

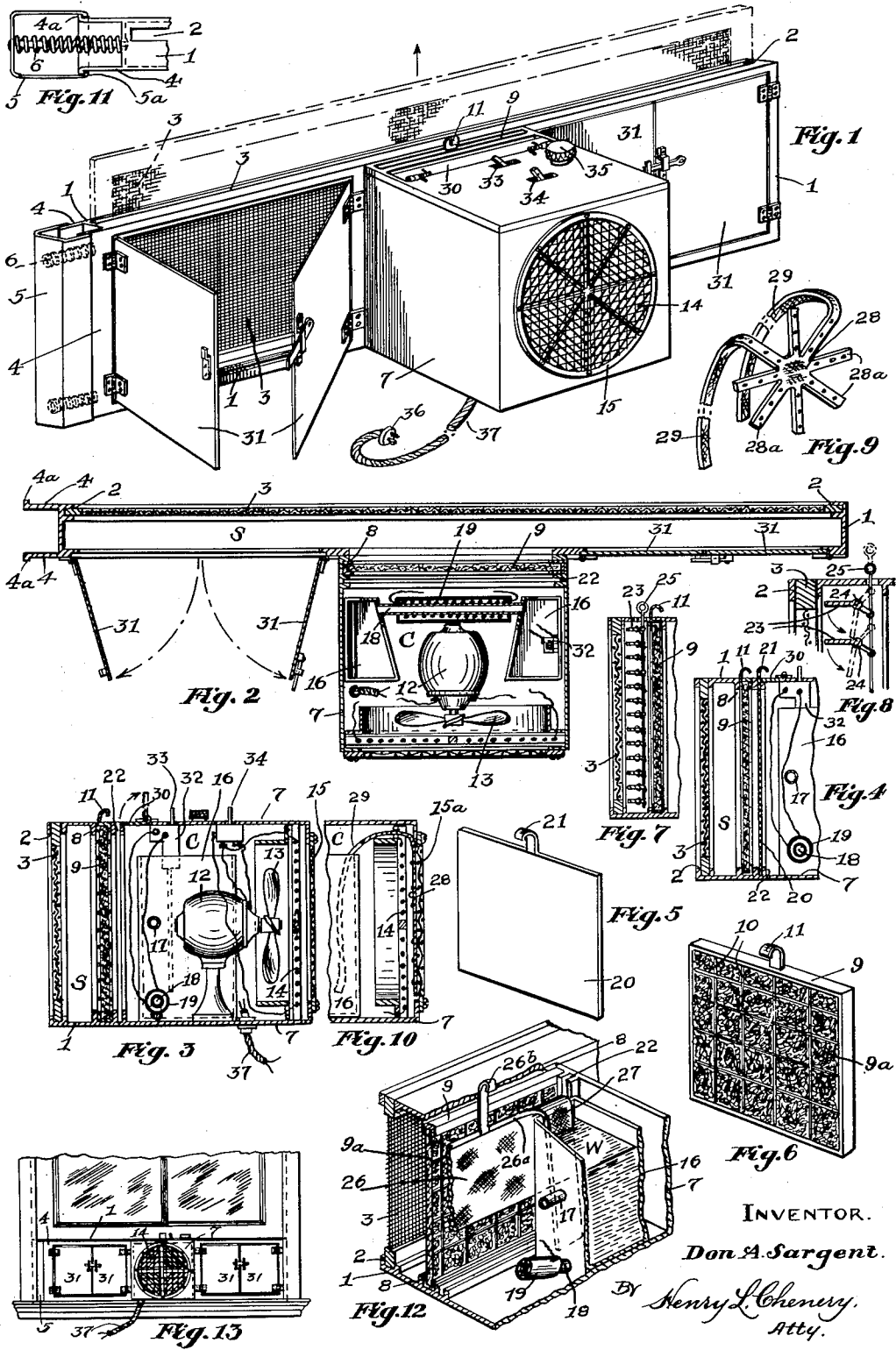
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VENTILATING AND AIR CONDITIONING APPARATUS

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VENTILATING AND AIR-CONDITIONING APPARATUS

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The invention hereinafter to be described relates, in general terms, to apparatus for ventilating the rooms of dwelling houses and hospitals, offices, public meeting places and other enclosed spaces in which the air requires frequent changing.

