

Sept. 5, 1933.

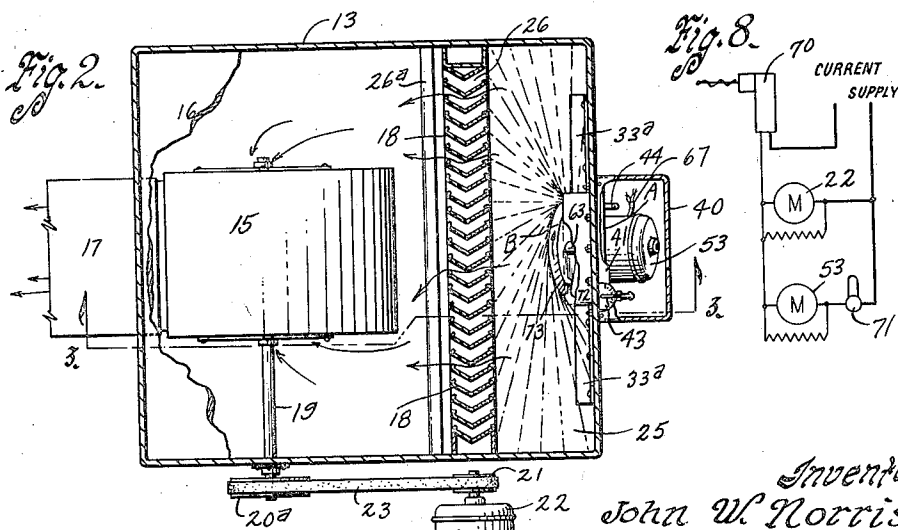
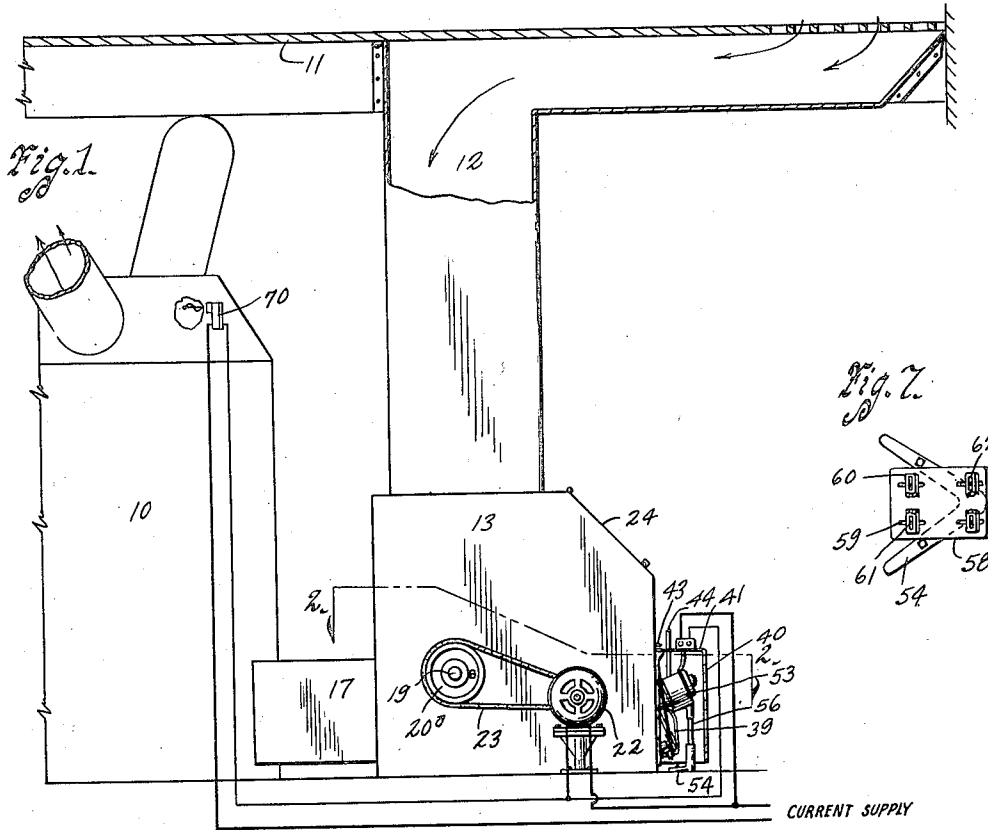
J. W. NORRIS

1,925,907

AIR CONDITIONING DEVICE

Filed Jan. 13, 1933

3 Sheets-Sheet 1



Witness
A. S. Mungenmaier

Inventor
John W. Norris
by Bair, Freeman & Sinclair
Attorneys

Sept. 5, 1933.

