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(54) Abstract Title
Vehicle seat convertible into a bed

(57) A bench seat for a vehicle which is convertible into a bed where there is a widening element 15 so as to provide a wider lying surface when the seat is in the bed position. The vehicle seat comprises a seat part 10 with a seat surface 11 and a back part 12, which can be folded over with a back surface 13, so as to swing the bench seat out in a longitudinal direction to form a substantially flat lying surface. Along one side of the seat and spaced away therefrom, is provided a widening element 15, which is pivotably mounted on a shaft 16. When the widening element 15 is in the horizontal position it forms part of a widened lying surface with the swung out bench seat, and when in the vertical position, the widening element 15 is spaced from the bench seat forming a free space there between. The shaft 16 is mounted so as to be vertically displaceable.

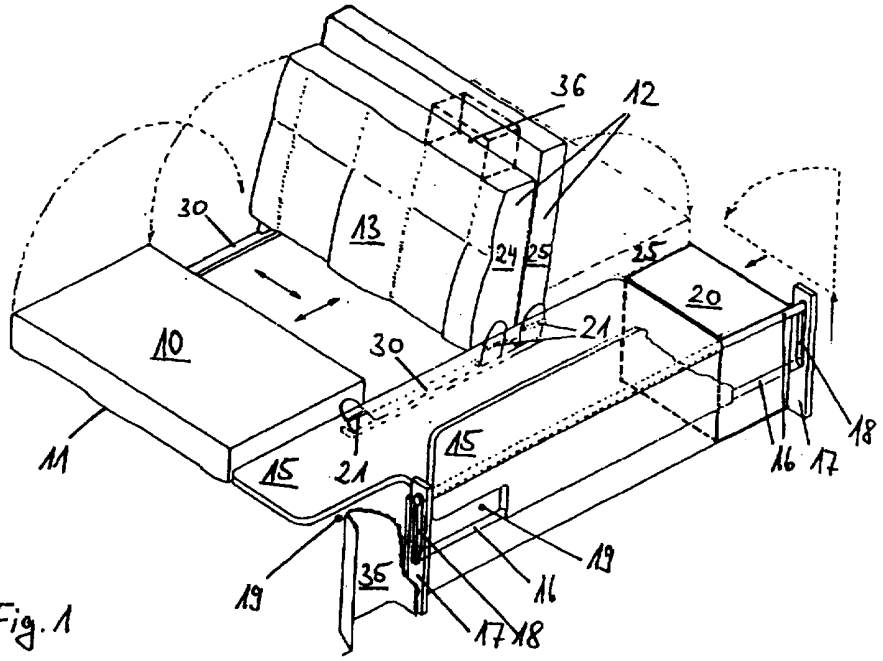

Fig. 1

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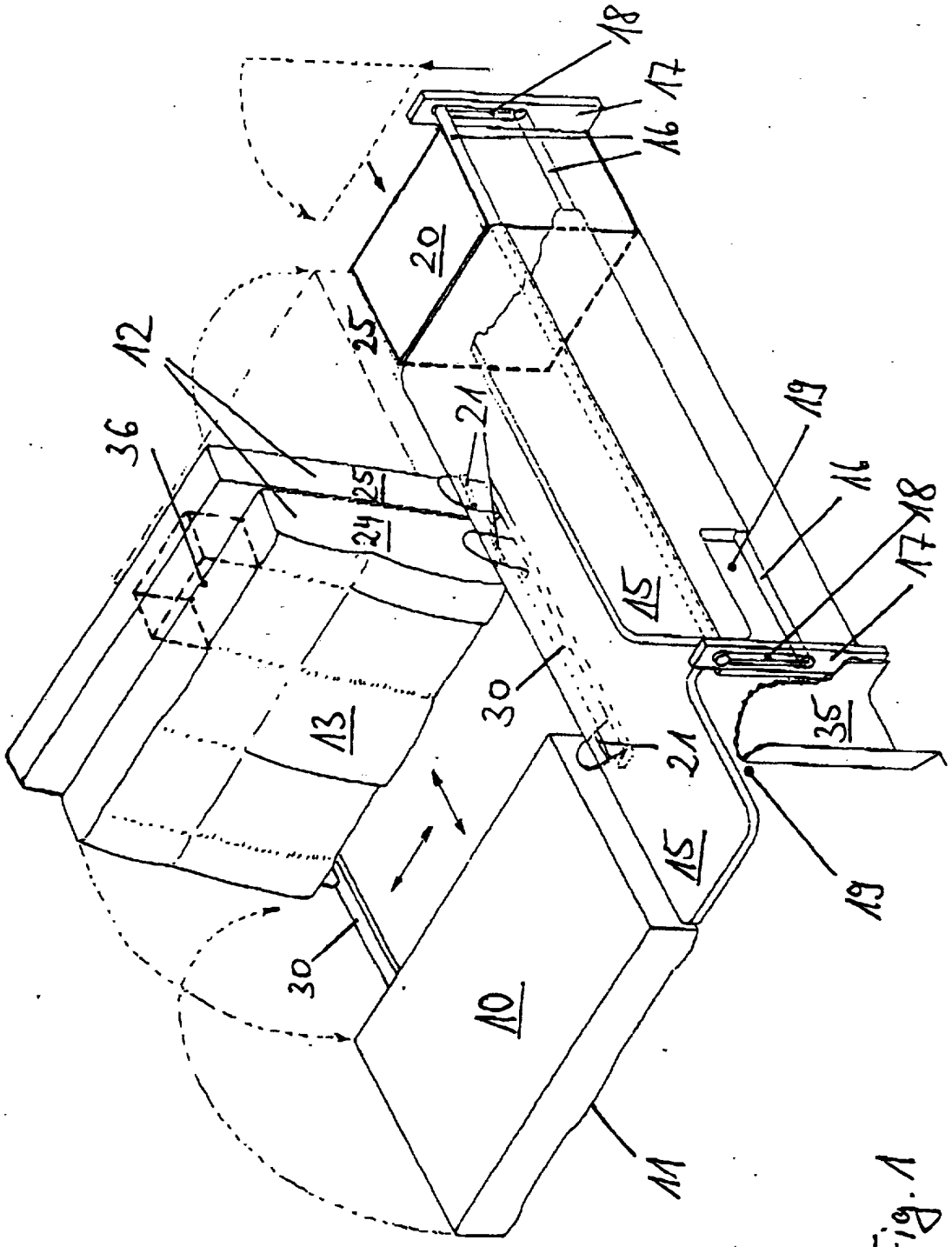

