(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 593 324 A1

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**09.11.2005 Bulletin 2005/45**

(51) Int Cl.[7]: **A47C 21/08**, A47D 15/00

(21) Application number: **04076342.7**

(22) Date of filing: **04.05.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
**AL HR LT LV MK**

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## (54) Bed rail assembly

(57) A bed rail assembly includes a joint device (1), a pair of corner members (3), a T-shaped male connector (5), a T-shaped female connector (6), and a pair of knuckle devices (10), which form a three-dimension rail assembly. The corner members (3) are connected to the vertical tubes (4) by V-shaped connection plates (41) such that they can be easily assembled/disassembled. The male/female connectors (5,6) are connected to support tubes (8,9) by a sleeve (7) and a V-shaped connection plate (81). Each knuckle device (10) includes a movable member movably connected to a base of the knuckle device so that a user may easily assemble/disassemble the device. A Y-shaped belt (13) and an L-shaped retention member board are used to secure the bed rail assembly to a mattress.

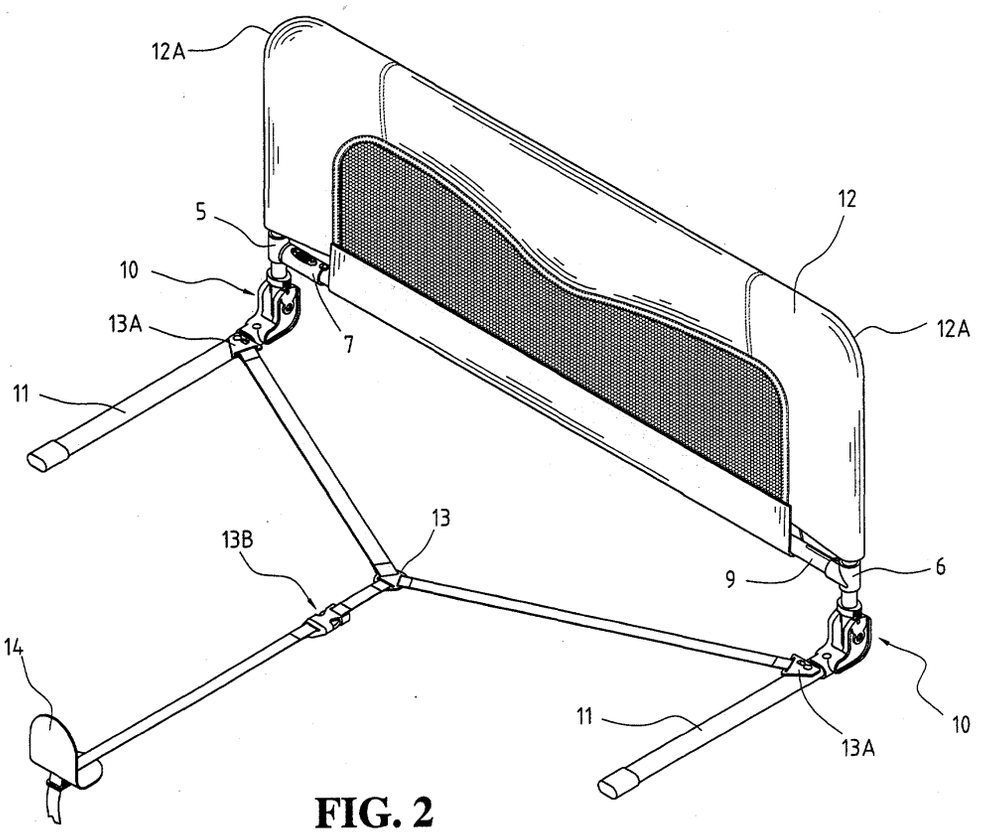


FIG. 2

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## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to a bed rail assembly that can be easily assembled and/or disassembled.

### BACKGROUND OF THE INVENTION

**[0002]** A conventional bed, especially a baby bed, generally includes rails on at least one side of the bed to prevent the baby from falling from the bed. A bed rail assembly that is currently available in the market is usually foldable for easy transportation and storage for it occupies a small amount of space after folded. Nevertheless, the conventional rail assembly has a great number of parts forming a complicated mechanism. It is not easy for the general consumers to assemble/disassemble the bed rail.

**[0003]** Thus the present invention is aimed to provide a bed rail assembly that can be easily assembled/disassembled. Further, the bed rail assembly of the present invention comprises a cover to shield moving parts thereof, which prevents a user from being damaged by the movement of the moving parts.

### SUMMARY OF THE INVENTION

**[0004]** The present invention relates to a bed rail assembly that comprises a joint device pivotably connected between two top tubes. Each top tube has a flat free end connected to a corner member. Each corner member has a clamp end pivotably connecting the flat end of the top tube and a receiving end to which a vertical tube is connected by a first leaf spring. A T-shaped male connector and a T-shaped female connector are respectively mounted to the vertical tubes. The male connector has a horizontal connection portion to which a sleeve is slidably and removably mounted. A first support tube is connected to the sleeve in such a manner to allow for limited movement therebetween. A second leaf spring is received in the first support tube to secure the first support tube and the sleeve together. A second support tube is connected to the first support tube by a third leaf spring. The female connector has a horizontal connection portion to which a second support tube is connected. A knuckle device has a vertical section pivotably connected to each vertical tube and a horizontal section to which a horizontal support tube is connected. Each knuckle device comprises a movable member movably received in a base and biased by a spring toward a locking position where rotation of the vertical tube with respect to the knuckle device is prevented. Each vertical tube has two aligned slots through which a rivet movably extends. The rivet is fixed to the movable member thereby guiding the movement of the movable member with respect to the vertical tube toward a releasing position against the biasing force of the spring to release the vertical tube from the knuckle device and thus allowing for rotation of the vertical tube with respect to the knuckle device.

