B. Z. FRIEDMAN.

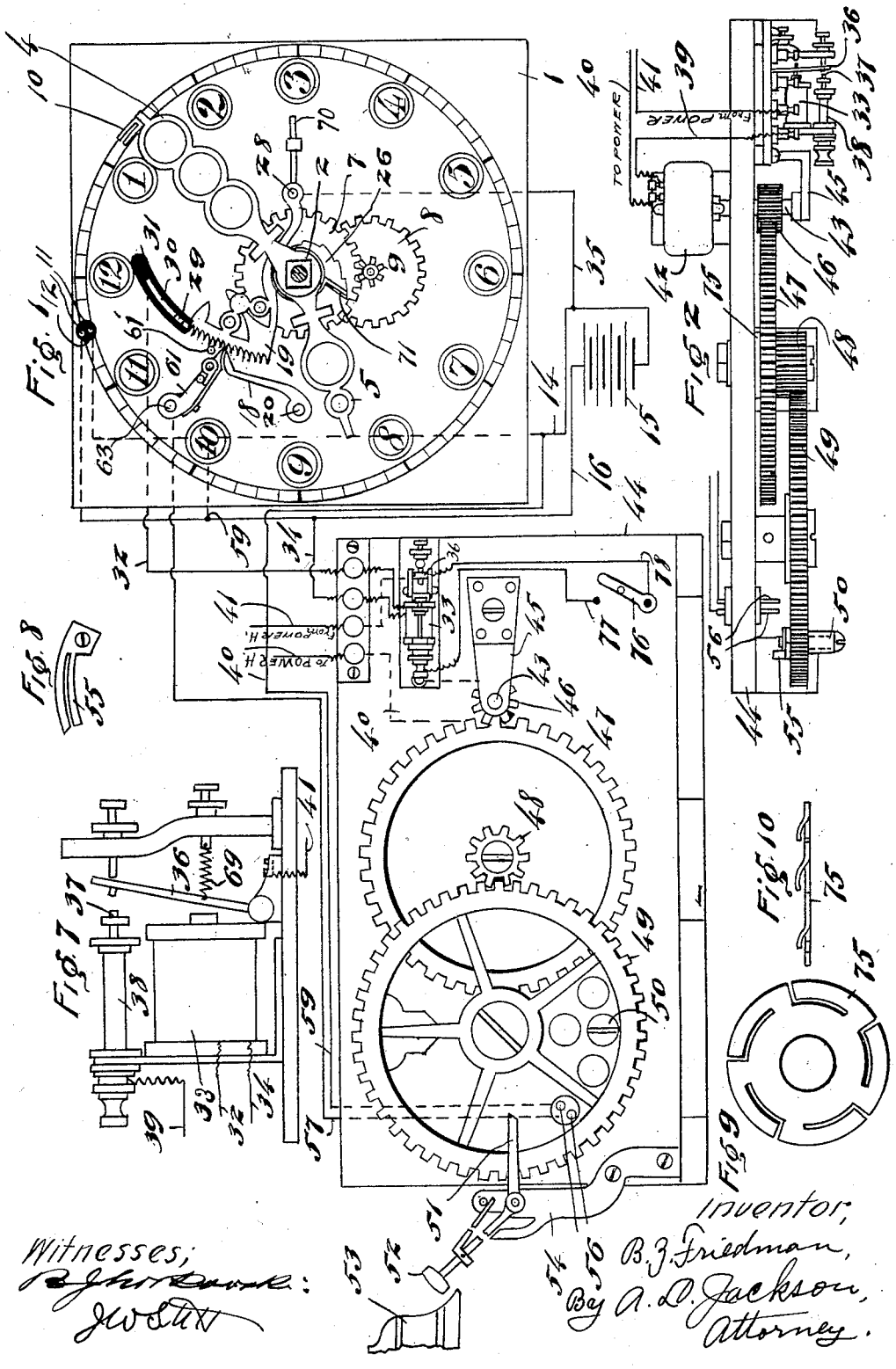
STRIKING MECHANISM FOR CLOCKS.

