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(54) **MODULAR CONSTRUCTION SYSTEM**

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(56) References cited:
EP-A- 0 162 730
GB-A- 923 907
GB-A- 2 041 228
US-A- 3 195 266

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Description

[0001] The invention relates to a modular construction system, for instance for educational purposes or for use as toy, which system comprises at least two components for mutual releasable coupling by means of coupling means, which coupling means comprise:

two coupling edges forming part of a wall of the one component and also forming the boundary of one or two continuous holes in this wall; and
two coupling lips which are each adapted to be inserted in a or the continuous hole and which each comprise for this purpose at least one snap edge for co-action with an associated coupling edge such that after this co-action has been effected, the displacement can only take place by exerting a certain minimum force upon disassembly of the coupling means and wherein the components consist at least partially of plastic.

[0002] Such a construction system is known for instance from US-A-3 195 266. The problem in a system of this type is that the coupling between the diverse components can only be released with difficulty. In order to release the coupling a comparatively great force must be exerted simultaneously on both coupling edges of a set such that the coupling is released in substantially axial direction. In addition, the construction system according to the said American patent has no provision whereby the couplings between the components are always free of play and do not rattle. GB-A-923 907 discloses a construction system in which the components are losely connected and kept together by an elastic string. Such a system cannot take any loads.

[0003] The invention has for its object to provide a modular construction system which does not display the stated shortcomings of the known art. To this end the construction system according to the invention has the feature that the coupling means are arranged such that in coupled situation the coupling edges and the coupling lips press against each other under bias with inclining coupling surfaces such that by rotation about the one set of coupling surfaces the contact between the other set of coupling surfaces can be released, and

a stop surface connects to a set of coupling lips, which stop surface presses in coupled situation with some force against at least a part of a coupling edge such that the coupling between the components is free of play.

[0004] A preferred embodiment has the special feature that the coupling surfaces have a generally convex shape.

[0005] A specific embodiment has the special feature that the coupling edges and the coupling lips have inclining pressure surfaces on their sides remote from said coupling surfaces, which pressure surfaces can slide over each other to effect the coupling when a pressure force is applied. With this embodiment the coupling can be brought about by applying a pressure force depending on said inclining position. It will be apparent that the flexibility of the lips and the coefficient of friction of the surfaces sliding over each other also determine the required pressure force. This is also the case for the said decoupling.

[0006] A particular variant has the special feature that said pressure surfaces have a generally convex shape.

[0007] Particularly the embodiment in which both the coupling surfaces and the pressure surfaces have a generally convex shape can advantageously be embodied such that the coupling lips and parts of the coupling edges co-acting therewith have substantially the same shapes.

[0008] Particular embodiments can advantageously have the special feature that the coupling edges and the coupling lips are non-round such that coupled components are locked against relative rotation.

[0009] The embodiment is recommended in which the stop surface forms part of a flange plate.

[0010] A specific variant of this latter principle has the feature that the flange plate is permanent-magnetic. Ferromagnetic components can hereby be connected magnetically to a made structure.

[0011] An exceptional embodiment has the feature that the flange plate can be flush-mounted in a recess in the coupling edge.

[0012] This embodiment is preferably embodied such that the flange plate fits into the recess with little play.

[0013] A specific embodiment has the feature that the one component comprises two sets of coupling lips present on either side of a flange plate and that the depth of said recess corresponds to half the thickness of the flange plate such that two components coupled by the first mentioned component are positioned with their coupling edges in at least substantially mutually abutting relationship.

[0014] An alternative comprises tensioning means for placing the lips under directed and great tension in the inserted situation such that the rearward displacement is only possible after the tensioning means have been deactivated.

[0015] This latter embodiment can have the feature that the tensioning means can be controlled from outside by means of control means.

[0016] A specific embodiment has the special feature that the control means comprise indicator means for the active and the inactive state of the tensioning means, which indicator means can be embodied for instance as colour coding means.

[0017] The construction system according to the invention preferably has the special feature that components consist of plastic, for instance ABS or polypropylene (PP). The use of a very strong plastic such as ABS has the advantage that the lifespan of the components is very long, even in the case of prolonged and even rough use. When non-clamping or non-snapping cou-

plings are applied the hard ABS is a very good choice. In the case where demands are made of the resilience of the material, particularly in the case of clamp couplings or snap couplings, a softer, more resilient plastic can be recommended. This can for instance be polypropylene.

[0018] A system with plastic components can have the special feature that components are manufactured by injection moulding.

[0019] An alternative can have the feature that components are manufactured by extrusion, followed by division into pieces of the profiled prismatic rod manufactured by extrusion, and optionally followed by selective removal of chosen areas.

[0020] It should be appreciated that the term "prismatic" is understood to mean a shape which at any position has the same cross-sectional form transversely of a principal direction.

[0021] The invention will now be elucidated with reference to the annexed drawing of a number of random embodiments, to which the invention is not limited. In the drawing:

Fig. 1 shows a partly perspective view of a first embodiment;
Fig. 2 shows partly in side view, partly in cross section the coupled components of fig. 1;
Fig. 3 is a perspective view of a second embodiment;
Fig. 4 shows a cross section IV-IV through the component of fig. 3 in coupled situation;
Fig. 5 is a partly broken away perspective view of a third embodiment;
Fig. 6 shows the cross section VI-VI according to fig. 5;
Fig. 7 is a partly broken away perspective view of a fourth embodiment;
Fig. 8 is a perspective view of a fifth embodiment;
Fig. 9 shows a cross section through the divided block according to fig. 8 in mounted situation;
Fig. 10 is a partly perspective view of a sixth embodiment;
Fig. 11 shows partly a top view, partly a cross section of the block of fig. 10;
Fig. 12 shows a cross section perpendicularly of the plane of the section according to fig. 11 of the block according to fig. 10 in mounted situation;
Fig. 13 is a view corresponding with fig. 1 of a seventh embodiment, wherein the manner of manufacture by extrusion is also shown;
Fig. 14 is a perspective view of an eighth embodiment;
Fig. 15 is a view corresponding with fig. 2 of a ninth embodiment;
Fig. 16 is a perspective view of a tenth embodiment which consists of a plurality of sub-components;
Fig. 17 is a perspective view of an eleventh embodiment;
Fig. 18 is an exploded view of the twelfth embodiment;
Fig. 19 is a perspective view of a thirteenth embodiment;
Fig. 20 is a perspective view of a fourteenth embodiment;
Fig. 21 shows partly in transparent view a perspective view of a fifteenth embodiment;
Fig. 22 shows a cross section in expanded situation of the component of fig. 21;
Fig. 23 shows a view corresponding with fig. 22 of the component in non-expanded situation;
Fig. 24 is an exploded view of a sixteenth embodiment;
Fig. 25 is an exploded view of a seventeenth embodiment;
Fig. 26 shows an exploded view of an eighteenth embodiment which is similar to the sixteenth embodiment according to fig. 24;
Fig. 27 shows a partly broken away exploded view of a nineteenth embodiment;
Fig. 28 shows a partially exploded view of a twentieth embodiment which is similar to the eighteenth embodiment according to fig. 26;
Fig. 29 shows a partially exploded view of the subcomponents from which the frame of fig. 28 is constructed;
Fig. 30 is a partly perspective view of a twenty-first embodiment;
Fig. 31 is a partly perspective view of a frame in a twenty-second embodiment;
Fig. 32 is a partly perspective view of a frame in a twenty-third embodiment;
Fig. 33 is a perspective view of a frame in a twenty-fourth embodiment;
Fig. 34 is a partly perspective view of a twenty-fifth embodiment;
Fig. 35 shows the embodiment according to fig. 34 in cross-sectional view;
Fig. 36 is a perspective view of a twenty-sixth embodiment;
Fig. 37 is a perspective view of a twenty-seventh embodiment;
Fig. 38 is a perspective view of an assembly of components as according to fig. 37;
Fig. 39 is a perspective view of an assembly of components as according to fig. 36;
Fig. 40 is a perspective view of a twenty-eighth embodiment;
Fig. 41 is a perspective view of a twenty-ninth embodiment;
Fig. 42 is a perspective view of an assembly of components as according to fig. 40;
Fig. 43 shows a building brick according to the invention in a thirtieth embodiment;
Fig. 44 shows an assembly of building bricks in accordance with a thirty-first embodiment;
Fig. 45 shows a perspective view, partly in exploded

view, of a building structure according to the invention;

Fig. 46 shows five building bricks according to the invention, all according to a thirty-second embodiment but with different dimensions;

Fig. 47 shows an exploded view of a building brick according to the invention consisting of two identical parts in a thirty-third embodiment;

Fig. 48 shows a partly broken away perspective view of a thirty-fourth embodiment;

Fig. 49 shows a thirty-fifth embodiment in perspective view, wherein the composite parts are drawn at some mutual distance;

Fig. 50 is a perspective view of the assembled building brick according to fig. 49;

Fig. 51A is a perspective view of a thirty-sixth embodiment;

Fig. 51B shows a side view thereof;

Fig. 52A shows a side view of a variant of the embodiment of fig. 51;

Fig. 52B shows an example of an application of the building brick of fig. 52A;

Fig. 52C shows a top view of the building brick of fig. 52A;

Fig. 53 is a partly perspective view of a thirty-seventh embodiment, wherein two building bricks are supported by a screw spindle and are axially movable in rotation thereof;

Fig. 54 is a perspective view of a thirty-eighth embodiment, the principle of which corresponds with the embodiment of fig. 53; and

Fig. 55 is a partly perspective view of a thirty-ninth embodiment.

[0022] In all the figures functionally identical components are designated as far as possible with the same reference numerals.

[0023] Fig. 1 shows a coupling block 1 and a frame 2, both components of a modular construction system according to the invention. Frame 2 comprises a continuous hole 3 which is bounded by four mutually perpendicular coupling edges which are all designated with 4 and all have the shown stepped structure.

[0024] Coupling block 1 has a central plate 5, the thickness of which is twice as great as the depth of the first step 6.

[0025] As shown in fig. 2, two frames 2 can be mutually coupled in this manner without interspaces by means of coupling block 1. Plate 5 has on each of both sides two coupling lips 7 with rounded outer edges 8. In the manner shown in fig. 2, these lips can be placed into snapping co-action with the inner steps 9. The snapping co-action is ensured by the shown rounded shape of outer edges 8. The coupling between block 1 and frame 2 can be released from the situation shown in fig. 2 only by exerting a relatively great force.

[0026] Fig. 3 shows a coupling block 10, of which the coupling lips 11 with the rounded outer edges 8 can be placed into snapping co-action with frame 2 as shown in fig. 4, but wherein the rearward displacement can, if desired, be blocked by tensioning means embodied as an eccentric cam element 12 which can be rotated by means of a tool 13 which is inserted into a correspondingly shaped hole 14. Due to this rotation the extreme faces of cam 12 press against correspondingly curved convex surfaces 15 with relatively large radius of curvature of the lips 11, whereby these latter are effectively driven apart, and the inward directed displacement is in any case blocked. Only by deactivating the described tensioning means can the coupling of fig. 4 be undone.

[0027] Fig. 5 and 6 show the use of a coupling block 16 which is embodied single-sided but is based on the same principle as coupling block 10. Use is made in this embodiment of a right-angled transmission with two co-acting bevel gears 17 which positively couple cam element 12 via corresponding shafts 18 to an externally accessible control element 18.

[0028] Fig. 7 shows a variant in which a coupling block 19 comprises a cam element 12 which is rotatable by means of a tooth wheel 20 which is arranged on shaft 18 and which co-acts with a rack 21 forming part of an axially displaceable control rod 22 which has a length such that in the inactive situation of cam 12 the one part of the rod protrudes outside the structure and in the active situation the other part protrudes. It is thus always clear to the user which movement he must perform to place the tensioning means into the situation other than the prevailing one. To avoid ambiguity both ends of rod 22 can be provided with clearly recognizable differing colours in order to indicate respectively the active and inactive situation of the tensioning means.

[0029] Fig. 8 shows an embodiment in which a coupling block 23 takes a divided form. Cam element 12 is embodied as according to the second embodiment of fig. 3. The outer edges 8 form in this embodiment the coupling lips, which however are not elastic, so the coupling respectively decoupling can only be effected by rotation of the cam 12. This is supported by a disc 25 which mutually connects the identical parts 24 of block 23 by friction. The coupling block 23 in divided form comprises ribs 71, 72 which fit in the manner shown in fig. 9 into a framework consisting of two parts 73, 74. In the manner drawn a tight fit can be obtained with the outer edges 8.

[0030] Fig. 10 shows a coupling block 29 wherein covers 26 are moulded on the ends of the, in this embodiment prismatic, form, which covers are connected to the main form by foil hinges. Covers 26 take a form such that they can be placed snappingly into the space defined by the coupling lips 7. It is noted that elevations 27 present as according to fig. 1 are absent in this embodiment. As fig. 11 shows, an arranged cover 26 can be removed with a tool 28.

[0031] Fig. 12 shows the situation of fig. 11 in a cross section which is directed perpendicularly of the cross section of fig. 11.

[0032] Fig. 13 shows an embodiment in which a cou-

pling block 30 takes an essentially prismatic form. The elevations 27 are absent here. Block 30 is manufactured from an extrudate 31 which is shortened successively at fixed separating zones 32, whereafter zones 33 are removed to obtain steps 34.

[0033] Fig. 14 shows that a block 35 consists of three parts, i.e. a separate plate 5 and two identical lip units 36 which are connected to plate 5 by means of coupling shaft 37. Thus obtained is a structure consisting of three components which can be grouped in a manner identical to block 30. In this embodiment the lip units 36 are however rotatable at any desired angle relative to plate 5.

[0034] Fig. 15 shows an embodiment wherein the inner steps 38, in contrast to the inner steps 6 of fig. 2, have rounded shapes. This facilitates the effecting and release of the coupling.

[0035] Fig. 16 shows a variant of the eighth embodiment of fig. 14. Plate 5 and lip units 36 are here mutually coupled by means of dovetail joints.

[0036] Fig. 17 shows a block 39 having on one side a lip unit 40 and on the other side a sleeve 41, for instance for rotatably receiving a shaft.

[0037] Fig. 18 shows an embodiment which forms an effective combination of the first embodiment according to fig. 1 and the eleventh embodiment according to fig. 17.

[0038] Fig. 19 shows an embodiment wherein two blocks 41,42 are hingedly coupled to each other by means of a hinge 43.

[0039] Fig. 20 shows a fourteenth embodiment wherein blocks 44 are embodied identically and each have a structure which is similar to the tenth embodiment of fig. 16. Blocks 44 are each supported by supports 45 by means of a dovetail joint. Both supports are identical and face in opposing directions and together with a pivot shaft 46 define a hinge. It is noted that a hinge of any type whatsoever can also extend on mutually facing edges of blocks.

[0040] Fig. 21, 22 and 23 show a block 47 which, like the fifth embodiment as according to fig. 8, is expandable by means of an eccentric element. A rotatable disc 48 has two inclining pressure surfaces 49 which co-act with corresponding inner surfaces 50 of the halves 51 of block 47. Fig. 22 and 23 show respectively the expanded and non-expanded situation. Disc 48 has a ribbed peripheral surface, whereby a user is able to apply the desired rotation force with his fingers. Alternatively, use can also be made of one or more protrusions.

[0041] Fig. 24 shows a coupling block 52 which can be coupled on one side to frame 2 and on the other side comprises two coupling lips 53 for coupling to a plate 54 with frame 55.

[0042] Fig. 25 shows a variant in which a coupling block 56 comprises four pairs of coupling lips 57. A maximum of four plates 55 can herewith be coupled to each other. One plate can also run along the whole width or length of block 56 in the manner according to fig. 24, while two other plates can extend as far as this continuous plate.

[0043] Fig. 26 shows a frame 58 with four continuous holes 3 as according to inter alia fig. 1. A coupling block 1 is received snappingly herein.

[0044] Fig. 27 shows two plates 59 which can be coupled to a coupling piece 60 which can be coupled to the peripheral edges of holes 3, as according to for instance fig. 1. The thickness of plate 61 corresponds with the depth of step 62 and the mutually facing edges of holes 3 have a similar recess. Plates 59 can thus be mutually coupled such that the bottom surfaces do not display any protruding portions, which would be the case with the above described blocks. Even a block 1 as according to fig. 1 taking a single-sided form would not meet the criterion of absence of protruding portions, since the plate 5 has a thickness amounting to twice the depth of step 9.

[0045] It will now be apparent that frame 58 according to fig. 26 can couple four plates to each other. Similarly to plates 59, these plates are provided with holes 3 in their angular points.

[0046] Fig. 28 shows the coupling between a coupling block 1, a frame 2 and a plate 63.

[0047] Fig. 29 shows that frame 2 can be embodied as two parts 64,65 manufactured by injection moulding and mutually connectable by pin-hole connections. Pins 66 and the associated holes (not shown) can also be omitted, in which case glue connections can for instance be applied. This has the advantage that parts 64,65 can be identical. Any suitable connection technique is in principle applicable. Use can for instance also be made of snap connections, clamp connections, weld connections or the like.

[0048] Fig. 30 shows an embodiment wherein a coupling block 67 has a substantially rotation-symmetrical form. The shape of continuous hole 68 in frame 69 with associated steps is adapted thereto. Fig. 30 shows clearly that block 67 comprises a comparatively large continuous hole 70, this being important in the case of use of this embodiment as child's toy. If a small child were to swallow block 67, the hole 70 would remain open as passage for air so that suffocation is out of the question. The structure shown in fig. 30 is preferably embodied such that ribs 75, 76 have a chamfering on their side directed axially outward which acts as positioning edge, whereby they are easily able to pass over the internal step 77 in frame 69. Shown schematically is that once an assembly of block 67 and frame 69 has been fixed it can be separated by pressing together the lips 78 by making use of a schematically designated tool 79 to be pushed axially.

[0049] Fig. 31, 32 and 33 show alternative frames 71, 72 and 73.

[0050] The block 67 according to fig. 30 is suitable for co-action with the schematically designated holes 68 in the frame or the building brick 72. It is noted that the edges of holes 68 are only shown schematically but in accordance with the teaching of the invention have a

sectional form for instance as shown in fig. 2.

[0051] Due to the presence of recesses 84 the block or the building brick 67 can be received locked against rotation in a hole 68. In this case at least one protrusion may be present under the ribs 30 of building brick 67, this protrusion fitting into a recess 84.

[0052] Another manner of locking against rotation is obtained with the non-round shapes of the holes 85 as according to fig. 31, with which correspondingly shaped building bricks can co-act.

[0053] Fig. 34 and 35 show a twenty-fifth embodiment. The shown coupling block 80 has a prismatic form and corresponds in this sense with the seventh embodiment according to fig. 13. Compared with the coupling block 30 shown there, the coupling lips 81 are elongated. By analogy with that discussed with reference to fig. 30, it is possible by pressing axially as according to arrow 83 making use of a tool 82 to achieve the removal of coupling lips 81 from their resilient clamping position relative to frame 2 as shown in fig. 35, whereby coupling block 80 can be removed from frame 2 by exerting a continued axial pressure force.

