Aug. 29, 1961 E. T. MORTON ET AL 2,998,504

COMBINED DEHUMIDIFIER AND HUMIDIFIER

Original Filed Feb. 1, 1954 4 Sheets-Sheet 1

Fig. 1.

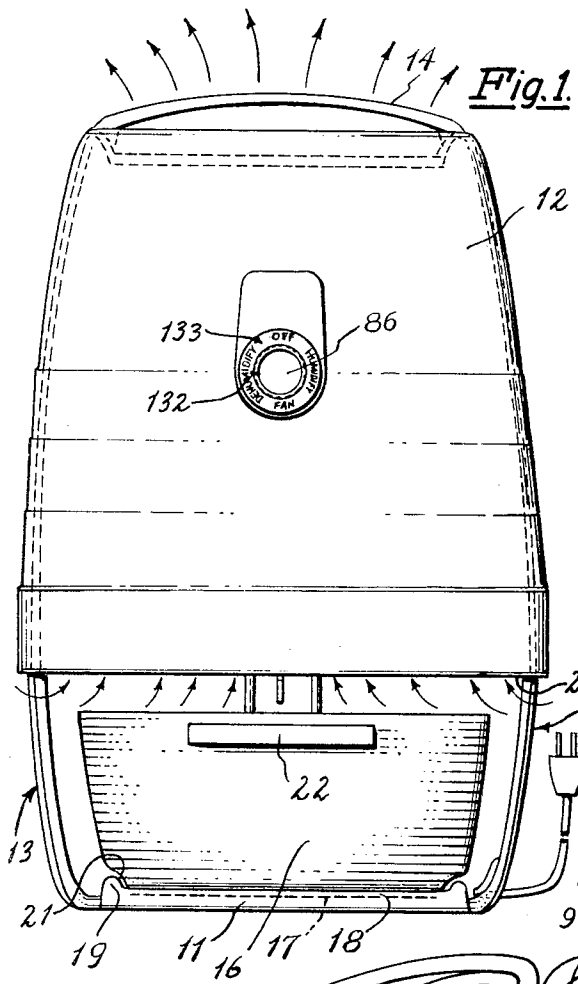
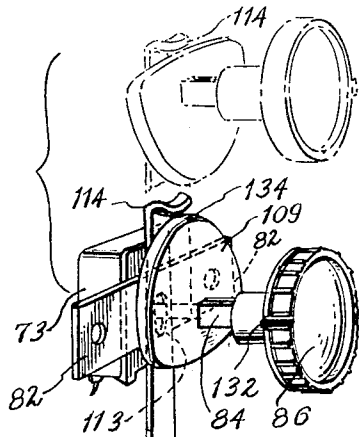


Fig. 5.



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COMBINED DEHUMIDIFIER AND HUMIDIFIER

Original Filed Feb. 1, 1954 4 Sheets-Sheet 2

Fig. 2.

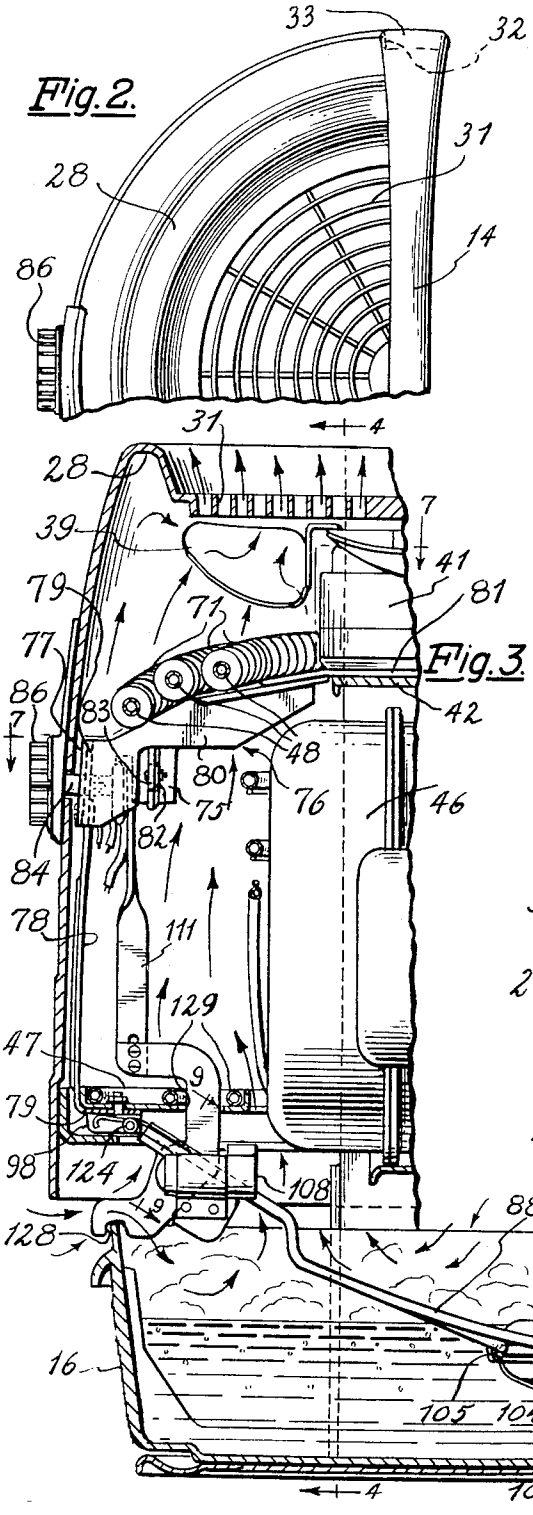


Fig. 3.

