April 20, 1937. F. MANNING 2,078,202

HUMIDIFIER UNIT

Filed March 2, 1935 2 Sheets-Sheet 1

Fig. 1

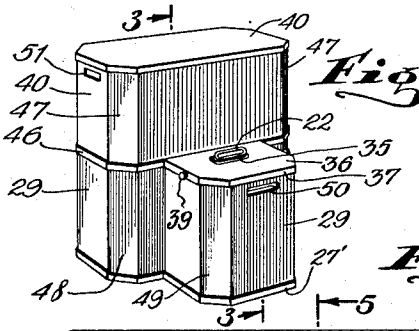


Fig. 2

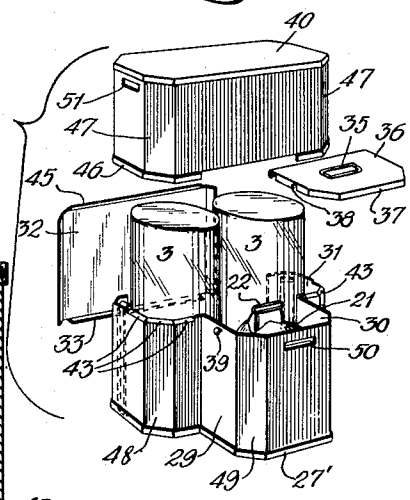
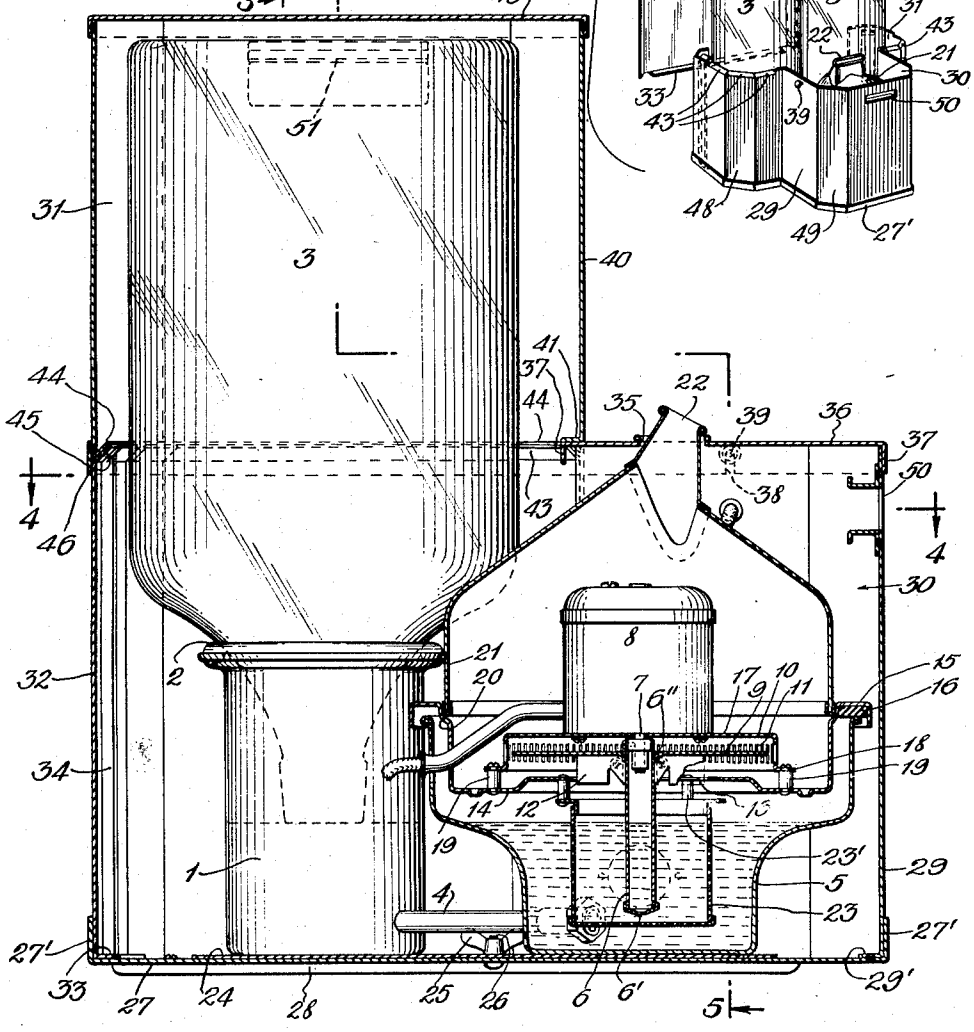


