# United States Patent [19]

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## [54] CABINET CONSTRUCTION


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[51] **Int. Cl.**.....**A47b 47/04,** B65d 9/22, B65d 9/34

[58] **Field of Search**...217/12, 65, 5; 312/257 R, 263, 312/257 SK



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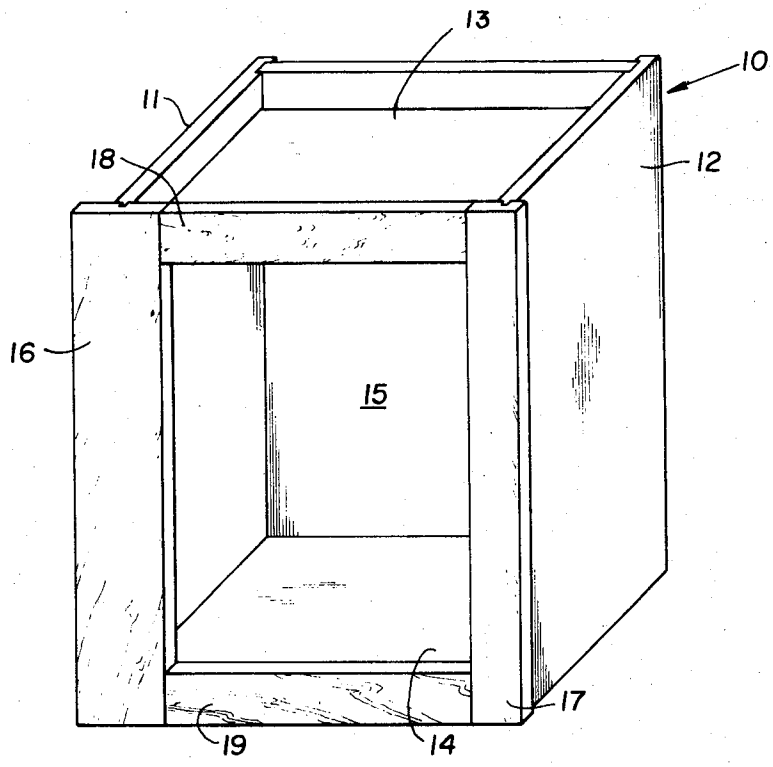
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[57] **ABSTRACT**

A new cabinet design is disclosed providing for an interlocked assembly of a cabinet structure from premachined wall elements, rails and stiles; said premachining requiring a minimum of machine settings; and it being possible to effect said assembly without tools.


