No. 863,339. PATENTED AUG. 13, 1907.

A. WIRSCHING.

ELECTRIC SELF WINDING CLOCK.

APPLICATION FILED NOV. 28, 1905.

2 SHEETS—SHEET 1.

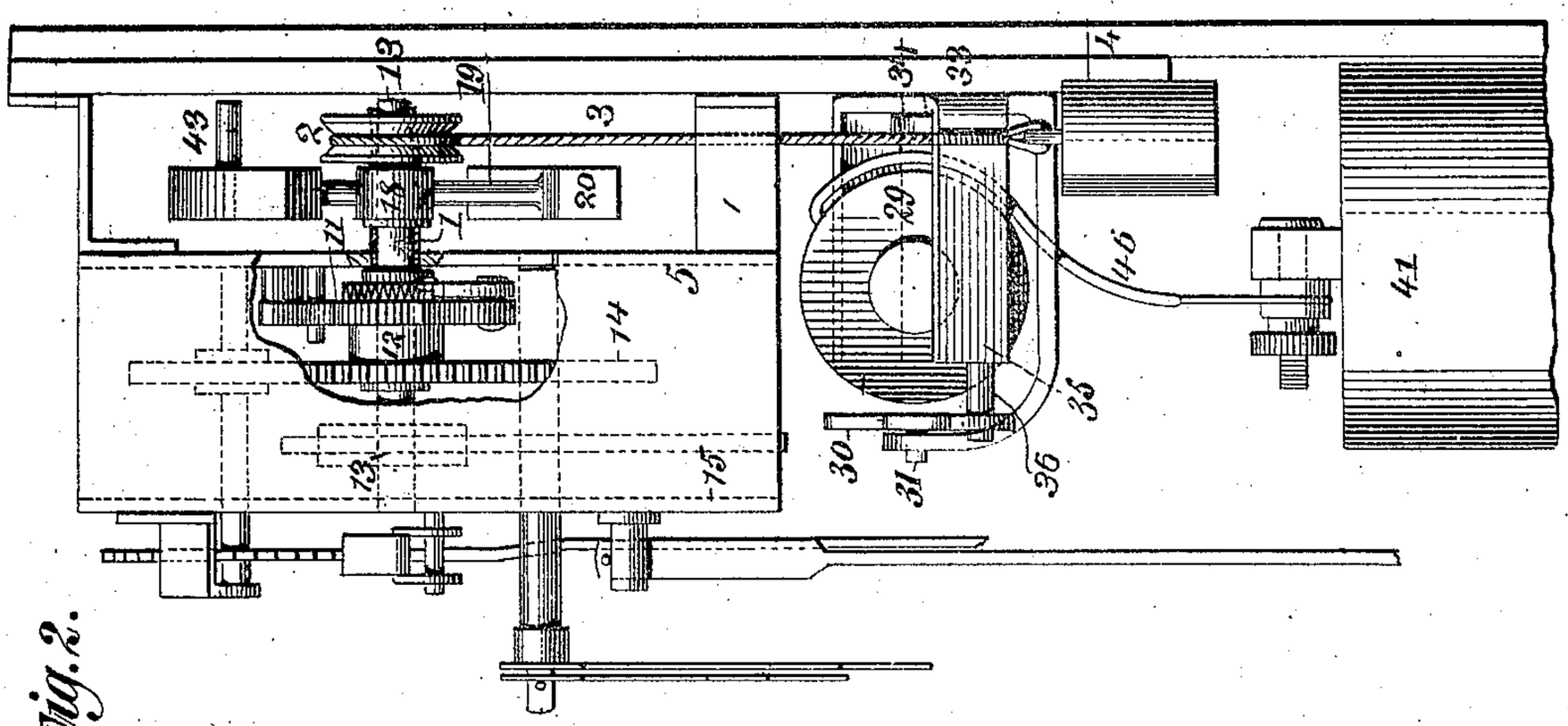


Fig. 2.

