In a vehicle seat (1), in particular a motor vehicle that is for a rear installation and includes a seat cushion support (3) that is constructed from multiple components (41, 43, 45) that are connected with each other, the seat cushion support (3) contains in the direction (y) transverse to the seat an adjustable width in which at least two of its components (41, 43) can be connected to each other in different relative positions.
VEHICLE SEAT, IN PARTICULAR A MOTOR VEHICLE SEAT

RELATED APPLICATION

[0001] The present application claims priority to DE 10 2005 060 446.3, which was filed Dec. 17, 2005. The entire disclosure of DE 10 2005 060 446.3 is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to a vehicle seat, in particular a motor vehicle seat for a rear installation, with the seat having a seat cushion support and a backrest, wherein the seat cushion support is constructed from multiple components that are connected to each other.

[0003] As an example, known vehicle seats of the type described immediately above are disclosed in DE 103 11 870 A1 and used at the rear of a vehicle's seating compartment, in particular in limousines with a notchback body style. The trunk can be connected to the passenger compartment by pivoting the backrest forward and downward toward the seat cushion. The vehicle seat is adapted in its width to the space that is determined by the vehicle structure.

BRIEF SUMMARY OF SOME ASPECTS OF THE INVENTION

[0004] An aspect of the present invention is the provision of improvements to a vehicle seat of the type mentioned above. In accordance with one aspect of the present invention, a vehicle seat, such as but not limited to a motor vehicle seat for use at the rear of a vehicle's seating compartment, has a seat cushion support and a backrest, and the seat cushion support is constructed from multiple components that are connected to each other. At least two of the multiple components of the seat cushion support can be connected to each other in different relative positions in a transverse direction of the vehicle seat, so that the seat cushion support has an adjustable width.

[0005] Because the seat cushion support has an adjustable width in the direction transverse to the seat, wherein at least two components of the seat cushion support can be connected to each other in different relative positions that differ according to different vehicle structures and are adaptable to customer requirements, vehicle seats can be manufactured by making use of numerous similar components and assemblies (so-called identical parts). A modular system is thereby available that saves, in particular for small batches, relatively high tool costs and thereby makes the manufacturing more economical.

[0006] The seat cushion support contains for the adjustable width preferably two sides as identical parts (i.e., seat cushion supports with different widths can have the same types of sides) and at least one cross beam that is to be connected with the sides. The cross beam can be relocatable in the direction transverse to the seat in different positions relative to at least one side, preferably both sides. The cross beam itself can be an identical component (i.e., seat cushion supports with different widths can have identical cross beams), whereby in general smaller width differences can be adjusted. In addition, the cross beam can be constructed as a profile (an elongate piece with a profile in an end elevation view of the cross beam) which can be cut to length in order then to be able to realize larger width differences. Preferably, therefore, as many as possible functions are integrated into the sides in order to design the cross beam to be as simple as possible.

[0007] For a prepositioning and definition of the mobility in the direction transverse to the seat, one of the sides, and preferably both of the sides, contain a projection with approximately the same profile as the cross beam. If additional cross beams of the seat cushion support are provided, they may be constructed in the same way or generally contain a selectable width.

[0008] The selectable width is preferably realized in part by virtue of the fact that respective components can be chosen from a set of components of different widths, with each of the components of the set otherwise having constant dimensions. That is, the components of the set have the same dimensions, except that they have different widths.

[0009] The backrest is preferably constructed with an adjustable width corresponding to the seat cushion support. More specifically, the backrest includes two side cross spars as identical components and at least one cross spar that is in particular constructed as a profile that can be cut to length, and they can be connected to each other (or at least one side cross spar and the transverse spar can be connected to each other) or to a backrest sheet with a selectable width, in such a way that they can be displaced in the direction transverse to the seat in different relative positions with respect to each other. The subject side cross spars preferably contain a projection with approximately the same profile as the transverse spar.

[0010] Other aspects and advantages of the present invention will become apparent from the following.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention is further explained in the following with reference to an exemplary embodiment shown in the drawings, in which:

[0012] FIG. 1 is an exploded view of the exemplary embodiment without cushioning, and

[0013] FIG. 2 is a corresponding perspective view of the exemplary embodiment without cushioning.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENT

[0014] A vehicle seat 1 of the exemplary embodiment of the present invention is designed for installation in the rear seating area in a motor vehicle. The vehicle seat comprises a seat cushion support 3 and a backrest 5 that is pivotally connected to the seat cushion support 3. The vehicle seat 1 has a width, and this width should be understood to be the dimension that lies in the direction y that is transverse to the seat, i.e., horizontal and perpendicular to the normal direction in which the vehicle travels. The seat cushion support 3 and the backrest 5 are separately cushioned.