APPLICATION FILED OCT. 3, 1911.

1,053,722.

Patented Feb. 18, 1913.

2 SHEETS—SHEET 1.



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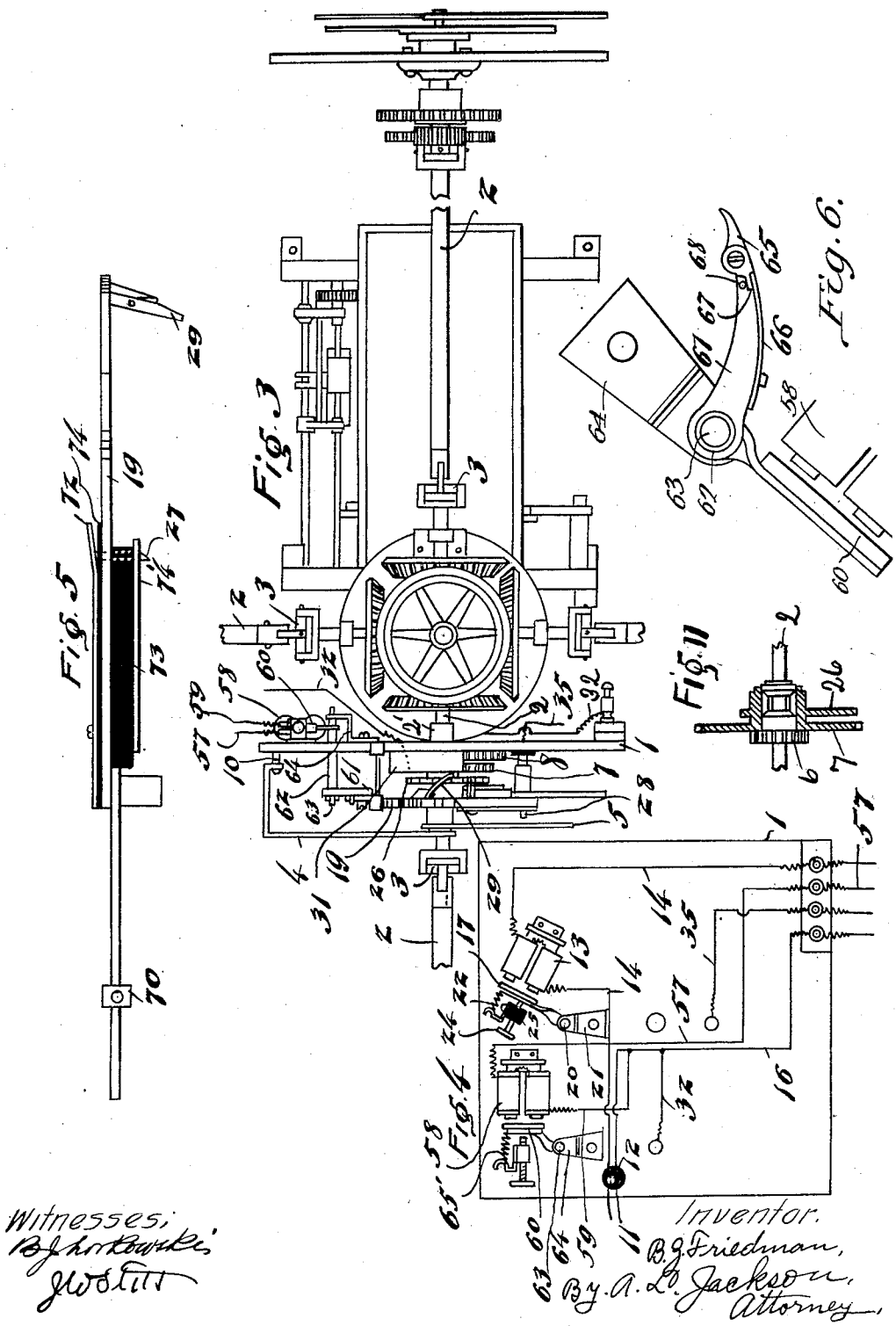

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UNITED STATES PATENT OFFICE.

