PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.

Improvements in Electrically Driven Clockwork.

I, THOMAS RUSHTON, 58, Birnam Road, Tollington Park, London, N. 4, (of English nationality), do hereby declare the nature of this invention to be as follows:—

This invention relates to electrically driven clockwork and its construction is carried out as follows:

A suitable wheel of the clock train is rotated by a weighted arm carrying a pawl which drives with the usual click and ratchet action.

The arm at one extremity carries the weight. This weight is arranged to assist the drive at one point but to retard at another.

The main driving force is a spring which applies a stress upon the weighted arm, and the stress of this spring and the position of the weight are so arranged that when the driving stress of the spring is at its greatest the weight acts to retard the drive, but when the stress of the spring has lessened and the weighted arm has been moved through a portion of its arc, the weight then gradually comes into action as a driving force, increasing as such while the driving force of the spring is lessening. It will be seen by this arrangement that a constant driving force is applied to the clock train.

The usual method of restoring the weighted arm is by means of an attracted armature carrying a contact closing a circuit by means of a contact carried by the weighted arm; the said arm being thrown upward and beyond a point at which the armature comes to rest, and so breaking the circuit and also restoring the driving force. Experience has shewn that the above method of controlling the circuit is not satisfactory and various attempts have been made to improve upon it.

In the present invention it is proposed to introduce a second pair of contacts, having a parallel connection with the first, and arranged in such a manner that the weighted arm first makes contact by engaging a contact rigidly mounted in its path.

The circuit is thus closed and the armature is attracted by the electro-magnet.

At the time when the first contact is made, a contact which is carried by the armature is a little distance away, but the moment the circuit is closed, this armature contact comes sharply into action with a second contact point upon the weighted arm, and a second circuit is immediately established which supplements the first and so ensures the satisfactory establishment of the circuit. Experience has shewn that this is a very vital consideration.

From this point the continued armature movement throws the weighted arm forward in the usual manner as described. This breaks the circuit and restores the driving force of the clock train.

Dated the 23rd day of May, 1924.

THOMAS RUSHTON.

COMPLETE SPECIFICATION.

Improvements in Electrically Driven Clockwork.

I, THOMAS RUSHTON, 58, Birnam Road, Tollington Park, London, N. 4, a British subject, 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 electrically driven clockwork of the type in which an oscillating arm during its driving movement in one direction drives a suitable wheel of the clock train by means of a pawl and ratchet motion, the return movement in the opposite direction being effected by electromagnetic means.

The usual method of restoring the arm is by means of an attracted armature carrying a contact closing a circuit by means of a contact carried by the arm; the said arm being thrown upward and beyond a point at which the armature comes to rest, and so breaking the circuit and also restoring the driving force.

Experience has shown that the above method of controlling the circuit is not satisfactory and various attempts have been made to improve upon it.

In the present invention it is proposed to introduce a second pair of contacts, having a parallel connection with the first and arranged in such a manner that the weighted arm first makes contact by engaging a contact rigidly mounted in its path.

The circuit is thus closed and the armature is attracted by the electro-magnet.

At the time when the first contact is made a contact which is carried by the armature is a little distance away, but at the moment the circuit is closed, this armature contact comes sharply into action with a second contact point upon the arm and a second circuit is immediately established which supplements the first and so ensures the satisfactory establishment of the circuit. Experience has shown that this is a very vital consideration. From this point the continued armature movement throws the arm forward in the usual manner as described, which breaks the circuit and restores the driving force of the clock train.

The invention also comprises a special arrangement and construction of the arm, which is weighted and carries a pawl, whereby any suitable wheel of the clock train is rotated by the usual pawl and ratchet action.

The arm at one extremity carries the weight. This weight is arranged to assist the drive at one point but to retard at another. The main driving force is a spring which applies a stress upon the weighted arm, and the stress of this spring and the position of the weight are so arranged that when the driving stress of the spring is at its greatest the weight acts to retard the drive, but when the stress of the spring has lessened and the weighted arm has been moved through a portion of its arc, the weight then gradually comes into action as a driving force, increasing as such while the driving force of the spring is lessening. It will be seen by this arrangement that a constant driving force is applied to the clock train.

