March 28, 1967 J. M. RAIT 3,311,355

PORTABLE HUMIDITY CONTROL DEVICE

Filed Aug. 19, 1965 2 Sheets-Sheet 1

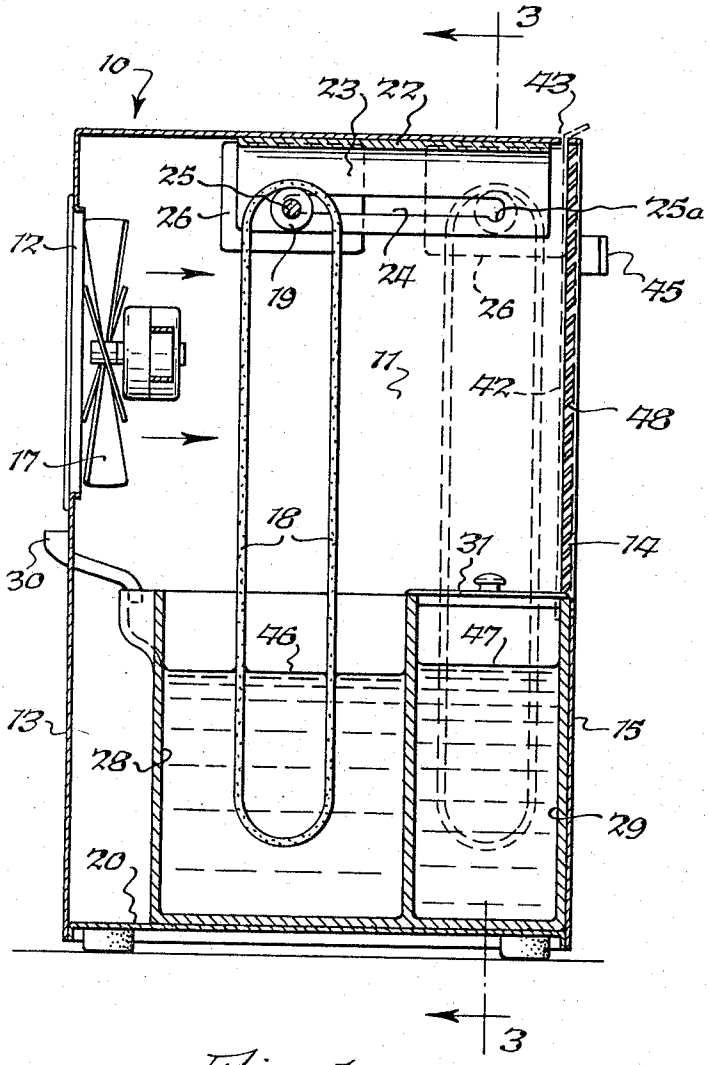


Fig. 1.

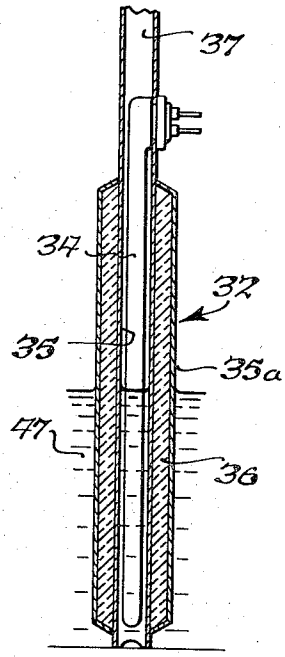


Fig. 2.

