

SPECIFICATION

SIMULATED PENDULUM CLOCK

The present invention relates to a simulated pendulum clock.

- 5 A simulated pendulum clock is a pendulum clock whose pendulum is merely provided as a rocking decoration and does not act as a timecontroller of the clock.

- In one type of a conventional simulated pendulum clock, an electro-magnetic device is employed to drive a pendulum, the electro-magnetic device being functionally separated from a timepiece movement of the clock. However, such a conventional simulated pendulum clock has had many disadvantages, e.g. an increase in the number of the component parts, parts having a complicated configuration, and an increase in the manufacturing cost. Thus such a clock has had to employ many expensive parts, such as a coil, a magnet and a transistor, to constitute the above-mentioned electro-magnetic device.

- According to the present invention, there is provide a simulated pendulum clock comprising a timepiece movement for driving hands of the clock, a rotating member driven by said timepiece movement, an escape wheel supported coaxially with said rotating member, a spring for applying torque to said escape wheel, said spring being wound up by said rotating member, a rockable pallet provided with two pallet pins which cooperate with teeth of the escape wheel to control the speed of the latter, and a rockably suspended pendulum interlocked with said pallet.

- Thus in the case of the present invention, the pendulum is driven by a well-known simple mechanism comprising an escape wheel, a pallet and a spring, the spring being wound up by the timepiece movement and providing torque for the escape wheel. The pendulum accordingly only controls the rotating speed of the escape wheel without acting as a timecontroller of the timepiece movement.

- Preferably, the rotating member and a transmission wheel for driving the rotating member are connected together with a predetermined frictional connecting force by employing a slipping clutch mechanism.

- Preferably, at least said rotating member, said escape wheel and said pallet are disposed behind a case for said timepiece movement.

- Preferably bearings for supporting arbors of said pallet and said rotating member are formed integrally with a case for said timepiece movement.

- The invention is illustrated, merely by way of example, in the accompanying drawings, in which:—

- Figure 1 is a rear view of a simulated pendulum clock according to the present invention, a rear supporting plate of the clock being removed,

Figure 2 is a side view, partly in section, of the clock shown in Figure 1, and

Figure 3 is a broken-away sectional view taken

on the line III—III of Figure 1.

- 65 Referring to the drawings, a simulated pendulum clock has a timepiece movement, for driving the hands of the clock, disposed within a front case 1 and a rear case 2. This timepiece movement comprises, as is well known, a driving circuit block containing a quartz oscillator, a motor block and a gear train (none of which is shown). A pinion 3, which is fixed to an arbor of the third wheel of the above-mentioned gear train, projects from the rear case 2 and meshes with a transmission wheel 4. The transmission wheel 4 is fixed to an arbor 5 which is rotatably supported by a bearing 6, the bearing 6 being integral with the rear case 2. The arbor 5 is also rotatably supported by a rear supporting plate 7. The rear supporting plate 7 is fixed by screws 9 to posts 8 projecting integrally from the rear case 2.

- A rotating member 10 is rotatable about the arbor 5, the rotating member 10 being connected to a portion of the arbor 5 with a predetermined frictional connecting force. This frictional connecting force arises from the force exerted by a leaf spring 11 which is disposed between the transmission wheel 4 and the rotating member 10. Consequently, the arbor 5, the transmission wheel 4, and the rotating member 10 rotate together as a unit so long as the load acting on the rotating member 10 is less than the said frictional connecting force, whereas the parts 4, 10 slip relatively to each other when the load exceeds the frictional connecting force.

- An escape wheel 12 is fixed to a bush 13 which is rotatable about the arbor 5. A spring 14, one end of which engages the escape wheel 12 and the other end of which engages a pin 15 fixed to the rotating member 10, is wound around the bush 13.

- A pallet 16 is provided with a pallet arbor 17, pallet pins 19, 20 and a pallet fork 28. The pallet arbor 17 is rotatably supported by the rear supporting plate 7 and by a bearing 18 which is integral with the rear case 2. The pallet pins 19 and 20 alternately cooperate with the teeth of the escape wheel 12 every time the pallet 16 rocks clockwise and counter-clockwise, to control the speed of the escape wheel 12. As shown in Figures 2 and 3, a suspension leaf spring 21 is clamped between supporting members 22 and 23, portions of the supporting member 22 being caulked to "L"-shaped plates 24 fixed on the rear case 2 by screws 25, 25. The suspension leaf spring 21 is situated in a concave portion 26 of the rear case 2.