J. W. NORRIS
AIR CONDITIONING DEVICE

1,925,907

Filed Jan. 13, 1933

3 Sheets-Sheet 2

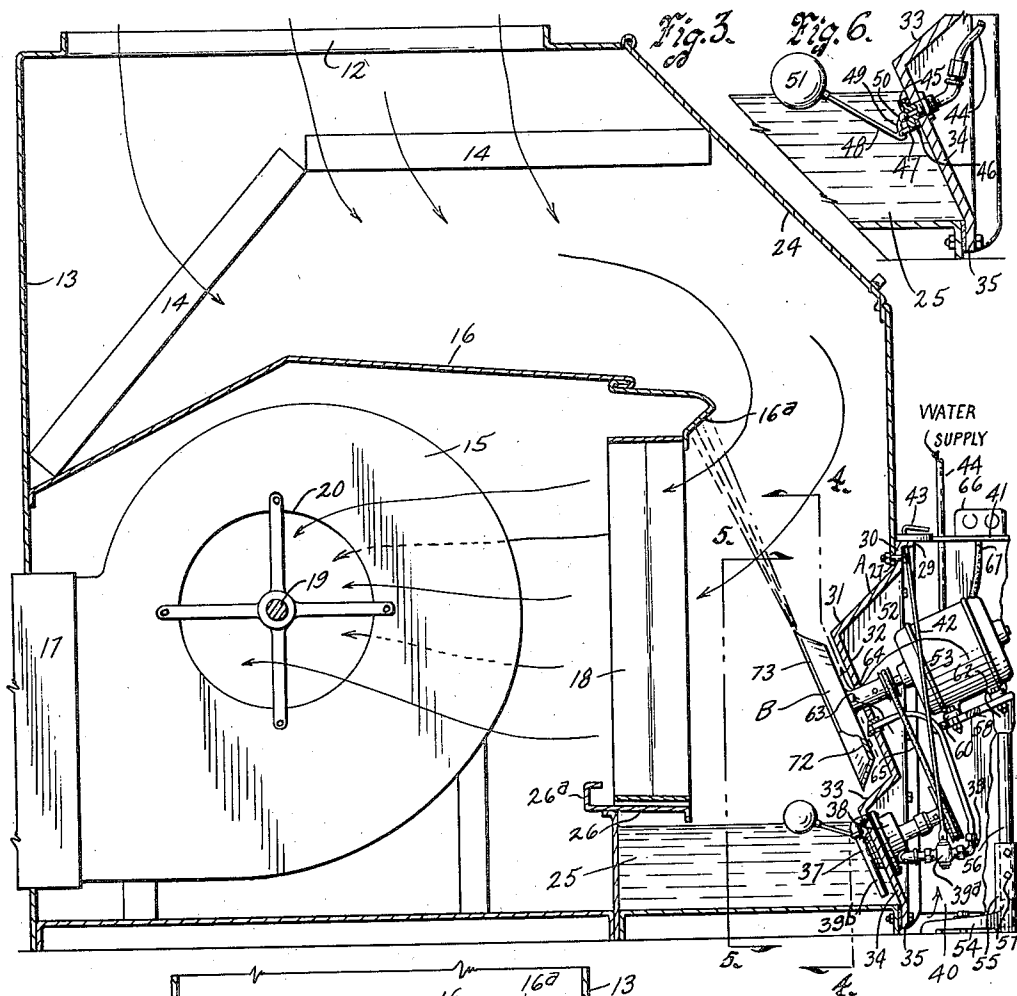
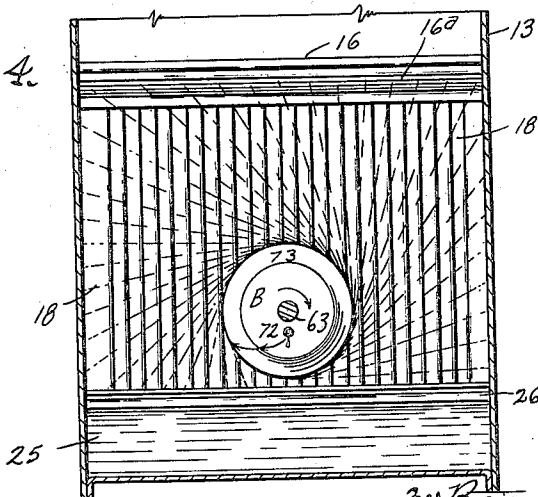
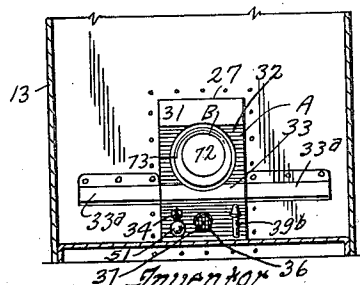


Fig. 4.



Witness
H. S. Wingermaier

Fig. 5.



Inventor
John W. Norris
by Barr, Freeman & Sinclair
Attorneys

Sept. 5, 1933.