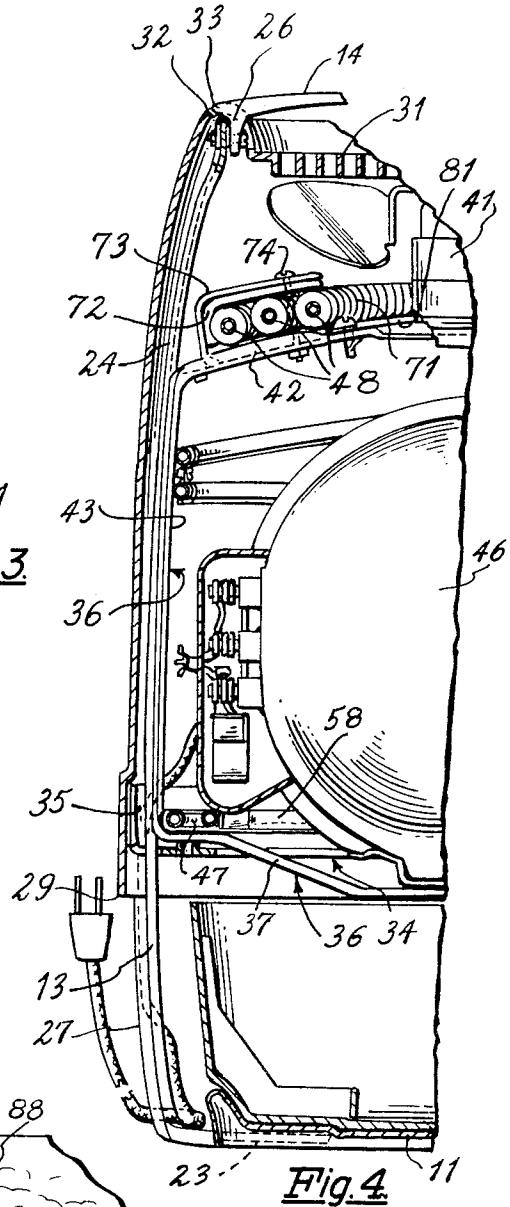


Fig. 4.

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COMBINED DEHUMIDIFIER AND HUMIDIFIER

Original Filed Feb. 1, 1954 4 Sheets-Sheet 3

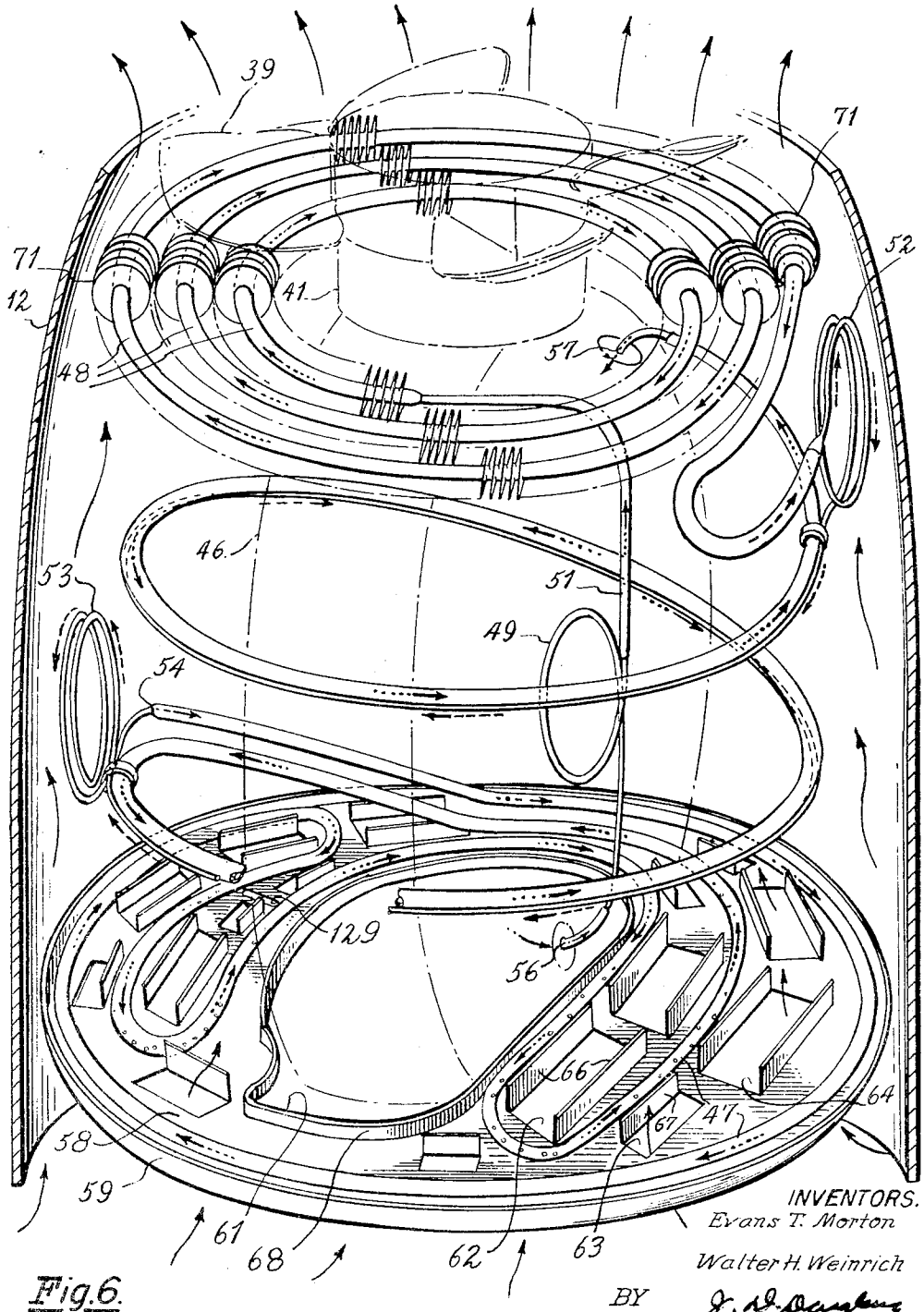


Fig. 6.

