

Sept. 3, 1968

A. J. ENSOR

3,399,916

INTERLOCKING BUILDING ELEMENTS

Filed Nov. 7, 1966

2 Sheets-Sheet 1

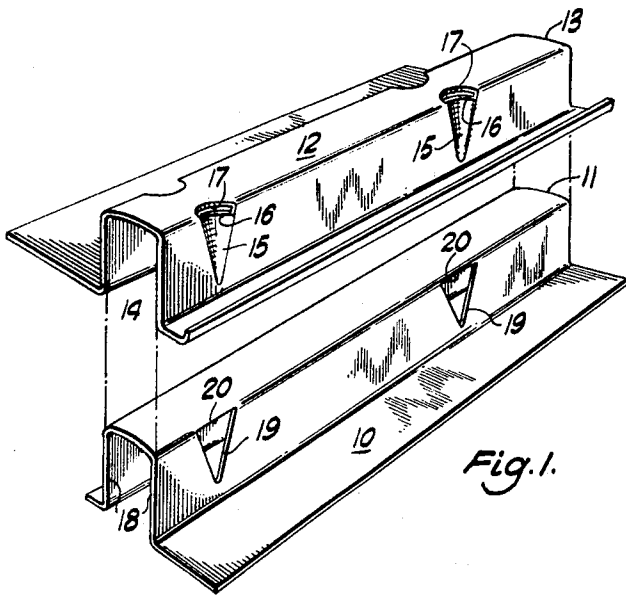


Fig. 1.

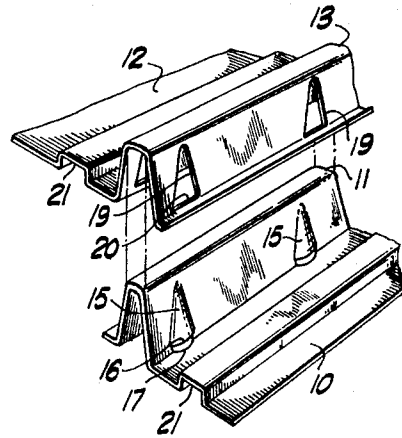


Fig. 2.

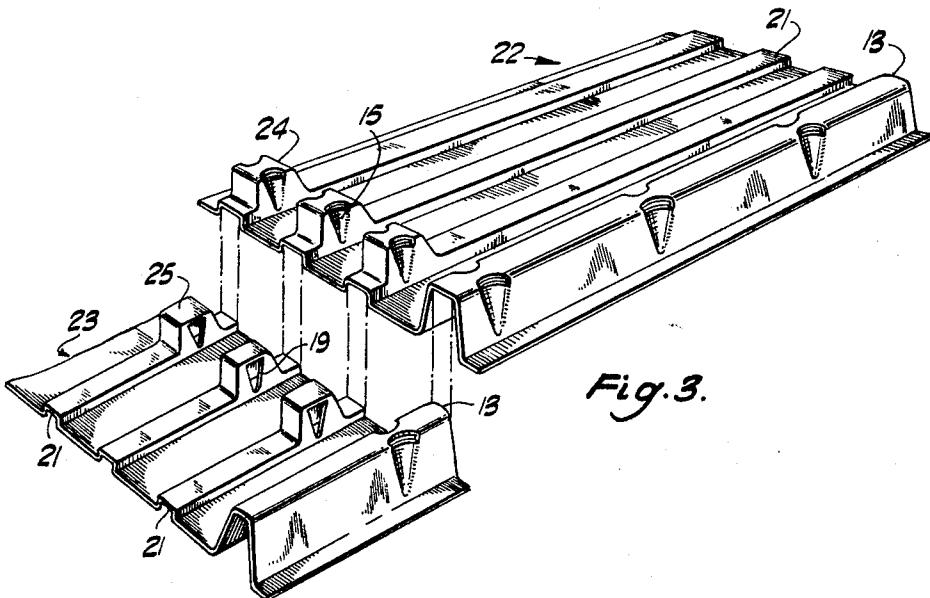


Fig. 3.

