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G. K. CAVINESS & C. J. YARRINGTON.
HEATING APPARATUS FOR INCUBATORS.

APPLICATION FILED JAN. 8, 1904.

Fig. 1.

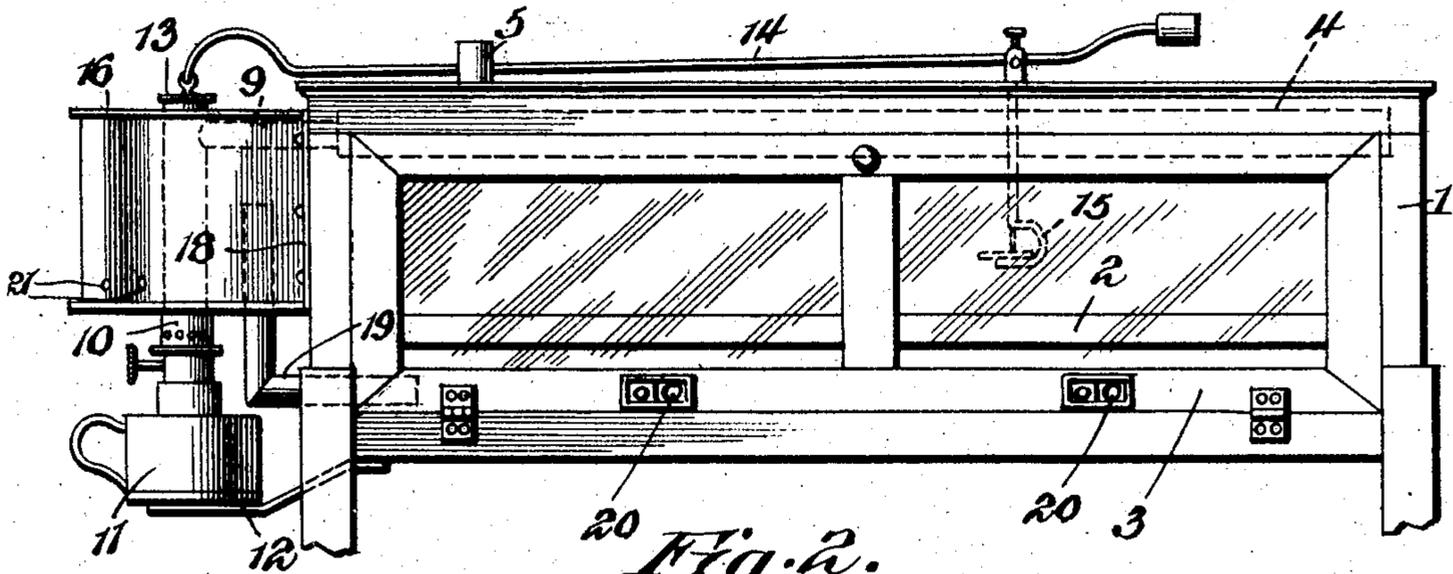


Fig. 2.

