Sept. 15, 1959 C. M. MOORE 2,904,144

INTERSECTING JOINT CONSTRUCTION

Filed May 4, 1956 2 Sheets-Sheet 1

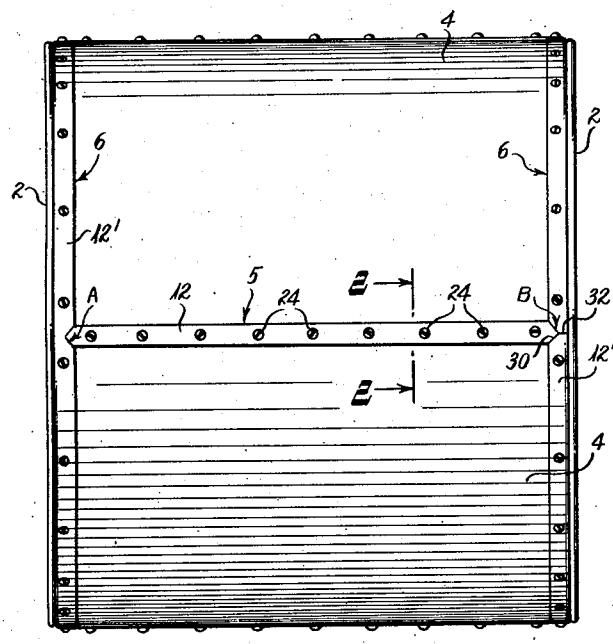


Fig. 1.

Fig. 2.

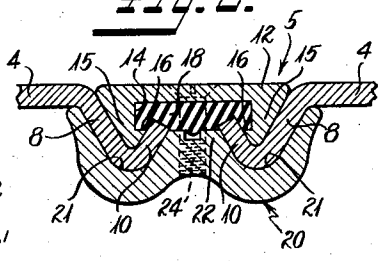


Fig. 4.

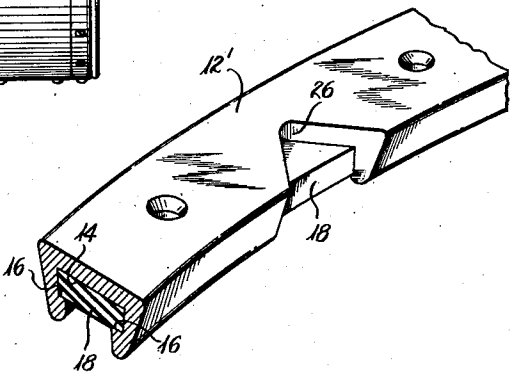


Fig. 3.

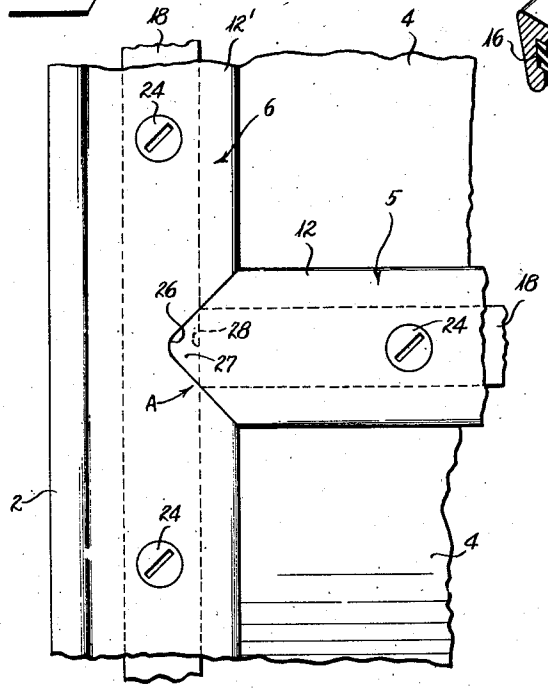
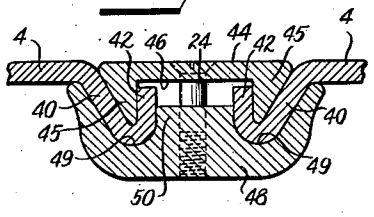


Fig. 5.



