PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.

Improvements in Mechanism for Converting Oscillating Movement into a Step-by-step Rotational Movement in Electrically Driven Indicators.

I, CHARLES EDMOND PRINCE, a British subject, of Stubbings Manor, Burchetts Green, Berkshire, do hereby declare the nature of this invention to be as follows:—

This invention relates to electrically driven indicators such as the time-indicating mechanism of electrical clocks or other indicating mechanism in which an electromagnetc device is periodically energised to cause an oscillating movement which is converted into a step-by-step rotational movement of a wheel or train of wheels.

According to the invention the armature of an electromagnet or equivalent oscillating member, whether electrically actuated or not, carries a pallet which cooperates not only with a toothed wheel of the train to be driven, but also with a second toothed wheel meshing therewith and acting as a continuous rotary lock for the train. The pallet, which may consist simply of a suitably shaped pin projecting from the oscillating element, engages alternately with the teeth of the two meshing wheels and at each engagement rotates them forwardly through an angle equivalent to half a tooth. With a suitably shaped pin, *e.g.* one which is cylindrical on its driving face and flat on its rear face, in appropriate relation with the teeth of the two meshing wheels an unfailing forward movement of the wheels in accordance with the oscillations of the armature or the like is assured and any possibility of backward movement of the wheels by reason of vibration or any other cause is prevented.

The relation of pallet to teeth may be adjusted by mounting the pallet on the armature or the like, so that it can be shifted longitudinally or the armature itself may be capable of being adjusted longitudinally, but the preferred method is to journal one of the two meshing wheels in a bracket which can be swung about the axis of the other wheel and secured in any desired position. As one of the objects of the invention is to obtain an absolutely dependable conversion of oscillating into rotational movement using rough apparatus, *e.g.* stamped wheels the meshing teeth of which may have considerable back lash, such an adjustment is necessary to enable the pallet and teeth to be brought in such relation as to ensure the desired step-by-step forward movement and provide an absolute lock against backward movement. One or both of the gear wheels may also be subject to the action of a spring brake or equivalent steadying device.

If the reciprocating element consists of the armature of an electromagnet it may be moved both to and fro by electrical means, but it would usually be spring-urged in one direction and suitable means provided for adjusting the tension of the spring.

Dated this 9th day of October, 1923.

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Price 33p

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COMPLETE SPECIFICATION.

Improvements in Mechanism for Converting Oscillating Movement into a Step-by-step Rotational Movement in Electrically Driven Indicators.

I, CHARLES EDMOND PRINCE, a British subject, of Stubbings Manor, Burchetts Green, Berkshire, 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 indicators such as the time-indicating mechanism of electrical clocks or other indicating mechanism in which an electromagnetic device is periodically energised to cause an oscillating movement which is converted into a step-by-step rotational movement of a wheel or train of wheels.

It has been proposed to provide an escapement for clocks or watches wherein a rock-lever is connected with the pendulum or balance of the clock or watch and a single pin on said lever is adapted to engage alternately between the teeth of two driven toothed wheels in gear with each other. It is also known to provide counting mechanism for typewriters consisting of two equal toothed wheels in gear with each other and a lever which is adapted to be given a backward and forward motion upon the depression of a letter key and space key respectively, said lever being provided with an arm which engages between the teeth of the two wheels and moves them through an angle equal to one tooth for each double swing of the lever.

According to the invention the armature of an electromagnet or equivalent electromagnetically operated oscillating member carries a pallet which cooperates not only with a toothed wheel of the train to be driven, but also with a second toothed wheel meshing therewith and acting as a continuous rotary lock for the train. The pallet, which may consist simply of a suitably shaped pin projecting from the oscillating element, engages alternately with the teeth of the two meshing wheels and at each engagement rotates them forwardly through an angle equivalent to half a tooth.

The invention is illustrated in the accompanying drawings with reference to an apparatus in which the oscillating element is the armature of an electromagnet. The electromagnet 1 therein shown is energised intermittently, *e.g.* upon each swing of a pendulum, not shown in the drawing, and upon being so energised attracts an armature 2 against the reaction of a spring 3. This armature or an extension thereof carries a projecting pin 4 which is adapted to engage alternately with the teeth of two wheels 5, 6 in mesh with each other, one of these wheels, say 5, being for example a member of a train of wheels which drive the hands of a clock. The pin or pallet 4 is suitably cam-formed on its working face so that when, for example, the armature 2 is attracted by the magnet 1 this operating cam face engages a tooth of the wheel 6 and shifts the latter in the direction shown by the arrow through an angle corresponding with half the pitch of its teeth. The wheel 5 being permanently in mesh with the wheel 6 will simultaneously be shifted through half a tooth. Upon the return of the armature 2 by the spring 3 the pallet 4 engages the next tooth of the wheel 5, shifting it through an angle represented by half the pitch of its teeth and consequently also shifting wheel 6 correspondingly. Thus, for each double oscillation of the armature the wheel 5 will be moved through an angle equal to the pitch of its teeth.

With a suitably shaped pin or pallet 4, *e.g.* one which is cylindrical on its driving face and flat on its rear face, in appropriate relation with the teeth of the two intermeshing wheels 5, 6 an unfailing forward movement of the wheels in accordance with the oscillations of the armature or the like is assured and any possibility of backward movement of the wheels by reason of vibration or any other cause is prevented.

