Nov. 28, 1933. S. MAZUR 1,936,684

STARTING MEANS FOR ELECTRIC CLOCKS

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Fig. 1.

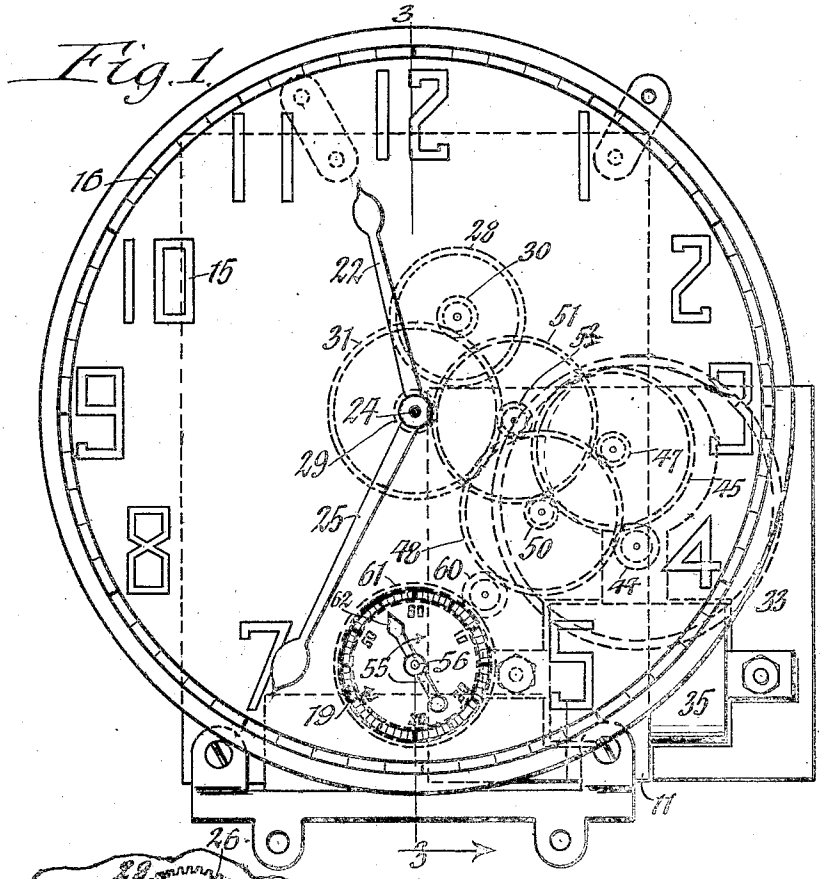
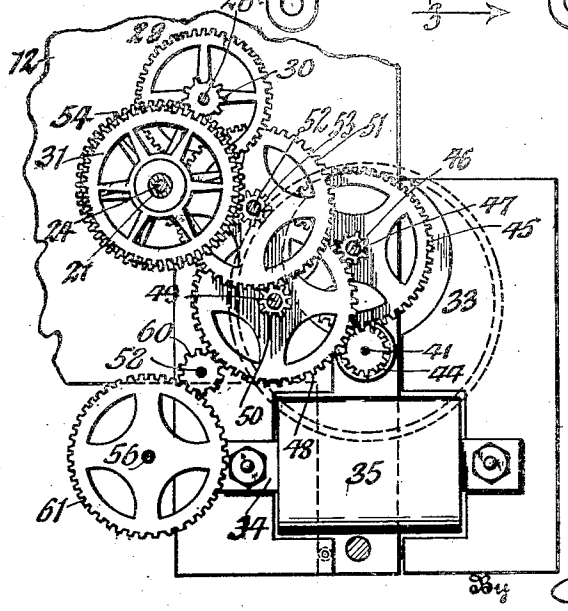


Fig. 2.



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Fig. 3.

