

Dec. 20, 1955

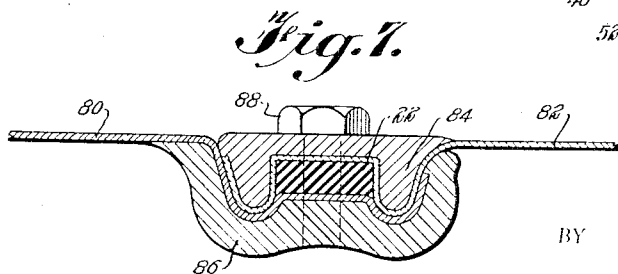
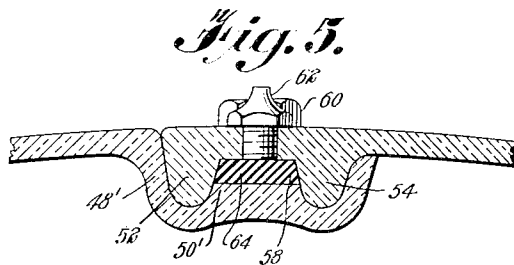
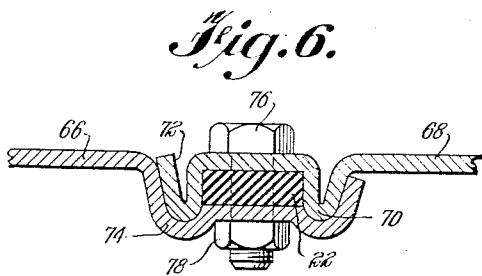
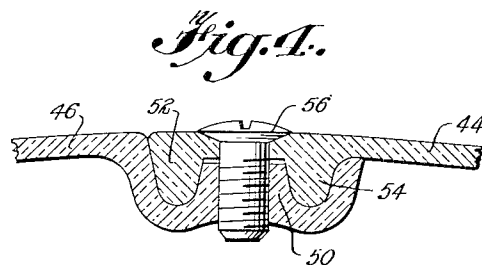
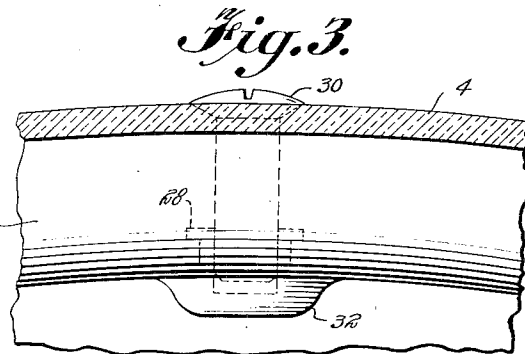
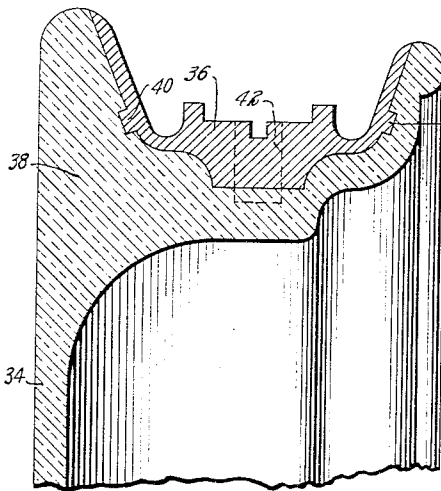
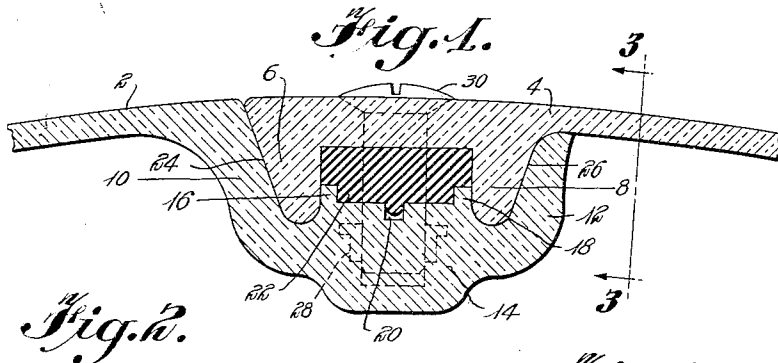
C. M. MOORE

2,727,286

INTEGRAL JOINT STRUCTURE

Filed May 24, 1951

3 Sheets-Sheet 1



INVENTOR

Clyde Maurice Moore

BY

Bacon & Thomas'

ATTORNEYS

Dec. 20, 1955

C. M. MOORE

2,727,286

INTEGRAL JOINT STRUCTURE

Filed May 24, 1951

3 Sheets-Sheet 2

Fig. 8.

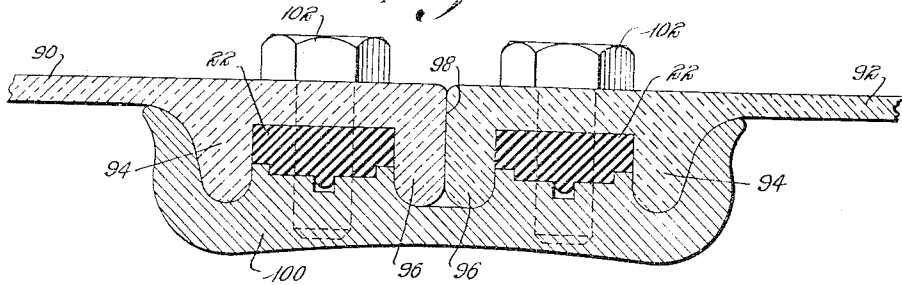


Fig. 9.

