A seat with an adjustable thigh support assembly includes a seat bottom with a rearward portion and a forward edge. The rearward portion is in substantial juxtaposition with the forward edge of the seat bottom. A thigh support has a rear edge and a forward edge extending generally horizontally beyond the forward edge of the seat bottom. The assembly further includes adjustable apparatus affixing the thigh support to the seat bottom for movement between a retracted position in which the rear edge of the thigh support extends below the forward edge of the seat bottom and an extended position in which the rear edge of the thigh support is in substantial juxtaposition with the forward edge of the seat bottom.
SEAT WITH ADJUSTABLE THIGH SUPPORT ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/839,435, filed 22 Mar. 2007.

FIELD OF THE INVENTION

[0002] This invention relates to seating devices.

[0003] More particularly, the present invention relates to seating devices with adjustable thigh supports.

BACKGROUND OF THE INVENTION

[0004] While many different seats have been devised that include lower leg supports, inclining backs and a variety of different adjustments, no seats have been devised that take into account the fact that all people have different dimensions. For example, in many instances even people of the same height have different lengths of legs. Further, in many instances the lengths of peoples thighs are different so that a seat with a given depth (i.e., the distances from the front of the seat cushion to the back rest) may be comfortable for some people but may be too long or too short for other people.

[0005] Here it must be noted that there is a substantial difference between a portion of a seat that reclines and provides a movable support for the lower legs (i.e., the calves, ankles, and feet) and the portion of the seat that supports the thighs. A person with long thighs sitting in a seat with a short depth can be as uncomfortable as a person with short thighs sitting in a seat with a long depth. In the first instance the feet will generally be on the ground with the thighs above the seat and unsupported. In the second instance the thighs will be supported but the feet may not be able to touch the ground. Both instances are uncomfortable.

[0006] It would be highly advantageous, therefore, to remedy the foregoing and other deficiencies inherent in the prior art.

[0007] Accordingly, it is an object of the present invention to provide a new and improved adjustable thigh support assembly.

[0008] It is another object of the present invention to provide a new and improved thigh support assembly that is adjustable for people with different lengths of legs and thighs.

[0009] It is another object of the present invention to provide a new and improved seat with an adjustable thigh support assembly.

SUMMARY OF THE INVENTION

[0010] Briefly, to achieve the desired objects and advantages of the present invention in accordance with a preferred embodiment, a seat with an adjustable thigh support assembly includes a seat bottom with a rearward portion and a forward edge. The rearward portion is positioned to receive the buttocks of a person with the thighs extending beyond the forward edge. A thigh support has a rear edge and a forward edge with the forward edge extending generally horizontally beyond the forward edge of the seat bottom. The assembly further includes adjustable apparatus affixing the thigh support to the seat bottom for movement between a retracted position in which the rear edge of the thigh support is in substantial juxtaposition with the forward edge of the seat bottom and an extended position in which the rear edge of the thigh support is in substantial juxtaposition with the forward edge of the seat bottom.

[0011] The desired objects and advantages of the present invention are further achieved in different specific embodiments in which the adjustable apparatus includes a lower track assembly affixed to the seat bottom and an upper track assembly affixed to the thigh support. The upper track assembly and the lower track assembly are engaged for supporting and controlling movement of the thigh support. In another embodiment the lower track assembly includes a curved extension and the upper track assembly includes a slide engaged with the curved extension. In still another embodiment the lower track assembly includes a straight extension and the upper track assembly includes a slide engaged with the curved extension. In this latter embodiment the lower track assembly further includes an anchor with an elongated slot therein and the upper track assembly includes a pin slidably engaged in the slot for supporting and limiting movement of the thigh support.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Specific objects and advantages of the invention will become readily apparent to those skilled in the art from the following detailed description of preferred embodiments thereof, taken in conjunction with the drawings in which:

[0013] FIG. 1 is a perspective view of a seat with adjustable thigh support assembly according to the present invention;

