N° 15,627 A.D. 1904

Date of Application, 13th July, 1904
Complete Specification Left, 13th Apr., 1905—Accepted, 13th July, 1905

PROVISIONAL SPECIFICATION.

Improvements in Electric Clocks.

I, GEORGE BENNETT BOWELL, of 6 Scarsdale Villas, Kensington in the County of London, Electrician, do hereby declare the nature of this invention to be as follows:—

Whereas in systems of electrically operated clocks, hitherto considerable difficulty has been encountered in the design of the electrical contact devices worked by the master clock, for the purpose of controlling the signals sent out through the connecting wires to the receiving electrically operated or controlled clocks, this invention has for its object the construction of a contact device in a transmitter, or master clock, which shall be free from the troubles of intermittent or irregularly performed closures and interruptions on the electrical circuit, and also which shall be free from the dangers of "hunting".

For the sake of clearness, but without wishing to bind myself to one form to the exclusion of other slight deviations in construction which would be substantially the same in intent, I will describe the invention in the form I prefer to employ. I construct a clock in the usual manner but with the characteristic feature that a number of the teeth of the escape wheel at one part of its circumference are omitted, the relationship of this omitted number to the number of teeth normally embraced by the pallets is such that during one part of its revolution, the escape wheel instead of dropping through a small arc between one impulse and the next, falls through a considerable arc, and a cam fixed upon the escape wheel arbor during this movement causes a pair of contact springs to be pressed together, these remain together approximately for the duration of one beat of the pendulum, and are allowed to become separate again by the next escape, which is through a similarly big arc. It will be noticed that this action occurs in such a manner as not to interfere with the regular impulses transmitted to the pendulum, and since the cam is so arranged in relation with the contact device as to be normally out of mechanical contact with it, the result is that neither function interferes with the other, that is to say, the clock train is utilised for driving the escapement to give impulses to the pendulum, and it is used to operate an electrical contact device, but the two functions are efficiently "detached" from each other.

For the purpose of reducing the wear on the first tooth I may thicken the metal of that tooth or I may provide a fan upon the arbor of the wheel, whose air-resistance in falling through the normal small arc would be negligable as compared with its resistance when falling through the large arc, or I may employ both of these provisions.

Further although I have described the contact in the form of a pair of springs yet I may of course provide any other well known form of contact device for this purpose, also this need not necessarily be actually fitted to the

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escape wheel, the third wheel or even the centre wheel may be made equally suitable parts to which to fix a cam, or other equivalent device. In the form I prefer this clock is driven in the customary manner by a mainspring or a weight wound up by hand, but I may substitute a small mainspring and arrange an electro-magnet controlled by the aforesaid contact for the purpose of winding the small spring at each minute or other suitable interval.

Dated this 13th day of July, 1904.

WHEATLEY & MACKENZIE,
40 Chancery Lane, London, W.C.
Agents.

COMPLETE SPECIFICATION.

Improvements in Electric Clocks.

I, GEORGE BENNETT BOWELL, of 6 Scarsdale Villas, Kensington, in the County of London, Electrician, 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:—

Whereas in systems of electrically operated clocks hitherto considerable difficulty has been encountered in the design of the electrical contact devices worked by the master clock, for the purpose of controlling the signals sent out through the connecting wires to the receiving electrically operated or controlled clocks, this invention has for its object the construction of a contact device in a transmitter or master clock which shall be free from the troubles of intermittent or irregularly performed closures and interruptions on the electrical circuit, and also which shall be free from the dangers of "hunting".

For the sake of clearness, but without wishing to bind myself to one form to the exclusion of other slight deviations in the construction which would be substantially the same in intent, I will describe the invention in the form I prefer to employ. I construct a clock in the usual manner but with the characteristic feature that a number of the teeth of the escape wheel at one part of its circumference are omitted, the relationship of this omitted number to the number of teeth normally embraced by the pallets is such that during one part of its revolution, the escape wheel instead of dropping through a small arc between one impulse and the next, falls through a considerable arc, and a cam fixed upon the escape wheel arbor during this movement causes a pair of contact springs to be pressed together, these remain together approximately for the duration of one beat of the pendulum, and are allowed to become separate again by the next escape, which is through a similarly big arc. It will be noticed that this action occurs in such manner as not to interfere with the regular impulses transmitted to the pendulum, and since the cam is so arranged in relation with the contact device as to be normally out of mechanical contact with it, the result is that neither function interferes with the other, that is to say, the clock train is utilised for driving the escapement to give impulses to the pendulum, and it is used to operate an electrical contact device, but the two functions are efficiently "detached" from each other.

