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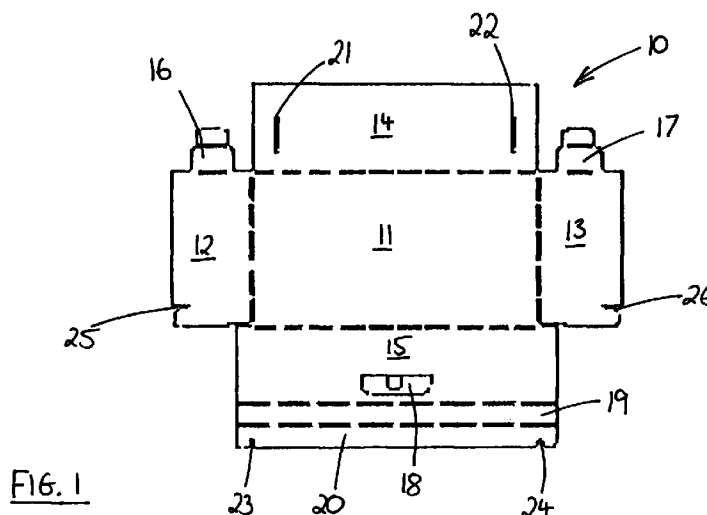
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(54) **Construction toy**

(57) A construction toy is disclosed which comprises a substantially planar, integral blank (10) having a number of panels (11,12,13,14,15). Each panel is connected to an adjacent panel by a line of weakness which allows the panel to be moved relative to the adjacent panel through plastic deformation of the blank along the line of weakness. In this way, a predetermined three-dimensional article can be constructed from the blank, the article retaining its shape once constructed. The blank may include rigidity-enhancing features, such

as tabs (16,17) which engage in slots (21,22), or such as slots (23,24) on free edges of one or more panels which engage in corresponding slots (25,26) on one or more other panels in the constructed article. A construction toy kit is also disclosed, which comprises two or more blanks as described above, the articles formed from these blanks being combinable to form a further three-dimensional article.



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Description

[0001] The present invention relates to a construction toy.

[0002] Construction toys and models, such as those sold under the names of Meccano (RTM), Airfix (RTM) and Lego (RTM), are well-known. In the case of the Meccano (RTM) system, models are created by connecting together discrete perforated metal components with nuts and bolts. Airfix (RTM) model kits contain discrete plastics components which are assembled into the model with the use of adhesive. In the Lego (RTM) system, discrete studded bricks are used to build structures, each brick being held in place by frictional engagement with one or more adjacent bricks.

[0003] The Meccano (RTM) and Lego (RTM) systems allow a substantial degree of freedom for the article under construction, although plans and instructions for some articles may be provided with the toys. Airfix (RTM) kits, by their nature, are limited to the particular model for which the plastics components have been designed and manufactured. The present invention is directed towards a construction system in which the final form of the article to be constructed is predetermined.

[0004] The disadvantage with the above prior art construction toys, when a specific toy or model is to be constructed, is that each system requires a number of discrete components to make a three-dimensional model or toy. These components may be awkward to handle or place accurately, or may become lost before the construction is completed. The discrete components require separate manufacture, or the use of accurate injection-moulding techniques to produce a number of components from the same mould, and this makes the toys relatively expensive. In addition, the time required to construct anything more than the most simple structures may be lengthy. The Meccano (RTM) system requires the use of small nuts and bolts, which again may be awkward to handle and will require the use of tools such as a spanner and a screwdriver for assembly. The Airfix (RTM) system requires the use of adhesive to construct the model, and may also require the use of a craft knife to cut the moulded plastics components from the sprues.

[0005] For the above reasons, the prior art systems are unsuitable where the aim is to produce a construction toy which is simple and inexpensive to mass-produce, and where the construction operation to produce any given toy is simple and straightforward compared to available prior art systems.

[0006] According to one aspect of the invention, there is provided a construction toy comprising a substantially planar blank having a plurality of panels, each panel being connected to an adjacent panel by a line of weakness, wherein the blank is plastically deformable along the or each line of weakness such that the panels may be moved relative to each other to construct a three-

dimensional article from the blank.

