

Sept. 20, 1971

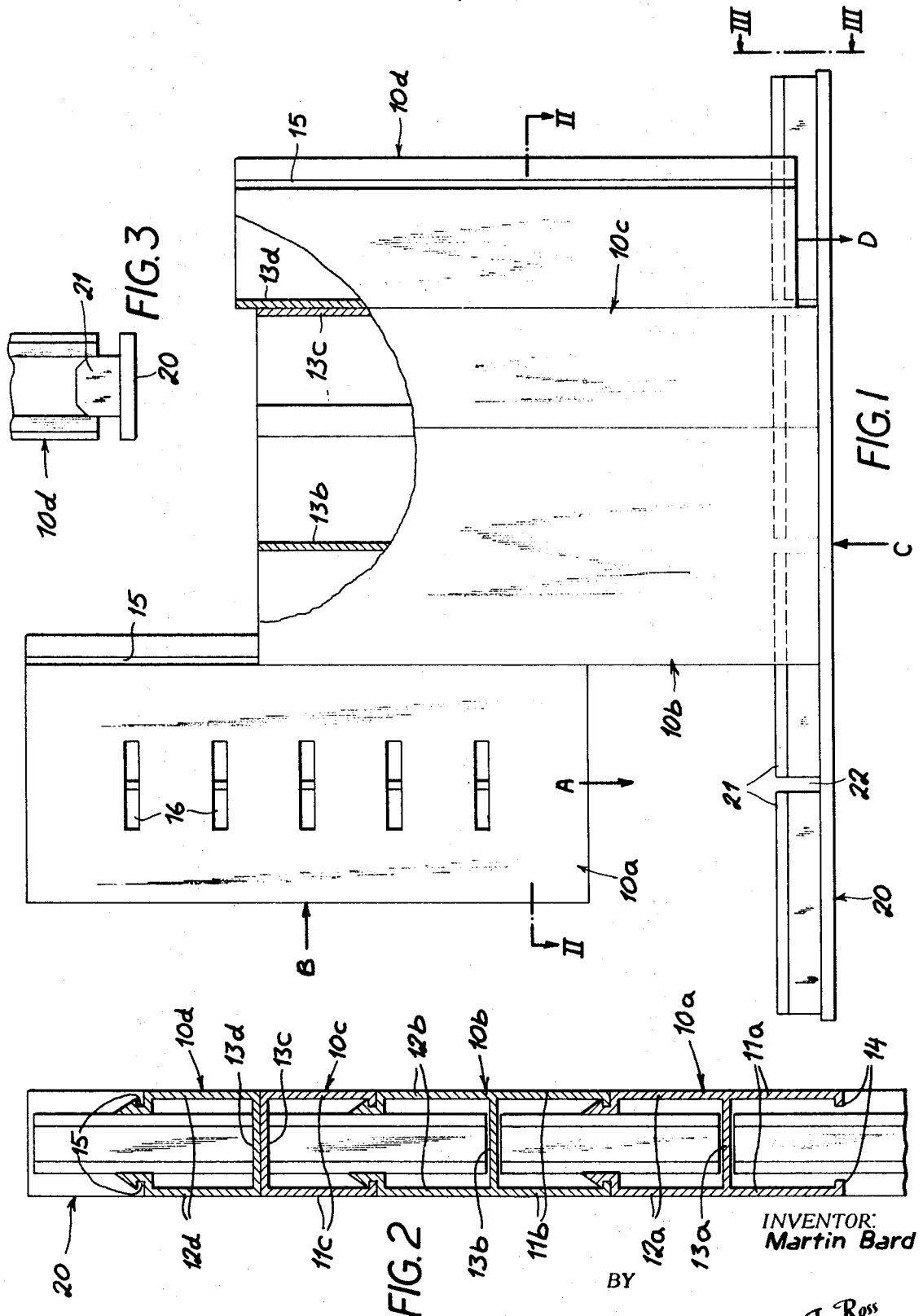
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3,605,363

ASSEMBLY OF STRUCTURE ELEMENTS

Filed March 14, 1969

4 Sheets-Sheet 1



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ASSEMBLY OF STRUCTURE ELEMENTS

