No. 724,460. PATENTED APR. 7, 1903.

E. FITCH.

CLOCK.

APPLICATION FILED MAY 12, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 2

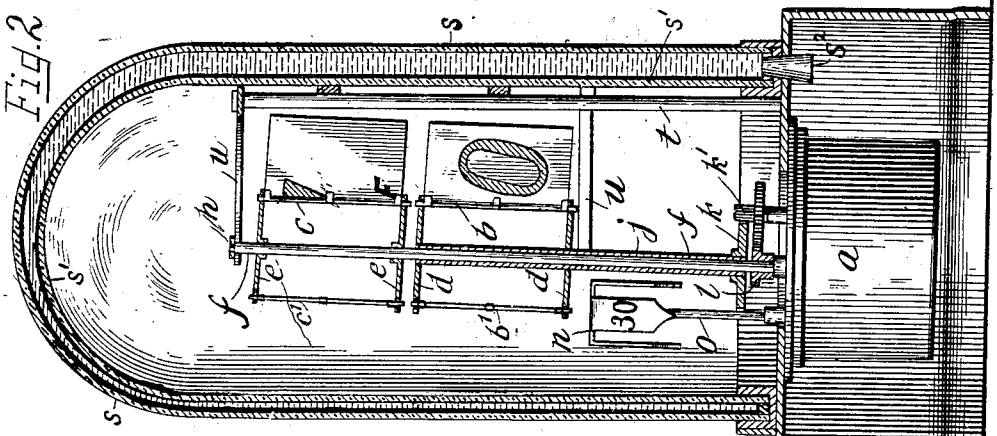


Fig. 2a.

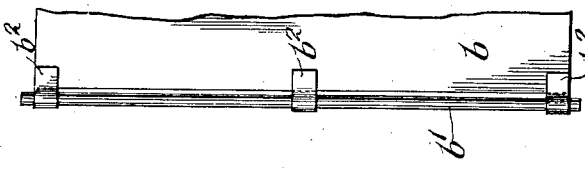
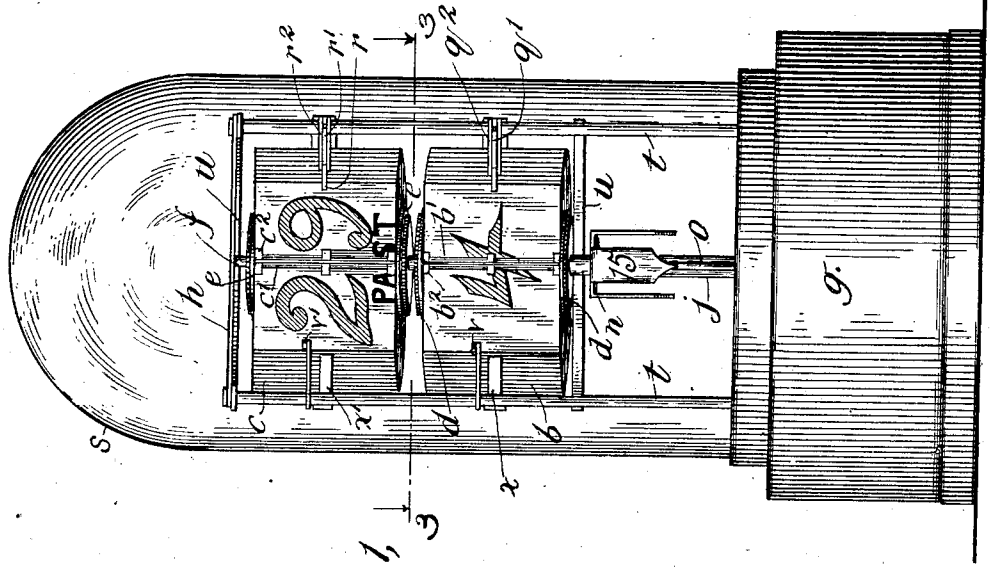


Fig. 2b



Fig. 1.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 6.

