

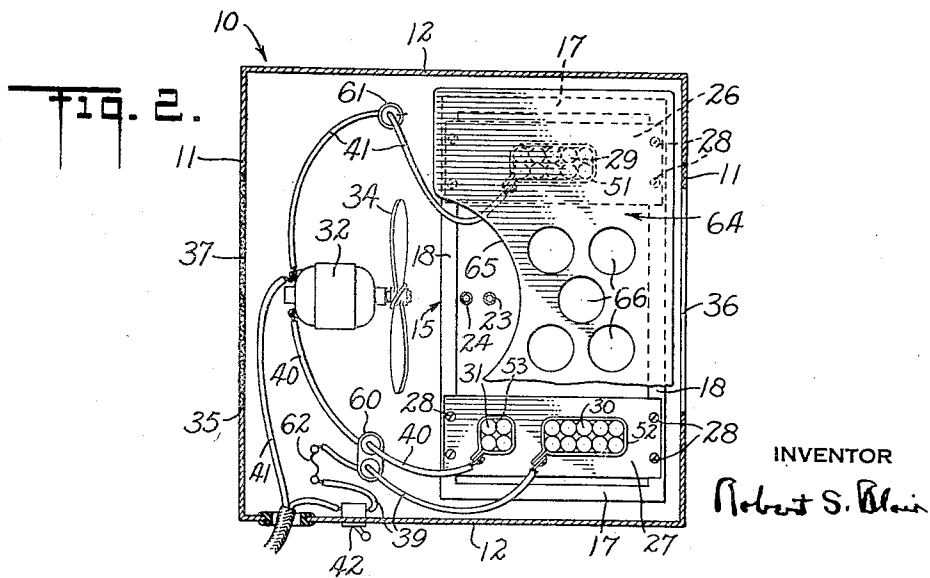
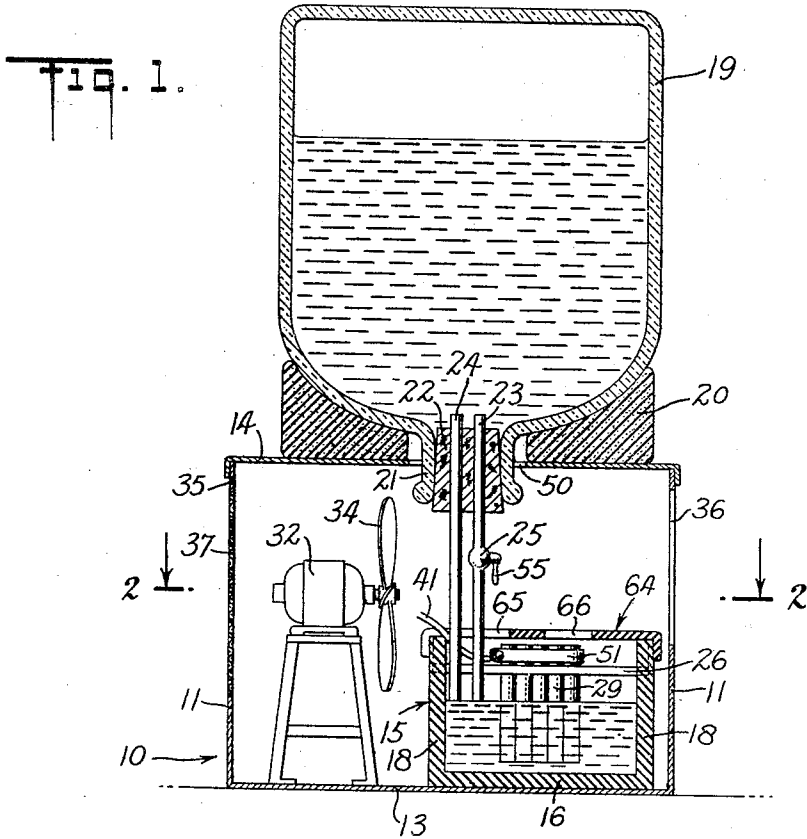
July 19, 1938.

R. S. BLAIR

2,124,482

HUMIDIFYING APPARATUS AND METHOD

Filed Sept. 17, 1935



UNITED STATES PATENT OFFICE

2,124,482

HUMIDIFYING APPARATUS AND METHOD

Robert S. Blair, New York, N. Y.