Fig. 1

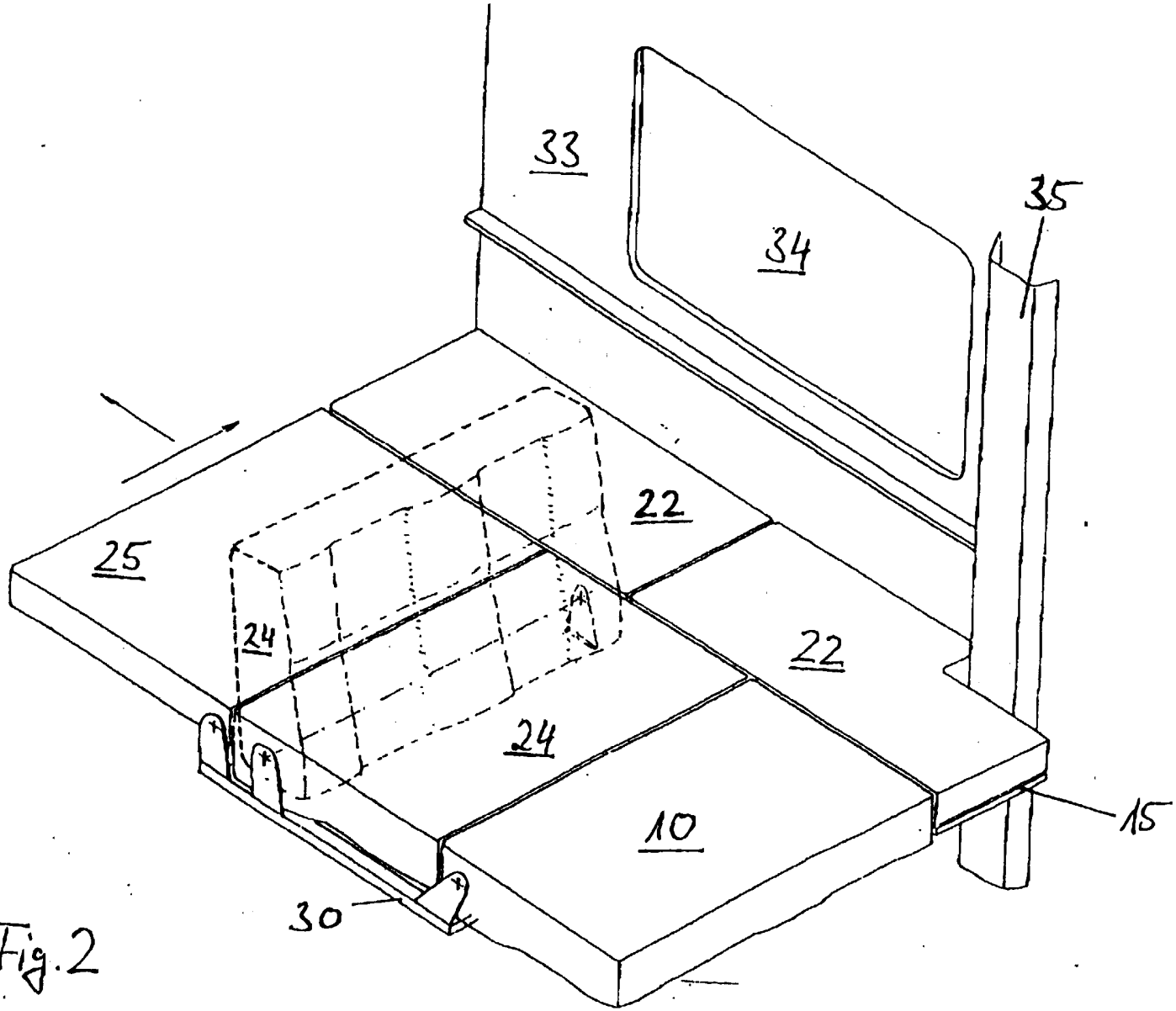

Fig. 2

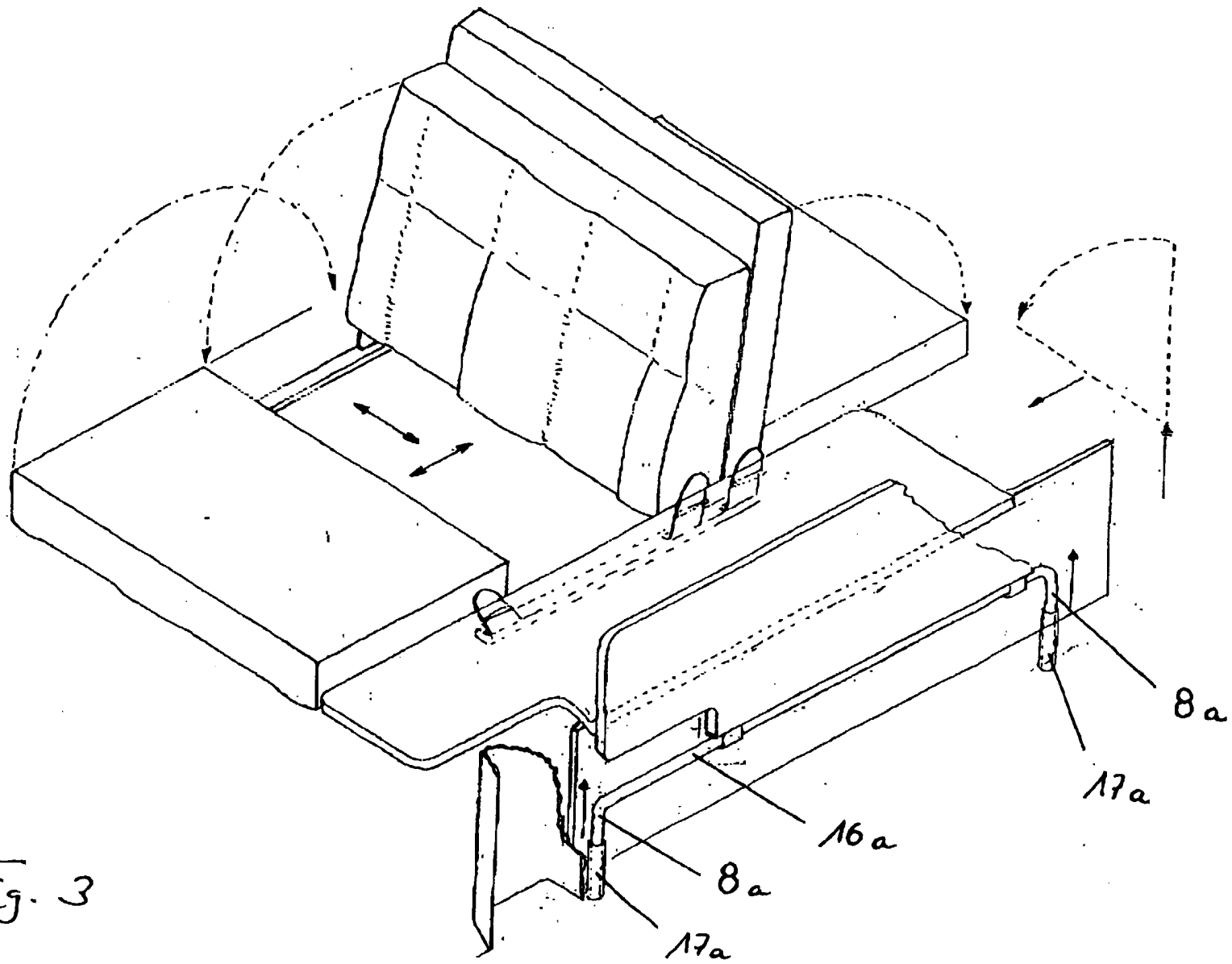

Fig. 3

BENCH SEAT ARRANGEMENT

The invention relates to a bench seat arrangement.

Such bench seat arrangements are more particularly used in vehicles, preferably in compact vehicles or motor homes.

In such compact vehicles the available space is generally greatly restricted and the existing space availability must be utilized to the greatest possible extent. Thus, generally no separate sitting and lying or reclining areas are provided. It is therefore conventional practice in such vehicles to make use of sitting/reclining combinations, in which, when necessary, a bench seat can be converted into a reclining or lying surface.

However, different and in part opposing demands are made on a bench seat on the one hand and a bed or lying surface on the other.

Thus, bench seats must be compact and can only have a width between approximately 90 and 95 cm, because in a lateral area of the bench seats there must be a passage to the rear vehicle area and also on the vehicle side wall opposite to the bench seat generally further fitments or furnishing are installed.

However, a lying or reclining surface must have a maximum length and width, so that a good lying comfort exists, also for two persons.

It is also necessary with such bench seat systems that it is possible to achieve a rapid and simple conversioiin between bench seat and lying surface.

The object of the invention is to create a bench seat arrangement, particularly for a vehicle, which on the one hand is space-saving and on the other can be converted particularly simply to a relatively large lying surface.

According to the invention this object is achieved by the bench seat arrangement having the features of claims 1 and 8.

A basic principle according to the first aspect of the invention is to provide a widening element, which is pivotably mounted on a shaft between a vertical position and a horizontal position, whilst being adjacent to the bench seat in the horizontal position, the shaft being mounted in vertically displaceable manner.

