

May 12, 1959

H. H. OLSEN ET AL

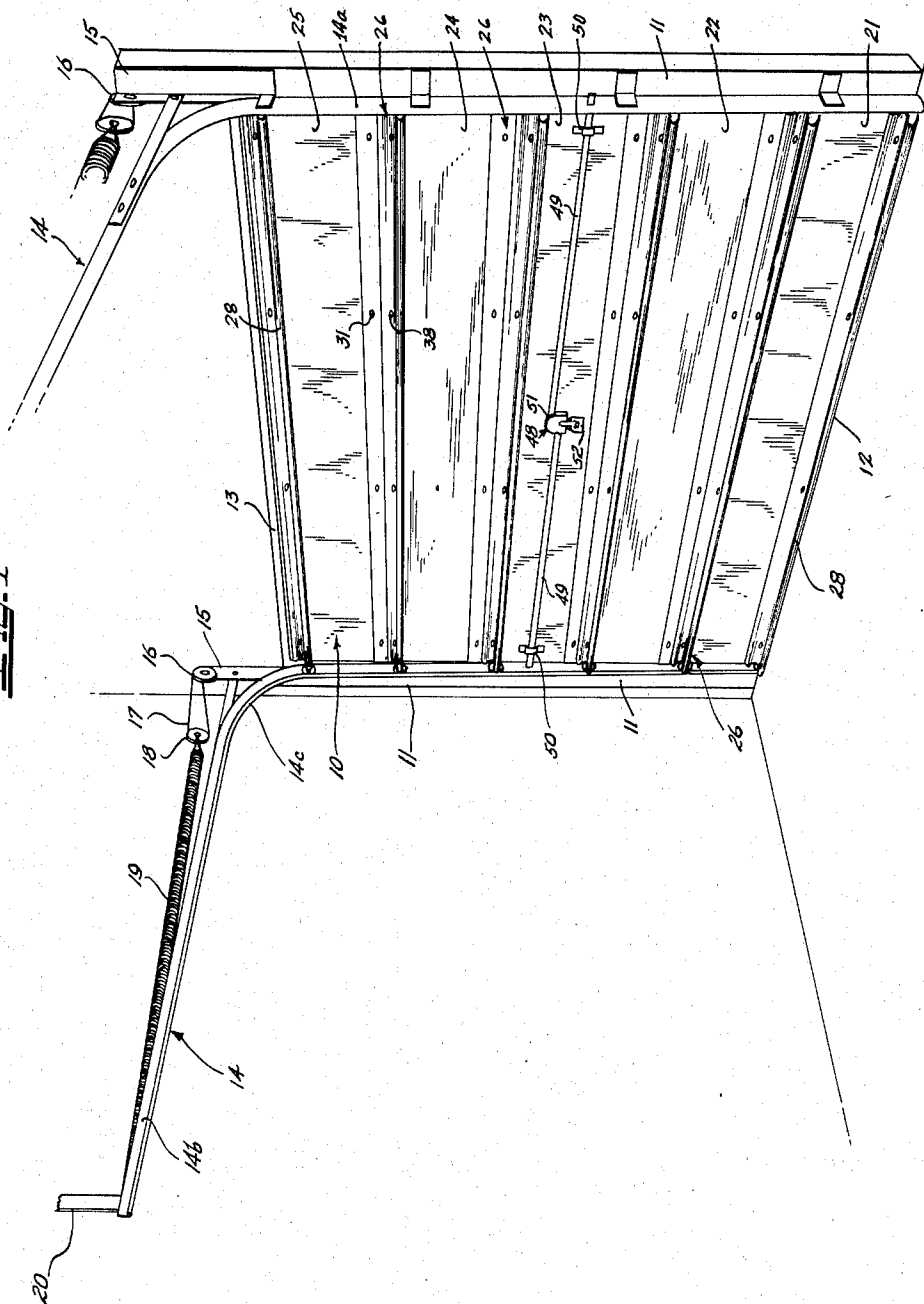
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MULTI-SECTION UPWARD ACTING DOOR

