(54) Title: CONVERTIBLE SEAT GROUP

(57) Abstract

The object of the invention is a convertible seat group for vehicles saving especially for long distance passenger transport, e.g. touristic buses comprised of seat parts and back-boards, the seat parts and the back-boards are in connection one with another by means of a connecting axle. The characteristic feature of the solution is that there are at least three seats (1) one behind another, on minimally one side of the seats (1) a carrying carcass (3) equipped with a lower motion path (3a) is positioned, the back-board (1b) of the seat (1) is equipped with a leading means (4) and the back-board (1b) and the leading means - or at least one of them - is equipped with one or more suspension appliance(s) (5), the connecting axle (2) is on one hand connected with the leading means (4), on the other hand with the lower motion path (3a) of the carrying carcass (3), further connecting forms (6, 6') are positioned on the upper end (11b) and the lower end (12b) of the back-board (1b), the seat part (1a) is seated on the holding unit (7) which is connected to the carrying carcass (3) by means of the unit (7a) lowerably and releitably.
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Convertible Seat Group

The invention relates to a convertible seat group especially for vehicles of long distance passenger transport e.g. for tourist buses comprising seats which consist of seat parts and back-boards and the back-boards are connected by a connecting axle.

In course of the history travel has always played an important part in the domain of broadening the commercial relations as well as of extension of different cultures. In our days traveling gets more and more belonging to the everyday life and also to entertainment.

One of the forms of touring is the so called "bus tourism" when passengers are being transported even for several weeks between the target stations. Numerous travel bureaus organize such tours - generally "bus tours" - where the passengers have to pass even several nights during the travel sleeping on the seats of the buses.

The advantage of such travel is that the traveling forth at night means time sparing and during the day there could be spent more time for sightseeing.

The disadvantage, however, is that sleeping in a sitting body position does not allow resting, it is even unhealthy. The stress of the organism, the fatigue of the persons desiring to sleep this way is growing, the feeling of comfort is worsening and so they cannot enjoy the services granted them.

In order to solve this problem a trial has been accomplished according to the patent specification registered under No. 1.223.705 in West Germany. The essence of the solution is that behind the bus transporting the passengers and being installed with seats a a trailer of large dimensions is being connected. The internal part of the trailer is divided in several rows and ranks in compartments in which resting-places for single persons are furnished.
This construction makes, indeed, more comfortable the resting during the travel, its disadvantage, however, is that the trailer of large dimensions means important surplus energy consumption, lesser traveling security and even the risk of accident is growing.

Another disadvantage is that the trailer needs important investment costs and so the travels supported by such means of comfort are very expensive.

The aim of our invention is to eliminate the disadvantages of the already known constructions and to develop a new solution by which the resting-places can be simply and quickly established from the seats placed in the passenger-room of the vehicle.

The basic idea of the invention was the recognition that if we can move the back-boards and the seat-parts of the seats independently one of another and associate these with unit-parts satisfying peculiar demands and connect the latter differently than in case of the known solutions, we would be capable of solving the problem.

According to the wanted aim the convertible group of seats complying with the invention, especially for vehicles for long distances passenger transport e.g. for tourist buses which comprise seats with sitting part and back board and these are joined one with another by a connecting axle-established in a way that at least three pieces of seats are positioned one after another and at least on one side of the seats carrying a carcase with lower moving path is positioned, the back-board of the seat is provided with a leading means and at least one of the leading means comprises one or more suspension appliances, the connecting axle is on one side connected with the leading means and on the other side it is connected with the lower moving-path, further on the upper end and the lower end of the back-board connecting parts are positioned and the seat-part is placed on a carrying unit which is connected with the carrying carcase by a joining part in a way to be let down or lifted again.
Another discriminate of the convertible seat-group according to the invention may be that in the space over the seats supplementary parallelogram-sectioned bed(s) are removably fixed.

From point of view of the accomplished form it is advantageous that the carrying carcase is provided with the upper motion path, the supplementary resting-place is on the one side connected with the upper motion-path of the carrying carcase by means of climbing parts and is fixed on the other side to the internal liner plate of the vehicle with the aid of the suspension appliance.

In one of the versions of the invention the lower motion path comprises a leading channel, practically in vertical direction, inserted into the side of the carrying carcase at the side of the seat as well as a fixing arch -to be bent back- and connected to the upper end of the leading channel.

At a possible establishment the suspension appliance is the longitudinal receiving riffle deepened into the back-board.

At another version, beneath the seat-part of the seat an extractable auxiliary pad is fixed. The carrying carcase and/or the seats are equipped with connecting parts to which sleeping-bags are fixed.