**[0005]** The present invention will become more obvious from the following description when taken in connection with the accompanying drawings, which show, for purposes of illustration only, a preferred embodiment in accordance with the present invention.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0006]** Figure 1 is a perspective view of a bed rail assembly in accordance with the present invention with a V-shaped belt detached therefrom and a cover removed;

**[0007]** Figure 2 is a perspective view of the bed rail assembly of the present invention with the cover attached thereto;

**[0008]** Figure 3 is an exploded view showing the spatial relationship among top tubes, corner members, vertical tubes, and V-shaped connection plates of the bed rail assembly of the present invention;

**[0009]** Figure 4 is an exploded view showing the spatial relationship among a T-shaped male connector, a T-shaped female connector, and support tubes of the bed rail assembly of the present invention;

**[0010]** Figure 5 is an exploded view showing a knuckle device of the bed rail assembly of the present invention;

**[0011]** Figure 6 is a cross-sectional view of the knuckle device to which a movable member and the vertical tube are coupled;

**[0012]** Figure 7 is a perspective view showing an application of the bed rail assembly used in connection with a mattress of a bed; and

**[0013]** Figure 8 is a side elevational view showing the bed rail assembly in a folded condition.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

**[0014]** Referring to the drawings and in particular Figures 1 and 3, a bed rail assembly constructed in accordance with the present invention comprises a joint device 1 that is pivotably connected between opposing ends of two top tubes 2. Each top tube 2 has a flat free end. The joint device 1 has a release button 100, which, when actuated, releases the top tubes 2 from the joint device 1 to allow the top tubes 2 to rotate in the direction designated by arrows A in Figure 3 thereby folding the bed rail assembly to a compact size as shown in Figure 8. The joint device 1 can be any known device that allows for folding and no further detail will be given hereinafter.

**[0015]** A substantially L-shaped corner member 3 is connected to the free end of each top tube 2. The corner member 3 has a clamp end 31 extending in a horizontal direction and pivotably connected to the free end of the

top tube 2 and a receiving end 32 extending in a vertical direction to receive an end of a vertical tube 4 therein. A first connection plate 41, preferably a V-shaped leaf spring having two resilient arms each forming a protrusion 411, is received in the vertical tube 4 with the protrusions 411 extending through both holes 410 defined in a side wall of the vertical tube 4 and corresponding holes 300 defined in side walls of the corner member 3 thereby releasably securing the vertical tube 4 to the corner member 3 and thus the top tube 2.

**[0016]** Also referring to Figure 4, a T-shaped male connector 5 and a T-shaped female connector 6 are respectively mounted to the two vertical tubes 4 by rivets R to respectively coupling first and second support tubes 8, 9 to the vertical tubes 4. The male connector 5 has a horizontal connection portion 51. A sleeve 7 has opposite openings (not labels) of which a first one is slidably and releasably fit over the horizontal connection portion 51 of the male connector 5. A second opening of the sleeve 7 is slidably fit over an end of the first support tube 8.

**[0017]** The first support tube 8 defines an axially elongated slot 80 for the extension of a river **R** that extends through a corresponding hole 700 defined in the sleeve 7 thereby preventing the sleeve 7 from sliding off the first support tube 8 and limiting axial movement of the sleeve 7 with respect to the first support tube 8. A second V-shaped connection plate or biasing element 81, such as a leaf spring, is received in the first support tube 8 and comprises a locking protrusion 811 extending from a resilient arm of the leaf spring through a hole (not label) defined in the first support tube 8 to selectively engaging a notch 71 defmed in an end of the sleeve 7 thereby defining an extending position of the sleeve 7.

**[0018]** The second support tube 9 has an end fit into a free end of the first support tube 8 and is coupled together by a third V-shaped connection plate 91, such as a leaf spring, which is received in the second support tube 9 and has two resilient arms each forming a protrusion 911 extending through holes (not labeled) defined in the second support tube 9 and holes 810 defined in the first support tube 8.

**[0019]** The female connector 6 has a horizontal connection portion 61, which is a hollow tube forming a rib 610, such as an elongate indentation extending axially, therein. An end of the second support tube 9 form an axially extending slot 92 slidably receiving the rib 610 to guide the engagement between the end of the second support tube 9 and the female connector 6 and also preventing rotation of the second support tube 9 with respect to the female connector 6.

**[0020]** Also referring to Figures 5 and 6, a knuckle device 10 is mounted to a lower end of each vertical tube 4, comprising a base 102 having a vertical end to which the lower end of the vertical tube 4 is pivoted by a rivet R2 and a horizontal end to which an end of a horizontal support tube 11 is mounted.

**[0021]** The base 102 of the knuckle device 10 comprises two spaced walls or plates 102A defining a space therebetween to receive a movable member 101. Each plate 102A forms in an inside surface thereof a recess 1021. The movable member 101 has a hollow cylindrical body 1011 movably fit over the lower end of the vertical tube 4 and two insertions 1012 extending from a lower end of the cylindrical body 1011 and movably received in the recesses 1021 of the plates 102A of the base 102. The engagement of the insertions 1012 with opposite banks of the recess 1021 prevents the movable member 101 and thus the vertical tube 4 from rotation about the pivot **R2,** which extends through holes 1020 defined in the plates 102A of the base 102 and aligned holes 43 defined in the lower end of the vertical tube 4.

