(No Model.) 2 Sheets—Sheet 1.

C. BASSINI & A. HEYDEN.

INCUBATOR.

No. 330,457. Patented Nov. 17, 1885.

Fig. 1.

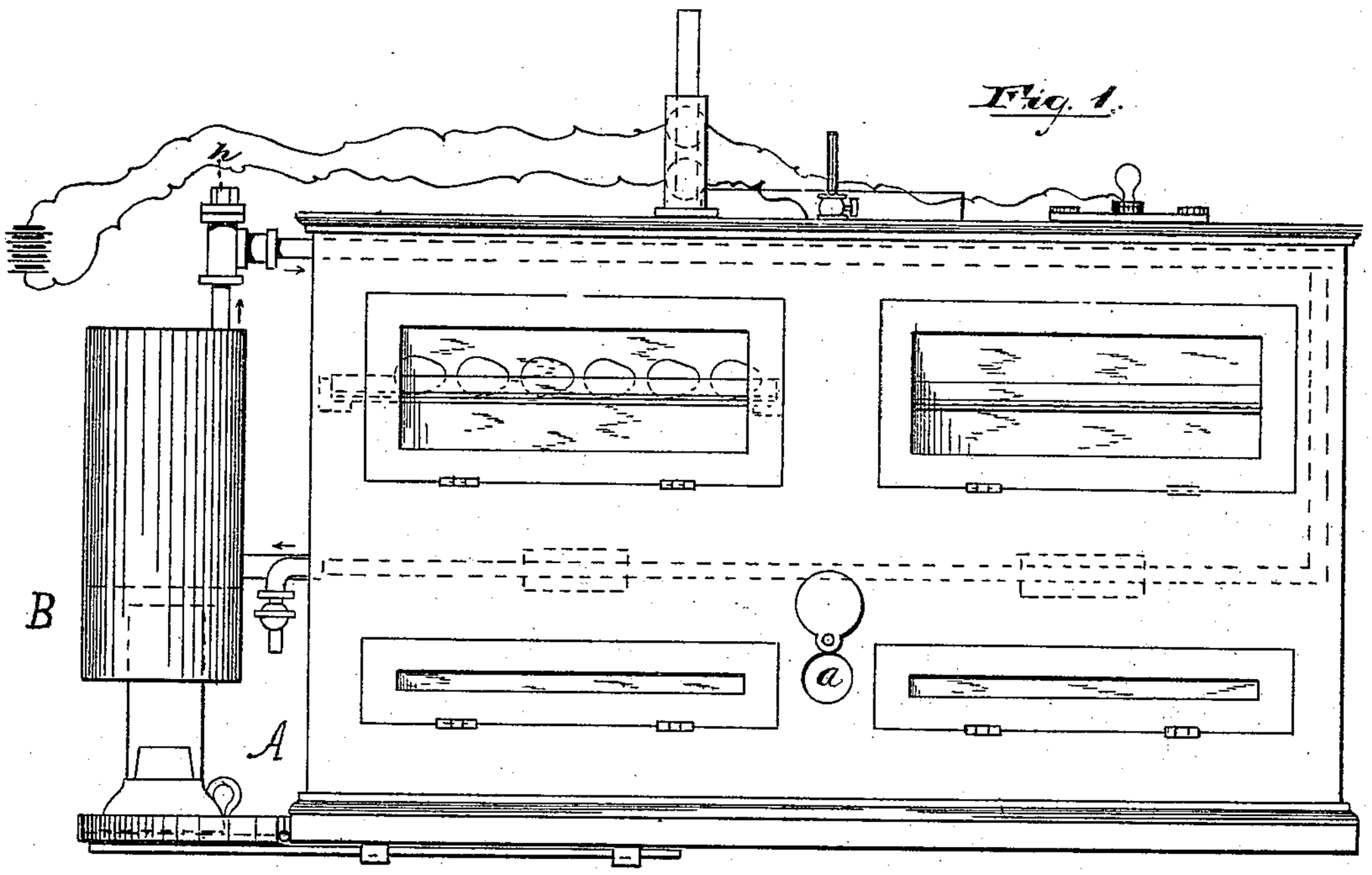
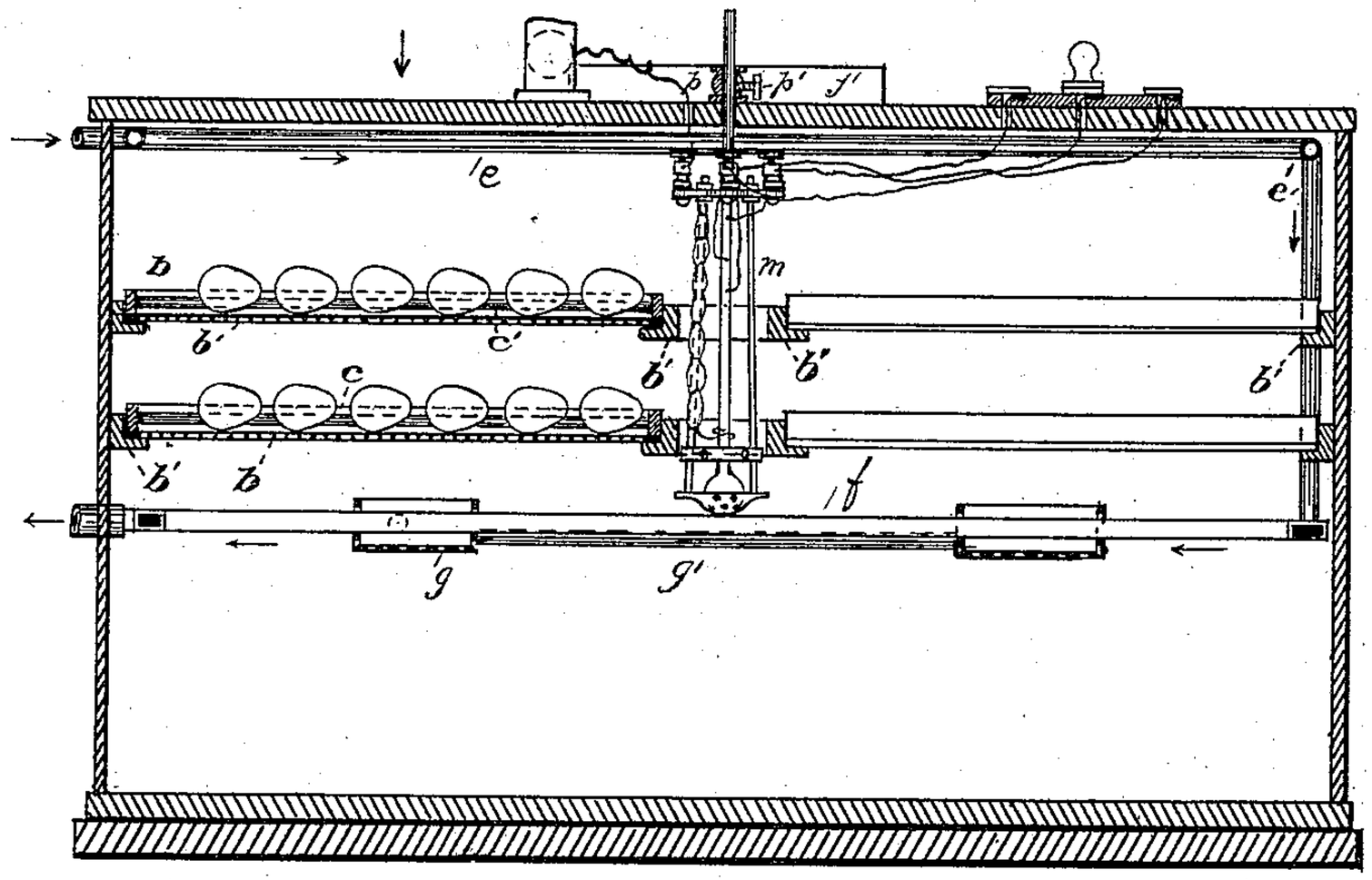


