PATENT SPECIFICATION

427,178

Application Date : Oct. 14, 1933. No. 28435/33.

Complete Specification Accepted : April 15, 1935.

COMPLETE SPECIFICATION

Improvements in or relating to Electric Clocks

I, MAURICE PHILIPPE FAVRE-BULLE, of 15 and 17 Rue Gambetta, Boulogne-sur-Seine, France, Citizen of the French Republic, 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 electric clocks in which the pendulum is electrically maintained and drives the hands, and particularly to the kind having the mechanism under glass.

In this kind of clock the coil or the co-acting magnet of the electro-magnetic system is usually arranged on the pendulum which as a rule is fairly long and has a pendulum bob formed by the coil which in view of its weight is highly important.

With this disposition, whether the magnet is supported by the pendulum, or fixed to the frame, it must be of such length as to correspond to the length of the pendulum. Consequently the length of magnets in existing systems is fairly long. To drive the mechanism the diameter of such a magnet, to constitute a good magnetic member, should be in proportion to its length and fairly heavy. The coil is also proportionate in size to that of the magnet and also in weight if good ohm resistance is desired.

The object of the present invention is to reduce the displacement of the coil over the magnet and regulate the amplitude of the pendulum.

According to my invention the pendulum is electrically maintained and drives the hands by the use of an improved arrangement of the electro-magnetic parts according to which the components for electrically maintaining the oscillation of the pendulum are placed substantially midway of the pendulum, that is to say, substantially between the suspension point of the pendulum and the pendulum bob, and comprise a coil arranged substantially midway on the pendulum and a permanent magnet with consequent poles, one being in the vicinity of the vertical line of the pendulum to give the motive impulse, and another to act by magnetic reaction as regulator of the amplitude.

[*Price* 1/-]

Price 4s

The pendulum is provided with attachment or anchoring means of a flexible nature by which the pendulum can be held stationary during transport.

The pendulum is also provided with a contact device adapted to engage the known fork member, controlling the pawl of the ratchet wheel of the escapement mechanism, and this contact device is arranged to be movable on the pendulum by providing the pendulum with a slot into which the end of the contact pin fits and is secured therein by a nut applied to the threaded end of the contact pin when in position in the slot, the sides of the insulating holder being arranged to grip the sides of the pendulum.

The pendulum suspension is devised to reduce friction for the weight of the component of the electro-magnetic system, carried by the pendulum calls for the use of suspensions either of spring formation or point contact, the latter being preferred to avoid excessive friction, which would tend to act as a retarding force to the swing of the pendulum, and moreover the suspension means must be such as will provide for the correct levelling of the clock, from front to back, to ensure that the magnet is in the centre of the coil and does not touch the coil, otherwise contact between them would stop vibration of the pendulum. Failure to meet this condition has been a drawback in the use of electrically maintained clocks, as compared with their great advantage over other systems.

Reduction in the weight of the pendulum allows for it to be hung on pivots, and the pendulum being guided does away with the drawback explained above and allows at the same time a considerable reduction in the size of the bore of the coil as compared with the diameter of the magnet.

Use is made of a fairly short magnet with consequent poles the magnetic field of which allows for the production of the motive impulse, and regulation of the amplitude by magnetic reaction.

The means for fixing the pendulum so as to be stationary during transport also comprises a stationary member fixed on the clock base.

The pendulum bob can be utilised for

advertising, or rendered otherwise attractive.

The mounting of the pendulum on pivots allows the weight of the pendulum, swinging on the pivots, to be increased without producing pressure on the pivots which would operate to brake the pendulum swing and also mean quick wear of the pivots, to that end use is made of a spring sustained roller suspension which is simple in construction, or alternatively the suspension may consist of an axis the ends of which are finished in V shape form so as to act as knife edges, which edges resting in suitable V shaped holes formed in brackets enable the pendulum to swing freely without much friction. The axis is slightly longer at the bottom of the V than on the top so that the bottom of the V shaped edges are pointed and act in a similar manner to the points of the pivots, the play from back to front being regulated by end plates against which the ends of the V shaped axis touch, thus avoiding friction.

The accompanying drawings illustrate the invention.

In the drawings:—

Fig. 1 is a side view of the apparatus according to the invention showing the pendulum in stationary position, and the mechanism enclosed by a glass globe or case.

