S. P. THRASHER.

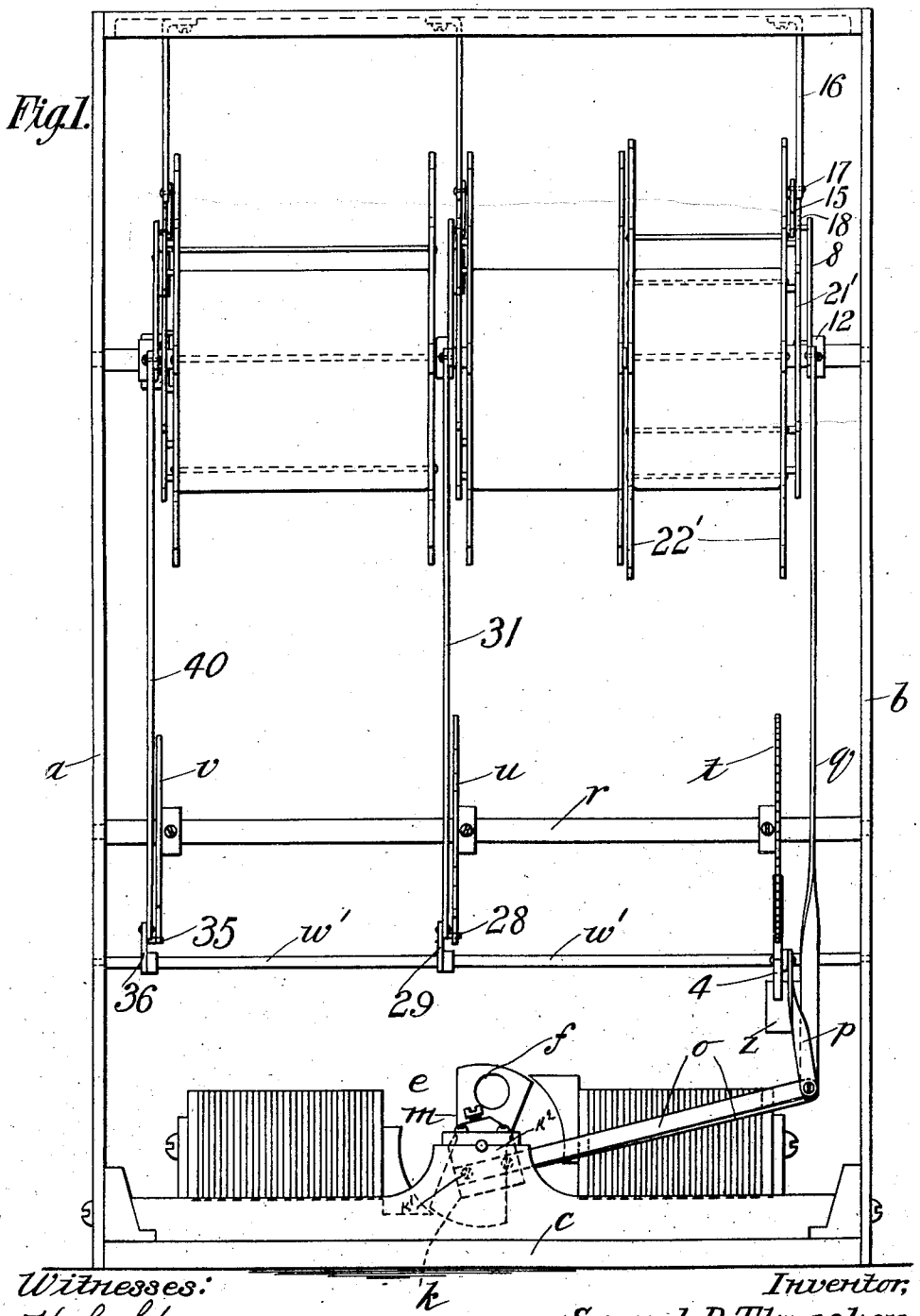
ELECTRICALLY CONTROLLED SECONDARY CLOCK.

APPLICATION FILED MAR. 20, 1908.

908,428. Patented Dec. 29, 1908.

3 SHEETS—SHEET 1.

Fig1.