- The clock has a pendulum comprising an upper pendulum 27 and a lower pendulum (not shown), as in a well-known conventional pendulum. The upper pendulum 27 is connected to the suspension leaf spring 21, the upper pendulum 27 being provided with a hook pin 29, for hanging the lower pendulum at its lower end. The lower pendulum is removable from the hook pin 29 and comprises a pendulum bob rod and a pendulum bob (neither of which is shown).

Further, as shown in Figure 1, a battery case 30 is formed integrally with the front case, the battery case 30 being provided with an electrically positive

contact plate 31 and with an electrically negative contact plate 32, for supplying the energy of a battery (not shown) to the above-mentioned timepiece movement.

5 When a battery is appropriately positioned in the battery case 30, the timepiece movement within the cases 1 and 2 is driven and thus the hands (not shown) for displaying the time are driven. The pinion 3 is also driven at the same
10 time, the rotation of the pinion 3 being transmitted to the transmission wheel 4. The above-described pendulum is then started manually, and the pendulum starts to rock at a predetermined speed. Thus, the pallet 16, which is interlocked with the
15 pendulum, rocks about the arbor 17, and the pallet pins 19 and 20 alternately cooperate with the teeth of the escape wheel 12. As the escape wheel 12 receives a counter-clockwise torque, as seen in Figure 1, about the arbor 5 by virtue of the force of
20 the spring 14, it rotates by one pitch at a time every time the pallet pins 19 and 20 engage its teeth. The pallet pins 19 and 20 receive impulses from the teeth of the escape wheel 12 as the pallet pins are withdrawn from the latter, and the rocking motion
25 of the pendulum is maintained by virtue of these impulses. The tension in the spring 14 is reduced by the rotation of the escape wheel 12, while, on the other hand, the spring 14 is wound up by the pin 15 of the rotating member 10, which is
30 connected to the arbor 5 with the predetermined frictional connecting force due to the force of the leaf spring 11. The arbor 5 and the rotating member 10 thus rotate together in unison provided that the said frictional connecting force overcomes
35 the load (i.e. the torque exerted by the spring 14) acting on the rotating member 10. However, the parts 5, 10 slip relatively to each other as soon as said load becomes equal to said frictional connecting force. Consequently, the force of
40 spring 14 i.e. the rotating torque of the escape wheel 12, is determined by said frictional connecting force.

The rotating speed of the transmission wheel 4 is arranged to be a little higher than that of the
45 escape wheel 12. Thus, the transmission wheel 4 always rotates to urge the rotating member 10 to rotate. As a result, the force of the spring 14 is always maintained constant, and the escape wheel

12 is stably driven with a constant rotating torque.

50 The simulated pendulum clock shown in the drawings can be manufactured at low cost as it does not need to use expensive parts such as a coil, a magnet and transistors to drive the pendulum. Further, it is possible to employ even a low power
55 timepiece movement such as a quartz clock, in which case the power available to wind up the spring 14 is small. Thus many kinds of quartz clock can be used. Furthermore, the force exerted by the spring 14 can always be maintained at an
60 appropriate constant value as the arbor 5 of the transmission wheel 4 and the rotating member 10 are connected with the predetermined frictional connecting force, and as the rotating speed of the transmission wheel 4 is a little higher than that of
65 the escape wheel 12. Thus, the escape wheel 12 is driven at a constant rotating torque, and the pendulum is driven in a stable manner.

CLAIMS

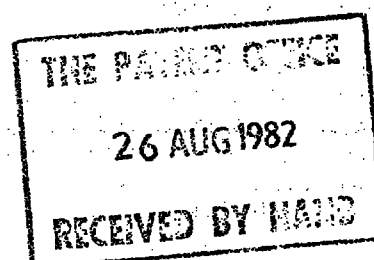
1. A simulated pendulum clock comprising a
70 timepiece movement for driving hands of the clock, a rotating member driven by said timepiece movement, an escape wheel supported coaxially with said rotating member, a spring for applying torque to said escape wheel, said spring being
75 wound up by said rotating member, a rockable pallet provided with two pallet pins which cooperate with the teeth of the escape wheel to control the speed of the latter, and a rockably suspended pendulum interlocked with said pallet.

80 2. A simulated pendulum clock as claimed in claim 1 in which the timepiece movement drives a transmission wheel, and the transmission wheel drives the said rotating member through a slipping clutch device.

