

[54] CONSTRUCTIONAL ELEMENT
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[51] Int. Cl. EO4b 1/00, EO4c 2/00
[58] Field of Search 52/619, 620, 626, 627,
52/222, 580, 461, 281, 282, 80, 82

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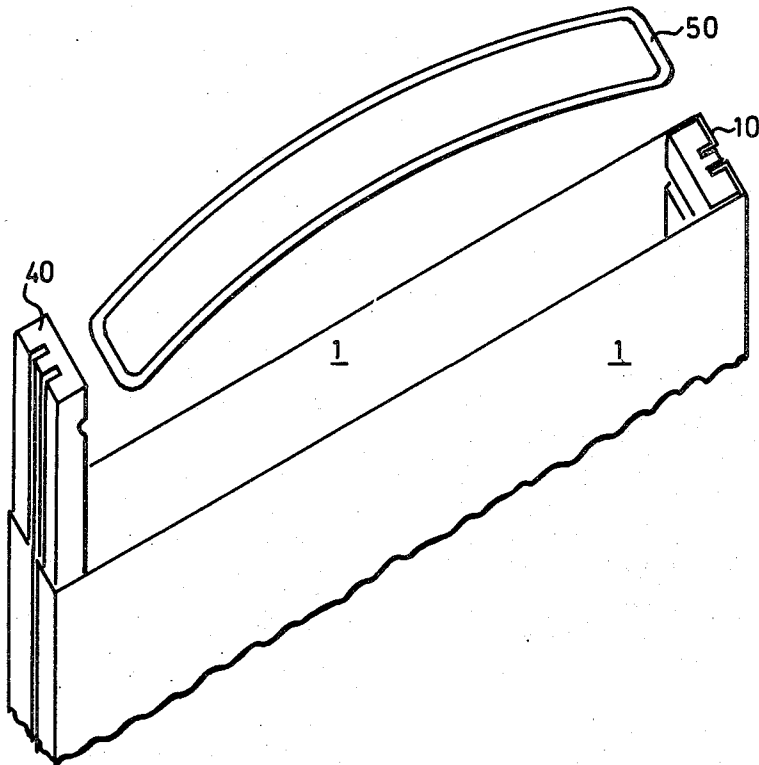
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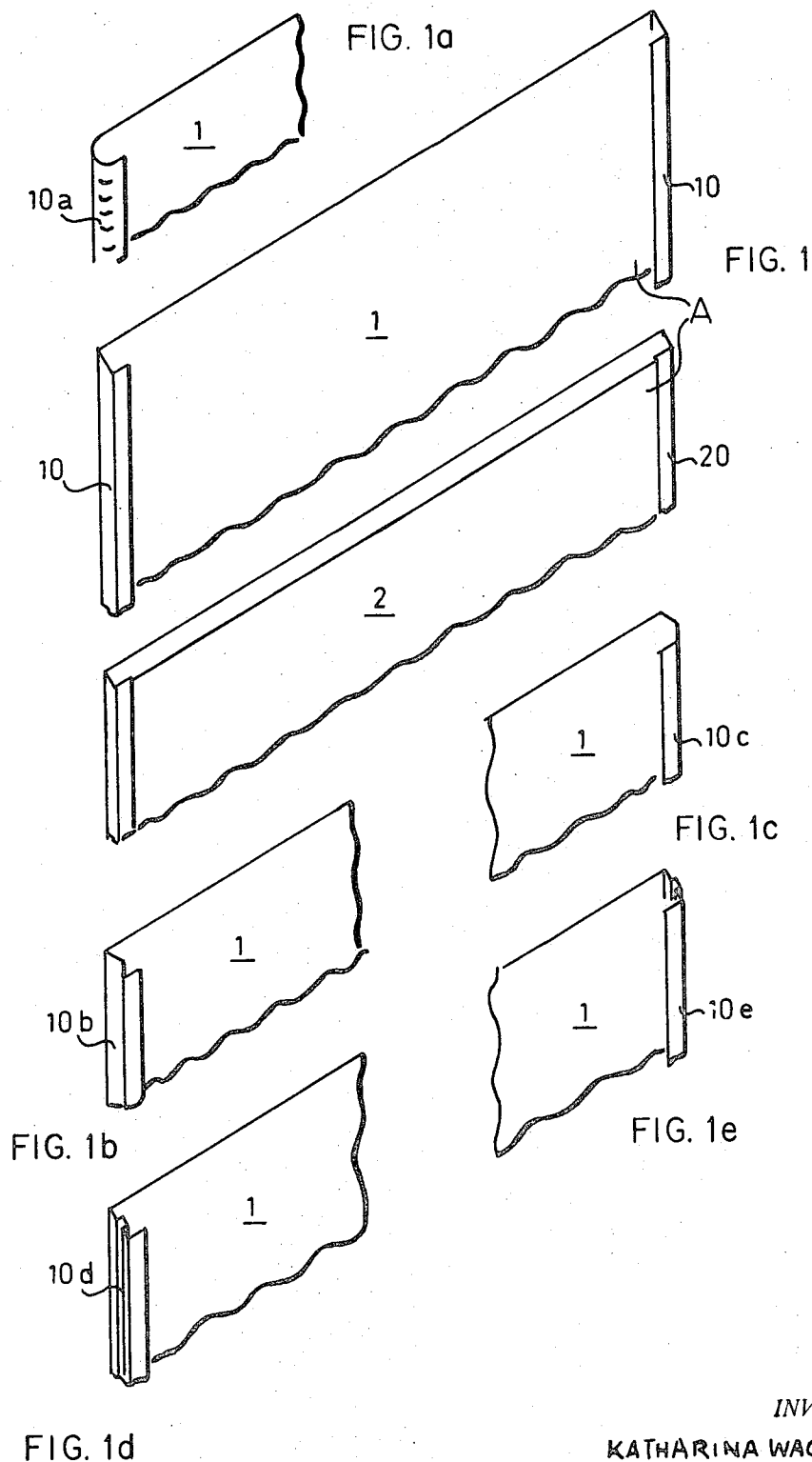
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Attorney, Agent, or Firm—Craig & Antonelli

[57] ABSTRACT
A constructional element the form of which is suitable for use in buildings, internal fittings, furniture, and packaging which includes a thin walled component and filler component with the thin walled component having guide strips on two opposite edges with which the filler component is engaged.

