April 4, 1967 W. SHEPHERD 3,312,159

COMBINATION FIRE AND VOLUME DAMPER

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FIG. 1

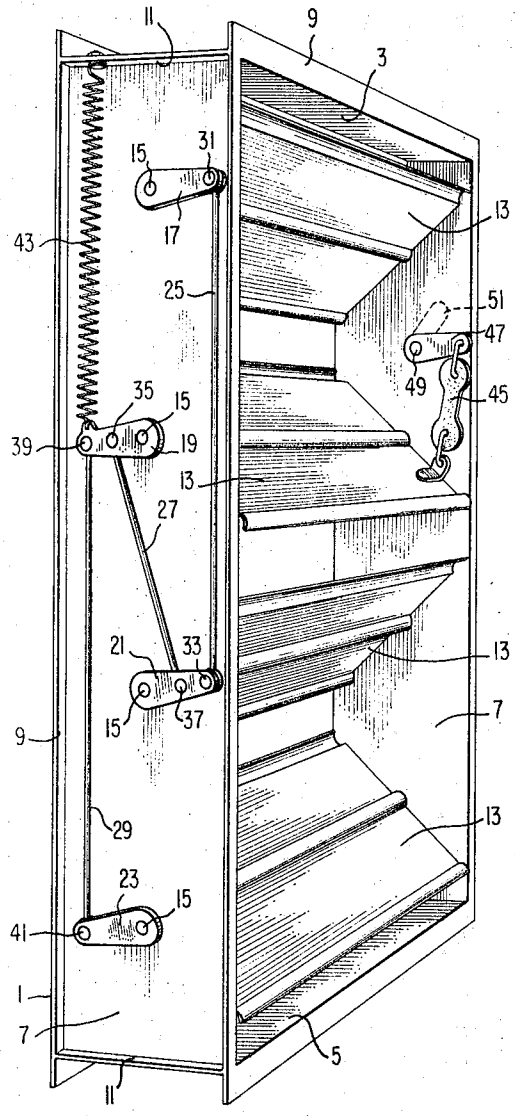
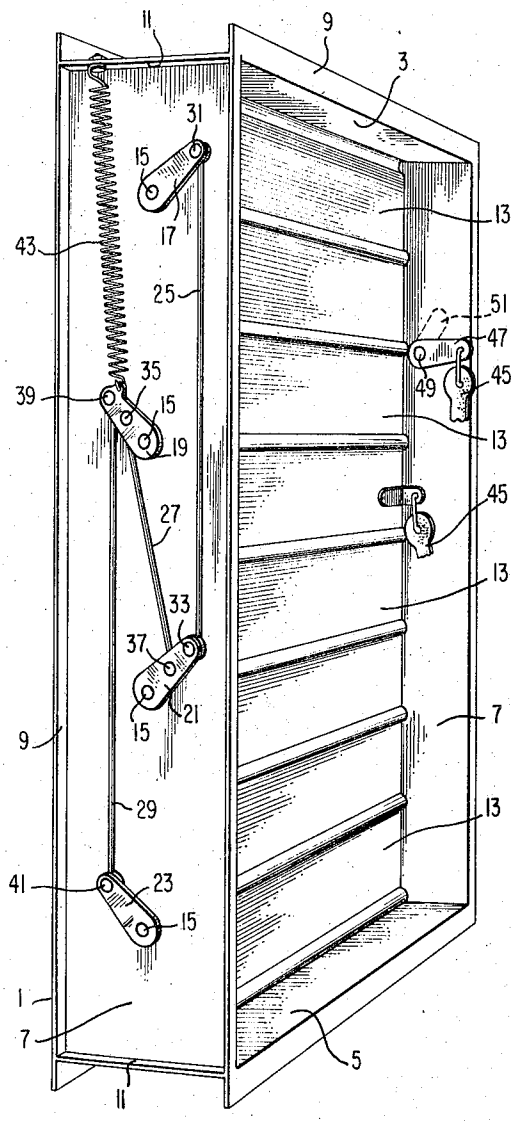


FIG. 2



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COMBINATION FIRE AND VOLUME DAMPER

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The present invention relates to combination fire and volume dampers, that is, to devices for installation in ventilating ducts or fire partitions or the like, adapted to regulate the volume of air passing therethrough and also to close automatically when subjected to abnormally high temperature thereby to impede the spread of a fire.

In the past, a number of different fire dampers have been proposed which include blades swingable between open and closed positions, the blades being continuously urged toward closed position but held open by a fusible link of some low-melting alloy well known in this art. Such fire dampers in the past have suffered from the disadvantages that they did not provide clear passage for air through them in ordinary use. As a result, air flow through them tended to be turbulent and noisy. Also, solids entrained in the air stream tended to clog in them, even to the point that they might malfunction when needed during a fire.

