(No Model.) 2 Sheets—Sheet 1.

W. D. HAWLEY.

TIME MEASURING DEVICE.

No. 441,661. Patented Dec. 2, 1890.

Fig. 1.

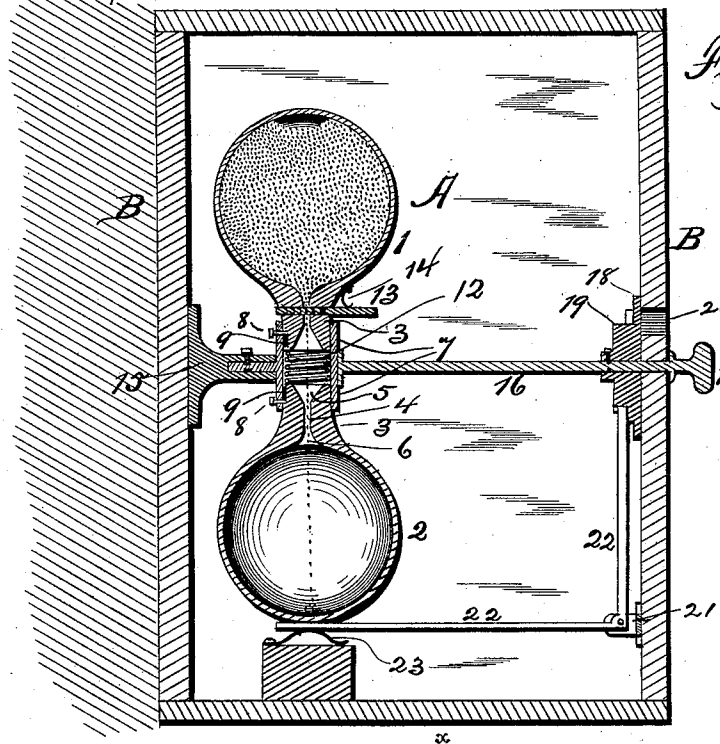


Fig. 7.

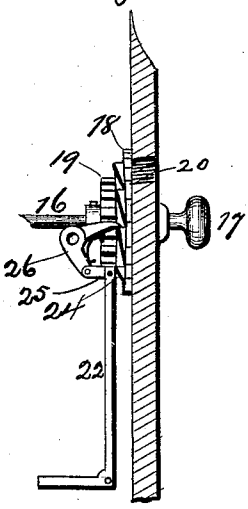


Fig. 2.

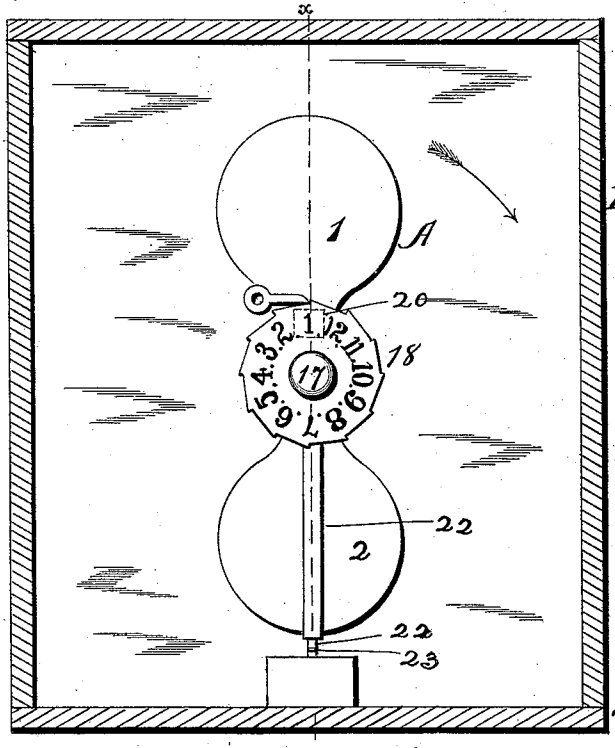
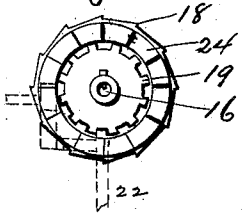


Fig. 3.



