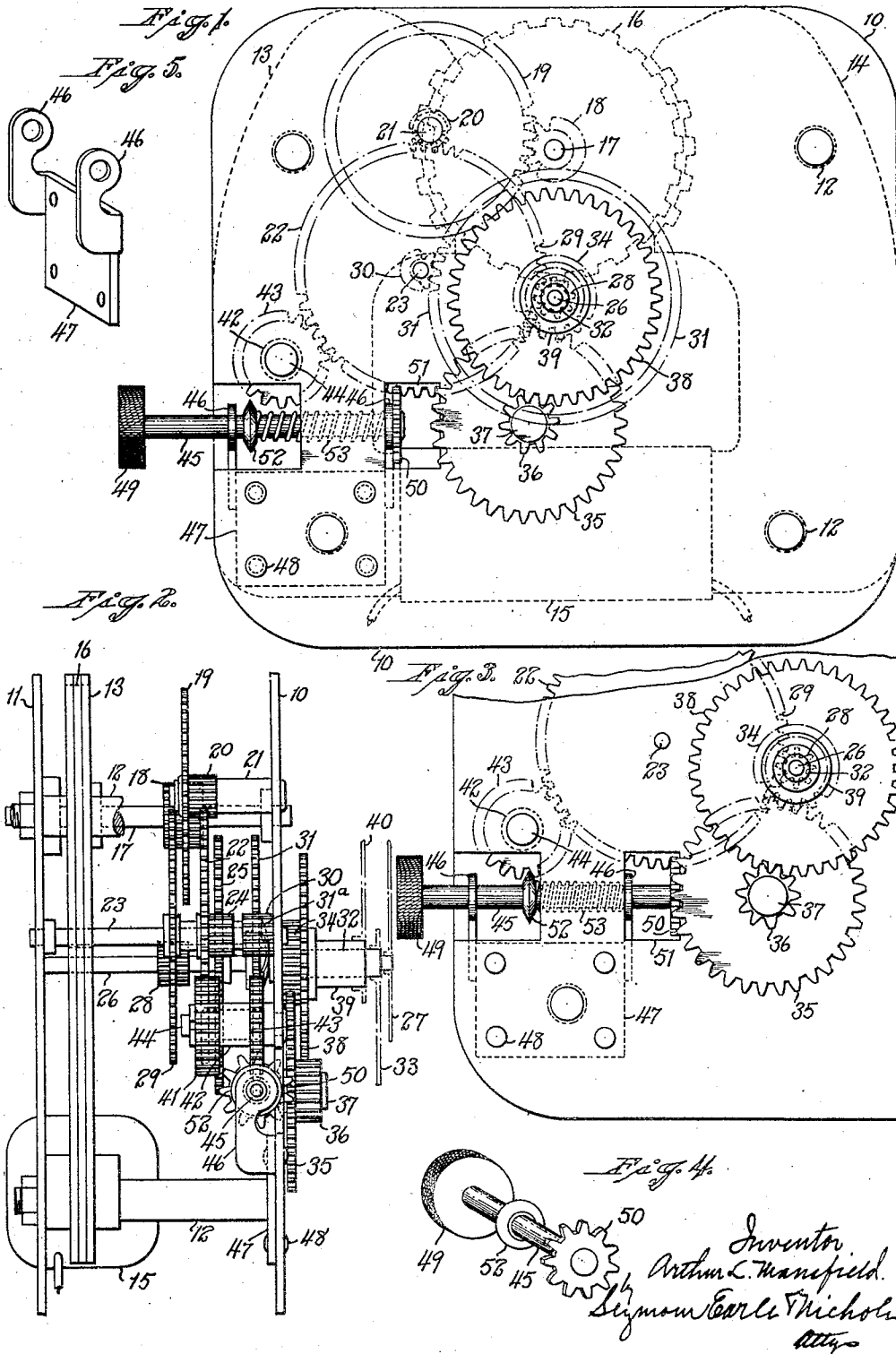


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SYNCHRONOUS ELECTRIC CLOCK AND THE
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8 Claims. (Cl. 58—26)

This invention relates to improvement in synchronous electric clocks and other synchronous time-instruments.

Heretofore, in synchronous electric clocks of the "manually-started" type, the means employed for starting the motor have been separate and distinct from the means employed for setting the clock, with the result that an appreciable degree of complexity of operation has existed and confusion has occurred on the part of the user.

One of the objects of my present invention is to provide a synchronous electric time-instrument having relatively few finger-buttons or like means for its control, etc.

A further object of my invention is to provide a synchronous electric time-instrument having unitary means for both setting its hands, or other indicating means, and starting its synchronous motor.

Other objects will appear to those skilled in the art from the following, taken in conjunction with the appended claims and the accompanying drawing.

