J. L. CAMPBELL.
Incubator.

No. 217,333. **Patented July 8, 1879.**

Fig: 1.

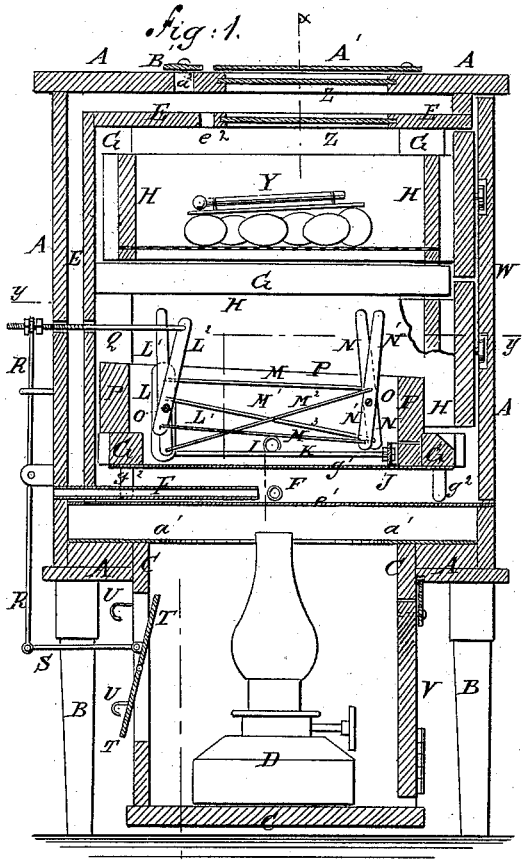


Fig: 2.

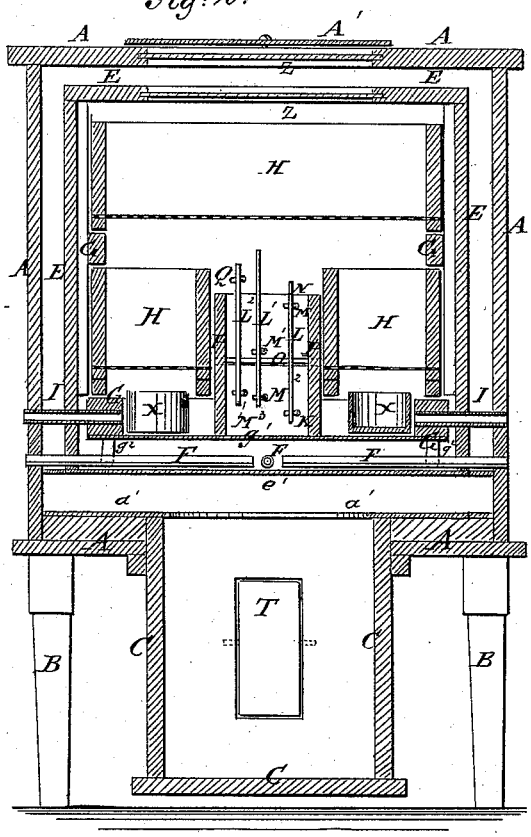
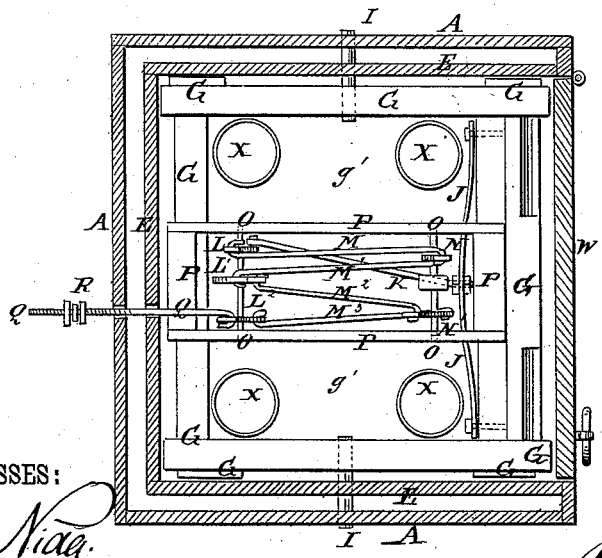


Fig: 3



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JAMES L. CAMPBELL, OF WEST ELIZABETH, PENNSYLVANIA.