In the past it has been thought sufficient for ordinary ventilating purposes to simply conduct outside air into the room, either by natural or forced draft, and until recently it would appear that due consideration has not been given the fact that even the outside atmosphere is not pure but more often than not, laden with foreign matter suspended in it, making it deleterious to one's health to breathe it.

As an example, during certain seasons of the year those who suffer from such diseases as asthma and hay fever aggravate their trouble by breathing the pollen from certain plant life, and populations residing in urban districts seldom breathe air which is clean and free from dust and fumes disseminated from industrial plants and automobiles.

It has therefore been uppermost in my mind in conceiving the present invention to provide an apparatus by means of which not only fresh air but air cleaned and filtered might be supplied to any of these interiors, and in conjunction with filtered air to provide means whereby the air could be humidified and medicated when required, and further to provide facilities to either cool or warm the air as it passes into the room.

Medical authorities now highly recommend humidifying the air in all living quarters as a preventative of grippe and influenza, and in a sick room a deodorant or disinfectant circulated through the air of the room is a quite necessary procedure in the routine work of the nurse. The apparatus performs these two operations automatically.

Briefly, my invention contemplates a structure comprising a screened box insertable in a window frame beneath the lower sash, with doors opening from the inside face of the screen-box to permit air, under certain conditions, to pass directly from the outside to the interior of the room; an air-conditioning box extending into the room from the

screen-box and containing an air-filtering element, a tank for water, a motor-driven fan and an air-heating unit.

With the foregoing are provided controls for regulating the operation of the various elements, as for instance, the fan may be driven simultaneously with the air-heater, or it may be operated alone. The humidifier may function only at such times as the proper switch is thrown on, and if sufficient draft from the outside air is present, the actuating elements of the apparatus may be entirely stopped and the air passed through the filtering element into the room naturally.

For a better understanding of the character of the invention reference should be had to the detailed description found in the following specification, taken in connection with the accompanying drawing disclosing an embodiment which, at the present time, I consider preferable to other possible forms in which the invention might be carried out.

In the drawing—

Fig. 1 is a view of the apparatus, in perspective;

Fig. 2 is a sectional plan view of the same;

Fig. 3 is a transverse sectional elevation through the screened and air-conditioned boxes;

Fig. 4 is a fragmentary sectional elevation showing particularly the air-cut-off slide;

Fig. 5 is a view of the air-cut-off slide;

Fig. 6 is a view of the air-filtering element;

Fig. 7 shows a shutter as an alternative method of cutting off the air from the air-conditioning box;

Fig. 8 is an enlarged detail view of a portion of the shutter shown in Fig. 7;

Fig. 9 is a perspective view of one of the capillary elements employed to procure certain results in the operation of the apparatus;

Fig. 10 shows the element, illustrated in Fig. 9, in position in the apparatus;

Fig. 11 is a plan view of the telescopic end of the screened box;

Fig. 12 shows another capillary element employed in the operation of cooling the air, and

Fig. 13 is a front view of the apparatus installed in a window frame.

Similar reference characters denote like parts in all the different views of the drawing.

Referring to the drawing, 1 is a relatively long and narrow box, in a slide-way 2 of which is located a screen 3 which is removable for cleaning or repair.

The box 1 has extended sides 4 over which operates the extension channel member 5. A spring 6 acts to thrust the member 5 from the screen box but upon compressing it allows the apparatus to be placed in the groove of a window frame.

The box 1, with the yielding element 5 mounted on one or both ends thereof, is preferably supplied in lengths of standard width window frames. However, in certain cases, where these widths are greater than standard I provide lengthening elements, or adapters, of conventional design which are positioned between the extensions 4 of the box and the yielding element 5, the latter being employed in all instances. The telescoping construction may be carried out on both ends of the screen box if desired. Stops 4a and 5a prevent complete longitudinal withdrawal of the members 5 from off the extended sides 4.