[0015] The backrest 5 contains an at least approximately flat backrest sheet 7 as well as a straight, upper transverse spar 9 and two approximately L-shaped side spars 11. The spars 9, 11 are all three connected to the backrest sheet 7,
thus forming a box girder profile. The upper transverse spar 9 extends in the direction y that is transverse to the seat, and both side spars 11 extend approximately perpendicular to the upper transverse spar 9 and parallel to the plane of the backrest sheet 7. The backrest 5 can be pivoted relative to the seat cushion support 3 around a first axis A. The first axis A is defined by links (e.g., pivots) that are for linking the backrest 5 to the seat cushion support 3, and these links are referred to as the upper backrest pivots 12 in the following. The upper backrest pivots 12 are arranged on the outside of the side spars 11 in the exemplary embodiment.

[0016] In addition, the backrest 5 is linked in such a way that it can pivot at the rear bases 13 around a second axis B. The second axis B is defined by links, which are referred to in the following as lower backrest pivots 14. The rear bases 13 are rigidly attached to the vehicle structure. The backrest 5 can therefore be rotated around the second axis B relative to the vehicle structure. The second axis B is arranged underneath the first axis A and proximate to the bottom edge of the backrest. After the seat cushion support 3 is linked at the front end by way of rocker arms 15 on the front bases 17 that are rigidly connected to the vehicle structure, a quadruple-joint is defined on each side of the vehicle seat by the axes A and B and the upper and lower linkage locations (i.e., upper and lower rocker arm pivots) of the rocker arm 15. More specifically and in accordance with the exemplary embodiment, each rocker arm 15 is a link having opposite ends, with one of the opposite ends being pivotally mounted (e.g., by way of a lower rocker arm pivot) to the respective front base 17, and the other end being pivotally mounted (e.g., by way of an upper rocker arm pivot) to the respective side component 41. The side components 41 are discussed in greater detail below. Preferably, at least one of the quadruple-joints can be driven by a motor, for example, via a toothed segment that is formed on the rocker arm 15 of the quadruple joint and that engages with the pinion gear of an electromotive drive unit.

[0017] The backrest’s inclination can also be adjustable via an additional electromotive drive unit in the region of the upper end of the backrest or via a fitting driven by a motor. Preferably, the backrest 5 can be locked with a backrest lock in the region of the upper end of the backrest or—in the case of a free-standing implementation—with at least one fitting at the location of a backrest pivot 12 or 14.

[0018] When the backrest 5 is unlocked, the quadruple-joints can be simultaneously folded (manually or with a motor), i.e. folding can be carried out so that the backrest 5 folds forward and the seat cushion support 3 is lowered so that when the backrest 5 arrives in a horizontal position the seat cushion support 3 arrives in its deepest possible, lowered position. This final position is referred to as the Explorer position (or base position or compacted configuration). The quadruple-joints bring the vehicle seat 1 back into the starting position in a corresponding reversed sequence. The starting position is referred to as a use position, in which the backrest 5 extends uprightly from the seat cushion support 3 so that a user can sit in the vehicle seat 1.

[0019] The assembled, composite seat cushion support 3 includes two side components 41, a front cross beam 43, and a rear cross beam 45, and these components are connected to each other in the form of a frame. Both side components 41 serve at their rear upper end for linking to the backrest 5 at the first axis A via the upper backrest pivots 12. Both side components 41 serve at their front end for respectively linking to the rocker arms 15 via the upper rocker arm pivots. Both of the cross beams 43 and 45 extend between the side components 41 and occupy the width that is available to the seat cushion support 3. The front cross beam 43 is constructed in the remaining dimensions to be always larger than the simple rear cross beam 45. Between both the cross beams 43 and 45 wires are attached (spot-welded) that serve as a support 47 for the padding.

[0020] The vehicle seat 1 according to the exemplary embodiment of the present invention can be adjusted in its manufacturing to different widths. If only vehicle seats 1 with smaller widths are to be provided: then the backrest sheet 7, as well as the rear cross beam 45 have a selectable width, i.e., they are selectable from a set of specimens of different width, whereas the other components (i.e., the upper transverse spar 9, side spar 11, front cross beam 43, and side component 41, in conjunction with joints, rocker arms 15, bases 13 and 17) are always constructed with constant dimensions, i.e., so-called identical parts. That is, for vehicle seats 1 with different widths, the backrest sheets 7 and the rear cross beams 45 of these vehicle seats are respectively different, whereas the other components (i.e., the upper transverse spar 9, side spar 11, front cross beam 43, and side component 41, in conjunction with joints, rocker arms 15, bases 13 and 17) of these vehicle seats are respectively the same.