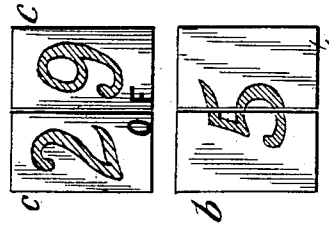


Fig. 9.

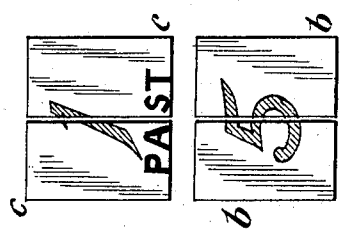


Fig. 5.

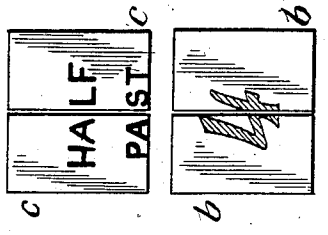


Fig. 8.

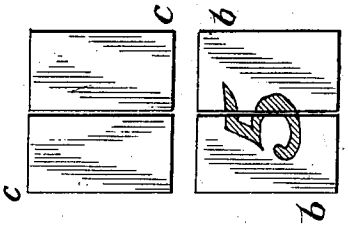


Fig. 4.

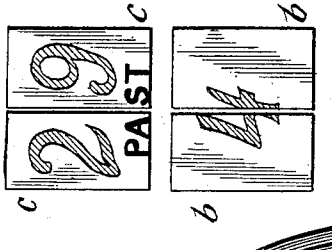


Fig. 7.

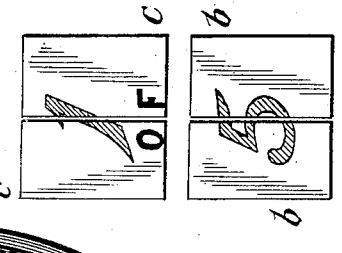
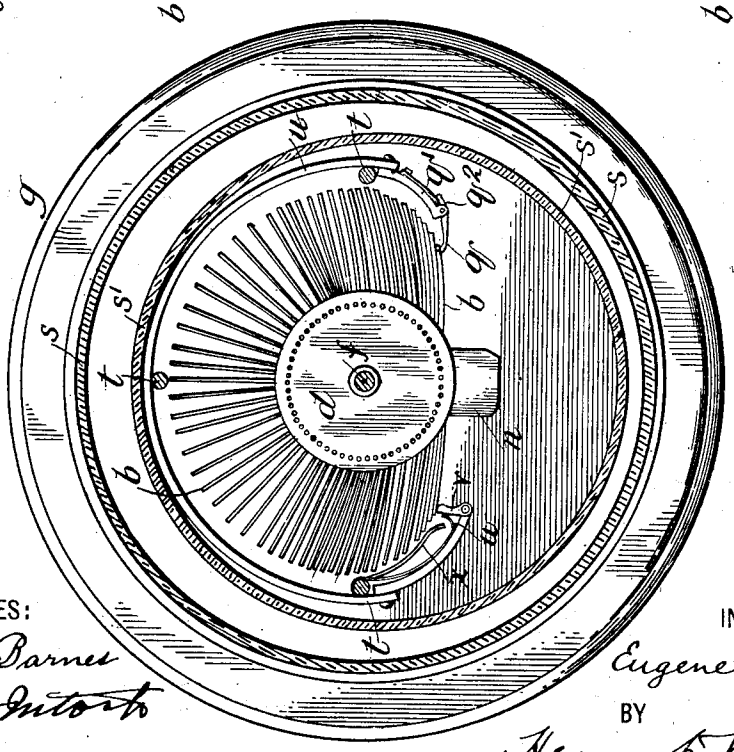


Fig. 3.



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No. 724,460. PATENTED APR. 7, 1903.

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NO MODEL. 3 SHEETS—SHEET 3.