IMPROVEMENT IN INCUBATORS.

Specification forming part of Letters Patent No. **217,333**, dated July 8, 1879; application filed March 5, 1879.

To all whom it may concern:

Be it known that I, JAMES L. CAMPBELL, of West Elizabeth, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Incubators, of which the following is a specification.

Figure 1 is a vertical longitudinal section of my improved incubator. Fig. 2 is a cross-section of the same, taken through the broken line *x x*, Fig. 1. Fig. 3 is a horizontal section of the same, taken through the line *y y*, Fig. 1, the egg-drawer being removed.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved device for hatching eggs artificially, which shall be so constructed that the burning of the lamp may be regulated automatically, so as to keep the eggs at a uniform temperature, and which shall be properly ventilated.

The invention consists in the incubator formed by the combination of the two boxes, having an air-space between them all around, the lamp-box, the frame, the three sheet-metal bottoms, the inlet and outlet ventilating-pipes, and the egg-drawers with each other; and in the combination of the curved iron bar, the rod, the set of connecting-rods, the two groups of balanced levers, the two connecting-rods, the lever, and the pivoted plate or valve with the frame and boxes and the lamp-box, as hereinafter fully described.

A is the outer wooden box, which may be made of any desired size, is supported upon legs B, and has a square hole about ten inches in diameter formed in its bottom, to receive the open-topped box C for the lamp D.

To the box A, one inch above the upper side of its wooden bottom, is attached a sheet-iron bottom, a^1, which has a hole formed through its center to receive the chimney of the lamp D.

E is the inner wooden box, which is made so much smaller than the outer box, A, as to leave a space of about an inch between them on all sides, to prevent the temperature of the box from being so easily affected by the outside temperature.

The bottom e^1 of the inner box, E, is made of sheet-iron or any suitable metal, and is heated by the lamp D. The space between the two metal plates a^1 e^1 will be always full of heated air, and will thus economize heat. The products of combustion from the lamp D pass down past the said lamp and out at the bottom of the lamp-box C.

Air is introduced through inlet-pipes F, which pass in through the side and rear walls of the boxes A E and terminate just above the center of the sheet-iron bottom e^1, so that the cold air will be introduced at the warmest point, and will be heated before it is distributed through the apparatus.

Within the inner box, E, is placed a frame, G, which is provided with a sheet-iron bottom, g^1, so that the hot air can only pass up around the edges of the said bottom g^1 and along the inner surface of the walls of the inner box, E.

The iron bottom or plate g^1 radiates heat enough to keep the lower egg-drawer, H, as warm as the upper one. By causing the heated air to pass up at the outside of the egg-drawers H the temperature will be kept even. If the heated air were allowed to pass up through the center the outside parts would be too cold.

The frame G is supported upon short feet g^2, to form a space between the two sheet-metal bottoms g^1 e^1.

H are drawers to receive the eggs, which rest and slide upon cleats or bars of the frame G, and which are made to fit snugly into their places, so that the said drawers and frame, H G, and the walls of the inner box, E, may form flues, through which the heated air passes up to the top of the said inner box, E. The upper drawer, H, does not reach quite to the top of the inner box, E, so that the heated air may enter the upper drawer and pass down through the said drawers H, which are made with perforated bottoms for this purpose.

The heated air escapes through a hole, e^2, in the top of the box E into the space between the tops of the two boxes E A, and escapes thence through the hole a^2 in the top of the outer box, A.

The heavy foul air sinks to the bottom g^1 of the frame G and passes out through the pipes I, which pass through the frame G and the walls of the two boxes E A.

To the end parts of the front base-bar of the

frame G, or to a wooden bar secured to the said front bar, are attached the ends of an iron bar, J, which is slightly curved, and to the center of which is secured the end of a rod, K. The rear end of the rod K is pivoted to the lower end of a lever, L, to the upper part of which is pivoted the end of a rod, M. The forward end of the rod M is pivoted to the lever N.

