(No Model.)

J. T. BUTTS.

INCUBATOR.

No. 559,260. Patented Apr. 28, 1896.

FIG. 1.

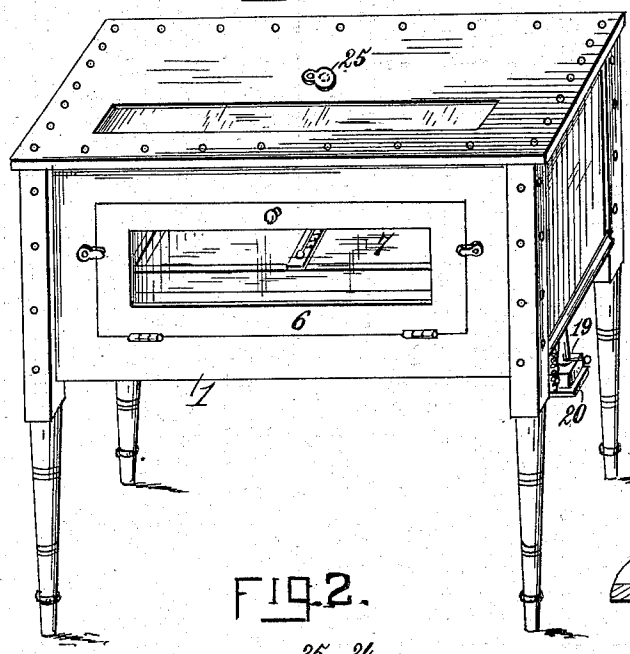


FIG. 3.

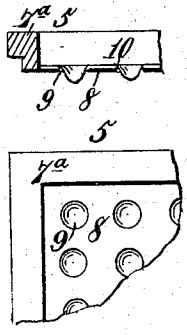


FIG. 4.

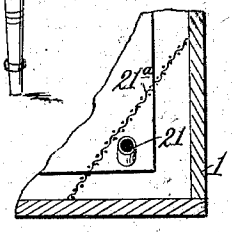


FIG. 2.

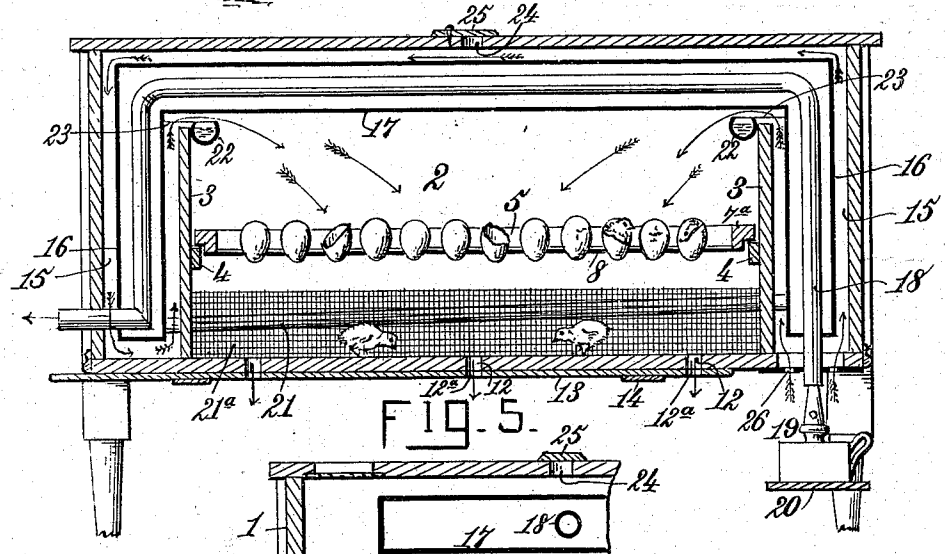
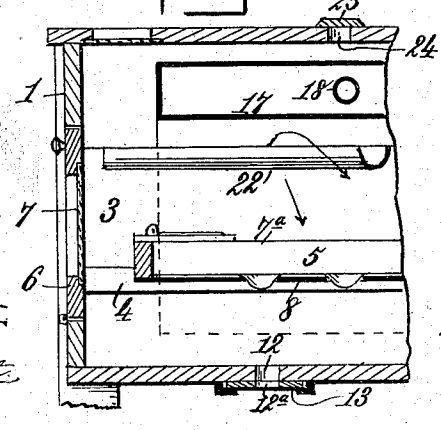


FIG. 5.



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UNITED STATES PATENT OFFICE.

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INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 559,260, dated April 28, 1896.

Application filed February 12, 1896. Serial No. 579,037. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. BUTTS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Incubators, of which the following is a specification.

My invention relates to certain new and useful improvements in incubators, my purpose being to provide a simple construction and arrangement of parts whereby the newly-hatched chickens may pass from the incubating-tray into a lower compartment where they have the proper degree of warmth and fresh air in abundance and in which they shall have an unobstructed and extensive space for exercise.

