A. L. SOHM.

SECONDARY CLOCK.

APPLICATION FILED OCT. 29, 1910.

1,049,004.

Patented Dec. 31, 1912.

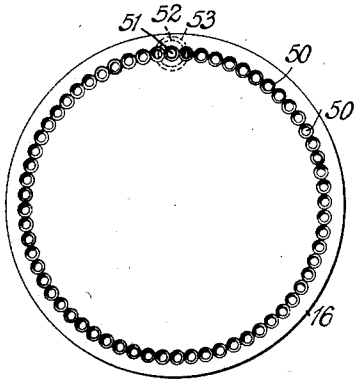

Fig. 3.

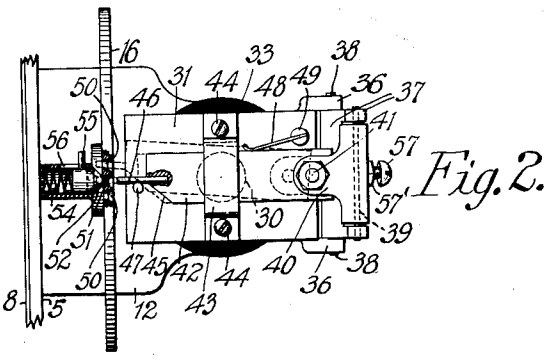

Fig. 2.

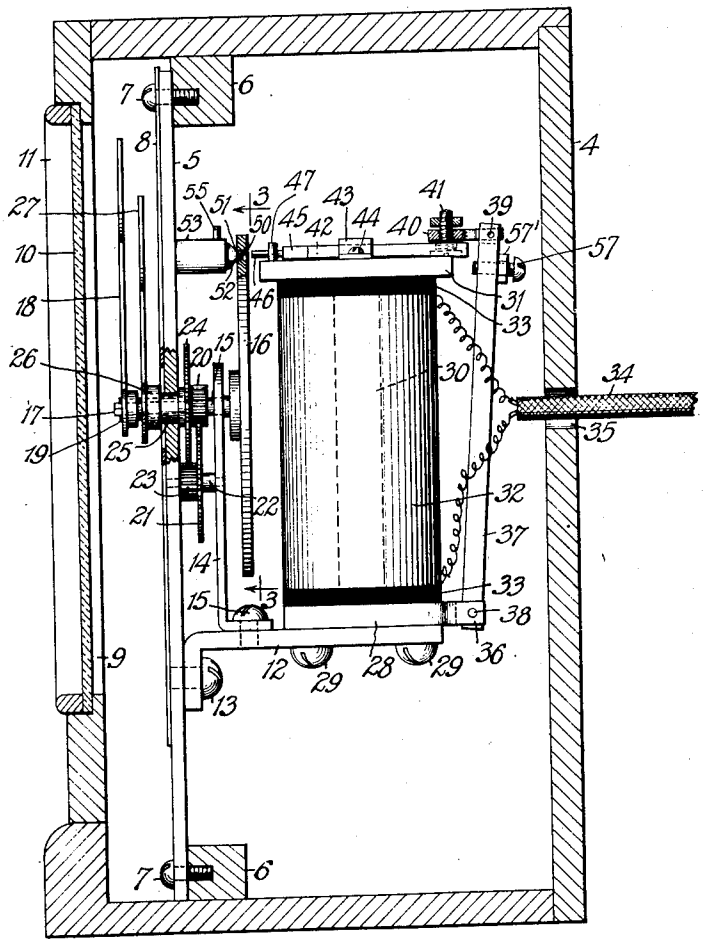

Fig. 1.

Witnesses:
Leonard W. Novander
Geo. E. Higham.

Inventor
Alfred L. Sohm
By Brown & Williams
Attorneys

UNITED STATES PATENT OFFICE.

ALFRED L. SOHM, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO SOHM ELECTRIC SIGNAL & RECORDING COMPANY, OF SPOKANE, WASHINGTON, A CORPORATION OF ARIZONA.

SECONDARY CLOCK.

1,049,004. Specification of Letters Patent. Patented Dec. 31, 1912.

Application filed October 29, 1910. Serial No. 589,673.

To all whom it may concern:

Be it known that I, ALFRED L. SOHM, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Improvement in Secondary Clocks, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to secondary clocks, such as are operated from a master clock by means of an electric current, and its object is to provide a simple, inexpensive and reliable structure.