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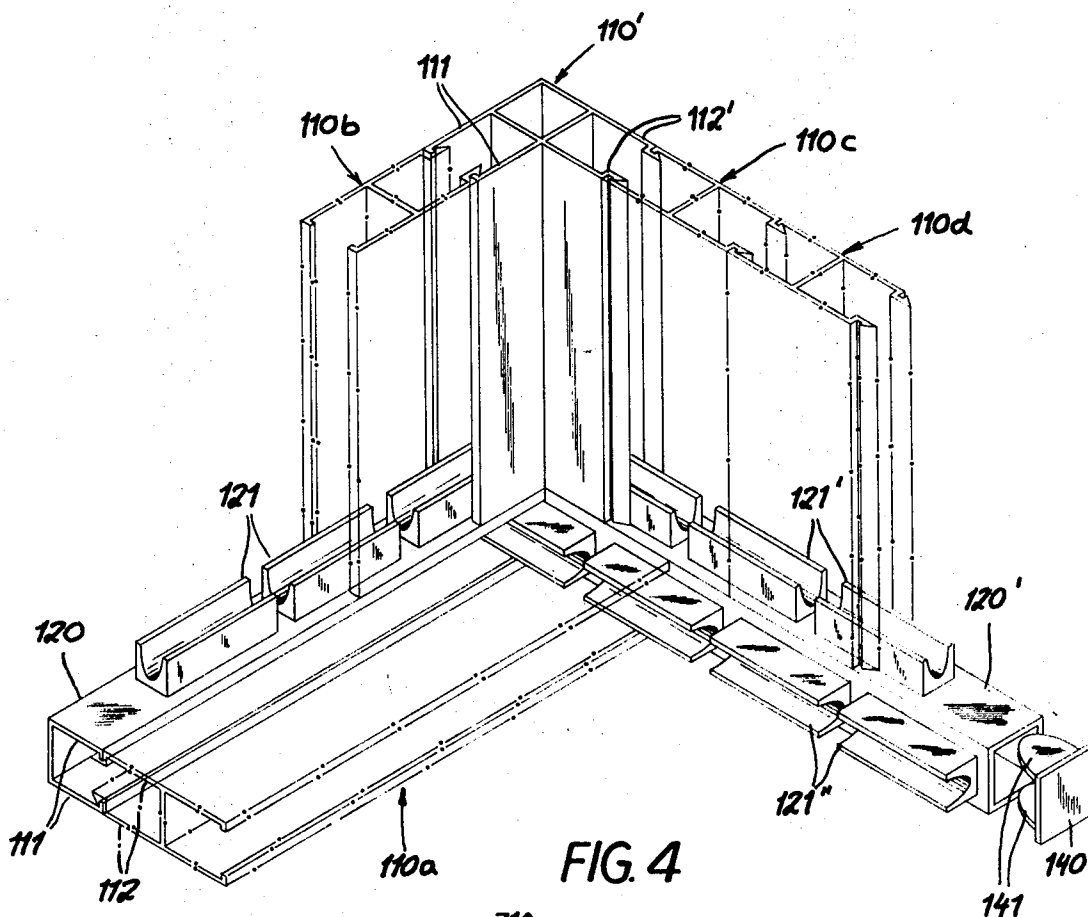


