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(54) **TRAY TABLES PRINCIPALLY FOR USE IN PASSENGER VEHICLES**

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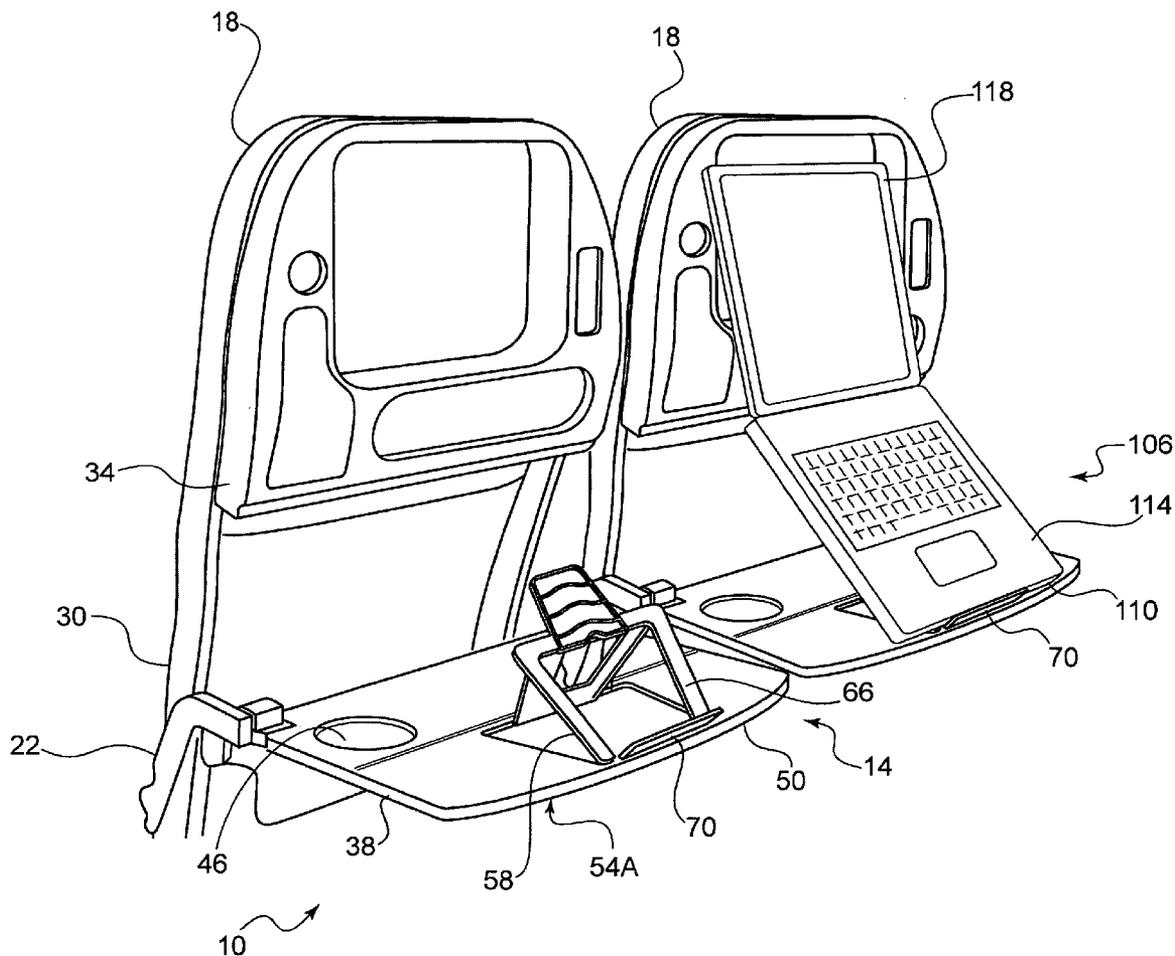
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(57) **ABSTRACT**
Tray tables adapted to support, among other things, certain portable electronic devices while in use are detailed. The tables may include multiple sections designed to move relative to horizontal bases. When not needed, the moveable sections may be stowed in recesses in upper surfaces of the bases.