19 Claims, 38 Drawing Figures





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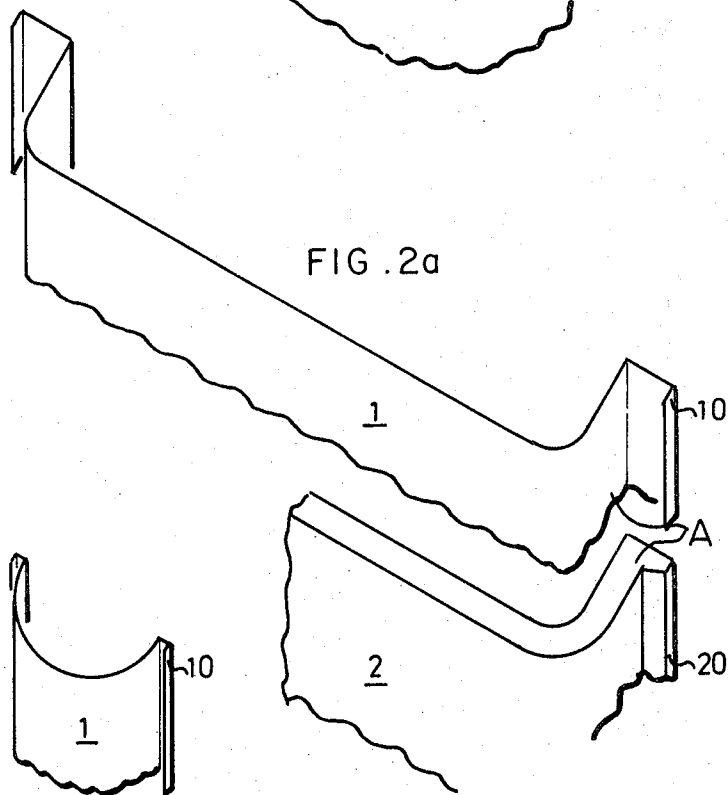
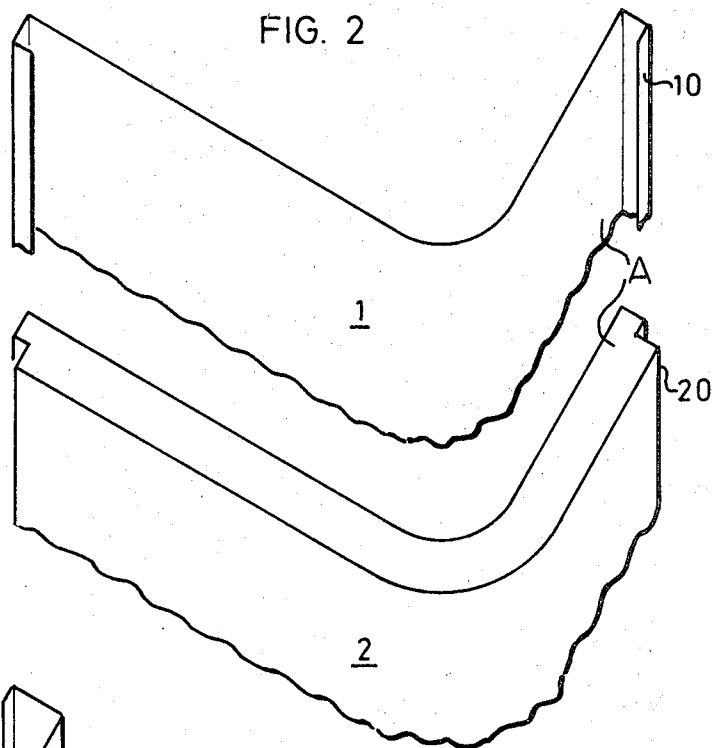
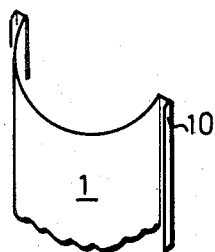


FIG. 2b



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FIG. 3

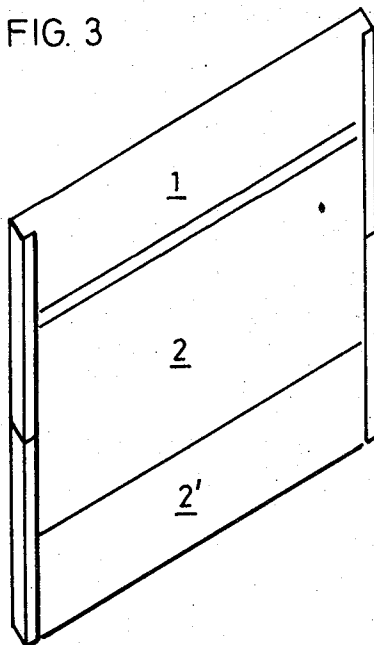
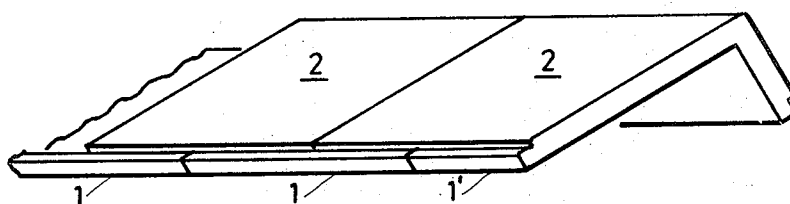


FIG. 3a



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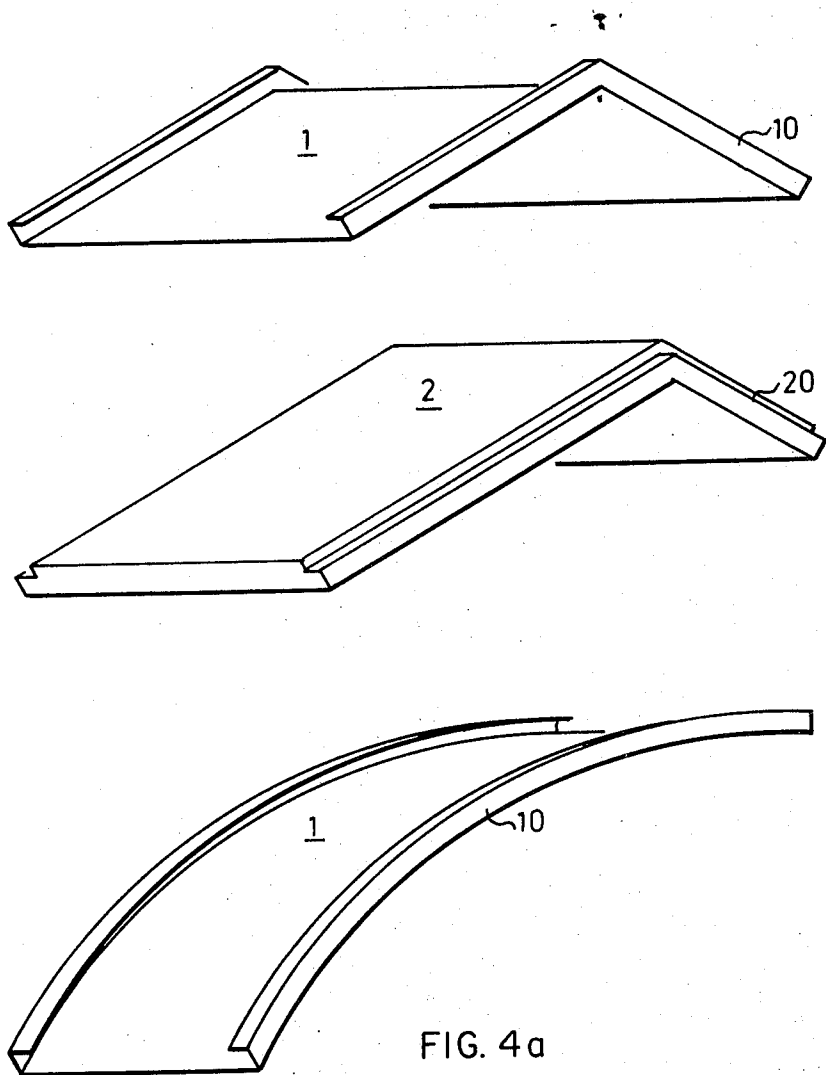
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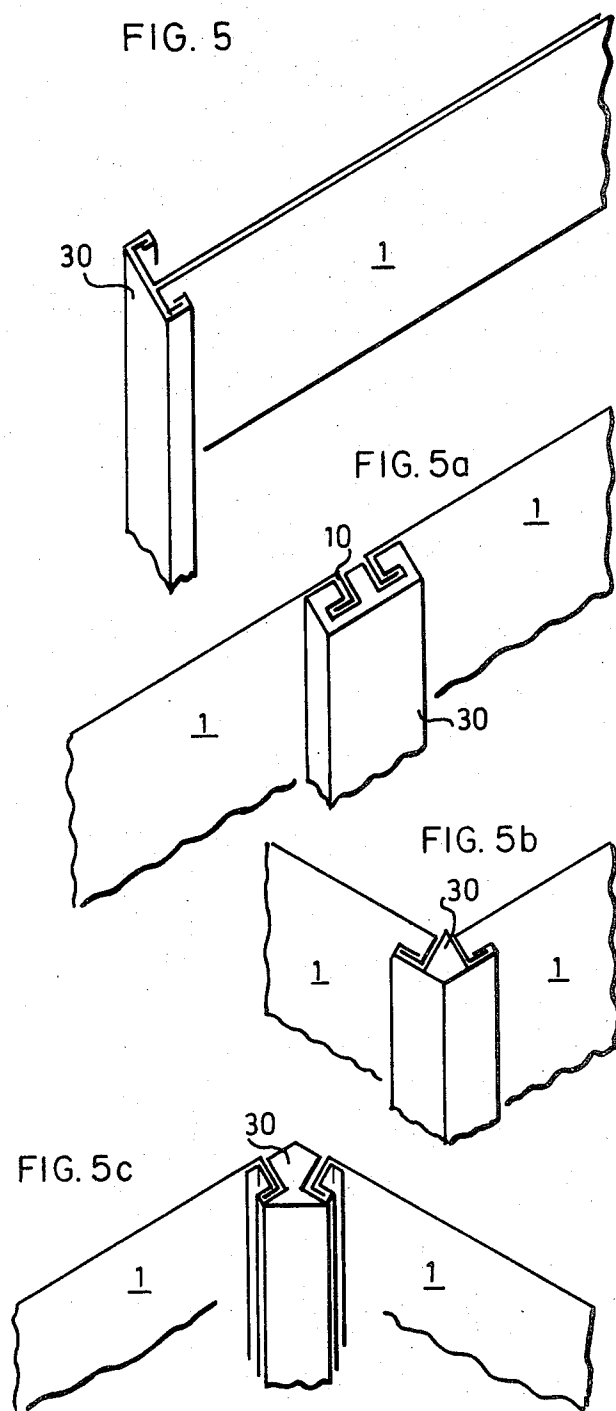
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FIG. 4



