United States Patent [19]

McCabe

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[54] **FIRE DAMPER AND METHOD OF FABRICATING SAME**

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[52] **U.S. Cl.** **160/207,** 160/235

[51] **Int. Cl.** **E05d 15/26**

[58] **Field of Search** 160/1, 5, 207, 206, 199; 49/1-7

[56] **References Cited**

UNITED STATES PATENTS

3,273,632	9/1966	McCabe	160/1
3,401,734	9/1968	McCabe	160/207
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Primary Examiner—Dennis L. Taylor

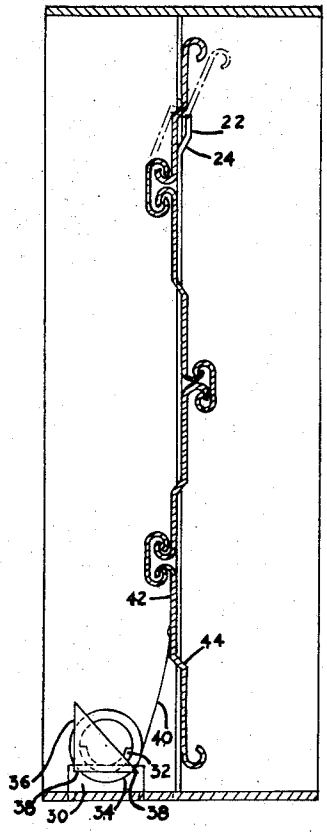
Attorney, Agent, or Firm—Paul & Paul

[57] **ABSTRACT**

A folding blade fire damper is provided with a means for retaining the upper most blade, which means is integral with the damper frame. There is also provided a means for retaining the closure spring which means is integral with the frame. The method of notching out the frames to provide these means is disclosed. The spring closure is attached to the last blade of the damper in a novel manner.

The blades are retained and articulated in combination with a novel connector member.