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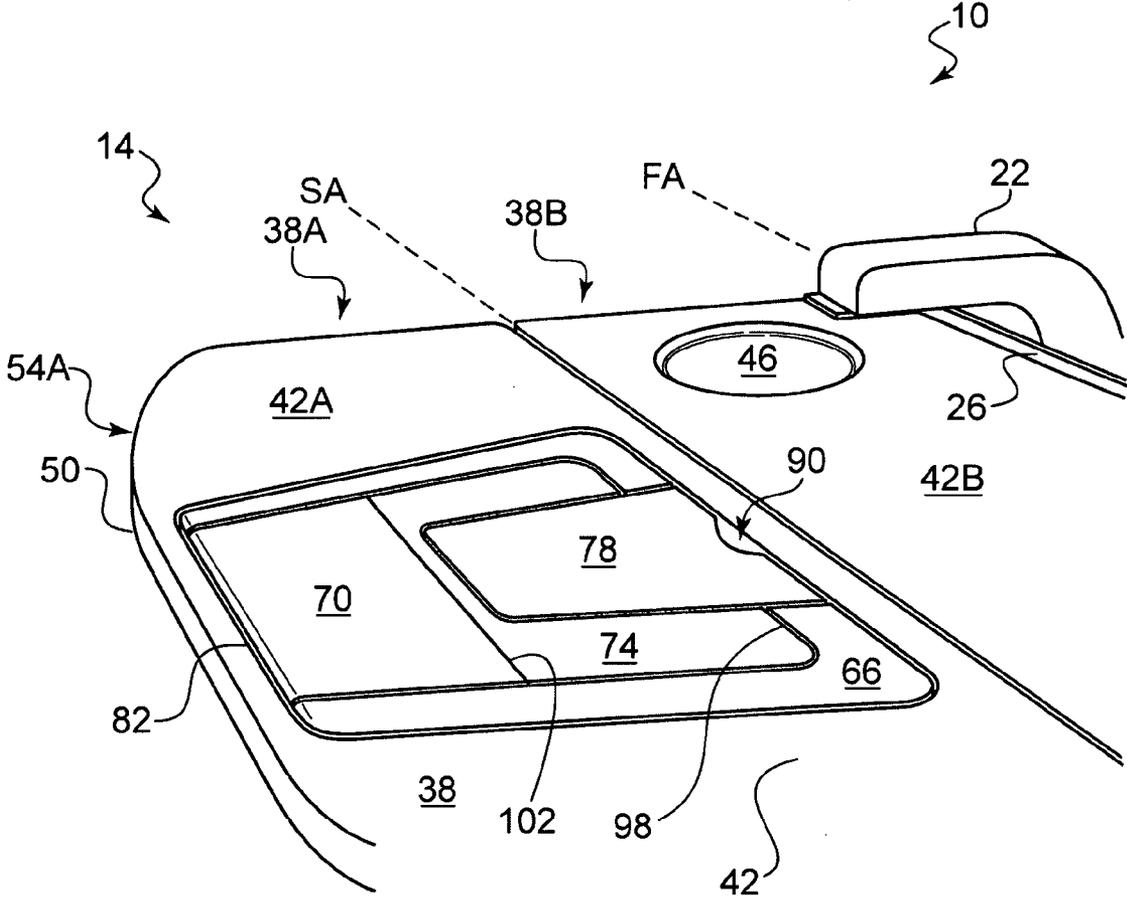


