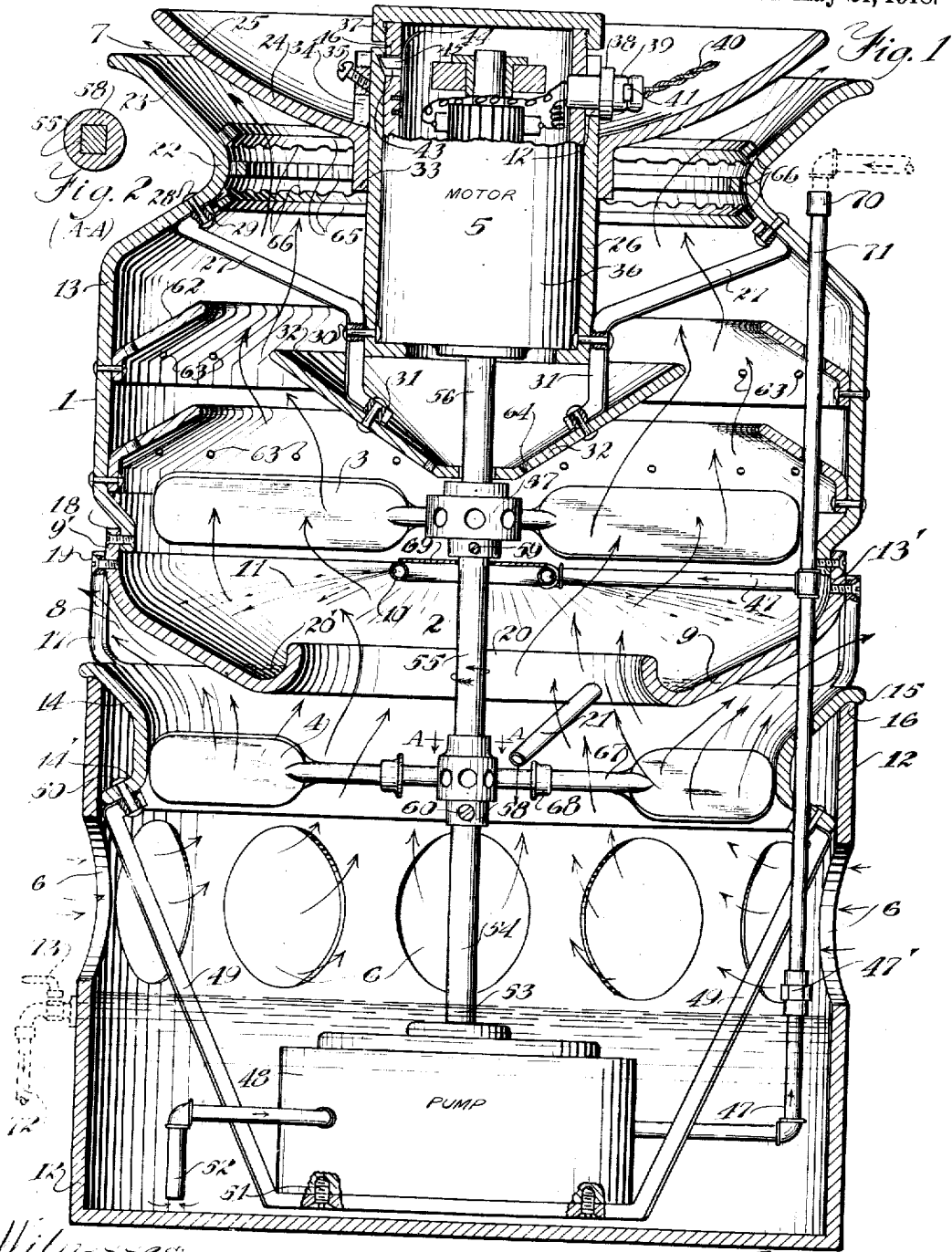


W. M. McEWEN.
 HUMIDIFYING FAN.
 APPLICATION FILED MAR. 14, 1917.

1,266,966.

Patented May 21, 1918.