Filed March 31, 1955

3 Sheets-Sheet 1

Fig. 1



Inventors
HENRY H. OLSEN
DAVID C. CRAWFORD

Attys.
Still, Sherman, Meiri, Kass & Simpson

May 12, 1959

H. H. OLSEN ET AL

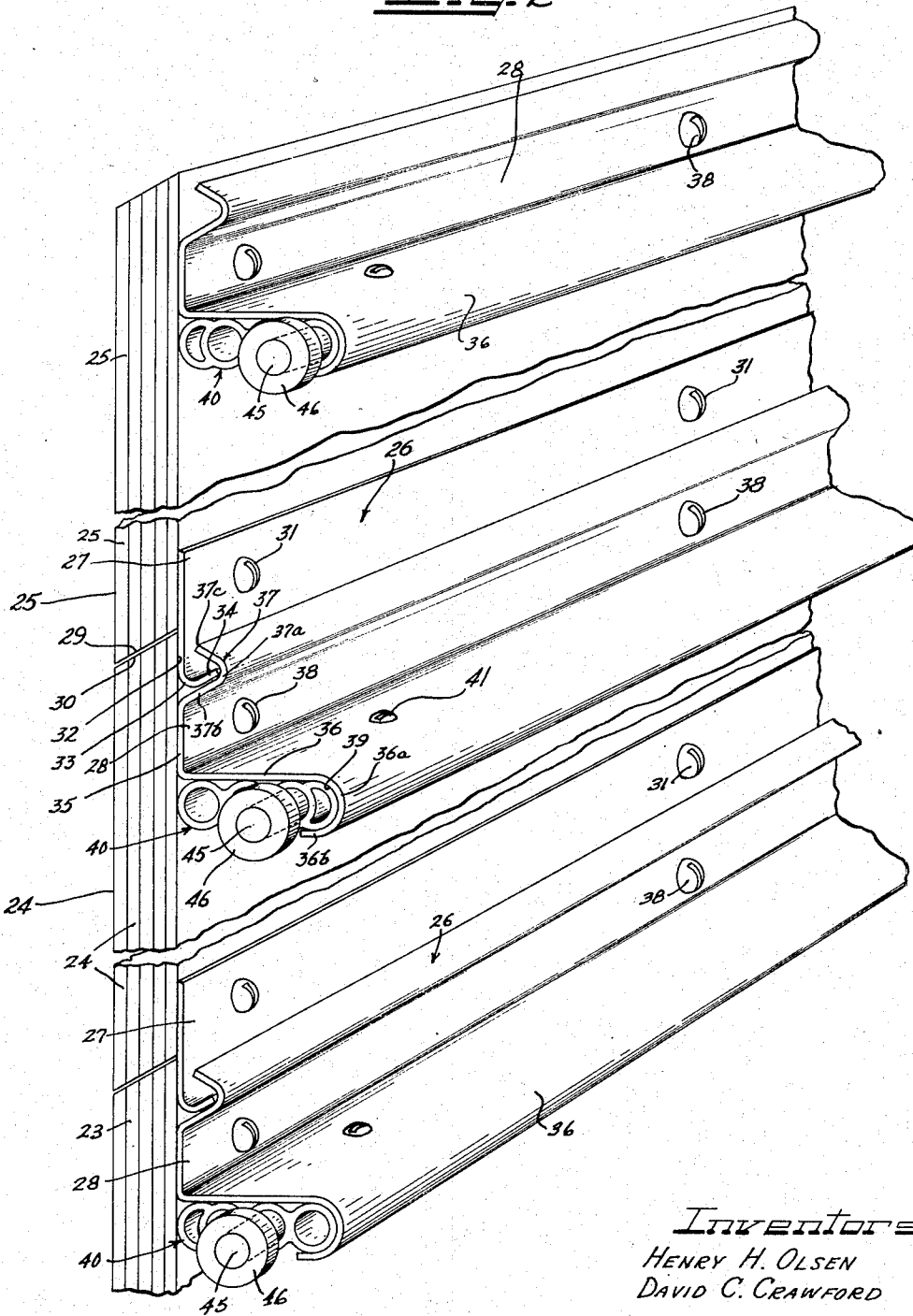
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Filed March 31, 1955

3 Sheets-Sheet 2

Fig. 2



Inventors
HENRY H. OLSEN
DAVID C. CRAWFORD

Edw. Kill, Sherman, Merri, Charles & George Attys.

