(No Model.) 2 Sheets—Sheet 1.

J. M. HALSTED.

INCUBATOR.

No. 262,407. Patented Aug. 8, 1882.

Fig. 1.

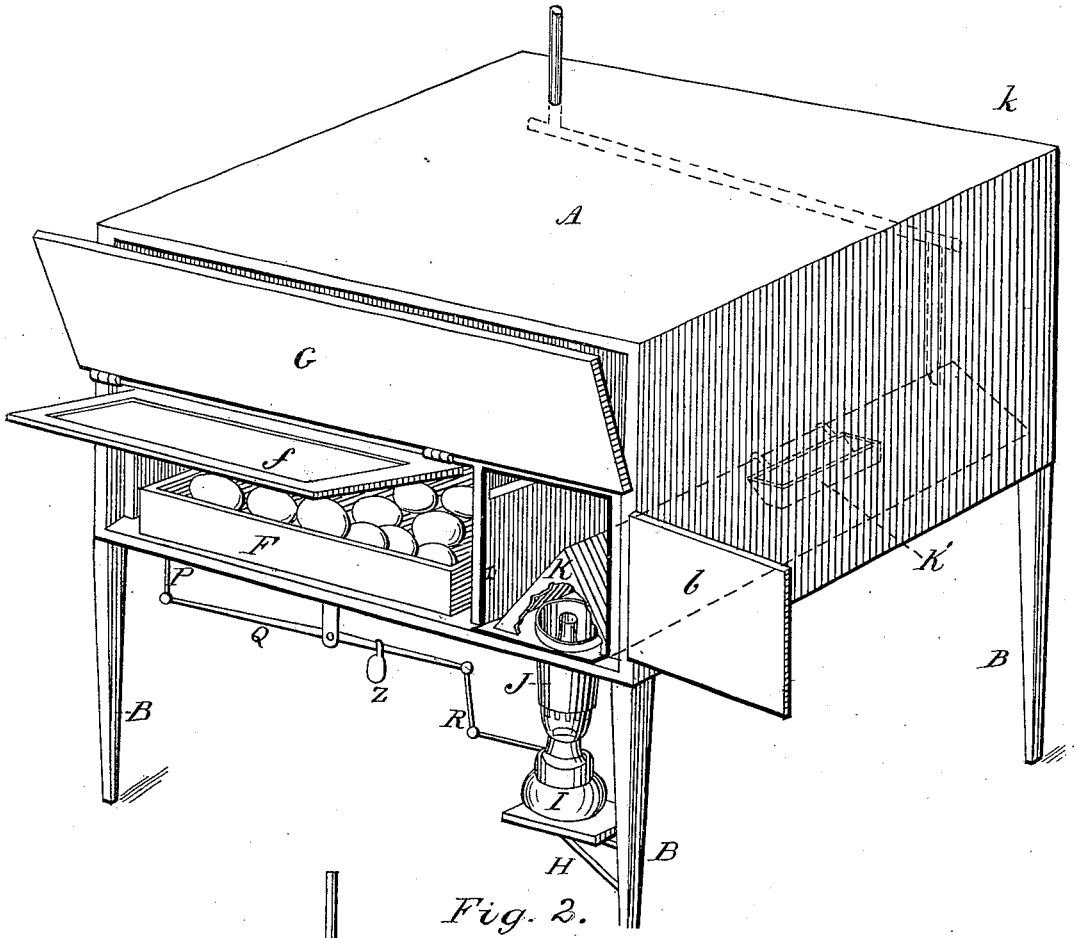
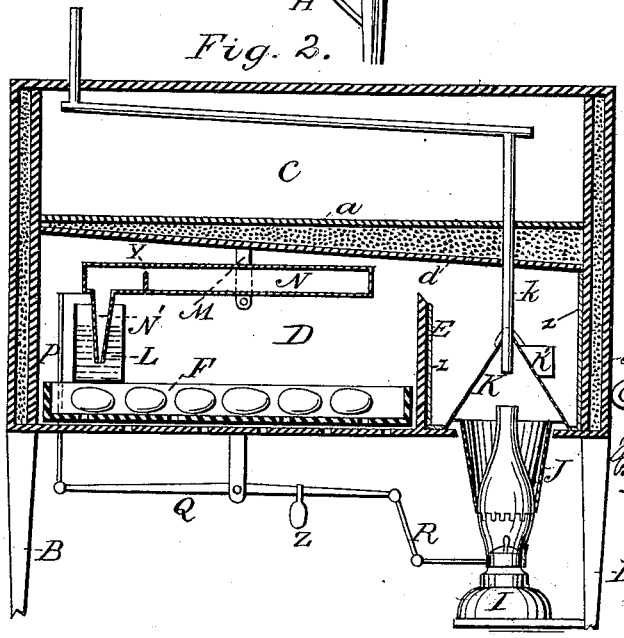