My invention is a radical departure from the prior art in that complicated pawl and ratchet mechanisms are entirely dispensed with, a simple cam mechanism being substituted therefor. In this regard one of the salient prior art structures, where pawl and ratchet mechanisms were used, it was attempted, in order to avoid under and over-throw, to lock the member to be advanced against such action; but this was secured by a resilient, more or less heavy drag upon the member acted upon, and the result was that the power of the operating mechanism had to be increased to overcome the drag, and the same difficulty would again present itself. It is a feature of my present invention that positive locking means are provided and that merely a weak spring is employed to bring the locking mechanism into effect.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevational view of the structure, part being cut away to reveal the construction; Fig. 2 is an isolated plan view of the operating mechanism; and Fig. 3 is an isolated view taken on line 3—3 of Fig. 1.

Like reference characters are applied to the same parts throughout the various figures.

The clock casing is shown at 4. The operating mechanism is mounted upon a structural frame 5 secured to lugs 6, 6 on the inside of the casing by means of screws 7, 7. The structural support 5 carries a dial 8 directly upon its face and in front of this dial the casing 4 is provided with an opening 9 in which a glass cover 10 is held by means of the frame 11. Secured to the supporting frame 5 and extending rearwardly therefrom is the bracket 12, held in place by means of screws 13, 13, this bracket carrying the upright secondary bracket 14, held in place by means of the screw 15. Mounted in the bracket 14 and extending through an opening in the support 5 is a spindle 15, which, on its rear end, carries a disk 16, which will be referred to in detail later. The spindle 15, at its front end, is squared as shown at 17, and there carries the minute hand 18, which is thus disposed in front of the dial 8, a staypin 19 being provided to hold the minute hand in place. The spindle 15 carries a pinion 20 meshing with the gear 21, which gear is securely mounted upon a countershaft 22, mounted in the support 5 and the bracket 14. Also securely mounted upon the countershaft 22 is a pinion 23, which engages a gear 24, securely mounted upon a sleeve 25 surrounding the spindle 15 and properly journaled in the support 5. The sleeve 25 is tapered for the reception of a collar 26, held in place in this way by frictional engagement and carrying the hour hand 27 also disposed in this way before the dial 8. The gears of the train comprising the parts 20, 21, 23 and 24 are so relatively proportioned that the sleeve 25 will make one revolution to every twelve revolutions of the spindle 15; this means that the minute hand will make the proper number of revolutions relative to the hour hand.

Mounted upon the rear of the bracket 12 is a supporting plate 28 of magnetic material, this plate being held in place by means of the screws 29, 29. Extending upwardly from the plate 28 is a magnetic core 30 of soft iron, this core terminating in the horizontal supporting plate 31, also of magnetic material so as to form a part of the magnetic circuit which will be referred to. The energizing winding 32 is wound upon the core 30 between the rubber or fiber heads 33, 33, the terminals of this winding being connected with a cable 34 passing from the clock casing 4 by way of an opening 35. The lower supporting plate 28 is bifurcated, as shown at 36, 36, the armature 37 being mounted between these two ends upon the spindle trunnions 38, 38. At the top the armature 37 itself is bifurcated and there has pivoted thereto, upon the pivot 39, a link 40, which, by means of a swivel

bolt 41, is connected with the shuttle 42 mounted for reciprocation under the strap 43 held in place upon the horizontal supporting plate 31 by means of screws 44, 44. The shuttle 42 is provided with a cam surface 45, which will be referred to later, and is also provided with a forward extension in the form of a pin 46, disposed in proximity to the disk 16 near the periphery thereof. The pin 46 is held against the stud 47, secured in the supporting plate 31, by means of a leaf spring 48, extending from the post 49 secured in the plate 31. From Fig. 2 it will appear that the leaf spring 48 holds the shuttle 42 in a definite path during its reciprocation. The position shown in full lines in Figs. 1 and 2 is the normal position.

As shown in the drawings, the disk 16 is provided near its periphery with a plurality, preferably sixty, of openings 50, 50, arranged circularly and concentrically with the disk itself. These openings are so positioned that they may come opposite the pin 46 on the shuttle 42, and, as well, in alinement with a locking stud 51 carried upon a plunger 52 reciprocating in a cylinder 53. This cylinder is suitably secured to the support 5 and is provided with a coiled spring 54, which tends to move the plunger 52 outwardly, this movement being limited by the engagement of the pin 55 on the plunger with the ends of the slot 56 in the cylinder. It will appear from Fig. 2 that the spring 54 tends to hold the plunger 52 in engagement with the forward side of disk 16 and, if one of openings 50, 50 is in alinement therewith, to hold the locking stud 51 in such opening. The disk, the locking stud 51 and the pin 46, are so arranged that when the shuttle is in its normal position the locking stud will extend into one of the openings in the disk and will be in alinement with the pin 46.