Application September 17, 1935, Serial No. 40,923

14 Claims. (Cl. 219—40)

This invention relates to humidifying.

One of the objects of this invention is to provide a simple, inexpensive and practical humidifier that will be well adapted to meet the varying conditions of use. Another object is to provide humidifying apparatus of the above character which will be efficient and reliable in operation. Another object is to provide humidifying apparatus of the above character whose use will be simple and which may be operated by unskilled users. Another object is to provide humidifying apparatus of the above character which will be neat and attractive in appearance and yet be of such sturdy construction as to withstand hard usage. Another object is to provide humidifying apparatus of the above character which may be constructed from inexpensive and light materials. Another object is to provide humidifying apparatus of the above character which will be inexpensive to manufacture and easily assembled. Another object is to provide humidifying apparatus of the above character from which varying amounts of moisture vapor may be given off. Another object is to provide humidifying apparatus of the above character which will be automatically operated and which will be entirely safe in operation. Another object is to provide a simple, practical, and inexpensive method of humidifying the atmosphere. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts and in the several steps and relation and order of each of the same to one or more of the others, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown one of the various embodiments of my invention,

Figure 1 is a vertical sectional view of my apparatus; and

Figure 2 is a horizontal sectional view of my apparatus taken along the line 2—2 of Figure 1. Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring now to the drawing in detail and to Figure 1 in particular, a chamber generally indicated at 10 comprises end walls 11, side walls 12 (Figure 2), bottom 13 and lid 14. This chamber may be constructed from sheet metal or from any other suitable material; the chamber is provided with lid 14 which is secured thereto in any suit-

able manner so that the user may have ready access to the interior of the chamber.

Within chamber 10 and positioned at one end thereof is a tank or receptacle generally indicated at 15. Preferably receptacle 15 comprises a bottom 16 and walls 17 (Figure 2) and side walls 18. Tank 15 is preferably open at the top and its width between side walls 18 is shown to be approximately equal to half the length of chamber 10. End walls 17 preferably lie adjacent side walls 12 of chamber 15. Tank 15 is preferably formed from any insulating material such as a hard rubber composition or the like and may be secured to the bottom 13 of chamber 10 by any suitable means. It might here be pointed out that tank 15 may be made in many varying sizes and shapes and that the tank disclosed herein is only used for purposes of illustration.

Upon lid 14 I preferably mount a suitable container which is shown in the drawing as a glass jug 19. Jug 19 preferably has its neck 21 extending through an aperture 50 formed in lid 14 and rests on a shock absorbing pad 20 which is positioned between the body of jug 19 and lid 14. Within neck 21 is a cork 22 preferably composed of rubber or any suitable resilient material. Extending through cork 22 from the interior of glass bottle 19 down into tank 15 are two tubes 23 and 24. Within tube 23 is a valve 25 having a valve handle 55 which controls the flow of liquid there-through. Preferably the inner diameter of tube 24 is sufficiently small in comparison with the size of bottle 19 that when bottle 19 is inverted and after a vacuum has been formed therein the liquid in bottle 19 does not run out of tube 24 due to the surface tension of the liquid within tube 24. However, when valve 25 is open, air is admitted to the interior of bottle 19 through one of the tubes and the liquid runs out of the other. The ends of tubes 23 and 24 are preferably positioned at a predetermined level and are equidistant from bottom 16 of tank 15. When the liquid reaches this level, it seals the ends of tubes 23 and 24 preventing any further entrance of the liquid into tank 15 even though valve 25 is open, and whenever the level of the liquid drops, the water flows until the predetermined level is again reached. Thus I have provided a method whereby a desired level of liquid may be automatically kept in tank 15 as long as there is any liquid in bottle 19 and valve 25 is open. Furthermore the rate at which the liquid flows into tank 15 may also be governed by adjustment of valve 25. It might here be pointed out that there are many methods for automatically feeding tank 15 and it is not desired

to limit this construction to this type of liquid dispensing system.

