

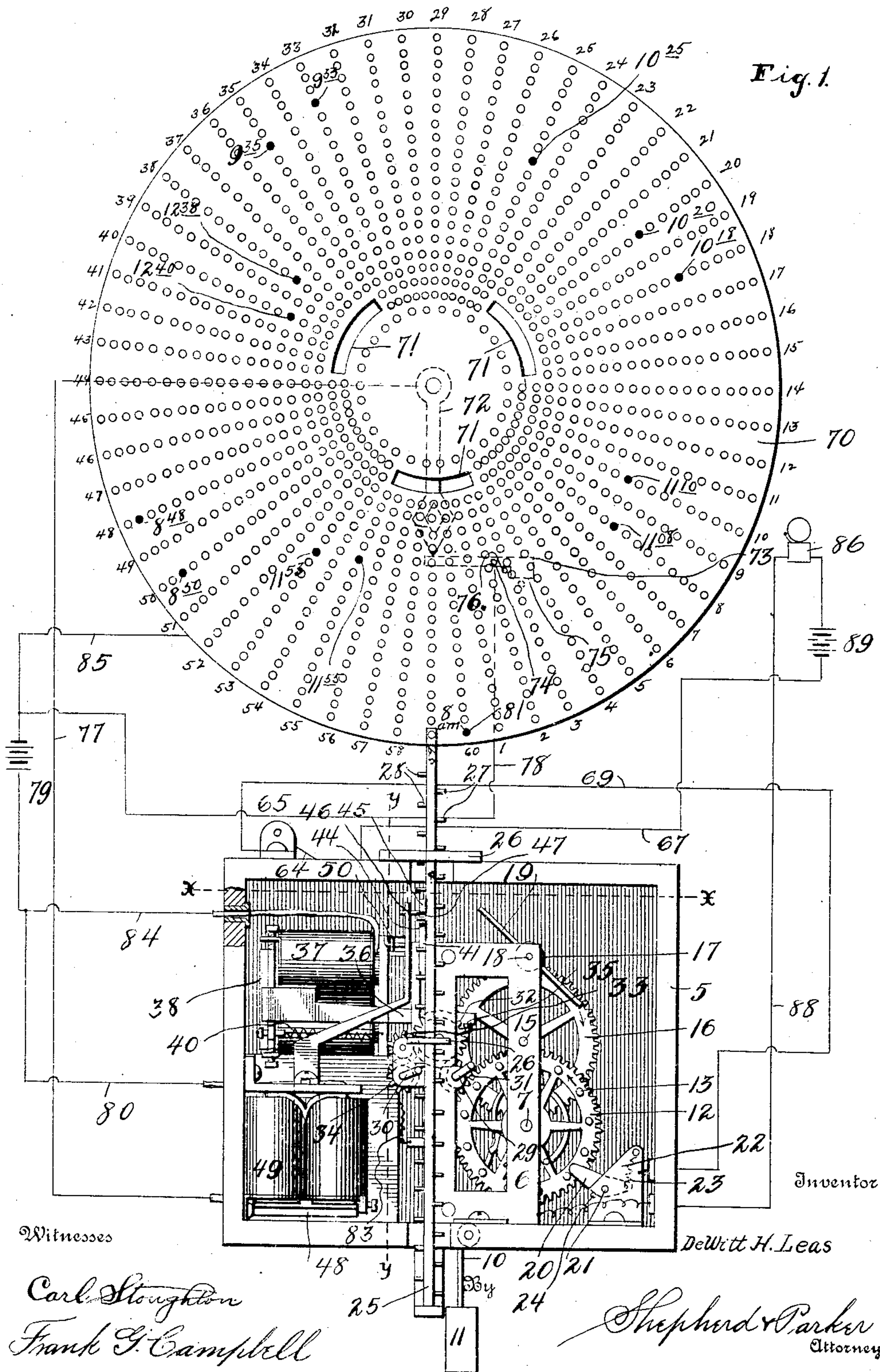
No. 865,598.

PATENTED SEPT. 10, 1907.

DE WITT H. LEAS.
PROGRAM CLOCK.

APPLICATION FILED OCT. 24, 1906.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

