This invention relates to ventilating apparatus and particularly to an air flow responsive type of damper means adapted to be installed in the flue of an exhaust fan and adapted to allow ready exhaust of air therethrough from the room to the flue discharge while at least substantially preventing air flow through the flue into the room.

The principal object of the invention is to provide an air flow responsive damper to be disposed at the air inlet end of an exhaust flue or vent associated with an exhaust fan and which is readily displaceable to any air flow into the vent or flue and which operates to at least substantially prevent air flow in the opposite direction.

Another object of the invention is to provide a damper embodying the above objective which is formed from a single piece of light weight, resilient sheet material.

A further object of the invention is to provide a one-way damper means which is capable of installation on existing exhaust fan equipment without the need of any special tools or other equipment.

With the foregoing objects in view, together with such additional objects and advantages as may subsequently appear, the invention resides in the provision of a one-way damper means which is responsive to differential air flows in one direction only as disclosed in the following specification of certain presently preferred embodiments of the invention, reference being had to the accompanying drawings which form a part of said specification and in which drawings:

FIG. 1 is a plan view of a one-way damper means constituting a first embodiment of the invention shown in its normal position of repose,

FIG. 2 is a plan view of a second embodiment of the invention also shown in its normal position of repose,

FIG. 3 is a perspective view of the damper means constituting the first embodiment of the invention as distorting an air flow through the flue or vent with which the said first embodiment of the invention may be associated.

FIG. 4 is a transverse sectional view of a portion of a building ceiling showing an exhaust fan installed in a vent leading from the ceiling of a room and with the first embodiment of the invention installed in connection therewith, the said first embodiment being shown as extended in response to air flow initiated by operation of the exhaust fan,

FIG. 5 is a perspective view of the second embodiment of the invention extended in response to air flow, and

FIG. 6 is a transverse sectional view of a building ceiling showing the second embodiment installed and caused to be extended and opened by a draft or air flow created by the operation of the associated exhaust fan.

Referring first to FIG. 4, there is shown a ceiling exhaust fan installation which is typical of those with which the invention is desirably associated. Exhaust fans and associated vents of this type are commonly employed in kitchens and bathrooms of dwelling houses and apartments, the illustrated installation comprising a metal flue or vent A extending from an opening B in the ceiling to a suitable opening in the roof (not shown). Slightly above the lower end of the flue and within the flue there is installed a vertically shaft electric motor C driving a propeller type fan D in a direction of rotation to draw air from the room upwardly through the flue. At the lower end thereof, the flue is concealed by an ornamental metal or plastic grille E removably secured by any suitable means as, for example, by a stud F projecting downwardly from the motor through the grille and having a threaded end disposed below the grille engaged by a hand knob or nut G holding the periphery of the grille against the ceiling surface.

Referring next to FIGS. 1 and 3 together with FIG. 4, the first embodiment of the invention comprises a thin, flat, generally rectangular plate 1 of light weight, somewhat resilient metal or plastic, the perimeter shown in FIGS. 1 and 3 including slightly convex side edges 2 and rounded corners 3 to accommodate the inner perimeter of the edges of the grille. The metal, for example, may be tempered aluminum of about .015" thickness and any sheet plastic used would have a comparable weight and resilience.

The plate 1 is installed between the upper face of the grille E and the ceiling and is provided with a first hole 4 at the center thereof to which the stud F extends; said central hole serving as a starting point or a narrow spiral cut or slot 5 of some 2½ convolutions terminating at a radial distance which is less than the smallest radial dimension of the flue opening. The plate may be further provided with a second hole 6 laterally offset from the center hole to accommodate a pull chain for those fans which are operated by a pull chain switch as shown at H rather than by a wall switch.

The convolutions downwardly from this center being sufficiently light to be readily displaced by the draft induced by action of the fan while at the same time having sufficient resilience to normally lie in a single plane when in repose.

FIGS. 2, 5 and 6 illustrate a second embodiment of the invention in which the fan element, instead of being mounted against the ceiling surface by the grille and having the center portion thereof movable in response to air flow, is mounted at its center on the stud which supports the grille with the convolutions and peripheral portion being yieldable up into the flue in response to exhaust fan induced air flow. In this form of the invention, the damper element comprises a circular plate 10 formed of the same materials as the plate 1 of the first described embodiment, said circular plate having a central hole 11 extending therethrough for reception of the stud F. The hole 11, however, serves as the mounting and securing means and to this end, the stud F is provided with a sleeve 12 extending from the motor to which the plate 10 is to be located, said sleeve being of greater diameter than the hole 11. The nut G which secures the grille E against the ceiling, also clamps the plate 10 against the lower end of the sleeve 12 leaving the rest of the plate free to yield in response to air flow. This capacity for response is achieved in the manner as for the plate 1 by providing the plate 10 with a narrow spiral cut or groove 13 of several convolutions which extend from an inner end adjacent to the hole 11 to an outer end adjacent to the edge of the plate thus forming the plate, like the plate 1, into a weak spiral spring having a
normal or reposed position in which the convolutions lie in the same plane and serve as a damper preventing down drafts through the exhaust fan flue by engagement with the adjacent upper face of the grille. If desired, a hole 14 for a pull chain switch may be provided. On operation of the exhaust fan, however, the induced flow of air will displace the convolutions substantially as shown in FIGS. 5 and 6 opening the damper and allowing substantially free flow of air therethrough.

Thus there has been provided a reverse flow preventing damper means which is particularly useful for ceiling exhaust fan vents and which is capable of being installed by merely removing the removable grille associated with such exhaust fans. Moreover, since it is formed of a single sheet of resilient metal or plastic, this damper is economical to manufacture and when it is in its normal position of repose it affords a satisfactory barrier for down drafts from wind or other conditions. Also, while it is useful for and will be more commonly employed for ceiling vents, the resilience of the plate obviously permits it to be employed in vents or flues which are located in walls rather than in the ceiling.

While in the foregoing specification there has been disclosed certain presently preferred embodiments of the invention, such disclosure has been by way of example, and the invention will be understood to include, as well, all such changes and modifications as shall come within the purview of the appended claims.

I claim:

1. A normally closed room exhaust vent damper means for use with a vent having a grille extending thereacross, said damper means comprising a normally flat, resilient sheet of material impervious to air and having a portion thereof resiliently displaceable out of the plane of said sheet when in its normal flat condition in response to a pressure differential on opposite sides thereof to create opening for air passage therethrough, and means for mounting said sheet at the side of the grille adjacent to the vent opening; said sheet including a portion thereof positioned to permit said sheet to be secured in operative position at said side of the grille by the means by which the grille is mounted across the vent opening.

2. The combination as claimed in claim 1 in which said damper means is disposed in such close adjacency to the adjacent surface of said grille as to be prevented thereby from displacement in response to a pressure condition tending to cause air flow through the vent into the room.

3. The combination as claimed in claim 2 in which said damper means is larger than the vent and has the peripheral edge thereof confined between the grille and the surface through which the vent extends.

4. The combination as claimed in claim 2 in which said damper means has a peripheral dimension and configuration closely fitting the vent, in which a mounting means for the grille is disposed at the center of the vent, and in which said damper means is secured at the center thereof on the mounting means for the grille.

5. A damper means as claimed in claim 1 in which said sheet has the central portion thereof formed into a spiral by a spiral cut of more than one convolution extending from a point near the center of the sheet to a point adjacent the peripheral edge of the sheet.

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