July 19, 1966 D. G. SMITH 3,261,493

STRUCTURAL JOINT FOR A CARGO CONTAINER

Filed April 18, 1963 3 Sheets-Sheet 1

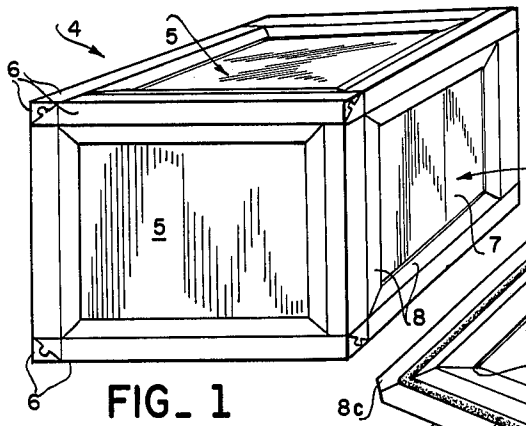
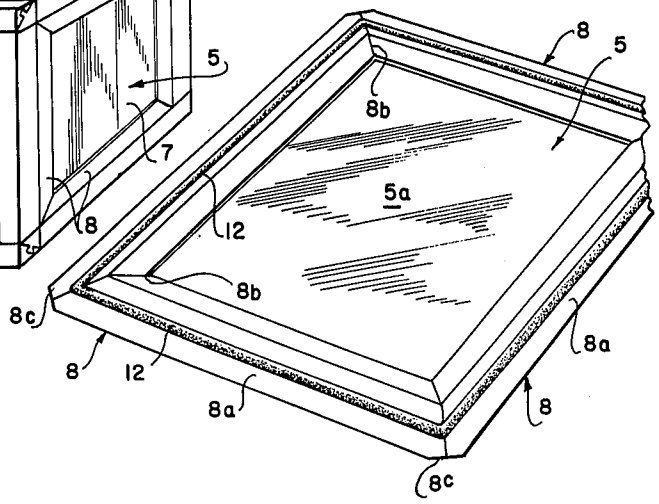


FIG_ 1

FIG_ 2



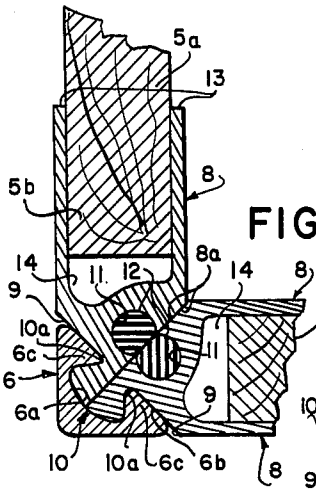


FIG_ 3

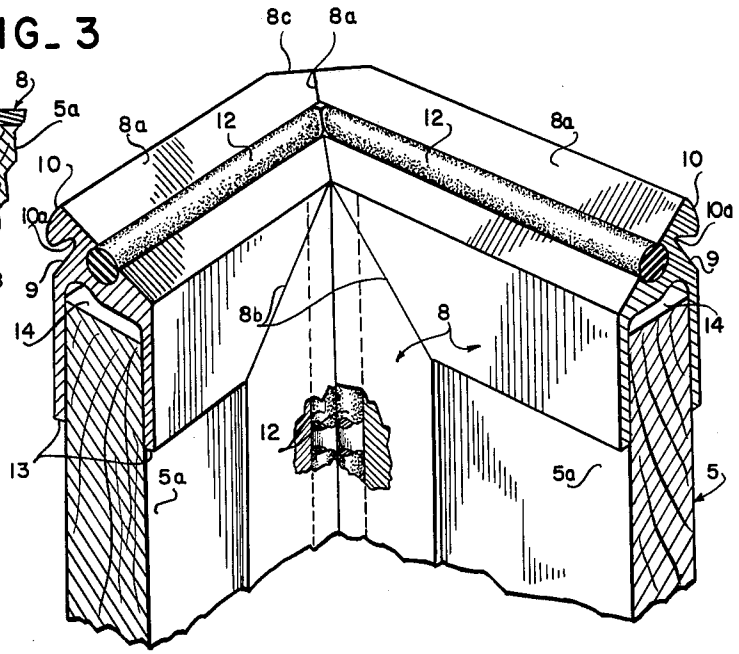


FIG_ 5

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STRUCTURAL JOINT FOR A CARGO CONTAINER