[0014] FIG. 2 is an exploded perspective view of portions of the adjustable thigh support assembly;

[0015] FIG. 3 is a perspective view of the substrate from the adjustable thigh support assembly;

[0016] FIG. 4 is a perspective view of a seat having an arcuate seat pan with the adjustable thigh support assembly in the retracted position;

[0017] FIG. 5 is a perspective view of a seat having an arcuate seat pan with the adjustable thigh support assembly in the extended position;

[0018] FIG. 6 is a perspective view of the seat cushion with the adjustable thigh support assembly in the extended position;

[0019] FIG. 7 is a perspective view of the seat cushion of FIG. 6 with the adjustable thigh support assembly in the extended position;

[0020] FIG. 8 is a portion of the adjustable thigh support assembly of FIGS. 1-3, 6 and 7;

[0021] FIG. 9 is a bottom view of the substrate of the adjustable thigh support assembly of FIGS. 1-3, 6 and 7;

[0022] FIG. 10 is a sectional side view of another embodiment of a thigh support assembly according to the present invention, in the retracted position;

[0023] FIG. 11 is a sectional side view of the thigh support assembly of FIG. 10 in the extended position;

[0024] FIG. 12 is a sectional side view of yet another embodiment of a thigh support assembly according to the present invention, in the retracted position; and

[0025] FIG. 13 is a sectional side view of the thigh support assembly of FIG. 12 in the extended position.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0026] Turning now to the drawings in which like reference characters indicate corresponding elements throughout the
several views, attention is directed to FIG. 1 which illustrates a seat generally designated 10. Seat 10 includes a seat bottom 12 and an adjustable thigh support apparatus 14. While in the preferred embodiment seat 10 is used in vehicles such as cars, trucks, buses, planes, trains, and the like, other seats such as office chairs and the like can employ the adjustable thigh support of the present invention.

[0027] With additional reference to FIGS. 2, 3, 8 and 9, seat bottom 12 includes a seat pan 16 supporting a cushion 18 and adjustable thigh support apparatus 14. In this preferred embodiment, seat pan 16 includes a top surface 20, a front edge 22, a rear edge 24 and opposing side edges 25 and 26. Top surface 20 supports cushion 18 from rear edge 24 to a position spaced from front edge 22. A lower track assembly 30 is carried by top surface 20 of seat pan 16 proximate front edge 22 and includes opposed track elements 32 and an adjustment mechanism 34. In this embodiment, track elements 32 are curved for purposes which will be discussed presently. As will be shown, a lower track element can be attached to seat pan 16 or the seat pan can be formed with a desired curve thereto proximate the front edge and formed with or have track elements attached thereto (FIGS. 4 and 5).

[0028] A thigh support 40 includes a substrate 41 having a top surface 42 padded or carrying a cushion 43 to generally match cushion 18, and a bottom surface 45 having track elements 44 formed therein, attached thereto or the like. Track elements 44, in this embodiment, are curved to match and engage track elements 32 of lower track assembly 30. Substrate 41 is movable between a retracted position and an extended position by movement of track elements 44 along track elements 32 from a rearward position (retracted) forwardly (extended position) along an arc of travel.

[0029] The curved shape at the front of seat pan 16 as the support for track elements 32 keeps thigh support 40 well supported throughout its travel. The change to seat pan 16 is such that the same pan can be used for both the extending and non-extending seats. This saves on investment and part proliferation. The curved tracks are less likely to ratchet or bind because they must move up and down over the curve while the thigh support moves fore and aft. This makes independent movement of one side less likely because more deflection of the thigh support substrate is required.

