July 15, 1924. 1,501,416

A. D. LANE

COOLING APPARATUS

Filed Dec. 13, 1922 2 Sheets-Sheet 1

Fig. 1.

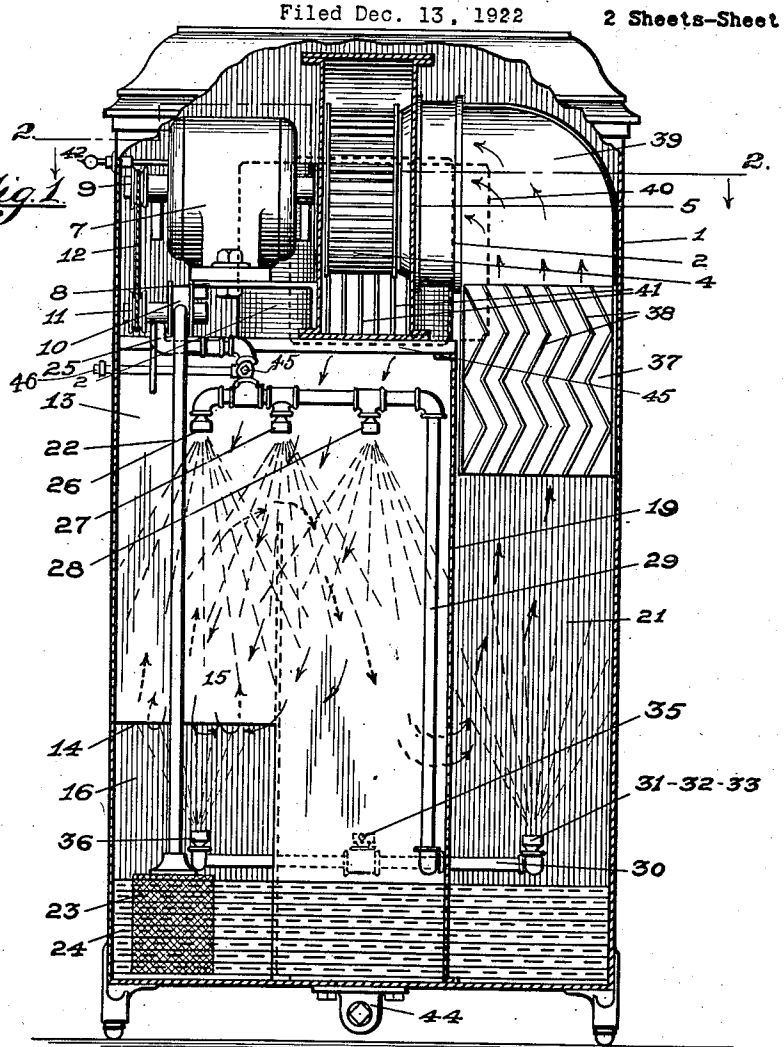
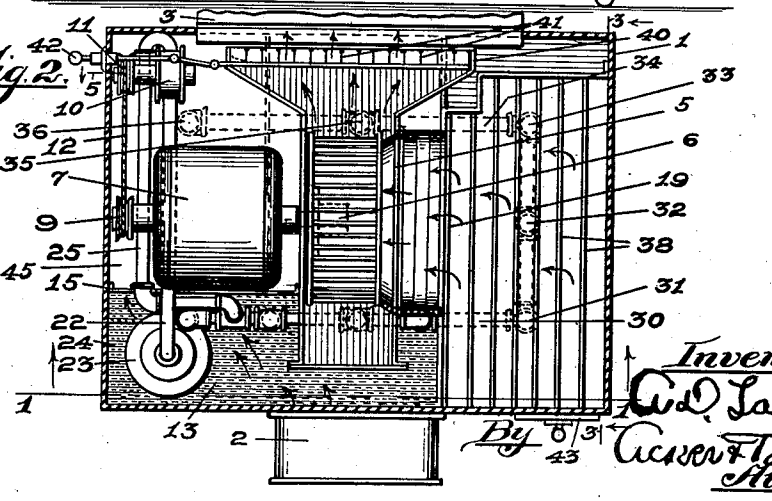


Fig. 2.



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Fig. 3.

