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(54) **FOLDING SIDE RAIL**

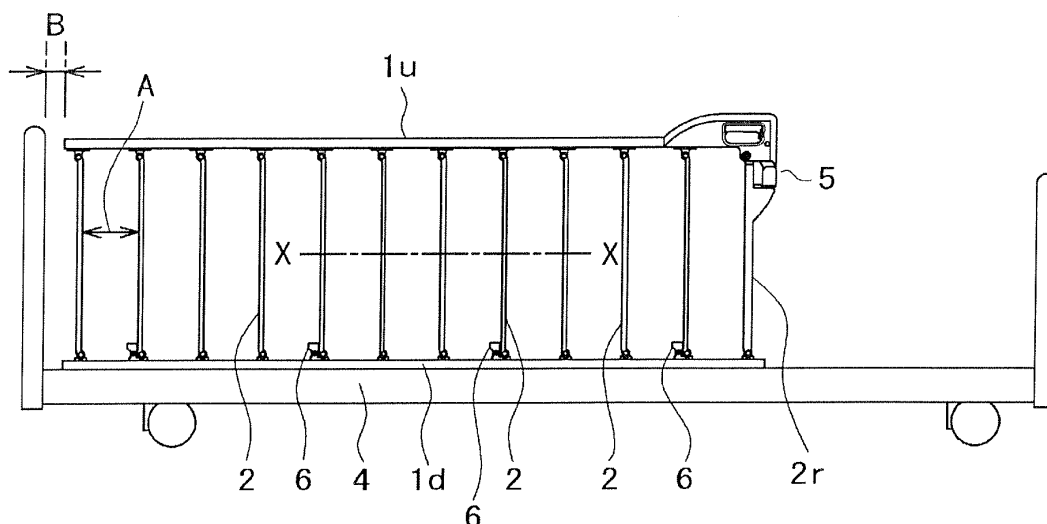
(57) [Abstract]

The object is to provide a side rail that satisfies the dimension specified in the IEC standard, etc. and prevents that the upper crosspiece member of the side rail becomes too high in the stowed state.

This invention proposes a foldable side rail in which multiple strut members 2 are pivotally rotatably connected between an upper crosspiece member 1u and a lower

crosspiece member 1d, to form a parallel link mechanism, while a holding mechanism 5 is provided for holding the abovementioned strut members in an upright position, wherein at least some of the strut members are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members, while the number of the strut members per unit length of the side rail is increased.

Fig. 1



Description

TECHNICAL FIELD

[0001] The present invention relates to a foldable side rail for a bed or the like, particularly a foldable side rail in which multiple strut members are pivotally rotatably connected between an upper crosspiece member and a lower crosspiece member, to form a parallel link mechanism.

BACKGROUND ART

[0002] Various side rails for beds have been proposed hitherto. Among them, widely used are foldable side rails, each comprising multiple strut members pivotally rotatably connected between an upper crosspiece member and a lower crosspiece member, to form a parallel link mechanism, in such a manner that the side rail can assume a deployed state for use where the abovementioned strut members are held in an upright position and a stowed state of disuse where the multiple strut members are laid down by pivotal rotation to lower the upper crosspiece member in parallel. In such a foldable side rail, it is desired that the upper crosspiece member is kept low in height in the stowed state of disuse.

[0003] There are many conventional foldable side rails as described, for example, in Patent Document 1. and Patent Document 2. Figs. 9 through 11 typically show such a conventional foldable side rail. In this foldable side rail, multiple strut members *c* are pivotally rotatably connected between an upper crosspiece member *a* and a lower crosspiece member *b*, to form a parallel link mechanism, and a holding mechanism *d* for holding the abovementioned strut members *c* in an upright position is provided. In this case, the multiple strut members *c* are basically square or circular in cross sectional form as shown in Fig. 11, and they are often chamfered or partially curved. Meanwhile, the operation of such a foldable side rail will not be explained here, since the operation is obvious from Fig. 9 showing the deployed state for use and Fig. 10 showing the stowed state of disuse.

[0004] In the meantime, in preparation for cases where such foldable side rails are used for medical beds, the dimensions of respective portions of side rails are specified in such standards as IEC standard, especially to ensure safe use.

[0005] In the IEC standard, for example in the case where a side rail has closed spaces like a lattice, the dimension of each space, namely, the dimension *A* in the drawings is specified to be 120 mm or less to prevent that the head of the user can be inserted into the space. Further, in the case where there is a space due to a clearance such as the clearance between the end of the upper crosspiece member *a* and the head board, it is specified that the dimension *B* of the clearance should be 60 mm or less to ensure that the neck of the user cannot be inserted into the space or should be 235 mm or more to ensure that the head cannot be caught.

