.

Fig. 7.

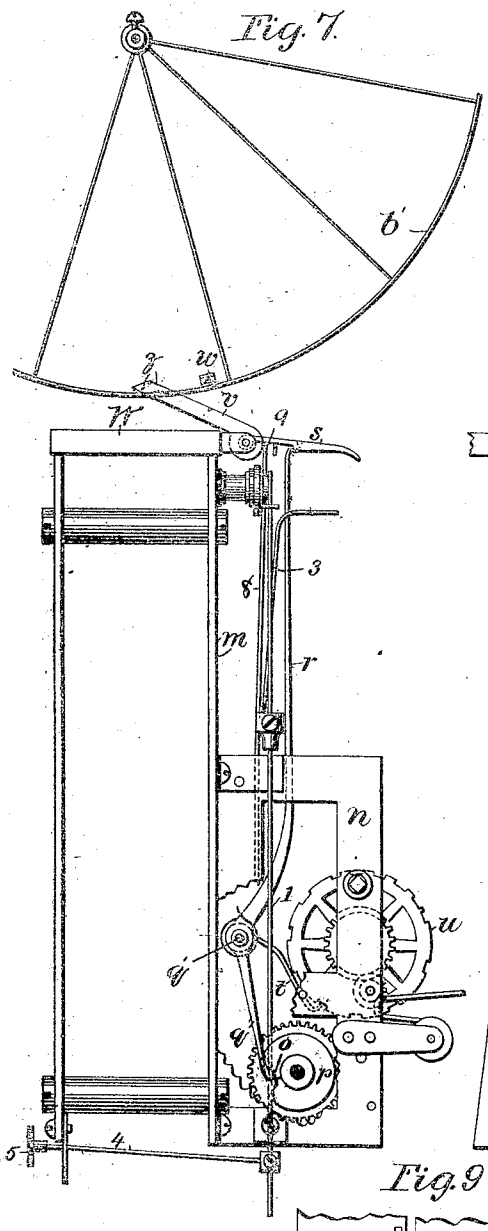


Fig. 8.

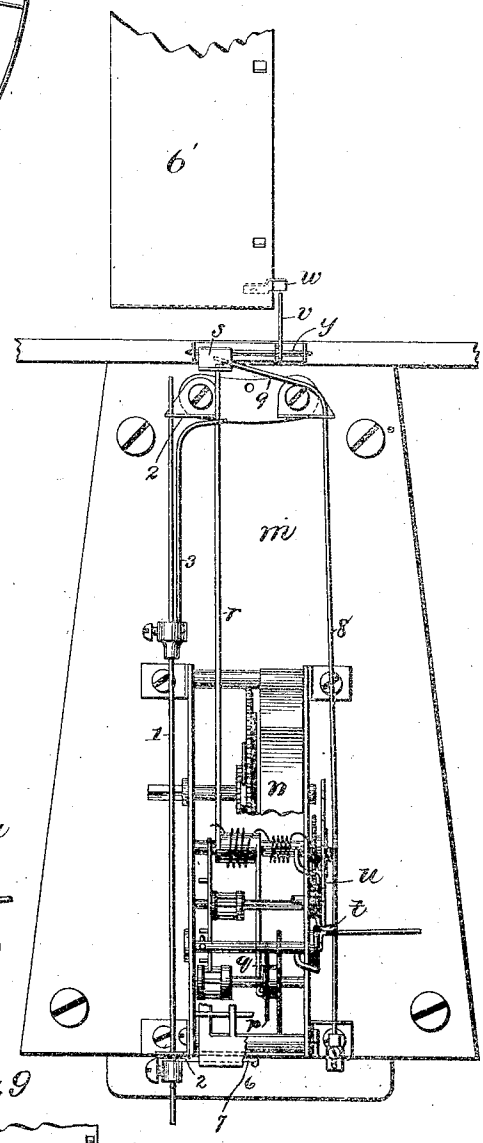
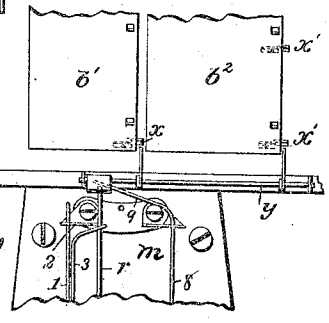


Fig. 9.