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COMBINED DEHUMIDIFIER AND HUMIDIFIER

Original Filed Feb. 1, 1954 4 Sheets-Sheet 4

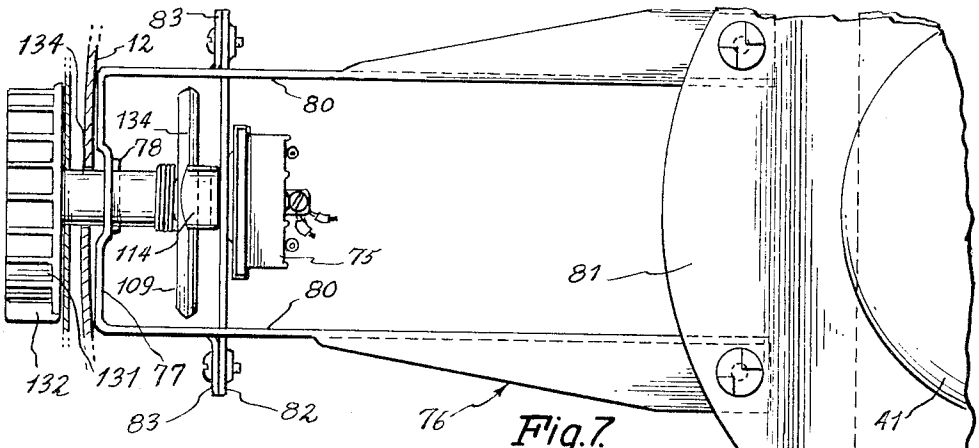


Fig. 7.

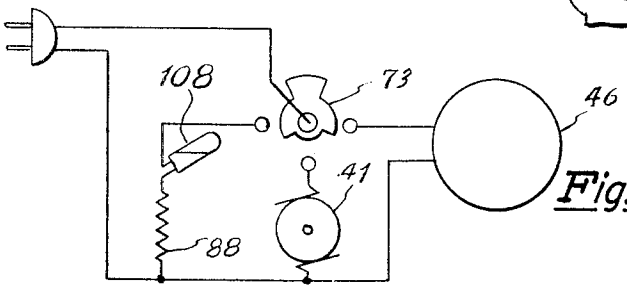


Fig. 10.

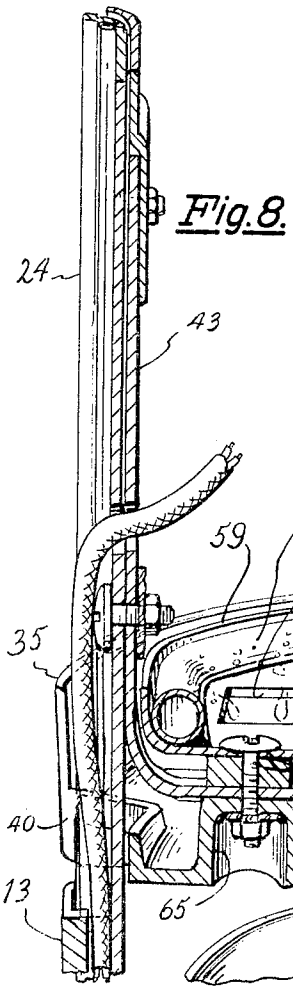


Fig. 8.

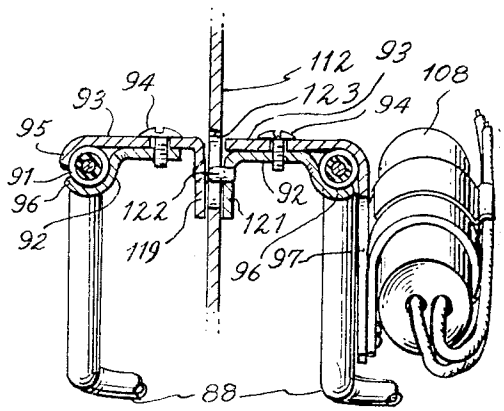


Fig. 9.

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United States Patent Office 2,998,504 Patented Aug. 29, 1961

2,998,504

COMBINED DEHUMIDIFIER AND HUMIDIFIER

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Original application Feb. 1, 1954, Ser. No. 407,484, now Patent No. 2,867,993, dated Jan. 13, 1959. Divided and this application Aug. 4, 1958, Ser. No. 753,857

15 Claims. (Cl. 219—39)

This invention relates to new and useful improvements in air conditioning apparatus, and in particular to a combination dehumidifying and humidifying apparatus and to a novel humidifier therein.

Among the improvements which are incorporated in the present invention are those which include simplicity of construction, portability, convenience of repair or adjustment of the same and economy of manufacture.

Other advantages of the invention will be set forth hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

FIG. 1 is an elevational view of the improved combination dehumidifier and humidifier, in its entirety;

FIG. 2 is a fragmentary top plan view thereof;

FIG. 3 is a fragmentary elevational view of the same, parts being broken away to reveal other parts;

FIG. 4 is a vertical section taken on line 4—4 of FIGURE 3;

FIG. 5 is a fragmentary perspective view of elements of the humidifying apparatus of the present invention;

FIG. 6 is a fragmentary perspective view of elements of the dehumidifying apparatus in the present combination dehumidifier and humidifier;

FIG. 7 is a section taken on line 7—7 of FIGURE 3, the view being on an enlarged scale;

FIG. 8 is a fragmentary enlarged vertical section in perspective, corresponding to FIGURE 4;

FIG. 9 is a section indicated by line 9—9 of FIG. 3; and

FIG. 10 is a wiring diagram, shown schematically.