[0021] The front cross beam 43 is a rolled seat sheet profile which is integrally constructed in the direction y transverse to the seat. More specifically and in accordance with the exemplary embodiment, the cross beam 43 has a length (which is sometimes referred to as width since this length extends in the widthwise direction of the vehicle seat 1) that extends in the y direction that is transverse to the seat, and a predetermined profile in an end elevation view of the cross beam. The profile of the cross beam 43 can comprise an undulating shape. In accordance with the exemplary embodiment of the present invention, the side components 41 contain a lateral projection 411 that has approximately the same profile as the front cross beam 43 (i.e., preferably has dimensions deviating only in material strength). During the manufacturing of the seat cushion support 3, the front cross beam 43 can thereby be inserted on both sides into (or through) the projections 411 of the side components 41, whereby in the direction y transverse to the seat the necessary width of the seat cushion support 3 can be adjusted via the insertion depth of the front cross beam 43, thus via a relative displacement of the front cross beam 43 and the side component 41. The front cross beam 43 is subsequently rigidly connected, for example, welded, to both side components 41.

[0022] In the same manner the upper transverse spar 9 consists of a U-shaped sheet profile which is likewise integrally constructed in the direction y transverse to the seat. More specifically and in accordance with the exemplary embodiment, the upper transverse spar 9 has a length (which is sometimes referred to as width since this length extends in the widthwise direction of the vehicle seat 1) that extends in the y direction that is transverse to the seat, and a predetermined profile in an end elevation view of the upper transverse spar. The profile of the upper transverse spar 9 can
be U-shaped. In accordance with the exemplary embodiment of the present invention, the side spars 11 contain a lateral projection 11' that has approximately the same profile as the upper cross spar 9 (i.e., preferably has dimensions deviating only in material strength). During the manufacturing of the backrest 5, the upper transverse spar 9 can thereby be inserted on both sides into (or through) the projection 11' of the side spar 11, whereby in the direction y transverse to the seat the necessary width of the backrest 5 can be adjusted via the insertion depth of the upper transverse spar 9, thus via a relative displacement of the upper transverse spar 9 and the side spar 11. The upper transverse spar 9 and the side spar 11 are rigidly attached, for example, welded, to the backrest sheet 7 and optionally to each other.

[0021] When a larger area of different widths must be covered, the front cross beam 43 and/or the upper transverse spar 9 can be respectively cut to length from significantly longer profiles, i.e., a type of bulk stock. In a variation, the front cross beams 43 and/or the upper transverse spar 9 has a selectable width, i.e., they are selectable from a set of specimens with different widths.

[0024] As an example and further regarding the backrest 5 being unlocked and the quadruple-joints being simultaneously folded, after the vehicle seat has been fully installed in a vehicle, the quadruple-joint at each side of the vehicle seat provides a four-bar linkage in accordance with the exemplary embodiment of the present invention. In this regard and for a representative one of the four-bar linkages of the exemplary embodiment, the first bar of the four-bar linkage is the rocker arm 15; the second bar of the four-bar linkage is the combination of the bases 13, 17 and the vehicle structure or other structure to which the bases are both fixedly connected; the third bar of the four-bar linkage is the structure of the vehicle seat 1 that extends between the upper and lower backrest pivots 12, 14; and the fourth bar of the four-bar linkage is the side component 41. As shown in FIG. 1 for the exemplary embodiment of the present invention, each side component 41 can, for example, be formed from separate pieces, such as a forward piece and a rearward piece. For a representative one of the illustrated side components 41, the forward piece of the side component 41 is pivotally connected to the respective rocker arm 15, the rearward piece of the side component 41 is connected to the respective upper backrest pivot 12, and the forward and rearward pieces of the side component 41 are fixedly connected to one another to form the rigid side component 41.

[0025] It will be understood by those skilled in the art that while the present invention has been discussed above with reference to an exemplary embodiment, various additions, modifications and changes can be made thereto without departing from the spirit and scope of the invention as set forth in the following claims.

What which is claimed:

1. A vehicle seat comprising:

a backrest; and

a seat cushion support, wherein

the seat cushion support includes multiple components that are connected with each other, and

at least two of the multiple components can be connected to each other in different relative positions in a transverse direction of the vehicle seat, so that the seat cushion support has an adjustable width.

2. The vehicle seat according to claim 1, wherein the multiple components are cooperative so that at least one component of the multiple components remains the same irrespective of the width of the seat cushion support.

3. The vehicle seat according to claim 1, wherein the multiple components include:

- two side components, wherein each of the side components remains the same irrespective of the width of the seat cushion support; and

- at least one cross beam, wherein the cross beam and at least one of the side components are cooperative so that the cross beam can be connected to the at least one of the side components in different relative positions in the transverse direction of the seat, so that the cross beam is displaceable with respect to the at least one of the side components in the transverse direction of the seat.

