

No. 704,874.

Patented July 15, 1902.

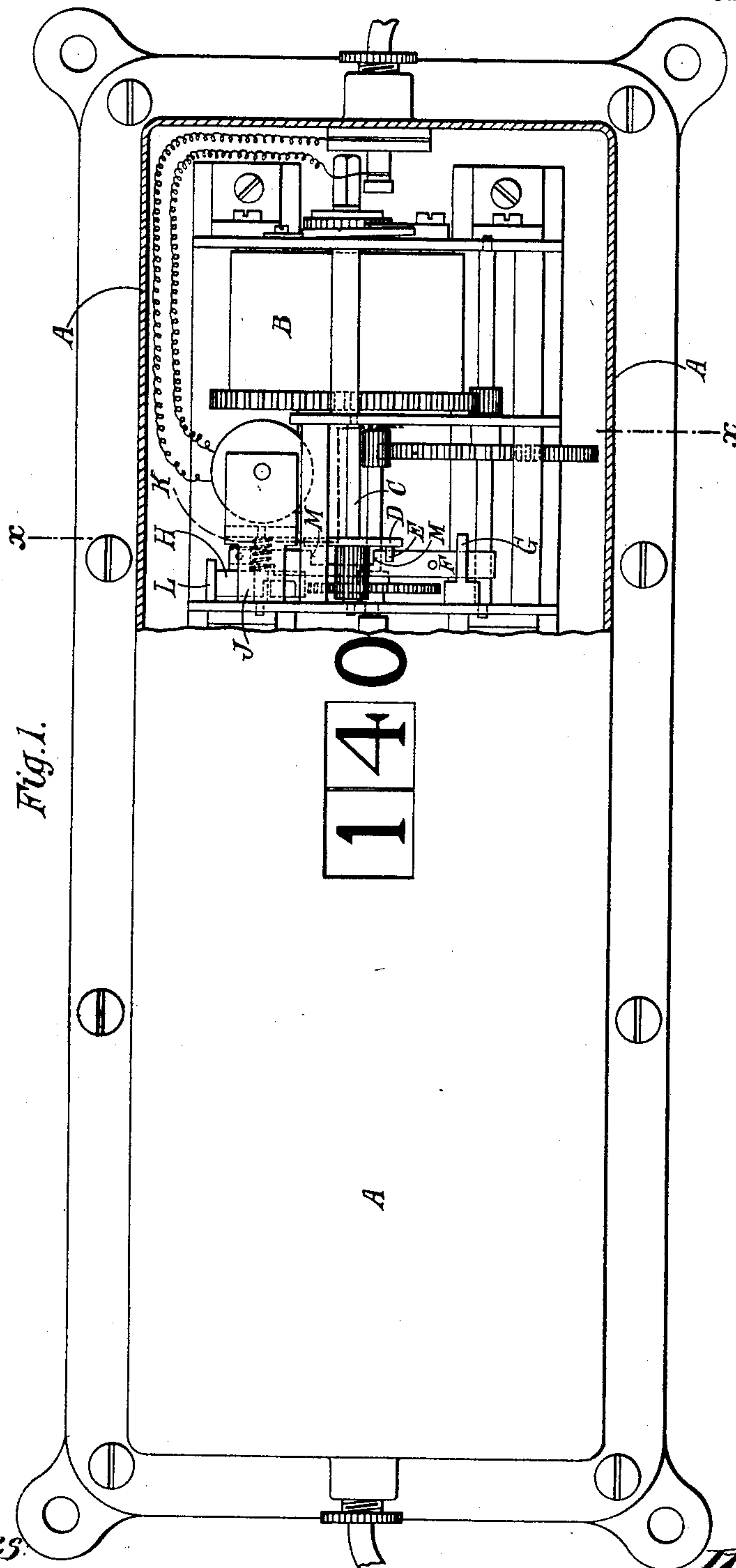
H. H. GRENFELL.

ESCAPEMENT FOR ELECTROMAGNETICALLY CONTROLLED CLOCKS.