**10 Claims, 6 Drawing Figures**



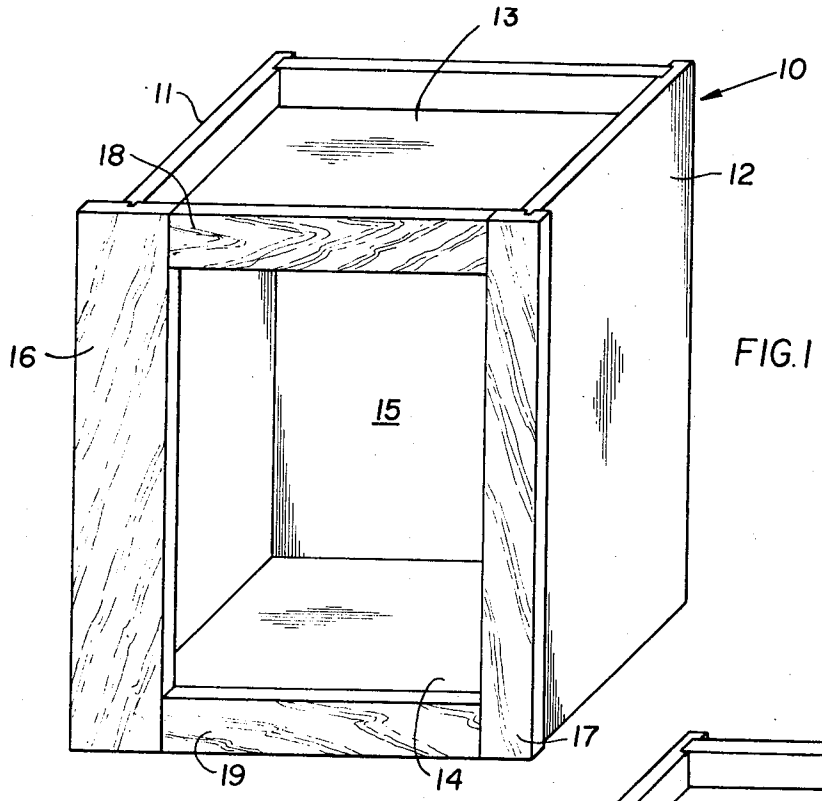



FIG. 1

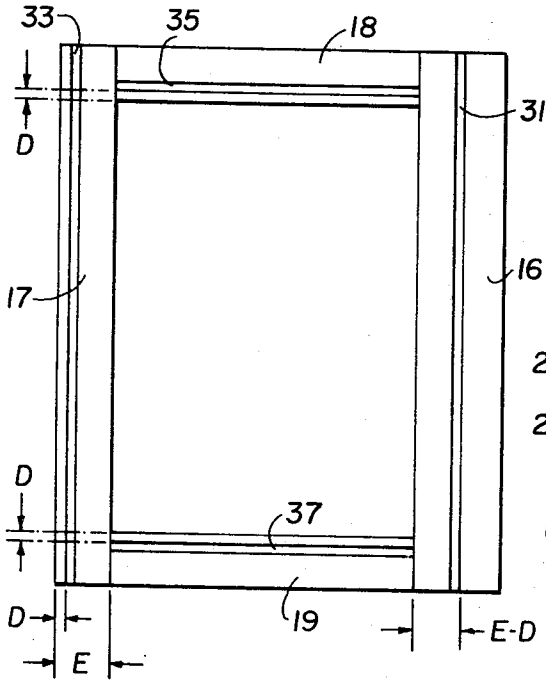



FIG. 3

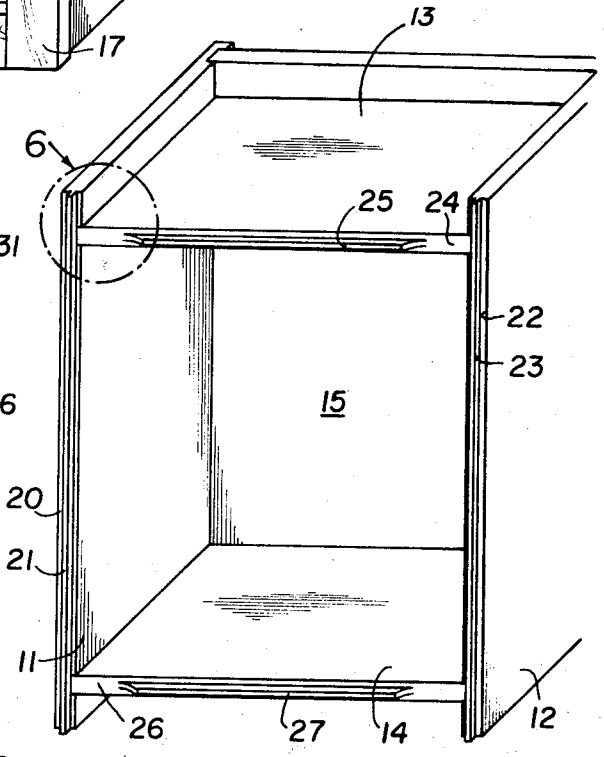



FIG. 2

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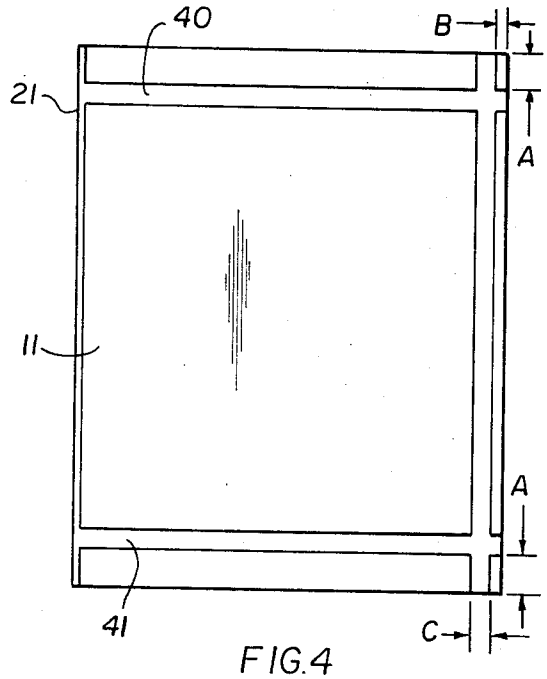



