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Uchida

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[54] **CHAIR WITH A DETACHABLE SEAT**

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[52] **U.S. Cl.** **160/327,** 160/371, 160/403, 160/404, 297/441

[51] **Int. Cl.** **A47c 5/06**

[58] **Field of Search** 160/327, 371, 383, 385, 160/387, 388, 390, 402, 403, 404; 297/441, 443, 445, 440

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[57] **ABSTRACT**

A chair made of a tubular steel comprises a frame assembly including a pair of lateral bars having a plurality of engaging holes; a flexible seat detachably fixed to the lateral bars and having at each side thereof a bag-like portion formed by being folded back upon itself; and wire-like bars each having two groups of projections and adapted to be inserted into the bag-like portion to permit the projections of one group to be engaged with the associated holes of the lateral bar and the projections of the other group different in a relative angle from those of one group to be forcibly engaged with the associated holes of the lateral bar, in a direction that the relative angle to the projections of one group is decreased, whereby the seat is detachably fixed to the lateral bar.

6 Claims, 5 Drawing Figures

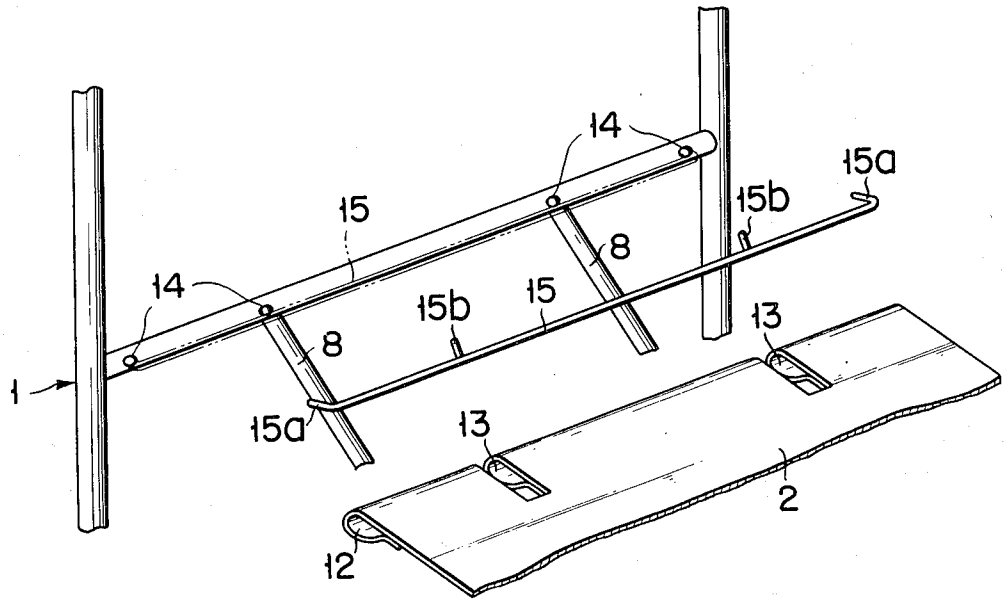


FIG. 1

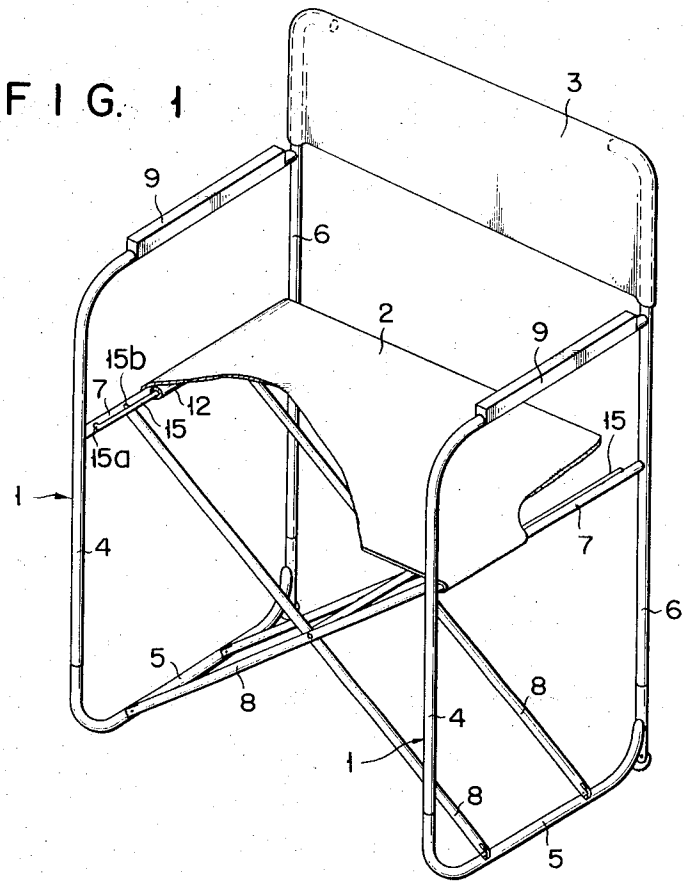


FIG. 2

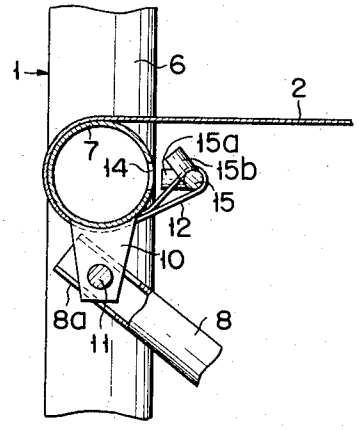


FIG. 3

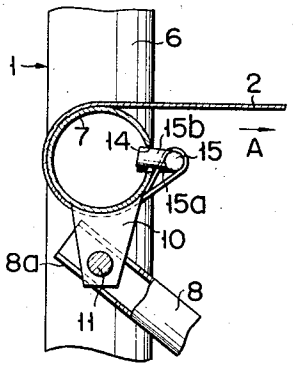


FIG. 5

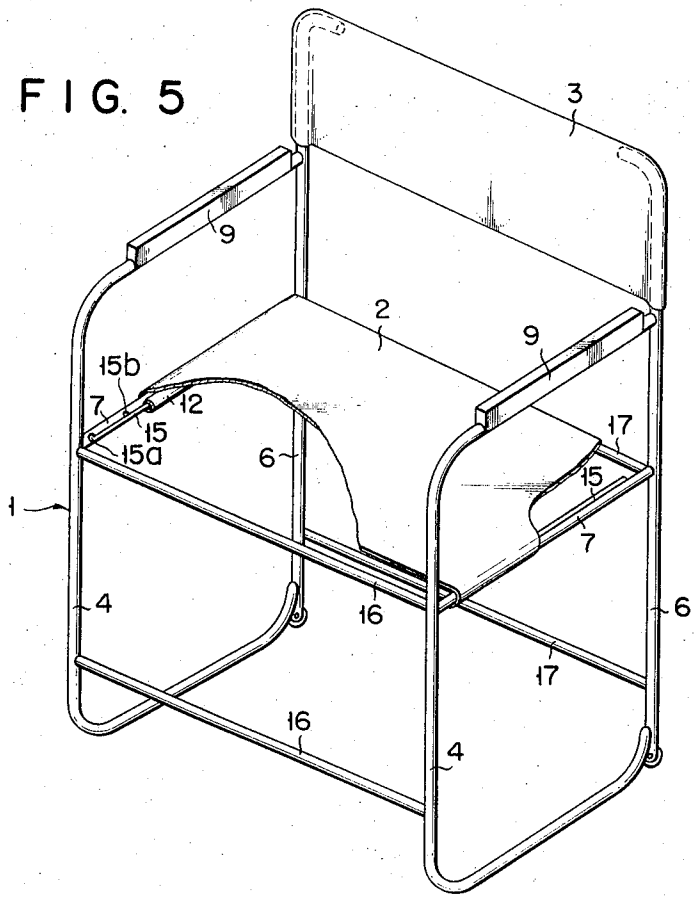
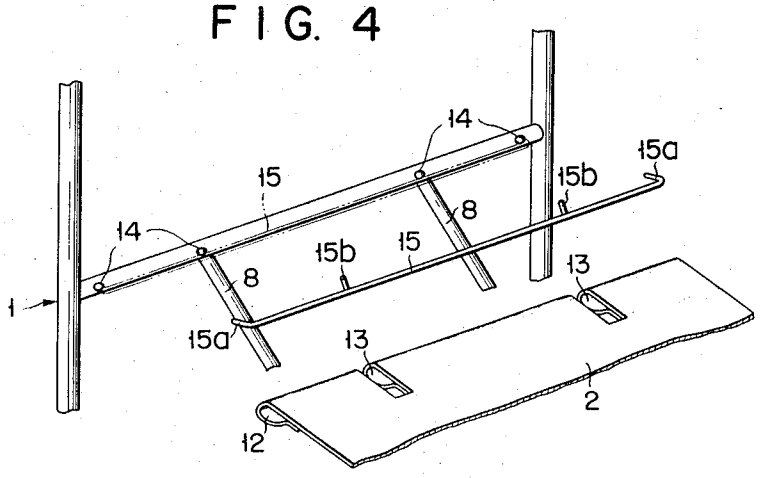

