PATENT SPECIFICATION

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238,843

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COMPLETE SPECIFICATION.

Improvements relating to Mechanism for Controlling Moving Leaves or Moving Band Apparatus.

We, SOCIÉTÉ ANONYME DES ATELIERS BRILLIÉ FRÈRES, a French company, of 28, Boulevard de Villiers, Levallois-Perret, Department of Seine, France, 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 mechanism for controlling apparatus which gives intermittent movement to moving leaves or bands, and the movement of which has to be controlled in accordance with the movement of a master control apparatus.

In apparatus driven in step-by-step fashion from a rotating electric motor, so that the movement of the driven apparatus is dependent upon that of a master control apparatus, it has been suggested already to complete the motor circuit through contacts closed at equally spaced times by a rotary contact maker driven continuously from the master apparatus.

According to the present invention, an apparatus arranged to be driven in step-by-step fashion by an electric motor is controlled so that its indications are intermittently brought into agreement with those of a master apparatus by means of a member driven intermittently from the master apparatus and a member connected to move only when the controlled apparatus is driven, said two members co-operating in such a way that after a pre-determined movement on the part of the first-mentioned member, contacts in the connections from a source of electrical supply to the driving motor are closed, and after a movement on the part of the other member corresponding to that of the first-mentioned member, the same contacts are opened with the result that the motor comes to rest.

The contacts are preferably controlled by a differential gearing or its equivalent, the members of which are driven respectively by the master apparatus and the controlled apparatus, while the planet carrier actually controls the electrical contacts in question.

The invention is particularly suitable for the control of one or more clocks having pivoted leaves, but it may be equally easily applied to apparatus with moving bands or drums which, for example, carry indications such as advertisements.

It is true that it has been proposed to maintain in step an electrically driven shaft and a controlling shaft, both of which are in continuous rotation, by arranging that when there is relative motion between members driven by the respective shafts, a rheostat is operated to vary the speed of the driving motor to correct the disagreement. In this case, however, the object was only to maintain two rotating bodies in step, not to drive apparatus periodically with intervening periods of rest.

In order that the invention may be clearly understood and readily carried into effect, it will now be more fully explained with reference to the accompanying drawings, in which one form of the invention is shown applied to the control of a clock with pivoted leaves. In these drawings:—

Figure 1 is an end view of such a clock;

Figure 2 is a rear view of the same, while

Figures 3 and 4 are purely diagrams showing side and end views respectively of the contact controlling mechanism, but to a scale having no relation to that of Figures 1 and 2.

Referring first of all to Figures 1 and

2, the framework or casing 1 of the clock has bearings for the minute arbor 2 and the hour arbor 3. Each of these arbors has at either end a circular disc to the periphery of which the leaves 4, 5 and 6 are pivoted. Normally two of the minute leaves are visible and also two of the hour leaves. In Figure 1 the leaf 5 is just about to fall and the other leaf 6 which is visible has just fallen. As the arbors 2 and 3 and their end discs rotate, the leaves fall in succession and those which have previously fallen are restored at the rear of the clock. The leaves about to fall are retained by a catch 7 which only allows them to escape one by one at the pre-determined times due to the rotation of the arbors and the end discs. Such mechanisms are already known in clocks and the present invention is more particularly concerned with the method of controlling the movements of the discs carrying the leaves.

The minute arbor 2 is driven directly by an electric motor 8, a simple form of reduction gearing being introduced and shown in the drawings as a spur wheel 9 and a pinion 10. The hour arbor 3 is driven from the minute arbor 2 in such a manner that it turns quickly through the appropriate angle once per hour, for example at the moment when the minute leaf which bears the minute indication " 59 " falls and exposes the succeeding leaf bearing the minute indication " 0 ". The mechanism connecting the arbor 2 and the arbor 3 comprises a ratchet wheel 11 fixed to the hour arbor 3 and in a clock which indicates twenty-four hours the wheel 11 conveniently has twenty-four teeth, but in a clock such as is more usual in England for indicating only twelve hours this wheel need only have twelve teeth. A pivoted pawl 12 maintains the ratchet wheel 11 and the whole of the hour leaves in definite positions.

