

O. P. SHOEMAKER.  
HEATER FOR INCUBATORS.  
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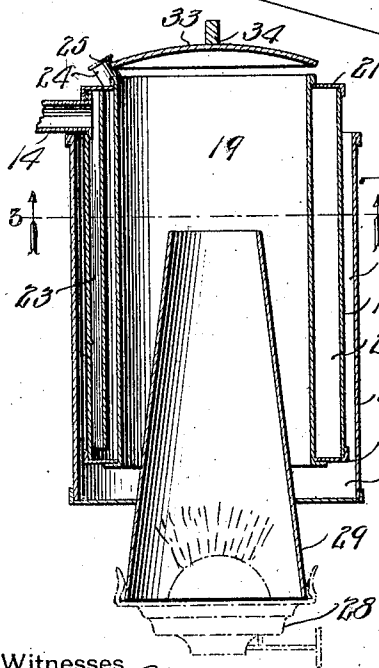
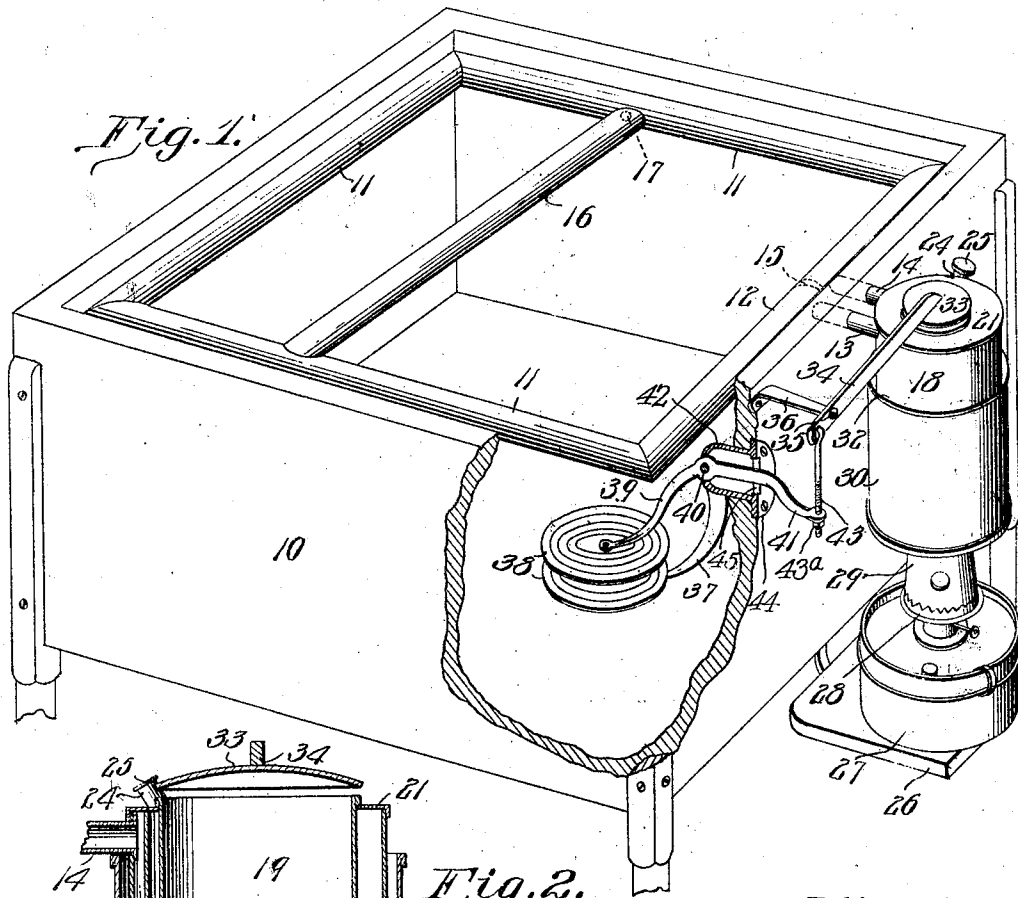


Fig. 2.