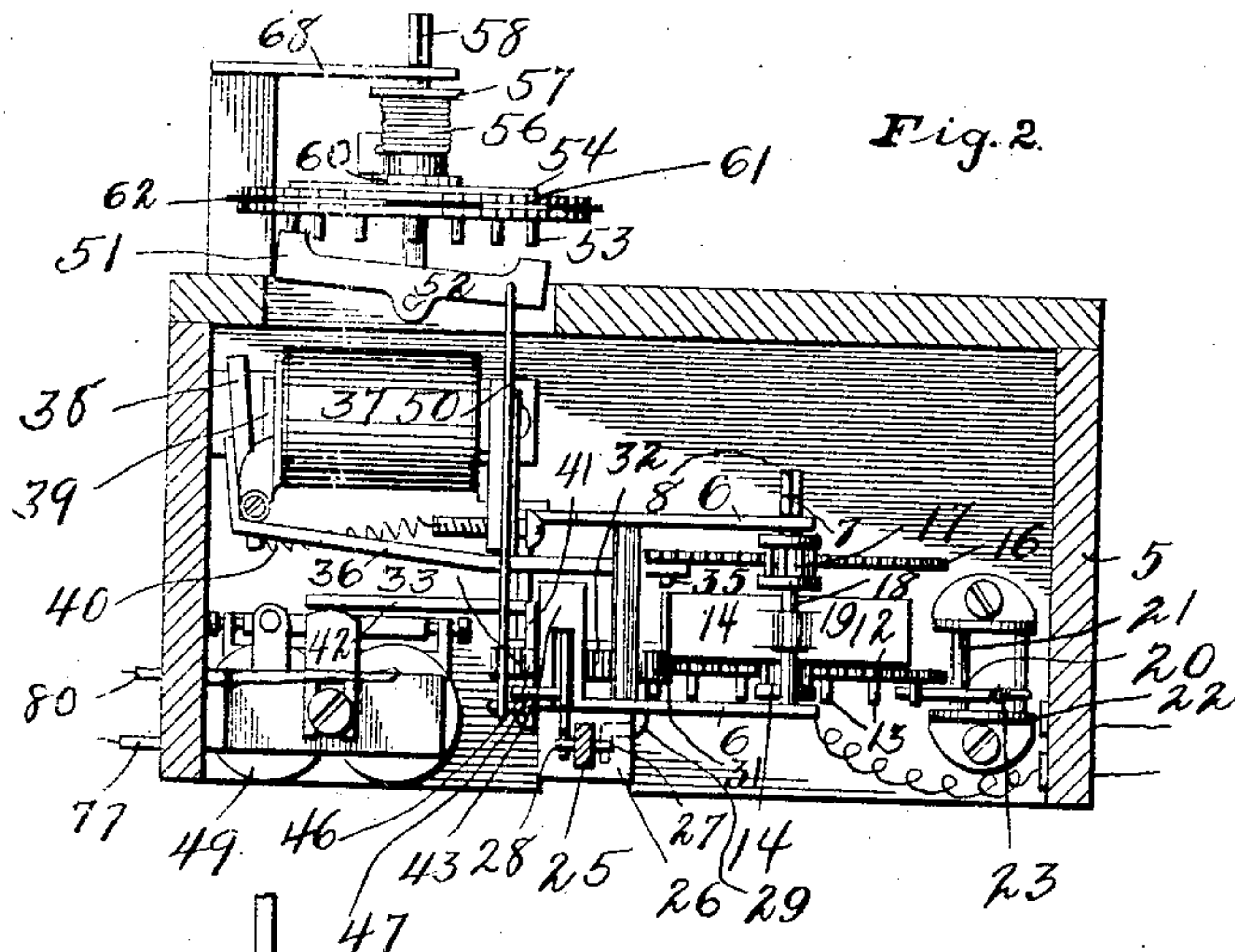


Fig. 2.

