Nov. 30, 1965 E. J. DE RIDDER 3,220,519

DOOR CONSTRUCTIONS

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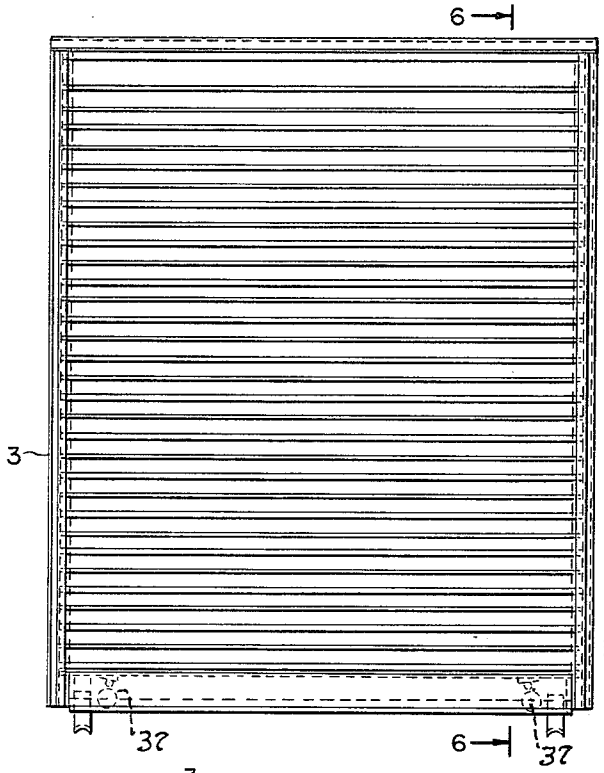


FIG. 1

FIG. 2

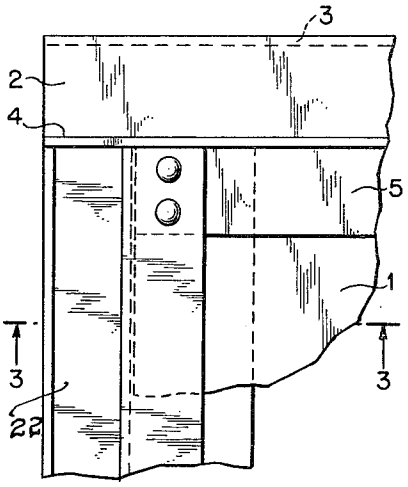
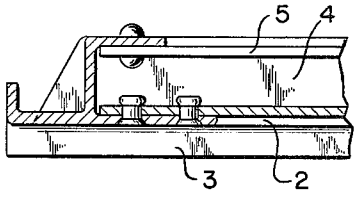


