Nov. 19, 1935. W. E. BUNDY 2,021,479

HUMIDITY CONTROL FOR INCUBATORS AND HATCHERS

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FIG 1

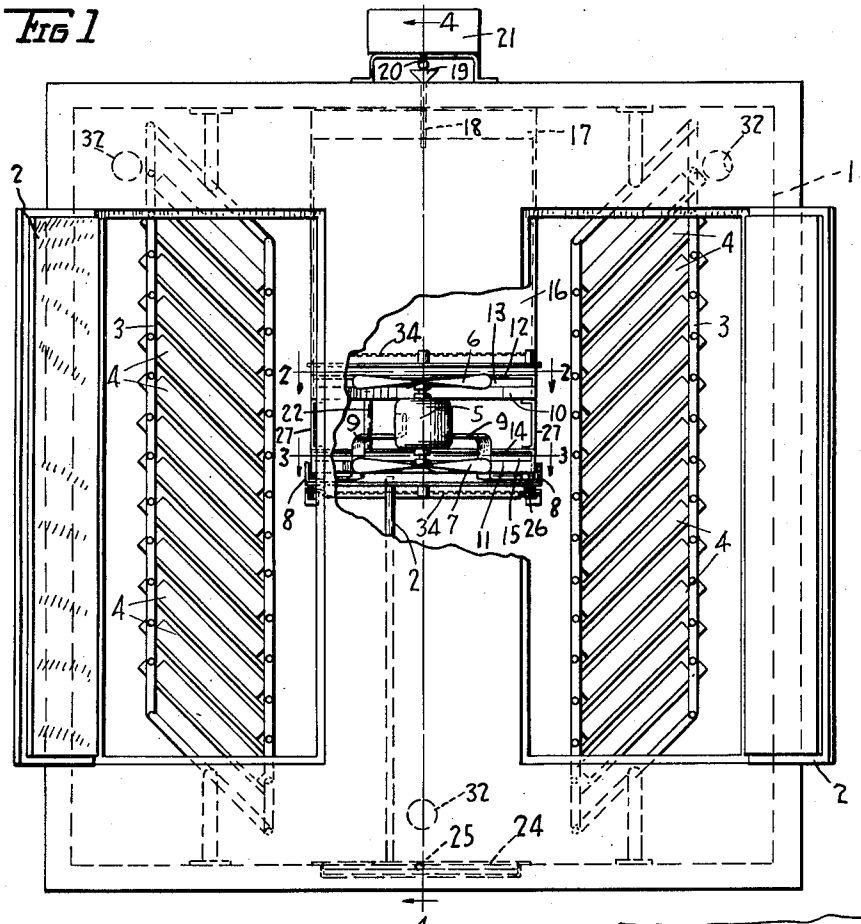


FIG 2

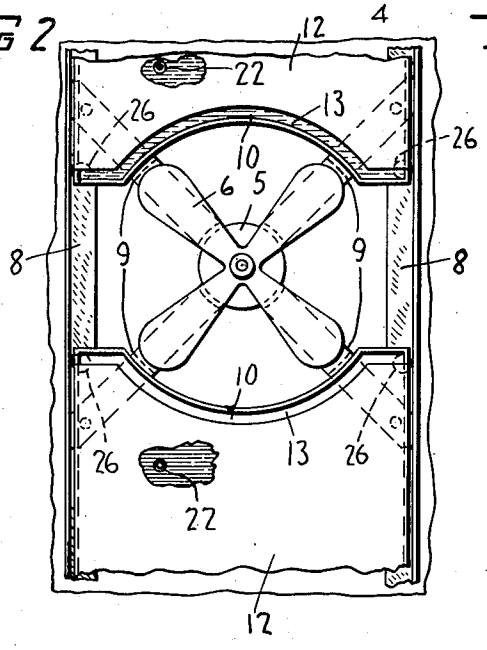
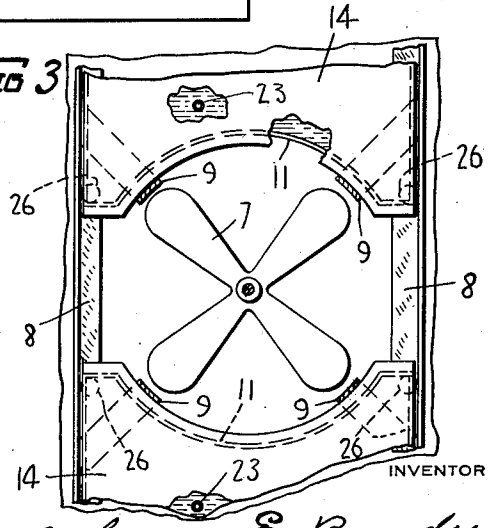


