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**F2M MB2**

(56) Documents Cited  
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**WO 97/25536 A1**                **FR 002721377 A**  
**US 5464298 A**                    **US 4693630 A**

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**UK CL (Edition R ) A4L LSD , E2A ACSF ACSN , F2M**  
**MB2**  
**INT CL<sup>7</sup> A47B 9/08 57/26 57/54 , F16B 7/04 12/20**  
**12/32 12/42**  
**Online : WPI, PAJ, EPODOC ;**

(54) Abstract Title  
**Connector for detachably connecting furniture parts**

(57) A connector for connecting panels such as shelves to a tubular frame 1 in an adjustable manner includes a hollow mounting block 2 housing a clamp which has expandable ends 32 for locating in a slot 12 in the tubular frame 1. The clamp is expanded by means of a rotatory cam carried by the mounting block 2. Rotation of the cam withdraws the clamp into the block and brings the ends of the clamp 32 into engagement with a pin 5 extending through the mounting block. This pin opens the ends of the clamp 32 into engagement with the sides of the slot 12 in the tubular frame 1.

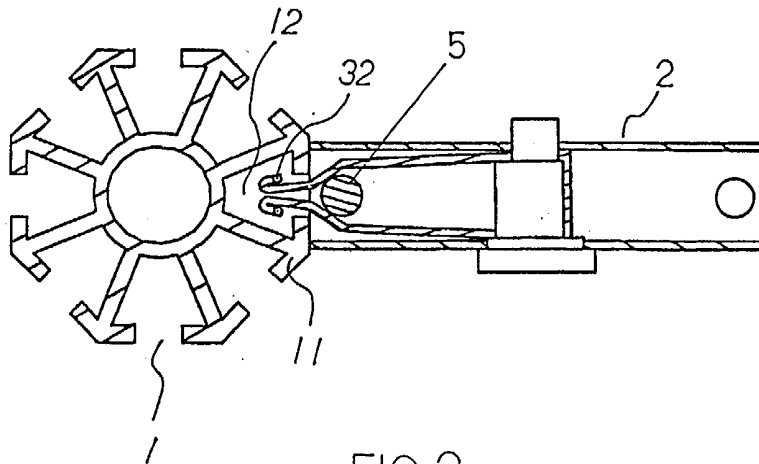
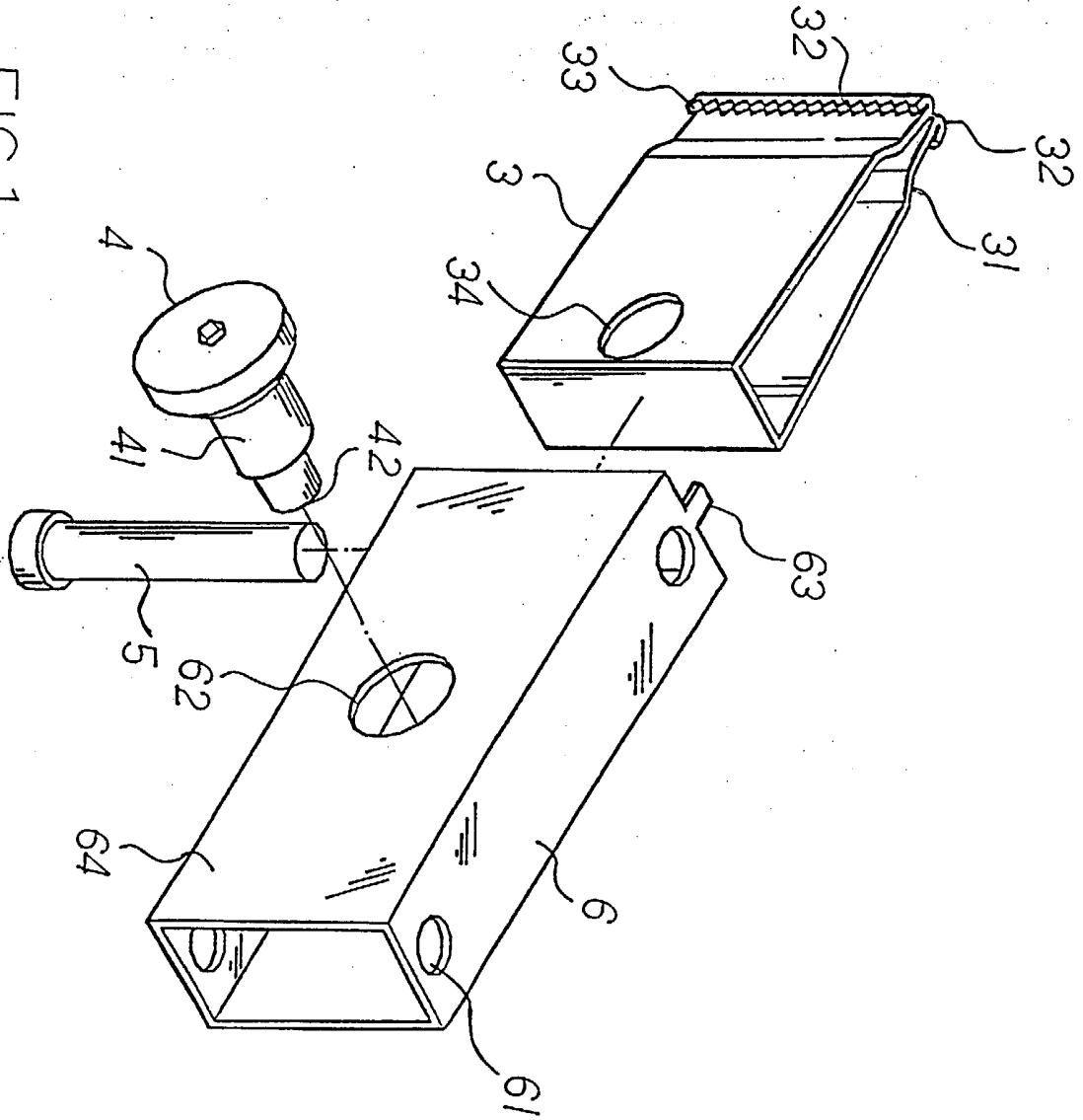


