

[54] **SINGLE BLADE FIRE DAMPER**

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[51] **Int. Cl.<sup>2</sup>** ..... **F16K 17/38**; E05C 3/00

[58] **Field of Search** ..... 137/75-77, 137/457; 251/297, 298, 303; 292/121; 160/1; 98/1, 86; 49/1; 126/285, 287.5

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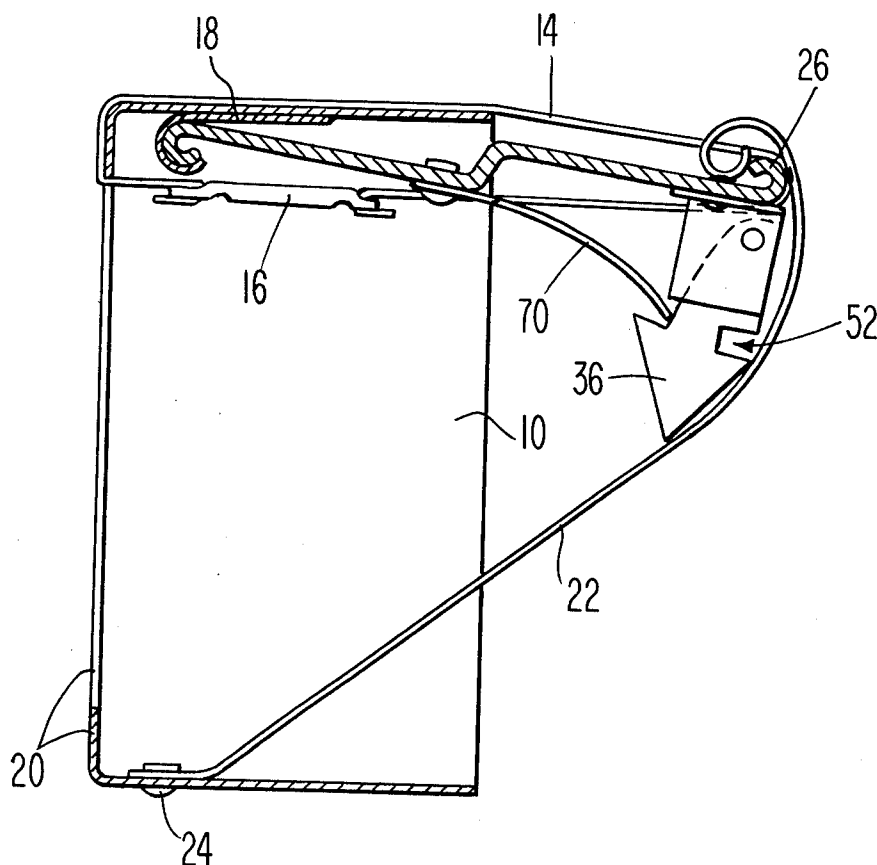
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[57]

**ABSTRACT**

A fire damper for use in small openings comprises a single blade articulated about a hinge within a frame, which blade is movable between an open and closed position. In the open position a fusible link and strap retain the blade. When the link is released a negator, extension-type spring mounted on the frame forces the blade to close the opening through the frame. A blade lock mounted on the blade engages the frame to retain the blade in the closed position.