3
9
2
9
15b
7
12
15
15a
6
17
15
7
1
4
16
6
17
16
4

FIG. 4


14
15a
15
15b
8
14
15b
15
13
8
1
15a
13
2
12

CHAIR WITH A DETACHABLE SEAT

BACKGROUND OF THE INVENTION

This invention relates to an improved chair and more particularly to an improved fixing arrangement for fixing a seat to a pair of lateral bars of a frame assembly of a chair such as a collapsible chair made of a tubular steel and having a flexible seat such as, for example, a vinyl leather material, canvas material etc.

Generally, with such a chair simple in structure a seat is wrapped around paired lateral bars of a frame assembly and fixed to the lateral bars by sewing. When the so fixed seat is soiled due to a long use or torn, it is not easy to remove it from the lateral bar for washing or replacement. Therefore, attempt has been made, for example, to fix a plurality of buttons to each side of the seat so that the seat can be detachably fixed to the lateral bar. However, when a person is seated on such a chair, a large load or repeated loads are applied as a concentration load to each button fixed to each side of the seat with the result that the button is damaged or the seat is torn around the button. In order to avoid such a situation a greater number of buttons are required to be used. As a result, it is cumbersome to remove the seat from the lateral frame and a high cost is involved.

SUMMARY OF THE INVENTION

According to this invention there is provided a chair having a seat detachable to a frame assembly. For this reason, each side of the chair is folded back upon itself to provide a bag-like portion at each side thereof, into which a fixing bar is inserted. On the fixing bar a plurality of projections are extended in a direction perpendicular to the axis of the bar, and these projections are adapted to be exposed when the fixing bar is inserted into the bag-like portion. In the paired right and left lateral bars of the frame assembly, on the other hand, engaging holes are provided at predetermined intervals along the lengthwise direction of the lateral bar and in a manner to correspond to the projections of the fixing bar. The right and left bag-like portions are wrapped around the right and left lateral bars with the fixing bar inserted into the bag-like portion. At this time, one group of the projections of the fixing bar are firstly engaged with the associated engaging holes. The remaining projections constituting another group are provided, at a relative angle different from the projections of said one group, around the axis of the fixing bar. Then, said another group of projections are forced into engagement with the associated holes of the lateral bar whereby the seat is fixed to the lateral bar. Unlike the conventional chair in which a seat is fixed by buttons to lateral bars, the chair so constructed is durable and it is easy to remove the seat from the lateral bar. Furthermore, a manufacturing cost can be reduced, since a very simple fixing arrangement is used.

A primary object of this invention is to provide a chair having a detachable seat which is simple in construction and low in manufacturing cost.

Another object of this invention is to provide a chair having a seat easily and rapidly attachable to and detachable from lateral bars.

Another object of this invention is to provide a chair having a detachable, durable seat which can be fixed to lateral bars without involving any unauthorized disengagement from the lateral bar.

Further object of this invention will be understood from a description of preferred embodiments and the disclosure of drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, partly broken away, showing one embodiment of a chair according to this invention in which a seat is fixed to lateral bars;

FIG. 2 is a partially enlarged view of a fixing arrangement showing a state taken immediately before the fixing arrangement is assembled;

FIG. 3 is a partially enlarged view of a fixing arrangement showing a state in which the fixing arrangement is assembled;

FIG. 4 is an exploded, perspective view showing the manner in which a seat is fixed to the lateral bar; and

FIG. 5 is a perspective view, partly broken away, showing a second embodiment of a chair according to this invention, in which a seat is fixed to lateral bars.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a foldable or collapsible chair made of a tubular steel. The chair consists generally of a tubular steel frame assembly **1**, a seat **2** and a back rest **3** or sheet **3**. The frame assembly **1** consists of a pair of right and left side frames **4, 4**, a pair of under frames **5, 5**, a pair of rear frames **6, 6**, a pair of lateral bars **7, 7** and a plurality of cross bars **8, 8**. Both ends of the under frame **5** are slidably inserted into the corresponding lower ends of the side frame **4** and rear frame **6**. At the upper end portions of the rear frames **6, 6** is mounted a back sheet **3** made of a flexible material. At the respective upper sections of the side frames **4, 4**, respective arms **9, 9** are fixed and the rear end of the upper section is rigidly secured to the rear frame **6**. The lateral bar **7** is rigidly supported between the vertical portion of the side frame **4** and the rear frame **6**.

