HEADREST STRUCTURE, HEADREST CUSHION AND PASSENGER SEAT

FIELD OF INVENTION

The present invention relates broadly to a headrest structure, a headrest cushion and to passenger seat.

BACKGROUND

Headrests are commonly used on passenger seats, for example aircraft passenger seats, to provide support for the head of the seat occupant. To be effective, the headrest should be positioned at a correct distance above the backrest of the seat. The distance above the backrest will defer from person to person depending on the anthropometry and comfort preference of an individual.

A conventional headrest for aircraft seating is a 2-way headrest where the seat occupant can adjust the headrest to be positioned to the correct distance above the backrest based on individual comfort and preference by upward and downward movement. To try and address issues encountered by the conventional 2-way headrest, a 4 and a 6-way headrest have been developed.

The 4-way headrest, in addition to allowing upward and downward adjustment, allows its sides to be folded to provide sideway head support for the seat occupant.

In addition to the function described above for the 4-way headrest, the 6-way headrest provides forward and backward tilting of the headrest. As such a 6-way headrest offers the seat occupant a wide range of headrest adjustment based on individual preference.

In existing headrest designs, the headrest cushion is typically shaped with a substantially flat support surface, i.e. the surface facing away from the headrest frame and towards the head of the seat occupant, to provide support for the head of the seat occupant. It has been found that strain and stiff neck continue to be experienced by many passengers, especially for long haul flight where seat occupant typically tilt their head sideways while sleeping. As such, comfort of passenger seating is compromised.

Embodiments of the present invention provide a headrest, a cushion for a head rest and a passenger seat that seek to address at least one of the above problems.

SUMMARY

In accordance with a first aspect of the present invention, there is provided a headrest structure for a passenger seat, the headrest structure comprising an adjustable headrest frame

for connection to a passenger seat; and a headrest cushion mounted to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame; wherein the headrest cushion comprises a support surface facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat.

In accordance with a second aspect of the present invention, there is provided a headrest cushion for an adjustable headrest frame for a passenger seat, the headrest cushion being configured for mounting to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame, and wherein the headrest cushion comprises a support surface disposed for facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat.

In accordance with a third aspect of the present invention, there is provided a passenger seat comprising a headrest structure of the first aspect.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

Figure 1a) shows a schematic exploded isometric view of a headrest structure according to an example embodiment.

Figure 1b) shows a schematic side view of the headrest structure of Figure 1.

Figures 2a) and b) shows schematic side views of the headrest frame of the headrest structure of Figure 1, in different respective tilt orientations.

Figures 3a) and b) show schematic side views of the headrest cushion of the headrest structure of Figure 1 in respective different tilt orientations.

Figure 4 shows a schematic isometric view of the headrest structure of Figure 1.

Figures 5a) and b) show schematic front and side views respectively of the headrest structure of Figure 1.

DETAILED DESCRIPTION

An embodiment of the present invention provides a 6 way headrest coupled with a tear drop shaped cushion. The 6 way headrest allows the seat occupant to adjust the headrest to their preferred configuration while the headrest cushion has a support surface with a concave upper

105 and the convex bottom portion 107 each extend substantially across the horizontal width of the headrest cushion 104 relative to the passenger seat.

With reference to Figures 2a) and b), the forward and backward tilting of the headrest frame 102 around the hinge 200 in the example embodiment advantageously allows the seat occupant to adjust the position of the headrest cushion 104 (Figure 1) to fit to the concave outline of the posterior of the neck and optionally to fit to the convex outline of the back of the head, thus providing specific neck and head support. The hinge 200 is configured in this embodiment to create an axis of rotation along about the top ¼ of the height of the headrest frame 102. The tilting angle of the headrest frame 102 can be, but is not limited to, between about 0° to about 90° from vertical (with reference to the seat back in a substantially upright position). A mounting brace 202 is provided for mounting the headrest frame 102 to the seat back of a passenger seat. Moveable blocks 204, 206 are guided in tracks (hidden in Figure 2) formed on the back of the headrest frame 102 for adjustment in upward and downward directions.

