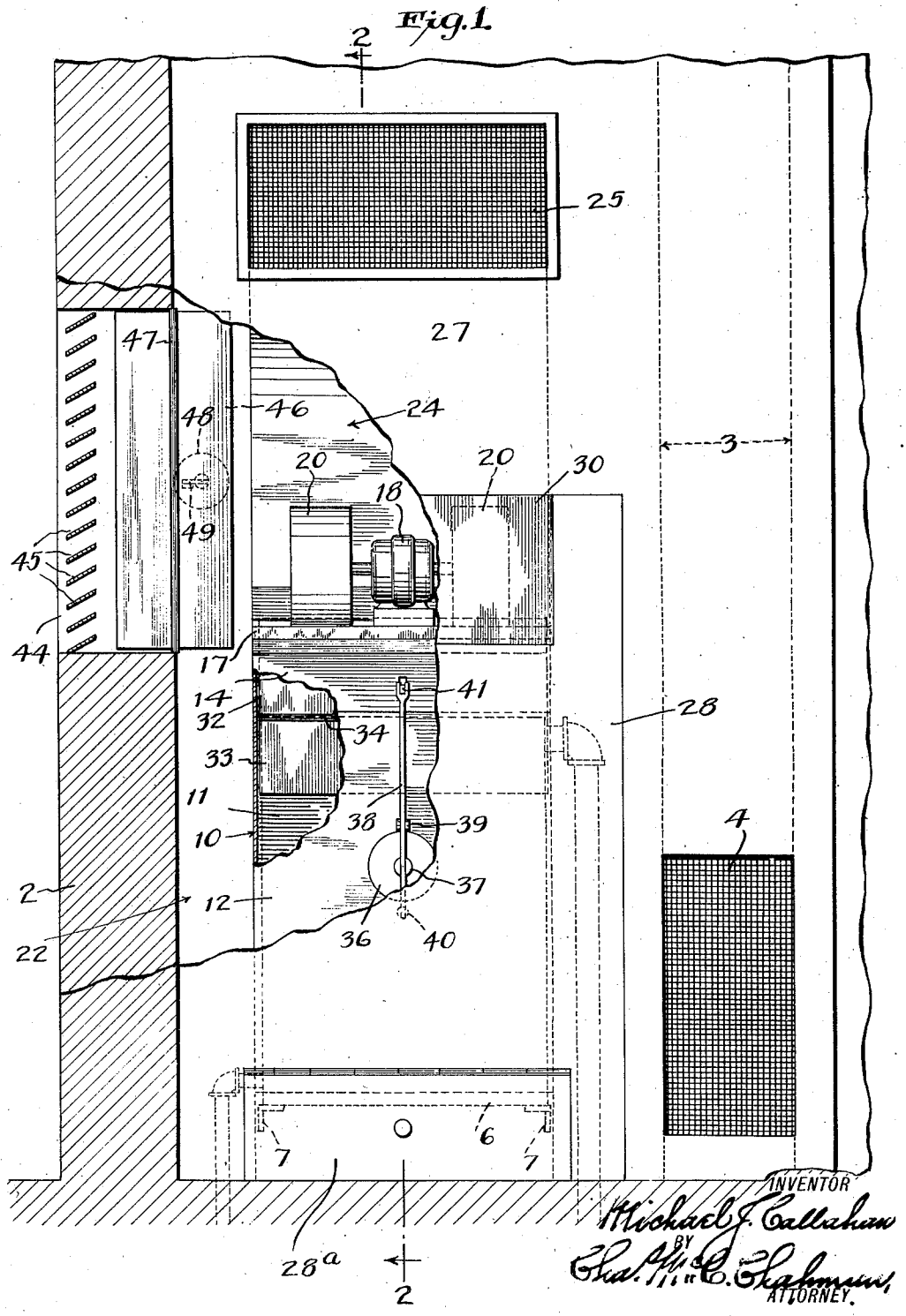
Nov. 25, 1930. M. J. CALLAHAN 1,782,711

CONCEALED UNIT FOR HEATING AND VENTILATING

Filed Feb. 20, 1925 4 Sheets-Sheet 1

Fig. 1.



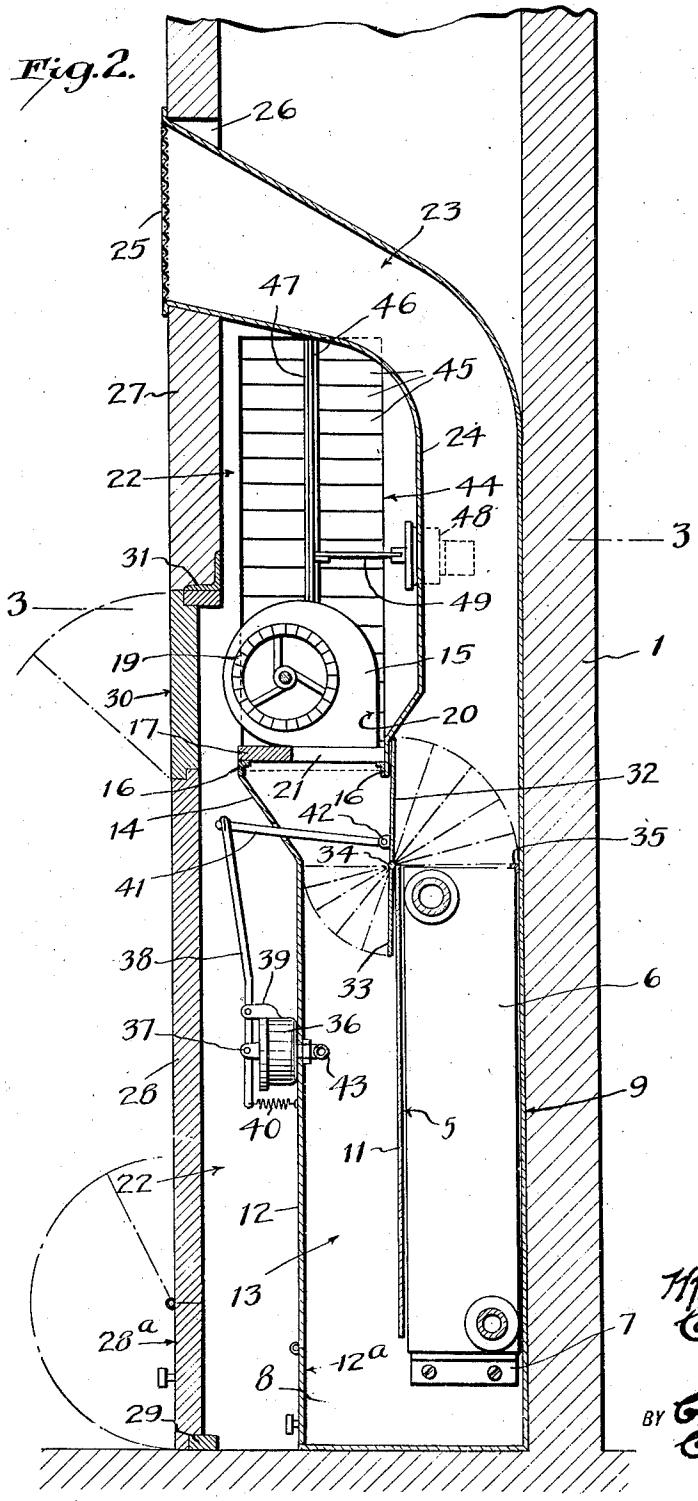
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Nov 25, 1930. M. J. CALLAHAN 1,782,711

