N° 19,906 A.D. 1905

Date of Application, 2nd Oct., 1905

Complete Specification Left, 2nd Apr., 1906—Accepted, 27th Sept., 1906

PROVISIONAL SPECIFICATION.

Improvements in Electric Clocks

We, ISAAC HARDY PARSONS of Faraday Works, Leicester, Electrical Engineer, and ALFRED ERNEST JOSEPH BALL of 40, St. Saviour's Road East, Leicester aforesaid, Electrician, do hereby declare the nature of this invention to be as follows:—

This invention relates to electric clocks, and mainly to the class known as secondary clocks, and has for object a secondary step-by-step mechanism which is locked during each cycle of its movements. The advantage of such locking is that the action of wind on the hands when such are exposed, is unable to affect the same whilst the propelling click is being withdrawn, and further the mechanism may be used for propelling time registering apparatus such as used for checking workmen, without any risk of the mechanism being disturbed by the process of registering, or, by such or similar apparatus which it may be driving, being out of poise.

In proceeding to carry this our invention into effect, we construct our improved secondary device in the following manner:—

Within a suitable frame, we mount a ratchet wheel having the required number of teeth, and we dispose a propelling click in such relation to the ratchet wheel that the propelling click in engaging a tooth in order to propel the wheel the required amount, also engages the front of the next tooth to be propelled and in such a position that a line drawn approximately at right angles from the front of the said tooth, bisects the pivot of the lever carrying the said propelling click, which lever for the purposes of this specification we will designate the vertical lever. Above the propelling click at about its point, we attach to the vertical lever a fixed stop, and, at about right angles to the said vertical lever near the propelling click we attach thereto, or form in one piece therewith, an arm, to the extremity of which we pivot the propelling click. We dispose the back stop or retaining click, so that its pivot is suitably near the vertical lever to enable a right angled arm thereof, to be engaged by the vertical lever when the propelling click is disengaged from the tooth which it normally holds, thus preventing the back stop click from rising out of the ratchet teeth at this cycle of its operation. When we dispose the pivot of the back stop click at a distance from the vertical lever, we connect an arm thereof to the vertical lever by means of a tracker or link. When this our improved step-by-step device has to perform exceptionally heavy work, we supplement the vertical stop with a fixed stop on the frame work. We attach an armature to the vertical lever, operated by a suitable electro-magnet.

It will now be seen that this device operates as follows:—

When at rest the ratchet wheel is locked in its forward direction by the fixed stop of the vertical lever limiting the forward rise of the propelling click, and in its backward direction by the back stop click. On the armature being

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attracted, the vertical lever draws back the propelling click in the usual manner to enable it to engage another tooth of the ratchet wheel.

During the time it is being drawn backwards it prevents the tooth it engages from escaping by reason of the front of the tooth being practically a segment of the circle in which it moves, but on the propelling click dropping on to the next tooth, the wheel is still held and prevented from turning forward by reason of the tail piece of the back stop click being now engaged by the vertical lever, thus preventing it from being lifted out of engagement with the ratchet wheel. On the vertical lever being released by the electro-magnet, the pressure on the tail piece of the back stop click is withdrawn, the propelling click then engaging the next tooth, thus preventing the wheel from advancing more than one tooth, and holding it rigidly locked when at rest as before.

Dated this 30th day of September 1905.

ISAAC HARDY PARSONS,
ALFRED. E. J. BALL.

COMPLETE SPECIFICATION.

Improvements in Electric Clocks.

We, ISAAC HARDY PARSONS of Faraday Works, Leicester, Electrical Engineer, and ALFRED ERNEST JOSEPH BALL of 40, St. Saviour's Road East, Leicester aforesaid, 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:—

This invention relates to electric clocks of the class known as secondary clocks, and has for object a secondary step-by-step mechanism which is locked during each cycle of its action. The advantage of such locking is that the action of wind on the hands, when such are exposed, is unable to affect the same whilst the propelling click is being withdrawn, and further the mechanism may be used for propelling time registering apparatus such as used for checking workmen, without any risk of the mechanism being disturbed by the process of registering or by the fact of such or other apparatus which it may be driving, being out of poise.