Fig. 2.



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Ford S. Adams

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(No Model.) 2 Sheets—Sheet 2.

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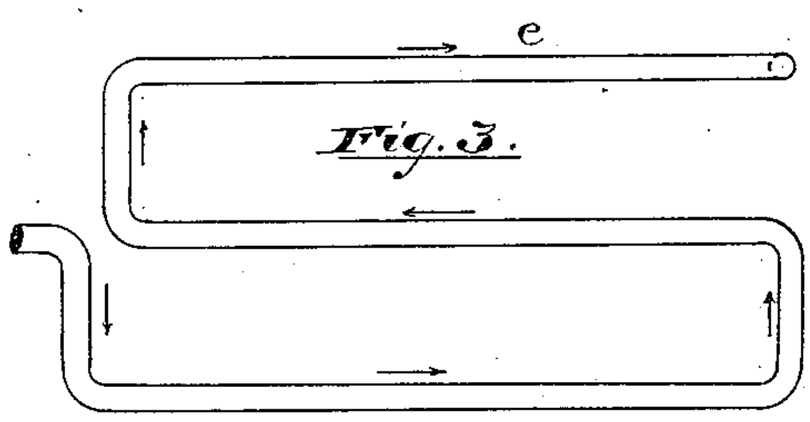

Fig. 3.