2 Claims, 4 Drawing Figures



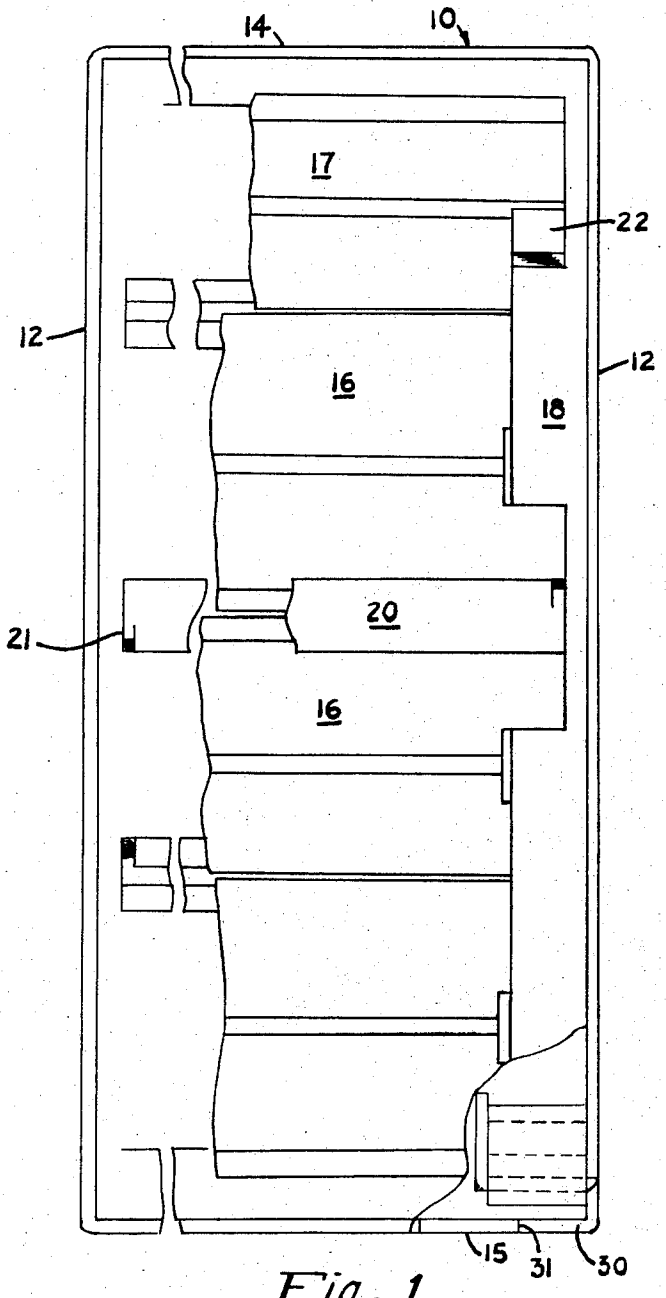


Fig. 1

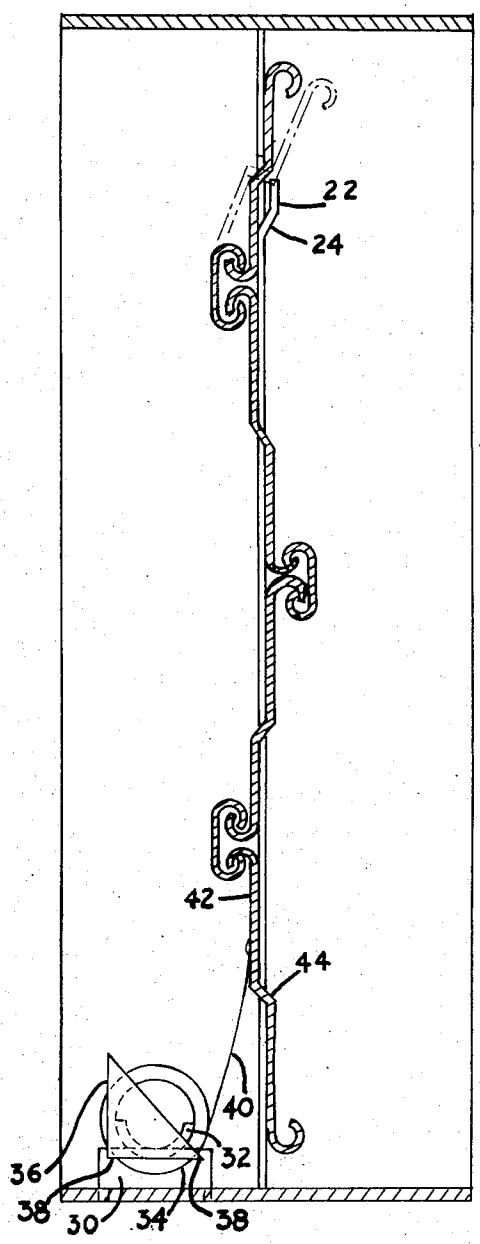


Fig. 2

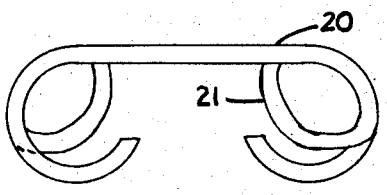


Fig. 3

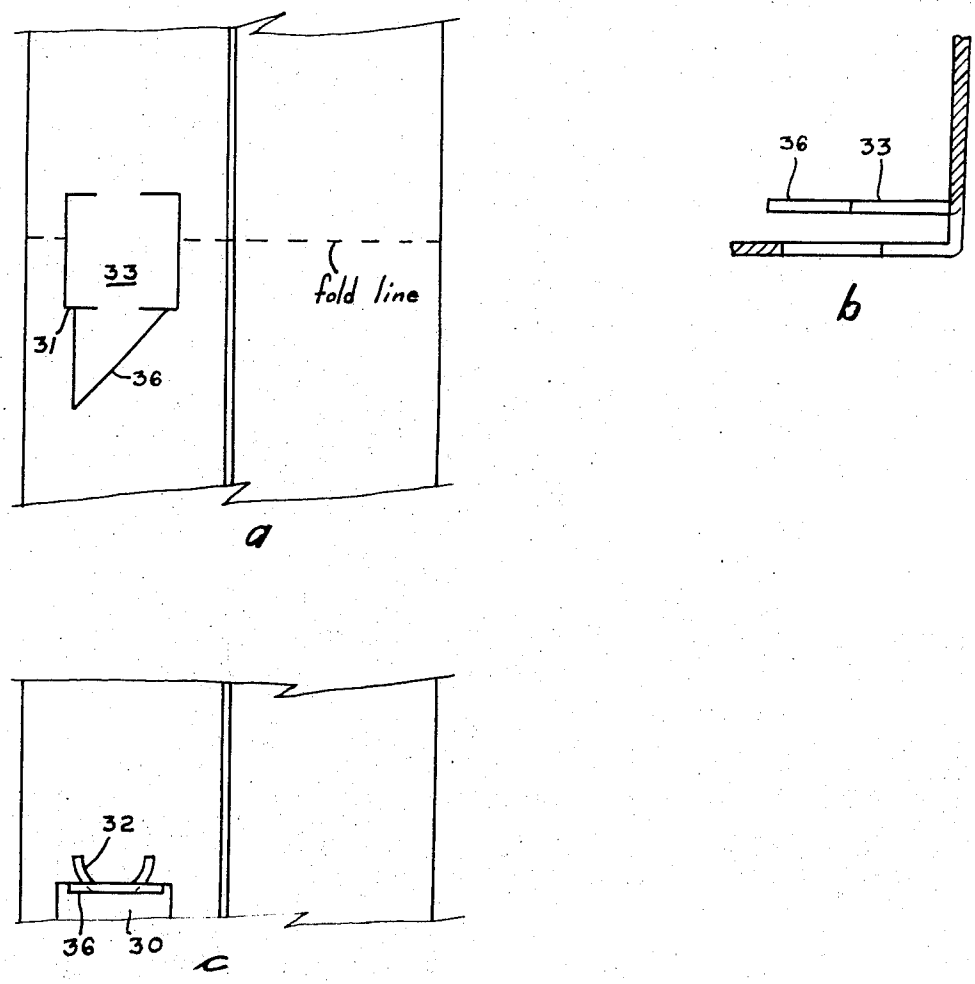


Fig. 4

FIRE DAMPER AND METHOD OF FABRICATING SAME

BACKGROUND OF THE INVENTION

This invention relates to fire dampers and more particularly to certain improvements in the frame construction of folding blade fire dampers and certain improvements in interconnection of the parts in said dampers.

In the prior art it is known to have folding blade fire dampers wherein the blades are z-shaped in section and are interconnected at the longitudinal edges by means of a sliding fit with connector members. Such a damper is disclosed in my prior patent for an Articulated Barrier No. 3,401,734. Therein, particularly as disclosed in FIGS. **1** and **2**, the following arrangement of parts is shown. The blades are z-shaped in section and are notched out along the center portions of the vertical edges, so that they are arranged to have opposite blade portions on opposite sides of vertically extending inwardly depending flanges extending from the walls of the damper. The uppermost blade is retained about a pin and is disposed on one side of the vertical flange.

The lower most blade is connected to a closure spring along the portion of the blade intermediate the web and the free end thereof. The spring is retained on a shaft extending from a flange.

SUMMARY OF THE INVENTION

In the present invention improvements are made in all these features of the prior art. The upper blade is retained directly in and overlapping the central vertical side flange thereby elminating the need for an upper support member.

The spring is mounted on a tab which is formed integrally with and extends from the wall of the damper frame. The spring is attached to the last blade in the damper at a point intermediate the web and the next adjacent connector member thereby providing for a tighter, surer closing of the damper.

An improvement is made in the connector member in that the blades are retained in their relation by the member and the coaction of the blades with the flange on both sides.

Accordingly its an object of this invention to provide an improved fire damper with less parts and better performance.

This and other objects of the invention will become apparent from the following description with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary elevational front view of a fire damper in accordance with my invention;

FIG. **2** is the vertical central section of a fire damper taken from the left side when viewed as in FIG. **1**;

FIG. **3** is a greatly enlarged end view of a connector element; and

