

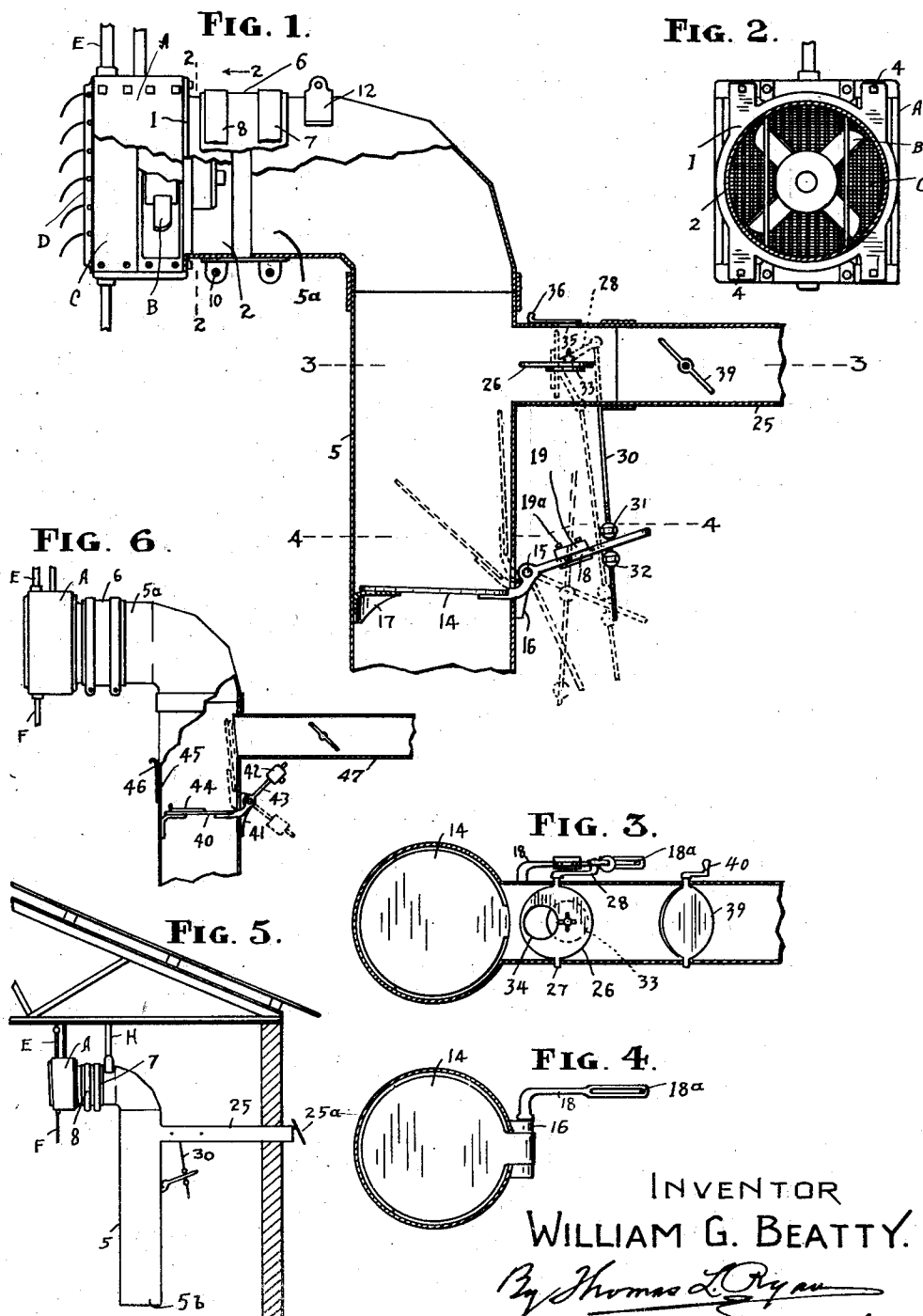
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AIR CONDITIONING APPARATUS