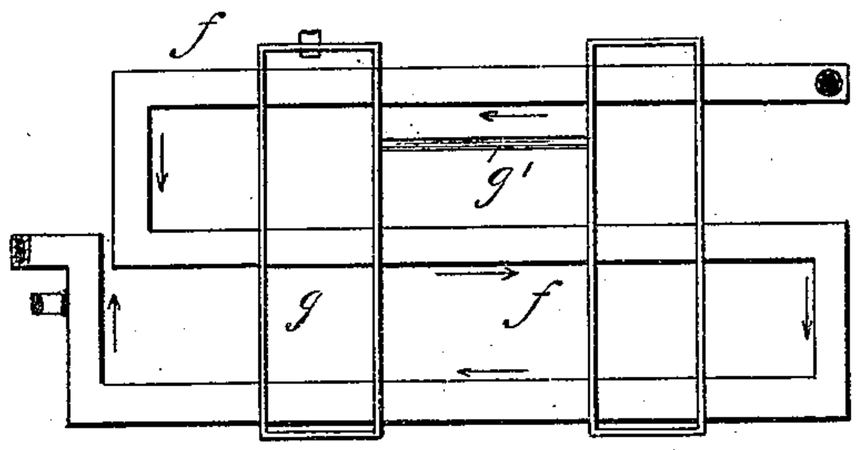

Fig. 4.

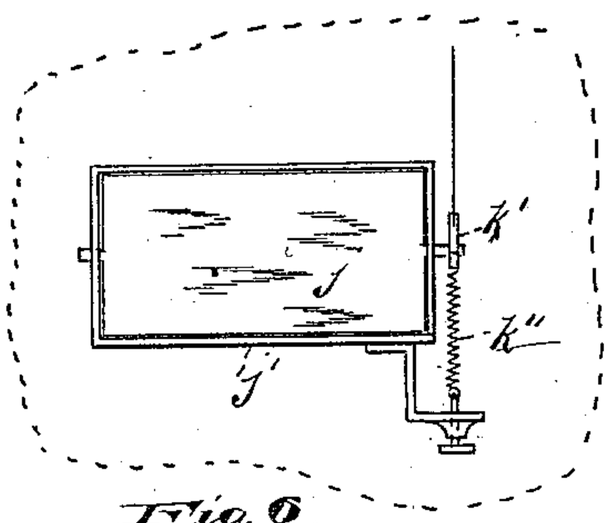

Fig. 6.

