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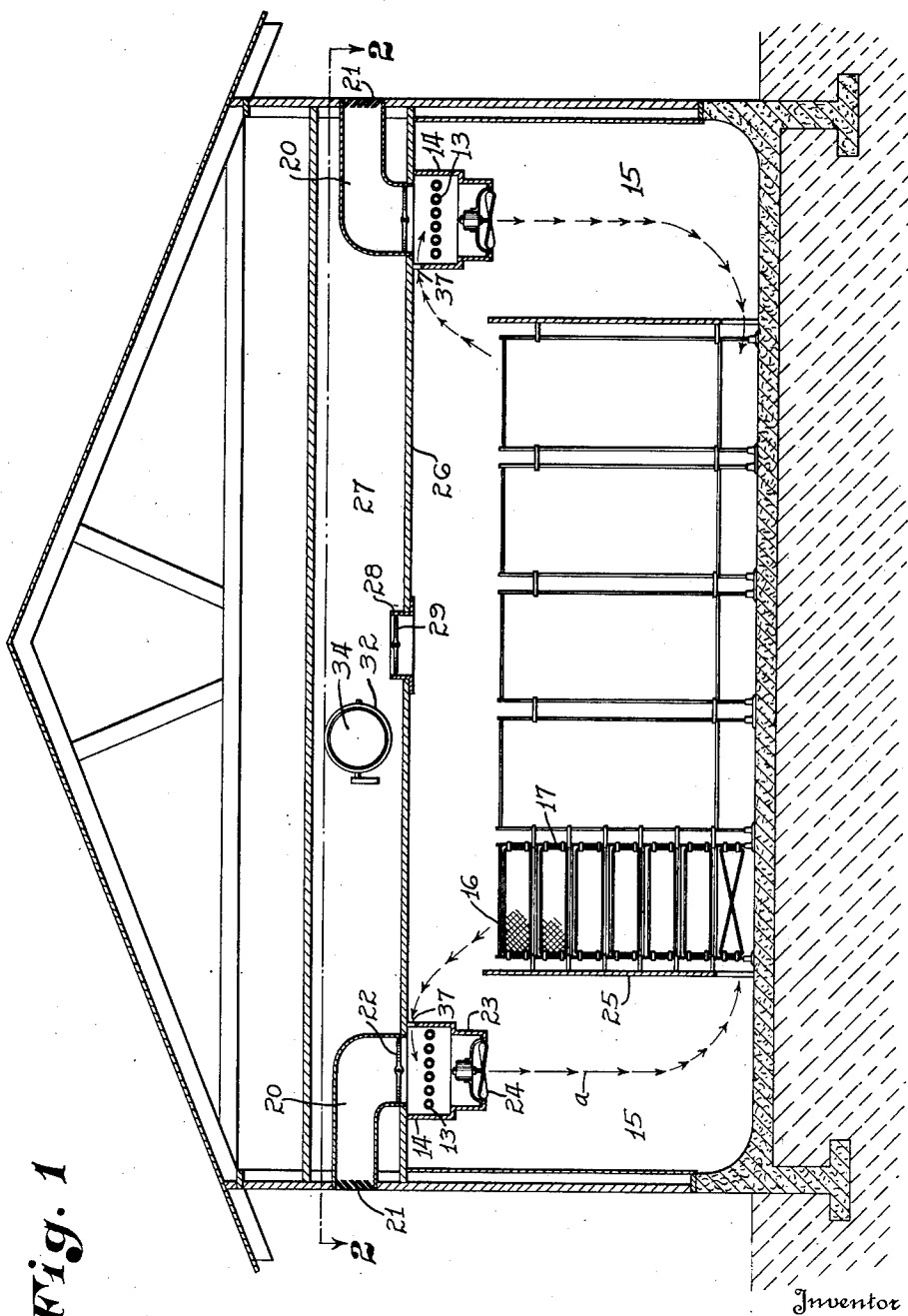
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1,837,065