FIG 3



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FIG 4

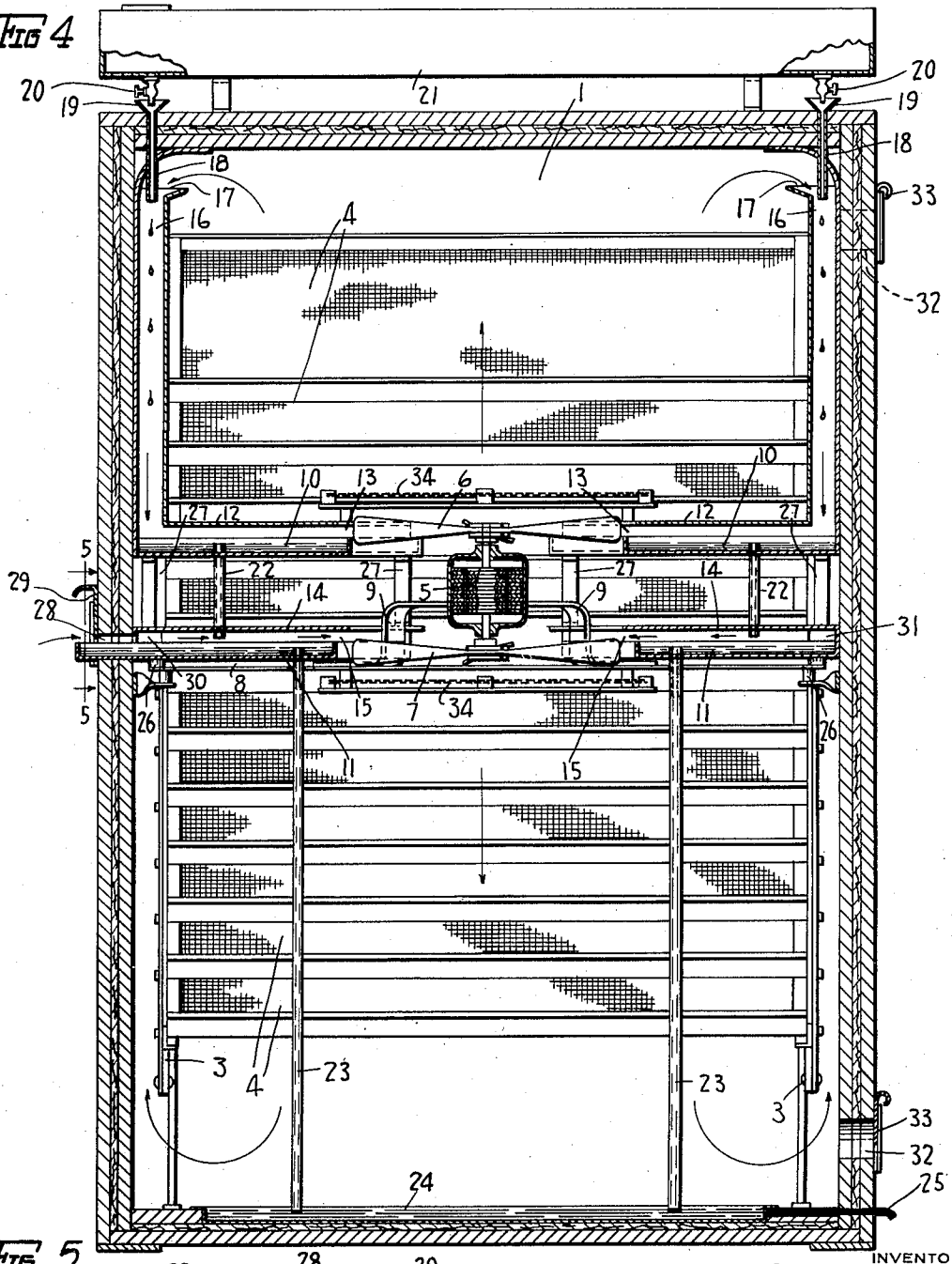
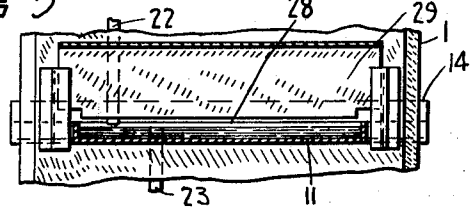


