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(54) **Shaping a solid wood item**

(57) The present invention concerns a method for shaping a solid wood item (1), and a structure comprising such a solid wood item, where the solid wood item is worked and fixed in a given shape. The method includes at least steps wherein at least two cutouts (2) are made in the solid wood item in the region where the solid wood item is to be shaped, where the solid wood item is worked or machined and fixed in the desired shape, and where a locking element (4) is mounted in the at least two cut-

outs. The cutouts may typically be a machined cutout at both sides of a solid wood item, where the solid wood item may be a rod-shaped or plate-shaped item, or provided with another shape. By making two or more cutouts, the strength of the wood item is weakened so much that it may be shaped more easily, in that the cross-sectional area subjected to bending is reduced. Hence, deformations in the form of tension and compression in the fibres of the solid wood item are not so great since the cross-section is minimised.

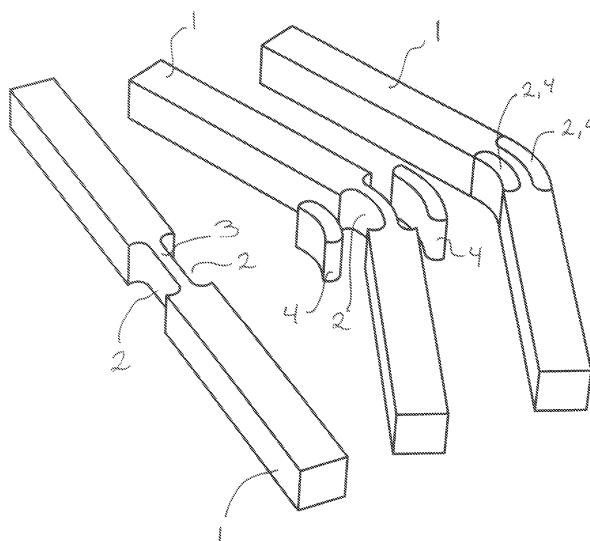


Fig.1

Description

Field of the Invention

[0001] The present invention concerns a method for shaping a solid wood item, wherein the wood item is worked or machined to have at least two cutouts and to be fixed in a given bended shape, where said cutouts is made in the solid wood item in the region where the wood item is to be fixed in said given bended shape. The invention further concerns a structure comprising at least one solid wood item, where the solid wood item is worked or machined and fixed in a given shape.

Background of the Invention

[0002] Within the art of cabinet-making and in particular within the furniture industry, it is often desired to make designs with rounded items, something which may be achieved in many different traditional ways. In particular, there are often used moulded items which typically are made up of a plurality of thin layers that are glued together in a given shape while the item is held fixed in a moulding tool. Another prior art method is steam bending, where the item is acted on by steam whereby the wood becomes flexible and thereby mouldable to some degree. Among other prior art methods can be mentioned compression which, like steam bending, occurs at high humidity and temperature, but where the item is compressed up to about 20% in longitudinal direction, causing a very great mouldability. In fact, by this method it is possible make the most incredible and fascinating items.

[0003] Common to the said methods is, however, that the processes are time-consuming, and that the items have to harden or dry before continuing the process. This hardening or drying time is obviously a cost-increasing process step, but is unfortunately required as the moulded item cannot maintain its shape if the item is not kept in a mould for a given period of time, while the steam-applied items also have to be fixed and dried to suitable humidity before continuing the process on the item.

Object of the Invention

[0004] It is the purpose of the invention to indicate a solution to the above mentioned inexpediciencies with regard to shaping solid wooden items, where such a long processing time is not required and where the need for fixing and drying the item is substantially less than by the prior art methods.

Description of the Invention

[0005] As mentioned above, the invention concerns a method for shaping a solid wood item, wherein the wood item is worked or machined to have at least two cutouts and to be fixed in a given bended shape, where said cutouts is made in the solid wood item in the region where

the solid wood item is to be fixed in said given bended shape, the method including at least steps wherein the solid wood item is worked or machined and fixed in the desired bended shape, with at least one cutout on the tension side of the bend, and further with at least one of the said cutouts located on the compressions side of the bend, and where after fixating the solid wood item in the desired bended shape a locking element is mounted in the at least one cutout on the tension side and in at least one cutout on the compression side.

[0006] The cutout may typically be a machined cutout at both sides of a solid wood item, where the solid wood item may be a rod-shaped or plate-shaped item, or provided with another shape. By making two or more cutouts, the strength of the solid wood item is weakened so much that it may be shaped more easily in that the cross-sectional area subjected to bending is reduced. Hence, deformations in the form of tension and compression in the fibres of the solid wood item are not so great since the cross-section is minimised. The invention may be realised by one or more cutouts at one side of the item, and may advantageously be made with at least one cutout at two opposing sides of the solid wood item. By having cutouts on the tension side and as well on the compressions side a very rigid structure is obtained as the locking element on the tension side will keep the solid wood item from going back to its original position and the locking element on the compression side will secure that the solid wood item is fixed in the desired shape as the two opposing cutouts and corresponding locking elements support each other. Thus no unintended deformation of the area of the bend will take place. Various preferred embodiments will be discussed hereinafter and shown in the Figures.

