Oct. 19, 1926. 1,604,099

H. A. JOHNSON

MOVABLE DOOR BINDER FOR FIRE DOORS

Filed Sept. 27, 1924

Fig. 1.

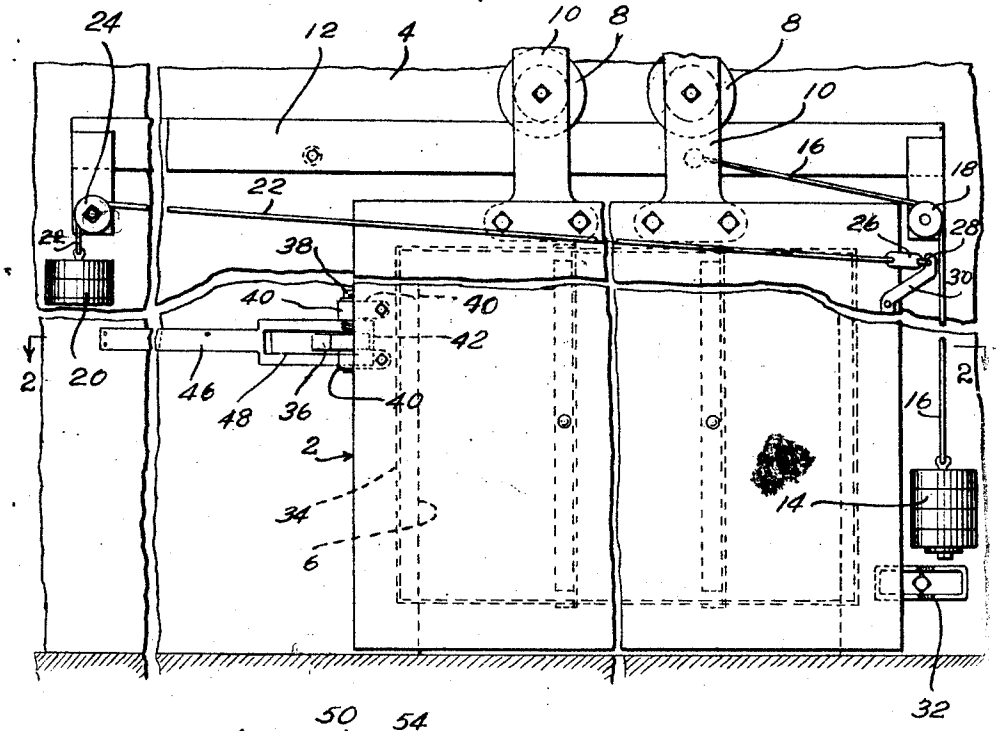


Fig. 2.

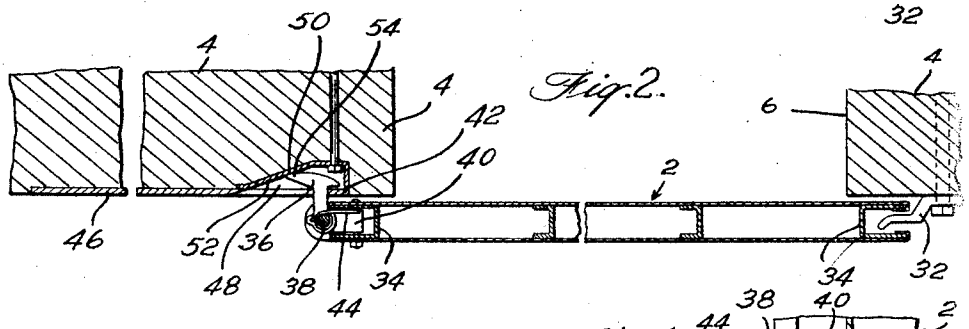


Fig. 3.

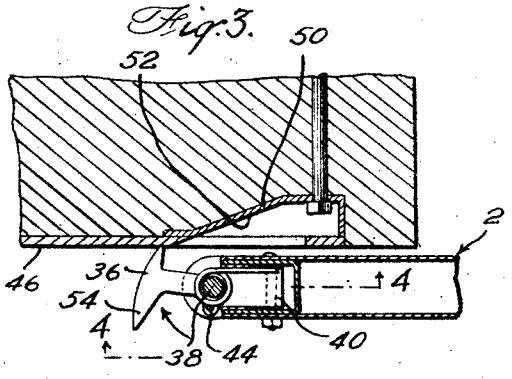
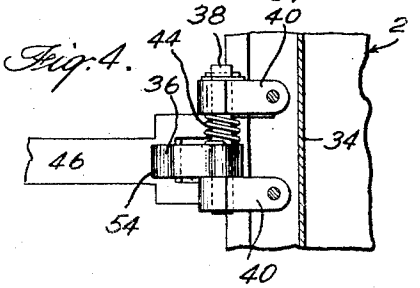


Fig. 4.