This makes it possible in a simple manner to bring about a widening of the lying surface, in that the widening element is adjacent to the lateral area of the bench seat and the lying surface is enlarged. As a result of the vertical displaceability of the shaft on which the widening element is pivotably mounted, an extremely space-saving housing of even large-area widening elements is possible. In particular, as a result of the "lowerable" widening element a housing thereof in the vicinity of the vehicle side walls

is possible, so that even with a relatively large widening element width, visibility through the window located in the side walls and positioned above the widening element is not impaired.

According to a preferred embodiment of the invention, the widening element is displaceable on the shaft in an axial direction of the latter. This makes is possible to bring about a widening of the usable lying surface over and beyond the original position of the widening element in the vehicle longitudinal direction, so that a particularly large lying surface can be obtained.

It is also advantageous if two holding or retaining elements are arranged in each case with a guiding device with a specific mutual spacing and the shaft is vertically displaceable along the guiding devices. In the case of a robust and inexpensive construction, this permits a particularly simple and user-friendly conversion of the bench seat into a lying surface. The retaining elements can be constructed in plate-like manner with a guide link or in rod-like or tubular manner with a cylinder guide or guide hole. In the latter case the shaft is preferably bent into a C-shaped rod, which is vertically guided in the guide tubes.

Preferably in an area remote from the shaft the widening element has a length, which approximately corresponds to the given spacing of the two retaining elements and the widening element in its area adjacent to the shaft has a recess for shortening the length. This permits a complete utilization of the maximum widening element length resulting from the spacing of the retaining elements. However, as a result of the clearly defined design of the recess

there can be a desired displacement in the vehicle longitudinal direction. In this way the widening element can be moved past the B-column of the vehicle, so that also the space area around the B-column can be used as a lying surface area.

A box-type element is placed between the widening element located in the vertical position and the bench seat. The box-type element can serve as a receiving container e.g. for lying or reclining cushions and the like. In the case of a corresponding design, the upper surface of the box-type element can serve as a surface element of the lying surface, which further increases the size of the lying surface. The box-type element preferably has a height such that it is terminated in flush manner with the widening element in the swung out, horizontal position.

For a particularly simple and robust fixing of the widening element in its horizontal position, preferably on the bench seat there is at least one support element, on which the widening element rests in the horizontal position.

In an advantageous embodiment of the invention the widening element has a supporting frame structure. This permits a particularly material-saving, lightweight, but still stable design of the widening element. For example, the supporting frame structure could comprise a light metal hollow frame, e.g. of aluminium and it can be covered with a fabric or braiding. This widening element can be provided in fixed form with a rest cushion. For a particularly space-saving arrangement in the swung up position of the widening element, it is advantageous for the cushion to be removeable and to be separately housed, e.g. in the afore-mentioned box-type element.

Another fundamental principle according to the second aspect of the invention is that the bench seat comprising a seat part and a back part is designed in such a way that the seat part is articulated in its area remote from the back part and can be folded over by approximately 180° into a lying or reclining position, that the back part comprises a front back element and a rear back element, which are in each case articulated in the lower foot or base area, that the front back element together with the back surface can be folded over forwards into a horizontal position and that the rear back element can be folded over backwards into a horizontal position.

As a result of the back part comprising two back elements which can be folded over, in conjunction with the over-foldable seat part, a lying surface length is obtained which is significantly greater than that of conventional bench seats, in which in general the lying surface is solely formed by the one-piece, folded over back part with the seat part.

Moreover, as a result of the folding over, as desired, of the rearwardly over-foldable, rear back element the lying surface length is freely selectable, because the rear back element can be made almost randomly large. An important advantage of this arrangement is that the contoured seat or back surfaces of the seat or back part can be folded downwards and are consequently not part of the lying surface. Through a corresponding upholstered, flat design of the rear areas of the seat part and the back elements it is possible to produce a comfortable and almost completely flat lying surface.

In addition, as a result of the forwardly foldable seat area, in simple manner and without any complicated conversion, it is possible to lengthen the lying surface towards the driver's compartment or cab. Thus, particularly together with the widening device according to the invention, the lying surface can project into the cab and consequently permits a particularly efficient utilization of the available space.