[0007] The construction toy of the present invention does not require tools during construction, or nuts and bolts or adhesive to secure the panels in place. Because the blank is plastically deformable along the lines of weakness, the panels simply need to be flexed relative to each other and moved to the correct relative position and orientation. Therefore, the construction operation is much simpler than that required for the prior art systems discussed above.

[0008] To produce a single article with a plurality of sides and/or features with the construction toy of the present invention, only one blank is needed. This has the advantage that a single relatively large blank is less likely to be lost than a smaller component part.

[0009] A blank in accordance with the invention is relatively inexpensive to mass-produce. Preferably, the blank is formed from a metal, which is preferably aluminium. Metals are particularly suitable materials for forming the present invention due to their material properties such as strength and plasticity. If metal is used, the blank may be formed by any suitable method such as casting, pressing, stamping or machining.

[0010] The lines of weakness should be such that the blank plastically deforms much more readily along them rather than elsewhere, and are preferably such that the panels can be moved relative to each other about the lines of weakness by hand. They should also, preferably, be such that the panels once moved remain in their moved position and do not tend to return to their original position (e.g. under the force of gravity). Thus the lines of weakness should preferably provide sufficient rigidity to hold the panels in their moved position without the need for further support.

[0011] Each line of weakness may be made by scoring the blank material, but preferably each line of weakness comprises a series of perforations, which are preferably elongate. The perforations could, for example, be in the form of elongate slits. The size of the perforations and their relative spacing will be determined according to the material properties of the blank such as thickness and resistance to plastic deformation (yield strength, tensile strength), the acceptable level of force required to bend the panels relative to each other, and the structural rigidity required in the final three-dimensional article.

[0012] All the lines of weakness in the blank could be substantially parallel to one another, but preferably they extend in more than one direction on the blank surface, such as in the orthogonal directions. This allows more complex three-dimensional articles to be constructed. The lines of weakness are preferably arranged in such a manner that a predetermined three-dimensional article can be formed by appropriate bending of the blank along the lines of weakness.

[0013] Thus, according to a second aspect of the present invention, there is provided a construction toy comprising an integral substantially planar sheet having

formed therein plural lines of weakness along which the sheet is readily plastically deformable, the lines of weakness being arranged such that by folding the sheet along the lines of weakness a predetermined three-dimensional article can be formed.

[0014] Should additional structural rigidity be required in the completed three-dimensional article, the blank may further comprise one or more tabs which are joined to a panel by a line of weakness and which are engageable with another panel of the blank when the article is constructed. One or more panels may be provided with slots for engaging corresponding tabs on another panel or panels. The or each tab may be arranged to be foldable back on itself once through the corresponding slot to provide an interlocking engagement. Corresponding pairs of slots that are interengageable in the constructed position of the panels to provide additional structural rigidity in the completed article may also be provided on free edges of two or more of the panels, if desired.

[0015] It is envisaged that the blank may be coloured or coated to provide the required surface colour and finish on the article. For this purpose, the blank may be powder-coated, painted or anodised, for example. In addition, decals or transfers may be provided for affixing to the completed article if desired.

[0016] It is envisaged that a complete article may be constructed from a single blank, but it is also possible for an article to be formed from more than one blank, each blank being constructed to form its three-dimensional component before being combined with one or more other three-dimensional components to form the finished article.

[0017] It is also envisaged that the constructed three-dimensional article may be further supplemented by other components depending on the requirements of the particular article, such as additional panels or wheels and axles, for example. Preferably, all the components are arranged such that they can be fitted on or attached to the constructed article without the need for nuts and bolts, or the use of tools. They could, for example, be arranged to push-fit and frictionally engage with the article or with each other.

[0018] Thus, according to a third aspect of the present invention, there is provided a construction toy kit comprising two or more blanks or sheets in accordance with the first or second aspects of the present invention, the blanks or sheets each being arranged to be formable into predetermined three-dimensional articles which may be combined to form a further predetermined three-dimensional article.