FIG.4

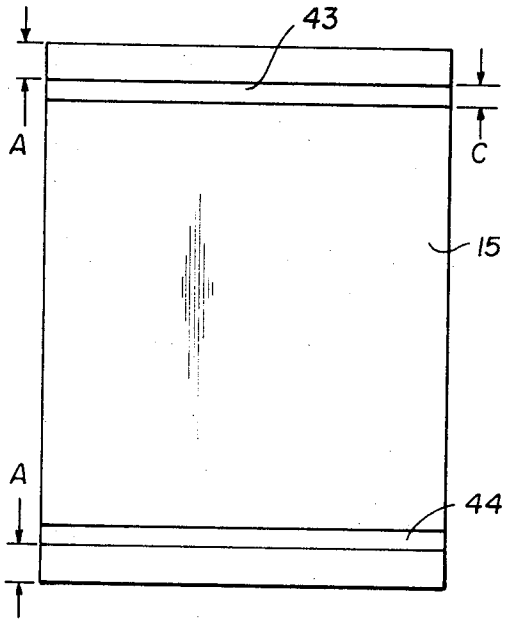



FIG.5

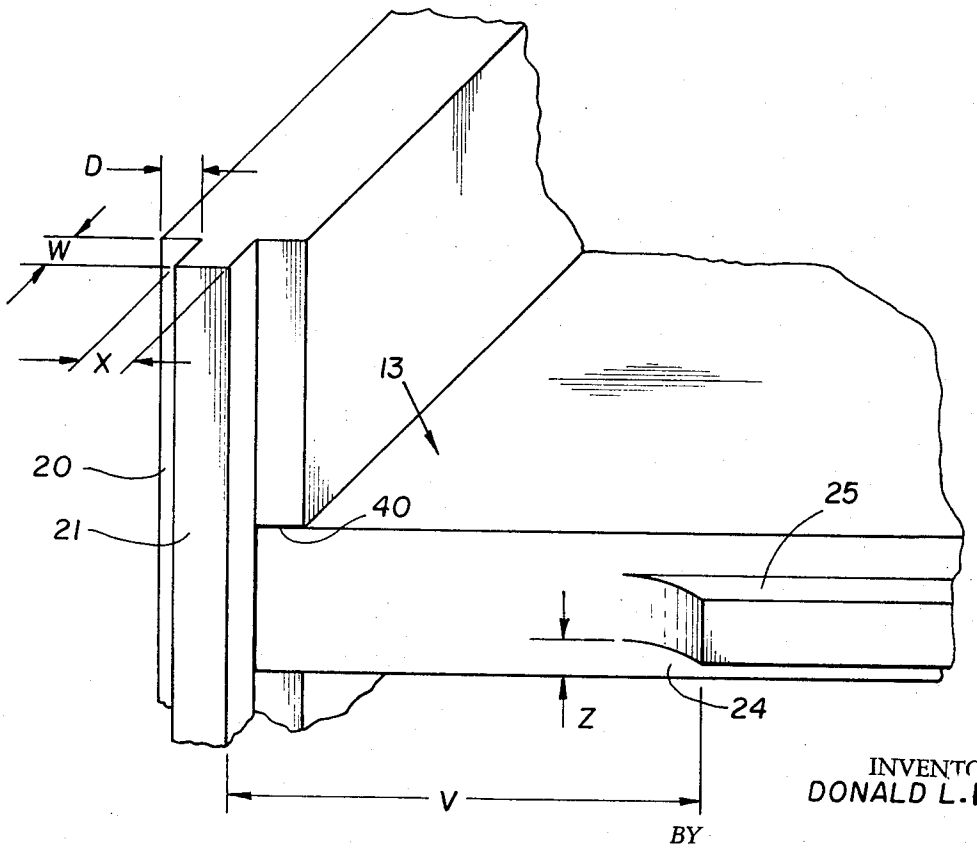



FIG.6

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# CABINET CONSTRUCTION

## BACKGROUND OF THE INVENTION

This invention relates to the assembly of structures, and more particularly to the assembly of cabinets and the like.

