April 9, 1968 M. S. SERRA 3,376,980

DISMOUNTABLE STRUCTURES

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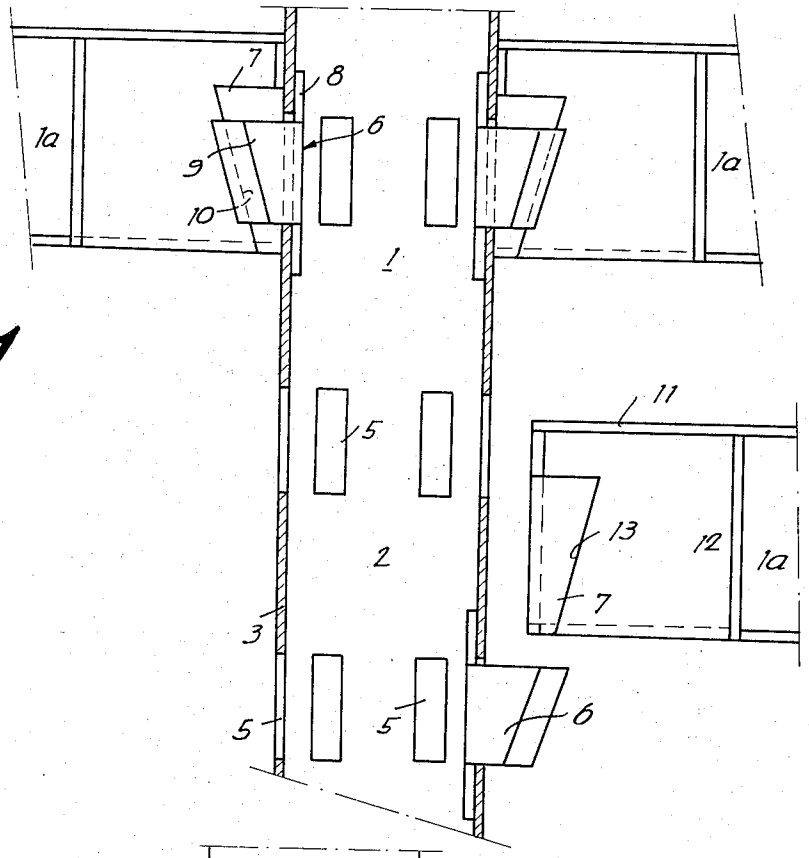