**[0022]** Also movably received in the lower end of the vertical tube 4 is a stopper 104 against which the spring 103 acts. The stopper 104 and the movable member 101 are respectively located inside and outside the vertical tube 4 and are coupled to each other by a rivet **R1** that extends trough a hole 1040 defined in the stopper 104 and a hole 1010 in the movable member 101 whereby the stopper 104 and the movable member 101 move in unison with each other. The vertical tube 4 defines axially elongated, aligned slots 42 slidably receiving the rivet **R1** such that the movable member 101 and the stopper 104 are movable relative to the aligned slots 42.

**[0023]** A spring 103 is received in the lower end of the vertical tube 4 and acts between the vertical tube 4 and the stopper 104 to bias the movable member 101 in such as direction to have the insertions 1012 fit into the recesses 1021 of the plates 102A of the base 102 thereby locking the vertical tube 4 in a vertical position. By manually moving the movable member 101 along the vertical tube 4 against the biasing spring 103, as indicated by arrows **B** of Figure 6, the insertions 1012 are disengaged from the recesses 1021 of the base thereby allowing the vertical tube 4 to rotate about the pivot **R2** with respect to the knuckle device 10.

**[0024]** An end cap **H** closes the lower end opening of the vertical tube 4.

**[0025]** Also referring to Figure 2, a cover 12 is mounted to the bed rail assembly to shield the moving parts of the bed rail assembly, such as the joint device 1, the top tubes 2, and the vertical tubes 4 therein so as prevent undesired contact of a user with these moving parts, causing damage to the user by the movement of the moving part. The cover 12 includes two corners 12A that fit over the corner members 3.

**[0026]** Also referring to Figure 7, a Y-shaped belt 13 comprises two first branches each having a distal end 13A and a second branch having a distal end 13B. The first distal ends 13A are fixed to the horizontal support tubes 11. An L-shaped retention member 14 is attached to the second distal end 13B of the belt 13 for engaging a side face of a mattress **M.** Each horizontal support tube 11 has a flat oval profile such that the support area for the mattress **M** is large enough to bear the load.

**[0027]** While we have shown and described the em-

bodiment in accordance with the present invention, it should be clear to those skilled in the art that further embodiments may be made without departing from the scope of the present invention.

## Claims

**1.** A bed rail assembly comprising:

a joint device pivotably connected between two top tubes, each top tube having a free end;
a corner member having a clamp end pivotably connected to the free end of each top tube and a receiving end to which a vertical tube is connected by a first V-shaped connection plate;
male and female connectors, both having a T-shape, respectively mounted to the two vertical tubes, the male connector having a horizontal connection portion to which a sleeve is slidably and removably mounted, an end of a first support tube coupled to the sleeve by a second V-shaped connection plate received in the first support tube in such a manner to allow limited movement of the sleeve with respect to the first support tube, a second support tube connected to the first support tube by a third V-shaped connection plate, the female connector having a horizontal connection portion to which an end of the second support tube is slidably and removably connected; and
a knuckle device a vertical section pivotably connected to a lower end of each vertical tube and a horizontal section to which a horizontal support tube is connected, each knuckle device comprising a base constituting the vertical section, a movable member movably coupled to the vertical tube and movable between locking and releasing positions, a spring received in the vertical tube to bias the movable member toward the locking position where the vertical tube is prevented from rotation with respect to the knuckle device, the coupling between the movable member and the vertical tube comprising aligned elongate slots defined in the vertical tube and a rivet movably extending through the slots and fixed to the movable member such that the movable member is movable along the aligned slots.

**2.** The bed rail assembly as claimed in Claim 1, wherein the movable member comprises a hollow cylindrical body movably fit over the vertical tube and two insertions extending from the cylindrical body, the base comprising two spaced plates movably receiving the movable member therebetween, each plate forming a recess defined by at least one bank to receive each insertion of the movable member, the insertion being engageable with the bank to prevent the rotation of the vertical tube when the movable member is at the locking position.

**3.** The bed rail assembly as claimed in Claim **1,** wherein the horizontal support tube has a flat oval profile adapted to support a bed mattress thereon.

**4.** The bed rail assembly as claimed in Claim 1, wherein the first V-shaped connection plate, the second V-shaped connection plate, and the third V-shaped connection plate have protrusions on two ends thereof.

**5.** The bed rail assembly as claimed in Claim **1,** wherein the horizontal portion of the female connector forms a rib in an inside surface thereof and the second support tube forms a slot slidably receiving the rib therein.

**6.** The bed rail assembly as claimed in Claim **1** further comprising a cover that shields the joint device, the top tubes, and the vertical tubes.

**7.** The bed rail assembly as claimed in Claim **1** further comprising a Y-shaped belt which has three distal ends and two of which are fixed to the horizontal support tubes and the remaining one retaining an L-shaped retention member that is adapted to engage a side face of a mattress.

