May 2, 1933. J. BURKE 1,906,533

AIR CIRCULATING DEVICE

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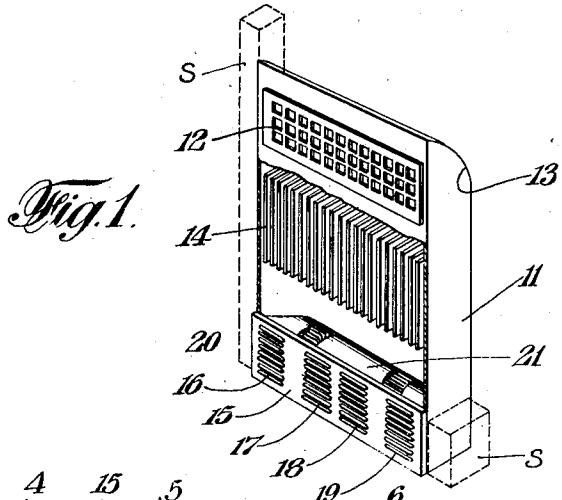


Fig. 1.

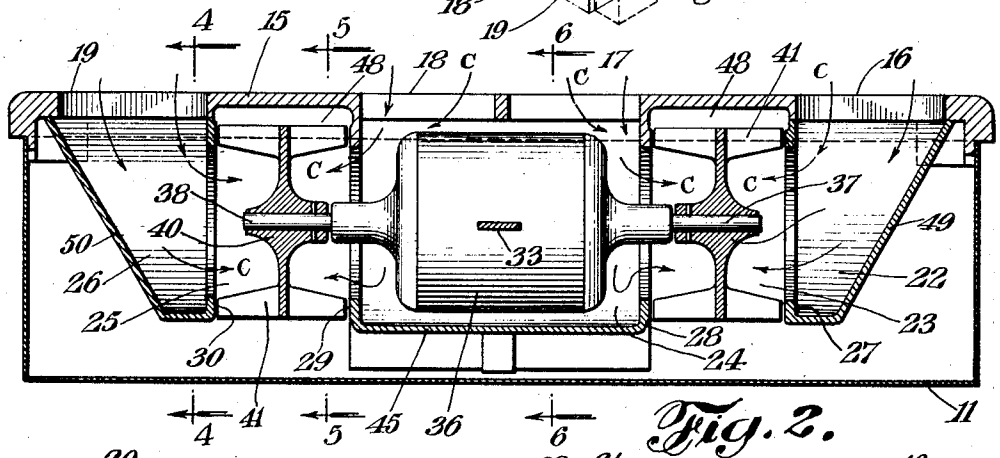


Fig. 2.

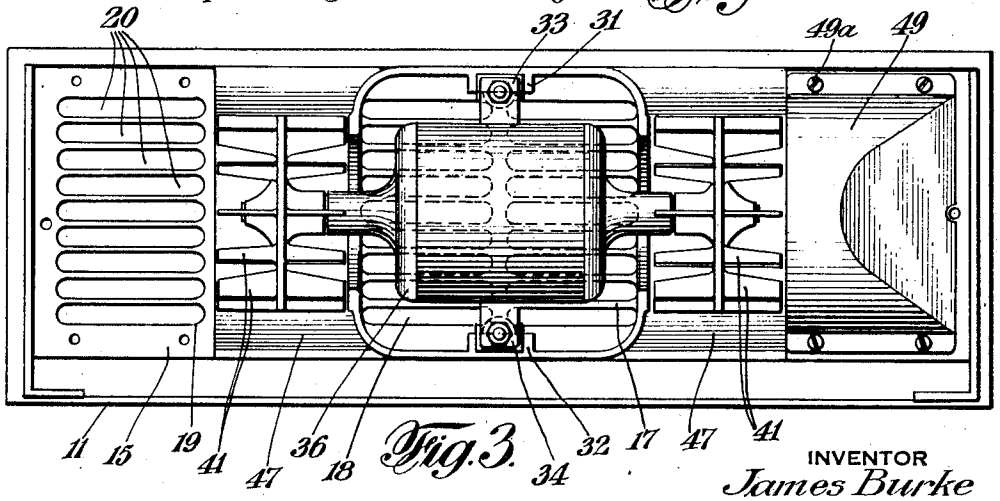


Fig. 3.