[0030] Movement of thigh support 40 between the retracted and extended position can be controlled by adjustment mechanism 34. Adjustment mechanism 34 includes detent element 35 carried by lower track assembly 30 intermediate track elements 32, and a spring biased engagement element 36 carried by substrate 41 of thigh support 40. As will be understood, detent element 35 is formed with a plurality of spaced apart detents each providing a different adjustable position for thigh support 40. As substrate 41 is moved between the extended and retracted positions, engagement element 36 interfaces with a selected one of the plurality of detents in detent element 35 positioned along the travel. Thus, an individual can overcome the bias of engagement element 36, disengage it from any of the detents in detent element 35, move thigh support 40 to a desired position in the travel, and permit engagement of engagement element 36 with a selected one of the plurality of detents in detent element 35 at the desired position. With engagement element 36 disengaged from detent element 35, thigh support 40 can be completely removed from seat 10 to facilitate cleaning, repair, replacement or the like.

[0031] As can be seen with continued reference to FIG. 2 and 8, a retainer 46 is provided to form an interface between seat pan 16, cushion 18 and thigh support 40. Retainer 46 has a rearward surface 48 conforming to an undercut front edge of cushion 18, a bottom surface 49 overlying seat pan 16, and a forward surface 50 over which thigh support 40 slides. Retainer 46 maintains the shape of the cushions and prevents binding or distortion therewithin during relative movements.

[0032] With reference to FIGS. 6 and 7, seat 10 is illustrated with thigh support 40 in the retracted position and the extended position, respectively. It can be seen that in the retracted position the adjustable apparatus affixes thigh support 40 to the seat bottom with the rear edge of the thigh support extending generally below the forward edge of the seat bottom. In the extended position the adjustable apparatus moves the rear edge of thigh support 40 into substantial juxtaposition with the forward edge of the seat bottom. Thus little or no uncomfortable break is detectable between the seat bottom and the thigh support by a person sitting in the seat regardless of the selected adjustment between the retracted and extended positions.

[0033] Turning now to FIGS. 10 and 11, another embodiment of an adjustable thigh support apparatus generally designated 50 is illustrated. In this embodiment, apparatus 50 includes a seat pan 52 having a curved extension 53 extending from a top surface thereof toward a front edge of the seat pan. Curved extension 53 can be a single element having a width generally spanning the seat pan between opposing sides, or, as in the preferred embodiment, a pair of rods proximate opposing sides of the seat pan. A thigh support 55 having a substrate 57 with a top surface carrying a cushion 58 and a bottom surface having a slide 60 carried thereby, is mounted on the seat pan. Slide 60 is received by curved extension 53 and permits movement of thigh support 55 between a rearward, retracted position (FIG. 10) and a forward, extended position (FIG. 11). For convenience in understanding the operation of the different embodiments, the curved extension 53 (in any form) is also considered a lower track assembly and slide 60 (in any form) is considered an upper track assembly.

[0034] Here it can be seen that in the retracted position the rear edge of thigh support 50 extends generally below the forward edge of the seat bottom and in the extended position the rear edge of thigh support 50 is moved into substantial juxtaposition with the forward edge of the seat bottom. Thus little or no uncomfortable break is detectable between the seat bottom and the thigh support by a person sitting in the seat regardless of the selected adjustment between the retracted and extended positions.

[0035] Attention is now directed to FIGS. 12 and 13, illustrating another embodiment of an adjustable thigh support apparatus generally designated 70. In this embodiment, apparatus 70 includes a seat pan 72 having a straight extension 73 extending from a top surface thereof toward a front edge of the seat pan. Straight extension 73 can be a single element having a width generally spanning the seat pan between opposing sides, or, as in the preferred embodiment, a pair of rods proximate opposing sides of the seat pan. A thigh support 75 having a substrate 77 with a top surface carrying a cushion 78 and a bottom surface having a slide 80 carried thereby, is mounted on the seat pan. Slide 80 is pivotedly mounted to substrate 77 of seat support 75 to permit an arcuate motion of thigh support 75 on straight extension 73. Slide 80 is received by straight extension 73 and permits movement of thigh sup-
port 75 between a rearward, retracted position (FIG. 12) and a forward, extended position (FIG. 13). An anchor slide assembly includes an anchor 82 affixed to seat pan 72 and a pin 84 carried by substrate 77 rearward of slide 80. Anchor 82 includes an elongated slot 85 slidably receiving pin 84 for longitudinal movement therealong. Movement of pin 84 within slot 85 is concurrent with movement of slide 80 along straight extension 73, and limits movement of thigh support 75 between the retracted and extended positions as well as supports the rear portion of thigh support 75 in its travel. For convenience in understanding the operation of the different embodiments, the straight extension 73 and anchor 82 (in any form) are also considered a lower track assembly and slide 80 along with pin 84 (in any form) are considered an upper track assembly.

