F. W. MOORE.

CLOCK.

APPLICATION FILED MAY 22, 1909.

966,038.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 1.

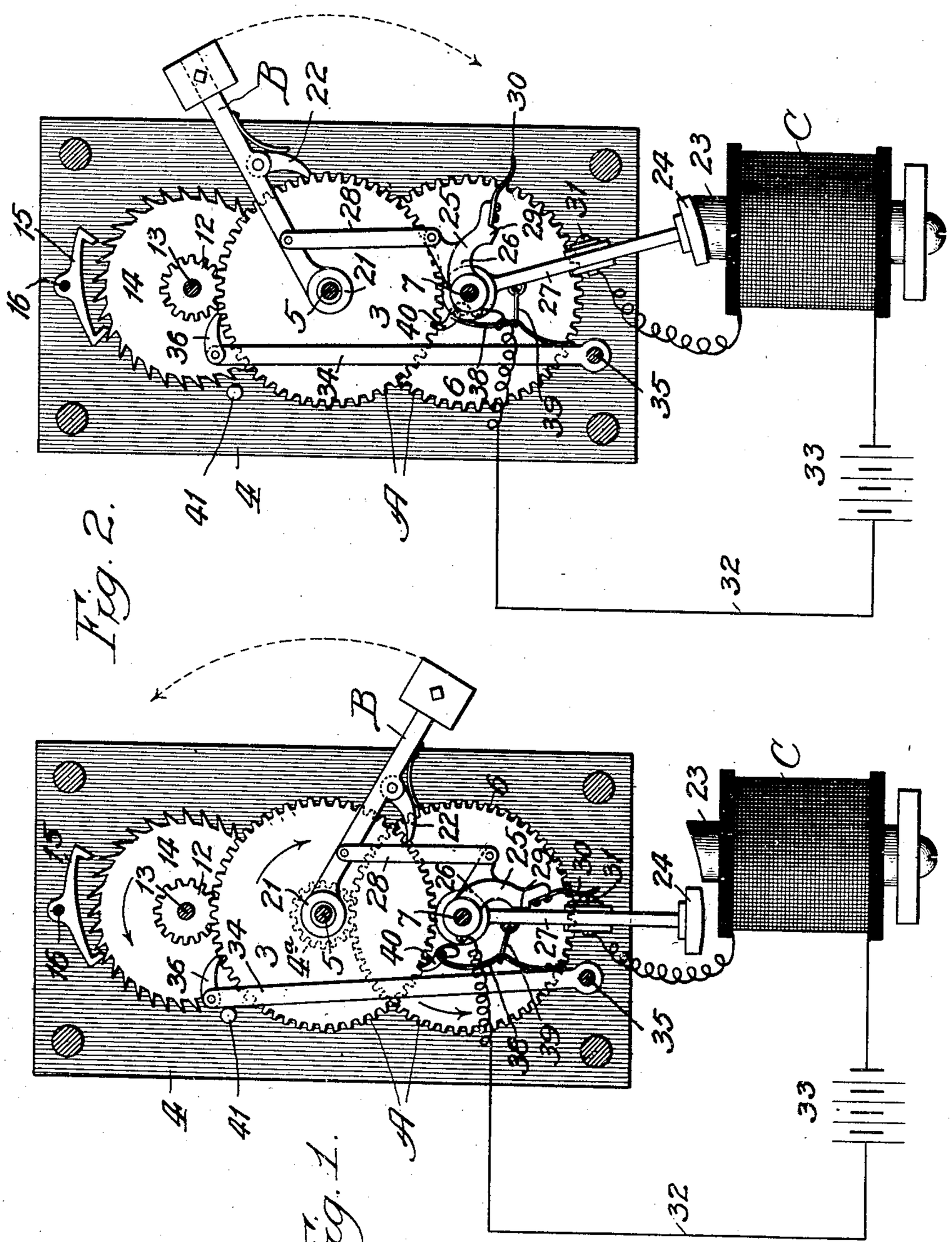

Fig. 2.

