Seats and components thereof are addressed. The seats typically, although not necessarily, are intended for use in passenger vehicles and may include any or all of tray tables, beverage holders, arm rests, and hand rails. Beverage containers may include gimbals and supports for versatility and greater effectiveness, while tray tables may include hinged sections for supporting objects other than by providing solely a horizontal base. Lighting forming part of a tilt mechanism for the video monitor of in-flight entertainment equipment may illuminate the tray table. Arm rests may include multiple components and either pivot about multiple points or both translate and pivot, permitting them to move downward from nominal use positions. Hand rails, additionally, may be designed and placed to facilitate their being grasped by passengers traversing aisles of vehicles in which associated seats are located.
FIG. 5
VEHICLE SEATS AND COMPONENTS THEREOF

REFERENCE TO PROVISIONAL APPLICATION

[0001] This application is based on and hereby refers to U.S. Provisional Patent Application Ser. No. 60/776,968, filed Feb. 27, 2006, having the same title as appears above, the entire contents of which are incorporated herein by this reference.

FIELD OF THE INVENTION

[0002] This invention relates to seats and components thereof, including but not limited to tray tables, beverage holders, arm rests, and hand rails, and more particularly (although not exclusively) to aircraft passenger seats with improved characteristics for, among other things, enhanced comfort and convenience.

BACKGROUND OF THE INVENTION

[0003] Disclosed in U.S. Pat. No. 4,526,421 to Brennan, et al. are existing aircraft seats with various conventional components. Illustrated, for example, in FIG. 7 of the Brennan patent is a typical tray table adapted to deploy from the rear face of the seat in front of the user. Such table may assume either of two positions: (1) a horizontal position parallel to the deck on which the seats are mounted (when the table is in use) and (2) a vertical position substantially perpendicular to the deck for when the table is stowed. No beverage holder or hand rail appears as part of any seat depicted in the Brennan patent, and the arm rests either are fixed in position or pivot solely upward from their nominal positions of FIG. 1 of the patent.

[0004] Described in U.S. Pat. No. 6,644,593 to Lambiaso is an alternative aircraft seat in which a tray table is stowed in a cavity within an arm rest. Again, however, the table is adapted for placement only horizontally (for use) or vertically (for stowage). Further, although a cover of the arm rest may pivot to allow access to the cavity, the position of the remainder of the arm is fixed relative to the seating deck. No beverage holder is detailed in the Lambiaso patent, nor does any reference to a hand rail appear.

[0005] Commonly-owned U.S. Pat. No. 6,237,994 to Bentley, et al., finally, also discloses improved seats useful by passengers of vehicles. Unlike conventional tray tables, those associated with these seats are designed to be adjusted upward and downward when in a horizontal position for use. Additionally, an upper section of these tables, which normally rests atop a horizontally-deployed base, may pivot between horizontal and vertical positions and thereby function “as a non-horizontal rest for books, magazines, computers, or other objects.” Like the Brennan and Lambiaso patents, the Bentley patent does not illustrate any beverage holder or hand rail, and the arm rests depicted in the patent preferably do not move independently of the seat frame (although their covers may pivot to allow access to tray tables stored within). Nevertheless, the contents of the Brennan, Lambiaso, and Bentley patents are incorporated herein in their entireties by this reference.

SUMMARY OF THE INVENTION

[0006] The present invention, by contrast, incorporates a beverage container and a hand rail into a passenger seat. It additionally may include arm rests adapted to move downward from a nominal position, either to be essentially flush with a seat bottom or to be positioned between the seat bottom and the deck on which the seat is mounted. Portions of a tray table, further, may tilt as desired, as may the in-flight entertainment (IFE) equipment, with one or more reading lights installed as part of the tilt mechanism for the IFE equipment (or in an extendable portion of a seat back) designed to project downward onto the table. By so positioning the reading lights, adverse effects of their illumination on the picture provided by a seat-back video monitor may be reduced or eliminated.

[0007] The beverage holder of the invention may support not only cups, cans, bottles, or other beverage containers, but also at least some other objects or containers. A preferred holder is designed to fit into a recess in the underside of the tray table so that it is accessible when the table is in its (generally vertical) stowed position. Included in the holder may be a collar to which both a gimbal and a support bar are attached, with the collar pivoting outward from the recess toward the passenger for use. Utilizing the gimbal permits the beverage or other object to be maintained substantially upright regardless of the position of the associated seat back, with the support bar supporting the object at its bottom.