For the purpose of reducing the wear on the first tooth I may thicken the metal of that tooth or I may provide a fan upon the arbor of the wheel, whose air-resistance in falling through the normal small arc would be negligable as compared with its resistance when falling through the large arc, or I may employ both of these provisions.

Further, although I have described the contact in the form of a pair of springs yet I may of course provide any other well known form of contact

device for this purpose, also this need not necessarily be actually fitted to the escape wheel, the third wheel or even the centre wheel may be made equally suitable parts to which to fix a cam, or other equivalent device. In the form I prefer this clock is driven in the customary manner by a main spring or a weight wound up by hand, but I may substitute a small mainspring and arrange an electro-magnet controlled by the aforesaid contact for the purpose of winding the small spring at each minute or other suitable interval.

In the accompanying illustration Fig. 1 shows an escapement, and Fig. 2 shows the arrangement of contact springs.

In Fig. 1, p is the pallet staff connected to the pendulum in the usual manner and carrying the pallets p^1 and p^2. S is the escape wheel mounted on an arbor s^1 which carries the pinion s^2 adapted to engage with the third wheel W; this third wheel being driven in the usual manner by power transmitted through other wheelwork from a spring or weight. The escape wheel S carries on its arbor s^1 a fly f and the teeth of this escape wheel S are omitted as shown between t^1 and t^2.

Referring to Fig. 2, s^1 and s^2 are springs mounted upon suitable fixings s^3 and s^4 and insulated from the frame of the clock; these springs carry platinum contact points s^5, s^6, s^7; another platinum contact point s^8 is supported rigidly from an insulated fixing block s^9. C is a cam fixed to the end of escape wheel arbor s^1 (Fig. 1). The insulated blocks s^3, s^4, s^9 are connected as follows:—s^3 to the battery, s^4 to the line, and s^9 to a non-inductive resistance, the other pole of the battery being connected respectively with the other end of the line and the other end of the non-inductive resistance. The action of the apparatus is as follows:—The escape wheel shown in Fig. 1 progresses in the manner of an ordinary escapement until it arrives at the position shown in the drawing, and when the escape wheel is in this position the cam C (Fig. 2) which moves with it, arrives at the position shown in Fig. 2. At this stage it will be seen that the pendulum is swinging to the left, and upon its return, the pallet p^2 will receive an impulse from tooth t^3 of escape wheel S in the ordinary manner, but immediately following this impulse, the escape wheel will run forward until tooth t^1 comes to rest upon the dead surface of pallet p^1. During this movement the cam C (Fig. 2) will have lifted spring s^1 high enough to make contact s^5 s^6 between spring s^1 and s^2 and break contact s^7 s^8 between spring s^2 and block s^9. In this position, the battery is connected to the line but not to the non-inductive resistance. The action position of cam C relative to spring s^1 at this moment is such that spring s^1 does not exercise any tendency to prevent further forward motion of cam C. Upon the return of the pendulum, tooth t^1 will give an impulse to pallet p^1 in the usual manner and immediately afterwards will move forward until it comes to rest against the dead surface of pallet p^2, during this movement the cam C (Fig. 2) will move forward far enough to clear the contact spring s^1 thereby cutting the battery off the line, but it will be seen that this break does not occur until just after the line has been connected through contact s^7 s^8 to the non-inductive resistance. This arrangement is to prevent the destructive arcing which would otherwise occur between s^5 and s^6 owing to the highly inductive nature of the line through the electro magnetic indicator dials. It will be seen that because the non-inductive resistance is not permanently connected in parallel with the line, it may be made as low as one likes comparatively with the resistance of the line, because s^7 s^8 and s^5 s^6 are never simultaneously closed except for an infinitesimally short space of time.

This arrangement also guards against failure of the system in the event of the non-inductive resistance becoming itself accidentally short-circuited.

Referring again to Fig. 1, it will be seen that from this time onwards until the escape wheel has completed another revolution, the action is that of an ordinary escapement, the air resistance met with by the fly f in this ordinary progression is negligable, this fly being merely added to steady the movement

whon the escape wheel falls through the long arcs as above described. The fly is not necessary but is advantageous.

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 a clock escapement the arrangement whereby a long run forward of the escape wheel is provided for between the ordinary periods of impulse, substantially for the purpose described.