(Application filed Feb. 5, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
*W. B. Keifer*  
*C. D. Hesler*

Inventor  
*Hubert H. Grenfell*  
By *James L. Norris*  
*Atty*

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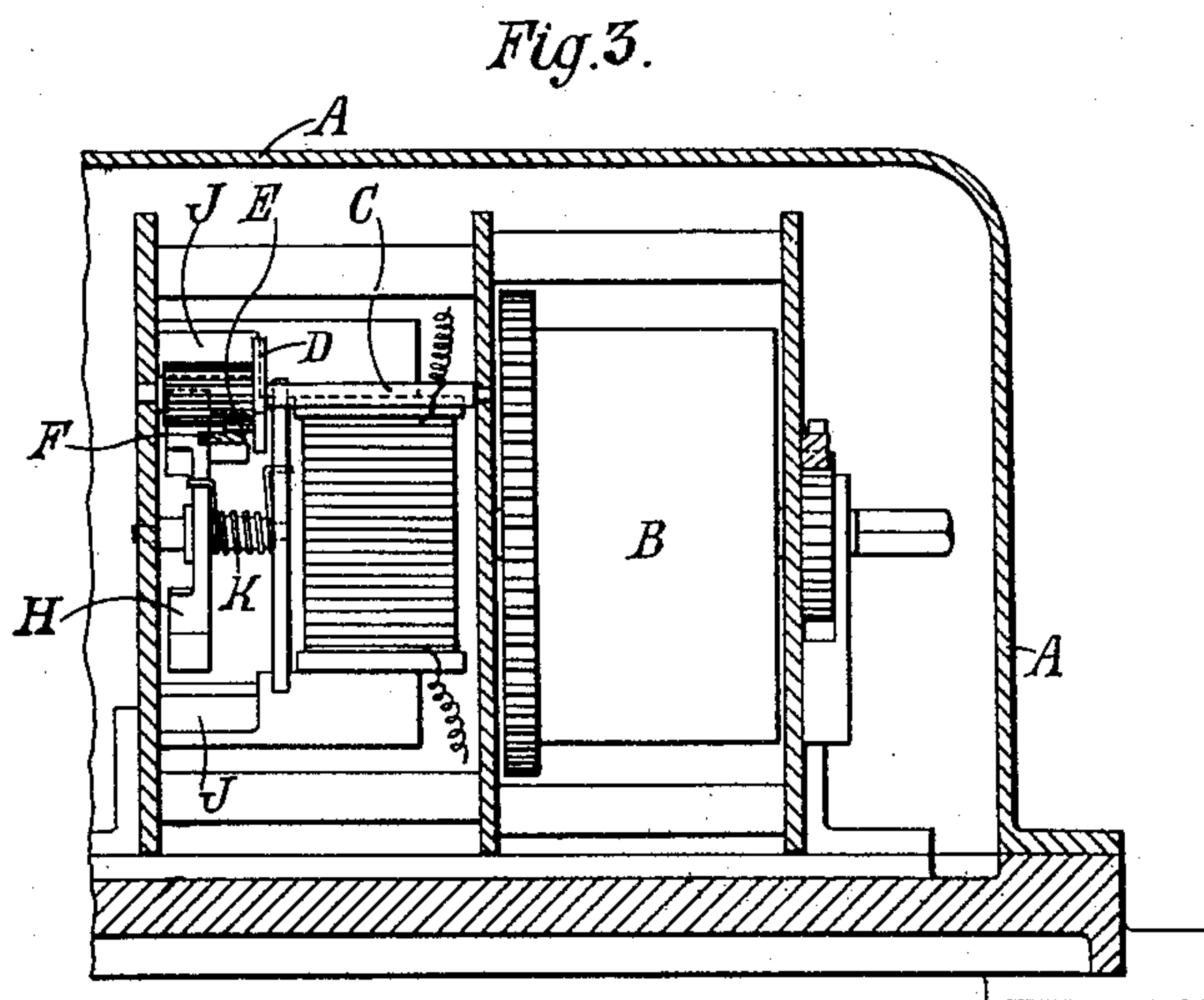
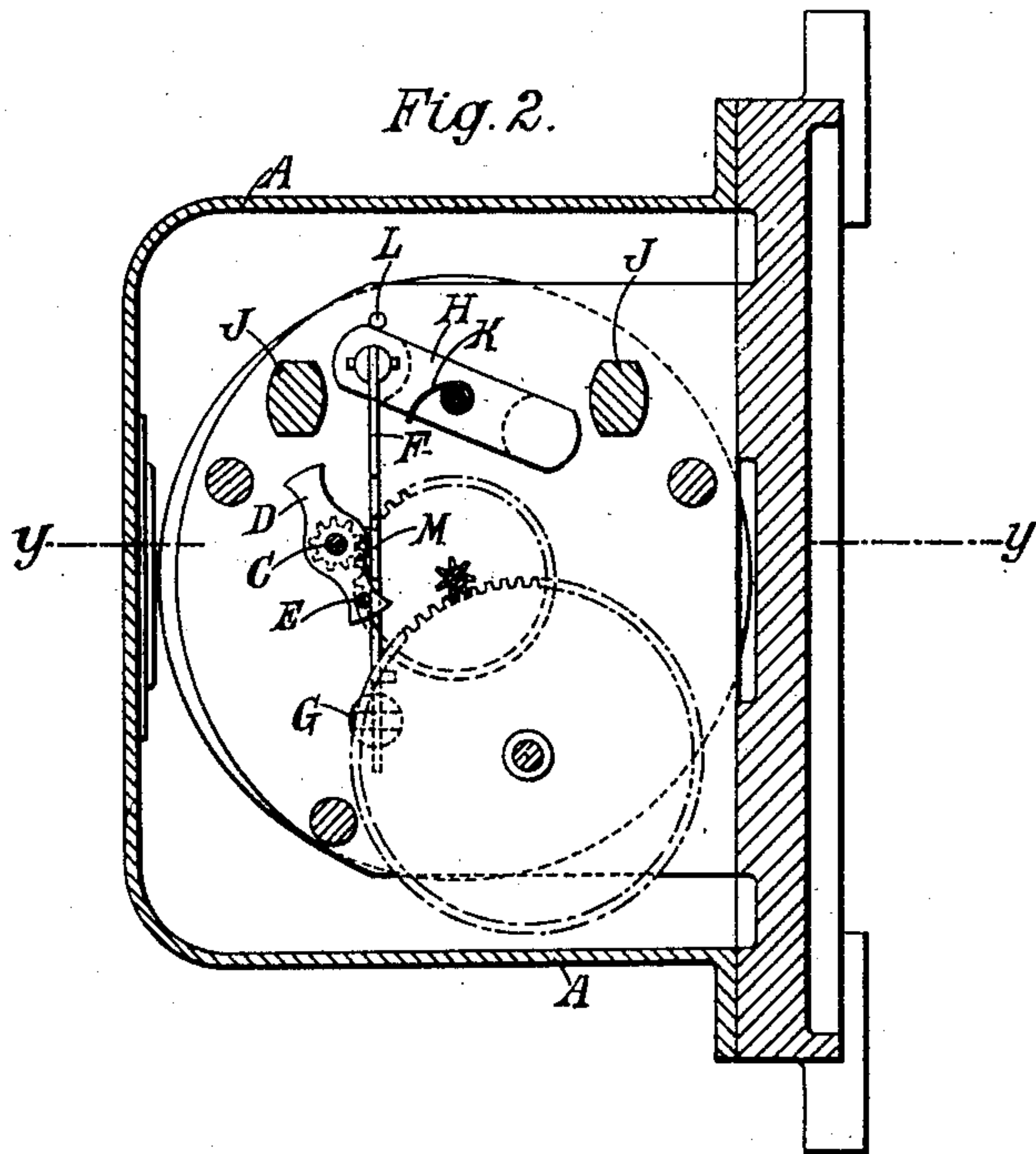
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Witnesses:

*J. B. Kuyper*

*C. D. Kessler*

Inventor

*Hubert H. Grenfell*

By

*James L. Norrie*

*Att'y*



# UNITED STATES PATENT OFFICE.

HUBERT HENRY GRENFELL, OF LONDON, ENGLAND.

ESCAPEMENT FOR ELECTROMAGNETICALLY-CONTROLLED CLOCKS.

SPECIFICATION forming part of Letters Patent No. 704,874, dated July 15, 1902.

Application filed February 5, 1902. Serial No. 92,687. (No model.)

*To all whom it may concern:*

Be it known that I, HUBERT HENRY GRENFELL, a subject of the King of Great Britain, residing at London, England, have invented a certain new and useful Improved Escapement for Electromagnetically - Controlled Clocks and Like Mechanism, of which the following is a specification.

My invention relates to an improved escapement for electromagnetically-controlled clocks and like mechanism, and is chiefly designed to produce a very simple device of this kind which is not liable to be deranged by shocks or vibrations.

According to my said invention I provide in connection with one of the arbors, preferably the escape-wheel arbor of a clockwork-train, which may be driven by a spring or otherwise, a pin adapted to coact with a longitudinally-movable and electromagnetically-controlled detent-bar having a slot formed therein, said slotted bar and pin together forming an escapement, as hereinafter fully described.

My said invention is shown in the accompanying drawings as being applied to an electromagnetically - controlled drum signaling device of the kind or class described in the specification of my prior application, Serial No. 70,993, for use particularly on ships, although it may be used generally in electrically-controlled clocks and like mechanism.