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UNITED STATES PATENT OFFICE.

SAMUEL P. THRASHER, OF NEW HAVEN, CONNECTICUT.

CLOCK.

SPECIFICATION forming part of Letters Patent No. 653,712, dated July 17, 1900.

Application filed March 6, 1897. Serial No. 626,216. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. THRASHER, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Time-Indicating Devices, of which the following is a specification.

My invention relates to time-indicating devices, and is especially adapted to indicate time by figures carried upon rotating spools or drums and to operate in connection therewith the striking mechanism; and it consists in the construction and relative arrangement of the parts, as hereinafter described, and pointed out in the claims, reference being had to the accompanying drawings, in which like letters and numerals of reference indicate like parts throughout the several figures.

Figure 1 is a front elevation of one embodiment of my device complete as it appears in operation. Fig. 2 is an enlarged front view of the time-movement removed from the case and having the seconds-dial and pointer removed from the front plate of the same and showing the drums connected with the movement provided with figures to indicate the hours and minutes. Fig. 3 is a perspective view showing the arrangement of the mechanism when the device is complete and in operation. Fig. 4 is an enlarged side view of Fig. 3. Fig. 5 is a top view of the drums and pawls engaging the same. Fig. 6 is a top view of my mechanism with the drums and frame supporting the same removed from the top of the time-movement. Fig. 7 is an enlarged detached view showing a portion of the striking mechanism and its frame attached to the rear plate of the time-movement and also showing the arrangement of the count and unlocking mechanism and the trip-lever in position to be engaged by one of the trip-fingers borne on one of the drums, the drum being broken away. Fig. 8 is a rear view of Fig. 7. Fig. 9 is a modification of the tripping mechanism, showing trip-fingers borne upon two of the drums and their engaging trip-lever.

In the above preferred embodiment, A is a bracket suitably secured to the back board B of the case by means of the posts C C, which are of sufficient length to allow convenient space between the bracket and the board B for the pendulum D, which is suspended from the stud E, secured to the rear of the bracket at its top. Arms F F of the bracket extend forward near the lower end of same and support a time-movement G, which is made fast in its proper position by means of the tightening-screws H H, entering the lower pillars of the movement, as shown. The time-movement is provided, preferably, with a weight I and the usual drum or barrel J, maintaining mechanism, and dog K, and has its winding-arbor L extending through the front plate to receive the key from the front. I have here shown the usual time-train in movements of this class, the arbor M, bearing the escape-wheel, making a complete revolution once a minute, being the one that usually carries the seconds-hand. This arbor extends through the front plate and has secured on its front end the pinion or wheel N and cam O, each of which makes a revolution once a minute. Suitably fastened to the front plate are the pillars P P, extending toward the front end and forming supports for a semicircular seconds-dial Q, which is fastened to the front end of said pillars. Arranged in front of said dial and connected therewith by means of short pillars is a perforated plate or mat R, in which is journaled the front end of a seconds-arbor S, which has frictionally secured thereon a seconds-indicator T, provided with two oppositely-disposed seconds-hands, as clearly shown in Fig. 3, and is adapted to make a complete revolution once in two minutes in a manner as follows: Secured to the rear end of its arbor is the gear-wheel U, having in this case sixty teeth, which is connected by an intermediate gear-wheel, V of any convenient number of teeth, with the pinion N, having thirty teeth, which, as previously stated, makes a revolution once a minute, thereby causing a revolution of the seconds-shaft to be effected once in two minutes and hence each pointer of the seconds-indicator to traverse the dial in turn every minute. Secured to the top of the time-movement G by means of screws passing through the top pillars of the movement into its base-plate W is a frame constructed with upright columns X X, rigidly connected at their upper ends by means of cross-bar Y and having forwardly-extending

arms Z Z, which support the plate or mat *a*, provided with openings to expose the figures on the movable time-indicators, in the present embodiment rotatable drums *b* *b'* *b²*. These figures are preferably painted on the faces of the drums; but it is obvious that the time-indicators would still carry the time-numerals even if such numerals were not fixed to the time-indicators, but were carried past the openings by the same. These drums are mounted upon a shaft supported at each end by the columns X X and are free to turn on the same. Preferably journaled also upon this shaft is a reciprocating pawl-carrier *c*, in this embodiment a yoke, which is preferably connected by means of pitman *d* to the outer end of the lever *e*, which is clearly shown in Fig. 2. This lever is secured to a shaft *f*, one end of said shaft having its pivot supported in the rear plate of the movement and its other pivot supported by a bracket *g*, secured to the front plate, as shown in Fig. 4. Secured also to the shaft is a laterally-extending arm provided with a weight *h*.

