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AIR CURTAIN DEVICE FOR DOORWAYS

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My invention relates to devices especially useful in connection with doorways normally open from the exterior into rooms in which are kept materials that should not be contaminated by insects, flying debris or atmospheric dirt. It is difficult to provide a barrier against such contaminants and still to permit easy ingress and egress to and from the room through the barrier so that the materials can readily be handled. Various devices for this purpose are employed and many of them are effective under certain conditions. The prime requirement is that flying insects such as the common housefly, be repelled from the open doorway. Under most circumstances it is satisfactory to provide a descending curtain of rapidly flowing air traveling across the doorway in a vertical direction. Insects do not travel through the air curtain.

It is therefore an object of my invention to provide a device for establishing an air curtain across an open doorway, the device being relatively simple, easily installed and effective in its result.

Another object of the invention is to provide an air curtain device which is light enough to be moved from time to time from one doorway to another.

A still further object of the invention is to provide a device for furnishing an air curtain, the device being substantially enclosed and unitary for ease in installation.

Another object of the invention is to provide an air curtain device of small dimensions but of considerable effectiveness over the entire doorway opening.

Another object of the invention is to provide an air curtain device in which the air currents are effective to maintain the device at a satisfactory operating temperature.

A still further object of the invention is in general to provide an improved air curtain device for a doorway and also to provide an improved air curtain.

Other objects, together with the foregoing, are attained in the embodiment of the invention described in the accompanying description and illustrated in the accompanying drawings, in which:

FIGURE 1 is an isometric view showing the structure of my invention as it is conventionally installed above a doorway of the type usually encountered.

FIGURE 2 is a cross section on a horizontal plane through the structure illustrated in FIGURE 1, the plane of section being indicated by the line 2—2 of FIGURE 1.

FIGURE 3 is a transverse cross section on a vertical plane through the device of FIGURE 1, the plane of section being indicated by the line 3—3 of FIGURE 2.

While the construction of the device of the invention can be varied in accordance with the particular environment in which it is to be utilized, it has successfully been incorporated as described and illustrated herein primarily for use on the usual rectangular doorway used as an ingress and egress opening between the outside and an interior storage room. The standard doorway includes an opening 12 defined by a side wall 13, a side wall 14 and a top wall 16.

Pursuant to the invention, preferably the exterior side of the walls 13, 14 and 16 above the opening 12 is provided with fasteners 21 and 22 holding in place an elongated enclosure 23, which is at the same time the frame or structural portion of the air curtain mechanism. The enclosure 23 is considerably longer than it is wide or

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high and preferably is formed in cross section, as shown in FIGURE 3, of a single sheet, preferably of metal which is rolled up into approximately a square cross section.

Intermediate its ends, and preferably much closer to one end than to the other, the enclosure 23 is provided with a pair of side channels 24 and 26, each being secured to one of the side walls 27 and 28 incorporated in the enclosure 23.

Designed slidably to fit between the channels 24 and 26 is a barrier 31 conveniently made of a stiff metallic plate supported well enough by the channels to serve as a base for a fan housing 32. The housing 32 is conveniently of scroll form and has an outlet 33 opening through the barrier 31 and has a pair of inlets 34 and 36 at opposite sides thereof. In effect, the fan housing and the barrier 31 separate the enclosure 23 into a relatively long plenum chamber 36 and a relatively short fan chamber 37.

Mounted on the fan housing 32, and thus supported from the enclosure 23, is a motor 38 connected directly to rotate a fan rotor 39 aligned with the openings 34 and 36 so that the fan tends to draw air into such openings and to discharge the air tangentially through the outlet 33. The enclosure 23 opposite the opening 36 has a screened inlet 41 and the end of the enclosure also has a screened inlet 42 so that there is adequate way of access for atmospheric air to the interior of the fan chamber 37. So that the combined fan housing 32, the motor 38 and the fan 39 can be installed and removed from the enclosure 23 as a unit, the top of the enclosure has a removable panel 43. This is secured in place by removable fastenings 44 and is of sufficient size so that the motor, fan and housing assembly can be withdrawn there-through when the barrier 31 is extracted from the housing 23.

The plenum chamber 36 is of such a volume, and is so located with respect to the fan, that the velocity energy of the air emerging from the discharge of the fan is substantially all converted into pressure energy. The air thus under substantially uniform pressure within the chamber 36 discharges with uniformity through a discharge opening 46. This extends for substantially the full length of the chamber 36 and preferably is formed by turning back the otherwise unconfined edges 47 and 48 of the material of the enclosure. There is afforded a relatively smooth lipped discharge orifice for the full length of the chamber 36, although an orifice of relatively narrow width. It has been found experimentally that the flow out of the orifice 46 is substantially improved when the edges 47 and 48 are outwardly turned to form, in effect, a discharge nozzle.

In operation, the motor is energized and air is drawn into the fan chamber through the openings 41 and 42 and is discharged from the fan into the plenum chamber 36 and then through the outlet 46, flowing downwardly in a uniform fashion over the opening 12 of the door. The air velocity is sufficient to drive away and to prevent insects and other atmospheric debris entering through the doorway 12, while allowing easy traverse to cargo.

What is claimed is:

1. An air curtain device for doorways comprising a hollow elongated housing having a top wall with a removable portion and a bottom wall and having upright side walls, said housing being closed except for air inlet means adjacent one end of said housing and except for air outlet means extending along the bottom of said housing, a pair of facing side channels secured to said upright side walls respectively beneath said removable portion, a barrier plate extending to said top and bottom walls and slidably supported within said channels and with said channels dividing said housing into a plenum cham-

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ber open to said outlet means and a fan chamber open to said inlet means, said barrier plate having an opening therein, a fan housing mounted on said barrier plate coextensive with said opening and extending into said fan chamber, there being communication between said plenum chamber and said fan chamber through said opening and said fan housing, and a fan mounted in said fan housing and effective when operating to move air from said fan chamber into said plenum chamber, said fan housing and said barrier plate being below said removable portion.

2. An air curtain device for doorways comprising a hollow elongated housing having a top wall with an aperture therein and a bottom wall and having upright side walls, said housing being closed except for air inlet means adjacent one end of said housing and except for air outlet means extending along the bottom of said housing, a pair of facing side channels secured to said upright side walls respectively beneath said aperture, a barrier plate extending to said top and bottom walls and slidably supported within said housing and dividing said housing into a plenum chamber open to said outlet means and a fan chamber open to said inlet means, said barrier plate having an opening therein, a fan housing mounted on said barrier plate coextensively with said opening and extending into said fan chamber, a cover panel removably mounted on and forming part of said housing covering said aperture and overlying said barrier plate and said fan housing, and a fan mounted in said fan housing and

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effective to move air from said fan chamber through said fan housing and into said plenum chamber.

3. An air curtain device for doorways comprising an elongated housing rectangular in cross section and having a top wall with an aperture adjacent one end thereof and a bottom wall and side walls, said housing being closed except for air inlet means adjacent said end and except for air outlet means extending along a portion of said bottom wall, a pair of channels disposed beneath said aperture and each extending upright on a respective one of said side walls, a barrier plate slidably engaging said channels and extending to said bottom wall and said top wall, said barrier plate having an opening therein, a fan housing mounted on said barrier plate around said opening therein, said fan housing extending toward said one end and being disposed beneath said aperture, a fan mounted in said fan housing, and a cover panel overlying said barrier plate and said fan housing and covering said aperture.

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