[0006] In the case where the dimension *A* does not conform to the abovementioned specification in the side rail of Fig. 9, it can be considered to increase the number of strut members *c* per unit length of the side rail as shown in Fig. 12 as a method for changing to satisfy the specification. That is, in the side rail of Fig. 12, the number of the strut members *c* in the side rail as a whole is increased to double compared with the number of strut members of Fig. 9.

Patent Document 1: Japanese Patent 2697765
Patent Document 2: Japanese Patent 3029026

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0007] However, if the number of strut members *c* per unit length of a side rail is increased as shown in Fig. 12, the height *C* of the upper crosspiece member *a* in the stowed state becomes higher than that of the side rail of Fig. 9 as shown in Fig. 13, and the stored state looks intrusive.

This invention has been created in view of the above. The object of this invention is to satisfy the abovementioned dimension *A* specified for side rails while preventing that the height of the upper crosspiece member of a side rail in the stowed state becomes too high.

MEANS FOR SOLVING THE PROBLEM

[0008] To solve the abovementioned problem, this invention proposes a foldable side rail in which multiple strut members are pivotally rotatably connected between an upper crosspiece member and a lower crosspiece member, to form a parallel link mechanism, while a holding mechanism is provided for holding the abovementioned strut members in an upright position, wherein at least some of the strut members are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members, while the number of the strut members per unit length of the side rail is increased.

[0009] Further, this invention proposes the abovementioned constitution, wherein the strut members are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members except the strut member positioned at the end in the folding direction of the side rail.

[0010] Furthermore, this invention proposes the abovementioned constitution, wherein one out of every predetermined number of strut members is a non-flat strut member.

[0011] Moreover, this invention proposes the abovementioned constitution, wherein the upper ends of the strut members are shifted in the folding direction of the side rail while the lower ends of the strut members are shifted in the unfolding direction of the side rail.

EFFECTS OF THE INVENTION

[0012] In the foldable side rail of this invention, the number of strut members per unit length of the side rail is increased to narrow the clearances formed between the strut members, hence to easily satisfy the specified dimension, and in addition, since the strut members are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members, the height between the top and the bottom of the side rail as a whole can be kept small even if the strut members overlap one after another when they are stowed. Therefore, it can be prevented that the upper crosspiece member becomes too high.

[0013] In the case where the upper ends of the strut members are shifted in the folding direction of the side rail while the lower ends of the strut members are shifted in the unfolding direction of the side rail, the clearances corresponding to the shifting distances can be formed between the upper crosspiece member and the lower crosspiece member on one hand and the pivotally inclined strut members on the other hand in the stowed state or in a state just before the stowed state is reached. The clearances serve to prevent that a finger of the user can be caught. This constitution is especially effective in the case where temporarily halting mechanisms for temporarily halting the strut members in a state just before the stowed state is reached are provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] [Fig. 1] is an illustration showing a first embodiment of the foldable side rail of this invention in a deployed state for use.

[Fig. 2] is an illustration showing the first embodiment of the foldable side rail of this invention in a stowed state of disuse.

[Fig. 3] is an illustration showing the first embodiment of the foldable side rail of this invention in a temporarily halted state just before the stowed state is reached.

[Fig. 4] is an illustration showing the portion corresponding to the X-X line section of Fig. 1 with the clearances between the strut members shortened for convenience.

[Fig. 5] is an expanded partial view of Fig. 1.

[Fig. 6] is an expanded partial view of Fig. 3.

[Fig. 7] is an illustration showing the first embodiment of the foldable side rail of this invention in the deployed state for use.

[Fig. 8] is an illustration showing the portion corresponding to the Y-Y line section of Fig. 7 with the clearances between the strut members shortened for convenience.

[Fig. 9] is a front view showing an example of the conventional foldable side rail in the deployed state for use.

[Fig. 10] is a front view showing an example of the conventional foldable side rail in the stowed state of disuse.

[Fig. 11] is an illustration showing the portion corresponding to the Z-Z line section of Fig. 9 with the clearances between the strut members shortened for convenience.

[Fig. 12] is a front view showing a state where the strut members of the conventional foldable side rail are increased in the deployed state for use.

[Fig. 13] is a front view showing a state where the strut members of the conventional foldable side rail are increased in the stowed state of disuse.

15 MEANINGS OF SYMBOLS

[0015]

1u	upper crosspiece member
1d	lower crosspiece member
2	strut member (flat)
20	strut member (ordinary)
2r	strut member (right end)
3	attaching rod
4	bed
5	holding mechanism
6	temporarily halting mechanism
7u, 7d	shifted portion

30 THE BEST MODES FOR CARRYING OUT THE INVENTION

[0016] Embodiments of the foldable side rail of this invention are explained below in reference to the attached drawings. At first, Figs. 1 through 6 show a first embodiment of the foldable side rail to which this invention is applied.