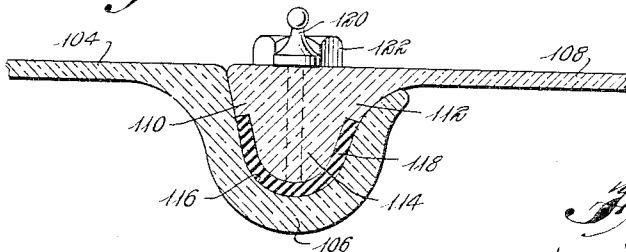


Fig. 10.

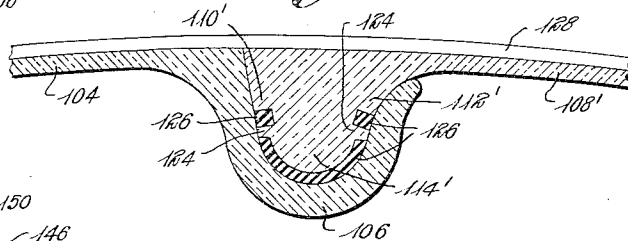


Fig. 11.

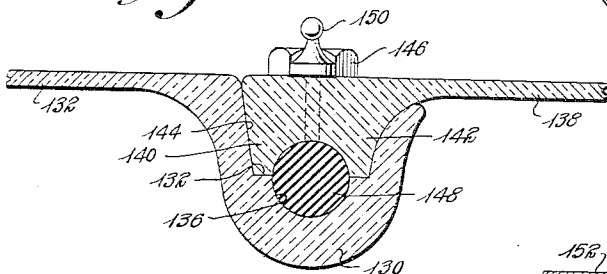


Fig. 12.

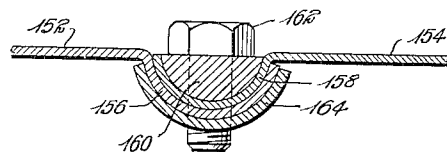
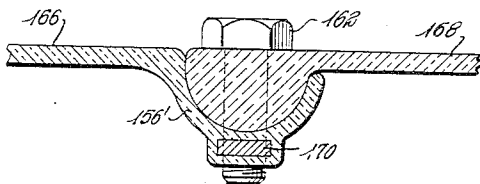


Fig. 13.



INVENTOR

Clyde Maurice Moore

BY

Bacon & Thomas

ATTORNEYS

Dec. 20, 1955

C. M. MOORE

2,727,286

INTEGRAL JOINT STRUCTURE

Filed May 24, 1951

3 Sheets-Sheet 3

Fig. 12.

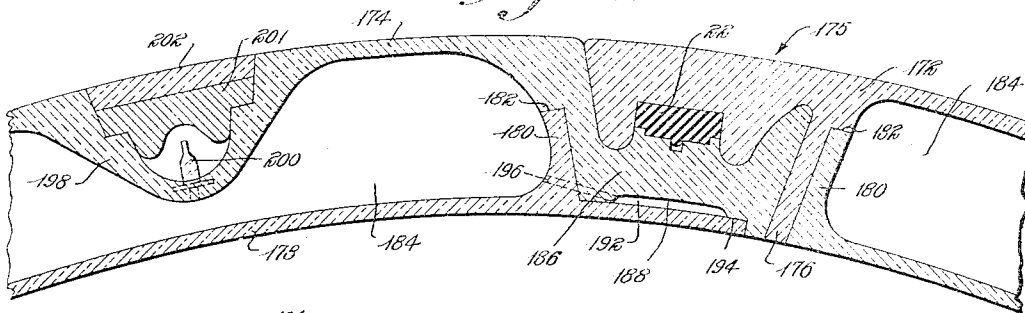


Fig. 15.

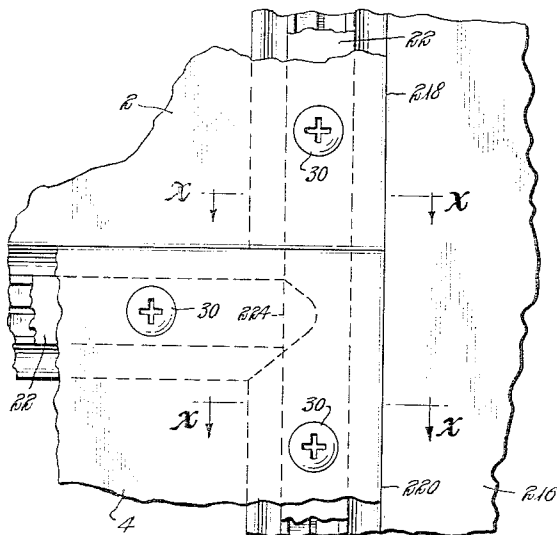


Fig. 16.