CONCEALED UNIT FOR HEATING AND VENTILATING

Filed Feb. 20, 1925 4 Sheets-Sheet 2

Fig. 2.



Michael J. Callahan, INVENTOR.

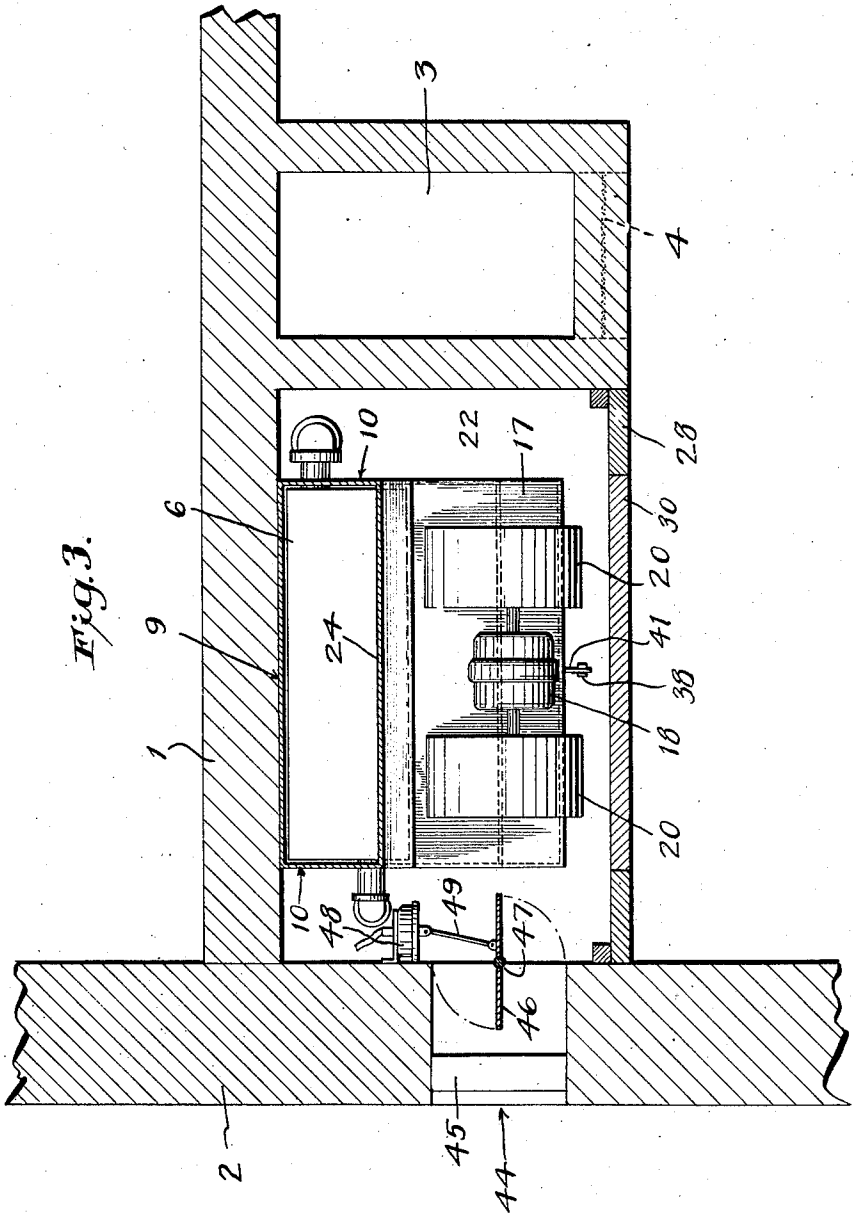
BY Chapman & McC. Chapman, ATTORNEY.

Nov. 25, 1930. M. J. CALLAHAN 1,782,711

CONCEALED UNIT FOR HEATING AND VENTILATING

Filed Feb. 20, 1925 4 Sheets-Sheet 3

Fig. 3.



