April 19, 1927. 1,625,663

W. H. KELLY

HUMIDIFIER

Filed June 16, 1926 2 Sheets-Sheet 1

Fig. 1.

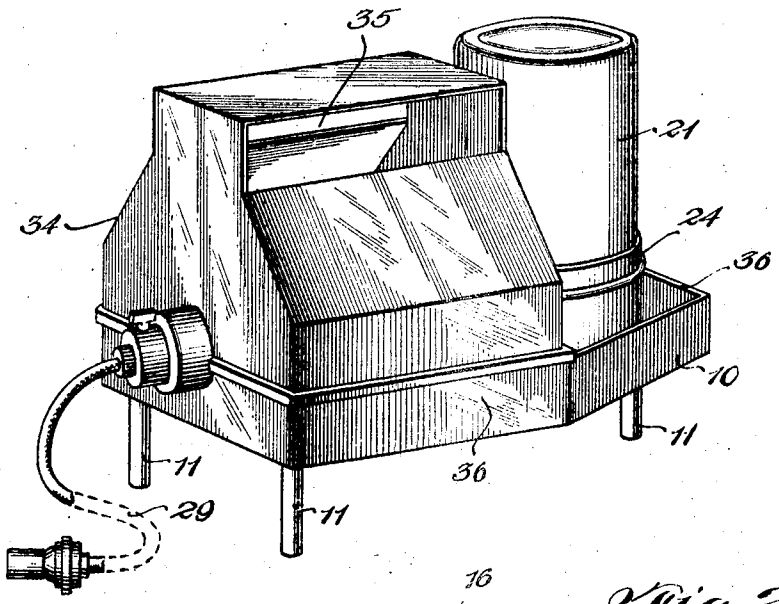
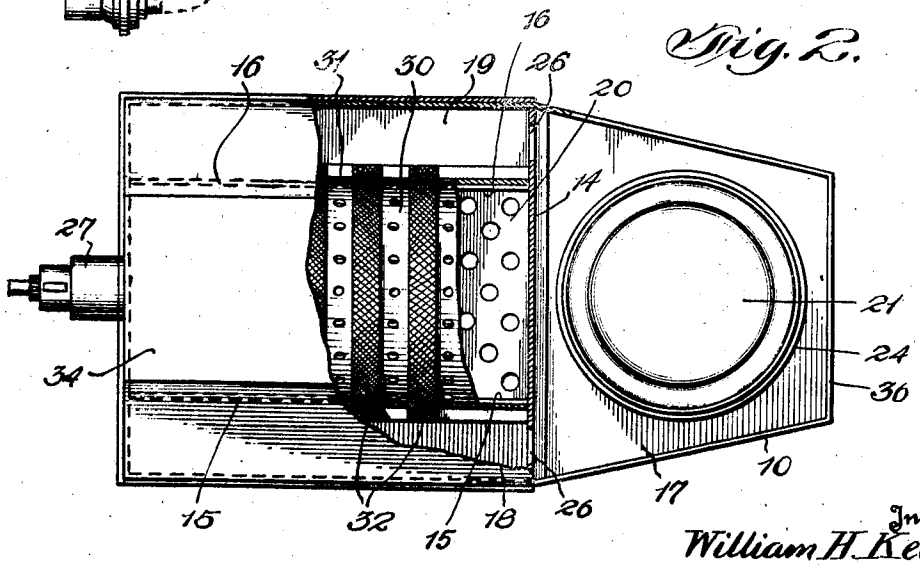


Fig. 2.



Inventor
William H. Kelly.

By Winson H. Kane.

Attorney

April 19, 1927. 1,625,663

W. H. KELLY

HUMIDIFIER

Filed June 16, 1926 2 Sheets-Sheet 2

Fig. 3.

