

Nov. 23, 1943.

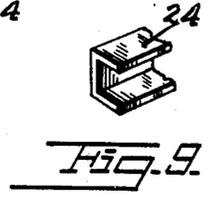
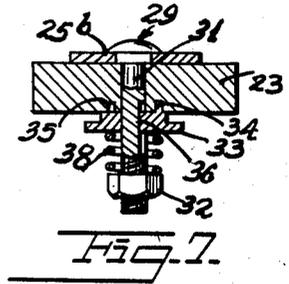
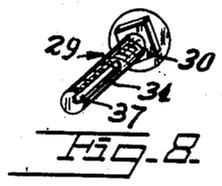
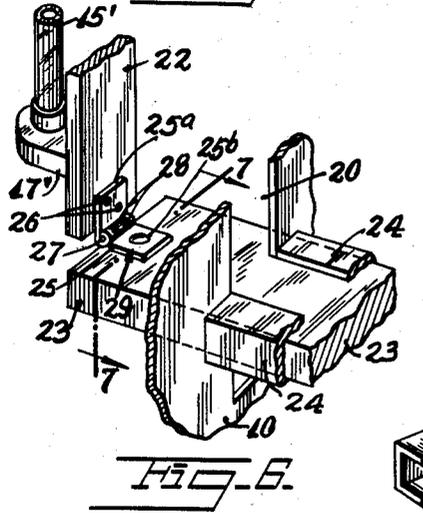
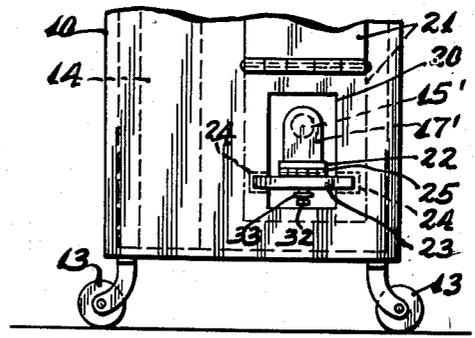
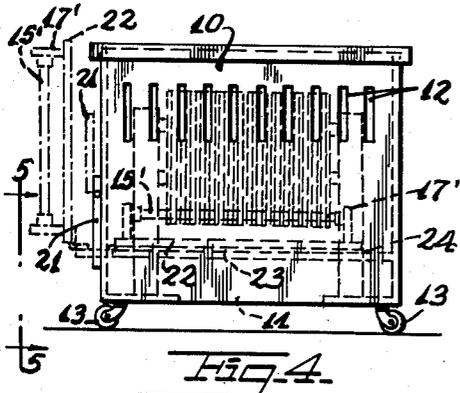
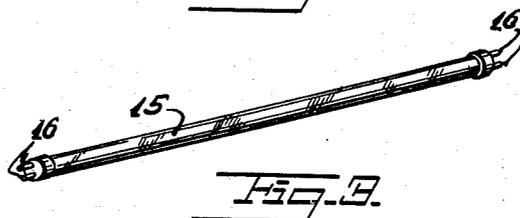
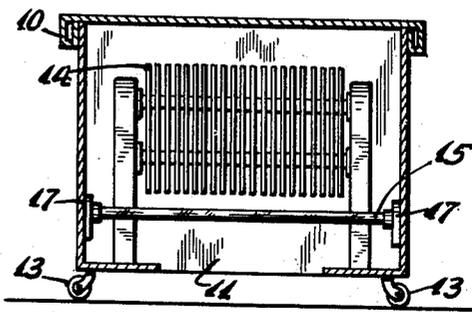
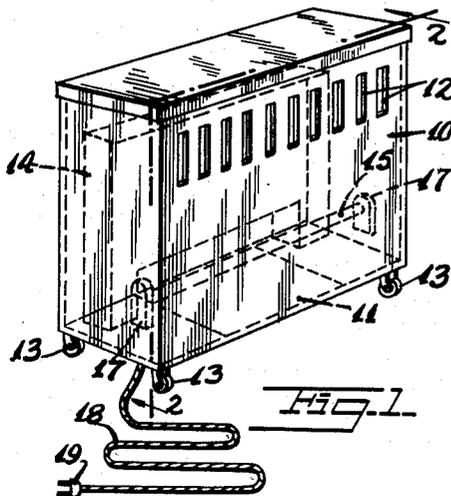
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2,335,056

