L. L. WHITE.

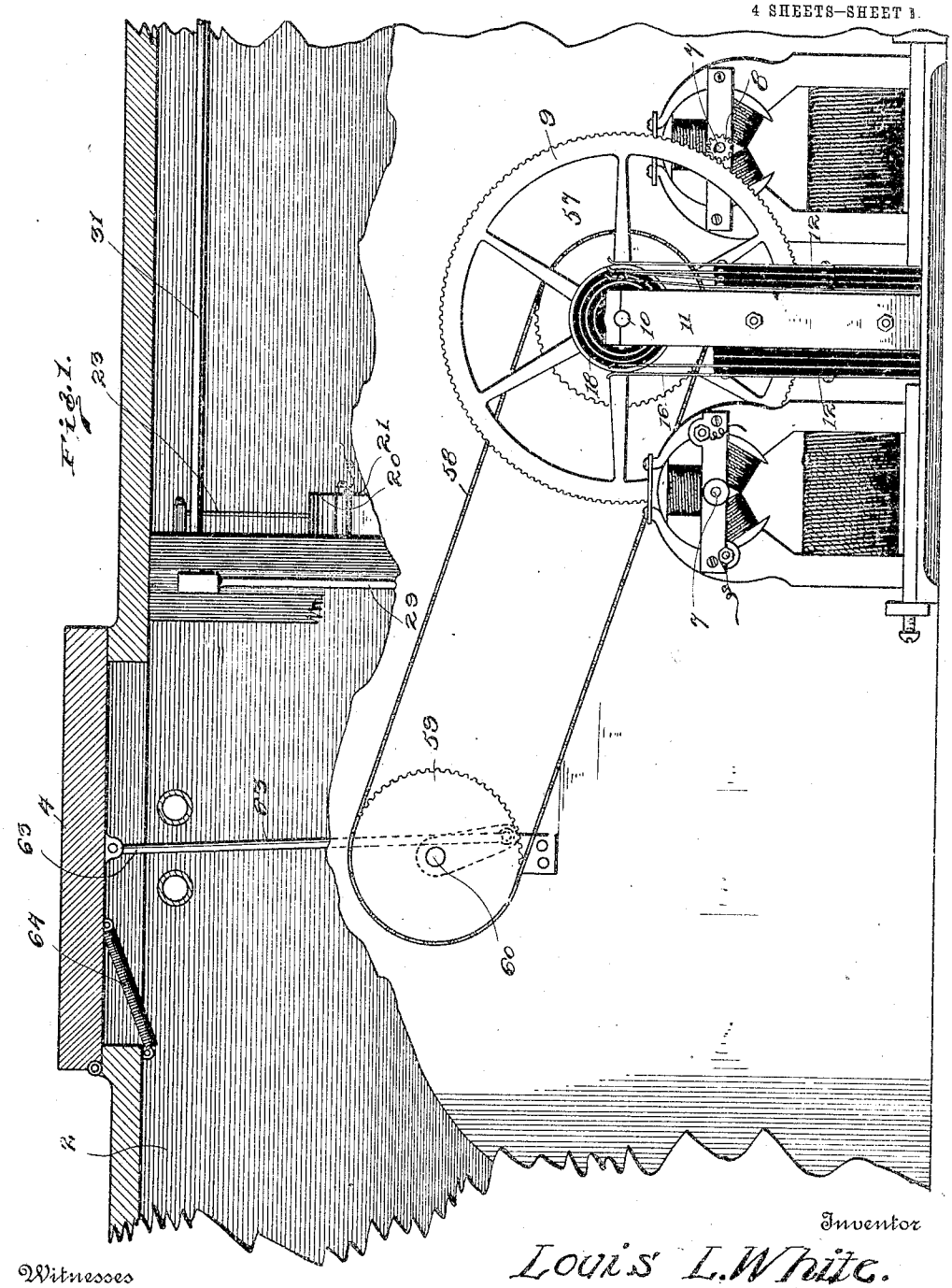
REGULATING MECHANISM FOR INCUBATORS.

APPLICATION FILED APR. 19, 1910.

989,462.

Patented Apr. 11, 1911.

4 SHEETS—SHEET 1.



Witnesses

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4 SHEETS—SHEET 2.

Fig. 2.