FIG. 3



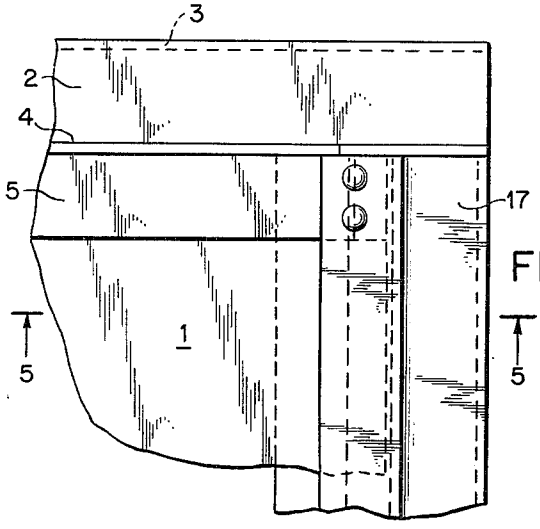


FIG. 4

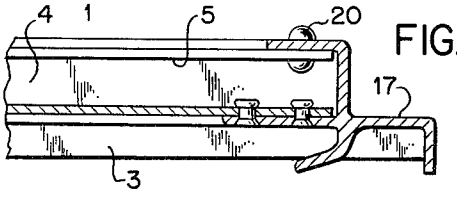


FIG. 5

INVENTOR.
ERNST J. DeRIDDER

BY W. Lee Helms

ATTORNEY

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FIG. 8a

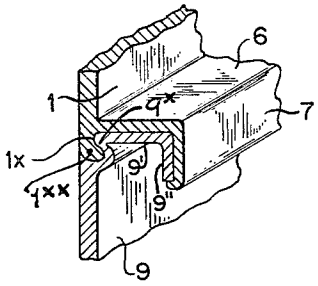


FIG. 8

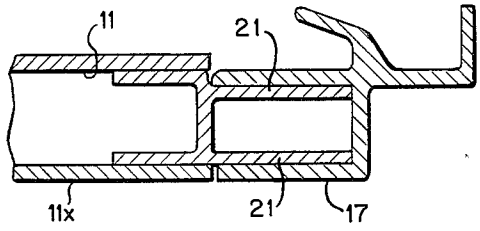
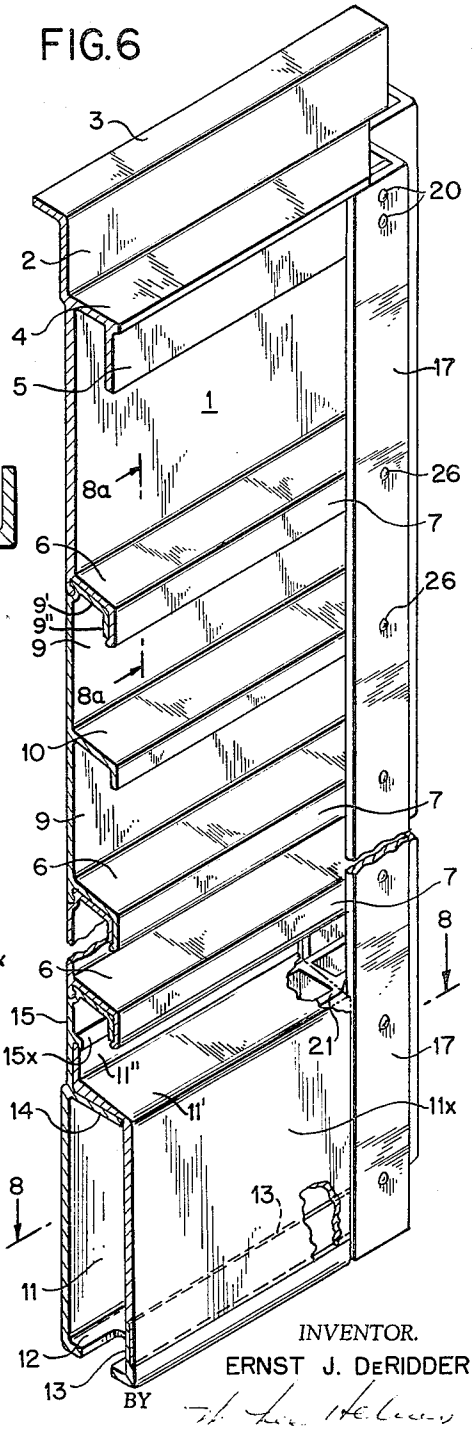