Witnesses:
 Lena C. Schultz
 H. M. Davis

Inventor
 Willard M. McEwen,
 By Rummel & Rummel, Attys.

UNITED STATES PATENT OFFICE.

WILLARD M. McEWEN, OF CHICAGO, ILLINOIS.

HUMIDIFYING-FAN.

1,266,966.

Specification of Letters Patent. Patented May 21, 1918.

Application filed March 14, 1917. Serial No. 154,700.

To all whom it may concern:

Be it known that I, WILLARD M. McEWEN, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Humidifying-Fans, of which the following is a specification.

This invention relates to air treating means adapted for use wherever air purifying and conditioning is desirable as for instance in living rooms, offices, assembly halls and restaurants, and it relates particularly to portable outfits adapted for setting up readily and for moving bodily from one location to another.

The main objects of the invention are to provide air washing and humidifying means of improved form adapted to purify and moisten the air and to so deliver the same back to the room as to avoid throwing any wet mist or liquid particles on the objects and persons in the room; to provide for delivering superimposed layers or drafts of air in such manner that a moisture-laden current overlies a current of relatively dry air; to provide an improved form of construction and arrangement of component parts in a device of the character described adapted for ready assembly and knock-down and also convenient of access for cleaning and repairs; and to provide a device of the general character stated adapted for use either in connection with a source of water under pressure or independently of any such source.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a vertical axial section of the device, and

Fig. 2 is a fragmentary hub and shaft cross section on the line A—A of Fig. 1.

In the embodiment shown in the drawings the device as a whole comprises a hollow casing or frame 1 disposed uprightly and provided with an air passage 2 extending upward centrally through the casing, a pair of fans 3 and 4 positioned in said passage one above the other in spaced relation, and means 5 for driving said fans, said casing being apertured near the bottom as at 6 for admitting air from the room, and near the top and intermediately for discharging air to the room as at 7 and 8 respectively, the upper of

said fans being located between the middle and uppermost apertures, said casing having an inwardly projecting guide 9 between the middle aperture 8 and the upper fan 3, and means 10 for discharging spray into the passage above said guide.

The upwardly moving air current is divided by the guide 9 which is inclined upwardly from its inner edge, and the outer part of the current is diverted beneath said guide and is driven outward at the medial apertures 8 by the lower fan 4. The inner part of the ascending current is drawn up centrally past said guide 9 by the upper fan 3, and having been washed and humidified by the spray 11, is discharged at 7. Both apertures 7 and 8 are nozzle-like in character and are inclined somewhat (preferably about 45 degrees) so as to discharge the two currents or layers of air one above the other with the moist layer overlying or substantially superimposed on the relatively dry layer. The apertures 7 and 8 are disposed peripherally of the casing so that when the latter is cylindrical (as illustrated in Fig. 1) the air currents thrown into the room are approximately of inverted bell shape. The intake apertures 6 also are disposed peripherally, and the total intake area is somewhat greater than the combined discharge area.

The said casing or mounting member 1 as a whole comprises a unitary base part 12, and a composite upper part seated thereon including a chambered body part 13 and a peripheral detachably connected support member 14 disposed downwardly from the body member to bear upon the base 12.

The said part 12 is formed as an open topped liquid-tight receptacle with rigid walls and is adapted to serve as a reservoir for water, and also as a support for said upper part. The air is admitted to the device through the walls of said base 12, the inlet ports 6 being distributed uniformly in a row medially of the water line and the top edge. Said ports are tall and narrow and are elliptical, so as to provide a large port area without weakening the walls unduly, and are spaced somewhat from the top, so as to clear the downward guide part 14' of said support member 14.

The annular support 14 is formed to nest in the top of the base 12. It includes the annular body part 14' having a downwardly

facing outwardly projecting shoulder or flange 15 at its upper edge to seat on the edge 16 of the base 12, and has upstanding arms 17 distributed at intervals around its upper edge to support the chambered part-
 5 13. The part 14' extends convexly inwardly, upward and outward, and constitutes the outer wall or guide leading upward to the lower discharge nozzle 8.

