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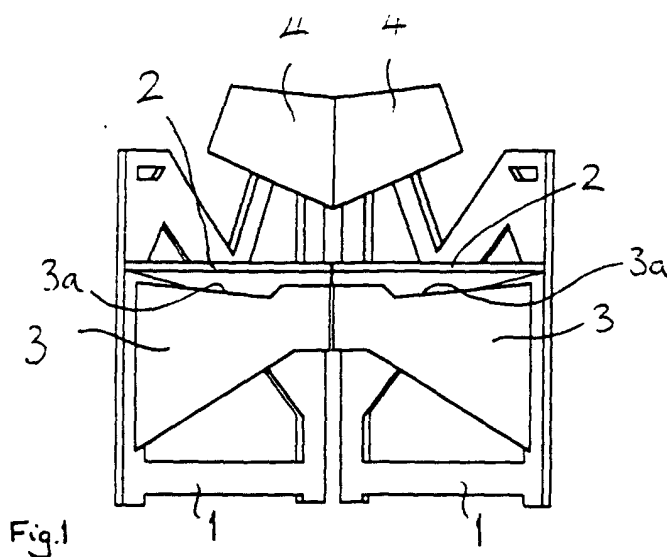
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(54) **Furniture**

(57) In order to provide furniture that can be erected and collapsed without the need for any tools or which does not have to be taken apart in order to collapse it to a form suitable for transport, there is provided an article of furniture comprising a rigid structural unit which is collapsible, the unit comprising planar elements connected by hinges which allow the planar elements to lie substantially parallel to one another when the unit is collapsed. The invention also provides a kit which is erectable to form an article of furniture, the kit comprising pla-

nar elements which are connected by hinges and which lie substantially parallel to one another, the planar elements being movable to constitute a rigid structural unit during erection of article of furniture. The invention also provides article of furniture comprising a rigid structural unit which consists of planar elements and hinges connecting at least some of the planar elements, the unit being collapsible by movement of the planar element to positions in which they all lie substantially parallel to one another.



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Description

[0001] This invention relates to articles of furniture which can be transported in a collapsed state and can be erected by the user.

[0002] It is well known to sell furniture as a kit of parts which have to be assembled by the purchaser. Such kits have the disadvantage that assembly requires the use of tools such as screwdrivers, spanners, Allen keys, etc., and the user has to exercise a certain degree of strength and/or skill. Furthermore, irreversible fixings are frequently used, making it impossible to collapse the furniture to facilitate transport to another location. Even if the article can be collapsed, this requires tools, strength, and skill, and results in a number of separated parts which can easily be mislaid.

[0003] It would be desirable to be able to provide furniture that can be erected and collapsed without the need for any tools.

[0004] It would also be desirable to be able to provide furniture which does not have to be taken apart in order to collapse it to a form suitable for transport.

[0005] It would also be desirable to be able to provide furniture which can be assembled without the use of fixing elements such as screws, bolts, barbed dowels, snap fittings, and other permanent or semi-permanent fixing means, e.g. nails or adhesives.

[0006] In one aspect the present invention provides an article of furniture comprising a rigid structural unit which is collapsible, the unit comprising planar elements connected by hinges which allow the planar elements to lie substantially parallel to one another when the unit is collapsed.

[0007] In another aspect the invention provides a kit which is erectable to form an article of furniture, the kit comprising planar elements which are connected by hinges and which lie substantially parallel to one another, the planar elements being movable to constitute a rigid structural unit during erection of the article of furniture.

[0008] In another aspect the invention provides an article of furniture comprising a rigid structural unit which consists of planar elements and hinges connecting at least some of the planar elements, the unit being collapsible by movement of the planar elements to positions in which they all lie substantially parallel to one another.

[0009] The unit may include at least one hinge having leaves which are separable, e.g. a hinge having a removable hinge pin. Preferably, the removable pin has a head at one end. The pin may have a removable cap fitted on one end, e.g. as an easily removable press fit or screw fit. Thus the hinge leaves can be separated by hand, without the need to use any tool.

[0010] The unit may include at least one planar element which is separable from the remaining planar elements of the structural unit. Preferably the separable planar element merely rests against the remaining planar

elements and keeps them in the required position.

[0011] The article of furniture may comprise a plurality of rigid structural units, which may be stacked and/or arranged side by side and which may be connected by easily separable connecting means such as wooden dowels, guide pins, or clips. Alternatively or additionally, two or more units may be interconnected by hinges having leaves which are separable (e.g. with a removable pin as mentioned above).

[0012] The unit will normally include a plurality of upstanding (preferably vertical) planar elements extending in different planes, and at least one transverse (horizontal or tilted) planar element which is supported by the upstanding planar elements.

[0013] In a preferred embodiment the invention provides an article of furniture, e.g. a table or chair, comprising a rigid structural unit comprising two similar planar vertical side elements having front edges which are spaced apart and rear edges which are connected together by hinge means, two similar planar transverse elements which extend in a common plane between the side elements, the transverse elements having respective outer side edges which are connected by hinge means to the respective side elements and having respective inner side edges which are connected together by hinge means, and two similar planar vertical support elements having respective upper edges on which the respective transverse elements rest and having respective outer side edges which are connected by hinge means to the respective side elements.

[0014] Preferably, the support elements have respective inner edges which are connected together by hinge means.

[0015] It is possible for one side element, one transverse element, and one support element to be cut from a single rectangular sheet of material.

[0016] The planar elements use in the present invention may be made of any suitable material, such as plywood, wood chipboard, hardboard, rigid plastic sheet, or sheet metal, for example.