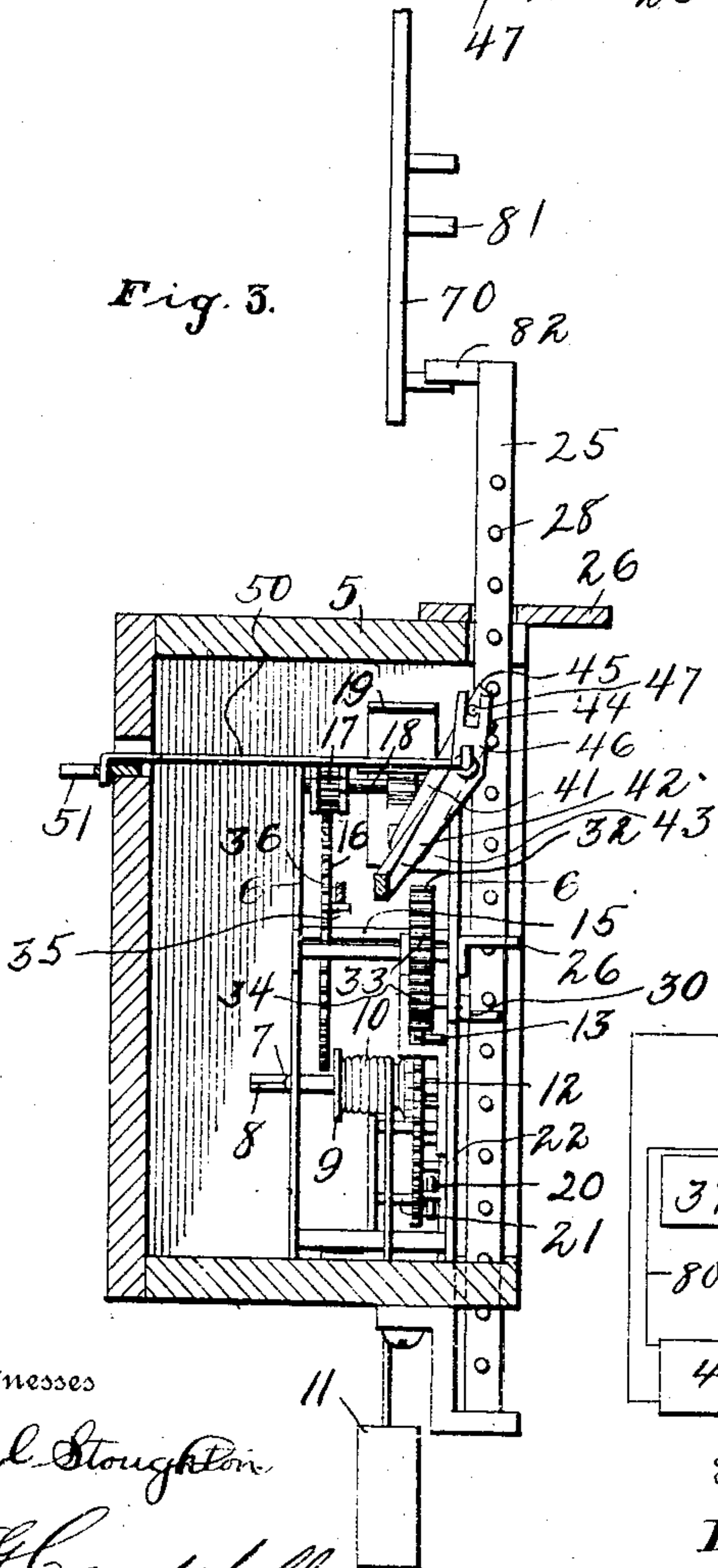


Fig. 3.