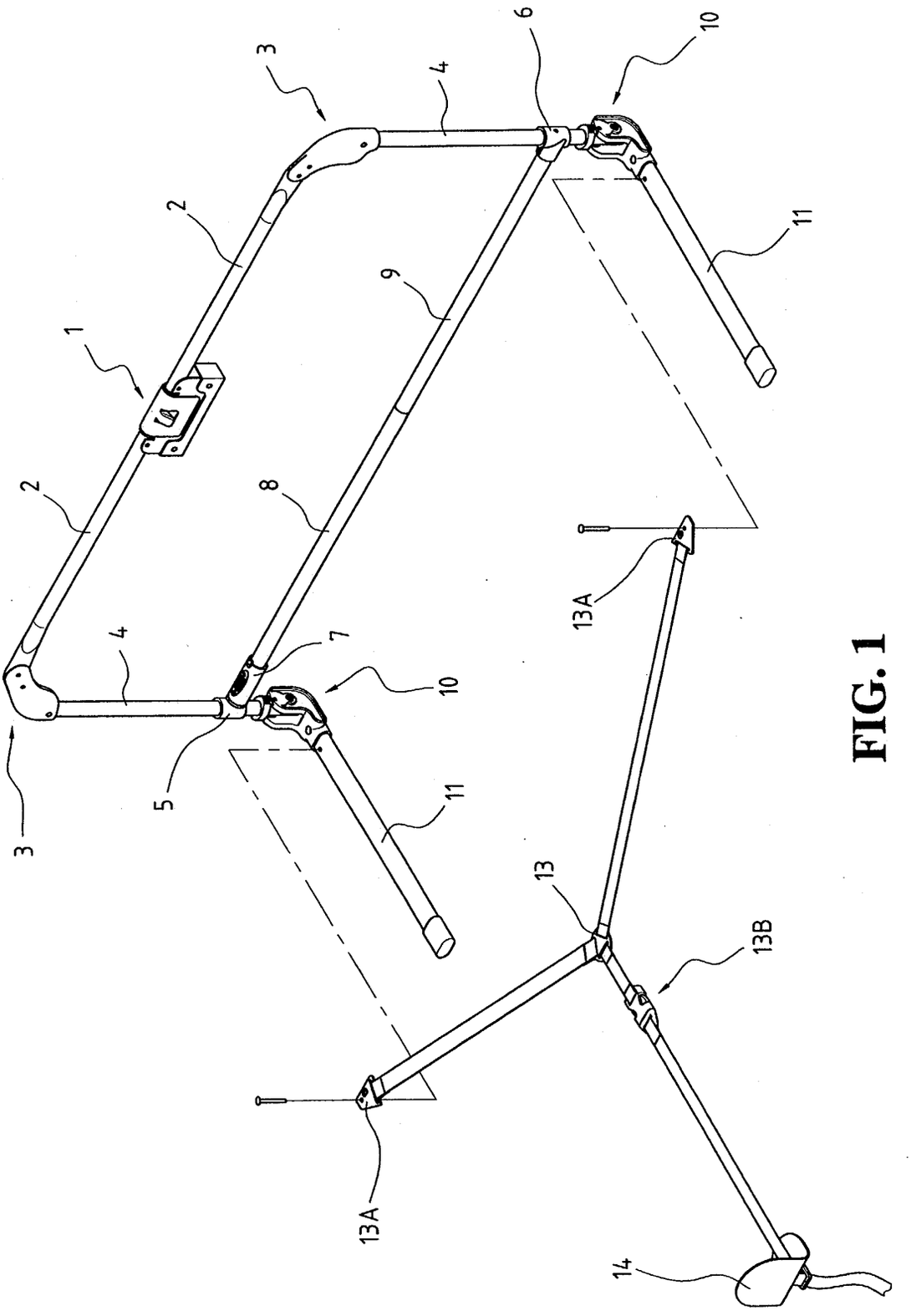


FIG. 1

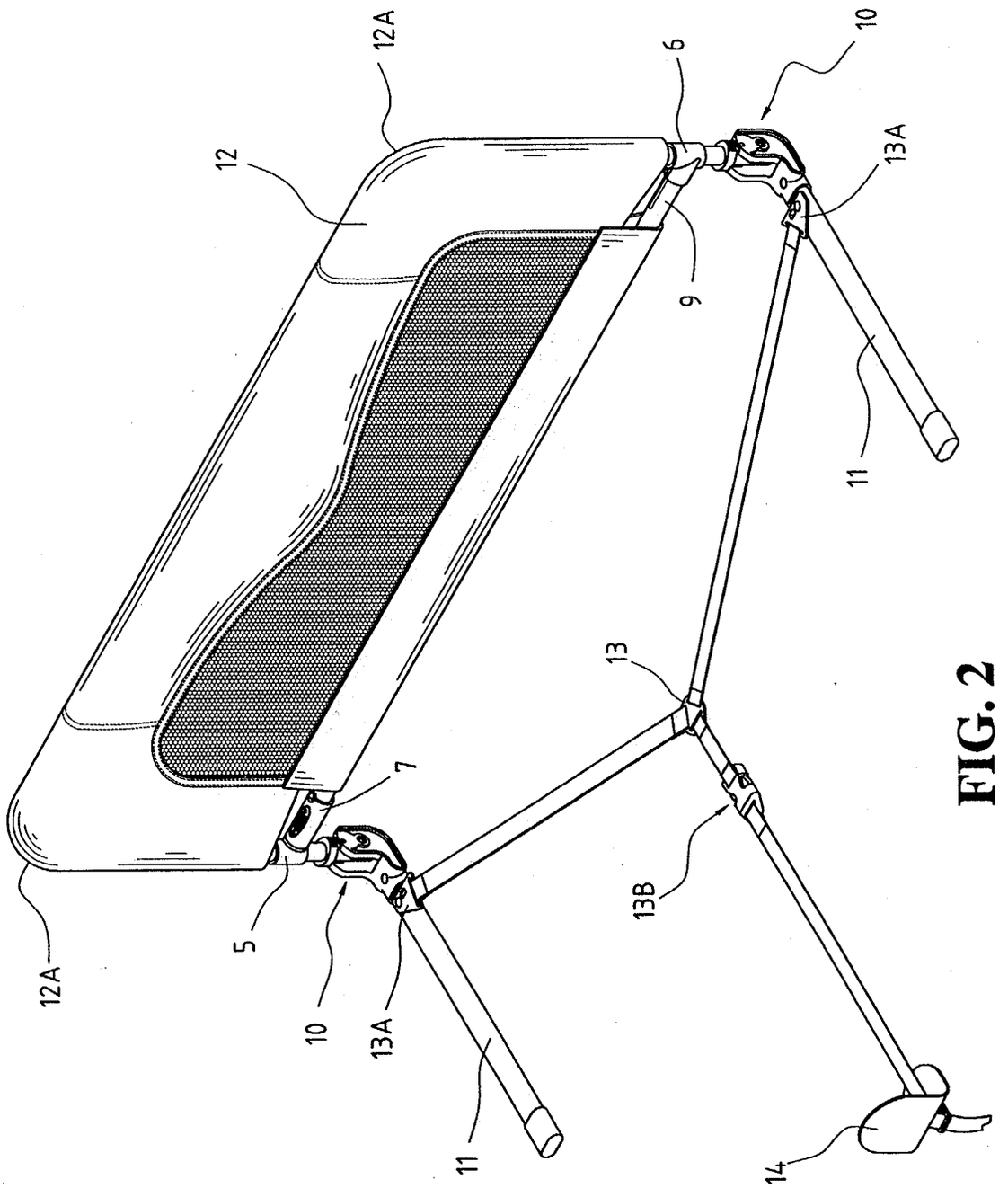


FIG. 2