Fig. 1

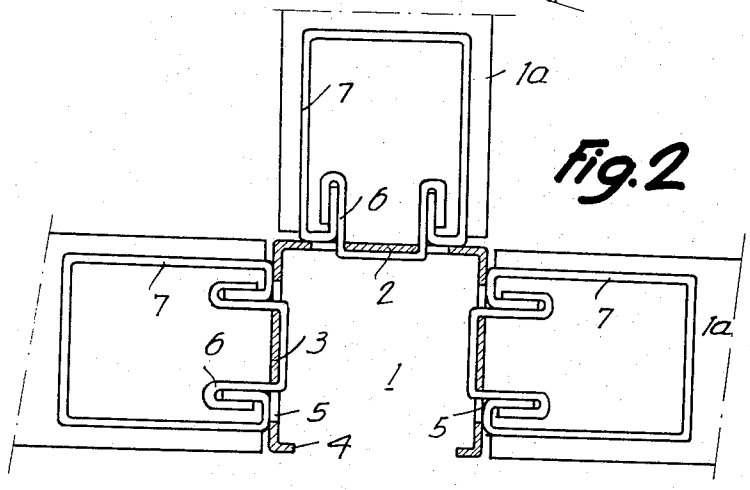


Fig. 2

INVENTOR.
MAX SCHAEFER SERRA
BY Sterling & Blake
Attys

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Fig. 3

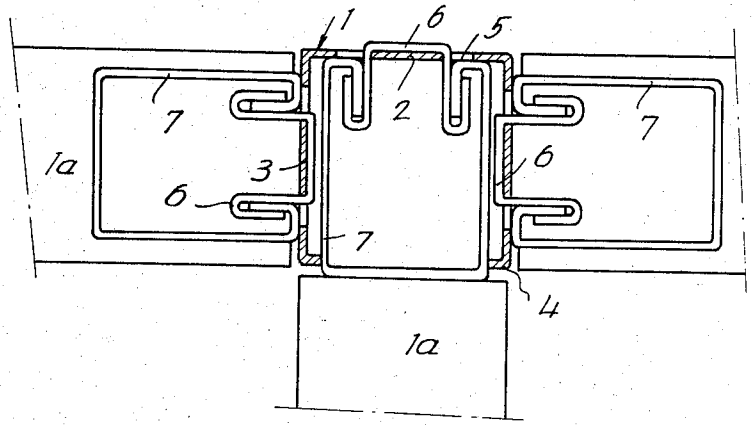
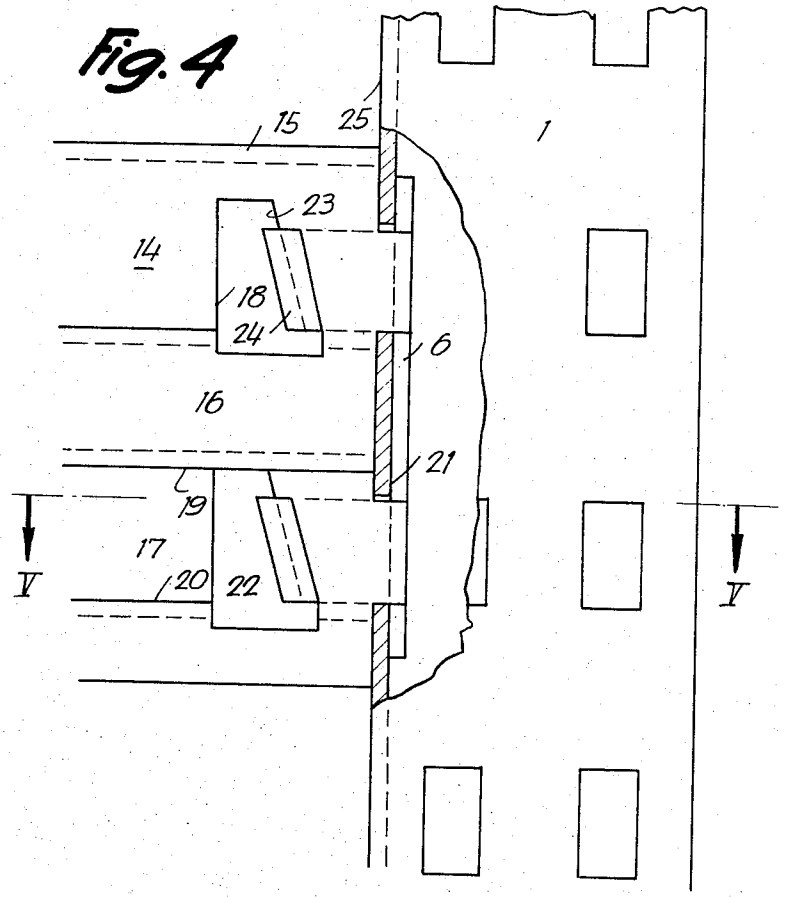