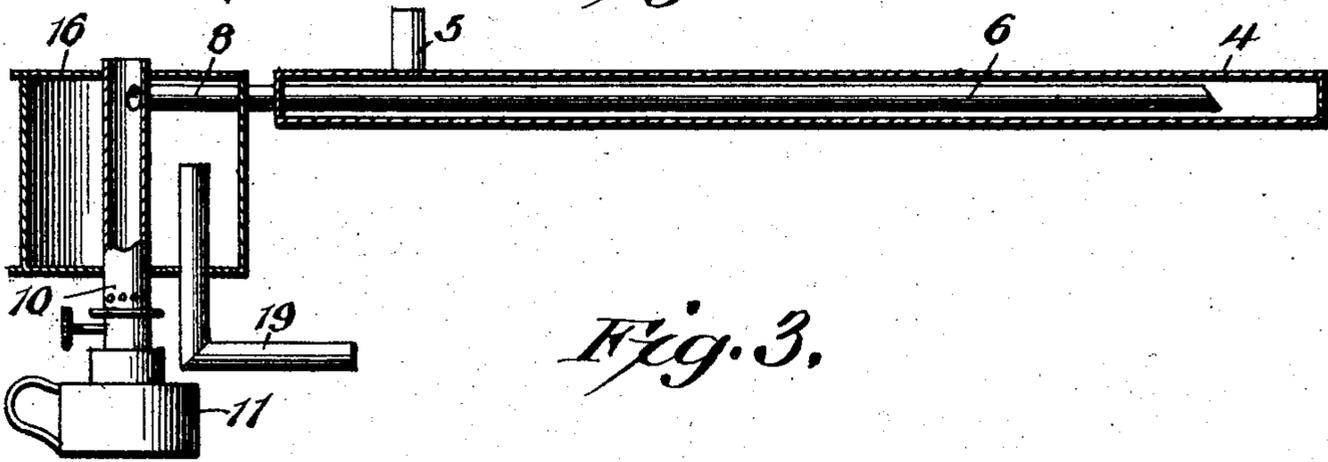
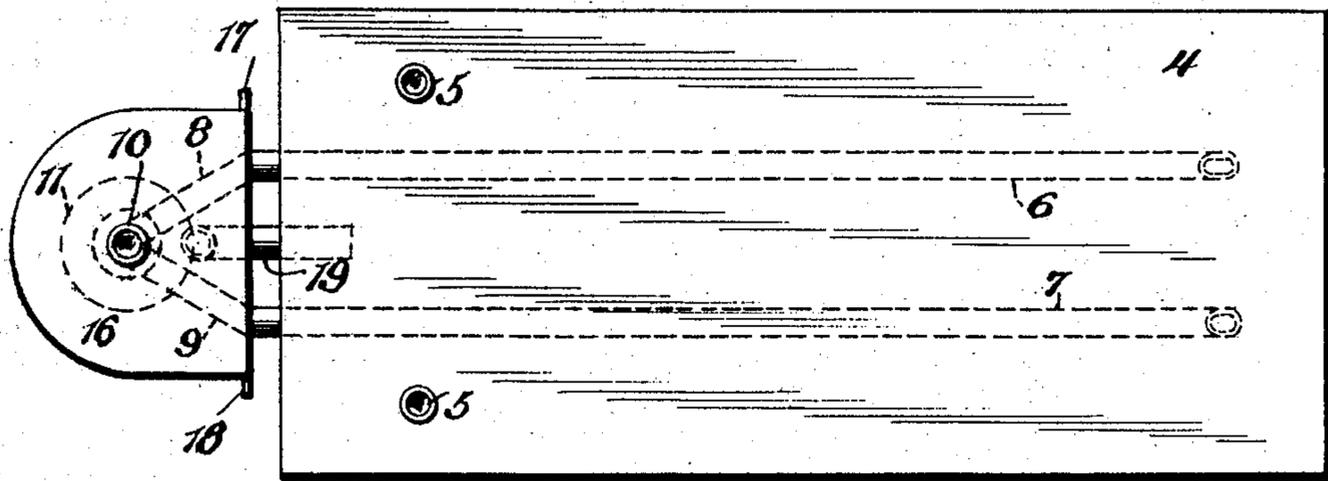


Fig. 3.



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HEATING APPARATUS FOR INCUBATORS.

SPECIFICATION forming part of Letters Patent No. 778,304, dated December 27, 1904.

Application filed January 8, 1904. Serial No. 188,218.

To all whom it may concern:

Be it known that we, GEORGE KIRBY CAVINESS and CHARLES JOSIAH YARRINGTON, citizens of the United States, residing at Princeton, in the county of Mercer and State of Missouri, have invented a new and useful Heating Apparatus for Incubators, of which the following is a specification.

Our present invention relates to a novel incubator, and more particularly to the heating apparatus thereof.

The object of the invention is to provide the incubator with heating apparatus which will insure an even temperature uniformly throughout the extent of the incubating-chamber, the control of the apparatus to suit varying conditions being effected automatically and without the necessity for the attendance of an operator.

A further object of the invention is to insure the proper diffusion and circulation of the air under the egg-tray and to so organize the elements of the heating device that the latter may be easily installed for use or detached from the incubator and disorganized for purposes of repair or cleaning.

Subordinate to these objects are others, which will more fully appear during the succeeding description of the illustrated construction.

In the accompanying drawings, Figure 1 is a side elevation of an incubator equipped with our heating apparatus and having its legs broken away. Fig. 2 is a sectional elevation of the heating apparatus detached, and Fig. 3 is a plan view of the subject-matter of Fig. 2.

Like numerals of reference are employed to designate corresponding parts in the several views.

1 indicates an incubator of the usual construction, above the bottom of which is supported an egg-tray 2, access to which is obtained by means of a hinged door 3, provided with glass panels through which eggs may be inspected without opening the incubating-chamber. Fitted in the top of the incubator to form the top or cover of the incubating-chamber is a shallow hot-air tank or chamber 4, preferably constructed of sheet metal and

provided adjacent to one end of its top wall with outlet or vent tubes 5. These vents are provided for the escape of hot air after the latter has traversed substantially the entire length of the hot-air chamber 4 from the open inner ends of a pair of parallel heating-tubes 6 and 7, extended into the tank 4 from one end thereof and having divergent outer ends 8 and 9, communicating with a lamp chimney or flue 10, extending upwardly from a lamp 11, supported beyond one end of the incubator in any suitable manner—as, for instance, by a lamp-bracket 12.

The products of combustion from the lamp 11 are designed to pass from the chimney or flue 10 to the heating-tubes 6 and 7, which these heated products escape at the end of the tank 4 farthest from the heater and after traversing the pan to the opposite end thereof escape from the vents 5. This circulation of hot vapor effectually heats the walls of the tank 4, and as said tank extends entirely over the incubating-chamber the latter is uniformly heated from above.