Witnesses

H. P. Denison

F. W. Denison.

Inventor

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By his Attorneys

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

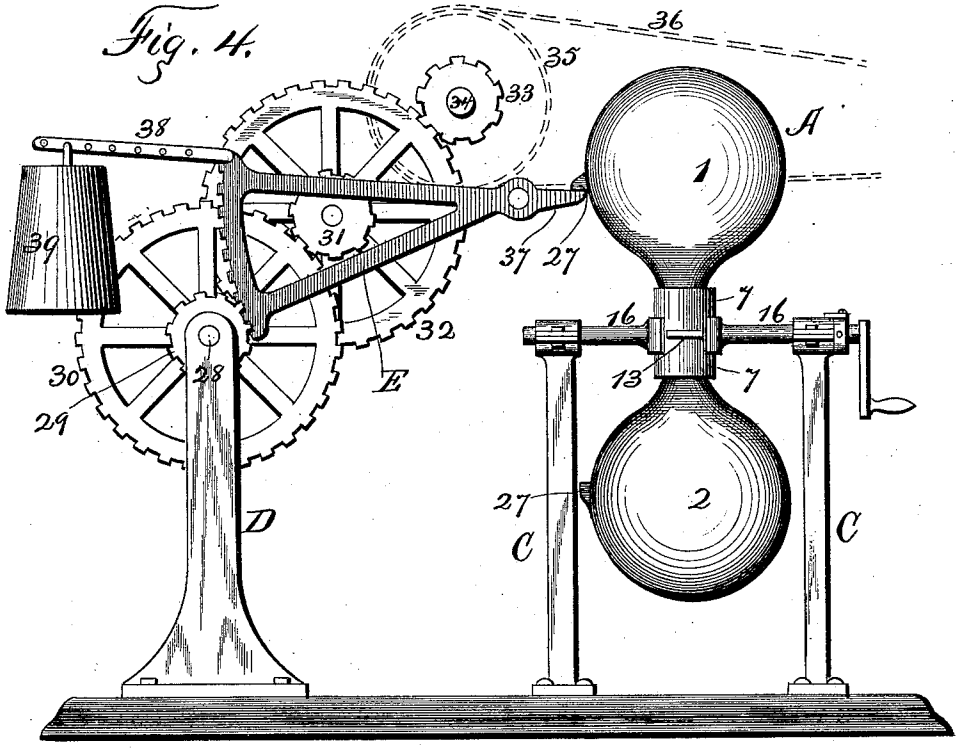


Fig. 6.

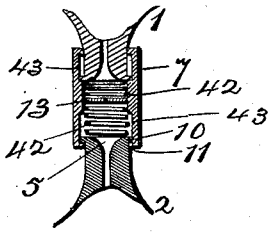
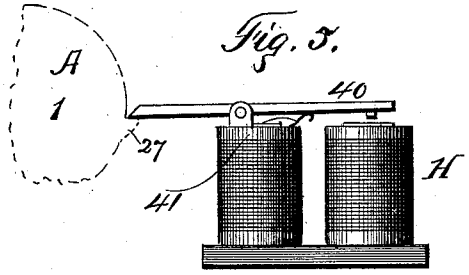


Fig. 5.



Witnesses
H. P. Denison
F. P. Denison.

William Dean Hawley Inventor
By his Attorneys
Smith & Denison

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM DEAN HAWLEY, OF SYRACUSE, NEW YORK.

TIME-MEASURING DEVICE.

SPECIFICATION forming part of Letters Patent No. 441,661, dated December 2, 1890.

Application filed February 8, 1890. Serial No. 339,682. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM DEAN HAWLEY, of Syracuse, in the county of Onondaga and State of New York, have invented new and useful Improvements in Time-Measuring Devices and Motors, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to devices for regulating and measuring periods of time and for varying the length thereof, as may be desired.

My object is to produce a time-measuring device adapted to be set so as to measure longer or shorter periods, as may be desired, and which can be adapted with slight changes in the mechanism to be used for a great variety of purposes—such as a watchman's time-detector by erecting one at each station in a building, as an electric alarm to be set to give an alarm at the expiration of a certain period, as a motor to drive a phonograph, and for many other uses, such as regulating the length of recitations in schools, shutting off gas at a certain time, opening dampers of heating apparatus, for feeding horses at a certain time in the morning, and analogous purposes—all accomplished by the operation of a sectional hour-glass or mechanism operating in like manner to one as a basis, and the connection thereto of different mechanisms for different purposes, all actuated by the shifting of the weight of the sand in the upper section of the glass.