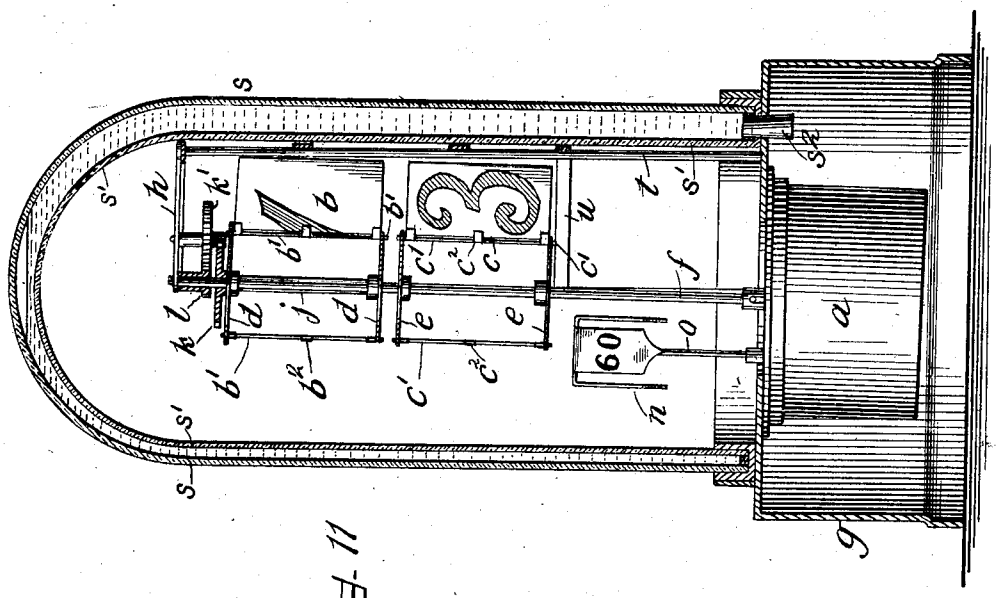


Fig. 11

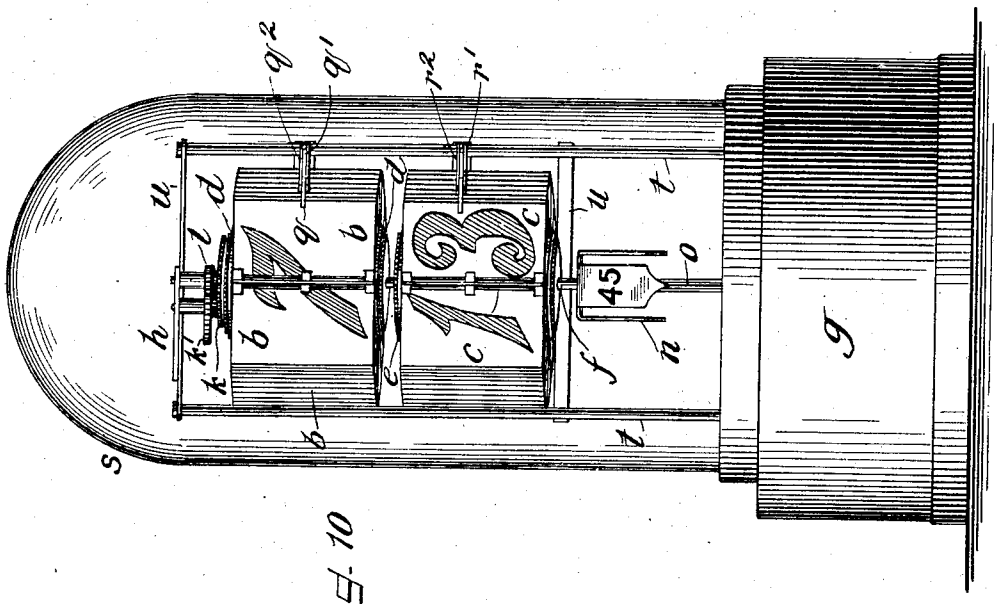


Fig. 10

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UNITED STATES PATENT OFFICE.

