

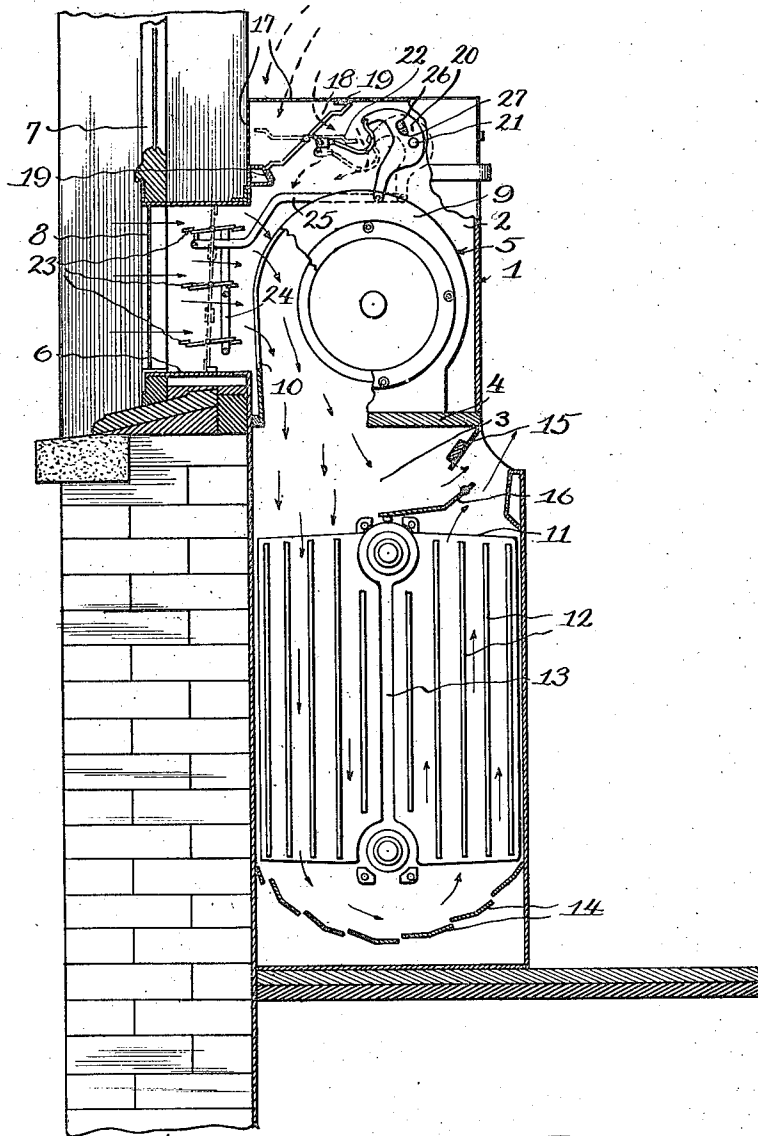
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HEATING AND VENTILATING APPARATUS

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# UNITED STATES PATENT OFFICE.

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## HEATING AND VENTILATING APPARATUS.

Application filed February 10, 1922. Serial No. 535,625.

*To all whom it may concern:*

Be it known that I, WILFRED SHURTLEFF, a citizen of the United States, and a resident of Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Heating and Ventilating Apparatus, of which the following is a specification.

This invention relates to improvements in heating and ventilating apparatus, and more particularly to a unitary device of the character described adapted to be installed in the room or space to be heated and ventilated, and preferably communicating directly with the outside atmosphere thru an opening in the wall of the building, or thru a duct fitting within the window sash and occupying a portion of the window.

The object of the invention is to provide a suitable construction in a heating and ventilating unit, whereby a portion of the air passing thru the unit and discharged into the room is drawn directly from the room, thus being recirculated.

A further object of the invention is to provide in a heating and ventilating unit a combination of dampers adapted to control the intake of air thru a duct communicating with the outside atmosphere, and an inlet opening communicating with the inside air, together with suitable operating mechanism whereby the dampers may be controlled simultaneously so that the proportion of outside and inside air taken into the apparatus may be varied at will, or either one or the other intake openings be entirely closed and the other open.

A preferable arrangement of the mechanism embodying the invention is disclosed in the drawing which represents a heating and ventilating unit in vertical section, as installed adjacent the outside wall of a room and receiving its supply of fresh air thru a duct projecting thru a window.

The heating and ventilating unit comprises in general an upright housing or casing 1, divided vertically into an upper blower chamber 2 and a lower heating chamber 3, there being a horizontal partition 4 separating these chambers. Within the blower chamber, and mounted upon the partition member 4, is a blower 5 having its discharge opening directed downwardly into the heating chamber and thru an opening in the partition member 4. Communicating with

the blower chamber, and forming a part thereof, is a lateral duct 6 serving as the fresh air inlet and adapted to fit snugly within the lower portion of a window opening, its entrance flush with the window sash 7, which rests upon the duct, as shown in the drawing. A screen 8 is preferably mounted at the entrance of the duct. In the wall of the blower casing 9 is an inlet opening 10 located immediately in line with the air intake duct 6, and thru which the air is drawn into the blower and thence discharged downwardly into the heating chamber, as indicated by the full line arrows in the figure.