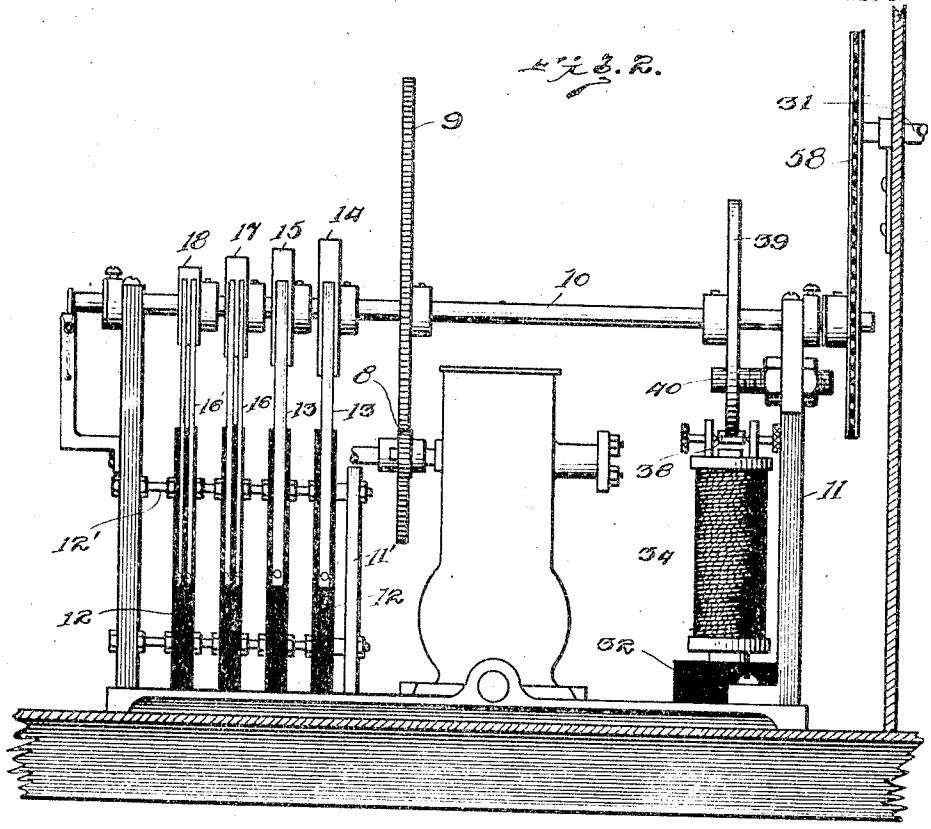
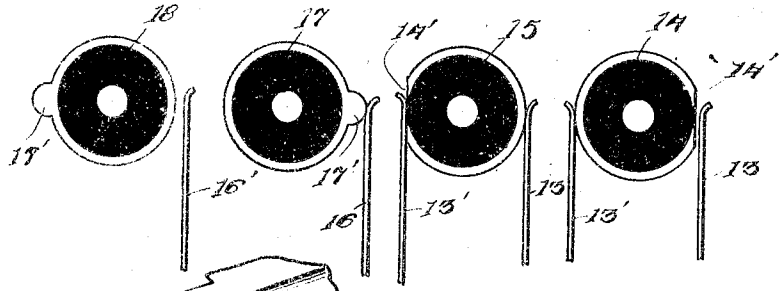


Fig. 3.



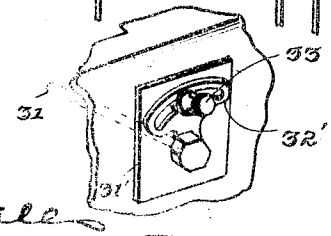


Fig. 6.

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4 SHEETS—SHEET 3.