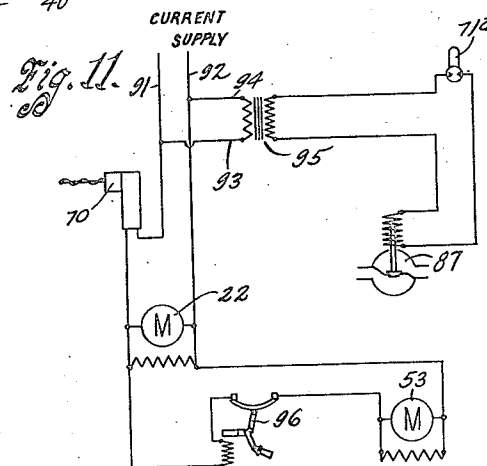
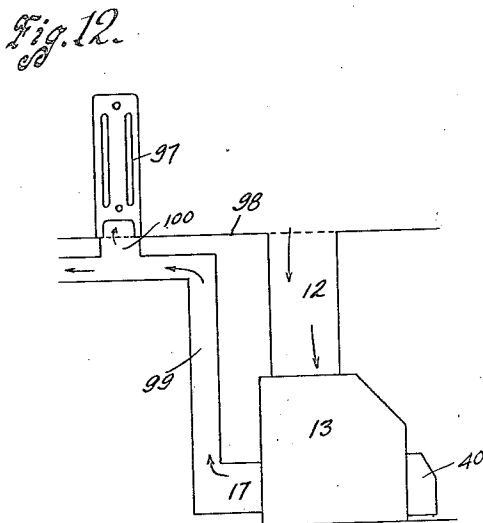
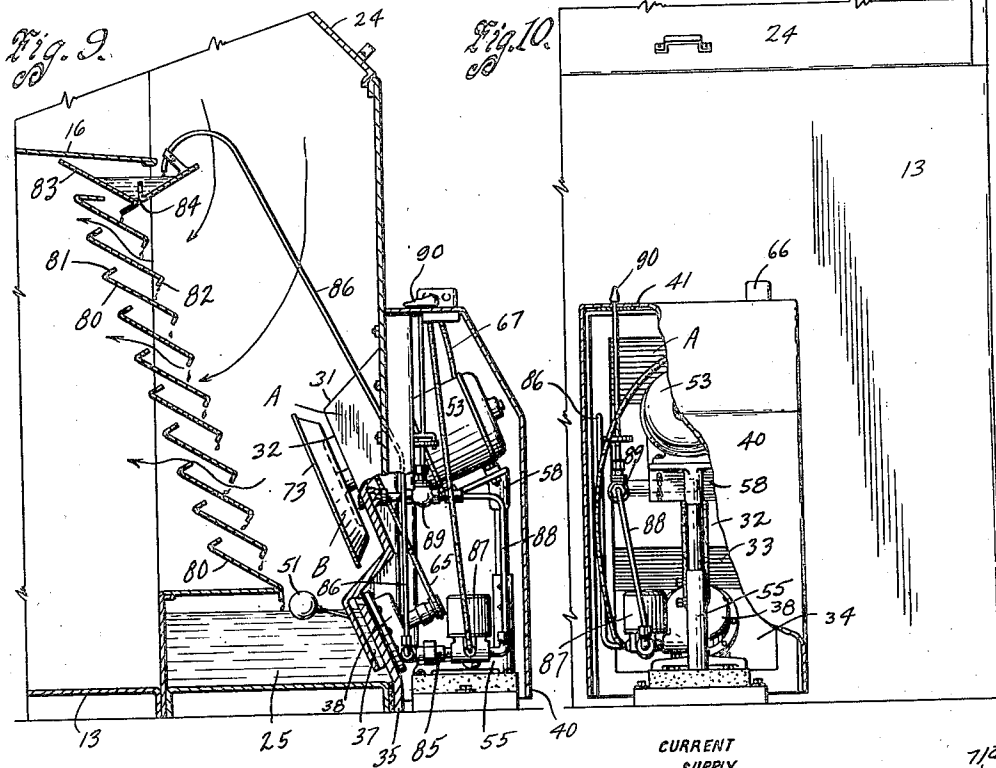
J. W. NORRIS

1,925,907

AIR CONDITIONING DEVICE

Filed Jan. 13, 1933

3 Sheets-Sheet 3



Witness
H. S. Munzmaier

Inventor
John W. Norris
By Bair, Freeman, & Sinclair
Attorneys

UNITED STATES PATENT OFFICE

1,925,907

AIR CONDITIONING DEVICE

John W. Norris, Marshalltown, Iowa, assignor to
Lennox Furnace Company, Marshalltown,
Iowa, a corporation

Application January 13, 1933. Serial No. 651,484

17 Claims. (Cl. 261—90)

The object of my invention is to provide an air conditioning device of a kind adapted to be used preferably with heating plants.

More particularly, it is my object to provide a structure usable in cooperation with an air fan for providing a thin spray of water through which the air passes, and whereby the air may be washed and humidified.

An additional object is to preferably provide in connection with such a device a suitable air filtering means.

More particularly, it is my purpose to provide a spray maker of very simple, durable and inexpensive construction having the following and perhaps other novel features.