Witnesses:
John Enders
Chas. H. Buell.

Inventor:
Frank W. Moore,
By Dyrenforth, Lee, Chritton & Wiles
Attys

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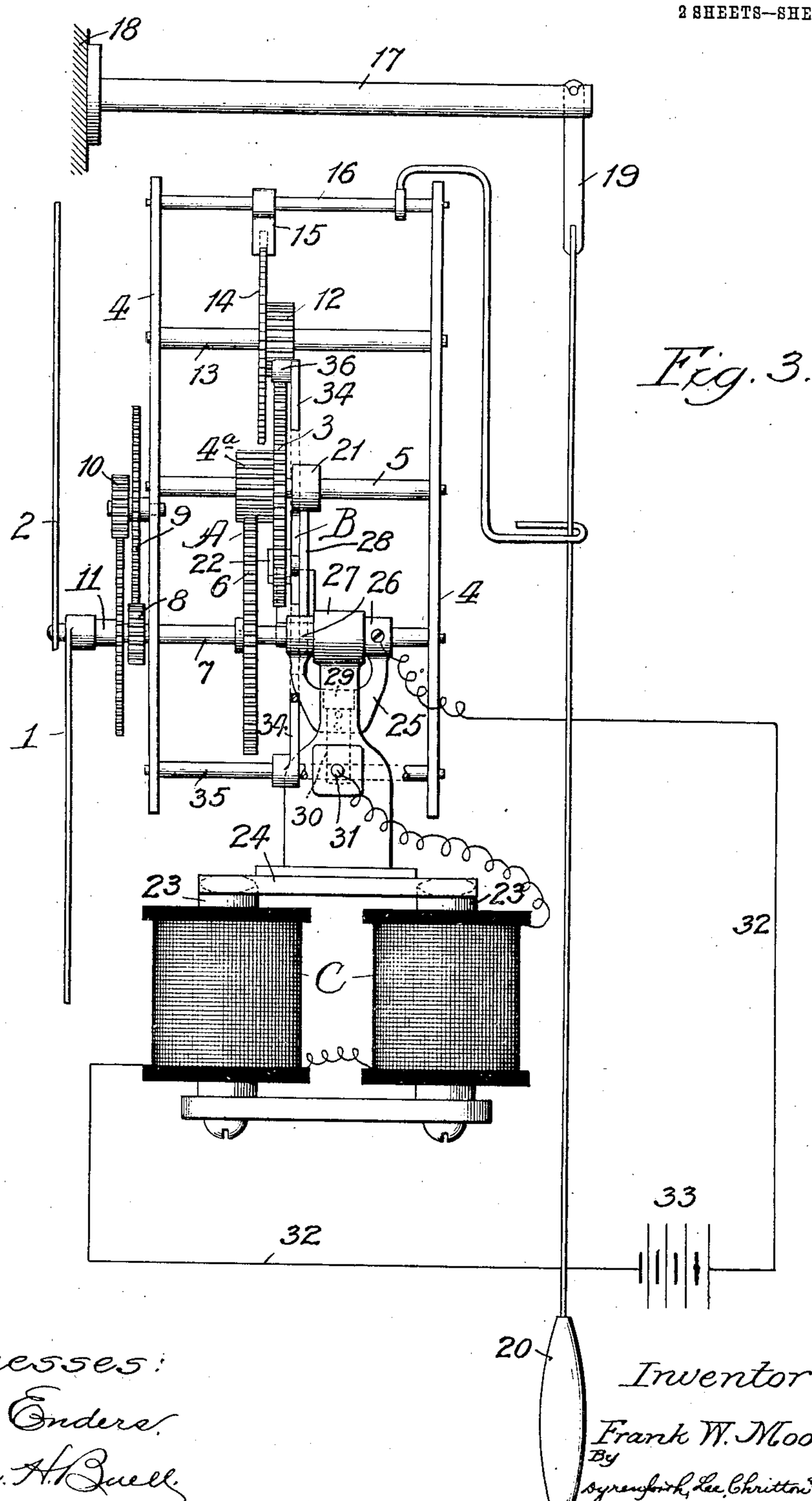

Fig. 3.

