July 3, 1945. M. BRAMSON 2,379,474

HEATING CABINETS, INCUBATORS, AND THE LIKE

Filed Nov. 10, 1943 2 Sheets-Sheet 1

Fig. 1.

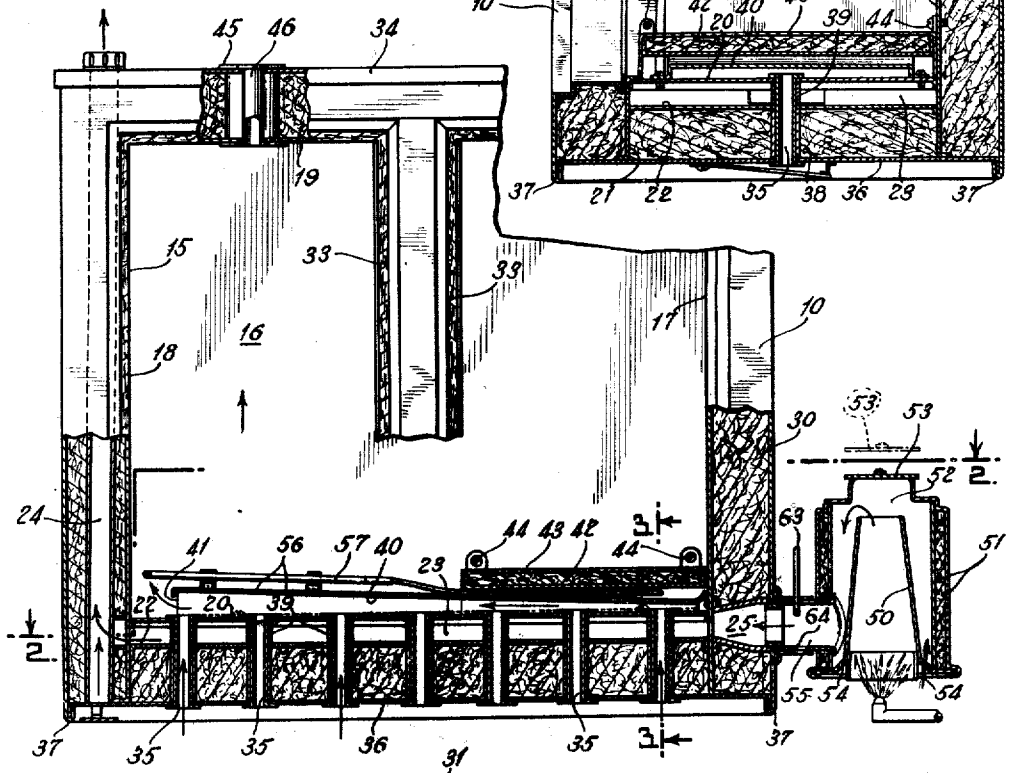


Fig. 3.

Fig. 2.

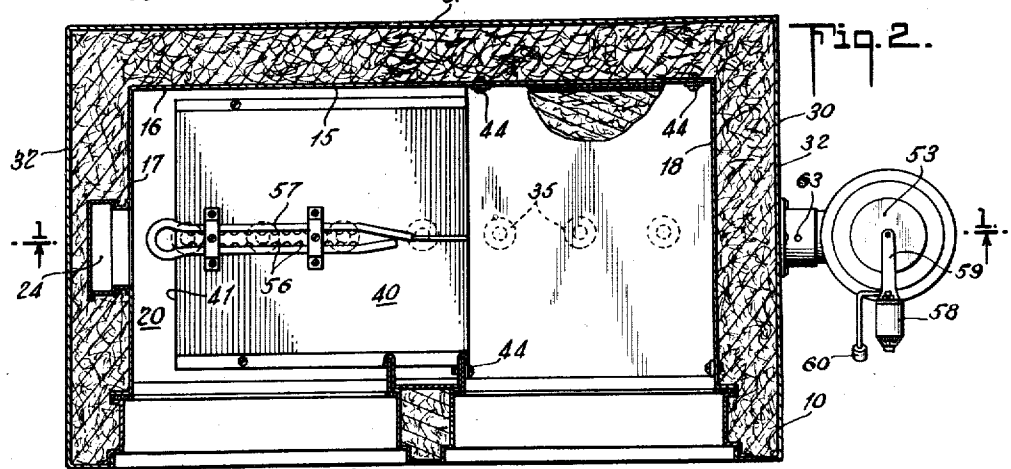
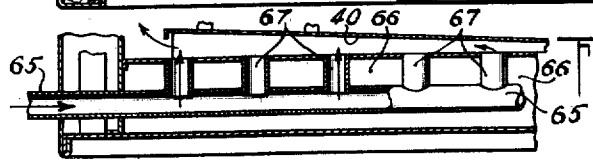