10 The casing member 13, wherein the air is conditioned or treated, comprises besides its main wall part the above-mentioned bottom member or guide plate 9, which is provided with upright flange means 9' whereon
 15 is attached demountably the main casing proper 13 of the device, said flange 18 being formed to overlap the flange 13', and being secured by screws 18. The tips of the arms 17 overlie the flange 9' and are secured there-
 20 to by screws 19. Said arms 17 clear the screws 18, so that either set of fastenings 18 and 19 may be operated independently of the other. The inner edge of said plate 9 is turned upward at 20 so as to form a stop
 25 for the surplus water discharged into the spray chamber, and which collects at 20', the flange 20 being provided with discharge means 21 preferably in the form of a tube set in a suitable aperture and leading in-
 30 ward for discharging the water centrally as will be explained.

The main wall of the casing part 13 is curved diagonally inward or converged somewhat near the top as at 22 and the upper
 35 extremity is turned outward or flared to constitute the lower side or lip 23 of the upper discharge nozzle.

The upper end or top of the chamber contained in casing 13 is closed mainly by a re-
 40 movable cover 24 which is substantially conoidal in shape with the upwardly divergent edges 25 arranged to constitute the upper wall or lip of the said upper nozzle 7. Said cover is adjustable for varying the size
 45 of the nozzle aperture 7, as will be explained.

Mounting means are attached rigidly in the top part of the device for said cover and for the motor, said means comprising a cylindrical hollow motor housing 26 held up-
 50 rightly by brackets 27 attached to the casing member 13. Said brackets are preferably attached to the under side of the inwardly converging wall part as at 28, and are held by any suitable means as rivets secured in
 55 the upturned ends or feet 29. The inner ends of said brackets are turned downwardly and secured by suitable means as rivets 30 to said housing member 26. The downwardly projecting ends 31 of said brackets are ex-
 60 tended somewhat for supporting the baffle member 32 which will be described.

The said part 26 has two main functions, namely, to house the motor 5, and to provide means for adjustably supporting the said
 65 nozzle member 25. With this latter end in

view the said cover 24 is provided with a downward cylindrical flange 33 slidably embracing the cylinder 26, an upstanding lug 34 being provided on said cover and also fitting slidably against said cylinder. Said
 70 lug is provided with a set-screw 35 whereby the vertical adjustment of the cover 24 may be set as desired, and thereby the size of the nozzle aperture 7 determined.

In order that the motor 5 may be thor-
 75 oughly protected from moisture and dust, it is inclosed in a tight cylindrical casing 36 formed and adapted to fit slidably and demountably in said mounting 26. Said cas-
 80 ing 36 is provided with a tight fitting cap 37.

A suitable insulator 38 is provided in one side of said casing through which an elec-
 85 trical circuit may be extended to the motor, said insulator being in the form of a socket adapted to receive a plug 39 having an elec-
 90 tric cord 40 attached thereto, as understood in the art. Said plug may to advantage be provided with a switch as indicated by the handle 41. The upper end of the housing 26 is provided with a vertical slot 42 to ac-
 95 commodate the above-mentioned insulator or socket 38.

An automatic lock or fastener is provided for said motor casing 36, said lock preferably being in the form of a spring latch member
 95 adapted to yield automatically when the casing is thrust downward into the mounting 26 and to lockingly engage the notch 43 in the housing 26 to prevent withdrawal until manual pressure is applied to the
 100 spring 44, whereon is fixed the latch or beveled member 45, said spring being accessible only by removing the cover 31. The casing 36 is apertured at 46 in registry with the notch 43 to accommodate the latch part 45.
 105

The spray producing means and means for supplying the water include the said nozzle member 10 which is preferably of annular shape concentric with the main axis of the device and provided with outwardly facing
 110 apertures for the spray, a tubular connection 47 on one side of the nozzle member, a pump 48 of the rotary type mounted preferably in the lowermost part of the device, said tubular connection communicating therewith.
 115

The pump 48 is carried by lugs or bracket-like means 49 depending from the downwardly projecting guide-wall of the member 14, being fastened thereto by suitable means as rivets 50. The pump is attached to the
 120 lugs 49 preferably by screws 51. Said pump may be more or less submerged and is provided with intake means 52 extending adjacent to the bottom of the reservoir 12 in order to reach the water when the supply is
 125 nearly exhausted. Said pump is driven by the motor 5 and is direct connected thereto by the shaft 53.