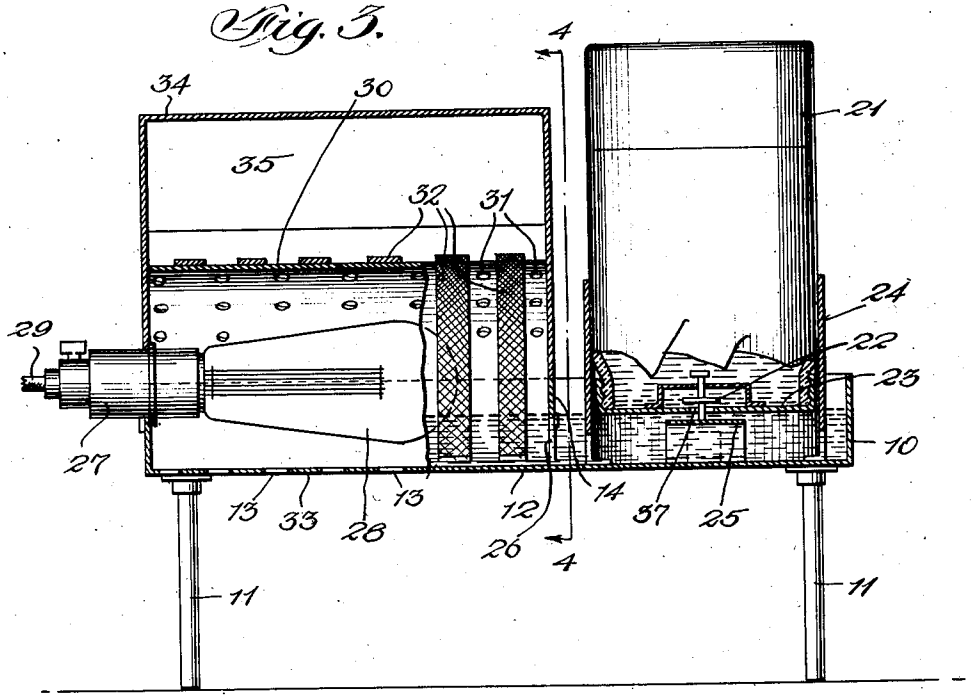
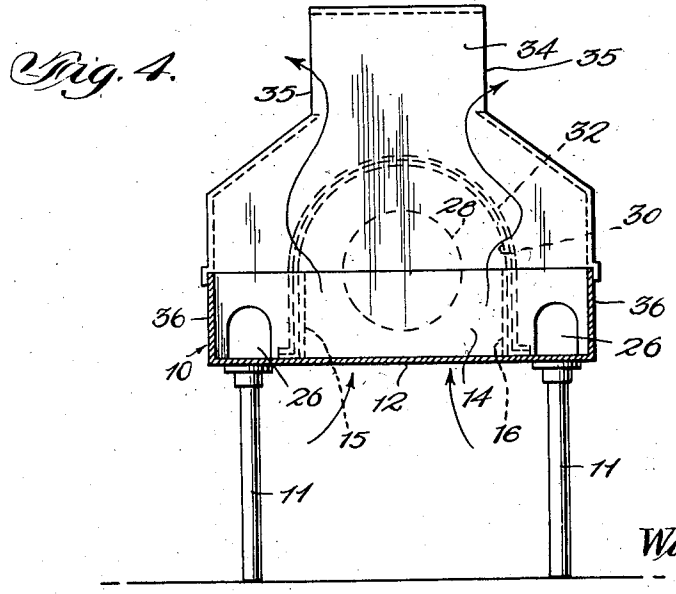


Fig. 4.



Inventor
William H. Kelly

By Munson H. Lare.

Attorney

Patented Apr. 19, 1927. 1,625,663

UNITED STATES PATENT OFFICE.

WILLIAM HARDY KELLY, OF CHARLOTTE, NORTH CAROLINA, ASSIGNOR OF ONE-THIRD TO CHARLES F. KEISTLER, OF CHARLOTTE, NORTH CAROLINA.

HUMIDIFIER.

Application filed June 16, 1926. Serial No. 116,354.

The invention relates to humidifiers.

The object of this device is to secure a simple and efficient means of humidifying small areas, such as tobacco cases and compartments where the introduction of free moisture is not desirable, but where a substantial circulation of air must be secured, preferably without the use of a fan.

There are numerous devices of this character on the market, but this invention contains peculiar points of advantage rendering it much more efficient and of a cost much reduced below that of existing types. The majority of devices of this character blow air over moistened surfaces with a fan; or heat the water and depend upon the vapor given off at the somewhat higher temperature producing vapor pressure of substantial amounts. In my device, however, I take advantage of the property of heated air to hold increasing amounts of moisture per cubic foot, and the fact that air when so heated decidedly increases its absorptive qualities, as will be seen from the following illustration.