FIG. 6



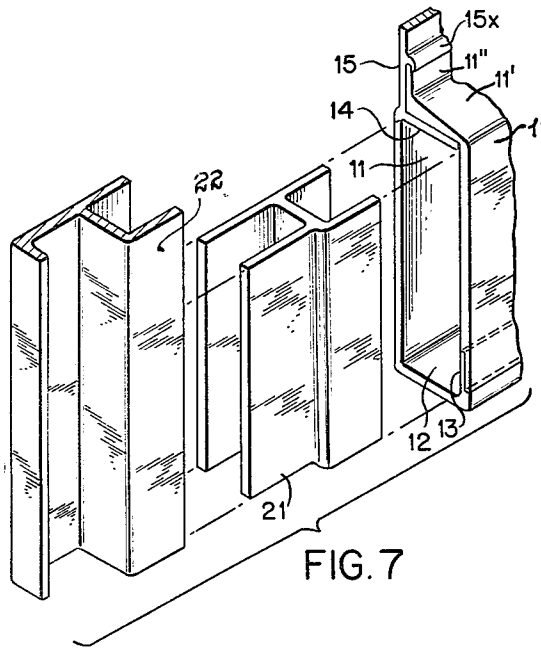


FIG. 7

INVENTOR.
ERNST J. DERIDDER
BY

ATTORNEY

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FIG. 9

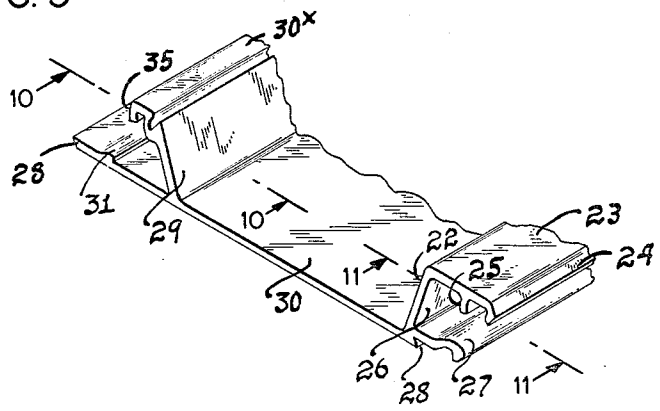
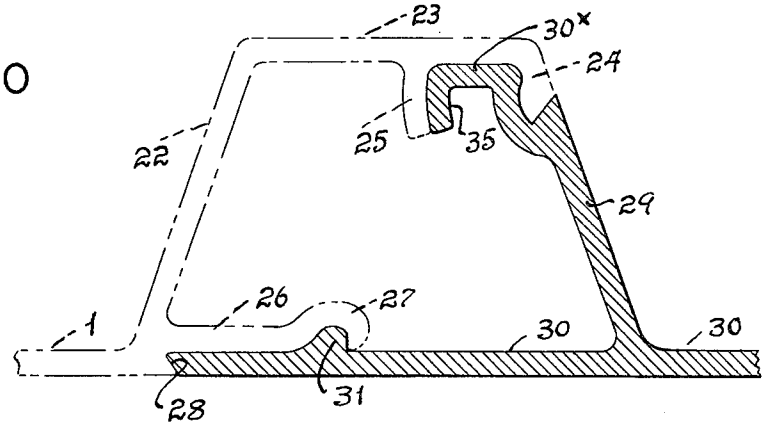


FIG. 10



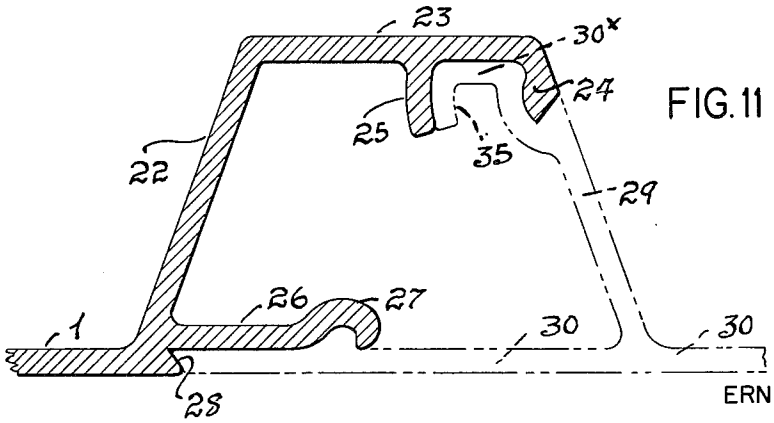


FIG. 11

INVENTOR.
ERNST J. DERIDDER

BY

ATTORNEY

United States Patent Office 3,220,519 Patented Nov. 30, 1965

3,220,519

DOOR CONSTRUCTIONS

Ernst J. De Ridder, Richmond, Va., assignor, by mesne assignments, to Youngstown Steel Door Company, Cleveland, Ohio, a corporation of Ohio

Continuation of abandoned application Ser. No. 675,176, July 30, 1957. This application Mar. 25, 1959, Ser. No. 801,964

9 Claims. (Cl. 189—46)

This application is a continuation of my copending application Serial No. 675,176, filed July 30, 1957, now abandoned.

The object of the present invention is to provide a strong and rigid door construction suitable for freight cars and consisting of extruded metal sections, preferably of aluminum alloy. The construction embodies top and base extruded elements and intermediate interlocking elements, together with side channel members, all providing for ease of insertion and assembly into a rigid structure.

The invention will be described with reference to the accompanying drawing, in which:

FIG. 1 is a view in front elevation of the assembled structure.

FIG. 2 is a fragmentary view in elevation showing a left hand corner of the structure shown in FIG. 1.

FIG. 3 is a horizontal section on the line 3—3, FIG. 2.

FIG. 4 is a fragmentary view showing the upper right hand corner of the structure shown in FIG. 1.

FIG. 5 is a horizontal section taken on the line 5—5, FIG. 4.

FIG. 6 is a somewhat enlarged vertical section on the line 6—6, FIG. 1.

