H. H. CUMMINGS.

AIR SCREEN.

APPLICATION FILED JULY 10, 1913.

1,279,993.

Patented Sept. 24, 1918.

4 SHEETS—SHEET 1.

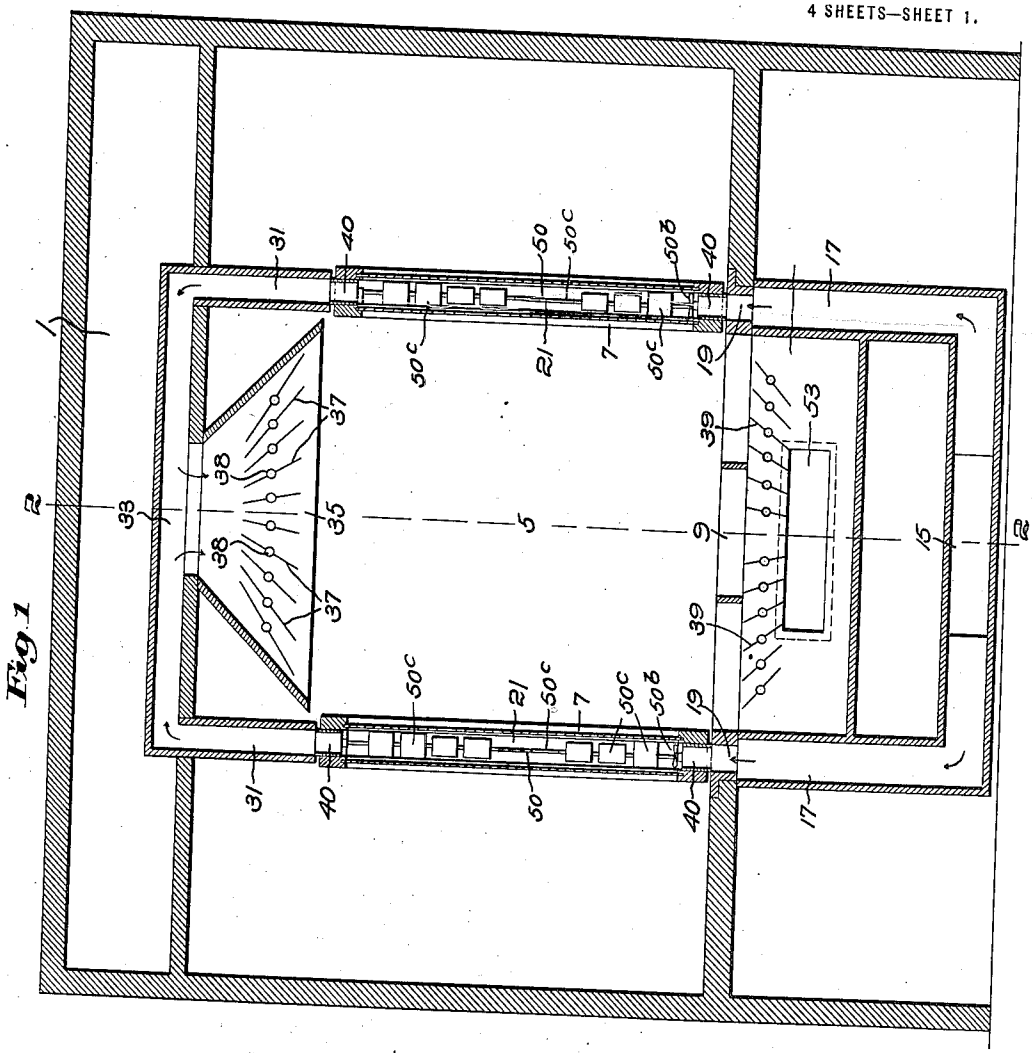


Fig. 1

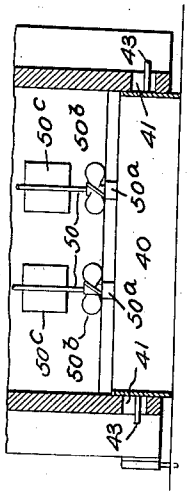


Fig. 5

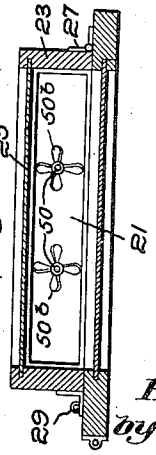


Fig. 6

Witnesses:
Franklin E. Low.
Carl L. Choate.