One form in which the invention may be carried into effect is illustrated diagrammatically in the accompanying drawings.

Any suitable wheel of the clock train is driven by the ratchet wheel 1, which is rotated by means of a pawl 2, mounted on an arm 3, which carries a weight 4 at one extremity and is pivotally mounted as at 5 coaxially with the centre of the wheel 1. A tension spring S has one end jointed to the arm 3, its other end being anchored to the clock frame. This spring tends to drive the arm 3 in the direction of the arrow, the weight 4 while in the dotted position opposing and during the later portion of the movement assisting the drive.

When the arm 3 has travelled a certain distance, for example when it has reached the position shown in full lines in the drawing, it is returned to its initial position by the following means. An electro-magnet 6, of any suitable shape, and having coils 7 and 8 is adapted, on excitation to attract an armature 9, eccentrically pivoted as at 10, and normally held out of contact with the magnet by means of a spring or the like 11.

Mounted on the arm 3 near its lower end are two contact pins 12 and 13, and an insulated contact pin 14 is fixed on the clock frame. The mechanism is shown on the drawing in one extreme position of the arm 3, the pin 12 having just come into contact with the fixed pin 14. Another insulated contact pin 15 is fixed to an arm 16 rigidly connected with the armature 9. When the pin 12 has just come into contact with the pin 14, the two pins 13 and 15 are still some distance apart.

One terminal 17 of the magnet coil is earthed to the clock frame, and is thereby electrically connected with both the contact pins 12 and 13. The insulated pins 14 and 15 are electrically connected by the conductor wire 18, the electrical circuit being completed by way of the conductor wire 19, battery or source of energy 20, conductor wire 21 to the other terminal 22 of the magnet coil.

The action of the mechanism is as follows:—When the arm 3 has just reached the position shown on the drawing in which pin 12 has just made contact

with the fixed pin 14, the electrical circuit is completed and current flows through the magnet coil, the armature 9 is powerfully attracted carrying with it the arm 16 and contact pin 15. The latter almost immediately makes contact with the pin 13 and begins driving the arm 3 in the direction opposite to that of the arrow. The contact of the pins 12 and 14 is suddenly broken as soon as pins 13 and 15 make contact, but the pins 13 and 15 remain in contact so preserving the electrical circuit, until the armature 9 comes against the core of the electro-magnet 6. The arm 3 and weight 4 have by this time acquired sufficient momentum to continue their movement against the resistance of the spring S, the pawl 2 free-wheeling over the teeth of the ratchet wheel 1, until the position shown by the dotted lines is reached. The electrical circuit is quickly broken by the contact pin 13 moving away from the pin 15, when the armature comes against the core of the electro-magnet. The drive begins from the dotted position shown, in which position the tension of the spring S is greatest, and the weight 4 opposes the drive. When the arm 3 has passed the vertical position, the tension of the spring S is lessened, and the weight 4 assists the drive.

The current which flows through the contact pins 12 and 14 is momentary, and has to effect the movement of the armature against the slight resistance of the spring 11 only. By the time the armature has moved to bring the pins 13 and 15 into contact, the pins 12 and 14 have separated. Alternatively to the circuit shown on the drawing, the contact pin 14 may be connected to the terminal 22 by a separate circuit comprising an auxiliary battery for the supply of the said momentary current. The battery 20 has to complete the movement of the armature against the resistance of the main spring S, and has therefore to supply a much greater amount of electrical energy than the auxiliary battery.

It will be obvious that the arrangement of supplementary electrical contacts hereinbefore described can equally well be applied to such clocks as comprise a pendulum which is kept oscillating by means of the periodical falls of an electrically reset weighted arm.

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. Electrically driven clockwork of the type referred to, in which the armature of the electro-magnet during a short portion at the beginning of its movement towards the core is entirely free from the driving arm and therefore moves quickly during said short portion.

2. Electrically driven clockwork of the type referred to comprising two pairs of contacts of which the first pair closes an electrical circuit through the coils of an electro-magnet to the armature, and the second pair immediately comes into action to supplement the first pair and to maintain the circuit when the first pair of contacts separate and to complete the movement of the armature.