At still another version the ends of the carrying carcase are equipped with sliding appliances and by insertion of these, the carcase - slidable in horizontal direction - is fixed to the internal liner plate of the vehicle.

The convertible seat group according to the invention has numerous advantageous features. The most important of these is that by its application the groups consisting of three seats one behind another can simply be converted to three pieces of beds. This is especially important in case of tourist groups, because this way the same amount of beds can be established as is the maximal number of passengers, in very short time.
A further advantage is that the seats and the appliances to be connected with them can be made by traditional means and low costs: they can be built-in without noteworthy reshaping also in older buses.

It is, further, advantageous, that the construction creates the possibility of secure sleeping even during the travel, which is a very important point of view in case of overland long-distance traveling because of the time factor.

The fact that the conversion of the internal part of the bus makes trailing of any object unnecessary: this means not only saving fuel, but also the amount of environmental pollution can be diminished.

It is an indirect advantage that because of traveling without trailer the stableness of the vehicle is growing, the road holding capacity will be better as well as the feeling of comfort of the travelers - and this is especially with the travel companies a primary point of view.

It should be considered as an advantage, too, that the constructional establishment makes the placing and the independent handling of the seat groups possible, so among the seat groups established beside one another and behind one another on group can be converted to resting-place while the next one can remain as a seat. One has even the possibility that while using the upper beds, the seats beneath them can remain unchanged.

We want to make known in the following the invention by accomplishment examples on the basis of drawings. On the drawings

Fig.1. shows the side-view of a variant of the seat group in basic position.
Fig.2. is the view from direction II. partly as a section.
Fig.3. is the side-view of the seat group in converted position, partly as a section.
Fig.4. is the side-view of the Fig.3. from direction IV.
Fig. 5 is the variant equipped with security appliances of one bed of the converted seat group in plan view.

On Fig. 1, we can see the three seats 1 positioned one after the other in basic position, convertible as a group according to the invention. The single seats 1 consist of the seat parts la and the backboards 1b as well as of the 11a auxiliary pads bent back under the seat parts la.

The seat part la and the back-board 1b are joined by the connecting axle with one another and with the carrying carcase 3.

On Fig. 1, it can be seen that the carrying carcase comprises on one hand the lower motion path 3a which receives the end of the connection axle 2 and on the other hand the upper motion path 3b in which the supplementary resting places 8 and their climbing appliances are fitted.

The lower motion path 3a of the carrying carcase 3 is an opening appliance like a hand grip of an umbrella compiled of the leading channel 31a and of the fixing arch 32a, while the upper motion path 3b - which is similar to the form of the lower motion path - is compiled of the leading channel 31b and the fixing arch 32b and is deepened in the carrying carcase 3, too.

With the carrying carcase 3 is connected also the support unit 7 inserted under the seat part la and its function is to hold the seat part la of the seat 1 in the wanted position. One part of the support unit 7 is the connecting part unit 7a with the aid of which the support unit 7 and the appliances of the seat part la can be lowered in a lower position when needed.

On Fig. 1, one can also well see the leading means 4 joining with the back-board 1b of the seat 1 which means consists in this established form of two pieces of rails along the back side of the back-board, positioned parallelly
in longitudinal direction of the board and which comprise also the, as climbing appliances the longitudinal recipient troughs 5a formed the leading means 4.

Fig. 1. shows also that the connecting forms 6 and 6' can be found on the upper end of the back-board 1b as well as of its lower end. At the present variant the connecting form 6 is the metal support carrying the head-holding part 13b of the back board 1b while the connecting form 6' is the deepening established in the lower end 12b of the backboard 1b which is closer to the la seat part and this deepening follows the form and dimension of the connecting form 6 that is passed through the head-holding part 13b.

It is apparent from fig. 1 that the ends 30 of the carrying carcase are joined with the liner plate 9a of the vehicle 9 with the aid of the sliding appliances 21. The sliding appliances consist of the rail 21a connected to the ends 3e of the carrying carcase 3 as well as of the case 21b fixed to the liner plate 9a. This kind of fixing the carrying carcase determines the stable position of the seats 1 in the basic state of the use and enables also the sideboard sliding of the carrying carcase in case of need.

Fig. 2. shows how the convertible group of seats can be positioned according to the invention in the internal space of a vehicle - in our case in a bus. The groups consisting of three pieces of seats 1 positioned one after the other can be found here on both sides, in pairs, of the vehicle 9. It is given by the establishment of the construction that the two neighboring seats 1 flank the carrying carcase 2 and the seats 1 next to the windows are connected with the liner plate 9a of the vehicle 9 while the other sides of the seats 1 positioned on the opposite side of the carrying carcase 3 are connected with the appendage of the support 3d.