Fig. 1.a



INVENTOR
MAURICE BRAMSON
BY
ATTORNEY

July 3, 1945. M. BRAMSON 2,379,474

HEATING CABINETS, INCUBATORS, AND THE LIKE

Filed Nov. 10, 1943 2 Sheets-Sheet 2

Fig. 4.

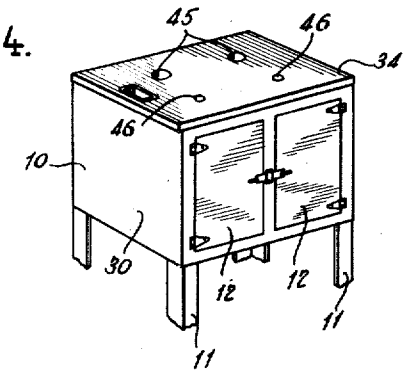


Fig. 5.

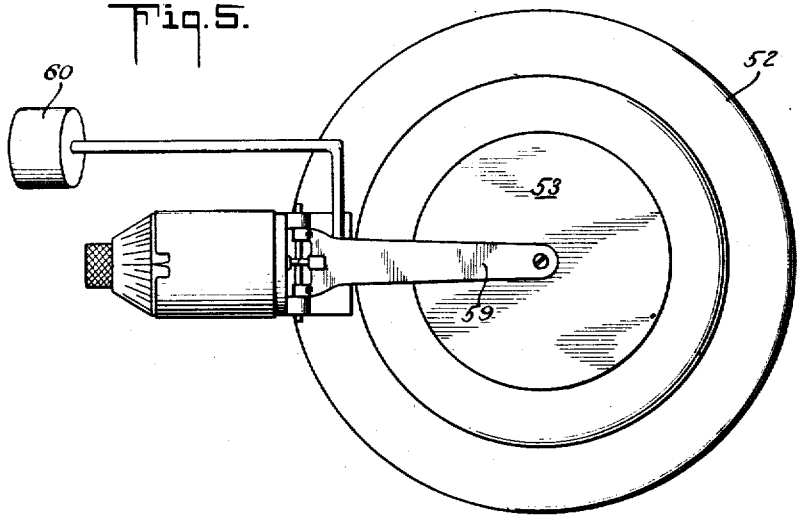
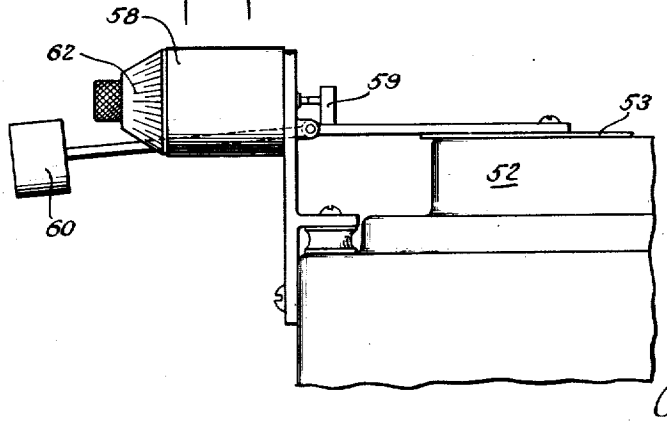


Fig. 6.