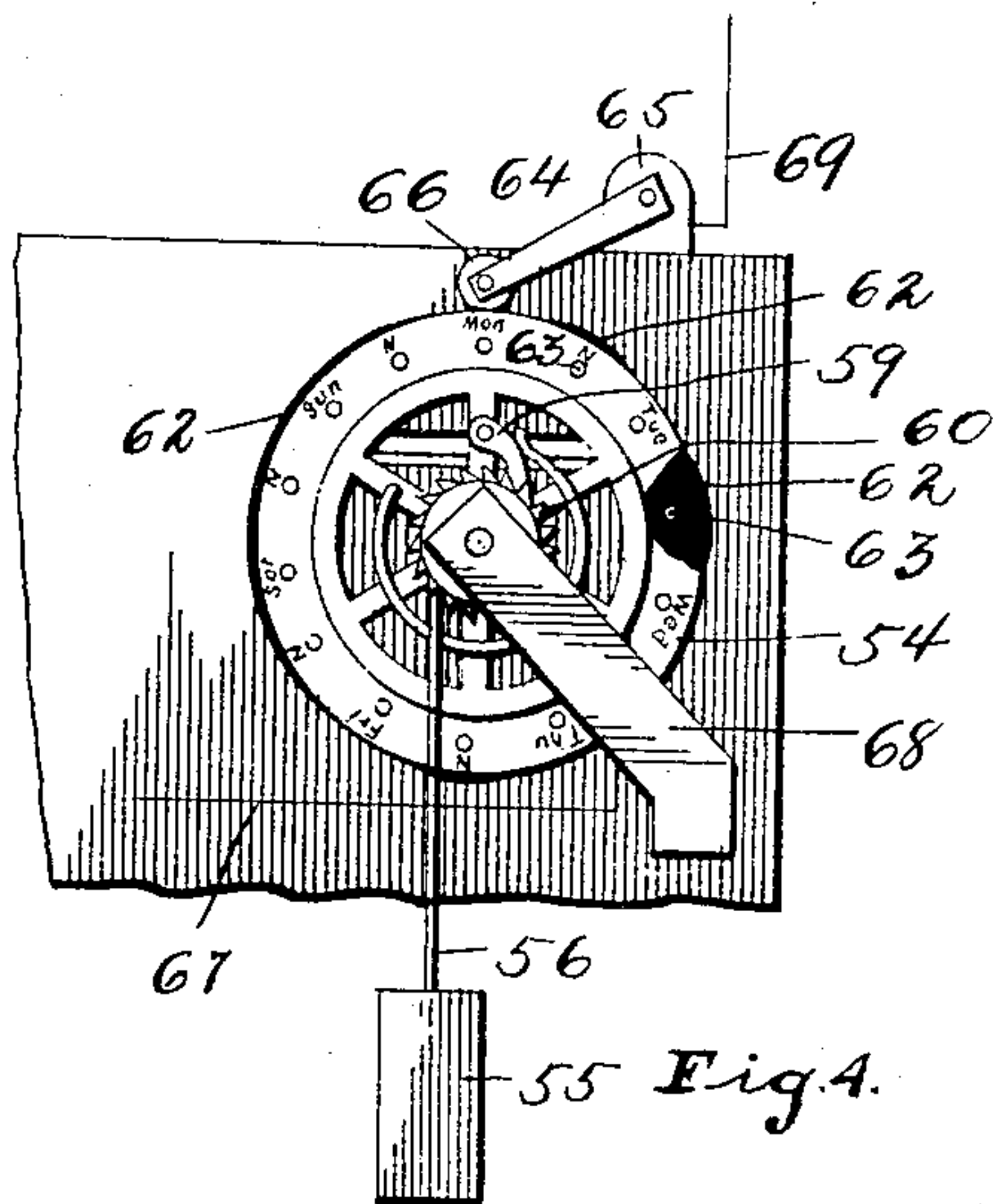


Fig. 4.

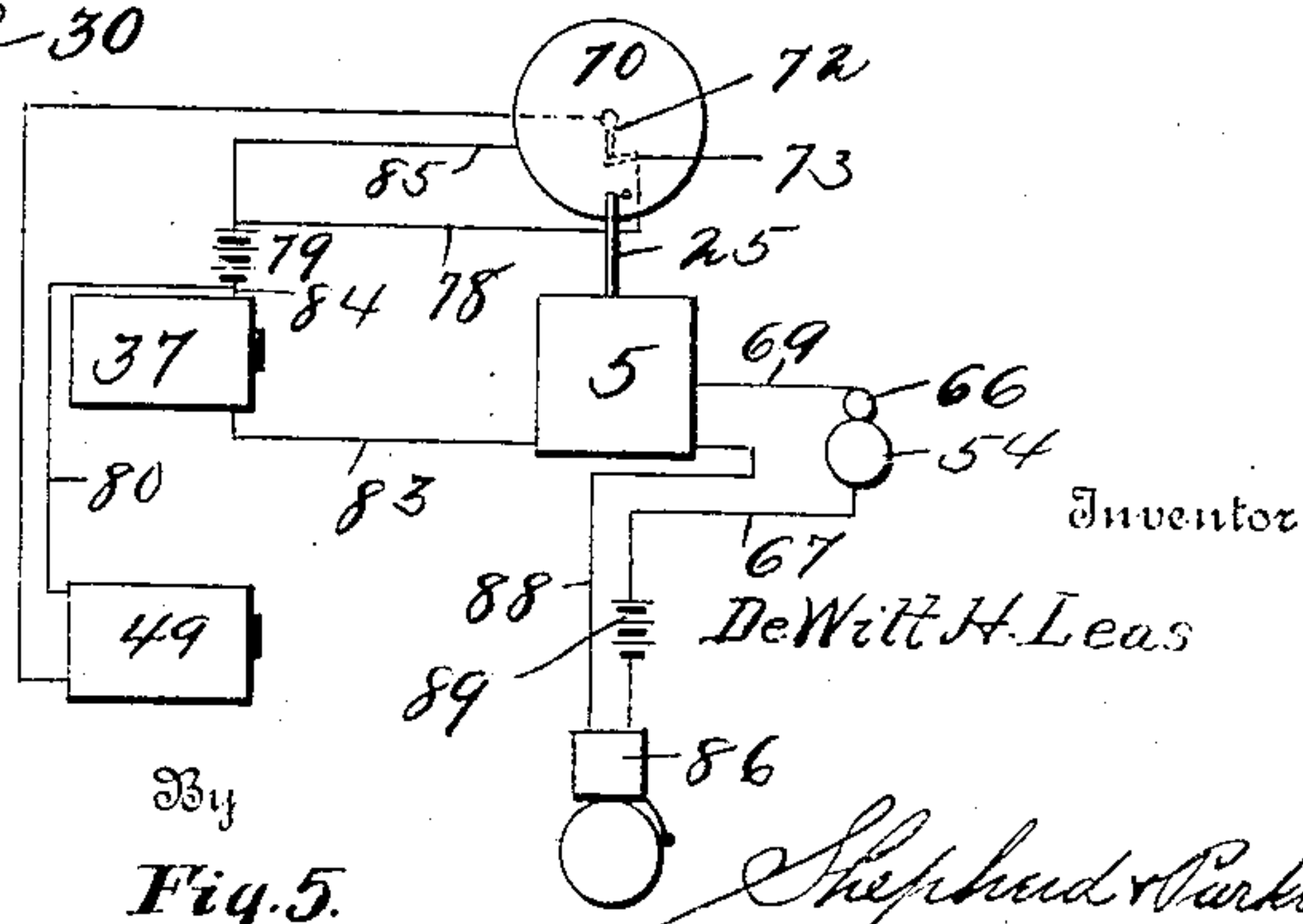


Fig. 5.