The relation of pallet 4 to the teeth of the wheels may be adjusted by mounting the pallet on the armature or the like so that it can be shifted longitudinally, or the armature itself may be capable of being adjusted longitudinally, but the preferred method is to journal one of the two meshing wheels in a bracket indi-

cated in dot and dash lines at 7, which can be swung about the axis of the other wheel and secured in any desired position.

As one of the objects of the invention is to obtain an absolutely dependable conversion of oscillating into rotational movement using rough apparatus, *e.g.* stamped wheels the meshing teeth of which may have considerable backlash, such an adjustment is necessary to enable the pallet and teeth to be brought into such relation as to ensure the step-by-step forward movement and provide an absolute lock against backward movement. One or both of the gear wheels 5, 6 may also be subject to the action of a spring brake 8 or equivalent steadying device.

The reciprocating element may be moved both to and fro by electrical means, but it would usually be spring-urged in one direction, as shown in the drawing, and any suitable means may be provided for adjusting the tension of the spring.

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. Mechanism for converting oscillating movement into a step-by-step rotational movement in electrically driven indicators, comprising in combination an electromagnetically operated oscillating element, a pair of toothed wheels permanently in mesh with each other, a pallet carried by the oscillating element and cooperating alternately with the teeth of the said wheels to rotate the latter through a definite angle at each swing of the oscillating element.

2. A mechanism according to Claim 1, wherein the pallet consists of a pin which is of substantially cylindrical shape upon its operating face and of flat shape on the reverse face.

3. A mechanism according to Claim 1, wherein the relation of the pallet with respect to the teeth of the wheels is adjustable.

4. A mechanism according to Claim 3, wherein the relation of the pallet with respect to the teeth of the meshing wheels is adjusted by journalling one of the two said wheels in a bracket mounted to swing about the axis of the other wheel.

Dated this 9th day of July, 1924.

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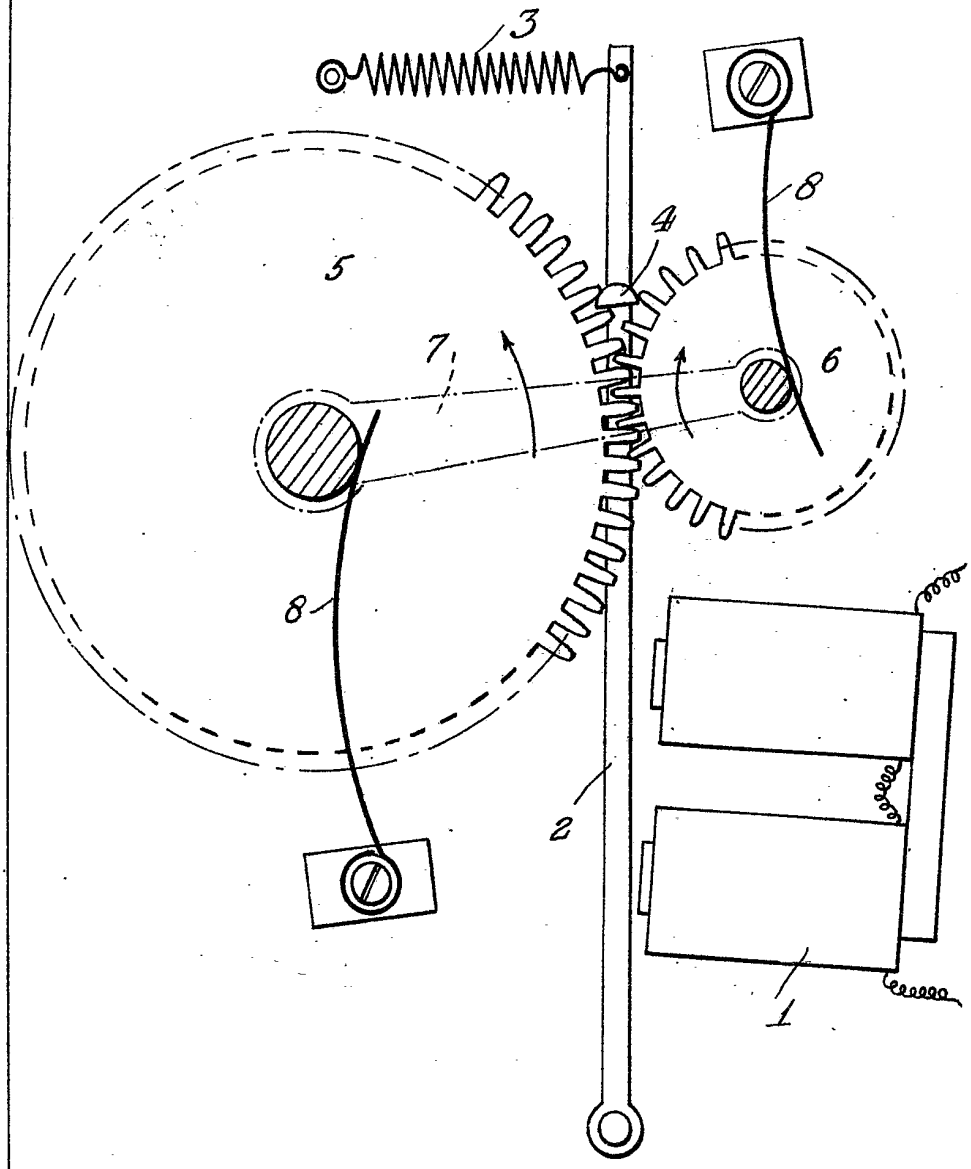

[This Drawing is a reproduction of the Original on a reduced scale]

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