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FIG. 6

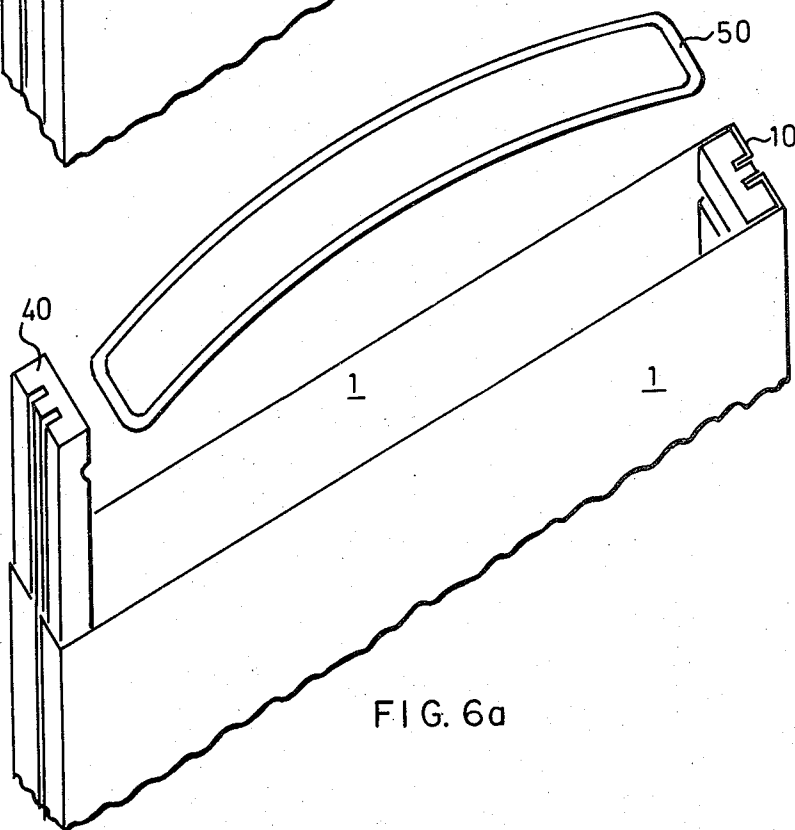
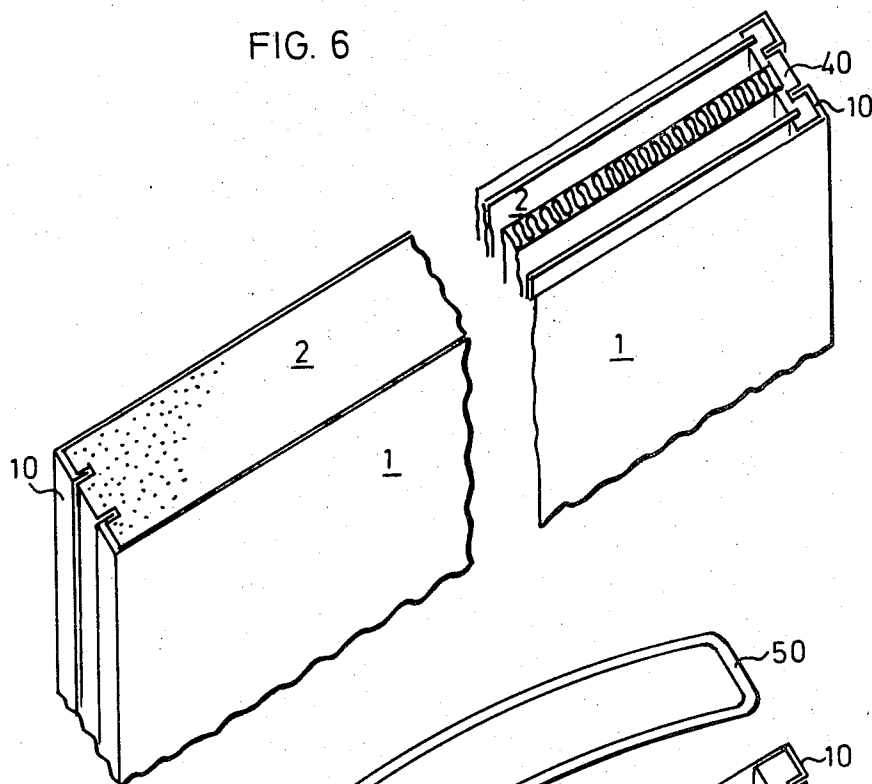