Extending from the indoor side of the box 1 is a rectangular shaped air-conditioning box 7 within which and adjacent the box 1 is a slide-way 8 in which is mounted a frame 9 containing a relatively thick pad of mineral wool 9a, the small strands of which are curled and twisted into a somewhat compact but spongy and perforate mass, the interstices permitting air to weave through in irregular courses through the pad, depositing on the wool elements a greater part of any foreign matter which enters with the air. And due to this fact the pad, which constitutes my air-filtering and noise eliminating element, needs frequently to be washed under a water faucet. Wires 10 confine the mineral wool in the frame.

On account of its non-rusting characteristic I prefer to use brass from which to construct the pad; however, any other material which will qualify as a filtering medium may be substituted. A hook 11 serves as means to withdraw the frame 9 for the cleaning operation.

Secured to the base of the box 7 is an electric motor 12 which operates the fan wheel 13; and outwardly of the latter is an electric heating unit 14 protected by a coarse mesh screen and cover 15. On each side of the motor is an open-top water tank 16, the two tanks being connected by pipes 17 and 18 vertically spaced.

On the pipe 18 I mount an electric heating unit 19 for the purpose of heating the water in the two tanks 16 and to expedite the circulation of the water from one tank

to the other, and pipe 18 is slightly inclined as shown in Fig. 12.

On certain occasions it might be desirable to prevent access of air to the air-conditioning box 7. For this purpose I provide a slide 20 having a hook 21 for raising it, the slide operating in the slide-way 22. As an alternative construction I may elect to employ a shutter as shown in Figs. 7 and 8, the shutter comprising a plurality of slats 23 pivoted at points 24 on their ends with a rod 25 to actuate them in unison.

The shutter construction will give a very effective graduated control of the amount of air admitted to the air-conditioning chamber C and in extremely cold weather is perhaps the preferable arrangement inasmuch as it compels the air to pass in less volume when the shutter is partially closed and to become more highly heated before passing into the room.

During intensely hot days in summer it is of advantage to be able to cool the air before it enters the room. In Figs. 10 and 12 I show construction by which this object may be attained.

A fabric blanket 26 (see Fig. 12) has two flaps 27 (one only being shown) which extend, respectively, into the two water tanks 16. The water W through the action of capillary attraction creeps up the flaps and spreads over the blanket and the incoming air drawn into the box by the suction of the fan 13 evaporates it and causes the temperature to drop as the air is wafted into the room. The blanket 26 is reinforced on its top edge by a metal binder 26a from which rises a hooked lug 26b by which the blanket is inserted and withdrawn in and from its position in the apparatus.

In addition to the foregoing method of cooling the air I supply another fabric element 28 having radial arms 28a (see Fig. 10) on two of which are flaps 29 which extend rearwardly and downwardly into the opposite ends of the water tanks. The radial arms 28a are secured to a wire screen cover 15a, the counterpart of cover 15, the two being removable from the end of the air-conditioning box and interchangeable. A trap door 30 permits the blanket 26 to be inserted in the air-conditioning chamber.

On each side of the air-conditioning box 7 and opening into the screen box 1 are hinged doors 31 providing the means for the passing of air from the outside directly into the room.

In one of the tanks I install a thermostatic temperature regulator 32, operating it in conjunction with the heating unit 19. This enables the water to be held at any desired temperature during any particular period of operation. A cut-out switch 33, manually operated, breaks electrical connection with the thermostat.

A double throw switch 34 controls the current for the motor and the heating unit 14, making it possible to operate the motor with or without the heater.

5 By removing the cap 35 access to the water tank 16 for filling may be had.

The operation of my ventilating and air-conditioning apparatus is so simple that any person of ordinary intelligence can handle it without difficulty.

10 In installing the device the lower sash of the window is raised and the air-conditioner inserted in the open space,—just as an ordinary fly-screen of the removable type is placed in the window. The plug 36 on the service cord 37 is inserted in any available lamp socket or wall fixture and the apparatus is ready to function.

One movement of the double-throw switch 20 34 starts the motor and fan. A draft of filtered air, of outside temperature, is now being circulated about the room. And while clean air is being forced into the room through the air-conditioning chamber, it is well to swing the doors 31 so that they are just ajar. This will have the effect of more expeditiously emptying the room of the foul air.