The core 30, the supporting plate 31, the armature 37 and the supporting plate 28, constitute the magnetic circuit. The shuttle 42 is made of non-magnetic material and it will appear from Fig. 1 that when the winding 32 is energized the armature 37 will swing counter clockwise about the pivot 38 so as to bring the shuttle 42 forwardly. Since normally the pin 46 is in alinement with openings in the disk and with the locking stud 51, such energization of the winding will cause the pin to enter the particular opening and to force the locking stud 51 out of engagement therein. It will appear from Fig. 2 that as the winding is energized the cam surface 45 on the shuttle approaches the stud 47, and it is apparent that after the cam surface has come into engagement with the stud the shuttle will be forced upwardly, swinging about the swivel bolt 41. The bridge formed by the strap 43 is of such length as to provide for such movement. The pin 46 is of such length and the cam surface 45 is so disposed that the shuttle 42 will be confined to translatory movement until after the locking stud 51 has entirely been released from the disk 16. Then the cam surface 45 engages the stud 47 and the shuttle is moved upwardly into the position shown in the dotted lines in Fig. 2. This rotates the disk 16 and the movement of the armature 37 is preferably so adjusted that the disk 16 will be rotated only far enough to bring the next succeeding opening 50 into alinement with the locking stud 51. In fact, the locking stud will snap into the next opening 50 and will arrest any further movement of the disk at that time. The plunger may be moved manually by pin 55 in setting.

The armature 37 is provided with an adjusting screw 57, in the end of which engages the end of the supporting member 31, a lock nut 57′ being provided to hold the adjusting screw in any desired position. This adjusting screw may be set in such a way that a disk with any number of holes may be properly operated and I wish to be understood as contemplating any combination between the throw of the armature and the number of openings in the disk that might be desired in any particular instance. As shown in the drawings, the openings 50, 50 are countersunk so as to guide the pin 46 properly into the restricted part of the opening.

Since the spindle 15 carries the minute hand and the disk 16, it is clear that if the disk has sixty openings and if the winding 32 is energized once every minute through a circuit properly controlled by a master clock, the minute hand 18 will act in synchronism with the minute hand of the master clock, while the hour hand 27 will, by way of the gear train described, follow in the proper manner.

It is to be noted that my invention provides for absolutely locking the disk 16 against under and overthrow, this being accomplished by means of the plunger arrangement described. I consider this matter of great importance, since one of the most serious disadvantages of the prior art structures is overcome by my invention in this respect. In order to avoid under and over throw in prior devices, where pawl and ratchet mechanisms were used, it was usual to employ a detent pawl held in engagement with the ratchet by a stout spring so as to place a drag upon the ratchet. In order that the ratchet could be moved under this drag it was necessary to provide a strong electromagnet and to give the armature a considerable throw so that the mechanism would be effective in securing the advance of the ratchet. This, however, was

not satisfactory. In my device, however, the locking engagement is a positive one and not resilient. The coiled spring 54 may be a very weak one since all it need do is to move the plunger into engagement with the openings in the disk. The spring itself places no drag upon the disk and once having placed the plunger in proper engagement with the disk its necessary function ceases.

In addition to the advantages above pointed out, it will appear that the various operating parts of the structure of my invention are easy of access and are so individually constructed that they may be readily repaired and replaced. Adjustment is secured in a convenient manner and the friction which the electromagnet must overcome in its operation is reduced to a minimum.

I claim as new and desire to secure by Letters Patent:

1. In a secondary clock, a member mounted on an axis, an electromagnet, a shuttle reciprocating substantially parallel to said axis, means on said shuttle for engaging said rotary member, and means for throwing said shuttle out of its translatory path when it is in engagement with said rotary member so as to advance said rotary member.

2. In a secondary clock, a member mounted to rotate upon an axis, an electromagnet, a member reciprocating substantially parallel to said axis by the action of said electromagnet, said member being thus adapted to engage said rotary member intermittently, and means for throwing said reciprocating member out of its translatory path when it is in engagement with said rotary member so as to advance said rotary member.