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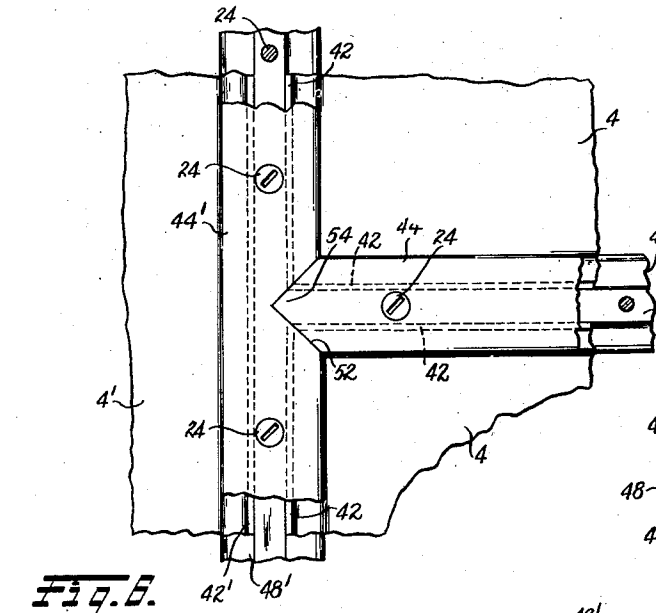

Fig. 6.

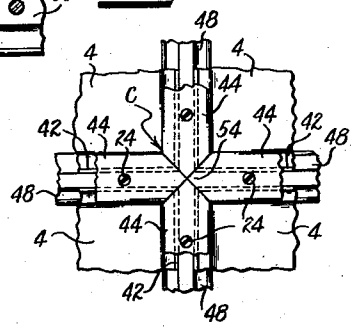

Fig. 9.

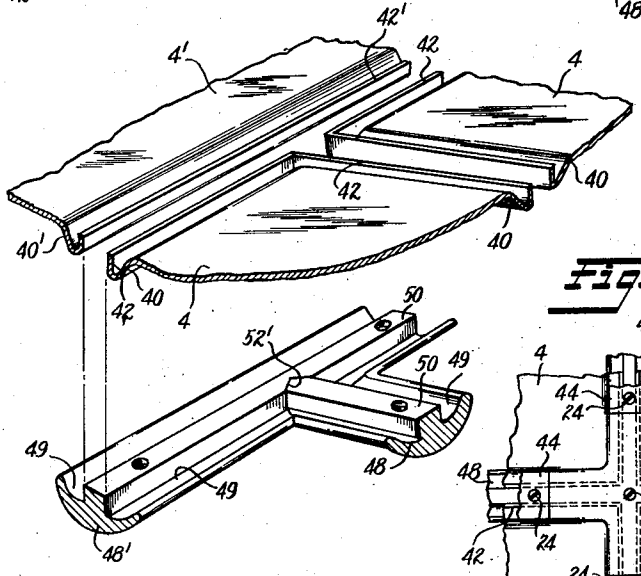

Fig. 7.

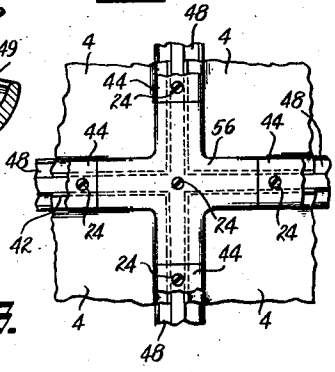

Fig. 10.

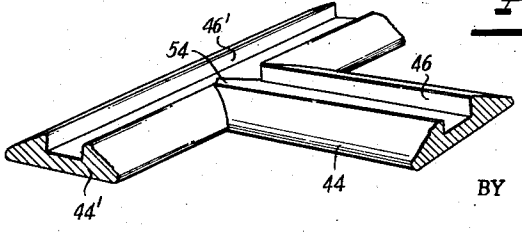

Fig. 8.

