SWING-UP DOOR MULLION

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ABSTRACT

A door mullion for hangar style doors pivoted at the top to swing from a vertical position, in which doors associated therewith are permitted to open and close, into a horizontal position in which raised doors associated therewith are locked in a raised position. The door mullion includes a portion extending beyond a pivot mounting therefor to lock one of two doors adjacent thereto on opposite sides thereof in an up position with the door mullion in a horizontal position. Means are also provided for guiding the mullion into the plane of the doors when it is pivoted into a vertical position and for locking the swing-up mullion in a vertical position.

10 Claims, 7 Drawing Figures
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SWING-UP DOOR MULLION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to hangar style overhead doors and refers more specifically to a swing-up mullion for use with such doors including means for locking doors on both sides of the mullion in an up position when the mullion is pivoted into a horizontal position in the plane of the doors and means for guiding the mullion into a vertical position in the plane of the doors and for locking the mullion in the vertical position.

2. Description of the Prior Art

In the past, mullions between doors of hangar constructions wherein a plurality of large overhead doors have been used to close a large opening have often been stationary so that the entire door opening was not clear. Swinging mullions have been provided in the past which were pivotable from a vertical into a horizontal position to provide a clear door opening. Most such structures of the past have provided swinging of the mullions directly into the building construction. Constructions have also been suggested for pivoting the mullions into the building diagonally with respect to the door opening. Both such constructions require clear space within the building through which the mullions are pivoted. Wherein the mullions have been pivoted in the plane of the door in the past, they have been restricted to pivotal movement in one direction from the vertical position thereof.

In addition, swing-up door mullions of the past have often not been capable of locking overhead doors associated therewith in an up position and means have not been provided in conjunction therewith for guiding the mullions into the plane of the door and for locking the mullions in a vertical position.

SUMMARY OF THE INVENTION

It is therefore one of the purposes of the present invention to provide a swing-up mullion for hangar style doors which may be pivoted in either direction from vertical in the plane of the door into a horizontal position and which provides a positive stop for preventing overhead doors associated therewith on both sides thereof from lowering while the mullions are in a horizontal position.

In one modification of the invention, a door track on the swing-up mullion extends beyond the pivot connection thereof and prevents lowering of the overhead door adjacent the mullion on the side thereof opposite the direction of pivoting of the mullion while the mullion is in horizontal position. In another modification of the invention, a portion of the mullion extends beyond the pivot mounting therefor and into the door opening on the side of the mullion opposite the side to which the mullion is moved to prevent lowering of the overhead door on that side of the mullion when the mullion is in a pivoted horizontal position.

In either modification of the swing-up mullion, an angled base plate is provided for guiding the mullion into the plane of the door on swinging of the mullion into a vertical position and a slideable rod and complementary opening in the base plate are provided for locking the mullion in a vertical position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial perspective view of a hangar building including overhead hangar style doors and swing-up mullions constructed in accordance with the invention.

FIG. 2 is a diagrammatic representation of the swing-up mullion structure of FIG. 1 enlarged and with the swing-up mullion structure illustrated in solid lines in the vertical position thereof and illustrated in phantom swung into a horizontal position on both sides of the vertical.

FIG. 3 is an elevation view of the swing-up mullion structure illustrated in FIGS. 1 and 2 taken in the direction of arrow 3 in FIG. 2.

FIG. 4 is a cross section of the swing-up mullion structure illustrated in FIGS. 1 through 3 taken substantially on the line 4—4 in FIG. 3.

FIG. 5 is an enlarged elevation view of the pivot means of modified swing-up mullion structure.

FIGS. 6 and 7 are partial section views of the modified swing-up mullion structure illustrated in FIG. 5 taken substantially on the line 6—6, 7—7 in FIG. 5 and illustrating the swing-up mullion structure pivoted in opposite directions.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The hangar structure 10 illustrated in FIG. 1 includes a door opening 12 in which overhead doors 13, 14 and 15 are secured between a fixed door mullion 16 at each side and similar swing-up door mullions 18 and 19 constructed in accordance with the invention at two places in the plane thereof to provide equally spaced door opening portions for the overhead doors 13, 14, and 15.