FIG. 6a

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FIG. 7

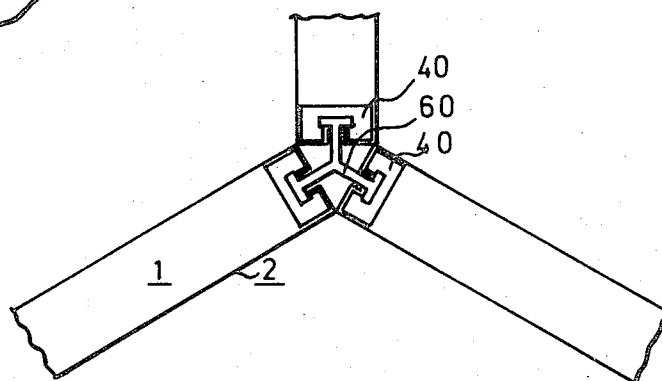
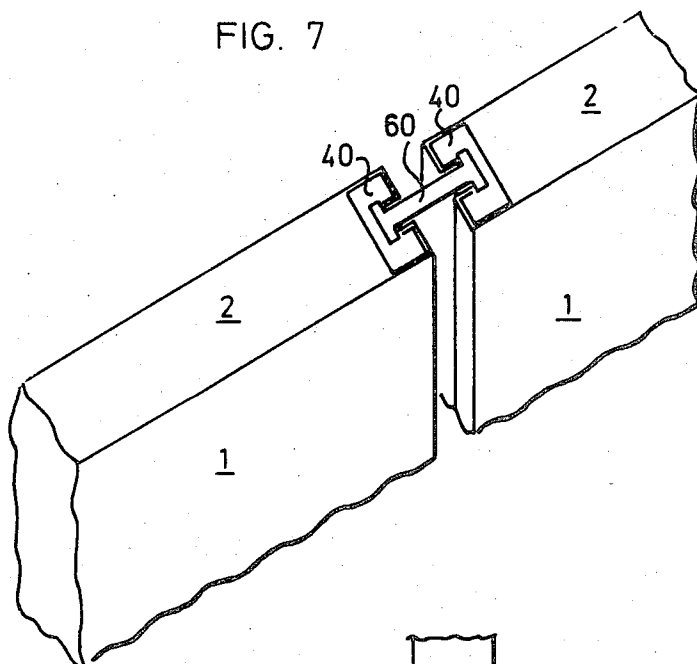


FIG. 7a

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FIG. 8

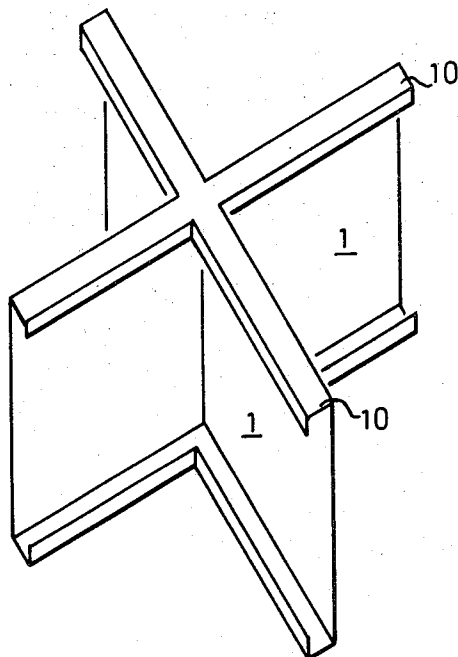
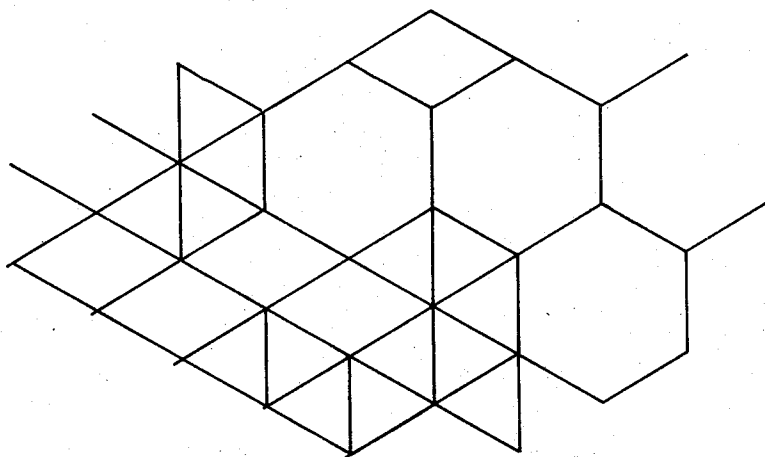


