PATENT SPECIFICATION

370,546

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Complete Accepted: April 14, 1932.

PROVISIONAL SPECIFICATION.

Improvements in and relating to Electrically Operated Clocks and Time Recorders.

We, ISAAC HARDY PARSONS, of "The Croft", Kibworth Harcourt, Leicester, and ALFRED ERNEST JOSEPH BALL, of 212, East Park Road, Leicester, aforesaid, both British Subjects, do hereby declare the nature of this invention to be as follows:—

This Invention relates to Electric Clocks and Time Recorders operated by Synchronous Motors from the Service Mains and which are kept to time by the regulated frequency of the Electric Supply. The object of this Invention is to employ such Motors—which produce continuous rotation to effect the progress of Clock Hands and Type Gears and the like in definite step as of one minute. A further object is to provide means whereby the driving spindle, or equivalent, of the Mechanism, is locked during the operation of the step-by-step action so that the Hands or Type Gear or the like can only advance in such steps as are pre-arranged, and cannot be moved forward or backward by external influences.

In carrying this our Invention into effect we may employ—when we require steps of one minute for instance—a Motor having a final spindle speed of one revolution per minute, and we fit this spindle with a Cam having a gradual rise and a sudden fall. We employ this Cam to energise a spring-actuated lever which we term an Impulse Lever. We provide this Impulse Lever with a Driving Pawl pivoted thereto and disposed to propel a driven Ratchet Wheel in steps. We also provide a back-stop pawl.

We provide means whereby the said Ratchet Wheel is prevented from moving more than one tooth at a time and then only by the Mechanism, by combining therewith any known Escapement Device applicable thereto, or an Escapement Device which we construct as follows:—

We mount on to the same arbor as the driven Ratchet Wheel is mounted, another Ratchet Wheel having an equivalent number of ratchet teeth, but with such teeth facing in the opposite direction, which we term the Locking Wheel. We provide the Impulse Lever with a Locking Pallet or catch, disposed to engage consecutively the teeth of this Locking Wheel and to prevent forward movement while the Impulse Lever is being lifted by the Motor driven Cam. On the complete withdrawal of the locking pallet and of the driving pawl we arrange that the back-stop pawl is held in engagement with the teeth of the driven wheel and so effect continuity of the locking action.

On the release of the Impulse Lever from the peak of the Cam, this Lever—impelled by its spring—causes the driving pawl to propel the driven Ratchet Wheel one tooth in a well known manner. The locking pallet then engages the next tooth of the locking wheel.

We may provide a limited action spring-controlled motion between the locking ratchet wheel and the driven ratchet wheel, in order to obtain a working clearance between the backs of the teeth of the locking wheel, and the back of the locking pallet, on the return motion of the latter. We may provide two locking pallets operating at different points in the periphery of the locking ratchet wheel, one operating on the forward motion of the Impulse Lever, and the other on the return of same.

Dated this 3rd day of February, 1931.

I. HARDY PARSONS.
ALFRED E. J. BALL.

COMPLETE SPECIFICATION.

Improvements in and relating to Electrically Operated Clocks and Time Recorders.

We, ISAAC HARDY PARSONS, of "The Croft", Kibworth Harcourt, Leicester, and ALFRED ERNEST JOSEPH BALL, of 212, East Park Road, Leicester, aforesaid, both

British Subjects, do hereby declare the 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 and Time Recorders operated by Synchronous Motors from the Service Mains and which are kept to time by the regulated frequency of the Electric Supply. The object of this Invention is to employ such Motors—which produce continuous rotation—to effect the progress of Clock Hands and Type Gears or the equivalent in definite steps such as of one minute. A further object is to provide means whereby the driving spindle, or equivalent, of the Mechanism, is locked during the operation of the step-by-step action so that the Hands or Type Gear or the equivalent can only advance in such steps as are pre-arranged, and cannot be moved forward or backward by external influences.