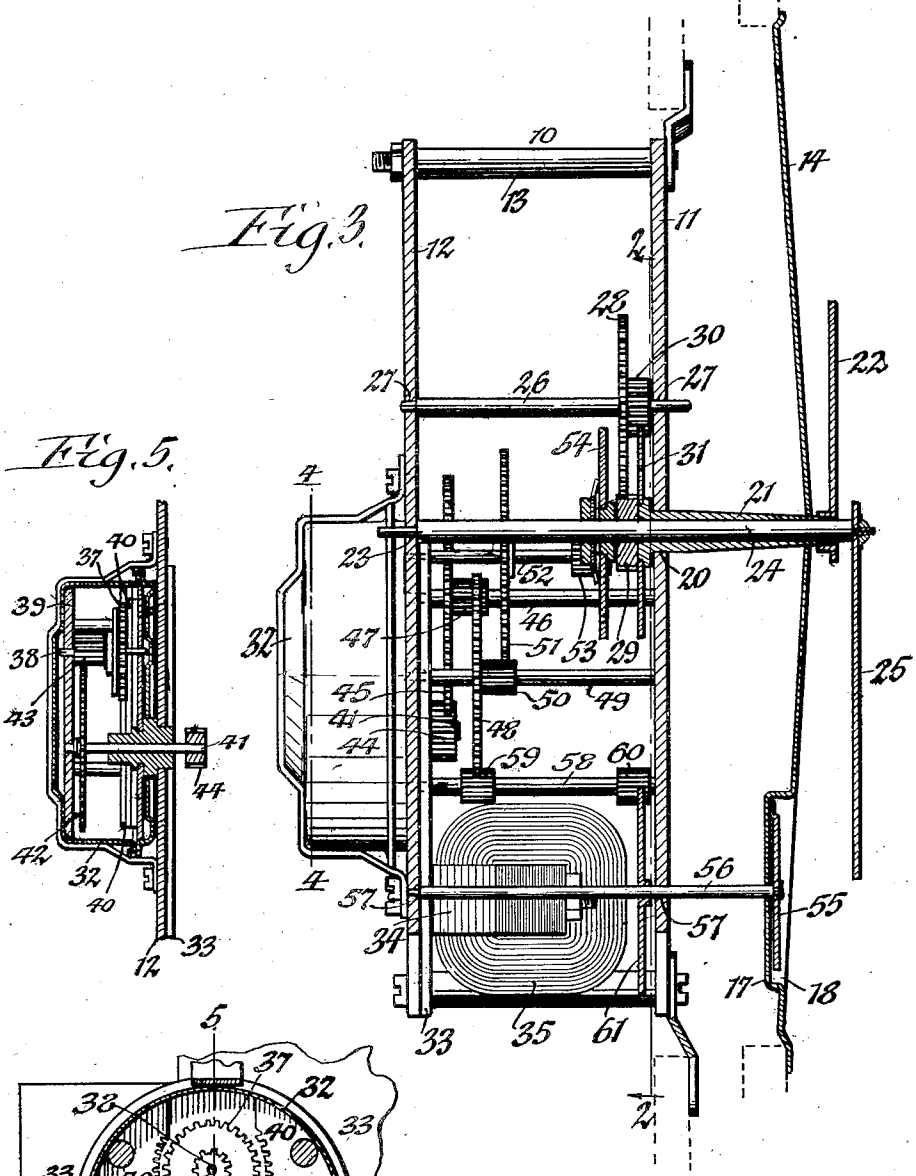


Fig. 5.

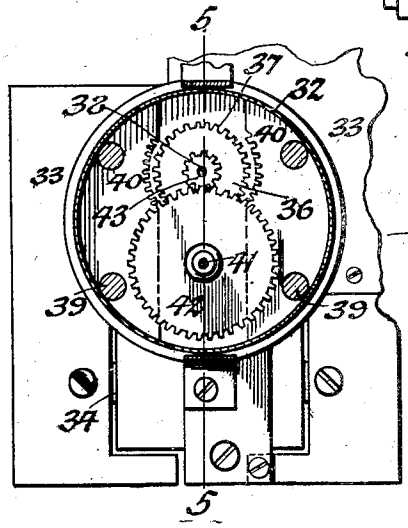


Fig. 4.

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STARTING MEANS FOR ELECTRIC CLOCKS

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Serial No. 502,311

1 Claim. (Cl. 58—26)

This invention relates to an electric clock which is operated by a synchronous electric motor which is preferably operated by an alternating electric current of sixty cycles so that each impulse corresponds to one-sixtieth of a second of time.

In some of the clocks of this character, as heretofore constructed, auxiliary driving means have been provided for maintaining the clock in operation for a brief period of current interruption in order to operate the clock as continuously as possible for indicating correct time.

