Nov. 21, 1950 C. R. B. HARDING 2,530,465

WALL AND WALL PANEL

Filed March 26, 1945 2 Sheets-Sheet 1

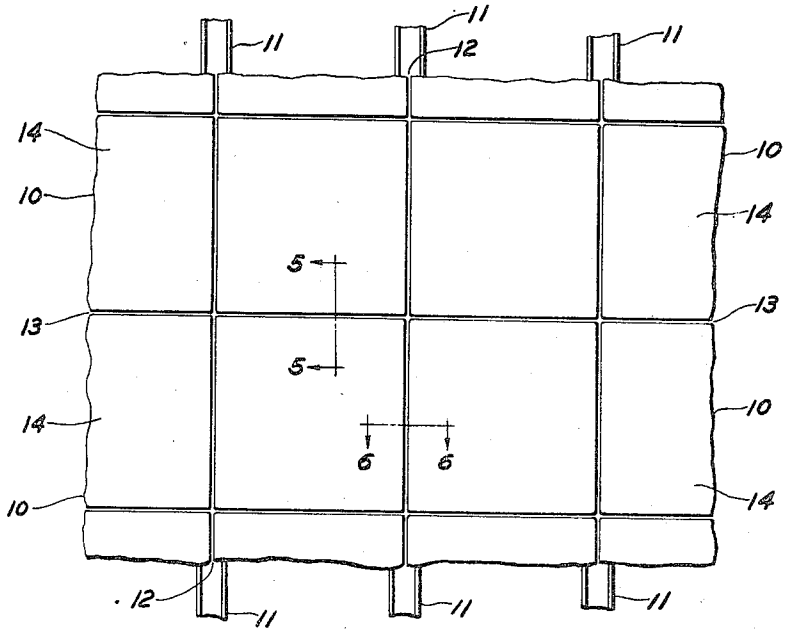


Fig. 1

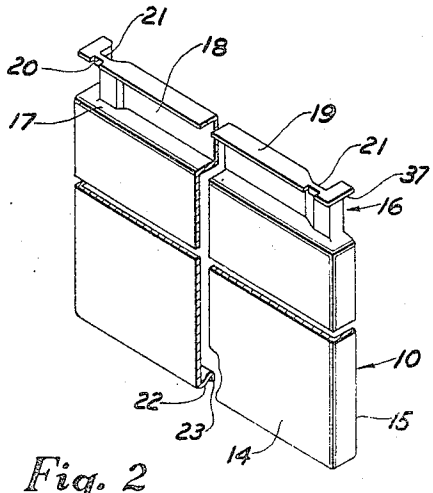


Fig. 2

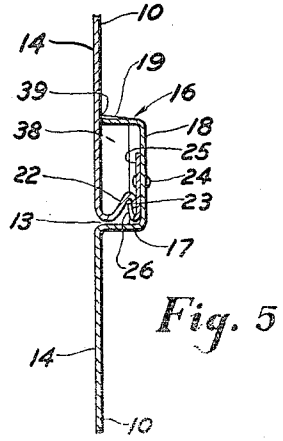


Fig. 5

Inventor
C. R. B. HARDING

By James J. Shanley
Attorney

Nov. 21, 1950 C. R. B. HARDING 2,530,465

WALL AND WALL PANEL

Filed March 26, 1945 2 Sheets-Sheet 2

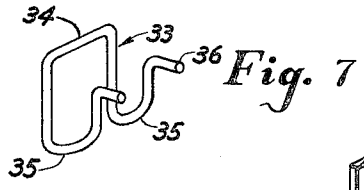


Fig. 7

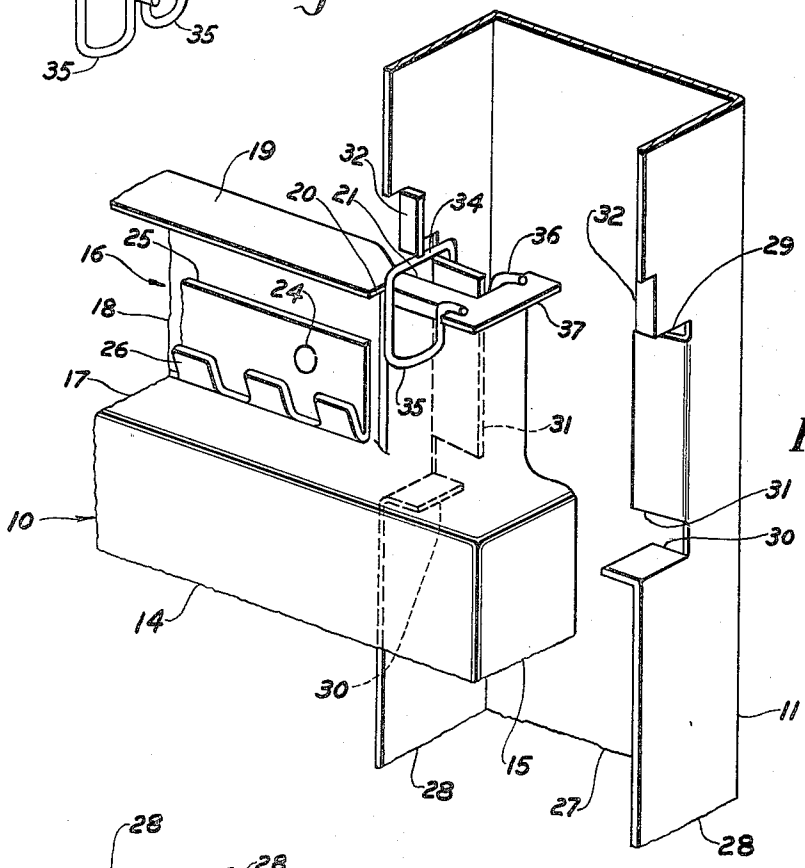


Fig. 3

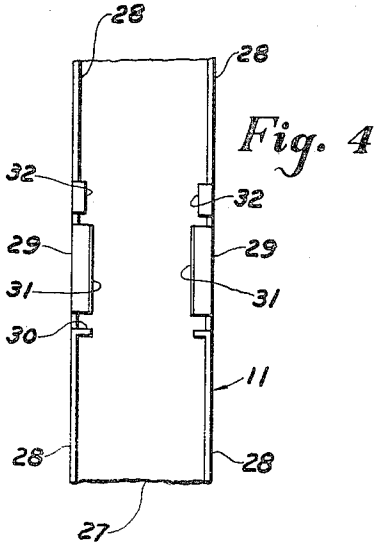


Fig. 4

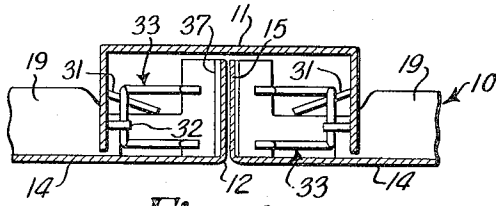


Fig. 6

Inventor
C. R. B. HARDING

By James J. Stanley

Attorney

Patented Nov. 21, 1950

2,530,465

UNITED STATES PATENT OFFICE

2,530,465

WALL AND WALL PANEL

Cyril R. B. Harding, Grosse Isle, Mich., assignor to National Steel Corporation, a corporation of Delaware

Application March 26, 1945, Serial No. 584,749

13 Claims. (Cl. 189—86)

1

This invention relates to new and useful improvements in wall panels and walls and is primarily concerned with improvements in novel wall panels which may be readily assembled to form a novel weatherproof wall without the use of mortar or other caulking compound in the joints between the adjacent edges.

Porcelain enamel panels, in addition to their use in the walls of bathrooms, kitchens, and other interior locations, are being used more and more on exterior walls where they are exposed to the weather, including driving rains. The joints between the panels are filled with mortar or a mastic compound as a caulking to provide a watertight construction. It is difficult, if not impossible, to insure that the joints will be permanently watertight and will not permit water to leak through into the interior portion of the wall where it will cause considerable damage. The watertightness of these joints is dependent on the quality and characteristics of the caulking compound and even though it be of good quality, poor workmanship in its application often results in leaky joints despite the fact that the joints are successfully sealed in the original installation. The life of the caulking compounds, so far developed, is much shorter than the life of the porcelain enamel panels so that the building develops leaks in a relatively short time and requires frequent and continuing maintenance. Caulking such a large number of joints even in a small building is a relatively costly and slow process. Another important difficulty involved in the use of caulking compounds is that any movement of the porcelain enamel panels due to temperature changes, settlement of the building or other causes, tends to destroy the watertightness of the mortar-filled joints and causes spalling of the enamel because the panels are rigidly fastened to the building structure. Attempts have been made to provide weatherproof walls without the use of a caulking compound in the joints, but these attempts have not, in general, met with success. One reason for this lack of success is that there is nothing preventing the rain from driving through the seam and into the interior of the wall.