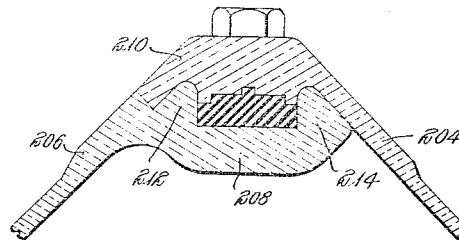
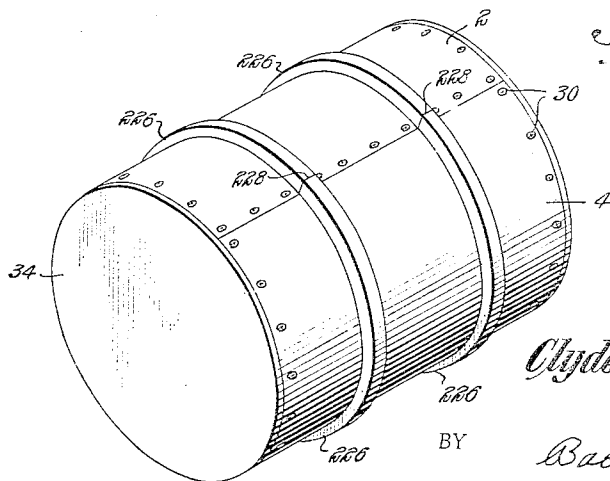


Fig. 17.



INVENTOR

Clyde Maurice Moore

BY

Bacon & Thomas

ATTORNEYS

1

2,727,286

INTEGRAL JOINT STRUCTURE

Clyde Maurice Moore, Richmond, Va., assignor to Moorex Industries, Inc., Richmond, Va., a corporation of Virginia

Application May 24, 1951, Serial No. 228,052

6 Claims. (Cl. 20—92)

This invention relates to joints for structures comprising a plurality of wall panels. The invention relates particularly to joints for demountable containers adapted for use in handling diverse kinds of materials but it will be readily apparent from the following description that the joint structure is of general utility and may be employed to join wall panels of many different kinds of structures. For instance, the joint disclosed herein may be employed in demountable boats, bathtubs, tanks, rafts and many other articles. According to the present invention the panels from which a finished structure is to be assembled may be prefabricated to the desired dimension and shape and shipped "in the flat" or in "nested" relation to a point of assembly or use. The panels may then be assembled in the field into the desired finished structure.

Structures capable of being shipped or stored in a knocked-down condition are very desirable since the shipping or storage space required for the finished article is quite great in comparison to the comparable space required for shipping or storage of the same structure when in knocked-down or disassembled condition. Many such structures are desirably made of materials impervious to the surroundings in which they are to be used. Particularly in the field of containers for shipping gas, chemicals, or bulk materials, it is desirable that a container of an impervious and inert material be employed. It has been found that a material, known as Fiberglas, comprising laminations of glass fibers impregnated with and bonded together by a thermosetting resin constitutes a satisfactory material for most uses; it being insert to most chemical materials. The fabrication of a container or other structure from such material has heretofore been impractical, particularly where attempts have been made to construct a demountable or knock-down structure from such materials. The difficulty arises in the joints between adjacent panels and attempts to make the joints completely sealed and of the requisite strength. The present invention contemplates a joint structure adaptable to various types of materials wherein the assembled structure has joints that are firm and rigidly locked.

In general the invention comprises providing adjacent edges of the individual panels with relatively offset overlapping portions having rib-and-groove interfitting portions extending along the panel edges and clamping means to hold the interfitting parts in assembled relationship. The joint of such construction may readily be provided with a flowable sealing means where a completely tight structure is desired or may be constructed without such sealing means where bulk materials are being handled or where it is not necessary to provide a completely sealed joint.

The present invention constitutes an improvement over the joint structure disclosed in copending applications of this same applicant as follows: Serial No. 167,793, filed June 13, 1950; Serial No. 177,106, filed August 1, 1950 and Serial No. 209,169 filed February 2, 1951.

While the above-identified applications disclose sealed

2

joint structures employing separate clamping and sealing bars embracing the edge portions of adjacent panels, the present invention contemplates the formation of the interfitting joint members integrally with the material of the panels themselves.

It is therefore an object of this invention to provide a joint for structures adapted to be disassembled for shipping or storage purposes.

Another object of this invention is to provide, in a structure as above noted, a sealed joint wherein no separate bars are employed thus precluding the possibility of the separate bar elements being lost or damaged during periods of transit or storage.

A still further object of this invention is to provide a joint for the panels of a demountable structure in which the joint-forming components are integral parts of the panel edges.

Still another object of this invention is to provide a joint structure capable of satisfactorily joining the edges of panels formed of Fiberglas.

Still another object of this invention is to provide a demountable structure including thermally insulated wall panels.

Still another object of this invention is to provide a joint structure for panels that is simple in nature, economical to construct and readily adaptable to mass production methods.

With the above objects in view reference is made to the accompanying drawings wherein:

Figure 1 is a transverse sectional view through a joint according to the present invention employing a flowable sealing material.

Figure 2 is a transverse sectional view through the edge portion of a panel comprising a drum head and illustrating a modified joint construction.

Figure 3 is a sectional view taken along line 3—3 of Figure 1.

Figures 4 and 5 are sectional views similar to Figure 1 but illustrating further modified forms of joint.

Figures 6 and 7 are transverse sectional views through a joint according to the present invention wherein the panels are of sheet metal construction.

Figure 8 illustrates a joint, in section, adaptable for use in constructing relatively large structures requiring reinforcements.

Figures 9 and 10 are sectional views illustrating different embodiments of a further modified form of joint.

Figure 11 illustrates a still further modified joint.

Figures 12 and 13 show a form of joint adaptable to molded panels or panels made of sheet material.

Figure 14 is a transverse sectional view through a joint in a container or the like having thermally insulated panels.