[0019] A construction toy kit in accordance with this third aspect may additionally comprise one or more further components which are adapted to frictionally engage and be frictionally retained on the three-dimensional articles formed from the blanks or sheets. For example, such components may be additional panels or wheels and axles, as mentioned above.

[0020] The construction toy of the present invention is suitable for the construction of articles commonly regarded as toys, such as model vehicles or buildings for example. However, the present invention is equally suited to the construction of articles which might not be considered as toys in their own right, such as the miniature cash drawer of the preferred embodiment. In either case, the "toy" or amusement aspect of the present invention lies in the actual construction of the object from the one or more blanks which are provided, and not necessarily in the object itself.

[0021] An embodiment of the invention will now be described by way of example only and with reference to the accompanying drawings. In the specific embodiment, the construction toy comprises two blanks which, when constructed, form a miniature cash drawer comprising a tray and a case. In the drawings:

Fig. 1 shows a plan view of the blank which forms the tray;

Figs. 2A and 2B show the interlocking engagement between a tab and a side portion of the tray blank during construction;

Fig. 3 shows the completed cash tray;

Fig. 4 shows a plan view of the blank which forms the case;

Figs. 5 and 6 show the case during two stages of construction;

Fig. 7 shows the front elevation of the completed case; and

Fig. 8 shows the completed cash drawer.

[0022] Blanks 10 (Fig. 1) and 30 (Fig. 4) are formed from aluminium sheets and consist of a number of portions or panels which are interconnected to each other by lines of weakness. Each blank is initially substantially planar, but during construction of the article, the various portions are folded relative to each other along the lines of weakness. The aluminium undergoes plastic deformation along the line of weakness such that each portion retains its position relative to the others in the blank once folded and such that the article maintains its shape once constructed. Each line of weakness is formed by means of elongate slit-like perforations in the aluminium.

[0023] With reference to Fig. 1, integral blank 10 is designed to form the tray portion of the cash drawer, and is initially planar. Blank 10 has base portion 11, left side portion 12, right side portion 13, rear side portion 14 and front side portion 15. Left and right side portions 12 and 13 include tabs 16 and 17 respectively. Front side portion 15 includes a louvre 18 and front edge portions 19 and 20. The blank is thus, effectively, a one-piece net for the three-dimensional tray.

[0024] To construct the tray portion from blank 10, with the blank lying flat on a surface, the rear, left and right sides 14, 12 and 13 are first folded upwards through 90 degrees. With reference to Figs. 2A and 2B, distal por-

tions of tabs 16 and 17 are then folded through 90 degrees as shown in Fig. 2A and inserted through slots 21 and 22 in rear side portion 14 whilst the proximal portions of tabs 16 and 17 are folded through 90 degrees relative to each side portion. Finally, the distal portions of the tabs are doubled over as shown in Fig. 2B to secure the arrangement.

[0025] To complete the tray portion, the louvred front side portion 15 is folded upwards through 90 degrees and front edge portions 19 and 20 are folded to be at 90 degrees relative to each other and to the front side portion 15. Front edge portion 20 has two slots 23 and 24 cut therein which engage with slots 25 and 26 respectively in left and right side portions 12 and 13, which adds structural rigidity to the tray. The final completed tray is shown in Fig. 3.

[0026] With reference to Fig. 4, blank 30 is designed to form the case portion of the cash drawer, and is initially planar. Blank 30 has top portion 31, left side portion 32, right side portion 33, rear side portion 34, front side portion 35 and base portion 36. Left side portion 32 and right side portion 33 include tabs 37 and 38 respectively, together with base corner portions 39 and 40, each with tabs 41 and 42. Base portion 36 includes flap 43 and tab 44.

[0027] To construct the case portion from blank 30, with the blank lying on a flat surface, the rear, left and right side portions 34, 32 and 33 are first folded upwards through 90 degrees. In a similar manner to that shown in Figs. 2A and 2B, distal portions of tabs 37 and 38 are then folded through 90 degrees and inserted through slots 45 and 46 in rear side portion 34 whilst the proximal portions of tabs 37 and 38 are folded through 90 degrees relative to each side portion. Finally, the distal portions of the tabs 37 and 38 are doubled over (as in Fig. 2B) to secure the arrangement.