[0007] A typical method is to work the items to some degree, e.g. turning the items into a desired shape, or the item is planed, after which one or more cutouts are made in the item. There may be oppositely located cutouts and there may be several cutouts along the item. Then the item is possibly further worked on, and the local region in which one or more cutouts have been made is processed e.g. by moisture and/or heat, after which the solid wood item is shaped and fixed. When the item is fixed in the desired shape, whether the case is one or more bends in one or more directions or alternatively twisting, locking elements are mounted in the now deformed cutouts made. The cutouts may be made in more than one step e.g. by making a cutout in a rough shape before shaping and fixing the solid wood item in the desired shape. After having fixed the solid wood item, the cutouts may be made in the precise dimensions to secure an optimal fit of the locking element. The mounting of locking elements may be effected by mounting without further fastening, or by mechanical fastening, but in a preferred variant, the locking element is glued into the cutout on the tension side and on the compression side of the solid wood item and thus the solid wood item is held in the fixed shape. In this way is achieved a very

great workability of the wood item without the whole item needing to be moistened and subsequently dried before further processing. Precisely this avoidance of moistening and drying is very attractive since hereby is saved time as well as energy, whereby the production costs are considerably minimised. Moreover, this is a process which is much faster than those belonging to the prior art, since mounting of the locking elements can be performed as a very rapid process where only an insignificant time for shaping and possibly drying is needed.

[0008] As already mentioned above, by this method according to the invention two or more cutouts can be made in the solid wood item, where these cutouts are in the same specific region of the solid wood item to be shaped. For example, two cutouts at each their side of a solid wood item may leave a central part of the solid wood item untouched, where this central part ensures the connection between the solid wood item at both sides of one or two cutouts. By minimising the cross-sectional area, it becomes possible to perform a much more free and positive shaping without risk of breaking the solid wood item as the tension and the compression in the fibres in the wood becomes smaller due to the minimised cross-sectional area.

[0009] In order to achieve optimal possibility of shaping by a method according to the invention, the solid wood item can be processed by action of moisture and/or heat before fixing in the desired shape. Hereby is achieved the same pliability in the solid wood item as by traditional steam bending, but only a very limited area on the item is processed and is subsequently to dry.

[0010] In a preferred embodiment of a method according to the invention, the locking element mounted in cutouts in the solid wood item is a firm and dimensionally stable element, preferably of metal, plastic, rubber or wood. For example, locking elements of plastic may be used which are moulded in a specific shape and thereby adapted to a specific cutout after being deformed in connection with fixing the wood item. Such a locking element may also be of metal which is cast or machined to the actual shape. For example, the locking element can be made of a metal rod or a metal pipe which is shortened to a suitable length.

[0011] In a preferred variant of the said locking element mounted in cutouts in the solid wood item, the method according to the invention may include that the locking elements is made of a workable and/or hardening material, preferably a polymeric material. Such a locking element may e.g. be of a fluid and hardening polymeric material with or without fibre reinforcement which is cast into the deformed cutout or cutouts provided in the solid wood item after the solid wood item has been fixed. After the filler mass is hardened, it may be worked or machined by suitable tools, which advantageously may be the same tools used for the further processing of the solid wood item. By such a moulded or cast locking element which is formed directly into one or more cutouts, it is possible to lock the item in question in a given shape, but there is

achieved the further advantage that two or more uniform or different solid wood items can be fixed to each other with one and the same locking element. This may, however, also be possible with locking elements that are formed prior to mounting in one or more cutouts.

[0012] As mentioned, the invention concerns a method for shaping a solid wood item, but includes furthermore a structure comprising at least one solid wood item that is worked/machined, shaped and fixed in a given shape by the said method, where the solid wood item is provided with at least two cutouts, where said cutouts is made in the solid wood item in the region where the solid wood item is to be shaped and fixed in a given bended shape, the solid wood item has a tension side and a compression side when fixed in said given bended shape, and wherein the at least one solid wood item is provided with at least one cutout on the tension side of said given fixed bended shape, and with at least one cutout on the compression side of said given fixed bended shape, where a dimensionally stable locking element is mounted in the at least one cutout. The dimensionally stable locking element may be dimensionally stable even before mounting, but may also attain this dimensional stability after a possible hardening time in the cutout.

[0013] Such a structure comprising a solid wood item according to the invention may advantageously be part of a larger structure with further items, preferably a furniture structure. It may e.g. be armrests, back rest, legs or other details of a piece of furniture.

[0014] An embodiment of a structure comprising a solid wood item according to the invention is where the solid wood item is provided with at least one cutout on the tension side of the solid wood item, and on the compression side of said solid wood items, and is further provided with at least one locking element in one cutout on each of the said sides, where at least one locking element is connected with other parts of the same structure. It may possibly be a linkage between e.g. several wood items or other elements that form part of the structure, but it may also be so that the locking element itself is part of a further structural member, e.g. in connection with a branching in the structure.

[0015] In that connection the structure comprising a solid wood item, which is provided with at least one cutout on the tensions side of said solid wood item, and with at least one cutout on the compression side of said solid wood item, and additionally provided with at least two locking elements, may be designed so that at least one of the locking elements is constituted by a pin or dowel or similar on a further item in the same structure and thereby filling the deformed cutout.

Description of the Drawing

[0016] The invention will be described in the following with reference to the drawing, wherein:

Fig. 1 shows a solid wood item with two opposing cut-

- outs.
- Fig. 2 shows two solid wood items that are joined by a locking element.
- Fig. 3 shows a bent solid wood item with a locking element in plastic.
- Fig. 4 shows a piece of furniture wherein drawer front and legs are provided with cutouts and locking elements.
- Fig. 5 shows a solid wood item with tubular locking elements.
- Fig. 6 shows a solid wood item with two locking elements.
- Fig. 7 shows a solid wood item with two moulded locking elements, where the solid wood item is twisted.