In proceeding to carry this our invention into effect, we construct our improved secondary device in the following manner:—

Within a suitable frame, we mount a ratchet wheel having the required number of teeth, and we dispose a propelling click in relation to the ratchet wheel, so that the propelling click in engaging a tooth in order to propel the wheel the required amount, also engages the front of the next tooth to be propelled and in such a position that a line drawn approximately at right angles from the front of the said tooth, bisects the pivot of the lever to which the said propelling click is pivotted, which lever for the purposes of this specification we will designate the vertical lever. Above the propelling click at about its point, we attach to the vertical lever a fixed stop, and, at about right angles to the said vertical lever near the propelling click we attach thereto, or form in one piece therewith, an arm, to the extremity of which we pivot the propelling click. We dispose the back stop or retaining click, so that its pivot is suitably near the vertical lever to enable the said vertical lever to engage an arm or extension of the back stop click, which arm or extension is either fixed rigidly thereto or is formed in one piece therewith. We adjust the movement of these parts so that when the propelling click is disengaged from the tooth which it holds or propels, the pressure of the vertical lever against

the arm or extension of the back stop click prevents this click from rising out of the ratchet teeth at this cycle of its action. When we dispose the pivot of the back stop click at a distance from the vertical lever, we connect an arm thereof to the vertical lever by means of a tracker or link. When this our improved step-by-step device has to perform exceptionally heavy work, we supplement the vertical stop with a fixed stop on the frame work. We attach an armature to the vertical lever, operated by a suitable electro-magnet.

It will now be seen that this device operates as follows:—

When at rest, the ratchet wheel is locked in its forward direction by the fixed stop of the vertical lever limiting the forward rise of the propelling click, and in its backward direction by the back stop click. On the armature being attracted, the vertical lever draws back the propelling click in the usual manner to enable it to engage another tooth of the ratchet wheel, in order to advance it one tooth.

During the time the vertical lever is being drawn backwards it prevents the tooth it engages from escaping in a forward direction by reason of the front of the tooth being practically a segment of the circle in which it moves, also on the propelling click dropping on to the next tooth, the wheel is still held and prevented from turning forward, by reason of the tail piece of the back stop click being now engaged by the vertical lever, thus preventing it from being lifted out of engagement with the ratchet wheel. On the vertical lever being released by the electro-magnet, the pressure on the tail piece of the back stop click is withdrawn, the propelling click or equivalent then engaging the next tooth, thus preventing the wheel from advancing more than one tooth at each operation, and holding it rigidly locked when at rest as before.

It is obvious that without departing from the substance of this our said invention, we may employ two vertical levers instead of one and so divide the work of propelling and locking the wheel between them. By this modification one lever and its click may be used for propelling the ratchet wheel and the other lever and its click or equivalent may be used for locking the ratchet wheel.

Referring to the annexed drawings in which like letters indicate like or equivalent parts:—

Fig. 1 illustrates the mechanism with the vertical lever arranged above the ratchet wheel, while Fig. 2 shows the position of the respective parts when the vertical lever is arranged below the ratchet wheel.

Fig. 3 shows a combination of the two designs employing the vertical lever in duplicate, one lever being used for locking the ratchet wheel and the other for driving the said wheel. Fig. 4 illustrates a re-arrangement of the combination shown in Fig. 3 in which the locking click becomes the vertical lever, being mounted with its pivot E in the same relative position to the ratchet teeth.

Referring to Fig. 1, A. shows the ratchet wheel, B the vertical lever, C the propelling click, D the fixed stop, E the pivot of the vertical lever which occupies a position at right angles to the face of the tooth held by the click C. F is the retaining click, G its tail-piece, H the tracker or link, I the impelling spring, J the armature and K, K^1 the magnet.

This arrangement of the device operates as follows:—

When at rest the ratchet wheel is locked in its forward direction by the click C controlled by the stop D, and in its backward direction by the back stop click F. On the armature J being attracted by the magnet K, K^1, the lever B draws back the propelling click C to enable it to engage another tooth of the wheel A. During the time it is being drawn backwards, the tooth of the ratchet wheel which it engages is prevented from escaping by reason of the front of the tooth being practically a segment of a circle through which the click C moves, but on the click C escaping from the point of the tooth which it held and dropping on to the next, the wheel A is still held and

prevented from turning forward by reason of the tail-piece G of the click F being held down by the tracker H thus holding the wheel locked. On the armature J being released by the magnet, the length and angle of the tail-piece G is such that the click F is permitted to lift at the same rate that the wheel A lifts it when advanced by the click C.