In carrying this our Invention into effect we may employ—when we require steps of one minute for instance—a Motor having a final spindle speed of one revolution per minute, and we fit this spindle with a Cam having a gradual rise and a sudden fall. We employ this Cam to energise a spring-actuated lever which we term an Impulse Lever. We provide this Impulse Lever with a Driving Pawl pivoted thereto and disposed to propel a driven Ratchet Wheel in steps. We also provide a back-stop pawl.

We provide means whereby the said Ratchet Wheel is prevented from moving more than one tooth at a time and then only by the Mechanism, by combining therewith any known Escapement Device applicable thereto, or an Escapement Device which we construct as follows:—

We mount on to the same arbor as the driven Ratchet Wheel is mounted, another Ratchet Wheel having an equivalent number of ratchet teeth. but with such teeth facing in the opposite direction, which we term the Locking Wheel. We provide the Impulse Lever with a Locking Pallet or catch, disposed to engage consecutively the teeth of this Locking Wheel and to prevent forward movement while the Impulse Lever is being lifted by the Motor driven Cam. On the complete withdrawal of the locking pallet and of the driving pawl we arrange that the back-stop pawl is held in engagement with the teeth of the driven wheel and so effects continuity of the locking action.

On the release of the Impulse Lever from the peak of the Cam, this Lever—impelled by its spring—causes the driving pawl to propel the driven Ratchet Wheel one tooth in a well known manner. The locking pallet then engages the next tooth of the locking wheel.

We may provide a spring connection of limited motion, between the locking ratchet wheel and the driven ratchet wheel, in order to obtain a working clearance between the backs of the teeth of the locking wheel, and the back of the locking pallet, on the return motion of the latter. We may provide two locking pallets operating at different points in the periphery of the locking ratchet wheel, one operating on the forward motion of the Impulse Lever, and the other on the return of same.

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

Fig. 1 shows a rear elevation of the Mechanism.

Fig. 2 shows a plan thereof.

Fig. 3 shows details of the Locking Device.

Referring to Figs. 1 and 2, A shows the ratchet wheel which when intended for propulsion at one minute intervals is provided with 60 ratchet teeth. B shows the locking wheel which may be provided with the same number of teeth as the driving wheel and both may be mounted rigidly on the arbor A1. C shows the Impulse Lever pivoted at C1 and C2 an arm thereof adapted to be lifted by the Cam D operated by the Synchronous Motor E.F.G. Instead of being constructed solid from one piece of metal as shown in figure 1 the parts C, C2 may be separate as shown in plan in Fig. 2 but both rigidly fixed to the same arbor C1. H shows the driving pawl pivoted to the impulse lever C at H1. J shows the back stop click pivoted at J1 to the base plate or frame seen in Fig. 2. The back-stop click is secured to the arbor J11 shown in Fig. 2, and in which the back-stop click J is shown broken away for the sake of clearness. K shows the locking pallet (illustrated in Fig. 1 only) attached to the Impulse Lever C and engaging the locking wheel B. J2 shows a D shaped pin (usually of steel) which engages the teeth of the driving ratchet wheel A and J3 an extension of the back-stop click which is engaged by a locking pin C3 while the Impulse lever C is at or about its extreme movement to the right.

The Mechanism shown in Figures 1 and 2 operates as follows:—

On the Synchronous Motor E.F.G. being connected to the Mains the Cam D rotates in the direction of the arrow and during the space of, say, one minute lifts

the arm C2 of the lever C until the driving pawl H engages the next tooth of the wheel A and the locking pallet K is withdrawn from engagement from the wheel B. In the meantime the pin C3 engages the extension J3 of the back-stop J causing the D shaped pin J2 to be held in engagement with the teeth of the wheel A. On the arm C2 falling from off the cam D, the Impulse Lever C moves to the left, impelled by the spring C4 the driving pawl H meanwhile advancing the wheel A one tooth and with it the wheel B one tooth, the locking pallet K again engaging the wheel B as before. Type wheels or Clock Hands when connected to the driving spindle or arbor A1 are definitely advanced one minute or other pre-arranged amount and held locked until again advanced.