Detailed Description of Embodiments of the Invention

[0017] In Fig. 1 is seen a solid wood item 1 in which is made two opposing cutouts 2. The solid wood item 1 is located between the two cutouts 2 with a remaining narrow connection 3. Fig. 1 shows the solid wood item 1 in three different process steps, where the first indicates a solid wood item 1 with cutouts 2, the second indicates a solid wood item 1 which is pressed to bending, whereby the two cutouts 2 are closed (compression) and opened (tension), respectively. Beside the two cutouts 2, two different locking elements 4 appear. In the third shown process step, the locking elements 4 are mounted in respective cutouts, and the item is thus fixed in the desired shape, ready for possible further processing. The two locking elements 4 may advantageously be glued into the corresponding cutouts 2 in the solid wood item 1. As it appears from Fig. 1, the cutouts 2 are designed such as to ensure a mechanical locking between the solid wood item 1 and the locking element 4. This direct mechanical locking is not necessary for a solution according to the invention, and other and more open types of cutouts 2 may be applied.

[0018] The cutout 2 may furthermore be provided with different cross-section as seen from the side of the solid wood item. For example, the length of a cutout 2 may be 50 mm at the sides of the cutout 2, whereas the length maybe is 80 mm at the centre of the cutout 2.

[0019] By such a solution there is achieved possibility of various shapes of a locking element which thus may contribute to an exciting expression of the design, whether the case is a fixed locking element which is glued into the cutout or it is a locking element which is moulded directly into the cutout.

[0020] In Fig. 2 appears a variant of the invention where two solid wood items 1 and 5 are fixed in two different shapes and are furthermore fixed to each other by two locking elements 4 and 6. By such a solution is achieved a rather extensive mouldability of the solid wood items 1, 5, while at the same time it is possible to connect several solid wood items 1, 5 to each other in a

hitherto unknown way.

[0021] In Fig. 3 appears yet a variant of a solid wood item 1 where in two opposing cutouts 2 there is mounted a locking element 7 with a forked shape that fits the cutouts 2 and which furthermore may function as e.g. arm-rest or carrying handle of a piece of furniture.

[0022] In Fig. 4 appears a piece of furniture 8, but with four legs 9 and a body 10 with a drawer 11. The body 10 of the furniture is made of plate material, and the sides 12 are provided with a groove 13 for receiving a solid wood item 1 including two legs 9 and a narrow connection 3. In this case it is thus the side 12 that constitutes the lock function and thereby the locking element 4 corresponding to the cutouts 2. In the shown embodiment, part of the legs 9 are furthermore enclosed at the end closest to the cutouts in order thereby to achieve a better rigidity in the furniture structure. As mentioned, the piece of furniture 8 is provided with a drawer 11 where the drawer front 14 is provided with two internal cutouts 2 in which locking elements 4 are provided. In this way, the drawer front may appear with a curving design.

[0023] In Fig. 5 appears another variant of a solid wood item 1 with two cutouts 2 in which two locking elements 4 are mounted, here made of a tubular material. Tubes of e.g. plastic, metal or other suitable material may be used, including fibre composite materials.

[0024] In Fig. 6 is seen a solid wood item 1 with two cutouts 2 and with two locking elements 4. One locking element 4 is a locking element 4 only with the purpose of filling the deformed cutout 2 on the compression side, whereas the other locking element 4 is part of the further structure 15 while simultaneously filling the second deformed cutout 2 on the tension side of the solid wood item 1.

[0025] Finally, in Fig. 7 appears a rectangular solid wood item 1 with two cutouts 2 in which is fitted moulded locking elements 4 after the solid wood item 1 having been moulded by twisting. The solid wood item it subsequently worked such that locking elements 4 follow the new shape of the solid wood item.

Claims

1. A method for shaping a solid wood item (1), wherein the wood item (1) is worked or machined to have at least two cutouts (2) and to be fixed in a given bended shape, where said cutouts (2) is made in the solid wood item (1) in the region where the solid wood item (1) is to be fixed in said given bended shape, **characterised in that** the method includes at least the following steps:

- the solid wood item (1) is worked or machined and fixed in the desired bended shape; with at least one cutout (2) on the tension side of the bend, and further with at least one of the said cutouts (2) located on the compressions side of

- the bend, and
 - after fixating the solid wood item (1) in the desired bended shape a locking element (4) is mounted in at least one cutout (2) on the tension side and in at least one cutout (2) on the compression side. 5
2. Method according to claim 1, **characterised in that** the solid wood item (1) is worked by action of moisture and/or heat before fixing in the desired shape. 10
3. Method according to any of claims 1 and 2, **characterised in that** the locking element (4) mounted in cutouts (2) in the solid wood item (1) is a firm and dimensionally stable element, preferably of metal, plastic, rubber or wood. 15
4. Method according to any of claims 1 and 2, **characterised in that** the locking element (4) mounted in cutouts (2) in the solid wood item (1) is made of a workable and/or hardening material, preferably a polymeric material. 20
5. Structure comprising at least one solid wood item (1) which is machined/worked to have at least two cutouts (2), where said cutouts (2) is made in the solid wood item (1) in the region where the solid wood item (1) is to be shaped and fixed in a given bended shape, the solid wood item (1) has a tension side and a compression side when fixed in said given bended shape, **characterised in that** the at least one solid wood item (1) is provided with at least one cutout (2) on the tension side of said given fixed bended shape, and with at least one cutout (2) on the compression side of said given fixed bended shape, where a dimensionally stable locking element (4) is mounted in the at least two cutouts (2). 25
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6. Structure comprising at least one solid wood item (1) according to claim 5, **characterised in that** the solid wood item (1) is part of a larger structure with further items, preferably a furniture structure. 40
7. Structure comprising at least one solid wood item (1) according to any of claims 5 and 6, **characterised in that** the solid wood item (1), which is provided with at least one cutout (2) on the tension side of said solid wood item (1) and on the compression side of said solid wood item (1), is further provided with at least one locking element (4) in one cutout (2) on each of the said sides, where at least one locking element (4) is connected with one or more other parts of the same structure. 45
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8. Structure comprising at least one solid wood item (1) according to claim 7, **characterised in that** the solid wood item (1), which is provided with at least one cutout (2) on the tension side of said solid wood item (1), and with at least one cutout (2) on the compression side of said solid wood item (1), and additionally provided with at least two locking elements (4), including at least one of the locking elements (4) being constituted by a pin or dowel or similar on a further item in the same structure. 55
9. Structure comprising at least one solid wood item (1) according to any of claims 5 to 8, **characterised in that** one solid wood item (1), when worked, shaped and fixed with more than two cutouts (2) and two locking elements (4), has more than one bend in more than one direction.

