

(No Model.)

A. P. HAZARD.
INCUBATOR.

No. 446,133.

Patented Feb. 10, 1891.

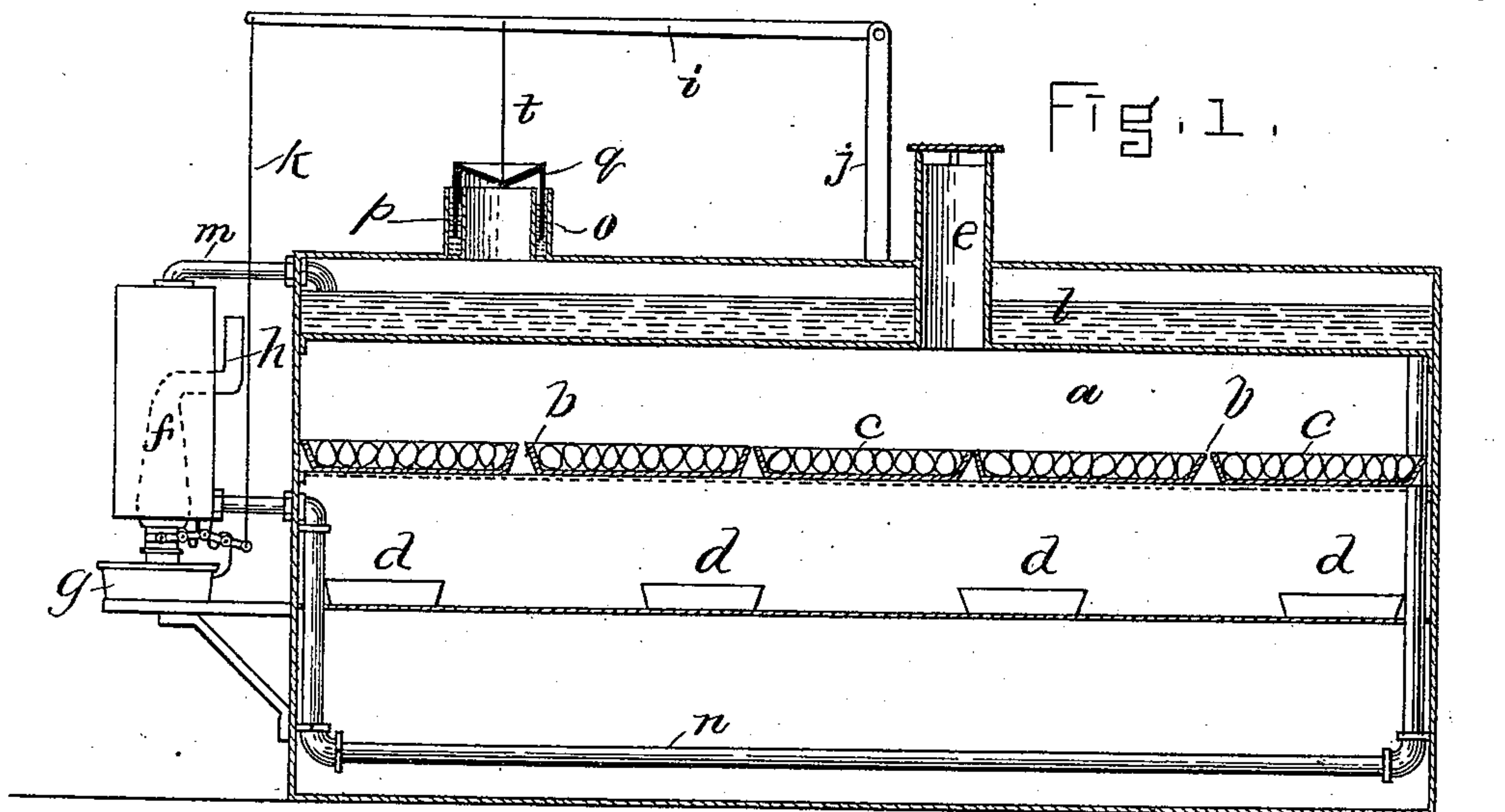


Fig. 2.