i is a pin made fast in the lever *e* and adapted to ride upon the face of the cam O. Journaled in the upper end of the carrier are the pawl-shafts *j j j*, which are provided with carrying and count pawls or dogs arranged and adapted to actuate their respective drums, said drums being provided with ratchets, in this embodiment formed on the drums themselves and engaging pawls similar in construction to those shown and described in my application, Serial No. 626,012, filed March 5, 1897, and the said pawls being adapted to operate their respective drums in effecting the preper change of time in substantially the manner shown in my application of October 19, 1896, Serial No. 609,295. The yoke *c* is provided with a light cross-bar *k* at its lower end, and by means of the three shafts *j j j*, with their pawls and the weight of the pitman *d* attached thereto, the upper end of the yoke is rendered heavier than the lower end, so as to be normally inclined to turn backward to the starting-point of its oscillation. Arms *l l* at the upper end support shafts which are provided with idle pawls to prevent the drums turning backward beyond their proper position when at rest. Suitably secured to the back plate *m* of the time-movement is a striking mechanism *n*, being vertically disposed and having its wheels and arbors substantially at right angles to the wheels and arbors of the time-movement by arrangement of the respective frames in like relative position to each other.

I will now proceed to describe the construction and arrangement of the striking mechanism in detail.

To carry out my invention, I have formed the locking-notch *o* in the disk *p*, as shown in Fig. 7, so as to present an inclined surface and so that the locking-dog *q* upon engaging the same at the conclusion of striking will have a tendency to pass out of the notch forthwith and to allow the striking to be continued by the unchecked rotation of the wheel and shaft to which the disk is secured. To prevent the said further rotation, however, I have secured to the shaft *q'* of the locking-dog *q* the upward-extending arm *r*, which instantly engages the holding and releasing dog *s* in the manner shown in Fig. 7 as soon as the count-dog *t*, which oscillates with the same shaft, falls into its notch on the count-wheel *u* and allows the locking-dog *q* to drop into the stop-notch on the disk *p* and engage the inclined surface, as referred to, and thus prevent the further striking. It will be seen by use of my novel mechanism here shown and described that the unlocking and the releasing of the striking is effected by a single operation, while in the ordinary class of striking-clocks two distinct operations are required, since in my mechanism the striking-train is inclined to run unchecked on account of the incline of the commonly-called "locking-notch" and is only prevented from so doing by engagement of the upward-extending arm *r* with the holding and releasing dog *s*. The releasing-dog *s* is pivotally supported in the position shown and has secured to its shaft a trip-lever *v*, which extends backward and upward and has its upper end arranged to be engaged by trip-fingers *w w*, fastened, preferably, to the drum *b'*, in which case four fingers will be required in striking the hours and half-hours, since the drum revolves once in two hours, the arrangement of the four fingers being substantially as represented in Fig. 4.

I have introduced Fig. 9 to show a modification in which the trip-fingers are secured to two of the drums, as follows: *x x* on drum *b'* to effect the striking of the half-hours and the twelve fingers *x' x'*, arranged on drum *b²*, to effect the striking of the hours. To engage the fingers on these two drums, I have elongated the shaft *y* and provided the same with two trip-levers, as shown. By forming the end of the trip-lever with a double incline *z*, as shown in Fig. 7, the trip-fingers may pass over the same when the drum is rotated in either direction, as in the case of setting. To prevent the striking when the trip-lever is depressed by the trip-fingers and the releasing-dog *s* is raised thereby, as is the case every hour or half-hour when the device is in operation, I have provided a throw-out or checking mechanism, which is particularly shown in Figs. 6, 7, and 8 and which I will now proceed to describe.