Inventor:
Henry H. Cummings.
by Emery, Booth, Janney & Varney
Attys.

H. H. CUMMINGS.

AIR SCREEN.

APPLICATION FILED JULY 10, 1913.

1,279,993.

Patented Sept. 24, 1918.

4 SHEETS—SHEET 2.

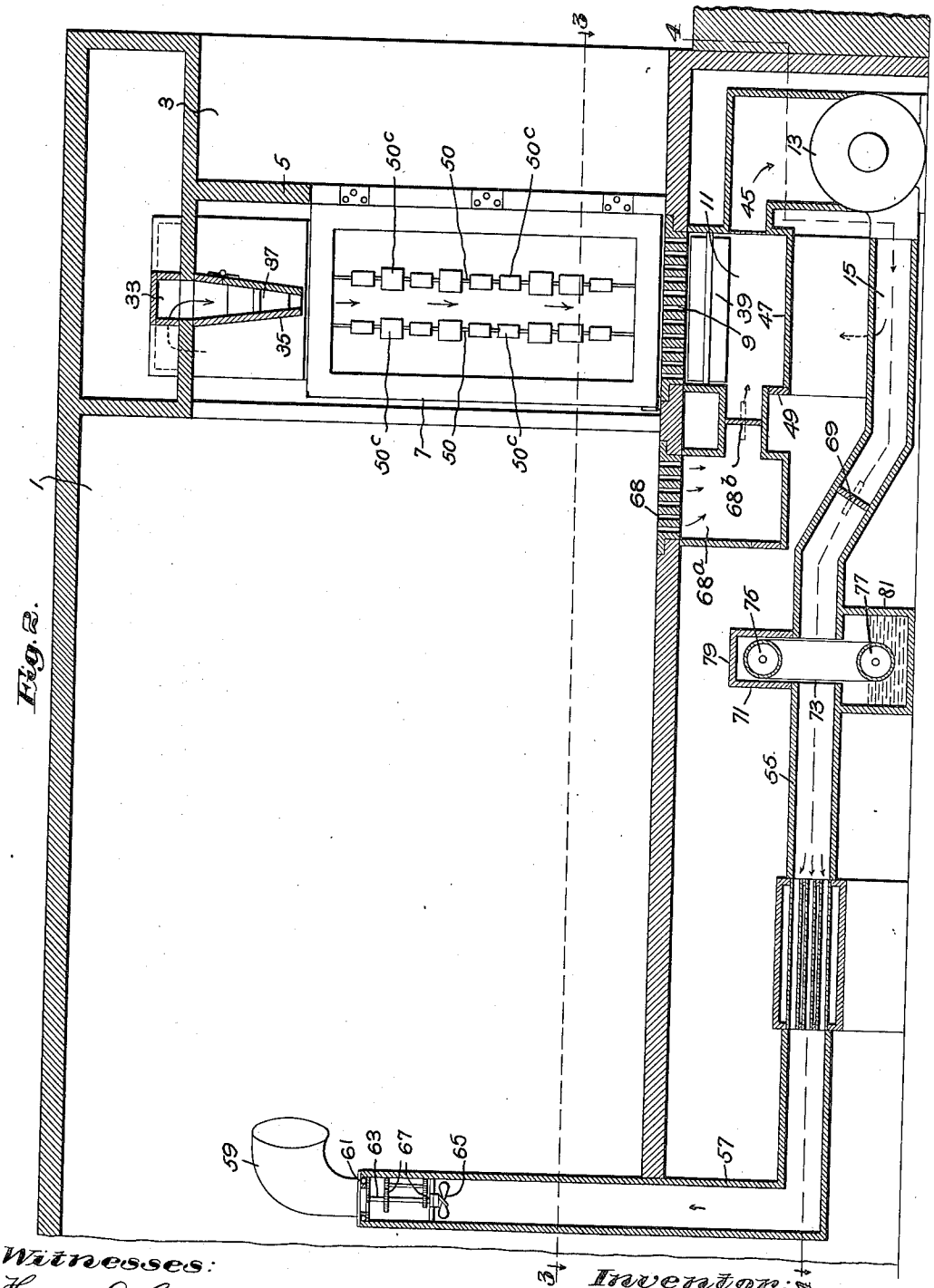


Fig. 2.