On the other hand, the minute arbor 2 has a snail cam 13 fixed to it and in the particular example under consideration this cam has a single step. The inner end of an arm 14 bears upon the snail cam 13 and the arm 14 is fixed to a spindle 15 extending along the whole length of the clock at the rear, in a position not to interfere with the cyclic movement of the leaves. At the opposite end of the spindle 15 another arm 16 is fixed; this arm has a counter-weight 17, the pull of which transmitted through the spindle 15 continuously presses the arm 14 against the snail cam 13. The spindle 15 also has fixed to it a short arm or wrist plate 18 to which is pivoted a long pawl 19 which rests in engagement with the teeth of the ratchet wheel 11. Bearing in mind that the snail cam 13 rotates with the minute arbor 2 and only has one step, it will be obvious that this cam lifts the end of the arm 14 clear and consequently also raises the arm 16 and the balance weight 17 enabling the pawl 19 to slip over and engage the next tooth of the ratchet wheel 11. However, when the step in the snail cam 13 arrives at the end of the arm 14, the weight 17 causes the latter to fall quickly, with the result that the pawl 19 gives a rapid impulse to the ratchet wheel 11 and moves it through an angle corresponding to one tooth; this results in the next hour leaf dropping.

Referring now to Figures 3 and 4 which illustrate diagrammatically the electrical controlling mechanism, the driving motor 8, the reduction gearing 9, 10 through which the minute arbor 2 is driven, again appear. The motor 8 drives the arbor 2 an amount every minute equal to one-sixtieth of a revolution so as to ensure that one of the minute leaves drops every minute so that the indications of the clock are kept in agreement with those of the master clock; the latter is indicated in Figures 2 and 3 at 20. It may be a very small standard clock or, on the other hand, 20 may be a secondary dial which is controlled electrically by an accurate standard clock placed at a distance. The master clock 20 is arranged with its minute arbor 21 in alignment with the minute arbor 2 of the clock to be controlled. The arbors 2 and 21 have bevel wheels 22, 23 forming the side members of a differential gearing mounted on their respective adjacent ends. The differential gearing also includes the planet bevel pinions 24 and 25 mounted as usual on studs carried by a carrier 26 movable around the axis 2, 21. The planet carrier 26 carries a pin 27 which in the position shown in Figures 3 and 4 has just raised a block 28 carried by a contact spring 29 so that the latter is held just separated from a fixed contact 30. The contacts 29, 30 are included in one of the connections from the source of electric supply to the electric motor 8 as indicated diagrammatically in Figure 4. In that figure the contacts are shown actually in the connection from the negative pole of the source of supply.

So far described the apparatus works as follows:—In the position illustrated in Figures 3 and 4, the motor 8 is clearly disconnected so that the side member 22 remains stationary while the arbor 21 is rotated one step each minute by the

master clock 20, but in a sense opposite to the normal rotation of the arbor 2. When the standard clock 20 has turned through an angle corresponding to one minute the side member 23 has moved the planet carrier 26 in the same sense but through half the angle. The effect of this movement is to free the contact spring 29 and move it into contact with the fixed contact 30. The motor 8 is then connected to the source of supply and if the latter is in order the motor 8 starts and drives the minute arbor 2 in the correct direction. One of the minute leaves falls but, at the same time, the side member 22 restores the planet carrier towards its initial position and when the arbor 2 has turned one-sixtieth of a revolution the pin 27 again lifts the block 28 and breaks contact between 29 and 30, the motor 8 then stops and the mechanism remains at rest until another minute has elapsed during which the above described cycle is repeated.

