No. 700,454. Patented May 20, 1902.

S. P. THRASHER.

SECONDARY ELECTRIC CLOCK.

(Application filed Feb. 23, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

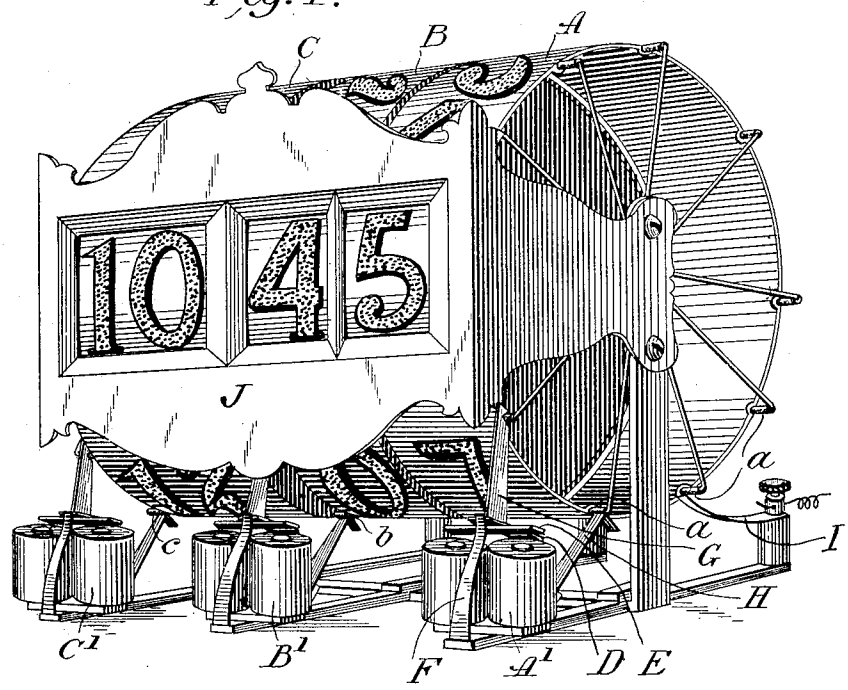
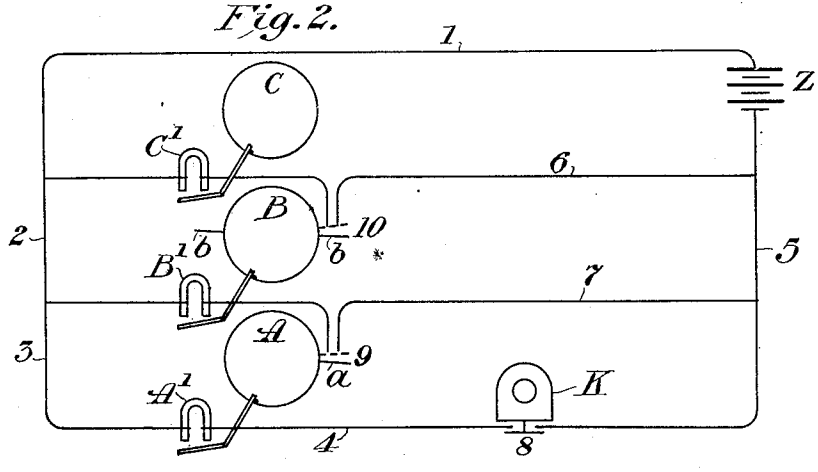


Fig. 2.



WITNESSES:

W. Hackley

D. S. Allyn

INVENTOR

Samuel P. Thrasher.

BY

R. Cunliffe

ATTORNEY

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Fig. 3.

