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DEVICE FOR AN ADJUSTABLE BED OR CHAIR

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Fig. 1

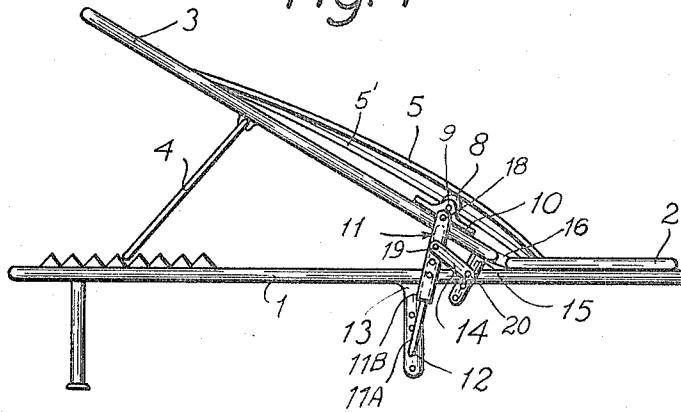
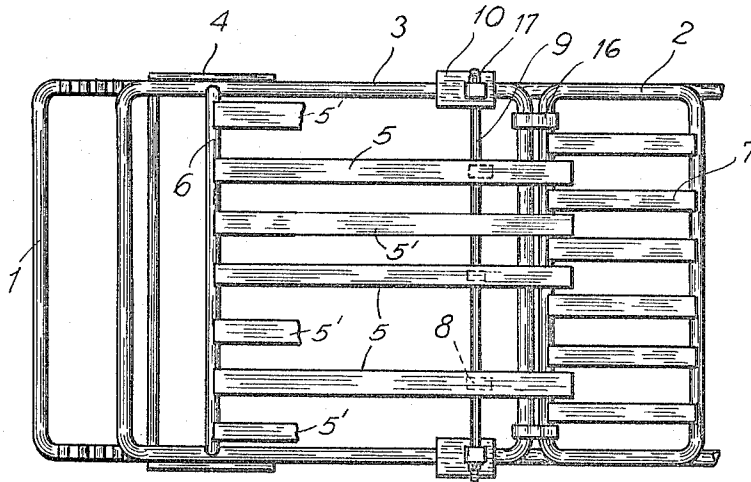


Fig. 2



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**DEVICE FOR AN ADJUSTABLE BED OR CHAIR**  
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The invention relates to a device for an adjustable bed or chair with bearing surfaces, the mutual angular position of which can be changed arbitrarily, one of the bearing surfaces being provided with a loin rest to support the spine of the user at the loin vertebrae.

It is commonly known that for correct supporting of the spine at the loin vertebrae it is adequate to shape the back of a chair with a convex section serving as a rest for the lumbar region. It is also known to use a saddle-shaped wood fibre plate, which is placed for shorter periods under the back of a patient, whose lumbar column it is desired to support in such a position as will cause it to assume its normal convex shape in the forward direction. The last-mentioned supporting plate, which is placed directly under the user's back, can certainly serve to straighten the patient's spine when he is lying fully stretched on his back, but it is not suitable for incorporation for instance into a chair an angularly adjustable rest for the back, or into a bed with bearing surfaces, which can be angularly adjusted in relation to one another. The outwardly bent sections, which in certain easy-chairs serve as a special support for the hollow of the back, cannot be utilized in chairs or beds with an adjustable more or less inclined back section either, since it has been proven that a support which is at a constant distance from the axis of rotation between a bearing surface for supporting the back of the user and a bearing surface for supporting of the seat of the user, even if it affords correct support for the hollow of the back in the lying position, will not give adequate support when the bearing surface for the back is turned upwards into an angular position, because of the anatomy of the spine. The placing of the seat region before the axis of rotation causes the support when the back is turned upwards to act upon such a part of the spine that it rather supports the pelvic region, which serves no useful purpose, but on the contrary gives a feeling of discomfort.

An object of the invention is to provide such a device for an adjustable bed or chair of the kind mentioned in which the loin-rest in any position of the bearing surface supporting the user's back will correctly support the spine in the place where it is most of all required, i.e. at the loin vertebrae.