FIG. 4

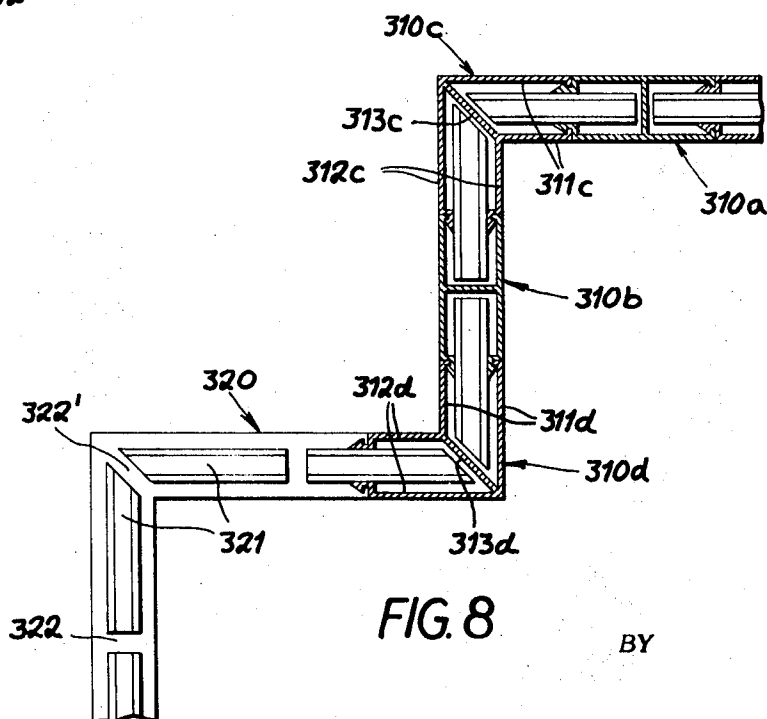


FIG. 8

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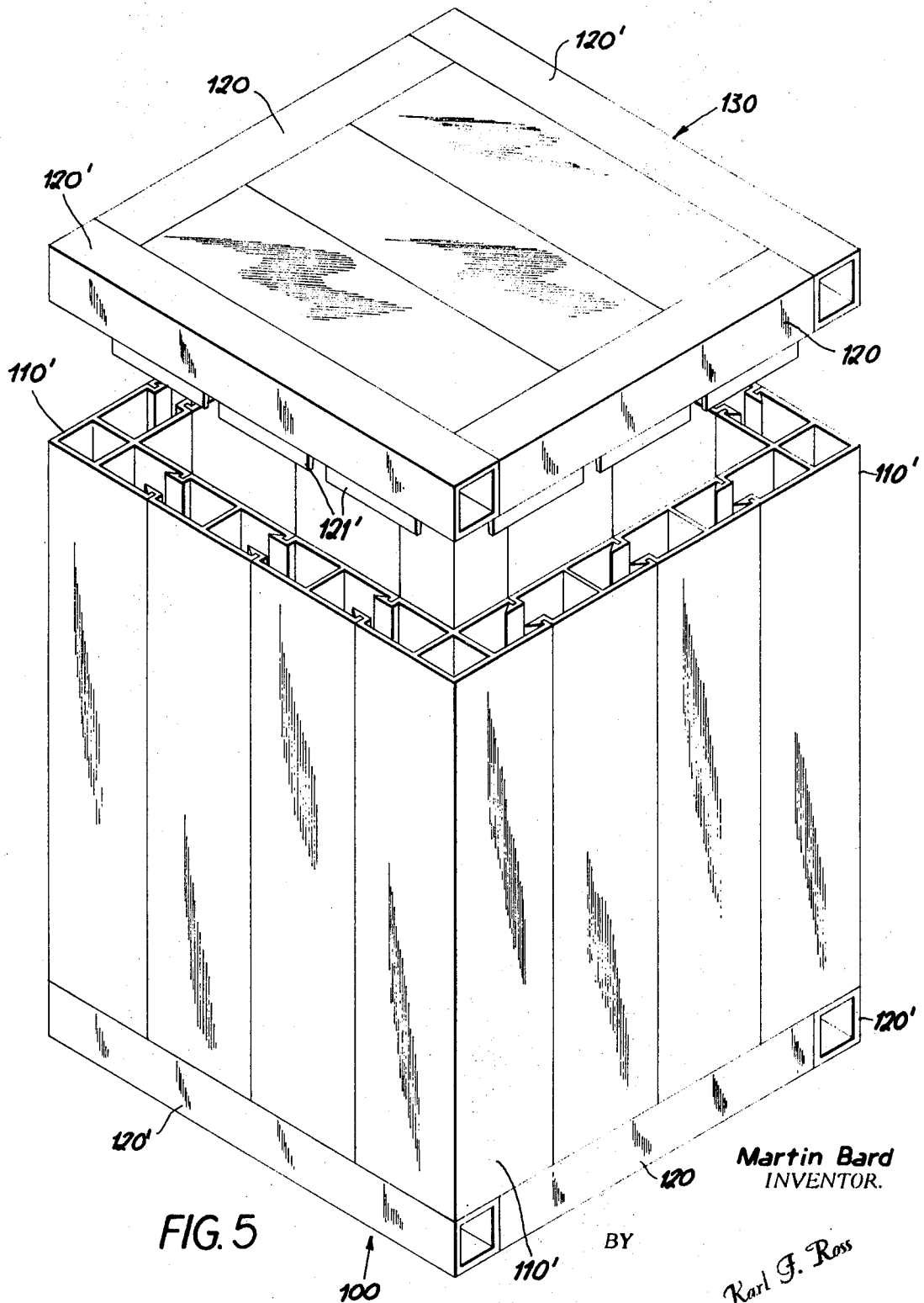
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ASSEMBLY OF STRUCTURE ELEMENTS