Witnesses:
Horace A. Grosman.
Carl L. Choate.

Inventor:
Henry H. Cummings
by Emery, Booth, Janney & Varney
Attys

H. H. CUMMINGS.

AIR SCREEN.

APPLICATION FILED JULY 10, 1913.

1,279,993.

Patented Sept. 24, 1918.

4 SHEETS—SHEET 3.

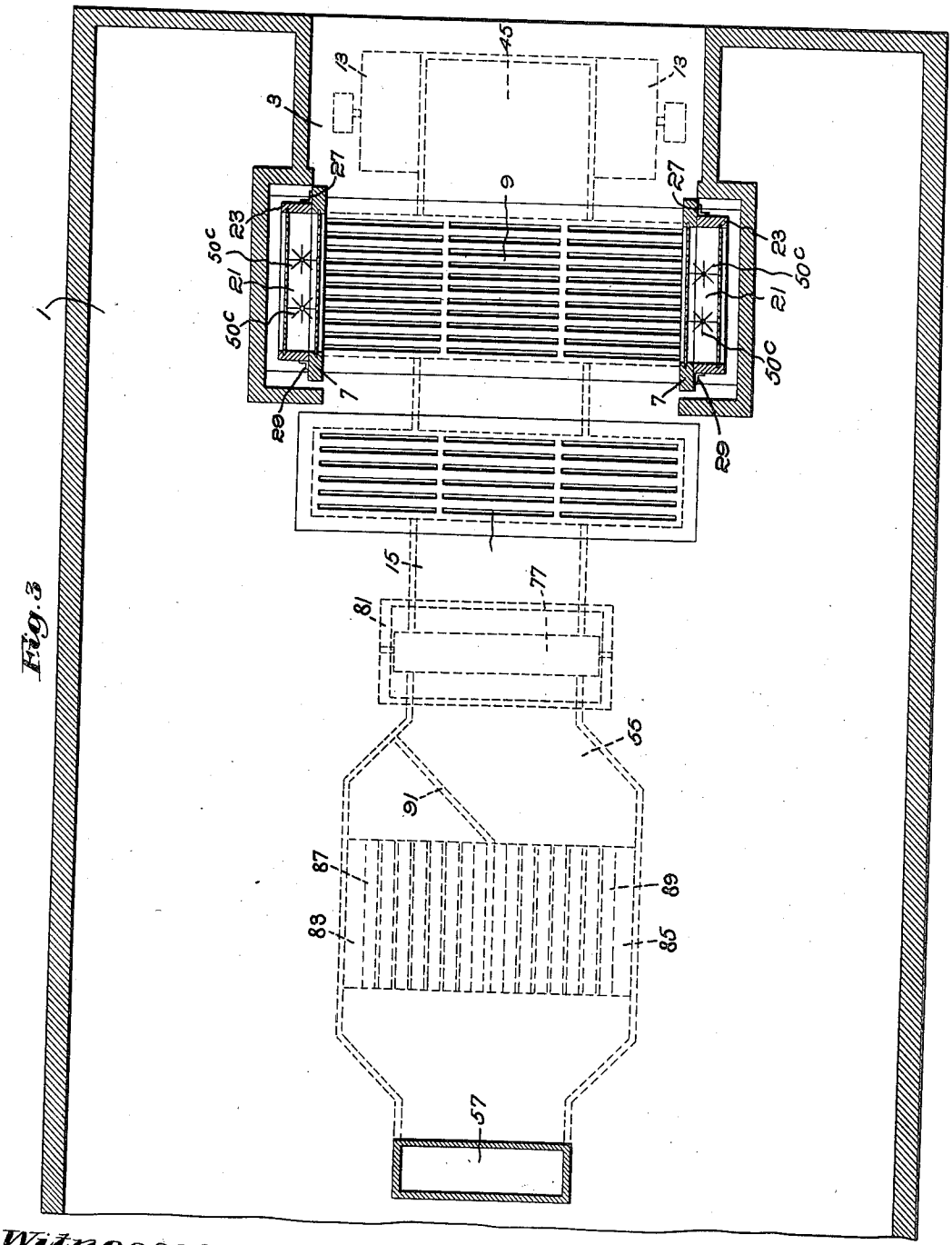


Fig. 3

Witnesses:
Horace A. Crossman
Carl L. Choate.