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

J. M. HALSTED.

INCUBATOR.

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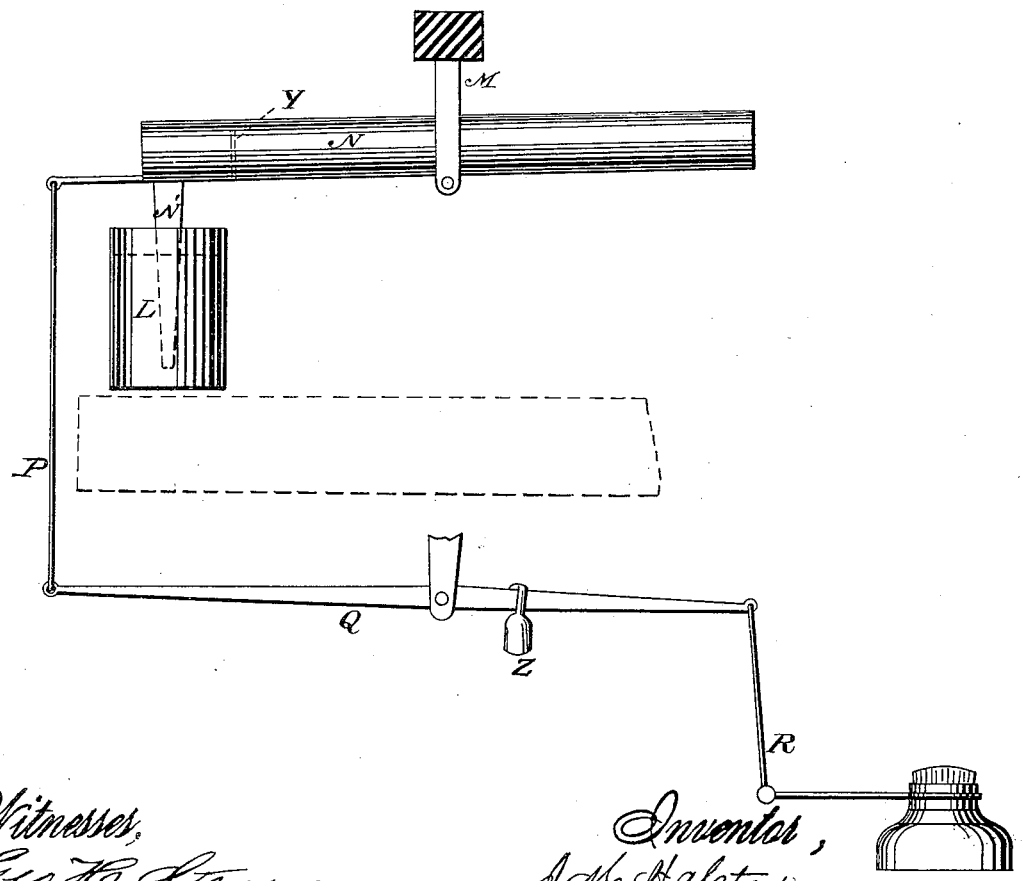
Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES M. HALSTED, OF OAKLAND, CALIFORNIA, ASSIGNOR TO KATE K. HALSTED, OF SAME PLACE.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 262,407, dated August 8, 1882.

