

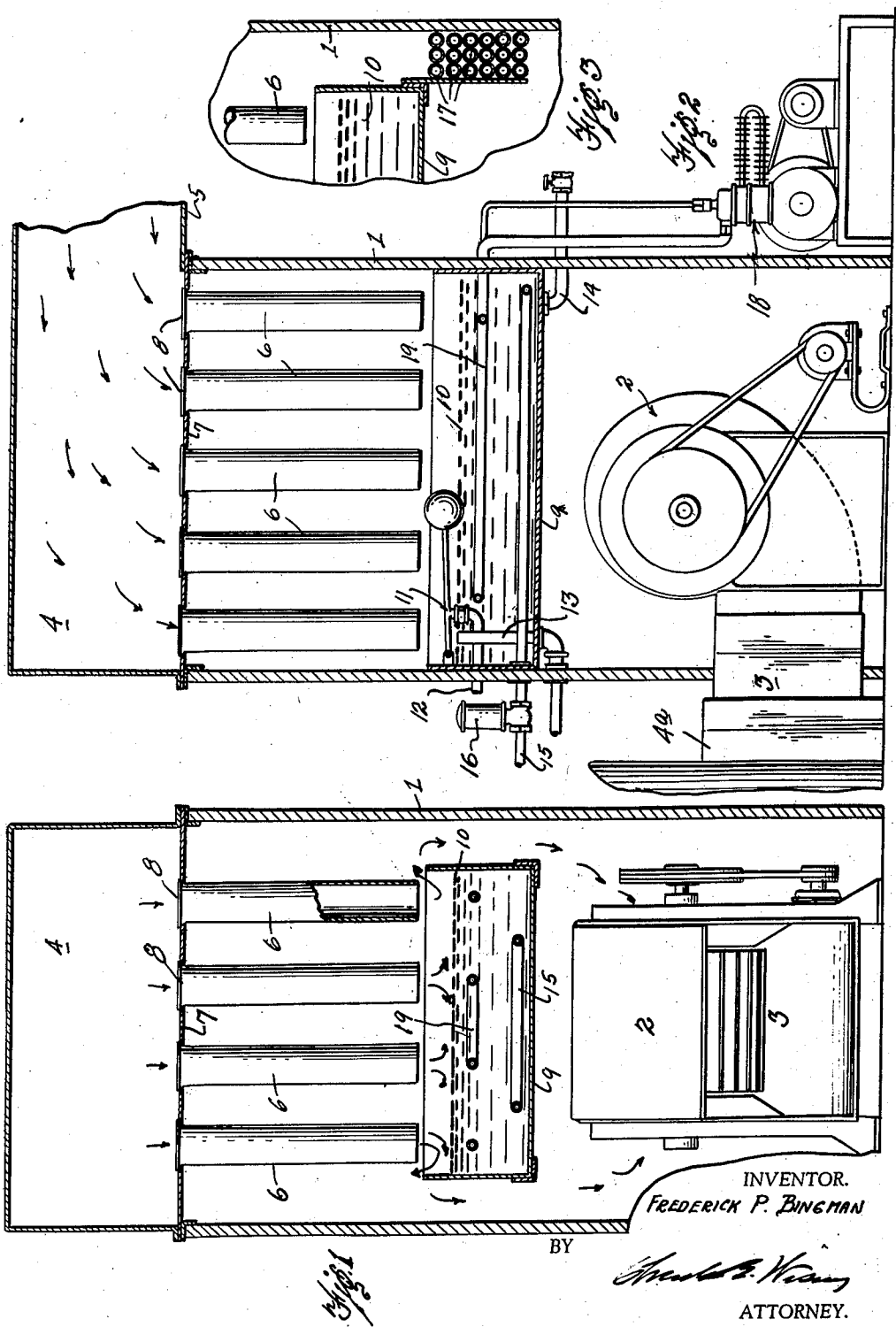
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AIR CONDITIONING APPARATUS

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AIR CONDITIONING APPARATUS

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The invention relates to air conditioning apparatus, the purpose being to provide a comparatively cheap and yet highly efficient device for maintaining proper condition of the air in a room in respect to its purity, in respect to its moisture content, and in respect to its temperature.

A feature of the invention is involved in the means provided for causing the dust particles to be removed from the air that is drawn from a room and returned thereto and a peculiar and primary feature of the invention is involved in the provision of a liquid body into which the dust particles are discharged and across the surface of which the air flows on its way to the room, and in the provision of means for heating and/or means for chilling the liquid whereby the moisture content and temperature of the air may be varied.