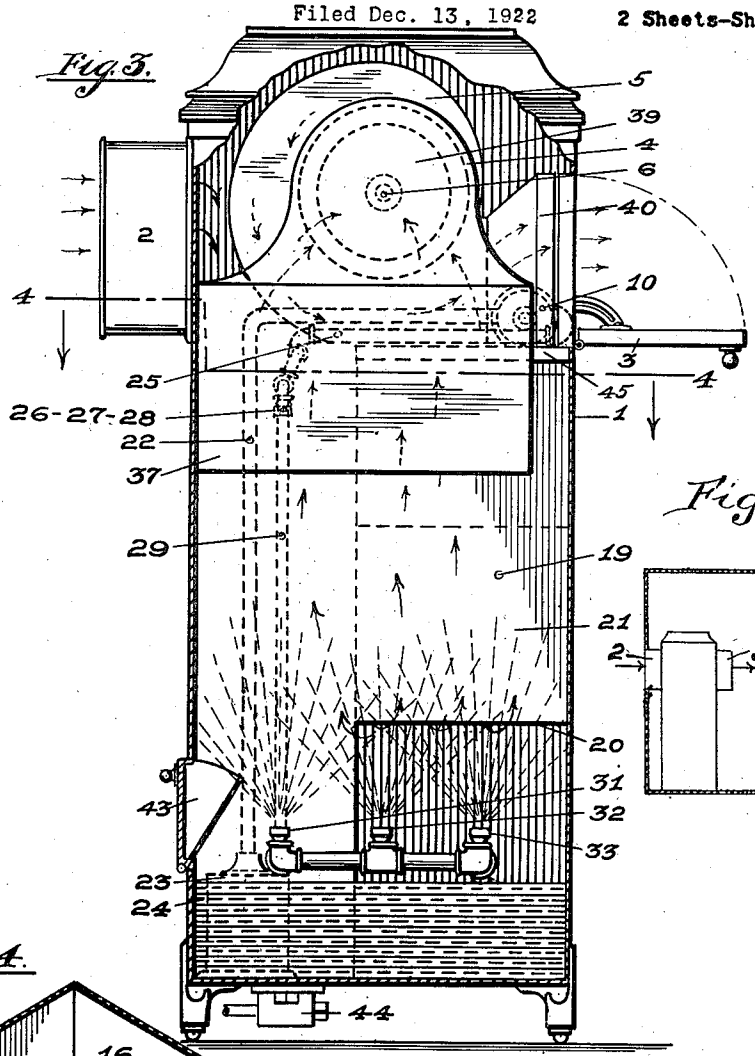


Fig. 6.

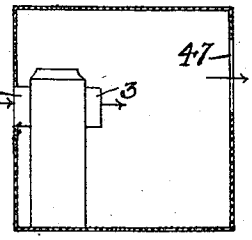


Fig. 4.

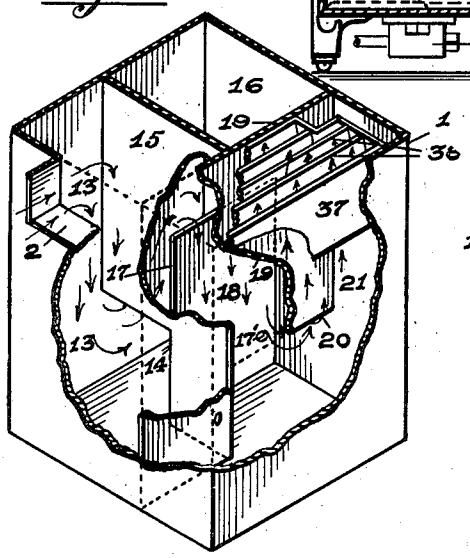
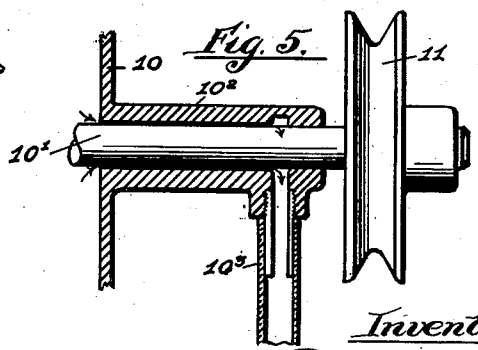


Fig. 5.



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Patented July 15, 1924. 1,501,416

UNITED STATES PATENT OFFICE.

ALBERT D. LANE, OF OAKLAND, CALIFORNIA.

COOLING APPARATUS.

Application filed December 13, 1922. Serial No. 606,753.

To all whom it may concern:

Be it known that I, ALBERT D. LANE, a citizen of the United States, residing at 2204 41st Avenue, Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Cooling Apparatus, of which the following is a specification.