CHICK BROODER

Filed March 25, 1929

3 Sheets-Sheet 1



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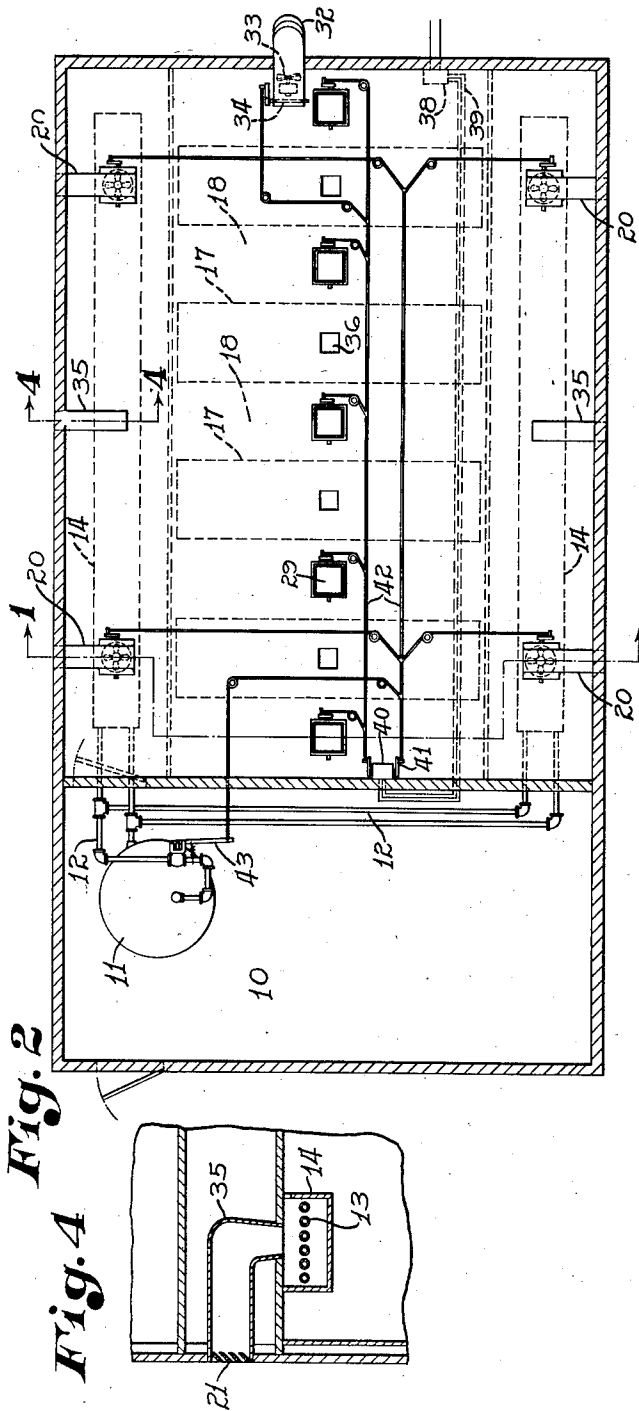
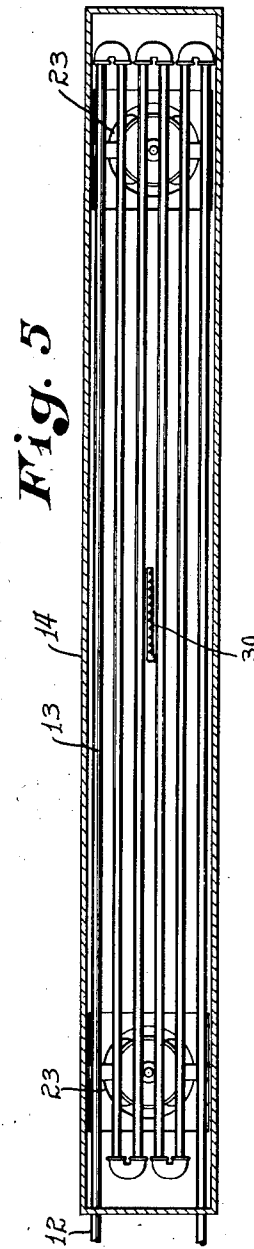
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 3