FIG. 7 is a view in perspective and partial section showing the lower left hand side frame member, base panel member and H-shaped connector.

FIG. 8 is a fragmentary section taken on the line 8—8, FIG. 6, FIG. 8*a* is an enlarged section taken on the line 8*a*—8*a*, FIG. 6.

FIG. 9 is a fragmentary perspective view of a modified form of intermediate panel.

FIG. 10 is a transverse section on the line 10—10, FIG. 9.

FIG. 11 is a transverse section on the line 11—11, FIG. 10.

The invention is characterized by the provision of two vertical side frame members which tie between them a top element, a box-like base element formed in two sections and an intermediate series of panels which interlock with each other and with the top and base elements, the side frame members being riveted or welded to the elements and panels to form a rigid combination.

Referring to FIGS. 1 to 8 of the drawings, the top element consists of a major wall or panel portion 1 having a slightly back-set top terminus 2 which carries a rearwardly extending horizontal flange 3. At the base of terminus 2 is a forwardly extending flange or rib 4 having an inset vertical wall or depending flange 5. At the base of major wall 1 is a forwardly projecting flange or rib 6 merging into a vertical wall or depending flange-like extension 7. The free edge of vertical wall 7 is preferably in-turned or beaded, as at 7′ (FIGURE 8*a*), and wall 1 extends a slight distance below flange 6 to define a nose portion or lip 1*xx* having a convex surface opposed to the extension 7. The convex surface of the lip 1*xx* merges at the base of the latter into a recess or groove 1*x* preferably having a curved bottom.

Interfitting with the convex surface and groove 1*x* of the lip 1*xx* is a complementary groove and nose 9*x* configuration at the base of a forwardly extending rib 9′ at the top of an underlying panel 9. The rib 9′ fits flush against the rib 6 and has a depending extension 9″ which is received snugly between the rib 6 and the bead 7′ on the extension 7 and fits flush against the latter. In a sense, it will be seen that the rib 9′ and extension 9″ constitute a reversely-turned portion of the panel 9.

Into the said recess at 1*x* of vertical wall 1 is projected the nose 9*x* of an underlying panel wall 9, the nose being carried at the rear of an L-shaped forward extension at the top of wall 9. The lower end of the panel 9 is formed with the same elements or configurations 1*xx*, 6 and 7 as carried by wall 1 and hence the same reference characters have been applied thereto. Also, panel 9 is preferably formed with an intermediate reinforcing L-shaped flange or rib at 10. In accordance with the height of the door, the interlocking panels as exemplified by panel 9, are repeated until the two-part base of the structure is reached.

The hollow base consists of a back wall or panel portion 11 having at its bottom a forwardly extending base rib 12 which carries an upstanding front flange like extension 13. At its top the back wall 11 carries a forwardly projecing flange 14 at the rear of which rises a slightly forwardly offset extension 15 of the wall 11. Above the rib 14 the forward face of the extension 15 is provided with a horizontal thickened area or rib 15*x* formed with a groove-seat in its under surface. The top of extension 15 is formed the same as the top of panel 9, and interlocks with the immediately above panel in the same manner. The hollow base is completed by a front panel 11*x* the lower portion of which overlaps upstanding extension 13 of member 11. Preferably, the overlapping portions of extension 13 and panel 11*x* are appropriately thinned or recessed on their opposed sides so that both sides of the extension and panel are flush with each other. The top of the panel 11*x* has an inturned flange or rib 11′ which overlies the rib 14 and has an upstanding extension 11″ disposed flush against the extension 15. The upper edge of the extension 11″ fits snugly in the seat in the underside of the rib 15*x*.

The right hand vertical frame member 17 is shown more particularly in section, FIG. 8 and in FIG. 5. It is a channel member which receives the ends of the panels 1, 9, and any intermediate like interlocked panels and which may secure such panels in position by any desired securing means, as by rivets 20, FIG. 5. However, the hollow base is connected to the right hand vertical frame member 17 by an H-connector 21 secured to the vertical frame 17 by rivets, as shown in FIG. 6, or by welding if desired.

The left-hand vertical frame member is shown at 22 FIG. 7, and is substantially the same as the right hand frame member 17, but reversed in direction. It receives the same H-connector 21 for the hollow base of the structure, and, as shown in FIGURE 3, it receives the top and intermediate panels in the same manner as does the right-hand frame member 17.