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STRIKING MECHANISM FOR CLOCKS.

1,053,722. Specification of Letters Patent. Patented Feb. 18, 1913.

Application filed October 3, 1911. Serial No. 652,618.

To all whom it may concern:

Be it known that I, BERNHARD Z. FRIEDMAN, a citizen of the United States, residing at Fort Worth, in the county of Tarrant and State of Texas, have invented certain new and useful Improvements in Striking Mechanism for Clocks, of which the following is a specification.

My invention relates to striking mechanism for clocks, and the object is to provide mechanism which will be automatic in action and which will be extremely accurate and which will always strike the number of times indicated by the hour hand, which is actuated by an electric current, and which is simple in operation and construction. One of the features of this striking mechanism is that it will not strike anything except the number of times indicated by the hour hand and there is nothing to be wound up about the mechanism.

Other objects and advantages will be fully explained in the following description and the invention will be more particularly pointed out in the claims.

Reference is had to the accompanying drawings which form a part of this application and specification.

Figure 1 is a diagrammatic view, showing the face of a dial and a side elevation of the operating mechanism and the electrical connection. Fig. 2 is a plan view of the operating mechanism. Fig. 3 is a plan view of the striking mechanism connected with a tower clock. Fig. 4 is a rear view of the dial plate, showing the magnets and the wiring. Fig. 5 is a side elevation of the strike controlling rack. Fig. 6 is a detail view of the rack lifting arm. Fig. 7 is an enlarged side elevation of the magnet which is shown in Figs. 1 and 2. Fig. 8 is an enlarged view of the brush contact shown in Fig. 2. Fig. 9 is an enlarged plan view of a friction ring. Fig. 10 is an edge view of the same. Fig. 11 is a detail view of the cannon pinion, showing the connection with the operating shaft and the position relative to the hour wheel.

Similar characters of reference are used to indicate the same parts throughout the several views.

The striking mechanism is shown connected with a tower clock so that the controlling mechanism of the striking mechanism is operated by the tower clock. The striking mechanism is provided with a dial plate 1 which is mounted on one of the bearings for the hand arbor 2 of the tower clock. The arbor 2 operates the minute and hour hands or the hand mechanism on the face of the dial of the striking mechanism. The arbor 2 has a universal joint 3 and actuates the hour and minute hands of the clock. A minute hand 4 and an hour hand 5 are mounted respectively on the cannon pinion 6 and the hour wheel 7 which is similar to the mounting of the usual mounting of these elements except the arbor 2 of the tower clock passes through the cannon pinion and the hour wheel. A minute wheel 8 with a pinion 9 makes connection between the cannon pinion 6 and the hour wheel 7 (see Figs. 1, 3 and 11). The minute hand 4 carries a brush contact 10 which closes a circuit by coming in contact with pins 11 which are inserted in the insulation 12. The pins are electrically connected to a magnet 13 by a wire 14 and electrically connected to the battery 15 by a wire 16. Whenever the magnet 13 is energized the armature 17 is drawn to the magnet. This action draws the dog 18 out of contact with the segment 19. The armature 17 and the dog arm 18 are rigid with a sleeve which rocks on the shaft 20 which is rigid with a bearing cock 21. The dog 18 normally locks the segment 19. When the dog 18 releases the segment 19, as just described, the segment drops, as hereinafter described. As soon as the magnet 13 performs its function it is deënergized and a spring 22 draws the armature 17 away from the magnet. The depth to which the dog 18 will enter the teeth of the segment is regulated by a screw 24 (see Fig. 4) which can be screwed more or less through the insulation 25. This will allow a less or greater movement of the armature 17 and arm 18.

