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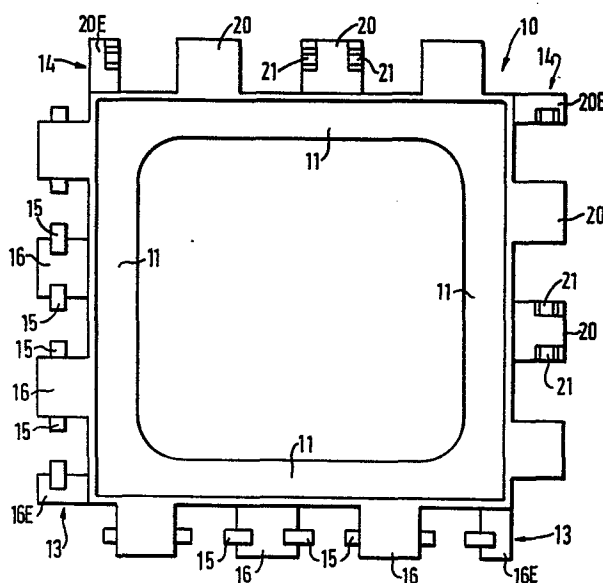
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54 Toy/model building system.

57 A modular unit (10) for a building toy or model system is of shallow formation having sets of intercoupling projections (13, 14) on sides (11) thereof. The projections are of two types, each type interfitting with the other type so as to afford a choice of relative angular positions of interengaged members or so as to afford a choice of hinged and non-hinged interengagement.



Title: Toy/Model Building System

DESCRIPTION

This invention relates to a building toy or model system particularly having modular units and to
5 such units.

The aim is to provide a system that has greater flexibility or other advantage, at least in certain circumstances, over well-known and popular systems relying on interference fitting relative to studs in
10 faces of modular members. Amongst the limitations of such systems is that building is restricted by requirements at least partially to superpose studded and receiving faces of the modular members. Those faces are generally simply the opposite faces of
15 standard or basic modular members of the system. As well as limiting erection/building, such systems often further lead to provision of an overly large number of special-purpose pieces.

With this aim in view, we now propose herein a
20 system utilising edge-wise intercoupling of modular members by mutual engagement of projections from each of such edges.

Shallow modular members can be provided, even

where, as is preferred, the projections are within the thickness of such members, and walls, skins, frames can be built up without undue and/or clumsy thickness. In fact, modular members hereof may be in the form of
5 peripheral frames with optional covers, thus enabling construction of skeletal forms or covered shells.

Preferably, for implementing this invention, modular members have edge projection formations of two types each to interfit with the other type on another
10 modular member. In one aspect hereof, such edge projection formations afford a choice of relative angular positions of interengaged members. In another aspect hereof, such edge projection formations afford a choice of hinged and non-hinged interengagement
15 of modular members.

Basic modular members have straight edges with said projections, preferably with at least one of each type on different edges thereof. Rectangular, specifically square, and triangular elements will be described, but
20 should not be taken as limiting, either to equal-length sides or to all-straight-sided shapes of members.

For hinging, preferred embodiments hereof have projections of one type, called male, in the form of lugs with sideways, spigot-like protrusions; and

projections of the other type, called female, in the form of lugs with grooves capable of accommodating male spigot-like protrusions. Clearly, for hinging the spigot-like protrusions of each set should all be aligned together. Moreover, for secure interengagement it will help for the lugs of each set corresponding to a side of a modular member to be staggered and alternating as to their heights relative to the thickness of the member, basically to opposite sides of the axis of hinging, but always with their spigot-like protrusions or grooves at the same medial-thickness of the member. Then, each of intercalating sets of lugs will have its lugs engaged from both sides.

For non-hinging interconnection, preferred embodiments hereof also have projections of one type, called male, in the form of lugs with thickenings or ribs; and projections of the other type, called female, in the form of lugs with recesses or grooves. Again, the lugs of each type should be staggered and alternating as to their positions in the thickness of the modular member, but now the lugs of the two types will register in position along a side of the member and be capable of being pushed together with lugs of one type sliding over lugs of the other in alternating sequence for security of engagement via interengagement

of the thickening or ribs and the recesses or grooves.

Both of hinging and non-hinging interengagement are readily provided for by appropriate positioning, in sets, of male lugs with sideways spigots extended
5 as ribs on the lugs; and female lugs with spaced grooves from each side and capable of accommodating either of a said spigot or a said rib like extension. Gaps between such ribs and such grooves as lands can assure lateral location.