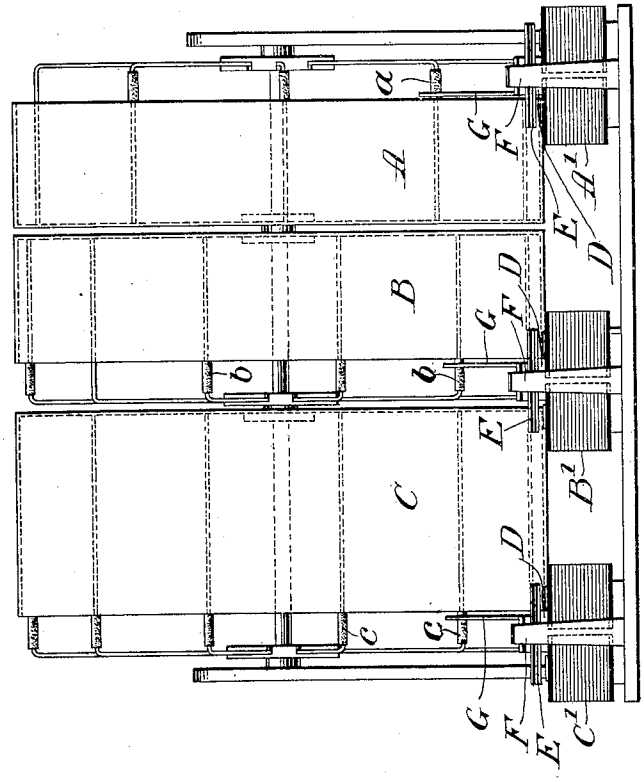
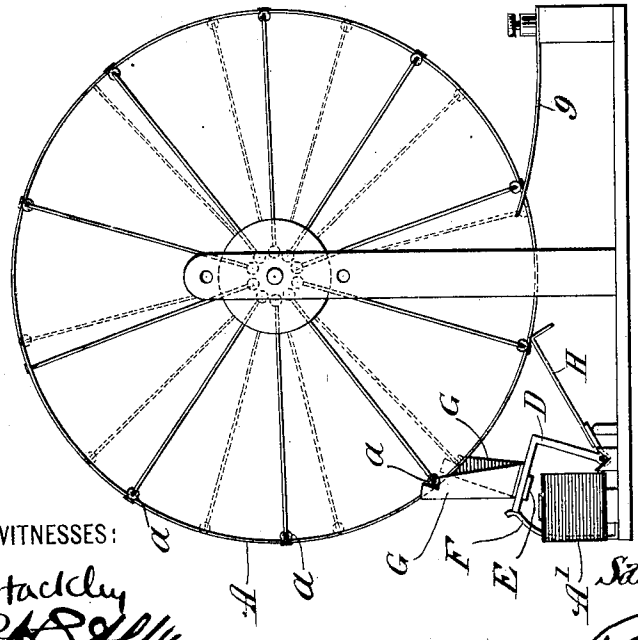


Fig. 4.



WITNESSES:

W. Hadley

INVENTOR

Samuel P. Thrasher.

BY

ATTORNEYS

UNITED STATES PATENT OFFICE.

SAMUEL P. THRASHER, OF NEW HAVEN, CONNECTICUT.

SECONDARY ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 700,454, dated May 20, 1902.

Application filed February 23, 1901. Serial No. 48,399. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. THRASHER, a citizen of the United States, residing at New Haven, New Haven county, Connecticut, have invented certain new and useful Improvements in Electrical Time-Indicators, of which the following is a full, clear, and exact description.

My invention relates to improvements in electrically-controlled time-keeping devices and the like, and has especial reference to means for indicating time by figures or numerals placed upon rotating disks, drums, belts, or the like. Obviously the mechanism may be adapted to advertising devices, whereby advertisements may be substituted in place of the numerals, which advertisements may be brought successively into view.

The object of my invention is to provide a simple, inexpensive, effective, and durable means whereby a device such as previously referred to may be operated.

In the drawings, Figure 1 is a perspective view of the preferred form of my invention as applied to time-keeping devices. Fig. 2 is a diagrammatic view of a circuit. Fig. 3 is a front elevation of the apparatus shown in Fig. 1, the cover-plate being removed. Fig. 4 is an end view of Fig. 3 looking from right to left.

In the preferred form of my invention as applied to time-keeping devices I employ a series of drums A, B, and C, which are suitably mounted so that they may be rotated by the action of the electromagnets A′ B′ C′, respectively. These magnets are located in a circuit, to be hereinafter described, and may be operated separately or simultaneously. In the particular form shown in the drawings the drums are provided with projections *a b c*, respectively, extending beyond the edge thereof, so as to be engaged by the propelling and locking mechanism. One or more of these projections may perform the function of one of the members of a circuit-closer. To that end, therefore, I prefer to insulate in any well-known way all of said projections *a b c* excepting those selected for the purpose of closing the circuit. When employed as a time-keeping device, the drum A is moved one interval every minute, and is consequently divided into ten spaces, which may be numbered from "0" to "9," inclusive. The drum B is designed to indicate the tens of minutes, and consequently may be divided into six sections or, preferably, into two series of six sections each, as shown, each of these series bearing numbers "0" to "5," inclusive, so that it may register in conjunction with the numerals upon the drum A the minutes from "10" to "59." The drum C is designed to indicate the hours of the day, and may consequently be divided into twelve sections bearing numbers "1" to "12," inclusive. Obviously the division of the drums is purely an arbitrary one. For example, the drum A when used for a time-keeping device might be divided into ten sections or any multiple thereof, the drum B might be divided into six sections or any multiple thereof, and the drum C might be divided into twelve sections or any multiple thereof. The same is true in case disks or belts might be substituted for the drums as the numeral-carrying devices. Of course when the apparatus is used as an advertising means the divisions of the drums or their equivalents need not be considered as important.