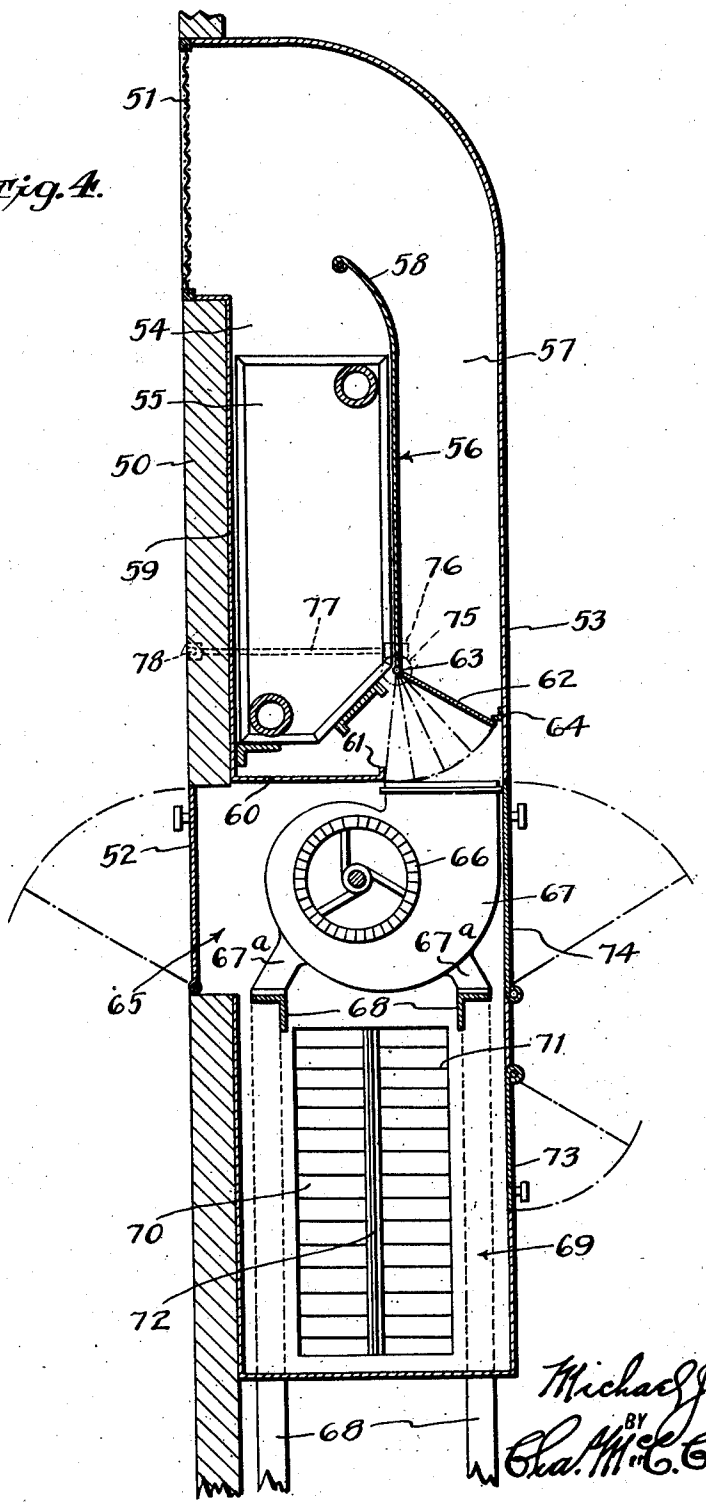
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Nov. 25, 1930. M. J. CALLAHAN 1,782,711

CONCEALED UNIT FOR HEATING AND VENTILATING

Filed Feb. 20, 1925 4 Sheets-Sheet 4

Fig. 4.



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Patented Nov. 25, 1930 1,782,711

UNITED STATES PATENT OFFICE

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CONCEALED UNIT FOR HEATING AND VENTILATING

Application filed February 20, 1925. Serial No. 10,715.

This invention has reference to ventilating apparatus of the so-called "unit" type, and particularly relates to devices, apparatus or units which are concealed, as distinguished from being located or set in the room to be heated and ventilated, apparatus of the concealed unit type being adapted for installation in buildings where it is desirable to economize space and reduce cost of installation and secure alleged sightliness, such as schools, lecture halls, ball rooms, and other public assembly rooms in hotels or other buildings.

Among the objects of my invention may be noted the following: to provide a heating and ventilating machine, apparatus or unit which is adapted to be located or installed in a small space or room such as a wardrobe, coat-room or closet usually spaced or partitioned off from school-rooms or lecture rooms in large buildings, so as to control the temperature of an adjacent room without being exposed to the latter or to being tampered with, investigated or experimented with, and so that it will not directly radiate or throw off heat from its parts into the room to be heated and ventilated; to provide a unit, such as referred to, comprising certain essential elements which are adapted to supply fresh air from the outside of the building, heat said fresh air to the desired temperature, and deliver the heated air into a separate room or space where the apparatus is not located, but adjacent to which it is installed, in order to obtain all the benefits derived from a unit located in the room the temperature of which is to be controlled; to provide a heating and ventilating unit adapted to convert fresh cold air into air heated to the desired temperature, and deliver the same to the room or space where desired directly from the unit, while the latter is concealed, and also to control the operation of the unit either manually or electrically, or through the medium of the temperature of the room to which the air is delivered; to provide a strong, durable, compact and effective unit apparatus adapted to produce the functions and results noted in the foregoing, and which is or may be entirely or partially concealed from sight of persons in the room, the temperature of which is controlled, and which apparatus or unit, in its operation, is controlled by the temperature in the room to which the air is delivered; to so construct and install a heating and ventilating unit that it may perform all its functions and carry out its modes of operation in a small, finite space adjacent the room, the temperature of which is to be regulated and the ventilation of which is to be controlled, the unit being compact, economical of production and in operation and capable of carrying out its operations and producing its functions either automatically or partly under manual control; to provide a combination of apparatus and mechanical means such that the foregoing objects can be obtained with economy both in materials, structure and space, and so that space otherwise serving no useful purpose can be utilized to great advantage; to provide structures and combinations of means by which the various parts of the apparatus may be inspected, repaired when necessary, readjusted, readily installed, and effectively controlled in its functional parts; to provide certain novel devices in a heating and ventilating unit, of the concealed or semi-concealed type, including (1) a unit as a whole having no part in the room, the temperature of which is to be regulated and controlled, but having its discharge passage terminate in the latter room, (2) a duplex mixing damper in the unit which is automatically controlled, or operated through the medium of a motor or mechanical means which are either electrically, thermostatically or manually controlled from within the room the temperature of which is to be regulated and controlled, (3) an intake for fresh air, located in the space of unit installation, the admission of air through which may be controlled by a damper which is operated through the medium of a motor controlled by a switch or other medium in the room the temperature of which is to be regulated and controlled, (4) means by which the various parts of the apparatus may be inspected from within the room, the temperature of which is to be regulated and controlled, (5) and means by which