Within tank 15 and positioned adjacent the top thereof are two supports 26 and 27 (Figures 1 and 2) which are preferably held in this position by screws 28 (Figure 2) and are made from an insulating material such as hard rubber. An electrode 29 preferably secured to support 26 extends therethrough so that its lower end is positioned a short distance above the bottom of tank 15. Support 27 has two electrodes 30 and 31 secured therein preferably in the same relation to bottom 16 of tank 15 as electrode 29. Electrodes 29, 30 and 31 may be composed of carbon or any other suitable material and preferably comprise a plurality of helical rods bound together above the surface of the liquid with brass strips 51, 52 and 53 respectively. Preferably electrodes 29 and 30 are substantially larger in size than electrode 31 and electrode 31 is positioned substantially adjacent electrode 30 for purposes to be more fully disclosed hereinafter.

Occupying the space at the end of chamber 15 opposite tank 10 is a motor 32. Motor 32 is preferably centrally positioned with respect to side walls 12 and adjacent lid 14. A fan 34 is secured to the shaft of motor 32 and is preferably positioned adjacent and facing tank 15. Within end wall 11 and adjacent the rear end of motor 32 I have formed an opening 35 preferably circular in shape. At the opposite end of chamber 10 and positioned above tank 15 I have formed a second opening which preferably extends a substantial distance across the top of tank 15. Preferably opening 35 is covered by a screen 37 and the second opening 36 is left open so that the user may have easy access to valve handle 55. Fan 34 has its blade so formed that a current of air is drawn in through opening 35 over motor 32 and then blown over tank 15 and out of the container through hole 36. Thus I have provided means for continuously circulating air through the chamber 10 across the top of tank 15 and also a construction in which the motor is both cooled and kept dry by the air stream passing over it.

Referring now to Figure 2 in which is shown the circuit of my apparatus, conduit 39 preferably leads through switch 42 and fuse 62 to brass strip 52 of electrode 30. Conduit 40 is preferably connected to the brass strip of electrode 31 and to one terminal of motor 32. Conduit 41 is preferably connected to the opposite terminal of the motor and to the brass strip 51 of electrode 29. Thus considering for the moment that conduit 39 is negative and that conduit 41 is positive and that switch 42 is closed, electrode 29 is charged positively and electrode 30 is charged negatively. When valve 25 of tube 23 is open, the level of the liquid in container 15 rises to the ends of tubes 23 and 24. If some material such as salt or borax is placed in this liquid and mixed therewith, the conductivity of the liquid in the tank is increased and the current passes from one electrode to the other, the water forming a conductor therebetween. However, this liquid is a poor conductor and thus forms a resistance to the current. The resistance, which in this case is the liquid, is heated by the flow of electricity therethrough and in time causes the liquid to boil giving off water vapor.

The positive conduit 41 is connected directly to motor 32 and, as electrode 31 is positioned adjacent negative electrode 30, the motor oper-

ates as soon as the liquid forms a conduit therebetween. As electrode 31 is considerably smaller than electrode 30 a very small amount of current is diverted from the main supply for the purpose of running the motor, and thus the main supply of current may be used in heating the liquid in tank 15. It may be seen that by connecting the motor in this manner it automatically starts whenever there is sufficient liquid in tank 15 to form a conduit between the electrodes and it also automatically stops whenever the liquid does not form a conduit for the current between the electrodes. Thus it can be seen that the operation of the device is controlled by a single switch and even if this switch is closed the device does not operate unless there is liquid in tank 15. Thus if the apparatus is accidentally left in operation, it automatically stops when the supply of liquid no longer connects the electrodes as a conduit.

It might here be noted that as the ends of the electrodes are spaced above the bottom of the tank there will always be liquid in the tank to keep the salt or borax in solution.

Conduits 39 and 40 preferably lead through male and female plug 60 and conduit 41 leads through male and female plug 61. Preferably one half of these plugs are connected to bottom 13 of chamber 10 and thus the circuits leading to tank 15 may easily be broken if it is necessary to remove tank 15 from chamber 10. Preferably extending over the top of tank 15 and formed from an insulating material such as hard rubber is a shield generally indicated at 64 having a cut-out portion 65 and a plurality of holes 66 formed therein. The water vapor can easily escape through cut-out portion 65 and holes 66, and this shield prevents the user from touching the electrodes while adjusting valve 25.

