

[54] **AIR CURTAIN SYSTEM**

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[58] Field of Search **98/36; 62/265**

[56] **References Cited**

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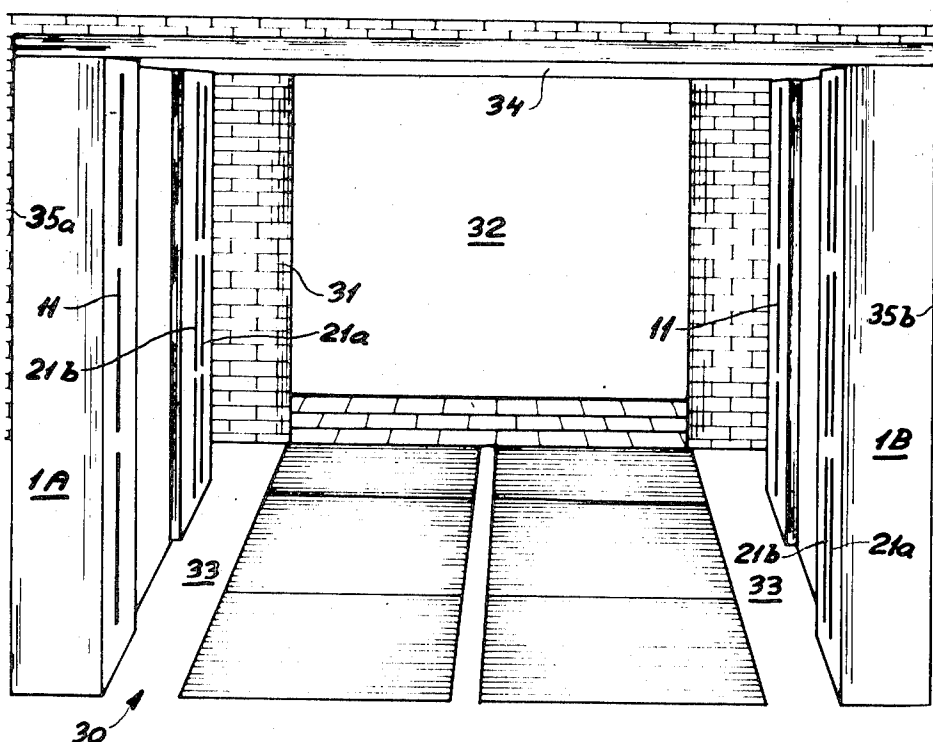
Attorney, Agent, or Firm—Fleit & Jacobson