Fig. 4



INVENTOR.
MAX SCHAEFER SERRA
BY Steinberg + Blake
Attys

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Fig. 5

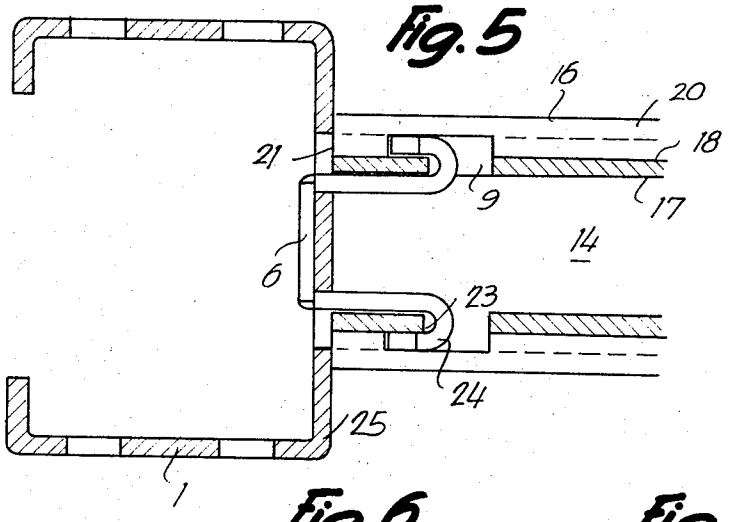


Fig. 6

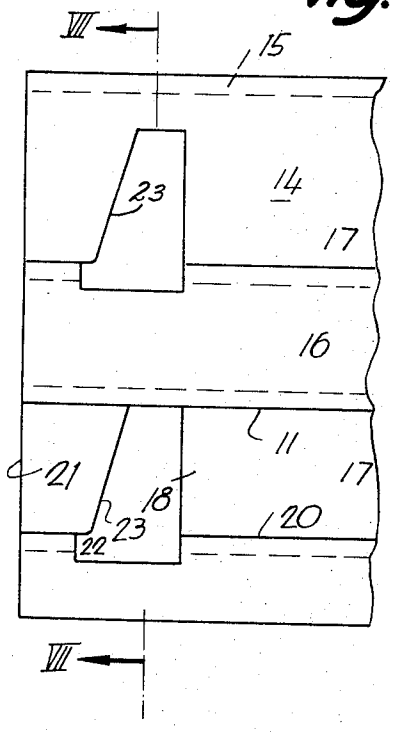
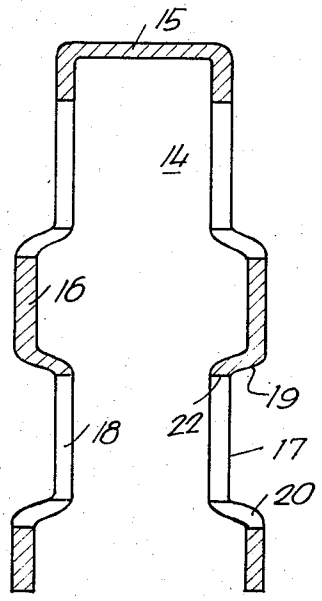


Fig. 7



INVENTOR.
MAX SCHAEFER SERRA
BY Steinberg & Blake
Attys

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Fig. 8

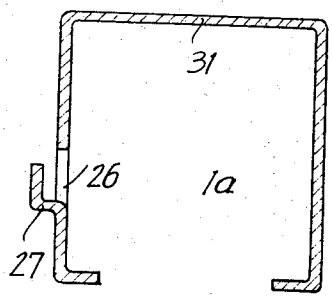
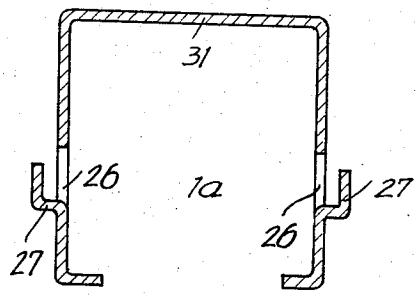


Fig. 9



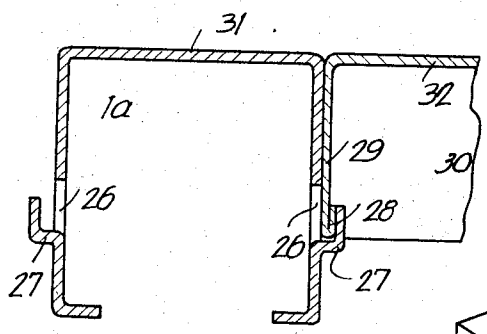
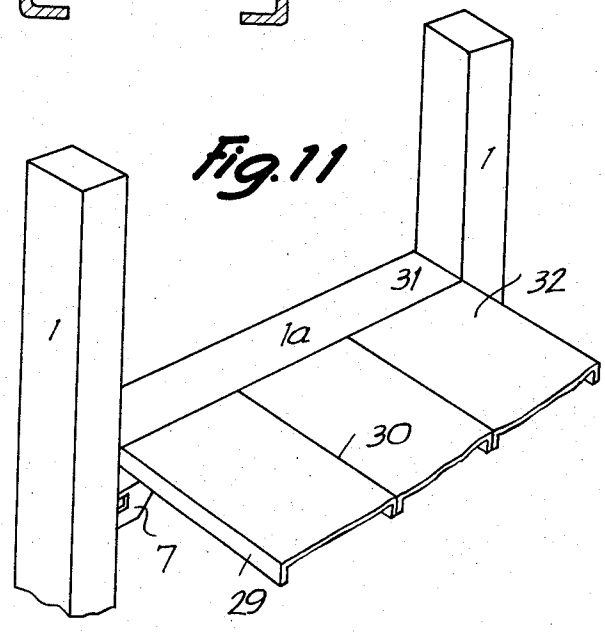


