(No Model.) 3 Sheets—Sheet 1.

D. OGDEN.

ELECTRIC PROGRAM CLOCK.

No. 563,052. Patented June 30, 1896.

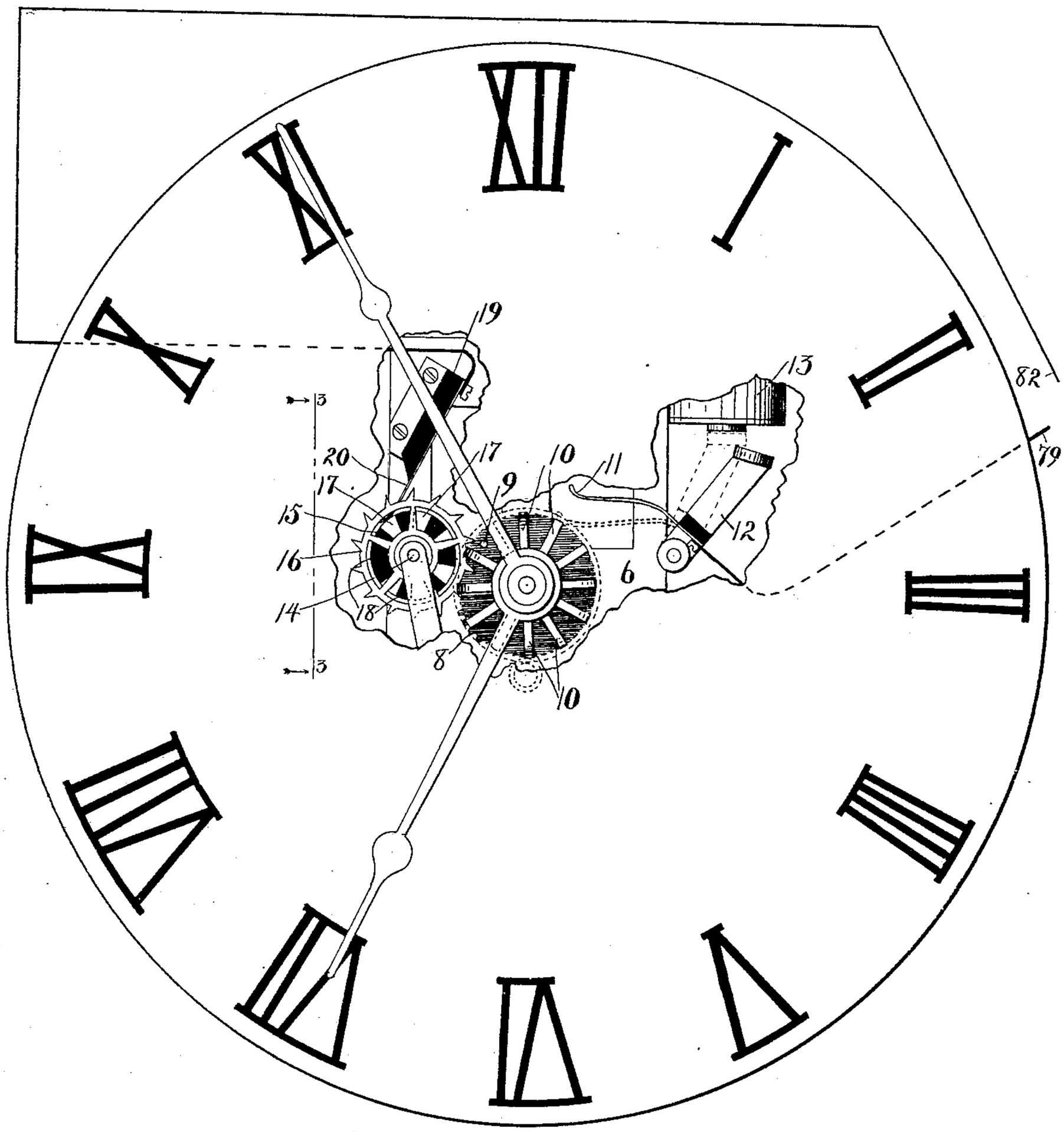

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