10 A half female or male type projection will usually be located at one end of each side of our modular members.

The spacing of the grooves/spigots on their respective projections from the sides of the modular
15 members are readily set so as to assist interengagement of modular members at angles other than 90° or 180°. The ends of at least the female type projections may be chamfered to further assist interengagement.

The modular members may further comprise
20 decorative or distinguishing means removably attachable thereto. The distinguishing means may in one embodiment comprise the aforesaid covers each being a substantially planar member adapted to engage and fill-in a recess or the like in the modular member.

The planar member which serves as an in-fill member may in a further embodiment comprise a skirt portion depending from one surface of the planar member, the skirt portion being adapted to interengage and interfit the recess, or a hole through the modular member as for a frame-like modular member. The skirt portion is preferably spaced from a peripheral portion of the planar member, so as to permit the peripheral portion to overlies the one or more sides of the modular member. The skirt portion is preferably adapted to friction-fit recess or the like of the planar member. The recess or the like has preferably the same dimensions as the skirt portion so that the recess or the like may positively interengage and interfit with the skirt portion.

The planar member may be identifiable by sight, preferably colour and/or pattern, and/or by touch, preferably texture.

The modular member may be formed by moulding, for example injection moulding, a synthetic polymeric material, such as a general purpose polystyrene, polypropylene or reinforced nylon.

This invention will now be further described, by way of example only, with reference to the accompanying

drawings, in which:

Figure 1 is a plan view of one embodiment of a square building system module according to the invention;

Figures 2 and 3 are side views of the module of Figure 1;

Figures 4 and 5 show details;

Figures 6 and 7 are side views of interconnected modules of Figure 1;

Figure 8 is a plan view of a triangular building system module; and

Figure 9 indicates a cover part.

Referring to Figures 1 to 5 of the drawings, a building system module of resilient plastics material has a generally open square body 10 having sides 11 of much less width and depth than their length. On each side 11 are a series of lug-like projections for interengagement with complementary lug-like projections of other modules.

Opposite sides of the module have like sets of projections, one set 13 being of what we call male type and the other set 14 of what we call female type. Basically, the male type comprises a pair of rod-like spigots extending generally parallel to the module sides in opposite directions from a lug 16. The spigot formations 15

extend partially above the top or bottom surface 17
of the associated lug 16 depending on the orientation
of the module. As shown, such extensions are alternately
above top and bottom surfaces from one lug to the
5 next. Basically, the female type projection comprises
a lug 20 having a pair of grooves 21 in top or bottom
surfaces thereof for accommodating the spigots of the
male type projections. Again, as shown, the grooves 21
alternate in being in top and bottom surfaces from
10 one lug to the next.

At one end of each side is a one-sided or half
projection for both male and female sets of projections.

The sets of male projections have their spigots
18 all in alignment, effectively to define an axis of
15 rotation that is at one half of the thickness of the
module along associates sides and positioned spaced both
from free ends and from bottom of the lugs.
Similarly, the sets of female grooves are aligned and
positioned for the same purpose when mated intercalatingly
20 with a male set for hinged interconnection.

It will be evident, for intercalation (see Figure 6)
that the extent of the spigots 15 beyond the lugs 16
parallel to the sides of the module will be accommodated
by the length of the grooves 21 in the lugs 20. Also, the

widths of the lugs 20 will be such as to fit between spacings of the lugs 16, and vice versa, for intercalation.

At intercalation, the spigots 15 of each lug 16 will engage grooves 21 of two flanking lugs 20 from
5 opposite sides and the same clearly applies to the grooved lugs 20 and flanking spigoted lugs 16, so that a secure hinged interengagement is achieved.

Overall, at intercalation, there will be appropriate clearances (between lugs 16 and 20 and between their ends
10 and the sides of the modules between the lugs) to allow hinged movement between limits that afford a range of movement between relative orientations of modules that constitute or go beyond desired normal connection directions. For the embodiment shown such range is at least 180°
15 to give directions that are at least 90° to each side.

It is also the case, as shown, that the extent of each of the spigots 15 over the top or bottom surface of lugs 16 is also such as to be accommodated by the grooves 21 in the lugs 20, and the widths of the lugs as well as the
20 spaces on each lug between ends of its spigot or groove formations permit of the lugs 16 and 20 being interconnected in superposition (see Figure 7) giving a substantially rigid, no hinged interconnection with the modules concerned essentially coplanar.