In the drawings, symbol 1u denotes an upper crosspiece member and 1d denotes a lower crosspiece member. Multiple strut members 2 are pivotally rotatably connected between the upper crosspiece member 1u and the lower crosspiece member 1d, to form a parallel link mechanism.

[0017] In Fig. 3, symbol 3 denotes an attaching rod projecting downward from the lower crosspiece member 1d, and the attaching rods 3 are fitted into the fitting holes formed in the upper surface of a bed frame, to attach the side rail to a lateral side of the bed 4. Further, symbol 5 denotes a holding mechanism for holding the strut members 2 in an upright position, namely, for holding the side rail in the deployed state for use, and the holding mechanism is a mechanism as described, for example, in the abovementioned Patent Document 1 or 2.

[0018] On the other hand, in this embodiment, the lower crosspiece member 1d is provided with temporarily halting mechanisms 6 for supporting the strut members 2 in a state just before the stowed state is reached, and as the temporarily halting mechanisms, mechanisms as

described, for example, in the abovementioned Patent Document 1 can be applied.

[0019] In the above constitution of this invention, at least some of the strut members 2 are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members, and in this embodiment, all the strut members 2 are flat strut members except the strut member 2r positioned at the end in the folding direction of the side rail.

[0020] Fig. 4 corresponds to the X-X line section of Fig. 1, and shows the respective strut members 2 with the respective clearances shortened for convenience, but it can be seen that the respective strut members 2 are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members.

[0021] Two types of strut members 2 different in the width in the pivotal rotation direction are used in this embodiment, and the strut members 2 supported by the abovementioned temporarily halting mechanisms 6 are larger in width to have a higher strength, though the strut members 2 can also be equal in width if they are strong enough. Further, in this embodiment, the strut members 2 are solid members, but can also be hollow members or can also be hollow members with ribs or the like formed inside.

[0022] Further in this embodiment, the upper ends of the strut members 2 are shifted in the folding direction of the side rail, and the lower ends of the strut members 2 are shifted in the unfolding direction of the side rail. In the drawings, symbols 7u and 7d show shifted portions.

[0023] In the above constitution, in the foldable side rail of this embodiment, the number of the strut members 2 per unit length of the side rail is increased to narrow the clearances A formed between the strut members 2 in the deployed state for use, hence to easily satisfy the specified dimension.

[0024] In addition, the strut members 2 are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members. Therefore, even if the respective strut members 2 overlap one after another in the stowed state as shown in Fig. 2, the overall height between the top and the bottom can be kept small. Therefore, it can be prevented that the upper crosspiece member 1u becomes too high in the stowed state.

[0025] Furthermore in this embodiment, the upper ends of the strut members 2 are shifted in the folding direction of the side rail, and the lower ends of the strut members 2 are shifted in the unfolding direction of the side rail. Therefore, the clearances S corresponding to the shifting distances 7u and 7d can be formed between the upper crosspiece member 1u and the lower crosspiece member 1d on one hand and the pivotally inclined strut members 2 on the other hand in the stowed state or in a state just before the stowed state is reached. The clearances S serve to prevent that a finger of the user can be caught. This embodiment is especially effective since the temporarily halting mechanisms 6 for temporarily halting the strut members in a state just before the

stowed state is reached are provided.

[0026] Figs. 7 and 8 show a second embodiment of the foldable side rail to which this invention is applied. In this embodiment, two flat strut members 2 disposed in such a manner that the flat surfaces thereof may face the adjacent strut members and an ordinary strut member 2o are disposed alternately so that every two flat strut members 2 are disposed between one each ordinary strut member 2o. The same components as those of the first embodiment are denoted by the same symbols, to avoid double explanation.

[0027] This embodiment can be constituted, for example, by disposing two flat strut members 2 for every strut member of the foldable side rail shown in the abovementioned Patent Document 1 or 2.

[0028] In this constitution, the load acting on the upper crosspiece member 1u can be received by the strut members 2o. Therefore, the flat strut members 2 are not required to be provided as structural components to withstand the load, and accordingly can be formed, for example, like thin strips. In this constitution, even if the strut members 2 and 2o overlap one after another in the stowed state, the upper crosspiece member 1u cannot be so high, since the strut members 2 are thin in thickness.

INDUSTRIAL APPLICABILITY

[0029] Since the foldable side rail of this invention is as described above, the foldable side rail satisfies the specified dimension and can prevent that the upper crosspiece member becomes too high in the stowed state. Therefore, the foldable side rail of this invention is most suitable for medical beds and stretchers.

[0030] Of course, the foldable side rail of this invention can also be used not only for medical beds but also for home care beds and general beds.

Claims

1. A foldable side rail in which multiple strut members are pivotally rotatably connected between an upper crosspiece member and a lower crosspiece member, to form a parallel link mechanism, while a holding mechanism is provided for holding the abovementioned strut members in an upright position, wherein at least some of the strut members are flat strut members disposed in such a manner that the flat surfaces thereof may face the adjacent strut members, while the number of the strut members per unit length of the side rail is increased.
2. A foldable side rail, according to claim 1, wherein the strut members are flat strut members except the strut member positioned at the end in the folding direction of the side rail.