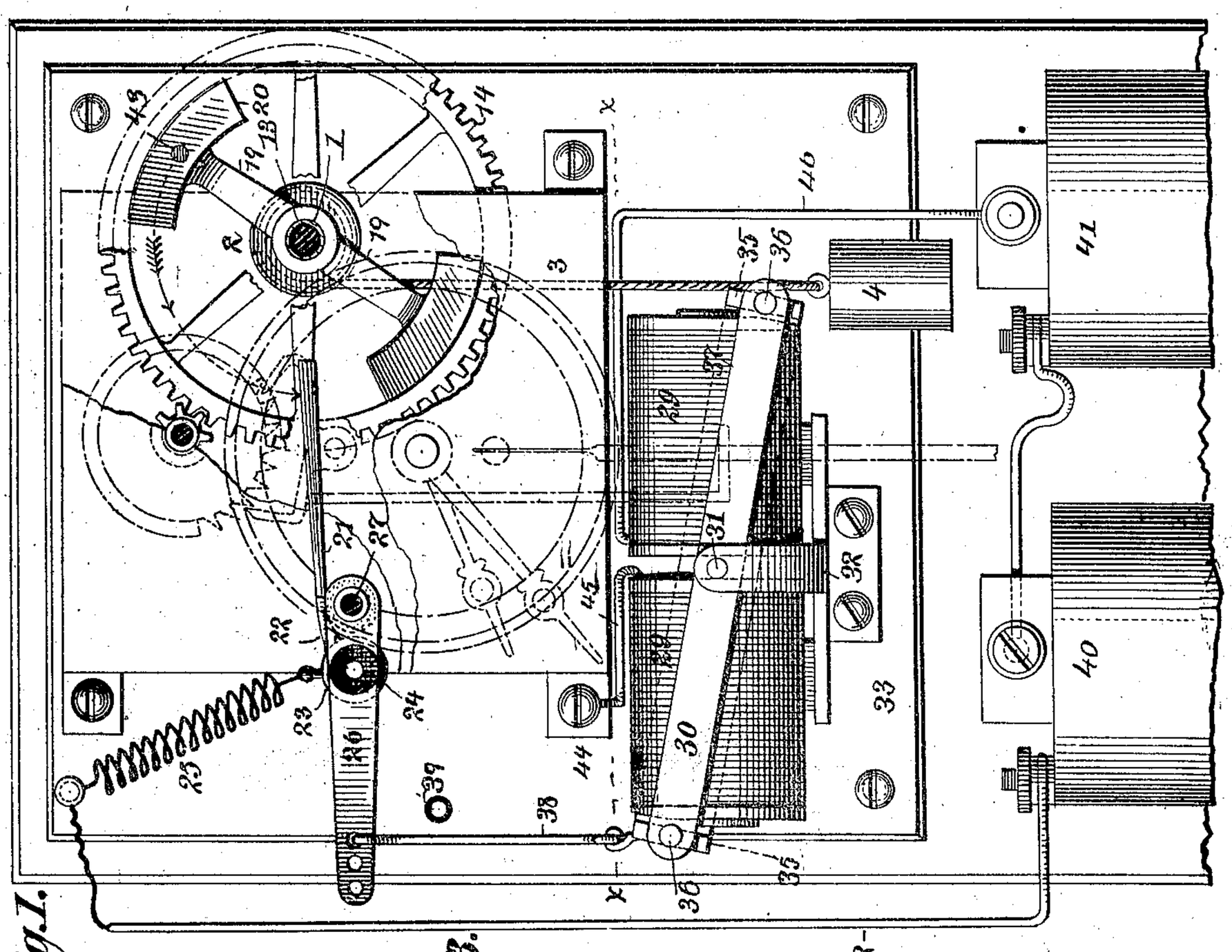
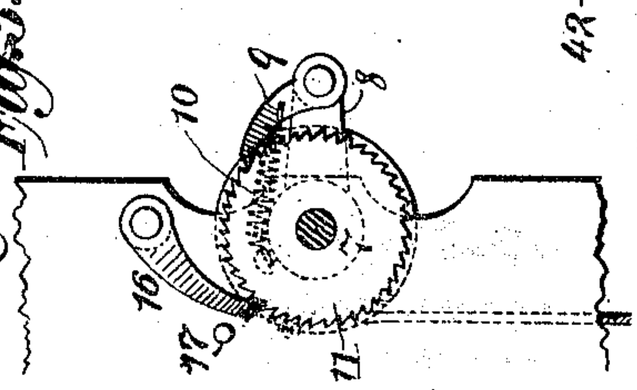


Fig. 1.

Fig. 3.



WITNESSES:

Gustave Dieterich.

Edwin N. Dieterich.