It is my purpose also to so arrange the moisture-generators that a substantially uniform and suitable degree of humidity shall be imparted to the air in the interior of the incubator at all times and throughout every part.

My invention also has for its purpose the provision of a construction whereby the young chickens shall be fully protected from contact with the heated pipe or pipes during the period that they remain in the incubator after hatching.

My invention also comprises the provision of incubating-trays having separate recesses or seats for the eggs, in which they are sustained with their points turned downward throughout the entire period of incubation, thereby preventing the settling of the yolks on one side and avoiding the necessity of turning the eggs over daily, means being provided whereby the chickens, after escaping from the shells, shall all pass into a compartment below the incubating-trays, provision being made to prevent them from dropping through or becoming entangled in the recesses, seats, or openings formed in said trays for supporting the eggs.

My invention also aims to provide a novel construction and arrangement whereby the temperature of the interior of the incubator is maintained at the normal point by a circulation of heated air through every part, provision being made for the supply of a suitable volume of such warm air to the lower part of the inclosed space, so that the chickens, after they pass to the retaining-compartment beneath the tray, shall have ample warmth, provision being made, as already mentioned, for shielding them from contact with the pipe or pipes through which circulation is established in the boiler.

Finally, it is my purpose to provide an incubator in which the temperature can be easily, quickly, and perfectly regulated and maintained at the proper point by a small consumption of oil or gas, said temperature being equalized at both ends and in all parts of the interior of the incubator.

The invention consists, to the several ends specified, in the novel features of construction and new combinations of parts hereinafter fully explained and then particularly pointed out and defined in the claim.

To enable those skilled in the art to which my invention pertains to fully understand and practice said invention I will describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of an incubator constructed in accordance with my invention. Fig. 2 is a vertical longitudinal section taken in substantially the central line of Fig. 1. Fig. 3 is a detail view showing a broken portion of the incubating-tray in section and in plan view. Fig. 4 is a detail view showing the angle of the lower compartment, in which the circulation-pipe is arranged, and the means for protecting the young chickens from contact with said pipe. Fig. 5 is a transverse vertical section of the incubator.

The reference-numeral 1 in said drawings indicates the inclosing case or box, which I may form of wood or any other suitable material. It is usually of rectangular form, and of any required dimensions, according to the number of incubating-trays employed. Ordinarily a single tray, as shown in Fig. 2, will answer the purpose and will serve to illustrate my invention.

Within the interior of the box 1 is the incubating-chamber 2, which is inclosed between the two side walls of the box and two interior end walls 3, which rise from the bottom of said box at a little distance from the end walls of the latter, said interior end walls rising to a point below the top of said box. About midway between the top and bottom of the end walls 3 are placed cleats 4 to sup-

port the tray 5, which slides in from the front through a doorway, the door 6 closing the latter being hinged, preferably, at its lower edge and provided with a transparent pane 7, through which the whole of the interior of the chamber 2 is easily seen.

The tray 5 consists of a frame 7ª, usually constructed of wood and having its ends rabbeted to fit upon the cleats 4. To the lower edge of this frame is attached a diaphragm 8, formed of thin sheet-iron or of any suitable material and provided at regular intervals with circular openings 9 of such size as to admit the points of the eggs, which should pass far enough below the diaphragm to enable the eggs to stand in an upright position. Over the diaphragm 8 is placed a layer of flexible material 10—such as cloth, muslin, or any suitable fabric—and upon this the eggs rest, the fabric 10 being pushed through the openings 9 by the points of the eggs. The tray divides the chamber into two parts, one above and one below the tray. The lower chamber is comprised between the floor of the box and the diaphragm 8, the floor being provided with openings 12, which may be closed or opened to any degree required by means of a slide 13, arranged in keepers 14 beneath the box and provided with apertures 12ª, which may be caused to register with the openings 12, as seen in Fig. 2. It should be noted that the incubating-tray 5 is of less width than the incubating-chamber, in order that when it is in place there shall be an open space between its front edge and the door or transparent pane 7, for a purpose presently to be explained.

