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RG11 4WI, United Kingdom

(51) INT CL:
G06F 1/16 (2006.01) **B64D 11/00** (2006.01)
B60R 11/02 (2006.01)

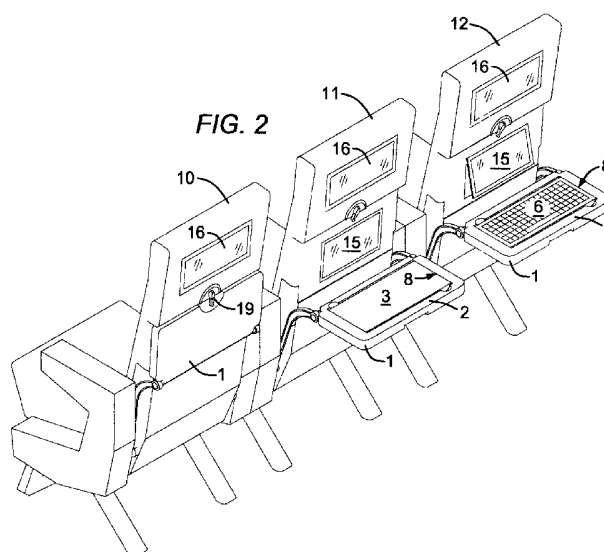
(52) UK CL (Edition X):
G4A ADT AKS

(56) Documents Cited:
GB 2382980 A **WO 2001/030607 A1**
DE 019825356 A1 **DE 019533494 A1**
DE 010133470 A1 **US 5975780 A**
US 4584603 A **US 2168880 A**
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(58) Field of Search:
UK CL (Edition X) **G4A**
INT CL⁷ **B60N, B60R, B64D, G06F**
Other: **Online: EPODOC, WPI**

(54) Abstract Title: **Keyboard and display apparatus for passengers in a vehicle**

(57) A foldable table apparatus with an integrated keyboard, an integrated display, or both is presented. Such an apparatus is typically mounted behind each seat in a passenger vessel such as an aircraft, bus, or train, and takes the place of the conventional foldable tray. The apparatus permits users to perform computer tasks, access software and other services, while traveling or in transit. The apparatus may be quickly stored to allow passengers to enter and exit their seats conveniently. The apparatus may also serve as a conventional table when the keyboard or display is closed. Connectors may be integrated within the table apparatus to facilitate data transfer to and from a third device. The keyboard apparatus may be removed for cleaning, repair, or replacement. When an array of such apparatus is used, a system is provided to allow such apparatus to access a variety of services using a wired or wireless connection. As users are typically in transit, the system provides the user with the ability to send emails and to use promotional software or services which they may later purchase. A method of targeting advertisements to such users is also provided.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

Original Printed on Recycled Paper

GB 2 430 769 A

FIG. 2

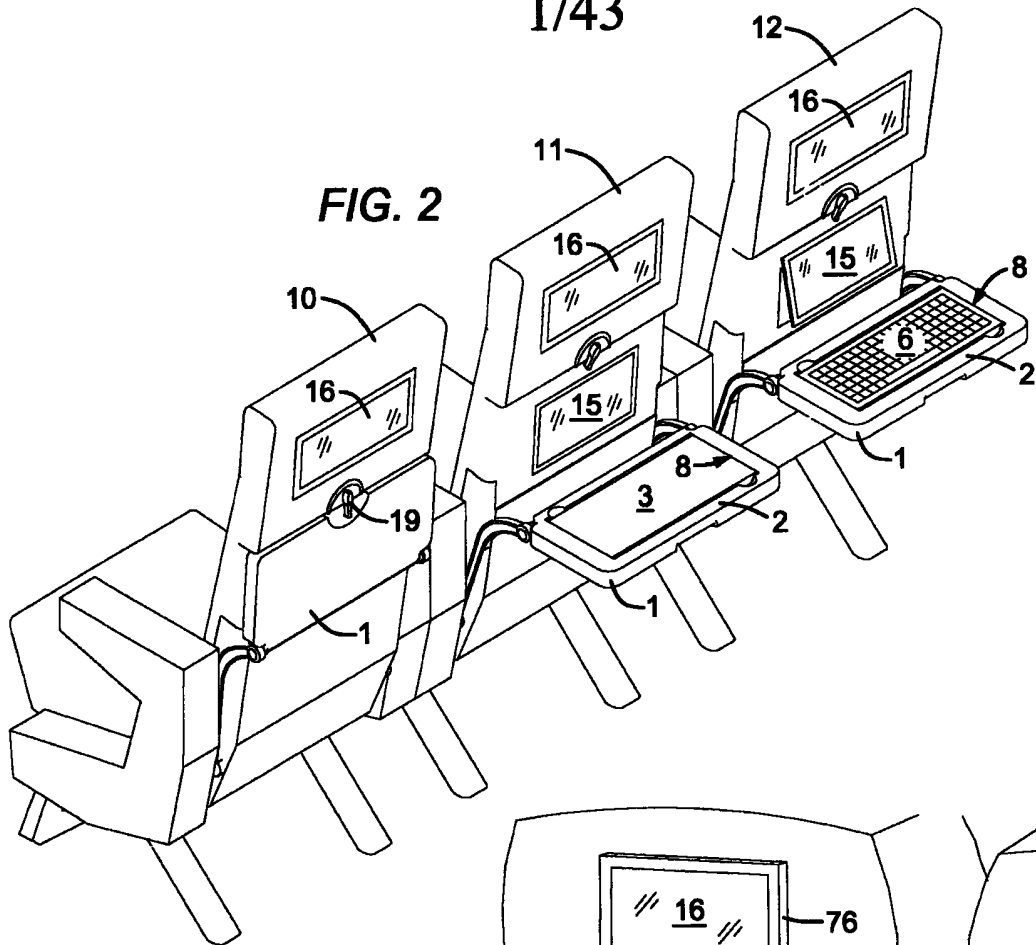
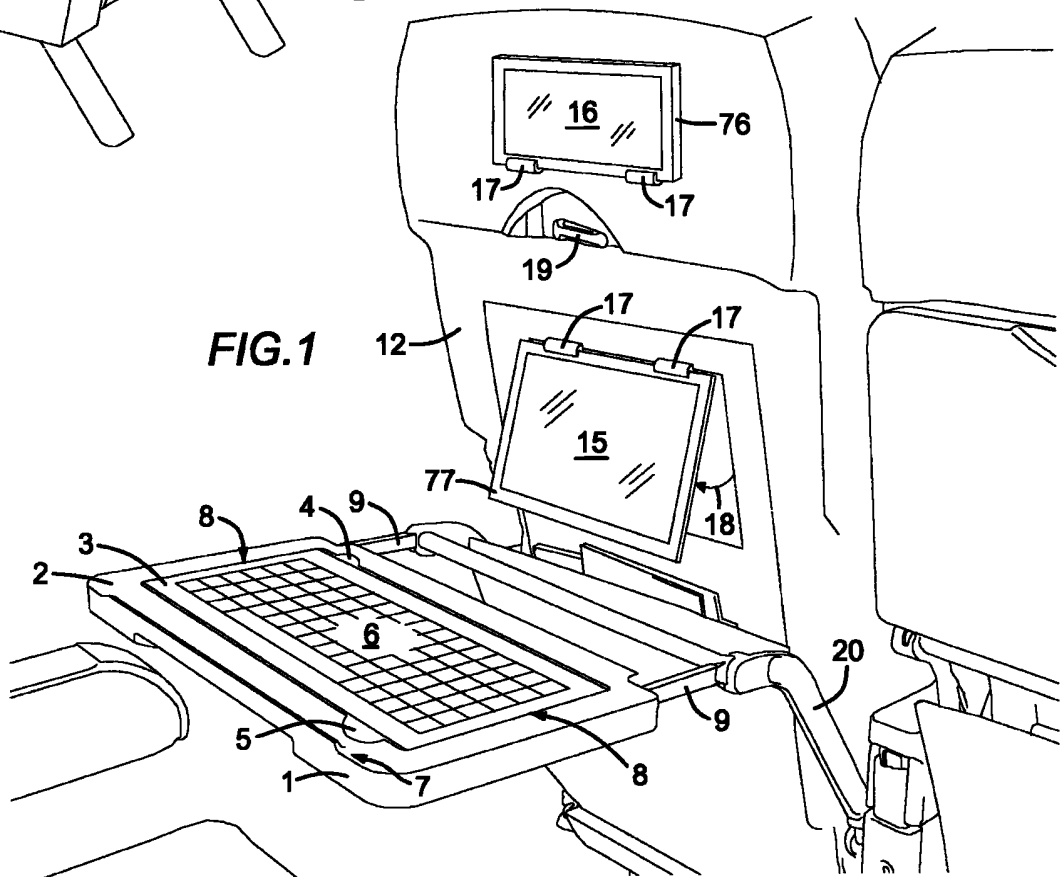