INVENTOR

Aloys Wirsching

BY Carl Benjamin

his

ATTORNEY

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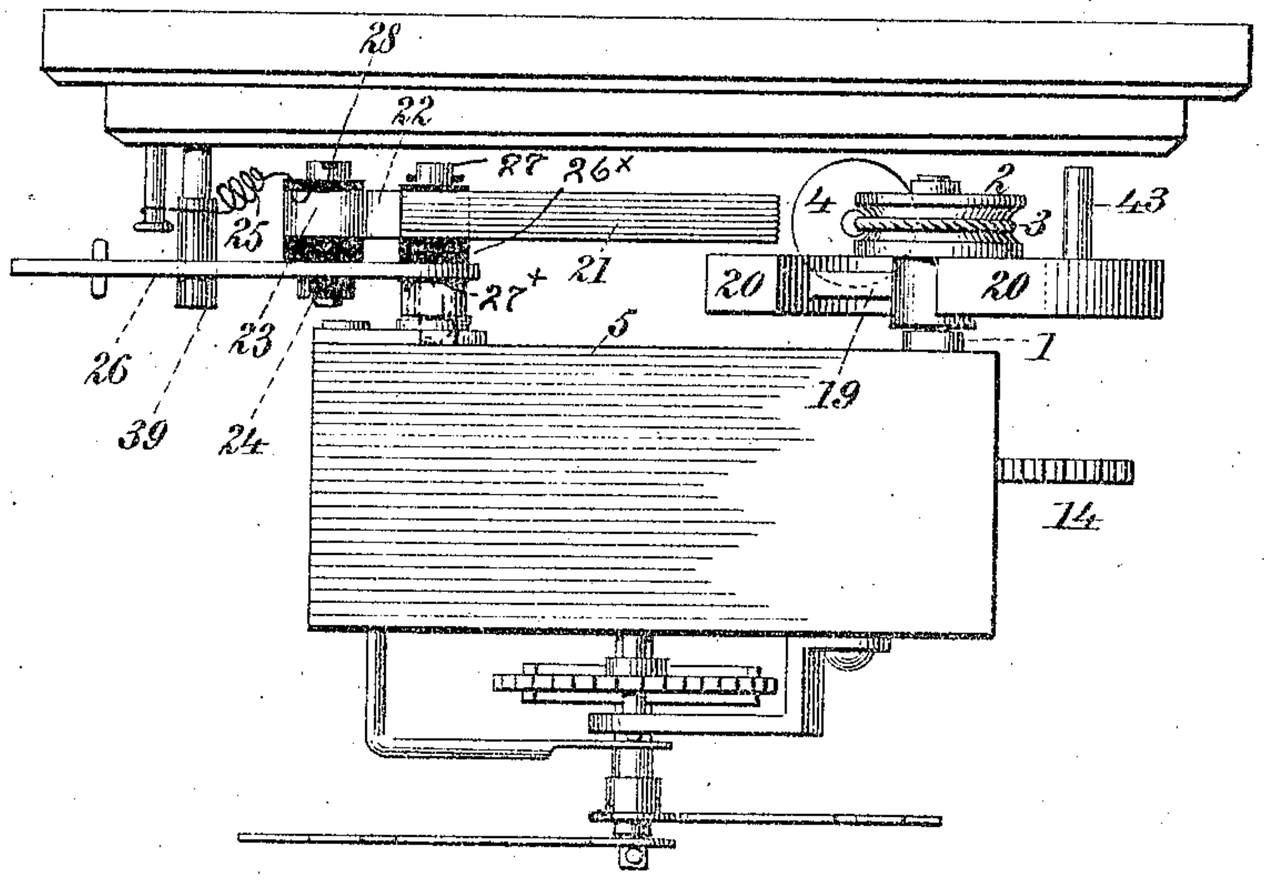
2 SHEETS—SHEET 2.

Fig. 4.