Fig. 3 shows an arrangement of two locking pallets operating at different points of the locking wheel. The arrangement here shown operates generally as described with reference to Fig. 1, but with the additional locking afforded by the pallet K2, and this Pallet operates as follows:—

On the pallet K withdrawing from the teeth of the wheel B while being moved with the lever C to the right by the Cam D the pallet K2 enters a tooth indent at a position approximately as shown and holds the wheel locked. On the driving pawl H on its return to the left advancing the wheel in the direction of the arrow (through wheel A) the angular face K3 of the pallet K2 permits the forward movement of the wheel B only at the same rate as it is advanced, until finally arrested and held by pallet K. The return of the Impulse Lever C is effected by the spring C4 as described in reference to Fig. 1.

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 an Electric Clock or Time Recorder operated by a Synchronous Motor from Alternating Current Supply, step-by-step impulse mechanism comprising a cam, or equivalent, rotated by said motor, an impulse lever lifted to a potential position and released by the said cam, a driving pawl pivotally connected to said lever, a ratchet wheel driven in steps by said driving pawl, a back-stop click and locking devices, the parts being disposed to advance said ratchet wheel one tooth at each rotation of said cam and to prevent the ratchet wheel from being advanced by external influences.

2. In an Electric Clock or Time Recorder, step-by-step Mechanism as in claim 1, and comprising a ratchet wheel disposed to be driven by a pawl pivotally attached to a driving lever, and a further ratchet wheel disposed to be locked by a pallet attached also to the driving lever, the arrangement being such as to prevent the first ratchet wheel from being advanced by outside influences while the said driving or impulse lever is being lifted to a potential position by a cam as herein described and shown.

3. Step-by-step Mechanism as claimed in the preceding Claim, and operated by a cam driven by a Synchronous Motor, the second ratchet wheel being locked by two pallets during the reciprocating movement of an impulse lever as described with reference to Fig. 3.

4. Improvments in step-by-step Mechanism operated by Synchronous Motor by a Cam, or equivalent, as herein described and shown.

Dated this 3rd day of November, 1931.

I. HARDY PARSONS.
ALFRED E. J. BALL.

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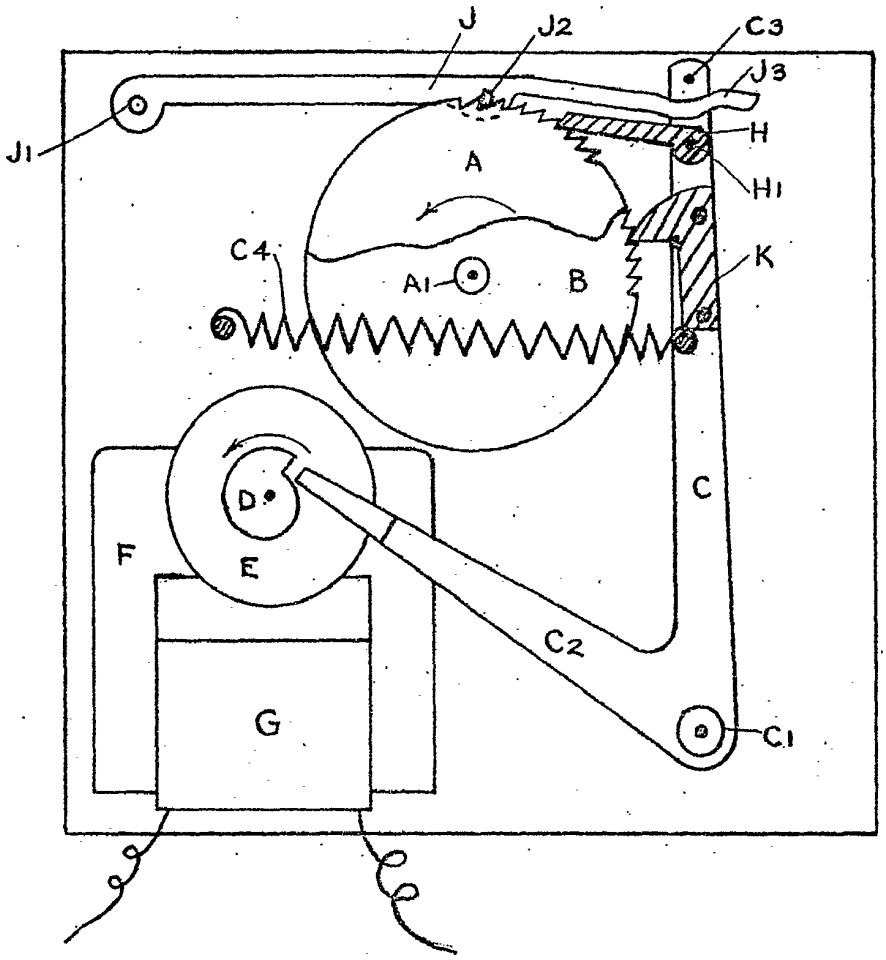