Between the paired lateral bars **7, 7** the seat **2** is removably supported by a fixing arrangement as will later be described. The cross bars **8**, each, have one end hingedly connected to the under frame **5** and the other end hingedly connected to the lateral bar **7**, so that they are crossed in an X-shape. With this frame asembly **1**, the chair is collapsible or foldable in such a direction that the side frames **4, 4** approach to each other. During the folding operation the under frames **5, 5** are automatically withdrawn from the respective lower ends of the slide frame **4** and rear frame **6** under the action of the cross bars **8** . . . .

The seat **2** is made of such a flexible material such as vinyl leather material or canvas material. The back sheet may be made of such material as used in the seat **2**.

The detailed hinge connection between one end of cross bar **8** and the lateral bar **7** is shown in an enlarged form in FIGS. **2** and **3**. A lug **10** is secured in a suspending fashion to the undersurface of the lateral bar **7**. The lug **10** is inserted into a cutout **8***a* provided at the cross bar **8** and pivotally secured to the end of the cross bar **8** through a hinge pin **11**. The other end of the cross bar **8** is hingedly secured to the under frame **5** in the same manner. The arrangement of the frame assembly **1**, seat **2** and back rest **3**, per se, is the same as the conventional tubular steel foldable chair and in this sense no particular difference is noticeable therebetween.

Explanation will now be made of the fixing arrangement for removably fixing the seat **2** to the paired lateral bars **7, 7**. Each side surface of the seat **2** is folded back upon itself to provide an open-ended bag-like portion **12**. The bent edge portion of the seat **2** is sewn up along, or secured by a suitable means to, the under surface of the seat **2**. A pair of cutouts **13, 13** are provided across the bag-like portion of the seat **2**. A spacing between the paired cutouts **13, 13** is equal to a spacing between the paired cross bars **8, 8** hingedly secured to the lateral bar **7**. In the inside surface of the lateral bar **7** four engaging holes **14** are provided. As will be evident from FIGS. **2** and **3**, since the lateral bar **7** is tubular, the engaging hole **14** communicates with the inner tubular hole of the lateral bar **7**. If the lateral bar **7** be solid, the engaging hole **14** assumes a blind hole having a predetermined depth which is directed to the center of the rod. The engaging holes **14** are arranged in a line along the longitudinal direction of the lateral bar **7**.

The inside two holes **14, 14** are provided in a position corresponding to that in which the cross bars **8, 8** are hingedly connected to the lateral bar **7** and the outside two holes **14, 14** are positioned one near to the side frame **4** and one near to the rear frame **6**.

As will be evident from the partial, exploded view of FIG. **4** a pair of fixing bars **15** made of a somewhat thick wire are provided to secure the seat **2** to the lateral bars **7, 7**. Both ends of the bar **15** are bent at a right angle to the axis of the bar **15** to provide engaging projections **15***a*, **15***a* parallel to each other. A spacing between the projections **15***a*, **15***a* is equal to a spacing between said two outside holes **14, 14** of said four engaging holes provided in the lateral bar **7**. The projections **15***a*, **15***a* extend in the same direction relative to the axis of the lateral bar **15**. Two pin-like engaging projections **15***b*, **15***b* parallel to each other are secured, by a suitable means such as welding, to the lateral bar **7** in a manner to be arranged at a right angle to the axis of the bar **15**. The projections **15***b*, **15***b* are provided in a position to correspond to said two inner holes **14, 14** of said lateral bar **7** when the projections **15***a*, **15***a* of the bar **15** are made to face said outside holes **14, 14** of the lateral bar. The projections **15***b*, **15***b* extend at an angle different from that of the projections **15***a*, **15***a* when viewed relative to the axis of the fixing bar **15**.