EUGENE FITCH, OF NEW YORK, N. Y.

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SPECIFICATION forming part of Letters Patent No. 724,460, dated April 7, 1903.

Application filed May 12, 1902. Serial No. 106,878. (No model.)

To all whom it may concern:

Be it known that I, EUGENE FITCH, a citizen of the United States, residing at the borough of Manhattan, county of New York, and State of New York, have invented certain new and useful Improvements in Time-Indicators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to time-indicators or clocks or indicating devices, and has for its principal object to provide improved means for successively exposing the indicating-plates. According to my invention the indicating-plates are pivotally mounted upon a rotating part arranged with its axis slightly inclined upward and rearward from the vertical, so as to utilize the force of gravity in the control of the plates and yet expose the plates in a nearly vertical plane. According to my invention each indicating-plate is pivotally mounted on the rotating part, so as to swing freely and without restraint thereon; but the plates are so combined with a stop for restraining their movement that the advance plate in contact with the stop coacts with the adjacent plates in rear to develop a resilient force which will swing the plate on its pivot when the plate is released from the stop and cause the next succeeding plate in rear to be exhibited.

My invention also includes a trap to catch the plates after they have been released by the stop to prevent retrograde movement thereof, the employment of a resilient stop, an improved arrangement of time-indicating plates, so as to give the indications in accordance with the ordinary reading of time, and various improvements in the construction and combination of parts.

I will now describe the time-indicator or clock embodying my invention illustrated in the accompanying drawings and will thereafter point out my invention in claims.

Figure 1 is a front elevation of a time-indicator embodying my invention. Fig. 2 is a central longitudinal vertical section of the same. Figs. 2^a and 2^b are respectively an enlarged front elevation and plan view showing the construction of pivoting means for the indicating-plates. Fig. 3 is an enlarged horizontal section of the same, taken on a plane indicated by the line 3 3, Fig. 1. Figs. 4, 5, 6, 7, 8, and 9 are face views of indicating-plates, showing different indications thereof. Fig. 10 is a front elevation of a time-indicator of modified construction. Fig. 11 is a central longitudinal vertical section of the same.

The actuating part of the time-indicator may be a clock-movement of any suitable construction, and I have not, therefore, illustrated the details of the clock-movement, showing only the exterior of the casing *a*, within which this clock-movement is inclosed, and showing the minute-spindle *f* and the second-spindle *o*, projecting upwardly therefrom. As usual, the minute-spindle will make one complete revolution every hour and the second-spindle will make one complete revolution every minute. This clock-movement is set slightly obliquely in the base or standard *g*, so that the minute-spindle *f* and the second-spindle *o* incline slightly upward and rearward from the vertical, this inclination of the minute-spindle accomplishing the function hereinafter set forth. The minute-spindle extends upward for a considerable distance and has a bearing at its upper end in a bearing-piece *h* of a frame extending up from the base or standard *g*, this frame having vertical supporting-posts *t* and arc-shaped horizontal members *u*, connecting the posts *t*.

The hour-indicating plates *b* are marked or impressed with numbers to indicate the hours, and the minute-indicating plates *c* are marked or impressed with numbers to indicate the minutes. Each of these plates is provided with means for pivotally connecting it with its plate-carrying rotating part and is detachably connected to its pivoting means, and such pivoting means comprises pivot-pins *b'* for the hour-plates *b*, and *c'* for the minute-plates *c*, each pivot-pin at its ends entering perforations in a pair of disks *d d* for the hour-plates and *e e* for the minute-plates. Each of the pivot-pins is provided with spring-holders b^2 for the hour-plates and c^2 for the minute-plates, adapted to receive and clamp the corresponding plates, and, as shown, three of these spring-holders are provided on each pivot-pin. This construction provides a simple and strong pivot and simplifies the work of assembling and the renewal of plates.