It is an object of this invention to provide an improved interlocking panel which is economical to manufacture and which may be readily assembled with other, like panels to form a weathertight wall without the use of a caulking compound in the joints between the panels.

A further object of this invention is to provide a novel wall including porcelain enamel panels that will have a life determined by the relatively

2

long life of the porcelain enamel coating and not by the relatively short life of the caulking compound that has heretofore been used.

It is also an object of this invention to provide a new and useful watertight wall with drainage channels in back of the seams between the adjacent panel edges which will prevent the entrance of any water into the interior portion of the wall where it may cause damage.

Another object of the present invention is to provide means for fastening the panels together which will normally hold the panels against movement but which will tend to center the panels if erected slightly off center and which will permit slight floating movement of the panels when settling of the building, temperature changes or other causes tend to shift the panels so as to prevent or reduce spalling of the enamel.

The present invention provides a new and novel interlocking panel and these panels may be readily assembled into a novel waterproof wall without a caulking compound in the seams between the adjacent edges of the panels. The wall comprises a plurality of panels assembled with their closely adjacent edges forming non-watertight, aligned seams therebetween. Relatively large expansion and drainage channels are provided in back of the horizontally and vertically aligned seams. These channels reduce the velocity of any water driven through the seams into the channels and since the velocity of the entering water is immediately reduced, the water will not be driven beyond the limits of the channels and the channels will drain away the water driven through the seams and into the channels. The panels are fastened to the supporting means by resilient elements which hold the panels against normal movement but permit some floating movement of the panels when there is a tendency for the panels to shift which may be caused by temperature changes, settling of the building or other causes. My novel panel is economical to produce and may be readily erected at low cost to form an improved wall.

While this invention is primarily concerned with porcelain enamel panels normally comprising a piece of sheet metal decorated with a porcelain enamel coating, it is not limited to such materials. The panels may be formed of any other suitable material such as opaque, translucent or transparent plastics or glass, molded wood products, and the like, having the necessary weathering properties and decorative surfaces. While I am primarily concerned with vertical walls, my invention is not limited to such walls and may be

used for ceilings, roofs and other horizontal or inclined walls.

These and other objects and advantages will become more apparent from the following detailed description and the accompanying drawings, in which:

Figure 1 is a front elevational view of a plurality of panels assembled into a wall and embodying the present invention;

Figure 2 is an isometric view of one of the panels of Figure 1 with portions broken away to show the internal structure and embodying the present invention;

Figure 3 is an enlarged isometric view of the upper right hand corner of the panel of Figure 2 and the supporting channel showing the means for fastening and supporting the panel.

Figure 4 is a front elevational view of a portion of the supporting channel of Figures 1 and 3;

Figure 5 is a fragmentary sectional view taken along line 5—5 of Figure 1;

Figure 6 is a fragmentary sectional view taken along line 6—6 of Figure 1; and,

Figure 7 is an isometric view of the clip also shown in Figure 3 for fastening the panel in place.

Referring to the drawings, the wall shown in Figure 1 comprises a plurality of panels 10 fastened to and supported by the vertical channels or studs 11 as will be more fully herinafter described in detail. The channels 11 may be formed of relatively light weight sheet steel or other material where they support only the weight of the panels 10 or may be formed of relatively heavy material when supporting part or all of the weight of the building. The adjacent edges of the panels are shown as being spaced apart a very slight distance sufficient to prevent damage to the porcelain or other decorative coating along the edges when the panels are being assembled, but the edges may be in contact with each other. In either arrangement, the panels are assembled with their adjacent edges forming aligned, vertical, non-watertight seams 12 and aligned, horizontal, non-watertight seams 13 therebetween.

