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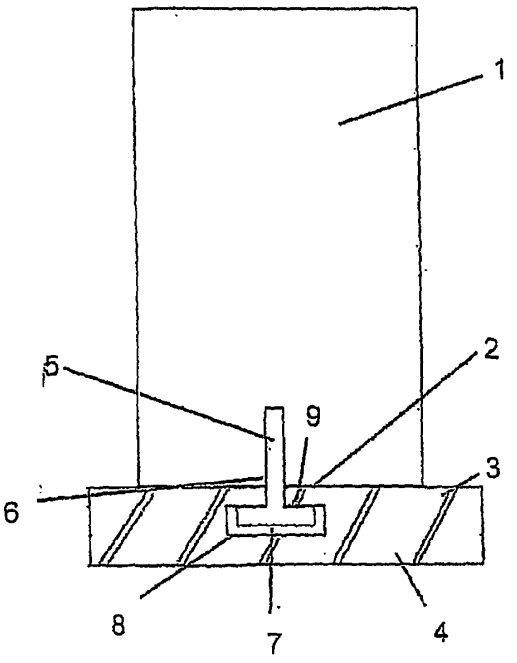
(54) Adjustable self-locking support system

(57) A system for supporting one or more articles is provided comprising:-
a planar base member having first and second opposed planar surfaces and an engaging surface, the planar base member having a longitudinally extending slot defined therein which opens onto said engaging surface; and
one or more support members, each support member comprising a surface defining a plane of support for the one or more articles,
a basal wall substantially perpendicular to said support defining surface, said wall being in contact with the first planar surface the planar base member, and
a linking member depending from the basal wall of the support member and extending through the slot in the planar base member, said linking member comprising a substantially L-shaped stem and having a locking bar located at the end of the stem distal to the basal wall of the support member,
the locking bar being arranged substantially perpendicularly to said stem and being of length greater than the width of the longitudinally extending slot defined in the planar base member, wherein the locking bar engages the engaging surface of the planar base member so as to lock the support member in position when the support member is substantially perpendicular to said planar base member but when the support member is tilted away from the perpendicular, the locking bar becomes disengaged from said engaging surface, thereby allowing the support member to slide longitudinally along the top wall of the planar base member.

A kit and method for preparing such a system is also provided.

Figure 1



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Description

Field of the invention

[0001] The present invention relates to an adjustable and self-locking support system wherein one or more support members are moveable on a planar member and are self-lockable in a position substantially perpendicular to the planar member. The system according to the invention may be used as a shelf for supporting books, CDs, cassettes, files, magazines or the like, wherein one or more support members are moveable along a planar base member and are self-lockable in a position substantially perpendicular to the base member when moved into engagement with the article to be supported so as to hold the articles in position on the base member, or alternatively may be used in an inverted configuration wherein the planar member provides a surface for supporting articles and is itself supported by the support members.

Background to the invention

[0002] Shelves for supporting objects such as books or the like having bookend dividers or support members located at fixed positions along the length of the shelf have long been known. A disadvantage of such systems, however, lies in their inflexibility. Having dividers provided at predetermined positions does not afford an efficient use of space, particularly if articles of differing dimensions need to be supported.

[0003] In order to overcome these disadvantages, shelving systems with movable dividers or bookends have been proposed. Commonly, the shelves in such systems are provided with slots or grooves along which the supporting bookends may move longitudinally until they reach any desired position and are then locked in place.

[0004] Although systems with movable dividers allow for more flexibility in use than the fixed position shelves discussed above and are thus less wasteful of space, the systems described to date present other disadvantages, most notably that the bookend or dividers are typically insertable and removable from the ends of the shelves only and/or that they rely for their operation on the bookend being tilted in the locked position.

[0005] A bookshelf system with a shelf having a longitudinal slot and a moveable, lockable bookend with tenons which fit through the slot and are locked in place by pins passing through the tenons is described in FR 2841110A. In the system as described, when a sideways force is applied to one side of the bookend causing the bookend to tilt from the vertical, frictional forces cause the pin to engage with the underside of the shelf so as to lock the bookend in place. In order for the locking mechanism to operate, therefore, both the books and the bookend must be tilted which is disadvantageous as books or the like are generally desirably shelved in a vertically upright manner.

[0006] US 5,205,420 describes an adjustable, self-locking book rack with a pair of bookends slidably mounted on a base. The base has a longitudinal dovetail groove therein and extending along the length thereof and each bookend has a dovetail depending from its base which is received within the dovetail groove. This dovetail and dovetail groove arrangement provides the locking mechanism. When the bookend is moved into engagement with a book, the lateral pressure of the book causes the top portion of the bookend to be tilted rearwardly, moving the front portion of the bookend upwardly and the rear portion downwardly, locking the bookend to the base. Apart from the requirement for tilting, a further disadvantage of this system is that the bookend is insertable and removable from the ends of the shelf only.

[0007] There therefore remains a continuing need for improved adjustable and locking support systems which overcome the deficiencies of the prior art.

Summary of the invention

[0008] According to a first aspect, the present invention provides a support system for supporting one or more articles comprising:-

a planar base member having first and second opposed planar surfaces and an engaging surface, the planar base member having a longitudinally extending slot defined therein which opens onto said engaging surface; and

one or more support members, each support member comprising a surface defining a plane of support for the one or more articles,a basal wall substantially perpendicular to said support defining surface, said wall being in contact with the first planar surface of the planar base member, and

a linking member depending from the basal wall of the support member and extending through the slot in the planar base member, said linking member comprising a substantially L-shaped stem and having a locking bar located at the end of the stem distal to the basal wall of the support member,

the locking bar being arranged substantially perpendicularly to said stem and being of length greater than the width of the longitudinally extending slot defined in the planar base member, wherein the locking bar engages the engaging surface of the planar base member so as to lock the support member in position when the support member is substantially perpendicular to said planar base member but when the support member is tilted away from the perpendicular, the locking bar becomes disengaged from said engaging surface, thereby allowing the support member to slide longitudinally along the first planar surface of the planar base member.

[0009] In another aspect, the invention provides a kit for preparing a support system according to the first as-

pect comprising:-

a planar base member having first and second opposed planar surfaces and an engaging surface, the planar base member having a longitudinally extending slot defined therein which opens onto said engaging surface; and

one or more support members, each comprising a surface defining a plane of support and a basal wall, substantially perpendicular to said support defining surface, having a linking member depending therefrom,

said linking member comprising a substantially L-shaped stem and having a locking bar of length greater than the width of the slot, arranged substantially perpendicularly to said stem, located at the end of the stem distal to the basal wall of the support member.

[0010] The invention also provides a method for constructing a support system according to the first aspect.

[0011] By means of the invention, an adjustable, self-locking shelf system is provided which holds the articles to be supported firmly in place, at any desired position along the base of the shelf, in a substantially upright position. Moreover, as the shelf system according to the invention does not require the support members to be introduced or removed from the ends of the shelf, additional support members may readily be introduced at any desired position along the base of the shelf as and when required. The shelf system according to the invention is constructed from a small number of components and can easily and simply be assembled and disassembled. Suitably, the shelf system may be provided in the form of a kit for assembly by the user.