Application filed March 10, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. HALSTED, of Oakland, county of Alameda, State of California, have invented an Improved Incubator; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a new and useful incubator; and it consists in certain improvements in the construction and arrangement of the entire device, having in view simplicity and economy, as will be fully explained in the course of the following more particular description, and by reference to the accompanying drawings.

Figure 1 is a perspective view of my incubator. Fig. 2 is a vertical section of same. Fig. 3 is an enlarged view of regulator.

Let A represent the body or box of the incubator, supported upon the legs B. The side walls of the box are made of two thicknesses of boards, separated slightly, leaving a space between, which is packed with cotton-batting and paper, thus forming walls well adapted to retain the heat. The box is divided into two compartments by a horizontal partition or floor, *a*. The upper chamber, C, is completely inclosed, and is preferably provided with a glass door upon its front, by means of which convenient access may be had to the interior. The floor *a* of the upper chamber does not form the roof, top, or ceiling of the lower chamber, D, but a top, *d*, is provided, consisting of boards extending from end to end upon an incline, as shown, so that at one end the chamber is not as high as at the other. The space between the partitions *a* and *d* is packed with paper and cotton, as are the sides, thus making the chamber as warm as possible. In the lower chamber, D, at its low end, is a vertical partition, E, extending from the floor toward the top. It does not reach the top, but leaves a space between. It divides chamber D into a larger and smaller compartment, the two being connected over the top of the vertical partition E. The larger compartment of chamber D is the egg-chamber, in which the egg-drawer F is laid, and is closed by a glass door, *f*, adapted to swing upwardly upon its hinges, as shown. The smaller compartment is the heating-chamber, and is inclosed by a door, *b*, swinging to one side, and the whole chamber D is closed by an outside door, G. The heating-chamber is preferably lined with bright-metal lining *z*—such as tin, for example—in order to improve its heat-radiation.

Upon the leg B is a bracket, H, upon which is a lamp, I, the chimney of which extends upward through a metal casing or sleeve, J, into a heater, K, lying within the smaller or heating compartment of chamber D its whole depth. The casing J fits loosely through the bottom of the box, leaving sufficient space around it to admit the passage of air from the outside. The heater K is a metal casing, preferably made triangular in shape, and has an exit-pipe or chimney, *k*, at its rear end. This pipe extends upward through the partitions *d* and *a* into the upper chamber, C, being closely packed in passing, and then extends the length of said chamber, finding an exit through the top, as shown. The chamber C is the brooder, into which I place the young chicks when hatched, it being kept warm by the passage of pipe *k* through it.

The bottom of the egg-chamber is perforated to permit ventilation through it. The outside air enters around the casing J, and flows through chamber D and down through its perforated bottom. This current is of course heated as it passes around the casing J and by the heater K, so that the desired temperature is maintained, while a constant and healthful ventilation is preserved. The packed walls of the chamber D keep the heat well within. When the chicks are hatched they are removed and placed above in the brooder C, which is kept warm by the pipe *k*, which carries off the products of combustion from the lamp.

Upon the apex of the triangular heater K is hung a small vessel or trough, K′, in which I place water, and thus keep a desirable moisture within the apparatus. It can be slipped along to the back end of the heater, in which position it is first placed; but as the time passes and more moisture is needed I gradually bring it forward toward the source of heat, so that a greater evaporation may take place. It is easily removable, and should be refilled at frequent intervals.

The operation of the device as far as explained is as follows: The egg-drawer, containing its eggs, is placed in the egg-chamber of

chamber D, and all the doors closed. The lamp is lighted and the products of combustion pass into the heater K, and thence through pipe *k*, out through the top of the machine. It heats up the metal casing J and the heater K, heating the compartment or heating-chamber in which the heater lies. Finding an outlet over the top of the partition E, the heat passes into the egg-chamber. The hot air passing over the partition E descends or comes into contact with and warms the eggs equally. The roof *d* of chamber D, by rising from the lower end, at which the hot air enters, gives the hot air an opportunity to rise, and it therefore flows to the far end of the chamber and warms it to the same degree as the end at which it enters. This is the object of the inclined roof *d* of the egg-chamber, to cause the hot air to heat the far end with an equal temperature, and it is accomplished by inducing it to rise, and thereby creating a current or flow to that end.