My device includes a casing having a front of peculiar shape and adapted to support a part of the operative mechanism. I include in the structure also means for supporting a power member, preferably an electric motor in such manner that the vibrations thereof can not be transmitted into any of the casings and yet the motor may be readily connected with the other parts of the operative mechanism.

It is my purpose to provide in such a spray maker a rotary sprayer of novel construction.

It is also my purpose to provide means of novel construction for preventing throwing water into any body of water.

It is also my purpose to provide an apparatus of the type under consideration, which automatically provides a film of water on a series of eliminator or scrubber plates and also discharges a fine spray of water across the path of the moving air.

This device has automatic means for shutting off the water spray when additional humidity is not desired.

Another purpose is to provide such an apparatus which can be used in connection with hot water and steam heating systems.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my air conditioning device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of an air conditioning device embodying my invention, parts being shown in section and parts being broken away.

Figure 2 is a horizontal, detailed, sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detailed, sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a vertical, detailed, sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a vertical, detailed, sectional view taken on the line 5—5 of Figure 3.

Figure 6 is a vertical, detailed, sectional view of the supply reservoir, illustrating the arrangement of the float, other parts being omitted.

Figure 7 is a detailed, sectional view taken through the supports of the motor, looking downward.

Figure 8 is a diagrammatic view illustrating the electric wiring for the fan motor and the spray unit motor.

Figure 9 is a vertical, detailed, sectional view illustrating another form in which my invention may be embodied.

Figure 10 is a rear elevation of my device of the form shown in Figure 9, parts being broken away and parts being shown in section.

Figure 11 is a diagrammatic view showing the wiring connections of the device illustrated in Figures 9 and 10; and

Figure 12 is a diagrammatic view illustrating a way in which my device may be used in association with steam or hot water heating system.

In the accompanying drawings, I have used the reference numeral 10 to indicate generally the furnace with which my apparatus is employed. 11 indicates the floor of a room above the furnace.

An air return passage 12 leads from the room to a casing 13.

In the upper part of the casing 13, air filters of suitable construction are arranged in the path of travel of the air.

In the lower part of the casing 13 and at what may be called the forward end thereof is a fan casing 15. Above this is a substantially horizontal partition 16 extending from side to side of the casing 13 and from the front wall thereof toward the rear wall, but terminating short of the rear wall.

An air passage or conduit 17 leads from the fan casing 15 to the furnace 10 through the front wall of the casing 13 as illustrated for instance in Figures 3, 2 and 1.

Below the rear end of the partition 16, there is arranged a row of vertical eliminator or scrubber plates 18. The row extends from side to side of the casing 13 in the present particular embodiment of my invention.

In the casing 15 is a fan, not here particularly shown, mounted on a shaft 19.

At the sides of the casing 15 are the air intake openings 20.

The shaft 19 extends through the side wall of

the casing 13 as indicated in Figure 2 and may have on its outer end a gearing device, such as the pulley 20a, in line with a pulley 21 on the shaft of a motor 22. There is provided a belt 23 for the pulleys 20a and 21.

It will be seen that air travels downwardly through the pipe 12 into the upper part of the casing 13, thence through the filters 14 and rearwardly over the partition 16 and thence downwardly and between the eliminator plates 18 and into the casing 15 and thence to the furnace.

At the upper rear part of the casing 13, I provide an inclined hinged cover 24 (Figure 3) forming part of the wall and affording access to the interior of the casing 13.

I provide means for throwing a fine mist or spray of water, so as to form a sheet, as it were, through which the air must pass after it has left the filters 14 and just before it reach the eliminator plates 18.

I will now describe this spray producing mechanism. At the bottom of the rear portion of the casing 13, I provide a water reservoir indicated generally at 25 (Figure 3). The details of the structure of the reservoir may be considerably varied.

The eliminator plates 18 are arranged just above the forward part of this reservoir and there is provided a drain plate 26 whereby water dripping off the eliminator plates is drained into the reservoir.

In the rear wall of the casing 13, there is provided an opening 27, which when the apparatus has been installed is closed by a panel A of peculiar shape. The panel A has a top horizontal strip-like portion 29 from which a portion 30 extends vertically downwardly. The panel then extends inwardly and downwardly as at 31, and is then inclined downwardly and rearwardly as at 32, and thence downwardly and inwardly or forwardly as at 33 to form a shelf, and thence is inclined downwardly and outwardly again as at 34, and thence vertically downwardly as at 35. The portion 34 forms the rear wall of the reservoir.

This panel supports a considerable part of the spraying mechanism. It has an opening 36 shown for instance in Figure 5 covered by a screen 37.

Supported on the rear of the portion 34 of the panel A is a pump 38 shown in Figure 3. A pipe 39 leads from the discharge end of the pump upwardly and discharges through the portion 32 against the back of a rotary spraying element B.