In the modified panel structure shown in FIGS. 9 to 11 inclusive it will be understood that the lower end of wall 1, FIG. 6 will be formed in the manner shown in the cross section part of FIG. 11 and at the right-hand side of FIGURE 9, and therefore will have an outwardly extending slightly downwardly inclined rib 22 merging into a depending extension 23 which will lie vertically. Wall 23 terminates with a nose or inturned lip 24 having a convex inner surface facing the rib 22. The extension 23 also is formed with an inner rib 25 the surface of which is concavely rounded at that area directly opposite nose 24. Preferably, the opposed rounded surfaces of the lip 24 and rib 25 have a common center of curvature as described more in detail in my copending application Serial No. 830,856.

The said modified end of wall 1 is formed with a

slightly outwardly offset extension or leg **26** having a hooked shaped end **27**, and wall **1** slightly projects behind leg **26** to provide an inclined abutment at **28**.

The top of the underlying panel to be interlocked with the said modified lower end of panel **1** will be formed as shown in section FIG. 10 and at the left-hand side of FIGURE 9. It will have an outwardly extending upwardly inclined rib **29**, projecting from its major wall portion **30** below the top thereof. Near its top rib **29** will merge into a normally vertical extension **30***x* which carries an inwardly directed flange-like rib **35** having a surface opposed and complementary to the rounded surface of the lip **24**. At the juncture of the rib **29** with its extension **30***x* is a groove complementary to and for the reception of the lip **24**. Preferably, the inner side wall of the groove is undercut, as shown, and the center of curvature of the curvature of the grooved wall of the groove and the curved outer surface of the rib **35** is at the junction of the undercut wall of the groove with the outer surface of the rib **29**, for reasons described more in detail in the above-mentioned copending application. The free edge of wall portion **30** is inclined so as to abut the inclined face **28**, and the wall **30** is formed with an outwardly extending ridge **31** to be engaged by hook **27**.

The intermediate panels, that is to say those underlying panel **1** will have the same top and bottom form formations, and one of said intermediate panels is shown in FIG. 9, the interlocking ends being the same as those of FIG. 10 and FIG. 11. Therefore FIG. 9 bears the same reference characters.

It will be understood that the hollow base of the door is adapted for internal mounting of rollers, as schematically indicated at **37**, FIG. 1, and means, when used, for raising and lowering the rollers according to known mechanism for that purpose.

Fundamentally the construction consist of a frame composed of the side members **17**, **22** and the top and bottom members **1** and **11**, **11***x*, between which and interlocked therewith, and to themselves are the panel strips **9**.

In assembling the structure of FIG. 1, the top flange **11'** of member **11***x* of the hollow base is brought in an outward and upward inclined against flange **14** of the coacting member **11**, and then swung down until the upper edge of the extension **11** enters the bottom groove of the rib **15***x*, and the lower portion of inner face of member **11***x* will abut upstanding extension **13**. Assembly of the intermediate panel strips **9** is simple, and as shown in FIG. 8*a* with respect to top wall portion **1** and the under lying panel strip **9**. The nose portion **1***xx* of wall member **1** is placed in register with the groove under lying nose **9***x* at the top of member **9**, and with the wall **1** rearwardly inclined. Wall **1** is then moved to vertical position so that the ribs **6** and **9'** abut one another. In this connection, it will be seen that if the elements **1** and **9** are thus pivoted into interlocking engagement, the extension **9''** will ride over the bead or inturned edge **7'** on the extension **7** with one or the other of the parts yielding slightly, until the edge of the extension **9''** snaps into place behind the bead with a latch-like action and locks the parts together.

The above operation is the same with respect to the respective intermediate panel strips **9**, of FIG. 6, which are brought into interlocking engagement with each other and with base member **11** as the case may be. In completing the assembly the vertical frame members **17**, **22** are brought into position and welded or riveted to the top wall **1** and/or its front flange **5**, the panel strips **9** and their vertical walls **7** and to the base member **11**, **11***x* or one of them.

When the H-connectors **21** are used, the base wall members **11**, **11***x* can be held in the assembly without welding or riveting, inasmuch as such connection will be via said connectors.