Fig. 2 is a back view of the clock.

Fig. 3 is a front view of the clock.

Fig. 4 is a side view of the clock showing the pendulum hooked for transport.

Fig. 5 is a side view of the pendulum with a different mode of fixing the pendulum for transport.

Fig. 6 is a side view showing the contact device.

Fig. 7 is a side view of the spring sustained roller suspension, and

Fig. 8 is a sectional view thereof.

Referring to the drawings 1 is the base of the clock, and 2 the glass shade which takes the place of a case. 3, 4, 5, and 6 are pillars of equal length which fix the clock to the base. 7 is the dial. 8 is the pendulum swinging on pivots in a holder 9 constituted by a pillar 10 and two sides 11 and 12, or a suitably bent bracket may be used. The pendulum rod 13 is of a substantially half-round blade design, of suitable material, which is rigid in the swinging direction but can be flexible in the direction transverse thereto.

The usual pendulum bob of the pendulum is replaced by an arrangement rather large in aspect but very light in weight constituted by concentric discs 14, 15 and 16 of different diameters with highly polished surfaces.

In the example Figs. 1-4 the electro-magnetic system is composed of a permanent magnet 17 having poles 19 and 20 of the same polarity fixed on the frame and a coil 18 placed on the pendulum rod 13 substantially midway of its length. The pole 19 is in the vicinity of the vertical line of the pendulum and gives the motive impulse, and the pole 20 or NN automatically regulates amplitude by magnetic reaction.

It will be seen from the drawings that the electro-magnetic system is hidden by the dial in the front view. The position of the coil is of importance. It must be near enough to the suspension point of the pendulum so that its course when the pendulum swings will be relatively short.

The means of rendering the pendulum stationary for transport consists in fixing the pendulum by its extremity in the direction from front to back of the clock. The extremity 21 of the pendulum rod 13 has a hole 22 and a hook 23 is fixed in the base 1 of the clock, or in any other convenient place, behind the pendulum, so that it suffices to slightly bend back the pendulum 13 by hand so as to bring the hole 22 in front of the hook 23 where it can be fixed on freely. This causes the complete immobility of the pendulum. In this way when the pendulum is so fixed the pendulum coil 18 is resting against the magnet 17 so that the pivot of the pendulum suspension cannot suffer from any shock in transit. As an alternative a spring blade 24, if the pendulum is made of wood and fairly rigid, can be added to the pendulum, this is shown in Fig. 5, and has a hole in the blade suitable to receive hook 23. This simple device is fixed together during transport of the clock, and when freed the starting of the clock can be done by inexperienced hands.

It is to be noted that the herein described clock can also be used as a secondary clock unit synchronised with a master clock for distributing time, by dispensing with the case and putting the clock works or mechanism in circuit with the electric circuit of the master clock.

The spring sustained suspension device comprises the axis 31 of the pendulum 32, the pivots 33 and 33′ of the axis being carried freely in the holes 34 and 34′. The back to front play of the axis is regulated by the end plates 35 and 36. The axis 31 has two circular grooves 37 and 38 in which rest the interior of two hard steel rings 39 and 40. The tops of these rings respectively hang at the extremities 41 and 42 of a spring 43 made of steel wire and fixed in the middle of the block 44 which is permanently fixed on the bracket 4″, this

spring being so constructed as to be pulling upwards so as to carry with the help of the rings 39 and 40 substantially the whole weight of the pendulum. Under these conditions substantially the whole weight is supported by the steel rings 39 and 40 and not by the pivot holes of the axis 31, the holes guiding the pendulum without any appreciable friction. The action of the rings is also substantially frictionless. When the axis 31 swings the interior part of the rings is dragged by the axis without any slipping, that is to say, the axis turns without slipping in the rings which are suspended so that they can oscillate freely and without any more friction than if they were actuated on knife edges.

The holder with silver pin contact 45 and insulating part 46, see Fig. 6, fixed on the pendulum by the threaded end 47 and a nut, makes contact only on one side of the known live fork, controlling the ratchet wheel pawl, and makes contact only for the propelling impulse as immediately the insulating part reaches the side of the fork contact is broken owing to the contact pin being put out of contact with the live side of the fork.