The plate-carrying disks are shown as fitted to rotate on a common axis in alinement with the minute-spindle of the clock-movement. The disks *e e*, carrying the minute-indicating plates *c*, are secured upon the minute-spindle *f* of the clock-movement, and in the construction shown in Figs. 1 to 9, inclusive, the minute-indicating plates *c* are arranged above the hour-indicating plates *b*, while in the modified construction shown in Figs. 10 and 11 the minute-indicating plates *c* are arranged below the hour-indicating plates *b*. In both constructions the disks *d d*, carrying the hour-indicating plates, are secured upon a sleeve *j*, which is loosely mounted on the minute-spindle *f*, so as to rotate freely thereon, and the hour-spindle is actuated by ordinary hour-hand reducing-gears of a clock-movement, shown as comprising a pinion *l*, secured upon the minute-spindle *f*, intermediate gears *k'*, and the gear *k*, secured upon the hour-sleeve *j*. In the constructions shown in Figs. 1 to 9, inclusive, this hour reducing-gearing is located just above the clockwork-casing *a*, while in the modified construction shown in Figs. 10 and 11 this hour reducing-gear is located at the top of the apparatus, just above the upper disk *d* of the hour rotating part.

The means for controlling the movements of the time-indicating plates so as to cause the plates of each series to be periodically successively exposed comprises a stop for each series of plates, arranged in the path of movement of the plates so as to successively restrain their movement and release them, and this stop has a resilient action and by light backward pressure upon the front plate presses this plate back against adjacent plates in rear and holds it in a substantially tangential position, with its front face substantially in the plane of the front of the indicator or clock, and therefore in a position best adapted for exhibiting the indication on the front of the plate, and also brings about a slight rearward deflection such that when the front plate is carried beyond the stop and released therefrom a resilient force is exerted, which throws the plate with sufficient force to carry it through an angle of about one hundred and eighty degrees, or from a position in which the front of the plate is exhibited to a position in which the back of the plate is exhibited. By the provision of a resilient stop I am enabled to develop this resilient force uniformly and with light pressure, the resilient stop being self-adjusting to compensate for any variations in the resiliency of the different indicating-plates, and I have shown pivoted spring-actuated stops, the stop *q* for the hour-plates and the stop *r* for the minute-plates, these stops being pivoted on plates *q'* and *r'*, respectively, adjustably secured to arc-shaped members *u* of the frame *t u*, and actuated by light springs q^2 and r^2, respectively. By reason of the slight upward and rearward inclination of the axis of the plate-carrying parts the movement of each plate after it has been released from its stop is slightly upward and against gravity for the first half of its movement and slightly downward or with gravity for the latter half of its movement, so that it is only necessary that the resilient force should be sufficient to carry the plate over its highest point—the middle point of its movement—and the weight or gravity of the plate will finish its movement and hold it forward against the next preceding plate. In the modified construction shown in Figs. 9 and 10 I have relied only upon the gravity or weight of the plates to held the advance exposed plate with its back exposed; but in the construction shown in Figs. 1 to 9, inclusive, I have provided a trap for the plates of each series for catching each plate after it has completed its movement, so as to prevent a return movement of the plate in the event that the clock or indicator is inclined forward from the normal position shown or is carried about. These traps—*v* for the hour-plates and *v'* for the minute-plates—are shown as pivoted latches actuated by light springs, so that they will be yieldingly held in normal positions and will afford slight resistance to the forward movement of the plates past the traps, while preventing backward movement of the plates after they have passed the trap. The spring *w* of the trap *v* is shown in Fig. 3. The corresponding spring for the trap *v'* is not shown, but its construction is identically the same as that of the spring *w* of the trap *v*, and the two traps *v* and *v'* are of identical construction. Each of these traps is of sufficient lightness and mobility to be readily pushed aside by a moving plate and will return to the normal position shown immediately after the plate has passed it. The operation of the trap is merely to be pushed or swung sufficiently to clear a plate by contact with the plate itself and to return to normal position under the action of its spring as soon as the plate has moved clear of it. I have also shown retaining-springs *x* and *x'*, respectively, beyond the traps, which act to relieve the traps of a portion of the weight of the plates should the time-indicator be tipped considerably forward.