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2 Sheets-Sheet 2

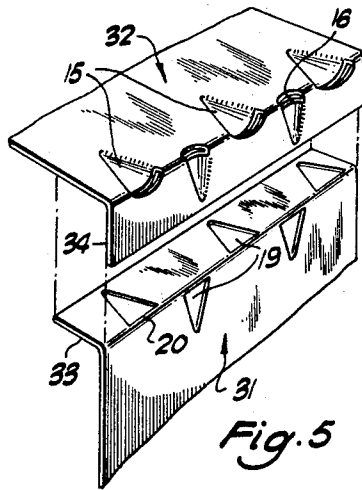


Fig. 5

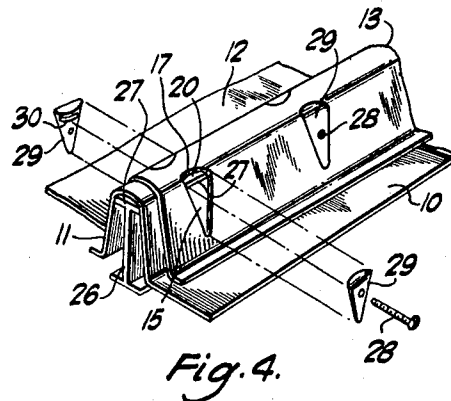


Fig. 4.

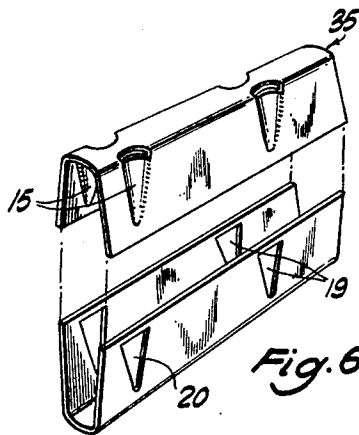


Fig. 6.

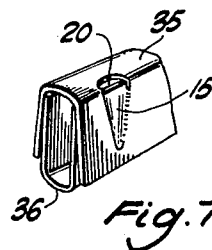


Fig. 7.

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INTERLOCKING BUILDING ELEMENTS

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969,330

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ABSTRACT OF THE DISCLOSURE

Building elements consisting of panels including nestable ribs, when nested are locked together. The means accomplishing the interlocking comprise a plurality of arcuate, resilient wedges formed in one of the ribs which are received by and which interlock with corresponding cut-away portions in another of the ribs, means in the form of a bolt and a pair of clamping elements may be provided as reinforcing means.

This invention relates to interlocking building elements. It is often desirable to form building elements such as panels, beams and the like so that they may be quickly and easily interlocked together. I have discovered an arrangement whereby such elements may be formed in such a fashion that they may readily be interlocked together without it being necessary to use cement or fasteners such as bolts or screws.

The invention may be defined in terms of a pair of building elements. The elements are each provided in the area where a joint is to be made with two walls such as might be defined by a U-shaped rib, an upstanding hollow projection, or even by two walls at right angles. The walls are formed so that those in one element are nestable within those of the other element. In at least one wall of at least one of the elements there is provided at least one slit which extends in a direction substantially transverse to the direction the elements have to be moved to accomplish nesting. One edge of this slit serves to define the base of an arcuate resilient wedge which protrudes from the walls and which may, for example, be moulded or pressed from the wall during the manufacture of the elements. For every such wedge there is provided a corresponding cut-away portion in a wall of the other element. This cut-away portion has an edge which is coincident with the slit in the other element when the two elements are nested, and the cut-away portion is large enough that the wedge may be received in it when the elements are pressed into nesting relationship. Separation of the elements when they are fully nested is accordingly prevented since the base of each wedge interlocks with the coincident edge of its corresponding cut-away portion.

In the drawings which illustrate the embodiments of the invention and in which like numerals refer to like parts,

FIGURE 1 shows, in perspective, two building elements which might, for example, be panels each having a U-shaped rib moulded in an edge thereof,

FIGURE 2 shows, in perspective, a second embodiment of that shown in FIGURE 1,

FIGURE 3 shows, in perspective, two building panels each having a U-shaped rib moulded in one edge thereof, and each also having a plurality of upstanding hollow projections in another edge thereof,

FIGURE 4 shows, in perspective, two panels according to the invention which are interlocked, and further illustrates how the interlocked panels may be locked to an I-beam and also how means may be provided for reinforcing the interlock between the panels,

FIGURE 5 shows, in perspective, two panels accord-

ing to the invention which may be interlocked so that one panel forms a right angle with the other,

FIGURE 6 shows, in perspective, two U-shaped members which may be interlocked to provide a tube, and

FIGURE 7 shows, in perspective, the members of FIGURE 6 interlocked to form a tube.

Referring now to FIGURE 1, there is illustrated a building element 10 having a U-shaped rib 11 formed in one edge, and a building element 12 having a U-shaped rib 13 formed in one edge. Rib 11 is designed to nest within rib 13.