In assembling the structure with the modified interlock of FIGS. 9 to 11, it will be understood that the top of base wall **11** and that of each intermediate panel will have configured edge portions as shown in cross-section FIG. 10, and that the bottom of each of these members will have a complementarily configured edge portion as shown in dotted lines in that figure. In bringing the members into interlocking position, as exemplified in FIG. 10 by top wall **1** and underlying panel strip **30**, the lip **24** is placed in the complementary groove at the outer edge of rib **29** in the panel **30**, with the wall **1** outwardly inclined. Then the wall **1** is moved to the vertical so that the hook **27** will ride over and latch with the rib **31** to interlock the parts as shown in FIGURES 10 and 11 and provide a box beam effect. When the spaced means for interlocking are closely fitted, compensation will be given by required slight spring action of the parts.

In both forms of interlock along the configured edge portions lengthwise of each of said sections latches, or two spaced pivotally interlocked joints are provided for holding the elements against relative movement either forwardly or rearwardly when the assembly is held in vertical position. The side frame members also hold the elements vertical against relative hinging action, but they are not required to be major strain-resisting elements.

It will be seen that in a sense the rib **6** and extension **7** together with the lip **1***xx*, of the interlocked joint shown in FIGURES 6 and 8*a*, define a channel-like configuration having one of its side walls undercut by the groove **1***x*. The rib **9'** and its extension **9''** together with the nose **9***x* may be considered to be a tongue-like configuration which is complementary to and adapted to interfit with the aforementioned channel-like configuration. The same terminology may also be applied to portions of the interlocked joint illustrated in FIGURES 9–11, wherein a channel-like configuration is defined by the extension **23**, rib **25** and nose **24** and a tongue-like configuration is defined by the extension **30***x* and rib **35**. It also will be seen that the inturned bead **7'** of the FIGURE 8*a* construction and the ridge **31** of the FIGURE 10 construction can be considered to be ridge-like latch-keeper means, while the extension **9''** and the extension **26** and hook **27** may be considered to be tongue-like latch-bolt means.

It will be understood that various modifications may be made in the form and arrangement of the elements constituting the embodiments shown without departing from the spirit of the invention. Thus at the areas where two parts are interlocked, one with a groove and one with a nose, for example, these elements obviously can be reversed as to the parts which carry them.

Having described my invention, what I claim and desire to secure by Letters Patent is as follows:

1. A door assembly comprising a base section, a top section, elongated intermediate extruded panel sections, all of said sections being formed of aluminum or the like with configured edge portions lengthwise of each of said sections being adjacent a complementarily configured edge portion of another of said sections, spaced means for substantially pivotally locked engagement along spaced surface portions of each of the adjacent configured edge portions, said adjacent edge portions in substantially pivotally locked engagement such that two spaced pivotally interlocked joints secure each pair of adjacent sections and define a substantially flat uninterrupted surface on one face thereof at the joint therebetween, and side reinforcing extruded members secured to the ends of said sections, one of the adjacent edge portions of each interlocked pair thereof being provided with a flat-bottom channel extending therealong and disposed entirely to one side of said one face of the corresponding section, said channel having one of its sidewalls provided with an undercut portion, and the other edge portion of said pair being provided with a reversely turned portion complementary to and interfitting snugly

within said channel, the construction and arrangement of said edge portions being such that to assemble a pair of adjacent edge portions, said reversely turned portion is partially engaged with said one side wall with the corresponding sections inclined relative to each other and then said sections pivoted about such engagement into a coplanar position of interlocked engagement, and including ridge-like latch-keeper means extending along one of said edge portions and tongue-like latch-bolt means extending along the other of said edge portions, said latch means being mutually engaged for restraining said sections against unlocking reverse pivotal movement and that portion of said edge portion which defines at least one of said latch means being resilient so that said one latch means can ride over the other into locking engagement as said sections are pivoted into said coplanar position.