Another movement given the switch 34 and 30 the heating unit 14 is put in operation. A current of warmed, filtered air now passes out of the apparatus into the interior space.

Should the air in the room seem somewhat dry and breathing more or less constrained 35 a movement of the switch 33 starts the heating unit 19 into action and in a very short period of time the water in the tanks 16 begins to throw off a vapor which is caught up by the incoming air passing through the air-conditioning chamber and projected into the room in the form of humidified, filtered air.

The thermostatic control of the water-heating unit regulates the degree of humidity required. It also may be set so that in 45 winter months the water never reaches or approaches the freezing temperature.

In the event that it is desired to deodorize or disinfect the air in a sick room, then, if the medicant is of the volatile kind a vessel 50 containing it may be placed in either the screen-box chamber S or the air-conditioning chamber C and the fumes from the deodorant will be carried with the filtered air into the room. Or if the medicant is in the form of a solid and non-volatile it may be placed in one of the water tanks and heated with the water to secure vaporization.

When the room is to be unoccupied for a considerable period, say in the day time, it 60 is not so essential nor is it desirable to operate the motor continuously. But the room requires to be ventilated to prevent staleness of the air, so, in this case the motor is stopped and the doors 31 opened wide. The room will then receive ventilation ordinarily supplied

by the ordinary fly-screen-equipped window. Upon again occupying the room the occupants will close the doors 31 and set the motor and fan operating again, soon filling the room with filtered air.

As foreign matter, like dust and pollen, is not so freely suspended in night-time air as it is in day-time atmosphere the doors 31 may often be left wide open when the occupants of a sleeping room retire for the night. The motor, in this instance, will be stopped temporarily.

A predominate characteristic of my air-filtering element 9 is its quality of absorbing sound. With the doors 31 closed street noises are as effectively eliminated as they would be with the window closed.

This feature adds greatly to the comfort and tranquility of dwellers on noisy thoroughfares and office workers in cities where noise makes it difficult to concentrate their thoughts. It is, moreover, in line with modern ideas on the subject of prevention of noises which scientists tell us is a contributory cause of many of the nervous ailments afflicting the human race.

In briefly summarizing the features of my invention I wish to stress the facts that my apparatus is strictly a portable, completely outfitted affair which can be moved from one window to another and put into service by simply raising a sash, placing the device in the window frame and then closing the sash on to it.

It is self-contained, in other words, and supplies in a unitary structure all the requirements for supplying clean, filtered air, either cool or warm, humidified or dry, plain or medicated.

Its original cost is relatively small and its operating expense extremely low, and considering the advantages accruing to those who benefit by its use it is believed that it will commend itself particularly to any one who considers healthful and comfortable surroundings of primary importance.

What I claim is:

1. An apparatus of the class described comprising in combination with a window screen, a screen-box supporting said screen and having a chamber therein, an open-end box secured to the indoor side of said screen-box intermediate its ends, said boxes having intercommunicating interiors, an air-filtering element in said open-end box adjacent said screen-box, means whereby a current of air may be drawn from the chamber of said screen-box, through said air-filtering element and projected out of the opposite end of said open-end box, and a heating element adapted to raise the temperature of the projected, filtered air while passing out of said open-end box.

2. A device of the character described comprising a screen-box adapted to be positioned

in a window frame beneath the raised lower sash therefor, a screen removably mounted in and adjacent the outdoor side of said screen-box, an air-conditioning box extending from the indoor side of said screen-box, an air-filtering element removably mounted in said air-conditioning box, adjacent said screen-box, a fan wheel in said air-conditioning box, and means to rotate said fan wheel.

3. A device of the character described comprising a long relatively narrow screen-carrying box adapted to be inserted in a window frame beneath a raised sash therefor, said frame and sash constituting the sole means for securing said box, a vertical slide-way in and adjacent the outdoor side of said screen-carrying box, a screen operable in said slide-way, an air-conditioning box secured to the indoor side of said screen-carrying box, said boxes having interior intercommunication, an air-filtering element on the inner end of said air-conditioning box, adjacent said screen-carrying box, said element including a frame, a relatively thick pad of mineral wool and cross wires adapted to confine said pad in said frame, a slide-way in which said air-filtering element is disposed and from which it may be slidably withdrawn, a fan wheel operably mounted in said air-conditioning box, means to actuate said fan wheel, and a heating unit on the end of said air-conditioning box opposite to that on which is said air-filtering element.