Said shaft 53 also drives the fans 3 and 4 which are mounted thereon. In order to fa-
 130

facilitate taking the device apart the shaft is made in sections 54, 55 and 56 and the fans are provided with hollow hubs 57 and 58 adapted to receive the corresponding shaft ends. The top section 56 is an extension of the motor shaft, and at its lower end fits in a co-rotary socket formed in the hub 57 of the upper fan member, which socket may be either square or hexagonal or otherwise formed if desired in any such manner as to insure co-turning of the shaft and hub. The lower side of the hub is provided with a set screw 59 whereby the medial shaft section 55 is fastened co-turnably to said hub. The lower end of the medial section 55 is fitted demountably in the lower fan hub 58 by socket connection, substantially as above described. The lowermost shaft section 54 is attached to the lower hub 58 by a set-screw 60 in the manner above mentioned. The lower end of the said lowest section is fitted to the pump 48 by a socket connection such as above described, or the shaft may be an extension of the pump shaft. The socket connections above mentioned are adapted to facilitate ready assembling and demounting the several parts of the apparatus either wholly or in part, as may be required for cleaning, repairs, or other purposes.

Separating means are provided to prevent particles of water from being carried or thrown from the device into the room. For this purpose baffle means are provided in the path of the humidified air, said means including the plates 61, 32 and 62 disposed alternately on the outer and inner sides of the air path, plates 61 and 62 being fixed to the inner side of casing 13 and plate 32 being held by the bracket extensions 31. The said baffles are frusto-conoidal in shape and are disposed with their free edges projecting diagonally upward into the path of the air current. Said baffles are apertured as at 63 and 64 adjacent to their lower edges to drain away the water. Additional baffles 65 of a narrow form are provided on the casing 13 near the point 22 just below the nozzle 7. These also are apertured as at 66 to facilitate drainage.

In order to prevent any of the water discharged from tube 21 and falling on the arms 67 of the lower fan from being carried outward thereon and thrown into the lower air current, a stop member 68 is provided on each arm, where it is spaced somewhat from the hub 58. The tube 21 projects inward far enough to discharge the water inward of the stops 68.

The fans are each provided with inclined blades adapted to exert a lifting force. The lower fan also acts centrifugally on the air, giving it an inclined upward and outward thrust. In order that the inner current may be substantially unaffected by the lower fan, the blades of the latter are short and the

arms 67 are relatively long as compared with the upper fan.

The spray generator or nozzle ring 10 is provided with a plate 69 fixed thereto, said plate having a central aperture for the shaft member 55. Said plate centers the ring 10 and also prevents any leakage of air through the nozzle ring instead of passing through the spray, which is preferably thrown outward only.

When assembled the device may be taken apart as follows: The main casing part 13 carrying the motor may be removed by taking out the screws 18 at the lower edge, whereupon the casing and motor may be lifted and removed as a unit, the shaft 56 leaving the hub 57, and the pipe 47, having first been uncoupled opposite the adjacent air intake opening 6 by unscrewing the union 47'. Access may then be had to the upper fan 3 which may also be removed by lifting it out of the rim frame as permitted by the socket connection at the lower end of the shaft section 55. If it is desired to remove the lower fan, it is first necessary to remove the screws 19 which secure the middle support and guide member 14, whereupon said guide member may be removed. The lower fan may then be lifted out of its position as permitted by the socket connection at the lower end of the bottom shaft section 54. Ready access may then be had to the pump, either in its position in the base member or reservoir 12, or the supporting frame (14-49) therefor may be lifted out. Said pump, so far as access to it alone is concerned, being carried by the downwardly projecting lugs 49, may ordinarily be gotten at sufficiently by merely removing the device as a whole from the reservoir without taking the several members apart as above described.