Witnesses:
John Enders.
Chas. H. Buell.

Inventor:
Frank W. Moore,
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UNITED STATES PATENT OFFICE.

FRANK W. MOORE, OF AUSTIN, ILLINOIS.

CLOCK.

966,038. Specification of Letters Patent. Patented Aug. 2, 1910.

Application filed May 22, 1909. Serial No. 497,653.

To all whom it may concern:

Be it known that I, FRANK W. MOORE, a citizen of the United States, residing at Austin, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Clocks, of which the following is a specification.

My invention relates particularly to clocks actuated by a weight, or weights, automatically lifted, or re-set, by means of an electro-magnet, at short intervals.

My primary objects are: to secure in clocks of the character indicated, a more uniform and better driving action through the gear-train; to reduce the friction of operation; to provide for greater economy in the use of electrical energy in the resetting operation; to reduce the noise of operation to a minimum; and, finally, to accomplish all of the foregoing objects in the simplest and cheapest manner possible. Those familiar with the art from the practical standpoint of the manufacturer and dealer understand that the last-mentioned object is hardly, if at all, less important than any of the others, since an article of this character must be at once cheap enough to sell at popular prices and at the same time a reliable and durable time-keeper of practically noiseless operation.

The preferred embodiment of my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view of the works of a clock, equipped with my improvements; Fig. 2, a similar view, showing the parts in different position; and Fig. 3, an elevational view of the mechanism.

A represents the gear-train of a clock to which motion is communicated to the hour-hand 1 and minute-hand 2; B, a weight-arm which co-acts with a gear 3 of the clock-train and serves to actuate the gear-train; and C, an electro-magnet serving to reset, or restore, intermittently at short intervals, the weight-arm.

The gear-train is supported on the usual frame 4 and comprises, in addition to the gear-wheel 3, a pinion 4^a fixed on the same shaft 5 as is the gear-wheel 3; a gear-wheel 6 meshing with the pinion and fixed on the minute-hand arbor 7; and a pinion 8 which communicates motion through a gear 9 and a pinion 10 to the hour-hand arbor 11. The gear 3 serves to actuate a pinion 12 secured on the shaft 13 which carries the escapement-wheel 14. The escapement-fork, or double-pawl, 15 is mounted on a shaft 16. A post 17, which may be attached to the casing-front 18, serves as a support for a spring 19 from which the pendulum 20 depends.

The weight-arm B is provided with a bearing 21, journaled on the shaft 5 adjacent the gear 3, and is equipped with a spring-held pawl 22 which engages directly with the gear-teeth of the wheel 3.

The electro-magnet C may be of any improved construction. According to the preferred construction, the poles 23 of the magnet are concaved, or beveled, and the armature 24 is pivotally suspended from the shaft 7. The shaft 7, also, has pivotally mounted thereon a weight-arm actuated member 25, which, preferably, is of yoke-form, having its arms 26 embracing the suspension-arm 27 of the armature. The member 25 is connected, by a link 28, with the weight-arm B a short distance from the pivot thereof. The member 25 may comprise either a casting, or a sheet-metal member, produced by proper blanking and stamping operations. The armature 24 hangs normally, like a pendulum, beneath the shaft 7, while the vertically-disposed, upwardly-presented, poles 23 of the magnet are located normally at one side of and below the armature. The member 25 is provided adjacent the arm 27 of the armature with a shoulder, or bearing, 29 adapted to be engaged by the arm 27 when the latter operates to raise the weight. The member 25 carries a yielding contact-member 30 adapted to engage a contact-member 31 carried by the arm 27 of the armature. Said contact-members are connected with the circuit 32 of the electro-magnet, said circuit being provided with a battery 33. When the weight descends, driving the clock-train, as the escapement permits, the yielding contact-member 30 engages the contact-member 31, thereby closing the electric circuit, whereupon the armature is swung to the position shown in Fig. 2. The instant the armature starts to move, the spring contact-member 30 yields somewhat, and the arm 27 of the armature encounters the shoulder 29 of the member 25, whereupon the member 25 is carried with the armature until the armature reaches the position shown in Fig. 2, the member 25, weight-arm B and connecting link 28 then continuing to travel under the