**5 Claims, 4 Drawing Figures**



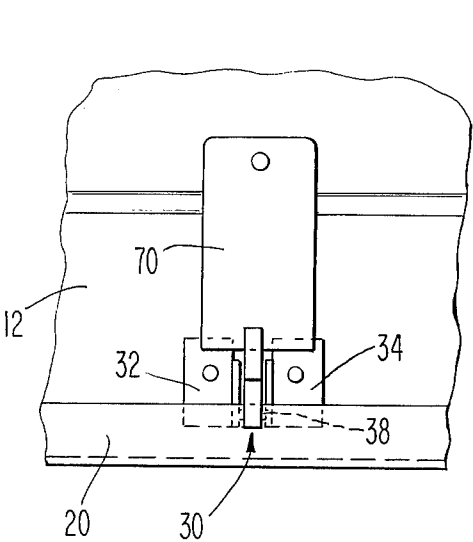


**Fig. 4**

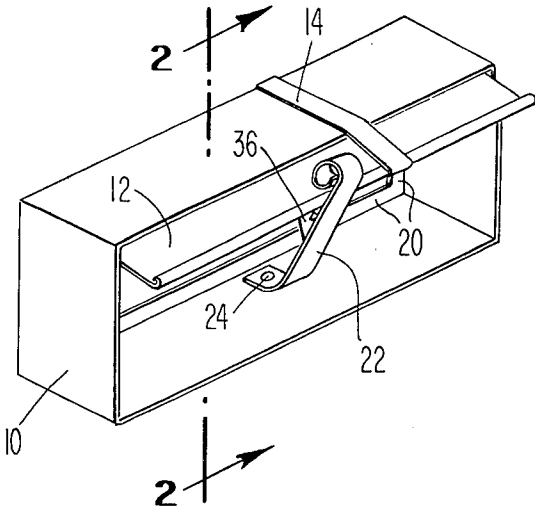


**Fig. 1**

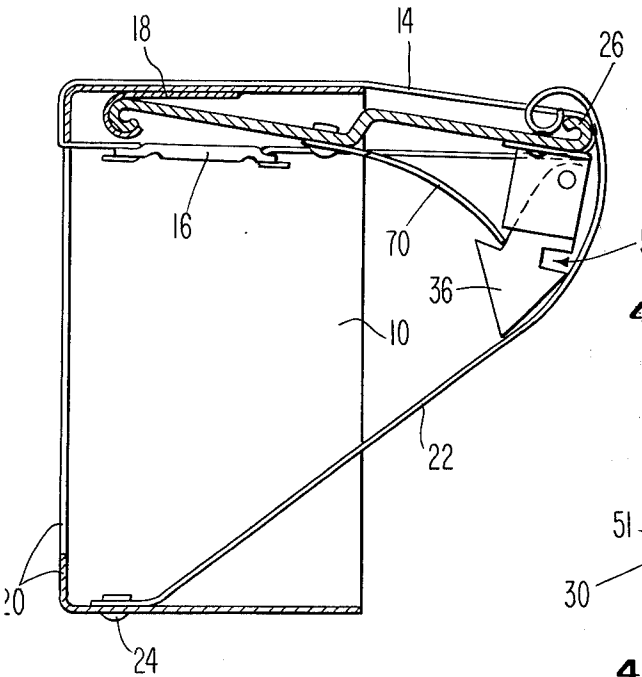


**Fig. 2**

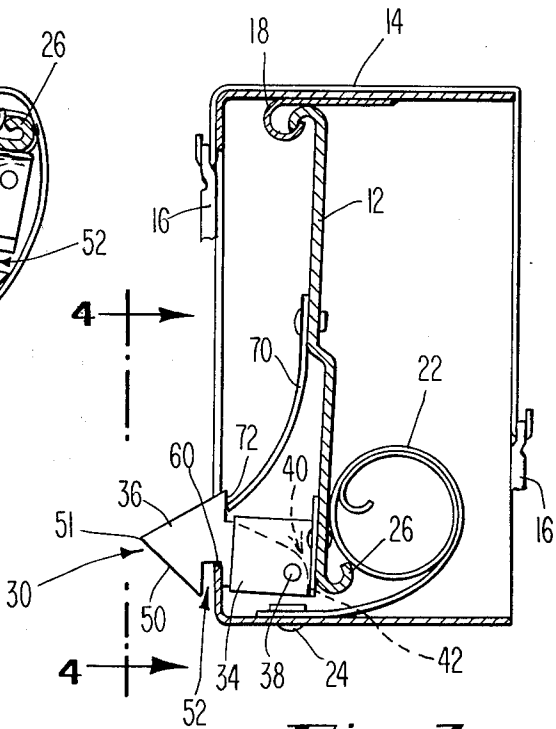


**Fig. 3**

## SINGLE BLADE FIRE DAMPER

## BACKGROUND OF THE INVENTION

This invention relates to fire dampers, and more particularly, fire dampers having a single blade to close the opening in an air duct system.