FIG. 1



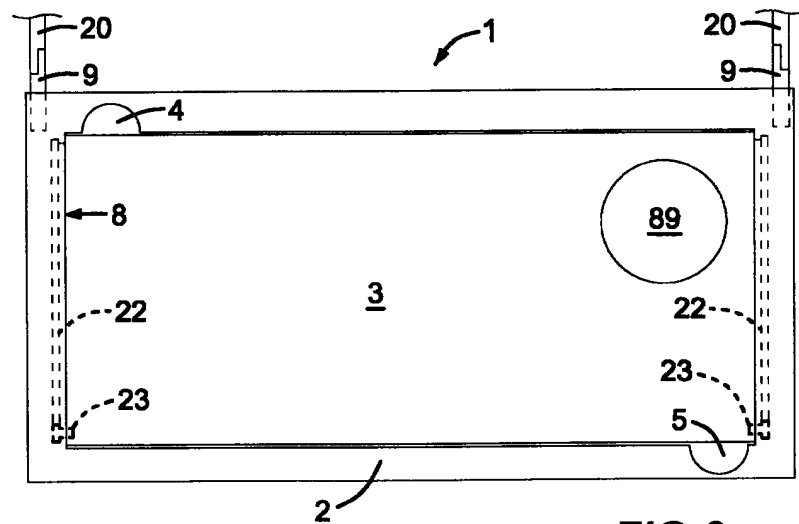


FIG. 3

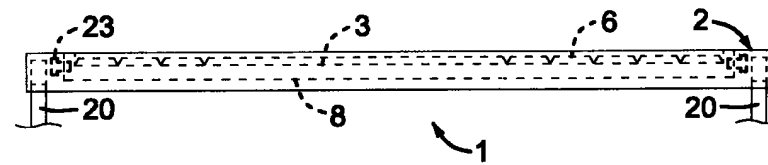


FIG. 5

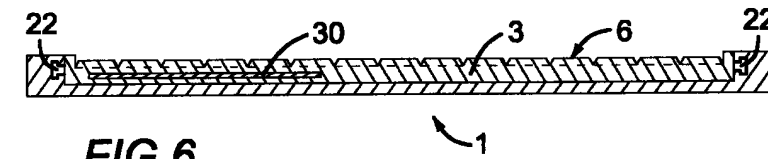


FIG. 6

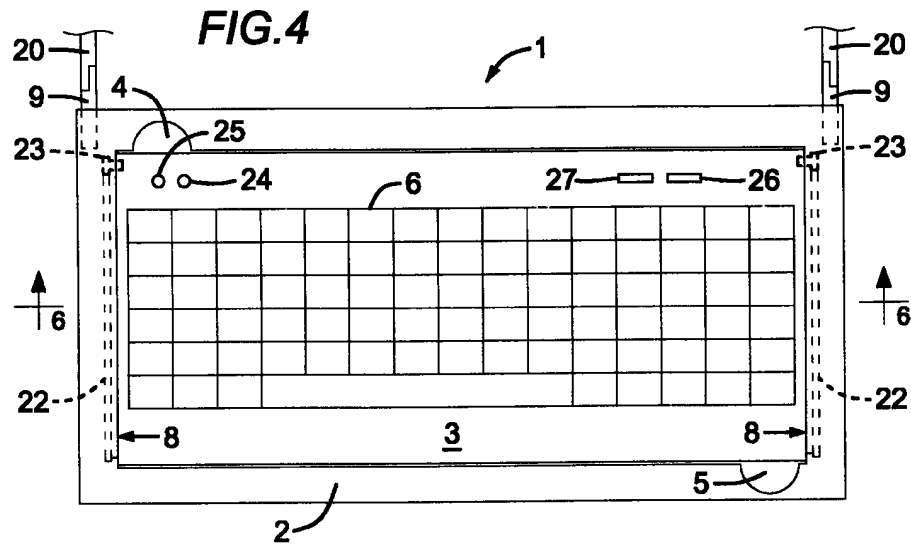


FIG. 4

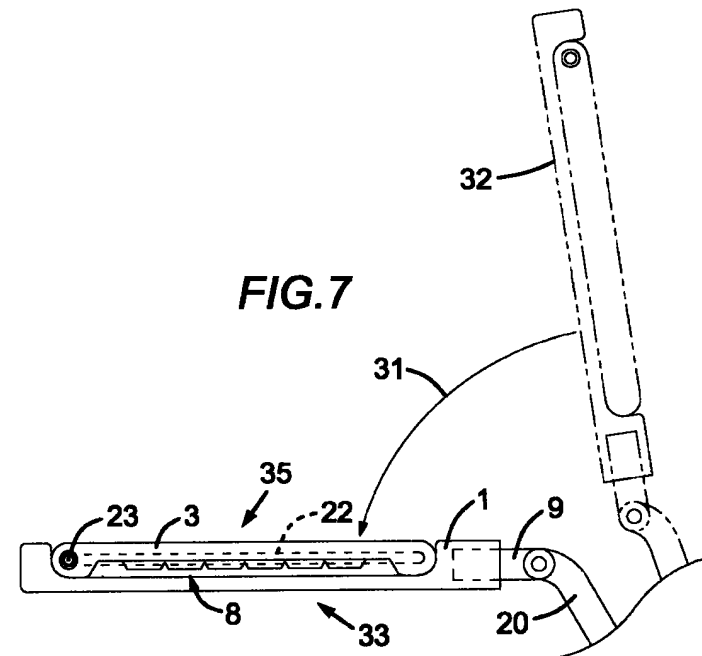


FIG. 7

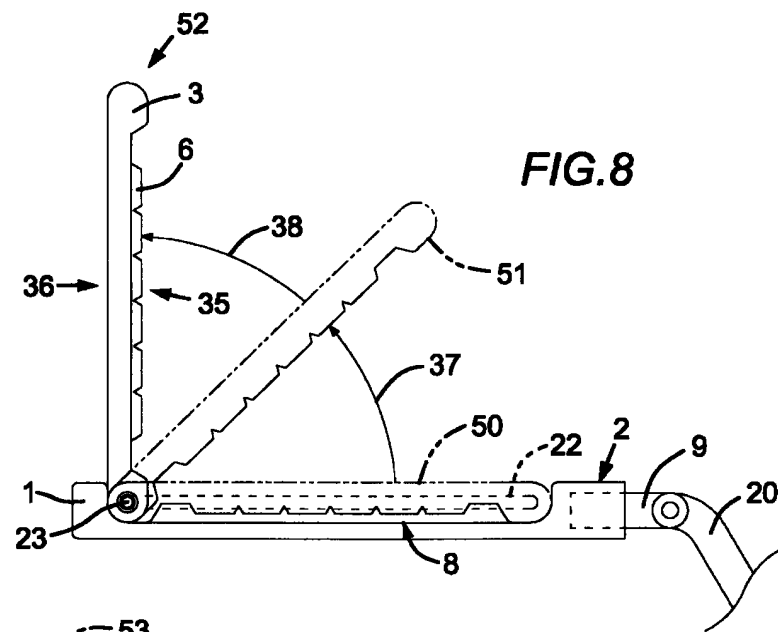


FIG. 8

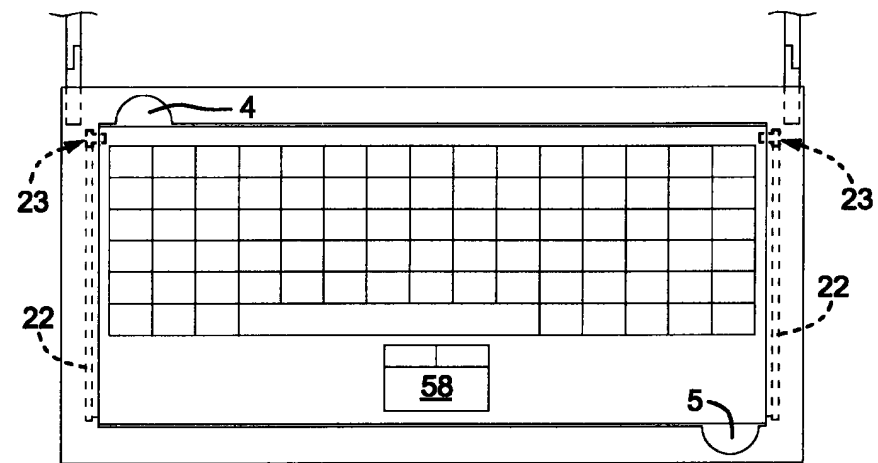


FIG. 11

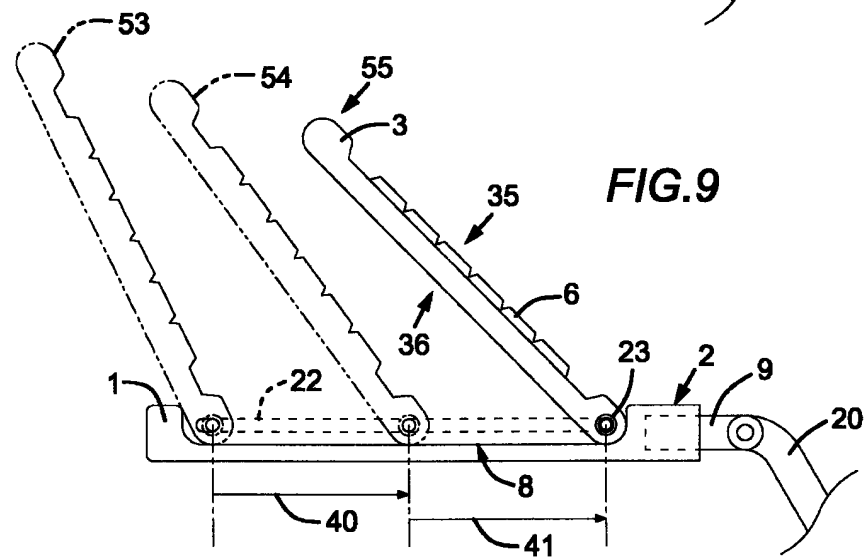


FIG. 9

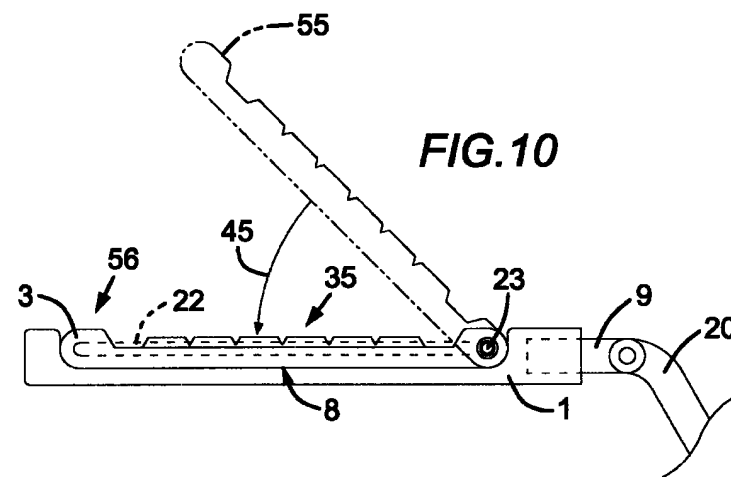


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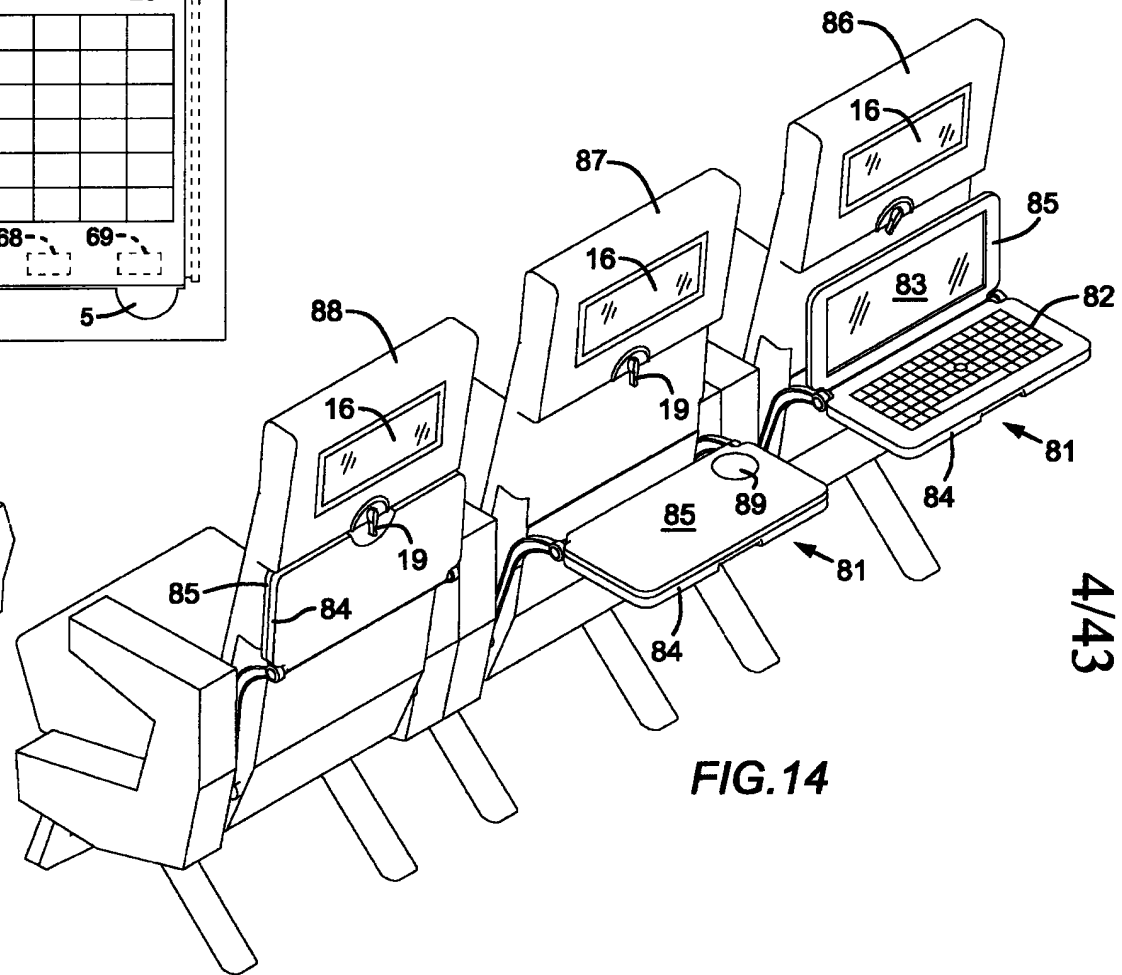
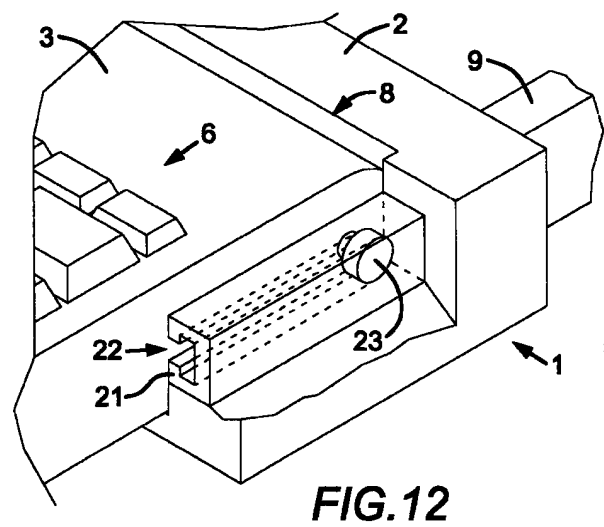
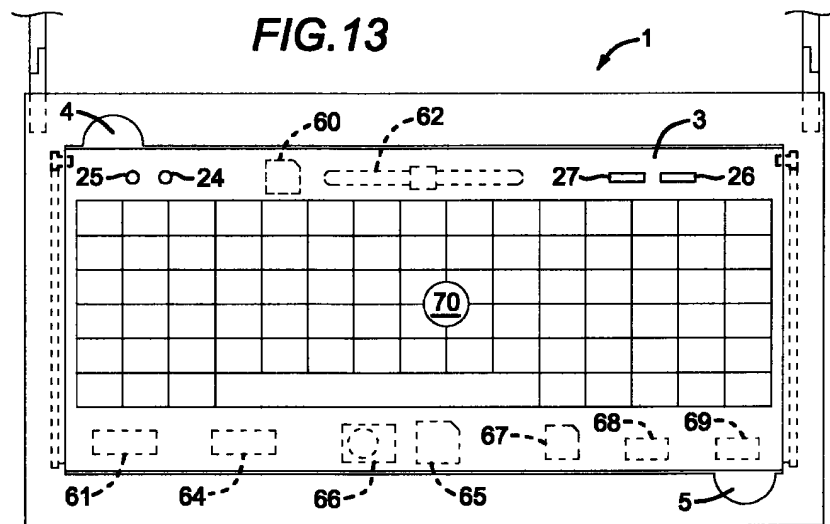