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Patented Oct. 19, 1926. 1,604,099

UNITED STATES PATENT OFFICE.

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MOVABLE DOOR BINDER FOR FIRE DOORS.

Application filed September 27, 1924. Serial No. 740,296.

This invention relates to fire doors and more particularly to devices for holding a margin of a fire door at certain points to the wall along which the door is arranged to move.

Fire doors are usually hung at their upper margins upon rollers and are arranged to slide along a track from open to closed position. When in closed position the margins of the door are ordinarily arranged to overlap the wall at the margins of the doorway which the door is designed to close. When a fire occurs, a very high pressure is often developed upon the inner side of the door over that of the outer side thereof, which tends to force the door away from the margin of the doorway. This pressure is often sufficient to force the margin of the door away from the wall at points at which the door is not firmly secured to the wall. Furthermore, the door is liable to buckle under the high temperature developed, and the buckling of the door may throw the door away from the margin of the doorway at one or more points. In either event, an opening is left through which the fire may pass and the protective usefulness of the door is to a large extent destroyed. For this reason, door binders have been provided for fire doors to hold the margins of the door from movement away from the wall when the door is closed.

One object of the present invention is to improve the construction and mode of operation of door binders for fire doors.

The margin of a fire door at the front edge thereof is usually held to the wall when the door is closed by fixed binders secured to the wall, and the top of the door is held in place by the devices which support the door. It is also common practice to provide one or more guide rollers at the base of the door and these will hold the door from being forced transversely out of position at this point. The rear edge of the door, however, is usually left free, with the result that the rear portion of the door under the pressure developed or the buckling strain is often forced away from the margin of the doorway, allowing the fire to pass through at this point.

Another object of the present invention is to provide a novel and improved construction for holding the rear edge of a fire door to the wall when the door is in closed position.

The invention will be clearly understood from the accompanying drawings illustrating the invention in its preferred form and the following detailed description of the construction therein shown.

In the drawings—

Fig. 1 is a view in front elevation of a fire door construction embodying the invention;

Fig. 2 is a view in horizontal section taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a detail view in horizontal section taken in substantially the same plane as Fig. 2 and illustrating certain of the parts in different positions; and

Fig. 4 is a view in vertical section taken substantially on the line 4—4 of Fig. 3.

In the construction illustrated in the drawing a fire door indicated at 2 is mounted to slide horizontally along a wall 4 of a building and when in closed position is arranged to close an opening 6 in said wall. The door 2 is mounted to slide upon rollers 8 journalled upon shafts carried by hangers 10 secured to the upper margin of the door, the rollers engaging a horizontal track 12 secured to the wall 4. Thus the door is mounted to slide horizontally along the wall 4 between open and closed positions. When in closed position the margin of the door overlaps the wall 4 at the margin of the doorway for a considerable distance, as is clearly shown in Figs. 1 and 2.

As is usual in fire door constructions, the present door is provided with mechanism acting automatically to close the door upon the occurrence of a fire. This mechanism, however, is counterbalanced so that normally the door may be moved by hand from open to closed position or from closed to open position and will remain in the position in which it is placed.

The door is acted upon by a weight 14 attached to one end of a cable 16 passing about a pulley 18 secured to the wall 4, the other end of the cable being attached to one of the hangers 10, as shown in Fig. 1. Thus the weight 14 acts on the door in a direction to move the same from open to closed position. The weight 14, however, is counterbalanced by a weight 20 attached to

one end of a cable 22 passing about a pulley 24 secured to the wall 4. From the pulley 24 the cable 22 extends toward the forward edge of the door and its other end is attached to a fusible link 26. This link is connected by a short length of cable 28 with a bracket arm 30 secured to the door, preferably adjacent the forward margin thereof.