FIG.2

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FIG. 1



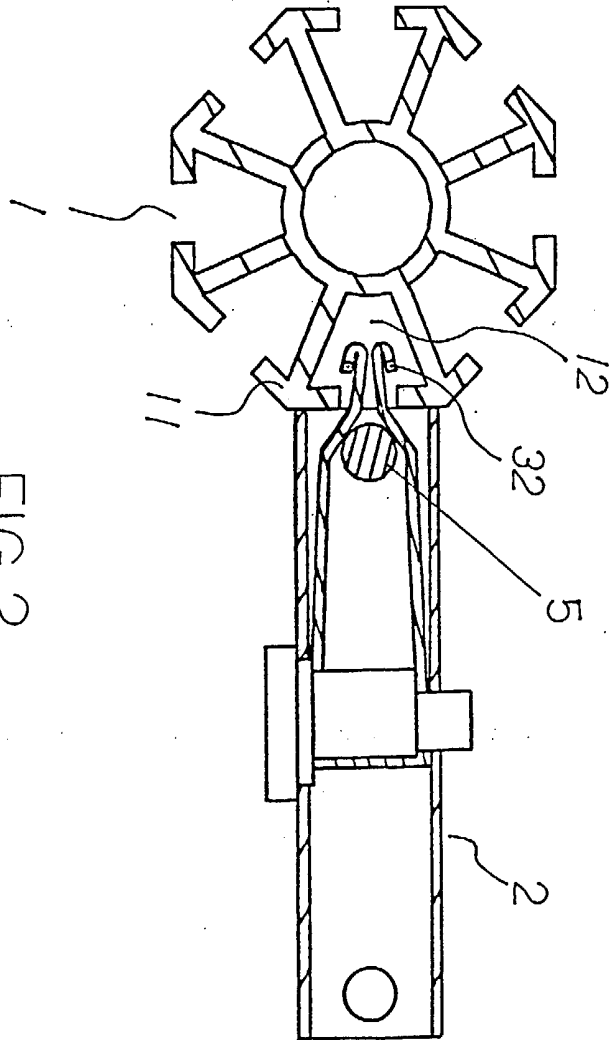


FIG. 2

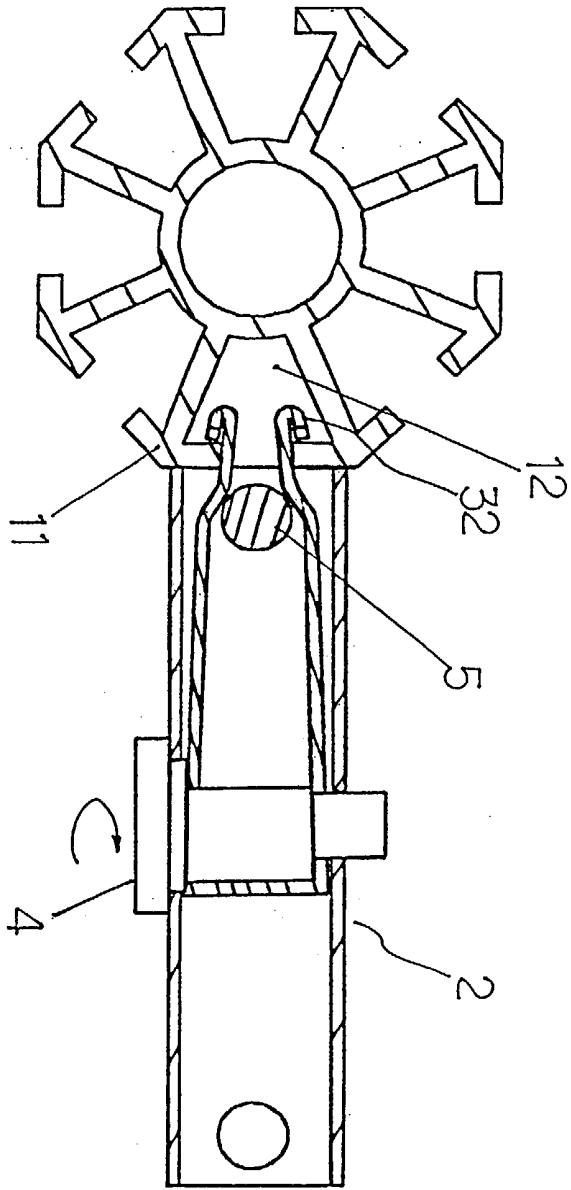
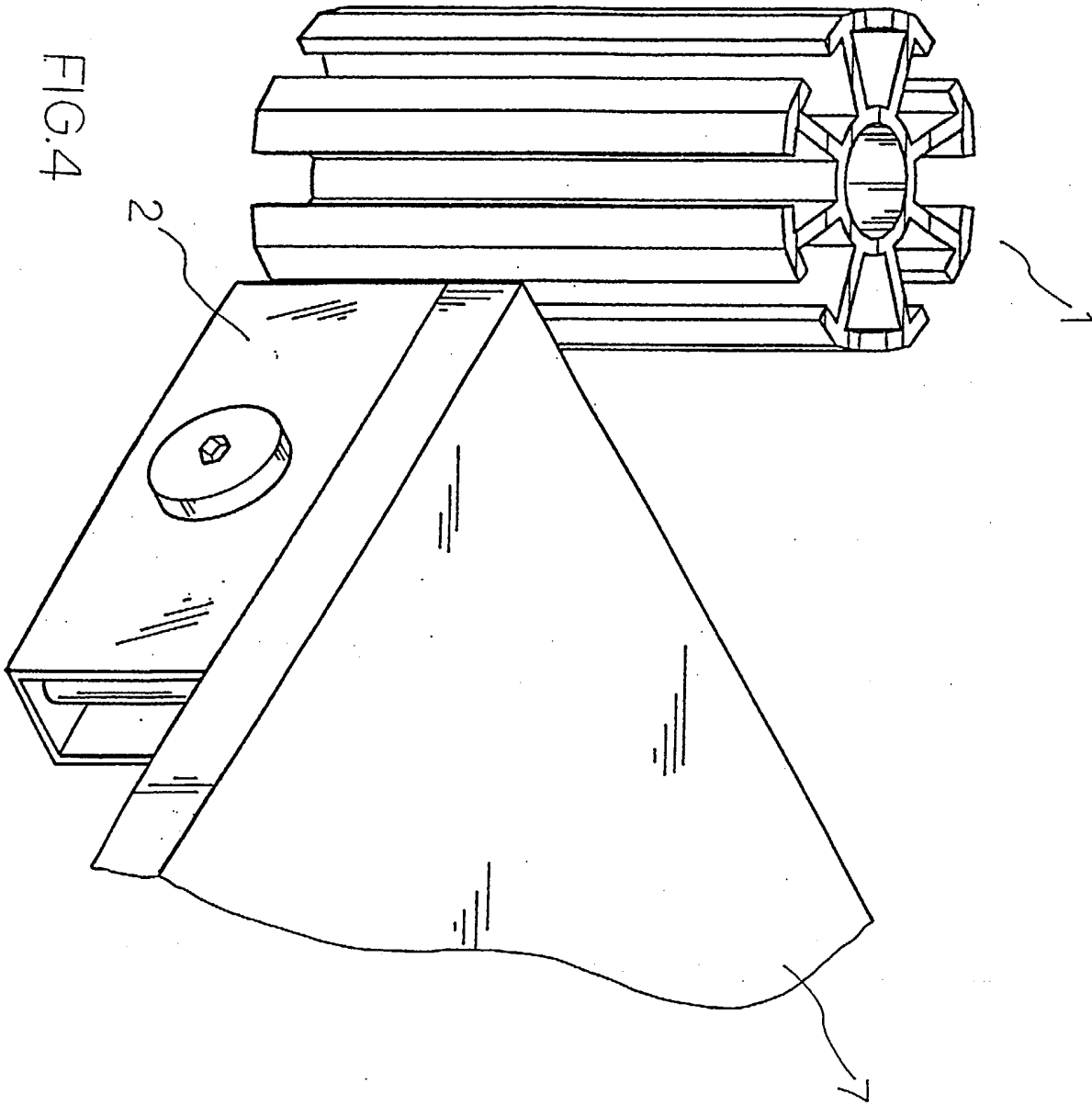