1 is a vertical rod having its bearings in small brackets 2 2 and provided with a collar secured to the rod and having rigidly connected thereto the arm 3, which extends upward and at the top is bent laterally and substantially disposed (see Fig. 6) in relation to the upper end of the arm *r*, so that when the rod 1, to which it is secured, is slightly turned in its bearings to the right the said arm *r* is allowed to vibrate without engaging the same;

but upon slightly turning the rod 1 toward the left its upper bent end will be brought into the pathway in which the arm *r* vibrates, and when the arm *r* is in its normal position it will be disposed immediately in front thereof and check further vibrations of the same until it is desired to again throw the striking mechanism into gear.

4 is a lever rigidly attached to the rod 1 and extending to the front of the time-movement and provided with a small button 5, by which the throw-out mechanism is manually operated.

6 is a detachable plate secured to the lower end of the front plate of the time-movement and provided with a horizontal slot 7, in which the front end of the lever 4 rests, the slot being slightly recessed at each end to guard against easy displacement of the lever when left in either position. By moving the lever (and to the position shown by dotted lines in Fig. 6, the upper bent end of the rod 3 being also shown by dotted lines in the same figure as out of engagement with the end of the arm *r*) to the extreme left the striking mechanism is free to operate when released by the dog *s*, and when it is desired to throw out the striking mechanism the lever 4 is moved to the opposite end of the slot and the upper end of the rod 3 brought in front of the upper end of the arm *r*, as previously referred to and shown by full lines in the same figure, and thus the striking mechanism prevented from operating. By making the arm 3 of small wire it is sufficiently flexible to yield laterally to the upper end of the arm *r* if at any time borne against it by moving the lever 4 suddenly to the right to throw out the striking mechanism when the device is in operation, and it will continue thus to yield laterally to the pressure of the said lever until it has returned to its normal position in the releasing-dog *s*, when it will at once dispose itself in front of the said upper end of the lever and in this position prevent further striking, as above stated. On the opposite side of the striking-movement I have arranged a vertical rod 8, having suitable bearings or guides at the upper and lower ends, in which it is free to slide up and down, and have inclined its upper end 9, so that in its normal position its extreme point is immediately under and slightly out of engagement with the releasing-dog *s*, as particularly shown in Fig. 8. Secured to the lower end is a lever 10, similar to lever 4 of the throw-out mechanism, which extends to the front end and is also supported in a slot 12, formed in the detachable plate 6, the slot in this case being vertical and adapted to allow sufficient upward motion of the lever and vertical rod 8 when lifted by the button by the operator to lift the releasing-dog sufficiently to free the striking mechanism. By repeating this operation my device may be struck around at any time to the correct hour. By providing a detachable plate for the support and adjustment of these levers 4 and 10 the front ends or buttons by which they are manually operated are conveniently disposed in front of the time-movement and at the bottom thereof, thereby affording easy access, and may be readily detached from the movement when it is desired to take any of the movements apart. I have attached the striking-bell to the back of the clock and adjusted the hammer in the usual manner. By providing the bracket A with four long posts C C and disposing the pendulum between the bracket and the back of the case I am enabled to provide sufficient space between the back of the time-movement and the pendulum to arrange the striking-movement between the time-movement and the pendulum in the manner shown and also bring the time mechanism, mounted on the top of the movement, nearer to the front of the case, with the pendulum in position at the same time approximately close to the back of the case. It will be observed in this releasing mechanism of mine that the detent mechanism operates automatically and that when released by the catch it operates independently of the motion of the time-indicator. What I mean by "operating independently of the motion of the time-indicator" is that it is not connected with the time-indicator so that the motion of one affects the motion of the other. In the present embodiment when the catch *s* releases the rod *r* the lever *r q* will rotate on its pivot independently of the motion of the drum, for it makes no difference whether the drum is rotating or at rest after the catch *s* has been raised.

I will now describe the portion of the mechanism which actuates the yoke each minute to rotate the drums. As previously stated, the upper end of the yoke is preferably sufficiently weighted to overcome the weight of its lower end, and thereby causes it to bear downward continually by means of the pitman upon the outer end of the lever *e*. I have also provided the lever *e* with a counterweight *h*, borne on its rear-extending arm. This weight is sufficient to overcome the weight of the lever *e* and the forward end of the yoke and the pitman and causes the pin *i* to press upward sufficiently against the cam O, so that when the cam has completed its revolution and the pin passes off from the highest point of the cam the lever will forthwith move upward to the throat of the cam with sufficient force to overcome the said weighted end of the yoke and cause it by its forward oscillation to carry with it one or more of the drums, as the change of time shown on the drums may require. The principal object of thus overweighting the upper end of the yoke, so that it continually rests by downward pressure upon the outer end of the lever *e*, and providing the lever *e* with the counterweight *h*, as described, has been to lessen the power required by the cam in depressing the lever each minute, for it will