[0054] The tool 82 can also be embodied such that said axial force is obtained by rotating the tool.

[0055] Fig. 36 shows a building brick 86, the special features of which do not have to be discussed in detail in view of the corresponding description of the relevant functional aspects thereof with reference to above described embodiments.

[0056] It is generally remarked that a particular embodiment attempts to embody all coupling edges and coupling lips in correspondence with each other. All complementary building bricks can hereby be coupled to each other. Another embodiment comprises for instance a plurality of building bricks each provided with at least two differently dimensioned coupling edges and/or coupling lips.

[0057] Fig. 37 shows a variant 87 which differs from the embodiment of fig. 36 in that top and bottom are open instead of closed.

[0058] Fig. 38 and 39 show examples of applications in which the building bricks according to fig. 37 and 36 respectively are mutually coupled. It will be apparent that the system according to the invention enables many other combinations.

[0059] Fig. 40 shows a single variant 88 of the embodiment according to fig. 37.

[0060] Fig. 41 shows a single variant 89 of the embodiment according to fig. 36.

[0061] Fig. 42 shows an assembly of the building bricks 88 according to fig. 40.

[0062] Fig. 43 shows a building brick 90 with two diagonally crossed sets of coupling edges and coupling lips.

[0063] Fig. 44 shows a plurality of building bricks 91 which are mutually connected in longitudinal direction respectively transverse direction.

[0064] Fig. 45 shows yet another example of a building structure with building bricks according to the invention.

[0065] Fig. 46 shows five building bricks 92, 93, 94, 95 and 96 with a generally elongate form which are provided on their end zones with holes with coupling edges.

[0066] Fig. 47 shows a perspective view of a building brick consisting of two identical parts 97, 98.

[0067] As described with reference to fig. 29, the parts 97, 98 are manufactured by injection moulding and are mutually connectable by pin-hole connections.

[0068] Fig. 48 shows a building brick 99 wherein the coupling edges form part of respective frames 100 which are embodied as inserts. Reference is also made in this context to the description of fig. 55 hereinbelow.

[0069] Fig. 49 shows an embodiment wherein a permanent-magnetic flange plate 101 can be coupled to separate plates 102, 103 which are provided with coupling lips. In this respect reference is made by way of explanation to for instance fig. 1 and 2. Plates 102, 103 can be connected to magnetic flange plate 101 by for instance a glue connection. Use can also be made of for instance a snap coupling, wherein plates 102, 103 mutually connect via the continuous hole 104 in flange plate 101.

[0070] Fig. 50 shows the thus obtained building brick 105.

[0071] Fig. 51A and 51B show building brick 106, wherein the respective coupling edges are rotated relatively through 90°.

[0072] This same structure can be found in the building brick 107 according to fig. 52.

[0073] Fig. 52B shows the coupling of two building bricks 107 to a plate 108 with a continuous hole with corresponding coupling edges.

[0074] Fig. 53 shows a screw spindle 109 carrying two building bricks 110, 111 co-acting therewith as nuts. Through rotation of the nut the building bricks 110, 111 move toward and away from each other because the associated screw threads 112, 113 have opposed orientation.

[0075] Fig. 54 shows a variant wherein the building bricks 114, 115 take a two-sided form as according to for instance fig. 1 and 2, while building bricks 110 and 111 are embodied single-sided.

[0076] Finally, fig. 55 shows a building brick 114 which is built up of identical walls 115 and plates 117 which are for anchoring therein via slotted holes 116 and which have continuous holes with coupling edges.

Claims

1. Modular construction system, for instance for educational purposes or for use as toy, which system comprises at least two components (1, 2) for mutual releasable coupling by means of coupling means, which coupling means comprise:

two coupling edges (9) forming part of a wall of the one component (2) and also forming the boundary of one or two continuous holes (3) in this wall; and

two coupling lips (7) forming part of the other component (2), which lips (7) are each adapted to be inserted in the one or the two continuous holes (3) and which each comprise for this purpose at least one snap edge (7) for co-action with an associated one of said coupling edges (9) such that after this co-action has been effected, the displacement can only take place by exerting a certain minimum force upon disassembly of the coupling means and wherein the components (1, 2) consist at least partially of plastic.

characterized in that the coupling means are arranged such that

in coupled situation the coupling edges (9) and the coupling lips (7) press against each other under bias with inclining coupling surfaces such that by rotation about the one set of cooperating coupling lip and edge the contact between the other set of cooperating lip and edge can be released, and

a stop surface connects to the two coupling lips (7), which stop surface presses in coupled situation with some force against at least a part of one coupling edge (9) such that the coupling between the components is free of play.

2. Construction system as claimed in claim 1, **characterized in that** the coupling surfaces have a generally convex shape.

3. Construction system as claimed in claim 1, **characterized in that**

the coupling edges and the coupling lips have inclining pressure surfaces on their sides remote from said coupling surfaces, which pressure surfaces can slide over each other to effect the coupling when a pressure force is applied.

4. Construction system as claimed in claim 3, **characterized in that** said pressure surfaces have a generally convex shape.

5. Construction system as claimed in claims 2 and 4, **characterized in that** the coupling lips and parts of the coupling edges coacting therewith have substantially the same shapes.

6. Construction system as. claimed in claim 1, **characterized in that** the coupling edges and the coupling lips are non-round such that the coupled components are locked against relative rotation.

7. Construction system as claimed in claim 1, **characterized in that** the stop surface forms part of a flange plate.

8. Construction system as claimed in claim 7, **characterized in that** the flange plate is permanent-magnetic.

9. Construction system as claimed in claim 7, **characterized in that** the flange plate can be flush-mounted in a recess in the coupling edge.

10. Construction system as claimed in claim 9, **characterized in that** the flange plate fits into the recess with slight play.

11. Construction system as claimed in claim 9, **characterized in that** the one component comprises two sets of coupling lips present on either side of a flange plate and that the depth of said recess corresponds to half the thickness of the flange plate such that two components coupled by the first mentioned component are positioned with their coupling edges in at least substantially mutually abutting relationship.

12. Construction system as claimed in claim 1, **characterized by** tensioning means for placing the lips under directed and great tension in the inserted situation such that the rearward displacement is only possible after the tensioning means have been deactivated.

13. Construction system as claimed in claim 12, **characterized in that** the tensioning means can be controlled from outside by means of control means.

14. Construction system as claimed in claim 12, **characterized in that** the control means comprise indicator means for the active and the inactive state of the tensioning means, which indicator means can be embodied for instance as colour coding means.

15. Construction system as claimed in claim 1, **characterized in that** components consist of plastic, for instance ABS or polypropylene (PP).

16. Construction system as claimed in claim 1, **characterized in that** components are manufactured by injection moulding.

17. Construction system as claimed in claim 1, **characterized in that**
components are manufactured by extrusion, followed by division into pieces of the profiled prismatic rod manufactured by extrusion, and optionally followed by selective removal of chosen areas.

Patentansprüche

1. Modulares Konstruktionssystem, beispielsweise für Ausbildungszwecke oder zur Verwendung als Spielzeug, wobei das System zumindest zwei Komponenten (1, 2) zur gegenseitigen, lösbaren Verbindung mittels Kupplungsmitteln aufweist und die Kupplungsmittel

- zwei Kupplungskanten (9), die einen Teil der Wand der einen Komponente (2) und ebenso den Rand einer oder zweier durchgehender Öffnungen (3) in dieser Wand bilden, und

- zwei Kupplungslippen (7), die einen Teil der anderen Komponente (2) bilden, deren Lippen (7) jede geeignet ist, in die eine oder die zwei durchgehenden Öffnungen (3) eingesetzt zu werden, und von denen jede zu diesem Zweck zumindest eine Schnappkante (7) für das Zusammenwirken mit der zugehörigen einen der Kupplungskanten (9) derart aufweist, dass nachdem dieses Zusammenwirken durchgeführt wurde, das Zurückziehen nur durch Ausüben einer gewissen Mindestkraft für das Lösen der Kupplungsmittel stattfinden kann, und wobei die Komponenten (1,2) zumindest teilweise aus Kunststoff bestehen,

aufweisen,
dadurch gekennzeichnet,
dass die Kupplungsmittel so angeordnet sind, dass in gekuppeltem Zustand die Kupplungskanten (9) und die Kupplungslippen (7) gegeneinander unter Spannung mit sich derart neigenden Kupplungsflächen drücken, dass bei einer Drehung um ein Paar aus zusammenwirkender Kupplungslippe und -kante der Kontakt zwischen dem anderen Paar aus zusammenwirkender Lippe und Kante gelöst werden kann, und
eine Stoppfläche eine Verbindung zu den zwei Kupplungslippen (7) herstellt, wobei die Stoppfläche in gekuppelter Stellung mit einiger Kraft gegen zumindest einen Teil einer Kupplungskante (9) so presst, dass die Verbindung zwischen diesen Komponenten spielfrei ist.

2. Konstruktionssystem nach Anspruch 1,
dadurch gekennzeichnet,
dass die Kupplungsflächen eine allgemein konvexe Gestalt haben.

3. Konstruktionssystem nach Anspruch 1,
dadurch gekennzeichnet,
dass die Kupplungskanten und Kupplungslippen geneigte Druckflächen auf ihren von den Kupplungsflächen entfernt liegenden Seiten haben, wobei diese Druckflächen übereinander gleiten können, um das Kuppeln zu erreichen, wenn eine Druckkraft angewandt wird.

4. Konstruktionssystem nach Anspruch 3,
dadurch gekennzeichnet,
dass die Druckflächen eine allgemein konvexe Gestalt haben.

5. Konstruktionssystem nach Anspruch 2 oder 4,
dadurch gekennzeichnet,
dass die Kupplungslippen und Teile der mit diesen zusammenwirkenden Kupplungskanten im wesentlichen dieselbe Gestalt haben.

6. Konstruktionssystem nach Anspruch 1,
dadurch gekennzeichnet,
dass die Kupplungskanten und Kupplungslippen derart unrund sind, dass die verbundenen Komponenten gegen relatives Verdrehen blockiert sind.

7. Konstruktionssystem nach Anspruch 1,
dadurch gekennzeichnet,
dass die Stoppfläche einen Teil einer Flanschplatte bildet.

8. Konstruktionssystem nach Anspruch 7,
dadurch gekennzeichnet,
dass die Flanschplatte permanentmagnetisch ist.

9. Konstruktionssystem nach Anspruch 7,
dadurch gekennzeichnet,
dass die Flanschplatte in einer Ausnehmung in der Kupplungskante versenkt montierbar ist.

10. Konstruktionssystem nach Anspruch 9,
dadurch gekennzeichnet,
dass die Flanschplatte in die Ausnehmung mit geringem Spiel passt.

11. Konstruktionssystem nach Anspruch 9,
dadurch gekennzeichnet,
dass die eine Komponente zwei Paare von Kupplungslippen an jeder Seite der Flanschplatte aufweist und dass die Tiefe der Ausnehmung der Hälfte der Dicke der Flanschplatte so entspricht, dass zwei durch die zuerst erwähnte Komponente verbundene Komponenten mit ihren Kupplungskanten zumindest im wesentlichen wechselseitig aneinander liegend angeordnet sind.

12. Konstruktionssystem nach Anspruch 1,
gekennzeichnet durch
Spannungsmittel zum Anordnen der Lippen unter gerichteter und großer Spannung im eingesetzten Zustand, so dass ein rückwärtiges Herausziehen nur möglich ist, nachdem die Spannungsmittel deaktiviert wurden.

13. Konstruktionssystem nach Anspruch 12,
dadurch gekennzeichnet,
dass die Spannungsmittel von außen mittels Steuermitteln gesteuert werden können.

14. Konstruktionssystem nach Anspruch 12,
dadurch gekennzeichnet,
dass die Steuermittel Anzeigemittel für den aktiven und inaktiven Zustand der Spannungsmittel aufweisen, wobei die Anzeigemittel z. B. als farbcodierende Mittel ausgeführt werden können.

15. Konstruktionssystem nach Anspruch I,
dadurch gekennzeichnet,
dass Komponenten aus Kunststoff bestehen, beispielsweise ABS oder Polypropylen (PP).

16. Konstruktionssystem nach Anspruch 1,
dadurch gekennzeichnet,
dass Komponenten durch Spritzgießen hergestellt sind.

17. Konstruktionssystem nach Anspruch 1,
dadurch gekennzeichnet,
dass Komponenten durch Extrudieren hergestellt sind, gefolgt durch ein Aufteilen in Stücke des profilierten prismatischen Stabes, der durch Extrudieren hergestellt ist, und optional gefolgt durch selektives Entfernen ausgewählter Bereiche.

Revendications

1. Système de construction modulaire, par exemple pour des buts éducatifs ou destiné à être utilisé comme un jouet, dont le système comprend au moins deux composants (1, 2) pour le couplage mutuel amovible au moyen de moyens de couplage, dont les moyens de couplage comprennent :

deux bords de couplage (9) faisant partie d'une paroi d'un composant (2) et formant également la limite d'un ou de deux trous continus (3) dans cette paroi ; et
deux lèvres de couplage (7) faisant partie de l'autre composant (2), dont les lèvres (7) sont chacune adaptées pour être insérées dans un ou dans les deux trous continus (3) et dont chacune comprend pour ce but au moins un bord d'enclenchement (7) pour la coaction avec un bord associé desdits bords de couplage (9), de sorte qu'après que cette coaction ait été effectuée, le déplacement arrière ne puisse avoir lieu qu'en exerçant une certaine force minimum suite au démontage des moyens de couplage et dans lequel les composants (1, 2) se composent au moins partiellement de plastique,

caractérisé en ce que les moyens de couplage sont agencés de sorte que dans la situation couplée, les bords de couplage (9) et les lèvres de couplage (7) appuient les uns contre les autres avec la sollicitation de surfaces de couplage inclinées, de sorte que grâce à la rotation autour d'un ensemble de lèvre de couplage et de bord de couplage coopérant, le contact entre l'autre ensemble de lèvre et de bord coopérant peut être libéré, et

une surface d'arrêt se raccorde aux deux lèvres de couplage (7), dont la surface d'arrêt appuie en situation couplée avec une certaine force contre au moins une partie d'un bord de couplage (9) de sorte que le couplage entre les composants est dépourvu de jeu.

2. Système de construction selon la revendication 1, **caractérisé en ce que** les surfaces de couplage ont une forme généralement convexe.

3. Système de construction selon la revendication 1, **caractérisé en ce que** les bords de couplage et les lèvres de couplage possèdent des surfaces de pression inclinées sur leurs côtés à distance desdites surfaces de couplage, dont les surfaces de pression peuvent coulisser l'une sur l'autre pour effectuer le couplage, lorsque l'on applique une force de pression.

4. Système de construction selon la revendication 3, **caractérisé en ce que** lesdites surfaces de pression ont une forme généralement convexe.

5. Système de construction selon les revendications 2 et 4, **caractérisé en ce que** les lèvres de couplage et les parties des bords de couplage coagissant avec celles-ci ont sensiblement les mêmes formes.

6. Système de construction selon la revendication 1, **caractérisé en ce que** les bords de couplage et les lèvres de couplage ne sont pas ronds, de sorte que les composants couplés sont bloqués contre la rotation relative.

7. Système de construction selon la revendication 1, **caractérisé en ce que** la surface d'arrêt fait partie d'une plaque de rebord.

8. Système de construction selon la revendication 7, **caractérisé en ce que** la plaque de rebord est à

aimants permanents.

9. Système de construction selon la revendication 7, **caractérisé en ce que** la plaque de rebord peut être encastrée dans un enfoncement situé dans le bord de couplage.

10. Système de construction selon la revendication 9, **caractérisé en ce que** la plaque de rebord s'adapte dans l'enfoncement avec un léger jeu.

11. Système de construction selon la revendication 9, **caractérisé en ce que** le un composant comprend deux ensembles de lèvres de couplage présents de chaque côté d'une plaque de rebord et **en ce que** la profondeur dudit enfoncement correspond à la moitié de l'épaisseur de la plaque de rebord de sorte que les deux composants couplés par le premier composant mentionné, sont positionnés avec leurs bords de couplage au moins en relation d'aboutement sensiblement mutuelle.

12. Système de construction selon la revendication 1, **caractérisé en ce qu'**il comprend des moyens de tension pour placer les lèvres sous une tension dirigée et importante dans la situation insérée de sorte que le déplacement arrière n'est possible qu'après que les moyens de tension aient été désactivés.

13. Système de construction selon la revendication 12, **caractérisé en ce que** les moyens de tension peuvent être commandés de l'extérieur au moyen des moyens de commande.

14. Système de construction selon la revendication 12, **caractérisé en ce que** les moyens de commande comprennent des moyens d'indicateur pour l'état actif et inactif des moyens de tension, dont les moyens d'indicateur peuvent être mis en oeuvre par exemple comme des moyens de codage de couleur.

15. Système de construction selon la revendication 1, **caractérisé en ce que** les composants se composent de plastique, par exemple de l'ABS ou du polypropylène (PP).

16. Système de construction selon la revendication 1, **caractérisé en ce que** les composants sont fabriqués par moulage par injection.

17. Système de construction selon la revendication 1, **caractérisé en ce que** les composants sont réalisés par extrusion, suivi de la division en deux parties de la tige prismatique profilée fabriquée par extrusion, et facultativement suivi par le retrait sélectif de zones choisies.