For instance, referring to the U. S. Weather Bureau psychrometic tables, it will be seen that a cubic foot of air at 70 degrees F. will contain a maximum amount of moisture of 7.98 grains, and if this same cubic foot of air is heated to 80 degrees, it will then contain 10.93 grains; to 100 degrees, 19.77 grains, and to 110 degrees 26.11 grains. So, it is evident that as the temperature of the air is increased its moisture absorbing properties are also increased at a very much more rapid rate. I am taking advantage of this property in the arrangement of the parts of my moistening device, whereby the air circulating through the apparatus is heated to a higher temperature before it passes over the moisture producing substance. Heating the air in this way gives it a much greater capacity to absorb moisture, and consequently I secure an increased evaporative effect, as well as obtaining a higher circulation of air, than in other machines that merely heat the water or heat the air after it has been in contact with the water.

While I realize that humidifiers have been devised which are designed to bring a small portion of heated air in contact with an absorbent medium, yet in these devices the arrangement of parts is such that only a thin outer layer of air is effective. The present device is designed to bring a very large portion of air, after having been heated, into intimate contact with the absorbent medium.

In the drawings there is shown an illustrative embodiment of a preferred form of my invention, in which:—

Fig. 1 is a perspective view of the complete humidifier ready for use.

Fig. 2 is a horizontal sectional view, parts being shown in plan.

Fig. 3 is central vertical section, certain parts being shown in elevation, and

Fig. 4 is an end view taken along the line 4—4 of Fig. 3, and looking in the direction of the arrows.

Referring to the several figures, the reference numeral 10 denotes a basin or box which is supported upon legs 11, of sufficient height to hold the bottom 12 of the basin above the compartment in which it is placed, thus allowing for circulation of air upwardly through the central portion, which is perforated as at 13 (Fig. 3) to permit the free admission of air. The basin 10 comprises a box having sides 36 and a plurality of water-tight partitions, indicated by reference numerals 14, 15 and 16, which form compartments 17, 18, 19 and 20. Compartment 17 holds the water reservoir 21, conveniently made of an ordinary fruit jar, provided with a valve arrangement 22, passing through the jar cover 23, whereby water can be retained in the jar after filling and while lowering into the holder 24.

When the jar 21 is placed in position, the stem of valve 22 will engage a stop 25, thus opening the valve, whereupon water will flow from the container and fill compartments 18, 19 and 17, openings 26 being provided in partition 14 to allow access to the compartments or wells 18 and 19. The water level in these compartments will reach the height of the aperture 37 in the bottom 23 of the liquid container, when atmospheric pressure will prevent further flow until the level of the water as evaporated is lowered below this opening, when the level will again be equalized, this action continuing until all of the water is drained from the reservoir 21.

Passing through the end wall of the box 10 is a lamp receptacle 27, into which is screwed an incandescent lamp 28, which is supplied by a cord 29 from a suitable source of electric current.

Supported in the bottom of the compart-

ments or wells 18 and 19 is an arched plate 30, preferably of brass, and perforated as at 31. Strung over this plate is a series of cotton wicks 32 fastened at their lower ends on each side to the bottom of the arch 30, the level of the water in the compartments or wells 18, 19 being such that the lower ends of the wicks 32 are submerged, and by capillary attraction the entire arched length of wicks 32 soon becomes saturated with water. These wicks do not entirely fill up the perforated metal arch 30, but space is left between each convolution.

Immediately below the lamp 28 is the perforated plate 33.

A removable cover 34 is provided for the purpose of properly protecting the lamp and wick from injury, this cover serves as a deflector and is provided with side openings adjacent the top thereof as at 35, whereby the draft of air generated by the heat of the electric lamp is properly drawn across the wicking and discharged with considerable velocity in each direction.