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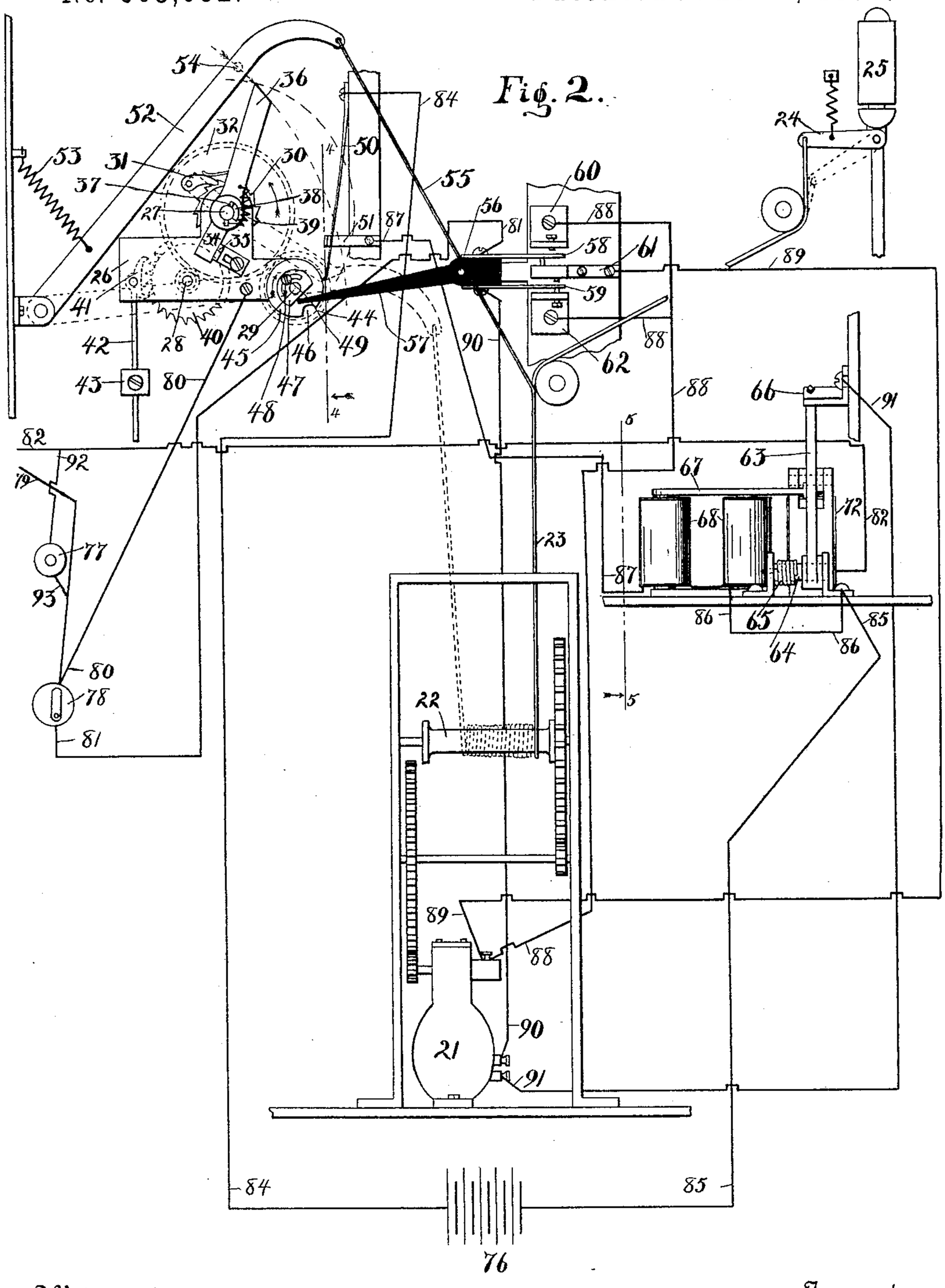
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

D. OGDEN.

ELECTRIC PROGRAM CLOCK.