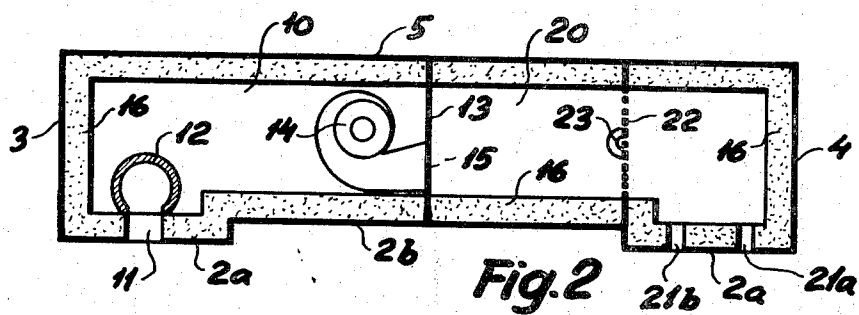
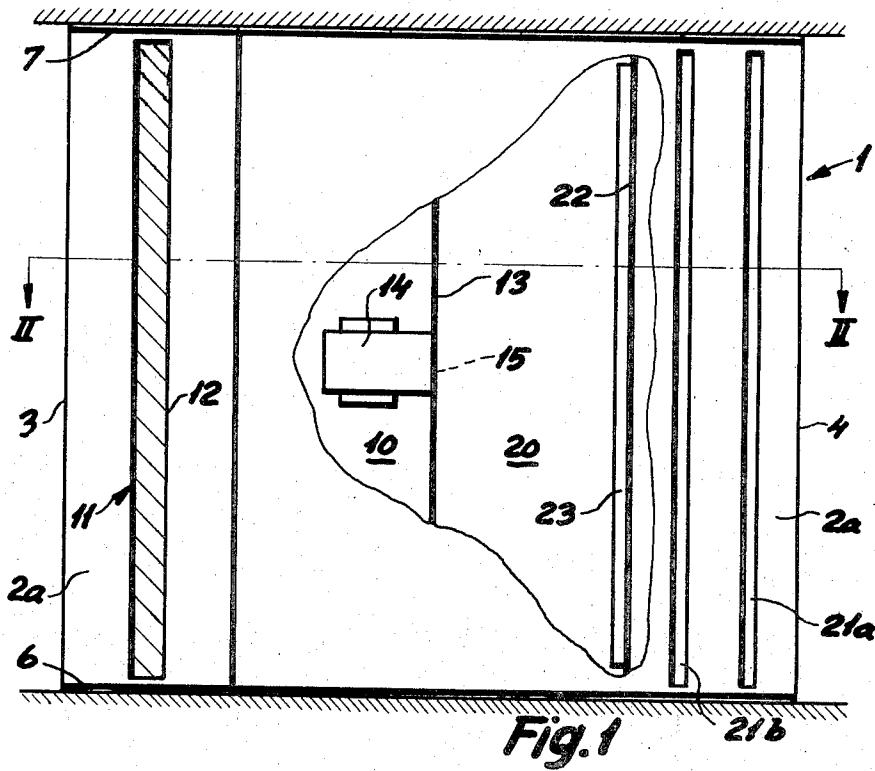
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ABSTRACT

An air curtain in the form of a cyclone is generated in an air chamber adjacent a door opening and comprising a ceiling and a pair of side walls extending at right angles to the door opening at either side thereof. The air cyclone is generated by one or a pair of blower units in the shape of an elongated cabinet having substantially the same length and height as the air chamber and being disposed adjacent one or both side walls thereof. Each blower unit includes a blower mounted on a partition within the cabinet dividing the same into a suction chamber communicating with an air intake aperture extending in the full height of the cabinet and a pressure chamber communicating with a pair of exhaust apertures likewise extending in the full height of the cabinet. The blower units are arranged in the air chamber, so as to generate air currents at either end thereof in the transverse direction of the air chamber suitable for setting up a cyclone-whirl air curtain therein.

