

Sept. 25, 1962

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3,055,066

AIR DEODORIZING APPARATUS

Filed Aug. 21, 1959

3 Sheets-Sheet 1

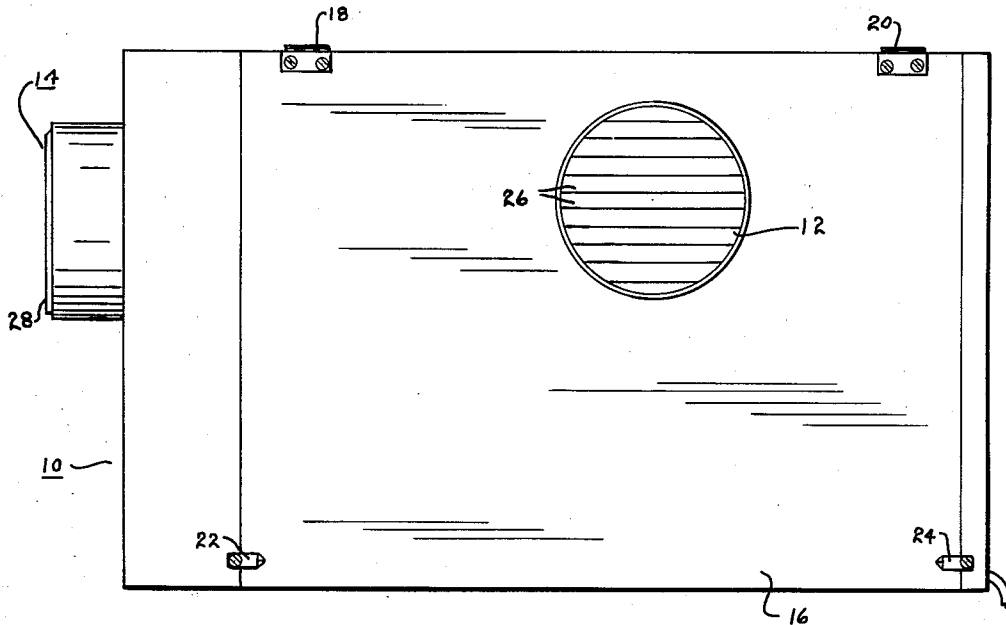


FIG. 1

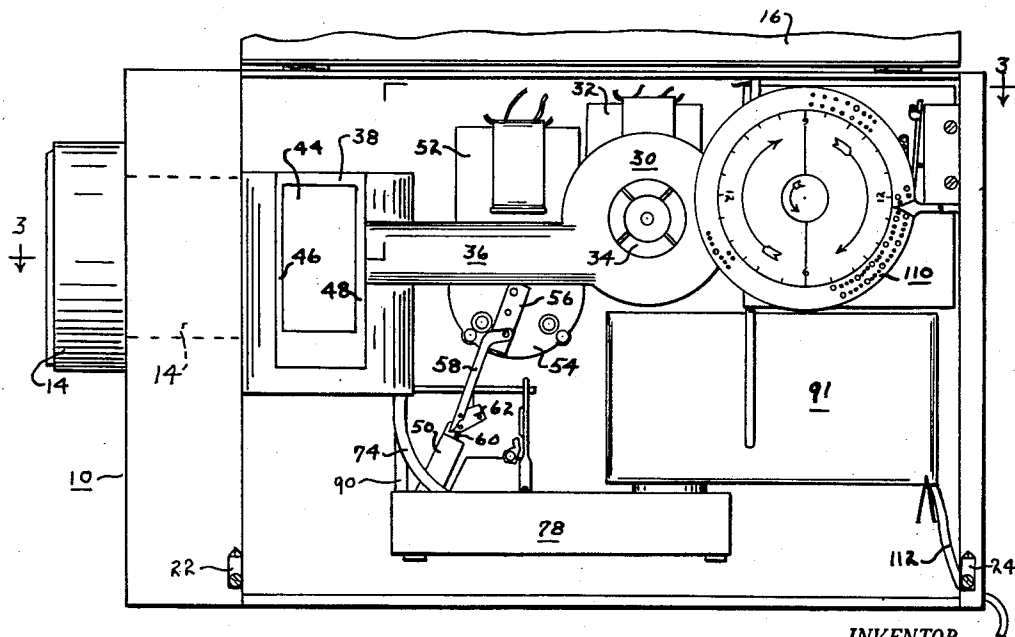


FIG. 2

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3 Sheets-Sheet 2

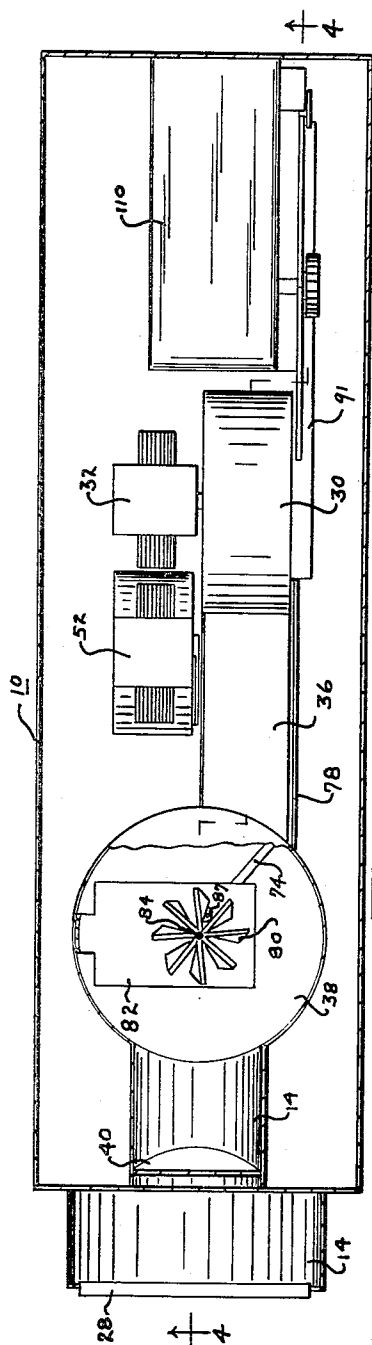


FIG. 3

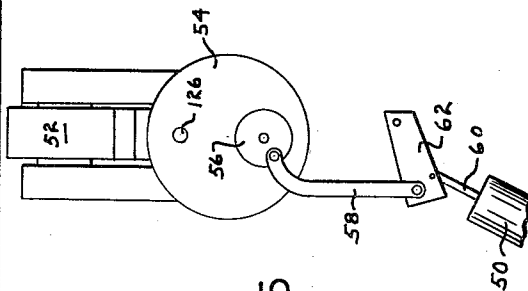


FIG. 5

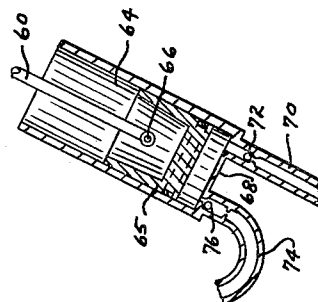


FIG. 6

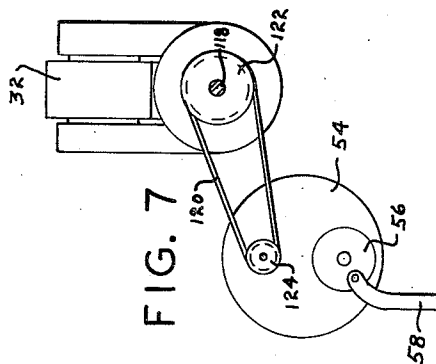


FIG. 7

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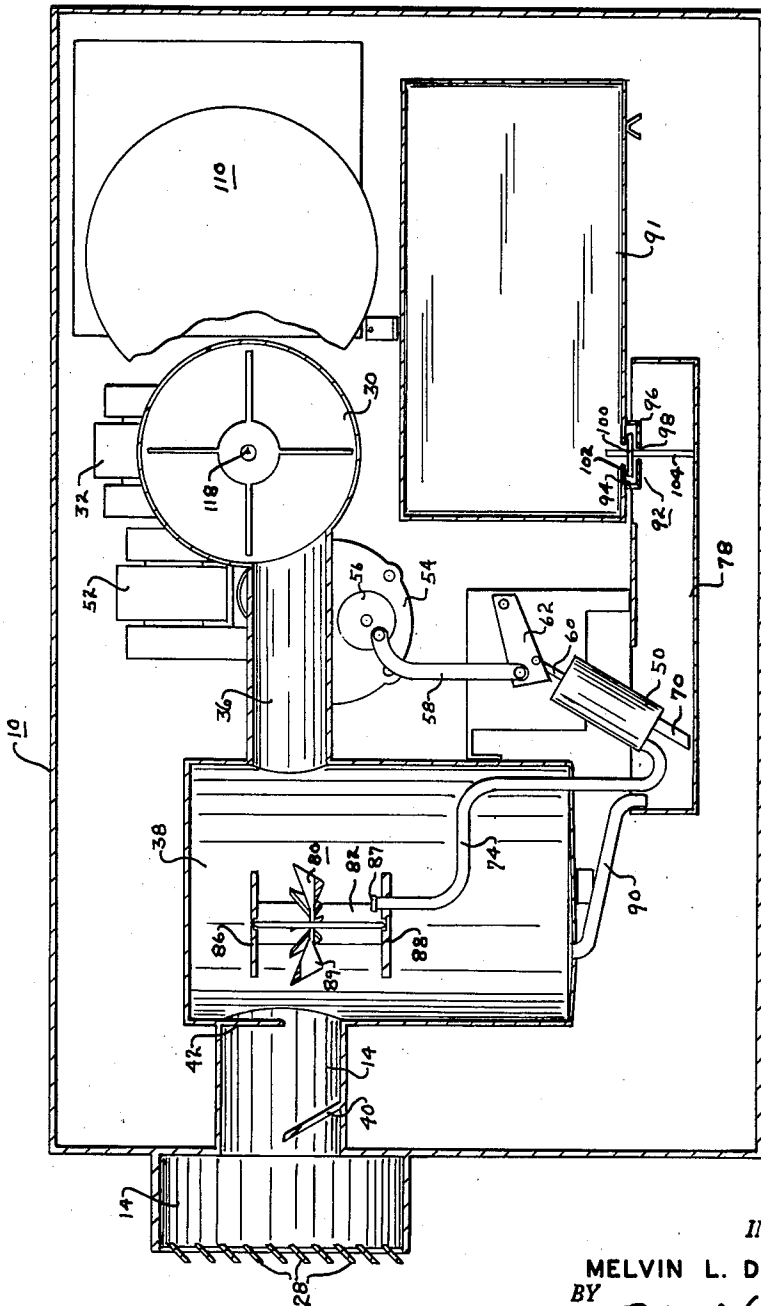
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3 Sheets-Sheet 3



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AIR DEODORIZING APPARATUS

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7 Claims. (Cl. 21-74)

The present invention relates to an air conditioning system and more particularly to an apparatus for deodorizing air in a confined area.

