

June 23, 1942.

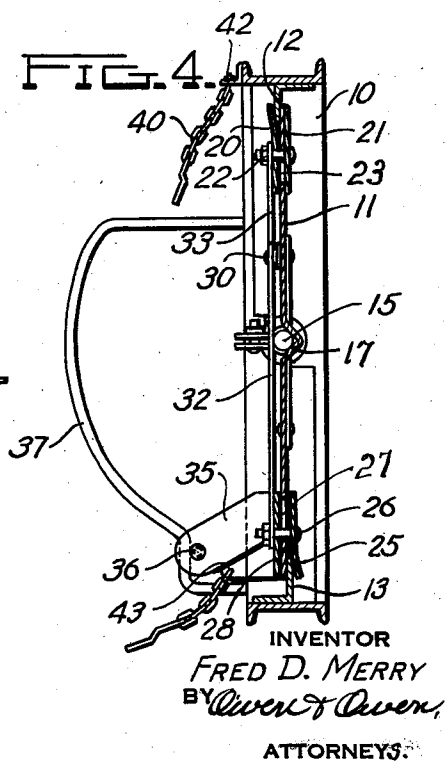
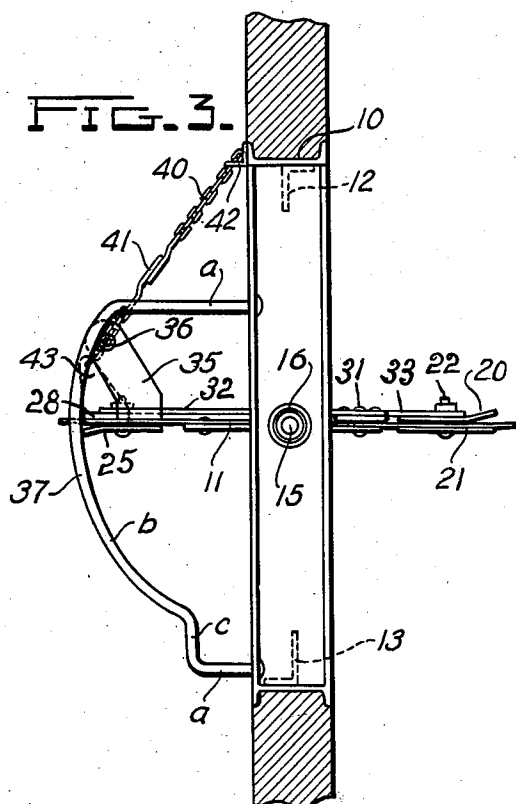
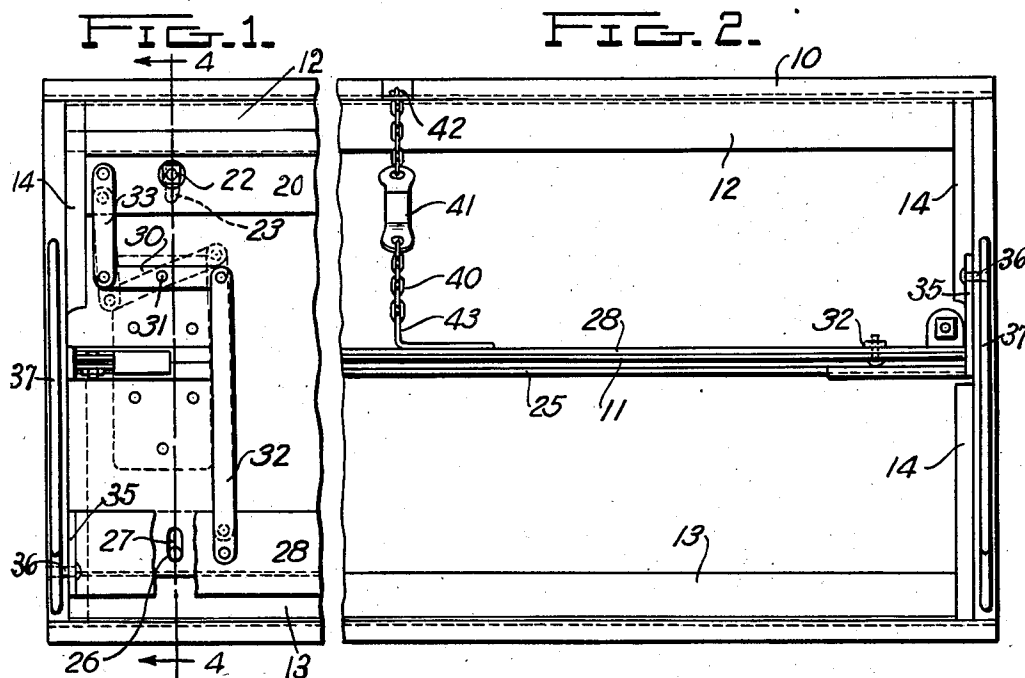
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2,287,262

