W. J. ANDERSON.

AUTOMATIC ELECTRIC INCUBATOR.

APPLICATION FILED APR. 5, 1920.

1,406,164. Patented Feb. 14, 1922.

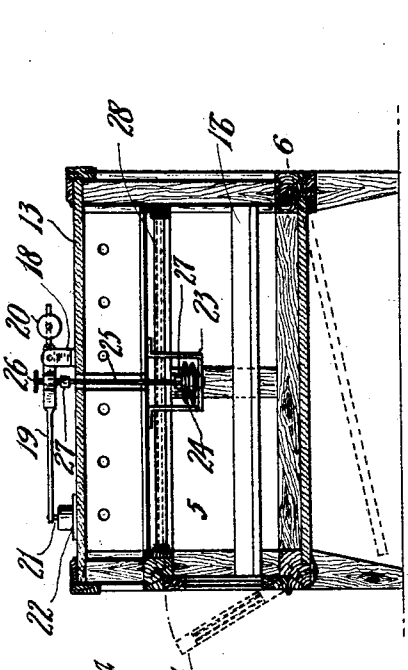


Fig. 2.

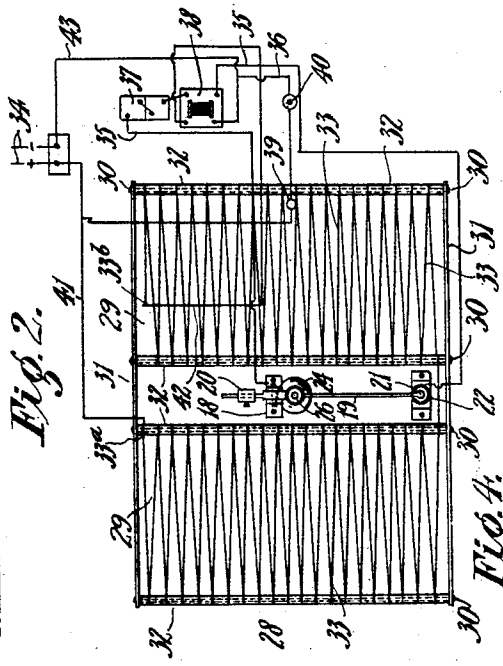


Fig. 4.

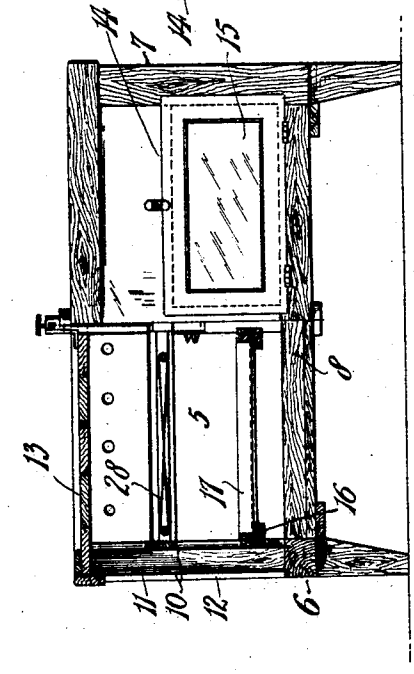


Fig. 1.

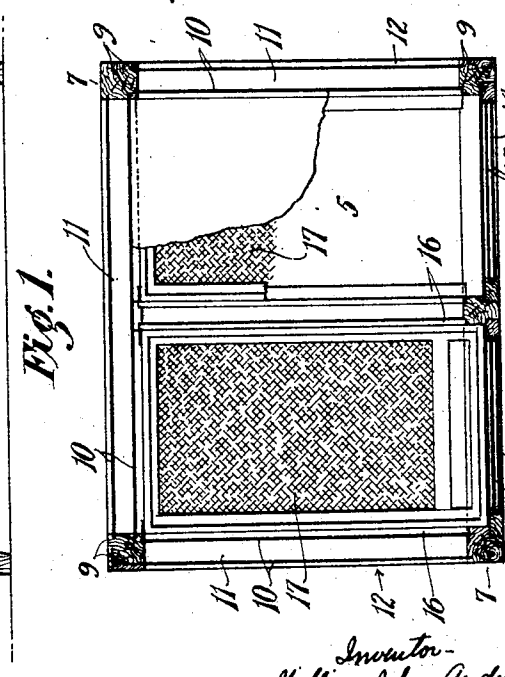


Fig. 3.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC ELECTRIC INCUBATOR.