Fig. 10

Fig. 11



INVENTOR.
MAX SCHAEFER SERRA
BY Steinberg + Blake
Attys

United States Patent Office

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DISMOUNTABLE STRUCTURES

Max Schaefer Serra, Calle Rosaria 17,
Barcelona, Spain

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Claims priority, application Spain, June 9, 1965, 314,308;
Feb. 4, 1966, 323,028; May 26, 1966, 327,633
10 Claims. (Cl. 211—148)

The present invention relates to a new system for the formation of dismountable structures, by means of which new possibilities of rationalisation and practical execution are opened up, by simple means, in the formation of shelving of all kinds, storage racks for goods of all types, and every kind of removable construction hereinafter generally referred to as "dismountable structures."

In accordance with the system forming the subject of the present invention, the starting material comprises open, channel sections the sides of which are provided with pairs of rectangular windows which are separated from one another longitudinally and between which there are placed from the interior of the section, by introduction from the open face of the latter, U-shaped clips the sides of which are bent over to form hooks and on the outside of the section form wedge-shaped bottom channels receiving the matching ends of assembly pieces connected to other sections which constitute or form part of the dismountable structure.

The aforesaid assembly pieces may be mounted on the ends of the structural members in such a manner as to project therefrom solely to their ends which are to be received in the wedge-shaped grooves. However, an alternative form of the invention provides for said assembly pieces to have sufficient length to be mounted on the inner face of the bottom of the channel sections, the clips being disposed from the outer face of said section.

When they assume horizontal positions on assembly, the sections carrying the assembly pieces may advantageously be used as supports for shelves or platforms in the structure, for which purpose the flanks of said sections are provided with connection means matching other means provided on the edges of the boards constituting said shelves or platforms, the respective means being associated with one another in such a manner that, when assembled, said boards have their upper surface flush with the top surface of the sections, so as to form a continuous surface.

The connection means provided on the sections preferably comprise hooks stamped out of at least one of the side walls of said sections and projecting outwards to a position adapted to receive the matching means provided on the shelves, which may advantageously be constituted by the actual bottom edges of the downwardly bent flanges of said shelves.

In this embodiment of the invention the sections intended to be connected so as to form an angle with the polygonal sections or uprights of the structure are equipped on their side walls with a longitudinally channelled structure, in which the channels have flat bottoms which are situated transversely opposite each other on the respective sides, while the transverse distance therebetween corresponds to the spacing of the channels of the hooks of the U-shaped coupling clips, so that the separation of the inner surfaces contained between said channels is greater than the maximum width of the aforesaid U-shaped channels, while the side walls of the section are provided, near

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their ends, with windows which extend at the bottom of the aforesaid channels and the bottom flanks of the latter, their edge nearest the adjacent of the section forming a slope which corresponds to that of the bottom of the hooks of the U-shaped clips.

In this manner the channelled sections can be inserted axially over the branches of the U-shaped clips which project from the connection side of the polygonal sections, the hooks on said clips sliding along the wide portions of the section, whereupon the latter can be moved transversely downwards, so that the sloping edge of its lateral apertures or windows is coupled like a wedge against the bottom of said hooks.

Without limiting the scope of the present invention, the accompanying drawings illustrate by way of example some preferred embodiments thereof, the drawings being diagrammatic.

In said drawings, FIGURE 1 is a sectional elevation of part of a structure formed in accordance with the system of the invention;

FIGURE 2 is a sectional plan view of one of the articular points shown in the previous figure;

FIGURE 3 is a similar view to FIGURE 2 and shows the form of assembly of internal cross-members;

FIGURE 4 is a side elevation of one of the ends of a section;

FIGURE 5 is a cross-sectional elevation on the plane V—V in FIGURE 4;

FIGURE 6 is a side elevation, partly in section, showing the coupling of one of these sections in the structure;

FIGURE 7 is a plan view in section on the plane VII—VII in FIGURE 6;

FIGURES 8 and 9 are cross-sections of sections provided with coupling means on one and both flanks respectively;

FIGURE 10 shows the grouping of a shelf module to one of these sections; and

FIGURE 11 illustrates in similar manner the completed shelf.