In side walls 14 of rib 13 there are provided arcuate resilient wedges 15 which protrude inwardly of the rib 13 and which each have a base 16 terminating in and defined by one edge of a slit 17. Slit 17 is substantially transverse to the direction in which ribs 13 and 11 must be moved in order to accomplish nesting.

In side walls 18 of rib 11 there are provided, in this case, triangular cut-away portions 19, each of which is of sufficient size to receive a wedge 15. Each cut-away portion 19 is provided with an edge 20 which coincides with a base 16 of a wedge 15 when said ribs 11 and 13 are fully nested.

It will be seen that when rib 11 is pressed into rib 13, the resilient wedges 15 will first tend to be flexed outwardly of side walls 14 by the edges 20 of rib 11, and, when the ribs are fully nested, will then be received within the cut-away portions 19 of rib 11. The base 16 of each wedge will then interlock with the coincident edge 20 of its corresponding cut-away portion 19 and thereby prevent separation of the elements when they are fully nested.

In the embodiment shown in FIGURE 2, there is illustrated again two building elements 10 and 12 having moulded in their respective edges U-shaped ribs 11 and 13. In this case the building elements 10 and 12 are provided with reinforcing ridges 21, but these do not form part of the invention. As in the embodiment illustrated in FIGURE 1, rib 11 is designed to nest within rib 13.

The embodiment shown in FIGURE 2 differs from that in FIGURE 1, however, in that the resilient wedges 15 are provided in rib 11 and extend outwardly therefrom. This of course means that cut-away portions 19 appear in rib 13. However, the principle of operation is exactly the same, the wedges 15 being first compressed as the ribs 11 and 13 are pressed into nesting relationship and then filling cut-away portions 19 when the ribs are fully nested. It will be noted that in the embodiment shown in FIGURE 2, the wedges 15 and cut-away portions 19 are inverted when compared with those of FIGURE 1. This is because the base 16 of each wedge must interlock with the coincident edge 20 of each corresponding cut-away portion 19 so as to prevent the nested ribs 11 and 13 from becoming unnested.

FIGURE 3 shows two building panels 22 and 23, each with a U-shaped rib 13 moulded adjacent a side edge thereof. In each panel, rib 13 is designed to nest with a rib of another panel (not shown) in exactly the same fashion as illustrated in FIGURE 1.

Panels 22 and 23 are also provided with reinforcing ridges 21 similar to those shown in FIGURE 2. Across the ends of panels 22 and 23 upstanding hollow projections 24 and 25 respectively are provided. These projections are moulded in the ribs 21 of the panels 22 and 23, although the reinforcing ribs 21 are not necessary to the invention. The upstanding hollow projections 25 are designed to nest within the hollow projections 24 and the interlocking principle is the same as that described in the description of FIGURE 1.

Each of the upstanding hollow projections 24 are provided with an opposed pair of arcuate resilient wedges 15 which are formed exactly as described in FIGURE 1. Similarly, the upstanding hollow projections 25 are pro-

vided with cut-away portions 19 as described in FIGURE 1.

It will of course be noted that if reinforcing ridges 21 are employed, those in panel 23 must also nest within those in panel 22 so that full nesting of the upstanding hollow projections 24 and 25 may be accomplished. The same is true with respect to the two ribs 13.

Thus in this embodiment, the building panels 22 and 23 may be locked together end to end with each other and may also be interlocked side by side with another building panel (not shown).

FIGURE 4 illustrates building elements similar to those described in FIGURE 1 but here they are in nested relationship. This figure also shows how, if arcuate resilient wedges 15 are designed to project inwardly of the nested pair of ribs 11 and 13, and I-beam 26 may also be interlocked with the already interlocked building elements. By pressing a flange 27 of I-beam 26 onto rib 11, resilient wedges 15 will first be pressed outwardly and then will lock under flange 27 and serve to hold the elements to the I-beam. Slit 17 must in this case be wide enough to receive both edge 20 in rib 11 and the flange 27 of I-beam 26.

FIGURE 4 also demonstrates a method whereby the interlocking action of wedges 15 may be reinforced. This is accomplished simply by passing a bolt 28 through an opposing pair of wedges 15 and by providing clamping elements 29 which serve to maintain the inward disposition of wedges 15 once the ribs 11 and 13 have been fully nested. Clamping elements 29 may be provided also with a slot 30 which will serve to grip the upper flange 27 of an I-beam 26. The clamping elements 29 may, of course, be designed so as to weather-proof the joint by covering the openings formed by slits 17 which is between each base 16 and the top of rib 13.