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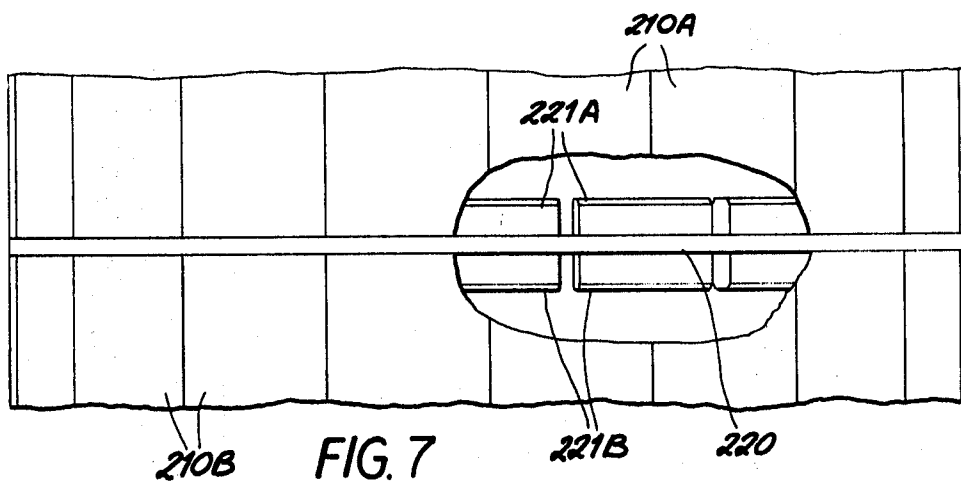
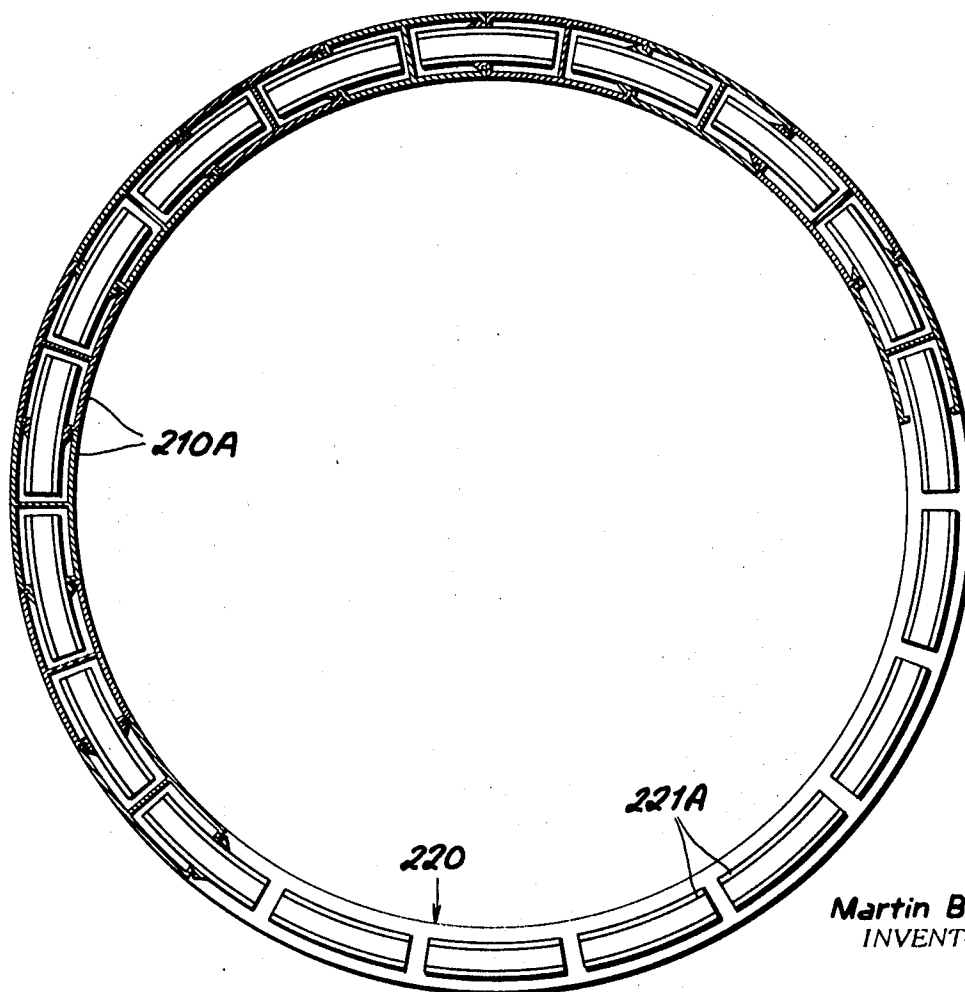
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ASSEMBLY OF STRUCTURE ELEMENTS