INVENTOR
MAURICE BRAMSON
BY John Zuck.
ATTORNEY

Patented July 3, 1945 2,379,474

UNITED STATES PATENT OFFICE

2,379,474

HEATING CABINET, INCUBATOR, AND THE LIKE

Maurice Bramson, Brooklyn, N. Y.

Application November 10, 1943, Serial No. 509,731

10 Claims. (Cl. 237—3)

The present invention relates to heating cabinets, incubators and the like, and is more especially directed toward incubators for bacteriological work where extremely close temperature regulation is important.

Many forms of heating cabinets, ovens and the like must be maintained during long periods at temperatures within very close limits. There is a type of such heating cabinets and ovens known as bacteriological incubators which additionally require the maintenance of a uniform temperature throughout all parts of the heating chamber during the prolonged period, as well as the constant supply of a flow of fresh air which may circulate through the chamber.

The present invention contemplates improvements in such heating cabinets whereby the uniformity of temperature throughout the heating chamber may be maintained and the air circulated. According to the present invention these results are obtained by comparatively inexpensive parts properly located with respect to one another. No moving parts are required and no thermostatic control is necessary other than the one for the primary purpose of maintaining a uniform temperature over the prolonged period where heating is necessary.

To accomplish all this the fresh air is admitted in such a manner that it is thoroughly mixed before it is discharged into the chamber so as to overcome differential temperatures in various parts of the chamber, and at the same time the radiation of heat from the heating source is reduced to an amount to where it can cause no local excess heating.

Other and further objects will hereinafter appear as the description proceeds.

The accompanying drawings show, for purposes of illustrating the present invention, an embodiment in which the invention may take form, together with modifications of certain parts, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In these drawings:

Figure 1 is a vertical sectional view through an incubator (with doors removed) taken on the line 1—1 of Figure 2 and showing parts in elevation and parts broken away;

Figure 1a is a fragmentary view similar to Figure 1 illustrating a modified form of construction;

Figure 2 is a horizontal sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a perspective view of the incubator at a reduced scale; and

Figures 5 and 6 are top plan and side elevational views of the damper control.

In the embodiment shown in the drawings the incubator employs a large rectangular box-like structure 10 which may be supported on legs 11. It is provided with two swinging doors 12, 12 and is arranged for using an extraneous heater, such, for example, as a liquid fuel burner. The incubator has double walls at the top, bottom, sides and back which contain insulation and the doors are also insulated.

The box has a sheet metal liner 15 with a rear wall 16, end walls 17 and 18, a top wall 19 and a bottom wall 20. A strip 21 is at the front below the door opening. This liner forms an upper five-sided chamber opening toward the front and a shallow five-sided chamber opening downwardly.

A partition 22 extends across the lower box-like chamber and is secured in place to the side, front and rear elements 16, 17, 18 and 21 of the liner so as to form a duct 23 of the full size of the bottom 20. At the left end of Figures 1 and 2 the duct 23 communicates with a flue or stack 24 which is suitably secured to the side wall 18. At the right end the duct 23 communicates with a tube 25 extending laterally as indicated. The outer housing 30 has a rear wall 31 and end walls 32, 32. It is open at the front and framed as indicated in the drawings for openings 33, 33 for the two doors.