FIRE DAMPER

Filed May 7, 1940

3 Sheets-Sheet 1



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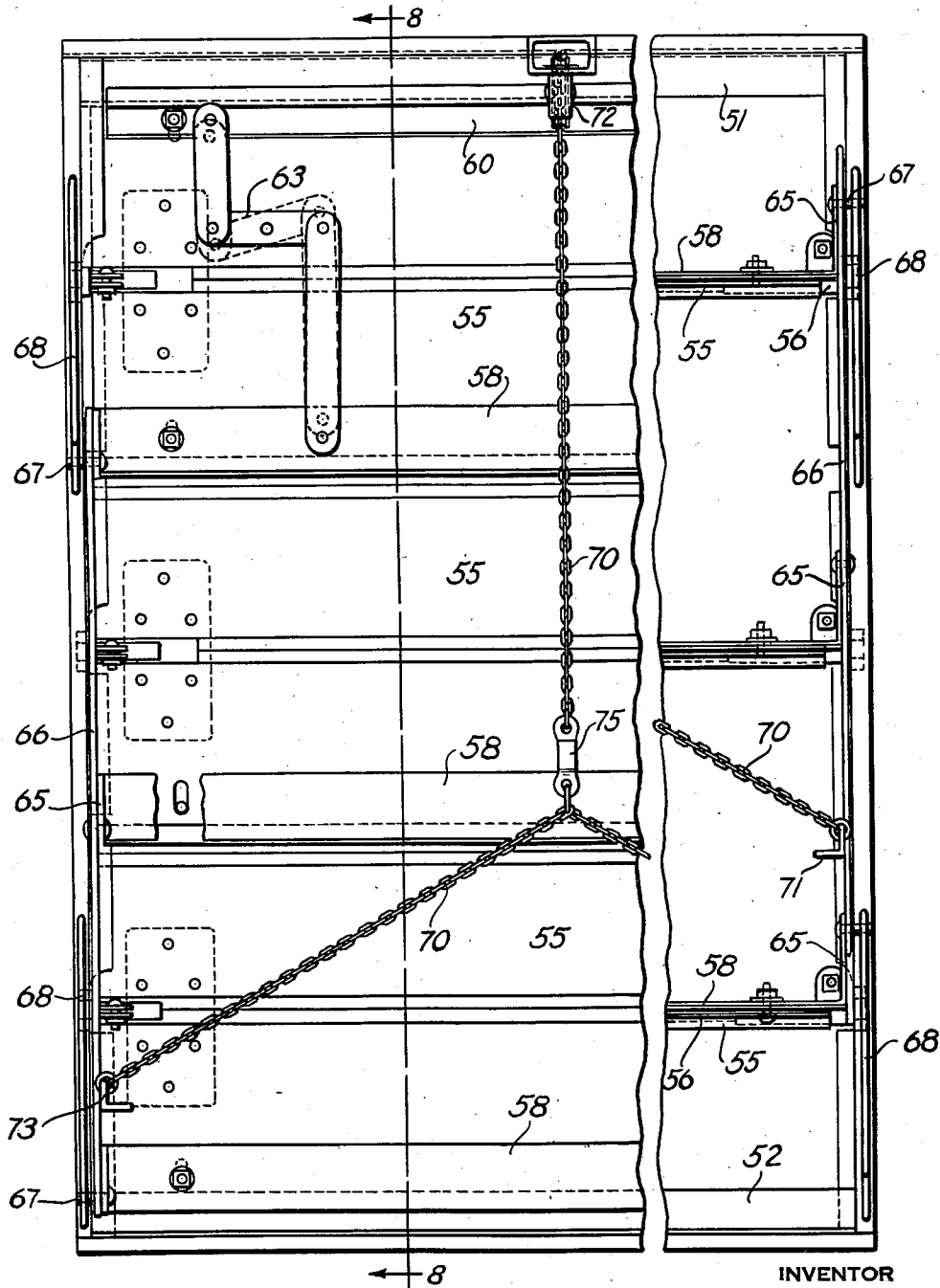
FIRE DAMPER

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FIG. 5.