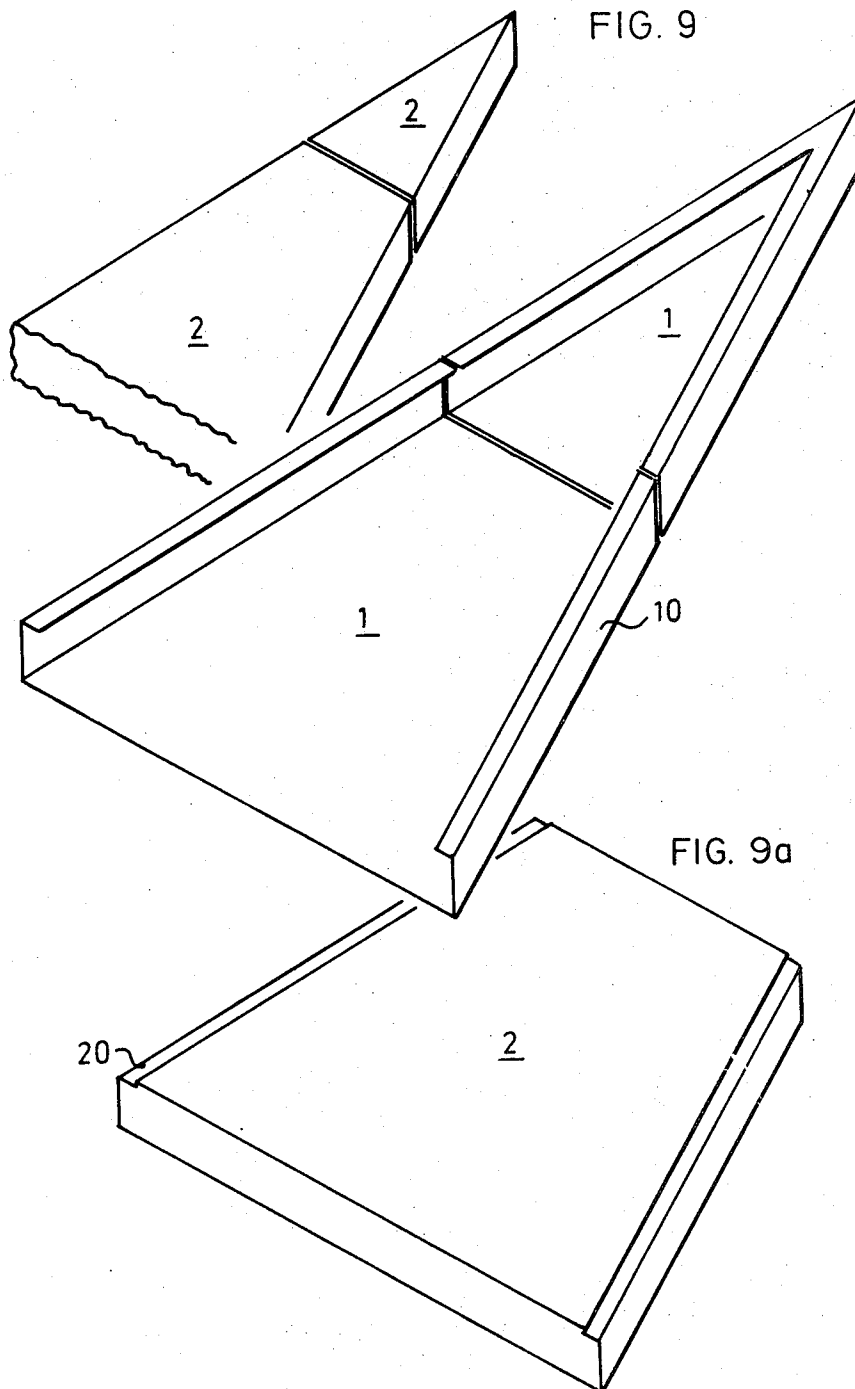
FIG. 8a



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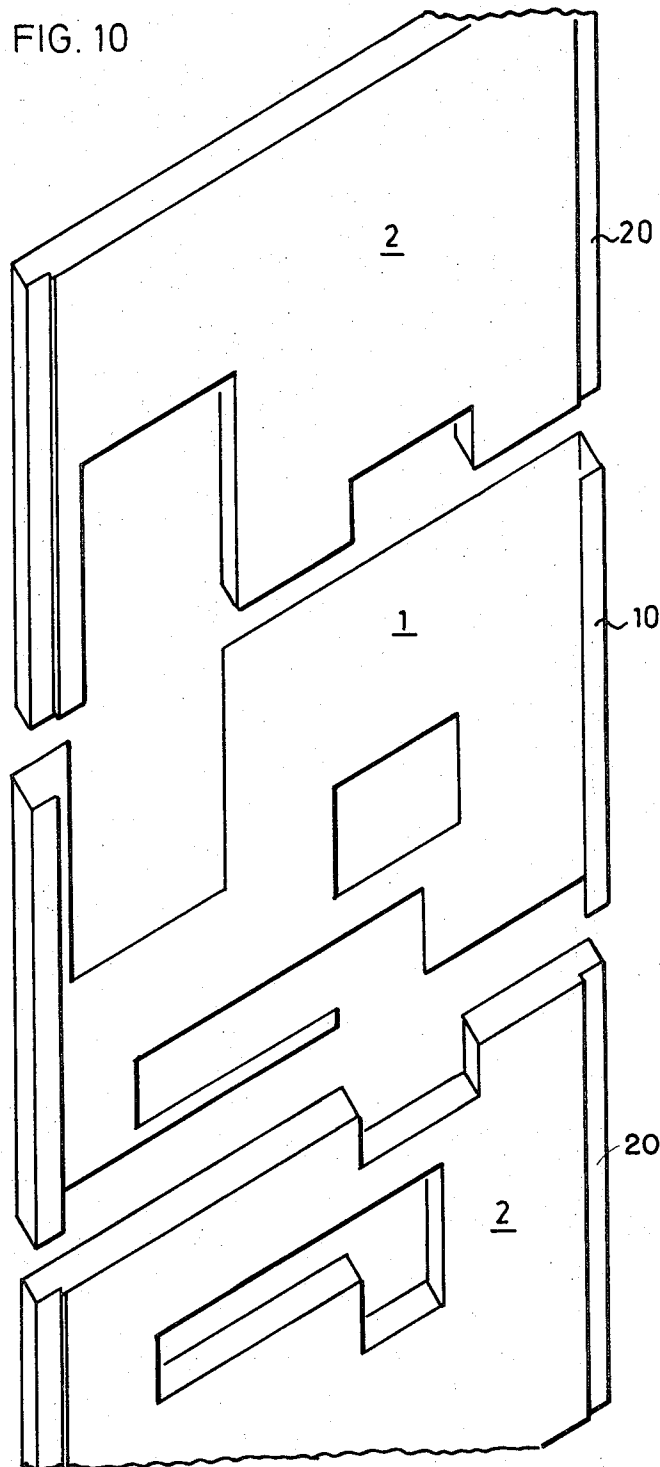
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FIG. 10



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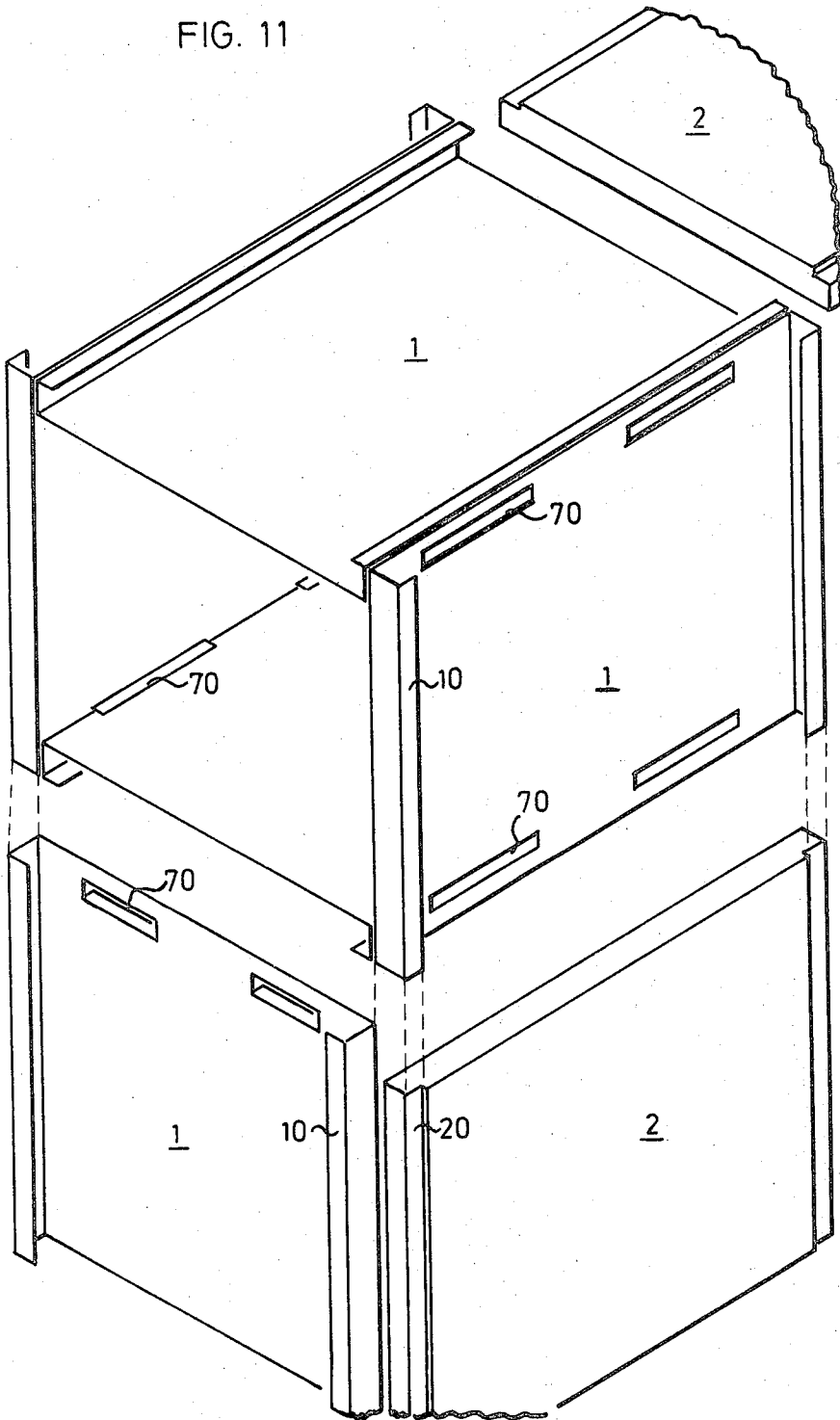
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FIG. 11