This invention relates to a portable unit device for cooling, humidifying and otherwise treating the air in all places of human habitation, and at the same time, when desired, to appear as a highly decorative piece of furniture, so it can be placed and operated in expensively furnished rooms and apartments and be appropriate to the surroundings.

In the thorough and efficient ventilation of residences, schools, stores, offices, theatres, hospitals and other buildings, recourse is usually had to electric fans and open windows, both of which are efficient and practical at certain times and seasons, but which are at all times subject to the limitations of existing conditions of temperature, winds and storms and which neither can in any manner change or modify.

In ventilating rooms occupied by humans it is highly desirable that a certain temperature be maintained and also equally desirable that the moisture content or humidity of the air be so regulated and apportioned that a nearly constant degree of humidity be maintained. This requirement is particularly desirable where steam or hot water heating plants are employed, since these systems do not ordinarily impart any moisture whatever to the air of a room, except at times when the air valves of steam radiators are opened, when usually too much moisture is given off so that it becomes detrimental to the glued joints and general finish of furniture, and since this plan is neither uniform or constant it is a highly impractical and undesirable method of humidifying the air.

Hot air furnace heating is better adapted to supply a sufficient moisture content to the air passing through the heating system, but unless the furnace man or attendant watches the water supply and keeps it fairly constant, even this method is inadequate, since it requires quite an enormous amount of evaporation by this means to maintain a sufficient humidity at all times and under varying conditions.

Specially constructed office and factory buildings and some theatres and other large institutions have been provided in their construction with adequate and sufficient means for washing, cooling, humidifying and otherwise treating the air as it is admitted to the various rooms and apartments, but heretofore, as far as my knowledge goes, there has been no portable or semi-portable unit available for the use of individual residences or other buildings, not so provided in their structure, whereby the air entering these places could be cooled, humidified or treated in any other manner as may be desired, therefore:

A principal object of my invention is to provide a portable or semi-portable unit, that is self contained and which can be placed in any room or apartment and which will forcibly circulate a volume of air through the device, and in contact with cooling and humidifying sprays of a suitable liquid, whereby the moving column of air absorbs moisture, and, due to the rapid evaporation of the misty sprays of liquid is considerably lowered in temperature by the time it is discharged from the apparatus into the room under the forced circulation, thus cooling and modifying and maintaining the air conditions of the room in any manner desired.

Another object of the invention resides in providing an apparatus that will be particularly adapted for cooling and humidifying and otherwise treating the air in hospitals and theatres, using as a cooling and humidifying medium, disinfecting or other suitable liquids, which will tend to replace the hand spray devices now quite extensively used in these places.

A constant supply of treated air from my device will ensure a thorough and regular displacement of contaminated or stagnant air in any room or compartment in a very short period of time and replace it with an exhilarating and fresh supply exactly suited to the needs or conditions of the situation.

Aside from the disinfecting features of the air delivered by my invention, it will most effectively act as an insect dispeller.

It is well known that certain odors that are very pleasant and acceptable to the

human senses are very disagreeable and obnoxious to insects.

If the cooling and humidifying medium is charged with some such odorous substance that is acceptable to the human senses and obnoxious to the insects, the circulating air will dispel all insects from the room or apartment so treated, and, with regular periodical agitation of the air in a room by this charged medium all of the insects will be kept away.

In medical jurisprudence it is also well known that certain medicines or compounds administered in the form of a vapor are much more effective in pulmonary ailments than when applied in any other manner. This invention is particularly adapted to supply vapors charged with any desired medicinal substance, that can be applied in this manner, and to provide them in any quantity and strength and for continuous periods or intermittently as may be desired.

The invention is also particularly adapted to affect the thorough and complete fumigation of rooms of any size or extent.

The present method of tightly closing a room and releasing destructive vapors, without circulation, is only partially successful unless the room is kept sealed for quite a long period. With my device destructive vapors may be injected into the room under forced circulation, and with considerable volume and rapidity so that the vapors will be actually forced into every crack and crevice in their endeavor to get out and thus perform their destructive work much more quickly and thoroughly, and especially so if the air forced into the sealed room is drawn from the outside and fully charged in passing through my device. This will be forcing an excess of air into the room and will create a considerable pressure above atmosphere and will thus surely force the charged air and destructive vapors into every crack and crevice and thus make the fumigation highly effective and will finish the operation in the minimum of time.

With such objects in view, as well as other advantages which may be incident to the use of the improvements, the invention consists in the procedure, and in the parts and combinations thereof hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be carried in proportions and arrangement without departing from the nature of the invention.