[0017] The invention will be described further, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a front view of an article of furniture in the form of a chair;

Figure 2 is a side view of the article;

Figure 3 is a plan view of the article;

Figure 4 is a side view of the collapsed article;

Figure 5 is a view showing how planar elements of the article may be cut from a rectangular sheet;

Figure 5a is a perspective view of a hinge for use in the article;

Figures 6 to 9 are views corresponding respectively to those of Figures 1 to 4 and diagrammatically indicating the locations of the hinges in the article;

Figures 10 to 14 are views similar to those of Figures 1 to 5 respectively but showing an article of

furniture in the form of a table or stool;

Figure 15 is a diagrammatic, cut-away, perspective view of the article as shown in Figures 10 to 12, viewed from the front and above, indicating the locations of the hinges;

Figure 16 is a perspective view of a bureau;

Figure 17 is a perspective view of the bureau with its doors open;

Figure 18 is a perspective view of three structural units which each form part of the bureau;

Figure 19 shows a hinge with separable leaves, used to connect the bureau units together;

Figure 20 shows the parts of the hinge of Figure 19 separated;

Figure 21 is a front view of an article of furniture in the form of a table, desk, or stool, with a rectangular top;

Figures 22 to 24 are respective rear, side, and plan views of the article of Figure 21;

Figure 25 is a section on line XXV-XXV in Figures 21 and 22;

Figures 26 and 27 are perspective views showing two successive steps in the collapsing of the article of Figures 21 to 25;

Figure 28 is a diagrammatic plan view showing a first hinged corner arrangement;

Figure 29 shows the arrangement of Figure 28 when folded flat;

Figure 30 is a diagrammatic plan view showing a second hinged corner arrangement;

Figure 31 shows the arrangement of Figure 30 when folded flat;

Figure 32 is a perspective view of a cabinet unit;

Figure 33 shows the cabinet unit when collapsed, without its top;

Figure 34 is a front view of an article of furniture comprising a plurality of cabinet units;

Figure 35 is a front view of a bookcase unit;

Figures 36 to 38 are respective side, plan, and perspective views of the bookcase unit;

Figure 39 is a perspective view of the collapsed bookcase unit;

Figure 40 is a section on line XL-XL in Figure 35;

Figure 41 shows how the planar elements of the bookcase unit may be cut from a rectangular sheet;

Figure 42 shows a bookcase comprising two of the bookcase units;

Figure 42a shows an alternative arrangement of the bookcase of Figure 42;

Figure 43 is an enlargement of the detail XLIII in Figure 42a;

Figure 44 is a perspective view of a foldable top piece of the bookcase;

Figure 45 shows the top piece folded flat;

Figure 46 shows a base part of the bookcase; and

Figure 47 shows the base part folded flat.

[0018] The article of furniture shown in Figures 1 to 3

is in the form of a chair (in particular an armchair, as illustrated) constituting a rigid structural unit which can be safely sat upon but which is, however, collapsible as will be explained below.

[0019] The chair consists of planar elements which are permanently connected by hinges. In particular, the chair has two vertical side elements 1 which diverge forwardly at an angle of about 60°. Two transverse elements 2 extend in a common plane between the side elements 1. In the embodiment illustrated, the common plane slopes rearwards at an angle of less than 10° to the horizontal. Two vertical support elements 3 have bevelled upper edges 3a on which the respective transverse seat elements 2 rest. The chair also includes two seat back elements 4.

[0020] Figure 5 shows how the elements 1 to 4 may be cut from a single rectangular sheet of suitably strong rigid sheet material (e.g. plywood).

[0021] The planar elements 1 to 4 are connected together by hinges 6, one of which is shown by way of example in Figure 5a as having two leaves 7 with knuckles 8 which are permanently connected by a hinge pin 9. In particular, the rear edges of the side elements 1 are connected by three (optionally two) hinges 6a. The outer side edge of each seat element 2 is connected by two hinges 6b to the corresponding side element 1 and the inner side edges of the seat elements 2 are connected together by two hinges 6c. The outer side edge of each support element 3 is connected by two hinges 6b to the corresponding side element 1 and the inner side edges of the support elements 3 are connected together by two hinges 6e. The inner side edges of the two seat back elements 4 are connected together by two hinges 6f and, intermediate its edges, each seat back element 4 is connected to a corresponding side element 1 by two hinges 6g.

[0022] It is to be noted that the support elements 3 do not extend in the same plane. Accordingly, although the structure of the chair is rigid in normal use, the chair can be folded and collapsed by lifting the seat, i.e. by raising the inner side edges of the seat elements 2. In the collapsed condition, shown in Figure 4, all the planar elements 1 to 4 lie parallel to one another.

[0023] The same principle can be applied to an article of furniture in the form of a triangular table or stool, as shown in Figures 11 to 15. The article has two side elements 11 whose rear edges are connected together by two hinges (not visible) and two co-planar horizontal top elements 12 whose outer side edges are connected to the side elements by hinges 6b and whose inner side edges are connected together by hinges 6c. The top elements are supported by vertical support elements 13 whose outer side edges are connected by hinges 6d to the respective side elements 11 and whose inner side edges are connected together by hinges 6e. As before, the article can be folded flat by lifting the top elements 12.

[0024] Figures 16 and 17 show a bureau comprising

three rigid structural units 21 to 23 which are releasably connected together. The units 22 and 23 are mirror images of one another, and therefore only one will be described in detail. The unit 22 has two side walls 24, 26, a rear wall 27, and a front panel 28 which are permanently connected by hinges. A door 29 is permanently hinged to the outer side wall 24. The unit 22 contains removable shelves 31, 32 which are supported by simply resting on the hinges in the unit.

[0025] The upper unit 21 has a top wall 33, a rear wall 34, a base wall 35, and a door 36 which are permanently connected by hinges. Vertical partitions 37 are permanently hinged to one of the walls 33 to 35. The unit 21 also contains removable shelves 38.

[0026] For the sake of simplicity, the permanent hinges, which allow collapsing of the units 21 to 23 by folding to a flat form, are not shown in Figures 16 to 18. Each unit 22 and 23 is connected to the corresponding end of the upper unit 21, by three separable hinges 39, one of which is shown in Figure 19. The hinge 39 comprises two leaves 41, 42 which can be separated from each other by withdrawing from the hinge knuckles a pin 43 having a head 44 at one end. In order to prevent the pin 43 from being lost, it can then be reinserted into one of the sets of hinge knuckles and retained there by a cap 46 which is a simple friction fit on the end of the pin. The pin 43 can easily be removed manually by pulling off the cap 46 and pushing the pin 43 upwards, whereupon the head 44 can easily be grasped and pulled.