Figures 3a) and b) illustrate the headrest cushion 104 in two different tilt orientations to fit two heads 300, 302 with different anthropometry, i.e. a shallower and a steeper neck curvature respectively. In Figure 3a), the headrest cushion 104 can be adjusted such that the lower concave portion 107 extends into and fits the convex neck outline 304, while the convex upper portion 105 "cradles" the concave outline 306 of the back of the head 300. Similarly, in Figure 3b), the headrest cushion 104 can be adjusted such that the lower concave portion 107 extends into and fits the steeper convex neck outline 308, while the convex upper portion 105 "cradles" the concave outline 310 of the back of the head 302.

As can be seen from Figures 3a) and b), the 6 way headrest 100 (Figure 1) of the example embodiment allows the seat occupant to adjust the headrest configuration to provide support for the head and neck based on their comfort preference and anthropometry, which can advantageously achieve improved comfort for the occupant.

Figure 4 shows a schematic isometric view of the headrest 100 with the headrest cushion 104 mounted to the headrest frame 102 using, for example, Velcro and/or a number of rivets e.g. 400 in this example embodiment, with a transparent view through the headrest cushion 104.

In different embodiment, the dimensions of the headrest structure and cushion depend on the dimensions and aesthetics of the seat, as will be appreciated by a person skilled in the art. As illustrated in Figures 5a) and b), one example implementation of a 6-way headrest 500 can have the following dimensions:

- width 502 about 450mm

- height 504 about 183mm

- maximum depth 506 about 55mm

- depth 508 at top about 25mm

CLAIMS

1. A headrest structure for a passenger seat, the headrest structure comprising:

an adjustable headrest frame for connection to a passenger seat; and

a headrest cushion mounted to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame;

wherein the headrest cushion comprises a support surface facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat.

2. The headrest structure as claimed in claim 1, wherein the headrest cushion comprises voids formed in a body thereof, the voids being aligned with respective folding joints of the adjustable headrest frame for folding side portions of the headrest frames relative to a mid-portion of the headrest frame.

3. The headrest structure as claimed in claims 1 or 2, wherein the headrest cushion comprises a mid-portion having a first compressive strength, and side portions having a second compressive strength different from the first compressive strength.

4. The headrest structure as claimed in claim 3, wherein the first compressive strength is higher than the second compressive strength.

5. The headrest structure as claimed in claims 3 or 4, wherein the mid-portion of the headrest cushion is mounted to a center mounting plate of the adjustable headrest frame.

6. The headrest structure as claimed in any one of claims 3 to 5, wherein the side portions of the headrest cushion are mounted to respective side mounting plates of the adjustable headrest frame.

7. The headrest structure as claimed in any one of the preceding claims, wherein the concave upper part of the support surface directly meets the convex bottom part of the support surface such that a cross-section of the headrest cushion along a vertical axis relative to the passenger seat is substantially reverse S-shaped.

8. The headrest structure as claimed in any one of the preceding claims, wherein the curvature of the concave upper part is shallower than the curvature of the convex lower part.

9. The headrest structure as claimed in any one of the preceding claims, wherein the concave upper part and the convex bottom part each extend substantially across the horizontal width of the headrest cushion relative to the passenger seat.

10. The headrest structure as claimed in any one of the preceding claims, wherein the adjustable headrest frame comprises a 4-way headrest frame.

11. The headrest structure as claimed in any one of claims 1 to 9, wherein the adjustable headrest frame comprises a 6-way headrest frame.

12. The headrest as claimed in claim 11, wherein the headrest frame is configured such that the headrest cushion is moveable in upward and downward directions, in forward and backward tilt, and folding along two fold lines.

13. A headrest cushion for an adjustable headrest frame for a passenger seat, the headrest cushion being configured for mounting to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame, and wherein the headrest cushion comprises a support surface disposed for facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat.