acquired momentum until the weight-arm is elevated to the position shown in Fig. 2.

For a short interval of time, at each operation of resetting the weight-arm, the gear-train is left without an impelling force thereon, so far as the weight-arm itself is concerned. In order to secure continuity of impelling force and smoothness of operation at the resetting periods, I support a pawl-actuating lever 34 on a pivot 35 slightly below the gear 6 and near the weight-arm 27; equip the upper end of the lever 34 with a pawl 36 which engages the gear 3; attach a spring 38 to the lever 34 somewhat above its path, and connect the same, by a link 39, with the armature-arm 27; and equip the upper end of the spring 38 with a self-righting pawl 40 which engages the lower portion of the gear 3. It will be understood that when the armature is drawn to the position shown in Fig. 2, the spring 38 will be placed under tension, thereby exerting an impelling action upon the wheel 3 through the medium of the pawl 36. When the armature moves into the position shown in Fig. 2, the pawl 40 is drawn to the right from the position shown in Fig. 1 through the space of one or more teeth, and as the gear 3 continues to rotate the pawl 40 and spring 38 return to their normal position, as does also the pawl-lever 34. The pawl-lever 34 normally rests, when in inactive position, against a stop 41.

The operation may be stated briefly thus: Assuming the weight-arm B to be in the elevated position, the weight-arm will serve, through the medium of the pawl 22, to actuate the gear-train of the clock, the movement being regulated by the escapement in the usual way. When the weight-arm reaches the lower end of its travel, the swingingly-suspended actuating member 25, which is linked to the weight-arm, carries the yielding-contact-member 30 into contact with the contact-member 31 on the armature-arm, thereby closing the circuit of the electro-magnet, whereupon the armature is thrown to the position shown in Fig. 2. In this operation, the weight-arm actuating-member 25, the weight-arm and connecting link, are given an impetus sufficient to carry them to the position shown in Fig. 2, the pawl 22 slipping idly over the gear-teeth of the wheel 3 in this operation. During the movement of restoration of the weight-arm to its elevated position, the spring 38 is under tension, thereby causing the pawl-lever 34 to operate through the medium of the pawl 36 upon the gear 3 and exert an impelling action on the gear-train. In the meantime, the pawl 40 is carried to the right from the position shown in Fig. 1, slipping over a tooth or the teeth of the gear 3, and the pawls 36 and 40 coöperate to exert an impelling action upon the gear-train until the normal position of rest of said parts shown in Fig. 1 is resumed. In the meantime, the pawl 22 has taken a fresh hold and the weight-arm B again operates to drive the clock-train.

My invention provides for simplicity of construction, uniform and continuous driving action upon the gear-train, a minimum of friction in the operation of the clock, and economical use of electrical energy in the resetting operation; also, my invention provides for the attainment of the desirable ends herein suggested with the utmost cheapness of construction consistent with good results. Furthermore, the device operates quite noiselessly, and the construction is thoroughly durable. It is to be observed that by causing the actuating-pawls of the gear-train to operate directly upon the gear-teeth of one of the wheels of the gear-train, the use of ratchet-wheels is obviated, and the pawls may act at an advantageous leverage on a large gear-wheel.