2. A door assembly comprising a base section, a top section, elongated intermediate extruded panel sections, all of said sections being formed of aluminum or the like with configured edge portions lengthwise of each of said sections being adjacent a complementarily configured edge portion of another of said sections, spaced means for substantially pivotally interlocked engagement along spaced surface portions of each of the adjacent configured edge portions, said adjacent edge portions in substantially pivotally interlocked engagement such that two spaced pivotally interlocked joints secure each pair of adjacent sections and define a substantially flat uninterrupted surface on one face thereof at the joint therebetween, and side reinforcing extruded members secured to the ends of said sections, one of the adjacent edge portions of each interlocked pair thereof being provided with a rib extending therealong and projecting from the other face of the corresponding section, a lip disposed generally in the plane of said section and overhanging the outer side of said rib, and a flange-like extension on said rib opposed to said lip having a latch-keeper ridge on its inner side spaced from said rib, said lip being provided with a convexly curved surface opposed to said extension and partially defining a groove adjacent the base of said rib, and the other edge portion of said pair is provided therealong with a groove and a nose portion, complementary to and interfitting snugly with said lip and groove along said one edge portion, and a rib having a reversed flange-like extension, the outer surfaces of said last-mentioned rib and extension being complementary to and fitting snugly against said outer side of said first-mentioned rib and said inner side of said first-mentioned extension between said ridge thereon and said first-mentioned rib, the construction and arrangement of said edge portions being such that to assemble a pair thereof said lip on said one edge portion may be partially engaged with said groove on the other with the corresponding sections inclined relative to each other and then said sections pivoted about such engagement into a coplanar position of interlocked engagement with said reversed extension riding over said ridge until it snaps into place therebehind.

3. A door assembly comprising a base section, a top section, elongated intermediate extruded panel sections, all of said sections being formed of aluminum or the like with configured edge portions lengthwise of each of said sections being adjacent a complementarily configured edge portion of another of said sections, spaced means for substantially pivotally interlocked engagement along spaced surface portions of each of the adjacent configured edge portions, said adjacent edge portions in substantially pivotally interlocked engagement such that two spaced pivotally interlocked joints secure each pair of adjacent sections and define a substantially flat uninterrupted surface on one face thereof at the joint therebetween, and side reinforcing extruded members secured to the ends of said sections, each pair of adjacent edge portions defines a hollow tubular configuration having some of the characteristics of a box beam.

4. A door assembly comprising a base section, a top section, elongated intermediate extruded panel sections, all of said sections being formed of aluminum or the like with configured edge portions lengthwise of each of said sections being adjacent a complementarily configured edge portion of another of said sections, spaced means for substantially pivotally interlocked engagement along spaced surface portions of each of the adjacent configured edge portions, said adjacent edge portions in substantially pivotally interlocked engagement such that two spaced pivotally interlocked joints secure each pair of adjacent sections and define a substantially flat uninterrupted surface on one face thereof at the joint therebetween, and side reinforcing extruded members secured to the ends of said sections, one of the adjacent edge portions of each interlocked pair thereof being provided with a rib extending therealong and projecting from the other face of the corresponding section, a forwardly extending flange-like extension on said rib terminating in an inturned lip having a convexly curved surface opposed to said rib and partially defining a groove adjacent the base of said lip, a rib-like flange on the inner side of said extension opposed to said lip, and a tongue-like forwardly extending projection at the base of said rib extending generally parallel to but offset inwardly from the one face of said section, said projection terminating in a hook-like end, and the other edge portion is provided with a rib extending therealong, projecting from the other face of its section, and terminating in a reversely turned portion complementary to and fitting snugly within the channel-like space defined by said extension, lip and flange on said one edge portion, and said last-mentioned rib also is provided with a groove complementary to and snugly receiving said lip, and said other edge portion also being provided with a forwardly extending projection which overlies said projection on said one edge portion and has a ridge engaged by said hook-like end, the construction and arrangement of said edge portions being such that said reversely turned portion can be partially engaged within said channel-like space with said sections inclined relative to each other and then the latter pivoted about said partial engagement into a coplanar position of interlocking engagement with said hook-like end riding over said ridge until it snaps into place thereover.

5. A set comprising at least two panel-like extruded metal sections having straight edge portions provided with complementary profile configurations adapted to be assembled into snug interlocking engagement to form at least a portion of a panel having a substantially flat and uninterrupted surface on one face thereof at the joint between said sections, the edge portion of a first of said sections being provided with a flat-bottom channel extending therealong and disposed entirely to one side of said one face of said first section, said channel having one of its side walls provided with an undercut portion, the edge portion of a second of said sections being provided with a reversely-turned portion complementary to and adapted to interfit snugly within said channel, the construction and arrangement of said edge portions being such that said reversely-turned portion can be partially engaged within said channel with said sections tilted relative to each other and then said sections pivoted about such partial engagement into a coplanar position of interlocking engagement, said edge portion of one of said sections having ridge-like latch-keeper means extending therealong and the edge portion of the other of said sections having tongue-like latch-bolt means extending therealong, both of said latch means being adapted to be mutually engaged, when said sections are in interlocking engagement, for restraining the latter against unlocking reverse pivotal movement, that portion of said edge portions which defines at least one of said latch means being

resilient so that said one latch means can ride over the other into locking engagement as said sections are pivoted into said coplanar position.