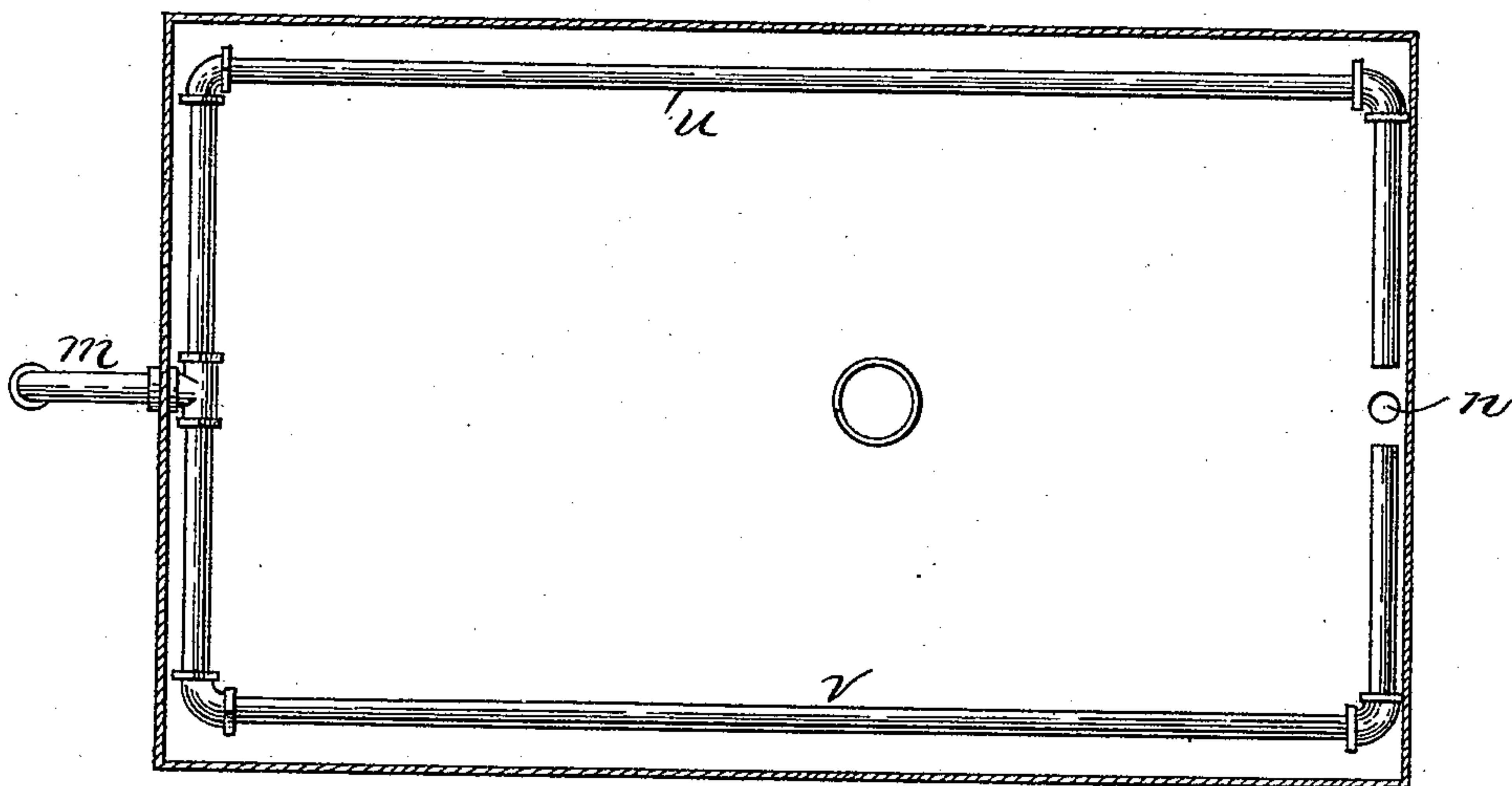