The regulation of the described circulation of hot air is effected by means of an automatic regulating apparatus of any desired type. In the illustrated embodiment of the invention, however, the upper end of the flue or chimney 10 is provided with a cap 13, carried at one end of a regulating-lever 14, controlled by a thermostat 15, disposed within the incubating-chamber to maintain the latter at a fixed temperature by the automatic adjustment of the cap 13 in a manner well understood in the art.

In addition to the described arrangement for heating the incubating-chamber from above it is desirable to provide for more or less circulation of air in the immediate neighborhood of the eggs. To attain this end, we surround the major portion of the flue or chimney 10 with a heating-drum 16, preferably constructed as shown and having a flat side 17 imposed against one end of the incubator and provided with flanges 18 to facilitate the bolting or screwing of the drum to the incubator-frame. The drum 16 also incloses at its upper end the converging ends 8 and 9 of the heating-tubes

6 and 7, and through the bottom of the drum is extended the vertical branch of an angular diffusion-pipe 19, the horizontal branch of which is located below the bottom of the drum and is extended into the egg-chamber of the incubator—that is to say, the horizontal branch of the diffusion-pipe 19 is extended into the incubator, below the egg-tray 2 therein, for the purpose of inducing a circulation of air in the neighborhood of the eggs, it being understood that the incubator is provided with suitable ventilators 20, as usual. The side wall of the drum 16 is provided with one or more openings 21, as shown.

From the foregoing it will be noted that the entire heating apparatus shown in Fig. 2 may be quickly applied to an incubator of any usual type and that when so applied the incubating-chamber will be automatically maintained at a uniform temperature and that a gentle circulation of air will be constantly maintained below the egg-tray and around the eggs supported thereby. It is to be distinctly understood, however, that while the illustrated embodiment of the invention is thought at this time to be preferable we reserve the right to effect such changes, modifications, and variations of the illustrated structure as may fall fairly within the scope of the protection prayed.

What we claim is—

1. The combination with an incubator-casing, of a hot-air tank located in the top thereof, a heater located beyond one end of the casing, a flue disposed over the heater, heating-tubes communicating with the flue, said tubes entering the heating-tank adjacent to the heater and having open ends adjacent to the opposite end of the tank, and vent-openings in the top wall of the tank at the end thereof adjacent to the heater.

2. The combination with an incubator-casing, of a shallow hot-air tank removably supported at the top of the casing and extending entirely over the incubating-chamber, vent-openings at one end of said tank, a pair of parallel heating-tubes located in the tank and opening adjacent to the end thereof farthest from the vent-openings, a vertically-disposed flue located beyond one end of the casing and communicating with converging ends of the heating-tubes, a lamp supported below the flue, and means for automatically regulating the flow of hot air to the heating-tubes.

3. The combination with an incubator-casing, of a shallow hot-air tank located in the top thereof, a lamp supported beyond one end of the casing, a flue disposed over the lamp, heating-tubes communicating with the flue and extended through the hot-air tank to a point

adjacent to the end thereof farthest from the flue, vent-openings at the end of the tank nearest the flue, a heating-drum surrounding the flue, and an angular diffusion-pipe having one end extended into the drum and the other end passed into the incubator-casing adjacent to the bottom thereof.

4. The combination with an incubator-casing, and an egg-tray supported therein, of a drum secured to one end of said casing, an angular diffusion-pipe having its vertical branch extended into the drum and its horizontal branch extended into the incubator-casing at a point below the egg-tray, a lamp supported below the drum, a flue extending through the drum from the lamp, a cap closing the upper end of the flue, automatic means for moving the cap to regulate the flow of hot air through the flue, a shallow hot-air tank fitted in the top of the incubator-casing, parallel heating-tubes disposed longitudinally of the tank and opening at the end thereof farthest from the heater, said heating-tubes having end portions converging to and in communication with the flue at points adjacent to the top of the drum, and vent-tubes extending from the top wall of the hot-air tank adjacent to the end thereof nearest the heater.

5. The combination with an incubator-casing, of a lamp supported beyond one end thereof, a flue disposed above the lamp, a drum surrounding the flue, heating-tubes extending across the top of the incubator-casing from the flue, and a diffusion-pipe extending from the interior of the drum and communicating with the interior of the incubator-casing adjacent to the bottom thereof.

6. The combination with an incubator-casing, of a lamp supported beyond one end thereof, a flue disposed above the lamp to convey the products of combustion therefrom, a drum surrounding the flue, a heating-tank within the casing at the top thereof, heating-tubes extended into the tank from the flue to direct the products of combustion to the interior of the tank, a diffusion-pipe establishing communication between the bottom of the casing and the interior of the drum, and a thermostatic device for regulating the flow of the products of combustion through the heating-tubes.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

GEORGE KIRBY CAVINESS.
CHARLES JOSIAH YARRINGTON.

Witnesses:

SCHUYLER KING,
A. F. EPPERSON.