The liner is secured in the housing in any suitable manner and the space between the liner walls and the housing walls and between the top of the housing and a cover 34 is filed with suitable insulating material, such as glass fibre. Tubes 35 extend down through aligned openings in the top and bottom walls of the duct 23 and are long enough to extend through a bottom plate 36 which is suitably secured in inturned flanges 37 around the lower edges of the side, front and back walls of the housing. Before this plate 36 is in inserted position the tubes are in place as well as spacers 38 and 39 and the space is filled with insulation as indicated. After the bottom plate 36 is in place the lower ends of the tubes are upset, as indicated in the drawings, so that the tubes are secured in place.

A baffle 40 is secured to the bottom plate 20 so as to form a manifold into which all the tubes 35 discharge the air warmed and drawn in by convection. This baffle requires all the air to travel towards the left, as indicated in Figures 1 and 2 of the drawings, and to be discharged past

the left edge 41 of the baffle plate. As the air coming up through the tubes near the right hand side of the figure will be heated too hot and would heat the lower end of the baffle to too high a temperature and cause radiation, this radiation is prevented by a heat baffle in the form of a lower plate 42 and an upper plate 43 with interposed insulation as indicated. This heat baffle may be secured in place by screws indicated at 44.

The warm air from the interior of the chamber escapes up through vent openings 45, 45, as indicated in Figure 4, and generally these openings will be provided with dust caps which are omitted from the drawings. The front part of the cover 34 carries two tubes 46, 46 for thermometers (not shown).

The source of heat may be a continuously operated gas or liquid fuel burner or an intermittently operated electric heater. Where the fuel burner is used the flame is allowed to enter a cone 50. This cone is surrounded by a double walled housing 51 and hot air is discharged into the top portion 52 of this chimney which is open when heating of the incubator is not required so that the hot air coming from the flame is dissipated in the room. When heating is required a damper 53 is arranged so as to close the top of the opening. This will require the products of combustion, together with such air as may be drawn through holes 54 into the space between the cone 50 and the chimney 51, to pass through a tube 55 into the tube 25 and therefore into the duct 23.

The air entering the duct 23 at the right hand end will be at such a high temperature as to heat air coming through the right hand tube 35 to too high a temperature for direct admission into the incubator chamber, and it is for this reason and to avoid relatively strong jets of heated air that the baffle is utilized to accumulate all the heated air and mix it before it is admitted into the chamber. A small amount of the air passing up through the baffle is allowed to enter the chamber through small holes 56 in the baffle and to thereby warm the bulb 57 of a thermal element which is connected to a bellows operator of conventional form enclosed in a casing indicated at 58 and arranged to act on the lever 59 which supports the damper 53. When the thermal element 57 is satisfied the bellows is expanded and the counterweight 60 opens the damper, and when the thermal element 57 is calling for heat the bellows is collapsed and the damper closed. Adjustment for the temperature is made by a knob 62 attached to the temperature responsive element so that its position can be adjusted and the exact temperature at which the damper is opened be controlled.

A thermometer 63 is inserted into the tube 55 to facilitate adjusting the burner, and the bottom of the tube 55 is provided with an opening 64 which facilitates the admission of cold air into the duct when the damper 53 is opened so as to check the flow of hot air and prevent continued rise in temperature after the thermostat has been satisfied.

Figure 1*a* illustrates the use of a manifold 65 in the fresh air duct 66, this manifold taking in air from one end of the device and having a number of tubes 67 which open upwardly in the same way as the tubes 35 described above, so as to discharge air out under the baffle plate 40 in the same manner as above described.

It will, of course, be understood that the manner in which the fresh air is introduced into the upwardly opening tubes will depend upon conditions met with in the design of the apparatus, for example, a number of laterally opening, individually arranged tubes may be employed instead of the manifold. It will also be understood that it is not always necessary to utilize the entire bottom of the chamber as duct surface.