These and other features and objects of the invention are hereinafter more fully described and claimed, and the preferred form of construction of an air conditioning apparatus embodying my invention is shown in the accompanying drawing in which—

Fig. 1 is an elevation in partial section of an air conditioning apparatus embodying my invention.

Fig. 2 is a section in partial elevation taken from the right side of Fig. 1.

Fig. 3 shows an alternative form of construction adapting the device to be used as a heater or cooler.

The principal use of the invention is in the conditioning of air for the rooms of houses or other buildings and the air is drawn from the room or rooms, the dust particles removed, its moisture content and its temperature varied if desired and returned to the rooms.

A convenient form of construction of the apparatus includes a casing 1 in the bottom of which is provided a suction blower indicated generally at 2 which may be of any preferred construction taking its air from the casing and discharging the same through the outlet 3 which, by means of conduits 4^a may be carried to any part of the building and, although not here shown, branch conduits may be utilized. At the top of this casing is a chamber 4 which is the terminal of a conduit 5 leading from the room or rooms and through which air is caused to flow from the rooms into the casing by means of the blower 2 and returned to the rooms in clarified and tempered condition. In the upper part of the casing are provided tubes 6, 6 which for ordinary use in homes may be three inches in diam-

eter and these are supported in the bottom wall 7 of the chamber 4 and have what may be termed a bell mouth 8 to permit the air to draw readily into the tubes by reason of the suction of the blower. These tubes all terminate in the same plane and for home use are about eighteen inches in length. Just beneath the lower end of the tube 6 is positioned a receptacle 9 which is filled with a liquid indicated at 10, and the level may be maintained through operation of a float controlled valve 11 shown in Fig. 2.

The preferred liquid is water and the water inlet for the receptacle 9 may be provided by a pipe 12 in which the valve 11 is provided. An overflow pipe 13 is also provided to prevent overflow of fluid from the receptacle, the upper and open end of the pipe 13 determining the normal level of the liquid 10. For the purpose of cleaning the receptacle, a valved drain pipe 14 may be provided as indicated in Fig. 2.

A particular feature of the invention resides in the provision of the tubes 6, the discharge ends of which are quite closely adjacent to the surface of the liquid. By this arrangement, it will be observed that air passing through the tubes is discharged at a right angle against the surface of the liquid and in order that the dust particles may be discharged from the air it is necessary to secure comparatively high velocity of movement of the air. The high velocity of movement of the air in the tubes may be provided for by making the tubes of a combined cross sectional area less than the cross sectional area of the conduit 5 or chamber 4 or by the fan providing enough difference of pressure to produce the velocity required. The dust particles, due to their momentum, pass into the liquid while the air, as indicated by the arrows at the bottom of the tubes in Fig. 1, passes laterally along the surface of the liquid and thence over the top of the receptacle 9 and thence downward to the blower. It is this change in the direction of flow of air and the velocity of the dust particles which cause the air to be clarified and is important in that the arrangement provides for a practically complete removal of the dust particles from the air.

This feature of construction also provides a means for adding moisture to the air or removing moisture from the air.

The device so far described may be used purely as an air conditioning apparatus and in no way connected with or forming part of the heating or cooling apparatus of the building except to such degree as the temperature of the liquid may

be varied to either add or remove moisture from the air.

If it be desired to utilize the apparatus as part of the heating or cooling apparatus of a building or room, the air may be heated or cooled to some degree by the steam or water pipes 17 positioned in the space between the receptacle and the casing across which the air after passing from the liquid is required to pass to the fan. The pipes 17 (although not here shown) may be connected with any appropriate device for causing hot or cold water, or steam to flow therethrough. Thus the device may be connected with any of the ordinary steam or hot water plants in use and the air heated by my improved apparatus, discharged to a room, withdrawn, purified and returned to the room. Thus for winter service the device may conveniently form a part of the heating apparatus. For summer use the device may be utilized to reduce the temperature of the air of a room by the use of cold water in the coils.