FIG.3

FIG.4



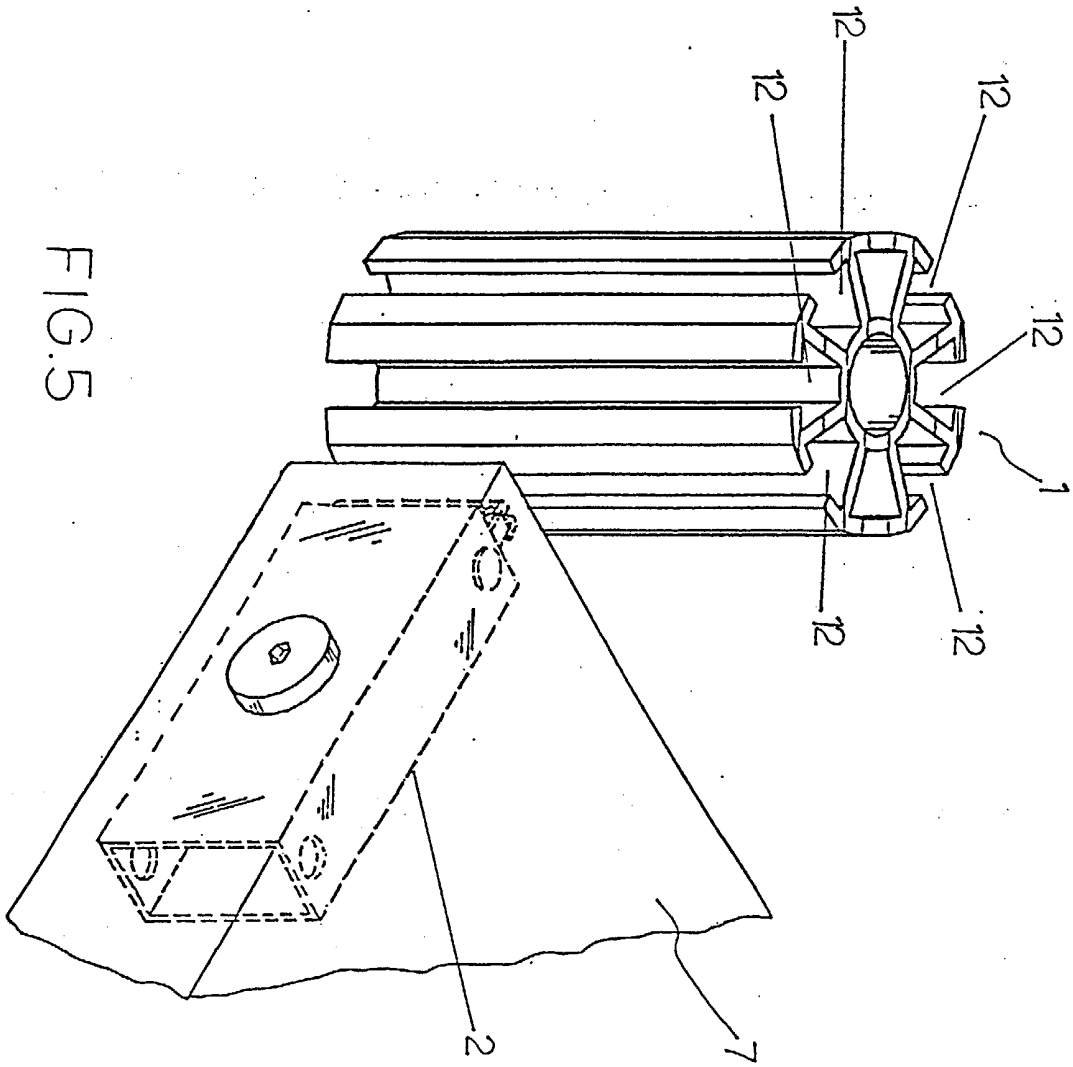


FIG. 5

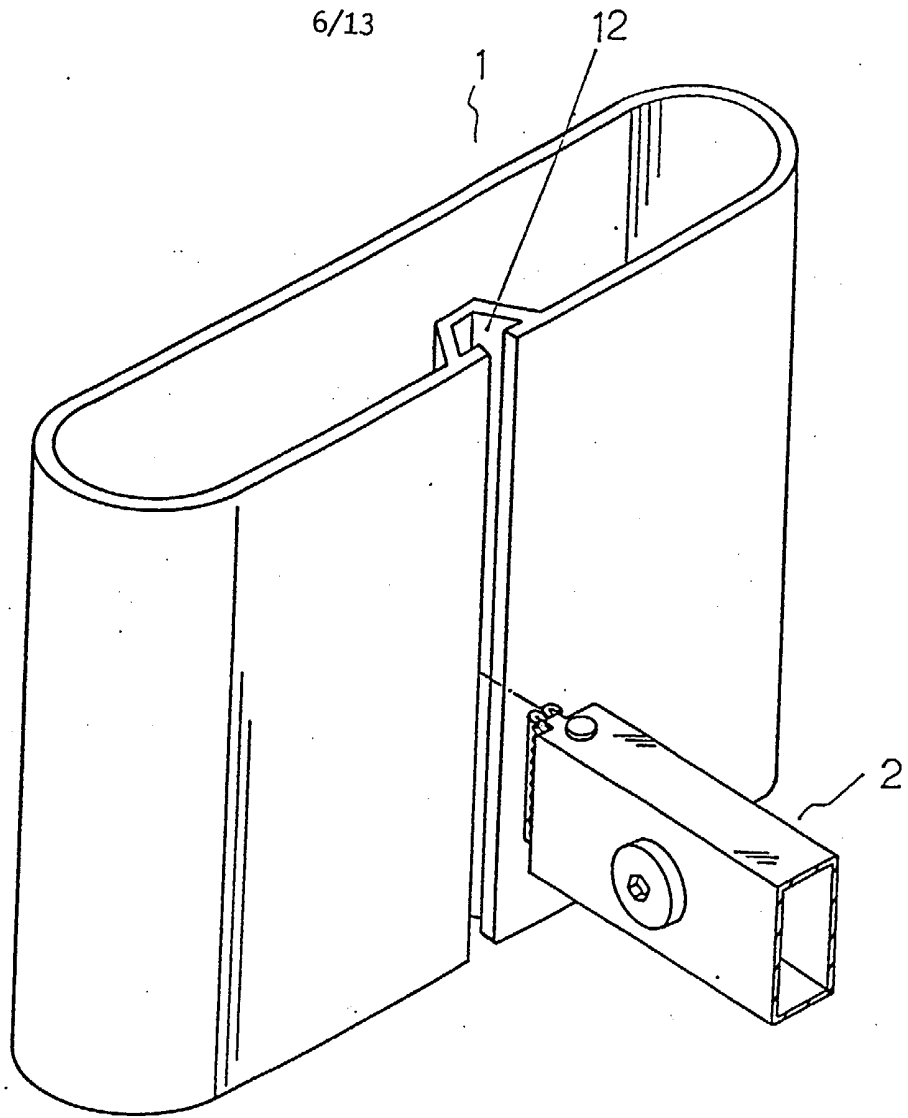


