United States Patent [19]

McCabe

[11] **3,796,248**

[45] **Mar. 12, 1974**

[54] **REMOTELY RESETTABLE FIRE DAMPER**

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[21] Appl. No.: **284,221**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 178,111, Sept. 7, 1971, Pat. No. 3,725,972.

[52] **U.S. Cl.** **160/1,** 160/35, 160/84

[51] **Int. Cl.** **E05f 15/20**

[58] **Field of Search** 160/1, 84, 5, 6, 36, 35; 126/287.5, 285; 137/457, 79; 98/85, 86; 251/66, 68

[56] **References Cited**

UNITED STATES PATENTS

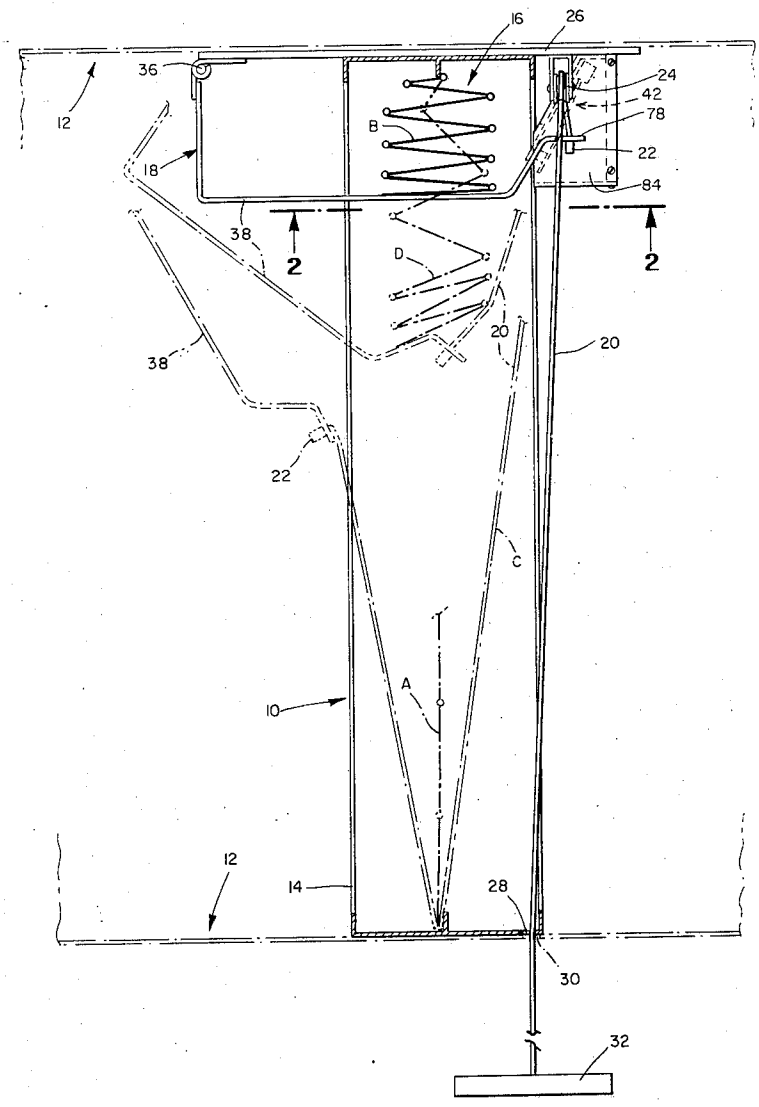
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Primary Examiner—Mervin Stein
Assistant Examiner—Philip C. Kannan

[57] **ABSTRACT**

A folding blade type fire damper is provided with a thermally actuated resettable release link and retraction means co-operating with the link to reset the blades in their retracted condition upon actuation from outside the duct in which the damper is mounted.