6. The structure defined in claim 5 in which the edge portions of said sections, when in interlocking engagement, define a hollow tubular configuration extending along the joint between said sections and having some of the characteristics of a box beam.

7. A set comprising at least two panel-like extruded metal sections having straight edge portions provided with complementary profile configurations adapted to be assembled into snug interlocking engagement to form at least a portion of a panel having a substantially flat and uninterrupted surface on one face thereof at the joint between said sections, a first of said sections having along its edge portion an integral rib projecting from the other face of said section, a lip disposed generally in the plane of said section and overhanging the outer side of said rib, and a flange-like extension on said rib opposed to said lip and having a latch-keeper ridge on its inner side spaced from said rib, said lip being provided with a convexly curved surface opposed to said extension and partially defining a groove adjacent the base of said lip, a second of said sections being provided along its edge portion with a groove and a nose portion complementary to and adapted for snug interfitting engagement with said lip and groove on said first section, said second section also being provided along its edge portion with a rib having a reversed flange-like extension, the outer surfaces of said last-mentioned rib and extension being complementary to and adapted to fit snugly against said outer side of said first section rib and the inner side of its extension, between said ridge thereon and said first-mentioned rib, the construction and arrangement of said parts being such that said lip on said first section may be partially engaged with said groove on said second section with both sections inclined relative to each other and then said sections pivoted about such partial engagement into a coplanar position of interlocked engagement with said reversed extension riding over said ridge, on said pivotal movement, until said extension snaps into place behind said ridge.

8. A set comprising at least two extruded metal sections having plane surface portions terminating in straight edge portions provided with complementary profile configurations adapted to be assembled into snug interlocking engagement with said plane surface portions in coplanar disposition, a first of said sections having an integral wall extending along its straight edge portion opposite its plane surface, a lip along said edge portion overhanging the outer side of said wall and having a convexly-curved inner surface partially defining a groove adjacent the base of said lip, a flange on the outer side of said wall having a surface opposed to said lip, a second of said sections having an integral rib extending along its straight edge portion opposite its plane surface and provided with a pair of oppositely facing surfaces, one adjacent the base of said last-mentioned rib and one adjacent the free edge thereof, said pair of surfaces being complementary and conforming respectively to said flange and lip opposed surfaces on said first section for snug interfitting engagement therewith when said edge portions of said sections are interlocked, said surface

adjacent the base of said second section rib defining a portion of a groove which is undercut as respects said plane surface portion of said second section, said lip being complementary and having surfaces conforming to said groove, whereby a portion of said second section adjacent said groove overhangs said lip when said sections are assembled, the arrangement being such that said complementary surfaces on said first section lip and on said second section groove can be partially engaged with said plane surface portions of said sections inclined relative to each other and then said sections pivoted about such partial engagement into a coplanar position of interlocked engagement.

9. A set comprising at least two extruded metal sections having plane surface portions terminating in straight edge portions provided with complementary profile configurations adapted to be assembled into snug interlocking engagement with said plane surface portions in coplanar disposition, a first of said sections having along its straight edge portion a lip-like configuration that side of which is opposite said plane surface portion of said one section being convexly-curved and bead-like with the center of curvature at said plane surface portion of said one section, the curved surface of said one side of said configuration extending on opposite sides of a plane which is generally normal to said plane surface portion of said one section and includes said center of curvature, the tip of said configuration being offset inwardly of said plane surface portion of said one section, a second of said sections having along its straight edge portion an undercut groove complementary and having surfaces conforming to said lip-configuration for interlocking engagement therewith, one edge of said groove being offset inwardly of said plane surface portion of said second section and the other edge of said groove substantially coinciding with said center of curvature when said sections are assembled, the construction arrangement of said sections being such that said lip-like configuration can be partially engaged in said groove with said plane surface portions of said sections inclined relative to each other and then said sections pivoted about such partial engagement into interlocking engagement and to dispose said planar surface portions in the same plane, said sections including surfaces separate from said lip-like configuration and said undercut groove and adapted to be engaged when said sections are assembled to restrain said pivotal movement beyond the point of said planar disposition of said plane surface portions.

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HARRISON R. MOSELEY, *Primary Examiner.*

JOSEPH D. BEIN, GEORGE NINAS, JR., BENJAMIN BENDETT, *Examiners.*