85 3. A simulated pendulum clock as claimed in claim 1 or 2 wherein at least said rotating member, said escape wheel and said pallet are disposed behind a case for said timepiece movement.

90 4. A simulated pendulum clock as claimed in claim 3 wherein bearings for supporting arbors of said pallet and said rotating member are formed integrally with a case for said timepiece movement.

95 5. A simulated pendulum clock substantially as hereinbefore described with reference to and as shown in the accompanying drawings.





contact plate 31 and with an electrically negative contact plate 32, for supplying the energy of a battery (not shown) to the above-mentioned timepiece movement.

5 When a battery is appropriately positioned in the battery case 30, the timepiece movement within the cases 1 and 2 is driven and thus the hands (not shown) for displaying the time are driven. The pinion 3 is also driven at the same
10 time, the rotation of the pinion 3 being transmitted to the transmission wheel 4. The above-described pendulum is then started manually, and the pendulum starts to rock at a predetermined speed. Thus, the pallet 16, which is interlocked with the
15 pendulum, rocks about the arbor 17, and the pallet pins 19 and 20 alternately cooperate with the teeth of the escape wheel 12. As the escape wheel 12 receives a counter-clockwise torque, as seen in Figure 1, about the arbor 5 by virtue of the force of
20 the spring 14, it rotates by one pitch at a time every time the pallet pins 19 and 20 engage its teeth. The pallet pins 19 and 20 receive impulses from the teeth of the escape wheel 12 as the pallet pins are withdrawn from the latter, and the rocking motion
25 of the pendulum is maintained by virtue of these impulses. The tension in the spring 14 is reduced by the rotation of the escape wheel 12, while, on the other hand, the spring 14 is wound up by the pin 15 of the rotating member 10, which is
30 connected to the arbor 5 with the predetermined frictional connecting force due to the force of the leaf spring 11. The arbor 5 and the rotating member 10 thus rotate together in unison provided that the said frictional connecting force overcomes
35 the load (i.e. the torque exerted by the spring 14) acting on the rotating member 10. However, the parts 5, 10 slip relatively to each other as soon as said load becomes equal to said frictional connecting force. Consequently, the force of
40 spring 14 i.e. the rotating torque of the escape wheel 12, is determined by said frictional connecting force.

The rotating speed of the transmission wheel 4 is arranged to be a little higher than that of the
45 escape wheel 12. Thus, the transmission wheel 4 always rotates to urge the rotating member 10 to rotate. As a result, the force of the spring 14 is always maintained constant, and the escape wheel

12 is stably driven with a constant rotating torque.

50 The simulated pendulum clock shown in the drawings can be manufactured at low cost as it does not need to use expensive parts such as a coil, a magnet and transistors to drive the pendulum. Further, it is possible to employ even a low power
55 timepiece movement such as a quartz clock, in which case the power available to wind up the spring 14 is small. Thus many kinds of quartz clock can be used. Furthermore, the force exerted by the spring 14 can always be maintained at an
60 appropriate constant value as the arbor 5 of the transmission wheel 4 and the rotating member 10 are connected with the predetermined frictional connecting force, and as the rotating speed of the transmission wheel 4 is a little higher than that of
65 the escape wheel 12. Thus, the escape wheel 12 is driven at a constant rotating torque, and the pendulum is driven in a stable manner.

CLAIMS

1. A simulated pendulum clock comprising a
70 timepiece movement for driving hands of the clock, a rotating member driven by said timepiece movement, an escape wheel supported coaxially with said rotating member, a spring for applying torque to said escape wheel, said spring being
75 wound up by said rotating member, a rockable pallet provided with two pallet pins which cooperate with the teeth of the escape wheel to control the speed of the latter, and a rockably suspended pendulum interlocked with said pallet.
- 80 2. A simulated pendulum clock as claimed in claim 1 in which the timepiece movement drives a transmission wheel, and the transmission wheel drives the said rotating member through a slipping clutch device.
- 85 3. A simulated pendulum clock as claimed in claim 1 or 2 wherein at least said rotating member, said escape wheel and said pallet are disposed behind a case for said timepiece movement.
- 90 4. A simulated pendulum clock as claimed in claim 3 wherein bearings for supporting arbors of said pallet and said rotating member are formed integrally with a case for said timepiece movement.
- 95 5. A simulated pendulum clock substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