12 Claims, 5 Drawing Figures



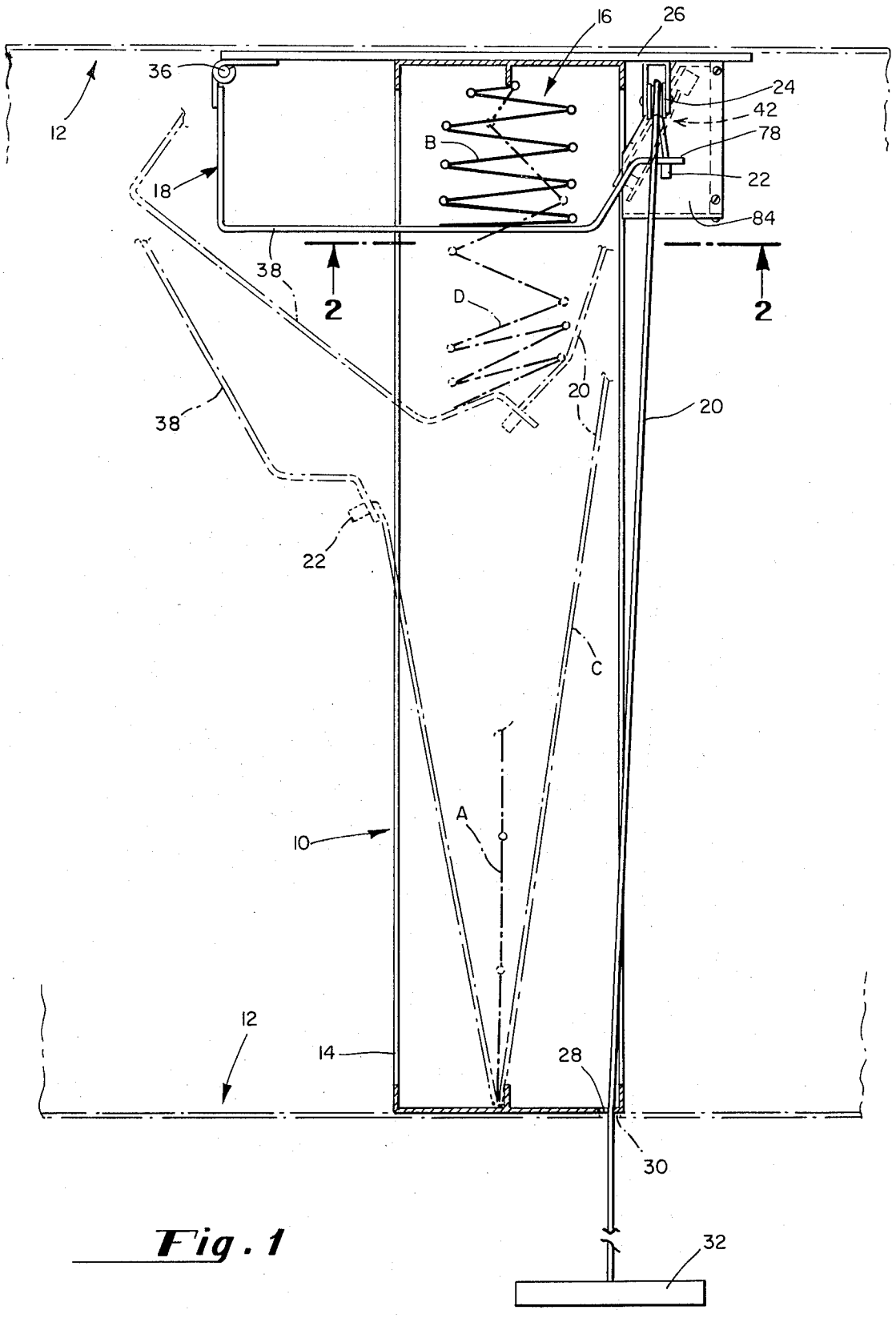


Fig. 1

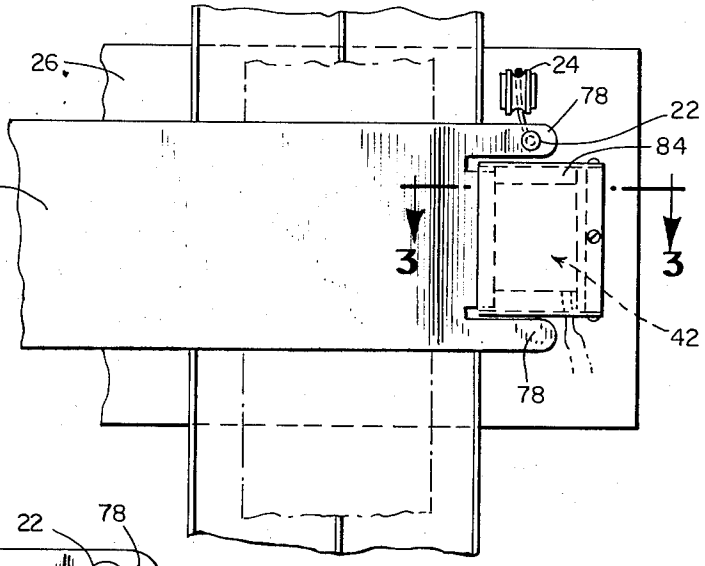


Fig. 2

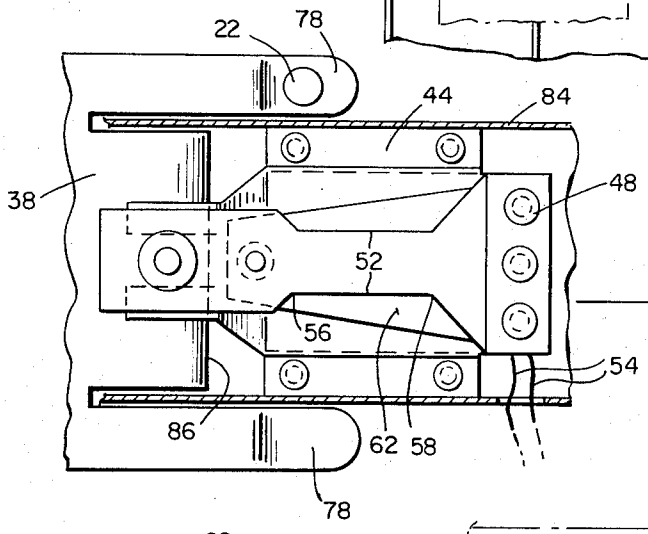


Fig. 5

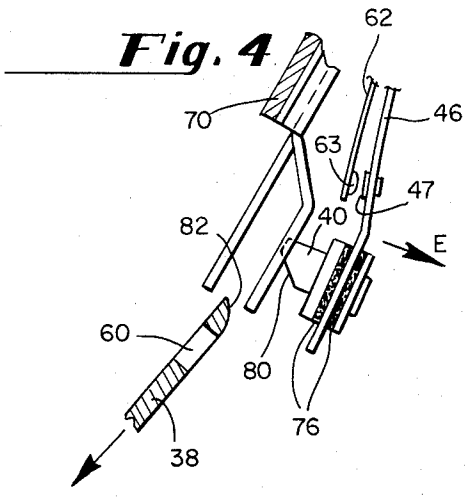


Fig. 4

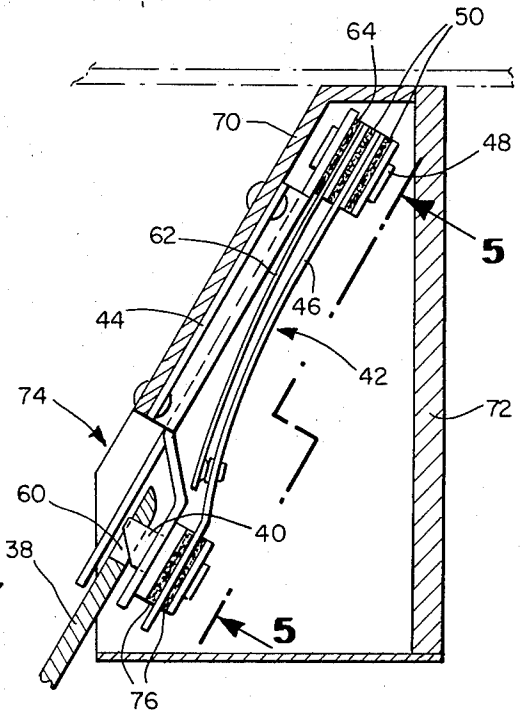


Fig. 3

REMOTELY RESETTABLE FIRE DAMPER

CROSS REFERENCE TO APPLICATION

This application is a continuation-in-part of my prior co-pending application for a Fire Link and Method of Actuating Same Ser. No. 178,111, filed Sept. 7, 1971, now U.S. Pat. No. 3,725,972, and discloses and claims, in part, the subject matter disclosed and claimed therein.

BACKGROUND OF THE INVENTION

This invention relates to thermally actuated fire dampers used in air ducts, and more particularly to a resettable link and a means co-operating therewith to reset the fire damper in its folded condition, from without the duct.

In the proir art, folding blade fire dampers such as those shown in my U.S. Pat. No. 3,273,632 and 3,401,734 were retained in a folded or retracted condition by a wire or chain held by a fusable link. The link was not resettable.

In my prior co-pending application I disclose a resettable link which can be actuated by a remote electrical signal to release the damper from its folded condition and allow it to extend to its fire blocking unfolded condition in the air duct in which it is mounted. However, in order to reset the damper in its retracted condition it is necessary to gain access to the air duct. It is desirable to be able to reset the damper remotely from outside the air duct.