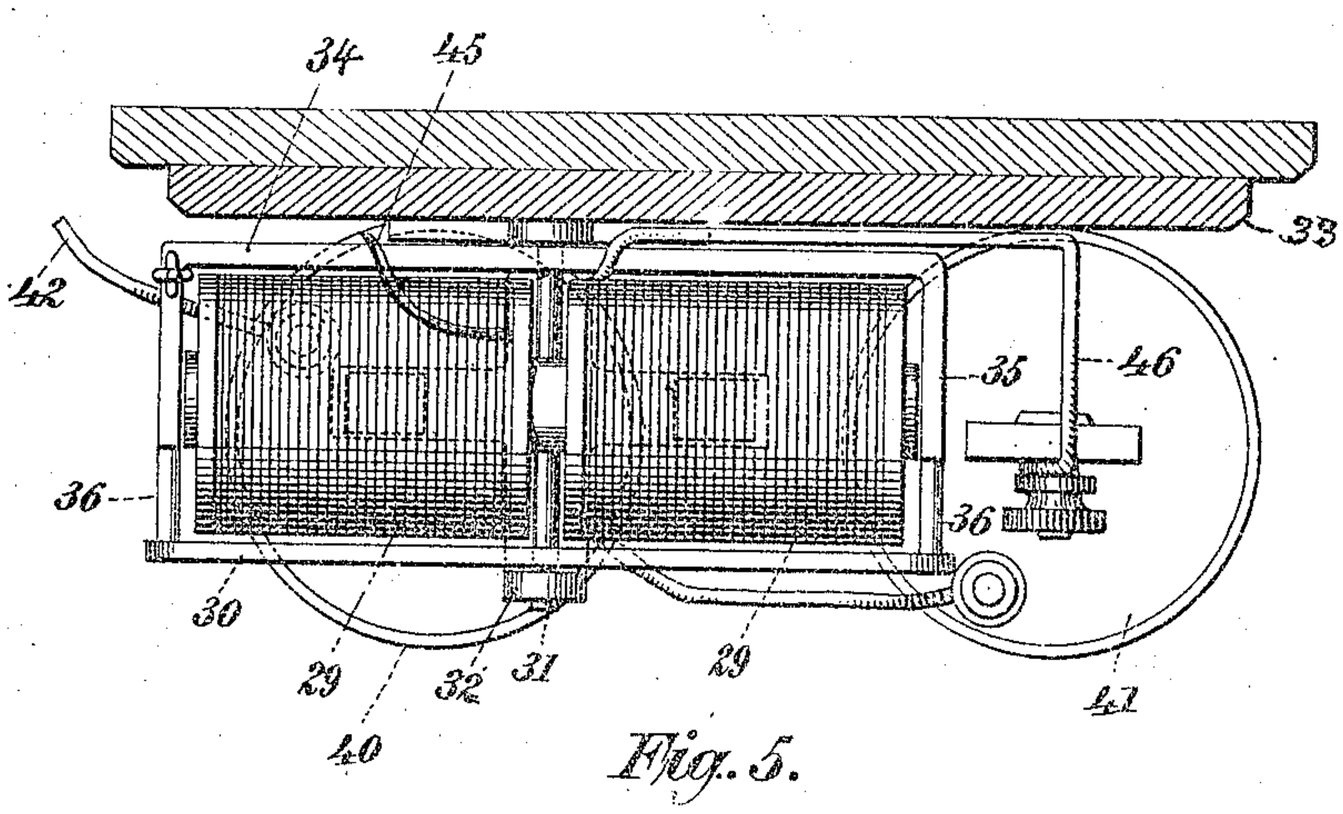


Fig. 5.

WITNESSES:

Gustav Dieterich.

Edwin H. Dieterich.

INVENTOR

Hugo Wirsching

BY Paul Benjamin

Rio

ATTORNEY

UNITED STATES PATENT OFFICE.

ALOYS WIRSCHING, OF BROOKLYN, NEW YORK.

ELECTRIC SELF-WINDING CLOCK.

No. 863,339. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed November 28, 1905. Serial No. 289,384.

To all whom it may concern:

Be it known that I, ALOYS WIRSCHING, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Electric Self-Winding Clocks, of which the following is a specification.

The invention relates to electrically actuated winding mechanism for clocks.

The invention consists in combination with a time mechanism, of a rotatable shaft, means for rotating said shaft in one direction, means for transmitting said motion in one direction from said shaft to said time mechanism, means for rotating said shaft in the opposite direction independently of said time mechanism and means controlled by said shaft upon the completion of a rotation thereof of predetermined extent, caused by said first named means, for setting in operation said second named means of rotation, and thereby imparting to said shaft an opposite rotation against the resistance of said first named means: also in the combination of mechanisms more particularly pointed out in the claims.

In the present embodiment of my invention I actuate the time mechanism from a shaft which is rotated in one direction by a descending weight, or its equivalent, and intermittently in the opposite direction by a reacting spring controlled by an electro magnet energized by contact of an arm carried by said shaft with said spring, when said shaft is rotated by said weight; the said spring reacting upon said arm, and by the reverse movement of said shaft raising said weight. The to and fro motion of the shaft is converted into rotation in one direction of the main driving gear of the time mechanism by any suitable interposed device for that purpose, such as the described pawl and ratchet.