The time-indicating plates will be sufficiently numerous to indicate by their successive exposures intervals of time sufficiently short for all practical purposes, and I have shown the same number of plates to indicate the minutes and hours. I have shown as a suitable number sixty plates in each series. As the hour rotating part makes one complete revolution every twelve hours, this arrangement provides for five successive indications of the same hour, one every twelve minutes, while as the minute rotating part makes one complete revolution every hour this arrangement provides for one indication for each minute. The indications are afforded by the exposure of the back of one plate and the front of the next succeeding plate, and the back and front of these two ad-

jacent plates will be exhibited side by side, with their inner vertical edges adjacent, and the indication to be given will be partly marked on the back of the advance plate and partly marked on the front of the adjacent plate in rear. Where the indication consists of a single number, as that of the hour "5" in Figs. 7, 8, and 9 and of the minute "1" in Figs. 7 and 9, this number will be partly marked on each of these two exposed surfaces. This is also true of the words "Past" and "of" and "Half-past," forming part of the indications, as shown. I also provide for changing the indication of the hour at the half-hour—as, for example, the next indication after "Half-past 4," Fig. 3, is "29 of 5"—and for indicating by the minute-plates the interval past the hour from the hour to the half-hour, as "29 past 4," Fig. 4, "Half-past 4," Fig. 5, "1 past 5," Fig. 9, and indicating the interval toward the next hour from the half-hour to the next hour, as "29 of 5," Fig. 6, "1 of 5," Fig. 7. This arrangement of indications corresponds to the most usual reading of time from the ordinary clock-dial, while embodying the substantial advantage of the use of indicating-plates that the work of calculation from the position of hands is entirely obviated, and it is only necessary to glance at the indication and read it to be apprised of the minute and hour of the day.

In the modified construction shown in Figs. 10 and 11 I have not embodied the above-described feature of my invention, but have provided for an indication such as has been heretofore used similar to the well-known railroad-time-table arrangement, changing the hour-indication at each hour and giving a minute-indication of the interval past the hour until the next succeeding hour is reached.

The second spindle *o* is provided with an indicator *n*, having a plurality of faces in planes parallel to the axis of the spindle, and each of these faces is marked to indicate the interval in seconds represented by the exposure of the face in the plane of the front of the clock or indicator. As shown, four of these faces are provided, marked to indicate the successive quarters of a minute, as "15, 30, 45, 60." The slight upward and rearward inclination of the axis of the second spindle accomplishes no function in this construction and is merely incidental to the inclination of the clock-movement as a whole; but it is to be observed that this inclination is not noticeable to a person standing in front of the clock or indicator.

The cover for the indicating part of the clock or indicator is of transparent material, as glass, and has an outer wall *s* and an inner wall *s'*, forming a chamber for the reception of a fluid, and this chamber is nearly filled with a colored fluid and creates the impression that the entire cover is filled with this fluid, with the indicating-plates immersed in it. The walls of the chamber approach quite closely together at the front, so that but a thin body of fluid is in front of the indicating-plates, while the walls of the chamber are farthest apart at the back, thereby compensating for the thinness of the body of fluid at the front, and the change in the distance between the walls of the chamber is gradual, so that along all diametrical lines the total thickness of the body of fluid is substantially uniform and the liquid presents a uniform tint when viewed from all substantially horizontal directions. The chamber in the cover is emptied and filled through an opening along the lower edge thereof, which may be closed by a cork s^2, as shown.

It is evident that various modifications may be made in the constructions shown and above particularly described within the spirit and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a plurality of indicating-plates, of a rotating part on which such plates are pivotally mounted, each of such plates being mounted on such rotating part so as to swing freely thereon and the axis of such rotating part being arranged at a slight inclination upward and rearward from the vertical, means for rotating such part, and a stop arranged to successively coact with such plates and press the advance plate back upon adjacent plates in rear so as to develop a resilient force to swing the plate and cause the next plate to be exposed.