SUMMARY OF THE INVENTION

My invention provides a mechanically operable resettable means for a fire damper, co-operating with a resettable link upon remote actuation from outside the air duct in which the damper is mounted. The means comprises a flexible member for pivoting an arm and raising the blades of the damper to their folded condition; which arm mechanically engages the resettable link.

In the preferred embodiment the link has a shroud associated with it for improved response to thermal conditions in the duct.

Accordingly, it is an object of my invention to improve fire damper systems by providing a means for remotely opening and resetting dampers mounted in ducts.

This and other objects of my invention will become apparent from the following description of the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of a remotely resettable folding blade fire damper in accordance with my invention shown partially in section, mounted in its environmental condition with alternate positions shown in phantom lines;

FIG. 2 is a partial plan view taken as indicated by the lines and arrows 2—2 in FIG. 1;

FIG. 3 is a section on a greatly enlarged scale taken as indicated by the lines and arrows 3—3 in FIG. 2;

FIG. 4 is a partial view similar to FIG. 3 showing the parts in an alternate position; and

FIG. 5 is a plan view taken as indicated by the lines and arrows 5—5 in FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

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 there forms of the invention, this description is not intended to limit the scope of the invention which is defined in the appended claims.

A folding blade fire damper of the type disclosed in my patents referenced above is shown in FIG. 1 designated generally **10** in its environmental condition mounted in an air duct shown in phantom lines and designated generally **12.** The damper comprises a frame **14** and a plurality of blades shown schematically and designated generally **16.** The blades shown in full lines are in their folded or retracted condition. This is the condition in which they would normally be retained by a wire or chain and fusable link. In the prior art, when the link melted and separated, the blades unfolded and extended to the bottom of the frame as shown by the phantom lines at "A." This was the unfolded or fully extended condition in which they prevented air and fire from passing through the duct.

If it was desired to reset the damper, then it was necessary to gain access to the duct. One had to reach into the duct and raise the blades by hand to their folded condition "B" and then attach another fusable link. By using a resettable link, the same link can be used again. By using the present invention, the damper can be reset from outside the duct. Among the advantages of this invention is that it provides a means for testing the functioning of the damper periodically at greatly reduced maintenance and test costs.