[0028] As shown in Fig. 5, front side portion 35 is then folded upwards through 90 degrees relative to top portion 31, and base portion 36 is folded over through 90 degrees. Flap 43 and tab 44 are then folded through 90 degrees relative to one another, with tab 44 being inserted through slot 47 in rear side portion 34 and doubled back on itself in a similar manner to that shown in Fig. 2B. At this stage, the case is as shown in Fig. 6. Next, the tabs 41 and 42 are folded through 90 degrees relative to base corner portions 39 and 40, and are inserted through slots 48 and 49 in base portion 36 as the base corner portions are folded to be flush with the base portion 36. Tabs 41 and 42 are not, however, folded back on themselves as in the other cases, but remain at 90 degrees to base corner portions 39 and 40 in order to act as guides for the tray when inserted in the case. A front elevation of the completed case is shown in Fig. 7. Rubber feet may optionally be affixed to the underside of the case to prevent slipping.

[0029] The final cash drawer is shown in Fig. 8.

Claims

1. A construction toy comprising a substantially planar blank having a plurality of panels, each panel being connected to an adjacent panel by a line of weakness, wherein the blank is plastically deformable along the or each line of weakness such that the panels may be moved relative to each other to construct a three-dimensional article from the blank.
2. A construction toy as claimed in claim 1, wherein the blank further comprises one or more tabs which are each joined to a panel by a line of weakness and which engage with another panel of the blank in the constructed article.
3. A construction toy as claimed in claim 2, wherein one or more panels are each provided with one or more slots for engaging corresponding tabs on another panel or panels.
4. A construction toy as claimed in claim 3, wherein the or each tab is arranged to be foldable back on itself once through the corresponding slot to provide an interlocking engagement.
5. A construction toy as claimed in any preceding claim, wherein corresponding pairs of slots are provided on free edges of two or more of the panels, the slots being interengageable in the constructed position of the panels.
6. A construction toy as claimed in any preceding claim, wherein the or each line of weakness provides sufficient rigidity to hold the panels or tabs in their moved position.
7. A construction toy as claimed in any preceding claim, wherein the or each line of weakness comprises a series of perforations.
8. A construction toy as claimed in any preceding claim, wherein the blank is formed from a metal.
9. A construction toy as claimed in any preceding claim, wherein the configuration of the three-dimensional article is predetermined.
10. A construction toy comprising an integral substantially planar sheet having formed therein plural lines of weakness along which the sheet is readily plastically deformable, the lines of weakness being arranged such that by folding the sheet along the lines of weakness a predetermined three-dimensional article can be formed.
11. A construction toy kit comprising two or more blanks or sheets in accordance with any preceding

claim, the blanks or sheets each being arranged to be formable into predetermined three-dimensional articles which may be combined to form a further predetermined three-dimensional article.

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12. A construction toy kit as claimed in claim 11, further comprising one or more components which are adapted to frictionally engage and be frictionally retained on the three-dimensional articles formed from the blanks or sheets.

