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Complete Specification Left, 2nd Dec., 1910—Accepted, 13th Apr., 1911

PROVISIONAL SPECIFICATION.

Improvements in or connected with Electrically Driven Clocks.

I, PERCIVAL ARTHUR BENTLEY, of 161, Waterloo Street, Burton-on-Trent, in the County of Stafford, Clock and Watch Maker, do hereby declare the nature of this invention to be as follows:—

My invention relates to improvements in or connected with electrically driven clocks of the kind in which a pendulum carries a coil of wire which reciprocates in the neighbourhood of fixed permanent magnets or electro-magnets, or which carries a permanent magnet or electro-magnet reciprocating in the neighbourhood of fixed coils or other magnets, or other similar type of electric clock, the necessary reversals of current in the coil or coils being brought about by a movable contact or contacts operated by the pendulum during its swinging movements.

In my invention the removable contact arrangement embraces a carriage, preferably a jockey carriage mounted on two wheels arranged tandem fashion and maintained in upright position by a pendant weight. This carriage is adapted to be reciprocated from side to side by a tapper (preferably adjustable) on the pendulum or some part attached to the pendulum. The wheels (which constitute the movable contacts) are preferably formed with peripheries of circular section and they run on two pairs of contact rails, one such pair being arranged on either side of the pendulum and extending in the same plane as, or in a plane parallel with, the plane of movement of the pendulum. This arrangement is preferable on account of simplicity but the contact rails may if desired be arranged otherwise and suitable devices be provided for causing the carriage to move in a plane not parallel with the plane of movement of the pendulum.

Each pair of rails is arranged with only a narrow space between them and the contact wheels roll upon the slot thus formed so that each wheel makes contact between the inner edges of one of the pairs of rails.

Whilst one of the rails of each pair is continuous the other is interrupted by a small air gap or other insulator at about its middle part so that as the carriage reciprocates and the wheels roll from one part of the divided rail to another the circuits are changed to bring about the necessary reversals of current, suitable connections being made for the purpose. Further, I provide at the outer end of one of the rails of each pair an insulating part so that if the amplitude of the pendulum swing becomes too great the contact wheels run on to this insulating part, the current is interrupted and the amplitude of swing decreases.

In a contemplated form of clock embodying my improvements I may employ a pendulum carrying a coil adapted to reciprocate over opposite poles of a fixed permanent magnet or magnets, the connections to the coil being made through two blade springs by which the pendulum is suspended. The two inner parts of the divided contact rails are connected together and to one pole of the battery or other source of electrical energy and the two outer parts are connected together and to the other pole of the said source. The continuous contact rails are connected one to each of the two suspension springs. I have found in prac-

[*Price 8d.*]

tice that a convenient battery consists of elements of zinc and carbon embedded in the earth. This gives sufficient energy for my purpose and is very constant. The clock train is driven by ratchet mechanism from the pendulum in any convenient well known way.

Each pair of contact rails is preferably mounted on a sliding base which is adjustable bodily in a transverse direction by an adjusting screw or screws or other means.

The wheels are insulated from the carriage in any suitable manner either by being mounted in jewel holes, or by other suitable means, substance, or material.

Dated this 12th day of August, 1910.

W. SWINDELL,
Imperial Chambers, Albert Street, Derby,
Agent for the Applicant.

COMPLETE SPECIFICATION.

Improvements in or connected with Electrically Driven Clocks.

I, PERCIVAL ARTHUR BENTLEY, of 161, Waterloo Street, Burton-on-Trent, in the County of Stafford, Clock and Watch Maker, 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:—

My invention relates to improvements in or connected with electrically driven clocks of the kind in which a pendulum carries a coil of wire which reciprocates in the neighbourhood of fixed permanent magnets or electro-magnets, or which carries a permanent magnet or electro-magnet reciprocating in the neighbourhood of fixed coils or other magnets, and in which the necessary reversals of current in the coil or coils are brought about by a sliding or otherwise movable contact or contacts operated by the pendulum at each extremity of its swinging movements.

My invention consists chiefly in the provision of means for maintaining the amplitude of the pendulum swing constant, and it also consists in an improved arrangement and construction of fixed and movable contacts as will be hereinafter described.

In order that my invention may be readily understood I shall now proceed to describe it with reference to the accompanying drawings, in which,

Figure 1 is an elevation showing the pendulum and electrical details of a clock constructed under my invention.

Figure 2 is a side view looking from right to left of Figure 1. The central part of this figure is drawn to a larger scale and shows the fixed table *t*, which carries the fixed contacts, in section.

Figure 3 is a plan of the fixed contacts and it also diagrammatically shows the electrical connections.