Fig. 2 shows a more compact arrangement of the parts illustrated in Fig. 1, the reference letters and its action being identical. The alternative position of the back stop click is indicated in this figure by the dotted lines, F^3 being the click & H^3 its arm or extension. B^6 shows an extension of the lever B which engages the arm H^3.

Referring to Fig. 3 which illustrates the arrangement of the parts when the vertical lever is employed in duplicate, A shows the ratchet wheel, B the vertical lever above the ratchet wheel and in which position it operates as the locking lever. The point of the click C is rounded or otherwise arranged to engage a lesser depth of the angular surface of the tooth. B^6 shows the vertical lever used for driving the ratchet wheel, E 1 its pivot and C 1 the propelling click which need not be provided with a stop such as D, F shows the back stop click, G its tail-piece, H the tracker connecting F to B, I the impelling spring acting in opposition to the magnet K—K^1, J being the armature.

This arrangement of the device operates as follows:—

When at rest the ratchet wheel A is locked in its forward direction by the click C controlled by the stop D and in its backward direction by the back stop click F. On the armature J being attracted by the magnet K—K^1, the lever B^1 draws back the propelling click C 1 in order to engage another tooth of the wheel A. The lever B^1, also after moving a certain distance, by means of its end B^5 engages and draws back the lever B and consequently the click C. During the time the lever B is moving backward, the tooth of the ratchet wheel which the click C engages is prevented from escaping by reason of the pivot E being in such a position that the front or angular face of the tooth is practically a segment of the circle through which the click moves, but on the clicks engaging their next respective teeth (the click C being preferably the last to fall) the wheel A is still held and prevented from turning forward by reason of the tail-piece G of the click F being held down by the tracker H which is now held in tension by an extension of the lever B^1 thus holding the wheel locked. On the armature J being released by the magnet, the wheel A is allowed to advance one tooth, the length and angle of the tail-piece G being such that the click F is permitted to rise at the same rate that the wheel A lifts it when advanced by the click C^1.

Referring to Fig. 4 which illustrates a rearrangement of the combination shown in Fig. 3, A shows the ratchet wheel, B the vertical locking lever which in this design is mounted on a lever D 1. C 1 shows the propelling click which is pivotted to the vertical lever B^1 which also carries the armature. E shows the pivot which occupies a position perpendicular to the angular face of the locked tooth of the wheel A. D shows the fixing stop which is in this instance mounted on the frame.

The action of this form of the device is practically identical with that of Fig. 3, and may be understood by following the description relating to same.

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. In a secondary "step-by-step" mechanism, the combination of the locking device comprising a pawl-carrying lever, pivotted in a position perpendicular to the angular face of the ratchet wheel tooth which the pawl engages, a stop fixed to the pawl carrying lever above the propelling pawl to limit its rise, and a back stop click which is held down between the teeth of the wheel by

the pressure of the armature; the said pressure being conveyed by a tracker or link, or an extension or a lever acting in an equivalent manner, while the pawl is taking up the next tooth in order to propel the wheel, substantially as described.

2. In a secondary "step-by-step" mechanism the duplication of the vertical lever and its driving and locking click, employing one lever for the purpose of driving the ratchet wheel and employing the other lever and click for the purpose of locking the said ratchet wheel, the wheel being prevented from turning forward by means of a stop on the vertical locking lever above the locking click, while the armature is being pulled towards the magnet, and during the remainder of the cycle by controlling the rise of the back stop click by means of motion conveyed from the armature or a part in connection therewith, substantially as described.

3. In a secondary "step-by-step" mechanism, the combination of a locking device operating at right angles to the angular face of the tooth in the ratchet wheel, such as that shown in Figs. 1, 2, 3 & 4, with a back stop click which is held into the teeth of the ratchet wheel by direct pressure conveyed from the armature, and which click is released only in proportion to its rise when lifted by the angular faces of the teeth of the ratchet wheel, substantially as described.