When a fire occurs with the door in open position, the link 26 fuses, thereby freeing the door from the action of the counterbalance weight 20. The weight 14 will then act to slide the door into closed position across the doorway 6.

In order to hold the forward edge of the door to the margin of the doorway, door binders 32 are secured to the wall 4 adjacent the forward margin of the doorway. As clearly shown in Figs. 2 and 3 of the drawing, the door is provided with channel bars 34 extending along the forward and rear margins thereof, thereby providing the door with inwardly-extending channels along these margins. The fixed door binders 32 in the preferred construction shown in the drawing are arranged to engage in the channel at the forward margin of the door, as clearly shown in Fig. 2. The upper margin of the door is held from being forced outwardly away from the wall 4 by the engagement of the rollers 8 with the track 12.

In order to hold the rear margin of the door from being forced outwardly by the pressure developed on the inner side of the door or from buckling under the heat, the door is provided with a movable door binder indicated at 36 for binding the rear margin of the door to the wall 4. The door binder 36 is pivoted upon a short shaft 38 mounted in supporting blocks 40 secured within the channel bar 34 extending along the rear margin of the door. The door binder 36 is made in the form of a hook or catch as shown in Figs. 2 and 3, and the forward part of the catch, when in operating position, is arranged to engage a plate 42 secured to the wall 4. The catch 36 is acted upon by a coiled spring 44 which constantly tends to swing the same into operating position. When the door is in open position, however, the forward end of the catch engages an extension 46 on the plate 42, which limits the movement of the catch under the action of the spring 44. As the door is moved from open to closed position the catch 36 moves along the extension 46 until it reaches an opening 48 in the plate 42. This opening leads to a recess in the wall 4 in which is mounted a recessed plate 50. In the closing movement of the door, as the catch 36 reaches the opening 48 in the plate 42, the catch is swung into the recess within the plate 50 and the forward part of the catch is carried across the part of the plate 42 in advance of the opening 48, as clearly shown in Figure 2. When in this position, the rear margin of the door is securely bound to the wall 4 by the catch 36.

It is highly important that a fire door shall be capable of being opened manually in all cases after it has been moved to closed position by the action of the automatic fire controlled mechanism so that there will be no danger that any person will be trapped in a burning building by the closing of the fire doors. The door binder for the rear edge of the door of the present construction is arranged so that it will not interfere with the opening of the door, the binder being thrown out of operating position as the door is moved from closed to open position. To this end the plate 50 is provided with an inclined cam surface 52 arranged to engage a projection or tail 54 formed on the catch 36. The cam surface and tail of the catch are constructed and relatively arranged so that, with the parts in the position shown in Fig. 2, the catch will be swung back out of operating position into the position shown in Fig. 3, by the first part of the sliding movement of the door from closed to open position. Thus the door may be readily opened whether it is closed automatically by the action of the fire-controlled mechanism or whether it is closed by hand.

The door binder mechanism for the rear edge of the door illustrated and described in this application, is extremely simple in construction, is reliable in its operation and is composed of relatively few parts so that it may be manufactured cheaply. Also the construction of this mechanism enables it to be readily installed on fire door constructions already in operation.

Having explained the nature and object of the invention and having specifically described a mechanism embodying the invention in its preferred form, what is claimed is—

1. In a door construction, a wall having a doorway, a sliding door to close the doorway, a movable door binder for binding an edge of the door to the wall when the door is closed, means tending constantly to throw said door binder into operation and means for controlling the door binder to maintain the same out of operation when the door is partially or entirely open and to allow the same to be thrown into operation when the door is closed.

2. In a door construction, a wall having a doorway, a sliding door to close the doorway, a movable door binder for binding an edge of the door to the wall when the door is closed, means tending constantly to move said door binder into operating position, means for controlling the door binder to maintain the same out of operation when the door is partially or entirely open and

to allow the same to be thrown into operation when the door is closed, and means for throwing the door binder out of operative position when the door is opened.

3. In a door construction, a wall having a doorway, a sliding door to close the doorway, a movable door binder for binding the rear edge of the door to the doorway when the door is closed, means for throwing the door binder into operating position when the door is closed and a fixed cam for engaging the door binder to throw the same out of operating position when the door is opened.

