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C. PRUDHON

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BACK DRAFT DAMPER FOR EXHAUST FANS

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Fig. 1.

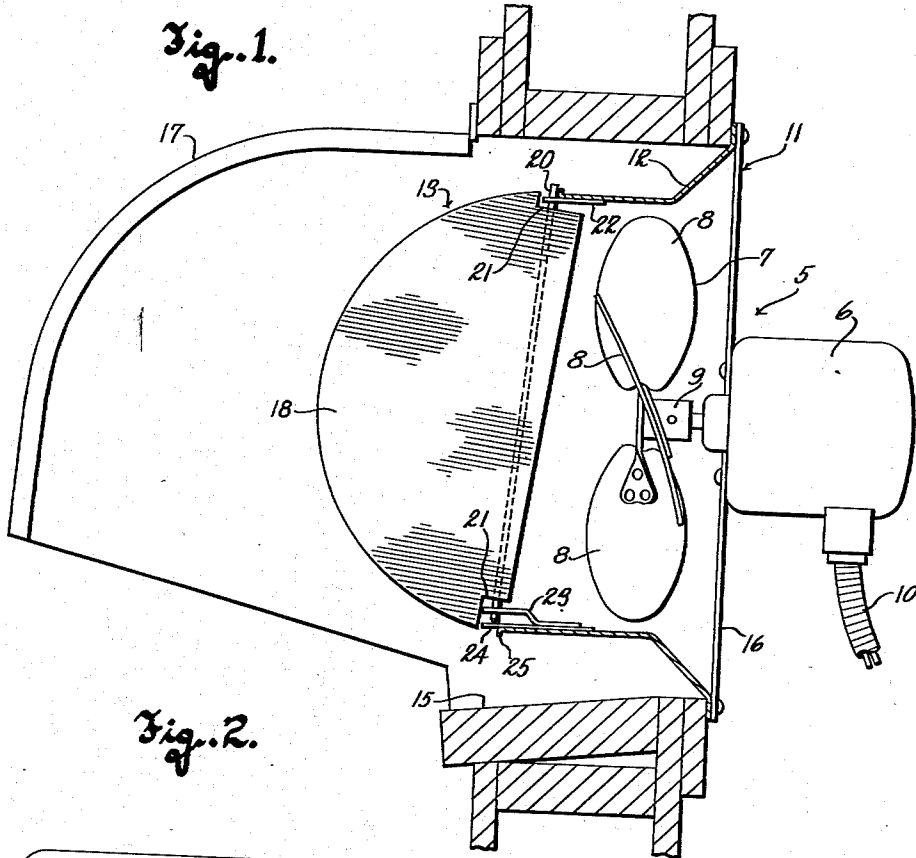
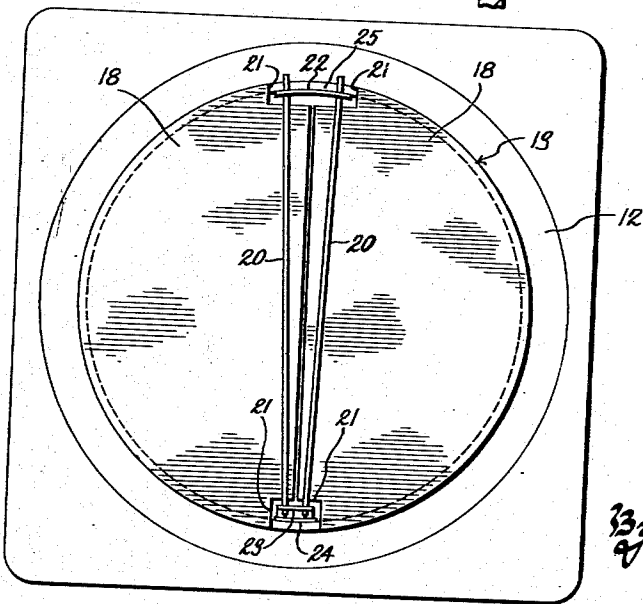


Fig. 2.



Inventor  
Clark Prudhon  
324 DuPont Jones  
Attorney

# UNITED STATES PATENT OFFICE

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## BACK DRAFT DAMPER FOR EXHAUST FANS

Clark Prudhon, Fort Atkinson, Wis., assignor to  
Pruden Products Co., Fort Atkinson, Wis., a  
corporation of Wisconsin

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1 Claim. (Cl. 98—116)

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This invention relates to ventilating apparatus and refers more particularly to a back draft damper for exhaust fans and the like.

Exhaust fans of the type to which this invention is particularly applicable are frequently used in poultry houses and similar quarters for livestock, where they are employed to expel warm air from the inside of the structure whenever the temperature therein rises above a predetermined value. Such fans, by exhausting warm, stale air to the outside of the house, cause fresh air to be drawn in through the various cracks and crevices which normally exist in such a structure, and in consequence the air inside the shelter is kept at a relatively constant temperature level and—by reason of constant circulation—the formation of dampness due to humidity condensation is effectively prevented.

A fan employed for this purpose is normally mounted in an aperture in a wall of the building and is controlled by means of a thermostatic switch inside the shelter. Because the fan works only intermittently there are frequent periods of time during which it would be possible for cold air from outside the building, along with rain, snow or other precipitation carried thereby, to enter the building through the fan opening. While the fan is in operation, of course, outside air is constantly driven away from the vicinity of the fan outlet duct by the force of the stream of exhaust air expelled by the fan.