Valve 25 may also be adjusted so that any desired amount of liquid flows into tank 15. Thus this valve may be regulated so that the liquid within tank 15 never reaches the ends of tubes 23 and 24 but does contact the electrodes. To do this the liquid is evaporated at the rate it enters the tank, and accordingly the liquid never reaches the ends of tubes 23 and 24. This is automatically done by the fact that at this time there is less liquid between electrodes 29 and 30, thus increasing the resistance therebetween whereby the flow of current therethrough is diminished. As the heat given off is proportional to the flow of current through the liquid, less heat is given off and the liquid boils at a slower rate. Thus by adjustment of valve 25 moisture may be given off by the apparatus at any desired rate.

In operation, the bottle 19 is filled with liquid, cork 22 with its tubes therein is placed in the neck of the bottle and this unit is then inverted so that tubes 23 and 24 enter tank 15 through aperture 50 in lid 14. A vacuum is formed after some liquid has run out of the bottle preventing any more liquid from escaping through tube 24. Then if valve 25 is opened and switch 42 is closed, the liquid enters tank 15 completing the various circuits therein. The liquid boils and the motor 32 drives fan 34 which mixes the water vapor and the dry air drawn from the room in which the apparatus is placed.

It will now become clear that I have provided a thoroughly practical and durable humidifier which is designed to operate automatically and to automatically shut itself off. Furthermore the device is inexpensive to manufacture and is

entirely safe in operation. I have also provided a device which efficiently humidifies the atmosphere and which may be run at a minimum cost.

It will thus be seen that I have provided a thoroughly practical humidifying device in which the several objects hereinabove mentioned as well as many others are successfully accomplished.

As many possible embodiments may be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth, or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus of the nature described, in combination, means adapted to form a vapor from a liquid, means adapted to propel said vapor, and means comprising an electrical circuit adapted automatically to start said propelling means upon said liquid being supplied.

2. In apparatus of the nature described, in combination, a receptacle adapted to contain a liquid, a pair of spaced electrodes in said receptacle, means adapted to propel a vapor from said liquid, and means forming an electric circuit comprising said electrodes and said propelling means whereby said propelling means will automatically be rendered operative upon said electrodes being connected by liquid in said receptacle.

3. In apparatus of the nature described, in combination, means adapted to form a vapor at a variable rate, means adapted to drive said vapor at a variable rate, and means adapted to increase the speed of said driving means as the rate of formation of vapor is increased.

4. In apparatus of the nature described, in combination, means adapted to contain a supply of liquid, an evaporating device comprising a receptacle positioned beneath said first means and a pair of spaced electrodes therein, means adapted to supply liquid to said device from said liquid supply and extending downwardly below the top of said receptacle, and means adapted to vary the rate of flow of said supply and maintain it at a predetermined rate whereby a controllable depth of liquid may be maintained in said second receptacle free from connection with said supply.

5. In apparatus of the nature described, in combination, means adapted to contain a supply of liquid, an evaporating device positioned below said first means and comprising a receptacle having spaced electrodes therein, means adapted to supply liquid to said device from said supply comprising means leading into said receptacle, means adapted to vary the rate of flow of said supply and maintain it at a predetermined rate, and means adapted automatically to stop said flow upon the level of liquid in said evaporating device reaching a predetermined point.

6. In apparatus of the nature described, in combination, a receptacle adapted to contain water, a second receptacle at a higher level than said first receptacle, means connecting said receptacles and adapted to transmit the water from one to the other thereof and adapted automatically to stop the flow of water therebetween upon the same reaching a predetermined level in said first receptacle, a pair of substantially spaced electrodes in said first receptacle adapted to transmit an electric current through the water

therein and boil the same to discharge steam therefrom, an electric fan mounted in a position to direct its discharge into said steam and thereby intermingle it with the surrounding air, and a single source of current connected with and supplying current to said electrodes and to said fan.

7. In apparatus of the nature described, in combination, a receptacle adapted to contain a liquid, a plurality of spaced electrodes in said receptacle, an electric fan adapted to act upon vapor from said receptacle, means adapted to form an electric circuit between a pair of said electrodes thereby to evaporate said liquid, and means adapted to form an electric circuit including another pair of said electrodes and said fan whereby said fan is automatically started upon said second pair of electrodes being connected by liquid.

8. In apparatus of the nature described, in combination, a receptacle adapted to contain a liquid, means adapted to evaporate said liquid and adapted automatically to increase the rate of evaporation as the body of liquid is increased, means adapted to propel the vapor from said receptacle, and means adapted automatically to increase the propelling effect as the rate of evaporation is increased.