[0027] Figure 21 to 25 show an article of furniture in the form of a table, desk, or stool. The article has two side walls 51, a rear wall 52, and a front element 53, all permanently connected together by hinges 6 as described above. The article also has a top element 54 which simply rests on the hinges 6 and is removable to allow folding of the hinged elements 51 to 53. As shown in Figure 26, the top 54, when removed, can be placed immediately below the front element 53, so that in the collapsed article as shown in Figure 27 all the planar elements 51 to 54 lie parallel to each other in a compact arrangement. Figures 28 and 29 illustrate one form of hinged corner arrangement in the erected condition and collapsed condition respectively, and Figures 30 and 31 similarly illustrate another form of hinged corner arrangement (in which the edges of the planar elements 51 to 53 are bevelled).

[0028] Figure 32 shows a cabinet unit 61 similar to the article shown in Figures 21 to 25. The unit includes side walls 51, a rear wall 52, and a front panel 53 which are permanently connected by hinges 6. A removable top 54 again rests on the hinges. The unit also has a door 56 which is permanently connected to one of the side walls 51 by two hinges 6a. When the top is removed, the unit can be folded as shown in Figure 33.

[0029] Figure 34 shows an article of furniture comprising stacks of units arranged side by side. Some of the units are cabinet units 61 as described above. Other units 62 are similar to the units 61, but without the door,

and with or without a removable shelf 63. Each stack rests on a rectangular base 64 comprising four boards which are permanently hinged together, e.g. in the manner indicated in Figures 28 and 29 or 30 and 31.

[0030] Figures 35 to 40 show a rigid shelf unit 71 which may be stacked with one or more similar units to form a bookcase. The unit 71 includes a planar vertical front element 62 and planar vertical side elements 73 permanently connected by hinges 6. The upper and lower edges of the side elements 73 are provided with guide holes 73a and guide pins 73b to facilitate stacking. A removable shelf 74 rests on the front element 72 and has grooved wings 74a which engage with slots in the side elements 73 so as to hold the side elements in position.

[0031] When the shelf element 74 is slid out rearwardly, the shelf unit 71 can be collapsed by folding the side elements 73 inwards, whereupon the shelf element 74 can be accommodated in a position in which it is coplanar with the front element 72 as shown in Figure 39, resulting in a compact arrangement for storage and transport. Figure 1 shows how the elements 72 to 74 may be cut from a single rectangular sheet.

[0032] Figure 42 shows a bookcase comprising a stack of two shelf units 71, with a separate top piece 76 and base piece 77. Figure 42a shows how the top piece 76 may be arranged in a different way. The top piece 76 comprises two planar parts 76a, 76b permanently connected by hinges 76c which allow the parts 76a and 76b to be moved to any position between the fully open obtuse angled position shown in Figure 44 and the collapsed position shown in Figure 45.

[0033] Finally, the base piece 77 comprises a front element 77a and two side elements 77b permanently connected by hinges 6 which allow the base piece to be collapsed by folding to the flat arrangement shown in Figure 47.

[0034] It will be appreciated that all the articles of furniture described above can be erected and collapsed by hand without the use of any tool.

Claims

1. An article of furniture comprising a rigid structural unit which is collapsible, the unit comprising planar elements connected by hinges which allow the planar elements to lie substantially parallel to one another when the unit is collapsed.
2. A kit of part which is erectable to form an article of furniture, the kit comprising planar elements which are connected by hinges and which lie substantially parallel to one another, the planar elements being movable to constitute a rigid structural unit during erection of the article of furniture.
3. An article of furniture comprising a rigid structural

unit which consists of planar elements and hinges connecting at least some of the planar elements, the unit being collapsible by movement of the planar elements to positions in which they all lie substantially parallel to one another.

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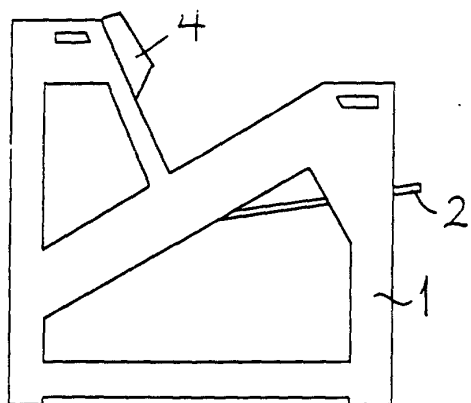