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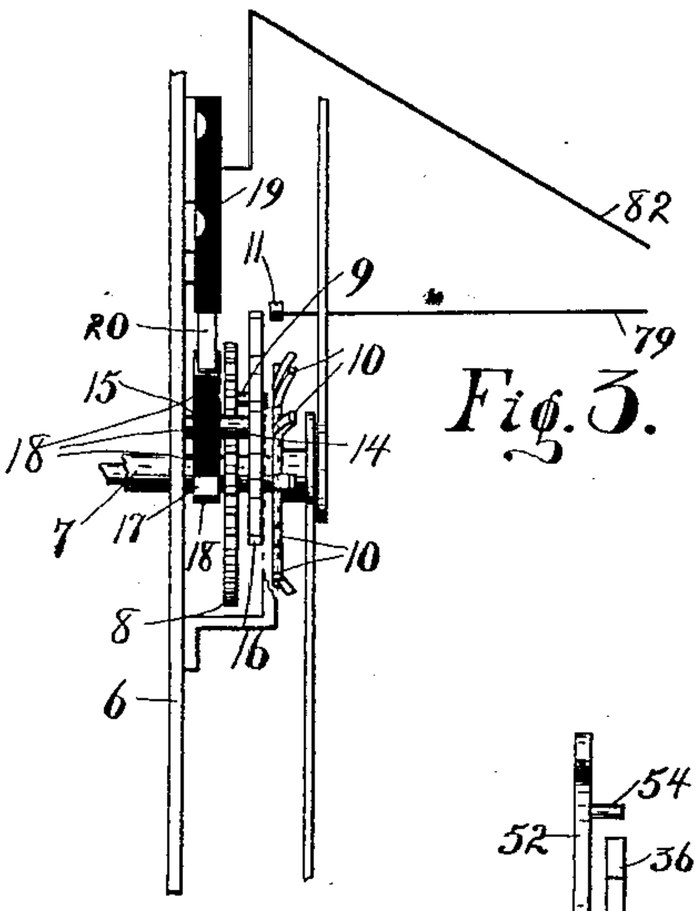

Fig. 3.

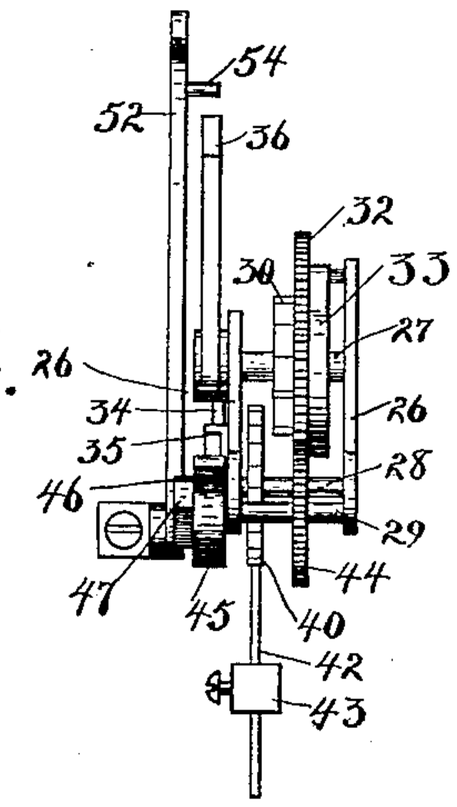

Fig. 4.