Referring now to these drawings, *e* is the pendulum carrying a coil *j*, and *u* is a fixed permanent magnet over which it swings. The movable contact arrangement embraces a jockey carriage *a* mounted on two wheels *b* (insulated from the carriage) arranged tandem fashion and maintained in upright position by a pendant weight *c*. This carriage is adapted to be reciprocated from side to side by adjustable tappers *r*, *s*, carried by a U-shaped frame *d* (shown broken away on Figure 1), on the pendulum *e*. The wheels which constitute the movable contacts, are preferably formed with peripheries of circular section and run on two pairs of contact rails F and G, one such pair being arranged on

either side of the pendulum and extending in a plane parallel with the plane of movement of the pendulum.

Each pair of rails is arranged with only a narrow space between them and the contact wheels roll upon the slot thus formed so that each wheel makes contact between the inner edges of one of the pairs of rails. The rear rail of each pair is formed in three sections f^1, f^2, f^3, and g^1, g^2, g^3, separated by air gaps as shown whilst the front rail of each pair is formed of two sections f^4, f^5 and g^4, g^5, interrupted by a small air gap or other insulator as shown at about its middle part so that as the carriage *a* reciprocates and the wheels *b* roll from one part of the divided rails to another the circuits are changed to bring about the necessary reversals of current, suitable connections being made for the purpose as I shall now describe.

Referring now to Figure 3, the two inner sections f^5, g^5, of the front rails are connected together and to one end of coil *j* through lead *y*, whilst the two outer sections f^4, g^4, of the front rails are connected together and to the other end of coil *j* through lead *x*. Leads *x* and *y* are taken to the terminals *p*, *q*, (Figure 2), which are connected with the two ends of the coil *j* through the suspension blade springs *k*. Each of the central sections of the two rear rails is connected to one pole of the battery and also to the two outer sections of the rear rail of the opposite pair. Thus f^2 is connected with the positive pole of battery *o* and to the two sections g^1, g^3, whilst g^2 is connected with the negative pole of the battery and also with sections f^1 and f^3. Normally the travel of the contact carriage *a* does not extend beyond the limits of the central sections f^2 and g^2.

Assume now that the pendulum has swung to the right and has moved the carriage *a* to the right so that the right hand wheel rests on contact rails g^2 and g^4, and the left hand wheel on contacts f^2 and f^5. Lead *x* will now be connected with the negative pole of the battery and lead *y* with the positive pole and the current will flow through coil *j* in one direction, this being such that it will be attracted by the permanent magnet on its swing to the left. When it reaches the end of its swing carriage *a* will be moved to the left by the tapper *s*, so that the left hand wheel will now rest on contact rails f^2 and f^4, and right hand wheel will rest on contact rails g^2 and g^5. Lead *x* will now be connected with the positive pole of the battery and lead *y* with the negative pole so that the direction of current in the coil *j* will be reversed and it will be attracted towards the right again. By this means the pendulum is caused to alternately swing to right and left and the movement drives the clock train through pawl *m* and ratchet wheel *l*.

Should the carriage swing too far to the left the left hand wheel will come on rails f^1, f^4, and the right hand wheel on rails g^3, g^5. It will now be seen that lead *x* will again be connected with the negative pole of the battery through leads 1, 2 and 3 and lead *y* will be again connected with the positive pole through leads 4, 5 and 6. Thus the current in the coil *j* will be reversed and instead of being attracted to the right it will be attracted to the left so that its downward swing under the influence of gravity will be retarded and the overswinging of the pendulum will be choked. The movement will be similarly choked if the pendulum swings too far to the right as will be readily understood. Thus the amplitude of swing is maintained constant.

The contacts may be made adjustable if desired.

Several variations of my invention may be made. Thus sliding contacts may be substituted for the wheels *b* but wheels are preferable on account of the slight friction which they oppose to movement. Also what have been termed the rear rails might be placed above the front rails instead of behind them and contact wheels or sliding contacts be adapted to run or slide between them. Or, the one pair of rails might be positioned vertically above the other pair, the form of carriage being suitably modified.

Further, I may vary the electrical connections. Thus I might connect the

two inner front rails together and to one pole of the battery, the two outer front rails together and to the other pole of the battery, and connect the central section of each rear rail to one end of the coil and to both the outer sections of the rear rail of the opposite pair.

I have found in practice that a convenient battery which gives sufficient energy for my purpose consists of elements of zinc and carbon embedded in the earth.

I prefer to insulate the contact wheels by forming them with jewelled bearings.