Within the heating chamber 3 is mounted a heating element 11 in the form of a radiator, substantially filling the heating chamber from front to rear, said radiator being of the ordinary sectional construction, and provided with vertical passages between the sections. These vertical passages are further defined by a series of vertical fins 12 extending lengthwise of the radiator sections and spaced apart laterally. The heating element or radiator is further characterized by central vertical partition walls 13 extending between the sections and thruout the height of the radiator, thereby virtually dividing the passages thru the radiator into a down passage adjacent the rear wall of the housing and directly below the blower discharge opening, and an up passage adjacent the front wall of the housing. These passages are readily identified by the arrows showing the path of the air therethru. The heating element or radiator 11 is spaced above the bottom wall of the housing, and within the space therebeneath, is mounted a series of louvres 14 extending longitudinally of the casing, and spaced apart edgewise, and further, arranged in the form of an arc, following generally the direction of the air in leaving the down passage, and entering the up passage of the radiator. These louvres form what is commonly termed the dust separator, which acts to remove the dust from the air, and depositing the same in the bottom of the housing. Above the radiator 11, and located in the front wall of the housing immediately below the partition 4, is the air outlet opening 15 thru which the heated air is discharged into the room. The discharge of air thru the outlet opening is controlled to some degree by a by-pass

damper 16 mounted immediately adjacent to the discharge opening and adapted to control or regulate the portion of unheated air passing directly from the blower to the outlet opening and the amount of air which circulates thru the radiator and thence outwardly thru the outlet opening.

The structure thus far described may be considered to be typical of heating and ventilating units to which the present invention is applicable.

Referring now to the air recirculating portion of the apparatus, there is located in the upper portion of the housing 1 an opening extending lengthwise of the housing; and thruout that portion immediately adjacent to the intersection of the top wall and the rear wall. This opening, which may be of any desired length, is identified by a grating or other perforated wall sections 17. Immediately inward from the opening to the housing thus formed, is mounted a damper 18 normally arranged transversely to the general direction which the air would enter the housing thru the recirculating opening. The damper swings within an oblique passage and engages at its ends stops 19—19 located on opposite sides of said passage.

Mounted within the upper portion of the blower chamber, and at some point intermediate the end walls thereof, is a lever 20 having a shape approximating that of a crescent, and normally assuming an upright position. This lever is pivotally supported upon a rod 21 so that the lever turns on a horizontal axis. The point of pivotal support is substantially intermediate the ends of the lever, the upper end thereof curving rearwardly and toward the damper 18, and having connection therewith thru the medium of a U-shaped link 22 bent in a downwardly and rearwardly direction. The free end of the link 22 is connected to the damper 18 adjacent the turning axis thereof. The lower end of the lever 20 is connected with a series of dampers 23 arranged in vertically spaced relation within the horizontal air intake duct 6. These dampers 23 are adapted to be operated as a unit, and are therefore connected together by an arrangement of transverse links 24 so that all dampers move simultaneously from open position, as indicated in full lines, wherein the several dampers occupy parallel positions, and into closed position, indicated by dotted lines, wherein the several dampers are swung into the same vertical plane. Connecting the uppermost damper with the lower end of the lever 20 is a link 25 having an offset portion intermediate its ends.

Any suitable method may be applied for operating the lever 20, such as a shaft extending inwardly from one end of the housing, and provided at its innermost end with a crank 26 which engages a slot 27 in the

lever immediately above and to the left of the point of pivotal support 21 as shown in the drawing. Mounted on the shaft exterior to the housing, may be a handle or other operating member for manually shifting the lever and the dampers operated thereby. As shown in the drawing, the air controlling dampers 18 and 24 (shown in full lines) are positioned so that the fresh air intake duct 6 is open and the recirculating opening is closed, thus providing for the air supply to the housing to be drawn entirely from the outside atmosphere. Presumably this would be the arrangement during moderate or mild weather conditions. By shifting the lever, that is, by rotating the same about its horizontal axis, and in a counterclockwise direction, the damper controlling mechanism is moved to the dotted line positions, in which the dampers 23 are closed, and the recirculating damper 18 is open. In this position, the air supply to the blower chamber is drawn entirely from the air within the room, and is thus recirculated thru the heating and ventilating unit. Manifestly, the dampers may be adjusted to intermediate positions so that the air supply to the blower will be partly fresh air and partly recirculated air, and in a ratio depending on the relative degree of opening of the corresponding dampers.

The manipulation or regulation of the dampers would largely be determined by the weather conditions, as well as by the air conditions within the room. As already suggested, and obviously, whenever possible, a constant supply of fresh air from the outside is to be desired at all times. However, during extremely cold weather, or when the full capacity of fresh air is not required, the supply of fresh air from the outside may be reduced or wholly shut off, and the air within the room recirculated thru the apparatus, either to be reheated or discharged into the room at substantially the same temperature, depending on the position of the by-pass damper 16.

The addition of a recirculating feature to a heating and ventilating unit provides for more accurate regulation of the air and temperature conditions, as conditions of the outside and inside atmosphere demand. Further, by operating both dampers by single mechanism, a definite ratio or proportion of the air supplies is uniformly maintained, so that the capacity of the apparatus is uniform at all times, and therefore can be operated at its utmost efficiency.

Having described and illustrated a preferred arrangement of the devices embodying the invention, I claim:

1. In a heating and ventilating unit, the combination of a blower chamber having a fresh air inlet duct, a recirculating inlet arranged at an angle to said fresh air inlet,

and a discharge opening communicating with the space to be ventilated, dampers in said inlets, a bell crank lever mounted in said chamber, links connecting the ends of said lever with said dampers, and means for shifting said lever to control the proportion of fresh and recirculated air entering said chamber through said inlets.

2. In a heating and ventilating unit, the combination of a blower chamber having a fresh air inlet duct in the outer vertical wall, a recirculating opening in the top wall and

a discharge opening in the bottom wall, dampers mounted in said fresh air and recirculating inlets, a bell crank lever mounted in said chamber, links connecting said dampers with the ends of said lever and means for shifting said lever to regulate the proportion of fresh and recirculated air discharged through said discharge opening.

In witness whereof, I hereunto subscribe my name this 6 day of February, A. D. 1922.

WILFRED SHURTLEFF.