FIG 5



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HUMIDITY CONTROL FOR INCUBATORS AND HATCHERS

Whitney E. Bundy, Springfield, Ohio

Application August 11, 1933, Serial No. 684,710

13 Claims. (Cl. 261—119)

This invention relates to humidifying devices for incubators, hatchers, brooders and the like, it more particularly relating to a humidifier of the type in which the air is circulated over the surface of water placed in a receptacle.

An object of my invention is to provide a humidifier of the character referred to which will be simple in construction and effective in operation.

A further object of my invention is to provide a humidifier of this character in which the circulating air may be brought rapidly into intimate contact with the surface of the water and a more efficient degree of humidity thereby obtained.

A further object of the invention is to provide, in an incubator or structure of that kind which has a plurality of air circulating fans, a plurality of water containers all supplied from a common source of water and so associated with the fans as to provide for an effective circulation of air over the surface of the water therein.

A further object of the invention is to provide a humidifier which can be effectively used to reduce the temperature of the structure in which it is installed by cooling the air.

Other objects of the invention will appear from the accompanying description and statement of advantages.

In the accompanying drawings:

Fig. 1 is a front elevation of an incubator in which the improvements have been installed with the front wall thereof partly broken away.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a longitudinal section on the line 4—4 of Fig. 1.

Fig. 5 is a section on the line 5—5 of Fig. 4.

In the present instance, the humidifier is shown applied to an incubator for incubating chicks. A closed incubating chamber is indicated at 1, 2 representing doors in the front wall thereof to furnish access thereto. There is arranged on each side of the incubator a tiltable tray rack 3 containing removable egg trays 4. In the space or corridor between the tray racks is mounted a vertically-disposed electric motor 5 having a horizontally-disposed fan, 6 and 7, on each end of the vertical shaft thereof, the upper fan 6 being arranged to project the air upwardly and the lower fan 7 to project the air downwardly in the manner described in my Patent No. 1,850,918, dated March 22nd, 1932. The motor is supported on a pair of spaced longitudinally extending angle-irons 8 through the medium of arms 9.

Adjacent the periphery of the upper fan 6 on each side thereof is a water pan 10, and adjacent the periphery of the lower fan 7, on each side thereof, is a water pan 11. The pans 10 have covers 12 which terminate just short of the inner ends of the pans to provide air outlets 13 adjacent the periphery of the fan 6, the major portion of the inner end of each pan being indicated on the arc of a circle to conform to the path of the tips of the fan blades. Each of the pans 11 has a cover 14, the inner end of which projects inwardly beyond the inner end of the pan and above the same to provide air outlets 15; the inner end of each of these pans 11 being also indented on the arc of a circle to conform to the path of the tips of the fan blades. The indented or concave form of the inner ends of the pans 10 and 11 provide air discharge openings of substantial width which lie close to the peripheries of the fans.