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AIR CONDITIONING APPARATUS

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That improved breathing conditions in interiors provided with warmed air may be had, there has long been the problem of the maintenance of equability of the temperature, and of the wholesomeness of the air. In describing and illustrating the present invention, and which is practiced in connection with means for the warming and circulating of the air, reference is made to a device of this kind which is known as a heater unit. It comprises a fan blower, a radiator operable by steam or hot water or by any other suitable means, and through which said radiator the air is passed and by which it is warmed, and deflector elements whereby the stream of air, as it passes from the radiator, is deflected in the direction desired.

Whereas it is practicable, by the use of a device of the above description, to warm the air and to deflect the flow thereof, and whereas it is also possible by the use of a recirculator duct in connection with said heater unit, to recirculate the air; an advantage as yet unattained is that of being able to recondition the air of the interior without materially varying the temperature thereof, and without having draughts or other disturbances to contend with.

The importance of this sought for advantage is apparent when it is realized that shifting currents of cold air, underheated air, or overheated air, are contributory to mental and physical discomfort, sickness, ill health and even disease.

The general objects of this invention are to provide means in combination with a heater unit of the type above referred to, or of any type wherein the air is passed, either by the force of propulsion or by induction, whereby recirculation of the air may be had, and whereby there may be at the same time an intake of fresh air in a constant flow, and of a predetermined amount, and also whereby such control of said inflow of the fresh air is had that the reconditioning of the air,

either by the circulation and recirculation thereof, or by the complete changing of same, may be accomplished without any considerable fluctuation of the temperature of the interior, and without the creation of any draughts or disturbing air currents.

The above named general objects as well as more specific purposes of my invention as they will presently appear, are accomplished by the new construction, combination and arrangement of parts described in the following specification and illustrated in the accompanying drawings.

The several parts of the invention are identified by suitable characters of reference applied to them in the different views in the drawings, in which—

Figure 1 is a side view of an embodiment of my invention of form suitable for use in connection with a heater unit of well known construction. In this view, portions of the walls of the ducts are broken away, disclosing to view the several interior parts of the device.

Figure 2 is a transverse cross section view taken on the line 2—2 and in the direction of arrow 2 in Figure 1.

Figure 3 is a sectional top plan view taken on the line 3—3 in Figure 1.

Figure 4 is a sectional top plan view taken on the line 4—4 in Figure 1.

Figure 5 is a view showing my invention in a typical form of construction and installation, suitable where the heater unit is supported at a height near the roof truss portion of the building.

Figure 6 is a modification.

My invention broadly stated, contemplates the combination with a heater unit, of a circulation duct to communicate therewith, an inlet duct opening into said circulation duct, devices operable in connection with the said ducts whereby one of said ducts is closed and the other of said ducts is opened. A preferred embodiment for carrying my inven-

tion into effect consists of a valve in the circulation duct arranged to repose normally in seated closed position and which is operable, by the suction in said duct, to open position, a valve in the inlet duct to repose normally at open position, and connections between the said valves whereby the valve in the inlet duct is operated simultaneously with the valve in the circulation duct. I also contemplate having a second valve in the inlet conduit, which may be manually operated and which is independent of other valves.

By this combination and arrangement of parts there is provision for, and the affording of, a flow of fresh air directly to the heater unit, in such measure as may be desired, also the control of said flow during all of the stages of the warming of the air content and the passing of the same through the said heater unit.

The heater unit in connection with which my invention is shown, comprises the usual frame A, a blower B, a condenser and radiator C, and the deflector plate D, all of which are retained in the assembled relation as shown in Figure 1. Steam or hot water is operated through the pipes E and F.

The unit shown is thirty-two inches in height, and has a capacity (with steam pressure five pounds per square inch and entering air temperature at twenty degrees) of 2890 cubic feet per minute. The unit is adapted to be supported at such location as may be desired, by suitable supports, as shown in Figure 5.