9. In apparatus of the nature described, in combination, a receptacle adapted to contain a liquid, a second receptacle adapted to contain a supply of liquid, means adapted to lead liquid from said second receptacle to said first receptacle, means adapted to vary the rate of flow of said liquid and maintain it at a predetermined rate, means adapted to evaporate liquid in said first receptacle, means adapted to propel the vapor resulting from said evaporation, and means controlling said propelling means to start the same by the flow of liquid into said first receptacle.

10. In apparatus of the nature described, in combination, a receptacle adapted to contain a liquid, a pair of spaced electrodes positioned within said receptacle and adapted to extend into the liquid therein, said electrodes being so positioned within said receptacle that varying portions of them are adapted to be immersed in the liquid in the tank, means adapted to supply liquid to this receptacle at varying rates of speed, propelling means, and means adapted to automatically increase the speed of said propelling means proportional to the rate of increase of moisture vapor given off which in turn is proportional to the rate of liquid entering said receptacle.

11. The herein described art of humidifying which consists in leading water from a source of supply to an evaporating device, varying the rate at which the water is led, utilizing the water to limit the amount of water in said device, leading current from a source through said water to evaporate the same, and blowing the vapor from said device by means of energy from said source of current.

12. In apparatus of the nature described, in combination, a receptacle adapted to contain the liquid to be evaporated, a pair of electrodes in said receptacle having surfaces adapted to resist electrolytic action and spaced to permit said liquid to rise and fall freely therebetween, a source of current connected with said electrodes to pass current thereby through said liquid and evaporate the same, a container forming a source of water supply, said container being positioned relative to said receptacle to have its contents at a higher level, and means connecting said con-

tainer to said receptacle to feed water therefrom by gravity into said receptacle and adapted to stop the flow of water from said container upon the level in said receptacle reaching a predetermined point, said connecting means being free from intermediate bodies of water of substantial size, whereby upon the failure of current the flow of water into said receptacle will be automatically limited, and upon the failure of water the heating effect of said current will be automatically terminated.

13. In apparatus of the nature described, in combination, a receptacle adapted to contain the liquid to be evaporated, a pair of electrodes in said receptacle having surfaces adapted to resist electrolytic action and spaced to permit said liquid to rise and fall freely therebetween, at least one of which is fixed in a position with its lower end substantially spaced from the bottom of said receptacle to such an extent as to insure a body of liquid being left in the receptacle, a source of current connected with said electrodes to pass current thereby through said liquid and evaporate the same, a container forming a source of water supply, said receptacle having walls whose surfaces are of insulating material, said container being positioned relative to said receptacle to have its contents at a higher level, means connecting said container to said receptacle to feed water therefrom by gravity into said receptacle and adapted to stop the flow of water from said container upon the level in said receptacle reaching a predetermined point, and means in said connection adapted to vary the flow of liquid into said receptacle and maintain it at a rate less than the maximum rate of evaporation thereof, whereby upon the failure of current the flow of

water into said receptacle will be automatically limited, and upon the failure of water the heating effect of said current will be automatically terminated and whereby the level in said receptacle may be maintained by evaporation equal to the rate of supply.

14. In apparatus of the nature described, in combination, a receptacle adapted to contain the liquid to be evaporated, a pair of electrodes in said receptacle having surfaces adapted to resist electrolytic action and spaced to permit said liquid to rise and fall freely therebetween, at least one of which is fixed in a position with its lower end substantially spaced from the bottom of said receptacle to such an extent as to insure a body of liquid being left in the receptacle, a source of current connected with said electrodes to pass current thereby through said liquid and evaporate the same, a container forming a source of water supply, said container being positioned relative to said receptacle to have its contents at a higher level, and means connecting said container to said receptacle to feed water therefrom by gravity into said receptacle and adapted to stop the flow of water from said container upon the level in said receptacle reaching a predetermined point, said connecting means being formed to prevent substantial escape of heated water from the body thereof through which said current passes, whereby upon the failure of current the flow of water into said receptacle will be automatically limited, and upon the failure of water the heating effect of said current will be automatically terminated and whereby the loss of heating effect is minimized.

ROBERT S. BLAIR.