[0012] In a further aspect, the invention provides a support system formed by inverting a shelf support system according to the first aspect such that the second planar surface of the planar base member provides a plane of support for supporting for one or more articles with the first planar surface of planar base member being supported by the support members.

Detailed description of the invention

[0013] The support system according to the invention is suitable for supporting books, CDs, cassettes, files, magazines and any other such like articles which require storage. Any reference herein to books, bookshelves or bookends should be interpreted accordingly and is not intended to be limiting to books alone.

[0014] It will further be appreciated that the shelf support system according to the invention is not restricted for use in the horizontal plane but may also be used when oriented in the vertical plane, with the support members providing a horizontal supporting surface for displaying articles, such as ornaments or plants, for example.

[0015] In such an embodiment, the support member providing the horizontal supporting surface may itself be provided with a longitudinally extending slot defined therein which opens onto an engaging surface into which an additional support member or members may be introduced, the support member providing the horizontal supporting surface thereby itself acting as a planar base member in a multi-shelf system.

[0016] In one embodiment, the system may be inverted to form a support system in which the second opposed planar surface of the planar base member defines the supporting surface for the one or more articles to be supported, the planar base member being supported at its first opposed surface by the supporting members.

[0017] In such an inverted construction , the support system functions as a table with the planar member functioning as the table top and the supporting members constituting the table legs, the distance between which can readily be adjusted as desired by means of the adjustable locking mechanism. Such an arrangement may conveniently find application as a raised tray for use by patients in a hospital bed, for example, with the gap between the supporting members being readily adjustable to comfortably fit around the users legs.

[0018] The planar base member for use according to the invention comprises first and second opposed planar surfaces, an engaging surface and has a longitudinally extending slot defined therein. The planar base member may be any desired shape, suitably, for example, rectangular, and may be intended to be free-standing or mounted on a wall. Alternatively, the planar base member may form part of a larger storage structure such as a book case or the like.

[0019] The planar base member may be made from any material which is conventionally used in shelving systems provided that it is sufficiently strong to bear the weight of the article or articles to be supported. Conveniently, the planar base member may be made from a plastics materials but other materials such as wood, metals or glass may also conveniently be used. If desired, the planar base member may be provided with a retaining lip along one or more of its edges.

Where the planar base member constitutes the supporting surface of a table system such as a raised tray intended for use in bed, it will generally be provided with a retaining lip as discussed above and may also be provided with additional features such as cup holders, which may be integral to the planar member or may be affixed thereto, or a gripping surface to help retain objects on the supporting surface.

[0020] The longitudinally extending slot defined in the planar base member may suitably be formed using standard cutting techniques conventional in the art, the choice of which will depend on the material from which the planar base member is constructed. It will be appreciated that as the shelf system according to the present invention does not require the support member or members to be introduced or removed from the ends of the planar base member, the longitudinally extending slot need not ex-

tend along the whole of the length of the base member although in one embodiment it may do so.

[0021] The width of the slot will be chosen such it is sufficiently wide for the locking member depending from the bottom wall of the support member to extend through the slot but is less wide than the length of the locking bar.

[0022] In one embodiment, the longitudinally extending slot extends through the first and second opposed walls of the planar base member and opens onto an engaging surface formed by the second planar surface of the planar base member.

[0023] In this embodiment, the planar base member is suitably provided with a longitudinal groove in the second opposed planar surface, the groove being wider than the length of the locking bar and being positioned such that the slot defined through the planar base member opens into this groove. This is advantageous as it allows the locking bar of the linking member depending from the support member and extending through the slot therein to be contained within this groove rather than protruding below the planar base member. This is of particular importance where the shelf system according to the invention is intended to be free-standing as the planar base member would otherwise be unable to sit flat on the surface on which it is placed.

[0024] In another, particular, embodiment the longitudinally extending slot defined in the planar base member extends through the first planar surface and opens into a longitudinally extending cavity formed within the planar base member, intermediate between the first and second opposed planar surfaces. The engaging surface in this embodiment is provided by the wall of the cavity proximal to the first planar surface of the planar base member.

[0025] Conveniently, in this embodiment, the longitudinally extending cavity within the planar base member comprises first and second opposed walls, said walls being substantially parallel to the first planar surface of the planar base member.

[0026] A shelf support system according to the invention may comprise a single support member, for example, where the shelf is wall-mounted and a perpendicular wall acts as a second support member, the article or articles being supported between the support member and the wall. In one embodiment, however, the shelf system according to the invention comprises a plurality of support members, especially two.

[0027] As with the planar base member, the one or more supporting members may be made from any material which is conventionally used in shelving systems. Suitably, the supporting member or members may be made from the same materials as the planar base member but the invention also contemplates the use of different materials to manufacture the planar base member and supporting member(s).

[0028] The one or more support members may be of any desired shape, provided that this includes a surface defining a plane of support and basal wall substantially perpendicular to said support defining surface. Where the shelf system comprises a plurality of support members, these may be of the same or different shapes. Conveniently, the one or more support members are rectangular in shape.

[0029] Each supporting member for use according to the invention has a linking member depending from the basal wall thereof. As used herein, where the shelf system is in the horizontal plane, the basal wall is that wall of the support member which is supported on the top or uppermost surface of the planar base member in the assembled construction.

[0030] In one embodiment, the linking member depends from the mid point of the basal wall of the support member.

[0031] The linking member may be attached at one end to the support member by any conventional attaching means such as by adhesive or using screws or nuts and bolts or, in one embodiment, one end of the linking member may be inserted into the basal wall of the support member.

[0032] A support member in which the depending linking member is formed integrally with the support member is also envisaged according to the invention.

[0033] The linking member may suitably be prepared from any material provided that it is sufficiently strong to lockingly engage the support member to the planar base member in operation. Suitably the linking member is made from materials such as steel or brass or other such similarly strong materials.

[0034] The linking member comprises a substantially L-shaped stem and has a locking bar located at the end of the stem distal to the bottom wall of the support member and arranged perpendicularly to the stem. The locking bar may suitably comprise one shoulder arranged perpendicularly to the end of the stem or more preferably comprises two shoulders arranged equally on either side, and perpendicularly, to the end of the stem.

[0035] The linking member, support member and/or planar base member may additionally comprise means, such as pins, slots or serrations, to increase the frictional engagement between the base member and support member(s) in the locked position. This is of particular importance when the support member is to be deployed in a horizontal position.