According to an advantageous development of the invention the bench seat is fitted to a sliding carriage, which is displaceably mounted along at least one axis. This permits an even better and also more flexible utilization of the vehicle space, because the position of the lying surface can be adapted to the given spatial circumstances. For example, in this way the entire lying surface can be moved towards the cab, so that in the rear vehicle area opposite to the cab a very large space is obtained, which can e.g. be used for storing luggage.

The bench seat arrangement according to the invention can be used wherever a bench seat in the form of a lying combination must be converted in a confined space to a flat bed or transportation surface, such as e.g. in the caravan or boat sector. However, it is preferable to provide the bench seat arrangement according to the invention in a vehicle, particularly a compact vehicle or motorhome. Particularly in such vehicles, e.g. on journeys, when camping or for transporting large objects, it is particularly advantageous to use the space-saving seat bench arrangement which can be transformed into a large lying or reclining surface.

In a vehicle a driver's seat and optionally also the passenger front seat, which are displaceably secured in a vehicle longitudinal direction between a rear and a front position, that the bench seat arrangement is located in the vehicle longitudinal direction behind the driver's seat and optionally the frontpassenger seat and that when the driver's and optionally passenger's front seat are moved forwards the bench seat arrangement in the folded or swung out position extends forwardly over the rear position of the driver's seat and optionally the front seat passenger's seat. This makes it possible to achieve an extremely efficient space utilization. Through a corresponding movement of the lying surface towards the driver's compartment, also this space can be fully utilized.

It is finally advantageous if the two retaining elements for the widening element are fixed to the bottom area of the vehicle. This obviates the need for any additional fixing device for the retaining elements, sothat a particularly simple, inexpensive fixing of the retaining elements is possible.

The invention is described in greater detail hereinafter relative to preferred embodiments and the attached drawings, wherein show:

Fig. 1 A view of the bench seat arrangement according to the invention with details of the design and function of the widening element.

Fig. 2 A view of the bench seat arrangement according to the invention following its transformation into a lying surface.

Fig. 3 A view according to fig. 1 of an alternative embodiment of the invention.

Fig. 1 is a view of the bench seat arrangement acording to the invention, which comprises a seat part 10, a back part 12 with a back surface 13 and a front back element 24 and a rear back element 25, as well as a widening element 15.

In this representation the seat part 10 is already in the lying position folded about a hinge joint in a front area, a seat surface 11 being directed downwards. The front and rear back elements 24, 25 are in each case articulated in the lower foot area and can be correspondingly folded over into a horizontal position, as is e.g. illustrated in the case of the rear back element 25 using broken lines. The width and length of the front back element 24 are such that it can be forwardly inserted flush into the free space formed by the folded over seat part 10.

The widening element 15 is mounted in rotary, displaceable manner on a shaft 16. For this purpose the shaft 16 is constructed as a rod or tube and is vertically displaceable along guide links 18 fitted in retaining elements 17. The widening element 15 comprises a tube, which is traversed by the shaft 16 for rotary, displaceable mounting. The drawing shows both the vertical and the horizontal position of the widening element 15.

As a result of this arrangement the rotation axis of the widening element 15 is "lowered" into the vertical position, i.e. displaced vertically downwards. This permits a particularly space-saving housing thereof, e.g. in a lateral area of a vehicle.

In the horizontal position the widening element 15 rests on several support elements 21 located on the bench seat. In this representation the widening element 15 is additionally displaced in the direction of the shaft 16, i.e. towards the vehicle driver's area. In order to permit a displacement past the vehicle B-column 35, the widening element 15 has been provided with a recess 19, whose dimensions corresspond to the shape of the B-column and the desired displacement.

In the rear area of the bench seat arrangement is provided a box-type element 20, which can e.g. serve as a receiving container for cushions or the like. In the represented embodiment the upper surface of the box-type element 20 terminates substantially flush with the horizontally mounted widening element 15, so that an additional lying surface is provided by said upper surface of the box-type element 20. On the box-type element can be provided further support elements, in order to bring about a particularly good supporting of the widening element 15.