Leading to each of the pans 10 is a vertical conduit 16, this conduit being open at the top to provide an air inlet 17. Projecting into each conduit is a pipe 18 which extends through the ceiling of the chamber 1 and has a flared or funnel-shaped mouth 19 located beneath a faucet 20 which controls the water supply from a water tank 21 mounted upon the top of the chamber 1.

Leading from each pan 10 to the pan 11 immediately beneath it is a pipe 22, the upper end of the pipe being extended into the pan 10 to the height of the desired water level therein and conveys the overflow from the pan 10 into the pan 11. Leading from each pan 11 is a pipe 23, this pipe 23 being extended into the pan 11 to the desired height of the water level therein and acting to convey the overflow from the pan 11 to a pan 24 located adjacent the floor of the chamber 1; this pan 24 having an overflow pipe 25 leading to a suitable point of discharge on the exterior of the chamber 1.

Each of the lower pans 11 is supported on the angle-irons 8 through the medium of small blocks 26 and the upper pans 10 are supported from the lower pans through the medium of vertical strips 27.

One of the pans 11 is extended through the front wall of the chamber 1 as shown in Fig. 4, the aperture 28 through which it is extended forming a fresh air inlet, the size of which may be regulated by a vertically movable manually-operated shutter 29. Each of the sides of this pan also has an air inlet 30 adjacent the inner side of the front wall of the chamber 1, and each of the sides of the opposite pan 11 also has an air inlet 31 adjacent the inside of the back wall of the chamber 1.

At 32 there is indicated a plurality of restricted orifices controlled by manually-operated shutters 33 to permit the escape of foul air in proportion to the amount of fresh air admitted, one of these outlets being provided in the rear wall near the floor of the chamber 1 and the other two outlets being placed in the rear wall near the ceiling of the chamber.

On the discharge side of each of the fans there is provided an electric heater 34 for the purpose of heating the circulated air, a suitable thermostat (not shown) responsive to the temperature of the air in the chamber 1 being provided for controlling these heaters.

In operation the fans cause a circulation of heated air through the incubating chamber in the manner described in my patent referred to. Some of this air will circulate downwardly through each of the conduits 16 over the water in the pans 10, the character of the outlet openings from these pans being such as to readily permit the air to circulate upwardly under the action of the fan 6, this fan acting to draw the air rapidly through the conduits 16 and inwardly over the surface of the water contained in the pans. The action of the fan 7 is such as to cause the air not only to be drawn through the inlets 30 and 31 but also through the fresh air inlet 28, such fresh air circulating in intimate contact with the surface of the water in the corresponding pan 11; the character of the discharge openings 15 from these pans being such as to direct the air downwardly under the action of the fan 7. The air is further humidified by its passage over the surface of the water in the lower pan 24.

The humidity can be regulated by the admission of more or less air through the fresh air inlet 28 and the proper amount of water for humidifying purposes regulated at the faucets 20.

In some localities in certain seasons of the year, it is necessary to reduce the temperature by a cooling medium and when such is desired, it may be readily accomplished by regulating the valves or faucet 20 so that a steady flow of cool water may be had through the pans, the heater at this time of course being out of operation.

Having thus described my invention, I claim:

1. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, one to direct the air upwardly and the other to direct air downwardly, a covered water container associated with each fan having an air outlet adjacent the periphery of the fan above the water level, each container also having an air inlet at a point remote from the air outlet whereby the fan causes a circulation of air over the water in said container.

2. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, one to direct the air upwardly and the other to direct air downwardly, a covered water container associated with each fan having an air outlet adjacent the periphery of the fan above the water level, each container also having an air inlet at a point remote from the air outlet whereby the fan causes a circulation of air over the water in said container, and an overflow pipe leading from the upper container to the lower container.