[0036] The linking member extends through the slot in the planar base member and the L-shaped configuration of the stem and the perpendicular arrangement of the locking bar around this end of the stem ensures that when the support member is positioned perpendicularly to the planar base member, the locking bar is brought into engagement with the engaging surfaceof the planar base member. As the length of the locking bar is greater than the width of the slot in the planar base member, the locking bar cannot pass back through the slot when the support member is rotated into position but instead is forced into engagement with the engaging surface of the planar base member thereby locking the support member in position. Tilting the support member away from the perpen-

dicular allows the position of the support member to be adjusted as it causes the locking bar to become disengaged from the planar base member, thereby allowing the support member to slide longitudinally along the top wall of the planar base member.

[0037] The process of attaching a support member to the planar base member is straightforward and comprises the steps of, first, laying the support member on the first planar surface of the planar base member, with the basal wall of the support member aligned with the slot in the planar base member, thenpushing the locking bar through the slot, rotating the support member through 90° and finally raising the support to an position where it is perpendicular to the planar base member.

[0038] In order to allow this assembly process to be carried out, the arm of the L-shaped linking member to which the locking bar is attached must be sufficiently long to allow the locking bar to pass beyond the distal opening of the slot when the support member lies flat on the planar base member.

[0039] Further features of the present invention will become apparent from the following non-limiting example. Generally speaking the invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims and drawings). Moreover unless stated otherwise, any feature disclosed herein may be replaced by an alternative feature serving the same or a similar purpose.

[0040] The present invention will now be further described with reference to the following non-limiting example and with reference to the accompanying illustrative drawings, in which:-

Figure 1 shows an end view of the support member engaged in a locking position with the planar base member;

Figure 2 shows a side view of the support member engaged in a locking position with the planar base member;

Figure 3 shows a side view of a support member in a tilted position relative to the planar base member;

Figure 4 shows a linking member according to the invention.

Figures 5 and 6 show alternative planar base members for use according to the invention;

Figure 7 shows the first stage in the construction of a shelf system according to the invention with the support member laying on the planar base member, with the basal wall of the support member aligned with the slot in the planar base member;

Figure 8 shows the second stage in the construction of a shelf system according to the invention with the support member rotated through 90°.

Figure 9 shows an alternative embodiment of the arrangement shown in Figure 2 in which the planar base member is serrated to increase the frictional engagement when the support member is engaged in a locking position with the planar base member;

Figure 10 shows a side view of a support member of the embodiment of Figure 9 in a tilted position relative to the planar base member;

Figures 11 and 12 show alternative planar base members for use according to the invention provided with means for increasing the frictional engagement with the support member in the assembled position;

Figure 13 shows an alternative support member for use according to the invention provided at its base with a slot which can lock into a slot in a planar base member as shown in Figure 14.

Figure 15 shows an embodiment in which the construction according to the invention is inverted to form a table system.

[0041] Referring to Figure 1, this shows a support member (1), the basal wall of which (2) is supported on the first, top surface (3) of the planar base member (4).The construction of the planar base member can be seen in Figure 6. A linking member (5) is shown inserted into the basal wall of the support member and extending through the slot (6) in the planar base member beyond the distal opening of the slot. A locking bar (7), which in the embodiment shown comprises two shoulders arranged equally on either side and perpendicularly to the end of the stem of the linking element, is located in a longitudinally extending cavity the first and second opposed planar surfaces. The engaging surface in this embodiment is provided by the wall of the cavity proximal to the first planar surface of the planar base member (9).The support member in the upright position as shown, engages this engaging surface.

[0042] Figure 2 shows a side view of this arrangement. When books or other objects are pushed along the direction Y against the surface (10) of a support member which defines a plane of support for said objects, the locking bar (7) of the linking member (5) is urged into locking engagement with the wall of the cavity proximal to the first planar surface of the planar base member (9). Figure 9 shows an alternative embodiment wherein the locking bar (5) of the linking member (7) interacts with a serration (shown as (12) in Figure 11) provided in the wall (9) to provide increased frictional engagement.

[0043] In the planar base member shown in Figure 6, the longitudinally extending slot (6) extends along the whole length of the base member. Figure 5 shows an alternative planar base member suitable for use accord-

ing to the invention in which the slot does not extend along the whole length of the base member.

[0044] Figure 3 illustrates how tilting the support member away from the perpendicular disengages the locking bar from the engaging surface of the planar support member. In this diagram the direction in which the support member must be rotated in order to move it to the perpendicular, locked position, is indicated by the arrow Z. The corresponding arrangement for the embodiment of Figure 9 is shown in Figure 10.

[0045] The steps involved in the construction of a shelf system according to the invention can be seen from Figures 7 and 8.

[0046] Firstly, the support member(1) is laid on the first planar surface of the planar base member (4), with the basal wall of the support member aligned with the slot in the planar base member and the locking bar of the linking member (5) is pushed through the slot, as shown in Figure 7. The construction of the linking member can be seen in Figure 4. The linking member comprises an L-shaped stem and a locking bar (7) and the arm of the L-shaped linking member (11) to which the locking bar is attached is sufficiently long to allow the locking bar to pass beyond the distal opening of the slot when the support member lies flat on the planar base member. The length of the locking bar is greater than the width of the slot in the planar base member.

[0047] In a second step, the support member is rotated through 90° , still lying on the planar base member (as shown in Figure 8), and finally the support member is raised to a position where it is perpendicular to the planar base member. In this position, the locking bar is brought into engagement with the engaging surface of the planar base member. As the length of the locking bar is greater than the width of the slot in the planar base member, the locking bar cannot pass back through the slot when the support member is rotated into position but instead is forced into engagement with the engaging surface of the planar base member thereby locking the support member in position.

[0048] Embodiments of the arrangements described above in which the planar base member and/or support members are provided with means to increase the frictional engagement between the planar base member and support member are shown in Figures 9 to 14.

Figures 9 to 11 show an embodiment in which the planar base member comprises serrations (12) with which the locking bar of the linking member interacts in the locked position. Figure 12 shows a planar base member (4) provided with a slot (13) into which can be inserted a pin or slot (14) extending from the basal wall of the support member (1) (as shown in Figure 13) to lock the support member in position. The assembled construction is shown in Figure 14.

[0049] Figure 15 shows an inserted construction in which the planar base member (4)forms a table top which is supported on its underneath by support members (1).

Claims

1. A system for supporting one or more articles comprising:-

   a planar base member having first and second opposed planar surfaces and an engaging surface, the planar base member having a longitudinally extending slot defined therein which opens onto said engaging surface;
   and
   one or more support members, each support member comprising
   a surface defining a plane of support for the one or more articles,
   a basal wall substantially perpendicular to said support defining surface, said wall being in contact with the first planar surface the planar base member, and
   a linking member depending from the basal wall of the support member and extending through the slot in the planar base member, said linking member comprising a substantially L-shaped stem and
   having a locking bar located at the end of the stem distal to the basal wall of the support member,
   the locking bar being arranged substantially perpendicularly to said stem and being of length greater than the width of the longitudinally extending slot defined in the planar base member,
   wherein the locking bar engages the engaging surface of the planar base member so as to lock the support member in position when the support member is substantially perpendicular to said planar base member but when the support member is tilted away from the perpendicular, the locking bar becomes disengaged from said engaging surface, thereby allowing the support member to slide longitudinally along the top wall of the planar base member.