PORTABLE AIR STERILIZING AND CONDITIONING MACHINE

Filed March 16, 1942

3 Sheets-Sheet 1



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2,335,056

PORTABLE AIR STERILIZING AND CONDITIONING MACHINE

Filed March 16, 1942

3 Sheets-Sheet 2

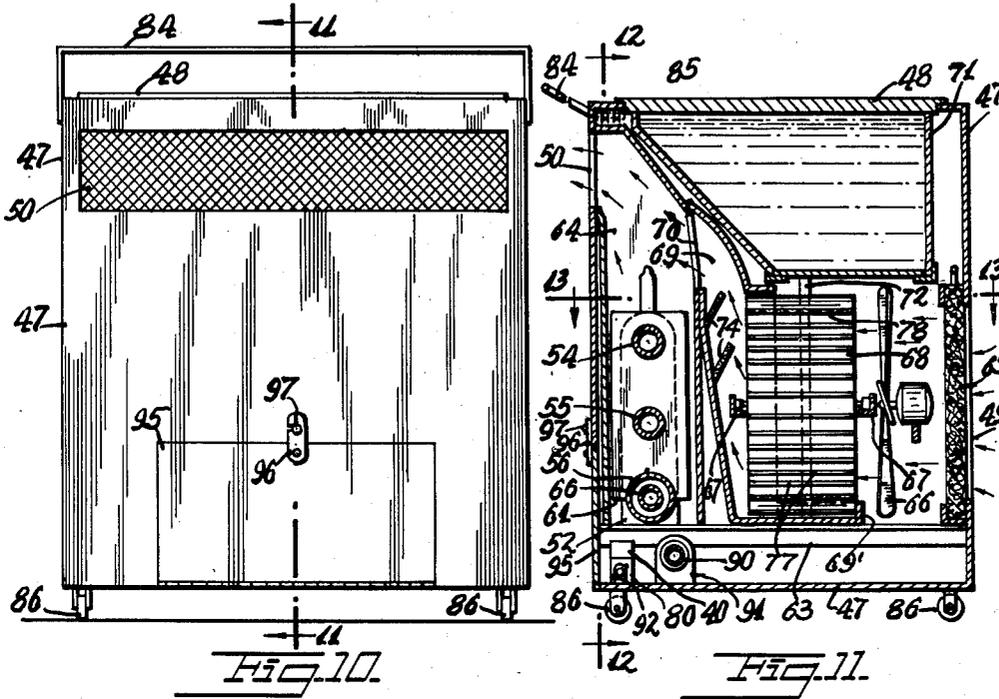


FIG. 10.

FIG. 11.

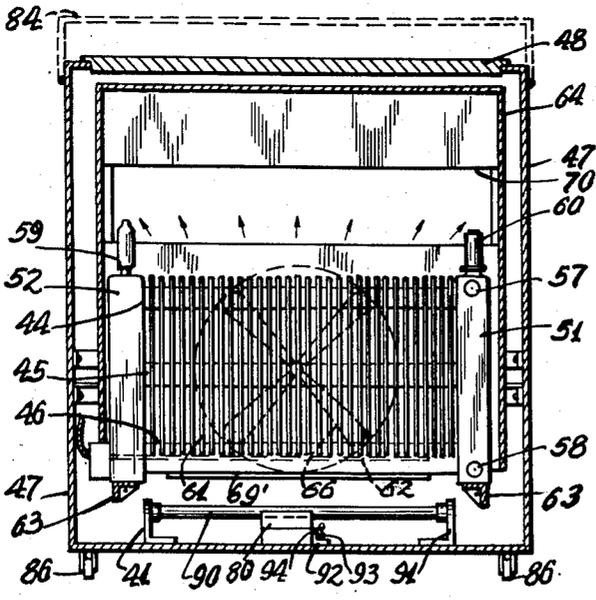


FIG. 12.

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2,335,056

PORTABLE AIR STERILIZING AND CONDITIONING MACHINE

Filed March 16, 1942

3 Sheets-Sheet 3

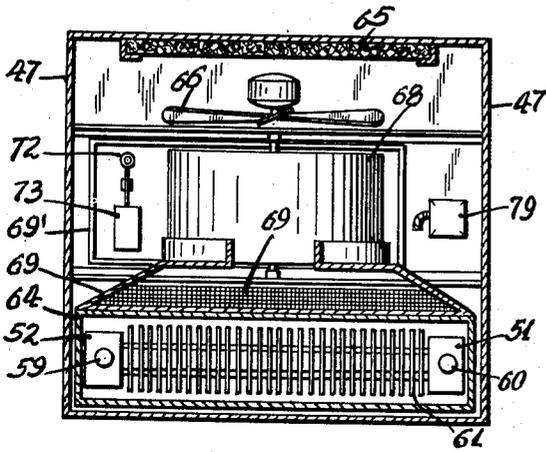


Fig. 13.

