Sept. 10, 1935. G. F. NEFF 2,014,187

STACK DAMPER

Filed April 3, 1934

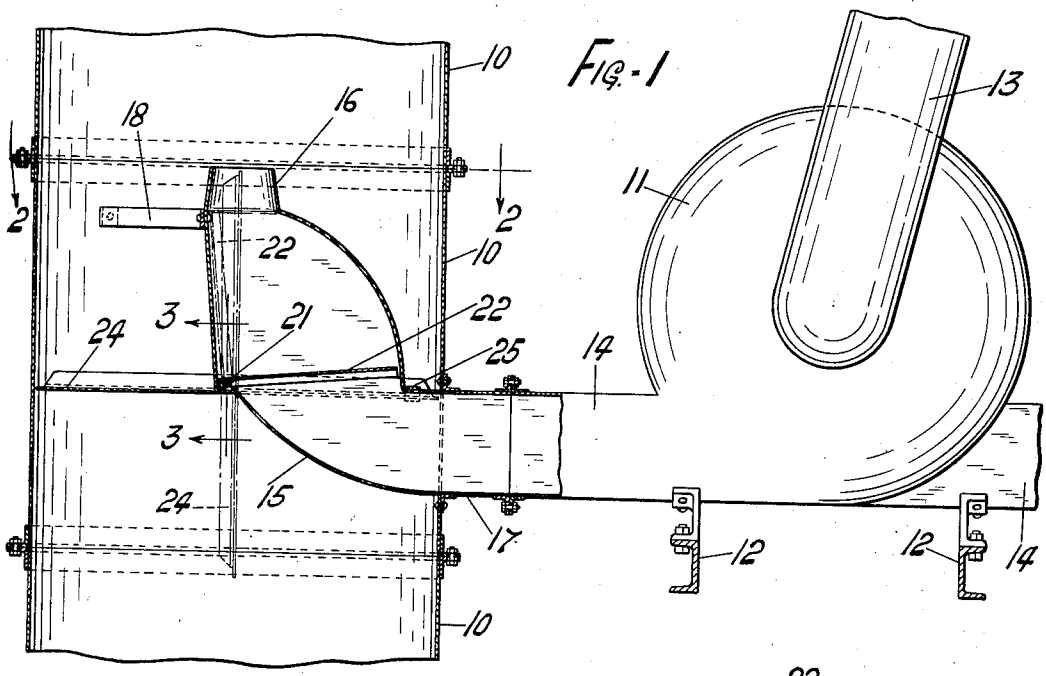

FIG. - 1

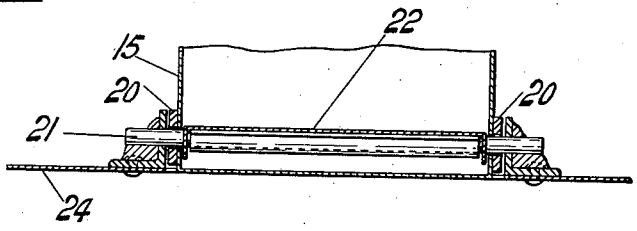

FIG. - 3

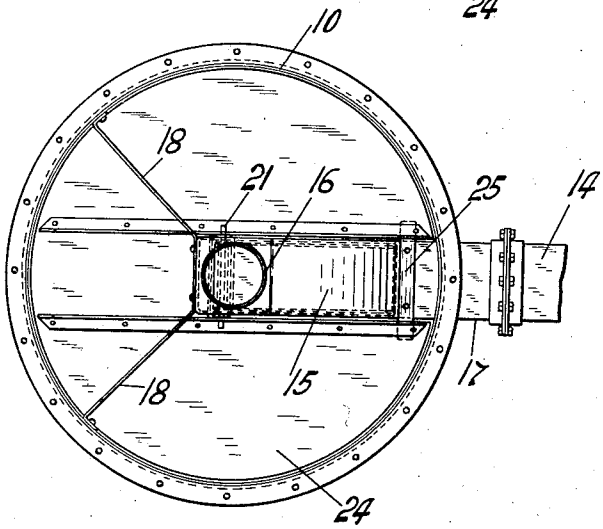

FIG. - 2

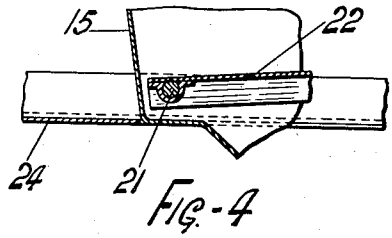

FIG. - 4

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STACK DAMPER

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5 Claims. (Cl. 98—43)

This invention relates to stack dampers, and more especially it relates to automatically operated stack dampers such as advantageously may be used in stacks equipped for forced ventilation.

Stacks of the character mentioned are commonly used in situations where rapid and effective ventilation is required, such as in spray booths and the like, and to this end usually are equipped with means, such as ejectors, for creating a forced draft. When the stack is not in use it is desirable that some means, such as a damper, be available to close the stack to prevent undesirable drafts for cooling the building, and it is to the provision of an improved damper that this invention primarily is directed.

The chief objects of the invention are to provide an improved automatic damper of the character mentioned which will be self-contained within the stack so that none of its operating mechanism is positioned exteriorly of the stack; to provide a damper construction whereby the damper opens substantially completely even with relatively low pressure through the ejector; and to obviate fluttering of the damper due to the pulsation of air from the blower that supplies the ejector. Other objects will be manifest in the following specification.

Of the accompanying drawing,

Figure 1 is a vertical section through the damper section of a stack embodying the invention in its preferred form, and a blower, shown in elevation, operatively associated therewith;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a section on a larger scale, on the line 3—3 of Figure 1; and

Figure 4 is a detail section, on a larger scale, of a portion of the structure shown in Figure 1.