In my new construction I provide a flange 1 having the circular neck 2. It is provided with holes so spaced that it may be readily secured to suitably threaded studs 4 provided therefor on the unit frame to which it is to be fastened. The duct 5, which may be either circular or angular in cross section, and preferably is made of sheet steel for a heater unit of the kind and size above referred to is about twenty-seven inches in width. The outlet end 5a of this duct is provided with a coupling sleeve 6. This sleeve, made of metal or of flexible material, such as leather composition, or canvas, may be secured to the rim of said duct by a clamping band 7, or by rivets. The free end of the said sleeve, when it is disposed in engagement with the neck 2, is fastened thereto by a constrictory band 8, the ends of which are drawn and are secured by a bolt 10. A lug 12 which is provided on said duct, is adapted to receive connections for a supporting element H, which is fastened to some part of the building structure.

Located inside, and at a suitable distance from the outlet end of said circulation duct 5, is a valve 14 which is pivoted at its side on a cross pin 15 of a lug 16, that is secured to the wall of the duct. The said valve, reposing at the closed position rests with its free end on a suitable seat 17. Extending

from said valve 14 is an arm 18 which has a longitudinal slot 18a. A weight 19 having a set screw 19a is capable of being retained on said arm at positions so adjusted that the valve 14 is balanced, and thereby is responsive to the suction force present in the duct.

Communicating with the said circulation duct 5 is an inlet duct 25. A valve 26, having lateral pintles 27 journaled in the walls of said duct 25, has a crank arm 28. Power transmitting connections between the valves 14 and 26 are as follows: a connecting member 30, which has pivotal connection with the arms 18 and 28, and whose threaded free end rests loosely in the slot 18a, is retained in such position in connection with the said arms, by rounded nuts 31 and 32, that when the valve 14 is at closed position the valve 26 is at open position, as shown in Figure 1 and Figure 3. Variation of the position of incline of the valve 26 may be had by adjusting the said nuts 31 and 32. It will be understood that by providing an arrangement for balancing the valve 26, a chain connection could be used instead of a connecting rod 30. A damper 33 is provided on the valve 26, and it is capable of being moved to and retained at different positions to vary the size of the opening 34 in said valve 26. An aperture 35 in the wall of the duct 25, and which is closed by a plate 36, affords access to the said damper 33. A valve 39 is positioned in the inlet duct and is operable by a handle 40 provided therefor. Its function will be presently referred to.

Whereas my invention is shown in a form of embodiment preferred for, and as especially adaptable to, a heater unit of the type and capacity shown, it will be understood that minor changes may be made in the structural features, to render the invention practicable in connection with heater units of other kinds, without departing from the spirit of the invention or sacrificing any of its advantages. The invention lends itself to practicable use to suit requirements of wide range. The circulation duct may be disposed in such alignment, either vertically or at an angle, and it may be of such length, as the air conditioning requirements may suggest. The inlet duct may enter the circulation duct at such location as may be proper, and it is extended to a source of fresh air supply or to the fresh air outside the building. It may be provided with a suitable head 25a, as shown in Figure 5.

The invention installed, appears as shown in Figure 5. Recirculating air of the interior is flowing through duct 5, and fresh air is flowing through the duct 25. This condition is present whether the blower is, or is not, in operation. It will be understood that in the use of heater units generally there is practiced the control of the power that actu-

ates the blower, either by manual, or by mechanical means.

When the room temperature will have become lowered and the blower is set in operation, the suction induced in the duct 5 causes the valve 14 to rise to open status, the valve 26 being moved to nearly closed status. With this functioning of the valves, there is increase of flow of air circulated through duct 5 and the heater, and at the same time the flow of fresh air is sufficiently impeded to avoid an over supply thereof. When the temperature will have been raised to the desired degree, the fan operation ceases and the valves (balanced as hereinbefore described) are automatically returned to their initial positions, as shown in Figure 1.