Here again it can be seen that in the retracted position the rear edge of thigh support 70 extends generally below the forward edge of the seat bottom and in the extended position the rear edge of thigh support 70 is moved into substantial juxtaposition with the forward edge of the seat bottom. Thus little or no uncomfortable break is detectable between the seat bottom and the thigh support by a person sitting in the seat. Here it can be seen that in the retracted position the rear edge of thigh support 50 extends generally below the forward edge of the seat bottom and in the extended position the rear edge of thigh support 50 is moved into substantial juxtaposition with the forward edge of the seat bottom. Thus little or no uncomfortable break is detectable between the seat bottom and the thigh support by a person sitting in the seat.

Various changes and modifications to the embodiments herein chosen for purposes of illustration will readily occur to those skilled in the art. As an example, a motorized version of the present apparatus is contemplated. A motor and gearbox can be interfaced with the track to drive the support forwardly and rearwardly. To the extent that such modifications and variations do not depart from the spirit of the invention, they are intended to be included within the scope thereof which is assessed only by a fair interpretation of the following claims.

Having fully described the invention in such clear and concise terms as to enable those skilled in the art to understand and practice the same, the invention claimed is:

1. A seat with an adjustable thigh support assembly comprising:
   a seat bottom with a rearward portion and a forward edge;
   a forward portion being positioned to receive the buttocks of a person with the thighs extending beyond the forward edge;
   a thigh support having a rear edge and a forward edge with the forward edge extending generally horizontally beyond the forward edge of the seat bottom; and
   an adjustable apparatus affixing the thigh support to the seat bottom for movement between a retracted position in which the rear edge of the thigh support extends below the forward edge of the seat bottom and an extended position in which the rear edge of the thigh support is in substantial juxtaposition with the forward edge of the seat bottom.

2. A seat with an adjustable thigh support assembly as claimed in claim 1 wherein the adjustable apparatus includes a lower track assembly affixed to the seat bottom and an upper track assembly affixed to the thigh support, the upper track assembly and the lower track assembly being engaged for supporting and controlling movement of the thigh support.

3. A seat with an adjustable thigh support assembly as claimed in claim 2 wherein the lower track assembly includes a curved extension and the upper track assembly includes a slide engaged with the curved extension.

4. A seat with an adjustable thigh support assembly as claimed in claim 2 wherein the lower track assembly includes a straight extension and the upper track assembly includes a slide engaged with the curved extension.

5. A seat with an adjustable thigh support assembly as claimed in claim 4 wherein the lower track assembly further includes an anchor with an elongated slot therein and the upper track assembly includes a pin slidably engaged in the slot.

6. A seat with an adjustable thigh support assembly as claimed in claim 1 wherein the adjustable apparatus includes a detent element attached to the seat bottom and a spring biased engagement element attached to the thigh support, the spring biased engagement element adjusting the detent element in any of a plurality of selectable different positions between the retracted position and the extended position.

7. A seat with an adjustable thigh support assembly as claimed in claim 1 further including a retainer providing an interface between the seat bottom and the thigh support.