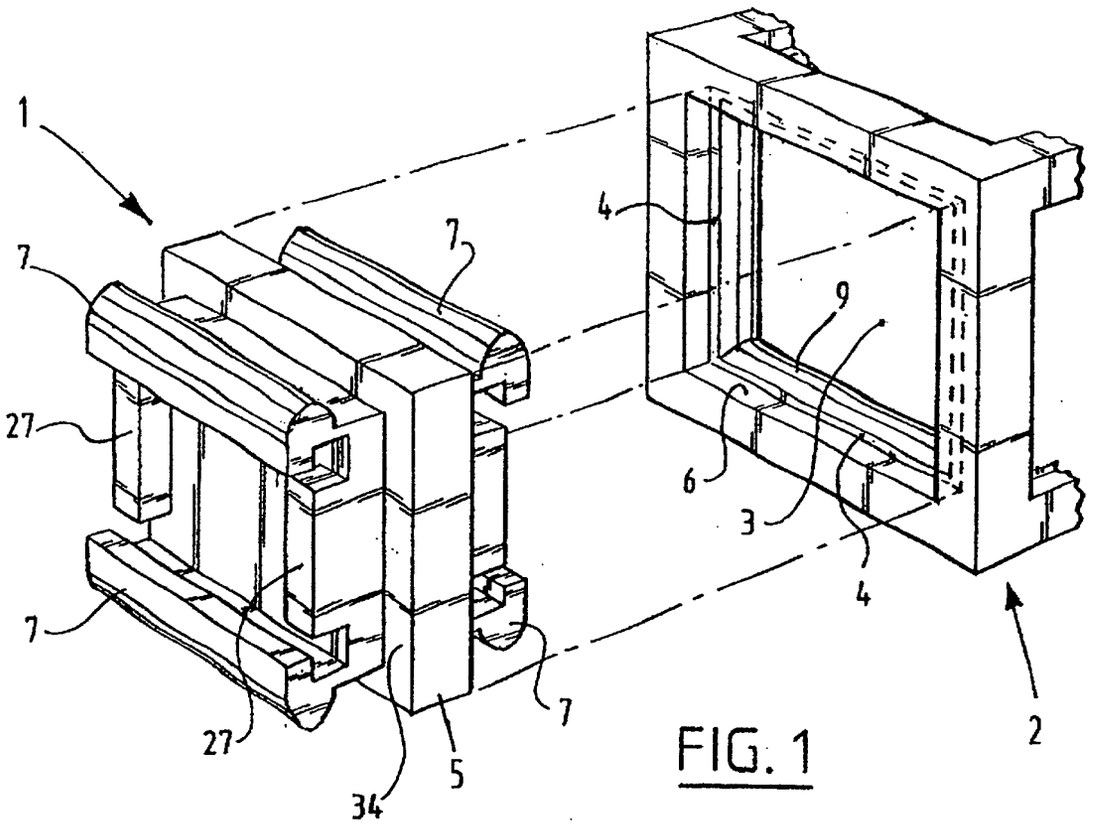


FIG. 1

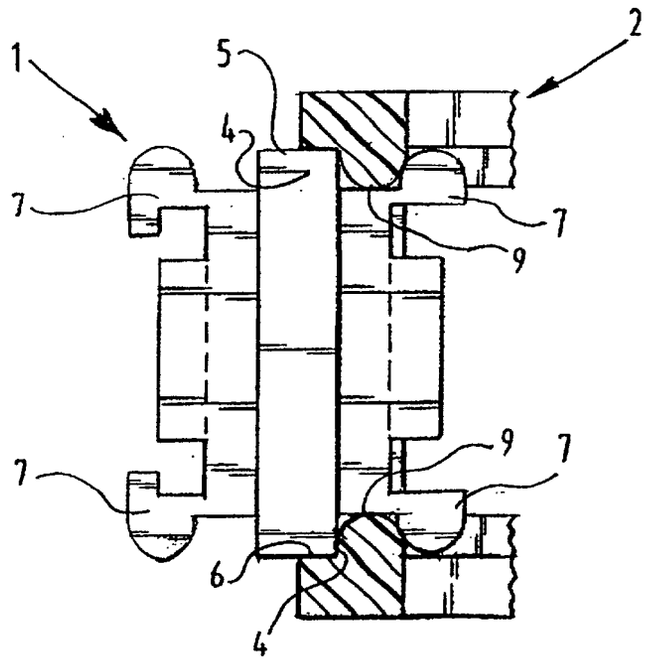
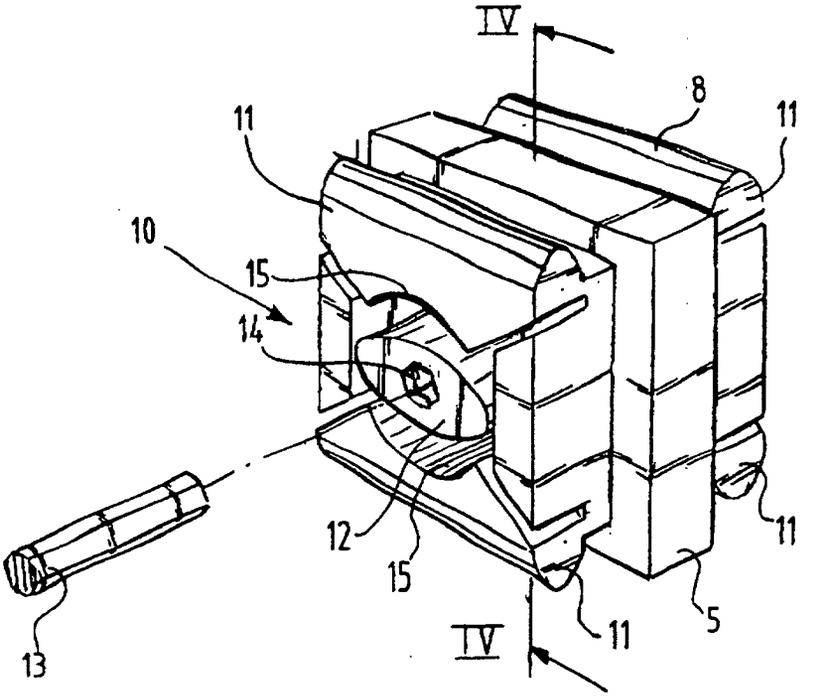


FIG. 2

FIG. 3



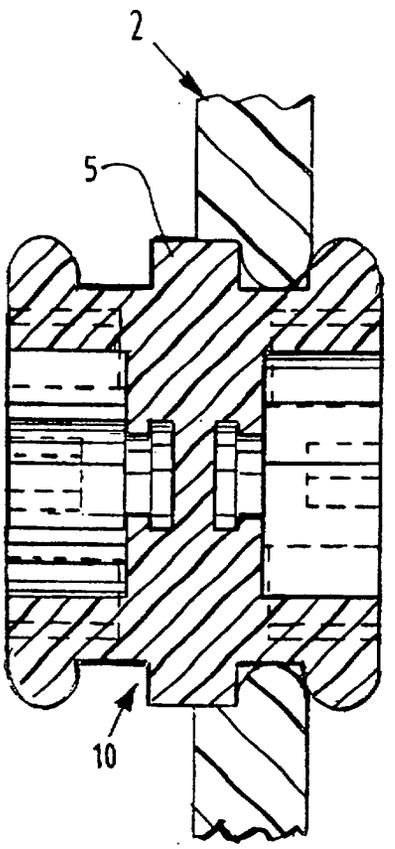
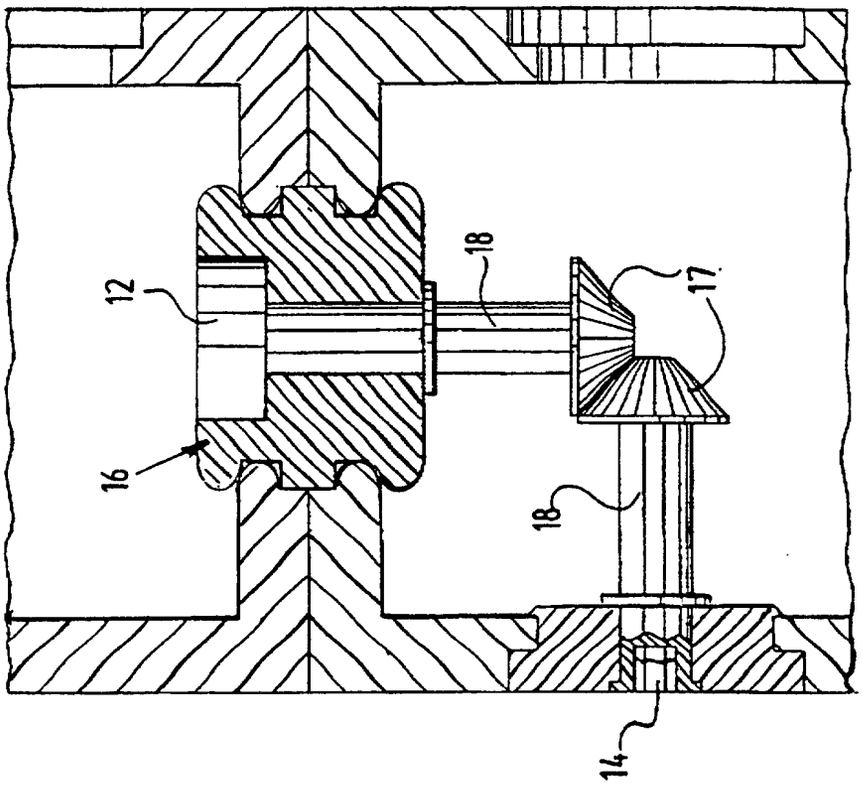


FIG. 4



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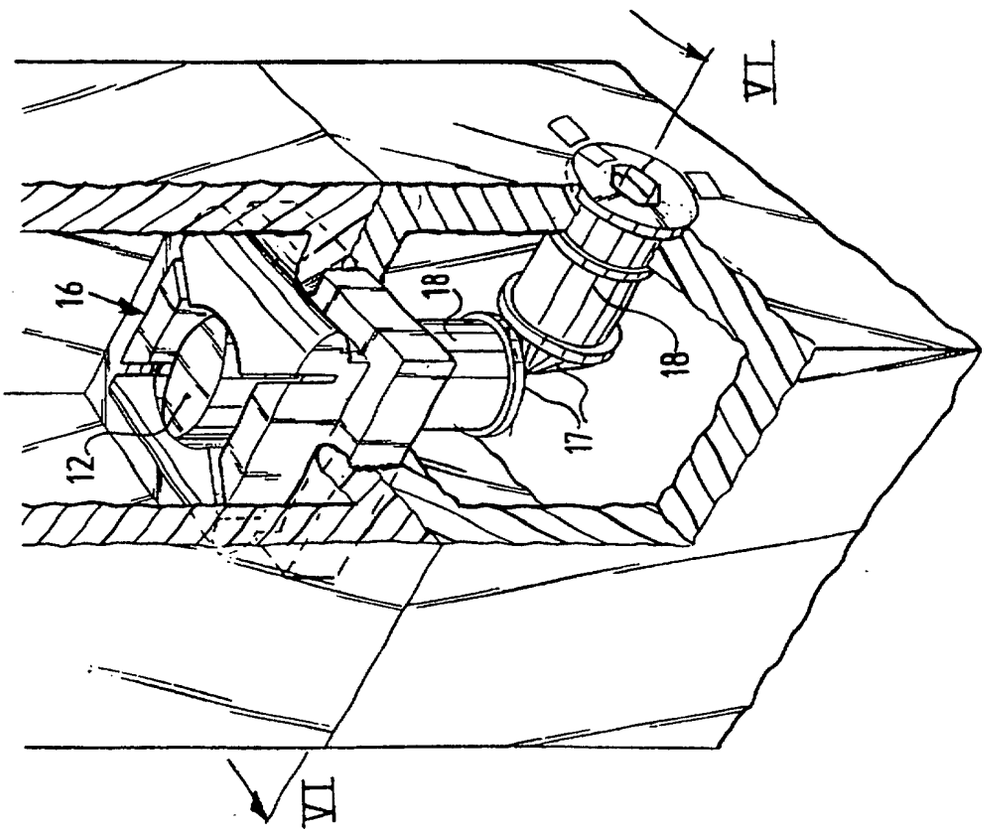


FIG.5

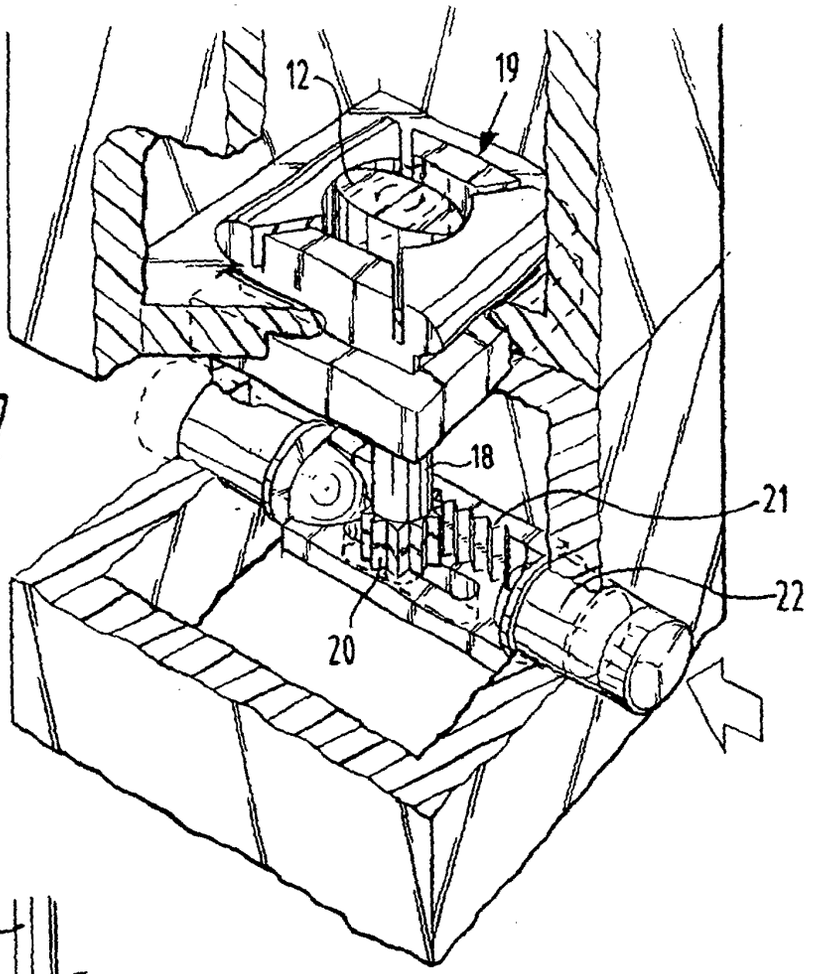


FIG. 7

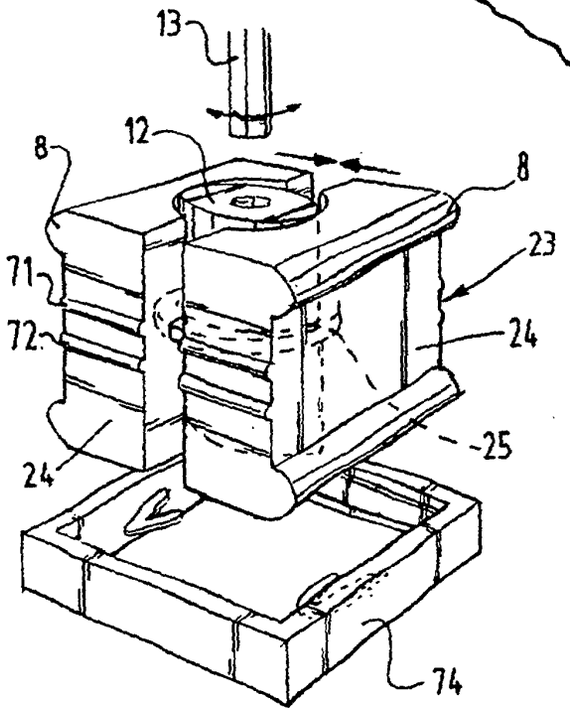


FIG. 8

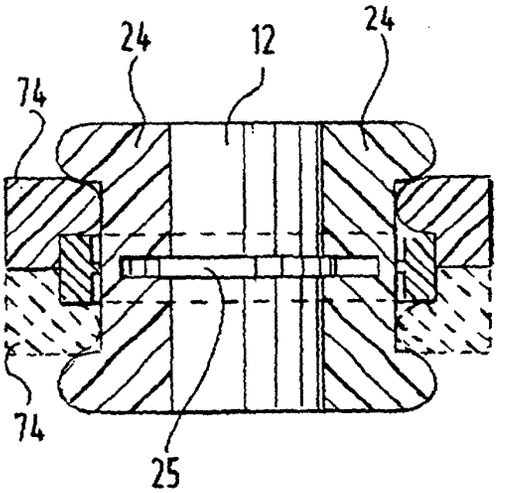
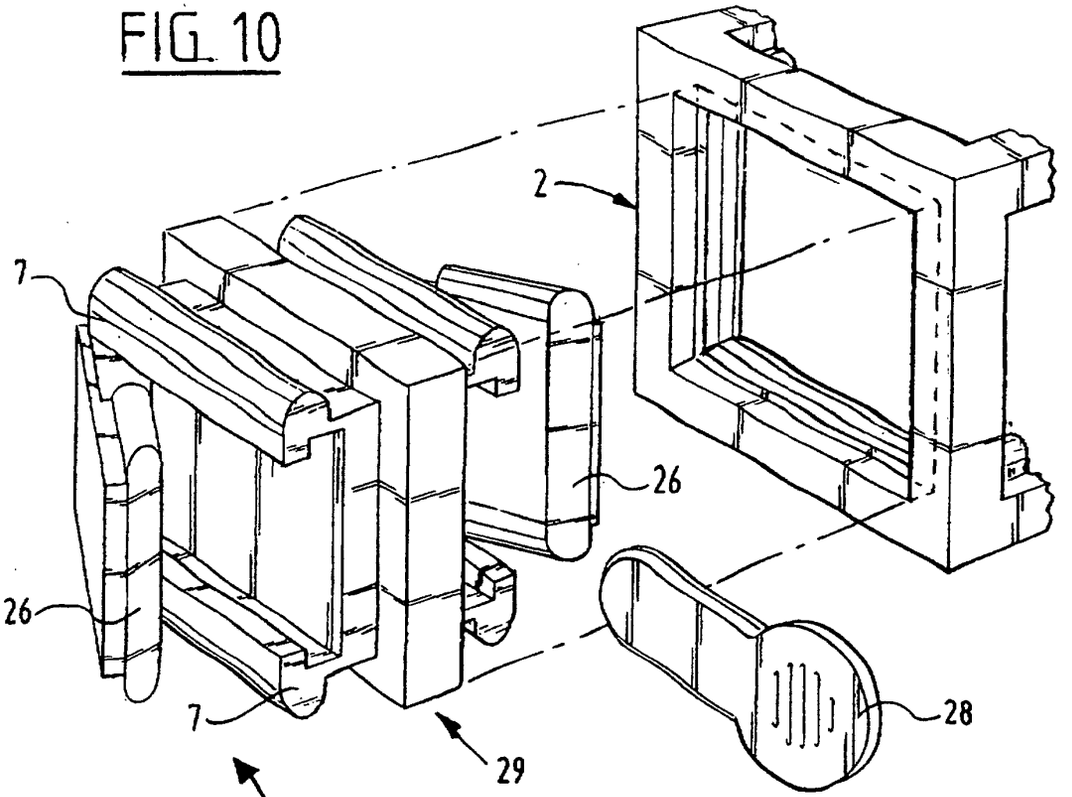