In view of these conditions it is an object of this invention to provide an automatic back draft damper for an exhaust fan which will in effect operate as a check valve to close the exhaust air duct at a point downstream from the fan rotor at times when the fan is not operating, to thus prevent outside air from entering the building through the fan duct aperture, and to open automatically in response to the flow of exhaust air generated by the fan when it is operating.

Another object of this invention resides in the provision of an unusually simple and reliable automatic back draft damper for the outlet duct of an exhaust or ventilating fan of the character described.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claim, it being understood that such changes in the precise embodiment of the hereinafter disclosed invention may be made as come within the scope of the claim.

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The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a sectional side view of an exhaust fan having the back draft damper of this invention installed in the outlet duct thereof, the damper being shown in its open position; and

Figure 2 is a front elevational view of the damper of this invention installed in the outlet duct of an exhaust fan and shown in closed position.

Referring now more particularly to the accompanying drawing, in which like numerals designate like parts throughout the several views, the numeral 5 designates generally an exhaust fan of the conventional type wherein an electric motor 6 turns a rotor 7 consisting of a plurality of pitched blades 8 mounted on a hub 9 secured to the motor shaft.

The motor is of course connected by means of conductors 10 to a suitable source of electric current and may be controlled by means of a thermostat (not shown).

The fan is mounted in a housing 11 which comprises a duct 12 having the back draft damper 13 of this invention installed therein. This housing, which is normally fabricated of sheet metal and the configuration of which is well known to those skilled in the art, is secured to a window or other suitable outlet opening 15 in the building to be ventilated.

The fan is mounted at the interior of the housing by having its motor secured to a pair of straps 16 which extend across the duct inlet, with the motor shaft extending outwardly so that the fan rotor operates in the throat of the duct 12.

A suitable hood 17, secured to the outside of the building, shelters the outlet of the exhaust fan aperture so as to protect the duct opening from rain and snow, particularly in severe weather during intervals when the fan is not operating. However, more complete assurance against the entry of outside air and precipitation is afforded by the back draft damper 13 of this invention which automatically closes the fan aperture substantially completely whenever the fan is turned off.

This damper comprises a pair of flat semi-circular wings 18 mounted with their straight edges vertical and closely adjacent to one another and in a manner permitting them to swing freely, flatwise, toward and from a closed posi-

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 tion in which they are coplanar. A rod 20 is flatwise secured to each of the wings, near its straight edge and nearly, but not exactly, parallel thereto. The curved edges of the wings are notched adjacent their straight edges, as at 21, so that the ends of the rods project beyond the wings to provide trunnions, said projecting ends of the rods being journaled in suitable holes in brackets 22 and 23 secured to the top and bottom of the duct 12, near the outlet thereof. The lower bracket 23 has its outer end portion offset upwardly, and the rounded lower ends of the rods ride on the upper surface of an arm 24 which is fastened between the inner end of the lower bracket and the duct. The arm 24 thus provides a relatively frictionless bearing support for the rods to enable the wings to swing freely.

The bearing holes in the brackets 22 and 23 are so disposed with respect to one another and the rods that the force of gravity will at all times act upon the wings to swing them inwardly toward their coplanar or closed position. More specifically, the two rods are disposed in a common plane substantially transverse to the duct axis (corresponding to the plane of the wings in their closed position), which plane, however, is tilted inwardly, toward the fan rotor, at its top, as shown in Figure 1. Moreover, the two rods converge downwardly toward one another, as well as toward the adjacent straight edges of their respective wings, as shown in Figure 2. The rods—and hence the pivot axes of the wings—are thus offset from the vertical in two directions, with the result that the wings will at all times tend to swing inwardly toward the fan rotor.

The outlet end of the duct is provided with a rolled lip 25 which provides an abutment against which the marginal edge portions of the wings engage in their coplanar closed position and which prevents them from swinging forwardly of said closed position. From this closed position the wings may be readily swung outwardly, to an open position, by the force of the stream of exhaust air expelled by the fan rotor when the fan is operating.

From the foregoing description, taken together with the accompanying drawing, it will be readily apparent that this invention provides an automatic back draft damper for an exhaust fan of the character described, which damper will close the outlet duct of the fan when the fan is not operating and will swing to an open position whenever the fan works. It will also be

apparent that the automatic check valve effect of the damper of this invention is achieved by reason of the fact that the pivot axes of the two wings which comprise the damper are offset from the vertical so that each of said wings will at all times tend to swing forwardly toward the fan rotor.

I claim:

10 A back draft damper for automatically closing an air duct downstream of an exhaust fan or the like when the fan is not operating, comprising: a pair of flat damper wings, each having substantially the shape of one-half of the duct cross section and said wings having straight edges adapted to lie closely adjacent to one another when the wings are disposed in coplanar position closing the duct; a straight rod flatwise overlying and secured to each of said wings near its said straight edge and having its upper and lower end portions projecting beyond the wing to provide trunnions, said rod converging downwardly toward said straight edge; and means freely pivotally mounting the wings in the duct, said means including a bracket at the bottom of the duct having apertures in which the lower trunnions are journaled and apertured means at the top of the duct in which the upper trunnions are journaled, the upper and lower apertures in which each rod is journaled being so disposed that the axes of the two rods lie in a common, nearly vertical plane substantially transverse to the duct axis, said plane being displaced from the vertical by having its top closer to the fan, and said axes being displaced from the vertical within said plane by diverging upwardly so that said wings will at all times tend to swing by gravity towards a position in which they are coplanar to thus substantially close the duct in said coplanar position, but so that said wings may be swung into alignment with the air stream from the fan by the force of said air stream.

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