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

1. In electric clocks of the kind specified an electro-magnetic system according to which the compenents for electrically maintaining the oscillation of the pendulum are placed substantially midway of the pendulum, that is to say, substantially between the suspension point of the pendulum and the pendulum bob and comprise a coil arranged substantially midway on the pendulum and a permanent magnet with consequent poles, one being in the vicinity of the vertical line of the pendulum to give the motive impulse, and another to act by magnetic reaction as regulator of the amplitude.

2. In electric clocks as claimed in claim 1, a pendulum provided with attachment or anchoring means of a flexible nature by which the pendulum can be held stationary during transport.

3. In electric clocks as claimed in claims 1 or 2 a contact device comprising a metal pin and insulating part adapted to engage the known fork member of the ratchet mechanism, and also adapted to be adjustable on the pendulum by means of a slot on the pendulum and threaded pin on the contact device.

4. In electric clocks as claimed in the previous claims, a pendulum suspension device of spring formation or point contact to avoid friction which would tend to act as a retarding force to the swing of the pendulum, comprising a spring sustained roller with circular members or rings in which the axis of the pendulum rolls freely.

5. In electric clocks as claimed in claim 1, forming the pendulum suspension device with V shaped ends which take into corresponding holes or holders on the clock frame.

6. In electric clocks as claimed in claim 3 a contact device comprising a holder carrying a silver contact pin to make contact with a live fork, the contact being broken when the insulating part of the holder meets the fork.

7. In electric clocks as claimed in claim 1, a pendulum having a series of concentric discs applied towards its free end.

8. Electric clocks as claimed in claim 1, wherein the pendulum is carried on guiding pivots to reduce friction.

9. The combination of parts arranged and constituting improved electric clocks of the kind herein specified, substantially as described and as illustrated by the accompanying drawings.

Dated this 10th day of October, 1933.

HERBERT DUNN,
Radley Lodge, Ditchling, Hassocks, Sussex.
Agent.

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Fig. 1.

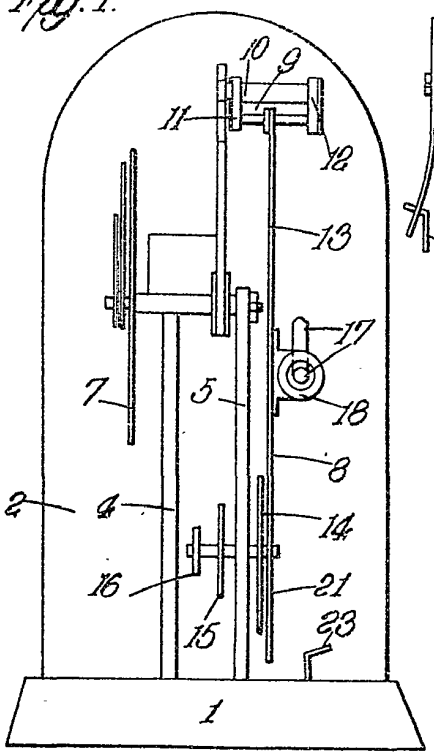


Fig. 5.

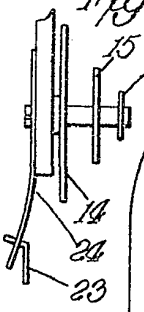


Fig. 2.

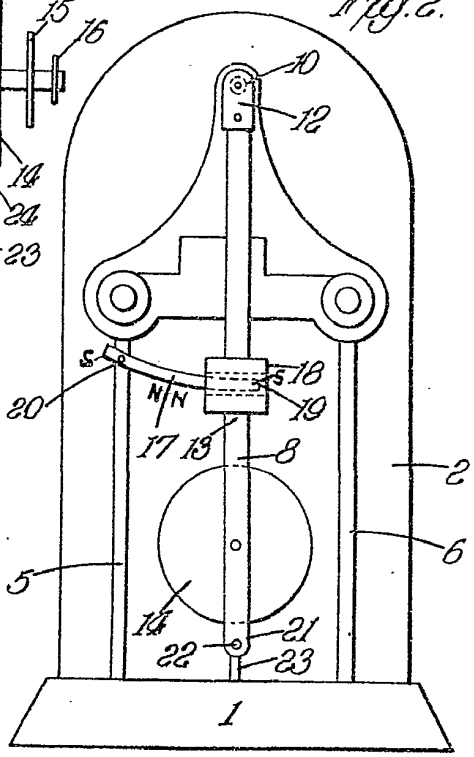


Fig. 3.