Witnesses

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Fig. 5.

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UNITED STATES PATENT OFFICE.

DE WITT H. LEAS, OF DELAWARE, OHIO.

PROGRAM-CLOCK.

No. 865,598.

Specification of Letters Patent.

Patented Sept. 10, 1907.

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To all whom it may concern:

Be it known that I, DE WITT H. LEAS, a citizen of the United States, residing at Delaware, in the county of Delaware and State of Ohio, have invented certain
5 new and useful Improvements in Program-Clocks, of which the following is a specification.

My invention relates to program clocks and has for its object the provision of a device of this character adapted at stated intervals to sound signals for various
10 purposes and particularly adapted to sound signals to indicate the study periods, rest periods and the like in schools and colleges.

A further object of the invention is the provision of a device of the character set forth, constructed in such
15 manner that any of the signals may be omitted at will, or the signals for an entire day may be cut out when desirable as upon a holiday.

Further objects and advantages of the invention will be set forth in the detailed description which now
20 follows.

In the accompanying drawings: Figure 1 is a front elevation of the device with the front of the casing which contains the mechanism, removed, Fig. 2 is a horizontal section upon line *x x* of Fig. 1, Fig. 3 is a
25 transverse vertical section upon line *y y* of Fig. 1, Fig. 4 is a detail view of an automatic switch hereinafter described, and, Fig. 5 is a diagrammatic view illustrating the arrangement of the various circuits.

Like numerals designate corresponding parts in all
30 of the figures of the drawing.

Referring to the drawing, the numeral 5 designates a casing. Mounted in this casing is a frame comprising members 6. Journaled in this frame is a shaft 7 having an angular end 8. A drum 9 is mounted upon this
35 shaft and a cord 10 is wound upon the drum. A weight 11 secured to the free end of this cord normally tends to rotate the shaft 7 toward the left in Fig. 1. A gear wheel 12 which is fast upon this shaft, carries a plurality of removable pins 13. The gear wheel 12
40 meshes with a pinion 14 which is fast upon a shaft 15. A gear wheel 16 which is also mounted upon this shaft, meshes with a pinion 17 carried by a shaft 18. A fan 19 is mounted upon this shaft, the size of said fan controlling to a certain extent, the speed of the mechanism. A tongue 20 is pivoted as at 21 in a bracket 22.
45 A spring 23 normally tends to lift the rear end of this tongue and to throw the front end of said tongue downwardly. The downward movement of the front end of this latch is, however, limited by a stop pin 24. A
50 bar 25 is slidably disposed in keepers 26. This bar carries a plurality of pins 27 upon one side thereof, and a plurality of pins 28 upon the other side thereof. A step by step movement is imparted to the bar 25 by small cranks 29 and 30. The crank 29 is rotated by a
55 pinion 31 which meshes with the gear wheel 12. This pinion in turn meshes with an idler pinion 32 and this

idler pinion 32 in turn meshes with a second idler pinion 33. The idler pinion 33 meshes with a pinion 34 to which the crank 30 is secured. It will therefore be seen that the pinions 31 and 34 rotate in opposite
60 directions, consequently the cranks 29 and 30 rotate in opposite directions and in such direction that during their rotation the crank 29 catches under the pins 27 to elevate the bar 25 one step and the crank 30 catches under the pins 29 to elevate said bar one step. A pin 35
65 is carried by the gear wheel 16 and the free end of a bar 36 normally lies in the path of movement of this pin and prevents rotation of the gear wheels and pinions of the mechanism. The movement of this bar 36 is controlled by a magnet 37 of the usual and well known
70 construction. When this magnet is energized, its armature 38 is drawn toward the core 39 (see Fig. 2) and the free end of the bar 36 is thrown out of the path of movement of the pin 35, this permits the gear wheel 16 to revolve once, or until the pin 35 again comes
75 around in position to strike the free end of the bar 36, the energizing of the magnet of course being but momentary and the spring 40 serving to return the armature to the position illustrated in Fig. 2, as soon as the magnet is deenergized.
80