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INTERSECTING JOINT CONSTRUCTION

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Application May 4, 1956, Serial No. 582,808

6 Claims. (Cl. 189—36)

This invention relates to joint construction, and particularly to the construction of intersecting joints between adjacent edges of panels or the like comprising the walls of containers, buildings, roofs, or similar structures.

This application is a continuation-in-part of my copending application Serial No. 209,169, filed February 2, 1951 (now Patent No. 2,751,109), which, in turn, disclosed improvements on the subject matter of my application Serial No. 167,793, filed June 13, 1950 (now Patent No. 2,673,659, dated March 30, 1954) and my copending application Serial No. 177,106, filed August 1, 1950, now Patent No. 2,761,582, dated Sept. 4, 1956.

Many proposals have been made heretofore for constructing containers, buildings and similar structures of separable panel-like sections to render the structures readily assemblable and demountable. Many different proposals for construction of the joints between adjacent panels have been proposed but, prior to my invention, no practical or simple solution was found to the problem of effecting a tight and continuous joint in the region wherein two such joints intersect.

According to the present invention, the joint between adjacent panels is formed by employing clamping bars on opposite faces of the structure wall, which bars each engage and overlie adjacent edge portions of the panels being joined. The invention includes interlocking means between the panels and bars to prevent lateral withdrawal of the panel edges from between the clamping and sealing bars. While the interlocking construction may take many forms, it preferably comprises features in the nature of transverse flanges extending along the edges of each panel and complementary grooves in the clamping bars. In regions where one such joint extends transverse to and intersects a similar joint, the clamping bars are constructed in a unique and novel manner whereby to provide a continuation of their channels "around the corner" from one joint to the joint it intersects whereby the flanges on the corresponding panels may extend continuously around a panel corner and thus insure continuous closing and/or sealing of the joint around the intersection. The novelty resides in part in the provision of a lateral notch in at least one of the clamping bars at the intersection and a complementarily formed end on the corresponding clamping bar of the intersecting joint, whereby the joint at the intersection not only constitutes a continuous closure but the interengagement between the bars locks one joint against shifting movement relative to the joint it intersects.

It is therefore a principal object of this invention to provide an interlocking joint between panel edges formed to interengage with a similar joint which it intersects and to provide continuous interlock between the parts and effective closure and/or sealing throughout the intersection without bulky or complicated additional parts.

Another object of the invention is to provide novel structure as set forth wherein the parts are easily assembled and disassembled.

Still another object of this invention is to provide an

intersecting joint construction as set forth wherein the intersecting joints are interlocked to prevent relative shifting of the parts.

A further object of this invention is to provide joint intersection construction as described including a flowable sealing material in the joint and a novel relationship between the sealing material and the structural elements at a joint intersection.

Further and additional objects and advantages will become apparent to those skilled in the art as the description proceeds in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevational view of a representative structure embodying the present invention;

Fig. 2 is a transverse sectional view taken along the line 2—2 of Fig. 1 and showing a fragmentary portion of the structure on an enlarged scale;

Fig. 3 is a fragmentary plan view of the lefthand central portion of Fig. 1;

Fig. 4 is a perspective view of one of the members shown in Fig. 3;

Fig. 5 is a transverse sectional view, similar to Fig. 2, but showing an alternative form of joint construction;

Fig. 6 is a plan view, similar to Fig. 3, but illustrating the joint construction of Fig. 5 as adapted to intersecting joints;

Fig. 7 is an exploded perspective view of the panels and the lower clamping bars of Fig. 6;

Fig. 8 is a perspective view of the upper clamping bars of Fig. 6 as viewed from the inner side thereof; and

Figs. 9 and 10, respectively, illustrate further modifications of joint intersection construction embodying the principles of the present invention.

The structure shown in Fig. 1, for purpose of illustration only, may be considered to be a tank or container of generally cylindrical form having end walls 2 and side wall panels 4. Adjacent edges of adjacent panels 4 are securely held together by a joint structure generally identified by numeral 5. The ends of the panels 4 are joined to the end panels 2 by a joint construction generally indicated by numeral 6. It is contemplated that the joints 5 and 6 be of substantially identical construction.