The means by which the drums A B C are preferably rotated are the electromagnets A′ B′ C′. Each of these magnets may be operated independently of the others, and inasmuch as the mechanism intermediate of the magnet and the drum is similar for each of the three magets it will be necessary to describe the mechanism of only one of these magnetic controllers.

Referring particularly to Figs. 1, 3 and 4, D is a movable frame carrying an armature E. F is a spring, the shape and arrangement of which is immaterial so long as it serves to tilt the frame D, so that it will move the armature E away from the magnet A′ when the latter is deënergized. G is a locking device carried by the frame, which, in its preferred form, is a blade having a notch at its upper end adapted to engage and hold any one of the extensions *a* of the drum A when the frame D is in the position shown in the drawings. H is an arm carried by the frame D, which arm is preferably in the form of a spring-blade, the end of which may be bent downward to present a beveled or inclined face to any one of the projections *a* that may approach it as the drum is revolving. The function of the arm

H is to propel the drum. When it is desired to rotate the drum A, the circuit is closed through the magnet A′, whereupon the armature is drawn toward the core of the magnet, thereby withdrawing the locking-arm G from engagement with the projection *a*. At the same moment the propelling-arm H presses against another one of the extensions *a* in such manner as to drive the drum ahead. The next instant the circuit is broken and the parts are caused to assume their normal position, whereupon the locking-lever G stands ready to catch and hold the next approaching projection *a*. The frame D is preferably of substantially the form shown in the drawings—for example, Fig. 4—in which it will be observed the frame is bent at substantially right angles, one end overstanding the magnet, while the other end is hinged at a point near the base of the magnet and between the magnet and the axis of rotation of the drums A B C. Consequently the frame D may partake of a long range of movement without moving the whole armature E out of the field of the magnet. This permits with a comparatively short stroke of the frame a long sweep of the propelling-arm H. This construction also permits the adjustment of the parts so that the transmitted power may be equalized, thereby taking the best advantage of the natural operation of the magnet. The strength of the springs and of the magnet, &c., is merely a matter of adjustment, and may be varied at the will of the mechanic to meet the requirements. One advantage of having the propelling-arm H in the form of a spring-blade is that it allows of the same becoming slightly flexed before the locking-lever G has been entirely withdrawn from engagement with the drum. Consequently the latter may be snapped ahead by a short elastic stroke instead of being moved positively the full distance that it is required to travel. Another advantage of having the propelling-arm H in the form of a blade is that it is silent or practically silent in its operation. Again, by having the arm yielding should any of the projections *a* hit against the beveled or inclined end of the propelling-arm H as they move toward the same the same would be depressed, and the spring would bring the arm back to its normal position. 9 represents blades or brushes which are located in the path of movement of the projections *a b*. The function of the said brushes is to complete the circuit through the magnets B′ C′, respectively. Both of these blades are illustrated diagrammatically in the circuit sketch.

In case the drum B is divided into twelve sections bearing two series of numerals "0" to "5," it is obviously necessary that two of the projections *b* be uninsulated, because obviously when one series of numerals "0" to "5" have passed the opening through which the numbers are seen in the face-plate J it is then time to advance the hour-drum one step. Of course if three or more series were provided a number of uninsulated points should be arranged, one for each series.

It is designed to time the operation of the drum A by means of a master-clock K, which controls the circuit-closer 8. (See Fig. 2.) Z is a battery. Wire 1 leads from the battery to the magnet C′. Wire 2 leads from the magnet C′ to the magnet B′. Wire 3 leads from the magnet B′ to the magnet A′. Wire 4 leads from the magnet A′ to the master-clock, and wire 5 leads from master-clock to the battery Z. Wires 6 and 7 lead from wire 5 to the magnets C′ B′, respectively, through circuit-closers 10 and 9, respectively. 8, 9, and 10 are circuit-closers. Circuit-closer 9 is controlled by the drum A. Circuit-closer 10 is controlled by the drum B. The circuit from the closers 8, 9, and 10 may be, instead of being effected through a wire or wires, simply a ground on the frame of the machine leading through the drums by the uninsulated projections *a* and *b*, respectively. For facilitating the explanation, however, the diagram illustrates the circuit as though wires were employed.

When the master-clock closes the circuit at 8, the magnet A′ is energized, whereupon the drum A is unlocked and advanced one step and then locked again. When the drum A has completed one revolution or has indicated the minutes from "0" to "9," inclusive, it operates to close the circuit at 9, energizing the magnet B′, whereupon the drum B is caused to rotate one step, which drum in turn when it is rotated the predetermined distance closes the circuit at 10, energizing the magnet C′, whereupon the drum C is advanced one step. Obviously the magnetic controlling devices may be operated singly or simultaneously.