[0008] Hand rails of the present invention advantageously may be placed on some or all seats adjoining an aisle of the vehicle dock on which they are located. These rails typically will be located in upper portions of seat backs so that they may readily be grasped by passengers traversing the aisles of the vehicle. Preferred versions of the rails are offset in the seat back so as to be closer to the aisle, facilitating their being grasped by traversing passengers both regardless of the recline of the seat back and during periods of turbulence (if installed in aircraft or, perhaps, watercraft) when the seat and aisle are moving vertically relative to the ground.

[0009] Whereas existing pivoting arm rests typically consist of single-piece arms pivoting about single points, those of the present invention may include multiple pieces with either multiple pivot points or able both to translate and pivot. Consequently, greater flexibility of movement exists in arm rests of the invention. In particular, in one version of the arm rests with multiple pivot points, the rests may be repositioned more or less horizontally—essentially flush with seat bottoms, while in a dual translating/pivoting and other versions, the rests may be repositioned more or less vertically, between forward portions of seat bottoms and the vehicle deck.

[0010] Tray tables of the invention may include a hinged section so as to provide support for books or other objects positioned other than substantially horizontally to the deck. The hinged section preferably is the center portion of the table, although those skilled in the relevant art will recognize that other portions may be hinged as well or instead. This arrangement avoids any need for the separate upper sections and bases disclosed in the Bentley patent. A pull-out handle or other device incorporating a reading light may be positioned in the IFE equipment or seat back above the table but below any video monitor of the IFE present in the seat back. By pulling the handle and activating the light, a passenger may cause light to be projected downward onto the table without disrupting the quality of the video presentation from the monitor.
It thus is an optional, non-exclusive object of the present invention to provide seats, and components of seats, for vehicles (including, but not limited to, passenger aircraft).

It also is an optional, non-exclusive object of the present invention to provide seats into which holders for beverage containers (or other objects) are incorporated.

It additionally is an optional, non-exclusive object of the present invention to provide seats having hand rails, particularly (although not exclusively) when the seats are installed in vehicles subject to significant rapid vertical movement relative to the ground (or sea).

It is, furthermore, an optional, non-exclusive object of the present invention to provide seats in which arm rests are adapted to move down, rather than up, from a nominal use position.

It is another optional, non-exclusive object of the present invention to provide seats in which arm rests include multiple pieces adapted either to pivot about multiple points or both to pivot and translate.

It is, moreover, an optional, non-exclusive object of the present invention to provide seats having tiltable sections of tray tables for supporting objects other than by simply providing a horizontal base.

It is yet another optional, non-exclusive object of the present invention to provide seats having lighting assemblies adapted to project light onto the tray tables without adversely impacting quality of video pictures provided by video monitors installed in the seats.

Other objects, features, and advantages of the present invention will be apparent to those skilled in the relevant art with reference to the remaining text and the drawings of this application.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1-3 illustrate aspects of a beverage holder consistent with the present invention.

FIG. 4 illustrates a series of passenger seats consistent with the present invention, with a seat intended to be placed adjacent an aisle of a vehicle including a hand rail.

FIG. 5 depicts, schematically, a seat including an arm rest of the present invention designed to pivot about multiple points for stowage between the bottom of the seat and the deck to which the seat is mounted.

FIG. 6 depicts, again schematically, a seat including an alternate arm rest adapted to be stowed substantially flush with the seat bottom.

FIG. 7 illustrates in schematic form a seat with yet another alternate arm rest which both pivots and translates.

FIGS. 8-9 depict arm rest assemblies similar to that of FIG. 6.

FIGS. 10-11 illustrate seats having tray tables consistent with the present invention.

FIG. 12 depicts exemplary IFE equipment, including a mechanism for tilting a video monitor, consistent with the present invention.

FIG. 13 illustrates the tilt mechanism of the IFE equipment of FIG. 12 projecting light onto a tray table.

DETAILED DESCRIPTION

Detailed in FIGS. 1-3 is underside 10 of tray table 14 which may form part of the present invention. Table 14, which may also comprise face 18 (see FIGS. 10-11), advantageously is adapted to extend rearward from rear 22 of the back 26 of a seat S for use by the occupant of a seat immediately to the rear of seat S. As shown in FIGS. 1-3 and 10-11, table 14 may connect to seat S using arms 30. It further may fit into recess R1 in back 26 when stowed in a substantially vertical position and pivot about an axis along edge E and intersecting arms 30 to assume a substantially horizontal position for use.