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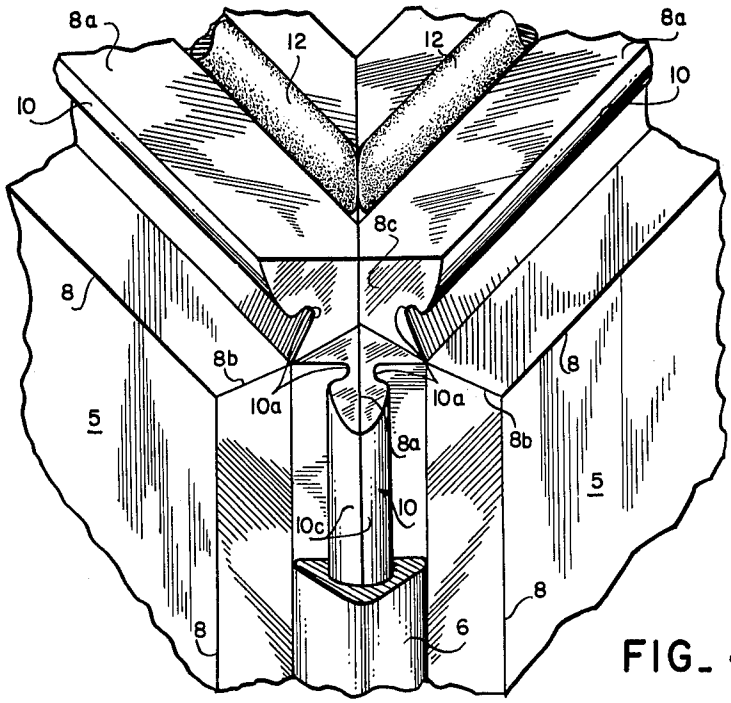


FIG_4

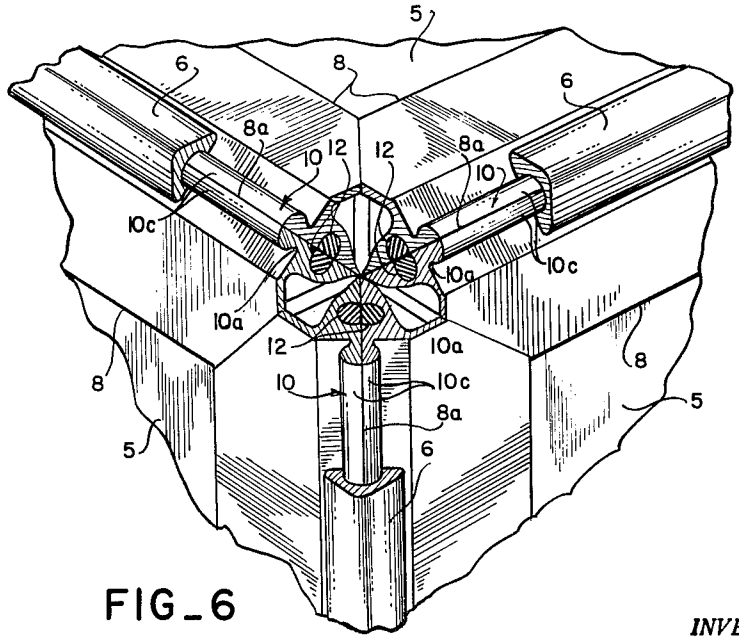


FIG_6

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STRUCTURAL JOINT FOR A CARGO CONTAINER

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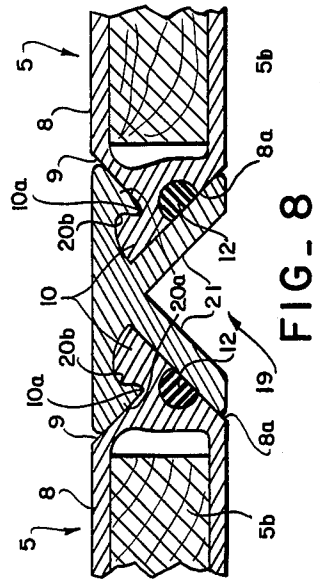


