PATENT SPECIFICATION

414,884

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Complete Left: April 17, 1934.

Complete Accepted: Aug. 16, 1934.

PROVISIONAL SPECIFICATION.

Improvements relating to Electric Clocks.

We, GENT & COMPANY LIMITED, a British Company, and REGINALD SWIFT, a British Subject, both of Faraday Works, St. Saviour's Road, (East) Leicester, do hereby declare the nature of this invention be as follows:—

This invention relates to clocks driven by small synchronous electric motors designed for operation from alternating current domestic supply mains and is an improvement in or modification of the invention disclosed in the specification of Patent No. 385,457. Such small electric motors are usually non-selfstarting and when they are connected to the supply mains an initial starting impulse has to be applied to the rotor or to gearing connected with the rotor. The initial impulse usually sets the rotor running at a speed above the synchronous speed and as the speed falls, there is the risk that at the moment at which the rotor reaches the synchronous speed, it may not be in step with the frequency of the supply and the speed will then drop below the synchronous speed until the rotor stops. It has been proposed to assist a rotor to step into synchronism by introducing friction between the rotor and a fly-wheel mounted on the rotor spindle, the degree of friction being sufficient to effect a driving connection between the rotor and fly-wheel but insufficient to overcome the synchronising force.

In the specification of the above-mentioned prior Patent No. 385,457, it has been proposed to mount the rotor and fly-wheel on the same spindle and to effect a driving connection by means of a pin and slot connection between them. Thus in one particular proposal in that specification, a pin projecting axially from the rotor engages the walls of an arc shaped slot in one face of a fly-wheel mounted freely on the rotor spindle, a relative angular movement between the rotor and fly-wheel being thus permitted. The relative lost motion between the rotor and fly-wheel is found to enable the rotor to step into synchronism when it reaches the synchronous speed after having an initial impulse applied to it.

According to the present invention, the fly-wheel in a driving mechanism for an electric clock of the type described in specification of Patent No. 385,457 is mounted on the rotor spindle and may move to a limited extent both axially and rotationally with respect to the rotor.

In a particular example of driving mechanism constructed in accordance with the invention, a relative axial movement between the rotor and the fly-wheel is obtained by mounting the fly-wheel freely on a screw-threaded portion of the rotor spindle. The relative axial and rotational movement of the fly-wheel with respect to the rotor is limited by a pin which projects axially from one face of the fly-wheel and engages a second pin which projects axially from the rotor spindle. If the fly-wheel is restrained from rotation and an impulse is imparted to the rotor, the pin on the rotor spindle will engage the pin projecting from the fly-wheel, and will tend to drive the latter. Thus the fly-wheel cannot complete a revolution relatively to the rotor and therefore cannot move axially with respect to the latter to an extent greater than one pitch of the screw thread.

A driving connection between the fly-wheel and rotor is thus effected by the axial and radial pins and is a positive driving connection, although there is a degree of lost motion between the rotor and the fly-wheel which facilitates the locking of the rotor in synchronism.

Dated this 28th day of June, 1933.

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[*Price* 1/-]

Price 4s 6d

COMPLETE SPECIFICATION.

Improvements relating to Electric Clocks.

We, GENT & COMPANY LIMITED, a British Company, and REGINALD SWIFT, a British Subject, both of Faraday Works, St. Saviour's Road, (East) Leicester, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to clocks driven by small synchronous electric motors designed for operation from alternating current domestic supply mains and is an improvement in or modification of the invention disclosed in the specification of Patent No. 385,457. Such small electric motors are usually non-selfstarting and when they are connected to the supply mains an initial starting impulse has to be applied to the rotor or to gearing connected with the rotor. The initial impulse usually sets the rotor running at a speed above the synchronous speed and as the speed falls, there is the risk that at the moment at which the rotor reaches the synchronous speed, it may not be in step with the frequency of the supply and the speed will then drop below the synchronous speed until the rotor stops. It has been proposed to assist a rotor to step into synchronism by introducing friction between the rotor and a fly-wheel mounted on the rotor spindle, the degree of friction being sufficient to effect a driving connection between the rotor and fly-wheel but insufficient to overcome the synchronising force.