According to the system described herein, use is made of basic sections **1** (FIGURES 1 to 5) of channel cross-section, in the form of a square C, which comprise bottom walls or webs **2** and side walls **3**, the latter being folded over inwards to form reinforcing ribs **4**. Each or only some of these walls are provided with a longitudinal series of pairs of oblong windows **5**, disposed parallel to the longitudinal axis of the section and receiving the other assembly elements which complete the system. It is obvious that it would also be possible to use sections of angular cross-section, possibly forming a non-right angle dihedron or else having a different number of sides, in the event of its being desired to form a structure requiring the provision of angles other than right angles between the various sections.

Some sections of the type described are disposed as uprights (FIGURES 1 to 3), while other similar or equivalent sections, indicated by the reference **1***a*, serve as cross-members. These members are coupled by means of the wedge-shaped clips **6** and the assembly pieces **7**.

The clips **6** comprise a base plate **8**, from the longer sides of which two parallel lugs **9** project, each of which is folded outwards in U-shape, but in such a manner that its bottom **10** forms an angle with the longitudinal axis of the base plate. Moreover, the transverse dimensions of the two lugs, and also the distance between them, are such that the aforesaid clip can be mounted through each

pair of windows **5**, as can be seen in FIGURES 2 and 3.

The assembly parts **7** are constituted by a U-shaped channel section having a base **11** and sides **12**, the free edges of which are folded over in U-shape in the inward direction and cut to form a wedge **13** adapted to be coupled to the bottom **10** of the parts **6**, as indicated in FIGURES 1 and 2. Since the members **6** and **7** are situated on opposite sides of the wall of the section **1** receiving them, the wedging together of their parts **10** and **13** effects rigid fastening of all the elements although they can easily be released by a simple blow applied oppositely to the coupling direction.

The aforesaid assembly pieces **7** may be fastened by welding to the end of the sections **1***a*, inside the latter and in such a manner that only their wedges **13** project. In this way it is possible to fix three sections **1***a* on the outer face of each of the walls **2** and **3** of a section **1**, by applying the corresponding wedge-shaped clips from the inside of the section (FIGURE 2). When for constructional requirements, for example in order to leave a smooth front on the outside of the structure, it is necessary to adopt the arrangement illustrated in FIGURE 3, said assembly pieces may be fixed to the closed ends of the sections **1***a*, in which case they are guided by the edges **4** of the upright and fastened by means of a wedge-shaped clip which is introduced into the windows **5** from the outer face of the section **1**.

In the embodiment illustrated in FIGURES 4 to 7, two sections intended to form the horizontal members of the structure, which are indicated by the general reference **14**, are formed with an inverted U-shaped cross-section, which comprises a central part or bottom **15** and side walls **16**. The latter are rolled in a longitudinally ribbed shape which forms outer longitudinal channels **17**, which comprise a flat bottom **18** and two flanks **19** and **20** at top and bottom respectively.

Near the coupling end **21** of the section **14** the bottoms **18** have two punched-out windows **22**, which extend over their entire width and over the entire bottom flank **20** and the adjoining edge of the wall parts **16** contained between the channels **17**. The edge **23** of each window, nearest the end of the section, forms a slope which converges downwards towards said end.

The section described is of such dimensions that the distance between the inside surfaces of its side walls **16** between the channels **17** is greater than the maximum external width of the U-shaped coupling clips **6** measured in the region of their coupling hooks **24**, and the bottom walls **18** of said channels correspond with the cavities **19** of said hooks **24**. In these circumstances, if the distance from the edge **23** of the windows **22** to the end **21** of the section corresponds to the length of the projecting portion of the U-shaped clips, in the assembled position illustrated in FIGURES 4 and 5, it is possible to introduce the section **14** over said clips in such a manner that the legs of the latter are received in its widest part until said end come into contact with the coupling face **25** of said uprights **1** which constitute the other elements of the structure, and then to lower the section **14** in such a manner that the edge **23** of its windows is coupled after the style of a wedge against the bottom of the hooks **24**.