Some electric clocks are also so constructed that they stop when the current supply is broken but start to run again automatically when the current supply is resumed.

Another form of electric clock stops when the electric current is arrested and remains at rest until the electric current is restored and the electric motor is again started manually.

The manual starting means for the synchronous motors of electrically operated clocks consisted either of a finger piece attached directly to the rotor of the electric motor and accessible either on the front side or the rear side of the clock which is unsatisfactory, owing to the small area of the finger piece which was inconvenient and difficult to grasp sufficiently firm to operate the rotor properly.

It has also been proposed to employ gearing and ratchet mechanism for starting the motor but these are noisy, complicated and expensive and therefore objectionable.

It is the object of this invention to provide means for starting a synchronous electric motor for operating clocks which are simple, inexpensive, reliable in operation, and capable of being easily manipulated, and which serve the double purpose of a seconds indicating device and a starting device.

In the accompanying drawings:

Figure 1 is a front elevation of an electric clock embodying my invention.

Figure 2 is a fragmentary vertical section of the same taken on line 2—2 Fig. 3.

Figure 3 is a vertical longitudinal section taken on line 3—3 Fig. 1.

Figure 4 is a fragmentary vertical transverse section taken on line 4—4 Fig. 3 on a reduced scale.

Figure 5 is a vertical longitudinal section taken on line 5—5 Fig. 4.

In the following description similar characters of reference indicate like parts in the several figures of the drawings.

The numeral 10 represents the main frame of the clock which may be of any suitable construction to support the several working parts and which in the present case comprises upright front and rear frame plates 11, 12 and horizontal rods 13 which connect the frame plates in a spaced apart position.

In front of the main frame is arranged a dial or face plate 14 which is preferably of circular form and provided on its front side with designations 15, 16 indicating hours and minutes. Extending horizontally and lengthwise with its front end through the central part of the front frame and journaled at its rear end in a bearing 20 in the central part of the front frame plate, is a hollow hour shaft 21 which is provided on its front end in front of the face plate with an hour hand 22 which traverses the hour numerals 15.

Journaled with its front part in the hollow hour shaft and journaled at its rear end in a bearing 23 on the rear frame plate is a minute shaft 24 which is provided at its front end in front of the hour hand and face plate with a minute hand 25 which traverses the minute graduations 16 on the face plate. The hour and minute hands are caused to rotate one turn of the hour hand to twelve turns of the minute hand by a gearing consisting preferably of a countershaft 26 journaled at its front and rear ends in bearings 27 in the front and rear frame plates, and provided with a large gear wheel 28 meshing with a small gear pinion 29 on the minute shaft 24 and also provided with a small gear pinion 30 which meshes with a large gear wheel 31 on the rear end of the hour shaft 21, as shown in Fig. 3.

The hour and minute hands and their respective shafts are rotated by an electric synchronous motor which is actuated by an alternating electric current of sixty cycles and though this motor may be variously constructed that shown in the drawings as an example of one suitable for present use is constructed as follows:

The numeral 32 represents the casing of the electric motor which is mounted on the rear side of the rear plate 12 of the main frame so that the front wall of this casing is close to the external pole pieces 33 which are secured to the front side of this frame plate. The lower parts of the external pole pieces 33 are secured to opposite ends of the core 34 which latter is surrounded by a coil 35 adapted to be placed in circuit with an alternating electric current of sixty cycles of which each impulse corresponds to one-

sixtieth of a second of time. Within the casing 32 is arranged a synchronous rotor 36 provided with an annular row of spaced projections 37 and mounted on a rotor shaft 38 which is journaled in a motor frame 39 within the casing. On diametrically opposite sides of the rotor projections 37, two internal pole pieces 40, 40 are arranged which constitute extensions of the external pole pieces 33, 33 so that the electric flux across the field between the opposing pole pieces will alternately attract and repel different projections of the rotor and thereby cause the same to turn as long as the alternating current passes through the coil.