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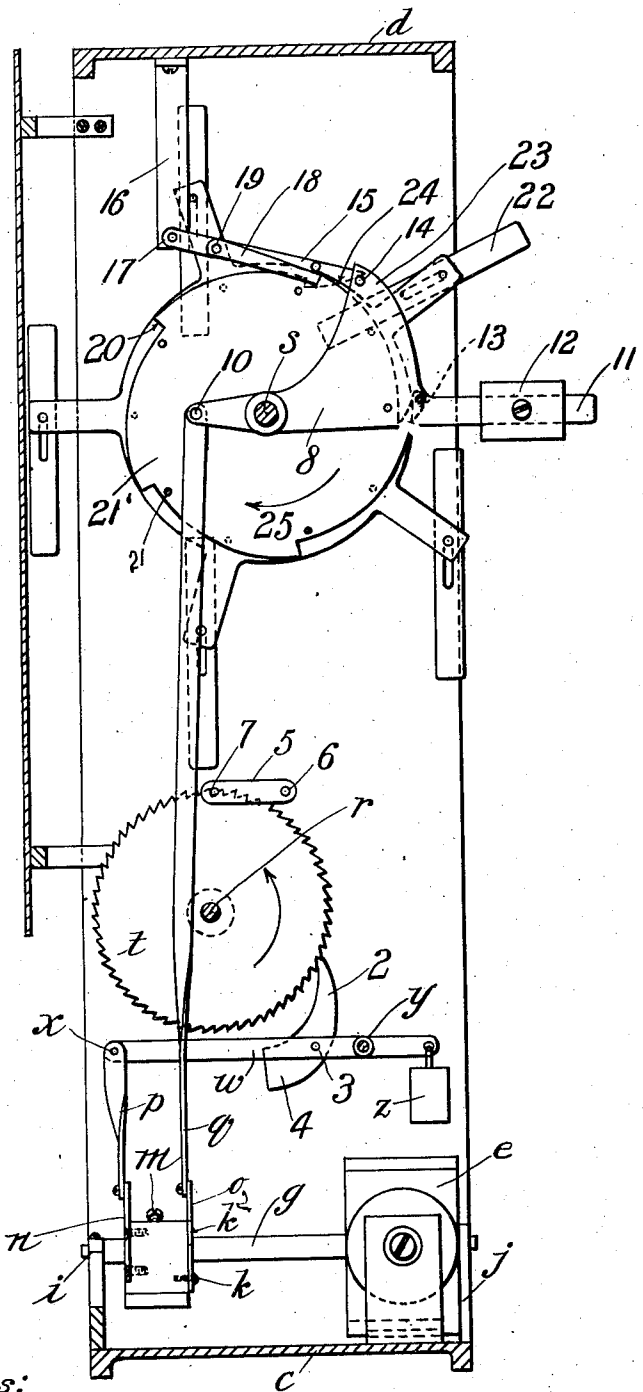
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