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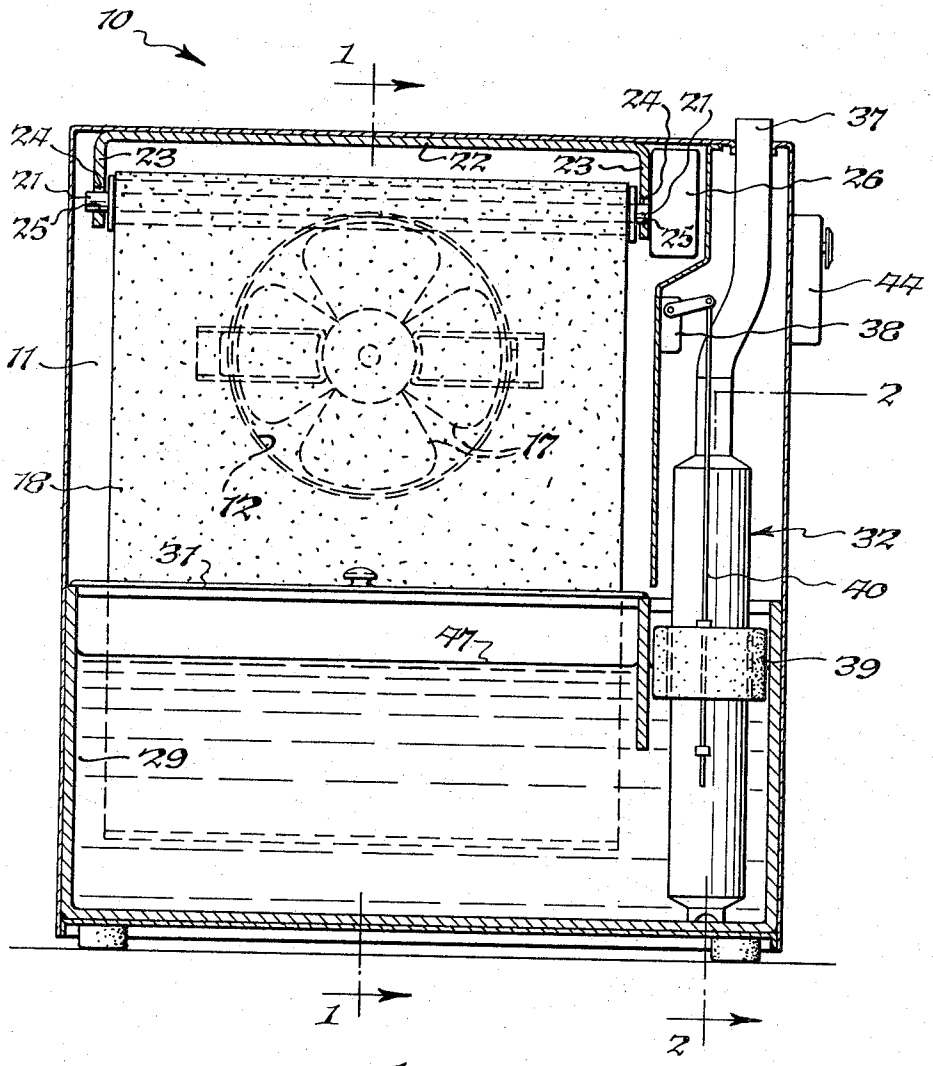


Fig. 3.

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United States Patent Office 3,311,355 Patented Mar. 28, 1967

3,311,355

PORTABLE HUMIDITY CONTROL DEVICE

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Filed Aug. 19, 1965, Ser. No. 480,999
16 Claims. (Cl. 261—2)

This invention relates to a low cost, portable device which may be used for humidification, dehumidification and air purification. More specifically, the invention relates to a combination humidifier and dehumidifier which may be used to remove moisture from the atmosphere in periods of high humidity and may be used to add moisture to the air when the latter is undesirably dry. In addition the apparatus of this invention may also be used as a steam vaporizer when so desired.

The use of humidity control in homes, offices, shops, hospitals and the like is now widely recognized as being of benfit to comfort, health and productivity, and of paramount importance in preventing mildew and corrosion. However, humidity control adequate for health and comfort involves periods when only humidification is desired and other periods when only dehumidification is desired. Therefore it is highly desirable to provide a unit which can accomplish such humidity control in an efficient yet inexpensive manner. However, portable devices for the control of moisture in the air which have been provided heretofore have generally been designed only for either humidification or dehumidification. Thus, where all season or year around control is desired, the use of two separate units has been required. Where dual function units have been offered, they have generally proven costly to build, requiring compressors, heat exchangers, condensing coils, refrigerants and the like. In addition, conventional compressor dehumidifiers require the use of a collecting pan which must be emptied regularly.