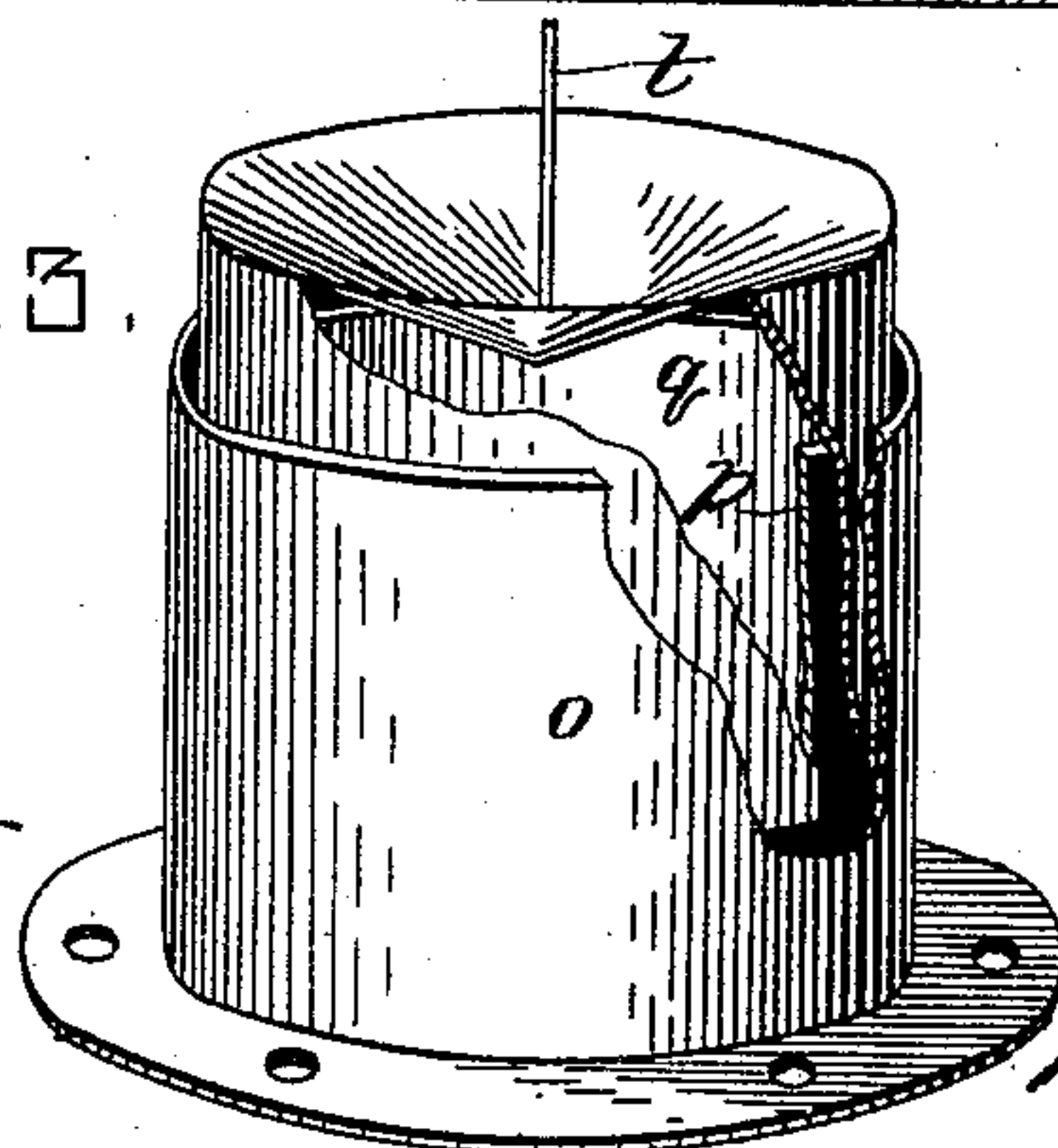