According to the invention, there is provided a loin-rest composed of a transverse supporting element located under the mattress or cushion of the bed or the chair, said supporting element being coupled by means of linked connections between the frame of the articulated bearing surface and the fixed framework of the bed or chair such that it will be displaced in an upwards direction on the bearing surface gradually as the inclined position thereof is increased. It has been established that such a loin-rest in all angular positions of the bearing surface for the user's back, affords a correct and comfortable support for the loins so that the supporting element practically cannot be felt, no matter whether the user of the bed or chair is resting directly on his back or more or less on one of his sides.

A preferred embodiment for the device according to the invention is characterized by an arm facing downwards which is rigidly fixed at either side of the frame for the upwards swivelling bearing surface and carrying a piv-

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otally mounted joint, the fulcrum of which on the arm is adjustable, the said joint being at its opposite end rotatably connected to a swivel link of variable effective length which at one end is rotatable around an adjustable point at the fixed frame of the bed or chair, and which at its opposite end is pivotally connected with a movable slide carrying the supporting element. The adjustable fulcrum enable the distance of the loin-rest from the axis of rotation between the seat bearing surface and the back bearing surface to be positioned individually according to the needs of the user, and once the adjustment has been made, the supporting element will support the lumbar region correctly in any angular position of the back of the chair or the corresponding bearing surface of the bed. It has been proved that the supporting element, in order to operate satisfactorily, must be displaced to an increasing extent for a given angular movement when the back bearing surface is turned upwards from the horizontal position into an inclined position, after which the proportion between displacement and angular movement must decrease again when the position of the back bearing surface becomes still steeper. This can be obtained by adequate adjustment of the fulcrum of the link connection.

The link mechanism for displacement of the slide can be carried out in several different ways, for instance, according to the invention, an arm facing downwards on either side of the frame for the upwards swivelling bearing surface may be link-connected with a movable slide for the supporting element through a toggle joint connection, the break point of which is guided in a curved guideway on the fixed framework of the bed or chair. The slide may for instance be a tube enclosing the frame of the bearing surface.

In order that the support may function as intended and afford a comfortable rest, even if the user is more or less hollow-backed, it is appropriate according to the invention that the supporting element is constituted by a pivotally mounted shaft on the slide with eccentrics for alteration of the shape of the loin-rest.

The supporting element may be arranged on top of the bearing surface immediately under the mattress or cushion, but in order that the dish areas of the resting surface may come to be curved as uniformly as possible in the longitudinal as well as the transverse direction it is appropriate according to the invention that the supporting element is placed under lamellae fitted on the bearing surface, said lamellae being arranged in the longitudinal direction of the bed or chair and extending in a manner, in itself known, between corresponding lamellae in a neighboring bearing surface. By this design, the resistance of the lamellae to displacement of the supporting element is less than it would be if the lamellae were attached to the end of the frame facing the axis of rotation.

The invention is explained further in conjunction with an embodiment as shown in the drawing, wherein:

FIGURE 1 shows in side view a part of a bed incorporating the device according to the invention, and

FIGURE 2 is a top view of the same.

The bed shown has a fixed framework 1, on which is arranged a bearing surface with a frame 2 to support the patient's seat. A frame 3 is pivotally supported in relation to the aforesaid bearing surface by means of hinges 16 to constitute a bearing surface for supporting the patient's back and head. In the embodiment shown the frame 3 is swung upwards by hand and is supported in a known manner by clamps 4, which are engageable in respective toothed rods R. It will be understood that the frame 3 can also be suitably swung upwards by means of hydraulic or electric driving mechanisms. Longitudinal lamellae 5 are attached to a transverse bar 6 in the frame 3 and extend into spaces between corresponding