In order to assemble the device the mounting frame 14, with the pump 48 thereon, is first hung on the reservoir frame or base member 12. The lower fan 4 is then assembled thereon, after which the middle guide plate is attached by its mounting screws 19. The upper fan 3 is then placed in position, and finally the main casing 13 and motor member 5 are added and secured by the screws 18. The motor 5 may be removed from the casing 26 by removing the cap 37 and releasing the latch 44-45, whereupon the motor container 36 may be slid out telescopically from the housing 26 wherein it is held.

The operation of the device is as follows: The motor is started by turning on the switch (as at 41) provided preferably near the motor. The rotation of the armature drives the shaft, which in turn carries the two fan members and the pump rotor, so that water is forced upward through the spray supply pipe and driven out through

the perforated ring in the form of a fine spray, the fans at the same time driving the air forcibly upward through the lower and upper discharge apertures respectively. The several baffle means serve to remove all particles or drops of water which have not been vaporized and the air is delivered at the upper discharge aperture in a thoroughly humidified state but free from any spray such as might fall as liquid if discharged into the room. All the moisture or spray which is not taken up by the air strikes the walls or baffles and drains down into the saucer-shaped middle guide plate 9, from whence it is carried inward adjacent to the drive shaft 53, from whence it flows by gravity back into the reservoir. The lips of both air nozzles are preferably divergent somewhat near their edges. Any occasional fine particles of mist escaping in liquid form with the upper air current are caught by the lower current and evaporated immediately.

Although the device is designed primarily for use where there is no water supply under constant pressure and the reservoir has to be replenished from time to time, still the device is adapted for use in connection with a city water main in which there is sufficient pressure to produce the required spray. In case such pressure is available the cap 70 at the upper end of the supply pipe branch 71 may be removed and the pipe connected directly to the source of water pressure. A waste pipe 72 may be provided to carry away the surplus water which collects in the reservoir when an outside source is used. A faucet 73 may be provided to advantage in the lower part of the tank and the waste pipe 72 connected thereto.

The casing parts 12 and 13 as well as some of the baffles 61, 32 and 62, the support member 14 and the adjustable top piece 24, are all adapted for stamping or spinning from suitable sheet metal.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:—

1. A device of the character described, having an air passage, and comprising a casing disposed uprightly and containing a pair of fans positioned one above the other in spaced relation in said passage, and means for driving said fans, said casing being apertured near the bottom for admitting air from the room and near the top and immediately for discharging air to the room, one of said fans being located between the medial and lowermost apertures and the other between the medial and uppermost apertures, said casing having an inwardly

projecting guide between the medial aperture and the upper fan, and means for discharging spray into the passage above said guide.

2. A device of the character described formed and adapted for receiving air in its lower part, and having a pair of vertically spaced discharge apertures in its upper part, means for urging the air from the lower part upward and outward through said apertures, and air washing and humidifying means disposed between said discharge apertures, whereby a layer of moist air is discharged above a layer of relatively dry air.

3. A device of the character described formed and adapted for receiving air in its lower part, and having a pair of vertically spaced discharge apertures in its upper part, means for urging the air from the lower part upward and outward through said apertures respectively, convergent guide means leading to said discharge apertures respectively, and air washing and humidifying means disposed between said discharge apertures, whereby a layer of moist air is discharged above a layer of relatively dry air, the one layer being substantially superimposed upon the other.

4. In a device of the character described, a casing or frame member formed and adapted to hold water in its lower part, means for propelling air upward through the casing, means for dividing the upwardly moving current and discharging same in a plurality of separate layers one above another, said means for propelling air comprising fans disposed coaxially for the separate current branches respectively, means for spraying water into one of said branches, and means for delivering to the said lower part of the device the water not taken up and carried away by the air current.

5. A device of the character described comprising a vertically disposed casing of substantially cylindrical shape having a guide or deflector disposed medially of its height, and projecting inwardly, said guide being inclined downwardly toward the center and terminating in an upwardly turned flange, means for propelling air upward through said casing centrally past said guide, means for discharging spray into the air current above said guide, and means for conducting the water collected by said guide back of said flange inwardly and downwardly.