In the accompanying drawing:

Fig. 1 is a view in front elevation of one form which a synchronous electric clock movement embodying my invention may assume, the combined starting-and-setting member being shown in its normal retired or inoperative position;

Fig. 2 is a view thereof in edge elevation, with the finger-button removed;

Fig. 3 is a fragmentary view corresponding to Fig. 1 but showing the combined starting-and-setting member in position for setting the clock and in position preparatory to being released for starting the motor;

Fig. 4 is a perspective view of the unitary starting-and-setting member detached; and

Fig. 5 is a similar view of the supporting-bracket detached.

The particular synchronous electric clock-movement herein chosen for the illustration of my invention includes complementary front and rear movement-plates 10 and 11 respectively coupled together in spaced relationship by means of pillars 12.

Mounted intermediate the movement-plates 10 and 11 is a synchronous electric motor consisting in the main of a stator-structure including complementary toothed pole-arms 13 and 14 energized by a usual electromagnetic coil 15 and having interposed between their respective opposed toothed faces a peripherally-toothed rotor 16 of magnetic material and mounted upon a rotor-

shaft 17 journaled at its respective opposite ends in the front and rear movement-plates 10 and 11. It may be here stated that the stator-structure just described exerts no appreciable self-starting torque upon the rotor 16 and that the latter must be manually rotated until it falls into synchronism with the pulsations of the alternating current supplied to the coil 15.

Mounted upon the rotor-shaft 17 about midway the length thereof is a pinion 18 meshing into and driving a gear-wheel 19 having staked to its forward face a pinion 20 and jointly mounted therewith for rotation upon a stud 21 rearwardly offsetting from the front movement-plate 10. The pinion 20 just referred to meshes into and drives a gear-wheel 22 mounted upon an arbor 23 with freedom for rotation with respect thereto. The said arbor 23 is journaled at its respective opposite ends in the front and rear movement-plates 10 and 11.

The wheel 22, above referred to, has staked to its front face a pinion 24 which meshes into and drives a seconds-wheel 25 staked upon a center-or seconds-arbor 26 forming a usual feature of synchronous electric clocks. The forward end of the seconds-wheel 26 just referred to carries a usual sweep-seconds pointer 27.

The seconds-arbor 26 has staked to it a pinion 28 meshing into and driving a gear-wheel 29 staked upon the arbor 23 before referred to for positively turning the same. The said arbor 23 has staked to it, adjacent its forward end, a pinion 30 meshing into and driving a minute-wheel 31 mounted upon and frictionally-coupled by means of a friction-washer 31^a to the rear end of a minute-sleeve 32 to turn freely upon the seconds-arbor 26 before referred to. The minute-sleeve 32 just referred to carries at its forward end a usual minute-hand 33.

Immediately forward of the front movement-plate 10 the minute-sleeve 32 has secured to it a usual cannon-pinion 34 meshing into and driving a dial-wheel 35 to which latter is staked a pinion 36 which, together with the said wheel 35, is mounted with freedom for rotation upon a stud 37 forwardly offsetting from the front movement-plate 10. The said pinion 36 meshes into and drives an hour-wheel 38 rigidly mounted upon the rear end of an hour-sleeve 39, which latter turns loosely upon the periphery of the minute-sleeve 32 and carries at its forward end the usual hour-hand 40.

The above-described parts constitute a synchronous electric clock-movement of more or less usual construction.

Meshing into the gear-wheel 22 is a gear-wheel 41 rigidly mounted at the rear end of a sleeve 42, which latter rigidly carries at its forward end a toothed impulse-wheel 43. The unit comprising the wheels 41 and 43 and the sleeve 42 are mounted for rotation upon a stud 44 rearwardly offsetting from the front movement-plate 10. Arranged in line with the impulse-wheel 43 just above referred to is a combined starting-and-setting rod 45 mounted with capacity for both reciprocation and rotation in the complementary arms 46—46 of a sheet-metal bracket 47 riveted, or otherwise secured, as at 48 to the rear face of the front movement-plate 10 in position to have its arms 46—46 rearwardly offset therefrom. At its outer end the rod 45 carries a knurled finger-button 49 by means of which it may be both reciprocating and rotating, as will hereinafter appear. The extreme inner end of the rod 45 has staked to it a toothed setting-wheel 50 extending laterally through a clearance-opening 51 in the front movement-plate 10 in position to have its teeth engaged, when desired, with the teeth of the dial-wheel 35 before referred to, as clearly shown in Fig. 3 of the drawing.

Intermediate its respective opposite ends and between the arms 46—46 I rigidly mount upon the rod 45 an annular projection or impulse-collar 52 having its annular edge chambered to mesh between the teeth of the impulse-wheel 43 when axially moved for that purpose, as will hereinafter appear. Interposed between the impulse-collar 52 and the innermost of the bracket-arms 46 is a helical impulse-spring 53 encircling the rod 45 and exerting a constant effort to move the same, together with the parts organized therewith, axially outward into a retired position, in which the impulse-collar 52 is clear of the impulse-wheel 43, and the setting-wheel 50 is similarly disengaged from the dial-wheel 35.