Fig. 2

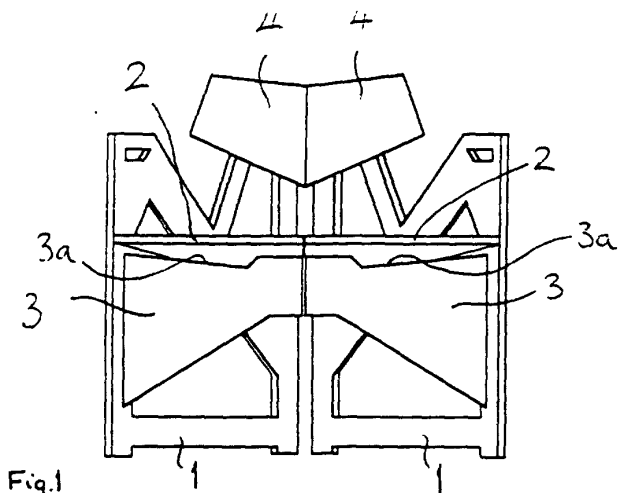


Fig. 1

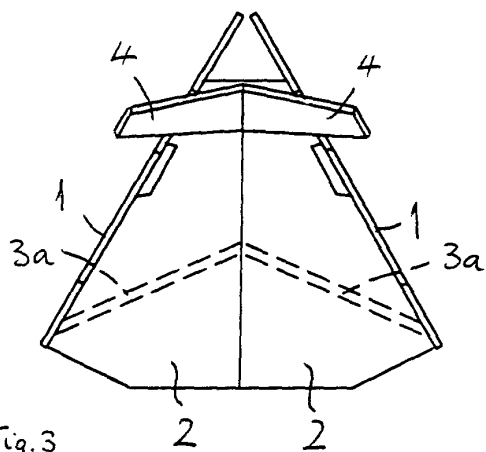


Fig. 3

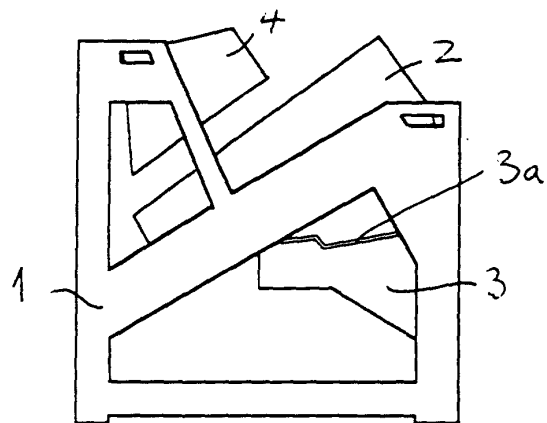


Fig. 4

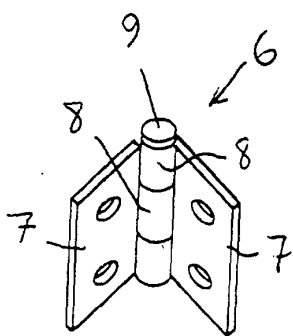


Fig. 5a

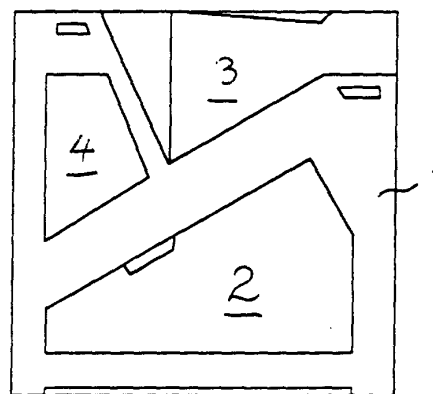


Fig. 5

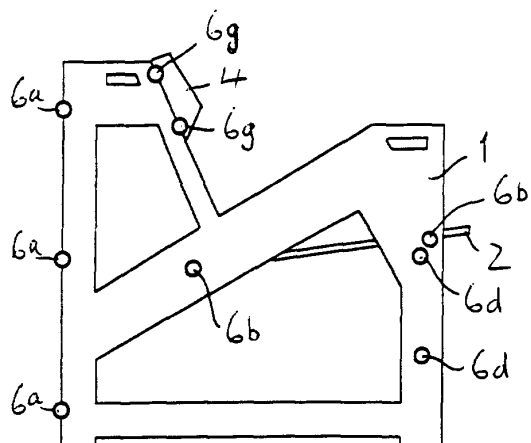


Fig. 7

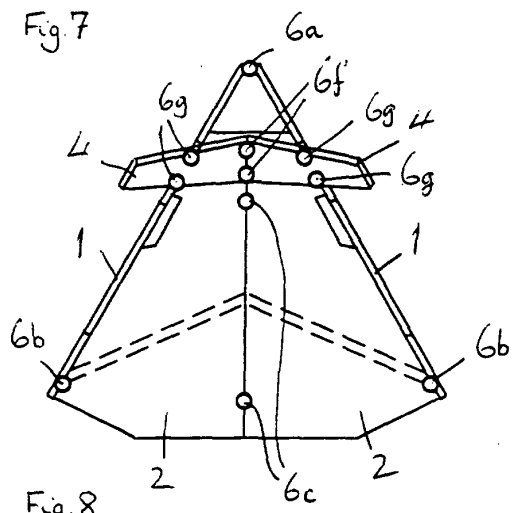


Fig. 8

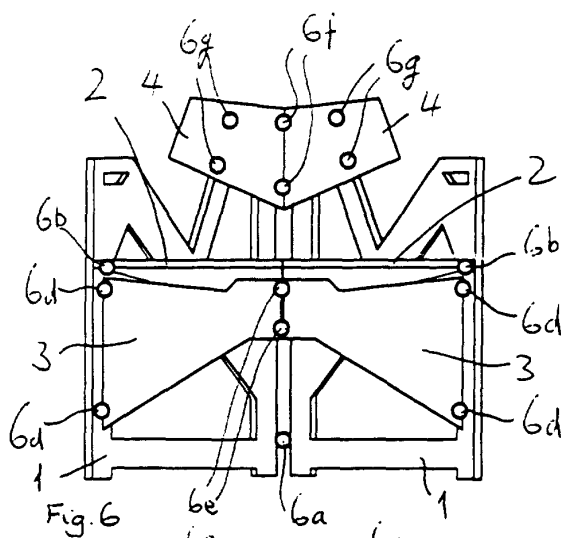