FIG. **4** is a composite view of three stages in the fabrication of the fire damper frame.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although specific form 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.

In FIG. **1** the basic damper frame designated generally **10** is shown. This is disclosed in my prior patent referred to above and comprises a pair of spaced upright plates **12** on each side interconnected by a top plate **14** and a base plate **15.** Insofar as the disclosure of that patent would aid in understanding the disclosure in this application, said patent is incorporated herein by reference. Accordingly for the shake of simplicity all of the known parts in existing fire dampers and particularly those made in accordance with the prior patent will not be disclosed in greater detail herein. Suffice it to say that it is known to have a plurality of fan folded z-shaped blades **16** which are mounted about vertically extending inwardly depending flanges **18** which extend inwardly from the sides **12.** The vertical edges of the blades **16** are notched out and each of the blades is interconnected with the next adjacent blade by means of a connector **20** which is in sliding engagement along the longitudinal edges thereof for both retention and articulation.

The first improvement to the basic apparatus which I will disclose in this application is in the mounting of the uppermost blade in the damper. In accordance with the present invention I have notched out the vertical inwardly extending flange **18** to form a tab **22** which extends parallel the face of the flange **18** after being offset therefrom by the portion **24.** The blade **17** differs from the blades **16** in that it is not notched along the vertical edges.

By way of background it is known to fabricate the frame of a fire damper by folding a single sheet of metal into a square shape providing the configuration shown. In accordance with the present invention, as this folding operation is taking place, the web of the blade **17** is inserted into the notch in the vertical flange **18** from one side and then the other. When the frame is fully formed and closed into a box shape, the blade will be retained in the notch as illustrated. Within this notch it can be articulated as shown by the phantom lines in FIG. **2.** Since the material involved is light gage metal it can easily be formed and if the tab or notch does not comfortably accommodate the blade so as to allow for articulation while at the same time providing for retention and support, the tab can be adjusted by pliers or other suitable hand tool, said adjustment being well within the skill of one knowledgeable in the metal working art.