3. A foldable side rail, according to claim 1, wherein one out of every predetermined number of strut members is a non-flat strut member.
4. A foldable side rail, according to claim 1, wherein the upper ends of the strut members are shifted in the folding direction of the side rail while the lower ends of the strut members are shifted in the unfolding direction of the side rail.

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Fig. 1

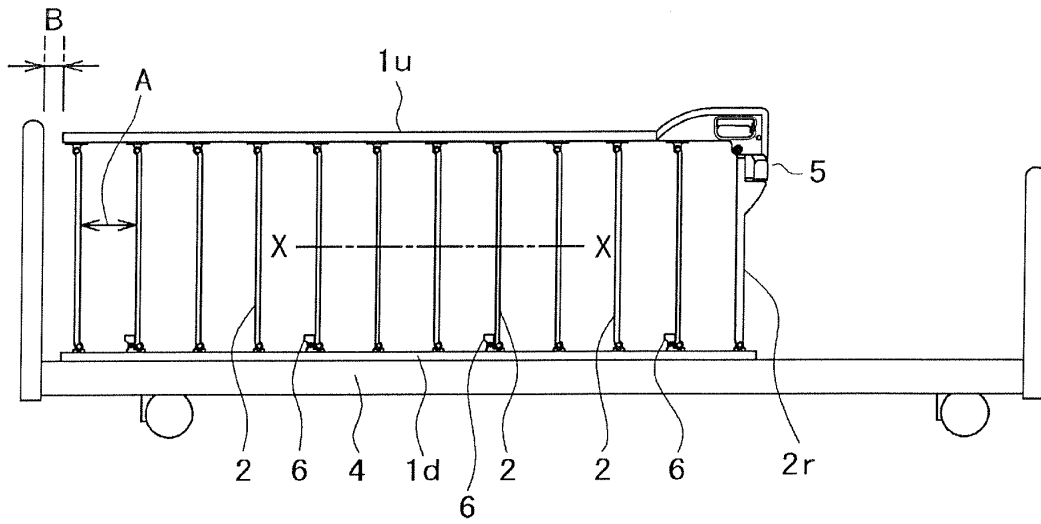


Fig. 2

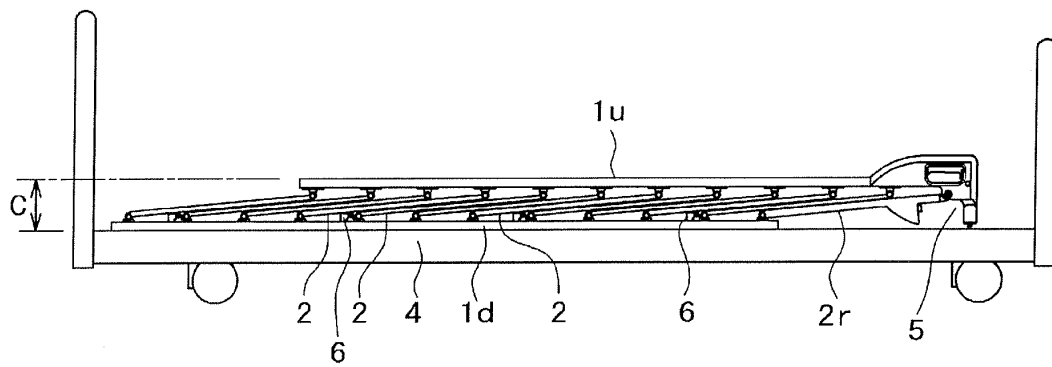


Fig. 3

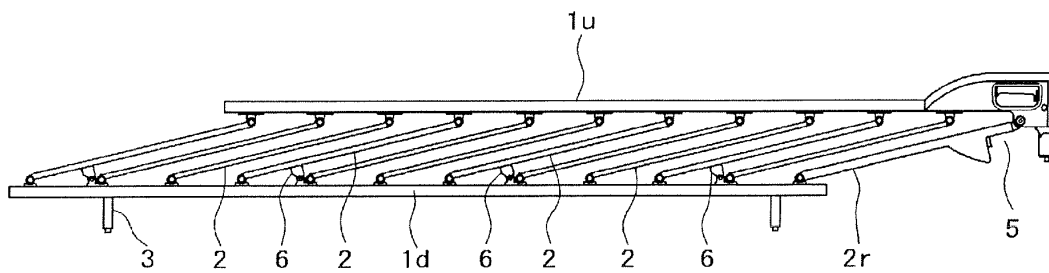


Fig. 4

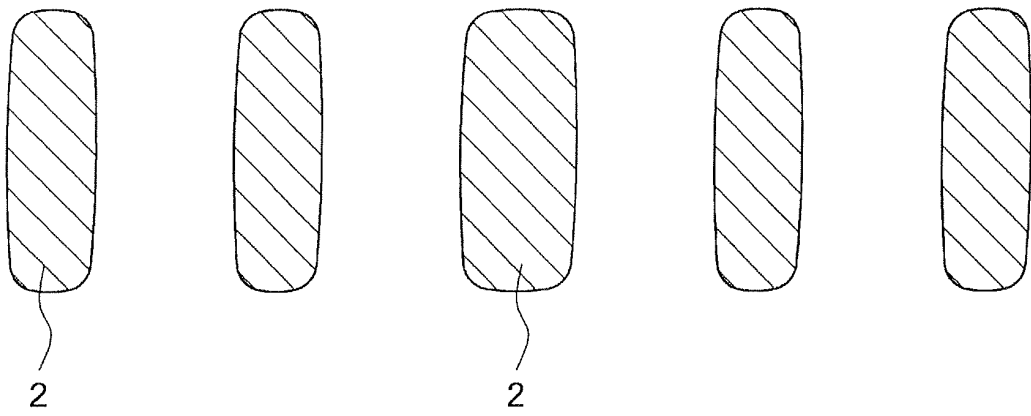


Fig. 5

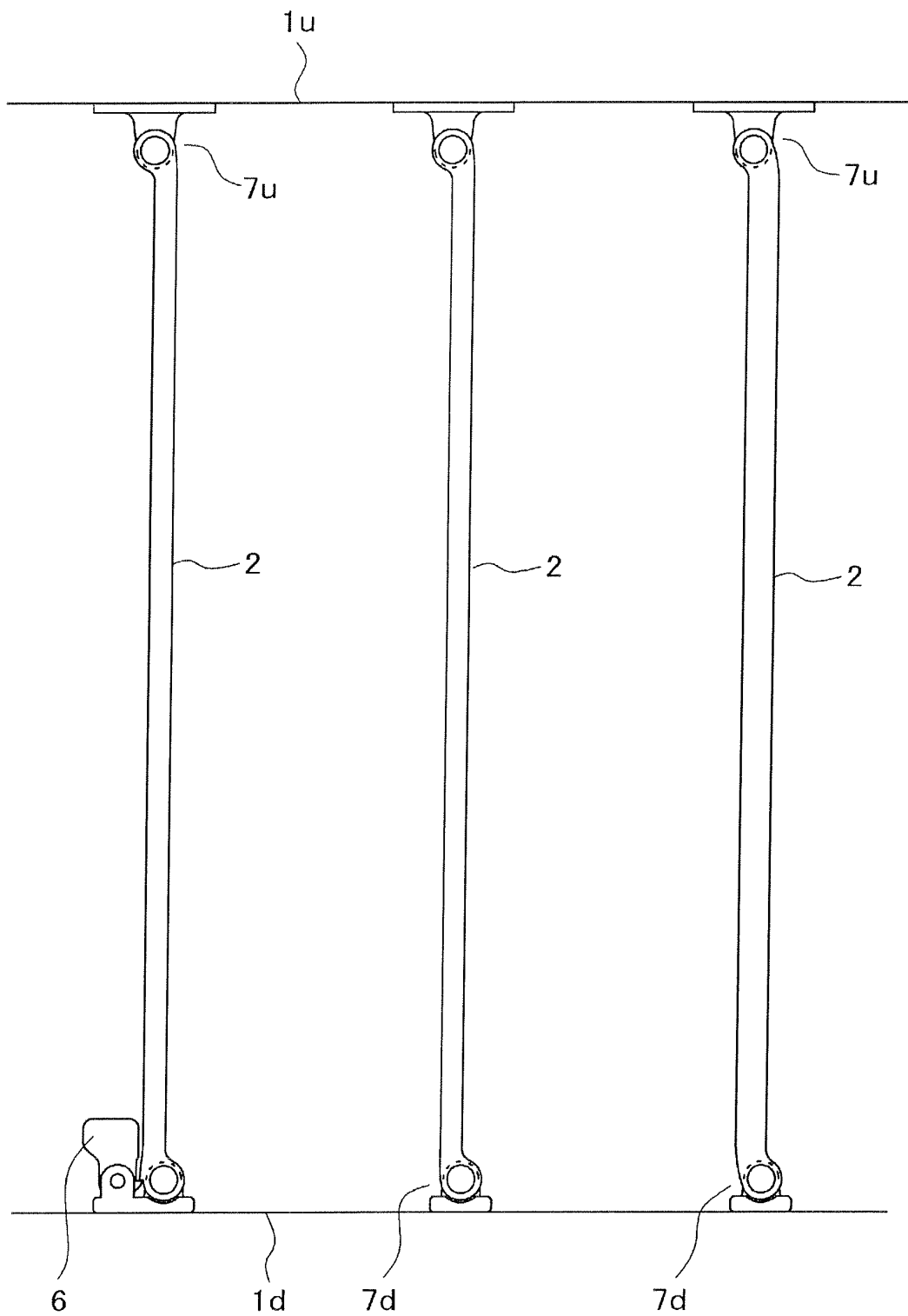


Fig. 6

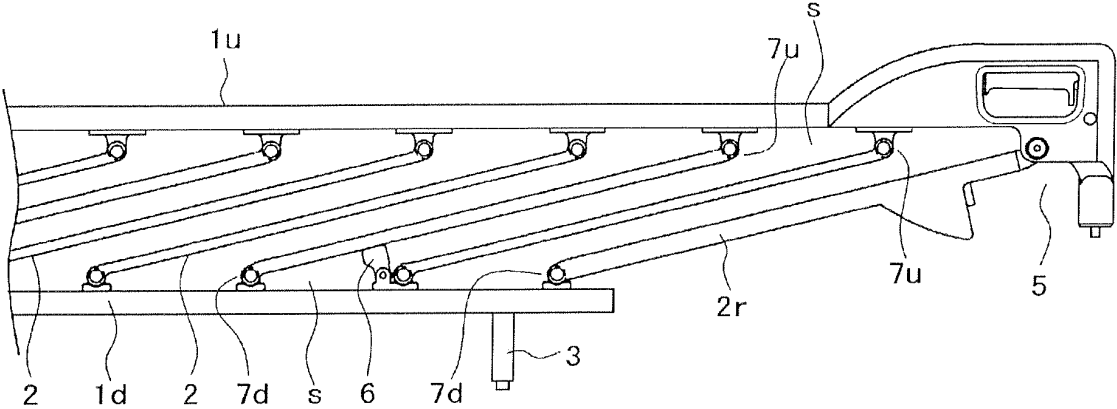


Fig. 7

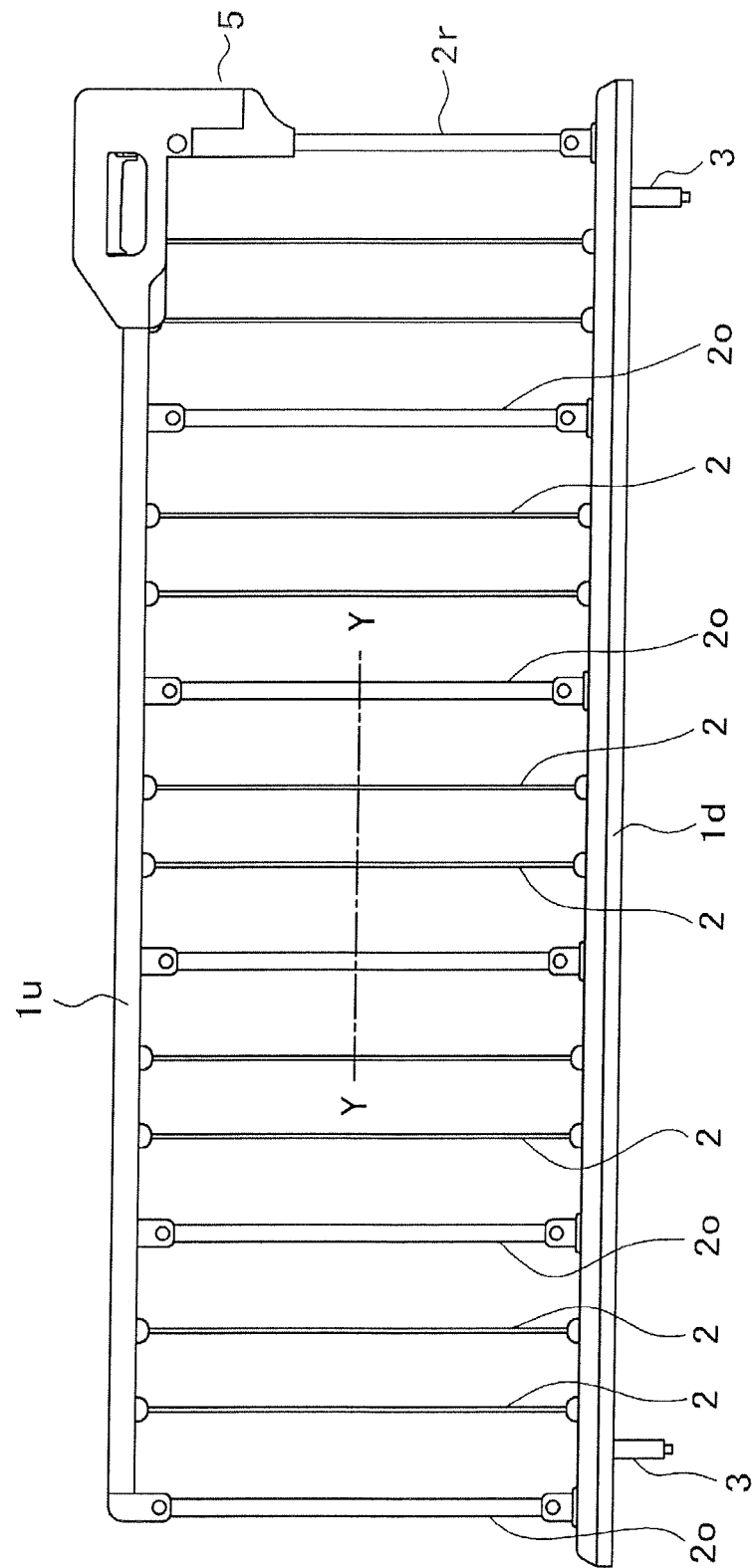


Fig. 8

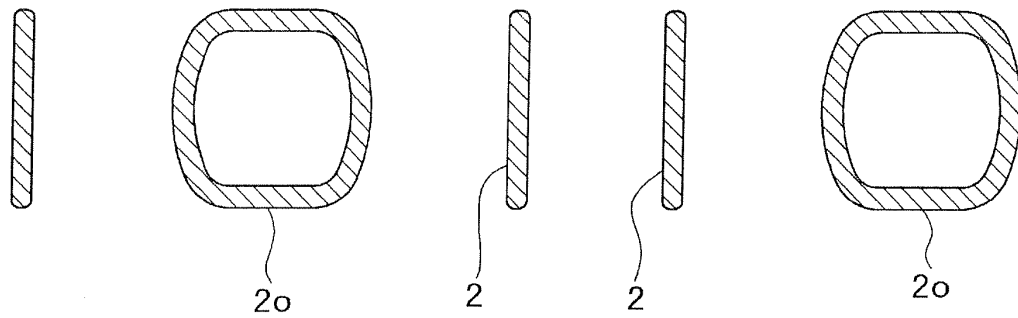


Fig. 9

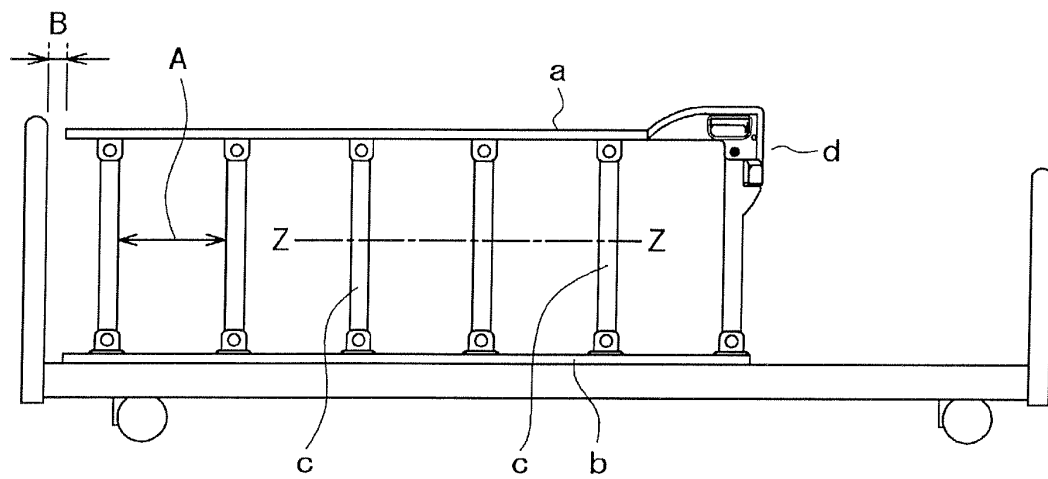