Fig. 9

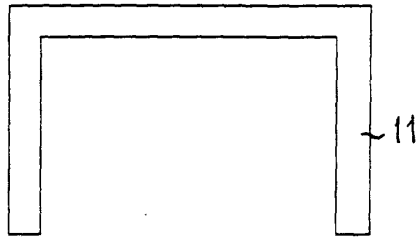


Fig. 11

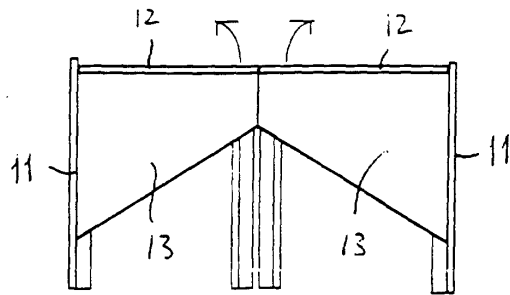


Fig. 10

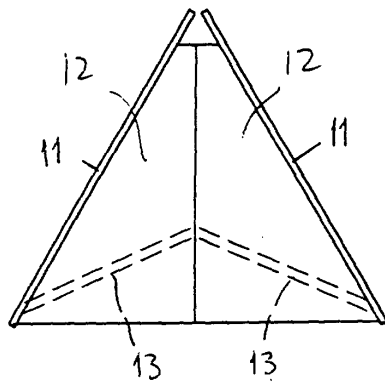


Fig. 12

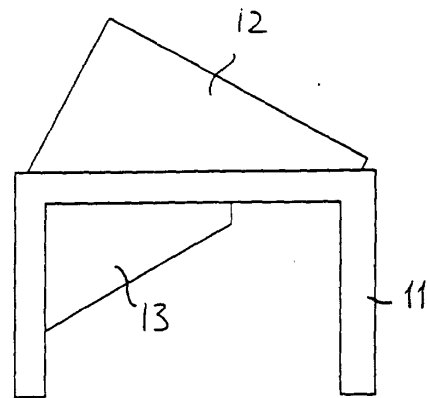


Fig. 13

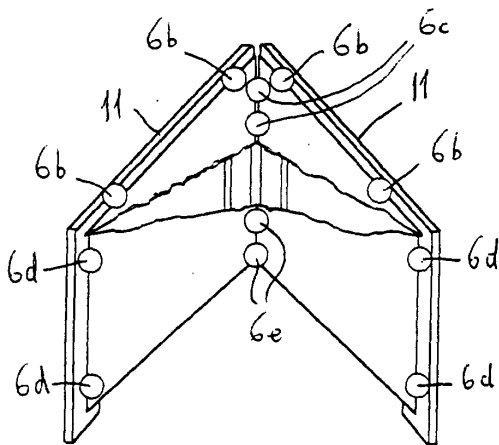


Fig. 15

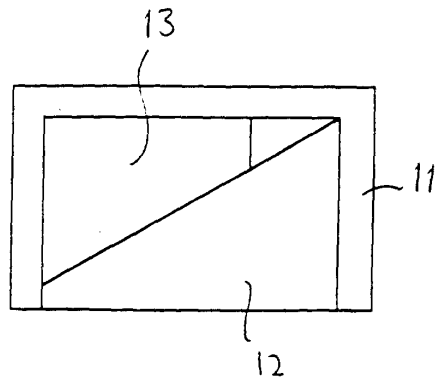
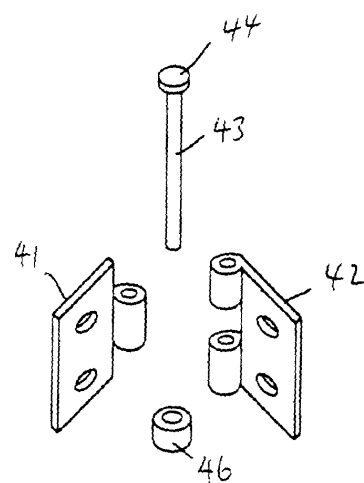
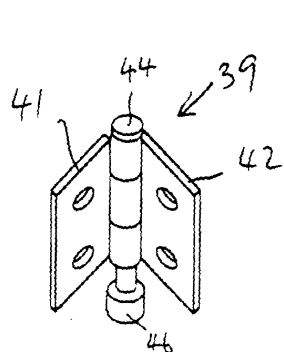