FIG.16

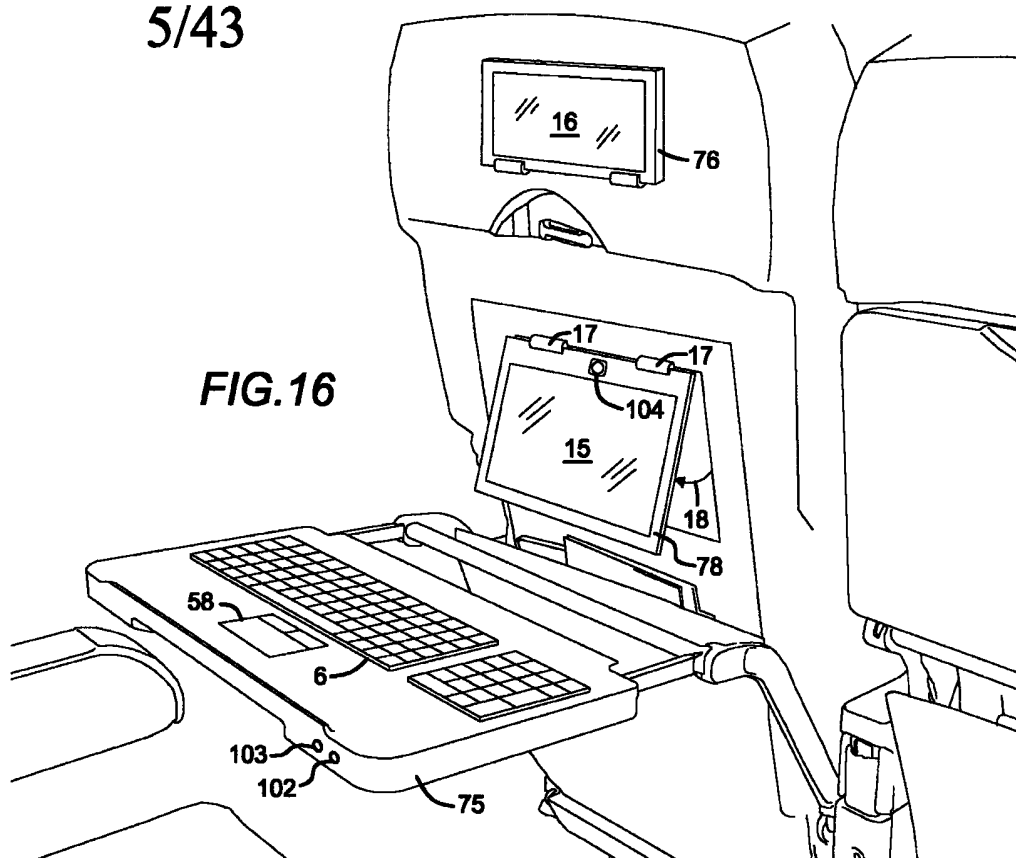
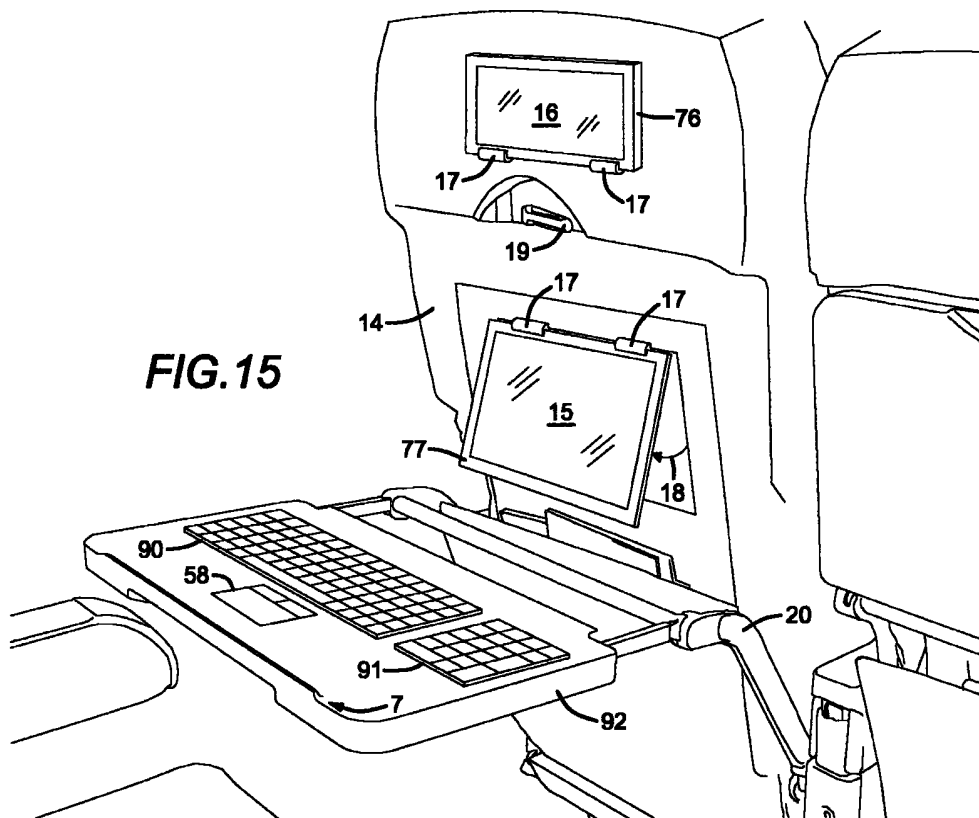
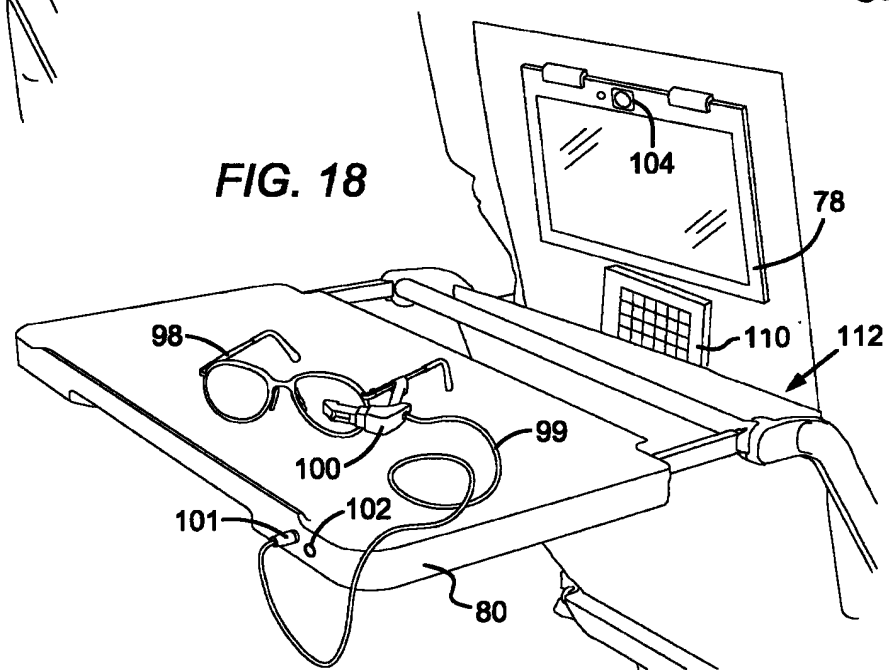
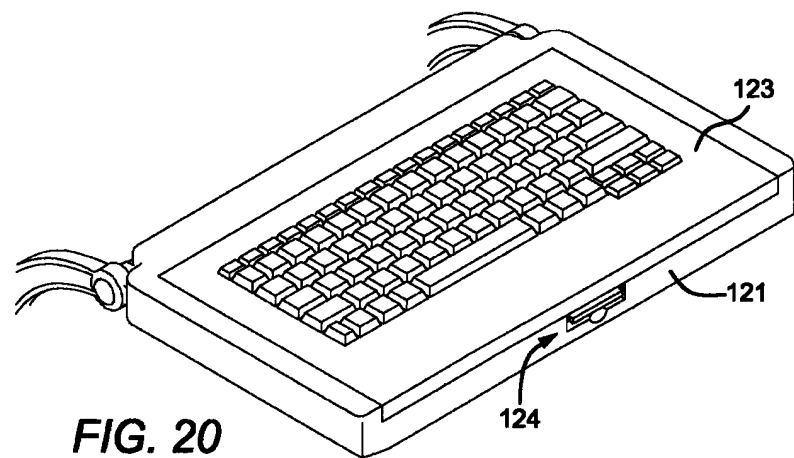
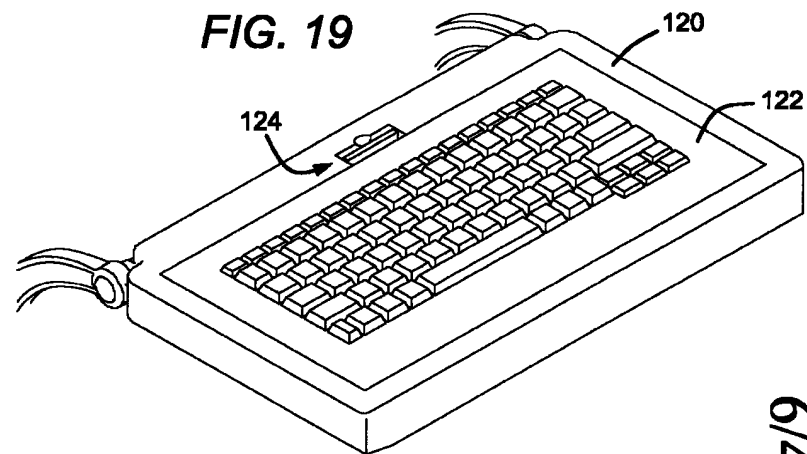
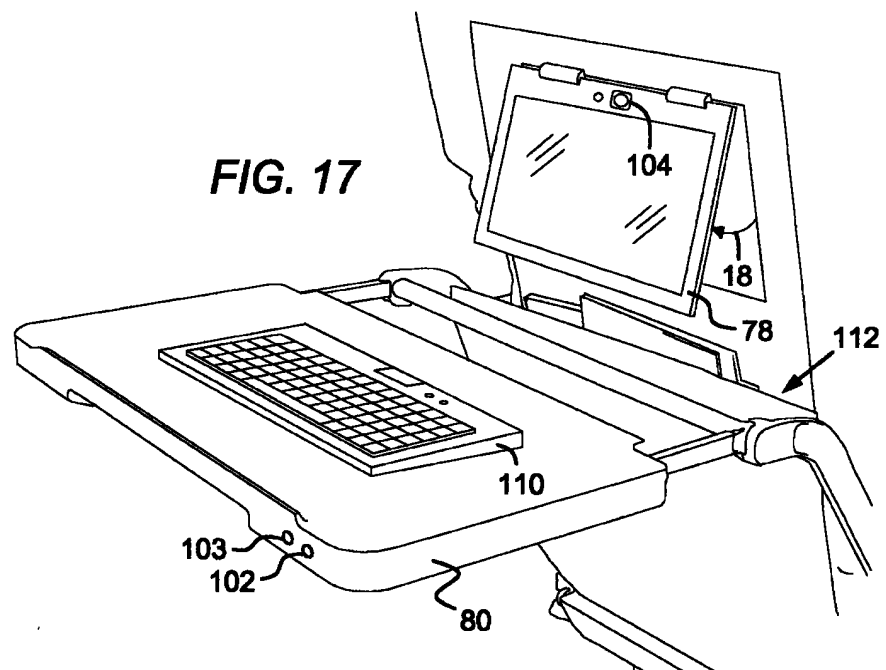


FIG.15





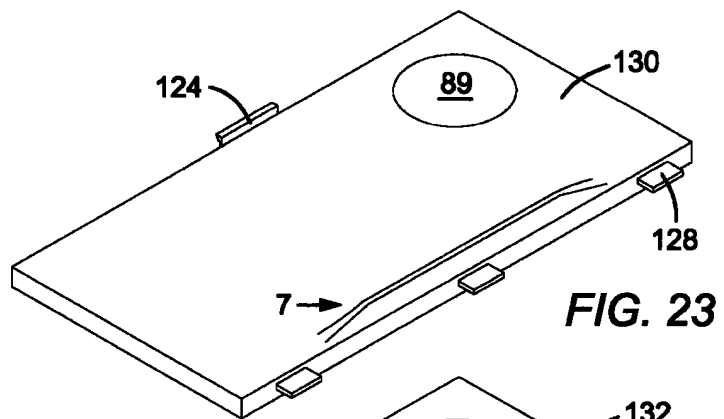


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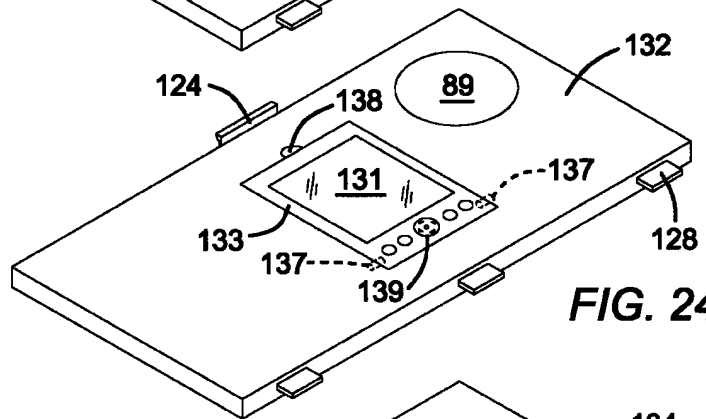


FIG. 24

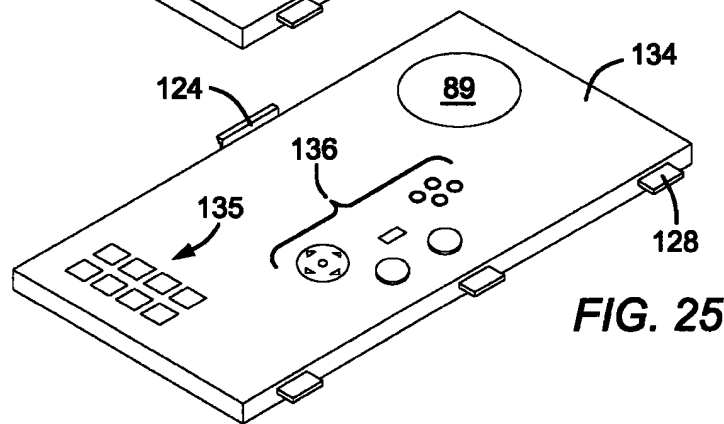


FIG. 25

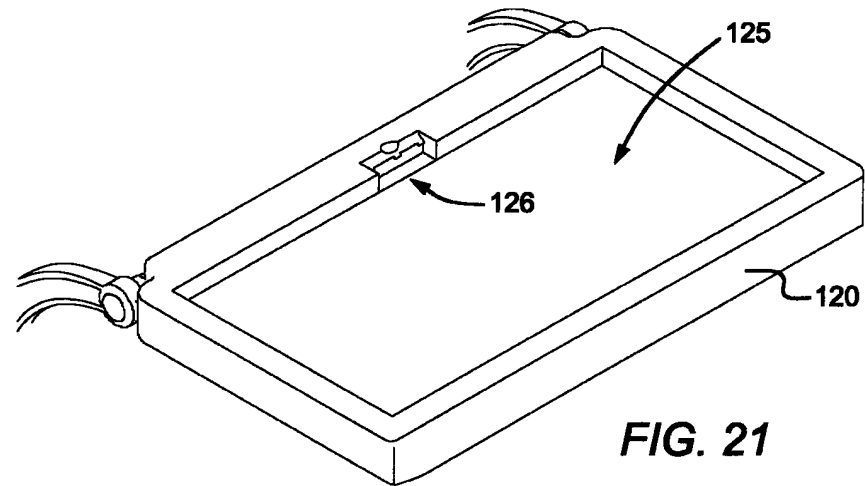


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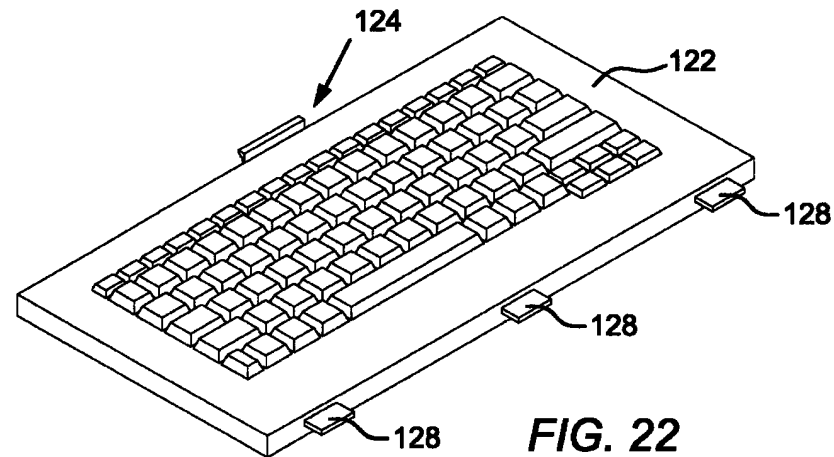