Dated this 31st day of March 1906.

I. HARDY PARSONS.
ALF. E. J. BALL.

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A.D. 1905, Oct. 2. N.º 19,906.

PARSONS & another's Complete Specification.

[2 SHEETS]

SHEET 1

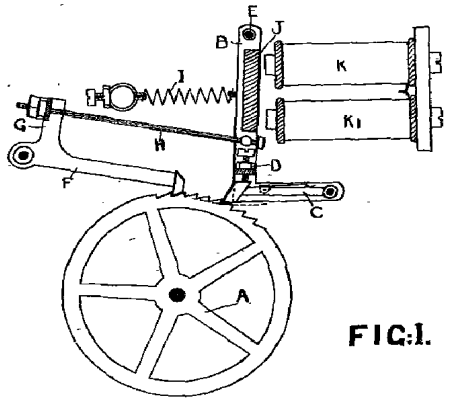

FIG. 1.

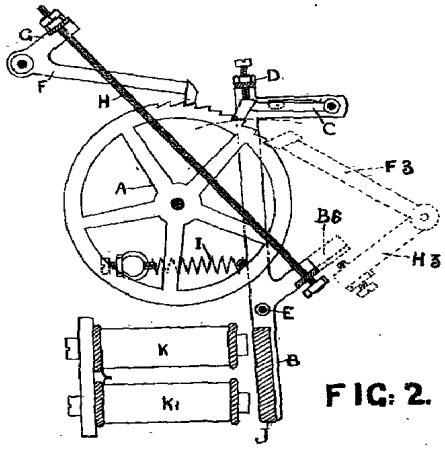

FIG. 2.

SHEET 2

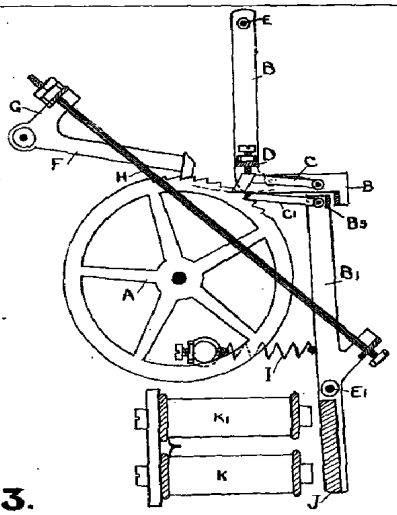

FIG. 3.

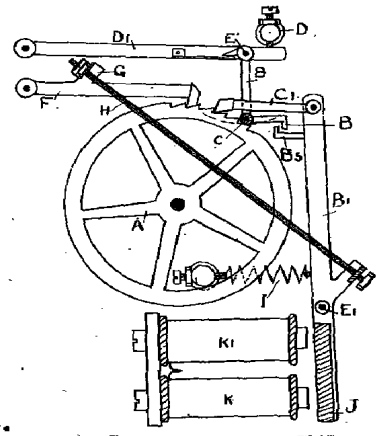

FIG. 4.

Valley & Sons, Photo-Litho.