FIG. 8

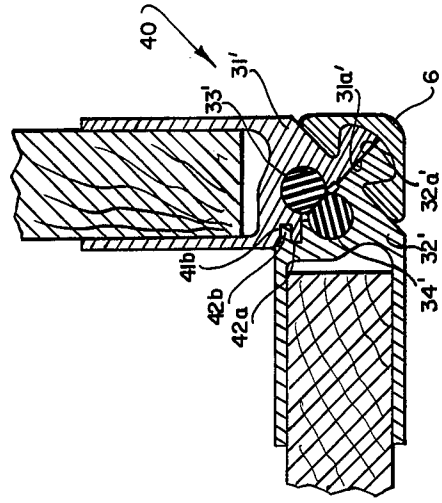


FIG. 10

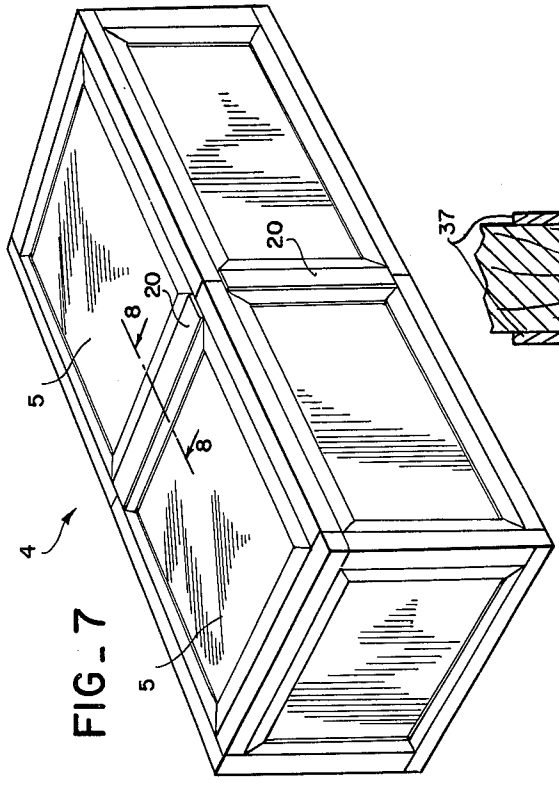


FIG. 7

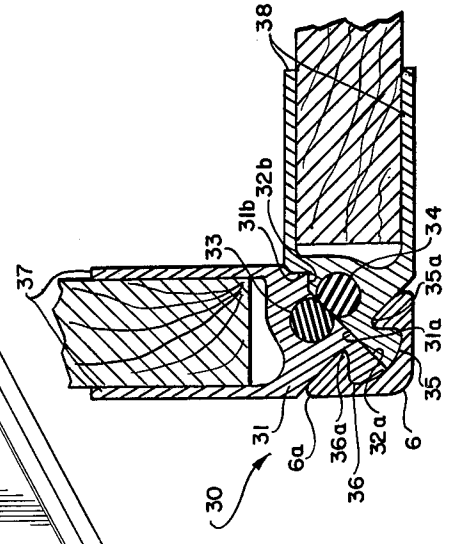


FIG. 9

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3,261,493

STRUCTURAL JOINT FOR A CARGO CONTAINER

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Filed Apr. 18, 1963, Ser. No. 273,985
3 Claims. (Cl. 217—65)

This invention relates to a knockdown container, and more particularly to a rigid knockdown container wherein the side walls are capable of being locked together in fluid tight sealing engagement in their assembled relation.

In the transportation of cargo, it is desirable to provide a rugged, re-useable cargo container forming a complete enclosure which may be easily assembled and disassembled after use for storage and transport to a place of re-use with a minimum of lost space. Such container should further be capable of being opened from any side, being made watertight, and include provisions for transferring load forces between the panels. Also, to minimize manufacturing costs, a plurality of sizes of containers should be capable of being built up from standard panels of simple construction. This invention provides a container meeting these criteria.

Accordingly, it is an object of this invention to provide a knockdown container capable of providing a complete enclosure by a plurality of container panels assembled together by locking angles.

Still another object of this invention is to provide a knockdown container capable of providing a complete watertight enclosure by a plurality of panels assembled together in sealing relation by locking angles.

Another object of this invention is to provide a container constructed of container panels having extruded metal mitered edgings around their peripheral edges.

A further object of this invention is to provide a container wherein the container panels each have an edging around their peripheral edges and have resilient seals retained therein which, upon assembly of the panels, engage the seal of an adjacent panel and seal the edges of the container.

A still further object of this invention is to provide an extruded container edging having a mitered side surface, a continuous gasket extending from the side surface, and spaced-apart flanges for permitting connection of the edging to a container panel peripheral edge.

Yet a further object of this invention is to provide a container wherein the container panels have mitered interior edges provided with bearing surfaces therealong for transmitting load forces between the panels.

