LE GRAND C. BUSH.

ELECTRIC CLOCK MECHANISM.

APPLICATION FILED AUG. 27, 1909.

1,051,553.

Patented Jan. 28, 1913.

4 SHEETS—SHEET 1.

Fig. 1.

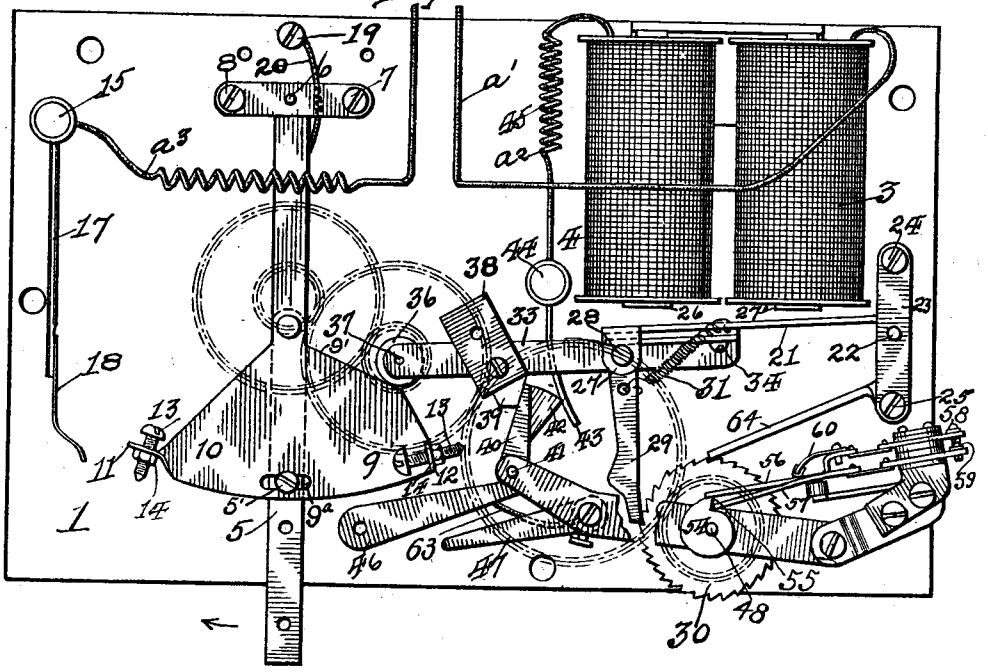
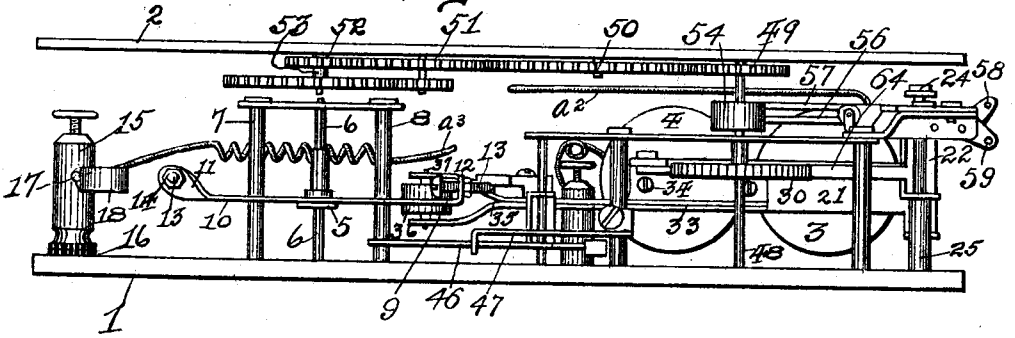


Fig. 2.



WITNESSES:

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Fig. 3.