May 12, 1959

H. H. OLSEN ET AL

2,886,102

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Fig. 3

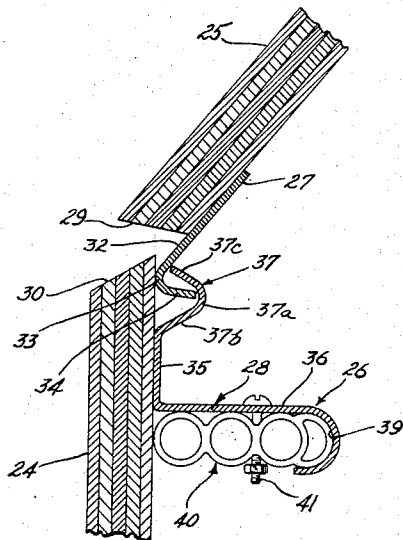


Fig. 4

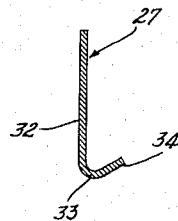


Fig. 5

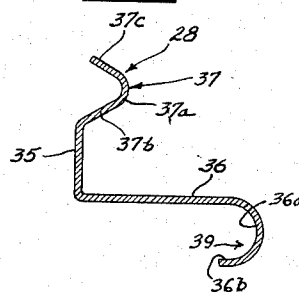


Fig. 6

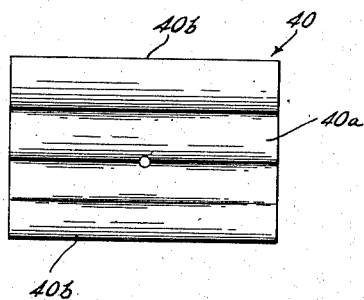
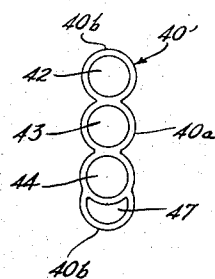


Fig. 7



Inventors

HENRY H. OLSEN

DAVID C. CRAWFORD

W. L. Sherman, Attorney, Kansas & Company

W. L.

Attys.

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MULTI-SECTION UPWARD ACTING DOOR

Henry H. Olsen, Detroit, and David C. Crawford, Grosse Pointe Woods, Mich., assignors to Crawford Door Company, Detroit, Mich., a corporation of Michigan

Application March 31, 1955, Serial No. 498,134

7 Claims. (Cl. 160—235)

This invention relates to articulated door constructions and particularly deals with a multi-panel upward acting door construction having the panels connected by a continuous beam type hinge which carries plugs at its ends to directly receive the axles or shafts of track mounted door supporting rollers.

While the invention will hereinafter be specifically described as embodied in a five-section or panel type upward acting garage door, counterbalanced by a spring and cable mechanism, it should be understood that the principles of this invention are generally applicable to hinges and closure supports and, therefore, the invention is not to be interpreted as limited to the hereinafter specifically described embodiment.

According to this invention, a plurality of plywood or other material panels are hingedly connected in superimposed relation by an inexpensive hinge construction which serves a quadruple function of articulately connecting the panels, providing a beam to prevent sagging of the panels, sealing the joints between the panels, and providing a roller mounting. The hinges are composed of two continuous metal strips which are easily bent from flat steel strip stock. One of the strips, providing the male half of the hinge, has the major portion of its width secured flat against the inner face of the panel with a projecting margin depending beyond the bottom edge of the panel and with an inwardly and upwardly turned flange on the end of the depending margin. This flange provides a wide mouthed hook. The second strip, constituting the female half of the hinge, has a flat intermediate web portion secured to the inner face of the next adjacent panel in spaced relation beneath the top edge of the panel. The upper edge of this female hinge part is bent into a V-shape with a bottom leg extending inwardly and upwardly from the web and a top leg extending upwardly and outwardly from the bottom leg. The top leg is shorter than the bottom leg to terminate inwardly from the first strip so that the hook of the male member can easily be received in the V-groove of the female member. The bottom of the web merges into a beam section with an elongated leg at right angles to the web which extends inwardly from the door panel a sufficient distance to provide a rigid web. The end of this leg is bent downwardly and inwardly to form a C. The C provides a fragmental cylindrical recess. The opposite ends of the beam portion of the strip receive plugs with apertures providing selective mountings for the shafts or axles of the rollers. The rollers are mounted in conventional tracks for upwardly acting doors. The plugs can be composed of wood, metal or plastic material. The holes in the plugs are arranged so that the rollers will be carried to correctly position the door and create a tight fit against the side door jambs when the door is in closed position. The series of holes in the plugs are eccentrically arranged relative to the sides of the plug so that reverse mounting of the plug in the beam will increase the available number of positions for the roller shafts.

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It is then an object of this invention to provide an upward acting door construction composed of inexpensive plain plywood or other material panels held together in articulated relation by continuous hinges which also provide panel rigidifying beams and roller mountings for the door.