FIG. 6.



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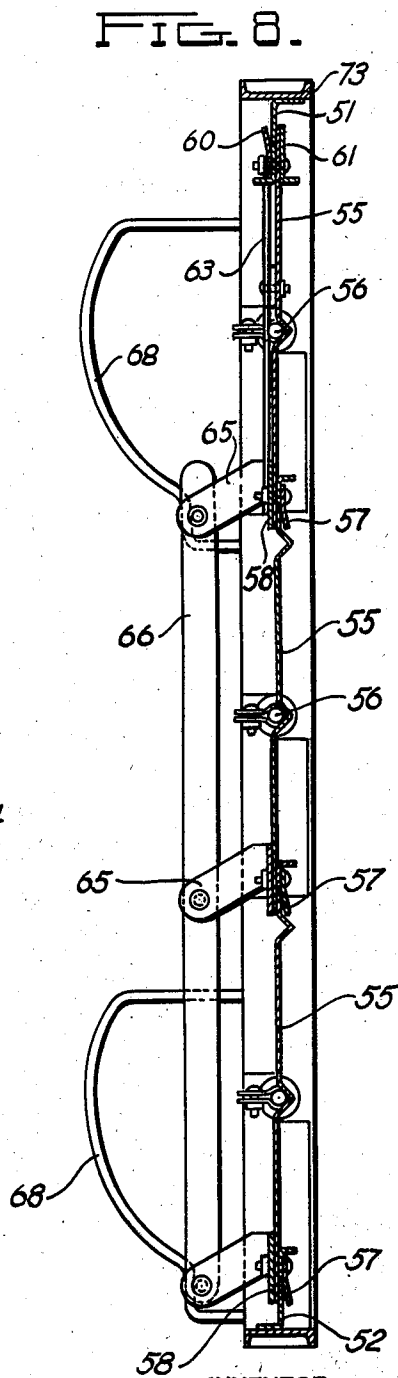
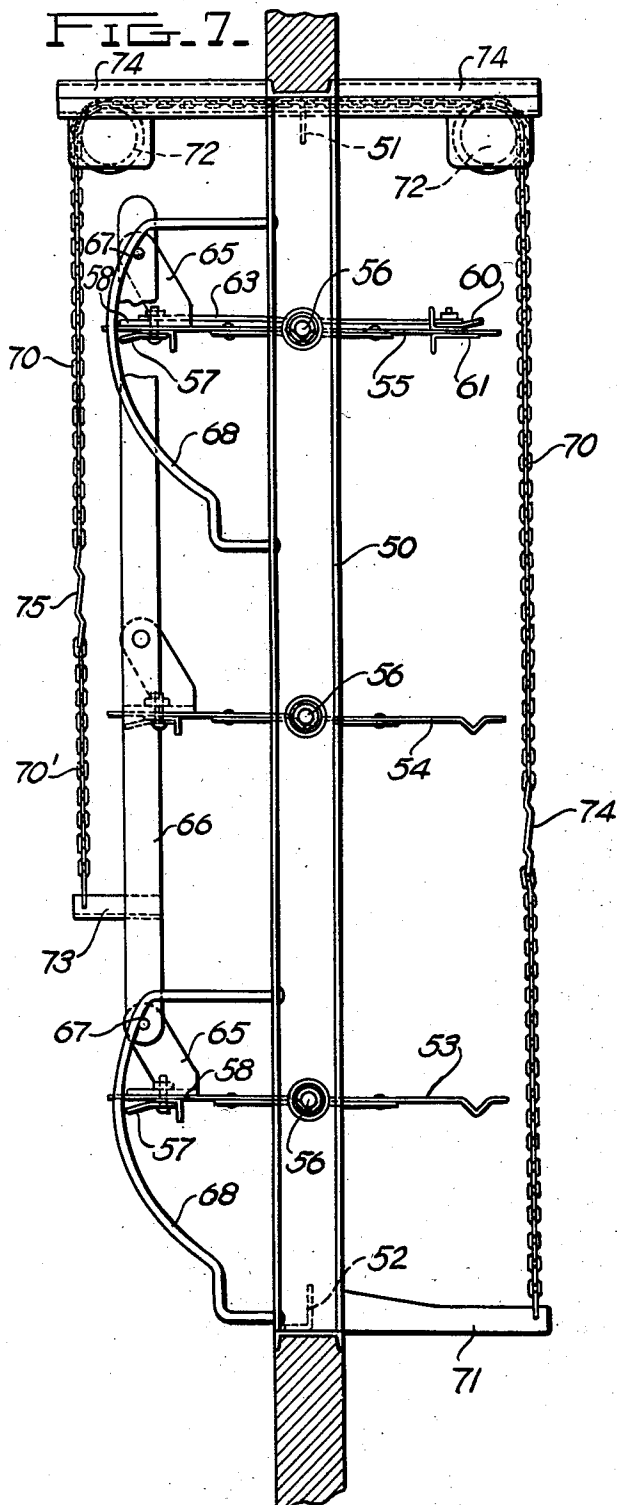
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FIRE DAMPER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,287,262