In the drawings, the reference character **11** is used to denote a base for the novel humidifier-dehumidifier apparatus, while above the level of the base is a casing or cowl **12**, supported from said base by a pair of standards **13** extending upward from opposite sides of the base. The cowl **12** is surmounted by a horizontal handle **14** transversely of its upper end as a convenience for moving the apparatus. The cowl **12** is spaced adequately from the base **11** to accommodate a removable basin or liquid receptacle **16** in which water removed from the air may collect when the apparatus is being operated as a dehumidifier and alternately, where a supply of liquid is carried when the apparatus is to be operated as a humidifier in accordance with the present invention.

Provision is made to support the basin **16** in a predetermined position wherein the basin is on the base **11** in concentric relation to the lower end of the cowl **12**. The lower extremity of the cowl is also at a level slightly above the level of the basin **16** so that air drawn into the cowl by means, later to be referred to within the cowl, may first pass at a uniform rate over the upper edge of the basin and be later ejected from the upper end of said cowl. The base **11** is therefore formed with a depressed central region or seat **17** complementary to the bottom of the basin thereby to include an annular

edge **18** between parallel guides or ridges **19**. The bottom of the basin **14** is formed, on opposite sides thereof, with a pair of parallel grooves or creases **21**, complementary to the ridges **18**. Assuming that the basin **14** has been removed from its position as indicated in FIG. 1 and it is desired to return the basin thereto, the ends of grooves **21** are brought into cooperation with the ends of the ridges **16**. Then the basin is slid inwardly and over the seat **17** to the support of which the basin drops slightly when it has passed the edge **18**. While so positioned, a pair of diametrically opposite handles **22** on the basin are accessible since they are disposed intermediate the standards **13**. Concurrently, angular displacement of the basin on its support is resisted by cooperation of the grooves **21** with the ridges **19**. When it is desirable that the basin be removed from under the cowl **12**, said basin is lifted over the edge **18** and slid horizontally outward in an order the reverse of what has just been indicated.

The standards **13** are preferably formed of pressed metal and are L-shaped in general formation thus including horizontal foot portions **23** (FIG. 4) and upright portions **24**. The feet **23** extend under the base **11** to which they are rigidly secured in any suitable manner such as by welding. The portions **24** are of curved formation and from points approximately at the level of the lower edge of the cowl they curve toward each other to their upper end portions which are bridged by the handle **14**, the latter including depending portions **26** bolted to the upper ends of the uprights **24**. If desired, the lower portions of the uprights **24**, where they extend between the base **11** and cowl **12** may be shielded by ornamental covers **27**, preferably of some suitable plastic material.

The cowl **12** is slightly bell-shaped since it has walls of curved vertical sections extending downward from the periphery of an uppermost annular end portion **28** its annular free edge **29**. Centrally of its upper end **28** and in offset relation thereto the cowl is formed with a grille or outlet duct **31** through which air is discharged on its passage through the cowl.

For its support, the cowl rests, at its annular portion **28** on the ends of the standards **13**. The cowl is provided with a pair of apertures **32** through which the depending portions **26** pass. For resisting displacement of the cowl **12** upward over the standards, the handle **14** is provided with horn **33** on either end thereof, which extends over the annular end **28**. Downwardly thereof, the cowl intimately embraces a vertical annular flange **35** of a drip ring **34** supported in fixed relation to the standards **13** by a stanchion **36** which includes a lower transverse member **37**, to which the drip ring is bolted at **55**. One of the purposes served by the drip ring is, therefore, to support the cowl against lateral sway of the cowl about its anchorage at the handle **14**. Other purposes of the ring will be referred to hereinafter.

As indicated by the arrows (FIG. 1), air is drawn into the cowl between the edge **29** of the cowl and the basin **16**, passes upward through the cowl, and the water may be condensed therefrom especially when the humidity of the air is high. Water may also be added to the air when the humidity is low. The flow of air through the cowl is effected by a fan **39** driven by a motor **41**. For its support, the motor **41** is suitably clamped to an upper transverse portion **42** of the stanchion **36** in a position wherein the fan **39** is disposed in a horizontal plane just below the grille **31**. Intermediate the portions **42** and **37**, the stanchion includes vertical portions **43** fixed to the standards **13**.

When the apparatus is operated as a dehumidifier, as the air flows through the cowl **12**, it is first cooled to condense the moisture it contains. The cooled, dried air then passes over the condenser to remove the heat from the condenser after which the heated air is ejected through

the grille 31. The apparatus producing these effects includes a motor-compressor unit 46 (FIG. 3) in a closed fluid circuit with an evaporator coil 47, below the motor-compressor, and a condenser coil 48 above the level of the motor-compressor. Also in the circuit, is a tube 49 (FIG. 6) that forms a vibration absorbing loop and which together with a tube 51, of size intermediate the size of tubing 49 and 48 connects the motor-compressor to the condenser. In circuit with the remaining end of the condenser is a capillary tube 52, which, at a distance along its length remote from the condenser, is intimately associated with the evaporator 47, as by soldering thereto until it continues in a series of convolutions 53 beyond which it is joined at 54 to the evaporator 47.

In operation, a suitable refrigerant in a gaseous state is compressed by the motor compressor 46. The refrigerant then passes from the compressor 46 at 56 and flows to the condenser 48 by way of the tubes 49 and 51. On passing through the tubing 52 the temperature of the refrigerant is so reduced that by the time it is ready to empty into the evaporator coils it is liquefied. The capillary tube discharges into the evaporator coils where it expands and there absorbs heat of the air flowing into the cowl thereby reducing the temperature of said air. This process continues until the refrigerant is delivered to the compressor unit 46, at 57, in a gaseous state.