A drain pipe 39b has its lower end arranged near the bottom of the reservoir 25 and its upper end extending through the upper portion of the member 34, so that when the water rises to the upper end of the pipe 39b, it drains out on the rear face of the member 34, so that the water will run on the floor and indicate that the system is out of order.

The upper end of the pipe can, of course, be connected with the sewer.

In the pipe 39 is a control valve 39a.

Secured to the rear end of the panel A is a casing 40, having rear and side walls as indicated in Figure 2. A separable cover or panel member 41 (Figure 3) is detachably supported on the top of the panel A.

A rod 42 extends through the panel 41 and preferably through the member 29 of the panel A and is operatively connected with the valve 39a for controlling it. At the upper end of the rod 42 is a suitable handle 43.

An intake pipe 44 as shown in Figures 3 and 6 extends through the panel A into the casing 40 and thence through the member 34 of the panel A. At the lower discharge end of the pipe 44 is provided a valve seat 45 in a suitable fitting 46. The fitting has a projecting arm 47 to which is pivoted a float rod 48 on which is an arm 49 having the valve 50 to cooperate with the valve seat. The arm 48 is connected with the float 51.

When the water stands at the desired level, the float closes the valve and prevents the inflow of any more water. When the level of the water lowers, the float drops and permits water to flow into the reservoir 25.

The spray producer B is supported on the shaft 52 of a motor 53. The motor 53 is designed to be supported on the floor of the room in which the apparatus is installed, and is so supported in order that the vibration of the motor may not be transmitted to the panel A or the casing 13 or the casing 40. I thus prevent the creation of an undesirable noise by the apparatus.

For supporting the motor 53, I provide a base 54, which may be bolted to the floor and has an upstanding sleeve 55 in which a rod 56 is adjustably mounted by means of set screws 57. Supported on the upper end of the rod 56 is an inclined shelf 58 shown in Figures 3 and 7. The shelf 58 has slots 59 elongated from front to rear. The motor 53 has legs 60 which are provided with slots 61 elongated transversely. Suitable bolts 62 are used for locking the motor to the shelf 58 and by reason of the arrangement of the slots mentioned and of the mounting of the rod 56 in the sleeve 55 ample adjustment is provided.

The spray producer B has a rearwardly extending hub 63 mounted on the shaft of the motor and extended through an opening 64 in the portion 32 of the panel A.

Power is transmitted from the motor shaft to the pump shaft by a flexible belt 65 of rubber or the like. On the panel 41 is an ordinary outlet post 66 from which a flexible current conductor 67 leads to the motor 53.

Suitable controls may be provided for the motors 22 and 53.

In Figure 8 is a diagram showing one way of connecting up the motors. In the hood of the furnace is located a thermostat 70 shown also in Figure 1. This thermostat and the two motors 22 and 53 are included in the current line. There may also be included in the line with the motor 53 a humidostat 71, which, of course, will be located in a room of the building to be heated. Figure 1 shows an installation without a humidostat. Other controls not particularly pertinent to the present device may be used for the fan and furnace.

In the practical operation of my improved apparatus, it will be observed that the motors are connected in parallel so that when the blower starts, the spray mechanism is started also, subject to the operation of the humidostat, which may automatically cut out the spraying device if the room shows sufficient humidity.

When the motors are operating, the fan forces the air to the furnace in the ordinary way. The spray motor 53 operates the spray producer B. In some installations, this spray producer is operated at about 1700 revolutions per minute.

It will be observed that the spray producer is of peculiar shape and mounting. It has a central flat disc 72 with an annular peripheral in-

clined flange 73. The flanged disc spray producer B is inclined at an angle from the vertical, as shown best in Figure 3. After long experiment, I have found that this particular shape and inclination affords satisfactory results. The water is fed up to the back of the disc 72 and flows to its outer edge and thence over the inclined flange 73 and is thrown substantially straight out from the forward edge of the flange. There is thus created a fine mist or spray in a sheet directed across the travel of the incoming air before the air reaches the eliminator plates.

The partition 16 is provided at its rearward end with an inwardly forwardly and downwardly inclined portion 16a (shown in Figure 3) against which the spray impacts. The spray is created, of course, in a circular sheet and some of it is directed against the side walls of the casing 13. The inclined shelf-like portion 33 of the panel A is arranged to receive the lower part of the spray. This portion 33 is inclined at an angle to the direction of travel of the spray and the surplus water then flows into the reservoir. The shelf-like member 33 is extended lengthwise by means of aligned shelf-like members 33a (Figures 2 and 5) secured to the rear wall of the casing 13.

The inclination of the portion 33 facilitates the travel of the water which strikes the portion 33 back to the reservoir and prevents noise. The arrangement shown avoids any throwing of water directly into the body of water in the reservoir and consequent noise. Some water flows down along the eliminator plates. These are preferably V-shaped in horizontal cross section as shown in Figure 2.

The air with any water that it may carry travels between the eliminator or scrubber plates in angular paths and impacts against the scrubber plates and deposits any surplus of moisture on them. Such surplus moisture drains down to the drain 26 and from thence to the reservoir. By this arrangement the air is washed and humidified.

