No. 868,587. PATENTED OCT. 15, 1907.

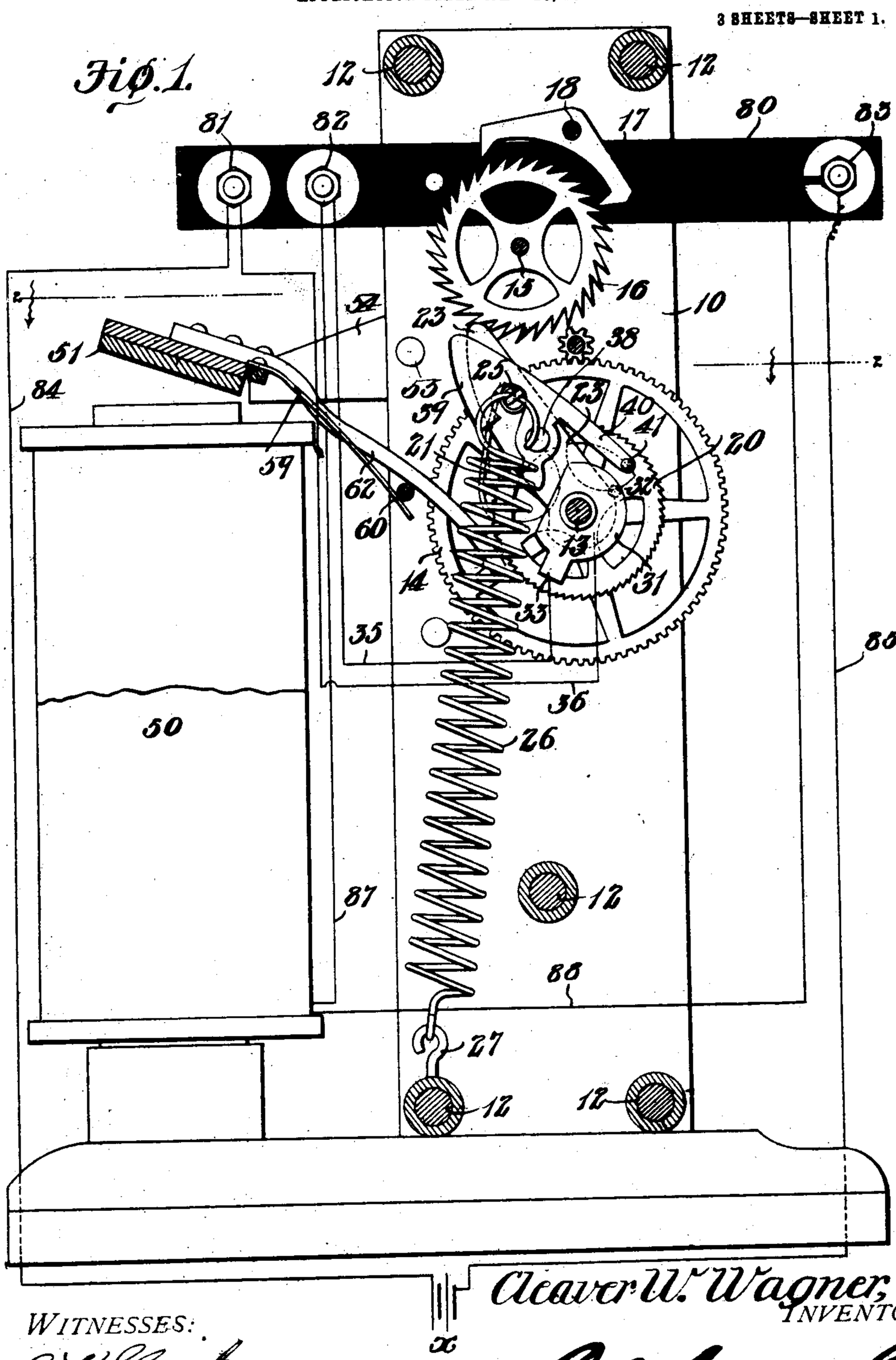
C. W. WAGNER.