FIG. 22

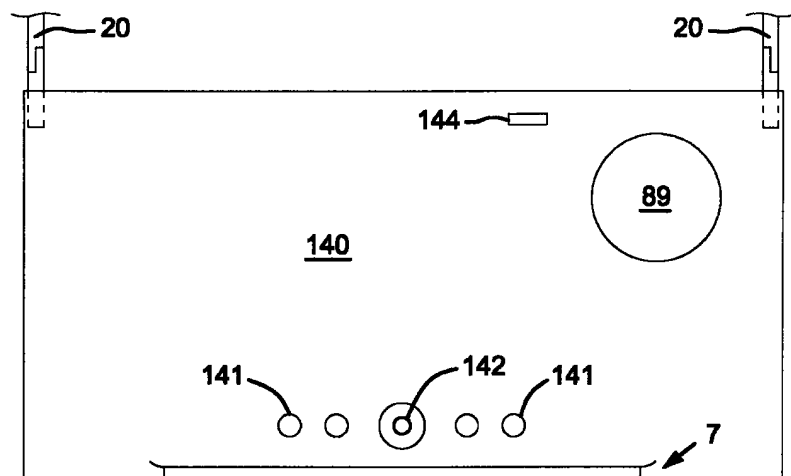


FIG. 26

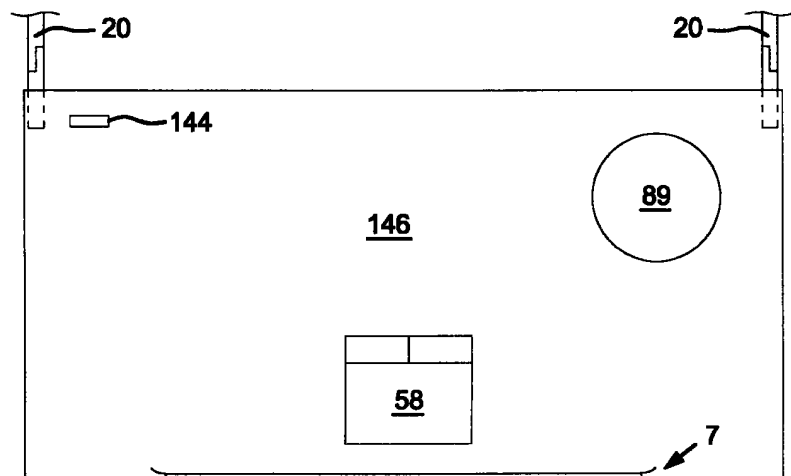


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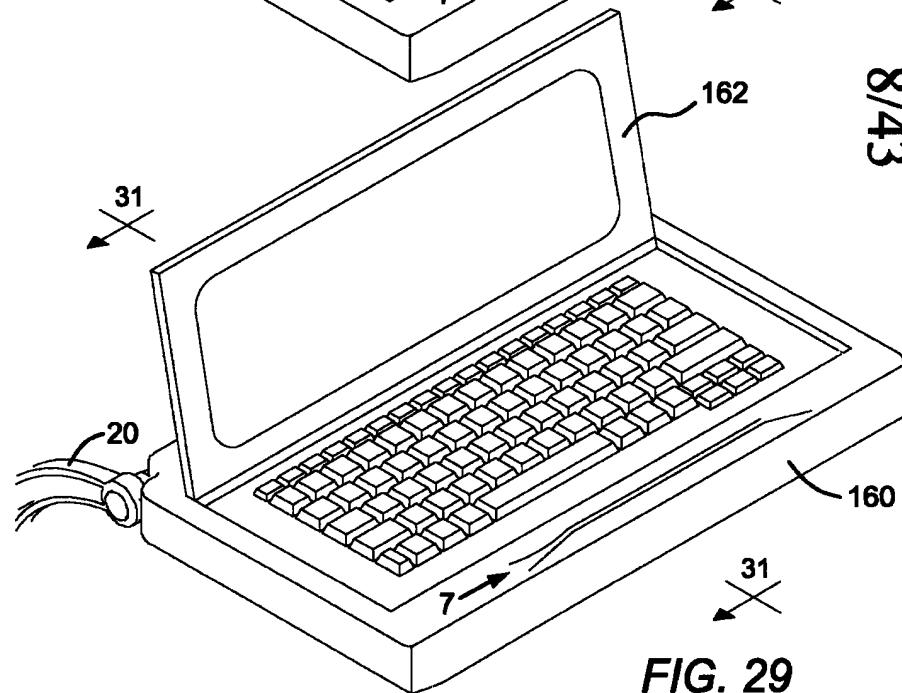
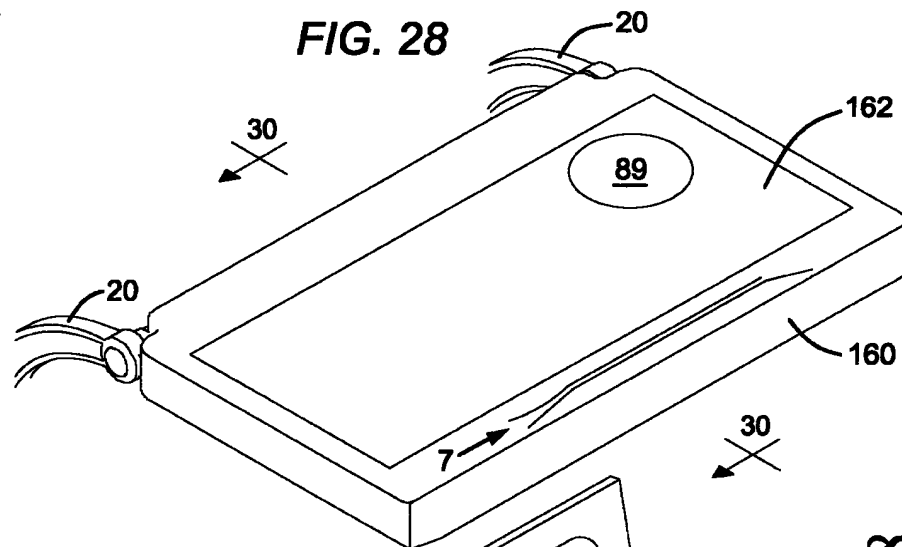


FIG. 29

8/43

FIG. 31

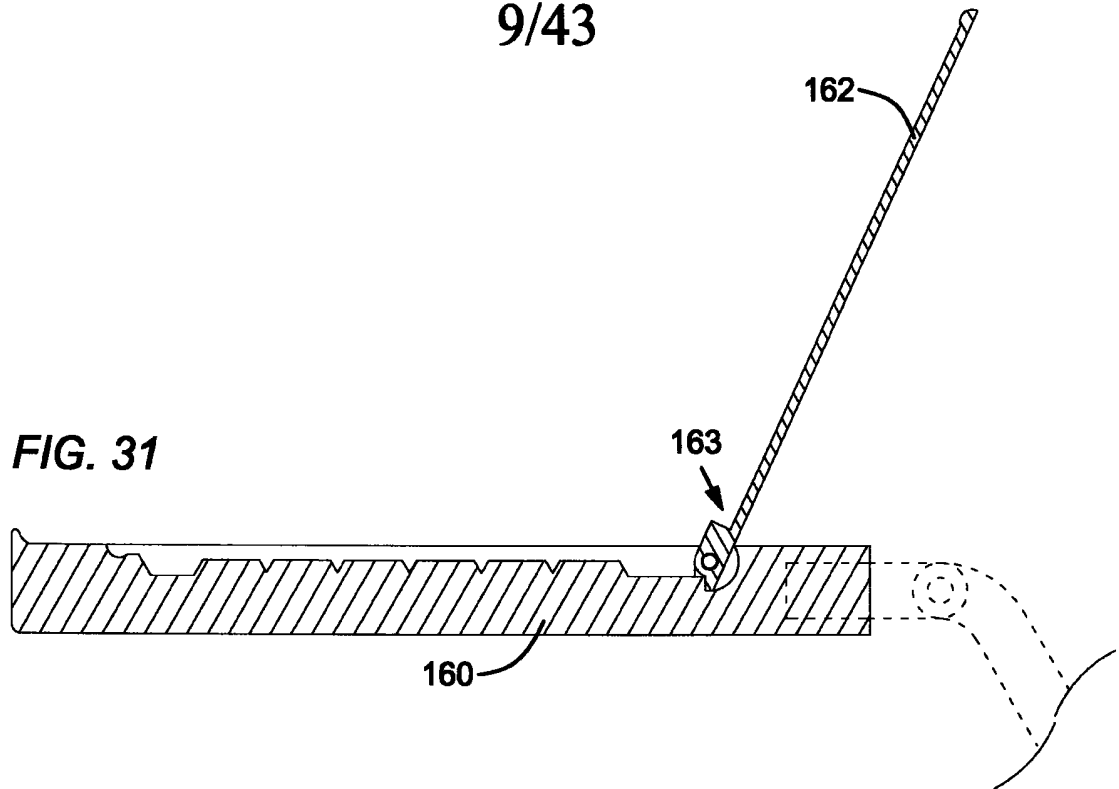


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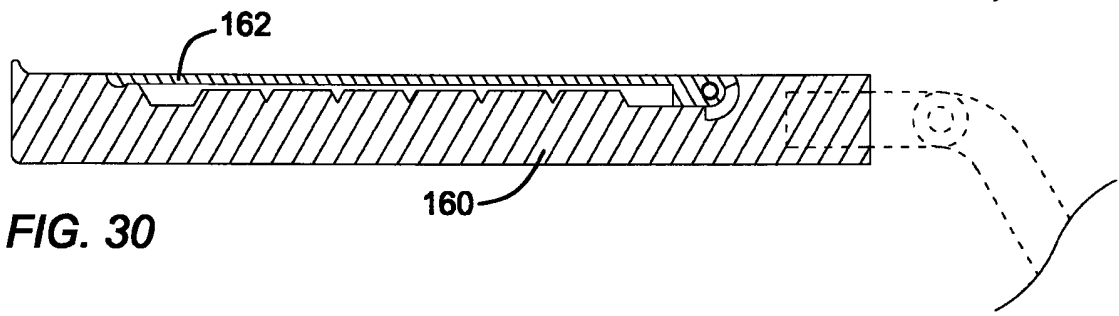


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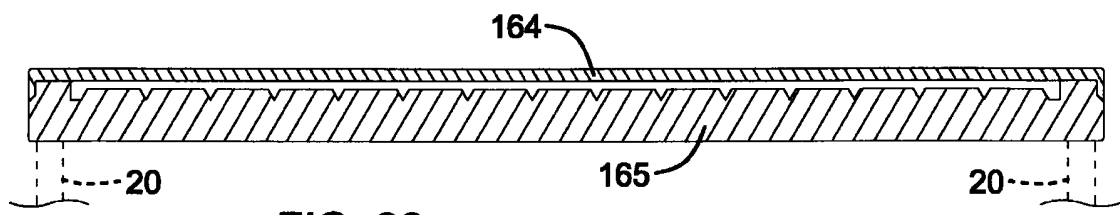
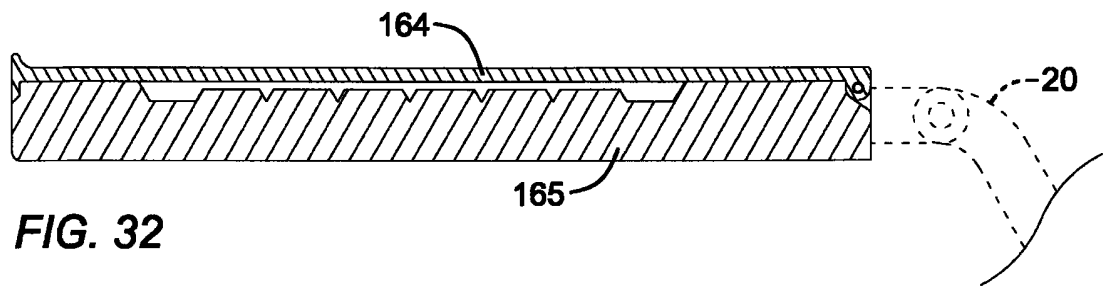
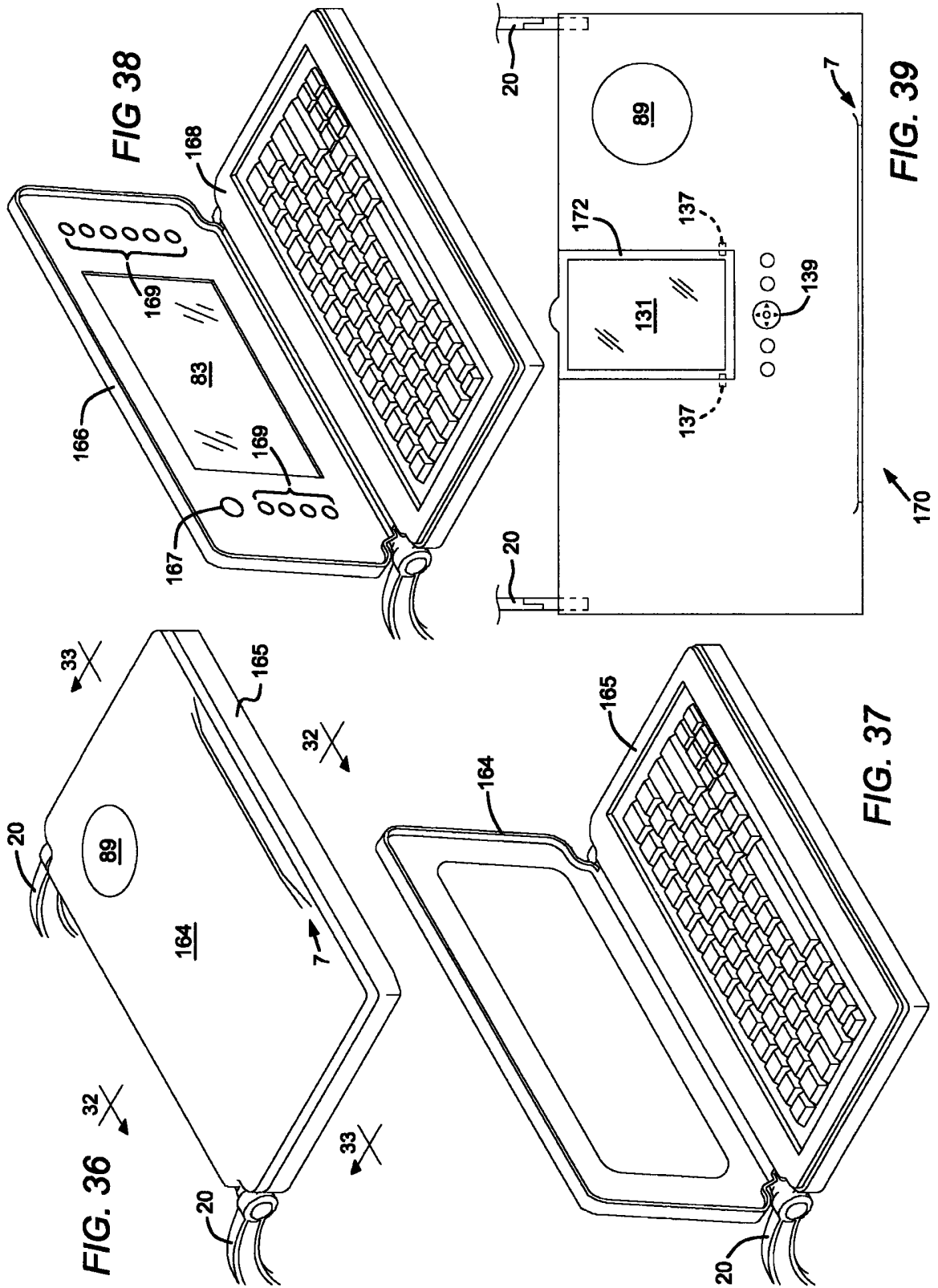
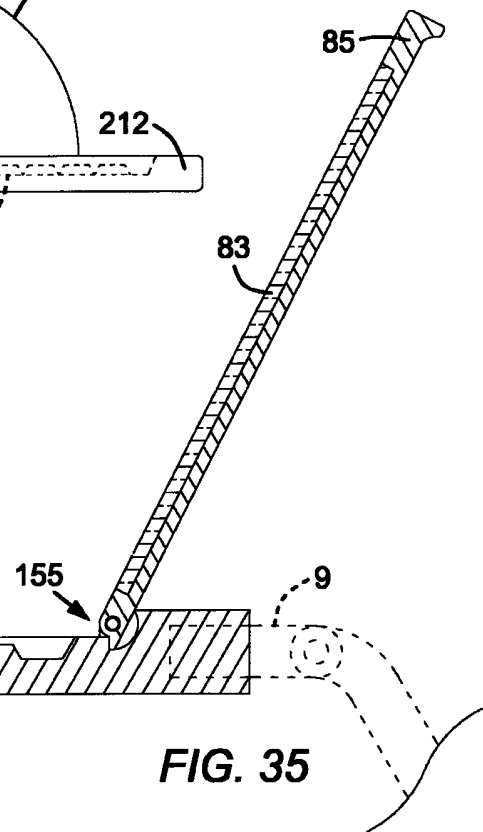
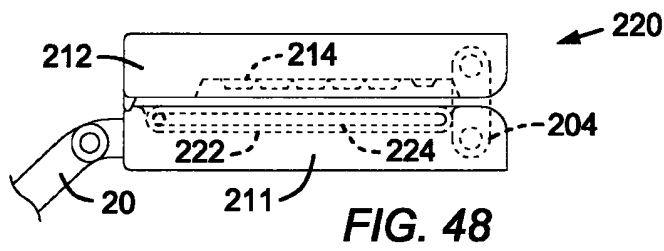
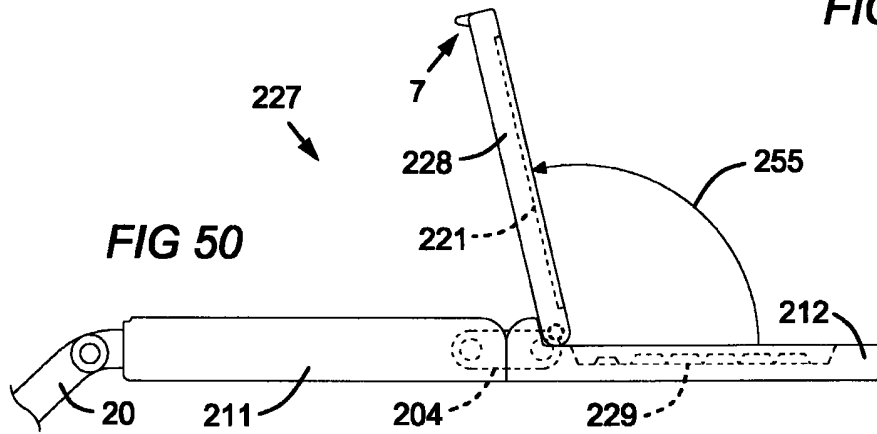
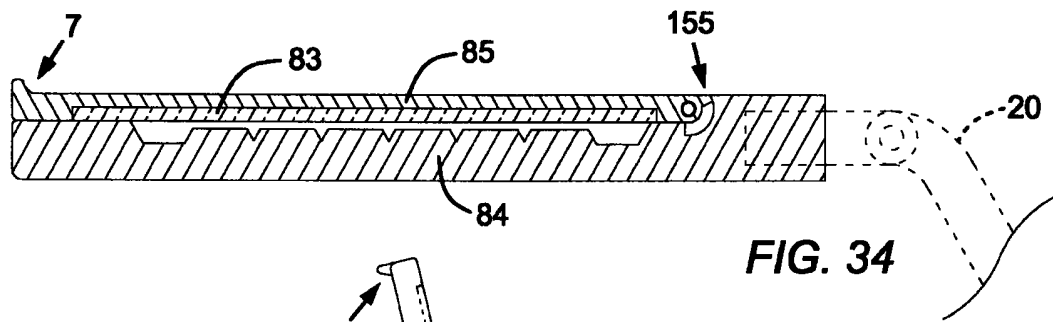
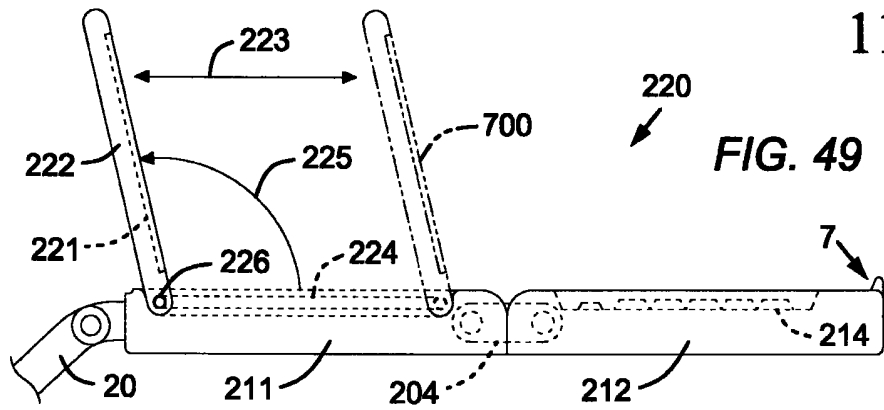