Another object of this invention is to provide a slide-on connecting angle capable of locking together all perpendicularly related panels of the enclosing container.

Still another object of this invention is to provide a slide-on locking angle for locking together two panels in end-to-end relation.

Other objects and advantages of this invention will become more apparent from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of one assembled container embodiment of this invention;

FIGURE 2 is a perspective view of the interior side of a panel for the container of FIGURE 1;

FIGURE 3 is a cross-sectional view taken along line 3—3 of FIGURE 1 showing in detail the connection of two mating panels of FIGURE 1;

FIGURE 4 is a fragmentary perspective view looking from the outside at a corner of two connected panels for the FIGURE 1 container;

FIGURE 5 is a fragmentary perspective view of the inner surfaces of the connected panels shown in FIGURE 4;

FIGURE 6 is a fragmentary pictorial view of an alternate exterior corner construction embodiment for the FIGURE 1 container panels permitting installation of the locking angles;

FIGURE 7 is a perspective view of two containers, exclusive of end panels, connected together by connector angles to form a double length container;

FIGURE 8 is a cross-sectional view taken along line 8—8 of FIGURE 7;

FIGURE 9 is a cross-sectional view of an alternate corner mitered edging embodiment for the FIGURE 1 container; and

FIGURE 10 is a cross-sectional view of a further alternate mitered edging embodiment for the FIGURE 1 container.

Generally stated, this invention comprises a rigid enclosing container formed of panels having mitered side edges which fit together with the mating mitered edges held in snug mating engagement by locking angles. To make the container watertight, seals are provided along the mitered mating surfaces. In one form of the invention, provisions are made for transmitting load forces directly between the panels. Also, to permit increasing of the length of the container, a connecting angle is provided for locking at least two panels in end-to-end relation.

More specifically, there is shown in FIGURE 1 a container 4 comprising six panels 5 which are secured together along their side edges by corner angles 6.

The body 5*a* of each panel 5, best seen in FIGURE 2, is formed of a single sheet of plyboard or other suitable container material and has edgings 8, which may be formed of extruded aluminum for example, secured to its peripheral edges. Edgings 8 are mitered at an angle of 45 degrees along the surface 8*a*, on the interior side of panel 5, and are mitered in a like manner at their junctures 8*b* so that they fit together to form a continuous mitered edging about the periphery of the panel.

The edgings 8, best seen in FIGURES 3, 4 and 5, of each panel have a planar surface 9 normal to the surface 8*a* and a tongue or protuberance 10 extending outwardly from surface 9, which is provided with an undercut channel or groove 10*a*. Substantially centrally of its width, surface 8*a* is provided with a concave groove 11 and retains therein a continuous one-piece resilient preferably cylindrical gasket or seal 12. Approximately one-third of the perimeter surface area of seal 12 extends from the groove while in excess of one-half, and preferably approximately two-thirds, of the seal 12 is confined within the groove 11 to prevent the seal from falling out when the panels are separated. Edgings 8 include spaced-apart flanges 13 which project from the main body portion of the edging and define a groove 14 for receipt of the terminal end wall 5*b* of the panel body 5*a*. The terminal end wall 5*b* is secured within the groove 14, such as by gluing along the confronting surfaces of the panel body and flanges 13, or by any other appropriate means or manner. With each panel 5 provided with edgings 8 about its periphery, which edgings are mitered at an angle of 45 degrees on the interior side of the panel, the six panels 5 are readily assembled together such that the seal 12 of one panel is in sealing engagement with the seal 12 of an adjacent panel 5, as best seen in FIGURES 4 and 5.

For locking the panels 5 together in their assembled position to form the container 4, the before-mentioned locking angles 6 are provided. Each locking angle 6 is triangular in cross-section and has an undercut channel or groove 6*a* formed centrally of its base 6*b* so as to provide opposed tongues 6*c* at the juncture of the opposite sides of groove 6*a* and base 6*b* which slide into mating and locking engagement with the grooves 10*a* formed in tongues 10 of the edgings 8. It will be appreciated that

upon sliding the locking angle **6** into place, adjacent confronting edgings **8** are drawn together and accordingly any seals **12** contained in grooves **11** will be resiliently deformed against one another so as to provide a fluid-tight seal. It will of course be further appreciated that the seals **12**, being resilient, maintain the grooves **10***a* of the edgings **8** biased into frictional engagement with the tongues **6***c* of the locking angle **6** to retain the locking angle in place.