SELF WINDING ELECTRIC CLOCK.

APPLICATION FILED MAR. 13, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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3 SHEETS—SHEET 2.

Fig. 2.

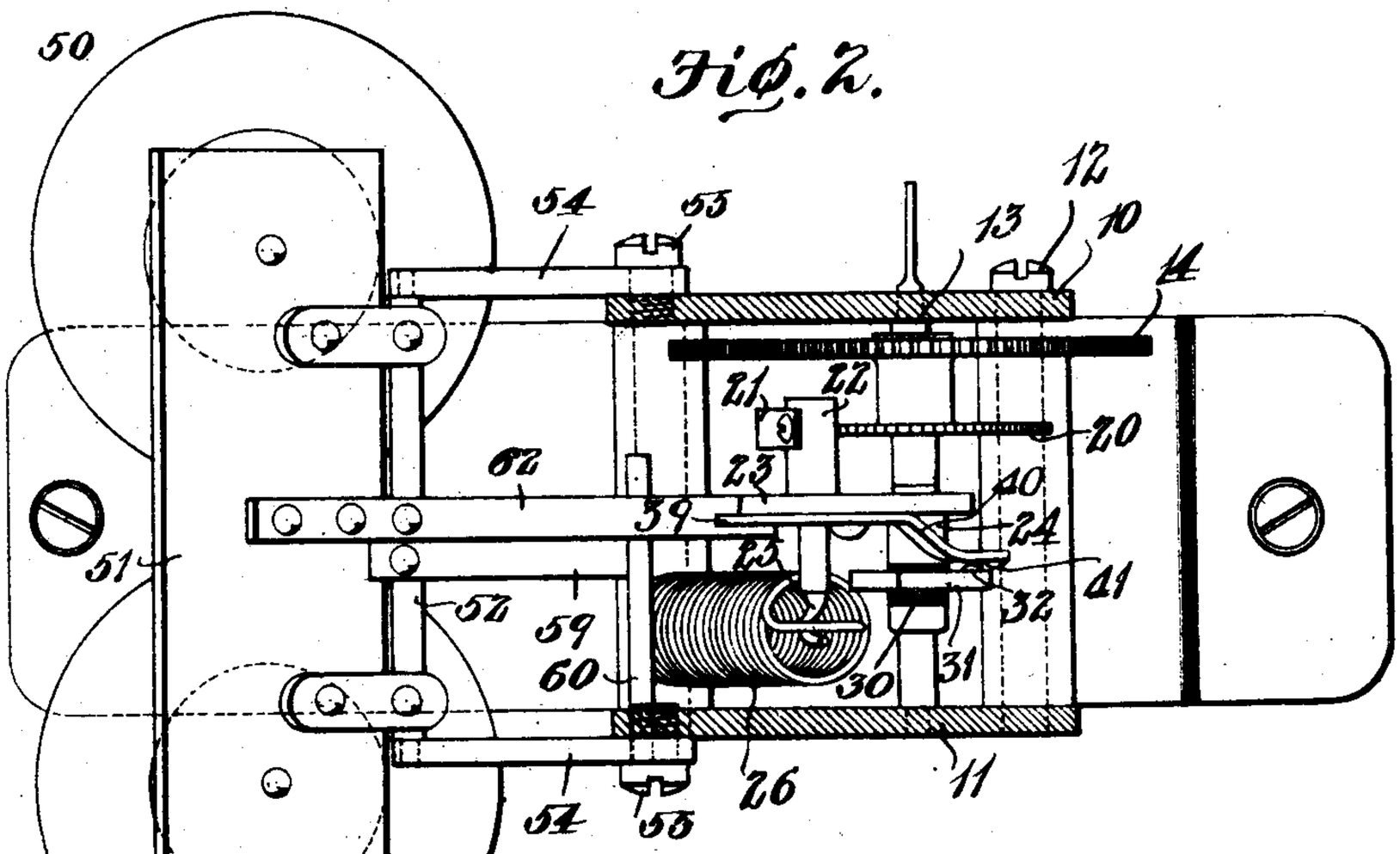

Fig. 4.