FIRE DAMPER

Fred D. Merry, Toledo, Ohio, assignor to The American Warming and Ventilating Company, Toledo, Ohio, a corporation of Ohio

Application May 7, 1940, Serial No. 333,796

9 Claims. (Cl. 98—1)

This invention relates to fire dampers, and particularly to those of the automatic closing type for use in the openings of ventilating flues, or the like.

An object of the invention is the provision of an improved and highly efficient damper of this character, the blade or blades of which are retained in open position by means that is automatically releasable under predetermined heat conditions and which when released move to and are locked in closed position.

A further object of the invention is the provision in connection with a damper of this character of means movably carried by the damper blade at its edges and retained in retracted inoperative position on the blade when the latter is in other than closed position and is automatically operable to move to joint-closing blade-locking position when the blade is in closed position.

Further objects and advantages of the invention will be apparent from the following detailed description thereof and from the accompanying drawings illustrating different embodiments of the invention, in which—

Figure 1 is a fragmentary side view of a damper embodying the invention, with the blade in closed and locked position; Fig. 2 is a similar fragmentary view with the damper in open position; Fig. 3 is a side edge view of a damper embodying the invention, with the blade in open position; Fig. 4 is a vertical section on the line 4—4 in Fig. 1, showing the damper in closed and locked position; Fig. 5 is a side view of a form of the invention including multiple blades or louvers, with the same in closed and locked position; Fig. 6 is a similar fragmentary side view of such form of the invention, with the blades in open position; Fig. 7 is an edge elevation of a multiple blade form damper embodying the invention, with the blades held in open position, and Fig. 8 is a fragmentary sectional view thereof taken on the line 8—8 in Fig. 5.

Referring to Figs. 1, 2, 3 and 4 of the drawings which illustrate the invention in association with a single blade or louver type damper, 10 designates a damper frame for insertion or building into a ventilating or intake opening of a draft flue, or the like, as well understood in the art, and 11 a damper blade mounted

the opening intermediate their side edges, and stop flanges 14 project inwardly from both side walls of the opening for cooperation with the damper blade when closed.

The blade 11 is of plate-form and is of a size to adapt it, when closed, to overlap, at its top and bottom edges, the respective sides of the lock flanges 12, 13, and also to overlap the stop flanges 14. It is provided at opposite side edges in axial alignment with trunnions 15 fitting into respective bearing openings 16 in each upright or side member of the frame. The trunnions, in the present instance, seat in a transverse crimp 17 in the blade and are secured therein by welding, or in any other suitable manner. These trunnions are disposed substantially centrally of the top and bottom edges of the blade, but in upwardly offset relation to the center of gravity thereof, so that the tendency of the blade is to close by gravity action.

The blade 11 is provided at its upper edge, at the side thereof which has stop coaction with the frame flange 12, with a lock strip 20 which extends the length of the blade edge and is mounted thereon for limited movements radially of the blade axis. The strip 20 and a companion backing strip 21, at the opposite side of the blade edge, are rigidly connected at intervals lengthwise of the blade by bolts 22 which project through radial slots 23 in the blade, thus permitting inward and outward movements of the strips 20, 21, relative to the blade. When the strips 20, 21, are in inward retracted position, the strip 20 stands in position to pass freely under the flange 12 during a closing movement of the blade. When the blade is in closed position and the strips 20, 21, are moved outwardly, they straddle the flange 12 so that the front strip 20 coacts therewith to prevent an opening of the blade and to provide a close joint between the flange and blade. The outer edge portion of the strip 20 is outwardly inclined to facilitate its engagement with the flange so that when moved outwardly it has a wedge-like action on the flange to draw the opposing blade edge closely thereto.