FIG. 9

FIG. 10



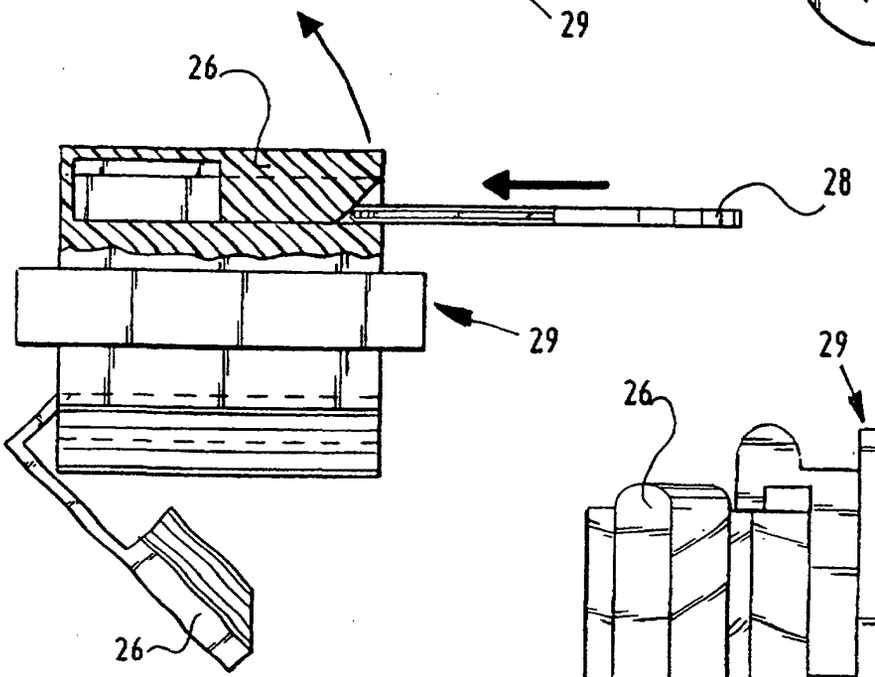


FIG. 11

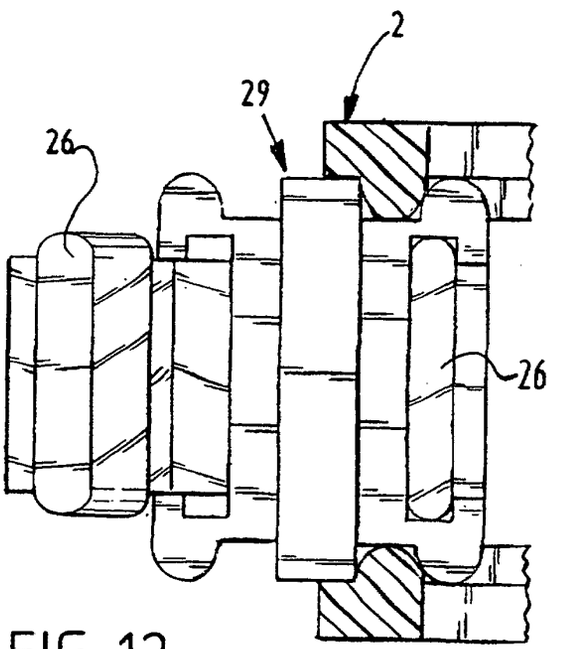
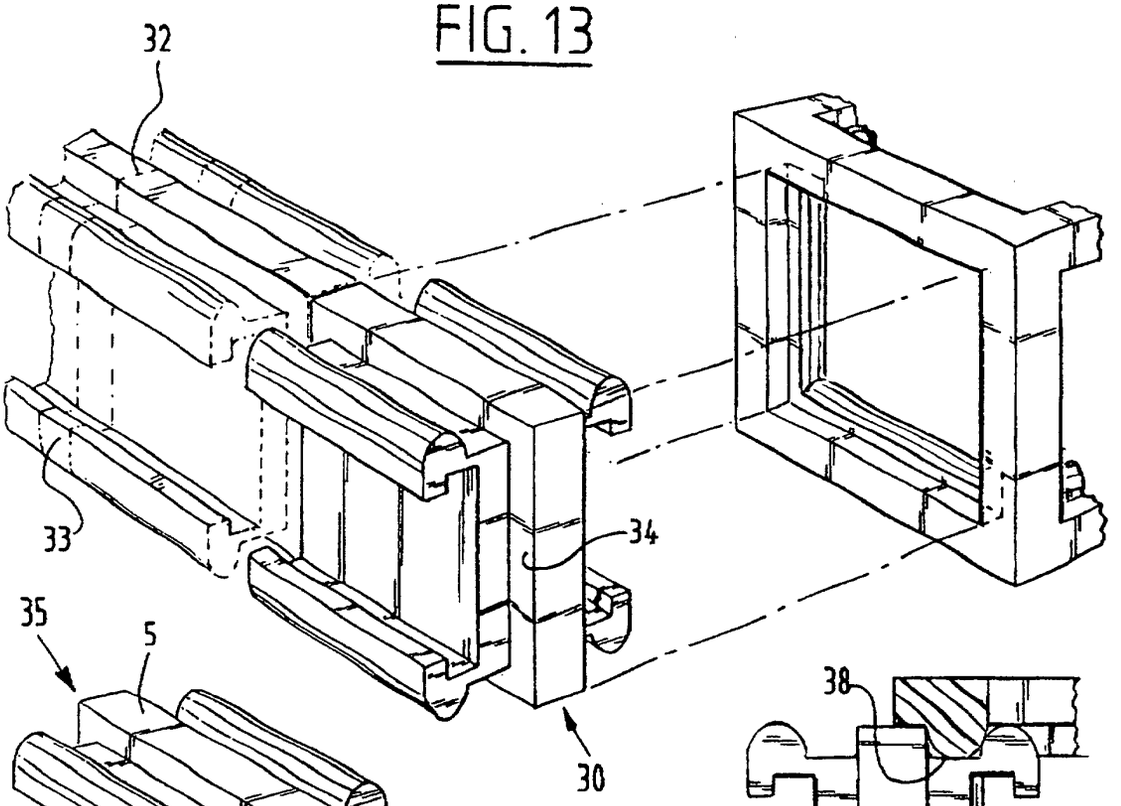