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FIG. 12

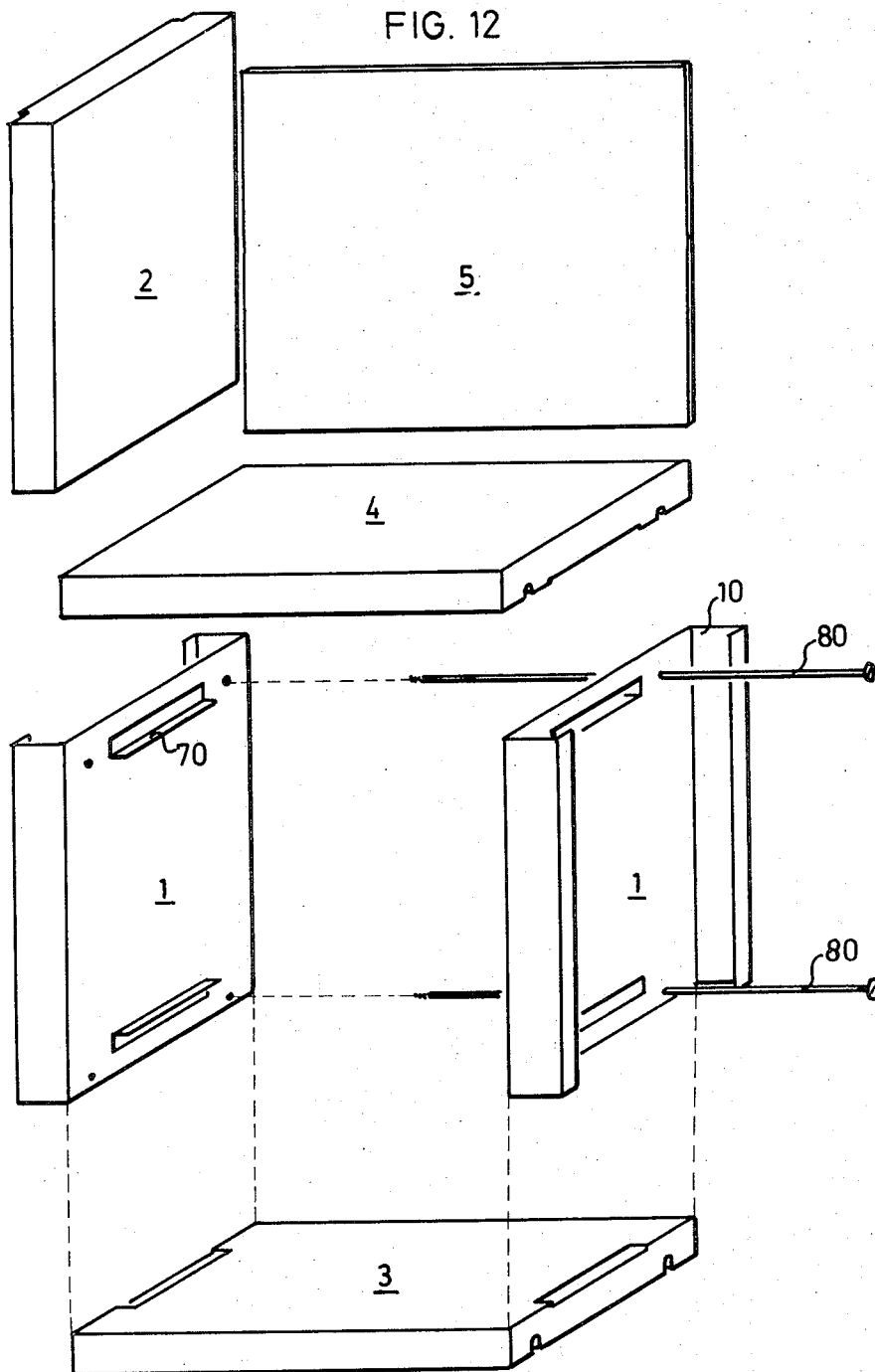


FIG. 12a

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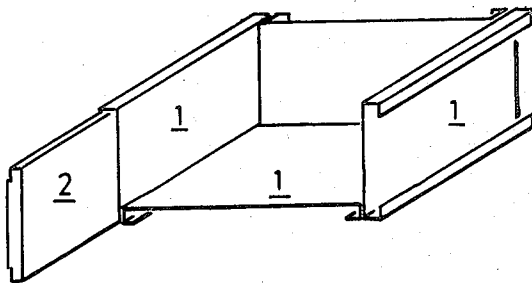


FIG. 13

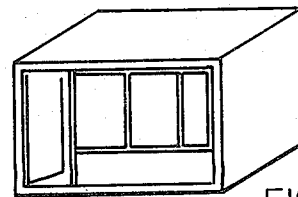


FIG. 13a

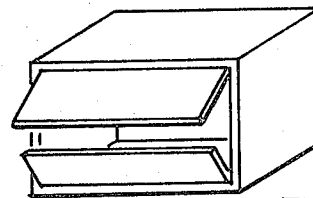


FIG. 13b

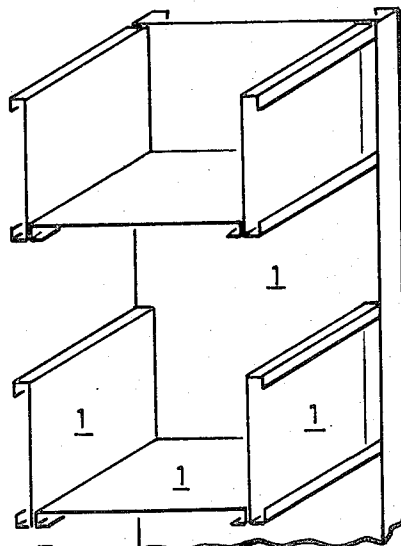


FIG. 13g

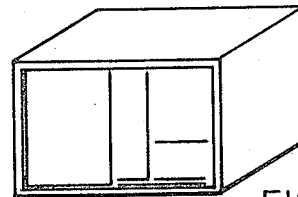


FIG. 13c

FIG. 13d

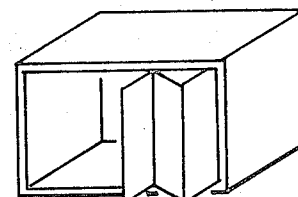


FIG. 13e

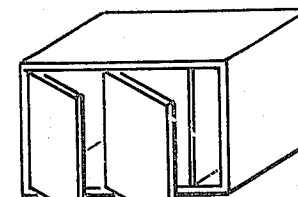


FIG. 13f

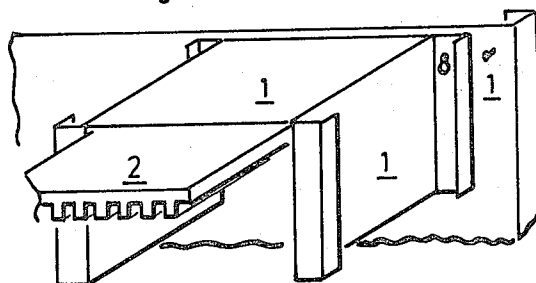
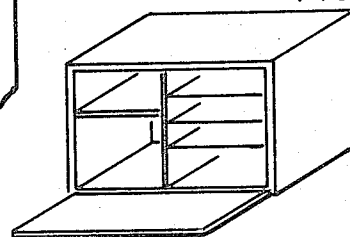


FIG. 13h



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CONSTRUCTIONAL ELEMENT

The invention relates to a composite constructional element for the construction of load-bearing or non-load-bearing surfaces and members of many forms, sizes and uses.