As is inevitable to properly form a complete structure, the joints 5 must intersect the joints 6 at a plurality of positions on the structure. This invention is directed principally to the relationship of the parts at those joint intersections generally identified by characters A and B of Fig. 1, by way of illustration.

Referring now to Fig. 2, which is an enlarged transverse sectional view through the joint 5 and may be considered as representative of a section through the joint 6 also, adjacent panels 4 are formed at their edges with inwardly extending continuous peripheral portions 8 terminating in outwardly directed transverse flanges 10. An upper clamping and sealing bar 12 is provided with a longitudinal channel 14. The side edge portions 15 of the bar 12 are so configured as to nest snugly within the space between the flanges 10 and portions 8 of the panels and is shown with its outer surface lying substantially flush with the outer surface of the panels although such flush relationship is not essential. This is merely an illustrative example since the features of the invention do not require that the clamping bar 12 be flush with the outer surface of the panels.

The channels 14 are provided with undercut portions 16 serving to retain therein a self-sustaining but flowable strip of deformable sealing material 18. The material 18 may be rubber or the like.

A clamping bar 20 extends along the joint 5 on the opposite face thereof from the bar 12 and is configured on one side to define channels 21 snugly embracing adjacent portions of the panels 4 and particularly to snugly

engage the flanges **10** and portions **8** of each panel with a longitudinal rib portion **22** extending inwardly between the spaced flanges **10** and into engagement with the sealing material **18**. Suitable means, such as screws **24**, are provided to draw the bars **12** and **20** together to thereby clampingly lock the edge portions of the panel **4** in the joint and apply pressure to material **18**. The screws **24** pass frictionally through the material **18** and are retained thereby against loss even when the various parts are disassembled.

As will be obvious, clamping of the bars **12** and **20** together causes rib **22** to apply pressure to the sealing material **18** and causes the same to "flow" to completely fill and sealingly engage all portions of those members bounding and defining the peripherally closed passageway, in channel **14**, along the joint.

Referring now to Fig. 3, the joints **5** and **6** identified therein are both constructed as described in connection with Fig. 2 but whereas, in the illustrated embodiment, joint **5** is rectilinear, joint **6** is circular since it extends around the periphery of the structure, and the outer clamping bar **12'** of joint **6** is curved as clearly indicated in the perspective showing of Fig. 4.

The clamping bar **12'** is provided with a notch **26** extending inwardly from one edge thereof substantially to the longitudinal center line of the bar and positioned in alignment with the joint **5**. The clamping bar **12** of joint **5** is formed with an end portion **27** complementary to the notch **26** and snugly fitting therein. The notch **26**, as clearly shown in Fig. 4, is formed in only the body of the bar **12'**, the strip of sealing material **18** therein is not notched. Thus, a portion of the top surface of the strip **18** and the edge portion thereof are exposed in the notch **26**, as clearly shown in Fig. 4. The sealing material **18** in the joint **5** terminates, at the intersection, in a transverse surface **28** (Fig. 3) so positioned that it abuts the exposed edge surface of the sealing material in joint **6** when the portions are in the relationship shown in Fig. 3. Thus it will be seen that the intersections or interengaging faces between sealing strips **18** at the intersection do not coincide with the abutting surfaces between the sealing bars **12** and **12'** but are in offset or staggered relation thereto. As the sealing material **18** is put under pressure by virtue of clamping the joint bars together, some longitudinal flow thereof will take place to firmly press the faces of those strips together in tight sealing relation at the joint intersection and thus form a continuous seal at the intersection. Although not shown in Fig. 3, the clamping bar **20** of the joint **5** and a corresponding bar of the joint **6** are similarly notched and formed to engage in the same manner as described in connection with the bars **12** and **12'**. The invention does encompass, however, an arrangement wherein the strip of sealing material is formed or bent to extend integrally "around the corner" of certain joint intersections. Later description in connection with a modified form (as shown in Figs. 7 and 8) will apply equally well to the clamping bars of the form just described and it is to be understood that the flanges **10** of the panels **4** extend continuously around the corners thereof at the joint intersection. As will be obvious from the later description, the channel **14** and the surfaces of the clamping bar **20** will be so related at the intersection as to form continuous panel and flange-engaging portions extending along one joint and continuously "around the corner" along the intersecting joint.