FIG. 6

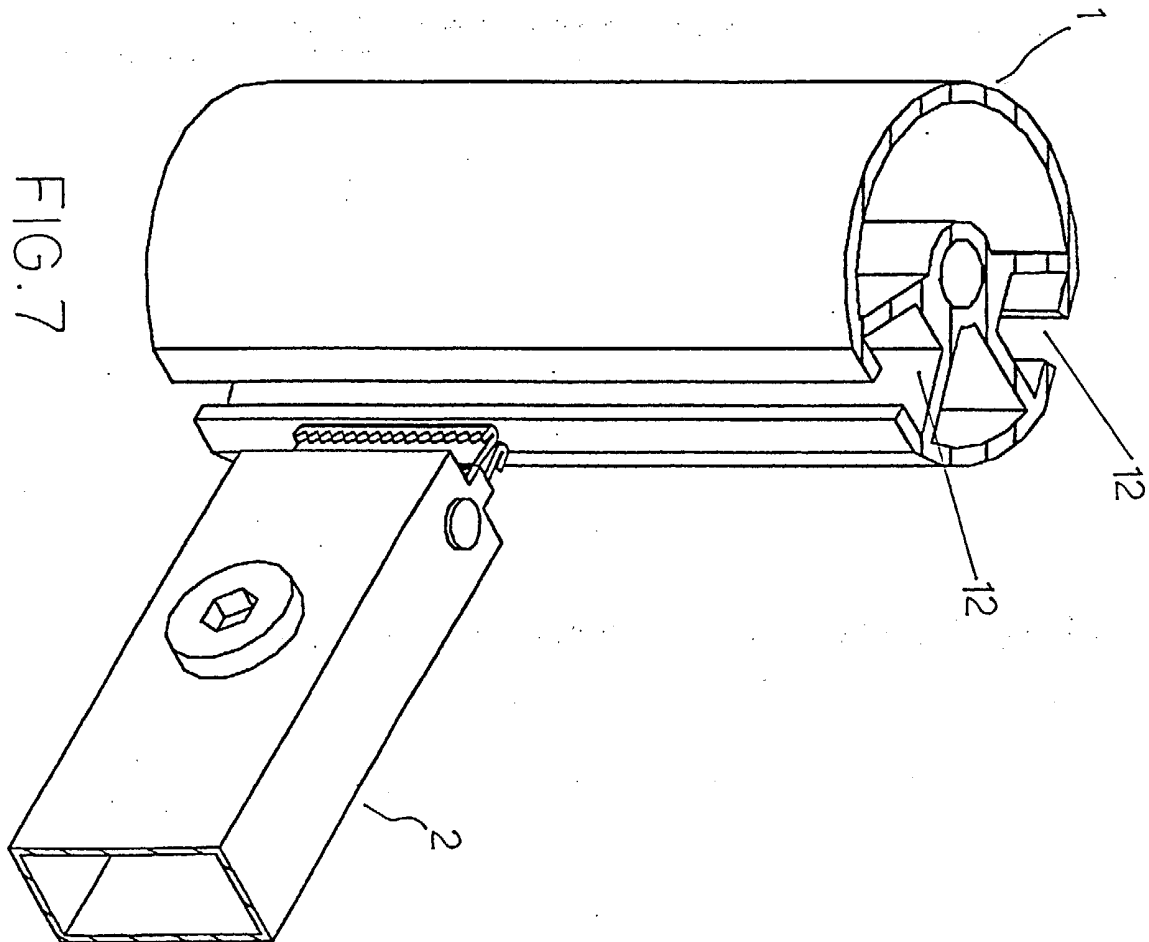
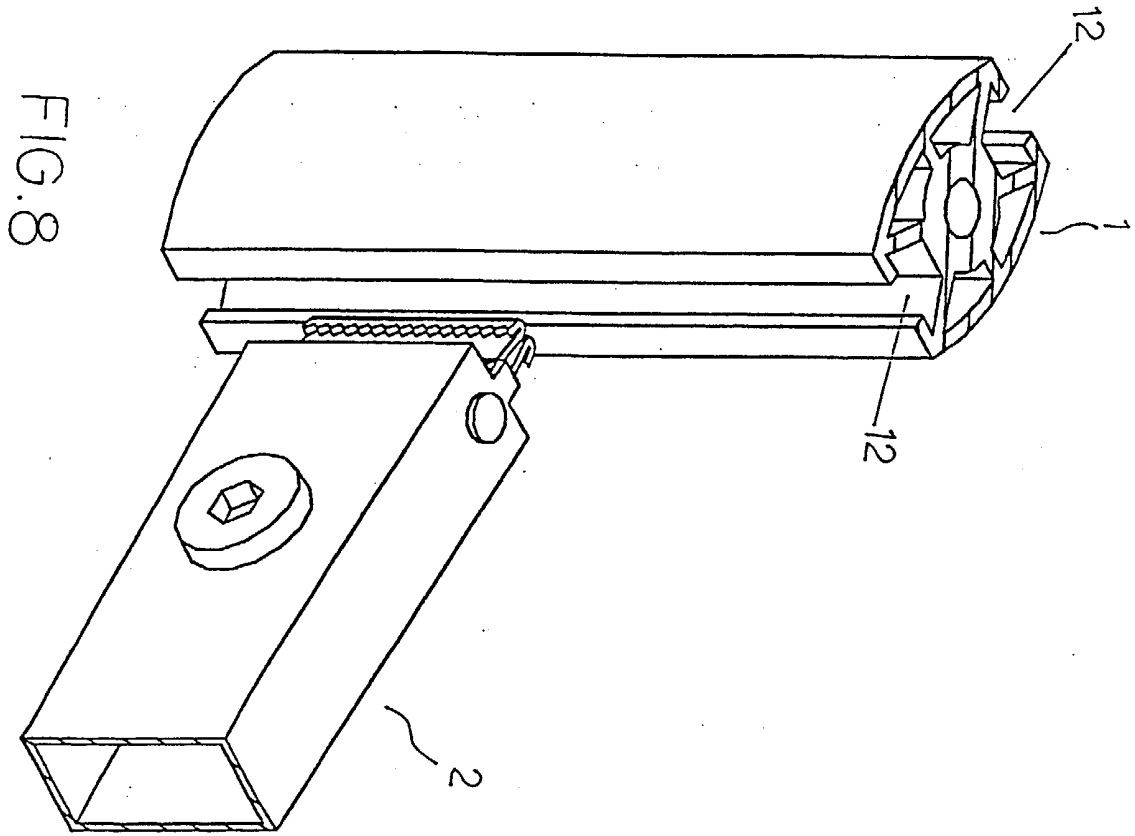