It should be understood that in the drawings I have shown the preferred form and arrangement of the parts; but obviously the particular arrangement may be modified quite radically without departing from the spirit or scope of my invention.

It should be understood by the use of the word "drum" or "drums" in the claims that I intend to include any equivalents thereof—such, for example, the equivalents I have mentioned hereinbefore—and it should also be understood that I intend to employ no terms to unnecessarily limit the invention to time-keeping devices, since it might be employed to advantage in advertising, counting devices, &c.

Obviously instead of employing a normally open circuit a normally closed circuit could be employed in a manner obvious to any mechanic skilled in the art. It should be understood that I regard a "circuit-breaker" as the full equivalent of a "circuit-closer."

What I claim is—

1. In a device of the character described, a

drum, a plurality of projections on said drum, a movable frame, a locking-arm carried by said frame adapted to engage one of said projections, a propelling-arm carried by said frame adapted to rotate said drum by the same movement which releases said locking-arm, an electromagnet for moving said frame, and an electric circuit for controlling said magnet, and means for making and breaking said circuit through one of said projections.

2. In combination, a drum, an electric circuit, a circuit-closer, an electromagnet in said circuit, means to normally lock said drum from rotation, means to first put said drum under a rotative tension while said drum is locked and then unlock said drum and allow the same to rotate, means to stop the rotation of said drum after a certain amount of rotation, and means to control said electric circuit.

3. In combination, a drum, a plurality of projections thereon, a pivoted frame, a locking-arm carried by said frame and normally engaging one of said projections, a propelling-arm carried by said frame arranged to coact with said projections to move said drum, an electromagnet for moving said frame, an electric circuit for controlling said electromagnet and means for opening and closing said circuit.

4. In combination, a drum, a plurality of projections at the rim of said drum, a pivoted frame, a locking-arm rigidly mounted on said frame and normally engaging one of said projections, a flexible propelling-arm mounted on said frame adapted to press against and rotate said drum, and means to operate said frame.

5. In combination, a drum, a plurality of projections thereon, a pivoted frame, a locking-arm rigidly mounted on said frame and normally engaging one of said projections, a flexible propelling-arm rigidly mounted on said frame adapted to coact with said projections to rotate said drum, and means to operate said frame.

6. In a device of the character described, a drum, a plurality of projections on said drum, a movable frame, a locking-arm carried by said frame adapted to engage one of said projections, a flexible propelling-arm carried by said frame adapted to rotate said drum by the same movement which releases said locking-arm, and means for operating said frame.

7. In combination, a drum, a plurality of projections thereon, a pivoted frame, a locking-arm rigidly mounted on said frame and normally engaging one of said projections, a flexible propelling-arm mounted on said frame adapted to coact with said projections to rotate said drum, and an electromagnet for operating said frame.

8. In combination, a drum, a plurality of independent projections at the rim of said drum one of said projections being an electric conductor uninsulated, another projection being insulated, a normally open electric circuit, one terminal of which is said uninsulated projection, another terminal of said circuit comprising a circuit-closing blade which lies in the path of movement of said projections on said drum, an electromagnet in said circuit and means operated by said electromagnet to rotate said drum.

9. In combination, a drum, a plurality of projections carried by the frame of said drum one of said projections being an electric conductor uninsulated, another projection being insulated, a normally open electric circuit one terminal of which is said uninsulated projection, another terminal of said circuit comprising a flexible circuit-closing blade which lies in the path of movement of said projections on said drum, an electromagnet in said circuit and means operated by said electromagnet to rotate said drum.

10. In combination, a drum, a plurality of projections thereon, means to normally lock said drum from rotation, means to bear against and move said projections, both of said means being rigidly secured together and having a common pivot, an electromagnet to move said named means, and an electric circuit for energizing said magnet and means for making and breaking said circuit through said projections.

11. In combination, a drum, a plurality of projections thereon, means to normally lock said drum from rotation, means to bear against and move said projections, both of said means having a common pivot, an electromagnet to move said named means, and an electric circuit for energizing said magnet said circuit passing through at least one of said projections.

12. In combination, a drum, a plurality of projections thereon, a spring-pressed pivoted frame, a locking-arm rigidly mounted on said frame and normally engaging one of said projections, a flexible propelling-arm rigidly mounted on said frame adapted to coact with said projections to rotate said drum, and means to operate said frame.

Signed at New York, N. Y., this 21st day of February, 1901.

SAMUEL P. THRASHER.

Witnesses:
L. VREELAND,
G. T. HACKLEY.