lamellae 7 in the frame 2. Lamellae 5 are supported by eccentrics 8 on a transverse shaft 9 forming a loin-rest whereas lamellae 5' rest directly on shaft 9. In the illustrated embodiment three eccentrics 8 are shown, the central one of which is lower than the two outer ones, so that a mattress placed upon the bed will assume a slight curvature in the transverse direction. Possibly the central eccentric may be left out altogether. The shaft 9 is rotatable in bearings in a slide 10 on either side of the frame and to adjust the position of the eccentrics and thereby of the lamellae 5. The shaft 9 can be clamped in adjusted position by tightening means such as nuts 17. The slide 10 is connected by a pivot 18 with a telescopic link 11 having at its opposite end a fulcrum 12, which can be displaced in the vertical direction and engaged in holes in an arm 13 arranged downwards from the frame 1. The telescopic link is composed of a conventional piston-cylinder arrangement in which piston 11A is slidable in cylinder 11B. Instead of a telescopic link there may be used a rigid joint with a longitudinal slit sliding over a bolt in the fulcrum 12. The telescopic link 11 is at a distance from its upper end pivotally connected at 19 with a further link 14, the opposite end of which is pivotally connected at 20 with a downward arm 15 welded at either side of the frame 3. The pivot 20 between the link 14 and the arm 15 is adjustable along the last-mentioned arm, which may for instance be provided with a number of holes as shown.

By changing the location of the fulcrum 12 and of the pivot 20 between the link 14 and the arm 15 the distance between the axis of rotation between the frames 2 and 3 and the shaft 9 forming the loin-rest may be varied and adapted individually to the patient, and moreover, the extent of the displacement of the loin-rest which is produced by a given angular movement can be altered hereby.

In operation, the change in the angular position of the frame 3 will be associated with a displacement of slide 10 and a consequent displacement of the shaft 9 whereby the position of the loin-rest afforded by said shaft 9 will also be modified. It is this displacement of the loin-rest by the link mechanism comprised of links 11, 14 and 15 which enables the bed to furnish the desired support for the spine of the user for all angular positions of frame 3.

The lamellae 5, which can freely adapt themselves to any position in which they are supported by the eccentrics 8, together with lamellae 5' afford such a support for the mattress of the bed that such mattress at any position of the frame 3 forms a uniformly curved supporting area for the patient's spinal vertebrae region and a surface which is comfortable to rest upon, no matter if the patient is lying on his back or on one of his sides.

It will be understood that the device according to the invention also can be used in connection with chairs, the back of which must be adjustable from a seating position backwards into a resting position—such as for instance is the case with the seats in aircraft and long-trip buses.

What I claim and desire to secure by Letter's Patent is:

1. An article of furniture comprising a back frame and a seat frame said frames being secured together for pivotal movement, a support member slidably supported on the back frame, means secured on said back frame and defining a bearing surface which is supported on the support member, and linkage means connected to said frames and to the support member to displace the support member on said back frame relative to the bearing surface in correspondence with the degree of pivotal movement of the frames.

2. An article of furniture as claimed in claim 1 comprising means on said support member for adjusting the curvature of the bearing surface for any relative angular position of the frames.

3. An article of furniture as claimed in claim 1 wherein said support member comprises a shaft extending transversely of the bearing surface, and means on the shaft engaging the bearing surface to affect the curvature thereof.

4. An article of furniture as claimed in claim 3 wherein the means on the shaft comprises eccentrics disposed in spaced relation along the shaft, said shaft being rotatable to adjust the curvature of the bearing surface.

5. An article of furniture as claimed in claim 4 wherein said linkage means includes interconnected links respectively connected to the support member and to the frames to displace the support member on said back frame as said frames are relatively rotated and vary the position of the eccentrics relative to the bearing surface.

6. An article of furniture as claimed in claim 5 wherein said links are constituted by a first link pivotally connected to said back frame, a second link pivotally connected to said first link and a third link variable in length and pivotally connected to the seat frame and to said support member.

7. An article of furniture as claimed in claim 6 comprising means on said frames for adjustably supporting the first and third links for pivotable movement.

8. An article of furniture as claimed in claim 5 wherein said means defining the bearing surface comprises a plurality of longitudinal lamellae secured to said back frame and resting on the eccentrics which control the curvature of said lamellae.

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