In the accompanying drawings—Figure 1 is a front elevation showing my electrical winding mechanism, the clock train being indicated in dotted lines. Fig. 2 is a side elevation. Fig. 3 is a detail view showing the ratchet mechanism which is interposed between the main driving gear and the winding device. Fig. 4 is a top view. Fig. 5 is a horizontal section on the line *x x* of Fig. 1.

Similar numbers of reference indicate like parts.

My electrical winding mechanism may be applied to any suitable clock train or other time mechanism.

1 is a sleeve or hollow shaft carrying the grooved pulley 2, in the groove of which is wound a cord 3 which carries the driving weight 4. The sleeve 1 extends through the back plate 5 as shown in section in Fig. 2, and has fixed upon it a collar 7 which carries an arm 8 on the end of which is pivoted a pawl 9 which, by means of the helical spring 10 connected to said pawl and to the collar 7, is held in engagement with the ratchet pinion 11, which is supported on the hub 12 of the main driving gear 14 fast on shaft 13. The shaft 13 enters the hollow shaft 1 and has its other end journaled in the front plate 15. Also engaging with the ratchet 11 is a holding pawl 16, which is pivoted on the back plate 5. The extent of movement of this pawl is limited by a stop 17 on said plate.

The operation of the spring pawl in connection with the ratchet is such that when the weight 4 descends the spring pawl engages with the ratchet and so actuates the clock train. When the weight 4 is caused to rise, its shaft then being turned in the opposite direction, the spring pawl 9 runs over the ratchet teeth and the ratchet pinion is held immovable by the engagement therewith of the holding pawl 16. It will be understood, therefore, that the clock train is operated by the intermittent descent of the weight 4, the shaft or sleeve 1 being electrically operated in the manner to be described, intermittently to wind up the cord 3 and thus raise said weight.

Extending rearwardly from the back plate 5 is the fixed pin 27, Fig. 4, which receives the sleeve 27* on the lever 26. Also on pin 27 is a sleeve 26* of insulating material. The lever 26 when swung downwardly meets a stop 39.

Secured on one side of the lever 26 by means of the headed pin 28 is a metal sleeve 23 having an arm 22 to which is attached the brush 21 formed of a multiplicity of conducting wires. The pin 28 may be threaded and secured by a nut 24 of insulating material, and as shown in Fig. 4 insulating sleeves are interposed between the sleeve 23 and the lever 26 and the head of pin 28. The brush 21 rests upon the upper side of sleeve 26* on pin 27 and extends into the path of movement of the weights 20.

Attached to the sleeve 23, in any suitable way, as to a lug thereon, as shown in Fig. 1, or by clamping between said sleeve and its adjacent piece of insulating material, is one end of a helical spring 25, the other end being fastened to a fixed abutment.

29 is an electro-magnet having two coils surrounded by a rectangular frame, pivoted at 31 in a bracket 32 supported on the back board 33. The frame is formed of a bar 34 of magnetic material which is bent laterally at its ends as shown at 35, so that said ends extend in front of the outer polar extremities of the electro-magnet. Extending from said bent over ends are rods 36, which are connected by the front longitudinal member 30 of the frame; said member is preferably of non-magnetic material.

The bar 34 forms the armature of the electro-magnet and is connected at one end by a link 38 to the pivoted lever 26. As the free end of said lever is held up by the helical spring 25, the frame normally stands in inclined position as shown in Fig. 1.

40 and 41 are cells connected in series, from which circuit proceeds as follows: from cell 40 by wire 42 to

spring 25 to brush 21, and from brush 21, when a pin 43 on weighted arm 19 comes in contact therewith, through the shaft carrying said arm to back plate 5, to one of the brackets 44 which support said plate on back board 33 by wire 45, to and through the coils of electro-magnet 29 and by wire 46 to cell 41.