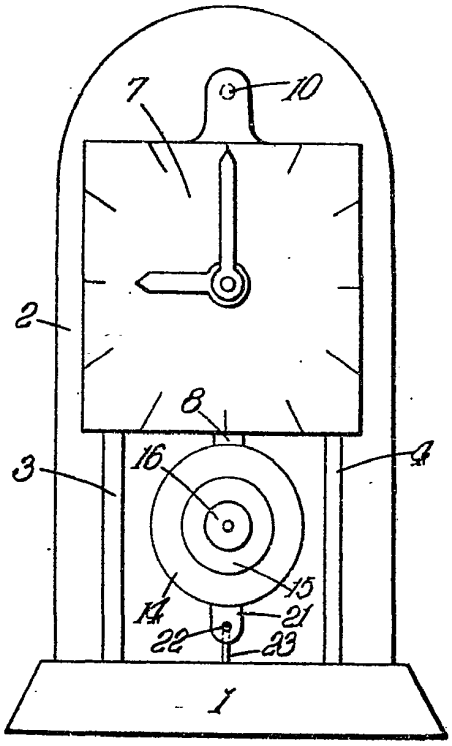
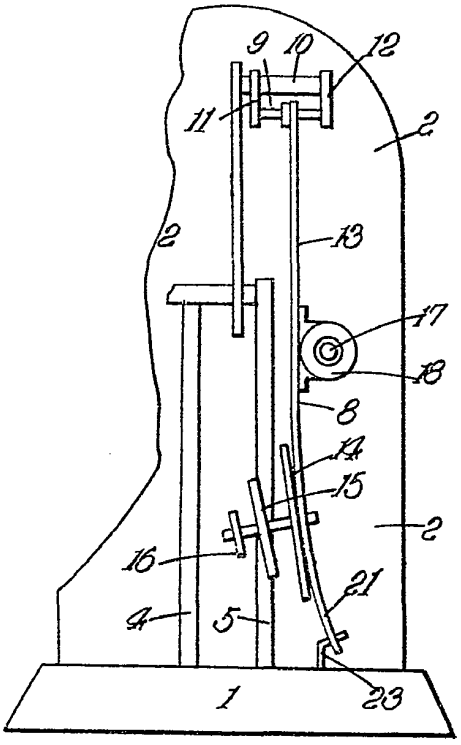
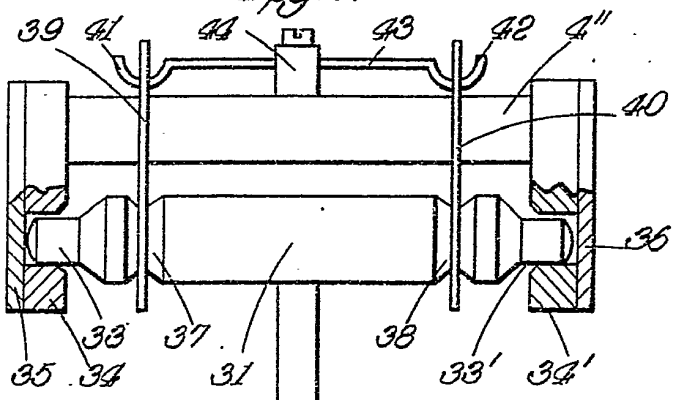


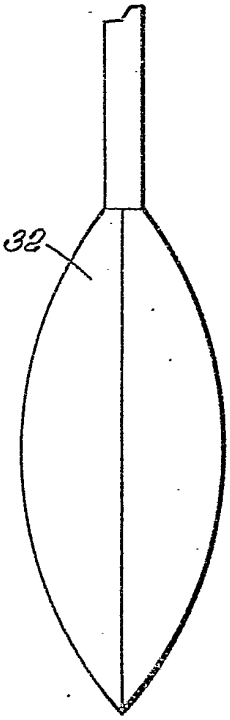
Fig. 4.



g.2.

Fig. 7.