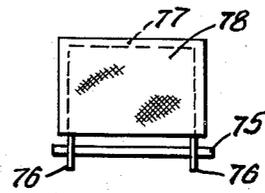


Fig. 15.

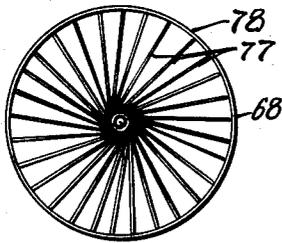


Fig. 14.

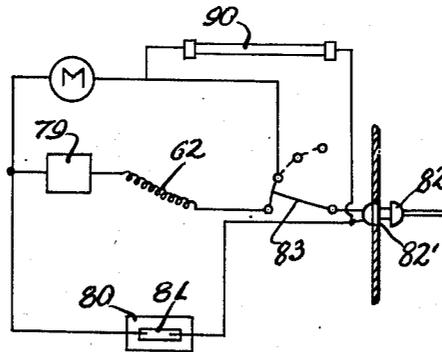


Fig. 16.

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UNITED STATES PATENT OFFICE

2,335,056

PORTABLE AIR STERILIZING AND CONDITIONING MACHINE

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Application March 16, 1942, Serial No. 434,820

4 Claims. (Cl. 250—43)

This invention relates to new and useful improvements in a portable air sterilizing and conditioning machine.

More specifically, the invention proposes the construction of a portable air sterilizing and conditioning machine designed to be used wherever people congregate in the home, office, garage, or hunting lodge for simultaneously conditioning and sterilizing the air in such rooms in a manner to heat it to a desired room temperature and kill all air borne bacteria and germs to prevent diphtheria, influenza, pneumonia, staphylococcus infections, streptococci infections, scarlet fever, tonsillitis, rheumatism, tuberculosis, typhoid fever, whooping cough and other similar contagious diseases.

A further object of this invention proposes the construction of a device employing a germicidal lamp arranged in a manner to have the ultraviolet rays emanating therefrom acting upon the air circulating through the machine to destroy the air borne bacteria and germs carried by the circulating air.

It is a further object of this invention to construct an air sterilizing and conditioning machine using a germicidal lamp capable of generating between 2250 and 2750 milliwatts of ultraviolet wave-length 2537-A, a wave-length considerably shorter than that generated by the summer sun, and the wave-length most effective in killing bacteria and germs.

Another object of this invention proposes the construction of a device characterized by a housing having an opening for the circulation of air with a heater mounted within the housing for warming the air and a germicidal lamp mounted in the bottom of the housing and in the path of circulation in a manner to kill air borne germs and bacteria in the air entering the housing.

A still further object of this invention proposes the provision of a means for slidably mounting the germicidal lamp within the housing in a manner to be extendable from an opening in one side of said housing to be extended vertically along the said side of said housing.

A further object is to provide a portable electrically operated air conditioning device, which may be plugged into an ordinary domestic electric circuit supply such as an electric light socket or wall outlet and which may be used for air heating, purifying, humidifying, filtering and deodorizing and cooling for summer use.

A further object of the invention is to provide a device whereby the room air is drawn from the room into a cabinet, through a filtering means, by an electrically operated fan and driven through a means, which will humidify or dehumidify the air and past a germicidal lamp to kill air borne germs and bacteria and then carry it through a heated air supply with which it is

mingled before being discharged back into the room.

For further comprehension of this invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure—

Fig. 1 is a perspective view of a portable air sterilizing and conditioning machine constructed in accordance with this invention.

Fig. 2 is a vertical sectional view taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of the germicidal lamp per se.

Fig. 4 is a front elevational view of a portable air sterilizing and conditioning machine constructed in accordance with a modification of this invention.

Fig. 5 is a partial side elevational view looking in the direction of the line 5—5 on Fig. 4.

Fig. 6 is a partial perspective view showing the connection between the slide and base supporting the germicidal lamp.

Fig. 7 is a vertical sectional view taken substantially on the line 7—7 of Fig. 6.