FIG. 7





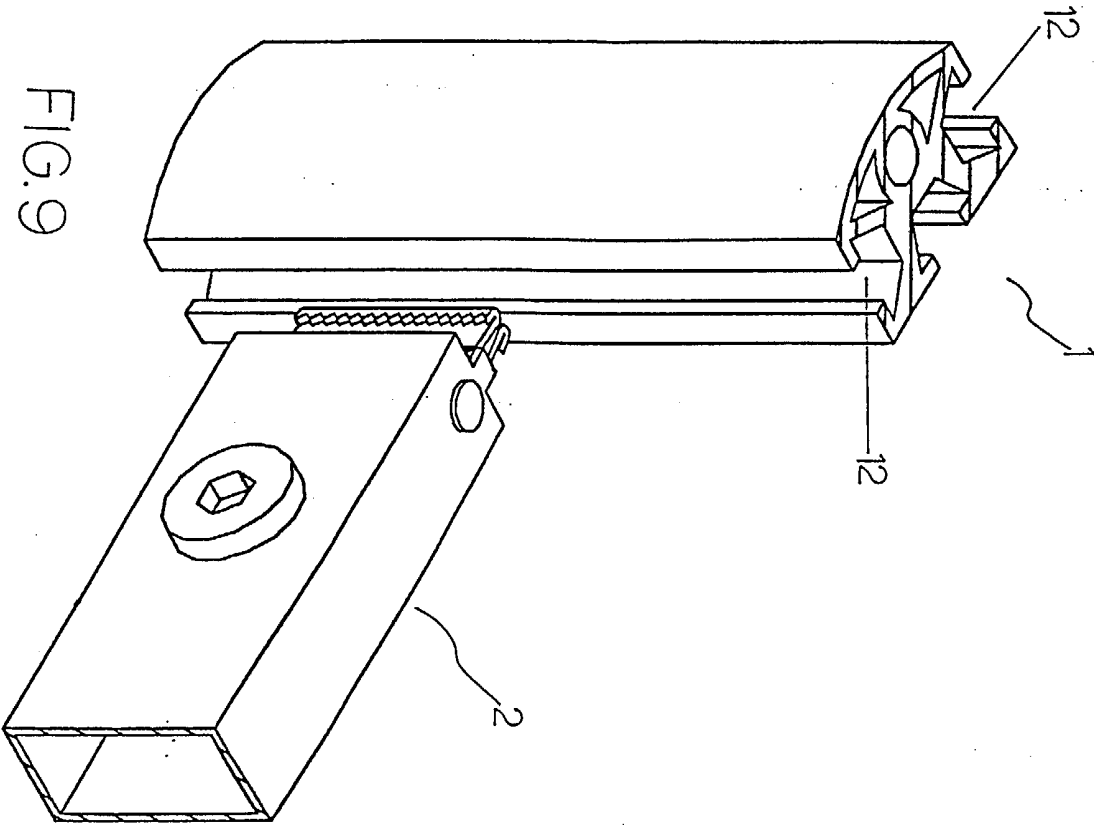


FIG. 9

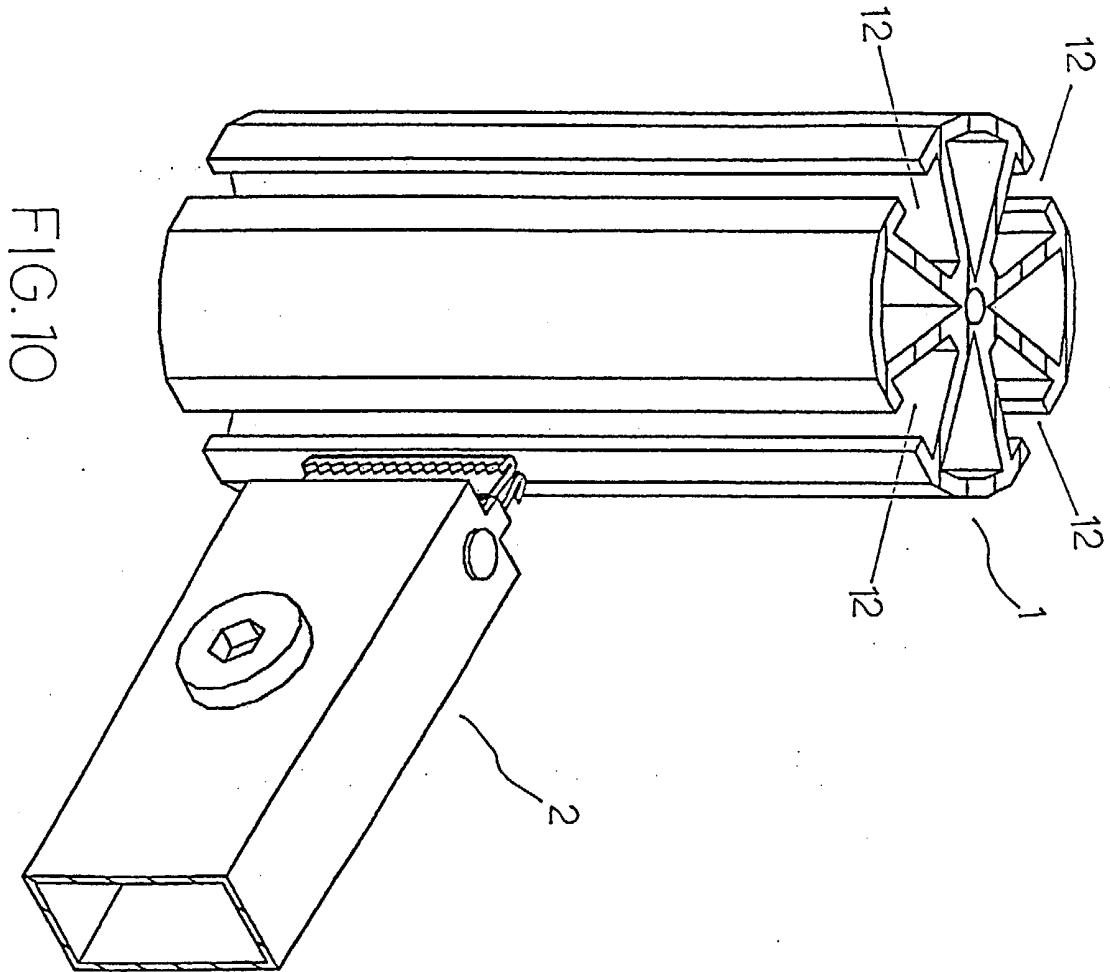


FIG. 10

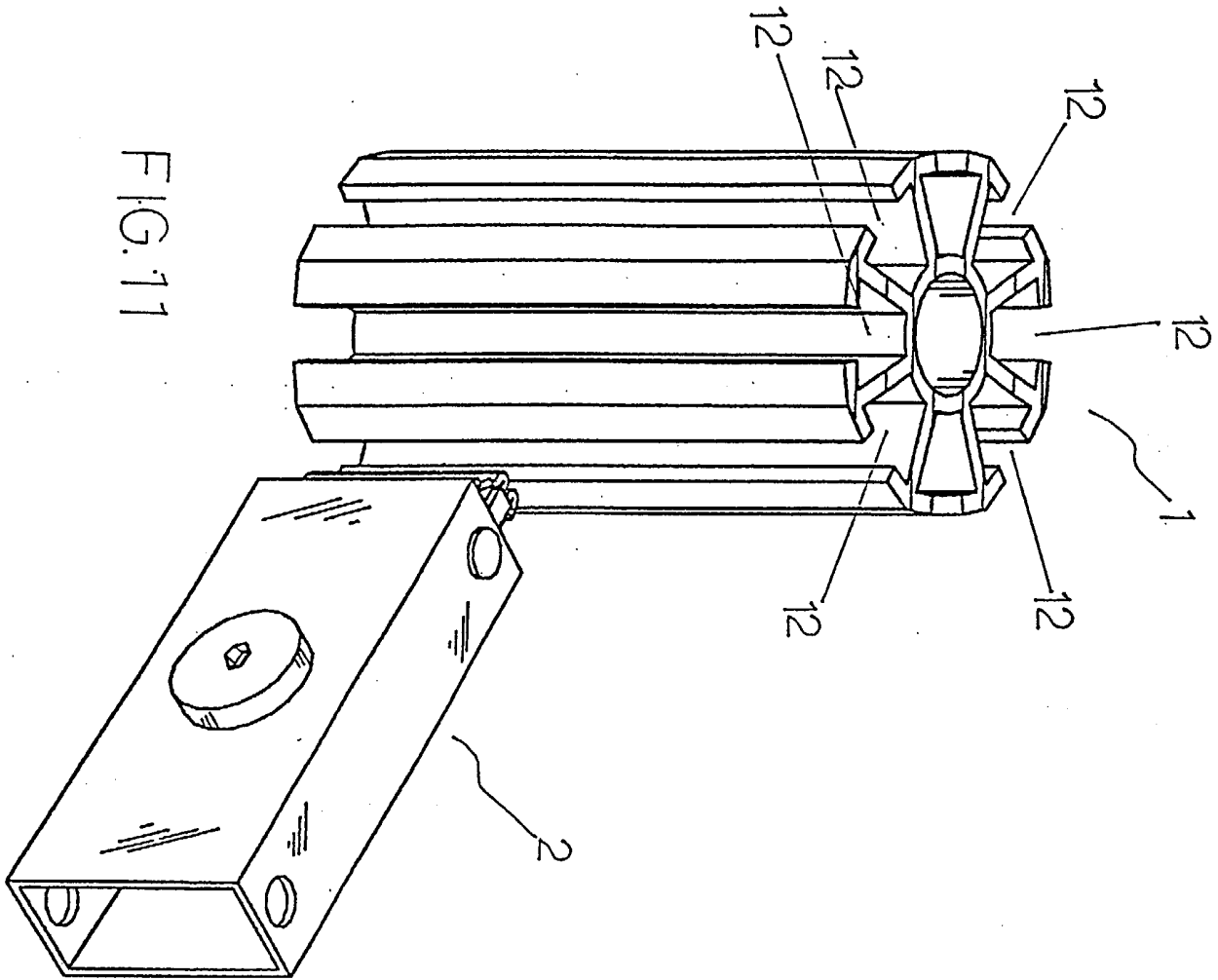


FIG. 11

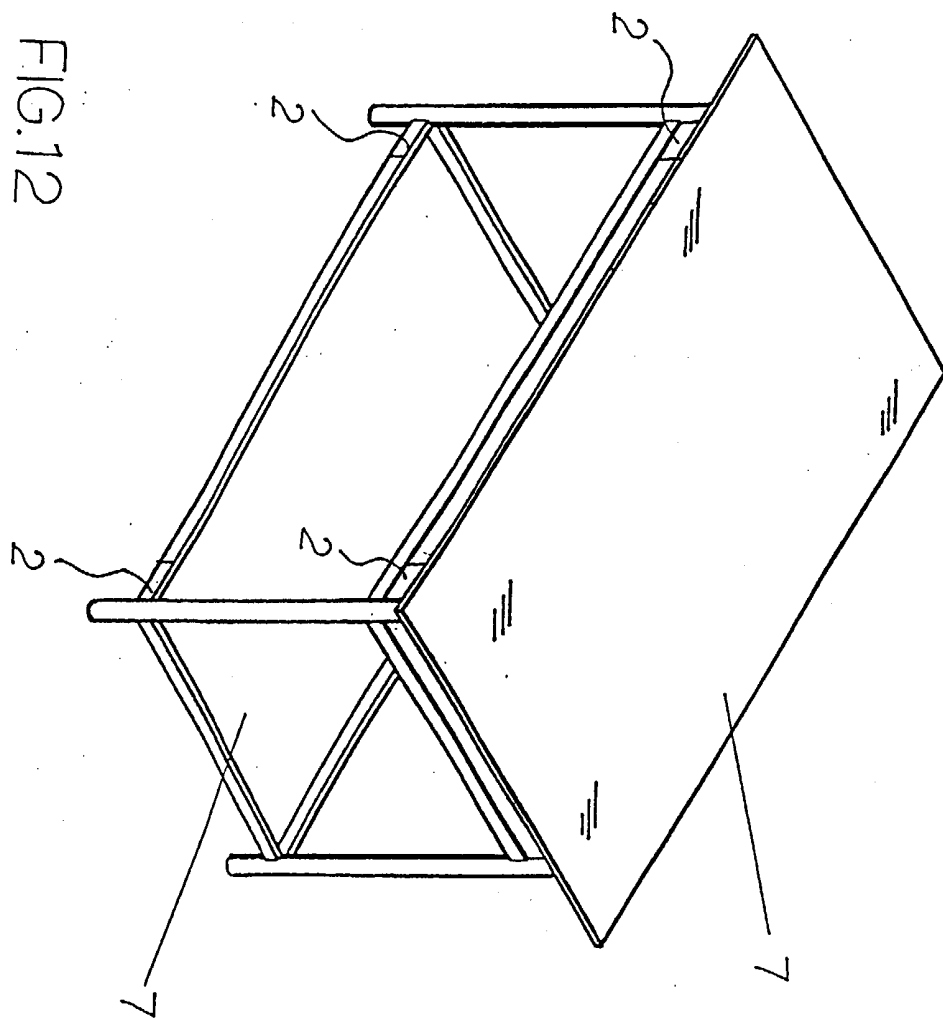


FIG.12

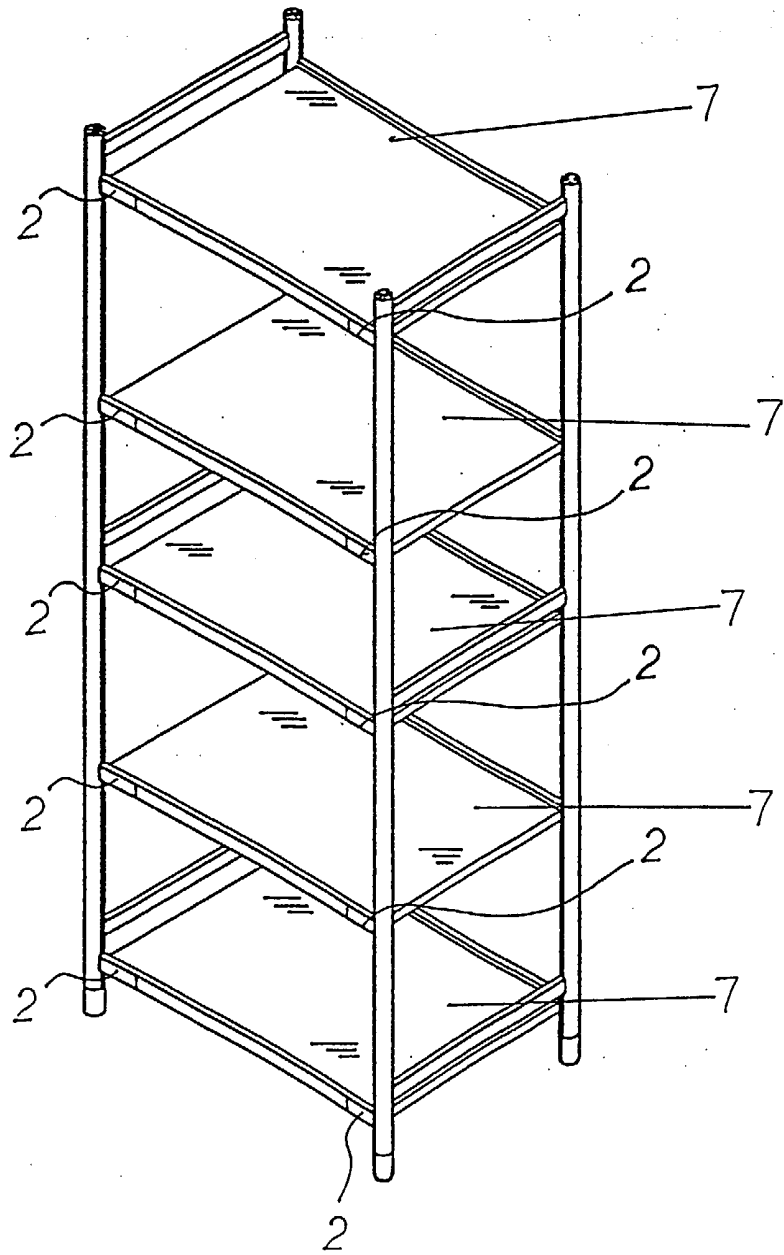


FIG.13

## A CONNECTOR FOR KNOCKDOWN FURNITURE

The present invention relates to a connector, more particularly to a knockdown furniture connector capable of adjusting the height of its connection position.

Conventional or prior art knockdown furniture usually consists of supporting framework tubes having layer boards or racks secured by fixing screws. Therefore, once the layer board or rack is fixed, it is not possible to adjust its height, and as such, connectors of this kind are not particularly convenient.

In recent years, furniture systems with adjustable layer boards or racks have been available. However, when the height of the layer boards or racks require adjustment, the user must firstly remove the layer boards prior to adjusting the height of the connector, before finally re-installing such at the desired height. Consequently, the operation of adjusting the height of the layer board or rack is therefore inconvenient and time consuming.

The primary objective of the present invention is to overcome the shortcomings of conventional connectors and to provide users with a more convenient and quicker way to adjust the height of shelving or layer boards in knockdown furniture. The scope for adjusting the position of the layer board is not restricted, which makes the adjustment much easier and more convenient. Furthermore, the present invention serves a useful and practical purpose in that it allows for the flexible assembly and adjustment of knockdown furniture.