FIG. 12

FIG. 13



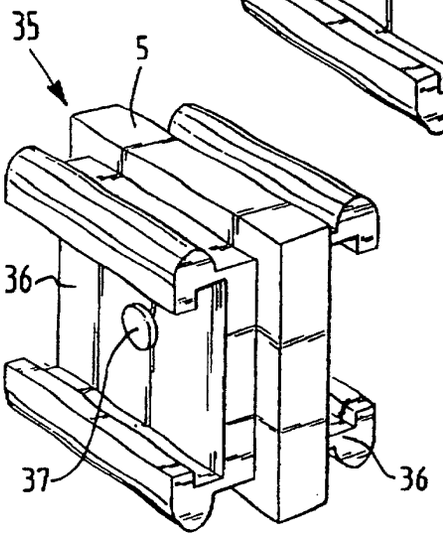


FIG. 14

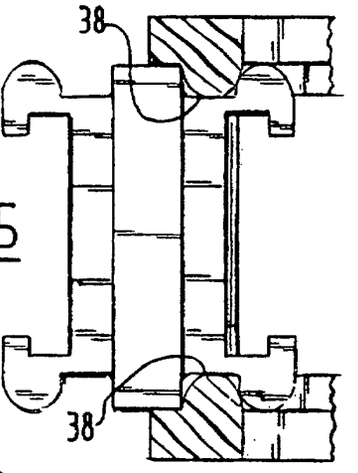


FIG. 15

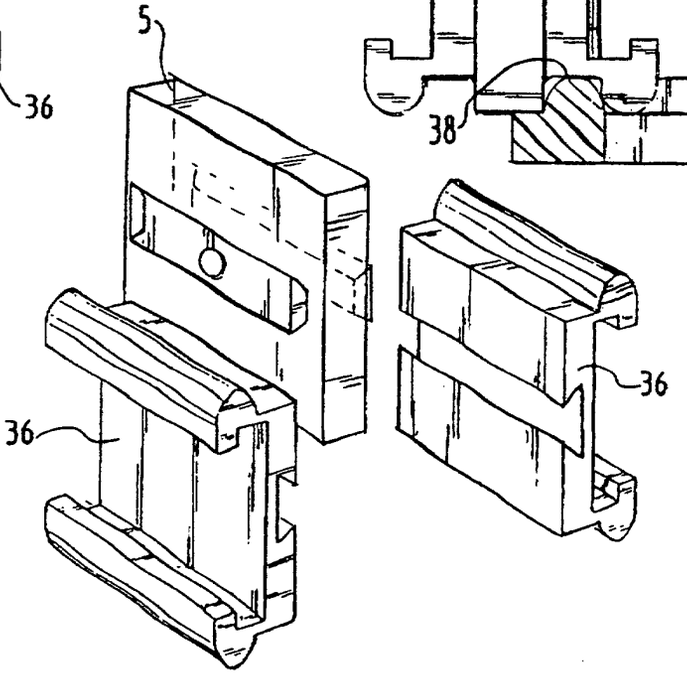


FIG. 16

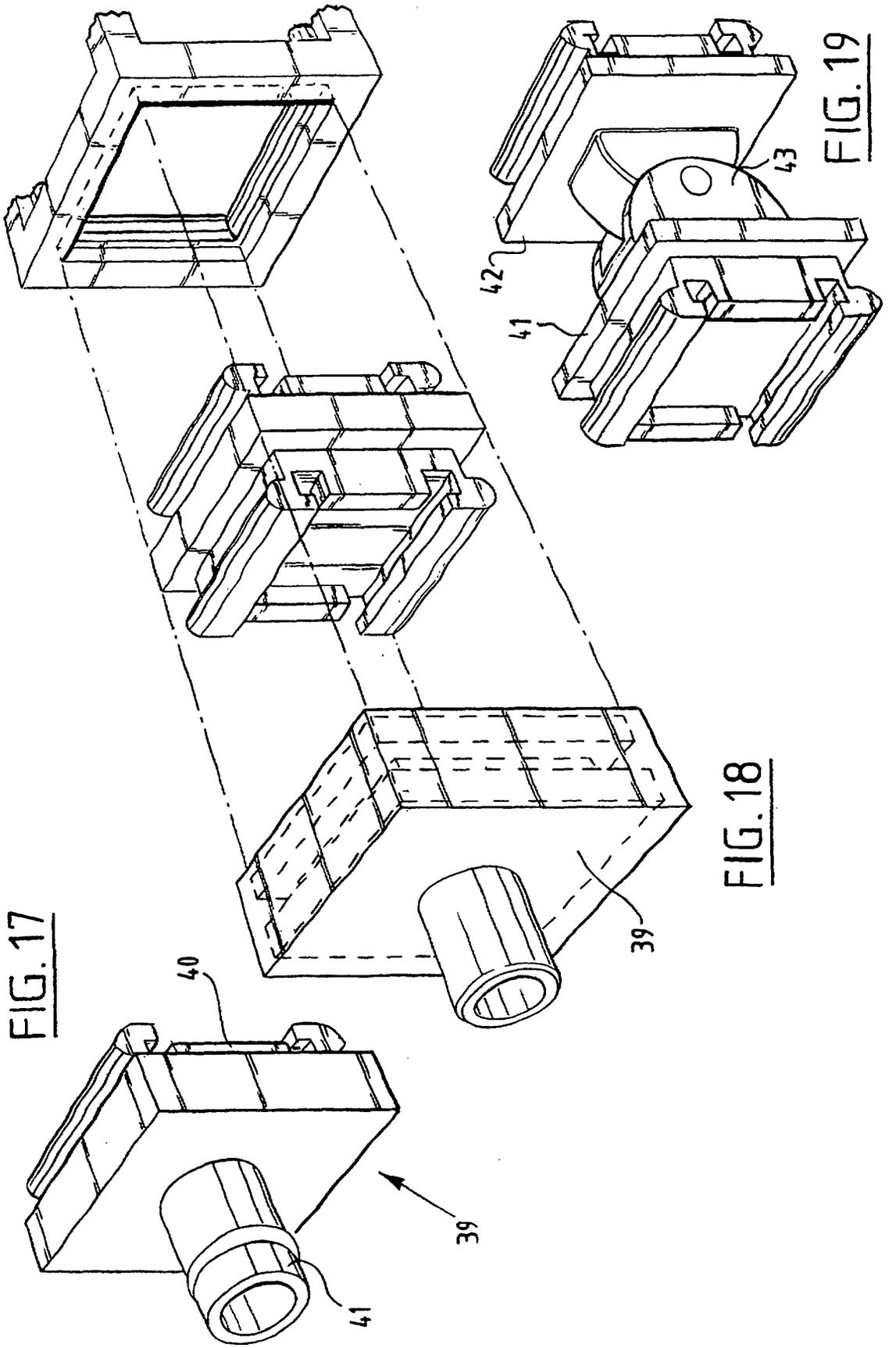


FIG. 17

FIG. 18

FIG. 19

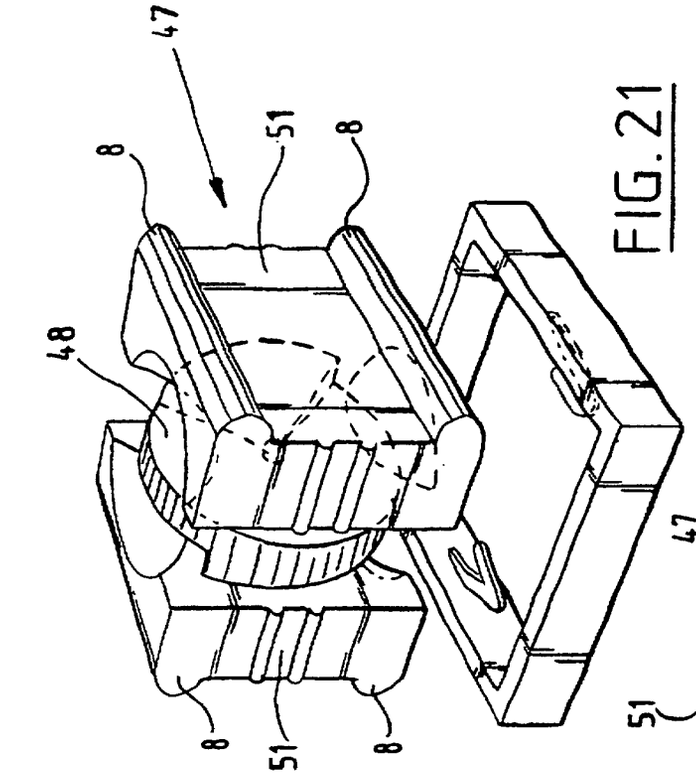


FIG. 21

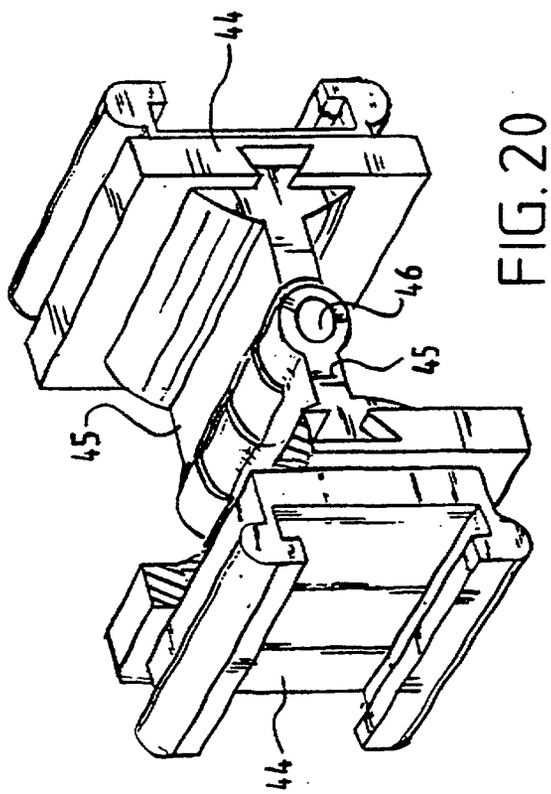


FIG. 20

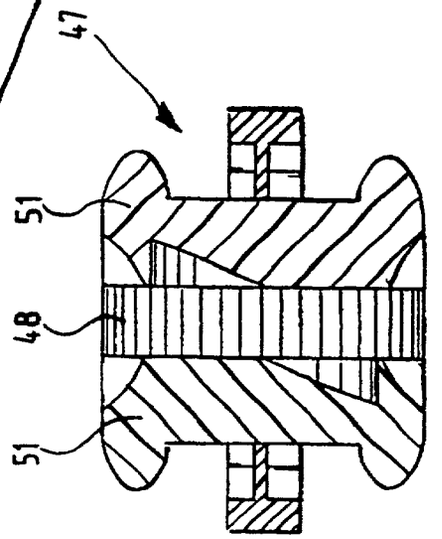


FIG. 23

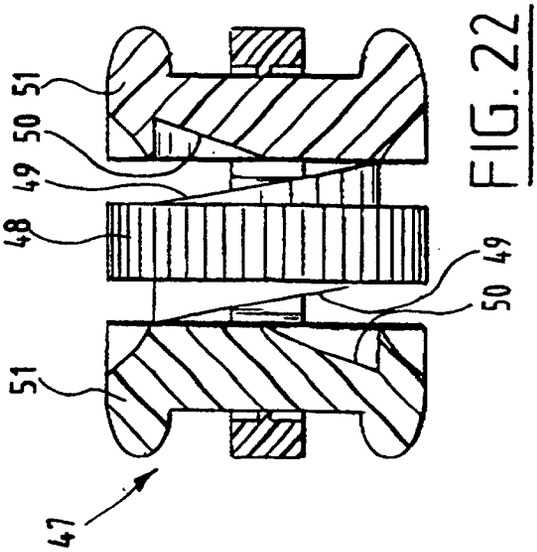


FIG. 22

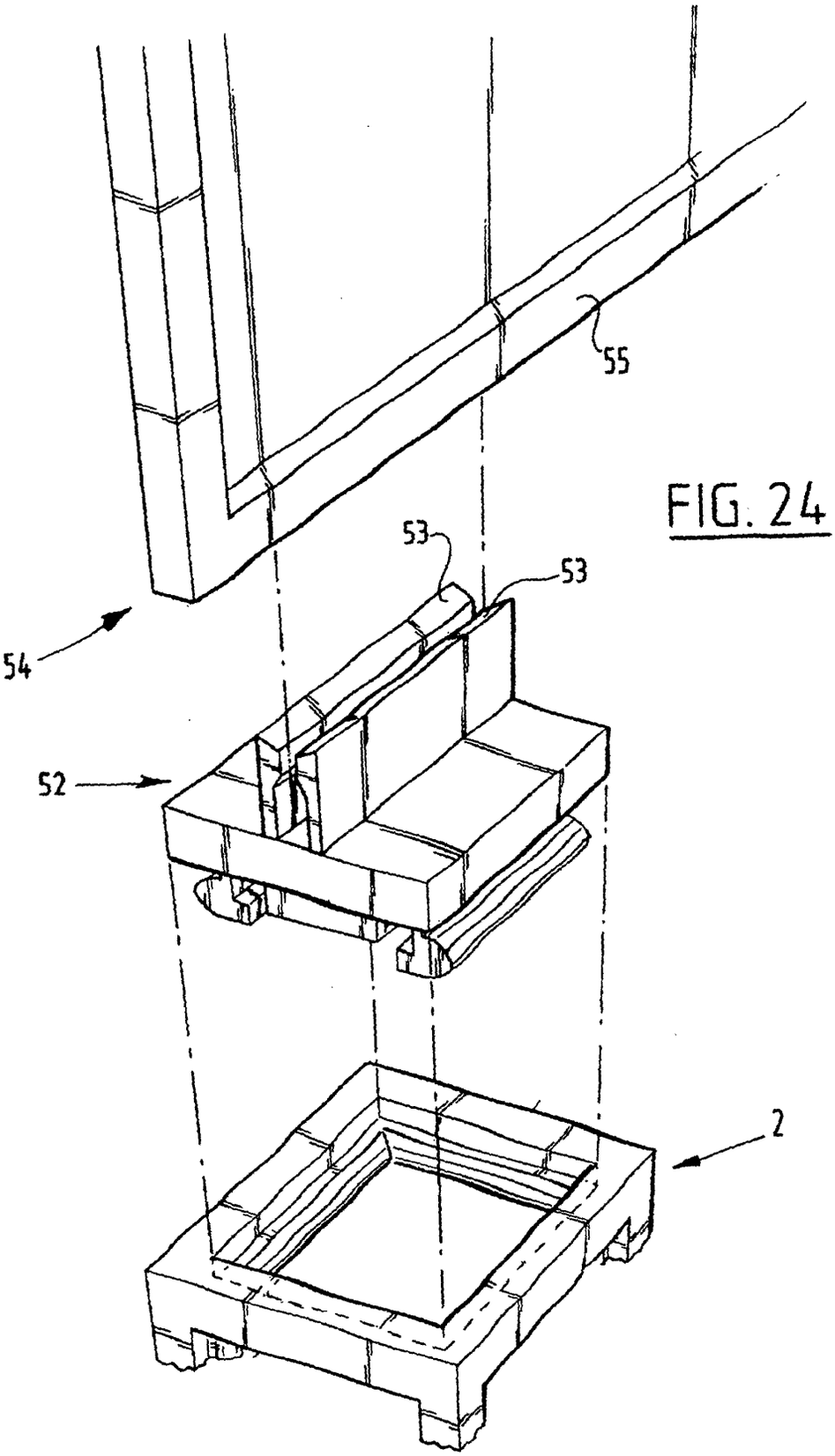


FIG. 24

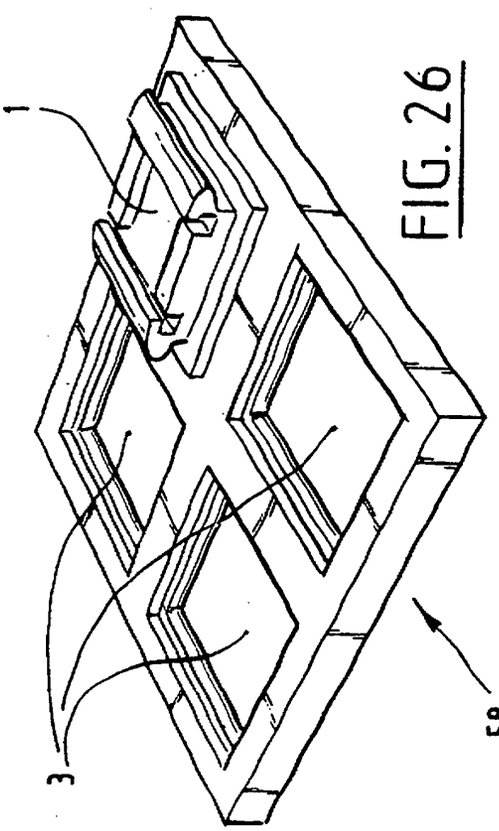


FIG. 26

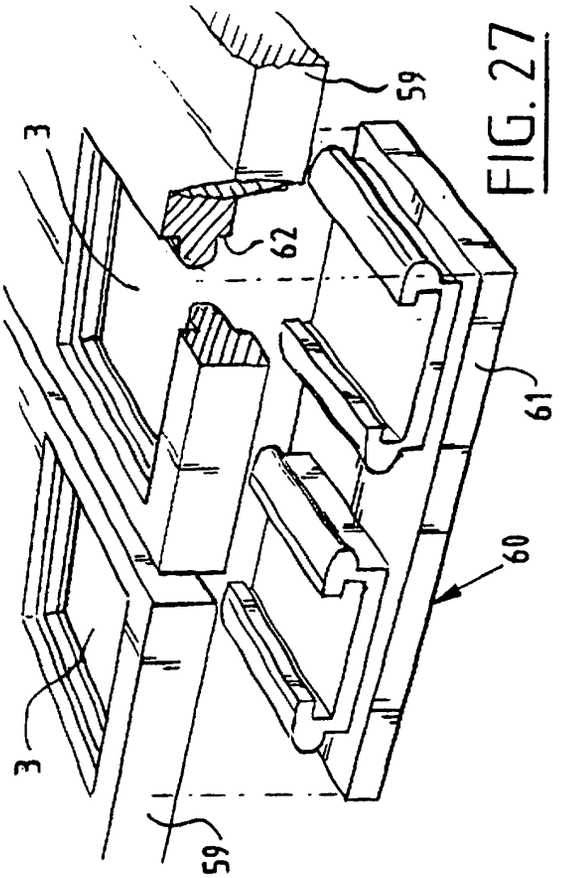


FIG. 27

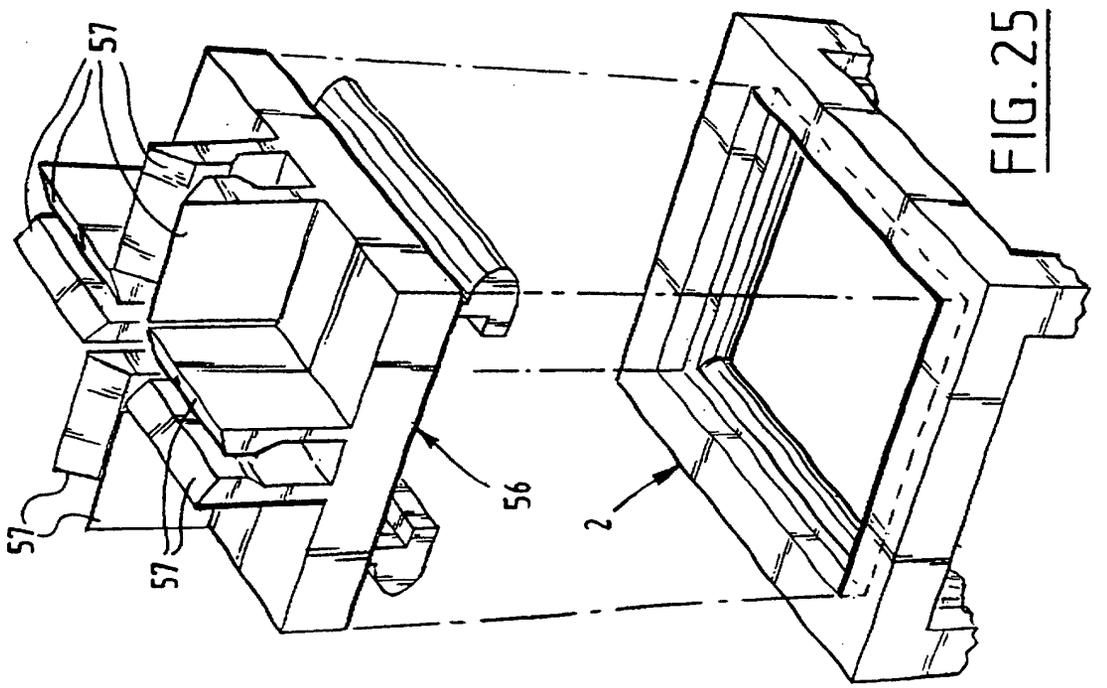


FIG. 25

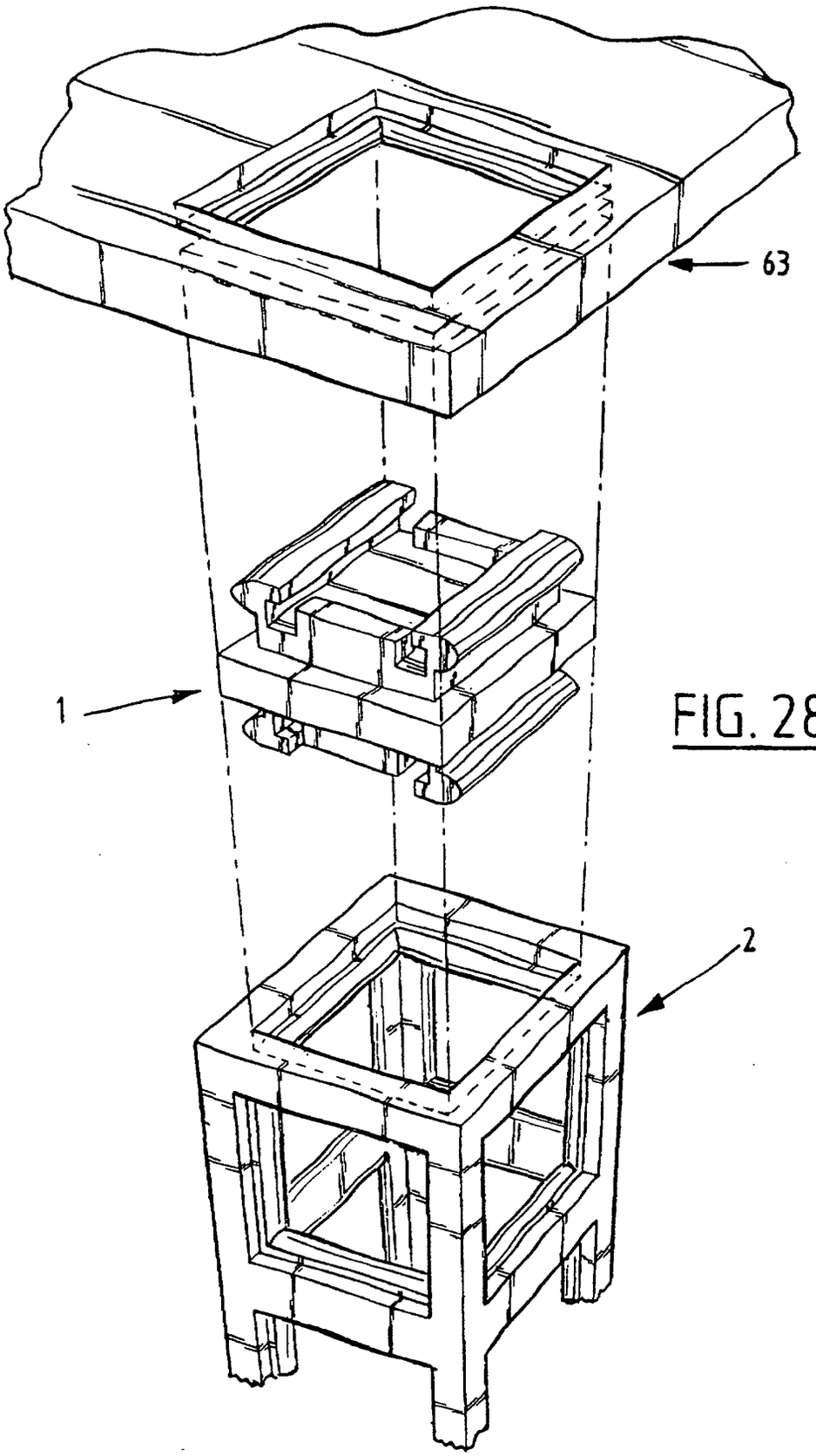


FIG. 28

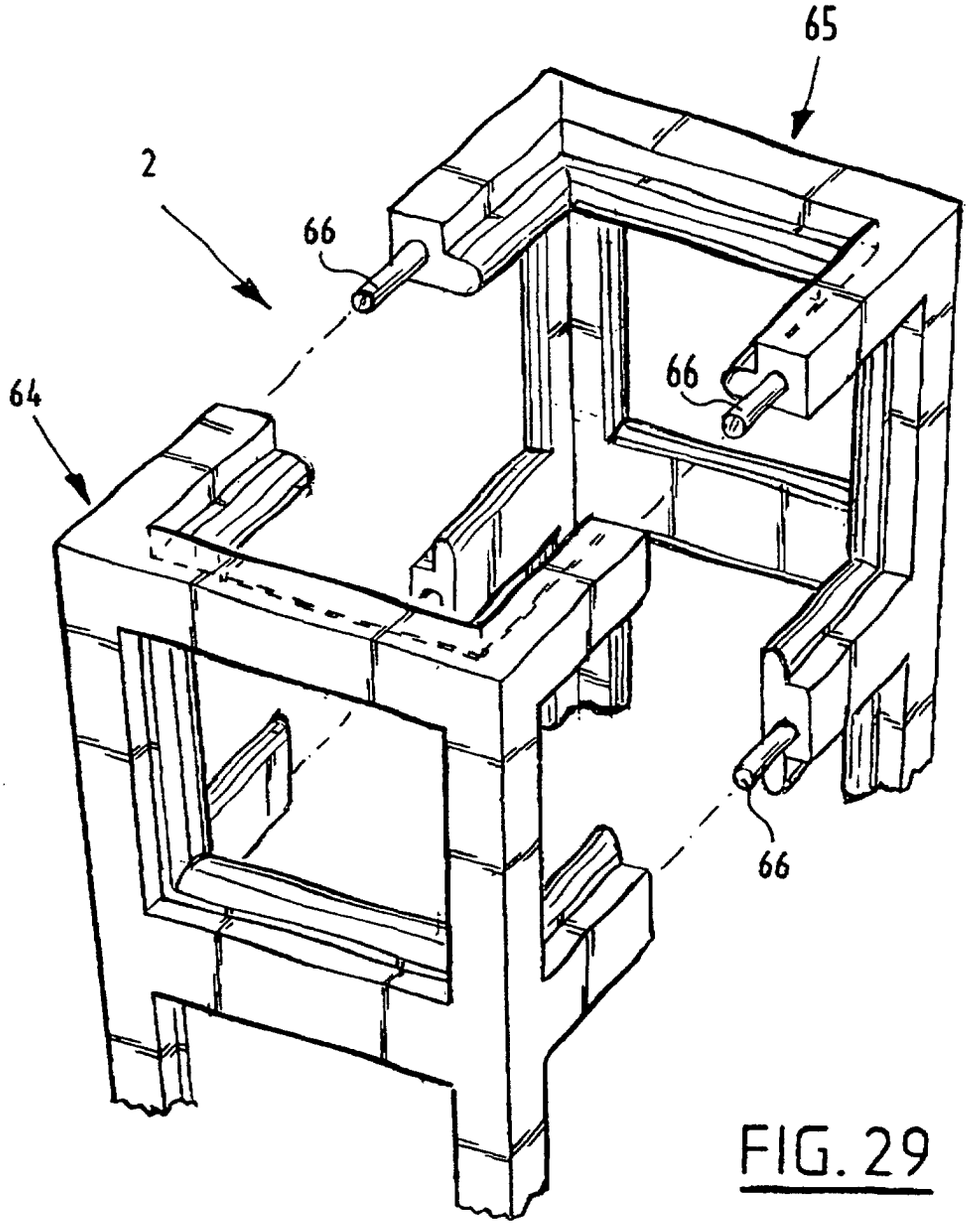


FIG. 29

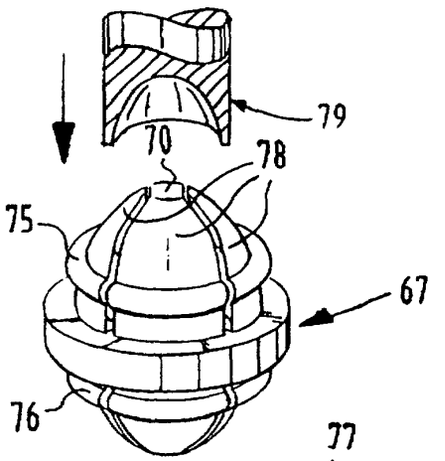
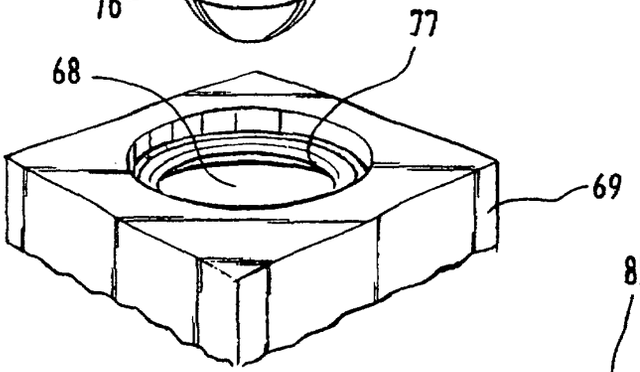
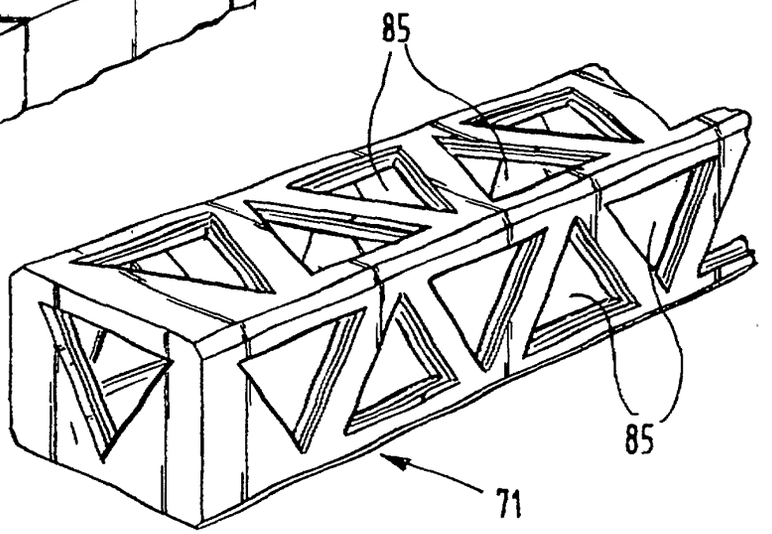


