Sept. 1, 1959 S. SHA'AG 2,901,781

BUILDING ELEMENTS

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FIG. 1.

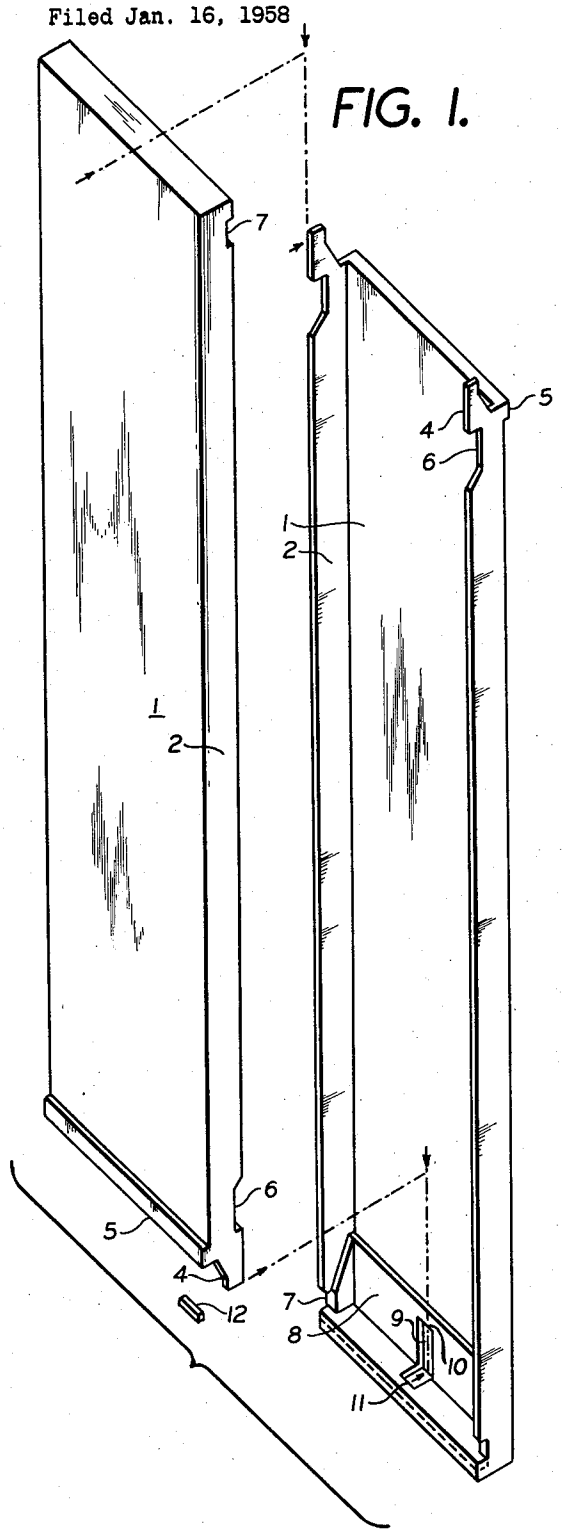


FIG. 3.

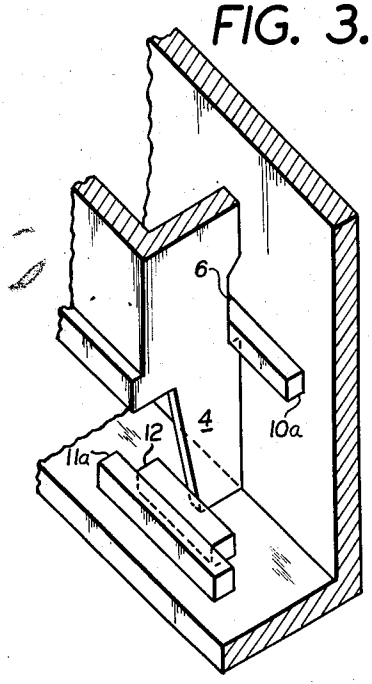
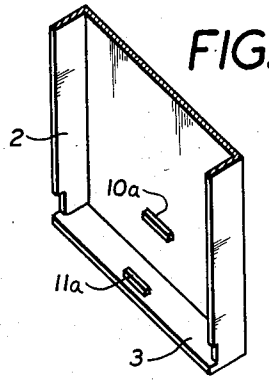


FIG. 2.