The hollow, pan-shaped panel 10 is formed by forming a thin sheet of steel to which the porcelain coating is then applied. Each panel 10 comprises a front wall 14 which may be flat, as shown, or which may be embossed, stamped or otherwise deformed, coated or treated to present the desired decorative effect. The edges of panel wall 14 are preferably slightly rounded as it is possible to more evenly enamel a round corner as compared to a sharp corner. An inwardly turned flange 15 extends along each of the two opposite, end edges of wall 14 and an inwardly depressed channel portion 16 extends across the upper edge of the front wall 14. The upper end portion of each flange is deformed to form a continuation of channel portion 16. The channel shaped portion 16 includes an inwardly bent, horizontal bottom shoulder 17, a web 18 parallel to wall 14, and a substantially perpendicular outer flange 19 extending along the edge of web 18. The shoulder 17, web 18 and flange 19 define a U-shaped channel with its open side toward the front of the panel. Near each end of the channel portion 16, there is formed a recess 21 and the flange 19 is lanced adjacent each end at 20 and opposite the recess 21 for the reasons more fully hereinafter described. An inwardly directed flange 22 extends across the bottom edge of the wall 14 and terminates in a downwardly bent lip 23.

A hook-shaped clip 25 is fastened to the web 18 by rivets 24 and extends along the channel substantially as shown in Figures 3 and 5. The clip includes tabs 26 which are bent back to receive and hold the lip 23 of an adjacent, upper panel 10. Other means may be used for fastening the clip 25 in place.

Channels 11 are supported in horizontally spaced apart positions as indicated in Figure 1, and each drain channel includes a back web 27 having an outwardly bent flange 28 extending along each vertical side so that the web 27 and channels 28 define a U-shaped channel passage with its open side toward the panels. Each flange 28 is provided with a notch 29 for each supported panel 10. At the bottom of notch 29 there is an inwardly extending, horizontal tab 30 and at the back of notch 29 there is a vertical, inwardly bent flange portion 31. A second relatively small inwardly bent tab 32 is provided at the upper side of notch 29.

When erecting a wall, the channels 11 are first properly positioned. The bottom panels are first fastened in place and then the next higher panels and so on, similar to the sequence used in fastening shingles in place. A lower panel is first placed in position with the end flanges 15, each in a corresponding channel 11, and then pressed into place so that the depressed channel shaped portion 16 fits into the corresponding pair of notches 29. The recessed portion 21 contacts the inwardly bent flange portion 31, as shown more clearly in Figures 6 and 7, and the shoulder 17 of channel portion 16 rests on the tab 30 at the bottom of notch 29. Thus, the weight of each panel 10 is supported by two flanges 28. The panel is removably fastened to the channel 11 by a spring clip including two leg portions 35, each terminating in a hook portion 36. The spring clip 33 is placed in position so that its straight portion 34 extends across the top of flange 19 and the upper edge of flange 31 with one leg 35 in back of flange portion 31 so that its hook portion 36 engages the upper end of flange 15 at 37 and with the other leg 35 fitting the lanced portion 20 of flange 19 so that its hook portion 36 engages the end of flange 19. The inwardly bent tab 32 holds the clip 33 in position. The clip 33 urges the web 15 away from flange 31 and is normally compressed so that, as shown in Figure 3, the clip tends to urge the panel toward the right. The two opposed clips 33 thus tend to center the panel 10 with respect to the channels 11. Each spring 33 resiliently urges each panel 10 toward the center of the adjacent, corresponding channel 11, urges each panel 10 inwardly against flange portion 31, and urges each panel downwardly toward the clip 25 in the channel portion 16 of the adjacent lower panel. The springs 33 can be readily removed to permit dismantling of the panels.

As shown more clearly in Figure 6, the flange 37 normally does not quite touch the flange 15 of the next adjacent upper panel. The flange portion 31 does not contact the back of the upper portion of flange 15 and the flanges 15 of two horizontally adjacent panels do not touch. Thus, each panel can shift horizontally a slight amount, that is, the panel has some horizontal float. If there is a temperature change or settling of the building or any other causes tending to slightly shift or move the panels, this floating movement is sufficient to permit the panels to move and prevent or greatly reduce spalling of the porcelain coating. The clips 33 are normally strong enough to prevent movement of the panels by wind or by

hand. At times, when erecting a wall, the panels may not be positioned in perfect vertical alignment and the clips 33 will tend, over a period of time, to center the panels with respect to the channels 11. Further, each flange portion 31 is bent slightly outward which provides limited resilience in the panel support.