FIG. 1

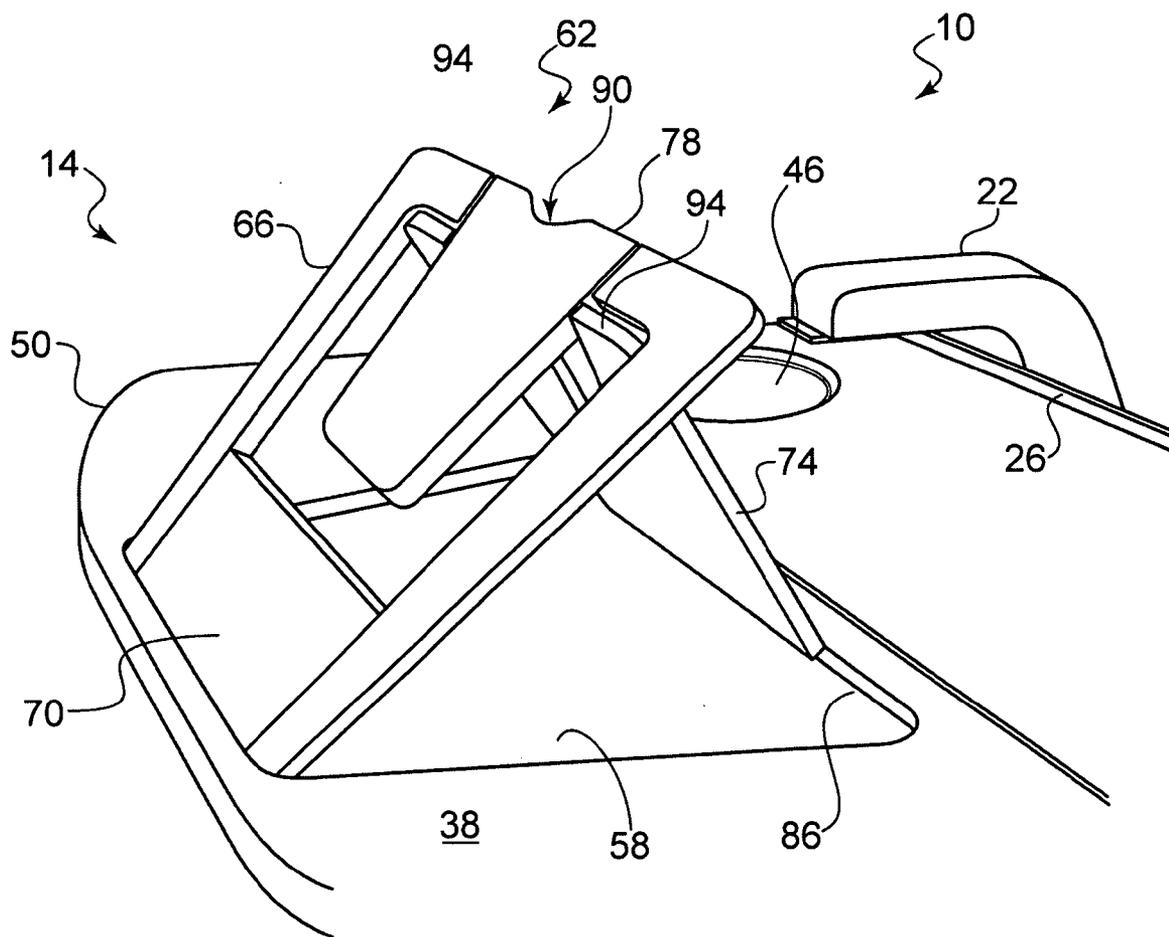


FIG. 2

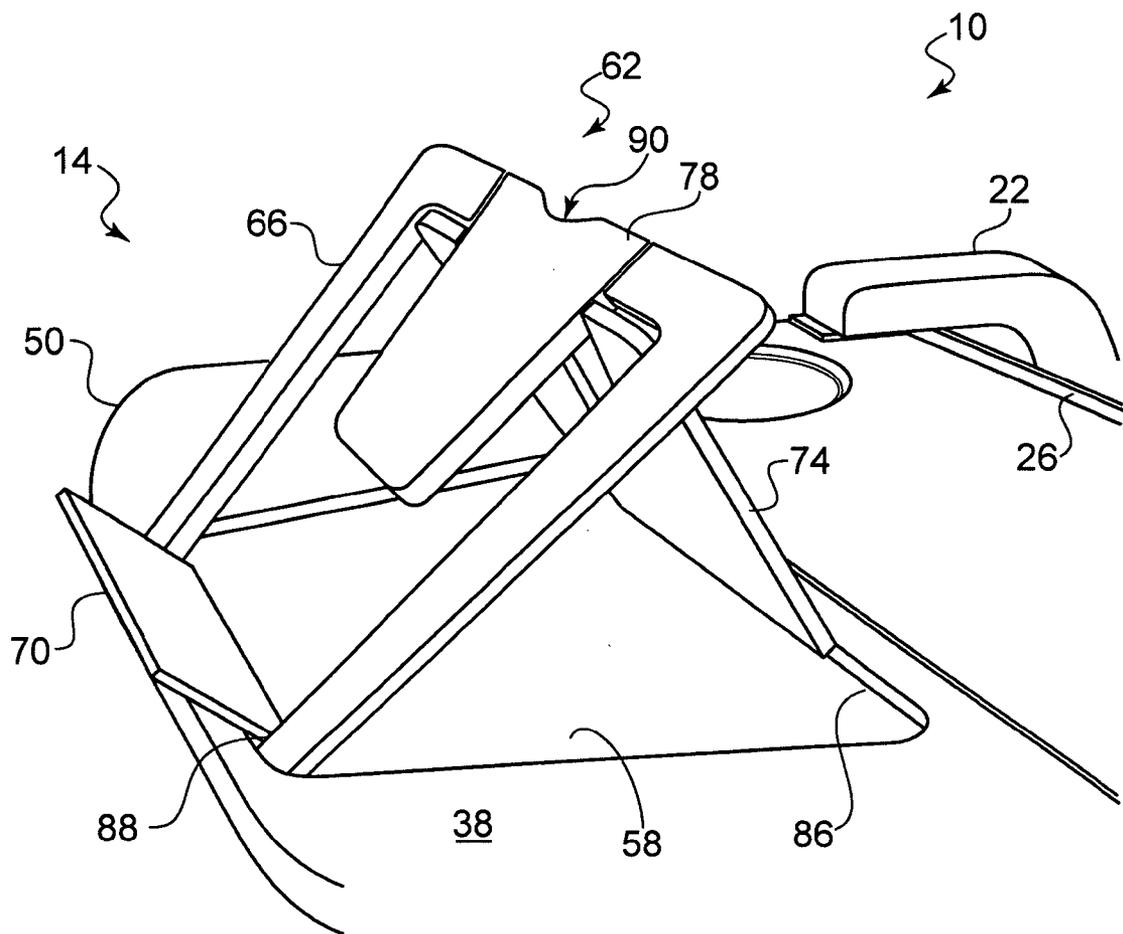


FIG. 3

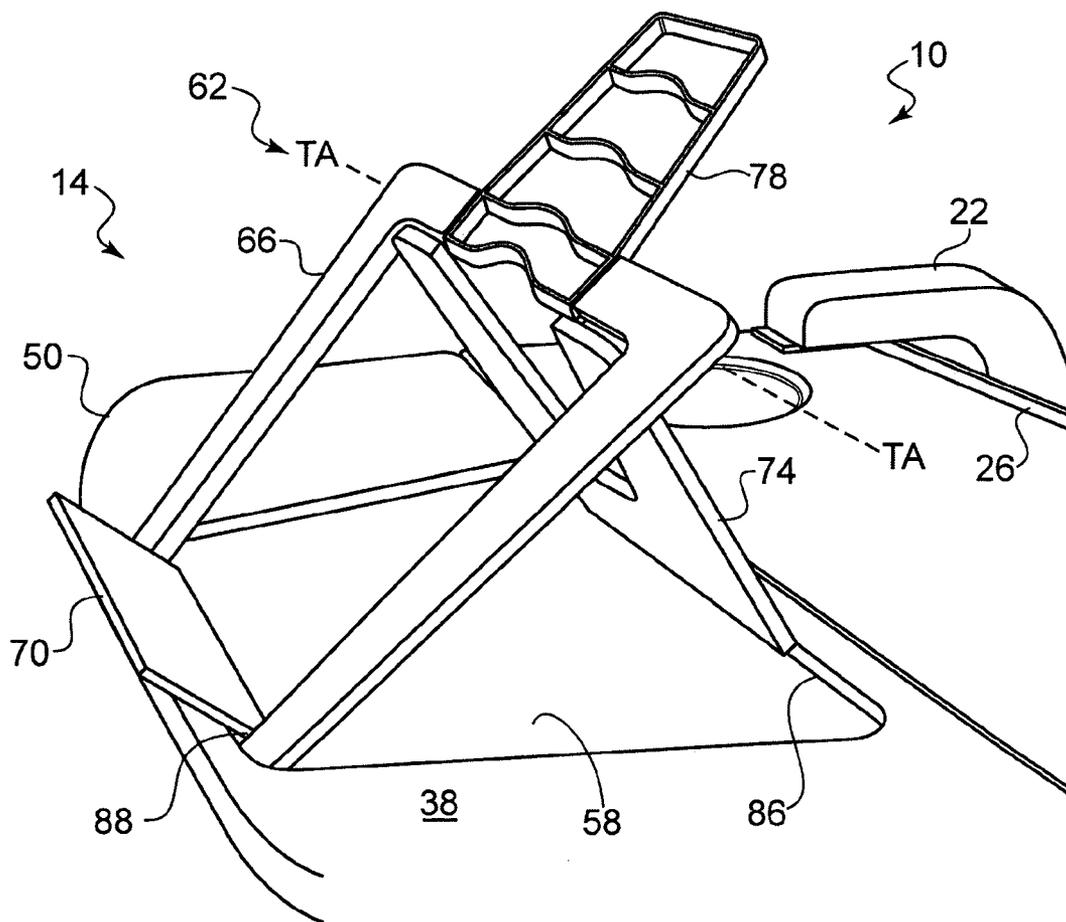


FIG. 4

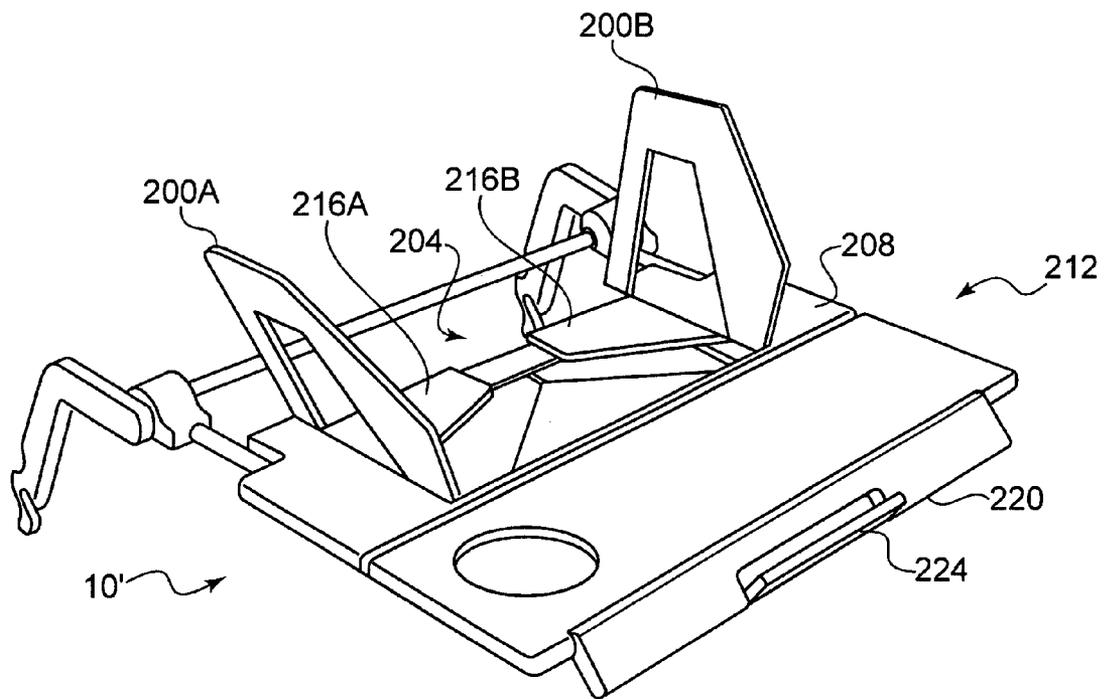


FIG. 6A

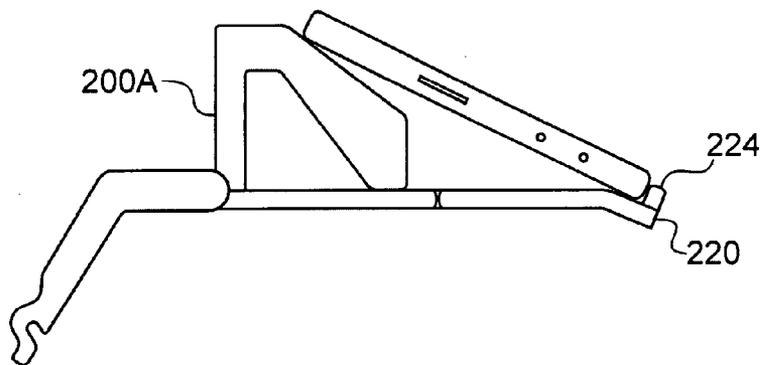


FIG. 6B

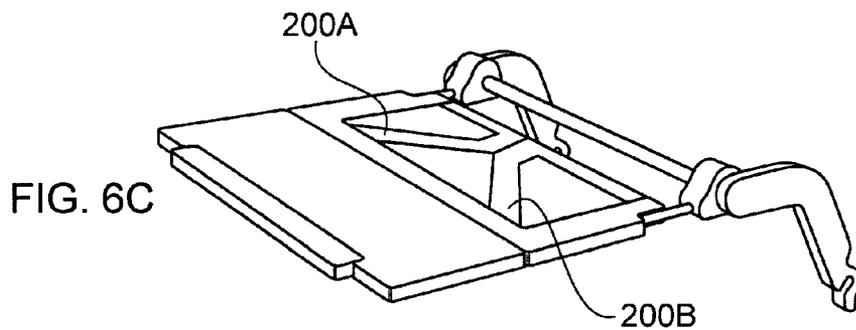


FIG. 6C

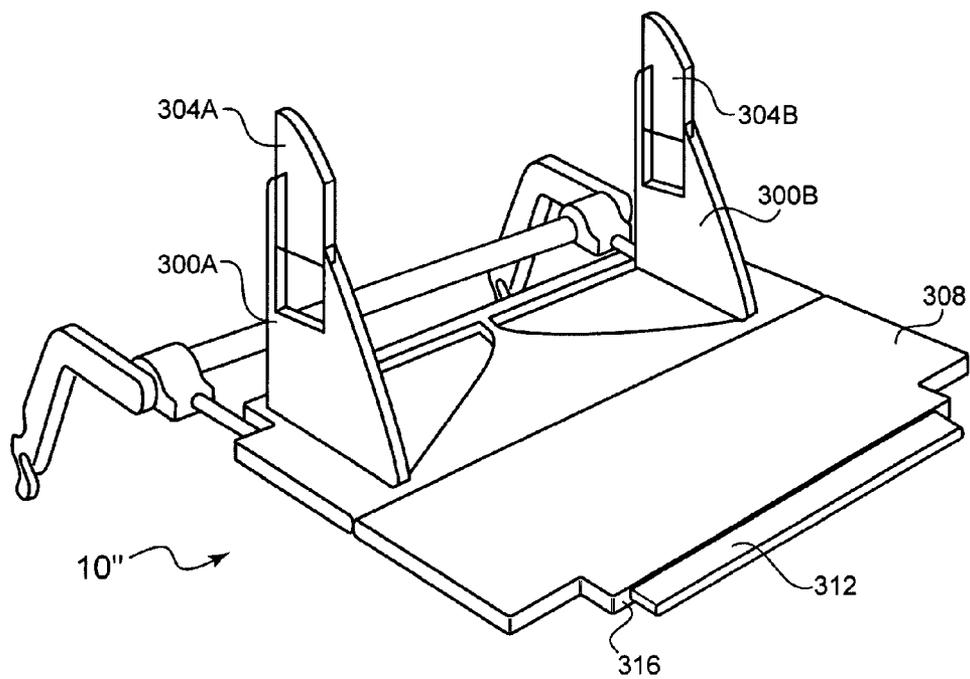


FIG. 7A

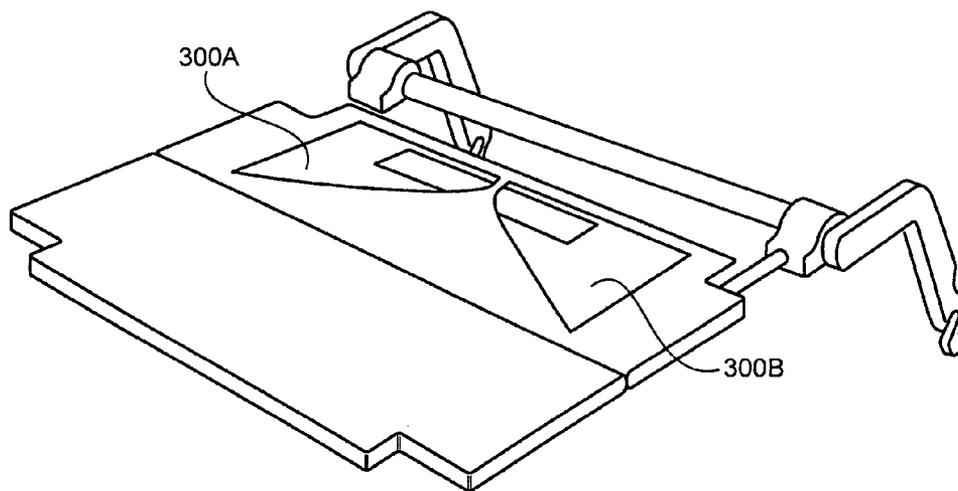


FIG. 7B

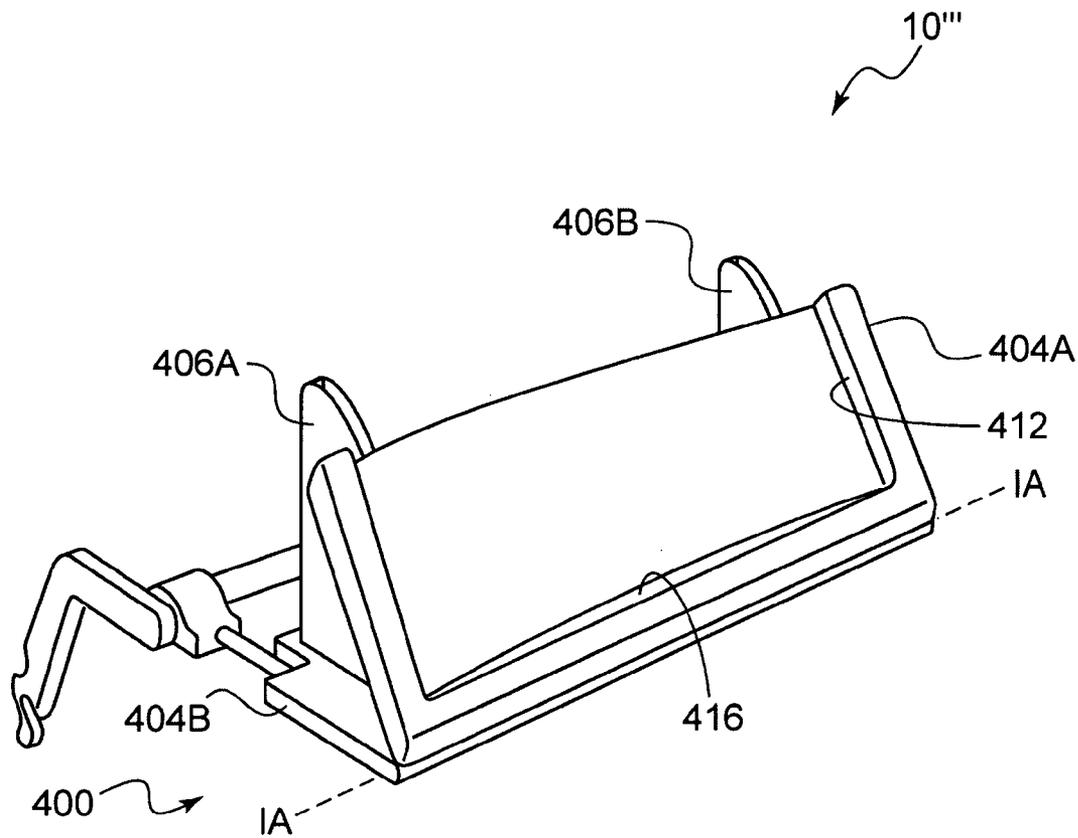


FIG. 8

TRAY TABLES PRINCIPALLY FOR USE IN PASSENGER VEHICLES

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/786,123 filed on Mar. 27, 2006, the contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This invention relates to tables and more particularly, although not necessarily exclusively, to tray tables commonly used in aircraft, trains, and other passenger transport vehicles.

BACKGROUND OF THE INVENTION

[0003] U.S. Pat. No. 4,526,421 to Brennan, et al. illustrates a conventional tray table intended for use by commercial aircraft passengers. The table is of unitary construction and adapted to pivot along an edge remote from the passenger with which it is associated. When deployed, the table is pivoted to a substantially horizontal position so it