FIG. 30





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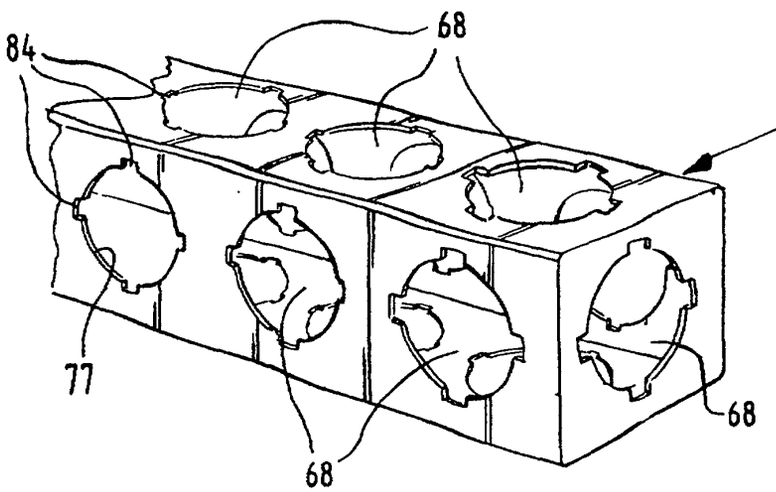

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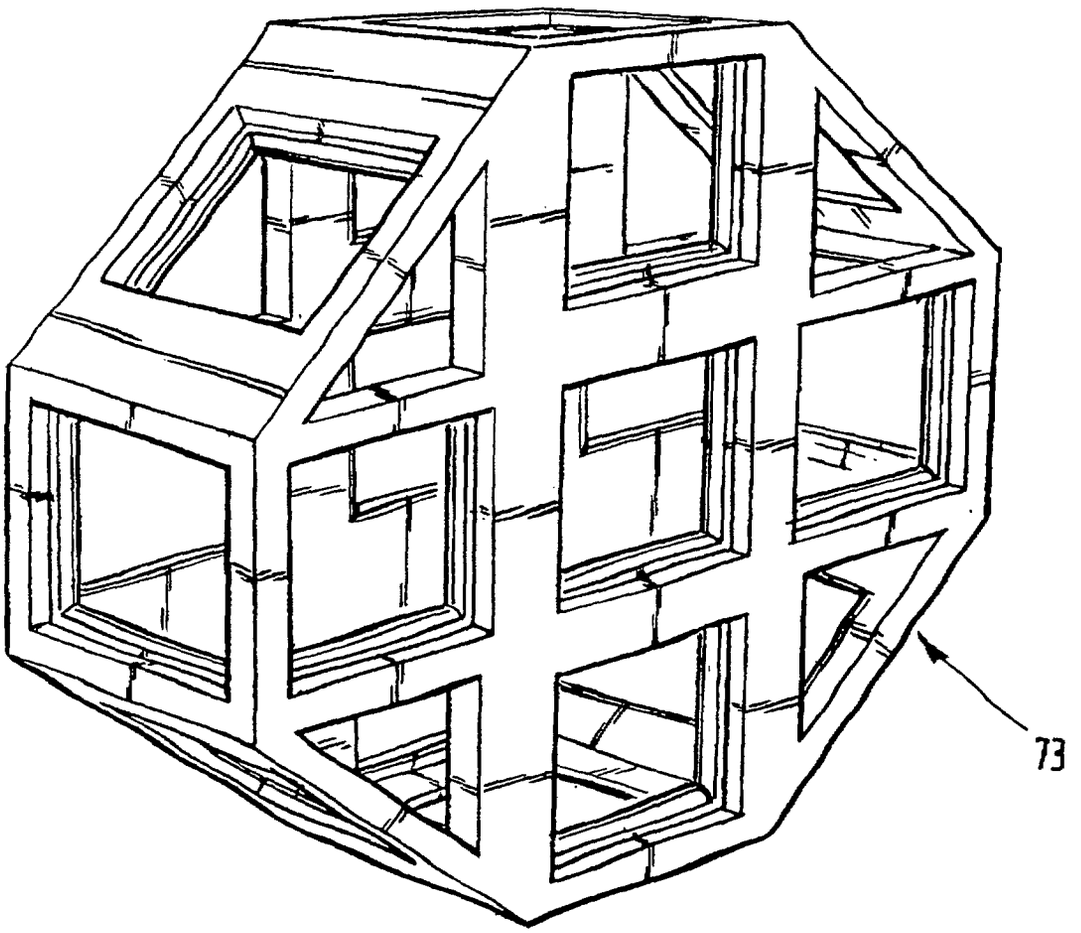


FIG. 33

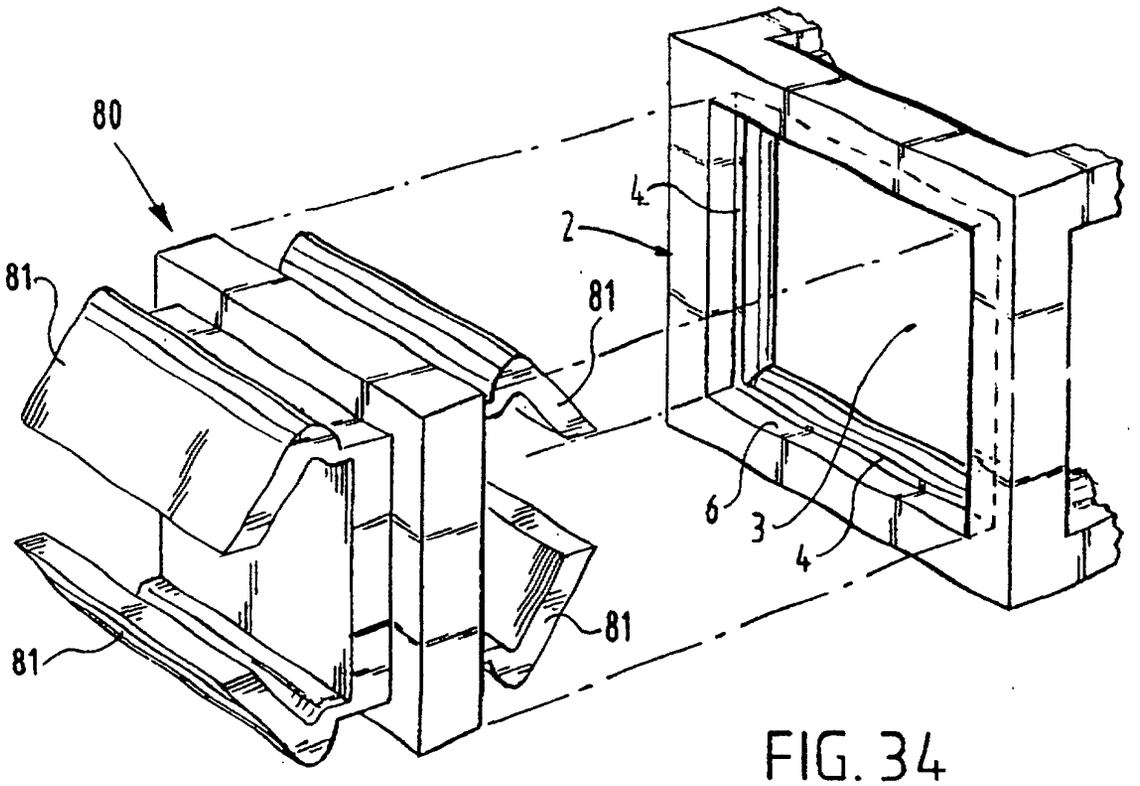


FIG. 34

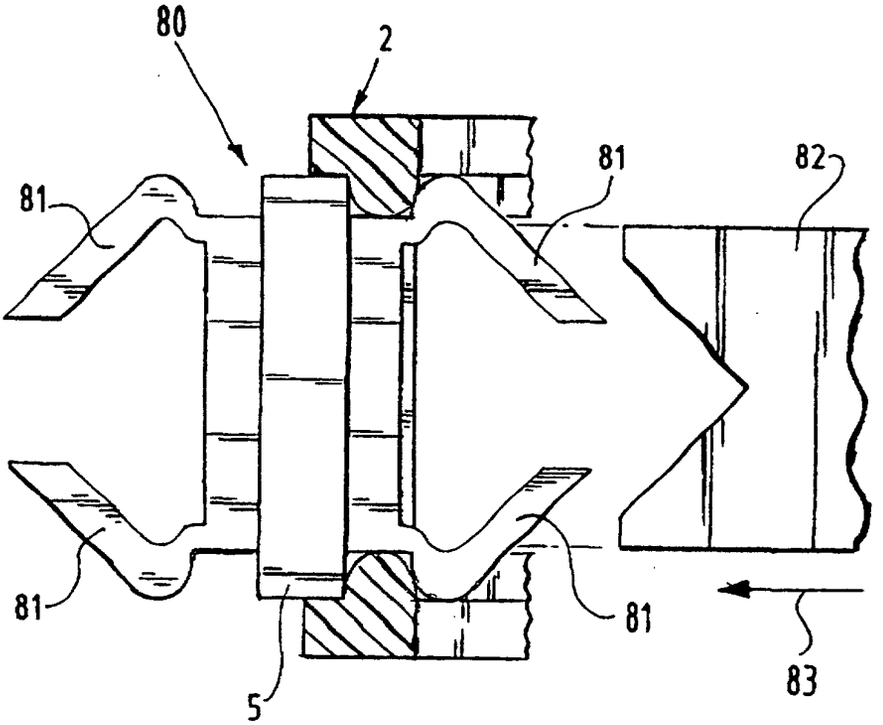


FIG. 35

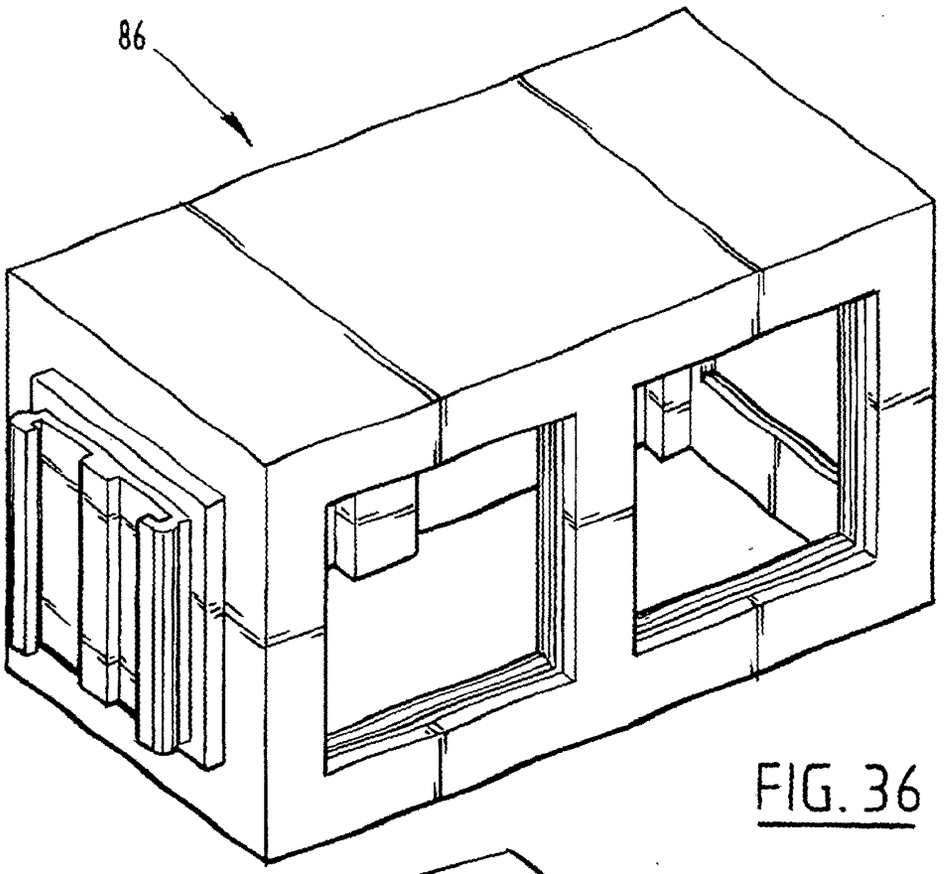


FIG. 36

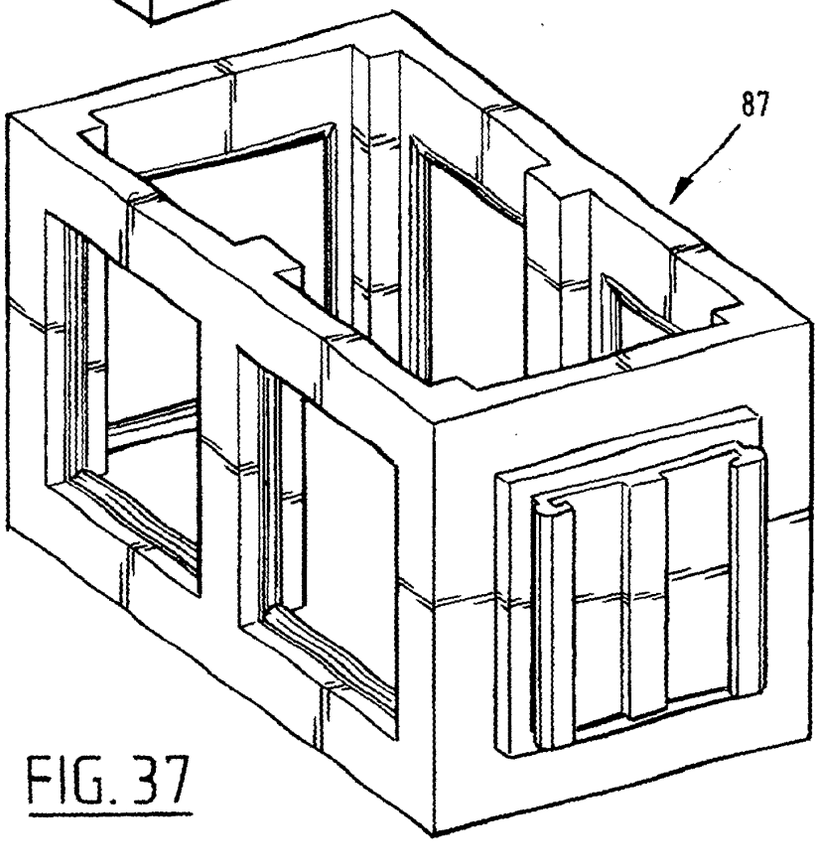


FIG. 37

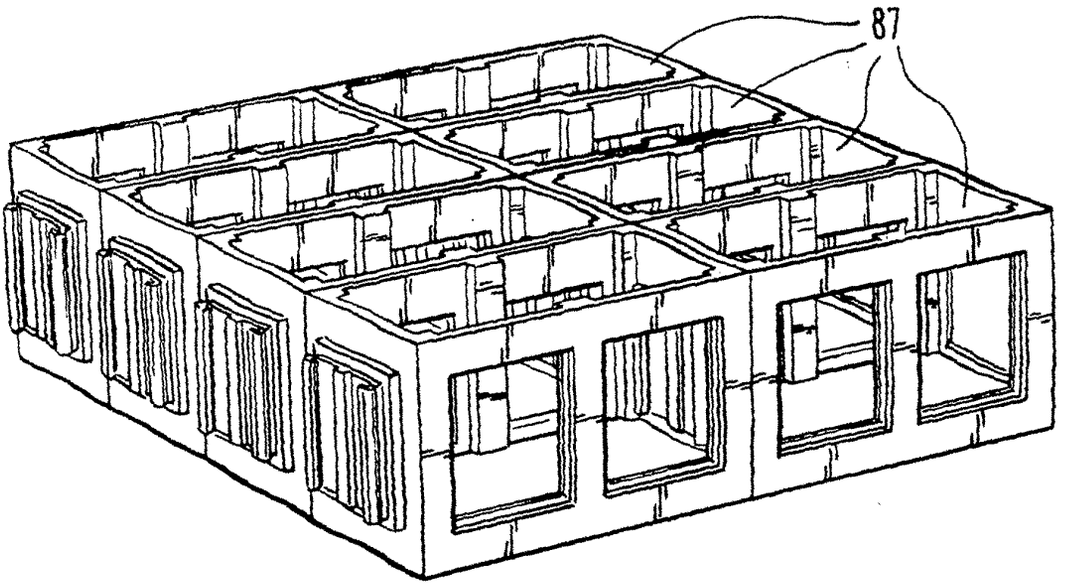


FIG. 38

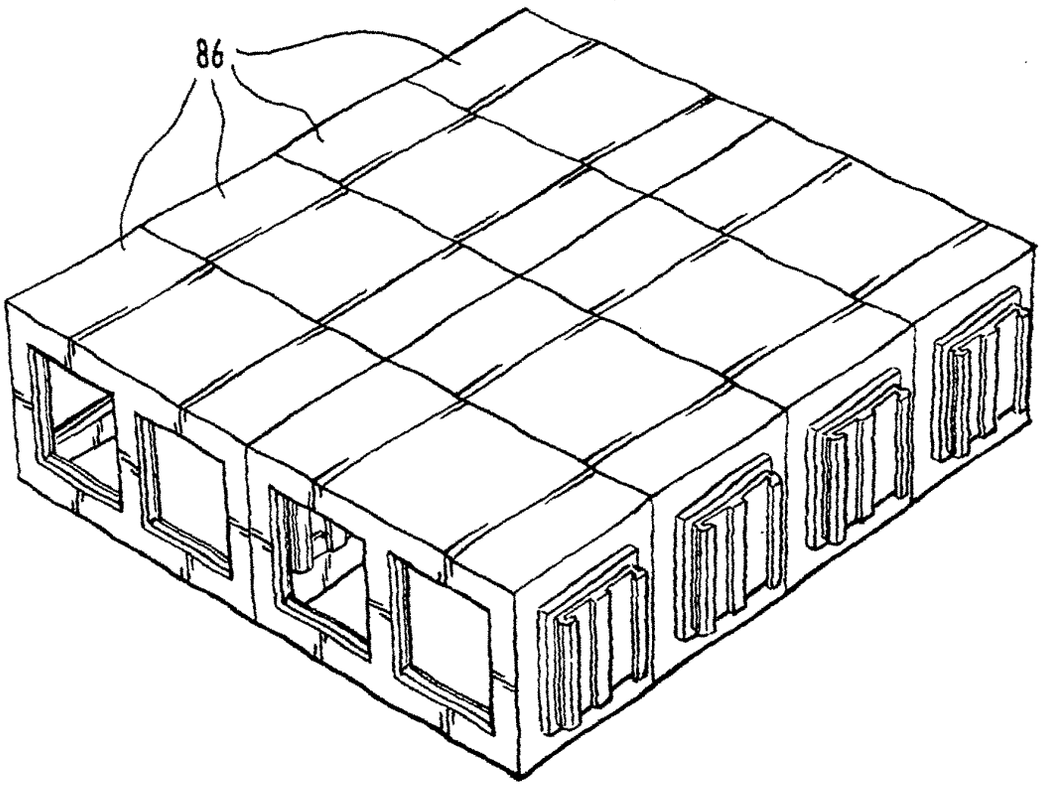
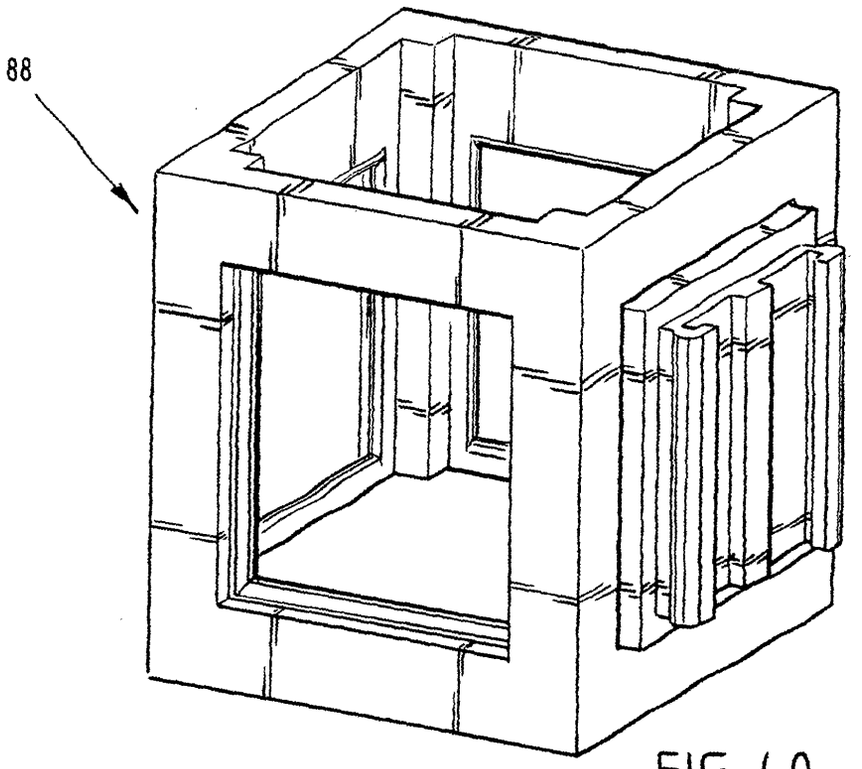