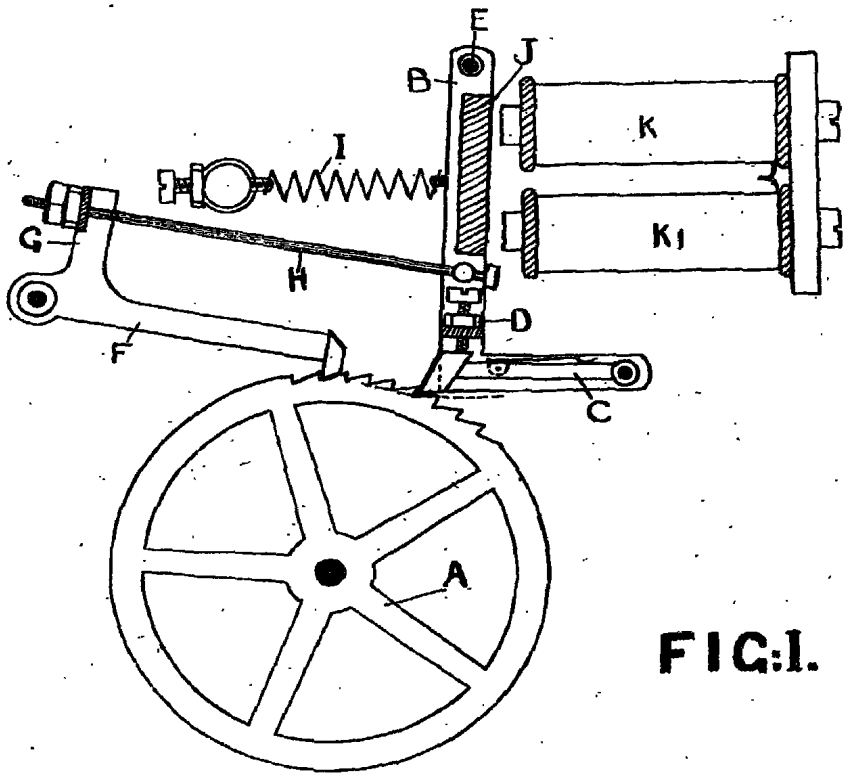

FIG:1.

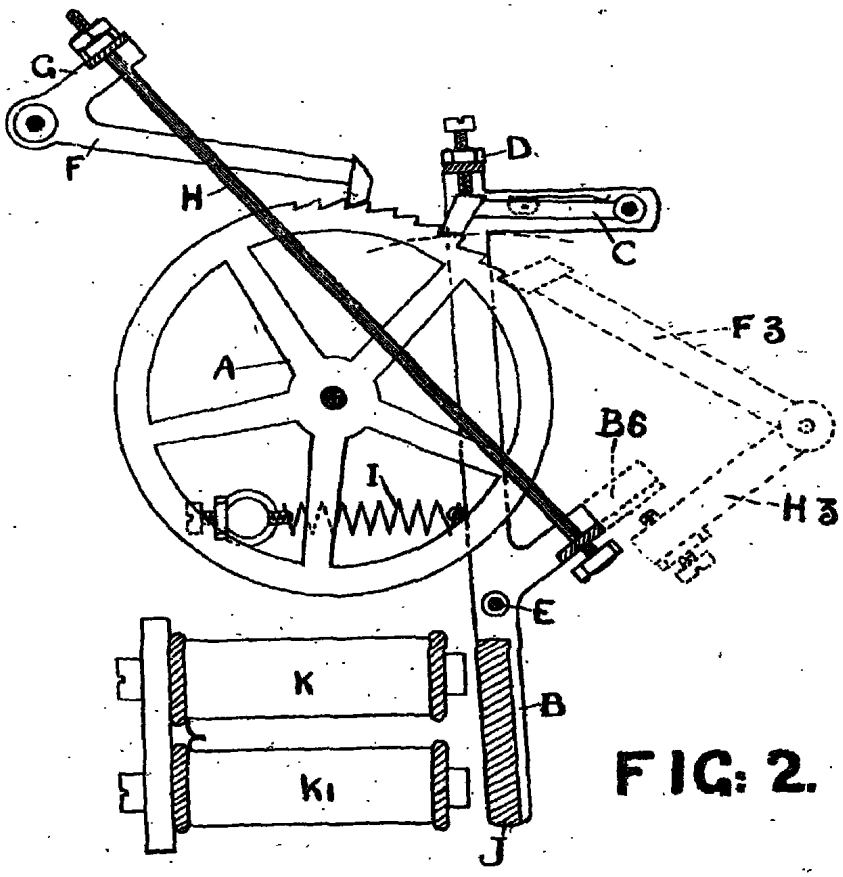

FIG: 2.