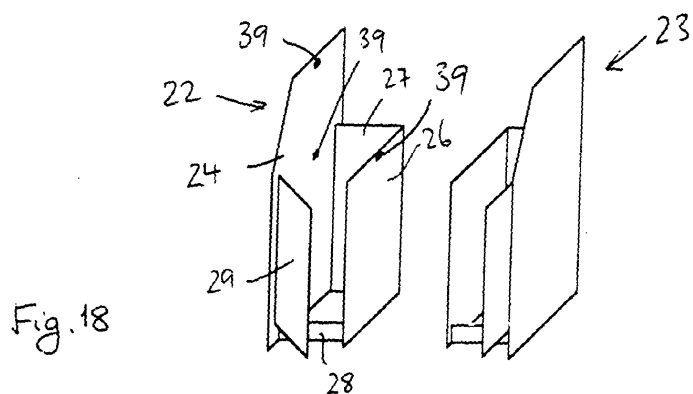
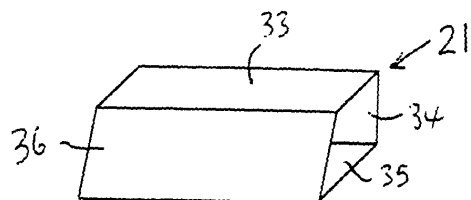
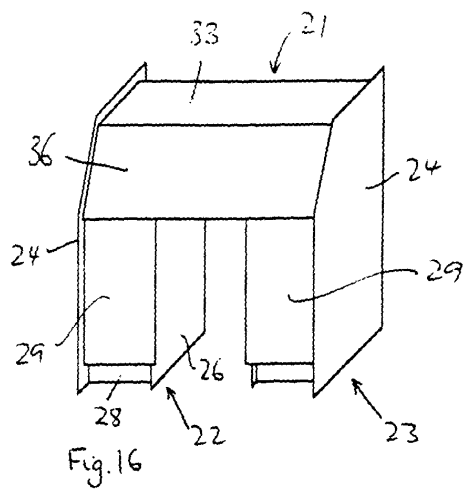
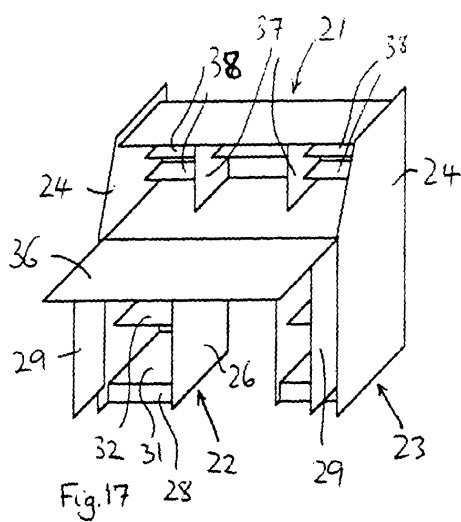
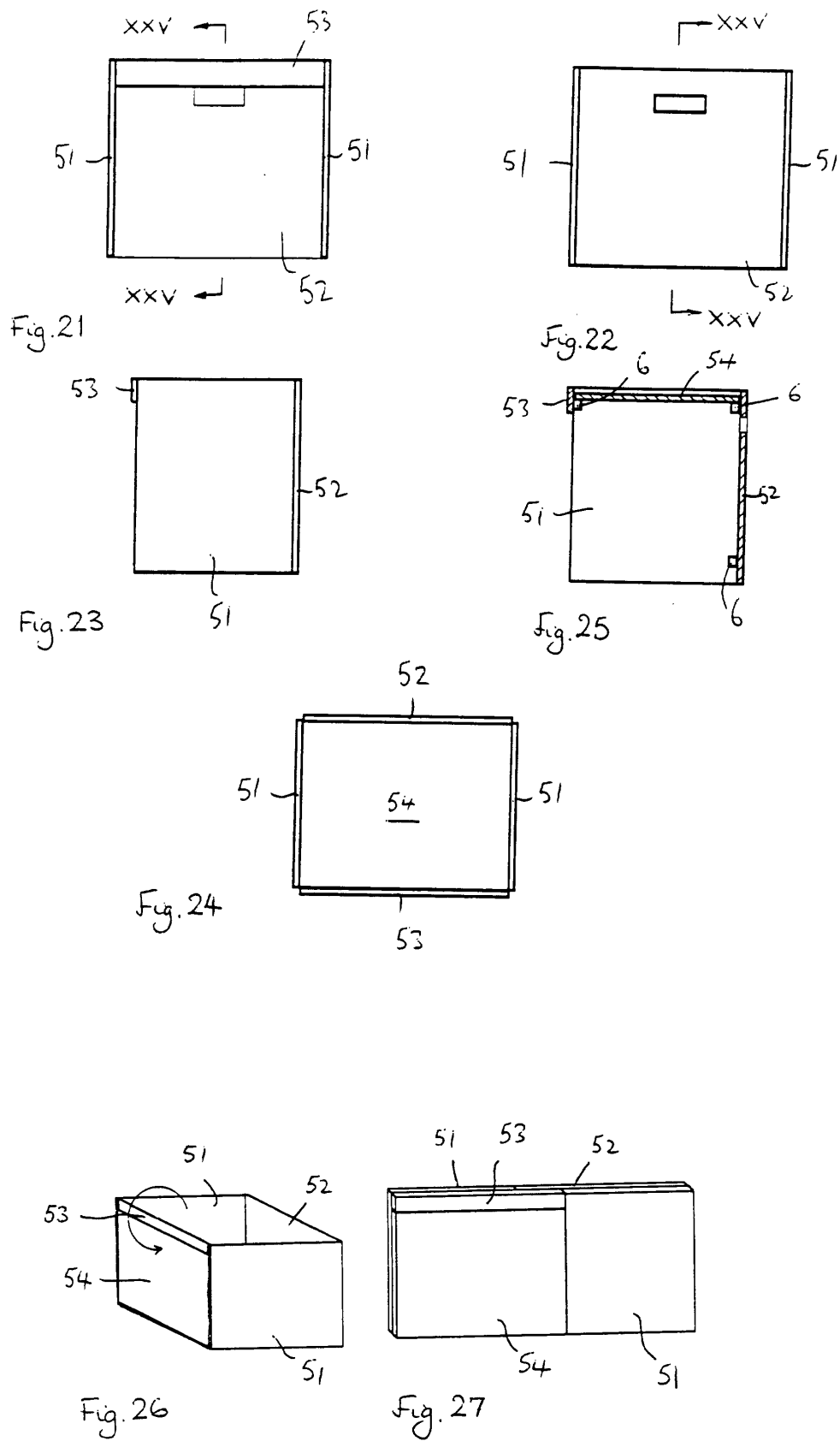
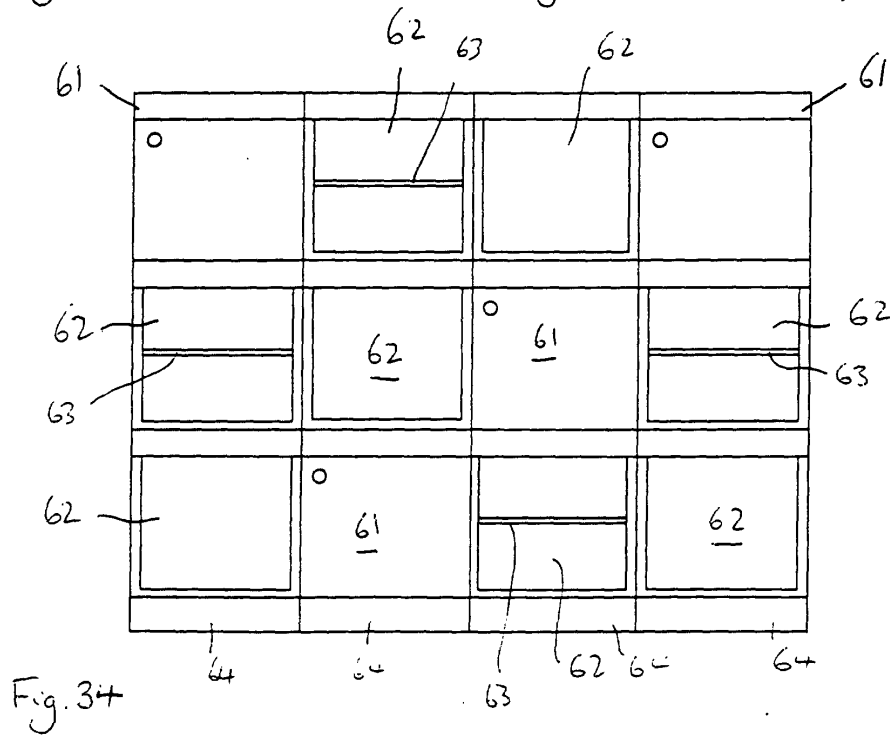
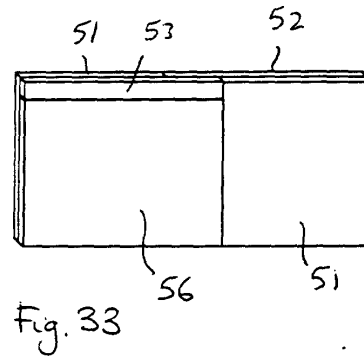
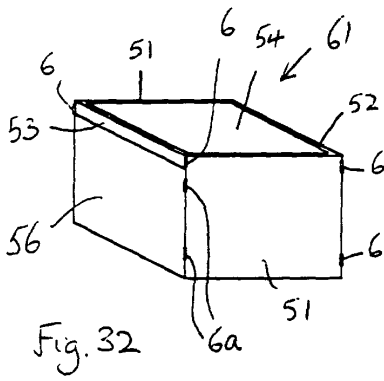
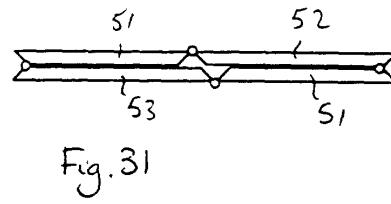