2. The combination, with a plurality of indicating-plates, of a rotating part on which such plates are pivotally mounted, each of such plates being mounted on such rotating part so as to swing freely thereon and the axis of such rotating part being arranged at a slight inclination upward and rearward from the vertical, means for rotating such part, and a resilient stop arranged to successively coact with such plates and press the advance plate back upon adjacent plates in rear so as to develop a resilient force to swing the plate and cause the next plate to be exposed.

3. In a time-indicator, in combination, a clock-movement, a plate-carrying rotating part actuated thereby, and arranged with its axis slightly inclined upward and rearward from the vertical, a plurality of time-indicating plates carried by such rotating part, each plate being pivotally mounted on the rotating part so as to swing freely thereon, and a stop arranged to successively coact with such plates and press the advance plate back upon adjacent plates in rear and thereby develop a resilient force to swing the plate and cause the next plate to be exposed.

4. In a time-indicator, in combination, a clock-movement, a plate-carrying rotating part actuated thereby, and arranged with its axis slightly inclined upward and rearward from the vertical, a plurality of time-indicating plates carried by such rotating part, each plate being pivotally mounted on the rotat-

ing part so as to swing freely thereon, and a resilient stop arranged to successively coact with such plates and press the advance plate back upon adjacent plates in rear and thereby develop a resilient force to swing the plate and cause the next plate to be exposed.

5. The combination, with a plurality of indicating-plates, of a rotating part on which such plates are pivotally mounted, each of such plates being mounted on such rotating part so as to swing freely thereon, means for rotating such part, a stop arranged to successively coact with such plates and press the advance plate back upon adjacent plates in rear so as to develop a resilient force to swing the plate and cause the next plate to be exposed, and a trap arranged to successively catch the plates to prevent backward movement thereof.

6. In a time-indicator, in combination, a clock-movement, a plate-carrying rotating part actuated thereby, a plurality of time-indicating plates carried by such rotating part, each plate being pivotally mounted on the rotating part so as to swing freely thereon, a resilient stop arranged to successively coact with such plates and press the advance plate back upon adjacent plates in rear and thereby develop a resilient force to swing the plate and cause the next plate to be exposed, and a trap arranged to successively catch the plates to prevent backward movement thereof.

7. In a time-indicator, in combination, a clock-movement, a plate-carrying rotating part actuated thereby and arranged with its axis slightly inclined upward and rearward from the vertical, a plurality of time-indicating plates carried by such rotating part, each plate being pivotally mounted on the rotating part so as to swing freely thereon, a resilient stop arranged in the path of movement of the time-indicating plates so as to successively coact with such plates and press the advance plate back upon the adjacent plates in rear and thereby develop a resilient force to swing the plate and cause the next plate to be exposed, and a trap arranged to successively catch the plates to prevent retrograde movement thereof.

8. In a time-indicator, in combination, a clock-movement, a plate-carrying rotating part actuated thereby and arranged with its axis slightly inclined upward and rearward from the vertical, a plurality of time-indicating plates carried by such rotating part, each plate being pivotally mounted on the rotating part so as to swing freely thereon, a resilient stop arranged in the path of movement of the time-indicating plates so as to successively restrain their movement and release them, a trap arranged to successively catch the plates and to prevent retrograde movement thereof, and a retaining-spring arranged to coact with such trap.

9. The combination with a plurality of indicating-plates, of a rotating part on which such plates are pivotally mounted, and means for rotating such part, and a pivoted stop located in the path of the plates and a spring for causing the stop to press the advance plate back upon adjacent plates in rear and thereby develop a resilient force to swing the plate and cause the next plate to be exposed.

In testimony whereof I have affixed my signature in presence of two witnesses.

EUGENE FITCH.

Witnesses:
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WALTER L. BUNNELL.