



May 13, 1969

L. W. MOSER ET AL

3,443,625

REINFORCED COLLAPSIBLE DOOR

Filed Dec. 26, 1967

Sheet 2 of 3

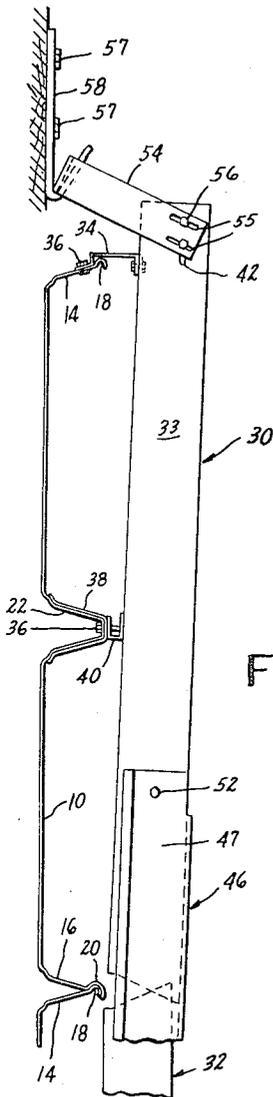


FIG. 2

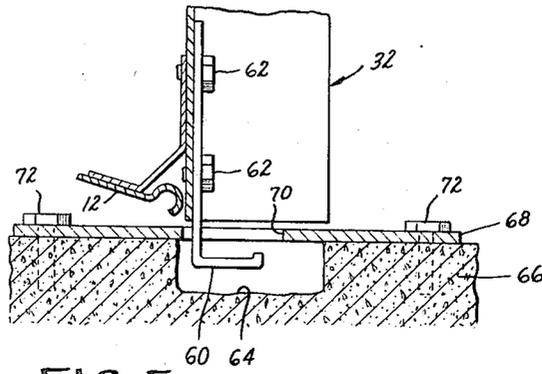


FIG. 5

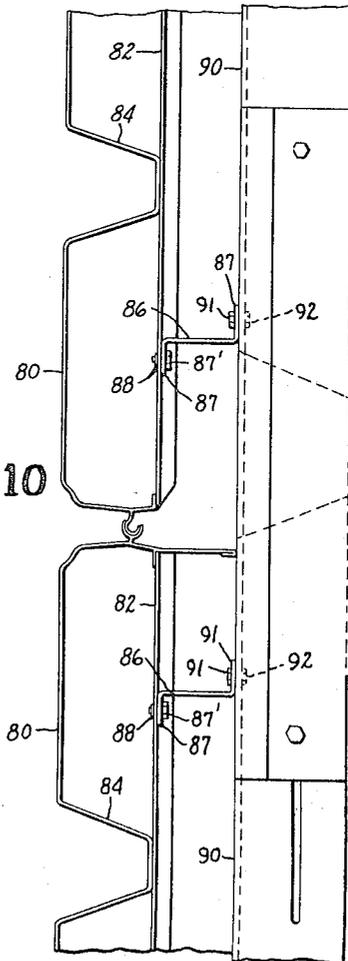


FIG. 10

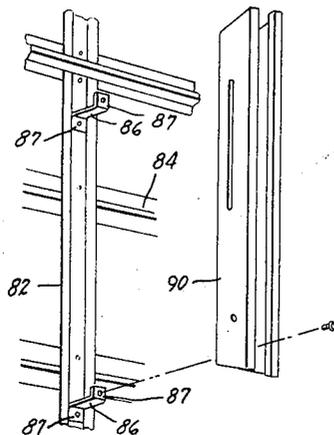


FIG. 9

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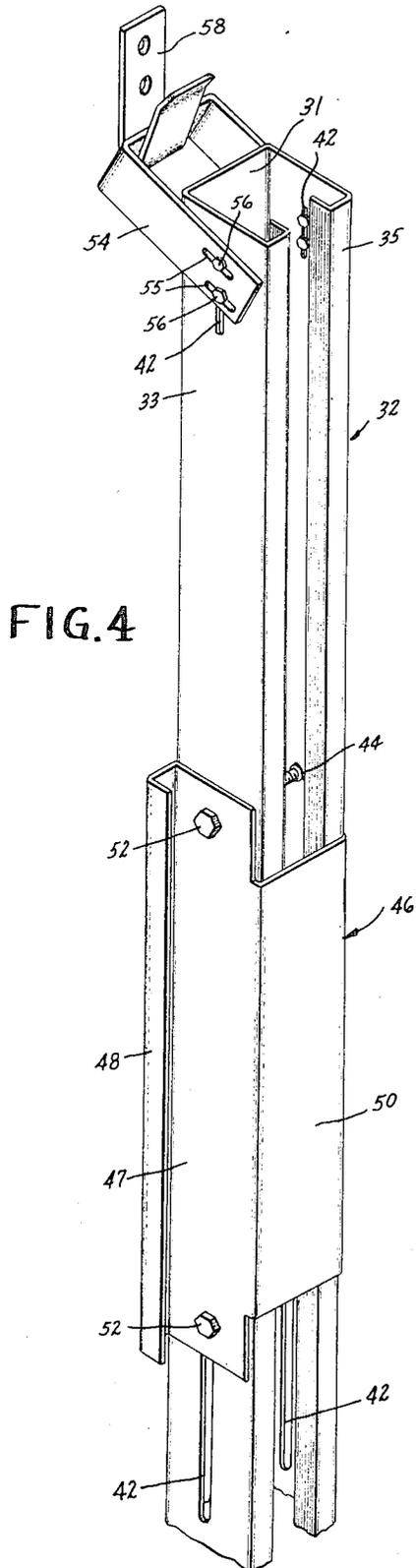


FIG. 4

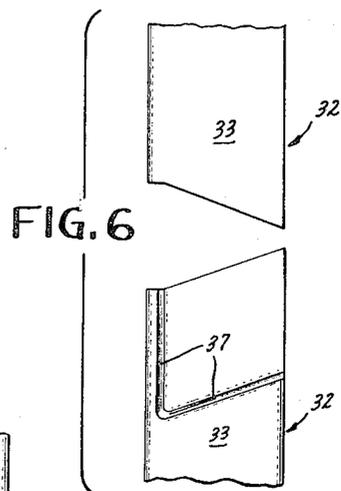


FIG. 6

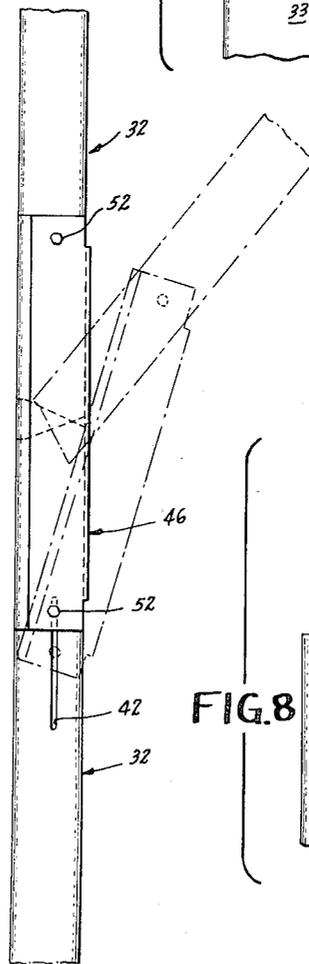


FIG. 7

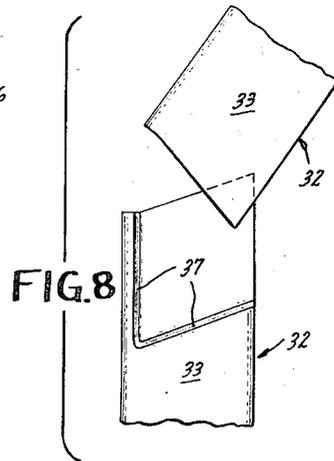


FIG. 8

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3,443,625

**REINFORCED COLLAPSIBLE DOOR**

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U.S. Cl. 160—181

15 Claims

**ABSTRACT OF THE DISCLOSURE**

There is disclosed a post assembly for reinforcing a door of the type having a plurality of transversely extending panels which are hingedly connected at their top and bottom edges such as conventional garage doors of the overhead type. The post assembly includes a plurality of reinforcing members which are mounted on the several door panels and cap members overlying the adjacent ends of the reinforcing members which prevent movement of the reinforcing members in the direction of the cap members or inwardly of the structure. The cap members are pivotally connected to the reinforcing members so as to permit relative pivotal movement between or pivoting of the panels as the door is moved into open position. Header locking means provides engagement between the upper end portion of the post assembly and the header above the door opening, and bottom locking means provides engagement between the lower end portion of the post assembly and the floor of the structure about the door opening. Both locking means are engageable when the door is moved into closed position but readily disengage when the door is moved upwardly into open position.