1,406,164. Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed April 5, 1920. Serial No. 371,375.

To all whom it may concern:

Be it known that I, WILLIAM JOHN ANDERSON, a subject of the King of Great Britain, residing at Caulfield, near Melbourne, in the State of Victoria, Commonwealth of Australia, have invented new and useful Improvements in Automatic Electric Incubators, of which the following is a specification.

This invention relates to an improved electrically heated incubator embodying improved constructional features, improved regulating means and a novel form of heating element.

The incubator is built of non-conducting material and has an improved electrical heating element and automatically operating means for regulating and controlling the temperature so that the same is maintained within the limits imposed by the requirements of incubation. By this means, the necessity of constant personal attention is obviated.

A salient feature of the invention resides in the provision of an incubator having an electrical resistance element supplied with current from a main circuit and automatically regulated by an auxiliary circuit in which is interposed a main circuit breaking device or relay, and a thermal device automatically opening and closing said auxiliary circuit.

With these and other objects in view the invention consists of the features of construction, combination and arrangement hereinafter fully described, reference being had to the accompanying drawings, wherein:

Figure 1 is a view in sectional elevation of the electrically heated incubator.

Figure 2 is a transverse section of the same.

Figure 3 is a view in sectional plan.

Figure 4 is a plan view illustrating heating elements and controlling means.

The numeral 5 designates an electrically heated incubator having a skeleton frame 6 consisting of corner posts 7 and connecting battens 8. Grooves 9 are formed in the posts 7 and accommodate slidably fitting sheets 10 of asbestos composition or other suitable insulating material. These sheets 10 are arranged with spaces 11 between them so as to form cavity walls 12, and aid in the retention of heat generated within the incubator. A removable cover 13 is placed on top of the walls 12, and doors 14 are fitted in the side walls of the structure to facilitate the placing of eggs and attention to the same.

Inspection ports 15 of transparent material are furnished in the incubator frame. Within the incubator are secured cleats 16, on which egg-holding trays 17 are supported.

On the top of the cover 13 there is mounted a metal bracket 18, in which is fulcrumed a control lever 19. This lever carries at one end an adjustable balance weight 20 and at its opposite end a plug contact 21.

Beneath said plug contact and secured to said cover 13 is a mercury cup 22. A bracket 23 is secured within the incubator and supports a double air-tight capsule 24. This capsule is adapted to move the control lever 19, acting through a vertical connecting rod 25 and an adjusting screw 26. The adjusting screw and the double capsule are furnished with sockets 27, in which the top and bottom ends of said rod 25 are retained.

Located transversely of the incubator and above the egg-holding trays 17 is an electrical heating element 28 comprising two units 29 electrically connected. Each of these units consists of a pair of metal cores 30, which are riveted at each end to metal bars 31 and have tubes 32 of fibre, porcelain, mica or other suitable insulating material, said tubes supporting a resistance wire 33 of nichrome or other suitable material. This resistance wire is spaced and maintained in a zig-zag form as shown in Figure 4 by means of locating grooves formed in said tubes 32.

The wiring connections and circuits of the incubator are indicated in part diagrammatically in Figure 4 of the drawings. According to the arrangement illustrated, there are employed a main circuit 34, an auxiliary or tripping circuit 35, a shunt circuit 36, a battery 37 in the auxiliary circuit, a relay or circuit breaking device 38 operated or tripped by means of said auxiliary circuit, and an inspection light 39 and control switch 40 interposed in said shunt circuit 36.

One end 33^a of the resistance wire is connected directly by means of a lead wire 41 to the main circuit 34, whilst the other end

33[b] of said resistance wire is connected to the main circuit 34 indirectly through the relay or circuit breaking device 38 by means of leads 42 and 43.

The auxiliary circuit 35 extends from the battery 37 to the metal bracket 18 along the control lever 19 to the plug 21 and from the mercury cup 22 to the relay or circuit breaking device 38, and from said relay or circuit breaking device back to the battery 37.

The circuit-breaking device 38 preferably employed is of the electro-magnetic type commonly adopted for analogous purposes and wherein a no-volt release coil is used.