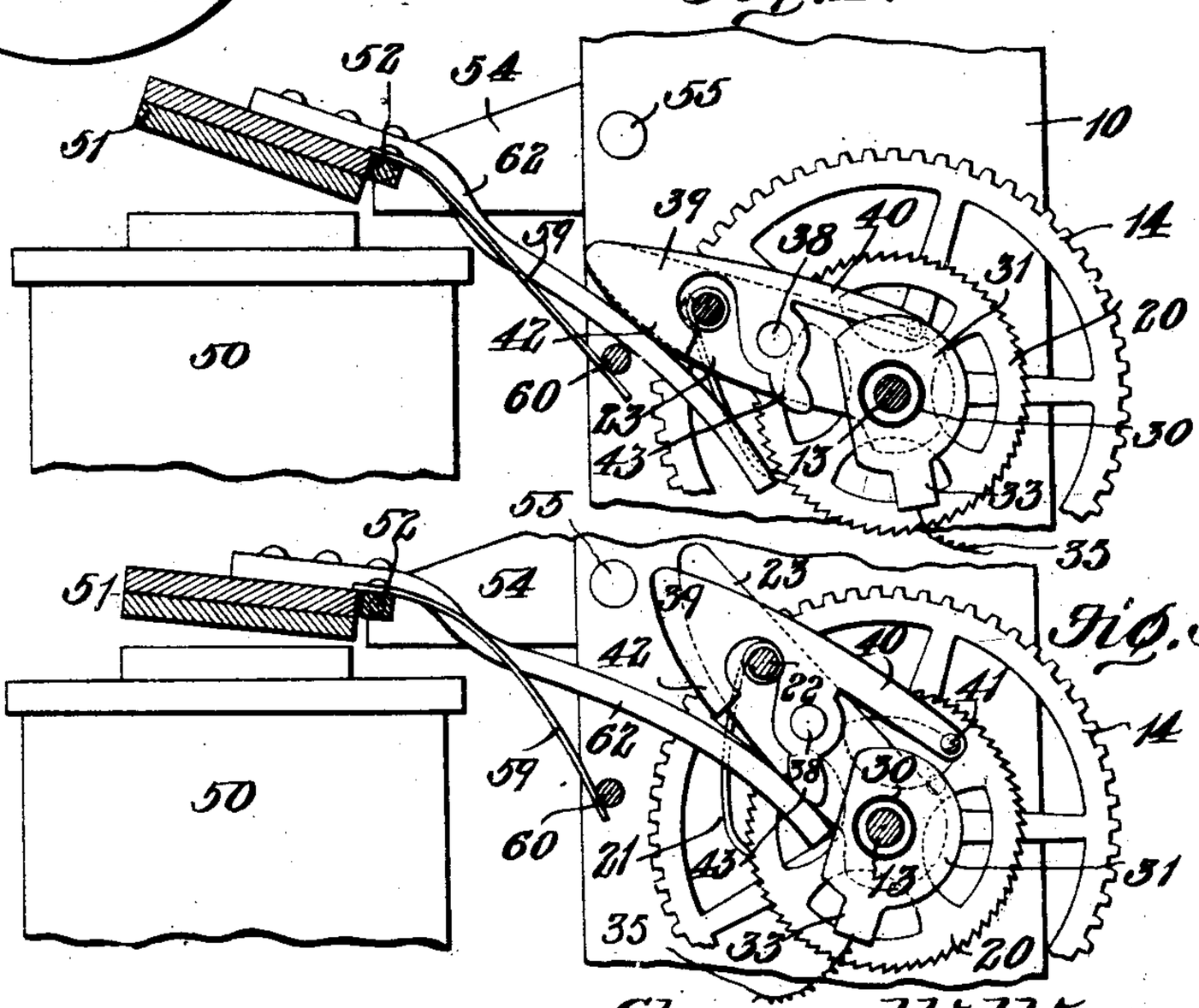

Fig. 5.