4. A device of the character described comprising a long, narrow screen-carrying box adapted to be secured by and beneath the sash of the raised window for a room, extended sides on said screen-carrying box having stop flanges on the outer ends thereof, a channel member adapted to slidably embrace said extended sides and having reversely disposed stop flanges adapted to engage the flanges on said extended sides to prevent complete withdrawal of said member from off said screen-carrying box, means to yieldingly hold said channel member in extended position on said extended sides, a screen in said screen-carrying box, removably disposed therein, an air-conditioning box having open ends secured on the indoor side of said screen-carrying box, an air-filtering element in said air-conditioning box, a fan wheel in said air-conditioning box adapted to draft air from said screen-carrying box, through said air-filtering element and thence project it into the adjoining space in the room, and means to close admission of air from said screen-carrying box to said air-conditioning box.

5. A ventilating and air-conditioning apparatus comprising a screen-carrying box adapted to be mounted in the frame of a window for a room, beneath the raised sash therefor, a screen on the outer side of said screen-carrying box, doors on the inner side of said screen-carrying box adapted, when opened,

to provide direct communication for air from the outside to the inside of the room, an open-end box disposed intermediate the ends of said screen-carrying box, adjacent said doors, an air-filtering element through which air may pass from the interior of said screen-carrying box to the interior of said open-end box, a water tank in said open-end box, means to heat water in said tank sufficient to create a vapor, a fan wheel in said open-end box, and means to actuate said fan wheel whereby outside air may be drawn through said air-filtering element, absorb the vapor rising from the heated water and thence projected into the space in said room raised in humidity above that of the outside atmosphere.

6. In ventilating and air-conditioning apparatus the combination with a fly-screen adapted for service in the window of a room, of a chambered box in which said screen is mounted and from which it may be slidably withdrawn, doors on the inward side of said chambered box permitting ingress of air from the outside directly into the room, an open-end box secured to and extending inwardly from said chambered box, an air-filtering element located in the end of said open-end box adjacent said chambered box, a fan wheel in said open-end box, means to actuate said fan wheel, two water tanks in said open-end box, a trap door in the top wall of said open-end box, and a fabric blanket, having two flaps thereon, adapted to be inserted in said open-end box, through said trap door opening, the said flaps being immersed, respectively, in the water in the two said tanks.

7. A ventilating and air-conditioning apparatus constructed as a completed and workable unit adapted to be mounted in a window frame beneath a raised sash, comprising a screen-carrying box having its outdoor side open, a screen disposed across said open side, an air-filtering element, a water-holding tank, a heater for said water-holding tank adapted to raise the temperature of the water above the vaporizing point, a fan wheel adapted to draw air through said air-filtering element, an air heating unit, and a structure enclosing and confining the filtered air while being subjected to a humidifying and warming treatment through the agency of said vaporized water and the heat from said air heater, said fan wheel thereafter projecting the filtered, humidified and warmed air from said structure into the surrounding air in the room.

8. An apparatus of the class described adapted to be used in an open window space and employed to ventilate and condition the air in a room comprising in combination with a fly screen substantially covering the said open space, a screen-box insertable under the raised sash of the window and carrying said fly screen, an air-conditioning box extending inwardly from said screen-box, a fan-wheel

in said air-conditioning box, means to actuate said fan-wheel, an air-heating element on the discharge end of said air-conditioning box, a frame removably disposed in the air-admission end of said air-conditioning box, a relatively thick pad constructed of curled and twisted mineral wool secured in said frame,

said pad adapted to serve as an air-filtering and noise-reducing element, and means, distinct and separate from said air-conditioning box, to admit outside air through said fly screen into the room.

In testimony whereof I affix my signature.

DON A. SARGENT.

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