FIG. 33





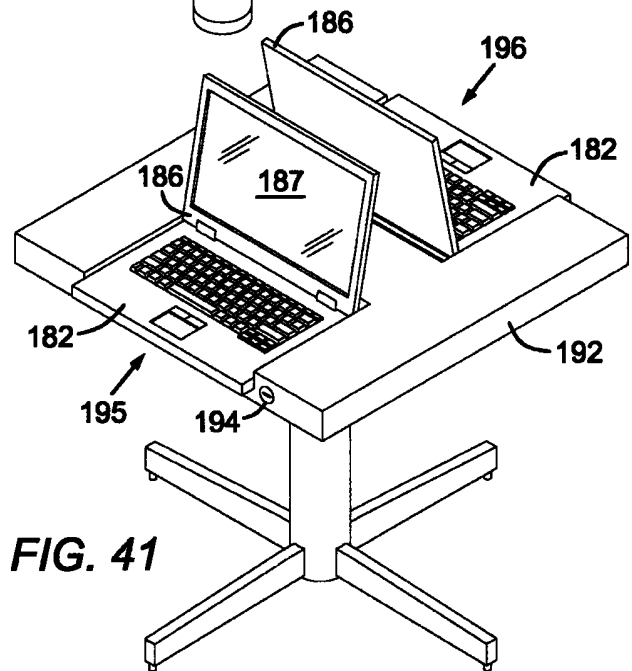
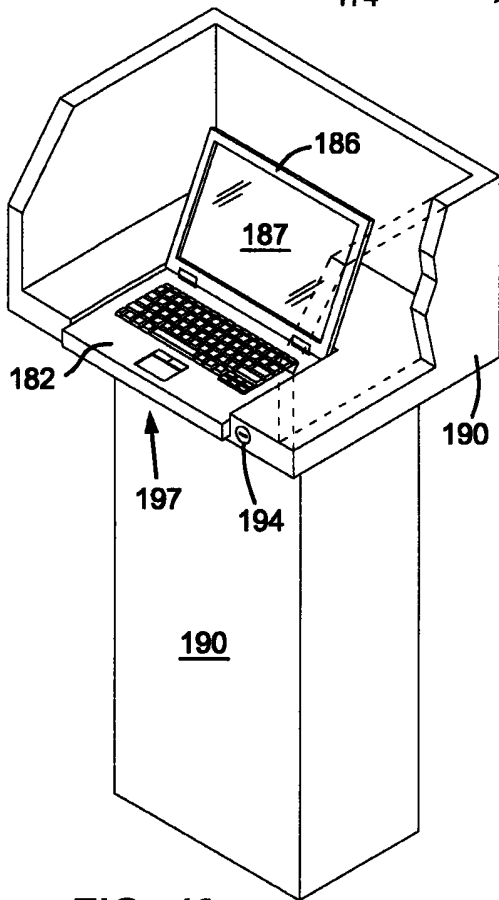
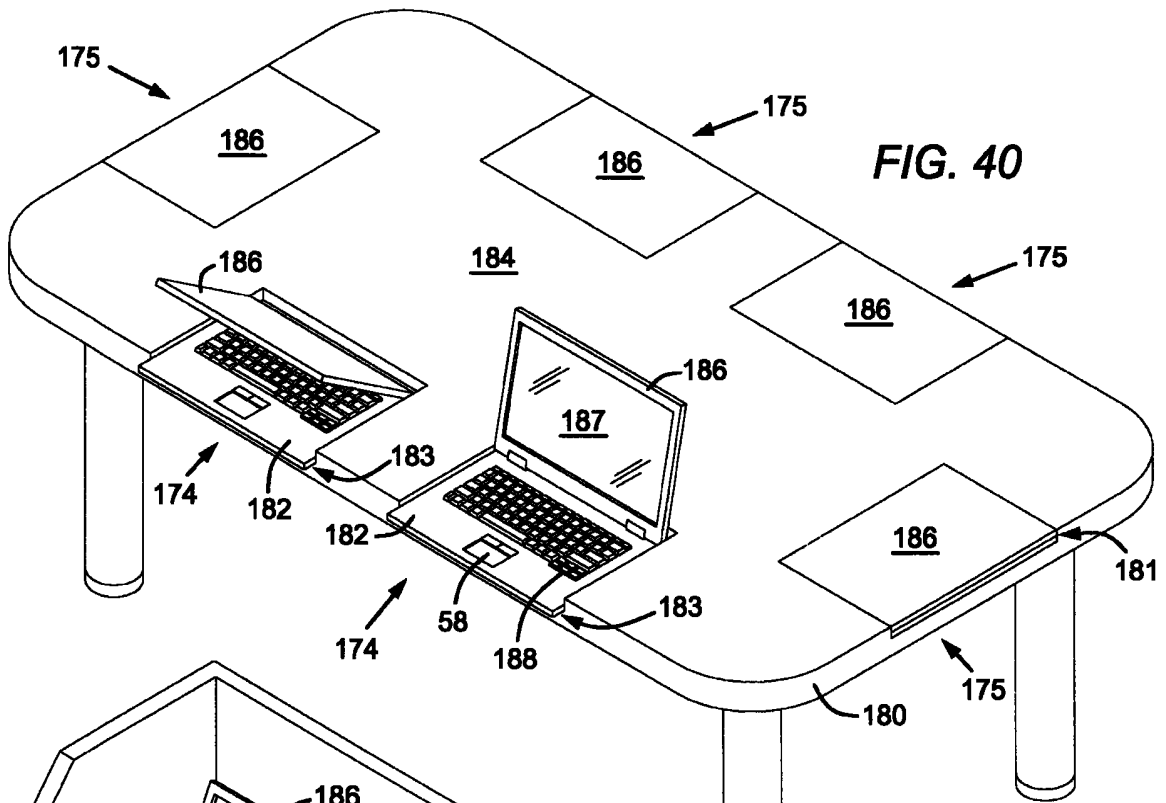
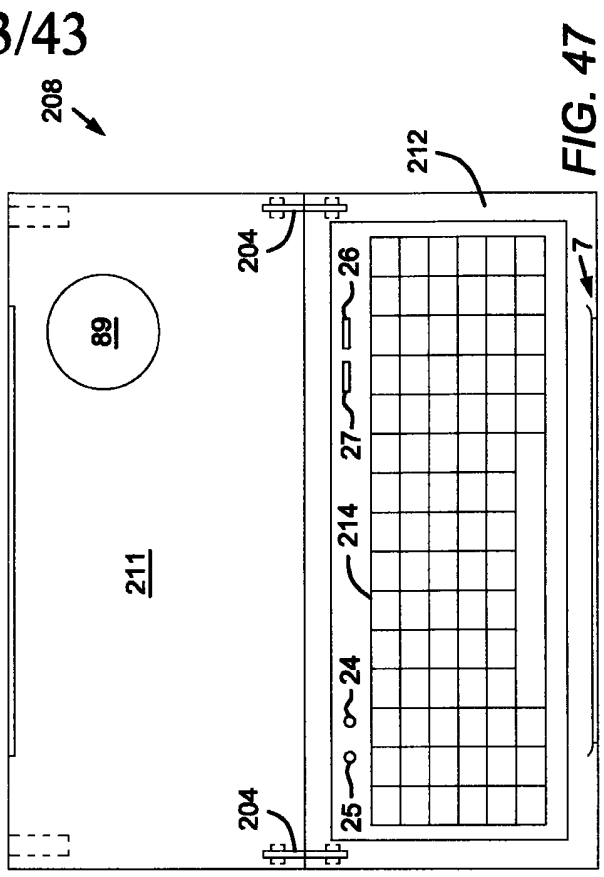
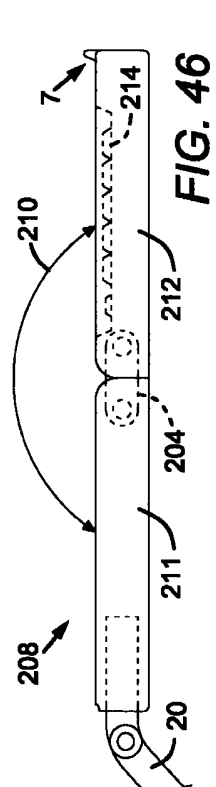
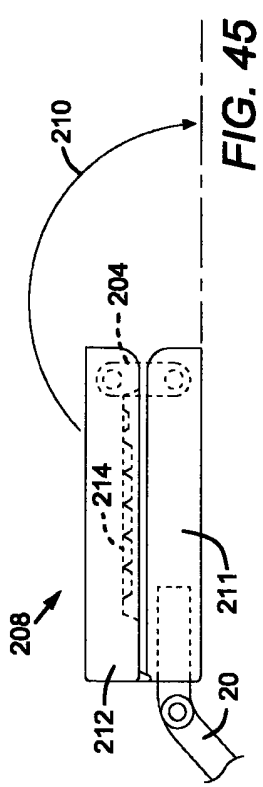
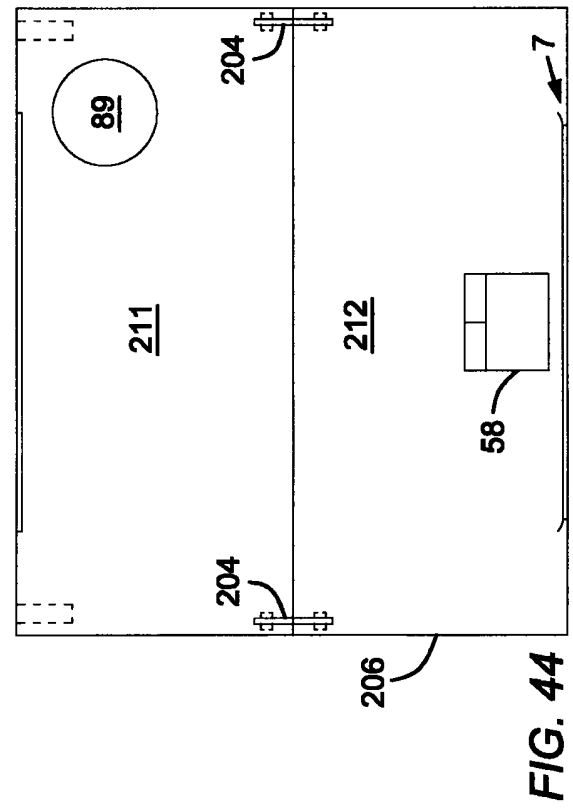
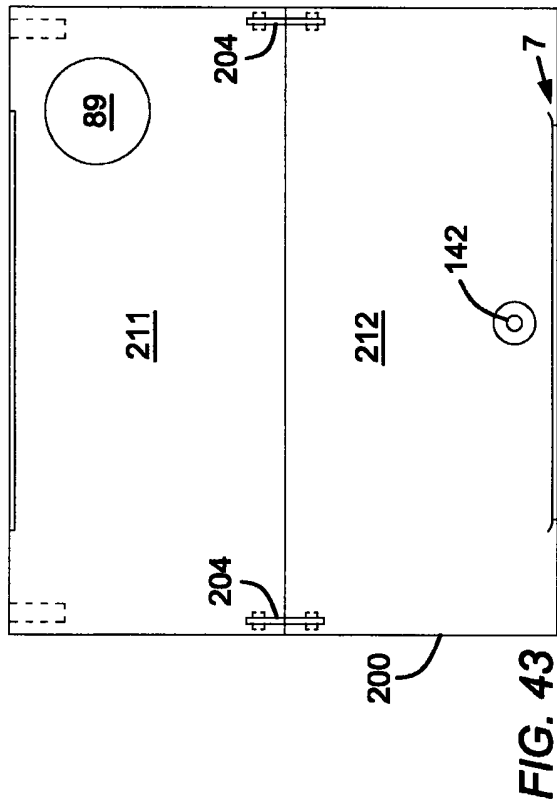