The structure shown is comparatively simple and inexpensive.

My spray producing apparatus can be readily installed as a unit with or without the fan and its motor. Of course, I preferably install the fan and spraying units together for getting the most satisfactory results. The air is humidified and washed without water waste.

One great advantage of this structure arises from the fact that it eliminates noise. The disc does not contact with the water in the reservoir and the spray is not driven into any body of water. The amount of water used in the spray is readily controlled by regulating the valve 39a. When the air is sufficiently humidified, the spray motor is cut out.

I find that with this type of spray producer, the water is not too much atomized although the eliminator plates are quite thoroughly covered with moisture.

With this structure, I find that I can wash the air without over humidification. I find also that although the amount of water supplied to the flanged disc spray producer B is reduced, yet the eliminator plates may still be completely covered.

This disc-like spray producer affords an even ejection of water in spray form from the outside edge of the flange 73.

The parts are so simple that they require a minimum of servicing. All parts are readily ac-

cessible through the hinged member 24 and the removable panel 41. The installation may be made without the necessity for a basement drain.

The casing 40 is open at the bottom as shown for instance in Figure 3 and the hole 64 through which the hub 63 of the spray producer extends is large enough so that air may flow into the bottom of the casing 40 around the motor and into the casing 13 through the opening 64 for cooling the motor.

It is, of course, obvious that the direction of flow of air into the casing 13 and that the flow of air through the casing 13 will tend to maintain a continued current of air around the motor 53.

In Figures 9, 10 and 11, I have illustrated a different form of my invention, which in many instances is the preferred form in which it may be embodied.

The chief differences between the structure shown in Figures 9, 10 and 11 and that shown in the figures heretofore described is in the following features:

Instead of the eliminator plates of the kind shown in Figure 2, I use a different type of eliminator plates. I provide in the form of the device shown in Figures 9 and 10 a means for supplying water to the eliminator plates independently of the spray already mentioned, and an automatic means for controlling water supply to the spray maker and to the eliminator plates.

In Figures 9 and 10, I have shown the structure as already explained with the following modifications:

Instead of the plates 18, there are provided eliminator plates 80. These are arranged in a tier as shown. The tier is slightly inclined from the bottom upwardly and toward the front of the device. Respective eliminator plates in the tier are inclined from their forward ends downwardly and rearwardly. They have at their forward ends upwardly extending flanges 81 and at their rear ends they preferably have the downwardly projecting flanges 82. The lowermost plate 80 discharges into the reservoir 25. Above the top eliminator plate 80 is a trough or reservoir 83 provided with a series of discharge openings 84 adapted to allow water to drop upon the upper eliminator plate 80.

It will now be seen why the tier of eliminator plates is inclined. This is so that the water on the upper plates may drop upon the lower plates and travel along them for a little distance. The current of air passing between the plates causes this water to be formed into a film on the plates for absorbing dust and the like. The flanges 81 prevent any passage of water over the forward ends of the plates.

In the form of the device now under consideration instead of using the pipe 39, I provide a pipe 85 leading from the pump. A by-pass tube or pipe 86 of small diameter leads from the pipe 85 near the pump and discharges into the trough 83.

Associated with the pipe 85 beyond the pipe 86 is a solenoid valve 87 from which a pipe 88 leads to and discharges against the rear of the spray making disc B in the same manner as heretofore described for the pipes 39. In the pipe 88 is a valve 89 with a hand control 90, whereby the flow to the disc B may be controlled.

In Figure 11, I have shown in a diagrammatic way the wires for the structure shown in Figures 9 and 10. The supply wires are shown at 91-92. Branch wires 93-94 lead through a transformer and are connected with a humidostat 71a

similar to the humidostat 71 and to the solenoid valve 87. The main circuit includes the thermostat 70 already described and the motors 22 and 53. An overload circuit breaker 96 is included in the circuit to the motor 53.

In the operation of the device shown in Figures 9, 10 and 11, it will be observed that normally the motor 53 operates whenever the blower motor 22 is in operation. Whenever the motor 53 operates, water is supplied to the eliminator plates. Whether or not water is supplied to the spray disc B depends upon the humidity of the air. The humidostat is preferably located in the room above, but may be placed at any desirable point.

The film of water on the eliminator plates takes up the dirt, and here is where most of the air cleaning is done. The greater part of the humidification of the air is done by the spray. Thus where no humidification is required, the washing operation continues, but humidification is reduced to a minimum.

It will be seen that eliminator plates of the kind shown in Figure 2 could be used instead of the plates shown in Figure 9. The important thing is to provide means for supplying films of water in the path of the traveling air for the purpose of taking out dirt and washing the air.

In Figure 12, I have shown my apparatus installed in connection with a hot water or steam heating system. A steam or hot water radiator is indicated at 97 in a room above the floor 98. The apparatus is similar to that described having the air conduit 12 and the casing 13 and the air washing and humidifying mechanism as heretofore explained. The air conduit 17, however, instead of leading to a furnace connects to a conduit 99 from which branches 100 lead to the various rooms to be heated, preferably adjacent to the radiators.