The blade at its lower edge is provided with a radially shiftable lock-strip 25 connected by a series of bolts 26, through radial slots 27 in the blade, to a backing strip 28 at the opposite sides of the blade edge. When the strips 25, 28, are retracted the lock-strip 25 passes freely over the frame flange 13, and when projected, said lock-strip has wedge engagement with said flange in opposition to the blade edge to lock the blade to

The frame 10, in the present instance, provides a rectangular opening. Lock flanges 12 and 13 extend the full length of and project inwardly, respectively, from the top and bottom walls of

the flange and to provide a tight joint between it and the blade edge the same as described for the upper edge strips 20, 21.

A link and lever connection is provided between the upper and lower sets of edge strips at one side of the blade and near opposite ends thereof and is of a nature to cause the strips to have opposing movements in unison when either set is moved. This connection, in the present instance, includes at each end of the blade a lever 30 pivoted to the blade at 31 and extending lengthwise thereof, and links 32 and 33 pivoted to opposite ends of the lever and projecting in opposite directions therefrom, with one pivoted at its outer end to the lower edge strips 28 while the other is pivoted at its outer end to the upper edge strip 20. The weight of the lower set of strips 25, 28, and their attachments, is such relative to the upper set of strips 20, 21, and their attachments, that when the blade is in vertical or closed position, both sets are moved, by gravity action of the former, to protracted positions, as shown in Figs. 1 and 4.

The lower strip 28, in the present instance, has a finger 35 projecting laterally therefrom at each end in the plane of swinging movements of the blade and from the side of the blade which is uppermost when the blade is in open position. A pin 36 projects outwardly from each finger 35 crosswise of the frame 10 and in guided engagement with the inner side of a respective guide-bar 37 on the adjacent frame upright. Each of these guide bars has a pair of laterally spaced legs *a*, *a*, attached to and rigidly projecting from the frame and connected by a pin guiding portion including an arcuate part *b* concentric to the swinging axis of the blade, and a vertically disposed part *c* at the lower end of the part *b*. The guide parts *b* coact with the pins 36 to retain the sets of blade edge plates 20, 21 and 25, 28, in retracted positions when the blade is in other than substantially vertical or closed position, and when in the latter position the pins are released by moving into register with the well formed by the part *c*, thus permitting the edge strips to move to projected locking engagement with the respective frame flanges 12, 13. When the blade is in closed position the pins 36 coact with the guide parts *c* to tend to lock the blade in such position, thus cooperating in this respect with the edge strips 20 and 25 in engagement with their respective frame flanges.

It is apparent that the guides 37 and cooperating parts are disposed at the outer or accessible side of a damper opening to permit manual, or manually-controlled, release of the blade locking parts and an opening of the blade.

The blade is retained in open position by a chain 40 provided with a fusible link 41 and connected at one end to an eye 42 on the frame 10 and at its other end to an eye 43, in the present instance, on the lower edge strip 28 of the blade.

The application of the invention to a damper of the multiple blade or louvre type is illustrated in Figs. 5, 6, 7 and 8. In this form of the invention, 50 designates the frame forming the damper opening, 51 and 52 the lock flanges projecting inwardly from the upper and lower members, respectively, of the frame, and 53, 54 and 55 the three blades pivotally mounted one over the other for vertical swinging movements in the frame and adapted to cooperate, when in closed or substantially vertically aligned positions, to close the frame opening, as shown in Figs. 5 and 8, 75