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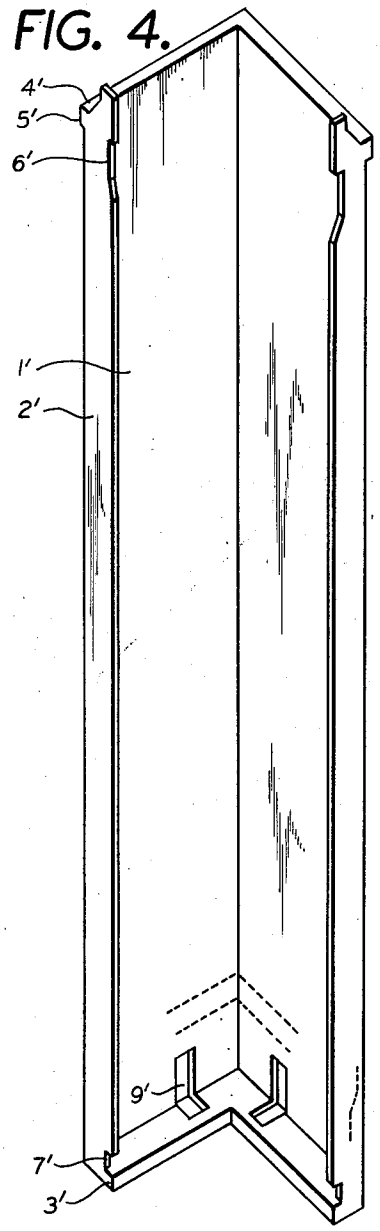
ATTORNEYS

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BUILDING ELEMENTS

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FIG. 4.



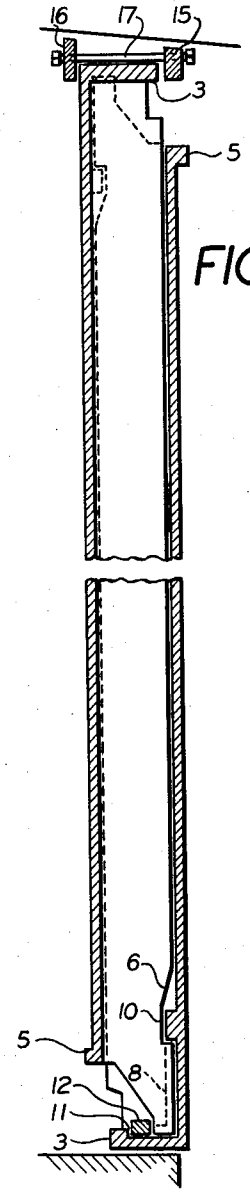


FIG. 8.

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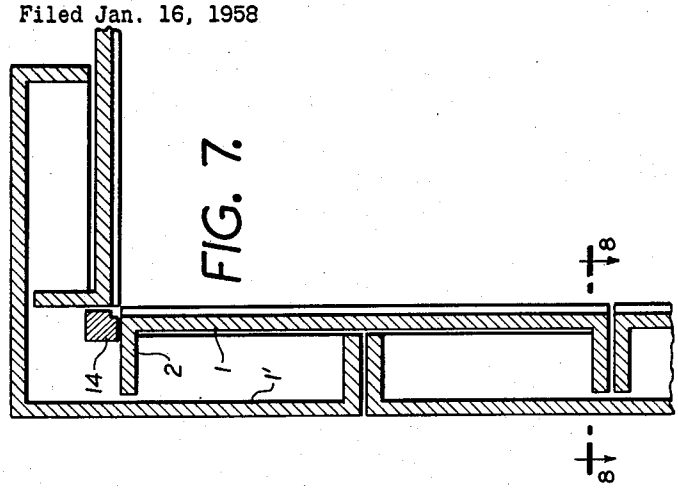


FIG. 7.