As shown in detail in FIGS. 2—4, the swing-up door mullion 19 of the invention includes a post 20 built up of a flange plate 22, a web plate 24 and connecting angles 26 and 28, all of which are secured together by convenient means such as rivets, welding or the like. The swing-up door mullion further includes the overhead door tracks 30 and 32 secured to the web plate 24 at the edge thereof opposite the flange plate 22.

The tracks 30 and 32 extend in the same direction as the flange plate 22 and as shown best in FIG. 4 guide rollers of the overhead doors 14 and 15.

Pivot means 34 are secured to the upper end 36 of the swing-up mullion 18 and to the hangar frame structure 38 to permit pivoting of the swing-up door mullion 18 about pivot axis 40 in the plane of the doors 14 and 15 in either direction. The pivot means 34 includes hinges 41 and 42 having bearing rings 43 and 45 alternately secured to the post 20 of the swing-up door mullion 18 and to the frame structure 38 and a pivot pin 47 extending therethrough on pivot axis 40.

The frame structure 38 includes the vertically extending frame member 44 which may be secured to or be a part of the structural elements of the building 10, the horizontal beam 46 to which the horizontal portion 48 of the overhead door roller track is secured. The horizontally extending beam 46 is secured to the vertical frame member 44 at one end and is suspended from the building structure 10 by the hanger 50 at the other end.

The arcuate portion 52 of the overhead door track 32 is secured at the lower end adjacent the mullion portion 54 of the overhead door track on the bracket 56.

Normal operating structure including cable drums 58 connected by torsion shaft 59 and electric motor 60 for rotating the cable drums 58 are provided in conjunction with each of the overhead doors 13, 14, and 15. In the usual manner, cables 62 wrapped around the drums 58 are connected to the overhead doors 13, 14, and 15. When the motors 60 are actuated in one direction, the cables are wound around the cable drums 62 to raise the overhead doors 13, 14, and 15 individually. On actuation of the motors 60 in the opposite direction, the cable drums 52 are rotated in the opposite direction to lower the overhead doors 13, 14, and 15. Such structure is well known and will not therefore be considered in further detail herein.

In addition, a separate cable drum 64, motor 66 connected to rotate the cable drum 64 and cable 68 wound on the cable drum 64 are positioned centrally of each of the portions of the door opening 12 between the fixed mullions and swing-up mullions illustrated in FIG. 1. The cables 68 are guided over pulleys 70 which again may be secured to the building structure at the head of the door opening 12 and are connected to the swing-up mullions at a position remote from the other end 72 by means of the bracket 74 secured to the swing-up mullions 18 and 19 and by the releasable hooks 76 secured to the cable 68.

The distance between the pivot axis 40 and the base plate 84 is less than the distance between adjacent swing-up or fixed mullions 16, 18 and 19 and the distance between the pivot axis 40 and the bracket 74 is made equal to half the distance between adjacent mullions. Thus, the swing-up mullions may be pivoted into an upper horizontal position as illustrated in
FIG. 2 in the plane of the door, and the same cable drum 64, motor 66 and cable 68 may be used to pivot either of two adjacent mullion structures in a horizontal position as in securing the cable end to the bracket 74 on the mullion it is desired to swing up.

The web portion 24 and the track portions 30 and 32 on the swing-up mullion structure 18 are provided with portions 78, 80 and 82 respectively which extend beyond the pivot axis 40 of the swing-up mullion structure 18. Thus, on pivoting of the swing-up mullion structure 18 into a horizontal position as illustrated in FIG. 2 in phantom, the track portions 80 and 82 along with the web portion 78 extend beneath the overhead door in a raised position in the portion of the door opening 12 opposite the portion of the door opening through which the major portion of the swing-up door mullion 18 is pivoted into the horizontal position. Both overhead doors adjacent the swing-up mullion are thus locked in an upper position when the swing-up mullion 20 is in a horizontal position to provide a fail-safe feature to prevent a raised overhead door from crashing down in the event the cables 62 holding the doors in an upper position fail.