Figure 15 is a plan view of the joints between three adjacent panels illustrating the manner of inter-relating a joint with an intersecting similar joint.

Figure 16 is a sectional view illustrating the adaptation of a joint according to the present invention to a corner of a rectangular structure, and

Figure 17 is a perspective view of a generally cylindrical container constructed according to the present invention and including integral roller rings.

Referring now to Figure 1, panels 2 and 4, comprising portions of the side walls of the desired structure, are illustrated as being of the Fiberglas material heretofore referred to but it is to be understood that they may be made of any other suitable material. As shown, the panel 4 is provided with a pair of spaced parallel depending integral ribs 6 and 8. The ribs 6 and 8 extend parallel to the edge of the panel 4 throughout the entire length of that edge. It will be noted that the ribs 6 and 8 define a channel therebetween. The panel 2 is provided with an

3

offset portion defining a channel having side walls 10 and 12 and a bottom portion 14. The channel defined by the portions 10, 12 and 14 is offset from the portion of panel 4 provided with the ribs 6 and 8 and the channel is of such dimensions as to snugly receive the ribs 6 and 8 therein. As shown the channel structure is provided with an upwardly projecting central portion having ribs 16 and 18 and a longitudinally extending groove 20. The upstanding portion of the base of the channel extends upwardly into the space between the ribs 6 and 8. The space between the said ribs 6 and 8 receives a longitudinally extending strip of self-sustaining flexible sealing material 22. The material 22 may be of soft rubber, soft neoprene or similar material capable of being deformed when placed under pressure. The strip of material 22 normally assumes a rectangular sectional shape but when assembled into the joint as shown in Figure 1 the upstanding ribs 16 and 18 compress the material 22 to expand the same both laterally and longitudinally to provide pressure sealing between the panels 2 and 4. The longitudinal groove 20 in the channel structure permits expansion of the material 22 to insure against bursting of the joint upon the application of undue pressure.

It will be noted that the ribs 6 and 8 and the side portions 10 and 12 of the channel structure are provided with mating tapered surfaces 24 and 26. By this construction the material of the joint itself effects a substantially tight seal upon clamping the members together.

The panel 4 is provided with a plurality of spaced openings adjacent one edge thereof in alignment with threaded bushings or nuts 28 imbedded in the material of the base of the channel structure. A screw threaded fastener means such as the screw 30 may be employed to apply transverse pressure to the joint to hold the panels in assembled relationship and to apply pressure to the flowable material 22.

The panels 2 and 4 may be molded in suitable apparatus and the nuts 28 may be imbedded in the material of the panel 2 at the time the panel is constructed.

In practice the panels 2 and 4 may be of identical construction, the edge of panel 2 opposite that illustrated in Figure 1 may be provided with the rib structure 6-8 shown on panel 4. Of the other two edges of the panel, one may be provided with the channel structure shown and the other may be provided with the ribs 6 and 8 whereby any desired number of identical panels may be assembled into a single structure. Aligned edges of the panels 2 and 4 will, of course, be provided with the same joint components. That is, aligned edges of the panels 2 and 4 will both be provided with the ribs 6 and 8 while the opposite aligned edges of those panels will be provided with the channel structures whereby a continuous joint with other panels may be formed.

The panels 2 and 4 may be of rectangular outline or the panel 2 may be provided with a circular opening within its boundaries while the panel 4 may be circular in outline to fit and close that opening. The panels may be flat or they may be segments of cylinders, cones, spheres or the like depending upon the shape of the finished structure to be produced.

As shown in Figure 1 the bottom of the channel structure in which the nut 28 is imbedded is provided with an opening in alignment with the opening in the nut for reception of the screw 30. In many installations it will be desirable that the bottom of the channel structure be provided with a projecting boss or protuberance 32, integral therewith, extending over and closing the end of the screw receiving opening. Reference to Figure 3 illustrates an elevational view of such an integral boss structure.

Referring now to Figure 2, there is shown a panel which may be a circular head 34 for a drum or the like having a channel structure corresponding to that shown in Figure 1 integrally formed therewith. In the modification of Figure 2, however, the channel opens periph-

4

erally outwardly of the circular head and is laterally offset therefrom. It will be readily apparent that a panel such as the panel 4 of Figure 1 may be readily assembled to the structure of Figure 2 to form a drum or other cylindrical structure. In many instances it is desirable to further reinforce the joint structure disclosed and in such cases the inner surface of the channel structure may be defined by a metallic insert 36 imbedded in the molded material 38 of the head. The insert 36 may be formed by conventional extruding processes and apparatus and subsequently rolled or bent to the desired shape and incorporated directly in the mold in which the panel 34 is made. Projections 40 are provided on the inner surface of the insert 36 to insure locking the insert to the body of the molded panel. In this modification it is unnecessary to imbed a nut, such as the nuts 28 of Figure 1, in the channel structure since a threaded opening 42 may be provided directly in the metal insert 36. Clearly such an insert may also be provided to define the surfaces of the joint portion of a panel corresponding to the panel 4 of Figure 1 and having such ribs as shown at 6 and 8. It will be recognized that the sealed joint incorporating the structure of Figure 2 will operate substantially as that disclosed in connection with Figure 1.