A cam ratchet 26 is mounted rigidly on the sleeve of the hour wheel 7. This ratchet cam is provided with twelve steps or teeth corresponding with the twelve numbers on the dial which indicate the hours. The cam ratchet 26 and the segmental rack 19 regulate the striking or determine the number of strokes. When the minute hand makes contact with the wires 11, the armature 17 moves and the arm 18 moves at the same time, leaving the segment 19. This segment will move immediately in the opposite direction from the hands of a clock until the pin 27 engages one of the teeth of the cam

ratchet 26. The teeth or steps on the cam ratchet are arranged progressively. The greatest movement permitted to the segment by the cam ratchet 26 is at twelve o'clock. The tooth or guide lug 27 (see Fig. 5) will move the greatest distance and stop against the shortest radius of the cam ratchet. At one o'clock, the segment 19 will move the shortest distance and the pin 27 will stop against the longest radius of the cam ratchet 26. At each succeeding hour on the making of the contact by the minute hand as described, the segment 19 will move one tooth farther and this will cause one more stroke on the sounding member. The segment 19 is the stroke regulator together with the cam ratchet 26. The stroke regulator is pivotally mounted on an arbor 28 which is rigidly mounted in and insulated from the dial plate 1. The stroke regulator 19 carries a brush contact 29 which closes a circuit by coming in contact with the metal bar 30 which is mounted on the insulation 31. The metal bar 30 is connected by a wire 32 to the magnet 33 and the magnet 33 is connected by wire 34 to the wire 16 which leads to the battery 15. The other pole of battery 15 is connected to the arbor 28 by a wire 35, which is connected with wire 14. The current will pass from the arbor 28 through the stroke regulator to the brush 29. When the brush 29 comes in contact with the bar 30, the magnet 33 is energized and the armature 36 will be drawn against the magnet 33 and the armature 36 will make contact with the screw 37 in the bar 38 to which wire 39 is electrically connected. The magnet 33 is energized for the purpose of operating the striking mechanism. The wire 39 is connected to the motor 42. The circuit is finished by the wire 40 which is connected to the motor 42 and then to the power house and then back by wire 41 to the armature 36. This completes a circuit for operating the motor 42 when the magnet 33 is energized. The motor 42 operates the striking mechanism. The motor 42 has a shaft 43 passing through the frame piece 44 which shaft is journaled in the bearing 45. A pinion 46 is rigid with shaft 43 and drives a cog wheel 47 which drives a pinion 48. Pinion 48 is rigid with cog wheel 47 and drives a cog wheel 49 which causes the striking. The wheel 49 has a lever operating pin 50 projecting from the face thereof. Every time the wheel 49 revolves, the pin 50 will bear the lever 51 down. This lever carries a hammer 52 which will strike a bell 53 every time the pin 50 lets the lever fall. The lever 51 is fulcrumed in a support 54 which is attached to the frame 44. The wheel 49 carries a brush contact 55. The contact 55, after each stroke of the hammer, passes over projecting pins 56. One pin 56 is electrically connected by a wire 57 to magnet 58. The other pin 56 is electrically connected by a wire 59 to a wire 14 which leads to battery 15. The circuit is completed by the wire 16 and wire 59 which comes back to the magnet 58 from the wire 16. The armature 60 is rigid with the arm 61, both being connected to a sleeve 62 which is mounted on the shaft 63 which is journaled in the dial plate 1 and the cock 64. When the magnet 58 is energized, the armature 60 is drawn to the magnet. At the same time the arm 61 is raised and moves the segment 19 the distance of one tooth. This will permit arm 18 to engage the next tooth below and support the segment until the arm 61 is again raised by the magnet 58. This is accomplished by reason of the fact that the brush 55 on wheel 50 leaves the pins 56 and breaks the circuit and allows the arm 61 to fall and at the same time the spring 22 allows the arm 18 to yield and allow a tooth to pass the arm 18 and fall behind the next tooth. The spring 22 is for the purpose of holding the arm 18 in contact with the teeth of the segment and also to hold the armature 17 away from the magnet 13. The spring 65′ serves to hold the armature 60 away from the magnet 58 and also to hold arm 61 down. The arm 61 is provided with a yielding point 65 so that the arm 61 can pass the teeth on the rack 19 when going down. The point 65 will be brought back to normal position by a spring 66. The point 65 will be rigid when going up or carrying a tooth of the rack or segment 19 because the tail lug 67 will come against a rigid pin 68. The striking will continue until the brush 29 travels far enough to leave the metal bar 30. At such time the last or lowest tooth of the segment 19 has passed the point of the arm 18. As soon as the brush 29 leaves the bar 30, the magnet 33 is deënergized and the spring 69 will break the current to the motor 42. Consequently the striking will stop.