recirculation can be brought about from the room through the apparatus and into the room by the adjustment and manipulation of simple parts; and to provide certain details of construction which are strong, durable, effective and which are compactly and economically disposed in the apparatus and in the room or space of installation of the apparatus, adapted to carry out the modes of operation and produce the functional results hereinbefore and hereinafter noted.

With the above objects in view and others which will be detailed during the course of this description, my invention consists in the parts, features, elements and combinations thereof hereinafter described and claimed.

In order that my invention may be clearly understood, I have provided drawings wherein:

Figure 1 is a view showing in front elevation a unit heating and ventilating apparatus embodying my invention, the same being concealed in a closet, wardrobe or cloak-room, parts of the figure being broken away to show details of construction, and the duplex mixing damper being shown in position to direct the fresh air so that it will traverse the heating chamber and be discharged into the room at predetermined temperature;

Figure 2 is a longitudinal sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2; and

Figure 4 is a view similar to Figure 2 showing an alternative form of ventilating unit embodying my invention.

Referring to the drawings, the numeral 1 indicates the wall of a room or, it may be, the outer wall of a building, and the numeral 2 indicates a wall of the building, or, it may be, the wall of a room, said walls 1 and 2 aiding in the production of a space which may be part of a cloak-room, wardrobe or other space particularly set aside for the installation of apparatus for heating and ventilating purposes. The room or space may also be partitioned to provide a ventilating shaft 3 in some portion of which, usually the bottom thereof, a grille 4 is set, through which cold and foul air may pass and be conveyed to the outside of the building, either directly or indirectly, as may be desired. In the form of my invention shown in Figures 1 to 3, the casing of the unit is specially constructed to provide the necessary chambers in which are placed the various elements and apparatus constituting the unit structure. In this instance of my invention, the casing is divided into a heating chamber 5 containing a heating element 6 such as a radiator, which may be of any approved type, or such as the one which I have installed in most of my heating and ventilating units, and which is disclosed in my Design Patent #54,059, granted Nov. 4, 1919, and which I have found to be unusually satisfactory because of its ample radiating surface. The radiator is supported on brackets 7 which are secured to the opposite ends of the casing in any approved manner, the same being made of angles set at a proper distance from the base of the unit so as to provide a humidifying chamber 8, in which is usually set a water pan (not shown) for cleansing and humidifying the air passing into the heating chamber. The heating chamber is formed by the back 9 of the casing, the ends 10, and a baffle-plate 11, the latter extending approximately the length of the radiator and being spaced from the front 12 of the casing to provide an inlet or fresh air passage and chamber 13, through which the fresh air passes to the humidifying chamber, and thence to the heating chamber. The front 12 of the casing, at its top, is extended outwardly at 14 to provide an enlarged entrance to the inlet chamber 13, and also to provide a deflector or shunt adapted to properly direct the air entering from the blower chambers 15, as hereinafter explained. The upper end of the portion 14 of the front wall of the casing is properly joined with angle 16, on which, together with others making a rectangular frame, the motor board 17 is set and may slide, said board supporting the motor 18, which drives a plurality of fans 19 operating in casings 20 providing the chambers 15, the lower open ends of which casings communicate with a passage 21 in the motor board communicating with the inlet passage and chamber 13. The fan casings are open at their opposite sides so as to enable the fans to suck air at their axes or eyes from the room, chamber or space 22 in which the unit is installed. The rear wall 9 of the casing is extended at its top and bent forwardly to provide the rear wall of a discharge passage 23, the front wall 24 of which is similarly extended and curved and forms the back of the fan and motor space or chamber in the room of installation. Preferably, the discharge passage 23 is flared at its delivery end, and the latter has a grille 25 set therein at the end of the casing which projects through the opening 26 in the wall 27 of the room, the temperature of which is to be regulated and which is to be ventilated. The wall 27 is provided with a large opening which is closed by a panel 28 of any suitable material which, at its lower end, rests upon the floor of the room to be heated and ventilated, the said panel being properly held in place by a ledge 29 suitably placed and applied and to which the panel can be secured in any suitable manner. At its upper end, the panel 28 is provided with a movable door 30 which may be hinged to the panel 28 or which may be so secured thereto as to be readily removed therefrom when it is desired to inspect or repair the motor and fans or

any mechanism which can be approached through such opening. A suitable molding and support 31 is applied to the lower edge of the wall 27, against which the door 30 can be set and secured. Thus by arranging the motor board 17 to slide upon the angles or supports 16, the apparatus carried thereby can be readily inspected, removed and replaced. The panel 28 may also be removed for the purpose of inspecting the lower portion of the unit and the parts carried thereby, and also for the purpose of installing the apparatus or gaining admission to the room of installation, as may be required. Air driven by the fans will be caused to travel downwardly in the passage 13 to the humidifying phon type mounted in any suitable and effective position with reference to the damper. Preferably, the motor casing 36 is secured to the front of the casing 12, as shown in Figure 2, and its plunger 37 has pivoted to it a lever 38 which is also pivoted to a lug or bracket 39 on the frame of the motor. The lower end of the lever is connected by an expansion spring 40 to the casing-wall 12, and the upper end of the lever is pivotally connected to a link 41, the inner end of which is pivoted at 42 to a lug on the member 32 of the mixing damper. Thus, normally, under the control of the spring 40, the lever 38 tends to draw the damper into the full line position shown in Figure 2 and hold it there. The

opposite ends at 47 to the top and bottom walls of the passage 44, the members of the damper being sufficiently extensive to entirely close the passage when required. Preferably, the inlet damper 46 is operated by a sylphon or motor generally indicated at 48, in all material respects substantially the same as that which operates the mixing damper; and said motor may be operated in the same way, or in any one of the ways indicated for the operation of the mixing damper. The plunger of the motor 48 operates the damper 46, through the medium of a link 49 pivoted at one end to the plunger, and at its opposite end to one of the wings of the damper. Thus the inlet of fresh air to the chamber 22 can be controlled as well as the temperature of the air passed through the unit from the chamber 22 of installation of the unit to the room the temperature of which is to be regulated.