8. A seat with an adjustable thigh support assembly comprising:
   a seat bottom including a seat pan and a seat bottom cushion positioned on an upper surface of the seat pan, the seat bottom having a rearward portion and a forward edge, the rearward portion being positioned to receive the buttocks of a person with the thighs extending beyond the forward edge;
   a thigh support including a substrate and a thigh support cushion supported on the substrate, the thigh support having a rear edge and a forward edge with the forward edge extending generally horizontally beyond the forward edge of the seat bottom; and
   an adjustable apparatus including a lower track assembly affixed to the pan of the seat bottom and an upper track assembly affixed to the substrate of the thigh support, the upper track assembly and the lower track assembly being engaged for supporting and controlling movement of the thigh support, the upper track assembly and the lower track assembly affixing the thigh support to the seat bottom for movement between a retracted position in which the rear edge of the thigh support extends below the forward edge of the seat bottom and an extended position in which the rear edge of the thigh support is in substantial juxtaposition with the forward edge of the seat bottom.

9. A seat with an adjustable thigh support assembly as claimed in claim 8 wherein the adjustable apparatus includes a detent element attached to the pan of the seat bottom and a spring biased engagement element attached to the substrate of the thigh support, the spring biased engagement element adjusting the detent element in any of a plurality of selectable different positions between the retracted position and the extended position.

10. A seat with an adjustable thigh support assembly as claimed in claim 8 further including a retainer attached to the pan of the seat bottom and extending upwardly therefrom between the seat bottom cushion and the thigh support cush-
ion to maintain the shape of the cushions and provide an interface between the seat bottom cushion and the thigh support cushion.

11. A seat with an adjustable thigh support assembly comprising:
- a seat bottom including a seat pan having a top surface, a front edge, a rear edge, and opposing side edges and a seat bottom cushion positioned on the top surface of the seat pan and spaced from the front edge, the seat bottom having a rearward portion and a forward edge, the rearward portion being positioned to receive the buttocks of a person with the thighs extending beyond the forward edge;
- a thigh support including a substrate and a thigh support cushion supported on the substrate, the thigh support having a rear edge and a forward edge with the forward edge extending generally horizontally beyond the forward edge of the seat bottom;
- a retainer attached to the top surface of the pan of the seat bottom in spaced relation from the front edge and extending upwardly from between the seat bottom cushion and the thigh support cushion to maintain the shape of the cushions and provide an interface between the seat bottom cushion and the thigh support cushion for preventing binding or distortion between the seat bottom cushion and the thigh support cushion during relative movements; and
- adjustable apparatus including a lower track assembly affixed to the top surface of the pan between the front edge of the pan and the retainer and an upper track assembly affixed to the substrate of the thigh support, the upper track assembly and the lower track assembly being engaged for supporting and controlling movement of the thigh support, the upper track assembly and the lower track assembly affixing the thigh support to the seat bottom for movement between a retracted position in which the rear edge of the thigh support extends below the forward edge of the seat bottom and an extended position in which the rear edge of the thigh support is in substantial juxtaposition with the forward edge of the seat bottom so that substantially no break is detectable between the seat bottom cushion and the thigh support cushion by a person sitting in the seat in any of the selected adjustment positions.

12. A seat with an adjustable thigh support assembly as claimed in claim 11 wherein the lower track assembly includes a curved extension and the upper track assembly includes a slide engaged with the curved extension.

13. A seat with an adjustable thigh support assembly as claimed in claim 11 wherein the lower track assembly includes a straight extension and the upper track assembly includes a slide engaged with the curved extension.

14. A seat with an adjustable thigh support assembly as claimed in claim 13 wherein the lower track assembly further includes an anchor with an elongated slot therein and the upper track assembly includes a pin slideably engaged in the slot.

15. A seat with an adjustable thigh support assembly as claimed in claim 11 wherein the adjustable apparatus includes a detent element attached to the pan of the seat bottom and a spring biased engagement element attached to the substrate of the thigh support, the spring biased engagement element engaging the detent element in any of a plurality of selectable different positions between the retracted position and the extended position.

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