The stroke regulator 19 is provided with a counter-weight 70. The pin 27 carried by the regulator 19 is beveled and a portion of the ratchet cam 26 is beveled at 71. The object of this is to prevent stopping the clock or breaking the pin 27 in case for any reason the striking mechanism failed to strike for twelve o'clock. If such accident occurs the beveled pin 27 will ride up the beveled portion 71 on the ratchet cam and thus prevent breaking the pin or stopping the clock. The pin 27 is carried by a spring 72. The pin 27 and the spring 72 are insulated from the segment 19 by the insulation 73 and 74. A bearing 74′ is attached to the insulation 73 to prevent displacement of the pin 27 when the segment 19 with this pin drops on cam ratchet 26 for striking operation.

A pin 61′ inserted in the dial plate 1

limits the movement of arm 61 so that this arm will move the segment 19 only one tooth at a time.

A friction spring bearing ring 75 is placed between the wheel 47 and the frame 44 for preventing the wheels 47, 49, and pinions 43 and 48 from turning after the motor current is broken. It is necessary that the wheels be stopped instantly on the stopping of the motor so that the pin 50 will not be carried around by the wheel 49 to interfere with the contact pins 56 by bringing the brush 55 in contact with these pins. This would cause an extra stroke, and might keep the battery 15 constantly working.

The striking mechanism above described and shown on plate 44 may be located at any suitable place, as in a distant building. Provision is made for using the striking mechanism independently of the clock mechanism, as for church purposes or for ringing the bell for any other purpose. A switch 76 is provided and wires 77 and 78 are electrically connected to the wires 39 and 41 and this switch can be made to take the place of contact 37 and armature 36.

The striking mechanism shown can be used with any suitable clock gearing. The dial plate 1 is rigidly attached to the bearing 2′ of the arbor 2. The operation of the striking mechanism shown depends for its working upon a clock movement. There are twelve teeth or steps on the cam ratchet 26 corresponding to the numbers on a clock dial and these steps or teeth correspond with the teeth on the segment 19.

The operation may be described as follows: Suppose the devices have just struck to indicate an hour. The tip of arm 18 rests below the lowest tooth of the segment 19. The brush 29 is not in contact with the bar 30 and there is no current passing anywhere. The minute hand 4 moves around the dial 1 until the brush 10 comes in contact with points 11. The magnet 13 is energized and raises or pulls the arm 18 out from under the segment and lets this segment fall. The pin 27 will rest on the cam ratchet 26 on the tooth or step which corresponds to the hour which the clock indicates. The magnet 13 will be deënergized at once because the brush 10 passes off of the points 11 and the spring 22 will move the armature 17 and the arm 18 and cause the arm 18 to engage a tooth of the segment corresponding to the step or tooth engaged by the pin 27 or the hour indicated by the clock. If, for instance, the hour hand is pointing to nine o'clock, the regulator 19 will drop with its pin 27 resting on the ninth step or tooth of the ratchet cam 26 and the arm 18 will engage the teeth of the regulator between the ninth and tenth teeth. Now the striking will commence, the circuit being closed by the brush 29 and bar 30 to energize the magnet 33 which operation will close the motor circuit through the armature 36 and contact point 37. This will start the motor 42 which operates the striking mechanism. The arms 18 and 61 with the regulator 19 act as a sort of escapement mechanism as follows: The wheel 49 will revolve and bring brush 55 in contact with points 56. This will energize magnet 58 and move armature 60 which is rigid with arm 61. Arm 61 will move the regulator one tooth while arm 18 acts as a pawl and drops below the next tooth. This operation will continue until the arm 18 comes below the last tooth of the regulator 19. By this time the brush 29 will have left the bar 30. There will be no more striking until the next hour when the minute hand again makes contact with points 11.