In the specification of the above-mentioned prior Patent No. 385,457, it has been proposed to mount the rotor and fly-wheel on the same spindle and to effect a driving connection by means of a pin and slot connection between them. Thus in one particular proposal in that specification, a pin projecting axially from the rotor engages the walls of an arc shaped slot in one face of a fly-wheel mounted freely on the rotor spindle, a relative angular movement between the rotor and fly-wheel being thus permitted. The relative lost motion between the rotor and fly-wheel is found to enable the rotor to step into synchronism when it reaches the synchronous speed after having an initial impulse applied to it.

According to the present invention, the fly-wheel in a driving mechanism for an electric clock of the type described in the specification of Patent No. 385,457 is mounted on the rotor spindle and may move to a limited extent both axially and rotationally with respect to the rotor. In one form of construction according to the invention, the fly-wheel is mounted on a screw thread formed on the rotor spindle, and the relative axial and rotational movement of the fly-wheel with respect to the rotor is limited by a pin which projects from the fly-wheel and engages a second pin which projects from the rotor spindle.

In order that the invention may be more clearly understood and readily carried into effect, a driving mechanism for an electric synchronous clock will now be described by way of example in connection with the accompanying drawings, in which:—

Figure 1 is a rear elevation of an electric clock driving mechanism constructed in accordance with the invention;

Figure 2 is an enlarged rear elevation of certain essential elements in the driving mechanism;

Figure 3 is an edge view of the elements shown in Figure 2; and

Figure 4 is a view of the fly-wheel taken on the line A—A in Figure 3.

Referring to the drawings, a circular framework 1 has mounted upon it a field magnet 2 of soft iron, built up from laminations, only the uppermost of which can be seen in the drawing. A coil 3, when connected to alternating current supply mains, serves to provide the necessary alternating magnetic field which is distributed by pole pieces 4 and 5 formed with toothed polar faces, to the periphery of a toothed laminated rotor 6 of soft iron. This rotor is mounted on a spindle 7 shown clearly in Figure 3, which runs in bearings 8 and 9 secured to bearing plates 10 and 11 respectively. The rotor spindle 7 is provided with a screw-threaded portion 12 and a fly-wheel 13 is mounted to run only on that screw-thread. The extent of axial movement of the fly-wheel and of its rotational movement relatively to that of the rotor, is limited by a pin 14 which projects axially from the fly-wheel coacting with a pin 15 projecting radially from the rotor spindle 7, and in a certain relative position of the fly-wheel 13 and rotor 6, the pin 14 engages the pin 15. This position is shown clearly in Figure 4, and it will be understood that the fly-wheel may revolve through an angle approaching 360

degrees relatively to the rotor until the pin 14 engages the opposite surface of the pin 15. This angular movement of the fly-wheel corresponds to an axial movement approximately equal to the pitch of the screw-thread 12. A pinion 16, locked to the spindle 7, engages a spur wheel 17 which is of compressed fibrous material and assists silent running of the mechanism. A pinion 18, which rotates with the wheel 17, drives a further spur wheel 19, which, in turn, is in driving connection with the remaining clock mechanism. The spindle of the spur wheel 17 projects through the bearing plate 11 and is provided with a knurled knob 20 which enables an initial rotary starting impulse to be applied to the wheel 17 and consequently through the pinion 16 to the rotor 6.

It will be understood that as the rotor begins to revolve when the knob 20 is twisted, the inertia of the fly-wheel will cause it to tend to remain stationary and the screw-threaded portion 12 will revolve relatively to the fly-wheel until the pins 14 and 15 engage with one another and cause the fly-wheel to be driven with the rotor spindle. During running of the motor, the fly-wheel is thus in a floating condition with respect to the rotor. The initial starting impulse is usually sufficient to cause the rotor and fly-wheel to run at a speed above the synchronous speed and as the speed falls until the synchronous speed is reached, the floating condition of the fly-wheel with respect to the rotor causes the rotor to be held running at the synchronous speed for a sufficient period to ensure that the synchronous driving impulses, due to the alternating magnetic field co-operating with the rotor teeth, lock the rotor into synchronism.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A synchronous electric clock motor provided with a fly-wheel mounted on the rotor spindle and designed to move to a limited extent both axially and rotationally with respect to the rotor due to a difference in speed of rotation between the fly-wheel and rotor.

2. A synchronous electric clock motor according to claim 1, in which the rotational movement of the fly-wheel is less than 360 degrees.

3. A synchronous electric clock motor according to claim 1 or claim 2, in which the fly-wheel is mounted on a screw-thread formed on the rotor spindle.