2. A system according to claim 1, wherein the longitudinally extending slot extends through the first and second opposed planar surfaces of the planar base member and opens onto an engaging surface formed by the second planar surface of the planar base member.

3. A system according to claim 2, wherein the planar base member is provided with a longitudinal groove in the second opposed planar surface, the groove being wider than the length of the locking bar and being positioned such that the slot defined in the planar base member opens into said groove.

4. A system according to claim 1, wherein the longitudinally extending slot defined in the planar base

member extends through the first planar surface of the base member and opens into a longitudinally extending cavity formed within the planar base member, intermediate between the first and second opposed planar surfaces.

5. A system according to claim 4, wherein the longitudinally extending cavity within the planar base member comprises first and second opposed walls, said walls being substantially parallel to the first planar surface of the planar base member.

6. A system according to claim 4 or claim 5, wherein the engaging surface is provided by the wall of the cavity proximal to the first planar surface of the planar base member.

7. A system according to any preceding claim, comprising a plurality of support members.

8. A system according to any preceding claim, wherein the linking member depends from the mid point of the basal wall of the support member.

9. A system according to any preceding claim, wherein the locking bar comprises two shoulders arranged equally on either side, and perpendicularly, to the end of the stem of the linking member.

10. A system according to any preceding claim, wherein the linking member additionally comprises means for increasing the frictional engagement with the base member in the locked position.

11. A system according to claim 10, wherein the means for increasing the frictional engagement with the base member in the locked position comprise pins or serrations.

12. A kit for preparing a support system according to claim 1 comprising:-

a planar base member having first and second opposed planar surfaces and an engaging surface, the planar base member having a longitudinally extending slot defined therein which opens onto said engaging surface; and
one or more support members, each comprising a surface defining a plane of support and a basal wall, substantially perpendicular to said support defining surface, having a linking member depending therefrom,
said linking member comprising a substantially L-shaped stem and having a locking bar of length greater than the width of the slot, arranged substantially perpendicularly to said stem, located at the end of the stem distal to the basal wall of the support member.

13. A method for constructing a support system according to any of claims 1 to 11 comprising the steps of

(i)laying one or more support members on the first planar surface of the planar base member, with the basal wall of each support member aligned with the slot in the planar base member;
(ii) inserting the locking bar of the locking member of each support member through the slot;
(iii) rotating each support member through 90° whilst still laying on the planar base member ; and
(iv)raising each support member to a position where it is substantially perpendicular to the planar base member.13. A system according to claim 1 which is inverted to form a support system in which the second opposed planar surface of the planar base member defines the supporting surface for the one or more articles to be supported, the planar base member being supported at its first opposed surface by the supporting members.

14. A support member comprising
a surface defining a plane of support for the one or more articles,
a basal wall substantially perpendicular to said support defining surface, and
a linking member depending from the basal wall of the support member,
said linking member comprising a substantially L-shaped stem and having a locking bar located at the end of the stem distal to the basal wall of the support member,
the locking bar being arranged substantially perpendicularly to said stem.