Present in underside 10 is recess R2. Fitted into recess R2 is holder 34, designed principally for holding cans, bottles, cups, or other containers for beverages. The function of holder 34 is not so limited, however, as the holder 34 may receive and support objects other than beverage containers.

Included as part of holder 34 are collar 38, gimbal 42, and support bar 46. Collar 38 is designed to move between a stowed position (in which, as detailed in FIG. 1, holder 34 is fitted into recess R2) and a deployed position (as shown in FIGS. 2-3). Although any mechanism may be used to allow such movement, collar 38 preferably contains pins fitted into opening in walls 50 of recess R1, allowing collar 38 to pivot about an axis intersecting the pins and openings.

Both gimbal 42 and support bar 46 are connected to collar 38 so as to permit their movement relative to collar 38. For example, when holder 34 is deployed, gravity causes support bar 46 to travel below collar 38, so that it may serve as a support for the lower surface of an object. Gimbal 42, further, may rotate within collar 38, allowing the received object to remain in an upright position regardless of whether seat back 26 is upright or reclined. FIG. 3 illustrates an object in the form of can C placed into holder 34 and supported by support bar 46, as shown in the figure, gimbal 42 is oriented in a different plane than collar 38 so as to offset effects of seat back 26 having been reclined.

In preferred embodiments of holder 34, gimbal 42 has circular cross-section and protruding pins 48 positioned one hundred eighty degrees apart around its circumference. These pins 48 are received by openings in depending legs 52 and collar 38 so as to connect support bar 46 and gimbal 42 to the collar 38. Alternatively, collar 38 may comprise pins received by openings in both legs 52 and gimbal 42. Other manners of connecting components of holder 34 may be envisioned as well by those skilled in the relevant field.

Depicted in FIG. 4 is an exemplary hand rail 54 of the present invention. Hand rail 54 typically (although not necessarily) will extend upward from upper portion 58 of back 26 of a seat S adjacent an aisle of a vehicle. In this position, it may be grasped readily as needed by passengers traversing the aisle. Function of hand rail 54 is not so limited, however, as it also may be used by, for example, passengers intending to occupy seats in a row either in which seat S is positioned or immediately behind the row containing seat S to facilitate their ingress into and egress from their respective rows.

Preferred versions of hand rail 54 are offset from a vertical centerline CL of seat back 26, positioned toward the
aisle of the corresponding vehicle. Hand rail 54 additionally may be asymmetrically shaped. As shown in FIG. 4, hand rail 54 may provide greater grasping clearance above upper portion 58 closer to the vehicle aisle, adding to its convenience to passengers traversing the aisle. Embodiments of hand rail 54 consistent with FIG. 4 further may include two ends 62 and 66, each of which may be connected to upper portion 58 to strengthen the attachment.

[0035] FIG. 5 illustrates one type of moveable arm rest 70 of the present invention. Arm rest 70 usually (but not necessarily) will be positioned between two seats S and intended to be used commonly by occupants (if present) of both such seats S. At times, however, use of arm rest 70 is not desired by the seat occupant or occupants, who instead prefer that it be moved to an unobtrusive location. Consequently, arm rest 70 is designed to drop forward and down below seat bottom 74 of seat S, ultimately resting between seat bottom 74 and the deck D to which seat S is mounted.

[0036] The embodiment of arm rest 70 shown in FIG. 5 comprises post 78 and arm support 82. In use, arm support 82 is oriented generally horizontally so as to support some or all of a forearm or elbow of an occupant of a seat S. Arm support 82 is connected to or adjacent first end 86 of post 78, which extends above seat bottom 74 to space arm support 82 therefrom. Second end 90 of post 78 typically connects to frame 94 of seat S.

[0037] Connections at or adjacent both first and second ends 86 and 90, respectively, permit movement of the connected components. Consequently, arm support 82 may pivot about a point at its connection with first end 86, while second end 90 may pivot about a point at its connection to a forward portion of frame 94. Preferably (albeit not necessarily), arm support 82 rotates clockwise as it pivots and post 78 rotates counterclockwise as it pivots. Regardless of movement directions, however, arm support 82 may move from a (more or less) perpendicular orientation relative to post 78 to a (more or less) parallel position relative thereto, and both arm support and post 78 may be moved from a position principally above seat bottom 74 to a position principally below the bottom 74. In a preferred resting position, both arm support 83 and post 78 are oriented generally vertically and located in an area between seat bottom 74 and deck D.

