April 28, 1925. 1,535,097

L. A. BROWN

INCUBATOR HEATER

Filed June 18, 1924 2 Sheets-Sheet 1

Fig. 1.

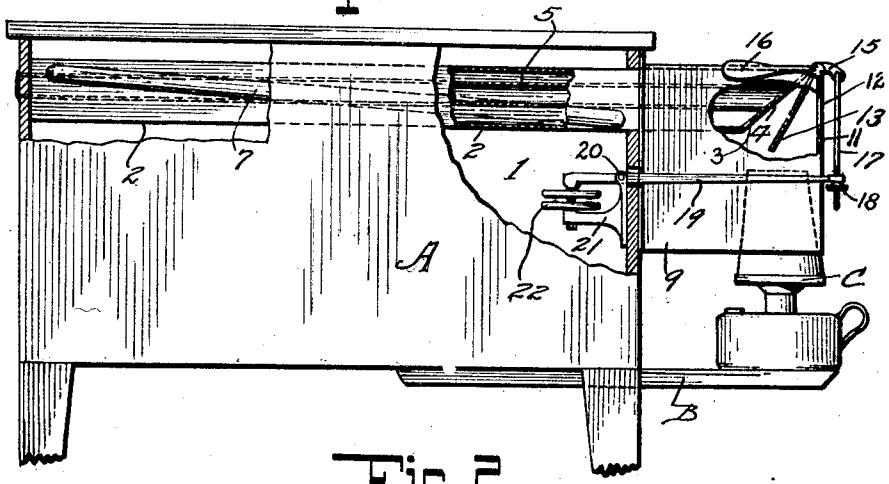
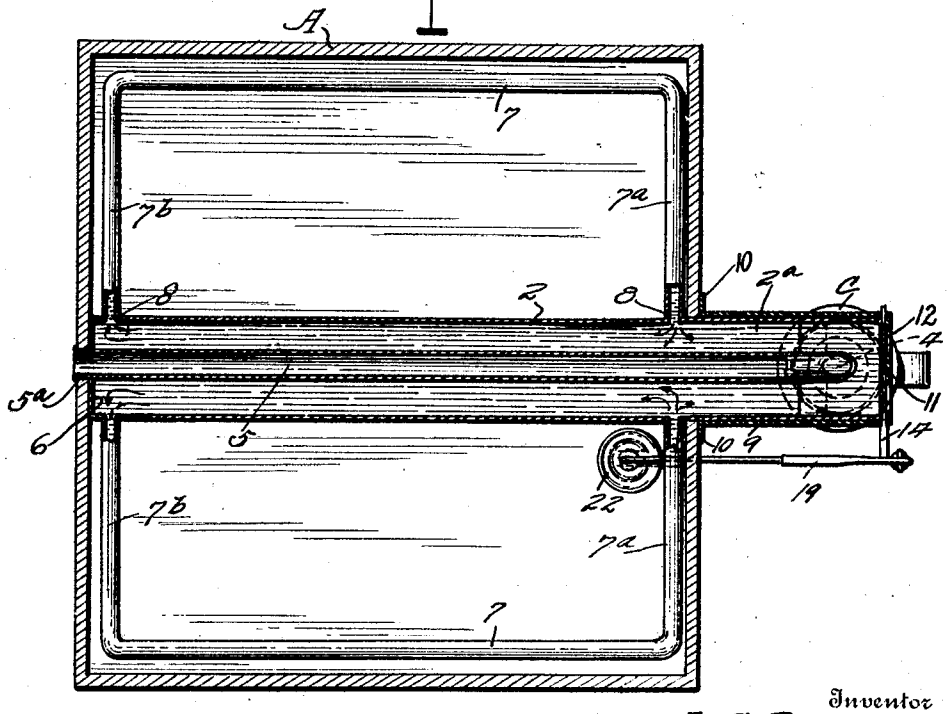


Fig. 2.



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2 Sheets-Sheet 2

Fig. 1.

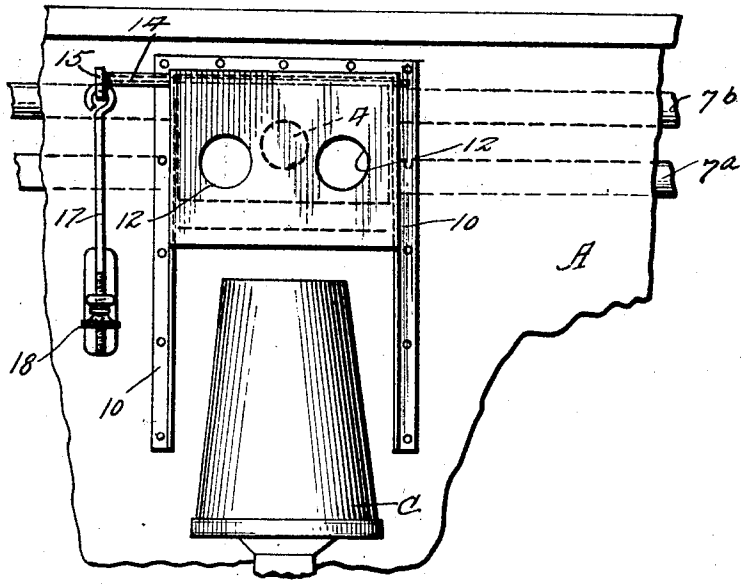


Fig. 5.