If the source of supply fails for a certain time, however, the motor 8 fails to drive the arbor 2 so that the side member 22 remains stationary until the source of supply is restored, when the motor drives the arbor 2 until the pin 27 interrupts the contacts 29 and 30 again, by which time the clock is once more in agreement with the standard clock 20. However, the source of supply may have failed for such a time that the planet carrier 26 has made a complete revolution or more, then clearly unless some provision is made the clock to be controlled will remain permanently slow relatively to the standard clock 20. The minute leaves will be correct but the clock to be controlled with be a complete number of hours in error. In order to bring the hour leaves into agreement with the standard clock after a prolonged failure of the current, the planet carrier 26 is fixed to a spur pinion 31 gearing with a spur wheel 32. The gear ratio in the present case is 12:1, so that the wheel 32 makes one complete turn while the planet carrier 26 has made twelve turns which in the present case corresponds to twenty-four turns of the minute arbor 21, assuming that the side member 22 has remained stationary all the time. In the case of a clock which instead of the 24 hour leaves as illustrated has only twelve hour leaves clearly the gear ratio between 31 and 32 would have to be 6:1.

The wheel 32 carries an operating pin 33 similar to the pin 27 carried by the planet carrier 26 and adapted to co-act with a block carried by a further contact spring 34. In the position illustrated, the pin 33 holds the contact spring 34 apart from a fixed contact 35. The contacts 34, 35 are connected in the negative supply conductor from the source of supply in parallel to the contacts 29, 30.

In order to appreciate clearly the effect of the wheels 31, 32 and their contact mechanism, suppose that the source of supply fails for two hours and twenty-four minutes, during that time the arbor 2 and the wheel 22 remain at rest but the standard clock 20 continues to move forward and causes the planet carrier 26 to move in the same sense as the arbor 21 but at half the speed. Therefore, in two hours and twenty-four minutes the clock makes two revolutions and four-tenths of a revolution and consequently the planet carrier 26 has turned through one revolution and two-tenths of a revolution and again the spur wheel 32 has moved through one-tenth of a revolution only. Thus the contacts 29 and 30 and the contacts 34 and 35 are all closed together but the motor during the two hours and twenty-four minutes has not rotated because of the failure of the source of supply.

As soon as this source of supply is restored, however, the motor 8 starts up until not only the pin 27 interrupts the contacts 29, 30, but also the pin 33 interrupts the contacts 34 and 35. It will then be appreciated that both the minute leaves and the hour leaves of the clock to be controlled agree with the time given by the standard clock 20.

It has already been indicated that the invention is not limited to the particular arrangement which has been described in detail. It is not limited strictly to clocks and it may be employed to control mechanisms which display indications other than the time on pivoted leaves or on moving bands, or on rotating drums and particularly to advertisements which are displayed for distinct intervals of time.

The mechanism employed may be varied without departing from the scope of the invention, for example the mechanism for rotating the leaves may be varied. The differential gearing may be varied, the only condition being that both sets of contacts 29, 30 and 34, 35 are interrupted when the moving parts of the controlled mechanism are in agreement with the standard mechanism, while the contacts are closed when the two mechanisms are not in agreement.

The functions of the contacts 29 and 30 and the contacts 34 and 35 could be fulfilled by a single pair of contacts

arranged to be controlled mechanically, so as to be interrupted when there is agreement between the minute leaves and the hour leaves of the clock to be controlled and the standard clock. Again instead of using the reducing gearing 31 and 32 the contacts 34 and 35 may be controlled by the hour arbors of the clock to be controlled and the standard clock, for example, through a second differential gearing similar to that illustrated in Figures 3 and 4. The source of supply shown at the right hand is shown in a general way as representing supply mains but, of course, the source of supply for the motor 8 could be obtained from a battery of primary cells or accumulators, or even further a battery might be employed which could automatically be connected to the supply terminals should the source of supply from outside power mains fail.

It has already been indicated that the invention is applicable to advertisement devices instead of clocks when the advertisements are shown on pivoted leaves or on one or several bands passing over drums arranged so that the indications on the bands appear in succession, or that the indications may be on one or more drums. However, even when the controller device is a clock it will embody advertisements also, for example, advertisements may appear on the rear faces of the leaves with the indications of the time so that when a leaf has fallen and its rear surface becomes visible it displays an advertisement.