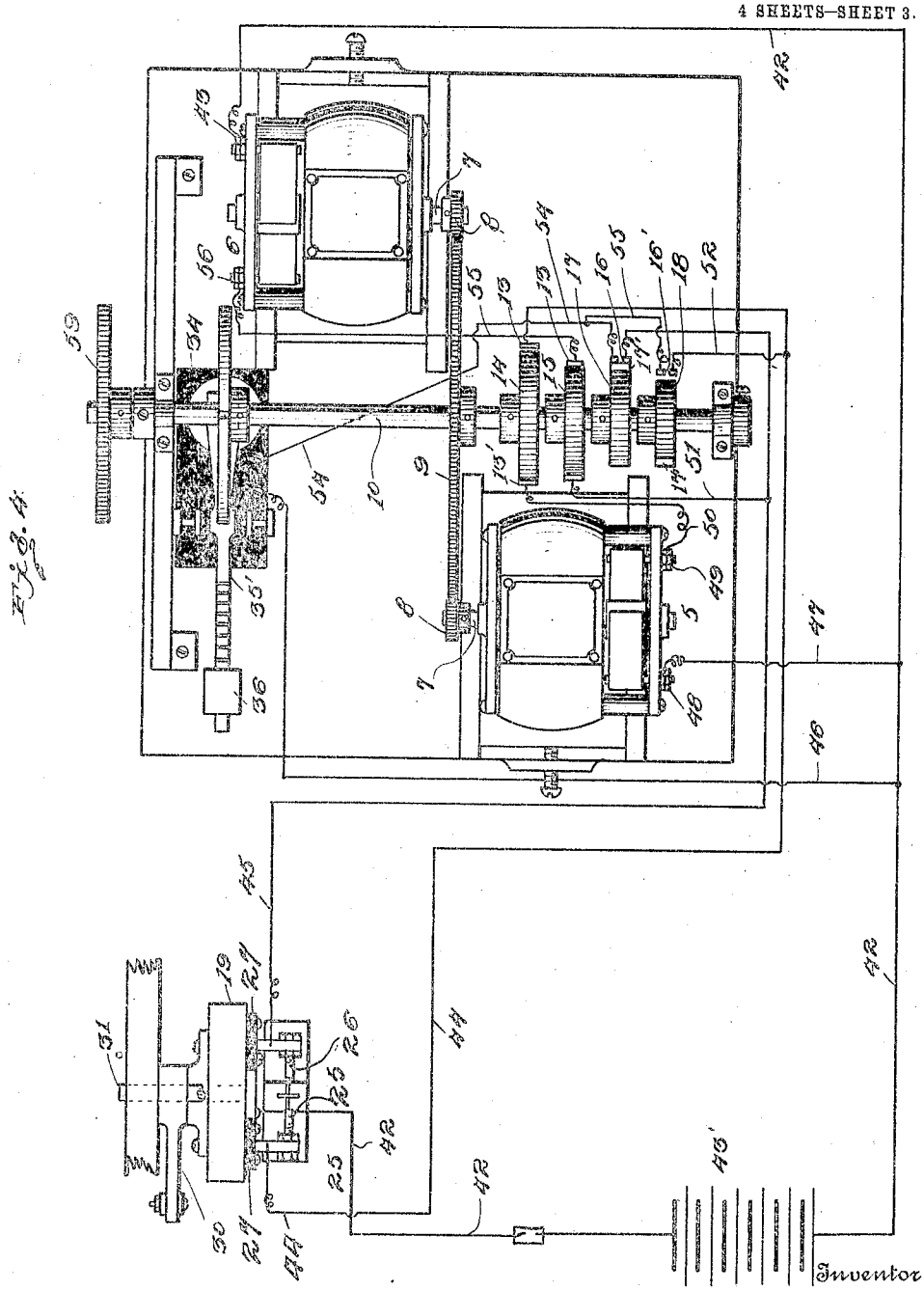

Fig. 3.

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4 SHEETS—SHEET 4.

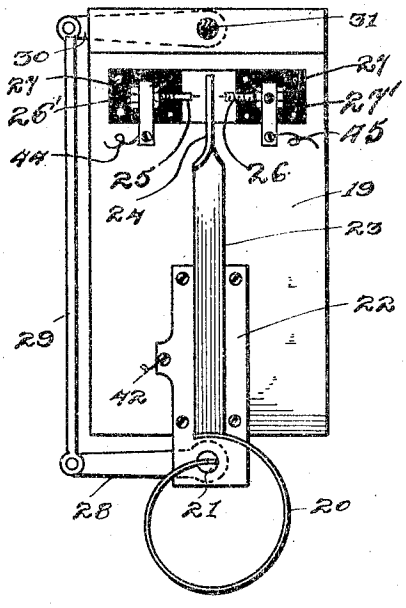


Fig. 5.