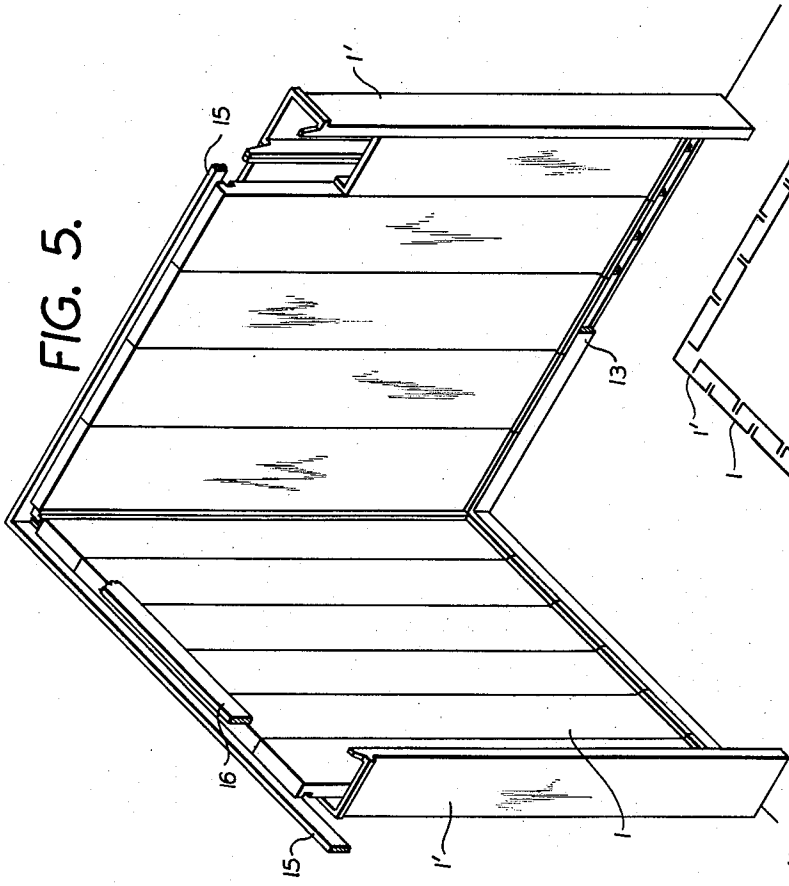


FIG. 5.

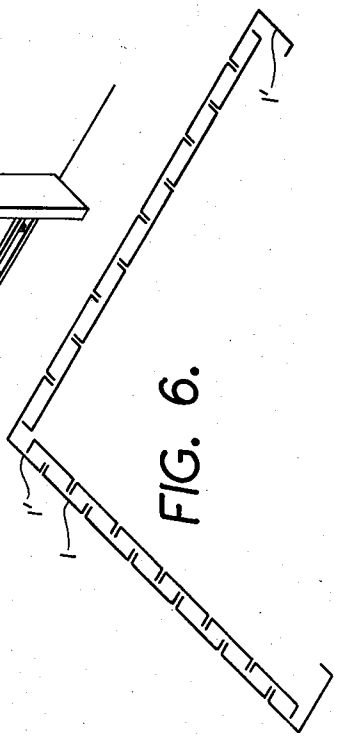


FIG. 6.