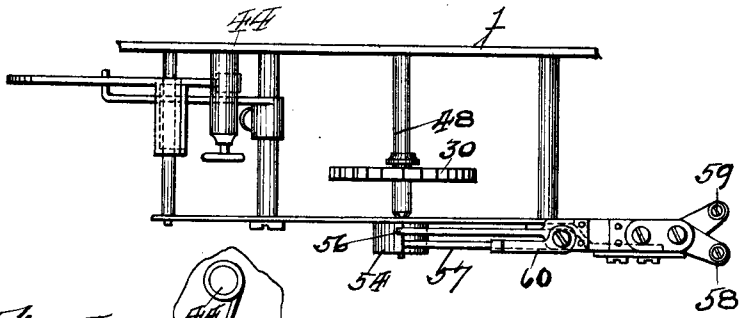
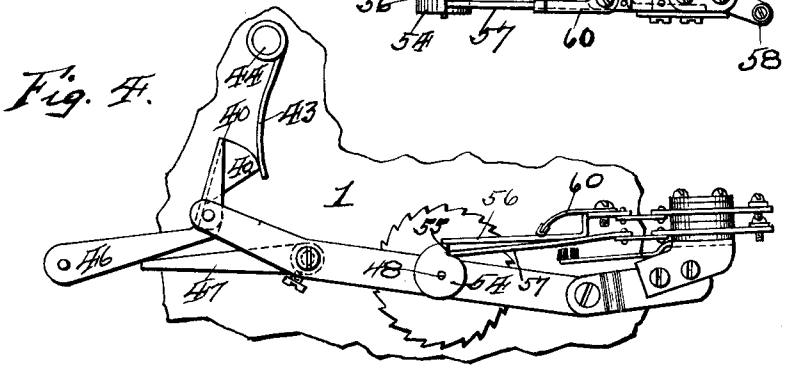


Fig. 4.



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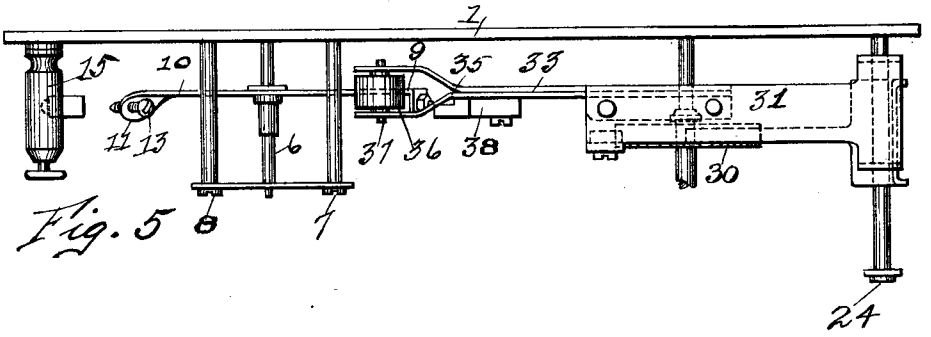

Fig. 5

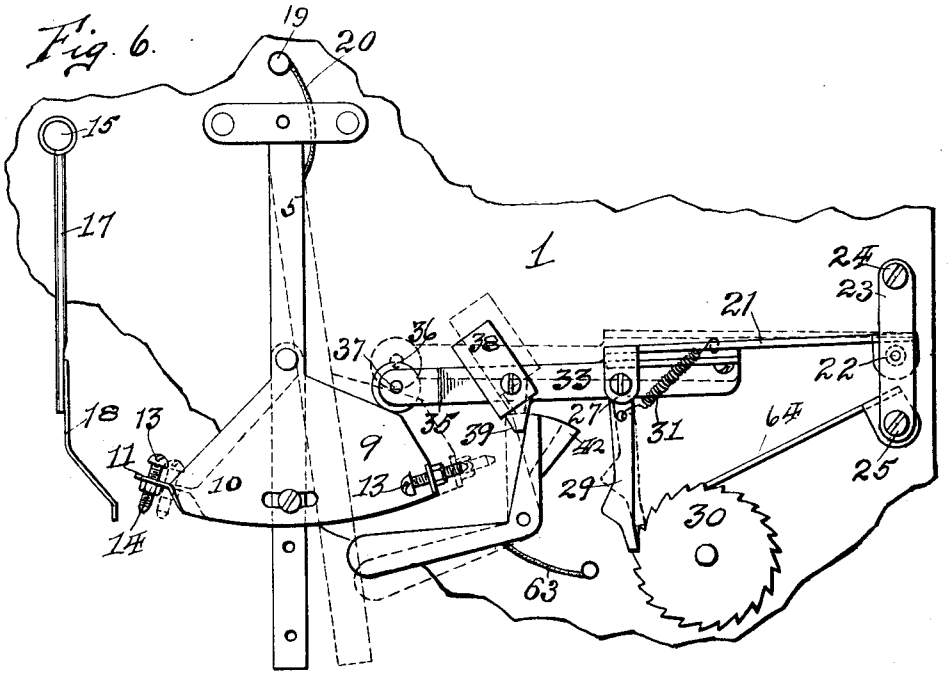

Fig. 6.

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4 SHEETS—SHEET 4.