When positioning the next upper panel, the lower edge 23 is fitted into the clip 25 and in back of the tabs 26 as shown more clearly in Figure 5. The upper channel shaped portion 16 is then pressed into the two corresponding notches 29 and fastened in place by means of clips 33 as previously described.

Insulating material may, if desirable, be added to the back of each panel front wall 14. Enough clearance must be left so that the panels can be assembled. The flange 19 is slightly flared outwardly and if there is insulating material on the back of the adjacent upper panel, the resilient flange 19 will press against the insulating material and form a seal. The springs 33 holding each panel in place urge the panel downwardly against clip 25 and if insulating material is present, they urge the insulation against resilient flange 19.

Referring more particularly to Figure 5, the U-shaped channel portion 16 defines a velocity-reducing passage or channel 38 which is in back of and above the seam 13. When, for example, a driving rain strikes the panels, water is driven through horizontal seam 13 into the channel 38. The cross sectional area of channel 38 is much greater than that of seam 13 so that the water entering the channel from the seam has its velocity reduced and it immediately drops to the bottom of channel 38 and drains into the vertical drain channel 11. Because of the reduction in velocity and the relatively large size of the channel 38 as compared to seam 13, the water does not tend to push between the edge of flange 19 and wall 14 at 39 and enter the building structure where it will cause considerable damage.

As shown more clearly in Figure 6, the seam 12 opens into the velocity-reducing channel or passage defined by studs 11 so that any water driven through seam 12 enters this vertical drain channel where its velocity is greatly reduced so that it immediately drains to the bottom of the channel. As the horizontal drain channels 38 communicate with the vertical drain channels defined by the studs 11, all of the water entering the seams 12 and 13 eventually flows out of the bottom of channels 11 to the ground or other locations where it will do no harm. If the channels 11 and panels 10 are assembled to form, for example, a roof, the lower ends of the channels may be directly above the eaves trough so that water draining from the channels 11 will flow into these troughs and be drained away in the usual manner.

The panels 10 can be very rapidly and easily assembled once the channels 11 are in place for it is only necessary to place each panel in position and snap two wire clips 33 into position. The assembled panels and channels provide a weatherproof wall without the use of a caulking compound and the wall is so constructed that the life of the wall is not limited to the life of the caulking compound and the panels are so supported that there is little or no tendency for the porcelain enamel coating to spall off under a change of temperature or settling of the building.

Having shown and described a preferred embodiment of my invention, it is to be understood that my invention is not limited to the structure shown and described and that some features may be used without others, all without departing from the spirit or scope of my invention, except as specifically set forth in the accompanying claims.

I claim:

1. A wall comprising a plurality of panels assembled with their adjacent horizontal and vertical edges forming horizontally and vertically aligned non-watertight seams therebetween; a plurality of vertical members supporting said panels and each member defining a vertical drain channel in back of the corresponding vertically aligned seams; a depressed channel shaped portion extending along the upper edge of each panel and integral therewith and defining a horizintal channel in back of and above the corresponding horizontal seam; means in said channel shaped portion securing thereto the lower edge portion of an adjacent upper panel; and means fastening the panels to the corresponding vertical members.

2. A wall comprising a plurality of panels assembled with their adjacent horizontal and vertical edges forming horizontally and vertically aligned non-watertight seams therebetween; a plurality of spaced vertical members supporting said panels and each member defining a vertical drain channel in back of the corresponding vertical seams; a notch in each of said vertical members for each supported panel; a channel shaped portion integral with and extending along the upper edge of each panel and defining a horizontal channel in back of and above the corresponding horizontal seam, said channel shaped portion including an inwardly bent shoulder, a web and a flange extending along the outer edge of said web, each of said channel shaped portions fitting into two of the notches in two vertical members; securing means in each of said channel shaped portions securing therein the lower edge portion of the adjacent upper panel; and means fastening the panels to the corresponding vertical members.