It is therefore an object of this invention to provide an apparatus which may be used for both humidification and dehumidification.

Another object of this invention is to provide a low cost, highly efficient device for removing undesirable moisture from the air in periods of high humidity and for moistening dry air during periods when the air is undesirably dry.

It is a further object of this invention to provide a device such as described which also obviates the necessity of emptying a moisture collecting container during the course of a dehumidification cycle thus permitting the unit to function unattended for extended periods of time.

It is still a further object of this present invention to provide a unit which is capable of returning moisture to an area in the form of hot vapor such as may be desired in sickroom or for the relief of ailments where steam vaporizers are commonly employed or when such additional service is required.

It is an additional feature of this invention to simultaneously free air of living microorganisms while it operates to remove undesired moisture from the air or while it operates to provide steam vapor to the air without the use of special filters.

The foregoing is not intended as a complete recital of the objects or advantages of this invention as a versatile device such as will be described below will undoubtedly give rise to many new uses and advantages which will become obvious to those enjoying its use or to others skilled in the art.

The details of the invention, and other objects thereof will be apparent from the following description and the appended drawings, wherein:

FIG. 1 is a side sectional vew of the apparatus of the present invention showing the position of the components

of the apparatus when it is employed as a humidifier. The broken lines in FIG. 1 show the position of the components when the unit is used as a dehumidifier.

FIG. 2 is a section view, through lines 2—2 of FIG. 3, of the evaporation chamber within the unit.

FIG. 3 is a front sectional view of the unit through lines 3—3 of FIG. 1.

According to the present invention there is provided an apparatus which may be used to provide all season humidity control, in that the apparatus may be used for both humidification and dehumidification, as desired. The apparatus comprises a housing enclosing an air treatment chamber, and has a rotatably mounted liquid transport belt disposed within the housing. The belt is slidably moveable over a pair of tanks disposed at the bottom of the chamber and extends into the tank over which it is positioned. One of the tanks is adapted to contain a humidifying liquid and the other tank a dehumidifying liquid. Therefore, control over widely varying conditions of atmospheric moisture may be exercised by merely moving the liquid transport belt into the suitable tank. Air entering the unit contacts liquid in the belt and is either humidified or dehumidified, depending on the liquid absorbed by the belt, and is discharged into any desired area.

Referring now to the drawings in which like numbers are used for like parts through the several sections, numeral **10** indicates the housing which encloses an air treatment chamber **11**. The housing has an inlet opening **12** in sidewall **13** and a discharge opening **14** in opposing sidewall **15** to permit ambient air to pass through the air treatment chamber. A fan **17** or other blower means is positioned adjacent the inlet opening to draw air into the unit in the direction generally indicated by the arrows. The inlet opening **12** is preferably covered by a porous metal plate such as a screen, sieve, grill and the like. An endless liquid transport belt **18** is vertically disposed within chamber **11** between the inlet and outlet openings and extends across the openings so that air drawn into the chamber through the inlet opening contacts the belt. The belt may be made of any suitable material which is absorbent and air-permeable such as cloth, cellulose sponge, plastic foams such as polystyrene foam and polyurethane foam. Because of its many useful characteristics, polyurethane foam is generally preferred.

The belt, which is mounted for rotational movement, is carried by roller **19**, and is of sufficient length so that the bottom end of the belt is near the bottom wall **20** of the housing. Trunnions **21** are located at each end of the roller. The roller is supported by yoke **22** which extends substantially perpendicular to sidewalls **13** and **14**, and is secured to the top wall of the housing. The arms **23** of the yoke, which are sightly flexible extend downwardly and have generally horizontal slots **24** formed therein in which the roller trunnions **21** are sidably mounted. The slots **24** terminate at both ends in downwardly extending notches **25** and **25***a*. The arms **23** extend above and are substantially perpendicular to a pair of elongated tanks or troughs located in the lower portion of chamber **11**, as will be described in more detail hereinbelow, with the notches **25** at one end of slot **24** being positioned above one of the tanks or troughs and notches **25***a*, at the other end of the slot being positioned above the other trough. In this manner the roller and the belt carried by the roller are slidably movable and may be positioned over either of the troughs as desired. The notches **25** and **25***a* preferably are rounded at the bottom and function as detents for holding the roller in position over the tanks or troughs. The notches also act as bearings for the roller trunnions. The end of one of the trunnions is squared off and fits into a receptacle in the rotor of roller

motor 26 which is adapted to receive the same. When actuated, the motor causes the roller to rotate thereby effecting rotational movement of the belt.