3. In a secondary clock, in combination, a rotary member, an electromagnet, a member reciprocated by the action of said electromagnet, said member being adapted to engage said rotary member, and means for throwing said reciprocating member out of its translatory path when it is in operative engagement with said rotary member so as to advance said rotary member.

4. In a secondary clock, in combination, a shaft, a disk mounted on said shaft, an electromagnet, a shuttle operated by said electromagnet, said shuttle being adapted to thus intermittently engage said disk, and means for throwing said shuttle out of its translatory path when it is in operative engagement with said disk.

5. In a secondary clock, in combination, a rotary member, an electromagnet, a reciprocating member operated by said electromagnet, an engaging part carried by said reciprocating member, locking means normally in engagement with said rotary member for holding said member against rotation in either direction, and means whereby said reciprocating member may cause said engaging part to directly engage said locking means to release said rotary member therefrom and engage said rotary member to advance it.

6. In a secondary clock, in combination, a rotary member, an electromagnet, a reciprocating member operated by said electromagnet, an engaging part on said reciprocating member, positive locking means normally in engagement with said rotary member, and means whereby said engaging part may directly engage said locking means to release said rotary member therefrom and directly engage said rotary member to advance it.

7. In a secondary clock, in combination, a rotary disk, an electromagnet, a shuttle operated by said electromagnet, an engaging part on said shuttle, and a member resiliently held in a position to positively prevent rotation of the disk, energization of said electromagnet causing the movement of said shuttle to cause said engaging part to engage said locking member and move it from the path of said disk and to engage said disk to advance it.

8. In a secondary clock, in combination, a shaft, a disk having a plurality of apertures circularly arranged near the periphery thereof mounted on said shaft, an electromagnet, a shuttle having back and forth movement operated by said electro-magnet and being arranged to engage in said apertures upon the energization of the electromagnet, and means for moving said shuttle from its translatory path to carry said disk about the axis thereof.

9. In a secondary clock, in combination, a rotary disk, an electromagnet, a shuttle operated by said electromagnet, a point on said shuttle, said disk having a plurality of apertures near the periphery thereof arranged to come into alinement with said point on said shuttle, a locking plunger held in the opening in alinement with said point by a weak spring, energization of said electromagnet causing said point to enter the aperture in alinement therewith to remove said locking plunger therefrom, and means for shifting said shuttle to move said disk about the axis thereof.

10. In a secondary clock, in combination, a member to be advanced, an electromagnet having a metal supporting member at each end, an armature pivoted to one of said metal members and extending lengthwise of the electromagnet, being arranged to be attracted to the other metal supporting member, a shuttle mounted to reciprocate upon the last named supporting member, said shuttle being arranged for intermittent engagement with said member to be advanced, and a loose link between the free end of said armature and said shuttle.

11. In a secondary clock, in combination,

a member to be advanced, an electromagnet having a metal supporting member at each end, an armature pivoted to one of said metal members and extending lengthwise of the electromagnet, being arranged to be attracted to the other metal supporting member, a shuttle mounted to reciprocate upon the last named supporting member, said shuttle being arranged for intermittent engagement with said member to be advanced, a loose link between the free end of said armature and said shuttle, and means for adjusting the air gap between the armature and said last named supporting member.

12. In a secondary clock, in combination, a rotary member, an electromagnet, a supporting plate mounted on the end of said electromagnet, a shuttle mounted to reciprocate on said supporting plate, a stud in said supporting plate, a spring for holding said shuttle against said stud, a point on said shuttle normally held against said stud, and a cam surface on said shuttle for engagement with said stud so as to move said shuttle laterally.

13. In a secondary clock, in combination, a dial, a shaft, a minute hand on said shaft, a disk on said shaft, a pinion on said shaft, a sleeve on said shaft, an hour hand held upon said sleeve by friction, gear connection between said sleeve and said shaft, an electromagnet, a shuttle mounted to be reciprocated by said electromagnet parallel to said shaft, said shuttle being adapted to intermittently engage said disk, and means for throwing said shuttle out of its translatory path while it is in engagement with said disk.

In witness whereof, I hereunto subscribe my name this 21st day of October, A. D. 1910.

ALFRED L. SOHM.

Witnesses:
ARTHUR H. BOETTCHER,
ALBERT G. MCCALEB.