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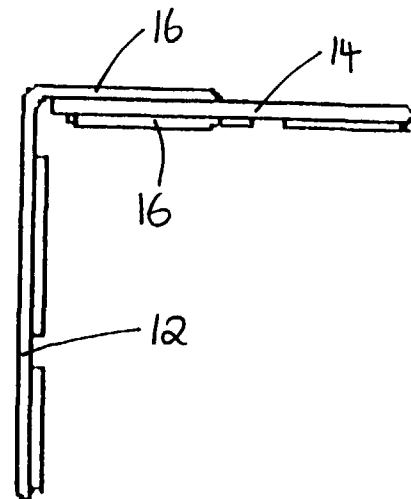
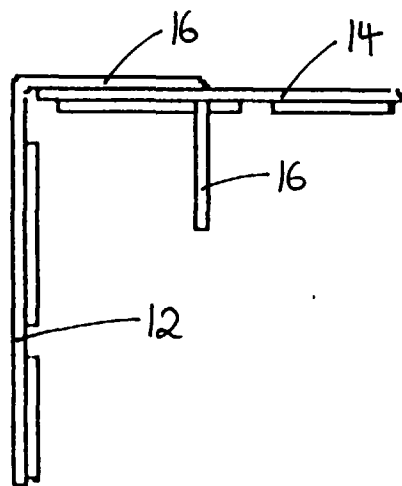
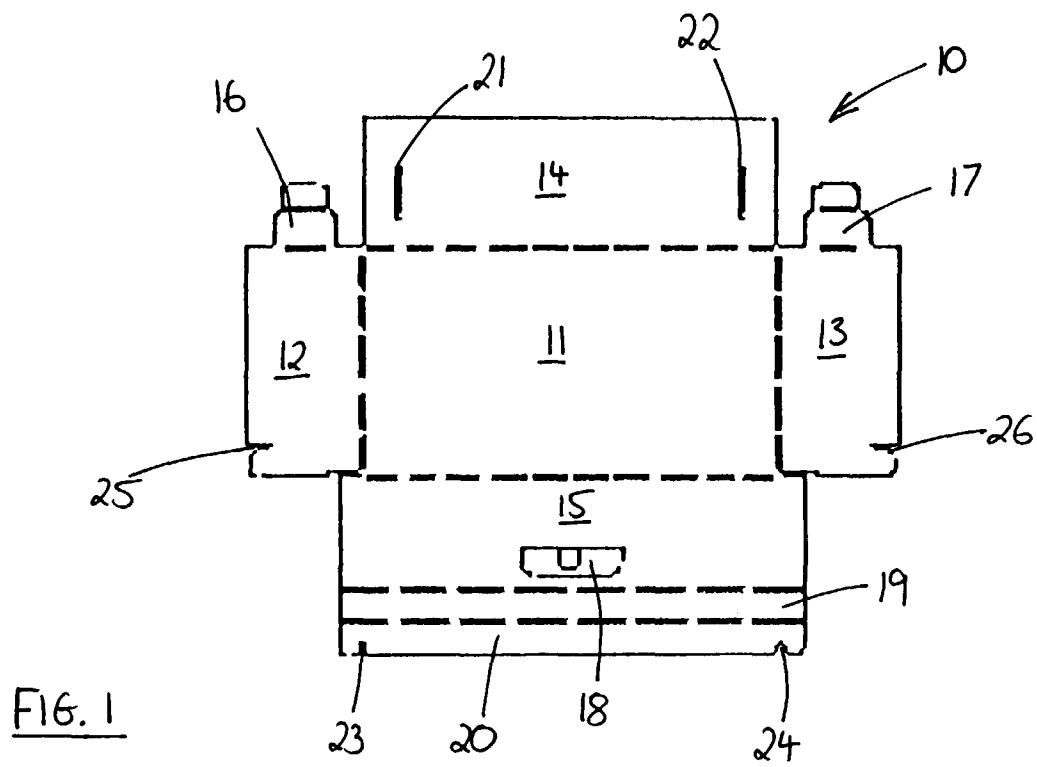