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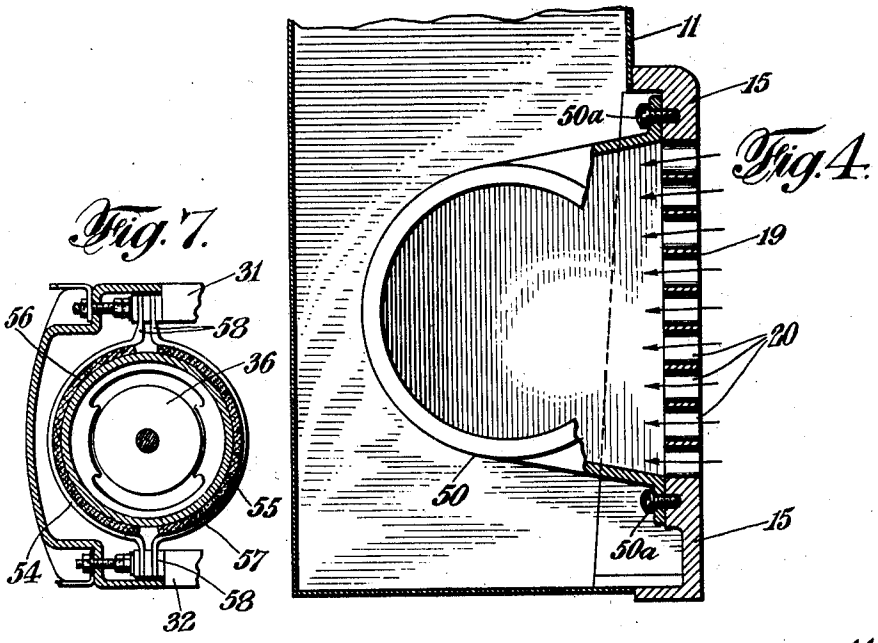


Fig. 4.

Fig. 7.

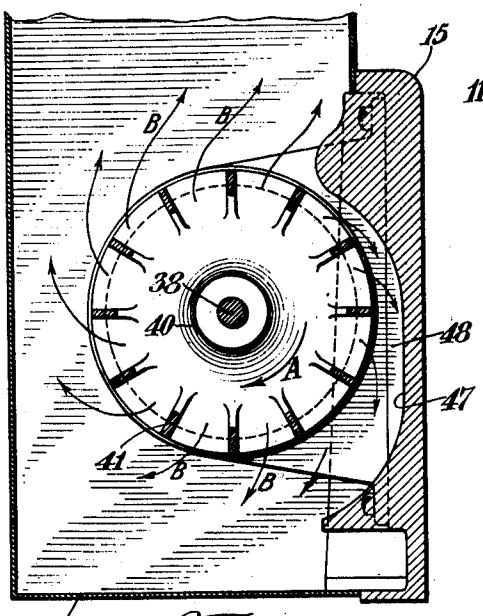


Fig. 5.

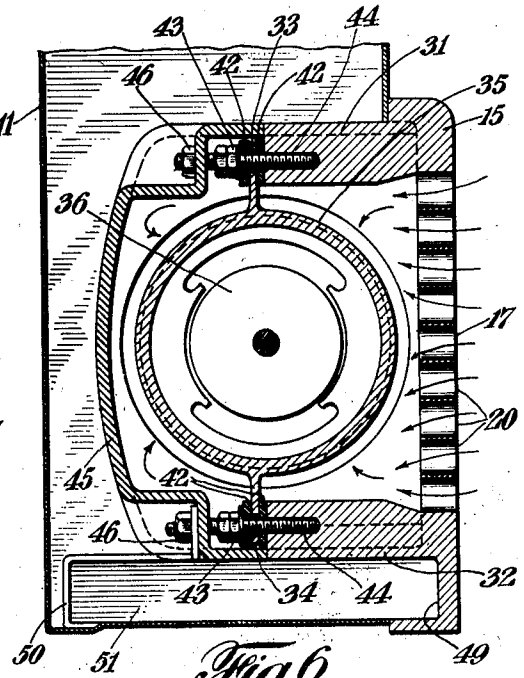


Fig. 6.