Fig. 8 is a perspective view of the bolt per se.

Fig. 9 is a perspective view of a portion of one of the tracks used for supporting the slide.

Fig. 10 is a front elevational view of an air conditioning device constructed in accordance with a still further modification of this invention.

Fig. 11 is a vertical sectional view taken substantially on the line 11—11 of Fig. 10.

Fig. 12 is a vertical sectional view taken substantially on the line 12—12 of Fig. 11.

Fig. 13 is a horizontal sectional view taken on the line 13—13 of Fig. 11.

Fig. 14 is an end elevational view of the preferred type of water wheel used for humidifying or de-humidifying.

Fig. 15 is a longitudinal detailed view of the fluid wheel axle with one of the fabric cover supporting means and cover shown connected thereto.

Fig. 16 is a schematic wiring diagram of the device.

The portable air sterilizing and conditioning machine, according to this invention, includes a housing 10 constructed of sheet metal and which is provided with convenient openings permitting air to circulate therethrough. These openings are characterized by an opening 11 in the bottom wall of the housing and a plurality of elongated adjacent openings 12 formed in the front wall of the housing 10 adjacent the top thereof. The bottom wall of the housing 10 is provided with a plurality of rollers 13 which are adapted to rest

on the floor and provide a convenient means for moving the housing from place to place. These rollers 13 are also provided for the purpose of maintaining the housing 10 in a position in which its bottom wall will be elevated slightly from the floor permitting air to enter through the opening 11 to discharge through the openings 12.

Mounted within the back portion of the housing 10 there is a heater 14 provided for the purpose of warming the air circulating through the housing 10 from the bottom opening 11 to the top openings 12. This heater 14 may be of any desired construction, but it has been found that an electrically operated steam heater is most advantageous for the purpose.

A germicidal lamp 15 is mounted in the bottom portion of the housing 10 and in the path of circulation for killing air borne germs and bacteria in the air entering the housing through the bottom opening 11. The germicidal lamp 15 is tubular in construction and is provided at its ends with outwardly extended prongs 16 which are adapted to engage conventionally constructed clips 17 mounted upon the end walls of the housing 10 for supporting the lamp 15 in a horizontal position across the bottom of the housing 10.

An electric cord 18 is provided with a plug 19 and is connected with the heater 14 and the lamp 15, these connections not being shown on the drawing, for the purpose of energizing the heater 14 and supplying the required current to illuminate the germicidal lamp 15.

The manner in which this form of the invention operates is as follows:

The air sterilizing and conditioning machine is moved to a desired position within a room and the plug 19 is engaged into a conventional house outlet for energizing the heater 14 and illuminating the germicidal lamp 15. The cold air along the floor of the room will enter the housing 10 through the opening 11 and pass upward within the housing to be warmed by the heater 14. The warm air will then discharge through the openings 12 formed in the front wall of the housing 10. While the air is circulating through the housing 10 ultra-violet rays from the germicidal lamp 15 will pass through the air and kill all germs and bacteria carried by the air to free the air of these air borne germs and bacteria to lessen the possibility of spreading contagious diseases.

In Figs. 4-9 a modification of the invention is disclosed in which a means is provided for slidably mounting the germicidal lamp 15' within the housing to be extended from an opening 20 formed in one side of the housing. The opening 20 is cut in the wall of the housing 10 and is adapted to be closed by means of a pivotally supported door 21 which is engageable across the opening 20 as shown in Fig. 4 and by the dot and dash lines in Fig. 5. The germicidal lamp 15' is mounted within clips 17' securely attached to a base member 22.

Means is provided for pivotally attaching the base member 22 to a slide 23 which engages a pair of oppositely disposed tracks 24 mounted between the side walls of the housing 10. The tracks 24 are constructed of channel shaped material which have their arms directed towards each other to engage about the sides of the slide 23, permitting the slide to be moved in and out of the housing 10 through the opening 20.

A hinge 25 is provided for pivotally attaching the end of the base 22 adjacent the opening 20

to the adjacent end of the slide member 23. This hinge 25 has one of its leaves 25^a securely attached to the bottom face of the base 22 by means of screws 26. The other leaf 25^b of the hinge 25 is pivotally attached to the adjacent end of the slide 23 by a means which will be hereinafter described. The hinge leaves 25^a and 25^b are pivotally connected together by means of a pin 27, and a means is provided for holding the leaves in various pivoted positions with relation to each other. This means comprises frictional elements 28 which are engaged between the overlapping portions of the hinge leaves 25^a and 25^b concentric with the pin 27 and which acts to frictionally maintain the leaves in various pivoted positions.