Figure 1 is a front elevation of an instrument adapted to be attached to a vertical wall, a part of the casing being removed to show the interior mechanism. Fig. 2 is a section on the line  $x x$ , Fig. 1, looking toward the left; and Fig. 3 is a section on the line  $y y$ , Fig. 2, looking upward.

Like letters of reference denote corresponding parts in the several figures.

A is the casing.

B is the spring-drum of the clockwork-train, and C is the escape-wheel arbor of said train.

On said arbor is fixed a balanced arm D, carrying a laterally-projecting pin E, which rests against a detent-bar F. Said bar F is adapted to slide in a suitable guide G and is pivotally connected to an armature H, which is pivoted centrally between the poles J J of an electromagnet. The armature H is normally held by a spring K in a position inclined to the

center line joining the poles J J, as shown in Fig. 2.

L is a stop to limit the movement of the armature.

The detent-bar F is slotted at M on the side adjacent to the arm D for a purpose that will presently appear. When the parts are in the position shown in the drawings, the pin E rests upon the detent-bar, and the arbor C is thereby prevented from rotating; but when the electromagnet is energized the armature H is attracted toward the central position between the poles, and the detent-bar F is thereby moved laterally until the slot M comes under the pin E, whereupon said pin, impelled by the clock-spring, passes through the slot, and the arbor C is thus allowed to turn. On completing a partial revolution the pin E is brought to rest by coming in contact with the detent-bar on the opposite side of the slot from that on which it first rested. As soon as the electromagnet is deenergized the armature H moves back to its normal position under the influence of its spring K, thus drawing back the detent-bar and allowing the pin E to pass through the slot again and make a further partial revolution, the movement being stopped by the detent-bar in the position first considered.

It will be seen that by energizing and then deenergizing the electromagnet the escape-wheel arbor is allowed to make one complete revolution, and the operations will be repeated every time the magnet is energized and deenergized. The drum controlled by the clock-movement will thus be turned through a definite angle each time the electric circuit which includes the electromagnet is made and broken.

The numerals "140" (shown in Fig. 1 of the drawings at the left of the train of mechanism) designate numerals operated by the mechanism set forth in this application, which numerals are arranged to indicate measurements, in the present instance in excess of one hundred yards. The right-hand character "0" is permanently painted on the casing of the apparatus. The figures "1" and "4" appear in the sight-opening in the wall of the casing shown in this figure, said figures, in common with others from "0" to "9," being carried by the interior mechanism and ap-



pearing, according to the operation of the machine, in said sight-openings. The stationary character "0" is painted on the casing. If desired, other stationary numerals, such as "00," may be painted on this casing, such numerals always remaining stationary. "00" can be painted on the casing when the mechanism is geared up to measure distances in excess only of one hundred, and so on.

10 What I claim is—

1. In an electromagnetically - controlled clock-movement, the combination, with an arbor of said movement, of a pin connected to said arbor, a slotted detent-bar forming a stop for said pin, but allowing the pin to pass through the slot as the said bar is moved to and fro, guides in which said bar can slide, a spring-controlled armature pivotally mounted between the poles of an electromagnet, and connected to the detent-bar, and said electromagnet, substantially as described.

2. In an electromagnetically - controlled clock-movement, an escapement consisting of a radial arm fixed on an arbor of said movement, a pin projecting from said arm substantially parallel to said arbor, a slotted detent-bar forming a stop for said pin, but allowing the pin to pass through the slot when the said bar is moved to and fro, guides in

which said bar can slide, a spring-controlled armature pivotally mounted between the poles of an electromagnet and pivotally connected to the detent-bar, said electromagnet, and a stop for said armature, substantially as described.

3. In a drum signaling device actuated by a clock-movement, the combination with the clock movement and the drum-axle, of an electromagnetically - controlled escapement comprising an electromagnet, an armature pivoted between the poles of said magnet, a spring for controlling the armature, a stop to limit the turning movement of the armature in one direction, a slotted detent-bar pivotally connected to the armature, guides for said detent-bar, and a pin connected to one arbor of the clockwork-train and adapted to rest upon the detent-bar and to pass through the slot therein as said bar is moved to and fro, substantially as described and for the purpose specified.

In witness whereof I have hereunto set my hand in presence of two subscribing witnesses.

HUBERT HENRY GRENFELL.

Witnesses:

GEORGE HARRISON,  
HENRY W. LYNDEN.