As is also shown in the drawing by means of continuous arrows, the bench seat fitted on a sliding carriage 30 mounted on guide rails can be moved both parallel and transversely to the vehicle longitudinal direction, which permits a flexible space utilization.

In the example shown the broken lines additionally represent a headrest 36, which is fitted to the front back element 24. The rear back element 25 is extended for forming a particularly large lying or reclining surface and a projecting area of the rear back element 25 simultaneously serves to reinforce the headrest 36. Fundamentally it is also possible to fit headrests to the rear back element 25.

In the travelling position the bench seat is moved to the right up to the folded in widening element 15, so that on the left-hand side of the bench seat there is an adequately wide passage to a rear vehicle area.

Fig. 2 is a view of the bench seat arrangement according to the invention following its conversion to a supporting or lying surface. To facilitate understanding of the drawing by broken lines are additionally shown the not yet folded over, front back element 24. Fig. 2 also partly shows a side wall 33, a window 34 and the B-column 35 of the vehicle.

Separate lying cushions 22 are placed on the widening element 15 and have a height such that with the folded over bench seat is formed a flat and almost gapless lying surface. In this embodiment the now upwardly directed rear area of the seat part 10 and the two back elements 24, 25 are provided with an integrated cushion, so that a comfortable lying surface is obtained.

The surface formed by the widening element 15, including the cushions 22 located thereon passes into the surface formed by the folded over seat part 10, the front and the rear back elements 24, 25, which leads to a very spacious, planar or flat lying surface. With the bench seat arrangement according to the invention it is readily possible to obtain a lying surface width of typically 160 cm.

The seat part 10 and rear back element 25 can be constructed as self-supporting elements which are kept stable solely by their hinge joint. It is fundamentally also possible to freely select the inclination angle of said elements 10 and 25, so that a "foot" or "head part" of the lying surface can be inclined as desired.

In the represented embodiment the widening element, including the cushion thereon, is led past the vehicle B-column 35, which permits a particularly effective space utilization.

A further advantage concerning the sitting and lying comfort of the bench seat arrangement according to the invention is due to the fact that for the lying surface, particularly in the vicinity of the bench seat, use is exclusively made of the backs of the seat part 10 and the back elements 24, 25, which consequently can be given a flat construction independently of specific requirements on the seat ergonomy and additionally can be upholstered e.g. in a particularly hard or soft manner. It is simultaneously possible to provide the seat and back surfaces with an ergonomically contoured upholstery for good sitting and optimum side hold.

Fig. 3 shows an alternative bench seat arrangement which, with the exception of the mounting of the widening element 15, corresponds to the arrangement of fig. 1. Identical or similarly constructed parts compared with the arrangement of fig. 1 are consequently not explained again.

Sleeve-like or tubular receptacles are fixed to the bottom area as retaining elements 17a. The shaft 16a is designed as a rod bent in C-shaped manner with two lateral guide rods 8a, which are vertically displaceably mounted in the sleeve-like retaining elements 17a. A locking of the shaft 16a in the desired position can take place by means of a suitable fixing device, such as a bayonet catch or a catch pin.

The above-described invention is eminently suitable for the extension of so-called box-type vehicles, in which the original body is utilized for a compact vehicle or motor home. However, the invention can also be used in other vehicles such as vans or combis, in which a bench seat has to be transformed into a flat loading surface, or in general in the furnishings sector.

CLAIMS

1. Bench seat arrangement, particularly for vehicles, with a bench seat, which comprises a seat part (10) with a seat surface (11) and a back part (12), which can be folded over, with a back surface (13), it being possible to swing the bench seat out in a longitudinal direction for forming a substantially flat lying surface,
c h a r a c t e r i z e d in that
- along one longitudinal side of the bench seat and spaced therefrom is provided a shaft (16),
- on the shaft (16) a widening element (15) is pivotably mounted between a vertical position and a horizontal position,
- in the horizontal position the widening element (15) is to the swung out bench seat for widening the lying surface,
- in the vertical position the widening element (15) is spaced from the bench seat for forming a free space and
- the shaft (16) is mounted in vertically displaceable manner.