The next improvement to the basic damper construction which I will describe is that of eliminating the shaft and other mounting parts necessary to retain the closure spring. In accordance with my invention I have notched out the wall of the fire damper (as at **30**) prior to the formation of the frame in the square shape shown (see FIG. **4***a*). The notch consists of a relatively square shape along the intermediate portion thereof terminating in a triangular shape at the upper end. When this notch is cut, the upper edge **31** of the square portion extends to undercut slightly the triangular portion. The notched out metal tab **33** is folded at a right angle to the frame (see FIG, **4***b*.) and the intermediate square portion is then rolled (see FIG. **4***c*.) to form a substantially cylindrical shaped portion **32.** The coiled spring **34** is placed over the cylindrical shaped tab, and,

with the spring in place, the free end **36** of the tab is folded at a right angle to the cylindrical portion downward toward the end of the cylinder thereby retaining the spring on the cylindrical portion of the tab. It will be noted that the ears **38** of the tab **36** will retain the spring since they are of a greater diameter than the diameter of the cylinder so formed. However they are not so great as to prevent placing of the spring about the cylinder in the first instance. In this regard the triangular shape allows for easy insertion.

I have discovered that the attachment of the spring to the last blade in a particular position can provide a unique and heretofore unknown advantage. The spring, as shown in FIG. **2** in my patent, is normally attached to the outward or lower end of the blade. This tends to leave the blade in a slightly cocked position, that is, it is not fully closed. In the present invention, by providing for attachment of the end **40** of the spring along the inner portion **42** of the last blade the forces are such that the blade closes tightly as shown. It's desirable when attaching this spring to the blade to have the position at a maximum of one-third of the blade width from the web portion **44** of the blade.

The next improvement to the basic fire damper construction which I have discovered is an improvement in the connector means. As shown in my prior patent a plurality of connectors **40** FIGS. **1** and **2** are slidingly interconnected by means of hook-shaped longitudinal edges with the edges of the blades. These connectors are free to shift laterally. Where screw heads project on the inner side of the end plates **12** it is possible for the connector elements to interfere with the screw heads. In accordance with the present invention I have cut the opposite end edges of the connector members and formed inwardly depending tabs. These tabs are formed prior to assembly. See for example the connector **20** FIG. **1** and the greatly enlarged end view FIG. **3** which shows in greater detail the tab **21.** This tab has been bent inwardly to interfere with the hook-shaped channel in the member **20.** The cut portions are exaggerated in FIG. **1** for purposes of illustration only. The blades are then assembled from opposite sides of the connector and are retained in their assembled condition when the unit is fully assembled. In order to accomodate these tabs I have notched the inner corners of the blades (not shown). Since the blades ultimately engage the inwardly depending vertically extending flanges **18** before they engage the walls **12,** these connectors will also be retained in their original lateral position without floating or interfering with the other parts of the device.

As has been alluded to above the blades with both the improved connectors and the improvement in the mounting means for the upper blade, are assembled prior to completing the assembly of the wrap-around frame. The steps in this assembly consist of sliding the blades together from alternate sides of the connectors and inserting, as an upper most blade, that blade which does not have notches in the vertical sides intermediate the edges. The uppermost blade is then inserted in the notch in the frame and the alternate blades are placed about the vertical flanges **18.** The opposite side of the frame is then folded inwardly until the same relationship obtains and the corner of the frame is then connected to complete the box shaped frame.

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 nonlegal technical statement of the contents of the disclosure in compliance with the Rules of Practice of the U.S. Pat. Office, and is not intended to limit the scope of the invention described and claimed herein.

What is claimed is:

1. In a fire damper having a frame with inwardly depending opposed side flanges, a plurality of z-shaped blades having web portions notched at the edges thereof, said flanges disposed in said notches, said blades interconnected along their longitudinal edges by separate connectors, for movement between a folded and unfolded condition, and a closure means for automatically drawing the blades from a folded open condition to an unfolded closed condition, the improvement wherein said closure means is retained and positioned to bring the faces of the blades into engagement with the faces of the flanges in the unfolded closed condition; said closure means comprising a spring attached to an end blade along that portion thereof intermediate the web and the next adjacent connector; and a retaining means for retaining said closure means comprising a tab formed integrally with a wall of said frame on the same side of the flange as the portion of the blade to which the spring is connected; said tab extending therefrom and having an intermediate cylindrical portion for mounting said closure means and a retainer portion for retaining said closure means on said cylindrical portion.

2. The invention of claim **1** wherein said retainer portion is triangularly shaped and has ears extending beyond the diameter of said cylindrical portion.

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