Below the evaporator 47 is an evaporator disc baffle or diaphragm 58. The baffle 58 is bolted at either side thereof at 55 to the member 37, FIG. 8. It is formed with a peripheral upturned rim 59 in adjacent relationship to the interior of the cowl 12. Consequently it affords, with exceptions later to be referred to, a partition transversely of the interior of the cowl. Centrally thereof the baffle 58 is formed with a major aperture 61 (FIG. 6) through which the compressor unit 46 extends. This aperture is large enough to provide a space for the passage of air between the edges thereof and said unit. For at least a fraction of its length, the evaporator coil 47 is soldered to the disc 58 so that heat received thereby from the air entering the cowl may be more readily conveyed to the evaporator for vaporization of the refrigerant therein. The disc 58 is also formed with minor air passages comprising apertures 62, 63, 64, etc., each of which has a flange struck upward from at least one of its edges. For example the aperture 62 is formed with a pair of flanges 66 at its edges, the aperture 63 has a flange 67 at one of its edges, etc. The major aperture 61 is formed with a flange 68 throughout the perimeter of its edge. The purpose of the flanges is to increase the area of disc 58 for contact with the air passing through the several apertures to remove therefrom a predetermined amount of the heat passing the evaporator so that the air loses its capacity to retain its moisture whereupon said moisture is condensed and deposited on the surface of the disc 58 and the coils 47.

As the condensed water comes in contact with the disc 58 and coils 47, it accumulates and escapes downward through the apertures aforesaid in the diaphragm 58 and accumulates in the basin 16. To guide the water thus formed adjacent the cowl, into the basin, the drip ring 34 is employed. It is preferably of molded plastic and L-shaped in transverse section (FIG. 8) so as to include a lower lip 38 extending inward beyond the edge of the basin 16 from the vertical flange 35. Adjacent the upright portions of the standards 13 the ring 34 is notched at 40 to accommodate said standards and thereat is provided, on opposite sides thereof, with a hollow boss 65 where the ring is bolted to the lower member 37.

As indicated, when the apparatus is operated as a dehumidifier, or as a humidifier, the condenser 48 receives the refrigerant in a compressed heated condition from the unit 46. The heat of the refrigerant passing through the condenser is then imparted to the air cooled by the evaporator. To augment the exchange of heat at the condenser 48 the coils thereof are surfaced with cooling fins 71.

The condenser 48 is mounted above the upper transverse member 42 (FIG. 4). For its mounting, the several coils of condenser 48 embraced by equiangularly spaced cushioning strips or pads 72, of some suitable soft material such as rubber, each of which is itself embraced by a U-shaped metal strap 73, bolted at 74 to the transverse member 42.

Provision is made for controlling the operation of both the fan motor 41 and the motor compressor 46. The provision involves a selector switch 75 (FIGS. 3 and 7), which selectively determines whether the apparatus is operated as a dehumidifier or as a humidifier. It is supported by means including a switch bracket 76 having a substantially vertical, planar portion 77 adjacent the wall of the cowl 12. For part of its support, the bracket 76 is bolted to the upper end of a post 78 having, at its lower end a lateral arm or foot 79 extending inwardly under the condenser disc 58 to which the foot is rigidly secured. From either vertical edge of the portion 77 one of a pair of parallel arms 80 extend upwardly and inwardly under a motor support plate 81 to which the arms are rigidly secured. Plate 81 in turn, is rigidly secured to the upper member 42. The switch 75 further has a pair of wings 82, in a vertical plane, extending away from each other while the arms 80 have a pair of flanges 83 similarly disposed and to which the wings 82 are bolted. The switch 75 bears a horizontal shaft 84 extending between the arms 79, through portion 77 and cowl 12, externally of which it bears a knob 86 for its manual rotation.

The switch 75 also controls humidifying apparatus according to the present invention for adding moisture to the air flowed through the cowl by the fan 39. The humidifying apparatus is, of course, operated when the motor compressor 46 is not operating, the switch 75 acting as an interlocking element so that the humidifying and dehumidifying apparatuses can be operated alternately.

Briefly, the humidifying operation is carried out by moving an electric resistor element, heated to an elevated temperature, into association wth the contents of the basin 16 to vaporize said contents by boiling it at its surface so that the vapor may mingle with the flowing air and be discharged through the grille 31. Such a heater element is indicated in its entirety by the character 88 (FIG. 5). It includes a resistance element, not shown, within a metallic tube 89, bent to a G-shaped formation so as to include its two end portions 91 which are parallel, and in spaced relationship to each other. The ends 91 are clamped in this position by a lower pinch plate 92, below the ends, and an upper pinch plate 93 above the ends, the clamping of the plates toward each other being effected by bolts 94 passing freely through one of the plates and threaded in said other plate. As an aid to further the fixed, spaced relationship of the tube ends 91 to each other, the lower plate 92, FIG. 9, has offset side flanges 96 extending under the ends and the upper plate 93 has side flanges 95 and 97 on opposite sides thereof extending downward for cooperation with offsets 96 to confine the ends against any tendency to be displaced laterally. To pivotally support the assembly of plates 92, 93 and element 88, the post 78 (FIG. 3) bears, on either side thereof, an ear 98 extending downward between and adjacent to tongues or continuation 99 of the offsets 96. A fulcrum is further provided for the element 88 by a pin 101 passing through the tongues 99 and ears 98 so that the remaining end of the heating element may swing between a point above the level of the basin and a point adjacent the bottom thereof.