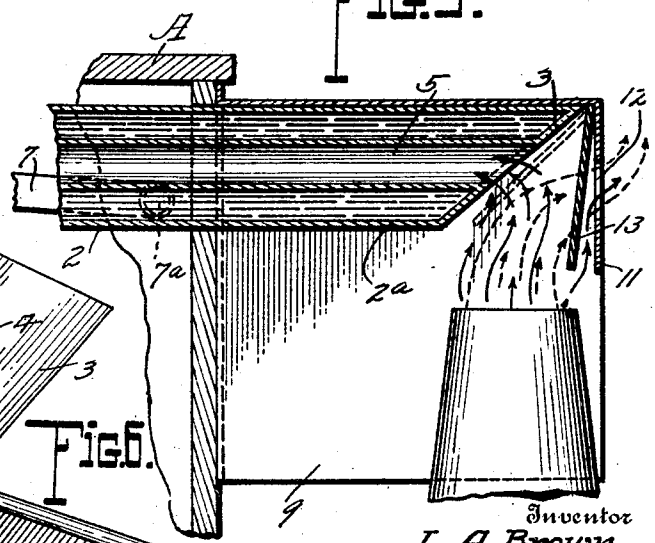


Fig. 4.

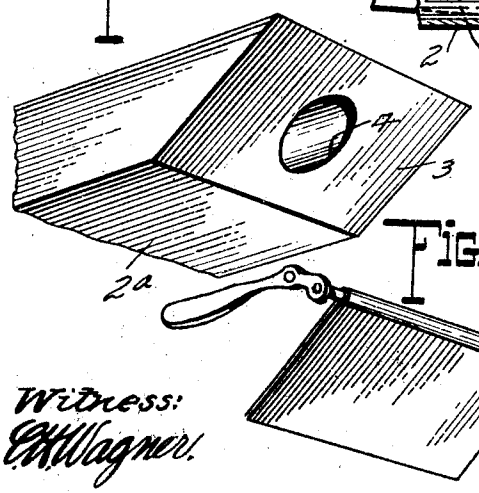


Fig. 6.

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UNITED STATES PATENT OFFICE.

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INCUBATOR HEATER.

Application filed June 18, 1924. Serial No. 720,807.

To all whom it may concern:

Be it known that I, LUCIUS A. BROWN, a citizen of the United States, residing at Clay Center, in the county of Clay and State of Nebraska, have invented certain new and useful Improvements in Incubator Heaters, of which the following is a specification.

This invention has to do with incubator construction and involves primarily improvements in heaters such as are usually employed for individual incubation apparatus, and involving ordinarily a heating tank through which heated water is circulated, together with controlling means for maintaining the temperature in the incubator substantially uniform.

In the carrying out of my invention I have designed a water heating tank and circulating pipes connected therewith with a special view to obtaining increased efficiency of the heating apparatus, as compared with present designs of such apparatus. I have had especially in mind the construction of my heating means in such a way as to obtain a comparatively simple arrangement of the circulating pipes and a simple and substantial formation of the tank, together with correspondingly simplified valve or damper apparatus by which the passage of the heat from a lamp or similar heater through the heating pipe of the water tank may be quickly regulated, the damper being readily responsive to the thermostatic action of the usual thermostat in the incubator.

With the foregoing in view my invention also has for its object to provide other detail features of construction conducive to ease and cheapness of manufacture of the heating apparatus, all of which will be more fully understood upon reference to the detailed description found hereinafter, in conjunction with the accompanying drawings: in which,

Figure 1 is a side view of an incubator showing the preferred construction of my invention, the side wall of the incubator being broken away to show the arrangement of the circulating pipe and tank, and the tank being also broken away and shown in section to illustrate the warm air pipe which passes therethrough somewhat more distinctly. Likewise, the outer end of the tank is broken away as well as the side of the heating chamber to show the valve or damper arrangement more fully.

Figure 2 is a horizontal sectional view through the incubator, showing various parts that require illustration, as for instance; the circulating pipes, tank, warm air pipe and thermostatic control connections.