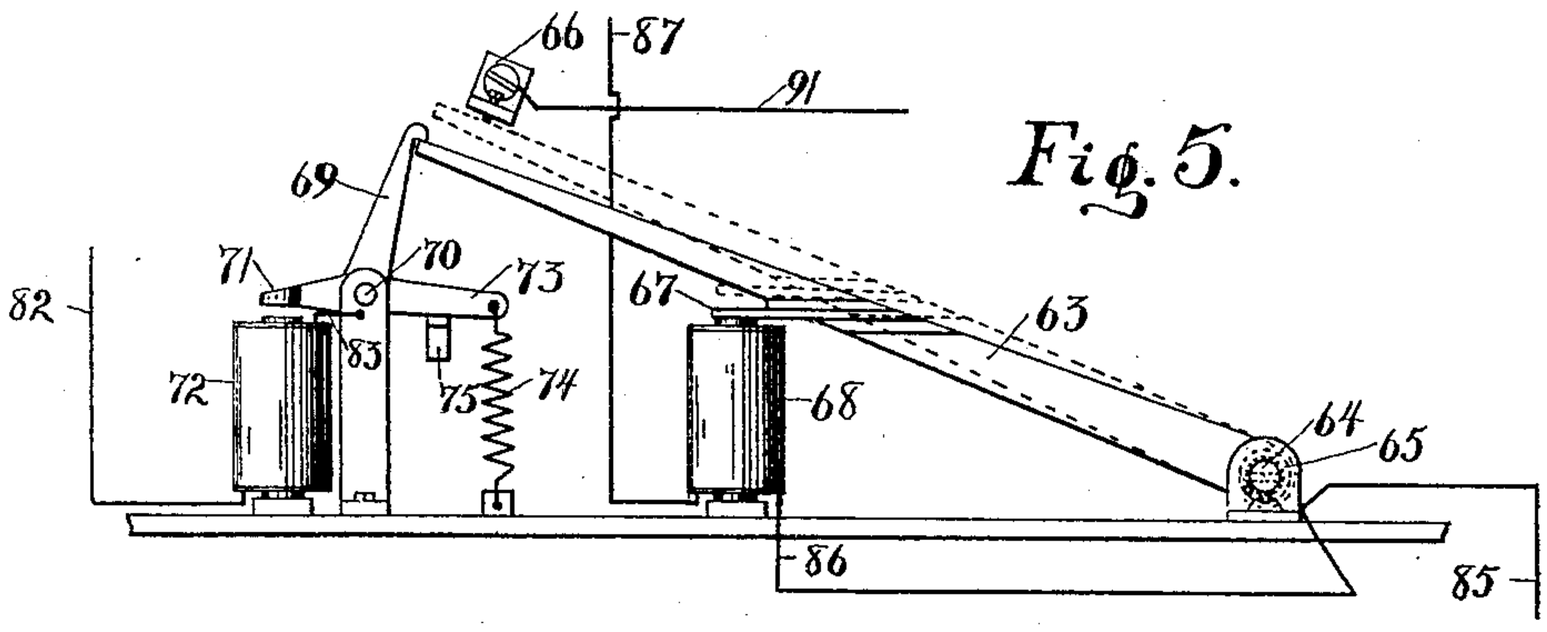

Fig. 5.

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UNITED STATES PATENT OFFICE.

DORA OGDEN, OF COLUMBUS, INDIANA, ASSIGNOR OF ONE-HALF TO GIRNIE L. REEVES, OF SAME PLACE.

ELECTRIC PROGRAM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 563,052, dated June 30, 1896.

Application filed October 12, 1895. Serial No. 565,442. (No model.)

To all whom it may concern:

Be it known that I, DORA OGDEN, a citizen of the United States, residing at Columbus, in the county of Bartholomew and State of Indiana, have invented a new and useful Automatic Time-Signal, of which the following is a specification.

My invention relates to means for operating a steam or other whistle or signal, automatically, by means of a standard or master clock.

The object of this invention is to provide means whereby the whistle or other signal used by a factory for indicating the time for beginning and quitting work may be automatically operated by a clock located at said factory; and my further object is to provide means whereby the whistles or signals of a series of factories, each having a clock forming a part of a system of time-regulation controlled by a central regulating-clock, may be automatically operated by said central clock.

The accompanying drawings illustrate my invention.

Figure 1 is a view of the face of the local clock used in my device, a portion of the face having been broken away. Fig. 2 is an elevation of the portions of my device other than the regulating-clock, the signal being shown on a smaller scale. Fig. 3 is a view on line 3 3 of Fig. 1. Fig. 4 is a view on line 4 4 of Fig. 2, and Fig. 5 is a side elevation on line 5 5 of Fig. 2.

In the drawings, 6 indicates the framework of the clock mechanism, 7 the hour-shaft thereof, and 8 a gear-wheel carried by said hour-shaft and actuated by the clock-train. Secured to gear 8 and projecting from the face thereof is a pin 9, the purpose of which will be hereinafter described. Secured to the hour-shaft is a disk provided with a series of radial contact-points 10, which are adapted to be engaged by the terminal 11, secured to the pivoted arm 12. Arm 12 is pivoted to the frame 6 and is adapted to be drawn up into the position indicated by dotted lines by means of the electromagnet 13, said magnet being energized by the operation of a master-clock (not shown) at stated periods in the ordinary manner.

Terminal 11 may be fixed in position to engage with points 10, if so desired, and this construction is the one used when the signal is not to be controlled, together with others, by a master-clock.