In the prior art, multiple blade fire dampers were known having a plurality of z-shaped blades centrally notched at their edges and disposed within a frame having an inwardly depending flange in such manner that the flange was positioned in the notch, so that the blades straddled the inwardly depending flange. See for example, my prior co-pending application Ser. No. 192,006, filed Oct. 26, 1971, and now U.S. Pat. No. 3,814,165. Such dampers were maintained in their open position with the blades folded by a fusible link and strap or other link mechanism. When the link released, the blades fell of their own weight to an unfolded position closing the damper. In addition, a spring could be used attached to the blades to pull the blades securely shut, so that their flat faces lay against the faces of the inwardly depending flange of the frame.

In use, the multiple blade straddling-type fire damper tended to remain closed even under increased hot air pressure due to fire, because the dynamic forces on alternate portions of the blades counteracted one another. This desirable feature creates undesirable problems when the dampers will be used in small areas, such as openings down to two inches in height. For one thing, the multiple blades and hinges are bulky and cut down on the usable area for air flow through the device. Secondly, if the multiple blades are replaced by a single blade, the single blade will act like a backdraft damper, that is, the force of onrushing hot air will force the blade open in one direction even against the action of the spring utilized to close it. Of course, if the fire is on the other side, the force of hot air will keep the blade closed. However, it will be readily apparent that this is an undesirable and unacceptable feature.

## SUMMARY OF THE INVENTION

The present invention recognizes and compensates for these problems. It has as an object to provide maximum air flow in the open condition and maximum air stoppage in the closed condition.

To accomplish these desirable ends, I have provided a frame with a single blade mounted internally. The configuration of the blade is such that in the open condition it lies within the envelope created by the inwardly depending flange of the frame. In the closed condition, a lock engages this flange and retains the blade, thereby preventing it from being forced open by the flow of air.

The above object and other objects will become apparent from the following description with reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the device in accordance with the preferred embodiment of my invention taken as viewed from the left-rear-top of the device with the blade shown in the open retained condition;

FIG. 2 is an enlarged section taken as indicated by the lines and arrows 2—2 in FIG. 1;

FIG. 3 is a view similar to FIG. 2 showing a slightly different arrangement of the parts of the device with the blade appearing in the locked closed condition; and

FIG. 4 is a view partially broken away taken as indicated by the lines and arrows 4—4 in FIG. 3.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Although specific forms of the invention have been selected for illustration in the drawings, and the following description is drawn in specific terms for the purpose of describing these forms of the invention, this description is not intended to limit the scope of the invention which is defined in the appended claims.

Referring to the figures, FIG. 1 shows a device comprising a frame 10 and blade 12 with the blade retained in the open condition by a strap 14 and fusible link 16 as shown in FIG. 2. The blade is articulated about a hinge member 18 which is suitably affixed to the inside of the frame 10 as by spot welding. The hinge member 18 and blade 12 form a continuous hinge of the type described generally in my prior issued patents in this field. The hinge member does not extend across the full width of the interior of the frame. The blade extends across the full width of the opening provided within the frame 10. This opening is somewhat smaller at the front of the device by virtue of a continuous flange 20 which depends inwardly from the side walls of the frame 10 all about the front periphery.

This device is placed in an air duct in an air handling system in a building by any suitable means well known in the art. It functions in case of fire by virtue of the fact that the fusible link 16 melts and falls apart (as shown in FIG. 3), thereby releasing the strap 14 which holds the blade and allowing the blade to drop to the closed position shown in FIG. 3. In order to aid in this action, a coiled spring 22 is provided fixedly attached at one end (as at 24) to the frame 10 of the device and engaging the face of the blade most remote from the front flange 20. The spring is retained by the lower hook shaped portion 26 of the blade. Springs of this type are sometimes referred to in the trade as "negator" springs and they have the ability to coil and uncoil upon themselves as shown in the figures. In this case, the spring exerts a force against the blade driving it toward the closed position and tends to maintain the blade in that position.

If a fire was located to the left of the device when viewed as in FIG. 3, the hot air passing through the air duct system would tend to force the blade to the right against the action of the spring and open the fire damper. In order to maintain the damper in the closed position I have provided a blade lock designated generally 30, FIGS. 3 and 4. The blade lock consists of L-shaped mounting brackets 32, 34 which are securely fastened to the blade 12 by any suitable means, such as by riveting and which are spaced from one another. Within this space a latch member 36 is pivotably mounted about a pin 38 which passes through the members 32, 34 and is retained therein by any suitable means such as crimping it over.