Inventor:
Henry H. Cummings.
by Emery, Booth, Janney & Varney
Attys

H. H. CUMMINGS.

AIR SCREEN.

APPLICATION FILED JULY 10, 1913.

1,279,993.

Patented Sept. 24, 1918.

4 SHEETS—SHEET 4.

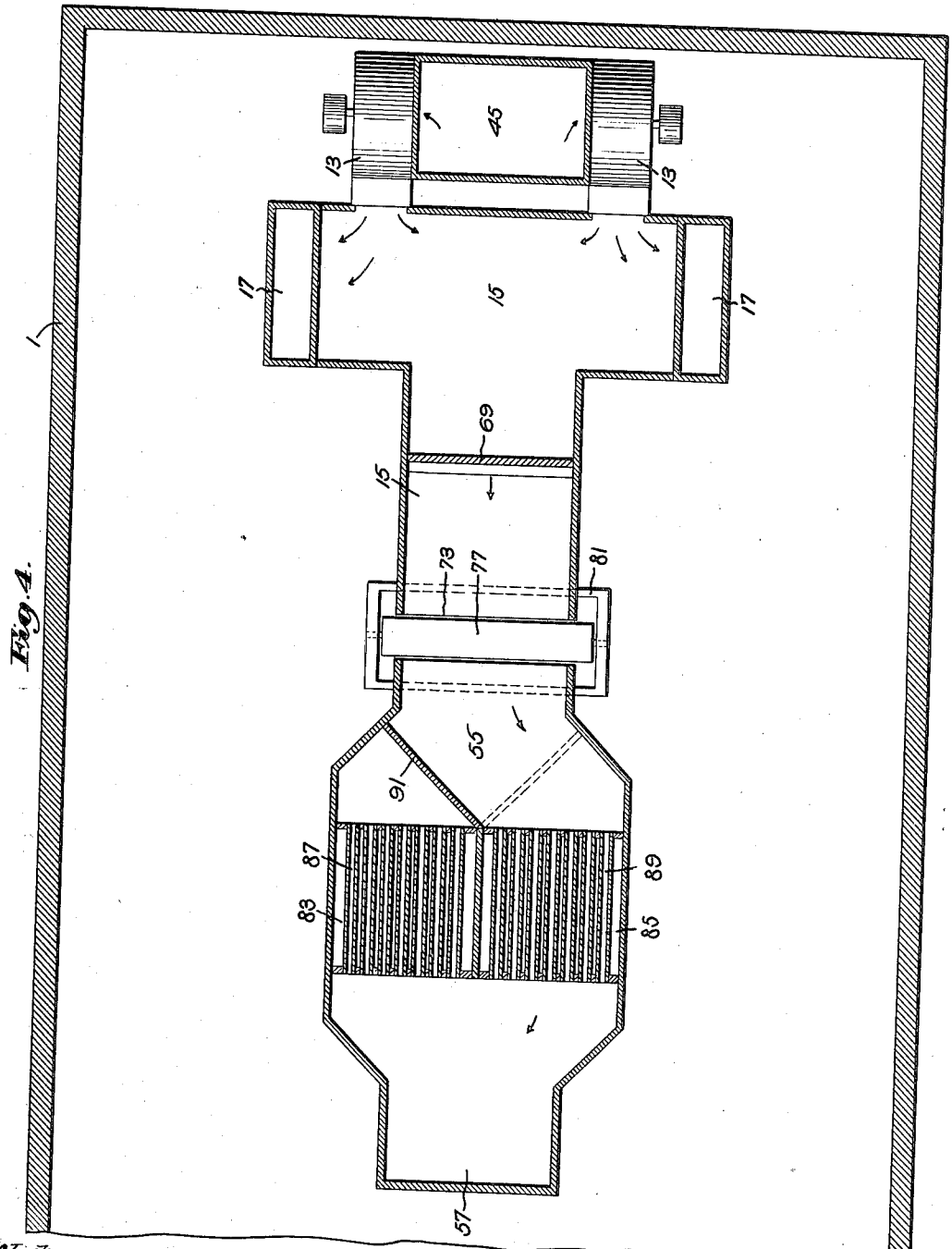


Fig. 4.