FIG. 39



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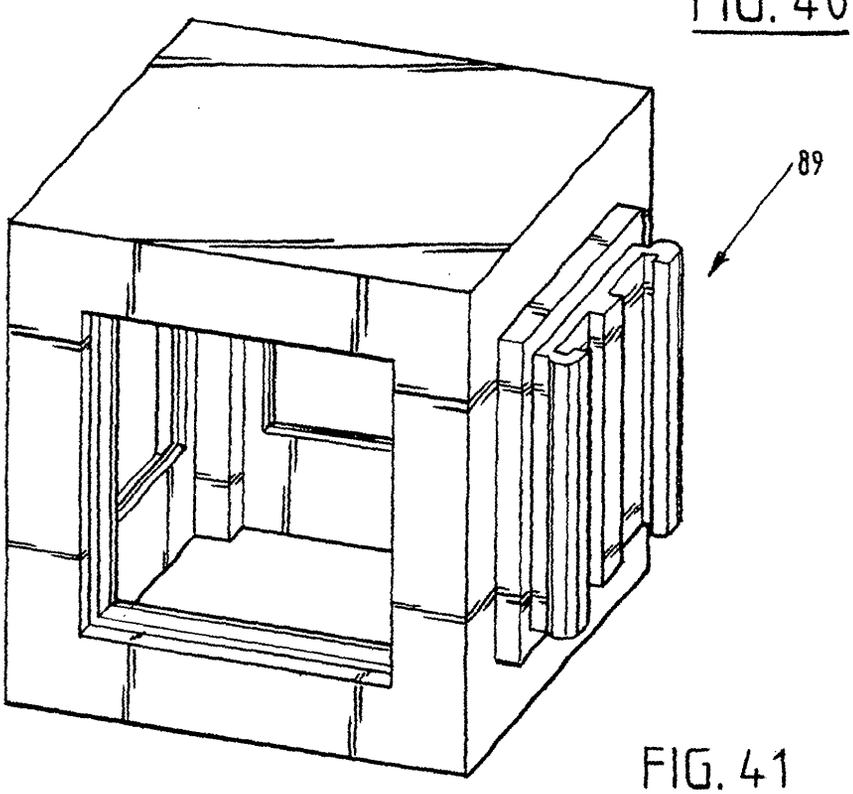