Between the end walls of the box 1 and the interior end walls 3, which partly inclose the incubating-chamber 2, are vertical spaces or chambers 15, which extend from side to side and from top to bottom of the box 1. These end chambers communicate with the open space directly over the tops of the end walls 3 and extending over the whole of the incubating-chamber. Within said chambers are arranged vertical casings 16, which form part of and communicate at their upper ends with a horizontal casing 17, extending over the top of the chamber 2. The end casings 16 are of such dimensions that a sufficient air-space is allowed between them and the end walls 3, as well as between their outer faces and the end walls of the box. There is also a suitable space between the horizontal casing 17 and the top of the box and a sufficient opening between the top of each end wall B and the lower wall of the horizontal casing to permit ample flow of air into the incubating-chamber. The lower ends of the vertical casings lie above the bottom of the box and space is also left between their vertical edges or sides and the side walls of the box. The interior space inclosed by the two vertical and the horizontal casings is continuous, as seen in Fig. 2. The lower ends of the casings 16 are closed, and a pipe or hot-air conduit 18 enters through one, and after traversing the inclosed space emerges at the lower end of the other vertical casing and passes through the wall of the box. This pipe is heated by any suitable means, such as a burner 19 of any preferred type, standing upon a bracket 20 beneath the entrance end of the pipe. A separate pipe 21 connects the lower closed ends of the vertical casings 16, this pipe being preferably but not necessarily arranged in the angle adjacent to the side of the box 1. The pipe is inclined somewhat, its exit end being the highest in order to promote circulation within the casings 16 17. In order to prevent contact, a sheet or strip 21ª of wire-gauze or other suitable material is secured to the floor and carried in an inclined plane to the side wall above the pipe 21, as shown in Fig. 4.

In or near the inner angles between the horizontal and the two vertical casings are arranged moisture-generators 22, extending transversely just within the upper edges of the end walls 3. These generators may conveniently be mounted on arms 23, which project from the inner faces of the vertical casings 16. Their open tops are thus brought into close proximity to the upper casing 17, from which they receive heat to produce evaporation. An opening 24, capable of being wholly or partly closed by a pivoted damper 25, is provided in the top of the box to assist in ventilation and in controlling the interior temperature when required.

The operation is as follows: The eggs being placed on end in the tray and the latter placed in the chamber 2, the burner 19 is put in operation, its hot gases being caused to traverse the conduit or pipe 18. The heat from the latter is imparted to the water in the interior of the closed space in which said pipe lies and to the walls of the casings 16 and 17, a substantial equality of temperature throughout the extent of said casings being secured by their interior circulation through the pipe 21, the warmer current in the highest end of said pipe, which is quite near the burner, flowing into the vertical casing and drawing after it the cooler portions at the lower end of the other vertical casing, which is most remote from the source of heat. Air from the exterior of the box is admitted through openings 26, near the entrance end of the pipe 21 and surrounding the burner, so that the air which enters through these openings receives a certain degree of heat before entering. The air admitted flows over the walls of the casings, from which it derives heat, and passes over the tops of the end walls 3 directly into the incubating-chamber 2, or, before doing so, flows over the top of the casing 17, then downward, between the other wall of the box and the casing 16 farthest from the burner, thence passing around its lower end and upward between said casing and the wall 3, finally passing over the top of said wall into the chamber 2. This prolonged travel of the air largely aids in the preservation of an equal tempera-

ture at both ends of the box. The warm air thus provided after circulating through the chamber 2 above the tray passes down into the lower compartment and emerges through the openings 12. The equality of temperature in the upper and lower parts of the chamber is promoted by the circulation-pipe 21. The moisture from the generators 22 naturally descends as the evaporation from these generators continues and thus permeates every part of the interior. The evaporation is materially promoted by the flow of warm currents of air over the tops of the walls 3 and directly over the open tops of the moisture-generators, as well as by the direct radiation from the lower wall of the casing 17.

The chickens, when hatched, emerge from the shells into the chamber above the tray. Being attracted by the light entering through the pane 7 they make their way toward it and thus pass down through the opening between the door and the front of the tray, passing into the lower chamber, where they have ample space for exercise and are suitably provided with warmth, air, and light. The netting 21^a serves as a shield to protect them from contact with the pipe 21, while it permits free passage to the air and heat. The flexible material or fabric covering the diaphragm of the tray prevents the chickens from becoming entangled in the openings 9.

The sole attention that the incubator requires is to air the eggs daily from five to ten minutes, this period being regulated by the temperature, as it must not be prolonged so as to permit the eggs to cool below 85° Fahrenheit. This and an occasional supply of water to the moisture-generators and the ordinary care of the lamp is all that is requisite, as the eggs need no turning, as already mentioned.

What I claim is—

In an incubator, the combination with an incubating-chamber, of a closed casing extending over the open top of said chamber and having two vertical portions lying outside and at a little distance from the end wall of the incubating-chamber, a circulation-pipe connecting the lower ends of the vertical portions of the casing, a box or casing inclosing the closed casing, a pipe entering both and traversing the horizontal and the two vertical parts of the closed casing, a burner connecting with said pipe, moisture-generators arranged in or near the interior angles between the horizontal and vertical parts of the casing and at or near the upper edges of the end walls of the incubating-chamber, and a tray arranged at or near the middle of said chamber and having a diaphragm provided with openings covered by flexible material or fabric, an open space being provided between the front edge of the tray and a transparent pane in the adjacent wall, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN T. BUTTS.

Witnesses:
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THOS. A. GREEN.