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3 SHEETS—SHEET 3.

Fig. 3.

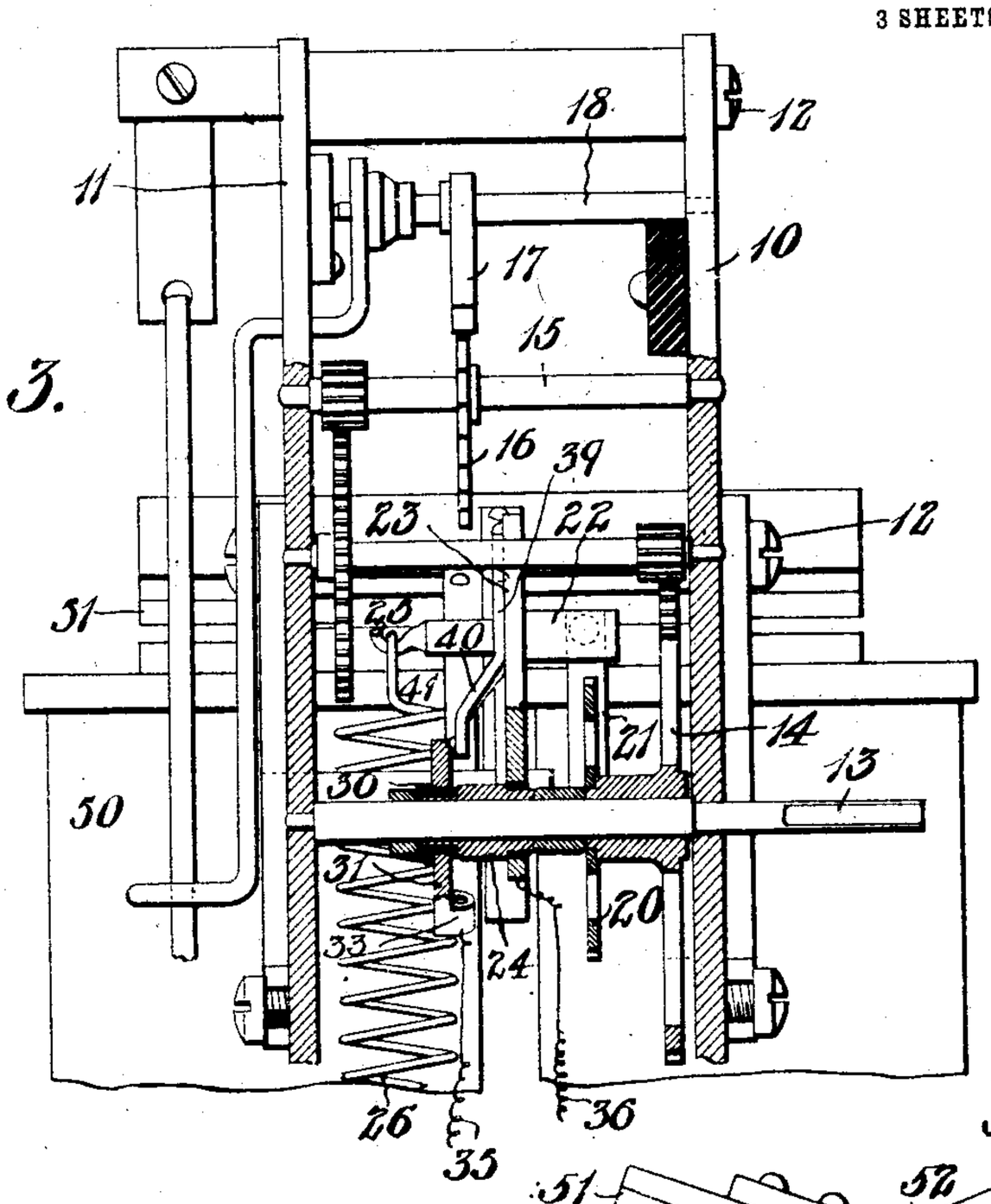

Fig. 8.