Figure 3 is a fragmentary front view of the incubator bringing out somewhat more clearly the arrangement of the lamp or burner which supplies the heat to the heating chamber from which the heat passes to the warm air flue or pipe of the tank.

Figure 4 is a fragmentary perspective view of an end portion of the tank at which the entrance to the warm air pipe is provided.

Figure 5 is a fragmentary sectional view showing more clearly the arrangement of the damper or valve and manner of supplying the heat from the burner or lamp to the water tank.

Figure 6 is a detail perspective view of the damper and counterbalancing weight therefor.

Specifically describing the invention and referring particularly to the various views of the drawings, I have designated the incubator box or body at A, the same being equipped with a sliding shelf B, on which the burner of lamp C, by which the heat is supplied to the incubator, is supported.

In all general ways the incubator construction may be said to be conventional, and the same may be of wood, metal or the like, as this phase of the construction is immaterial to the invention. Extending horizontally across the inner chamber 1 of the incubator near the top thereof is mounted my heating apparatus, by which the temperature within the incubator is controlled. This apparatus includes primarily the water tank 2 in the form of a long rectangular reservoir which projects at the front end of the incubator quite a little distance from the front wall as shown at 2^a. The outer end of the projecting portion 2^a of the tank 2 is provided with an inclined closing wall 3, said wall slanting downwardly and inwardly toward the incubator and being provided with a central opening 4, see Figure 4. The said opening 4 is provided as an entrance to the horizontal warm air pipe or flue 5 which extends longitudinally and centrally through the body of the tank 2 from end to end, preferably projecting slightly beyond the left-hand end wall 6 of the tank

as seen in Figure 2, and being arranged so as to extend through the left-hand or rear wall of the incubator, as seen at 5^a. Such construction, as seen at the left-hand extremity of the pipe 5 forms a support assisting to maintain the heating apparatus in proper position on the incubator. It is evident, of course, that the right-hand end of the pipe 5 is cut off on a slant which corresponds with the slant of the end wall 3 of the tank 2, and at the place where the said pipe is joined to the wall 3 forming the opening 4 above mentioned.

In conjunction with the tank 2 I employ circulating pipes for the water which is contained in the tank, and a peculiar arrangement of said pipes has been devised by me. The water circulating pipes are designated at 7 and are of similar form, being located at opposite sides of the tank 2. These pipes 7 may be said to have a U shape, as the ends of the main length of the pipe are turned at right angles thereto and joined with the tank at the points 8. It is notable, however, that the end 7^a of each circulating pipe 7, which end is nearer to the lamp or heating device C, is joined with the tank 2 near the bottom of said tank, while the other end 7^b of each pipe 7 is joined to the tank near the top of the latter, or as seen best in Figure 1 of the drawings.

Extending over and to a certain extent housing the projecting portion 2^a of the tank 2 is a box or heating chamber 9. This heating chamber is formed with flanges 10 which are directly attached to the adjacent side of the incubator to support the box or heating chamber in proper position on the incubator body. The sides of the box or chamber 9 project some distance below the outer end wall 11 of the chamber and the lamp C is so disposed that its chimney projects upwardly between the sides of the chamber or box 9 to a point a short distance below the slanting end wall 3 of the tank, and correspondingly below the opening 4, in fact, the center of the chimney of the lamp will preferably be approximately beneath the center of the opening 4. The said outer end wall 11 of the box 9 is provided with one or more warm air outlet openings 12. I illustrate two of such openings by way of preference.

In the space between the wall 11 of the box 9 and the slanting end wall 3 of the tank 2 I mount a valve or damper 13, movable toward and from each of said walls and adapted, when disposed against the wall 11, to close the openings 12 of the latter. The damper 13 is mounted upon a damper shaft 14, equipped with a rocker arm 15 projecting outwardly therefrom and a small counterbalance weight 16 projecting inwardly therefrom. A rod 17 connects the arm 15 by means of an adjustable nut 18, or like means, with the thermostatically operated lever 19. The lever 19 is pivoted at 20 to a bracket 21 in the incubator chamber, and a common form of thermostat 22 is mounted to operate the lever 19 and correspondingly move the damper 13.

With the construction of my invention as set forth above, the operation of the same under actual conditions is as follows:

As the heat from the lamp C passes from its chimney it enters the pipe or flue 5, and by heating said pipe heats the water in the tank 2. From the pipe 5 the warm air passes out through the left-hand end 5^a of said pipe and the rear wall of the incubator. As the water in the tank 2 becomes heated the heat is radiated from the wall of said tank and from the pipes 7 connected therewith and warms the incubator chamber in the well known manner. The uniformity of the temperature in the incubator chamber is maintained by the thermostat 22 controlling the damper 13. If the temperature rises above a certain degree the thermostat 22 pulls downwardly on the rod 17 and rocks the damper 13 outwards to deflect the currents of heated air rising from the chimney of the lamp C to cause said currents to pass out of the chamber or box 9 through the openings 12, instead of passing upwards and out through the pipe 5. In other words, the above action is to more or less open the openings 12 to the deflected currents of heated air, and correspondingly more or less close the opening 4 through which the currents are supplied to the pipe 5, and obviously through the arrangement of the valve or damper 13 a very sensitive control of the heated air currents is obtained.