My invention consists in the several novel features of construction and operation hereinafter fully described, and which are specifically set forth in the several clauses of the claim hereunto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of my invention set up in a case for use as a watchman's time-detector on line *x x*, Fig. 2. Fig. 2 is a front elevation of the same with the casing in section. Fig. 3 is a plan of the inner face of the dial and the ratchet thereon. Fig. 4 is a side elevation of my apparatus set up as a motor or for actuating the rotation of the cylinder of a phonograph. Fig. 5 shows it connected to and operating to throw the armature of an electro-magnet into contact to make a circuit for ringing a bell at a stated time, or at the expiration of a certain period, or to give an alarm for other purposes. Fig. 6 shows the perforated regulating-slide inserted through the connecting-sleeve and having the extensor-spring in sections, one above and the other below the slide, instead of through the neck of one of the hour-glass sections, as shown in Fig. 1. Fig. 7 is a sectional side elevation of a dial-shifting mechanism of a slightly different construction from that shown in Fig. 1.

I do not illustrate all of the many adaptations to which my invention can be applied—to wit, the use of an hour-glass as a time-regulating motor—believing that what I have shown fully illustrates the principle of my invention and its general adaptability.

Referring to the drawings, A is my motor constructed of two hollow sections 1 and 2, spherical, spheroidal, conical, or frusto-conical in form, or of any other shape desired, each provided with a neck 3, having a longitudinal perforation 4, enlarged outwardly, as at 5, and being also enlarged, as at 6, where it opens into the interior of the section, where it is necessary on account of the contour of the inner surface adjacent to the perforation.

In Figs. 1 and 2, B is an inclosing-case. The necks of the sections 1 and 2 fit into a tubular sleeve 7, and are held therein loosely by means of a pin 8 through the sleeve into an elongated recess 9 in the neck, so that each section can slide in the sleeve, or, as in Fig. 6, by means of a rim 10 on the neck and an inward flange 11 upon the end of the sleeve.

In Fig. 1 I show an extensor-spring 12 within the sleeve and between the ends of the necks. In the figure I show a slide 13 inserted horizontally into and through the neck of the then upper section in a mortise for that purpose and provided with holes through it varying in size, and 14 is a friction-spring or equivalent mechanism for holding or locking the slide at any desired point.

At 15 I show a bracket secured in the case, in which the inner end of the shaft 16 is stepped or journaled. This shaft is in sections, which are secured to the outer surface of the sleeve, and the outer end of the shaft

passes out through the casing and is journaled therein, and 17 is a button or crank upon this end.

Just inside of the casing I secure upon a shaft a dial 18 and a ratchet 19, either separate or integral with each other, and 20 is an opening through this casing, through which the figures upon the dial can be inspected one at a time as the dial is rotated.

At 21 I secure a bracket, and 22 is a pawl pivotally mounted therein, the upper end engaging with the ratchet and the other end extending backward to a point beneath the lower section, and 23 is a spring suitably supported, which engages with the pawl-arm and holds it up against the lower section 2 and actually supports this section when it is empty, and this spring also operates to hold the pawl in engagement with the ratchet.

This mechanism operates as follows: Starting at the position shown in Fig. 1, when the numeral 1 should be opposite the opening in the case and the slide should be adjusted so that it will require a specified time for the sand to run through the hole therein which coincides with the neck of the section—say one hour—then as the sand gradually runs down into the lower section the weight added to this section will gradually force down the rear arm of the pawl, slowly withdrawing the upper end out of engagement with the ratchet until at the close of the hour the pawl is wholly disengaged, and then when the watchman comes around he turns the shaft, reversing the hour-glass, bringing the figure 2 into view, and the pawl is again engaged with the ratchet. The slot-and-pin connection between the neck and sleeve permits the lower section to settle down, as aforesaid. The numeral in sight upon the dial will indicate the number of times the watchman has visited this section and reversed the mechanism.

In Fig. 7 I show a slightly-different construction, in that the dial 18 and ratchet 19 are loose upon the shaft 16, and the dial and ratchet are shifted automatically, the shaft being rotated to reverse the motor independently of the other parts. A rack 24 is formed upon the inner face of the dial 18 between the outer periphery of the ratchet 19 and that of the dial. A bar 25 is pivoted upon the vertical arm of the pawl 22 adjacent to its top, and normally stands out horizontally therefrom, and is also pivotally connected to the downward arm of the angular-shaped pawl 26. The upper arm of this pawl engages with the rack 24, the point resting upon the shoulder of one rack-tooth, so that when the vertical arm of the pawl 22 is thrown inward out of engagement with the ratchet 19 this will swing the lever-arm of the pawl 26 out of engagement, throwing the point of the upper arm downward, and thus rotating the dial the distance of one tooth on the rack or one figure on the dial. When the sand runs down into the lower section 2, its weight will cause this section to lower down upon the arm of the pawl 22, and, finally, the weight will operate the pawl, so as to throw its upper end out of engagement with the rack 19. Then when the motor is reversed by semi-rotation, bringing the lower section 2 uppermost, so that the sand will run back into section 1, such rotation, through the spring 23, throws the pawl 22 back into re-engagement with the ratchet 19, and this swings the point of the pawl 26 upward into engagement with the next tooth on the rack, and then when all of the sand has run from section 2 into section 1 the pawls 22 and 26 again operate to from section 2 into section 1, and the pawls 22 and 26 again operate to rotate the dial the distance of another tooth on the back or another figure on the face.