As best seen in FIGURE 4, the exterior tip ends of the edgings **8** are mitered so as to provide a surface **8***c* having a relationship of substantially 45 degrees relative to the plane of each of the three sides forming a container corner. The tip ends of the edgings **8** are cut off to give free access to the grooves **10***a* in the tongues **10** of the mating edgings **8** by the tongues **6***c* of a locking angle **6**, but not far enough to intersect the grooves **11** which retain seals **12** so as to maintain the seal of the container at the corners. The cutting off of the exterior tip ends of the panel edgings **8**, it will be appreciated, is necessary to prevent the confronting tongues **10** of one pair of mating edgings **8** from interfering with and preventing the locking engagement of locking angle **6** with the pair of mating tongues of the perpendicularly related edgings **8** at the corner of the container. The third panel which matingly fits with the two panels shown in FIGURES 4 and 5 to form a container corner is not shown; however, it will be understood that the tip end of its edging is mitered to form a surface which is an extension of the surface **8***c* when the three panels are fitted together.

An alternate approach to making provisions for sliding on the locking angle **6** is shown in FIGURE 6. As shown therein, the tongues **10** of edgings **8** are each provided with transverse slots **10***c* in alignment with the perpendicularly related groove **10***a* of an adjacent edging. It will be seen that this construction permits the passage of the locking angle **6** through the transverse slot **10***c* and into engagement with the grooves **10***a* whereby the container panels may be locked together by the slide-on locking angle **6**. It will of course be appreciated that if a locking mechanism of the clamp type were used, for example, no cutting of the container corners would be needed.

In some applications it may be desirable to extend the length, or width, of the container **4**, and toward this end there is shown in FIGURE 7 a container **18** comprising two containers **4**, each exclusive of one end panel, connected together at their open ends in end-to-end relation by the connecting angles **19**. A slide-on connecting angle **19**, shown in detail in FIGURE 8, is provided for interconnecting two confronting panels **5** of the containers **4** in end-to-end relation. Each connecting angle **19** is X-shaped and has a top portion **20** and two legs **21** extending or projecting outwardly from the center of the top portion **20** so as to form 45-degree angles with the free ends of the top portion. The terminal ends **20***a* of the top portion **20** are tapered along a plane normal to the adjacent leg **21** and are provided with grooves **20***b* on their under sides which form tongues or protuberances of the terminal ends **20***a*.

It will be seen therefore that the tongues **20***a* and grooves **20***b* of the angle **19** interfit with the grooves **10***a* and tongues **10** of an adjacent edging **8** to maintain the exterior surfaces **21***a* of the angle **19** in snug engagement with the surface **8***a* of the adjacent fitting **8** to lock the panels **5** together in end-to-end relation. The seals **12**, being in biasing engagement with the exterior surfaces **21***a* of the legs **21**, provide a watertight seal and also take up any slack in the connection.

It will be appreciated that to form a container of double panel length, the panels **5** must be secured together in end-to-end relation by the connecting angles **19** before the panels are connected together to close the container **18**. Also, although the connecting angles **19** sealingly interconnect the panels along their center portion, they do not provide a seal at the corners. Accordingly, to seal the corners, a suitable insert and/or sealing compound should

be provided at these corners if a completely fluid-tight container is desired.

Referring now to FIGURE 9, there is shown an alternate form of the mitered edging of FIGURES 1 to 6. The corner **30** shown in FIGURE 9 comprises a pair of complementary edgings **31** and **32** which have resilient seals **33** and **34** fitted in grooves formed in their mating mitered surfaces **31***a* and **32***a*. The edgings **31** and **32** also include tongues or protuberances **35** and **36** provided with grooves **35***a* and **36***a* for mating engagement with the tongues **6***a* of a locking angle **6** and flanges **37** and **38** extending from the edging bodies for connection of the edgings to panels **5**. It will be seen that the edgings **31** and **32** are identical to edgings **8** with one exception; namely, the provision of a rectangular inset or seat **31***b* in surface **31***a* of edging **31** and a complementary mating rectangular perpendicularly related step **32***b* in surface **32***a* of edging **32**. This step and seat construction provides for the transmission of load forces directly between the panels **5** removing some of the strain from the locking angle **6**. The step and seat arrangement thus provided prevents any tendency of one panel to slide relative to its adjoining panel although such relative movement is effectively precluded by the locking angle **6**. The complementary edgings **31** and **32**, it will be seen, can provide a watertight seal and may be used in any application where the edgings **8** may be used, when confronting container panels are provided therewith.