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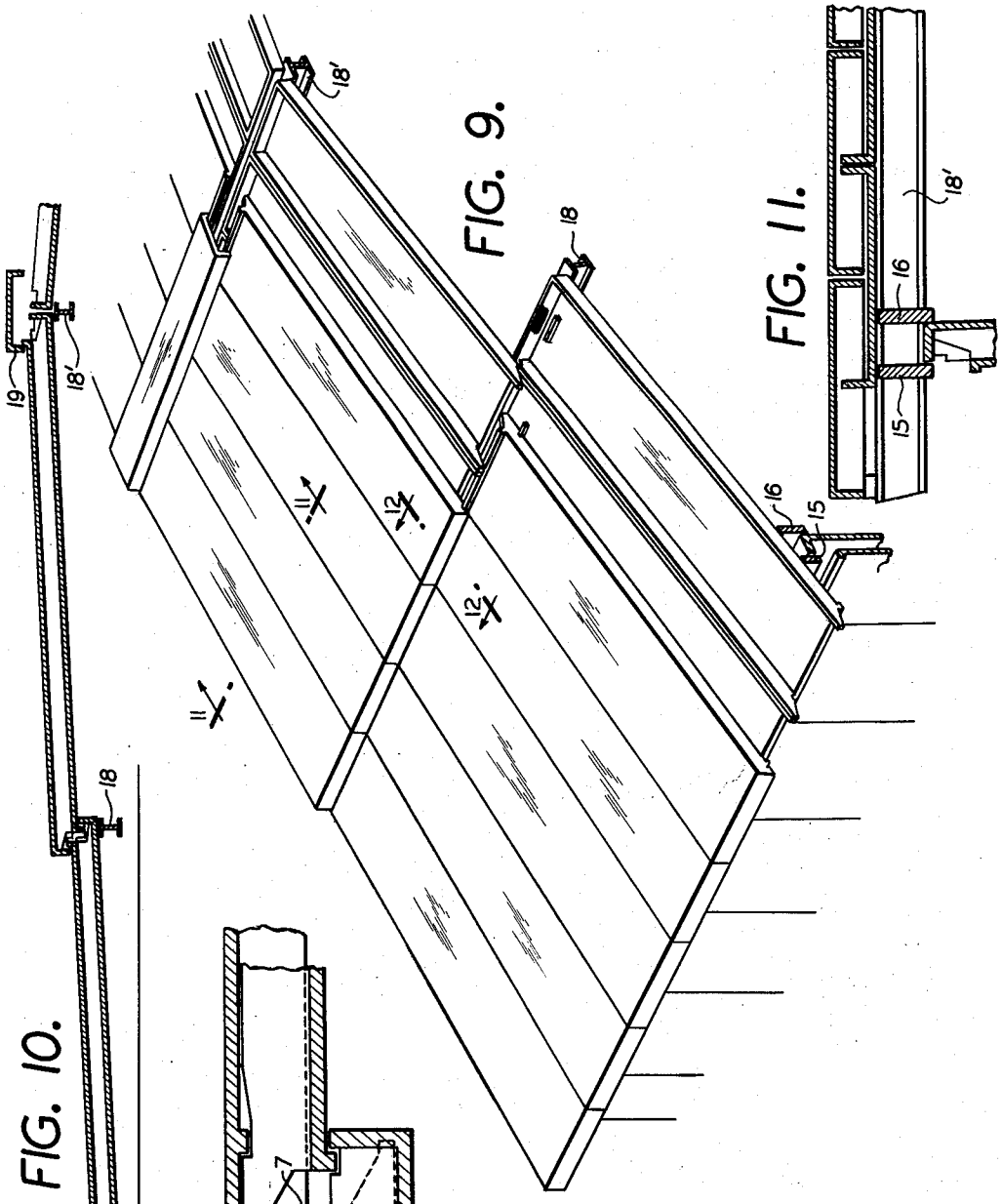


FIG. 9.

FIG. 11.

FIG. 10.

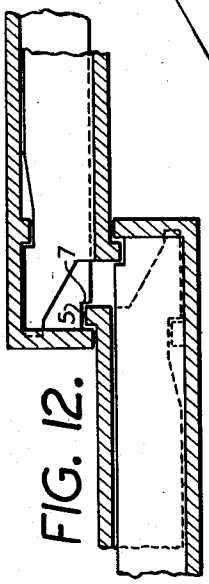


FIG. 12.

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FIG. 13.