Another object of this invention is to provide an inexpensive closure composed of plain plywood or other inexpensive sheet material which is normally not strong enough or rigid enough to form a door panel wherein the desired strength and rigidity is imparted by a continuous hinge beam.

A still further object of this invention is to provide a hinge for closures which simultaneously rigidifies the closures against sagging and provides a mounting for the closures.

A specific object of this invention is to provide an upward acting multi-panel garage door having less parts than has heretofore been necessary and utilizing inexpensive material for the panels.

A still further specific object of this invention is to provide a continuous hinge for the panels of upward acting garage type doors which will reinforce the panels against sagging, form a seal between the panels, and provide roller mountings for the door rollers.

Another object of this invention is to provide a combination hinge and closure reinforcing beam.

A still further object of this invention is to provide a roller mounting for upward acting doors which has a plurality of preformed roller supports adapted to be selectively positioned to provide a large number of available positions to mount the roller.

Other and further objects of this invention will be apparent to those skilled in the art from the following detailed description of the accompanying sheets of drawings which, by way of example only, illustrates a preferred embodiment of the invention.

On the drawings:

Figure 1 is a perspective view of the inside of the upward acting door construction of this invention.

Figure 2 is a perspective view of portions of the top three panels of the door of Figure 1.

Figure 3 is an end edge elevational view of the portions of two panels of Figure 2 and illustrating the panels in inclined relation to demonstrate the operation of the hinge.

Figure 4 is a transverse cross-sectional view of the male hinge part.

Figure 5 is a transverse cross-sectional view of the female hinge part.

Figure 6 is a plan view of the roller mounting plug.

Figure 7 is an end elevational view of the plug.

As shown on the drawings:

The door 10 of Figure 1 is illustrated as closing the door opening of a building or garage having side door jambs 11, a floor 12, and a top lintel 13. A pair of conventional roller carrying tracks 14 support the door in the illustrated vertical closed position and an overhead horizontal position. These tracks 14 have vertical leg portions 14a secured to the side door jambs 11 and horizontal overhead legs 14b extending into the building inwardly from the door jambs at a level above the lintel 13. The vertical legs are connected with horizontal legs by arcuate track sections 14c. Mounting brackets 15 connected to the door jambs 11 are provided adjacent the arcuate sections 14c and also carry pulleys 16 around which are trained cables 17. The cables are also trained around pulleys 18 on the ends of counterbalancing springs 19 which lie adjacent the horizontal track legs 14b and are anchored at their ends to track hangers or the like 20. An end of each cable 17 is attached to the adjacent

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bracket 15 and the other end is attached to the bottom of the door 10 or to the bottom door roller.

The door 10 is composed of five plain plywood panels 21, 22, 23, 24 and 25. These panels overlap the inner faces of the door jambs 11 and the bottom panel 21 abuts the floor 12 while the top panel overlaps the lintel 13 when the door is in closed position. When the door is in opened position, the top panel 25 will be at the rear ends of the horizontal tracks 14b adjacent the hanger 20 while the bottom panel 21 will be at or above the lintel 13.

The door panels are hingedly connected by continuous hinges 26 which simultaneously serve as seals between the panels, as panel reinforcing beams, and as roller mountings. As best illustrated in Figures 2 and 3, each hinge 26 is composed of a male member 27 and a female member 28 extending across the entire width of each panel to terminate flush with the side edges of the panels. Each panel has a downwardly inclined bottom edge 29 and an upwardly inclined mating top edge 30 so that the space therebetween will be self-draining to the outside face of the door.

The male hinge member 27 is a flat metal strip with a hook on the bottom edge thereof. The strip lies flat against the inner face of each panel adjacent the bottom edge 29 thereof and is secured to the panel at intervals along its length by screws 31. The strip projects beyond the bottom edge 29 to provide an abutment face 32 for the top edge of the next adjacent panel. The space between the edges 29 and 30 is thereby sealed by the strip when the doors are in closed position as shown in Figure 2 since the projecting face 32 will receive the top portion of the panel 24 thereagainst while the main body of the strip is securely pressed against the inner face of the bottom edge portion of the panel by the screws 31. The flat portion of the strip including the part attached to the top panel and the depending face part 32 need only be about 1" wide.

The hook-like bottom end of the strip 27 includes a rounded bottom edge 33 and an upwardly inclined leg 34. The leg is inclined at an angle of about 30° from the bottom edge of the strip and the total inward extent of the hook can be less than ½".