[0038] FIGS. 6 and 8-9 detail an alternative arm rest 98 useful for a seat S. Like rest 70, arm rest 98 includes a post 102 and an arm support 106 connected thereto, with post 102 spacing arm support 106 above seat bottom 74 for use (see FIGS. 6 and 8). However, unlike post 78, post 102 beneficially connects to frame 94 near the joiner of seat back 26 and seat bottom 74. Such beneficial connection near the joiner of back 26 and bottom 74 is not mandatory, though, as those skilled in the relevant art will recognize other configurations as being permissible as well.

[0039] As is true for rest 70, arm support 106 is moveable relative to post 102 and post 102 is moveable relative to frame 94. Although arm support 106 remains substantially horizontal throughout its movement, post 102 is designed to move from a more vertical orientation (FIG. 6 and 8) to a more horizontally-oriented position (FIG. 9). In this latter position, arm support 106 is generally flush with (or, perhaps, even below the level of) seat bottom 74, reducing its obtrusiveness for any occupants of seats S not desiring its use. Additionally, at least some versions of arm support 106 may assume one or more positions intermediate those illustrated respectively in FIGS. 8 and 9. If means are utilized to lock arm support 106 in these intermediate positions, support 106 effectively may be lowered and raised to a height desired by an occupant of an associated seat S.

[0040] FIG. 7 depicts yet another arm rest 110 consistent with the present invention. Similar to rests 70 and 98, arm rest 110 comprises at least post 114 and arm support 118 connected to an end thereof. Like post 102 of rest 98, furthermore, post 114 may be positioned adjacent the joiner of seat back 26 and seat bottom 74 when arm rest 110 is in use. Although it may do so if necessary, arm support 118 need not move relative to post 114; however. Instead, post 114 may translate forward within and then pivot with respect to frame 94, moving from a generally vertically-oriented position adjacent the intersection of seat back 26 and seat bottom 74 to a generally horizontal position toward the front portion of frame 94. Because arm support 118 is fixed to post 114, it too translates forward and then rotates to a generally vertical position between bottom 74 and deck D.

[0041] Tray table 14 shown in FIGS. 10-11 may comprise peripheral sections 122A and 122B and central section 126. As shown particularly in FIG. 11, central section 126 may move relative to peripheral sections 122A and 122B; it may, for example, pivot along a rod connecting sections 122A, 122B, and 126 at or near edge R (which is opposite edge E), whereas the positions of sections 122A and 122B relative to the rod are fixed. Preferably, central section 126 is adapted to pivot solely at or above the level of sections 122A and 122B, although conceivably it could pivot below sections 122A and 122B if desired.

[0042] A ratchet or any other suitable mechanism may be used to latch central section 126 in a particular position; as shown in FIG. 11, central section 126 may be latched in an upwardly-oriented position so as to support, for example, a book or magazine. Alternatively, central section 126 may remain in (or be returned to) an unpivoted position so that its portion of face 18 is flush with the portions of face 18 provided by sections 122A and 122B (as appears in FIG. 10). Section 126 need not necessarily be centrally located within tray table 14, however, and more than one section of the table 14 may move if desired to achieve other objectives.

[0043] Illustrated in FIGS. 12-13 are portions of IFE equipment 150. Equipment 150 may comprise video monitor 154 together with one or more controls 158 and a housing 160 therefor. Equipment 150 additionally may be mounted onto or otherwise connected to or in the back of a seat.

[0044] As shown in FIGS. 12-13, equipment 150 additionally may include generally L-shaped plate 162 to which handle 166 is attached or integrally formed. Plate 162 typically provides a mechanism for mounting housing 160 to or in a seat back. Housing 160 preferably connects to plate 162 in any manner allowing the housing 160 and plate 162 to pivot together relative to the seat back. FIGS. 12-13 illustrate a mounting arrangement including one or more brackets 168 and pins 170, although other pivot-permitting mounting mechanisms may be used instead.

[0045] Positioned on or in underside 172 of base 176 of plate 162 is lighting assembly 180. Assembly 180 advantageously comprises one or more light-emitting diodes (LEDs)
within transparent or translucent cover 184. Those skilled in the relevant art will, however, recognize that light sources other than LEDs may be utilized instead. Controls for the light sources of assembly 180, such as dimmer switch 188 and power switch 192, may if desired be present in or on handle 166.