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4 Sheets-Sheet 4



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ASSEMBLY OF STRUCTURE ELEMENTS

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7 Claims

ABSTRACT OF THE DISCLOSURE

Several profiled members of metal or other resilient material, each with one or more pairs of parallel flanges held together by a transverse web, are interconnectable by tongue-and-groove formations extending along the free edges of their flanges. The interconnected members are locked in position by a bar disposed transversely to these members and provided with tenons inserted endwise into the channel formed between the webs and flanges of adjoining members, thereby preventing their untimely disengagement while reinforcing the structure.

My present invention relates to structural elements for use in partitions, walls, containers or similar units to be assembled from prefabricated sections.

The general object of my invention is to provide a set of elements which can be quickly, easily and dependably fitted together into a variety of shapes to yield a mechanically strong, solid structure for a variety of purposes including those indicated above.

This object is realized, pursuant to the present invention, by the provision of a plurality of profiled members each having one or two pairs of substantially parallel flanges interconnected by a generally transverse web, the free edges of the flanges of co-operating members being alternately ribbed and grooved or otherwise provided with mating terminations to enable these members to be interfitted with longitudinal slidability; to strengthen the resulting structure. I further provide at least one retaining element designed to hold the interfitted members in position by having one or more upstanding formations projecting endwise into the channel or channels formed by the interconnected flange pairs of adjoining members.

In order to create a particularly firm structure, I prefer to design the upstanding formations of the retaining elements as tenon-shaped sections of transversely slotted ribs, the slots serving to accommodate the ends of respective webs which terminate flush with the flanges between adjoining channels. The rib sections, extending into the channels for only a fraction of the length of the latter, engage the flanges of the members with frictional fit so as to be readily removable therefrom for the purpose of disassembly.

According to another feature of my invention, the retaining elements may concurrently serve as a junction and a mechanical link between two or more arrays of flanged members interconnected in the aforescribed manner. Thus, the retaining element may be a profiled bar having ribs rising from two or more faces thereof, each rib being anchored to a respective planar array so that a plurality of such arrays radiate outwardly in different planes. A retaining element of this description may serve, for example, as a corner post between adjoining walls each constructed of interfitted profiled members according to the invention. In a similar manner, risers and treads of stairs can be assembled as well as the sides and the bottom of a box or a crate. If the members are curved rather than flat in a plane transverse to their webs and flanges, several of them can be assembled into a pipe.

According to another important feature of my invention, the flanges of the channel-forming members are made sufficiently resilient to snap into interlocking en-

gagement with those of an adjoining member upon transverse motion of the two members toward each other, this interengagement involving a certain inward deflection of that flange pair whose edges are to be bracketed by those of the adjoining flange pair. Upon insertion of a rib section of the associated retaining element into the channel formed by these flange pairs, the rib section overlies the junctions of their mating termination so as to prevent such inward deflection whereby the members cannot be separated by a transverse motion away from each other.

In principle, the members as well as the retaining element or elements may be of metal (e.g. aluminum) or any synthetic resin having the requisite degree of resiliency. Naturally, the actual choice of material depends upon considerations of weight, strength and other properties of the finished unit.

The above and other features of my invention will become more fully apparent from the following detailed description of certain embodiments, reference being made to the accompanying drawing in which:

FIG. 1 is a side-elevational view, with parts broken away, of a panel in the process of being assembled from elements according to my invention;

FIG. 2 is a cross-sectional view taken on the line II—II of FIG. 1;

FIG. 3 is a fragmentary end view taken on the line III—III of FIG. 1;

FIG. 4 is a partial isometric view of a box-type assembly according to my invention;

FIG. 5 is an isometric view of a completed box incorporating the structure of FIG. 4;

FIG. 6 is an end view, partly in section, of an incomplete tubular structure embodying my invention;

FIG. 7 is a fragmentary side view (with parts broken away) of the structure of FIG. 6; and

FIG. 8 is a side-elevational view, partly in section, of an incomplete stepped structure according to my invention.