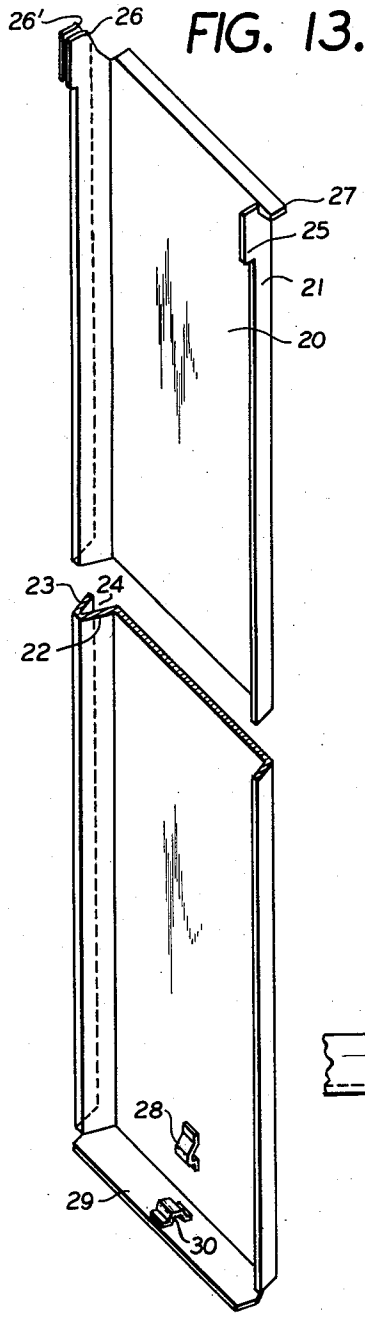


FIG. 14.

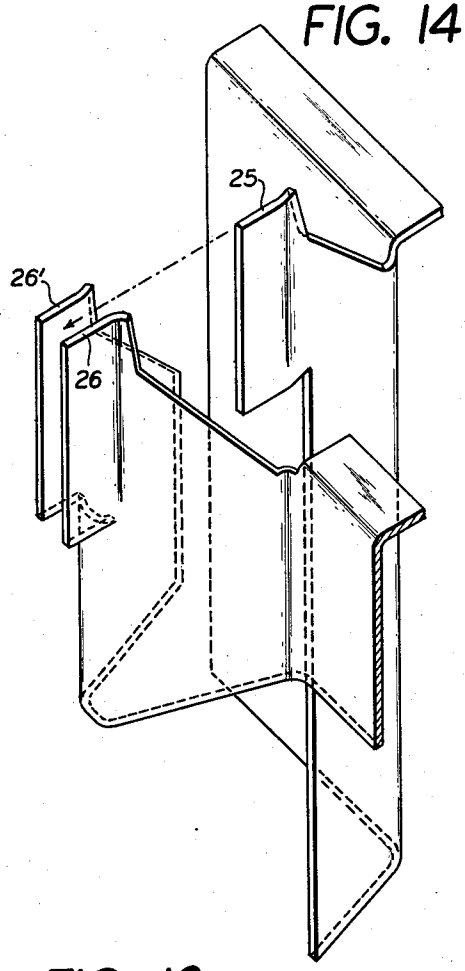


FIG. 16.

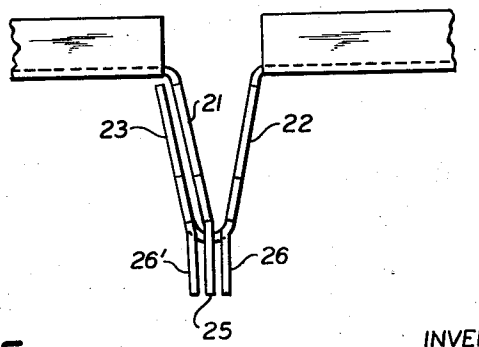
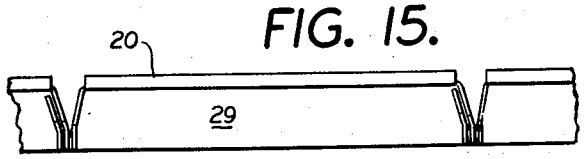


FIG. 15.



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United States Patent Office 2,901,781 Patented Sept. 1, 1959

2,901,781

BUILDING ELEMENTS

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Application January 16, 1958, Serial No. 709,289

Claims priority, application Israel February 19, 1957

9 Claims. (Cl. 20—4)

This invention relates to prefabricated houses and has as its object to provide a building element that can be used both as a wall panel and as a roof element.

In particular, the invention aims at providing a building element that can be used virtually as only element for the erection of a complete house, supplemented only by one or two subsidiary elements to be disposed at the corners or round wall openings.

The invention consists in a building element for the construction of two-sheet walls, said element being an oblong rectangular shallow, trough-like panel comprising rims along both longitudinal edges and one transverse edge, noses projecting from the rimless transverse edge and formed by extensions of the longitudinal rims, and abutments in the center portions of the transverse rim and the adjacent stretch of the panel at the inner side thereof. One of the sheets of a hollow wall can be erected from juxtaposed panels of this kind stood on their rimmed transverse edges, and the second wall sheet from juxtaposed panels having their rimmed transverse edges turned upwards, facing the inner sides of the panels of the first wall sheet with their inner sides and being staggered with relation to them by half the width of a panel, the adjacent noses of each two juxtaposed panels of either sheet being lodged in the space between the abutments of a panel of the opposite sheet.

