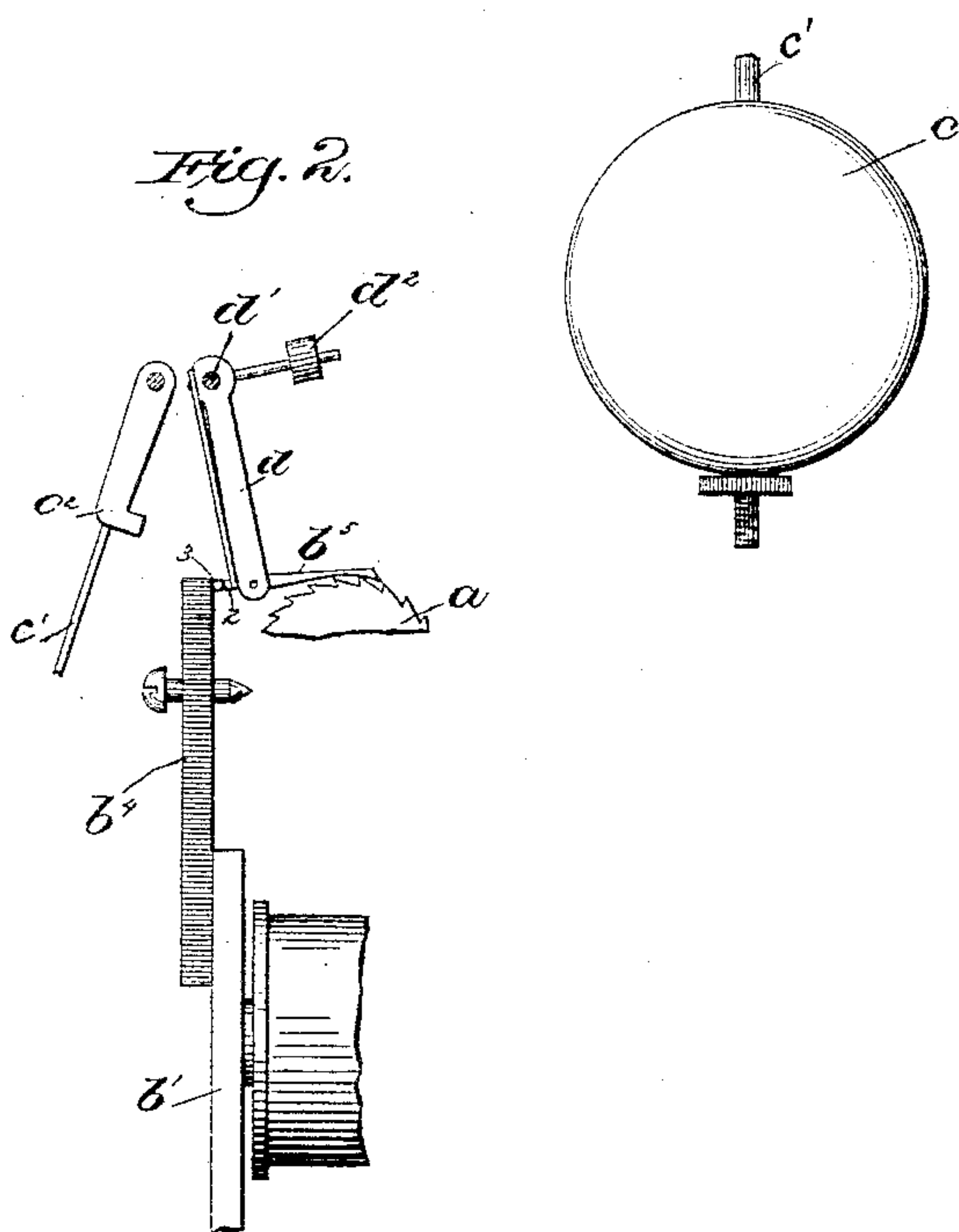
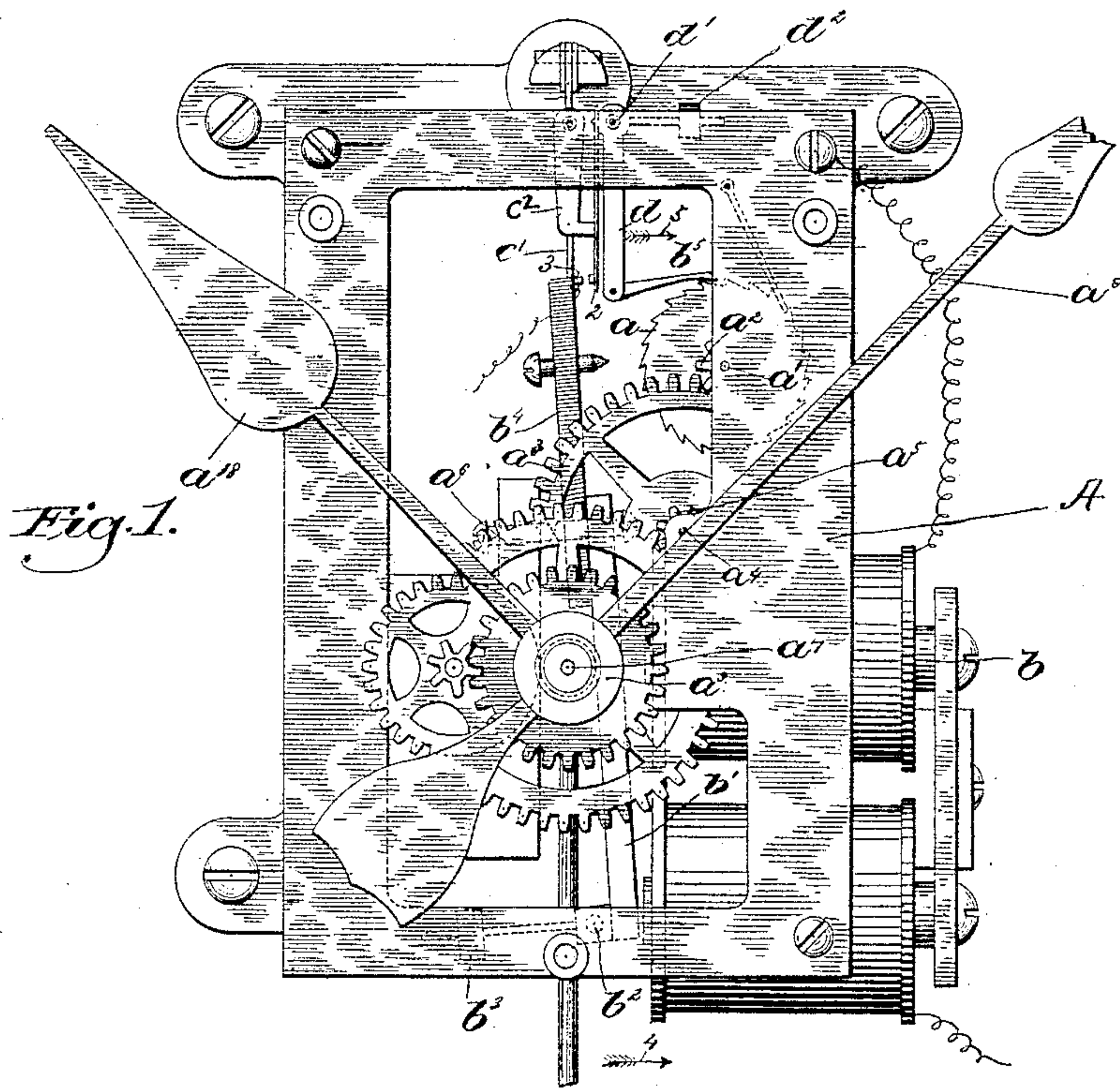