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UNITED STATES PATENT OFFICE

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AIR CIRCULATING DEVICE

Application filed April 10, 1929. Serial No. 353,922.

This invention relates to apparatus for circulating air and more particularly to such apparatus which withdraws air in one direction and discharges it in another. One important application of the invention is for the purpose of withdrawing air from a room, passing it over the surface of a heater, and then discharging it into the room. By the means herein described such a device may be constructed in a very small space, and may even be installed within the wall of an ordinary room which is usually about four inches in thickness.

The objects of the invention are to provide an air circulating device which shall be extremely compact and small in size, efficient and noiseless in operation, which will deliver air at a positive pressure and which shall be adaptable for use under various conditions and for various requirements. Devices constructed in accordance with the present invention are particularly adapted for use in connection with small unitary heating devices to be installed in each room of a house, apartment, office or store. These and other objects of the invention will appear to those skilled in the art to which it appertains by a consideration of the following description of one embodiment thereof taken in connection with the accompanying drawings in which

Fig. 1 is a perspective view of an air circulating device used in connection with a heater;

Fig. 2 is a horizontal section of the air circulating device of Fig. 1 taken in the plane of the motor shaft;

Fig. 3 is a rear elevation of the device with certain parts broken away to show the interior construction;

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 2;

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 2;

Fig. 6 is a vertical section taken on the line 6—6 of Fig. 2; and

Fig. 7 is a vertical section similar to Fig. 6 showing a somewhat different form of sound deadening motor suspension.

The reference character 11 indicates a circulation box at the upper portion of which there is positioned a discharge orifice 12 which is shown as covered with a grill or screen and which with the assistance of the curved conformation 13 of the box 11 discharges the air into the room in a substantially horizontal direction. In the lower portion of the box is positioned an air circulating device having suitable inlet orifices. Between the discharge orifice 12 and the air circulating device there is positioned in the interior of the box 11, a heater 14. In order to be able to place the air circulating device and the heater as a whole within the wall of an ordinary room it is necessary to have it as small and compact as possible. In Fig. 1 the whole device is shown positioned between adjacent studs S, indicated in dotted lines, of the wall of a room. For such installations the device has been made as small as fifteen inches wide and three and one-half inches deep.

A panel 15 provides a closure for the lower front portion of the box 11 and may be provided with one or more inlet orifices, in this case there being shown four such orifices 16, 17, 18 and 19, each orifice being divided into a series of vertically spaced slots 20. This panel also provides the supporting frame and one side of the casing of the air circulating unit, the other side of the casing being in approximately semi-cylindrical form as indicated at 21 and if desired may comprise several different parts. The casing or housing provided by the front panel 15 and the semi-cylindrical portion may be divided into a plurality of compartments 22, 23, 24, 25 and 26 by transverse partitions 27, 28, 29 and 30. Upper and lower projections 31 and 32 extend from the panel 15 into the middle compartment 24 and to these projections are secured ears 33 and 34 of a yoke 35 of a motor 36. The motor is disposed with its shaft horizontal and extending into adjacent compartments as indicated at 37 and 38. The compartment 23 into which the shaft extension 37 extends has the rotor 39 of a centrifugal blower secured to the shaft and similarly the compartment 25 has the rotor 40 of a centrifugal blower secured to the shaft extension 38. As shown these rotors are pro-

vided with radial vanes 41 which discharge the air outwardly under a definite pressure. Such a type of blower which is capable of discharging the air under a definite pressure is preferable for the purposes of the present invention.