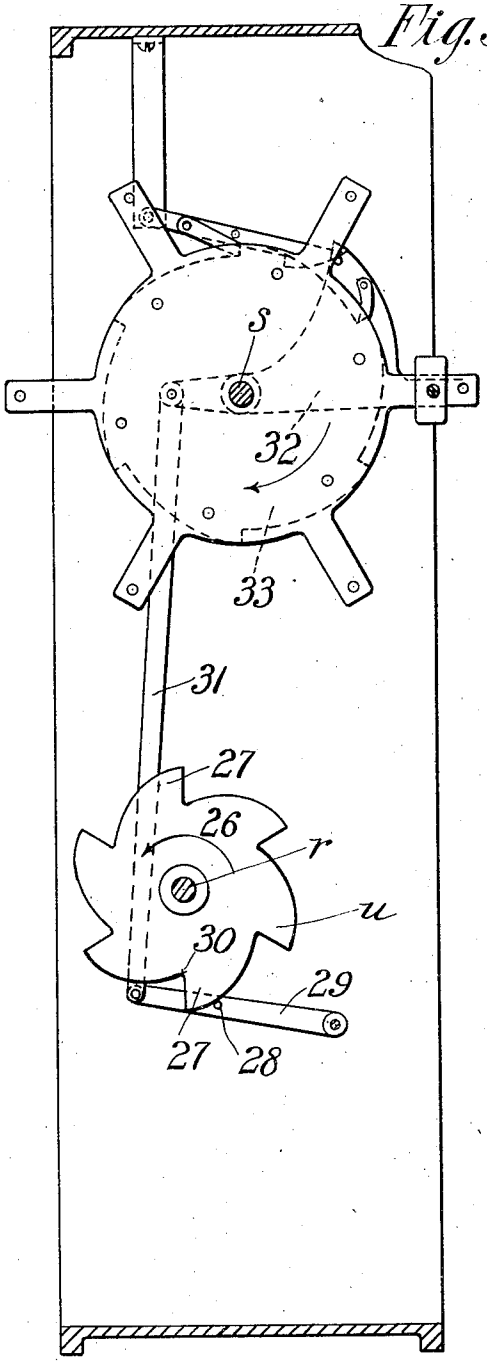
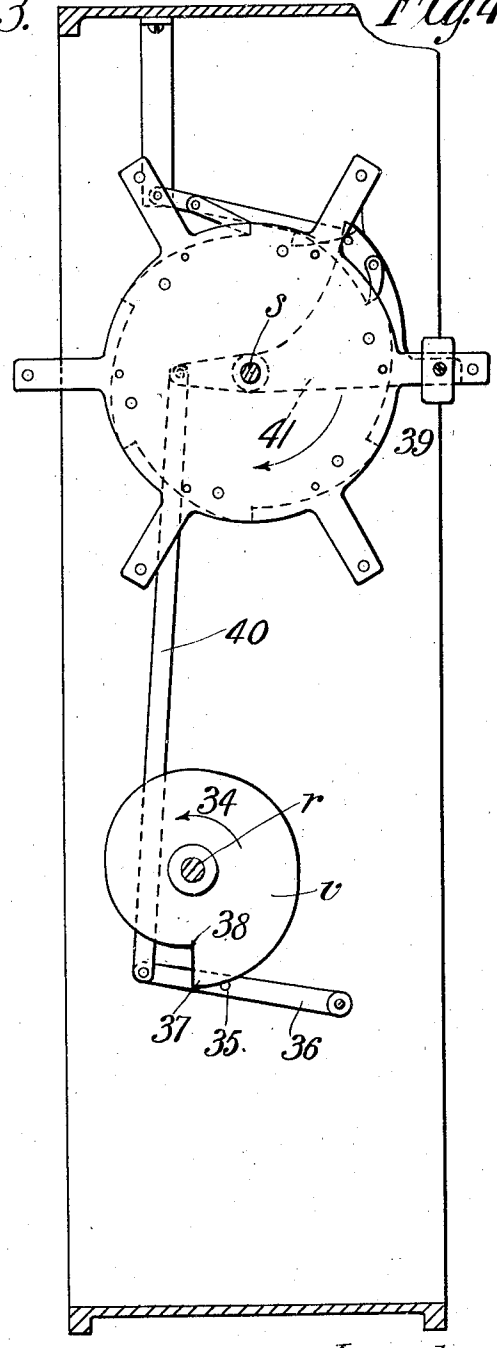


Fig. 4.



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UNITED STATES PATENT OFFICE.

SAMUEL POWERS THRASHER, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE THRASHER CLOCK COMPANY, OF MANCHESTER, CONNECTICUT, A CORPORATION.

ELECTRICALLY-CONTROLLED SECONDARY CLOCK.

No. 908,428. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed March 20, 1908. Serial No. 422,260.

To all whom it may concern:

Be it known that I, SAMUEL POWERS THRASHER, a citizen of the United States of America, residing at Hartford, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Electrically-Controlled Secondary Clocks, of which the following is a specification.

This invention relates to improvements in clock mechanisms.

Primarily it has for its object to provide an electrical mechanism that is adapted to be controlled by means of a master clock which is in circuit therewith, the electrical devices or mechanisms in turn serving as actuating means to operate gravity devices for propelling or driving the clock or timing mechanisms proper.

The present invention is an improvement upon the constructions shown in my prior applications for Letters Patent of the United States filed on September 4, 1906 under Serial Nos. 333,166 and 333,167, respectively, wherein I have fully shown, described, and claimed the specific construction of the time-indicating reversible cards, and the means of mounting and for reversing the same in a step-by-step manner.