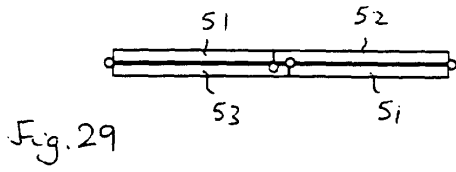
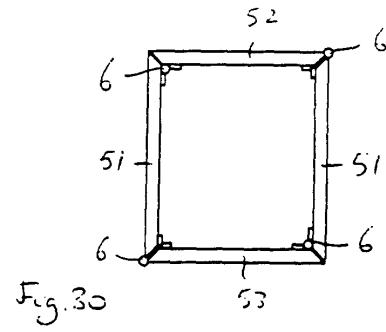
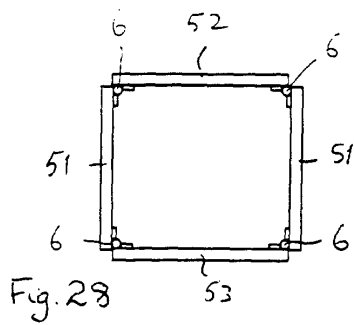
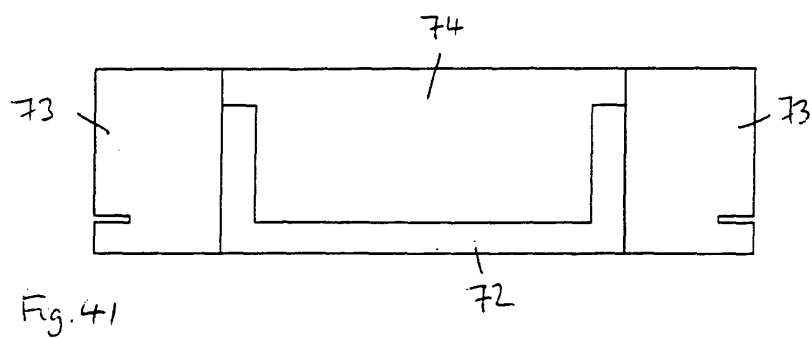
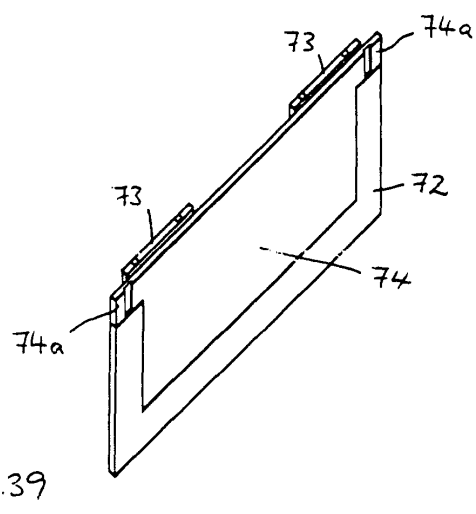
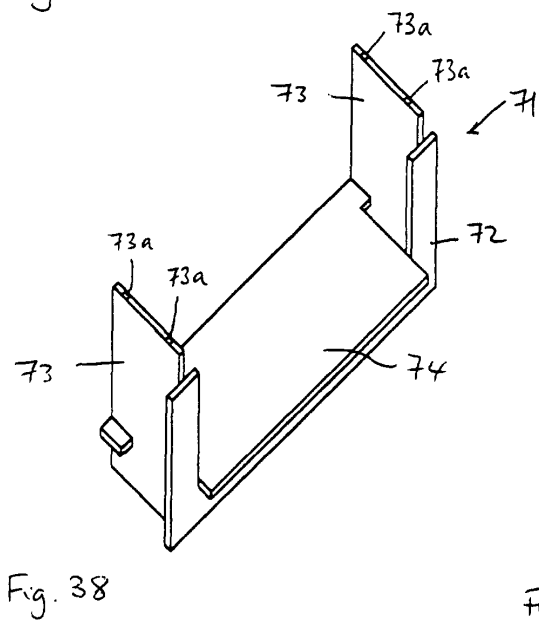
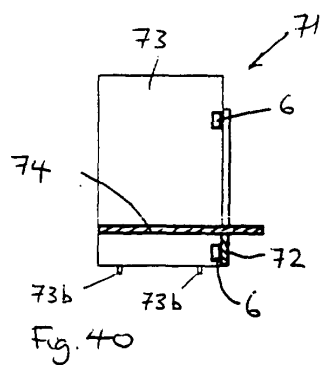
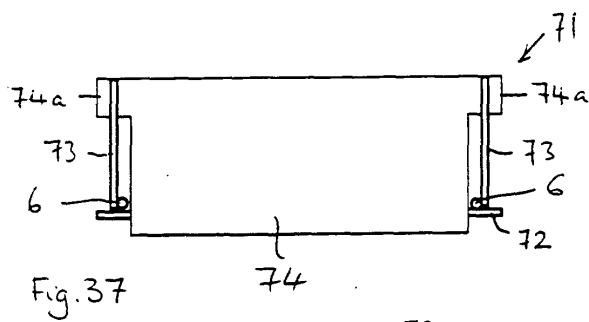
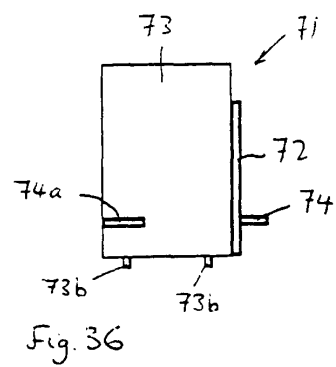
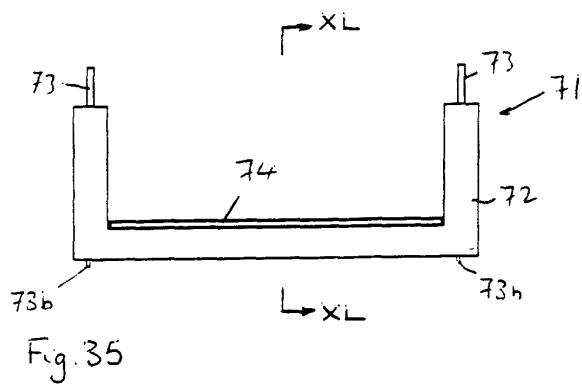