Many constructional forms of composite constructional elements are known in various technical fields, in the form of single-material or multi-material elements. They are used for example in the building trade as building boards, solid doors or the like.

The invention has as its object to provide a composite constructional element which may be of various forms and sizes so as to be used for many purposes, for example in the structures of buildings, in internal fittings, furniture construction, the packaging field and the like. In accordance with this object, the constructional element should be such that many materials and material combinations are possible in order to satisfy the different technological requirements.

The present invention provides a constructional element comprising a thin-walled guide component, guide strips being provided along opposite edges of said guide component, which guide strips stiffen said guide component and are open towards one another, and a filler component which is adapted to be introduced into the guide component, said filler component having opposite edges shaped to fit into the guide strips.

In this composite constructional element, any forces which occur are preferably taken up by the filler part, which consists of a material suitable for these requirements, or is constructed appropriately. Instead of this it is also possible more particularly when the forces occurring are not considerable, for the guide part to take up these forces, in which case the filler part may be of such construction and made of such material that it has to carry out other tasks, for example thermal or sound insulation, forming transparent surfaces, or the like.

To form surfaces which are larger than an individual component, two or more constructional elements may be adapted to be connected by staggering the joints of the corresponding components, one of the two components in each case connecting two of the corresponding components, bridging the joints between them. Thus a simple method is provided for connecting the elements in one direction.

As already indicated, the composite constructional element proposed according to the present invention may include many configurations. For example the guide components and filler components can be made in congruent form, each guide strips being straight. Alternatively, however, one of the two components may be bent about an axis at right angles to the guide strips, in which case corresponding components can be arranged in the two limbs of the angle. In this case, the joint between the introduced components is bridged by the bent component.

In further development of the invention it may be provided that the components are curved to a circular shape in the direction of the guide strips, so that they can be likewise connected together. In the case of the curvature deviating from the circular, in principle a component can be given the entire curvature, but in that case the components corresponding thereto must be introduced into that component in several small sections or must be elastic.

To permit connection of adjacent guide strips, the guide components or the elements and the filler components are adapted to be connected at their edges by push-on strips. Thus in this way the composite constructional elements can be connected in both co-ordinate directions to form relatively large surfaces.

Two guide parts facing towards one another with their guide strips can be connected by means of a common filler part. The filler component in this case has a shaped edge engaging guide strips situated side by side.

In order to form hollow, double constructional elements, the mutually facing guide strips of the guide components are connected by means of grooved strips, the grooved strips situated opposite one another being pressed into the guide strips by spring means bridging the space. The composite constructional element thus obtained is rigid in itself, since the spring means provided bring about the necessary restraining effect.

The constructional element according to the invention is also suitable to form cellular structures. By construction one of the two components as a multi-arm member whose arms form with one another angles appropriate to the desired structure.

Instead of a rigid connection for the elements, it is also possible to use articulated connection, in order to permit the elements to move relatively to one another. Hinges or the like, flexible push-on strips or connecting means can be used for such articulation.

Whereas the components according to the invention generally have a rectangular form, it is also possible for certain purposes to use components having convergent edges including the guide strips. Triangular or trapezoidal components are suitable. It may also be arranged that the plane components have a form which differs in their plane from the angular form, for example they may be in the form of a part-circle (less than half a circle), a part-oval, or the like. Such elements are particularly suitable for specifically shaped closures or surfaces or members.

Additionally the components of the invention can be provided with apertures for forming openings for doors, windows, cabling or the like. These apertures may be provided for example of their final shape in one component, and in the other components they may be in a form which is completed only when two of these components are put together.

The constructional elements according to the invention are equally advantageous for the construction of hollow members. This is achieved by interconnecting that several elements to one another in accordance with the desired member shape, a framework for the member being preferably formed by the guide component. These components may either form a complete frame type of structure or only parts of a framework, in which case clamping parts or the like may be provided additionally to these components. The construction is such that the clamping parts and other connecting means and also any auxiliary means for accepting forces partly or wholly are incorporated within the components in order to obtain smooth surfaces. Hollow members constructed in this way are suitable more particularly for the formation of cubicles, articles of furniture, packing materials or the like. Individual sides may be left open, for example in order to receive flaps, doors or the like. Furthermore two sides abutting on one another may be open, for example for use in

shelves in furniture construction, for balconies, loggias or the like in building work. Of course it is also possible to build compartments into hollow members constructed in this way. These hollow members may also be provided with fittings such as stands, feet, rollers, suspension means or the like. These members can be connected by the same elements as are provided for the connection of individual elements.

Further features, details and advantages of the invention are shown in the following description of some preferred constructional forms, and also with the help of the drawings in which:

FIG. 1 illustrates the components of a composite constructional element;

FIGS. 1a-1e illustrate alternate configurations of the guide strips;

FIG. 2 illustrates an example of the configuration of constructional elements;

FIGS. 2a and 2b illustrate modification of the arrangement of FIG. 2;

FIG. 3 illustrates another arrangement of the constructional elements which are connected by staggered arrangement of the joints;

FIG. 3a illustrates a modification of the arrangement of FIG. 3;

FIG. 4 illustrates the constructional elements of the instant invention angled in the direction of the guide strips;

FIG. 4a illustrates a constructional element curved in the direction of the guide strips;

FIG. 5-5c illustrates constructional elements of the instant invention connected by means of push-on strips;

FIGS. 6 and 6a illustrates double constructional elements which are connected to one another in alternative ways;

FIG. 7 illustrates double constructional elements of the instant invention which are connected by means of a connector;

FIG. 7a illustrates an arrangement similar to FIG. 7 wherein a three dimensional connector is used;

FIGS. 8 and 8a illustrate cellular structures formed of two or more constructional elements;

FIGS. 9 and 9a illustrate constructional elements with convergent guide strips;

FIG. 10 illustrates constructional elements with apertures;

FIG. 11 A box-section hollow member employing the constructional elements of the instant invention;

FIGS. 12 and 12a illustrate a box-section hollow member open at one end,

FIGS. 13 13h illustrate various constructional forms of box-section hollow members open at two sides.

FIG. 1 shows a composite constructional element A which comprises two components, namely a thin-walled guide part 1 and a filler part 2 which is pushed into the guide part.

In its simplest form shown in FIG. 1, the guide part 1 is provided at its two opposite side edges with guide strips 10 which are open at the sides and directed towards one another. FIGS. 1a-1e illustrate the alternative configuration of the substantially U-section strips 10a to 10e. It will be appreciated that other sections can be provided. The filler part 2, in its simplest form a solid body, comprises at its side edges edge strips 20 corresponding to the guide strips 10.

FIGS. 2, 2a and 2b show various shaped elements A, whose filler parts 2 may be solid or laminated bodies having surfaces which are flush with the guide parts 1, shown projecting or in a sunken position.