2. In an electrical contact device operated by the rotary motion of a cam driven by clockwork, the arrangement of contact spring, substantially as shown with reference to Fig. 2.

3. In an electrical contact device operated by the rotary motion of a cam driven by clockwork, the employment of a non-inductive resistance of comparatively low value brought into circuit the instant before breaking the main circuit. substantially as described.

4. The improved electrical transmitter or master clock substantially as described with reference to the drawings.

Dated this 13th day of April, 1905.

WHEATLEY & MACKENZIE.
40 Chancery Lane, London, W.C.
Agents.

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BOWELL'S COMPLETE SPECIFICATION.

(1 SHEET)

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

Fig. 1.

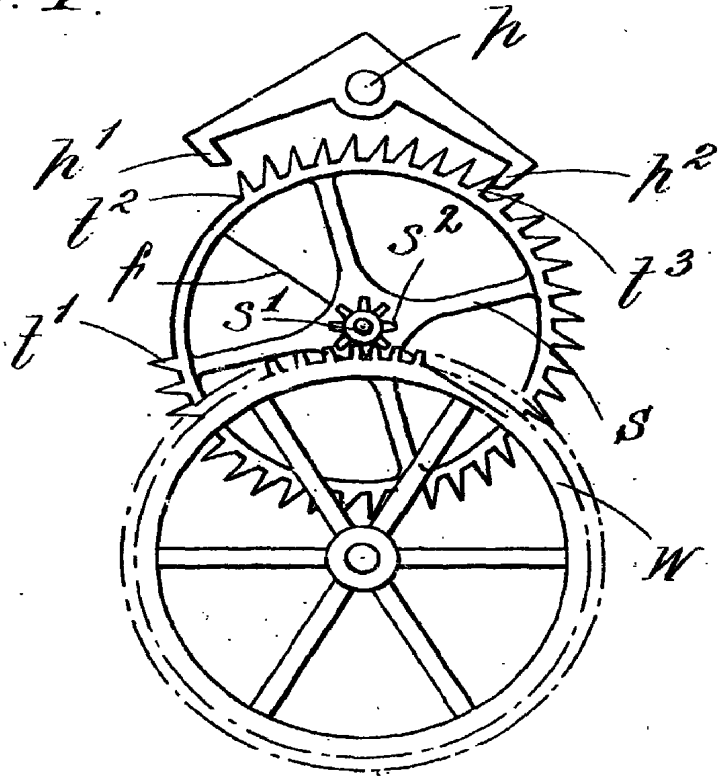
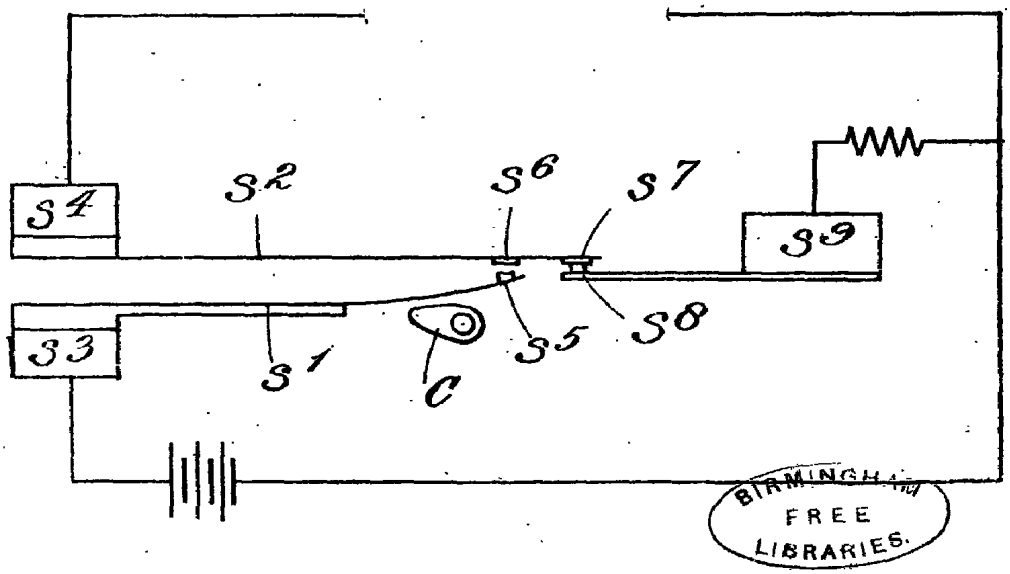


Fig. 2.



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