FIG. 41



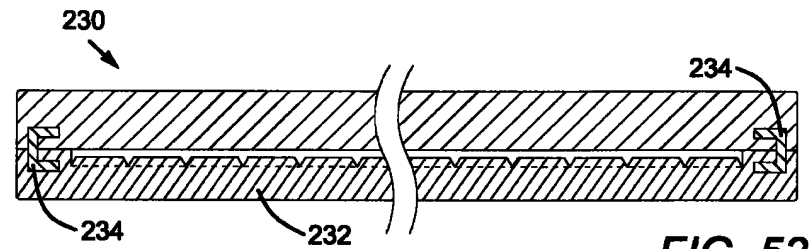
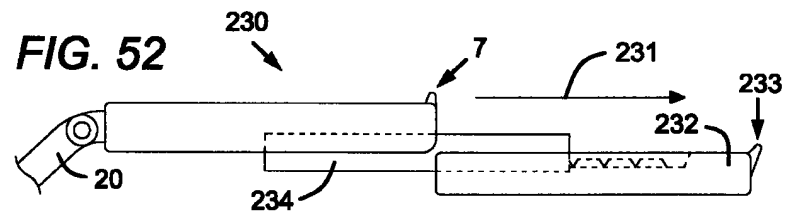


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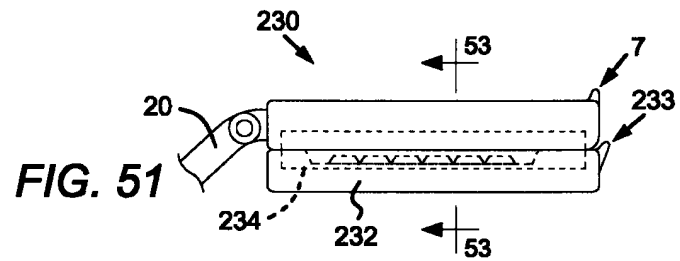


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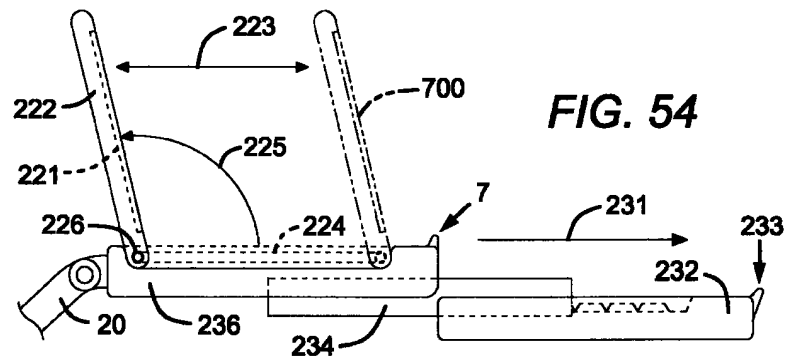


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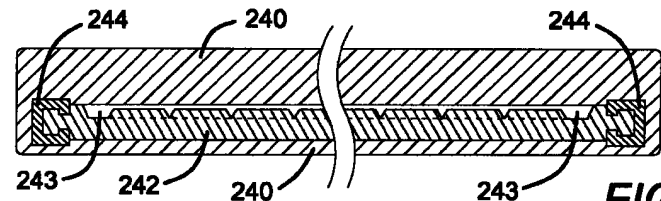


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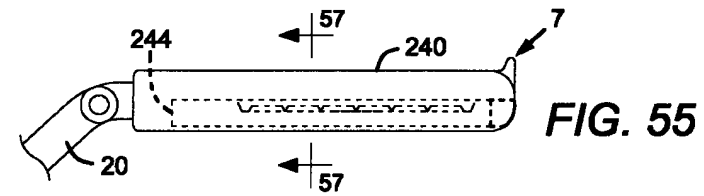


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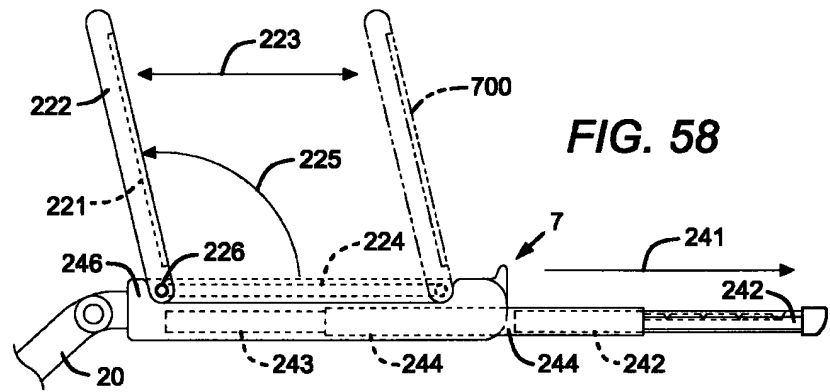


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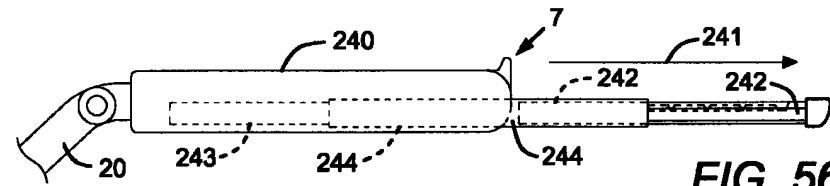
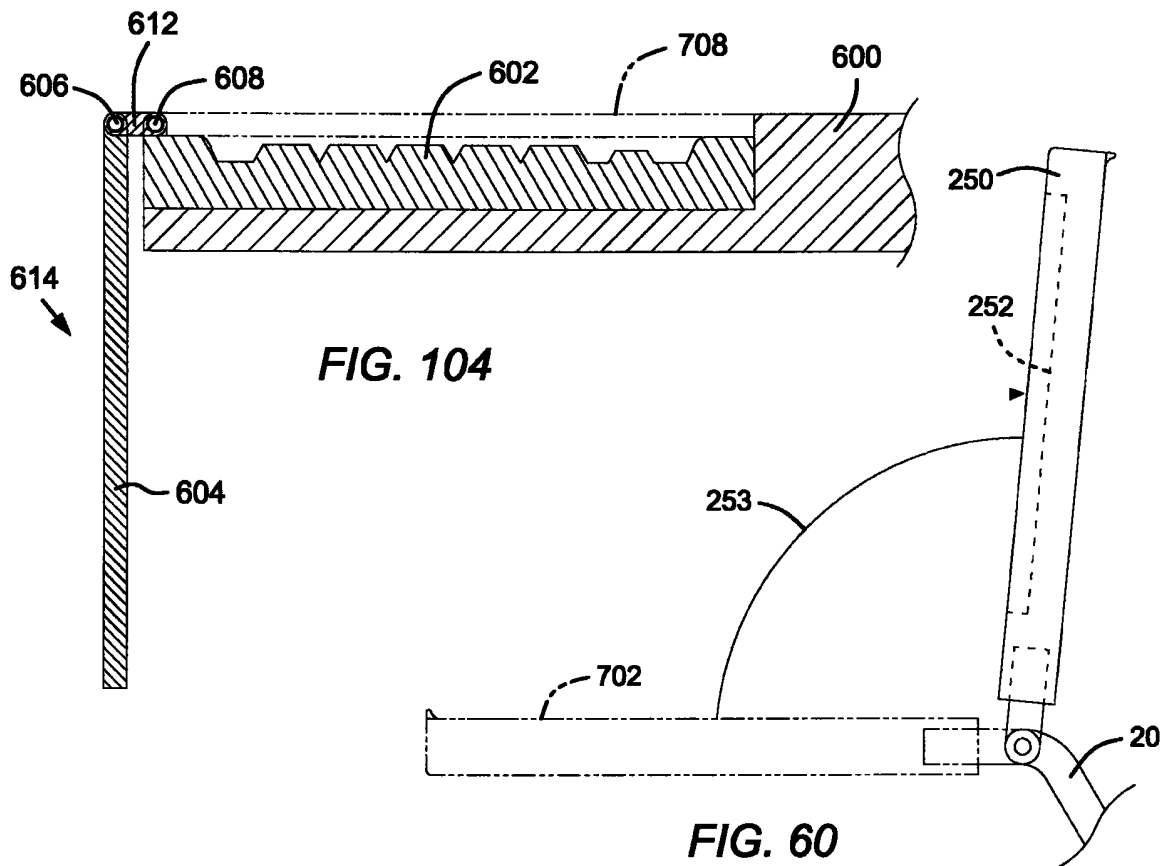
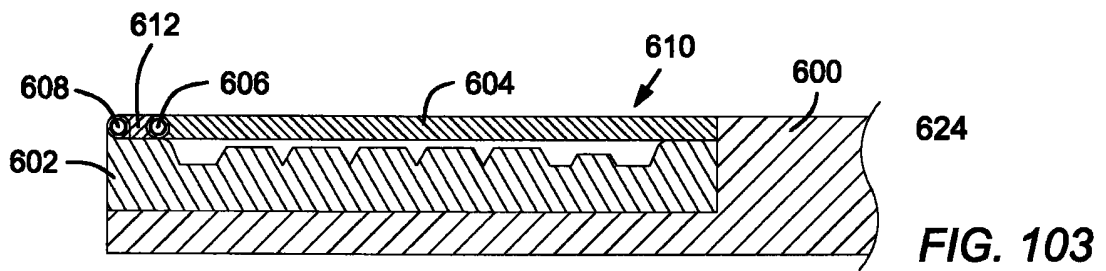
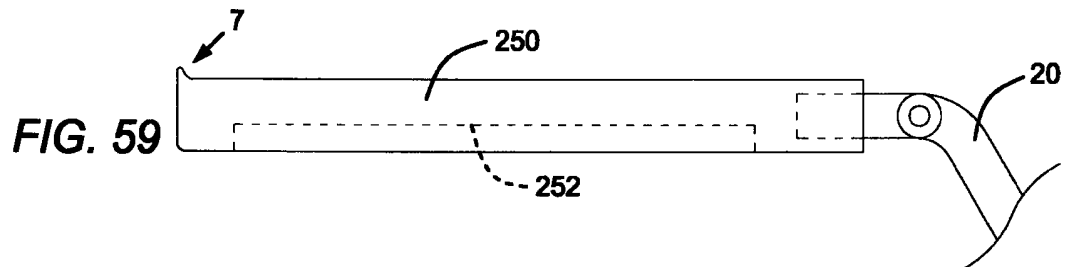
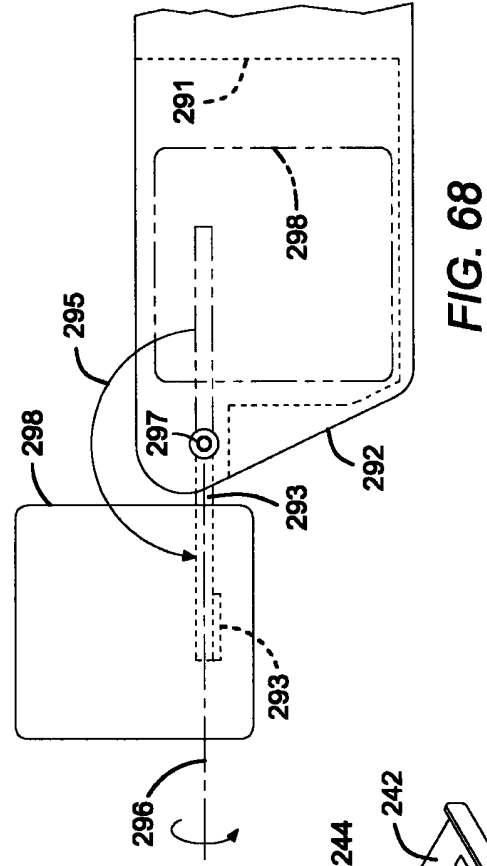
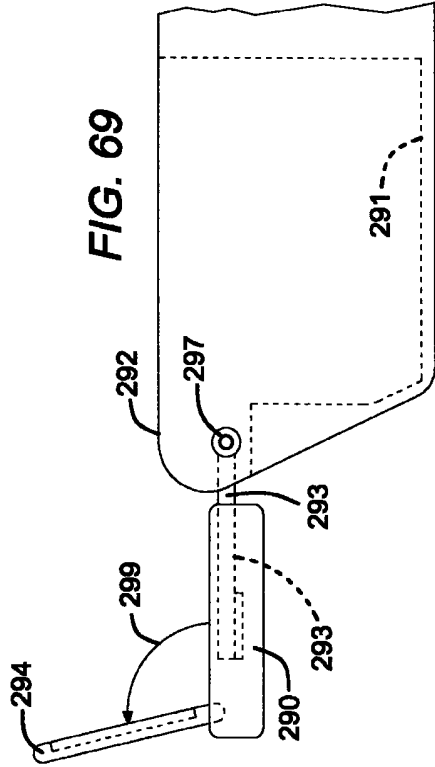
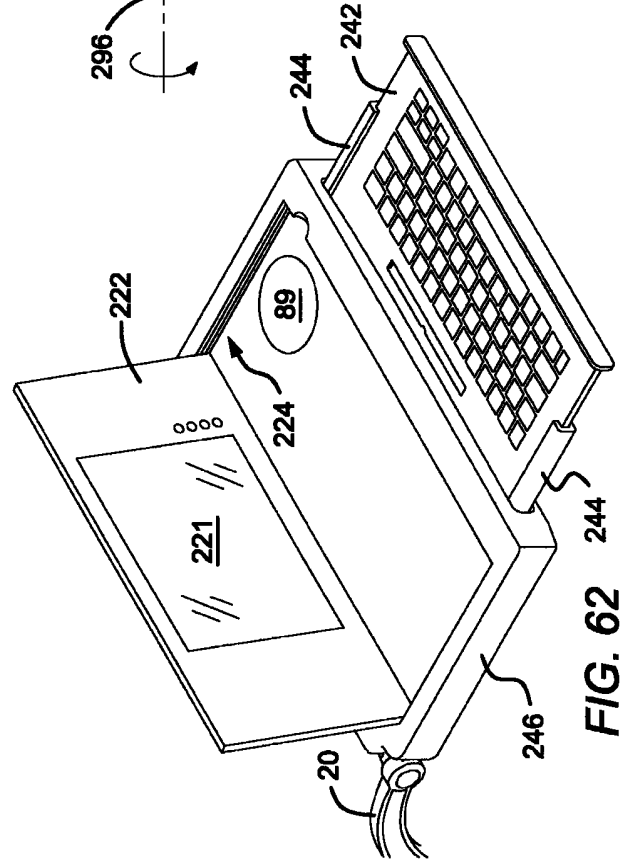
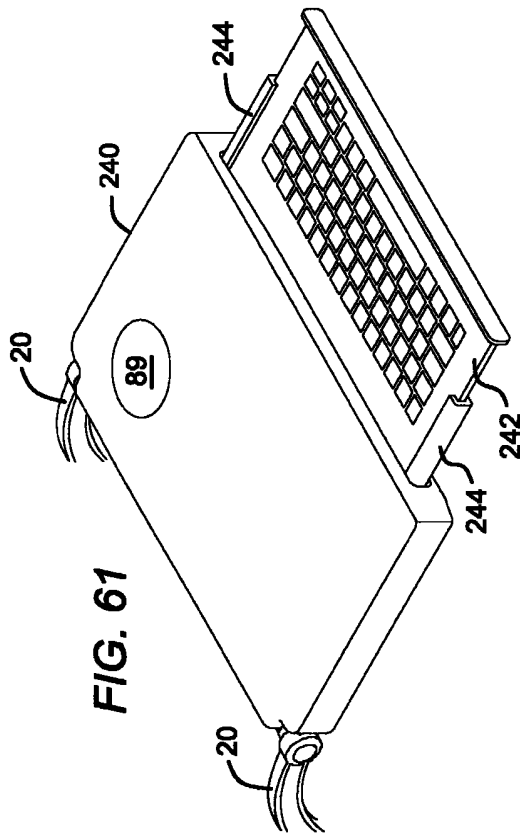


