(No Model.) 2 Sheets—Sheet 1.

C. WIRT.

ELECTRIC MOTOR.

No. 533,108. Patented Jan. 29, 1895.

Fig. 1.

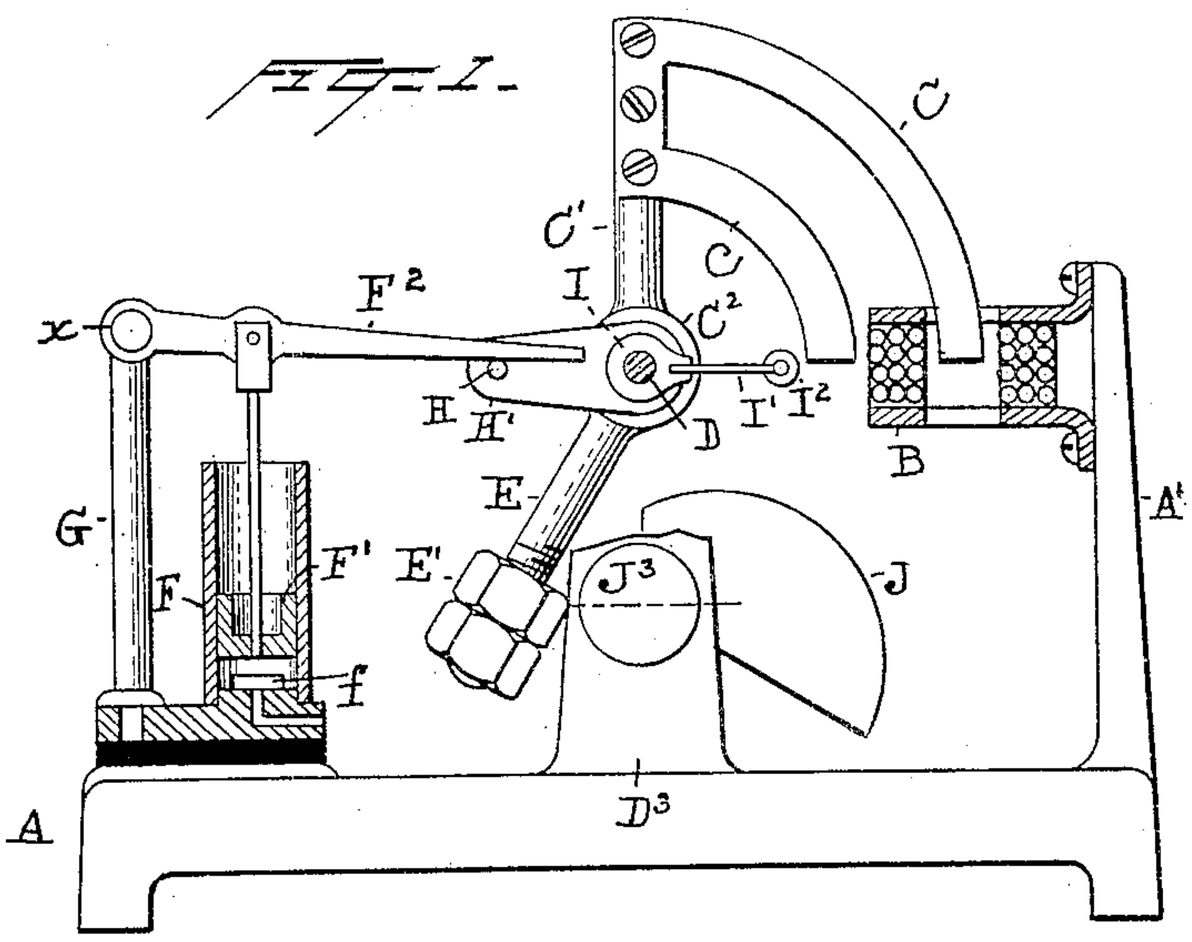
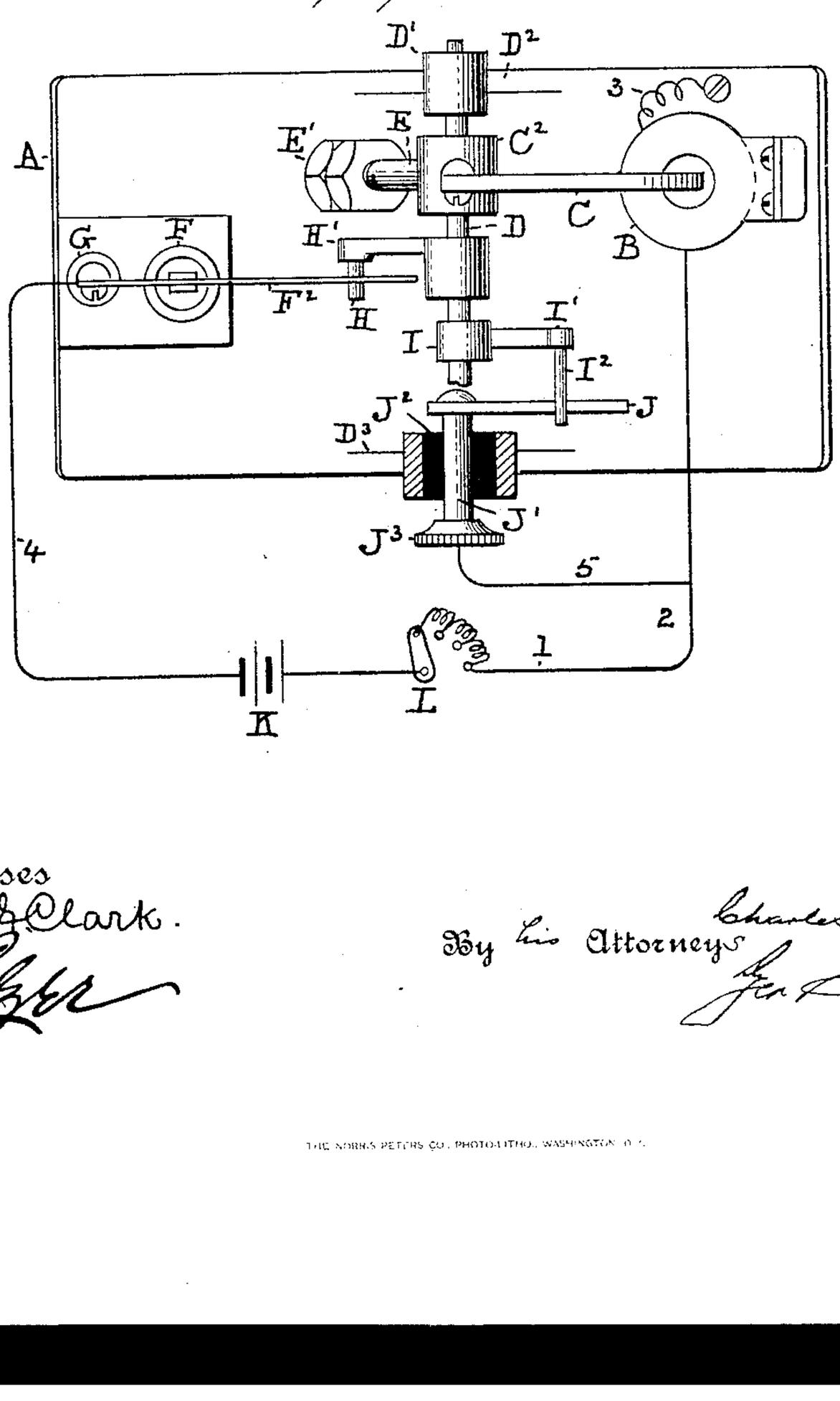