Mounted on frame 6 is a shaft 14, to which are secured wheels 15 and 16, wheel 16 being provided with a series of teeth adapted to be engaged by pin 9. Wheel 15 is composed of a series of metallic segments 17 and a series of non-metallic or non-conducting segments 18, the segments alternating around the periphery of the wheel, except in one place, where three non-conducting segments are placed in succession. The total number of segments is equal to the number of days and nights in a week, a metallic segment being provided for each day of the week except Sunday, for which, together with each night, a non-conducting segment is provided.

19 indicates an insulated standard secured to frame 6, and to this standard is secured a spring-terminal 20, said terminal engaging with the periphery of wheel 15.

21 indicates an electric motor of any ordinary construction, and connected to this motor by any desired train of gears is a windlass or drum 22, to which is secured a cord or chain 23, the free end of which is secured to the operating-arm 24 of the whistle or other signal 25.

26 indicates a metallic framework in which are mounted shafts 27, 28, and 29. Secured to shaft 27 is a ratchet-wheel 30, which is engaged by pawl 31, carried by gear-wheel 32, which is loosely mounted on said shaft.

33 is an ordinary volute spring, one end of which is secured to the shaft and the other end of which is secured to the frame 26.

34 indicates an arm secured to shaft 27 and adapted to engage with the adjustable stop 35, secured to frame 26. An arm 36 is mounted upon shaft 27 and is adapted to turn the shaft and thereby wind up spring 33. Arm 36 is allowed a certain freedom of movement on shaft 27 by means of a pin 37 and slot 38, as shown in Fig. 2, and is kept in a position to move shaft 27 forward by means of a spring 39, one end of which is secured to the arm and the other end of which is secured to the shaft. Shaft 28 is provided with a gear, which engages with gear 32, and is also provided

with an escapement-wheel 40, which is engaged by pallet 41, said pallet being provided with a pendulum-rod 42 and adjustable weight 43. Shaft 29 is provided with a gear 44, which meshes with gear 32, and is also provided with a disk 45, provided with a notch 46 in its periphery.

47 is a cam adjustably mounted on shaft 29, provided with slot 48, and secured to disk 45 by means of screw 49 passing through said slot.

50 indicates a spring-terminal, the free end of which rests upon the periphery of disk 45.

51 indicates a terminal which lies in front of spring-terminal 50 and is so placed that it will be engaged by terminal 50 when the free end of said terminal falls into notch 46, but will be out of engagement therewith when the free end of said terminal rests upon the periphery of said disk.

52 indicates a pivoted arm supported by a spring 53 and provided with a pin 54, which is adapted to engage arm 36. A cord or chain 55 is secured at one end to the free end of arm 52 and at the other end is secured to cord 23.

Pivoted at 56 is an insulated arm 57, one end of which engages cam 47 and the other end of which is provided with two terminals 58 and 59, said terminals being insulated from each other. The free ends of terminals 58 and 59 play between terminal points 60, 61, and 62, terminal 58 engaging either terminal 60 or 61, and terminal 59 engaging either terminal 61 or 62, for a purpose hereinafter explained.

63 indicates a metallic switch-lever, pivoted at 64 and provided with a spring 65, which tends to throw the switch-lever upward into engagement with terminal 66. Lever 63 is provided with an extending armature 67, which overhangs the cores of the electromagnets 68. The free end of lever 63 is adapted to be engaged by the metallic hook 69, pivoted at 70. Said hook is provided with an armature 71, which overhangs the core of an electromagnet 72, and is also provided with an arm 73, to which is secured one end of spring 74, the other end of said spring being secured to some stationary part. A stop 75 is provided to limit the operation of spring 74, said spring operating to place hook 69 in a position to engage lever 63.

76 indicates a battery or other source of electrical energy, 77 an ordinary push-button, and 78 an ordinary cut-out, the uses of which will be made apparent.

79 indicates a conductor leading from terminal 11 to one terminal of the cut-out 78, 80 a conductor leading from the same terminal of the cut-out to the metallic frame 26, and 81 indicates a conductor leading from the opposite terminal of the cut-out to the terminal 58.

82 indicates a conductor leading from terminal 20 to the coil of magnet 72, and 83 indicates a conductor leading from the said coil through pivot 70 to hook 69.

84 indicates a conductor leading from terminal 50 to one pole of the battery 76, and 85 indicates a conductor leading from the other pole of the battery to lever 63.