According to the present invention there is provided a knockdown furniture connector, comprising:

a connecting block, having an aperture at both ends, and said aperture at the front end is for fixing a rod which further comprises a hole on each of its lateral sides;

a pressing bracket, disposed in the connecting block, having its front end pivoted outward to form a suppressing surface, and having a hole at the rear end;

a locking member, having an eccentric axle which passes through the aperture on the connecting block and the hole on the pressing bracket which connects the front end of the pressing bracket to the connecting block; and

a rod pivoted in the front end of said connecting block and is disposed at the rear end of the diminishing opening of said pressing bracket.

Preferably, said suppressing surface of said pressing bracket may be provided with a plurality of serrations. Front of said pressing bracket may be provided, preferably, with a diminishing opening.

Further preferably, said knockdown furniture connector is provided wherein the front end at the top surface of said connecting block has a guiding track for guiding the connector into the long groove on a tube of the frame for connection.

The advantages of the present invention are that the layer boards, racks or shelving of knockdown furniture can be readily and easily assembled and adjusted. Any further or subsequent adjustment can be achieved with the layer boards, racks or shelving remaining in-situ.



Other objects, features, and advantages of the invention will become apparent from the following detailed description of the preferred but non-limiting embodiment. The description is made with reference to the accompanying drawings, in which:

Fig. 1 shows a three-dimensional diagram of the disassembled parts of the present invention.

Fig. 2 shows a perspective diagram of the assembly of the connector with the supporting tubes (in the loosened state) according to the present invention.

Fig. 3 shows a perspective diagram of the assembly of the connector with the supporting tubes (in the tightened state) according to the present invention.

Fig. 4 shows a preferred embodiment of the present invention and partially illustrates in a three-dimensional diagram the assembly of the knockdown furniture connector to the edge of the lower section of the layered rack.

Fig. 5 shows a further embodiment of the present invention which partially illustrates the assembly of the knockdown connector directly into the internal portion of the layered rack.

Fig. 6 shows a three-dimensional diagram of the construction of the present invention and the first method of utilising the supporting tubes of the rack (working with a single angled rectangular supporting tube).

Fig. 7 shows a three-dimensional diagram of the construction of the present invention and the second method of utilising the supporting tubes of the rack (working with a supporting tube capable for a right-angle rotation).

Fig. 8 shows a three-dimensional diagram of the construction of the present invention and the third method of utilising the supporting tubes of the rack (working with a supporting tube capable for 180-degree rotation).