By the addition of a refrigerating apparatus indicated generally at 18 in Fig. 2, the cold coil 19 of which is positioned in the liquid in the receptacle 9 the temperature of the liquid may thereby be reduced making a condensing surface which will de-humidify the air. The air passing through the tubes 6 and in striking the surface of the liquid and the flowing thereacross will tend to give up part of its moisture content and will be discharged in a cooler and drier state to the room by means of the blower as heretofore described and, if necessary and to increase the cooling effect, the coils 17 may have a cold fluid circulated therethrough although this latter expedient may be unnecessary for the smaller homes. It is possible to heat the liquid in the receptacle 9 to a temperature above the wet bulb temperature of the entering air to thereby increase its humidity. This may be accomplished by a hot water coil 15 with which is associated a humidistat 16. From the foregoing it will be evident that the device is comparatively simple and inexpensive in construction and highly efficient in operation particularly due to the manner in which the air is freed of its dust particles, and the air discharged to the room is what may be termed "washed" air. Further that the device may be used in conjunction with a heating or a cooling apparatus in order to humidify or de-humidify the air, and that the various objects of the invention are attained by the construction described.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In an air conditioning apparatus, a casing, a conduit leading therefrom to a room and a conduit leading thereto from a room, an exhaust blower for causing movement of air to the room and back to the apparatus in a continuous circuit, means in the casing for removing dust particles from the air, comprising a receptacle within the casing containing a body of liquid, means for maintaining a practically constant level of liquid in the receptacle, a series of tubes through which the air withdrawn from a room is discharged, the combined cross sectional area of the several tubes being less than the cross sectional area of the conduit leading thereto whereby the air passes through the tubes under comparatively high velocity, said tubes being positioned with the discharge end thereof ad-

jacent the surface of the liquid whereby due to the velocity of movement of the air and the momentum of the particles of dust the said particles enter the liquid and the air passes laterally therefrom along the surface of the liquid to the blower, and means for varying the temperature of the liquid in the receptacle.

2. In an air conditioning apparatus, a casing, a conduit at the bottom thereof leading therefrom to a room, a conduit leading to the top thereof from a room, an exhaust blower in the lower part of the casing for discharging air from the casing through the conduit leading to the room, a series of tubes in the upper part of the casing providing an outlet for the conduit leading from the room, a receptacle containing a body of liquid, the surface of which is positioned adjacent the discharge end of the tubes whereby air is driven vertically against the horizontal surface of the liquid by operation of the blower to cause the dust particles to enter the liquid and the air to flow laterally across the surface of the receptacle and thence to the blower, and means for cooling the liquid to thereby reduce the humidity of the air through condensation of its moisture content.

3. In an air conditioning apparatus, a casing, a conduit at the bottom thereof leading therefrom to a room, a conduit leading to the top thereof from a room, an exhaust blower in the lower part of the casing for discharging air from the casing through the conduit leading to the room, a series of tubes in the upper part of the casing providing an outlet for the conduit leading from the room, a receptacle containing a body of liquid, the surface of which is positioned adjacent the discharge end of the tubes whereby air is driven vertically against the horizontal surface of the liquid by operation of the blower to cause the dust particles to enter the liquid and the air to flow laterally across the surface of the receptacle and thence to the blower, and means for heating the liquid to a temperature above the wet bulb temperature of the entering air to thereby increase its humidity.

4. In an air conditioning apparatus, a casing, an outlet conduit leading from the bottom of the casing to a room, an inlet conduit leading thereto from a room, an exhaust blower taking air from the casing and discharging to the outlet conduit, a series of tubes in the casing between the inlet and the blower and through which the air from the inlet conduit passes, a receptacle within the casing and containing a body of water, said receptacle having at least one wall thereof spaced from the wall of the casing and being positioned between the inlet and the outlet, the surface of the water being at a right angle to the longitudinal axis of the tubes and the arrangement providing a means for causing the dust particles to enter the water and the air to flow laterally thereacross and thence through the space between the casing and the receptacle to the blower, the arrangement of the tubes and water providing means whereby the humidity of the air may be varied.

5. In an air conditioning apparatus, a casing, a conduit at the bottom thereof leading therefrom to a room, a conduit leading to the top thereof from a room, an exhaust blower in the lower part of the casing for discharging air from the casing through the conduit leading to the room, a series of tubes in the upper part of the

casing providing an outlet for the conduit leading from the room, a receptacle containing a body of liquid, the surface of which is positioned adjacent the discharge end of the tubes
5 whereby air is driven vertically against the horizontal surface of the liquid by operation of the blower to cause the dust particles to enter the liquid and the air to flow laterally across the surface of the receptacle and thence to the
10 blower, means for cooling the liquid to thereby reduce the temperature of the air, means for heating the liquid, and means for heating the air as it passes from the liquid.

6. In an air conditioning apparatus, a casing,

a receptacle extending transversely of the casing and spaced from the side walls thereof, a blower in the bottom of the casing for discharging air therefrom, a series of vertical tubes in the top of the casing having their discharge
5 ends adjacent the horizontal surface of the liquid whereby air caused to flow therethrough by the blower is discharged directly against the surface of the liquid to cause the dust particles of the air to enter the liquid and permitting the
10 air to pass laterally across the surface of the liquid and thence to the blower.

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