6. In a device of the character described, a casing, means for propelling a current of air upward in said casing, means for dividing said current concentric with its medial axis, means for discharging inner and outer parts of said current at points spaced apart, one above the other, the air propelling means including a fan arranged to urge the lower current of air outward through its cor-

responding aperture, and another fan arranged to urge the upper current of air outward through its aperture, means for discharging spray into the upper current, means above the lower current for collecting the spray and water not absorbed by the upper current, and liquid conducting means extending inward from the spray collecting means and terminating adjacent to the axis of the fan members, the lower fan member having fluid stops on its arms spaced outward somewhat from the axis whereby the liquid discharged downward from the collecting member is prevented from being thrown out centrifugally by the lower fan.

7. In a device of the character described, a combined guide and frame member comprising a body part of annular shape including outwardly turned and divergently inclined flanges, the upper of which projects somewhat over and beyond the lower for resting on a corresponding annular support.

8. In a device of the character described, a combined guide and frame member comprising a body part of annular shape including outwardly turned and divergently inclined flanges, the upper of which projects somewhat over and beyond the lower for resting on a corresponding annular support, said upper flange having upstanding arms or brackets spaced apart peripherally and adapted to serve as supports as for another frame member.

9. In a device of the character described, a combined guide and frame member comprising a body part of annular shape including outwardly turned and divergently inclined flanges, the upper of which projects somewhat over and beyond the lower for resting on a corresponding annular support, said lower flange being provided with a downwardly projecting bracket or support substantially as and for the purpose set forth.

10. A device of the character described, comprising a knockdown sectional frame or casing including an annular support member having a downwardly facing shoulder adapted to rest demountably and unattached on a correspondingly formed support, in combination with a hollow member adapted to serve as a humidifying chamber, said latter member including a separable bottom part having an upwardly turned outer part or flange secured demountably at its upper edge to the complementary lower part of the body of said hollow member, and said support member having upstanding lugs or arms secured detachably to and exteriorly of said bottom part adjacent to but below the first-mentioned fastening.

11. In a device of the character described, a knockdown member comprising a plurality of co-rotary parts disposed in vertical axial alinement, said parts being formed at

mutually contiguous axial points to register and nest together vertically in non-turning relation to each other.

12. In a device of the character described, a knockdown member comprising a plurality of co-rotary parts disposed in vertical axial alinement, said parts being formed at mutually contiguous axial points to register and nest together vertically in non-turning relation to each other, said parts including a motor and a pump spaced apart, the former above the latter, and air propelling means disposed between said motor and pump.

13. A device of the character described comprising a shell or casing having an air passage extending upward therethrough and being adapted to hold water in its lower part, a motor carried by said casing, a vertically disposed power shaft connected to said motor, a rotary pump connected to said shaft, air propelling means driven by said shaft, a nozzle or spray discharge member arranged to project spray or fine streams of water into said air passage, water intake means extending from the lower part of said casing to said pump, means extending from said pump to the spray nozzle for supplying the latter with water, and means for returning that part of the water discharged from said nozzle which is not vaporized and carried away by the air.

14. In a device of the character described, an upright casing or frame including a lower or supporting part and an upper part carried detachably by said lower part, a pump carried by said lower part, spray producing means carried by said upper part, and piping connecting said pump and said spray producing means, said piping including a detachable union or connection.

15. In a device of the character described, an upright casing or frame, including a lower or supporting part and an upper part carried detachably by said lower part, a pump carried by said lower part, spray producing means carried by said upper part, and piping connecting said pump and said spray producing means, said piping including a detachable union or connection, and said casing having an air inlet opening opposite said union, whereby the latter is accessible for disconnection.

16. In an air treating device of the character described, a casing of annular shape, a motor mounted concentrically in said casing, brackets disposed radially and connected to said casing for supporting said motor, a mounting member attached to said brackets, said motor having a frame formed and adapted for sliding longitudinally into and out of said mounting member, a manually operable yielding fastening or latch adapted to lock the motor in place, and means operably connected to said motor for propelling and treating the air.