The female hinge part 28 is composed of a metal strip bent to have a vertical web portion 35, a horizontal beam portion 36 at right angles to the web portion extending from the bottom of the web portion and a V portion 37 at the top of the web portion. The web portion 35 is secured flatwise against the inner face of each plywood panel just below the top edge thereof by means of screws 38 at spaced intervals along the length of the strip. The horizontal beam portion 36 extends inwardly from the inner face of the panel a distance which is greater than the height of the web. The end of this beam is bent downwardly into an inverted C shape and provides a rounded inner edge 36a with an inturned flat lip or bottom leg 36b. A recess 39 is thereby provided which opens toward the inner face of the door panel.

The V portion 37 at the top of the web 35 has a rounded base 37a with an upwardly and inwardly inclined bottom leg 37b and an upward and outwardly inclined top leg 37c. The top leg 37c is shorter than the leg 37b so as to be spaced inwardly from the inner face of the door panel. The legs 37b and 37c are preferably inclined at an angle of about 30° from a plane bisecting the center of the rounded base 37a.

The male and female parts of the hinge can be separately attached to respective bottom and top portions of the panels and can then be readily rocked into interlocked relation as illustrated in Figure 3. In operation, the panels are never articulated beyond the angle illustrated in Figure 3 so that the hinges will remain joined. However, it is evident from Figure 3 that further tilting of the panel 25 could result in unlocking the hinge to separate the panels.

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In operation of the hinge, the rounded bottom edge 33 of the hinge part 26 rocks on the inner face of the upper edge of the door panel while the leg 34 rides along the leg 37c of the female hinge part 28 and then rides into the rounded base 37a as shown in Figure 2.

It will be evident from Figures 1 and 2, that the hinges 26 serve to reinforce the panels against sagging even when they are in overhead horizontal position.

As shown in Figure 1, a female hinge part 28 is secured to the bottom edge of the bottom panel 21 and to the top edge of the top panel 25 for rigidifying the ends of the door and for providing roller mountings at the ends of the door. The complete hinges 26 each have the female hinge member 28 secured adjacent the top edges of the panels.

Plugs 40 are inserted in the ends of each female hinge part 28. These plugs are best shown in Figures 6 and 7 and are generally flat slabs preferably composed of extruded plastic such as Bakelite or the like. Each plug has generally flat top and bottom faces 40a which can be convoluted as illustrated and has semi-cylindrical ends 40b for fitting into the recess 39 provided by the C-shaped end of the hinge part 28. The plugs have a length equal to or shorter than the length of a roller shaft or axle and a width for snug fitting in the ends of the beam portion of the hinge. One rounded end 40b of the plug will be snugly retained in a bottom recess 39 while the other end will abut the inner face of the adjacent door panel. If desired, a mounting bolt 41 can extend through the plug and beam 36 to more firmly unite the plug with the beam.

Each plug has three longitudinal holes 42, 43 and 44 therethrough. These holes each have a diameter sized for snugly receiving the axle 45 of a roller 46 which rides in a track 14 for supporting the door from the track. The rollers and axles are of conventional construction with the roller preferably being freely rotatable around the outer end of the axle. One end portion of the plug 40 also contains a half-hole 47 having a width equivalent to one-half the diameter of the holes 42, 43 and 44. Thus, the holes 42, 43 and 44 are eccentrically arranged relative to the rounded ends 40b of the plug and reverse positioning of the plug in the beam will provide centers for the roller axles 45 which are spaced from the inner face of the door panels in increments equivalent to one-half the shaft diameter.

The shafts 45 are selectively seated in the plug holes and the plugs are selectively positioned in the ends of the hinge beams so that the rollers will carry the door 10 to have a tight fit against the door jambs 11 when the door is in closed position and to space the door inwardly from the door jambs to prevent rubbing of the panels on the door jambs as the door is opened. For this arrangement, therefore, the bottom door rollers will be positioned closer to the door panels than the succeeding rollers as illustrated in Figure 2.

The cables 17 are preferably attached to the axles of the rollers at the bottom of the door panel 21. The springs 19 are thereby effective to pull the pulleys 18 for drawing the cable 17 over the pulleys 16 to counterbalance the weight of the door.

A conventional door locking arrangement 48, shown in Figure 1, can be provided to lock the door in closed position. This lock includes a pair of bars or rods 49 slidable through brackets 50 at the end edges of the middle panel 23 to extend into keepers on the door jambs 11 or into slots in the tracks.