The operation of the apparatus is as follows: Reservoir 21 being filled with water and placed in its receptacle 24 and the wicks 32 being suitably moistened thereby, the lamp 28 is connected by the cord 29 to a suitable source of electric current. Immediately the globe heats, the air becomes warmed and due to natural law rises, passes through the perforated metal in the arch above it, and comes into intimate contact with the damp wicks 32. The temperature of this air being comparatively high, it seizes a considerable amount of moisture from the wicking and becomes heavily loaded, and as this air is forced aside by the action of the heat producing lamp below it, a very decided circulation is established, whereby the moist, saturated air issues from the side opening 35 and spreads in each direction.

There is therefore a circulation of air established through the box and out at the top, and as is well-known highly humidified air travels rapidly and in the size of cabinet to which the respective sizes of this device are adapted conditions of humidity become surprisingly uniform over the interior.

The efficiency of this device is illustrated in the following actual record of test made on the working model.

Air entering the base at 80 degrees F. and 40% relative humidity has its temperature raised by the lamp 28 to 120 degrees F., and after passing around the moistened wicks 32 it issues from the top opening 35 with a relative humidity of approximately 95% and a temperature of 92 degrees F. It will be seen therefore that more than 10 grains of moisture are added to each cubic foot of air passing through the device, and on account of the fact that the disposition of the parts is such as to allow a free circulation, and the further fact that the moistened air issuing does not contain any free moisture, there is no tendency for the moistened air to fall and re-enter the base, thereby causing re-circulation. The moistened air as it issues spreads to the far side of the enclosure in which the device is placed, and diffuses evenly throughout the interior, the circulation of air being secured through the device by means of the lamp, or other heating element, taking the cool, drier air from the bottom of the container.

It is also evident that this device can be adapted to different sizes of containing cabinets by the mere interchange of heating elements. For instance, a cabinet having a volume of ten or twelve cubic feet can be easily humidified with an electric lamp having a capacity of approximately 40 watts, and for a larger cabinet by merely increasing the size of the lamp the additional volume is easily taken care of.

It is also evident that other forms of heating elements can be employed other than incandescent lamps, the requirement being to produce a draft of air which is heated and then passed over the moisture-producing mechanism.

Having described my device and its operation, I now claim as new:

1. A humidifier, comprising a heating element, means for supplying dry air to the heating element, liquid containing wells located on opposite sides of the heating element, a perforated arched plate supported in said wells and bridging over the heating element, wicks laid across said arched plate and having their extremities extending into the liquid in said wells.

2. A humidifier, comprising a heating element, means for supplying dry air to the heating element from below, liquid containing wells located on opposite sides of the heating element, a perforated arched plate supported in said wells and bridging over the heating element, wicks laid across said arched plate and having their extremities extending into the liquid in said wells, and means for supplying additional liquid to said wells when the level falls below a predetermined point.

3. A humidifier comprising a heating compartment, having its bottom perforated to permit access of air, an incandescent lamp located in said compartment, liquid containing wells located on opposite sides of the heating compartment, a perforated arched plate supported in said wells and bridging over the incandescent lamp, and a plurality of wicks laid at intervals across the arched plate and having their extremities extending into the liquid in said wells.

4. A humidifier comprising a box having a plurality of compartments, including a

heating compartment the bottom of which is perforated, and two side compartments constituting liquid containing wells located on opposite sides of the heating compartment, a perforated arched plate supported in the wells and bridging over the heating compartment, and a plurality of wicks laid at intervals across said arch, and having their extremities extending into the liquid in said wells.

5. A humidifier comprising a box having a plurality of compartments, including a heating compartment, the bottom of which is perforated to permit access of air, and two side compartments constituting liquid containing wells located on opposite sides of the heating compartment, a perforated arched plate supported in said wells and bridging over the heating compartment, a plurality of wicks laid at intervals across said arched plate and having their extremities extending into the liquid in said wells, and a reservoir to supply liquid to said wells.

6. A humidifier comprising a box having a plurality of compartments, including a heating compartment perforated to permit access of air, and two side compartments constituting liquid containing wells located on opposite sides of the heating compartment, a reservoir for supplying liquid to said wells, a perforated arched plate supported in said wells and bridging over the heating compartment, a plurality of spaced wicks laid at intervals across said arched plate and having their extremities extending into the liquid in said wells, and a cover extending over said wells and over the arched plate, said cover having an opening at the upper side portion thereof, to permit exit of air.

In testimony whereof I affix my signature.

WILLIAM HARDY KELLY.