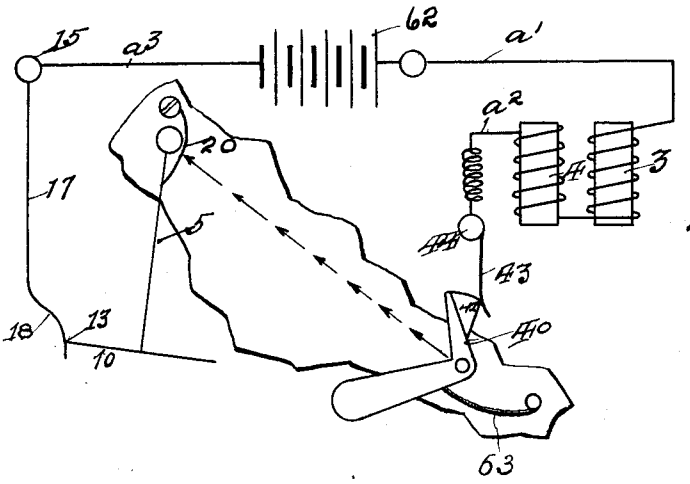

Fig. 7.

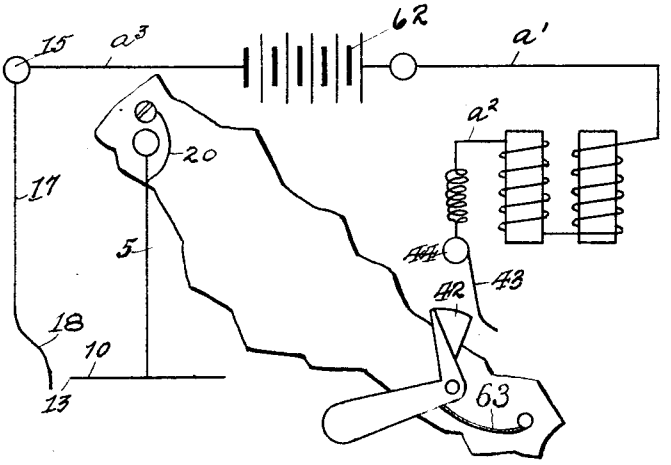

Fig. 8.

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UNITED STATES PATENT OFFICE.

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ELECTRIC CLOCK MECHANISM.

1,051,553. Specification of Letters Patent. Patented Jan. 28, 1913.

Application filed August 27, 1909. Serial No. 514,874.

To all whom it may concern:

Be it known that I, LE GRAND C. BUSH, a citizen of the United States, residing at Elkhart, county of Elkhart, and State of Indiana, have invented a certain new and useful Improvement in Electric Clock Mechanism, of which the following is a specification.

My invention relates to electrically actuated and controlled clock mechanism, and especially to that class of devices which are designed to overcome the objectionable features present in a spring or weight actuated clock, and has for its object to provide a clock mechanism to supply electrical power at regular intervals for operating mechanical devices, such as time stamps, recording door locks, secondary clocks, etc., and has for its further object to provide a pendulum which will be moved by the fall of a weight, the latter being raised at regular intervals by magnetic attraction, and has for its further object to provide invariable power for the movement of the clock train, and has for its further object to provide electrical contacts, and automatic means for making and breaking said contacts, the electrical mechanism being intermittently rendered operative by the movement of means of a detent.

My means of accomplishing the foregoing may be more readily understood by having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved device, the upper plate and certain electrical connections being omitted for the sake of clearness, the clock train being indicated in broken lines. Fig. 2 is an under-plan view of the same, the plate and clock train being shown in position. Figs. 3 and 4 are fragmentary detail views showing the mechanism for actuating electrical devices at regular intervals. Figs. 5 and 6 are fragmentary details of the operating mechanism for the movement of the clock train. Figs. 7 and 8 are diagrammatic views, showing the wiring diagram during the completion and breaking of the circuit.

Similar reference characters refer to similar parts throughout the several views.

As shown in the drawings, my device is mounted between plates 1 and 2, and consists of a pair of electromagnets 3 and 4, a pendulum rod 5 which swings upon a pin or pivot 6 and which is secured in position by means of two bolts 7 and 8. The pendulum rod 5 is provided with two lateral extensions 9 and 10 which are provided with upturned flanges 11 and 12, in each of which is mounted a contact screw 13 secured in place by a lock nut 14 or in any other usual and convenient manner. It is obvious that, by adjusting the screws 13, the time of completion of the electric contacts, or connections, may be regulated. These connections may also be regulated by means of the screw 5′ and slot 9^a.