It is to be noted that fresh air enters the room or chamber 22, of installation of the unit, directly and the blower chamber 15 indirectly; that is to say, the blowers draw fresh air from the room 22, not directly from the exterior of the building. The fresh air is driven by the fans directly down into the enlarged upper portion of passage 13. If the mixing damper is in the solid line position of Figure 2, the air will pass through passage or chamber 13, into the humidifying chamber 8 where it will be cleansed and moistened. From chamber 8 the air will pass through heating chamber 5, in which its temperature will be raised to maximum, and the heated air will be discharged through passage or chamber 23 into the room of service. Temperatures below maximum can be given the fresh air by shifting the mixing damper, as has been described; and all cold air, or at outside temperature, can be discharged into the room of service by shifting the mixing damper to the dotted line position of Figure 2, viz., across the heating element at its top and across the passage 13, thus entirely by-passing the heating chamber. When the cold air by-passes the heating chamber, it is not humidified, since the air, as taken from the outside, is sufficiently laden with moisture. The water pan can be placed and removed by lifting the door 28ª in panel 28, as shown in dotted lines, Figure 2, and by lifting the door 12ª in the front wall 12 of the casing, handles being provided in both instances for the purpose.

As before stated, when it is desired to pass cold air from the outside directly to the room of service, without any preliminary heating, the mixing damper is shifted from the solid line to the dotted line position of Figure 2. This makes a chamber for completely by-passing the heating chamber and heating element therein, and, by flaring the upper wall 14 of the passage 13, the by-pass chamber is enlarged and made to extend from front to back of the casing; and the flared wall 14 also provides for shunting the air, driven down by the fans, backwardly to the discharge passage 23, giving the air a swirling action with initial direction up the passage 23. Thus the space above the heater and below the level of the motor board becomes both a by-pass chamber and a mixing chamber; for, under predetermined control, the mixing damper is shifted into any one of the dotted line positions of Figure 2, so that hot and cold air will be mixed in said chamber. If the control is by thermostat, the temperature of the room of service will primarily control the temperature of the air delivered by the unit, the intermediate means, operated by the thermostat, for shifting the damper being either electrical or pneumatic. If the control of the temperature of the room is to be by manual means, a hand-operated switch will be shifted to enable the motor 36 to operate to shift the mixing damper into desired position.

When it is desired to recirculate the air in the room of service, for a quick rise of temperature, or because the outside temperature is too low, the upper door 30 can be opened allowing air to pass from the room of service to the room 22 of installation. The duplex damper 46 will be closed and, with the fans in operation, the air will be taken from room 22 and driven through the unit in any one of the three ways indicated, viz., (1) for all hot air, passage 13, heating chamber 5, and passage 23; (2) for mixed hot and cold air, passage 13, heating chamber 5, by-pass chamber, and passage 23; and (3) for all cold air, by-pass chamber and passage 23. Or, the door 30 can remain closed and the lower door 28ª can be opened, enabling the cold air in the room of service to enter the room of installation so that the fans can draw the said cold air and drive it through the unit in any of the three ways noted in the foregoing.

In the form of my invention shown in Figure 4, the unit is only partially concealed; that is to say, it is entirely concealed from the room of service the temperature of which is to be regulated, and the unit stands out in the room of installation which may be a cloak-room, wardrobe, closet or service room of some kind. In other words, the unit is not boxed off or placed in a finite section of a cloak-room, etc., as in the form of my invention shown in Figures 1 to 3. In this form, the unit is installed at the wall or partition 50 and discharges through a grille 51 suitably disposed therein. The wall is also provided with an opening in which is set a hinged panel or door 52 adapted to be opened for inspection of certain portions of the apparatus, and also adapted to provide for recirculation of the air in the room of service through the apparatus. The back of the casing or frame of the unit indicated at 53 is, at its top,

curved to pass about the heating chamber 54, and heating element 55, which is at the upper part of the casing and unit. The baffle-plate 56 divides the upper part of the casing into the heating chamber 54 and passage 57, the baffle 56 being curved at 58 to deflect the cold air around the heating chamber. In this instance, the discharge passage 57 also becomes a by-pass; that is to say, a passage through which all cold air may be driven so as to by-pass the heating element and heating chamber. The heating chamber is also bounded at the front by the casing plate 59 and at the bottom by the partition or casing plate 60, the latter, at its inner edge, being upturned to provide a flange 61 operating as a stop for the mixing damper 62 pivotally mounted at its upper edge, as at 63, on the lower edge of the baffle 56. An angle 64 applied to the back 53 of the casing also operates as a stop for the mixing damper 62 at the opposite extreme of its movement. The motor and blower chamber 65 is below the heating and by-pass chambers and contains the fans 66 and motor (not shown) similar to the one shown in the other form of my invention, Figure 3. In this instance, the fans discharge upwardly through their casing 67 at the rear of the unit casing into either the heating chamber, or the by-pass chamber, or both the by-pass chamber and heating chamber 57, according to the position of the mixing damper 62. The motor and fans are mounted on angles or supports 68 between which the unit casing at its bottom is extended, so as to provide an inlet chamber 69 into which the inlet passage 70 is entered, the same being protected by fixed louvers 71, the same as in the other form of my invention. A duplex inlet damper 72 is also applied in the same manner and for the same purpose, and may be operated in the same way, as described in connection with the other form of my inveniton; but, it will be noted that, in this form of my invention, the cold air enters below the fans into the chamber 69, which is a part of the unit and at the top of which the fans operate, the latter thus drawing the air in at their axes or eyes and discharging upwardly into the heating and by-pass chambers. The back wall of the casing at the chamber 69 is provided with a swinging door 73 enabling the damper 72 and louvers 71 to be inspected. There is also a swinging door 74 at the back of the motor and blower chamber 65, rendering it convenient to inspect and repair the motor or fans, as the case may be. The motor and fans are carried by a suitable support, the legs of which are indicated at 67^a, the remainder of the support not being shown since it is no part of my invention. It is important only that the motor and fans shall be supported conveniently for inspection, repair and removal through either of the doors 52 or 74.