86 indicates a conductor leading from lever 63 to the coils of magnets 68, and 87 indicates a conductor leading from said coils to terminal 51.

88 indicates conductors leading from terminals 60 and 62 to one terminal of the motor-armature, and 89 indicates a conductor leading from terminal 61 to the other terminal of the motor-armature.

90 indicates a conductor leading from terminal 59 to one terminal of the field-magnet of the motor, and 91 indicates a conductor leading from the other terminal of the field-magnet to terminal 66.

92 indicates a conductor connected to conductor 82, at a point intermediate its length, and leading to one terminal of push-button 77, and 93 indicates a conductor connected to conductor 79, at a point intermediate its length, and leading to the other terminal of the push-button.

Supposing that it is desired that the signal be sounded or made at seven a. m., twelve m., and one and six p. m., all except four of the contact-points 10 are bent outward, as shown in Fig. 3, so that their ends lie out of reach of terminal 11, the four points which are not so bent being those which lie opposite terminal 11 at the hours indicated. Starting with the clock at 6.55 a. m., as shown, the operation is as follows: When the clock has advanced so as to indicate seven a. m., the hour-hand, terminals 10, and gear 8 moving forward together, a current is sent from the standard clock (not shown) through the coil of magnet 13. The magnet, when thus energized, draws arm 12 up to the position indicated in dotted lines, terminal 11 is thereby thrown down to the position indicated and comes into contact with one of the points 10. When the magnet 13 is energized at hours other than those named above, terminal 11 is thrown down, but fails to make contact with one of the points 10 owing to the fact that those particular points have been bent out of the way, as described above. At the instant that contact is made between one of points 10 and terminal 11 the following circuit is completed: from the battery through conductor 84, terminal 50, disk 45, frame 26, conductors 80, conductors 79, terminal 11, contact-point 10, frame 6, shaft 14, one of segments 17, terminal 20, conductor 82, the coil of magnet 72, conductor 83, pivot 70 and hook 69, lever 63, and conductor 85 back to the battery. The completion of this circuit energizes magnet 72 and causes hook 69 to be drawn away from the end of lever 63. Lever 63 is thereby freed, and, on account of the action of spring 65, flies upward and comes into contact with terminal 66, this movement of lever 63 at the same time breaking the circuit described above, depriving magnet 72 of its power and

allowing hook 69 to be drawn back into place by spring 74. When lever 63 comes into contact with terminal 66, a circuit is completed through the motor through the following parts: from the battery through conductor 84, terminal 50, disk 45, frame 26, conductor 80, cut-out 78, conductor 81, terminals 58, terminals 61, conductor 89 to one terminal of the motor-armature, from the other terminal of the motor-armature through conductor 88, terminals 62, terminals 59, conductor 90, through the field-coil of the motor, conductor 91, terminal 66, lever 63, and conductor 85 back to the battery. The completion of this circuit through the motor causes it to revolve in the proper direction to cause cord 23 to be wound upon drum 22. The winding up of cord 23 upon drum 22 causes arm 24 of the signal device to be drawn down and the signal is thus sounded and continues until arm 24 is released in a manner to be explained. Cord 55 being secured to cord 23 advances with it, thus drawing down arm 52 against the action of spring 53. Pin 54 of said arm engages the outer portion of arm 36 and causes said arm to move downward to the position indicated in dotted lines in Fig. 2, pin 54 slipping from the end of arm 36 when this position is reached. The downward movement of arm 36 winds up spring 33. Spring 33 then causes gear 32 to move in the direction indicated by the arrow thereon, said motion continuing until arm 34 comes into contact with stop 35. The forward movement of gear 32 is regulated and controlled by means of escapement-wheel 40, pallet 41, and pendulum 42 43, and said movement of gear 32, through gear 44, causes disk 45 and cam 47 to move in the direction indicated by the arrow thereon. As the forward movement of cam 47 continues, said cam comes into contact with arm 57, causing said arm to swing upon its pivot. This movement of arm 57 first causes the motor-circuit to be broken, terminals 58 61 and 59 62 being separated, and the motor is therefore stopped, and then a new circuit is established as follows: from the battery through conductor 84, terminal 50, disk 45, frame 26, conductor 80, cut-out 78, conductor 81, terminals 58 and 60, conductor 88, through the motor-armature, conductor 89, terminals 61, terminals 59, conductor 90, through the field-magnet of the motor, conductor 91, terminal 66, lever 63, and conductor 85 back to the battery, thus reversing the motor and causing cords 23 and 55 to be unwound from drum 22, arm 52 returning to its original position and the signal being released. Pin 54 is enabled to pass the end of arm 36, owing to the arrangement of slot 38 in said arm and pin 37 in shaft 27, as is clearly apparent from Fig. 2. During the entire movement of the motor, both in the forward and in the backward direction, disk 45 and cam 47 are constantly advancing, and when notch 46 of disk 45 reaches a point opposite the free end of terminal 50 the said end of said terminal springs down into the notch and thus completes the following circuit by bringing terminals 50 and 51 together: from the battery through conductor 84, terminals 50, terminals 51, conductor 87, through the coils of magnets 68, conductors 86 and 85, back to the battery. The completion of the above-mentioned circuit causes the magnets 68 to be energized, these in turn drawing down armature 67, thus breaking the contact between lever 63 and terminal 66, and thus stopping the motor, and this movement brings the free end of lever 63 into engagement with hook 69. As disk 45 continues to advance, notch 46 is moved away from the free end of terminal 50 and said free end is forced out upon the periphery of the disk, thus breaking the contact between terminals 50 and 51. Disk 45 and cam 47 continue to advance until arm 34 comes into contact with stop 35, cam 47 at the same time reaching a position which will allow arm 57 to return to the position shown in Fig. 2. The entire apparatus is then in its original position and is ready to be again operated in the manner described above.