The inner ends of the bars are pivotally attached to a toggle plate 51 operated by a handle 52 to shift the bars 49 into and out of their keepers.

From the above description it will be evident that this invention now provides an inexpensive overhead garage door or the like where the door panels need not have rails or stiles to provide strength and where continuous hinges serve a quadruple function of articulately connect-

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ing the panels, sealing the joints between the panels, providing reinforcing beams for the panels, and providing roller mountings for the door.

It will, therefore, be understood that variations and modifications may be effected without departing from the scope of the novel concepts of this invention.

We claim as our invention:

1. In an upward acting door construction, a roller mounting which comprises a plug having a plurality of longitudinal holes sized for receiving roller shafts, said holes being eccentrically related to the ends of the plug whereby reverse mounting of the plug will shift the hole centers to increase the permissible number of positions for the rollers, and said plugs being insertable into the ends of door beams to connect the door rollers directly with the beams.

2. A roller mounting for doors or the like which comprises a molded plastic plug having a plurality of longitudinal holes therethrough sized for receiving a roller shaft, said holes being arranged in side-by-side relation and being eccentrically spaced from the opposite ends of the plug whereby reverse positioning of the plug in a carrier will shift the centers of the holes to increase the available roller shaft positions.

3. A door mounting which comprises a beam member adapted to be secured to the inner face of a door, said beam member having open ends, roller mounting plugs in said open ends of the beam member, each of said plugs having a plurality of holes therethrough in side-by-side relation, and said holes being eccentrically arranged relative to the ends of the plug whereby reverse mounting of the plug in the beam will shift the centers of the holes to increase the available positions for mounting a roller.

4. A door assembly which comprises a plurality of elongated door panels adapted to be hingedly joined at adjacent edges for articulate movement, a pair of metal strips extending substantially the width of the door and having interlocking hinge portions cooperatively joined to attach the door panels in rockable relation, one of said strips having an elongated substantially rigid beam portion separate from the hinge portion and extending the length of the strip and projecting inwardly from the door panel at right angles thereto whereby the full length of the panel is supported, said beam portion curved inwardly at its free edge to form a rounded flange extending substantially the width of the door and beam plugs held within the rounded flange at each end of the beam and clamped by the flange, and door rollers connected to the plugs to support the door on tracks.

5. A door hinge which comprises a pair of elongated metal strips having substantially the width of the door for attachment to door sections of an overhead door and having continuous hook portions along mating edges thereof extending the full length of the strips, said hook portions joining the strips in rockable relation, a separate beam portion along one of the strips remote from the hook portion extending substantially the full length of the strip and formed integrally with one of the strips and projecting inwardly at substantially right angles to the door whereby the strength of the beam is transmitted

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to the metal strips to prevent sagging of door sections on which the strips are fastened and the strip to which the beam portion is attached is held rigid for non-binding coaction with the other strip, and a roller carrying means for attaching to the door sections for carrying them on a track.

6. In a multi-section upward acting door construction having tracks for supporting the door sections, the improvement of a first and a second door panel having surfaces in substantially the same plane, a first continuous hinge section attached to the surface of the first panel at the edge of the first door panel, a second continuous hinge section attached to the surface of the second panel at the edge of the second door panel adjoining the first panel, said hinge sections joined to each other to connect the door panels in articulate relationship, said first hinge section formed with a face substantially in the plane of the surface of the first door panel surface and extending past the edge of the second door panel engaging the second door panel surface along the length of the panel to form a panel holding abutment therefore, said second hinge section spaced from the edge of the second panel to permit engagement by the first hinge section, and means attached to the door and carrying rollers for supporting the door panels from tracks.

7. A multi-section upward acting door assembly which comprises a plurality of panels having inner planar faces, a male hinge part having a substantially flat elongated strip portion secured to the inner face of a first door panel and projecting beyond the edge of the panel in the plane of the panel face and engaging the inner face of a second panel adjacent the first panel to form an abutment face for the second panel to thereby seal the joint between the panels, said strip having a continuous hook portion on the bottom edge thereof, a female hinge part having an elongated substantially flat strip portion secured on the inner face of said second door panel adjacent said hook portion, a continuous elongated V-shaped portion on one side of the flat portion of the female part receiving the hook portion therein whereby the parts are joined in hinged relation and said first door panel is restrained in one direction by said hook portion engaging said V-shaped portion and in the opposite direction by the flat portion of the male hinge part engaging the surface of the second door panel, and means carrying rollers attached to the door assembly for supporting the door on tracks.

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