As will be realised, in this embodiment the ends of the sections **14** are more effectively engaged between the hooks **24** and the uprights **1** than the folded-over ends of the corresponding sections or the assembly pieces previously described, so that greater strength and greater stability of the assembled structure are obtained. At the same time it is easier to manufacture the sections **14** by punching and rolling than by the operations of folding over the ends which were necessary in the members of the previous structure.

As can be seen from FIGURES 8 to 11, the sections **1***a* provided with the terminal assembly pieces **7** for coupling to the uprights **1** in the manner previously described, or else the sections **14**, are provided at their side walls

with partially punched out windows **26**, by means of which there are formed on the outside, tongues which are formed into hooks **27** disposed to receive the flanged-over edge **28** of the sides **29** running around the shelf or platform modules indicated by the general reference **20**.

The hooks **27** may be formed on one side only (FIGURE 8) or on both sides (FIGURES 9 and 10), depending on whether they are to occupy end or intermediate positions in the structure. In addition, the distance between the bottom of said hooks **27** and the top surface **31** of said sections **1***a* is made equal to the total height of the modules **30**, so that the upper face **32** of the latter forms a continuous surface with the face **31** of the former.

I claim:

1. A dismountable structure in assembled form comprising

(a) channel sections which form uprights, one face thereof being open and the other faces being provided with pairs of windows which are separated from one another longitudinally of the sections,

(b) U-shaped clips the upper edges of the legs of which are folded into the shape of hooks of a size to pass through the windows and are sloped with respect to the bases of the U-clips whereby wedge-shaped channels are formed between the polygonal sections and the folded edges of the clips when the clips are positioned with the legs through the windows and

(c) wedge-shaped assembly pieces corresponding in shape to the wedge-shaped openings and secured to

(d) other sections which form shelves or other members passing between the polygonal sections when the assembly pieces are inserted in the wedge-shaped openings.

2. A dismountable structure according to claim **1**, in which the assembly pieces are secured to certain of the said other sections in such a manner as to project therefrom so that the ends of the assembly pieces may be mounted in the channels in the clips in the interior of the polygonal sections when the clips are positioned therein, said clips being mounted from the outside inwards through the windows on the opposite faces to the open faces of the polygonal sections.

3. A dismountable structure according to claim **1**, in which the legs of the U-shaped clips have two equal notches which permit their coupling in the windows and form hooks for connection of the ends of boards forming shelves.

4. A dismountable structure according to claim **1**, in which the clips form frame-like pieces from the edges of which pairs of channeled lugs having wedge-shaped bottoms project in opposite directions, those on one side having greater length than those on the other, in order to pass through the windows in the walls of the polygonal sections and form wedge-shaped recesses for coupling cross-members on both faces of said walls.

5. A dismountable structure according to claim **3**, in which the U-shaped clips are provided with hooks on both sides of the notches, forming supports for pairs of boards situated one on each side of intermediate uprights.

6. A dismountable structure according to claim **1**, in which the other sections have longitudinally channeled cross-sections in their side walls, so that the channels have flat bottoms which are mutually opposite transversely in the respective sides, and the transverse distance between them corresponds to the spacing of the channels of the hooks of the U-shaped clips, while the distance between the inner surfaces contained between the channels is greater than the maximum width of the U-shaped clips, the side walls of the sections being provided, near their ends, with windows which extend transversely in the bottom of said channels and the bottom flanks of the latter while their edges nearest the adjacent ends of the sections form a slope corresponding to that of the bottoms of the hooks of the U-shaped clips.

7. A dismountable structure according to claim 1, in which the other sections have coupling means matching other means formed on the edges of boards, members or modules intended to form platforms or shelves, the two means being associated with one another in such a manner that the upper surfaces of said means and those of the said other sections form continuous planes when assembled.

8. A dismountable structure, according to claim 7, in which the coupling means of the boards are constituted by the actual bottom edges of downwardly bent flanges of said boards.

9. A dismountable structure according to claim 1 in which coupling means of the sections are constituted by hooks stamped out of at least one side wall of the latter and projecting outwards in such a position as to receive

matching coupling means on platform or shelf boards, members or modules.

10. A dismountable structure, according to claim 9, in which the coupling means of the boards are constituted by the actual bottom edges of downwardly bent flanges of said boards.

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CHANCELLOR E. HARRIS, *Primary Examiner.*

W. D. LOULAN, *Assistant Examiner.*