Cam 47 is made adjustable in order to regulate the reversing mechanism of the motor.

The time consumed in one revolution of disk 45, and the consequent length of signal, is regulated by pendulum 42 43.

When the clock has advanced to a position indicating about 6.30 p. m., pin 9 has reached a position where it will engage one of the teeth of wheel 16, and a further advance of the hour-shaft causes said wheel to be advanced one division, the movement of said wheel causing a similar movement of wheel 15, thus bringing one of the non-conducting segments 18 opposite terminal 20. The mechanism shown in Fig. 2 therefore remains inoperative during the night, owing to the fact that no current can pass through the coil of magnet 72. At 6.30 a. m. pin 9 again causes wheels 16 and 15 to advance one segment, thus bringing terminal 20 into engagement with one of the conducting-segments 17, unless the day happens to be Sunday, a non-conducting segment being introduced for the daytime of Sunday. Cut-out 78 is provided so that the mechanism may be made inoperative upon any days on which the factory is not running, and button 77 is provided so that if it is desired to operate the signal at some unusual hour it may be done.

I claim as my invention—

1. The combination of a clock, one or more contact-points secured to the hour-shaft thereof and revolving therewith, a terminal arranged in the path of said contact-points and adapted to engage therewith, a wheel mounted so as to turn on the frame of said clock and provided with a series of projecting teeth, a series of conducting and non-conducting segments arranged to revolve therewith, means operated by the clock mechan-

ism and adapted to engage with and to periodically operate said wheel, and a terminal adapted to engage with said series of conducting and non-conducting segments, together with an electric circuit connected to said last-mentioned terminal and to the terminal arranged in the path of the contact-points revolving with the hour-shaft, said electric circuit containing a signal-operating mechanism adapted to be set in motion when the circuit is closed, substantially as and for the purpose set forth.

2. The combination of a clock, one or more contact-points secured to the hour-shaft thereof and revolving therewith, a terminal movable upon the clock-frame and adapted to be brought into the path of said contact-points by means of an electromagnet, a wheel mounted to turn on the frame of said clock and provided with a series of projecting teeth, a series of conducting and non-conducting segments arranged to revolve therewith, means, operated by the clock mechanism, to engage with and to periodically operate said wheel, and a terminal adapted to engage with said series of conducting and non-conducting segments, together with an electric circuit connected to said last-mentioned terminal and to the terminal arranged to engage with the contact-points revolving with the hour-shaft, said electric circuit containing a signal-operating mechanism adapted to be set in motion when the circuit is closed, substantially as and for the purpose set forth.