The same wall panels may also serve as roof panels, in which case they will have near the rimless transverse edge an outer reinforcing ledge, and corresponding notches in the longitudinal rims near the rimmed transverse edge for receiving the reinforcing ledges of the aligned companion panels.

The panel according to the invention may be made from metal, in particular a light-weight metal such as aluminum, or from concrete, asbestos cement, plastics or any other material having the necessary strength and being capable of being formed into the intended shape of the panels.

The invention is illustrated, by way of example only, in the accompanying drawings, in which—

Fig. 1 shows in perspective view two building panels according to a first embodiment of the invention about to be assembled;

Fig. 2 is a fragmentary perspective view of a panel according to a second embodiment of the invention;

Fig. 3 is a fragmentary perspective view of two assembled panels according to Fig. 2;

Fig. 4 shows in perspective view of a corner panel according to the invention;

Fig. 5 is a fragmentary perspective view of the corner part of two adjoining walls built up from panels according to the invention;

Fig. 6 is a diagrammatic plan view corresponding to Fig. 5;

Fig. 7 is a fragmentary horizontal section of a corner on a larger scale;

Fig. 8 is a vertical section of the wall along line VIII—VIII of Fig. 7, seen in the direction of the arrows;

Fig. 9 is a fragmentary perspective view of a roof according to the invention;

Fig. 10 is a transverse section of the roof according to Fig. 9;

Fig. 11 is a fragmentary longitudinal section of the roof on line XI—XI of Fig. 9;

Fig. 12 is a fragmentary transverse section of the roof along line XII—XII of Fig. 9, on a larger scale;

Fig. 13 is a fragmentary perspective view of another embodiment of a building element according to the invention;

Fig. 14 is a fragmentary perspective view, drawn to a larger scale, of two building elements according to Fig. 13 in the course of being assembled;

Fig. 15 is a fragmentary plan view of some elements according to Fig. 13 aligned to form one sheet of a wall;

Fig. 16 is a detail of Fig. 15 drawn to a larger scale.

The basic building panel according to the invention shown in Fig. 1 is a shallow trough **1** whose length is nearly equal to the height of a wall to be erected, the panel having rims **2** along its longitudinal edges and a rim **3** along one of its transverse edges. For the sake of convenience, the side of the panel where the rims **2** are located will be called herein its inner side. The rims **2** project beyond the other transverse edge in the form of nose-like extensions **4** ("noses" for short). Along this transverse edge a reinforcing ledge **5** is provided at the outer side of the panel. The rims **2** have cut-outs **6** near the noses **4** and notches **7** adjacent the rims **3** with a profile similar to that of the ledge **5**.

A reinforce **8** is attached to the rim **3** and the adjacent stretch of the panel on their inner sides. This reinforce has in its center a recess **9** whose length in the longitudinal direction of the panel is substantially equal to the length of the noses **4** between the cut-out and their ends while its width corresponds to the aggregate width of two such noses. The shoulders **10**, **11** of the reinforce at the ends of the recess **9** form abutments, as will be explained below, and will be referred to as such.

Instead of being made in an attached reinforce, recess **9** may be made in the panel itself if the latter is thick enough, as shown in Fig. 4.

For erecting a two-sheet hollow wall, a number of panels are stood upright in alignment side by side on the rims **3** with their adjacent rims **2** contacting one another. A second row of panels is similarly erected opposite the former so that the inner sides of the panels of both rows face each other. The panels of the second row have their rimmed ends turned upwards and are staggered with relation to the panels of the first row by half the width of a panel. In this position each pair of adjacent noses **4** of juxtaposed panels of the one row enters the recess **9** of an opposite panel and the abutments **10** come to be lodged in the cut-outs **6** of rim **2** in contact with the end of the nose. This interengaging connection of opposite panels is indicated in Fig. 1 by dotted lines. The panels are locked in the assembled state by means of keys **12** inserted in the recess **9** between the outer end of the noses and the abutment **11** (see also Fig. 8). Keys **12** are held in their locking position either by friction or by glueing.