The element 88, at its swinging end, embraces a float 102, preferably a hollow body formed of pressed metal and having a peripheral flange 103 held in clamped relation to the element by a leaf spring clip 104. It is formed with U-shaped ends 105 and 106, biased toward each other to concurrently embrace the flange 103 and tube 89. From its ends 105 and 106 the clip extends downward

and at the forward region of its downward extension provides a stop **107** engageable with the bottom of the basin **12**. When the element is lowered from its uppermost position, above the level of the basin, the buoyancy of the liquid therein supports the float during which the element **88** is sustained at the surface of, but in engagement with, said liquid. In so doing, the heat necessary to vaporize the liquid is imparted thereto principally in the region of the surface thereof, there being no need to heat the entire body of liquid. As it is varporized, the depth of the liquid is, of course, gradually reduced until means, later to be described, automatically operates to de-energize the element **88** at a predetermined reduced level of the liquid. In case the element **88** is still hot when there is insufficient liquid in the basin to support the float then the stop **107**, by engaging the bottom of the basin, spaces the heating element adequately therefrom to obviate damage to the plastic of the basin.

To de-energize the element **88** when it has been lowered to a predetermined level by vaporization of the liquid, a position switch or mercury switch **108** is connected in series with the heating element. Said switch is fixed to the flanges **97** of the plate **93** and so arranged to be closed except when it is tilted adequately by movement of the element **88** to its lower predetermined position.

As indicated, when the dehumidifying apparatus is in operation, the humidifying apparatus of the present invention is not operating, the heating element **88** being out of the basin **14**. Besides the support provided by the pin **101** the element **88** is also supported from the shaft **84** (FIG. 5). This is effected by linkage between said shaft and element **88** including a cam **109** fixed to the shaft **84**. It also includes a follower link **111** and a latch link **112**. The link **111** is formed with a slot **113** through which the shaft **84** passes freely so that said link may have longitudinal movement transversely of the shaft and be supported by engagement of a lateral follower portion **114**, on its upper end, by the cam **109**. The lower end of the link **111** is adjustably secured to the upper end of link **112**. This is provided by a pair of bolts **117** passing through holes in the link **112** and through a slot **118** in the link **111** which said slot extends longitudinally so that the proximity of the link to the shaft may be varied. For its coupled relationship to the element **88**, the link **112** extends between a flange **119** (FIG. 9), bent downward from the upper pinch plate **93**, and a flange **121**, bent downward from the lower plate **92**. The flange **119** carries a stud **122** extending into a triangular-shaped aperture **123** in the link **112** which is restrained from removal from the stud by the proximity thereto of the flange **121**. Also, it should be noted that the aperture **123** is formed to provide lost motion between the edges thereof and the stud **122**. This arrangement enables the element **88** to have movement by the surface of the liquid independently of the linkage when it is lowered by the operation of the cam **109**. If desired, counter-weight means may be provided to decrease the pressure of the element **88** on the liquid and to make it easier to turn the cam **109**. Suitable means may involve use of a spring **124** coiled about the pin **101** and under torsional deflection by one of its ends **126** pressing against the lower side of pinch plate **92** and another of its ends **127** pressing against the lower side of the foot **78**.

It is desirable that the basin be locked against removal, and particularly against lateral forces to dislodge it suddenly from its normal position beneath the cowl **12**. This is to avoid damage to the heating element or the basin when the latter is moved violently into engagement with the former. Accordingly, the link **112** extends downward and to a point over the rim of basin **16** where the link is formed with a notch **128** into which the rim of the basin extends when the element **88** is lowered from its uppermost position. In this position, the weight of links **111** and **112** remain supported by the cam **109**. Also while in this position, the link **112** is locked against

movement by the basin since the link extends through a slot **129** in the plate **58**, the slot limiting edgewise motion of the link **112**.

The control of the foregoing apparatus is partly by manual operation of the knob **86**. It is fixed to the outer end of the shaft **84** and is formed with a pointer **132** (FIG. 5) at its periphery. About the periphery of the knob, on an ornamental dial **133** (FIG. 1) which is fixed to the cowl **12**, are spaced apart graduations denoted by the following indicia: namely, "Off," "Dehumidify," "Fan" and "Humidify." When the pointer **132** is opposite the "Off" indicia, all features of the apparatus are inactive. This is because the several connections, not shown, within the switch **75**, are open. Also while the switch connections are open, the follower **114** rests on a high side **134** of the cam **109** thereby supporting the element **88** in its uppermost position above the level of the basin **14**. The element **88** remains in its uppermost positon when the knob **86** is moved counterclockwise until pointer **132** is at "Humidify," due to the formation of the cam **109**. When the knob is turned from the "Off" position one-quarter turn counterclockwise to the "Dehumidify" position the fan motor **41** and motor compressor **46** are energized due to the operation of the switch to cause the apparatus to operate as a dehumidifier, so that it reduces the humidity of the air within the cowl **12** and ejects the air so conditioned from the upper end of the cowl. By swinging the pointer **132** additionally in a counterclockwise direction, until it is opposite the indicia, "Fan," the motor, compressor **46** is de-energized without interrupting the operation of the fan **39** while the element **88** is retained in its uppermost position. The cam **109** has a dwell **136** or low side at its periphery, however, which faces upward when the pointer is swung counterclockwise to a point opposite the notation "humidify." At this point the follower **114** having been lowered, the element **88** is also lowered as permitted by the buoyancy of the fluid of basin **16**. Concurrently as the pointer is swung to its "humidify" position the switch **75** permits the heating element to become energized the circuit being through the mercury switch **108** while the fan **39** continues its operation to blow the moistened air from the cowl. The humidifying operation may, of course, be discontinued at any time by moving the pointer in either direction away from its humidifying position. It is also possible to turn the knob **86** in either direction to shift from one of the operations aforesaid to another of the operations of the apparatus.

Although we have described one embodiment of our invention, we are aware that numerous and extensive departures may be made therefrom without departing from the spirit or scope of the invention.

This application is a division of our copending application Serial No. 407,484, filed February 1, 1954.