Thus the air conditioning apparatus of the kind here shown may be used with practically all kinds of heating plants. It will be noted that a part of the trough 84 serves the function of the deflecting plate 16a already referred to.

Changes may be made in the details of the structural arrangement of the parts and materials used without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modifications or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. In a device of the class described, a casing having an air passage provided with eliminator plates, a reservoir below the plates adapted to receive drainage therefrom, a panel forming a part of the casing wall, a motor outside the panel, a spray producer inside the panel, operatively connected with the motor, for producing a spray of water across the path of air travel to the plates, comprising an inclined disc having an annular inclined flange, a pump mechanism carried by the panel for carrying water from the reservoir and discharging it against the back of the disc and operated from the motor.

2. In a device of the kind described, a casing having an air passage provided with eliminator plates, a reservoir to receive drainage from the plates, a panel forming part of the casing wall, a motor outside the panel, a spray producer operatively connected with the motor arranged inside the panel, and comprising an inclined disc, having an annular inclined peripheral flange, a pump mechanism operated from the motor for pumping

water from the reservoir and discharging it against the back of the disc, a casing for the motor of which said panel forms a wall, said last casing being open at the bottom and said panel having an opening whereby air may flow through the second casing for cooling the motor, and means for drawing air through the eliminator plates.

3. In a device of the class described, a casing having an air passage provided with eliminator plates, a reservoir arranged below the eliminator plates for receiving drainage therefrom, a motor outside the casing, a spray producer arranged inside the casing for throwing a spray of water into the path of air to the plates, a pump mechanism for pumping water from the reservoir and discharging it to the spray producer, means for operating the spray producer and the pump from the motor, a casing for the motor having air intake means at its lower part, said first casing having an opening to permit passage of air from the second casing into the first casing, whereby the current of air may be created for cooling the motor, and means for drawing air through the eliminator plates.

4. In a device of the class described, a casing having an air passage provided with eliminator plates, a reservoir below the plates adapted to receive drainage therefrom, a panel forming a part of the casing wall, a motor outside the panel, a spray producer inside the panel, operatively connected with the motor, for producing a spray of water across the path of air travel to the plates, comprising an inclined disc having an annular inclined flange, a pump mechanism carried by the panel for carrying water from the reservoir and discharging it against the back of the disc and operated from the motor, and adjustable means for supporting the motor independently of the casing for thus preventing transmission of the vibration from the motor to the casing.

5. In a device of the class described, a casing having an air passage provided with eliminator plates, a reservoir below the plates adapted to receive drainage therefrom, a panel forming a part of the casing wall, a motor outside the panel, a spray producer inside the panel, operatively connected with the motor, for producing a spray of water across the path of air travel to the plates, comprising an inclined disc having an annular inclined flange, a pump mechanism carried by the panel for carrying water from the reservoir and discharging it against the back of the disc and operated from the motor, an inclined impact plate above the eliminator plates in the path of the water spray.

6. In a device of the class described, a casing having an air passage provided with eliminator plates, a reservoir below the plates adapted to receive drainage therefrom, a panel forming a part of the casing wall, a motor outside the panel, a spray producer inside the panel, operatively connected with the motor, for producing a spray of water across the path of air travel to the plates, comprising an inclined disc having an annular inclined flange, a pump mechanism carried by the panel for carrying water from the reservoir and discharging it against the back of the disc and operated from the motor, an inclined shelf-like plate below the spray producer in the path of the spray discharged downwardly therefrom inclined at an angle to the discharge of the spray and adapted to drain into the reservoir.

7. In a device of the class described, a casing,

a series of eliminator plates therein, means for drawing air through the plates, a deflector above the plates, in position to deflect water sprayed thereon to the plates, a reservoir below the plates to receive water drained therefrom, means for drawing water from the reservoir and discharging it in a spray across the path of air approaching the plates and against the deflector.

8. In a structure of the kind described, a rotating spray producer comprising a disc having a peripheral annular inclined flange, means for supplying a stream of water to the back of the disc, a series of eliminator plates, means for moving air through the eliminator plates in the path of the spray produced by said spray producer, an inclined impact plate above the eliminator plates in the path of such spray adapted to drain through the eliminator plates, a reservoir below the plates for receiving drainage therefrom, and a shelf below the spray producer in the path of the spray discharged therefrom inclined at an angle to the travel of the spray and adapted to drain into said reservoir.

9. In a structure of the kind described, a rotating spray producer comprising a disc having a peripheral annular inclined flange, a series of eliminator plates, means for moving air through the eliminator plates in the path of the spray produced by said spray producer, an inclined impact plate above the eliminator plates in the path of such spray adapted to drain through the eliminator plates, a reservoir below the plates for receiving drainage therefrom, a shelf below the spray producer in the path of the spray discharged therefrom inclined at an angle to the travel of the spray and adapted to drain into said reservoir, and means for drawing water from the reservoir and discharging it against the back of said disc.