The latch member comprises a substantially flat piece of metal having a curved upper rear surface shown in dotted lines in FIG. 3 and designated generally 40, which terminates in a flat rear end portion 42. This flat rear end portion 42 rests against the face of the blade 12, thereby preventing the latch member 36 from pivoting in a counterclockwise direction about the pin 38 when viewed as in FIG. 3. The curved portion 40 allows the member 36 to be pivoted about the

pin 38 in a clockwise direction when viewed in FIG. 3. This condition is important in the latching of the device.

The front of the member 36 has a beveled surface 50 terminating at its outermost end in a point 51 and at its bottom end in a notch designated generally 52. The arrangement is such that, with the device properly positioned on the blade 12, the flat end 42 maintains the point 51 above the innermost terminus 60 of the flange 20 when viewed in the vertical position shown in FIG. 3. Thus, as the blade swings from the position shown in FIG. 2 in a clockwise direction to the position shown in FIG. 3 the surface 50 engages the terminus 60 and cams the member 36 in a clockwise direction about the pin 38 until the inwardly depending flange 20 enters the slot 52. To provide for positive latching, a leaf spring 70 is mounted on the blade in any suitable fashion as by riveting and engages the shoulder 72 on the member 36 to exert a counterclockwise force thereon about the pin 38. The leaf spring insures the maintenance of positive engagement of the member 36 with the flange 20 and therefore the blade 12 remains in the locked closed position even against the action of hot air pressure tending to move it in a counterclockwise direction.

If it is desired to reset the mechanism, the member 36 can be raised in a clockwise direction about the pin 38 against the spring 70 by manual means and then the blade can be raised to the position shown in FIGS. 1 and 2. Another fusible link can be used on the strap 14 or a variety of other links may be provided. It should be noted when viewing the device as in FIG. 2 that the single blade construction and articulated mounting provide an arrangement wherein the blade lies within the envelope bounded by the upper wall of the frame and an imaginary line drawn horizontally when viewed as in FIG. 2 from the lower terminus of the inwardly depending upper flange 20. Such an imaginary line would lie directly on the lower portion of the strap 14. Thus, the blade does not provide any obstruction to the free flow of air through the device.

It should also be noted that this device can be mounted horizontally rather than vertically and the action of the spring 22 and lock means 30 will function in a manner identical to that previously described.

It will be understood that various changes in the details, materials and arrangement of parts which have been herein described and illustrated in order to explain the nature of this invention may be made by those skilled in the art within the principle and scope of the invention as expressed in the following claims.

It will further be understood that the "Abstract of the Disclosure" set forth above is intended to provide a non-legal technical statement of the contents of the disclosure in compliance with the Rules of Practice of the United States Patent Office, and is not intended to limit the scope of the invention described and claimed herein.

What is claimed is:

1. A fire damper, comprising:

- a. a frame, said frame defining a flow passage there-through and having a flange thereon inwardly depending from the walls thereof;
- b. a blade mounted within said frame to articulate about one edge of said blade so as to be movable between open and closed positions with respect to said frame;
- c. spring means mounted to said frame and engaging the free swinging portion of said blade to exert a force thereon to move said blade from said open to said closed position;
- d. lock means for securely engaging the frame and the blade in the closed position to retain the blade in that position, said lock means comprising a pivotally mounted latch member and a spring, said latch member having a free end with a beveled surface thereon and having a slot defined therein, said beveled surface positioned to engage the inwardly depending flange of the frame on movement of said blade from an open position to a closed position, continued movement thereof to cam said latch about its pivot to allow said slot to matably engage said flange in the closed position, thereby producing positive retention of the blade in the closed position.

2. The invention of claim 1 wherein said spring engages said latch to urge it in a direction to engage said flange.

3. The invention of claim 1 wherein said latch has a curved portion permitting pivotal movement in one direction to allow engagement with said flange.

4. The invention of claim 3 wherein said latch has an end portion preventing pivotal movement in the opposite direction beyond a predetermined point, so that said beveled surface will engage said flange as aforesaid.

5. The invention of claim 1 wherein said blade is shaped and arranged to lie behind said flange and not obstruct the air flow through said device when said device is positioned in an air flow system.

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