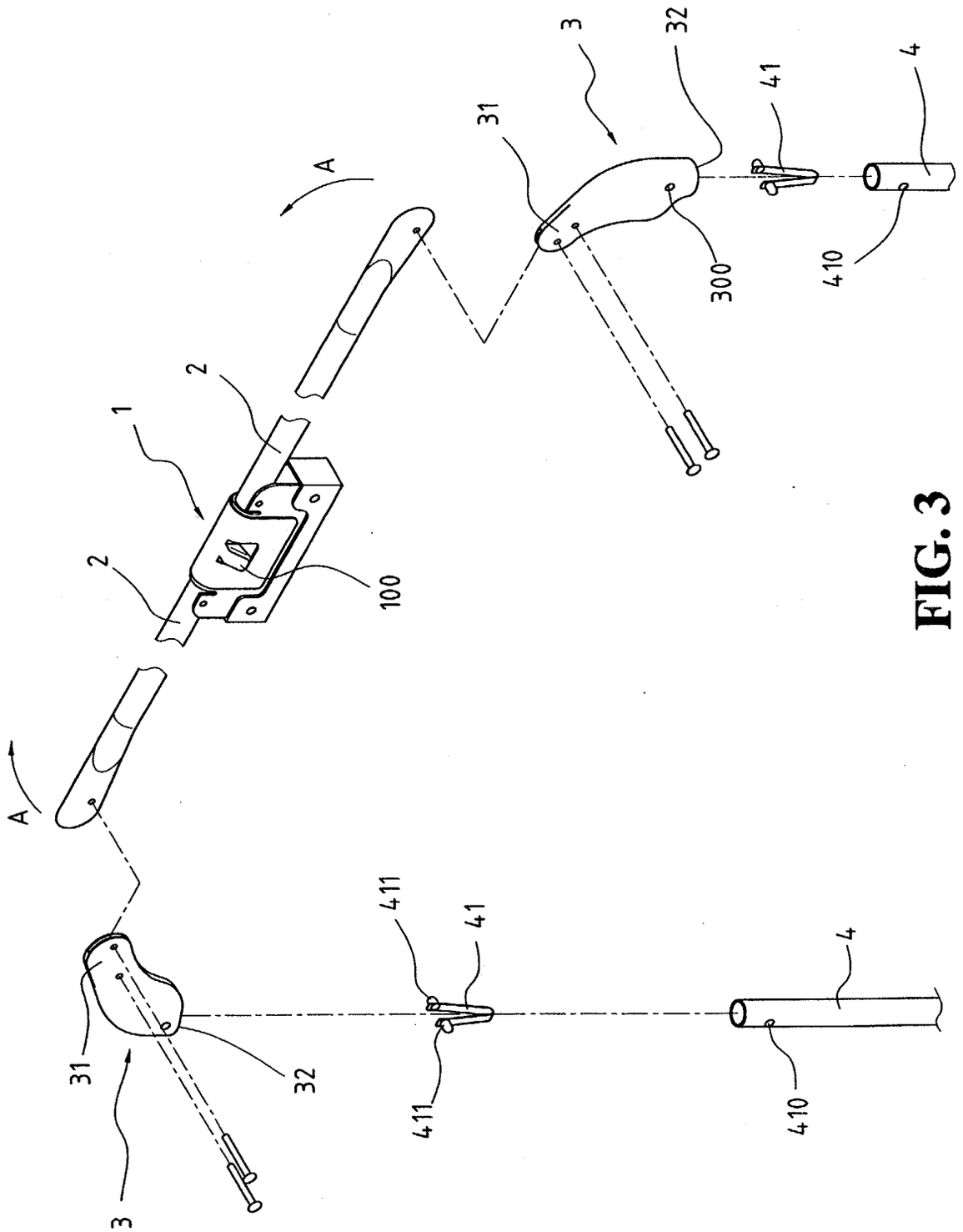


FIG. 3

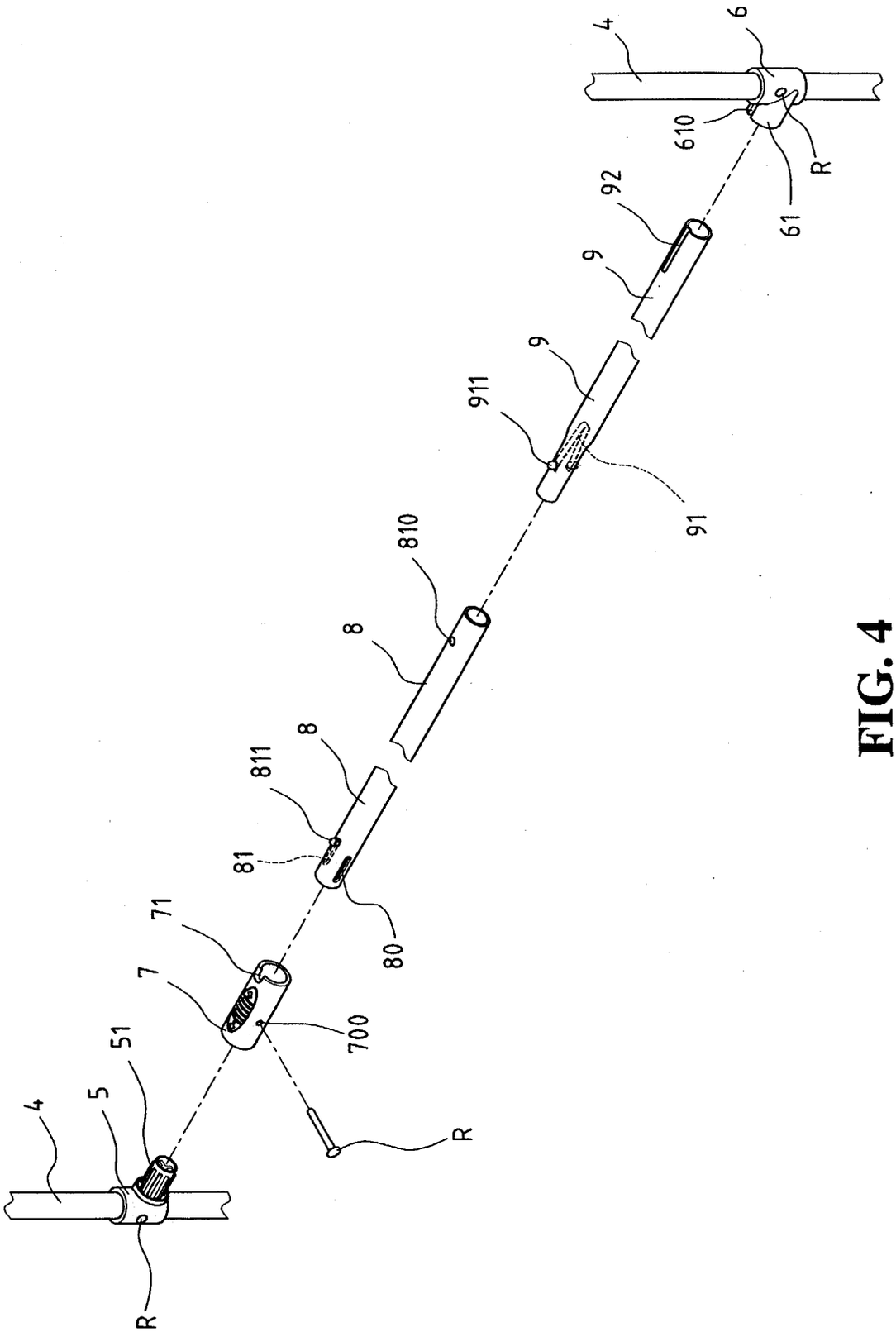


FIG. 4

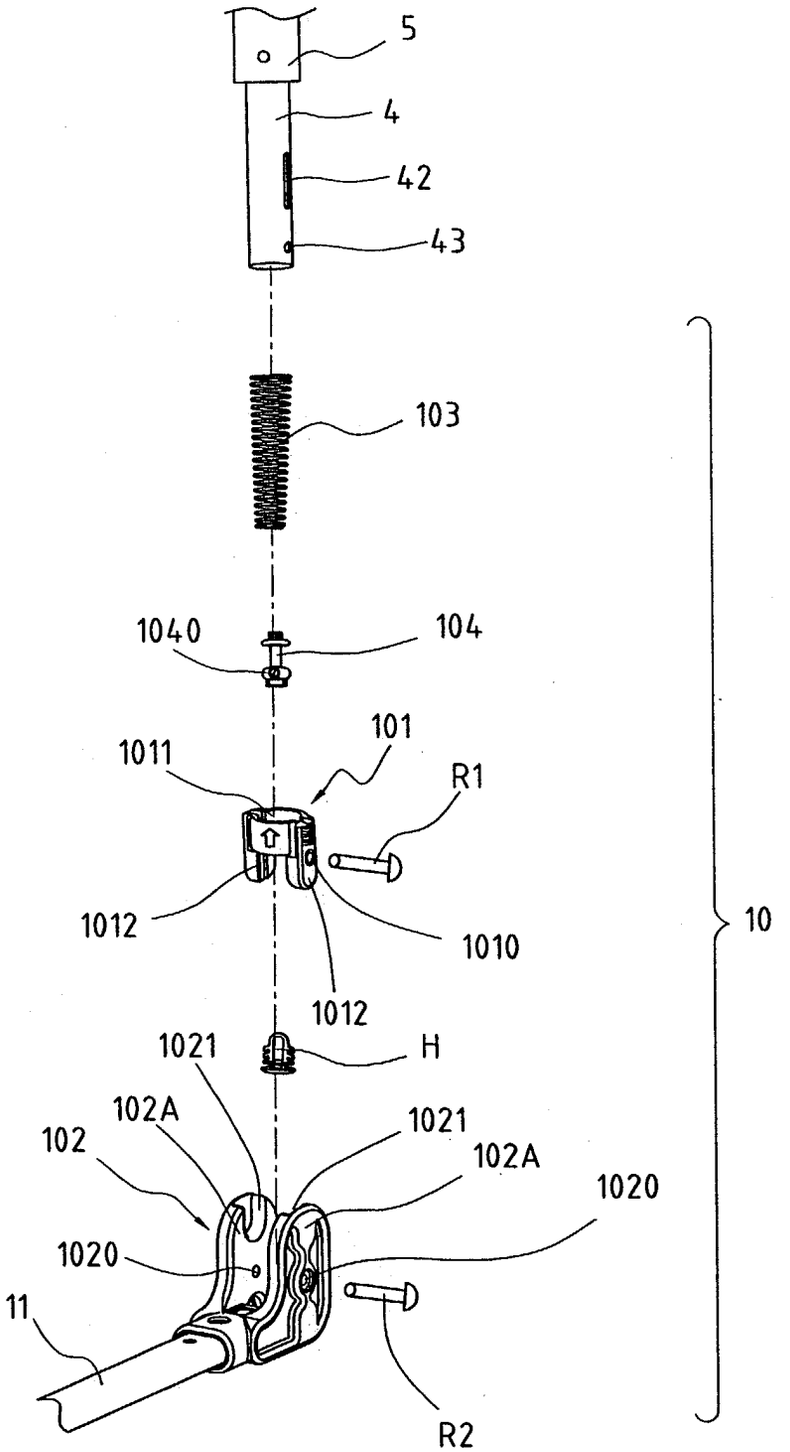
5
4
42
43
103
1040
104
101
1011
R1
1012
1010
10
1012
1021
H
102A
1021
102
102A
1020
1020
11
R2