A latch 41 is pivoted as at 42 to an extension 43 of the frame. This latch has two faces 44 and 45 which are adapted to engage beneath the pins 28 to hold the bar 25 in its elevated position as it is moved upwardly by the cranks 29 and 30. A forked arm 46 engages a
85 pin 47 carried by this latch (see Figs. 1 and 3) said forked arm being connected to the armature 48 of an electro-magnet 49, the energizing of said magnet serving to throw the arm 46 to the left in Fig. 3 and to withdraw the latch 41 from engagement with the pins 28.
90 A wire or rod 50 connects the arm 46 with an escapement bar 51 (see Fig. 2). This escapement bar is pivoted at 52 for oscillatory movement and is adapted to coact with pins 53 carried by a disk 54 to permit a step by step movement of said disk, rotation being imparted
95 to this disk by a weight 55 (see Fig. 4) which is attached to a cord 56, said cord being wound upon a drum 57 which is fast upon a shaft 58. The disk 54 is, however, loosely mounted upon this shaft. Rotation of the disk toward the left in Fig. 4, is accomplished
100 by mounting a pawl 59 upon the disk, said pawl engaging a ratchet 60 which is carried by the drum 57. The outer end of the shaft 58 is angular. By applying an ordinary clock key to this shaft, it is possible to wind the cord 56 upon the drum, the disk being held
105 against rotation at this time by one end of the escapement bar 52 engaging one of the pins 53. This disk and the parts connected thereto, forms an automatic switch which completes an electric circuit to the bells to be rung during the day, but automatically breaks said
110 circuit during the night and from Friday night until Monday morning. The periphery of the disk 54 is

grooved as at 61 for the reception of pieces of insulating material 62. These pieces of insulating material are slipped into the grooved periphery of the disk and are held in place by pins 63. An arm 64 is pivoted to a bracket 65 and carries at its free end a roller 66 which rolls over the periphery of the disk. An electrical conductor 67 leads from a bracket 68 in which the outer end of the shaft 58 is mounted and a second electrical conductor 69 leads from the bracket 65, it being apparent that an electric circuit will be completed from the electrical conductor 69 to the conductor 67 when the roller 66 rests upon the metallic portion of the disk 64, but that said circuit will be broken when said roller rests upon one of the pieces of insulating material which project beyond the periphery of the disk.

Referring now to Fig. 1, the numeral 70 designates a disk having sixty radial lines of holes formed therein. This disk is secured upon the minute arbor of an ordinary clock and makes one complete revolution in an hour. It will therefore be seen that the radial lines of holes are spaced one minute apart. This disk is cut away as at 71 to permit the clock to be wound in the usual manner, by inserting a key through said cut away portions. 72 designates the hour hand of the clock, this hour hand making one complete revolution in twelve hours and moving toward the left in Fig. 1. A contact member 73 illustrated in dotted lines in Fig. 1, is pivoted to a portion of the clock frame, not shown, at 74, the rear end of this contact member being weighted as at 75 to normally elevate the front end thereof, the elevation of the front end of this contact member, however, being limited by a stop pin 76. The hour hand 72 is electrically connected by a conductor 77 with the magnet 49, while the contact member 73 is electrically connected by a conductor 78 to a source of electrical energy indicated at 79 in the diagrammatic view, Fig. 5. An electrical conductor 80 completes the circuit from the source of electrical energy to the magnet 49. It will therefore be seen that when the end of the hour hand rides over the contact member 73, the magnet 49 will be energized. The purpose of thus energizing the magnet will be hereinafter described. Pins 81 which project from the rear face of the disk are adapted to contact with the nose 82 carried by the upper end of the bar 25.

The circuit to the magnet 37 is completed as follows: from one of the poles of said magnet through the conductor 83 to the frame formed by the members 6, thence through the bar 25, nose 82 and pins 81 to the disk 70. The opposite pole of the magnet is connected by a conductor 84 with the battery or other source of electrical energy 79, said battery in turn being connected by a conductor 85 with the disk 70.

86 designates an electrically actuated bell or other electrically actuated signal and the circuit to this bell is completed from the roller 66, through conductor 69 to the bracket 22 which carries the contact point 20, through said contact point, pins 13 and the clock frame to the signal 86 through a conductor 88, thence from said signal through the battery or other source of electrical energy indicated at 89 and thence through the conductor 67 to the disk 54.

The operation of the device is as follows: We will assume that it is desired to sound the signal 86 at 8, 8.48, 8.50, 9.33, 9.35, 10.18, 10.20, 10.25, 11.08, 11.10, 11.53