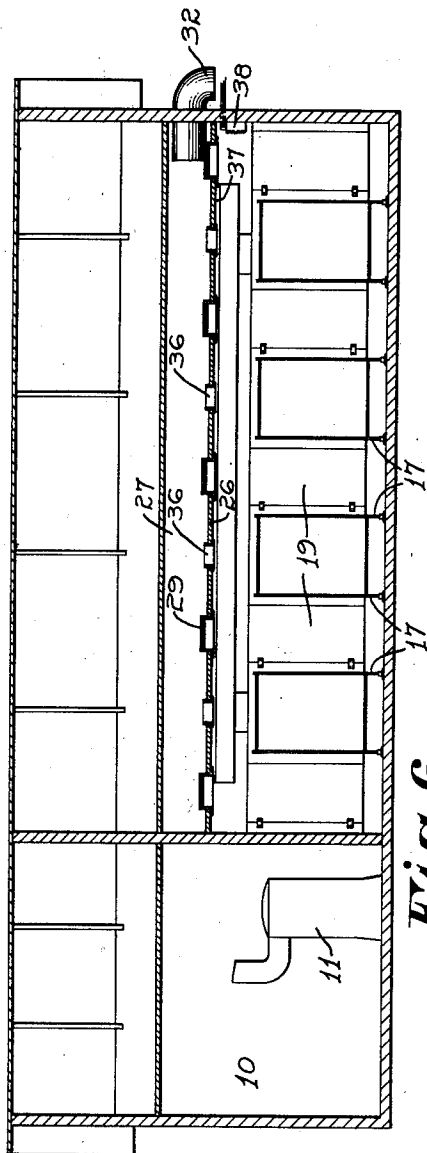
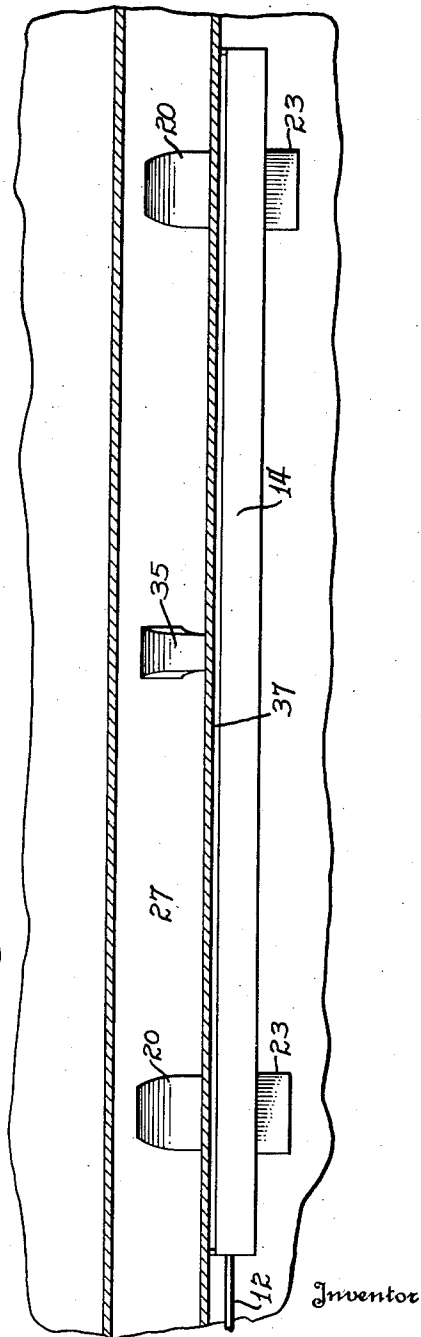


Fig. 6



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UNITED STATES PATENT OFFICE

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CHICK BROODER

Application filed March 25, 1929. Serial No. 349,590.

This invention relates to a brooder particularly adapted for housing a considerable number of chicks.

An object of the invention is to produce a new and improved chick brooder having features of construction, arrangement and operation which enable warm fresh air to be continuously circulated through the chamber containing the chick-receiving compartments in such a manner that drafts on the chicks are prevented, the desideratum being the brooding of sturdy and healthy chicks of good vitality.

A further object is to secure an efficient method of treating and circulating air in a chick-brooding chamber by which the air is maintained at the proper temperature, and the chamber is supplied with sufficient fresh air at all times so that the chicks breathe fresh vitalizing air rather than foul unhealthy air.

Further objects of the invention will hereinafter appear.

The invention is particularly well adapted for use in raising chicks on a large scale, and is preferably arranged so that the conditions are automatically regulated.