On Fig. 2. one can well see the holding unit 7 positioned on the bottom of the seat part 1a of the seat 1 as well as the sliding appliance 21 at the ends 30 of the carrying carcase 3.
Fig. 3. shows in side elevation the position of the three pieces of seats one behind the other and the position of the supplementary resting-place above them. After the conversion. On Fig. 3. it is apparent, how after the dismounting and moving the seats 1 as well as after the letting down the supplementary resting-place three pieces of beds positioned one above the other come into being.

The lowest bed is established by positioning the supplementary pads - slid between the seat parts 1a - one after the other. One can also see that the holding unit 7 supporting the seat part 1a sinks down in its let-down position into the recess 9b established in the liner plate 9a. The middle bed is established by lifting of the back-boards 1b on the section traced by the lower motion path and after inverting, by mounting together with the connecting forms 6 and 6'. The holding in the right position the middle bed mounted this way are the functions of the connecting axles 2 which have to be fastened in the fixing arch 32a of the lower motion path 3a.

The third bed i.e. the top bed consists of a single piece 8, the supplementary resting-place and it is fixed with the aid of the climbing appliances 8a in one part to the bottom of the leading channel 31b the upper motion path 3b and in another part to the suspension appliance 3b reaching down from the liner plate 9a on the top of vehicle 9.

On Fig.4. one can see the front view picture of the converted internal space, and so it will be clear, how the lower and the middle beds are established from the seat part 1a and the back-board of the seat 1 beside one another and above one another as well as the upper beds established from the supplementary resting-places 8.

The secure fixing of those beds being more distant from the internal liner plates 9a covering the side of the vehicle 9 is enabled by the suspension
appliances 8b which can be let down from the upper liner plate 9a, as well as by the support appendages 3d lifted from the internal liner plate 9a which forms the floor.

The Fig. 5 is the plan view of one of the beds. One can see here that on the supplementary resting-places 8 with the aim of helping the sleeping, a sleeping-bag 20 is mounted and this can be joined with the aid of the straps 20a and also using the connection appliances 10 on the one side of the supplementary resting-place to the carrying carcase and on its other side to the suspension appliances 8b.

The sleeping-bag 20 with its fixing this way enables sleeping in the moving vehicle without the risk of the person lying on the bed to fly or runaway from it in case of a quick change of the vehicle's motion.

For the use of the seat group to be converted according to the invention the seats being in basic position can be converted to resting-places as follows. First, removing the connecting axle 2 joining the seat part 1a with the back-board 1b and we separate the seat part 1a and the back-board 1b. After this, we lower by moving the connecting unit 7a the support unit 2 holding the seat part 1a and let it down until the plain of the liner plate constituting the bottom part of the vehicle in a way that meanwhile we drive out the auxiliary pads 11a from beneath the seat-parts 1a and we fill out the free space forming before the more postious two seats 1 and then we fix the seat parts 1a in the given position.

We let slide the head-rests 13b of the loosen back-boards 1b on the connecting form 6 until the head-rest gets in touch with the upper end 11b of the back-board 1b. In this position of the head-rest 13b the connecting form 6 reaches over the head-rest 13b.

Rotating the so prepared back-boards around the connecting axle and pressing the end of the connecting form 6 - which reaches out of one of the
back-boards 1b - into the deepening of the 6' connecting form, established at the lower end 12b of the other back-board 1b, we fix them with one another. We lift the back-boards 1b joined with the aid of the connecting forms 6 and 6' according to the line admitted by the lower motion path 3a of the carrying carcase 3 and move the back-boards 1b with the aid of the connecting axle 2 and of leading means 4 in a way that, on the one hand, the connecting axles 2 should hitch in the fixing arch 32 e of the lower motion path 3 and on the other hand - they should snap into the suspension appliance 5 which is established in our case in the leading means on the back side of the back-boards 1b in form of a longitudinal trough.

As a last step follows the letting down of the supplementary resting-places. In course of this operation we lift first the supplementary resting-place 8 on the line determined by the upper motion path 3b of the climbing appliances 8a and the carrying carcase 3b., this is needed for the climbing appliances to their removal from the fixing arch 32b.

When then the climbing appliances get in the leading channel 31b of the upper motion path 3b, we simply let down the supplementary resting-place until the position where the climbing appliances 8a of the supplementary resting place 8 will prop up on the bottom of the leading channel 31b of the upper motion channel 3b.