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 mechanism for controlling an apparatus of the type described, driven in step-by-step fashion by an electric motor, so that its indications are intermittently brought into agreement with those of a master apparatus, wherein a member driven intermittently from the master apparatus and a member connected to move only when the controlled apparatus is driven, so co-operate that after a pre-determined movement on the part of the first-mentioned member, contacts in the connections from a source of electrical supply to the driving motor are closed, and after a movement on the part of the other member corresponding to that of the first-mentioned member, the same contacts are opened.

2. A mechanism according to Claim 1, wherein the side members of a differential gearing are connected respectively to the master or controlling apparatus and to the controlled apparatus and the planet carrier serves to open and close the contacts controlling the electric motor driving the controlled apparatus.

3. A mechanism according to Claim 1 applied to maintaining an electric clock in agreement with a standard or master clock, wherein two pairs of contacts are arranged in parallel in a supply conductor to the motor driving the clock, one pair of contacts being opened when the clock is correct as regards the minute indication, the opening and closing being effected by the planet carrier of a differential gearing, the side members of which are driven respectively by the controlling clock and the clock to be controlled, while the second pair of contacts are opened when the hour indication of the controlled clock is correct, the opening and closing of the second mentioned pair of contacts being effected by a member geared to the planet carrier of the differential gearing, substantially as described.

4. A mechanism for controlling synchronised clocks and advertisement apparatus with pivoted leaves, substantially as described with reference to the accompanying drawings.

Dated this 27th day of January, 1925.

For the Applicants,
H. A. GILL & Co.,
Chartered Patent Agents,
51/52, Chancery Lane, London, W.C. 2.

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Fig.1.

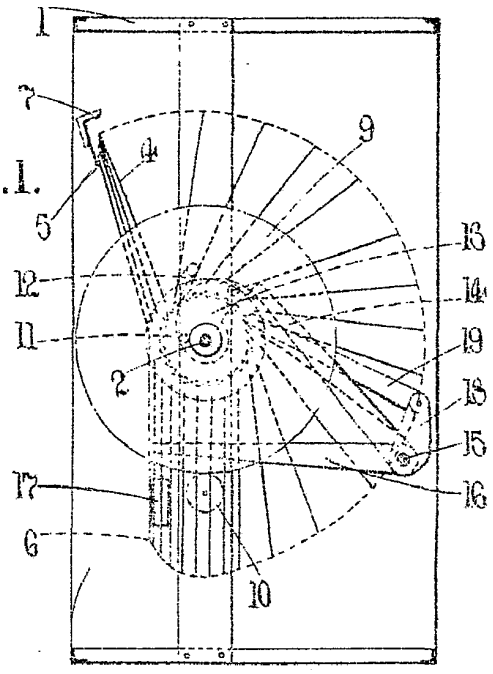
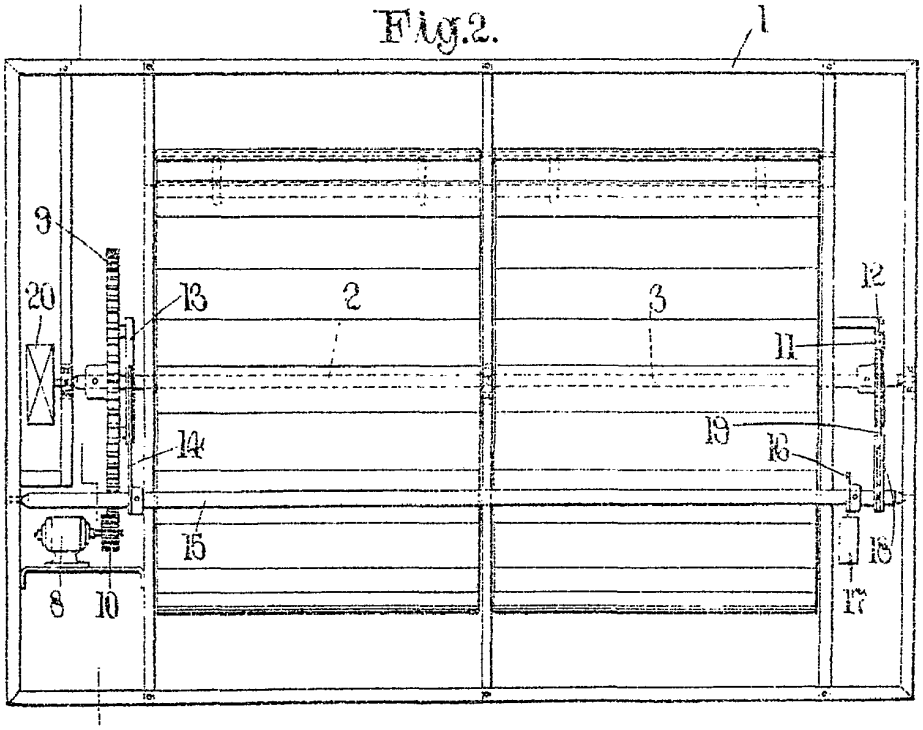