Fig. 10

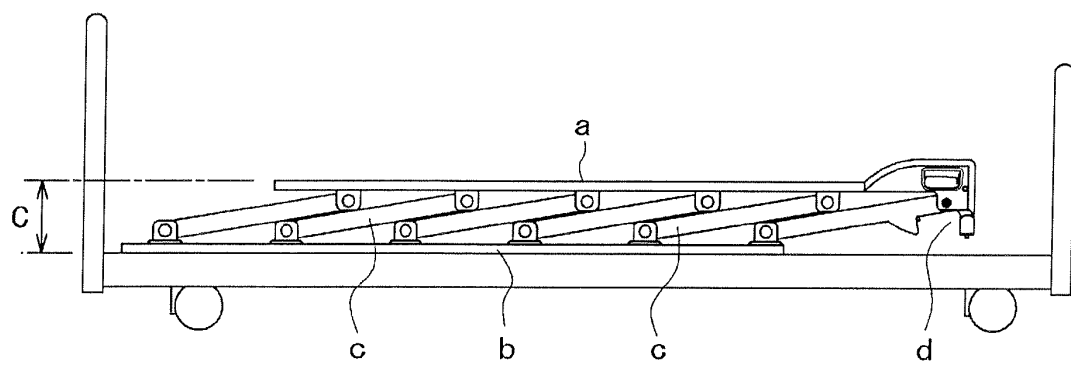


Fig. 11

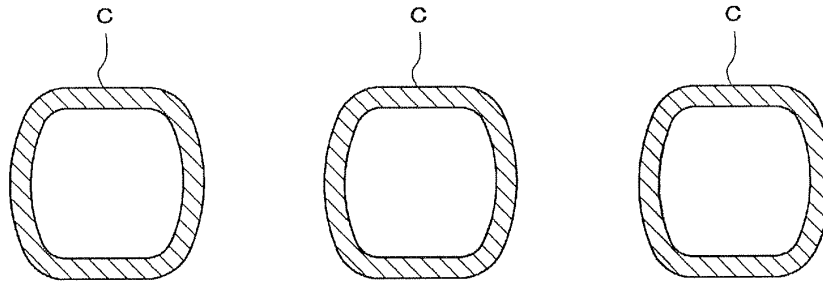


Fig. 12

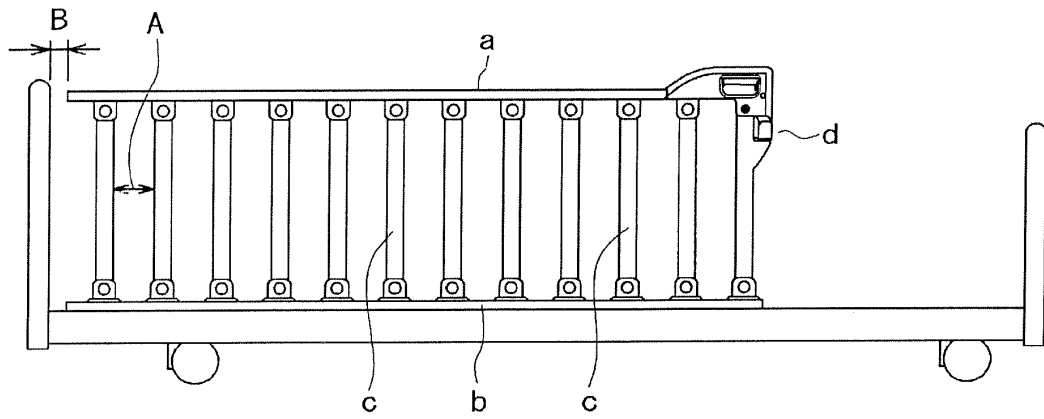
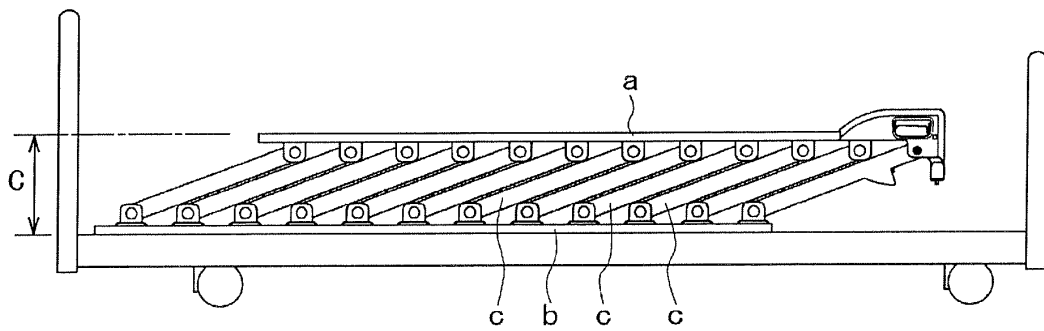


Fig. 13



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2008/065198

A. CLASSIFICATION OF SUBJECT MATTER

A47C21/08(2006.01) i, A61G7/05(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47C21/08, A61G7/05

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2008
Kokai Jitsuyo Shinan Koho	1971-2008	Toroku Jitsuyo Shinan Koho	1994-2008

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2005-58513 A (Paramount Bed Co., Ltd.),	1-3
Y	10 March, 2005 (10.03.05), Full text; all drawings (Family: none)	4
A	CD-ROM of the specification and drawings	1-3
Y	annexed to the request of Japanese Utility Model Application No. 64380/1993 (Laid-open No. 33321/1995) (Kabushiki Kaisha Kansai Seisakusho), 20 June, 1995 (20.06.95), Full text; Figs. 1 to 8 (Family: none)	4



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search
25 November, 2008 (25.11.08)Date of mailing of the international search report
09 December, 2008 (09.12.08)Name and mailing address of the ISA/
Japanese Patent Office

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2697765 B [0006]
- JP 3029026 B [0006]