Fig. 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

ARTHUR P. HAZARD, OF BROCKTON, MASSACHUSETTS.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 446,133, dated February 10, 1891.

Application filed September 15, 1890. Serial No. 364,994. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR P. HAZARD, of Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

My invention relates to means for regulating the heating or warming of the hatching-chambers of incubators; and it has for its object the provision of improvement whereby the water by which the hatching-chamber is warmed may be maintained at, to all intents and purposes, an absolutely-uniform degree of heat, and whereby, also, there may be no appreciable diminution of water in the boiler or water-apartments in the use of the incubator.

To the foregoing ends my invention consists of the improvements hereinafter described and claimed, reference being had to the annexed drawings and the letters of reference marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 is a sectional side elevation of an incubator provided with my improvements. Fig. 2 is a horizontal sectional view of parts of the same. Fig. 3 is a perspective view of my improved means for operating the lever, which is connected with the lamp-extinguisher and regulates the flame by which the water is heated.

In the drawings, *a* designates the hatching-chamber, which is provided with trays *b*, upon which are placed the eggs *c*.

d represents evaporating-pans placed below the egg-trays, and *e* is a ventilating-pipe communicating between the hatching-chamber and the exterior of the incubator.

f is the boiler, the water in which is heated by a lamp or lamps *g*, a chimney *h* extending up part way through the boiler and out to the exterior atmosphere.

i is a lever pivoted upon a standard *j* and provided at its opposite end with a wire or cord *k*, which is connected through the medium of suitable levers or otherwise with the extinguisher on the lamp *g* in such manner that when the forward end lever *i* is raised the extinguisher will be operated to lessen the

flame of the lamp, and when it is lowered the extinguisher will be actuated to increase the flame.

l designates the water-chamber, into which heated water is led from the boiler *f* by means of the pipe *m*, the cooling-water returning to the boiler through the pipe *n*, which may pass below the egg-trays and evaporating-pans.

All of the parts so far described may be of usual or suitable form and arrangement, since they alone constitute no part of my present improvements.

Heretofore it has been proposed to actuate the lever *i* conformably with the degree to which the water in the chamber *l* was heated by providing the top of said chamber with a tube communicating with the interior of the chamber and placing a float in said tube, so as to fit closely therein and rest upon the water. A rod was connected with the said float and extended up and was connected with the said lever, so that when the water and atmosphere in the water-chamber were expanded by heat the float would rise, raising the lever and lessening the lamp-flame by means of the extinguisher, and as the expansive force in the chamber *l* subsided the lever *i* would be lowered and the lamp-flame increased. A difficulty with this contrivance arose from the fact that the float operated with more or less friction on the sides of the tube, and therefore was uncertain and irregular in its effects, and besides this means were afforded between the sides or edges of the float and the sides of the tube for the escape and evaporation of water from the tank *l*, thus continually varying the expansive force of the water and air in the said tank. By one feature of my improvements this objection is overcome, and this feature of the invention will now be explained.

o designates a tube provided with an annular chamber *p*, the said tube being secured to the top of the incubator and communicating with the water-chamber *l*. The annular chamber *p* is, however, so constructed that the water in the water-chamber cannot communicate therewith.

q designates an inverted-cup-shaped float arranged in the annular chamber *p*, so that it may be moved up and down with freedom therein, and in oil or other suitable liquid *r*

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placed in the annular chamber, in order to form an absolute trapping of the air and water in the water-chamber *l*. The inner face of the closed end of the cup *q* is made of convex form, so that if steam should condense thereon it would drop from the center thereof back into the water-chamber *l* and not be carried down on the sides of the cup *q* into the annular oil-chamber *p*. The cup *q* is connected with the lever *i* by means of a rod *t*. With this construction and arrangement of parts it will be seen that there is a perfect trapping of the water and air in the water-chamber, and that the cup will operate with the utmost freedom in the annular chamber of the tube *o* and respond in its movements with entire exactness to the degree of pressure in the water-chamber, so that the degree to which the water is heated may be absolutely uniform.

Another difficulty experienced in the use of incubators has been that the water in the water-chamber *l* maintained a higher degree of heat in the center than at the sides, for the reason that the heat at the sides radiated the more readily. In order to overcome this difficulty, I lead the water from the pipe *m* into the water-chamber *l* through pipes *u v*, which branch from the pipe *m* and extend around, as near as may be desirable, to the ends and sides of the water-chamber, and terminate with open mouths or ends in the vicinity of the end of the return-pipe *u*, which latter device communicates with the water-chamber near the outer edge or wall thereof. I have ascer-

tained that by these means the water at the sides of the water-tank may be heated to an extent corresponding with the rate at which the heat in the water is more greatly radiated at the sides of the water-chamber than at the center, and by this mode I am enabled to maintain a uniform temperature of the water in the water-chamber throughout all parts of the same.

It is obvious that changes may be made in the form and arrangement of parts comprising my improvements without departing from the nature or spirit thereof.

Having thus explained the nature of my improvements and described a way of constructing and using the same, I declare that what I claim is—

As a means for actuating the flame-regulating lever of incubators, the combination, with the water-heating chamber, of a tube provided with an annular chamber and communicating with the water-chamber, and an inverted cup arranged in liquid in the said chamber, the inner surface of the closed end of the cup being of concave form, and connections between the said cup and lever, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 6th day of September, A. D. 1890.

ARTHUR P. HAZARD.

Witnesses:

ARTHUR W. CROSSLEY,
A. D. HARRISON.