Fig.2.



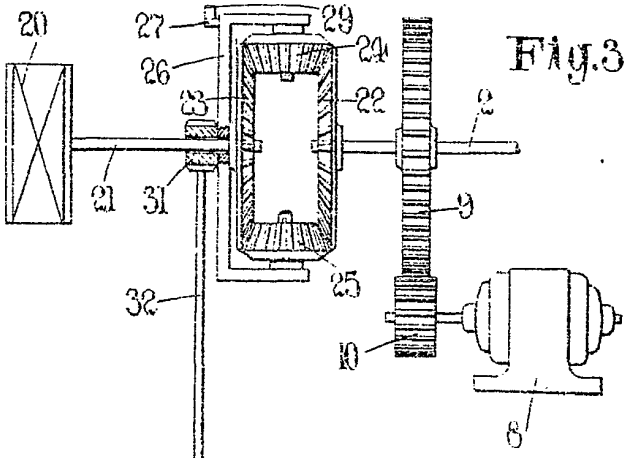


Fig.3.

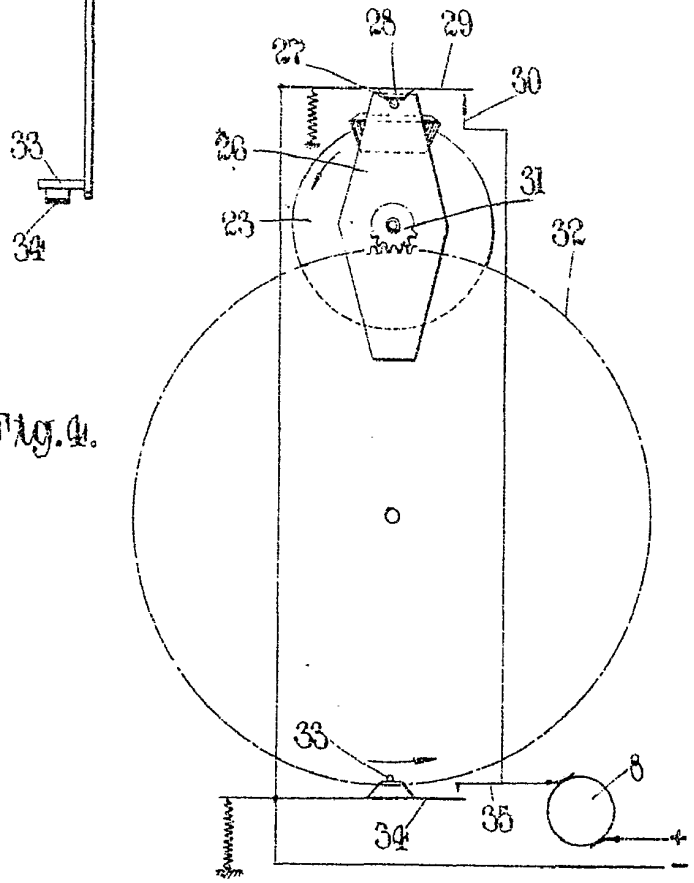
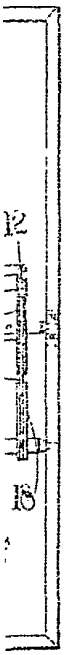


Fig.4.