Presuming that current is flowing through the coil 15, so as to magnetically energize the pole-arms 13 and 14 of the synchronous motor, the rotor 16 and hence the clock-movement may be started and the minute- and hour-hands 33 and 40 respectively properly set by sliding the starting-and-setting rod 45 inwardly against the counter urge of the spring 53, so as to engage the impulse-collar 52 with the impulse-wheel 53 and also engage the setting-wheel 50 with the dial-wheel 35. The parts will now have assumed the positions in which they are shown in Fig. 3.

With the combined starting-and-setting member (comprising the parts 45, 49 and 50) moved into the position in which it is shown in Fig. 3, an appropriate turning movement upon the finger-button 45 will serve to set the minute- and hour-hands 33 and 40 of the clock through the intermediary of the dial-wheel 35. The setting of the hands 33 and 40, as just referred to, takes place independently of the major portion of the time-train and of the rotor, owing to the fact that the minute-sleeve 32 is frictionally and hence yieldingly coupled to the minute-wheel 31 and may be turned relatively thereto.

After the clock has been properly set, the finger-button 49 may be released, whereupon the spring 53 will assert itself and move the rod 45 rearwardly with the effect of causing the impulse-collar 52 to impart a clockwise rotary impulse to the impulse-wheel 43, and since the latter is connected (through the intermediary of the parts 42, 41, 22, 20, 19, 18 and 17) with the rotor, the latter will thereby have imparted

to it a counterclockwise rotary impulse, after which impulse the said rotor will continue to run under the synchronous torque afforded by the pole-arms 13 and 14.

It is obvious that instead of employing the spring 53, or equivalent spring-member, for imparting the impulse to the rotor 16 upon the release of the combined starting-and-setting member, the rotor may be started by manually moving the rod 45 by means of its finger-button 49.

From the foregoing, it will be clear that by means of my invention, the user of a synchronous time-instrument is enabled with the utmost facility to both set and start the instrument with the minimum of uncertainty and confusion.

It will be understood by those skilled in the art that my invention may assume varied physical forms without departing from my inventive concept, and I, therefore, do not limit my invention to the specific embodiment herein chosen for illustration.

I claim:

1. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a setting-wheel associated with said settable indicating-means; and a manually-operable starting-and-setting rod carrying a setting-element and movable to engage said setting-element with said setting-wheel to set said indicating-means, and said rod carrying a starting-element and movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor.

2. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a setting-wheel associated with said settable indicating-means; and a manually-operable starting-and-setting rod carrying a setting-element and movable to engage said setting-element with said setting-wheel to set said indicating-means, and said rod carrying a starting-element and movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor; and spring-means associated with said rod to move the latter to cause said starting-element to rotate said starting-wheel.

3. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a setting-wheel associated with said settable indicating-means; and a manually-operable starting-and-setting rod having its longitudinal axis located in a plane extending in substantially the same general direction as the plane of said starting-wheel and carrying a setting-element and movable to engage said setting-element with said setting-wheel to set said indicating-means, and said rod carrying a starting-element and movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor.

4. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a setting-wheel associated with said

settable indicating-means; and a manually-operable starting-and-setting rod having its longitudinal axis located in a plane extending in substantially the same general direction as the plane of said starting-wheel and carrying a setting-element and movable to engage said setting-element with said setting-wheel to set said indicating-means, and said rod carrying an annular starting-element and movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor.

5. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a first setting-wheel associated with said settable indicating-means; and a manually-operable starting-and-setting rod mounted for both rotary and axial movements; a second setting-wheel carried by said rod and rotatable thereby for rotating said first setting-wheel to set said indicating-means; said rod also carrying a starting-element and axially movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor.

6. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a first setting-wheel associated with said settable indicating-means; and a manually-operable starting-and-setting rod mounted for both rotary and axial movements; a second setting-wheel carried by said rod and rotatable thereby for rotating said first setting-wheel to set said indicating-means; said rod also carrying a starting-element and axially movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor; and

spring-means associated with said rod to move the latter to cause said starting-element to rotate said starting-wheel.

7. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a first setting-wheel associated with said settable indicating-means; and a manually-operable starting-and-setting rod having its longitudinal axis located in a plane extending in substantially the same general direction as the plane of said starting-wheel and mounted for both rotary and axial movements; a second setting-wheel carried by said rod and rotatable thereby for rotating said first setting-wheel to set said indicating-means; said rod also carrying a starting-element and axially movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor.

8. In a synchronous electric time-instrument, the combination with a synchronous electric motor, including a rotor having a starting-wheel associated therewith; of settable indicating-means yieldingly coupled to said rotor and driven thereby, and a first setting-wheel associated with said settable indicating-means; and a manually-operable starting-and-setting rod having its longitudinal axis located in a plane extending in substantially the same general direction as the plane of said starting-wheel and mounted for both rotary and axial movements; a second setting-wheel carried by said rod and rotatable thereby for rotating said first setting-wheel to set said indicating-means; said rod also carrying an annular starting-element and axially movable to cause said starting-element to engage and rotate said starting-wheel to start said rotor.

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