4. The vehicle seat according to claim 3, wherein the cross beam has a length and a profile, and the cross beam can be cut to change the length of the cross beam and thereby adjust the width of the seat cushion support.

5. The vehicle seat according to claim 3, wherein:

- the cross beam has a profile,

- the at least one of the side components includes a projection with a profile, and

- the profile of the cross beam is approximately the same as the profile of the projection.

6. The vehicle seat according to claim 3, wherein:

- the cross beam is a first cross beam, and

- the seat cushion support includes a second cross beam with a selectable width.

7. The vehicle seat according to claim 6, wherein the second cross beam having a selectable width comprises:

- the second cross beam being selectable from a set of components of different width with otherwise constant dimensions.

8. The vehicle seat according to claim 1, wherein:

- the backrest includes multiple components that are connected with each other,

- at least two of the multiple components of the backrest can be connected to each other in different relative positions in the transverse direction of the seat, so that the backrest has an adjustable width;

the multiple components of the backrest include

(a) two side spars, wherein each of the side spars remains the same irrespective of the width of the backrest, and

(b) a transverse spar; and

the transverse spar can be connected in different relative positions in the transverse direction of the seat with respect to at least one of the side spars, so that the
transverse spar is displaceable with respect to the at least one of the side spars in the transverse direction of the seat.

9. The vehicle seat according to claim 8, wherein:
the transverse spar has a profile,
the at least one of the side spars includes a projection with a profile, and
the profile of the transverse spar is approximately the same as the profile of the projection of the at least one of the side spars.

10. The vehicle seat according to claim 8, wherein the transverse spar has a length and a profile, and the transverse spar can be cut to change the length of the transverse spar and thereby adjust the width of the backrest.

11. The vehicle seat according to claim 8, wherein the transverse spar is connected to the at least one of the side spars.

12. The vehicle seat according to claim 8, wherein the multiple components of the backrest includes a backrest sheet having a selectable width, and the transverse spar (9) is connected to the backrest sheet.

13. The vehicle seat according to claim 1, wherein the backrest is pivotally mounted to the seat cushion support.

14. The vehicle seat according to claim 13, wherein:
the backrest is mounted for being rotated about
(a) a first axis relative to the seat cushion support, and
(b) a second axis relative to vehicle structure,
the seat cushion support is connected to the vehicle structure via pivotable links, and
pivots of the pivotable links in combination with the first and second axes define on each side of the vehicle seat a quadruple-joint through which the vehicle seat can be converted from a use position, in which the backrest extends uprightly from the seat cushion support, to a compacted configuration by folding the backrest forwardly and the lowering of the seat cushion support.

15. A vehicle seat comprising:
a backrest; and
a seat cushion support, wherein
the seat cushion support includes at least one cross beam, a first side component and a second side component,
the cross beam is positioned between and operatively connected to the first and second side components to at least partially form a frame of the seat cushion support,
the first side component includes a projection that projects toward the second side component, and
the cross beam extends at least partially into the projection of the first side component.

16. The vehicle seat according to claim 15, wherein:
the second side component includes a projection that extends toward the first side component, and
the cross beam is extends at least partially into the projection of the second side component.

17. The vehicle seat according to claim 16, wherein:
the cross beam has a profile;
the projection of the first side component has a profile that is about the same as the profile of the cross beam, and
the projection of the second side component has a profile that is about the same as the profile of the cross beam.

18. The vehicle seat according to claim 17, wherein the profile of the cross beam comprises an undulating shape.

19. A method of assembling a vehicle seat, comprising:
adjusting a width of a seat cushion support, wherein the adjusting of the width comprises changing the relative position between at least two components of the seat cushion support in a transverse direction of the seat, and
then connecting the at least two components with each other.

20. The method of claim 19, wherein:
the changing of the relative position between the at least two components comprises changing a distance to which a cross beam is at least partially inserted into a projection of a first side component; and
the connecting of the at least two components comprises connecting the cross beam to the first side component while the cross beam is at least partially inserted into the projection of the first side component.

21. The method of claim 20, further comprising changing a distance to which the cross beam is at least partially inserted into a projection of a second side component, and then connecting the cross beam to the second side component while the cross beam is at least partially inserted into the projection of the second side component, wherein:
the cross beam is positioned between the first and second side components after the cross beam has been connected to the first and second side components,
the projection of the first side component projects toward the second side component after the cross beam has been connected to the first and second side components, and
the projection of the second side component projects toward the first side component after the cross beam has been connected to the first and second side components.

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