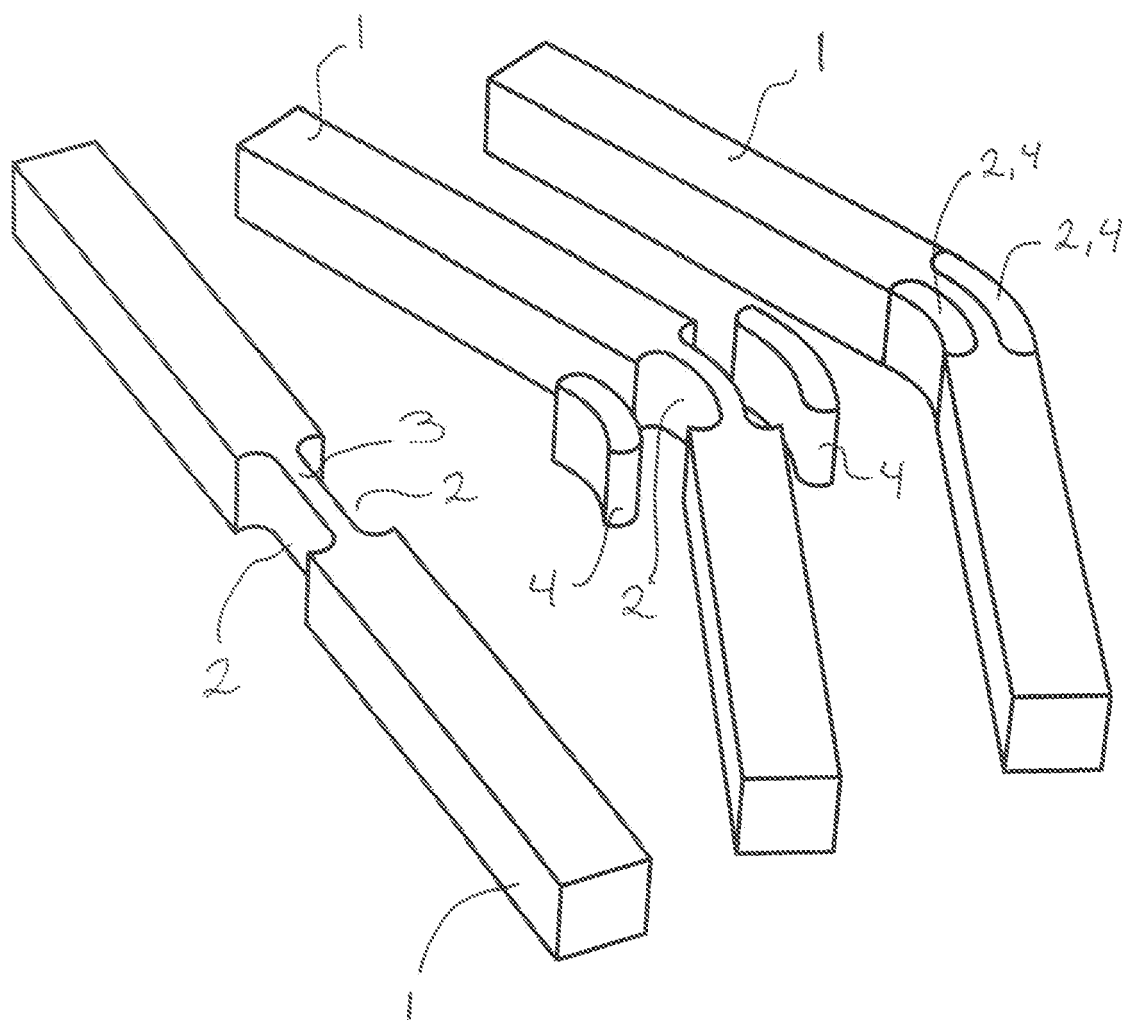


Fig.1

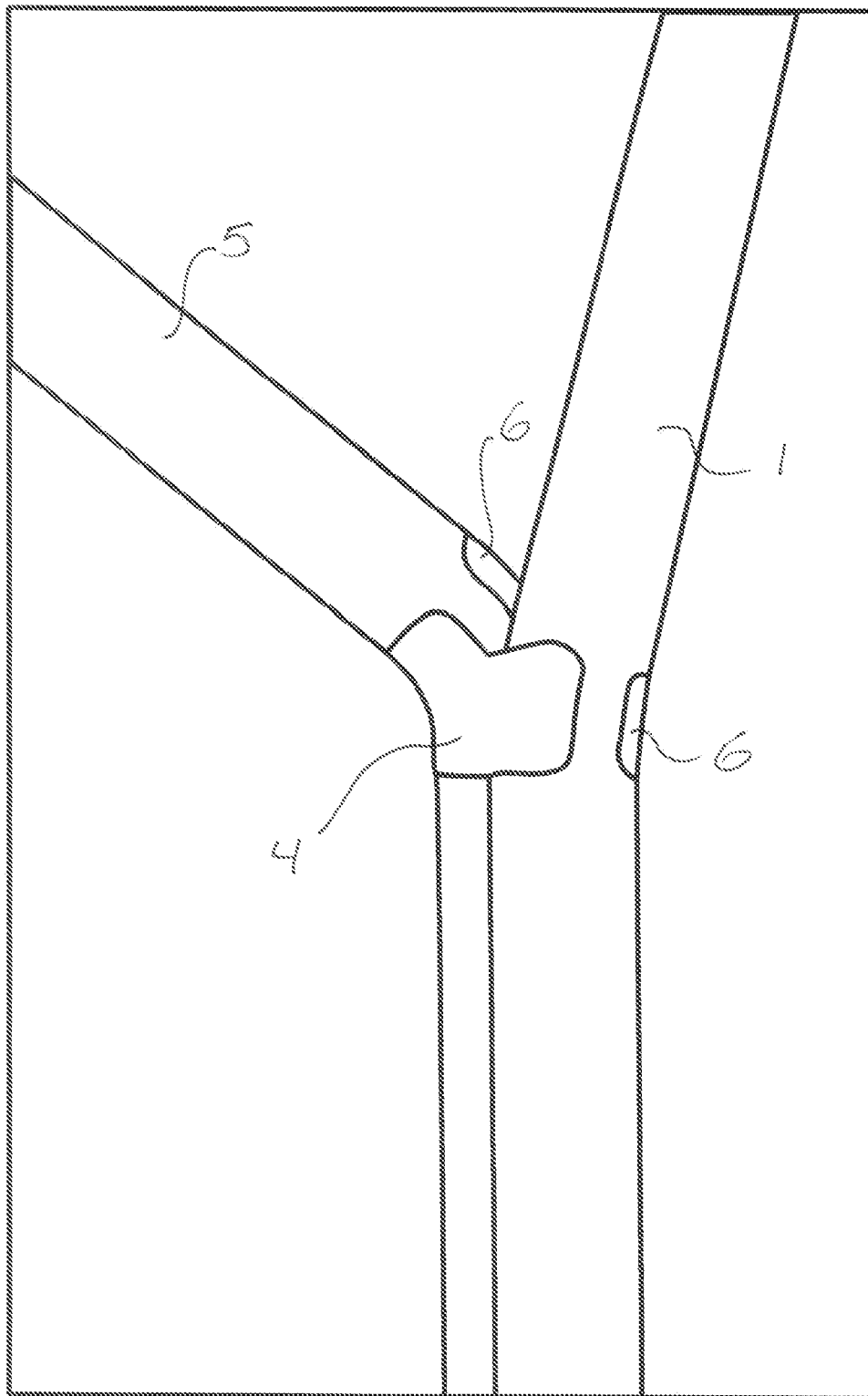


Fig.2

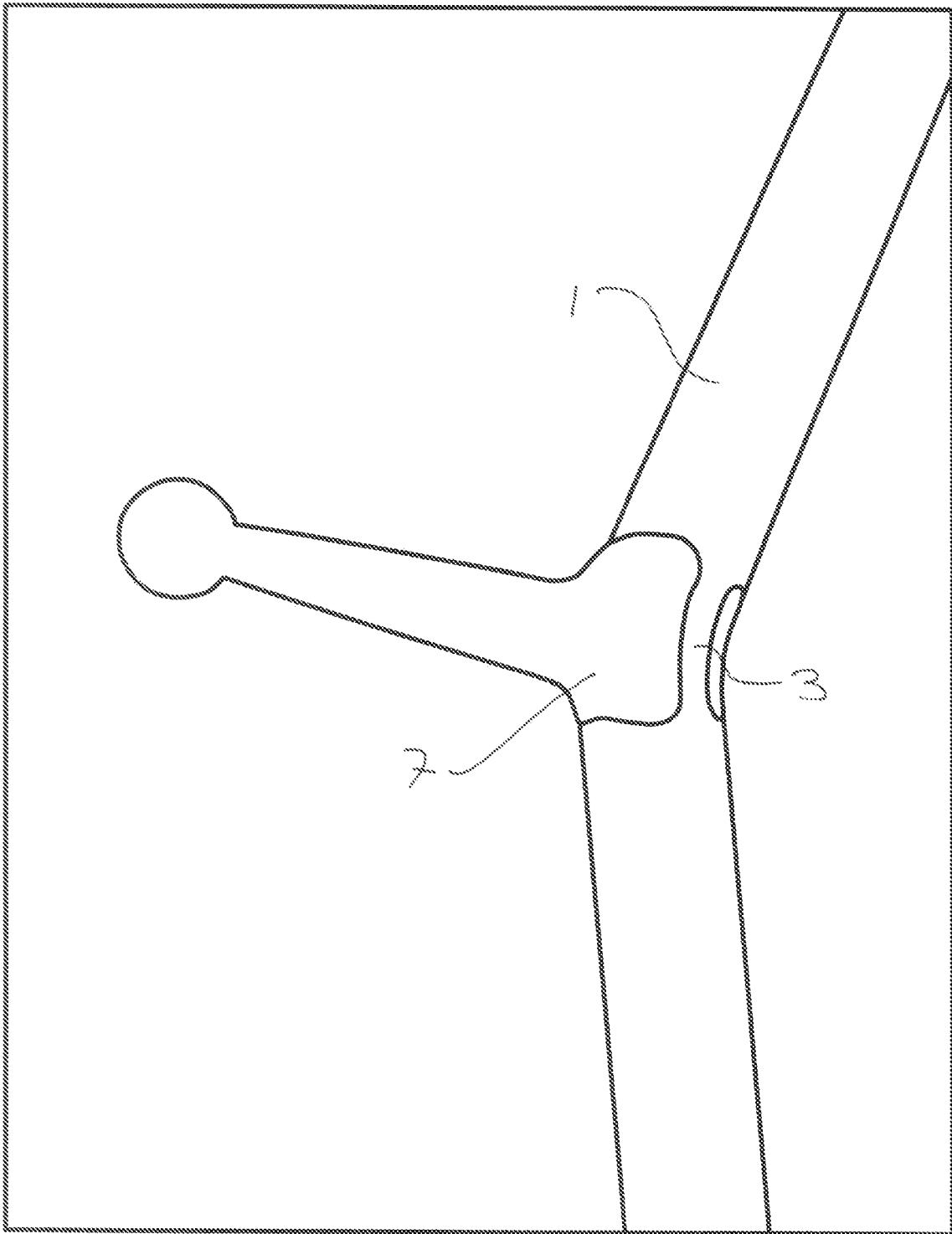


Fig.3

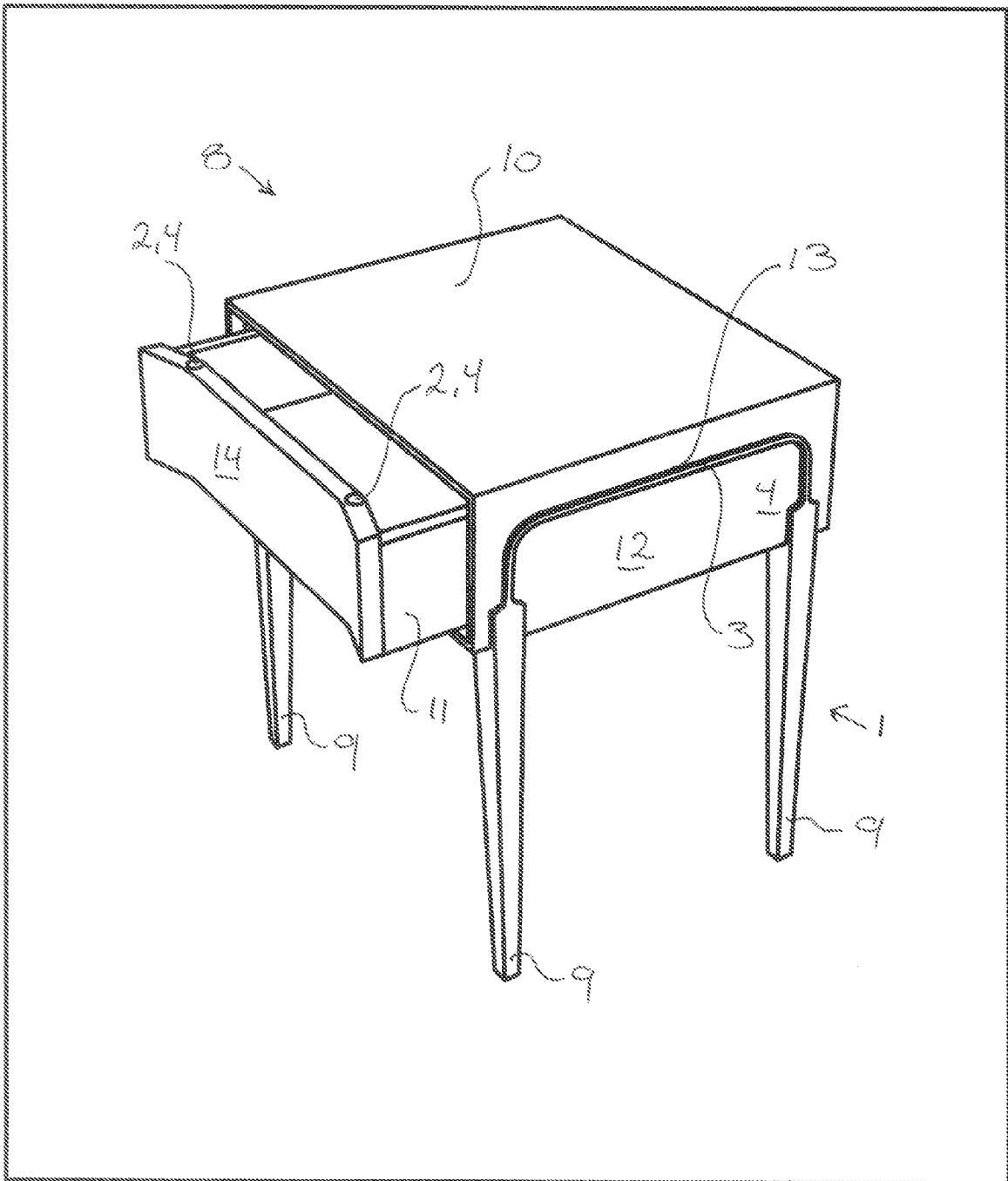


Fig.4

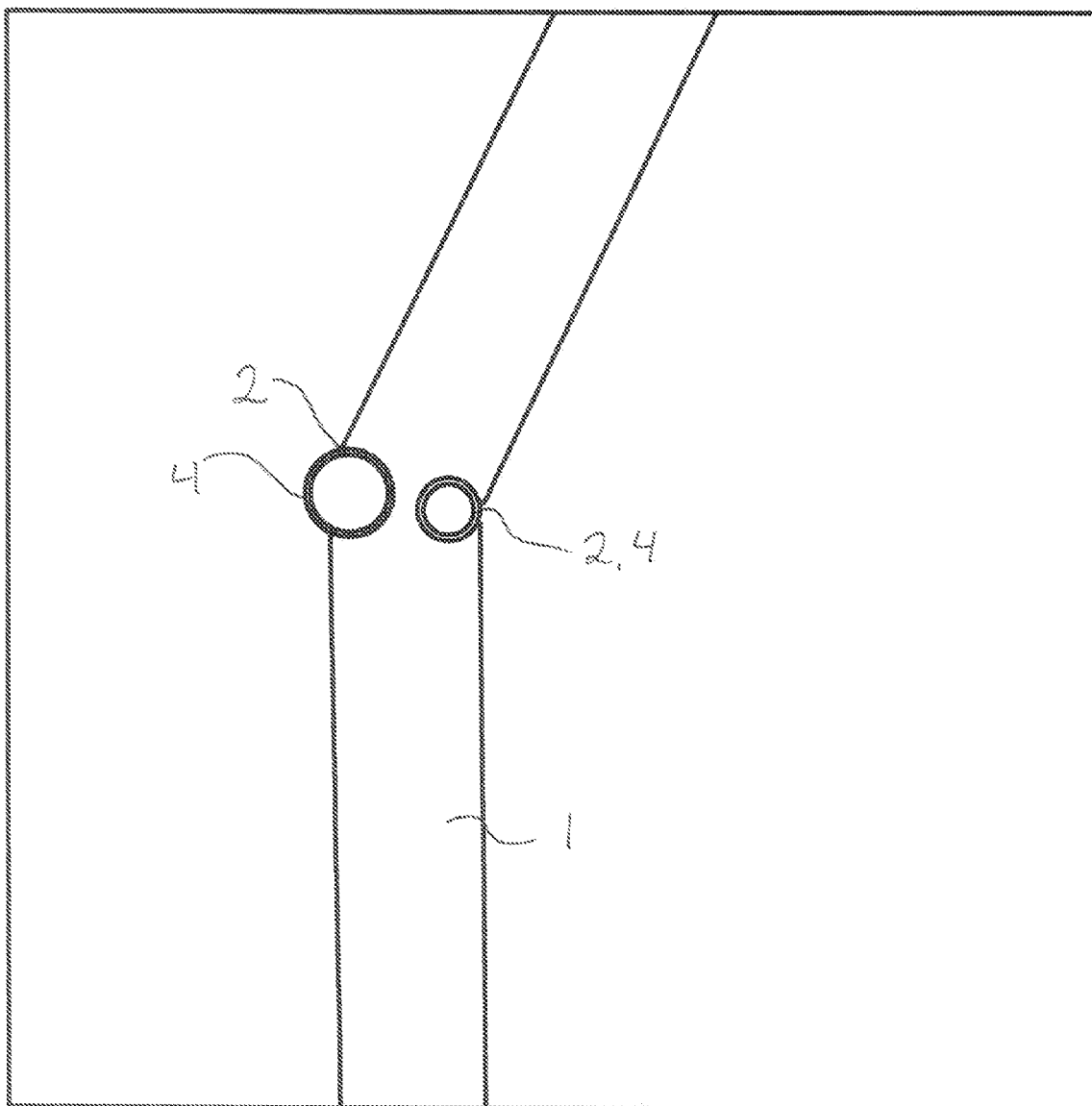