14. The headrest cushion as claimed in claim 13, wherein the headrest cushion comprises voids formed in a body thereof, the voids being aligned with respective folding joints of the adjustable headrest frame for folding side portions of the headrest frames relative to a mid-portion of the headrest frame.

15. The headrest cushion as claimed in claims 13 or 14, wherein the headrest cushion comprises a mid-portion having a first compressive strength, and side portions having a second compressive strength different from the first compressive strength.

16. The headrest cushion as claimed in claim 15, wherein the first compressive strength is higher than the second compressive strength.

17. The headrest cushion as claimed in claims 15 or 16, wherein the mid-portion of the headrest cushion is configured for mounting to a center mounting plate of the adjustable headrest frame.

18. The headrest cushion as claimed in any one of claims 15 to 17, wherein the side portions of the headrest cushion are configured for mounting to respective side mounting plates of the adjustable headrest frame.

19. The headrest cushion as claimed in any one of claims 13 to 18, wherein the concave upper part of the support surface directly meets the convex bottom part of the support surface such that a cross-section of the headrest cushion along a vertical axis relative to the passenger seat is substantially reverse S-shaped.

20. The headrest cushion as claimed in any one of claims 13 to 19, wherein the curvature of the concave upper part is shallower than the curvature of the convex lower part.

21. The headrest cushion as claimed in any one of claims 13 to 20, wherein the concave upper part and the convex bottom part each extend substantially across the horizontal width of the headrest cushion relative to the passenger seat.

22. A passenger seat comprising a headrest structure as claimed in any one of claims 1 to 21

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FIELD OF INVENTION

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BACKGROUND

Headrests are commonly used on passenger seats, for example aircraft passenger seats, to provide support for the head of the seat occupant. To be effective, the headrest should be positioned at a correct distance above the backrest of the seat. The distance above the backrest will defer from person to person depending on the anthropometry and comfort preference of an individual.

A conventional headrest for aircraft seating is a 2-way headrest where the seat occupant can adjust the headrest to be positioned to the correct distance above the backrest based on individual comfort and preference by upward and downward movement. To try and address issues encountered by the conventional 2-way headrest, a 4 and a 6-way headrest have been developed.

The 4-way headrest, in addition to allowing upward and downward adjustment, allows its sides to be folded to provide sideway head support for the seat occupant.

In addition to the function described above for the 4-way headrest, the 6-way headrest provides forward and backward tilting of the headrest. As such a 6-way headrest offers the seat occupant a wide range of headrest adjustment based on individual preference.

In existing headrest designs, the headrest cushion is typically shaped with a substantially flat support surface, i.e. the surface facing away from the headrest frame and towards the head of the seat occupant, to provide support for the head of the seat occupant. It has been found that strain and stiff neck continue to be experienced by many passengers, especially for long haul flight where seat occupant typically tilt their head sideways while sleeping. As such, comfort of passenger seating is compromised.

DE 10113091A1 describes a motor vehicle seat with a seat back with a collapsible internal structure. AT506239A1 describes a headrest with a cushion that is connected to a seatback by way of a support element made of a thin strip or band of material. WO2005/009782 describes a headrest simultaneously brought into contact with the lower surface part of the rear head part, upper cervical vertebrae part, and fifth cervical vertebrae part of an occupant. DE102004058788A1 describes a headrest with a fluid-fillable bladder. US2004/0217639 describes an adjustable headrest with height adjustment, forward and rearward adjustment and separate adjustable side-support members.

Embodiments of the present invention provide a headrest, a cushion for a head rest and a passenger seat that seek to address at least one of the above problems.

SUMMARY

In accordance with a first aspect of the present invention, there is provided a headrest structure for a passenger seat, the headrest structure comprising an adjustable headrest frame for connection to a passenger seat; and a headrest cushion mounted to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame; wherein the headrest cushion comprises a support surface facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat.