FIG. 56





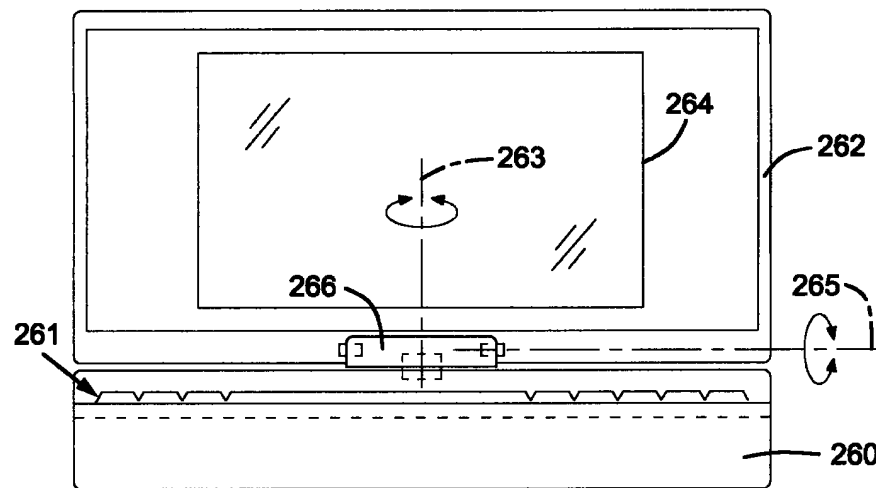


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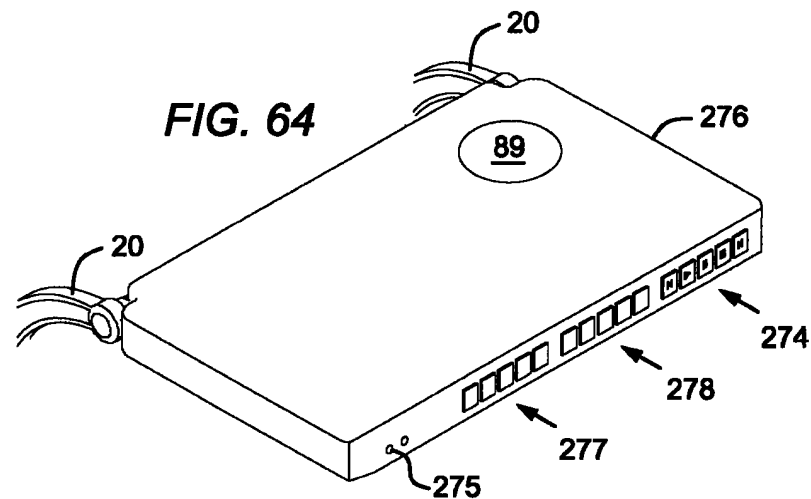