To the lower end of the lever N is pivoted the end of a rod, M^1, the rear end of which is pivoted to the lever L^1 a little above its pivot.

To the lower end of the lever L^1 is pivoted the end of a rod, M^2, the forward end of which is pivoted to the lever N′ a little above its pivot. To the lower end of the lever N′ is pivoted the end of a rod, M^3, the rear end of which is pivoted to the lever L^2 a little below its pivot.

The two groups of levers L L^1 L^2 and N N′ are pivoted by the rods O to the rear and forward parts of the sides of the box P, which is made open at top and bottom, and is secured to the middle parts of the front and rear base-bars of the frame G.

The middle part of the lower drawer, H, is cut away to form a space for the box P. The levers L L^1 L^2 and N N′ are all balanced, so that they may be moved with the least possible outlay of power.

To the upper end of the lever L^2 is pivoted the end of the rod Q, which passes out through the rear sides of the boxes E A, and has a screw-thread cut upon its outer end.

R is a lever, the upper end of which has an eye formed in it to receive the outer end of the rod Q, where it is secured in place adjustably by two nuts screwed upon the said end of the rod Q, upon the opposite sides of the end of the said lever R. The lever R is pivoted to a support attached to the rear side of the box A, and to its lower end is pivoted the end of a rod, S, the forward end of which is pivoted to the plate T. The plate T is placed in an opening in the rear side of the box C, and is pivoted at the middle part of its side edges to the said box C, so as to serve as a damper or valve to admit air to the lamp D. To the rear side of the box C are attached stops V to limit the movement of the said plate.

With this construction slight changes in temperature will expand and contract the bar J and the rods M, and will thus adjust the plate T to admit less or more air to the lamp D, to lessen or increase the heat, so that the interior of the incubator will be kept constantly at the same temperature, and this temperature may be increased or diminished by adjusting the nuts upon the end of the rod Q.

The lamp-box C is closed by a door, V, which fits tightly, except at the bottom, where there is left a small opening, only large enough to admit sufficient air to prevent the lamp from going out should the plate T be fully closed.

The front of the boxes A E is closed by a door, W, which fits closely all around. Upon the bottom g^1 of the frame G are placed cups or pans X of water, to give the necessary moisture to the air.

The temperature of the interior of the incubator may be ascertained at any time by inspecting the thermometer Y, which should be laid upon the eggs in the upper drawer, H. To allow this to be done without opening the door W glass plates Z are inserted in openings in the tops of the boxes A E, as shown in Figs. 1 and 2. In this case the glass plate Z in the top of the outer box, A, should be covered by a pivoted or sliding plate, A^1, to keep out the light. The outlet-opening a^2 in the top of the box A is also provided with a pivoted or sliding plate, B^1, to allow the escape of the heated air to be regulated as may be desired.

I am aware that the sliding door of an incubator has been operated by the expansion and contraction of a rod having teeth, which mesh with one of the wheels of a train of gearing, the last one of which meshes with a rack attached to the door.

I am also aware that cold air has been automatically admitted to the fire-chamber of a furnace by the expansion and contraction of strips connected by a series of levers to the valve of the air-inlet pipe; but

What I claim, and desire to secure by Letters Patent, is—

1. The incubator formed by the combination of the two boxes A E, having an air-space between them all around the lamp-box C, the frame G, the three sheet-metal bottoms a^1 e^1 g^1, the ventilating-pipes F I, and the egg-drawers H with each other, substantially as herein shown and described.

2. The combination of the curved iron bar J, the rod K, the set of connecting-rods M, the two groups of levers L N, the screw-threaded connecting-rod Q, provided with adjusting-nuts, the lever R, the connecting-rod S, and the pivoted plate or valve T with the frame and boxes G E A and the lamp-box C, substantially as herein shown and described.

JAMES LOGAN CAMPBELL.

Witnesses:
ROBERT CAMPBELL,
THOMAS MCCLEES.