Referring to the drawing, 10, 10 are tubular sections of a vertical ventilating stack that receives fumes at its bottom and discharges them from its top. The intermediate stack section shown is a damper section and includes an ejector that receives air from an exteriorly disposed blower 11 and directs said air upwardly interiorly of the stack. The blower 11 is of any known or desired type, and may be driven by a belt or motor (not shown) as desired. As shown, the blower preferably is suitably supported adjacent the stack upon beams 12, 12 and has an air inlet 13 and two air outlets 14, 14, the arrangement being such that the single blower may supply air to two ventilating stacks.

The ejector, designated 15, is a hollow, generally arcuate structure having flat lateral walls. It has an upwardly directed delivery nozzle or spout 16 positioned at the axis of the stack, and has a laterally directed inlet portion 17 that extends through the wall of the stack section 10 and is connected to one of the outlets 14 of the blower 11. The ejector is retained in place by having its inlet portion 17 secured to the stack, and by a pair of radial braces 18, 18 secured to its upper portion and to the stack. The area of the inlet portion 17 is about 50 per cent. greater than the area of the opening in nozzle 16, with the result that there is compression of the air in the ejector and it passes out of the nozzle with a smooth, even flow notwithstanding pulsation of the incoming air from the blower.

Fixed to the opposite lateral walls of the ejector 15 are respective journal bearings 20, 20, Figure 3 and journaled therein is a horizontal shaft or hinge pin 21 that extends through the ejector and has its respective end portions projecting laterally thereof. The shaft is parallel to and closely adjacent one of the other walls of the ejector, and is positioned at one side of the axis of the stack as is most clearly shown in Figure 2. Fixedly mounted upon shaft 21, within the ejector, is a plate or vane 22 of substantial length, the wall of the ejector adjacent the free end thereof being arcuate concentrically with shaft 21 to permit the said vane to move between an inoperative horizontal position, and a substantially vertical position to which it is moved by the passage of air through the ejector. When the vane is in the latter position the nozzle 16 is open to eject the air entering inlet 17.

Fixedly mounted upon the projecting end portions of shaft 21 is a damper 24 that is generally circular in form, being radially slotted on one side to accommodate the ejector 15. The damper 24 is disposed substantially parallel to vane 22 and moves with it. Because the shaft 21 is journaled at one side of the axis of the stack, the slotted side of the damper is slightly heavier than the opposite side thereof, and a strap or support 25 is mounted on the ejector 15 and projects laterally thereof to provide a rest for said heavy side of the damper in the inoperative position of the latter, in which position the damper is horizontal so as completely to obstruct the passage of air coming down the stack.

The normal inoperative position of the device is shown in full lines in Figure 1, wherein it will be seen that the damper 24 completely obstructs the stack and the vane 22 completely obstructs the passage through the ejector 15. In operation, air from the blower 11 enters ejector inlet 17 be-

low vane 22, and lifts the latter and at the same time tilts the damper 24 which is fixed to shaft 21 with said vane. Before the incoming air can escape through nozzle 16, the vane is lifted almost to vertical position, and the pressure of air at said nozzle, due to the restricted area of the latter as compared to the area of inlet 17, forces and holds said vane against the ejector wall, as is shown in broken lines in Figure 1. In this position of the vane the damper 24 is vertically disposed so as to offer minimum resistance to fumes passing through the stack. When the blower is shut off, gravity causes the heavy side of the damper to fall back to inoperative position, the vane moving with it, of course.

Because of the air pressure adjacent the nozzle 16 and free end of vane 22, the latter is held fully open even under relatively light incoming air pressure, and will not flutter or chatter. The invention is of relatively simple construction and economical operation, and achieves the several objects set out in the foregoing statement of objects.

Modification may be resorted to without departing from the spirit of the invention or the scope of the appended claims, which are not limited wholly to the specific construction shown and described.

What is claimed is:

1. In a device of the character described, the combination with a stack, of an ejector therein, a pivotally mounted vane interiorly of said ejector movable by air passing therethrough, a damper in said stack, and means connecting said vane and damper so that they operate in unison, said ejector being so shaped about the operative arc of the vane as to cause the latter completely to obstruct the passage of air through the ejector throughout the major portion of its movement, whereby the damper is almost completely opened before air passes out of the nozzle of the ejector.

2. In a device of the character described, the combination with a stack, of an ejector therein, a rotatable shaft, a stack damper mounted on said shaft, and a vane mounted on said shaft and so disposed as to be moved angularly by air passing through said ejector.

3. In a device of the character described, the combination with a ventilator stack, of an ejector mounted therein, a shaft journaled in said ejector and projecting therefrom, a vane on said shaft interiorly of said ejector, and a stack damper mounted upon said shaft exteriorly of the ejector.

4. In a device of the characetr described, the combination with a ventilator stack, of an ejector mounted therein, a shaft journaled in said ejector, a vane fixed on said shaft interiorly of said ejector and movable by air passing therethrough, the wall of the ejector adjacent the free end of the vane being concentric with said shaft, whereby the vane completely obstructs the passage of air through the ejector throughout the major portion of its movement, a stack damper in said stack, and means connecting the stack damper with said shaft whereby the vane and damper operate in unison.

5. In a device of the character described, the combination with a ventilator stack, of an ejector mounted therein, a rotatable shaft extending through said ejector and projecting laterally therefrom, a vane on said shaft interiorly of the ejector, the wall of the ejector opposite the free end of the vane being concentric with said shaft, and a stack damper mounted upon said shaft exteriorly of the ejector.

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