3. A wall comprising a plurality of panel walls assembled with their adjacent horizontal and vertical edges forming horizontally and vertically aligned non-watertight seams therebetween; a plurality of horizontally spaced apart vertical members supporting said panel walls and each member including a web, an outwardly extending flange along each vertical edge of said web and a notch in each flange for each supported panel wall, said web and said flanges defining a vertical drain channel in back of the corresponding vertically aligned seams; a depressed channel shaped portion integral with and extending along the upper edge of each panel wall and including an inwardly bent bottom shoulder and a web parallel to the front wall, said channel shaped portion fitting into the two corresponding notches in the flanges of two adjacent vertical members; means securing the lower edge of an adjacent upper panel in said channel shaped portion; and resilient means removably fastening the panels to the vertical members.

4. A wall comprising a plurality of panel face walls assembled with their adjacent horizontal and vertical edges forming horizontally and vertically aligned non-watertight seams therebetween; a plurality of horizontally spaced apart vertical members supporting said panel face walls, each member defining a vertical drain

channel in back of corresponding, vertically aligned seam, and each member including a web, an outwardly extending flange along each edge of said web, a notch in each flange for each supported panel, a horizontally inwardly bent tab at the bottom of each notch, an inwardly bent and vertical flange portion at the back of each notch; an inwardly bent flange extending along two opposite ends of each panel face wall and extending into the corresponding channel defined by a vertical member; a depressed channel shaped portion extending along the upper edge of each of said panel walls and fitting into the two corresponding notches, each channel shaped portion including an inwardly bent bottom shoulder engaging two of the corresponding, inwardly bent tabs at the bottom of these two notches, a web parallel to the panel face wall and contacting two of the inwardly bent vertical flange portions, and an upper flange extending along the upper edge of said web; and means extending along said channel shaped portion securing therein the lower edge of an adjacent upper panel; and resilient means holding the channel shaped portion in the corresponding notches.

5. A unitary panel comprising a front wall; an inwardly bent flange extending along each of the two opposite end edges of said wall; an inwardly depressed channel shaped portion extending along the upper edge of said wall and including an inwardly bent horizontal shoulder adjacent said wall, a web parallel to said wall and extending along the inner edge of said shoulder, and a horizontal flange extending along the upper edge of said web; an inwardly bent lower edge portion extending along the lower edge of said wall and terminating in a downwardly bent lip; and a clip fastened to said web for receiving and holding the downwardly bent lip of the lower edge portion of an adjacent upper panel.

6. A unitary panel comprising a front wall; an inwardly bent flange extending along each of the two opposite end edges of said wall; an inwardly depressed channel shaped portion extending along the upper edge of said wall and including an upwardly bent horizontal shoulder adjacent said wall and a web parallel to said wall and extending along the inner edge of said shoulder, and a horizontal flange extending along the upper edge of said web; an inwardly bent lower edge portion extending along the lower edge of said wall; and a clip fastened to said web for engaging and holding the lower edge portion of an adjacent upper panel.

7. A panel-supporting member defining a U-shaped channel and comprising a web; an outwardly extending flange along each side edge of said web; a notch in each flange for each supported panel; a horizontal, inwardly bent tab at the bottom of each notch; an inwardly bent, vertical flange portion at the back of each notch; and a second inwardly bent upper tab, both of said tabs and said flange portions being inwardly bent segments of the corresponding flange extending along said web.

8. A wall comprising a plurality of rectangular panels each having a front face wall with an inwardly bent edge flange portion extending along each vertical edge, an inwardly bent shoulder portion extending along the upper horizontal edge of the face wall, and an inwardly bent edge portion extending along the lower horizontal edge of the face wall, said panels being assembled with their adjacent horizontal and vertical portions forming horizontal and vertical, open seams therebetween; a vertical drain channel in back of each vertical seam and the corresponding panel flange portions, each vertical channel including a web spaced from the inner edges of the flange portions and outwardly bent flanges spaced from the panel flange portions; and an upwardly bent web portion extending along the inner edge of each inwardly bent panel shoulder portion and extending in back of the inwardly bent lower edge portion of the adjacent upper panel and defining a velocity reducing drain channel communicating with the corresponding horizontal seam and communicating with the vertical drain channel.