The means hereinabove referred to for pivotally connecting the hinge leaf 25^b to the slide 23 is characterized by a bolt 29. The bolt 29 is provided with a square portion 30 adjacent its head which engages a complementary square opening formed in the hinged leaf 25^b. The square portion 30 then continues into a cylindrical shank 31 which is extended through a round opening formed in the slide 23. A nut 32 is threadedly engaged upon the bottom end of the shank 31 and is spaced a considerable distance from the bottom face of the slide 23. A bushing 33 is slidably but non-rotatively mounted on the shank 31 and is provided on its face adjacent the bottom face of the slide 23 with an upwardly extended pin 34 which is selectively engageable with one of a plurality of openings 35. The openings 35 are arranged in a circle about the circular opening in the slide 23 through which the tubular shank 31 of the bolt 29 passes.

The bushing 33 is provided with an inwardly extended projection 36 which engages a key cut-out 37 formed in the side of the shank 31 of the bolt 29 for holding the bushing 33 against rotating relative to the shank 31. A spring 38 is coaxially mounted upon the shank 31 of the bolt and operates between the adjacent faces of the bushing 33 and the nut 32 for urging the bushing 33 into a position in which its pin 34 will engage one of the openings in the slide 23.

The operation of this form of the invention is as follows:

Normally, the germicidal lamp 15' is disposed in a horizontal position within the housing 10 as shown by the dotted lines in Fig. 4. It is possible to pivot the door 21 to a vertical position, indicated by the dot and dash lines in Fig. 4, permitting the slide 23 and the base 22 carrying the germicidal lamp 15' to be moved outwards relative to the housing 10 through the opening 20. In this latter position it is possible to pivot the germicidal lamp 15' and the base 22 to a vertical position indicated by the dot and dash lines in Fig. 4. The slide 23 may then be returned to its normal position within the housing 10 permitting the germicidal lamp to extend in a vertical position in intimate contact with the adjacent side wall of the housing 10. In this position the germicidal lamp 15' may be used for the purpose of killing germs and bacteria in the air outside of the housing 10 and permits the lamp 15' to be conveniently changed when it is burned out.

It is possible to adjust the angular position of the base 22 with relation to the slide 23 for directing the rays of the germicidal lamp 15' in any desired direction. With the lamp in the vertical position this is accomplished by pulling downwards upon the bushing 33 against the nor-

mal action of the spring 38, freeing the pin 34 from its opening 35 and permitting the bushing 33 to be turned to turn the bolt 29 to which it is securely locked. As the square portion 30 of the bolt 29 engages a square opening in the hinge leaf 25^b it will cause the hinge 25 to be turned with relation to the slide 23 and similarly adjust the base 22 and germicidal lamp 15'. When a desired adjusted position is reached the bushing 23 is again released and the spring 38 will urge the bushing 33 upwards causing the pin 34 mounted thereon to engage the opening 35 with which it is now aligned to securely lock the base 22 and lamp 15' in its newly adjusted position.

In other respects this form of the invention is identical to the previous form and like parts are indicated by like reference numerals.

In the form of the invention shown in Figs. 10-16, a cabinet 47 has a removable cover 48. The cabinet is further provided with an inlet opening 49 preferably in its back and a grid outlet opening 50 preferably in the front. Adjacent the front wall of the cabinet, I provide a heating unit, which may be referred to hereinafter in its entirety as a radiator, and which in general construction is composed of headers 51 and 52, having interconnecting water tubes 54, 55 and 56, the latter preferably being slightly larger than the other two. The header 51 is provided with a filling opening 58 with a closure plug therefor, which opening is preferably in line with the water tube 54. The header 51 is further provided with a drain opening 58 with a closure plug therefor, which opening is preferably in line with the bottom of the water tube 56. Preferably, one of the headers is provided with a vacuum air valve 59 and the other with a steam blow-off valve 60. Intermediate the headers 51 and 52, I provide a plurality of heat radiating fins 61 through which the water tubes 54, 55 and 56 extend and are in tight contact therewith. In the water tube 56, I provide an immersion heating element 62, which may be of any commercial type and to which suitable electrical connection is made as hereinafter described.