The mixing damper 62 is fixed to its pivotal bar 63, which latter is provided at a suitable point with a worm-wheel or gear 75 adapted to be operated by a worm 76 carried by a rod 77 extending through the unit casing or alongside the same, and through the wall 50, at which point it is enlarged, as at 78, to provide a head or operating disk which may be manipulated by a key or crank for the purpose of manually shifting the damper 62. This manual means for controlling the damper is simple, strong, durable, effective and cannot be tampered with, since the manipulating head 78 can be so formed as to be operated by a special key only.

This form of my invention is simple and very effective, and an important factor in its economy of construction and installation. It is also out of sight with respect to the room the temperature of which is to be controlled. and at the same time is freely accessible from the room of installation. Also, this form of my invention provides recirculating possibilities from both the room of installation and the room from the temperature of which is to be regulated, through door 52, the damper 72 being closed, or through either or both of the doors 73, 74.

Within the scope of my invention, the mixing damper may be thermostatically or electrically controlled through the medium of a sylphon or other form of motor, in both forms of my invention shown in the drawings, or said damper may be hand-controlled through the medium of such motor, or said damper may be hand-controlled by direct means such as shown in Figure 4. All the controlling means for the mixing damper have not been shown in the structures of the respective forms, since so to do would unduly multiply the figures of the drawings or confuse the figures employed to demonstrate my invention. Moreover, in each instance the inlet damper may be either motor-controlled or hand-controlled as noted with reference to the mixing damper.

In the form of my invention just described and shown in Figure 4, the mixing damper differs from the mixing damper of Figure 2 and its mode of operation is different; that is to say, the mixing damper 62 is hinged along its top edge and depends into a small chamber below the heating element 55 and above the partition 60, and the damper 62 is a single one-blade damper, as distinguished from the double or two-blade damper shown in Figure 2. In the Figure 4 construction, the cold air is drawn into the inlet chamber through the damper 72 by the fans 66 and is driven by the latter into the smaller chamber between the partition 60 and the heating element 55, said chamber being formed in continuity with both the heating chamber and the combined discharge and by-pass chamber. In the extreme position shown in

Figure 4 and indicated by the solid lines, the damper 62 shuts off the by-pass chamber and shunts all the cold air driven by the blowers into the damper chamber into contact with the radiator, from whence it is driven through the heating chamber into the mixing chamber and out through the grille 51. This is an extreme position of the damper 62 and the opposite extreme position of the damper is against the upstanding lug or flange 61, in which position the damper shuts off the heating chamber and allows all the cold air to pass through the by-pass and discharge chambers into the mixing chamber and out through the grille 51. In any intermediate position of the damper 62, more or less of the cold air driven by the blowers, according to the position of said damper 62, will be driven through the chamber 57 and the heating chamber in contact with the radiator and into the mixing chamber, the tempered air then passing through the grille 51 into the room of service. As shown in Figure 4, the adjustment of the damper is through the medium of the rod 77 and worm or gearing devices 75, 76, which are coupled with the shaft 63 on which the damper 62 swings, or the damper may be operated thermostatically or electrically or pneumatically or through the medium of a sylphon, as suggested in connection with the structure of Figure 2 and as shown therein at 36.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. A heating and ventilating unit consisting of a casing divided into a heating chamber located wholly at its back, a humidifying chamber located below the heating chamber and extending forwardly thereof, a fresh air inlet passage beside and parallel with the heating chamber, a by-pass chamber at the top of and formed as a part of the inlet passage, and a discharge passage formed in continuity with the heating chamber; a mixing damper located between the heating chamber and blower chamber and adapted to entirely close the heating chamber at its top, and to shut off the inlet passage thus defining the bottom of the by-pass chamber; and means for operating the mixing damper to enable it to perform its functions substantially as described.

2. In combination with a room having an inlet for fresh air and an opening in its wall, a heating and ventilating unit located in the room and comprising a mechanism inclosing casing having a discharge passage communicating directly with said opening, a heating element in a chamber formed in continuity with said passage; a single mixing damper pivotally mounted in the casing adjacent said element; and means by which air may be drawn through the inlet and driven through the casing so as to be discharged through said passage and the opening in the wall of the room.

3. In combination with a room to be served with air of regulated temperature, a room of finite space in which a heating and ventilating unit may be installed; a wall between the two rooms having a discharge opening and a movable panel; a heating and ventilating unit located adjacent and behind the panel in the room of finite space so as to be easily inspected, said unit comprising an inclosing casing having means for drawing and driving air, a heating element, a single mixing damper cooperative with the heating element, a discharge passage from the heating element in direct communication with the discharge opening in the wall, and means for operating the mixing damper so as to control the flow of air through the discharge passage.

4. A heating and ventilating unit comprising a casing divided into a plurality of chambers, one adapted to contain the heating element, another adapted for the passage of fresh air, and another adapted to enable fresh air to by-pass the heater and located above the heating chamber, the unit also having a discharge passage; the fresh air chamber being parallel with the heating chamber and opening into the by-pass chamber at the top and into the heating chamber at the bottom; and means for drawing air and driving it into and through the several chambers; a mixing damper mounted between the heating and by-pass chambers and adapted to be shifted to simultaneously close the heating chamber and the fresh air chamber, or to be shifted into any one of a plurality of intermediate positions; and means for shifting the damper relatively to the heating and by-pass chambers, substantially as described.