As stated hereinabove, a pair of tanks or troughs 28 and 29 are located in the lower portion of the treatment chamber 11. Preferably these tanks are supported on the bottom wall 20 of the chamber and are larger in size than the endless belt 18, so that the belt may be readily inserted in and/or removed from the tanks. Moreover, the tanks must have a depth sufficient so that a substantial portion of the belt extends into the tanks. In the embodiment of the invention shown in the drawings the tanks are elongated and extend across the air treatment chamber substantially parallel to sidewalls 13 and 15, so that the yoke 22 at the top of the chamber, extends across both the tanks. Tank 28, which is near the front of the housing, i.e. near sidewall 13, is positioned beneath notches 25, so that when the roller trunnions are moved into these notches, the endless belt, carried by the roller will extend downwardly into tank 28. Tank 29, which is near the rear of the housing, i.e. near sidewall 15, is positioned beneath notches 25*a* so that movement of the roller towards the rear of the housing will carry the endless belt from tank 28 into tank 29. This position of the belt and roller is shown by the broken lines in FIG. 1.

Both of the tanks are adapted to contain a liquid, one of the tanks containing a humidifying liquid and the other tank a dehumidifying liquid. In the embodiment illustrated in the drawings, the humidifying liquid 46 such as water and the like, is contained in tank 28 and may be introduced therein by an convenient means, such as by inlet 30. When the unit is used for humidification, sufficient humidifying liquid must be maintained within tank 28 so that a substantial portion of the belt extends into the liquid. Tank 29 contains a dehumidifying liquid 47 which may be introduced therein by any convenient means. When the unit is used for dehumidification, sufficient liquid must be maintained in this tank to permit a substantial portion of the belt to extend into the liquid. When the unit is not being used for dehumidification, a removeable cover 31 may be placed over the tank containing the dehumidification liquid.

In order to prevent the dehumidifying liquid from becoming too dilute due to the absorption of water vapor from the air, an evaporation chamber 32 is provided within the tank containing the dehumidifying liquid. This chamber consists of an electrically powered heater 34, having its surface covered by a material resistant to the effect of the dehumidifying liquid such as glass, the heater being surrounded by an insulating jacket consisting of inner and outer shells 35 and 35*a* having an insulating material 36 therebetween. The diameter of inner shell 35 is slightly greater than the diameter of heater 34 thereby forming an annular space between the heater and the inner shell into which the dehumidifying liquid enters by means of openings in the bottom of the evaporation chamber, the liquid thereupon surrounding the bottom portion of the heater. A vapor duct 37 communicates with the annular space and extends through the housing. The heater is actuated by switch 38 which is in turn actuated by float 39 and toggle 40. The insulating jacket is desirably made of any material resistant to the action of the hot dehumidifying liquid, such as, for example galvanized iron. Also, the insulating jacket may be made of a suitable plastic in which case the insulating material 36 may be eliminated.

A deflector screen member 42 is positioned within chamber 11 adjacent discharge opening 14, and is inserted in place through slot 43 in the top wall of the enclosure. A louvre 48 or other suitable means is removeably positioned in discharge opening 14 and is held in position by any suitable means, such as spring clips (not shown).

A suitable humidistatic control that can be employed in this invention incorporates a conventional humidity sensing device 44 such as a hair or a lithium chloride film

or other suitable means as described in Chemical Engineering, June 1957, page 17. The humidity sensing device is adapted to close a switch connecting a first circuit to a source of electric current only when the humidity is above a predetermined level, and to close a switch connecting a second circuit to a source of electric current only when the humidity is below a predetermined level. A mode or selector switch 45 connects the fan 17, roller drive motor 26 and heater 34 into the first energizing circuit when it is set for dehumidification. As noted above, the heater circuit is further controlled by being made responsive to the level of the liquid in the dehumidifying tank. The fan and roller drive motor are connected into the second energizing circuit when the mode or selector switch is set for humidification. A third position of the selector switch can be used to connect the heater directly to the electric current when the unit is used solely as a vaporizer.