be seen that by having left a little space between the under side of the outer end of the lever and the hub 11, attached to the pitman, as shown in Fig. 2, and having disposed the balance of weight of the yoke so as to rest upon the pitman normally at each sudden or intermittent forward movement of the cam caused by the intermittent movements given to it by the action of the escapement when a sudden downward movement is at each time imparted to the lever, it will freely yield suddenly thereto without the resistance of the yoke and its connection with the said lever; but forthwith the weighted upper end of the yoke and its pitman will overtake the lever and rest thereupon until again suddenly actuated by the cam, and thus this operation is continuously repeated at each action of the escapement. It will be observed that in the construction shown in the drawings the weight is not attached to the carrier, but is connected therewith.

The seconds-dial here employed is constructed in the form of half a circle and graduated into sixty seconds, the first graduation-mark (naught or zero) being at one end and the last or sixtieth graduation-mark being at the opposite end of an imaginary straight line preferably horizontal with the center of the seconds-shaft. By providing a seconds-shaft which revolves once in two minutes, as previously stated, with two ends or pointers and arranging the same in relation to the dial, as described, the same is adapted in its revolutions to have one of its pointers over the first or zero graduation-mark and the other over the last or sixtieth graduation-mark at the commencement and conclusion of each minute, so that proper indication of the successive seconds is continuously maintained by the uniform forward rotation of the double pointer or seconds-indicator. This arrangement presents a neat and attractive appearance on the face of the timepiece. By constructing the device as shown the time-train, the striking-train, and the frame supporting the drums carrying figures form practically a combination of three complete and detachable frames, which renders it possible to repair or change the parts in any of the frames without disturbing or taking down the parts contained in the other frames. A still further advantage is gained from being able to leave out the striking mechanism or to remove at any time, if desired, the time-indicating mechanism and to operate the same electrically or otherwise. Again, by employing one or more of the drums to release the striking mechanism the same is effected independent of the time-train, which in other timepieces serves for this purpose, and the time indicating and striking mechanisms of my device are both operative when the time mechanism is actuated by other power or other means than the time-movement as here shown. By disposing the drums on the top of the time-movement the striking mechanism in the rear thereof and the seconds-dial supported upon the pillars on the front thereof I am enabled to utilize an ordinary time mechanism to operate my device without making any substantial alteration of the same. By employing the perforated plate or mat disposed in front of the seconds-dial to support the front end of the seconds-shaft the shaft may at any time be readily detached from the movement without disturbing the regulator and the seconds-shaft may be provided with a pivot on its front end. By securing the detachable striking mechanism to the back plate and substantially in the rear thereof, as shown, the general arrangement and appearance of my device from the front are not materially changed when the striking mechanism is omitted, and this plan also affords convenient space for the employment of an electromagnet with or without the time-train to actuate the drums.

It is evident that various changes in the construction and relative arrangement of the parts herein shown and described might be made and yet be within the spirit and scope of my invention, and I do not wish to be understood as in any way limiting myself to the exact construction and arrangement of the several parts hereinbefore described and set forth; but,

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

1. In a time-indicating device, in combination with the stop-arm 3, a vertically-disposed rod 1 having said arm 3 secured thereto and being provided with means for oscillating the same at will to prevent the device from striking, substantially as and for the purposes described.

2. In a time-indicating device, in combination with the vertical rod 1, provided with the stop-arm 3, an oscillating lever 4, slot 7 and recesses therein, when constructed and operated substantially as and for the purposes described.

3. In a time-indicating device, in combination with a releasing-dog *s*, a vertical rod 8 having its upper end adapted to engage the dog in striking the clock and being provided at its lower end with the forward-extending arm 10 whereby the same may be operated from the front of the clock, substantially as and for the purposes described.

4. In a time-indicating device, in combination with the vertical rod 8 and projecting arm 10, the slot 12 arranged and adapted to hold the forward end and limit the motion thereof in its upward and downward direction, substantially as and for the purposes described.