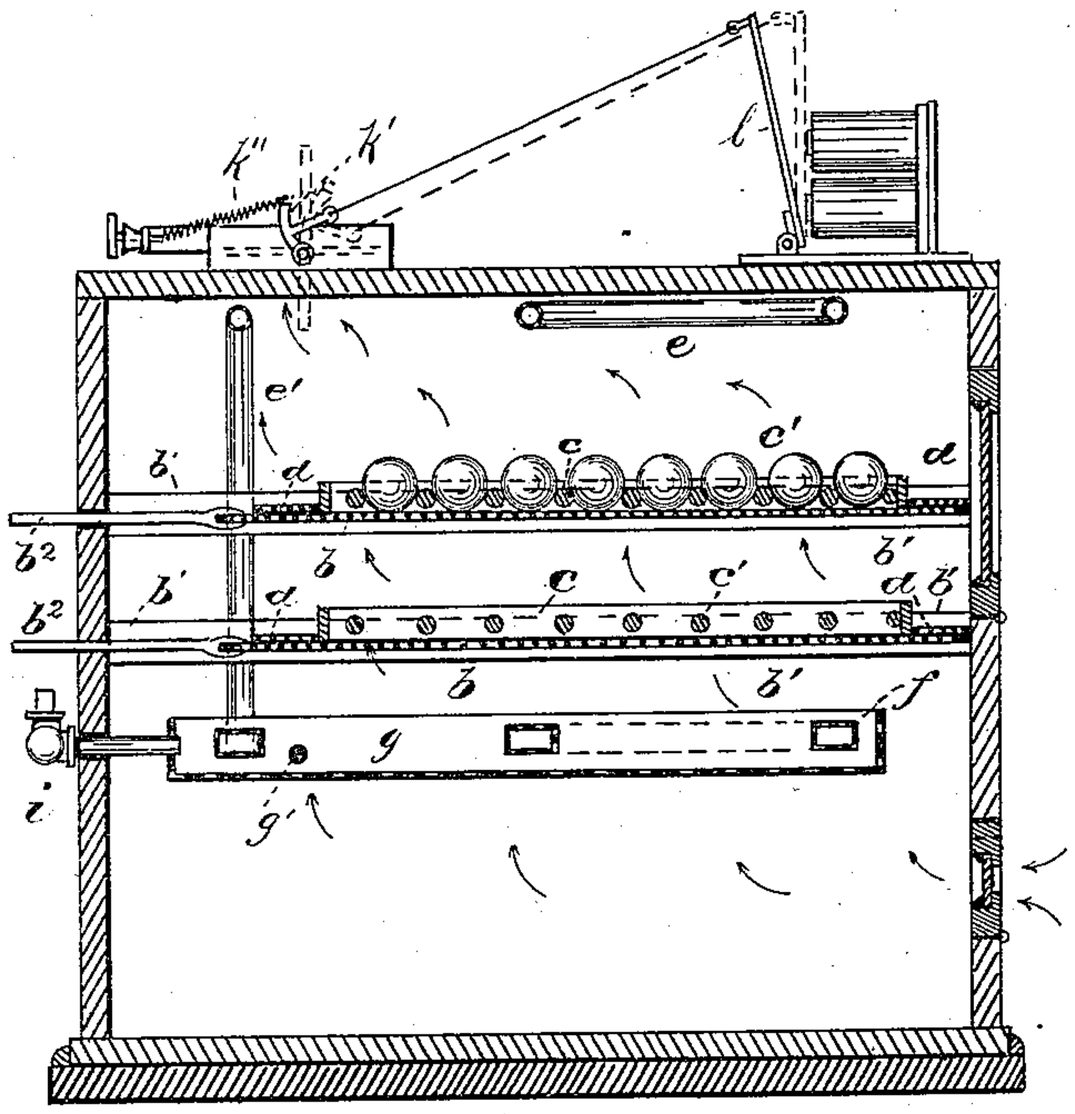

Fig. 5.

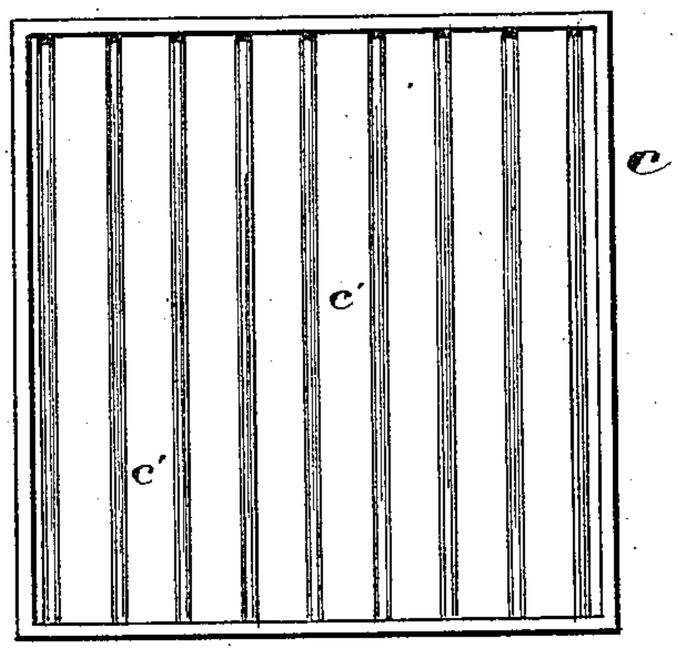

Fig. 7.

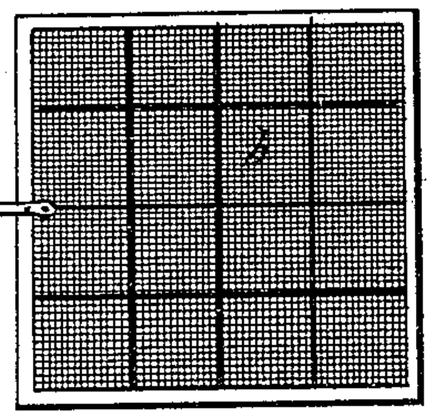

Fig. 8.