may serve as a platform for a food tray or other object. The table additionally is connected to moveable arms extending rearward from a seat positioned in front of the passenger. When not in use, the table may be pivoted to a substantially vertical position for stowage in a space present in the back of that seat.

[0004] U.S. Pat. No. 6,761,398 to Bentley, et al. discloses additional tray tables stowable within or adjacent to seat backs. Although some of the tray tables of the Bentley '398 patent are unitary structures like those of the Brennan patent, others are not. Some tables, for example, have a second pivot axis intermediate (between) the passenger and the first pivot axis at the moveable arms. These types of tables are typically called "bi-fold" tables to reflect that they are typically pivoted twice for deployment or storage.

[0005] Detailed in U.S. Pat. No. 6,237,994 to Bentley, et al. are various tray table assemblies adapted for stowage within arm rests of passenger seats. Some of the table assemblies of the Bentley '994 patent are adjustable vertically while remaining substantially horizontal platforms. Others of the assemblies include an upper section that itself may pivot relative to a base to a non-horizontal position. As noted in the Bentley '994 patent, this upper section "may thus function not just as the horizontal platform of conventional tables, but also as a non-horizontal rest for books, magazines, computers, or other objects." See Bentley '994, col. 5, 11. 32-35.

SUMMARY OF THE INVENTION

[0006] The present invention provides improvements to existing tray table designs, including but not limited to those of the Bentley '994 patent. Included as part of the innovative tables are multiple sections designed to pivot, or otherwise move, relative to horizontal bases. These moveable sections cooperate to support such things as laptop computers, portable digital video disc (DVD) players, and books for use, with monitor screens of computers and DVD players, for example, being easily viewed by corresponding passengers.

The moveable sections additionally may be designed to fit into a recess present on the upper surface of the horizontal bases of the tables.

[0007] Preferred versions of the invention include a main object support and a stop positionable substantially perpendicular thereto. Such versions also may include a brace for the main object support and a secondary, or ancillary, object support. Advantageously each of these pieces may move relative to a horizontal base, although those skilled in the relevant art will recognize that movement of all such pieces might not always be necessary.

[0008] Moveable sections of the invention may be made of plastic or other material as appropriate or desired. Preferably the materials are lightweight (particularly if used on-board aircraft) so as not to increase meaningfully the weight of any vehicle in which they are deployed. They nonetheless are sufficiently strong and rigid to support certain portable electronic or other objects.

[0009] Alternate versions of the invention may include more or fewer moveable pieces than in preferred versions. Moreover, moveable pieces need not necessarily be stowed in a recess in the upper surface of a horizontal base. Yet additionally, in some embodiments of the invention, a first portion of the base itself may pivot at an angle to a second portion of the base so as to form part of the main object support.

[0010] It thus is an optional, non-exclusive object of the present invention to provide innovative tray tables.

[0011] It is also an optional, non-exclusive object of the present invention to provide tray tables for use in passenger vehicles.