The noise of the motor and of the blowers if transmitted to the adjacent framework is very undesirable and it is, therefore, preferable to provide sound deadening means between the supporting frame or panel 15 and the motor. This may be done by interposing washers 42 of rubber, cork or other suitable material between the ears 33 and the projections 31 and 32 and also between the ears and the nuts 43 which thread on the bolts 44. An approximately semi-cylindrical casing 45 may be secured by means of nuts 46 to the bolts 44 and serves to complete the motor compartment 24. The panel 15 may be formed with curved portions 47 at the blowers 39 and 40 to provide discharge passages 48 of gradually increasing cross-sectional area. These passages may be continued to any desired distance or as shown in the drawings they may merge with the discharge path provided by the circulation box 11.

End shields 49 and 50 secured to the front panel 15 by screws 49*a* and 50*a* may be provided to complete the end or inlet compartments 22 and 26 and serve to direct the air from the inlet orifices 16 and 19 to the blowers 37 and 38. The panel 15 may be provided with a recess 51 under the motor 36 which together with a clamp 52 holds in place a condenser 53 which is required with certain types of motors.

In Fig. 7 the motor 36 is clamped by a pair of yoke members 54 and 55 which have interposed between them and the motor, cushions 56 and 57 of sound deadening material such as rubber or cork. The yoke members have ears 58 by which they are secured to the projections 31 and 32 by the bolts 44 and nuts 43 as in the form shown in Fig. 6.

In operation, the motor is rotated in the direction of the arrows A in Fig. 5 and discharges the air outwardly in a more or less radial direction as indicated by the arrows B of Fig. 5, drawing the air from near the hub or axis of each rotor of the centrifugal blowers. Air is supplied to the inner portions of the rotors 39 and 40 in an axial direction as indicated by the arrows C in Fig. 2. It will be seen that the blower 39 is supplied with air from the inlet orifice 16 which air enters the device in a direction at right angles to the shaft of the motor and is deflected toward the center and hub of the rotor and is also supplied with air entering the orifice 17 near the motor and which is deflected and guided into the central portion of the rotor from the opposite direction. In like manner the rotor 40 receives air from both the inlet orifice 19 at the end of the casing and also from the inlet orifice 18 near the motor.

As illustrated in the hereinbefore described embodiment of the invention, a simple and compact air circulating unit of unitary construction has been provided which is efficient and noiseless in operation and which is ideally adapted for certain uses. To illustrate the compactness and efficiency of the device as it has been actually constructed it may be stated that the total wattage imput of the motor which drives the blower is less than twenty watts. While the particular embodiment set forth is the preferred form of the invention at present, it is to be understood that such embodiment has been described for the purpose of illustration only and various changes may be made therein without departing from the spirit and scope of the invention as defined in the sub-joined claims.

I claim:

1. A unitary air circulating device comprising a casing vertically disposed within the wall of a room or enclosure so that the front vertical wall of the casing is in the same general plane as the wall of the room, a vertical panel constituting part of the front wall of the casing and disposed at its lower side at the floor level, an electric motor within the casing and supported on said panel, and a co-axial centrifugal blower, said vertical panel being provided with air intake orifices communicating directly with the air outside the casing in the room in which the device is located.

2. A unitary self-contained air-circulating device comprising a casing within which the entire device is enclosed, said casing being vertically disposed within the wall of a room and so that its front vertical face is in the general plane of the room wall, a vertical panel mounted on the casing and constituting its front wall at the floor level, a motor directly mounted on said panel about centrally of its length within the casing, a pair of blowers mounted on shaft extensions at opposite sides of said motor, said panel being provided with a plurality of sets of air-intake orifices arranged in pairs, one pair co-operating with each blower, the orifices of each pair being disposed outside the planes bounding the path of rotation of the associate blower so that the blower is protected by the panel from direct exposure to the interior of the room, air directing devices providing passages for carrying air from the outer sets of orifices axially inward to the associate blowers, and air-discharge openings at the upper portion of the casing in the general plane of its front wall.

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