Figure 4 illustrates a modified form of joint, similar to that of Figure 1, but in which the flowable sealing material 22 is omitted. According to the showing of Figure 4 panels 44 and 46 are provided with overlapping interfitting channel-and-rib structures but the channel portion 48 of the panel 46 is provided with a higher central rib-like upstanding portion 50 projected upwardly into the space between the ribs 52 and 54. The side faces of the ribs 52 and 54 and the corresponding surfaces of the channel structure 48 and projection 50 are generally tapered whereby the application of clamping pressure to the joint will wedge those members together to effect a satisfactory seal for many structures. Suitable screw threaded fastening means 56 may be employed to hold the joint assembled and to apply the necessary pressure for effecting the desired sealing in this modification. The upstanding portion 50 is of sufficient length that the threads for engagement with the fasteners 56 may be molded or cut directly into the material of the channel and provide the necessary resistance to stripping without the necessity of providing a threaded metallic insert.

In the modification of Figure 5 the panels may be constructed similarly to those of Figure 4 but with the upstanding portion 50' of the channel structure 48' being somewhat lower or shorter than that shown in Figure 4 whereby a chamber or space 58 is provided between the ribs 52 and 54. Screw threaded fastening means 60 may be employed to hold the joint in assembled relationship, as disclosed in connection with Figure 4. The closed space or chamber 58 extends longitudinally of the joint between the panels and may be in communication with similar chambers in joints intersecting the joint illustrated. The channel 58 and/or communicating channels are completely enclosed and define a closed system of passageways following the joints of the structure. A suitable valved fitting 62 may be provided to provide communication between the exterior of the structure and the chamber 58. Through such fitting 62 a liquid or semi-liquid sealing material 64 may be forced under pressure and caused to completely fill the network of channels in the structure to thereby effect a complete and absolute seal between the panels forming the various joints. In the event the panels are constructed of resinous material the sealing material 64 may be in the form of a cement to further bond the panels together or it may be a non-setting sealing material whereby the structure may be readily demounted if desired. Even in the event a cementitious material is employed it may be of such nature that it may be softened by heat or other treatment to render the structure demountable. If desired, a

5

separate fitting 62 may be employed for each joint between adjacent panels.

Referring now to Figure 6, the panels 66 and 68 are shown as constructed of sheet metal of uniform thickness although it is not necessary that metal be employed since other sheet material, capable of being bent or formed, may be used. As shown in Figure 6 the panel 68 is provided with a pair of reversely bent ribs 70 and 72 whereas the panel 66 is provided with the channel structure 74. In all other respects a joint constructed in accordance with the showing of Figure 6 may be the same as that of Figure 1 although the ribs 16 and 18 of Figure 1 may be omitted. A suitable sealing material 22 may be employed in this modification and bolts 76 and nuts 78 may be employed to apply the necessary clamping pressure to the joint.

Figure 7 illustrates an embodiment similar to that of Figure 6 but wherein the panels 80 and 82 are constructed of very thin sheet material. A structure having panels constructed of such thin sheet material and including such a joint as illustrated in Figure 6 would not be very rigid and the joint would not withstand the clamping pressure necessary to establish an effective seal. To overcome this difficulty the panels 80 and 82 are formed with the ribs and channel structures shown in Figure 6 and in addition suitable metallic or other reinforcing elements 84 and 86 are welded or otherwise suitably fixed to the outer surfaces of the overlapping portions of the panels. The reinforcing bars 84 and 86 may be extruded, in a well known manner, and of such configuration as to snugly embrace the outer surfaces of the overlapping portions of the panels. In such construction the threaded fastening means may threadedly engage a suitable opening in the reinforcing bar 86 and the joint may include the flowable sealing material 22.

Referring now to Figure 8 there is shown a further modified form of joint wherein the panels 90 and 92 are identical in all respects. Each of the panels is provided with integral ribs 94 and 96, the ribs 96 being formed with abutting outer edge surfaces 98. A backing bar 100, which may be of extruded material, is formed with a duplex channel configuration on one face whereby to embrace both pairs of ribs 94 and 96 and to compress the sealing material 22 between each pair of ribs, in the manner disclosed in connection with Figure 1. Lengths of the channel bar 100 may be welded or otherwise suitably joined to form a grid or latticework defining a basic frame for the desired structure. Each of the openings of the latticework or grid will be of the same outline and dimensions as the panels 90 and 92 whereby the panels may be applied to said latticework and joined thereto to form a continuous surface and a completely enclosed and sealed structure. Suitable bolts 102 extend through each of the panels 90 and 92 at spaced intervals along the joint and threadedly engage corresponding openings in the bars 100 to effect sealing of the structure and maintenance of the parts in assembled relationship. This construction is particularly adaptable to unusually large tanks, storage bins or the like or may be employed in the construction of buildings where completely sealed joints are required.

Figure 9 illustrates a joint wherein a molded panel 104 is provided with an offset generally semi-cylindrical integral channel 106 and panel 108 is provided with integral ribs 110 and 112. The ribs 110 and 112 are of generally tapered configuration and engage within the channel 106 with the wedging action described in connection with previous embodiments. The panel 108 may also be provided with an enlarged integral rib 114 occupying the space between the ribs 110 and 112 and extending downwardly into the channel 106. The rib 114 does not engage the channel 106 but is spaced therefrom, defining a chamber 116 which may be filled with a suitable sealing material 118. The material 118 is introduced to the chamber 116 through a suitable valved

6

pressure fitting 120 in the manner described in connection with Figure 5. Prior to introduction of the material 118 into the joint, threaded fastening means 122 are installed to apply pressure to the ribs 110 and 112 to maintain the joint in assembled relationship and to resist the expansive tendency of the material 118.