One of the principal objects of the present invention is to provide an air deodorizing apparatus which circulates air in a room or other confined space injecting the deodorant into and distributing it thoroughly throughout the space and which utilizes a liquid deodorant, metering the liquid, and then dispersing it in an air stream in an easily vaporizable form.

Another object of the invention is to provide an apparatus which quickly and efficiently converts a liquid deodorizer into a gaseous state and discharges the vaporized material into a confined space in a recirculating air stream.

Still another object is to provide a portable compact air deodorizing apparatus which can be placed in wash rooms, rest rooms, locker rooms, storage spaces, basements and similar places by merely plugging in an electrical cord, and which will operate either continuously or intermittently as desired over long periods of time without attention, and which can easily be serviced and supplied with the liquid deodorant on a predetermined schedule.

A further object of the invention is to provide an apparatus of the aforesaid type which can be placed temporarily in spaces requiring deodorizing under special or emergency conditions and provide under positive control the required deodorizing material for a selected period of time.

Additional objects and advantages will become apparent from the following description and accompanying drawings, wherein:

FIGURE 1 is a side elevational view of my air deodorizing apparatus in operating condition;

FIGURE 2 is a side elevational view of the air deodorizing apparatus shown in FIGURE 1, with the door used in servicing the apparatus held in open position;

FIGURE 3 is a horizontal cross sectional view of the deodorizing apparatus taken on line 3-3 of FIGURE 2;

FIGURE 4 is a vertical cross sectional view of the apparatus shown in the preceding figures taken on line 4-4 of FIGURE 3;

FIGURE 5 is an elevational view of the power mechanism for delivering the liquid deodorizing material to an air stream;

FIGURE 6 is an enlarged vertical cross sectional view through a pump forming a part of the power delivery mechanism shown in FIGURE 5; and

FIGURE 7 is an elevational view showing a modification in the present apparatus.