*Background of the invention*

Overhead doors are widely employed as a means for minimizing the loss of available floor space in various structures and for facilitating movement of relatively heavy doors through use of springs and counterbalances. Such overhead doors have gained widespread acceptance in garage construction and now come in varying widths from those designed to enclose a door opening large enough for a single car to those sufficiently large to enclose door openings designed to accommodate two or more cars or trucks.

The material from which such overhead doors are constructed varies widely with wood, steel and reinforced fiber glass being the most prevalent. With the increasing popularity of electrical door-opening devices which may be remotely controlled, there has been a desire to minimize the weight of the door in order to reduce the load being handled by the mechanical door-opening device. Thus, lighter weight door panels which are suitably reinforced are finding even more widespread use.

A particular problem arises with respect to overhead doors in areas which are subjected to high wind velocities such as the so-called "hurricane belt." The very heavy wind pressures acting upon the exterior surface of the door tend to cause the door to buckle inwardly since the span of the door is effectively being held only by the rollers which ride in the vertical rails at the sides of the door opening. The door may be braced internally against such pressures if suitable advance notice is available, but high winds often arise rapidly and the owner might not be in the area at the time.

Accordingly, it is an object of the present invention to provide a novel post assembly for attachment to multi-paneled doors of the overhead type to provide the reinforcement for the door intermediate its width.

It is also an object to provide such a post assembly

which is operative each time that the door is moved into closed position and yet does not interfere with opening and closing movement of the door during normal use.

Another object is to provide such a post assembly which is readily adapted to doors of varying construction and varying width, and which is relatively simple to mount upon the doors.

A further object is to provide such a post assembly which may be readily and relatively economically fabricated from durable materials, and which is adapted to mounting upon varying types of doors by change of a minimum number of parts.

*Summary of the invention*

It has now been found that foregoing and related objects and advantages can be readily attained in a post assembly for reinforcing a door of the overhead type having a plurality of transversely extending panels hingedly connected at the top and bottom edges to provide pivoting therebetween about horizontal axes. The post assembly comprises a plurality of reinforcing members dimensioned and configured to be mounted fixedly on the several door panels in a line extending normally of the hinged connections between the panels. Cap members overlie the adjacent ends of the reinforcing members and are configured to limit movement of the adjacent ends in the direction of the cap members or inwardly of the building structure.

The cap members are pivotally connected to adjacent ends of the reinforcing members by suitable means which permits relative pivotal movement therebetween in the direction away from the cap members or outwardly of the building structure for pivoting of the panels as the door is moved into open position. However, the cap members and pivotal connecting means prevent pivoting of the reinforcing members in the direction of the cap members or inwardly of the structure to prevent buckling of the door in the closed position thereof under pressures applied externally of the building structure.

At the top of the post assembly is header locking means including a header member which is attachable to the header of the door frame and a catch member on the reinforcing member for the uppermost door panel and adjacent the upper edge thereof. The catch member is engageable with the header member in the closed position of the door to prevent movement of the post assembly in the direction of the cap members or inwardly of the building structure but it is readily disengageable therefrom upon opening of the door. Similarly, the lower end of the post assembly is provided with bottom locking means including a latch member providing engagement between the lower end portion of the reinforcing member for the lowermost door panel and the floor of the structure about the door opening when the door is in the closed position. The bottom locking means is so constructed that the latch member is readily disengageable upon opening movement of the door.