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 an electric clock the combination of movable contacts and fixed contacts, the fixed contacts embracing pairs of contact rails one rail of each pair being divided into two sections and the other rail of each pair being divided into three sections, for the purpose set forth.

2. In an electric clock the arrangement and combination of fixed and movable contacts set forth, with reference to Figures 1, 2 & 3.

3. The arrangement and combination of parts constituting an electric clock as set forth with reference to the drawings.

4. In an electric clock the combination of a source of electrical energy, a coil carried by the pendulum, fixed contacts and electrical connections, substantially as set forth with reference to Figure 3.

Dated this 1st. day of December, 1910.

W. SWINDELL,
Imperial Chambers, Albert Street, Derby,
Agent for the Applicant.

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BENTLEY'S Complete Specification.

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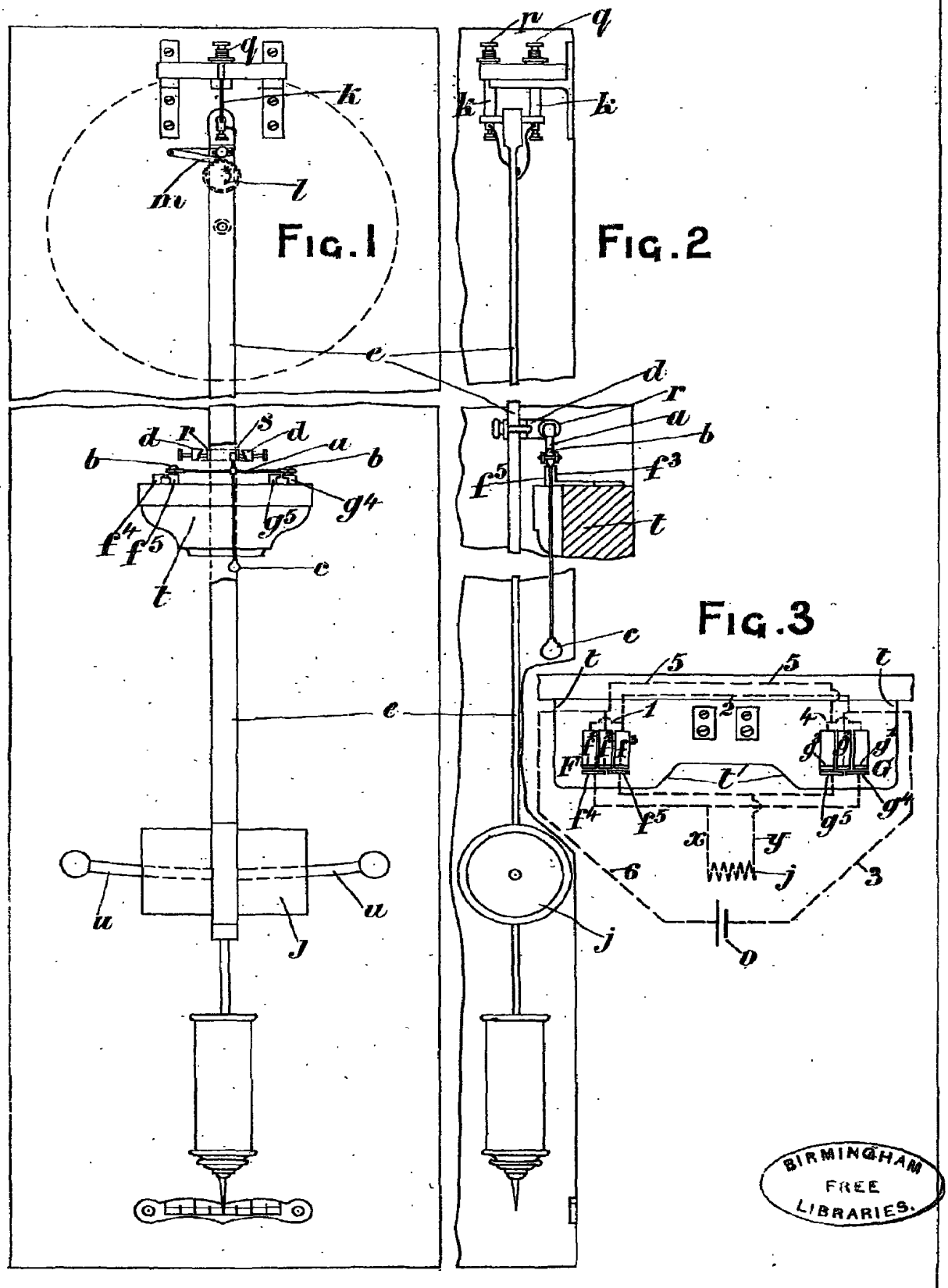

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