3. In a structure of the character described, a horizontally disposed fan, a covered water container having an air outlet disposed adjacent the periphery of the fan above the water level, an upwardly extending conduit open at its upper end communicating with said water container at a point remote from the air outlet whereby the fan causes a circulation of air down the conduit and over the surface of the water in said container, and means for supplying a regulated quantity of water through said conduit to said container.

4. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, one to direct air upwardly and the other to direct air downwardly, a covered water container on each side of each fan, each container having an air outlet adjacent the periphery of the associated fan above the water level, each container also having an air inlet at a point remote from the air outlet whereby the fan causes a circulation of air over the water in said containers.

5. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, one to direct air upwardly and the other to direct air downwardly, a covered water container on each side of each fan, each container having an air outlet adjacent the periphery of the associated fan above the water level, each container also having an air inlet at a point remote from the air outlet whereby the fan causes a circulation of air over the water in said containers, means for supplying water to the upper containers, and an overflow pipe leading from each upper container to one of the lower containers.

6. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, one to direct air upwardly and the other to direct air downwardly, a pair of water containers associated with each fan one on each side thereof, each container having an air outlet adjacent the periphery of the fan above the water level, an upwardly extending conduit leading to each one of the upper water containers at a point remote from the air outlet thereof, each of said lower conduits having air inlet means remote from the air outlet thereof.

7. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, one to direct air upwardly and the other to direct air downwardly, a pair of water containers associated with each fan one on each side thereof, each container having an air outlet adjacent the periphery of the fan above the water level, an upwardly extending conduit leading to each one of the upper water containers at a point remote from the air outlet thereof, each of said lower conduits having air inlet means remote from the air outlet thereof, means for supplying regulated quantities of water to said upper containers through said conduits, and an overflow pipe leading from each upper container to a lower container.

8. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, one to direct air upwardly and the other to direct air downwardly, a covered water container on each side of each fan, each container having an air outlet adjacent the periphery of the associated fan above the water level, each container also having an air inlet at a point remote from the air outlet whereby the fan causes a circulation of air over the water in said containers, means for supplying water to the upper containers, an overflow pipe leading from each upper container to one of the lower containers, another water pan in the lower part of said structure, and an overflow pipe leading from each of the aforementioned lower water

containers to said pan, and an overflow leading from said pan.

9. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, a pair of water containers associated with each fan, one on each side thereof, each container having an air outlet adjacent the periphery of the fan and also having an air inlet, the air inlet for one of said containers leading to outside atmosphere.

10. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, a pair of water containers associated with each fan, one on each side thereof, each container having an air outlet adjacent the periphery of the fan and also having an air inlet, the air inlet for one of said containers leading to outside atmosphere, and means for regulating the size of said last mentioned air inlet.

11. In a structure of the character described, a pair of horizontally disposed fans arranged one above another, a pair of water containers associated with each fan, one on each side thereof, each container having an air outlet adjacent the periphery of the fan and also having an air inlet, the air inlet for one of said containers leading to outside atmosphere, means for regulating the size of said last mentioned air inlet, and means for supplying regulated quantities of water to said containers.

12. In a structure of the character described, a chamber, a horizontally disposed fan in said chamber, a comparatively shallow covered water container in said chamber on each side of said fan each having its water level located substantially in the horizontal plane of the fan and each having an air outlet disposed adjacent the periphery of the fan above the water level, each container having an air inlet at a point remote from the air outlet whereby the fan causes a circulation of air over the surface of the water in said container.

13. In a structure of the character described, a chamber, a horizontally disposed fan in said chamber, a comparatively shallow covered water container in said chamber on each side of said fan each having its water level located in substantially the horizontal plane of said fan, each container having an air outlet disposed adjacent the periphery of the fan above the water level, an upwardly extending conduit open at its upper end for each container and communicating therewith at a point remote from the air outlet thereof whereby the fan causes a circulation of air down the conduits and over the surface of the water in said container.

WHITNEY E. BUNDY.