Figure 2

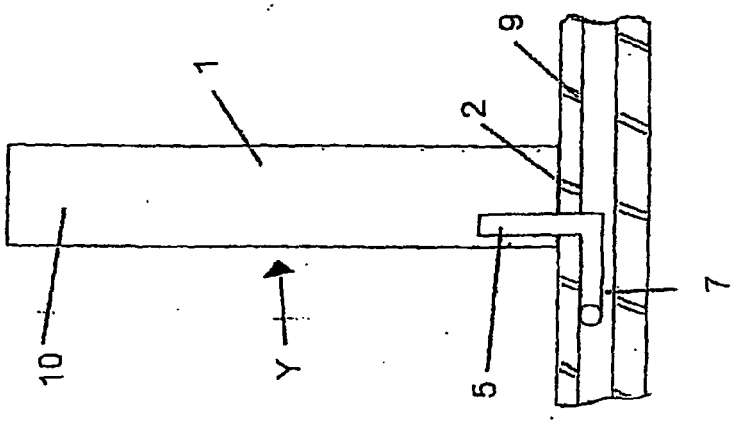


Figure 1

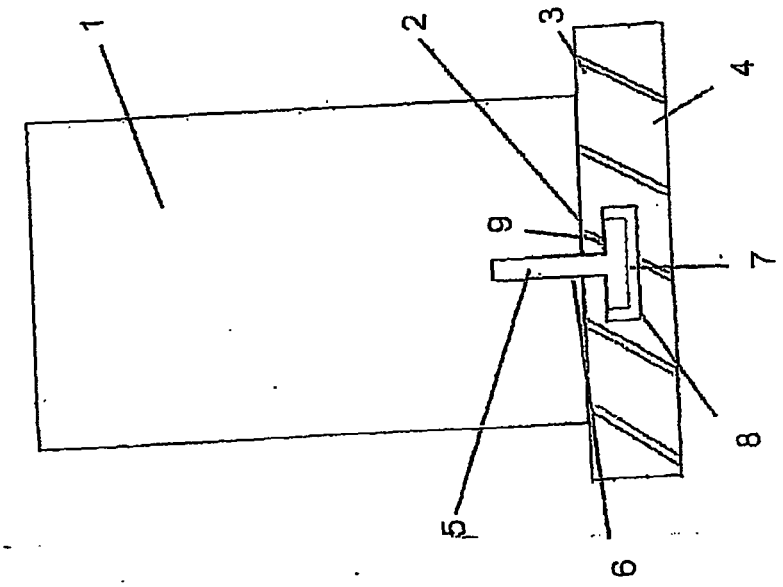


Figure 4

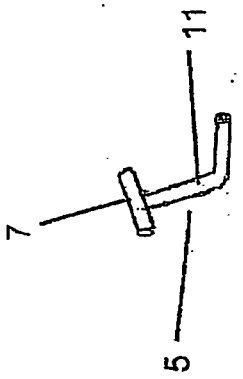


Figure 3

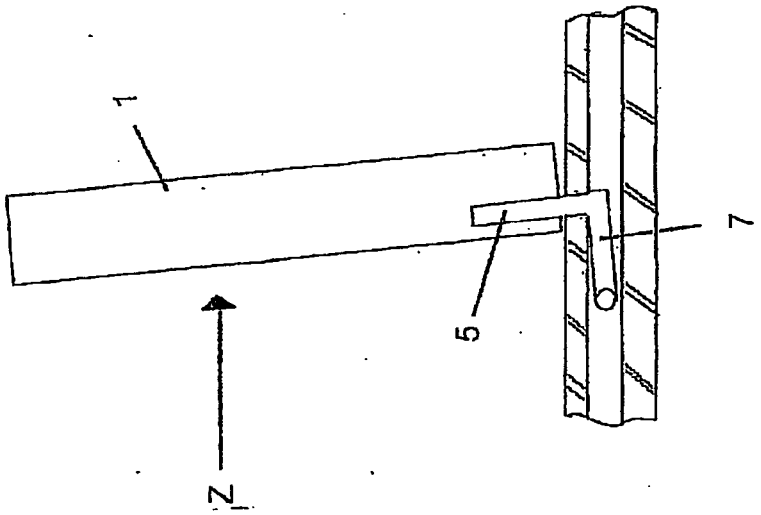
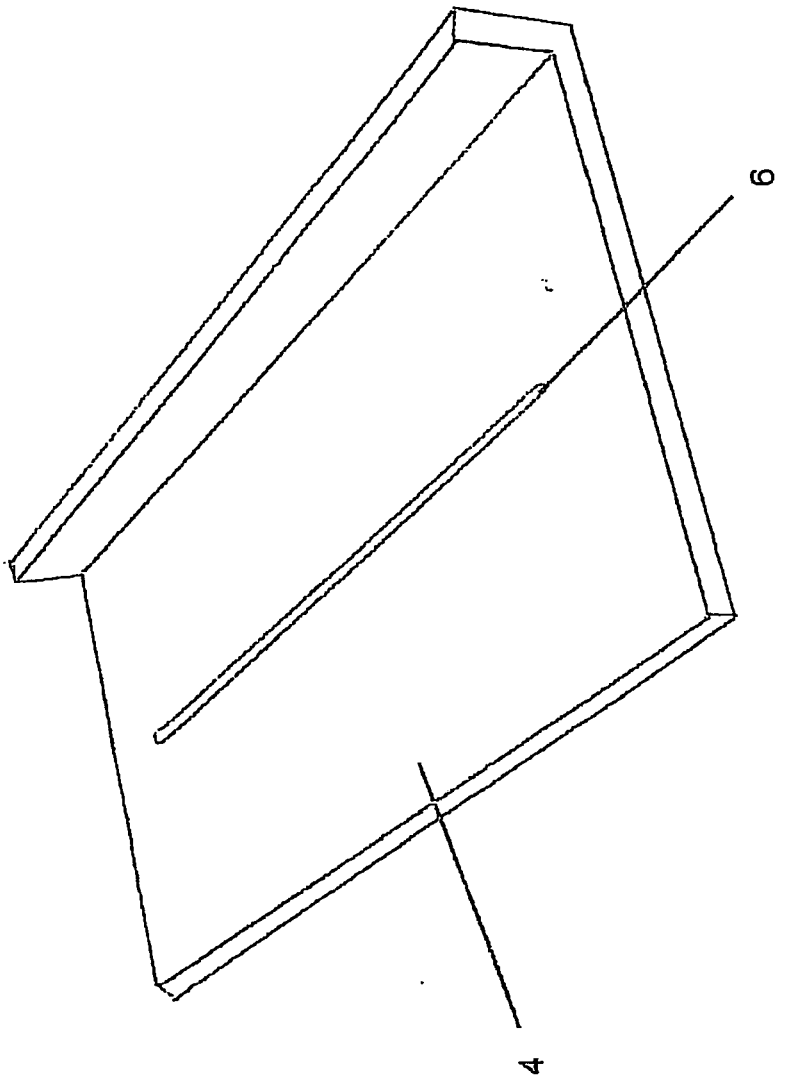