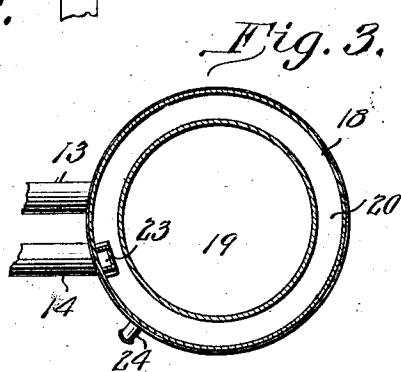


Fig. 3.

Witnesses  
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# UNITED STATES PATENT OFFICE.

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## HEATER FOR INCUBATORS.

No. 833,638.

Specification of Letters Patent.

Patented Oct. 16, 1906.

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*To all whom it may concern:*

Be it known that I, ORLANDO P. SHOEMAKER, a citizen of the United States, residing at Clay Center, in the county of Clay and State of Nebraska, have invented a new and useful Heater for Incubators, of which the following is a specification.

This invention is a heater for heating water, and is primarily designed for use in connection with a hot-water heating system for incubators, brooders, and the like.

It is an important object of the invention to adapt the device for convenient application to an incubator and to enable the ready removal and return of the lamp which generates the heat without disturbing the other elements of the apparatus.

A further object of the invention is to obtain a maximum radiating-surface for heating the water without increasing the size of the heater and to obtain an effective circulation of the water.

Another object of the invention is to effect an automatic control of the heater by the temperature of the chamber to be heated in order that said chamber may be maintained at a uniform temperature irrespective of the rise and fall of the temperature externally of the chamber.

It is also proposed to enable the convenient adjusting of the regulating mechanism without dismantling the heater.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a perspective view of a heater of the present invention applied to an incubator, the top of the incubator being removed and a portion of the case thereof being broken away to disclose the regulating means. Fig. 2 is an enlarged vertical sectional view of the boiler and heating-drum therefor. Fig. 3 is a detail cross-sectional view of the boiler.

Like characters of reference designate corresponding parts in each of the several figures of the drawings.

For an adequate understanding of the ap-

plication and operation of the present invention a conventional form of incubator has been shown at 10 in Fig. 1 of the drawings, the top of the incubator being omitted. 60

The present heating system includes a radiator 11, which extends around the inner walls of the incubator adjacent the top thereof, so as to carry the heated water entirely around the incubator and into the corners thereof. Ordinarily the box or case of an incubator is square or rectangular in form, and therefore the radiator is made up of four successively-connected pipe or flue sections arranged in the form of a rectangle. A cross-flue 16 connects opposite sides of the radiator. Communication between the cross-flue and each adjacent side of the radiator is had through a relatively small opening 17. Instead of locating the cross-flue 16 at the middle of the radiator it is disposed at a distance more than one half of the length of the radiator from that side which is connected directly to the heater for the purpose of compensating for the reduction of the temperature of the water at its remotest point from the heater. That side of the radiator which is to be connected to the heater is provided about midway of its ends with a plug or partition 15, and at the opposite sides of this partition induction and eduction pipes 13 and 14 lead outwardly from the radiator and pass through suitable openings formed in the adjacent side of the incubator. 85

The water-heater includes a boiler made up of outer and inner concentric shells 18 and 19, the annular space between the shells being closed at its upper and lower ends by means of top and bottom pieces 21 and 22. A duct or passage 23 is located within the annular water-space 20, the upper end of the passage being closed by the top 21 and its lower open end being adjacent the bottom of the boiler. The induction-pipe 14 pierces the outer boiler-shell 18, in communication with the upper portion of the duct 23, while the eduction-pipe 13 communicates directly with the interior of the boiler. It will here be explained that the boiler is suspended from the pipes 13 and 14. A suitable filling-spout 24 is provided in one side of the boiler adjacent its top and has a suitable closure 25. 95