17. In an air agitating and purifying device of the character described, a stationary casing member having a divergently inclined or flaring top flange, a motor disposed centrally in said casing, means extending inward from said casing to support said motor, an upright mounting member carried by said supporting means whereon the motor is demountably secured, and a movable casing member spaced above said flange and slidably connected to said mounting member for vertical adjustment to vary its spacing with respect to said stationary casing member.
18. In an air agitating and purifying device of the character described, a stationary casing member having a divergently inclined or flaring top flange, a motor disposed centrally in said casing, means extending inward from said casing to support said motor, an upright mounting member carried by said supporting means whereon the motor is demountably secured, and a movable casing member spaced above said flange and slidably connected to said mounting member for vertical adjustment to vary its spacing with respect to said stationary casing member, said motor having a plug connection on one side, and said mounting member having an upwardly opening slot or aperture to receive or accommodate said plug connection when the motor is set in place.
19. In an air agitating and purifying device of the character described, a stationary casing member having a divergently inclined or flaring top flange, a motor disposed centrally in said casing, means extending inward from said casing to support said motor, an upright mounting member carried by said supporting means whereon the motor is demountably secured, and a movable casing member spaced above said flange and slidably connected to said mounting member for vertical adjustment to vary its spacing with respect to said stationary casing member, said movable casing member having a substantially cylindrical flange disposed downwardly in telescopic relation to said mounting member and also having an upstanding lug provided with locking or set means for engaging said mounting member.
20. In a device of the character described, an annular casing member comprising a stationary part and a relatively movable part held in variable spaced relation to said stationary part and formed and arranged to provide an air discharge aperture or nozzle between said parts, said stationary part having inwardly projecting support or mounting means whereon said movable part of the casing is adjustably slidable toward and away from said stationary part for adjusting said nozzle, and means adapted for manual control for locking the movable part to maintain its adjustment.
21. A humidifying device of the character described, comprising an upright casing or shell of substantially cylindrical shape having a humidifying chamber provided with a central inlet or opening in its lower part for the admission of air, and an annular discharge aperture or nozzle disposed peripherally at the top of said chamber, spray producing and air propelling means adjacent to said inlet, and annular baffle means disposed above said spray producing and air propelling means for removing particles of liquid from the air as it passes upward for discharge through said nozzle.
22. A humidifying device of the character described, comprising an upright casing or shell of substantially cylindrical shape having a humidifying chamber provided with a central inlet or opening in its lower part for the admission of air, and an annular discharge aperture or nozzle disposed peripherally at the top of said chamber, spray producing and air propelling means adjacent to said inlet, and annular baffle means disposed above said spray producing and air propelling means for removing particles of liquid from the air as it passes upward for discharge through said nozzle, said baffle means being inclined upward toward or into the passageway for the air current and being provided with apertures near their lower edges for the drainage of liquid collected by the baffles.
23. An air propelling and humidifying device comprising a casing, having a longitudinal air passage, and air propelling means disposed coaxially therein, a medially positioned centrally apertured diaphragm extending inward from the wall of said casing, air spraying means on one side of said diaphragm, and said casing having an air inlet or aperture on the opposite side, and said casing having air outlets on opposite sides of said diaphragm, one being between said inlet and said diaphragm, and said air propelling means including a long armed fan disposed between the air inlet and the air outlet on one side of said diaphragm and a short armed fan between said diaphragm and the other said outlet.
24. A device of the character described, comprising a portable tank or reservoir, in combination with air conditioning means resting thereon and extending downward therein, said tank having lateral apertures above the water line for the admission of air, and said conditioning means being adapted to urge the air upward centrally and discharge same under pressure, and comprising a spray generator adapted to cleanse and moisten the air moving upward past the same.

25. A device of the character described, comprising a tank open at the top and apertured laterally for the admission of air, in combination with air conditioning means
5 having shoulders resting on the upper edge of said tank and including a pump supported in the lower part of the device, spray producing means disposed medially in
10 said device and communicating with said pump, air discharge apertures below and
above said spray producing means, a centrally apertured guide member disposed between the lower aperture and said spray discharge means, fans for urging the air outward through said discharge apertures
15 respectively, and a motor for driving said pump and fans.

Signed at Chicago this 10th day of March 1917.

WILLARD M. McEWEN.