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Engagement of modules is achieved by pushing complementary projections together in the desired orientation of the modules until the spigots 15 are in the grooves 21. The resilience of the module material allows some deformation of the projections to facilitate this. Furthermore, chamfered ends 25 of the female type projections can facilitate the push engagement of the modules.

If another identical module to that shown in Figure 1 is placed in register over the module of Figure 1, then a hinged connexion between the two modules would be formed at the right hand side of the first or lower module by translating the upper module to the right hand side of the module of Figure 1, and then pushing complementary projections or lugs together. A similar connection can also be made after rotating the upper module clockwise through 90° , due to the male projection sets 13 being on adjacent sides of the modules 10.

Alternatively, if the other identical module to that shown in Figure 1 is placed in register over the module of Figure 1, non-hinged connection will be achieved if the other module is turned over maintaining side edge positions and optionally rotated through 90° in a counter clockwise direction, translated to the left

hand side of the lower module, and spigots and grooves engaged by pushing the sides of the modules together.

Lateral movement between two modules hinged together is substantially prevented by intercalation
5 of their lugs. Such movement is also substantially prevented for non-hinged interconnection by the lands between grooves of a lug and spigots of a mating lug.

Once two modules have been secured together in a substantially co-planar relationship, it is possible
10 to secure either a single further module to the previously coupled modules, or two further modules to the previously coupled modules, one further module being on each side of the coupled modules and secured together via their complementary projections.

15 A single further module is secured to the previously coupled modules in a hinged relationship. If two further modules are secured to the previously coupled modules, the connexion so formed between the additional modules is substantially co-planar and
20 rigid or non-hinged, and the four relatively secured modules are in cruciform relation.

The square embodiment of Figure 1 represents a development from a module where similarly lugged sides were disposed oppositely, but no particular disadvantages

in use is seen in the latter as an alternative or additional option to what is shown. However, for manufacture, that shown will need no relative inversion of the lug formations of the same type.

5 In off-setting the projections, there are complementary half-male/female projections at corners and diagonally opposite each other.

Figure 8 shows a triangular module 40 with two female and one male side otherwise the same as for
10 Figure 1. It will, of course be useful also to provide a triangular module with two male and one female side.

A substantially planar in-fill member 50 is shown in Figure 9 having a skirt 52 depending therefrom and
15 spaced from a peripheral portion 54 thereof. The in-fill member is adapted to engage and interfit a central recess 70 in a module and serves to distinguish modules relative to each other. The skirt is adapted to friction fit the recess, whilst the peripheral portion
20 54 can overlies the sides of the module. It will be evident that similar provision may be made for the triangular module.

It will be appreciated that although square and triangular shaped modules have been described, modules

of any geometric shape with at least one straight side, normally a plurality such as rectangles and other polygons, are included within the scope of the invention.

CLAIMS

1. A modular unit for a building toy or model system, having projections from edges thereof that are mutually engageable with projections of other said units.
- 5 2. A unit as claimed in claim 1 having edge projection formations of two types each to interfit with the other type on another modular unit.
3. A unit as claimed in claim 1 or 2 wherein said edge projection formations afford a choice of relative angular
10 positions of interengaged units.
4. A unit as claimed in claim 1 or 2 wherein said edge projection formations afford a choice of hinged or non-hinged interengagement of modular units.
5. A unit as claimed in any one of claims 1 to 4 wherein
15 said units have straight edges with said projections.
6. A unit as claimed in claim 5 having a set of each type of projection on different edges thereof.
7. A unit as claimed in any one of claims 1 to 6 wherein one type of projection is a lug with sideways spigot-like
20 protrusions and the other type is a lug with grooves capable of accommodating the spigot-like protrusions of the one type of projection.
8. A unit as claimed in claim 7 wherein said spigot-like protrusions of each set are aligned together.
- 25 9. A unit as claimed in claim 8 wherein the lugs of each set corresponding to a side of the unit are

staggered and alternating as to their heights relative to the thickness of the unit.

10. A unit as claimed in claim 9 wherein the lugs are to opposite sides of a hinging axis.

5 11. A unit as claimed in any one of claims 7 to 10 wherein a set of projections are in the form of lugs with thickening or ribs and a set of projections are in the form of lugs with recesses or grooves for accommodating said thickenings or ribs, the lugs of
10 each set being staggered and alternating as their positions in the thickness of the unit.

