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1,448,816

F. J. REILLY

SECONDARY CLOCK

Filed Feb. 27, 1920

Fig. 1.

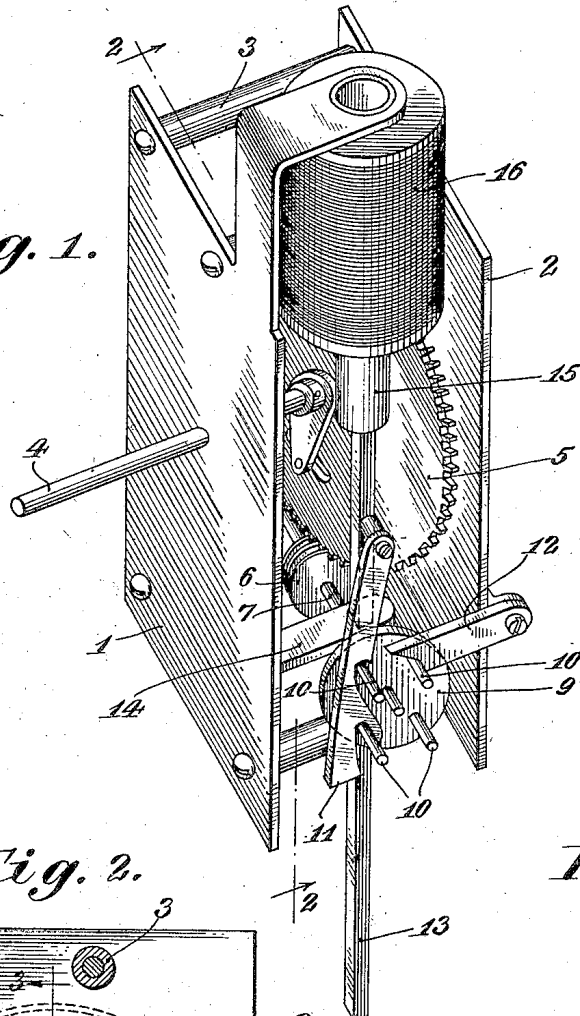


Fig. 2.

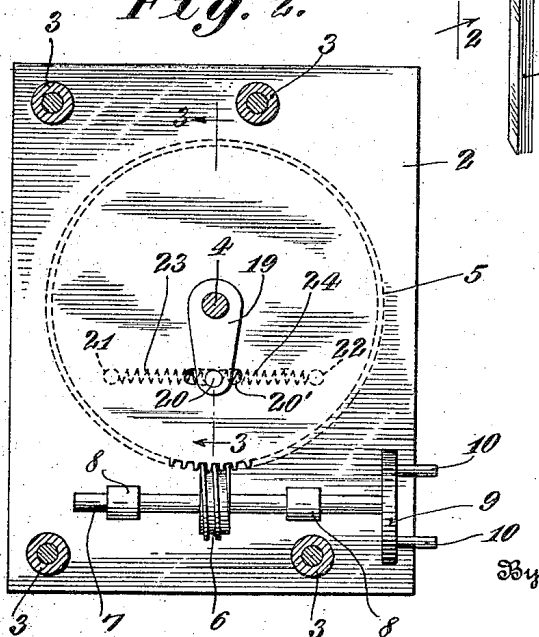
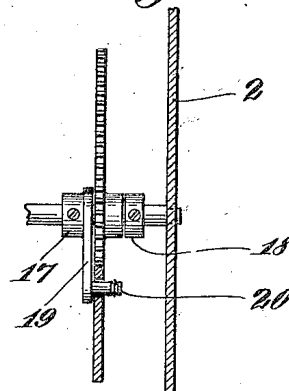


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANCIS J. REILLY, OF NEW YORK, N. Y.

SECONDARY CLOCK.

Application filed February 27, 1920. Serial No. 361,879.

To all whom it may concern:

Be it known that I, FRANCIS J. REILLY, a subject of the King of Great Britain, residing at New York city, borough of Manhattan, county and State of New York, have invented a certain new and useful Secondary Clock, of which the following is a specification.

This invention relates to clocks and, more particularly, to secondary clocks, a large number of which may be operated and controlled by a single primary, master clock.

Clocks of this general character are well known and are almost universally electrically operated from the master clock, which periodically completes an operating electric circuit controlling mechanism in each secondary clock to advance the hands thereof an angular distance corresponding with the interval of time between electrical impulses. While such a clock arrangement is usually employed for the control of a large number of clocks, its use is not thus restricted, since large belfry and tower clocks and advertising clocks, having large dials, are now, almost invariably, clocks of the secondary type herein under consideration.

The objects of the present invention, as differentiated from prior clocks, are to provide a secondary clock wherein the hands will be gravity operated; to thus simplify the construction of such a clock and render it unfailling in its operation; to provide a secondary clock movement which will be self-locking at all times, i. e., one wherein the hands will be automatically locked against inadvertent shifting; and to provide such a clock, as will be suitable for belfry and tower installation, with means whereby the movements of the hands are cushioned, that is to say, started and stopped at each successive movement thereof without shocks or vibrations.

Features of the invention, other than those specified, will be apparent from the hereinafter detailed description and claims, taken in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not, as defining the limits of the invention.

Figure 1 is a perspective view of a secondary clock movement embodying the pres-

ent invention, certain parts thereof having nothing to do with the present invention being omitted in the interests of clearness.

Figure 2 is a section taken in the plane of the line 2—2 of Figure 1; and,

Figure 3 is a section on the line 3—3 of Figure 2.