FIG. 1

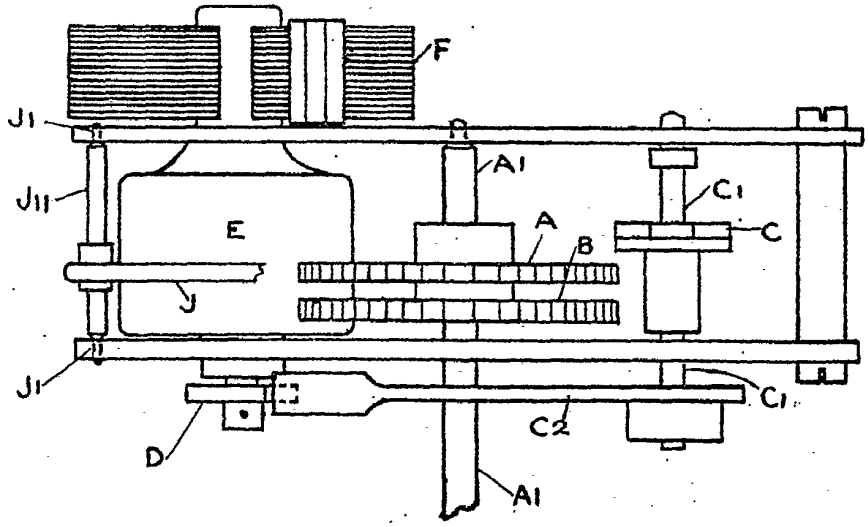

FIG. 2.