The damper reset comprises a pivotally mounted angled arm **18.** The arm is made of flat metal, preferably several inches wide to provide a stable surface upon which to rest the blades and to raise the blades without cocking them. This is accomplished as shown in phantom lines in FIG. 1 depicting several alternate positions. With the blades extended as at "A" a flexable braided wire **20** is loosely positioned as at "C" underneath the free end of the last blade. One end of the wire **20** passes through a hole in the free end of the arm **18** and is retained from being pulled through the hole by a metallic clip **22.** The wire **20** passes over a pulley **24** which is fixedly attached to the upper extension **26** of the frame **10**; the extension **26** being cantilevered from the top of the frame. The other end of the wire **20** extends through a hole **28** in the bottom of the frame **10** and a hole **30** in the duct, and terminates in a handle **32** attached thereto in any suitable manner.

The arm **18** is pivoted about a pin **36.** Accordingly, when the handle **32** is pulled from outside the duct, the wire **20** is drawn over the pulley **24** and begins to lift the blades **16.** As more and more wire is withdrawn the blades are folded and raised upwardly and the arm **18** begins to engage the blades as shown at "D." Upon further retraction, the arm fully pivots to the position shown in full lines wherein the end **38** FIG. 3 of the arm **18** mechanically interlocks with the pin **40** of the resettable link designated generally **42.**

The link comprises a base **44** upon which are mounted a plurality of metal strips each insulated from the other and from the base. The outer strip **46** is a bimetallic thermally responsive element which when heated moves in the direction of the arrow "E" FIG. **4.**

The rivet **48** retains the fixed end of the element **46** between spacer insulators **50** so that as heat builds up in the element **46** it bends. The narrow neck portion **52** FIG. **5** defines the portion of the element wherein the greatest bending will occur.

When the heat is supplied by a remote electrical source through the wires **54**, the electrical resistivity concentrates the heat in the narrow throat portion thereby preventing heat buildup in the area of the insulators **50**. It is desirable to make the end **56** of the neck **52** slightly narrower than the end **58** (on the order of 0.030 of an inch less) as this will direct the bending slightly forward to advantageously release the pin **40** from the hole **60**. The pin **40** is cocked at its free end slightly back in a direction toward the rivet **48** in order to hold greater weight when engaged by the arm **38** as in FIG. **3**. Accordingly, causing the greatest bending to occur closer to the free end of the element **46** upon heating of the element, provides for the release of more weight more efficiently.

The element **62** is a thin, flat strip of metal fixedly held at one end by the rivet **48** between the insulator spacers **64** and **50**. The metal member **62** is preformed or bent so that its normal position, when not acted upon by the member **46** would be that shown in part in FIG. **4**. However, the member **46** is a heavier gauge material and in its normal unheated condition it assumes the position shown in FIG. **3** wherein it forces the free end of element **62** back toward the base **44**. The element **62** has sufficient spring resiliency in it so that it is not deformed by this action and will move to its normal position as shown in FIG. **4** when the element **46** has been sufficiently heated to bend it in the direction of the arrow "E" to the position shown in FIG. **4**.

An electrical contact **63** is provided on the end of element **62** to engage an electrical contact **47** on element **46** and and complete the electrical circuit necessary to remotely heat element **46**. When these contacts are separated as in FIG. **4** the circuit is broken and heating ceases. Thereafter, as element **46** cools, it begins to return to its normal condition as shown in FIG. **3**. As long as the electrical signal is present when the contacts **43** and **47** again engage, the element **46** will again begin to heat up. The purpose of this is to prevent overheating of the bimetallic element **46**, which could cause elastic deformation or burning up of the electric circuit components.

The base **44** is fixedly attached as by riveting to an agnled bracket **70** which is fixedly attached by any suitable means to the overhang **26**. The angled bracket is a solid piece of metal. Mounted about the bracket and link **42** is a solid metallic shroud **72**. The shroud can be fixedly or pivotally attached to the angled bracket **70**. As shown, it provides an enclosure about the link **42** open only at the lower end designated generally **74** FIG. **3**. This prevents heat dissipation which would result from air flowing through the duct at too fast a rate. The open end would allow entry of hot air for thermal actuation, while preventing air flow through.