A base plate 84 is secured to the floor of the building 10 by convenient means such as anchor bolts and is provided with an angle portion 86 extending vertically and having the beveled edges 88 adjacent the swing-up mullion structure 18 and 19 whereby the swing-up mullion structures may be guided into the plane of the door on pivoting of the swing-up mullion structures into a vertical position from the horizontal position illustrated in FIG. 2.

A vertically movable rod 90 is positioned in the rings 94 secured to the swing-up mullion structures 18 and 19 and is cooperative with an opening 96 in the base plate 84 to provide a positive lock for the swing-up mullion structures in a vertical position. The rod 90 is provided with a handle portion 100 extending at right angles thereto which may be grasped to move the rod vertically to lock and unlock the swing-up mullion structures.

In overall operation, when it is desired to open the entire opening of the building structure 10 from a completely closed position in which the swing-up mullion structure 18 and 19 are locked in their vertical position in the plane of the door opening and the overhead doors 13, 14 and 15 are down, the motors 66 are first actuated to raise the overhead doors 13, 14, and 15 through cables 68 attached thereto in the usual manner. Cables 68 are secured to one side of each swing-up mullion structure 18 and 19. The rod 90 is then moved vertically to unlock the swing-up mullion structures and the motors 66 are started to wrap the cables 68 around cable drums 64 whereby the load of the integrally mullion move in an arcuate upward path about the pivot axis 40 of the pivot means 34 until the swing-up mullion structures are in a horizontal position as illustrated in FIG. 2.

In such position, the overhead doors on both sides of the swing-up mullion structure are prevented from accidental crashing down and the door opening 12 is completely open. The closing of the opening 12 is accomplished in a reverse manner with the swing-up mullion structure being guided into the plane of the door by the base plate 84.

The modified swing-up mullion structure 102 illustrated in FIGS. 5, 6, and 7 includes a post 104 having a flange portion 106 and a web portion 108. The post 104 further includes the overhead door tracks 110 secured to one edge of the web 108 and extending longitudinally thereof.

The pivot structure 112 for the post 104 includes the hinge bearings 114 and 116 secured to the vertically extending building frame member 118 and the web 108 of the post 104 respectively and the pivot pin 120.

At the time the door tracks 110 are split along the line 122 and are beveled and/or spaced apart vertically to permit pivoting of the post about the pivot pin 120 in the plane of the door opening 12 into a horizontal position without binding.

The flange 108 of the post 104 is extended beyond the hinge bearing 116 to provide a portion 124 which is adapted to pass through the opening 126 in the building frame member 118 to extend on opposite sides of the building frame member 118 from the major feature axis of the post 104, with the post 104 pivoted into a horizontal position.

The portion 124 of the flange 108 of the post 104 is operable to engage a portion of the overhead door in an upper position or a bracket secured thereto to prevent the overhead door on the side of the post 104 opposite the side to which the post 104 is moved when it is in a horizontal position from lowering. Thus a fail-safe feature is provided for the overhead door structure. The portion 124 of the web 108 may be reinforced by gussets 128, if required.

While one embodiment of the present invention and a modification thereof have been considered in detail, it will be understood that other modifications and embodiments are contemplated by the inventor. It is the intention to include all modifications and embodiments of the invention as are defined by the appended claims within the scope of the invention.

What we claim as our invention is:

1. A swing-up mullion for hangar style doors positioned in a door opening, pivot means positioned at the head of the door opening and connected to one end of the mullion, means connected to the mullion for swinging the mullion in either direction from vertical in the plane of the door about the pivot means into a horizontal position to provide a clear door opening and means operably associated with the pivot means and mullion for positively preventing lowering of an overhead door in a raised position in the door opening on the side of the swing-up mullion opposite the side of the mullion toward which the major portion of the mullion is swung into the horizontal position, said means for pivoting the mullion into a horizontal position comprises cable drum means, cable means operable to rotate the cable drum means and means for rotating the cable drum means.