In order to make the invention more clearly understood there are shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements in their useful applications, to the particular constructions which, for the purpose of explanation, have been made the subject of illustration.

In the accompanying drawings:—

Fig. 1 is a sectional elevation of my apparatus taken on line 1—1 of Fig. 2, and looking in the direction of the arrows. This is looking into the interior of the device and shows clearly the mechanism and its general arrangement as I have placed it to illustrate my invention.

Fig. 2 is a sectional plan taken on the irregular line 2—2 of Fig. 1, and looking in the direction of the arrows with the various parts in the same relative positions as they appear in Fig. 1. The section line is shown to pass through the fan element but in this figure this element has been left in full lines as better showing its location and arrangement.

Fig. 3 is a side sectional elevation taken on line 3—3 of Fig. 2, and looking in the direction of the arrows. This view also shows the various elements in the same general positions as the previous figures.

Fig. 4 is a diagrammatic perspective taken approximately on line 4—4 of Fig. 3 and looking in the direction of the arrows. The object of this view is to clearly show the path of the air through the apparatus as indicated by arrows and is drawn in a manner to show this path as clearly as possible by neglecting to adhere strictly to the exact size, arrangement and proportion of parts as illustrated in the other views and by leaving out all mechanism so that the various compartments will be clearly seen in relation to each other and by means of the arrows the air current can be easily traced.

Fig. 5 is a detail of a specially water cooled and lubricated bearing taken in line 5 of Fig. 2 and looking in the direction of the arrow. The view is facing in the opposite direction to the plane it occupies in Fig. 2.

Fig. 6 is a view in elevation of the apparatus positioned within a room or enclosure.

In the drawings like numerals of reference indicate like parts of the various views.

In order to make the apparatus self contained and of a pleasing appearance it is preferably made up of a suitable casing 1, in the form of a decorated cabinet, having a port of air entry 2 and a hinged door 3 for the exit of the treated air.

A rotary blower 4, of suitable construction and size is mounted to rotate in a suitable housing 5, it is directly connected to the end of an electric motor shaft 6, driven by the motor 7, which is in turn mounted on a suitable support 8, the other end of the motor shaft 6 carries a grooved pulley 9. A circulating pump 10, is located in one corner of the casing and having a grooved pulley 11 secured to the pump shaft. The pulleys 9 and 11 are connected by a suitable belt 12 so that the pump will

be driven by the motor. The showing of grooved pulleys in this place is only illustrative as well as much of the mechanism herein. To show actual construction would require a great amount of detail in the drawings and would add nothing to a clear understanding of the invention. The apparatus used for carrying out the invention is such as is procurable in the general market and well known by those familiar with the art. My arrangement and combination of this familiar apparatus is new as well as the results obtained thereby. The reader is therefore requested to have this in mind when perusing this description and thus understand the lack of detail pertaining to the individual elements used further than is shown to make the invention intelligible.

The principal idea contained in this invention and carried into effect by the special arrangement of apparatus I have illustrated is to have a number of compartments having intercommunicating ports arranged in such a manner that the air passing therethrough is caused to follow a tortuous path, and while following such tortuous path to come in contact with a fine spray or mist of a suitable liquid, whereby owing to the quick absorption of moisture from this spray by the air its temperature is considerably lowered and its humidity increased to such extent as may be desired.

The arrangement of compartments is best shown in Fig. 4 and very well shown in Fig. 1. Air entering the port 2 goes first into compartment 13 where it is deflected downward and passes through the port 14 in the partition 15, entering compartment 16, here it is intercepted by partition 17 which closes the lower portion of the compartment 16, and is deflected upward and passes over the top of the partition 17 and enters compartment 18 where it encounters partition 19, where it is deflected downward and passes through port 20 into compartment 21 where it is deflected upward and passes through an interrupting device that will be explained further on in the description.

Passing from the circulating pump 10 is a pipe line 22 going to a screened device 23 immersed in a liquid 24 resting in the bottom of the casing 1, the pump when in operation draws liquid from this source and circulates it through the pipe 25 to a series of spray units 26, 27 and 28 located in compartment 13. This is the compartment where the air first enters and by means of these three spray devices it is met by an abundance of moisture where the absorption and cooling begins to take place. It is understood of course that the movement of air through the device is brought about by the suction action of the rotary blower 4 and the speed of circulation is controlled by the speed of rotation of said blower which is controlled through the use of suitable switches and rheostats of well known construction. The suction action of the blower 4 causes the air entering the compartment 13 to be deflected downward into the sprays produced by the devices 26, 27 and 28 and pass through the port 14. A continuation of the pipe line 25 comprises a riser 29, connecting with a horizontal pipe 30 which in turn connects with the spray heads 31, 32 and 33 in the compartment 21.