The radiator may be supported on any suitable supports, such as the angle bars 63, the ends of which may be secured to the cabinet. The radiator is mounted in an air duct 64, permitting air intake from below the radiator and having an outlet registering with the grid outlet opening 50.

Suitably supported against the inner face of the back of the cabinet 47 and covering the inlet opening 49, I provide a removable air filter 65, which may be of any particular or commercial type suitable to be used for this purpose. Positioned inwardly of the filter and preferably in alignment therewith, I provide a suitably mounted electrically operated fan 66 rotated in a direction to cause a draught of room-air through the filter 65 into the cabinet as indicated by the arrows in Fig. 11. Suitably mounted on angle irons 67 or in any other desired manner, I provide a wheel 68 preferably in alignment with the fan 66 and which is slowly rotated by the air blast therefrom. An air duct 69 is adapted to convey the air blast through the wheel 68. The discharge end thereof registers with the opening 70 in the air duct 64 so as to discharge the air blast into the duct 64 where it mingles with heated air rising through this duct 64, before it is discharged through the grid opening 50. The front wall of the duct 69 preferably extends back under the wheel 68 to form a water tray 69', the

wheel 68 being so positioned as to permit the lower periphery thereof to be immersed in the water or other fluid therein during the rotation thereof. If desired a deodorant, disinfectant or perfume compound or solution may be added to the water in the reservoir 71 from which there is communication by means of the pipe 72, controlled by the float valve 73, with the water tray 69'. The front wall of the air duct 69 may be provided with transversely disposed trays 74 in which calcium chloride or any other suitable compound may be placed when it is desired of de-humidifying the air during the summer months or these trays may hold a compound for deodorizing, disinfecting or perfuming.

The trays are preferably foraminous so as to permit the air coming from the wheel 68 to pass therethrough and contact the compound during its travel through the duct 69. Referring more particularly to the wheel 68, this wheel preferably is composed of a shaft 75 having discs 76 fixed thereto adjacent its ends. The U-shaped wire frame 77, the ends of which are attached to the respective discs 76 preferably in tangent relationship to the periphery thereof. Each wire frame 77 is covered with a fabric, preferably of pocket shape, to cover each side thereof. A cylindrical fabric band 78 encircles the frames 77 and is attached to the outer ends of the fabric forming the pockets on the frames 77 so as to maintain them in substantially equal predetermined spaced relationship.

Preferably with each cabinet, I provide two wheels, one being covered with fabric of a texture so as to be highly absorbent of the liquid in the tray 69' so that although only a periphery portion passes through the liquid in the tray 69', the whole fabric will be substantially saturated by a combination of capillary and gravity actions as the wheel rotates. A wheel having this type of fabric thereon will be used during the winter months, when it is desired of using my device as a humidifier in combination with a heating radiator. During the summer months, when there is a greater amount of humidity in the air, it is often desired to de-humidify and cool the air. When this is desired a wheel having a tightly woven thin fabric, which only will be moistened but not saturated by its immersion in the liquid in the tray 69', will be used. The air driven through this latter wheel by the fan 66 will be cooled and the humidity of the air decreased by its contact and passage through the calcium chloride in the trays 74 during passage up through the air duct 69. If desired, a deodorant, disinfectant, or perfume compound or solution may be added to the liquid in reservoir 71 which will be exposed to the flow of air by the wheel 68 and carried off thereby.

Referring to the electrical circuits, these are illustrated diagrammatically in Fig. 16. One of the headers, preferably header 51 has suitably connected thereto a steam pressure control switch 79 which may be of any suitable commercial type used in a variation control of low pressure. Suitably supported in the cabinet 47, I provide a fuse box 80, preferably having an open face, which is positioned adjacent to the water tube 56. Upon a predetermined excess heat from the water tube 56, the replaceable fusible link 81 in the fuse box 80 will be melted and break the electrical circuits hereinafter described. The fuse is also designed to melt under an overload of the circuits. The cabinet is provided with a suitable plug-in opening 82' into

which a plug connection 82 from any suitable source of electrical supply may be made. One side of the circuit goes to one pole of the three-position switch 83, which in its shown position completes the circuit through the fan motor and through the heating element 62 and its pressure switch 79 in series, both circuits then extend through the fuse box 80 to the opposite side of the plug-in opening 82'. When the switch is in this position, as will be common during winter use, both the heating radiator and the electric fan will be energized. During the summer, it is naturally not desirous to use the heater shown in Fig. 16 to cut off the circuit to the heating element 62 and its pressure switch, the circuit through the motor and the fuse box 80 remaining completed. When the switch is moved to its third position, both circuits will be broken.