[0012] It is another optional, non-exclusive object of the present invention to provide tray tables adapted for use with portable electronic equipment, books, or other objects.

[0013] It is a further optional, non-exclusive object of the present invention to provide tray tables capable of supporting laptop computers and portable DVD players so that their screens are readily viewable by passengers.

[0014] It is an additional optional, non-exclusive object of the present invention to provide tray tables having one or more pieces moveable relative to a horizontal base.

[0015] It is, moreover, an optional, non-exclusive object of the present invention to provide tray tables in which moveable pieces may be stowed in a recess in a horizontal base.

[0016] It is yet another optional, non-exclusive object of the present invention to provide tray tables having some or all of a horizontal base, a main object support, a stop, a brace, and a secondary object support.

[0017] 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 drawings of this application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 illustrates a tray table of the present invention prior to deployment of any section moveable relative to a horizontal base.

[0019] FIG. 2-3 illustrate the tray table of FIG. 1 with moveable sections partially deployed in alternate configurations.

[0020] FIG. 4 illustrates the tray table of FIGS. 1-3 as fully deployed.

[0021] FIG. 5 depicts two tray tables of FIGS. 1-4 as fully deployed, with one such table supporting a laptop computer.

[0022] FIGS. 6A-C depict a first alternate tray table of the present invention.

[0023] FIGS. 7A-B illustrate a second alternate tray table of the present invention.

[0024] FIG. 8 shows a third alternate tray table of the present invention.

DETAILED DESCRIPTION

[0025] Detailed in FIGS. 1-5 is assembly 10 of the present invention. Assembly 10 may comprise tray table 14 together with, optionally, means for connecting table 14 to a seat 18. Such means may be conventional, comprising moveable arms 22 attached to table 14 and to seat 18. Attachment of table 14 and arms 22 occurs in a manner permitting table 14 to rotate at least approximately ninety degrees about a first axis FA coincident with or parallel to its distal edge 26, from a substantially horizontal position for use (as shown in FIGS. 1-5) to a substantially vertical position for stowage within recess 30 of back 34 of seat 18. However, persons skilled in the relevant field will recognize that table 14 instead may be stowed within an arm rest of a seat (or elsewhere) or may be connected to seat 18 other than in the manner depicted in FIG. 5.

[0026] Consistent with its traditional uses, table 14 is designed to function as a stable surface on which to place food trays or similar items. Accordingly, table 14 comprises platform or base 38 which, when deployed, is positioned substantially horizontally with its upper face 42 being flat (or substantially so). This configuration is shown in FIG. 1. If desired, upper face 42 may include a small circular (or similar) recess 46 in which to place a beverage cup or can.

[0027] Base 38 may comprise a unitary structure. Alternatively, it may have a bi-fold structure as appears in FIGS. 1-5. In this latter configuration, base 38 has a second pivot axis SA intermediate distal edge 26 and proximal edge 50 and which is parallel to first axis FA. Base section 38A may pivot about axis SA so that its upper face 42A abuts upper face 42B of base section 38B, thereby exposing its lower face 54A. Such pivoting may occur to form a slim rectangular structure (in which lower face 54A is the platform) or for stowage.

[0028] Also included as part of base 38 is recess 58. In a bi-fold base design, recess 58 preferably is present in upper surface 42A of base section 38A. In any configuration, however, recess preferably is present in a portion of base 38 adjacent proximal edge 50.

[0029] In the version of assembly 10 illustrated in FIGS. 1-5, into recess 58 is fitted component assembly 62 designed to move relative to base 38. FIG. 1 illustrates component assembly 62 entirely fitted into recess 58, in which case upper surface 42A remains generally flat. FIGS. 2-5, by contrast, depict component assembly 62 with portions hav-

ing been moved relative to base 38, so that upper surface 42A no longer is substantially flat. Component assembly 62 beneficially may include some or all of main object support 66, stop 70, brace 74, and secondary object support 78. Collectively, the members of assembly 62 function to support laptop computers, portable DVD players, books, or other objects in positions facilitating their operation or use.

[0030] Recess 58 may be defined, in part, by proximal wall 82 and distal wall 86. Present in or adjacent proximal wall 82 is an axle or other structure 88 to which both main object support 66 and stop 70 may be connected. Brace 74 and secondary support 78 are connected to main support 66 and adapted to move relative to it.

[0031] Secondary support 78 additionally may comprise cut-out 90 adjacent distal wall 86 when component assembly 62 is fitted into recess 58. Cut-out 90 may function as a finger hole for initiating movement of the component assembly 62 when it is fitted into recess 58. A passenger may grasp cut-out 90 with a finger and pull secondary support 78 toward him or her, thereby causing at least interconnected secondary support 78, main support 66, and brace 74 to protrude above upper surface 42A.

[0032] As such pulling occurs, hinges 94 connecting top portion 98 of brace 74 to main support 66 allow brace 74 to swing outward such that its bottom portion 102 contacts distal wall 86 of recess 58. Distal wall 86 thus serves to anchor brace 74 against further outward swinging, causing component assembly to assume the configuration depicted in FIG. 2. In this configuration, both main support 66 and brace 74 protrude above upper surface 42A at acute angles to that surface, forming a structure having a generally triangular cross-section.

[0033] Thereafter, stop 70 may be pivoted about structure 88 so that it no longer lies in the same plane as main support 66. Indeed, as shown in FIG. 3, stop 70 preferably is pivoted so that it rests against proximal wall 82, in which case it is perpendicular (or substantially so) to main support 66. As so pivoted, stop 70 may function as a base for the object to be supported, counteracting force of gravity and preventing downward motion of the supported object.