10. In a structure of the class described, a casing having an air passage, provided with eliminator plates for causing the air to follow a tortuous path, a deflector plate above the plates, means for directing a spray of water across the path of the air to the plates and toward the deflector plate, a water reservoir, means for draining water from the deflector plates to the reservoir, said first means comprising a rotating disc inclined from vertical having an annular peripheral flange adapted to throw a spray of water in a plane approximately intersecting the deflector plate, means for supplying water to the back of the disc from the reservoir including a control valve, an inclined shelf member below the disc, positioned to be struck by the spray at an angle and to drain into the reservoir.

11. In a structure of the kind described, a casing having a front panel with a portion inclined from vertical, and a second portion inclined downwardly and away from said first portion forming a shelf, a motor support inclined from the vertical in substantially right angles to said first panel portion, a motor on said shelf on one side of the panel, a spray producer on the other side of the panel operatively connected with the motor, comprising an inclined disc substantially parallel with said first panel portion and provided with an annular inclined peripheral flange adapted to throw a spray, said second portion of the panel being arranged in the path of part of said spray below the spray producer at an angle to the path of the spray.

12. In a structure of the class described, a casing having an air passage, provided with eliminator plates for causing the air to follow a tor-

tuous path, a deflector plate above the plates, means for directing a spray of water across the path of the air to the plates and toward the deflector plate, a water reservoir, means for draining water from the deflector plates to the reservoir, said first means comprising a rotating disc inclined from vertical having an annular peripheral flange adapted to throw a spray of water in a plane approximately intersecting the deflector plate, means for supplying water to the back of the disc from the reservoir including a control valve, an inclined shelf member below the disc, positioned to be struck by the spray at an angle and to drain into the reservoir, a pump supported on said panel and operatively connected with said motor and adapted to discharge water against said spray portion.

13. In a structure of the class described, a casing having an air passage, provided with eliminator plates for causing the air to follow a tortuous path, a deflector plate above the plates, means for directing a spray of water across the path of the air to the plates and toward the deflector plate, a water reservoir, means for draining water from the deflector plates to the reservoir, said first means comprising a rotating disc inclined from vertical having an annular peripheral flange adapted to throw a spray of water in a plane approximately intersecting the deflector plate, means for supplying water to the back of the disc from the reservoir including a control valve, an inclined shelf member below the disc, positioned to be struck by the spray at an angle and to drain into the reservoir, and adjustable means for supporting said motor support independently of the casing.

14. In a structure of the class described, a casing having an air passage, provided with eliminator plates for causing the air to follow a tortuous path, a deflector plate above the plates, means for directing a spray of water across the path of the air to the plates and toward the deflector plate, a water reservoir, means for draining water from the deflector plates to the reservoir, said first means comprising a rotating disc inclined from vertical having an annular peripheral flange adapted to throw a spray of water in a plane approximately intersecting the deflector plate, means for supplying water to the back of the disc from the reservoir including a control valve, an inclined shelf member below the disc, positioned to be struck by the spray at an angle and to drain into the reservoir, a valve for controlling the flow of water from the pump, and a control rod extending from the valve to the outside of said casing.

15. In a structure of the class described, a casing having an air passage, provided with eliminator plates for causing the air to follow a tortuous path, a deflector plate above the plates, means for directing a spray of water across the path of the air to the plates toward the deflector plate, a water reservoir, means for draining water from the deflector plates to the reservoir, said first means comprising a rotating disc inclined from vertical having an annular peripheral flange adapted to throw a spray of water in a plane approximately intersecting the deflector plate, means for supplying water to the back of the disc from the reservoir including a control valve, an inclined shelf member below the disc, positioned to be struck by the spray at an angle and to drain into the reservoir, said panel forming one wall of said water reservoir, said reservoir being adapted to supply water to the pump, an intake

pipe leading to the reservoir, a float control valve for controlling flow of water through said pipe into the reservoir.

16. In a structure of the kind described, a casing
 5 having an air passage, a series of eliminator plates in the passage, means for discharging a spray of water across the path of air which travels through the plates, means for conducting part of the spray
 10 to the plates, additional means for supplying water to the eliminator plates, means for automatically controlling the discharge of water by the first means, according to the humidity of the air.

17. In a structure of the kind described, a casing having an air passage, a tier of eliminator plates in the passage arranged to discharge successively upon each other, means for discharging
 80 a spray of water across the path of air approaching the plates, means for conducting part of the spray to the plates, additional means for supplying water to the upper eliminator plate, means for automatically controlling the discharge of water
 85 by the first means, according to the humidity of the air, and a control for regulating the volume of flow from the third means.

JOHN W. NORRIS.

15

90

20

95

25

100

30

105

35

110

40

115

45

120

50

125

55

130

60

135

65

140

70

145

75

150