Fig. 3



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April 20, 1937. F. MANNING 2,078,202

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Filed March 2, 1935 2 Sheets-Sheet 2

Fig. 4

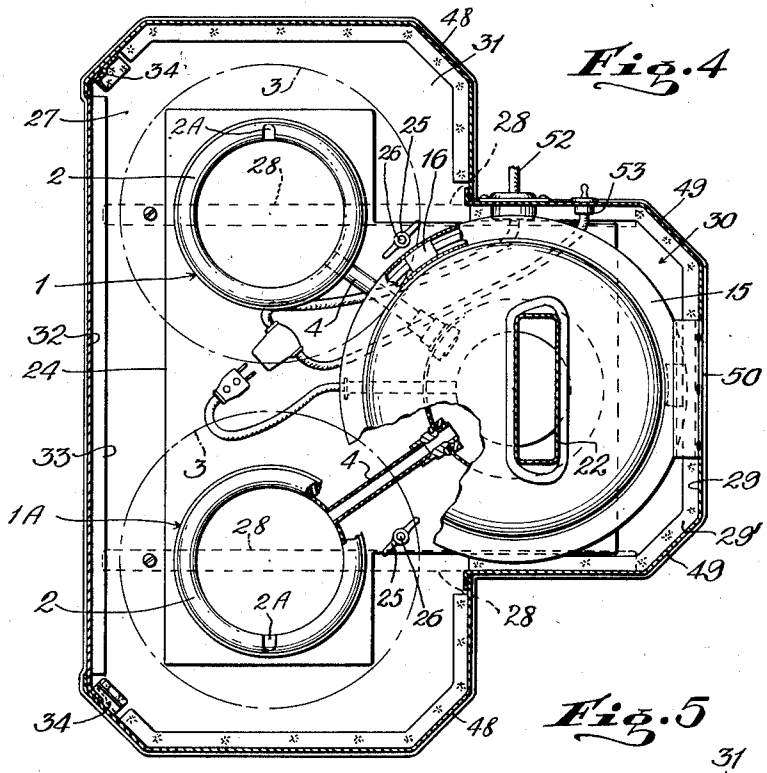
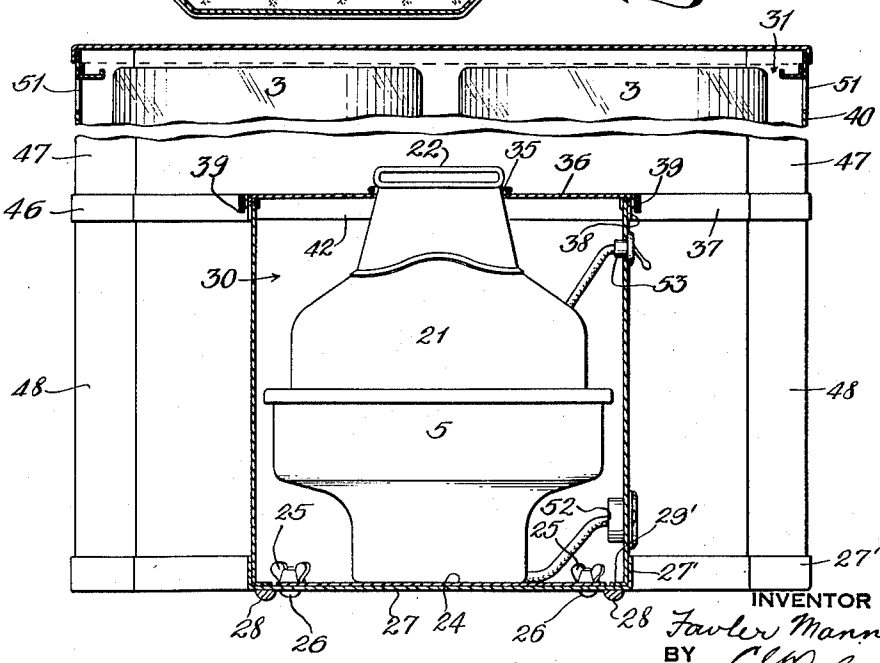


Fig. 5



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UNITED STATES PATENT OFFICE

2,078,202

HUMIDIFIER UNIT

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Application March 2, 1935, Serial No. 9,063

7 Claims. (Cl. 261—91)

The general object of the present invention is to provide a humidifier unit comprising motor driven humidifying means, and having a substantial water holding capacity, which is of desirable form, and includes improvements especially adapting it for use in office and residence rooms as a part of the movable equipment or furniture of such rooms. My improved unit in its preferred form comprises one or more water receiving or reservoir members, each open at its upper end to receive the neck of an inverted water bottle which is removably mounted on said reservoir member, the bottle or bottles so mounted, providing the bulk of the water holding capacity of the unit.