In accordance with a second aspect of the present invention, there is provided a headrest cushion for an adjustable headrest frame for a passenger seat, the headrest cushion being configured for mounting to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame, and wherein the headrest cushion comprises a support surface disposed for facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat.

In accordance with a third aspect of the present invention, there is provided a passenger seat comprising a headrest structure of the first aspect.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

Figure 1a) shows a schematic exploded isometric view of a headrest structure according to an example embodiment.

Figure 1b) shows a schematic side view of the headrest structure of Figure 1.

Figures 2a) and b) shows schematic side views of the headrest frame of the headrest structure of Figure 1, in different respective tilt orientations.

Figures 3a) and b) show schematic side views of the headrest cushion of the headrest structure of Figure 1 in respective different tilt orientations.

Figure 4 shows a schematic isometric view of the headrest structure of Figure 1.

Figures 5a) and b) show schematic front and side views respectively of the headrest structure of Figure 1.

DETAILED DESCRIPTION

An embodiment of the present invention provides a 6 way headrest coupled with a tear drop shaped cushion. The 6 way headrest allows the seat occupant to adjust the headrest to their preferred configuration while the headrest cushion has a support surface with a concave upper

105 and the convex bottom portion 107 each extend substantially across the horizontal width of the headrest cushion 104 relative to the passenger seat.

With reference to Figures 2a) and b), the forward and backward tilting of the headrest frame 102 around the hinge 200 in the example embodiment advantageously allows the seat occupant to adjust the position of the headrest cushion 104 (Figure 1) to fit to the concave outline of the posterior of the neck and optionally to fit to the convex outline of the back of the head, thus providing specific neck and head support. The hinge 200 is configured in this embodiment to create an axis of rotation along about the top ¼ of the height of the headrest frame 102. The tilting angle of the headrest frame 102 can be, but is not limited to, between about 0° to about 90° from vertical (with reference to the seat back in a substantially upright position). A mounting brace 202 is provided for mounting the headrest frame 102 to the seat back of a passenger seat. Moveable blocks 204, 206 are guided in tracks (hidden in Figure 2) formed on the back of the headrest frame 102 for adjustment in upward and downward directions.

Figures 3a) and b) illustrate the headrest cushion 104 in two different tilt orientations to fit two heads 300, 302 with different anthropometry, i.e. a shallower and a steeper neck curvature respectively. In Figure 3a), the headrest cushion 104 can be adjusted such that the lower convex portion 107 extends into and fits the concave neck outline 306, while the concave upper portion 105 "cradles" the convex outline 306 of the back of the head 300. Similarly, in Figure 3b), the headrest cushion 104 can be adjusted such that the lower convex portion 107 extends into and fits the steeper concave neck outline 310, while the concave upper portion 105 "cradles" the convex outline 308 of the back of the head 302.

As can be seen from Figures 3a) and b), the 6 way headrest 100 (Figure 1) of the example embodiment allows the seat occupant to adjust the headrest configuration to provide support for the head and neck based on their comfort preference and anthropometry, which can advantageously achieve improved comfort for the occupant.

Figure 4 shows a schematic isometric view of the headrest 100 with the headrest cushion 104 mounted to the headrest frame 102 using, for example, Velcro and/or a number of rivets e.g. 400 in this example embodiment, with a transparent view through the headrest cushion 104.

In different embodiment, the dimensions of the headrest structure and cushion depend on the dimensions and aesthetics of the seat, as will be appreciated by a person skilled in the art. As illustrated in Figures 5a) and b), one example implementation of a 6-way headrest 500 can have the following dimensions:

- width 502 about 450mm
- height 504 about 183mm
- maximum depth 506 about 55mm
- depth 508 at top about 25mm

CLAIMS

1. A headrest structure for a passenger seat, the headrest structure comprising:

an adjustable headrest frame, with folding joints of the adjustable headrest frame for folding side portions of the adjustable headrest frame relative to a mid-portion of the adjustable headrest frame, for connection to a passenger seat; and

a headrest cushion mounted to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame;

wherein the headrest cushion comprises a support surface facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat, the concave upper part having a minimum depth perpendicular to the headrest frame that is smaller than a depth perpendicular to the headrest frame at a top of the headrest cushion

wherein the headrest cushion comprises cutouts formed in the support surface, the cutouts being aligned with the respective folding joints.