Witnesses:
Franklin E. Lowe
Carl L. Choate

Inventor:
Henry H. Cummings.
by Emery, Booth, Janney & Varney
Attys

UNITED STATES PATENT OFFICE.

HENRY H. CUMMINGS, OF NEWTON, MASSACHUSETTS.

AIR-SCREEN.

1,279,993. Specification of Letters Patent. Patented Sept. 24, 1918.

Application filed July 10, 1913. Serial No. 778,303.

To all whom it may concern:

Be it known that I, HENRY H. CUMMINGS, a citizen of the United States, and a resident of Newton, Massachusetts, have invented an Improvement in Air-Screens, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to air screens, such for example as disclosed in Letters Patent No. 983,877 granted to me February 14, 1911; and among other objects provides improvements in mechanism for producing the air screen, and ventilation and other devices coöperating therewith.

One of the important uses of the invention is as a substitute for the revolving doors which are commonly used in the doorways of hotels, stores and other places to keep out drafts and dust. These doors are objectionable for a number of reasons. Among others, they are slow and dangerous in operation, being liable to impede, catch and injure persons passing through them.

The air screen to be described enables the door to be left wide open and unobstructed so that persons may pass freely therethrough without hindrance or danger and at the same time constitutes a sufficient barrier to prevent drafts and dust from entering the room.

The character of the invention may be best understood by reference to the following description of an illustrative embodiment thereof shown in the accompanying drawings, wherein:

Figure 1 is a transverse section through a room having a doorway equipped with an illustrative air screen apparatus embodying the invention;

Fig. 2 is a vertical longitudinal section taken on line 2—2 of Fig. 1;

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 2; and

Figs. 5 and 6 on an enlarged scale are sectional details to be referred to.

Referring to the drawing, 1 designates a room having a vestibule 3 in which is a doorway frame 5 provided with doors 7, 7 hinged thereto, more fully hereinafter described.

An illustrative apparatus for producing an air screen or veil in the form of a sheet of air flowing from the top of the doorway downward to the threshold of the doorway will now be described. This apparatus includes an apertured threshold in the doorway frame, herein in the form of a grille plate 9 (Fig. 2) of metal or other suitable material set in the base of the doorway frame and communicating with an inlet duct 11 leading to one or more fans 13 of usual construction driven by an electric motor or other suitable source of power not shown. To receive the air from the fans there is provided a horizontal duct 15 extending beneath and parallel to the threshold plate 9 and communicating with risers 17 (Figs. 1 and 4) registering with mouths 19 in the threshold plate 9, referred to.

The air is sucked by the fan down through the grille threshold 9 through the duct 11 and forced by the fan through the duct 15, thence upwardly through the risers 17 and plate mouths 19.

An important feature of the invention relates to simple and effective means for conducting the air from said mouths to the top of the doorway. To this end the doors 7 referred to are made hollow to constitute air conducting passageways 21. A usual door may be readily equipped with such a passageway by superposing on a face thereof a three sided box or compartment 23 (Fig. 6) preferably having a glass panel 25 opposite the glass panel of the door proper. To permit convenient access to the interior of this compartment it may be connected to the door proper by hinges 27 and secured in closed position by an appropriate latch 29.

Registering with the passageways thus formed in the doors are upper hollow risers 31 communicating with a horizontal passageway 33, the latter in turn communicating with an elongated hood or discharge outlet 35 extending substantially the entire width of the doorway and flared laterally properly to deliver the air therefrom.

To assist in directing and controlling the air discharged from this outlet it may be provided with a series of deflecting vanes 37 fulcrumed on pins 38 mounted in the hood and held in their positions of adjustment by their frictional engagement with said pins. As shown herein, these vanes radiate from the entrance end of the hood toward the discharge end.

To control and distribute the air entering the inlet duct 11 it may be provided with a

series of vanes 39 fulcrumed on pins secured in said duct 11 and held in different positions of adjustment by their frictional engagement with said pins.