The specific construction of the invention in its preferred embodiment, together with its mode of operation and the advantages resulting therefrom, will be more particularly described in connection with the accompanying drawings, in which:

Fig. 1 is a vertical transverse section through a brooder house built in accordance with the invention, the section being taken approximately on the line 1—1 of Fig. 2;

Fig. 2 is a sectional plan view taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical section taken longitudinally through one of the aisles;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a plan view of one of the heating coil housings; and

Fig. 6 is a longitudinal vertical section through the plenum chamber.

In accordance with the invention, the outside walls of the brooder house may be of any suitable construction with a door leading into the ante chamber 10, in which is located

a heating plant 11 having steam or hot water pipes 12 leading to heating coils 13 located within housings 14 preferably arranged along the side walls of the house and high enough to leave aisles 15 therebeneath. Arranged between the aisles 15 are banks or tiers of brooder trays 16 having walls of wire mesh. These trays are suitably supported by racks 17 with transverse aisles 18 between them and partially separated from the aisles 15 by doors 19.

Suitable air inlet conduits 20 are provided at the sides of the building and lead into the heating coil housings 14. Each of these conduits 20 is provided at its intake end with louvers 21, and has a damper 22 to regulate the flow of air therethrough. Each housing 14 is provided with outlets 23 directed downwardly and preferably located directly beneath the conduits 20. Each outlet 23 is provided with an electric fan 24 for drawing air into the brooder house.

The fresh air, as it leaves the outlet 23, is directed downwardly, as indicated by the arrows "a" in Fig. 1, and as it reaches the floor, it is, of course, deflected inwardly beneath the banks of trays 16. Partitions 25 are provided between the tray chamber and the aisles 15 to prevent any direct draft reaching the chicks, and to assist in the diffusion of air. The lower edges of these partitions, however, are far spaced from the floor to permit free circulation of the air therebeneath. The air thus entering the brooder chamber is gently and substantially uniformly diffused throughout the chamber and toward the ceiling 26.

Above the ceiling 26 there is an exhaust chamber 27, and formed in the ceiling 26 are openings 28, which are regulated by dampers 29. Providing an outlet for the exhaust chamber is a pipe 32 and the flow of air through the pipe 32 is induced by an electric fan 33, which is located within the conduit, a damper 34 controlling the passage of air therethrough. In order to humidify the air drawn into the chamber, a perforated pipe 30 is connected to one of the coils 13 to allow steam to enter the housing 14 for moistening the air drawn therein.

In order to secure sufficient ventilation under all conditions, certain of the inlet conduits leading to the box 14, as indicated at 35, are without dampers. These inlets are always open and located at some distance from the outlets 23, so that the air coming through the conduits 35 will have sufficient contact with the heating coils 13 to become well heated. If necessary, baffles may be provided to insure intimate contact of the air with the pipes. Openings 36 without dampers are provided in the ceiling 26, and the damper 34 is so constructed that it will never entirely close the conduit 32. Thus provision is made for ventilation, even where the dampers 22 and 29 are in fully closed position.

It will be understood that the dampers will all be closed in the coldest weather, and upon a rise in temperature they will be opened to allow more outside air to enter the brooder house. Moreover, the air entering through the conduits 20 passes directly through the housings 14, and is, therefore, not heated as much as that which enters through the inlets 35.

It is desirable to regulate the temperature automatically within the brooder house, and for this purpose a thermostat 38 may be provided. As shown in Fig. 2, this thermostat is connected by wires 39 to a torque motor 40. The shaft of this motor has crank arms 14, which are adapted to move through arcs of approximately one hundred and eighty degrees when the motor is energized. The thermostat 38 is arranged so as to energize the motor whenever the temperature falls below a predetermined point. The crank arms 41 are connected by cables 42, or other suitable means, to the respective dampers 22, 29 and 34, so as to close them when the motor is energized. One cable may also be connected to a lever arm 43 for controlling a valve in the pipe line 12.

In the operation of my invention, since the damper 34 never completely closes the conduit 32, and since the inlets 35 and openings 36 and 31 are always clear, there is at all times an efficient ventilation of the brooder section and a continuous supply of fresh air thereto. The partitions 25 prevent any possibility of a direct draft upon the chicks and cause the air currents to flow underneath the brooder trays toward the center line of the brooder section. These currents flowing inwardly from opposite sides are gradually diffused upwardly through all of the brooder trays. The partitions 25 also constitute baffles, which in conjunction with the openings 37 in the housings 14, establish closed air circuits in which substantially ninety percent of the air passing through the trays is recirculated, while the remaining ten percent passes into the exhaust chamber, and thence through the conduit 32

to the outside of the building. This continued circulation of the air through the housings 14 past the heating coils 13 utilizes the heat from the coils to the fullest extent possible, and maintains a substantially uniform temperature throughout the brooder section. The thermostat 38 may be adjusted to close the circuit through the motor 40, and thereby to open all of the dampers, at the same time shutting off the heat by means of the lever 43, whenever the temperature rises above a predetermined point. When the temperature falls, the thermostat will open the circuit and permit the dampers to close by gravity.