5 Claims, 5 Drawing Figures





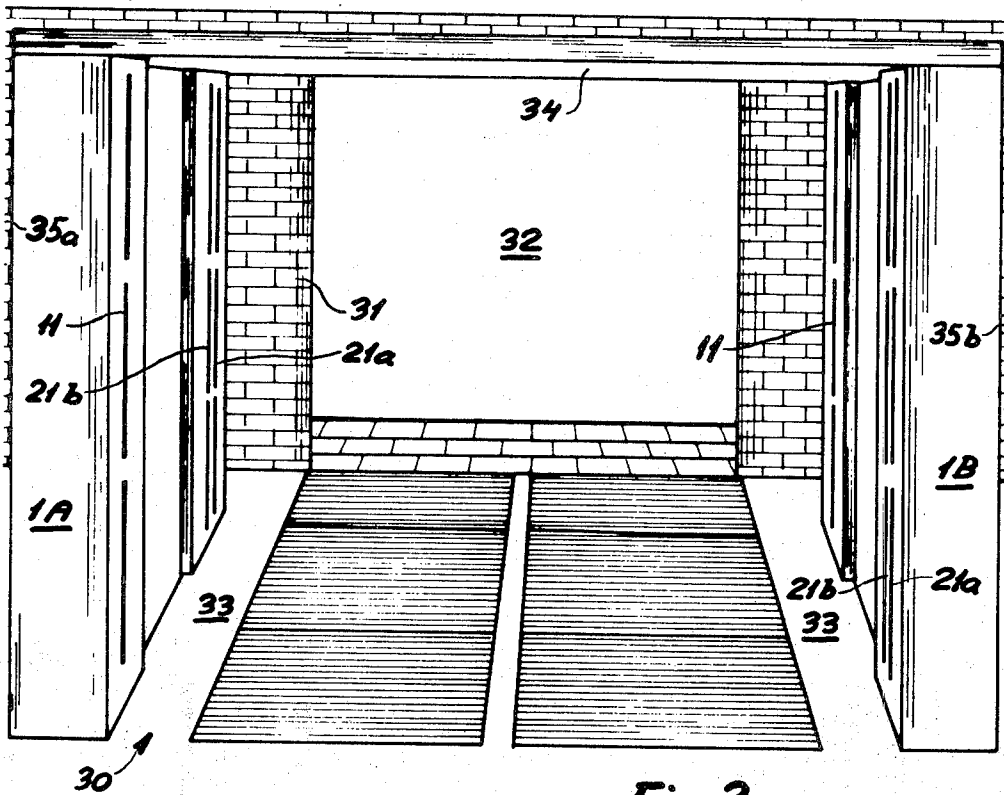


Fig. 3

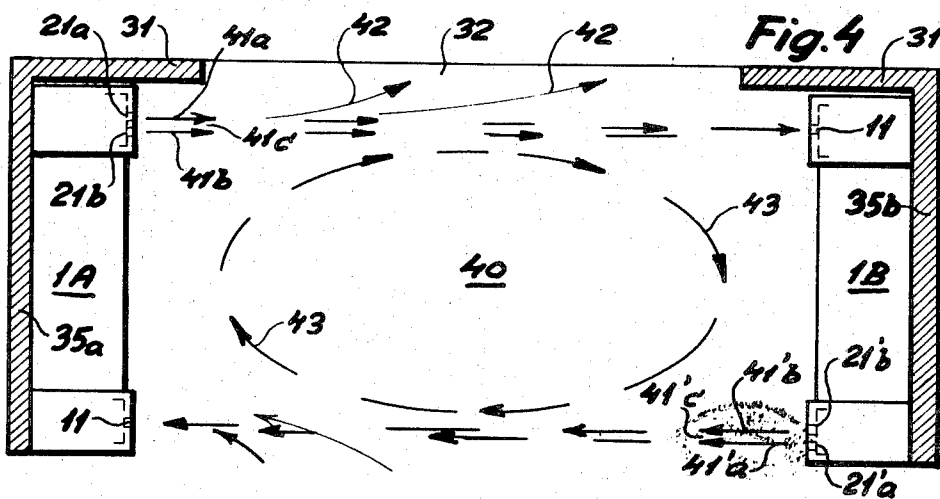


Fig. 4

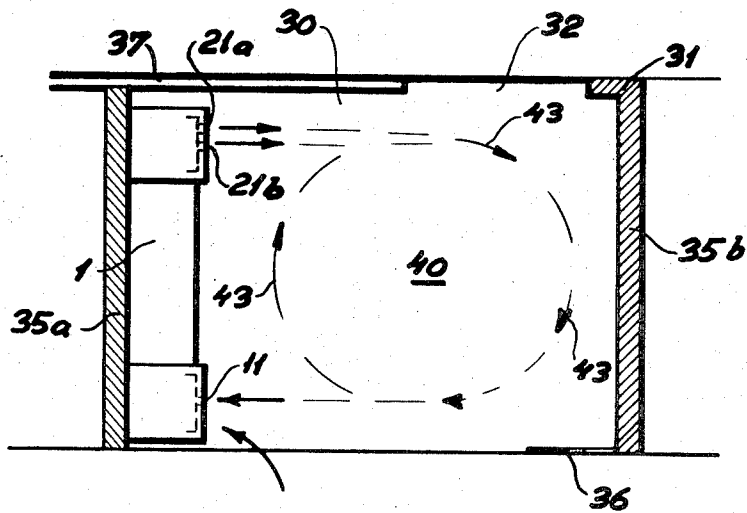


Fig. 5

AIR CURTAIN SYSTEM

This invention relates to a system for generating an air curtain behind a door opening in a room, so as to prevent or very substantially reduce air currents flowing through the door opening into the room or from the room to the exterior.