15 is a binding post which is provided with suitable insulation 16 separating it from the metal plate 1, the binding post 15 has extended downwardly therefrom, the member 17, the outer end of which is provided with a flat spring 18 adapted to contact with the contact screw 13, in the lateral extension 10 of the pendulum rod 5 at the extreme of the swing. A screw 19 is provided adjacent to the pivot 6 of the pendulum rod and is provided with a wire 20 which is adapted to contact continually with the pendulum rod 5, thereby providing a ground, without the electrical current having to go through the moving pivot 6. A weighted lever 21, which is pivoted upon a pivot pin 22, suitably journaled in a plate 23, which is secured in position by screws 24 and 25, or in any other suitable or convenient manner, is located adjacent the polar extremities 26 and 27′ of the magnetic coils 3 and 4.

The weighted lever 21 is formed of material which is capable of being attracted by the magnetic lines of force of the electromagnets 3 and 4 when they are energized. The outer end of the lever 21 is provided with a downwardly extending lug 27 which is provided with a pivot pin 28, from which depends a pawl 29, the lower end of which engages the teeth of a ratchet wheel 30, the pawl being held in engagement with the teeth by means of a coil spring 31, and an extension 33 is secured to the lever 21 by means of screw 34, the outer end of this extension being forked or bifurcated as at 35, and has a roller 36 rotatably mounted upon a bearing 37 secured to the forked end of the extension 33. The roller 36 is in engagement with the upper edge of the lateral extension 9 of the rod 5. A weight 38 is secured to the extension 33, the lower end of which is provided with a shoulder 39 the weight being adapted to engage a detent 40,

which operates to hold the lever 21 up after the electrical circuit has been broken. The shoulder 39 is beveled for the purpose of causing the detent to form a perfect contact with the flat spring 43, as clearly seen in Fig. 1. This detent is formed in the shape of a bell crank lever and is mounted upon a pivot 41. The upper end 42 of the detent 40 is adapted to contact with a flat spring 43 secured in a binding post 44 to which the electrical current passes from the magnet 4 through the wire 45. The other end 46 of the detent 40 is considerably longer than the end 42, so that it will over balance and hold the end 42 in the proper position to engage the shoulder 39 of the weight 38, thereby holding it up after the circuit is broken. An adjustable stop member or arm 47 is provided for the purpose of regulating the movement of the detent 40, so as to time its engagement with the weight properly. The shaft 48, to which is secured the ratchet wheel 30, has a gear 49 secured thereon and adapted to engage with the first of a series of gears 50, 51 and 52, thereby transmitting motion to the hour shaft 53. A detent 64 is secured to the screw 25 to prevent backward movement of the ratchet wheel 30. That portion of the device which furnishes electrical current intermittently to operate other devices such as locks, etc., is more clearly shown in detail views Figs. 3 and 4 in which a cam 54 is shown mounted upon the shaft 48 and is provided with a shoulder 55, two spring fingers 57 and 56, the latter of which is shorter than the former, rest upon the face of the cam 54 and are elevated by the shoulder 55 once during each revolution of the cam 54. The spring finger 56 is connected to the battery, not shown, through the medium of a binding post 58, while the finger 57 is connected through the medium of a binding post 59. A flat spring 60 is provided, its outer end engaging the finger 56, when the finger 57 drops off the cam shoulder 55, thus breaking the circuit. When the cam reaches the point in its rotation where the shoulder 55 deviates the spring fingers, it is apparent that the finger 57 will drop before the finger 56 can drop thereby breaking the circuit. As shown, this make and break occurs once in each revolution of the cam, it will be apparent to a person skilled in the art, that any desired number of shoulders for making and breaking the circuit may be provided for if desirable.

The operation of the device is as follows: As shown in Fig. 1, the pendulum 5 is swinging to the left in the direction indicated by the arrow. It will be obvious that when it reaches the extremity of its travel, that the contact screw 13 will engage the flat spring 18 and the electric circuit will be closed which can be more clearly followed by having reference to the wiring diagrams Figs. 7 and 8. As diagrammatically shown in Fig. 7, the contact screw 13 completes the circuit by coming into contact with flat spring 18. The current flows from the battery 62 through the wire a^1 into the magnet 3, thence it passes into the magnet 4 through the wire a^2 into the binding post 44, through the flat spring 43 into the detent 40 by the contact point 42, which is connected to a wire 63, provided for conveying the current into the plate 1, whence it travels as shown by the dotted arrows to the wire 20 and into the pendulum rod 5, through the lateral extension 10 and contact screw 13, into the flat spring 18, thence through the rod 17, binding post 15, through the wire a^3 and into the battery 62. It will be apparent from the foregoing description that the instant the contact is completed, the magnets 3 and 4, becoming energized, operate to raise the weighted lever 21, which lifts the spring pressed pawl 29 sufficiently to engage the next adjacent upper tooth of the ratchet wheel 30, and the raising of this lever permits the arm 46 of the detent 40 to move downwardly and causes the detent 40 to engage the under side of the shoulder 39 of the weight 38, thus holding the weighted lever in upper position as shown in the dotted lines in Fig. 6, and this movement of the detent operates to move the contact point 42 out of engagement with the flat spring 43 so that the circuit is already broken before the pendulum moves out of contact with the flat spring 18. It will be apparent from the foregoing description that the instant this current is broken, the magnets 3 and 4 cease to attract the weighted lever 21 and it would fall were it not for the fact that it is engaged by the detent 40.