As will be clear, the form of joint intersection just described defines a simple and readily assembled arrangement without the necessity of providing additional or bulky elements and serves not only to form a tight and continuous joint at the intersection but also serves to prevent shifting movement of the panels **4** longitudinally of the joint **6**, by virtue of the interlock between bars **12** and **12'**. The described construction also provides uninterrupted boundary surfaces at the periphery of the abutting faces of material **18** at the intersection.

Figs. 3 and 4 illustrate the joint intersection shown generally at A in Fig. 1. The joint shown at B of Fig. 1 is essentially identical to that shown at A, except that the corresponding notch **30** is not formed as a single notch intermediate the ends of the bar **12'** but is defined by beveled end portions of the bar **12'** which end portions abut each other at **32** directly aligned with the centerline of the joint **5**. Clearly, the present invention encompasses both forms as shown at A and B.

The embodiment illustrated specifically in Figs. 5 through 8 is similar in all essential respects to that of Figs. 2 through 4 but omits the sealing material **18** of Fig. 2. Referring specifically to Fig. 5, which illustrates a sectional view of a joint that could be employed for the structure of Fig. 1 and corresponds generally to the showing of Fig. 2, the panels **4** are provided with downwardly and inwardly inclined edge portions **40** terminating in outwardly directed flanges **42**. The clamping bar **44** is provided with a longitudinal rectangular channel **46** and its edge portions **45** are configured and arranged to snugly nest within the space between flanges **42** and edge portions **40**. An inner clamping bar **48** is provided with an inner face configured to define channels **49** snugly embracing the inner surfaces of the portions **40** and flanges **42** and is provided with a longitudinal rib **50** extending outwardly between the flanges **42** and holding those flanges in spaced relation and in engagement with the inner side faces of the channel **46**. Clamping screws **24** are employed to clamp the bars **44** and **48** together and to clamp the edge portions of the panels **4** therebetween.

The structure of Fig. 5 is obviously adapted to the intersecting joint construction described in connection with Figs. 1 through 4 and such a joint is shown in plan in Fig. 6 wherein the clamping bar **44'** of one joint is provided with a notch **52** in one of its edges extending substantially to the longitudinal center line of that bar. The other clamping bar **44** has its end **54** formed complementary to the notch **52** and nested therein.

As will be obvious from Figs. 7 and 8, the flanges **42** extend continuously along the adjacent edges between panels **4** and "around the corner" to extend along the edges adjacent the third panel **4'** (the same being true of the flanges **10** of Fig. 2). As is evident from the lower portion of Fig. 7 and from Fig. 8, the notched connection between the bar **48** and bar **48'** on one hand and bar **44** and bar **44'** on the other hand is such that the rib **50** on the bars **48** and **48'** and the channels or grooves **49** alongside that rib extend continuously "around the corner" of the joint intersection to receive the continuous corresponding portions of the edges of panels **4**. In like manner the mitered relation of the bars **44** or **44'** is such that the channels **46** thereof intersect to form a T-shaped channel at the intersection to receive the continuous flanges **42**. It will be obvious that when the fitted bars of Fig. 8 are inverted and applied to the top of the assembly of Fig. 7 in the obvious manner, the entire structure at the joint intersection will be securely locked together against any relative shifting and the arrangement provides for a continuous mechanical closure and mechanical seal throughout the joints and their intersection even though no hermetic sealing means are provided.

While Figs. 6 through 8 illustrate a T-shaped joint wherein one of the bars is notched, corresponding to the joint at A of Fig. 1, it will be obvious that the bar **44'** of Fig. 6 may, in fact, constitute two bars having their ends in abutment at the apex of the notch **52**, in the manner shown at B in Fig. 1.