This rotary motion of the rotor 36 is transmitted to the minute shaft 24 of the time mechanism by a main train of reducing gearing which comprises a counter or driving shaft 41 journaled in the frame 39 and provided within the casing 32 with a gear wheel 42 meshing with a gear pinion 43 on the rotor shaft 38, a gear pinion 44 secured to the counter shaft 41 externally of the casing 32 and meshing with a gear wheel 45 on a counter shaft 46 journaled on the main frame, a gear pinion 47 turning with the gear wheel 45 and meshing with a gear wheel 48 on an intermediate shaft 49, a gear pinion 50 turning with the gear wheel 48 and meshing with a gear wheel 51 on an intermediate shaft 52, and a gear pinion 53 turning with the gear wheel 51 and meshing with a gear wheel 54 on the minute shaft 24, as shown in Figs. 1, 2 and 3.

Means are provided for indicating the seconds of time which means are so constructed that the same may be utilized for giving the rotor of the electric motor initial turns for starting the same when the alternating electric current is flowing through the coil 35 and thereafter cause the rotor to be turned electrically.

In the preferred form of these means for indicating seconds of time and enabling the motor to be started for operating the clock the same are constructed as follows:

The numeral 17 represents a rearwardly dished part formed on the lower part of the face plate and providing a forwardly opening circular recess 18 on the front side thereof. On the marginal part of the bottom of the recess is arranged an annular seconds scale 19 which is traversed by a rotary second indicating hand 55 which is arranged within the recess 18 and far enough back so as not to interfere with the free rotation of the hour and minute hands.

This second hand is turned sixty times during every rotation of the minute hand 25 by motion derived from the motor through the medium of an auxiliary train of reducing gearing which is operatively associated with the main train of gearing of the time mechanism and is preferably constructed as follows:

The numeral 56 represents a second shaft journaled horizontally and lengthwise in bearings 57 on the lower parts of the front and rear frame plates and extending forwardly through the face plate axially in line with the second dial thereon. On the front end of the second shaft is mounted the second hand. Motion is transmitted from the main train of gearing to the second shaft 56 by a counter shaft 58 journaled horizontally and lengthwise on the lower parts of the front and rear frame plates and provided with a rear gear pinion 59 which meshes with the gear wheel 48 of the main train and also provided with a front gear pinion 60 which meshes with a gear wheel 61 on the second shaft 56 in rear of the front frame plate, as shown in Figs. 1, 2 and 3.

During the normal operation of the clock the hour hand, minute hand and second hand sweep over the clock dial to indicate the time of day and the second hand also indicates when the clock is running.

If the supply of alternating electric current is interrupted the motor stops running and this is plainly evident upon observing the second hand which ordinarily moves distinctly and at an easily discernible speed while the clock is in operation.

In order to again get the clock running when the supply of electric current has been restored it is only necessary for a person to grasp the second indicator hand and give the same a twirl sufficiently rapid to cause the rotor to turn more rapidly than its normal speed when the clock is ordinarily in operation. When this is done the rotor gradually slows down from the impetus given to it by the motion of hand until the speed of the rotor has stepped down to that which is ordinarily imparted to the same by the operation of the electric current.

After the rotor is again in harmony with the impulses of the alternating electric current the same continues to operate as long as the current is on.

To enable the second hand to be thus employed as a handle for turning the rotor through the medium of the auxiliary train of gearing and part of the main train of gearing of time mechanism, the second hand 55 is made sufficiently sturdy so as to permit the fingers of a person to firmly grasp the same and turn the second hand manually forwardly with the required speed to again set the clock in motion when the speed of the rotor is again in step with the impulses of the alternating current.

By thus employing the second hand as an indicator of the operation of the clock and also as a manually operated device for starting the clock no special starting mechanism is required, thereby materially simplifying the construction of the clock, reducing the cost of manufacture, and minimizing the chances of getting out of order.

I claim as my invention:

An electric clock comprising a synchronous electric motor, a time mechanism having hour and minute hands, a train of speed reducing gearing interposed between said motor and said time mechanism and having a fast speed rotating member geared to the motor and a slow speed rotating member geared to the time mechanism, and an intermediate speed rotating member arranged intermediate of said fast and slow speed rotating members, a rotary second indicating hand forming a handle adapted to be manipulated for starting said motor, and a train of gearing interposed between said train of speed reducing gearing and said second hand and including a gear pinion operatively connected with said speed reducing gearing, and a gear wheel meshing with said pinion and connected with said handle.

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