Fig.5

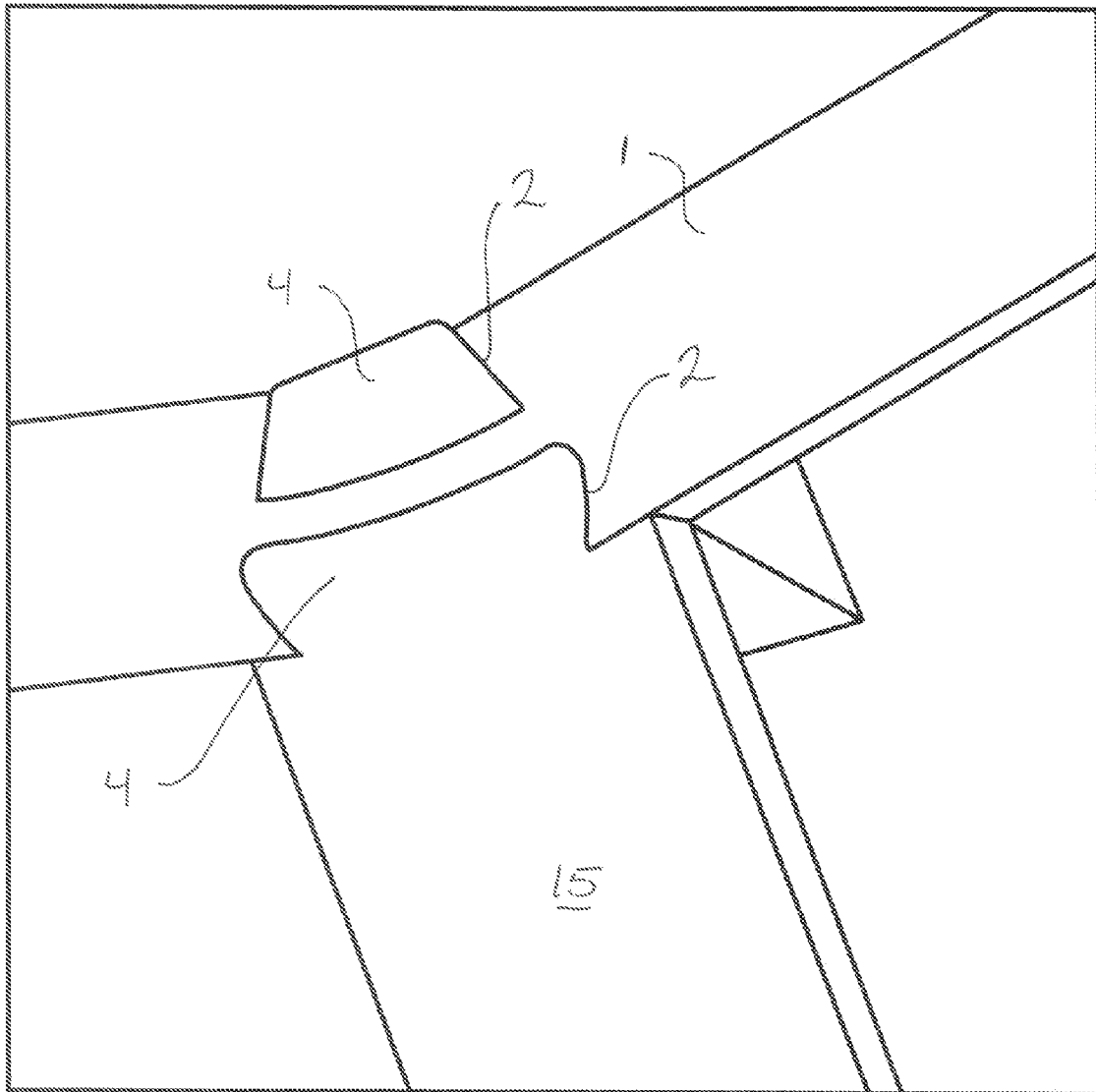


Fig.6

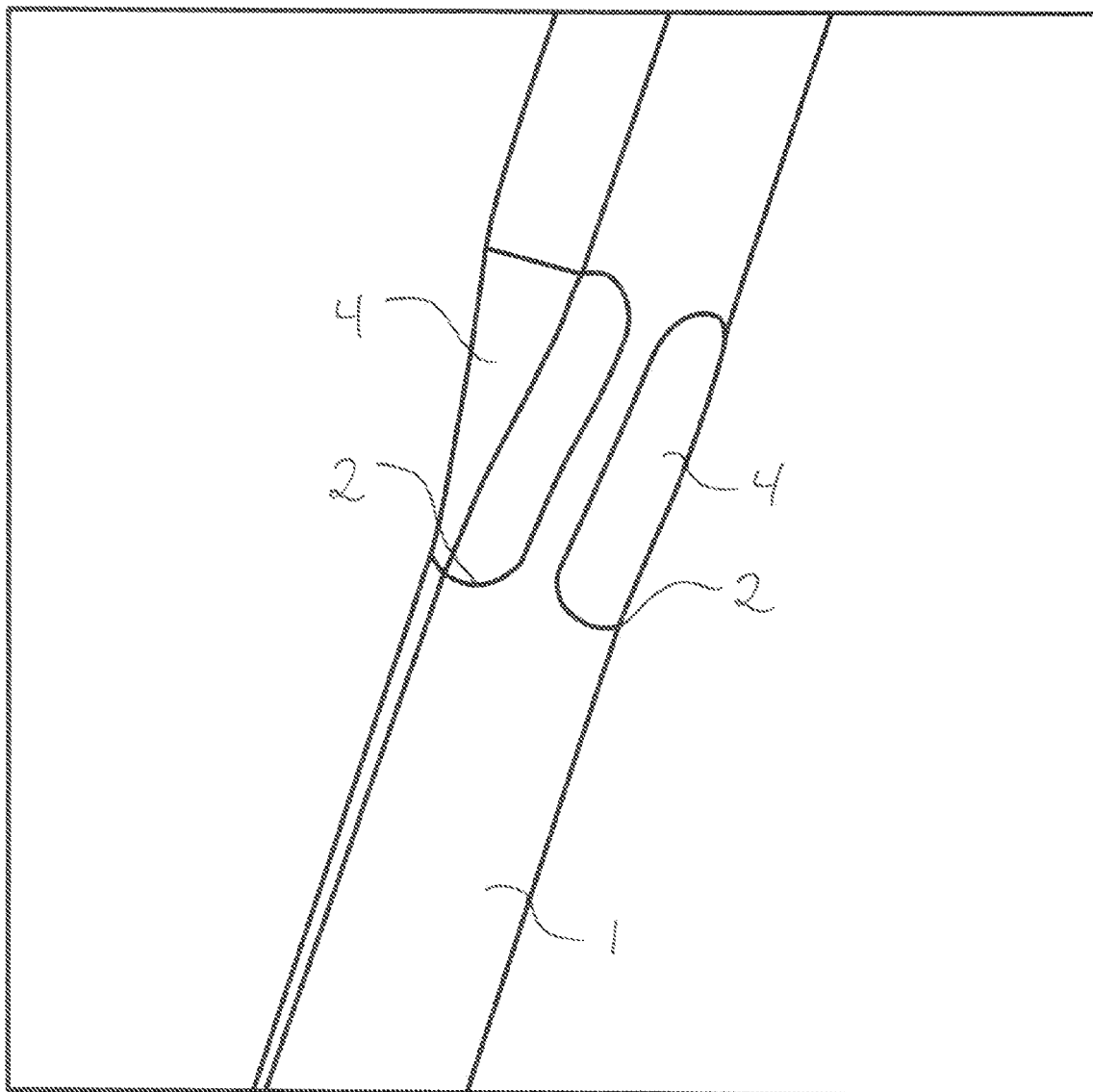


Fig.7



EUROPEAN SEARCH REPORT

Application Number
EP 10 16 5237

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	STANUL W: "REPAIRING CHAIR PARTS WITH BANDSAWN COMBS" FINE WOODWORKING, TAUNTON PRESS, NEWTON, CT, US, no. 82, 1 June 1990 (1990-06-01), page 14, XP000109350 ISSN: 0361-3453	5,6	INV. B27H1/00 B27M3/18
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A	FR 1 409 726 A (DIAZ MAGRO) 3 September 1965 (1965-09-03) * the whole document *	1,5	
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 September 2010	Examiner Huggins, Jonathan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 16 5237

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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14-09-2010

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