To prevent leakage of air between the hollow doorways and the risers with which they communicate the doors may be provided at their upper and lower ends with adjustable internal sleeves 40 (Fig. 5). The outer edges of these sleeves may be of rubber or other appropriate weather strip material to insure tight closure. After the doors have been opened the sleeves are slid outward to their position shown in Fig. 1 and when it is desired to close the doors the sleeves may be slid inward. To permit these adjustments the air passage compartment 23 of each door is provided with elongated slots 41 (Fig. 5) through which project pins or handles 43 frictionally engaging the walls of the slots 41 sufficiently to hold the sleeves in their adjusted positions.

To lock and unlock the doors in their open position their lower ends may be provided with pins 44 for entrance into corresponding holes in the threshold plates 9.

When the doors are swung to their open positions as shown in Figs. 1, 2 and 3, and the fans are started there will be maintained a circulation of air from the grille threshold inlet through the duct 11, horizontal duct 15, thence upward through the risers 17, door passageways 21, upper risers 31, horizontal passageway 33, and through the discharge outlet hood, the air passing thence downward across the open doorway in the form of a sheet-like screen and entering the threshold. Thus a continuous circulation of air may be had, maintaining the air screen barrier across the open door for any length of time desired.

In use, more or less dirt may be drawn down through the threshold 9. To prevent this dirt from being circulated around and deposited on the heads of persons passing through the doorway a screen 45 or other appropriate air cleaning device may be interposed in the inlet duct 11. This will cause the dirt to be arrested and gravitate into a pocket 47 directly beneath the threshold 9. This pocket may be freed from the dirt accumulated therein when desired through a suitable door 49.

The hollow doors and the upward flow of air therethrough may be utilized for receiving and manipulating display devices of different kinds. Herein there is introduced within the door vertical shafts 50 journaled in bearings in upper and lower brackets 50^a connected to the door proper and having thereon propellers 50^b and display cards 50^c, which may have a propeller-like twist. The flow of air through the door acts on the propellers and cards and rotates the shafts and display cards. The speed of these may be varied as desired. These rotating devices by virtue of their movement attract attention and may be provided with any desired advertising matter thereon.

One of the objects of the invention is to provide a temperature controlling and ventilating apparatus in combination with the air screen described. To conduct into the room some of the air thus sucked in by the fans 13 there is provided a duct 55 extending horizontally beneath the floor of the room to and communicating with a riser duct 57 shown herein as projecting upward a substantial distance into the room and provided at its upper end with a discharge horn 59. This horn may be stationary or rotative more effectually to distribute the air into the room as desired. To permit the rotation of the horn it may be mounted on ball bearings 61 and be connected to a vertical shaft 63 driven by a propeller 65 through the medium of a series of speed reduction gears 67. The upward current of air in the riser 57 will act on the propeller 65 and cause the horn 59 to rotate slowly and distribute its contents in the room.

To control the discharge of air from the fan through the duct 55 the latter may be provided with a valve or gate 69 which may be adjusted to permit the passage of any amount of air desired. This gate should be so regulated as to provide a sufficient flow of air to maintain the air screen across the doorway and at the same time permit a proper amount of air to be shunted through the duct 55 for ventilation and temperature controlling purposes.

The downward stream of air composing the air screen tends to drag downward along with it the air inside the room adjacent thereto. This creates a downward whirl or circulation of air which strikes the floor of the room directly back of the threshold 9 and may at times cause an objectionable draft adjacent the floor of the room. To prevent this there is introduced in the floor of the chamber directly back of the grille threshold 9 a second and preferably narrower grille 68 (Figs. 2 and 3) communicating with the duct 11 through a branch duct 68^a. The air is drawn down through this grille by the fans 13 and is forced therefrom and delivered and distributed into the room. Between these ducts there is interposed an adjustable door 68^b which may be opened or closed to permit or prevent the passage of air into said duct 11.

To make certain that only pure air is delivered into the room there may be interposed in the duct 55 an air washing or cleaning apparatus shown conventionally at 71. This apparatus as shown herein comprises an endless apron 73 of appropriate screening fabric mounted on upper and lower rollers 75 and 77, the upper roller be-

ing journaled in a housing 79 and the lower roller being journaled in a vat 81 containing a suitable cleaning liquid. The screen 73 may be fed from time to time to present clean fresh portions across the duct 55.