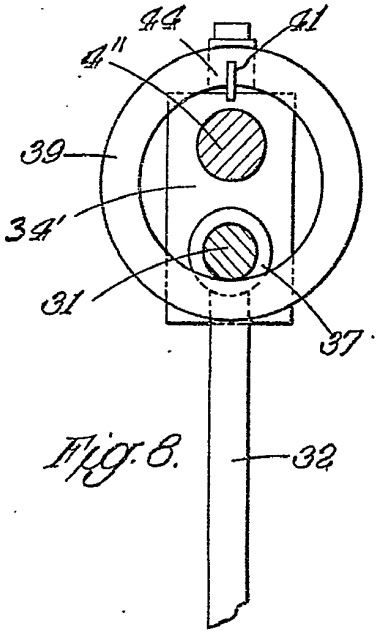
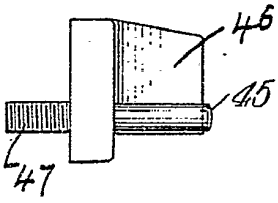


Fig. 8.

Fig. 6.



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2 SHEETS

SHEET 1

SHEET 2

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

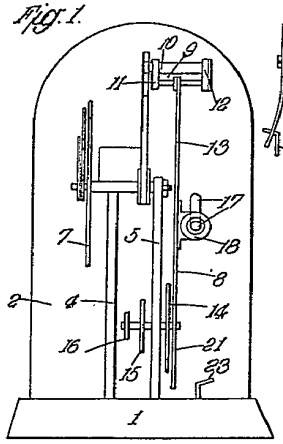


Fig. 5.

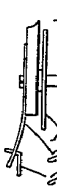


Fig. 2.

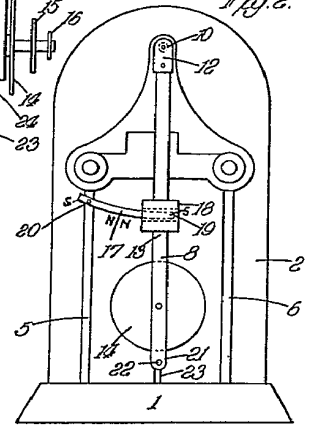


Fig. 3.

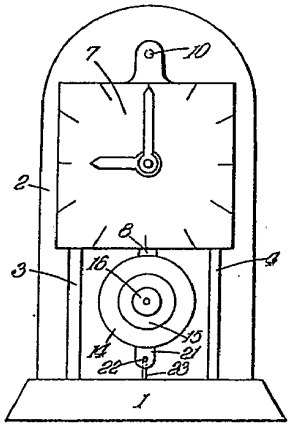


Fig. 4.

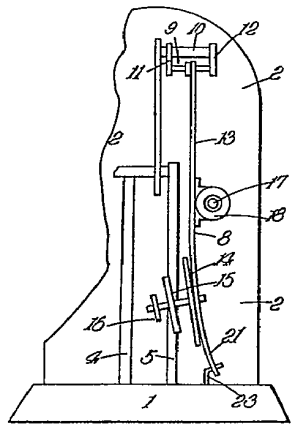
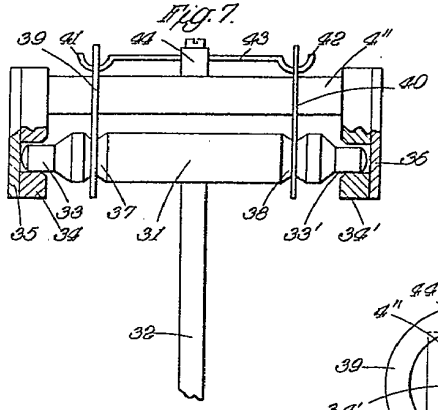
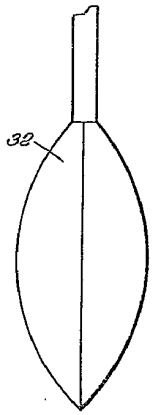


Fig. 7.





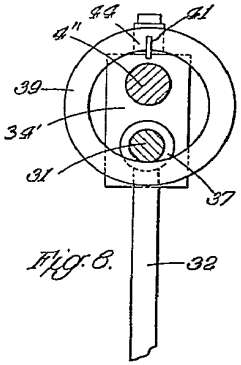
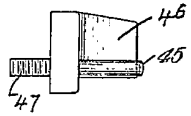


Fig. 8.

Fig. 6.



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