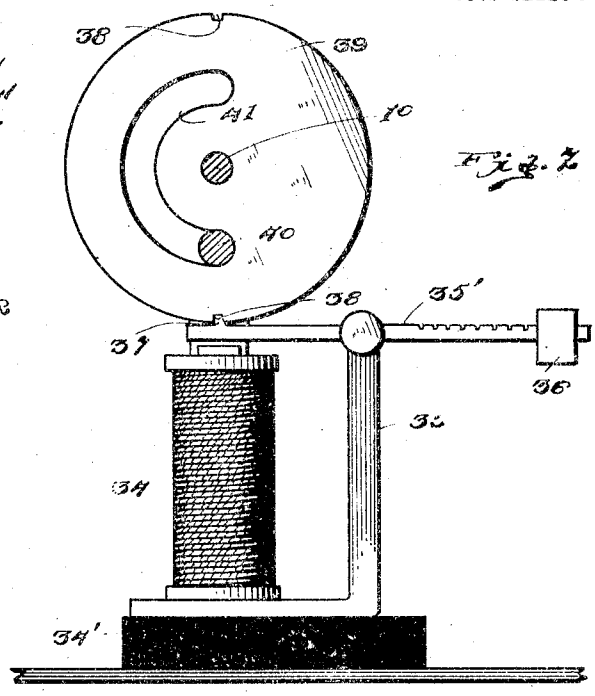
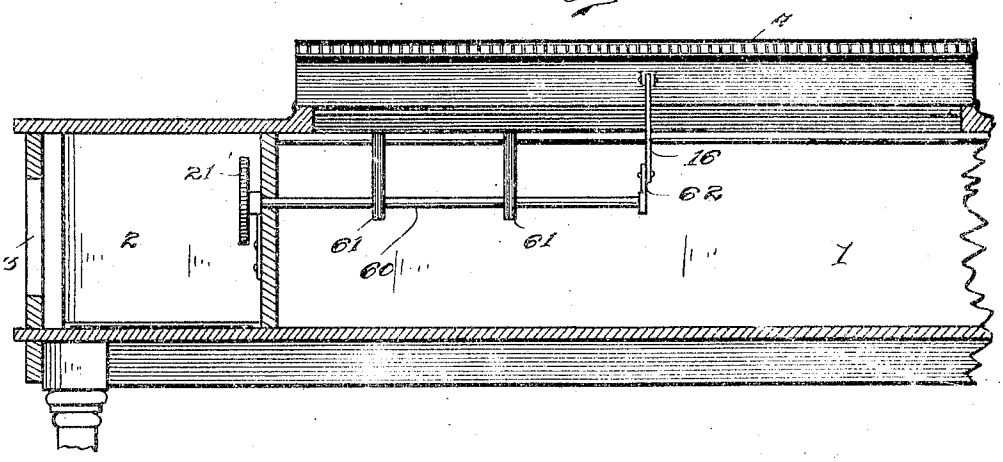


Fig. 7.

Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

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REGULATING MECHANISM FOR INCUBATORS.

989,462. Specification of Letters Patent. Patented Apr. 11, 1911.

Application filed April 19, 1910. Serial No. 556,338.

To all whom it may concern:

Be it known that I, LOUIS L. WHITE, a citizen of the United States of America, residing at Eugene, in the county of Lane and State of Oregon, have invented certain new and useful Improvements in Regulating Mechanism for Incubators, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to incubators, and has for its object to provide an apparatus by means of which the heat of the incubator may be automatically regulated.

The invention further has for its object to provide an apparatus used in connection with an incubator by means of which a damper closing the heat chamber of the incubator may be automatically opened and closed by the variation of the heat in the incubator.

These and other objects of this invention will appear in the course of the following specification.

Referring to the accompanying drawing,—Figure 1 shows on a large scale a portion of an incubator, with parts broken away, and in transverse section of the incubator body with a portion of the mechanism for automatically opening and closing the damper of the incubator. Fig. 2 is an enlarged side view of a portion of the electrical mechanism for automatically operating the damper of the incubator. Fig. 3 is an enlarged detail view of a number of contacts and rotary contact disks detached from their supports and partly broken away. Fig. 4 is a diagrammatic view of the electrical apparatus and circuits and thermostat by means of which the damper in the incubator is automatically opened and closed. Fig. 5 is an enlarged detail view of a thermostat employed in connection with this invention. Fig. 6 is a detail view in perspective with parts broken away of a portion of a device for regulating the position of the thermostatic lever. Fig. 7 is an enlarged detail view of an electro-magnet employed in connection with this invention, and a rotary disk controlled by said electromagnet. Fig. 8 is an enlarged detail view in longitudinal section of a portion of an incubator showing its damper open and the lever mechanism for operating said damper.

In carrying out this invention, an incubator of the usual form is employed, provided with a heating chamber 1 and a small chamber 2 at the end of the incubator adjacent to the heating chamber 1, said chamber 2 having a window 3 in its side for the purpose of inspection of the contents of said chamber. The electrical mechanism, which for practical purposes is of a small size, is located in the chamber 2. The incubator is provided with a hinged cover or damper 4 located in its top.