As noted hereinabove, water is a suitable humidifying liquid for use in this invention. The dehumidifying liquid used is a hygroscopic liquid comprising an aqueous solution of a lithium halide. This salt functions by sharply lowering the equilibrium vapor pressure of the water in which it is contained. Such a solution will markedly condense water from moist air in contact with it until the vapor tension of the water in the air equals the equilibrium vapor pressure of the salt solution. The upper limit of useful concentration is governed by the solubility of the lithium halide, and the lower limit is a function of the humidity at which the air is to be maintained. Preferably the dehumidifying liquid contains from about 25% to about 45% by weight of the lithium halide. Lithium halide concentrations within this range can lower the humidity of air contacting it from 100% relative humidity to less than 25% humidity over a wide range of temperatures. Suitable lithium halides include lithium chloride and lithium bromide, with lithium chloride generally being preferred. Lithium halide solutions also have the property of destroying living bacteria, so that air contacting such a solution is purified as well as dehumidified.

The dehumidifying liquid also preferably contains an additive selected from the group consisting of water soluble polyols and glycol ethers having two to six carbon atoms and at least one free hydroxyl group. The inclusion of such an additive in the dehumidifying liquid keeps the belt flexible and prevents it from stiffening upon standing in the dry state, especially after being run through the concentrated lithium halide solution. Thus, if the polyol or glycol ether additive is not included in the dehumidifying liquid, the belt tends to become stiff and inflexible if permitted to dry out after having been run through the lithium halide solution. As a result, the belt will not rotate properly on the roller and tends to shrink out of contact with the liquid in the tank. In order to render the belt useful again it must be prewetted before starting the roller to restore its flexibility. Alternatively, the ability to roll smoothly after drying can be obtained by fastening thin strips of sponge across the belt at regular intervals and by the use of idler rollers holding the belt in the troughs. However, these methods of restoring flexibility to the belt are not required when the polyol or glycol ether additive are incorporated in the dehumidifying liquid, for these materials keep the belt flexible and permit complete satisfactory use of the belt even when it is cycled through periods in which it is unwetted for extended lengths of time. Furthermore, the polyols and glycol ethers provide an additional dehumidifying effect. Samples of polyols and glycol ethers which may be added to the dehumidifying liquid are ethylene glycol, diethylene glycol, triethylene glycol, glycerol and ethylene glycol monomethyl ether. Generally ethylene glycol and triethylene glycol are preferred. The polyol or glycol ether additive may be incorporated in the dehumidifying liquid in amounts of from about 2% to about 20% by weight.

While many of the parts of the present apparatus can be constructed of materials which are resistant to the effect of lithium halide solutions, such as polyethylene and galvanized iron, the apparatus may be rendered more flexible with respect to materials of construction by the inclusion of a small amount of a corrosion inhibitor in the hygroscopic dehumidifying liquid. Thus it is generally preferred to add from about 0.5% to about 2% by weight of a corrosion inhibitor to the dehumidifying solution. Suitable inhibitors which may be added include chromates, arsenites, molybdates and aryl guanidines. The use of an aqueous solution containing lithium chloride as the lithium halide, triethylene glycol as the belt softening additive and lithium molybdate as the inhibitor as the dehumidifying liquid in the apparatus of this invention has been satisfactory.