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

C. WIRT.

ELECTRIC MOTOR.

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Fig. 3.

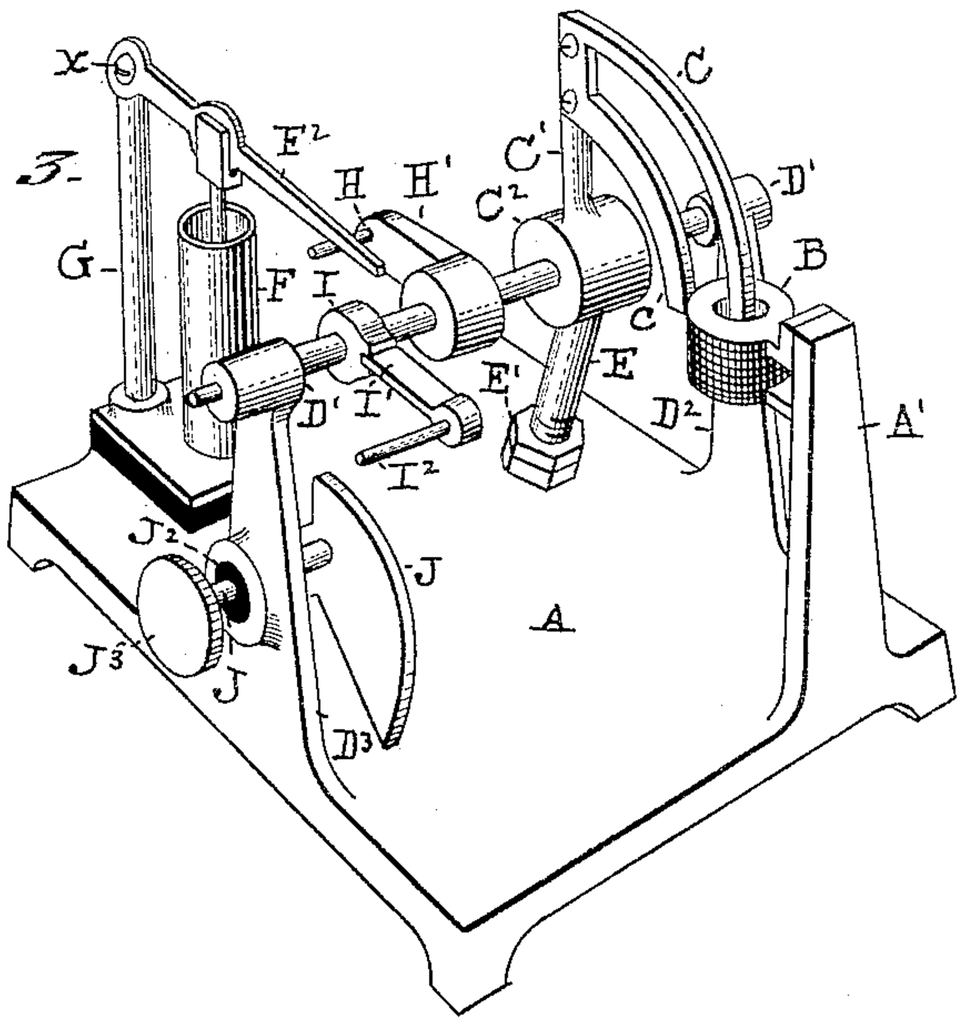
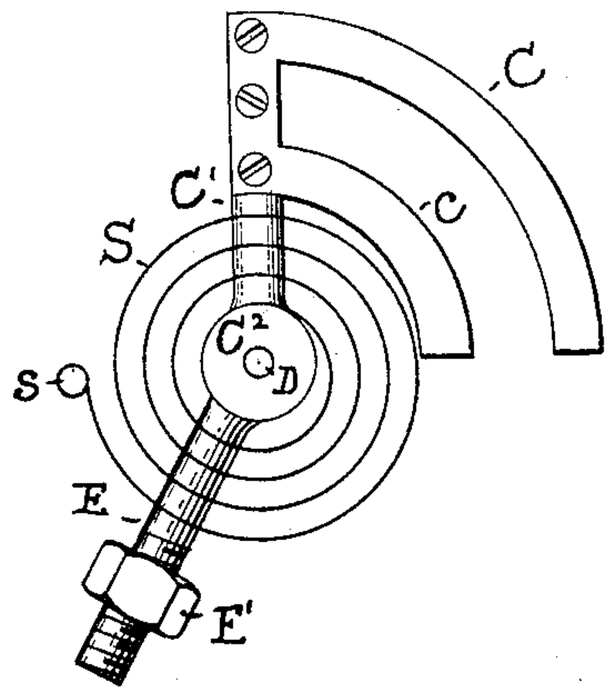


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES WIRT, OF CHICAGO, ILLINOIS.

ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No 533,108, dated January 29, 1895.

Application filed April 23, 1894. Serial No. 508,662. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WIRT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Motors, of which the following is a specification.

My invention relates to electric motors designed to produce reciprocating or oscillating movements, and my object is to produce a motor which will have a definite rate of movement capable of accurate regulation and adjustment and which will at the same time be simple in construction and hence not liable to derangement.

A motor constructed in accordance with my invention is particularly useful for operating the escapement mechanism of clocks, electric meters or other apparatus requiring a chronometric movement.

A motor embodying my invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation and partial section; Fig. 2, a plan view with the circuit connections; Fig. 3, a perspective view; and Fig. 4, a modified oscillator, constructed as a balance wheel.

A is the base upon which the operating parts are mounted.

A′ is a post for supporting a solenoid B.

C is an iron core for the solenoid. An auxiliary armature *c* working outside the solenoid may also be used. This core C, *c* is secured to an arm C′ extending from a hub or collar C^2 on a shaft D, which shaft is journaled in bearings D′ on standards D^2 and D^3. Another arm E also extends from hub C^2 and this arm carries an adjustable counterbalancing weight E′.

F is a dash-pot within which works a piston F′.

As shown in Fig. 4, the pendulum may be provided with a spiral spring S having its inner end secured to the shaft or hub C^2, and its outer end to a stationary post *s*. When such a spring is employed, a smaller counterbalancing weight is required and the pendulum works as a balance wheel. The dash-pot has an inwardly opening valve *f* in its bottom which permits a free upward movement of the piston. This piston is connected with a lever F^2 which is pivoted at *x* to an upright G extending from the base. The free end of lever F^2 engages with the pin H of crank H′ on shaft D.

I is a collar on shaft D from which projects a spring arm I′ provided at its extremity with a finger I^2 adapted to strike the cam-shaped plate J. This plate is carried by a spindle J′ which passes through a bushing J^2 of insulating material seated in standard D^3. The spindle J′ is provided with a milled head J^3 by which it is turned to adjust the position of plate J relative to finger I^2.

The current for energizing the solenoid is derived from a battery K or other source of electrical energy.

L represents a switch and resistance for closing the circuit to the solenoid and for regulating the current supplied thereto.

The circuit connections are as follows: from battery K by wire 1 to the switch arm through wire 2 to coil B through the coil to base A by wire 3, through standards D^2 and D^3 to shaft D, crank H and pin H′ to lever F^2 through the dash-pot or upright G and wire 4 back to the battery.

When the motor is at rest the position of the core C, counterbalance weight E′ and lever F^2 will be as shown in Fig. 1, and on closing circuit to the solenoid B the same is energized and produces a pull on the core, which action rocks shaft D and raises the counterbalance, and also lever F^2 through crank H′. The pull on the core produces a swinging or pendulous movement of the counterbalance and consequently a rocking movement of shaft D. The downward movement of the counterbalance after the first pull on the core breaks the contact between the lever F^2 and pin H and opens the circuit. The lever F^2, due to its weight and that of the piston F′, then moves downward against the air pressure in the dash-pot. A spring may be used to assist this movement. The downward

movement of the lever is slower than the downward movement of the counterbalance weight.

The dash-pot is provided for the purpose of regulating the movement of lever F^2 so that contact between it and pin H is made only on the upward swing of the counterbalance weight, and contact is broken immediately as the weight begins to move downward. As the weight swings upward again, the pin H again makes contact with the lever F^2, closing circuit to the coil B, which again produces a pull on the core. Thus the coil B is only energized on each upward or forward swing of the weight, and since the position of lever F^2 after the motor is started will always be higher than when starting from the point of rest, the periodical pull will be for a less period than on the initial swing and hence the pull is only sufficient to maintain a constant swing or pendulous movement of the weight and core.