5. In combination with a service room the temperature of which is to be controlled, a room of finite space having a fresh air inlet thereinto, and a discharge opening through the wall thereof to the room of service, a movable panel in the said wall between the two rooms, said panel having a door at its bottom and a door at its top; and a heating and ventilating unit in the room of finite space arranged adjacent said panel so as to be reached therethrough, said unit having a motor and blower adjacent the top door of the panel and a humidifying chamber adjacent the bottom door, and an air discharge passage extending therefrom to the discharge opening in the wall.

6. In combination with a room of service, a room of installation, a discharge opening in the wall between the two rooms having a movable panel, a fresh air inlet into the room of installation; and a heating and ventilating unit located in the room of installation adjacent the panel, comprising a fan and

means to operate the same exposed in the room of installation; and a discharge passage in the unit and connecting directly with the opening in the wall.

7. In combination with a room of service, a room of installation, a wall between the two rooms having an opening and a movable panel, a cold air inlet to the room of installation; a heating and ventilating unit located in the room of installation adjacent the panel and having a discharge passage connecting directly with the opening in the wall; a damper located at the cold air inlet, and means for shifting the damper to control the passage of air through the unit.

8. A heating and ventilating unit having, in combination, a casing having a chamber at its bottom containing a heating element, and a discharge chamber at the top, and a motor and blower between said element and discharge chamber, a single pivotally mounted mixing damper positioned to swing so as to control the exit of the heating chamber and the entrance of the discharge chamber, and means for actuating the damper to shift the same between extremes to any one of a plurality of positions, whereby air of predetermined temperature may be delivered from the unit.

9. A heating and ventilating unit comprising a casing divided into a plurality of chambers, one at the bottom of the casing adapted to contain humidifying means, a chamber above the humidifying chamber adapted to contain a heating element, another chamber above the humidifying chamber and parallel with the heating chamber for the passage of fresh air to the heating chamber, a by-pass chamber above the heating chamber, a discharge chamber above the by-pass chamber; means for drawing and driving air mounted on the outside of the casing; a support for said means having a passage therethrough into the fresh air and by-pass chamber; and a mixing damper located between the by-pass chamber and the heating chamber; and means for actuating the mixing damper.

10. A heating and ventilating unit comprising a casing divided into a plurality of chambers, one adapted to contain a heating element, another adapted for the passage of fresh air, and another adapted to enable fresh air to by-pass the heater and located above the heating chamber, the unit also having a discharge passage; and means for drawing air and driving it into and through the several chambers; a duplex mixing damper mounted between the heating and by-pass chambers and adapted to be shifted to simultaneously close the heating chamber and the fresh air chamber, or to be shifted into any one of a plurality of intermediate positions; and means for shifting the damper relatively to the heating and by-pass chambers, substantially described.

11. A heating and ventilating unit comprising a casing having a humidifying chamber at the bottom and a discharge chamber or passage at its top, and a heating chamber between the two said chambers, a fresh air inlet chamber, and a by-pass chamber, the fresh air inlet chamber being enlarged at its top to aid in the production of the by-pass chamber located below the discharge chamber; and a mixing damper of duplex form pivoted between its ends in position between the heating and fresh air chambers and adapted to be shifted so as to entirely shut off the fresh air chamber from the discharge passage and also to shut off the heating chamber and a part of the fresh air chamber from the discharge passage, and thereby produce the by-pass chamber partly from the fresh air chamber; and means mounted on the casing for drawing and driving air comprising a support with a passage therethrough into the by-pass chamber; and means for actuating the mixing damper whereby its position may be changed as desired or according to the temperature of the room to be served by the unit.

12. A heating and ventilating unit having a casing divided into a heating chamber, a fresh air chamber, a discharge chamber, and a by-pass chamber, the fresh air chamber at its top above the heating chamber being enlarged; a motor board having a passage therethrough located at the top of the fresh air chamber; a motor and blower means mounted on the board; a mixing damper mounted to cooperate with the heating chamber, discharge chamber, fresh air chamber and by-pass chamber, and between extremes of movement to be shifted relatively to the discharge chamber, heating chamber and fresh air chamber; and means for actuating the damper enabling it to assume any one of a plurality of positions between extremes for completely cutting off the heating chamber and a portion of the fresh air chamber from the by-pass and discharge chambers, or for partly closing the heating chamber, the fresh air chamber and the by-pass chamber, substantially as described.

13. A heating and ventilating unit comprising a casing having chambers in the lower portion of which humidifying means and a heating element may be located, and in which a baffle is arranged to divide the space of the casing into a heating chamber and a fresh air chamber; and a mixing damper arranged in the lower part of the casing above the heating and fresh air chambers and adapted to cut off said chambers to provide a by-pass chamber; and the upper part of the casing being formed into a discharge chamber communicating with the by-pass chamber; a support mounted at the junction between the upper and lower portions of the casing and having a passage

therethrough to the by-pass chamber, and having mounted thereon a motor and blower, the casing of which latter communicates with the passage through the support; and means for actuating the damper enabling it to be shifted between extremes into any one of a plurality of positions, substantially as described.

14. A heating and ventilating unit comprising a casing divided into a plurality of chambers, one at the bottom of the casing for the admission of fresh air, one at the top of the casing for the discharge of air from the unit, an intermediate support for a motor and blower, and another chamber adapted to contain a heating element; in combination with a mixing damper pivotally mounted to swing within the casing between the blower and heating element and to control the delivery of air through the discharge chamber.

15. A heating and ventilating unit comprising an inclosing casing divided to form a heating chamber near its bottom and at one side thereof, a fresh air inlet parallel with the heating chamber, a by-pass chamber above the heating chamber and fresh air inlet, and a discharge passage formed in continuity with the heating chamber and by-pass chamber and forming the top of the unit, a mixing damper pivotally mounted at the top of the heating chamber and positioned to swing so as to control the exit of the heating chamber, the entrance to the inlet and the entrance to the discharge passage; and means for actuating the damper to shift the same between extremes to any one of a plurality of positions, whereby air of predetermined temperature may be delivered from the unit.