More specific objects are to provide a humidifier unit which, notwithstanding its substantial water holding capacity, is compact and pleasing in form, and light enough in weight to permit of its ready manual movement from one position to another as conditions make desirable, and which includes a chassis or supporting body, upon which all of the humidifying apparatus is mounted, and a casing, which provides a light but suitable strong and rigid enclosure for the apparatus, and in which said chassis or support is removably mounted, said casing including parts readily separable for water bottle replacements and to provide all desirable access to the humidifying apparatus normally enclosed and hidden by the casing.

The improved unit is preferably composed mainly of sheet metal parts, and is characterized by features facilitating its construction of sheet metal parts which are desirably light in weight and simple in form.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described a preferred embodiment of the invention.

Of the drawings:

Fig. 1 is a perspective view of a humidifier unit of preferred form in its normal condition;

Fig. 2 is a perspective view of the unit with the separable parts of the casing displaced from one another;

Fig. 3 is a section through the unit on the plane indicated by the line 3—3 of Fig. 1;

Fig. 4 is a plan in section on the line 4—4 of Fig. 3; and

Fig. 5 is a section on the broken line 5—5 of Fig. 3.

The humidifying unit in the preferred form shown in the drawings, comprises two water receiving or reservoir members 1 and 1A, each in the form of a cup-shaped member of sheet metal. The two reservoirs 1 and 1A are arranged side by side, and each is provided at its open upper end with a seat for an inverted water bottle 3. Each seat may well be formed by a rubber ring 2 cemented to a rim enlargement of the upper end of the corresponding reservoir. The neck of the bottle 3 associated with each of the members 1 and 1A, extends down into the latter, the shoulder portion of the bottle resting on the seat 2. The latter is notched as indicated at 2A, to provide an air passage to maintain atmospheric pressure above the water level in the corresponding reservoir 1 or 1A. Each of the reservoirs 1 and 1A is connected at a point below the normal water level therein, by a corresponding pipe 4 to a cup shaped receptacle or reservoir 5, which forms the water supply chamber for the humidifying pump.

The latter is in the form of a vertically disposed tubular element 6 suspended from the shaft 7 of its electric driving motor 8. The lower end of the tubular element 6 extends down into the water in the pump supply chamber 5, and is closed except for a small central inlet 6'. Adjacent its upper end and well above the normal water level in the chamber 5, the pump element 6 is provided with outlets 6''. In operation the rapid rotation of the tubular element 6 causes a flow of water into and through the element, and out of the latter through its ports 6''. The water issuing through the outlet 6'' passes onto a horizontal sheet metal disc 9 coaxial with and secured to the pump element 6. Centrifugal force action causes the water discharged onto the disc 9 through the ports 6'', to move outward in a film to the edge of the disc, from which the water is discharged with a substantial velocity.

The water so discharged from the disc 9 impinges against a stationary cylindrical part 10 surrounding, and spaced away from the periphery of the disc 9. The cylindrical part 10 is formed with a multiplicity of discharge orifices 11 shown as in the form of vertical slots extending from a level appreciably above the top side of the disc 9 to a level appreciably below the lower side of the disc. The water comes to the inner ends of the orifice slots 11 in finally divided form, and is in effect atomized and moved through and discharged from the orifice slots in the form of

a mist, by air set in motion by fan blades or vanes 12 secured to the under side of the disc 9 and extending outwardly from the element 6 for more or less of the radial depth of the disc 9. The disc 9 and vanes 12 thus form the impeller of an air moving fan which has its air inlet 13 formed by the central aperture in the bottom portion of a dished sheet metal part 14. The latter has a rim portion 15 which extends outward over, and is supported by the upper edge of the member 5. As shown, rubber bodies 16 are interposed between the rim portions 15 of the member 14 and the upper edge of the member 5, at intervals along their peripheries, so that air may pass into the space within the member 5 above the water level therein and below the member 14, through the open joint spaces between the upper edge of the receptacle member 5, and the rim portion 15.