Referring more specifically to the drawings, the present air deodorizing apparatus is contained in a housing 10 rectangular in shape and having an air inlet port 12, air deodorant outlet conduit 14 and a service door 16 suspended by two hinges 18 and 20 at the top from a portion of the housing and held in closed position by two turn buttons 22 and 24. A handle for carrying the apparatus may be attached to the top so that it can be readily moved from place to place with one hand. Air inlet port 12 is preferably provided with louvers 26 and a filter, and the discharge end of the outlet conduit 14 is provided with louvers 28 which can be adjusted to various positions to change the direction of the air stream leaving the conduit. The size and shape of the housing are not considered im-

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portant to the present invention; however, since the present unit is normally moved from place to place, suit case size and shape are desirable. In the present embodiment the housing forms the supporting structure for the operating parts contained therein and may be constructed of any suitable materials capable of providing a rigid structural support for the parts.

Air to be deodorized is circulated through the unit by a fan 30, the one shown being the centrifugal type, driven by a small electrical motor 32 to draw air inwardly through intake 34 in the end of the fan housing opposite the motor and to discharge air through an outlet conduit 36 into a mixing chamber 38 and thence outwardly through outlet conduit 14. Intake 34 communicates directly with the interior of the housing and is positioned in close proximity to air inlet port 12 so that the air entering the inlet port passes directly to the fan intake without circulating through the housing. The particular fan used and the exact location of the fan in the housing may be changed to different types and locations to suit requirements; however, the centrifugal fan is the preferred type. Conduit 36 discharges into chamber 38 slightly to one side so that turbulence is created in the air flow through the cylindrical mixing chamber, thus assisting in the atomization of the liquid deodorant and hence in the rapid vaporization of the liquid in the air. Baffles 40 and 42 are also provided in outlet conduit 14 to further assist in the complete atomization and vaporization before the material entrained in the air stream is discharged from the apparatus. In order to check the operation of the mechanism in the mixing chamber and to permit the chamber to be serviced and cleaned, a door closed by a sliding panel 44 held in place by tracks 46 and 48 is provided in the side wall of the chamber, this panel preferably being of glass or clear plastic so that the operation taking place in the chamber can be easily observed without opening the door.

In the present deodorizing apparatus, the deodorant is positively discharged into the air stream under pressure by a mechanism consisting of a pump 50 driven by a motor 52 through a gear reduction box 54, wheel 56, and rods 58 and 60, said rods being connected by a pivoted lever 62. The pump in this embodiment is a reciprocating piston type having a cylinder 64 with an open upper end and a piston 65 in the hollow interior connected to the lower end of rod 60 by a pin 66. The lower end of the cylinder is closed by member 68 and is connected with an inlet tube 70 having a check valve 72 therein and an outlet tube 74 having a check valve 76 therein. The lower end of tube 70 extends into a sump 78 which during the operation of the deodorizing unit is partially filled with the deodorizing liquid maintained at a substantially constant level.

Tube 74 connects the pump with chamber 38 and discharges the liquid from the pump into a diffuser wheel 80 rotatably supported in chamber 38 on a bracket 82 mounted on the internal wall of the chamber. The wheel is mounted on a vertical shaft 84 which is journaled at the top and bottom in bracket arms 86 and 88 and consists of a plurality of radially extending blades or vanes 89. Each blade is set at an acute angle from the horizontal plane so that the liquid ejected from the discharge end of tube 74 will impinge on the angularly arranged blades and be dispersed into small easily vaporizable droplets of liquid. As the liquid strikes the blades, the wheel is rotated by the force of the liquid and by the air stream from the fan. The discharge end of tube 74 is preferably provided with a nozzle 87 so that a small stream of liquid at high velocity impinges on the blade, the blades being so formed with relation to the jet from the nozzle that the jet strikes the rear side of the blades and is propelled upwardly within the chamber by the next succeeding blade.

This provides efficient dispersal on the small droplets in the air passing through the chamber and thus facilitates proper atomization and vaporization of the deodorant in the air stream discharged through conduit 14. Chamber 38 together with baffles 40 and 42 serves the function of removing and collecting any unatomized or unvaporized deodorant fluid from the air before it passes from the unit. This removed liquid is collected in the bottom of chamber 38 and returned to sump 78 by a tube 90 connected to the bottom of the chamber and extending to the sump.