*Brief description of the drawings*

FIGURE 1 is a rear elevational view of a single width steel garage door employing the post assembly of the present invention;

FIGURE 2 is a sectional view thereof along the line 2—2 of FIGURE 1;

FIGURE 3 is a sectional view thereof to an enlarged scale along the line 3—3 of FIGURE 1;

FIGURE 4 is a perspective view to an enlarged scale of upper portion of the post assembly in FIGURE 1;

FIGURE 5 is a sectional view to an enlarged scale of the lower portion of the door assembly of FIGURE 1 along the line 5—5 thereof;

FIGURE 6 is a fragmentary view to an enlarged scale

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of the adjacent ends of two channel members of the post assembly in FIGURE 1 with the joining cap removed;

FIGURE 7 is a fragmentary side elevational view to an enlarged scale of the post assembly of FIGURE 1 showing the assembly in closed position in full line and showing the upper channel member and joining cap in phantom line pivoted in the manner occurring during movement of the door panels from the vertical portion of the rails into the horizontal or overhead portion of the rails;

FIGURE 8 is a view similar to FIGURE 6 but showing the upper channel member pivoted as in FIGURE 7 in phantom line;

FIGURE 9 is a fragmentary and exploded view of an alternate embodiment of the present invention wherein the post assembly is applied to a reinforced fiberglass door; and

FIGURE 10 is a fragmentary sectional view in elevation of the embodiment of FIGURE 9.

#### *Detailed description of the preferred embodiment*

Turning now to FIGURES 1-8 of the attached drawings in detail, the present invention is illustrated as applied to a conventional steel garage door of the overhead type and generally designated by the numeral 10. As can be seen, the door 10 has four elongated panels 12 with top and bottom flanges 14, 16 which extend toward the interior of the garage and have rolled edges 18, 20 which interfit with the rolled edges of adjacent panels 12 as seen in FIGURE 2 to provide a continuous hinged connection therebetween. To stiffen the panels 12, they are provided with a horizontal rib or corrugation 22 intermediate the height thereof. The sides of the panels 12 are stiffened by end caps 24 of generally U-shaped cross section with one leg lying against and welded to the front face of the panel 12 and with the other leg extending behind the rolled edges 18, 20 and intermediate rib 22. The top and bottom panels 12 are also stiffened by brace members 25 adjacent the center thereof. A plurality of rollers 26 are supported in the hinged connections provided by the interfitting rolled edges 18, 20 and mount the door 10 for movement in the side rails (not shown). In addition, the metal end caps 24 of the upper panel 12 support a pair of additional rollers 26 adjacent the upper edge thereof.

Mounted on the several panels 12 adjacent the center thereof is a post member generally designated by the numeral 28 and comprised of a stationary upper channel member generally designated by the numeral 30 on the upper panel 12 and a plurality of stationary lower channel members generally designated by the numeral 32 attached to the lower panels 12. The channel members 30, 32 have base walls or webs 31 and side walls 33 with inturned flanges 35 at their free or outer ends. The base wall or web 31 of the upper channel member 30 is secured to the panel 12 both on a top hook 34 which is secured to the upper flange 14 using threaded fasteners 36 and on a spacer 40 which seats against a generally V-shaped reinforcing clip 38 which fits over the intermediate rib 22 by the similar threaded fastener 36. In this manner, the upper channel member 30 is spaced outwardly from the upper flange 14 and intermediate rib 22 to provide an angle therebetween opening toward the upper edge of the panel 10. The side walls 33 of the upper channel member 30 have elongated slots 42 adjacent the upper end thereof and apertures 44 adjacent the lower end thereof. In addition the side walls 33 taper inwardly toward the web or bottom wall 31 at the bottom end thereof and the flanges 35 are cut away adjacent the bottom end.

The lower channel members 32 are generally similar in construction to the upper channel member 30; however, the side walls 33 also taper inwardly toward the web or bottom wall 31 at the upper end thereof with

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the flanges 35 also being cut away at the upper end. In addition, the side walls 33 are inwardly offset to provide recesses 37 at the upper end to accommodate the lower ends of the side walls 33 of the next upper channel member as seen in FIGURE 6. The slots 42 are also longer and spaced further from the upper end. The lower channel members 32 are secured against the reinforcing clips 38 on the intermediate ribs 22 of the several panels 12 by the threaded fasteners 36.

The several channel members 30, 32 are hinged together by joining caps generally designated by the numeral 46 and of generally U-shaped cross section which fit thereover and which are stiffened by outwardly disposed flanges 48 on the side walls 47 thereof. As seen in FIGURE 4, the web 50 is cut away at the top and bottom ends. Threaded fasteners 52 extend through apertures in the side walls 47 thereof adjacent the upper end and through the apertures 44 at the bottom ends of the channel members 30, 32 and through apertures in the side walls 47 adjacent the lower ends thereof and the slots 42 adjacent the upper ends of the channel members 32.