Accordingly, it is an object of the present invention to provide combination fire and volume dampers providing minimum obstruction to air flow during normal usage.

Another object of the present invention is to provide combination fire and volume dampers that do not become clogged with solids despite long use and which accordingly require no cleaning.

Still another object of the invention is the provision of combination fire and volume dampers which close automatically in the event of a fire but which can be adjusted in normal use to permit the flow of any desired volume of air therethrough.

Finally, it is an object of the present invention to provide combination fire and volume dampers that are relatively simple and inexpensive to manufacture, easy to install, and rugged and durable in use.

Other objects and advantages of the present invention will become apparent from a consideration of the following description, taken in connection with the accompanying drawing, in which:

FIGURE 1 is a perspective view of a damper according to the present invention, with the blades open and in the position of normal use; and

FIGURE 2 is a view similar to FIG. 1 but showing the damper closed as a result of the high heat of a fire.

Referring now to the drawing in greater detail, there is shown in the drawing a combination fire and volume damper adapted to be inserted in a ventilating duct or fire partition or other passageway for air, comprising a generally rectangular frame **1** having a top **3**, a bottom **5**, and sides **7**. Frame **1** is preferably of heavy sheet metal, the top and bottom being parallel to each other, and the sides being parallel to each other and perpendicular to the top and bottom. Flanges **9** extend outwardly from both side edges of each of top **3** and bottom **5** and sides **7**, so that the flanges **9** on one side of frame **1** are rectangular and disposed in a common plane, while the flanges **9** on the other side of frame **1** are similarly rectangular and coplanar in a plane parallel to the plane of the first-mentioned flanges **9**. Top **3** and bottom **5** extend endwise outwardly beyond the ends of their associated sides **7**, to provide protruding ends **11** that extend out to the outer side edges of flanges **9**. Flanges **9** and ends **11** thus form, with their respective sides **7**, shallow receptacles open on their outer sides.

Mounted for pivotal movement in frame **1** about spaced

parallel horizontal axes are four blades **13** of conventional configuration. Blades **13** are horizontally elongated and are mounted for rotation about horizontal axes coincident with their longitudinal midlines, on trunnions **15** that extend at both ends through opposite sides **7** of frame **1**. Trunnions **15** are in unitary assembly with their respective blades **13** and turn with blades **13** as blades **13** turn between the open positions of FIG. 1 and the closed positions of FIG. 2. The ends of the four trunnions **15** thus project endwise outwardly beyond each side **7**.

Four levers **17**, **19**, **21** and **23** are fixed in unitary assembly on the ends of the four trunnions **15** that extend outwardly beyond one side **7**. The levers extend in alternate directions away from their respective trunnions. Thus, as seen in FIG. 1, lever **17** extends to the right, lever **19** to the left, lever **21** to the right, and lever **23** to the left. These four levers are interconnected by three rods **25**, **27** and **29**. Each of these rods is pivotally interconnected between two levers at pivot points on the levers remote from the axes of trunnions **15**. Thus, rod **25** is a push rod and is pivotally interconnected with lever **17** at pivot **31** and with lever **21** at pivot **33**. Rod **27** is a pull rod and is pivotally interconnected with lever **19** at **35** and with lever **21** at **37**. Rod **29** is also a pull rod and is pivotally interconnected with lever **19** at **39** and with lever **23** at **41**. Swinging movement of one lever thus inevitably causes all the levers to swing conjointly upwardly or downwardly as seen in FIG. 1.

A coil tension spring **43** is secured at its upper end to end **11** of top **3** and at its lower end to the outer end of lever **19** and is continuously in tension at least when the damper is open. Thus, spring **43** tends continuously to pull the parts from the position of FIG. 1 toward the position of FIG. 2.

A fusible link **45**, which of itself is conventional in structure, is secured between a control lever **47** and a blade **13** remote from the associated trunnion axis of the blade. Fusible link **45** is too short to permit the blades to close, but instead maintains them in the open position of FIG. 1 as long as the link **45** remains unruptured. Upon the attainment of a heat above the softening point of the fusible link, for example, 160° F., the link will rupture and coil tension spring **43** will actuate the lever system to close the blades.

Meanwhile, however, the control lever **47** can be used to adjust the rotated position of the blades, thereby to regulate the volume of transmitted air, without breaking the fusible link. To this end, control lever **47** is mounted on a short shaft **49** that extends rotatably through the associated side **7** and carries at its outer end an actuator **51** that may be turned either manually or by power-driven means (not shown) to adjust the position of the blades. Means (not shown) may also be provided for releasably retaining actuator **51** in any selected position of adjustment thereby to fix the blades in a desired position.