Sump 78 is constantly replenished with liquid deodorant from a removable reservoir 91 consisting of a fully enclosed container with the exception of the combined inlet and outlet opening 92. The opening is provided with a neck 94 and screw cap 96, the latter having a hole 98 therein serving as a liquid outlet port when the container is in its inverted position, as shown in the drawings. A valve 100 is disposed between cap 96 and an inwardly extending flange 102 and is provided with a stem 104 which contacts the bottom of sump 78 when the reservoir is in operative position and permits the liquid to flow freely from the container. When the container is lifted from the position shown in the inverted position, i.e. with the opening down, valve 100 closes the opening and prevents the liquid in the container from being spilled while the container is being placed in and removed from its operating position in housing 10. When the container is to be filled, it is removed from the housing and turned to the position placing the opening at the top and the cap and valve are removed from the neck.

While the present apparatus can be controlled manually too, operating continuously until it is shut off by the operator or service man on periodic visits, it is preferably controlled by a timer which will permit the apparatus to operate at predetermined intervals of constant or varying periods. A timer is illustrated at numeral 110 and for the purpose of the present invention is considered to be of conventional or standard construction, adapted to be set by a service man to operate at selected times during the day or night. The times when the apparatus will operate and not operate as well as the length of the periods of operation and non-operation may be varied to satisfy requirements. The current for the motors is supplied by a cord 112 connected to the timer and thence by circuits between the timer and the two motors.

In the operation of the present apparatus, reservoir 91 is filled with deodorant liquid and mounted in the housing 10 in the position shown with valve stem 104 resting on the bottom of sump 78. Liquid flows from the reservoir through opening 92 until the liquid level in sump 78 rises to or slightly above the lower end of cap 96, thus closing hole 94 and preventing air from entering the reservoir and replacing the liquid. The liquid is maintained at this level throughout the normal operation of the apparatus as long as any liquid remains in the reservoir. When the timer turns the apparatus on, motors 32 and 52 become operative simultaneously, the former drawing air inwardly through inlet 12 and discharging it through conduit 36 into chamber 38 and then outwardly through conduit 14, and the latter motor driving pump 50 to discharge the liquid deodorant into chamber 38 against rotating wheel 80 where it is mixed with the air, vaporized and discharged with the air through conduit 14.

A modified construction of the present apparatus is shown in FIGURE 7 wherein the fan and pump are driven by the same electrical motor 32. In this form, the fan is driven directly from the motor through shaft 118 and the gear reduction box is driven through a belt 120 and pulleys 122 and 124 from the fan motor. As an alternative in a single motor embodiment, the fan may be driven directly from motor 52 through shaft 126 thus eliminating belt 120 and pulleys 122 and 124. Various other changes and modifications in the apparatus may be made without departing from the scope of the present invention.

I claim:

1. An air deodorizing apparatus, comprising walls forming a housing, an air inlet port in one wall of said housing and air outlet conduit through another wall of said housing, said conduit having oppositely disposed baffles therein, a vertically disposed cylindrically-shaped air-liquid deodorant mixing chamber, a wheel mounted on a vertical axle in said chamber and having a plurality of radially extending blades set at an acute angle from the horizontal plane, said chamber having an air inlet in the side and on substantially the same level as said wheel for directing the flow of air onto said wheel on a radial plane therewith and a mixture outlet in the side substantially opposite said air inlet and on substantially the same level as said air inlet connected to said outlet conduit, a centrifugal fan for drawing air from said inlet port and supplying it to said chamber inlet, an electrical motor for driving said fan, a sump for liquid deodorant, a reciprocating piston type pump for the liquid deodorant, a tube connecting said pump with said sump, a tube for connecting said pump with said mixing chamber, a nozzle on said tube for discharging the liquid deodorant against the side of said wheel at a point spaced from the axis thereof, an electrical motor for driving said pump, a drain conduit for returning liquid from said chamber to said sump, a reservoir for maintaining a substantially constant level in said sump, and a timing means for controlling the operation of said pump and fan.