These blades are mounted in the frame on trunnions 56 the same as described in the single blade form. Each of the blades is provided at its lower edge with a pair of edge strips 57 and 58, which have limited movements radially of the respective blades and correspond in operation and function to the lower edge strips 25, 28, of the single blade form. When the blades are in closed position, the lower blade 53 laps the frame flange 52, while the lower edges of each of the other blades lap the upper edge of the blade next below. At the same time the edge strip 57 on the lower blade has locking coaction with the frame flange 52, while the corresponding edge strips of the remaining blades have locking coaction with the upper edges of the adjoining blades the same as if such edge were a flange on the frame. The upper blade 55 has at its upper edge a pair of edge strips 60 and 61, which are connected together and are adapted to have limited movements radially of the blade the same as the top edge strips 20 and 21 of the single blade form of the invention. When the blade 55 is in closed position, the edge strip 60 coacts with the opposing side of the frame flange 51 to that engaged by the edge of the blade and locks the blade in closed position. In this form of the invention, the upper blade, 55, is the only one having edge flanges at each edge thereof the same as in the single form of the invention. These edge flanges of the upper blade have link and lever connection 63 the same as shown in Fig. 1, whereby a lowering movement of the lower edge strips on the blade will effect a raising movement of the upper edge strips.

The backing strip 58 at the lower edge of each blade is provided at each end with an outwardly projecting finger 65 and these fingers, at each side of the damper, are pivotally connected to a respective bar 66 which cause the blades to have opening and closing movements in unison. The pivotal connection of the upper and lower fingers 65 with the bar 66 are extended to provide guide pins 67 which coact with respective guide bars 68 to hold the edge strips of the respective blades in retracted position until the blades have moved to closed or vertical position and then to permit a gravity projection of the edge strips the same as described in connection with the single form. In this multiple louvre form, the fusible connection for retaining the blades in open position comprises a chain 70 anchored at one end to an arm 71 projecting outwardly from the lower portion of the frame 50 at one side thereof, and thence extends upwardly and around sheaves 72 crosswise of the frame and thence down on the opposite side to the central portion of a loop chain 70', which connects at opposite ends to bracket fingers 73 projecting outward from the respective bars 66. The sheaves 72 are carried by arms 74 projecting from opposite sides of the top portion of the frame. The connection 70 is provided at each side of the frame with fusible links 75.

It is apparent with this multiple blade construction that when either link of the connection 70, 70', is fused, the blades will be permitted to have gravity closing movements in unison and the lower edge locking strips 57 on each of the blades and the upper edge locking strips 60 on the upper blade will have protracted joint closing movements by gravity action when the blades are in closed positions. When the blades are in open positions the edge locking strips are retained in retracted position due to the coaction of the pins

67 with the guide bars 68. When the blades have swung to closed position the pins 67 move into the wells at the lower ends of the guides and permit gravity protracted movements of the edge strips for the purpose described.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent, is:

1. In a fire damper, a frame forming an opening and having inwardly projecting edge parts, a blade mounted for vertical swinging movements in said frame between said parts, means carried by said blade and including inwardly and outwardly shiftable members at the upper and lower edges thereof and connections therebetween operable by gravity action to move said members into locking coaction with the respective edge parts to lock the blade in closed position when it has moved to such position, means coacting with said first means to retain its members retracted from edge part engaging positions until the blade is moved to its closed position, and releasable means for holding the blade in open position.

2. In a fire damper, a frame forming an opening and having an inwardly projecting flange on one of its upper and lower walls, a blade mounted for vertical swinging movements in said frame to open and closed positions and normally movable by gravity to closed position, an edge strip carried by an edge of the blade for limited radial movements relative to the swinging axis of the blade and operable by gravity action to move outward on the blade to have locking joint closing engagement with said flange when the blade is in closed position, means for preventing outward movement of said edge strip on the blade except when the blade is in closed position, and releasable means for holding the blade in open position.

3. In a fire damper, a frame forming an opening and having an inwardly projecting flange on each of its upper and lower walls, a blade mounted for vertical swinging movements in the frame and for stop coaction at its upper and lower edges with said flanges when closed, said blade normally moving to closed position by gravity action, an edge strip carried by each upper and lower edge portion of the blade for limited inward and outward movements relative thereto, means connecting said strips to have opposed movements in unison, said strips being normally operable to have sliding engagement with the respective flanges when the blade is in closed position, means acting to retain said strips in retracted position except when the blade is in closed position and means for holding the blade in open position and releasable by predetermined temperature conditions.

4. In a fire damper, a frame forming an opening and having an inwardly projecting flange on its lower wall, a blade mounted for vertical swinging movements in the frame and for stop coaction at its lower edge with said flange, a member movably carried by the lower edge portion of the blade and projectable by gravity action into locking and joint closing engagement with said flange when the blade is in closed position, guide means carried by the frame and cooperating with said member to retain it in retracted position except when the blade is in

closed position and to then act to prevent opening movement of the blade until the member has been retracted, and means to retain the blade in open position and releasable by predetermined temperature conditions.