In Fig. 4 C C are standards upon which the shaft is journaled, and in this instance each section is provided with a lug 27 upon the exterior surface of the body. D is a standard, in the top of which a shaft 28 is journaled, and 29 is a pinion secured upon this shaft, and 30 is a gear-wheel secured upon the same shaft, and 31 and 32 are a pinion and gear connecting the gear 30 to the driving-pinion 33 upon the drive-shaft 34, rotating the drive-pulley 35, and 36 is the driving-belt. To actuate this train of gearing, I use the quadrant E, geared upon its curved outer end and meshing with the pinion 29 and pivotally mounted, and its inner end 37 constitutes an arm, which engages with the lug 27. Upon the outer end of the quadrant I secure an arm 38, and 39 is a weight adjustably mounted upon the arm. Then as the sand runs out of the upper section that section becomes correspondingly lighter, the weight lowers proportionally lifting the upper section, thus rotating the pinion 29 and through the train of gearing rotates the drive-pulley 35, and this rotation will continue until all of the sand has run down. Then I reverse the motor, bringing the arm into engagement with the lug on the then upper section, and the sand again runs from the upper section, and the mechanism again starts up.

In Fig. 5, H is an electro-magnet of any ordinary construction and energized by any system of wiring, (not shown,) and the armature 40 is pivotally mounted above one pole and adapted to make a contact with the other, being normally supported out of contact by a spring 41. The armature is extended outward and engages with a lug on the upper section of the motor, as shown by the dotted lines, and then as the sand runs out of the upper section the spring 42, Fig. 6, will gradually lift this section and eventually raise the outer end of the armature, so that its inner end will make a contact with the electro-magnet, making a circuit through a wire (not shown) connected to the armature, and ringing a bell or sounding an alarm. Then I reverse the motor and set it again to give another alarm at a future period of time, which is regulated by the graduated size of the open-

ings through the plate, which is shown in Fig. 6 as inserted through the connecting-sleeve, and the sleeve has an internal annular groove 43 at each end, while each section has a rim or flange engaging therewith.

It will be seen that when I use the motor for a single specific object and a specific time I can use a slide with only one sand-opening through it.

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

1. A motor comprising an hour-glass bisected at the neck, a sleeve connecting the sections, and means for supporting it, as set forth.

2. A motor comprising an hour-glass bisected at the neck, a sleeve connecting the sections, a spring between the ends of the neck, and means for supporting it, as set forth.

3. A motor comprising an hour-glass bisected at the neck and concaved in the ends of the neck-sections, a sleeve fitting over the necks and connecting the sections, and means for supporting it, as set forth.

4. A motor comprising an hour-glass bisected at the neck and concaved in the ends of the neck-sections, a sleeve fitting over the necks and connecting the sections, a spring between the ends of the neck, and means for supporting it, as set forth.

5. The combination, with an hour-glass, of a slide having vertical openings graduated in size inserted transversely to the neck, and an opening in the slide coinciding with the opening through the neck.

6. A motor comprising an hour-glass bisected at the neck, a sleeve connecting the sections, and a slide having vertical openings graduated in size inserted transversely to the neck, the opening in the neck being in line with one of those in the slide, and means for supporting it, as set forth.

7. A motor comprising an hour-glass bisected at the neck, recesses in the necks, a sleeve fitting over and connecting the neck-sections, means for connecting the sleeve to the recesses in the sections, and means for supporting the motor, as set forth.

8. A motor comprising an hour-glass bisected at the neck, a sleeve connecting the sections, and a spring between the ends of the sections and a shaft upon which it is mounted, in combination with a dial and a ratchet mounted upon the shaft and a pivotally-mounted pawl engaging at one end with the ratchet and at the other with the lower section of the motor.

9. A motor comprising an hour-glass bisected at the neck, flanges upon the ends of the neck-sections, a sleeve fitting over the necks and recessed internally to receive the flanges, a slide provided with graduated openings inserted through the sleeve between the necks, and separate springs above and below the slide and bearing against the slide and the ends of the necks, as set forth.

In witness whereof I have hereunto set my hand this 6th day of February, 1890.

WILLIAM DEAN HAWLEY.

In presence of—
HOWARD P. DENISON,
F. T. DENISON.