In accordance with the well known principle that the warm water in the tank 2 will be nearer to the top of the tank than the bottom, I connect the ends 7^b of the circulating pipes 7 near the rear wall of the incubator with the top portions of the tank, whereas the ends 7^a connect with the lower portions of the tank. Under these conditions obviously the water is caused to circulate from the tank through the pipes 7 by entering the ends 7^b of the pipes 7 first, and passing back to the tank near the lower portion or bottom of the latter where the water is coolest.

The above arrangement is desirable, because obviously the end portion of the pipe 5 nearer to the heater C is warmer than the opposite end portion, and the ends 7^b of the pipes 7 will ordinarily be slightly warmer than the ends 7^a, so that the heating effects of these parts are somewhat equalized, and this promotes the establishment of a uniform heating of the incubating chamber.

It will be observed from the foregoing that I use in my incubator heating appa-

ratus metal parts which are standard shapes very largely, that is to say I use pipe lengths that are simply constructed, rather than special formations or special metals. In this way I simplify materially and cheapen very considerably the production cost of my incubator heating means. Even the valve or damper 13 is a simple rectangular piece of sheet metal, very easily constructed.

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

1. In heating apparatus for incubators, in combination, an incubating chamber, a water tank extending across said chamber, water circulating pipes connected with said tank, one end of the tank projecting through a wall of the incubating chamber and extending a considerable distance beyond said wall, a box-like compartment enclosing said projecting end portion of the tank and having air outlet openings, a warm air pipe disposed within the said tank, the tank comprising end walls through which said warm air pipe extends, the end wall of the projecting end portion of the tank being spaced from the outer end of said compartment, a warm air supply means disposed beneath said last mentioned end wall and compartment to supply air to the end of the warm air pipe which leads through said end wall, and a valve movable in said compartment between the end of the air pipe and the outlet openings to open or close either of them substantially as described.

2. In heating apparatus for incubators, in combination, an incubating chamber, a water tank extending across said chamber and having one end projecting externally of the chamber and formed with an end wall, said end wall being provided with an opening, a warm air pipe leading from said opening through the water tank, a warm air supply means located beneath said opening, a warm air compartment communicating with said warm air supply means and with said opening and a valve pivoted near the end wall and adapted to move against and away from said wall for controlling the amount of warm air supplied to said opening, said end wall being disposed in a slanting position so as to facilitate the entrance of warm air to said opening.

3. In heating apparatus for incubators, in combination, an incubating chamber, a water tank extending across said chamber and projecting through one wall thereof so as to extend some distance from said wall, a hot air pipe passing through said water tank, a box at the projecting end portion of the water tank into which the air pipe opens and forming a warm air chamber adapted to receive warm air from a source of supply and deliver it to the air pipe, said box having air out-flow openings, and a damper mounted to control the amount of warm air passing from the said warm air chamber to the said pipe, or passing from said chamber through the said openings, and movable between said outflow openings and air pipe to close either of them.

4. In a heating apparatus for incubators, in combination, an incubating chamber, a water tank extending across said chamber and projecting through one wall thereof, a warm air compartment at the projecting end of the said water tank, said water tank having a downwardly and inwardly slanting end wall within the warm air compartment and formed with an opening therethrough, a warm air pipe leading from said opening in the end wall through the water tank, and a damper movable toward and from said opening in the end wall to cut off to a greater or less extent the flow of warm air from the warm air compartment through said pipe.

5. In a heating apparatus for incubators, in combination, an incubating chamber, a water tank extending across said chamber and projecting through one wall thereof, a warm air compartment at the projecting end of the said water tank, said water tank having a downwardly and inwardly slanting end wall within the warm air compartment and formed with an opening therethrough, a warm air pipe leading from said opening in the end wall through the water tank, and a damper movable toward and from said opening in the end wall to cut off to a greater or less extent the flow of warm air from the warm air compartment through said pipe, the warm air compartment embodying also an end wall on the side of the damper opposite the end wall of the water tank, and provided with openings for out-flow of warm air from the warm air compartment, the said damper being adapted to close said last mentioned openings to a greater or less extent as well as to close the opening leading to the warm air pipe to a greater or less extent.

In testimony whereof I affix my signature.

LUCIUS A. BROWN.