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

1. A striking mechanism for clocks having a motor, gearing operatively connected with said motor including a stroke wheel, an actuating pin carried by the stroke wheel, a hammer having an arm standing in the path of said pin, a bell in reach of said hammer, means for starting the operation of said motor at predetermined times, a brush contact carried by said stroke wheel, contact points in the path of said brush, electrical devices operatively connected with said contact points provided with make and break devices, and an escapement mechanism actuated by said make and break devices for determining the number of strokes to be made at any predetermined time.

2. A striking mechanism for clocks having a motor, time actuated electrical devices for starting said motor to running, gearing operatively connected with said motor including a stroke wheel, sounding devices actuated by said stroke wheel, a brush contact carried by said stroke wheel, contact points in the path of said brush, electrical devices operatively connected with said points and provided with make and break devices, a stroke regulator electrically connected with said motor and provided with means for determining the number of strokes, and escapement mechanism actuated by said make and break devices coöperating with said regulator.

3. A striking mechanism for clocks having an electric motor, sounding devices actuated by said motor, electrical time actuated devices for operating said motor, and means for regulating the strokes of said sounding devices consisting of a regulator having a number of teeth corresponding to the number of strokes to be made by said sounding devices, make and break devices and electric circuits operatively connected with said sounding devices, and escapement

arms actuated by said make and break devices coöperating with said regulator to regulate the strokes of the sounding devices and to prolong the current for running said motor until the number of strokes is completed.

4. A striking mechanism for clocks having an electric motor, sounding devices actuated by said motor, electric circuits including make and break devices operatively connected with said sounding devices, electric and timing mechanism for operating said motor, a stroke regulator operatively connected with said timing mechanism and electrically connected to said motor, and devices actuated by said make and break devices coöperating with said regulator and prolonging the current through said motor during a striking operation until the striking is complete.

5. A striking mechanism for clocks having an electric motor, sounding devices actuated by said motor, electric and timing mechanism for starting the running of said motor, and means for regulating the strokes of said sounding devices consisting of a cam ratchet connected with said timing mechanism and provided with a plurality of teeth or steps, a regulator provided with a pin adapted to engage any one of said teeth or steps and provided with a plurality of teeth corresponding with the teeth on said ratchet, electrical devices including magnets and armatures therefor operatively connected with said sounding devices and actuated by said sounding devices, and escapement arms actuated by said armatures and coöperating with said regulator to control the strokes of the sounding devices and prolonging the current through said motor during a striking operation until the striking is complete.

6. A striking mechanism for clocks having an electric motor, electrical devices and a timing mechanism for starting said motor to running, sounding devices actuated by said motor, electrical devices including contact points and magnets and armatures therefor operatively connected with said sounding devices, a regulator operatively connected with said timing mechanism and electrically connected with said motor and provided with a plurality of teeth, an arm rigidly connected to one of said armatures and adapted to engage a tooth of said regulator corresponding to the hour indicated by said timing mechanism and holding said regulator in position until each stroke is made by the sounding devices, and another arm rigidly connected to the other armature to move said regulator up one tooth after each stroke.

In testimony whereof, I set my hand in the presence of two witnesses, this 28th day of September, 1911.

BERNHARD Z. FRIEDMAN.

Witnesses:
A. L. JACKSON,
J. W. STITT.