Figure 10 illustrates a construction very similar to that of Figure 9 and wherein the panel 104 may have a channel structure 106 identical to that of Figure 9. The mating panel 108' is provided with ribs 110' and 112', as in Figure 9, and with a downwardly projecting and large integral rib 114'. In this modification however the rib 114' may be provided with additional outwardly extending ribs 124 spaced from the ribs 110' and 112'. A semi-solid material such as rubber, neoprene or the like 126 is positioned in the space between the ribs on panel 108' and in the space between the rib 114' and channel 106. The strips of material 126 normally assume a shape having a cross-sectional area slightly greater than the spaces in the assembled joint whereby assembly of the joint and the application of clamping pressure results in compression of the material 126 and its flow in a direction extending along the joint. Thus, longitudinal pressure is transmitted to corresponding material in a transverse joint intersecting that illustrated, all as disclosed in the earlier applications above identified. In this modification the panels 104 and 108' may be cylindrical segments and instead of employing a threaded fastening means to apply pressure to the joint a circumscribing band 128 having adjacent end portions (not shown) may be provided with a suitable turnbuckle or similar arrangement to draw the band tightly about the cylindrical structure and apply the required clamping pressure to all of the circumferentially spaced joints simultaneously.

Figure 11 illustrates a still further modified form of joint, similar in many respects to those of Figures 9 and 10 but wherein the channel 130 of panel 132 is provided with a flat bottom 134 and a semi-cylindrical groove 136. The panel 138 is provided with a pair of ribs 140 and 142 having surfaces mating with corresponding surfaces of the channel at the inner face 144. The said surfaces are tapered as previously described to provide the wedging action desired. The space between the ribs 140 and 142 is of generally semi-cylindrical shape and complements the groove 136 to form a generally cylindrical chamber extending along the joint. After assembling the panels and installing the threaded fastening means 146 to hold the parts in assembled relationship, flowable sealing or cementitious material 148 may be introduced under pressure to the cylindrical chamber through the valved pressure fitting 150.

Figure 12 illustrates a still further modified integral joint construction wherein metal panels 152 and 154 are formed at adjacent edges with generally semicylindrical channels 156 and 158, respectively. A half-round rod 160 may be welded or otherwise permanently fixed inside the channel 158 to define a rigid rib at the edge of the panel 154. The rib 158-160 is of such dimension as to be snugly received within the channel 156 of panel 152 in the manner shown. Threaded fastening means 162, spaced along the joint between the panels, extend freely through the rib 158-160 and may be threaded into a pressure applying bar 164 embracing the outer surface of the channel 156. A joint of this type provides a readily assembled and demountable joint between panels comprising any structure desired to be assembled. While no positive sealing means is provided it will be clear that a structure having a joint may be employed for many purposes.

Figure 13 illustrates a still further modified joint similar to that of Figure 12 but wherein the panels 166 and 168 are of molded material such as the Fiberglass previously referred to. The panels of this modification are provided with a rib and channel, respectively, similar to that of Figure 12 but formed integrally therewith. The

threaded fastening means 162 may engage a metallic nut 170 imbedded in the material comprising the base of the channel 156'.

In the heretofore described embodiments of the invention, some include flowable sealing means whereas others do not. Joints made in accordance with the teaching of Figures 4, 12 and 13 may be employed in containers or the like intended for the handling of liquid materials and a suitable seal may be effected by coating the entire interior of the container with a suitable flexible film-forming material. Such materials are available on the market at the present time. Reference is made to a material commonly known by the trade name "Primoid" which, with slight modifications, is adaptable for coating containers. The material forms a film tenaciously adhering to the walls of a container formed of the Fiberglass material and other materials and is sufficiently flexible to withstand the vibration to which such containers are subjected. The material is substantially inert to most chemicals and may be readily stripped from the container when it is desired to disassemble the parts for shipment or storage. Alternatively, a separable bag or liner of such material as Vinylite and having the same dimensions as the inside of the container, could be employed to effectively retain liquid or other materials.

Referring now to Figure 14 there is shown a portion of adjacent channels forming a container having thermally insulated wall panels. Adjacent panels 172 and 174 may be made of suitable molded material such as Fiberglass and provided with overlapping rib-and-channel portions defining a joint 175 which may be substantially identical to the joint shown in Figure 1 and including the sealing material 22 and suitable pressure applying means (not shown in this figure) such as the screws 30 in Figure 1. In many instances it is desired to ship the materials or to store them under uniform temperature conditions which necessitates insulating the containers in some manner. The modification of Figure 14 illustrates a container providing the necessary thermal insulation and the features of demountability for shipment or storage along with the characteristic of being inert to most chemicals.

As shown the panel 172 is provided near the joint with an inwardly directed flange 176. It is to be understood that the flange 176 extends around the entire outline of the panel just inwardly of the joint forming structure. A secondary panel 178 is provided with an inwardly extending flange 180 of such outline as to be snugly received within the flange 176. The innermost edge of the flange 180 abuts a shoulder 182 formed adjacent the flange 176 and the panels 172 and 178 are joined in a permanent manner such as by the application of a cement material between the flanges 176 and 180 whereby the panels define a completely enclosed hermetically sealed space or chamber 184. The edge of the panel 172 opposite that shown in Figure 14 will correspond to the illustrated portion of panel 174 and it will be seen that the flange 180 extends completely around the panel. The panels 172 and 178 have opposed outer surfaces that are substantially parallel and radially spaced apart and the entire joint structure comprising the portion of channel 172 having the ribs and the edge portion of panel 174 defining the channel structure located entirely between the inner and outer surfaces of the wall structure. This construction gives an unusually smooth surfaced container.