2. The headrest structure as claimed in claim 1, wherein the headrest cushion comprises a mid-portion made from a softer material compared to side portions of the headrest cushion.

3. The headrest structure as claimed in claim 2, wherein the mid-portion of the headrest cushion is mounted to a center mounting plate of the adjustable headrest frame.

4. The headrest structure as claimed in any one of claims 2 to 3, wherein the side portions of the headrest cushion are mounted to respective side mounting plates of the adjustable headrest frame.

5. The headrest structure as claimed in any one of the preceding claims, wherein the concave upper part of the support surface directly meets the convex bottom part of the support surface such that a cross-section of the headrest cushion along a vertical axis relative to the passenger seat is substantially reverse S-shaped.

6. The headrest structure as claimed in any one of the preceding claims, wherein the curvature of the concave upper part is shallower than the curvature of the convex lower part.

7. The headrest structure as claimed in any one of the preceding claims, wherein the concave upper part and the convex bottom part each extend substantially across the horizontal width of the headrest cushion relative to the passenger seat.

8. The headrest structure as claimed in any one of the preceding claims, wherein the adjustable headrest frame comprises a 4-way headrest frame for allowing upward and downward movements, as well as folding to provide sideway head support.

9. The headrest structure as claimed in any one of claims 1 to 7, wherein the adjustable headrest frame comprises a 6-way headrest frame for allowing upward and downward movements, folding to provide sideway head support and forward and backward tilt.

10. The headrest structure as claimed in claim 9, wherein the headrest frame is configured such that the headrest cushion is moveable in upward and downward directions, in forward and backward tilt, and folding along two fold lines.

11. A headrest cushion for an adjustable headrest frame for a passenger seat, the headrest cushion being configured for mounting to the adjustable headrest frame such that the headrest cushion is moveable relative to a seat back of the passenger seat by way of the adjustable headrest frame, with folding joints of the adjustable headrest frame for folding side portions of the adjustable headrest frame relative to a mid-portion of the adjustable headrest frame, and wherein the headrest cushion comprises a support surface disposed for facing away from the headrest frame, the support surface comprising a concave upper part and a convex bottom part relative to the passenger seat, the concave upper part having a minimum depth perpendicular to the headrest frame that is smaller than a depth perpendicular to the headrest frame at a top of the headrest cushion

wherein the headrest cushion comprises cutouts formed in the support surface, the cutouts being aligned with the respective folding joints.

12. The headrest cushion as claimed in claim 11, wherein the headrest cushion comprises a mid-portion made from a softer material compared to side portions of the headrest cushion.

13. The headrest cushion as claimed in claims 12, wherein the mid-portion of the headrest cushion is configured for mounting to a center mounting plate of the adjustable headrest frame.

14. The headrest cushion as claimed in any one of claims 12 to 13, wherein the side portions of the headrest cushion are configured for mounting to respective side mounting plates of the adjustable headrest frame.

15. The headrest cushion as claimed in any one of claims 11 to 14, wherein the concave upper part of the support surface directly meets the convex bottom part of the support surface such that a cross-section of the headrest cushion along a vertical axis relative to the passenger seat is substantially reverse S-shaped.

16. The headrest cushion as claimed in any one of claims 11 to 15, wherein the curvature of the concave upper part is shallower than the curvature of the convex lower part.

17. The headrest cushion as claimed in any one of claims 11 to 16, wherein the concave upper part and the convex bottom part each extend substantially across the horizontal width of the headrest cushion relative to the passenger seat.

18. A passenger seat comprising a headrest structure as claimed in any one of claims 1 to 10.

19. A passenger seat comprising a headrest cushion as claimed in any one of claims 11 to 17.