The invention herein referred to, and which will be described in detail in the specification and particularly covered in the claims, relates to an electro-mechanically operating means for driving and controlling the clock mechanisms proper from a master clock.

In the drawings forming a part of this application,—Figure 1 is a front elevation of the invention showing the operative connecting means between the electro-magnet, the cam-shaft, and card-shaft. Fig. 2 is an end elevation of Fig. 1 with one of the side plates removed from the frame of the clock showing the link connection between the armature of the electro magnet and the gravity-actuating devices. Fig. 3 is a detailed side elevation showing the ten-minute cam construction and the gravity or weight-operating devices connected thereto for moving the corresponding minute cards. Fig. 4 is a side elevation showing, in detail, the hour cam and the weight-driving mechanism connected thereto for moving the corresponding hour cards.

Referring to the drawings in detail, *a* and *b* designate the side plates of the clock frame containing the clock mechanism, and *c* and *d* the top and bottom base-plates of the frame.

Mounted on the base-plate *c* is an electro magnet designated as a whole by the letter *e*. The details of construction of this electro-magnet form no part of this invention as the same is shown, described, and claimed in my prior application for Letters Patent of the United States filed November 6, 1907 under Serial No. 401,018. The armature of this electro-magnet is rotatably mounted on a shaft *g* at the bearing points *i* and *j*.

k designates a block that is secured to the shaft *g* by means of a set-screw *m*. Extending forwardly and upwardly from opposite sides of the block *k* are the arm or link pieces *n* and *o*, and connected with these link pieces are the links *p* and *q* for actuating the gravity-operating devices whereby the cam-shaft and card-shaft are respectively rotated. The arm *n* is rigid with the shaft *g* and is secured to the block *k* by rivets or other analogous devices, while the arm or link *q* is pivotally connected to the block *k* at k^1 and underlies a shoulder k^2 of the block *k*.

The cam-shaft is designated by the letter *r* and the card shaft by the letter *s*. Mounted on the cam-shaft *r* are the toothed wheels *t*, *u*, and *v*,—the wheel *t* being provided with 60 teeth representing minutes, and is therefore termed "minute-wheel", the wheel *u* with 6 teeth (which may be termed the ten-minute wheel) and the wheel *v* with only one tooth and is termed the hour wheel or cam.

Referring now to the means for driving the minute-wheel *t* which as aforesaid contains 60 teeth: Each tooth represents one minute of time and the link *p* is pivotally connected to the lever *w* at the point *x*. The lever *w* is pivotally mounted on the rod w^1 at the point *y* and its free end is provided with a weight *z*. The lever *w* is further provided with a pawl 2 which is pivoted to this lever at 3 and is so made as to swing toward the minute wheel *t* by reason of the over-weighted end 4 thereof.

5 designates a pawl for preventing the reverse movement of the minute-wheel *t* that is pivoted to the frame at 6 and has a pin 7 for engaging the teeth. When the electro-magnet *e* is energized, the armature *f* thereof will rotate the shaft *g* and cause the links *n* and *p* to draw the lever *w* downward and elevate the weight *z;* and when the electro magnet is deënergized, or the circuit is broken with the master clock, the weight *z*, moving in a reverse direction, will elevate

the pawl 2 and cause the wheel *t* to be rotated or advanced a distance or arc of one tooth, which represents one minute of time. At the same instant, the pin 7 on the pawl 5 will drop onto the wheel *t* back of a tooth, thus locking the wheel against any backward or reverse rotation.

The link *q*, which is attached to the pivotal arm *o*, will simultaneously, with the movement of the minute-wheel *t*, operate the lever 8 that is pivotally mounted on the fixed card shaft *s*. This lever is connected to the link *q* at the point 10 and carries on the arm 11 thereof the weight 12. The lever 8 is also provided with a pawl 13 and a pin 14 which are for the purpose of raising the latch 15 that is pivoted to the clock frame by means of a bracket 16, at the point 17. Pivotally mounted on the latch 15 is a gravity pawl 18 at the point 19, which is for the purpose of engaging the shoulders 20 of the card actuating disks and for preventing backward rotation thereof, while the latch 15 is for the purpose of engaging the pins 21 on the card-operating disks 21^1 that carry the minute cards 22, and locking the disks against forward rotation.