The electrical apparatus for operating the damper or door 4 is constructed and arranged as follows: A pair of electric motors 5 and 6 are employed mounted in position adjacent to each other, as shown in Fig. 4, the driving shaft 7 of each motor being provided at one end with a small gear wheel 8 which meshes with a large toothed wheel 9 mounted on a shaft 10 having its bearings in uprights 11 supported on the floor of the chamber 2. Mounted in insulated supports 12, which are in turn mounted by means of rods and bolts 12′ and connecting one of the uprights 11 with an upright 11′, are a number of flexible contact strips 13 and 13′ and 16 and 16′. The contact strips 13 and 13′ are adapted to contact with rotary contact disks 14 and 15 mounted on the shaft 10, and the contact strips 16 and 16′ are adapted to contact with rotary contact disks 17 and 18 mounted on the shaft 10, there being but one contact strip 16 and 16′ for each of the rotary contact disks 17 and 18, while there are two contact strips 13 and 13′ for each of the rotary contact disks 14 and 15. The rotary contact disks 14 and 15 are each formed with a flat face or side 14′, and the rotary contact disks 17 and 18 are each formed with a projection 17′, the purposes and objects of which construction will be hereinafter set forth and explained.

A suitable thermostat is suspended in the heating chamber 1 above the eggs placed upon the floor thereof, and is preferably constructed as follows: The thermostat is mounted on a support formed of a block 19 which is suspended from the upper side of the heating chamber 1, as shown in Fig. 1, and preferably consists of a metal coil 20 composed of strips of brass and steel soldered together, one end of said coil 20 being secured in the end of a shaft 21 projecting through a plate 22 secured to the block 19, and on the other end of said coil 20 is mounted the thermostatic lever arm 23 provided with a twisted end 24 which projects between the needle contact points 25 and 26,

and has its flat side faces located intermediate between said contact points 25 and 26. In order to adjust the thermostatic lever 23 in proper position between said contact points, an arm 28 is mounted on a shaft 21 and is connected by a connecting rod 29 with a lever arm 30 which is mounted on a shaft 31, said shaft 31 projecting across the heating chamber 1 and terminating at its outer end in a plate 31′ mounted on the outside of the incubator and having a slotted arm 32 controlled by a thumb binding screw 33, whereby on unscrewing said screw 33 the arm 32 may be shifted so as to rotate the shaft 31, and, through its connections with the thermostatic arm 23, adjust the latter to the proper position between the contact points 25 and 26. The contact points 25 and 26 are each mounted on a suitable insulating block 27 and are connected to binding posts 26′ and 27′.

Located beneath the shaft 10 and adjacent to one of the motors 6 is an electro-magnet 34 mounted on an insulating block 34′; a d mounted on a standard 35 on said insulating block 34′ is an armature lever 35′ having a counterweight 36 at one end and a projection or pin 37 at its other end which is adapted to engage one of a pair of notches 38 in the periphery of a rotary disk 39 mounted on the shaft 10, the rotary disk 39 being limited in its rotary movement by means of a pin 40 mounted on one of the standards 11 and projecting through a curved slot 44 in the disk 39.

The motors 5 and 6, the electro-magnet 34 and the thermostat are located in an electric circuit arranged as follows: A conducting wire 42 extends from the plate 22 of the thermostat to one of the binding posts 43 of the motor 6, there being a battery 43′ located in said circuit between the thermostat and the motor 6. A conducting wire 44 leads from one of the binding posts 26′ of the thermostat to a contact strip 13 of the rotary contact disk 14. A conducting wire 45 leads from the other binding post 27′ of the thermostat to the contact strip 16 of the rotary contact disk 17. A branch conducting wire leads from the wire 42 to the electro-magnet 34. A branch conducting wire 47 leads from the conducting wire 42 to one of the binding posts 48 of the motor 5. From the other binding post 49 of the motor 5, a conducting wire 50 leads to the contact strip 13′ of the rotary contact disk 14. A branch conducting wire 51 leads from the wire 45 to the contact strip 13′ of the rotary disk 15. A branch conducting wire 52 leads from the wire 44 to one of the contact strips 16′ of the rotary contact disk 18. From the other contact strip 16′, a branch wire 53 leads to a branch wire 54 extending from a contact 16 of the rotary disk 17, said wire 54 leading to the other electro-magnet 34. A branch wire 55 leads from the contact strip 13 of the rotary contact disk 15 to the binding post 56 of the motor 6.