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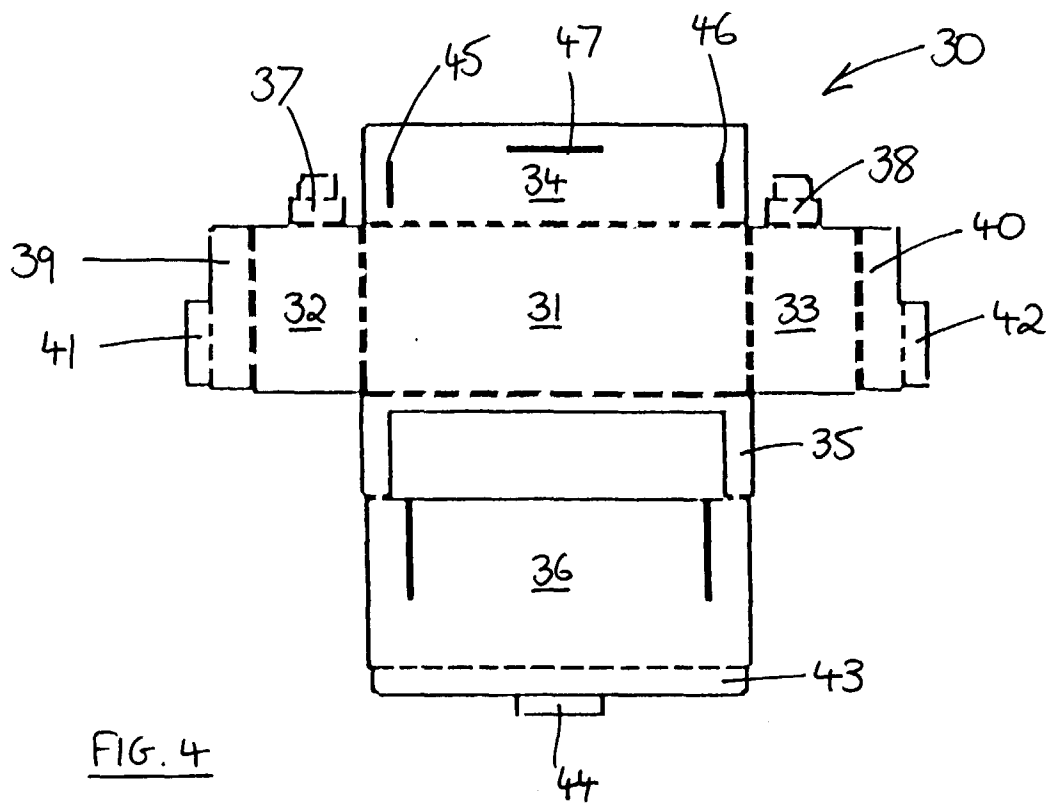
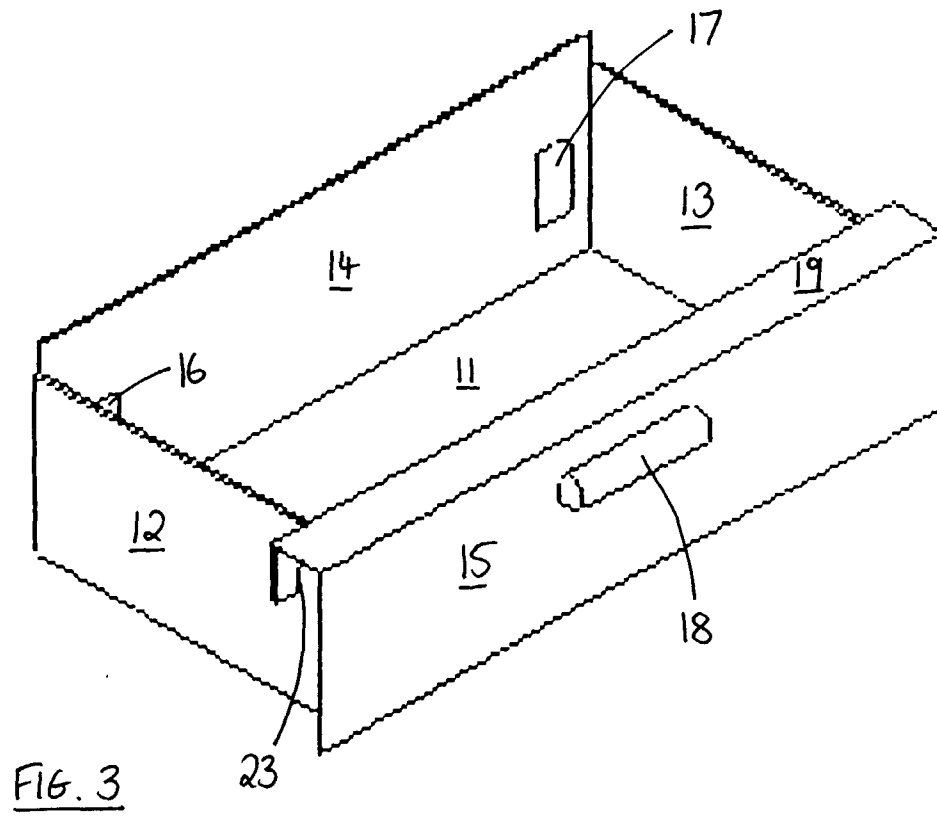
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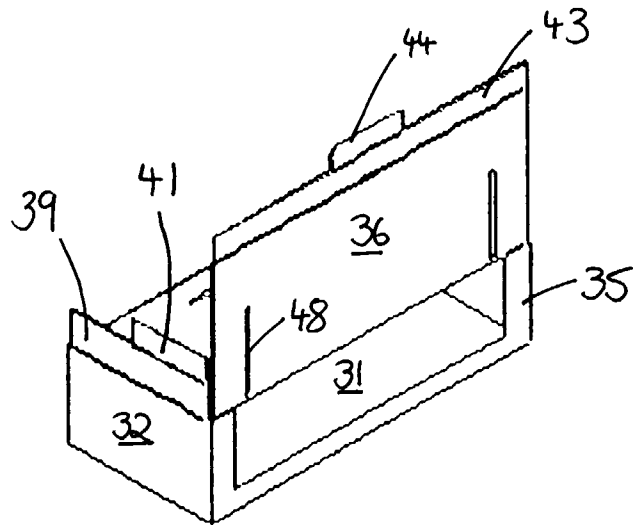