9. A panel-supporting member defining a U-shaped channel and comprising a web; outwardly extending flanges extending along opposite side edges of said web; a notch with an open front side in each flange for receiving a portion of each supported panel; and a vertical flange portion bent inwardly toward the opposite flange at the back of each notch, said flange portions being inwardly bent segments of the corresponding flange extending along said web and each of said flange portions being bent slightly outwardly away from the web so that the inner free edge of each inwardly bent flange portion is in front of the back of the corresponding notch.

10. A wall comprising a plurality of panels assembled with adjacent horizontal and vertical edges of their walls forming horizontally and vertically aligned non-watertight seams; a plurality of horizontally spaced vertical members supporting said panels, each member defining a vertical drain channel in back of the corresponding vertically aligned seam and each member including a web, an outwardly extending flange along each edge of said web, a notch in each flange for each supported panel, a horizontally inwardly bent tab at the bottom of each notch, an inwardly bent vertical flange portion at the back of each notch and a second inwardly bent upper tab; an inwardly bent flange extending along each of the two opposite end edges of each panel face wall and extending into the channel defined by the corresponding vertical member; a depressed channel shaped portion extending along the upper edge of each of said panel walls and fitting into the corresponding two notches in the flanges, each channel shaped portion including an inwardly bent bottom shoulder engaging two of the corresponding, inwardly bent tabs at the bottom of the notches, a web parallel to the front wall and contacting two, corresponding, inwardly bent flange portions, and an upper flange extending along the upper edge of said last mentioned web; and means extending along said channel shaped portion secured therein the lower edge of an adjacent upper panel; and resilient clips for fastening the channel shaped portion in the corresponding pair of notches, each of said clips comprising a portion extending across the top of the flange at the upper edge of said last mentioned web and across the top of the inwardly bent flange portion at the back of the notch, and two compressed spring leg portions extending from said straight portion and engaging the panel at their outer ends so as to urge the latter toward the central plane of the corresponding vertical drain channel, said spring clip permitting limited floating movement of the panel wall relative to the supporting member and being held in place by the second inwardly bent upper tab adjacent to each notch.

11. A wall comprising a plurality of panels as-

sembled with their adjacent edges forming horizontally and vertically aligned non-watertight seams therebetween; a plurality of vertical members supporting said panels and each member defining a vertical drain channel in back of the corresponding vertically aligned seams; a channel-shaped element carried by and extending along the upper edge of each panel and defining a horizontal channel in back of and above the corresponding horizontal seams; means attaching said panels together; and means fastening the panels to the corresponding vertical members.

12. A wall comprising a plurality of vertical supporting members, each supporting member having a web and side flanges, a plurality of panels carried by said supporting members, neighboring edge portions of said panels being in close juxtaposition to provide non-watertight vertical seams, and non-watertight seams angled with respect to the vertical, said seams being free of caulking material, a channel-shaped member in back of each of said angled seams, said channel-shaped and said supporting members extending toward and terminating in proximity to the inner surface of the panels for forming therewith channels behind said seams, the side flanges of each vertical supporting member being spaced from its associated seam, the open area of said channels being large as compared with that of said seams, whereby water driven into said channels through said seams has its velocity materially reduced upon entering the channels and is then drained away.

13. A wall comprising a plurality of panels assembled with their adjacent vertical edges forming non-watertight, vertical seams therebetween and with their adjacent horizontal edges forming non-watertight horizontal seams therebetween, a plurality of vertical supporting members supporting the panels, each member defining a vertical drain channel in back of respective vertical seams, there being a vertical drain channel in back of each vertical seam, means fastening the panel to the vertical supporting members, and a rearwardly depressed channel-shaped element integrally joined to and extending along the upper edge of each panel, each channel-shaped element defining a horizontal drain channel in back of the horizontal seam at the upper edge of the respective panel, the horizontal drain channel extending upwardly above the corresponding horizontal seam and each horizontal channel communicating with a vertical drain channel.

CYRIL R. B. HARDING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,594,614	Haines	Aug. 3, 1926
1,874,790	Mortenson	Aug. 30, 1932
2,128,976	Voegeli	Sept. 6, 1938
2,190,818	Wysong	Feb. 20, 1940

Certificate of Correction

Patent No. 2,530,465 November 21, 1950

CYRIL R. B. HARDING

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 7, line 46, for "upwardly" read *inwardly*; line 75, before the word "portions" insert *edge*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of May, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.