Since it is obvious that the invention may be embodied in other forms and constructions within the scope of the claims, I wish it to be understood that the particular forms shown are but two of these forms, and various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. A warming cabinet comprising means for defining a chamber for the reception of articles to be heated, a vent for the chamber, the bottom of the chamber being the top wall of a hot air duct, a heater for heating the duct hotter at one part than at another, upwardly opening tubes extending through the duct and opening below it so that fresh air may be heated in the tubes and circulate through the cabinet, and a baffle plate above all the top tube openings and sloping downwardly toward the warmer part of the duct, the edge of the higher end of the baffle being spaced from the adjacent side of the chamber to permit the warmed air to rise.

2. A cabinet such as claimed in claim 1, having a temperature responsive device in the chamber for controlling the admission of heated air to the duct.

3. A cabinet such as claimed in claim 1, having insulating material above the lower portion of the baffle to prevent radiation of heat from said portion of the baffle into the chamber.

4. A cabinet such as claimed in claim 1, having a temperature responsive device carried by the baffle and controlling the admission of heated air to the duct.

5. In an incubator or the like, means for defining a chamber, insulation for the chamber, the chamber having a bottom at least a portion of which is formed by a sheet metal duct for the passage of hot air lengthwise of the duct, fresh air tubes extending through the duct and opening above and below the duct, a baffle plate mounted adjacent the top wall of the duct and sloping upwardly away from the warmer end of the duct, the edge of the baffle at its higher end being spaced from the adjacent side of the chamber so that warmed air supplied by the fresh air tubes may rise into the chamber, the lower end of the baffle being covered by an insulating pad which prevents radiation of heat from the warmer end of the baffle.

6. The improvement in rectangular heating chambers with side walls, a top and a bottom, and having as a source of heat therefor a duct extending immediately under the bottom of the chamber, a heater connected to one end of the duct, and a draft tube connected to the other end of the duct, whereby one end of the duct is hotter than the other, which comprises upwardly opening fresh air tubes extending completely through the duct and distributed from the hotter end to the cooler end, and means for baffling the flow of incoming fresh air to require it to flow horizontally toward the end wall of the chamber near the draft tube and prevent its rise directly from the hotter end of the duct.

7. The improvement claimed in claim 6, wherein the hotter end of the baffle is insulated to prevent heat radiation.

8. An incubator or the like comprising a sheet

metal liner forming an upper five-sided box-like chamber with an open front wall and having the bottom of the chamber disposed above the lower edges of the front, the rear and the sides of the liner to provide a lower downwardly opening rectangular chamber, a horizontal partition extending across the downwardly opening chamber to form a duct under the bottom of the first chamber, a flue carried by one end of the liner and communicating with the duct, a hot air supply for the other end of the duct, an outside housing about the liner and open at the front and bottom, a bottom plate across the bottom of the housing, insulation in the spaces between the housing and the liner top and sides and the bottom plate and partition, doors for the front opening, and fresh air tubes extending through the duct and the bottom plate for admitting fresh air to the upper chamber.

9. An incubator or the like having a liner providing a bottom wall and side and end walls for a chamber, the bottom wall having tubes for the admission of heated fresh air, means for directing the flow of extraneously heated hot air underneath and across the said bottom wall whereby one end is heated more than the other and the fresh air admitted through the tubes nearer the source of heat is hotter than that admitted through the more remote tubes, a baffle plate sloping upwardly away from the hotter end of the bottom, the upper edge of the baffle plate being spaced from the front chamber wall, and an insulating baffle above the lower end of the baffle plate which diverts heated air toward the center of the chamber and prevents radiation of heat from the covered portion of the baffle plate.

10. An incubator or the like having means for defining a chamber, the chamber having a bottom wall which is the top of a duct for extraneously heated hot air and through which such hot air passes lengthwise, a row of vertical tubes extending through the duct for allowing the passage of warmed fresh air into the chamber of the incubator, a sloping cover plate secured to the top of the duct to form a common horizontal discharge manifold for all the tubes and being spaced farthest from the duct wall at the cooler end of the duct whereby the warmed fresh air must traverse the length of the manifold before being discharged into the chamber.

MAURICE BRAMSON.