An important feature of the invention consists in the method of treating and circulating the air for the inside of the chick-brooding chamber. It will particularly be observed that approximately ten percent of fresh air is at all times drawn into the chamber, and the temperature of this air is modified during its passage to the chamber. Before the air thus treated is admitted to the chamber, it is thoroughly mixed with air which has previously been circulated, preferably, about ninety per cent of recirculated air is used. Obviously, this facilitates in securing uniform air temperature within the chamber.

The air thus mixed is not directly forced to the chick-compartments, because the partitions eliminate liability of drafts on the chicks, and cause the air current, which is directed downwardly, to become converted into a gentle diffusion of air beneath the partitions, and then gradually flowing upwardly through the compartments, driving off the foul air and replacing the same with fresh vitalizing air. The permanent openings 36 arranged directly above the banks or tiers of trays provide a fixed air outlet through which approximately ten percent of air is exhausted, the remaining air returning to the fans for recirculation. It has been found empirically that this method is most satisfactory in brooding healthy chicks.

The partitions 25 are of considerable importance in the elimination of drafts on the chicks, and securing the desired movement of air through the chick-compartments. They serve not only to prevent direct drafts from the fans, but also eliminate the liability of cold outside air passing through the outer walls of the chamber from reaching the chicks. It is apparent that the partitions also facilitate the scheme of air recirculation hereinbefore described.

It is evident that numerous changes in construction and arrangement may be effected without departing from the invention, and I desire that the above be considered by way of illustration and not of limitation. The arrangement of the coil boxes 14 may be changed without affecting the desired re-

sults, and recirculation of air may be accomplished in a different manner, such as through the plenum chamber, but I consider the form shown and described as the preferred form. Numerous other modifications may be made without departing from the spirit of the invention, especially as defined in the appended claims.

What I claim is:

1. In a brooder, a room having a series of brooder trays therein, with a partition at each side thereof and spaced laterally thereupon, means inside said room for creating currents of fresh air downwardly outside of the partitions and inwardly beneath the same to cause a gentle diffusion of air upwardly through and around the trays, and means including a constantly open outlet for conducting air from the space above the trays to the outside atmosphere.

2. In a brooder, a room having a series of brooder trays therein, with a partition at each side thereof, mechanical means inside said room for creating currents of fresh air downwardly outside of the partitions and inwardly beneath the same to cause a gentle diffusion of air upwardly through the trays, an exhaust chamber above the ceiling of the brooder room, said ceiling having one or more openings therein, and means for conducting air from the exhaust chamber to the outside atmosphere.

3. In a brooder, a room having a series of brooder trays therein, with a partition at each side thereof, heating devices, means inside said room for creating currents of fresh air past the heating devices and directing the same downwardly outside of the partitions to cause a gentle diffusion of air upwardly through the trays, and means for discharging a portion only of the air into the atmosphere after it passes the trays and for causing the remaining portion to be re-circulated past the heating devices.

4. In a brooder, a series of brooder trays, an exhaust chamber located above the tray space and having restricted communication therewith, a heating device located at each side of the trays, a partition disposed in a plane between the trays and each heating device, means within said space for creating a flow of air in a circuit past each heating device and past the trays, said circuits passing respectively beneath the partitions and above the same, means for continuously introducing a proportion of fresh air from outside the building to the air circuit in the region of the heating device, and means for continuously discharging a like proportion of the circulating air from the tray space to the exhaust chamber and thence to the outside atmosphere.