Fig. 14









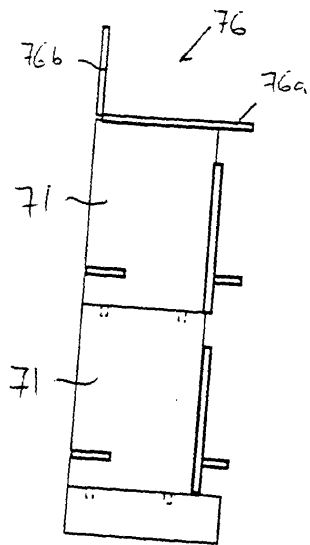


Fig. 42

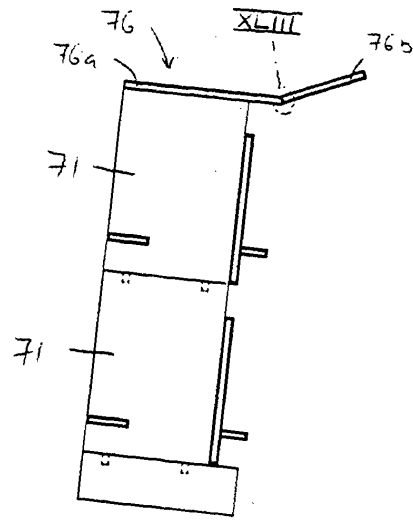


Fig. 42a

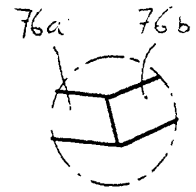


Fig. 43

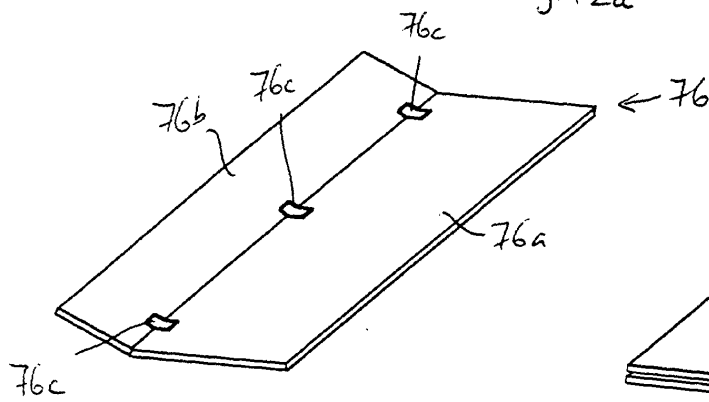


Fig. 44

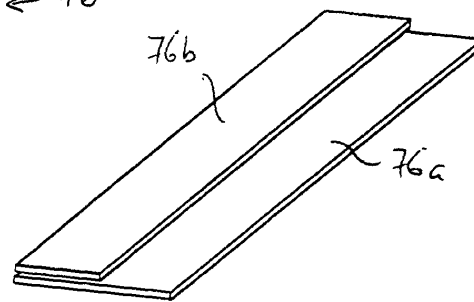


Fig. 45

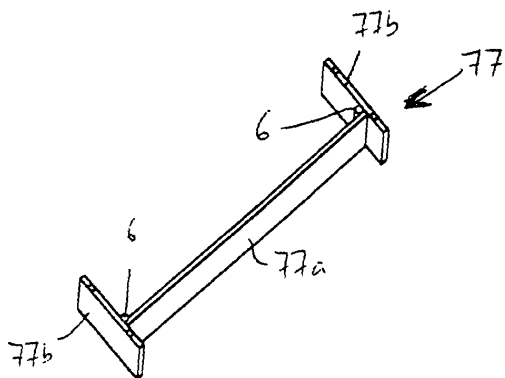


Fig. 46

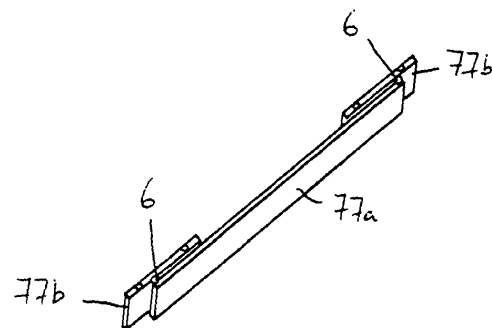


Fig. 47



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 31 0717

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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