Explanation will now be made of fixing the seat **2** to the lateral bars **7, 7** using the so constructed fixing arrangement. The bag-like portions **12, 12** of the both side portions of the seat **2** are wrapped around the lateral bars **7, 7** as shown in FIGS. **2** and **3**. During this operation the cutouts **13, 13** of the seat are brought into engagement with the cross bars **8, 8** at a location in which the cross bar is secured to the lateral bar **7**, and thus the cross bar presents no hindrance in wrapping the side portions of the seat **2** around the lateral bar **7**. With the bag-like portion **12** wrapped around the lateral bar **7**, the fixing bar **15** is inserted into the open-ended bag-like portion **12** of the seat **2** to cause the engaging projections **15***a*, **15***a* to be projected from the openings **12, 12** of the bag-like portions **12** of the seat **2** and the engaging projections **15***b*, **15***b* to be projected from the cutouts **13, 13** of the bag-like portion **12** of the seat **2**. Then, the respective bars **15, 15** are manually pulled inwards together with the seat **2** so that the seat **2** is kept taut, and the projections **15***a*, **15***a* of the bar **15** are inserted into the associated engaging holes **14, 14** of the lateral bar **7**. FIG. **2** shows the position taken immediately before the engaging projections **15***a*, **15***a* are inserted into the corresponding holes **14, 14**.

It is only necessary that the remaining two inside projections **15***b*, **15***b* be pushed into the associated engaging holes **14, 14**. This pushing operation is manually effected by forcedly twisting the bar **15** through the utilization of its elastic force in a direction that the relative angle to the projections **15***a*, **15***a* is decreased. FIG. **3** shows the state in which the engaging projections **15***a*, **15***a* and **15***b*, **15***b* are completely fitted into the outside holes **14, 14** and the inside holes **14, 14**, respectively. FIG. **4** shows, by a broken line, the state taken immediately before the projections **15***b*, **15***b* of the bar **15** are inserted into the corresponding holes **14, 14** through the utilization of the twisting of the bar **15**. In the state as shown in FIG. **3** internal stresses are produced due to the twisting of the bar **15** so that projections **15***a*, **15***a* and **15***b*, **15***b* tend to move in the directions opposite to each other and create stressed conditions within the respective holes **14**. This assures a positive engagement of the projections **15***a*, **15***b* with the holes **14**, thus preventing an unauthorized disengagement of the projection from the hole. In this way, the seat **2** is fixed to the lateral bar **7**.

In order to achieve such positive engagement of the engaging projections **15***a*, **15***b* with the associated holes **14** by twisting the fixing bar **15**, it is necessary that the fixing bar, by itself, be made of a flexible metal. Even if the fixing bar **15** is less flexible in nature, the same effect can be attained if the engaging projection, per se, is flexible in nature.

Suppose that a person is seated on a chair so constructed. Then, a load applied to the seat **2** tends to cause the seat **2** to be pulled taut and its pulling force works on the fixing bar **15** through the bag-like portion **12** of the seat **2**. A direction of the force applied to the bar **15** is made vertical to a direction, as shown by an arrow A in FIG. **3**, in which the bar **15** is withdrawn from the associated hole **14**. Therefore, even if its application force is fairly great or is repeatedly applied to the bar **15**, there is no risk of the fixing bar **15** being disengaged from the associated hole **14**.

When it is desired to replace a spoiled seat by a new one, the fixing bar **15** is strongly pulled in the direction shown by an arrow A in FIG. **3** and, then, the respective engaging projections **15***a*, **15***b* are withdrawn from the associated hole **14**. Thereafter, the fixing bar **15** is withdrawn from the baglike portion **12** of the seat **2** to permit the seat **2** to be automatically released from the lateral bar **7**. Then, the new seat can be fixed to the lateral bars **7, 7** through the fixing bar **15** as mentioned above. It is needless to say that the respective projections **15***a*, **15***b* of the fixing bar **15** which are withdrawn from the associated holes **14** are returned to the original unstressed position due to its elastic recovery. Fixing the seat **2** to the lateral bars **7, 7** can be effected with the frame assembly **1** somewhat collapsed, i.e., without pulling the seat **2** taut. In this case, the operation of fixing the projections of the fixing bar **15** to the associated engaging holes **14** will be readily effected.

FIG. **5** shows another embodiment of a tubular steel chair which is, unlike the above-mentioned embodiment, of non-collapsible type. Like the above-mentioned embodiment a seat can be fixed to a frame assembly by the fixing arrangement according to this invention. With this second embodiment, like refer-

ence numerals are used to designate members or elements similar to those of the first embodiment and any further explanation is omitted and, instead, emphasis is put on different parts or members.