2. Structure as set forth in claim 1 wherein a plurality of the swing-up mullions are spaced apart in the door opening, the door opening is wider between adjacent mullions and between a mullion and the side of the door opening then the length of the mullion between the pivot means and the other end thereof.

3. Structure as set forth in claim 2 wherein the cable means is adapted to be releasably secured to a predetermined point on each of two adjacent swing-up mullions remote from the other end thereof, the cable drum means is positioned centrally of the door opening between the adjacent mullions and the distance between the pivot point and the predetermined point on the two adjacent mullions is equal to half the distance between the two adjacent mullions.

4. Structure as set forth in claim 1 wherein an overhead door track is provided connected to and extending longitudinally of the mullion and the means for preventing lowering of an overhead door comprises a portion of said mullion and overhead door track extending beyond the pivot means and having an arcuate end with a center of curvature on the pivot axis of the pivot means.

5. Structure as set forth in claim 1 wherein the mullion includes a flange portion and a web portion and the means for preventing lowering of an overhead door comprises a portion of the web of the mullion extending beyond the pivot axis of the pivot means.

6. Structure as set forth in claim 1 and further including means for guiding the swing-up mullion into the plane of the door on swinging of the mullion into a vertical position.

7. Structure as set forth in claim 6 and further including means for locking the swing-up mullion in a vertical position in the plane of the door.

8. Structure as set forth in claim 7 wherein the means for guiding the mullion into the plane of the door comprises an angle-shaped base plate having a vertically extending portion with beveled side edges and the means for locking the mullion in a vertical position comprises a rod secured to the mullion.
and movable longitudinally thereof and a complementary opening through the plate.

9. A swing-up mullion for hangar style doors positioned in a door opening including a web portion, pivot means having a pivot axis positioned at the head of the door opening and connected to one end of the mullion, means connected to the mullion for swinging the mullion in either direction from vertical in the plane of the door about the pivot means into a horizontal position to provide a clear door opening including cable drum means, cable means securable to the mullion connected to the cable drum means and means for rotating the cable drum means, means operably associated with the pivot means and mullion for positively preventing lowering of an overhead door in a raised position in the door opening on the side of the mullion opposite the side of the mullion toward which the major portion of the mullion swings into the horizontal position, including a mullion web portion part extending beyond the pivot axis of the pivot means, means for guiding the mullion into the plane of the door on swinging of the mullion into a vertical position including an angle-shaped base plate having a vertically extending portion with beveled side edges and means for locking the swing-up door mullion in a vertical position in the plane of the door including a rod secured to the mullion and movable longitudinally thereof and a complementary opening through the plate.

10. A swing-up mullion for hangar style doors positioned in a door opening, pivot means having a pivot axis positioned at the head of the door opening and connected to one end of the mullion, means connected to the mullion for swinging the mullion in either direction from vertical in the plane of the door about the pivot means into a horizontal position to provide a clear door opening including cable drum means, cable means securable to the mullion connected to the cable drum means and means for rotating the cable drum means, means operably associated with the pivot means and mullion for positively preventing lowering of an overhead door in a raised position in the door opening on the side of the mullion opposite the side of the mullion toward which the major portion of the mullion swings into the horizontal position, including an overhead door track connected to and extending longitudinally of the mullion, a portion of which overhead door track extends beyond the pivot axis of the pivot means and has an arcuate end with a center of curvature on the pivot axis of the pivot means, means for guiding the mullion into the plane of the door on swinging of the mullion into a vertical position including an angle-shaped base plate having a vertically extending portion with beveled side edges and means for locking the swing-up door mullion in a vertical position in the plane of the door including a rod secured to the mullion and movable longitudinally thereof and a complementary opening through the plate.

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