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UNITED STATES PATENT OFFICE.

CHARLES BASSINI, OF IRVINGTON, AND ADOLF HEYDEN, OF NEWARK, NEW JERSEY.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 330,457, dated November 17, 1885.

Application filed April 16, 1885. Serial No. 162,449. (No model.)

To all whom it may concern:

Be it known that we, CHARLES BASSINI and ADOLF HEYDEN, citizens of the United States, residing at Irvington and Newark, respectively, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Incubators; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Our invention relates to incubators for the artificial hatching of chickens, &c.; and it consists more particularly in the improved mechanism for turning the eggs without necessitating access to the interior of the box, and in the novel construction and arrangement of the heating and air-moistening apparatus.

In the accompanying drawings, Figure 1 is a front elevation of an incubating box and boiler illustrating our invention. Fig. 2 is a longitudinal section of the same. Figs. 3 and 4 are plan views of the upper and lower heating-coils, respectively. Fig. 5 is a transverse section in the direction of *x* in Fig. 2. Fig. 6 is a plan view of the damper and adjacent mechanism. Fig. 7 is a plan view of an egg-receiving frame, and Fig. 8 is a similar view of one of the slides or tables.

Similar letters of reference indicate like parts.

A is the incubating box or chamber, provided with glass-paneled doors. In the front side of said box is an opening, *a*, for the admission of fresh air. Said opening is provided with a pivoted lid or cover, as shown. In large boxes several openings similar to *a* may be provided. In the top of the box A is arranged a damper, *j*, which when opened allows of the escape of the warm air from the box. Inside the box are secured grooved ways, *b'*, which support and in which move the slides or tables *b*. Each slide is provided with a rod, b^2, which extends through the back of the box. By means of this rod the slide may be conveniently reciprocated in its ways. Above each of the slides *b* is an egg-receiving frame, *c*, which consists of a rectangular frame-work having transverse slats, bars, or partitions. Said frame may rest upon the slide beneath it, as is here shown, but is prevented from moving with said slide by bars or strips, *d*, which secure said frame in stationary position. The bars *d* are preferably made of wire, and are arranged in front and in rear of the frame *c*, and are attached to the box A at their ends. The eggs are placed in the spaces between the bars or partitions of the frames *c*, and hence their lower portions meet the upper surfaces of the slides *b*. When the slides *b* are reciprocated in their ways, the eggs are thereby turned or rotated. The eggs are supported by the transverse bars or partitions of the frames *c*, so that they do not rest with their whole weight on the slides.

We are aware that eggs have hitherto been placed between the bars of a stationary frame and caused to rest upon a moving web beneath, whereby they are turned as the web progresses, the frame preventing the eggs being carried along by the web. By this construction the whole weight of the eggs rests on the web, and, as some eggs are heavier than others, this weight is unequally disposed. The web then sinks down more in some places than in others, and the eggs become displaced, unevenly rotated, and, besides, are carried along by the web and brought into jarring contact with their retaining-bars whenever the web is moved. Another difficulty of this device is that the movement of the web is resisted by the weight of all the eggs resting upon it.

Inasmuch as the smallest crack in the shell will prevent the hatching of an egg, it is exceedingly important in devices of this sort that the mechanism for turning the eggs should move freely and easily, and that above all the eggs should not be subjected to jars or shocks.

By our invention the above requirements are secured and the difficulties mentioned wholly avoided. The transverse bars of our frame support the weight of the egg. The body of the egg protrudes below the slats sufficiently to make contact with the slide, and the slide in moving turns the eggs.

We find it preferable to make the slides

with roughened or corrugated surfaces, and also to form holes through them so as to allow free circulation of air to the eggs. In practice we find wire cloth or netting to be well adapted for this purpose, inasmuch as it is sufficiently rough to engage with and easily move the eggs, while it also allows free circulation of the heated air through its meshes.

Referring now more particularly to the heating apparatus, B is a boiler arranged outside the box A, and heated by a lamp or any other suitable means. Connected with the upper portion of said boiler, and arranged in the upper portion of the box, is a coil of tubes, *e*. Connected with the lower part of the boiler, and disposed in the lower part of the box, is a coil of tubes, *f*. The two coils *e* and *f* communicate by a vertical tube, *e'*.

The egg-receiving devices above described are disposed between the coils *e* and *f*. In said coils there is a constant circulation of water from the boiler, and hence heat is radiated from them, and by this means the air within the box A is suitably warmed.