5. In a time-indicating device, the vertical rods 8 and 1 provided with means respectively at their upper ends for engaging the upward-extending arm *r* and each provided at its lower end with a lever, as 4 and 10, extending to the front of the time-movement,

substantially as and for the purposes described.

6. In a time-indicating device, the detachable plate 6 secured to the bottom of the movement and provided with the horizontal and recessed slot 7 and the vertical slot 12, when used in the manner and for the purposes described.

7. In a time-indicating device in combination, a rotating drum carrying time-numerals, striking mechanism, a count-wheel for said striking mechanism for regulating the number of strokes, a shaft connected with said striking mechanism and rotated thereby, a wheel on said shaft having an inclined locking-notch therein, a two-armed lever one of said arms engaging the inclined face of said locking-notch, the other of said arms being of a greater length than said first arm and adapted to fall by its own weight and release said other arm from said locking-notch, a catch to engage the end of said longer arm and hold said shorter arm in engagement with said locking-notch, and means on said drum to release said catch, said two-armed lever being adapted to rotate on its pivot and release said striking mechanism independently of the rotation of said drum.

8. In a time-indicating device in combination, a rotatable drum carrying time-numerals on its face, striking mechanism having a rotatable wheel, a two-armed lever *r*, *q*, engaging a stop on said wheel to hold said striking mechanism from operation, a count-wheel *u* for regulating the number of strokes, said arm *r* being longer than said arm *q* and extending substantially vertically to a point near said drum, a catch for engaging the end of said arm and a projection from said catch adapted to be engaged by a part on said drum to release said catch, said lever being adapted to rotate on its pivot when released from said catch and operate said striking mechanism independently of the movement of said drum.

9. In a time-indicating device in combination, a rotating drum carrying time-numerals, striking mechanism operative independently of the movement of said drum, a count-wheel *u* for regulating the number of strokes, a wheel rotated by the operation of said striking mechanism said wheel having an inclined-faced locking-notch *o*, a two-armed pivoted lever one of the arms of which engages said notch to hold said striking mechanism and the other arm of which is longer than said first arm and extends substantially vertically to a point near said drum, said longer arm adapted to fall by its own weight when released and move said shorter arm out of said notch, a detent *s* to engage the upper end of said longer arm and a projection *v* from said detent engaged by another projection on said drum to release said detent, an arm *t* engaging said count-wheel *u* and moved by the movement of said lever out of engagement with said wheel.

10. In a time-indicating device in combination a clock-face having a semicircular opening therein, a single stationary and curved seconds-scale showing therethrough in a half-circle of substantially the same length as said opening, the lower edge of said opening being substantially horizontal, and a pair of oppositely-pointing seconds-hands located so as to move behind said clock-face but in front of said scale and fixed on a seconds-shaft, and means to intermittently rotate said seconds-shaft to move each of said seconds-hands successively over the full length of said scale.

11. In a time-indicating device in combination, a movable time-indicator, a ratchet connected with the same, a pawl to engage said ratchet, a reciprocating carrier for said pawl, means to move said carrier in one direction until said pawl engages said ratchet and to release said carrier, and a weight unattached to said carrier but connected therewith and adapted to fall and move said carrier-pawl and time-indicator in the opposite direction.

12. In a time-indicating device in combination, a movable time-indicator, a ratchet connected with the same, a pawl to engage said ratchet, a reciprocating carrier for said pawl, a pivoted lever connected with said carrier, a clock-movement and means controlled by said clock-movement to move said lever downward and release said carrier, a weight connected with said lever and adapted to fall and return said lever and thereby move said carrier-pawl and time-indicator in the opposite direction.

13. In a time-indicating device in combination, a rotatable numeral-carrying time-indicator, a ratchet connected with the same, a pawl to engage said ratchet and a reciprocating carrier for said pawl, a pivoted lever having two arms one of which is connected with said carrier to reciprocate the same and the other of which carries a weight, a clock-movement and a cam operated thereby and connected with said lever to tilt the same thereby raising said weight and moving said carrier in one direction until said pawl engages said ratchet, said cam adapted to then release the same thereby allowing said weight to fall and return said lever, carrier, and time-indicator in the opposite direction.

Signed at New Haven, in the county of New Haven and State of Connecticut, this 5th day of March, A. D. 1897.

SAMUEL P. THRASHER.

Witnesses:
S. McALVIN,
F. E. HURLBUT.