To aid in the mechanical interlocking of the end **38** with the pin **40**, I have provided a sloping surface **80** on the pin **40** which is engaged by the sloping surface **82** of the advancing end **38** of the arm. As the wire **20** is drawn through the device the advancing end **38** cams the pin **40** outwardly from its normal position in FIG. **3** until the hole **60** is aligned with the pin **40** and the pin drops into place as shown in FIG. **3** under the spring force of the member **46**. It should be noted that the pin **40** is fixedly held on the end of the member **46**, and is electrically insulated therefrom by the insulators **76**.

To aid in guiding the pin into the hole **60**, the hole is made slightly oversized and the tabs **78** FIGS. **2** and **5** extending from the end of the end **38** are positioned closely adjacent to the walls **84** of the shroud **72**. This provides an initial guide for the pin. In addition, the end **86** of the arm end **38** fits closely within the walls of the shroud thereby providing a further guide.

It will be apparent from what has been disclosed that various changes may be made by those skilled in the art within the principle and scope of the invention. For example, the cable **20** could be remotely controlled.

It should be noted that when the cable is retracted in the duct, it provides a visible indicator outside the duct that the damper blades have fallen.

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. In combination with a folding blade damper having blades movable between a folded and unfolded condition, the improvement comprising: a resettable link thermally actuatable between a closed and opened condition, comprising a bimetallic element cantilevered from a support connected to said damper and having a narrow neck portion intermediate the free end and the supported end, which element is thermally responsive to open and close said link; and a retraction means connected to said damper cooperating with said link to move said blades from their unfolded to their folded condition and retain them in their folded condition upon actuation from outside said damper.

2. The invention of claim **1** wherein said link has a pin extending from the free end of said element toward said support for engaging said retraction means.

3. The invention of claim **2** wherein said neck is narrower at the end thereof most remote from said support.

4. In combination with a folding blade damper having blades movable between a folded and unfolded condition, the improvement comprising: a resettable link connected to said damper; and a retraction means comprising an arm pivotally connected to said damper; said arm adapted to mechanically interlock with said link when said blades are in a folded condition and retain them in their folded condition; and a flexible member connected to the free end of said arm and coacting with said damper to pivot said arm and fold said blades upon retraction from outside said damper.

5. The invention of claim **4** wherein in the unfolded condition said arm is disposed on one side of said blades and said flexible member passes about the free end of one of said blades.

6. The invention of claim **4** wherein said damper has a frame and said flexible member extends beyond said frame in both the folded and unfolded condition.

7. The invention of claim **2** wherein said link comprises a bimetallic element having a pin extending from one end presenting a beveled surface to the free end of said arm.

8. The invention of claim 4 wherein said arm has a guide means at its free end to guide it into engagement with said link.

9. In combination with a folding blade damper having blades movable between a folded and unfolded condition, the improvement comprising: a resettable link connected to said damper; and a retraction means connected to said damper cooperating with said link to move said blades from their unfolded to their folded condition and retain them in their folded condition upon actuation from outside said damper; said link comprising a bimetallic element cantilevered from a support thermally actuatable between a closed and opened condition of engagement and disengagement with said retraction means; and a second element cantilevered from said support; said elements being electrically insulated from each other and from said support; said elements comprising an electric switch.

10. The invention of claim 9 wherein said second element is resilient and is movable between a flexed position in engagement with said bimetallic element and an unflexed position when no longer engaging said bimetallic element.

11. The invention of claim 9 wherein said switch remains closed while said link engages said retraction means.

12. In combination with a folding blade damper having blades movable between a folded and unfolded condition, the improvement comprising: a resettable link connected to said damper; and a retraction means connected to said damper cooperating with said link to move said blades from their unfolded to their folded condition and retain them in their folded condition upon actuation from outside said damper; said resettable link comprising a bimetallic element cantilevered from a support and having engagement means at the free end thereof for engaging said retraction means; said bimetallic element being thermally actuatable between a closed and opened condition of engagement and disengagement with said retraction means and being substantially closed by a shroud.

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