Experiments with air curtain systems known in prior art, and, in particular, systems for setting up an air curtain comprising two spaced-apart paths for air currents from each side across a door opening, i.e. in the transverse direction thereof, have shown that although such air curtains do provide some protection against inflow and outflow of air through the door opening (draught), the stability of such air curtains is insufficient for maintaining an efficient prevention of draught currents through the door opening.

The main object of the invention, therefore, is to provide means for increasing the stability and efficiency of air curtains of the kind referred to.

A further object of the invention is to provide a blower unit suitable for setting up a stable and efficient air curtain behind a door opening, said blower unit being made as an article of manufacture ready to be installed adjacent the door opening, neatly and inconspicuously arranged therebehind and without requiring any air ducts or other constructional modifications in or near the doorway.

With these and other objects in view, as will appear from the following specification and claims, the invention will now be described with reference to the drawings, wherein

FIG. 1 is an elevation partly in section showing a blower unit according to the invention,

FIG. 2 is a cross section taken substantially on line II-II in FIG. 1,

FIG. 3 is a perspective view of an air chamber arranged behind a door opening for setting up an air curtain,

FIG. 4 is a schematic plan view showing the flow of air currents within the air chamber of FIG. 3 for setting up an air curtain therein, and

FIG. 5 is a schematic plan view similar to FIG. 4 showing air flows in an air chamber comprising one blower unit.

Referring to FIGS. 1 and 2, numeral 1 indicates a blower unit in the form of a cabinet having a front wall 2a and 2b, end walls 3 and 4, a back wall 5, a bottom wall 6 and a top wall 7. The interior of this cabinet which may be made of steel sheets or any other suitable material is divided by a partition 13 into two main chambers, viz. an air intake chamber 10 and a pressure chamber 20. An air intake slot 11 is provided in the portion 2a of the front wall adjacent the end wall 3 and extends vertically substantially throughout the entire height of the cabinet. An air filter 12 is located in the intake chamber 10 adjacent the slot 11. An aperture 15 is provided in the partition 13, and a centrifugal blower 14 is mounted on the partition 13, the exhaust side of which communicates with the aperture 15, so as to enable air passing through the slot 11, filter 12 and the intake or suction chamber 10 to be blown into the pressure chamber 20. In this chamber there is provided a second partition 22 comprising a plurality of perforations, and a heating or cooling element 23 extending substantially throughout the entire height of the cabinet is mounted on the partition 22, which provides for

an even distribution of the air pressure in the portion of the pressure chamber 20 adjacent the end wall 4. In the frontwall 2a adjacent the end wall 4 there are provided a pair of exhaust slots 21a and 21b extending substantially throughout the entire height of the cabinet. The inner surface of the walls of the cabinet is provided with a lining 16 of a suitable sound damping material adapted to ensure a substantially noiseless operation of the blower unit.

Referring now to FIGS. 3 and 4, the numeral 30 generally indicates an air chamber located behind an outer wall 31 having a door opening 32. This air chamber which is provided for the purpose of generating an air whirl in the interior thereof is defined by a floor 33, a top wall or ceiling 34 and side walls 35a and 35b, and a blower unit as shown in FIGS. 1 and 2 is arranged in the air chamber 30 along each of the side walls 35a and 35b, the arrangement being such that the height of each of the cabinets 1A and 1B is substantially equal to the height of the air chamber, and the lengths of the cabinets is substantially equal to the length of the side walls 35a and 35b. Furthermore, the two cabinets are positioned in such a manner that the exhaust slots 21a and 21b of one cabinet are located opposite the intake slot 11 of the other cabinet.