4. In a door construction, a wall having a doorway, a sliding door to close the doorway, a pivoted door binder for binding an edge of the door to the doorway when the door is closed, a spring tending constantly to swing said door binder into operating position, a plate having an extension arranged to be engaged by said door binder to limit the movement thereof under the action of the spring except when the door is at or adjacent its closed position, said plate having an opening through which the door binder may swing into operating position as the door approaches final closed position in its closing movement and a portion for engagement with said door binder to bind the door to the wall, and a plate having a cam surface for engagement with a projection on the door binder to throw the door binder out of operating position as the door is moved from closed to open position.

5. In a door construction, a wall having a doorway, a sliding door to close the doorway, a movable door binder mounted on the rear edge of the door for binding said edge of the door to the wall when the door is closed, means tending constantly to move said door binder into operating position, and means for controlling the door binder to maintain the same out of operation when the door is partially or entirely open and to allow the same to be thrown into operating position when the door is closed.

6. In door construction, a wall having a door opening, a sliding door having a movement of translation only and arranged to slide along the wall from an open position to a closed position at one side of the wall and without the door opening, means for binding the front edge of the door to the wall, and means movable with relation to the door into and out of binding position and brought into operation by movement of the door into the latter position for binding the rear edge of the door to the wall when the door is closed, said means being inactive when the door is open.

7. In door construction, a wall having a door opening, a sliding door having a movement of translation only along the wall from open position to closed position at one side of the wall and without the door opening, a door binder movable with relation to the door into and out of binding position, and means for operating automatically the door binder with relation to the door to bind an edge of the door to the wall as the door slides to the latter position.

8. In door construction, the combination with a wall having a doorway, a sliding door to close the doorway, and a bracket on the wall at one side of the doorway having an offset portion to overlap a front edge of the door when closed, of an anchorage on the wall at the opposite side of the doorway, a hook shaped catch movably mounted on the rear edge of the door, and means brought into operation by closing movement of the door for moving the catch relatively to the door into engagement with the anchorage to hold said rear edge of the door against movement away from the wall.

9. In door construction, the combination with a wall having a doorway, a sliding door to close the doorway, and a bracket on the wall at one side of the doorway having an offset portion to overlap a front edge of the door, when closed, of an anchorage on the wall at the opposite side of the doorway, a hook shaped catch movably mounted on the rear edge of the door, means controlled by movement of the door for moving the catch relatively to the door into engagement with the anchorage as the door is closed to hold said rear edge of the door against movement away from the wall, and means also controlled by movement of the door for disengaging the catch from the anchorage as the door is opened.

10. In door construction, the combination with a wall having a doorway, a track over the doorway, rollers mounted to travel on the track, a door secured at its upper edge to the rollers, a binder on the wall at one side of the doorway in position to engage a front edge of the door intermediate the top and bottom edges when the door is closed, a binder movable with relation to the door to interlock the rear edge of the door and the wall intermediate the top and bottom edges of the door, and means controlled by closing of the door for operating the binder, whereby three edges of the door will be secured against movement away from the wall while the door is closed.

11. In a door construction, a wall having a doorway, a sliding door to close the doorway and an automatic door binder mounted for movement with relation to the door into and out of binding position and controlled by the sliding movement of the door for binding the rear edge of the door against movement transverse to its normal direction of movement when the door is closed.

12. In a door construction, a wall having

a doorway, a sliding door for closing the doorway and a door binder mounted for movement with relation to the door into and out of binding position for binding an edge of the door against movement in a direction transverse to the normal movement of the door, the door binder being arranged to be thrown into operation automatically when the door is closed.

13. In a door construction, a wall having a doorway, a door having a sliding movement of translation only for closing the doorway and a door binder mounted for movement with relation to the door into and out of binding position for binding an edge of the door to the wall, the door binder being constructed and arranged to be thrown into operation automatically by the closing movement of the door and to be thrown out of operation automatically by the opening movement of the door.

14. In a door construction, a wall having a doorway, a sliding door to close the doorway, means controlled by temperature conditions for causing an emergency closing of the door, and binding means carried on the door and mounted for movement relatively to the door into and out of binding position to bind an edge of the door to the wall when the door is closed.

15. In a door construction, a wall having a doorway, a sliding door to close the doorway having a movement of translation only from open position to closed position at one side of and overlapping the wall, and means movable with relation to the door into and out of operative position and inactive when the door is open for binding the rear edge of the door directly to the wall when the door is closed.

Signed at Norfolk, Va., this 25th day of September, 1924.

HOWARD A. JOHNSON.