We claim:

1. A humidifying apparatus comprising a casing through which air may be flowed, a liquid receptacle arranged for the contents thereof to be in communication with the flow of air, a heating element within the casing, and a linkage principally within the casing and supporting the element but including a portion extending externally of said casing from where the linkage may be manipulated manually to vary the flow of air by cooperating with draft regulating instrumentalities within said casing to concurrently vary the position of said element between a point adjacent the basin and a point within the basin occupied by its contents, said element being capable of vaporizing the contents by engagement therewith so that the vapor thereby produced may mix with the flowing air.

2. A humidifying apparatus comprising a casing through which air may be flowed by a blower within the casing, a liquid receptacle arranged at the bottom of the casing for the contents thereof to be in communication with the air flowing through said casing, a control shaft

extending externally of the casing where it may be manually manipulated to manipulate apparatus therein for controlling the operation of the blower, a linkage having a remote portion adjacent the receptacle and a near portion at the shaft, a heating element supported from the remote portion, means on the shaft cooperating with said near portion, to provide an operating relationship between a lateral region of said shaft and said linkage whereby said element may be moved in and out of engagement with the contents of the receptacle as the shaft is moved alternately in opposite directions, said element being capable of vaporizing the contents of the receptacle when in communication therewith so that the vapor thus produced may mix with the air flowing through the casing.

3. A humidifying apparatus comprising a casing through which air is flowed from an inlet duct at the bottom to an exhaust duct at the top thereof, a basin to hold water in communication with the air passing through the casing, a shaft, extending through the wall of the casing of which it may be manually turned to manipulate draft control means within the casing, an electric heating element, a linkage supporting the element in pivoted relation to the basin and extending to the shaft, means on the shaft spacing the linkage therefrom to a degree varying with the angular position of said shaft thereby for the element to be swung into engagement with and alternately out of engagement with the water as the shaft is turned through a complete revolution, said element being capable of vaporizing the water enabling it to mix with the air passing through the casing and be ejected from the exhaust duct.

4. A humidifying apparatus comprising a casing having an air inlet at the base and an outlet at the top thereof, a motor driven fan within the casing to flow the air therethrough, a basin to hold water in communication with the air passing through said casing, an electric heating element, a shaft extending through the wall of the casing exteriorly and arranged to be turned manually, a linkage connected to and supporting the element in movable association with the basin and extending to the shaft, a cam fixed to said shaft and spacing the linkage therefrom whereby said element is moved into engagement with the water of the basin when the shaft is rotated through one arc and alternately moved out of engagement with the water when the shaft is turned through another arc, said element being energized concurrently with its movement into engagement with the water and deenergized with its movement out of engagement therewith, said element vaporizing the water during its engagement for the vaporized water to mix with the flowing air, said connection of said heating element to said linkage comprising a lost motion connection enabling the heating element to float in the water and rise and fall with the level of the water.

5. A humidifying apparatus comprising a casing through which air may be flowed, a removable liquid receptacle arranged for the contents thereof to be in communication with the air passing through the casing, a heating element within the casing, a linkage therein extending through the walls thereof for its manual manipulation externally thereof to control means within the casing for governing the flow of air and to provide support for the element whereby said element may be moved alternately in and out of communication with the contents of the receptacle as the position of said portion is varied alternately in opposite directions, said element being capable of vaporizing the contents of the receptacle when in engagement therewith for the vaporized contents to mix with the air flowing through the casing, and interlocking means on the linkage for engaging the receptacle when the element is moved into the liquid to lock the receptacle against removal from the casing until said element is moved away from the contents of said liquid.

6. A humidifying apparatus comprising a casing through which air may be flowed by a blower within the casing, a removable liquid receptacle arranged at the bottom of the casing for contents of said receptacle to be in communication with the air flowing through said casing, a control shaft extending externally of the casing where it may be manually manipulated to manipulate apparatus therein for controlling the operation of the blower, a linkage having a remote portion adjacent the receptacle and a near end at the shaft, a heating element supported from the remote portion, a member on the shaft cooperating with said near end to provide a mechanical advantage between the shaft and said linkage to move the linkage when the shaft is moved thereby for said element to be moved in and out of engagement with the contents of the receptacle as the shaft is moved alternately in opposite directions, said element being capable of vaporizing the contents of the receptacle when in communication therewith for the vaporized contents to mix with the air flowing through the casing, and locking means on the linkage for engaging the receptacle when the element is moved into the liquid to lock the receptacle against removal from the casing until said element is moved away from the contents of said receptacle.

7. A humidifying apparatus comprising a casing through which air is flowed from an inlet duct at the bottom to an exhaust duct at the top thereof, a slidably removable basin to hold water in communication with the air passing through the casing, a shaft extending through the wall of the casing exteriorly, said shaft arranged to be turned manually to manipulate draft control means within the casing, an electric heating element, a linkage supporting the element in pivoted relation to the basin and extending to and being biased toward the shaft, means on the shaft spacing the linkage therefrom to a degree varying with the angular position of said shaft thereby for the element to be swung into engagement with and alternately out of engagement with the water as the shaft is turned through a complete revolution, said element being capable of vaporizing the water enabling it to mix with the air passing through the casing and be ejected from the exhaust duct, and a locking device in connection with the linkage for locking the basin against removal by embracing an edge wall of said basin when the element is moved toward the water and is disengaged from said edge when the element is moved away from the water.