There is shown in FIGURE 10 a corner **40** which, being identical to corner **30** with one exception, will only be described in detail as to how it differs from corner **30**. Also, the major features of corner **40** will be given the prime reference numerals corresponding to the identical features of corner **30** and reference should be made to the description of corner **30** for a detailed description of such features. The corner **40** differs from corner **30** only in that the surface **31***a* is provided with a tongue **41***a* and a groove **41***b* for cooperating engagement with a perpendicularly related groove **42***a* and tongue **42***b* formed in surface **32'***a* rather than a step and seat arrangement. The tongue and groove arrangement provides a positive interengagement between the adjacent edgings and transmits load forces between the panels **5**.

It can be seen from the foregoing that this invention provides a knockdown cargo container capable of providing complete enclosure formed of container panels having interfitting mitered edgings, which panels are locked together preferably by slide-on locking angles. In one form of the invention the mitered edgings of each panel are identical, and thus all panels are interchangeable; while in alternate forms of the invention, complementary mitered edgings are provided with perpendicularly related bearing surfaces for direct transmission of load forces between the panels. The mitered surfaces of the edgings can mount continuous resilient seals which upon assembly of the panels are in sealing engagement with the seals of an adjacent panel, thereby making the container watertight. Also, the invention provides a connecting angle for connecting two containers, each exclusive of one end panel, together in end-to-end relation to form a container of increased size.

While particular embodiments of the invention have been illustrated and described, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the invention, and it is intended to cover in the appended claims all such modifications and equivalents as fall within the true spirit and scope of this invention.

What is claimed is:

1. A structural joint for connecting panels in angular relation comprising in combination:

a pair of adjacent edgings having confronting edge mitered mating surfaces;

a first groove formed in each of said edges, said first groove located in and extending longitudinally the length of said mitered surface;

a resilient seal mounted in the first groove of each panel and extending the distance of said first groove, a portion of said seal extending out of said first groove and above the mitered surface;

the cross-sectional shapes and area relationships of said first groove and said seal are interrelated for retention of said seal in said first groove against free removal;

a second groove formed in each of said edges, said second groove located in the edging side opposite the mitered surface and extending the length of said mitered surface;

said edgings assembled together with said mitered surfaces of adjacent panels in mating juxtaposition;

and, a lock means slidably mounted over the assembled edgings, said lock means slidably engageable in both said second grooves for locking the panels together with said seals in the first grooves in cooperating contact to effect a fluid-tight seal.

2. A structural joint for connecting panels in angular relation comprising in combination:

a pair of adjacent edgings having confronting edge mitered mating surfaces;

a first groove formed in each of said edges, said first groove located in and extending longitudinally the length of said mitered surface;

a resilient seal mounted in the first groove of each panel and extending the distance of said first groove, a portion of said seal extending out of said first groove and above the mitered surface;

a seat in one of said mitered mating surfaces;

a perpendicularly related step in the other of said mitered mating surfaces complementary to said seat;

a second groove formed in each of said edges, said second groove located in the edging side opposite the mitered surface and extending the length of said mitered surface;

said edgings assembled together with said mitered surfaces of adjacent panels in mating juxtaposition with said step interfitting said seat;

and, a lock means slidably mounted over the assembled edgings, said lock means slidably engageable in both said second grooves for locking the panels together with said seals in the first grooves in cooperating contact to effect a fluid-tight seal.

3. A structural joint for connecting panels in angular relation comprising in combination:

a pair of adjacent edgings having confronting edge mitered mating surfaces;

a first groove formed in each of said edges, said first groove located in and extending longitudinally the length of said mitered surface;

a resilient seal mounted in the first groove of each panel and extending the distance of said first groove, a portion of said seal extending out of said first groove and above the mitered surface;

a tongue and groove in one of said mitered mating surfaces;

a perpendicularly related groove and tongue in the other of said mitered mating surfaces complementary to said tongue and groove in said one of said mitered mating surfaces;

a second groove formed in each of said edges, said second groove located in the edging side opposite the mitered surface and extending the length of said mitered surface;

said edgings assembled together with said mitered surfaces of adjacent panels in mating juxtaposition and said tongue and groove of one mitered mating surface interfitting said groove and tongue of said other mitered mating surface;

and, a lock means slidably mounted over the assembled edgings, said lock means slidably engageable in both said second grooves for locking the panels together with said seals in the first grooves in cooperating contact to effect a fluid-tight seal.

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