FIGURE 5 shows a panel 31 with a slide flange 33 at right angles thereto and a panel 32 with a side flange 34 at right angles thereto. When panels are formed in the manner shown in FIGURE 5, it is possible to join the two panels so that panel 32 is at right angles to panel 31. Arcuate resilient wedges 15 are provided alternately in the panel 32 and the side flange 34, each of the wedges 15 having its base 16 near the point of intersection of panel 32 and side flange 34. The wedges 15 all protrude inwardly of the right angle formed between panel 32 and side flange 34. Corresponding cut-away portions 19 are provided alternately in side flange 33 and panel 31. Thus, in the embodiment shown in FIGURE 5, panel 31 with its side flange 33 may be pressed into interlocking, nesting relationship within the right angle formed by panel 32 with its side flange 34.

In FIGURE 6, there is shown a U-shaped member 35 which is provided with inwardly projecting arcuate resilient wedges 15 similar to those described in FIGURE 1. There is also shown a second U-shaped member 36 having cut-away portions 19 which are inverted when compared with those of FIGURE 1 so that U-shaped member 36 will nest within U-shaped member 35 so as to provide a tube such as is best seen in FIGURE 7.

In each of the above described embodiments, the interlocked building elements may be separated from one another by depressing the resilient wedges 15 out of interlocking engagement with the coincident edges 20 of their corresponding cut-away portions 19.

From the above description, it will be seen that I have provided a versatile and inexpensive method of interconnecting panels, beams and the like. The cut-away portions 19 and resilient wedges 15 are easily formed at the time of manufacture of the building elements, and they are such that they do not significantly reduce the inherent strength of the building elements. Of course the invention is not restricted to the particular embodiments illustrated since there are many possible combinations of building elements which may be devised and which may

fall within the scope of the invention as defined in the appended claims.

What I claim as my invention is:

1. A pair of building elements,
 - (a) each comprising a rectangular panel formed of resilient material,
 - (b) a rib having opposed sidewalls formed adjacent at least one edge of each panel, a first rib in one edge of one panel being nestable within a second rib in one edge of the other panel so that the panels are joinable in overlapping edge-to-edge relationship,
 - (c) a plurality of slits in the sidewalls of said second rib extending in a direction substantially transverse to the direction said ribs would be moved to accomplish nesting,
 - (d) an arcuate resilient wedge associated with each slit, said wedge protruding inwardly from the sidewall and having its base terminating in and defined by an edge of its associated slit, and
 - (e) corresponding cut-away portions in the sidewalls of said first rib, each cut-away portion having an edge which is coincident with one of the slits when the ribs are nested.
 - (f) the wedges in said second rib being located for reception within corresponding cut-away portions in said first rib when said ribs have been pressed into nesting relationship,
 - (g) the base of each wedge in the second rib interlocking with the coincident edge of a corresponding cut-away portion in the first rib so as to prevent separation of the panels when the ribs are fully nested,
 - (h) said wedges, when said ribs are fully nested, protruding inwardly of the sidewalls of said second rib at points sufficiently below the top of said first rib to permit the base of each wedge to further interlock with an I-beam nested within said other rib.
2. A pair of building elements,
 - (a) each comprising a rectangular panel formed of resilient material,
 - (b) a rib having opposed sidewalls formed adjacent at least one edge of each panel, a first rib in one edge of one panel being nestable within a second rib in one edge of the other panel so that the panels are joinable in overlapping edge-to-edge relationship,
 - (c) a plurality of slits in the sidewalls of said second rib extending in a direction substantially transverse to the direction said ribs would be moved to accomplish nesting,
 - (d) an arcuate resilient wedge associated with each slit, said wedge protruding inwardly from the sidewall and having its base terminating in and defined by an edge of its associated slit, and
 - (e) corresponding cut-away portions in the sidewalls of said first rib, each cut-away portion having an edge which is coincident with one of the slits when the ribs are nested,
 - (f) the wedges in said second rib being located for reception within corresponding cut-away portions in said first rib when said ribs have been pressed into nesting relationship,
 - (g) the base of each wedge in the second rib interlocking with the coincident edge of a corresponding cut-away portion in the first rib so as to prevent separation of the panels when the ribs are fully nested,
 - (h) said resilient wedges being spaced in pairs along said second rib, the wedges of each pair protruding from the sidewalls of the second rib towards one another.
 - (i) at least one means being provided for reinforcing the interlocking action between the bases of the wedges and the coincident edges of the cut-away portions when said ribs are fully nested,
 - (j) each of said reinforcing means comprising a bolt and a pair of clamping elements,
 - (k) said bolt passing through said pair of wedges and

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being arranged to force said clamping elements inwardly against said wedges.

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