5. In a fire damper, a frame forming an opening and having an inwardly projecting flange on each edge of its upper and lower walls, a blade mounted for vertical swinging movements in the frame and for stop coaction at its upper and lower edges with said flanges when closed, said blade normally moving to closed position by gravity action, an edge member carried by each upper and lower edge portion of the blade for limited inward and outward movements relative thereto, and when moved outwardly with the blade in closed position to coact respectively with said flanges and in opposition to the blade edges to retain the blade in closed position, means carried by the blade and connecting said members to cause them to have inward and outward movements in unison, said means and members being normally operable by gravity to move to protracted positions, means coacting with one of said members to retain the members in retracted positions except when the blade is in closed position, and means for retaining the blade in open position and releasable by predetermined temperature conditions.

6. In a fire damper, a frame forming an opening and having an inwardly projecting flange on its lower edge wall, a plurality of blades mounted in vertically spaced relation for vertical swinging movements in said frame and cooperating to close the opening when swung to vertical position, a member carried by the lower edge portion of each blade for limited inward and outward movements relative thereto, means connecting said members to cause them to have inward and outward movements in unison, said members being movable outward on the blades by gravity action when the blades are in closed positions with the member on the lower blade in joint closing engagement with said flange and with the members on each of the other blades in joint closing engagement with the upper edge of the blade next below, means for retaining the members in retracted positions when the blades are in closed position, and releasable means for retaining the blades in open positions.

7. In a fire damper, a frame forming an opening and having an inwardly projecting flange on its lower edge wall, a plurality of blades mounted in vertically spaced relation for vertical swinging movements in said frame and cooperating to close the opening when swung to vertical position, a member carried by the lower edge portion of each blade for limited inward and outward movements relative thereto, means connecting said members to cause them to have inward and outward movements in unison, said members being movable outward on the blades by gravity action when the blades are in closed positions with the member on the lower blade in joint closing engagement with said flange and with the members on each of the other blades in joint closing engagement with the upper edge of the blade next below, means operable to retain said members in retracted positions except when the blades are in closed positions and releasable means for holding the blades in open position.

8. In a fire damper, a frame forming an opening and having an inwardly projecting flange on each of its upper and lower walls, a plurality of blades mounted in said frame one above the

other and for vertical swinging movements to cooperate with said flanges to close the frame opening, a member carried by the lower edge portion of each of said blades for limited inward and outward movement relative thereto, means connecting said members to cause them to have inward and outward movements in unison, said members being projected when the blades are in closed position with the lower member coacting with the lower flange to close the blade joint therewith and with the other members coacting with the upper edge portions of the blades next below to close the joints therebetween, a member carried by the upper edge portion of the upper blade for inward and outward movements relative thereto and for joint closing engagement with said upper flange when the blades are in closed position, means connecting the members on said upper blade to cause them to have protracting and retracting movements in unison, means coacting with certain of said members to retain them in retracted position except when the blades are in closed positions and releasable means for holding the blades in open position.

9. In a fire damper, a frame forming an opening and having an inwardly projecting flange on each of its upper and lower walls, a plurality of

blades mounted in said frame one above the other and for vertical swinging movements to cooperate with said flanges to close the frame opening, a member carried by the lower edge portion of each of said blades for limited inward and outward movements relative thereto, means connecting said members to cause them to have inward and outward movements in unison, said members being projected when the blades are in closed position with the lower member coacting with the lower flange to close the blade joint therewith and with the other members coacting with upper edge portions of the blades next below to close the joint therebetween, a member carried by the upper edge portion of the upper blade for inward and outward movements relative thereto and for joint closing engagement with said upper flange when the blades are in closed position, means connecting the members on said upper blade to cause them to have protracting and retracting movements in unison, and means coacting with certain of said members to retain them in retracted positions except when the blades are in closed positions, and fusible means connected to and normally retaining said blades in open positions.

FRED. D. MERRY.

CERTIFICATE OF CORRECTION.

Patent No. 2,287,262.

June 23, 1942.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 48, claim 6, after "positions" insert "--except--"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of August, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.