FIG. 5

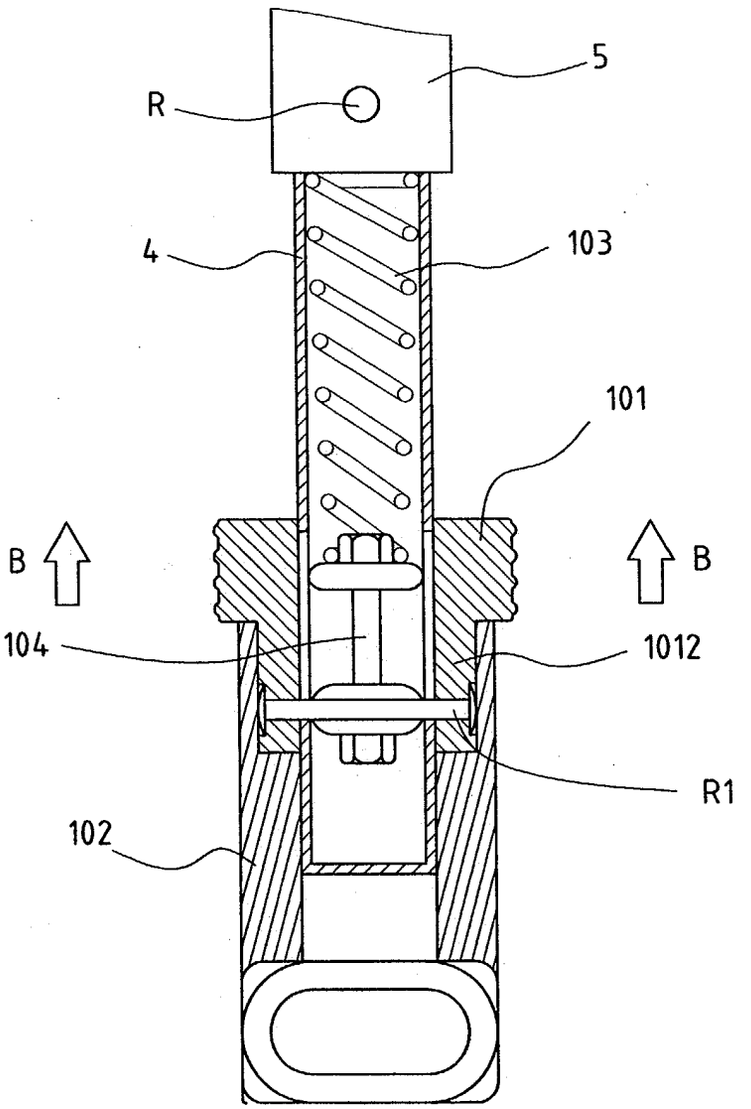


FIG. 6

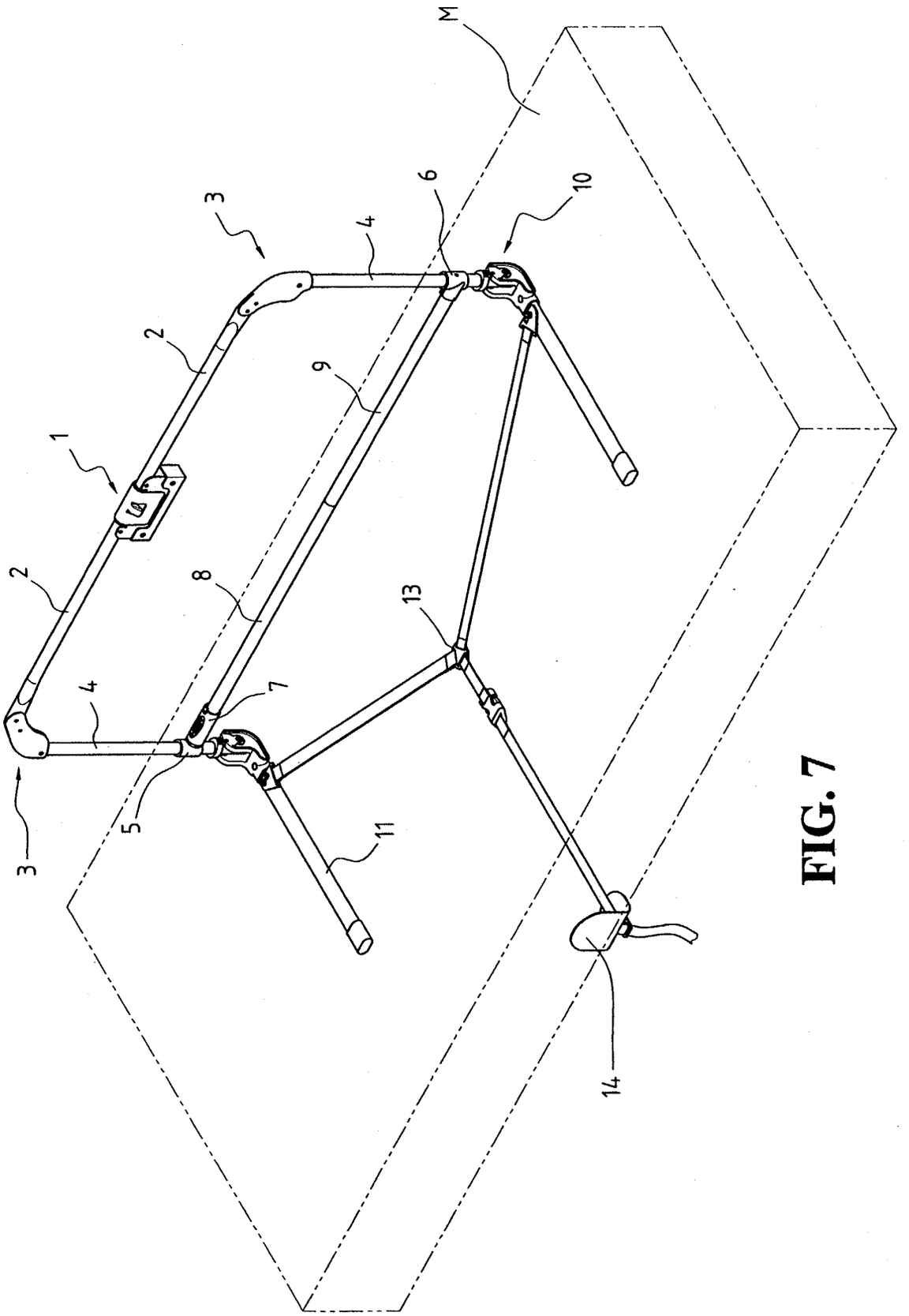


FIG. 7

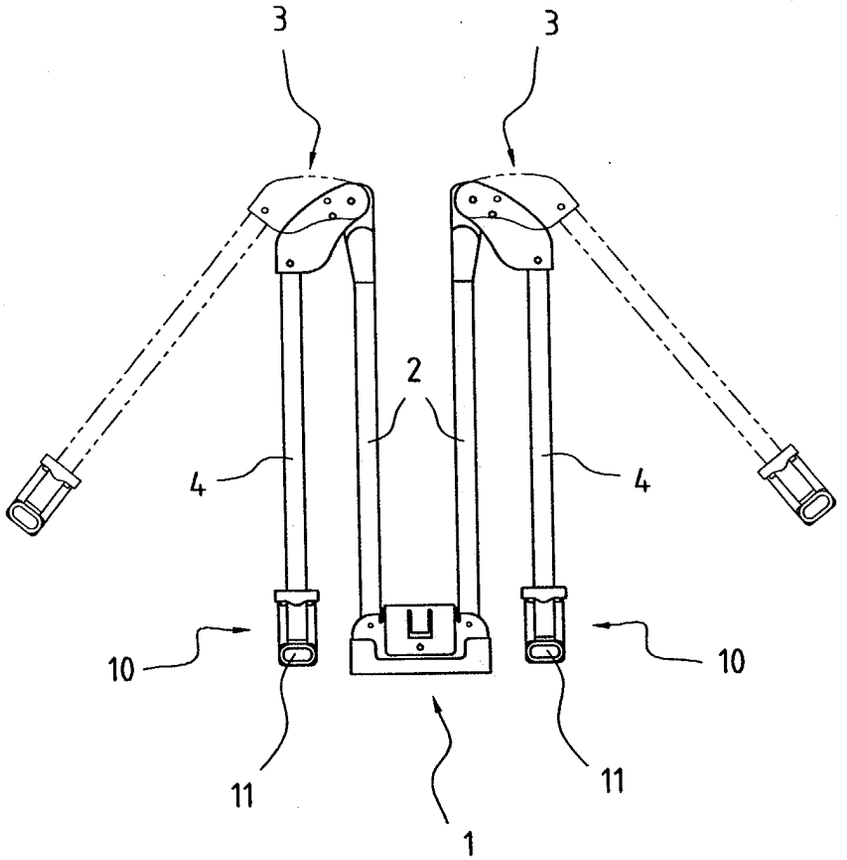


FIG. 8

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# EUROPEAN SEARCH REPORT

Application Number
EP 04 07 6342

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
|---|---|---|---|
| A | US 5 671 490 A (WU SUNG-TSUN)<br>30 September 1997 (1997-09-30)<br>* claim 1; figures *<br>----- | 1-6 | A47C21/08<br>A47D15/00 |
| A | US 2003/024047 A1 (WU SUNG-TSUN)<br>6 February 2003 (2003-02-06)<br>* abstract; figures *<br>----- | 1 | |
| A | US 5 596 776 A (HUANG LI-CHU C)<br>28 January 1997 (1997-01-28)<br>* abstract; figures *<br>----- | 1 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A47C
A47D
A61G

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 4 October 2004 | Amghar, N |

CATEGORY OF CITED DOCUMENTS

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 07 6342

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04-10-2004

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82