With this arrangement of the blower units within the air chamber, the blower units, when in operation, will set up air currents as illustrated by the arrows in FIG. 4. The exhaust currents 41a and 41b generated by the blower unit 1A adjacent side wall 35a will flow across the door opening 32 towards the intake slot 11 of the other unit 1B. It has been found that when using two exhaust slots 21a and 21b instead of one, the corresponding air currents 41a and 41b will have a tendency of converging on their way across the door opening which will result in increased stability of the resulting air flow 41c. A relatively small portion 42 of the air flow will tend to pass out through the door opening 32, and although this portion does not directly contribute to the generation of an air whirl 40 in the interior of the air chamber, it will nevertheless be useful in that it will counteract an inflow of air through the door opening, thereby contributing to the stabilization of the rotating currents in the air chamber 30. This rotational movement of the air volume within the air chamber is enhanced by the exhaust currents 41'a and 41'b from the blower unit 1B resulting in the rotating air curtain 43 generating the whirl 40 therein. It will be understood that due to the depression inside the cyclone 43 this air curtain will efficiently prevent draught currents from passing through the air chamber.

Referring finally to FIG. 5, which is a schematic plan view similar to FIG. 4, this figure shows a simplified embodiment of the air chamber comprising only one blower unit located adjacent the side wall 35a and having a screen wall 36 extending at right angle to the side wall 35b. A slideable glass door 37 may be arranged adjacent the door opening 32, preferably of the type which automatically opens when a person approaches the door opening from the outside. A similar door arrangement may also be provided in the embodiment shown in FIGS. 3 and 4.

Finally, it should be noted that, in the embodiment of FIGS. 3 and 4, the generation of the cyclone 43 may be further enhanced by operating the blower unit 1A at a greater speed than that of the unit 1B.

What is claimed is:

1. An air curtain system comprising a room having an outer wall and a door opening therein, an air chamber intermediate said door opening and said room and having a floor, a ceiling, and a pair of side walls extending from the door opening into the room at right angles to the outer wall, and at least one blower unit adjacent one side wall of said air chamber, said blower unit extending in a horizontal direction substantially through the entire length of the air chamber and extending in a vertical direction substantially from the floor to the ceiling, and comprising an elongated cabinet of substantially rectangular cross section having bottom and top walls, a pair of side walls and a pair of end walls, cyclone means for developing a cyclone of air in said air chamber, said cyclone means comprising an air intake aperture in one of said side walls adjacent one of said end walls, and a pair of exhaust apertures in said side wall adjacent the other end wall, spaced in a horizontal direction from said intake aperture by a distance so that the air traveling from said exhaust apertures interacts with the air traveling to said intake aperture so as to form said cyclone of air therebetween, said apertures extending in the full height of the cabinet from the bottom wall to the top wall thereof, a partition in said cabinet intermediate said intake and exhaust apertures dividing the cavity of the cabinet into an air intake chamber and an exhaust chamber, an aperture in said partition, and a blower mounted on said partition

adjacent the aperture therein.

2. An air curtain system as recited in claim 1, wherein a single blower unit is disposed along one side all of the air chamber, and wherein said blower unit includes a pair of exhaust apertures located adjacent the door opening.

3. An air curtain system as recited in claim 1, comprising a pair of blower units disposed in the air chamber along opposite side walls thereof.

4. An air curtain system as recited in claim 3, wherein each of said blower units comprises at least one exhaust slot adjacent one end thereof and one intake slot adjacent the other end thereof, the arrangement of said blower units being such that the exhaust aperture of one unit is located opposite the intake slot of the other unit.

5. An air curtain system as recited in claim 1, wherein a first blower unit is disposed along one side wall of the air chamber having a pair of exhaust apertures located adjacent the door opening, wherein a second blower unit is disposed along the other side wall of the air chamber having its intake aperture located adjacent the door opening substantially in alignment with the exhaust apertures of said first blower unit, and wherein said first blower unit operates at a higher speed than said second blower unit.

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