Fig. 9 shows a three-dimensional diagram of the construction of the present invention and the fourth method of utilising the supporting tubes of the rack (working with a supporting tube capable for either a right-angle or 180-degree rotation).

Fig. 10 shows a three-dimensional diagram of the construction of the present invention and the fifth method of utilising the supporting tubes of the rack (working with a supporting tube capable for a right-angle, 180-degree, 270-degree, or 360-degree rotation).

Fig. 11 shows a three-dimensional diagram of the construction of the present invention and the sixth method of utilising the supporting tubes of the rack (working with a supporting tube capable for a right-angle, 60-degree, 120-degree, 180-degree, 240-degree, 300-degree, 270-degree, or 360-degree rotation).

Fig. 12 shows a three-dimensional diagram of the assembly of the present invention with a single layer rack.

Fig. 13 shows a three-dimensional diagram of the assembly of the present invention with a double (or multiple) layer rack.

Referring to Figures 1 to 5 of the knockdown furniture connector 2 of the present invention. The framework of the knockdown furniture is comprised of a predetermined number of tubes 1 and layer boards or racks 7, connectors 2 and relevant accessories. The connector 2 is mounted to a fixed location on the layer board or rack, and usually is connected to the four corners; such connector being fixed in position onto the tubes 1 of the framework. The tubes 1 are equidistant from each other forming a "T" shaped rib 11, and two of such corresponding T-shaped ribs 11 form a long groove 12.

The connector 2 comprises a connecting block 6 which is hollow, and there is a guiding member 63 at the front end of the top surface of said connecting block for guiding the connector 21 into the long groove 12 of the tube 1 of the framework for the connection. There are apertures 61 both in the front end and in the rear end, wherein the aperture 61 at the front end is for a rod 5 which further comprising a hole 62 on both lateral sides; a pressing bracket 3 inside the connecting block 6 has a diminishing opening 31 at its front end and the edge of the front end pivoted outward to form a suppressing surface 32; such suppressing surface 32 having a plurality of serrations 33 and having a hole 34 at the rear end; a locking member 4 having an eccentric axle 41, said eccentric axle 41 passes through the aperture 62 on the connecting block 6 and the hole 34 on the pressing bracket 3 all the way through to the bottom surface. The rear end 42 of said eccentric axle 41 passes through the right lateral side 64 of said connecting block 6 and then forces the front end of the pressing bracket 3 to the connecting block 6; a rod 5 pivotally coupled to the hole 61 in the front end of the connecting block 6 and is disposed at the back end of the diminishing opening 31 of the pressing bracket 3; it finally composes a connector 2.

Such arrangement allows the user to pre-install the layer board or rack 7 with the connector 2 first before the assembly of the furniture, or wait until the connector is installed onto the tubes 1 of the framework before

assembling the knockdown furniture. During the assembly of the knockdown furniture, the guiding member 63 is aligned with the long groove 12 of the tube 1 of the framework to guide the suppressing surface 32 at the front end of the pressing bracket 3 into the long groove 12 of the framework tube 1. Said guiding member 63 also acts as a stopper to prevent the tubes of the framework shaking from side to side during its assembly. At the required height, a wrench may be used to rotate the locking member 4 and press the rear end 35 of the pressing bracket 3 by the eccentric axle 41 of the locking member 4. Such makes the pressing bracket 3 move backwards and in turn makes the diminishing opening 31 at the front end of the pressing bracket 3 extend outwards due to the pressing by rod 5, and further to have an occlusion with clipping member 13 at the rib surface of the long groove 12.

Since there are serrations 33 on the suppressing surface, and such serrations give a more secure occlusion effect to the rib surface 13 of the framework tube after having the occlusion with the clipping member. It definitely meets the loading requirement and further can be securely mounted onto the framework tubes 1 for positioning and forms a structure of knockdown furniture. When there is a need to adjust the height of the layer board or rack, the user only has to loosen the locking member 4, which will separate serrations 33 on the suppressing surface 32 of the pressing bracket 3 from the rib surface 13 of the framework tube 1, and the user can freely adjust the height of the layer board 7. After the layer board is in position, the user can lock the locking member 4. Such arrangement does not only provide a simple and fast assembling of knockdown furniture, it also gives a more convenient way to adjust the height of the layer board 7, and it is certainly a very practical connector for assembling knockdown furniture.

Figures 6 to 13 demonstrate the use of the present invention for the assembly of knockdown furniture with connector 2 to various framework tubes 1 at different angles and different number of long grooves.

While the invention has been described by way of example and in terms of a preferred embodiment, it is to be understood that the invention is not limited thereto. To the contrary, it is intended to cover various modifications and similar arrangements and procedures, and the scope of the appended claims therefore should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements and procedures.

**CLAIMS**

1. A knockdown furniture connector, comprising:
  - a connecting block, having an aperture at both ends, and said aperture at the front end is for fixing a rod which further comprises a hole on each of its lateral sides;
  - a pressing bracket, disposed in the connecting block, having its front end pivoted outward to form a suppressing surface, and having a hole at the rear end;
  - a locking member, having an eccentric axle which passes through the aperture on the connecting block and the hole on the pressing bracket which connects the front end of the pressing bracket to the connecting block; and
  - a rod, pivoted in the front end of said connecting block and is disposed at the rear end of the diminishing opening of said pressing bracket.
  
2. A knockdown furniture connector according to claim 1, wherein said suppressing surface of said pressing bracket has a plurality of serrations for a secure mounting.
  
3. A knockdown furniture connector according to claim 1, wherein the front end of said pressing bracket has a diminishing opening.
  
4. A knockdown furniture connector according to claim 1, wherein the front end at the top surface of said connecting block has a guiding track for guiding the connector into the long groove on a tube of the frame for connection.



INVESTOR IN PEOPLE

- 9 -

Application No: GB 0016496.2  
Claims searched: 1-4

Examiner: Phil Thorpe  
Date of search: 17 November 2000

### Patents Act 1977 Search Report under Section 17

#### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): A4L (LSD) ; F2M (MB2) ; E2A (ACSF, ACSN) ;

Int Cl (Ed.7): A47B (9/08, 57/26, 57/54) ; F16B (7/04, 12/20, 12/32, 12/42) ;

Other: Online : (WPI, PAJ, EPODOC) ;

#### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X, Y	EP 0582258 A1 (Mero-Raumstruktur) - see figures 4 and 6 in particular guides 30.	X:1,3,4 Y:2
X, Y	EP 0337845 A1 (Sodem) - see especially figures 4 and 5.	X:1,3 Y:2
X, Y	WO 97/25536 A1 (Syma Intercontinental) - see especially figures 17 & 18.	X:1,3 Y:2
X, Y	US 5464298 A (Schomakers) - see whole document.	X:1,3 Y:2
Y	US 4693630 A (Giovannetti) - see serrated edges on arms 72.	2
X, Y	FR 2721377 A (Alugrip) - see whole document.	X:1,3 Y:4

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Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.