The bodies 16 also provide a resilient noise and vibration eliminating support for the motor 8, which is supported by the member 14 through parts including the cylindrical part 10. The latter as shown is an integral down turned flange portion of a sheet metal disc 17 through which the motor shaft passes and on which the frame of the motor 8 is secured. At its lower edge, the cylindrical part 10 terminates in an outturned flange portion 18 secured to the member 14 by posts 19. At the inner side of its rim portion 15, the member 14 is shaped to provide an annular seat 20 for the base of a bell shaped member or hood 21. The hood 21, member 14, and receptacle 5 form a casing enclosing the motor 8, and all portions of the air and water impelling means operated by the motor. The highly humidified air and entrained water mist passing upward through the motor enclosing casing is discharged with considerable velocity imparted thereto by the impeller element, through an outlet nozzle 22 provided at the upper central portion of the top of the hood 21, the moisture laden air or mist being emitted in a defined stream from the nozzle.

Advantageously, and as shown, a cup shaped screen 23, suspended by parts 23' from the member 14, extends across the path of flow of water entering the receptacle 5 through the pipes 4 and passing to the pump inlet 6. Advantageously and as shown, the water holding capacity of the member 5 is reduced by reducing the diameter of the lower portion of the member, to thereby insure a bodily flow of water through the member 5 rapid enough to prevent the accumulation of stale or foul water in the chamber 5 during the normal operation of the apparatus.

The reservoir or receptacle members 1, 1A, and 5 are mounted on a chassis or base support 24 shown as consisting of a metal plate of T form. The bottom of the member 5 is welded or otherwise suitably secured to the upper side of the leg portion of the chassis 24, and the reservoir members 1 and 1A are similarly secured to the upper sides of the ends of the cross bar or top portion of the T shaped chassis. This permits a very compact assemblage. As shown, the rim portion 15 of the member 14 extends into the space between the members 1 and 1A, and the body portions of the bottles 3 overhang the hood member 21. The chassis 24 is detachably secured to the bottom wall 27 of a humidifier casing enclosing all of the humidifying apparatus previously mentioned, except the upper end of the outlet nozzle portion 22 of the hood 21, which extends through a humidifier casing aperture, to which reference is made later, by means of wingnuts 25 threaded on uprising bolts 26 passing through holes in the chassis plate and wall 27.

The humidifier casing is formed of sheet metal parts, and its bottom wall 27 is reenforced by bar like parts 28 secured to its under side, and serving as skids to facilitate movement of the unit over the floor of a room in which it may be placed or through which it may be moved. The casing comprises a vertical body portion 29 rigidly secured at its lower edge, as by welding, to the bottom member 27, which is provided with an uprising marginal flange 27' which overlaps the lower portion of the part 29. The latter is formed at its lower end with an inturned flange 29' bearing against the bottom member 27. The bottom portion 27, while extending horizontally outwardly from the edges of the chassis member, conforms generally in shape thereto, so that the portion of the casing space surrounded in part by the vertical casing element 29 may be described as including a bay extension 30 at one side of a body portion 31 generally rectangular in horizontal section. The reservoir members 1 and 1A and the lower portions of the bottles 3 are located in said body space portion 31 while the member 5 and hood 21 are located mainly in the bay extension, though having portions projecting into the space portion 31. The vertical casing member 29 forms the vertical casing wall for the bay space 30, and for the lower portion of the body space 31, except at the rear or side of the latter remote from the bay extension.

The ends of the wall part 29 extend to the rear of the space portion 31, but are spaced away from one another to provide an opening normally closed by a removable panel or wall portion member 32. The removal of the latter provides all needed access to the lower portion of the space 31. As shown, the panel member 32 is formed with an inturned flange 33 which normally rests on the casing floor member 27. The width of the opening between the ends of the member 29 and normally closed by the panel member 32 is sufficient to permit the lateral removal of the chassis 24 when the wing nuts 25 are removed. The vertical side edges of the panel member 32 are received in guideways formed between the inner sides of the ends of the member 29, and suitably shaped guide strips 34 secured to said ends.

The upper edges of the wall member 29 and panel 32 are at a level substantially intermediate the tops of the bottles 3 and the chassis 24, and above the body of the hood member 21, but below the top of its nozzle part 22. The latter normally extends through an opening 35 in a flat removable cover member 36 which is mounted on the top of the portions of the wall member 29 forming the front and end walls of the bay space 30, said opening being out of vertical axial alignment with the element 9, and the discharge opening in the top of the hood 21. As shown, the cover part 36 is formed with a downturned rim flange 37 which overlaps the corresponding upper edge portion of the wall member 29. The rim flange 37 is notched at 38 to receive clamping screws 39 for detachably securing the cover plate 36 in position. The flange 37 is also provided at the inner side of the member 36. The upper portions of the bottles are enclosed by a casing member 40 which is in the form of a box open at its underside, and normally rests on corresponding upper edge portions of the member 29 and panel 32.