A germicidal lamp 90 is mounted on the floor of the cabinet 47 beneath the air duct 24 which houses the heat radiator. This germicidal is connected in the electric circuit provided to be heated. The rays from the lamp 90 will pass upward through the air duct to kill air borne germs and bacteria in the air being conditioned before the air has an opportunity of passing through the outlet grid opening 50. This germicidal lamp is removably mounted in clips 91 connected with the electric circuit in parallel.

The fuse 80 is removably mounted upon the bottom wall of the cabinet 47 by reason of its engagement with a small angle iron 92 mounted upon the bottom wall of the cabinet 47. A screw 93 projects from the fuse 80 and passes through an opening in the angle iron 92 and is engaged by a thumb nut 94.

The front wall of the cabinet 47 beneath the grill opening 50 is formed with an opening closed by means of a door 95. The door 95 has its bottom edge hingedly supported on the cabinet 47 and its top edge retained in a closed position by means of a pivotally mounted lever 95 which releasably engages a pin 97 mounted upon the cabinet 47 above the opening adapted to be closed by the door 95.

The construction is such that the door 95 may be opened and the fuse 80 removed to permit the lamp 90 to be removed and interchanged with a new one when it becomes burnt out.

Preferably, the cabinet 47 will be mounted on a plurality of casters 86 so that it may be conveniently moved around as a portable unit. It has been found very convenient to provide a clothes drying rod to be used in combination with this cabinet. In the drawings Figs. 11 and 12, I have shown a U-shaped drying rod 84, the ends of which are suitably supported through slotted loops 85 in opposite ends of the cabinet. The cross bar of the clothes rod 84 will be supported in front of the cabinet so that air discharged through the grid opening 50 will provide a means for easily and quickly drying light clothing or other material placed thereon.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

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

1. A portable air sterilizing and conditioning machine, comprising a housing having openings for the circulation of air, a heater within said housing and in the path of said circulation for warming the air, and a germicidal lamp mounted in the path of said circulation for killing air borne germs and bacteria in the air entering said housing to be warmed, means for slidably mounting said lamp within said housing to be extended from an opening formed in one side of said housing and to be extended vertically along said side, said means comprising a base upon which said germicidal lamp is mounted, a slide upon which said base is pivotally mounted, and means for movably mounting said slide within said housing.

2. A portable air sterilizing and conditioning machine, comprising a housing having openings for the circulation of air, a heater within said housing and in the path of said circulation for warming the air, and a germicidal lamp mounted in the path of said circulation for killing air borne germs and bacteria in the air entering said housing to be warmed, means for slidably mounting said lamp within said housing to be extended from an opening formed in one side of said housing and to be extended vertically along said side, said means comprising a base upon which said germicidal lamp is mounted, a slide upon which said base is pivotally mounted, and a means for movably mounting said slide within said housing, said latter means comprising tracks mounted within said housing and engaging the sides of said slide.

3. A portable air sterilizing and conditioning machine, comprising a housing having openings for the circulation of air, a heater within said housing and in the path of said circulation for warming the air, and a germicidal lamp mounted in the path of said circulation for killing air borne germs and bacteria in the air entering said housing to be warmed, means for slidably mounting said lamp within said housing to be extended from an opening formed in one side of said housing and to be extended vertically along said side, said means comprising a base upon which said germicidal lamp is mounted, a slide upon which said base is pivotally mounted, and a means for movably mounting said slide within said housing, said base being connected to said slide by means of a hinge having its leaves frictionally connected together to frictionally maintain various pivoted positions with relation to each other.

4. A portable air sterilizing and conditioning machine, comprising a housing having openings for the circulation of air, a heater within said housing and in the path of said circulation for warming the air, and a germicidal lamp mounted in the path of said circulation for killing air borne germs and bacteria in the air entering said housing to be warmed, means for slidably mounting said lamp within said housing to be extended from an opening formed in one side of said housing and to be extended vertically along said side, said means comprising a base upon which said germicidal lamp is mounted, a slide upon which said base is pivotally mounted, and a means for movably mounting said slide within said housing, and a lock means arranged in connection with the pivotal mounting of said base on said slide for holding said base and germicidal lamp mounted thereon in various pivoted positions with relation to said slide.

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