Therefore, as will be seen by comparison of FIGS. 1 and 2, when a sufficiently high temperature is reached by the air passing through the fire damper of the present invention, the fusible link will be warmed to the point that it rupturs, whereupon the linkage will turn from the position of FIG. 1 to the position of FIG. 2 to close the blades. It is especially to be noted that all the linkage is outside the airstream, and only the fusible link is in contact with the flow of air. It is thus ensured that the flow of air is unimpeded, and the damper of the present invention is accordingly free from noise and the tendency to produce turbulence in the air stream. Moreover, there is virtually nothing on which solids entrained in the air stream can catch, as the fusible link itself has minimum opportunity to become jammed with solids. The linkage and levers and spring and actuator, by contrast, are out of the air

stream and are all disposed in the shallow receptacles formed between flanges 9 and ends 11 on the outer sides of sides 7 of the frame 1. They are thus nicely protected during shipping and handling of the damper, as they do not extend beyond or away from their associated side 7 a distance greater than the depth of the flanges 9 and ends 11. At the same time, one of the ends 11 provides a desirably placed anchor for one end of the spring 43.

Moreover, the framework comprised by the ends 11 and the associated side 7 and flanges 9 forms a rigid mounting for the linkage and the trunnions so that racking or twisting of frame 1 cannot take place; and it is thus ensured that the linkage cannot malfunction or become jammed by virtue of the parts becoming misaligned.

From a consideration of the foregoing disclosure, therefore, it will be evident that all of the initially recited objects of the present invention have been achieved.

Although the present invention has been described and illustrated in connection with a preferred embodiment, it is to be understood that modifications and variations may be resorted to without departing from the spirit of the invention, as those skilled in this art will readily understand. Such modifications and variations are considered to be within the purview and scope of the present invention as defined by the appended claims.

Having described my invention, I claim:

1. A fire damper comprising a frame having upright sides and a horizontal top and bottom, first, second, third and fourth blades journaled at their ends on trunnions extending through at least one of said sides of the frame for rotation about horizontal axes between open and closed positions, first, second, third and fourth levers in unitary assembly with said trunnions of said respective blades on one outer side of said frame, a push link interconnecting said first and third levers remote from their trunnions, a pull link interconnecting said second and third levers remote from their trunnions, a pull link interconnecting said second and fourth levers remote from their trunnions, means continuously resiliently acting on said links and levers in a direction to place said pull links in tension and said push link in compression, and fusible link means placed in tension by said resiliently acting means.

2. A fire damper as claimed in claim 1, said fusible link means interconnecting the frame and one end of one blade on the inner side of the frame.

3. A fire damper as claimed in claim 1, the sides of the frame having parallel outwardly extending flanges, said first, second, third and fourth levers and said push link and both said pull links and said urging means being disposed between said flanges.

4. A fire damper as claimed in claim 3, one of the top and bottom of said frame having at least one end extending outwardly between said flanges, said resiliently acting means being connected to said one end.

5. A combination fire and volume damper comprising a frame, at least one blade mounted for rotation in the frame between open and closed positions, means continuously urging said at least one blade toward closed position, fusible link means interconnecting said frame and said at least one blade and disposed on the inner side of the frame and maintaining said at least one blade open, and means including said fusible link means for adjustably positioning said at least one blade in any of a plurality of positions between fully open and fully closed thereby to regulate the volume of air that can pass through said damper, the last-named means including a rigid lever mounted for rotation about an axis parallel to the axis of rotation of said at least one blade, said fusible link means being interconnected with said lever at a point spaced a substantial distance from said axis of rotation of said lever.

6. A combination fire and volume damper as claimed in claim 5, said last-named means including a portion rigid with said lever and passing through said frame along said axis of rotation of said lever, and blade-actuator means rigid with said portion and disposed on the outer side of said frame.

7. A fire damper comprising a frame, a plurality of blades journaled at their ends on trunnions extending through at least one side of the frame for rotation between open and closed positions, linkage interconnecting said trunnions on the outer side of said at least one side of the frame for conjoint rotation of the trunnions, means resiliently urging the linkage toward a position in which the blades are in said closed position, and fusible link means interconnecting said frame and a said blade and disposed on the inner side of the frame and maintaining said blades open, the sides of the frame having parallel outwardly extending flanges, said linkage and said urging means being disposed entirely between said flanges, one of the top and bottom of said frame having at least one end extending outwardly between and secured to said flanges, said resiliently urging means being connected to said one end.

References Cited by the Examiner

UNITED STATES PATENTS

2,287,262	6/1942	Merry	98—1
2,474,760	6/1949	Smith	98—37

MEYER PERLIN, *Primary Examiner.*