Mounted on the upper end of the upper channel member 30 is a top hook 54 of generally U-shaped configuration and which is provided with a pair of elongated slots 55 in each leg thereof. A pair of fasteners 56 seat in the slots 55 and extend through the slots 42 in the side walls of the upper channel member 30. The top hook 54 is engageable in the closed position of the door 10 with a cooperating header hook 58 which is mounted on the header (not shown) above the door opening by fasteners 57 and which has an upturned lip extending at an angle to the front wall of the garage so that the top hook 54 on the door 10 will readily pass thereover in opening and closing movement.

Mounted on the lowermost of the channel members 32 by the fasteners 62 is a bottom hook 60 of generally L-shaped configuration which extends below the bottom edge of the door 10. As seen in FIGURE 5, a hole 64 is formed in the floor 66 of the garage and a plate 68 having an aperture 70 therein is secured to the floor 66 by the fasteners 72 to provide a latch aperture receiving the protruding end of the bottom hook 60.

In operation of the door and post assembly illustrated in FIGURES 1-8, the door 10 slides upwardly and downwardly on rails (not shown) above and to the sides of the door opening by means of the rollers 26. Since the panels 12 are hingedly connected by the interfitting rolled edges 18, 20, they pivot as they pass into the horizontal portion of the rails (not shown) in the manner indicated by the phantom line showing in FIGURE 7 and the lower ends of the channels 30, 32 can pivot about the sides of the upper ends of the adjacent channels 32 in the recesses 37 as indicated in FIGURE 8. Although the channel members 30, 32 are rigidly secured to the several panels 12, the joining caps 46 permit collapsing thereof from the straight position shown in solid line in FIGURE 7 by reason of the slots 42 which permit the fasteners 52 to travel freely therein in pivoting of the door to open or closed position as indicated by the phantom line showing in FIGURE 7. In moving to closed position, the door 10 moves downwardly and, as it reaches the bottom of its path, the top hook 54 moves into and engages with the header hook 58.

However, when the door 10 is in the fully closed position as seen in FIGURES 1-7, the top of the post 28 is held against movement away from the header by engagement of its top hook 54 with the header hook 58. Similarly the bottom of the post 28 is held against movement away from the door frame or inwardly of the garage by reason of the engagement of its bottom hook 60 within the aperture 70 of the latch plate 68. The several channel members 30, 32 reinforce the several panels 12 of the door against pressures tending to collapse them inwardly and themselves are held from collapsing by the webs 50 of the

joining caps 46 which prevent the adjacent ends from pivoting inwardly of the garage.

The post assembly illustrated in FIGURES 1-8 is readily assembled to the overhead door after a vertical line in the desired position along the door span has been marked on the rear surface of the door. Holes are drilled through the central ribs 22 in the several panels 12 and the reinforcing clips 38 are seated thereover. In the top flange 14 of the uppermost panel 12, a hole is also drilled and the top hook 34 is secured thereto by the fasteners 36. The upper channel member is positioned on the top hook 34 and upon the spaced 40 superposed upon the reinforcing clip 38, and it is secured in place by fasteners 36. The lower channel members 32 are secured in position on the reinforcing clips 38 on the lower panels 12 by the fasteners 36.

The joining caps 46 are then fitted over the adjacent ends of the channel members 30, 32 and secured in position to provide a hinged connection therebetween by bolt and nut fasteners 52 which extend through the slots 42 and the apertures 44 of the channel members. A hole 64 is made in the floor 66 of the garage and the plate 68 is secured in position by the fasteners 72. The bottom hook 60 is then secured to the lowermost channel member 32 in the desired position by drilling holes in the channel member and inserting the fasteners 62.

The header hook 58 is secured to the header of the door frame in as low a position as possible to permit clearance of the door in its movement between open and closed positions. The top hook is secured to the upper channel member by the fasteners 56 which extend through the slots 55 therein and the slots 42 in the channel member 30 and permit adjustment of the angle therebetween to provide proper cooperation with the header hook 58. In this manner, the top hook can be pivoted relative to the top post and moved vertically therealong to seat fully at the bottom of the converging channel provided by the header hook 58 before it is locked into position by the fasteners 56.