2. Bench seat arrangement according to claim 1,
c h a r a c t e r i z e d in that
the widening element (15) is displaceable on the shaft (16) in an axial direction of said shaft (16).

3. Bench seat arrangement according to one of the claims 1 or 2,
c h a r a c t e r i z e d in that
there are two retaining elements (17) with in each case one guiding device (18) with a specific spacing and that the shaft (16) is vertically displaceable along the guiding devices (18).

4. Bench seat arrangement according to claim 3,
c h a r a c t e r i z e d in that
in its area remote from the shaft (16), the widening element (15) has a length roughly corresponding to the specific spacing of the two retaining elements (17) and that in its area adjacent to the shaft (16), the widening element (15) has a recess (19) which shortens the length in this area.

5. Bench seat arrangement according to claims 1 to 4,
c h a r a c t e r i z e d in that
a box-type element (20) is positioned between the widening element (15) in the vertical position and the bench seat.

6. Bench seat arrangement according to one of the claims 1 to 5,
c h a r a c t e r i z e d in that
on the bench seat is provided at least one support element (21) on which the widening element (15) rests in the horizontal position.

7. Bench seat arrangement according to one of the claims 1 to 6,
c h a r a c t e r i z e d in that
the widening element (15) comprises a supporting frame structure.

8. Bench seat arrangement, particularly according to one of the claims 1 to 7, with a bench seat, which comprises a seat part (10) with a seat surface (11) and a back part (12), which can be folded down, with a back surface (13), it being possible to swing out the bench seat in a longitudinal direction for forming a substantially flat lying surface,
c h a r a c t e r i z e d in that
- the seat part (10) is articulated in its area remote from the back part (12) and can be folded down into a lying position by approximately 180°,
- the back part (12) comprises a front back element (24) and a rear back element (25), each being articulated in its lower foot area,
- the front back element (24) with the back surface (13) can be forwardly folded down into a horizontal position and
- the rear back element (25) can be folded down rearwardly into a horizontal position.

9. Bench seat arrangement according to one of the claims 1 to 8,
c h a r a c t e r i z e d in that
the bench seat is fitted on a sliding carriage (30) and that the sliding carriage (30) is displaceably mounted along at least one axis.

10. Vehicle, particularly compact vehicle,
c h a r a c t e r i z e d in that
a bench seat arrangement according to one of the claims 1 to 9 is provided.

11. Vehicle according to claim 10,

characterized in that

- a driver's seat and optionally a passenger front seat are provided, which are displaceably mounted in a vehicle longitudinal direction between a rear and a front position,

- the bench seat arrangement is located in the vehicle longitudinal direction behind the driver's seat and optionally the passenger front seat and

- when the driver's seat and optionally front seat passenger seat are moved forwards, the bench seat arrangement in the swung out, horizontal position extends forwardly over and beyond the rear position of the driver's seat and optionally the front seat passenger's seat.

12. Vehicle according to one of claims 10 or 11,

Characterized in that

both retaining elements (7) for the widening element (15) are fixed to a bottom area of the vehicle.

13. A bench seat arrangement according to claim 1 substantially as hereinbefore described with reference to Figs. 1 and 2 or Fig. 3.

14. A vehicle according to claim 10 substantially as hereinbefore described with reference to the accompanying drawings.

Application No: GB 0002616.1
Claims searched: 1-14

Examiner: Chris Archer
Date of search: 30 May 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): A4L (LBMF, LBMB, LBME, LBMH, LBLA)

Int Cl (Ed.7): B60N (2/34, 2/36) B60P (3/38, 3/39)

Other: ONLINE: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	EP 0850834 A1	(BOEING)	
A	EP 0472955 A1	(WESTFARLIA-WERKE)	
A	US 4620335	(DODGEN)	
A	WPI abstract 1982-F3673E & CH 000629378 (WUNDERLI)		

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.