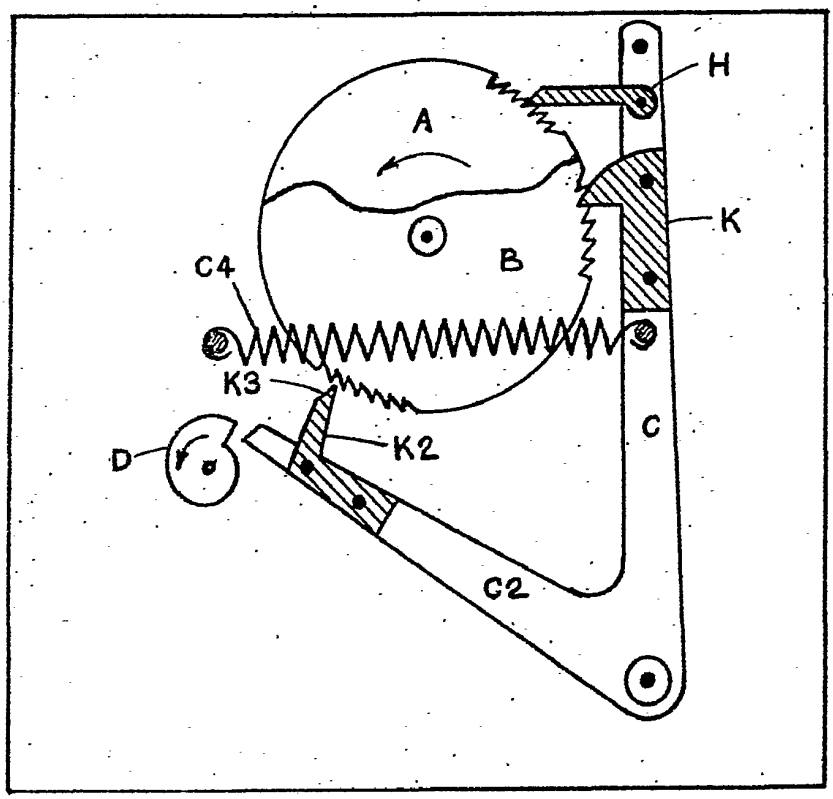

FIG. 3.

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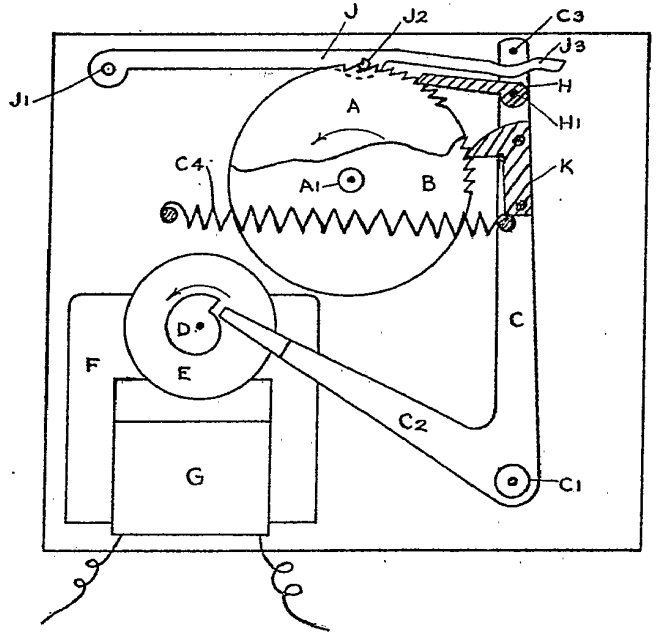

FIG. 1

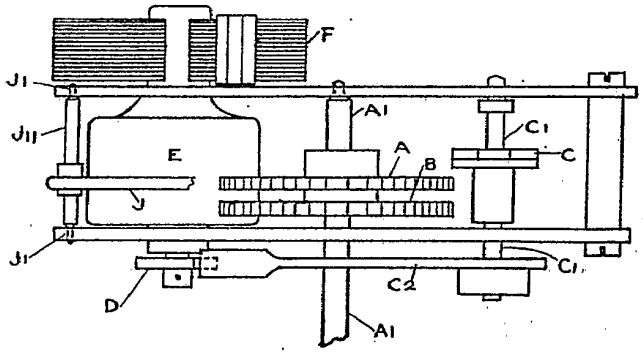

FIG. 2.

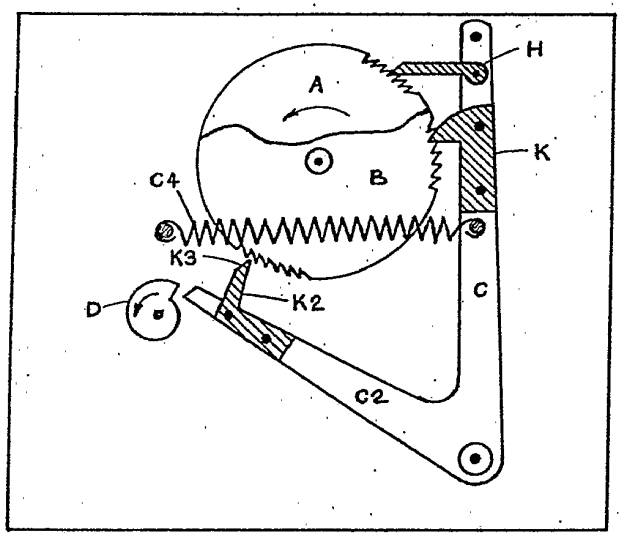

FIG. 3.