Mounted on the shaft 10 is a sprocket wheel 57 which is connected by means of a sprocket chain 58 with a sprocket wheel 59 mounted on a shaft 60 extending through the side of the chamber 2 into the heating chamber 1 and supported therein by means of hangers 61. Said shaft has mounted thereon, an arm 62 which is pivoted to the end of a rod 63 hinged at its other end to the damper or door 4 of the incubator, the door 4 being controlled in its movement by means of a spring 64.

The operation of the apparatus is as follows: When the temperature in the heating chamber 1 rises to a certain point which is greater than the temperature desired, the thermostat is operated by the heat to cause the arm 23 to move into contact with the contact point 26 thereby closing the circuit from battery 43, through wire 42, through thermostat, through wire 45 and wire 51, through rotary switch 15, and through wire 55 to the motor 6. Simultaneously with the flow of the current as just described, current will flow through wire 45 to contact 16, rotary switch 17, through wire 54 to electro-magnet 33 and back to battery through wire 46 and wire 42. This latter current causes the electro-magnet 33 to attract the hinged lever armature 35 and thereby release the disk 39, this action being simultaneous with the starting of the motor. During the operation of the motor, the shaft 10 will rotate until the projection 37 engages the opposite notch 38 in the disk 39. The electro-magnet 33 becomes demagnetized as soon as the projection 17′ on the rotary switch 17 leaves contacts 16 which breaks the circuit, as the notch 38 on the disk 39 arrives opposite the projection 37 on the armature 35, the weight 36 causing the projection 37 on the lever 35 to be lifted into engagement with the notch 38.

The projection 40 in the slot 41 limits the movement of the disk 39 in either direction and also the rotation of the shaft 10. When the disk 39 is in the position shown in Fig. 7, the lug 17′ on the disk 18 is in the position shown in Fig. 3. Then as the thermostat cools, the thermostat contact arm 23 will move away from contact 26 and contact with contact 25, thus closing the circuit. The current will then flow from the battery 43, through wire 42, through the thermostat into the contact 25, and through wire 44 to contact 13, and rotary switch 14 and through wire 50 to motor 5, and back through wire 47, and wire 42 to battery 43. The current will also branch off from wire 44 through wire 52, contacts 16′ and rotary switch 18, through wires 53 and 54 to electro-magnet 33 and wires 46 and 42 to bat-

tery 43. As the armature lever 35 drops, the motor 5 rotates the shaft 10 half a revolution until the disk 39 is stopped by the pin 40, and the pin 37 on the armature 35 engages the notch 38.

By means of the electric circuit and the apparatus hereinbefore described, it will readily be seen that the temperature of the heating chamber of an incubator will be automatically regulated in a very efficient manner.

What I claim as my invention is:—

1. In an apparatus of the character described, an incubator, a damper closing the hot air chamber thereof, mechanism for opening and closing said damper, said mechanism having a rotary driving shaft, a pair of alternately operating electric motors geared to said driving shaft, a thermostat located in the heating chamber of the incubator, an electric circuit connected with said motors and thermostat, and electrically controlled means in said circuit for releasing said driving shaft and permitting it to partially rotate in one direction or another and electrical means for cutting out one of said motors from the circuit.

2. In an apparatus of the character described, an incubator, a damper closing the heating chamber thereof, mechanism for opening and closing said damper, electrical means for operating said mechanism including a series of rotary contact disks and vibratable contacts adapted to engage therewith, a pair of alternately operating electric motors located in the same circuit with said contact disks and alternately cut out of said circuit by said disks, a thermostat mounted in the heating chamber of the incubator, and means electrically controlled by said thermostat for operating said electrical mechanism.

3. In an apparatus of the character described, an incubator, a damper closing the heating chamber thereof, mechanism for opening and closing said damper and having a rotary driving shaft, a series of rotary contact disks mounted on said shaft, and flexible contact arms adapted to engage therewith, a portion of said arms being normally out of contact with said disks, electric motors geared to said driving shaft, a thermostat located in the heating chamber of the incubator, an electro-magnet, a balanced armature lever controlled by said electro-magnet, said electric motors, thermostat and electro-magnet being electrically connected, a rotary disk on said driving shaft, means for limiting the rotary movement of said disk in said driving shaft, said disk being adapted to be detachably engaged with said armature lever whereby said electro-magnet is controlled by said thermostat and the one or the other of said motors is permitted to operate to open or close said damper.

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

LOUIS L. WHITE.

Witnesses:
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FORREST F. VROOMAN.