From the spray head 33 a pipe 34 extends horizontally through the air port 29 into compartment 18 where a spray head 35 is placed. A continuation of this line passes through partition 17 by means of the hole 17′ and enters compartment 16 where the spray head 36 is placed. This arrangement of pipes and spray heads supplies each of the compartments through which the air is caused to circulate with a continuous source of moisture in a finely divided state so that the passing air will absorb a sufficient quantity to impart to it the desired temperature and humidity, and at the same time wash it of any inherent impurities that it may bring from the outside, including odors, dust, insects or any other substance.

It has been mentioned that the speed of the air passing through the apparatus is regulated by suitable switches and rheostats, not shown, and to prevent a rapid column of circulating air from carrying free moisture out of the apparatus I have provided a series of baffle plates arranged in zig-zag arrangement to intercept the column of air and cause a bombardment of the moisture particles against the baffle plates and thus separate them and cause them to fall back into the compartment. This series of baffle plates is placed in a box like structure designated by the numeral 37 and the baffle plates 38. After the air leaves this structure it is conveyed through a hooded compartment 39 into the rotary blower 4 and is by this blower forced out of the apparatus through the blower casing 5, through a shutter controlled opening 40 having the hinged shutters 41, in turn manually controlled by the outside handle 42 and the attending connections as shown. The door 3 closes the opening 40 when the apparatus is not in operation.

The motor 7, pump 10 and rotary blower 4 and connections are located in the top of the casing 1 and are supported on an insulated base plate 45, which plate in turn rests on the tops of the partitions 15 and 19 thus forming a top closure over the compartments 16 and 18.

The liquid 24 is placed into the apparatus through the filtering, hinged device 43.

The construction of the water cooled and water lubricated bearing as shown in Fig.

5 is clearly shown in this view and needs little explanation to render its action clear. The pump shaft 10^1 extending through the bearing extension 10^2 of the pump 10 could not be easily lubricated with an oil or grease so that recourse is had to the water being propelled by the pump to act as lubricant and as a cooling medium. On account of the resistance of the spray heads there will be some pressure created in the pipe line and this will cause a leakage through the bearing, which leakage will be conveyed back into the water compartment by means of suitable hose or a short pipe 10^3.

A valve 44 is provided for draining the casing 1 of its liquid contents whenever desired.

On account of the liquid being carried in the bottom of the apparatus the casing 1 is preferably made of a metal hermetically sealed at the corners and treated to prevent rust or corrosion.

From the foregoing description it is easily seen that there are vast possibilities ahead for such an invention as I have shown and described, and by making a casing of a highly decorative nature such as is supplied, for instance, in phonographs the apparatus can be placed in any room and will fit in with any kind of individual decoration that may be desired, and since the whole operating mechanism is rotary, it will be practically noiseless and not objectionable in any manner and by regulating the speed to suit individual desires it will produce variable results as may be required. The air circulated may be drawn from the outside so that fresh air is constantly supplied in just the volume needed, or the air in a closed room may be circulated continuously without the addition of outside air other than the small amount that will seep in through cracks around windows and doors and in many instances such seepage will be found sufficient to give a very efficient ventilation where the air in the room is kept in circulation, because in such a case there will be quite some interchange of air, otherwise there would soon be a considerable pressure created in the room, the forced circulation will surely cause such change which would not be likely to occur without such circulation.

It should now also be easily seen where the apparatus is particularly applicable to the other uses mentioned and described, so that any one skilled in the art will be able to construct and use the invention for any of the purposes mentioned or for any other purposes to which it may be adapted.

Under certain conditions, when it is desired to expedite the emptying of the casing, the valve 45^1 in the pipe 25 in advance of the members 26, 27 and 28 may be operated to interrupt the flow of water through the sprays and to direct the water pumped from the sump 24 outwardly through the pipe 46 which extends exteriorly of the casing, and to the outer end of which pipe may be connected a hose.

It will be observed that the inlet of the apparatus being connected with the supply of fresh air and the apparatus placed within an enclosure provided with an outlet 47 that a constantly high cooling effect is obtained by the apparatus working on dry air drawn from the outside of the enclosure and forced from the chambers into the enclosure. This positioning of the apparatus insures a constant supply to the enclosure of external air for cooling and ventilating and overcomes the objection when small capacity apparatus is placed within an enclosure and the operation of which causes the enclosure air to become saturated in a very short while thus destroying further cooling action of the apparatus on the enclosure air.