12. A unit as claimed in any one of claims 7 to 11 wherein at least a set of lugs has sideways spigots extended as ribs on the lugs and at least a set of lugs
15 has lugs with spaced grooves from each side and capable of accommodating either of a said spigot or a said rib.

13. A unit as claimed in any one of claims 7 to 12 wherein ends of lugs are chamfered.

14. A unit as claimed in any one of claims 1 to 13 of
20 shallow formation.

15. A unit as claimed in any one of claims 1 to 14 having a recess therein or a hole therethrough.

16. A unit as claimed in claim 15 having a cover for said recess or said hole.

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17. A unit as claimed in claim 16 wherein said cover comprises a planar member having a skirt portion that interengages and interfits the recess or the hole.

18. A unit as claimed in claim 17, wherein the skirt
5 portion is spaced from a peripheral portion of the planar member.

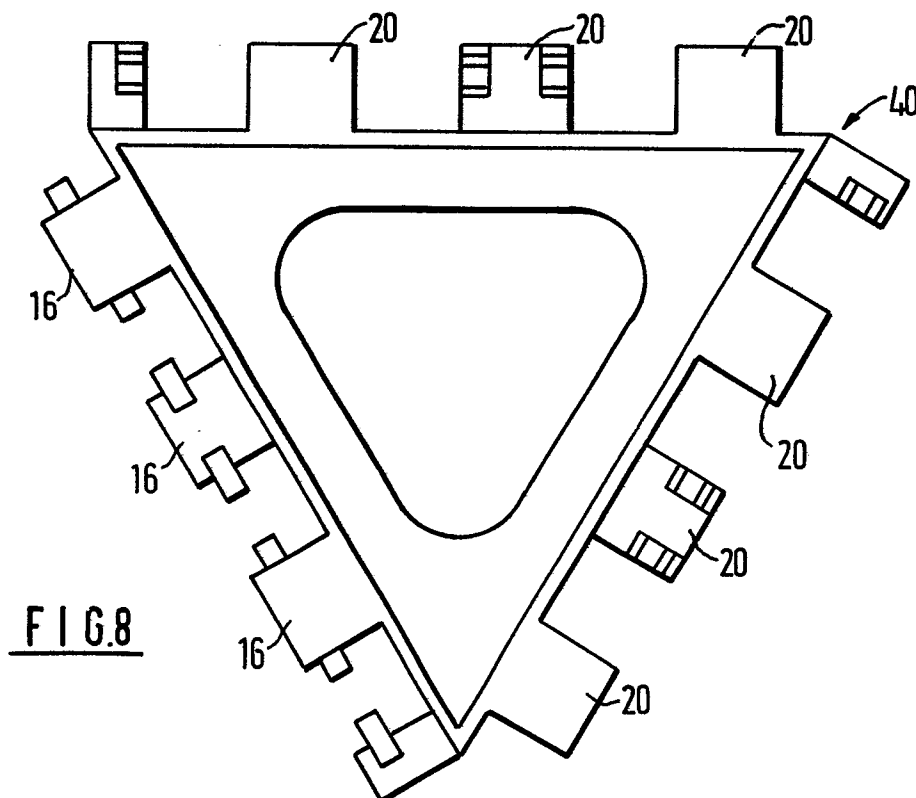
19. A unit as claimed in claim 17 or 18 wherein the skirt portion is a friction fit with said recess or hole.