Cabinet construction is an old art and the manner in which the cabinets are formed and the individual elements thereof secured in place, has been well studied and developed by those skilled in the art over many centuries. With the increasing use of machines and the availability of metal fastening devices, the techniques for joining the individual sides, tops, bottoms and rear components of cabinets have changed in an attempt to take full advantage of the equipment available. Furthermore, the introduction of new structural members and finishing techniques such as utilization of laminates has given rise to new designs and assembly techniques.

Still further, the cabinet making industry has been affected by other fields such as transportation and labor availability, giving rise to the so-called knock-down cabinet concept, and the use of modularization. The knock-down concept makes possible the shipping of a cabinet as separate components in a flattened container, with the expectation that the cabinet will be formed on location by relatively unskilled assemblers. The modularization concept makes possible the provision of standard components, including sides, backs, front and rear portions, and stiles and rails which can be quickly and easily assembled in a variety of shapes and sizes in order to fit within the space limitation of a particular installation.

In implementing the modularization and knock-down concepts of cabinet construction, new fastening devices have been introduced and various design criteria have been established which permit assembly by unskilled persons with a minimum of tools.

## SUMMARY OF THE INVENTION

To date, no entirely satisfactory technique of cabinet design has been developed which will permit optimum utilization of existing machine tools, in order to develop the necessary component parts for a modular cabinet line and simultaneously provide for assembly of cabinets with unskilled labor and without the use of tools. The present invention discloses a new design for cabinets and similar structures of the type wherein five sides, or more, enclose an area. In this design the various wall elements are interlocked.

It is an object of the invention to provide an improved design for cabinets and the like wherein the component wall elements interlock with each other.

It is another object of the present invention to provide an improved design for cabinets and the like, making possible the simple and convenient assembly of cabinets.

Another object of the present invention is to provide an improved design for cabinets and the like, wherein the individual elements of the cabinet are initially formed by automatic machine tools and wherein the forming requires the utilization of a minimum number of dimensions or tool settings.

Another object of the present invention is to provide an improved design for cabinets and the like, which facilitates unskilled assembly and self-locating of the various elements of premachined components.



Yet another object of the invention is to provide an improved design for cabinets and the like, in accordance with a prescribed modular concept providing flexibility of design and permitting modifications in the size and interchangeable components utilizing the same basic components.

Another object of the present invention is to provide a design for cabinets and the like, adaptable to employment with pre-finished surface materials, such as laminates, which require no surface retouching.

Yet another object of the present invention is to provide an improved design for cabinets and the like, suitable for use in knock-down shipping and subsequent local assembly.

The above objects are attained in accordance with the invention wherein there is provided a structure comprising at least five interconnected elements having substantially planar surfaces, the facing portions of a first pair of said elements being substantially mirror images of each other and the facing portions of a second pair of said elements being substantially mirror images of each other. The surface of the fifth element is slotted to receive the first pair of elements and the surfaces of each of the second pair of elements are similarly slotted to receive the opposing unconnected edges of the fifth element. In order to effect a complete interlock, the surfaces of the second pair of elements are also slotted to receive the remaining opposing edges of the first pair of elements whereby the interconnected elements form an open-ended box.

In accordance with a further aspect of the invention, the above described open-ended box is used in combination with specially designed and cooperating rails and stiles to produce a facing portion which interlocks therewith and which retains the dimensional flexibility features of the basic cabinet construction.

The specifically recited objects, as well as additional objects and unique features of the present invention, will be better understood and appreciated after a consideration of the following description which is made in conjunction with the drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustrative perspective view of a cabinet assembled in accordance with the design of the present invention;

FIG. **2** is an illustrative perspective view showing the front portion of the cabinet illustrated in FIG. **1**, with the facing rails and stiles removed;

FIG. **3** is a rear view of the assembled facing rails and stiles illustrated in FIG. **1** after removal and rotation about the left stile by 180°;

FIG. **4** is an elevation view of the inside surface of the left wall of the cabinet shown in FIGS. **1** and **2**;

FIG. **5** is an inside elevation view of the rear surface of the cabinet shown in FIGS. **1** and **2**; and

FIG. **6** is an enlarged view of the area enclosed within the circle **6** appearing in the upper left quadrant of FIG. **2**.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

The cabinet structure illustrated in FIG. **1** has been developed primarily for purposes of explaining the design techniques and arrangement of the present invention. It will, of course, be understood by those

skilled in the art that the specific structure shown in FIG. 1 may be modified in accordance with space requirements and other more technical details. On the other hand, the design consideration described and explained hereinafter will have to be adhered to in order to achieve the advantageous results available with this invention.