The operation of the combination humidifier and dehumidifier described hereinabove is as follows. In using the unit as a dehumidifier, the dehumidifying liquid is introduced into tank **29** and the roller **19** is slidably moved into place over tank **29** bringing with it the belt which extends in the liquid in the tank. In this position, the roller trunnions are engaged in notches **25***a* thereby maintaining the roller in position over the tank. The deflector screen **42** and louvre **48** are then positioned in place. The mode switch **45** is set to dehumidification the humidistat **44** is adjusted to a desired value, and the unit is started up by turning on a source of power. When the humidity in the ambient air is above the desired value, the fan **17**, roller drive motor **26** and heater **34** are actuated as described hereinabove. Humid air is drawn into the unit by the fan and contacts the first vertical segment of the permeable endless belt. As the air passes through this segment of the belt it contacts the dehumidifying liquid held therein. The liquid absorbs a portion of the moisture in the air as the air passes through this first segment of the belt, and an additional quantity of moisture as it passes through the segment of the belt furthest the fan. In contacting the dehumidifying liquid, the air is also cleansed of living bacteria and of many objectionable odors. Rotation of the belt through the dehumidifying liquid in the tank returns the diluted liquid to the trough and brings fresh liquid into the path of the incoming air. Before being discharged from opening **14** the dehumidified air is freed of any droplets of the dehumidifying liquid by the deflector screen **42**, the droplets being returned to tank **29**.

As the dehumidifying liquid becomes diluted by the absorbed moisture it expands in volume thereby raising float **39** and activating heater switch **38**. The heater causes the liquid contained within the annular space in the evaporation chamber, to boil thereby driving off the water in the form of steam through vapor duct **37**. The steam is lead away from the unit by any suitable means such as a duct or hose (not shown) to an indifferent area such as outside a window or to an area where bacterially pure steam vapor is desired. Once the unit is started up as a dehumidifier, it can go unattended for extended periods of time.

In using the unit as a humidifier a humidifying liquid such as water is introduced into tank **28** and the roller slidably moved in position over the tank thereby bringing the belt into the tank so that it extends into the liquid. The roller and belt are maintained in this position by the engagement of roller trunnions **21** in notches **25**. The mode switch and humidistat are adjusted as required so that when the humidity of the ambient air falls below a predetermined level, the fan and roller motor are actuated thereby causing the air to be drawn into the unit and contact the humidifying liquid absorbed in the belt. As the air passes through both vertical segments of the belt it absorbs water therefrom and approaches a state of saturation. The moisture laden air then passes out of the unit through discharge opening **14**. The deflector screen **42** may be removed from the unit when it is used for humidification. Also, when the unit is used as a humidifier or is stored for extended periods, cover **31** is preferably placed over the dehumidification tank.

In order to use the unit as a vaporizer, vapor duct **26** is merely brought to the desired location and the selector switch adjusted for vaporization.

In a preferred embodiment of the unit described the belt has a total length when extended of 36 inches and a width of 14 inches. When the unit, using this belt, is used for dehumidification, it can absorb 24 pints of water in 24 hours at 80° F. and 60% relative humidity. When used for humidification, it can supply 64 pints of water in 24 hours, and when used as a vaporizer can supply 24 pints of water, as steam vapor in 24 hours.

It is to be understood that the dimensions of the belt and the output of the unit are not to be limited to that described above, but these are supplied merely as an illustration of the practical utility of the apparatus.

Also, while the apparatus has been described as having certain specific structural features, it is apparent that these may be modified by providing equivalent structures. For example, the tanks need not be elongated, but need only be of a suitable size and shape as to permit the belt to be readily inserted in and removed therefrom. Also, the tanks may be formed as an integral part of the bottom wall of the housing. Similarly the arms **23** which support the roller may also be formed as an integral part of the top wall of the housing. The arms **23**, whether formed as an integral part of the housing or as part of the yoke secured to the housing, are slightly flexible. This enables the belt to be removed from the housing, when desired for cleaning or other purposes, by spreading the slightly flexible arms and removing the roller and belt from the slots.

Alternatively an additional pair of slots (not shown) can be provided extending between the end of the horizontal slot **24** and the back edge of the arms **23** for the same purpose.

The dimensions of the endless belt may be varied widely, the dimensions being dependent in part upon the desired output of the apparatus. Thus, according to the principal of the invention, the belt has a sufficient length and width so that when the unit is used for dehumidification the belt transports enough dehumidifying liquid in one revolution to absorb a minimum amount of moisture from a current of humid air urged through it, and so that when the unit is used for humidification, the belt transports sufficient humidifying liquid in one revolution to release a minimum predetermined amount of moisture to the dry air urged through it. The belt must have a sufficient length so that when positioned in the path of the air flow passing through the unit, it extends a substantial distance into the liquid contained in either of the tanks. In this manner, as the belt is rotated the portion of the belt extending into the liquid carries a predetermined amount of the liquid into the path of the air thereby effecting humidification or dehumidification of the air, depending upon the liquid into which the belt extends.