4. A synchronous electric clock motor according to claim 3, in which the relative axial and rotational movement of the fly-wheel with respect to the rotor is limited by a pin which projects from the fly-wheel and engages a second pin which projects from the rotor spindle.

5. A synchronous electric clock motor provided with a driving connection between the rotor and the fly-wheel, substantially as described with reference to the accompanying drawings.

Dated this 17th day of April, 1934.

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Fig. 1.

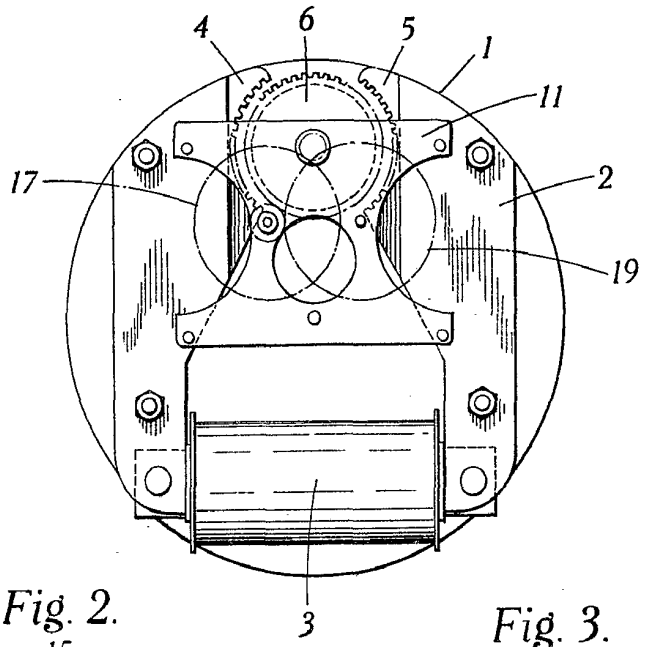


Fig. 2.

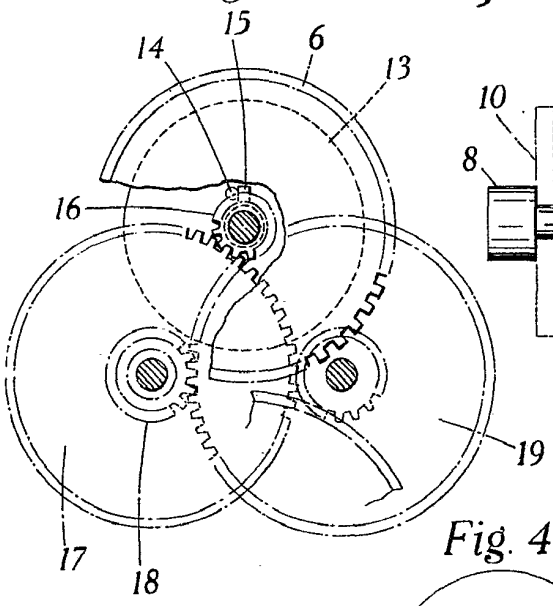


Fig. 3.

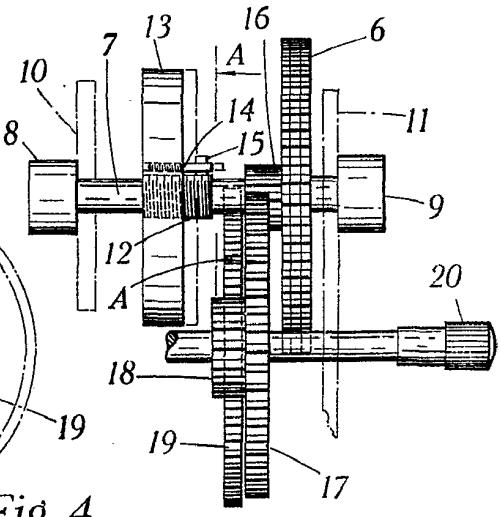
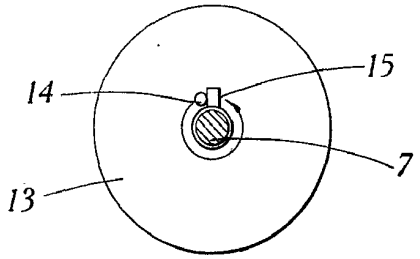


Fig. 4.



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