The panel 174 of Figure 14 is provided or formed with the integral channel structure 186 having a concave innermost surface 188. The inner panel 178 has a flange 190 extending over the concave surface 188 and defining a chamber 192 therewith. The outermost edge of the flange 190 is complementary to a groove 194 in the channel structure 186 and is cemented therein to hermetically seal the chamber or space 192. One or more small passageways 196 provide communication between the interior of chamber 184 and the space 192.

Each of the panels of the container of this modification,

having the hermetically sealed chamber 184 therein, is provided with an inwardly projecting hollow boss 198 having a suitable fitting 200 in the base thereof. The fitting 200 may be a short length of glass tubing having a portion imbedded within and locked to the material of the boss 198. A passageway extends through the tubing 200 and provides communication between the chamber 184 and the hollow interior of the boss, which is initially accessible from outside the panel. After assembly of the panel components and the sealing thereof to form the sealed chamber 184 suitable means may be employed to evacuate substantially all of the air from the chamber 184 through the fitting 200 and the latter then may be fused closed to provide a permanent seal whereby the vacuum within the chamber 184 is maintained. It is a well known fact that such vacuum chambers constitute almost perfect thermo-insulation between the opposite sides thereof and thus a container constructed of such panels will be thermally insulated. During evacuation of the chamber 184 air will also be drawn through the passageways 196 to simultaneously evacuate the space 192 underlying the joint between the panels, thus effectively insulating that portion of the finished structure.

After evacuation of the chamber 184 and before assembly of the panels into a complete container, a suitable metallic plug 201 may be cemented or pressed into the hollow boss 198 to provide armored protection for the fitting 200. The plug 201 may lie entirely below the outer surface of the panel 174 and an inlay 202 cemented thereover to provide a continuous homogeneous outer surface for the panel. The inlay 202 is of the same material as the panel 174.

An end wall or drum head similar to that shown in Figure 2 may be provided with the evacuated chambers shown in connection with Figure 14 and constitute the end walls of the drum or container. In addition, either or both of the insulated heads or end walls may have filling or emptying openings therethrough and closures for such openings may be joined to the heads by means of the same joint employed in the rest of the container. It will be readily apparent that a container constructed in accordance with this modification is capable of handling an extremely wide variety of chemical materials or food products without reacting therewith. Such containers may be shipped to the point of use in disassembled condition, thus conserving space, then assembled and filled. The container furthermore provides highly efficient insulation against loss or acquisition of heat when the materials being handled require such treatment.

Figure 16 illustrates a joint similar in most respects to that shown in Figure 1 but wherein the panels 204 and 206 are to be assembled to extend angularly to each other, such for instance as the corner panels of a rectangular or cubical structure. The joint illustrated in this figure contains all of the basic features of that shown in Figure 1 except that the edge portion 208 carrying the ribs 212 and 214 extends generally obliquely to the plane of panel 206 while the panel 204 itself forms one wall of the channel structure of the other panel and the wall portion 210 of the channel structure extends at substantially 90° to the plane of panel 204. It will be readily apparent that this joint comprises overlapping and relatively offset rib-and-channel structures cooperating in exactly the same manner as described in connection with Figure 1 to form a completely sealed corner joint.

Figure 15 is a plan view of a portion of a structure embodying the present invention and showing the intersection of two joints between adjacent panels. For purposes of illustration the joint of Figure 1 has been chosen to illustrate the manner in which intersection joints are arranged. The panel 4 of Figure 15 corresponds to the panel 4 of Figure 1, having the rib structure integral therewith while numeral 2 indicates the panel 2 of Figure 1 and its channel. Numeral 216 indicates a third panel joined to the aligned edges of panels 2 and 4. As previ-

ously described the aligned edges 218 and 220 of the panels 2 and 4 are each provided with the rib structure shown on panel 4 of Figure 1 while the illustrated edge of panel 216 is provided with the channel structure shown in Figure 1 on panel 2. Thus a sectional view along either line X—X of Figure 15 will be identical to Figure 1. The channel structure of panel 216 is provided with a miter notch 222 extending substantially to the midpoint of the channel structure, from its free edge, as shown. The channel structure of panel 2 of Figure 15 is cut away at its end to a shape complementary to that of the notch 222 so that upon assembly of the panel 2 to the panel 216 the channel structures thereof will intersect at a mitered joint at 222 forming a T-shaped channel structure to receive the edge portions of the panel 4, each of which is provided with the depending ribs 6 and 8. The flowable sealing material 22 extending along the joint with panel 216 extends across the three-panel juncture whereas the sealing material 22 in the joint between panels 2 and 4 abuts at its end 224 with a side edge of the sealing material extending at right angles thereto. As previously described, tightening of the threaded fastenings 30 applies pressure to the sealing material 22 and since the latter is confined against lateral expansion it tends to expand in a longitudinal direction, thus forcing the end 224 into tight sealing engagement with the edge of the transversely extending strip of sealing material thus providing a complete and effective seal at the three-panel joint. The panels 2 and 4 of Figure 15 may be cylindrical segments and the panel 216 may in fact be an end head such as shown in Figure 2. In that case the sealing material 22 extending around the head or end will have its own two ends abutting each other and the pressure applied thereto forces those ends into tight engagement to provide a continuous seal.