The plane and bent elements shown in FIGS. 3 and 3a are connected to one another by a staggered arrangement of the joints. In the case of the plane element (FIG. 3), the end filler part 2 is only half the size of the other filler parts 2 in the direction at right angles to the joint.

In the case of the bent element (FIG. 3a), the end guide part 1 is shown as half the width. In the two arrangements illustrated, the components are connected by one component bridging the joint between two adjacent components corresponding thereto.

FIG. 4 shows a guide part 1 which is bent in the direction of the guide strips 10 and the filler part 2 which is bent in the direction of the edge strips 20. The bending can be effected at any place, but preferably at right angles to the guide or edge strips.

Furthermore in FIG. 4a there is shown a guide part 1 which is curved in the direction of the guide strips 10 and whose curvature corresponds to a segment of a circle. A corresponding filler part 2 (not shown) can be pushed into this guide part. The curvature may also be of other shapes, in which case the corresponding filler part 2 is formed of several small sections or consists of an elastic or a subsequently hardenable material.

FIGS. 5 5c show several examples for the connection of elements abutting on one another, by means of push-on sections 30 arranged on the guide parts 1. As the drawings show, any desired angle connections can be formed, it being simply necessary to adapt the profile of push-on sections 30 correspondingly.

FIG. 6 shows double elements, two guide parts 1 facing towards one another with their guide strips being connected by a common, solid or multi-layer filler part 2.

Also shown in FIG. 6a guide part 1 is a hollow element whose guide strips 10, directed towards one another, are connected with grooved strip members 40 which themselves are pressed by spring means such as action spring clips 50, expanding into the U-shaped guide strips 10 so that the hollow element is clamped in itself.

The double elements shown in FIG. 7 are connected along the guide strips 10 by means of connectors 60. In the embodiment shown in FIG. 7a T-shaped connecting strips 60' of flat or three-dimensional form are employed.

FIGS. 8 and 8a show cellular structures which may be obtained by the use of the constructional elements of the instant invention. In FIG. 8 there is shown a right-angled multi-arm guide part 1 with which there can be associated corresponding fill parts 2 (not shown) in order to construct rectangular structures. Alternatively, it is also possible to use multi-arm filler parts 2 (not shown) with corresponding guide parts 1. FIG. 8a illustrates a triangular, hexagonal and rhomboidal cellular structure using the conventional element of the instant invention.

FIG. 9 shows a constructional element whose guide strips 10 converge and form trapezoidal or triangular shapes. The guide parts 1 are connected by the use of filler parts 2, the size of the filler parts 2 being arranged so that the joints between adjacent filler parts 2 are staggered from the joints between guide parts 1. FIG.

9a shows a modification of the edge strip 20 of the filler part 2 which could be employed in the arrangement of FIG. 9.

FIG. 10 shows constructional elements with openings of many different kinds. In the illustrated example the joint between the two filler parts 2 is arranged in the middle of the guide part 1, so that the apertures in the two adjacent filler parts 2 complement one another at the joint, to produce the final aperture whereas in the guide part the apertures are made in their final shape.

FIG. 11 shows a simple, right-angled hollow member in the form of a box composed of the novel constructional elements of the instant invention with the guide strips 10 of the guide parts 1 being all directed outwardly. Pressed out supports 70 are provided in one guide part to support adjacent guide parts e.g. in order to accept shearing forces. Connections using screws or based on the principle of cupboard bolts or bed fittings are not shown, since they are known. By staggering the joints of the filler parts 2, it is possible to connect several hollow members in every direction.

FIG. 12 shows the construction of a hollow member of box-shaped cross-section which is open at one side, and which is formed of two oppositely disposed constructional elements supplemented by the other surfaces 2, 4, 5. The surfaces of the hollow member may be held together by the clamping parts 80 shown in FIG. 12a which are concealed in grooves in parts 3, 4. The heads of clamping parts 80 are covered so as to be invisible by means of the filler parts 2. By means of the surface 5 the box-section hollow member can be given the necessary angular rigidity.

FIGS. 13 through 13h shows examples of the construction of simplified box-section hollow members with one or two open sides, which can be closed in the various ways shown FIGS. 13a-13f the examples shown in FIGS. 13e and 13f are additionally provided with compartments.

The examples illustrated in FIGS. 13, 13g and 13i show box-shaped hollow structures with two open sides adjoining one another. Examples in 13g and 13h show the structures with a relatively large common composite constructional element to which the box-like hollow members are secured. FIG. 13h illustrates the use of a specially shaped filler part 2.

What we claim is:

1. A constructional arrangement comprising: a thin walled guide component, substantially U-shaped guide strips extending along opposite edges of said guide component opening toward each other, a filler component extending between said opposite edges of said guide component and received by said substantially U-shaped guide strips, the edges of said filler component which are received by said substantially U-shaped guide strips are of substantially the same configuration as the guide strips, at least one further guide component, grooved strips and spring means disposed between said guide components, said guide strips, and said grooved strips to form hollow double constructional elements, said guide strips of said two guide components being arranged to face towards one another, adjacent guide strips of said two guide components being coupled by means of said grooved strips, said grooved strips being situated opposite one another being pressed into said guide strips by said spring acting between said grooved strips.

2. A constructional arrangement according to claim 1 wherein the edges of said guide component and said filler component including said guide strips are convergent.

3. A constructional arrangement according to claim 1 further including a connector for engaging the grooved strips and/or the guide strips of two adjacent pairs of guide components.

4. A constructional arrangement according to claim 1 in which means may be provided to join adjacent constructional elements in articulated manner.

5. A constructional arrangement according to claim 1, wherein the edges of said guide component and said filler component including said guide strips are convergent.

6. A constructional arrangement according to claim 1, in which the plane components have a form which differs in their plane from the polygonal.

7. A constructional arrangement according to claim 1, wherein said guide component and said filler component are each provided with apertures therethrough.

8. A constructional arrangement according to claim 1 wherein at least one of said filler components is of a smaller size in the direction parallel to said opposite edges of the guide component than the remaining filler components.

9. A constructional arrangement according to claim 1 wherein at least one of the two components is bent about an axis which is parallel to said guide strips.

10. A constructional arrangement according to claim 1 wherein said guide component and said filler component are bent about an axis which is parallel to said guide strips.

11. A constructional arrangement according to claim 1 wherein at least one of the two components is curved in the direction of said guide strips.

12. A constructional arrangement according to claim 1, wherein at least one of the two components is constructed as a multi-arm member.

13. A constructional arrangement according to claim 12 wherein said guide component is constructed as a multi-arm member and said filler component is receivable in each of the arms.

14. A constructional arrangement according to claim 1 including a plurality of guide components arranged to form a box structure and a plurality of filler components each of which is disposed in said guide components.

15. A constructional arrangement according to claim 14 wherein the guide strips on each of said plurality of guide components are directed outwardly of the box structure.

16. A constructional arrangement according to claim 14 further comprising means for fastening said guide components.

17. A constructional arrangement according to claim 16 further comprising means on each of said guide components for supporting adjacent guide components.

18. A constructional arrangement according to claim 17 wherein said supporting means includes a pressed-out portion of said guide component.

19. A constructional arrangement according to claim 16 wherein at least one of said plurality of guide components is substantially larger than the remaining guide components and acts as a frame member upon which the remaining components are fastened.

* * * * *