In the panels according to Figs. 2 and 3, the abutments are constituted by mere ledges **10***a*, **11***a*. As shown in Fig. 3, the wedge may be trapezoidal in profile, and one surface of each nose or of the abutment **11***a* may be re-entrant, whereby the locking action of the wedge is still enhanced.

Fig. 4 shows a corner panel. This is ideally composed of two basic panels **1'** disposed at right angles and

merging into each other with the omission of their adjacent longitudinal rims and corresponding noses. These corner panels are disposed in the outer wall sheet only (Figs. 5, 6). In their inner sheet the end panels of both inner rows of the intersecting walls nearly abut each other. The narrow gap between them is closed by a batten 14 (see Fig. 7). The connection of the corner panel with the terminal panels of the inner sheet is effected in the same way as that between opposite basic panels. Corner posts may be cast in the space within the corner panel and adjacent wall panels.

The corner panels may also be used at the junction of the outer wall with an inner partition.

The open stretch at the foot end of the assembled panels on the inner side of the wall may either be left open for ventilation, or be covered by a baseboard 13 (see Fig. 5). Similarly, the open stretch at the top on the outer side of the wall may either be left open or be covered with a fillet similar to the baseboard 13.

Figs. 9 to 12 show the construction of a roof from panels according to the invention. Similarly as in the case of the walls the panels are arranged in two sheets facing each other with their inner sides and staggered with relation to one another from sheet to sheet by half the width of the panel. If the slope of the roof at either side of the ridge is to be longer than the length of a single panel, the panels are disposed in two or more longitudinally aligned rows and the lower end of each upper row overlaps the upper end of the next lower row and is linked to the latter in that the reinforcing ledges 5 of the top panels on the lower row engage the notches 7 of the top panels of the next upper row. The lower ends of the lower row of panels are supported on wall plates constituted by battens 15, 16, preferably of wood, clamped by bolts 17 against the outer and inner faces, respectively, of the top of the walls (Fig. 8). The space between battens 15, 16 may accommodate electric wires, water pipes and the like or concrete may be cast into it to form a beam. The inner batten 16 is higher than the outer batten 15 by so much as corresponds to the slope of the roof. The top ends of the lower rows of panels are supported by I-beams 18 and the top ends of the upper row of panels by a similar beam 18'. The gap between the top ends of the upper panels is covered by aligned ridge slabs 19 having a shallow channel profile.

The elements may be so designed that the joints of the walls or roofs erected from them are watertight. For this purpose one of the rims may be extended by a folded-back flange whereby a channel is formed along one of the longitudinal edges of the element, in which the flangeless rim of one of the longitudinal edges of the adjacent elements of the same sheet will be inserted. An embodiment of building elements according to the invention thus designed is illustrated in Figs. 13–16.

This building element, whose general design is similar to that of the elements described hereinbefore, comprises a shallow trough 20 with rims 21, 22, along its longitudinal edges. Rim 21 has an outward slant. Rim 22 is similarly slanted and, in addition, continued by a folded-back flange 23 so that a re-entering channel 24 is defined on the side of the element opposite the open side of the trough. The rim 21 merges at one end into a single nose 25 analogous to the nose 4 of the element according to Fig. 1 while the rim 22, 23, merges in the corresponding position into two noses 26, 26' spaced from one another by a narrow gap adapted to receive the nose 25 of an adjacent element. The element also comprises a transverse reinforcing ledge 27 whose function is similar to that of ledge 5 of the element illustrated in Fig. 1.

An abutment 28 is made integral with the main board of the element near the transverse rim 29 and a second abutment 30 is integral with rim 29, the distance between abutments 28 and 30 being equal to the length of noses 25, 26, 26' so that the latter can be snugly inserted between the two abutments. The width of each abutment is at least equal to the combined widths of the noses.