Figure 5



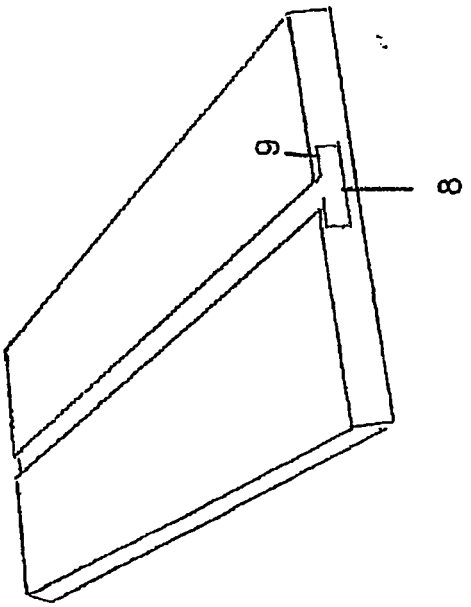


Figure 6

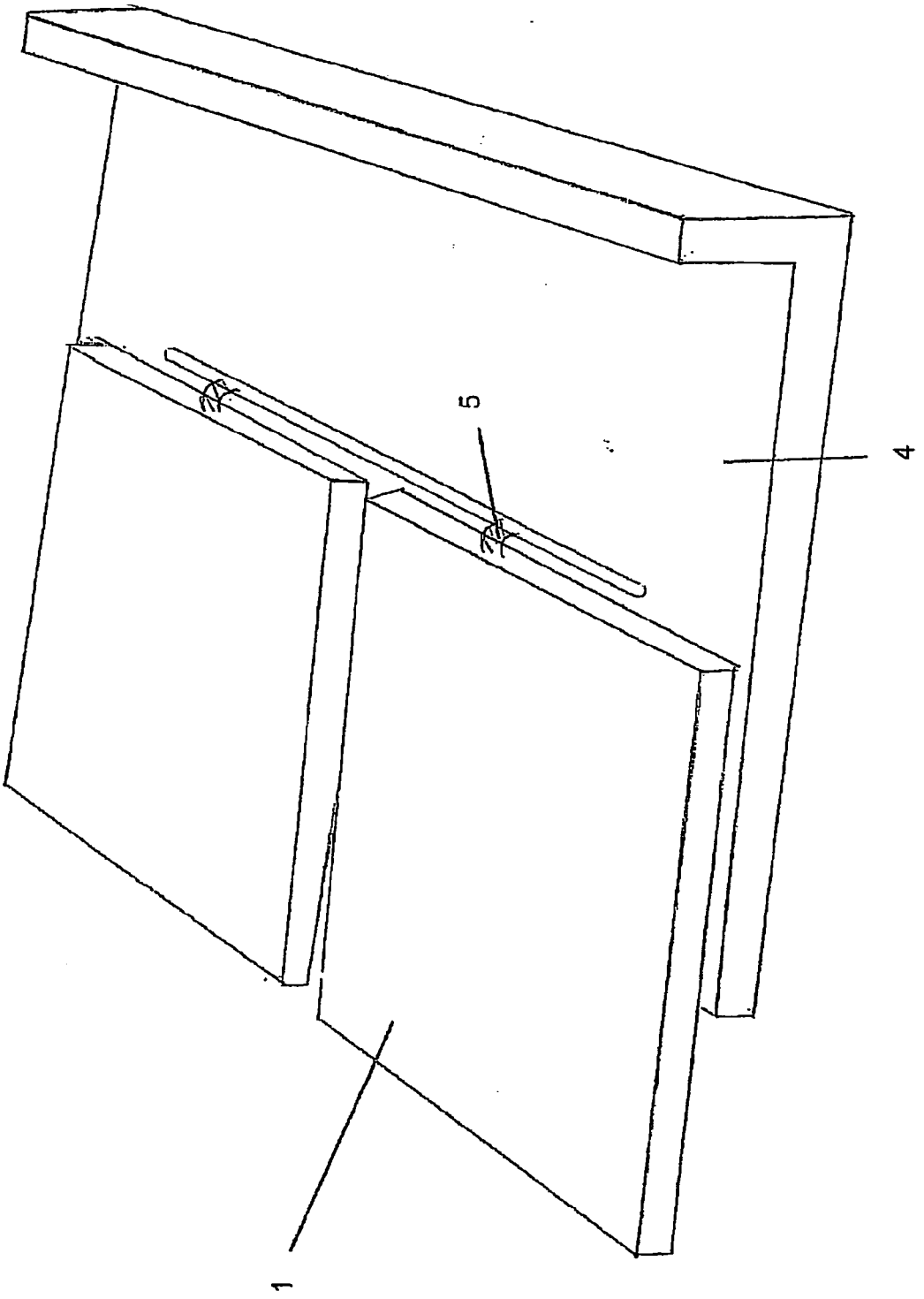


Figure 7

Figure 8

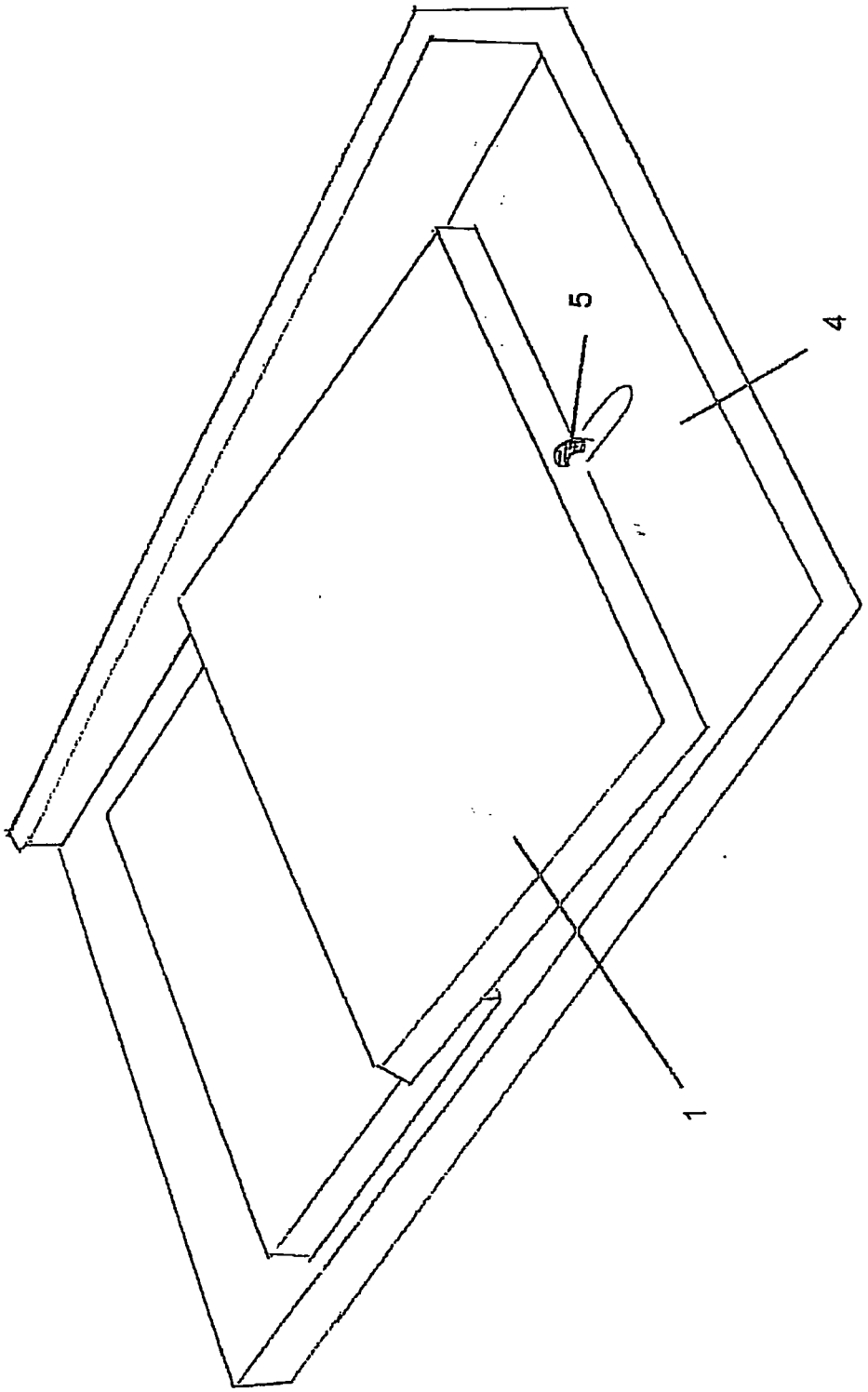


Figure 10

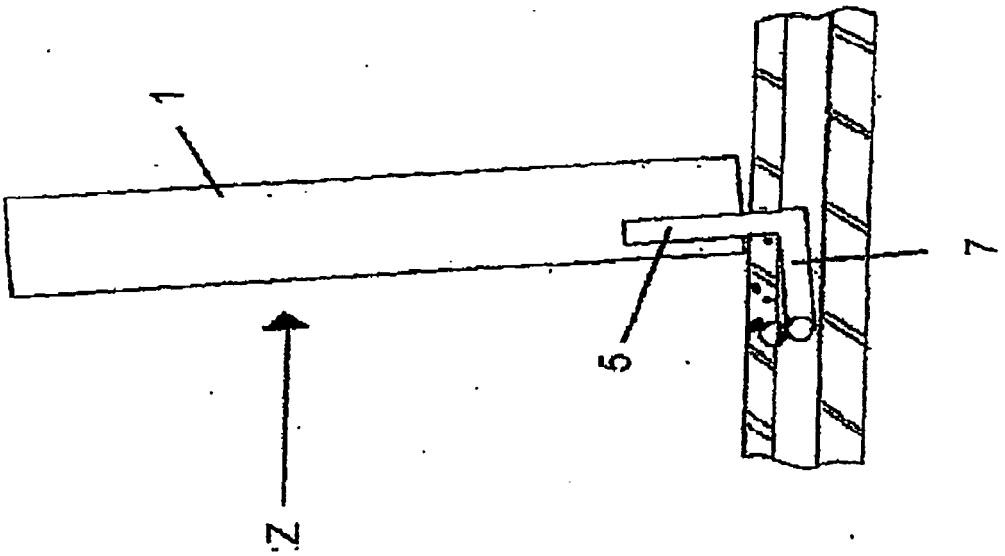
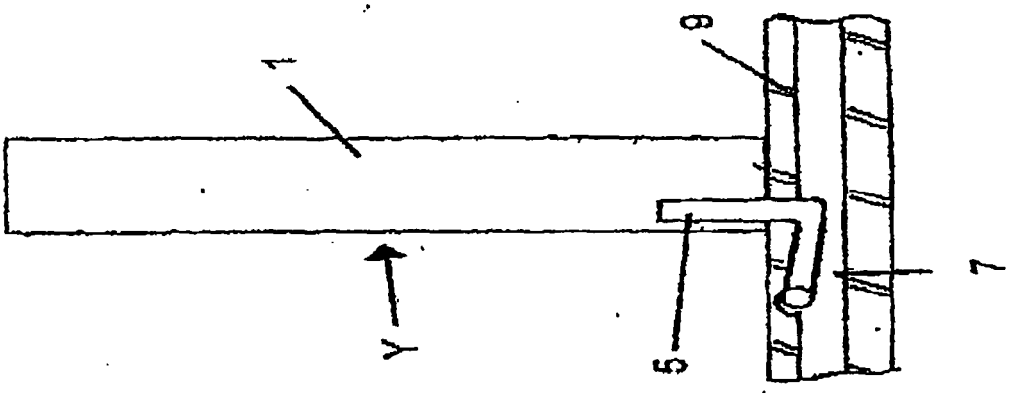