Independent of the boiler and concentrically embracing the same is a shell 30, having its open upper end terminating short of the boiler and its lower end disposed below the lower end of the boiler and having a bottom 110

31 pierced by an upwardly-tapered open-ended lamp-chimney 29, which rises within the boiler and projects a suitable distance below the bottom of the shell. This chimney is adapted to fit the burner 28 of a lamp 27, and the latter is normally supported upon a bracket or shelf 26. By preference the bracket or shelf is hinged or pivotally supported upon the bottom of the incubator in order that it may be swung to one side of the heater for applying and removing a lamp. It will here be explained that the lamp carries the chimney 29 and the shell 30, so that when the lamp is removed the shell and chimney are removed therewith without disturbing the boiler.

When the lamp is burning, the heated products of combustion will pass up through the chimney and the central hot-air flue of the boiler, defined by the inner shell 19, while some of the products of combustion will pass upwardly through the annular flue-passage formed by the outer shell 18 of the boiler and the flue-shell 30, whereby the boiler has inner and outer heating-surfaces, which materially promotes the heating of water. It will here be explained that when the water becomes heated circulation takes place from the boiler through the pipe 13 into the radiator and then back through the pipe 14 into the duct 23 and thence downwardly to the bottom of the boiler, whereby the relatively cool water is returned into the bottom of the boiler, so as to insure the proper circulation of the water.

It is proposed to regulate the paths of the products of combustion by the temperature within the chamber defined by the walls of the incubator, and this will be accomplished in the following manner: A damper 33 is provided for the top of the hot-air flue through the boiler, and this damper is carried by the long end portion of a vertically-swinging lever 34, fulcrumed adjacent its other end upon a bracket 36, projecting outwardly from the adjacent side of the incubator. A threaded link 43 is loosely hung from the short end of the lever and passes loosely through a perforation in the free end of one arm 41 of a bell-crank lever which works through an opening in the adjacent wall of the incubator. Upon the lower end of the link 43 there is an adjusting-nut 43<sup>a</sup>, which bears against the lower side of the arm 41 of the bell-crank lever. The bell-crank lever works in a tubular sheath or case 42, which pierces the adjacent wall of the incubator and is provided upon its outer end with an external annular flange 44, rigidly connected to the outer face of the incubator by means of suitable fastenings. The outer closed end of the tubular sheath is provided with a vertical slot 45, in which the arm 41 works. At the point of juncture of the arms 39 and 41 of the bell-crank lever said lever is made substantially circular or in the form of a disk which has a working fit in

a slot or opening in the rear end of the sheath, and this disk portion is pierced by a pivot or fulcrum 40. A bracket-arm 37 depends from the inner end of the sheath within the incubator and carries upper and lower spaced substantially horizontal thermostatic disks 38, which are hollow and contain a suitable liquid, which expands quickly under the influence of heat. The lower free end of the arm 39 of the bell-crank lever engages the upper thermostatic disk, whereby the lever is actuated by the rise and fall of the thermostatic members, due to the expansion and contraction, and hence the damper 33 will be raised and lowered accordingly.

When the lamp is first lighted, the thermostatic members 38 are in their normal conditions, whereby the arm 39 of the bell-crank lever will be at its lower limit and the damper 33 will be closed. In this condition the draft of the lamp is indirect—that is to say, the heated products of combustion pass upwardly from the chimney 29 into the boiler-flue, thence down into the drum or shell 31, and upwardly through the latter at the outside of the boiler, whereby the inner and outer surfaces of the boiler are subjected to the heated products of combustion, so as to quickly and uniformly heat the water. As the water becomes heated it circulates through the radiator and back into the boiler, thereby heating the compartment 10 by radiation. As the temperature rises within the compartment the thermostatic members 38 expand, thereby tilting downwardly the arm 41 of the bell-crank lever, and thus lifting the damper 33, whereby the indirect draft of the lamp is gradually reduced until the temperature reaches a predetermined high degree, when the damper will be entirely open and the draft will be direct upward and outward through the open top of the boiler-flue. When the damper is entirely open, the heated products of combustion escape quickly through the top of the boiler-flue without materially heating the boiler. Hence the boiler cools off and the temperature in the compartment 10 is reduced. As the action of the regulator is automatic, the temperature of the chamber or compartment is maintained substantially uniform.