The operation is as follows: The cord being initially wound on pulley 2, the clock train is actuated by the descending weight 4 until the pin 43 on arm 19 moved in the direction of the arrows Fig. 1, makes contact with the brush 21, thus closing circuit through the electro-magnets, which attract their armatures, bringing the frame to substantially horizontal position and the lever 26 against stop 39, preferably covered with elastic material. This drawing down of link 38 throws the brush 21 sharply upward, causing it to strike and by its elasticity to react upon the pin 43 on arm 19. The shaft 1 carrying said arm is thus rotated in the reverse direction and by the inertia of the weighted arms its arc of travel is increased. This reverse movement of the shaft is not transmitted to the clock train because of the running of pawl 9 over the ratchet 11, which ratchet meanwhile is held at rest by the holding pawl 16. But the reverse rotation of shaft 1 turns the grooved pulley 2 so as to wind thereon cord 3 and thus raise weight 4,—and at the same time the pin 43 is carried away from brush 21, thus breaking circuit. When the arms reach the end of the path of impressed rotation, the weight again resumes control, descends; and the foregoing operation is repeated. It will be seen, therefore, that the rotatable member or shaft 1 is rotated first in one direction by the descending weight 4, and then in the other direction by the electrically controlled reacting spring or brush 21, and its last named reverse movement raises the weight 4 and so restores the potential energy thereof. This alternate motion of shaft 1, of course, continues as long as current is supplied to the electro-magnet—and hence the clock train runs and time is indicated in the usual way for a like period. Owing to the momentary contact of brush 21 and pin 43, which can be caused to take place at any predetermined interval of time by suitable construction of the clock train the expenditure of current is very small, and hence the need of renewing cells, when these are used as the source, occurs only at long intervals. Of course, the cells can be omitted and any other convenient source of current, such as ordinary house wires from the street mains, substituted. It is preferable to adjust the brush wires so that the pin 43 meets them successively, thus insuring good contact of pin and brush.

In place of weight 4, an equivalent spring may be substituted having one end connected to the cord and the other to any fixed abutment, or the well known volute or hook spring may have one extremity directly connected to the shaft 1 and the other to said abutment, or any other device known in the art, which will operate to move the shaft 1 in one direction and be itself acted upon to store power by the impressed motion of the shaft in the other direction, may be employed. The extent of movement of the end of brush 21 may be regulated by securing the extremity of the link in one of the several holes shown near the end of the lever arm.

The term "rotating" in the claims applied to the rotatable member or shaft 1, means broadly either a partial rotation—or a complete rotation—or a complete rotation plus a partial rotation, of said member as any one of these conditions may exist, depending, for example, upon the extent of descent of the weight, and the diameter of the cord receiving pulley.

I claim:

1. A shaft, means for rotating the same in one direction, an arm on said shaft, a spring in the path of movement of said arm and means for electrically vibrating said spring to re-act on said arm and reverse the movement of said shaft; the said vibrating means, arm and spring, being in circuit.

2. A shaft, means for oscillating the same in one direction, an arm on said shaft, a spring in the path of movement of said arm and means for electrically controlling said spring to re-act on said arm to reverse the movement of said shaft and thereby restore the expended potential of said first named means; the said arm, spring and electric controlling means, being in circuit.

3. In combination with a time mechanism, a rotatable shaft, means for rotating said shaft in one direction, an arm on said shaft, a pivoted contact brush extending into the path of movement of said arm, an electro magnet, a pivoted armature-carrying frame surrounding said magnet, a link connecting one end of said armature to said brush, and circuit connections, substantially as set forth.

4. In combination with a time mechanism and a motor therefor, a winding mechanism for said motor, a resilient vibrating body for actuating said winding mechanism, an electrically actuated device for vibrating said body and means controlled by said motor for intermittently closing circuit to said electrically actuated device through said resilient body.

5. In combination with a time mechanism and a motor therefor, a winding mechanism for said motor, a resilient vibrating body for actuating said winding mechanism, an electrically actuated device for vibrating said body and means controlled by said motor for intermittently closing circuit to said electrically actuated device through said resilient body and simultaneously subjecting said body to strain against its own resiliency.

6. In a time mechanism, a rotatable shaft, means for rotating the same in one direction, winding mechanism actuated by said shaft when rotated in the opposite direction, a circuit closing arm on said shaft, a movable vibrating contact spring in the path of said arm, an electrically actuated device for vibrating said contact spring and circuit connections; the aforesaid parts being constructed and arranged so that when said shaft is rotated by said rotating means, said arm shall meet and compress said spring, thereby simultaneously establishing circuit to said electrically actuated device to vibrate said spring, and be thrown by the conjoint action of said device and the resiliency of said spring in the opposite direction to actuate said shaft and said winding mechanism.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALOYS WIRSCHING.

Witnesses:
JAS. E. WIRSCHING,
ALEXANDER H. WIRSCHING.