Figure 9



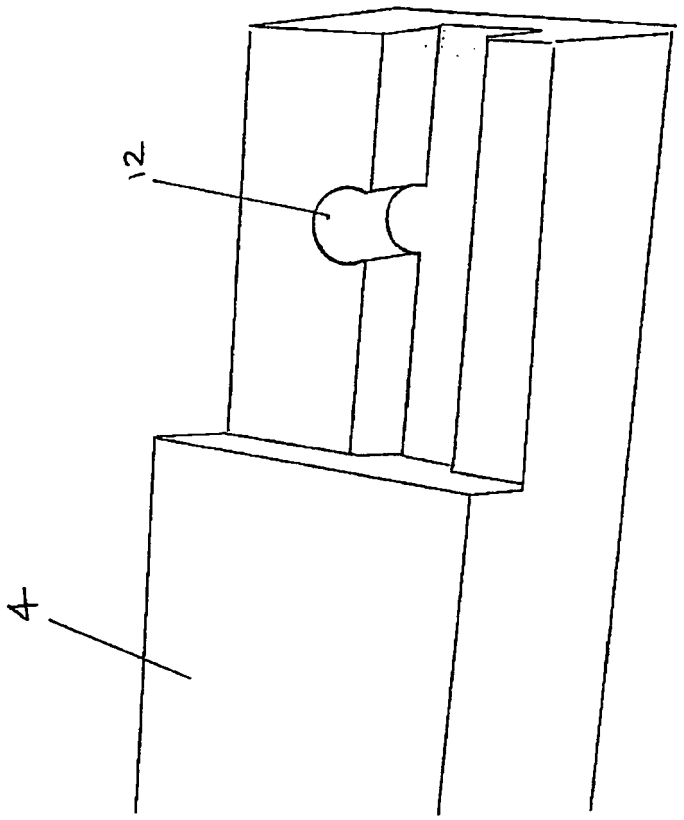


Figure 11

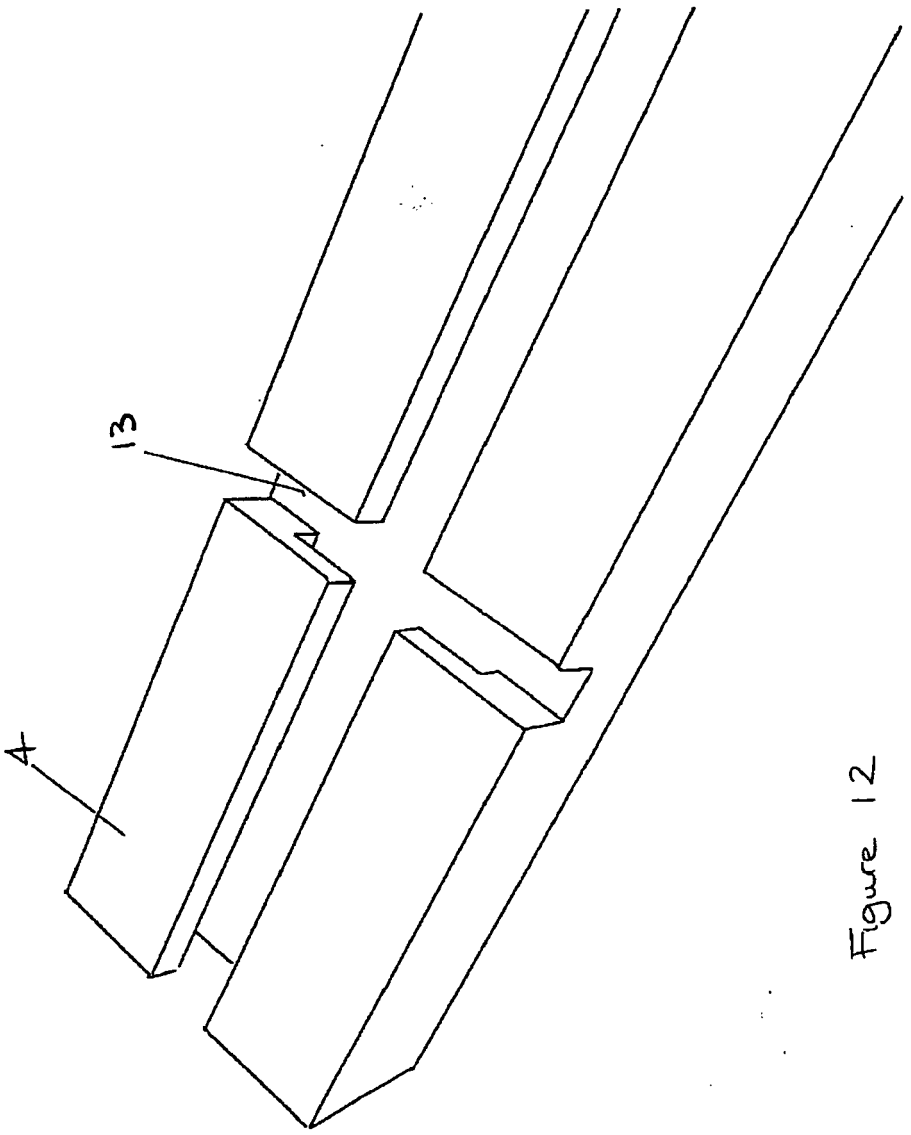


Figure 12

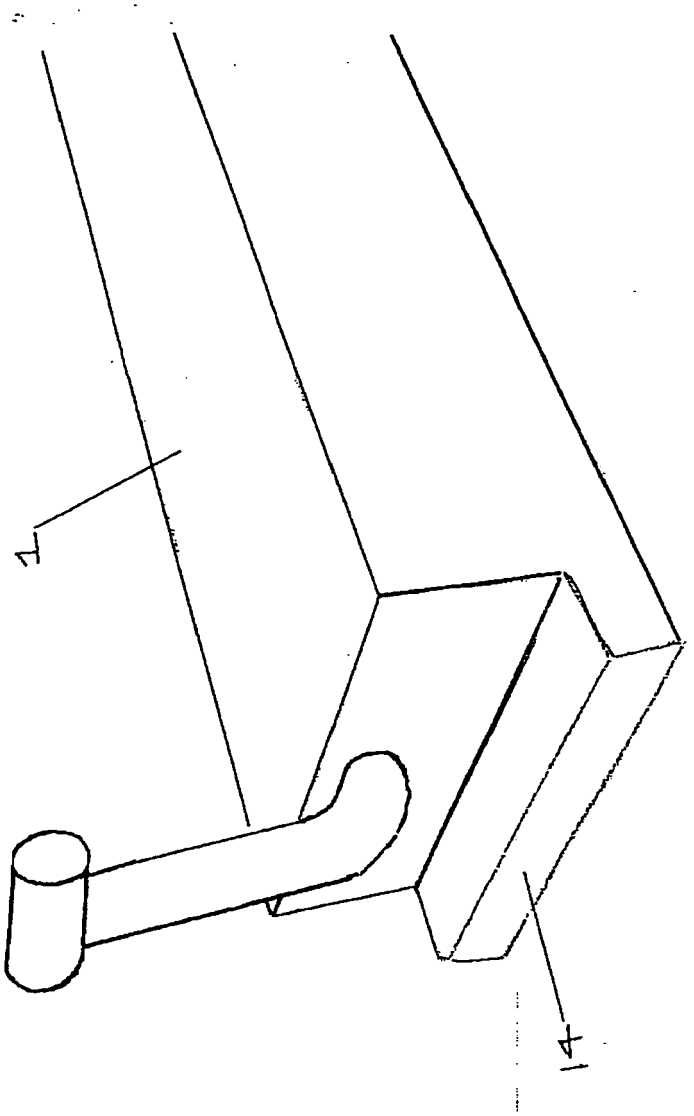


Figure 13

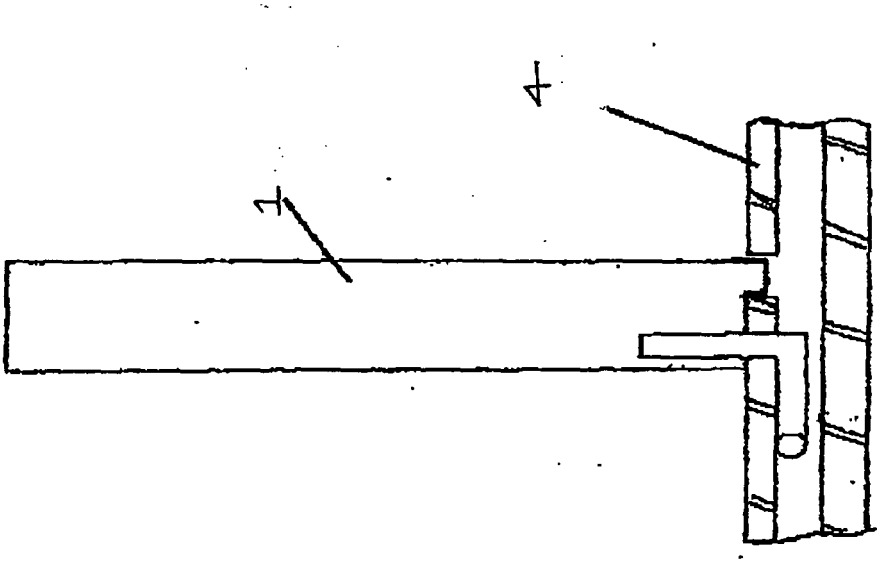
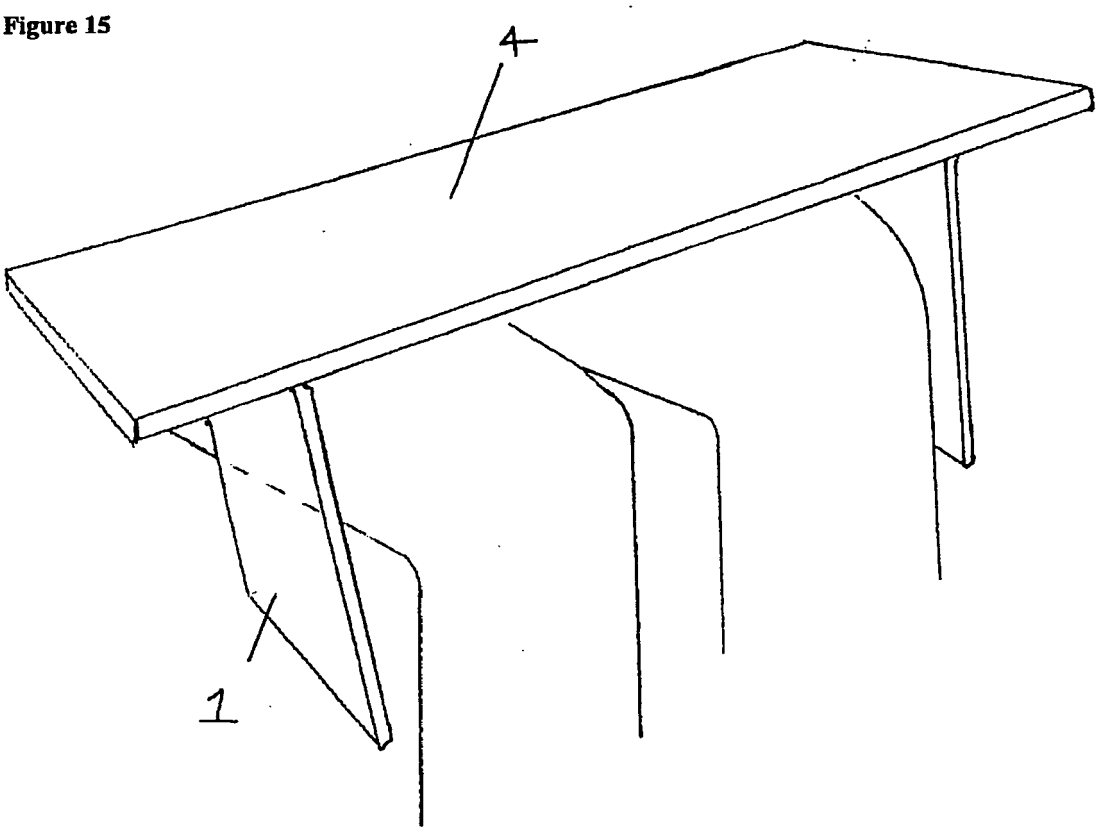


Figure 14

Figure 15



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Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 December 2008	Lassen, Steen D.

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