In all incubators some device is needed to regulate the temperature and maintain it constant, and it has been found that an automatic regulator is better adapted than any attention of the operator. In order to accomplish this result, I have the following device:

In one corner of the egg-chamber of chamber D, I place a cup, L, having a certain quantity of liquid in it. This liquid can be water or any other; but I prefer to have a liquid which will not rapidly evaporate and will not become rancid. I have therefore found that glycerine serves the purpose, and it is this liquid I use.

To the ceiling *d* is attached a bracket, M, to which is pivoted an air-tight casing, N, (here shown as a cylinder.) This cylinder is provided with a neck, N′, which projects downwardly into the liquid in the cup. The end of the neck is open and is the only entrance to the cylinder, which is otherwise air-tight. It is hung on its center of gravity with precision, and may easily move upon its pivot-point.

The operation of this device is as follows: The cylinder being full of air, its neck is extended down within the liquid, and the air within is thus confined. As the heat becomes greater and the air within becomes lighter and expands it presses against the liquid in the neck, and thus forces the cylinder (which is nicely pivoted) up. It will not escape through the liquid, as it is easier to move the cylinder. This movement of the cylinder I take advantage of to regulate the heat in the egg-chamber. Connected with its end is a wire or rod, P, extending down through the bottom of the box and connected with the end of a pivoted lever, Q, suspended under the box. The other end of lever Q is attached to rods or wires R, which are connected in any suitable manner with the burner of the lamp, and are adapted, upon the movement of the lever Q, to raise or lower the wick or otherwise to increase or decrease the flame and heat. Thus when the regulating-cylinder moves its end upward by reason of the expansion of the air within it, induced by increased temperature in the chamber, the rod P will move the lever Q to regulate the source of heat.

For more effective use of this regulator I place in the cylinder N a transverse partition, Y, having a small opening at the top, thus dividing the cylinder into two compartments, opening into each other through the top of the partition. This allows a free circulation of the air and prevents the liquid, which may be drawn up through the neck N′ into the cylinder, from passing from one part of said cylinder to the other, as it would be liable to do were the cylinder tipped the wrong way by accident. It also keeps the liquid at the point farthest from the center of gravity of the cylinder, thus allowing its most advantageous action.

In order to facilitate the regulator and cause it to change its limits as regards the degree of temperature necessary to operate it, I use a small weight, Z, adapted to be hung upon the lever Q.

If I want to decrease the temperature of an apartment sooner than would be done by the regulator unassisted, I move the weight Z out upon the lever Q, between its pivot-point and lamp-connections, to the point desired. This will cause the cylinder N to rise before it would do so of itself, and thus turn down the lamp sooner than otherwise. The opposite of this result will be obtained by hanging the weight Z upon the lever Q between its pivot and the other end.

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

1. In an incubator, the chamber D, divided into a hatching-compartment and a heating-compartment by the vertical partition E, the said heating-compartment being metal-lined, as shown, in combination with a heating device communicating its heat to the interior of the metal-lined chamber, as set forth.

2. In an incubator, the heating-chamber D, with its partition E, in combination with the heater K within said chamber, and the lamp I, the chimney of which extends within the heater, substantially as and for the purpose herein described.

3. In an incubator, the combination and arrangement of the lamp I, casing J, heater K, with its cup K′ within the hatching-chamber, and the exit-pipe *k*, substantially as herein described.

4. An incubator consisting of the combination and arrangement of the brooding-chamber C, hatching-chamber D, with its partition E, open above, the heater K within chamber D, and pipe *k*, and the lamp I, with the casing J, substantially as herein described.

In witness whereof I hereto set my hand.

JAMES M. HALSTED.

Witnesses:
W. H. BURRALL,
F. G. MCCANN.