(No Model.)

W. S. SCALES.
SECONDARY ELECTRIC CLOCK.

No. 448,999.

Patented Mar. 24, 1891.



Witnesses.

Fred. S. Greenleaf
G. Huntington.

Fraverdor:

William S. Scates.
by Crosby & Gregory attys.

UNITED STATES PATENT OFFICE.

WILLIAM S. SCALES, OF EVERETT, ASSIGNOR OF TWO-THIRDS TO JOSEPH H. CLARK, OF QUINCY, AND JOHN B. HUMPHREY, OF BOSTON, MASSACHUSETTS.

SECONDARY ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 448,999, dated March 24, 1891.

Application filed October 20, 1890. Serial No. 368,672. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. SCALES, of Everett, county of Middlesex, State of Massachusetts, have invented an Improvement in Electric Clocks, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to improve the construction of electric clocks such as shown in my application, Serial No. 359,304, filed July 19, 1890.

In accordance with this invention any suitable train may be employed, and a step-by-step driving mechanism is provided, consisting of a ratchet-wheel secured to one of the shafts of the train and a pawl. As herein represented a single pawl is used which is attached to or moved by the propeller. The propeller is moved in one direction to accumulate a force which is to be imparted to the pendulum or other regulating member by means of the armature of an electro-magnet and is held in such elevated position until the circuit of the electro-magnet is broken, when the armature retracts and the entire weight of the propeller is given to the pendulum. The circuit of the electro-magnet is broken by the pendulum just prior to arriving at one limit of motion. The propeller is so arranged that if the armature fails to move it or to even move it sufficiently to in turn move the ratchet-wheel the pendulum will accomplish such result.