We find it especially advantageous to employ coils of tubes in lieu of tanks or other large receptacles for the hot water and steam, because a better circulation is obtained, their contents are more quickly heated, they occupy less space in the box, they are not so liable to become leaky by expansion and contraction, they are more easily got at and romoved for repair, they allow of circulation of air between the tubes and hence of unobstructed draft between air inlet and outlet, they are cheaper in construction, and by actual experiment we find that the warmth diffused is much more equable and uniform.

In order to render the heated air properly moist, we provide open pans *g*, which are placed in the lower part of the box. Through these pans pass the tubes of the lower coil, *f*. The pans are filled with water, which is slowly evaporated by the heat obtained from the warm tubes passing through it. The vapor thus generated thoroughly and uniformly moistens the air in the box.

It is well known that the temperature within an incubating-box must be steadily maintained at certain points, and that it should range between 104° Fahrenheit at the beginning of the incubation to 98° Fahrenheit at the end.

In order properly to regulate the temperature in our device, we arrange in connection with the damper *j* an electrical thermostat, which when the degree of temperature in the box rises unduly opens the damper, and on a lowering of the temperature causes the damper to close. When the damper is open, the heated air escapes, and the aperture *a* in the lower part of the case also being open cold air is free to enter.

The heat-regulating contrivance which we preferably employ comprises a mercurial thermometer, *m*, which acts as a circuit-closer when the mercury in rising reaches certain predetermined points, and so establishes a current from a battery through an electro-magnet, energizing the latter and causing it to attract its armature *l*.

From Figs. 5 and 6 it will be seen that the damper is journaled in a frame, *j'*, and provided at one end with an arm, *k'*, which is connected to the armature *l*. Said arm is also provided with a spring, *k''*. The armature when attracted by the electro-magnet opens the damper, and when the armature is released the damper is closed by the action of the spring *k''*.

We do not limit ourselves to the use of the particular electrical heat-regulator here shown in connection with the damper of our incubator; neither do we herein claim the construction and arrangement of the heat-regulating device above described, because the same is fully set forth and claimed by us in another application for Letters Patent No. 172,270, filed July 22, 1885.

Referring now to the particular arrangement and construction of an incubator, it will be seen that we arrange our egg-receptacles between the heating-coils, and hence in the place where there is most uniform heat; also, that our open water-vessels *g* are placed in the lower part of the box, and are traversed by the lower coils. Being directly below the eggs, the moisture from said vessels rising of course meets the eggs. We place our air-inlet below the lower coil and also below the water-vessels so that the incoming cold air is not only warmed by contact with the lower coil, but is also moistened by meeting the vapor rising from the open vessels before it encounters the eggs. In this way we prevent sudden chilling drafts and like abrupt variations of temperature. Our damper, on the other hand, is placed above the top coils, and hence is in the best position to carry off the heated air. It will be seen, therefore, that in operation the fresh-air supply enters at the air-inlet, thence passes around the first or lower heating-coil and over the moistening-pans, thence to and around the eggs, thence to and around the upper or second heating device, and then through the damper if the latter be open.

We claim as our invention—

1. In an incubator, the combination of a horizontally-reciprocating slide and a stationary frame supported above said slide, provided with transverse slats or bars, between and upon which bars the eggs are received and supported, substantially as described.

2. In an incubator, the combination of the incubator-box provided with air-inlets, an egg-receptacle therein supported upon a perforated reciprocating slide, a boiler or heater, heating-coils in said box above and below said egg-receptacle, connecting-pipes *e'*, damper *j*, and means for automatically opening said damper.

3. In an incubator, the combination, with the incubator-box provided with air-inlet *a* and damper *j*, of the upper and lower heating-

coils, *e f*, connecting-pipes *e'*, and an open water-vessel, *g*, through which the lower coils, *f*, pass, substantially as described.

4. In an incubator, the combination of an incubating-box, egg-receptacles therein supported upon reciprocating perforated slides, an open water-vessel, and heating coils or pipes passing through said vessel, substantially as described.

5. An incubator consisting of an incubating-box provided with air-inlet *a*, and damper *j*, egg-receptacles on said box supported above reciprocating perforated slides, a boiler or heater, upper coils, *e*, lower coils, *f*, connecting-pipes *e'*, and open water-vessels through which the lower coils pass, the parts being combined substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands this 11th day of April, 1885.

CHARLES BASSINI.
ADOLF HEYDEN.

Witnesses:
FREDERICK F. CAMPBELL,
OSCAR A. MICHEL.