Turning now to the embodiment of FIGURES 9 and 10, there the present invention is shown as applied to a conventional reinforced fiberglass door. The several horizontally extending fiberglass panels 80 are reinforced by muntins 82 which extend normally to the transversely extending reinforcing ribs 84 formed integrally in the panels 80. Clips 86 having oppositely extending arms 87 at the ends thereof are secured to the muntins 82 by sheet metal screws 87 and cooperating sheet metal nuts 88, and the channel members 90 are secured to the clips 86 by similar sheet metal screws 91 and nuts 92. Thus, the post assembly structure is essentially the same as that of FIGURES 1-8 except for the arrangement for mounting the several channel members 30, 32 to the individual panels 80.

Although the structures illustrated in FIGURES 1-10 are single width doors, the invention may be adapted readily to doors of larger width by use of two or more post assemblies spaced across the width of the door. Moreover, with above-average width single doors and particularly with fiberglass doors of even average single width, it is generally desirable to employ two post assemblies spaced one-third of the way from either side of the door.

Various modifications of the present invention may be employed. In place of the bottom hook and plate arrangement shown in FIGURE 5, an alternate structure employs an upstanding hook or post on a floor mounted plate which provides a stop against which the lower channel member 32 abuts so as to prevent inward movement of the lower end of the post assembly.

Other connections providing hinged movement of the several channel members and joining caps may also be employed so long as the post assembly is rigidly held against movement in a direction inwardly of the garage when the door is in the closed position. The specific supports and mounting elements for the channel members

will vary with the type of door and the configuration of its panels and reinforcing ribs, the muntins, if any, etc.; and the configuration of the several channel members and the joining caps may also vary. If so desired, the door may also be reinforced by the addition of truss members to the upper and lower panels to provide additional strength in the horizontal dimension of the door between the post assemblies or between the post assemblies and the sides of the door.

Other modifications of the post assembly and its components will be readily apparent to those having ordinary skill in the art and the foregoing specifically described structures are meant only to be illustrative of the structures of the present invention.

Having thus described the invention, we claim:

1. A post assembly for reinforcing a door of the overhead type having a plurality of transversely extending panels hingedly connected at their top and bottom edges to provide pivoting therebetween about horizontal axes comprising: a plurality of reinforcing members dimensioned and configured to be mounted fixedly on the several door panels in a line extending normally of the hinged connections between the panels; cap members overlying the adjacent ends of said reinforcing members and configured to limit movement of said adjacent ends in the direction of the cap members; means pivotally connecting said cap members to said adjacent ends of said reinforcing members to permit relative pivotal movement therebetween in the direction away from said cap members for pivoting of the panels as the door is moved into open position, said cap members and pivotal connecting means preventing pivoting of the reinforcing members in the direction of the cap members to prevent buckling of the door in the closed position thereof under pressures applied externally thereof; header locking means including a header member attachable to the header of the door frame and a catch member on the reinforcing member for the uppermost door panel and adjacent the upper edge thereof, said catch member being engageable with said header member in the closed position of the door to prevent movement of the post assembly in the direction of the cap members and disengageable therefrom upon opening of the door; and bottom locking means including a latch member providing engagement between the lower end portion of the reinforcing member for the lowermost door panel and the floor of the structure about the door opening when the door is in the closed position but readily disengageable upon opening movement of the door.

2. The post assembly of claim 1 wherein said header member is a hook and said catch member has an arm portion receivable in the channel of said hook member in the closed position of the door, said reinforcing member for the uppermost door panel being dimensioned to project above the upper edge thereof and said catch member being secured to the projecting portion of said reinforcing member and extending in a direction away from said cap members.

3. The post assembly of claim 1 wherein said latch member is secured to the reinforcing member for the lowermost door panel and extend beyond the end thereof and wherein said bottom locking means also includes a plate having an aperture therein and adapted to be secured over a recess in the floor inwardly of the door to provide a catch aperture for the latch member when the door is in closed position.

4. The post assembly of claim 1 wherein said latch member is an upwardly projecting arm on a latch plate adapted to be secured to the floor inwardly of the door and wherein said latch member and the reinforcing member for the lowermost door panel enter into abutting relationship in the closed position of the door.

5. The post assembly of claim 1 wherein said reinforcing members are of generally channel-shaped configuration with the web thereof being adapted for engagement against the door panels and the side walls thereof being

provided with apertures for the pivotal connecting means.