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

Fig.1.

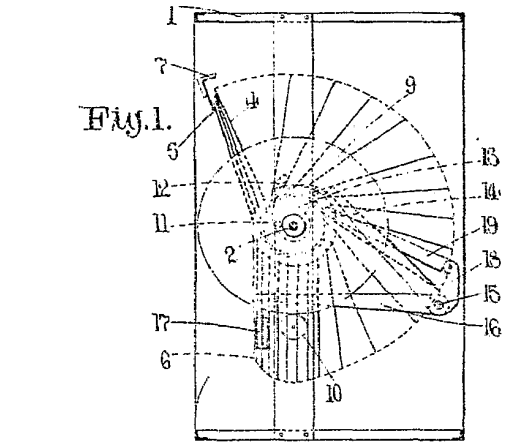


Fig.2.

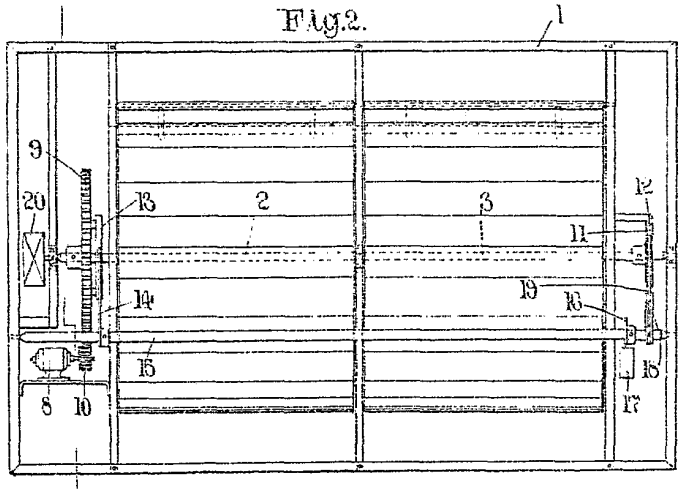


Fig.3.

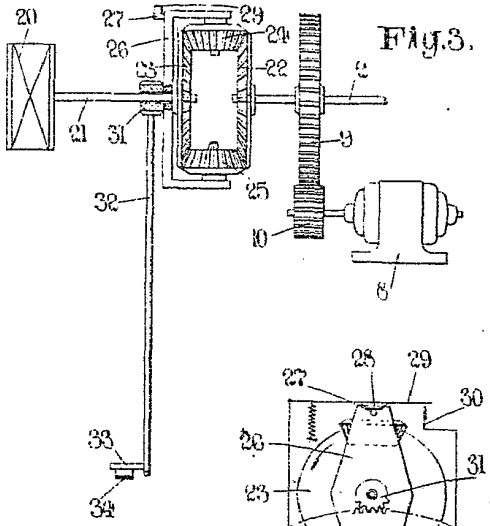
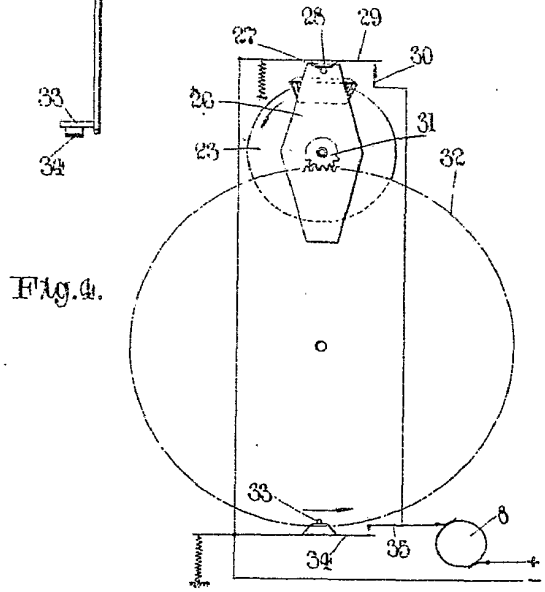


Fig.4.



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