To heat or cool the air delivered through the duct 55 there may be interposed therein a heating apparatus 83 and a cooling apparatus 85. The heating apparatus may contain tubes 87 heated by hot water, steam or other appropriate means. The cooling apparatus may comprise tubes 89 around which cooled water may be circulated. To permit either the heating or the cooling apparataus to be placed at will into active communication with the duct 55 there is provided a door 91 which may be swung from its position shown in Figs. 3 and 4 where it permits the air to pass through the cooling apparatus to an opposite position shown in dotted lines in which it permits air to pass through the heating apparatus. Thus pure heated or cooled air may be delivered into the room as desired.

At night the air screen is shut off and the solid doors are closed, but during the day the solid doors are opened and form air conducting passages for the air screen. Thus there are provided for the doorway air and solid doors which are interchangeable at will.

It is not indispensable that all of the features of the invention should be used conjointly since some of them may be used separately to advantage.

Having described one illustrative embodiment of the invention, without limiting the same thereto, what I claim as new and desire to secure by Letters Patent is:

1. A room ventilating system comprising in combination an air intake adjacent the threshold of the entrance of the room; a circulatory blower for creating a suction in said intake; an air conducting conduit for conducting air from said blower; and a discharge opening in said conduit for delivering air to the back of the room, whereby the direct flow of cold air through the entrance of said room is intercepted.

2. A room ventilating system comprising in combination an air intake in the floor of the room extending substantially across the threshold of the entrance opening of the room and adjacent said threshold; a circulatory blower for creating a suction in said intake; an air conducting conduit for conducting air from said blower; and a discharge opening in said conduit for delivering air to the back of the room, whereby the direct flow of cold air through the door of said room is intercepted.

3. A room ventilating and temperature controlling system comprising in combination an air intake in the floor of the room extending substantially across the threshold of the entrance opening of the room and adjacent said threshold; a circulatory blower for creating a suction in said intake; an air conducting conduit for conducting air from said blower; air heating means operatively interposed in said conduit; and a discharge for said conduit removed from the entrance of said room, whereby the direct flow of cold air through the entrance opening of said room is intercepted and diverted through said heating means prior to entering said room.

4. In combination, a building having an opening in one of its walls, means for directing a current of air downwardly across the opening, suction means comprising an intake located near the lower side of the opening for receiving said current of air, and a second suction means also comprising an intake located near the lower side of the opening for intercepting the current of air that tends to create a draft adjacent the floor of the building.

5. In combination, a building having an opening in one of its walls, means for directing a current of air downwardly across the opening, suction means comprising an intake located near the lower side of the opening for receiving said current of air, said suction means being arranged to discharge the air within the building, and suction means also comprising an intake located interiorly with respect to the first mentioned intake and near the lower side of the opening for intercepting the current of air that tends to create a draft adjacent the floor of the building.

6. In combination, a building having an opening in one of its walls, means for directing a current of air from above downwardly across the opening, and suction means comprising an intake located near the lower side of the opening for receiving the current of air, said suction means being arranged to discharge the air in the interior of the building.

7. In combination, a building having an opening in one of its walls, means for directing a current of air across the opening, and suction means comprising an intake located near an opposite side of the opening for receiving the said directed current of air, said suction means being arranged to discharge the air into the interior of the building.

8. In combination, a building having an opening in one of its walls, means for directing a current of air from above downwardly across the opening, suction means comprising an intake located near the lower side of the opening for receiving the current of air, said suction means being arranged to discharge said air in the interior of the building, and a suction intake 68 located near the lower side of said opening within

the room of the building into which said opening leads, and means for changing the temperature of the air entering said suction intake 68.

9. A room ventilating and temperature controlling system comprising in combination, an air intake in the floor of the room extending substantially across the threshold of the entrance opening of the room and adjacent said threshold, a circulatory blower for creating a suction in said intake, an air conducting conduit for conducting air from said blower, means operatively interposed in said conduit for changing the temperature of the air passing therethrough, and a discharge for said conduit removed from the entrance opening of said room, whereby the direct flow of air through the entrance opening of said room is intercepted and diverted through said temperature changing means prior to entering said room.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

HENRY H. CUMMINGS.

Witnesses:

HENRY T. WILLIAMS,

ROBERT H. KAMMLER.