Although I have shown a dash-pot for controlling or retarding the movement of lever F^2, it is evident that a number of other devices may be employed for accomplishing the same object without departing from the spirit of my invention. For instance, a retarding fan or retarding escapement such as are well known in clock work movements may be employed.

The action of the motor may be modified and regulated by the employment of the cut-off consisting of the spring-arm I′, finger I^2 and plate J, the plate J being connected to wire 2 by wire 5. As the core is drawn into the coil and shaft D is rocked, the spring-arm I′ moves downward and finger I^2 makes contact with plate J, thus short-circuiting the coil before contact is broken at lever F^2 and pin H. The establishment of this short-circuit also prevents sparking at F^2 and H. Plate J being adjustable, the point at which the short-circuit is established can be easily regulated. The spring-arm I′ is preferably employed for carrying the finger for making contact with plate J in order to avoid a rigid contact between the finger and plate, which would retard the action of the motor.

From the foregoing description it will be seen that my motor is essentially a pendulum or balance wheel whose movement is initiated and maintained by an electric actuating device through a floating contact whose position of rest closes the circuit to the actuating device when the pendulum is also at rest, and is capable of being easily moved by the pendulum from this normal position and returns to the normal position with a retarded movement. By this means the motor is not only self starting, but the movement of the pendulum pushes the floating contact away from the normal or central position of the pendulum until the maximum swing of the pendulum is reached, when, on each forward movement, the pendulum will close the circuit through the floating contact for a definite period of time depending upon the rate of swing of the pendulum and the rate of movement of the retarded or floating contact. This action may be in turn modified by the cut-out device. Thus an exceedingly effective and readily adjusted chrono-electric motor is produced.

It is evident that the form of apparatus illustrated may be modified without departing from the spirit of my invention, and in making use of the word pendulum in the claims I mean to include a balance wheel or other form of oscillator.

What I claim is—

1. A chrono-electric motor having in combination a pendulum, a contact moved thereby, an electric actuating device, and a contact having a retarded movement toward the pendulum contact and a free movement in the opposite direction, substantially as and for the purposes set forth.

2. A chrono-electric motor having in combination a pendulum, a contact moved thereby, an electric actuating device, and a contact having a retarded movement toward the pendulum contact and a free movement in the opposite direction, said retarded contact closing the circuit at the pendulum contact when the parts are in the position of rest, substantially as set forth.

3. A chrono-electric motor having in combination a pendulum, a contact moved thereby, an electric actuating device, a contact having a retarded movement toward the pendulum contact and a free movement in the opposite direction, and an adjustable cut-out device withdrawing the current from the electric actuating device at a predetermined point during the closure of the circuit by the pendulum and retarded contacts, substantially as and for the purposes set forth.

4. A chrono-electric motor having in combination a pendulum, a contact moved thereby, an electric actuating device, a contact having a retarded movement toward the pendulum contact and a free movement in the opposite direction, said retarded contact closing the circuit at the pendulum contact when the parts are in the position of rest, and an adjustable cut-out device withdrawing the current from the electric actuating device at a predetermined point during the closure of the circuit by the pendulum and retarded contacts, substantially as set forth.

5. In a chrono-electric motor, the combination with an oscillating shaft, of a solenoid core carried by said shaft, a solenoid acting upon said core, a pendulum carried by said shaft, a swinging contact carried by said shaft, and a contact having a retarded movement toward the first contact and a free movement in the opposite direction, substantially as set forth.

6. In a chrono-electric motor, the combination with the oscillating pendulum, actuating

solenoid and contact having a retarded movement in one direction, of a flexible or yielding contact carried by the pendulum, and an adjustable contact point or plate closing a shunt or cut-out circuit with the yielding contact at a predetermined point, substantially as set forth.

This specification signed and witnessed this 21st day of April, 1894.

CHARLES WIRT.

Witnesses:
W. PELZER,
EUGENE CONRAN.