As shown in FIG. 1, the cabinet has a pair of side walls 11 and 12, top and bottom walls 13 and 14, and a rear wall 15. It is contemplated that for optimum appearance and durability, the interior surfaces of each of the illustrated walls may be vinyl laminated prior to assembly. If desired, pre-treatment of the exterior surfaces is also possible. This feature makes it important to provide a fastening technique which will not abrade or damage the wall surfaces in any way. It will be noted that no fastening or fastening devices appear on the interior surfaces nor upon the exterior surfaces of this cabinet structure.

The front face of the cabinet is finished by the utilization of a pair of finishing stiles 16 and 17 and a pair of finishing rails 18 and 19. These stiles and rails are fixed to the open face of the cabinet in a specific manner to be described hereinafter. Once again, the complete absence of fastening devices it to be noted. It is also to be noted that the stiles and rails will customarily be prefinished, perhaps with a laminated surface, and that accordingly the proper positioning of the elements relative to butting contact and surface regularity, must be maintained and assured by the assembly design.

Reference is now made to FIGS. 2 and 3 which show the removal of the facing stiles and rails by means of rotation of the front assembly about the left edge of the cabinet. These two figures reveal the tongue and groove arrangement for interconnecting the facing rails and stiles to the open end of the cabinet proper. Thus, upon the edges 20, 22, 24, and 26 of the sides and top and bottom, there are shown tongues 21, 23, 25, and 27, respectively. These tongues extend longitudinally along the edges, and in the case of the sides, they extend to the extreme end. On the other hand, both the top and bottom elements have tongues 25 and 27 which terminate some distance before the end of the edge upon which they appear. In this respect, attention is directed to the enlarged view in FIG. 6. As illustrated in this view, each tongue has a width X and a length W. The internal face of the tongue is located a distance Z which can be equal to D from the finished face of side 11. This is an important design aspect of the invention. On each of the elements under consideration, the tongue is located the same dimension Z from the finished face of the respective element. This insures that in the machining of the various elements, a single setting only is required in order to prepare the tongued edge of each element. It is also important because the mating grooved portion on the respective rails and stiles also partakes of this single dimensional stability and thereby renders the necessary automatic machining of these rails and stiles extremely simple and relatively free of machine adjustment.

Considering FIG. 6 still further, it will be noted that the tongue 25 on top element 13 terminates a distance V from the end of the element. The distance V is determined by the width of stile employed. With reference to the mating stile 16 appearing in FIG. 3, it will be appreciated that the length V must be greater than the dimension E – D wherein D is the distance of the groove from the finished face and E is the width of a standard stile, allowing for projection into the area surrounding the cabinet cavity.

FIG. 6 also reveals in enlarged detail the presence of a groove 40 in wall element 11, into which top element 13 extends. Groove 40 is part of the interlocking structure of the present cabinet design and will be seen to extend across the upper portion of left wall element 11 as illustrated in FIG. 4.

Both the left and right side wall elements 11 and 12 are provided with grooves having a width substantially the same as the thickness of the stock employed for the various elements of the cabinet. The opposing faces of the left and right side elements are substantial mirror images of one another and consequently consideration of the interior view of the left side element shown in FIG. 4 is sufficient to understand the forming of both sides.

The laterally extending grooves 40 and 41 appear at the top and bottom portions of the side element 11. These grooves are spaced from the adjacent edge of the element by the same dimension A. By maintaining this dimension, one again provides for ease of machine setup and makes it possible to cut and form the side and back elements for cabinets of all sizes, while utilizing a single machine setting.

A further groove 42 extends the entire height of wall element 11 and is spaced from the back edge by a distance B. Although dimension B may be the same as dimension A, in order to provide a maximum interior cavity, it may be found desirable to make dimension B somewhat smaller than dimension A. In fact, suitable selection of dimension A is generally governed by the width of the rails 18 and 19 in a cabinet of the type shown in FIGS. 1 and 2. Thus, where the designer intends to have the inner portions of the rails form a continuation of the upper and lower walls, this immediately determines the magnitude of dimension A. In the absence of such external criteria, one might easily have these dimensions of the same value. As noted previously, the width of the grooves C is established by the width of the stock employed for the elements. The depth of the grooves is selected as required to provide satisfactory seating of the respective components.