When the pendulum swings to its extreme rightward position, the contact screw 13 pushes the detent 40 from under the shoulder 39 of the weight 38 thereby causing the point 42 to contact with the flat spring 43, in which position it is held by the right hand vertical surface of the shoulder 39 of the weight 38, and as the pendulum swings back leftward, the weighted lever 21 assumes the position shown in Figs. 1 and 6, while the wheel 38 rolls downward along the top edge of the lateral extension 9. This downward movement operates to advance the ratchet wheel 30 one tooth, as the pendulum in its travel completes the circuit, and the magnets are again energized and the foregoing operation is repeated. The action of the roller 36, pressed by the weight 38 on the cam surface 9′, assists and hastens the leftward movement of the pendulum and supplies motive force therefor. This cam also prevents the sudden dropping of the lever, when released by the detent 42. Thus the clock mecha-

nism is propelled through the medium of the spring pressed pawl 29, engaging the teeth of the ratchet wheel 30 causing it to rotate.

In clocks of ordinary construction, the power is usually applied by means of a main spring, or by other means, directly to the comparatively slow speed shaft, which carries the dial hands; and a retarding mechanism is employed to engage the teeth of the relatively fast speed escapement wheel. In such construction, the continual and excessive pressure of the main spring causes considerable friction on the spindles and teeth of the various gear wheels and on the teeth of the escapement wheel. In the present invention, the motive power is applied to the relatively fast speed wheel, and having no main spring or escapement, it is obvious that there is no friction due to such elements, and the efficiency and life of the clock is greatly increased by the elimination of such friction and consequent wear. It will be obvious to persons skilled in the art that the foregoing construction operates to avoid using the same contact point to complete the circuit which breaks it, which is a very desirable feature of the invention, inasmuch as it gets away from the danger of an arc and its tendency to corrode the metal caused by the spark thus formed and at the same time leaves a pendulum movement almost entirely free from friction, besides the arrangement being such that the fall of the weight 38 operates to hold the contact point 42 securely against the flat spring until it is broken by the further operation of the device.

Having described my invention what I regard as new and desire to secure by Letters Patent is,

1. The combination of a plate, a dial train comprised of a plurality of gears, a pendulum, electromagnets, a weighted lever having means secured thereto for directly engaging and moving a member of the dial train, said magnets operating to lift said weighted lever, means to hold said lever up when the circuit is broken, means to cause the swinging of the pendulum to detach said means from engagement with the weighted lever, the swing of the pendulum operating intermittently to complete electrical connections and energize the magnets, and means to regulate the time of completion of the said connection.

2. The combination of a plate, dial train comprised of a plurality of gears, a pendulum, electromagnets, a weighted lever adapted to move the pendulum mechanically by its fall, said magnets operating to lift said weighted lever, the swing of the pendulum operating intermittently to complete electrical connections and energize the magnets, separate means to break the electrical circuit when it has been completed, a detent to hold the weighted lever up after the circuit is broken, means to cause the pendulum to disengage said detent, means to prevent the sudden dropping of the lever after the detent is disengaged.

3. The combination of a plate, dial train comprised of a plurality of gears, a pendulum provided with lateral extensions, contact screws mounted at the extremity of said lateral extensions, the electromagnets, a weighted lever horizontally disposed above and adjacent the polar extremities of said magnets, a spring pressed pawl depending downwardly from said weighted lever, a ratchet wheel, a shaft upon which said ratchet wheel rotates, the teeth of said ratchet wheel being engaged by lower extremity of the spring pressed pawl, a weight secured to said lever, a shoulder on said weight, a detent adapted to engage said shoulder and prevent the dropping of the lever when the electrical circuit is broken, means on one of said lateral extensions to prevent the sudden dropping of the lever when the detent is disengaged.

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Witnesses:
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