In order to set the incubator in readiness for use, the lever 19 is first adjusted by moving the balance weight 20 and the adjusting screw 26 so that the plug 21 makes contact with the mercury cup 22, thereby completing the auxiliary circuit 35 to the battery 37. The no-volt coil of the circuit-breaking device 38 is thereby energized and closes the gap between leads 42 and 43 from the resistance wire 33 to the main circuit 34. Current when switched on to the main circuit flows normally through said resistance wire 33 causing the latter to become heated and thereby raise the temperature within the incubator 5. Should the heat rise beyond a predetermined set temperature for which the lever 19 has been adjusted, the air confined within the capsule 24 expands and causes the top of the latter to rise vertically. Acting through the rod 25 and adjusting screw 26, said capsule lifts the lever 19 so that contact between the plug 21 and the mercury cup 22 is broken. The auxiliary circuit 35 is thereby opened, whereupon the no-volt coil in the circuit-breaking device 38 is de-energized, and the main circuit 34 is opened by again interposing a gap between said leads 42 and 43. By these means the temperature of the incubator is allowed to decrease to a predetermined degree, whereupon the top of the capsule 24 descends owing to the contraction of its contained air. The lever 19 is thereby allowed to fall and restores the contact between the plug 21 and the mercury cup 22. The auxiliary circuit 35 is thus again closed and causes the circuit-breaking device 38 to close the main circuit gap between said leads 42 and 43, whereupon the resistance wire 33 becomes normally heated as heretofore.

By the means described, uniform conditions of temperature within definite limits are maintained in the incubator 5 so that the process of incubation is materially aided and without the necessity for constant attention being given to the apparatus.

What I do claim is:

1. An electrically heated incubator having an electrical resistance element, means for supplying current to said element, from a main circuit, an auxiliary circuit, a main circuit breaking device interposed in the auxiliary circuit, and a thermal device in the incubator for automatically opening and closing said auxiliary circuit.

2. An electrically heated incubator having a resistance element, means connecting said element to a main circuit, a circuit-breaking device interposed across the main circuit, a battery circuit connected to said circuit-breaking device and adapted to energize said device and thereby complete said main circuit, a thermal capsule controlled by the temperature conditions within said incubator, and a contact making and breaking device interposed in said battery circuit and operated by said thermal capsule.

3. An electrically heated incubator having a frame, cavity walls, a removable cover, a resistance heating element, means connecting said element to a main circuit, a circuit-breaking device for regulating said element, an auxiliary circuit for controlling said circuit breaker, and means for automatically opening and closing said auxiliary circuit according to the temperature conditions within said incubator.

4. An electrically heated incubator having an electrical resistance element, means for supplying current to said element from a main circuit, an auxiliary circuit, a main circuit breaking device interposed in the auxiliary circuit, a thermal device in the incubator, a pivoted lever and a mercury cup both interposed in the auxiliary circuit, a contact member on said lever, and means adjustably connecting said thermal device to said lever.

5. An electrically heated incubator having an electrical resistance element connected with a main circuit, an auxiliary circuit, a main circuit breaking device interposed in the auxiliary circuit, a thermal device for automatically opening and closing said auxiliary circuit, a shunt circuit, a lamp connected to said shunt circuit, and a switch connected to said shunt circuit.

6. An electrically heated incubator comprising, a base, vertical cavity walls, a cover, a lever pivotally mounted on said cover, a contact plug on said lever, a balance weight adjustably mounted on said lever, an adjusting screw in said lever, a mercury cup mounted on said cover beneath said contact plug, an air-tight hollow capsule secured within the incubator, a rod connecting said capsule to said adjusting screw, a resistance heating element within said incubator, means connecting said element to a main circuit, a circuit breaking device interposed in the main circuit, a battery and an electrical connection from said battery to said lever and to said mercury cup through said circuit breaking device.

7. An electrically heated incubator having two electrical heating elements compris-

ing tubes of insulating material, resistance wire wound around said tubes, transverse bars, rods on said bars supporting said tubes, means electrically connecting said elements and for supplying current thereto from a main circuit, an auxiliary circuit, a circuit breaking device interposed in the auxiliary circuit and a thermal device in the incubator for automatically opening and closing said auxiliary circuit.

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

WILLIAM J. ANDERSON.

Witnesses:

JUNE SYMES,

JAMES H. ANDERSON.