8. A humidifying apparatus comprising a casing having an air inlet at the base and an outlet at the top thereof, a motor driven fan within the casing to flow the air therethrough, a removable basin to hold water in communication with the air passing through said casing, an electric heating element, a shaft extending through the wall of the casing exteriorly and arranged to be turned manually to operate switches controlling the energization of the element and operation of the fan, a linkage supporting the element in movable association with the basin and extending to the shaft and being biased toward said shaft, a cam fixed to said shaft and spacing the linkage therefrom whereby said element is moved into engagement with the water of the basin when the shaft is rotated through one arc and alternately moved out of engagement with the water when the shaft is turned through another arc, said element being energized concurrently with its movement into engagement with the water and deenergized with its movement out of engagement therewith, said element vaporizing the water during its engagement therewith enabling it to mix with the flowing air, and a locking device on the linkage arranged to grasp an edge of the basin when the element is lowered and prevent removal of said basin from the casing until said element is raised out of said basin.

9. A humidifying apparatus comprising a base, a vertical cowl supported above the level of the base and having means therein for flowing air therethrough, a liquid basin formed for insertion between said base and said cowl and having first guide surfaces thereon, said base being formed with a seat centrally thereof for the basin and with second guide surfaces communicating with said

seat for cooperation with said first surfaces when the basin is slid over toward the seat and by which the basin when supported by said seat is supported in a predetermined position relative to the base.

10. A humidifying apparatus comprising a base, a vertical cowl supported above the level of the base and having means therein for flowing air therethrough, a liquid basin formed for insertion between said base and said cowl and having first guide surfaces thereon, said base being formed with a seat centrally thereof for the basin and with second guide surfaces communicating with said seat for cooperation with said first surfaces when the basin is slid over the base toward the seat and by which the basin when supported by said seat is supported in a predetermined position relative to the base, and a locking device supported at a point adjacent the cowling and movable into locking cooperation with an edge portion of the basin to resist removal of said basin when the humidifying apparatus is in operation.

11. A humidifying apparatus comprising a base, a vertical cowl supported above the level of the base and having means therein for flowing air therethrough, a liquid basin formed for insertion between said base and said cowl to occupy a position thereunder, a manually operable shaft extending through the walls of the cowl and in communication with control means therein for controlling the flow of air through said cowl, an electric heating element, a linkage supporting said element in movable relation to the basin and being coupled to the shaft, said coupling providing a mechanical advantage between the linkage and shaft as said shaft is moved thereby to move the element in greater or less proximity to the bottom of the basin, and a spacer in fixed relation to the element to engage the bottom and thereby limit the proximity to which said element may approach said bottom.

12. A humidifying apparatus comprising a base, a vertical cowl supported above the level of the base, a basin to hold water, said basin being formed for insertion between said base and said cowl to occupy a position under said cowl, a motor-driven fan within the cowl to flow air therethrough, an electric heating element, a shaft extending through the wall of the casing exteriorly of which said shaft may be turned manually to operate switches controlling the energization of the element and operation of the fan, a linkage supporting the element in movable association with the basin and extending to the shaft and being biased toward said shaft, a cam fixed to said shaft and spacing the linkage therefrom whereby said element is moved into engagement with the water of the basin when the shaft is rotated through one arc and alternately moved out of engagement with the water when the shaft is turned through another arc, and a switch associated with the linkage and in circuit with the element, said switch being normally closed but arranged to be opened by a motion of said element to a predetermined proximity of the bottom of the basin, said element being energized concurrently with its movement into the water and deenergized on its movement therefrom and being capable of vaporizing the water during its engagement for the vaporized water to mix with the air flowing through the cowl.

13. A humidifying apparatus comprising a casing through which air may be flowed, a liquid receptacle arranged for the contents thereof to be in communication with the air passing through the casing, a heating element, a linkage within the casing, said linkage being arranged to movably support the element and to extend to the exterior of the casing to be operated manually in one direction to lower said element into engagement with the contents of the receptacle and alternately in the opposite direction to withdraw the element from engagement with said contents and to control the flow of air through the casing by concurrently regulating draft producing means, said element being capable of vaporing the contents when engaging the same so that said contents may mix with the air and be carried out of the casing, a float to support the element in engagement with the contents at the surface thereof by the buoyant effect of said contents on said float and being supported by said element when it is out of engagement with said contents, the engagement of the element with the contents providing for vaporizing of the contents progressively from the surface thereof.

14. A humidifying apparatus comprising a casing through which air is flowed from an inlet duct at the bottom to an exhaust duct at the top thereof, a basin to hold water in communication with the air passing through the casing, a shaft extending through the wall of the casing exteriorly and arranged to be turned manually to manipulate draft control means within the casing, an electric heating element, a linkage supporting the element in pivoted relation to the basin and extending to and being biased toward the shaft, means on the shaft spacing the linkage therefrom to a degree varying with the angular position of said shaft enabling the element to be swung into and out of engagement with the water as the shaft is turned through a complete revolution, said element being capable of vaporizing the water to mix it with the air passing through the casing and to be ejected from the exhaust duct, and a float supported by the element to engage the water when said element is lowered and provide sufficient buoyancy for the element to be floated at the surface of said water to evaporate said water from the surface thereof.

15. A humidifying apparatus comprising a casing having an air inlet at the base and an outlet at the top thereof, a motor driven fan within the casing to flow air therethrough, a basin to hold water in communication with the air passing through said casing, an electric heating element, a shaft extending through the wall of the casing exteriorly and arranged to be turned manually to operate switches controlling the energization of the element and operation of the fan, a linkage supporting the element in movable association with the basin and extending to the shaft and being biased toward said shaft, a cam fixed to said shaft and spacing the linkage whereby said element is moved into engagement with the water of the basin when the shaft is rotated through one arc and alternately moved out of engagement with the water when the shaft is turned through another arc, said element being energized concurrently with its movement into engagement with the water and deenergized with its movement out of engagement therewith, said element vaporizing the water during its engagement therewith for the vaporized water to mix with the flowing air, and a float in association with the element to engage the water when said element is lowered and to provide sufficient buoyancy to support said element at the surface of the water when in engagement therewith thereby progressively vaporizing the water from its surface downward.

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