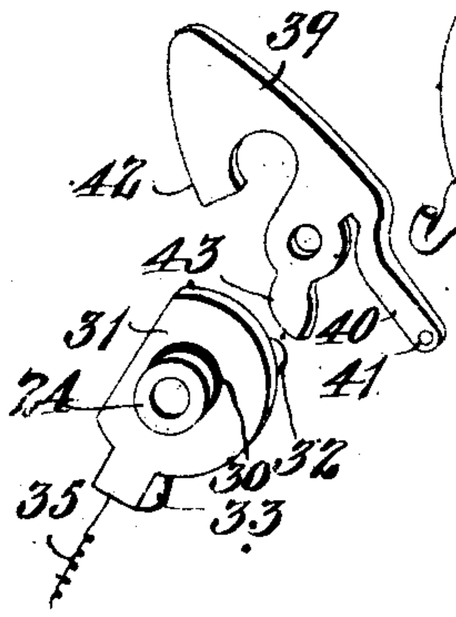

Fig. 7.

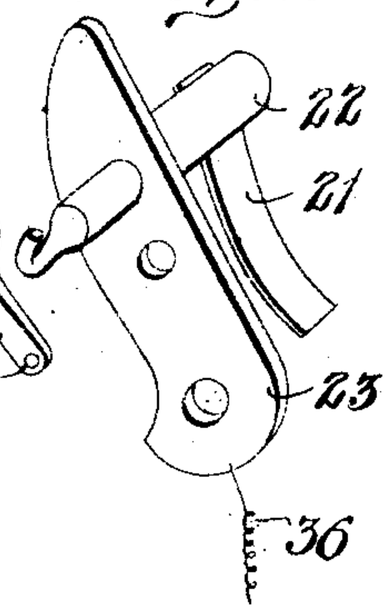

Fig. 6.

Fig. 9.

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UNITED STATES PATENT OFFICE.

CLEAVER W. WAGNER, OF DANVILLE, PENNSYLVANIA, ASSIGNOR TO AUTOMATIC CLOCK COMPANY, OF DANVILLE, PENNSYLVANIA.

SELF-WINDING ELECTRIC CLOCK.

No. 868,587. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed March 13, 1906. Serial No. 305,873.

To all whom it may concern:

Be it known that I, CLEAVER W. WAGNER, a citizen of the United States, residing at Danville, in the county of Montour and State of Pennsylvania, have invented a new and useful Self-Winding Electric Clock, of which the following is a specification.

This invention relates to self winding electrical clocks of that general type in which a propelling spring is placed under stress at intervals of five or six minutes, more or less, through the operation of an electro-magnet, and during that interval serves to propel the clock train.

One of the principal objects of the invention is to improve and simplify the circuit controlling mechanism to the end that both the making and breaking of the circuit may be positive and abrupt, and may be accomplished without in any way interfering with the action of the clock train propelling spring or impairing or reducing the force exerted by the latter in accomplishing its work.

A further object of the invention is to provide a novel form of movable contact for making and breaking the circuit, said contact being actuated by the armature or the armature carried member in such manner as to cause it to move positively into engagement with, and positively out of engagement with the second contact or terminal of the circuit of the electro-magnet.

A still further object of the invention is to provide a movable contact member, so mounted as to receive two positive movements from the armature or armature carried member, the completion of the movement in one direction, to make the circuit, being instantly followed by movement in the opposite direction, for the purpose of positively breaking the circuit.

A still further object of the invention is to provide a mechanism of this type in which the circuit of the magnet is completed independent of the frame and arbors of the clock train, so that the passage of the current will not be retarded by the resistance frequently offered at the journals, owing to the presence of the lubricating material, and further to avoid the deterioration of the lubricant which in some cases follows the passage of a current therethrough.