In FIGS. 1-3 I have illustrated several upright profiled members 10a, 10b, 10c, 10d in the process of assembly to form a panel or wall structure. Members 10a and 10b have a generally H-shaped profile defined by a first pair of flanges 11a, 11b and a second pair of flanges 12a, 12b interconnected by a transverse web 13a, 13b. Members 10c and 10d, on the other hand, each have a C-shaped profile defined by a single pair of flanges 11c, 12d and a web 13c, 13d; it will be noted that the two members 10c and 10d together have a cross-section substantially identical with that of either of the two other members 10a and 10b.

The free outer edges of the flanges of each member are provided with either male terminations in the form of ribs 14, as shown for the flanges 11a, 11b and 11c, or female terminations in the form of grooves 15, as shown for the flanges 12a, 12b and 12d. Thus, each of the H-shaped members 10a, 10b has one ribbed pair and one grooved pair of flanges whereas the two C-shaped members 10c, 10d facing in opposite directions, are respectively provided with ribs and grooves only. This alternation of male and female terminations is not absolutely necessary but is convenient for purposes of uniformization since it enables all the H-shaped members, which constitute the major part of the wall surface, to be made of identical profiles; the narrower members 10c and 10d are merely the end strips which finish the vertical sides of respective panels each including a multiplicity of H-profiles. The remainder of the panel starting with member 10d has not been illustrated.

All the members 10a-10d co-operate with a common retaining element 20 in the form of a bar extending transversely (here horizontally) to the interlocked edges of the profiled flanges. The bar 20 has upstanding formations

21 in the shape of tenons which together define a rib having transverse slots 22, these slots being wide enough to accommodate either a single web 13a, 13b of an H-profile or the webs 13c, 13d of two C-profiles positioned back-to-back. Thus, the tenons 21 penetrate endwise (i.e. from below) into the channels formed by the interlocked flanges, such interengagement being readily accomplished by sliding a newly added member (as shown in FIG. 1 for the profile 10a) downwardly toward the bar 10 in sliding engagement with a neighboring member (10b) until its web enters the assigned slot 22 (arrow A). It is, however, also possible to preassemble some or all of the profiled members into a planar array, either by relative longitudinal sliding or by a sharp transverse blow (arrow B) which lets their ribbed and grooved flanges snap into locking engagement; the retaining bar 20 is then attached to all the interconnected profiles by a relative vertical motion (arrow C). The lone end member 10d of the assembly of FIG. 1 may be simply slid into its slot 22 (arrow D) alongside member 10c.

The tenons 21 are so dimensioned that the flanges of the engaging profiles resiliently grip them under sufficient pressure to prevent a spontaneous disassembly. Naturally, a bar similar to element 20 but disposed with downwardly facing tenons may be secured to the profiles 10a-10d from above to enhance the rigidity of the resulting structure. As best seen in FIG. 3, the tenons 21 are slightly beveled at their upper surfaces to facilitate their insertion into the profiled channels. Although these tenons have been shown as solid in FIGS. 1-3, they could also be longitudinally grooved so as to form trough-shaped rib sections as illustrated in FIG. 4. The latter configuration not only saves material and weight but also imparts a certain elasticity to these tenons so as to allow the parts to be interfitted with less outward deflection of the flanges.

Since the profiled members of the wall structure shown in FIGS. 1-3 are easily interchangeable, one or more of them could be provided with hooks, slits or other formations designed to facilitate the mounting of shelf brackets and similar attachments thereon. This has been illustrated in FIG. 1 for the member 10a whose cutouts 16 enable it to be used as a pilaster or shelf carrier. If shelving is to be supported on some other part of the panel, one or more of its other members may be replaced by slotted sections similar to member 10a.