3. Electrically driven clockwork as set forth in Claim 2 in which two contact pins fixed to the driving arm are always in electrical connection by means of the metal work with one terminal of the coils of the electro-magnet, a third insulated contact pin is fixed to the clock frame, and a fourth contact pin is fixed to an arm in rigid connection with the armature.

4. Electrically driven clockwork as set forth in Claim 2, comprising two separate circuits each with a battery or source of electrical energy, corresponding to the said two pairs of contacts.

5. Electrically driven clockwork as claimed in any of the preceding claims, in which a spring applies the main driving force to the oscillating arm during its driving movement, and a weight attached to the arm retards the drive when the force of the spring is greatest and assists the drive when the force of the spring has lessened.

6. The modification of an electrically driven clock as claimed in any of Claims 2 to 4 in which the supplementary contacts are utilised for electrically resetting a weighted arm the periodic falling of which maintains the oscillations of a pendulum.

7. Electrically driven clockwork substantially as hereinbefore described or as illustrated.

Dated this 23rd day of February, 1925.

For the Applicant,

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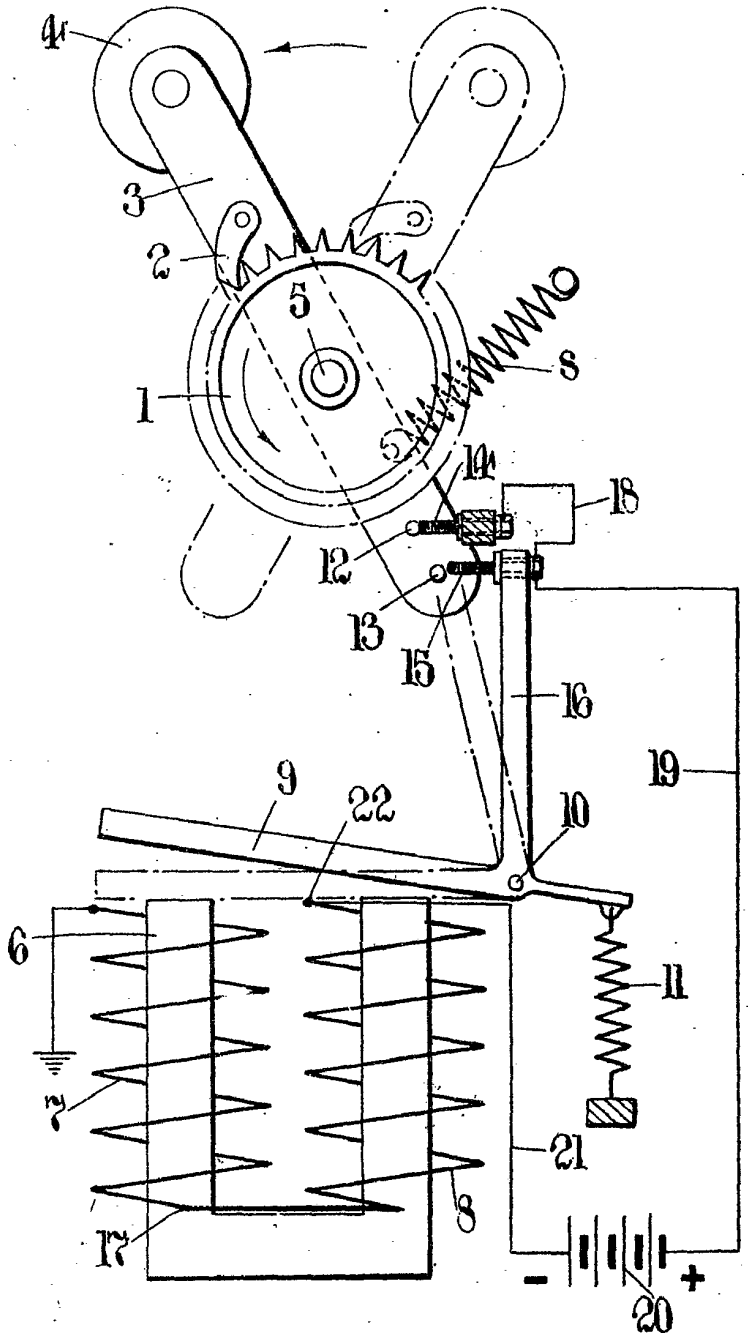

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