The secondary clock movement shown in the drawings is supported on a pair of plates 1 and 2 spaced apart by posts 3. This construction is, however, illustrative only and does not define the limitations of the invention, as the mounting for the movement will depend, in practice, entirely upon the environment in which it is to be used.

Mounted for rotation in the spaced plates 1 and 2 is the main arbor or spindle 4 which carries the minute hand (not shown) and geared to this arbor may be the usual hollow concentric shaft for the hour hand. These details of construction, however, form no part of the present invention and their adaptation to the movement, as illustrated, is well within the skill of any intelligent watch or clock maker.

The spindle 4 is operated by a gear 5 suitably mounted thereon and this gear is driven from a worm 6 fixed on a drive shaft 7. The shaft 7 is shown in Figure 2 as carried in bearings 8 supported on the interior of the plate 2. Fixed on one end of the drive shaft 7 is a drive disc 9 having a number of drive pins 10 with which cooperate two pawls 11 and 12. The pawl 11 constitutes the driving pawl and is pivoted at its upper end to an operating rod 13. The pawl 12 is for locking the disc 9 against retrograde rotation and is pivoted to the plate 2 so as to normally gravitate into engagement with the drive pins 10, as shown in Figure 1.

The rod 13, to which the pawl 11 is pivoted, is guided for vertical sliding movement in a bracket 14, and its upper end is fixed to the core 15 of a solenoid 16. This solenoid is included in an electric circuit with a suitable master clock, the function of which is to periodically energize the solenoid 16. Each time the solenoid is energized, its core 15 is elevated, carrying the rod 13 and driving pawl 11 pivoted thereto. As soon, however, as the circuit is broken and the solenoid deenergized, gravity acts upon the parts to impose the weight of the core, rod and pawl upon the driving pins 10 with the result that the disc is rotated, the worm

turns and the gear 5 is operated to turn the hands. The hands cannot, however, over-travel since the worm gear drive forms a highly efficient lock in precluding this. It will thus appear that the clock hands are operated by gravity, electrical means being utilized merely to position the parts to gravitate and operate the hand or hands. In this manner, the hands are given a step by step advance in accordance with the electrical impulses of the master clock.

The gear 5 has been hereinbefore referred to as suitably secured to the main arbor 4 and, in small clocks, this connection may be a rigid one. However, in large clocks, where the hands are frequently several feet in length and quite heavy, I have found a rigid connection to be unsatisfactory for the reason that the more or less sudden stopping and starting of the hands, due to the corresponding action of the worm, results in shocks and vibrations which are detrimental to the movement. Accordingly, in large clock construction, the connection between the gear and arbor is preferably yielding or resilient to compensate for these shocks or jars and such a construction as shown in the drawings proves of considerable advantage. In this showing, the gear is loose on the arbor between two fast collars 17 and 18. The collar 17 carries a rigid arm 19 on which is mounted a pin 20 projecting through an arcuate slot 20' found in the gear. Beyond the opposite ends of the slot are fixed pins 21 and 22 and springs 23 and 24 are secured to the pins 21 and 22 and to the pin 20 as clearly appears from Figure 2. The springs 23 and 24 are tensional alike and serve to normally centralize the pin 20 in the slot 20'.

With this construction, it will be apparent that the gear is started and stopped through the springs 23 and 24, which cushion the movements thereof in such manner as to dissipate detrimental shocks and vibrations.

It will be understood that the specific invention described may be modified in formal respects, such as by the substitution of equivalents, and that parts of the complete mechanism described may be used alone, or in other environments, without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A secondary clock embodying an arbor, a gear for driving the arbor, a worm meshing with the gear, and means for periodically rotating the worm through a predetermined number of angular degrees, in combination with resilient connections between the arbor and the drive gear for cushioning the stopping and starting of the arbor from

said gear as the worm is periodically operated.

2. A secondary clock embodying an arbor, a gear for driving the arbor, a worm meshing with the gear, and means for periodically rotating the worm through a predetermined number of angular degrees in combination with a normally balanced spring arrangement for resiliently securing the arbor to the gear, whereby the arbor is driven from the gear through said spring arrangement which serves to cushion the arbor against shocks or vibrations resulting from periodical sudden impulses imparted to the gear by the worm.

3. A secondary clock embodying an arbor, a gear for driving the arbor, a worm meshing with the gear, and means for periodically rotating the worm through a predetermined number of angular degrees, in combination with a radial arm on said arbor, a pair of opposed springs, one end of each of which is secured to said arm and the other ends of which are secured to the driving gear, for the purpose of driving the resilient driving connection between the gear and the arbor, whereby sudden starting and stopping of the drive gear, due to the driving impulses of the worm, are resiliently imparted to the arbor.

4. A secondary clock embodying an arbor, a drive gear loosely mounted thereon, and means for periodically rotating the drive gear through a predetermined number of angular degrees, in combination with resilient means for securing the arbor, off center to the drive wheel, off center, whereby the arbor is driven from the drive wheel through a resilient connection which cushions the starting and stopping of the drive wheel in its transmission to the arbor.

5. A construction of the character described embodying a substantially horizontal shaft, a disc rigidly associated therewith, and four pins extending parallel to the shaft and rigidly mounted on the disc, said pins being spaced in annular series about the axis of the shaft at equal distances apart, in combination with a solenoid provided with a movable core positioned with its axis vertical, a depending stem associated with the core, and a pivoted latch mounted on the stem and having at least one tooth adapted to engage with the pins in succession, whereby, when the solenoid is energized the core is elevated and when the solenoid is de-energized the core drops by gravity carrying the latch therewith for the purpose of driving said shaft through substantially ninety degrees.

In testimony whereof, I have signed my name to this specification.

FRANCIS J. REILLY.