With the chair shown in FIG. **5**, a pair of front bars **16, 16** and a pair of rear bars **17, 17** are provided in place of the cross bars **8, 8** of the first embodiment. The front bars **16, 16** have their respective ends rigidly secured to the vertical portions of the right and left side frames **4, 4** and the rear bars **17, 17** have their respective ends rigidly secured to the right and left rear frames **6, 6**. With this embodiment no separate under frame is provided unlike the first embodiment. That is, the under frame constitutes part of the side frame **4**, and the side frames **4, 4** have their respective ends rigidly secured to the rear frames **6, 6**. Furthermore, it is unnecessary to fix the cross bar **8** to the lateral bar **7**, since no cross bar is used in this embodiment. This made it easier to fix the seat **2** to the lateral bars **7, 7** than in the first embodiment. That is, with the first embodiment the cross bars **8, 8** are hingedly connected to the lateral bar **7** and the cross bars **8, 8** present a hindrance in wrapping the bag-like portion **12** of the seat **2** around the lateral bar **7** with the fixing bar **15** preliminarily inserted into the bag-like portion **12** of the seat **2**. For this reason, with the first embodiment of the bag-like portion **12** is firstly wrapped around the lateral bar **7** and then the fixing bar **15** is inserted into the bag-like portion **12** with the projections **15***a*, **15***b* on the bar **15** engaged with the corresponding engaging holes **14**. When the lateral bar **7** is disengaging from the bag-like portion **12** of the seat **2**, the step of removing the fixing bar **15** from the bag-like portion **12** of the seat **2** is necessary.

With the second embodiment, however, the bag-like portion **12** of the seat is wrapped around the lateral bar **17** with the fixing bar **15** preliminarily inserted into the bag-like portion **12** of the seat **2** and then the projections **15***a*, **15***b* of the fixing bar **15** are engaged with the associated engaging holes **14**. When the seat **2** is removed from the lateral bars **7, 7**, it is only necessary to disengage the projections **15***a*, **15***b* of the fixing bar **15** from the associated holes **14**. A difference in operation procedure between the first and second embodiments is due to a minor structural difference and, in any embodiments, it is possible to firmly fix the seat **2** to the lateral bars **7, 7** and it is also possible to easily remove the seat **2** from the lateral bars **7, 7**.

According to this invention, when the seat is soiled due to a long use or torn, the seat is easily removed from the lateral bar for washing or replacement. Unlike a conventional structure in which a seat is fixed by means of buttons, according to this invention no local load is created when a person is seated on a chair. Since the loads on the seat are dispersed over the whole length of the fixing bar, the chair can withstand an appreciably great load or repeated loads and the durability of the seat by itself is therefore prominently enhanced. Moreover, a manufacturing cost can be reduced to a greater extent.

What is claimed is:

1. A chair having a detachable seat comprising in combination

a. a frame assembly including a pair of side frames and a pair of lateral bars rigidly connected to the respective side frames, said respective lateral bars having a plurality of engaging holes longitudinally arranged in a line and spaced apart at predetermined intervals;

b. a seat having both sides doubled back to provide bag-like portions adapted to be wrapped around the respective lateral bars; and

c. a pair of fixing bars inserted into the respective bag-like portions of the seat and having two groups of engaging projections projecting normal to the axis of the fixing bar and engaged in said engaging holes of the lateral bar;

d. said fixing bars, prior to assembly, having one group of the engaging projections differing in a relative angle from the other group of engaging projections so that, when the engaging projections of said one group are engaged with the respective holes of said lateral bars, the engaging projections of said other group are forced into the corresponding holes of said lateral bars, in a direction that the relative angle to the projections of said one group is decreased, whereby the seat is removably fixed to the lateral bar through the fixing bar.

2. The chair according to claim **1** in which said respective members constituting said frame assembly are made of a tubular steel.

3. The chair according to claim **1** in which said engaging holes of the lateral bar are four in number, the outer two of which correspond to the projections of said one group, and the intermediate two of which correspond to the projections of said other group.

4. The chair according to claim **3** in which said bag-like portion of the seat has two cutouts through which the two intermediate projections on the fixing bar are respectively exposed.

5. The chair according to claim **3** wherein the projections of said one group are at respective ends of the fixing bar and the projections of said other group are intermediate said ends of the fixing bar.

6. The chair according to claim **5** wherein said end projections comprise bent over ends of the fixing bar and said intermediate projections are welded to intermediate portions of the fixing bar.

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