Figure 1 shows in front elevation an electric clock embodying this invention, and Fig. 2 a detail of the operating parts in a different position.

The main frame-work A, the driving-train consisting of the ratchet-toothed wheel a , secured to a shaft a' , bearing a pinion a^2 , which meshes with a toothed wheel a^3 , secured to a shaft a^4 , carrying the pinion a^5 , which engages a toothed wheel a^6 , secured to a shaft a^7 , carrying the minute-hand a^8 and the ordinary mechanism for driving the hour-hand a^9 , the electro-magnet b , and its armature b' , pivoted at b^2 and provided with a retractile weight b^3 , or it may be a spring, are all sub-

stantially as in the application referred to. The driving mechanism herein shown is specifically different, however, from that shown in the said application, it consisting of a pawl b^5 , attached to the propeller d , pivoted at d' and carrying a weight d^2 , and an arm, as b^4 , attached to the armature for moving said propeller in one direction to in turn move the ratchet-wheel forward step by step, and the arm, as c^2 , attached to or moved by the pendulum for also moving said propeller in case the arm b^4 fails. The pendulum, as herein shown, consists of the bob c and rod c' , to which it is attached. In lieu of the arm b^4 the armature itself may subserve the purpose.

The circuit-closer of the electro-magnet consists of a flat spring, or it may be a spring-acting arm 2, attached to the propeller, and a contact 3, carried by the arm b^4 .

The operation of the parts is as follows: Supposing the pendulum to be swung in the direction of the arrow 4, the short arm c^2 will bear against the spring 2, pressing it against the propeller d , thereby moving the propeller d in the direction of the arrow 5 so far as to cause the pawl to move the ratchet-wheel a ahead the distance of one tooth. As the pendulum returns, the propeller d follows it until the spring 2 strikes the contact 3 on the arm b^4 , at which time the circuit of the electro-magnet b is closed and the armature is at once attracted, moving the propeller d again in the direction of the arrow 5 and moving the ratchet-wheel a ahead another tooth while the pendulum c is completing its movement in a direction opposite the arrow 4. The propeller will be held in its elevated position with the armature attracted until the pendulum returns in the direction of the arrow 4 and the short arm c^2 strikes the spring 2, moving it away from the contact 3, and thereby opening the circuit of the electro-magnet b , when, the armature immediately retracting, the weight of the propeller falls on the arm c^2 and is hence imparted to the pendulum. This operation is continued, the propeller being lifted by the attracting armature to accumulate a force to be given to the pendulum, and when the propeller is so lifted the

ratchet-wheel is moved so that for the accomplishment of the work which it is desired to be done the electro-magnet is depended upon; yet if the armature should fail for one or
5 more impulses to accomplish these results the arm c^2 , acting in a manner as above described in starting the clock, would move the propeller and ratchet-wheel. The spring 2 is quite weak, and when acted upon by the arm
10 b^4 will bear against the propeller d to move it, and the pawl b^5 is so shaped as to be disengaged from the teeth of the ratchet-wheel when it has moved said wheel forward a tooth, so that as the arm c^2 comes forward
15 and strikes the propeller it may move it sufficiently to break the contact 2 3 and at the same time not move the ratchet-wheel, the propeller being shown in this position in Fig. 2.

I claim—

20 1. In an electric clock, a train and a step-by-step driving mechanism therefor, consisting of a ratchet-wheel and pawl, combined with an electro-magnet and its armature and a regulating member for the clock, both the ar-
25 mature and regulating member being adapted

to actuate said pawl, substantially as described.

2. In an electric clock, a train, a regulating member therefor, an electro-magnet and its armature, and a step-by-step driving mechanism for the train, consisting of a ratchet-wheel and pawl, combined with a propeller for the regulating member which carries said
30 pawl, substantially as described.

3. In an electric clock, a train, a regulating member therefor, an electro-magnet and its
35 armature, and a step-by-step driving mechanism for the train, combined with a propeller for the regulating member and a circuit-closer, one member of which is operated by the propeller and the other member by the armature, substantially as described.
40

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM S. SCALES.

Witnesses:

BERNICE J. NOYES,

EMMA J. BENNETT.

It is hereby certified that the title of the invention described in Letters Patent No. 448,999, granted March 24, 1891, upon the application of William S. Scales, of Everett, Massachusetts, should have been written and printed *Electric Clocks* instead of "Secondary Electric Clocks;" and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 21st day of April, A. D. 1891.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

NATHANIEL L. FROTHINGHAM,
Acting Commissioner of Patents.