When the rotary magnet *e* is energized the weight 12 is elevated causing the arm 23 of the lever to rise. This arm brings the pin 14 against the curved surface 24 of the latch 15 disengaging the same from one of the pins 21 which then permits the pawl-lever 18 to trail over the edge of the disk 21^1 and engage the shoulder 20 of the card-actuating disks that carry the minute cards 22, that are rotatably hung between the arms 22^1, as fully described in my prior application. At the same time, that is when the magnet *e* is deënergized, the pawl 13 will engage the shoulder 20 of the disk 21^1 and rotate the same in the direction of the arrow 25 whereby a new minute card will be brought into view. The pins 21, it will be observed, serve to transmit the rotary movements of the disk 21^1 to the arm 22^1.

It will be noticed that the position of the lever 8, shown in Fig. 2, is such that the pawl 13 engages the shoulder 20 whereby the greatest leverage is exerted by the weight 12 on the card-disks, and is a gradually decreasing leverage, as the weight 12 falls: At the same time, or during the rotary movement of the disk, the gravity pawl 18 will trail over the edge of the disk 21^1 and drop into the succeeding notch preventing a backward rotation of the disk and at the same time the latch 15 will drop over one of the pins 21 thus holding the disk locked in both directions, that is against further rotation forward and against any tendency to rotate in a backward direction.

Simultaneously with the movement of the minute-wheel *t* the wheel *u* is turned forward in the direction of the arrow 26, and this cam is provided, as shown in Fig. 3, with six teeth designated at 27, so that when the minute-wheel has moved through ten minutes of time the pin 28 on the lever 29 will drop from one of the teeth 27 to the base of the succeeding tooth, designated at 30. This operation causes the link 31 (which is pivoted to the lever 29) to actuate the lever 32 whereby the disk 33 is rotated through a sixth of a revolution, causing one of the cards thereon to display the succeeding numeral of the tens place; that is, if the previous card, indicated 29 minutes for example, the next card would be moved to indicate 30 minutes: Simultaneously with the movements of the minute-wheel *t* and the ten-minute wheel *u*, the cam *v* (which is secured to the shaft *r*,) is moved forward in the direction indicated by the arrow 34 one-sixtieth of a revolution, and at the expiration of the hour, the pin 35 on the pivoted lever 36 will fall from the point 37 to the point 38 by reason of the weight 39, and the link connection 40, the weight 39 being mounted on an arm of the lever 41, which lever rotates the disk on which are mounted the hour-cards through one-twelfth of a revolution in the same manner as that already described in connection with Fig. 2.

The pawl, ratchet, and weight mechanism for moving the ten-minute and hour cards are operated from the links 31 and 40 in the same manner as that already described in connection with the minute cards which is clearly shown in Fig. 2.

The link *o* is pivotally connected to one side of the block *k* and below the shoulder or ledge portion k^2 so that as the weight 12 falls to drive the clock train, the link *q* will gradually lift the link *o* into engagement with the overhanging shoulder or ledge k^2 on the block *k*; and when this engagement occurs, the circuit is again closed from the master clock, causing another energization of the magnet *e* whereby the cycle of operations are again repeated.

What I claim, is:—

1. In combination, an electro-magnet, the poles of which are offset from the axial line of the magnet, an armature therefor having fan-shaped end portions normally maintained adjacent the poles, an armature-shaft, a block mounted thereon, a clock train, and link connections extending between the block and the clock-train.

2. In combination, a card-shaft, card-actuating disks mounted on the shaft, means for rotating the disks including an electro-magnet, said magnet being provided with oppositely arranged offset pole-pieces, a rotary armature, and link connections extending between the armature and the disk rotating means, as described.

3. In a time-measuring instrument, a cam-shaft, a minute-wheel, a ten-minute and an hour-cam mounted thereon, a card-shaft,

card-actuating disks mounted on the card-shaft, and means for driving the card-disks from the minute-wheel, ten-minute and hour-cams respectively, said means including a weighted lever, a pin thereon for unlocking the disks to permit rotary movement, a rotary magnet for actuating the lever, and connecting means between the lever and magnet, as described.

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