When two such elements are juxtaposed, the rim 21 of one element is inserted into the channel 24 of the adjacent element and simultaneously nose 25 of rim 21 of the first element is inserted in the gap between noses 26, 26' of the second element. This is illustrated in Fig. 14 which shows the relative positions of nose 25 on the one hand and nose 26, 26' on the other hand shortly prior to the insertion of the former between the two latter. By so juxtaposing a number of elements one sheet of a wall or of a roof according to the invention is erected. A second sheet is built up and at the same time connected to the former in that the elements of the second sheet are assembled upside-down and laterally staggered by the widths of half an element relative to the elments of the first sheet, with the transverse rim 29 of the elements of the second sheet overlying the rimless transverse edges of the elements of the first sheet, and the juxtaposed noses 25, 26 of each two vicinal elements of either sheet inserted between the abutments 28, 30 of an element of the opposite sheet.

Instead of providing the folded-back longitudinal flange with two noses defining between them a gap, as has been illustrated in Figs. 13 and 14, it is also possible to provide a single nose only either on the inner rim 22 or on the folded-back flange 23.

Furthermore, it is also possible to replace the double nose of the embodiment illustrated in Figs. 13 and 14 by a single cage-like nose whose interior receives the single nose of a neighbouring element of the same wall sheet. This cage-like nose may comprise at its longitudinal, upper side an oblong slot for receiving the upper edge of the single nose of a neighbouring sheet. It may, however, be entirely sealed, in which case the inner space of the cage will have to be high enough to receive the entire single nose of the neighbouring element of the same sheet.

The elements of this embodiment are advantageously made of metal and the abutments 28 and 30 which will in this case equally be of metal, can be made somewhat resilient so that they grip the noses of the opposite elements without requiring the insertion of wedges such as are required, for example, in the case of the embodiment according to Fig. 3.

The relative positions of the rims and noses of assembled vicinal elements of the same sheet of a wall are illustrated in Figs. 15 and 16. It is seen that the nose 25 of rim 21 of each element is inserted in the gap between noses 26, 26' of the rim 22, 23 of the vicinal element.

The embodiment of Fig. 13 has also a further advantage in that owing to the tapering slant of the rims the elements can be placed within one another for transportation and storage, whereby a considerable saving of space is achieved.

I claim:

1. A two sheet wall construction including a first panel, said panel being of rectangular, shallow, trough-like shape, including rims along both longitudinal edges and one transverse edge, noses projecting from the rimless transverse edge and formed by extensions of the longitudinal rims, abutments in the center portion of both the transverse rim and the inner side of the panel near the rimmed transverse edge thereof, and a second similar vertically reversed confronting panel, the nose of each panel engaging in the space between the abutments of the opposed panel.

2. A panel as claimed in claim 1, also serving for the erection of a two-sheet sloping roof from longitudinally aligned pairs of panels overlapping at their ends, characterized in that each panel has near its rimless transverse edge an outer reinforcing ledge, and corresponding notches

in the longitudinal rims near the rimmed transverse edge for receiving the reinforcing ledges of the aligned companion panels.

3. A panel as claimed in claim 1, wherein one of the longitudinal rims is extended by a folded-back flange defining with said rim a re-entering channel for the reception of the flangeless rim of a similar second panel to be assembled with the former in juxtaposition.

4. A panel as claimed in claim 3, wherein the flanged rim is provided with a double nose for the reception of the single nose of the flangeless rim of a similar second panel to be assembled with the former in juxtaposition.

5. A panel as claimed in claim 3, wherein the flanged rim is provided with a single, cage-like hollow nose for the reception in its interior to receive the single nose of the flangeless rim of a similar second panel to be assembled with the former in juxtaposition.

6. A panel as claimed in claim 1, wherein the abutments are formed by the opposite ends of a central recess made in the transverse rim and in the adjacent portion of the panel on its inner side.

7. A panel as claimed in claim 1, wherein the abutments are formed by the opposite ends of a central recess made in a reinforce attached to the transverse rim and the adjacent portion of the panel on its inner side.

8. A panel as claimed in claim 1, wherein the abutment are formed by ledges integral, respectively, with the transverse rim and a portion of the inner side of the panel disposed in the central portion of the panel near the rimmed transverse edge thereof.

9. A corner panel for use together with wall panels of the kind defined in claim 1, composed of two webs merged into each other at right angles and corresponding to two of said wall panels, whose longitudinal rims and corresponding noses are omitted in the corner.

References Cited in the file of this patent

UNITED STATES PATENTS

1,913,066	Carter	June 6, 1933
2,863,180	Birdwell	Dec. 9, 1958