As the supplementary resting-place 8 reaches this position, we join also the suspension appliances to the climbing appliances 8a of on the other side of the supplementary resting-place and by this we fix the bed in a position ready for lying.

The resetting of the beds to chairs 1 is simply to be accomplished by the contrary operations to those described above. The convertible seat group
according to the invention can be well applied for every vehicle, but especially for buses where the transport of passengers takes up very much time, eventually several days, e.g. in case of non-stop tours.
List of references

1 seat
   1a seat part
      11a auxiliary pad
   1b back board
      11b upper end
      12b lower end
      13b head-holding part

2 connecting means

3 carrying carcase
   3a lower motion-path
      31a vertical direction
      32a backward bent fixing arch
   3b upper motion path
      31b vertical direction
      32b backward bent fixing arch
   3c end
   3d upper motion path

4 leading means

5 suspension appliance
   5a longitudinal recipient trough

6 connecting form

6' connecting form

7 holding unit
   7a connecting unit

8 supplementary resting-place
   8a climbing appliance
   8b hanger appliance

9 vehicle
   9a liner plate
   9b recess

10 connecting appliances

20 sleeping-bag
   20a strap

21 sliding appliance
   21a rail
   21b case
CLAIMS

1. Convertible seat group, especially for vehicles for long distance passenger transport e.g. for tourist buses comprising seats equipped with seat parts and back-boards and the seat part and the back-board are connected one with another by means of a connecting axle characterized by that, at least three pieces of seats (1) are placed one after another. on at least on one side of the seats (1) a carrying carcase is positioned equipped with a lower motion-path (3a), the back-board (1b) of the seat (1) is equipped with a leading means (4) and the back-board (1b) at least one of the leading means (4) is equipped with one or more suspension appliance(s) (5), the connecting means (2) is on the one hand connected with the leading means (4) and on the other hand with the lower motion path (3a) of the carrying carcase (3), further on the upper end (11b) and the lower end (12b) of the back-board (1b) connecting forms (6, 6'), are positioned and the seat part (1a) is seated on holding units (7) which is connected with the carrying carcase (3) by means of the connecting unit (7a) lowerably and again liftably.

2. The convertible seat group according to claim 1. characterized by that, a supplementary resting-place (8) in form of a bed of parallelogram cross section is removably fixed in the space above the seats (1).

3. The convertible seat group according to claim characterized by that, the carrying carcase (3) being provided with an upper motion path (3b), the supplementary resting-place (8) is on the one hand connected with the upper motion path (3b) of the carrying carcase (3) by means of the climbing appliances (8a) and on the other hand it is fixed to the liner plate (9a) of the vehicle (9) by means of the hanger appliance (8b).
4. The convertible seat group according to any claim 1.-3. characterized by that, the lower motion path (3a) comprises a leading channel suitably of vertical direction (31a) which is deepened in that side of the carrying carcase (3) which is beside the seat (1), and comprises a backward bent fixing arch (32a) which is connected with the upper end of the leading channel (31a).

5. The convertible seat group according to any claim 1.-4. characterized by that, the upper motion path (3b) comprises a leading channel suitably of vertical direction (31b) which is deepened in that side of the carrying carcase (3) which is beside the supplementary resting-place (8) a backward bent fixing arch (32b) connected with the upper end of the leading channel (31b).

6. The convertible seat group according to any claim 1.-5. characterized by that, a longitudinal recipient trough (5a) deepened into the back-board (1b) is the suspension appliance (5).

7. The convertible seat group according to any claim 1.-6. characterized by that, an auxiliary pad (11a) to be driven out is fixed under the seat part (1a) of the seat (1).

8. The convertible seat group according to any claim 1.-7. characterized by that, the carrying carcase. (3) and/or the seats (1) are equipped with connecting appliances (10) and by means of straps (11a) sleeping-bags (20) are fixed to the connecting appliances (10).

9. The convertible seat groups according to any claim 1.-8. characterized by that, the ends (30) of the carrying carcase (3) equipped with sliding appliances (21) and the carcase (3) is by inserting the sliding appliances (21) is horizontally slidably fixed to the liner plate (9a) of the vehicle (9).
Fig. 5.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

**IPC**: B 60 N 2/34

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)

**IPC**: B 60 N 2/32, 2/34; B 61 D 31/00, 33/00

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

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<td>US 4 735 456 A (HAEFELFINGER) 05 April 1988 (05.04.88), totality.</td>
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**Date of the actual completion of the international search**
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