FIG. 5

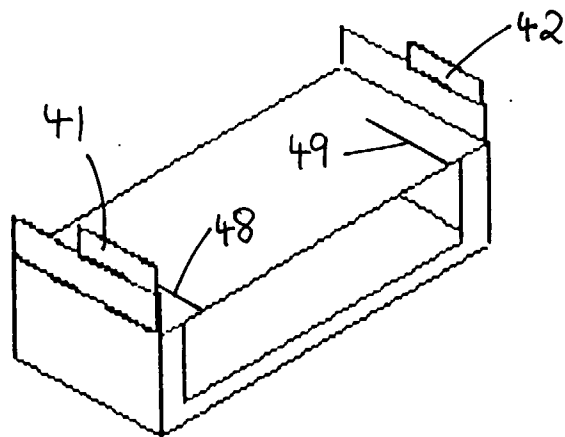


FIG. 6

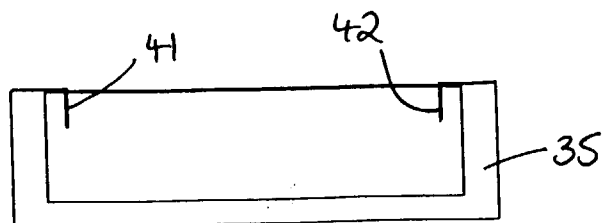


FIG. 7

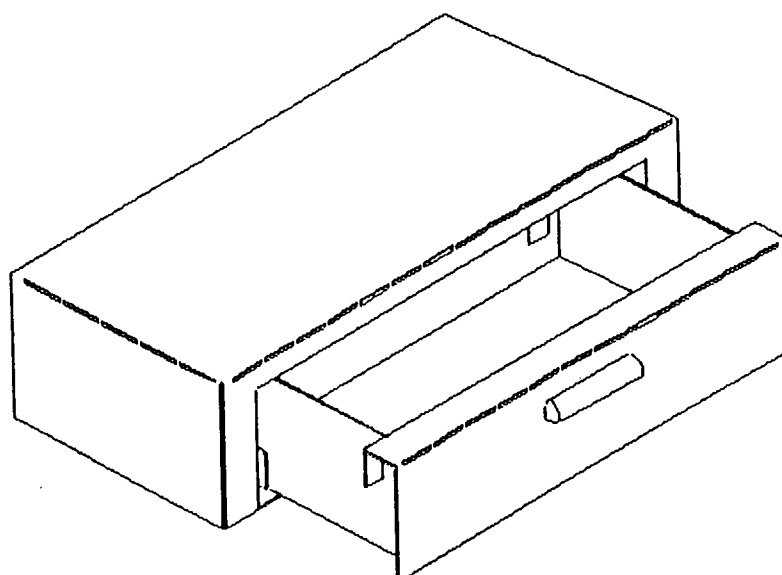


FIG. 8