As shown the member 40 is provided with an

inturned portion 41 at its front side which normally rests on the inner edge of the cover plate 36. Advantageously, and as shown, the portions of the wall member 29 at the rear of the bay space 30 are inturned at their upper edges to provide an inclined flange 43 forming a seat for a reversely bent lower end portion 44 of the casing member 40, which is thus seated on the flange portion 43 and on the similar inclined flange 45 provided at the upper end of the panel member 32. A strip 46 welded or otherwise attached to the outer side of the casing member 40 at the lower end of the latter, overlaps the upper ends of the panel member 32 and the portions of the wall member 29 at the rear of the cover member 36. The strip 46 provides trim, appearing as a continuation of the trim formed by the rim portion 37 of the cover plate 36, and thus contributes to a pleasing appearance of the humidifier unit casing, imparts rigidity to the casing, and interlocking the casing parts. The provision of the various flanges previously mentioned also contribute to the stiffness of the casing structure.

The appearance of the unit is improved, and additional rigidity and some reduction in bulk are secured, by flattening the vertical corner portions 47 of the member 40, the subjacent corner portions 48 of the wall member 29, and the front corner portions 49 of the portion of the member 29 enclosing the bay space 30. A handhole opening 50 is formed in the front wall of the bay space 30 adjacent its upper end, for use in effecting bodily movement of the unit, and handhole openings 51 formed in the ends of the casing part 40, facilitate the manipulation of the latter. These handhole openings also provide for the free ingress of air set in motion by the air impeller vanes 12. The energizing connection cable 52 for the motor 8 may pass through, and the motor switch 53 may be mounted in the wall member 29.

As is made plainly apparent in Fig. 3, the nozzle 22 has its axis inclined to the vertical away from the upper central portion of the hood and from the adjacent vertical wall portion of the member 40, so that the mist discharged through the nozzle is directed in a well defined stream away from the casing member 40, and the deposit of moisture on the latter is avoided notwithstanding that the mist discharge is at a level desirably low and appreciably below the level of the top of the casing member 40. The nozzle 22 is spaced inwardly from the planes of the vertical walls of the bay extension 30 far enough to prevent an excessive discharge of mist against, and the resultant deposit of water on, vertical room wall or furniture surfaces with which the lower portion of the unit may be in contact no matter how the unit is disposed. In many cases, however, the unit is advantageously disposed adjacent a side wall of the room with its nozzle 22 directed away from the wall so that the humidified air and mist is directed toward the portion of the room space intermediate the ceiling and floor and intermediate the opposing side walls of the room.

The water bottles 3 may be ordinary glass bottles of any convenient size. In the considerable practical use which has been made of the invention, each bottle 3 has been of a size to hold three gallons of water. Advantageously, and as shown, the casing is so formed and proportioned relatively to the bottle or bottles 3 used as to prevent the tipping of a bottle out of suitable engagement with its seat 2 by any bodily movements given the unit in the ordinary use of the latter.

The humidifier unit specifically illustrated herein includes certain novel features especially useful in a unit comprising provisions for simultaneously mounting two water supply bottles therein, and other features generically claimed herein, which may be used as illustrated in my co-pending application Serial No. 9,064 filed of even date herewith, in a humidifier unit including provisions for mounting but a single water supply bottle in the unit.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the appended claims, and that in some cases, certain features of my invention may be used to advantage without a corresponding use of other features.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A humidifier unit comprising a water receiving receptacle open at its upper end; a water supply bottle arranged in inverted position and including a spout extending downwardly into said receptacle and a shoulder portion engaging the upper part of said receptacle; air humidifying mechanism located alongside said receptacle and receiving water therefrom and including air and water impelling means; a chassis on which said receptacle and mechanism are mounted; and a casing enclosing said chassis, receptacle, bottle and mechanism and comprising a bottom wall portion on which said chassis is detachably mounted, and uprising and top wall portions separable from said bottom wall to permit water bottle replacements, and comprising another portion separable from the previously mentioned portions to permit the removal of said chassis with said receptacle and mechanism mounted thereon.