Fig. 9 illustrates a further adaptation of the present invention wherein four panels **4** meet at a joint intersection C. In this embodiment the bars **44** and **48** are each formed with pointed mitered ends **54**. Thus, two aligned bars **44**, in effect, define a bar having notches on opposite

edges to receive the end portions of transverse bars **44**. The arrangement is clearly shown in Fig. 9 and it is believed obvious that such an arrangement incorporates the basic features of the described invention.

Fig. 10 shows a further adaptation of the invention to a cross-over joint intersection wherein the bars **44** terminate short of the joint intersection between four adjacent panels **4** and wherein a cross-shaped fitting **56** is provided at the joint intersection. Each leg of the fitting **56** is formed to a cross-section identical to that of the bars **44** and its central portion is configured like the adjacent portions of the bars **44** of Fig. 9 to define an integral cross-over member. Obviously, the fitting **56** provided for engagement of and closure with the continuous flanges **42** shown in Fig. 7. If desired, a fitting **56** may be provided on one face of the structure while the bars **48** on the other face thereof may be mutually mitered as suggested in Fig. 9, or a fitting corresponding to that shown at **56** may be provided for the intersection between bars **48** on the other side of the structure.

Clearly, such arrangements as shown in Figs. 9 and 10, in connection with the form of joint of Fig. 5, may also be employed with the sealed joint shown in Figs. 2 through 4.

While a limited number of embodiments of the invention have been shown and described herein, they are to be considered merely illustrative and not as limiting the scope of the invention. Other embodiments falling within the terms of the appended claims are contemplated within the scope of this invention.

I claim:

1. A structure comprising a plurality of wall panels arranged with adjacent edge portions extending along joints between said panels, each of said joints comprising a pair of clamping bars extending therealong with said adjacent edge portions of said panels lying between said bars, interlocking formations on said edge portions and said bars, means clamping said bars together and interlockingly securing said panels along said joints in direct contact with said bars, said structure including at least one joint extending transverse to and intersecting another joint, both the clamping bars of said other joint being laterally notched in alignment with said one joint, and end portions of both the clamping bars of said one joint being formed complementary to said notches and nested therein.

2. A structure as defined in claim 1 wherein said interlocking formations comprise lateral flanges extending peripherally of said panels and being continous from one edge to an adjacent edge of each panel, at least one of the clamping bars of each pair having a longitudinal channel therein snugly receiving the flanges of said panels and holding the same against relative movement, said notches and complementary end portions providing communication between said channels at said joint intersection whereby the flange of a panel adjacent said intersection extends, in said channels, continuously from said one joint to and along said other joint.

3. A structure as defined in claim 2 wherein said flanges, said channels and the other of said clamping bars defines peripherally closed channels extending along said joints, said closed channels being filled with flowable sealing material under pressure therein and sealingly engaging both flanges of said joint.

4. A structure comprising separate wall sections having intersecting joints at their adjacent edges, said wall sections having flanged edge portions, grooved clamping bars extending along said joints, self-sustaining flexible sealing material in the grooves of said bars, the said flanged edge portions of said wall sections extending into said grooves in engagement therewith and engaging said sealing material therein, and means for confining said sealing material to said groove and applying pressure thereto, said clamping bars having abutting mitered edge portions at an intersection of said joints, the said sealing material in the groove of one of said bars having an end face abutting a side face of the sealing material of an adjacent bar at said joint, the abutting faces of said sealing material being offset relative to the abutting mitered edges of said sealing bars.

5. A structure comprising a plurality of wall panels having joints at their adjacent edges and arranged to define at least one joint transverse to and intersecting another joint, said panels having lateral edge flanges extending along said joints and being continuous from one of said intersecting joints to the other, said joints including means overlying adjacent edge portions of said panels and having channels therein snugly receiving and interlocking with said flanges to hold the same against relative movement, the channels of said means intersecting at said joint intersection to receive said continuous flanges, and means clamping said flanges in said channels.

6. A structure as defined in claim 5 including self-sustaining but flowable sealing material in said channels in pressure engagement with the edge faces of said flanges, said edge faces extending endlessly around the periphery of said panels and said sealing material engaging and sealing said edge faces throughout the entire periphery of each panel.

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