A still further object of the invention is to improve and simplify the construction and mounting of the armature with a view of securing the utmost accuracy of adjustment of the arcuate movement of said armature.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a sectional elevation of a self winding electric clock constructed in accordance with the invention, the parts being shown with the propelling spring under full stress. Fig. 2 is a sectional plan view of the same on the plane indicated by the line 2—2 of Fig. 1. Fig. 3 is a side view of the upper portion of the clock, partly in section in the plane of the minute arbor. Fig. 4 is a sectional elevation, illustrating principally the contacts and the parts being shown in the position assumed just as the circuit is completed and before the downward movement of the armature. Fig. 5 is a similar view, showing the armature nearly at the completion of its downward movement. Fig. 6 is an elevation of one end of the armature and one of the armature carrying brackets. Fig. 7 is a detail perspective view of the rocker arm to which the propelling spring is connected. Fig. 8 is a similar view of the movable contact carried by the rocker arm. Fig. 9 is a detail perspective view of the relatively stationary contact carried by the minute arbor, and with which the movable contact engages.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The working parts of the apparatus are supported in a clock frame including plates 10 and 11 that are held in spaced relation by the usual sleeved bolts 12, and the frame has bearings for a simple form of clock train including a main arbor 13 which carries a minute wheel 14, and the latter is connected through intermediate gearing to an escapement arbor 15, carrying a scape wheel 16 under the control of an anchor 17 mounted on an anchor arbor 18 in the usual manner.

Secured to the hub of the minute wheel is a ratchet wheel 20 having teeth of fine pitch which are engaged by a spring pawl 21 that is carried by a stud 22 projecting from one side of a rocker arm 23, the latter being rigidly secured to a collar 24 that is mounted loosely on the main arbor, 13, and through this rocker arm and pawl movement is imparted to the clock train. The stud 22, or a reduced portion thereof, extends through the rocker arm and carries a hook 25 to which is connected the upper end of a clock train propelling spring 26, the lower end of which is connected to a fixed eye 27 carried by the frame. When the spring is under full stress and exercising its greatest force, the stud 25 is in the highest position shown in Fig. 1, and as the stress or force of the spring decreases owing to the contraction of the spring, the hook 25 is pulled down toward the position shown in Fig. 4, and it will be ob-

served that as the energy of the spring decreases, there will be a corresponding increase in the distance between the vertical plane of the hook and the axis of the shaft 13, so that the leverage force will gradually increase and thus automatically compensate for the gradually reducing power of the spring, and the arrangement is such that the propelling force exerted by the clock train is substantially the same at all times.

On the reduced portion of the collar 24 is an insulating sleeve 30 (Fig. 3) on which is mounted a metallic disk 31 carrying a contact point 32, preferably formed of platinum. The metal at one side of the disk is extended and bent to form a loop 33 which embraces and supports the upper end of an insulated wire 35, the extreme end of which is soldered to the disk 31, while another wire 36 is soldered to the rocker arm 23, these two members being held from electrical contact by the insulating sleeve 30. The rocker arm 23 carries a stud 38 on which is mounted a contact member 39 which may be formed of brass or other sheet metal, and this contact is provided with a yieldable arm 40, preferably forming an integral part of the contact and provided with a contact point 41 formed of platinum and adapted to engage with the platinum contact 32 for the purpose of closing the circuit of the electro-magnet. The contact 39 is provided further with two arms 42 and 43 which are arranged to engage with the armature lever for making and breaking the circuit of the magnet.

The electro-magnet 50 is mounted at one side of the frame, with the coils in vertical position, and the soft iron armature 51 is arranged above the poles of the magnet. The armature is carried by a rock shaft 52 which may be formed of brass or other suitable metal, rigidly secured to the armature. The opposite ends of the rock shaft are mounted in bearings formed in the approximately horizontal arms of bell crank levers 54 that are pivoted, at the point of bifurcation, on screws 55 secured to the front and rear plates of the clock frame. The vertical arms of the bell crank levers are provided with end slots 56 arranged on curved lines struck from the center of the screw 55 and through these slots pass locking screws 57 into the threaded openings in the frame plates. The construction is such that the bell crank levers may be moved on the pivot screws 55 for the purpose of adjusting the position of the armature carrying shaft 52 with respect to the poles of the electro-magnet, after which the screws 57 may be tightened for the purpose of locking the bell crank levers in place. The armature is normally held in elevated position by means of a leaf spring 59 which extends from the armature shaft to a point under a cross bar 60 carried by the frame, or extending from one of the bell crank levers.