16. A heating and ventilating unit comprising a casing, the lower portion of which is divided into chambers adapted to contain respectively humidifying means and heating means, and also containing a chamber into which and through which fresh air may pass to the other two chambers, the casing also having at its top a discharge chamber with an opening at the front of the unit, and the casing also having approximately at its middle a by-pass chamber, and a mixing damper mounted therein; means for actuating the mixing damper to control the passage of air to the heating chamber and from the latter to the discharge chamber; and a motor and blower mounted at the middle of and on the outside of the casing and adapted to drive air into the by-pass chamber.

17. A heating and ventilating unit comprising an inclosing casing divided by a partition to form a fresh air passage on one side and a heating chamber on the other side, a damper pivoted between its ends at the top of the partition, and means for operating the damper to simultaneously partially or entirely close the chamber and passage and form a by-pass above them.

18. A heating and ventilating unit comprising an inclosing casing embodying a fresh air passage, a heating chamber and a discharge passage above said chamber; a damper pivotally mounted between the fresh air passage and the chamber and adapted to swing across the discharge passage; and means for operating the damper to partially or entirely close the fresh air passage and form a by-pass above it to control the temperature of air passing through the discharge passage.

19. A heating and ventilating unit comprising a casing divided into a plurality of chambers, one at the bottom of the casing for the admission of fresh air, one at the top of the casing for the discharge of air from the unit, an intermediate support for a motor and blower, and another chamber adapted to contain a heating element; in combination with a single mixing damper pivotally mounted along its upper edge so as to swing within the casing between the blower and heating element and to control the delivery of air through the discharge chamber.

20. A heating and ventilating unit comprising a casing divided into a plurality of chambers, one at the bottom of the casing having an opening for the admission of fresh air and having a motor and blower located therein, one at the top of the casing for the discharge of air from the unit and an intermediate chamber having a heating element therein; in combination with a damper pivotally mounted to swing within the casing between the blower and heating element and adapted to control the delivery of air through the heating chamber and the discharge chamber.

21. A heating and ventilating unit comprising a casing divided into a plurality of chambers, one at the bottom of the casing having an opening for the admission of fresh air and having a motor and blower located therein, one at the top of the casing for the mixing and discharge of air from the unit, and a vertical partition dividing the intermediate space of the unit into two chambers, one having a heating element therein and the other forming a by-pass chamber; in combination with a mixing damper pivotally mounted on the partition to swing between the heating and by-pass chambers and being thereby adapted to control the passage of air from the blower to the discharge passage and direct said air more or less through the heating and by-pass chambers.

22. A heating and ventilating unit comprising a casing having its interior space divided into a blower chamber, a heating chamber above the blower chamber, a by-pass

chamber above the blower chamber and beside the heating chamber, a mixing chamber above the heating chamber, and a discharge opening at the top of the casing; in combination with a mixing damper pivotally mounted at the bottom of the heating chamber so as to swing between the latter and the blower chamber, and means for shifting the damper relatively to the blower discharge so as to control the path of the air from the blower through the unit.

23. In a device of the class described, the combination of a radiator casing provided with air intake ports and with a discharge port at its upper end and otherwise closed, air heating means and air circulating means housed within the casing in superposed order, said casing provided with a conduit for conducting the discharge from the circulating means past one side of the heating means to give the air an initial preheating before it is discharged into contact with the heating means and said conduit being of inverted L shape with a part thereof leading horizontally from said preliminary heating part to discharge the air into direct heat absorbing contact with the heating means.

24. Means for regulating and controlling the air circulation within an enclosed casing, comprising a shaft mounted within the casing, a damper secured to the shaft along its top edge, means accessibly carried by the casing for actuating the damper, to set the same in predetermined position relative to the air passage within the casing, said means including a rotary rod, a grooved member connected to said rod, and a connection between said member and the damper.

25. Means for regulating and controlling the air circulation within an enclosed casing, comprising a shaft mounted within the casing, a damper secured to the shaft, means accessibly mounted on the casing for actuating the shaft, said means including worm gear devices connected to the damper.

26. A heating and ventilating unit comprising a casing having at its bottom a blower chamber and a fresh air inlet; a heating chamber and a by-pass chamber, both above said blower chamber; a discharge chamber at the top of the casing; a single shiftable damper located between the heating and by-pass chambers to control the passage of air from the blower chamber to the discharge chamber; and means for shifting the damper so as to direct the air through either the heating or by-pass chamber, or partly through both of said chambers.

27. A heating and ventilating unit comprising a casing having a blower chamber at its bottom, a discharge chamber at its top, and a heating and a by-pass chamber between the top and bottom chamber; a mixing damper interposed between the blower and heating chambers and at the entrance to the by-pass chamber; and means for shifting the mixing damper so as to control the passage of air from the blower chamber to the heating and by-pass chambers.

28. A heating and ventilating unit comprising a casing having a blower chamber at its bottom; a heating chamber above the blower chamber; a by-pass chamber beside the heating chamber; a mixing damper located at the entrance to the by-pass chamber and between the heating and blower chambers; and means for actuating the mixing damper whereby to control the passage of the air from the blower chamber through the heating and by-pass chambers.

29. A heating and ventilating unit comprising an inclosing casing having a heating chamber; means in the casing for driving air through said chamber; and means whereby both the entrance and the discharge ends of the heating chamber may be completely shut off.

30. A heating and ventilating unit comprising an inclosing casing having an inlet chamber at its bottom, a discharge chamber at its top, heating and by-pass chambers between the top and bottom chambers; a blower disposed in a chamber below the heating and by-pass chambers; a damper located at the entrance to the heating and by-pass chambers for controlling the passage of air therethrough; and means for actuating the damper to change its position whereby the amount of air passing through said heating and by-pass chambers can be controlled.

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