FIG. 41

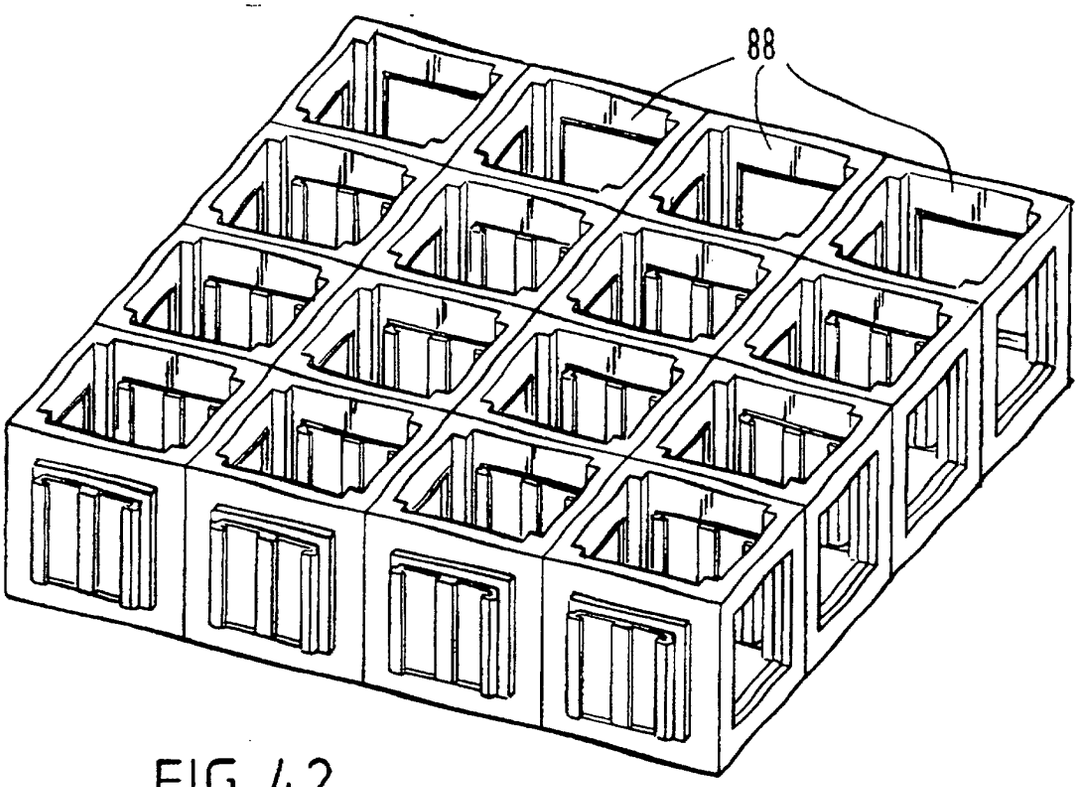

FIG. 42

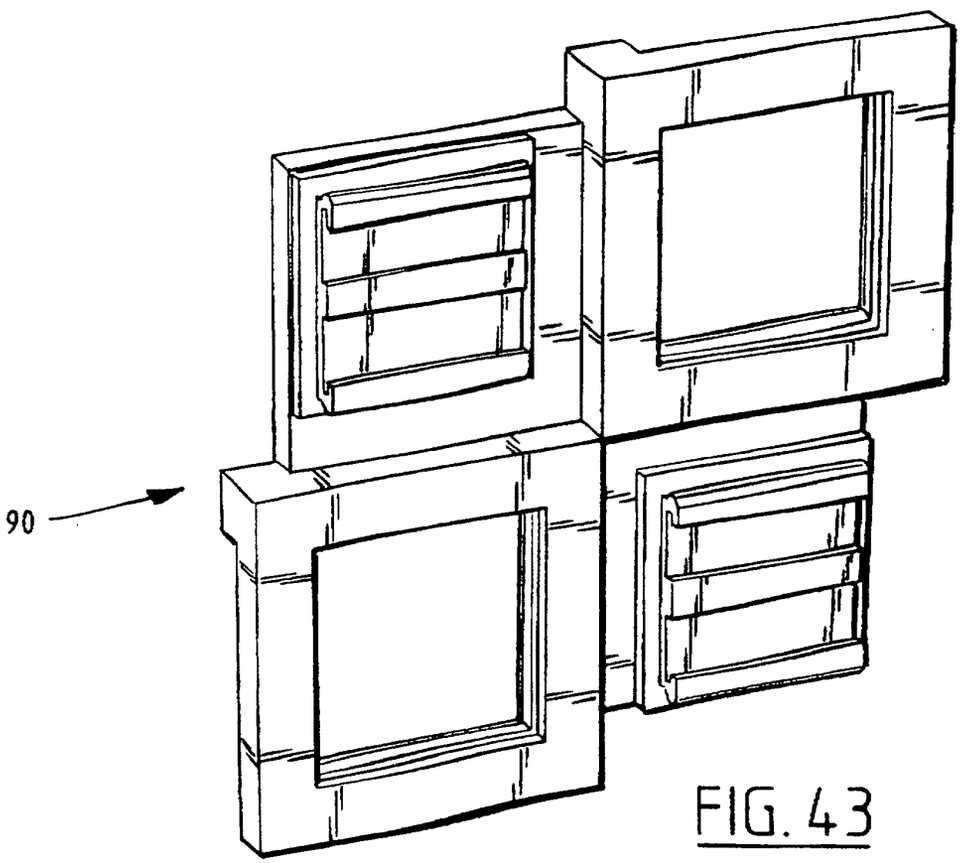

FIG. 43

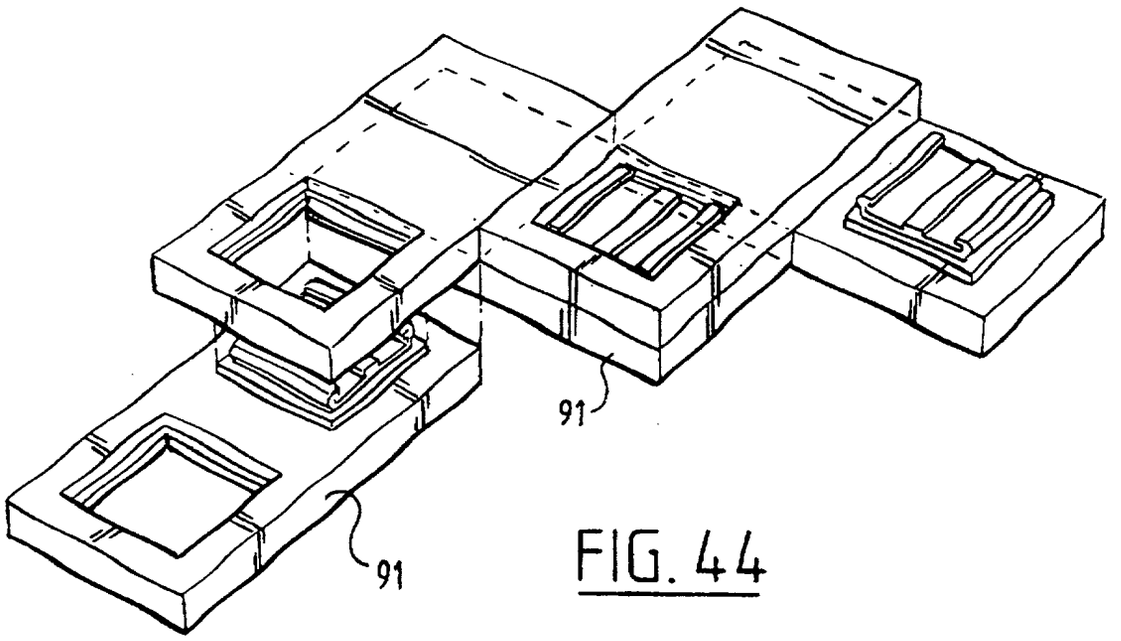

FIG. 44

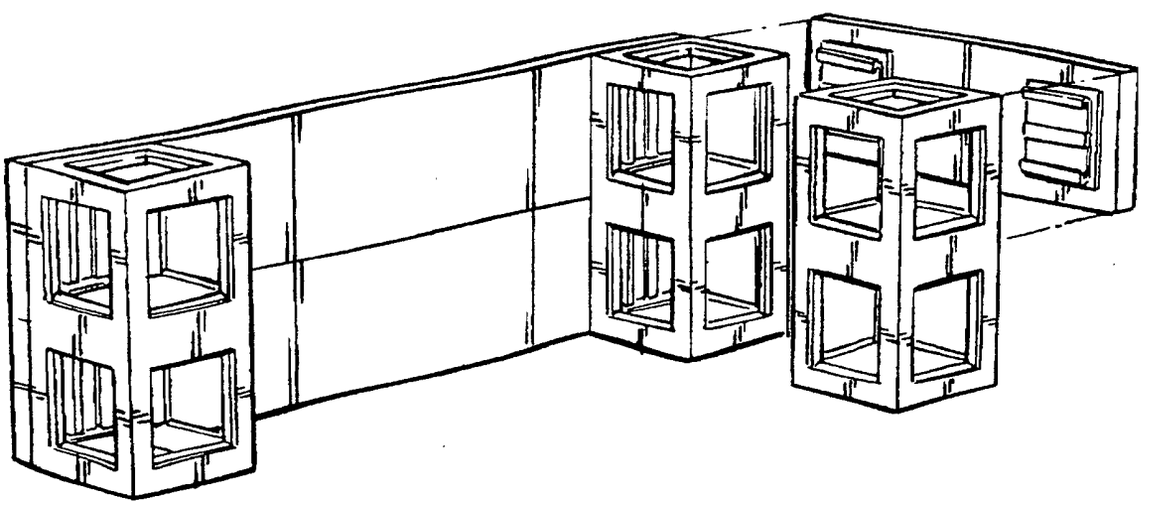

FIG. 45

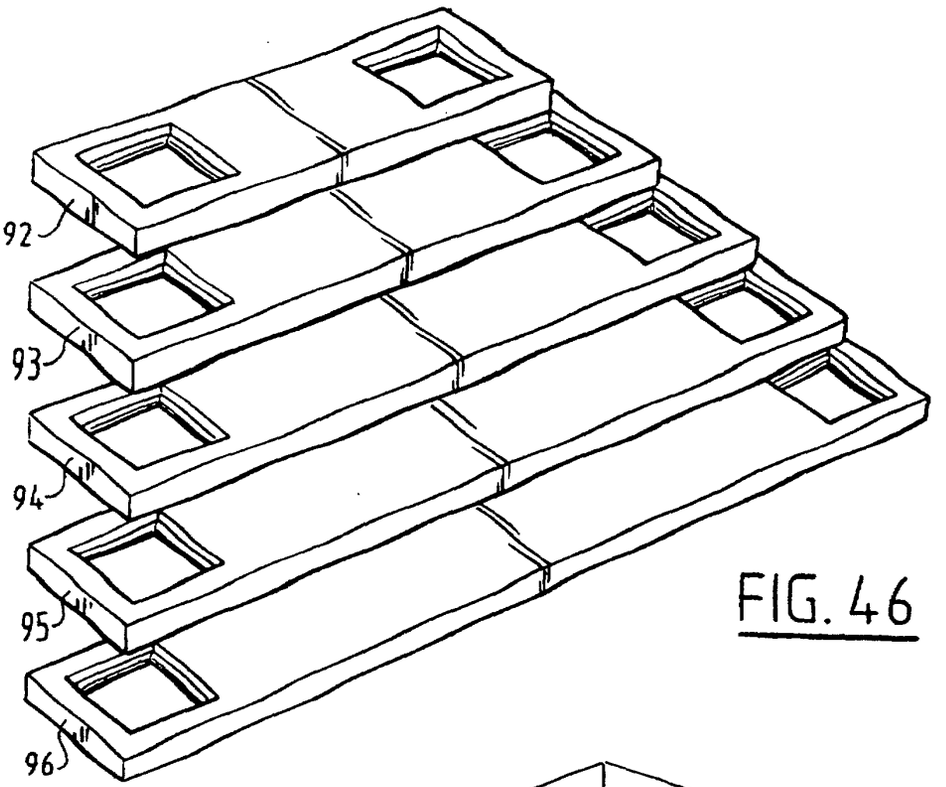

FIG. 46

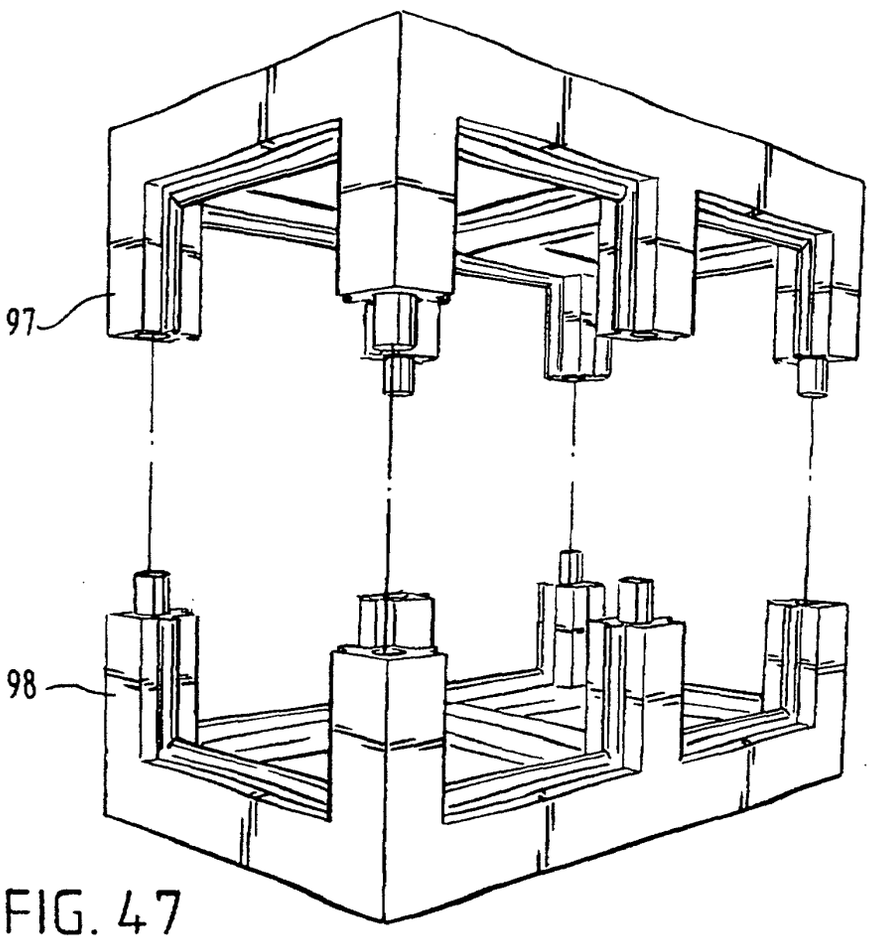

FIG. 47

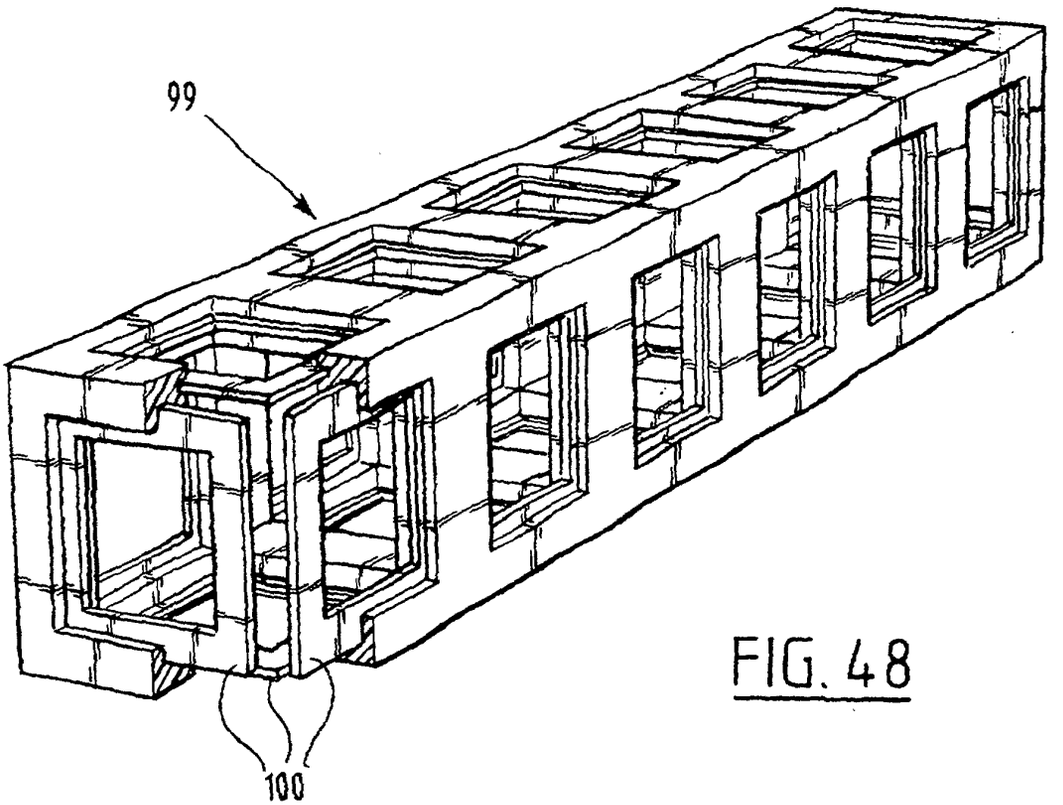

FIG. 48

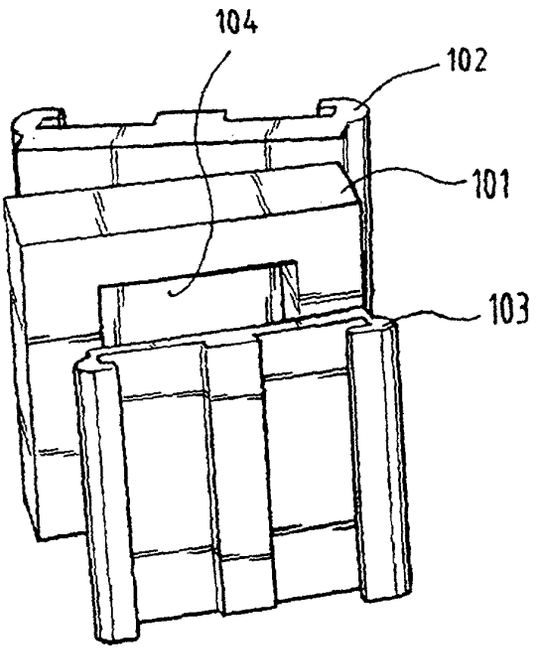

FIG. 49

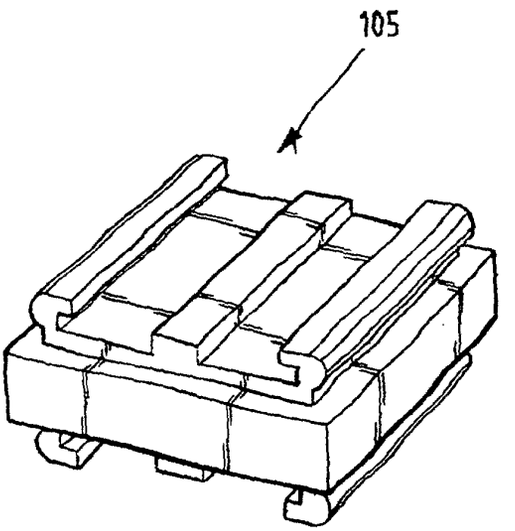

FIG. 50

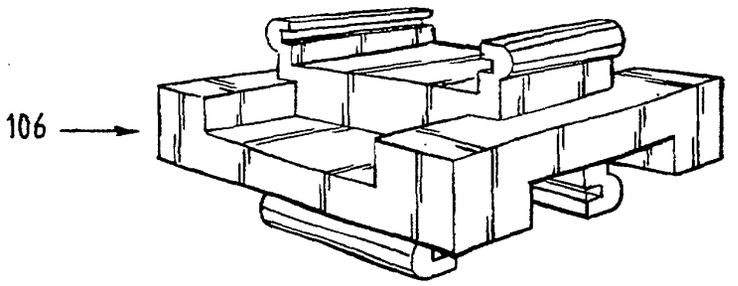

FIG. 51A

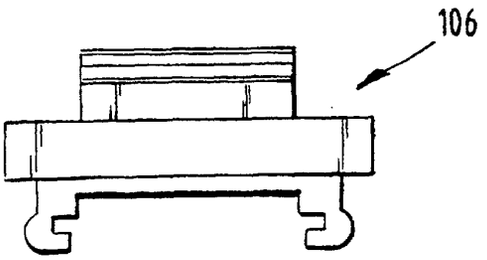

FIG. 51B

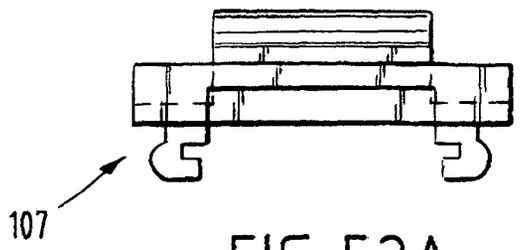

FIG. 52A

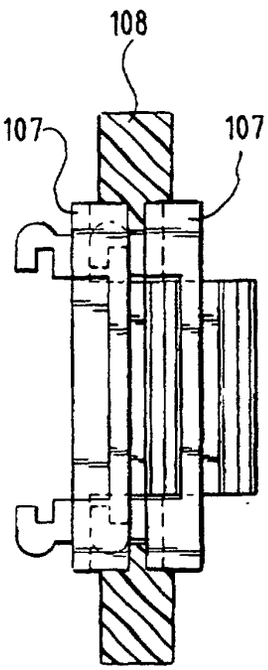

FIG. 52B

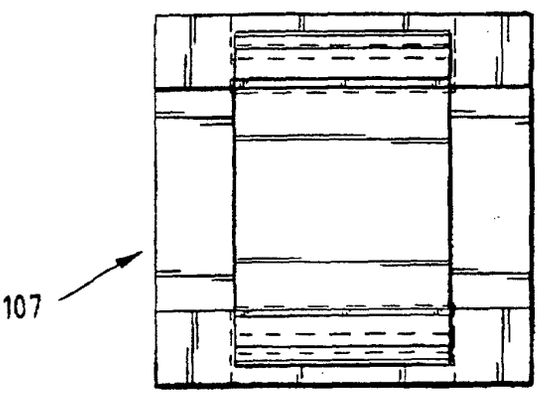

FIG. 52C

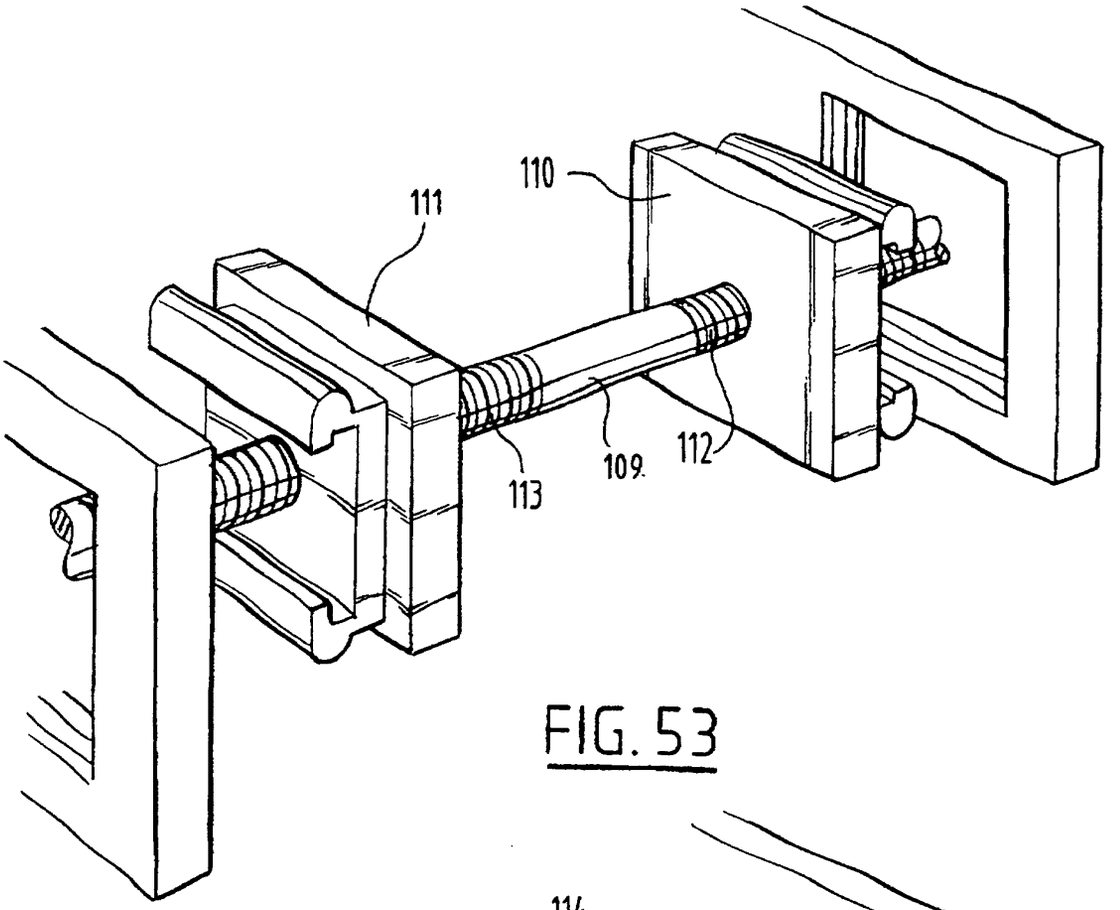

FIG. 53

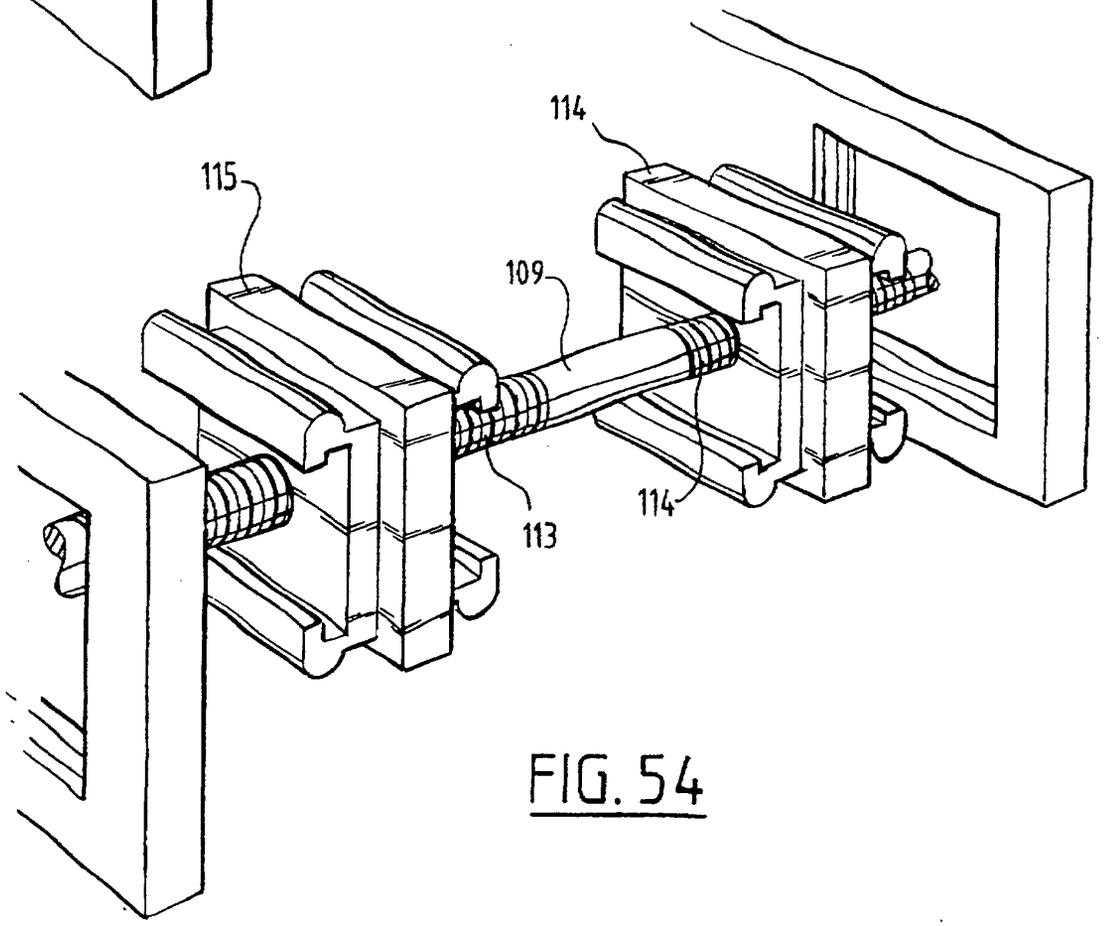

FIG. 54

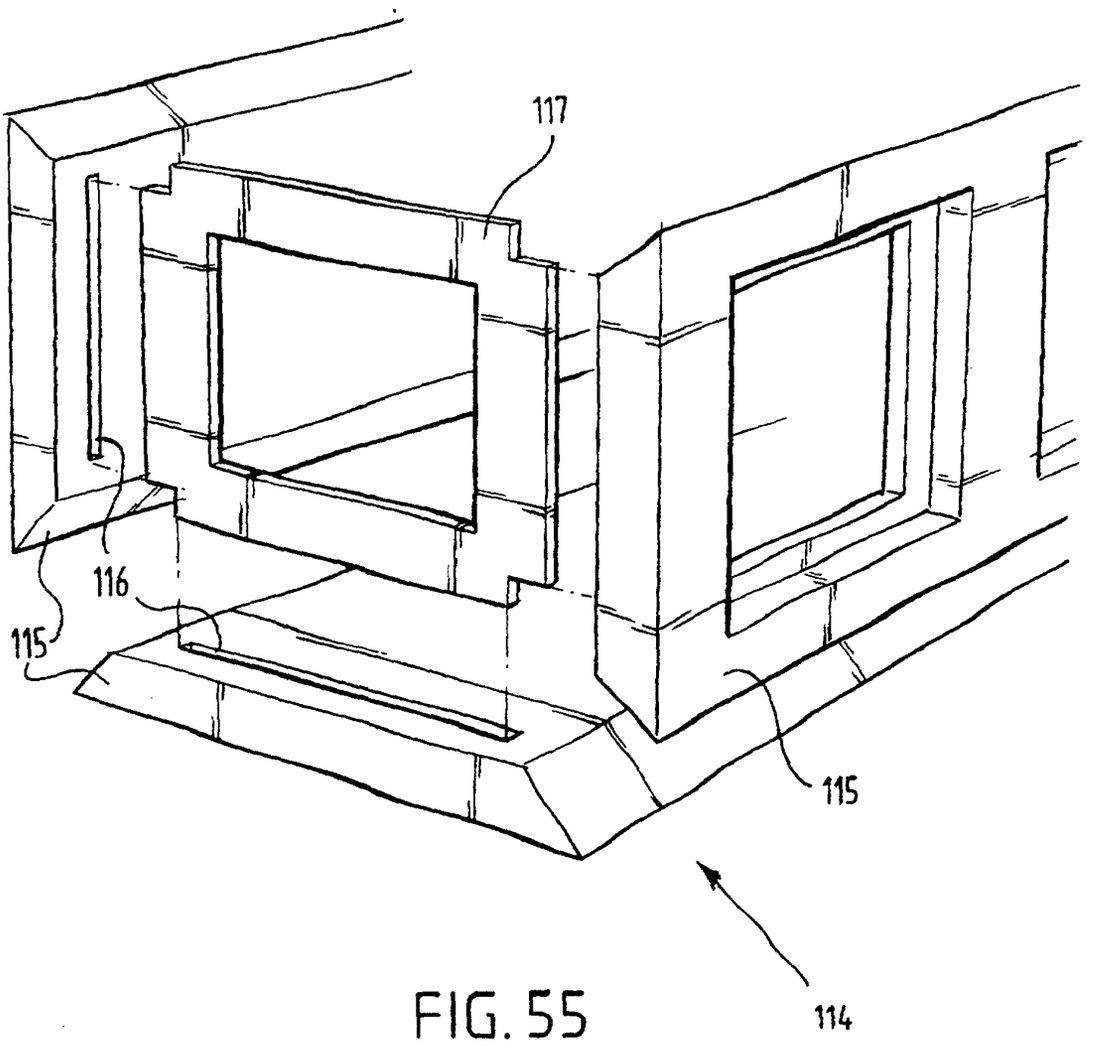

FIG. 55