5. In a brooder, a series of brooder trays, a ceiling above the same, an exhaust chamber above the ceiling, a heating device at opposite

sides of the trays and immediately beneath the ceiling, a partition disposed in a plane between said trays and each heating device, a housing about each heating device having a downwardly directed outlet and inlet adjacent the ceiling on the side toward the trays, means for forcibly creating a flow of air past each heating device through the respective outlet, beneath the adjacent partition, thence upwardly by a gentle diffusion past the trays and thence through the respective inlet back to the heating device, each housing having an auxiliary inlet from outside the building to permit the admixture of fresh air, an outlet from the tray space to the exhaust chamber, and means for forcibly discharging air from the exhaust chamber to the outside atmosphere.

6. In a brooder having a closed chamber, a partition disposed on opposite sides of the chamber spaced from the floor thereof, a housing spaced laterally from each partition, a temperature modulating device in each housing for the air passing therethrough, means providing an air inlet passage from the outside atmosphere to each housing, each housing having an air-outlet to the chamber adjacent to the respective inlet passage, a fan in the region of each inlet passage for drawing air into the chamber, a damper controlling each inlet passage, means operable when the temperature within the chamber exceeds a predetermined degree for opening said damper, whereby fresh outside air may be drawn freely into the chamber past said temperature modulating device without materially changing the temperature thereof, means providing an additional air inlet to each housing spaced laterally from said first inlet thereof and through which air may be drawn when the respective damper is closed, and means for discharging air from said chamber.

7. In a brooder, a structure having an enclosed brooding chamber, means for forcibly supplying fresh air to opposite sides of said brooding chamber, air modulating means in the air supply means and in said brooding chamber, a partition disposed on opposite sides of the chamber spaced laterally from said supplying means and above the floor of the chamber, means for recirculating the major portion of the air in said brooding chamber, the used air passing above the partition and over said air modulating means, and an air discharge chamber above said brooder chamber in communication therewith through a plurality of restricted openings, said latter chamber having an opening leading to atmosphere, and an exhaust fan located in said opening.

8. In a brooder, a room having a series of brooder trays therein, a partition at each side thereof and spaced laterally therefrom, a fan in said room for drawing fresh air into said room and for forcing currents of air down-

wardly outside of the partition and inwardly beneath the same to cause a gentle diffusion of air upwardly and around the trays, an exhaust chamber above the ceiling of the
 5 brooder room, said ceiling having one or more openings, and a fan for drawing air from the exhaust chamber in definite proportion to the amount of fresh air drawn into said room.

9. In a brooder, a series of brooder trays, a
 10 ceiling above the same, an exhaust chamber above the ceiling, a temperature-modulating device at opposite sides of the trays and immediately beneath the ceiling, a partition disposed in a plane between said trays and each
 15 modulating device, a housing about each modulating device having a downwardly directed outlet, a fan for creating a flow of air past each modulating device through the respective outlet, beneath the adjacent partition, and thence upwardly by gentle diffusion
 20 past the trays, each housing having an auxiliary inlet from outside the building to permit the introduction of fresh air, an outlet from the tray space to the exhaust chamber,
 25 and a fan for discharging air from the exhaust chamber to the outside atmosphere.

10. In a brooder having a closed chamber, brooder trays in said chamber, an exhaust chamber above said closed chamber and in
 30 restricted communication therewith, a housing disposed in the upper portion of said closed chamber and at opposite sides of said trays, each housing comprising means providing an air inlet passage from the outside,
 35 an air outlet to said chamber communicating directly with said inlet passage, a normally closed damper controlling said inlet passage, a second inlet passage to the housing from the outside spaced laterally from the air out-
 40 let passage and open at all times, means adjacent said first inlet for forcing air from the second inlet, a temperature-modulating device in the housing between said air-forcing means and said second inlet, temperature-
 45 controlled means for opening the damper in the housing, partition means between each housing and brooder trays for causing air to flow downwardly toward the floor of the chamber and thence upwardly past said trays
 50 and into said exhaust chamber, and means for forcibly discharging air from said exhaust chamber.

11. In a brooder, a series of brooder trays,
 55 an exhaust chamber located above the tray space and having restricted communication therewith, a temperature modulating device located within the tray space at each side of the trays, a partition disposed in a plane between
 60 opposite sides of the trays and each modulating device, a fan for creating a flow of air past each modulating device, beneath the partitions and past the trays, means providing an air inlet for supplying fresh air
 65 to said fan, and a second fan for discharg-

ing air from the tray space to the exhaust chamber and thence to the outside.

In testimony whereof I have hereunto signed my name to this specification.

ESTA M. PIERCE.

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