6. The post assembly of claim 1 wherein said cap members are of generally channel-shaped configuration and wherein the end portions of said reinforcing members are received between the side walls thereof and abut against the web thereof so as to be limited in movement in the direction of the cap members, the side walls of said cap members being provided with apertures for the pivotal connecting means, said webs having cutout portions adjacent the ends thereof to permit limited pivotal movement of the reinforcing members during opening and closing movement of the door.

7. The post assembly of claim 1 wherein one of said reinforcing and cap members has elongated slots therein and the other of said members has apertures therein and wherein pivot members extending through said slots and apertures so as to provide pivotal connecting means therebetween.

8. The post assembly of claim 1 wherein said cap members are of generally channel-shaped configuration and wherein said reinforcing members are also of generally channel-shaped configuration with their side walls receivable between the side walls of said cap members, the webs of said reinforcing members and cap members being disposed at opposite ends of the interfitting side walls thereof, the webs of said cap members having cutout portions in the end portions to permit limited pivotal movement of the reinforcing members during opening and closing movement of the door, the side walls of said reinforcing members having elongated slots at one end and apertures at the other end thereof and the side walls of said cap members having cooperating apertures, said pivotal connecting means including pivot members seated in said cooperating apertures and slots to provide said connecting means.

9. The post assembly of claim 1 wherein there is included mounting means for spacing the reinforcing member for the uppermost door panel at an angle to the inner surface thereof opening toward the header of the door frame.

10. In combination, a building structure having a door opening with a frame providing a header thereabove and a floor therebelow; a door of the overhead type having a plurality of transversely extending panels hingedly connected at their top and bottom edges to provide pivoting therebetween about horizontal axes; a plurality of reinforcing members mounted fixedly on the several door panels in a line extending normally of the hinged connections between said panels; cap members overlying the adjacent ends of said reinforcing members and configured to limit movement of said adjacent ends in a direction inwardly of said structure; means pivotally connecting said cap members to said adjacent ends of said reinforcing members to permit relative pivotal movement therebetween in the direction away from said cap members for pivoting of the panels as said door is moved into open or closed position, said cap members and pivotal connecting means preventing pivoting of the reinforcing members in the direction of the cap members to prevent buckling of said door in the closed position thereof under pressures applied externally thereof; header locking means including a header member mounted to said header of the door frame and a catch member in the reinforcing member on the uppermost door panel and adjacent the upper edge thereof, said catch member being engageable with said header member in the closed position of said door to prevent movement of the post assembly in the direction in-

wardly of said building structure and disengageable therefrom upon opening of said door; and bottom locking means including a latch member providing engagement between the lower end portion of the reinforcing member for the lowermost door panel and said floor of the structure about said door opening when said door is in the closed position but readily disengageable upon opening movement of said door.

11. The combination of claim 10 wherein said header member is a hook and said catch member has an arm portion receivable in the channel of said hook member in the closed position of said door, said reinforcing member for the uppermost door panel projecting above the upper edge of said door and said catch member being secured to the projecting portion of said reinforcing member and extending over the upper edge of said door.

12. The combination of claim 10 wherein said latch member is secured to the reinforcing member for the lowermost door panel and extends beyond the lower end thereof and wherein said bottom locking means also includes a plate having an aperture therein and secured over a recess in said floor inwardly of the door opening to provide a catch aperture of said latch member when said door is in closed position.

13. The combination of claim 10 wherein said latch member is an upwardly projecting arm on a latch plate secured to said floor inwardly of said door opening and wherein said latch member and the reinforcing member for the lowermost door panel enter into abutting relationship in the closed position of said door.

14. The combination of claim 10 wherein said cap members are of generally channel-shaped configuration and wherein said reinforcing members are also of generally channel-shaped configuration with their side walls fitting between the side walls of said cap members, the webs of said reinforcing members being disposed against said door panels and the webs of said cap members being disposed away therefrom, the webs of said cap members having cutout portions in the end portions to permit limited pivotal movement of the reinforcing members during opening and closing movement of said door, the side walls of said reinforcing members having elongated slots at one end and apertures at the other end thereof and the side walls of said cap members having apertures cooperating therewith, said pivotal connecting means including pivot members seated in said cooperating apertures and slots to provide said connecting means.

15. The combination of claim 14 wherein there is included mounting means spacing the reinforcing member for the uppermost door panel at an angle to the inner surface thereof which opens toward said header of said door frame.

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U.S. Cl. X.R.

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