FIG. 4 illustrates a corner structure at the junction of three sides of a prismatic container whose walls and bottom are assembled in the general manner described in connection with FIGS. 1-3. This structure includes two retaining elements 120, 120' lying at right angles to each other. Element 120, carrying a row of tenons 121 at its upper surface, is a C-profile bar with a pair of ribbed flanges 111 adapted to engage a pair of grooved flanges 112 of an adjoining profile 110a. Element 120' is a square-profiled bar carrying tenons 121' on its upper surface and other tenons 121'' on one of its lateral surfaces, the latter tenons being received in the channels defined by the flanges of elements 120, 110a and of other profiled members, not shown, which form the bottom of the container. The side walls rising from bars 120 and 120' include further profiles 110b, 110c, 110d, each similar to member 110a and to the members 10a and 10b of FIGS. 1 and 2, as well as a corner post 110' which comprises an upright square-profiled bar having ribbed flanges 111' and grooved flanges 112' extending from adjoining faces thereof. It will be readily apparent that, with the addition of further profiles and corner posts 110' as well as a second bar 120 and 120', a complete upwardly open box can be constructed, such box having been illustrated at 100 in FIG. 5. A complementary lid or cover 130, of a construction identical with that of the bottom of the box, can be attached to the top of the box by its depending tenons 121, 121' entering the open upper ends of the channels formed by the box profiles.

Elements 120 and 120', as well as corner post 110', have been shown hollow in FIGS. 4 and 5 for the purpose of weight reduction. A plug 140 with spring legs 141 may be attached to the open end of each of these elements to close them.

In principle, the bottom of box 100 could be as readily detached from its four-sided periphery as the lid 130 upon closure of the box. If desired, the tenons 121, 121' of the lid may be made narrower or more readily deformable than those of the bottom, thus causing the latter to be held more firmly, or the bottom and the sides of the box could be additionally secured by temporary or permanent fastening means, such as screws, rivets or solder.

In FIGS. 6 and 7 I have shown an annular retaining element 220 having arcuate tenons 221A, 221B at its top and bottom, respectively. Correspondingly curved profiles 210A, 210B are fitted to these tenons in the aforescribed manner and are mutually interlocked to form a pair of coaxial tubular structures joined together by the element 220. In like manner, further tubular arrays may be added to extend the resulting conduit.

An element similar to bar 220, but with only one set of tenons, may be used to terminate the tubular structure at each end.

In FIG. 8 I have shown a zigzag-shaped retaining element 320 serving, together with a similar companion element not shown, as a support for a stairway constituted by an array of interlocking members including H-profiles 310a, 310b and L-profiles 310c, 310d. The H-profiles 310a, 310b are generally similar to those of the preceding figures whereas the L-profiles 310c and 310d have their respective flange pairs 311c, 311d (ribbed) and 312c, 312d (grooved) extend at right angles to each other, their webs 313c, 313d lying at an angle of 45° to both flange pairs. The tenons 321 of each stringer 320 have correspondingly beveled ends defining inclined slots 322', their other ends being cut off straight as in the preceding embodiment to form transverse slots 322.

It will be evident that the shapes of the interlocking profile and of the associated retaining elements may be further modified to form a variety of other structures by the mode of assembly described above. The tenons and the interlocking terminations of the flanges may also be changed and, if desired, several longitudinally spaced webs could be provided between the flanges in lieu of the single webs of the illustrated H-profiles.

I claim:

1. A structure comprising at least three profiled members each having at least one pair of substantially parallel flanges of resilient material and a generally transverse web interconnecting said flanges, the flanges of adjoining members having free edges provided with mating longitudinal terminations which are inwardly deflectable for snap interengagement upon transverse motion of said members toward each other whereby said adjoining members are interconnected with relative longitudinal slidability, each pair of adjoining members thus interconnected forming a longitudinal channel bounded by the interconnected flanges and by their respective webs, and a solid structural retaining element with a plurality of upstanding formations each projecting endwise into a respective channel with frictional fit while overlying the junctions of said mating terminations in sliding contact therewith for preventing disengagement of said members by a reverse motion.

2. A structure as defined in claim 1 wherein said element is a flat bar coextensive in width with said members, said upstanding formation being a rib on said bar divided into tenon-shaped sections each fitted into a respective channel, adjoining sections of said rib being separated by a slot accommodating the end of a web separating the corresponding channels.

3. A structure as defined in claim 2 wherein said sections are longitudinally split into two interconnected halves bearing resiliently upon the engaged flanges.

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4. A structure as defined in claim 2 wherein said element is a bar of polygonal cross-section having a plurality of faces provided with respective ribs each engaging a respective set of said members interconnected in a planar array.

5. A structure as defined in claim 4 wherein said bar is substantially coextensive in length with each of said arrays.

6. A structure as defined in claim 5 wherein said bar is hollow and provided at each end with a removable cap. 10

7. A structure as defined in claim 4 wherein the arrays engaged by said ribs lie in different planes.

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15 52—286, 293, 584, 588, 627, 731