and 11.55 a. m. and 12.38 and 12.40 p. m., these intervals representing the actual periods at which it was necessary to sound the signals in a school in which the device forming the present invention, has been used. The pins 81 are inserted in the holes in the disk 70 at the points indicated by the solid black circles. In order that the illustration given may be readily understood, the pin which acts at a given time will be marked with that time. For instance, the pin in the first circular row of holes at the bottom of the disk has been marked 8 a. m. The pin which acts to sound the signal at 8.48 a. m. has been correspondingly marked and so on. When the pin marked 8 a. m. contacts with the nose 82 of the bar 25, a circuit is completed as has been hereinbefore described to the magnet 37, the bar 25 being in contact with the frame 6. This energizes said magnet and the free end of the bar 36 is withdrawn from the path of the pin 35 and the gear wheel 16 is permitted to make one complete revolution. When this gear wheel makes this revolution the crank 29 or the crank 30 whichever happens to be in position at the time, engages one of the pins 27 or one of the pins 28 and lifts the bar 25 one notch. This brings the nose 82 into line with the second circular row of holes. The complete revolution of the gear wheel 16 is sufficient to move one of the pins 13 past the contact point 20, this completes the circuit to the signal 86 in the manner hereinbefore described, it being understood that normally none of these pins is in contact with the contact point 20. When during the revolution of the disk 70 the pin marked 8.48 in the second row comes around and contacts with the nose 82 of the bar 25, the same operation takes place and the bar is moved up another notch, the latch 41 holding the bar in the position to which it is elevated. The signal is again sounded at 8.48. Two minutes later, or at 8.50 the pin marked 8.50 contacts with the nose and the bar again moves up. This operation continues during the day until all of the signals have been sounded. After the last pin or the 12.40 pin acts to sound the signal, the bar 25 makes no further movement until at some time between 7 and 8 o'clock in the evening the end of the hour hand contacts with the contact piece 73 and in the manner hereinbefore described, energizes the magnet 49. The energizing of this magnet pulls the bar 46 to the left in Fig. 3 and consequently through the pin 47, pulls the end of the latch 41 from under the pins 28. This permits the bar 25 to drop back to the position illustrated in Fig. 1 in readiness to begin to repeat the operation at 8 o'clock in the evening. It is not desirable, however, to have these signals sound during the night and it is to prevent the sounding of these signals that the automatic switch shown in Fig. 4 is provided. When the magnet 49 is energized to let the bar 25 drop back, the rod 50 moves the escapement bar 51 (see Fig. 2) to permit a partial rotation of the disk 54. Assuming that the hereinbefore described operation of the parts occurred during the day on Monday, the parts of the automatic switch will be in the position illustrated in Fig. 4, but when the magnet 49 is energized and the escapement bar 51 acts to permit a slight movement of the disk 54, the insulating block 62 moves beneath the roller 66 and breaks the circuit to the signals. The signals will consequently not sound during the night. Between 7 and 8 a. m. the hour hand again contacts with the contact member 73, the magnet

49 is energized and the bar 25 drops to the position illustrated in Fig. 4, the escapement lever 51 is again elevated and the portion 62'' of the disk comes beneath the roller 66 and completes the circuit to the signals.

5 The roller is maintained in this position throughout the day on Tuesday before the next insulating block moves under said roller on Tuesday evening. If it should be desired to cut out all of the signals during the day, as on a holiday, another insulating block may be slipped into 10 the grooved periphery of the disk 54 to accomplish this purpose, for these insulating blocks are held removably in position by the pins 63 and may be removed and replaced at will. It will be seen that the length of the insulating block at the left of the disk in Fig. 4 is such as 15 to cut out all signals from Friday night until Monday morning. If it be desired to omit any of the usual signals, the necessary pins 13 may be removed to accomplish this purpose.

From the foregoing description, it will be seen that 20 simple and efficient means are herein provided for accomplishing the objects of the invention, but while the elements shown and described are well adapted to serve the purposes for which they are intended, it is to be understood that the invention is not limited to the precise construction set forth, but includes within its pur- 25 view such changes as may be made within the scope of the appended claims.

What I claim, is:

1. In a device for actuating electric signals at predetermined intervals, the combination with a circuit closing 30 mechanism, of an automatic switch located in the circuit controlled by said circuit closing mechanism, said automatic mechanism comprising a rotative disk, means for rotating said disk, a pivoted arm, a roller carried by said arm which rides upon the periphery of the disk, an electrical conductor, means for connecting said electrical con- 35 ductor to said pivoted arm, a frame in which the disk is rotatably mounted, an electrical conductor connected to said frame, and removable insulating members carried by the disk and projecting beyond the periphery thereof to lift the roller out of contact with the disk, substantially as described.

2. In a device of the character described, the combination with a rotative time controlled member, of a circuit 45 closing mechanism comprising a vertically movable bar, and members forming a part of the mechanism adapted to impart a step by step movement to said bar in a vertical direction, means for completing an electric circuit through said bar at predetermined intervals to thereby actuate an 50 electric signal, and means for releasing said bar to return said bar to its original position after all of the desired signals have been sounded.

3. In a device of the character described, the combination with a circuit closing mechanism, of a time controlled member, means for completing an electric circuit 55 to said circuit closing mechanism at predetermined intervals to release said circuit closing mechanism and permit the same to act to temporarily close an electric circuit, said circuit closing mechanism comprising a vertically 60 movable bar to which the circuit closing mechanism is adapted to impart a step by step movement in a vertical direction, a latch adapted to hold said bar in its elevated position, and electrically controlled means adapted to withdraw said latch to permit the bar to drop.