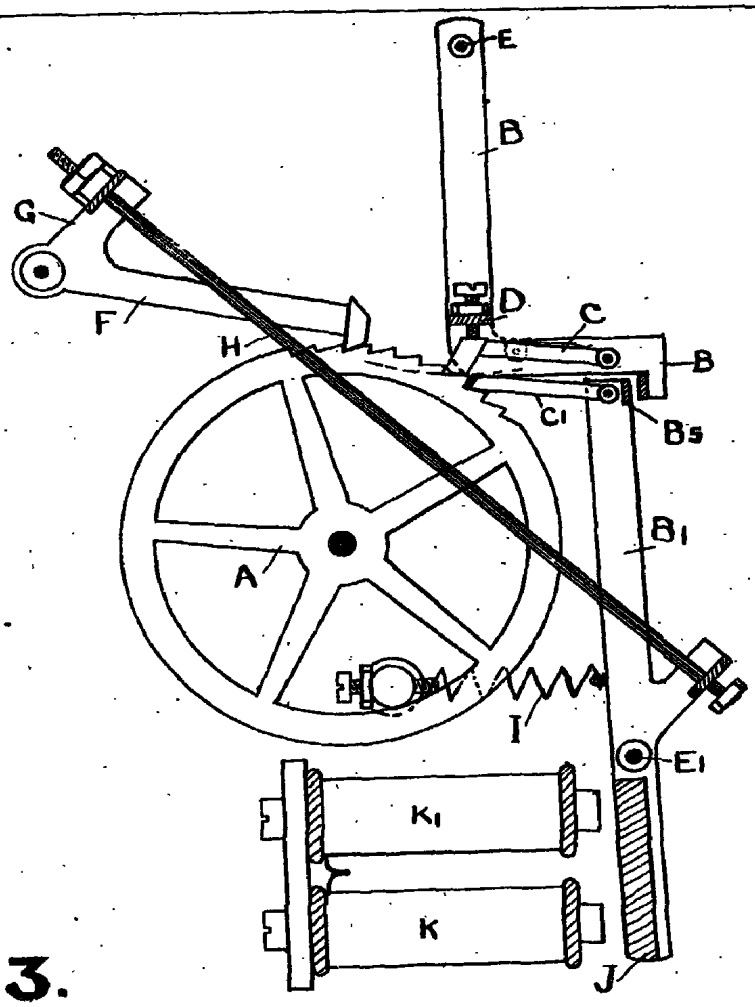

FIG: 3.

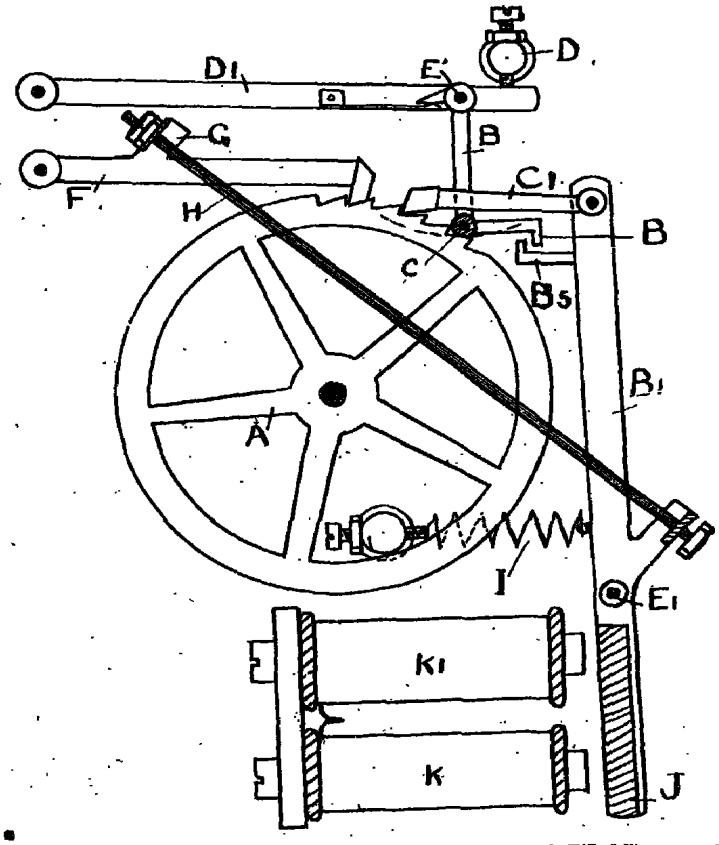

FIG: 4.

Malby&Sons, Photo-Litho.