Secured to the armature and its rock shaft is a lever 62 that extends inward to a position under the rocker arm 23, and the contact 39, and serves on engagement with the rocker arm 23 to effect movement of the latter from the position shown in Fig. 4 to the position shown in Fig. 1, and each time this occurs the spring 26 will be placed under stress and will operate to drive the clock train until the rocker arm once more approaches the position shown in Fig. 4, whereupon the circuit of the electro-magnet will be closed, the armature attracted, and the rocker arm will be again moved to position shown in Fig. 1, and the spring once more placed under stress.

In order to reduce friction, the lower surface of the rocker arm 23 is curved, and the upper surface of the lever 62 is also curved, said curves being so proportioned to each other that during the operative engagement of the lever 62 with the arm 23, the latter will be moved upward without sliding frictional engagement, the parts being in rolling contact. This construction is taken advantage of in the arrangement and mounting of the contact 39. It will be observed that the arm 42 of the contact 39 is recessed to permit free play of the spring carrying hook 25, and the lower edge of said arm 42 is of a contour corresponding exactly to that of the adjacent portion of the rocker arm 23. The arm 42, moreover, is much heavier than the contact carrying arm 40, and said arm 42 will move by gravity to the position shown in Fig. 1, or until the top wall of this recess rests against the spring carrying hook 25, and the parts will continue in this position during the downward movement of the arm 23 under the influence of spring 26. During the latter portion of the downward movement of the arm 23, the arm 42 of the contact will strike against the armature lever 62, and then as the downward movement of arm 23 continues and the pivot stud 38 is carried down, this arm 42 will rock on the lever 62 and the contact 41 will be moved downward into engagement with the contact 32, the latter approaching the path of movement of the contact 41, owing to the rotative movement of disk 31. In other words, these two contacts approach each other on arcuate lines which intersect at a point where the lines are approximately at a right angle to each other, and the closing of the circuit is made positive and certain.

The circuit closing operation takes effect before the arm 23 can engage with the armature lever 62, or the latter, being the stationary member, and bearing against the cross bar 60, will stop the movement of the arm 23, and thus arrest the movement of the clock train. The circuit closing takes place immediately before these members come into contact, and as soon as the circuit is closed, the electro-magnet is energized and the armature is attracted. The lever 62 then rides or rolls under the arm 42 of the contact and the curved lower surface of the rocker arm 23, forcing the latter up from the position shown in Fig. 4 to the position shown in Fig. 1. During the first part of this movement, the two platinum contacts remain in engagement with each other in order to insure the full stroke of the armature, and towards the end of the movement the curved face of the lever 62 will engage against the arm 43 of the contact and will force the movable contact 39 to the position shown in Fig. 5. It will be observed on reference to Fig. 4 that when the contacts are in engagement, the arm 43 extends slightly below the curved lower face of the rocker arm 23 and remains in this position until the parts have assumed the position shown in Fig. 5, whereupon the lever 62 will engage with the arm 43 and positively force the contacts out of engagement, thus insuring positive and abrupt breaking of the making circuit.