2. An air deodorizing apparatus, comprising walls forming a housing, an air inlet port in one wall of said housing and air outlet conduit through another wall of said housing, an air-liquid deodorant mixing chamber, a rotatable wheel-like means mounted in said chamber having a plurality of radially extending angularly positioned blades, said chamber having an air inlet in the side and on substantially the same level as said wheel for directing the flow of air onto said wheel on a radial plane therewith and a mixture outlet in the side substantially opposite said air inlet and on substantially the same level as said air inlet connected to said outlet conduit, a fan for drawing air from said inlet port and supplying it to said chamber inlet, a sump for liquid deodorant, a reciprocating piston type pump for the liquid deodorant, a tube connecting said pump with said sump, a tube for connecting said pump with said mixing chamber, a nozzle on said tube for discharging the liquid deodorant against the side of said wheel at a point spaced from the axis thereof, a power means for driving said pump and fan, a reservoir for supplying liquid deodorant to said sump, and a timing means for controlling the operation of said pump and fan.

3. An air deodorizing apparatus, comprising walls forming a housing, an air inlet port in one wall of said housing and air outlet conduit through another wall of said housing, a vertically disposed cylindrically shaped air-liquid deodorant mixing chamber, a wheel mounted on a vertical axle in said chamber and having a plurality of radially extending blades set at an acute angle from the horizontal plane, said chamber having an air inlet in the side and on substantially the same level as said wheel for directing the flow of air onto said wheel on a radial plane therewith and a mixture outlet in the side substantially opposite said air inlet and on substantially the same level as said air inlet connected to said outlet conduit, a fan for drawing air from said inlet port and supplying it to said chamber inlet, a sump for liquid deodorant, a pump for the liquid deodorant, a tube connecting said pump with said sump, a tube for connecting said pump with said mixing chamber, a nozzle on said tube for discharging the liquid deodorant against the side of said wheel at a point spaced from the axis thereof, and a power means for driving said pump and fan.

4. In an air deodorizing apparatus, a vertically disposed cylindrically shaped air-liquid deodorant mixing chamber, a wheel mounted on a vertical axle in said

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chamber and having a plurality of radially extending blades set at an acute angle from the horizontal plane, said chamber having an air inlet in the side and on substantially the same level as said wheel for directing the flow of air onto said wheel on a radial plane therewith, an outlet conduit connected to said chamber outlet, a centrifugal fan for supplying air to said chamber inlet, a sump for liquid deodorant, a reciprocating piston type pump for the liquid deodorant, a tube connecting said pump with said sump, a tube for delivering the liquid deodorant from said pump to said chamber and discharging it against the side of said wheel at a point spaced from the axis thereof, a power means for driving said pump and fan, and a timing means for controlling the operation of said pump and fan.

5. In an air deodorizing apparatus, a cylindrically shaped air-liquid deodorant mixing chamber, a wheel in said chamber having a plurality of radially extending angularly positioned blades, said chamber having an air inlet in the side and on substantially the same level as said wheel for directing the flow of air onto said wheel on a radial plane therewith and a mixture outlet in the side substantially opposite from said air inlet, an outlet conduit connected to said chamber, a fan for supplying air to said chamber inlet, a pump for the liquid deodorant, a tube for delivering the liquid deodorant from said pump to said chamber and discharging it against the side of said wheel at a point spaced from the axis thereof, and a power means for driving said pump and fan.

6. In an air deodorizing apparatus, an air-liquid deodorant mixing chamber, a rotatable member in said

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chamber having a plurality of radially extending angularly positioned blades revolving in a horizontal plane, said chamber having an air inlet positioned to pass air about said member on a radial plane therewith and a mixture outlet, an outlet conduit connected to said chamber outlet, a fan for supplying air to said chamber inlet, a pump for the liquid deodorant, a tube for delivering the liquid deodorant from said pump to said chamber and discharging it against said rotatable member, and a power means for driving said pump and fan.

7. In an air deodorizing apparatus, air-liquid deodorant mixing chamber, a rotatable member disposed in said chamber and having spaced liquid contact elements thereon set at an angle, said chamber having an air inlet positioned to pass air about said member on a radial plane therewith and a mixture outlet, an outlet conduit connected to said chamber outlet, a fan for supplying air to said chamber inlet, and a means for supplying said chamber with liquid deodorant and discharging it onto the side of said rotatable member at a point spaced from the axis thereof.

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