While only water has been specifically mentioned as the humidifying liquid for use in the present invention, it will be understood that other suitable humidifying liquids may also be used. Similarly, suitable dehumidifying liquids, other than those specifically mentioned herein may also be used.

Therefore, it will be understood that various changes in the details, materials, steps, and arrangement of parts, which have herein been described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principal and scope of the invention as expressed in the appended claims.

I claim:

1. A humidity control apparatus suitable for use for both humidification and dehumidification which comprises

a housing enclosing an air treatment chamber, said housing having an air inlet opening in one wall and an air discharge opening in an opposing wall,

a pair of tanks positioned at the bottom of said chamber,

an endless, liquid-transport belt within said chamber between said openings, the belt extending across the openings in the housing, said belt being rotatably mounted and slidably moveable in the housing and extending below the upper level of said tanks,

support means positioned above and extending across said pair of tanks,

means for rotating said belt, said rotating means comprising roller means on which said endless belt is carried, and motor means connected to said roller means, whereby said motor means, when actuated, causes rotational movement of the roller and the endless belt carried by said roller, said roller means being supported by and slidably moveable within said support means, and

blower means for causing ambient air to enter said air inlet opening in said housing and to be discharged from said air discharge opening, whereby the ambient air passes through said endless belt before it is discharged from the housing.

2. The apparatus as defined in claim 1 in which said support means consists essentially of downwardly extending arm members at each end of said roller, said arm members being positioned above and extending across said tanks, each of said arm members having a substantially horizontal slot through which the ends of said roller means extend, the horizontal slots continuously extending from a point above one of said tanks to a point above the other of said tanks, whereby said rollers means and said endless belt are slidably moveable along the horizontal slots.

3. The apparatus as defined in claim 2 in which the horizontal slots terminate at each end in a downwardly extending notch, the notch at one end of the slot being above the midpoint of one tank and the notch at the other end of the slot being above the midpoint of the other tank.

4. The apparatus as defined in claim 1 in which said blower means is a fan positioned within said air treatment chamber adjacent one of the openings in said housing whereby said fan draws ambient air in the air inlet opening, forces it through the endless belt and causes it to be discharged through the air discharge opening in the opposing sidewall of said housing.

5. The apparatus as defined in claim 1 in which said tanks are supported on the bottom surface of said chamber and extend across the chamber substantially parallel to the sidewalls having the openings therein.

6. The apparatus as defined in claim 1 in which a heating means is enclosed within one of said tanks, said heating means having inlet means communicating with said tank, and having an outlet extending through the housing.

7. A portable, low cost combination humidifier and dehumidifier which comprises

(a) a housing enclosing an air treatment chamber, said housing having an air inlet opening in one sidewall and having an air discharge opening on the opposing sidewall,

(b) a first tank means at the bottom of said chamber, said first tank means containing a humidifying liquid,

(c) a second tank means at the bottom of said chamber adjacent said first tank means, said second tank means containing a hygroscopic dehumidifying liquid,

(d) an endless liquid-transport belt rotatably supported between said inlet and discharge openings and extending downwardly below the level of the liquids in said first and second tank means,

(e) means for rotating said belt,

(f) means for slidably moving said belt substantially horizontally within said chamber so that the belt may be inserted into either of said tank means, and

(g) blower means for causing air to enter said air inlet opening, whereby the air passes through said endless belt and is discharged from the chamber through the air discharge opening.

8. The apparatus as defined in claim 7 in which the means for rotating the belt comprises roller means carrying the belt and motor means connected to said roller means, whereby the motor means when actuated causes rotational movement of the roller means and the endless belt carried by the roller.

9. The apparatus as defined in claim 7 in which said roller means is supported by and slidably moveable within support means secured to the upper surface of said air treatment chamber, said support means being substantially perpendicular to the sidewalls having the openings therein, and extend above said first and second tank means whereby the roller means and the endless belt carried by the roller may be reciprocally moved within said chamber.