4. In a device of the character described, the combination with a mechanism comprising a rotative gear wheel, 65 a plurality of pins carried by said gear wheel, a vertically movable bar, means actuated by the mechanism for imparting a step by step movement to said bar, of an electro-magnet, a member adapted to be moved when said magnet is energized, and a member normally preventing 70 rotation of the circuit closing mechanism.

5. In a device of the character described, the combina-

tion with a mechanism comprising a rotative gear wheel, a plurality of pins carried by said gear wheel, a vertically 75 movable bar, means actuated by the mechanism for imparting a step by step movement to said bar, of an electro-magnet, a member adapted to be moved when said magnet is energized, a member normally preventing rotation of the circuit closing mechanism, a latch adapted to hold the 80 vertically movable bar in its elevated positions, a second electro-magnet, and a member controllable by said electro-magnet which is adapted to withdraw said latch to permit the bar to drop.

6. In a device of the character described, the combination with time controlled members, one of which rotates 85 once in one hour and the other of which rotates once in twelve hours, of a circuit closing mechanism, an electro-magnet adapted to release said circuit closing mechanism to permit the same to temporarily close an electric circuit, 90 means for completing an electric circuit from the time controlled member which rotates once in an hour to said electro-magnet, a vertically movable bar which forms a part of the connection between said time controlled member and said electro-magnet, means for imparting a step by step move- 95 ment to said vertically movable bar, a second electro-magnet, means for holding said vertically movable bar in its elevated position, and means for completing an electric circuit from the time controlled member which rotates 100 once in twelve hours to said electro-magnet to thereby energize said magnet and release the vertically movable bar to permit said bar to return to its original position.

7. In a device of the character described, the combination with a circuit closing mechanism, of means for im- 105 parting movement to said circuit closing mechanism, an electro-magnet which normally holds said circuit closing mechanism against movement, time controlled means for completing a circuit through said electro-magnet at pre- determined intervals, said circuit closing mechanism com- 110 prising a vertically movable bar, and means for imparting a step by step movement to said bar, a second electro-magnet, a latch for holding said bar in its elevated position, means for withdrawing said latch to permit the bar to drop when the second electro-magnet is energized, and 115 means controllable by said second electro-magnet for actuating an automatic switch which is adapted to make and break an electric circuit.

8. In a device of the character described, the combination with a rotative shaft, of a gear wheel mounted upon 120 said shaft, means for imparting rotation to said shaft, pins carried by said gear wheel, a contact point with which said pins are adapted to engage to complete an electric circuit, a vertically movable bar having pins arranged 125 upon each side thereof, said pins being staggered with relation to each other, rotative members actuated from the gear wheel which are adapted to engage said pins to impart a step by step movement to said bar, means for holding said bar in its elevated position, and an electro-magnet adapted to withdraw said means to permit the bar to drop.

9. In a device of the character described, the combination with a rotative shaft, of a gear wheel mounted upon 130 said shaft, means for imparting rotation to said shaft, pins carried by said gear wheel, a contact point with which said pins are adapted to engage to complete an electric circuit, a vertically movable bar having pins arranged upon 135 each side thereof, said pins being staggered with relation to each other, rotative members actuated from the gear wheel which are adapted to engage said pins to impart a step by step movement to said bar, means for holding said bar in its elevated position, an electro-magnet adapted to withdraw said means to permit the bar to drop, and an auto- 140 matic switch also controlled by said electro-magnet.

10. In a device of the character described, the combination with a rotative shaft, of a gear wheel mounted upon 145 said shaft, means for imparting rotation to said shaft, pins carried by said gear wheel, a contact point with which said pins are adapted to engage to complete an electric circuit, a vertically movable bar having pins arranged upon each side thereof, said pins being staggered with relation to each other, rotative members actuated from the 150 gear wheel which are adapted to engage said pins to impart a step by step movement to said bar, means for holding said bar in its elevated position, an electro-magnet

adapted to withdraw said means to permit the bar to drop, a time controlled member which rotates once in an hour, and circuit closing members carried by said rotative members and adapted to contact with said vertically movable bar at predetermined intervals.

11. In a device of the character described, the combination with a rotative shaft, of a gear wheel mounted upon said shaft, means for imparting rotation to said shaft, pins carried by said gear wheel, a contact point with which said pins are adapted to engage to complete an electric circuit, a vertically movable bar having pins arranged upon each side thereof, said pins being staggered with relation to each other, rotative members actuated from the gear wheel which are adapted to engage said pins to impart a step by step movement to said bar, means for holding said bar in its elevated position, an electro-magnet

adapted to withdraw said means to permit the bar to drop, a time controlled member which rotates once in an hour, circuit closing members carried by said member and adapted to contact with said vertically movable bar at predetermined intervals, an electro-magnet which is adapted to be energized when the circuit is completed through said bar, and a member carried by said electro-magnet which normally holds the circuit closing mechanism against operation.

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

DE WITT H. LEAS.

Witnesses:

A. L. PHELPS,

FRANK G. CAMPBELL.