[0046] Assembly 180, if energized, may illuminate tray table 196 regardless of the position of housing 160 relative to the seat back to or in which it is mounted. Preferably, though, a passenger manually may grasp or contact handle 166 and pull the handle 166 toward him or her, so that equipment 150 is positioned generally as shown in dotted lines in FIG. 13. In this tilted position, assembly 180 illuminates a central area A of tray table 196 without impacting quality of presentation from video monitor 154.

[0047] The foregoing is provided for purposes of illustrating, explaining, and describing exemplary embodiments and certain benefits of the present invention. Modifications and adaptations to the illustrated and described embodiments will be apparent to those skilled in the relevant art and may be made without departing from the scope or spirit of the invention. Additionally, although objects described herein are designed principally for use in, with, or as part of aircraft seats, any or all of them may be used in, with, or as part of other seats (vehicular or otherwise) or for other purposes as appropriate or desired.

What is claimed is:

1. A seat comprising:
   a. a seat bottom positioned at a height above a floor;
   b. a seat back having a rear surface;
   c. a video monitor abutting the rear surface and having a lower section comprising at least one light source;
   d. a tray table defining an upper surface and a lower surface and moveable from a first position abutting the rear surface to a second position in which at least a portion is substantially horizontal, (i) the upper surface (A) being illuminated with light from the at least one light source when the tray table is in the second position and (B) comprising first and second sections, the first section being moveable from a first position generally coplanar with the second section to a second position in which the first section forms an angle of other than zero or one hundred eighty degrees with the second section and (ii) the lower surface comprising (A) a collar, (B) a support extendable below the collar when in use, and (C) means, comprising a rotatable gimbal connected to the collar, for receiving the object in use; and
   e. an arm rest moveable between a first position in which at least part of the arm rest is above the seat bottom and a second position in which at least part of the arm rest is at or below the height of the seat bottom.

2. A seat comprising a seat bottom, a seat back having a rear surface, and a holder for an object, the holder extending rearward of the rear surface of the seat back and comprising:
   a. a collar;
   b. a support extendable below the collar when in use; and
   c. means, comprising a rotatable gimbal connected to the collar, for receiving the object in use.

3. A seat according to claim 2 in which the seat back is moveable, such movement causing the receiving means to rotate in use so as to permit the received object to remain in an upright position notwithstanding such movement.

4. A seat according to claim 3 in which the gimbal comprises a ring, the support comprises a bar, and the object is a beverage container.

5. A seat according to claim 4 further comprising a tray table abutting the rear surface of the seat back, the tray table having an underside comprising a recess into which the holder fits in generally planar fashion when not in use.

6. A seat comprising a seat bottom, a seat back defining a vertical centerline and having an upper surface, and a hand rail extending upward of the upper surface and asymmetric with respect to the vertical centerline, the hand rail comprising a structure having first and second ends connected to the upper surface so as to define a space therebetween for receiving at least a portion of a hand of a passenger grasping the structure.

7. A seat comprising a seat bottom positioned at a height above a floor, a seat back, and an arm rest moveable between a first position in which at least part of the arm rest is above the seat bottom and a second position in which at least part of the arm rest is at or below the height of the seat bottom.

8. A seat according to claim 7 in which the seat bottom has an upper surface and, in the first position, at least part of the arm rest is substantially parallel to the upper surface and, in the second position, at least part of the arm rest is substantially perpendicular to the upper surface.

9. A seat according to claim 7 in which, in the second position, at least part of the arm rest is forward of the seat bottom.

10. A seat according to claim 7 in which, in the second position, at least part of the arm rest is at the height of the seat bottom.

11. A seat according to claim 7 in which, in the second position, at least part of the arm rest is below the height of the seat bottom.

12. A tray table for a seat, the tray table comprising at least first and second sections, the first section being moveable from a first position generally coplanar with the second section to a second position in which the first section forms an angle of other than zero or one hundred eighty degrees with the second section.

13. A tray table according to claim 12 in which the first section may be latched in the second position.

14. A seat comprising a seat bottom, a seat back, a tray table deployable with at least a portion being in a substantially horizontal position, and a video monitor having a lower section comprising at least one light source whose illumination is directed onto the tray table when in the substantially horizontal position.