What I regard as new, and desire to secure by Letters Patent, is—

1. The combination with the gear-train of a clock, of an actuating-arm therefor, an electro-magnet having an armature, and a swinging independently mounted armature-actuated, arm-actuating member adapted to independent movement with relation to said armature.

2. The combination with the gear-train of a clock, of a gravity-impelled actuating-arm therefor, an electro-magnet, a swinging armature, an independently-swinging armature-actuated member, and a link connecting said member to said arm.

3. The combination with the gear-train of a clock, of a gravity-impelled actuating-arm therefor, an electro-magnet provided with a circuit, a swinging-armature carrying a contact-member, an independently-pivoted, armature-actuated member equipped with a contact-member, one of said contact-members being yielding, and connecting means between said armature-actuated member and said arm.

4. The combination with the gear-train of a clock, of a weight-impelled actuating-arm therefor, a pivotally-suspended armature, an electro-magnet having upwardly-presented cores located out of alinement with said armature when the latter is in the normal position of rest, an independently-movable armature-actuated member, and a chain of connecting means between said last-named member and said actuating arm.

5. The combination with the gear-train of a clock, of a gravity-impelled actuating-member therefor, a pivot, an armature suspended therefrom, an electro-magnet having poles adapted to draw said armature from its normal position of rest, thereby swinging the armature about its pivot, an inde-

pendently-pivoted armature-actuated member having its axis near the axis of the armature, and connecting-means joining said armature-actuated member to such gravity-impelled arm.

6. The combination with the gear-train of a clock, of a gravity-impelled arm through the medium of which the gear-train may be actuated, a pivotally-suspended armature, an electro-magnet adapted to draw said armature from its vertical depending position, a link connected with said arm, a pivotally-supported armature-actuated member having movement independent of the armature, a contact-member carried by the armature, a yielding contact-member carried by the armature-actuated member, a bearing shoulder on the armature-actuated member adapted to be struck by the armature, and a link connecting the armature-actuated member to said gravity-impelled arm.

7. The combination with the gear-train of a clock, of a gravity-impelled actuating-arm therefor, an electro-magnet, an armature therefor serving to restore said actuating-arm to its elevated position, a pawl-equipped member serving to actuate the gear-train during the period of restoration of the weight-impelled arm, and armature-flexed tension-means for actuating said last-named element.

8. The combination with the gear-train of a clock, of a weight-impelled, pawl-equipped actuating-arm, a suspended armature, an electro-magnet, an armature-actuated member linked to said arm, a pawl-equipped lever equipped with a spring, and connecting means between said spring and said armature.

9. The combination with the gear-train of a clock, of a weight-impelled, pawl-equipped actuating-arm, a suspended armature, an electro-magnet, an armature-actuated member linked to said arm, a pawl-equipped lever equipped with a spring, connecting means between said spring and said armature, and an actuating-pawl carried by said spring.

10. The combination with a gear-wheel of a clock-train, of a gravity-impelled arm equipped with a pawl directly engaging the gear-teeth of said wheel, an electro-magnet, an armature serving to restore said arm to its elevated position, a lever equipped with a pawl engaging the gear-teeth of said wheel, a spring attached to said lever and linked to said armature, and a pawl carried by said spring and engaging the gear-teeth of said wheel.

11. The combination with the gear-train of a clock, of an actuating arm therefor, an electro-magnet, a pendent armature pivotally suspended out of vertical line with said magnet, a pendent arm-actuating member pivoted adjacent to said armature, and means connecting said member with the clock-actuating arm.

12. The combination with the gear-train of a clock, of an actuating arm therefor, an electro-magnet, a pendent armature pivotally suspended out of vertical line with said magnet, a pendent arm-actuating member pivoted adjacent to said armature, means connecting said member with the clock-actuating arm, and means connected with said armature whereby the gear-train is actuated during the period of re-setting of the gear-actuating arm.

FRANK W. MOORE.

In presence of—
R. A. RAYMOND,
R. A. SCHAEFER.