[0034] If the object to be supported is taller than main support 66, secondary support 78 may be deployed. As illustrated in FIGS. 3-5, secondary support 78 may be pivoted one hundred eighty degrees about third axis TA from a first position (as appears in FIG. 3) to a second position (shown in FIGS. 4-5). As so pivoted, secondary support 78 protrudes above—but remains in the same plane as—main support 66 so as to provide additional support for an object.

[0035] FIG. 5 also depicts an exemplary laptop computer 106 in use in connection with assembly 10. With component assembly 62 configured as in FIG. 4, lower edge 110 of computer 106 bears against stop 70 while base 114 of computer 106 bears against main and secondary object supports 66 and 78, respectively. The result is that computer base 114 is angled upward of base 38, with the upward angling repositioning monitor portion 118 of computer 106 at a level closer to the passenger's eyes and orienting it higher and more vertically in space.

[0036] FIGS. 6-8 illustrate various alternative designs for assembly 10. Assembly 10' of FIGS. 6A-C, for example, uses a pair of main supports 200A and 200B which may be

pivoted upward from recess 204 of base 208 of tray table 212. If smaller main supports are needed, alternate main supports 216A and 216B may be pivoted upward instead. Table 212 additionally may include a proximal lip 220 capable of pivoting downward relative to base 208 so as better to accommodate laptop computers, with lip 220 including an upwardly-projecting stop 224.

[0037] FIGS. 7A-B show an analogous pair of main supports 300A and 300B as part of assembly 10". Such supports 300A and 300B may, however, include pull-ups 304A and 304B to provide greater support for tall objects or to place them at angles relative to base 308 greater than those typically provided by assemblies 10 and 10'. FIG. 7A also illustrates lip 312, which may pull out (and potentially up) from proximal edge 316 of base 308.

[0038] FIG. 8, finally, illustrates assembly 10" utilizing bi-fold tray 400. Base section 404A may be pivoted about intermediate axis IA to rest against main supports 406A and 406B and thereby form an acute angle relative to base section 404B. So pivoting base section 404A exposes its lower face 408, in which recess 412 bounded by wall 416 exists. In this configuration an object to be supported may be positioned within recess 412, with wall 416 acting to stop downward movement of the object. Assembly 10" also may include a rotating or other stop (not shown) located within recess 412 in the closed position. The stop may be rotated out of recess 412 by ninety degrees thereby providing a larger surface (as compared to solely the depth of recess 412) to counteract force of gravity and prevent downward movement of the item to be supported.

[0039] The foregoing is provided for purposes of illustrating, explaining, and describing embodiments of the present invention. Modifications and adaptations to these embodiments will be apparent to those skilled in the art and may be made without departing from the scope or spirit of the invention. Incorporated herein by this reference are the entire contents of each of the Brennan, Bentley '398, and Bentley '994 patents.

What is claimed is:

- 1. A tray table configured for movement between a stowed position and a deployed position, the tray table comprising:
 - a. a base configured so that at least a portion is generally horizontal when the tray table is deployed; and
 - b. a component assembly attached to the base configured for movement between a first, generally horizontal, stowed position and a second non-horizontal position.
- 2. A tray table according to claim 1 in which the base comprises a recess into which the component assembly fits when in the first position.
- 3. A tray table according to claim 2 in which the component assembly extends upward from the base when in the second position.

4. A tray table according to claim 3 in which the component assembly comprises a main object support and a brace.

5. A tray table according to claim 4 in which the base is configured to move relative to the main object support.

6. A tray table according to claim 5 in which (a) the recess is defined in part by a wall and (b) the brace contacts the wall when the component assembly is in the second position.

7. A tray table according to claim 6 in which the component assembly further comprises a stop moveable between a stowed position in a plane generally coincident with the main object support and a deployed position in a plane generally perpendicular to the main object support.

8. A tray table according to claim 7 in which the component assembly further comprises a secondary object support moveable relative to the main object support.

9. A tray table according to claim 8 for deployment within a passenger transport vehicle.

10. A tray table according to claim 9 in which the passenger transport vehicle is an aircraft.

11. A tray table according to claim 2 in which (a) the base has a nominally upper surface in which the recess is formed and (b) the component assembly is generally flush with the upper surface when in the first position.

12. A tray table according to claim 1 further comprising a lip configured to move relative to the base.

13. A tray table according to claim 12 in which the lip comprises a stop.

14. A tray table according to claim 12 in which the lip is configured to pull out from the base.

15. A tray table according to claim 1 in which the base comprises first and second sections, the second section being moveable relative to the first section.

16. A tray table according to claim 15 in which the second section has a nominally lower surface comprising a recess.

17. A tray table according to claim 16 in which the component assembly fits into the recess when in the first position.

18. A passenger seat comprising a tray table comprising:

- a. a base configured so that at least a portion is generally horizontal when the tray table is deployed; and
 - b. a component assembly attached to the base configured for movement between a first, generally horizontal, stowed position and a second non-horizontal position.
19. An aircraft comprising a plurality of passenger seats, each passenger seat comprising a tray table comprising:

- a. a base configured so that at least a portion is generally horizontal when the tray table is deployed; and
- b. a component assembly attached to the base configured for movement between a first, generally horizontal, stowed position and a second non-horizontal position.

* * * * *