FIG. 5 illustrates the interior surface of a back element 15 and reveals the presence of transverse grooves 43 and 44, each spaced from the adjacent edge by an amount A. The grooves 43 and 44 are thus aligned with grooves 40 and 41 respectively of the side wall elements. Thus, in assembling the cabinet, the top and bottom elements 13 and 14 each fit within a set of grooves securing three edges thereof. The resulting interlock prevents pivoting about any of the various joints and insures a rigid cabinet structure. This rigidity has been effected within a unit having elements characterized in that the groove dimensions are constant in each element and the grooves are spaced from the proximate edge of each element by a constant dimension.

In order to permanently secure the various elements of the illustrated cabinet, one may simply apply glue in the various grooves. There is no need for external fastening devices such as clips, clamps, or glue blocks.

With a little care, the assembler can avoid any surplus glue and consequently there will be no visible fastening means between the various elements. In addition to noting this fact, it will be immediately apparent that the assembler has had no need for tools in effecting assembly; nor has there been any need for consideration of dimensions. The elements of the cabinet fit together with ease, with precision, and without mental effort.

In describing a particular embodiment of the invention, attention has been directed to the various features thereof. Those skilled in the art will appreciate the applicability of the various features to other structures and, of course, the construction of drawers is almost directly analogous to the construction of the illustrated five-sided cabinet. The changes required primarily relate to the designation of one of the sides as a facing side and perhaps a relocation of the grooves in order to assure that this facing side is properly supported and interlocked. All modifications of the illustrated embodiment which utilize the teachings and principles of this invention are intended to be covered by the following claims.

I claim:

1. A structure comprising at least five interconnected elements having substantially planar surfaces and four substantially orthogonal edges, the facing portions of a first pair of said elements being substantially mirror images of each other and the facing portions of a second pair of said elements being substantially mirror images of each other, a surface of the fifth element being slotted at opposing ends to receive one edge of each of said first pair of elements and the surfaces of each of said second pair of elements being slotted to receive the opposing unconnected ends of the fifth element, said second pair of elements being further slotted to receive the remaining opposing edges of said first pair of elements, whereby said interconnected elements form an open-ended box; the exposed edges of said first and said second pair of elements having longitudinally extending tongues thereon, said tongues each being spaced from a selected face of the respective elements by the same dimension Z, and having a width less than the width of the stock forming said elements; and a pair of stiles and a pair of rails, said stiles and rails having grooves in one face thereof dimensioned to receive said tongues and spaced from selected edges thereof by said same dimension Z.

2. A structure as defined in claim 1, wherein each element has four substantially orthogonal edges.

3. A structure as defined in claim 1, wherein the slots on the second pair of elements for receiving the first pair of elements, are spaced from the adjacent edge by the same dimension A.

4. A structure as defined in claim 3, wherein the slots on said fifth element are spaced from the adjacent edge by said same dimension A.

5. A structure as defined in claim 4, wherein the slots on said second pair of elements for receiving said fifth element, are spaced from the adjacent edge by said same dimension A.

6. A structure as defined in claim 1, wherein the tongues on the edges of said first pair of elements terminate before each end by an amount greater than the distance between the groove in each stile and the inner edge thereof.

7. A structure including at least five interconnected elements comprising a first pair of elements having flat planar faces, constant thickness, and similar length and breadth dimensions; one element having a substantially flat surface with slots at opposing ends to receive one edge of each of said first pair of elements, said slots having a width substantially equal to said constant thickness; and a second pair of said elements having opposed substantially flat facing portions which are substantially mirror images of each other, the surface of said facing portions having slots to receive the opposing unconnected edge of said one element and the remaining opposing edges of said first pair of elements, said slots having a width substantially equal to the thickness of the respective elements received thereon; whereby said interconnected elements form an open-ended box.

8. A structure as defined in claim 7, wherein the slots on the second pair of elements for receiving the first pair of elements are spaced from the adjacent edge by the same dimension A.

9. A structure as defined in claim 8, wherein the slots on said one element are spaced from the adjacent edge by said same dimension A.

10. A structure as defined in claim 9, wherein the slots on said second pair of elements for receiving said one element, are spaced from the adjacent edge by said same dimension A.

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