3. In an automatic signal apparatus, an electric motor, a winding-drum connected therewith, a reversing-switch connected to said motor, and a source of electrical supply, by suitable conductors, a cam adapted to operate said reversing-switch, a signal, and intermediate connecting mechanism between the winding-drum, the signal and the cam, whereby the forward movement of the motor will cause the signal to be operated and will also cause the cam to operate the reversing-switch, all combined to coöperate substantially as set forth.

4. In an automatic signal apparatus, an electric motor, a winding-drum connected therewith, a reversing-switch, connected by suitable conductors to said motor and a source of electrical supply, a cam adapted to operate said reversing-switch, a train of spring-driven gears adapted to drive said cam, means for controlling the movement of said train of gears, an arm mounted on the spring-shaft, said arm being adapted to move the shaft in the direction necessary to energize the spring and being free to move on the shaft for a portion of a revolution in the other direction, a second arm pivoted at a point other than the pivotal point of the first-mentioned arm and provided with a pin adapted to engage said first-mentioned arm during a portion of its movement, a signal, and intermediate connecting mechanism connecting the drum, signal, and the last-mentioned arm, whereby the forward movement of the motor operates the signal and the cam, substantially as set forth.

5. In an automatic signal apparatus, the combination of an electric circuit, a clock arranged in said circuit and carrying means for closing and opening said circuit, an electromagnet forming a portion of said circuit, an armature adapted to be acted upon by said magnet and carrying a dog forming a part of said circuit and adapted to engage a spring-controlled switch-lever contained in said circuit, a terminal arranged in the path of said switch-lever and adapted to be engaged thereby when said lever is released by the dog, in combination with an electric circuit containing a motor and connected to the said terminal and to the switch-lever, substantially as set forth.

6. In an automatic signal apparatus, the combination of an electric circuit, a clock arranged in said circuit and carrying means for closing and opening said circuit, an electromagnet forming a portion of said circuit, an armature adapted to be acted upon by said magnet and carrying a dog forming a part of said last-mentioned circuit and adapted to engage a spring-controlled switch-lever contained in said circuit, a terminal arranged in the path of said lever and adapted to be engaged thereby when said lever is released by the dog, an electric circuit containing a motor and connected to the said terminal and to the switch-lever, an armature mounted on said switch-lever, and an electromagnet adapted to act on said armature so as to draw the said switch-lever into engagement with the said dog, together with means connected with the motor for closing the circuit of the said magnet, all arranged to coöperate substantially as set forth.

7. A signal adapted to be operated periodically, an electric motor arranged to operate said signal, an electric circuit arranged to control said motor, a clock, a switch held normally open by a dog forming a part of an electric circuit, and means controlled by the clock for closing said last-mentioned circuit and thereby withdrawing said dog from engagement with the switch, whereby the circuit controlling the motor is automatically closed by the action of the clock, substantially as described.

8. A signal adapted to be operated periodically, an electric motor arranged to operate said signal, an electric circuit arranged to control said motor, a clock, a switch-lever adapted to close said motor-circuit but held normally open by a dog, an electromagnet controlling said dog, an electric circuit arranged to energize said magnet, mechanism carried by said clock for closing said circuit periodically, and thereby releasing said switch-lever and thus closing the motor-circuit, a reversing-switch contained in the motor-circuit, intermediate connecting mechan-

ism operated by the motor and adapted to control the reversing-switch, an armature secured to the switch-lever, an electromagnet adapted to act upon said armature and thereby draw the switch-lever into engagement with the dog, an electric circuit including said magnet, and means, controlled by the motor, for closing said circuit, whereby said motor-circuit is opened, substantially as described.

DORA OGDEN.

Witnesses:
ALBERT N. BLESSING,
THOMAS E. DAVIDSON.

Corrections in Letters Patent No. 563,052.

It is hereby certified that in Letters Patent No. 563,052, granted June 30, 1896, upon the application of Dora Ogden, of Columbus, Indiana, for an improvement in "Electric Program-Clocks," errors appear requiring correction as follows: In line 7 of the grant the word "She" should be *He*, and the word "her" should be *his;* on page 2, line 122 of the printed specification, the word "conductors" should be *and;* on page 3, lines 7–8, line 11 before the numerals 59, line 52, and at the end of line 71, the word "terminals" should read *and;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 14th day of July, A. D. 1896.

[SEAL.]

WM. H. SIMS,
First Assistant Secretary of the Interior.

Countersigned:

S. T. FISHER,
Acting Commissioner of Patents.