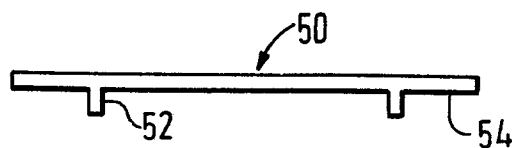
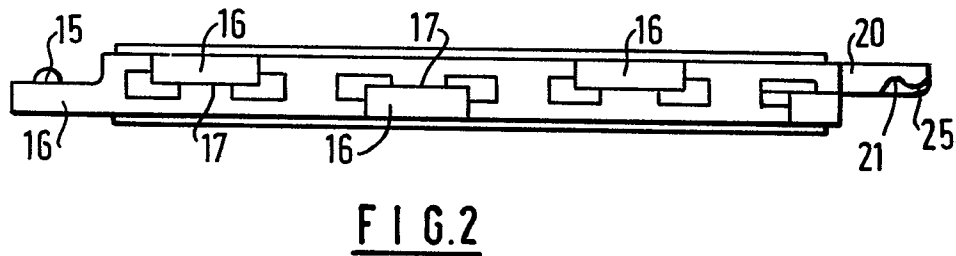
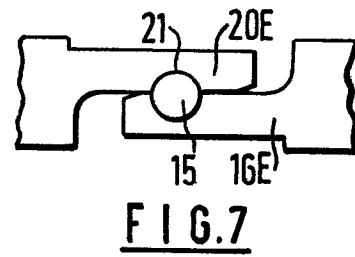
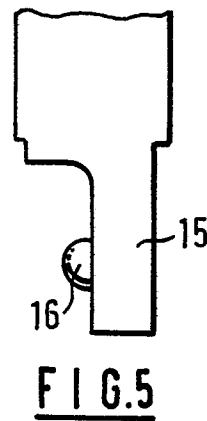
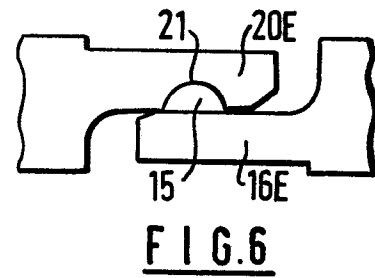
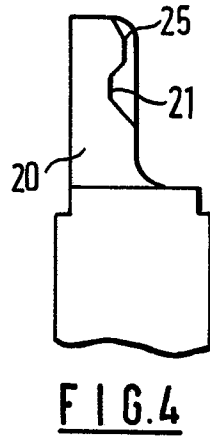
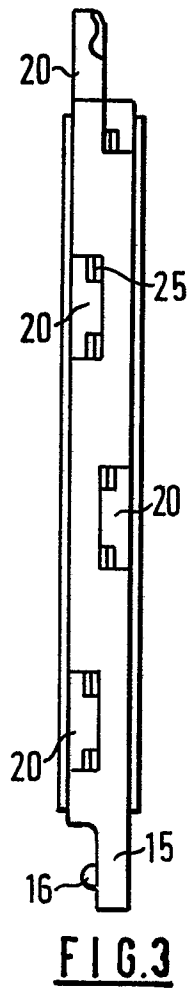
10 20. A unit as claimed in any one of claims 1 to 19 of synthetic polymeric material.

21. A unit as claimed in claim 20 of polystyrene polypropylene or reinforced nylon.

22. A building toy or model system comprises a
15 plurality of units according to any one of claims 1 to 21.

FIG. 1







European Patent
Office

EUROPEAN SEARCH REPORT

0109181

Application number

EP 83 30 6154

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. 3)
X	US-A-2 776 521 (E.L. ZIMMERMAN) * Claim; column 1, lines 27-31; figures 1-7 *	1-3	A 63 H 33/08
A	* Column 2, lines 7-12, 18-20 *	7,8,14	
X	US-A-4 055 019 (E.H. HARVEY) * Claim 1; column 1, lines 5-8; column 3, lines 49-54; figures 1-4 *	1-3	
A	* Column 4, lines 30-34, 41-43 *	20,21	
X	DE-U-1 953 944 (F. SCHLEICH) * Claim 1; figures 1, 3 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A	DE-A-1 603 624 (F. STEINER) * Claims 1, 3, 5-7, 10; figures 1, 5 *	1-3,5, 6,15, 20,22	A 63 H 33/04 A 63 H 33/06 A 63 H 33/08 G 09 B 1/36
A	DE-A-2 356 930 (A. MAYR) * Claims 1, 4; figures 1-4 *	1-3,11	
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 06-01-1984	Examiner CLOT P.F.J.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	



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EUROPEAN SEARCH REPORT

0109181

Application number

EP 83 30 6154

DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	FR-A-1 108 410 (G.G. HUARD et al.) * Page 1, right-hand column, lines 12-18; figure 2 *	15-19	
A	GB-A-1 442 602 (MOULDED PLASTICS) * Page 3, lines 44-54; figure 7 *	15,16	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
Place of search BERLIN		Date of completion of the search 06-01-1984	Examiner CLOT P.F.J.
<div>CATEGORY OF CITED DOCUMENTS</div> <div>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</div> <div>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</div>			