I claim:

1. A portable unit air cooling and humidifying device, comprising a casing provided with air inlet and discharge openings, a plurality of spaced partitions therein dividing the same into a continuous air duct within the casing and connecting the air inlet and discharge openings, a base plate disposed transversely within the upper portion of the casing forming an open topped chamber in the upper end of the casing, and affording a top wall for a portion of said duct, an air blower within the duct and located above said base plate, a liquid circulating pump supported upon said base plate, an electric motor supported on the base plate and connected for operating said pump and blower, a body of liquid within said casing, a system of pipes and spray heads within said air duct and connected with said pump and body of liquid whereby the air in said passage is cooled and humidified, and a cover for said open topped chamber, said pump and motor adapted for exposing on the removal of said cover from said chamber.

2. A portable unit air cooling and humidifying device, comprising a casing provided with air inlet and discharge openings, a plurality of spaced partitions therein dividing the same into a continuous circuitous air duct within the casing and connecting the air inlet and discharge openings, a base plate disposed transversely within the upper portion of the casing forming an open topped chamber in the upper end of the casing, and affording a top wall for a portion of said duct, an air blower within the duct and located above said base plate, a liquid circulating pump supported upon said base plate, an electric motor supported on the base plate and con-

nected for operating said pump and blower, a body of liquid within said casing, a system of pipes and spray heads within said air duct and connected with said pump and body of liquid whereby the air in said passage is cooled and humidified, and a cover for said open topped chamber, said pump and motor adapted for exposing on the removal of said cover from said chamber without interfering with the flow of air through the duct.

3. In an appartus for the described purpose, the combination with a portable casing, of means therein for moving a column of air, a series of interconnected compartments therein through which said air is moved over a tortuous path, an electric motor, liquid spraying means operated thereby and including a pump and also including piping and spray heads in said interconnected compartments, for providing a spray through which said air passes and becomes cooled and humidified, a plurality of baffles within said compartments against which the entire body of humidified air is directed prior to discharging from the apparatus and after passing the last liquid spray means whereby surplus moisture is removed therefrom, a cover for the casing adapted to open to expose the motor and pump without interrupting the passage of air through said compartments.

4. A portable unit device for producing and delivering a continuous supply of treated air to a room or compartment comprising a casing having air inlet and outlet means, a series of vertically disposed spaced partitions within said casing dividing the same interiorly into a plurality of compartments connected to form a continuous tortuous path within the casing extending from the inlet to the outlet means, a rotary fan element connected with said tortuous path and adapted to draw air through said inlet, to circulate it through said tortuous path and force it from said casing through said outlet, a source of air treating medium within said casing, means for bringing said medium into intimate contact with said air by directing the medium against the direction of travel of the air through one of said compartments while said air is circulating within said casing whereby said air is treated and charged through contact with said medium.

5. A portable unit device for producing and delivering a continuous supply of treated air to a room or compartment, comprising a casing having air inlet and outlet means, a series of spaced partitions within said casing dividing the same into a plurality of connected chambers so arranged as to form a continuous tortuous path through said casing, extending from said air inlet to said air outlet, a rotary fan or blower located in said path through said casing and adapted to draw air into the inlet through the path and eject it from said casing, a body of liquid contained within said casing in the lower ends of the chambers, a liquid circulating pump and a suitable system of piping and spray heads having operative connection with said body of liquid whereby the same is circulated and sprayed directly against the entire column of air for a portion of its travel in its path so as to contact with the column of air passing through said casing and thereby treat the same.

6. A portable unit air cooling and humidifying device, comprising a casing having inlet and outlet means, a series of spaced partitions within said casing dividing the same into communicating chambers forming a continuous tortuous air passage therethrough between said inlet and outlet means, a rotary air blower within said passage near the outlet means, a rotary liquid circulating pump, an electric motor adapted to operate the said rotary air blower and the said liquid circulating pump, a body of liquid in said casing, a system of pipes and spray heads in circuit with said pump, whereby through the operation of said pump the said liquid is converted into a spray within the area of said tortuous air passage whereby air in said passage is cooled and humidified, said motor and pump being positioned exteriorly of the air passage and readily accessible through the top of the casing without interrupting the circulation of air through said passage.

In testimony whereof I have signed my name to this specification.

ALBERT D. LANE.