10. The apparatus as defined in claim 7 in which said blower means is a fan positioned within the air treatment chamber between the air inlet opening and the endless belt, whereby air is drawn in the inlet opening, forced through the endless belt and discharged from the discharge opening.

11. The apparatus as defined in claim 7 in which an evaporation chamber is disposed within said second tank means, said evaporation chamber comprising a heating means, an insulating jacket surrounding said heating means, the jacket being spaced from the heating means to provide an annular chamber therebetween, said insulating jacket having openings therein so that the dehumidifying liquid in the second tank means enters the annular chamber, duct means communicating with said annular chamber and extending through the housing, and switch means responsive to the level of the dehumidifying liquid in the second tank means for actuating the heating means.

12. The apparatus as defined in claim 7 in which the endless belt extends across the inlet opening and is vertically disposed within the air treatment chamber, so that the surface of the belt is substantially perpendicular to the flow of air entering the air treatment chamber through the air inlet opening, the belt extending from a point above the top of the air inlet opening to a point substantially below the level of the liquids in said first and second tank means.

13. The apparatus as defined in claim 7 in which the hygroscopic dehumidifying liquid contained in said second tank means is an aqueous solution containing from about 25% to about 45% by weight of a lithium halide selected from the group consisting of lithium chloride and lithium bromide, from about 2% to about 20% by weight of a belt softener selected from the group consisting of polyols and glycol ethers having 2 to 6 carbon atoms and at least one free hydroxyl group, and from about 0.5% to about 2.0% by weight of a corrosion inhibitor selected from the group consisting of chromates, arsenites, molybdates and aryl guanidines.

14. A combination humidifier and dehumidifier which comprises

(a) a housing enclosing an air treatment chamber, said housing having a front wall having an air inlet opening therein, an opposing rear wall having an air discharge opening therein, side walls joining said front and rear walls and top and bottom walls enclosing said air treatment chamber,

(b) a first tank supported on said bottom wall, said first tank extending across the air treatment chamber between said sidewalls and containing a humidifying liquid,

(c) a second tank supported on said bottom wall ad-

jacent said first tank and extending across the air treatment chamber between said sidewalls, said second tank containing a hygroscopic dehumidifying liquid,

(d) an evaporation chamber within said second tank means, the evaporation chamber comprising an electrically powered heating means, an insulating jacket surrounding said heating means, the jacket being spaced from the heating means to provide an annular chamber therebetween, said insulating jacket having openings at the bottom thereof, duct means connected to said annular chamber and extending through said housing, switch means responsive to the level of the liquid in said second tank for actuating the heating means,

(e) an endless, air permeable, absorbent belt rotatably mounted between said inlet and discharge openings and extending across said openings, the belt being vertically disposed within the air treatment chamber with the surface of the belt being substantially perpendicular to the flow of air entering through the inlet opening, the belt extending from above the top of the air inlet opening to below the level of the liquid in said first and second tanks,

(f) a roller carrying said belt, the roller being supported by and slidably moveable within support means secured to the top wall of said housing, said roller being connected to a motor for providing rotational movement of the roller, said support means being substantially parallel to the sidewalls of the housing and extending above the first and second tanks,

(g) a fan positioned between the air inlet opening and the endless belt,

(h) a humidity sensing device secured to the outside of the housing, and

(i) a selector switch connecting the fan, motor and heating means to a source of electric current.

15. A hygroscopic dehumidifying liquid composition consisting essentially of an aqueous solution of from about 25% to about 45% by weight of a lithium halide selected from the group consisting of lithium chloride and lithium bromide, from about 2% to about 20% by weight of a water soluble belt softener selected from the group consisting of polyols and glycol ethers having 2 to 6 carbon atoms and at least one free hydroxyl group, and from about 0.5% to about 2.0% by weight of a corrosion inhibitor selected from the group consisting of chromates, arsenites, molybdates and aryl guanadines.

16. The composition as defined in claim **15** in which the lithium halide is lithium chloride, the belt softener is triethylene glycol, and the corrosion inhibitor is lithium molybdate.

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