2. A humidifier unit comprising a water receiving receptacle open at its upper end; a water supply bottle arranged in inverted position and including a spout extending downwardly into said receptacle and a shoulder portion engaging the upper part of said receptacle; air humidifying mechanism located alongside said receptacle and receiving water therefrom and including air and water impelling means; a chassis on which said receptacle and mechanism are mounted; and a casing enclosing said chassis, receptacle, bottle and mechanism, and comprising a bottom wall portion on which said chassis is detachably mounted, an uprising wall portion secured to said bottom portion and extending about three sides of said chassis, an uprising part at the fourth side of said chassis detachably connected to said bottom wall and to said uprising portion, and a casing part in the form of a box open at its under side and engaging and extending upwardly from said uprising part and from the adjacent portions of said uprising wall portion.

3. A portable humidifier unit comprising a water supply means; an air humidifying mechanism operatively connected to the supply means and including an upwardly-extending discharge duct; a chassis; means for securely fastening the water supply means and the humidifying mechanism to said chassis; a casing structure

enclosing said water supply means, said humidifying means and said chassis and conforming generally to the outlines of said elements; and means for detachably securing said chassis to said casing.

4. A portable humidifier unit comprising a water receiving receptacle having an opening in the upper part thereof; a water supply receptacle removably supported in inverted position by said water receiving receptacle and including a spout extending downwardly through said opening and into said water receiving receptacle, and also including a shoulder portion engaging the upper part of said water receiving receptacle; air humidifying mechanism located alongside said water receiving receptacle and connected thereto and including a discharge duct; said mechanism including means for effecting a flow therefrom of air with water mist entrained in the air; a chassis; means for securely fastening the water receiving receptacle and the air humidifying mechanism to said chassis so as to provide a removable unit; a casing structure enclosing said water receiving receptacle, water supply receptacle, mechanism and chassis and conforming generally to the outlines of said elements and having a wall portion adapted to be moved to permit removal of said unit from the casing; and means for removably securing said chassis in said casing.

5. A portable humidifier comprising, in combination, a chassis member; water supply means including a water receiving receptacle fixed to the chassis member; an inverted water supply receptacle supported by the water receiving receptacle; a humidifying mechanism located alongside said receptacles and including a base member fixed to said chassis, a cover member positioned on said base member, and a discharge spout extending upwardly from the cover; a casing enclosing said chassis, said receptacle and said mechanism and having an outlet opening in registering relation with the upper end of said discharge spout, and including a movable wall portion through which the chassis, receptacles and mechanism may be removed and replaced as a unit; and coacting means carried partly by said casing and partly by said chassis for detachably securing and properly positioning the chassis in the casing so that the mechanism will operate properly when in the casing and the end of the spout will register with the casing outlet opening.

6. A portable humidifier unit adapted to be placed on the floor of a room space and adjacent articles of furniture therein or a wall of the room and comprising a relatively small cabinet including a flat top portion and having an outlet opening in a wall thereof remote from said flat top portion; a water receiving receptacle disposed within said cabinet at one side thereof; a water supply receptacle positioned in said cabinet above said receiving receptacle and operatively associated therewith; a mechanically-operated water-atomizing mechanism positioned in said cabinet closely adjacent said receiving receptacle and at the side of the cabinet opposite thereto and connected to said receptacle and operable to discharge a stream of air with water mist entrained therein; a single discharge duct receiving said stream of air and water mist from said mechanism and extending upwardly therefrom and terminating in an upwardly-inclined nozzle portion positioned to discharge said stream of air and water mist at an appreciable velocity through said outlet opening in the cabinet and into said room space in a single direction extending upwardly and away from said casing and the flat top portion thereof whereby the water mist becomes vaporized in the air of the room space without contacting said casing and the flat top portion thereof, adjacent articles of furniture, or the floor of the room.

7. A portable humidifier unit for room spaces comprising a casing having an air delivery opening through a wall thereof, and humidifying apparatus within said casing comprising an impeller rotating about a vertical axis horizontally displaced from said opening, a hood above said impeller and at a lower level than said opening to receive a stream of air with water mist entrained therein from said impeller, said hood having an outlet nozzle leading from the upper central portion thereof and receiving air and entrained water mist under velocity imparted thereto by said impeller and said nozzle having its outlet located adjacent said air delivery opening and delivering the air and entrained water mist in a stream flowing in an upwardly-inclined direction and away from said casing, whereby the mist is evaporated in the surrounding atmosphere of the room space and deposit of moisture from said stream onto said casing is prevented.

FOWLER MANNING.