In the operation of clocks of this general type, considerable difficulty is experienced where the frame and arbors of the clock train are employed as current conductors, the resistance to the passage of the train

being abnormal, and in some cases considerable difficulty is experienced owing to deterioration of the lubricant due to the passage of the current across the bearings. In the present case no part of the frame forms a part of the conductor. The principal connections are supported on a bar 80 formed of rubber or fiber and secured to the frame plate 10. This bar carries three sets of binding posts 81, 82 and 83, and of these, the binding posts 81 and 83 are connected to the battery x by wires 84 and 85, respectively. The wire 35 of the contact disk 31 extends to the binding post 82, and the wire 36 which is secured to the rocker arm 23 extends to the binding post 81. The electro-magnet is connected by wires 87 and 88 to the binding posts 82 and 83, respectively. The circuit may be traced from battery x through wire 84, binding post 81, wire 36, rocker arm 23, contact 39, platinum points 41 and 32, contact disk 31, wire 35, binding post 82, wire 87, electro-magnet 50, wire 88, binding post 83, and wire 85 back to the battery.

I claim:—

1. In a self-winding clock, a clock train, a propelling spring therefor, an electro-magnet and connections between the same and the propelling spring for putting the latter under stress, a pair of adjacent contacts insulated from each other and carried by and movable with a movable part of the clock train, electric conductors directly connected to said adjacent contacts whereby they form the terminals of a charged electric circuit, and a bridging conducting member mounted on one of the contacts and having movement independent of said contact to complete the circuit to the other contact.

2. In a self-winding clock, a clock train, propelling means for the same, electro-magnetically actuated means operating on said propelling means at intervals, a pair of adjacent contacts insulated from each other and forming the terminals of an electric circuit and carried by and movable with a movable part of the clock train, and a bridging conducting member carried by one of said contacts and movable by gravity to a position to be impelled to close the circuit between the contacts prior to the action of the electric means on the clock train propelling means.

3. In a self winding clock, a clock train, a spring impelled arm through which movement is imparted to the train, an electro-magnet, an armature disposed within the field of force of the electro-magnet, a lever carrying said armature and arranged to engage the spring impelled arm at intervals to place the spring under stress, an electric circuit including the electro-magnet and a source of energy, and a pivotally mounted contact carried by the arm and arranged to engage the armature lever for moving to circuit closing position in advance of the operation of said armature lever.

4. In a self winding clock, a clock train, a spring impelled arm for imparting movement to the clock train, an electro-magnet, an armature disposed within the field of force of the electro-magnet, a lever carrying said armature and arranged to engage with the spring impelled arm at intervals, an electric circuit including the electro-magnet and a source of energy, and a contact carried by the arm and provided with a pair of arms for successive engagement with the armature lever to effect successive making and breaking of the circuit.

5. In a self winding clock, a clock train, a spring impelled arm for imparting movement to the train, an electro-magnet, an armature disposed within the field of force of the electro-magnet, a lever carrying said armature and arranged to engage the spring impelled arm at intervals, an electric circuit including the electro-magnet and a source of energy, pivoted contacts mounted on said arm and connected in the circuit, said contact being provided with a pair of projecting arms arranged to be successively engaged by the armature lever for effecting first the make, and then the break of the electric circuit.

6. In a self winding clock, a clock train including an arbor, a ratchet wheel on said arbor, a collar free to oscillate on the arbor, an arm secured to the collar, a pawl carried by the arm and engaging the teeth of the ratchet wheel, a tension spring extending between the arm and a fixed point, an electro-magnet, an armature disposed within the field of force of the electro-magnet, a lever carrying the armature and disposed under said arm, the adjacent faces of the arm and lever being rounded to permit rolling engagement between them, an electric circuit including the electro-magnet and a source of energy, a contact member also carried by the sleeve, a second contact member pivoted to the spring actuated arm and provided with a pair of spaced arms for successive engagement with the armature lever, whereby said pivoted contact may be positively moved toward and from the collar carried contact.

7. In a self winding clock, a clock train, means for propelling the same, an electro-magnet for winding the propelling means, an electric circuit including the electro-magnet and a source of energy, a pair of clock train carried contact forming the terminals of the circuit and arranged in close relation, means independent of the propelling means for moving one of said contacts with relation to the other to complete the circuit, and means for insulating said contacts from the frame and arbors.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CLEAVER W. WAGNER.

Witnesses:
FRANK C. ANGLE,
J. H. COLE.