For interiors such as those of hatcheries and the like, in which are required the supplying of fresh air without inducing of air currents or draughts, and which also require periodically the complete changing of the air content, my invention is especially effective. In expelling of air from interiors, through open doors or by positive means such as by an exhaust fan or fans, the temperature of the room becomes lowered. Coincidentally with such lowering of the temperature, the fan blower resumes operation, either automatically or by manual control.

Now to obtain the maximum efficiency afforded by my invention, the damper 35 of the inlet duct is set so as to provide a passway area of measure in suitable relation to the measure of the outgoing or exhausting flow of air from the room interior. By the damper 33, the area of the opening 34 of valve 26 may be varied in conformity with the intensity of the suction force that is operating through duct 5, whereby to assure a constancy in the velocity of the fresh air flow.

By my invention there is at all times assured the travel of the fresh air directly toward and into the heater unit. Coincidentally with decreasing energy of the suction there is the closing action of the valve 14. Whereas during this phase there is a less impeded flow of the fresh air, the valve 14 in its action of partially closing, or completely closing the duct, effectually overcomes any tendency of the fresh air to move downwardly as it passes from the inlet duct 25.

It will be understood that the invention is not limited to an embodiment precisely as shown, as obviously the circulation duct may be disposed at such angle with relation to the heater unit, and its intake portion 5b may be at such location and height, as conditions may suggest to the engineer. The ducts may be conventional, within certain limitations, as to form and dimension, and, by providing the damper 35, which is adapted to be set at desired adjusted positions, it renders practicable the adaptation of my invention to varying needs of differentiating local air condi-

tion requirements, without making any changes necessarily of any of the parts.

In installations where variation in the velocity of the suction operating through duct 5 is not of the wide range which is present in interiors of larger areas, the modification shown in Figure 6 is suggested. In this modification the valve 40, which is pivoted at one side on a cross pin bearing 41, and counter balanced by a weight 42 retained adjustably on the arm 43, is provided with a damper 44 therein. An aperture 45 provided in the wall of the duct, and closed by a movable closure plate 46, affords access to the damper 44 for the purpose of setting same in the desired adjusted position. The valve 40 is so positioned with relation to the inlet duct 47 that as it rises toward the dotted line position as shown in Figure 6, it impedes the velocity of the fresh air flowing through the duct 47.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In combination with a heater unit, a circulation duct, a valve in said duct which is retained by gravity normally closed, but which by the force of suction in the circulation duct is operable to open position, a fresh air inlet duct opening into said circulation duct, a valve in the inlet duct adapted to repose normally at open position, and power transmitting connections between said valves whereby the valve in the inlet duct is moved to closed position when the valve in the circulation duct is moved to open position.

2. The invention as defined in the preceding claim numbered 1, plus a damper in the valve of the inlet duct.

3. In air conditioning apparatus, the combination with a heater unit adapted to have air passed therethrough either by propulsion or by induction, a circulation duct communicating with said heater unit, a fresh air inlet duct opening into the circulation duct, a valve in said circulation duct to retain the duct normally closed, an arm extended from said valve, a valve pivotally retained in the inlet duct, and balancing devices for, and connections between said valves, whereby said valves are operable by the force of the suction in said circulation duct.

4. In combination with a heater unit and a blower device to propel the air therethrough, an upright circulation duct, a valve in said duct which is retained by gravity normally closed but which by the force of suction in the circulation duct is operable to open position, a fresh air inlet duct opening into the circulation duct at a level above that of the said valve, a valve in the inlet duct adapted to repose normally at open position, balancing devices for and connections between the said valves whereby the valve in the inlet duct is moved to closed position when the valve in the circulation duct is moved to open position.

5. In combination with a heater unit and a blower communicating therewith a circulation duct, a fresh air duct entering the circulation duct, gravity balanced means in the circulation duct at a level below the level of the said fresh air duct and having communication with the fresh air duct, to maintain the circulation duct normally closed, and which said means is operable to open the circulation duct, and to partially close the fresh air duct.

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