While the mitered joints of Figure 15 have been illustrated in connection with the basic structure shown in Figure 1 it is to be understood that such a joint is contemplated for use with all of the modifications heretofore illustrated in Figures 1 through 14, inclusive. It will be readily apparent that this manner of assembling a structure having intersecting joints is readily applicable to any of the modified forms shown herein since each of them consists of overlapping edge portions on adjacent panels, one edge portion of which defines a channel parallel to the panel edge and configured to snugly receive a rib structure carried by the other panel edge.

Figure 17 is a perspective view of a completely assembled drum constructed in accordance with the present invention. For purposes of illustration, it will be assumed that the joint of Figure 1 is employed to join panels 2 and 4. The periphery of the drum comprises at least three panels, the third panel not being visible in Figure 17. The end or head of the drum may be constructed in accordance with Figure 2 and comprises the circular panel 34. It is to be understood that any of the joints illustrated herein may be employed in assembling such a drum or container.

Each of the panels defining the cylindrical wall of the drum is provided with integrally formed, outwardly directed annular rib segments 226. The ribs 226 extend circumferentially about the segments, are integral therewith, are spaced apart and parallel, and are provided with radially extending end surfaces in alignment with the joint of the finished container. When the panels are assembled into the structure shown in Figure 17 the end surfaces of aligned ribs 226 are brought into abutment at the seam 228 and define a continuous circumscribing ring about the container. The rings 226 not only provide structural reinforcement for the panels of the drum but provide roller rings upon which the entire drum may be supported for rolling engagement with any supporting surface. The provision of such roller rings is particularly advantageous if the panels are provided with additional integral reinforcing ribs and further prevent damage

to the heads of screw fasteners 30 when rolling the drum over a surface.

Certain modifications, such as Figures 1, 6, 7, 8, 10, 14 and 16, show a self-sustaining solid but flowable sealing material 22 while Figures 5, 9 and 11 show sealing material introduced in liquid form into the assembled joint. It is to be understood, however, that the sealing material in any of the forms may be introduced in the assembled joint through such valved fittings as those of Figures 5, 9 or 11. The showing of Figure 15 clearly illustrates that such pressure-introduced liquid sealing medium will flow throughout a network of joints in a structure.

While a limited number of specific examples have been shown and described to illustrate the present invention it is to be understood that the invention is not to be limited thereto but is to include all modifications falling fairly within the scope of the appended claims.

I claim:

1. In a structure having wall panels joined at their edges; one of said panels having a pair of integral spaced ribs projecting from one face thereof adjacent and parallel to one of its edges, a second panel having an edge structure fixed thereto and, defining an offset channel snugly receiving said pair of spaced ribs to form a closed chamber therebetween, and pressure applying means holding said ribs in said channel, the outer faces of said ribs and the inner side surfaces of said channel being correspondingly inclined and in surface engagement whereby a tight seal is effected between said ribs and channel and flowable sealing means under pressure in the said chamber between said ribs.

2. A structure as defined in claim 1 including means carried by the bottom of said channel structure and extending part way between said ribs to transmit pressure to said sealing means.

3. A structure as defined in claim 2 wherein said panels, ribs and channel structure are molded of reinforced resin material and define a continuous smooth outer surface for said structure.

4. A structure as defined in claim 2 wherein said panels, ribs and channel structure are molded of reinforced resin material, and wherein said pressure applying means comprise a screw extending through said one panel between said ribs and a nut threadedly engaged thereby, said nut being imbedded in the material of said channel structure.

5. In a structure having wall panels joined at their edges; one of said panels having a pair of integral spaced ribs projecting from one face thereof adjacent and parallel to one of its edges, a second panel having an edge structure fixed thereto and, defining an offset channel snugly receiving said pair of spaced ribs, and pressure applying means holding said ribs in said channel, the outer faces of said ribs and the inner side surfaces of said channel being correspondingly inclined and in surface engagement whereby a tight seal is effected between said panels, said panels, ribs and channel structure being of molded reinforced resin material, the inner surfaces of said channel structure comprising a metal insert at least partially imbedded in said resin material.

6. In a structure having wall panels joined at their edges; the improvement wherein, adjacent edges of a first pair of adjacent panels are provided with overlapping and interfitting portions comprising a channel on one portion and rib means on the other portion nested in said channel and defining a closed chamber therebetween, said interfitting portions defining a first joint between said panels, a joint between aligned edges of said first pair of panels and a third structure, said last-named joint comprising overlapping and interfitting portions, like said first joint, the channel of said third structure having a notch therein adjacent the intersection of said joints, the channel of said first pair of panels having an end portion formed to mate in said notch whereby to prevent slipping of said first pair of panels along the joint with

said third structure, the chambers in said joints being in communication and with flowable sealing means under pressure therein.

References Cited in the file of this patent

UNITED STATES PATENTS

405,562 King ----- June 18, 1889

1,191,141

1,412,556

1,875,666

1,946,694

2,064,276

2,257,775

2,611,285

Allsteadt ----- July 18, 1916
 Earnshaw ----- Apr. 11, 1922
 Schwemlein ----- Sept. 6, 1932
 Hunter ----- Feb. 13, 1934
 Strattard ----- Dec. 15, 1936
 Zellers ----- Oct. 7, 1941
 Gross ----- Sept. 23, 1952