From the foregoing description it will be understood that the boiler and the thermostatic regulator are carried by the incubator, while the heating-drum 30 and the chimney 29 are carried by the lamp. Hence the heating-drum is removed with the lamp when the latter is to be filled without disturbing the boiler and the regulator. It will also be noted that by having the boiler provided with a central heat-flue the available heating-surface of the boiler is practically doubled, thereby insuring a quick and uniform heating of the water, as all parts thereof are subjected to the heat of the lamp.

Having thus described the invention, what is claimed is—

1. A water-heater comprising a boiler having an open-ended heating-flue passing there-  
5 through, outlet and return pipes for the boiler, a passage within the boiler leading from the return-pipe to the bottom of the boiler, a drum embracing and spaced from the boiler to form an annular flue-space, the drum being  
10 independent of the boiler with its upper end open and its lower end closed, and a chimney piercing the bottom of the drum and entering the heat-flue of the boiler.

2. A water-heater comprising a boiler hav-  
15 ing an open-ended heating-flue passing there- through, outlet and return pipes for the boiler, a passage within the boiler leading from the return-pipe to the bottom of the boiler, a drum embracing and spaced from the boiler  
20 to form an annular flue-space, the drum being independent of the boiler with its upper end open and its lower end closed, a chimney piercing the bottom of the drum and entering the heat-flue of the boiler; a damper for the  
25 upper end of the heat-flue of the boiler, and a thermostatic regulator connected with the damper.

3. A water-heater comprising a boiler hav-  
30 ing a heating-flue passing therethrough, out- let and inlet pipes communicating with the boiler, a drum independent of and embracing the boiler with an annular flue-space between the boiler and the drum, the top of the drum being open and its bottom being closed, and a  
35 chimney piercing the bottom of the drum and entering the flue of the boiler.

4. A water-heater comprising a boiler hav-  
40 ing a heating-flue passing therethrough, out- let and inlet pipes communicating with the boiler, a drum independent of and embracing the boiler with an annular flue-space between the boiler and the drum, the top of the drum being open and its bottom being closed, a  
chimney piercing the bottom of the drum and

entering the flue of the boiler, a damper for  
45 the open top of the boiler-flue, and a thermo- static regulator connected to the damper.

5. The combination with a chamber to be heated; of a radiator therein, a boiler con-  
50 nected with the radiator and having a heat- ing-flue passing therethrough, outlet and in- let pipes communicating with the boiler, a drum independent of and embracing the boiler with an annular flue-space between the  
55 boiler and the drum, the top of the drum be- ing open and its bottom being closed, a chim- ney piercing the bottom of the drum and en- tering the flue of the boiler, a damper for the open top of the boiler-flue, a bell-crank lever  
60 pivotally mounted within the casing, an op- erative connection between said lever and the damper, and a thermostat associated with the inner portion of the lever.

6. The combination with a chamber to be heated, of a radiator therein, inlet and outlet  
65 pipes extending from the radiator through one wall of the chamber, a boiler supported by the pipes and provided with an upright heating-flue passing therethrough, a lamp  
70 supported below the boiler, a chimney upon the lamp rising into the boiler-flue, a drum supported by the chimney independent of the boiler and surrounding the same to define an  
75 annular flue-space between the boiler and the drum, the bottom of the drum being closed and its top being open, a damper for the top of the boiler-flue, a thermostat within the chamber, and a connection between the ther-  
80 mostat and the damper for automatically regulating the latter.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ORLANDO P. SHOEMAKER.

Witnesses:

OTTO BARTH,  
L. F. FRYAR.