FIG. 64

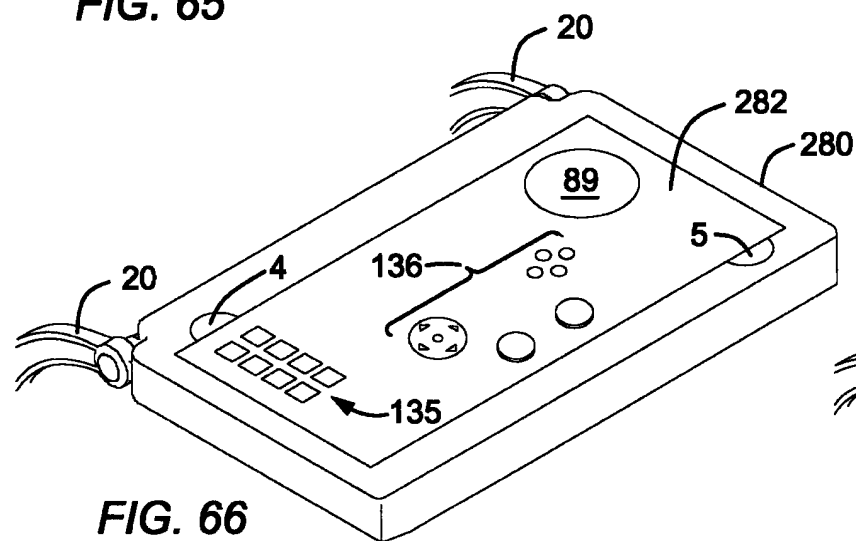


FIG. 66

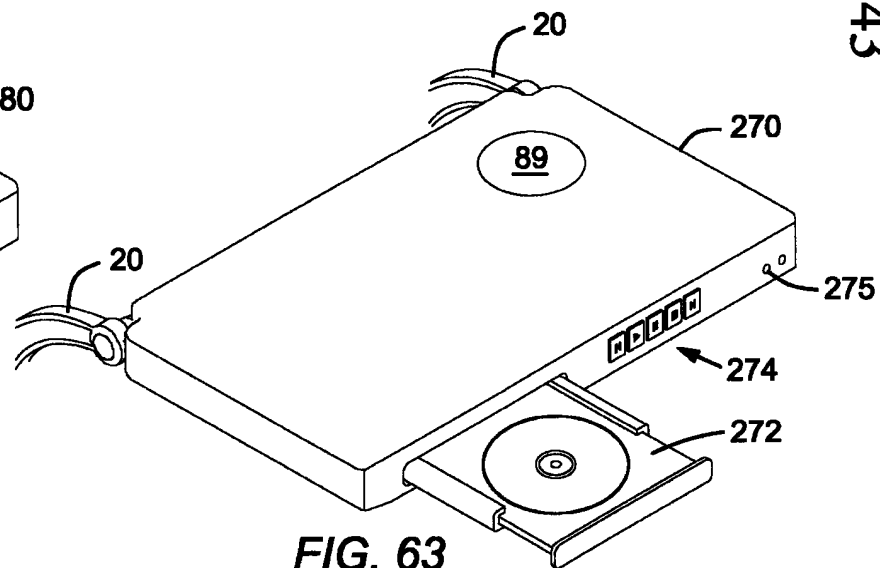


FIG. 63

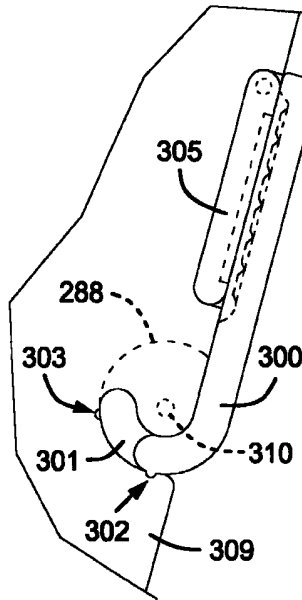


FIG. 70

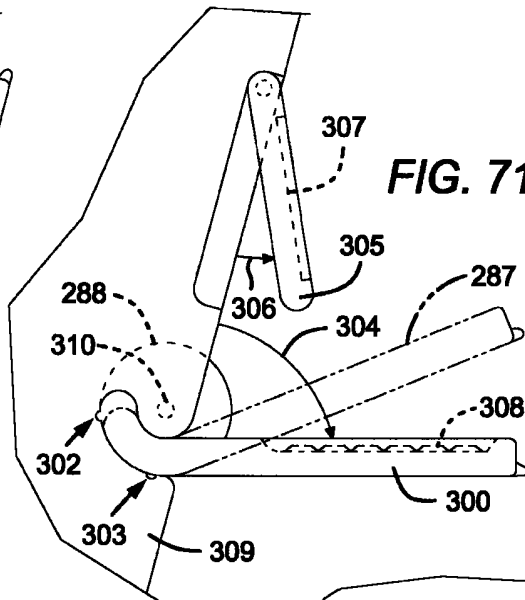


FIG. 71

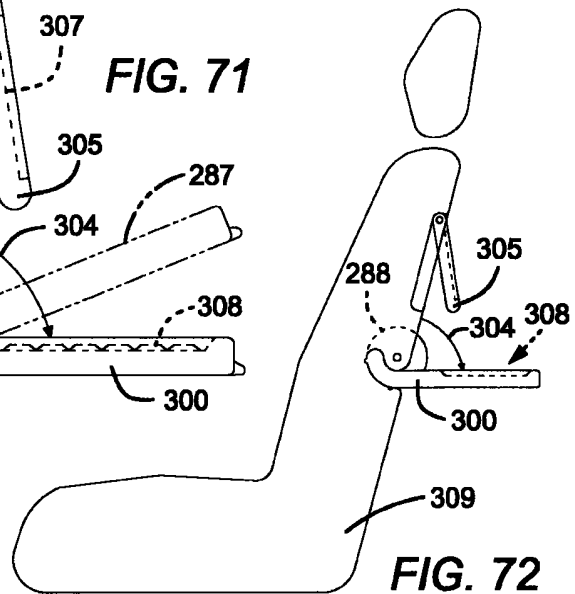


FIG. 72

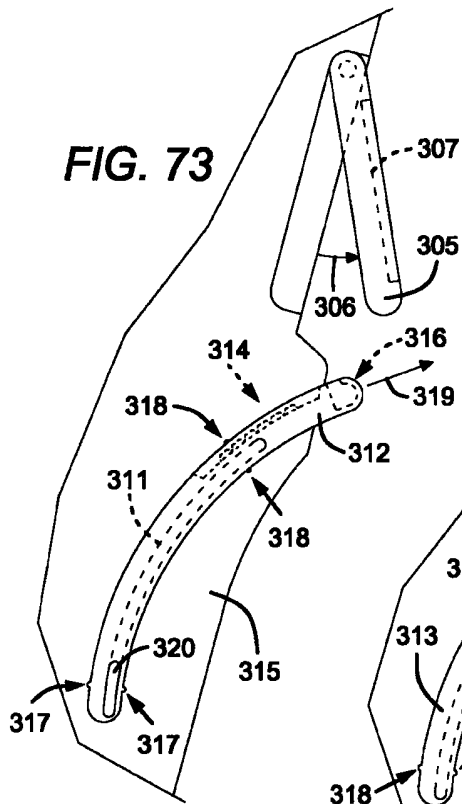


FIG. 73

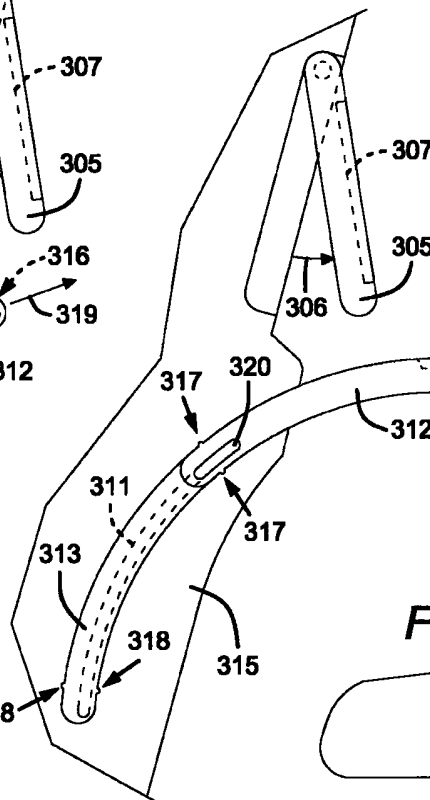


FIG. 74

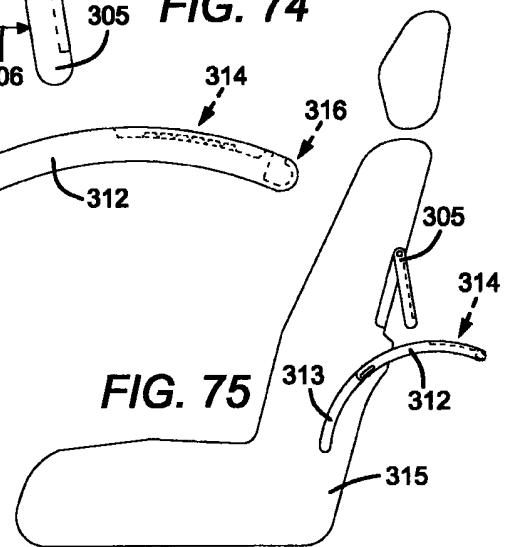


FIG. 75

FIG. 76

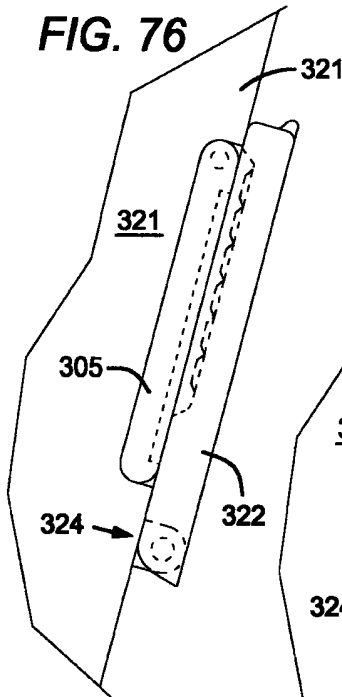


FIG. 77

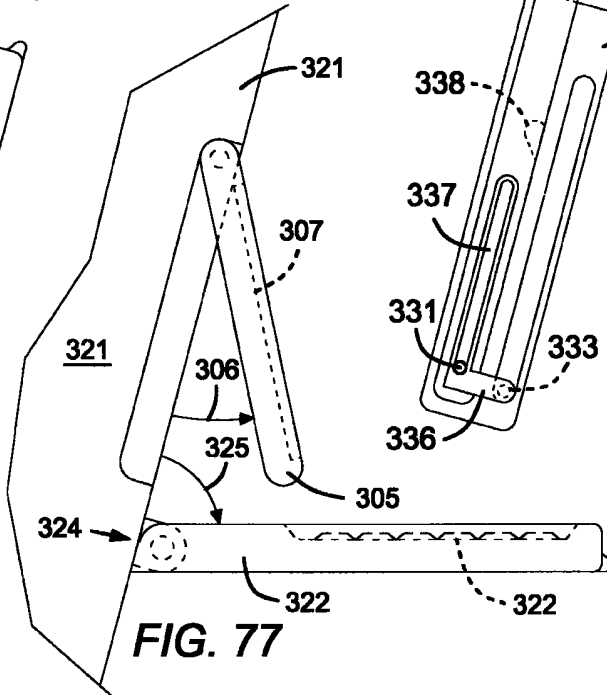


FIG. 79

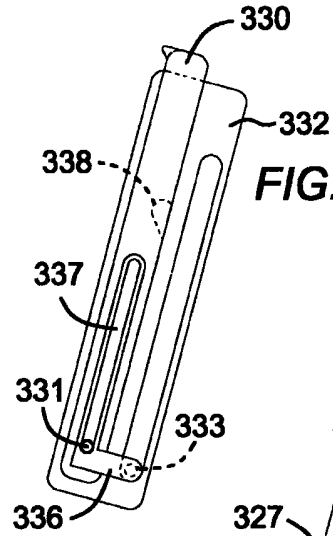


FIG. 80

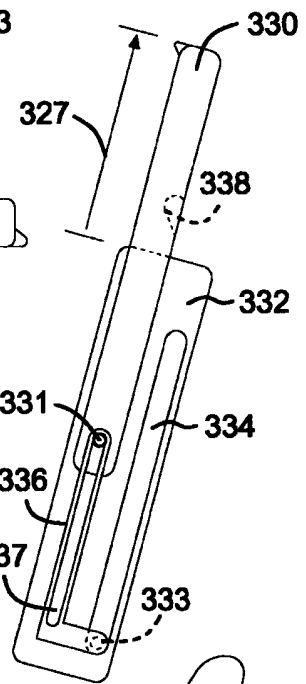


FIG. 82

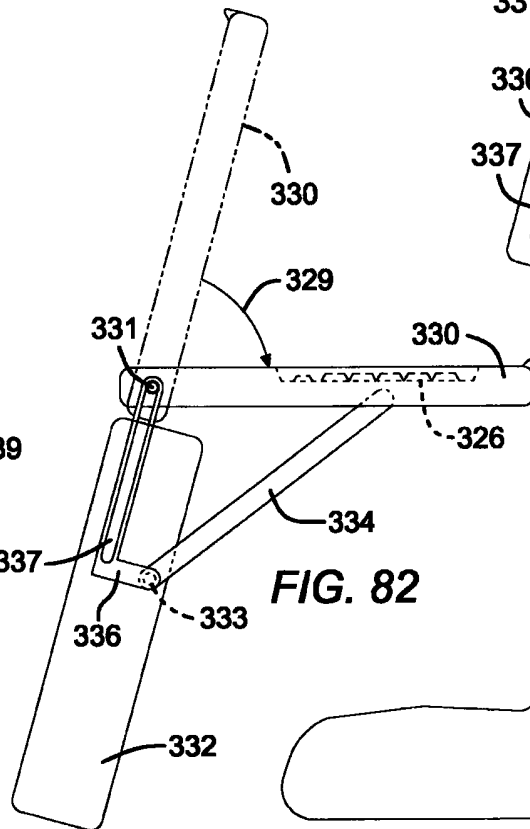


FIG. 81

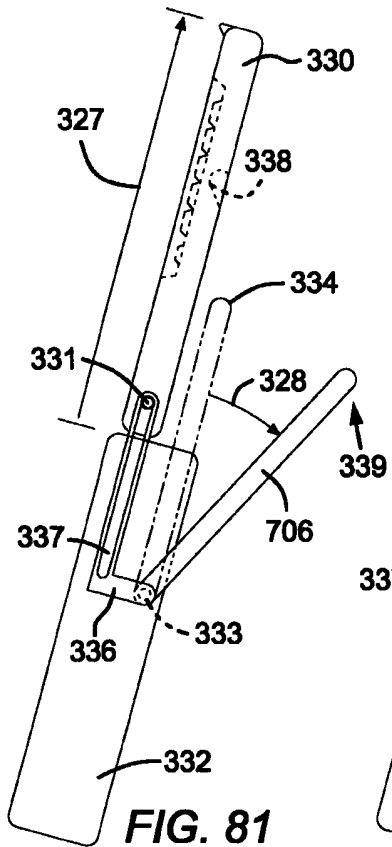
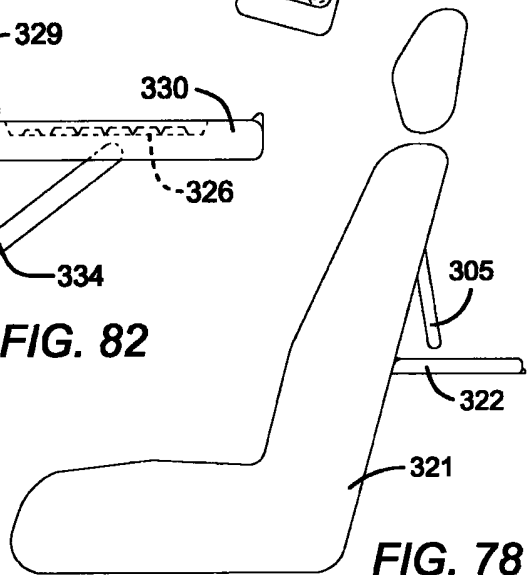
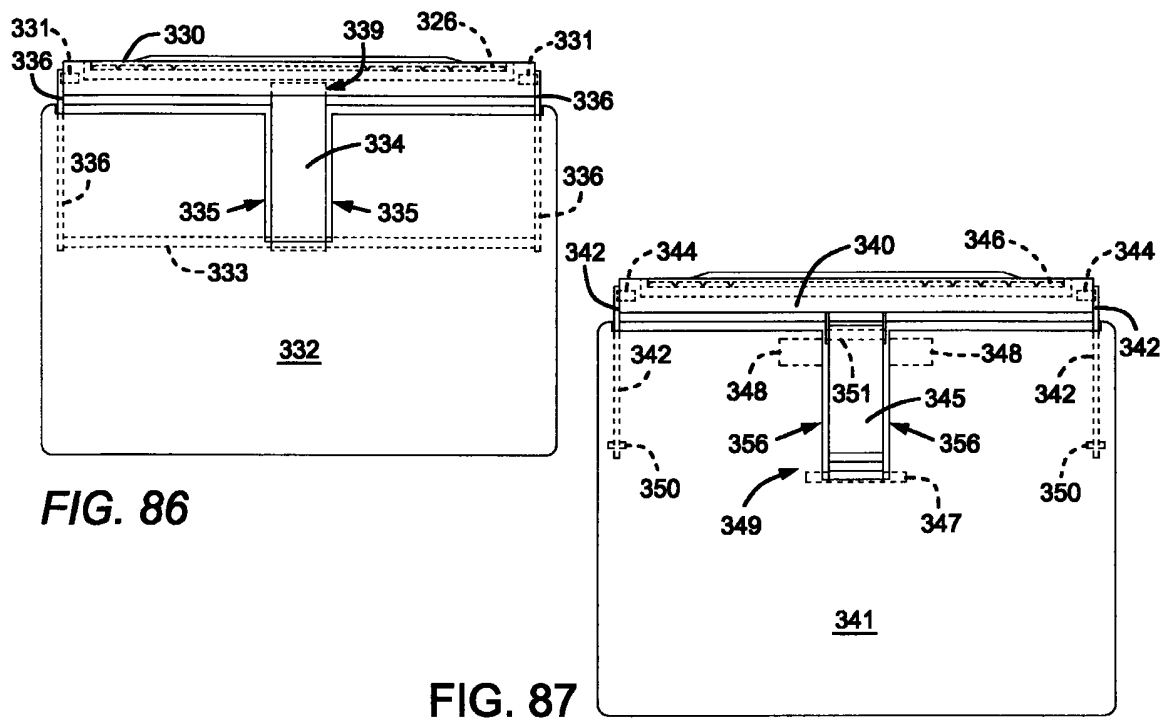
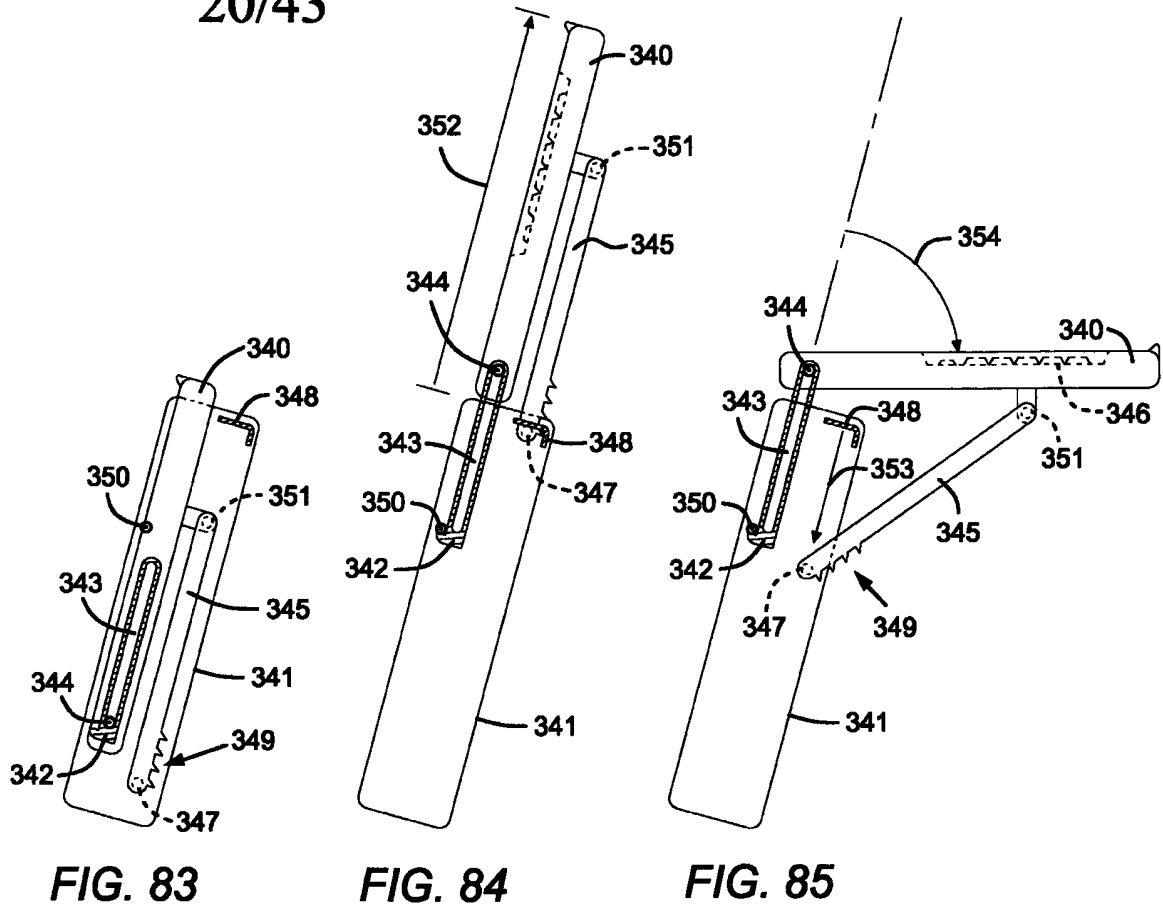
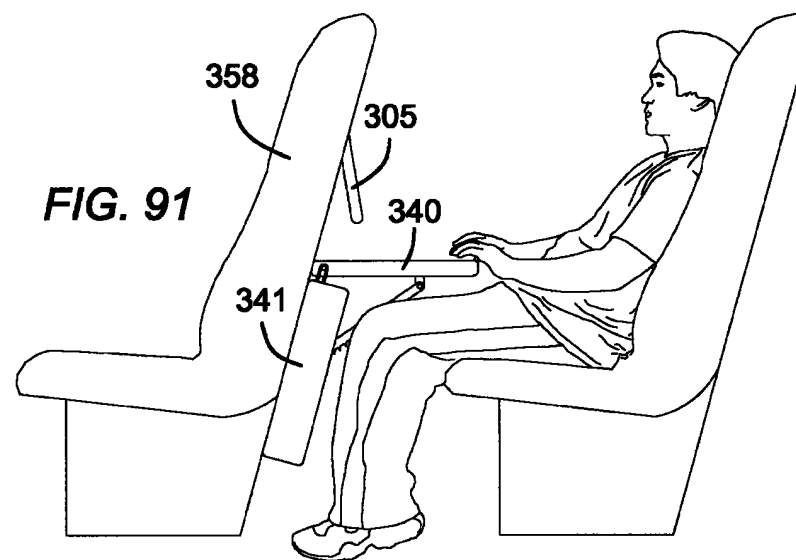
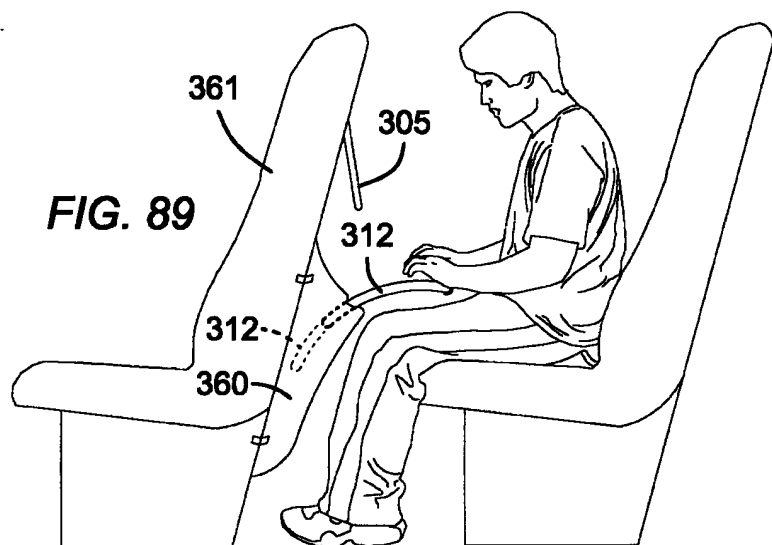
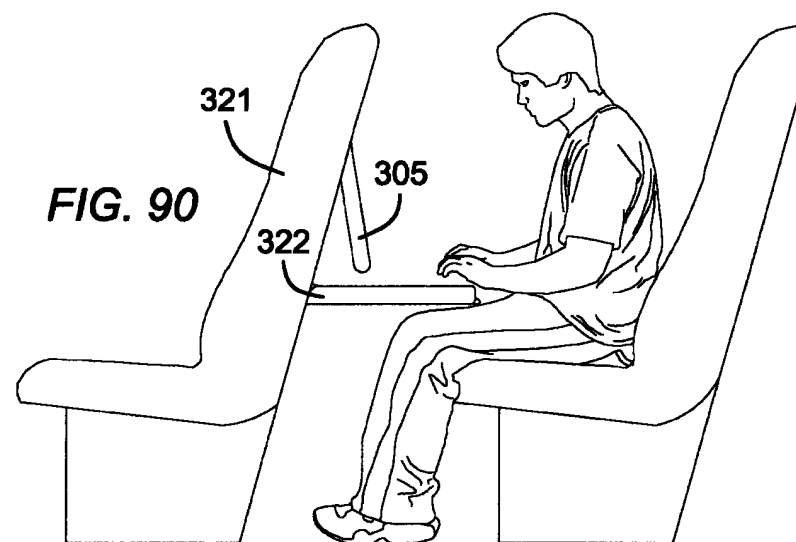
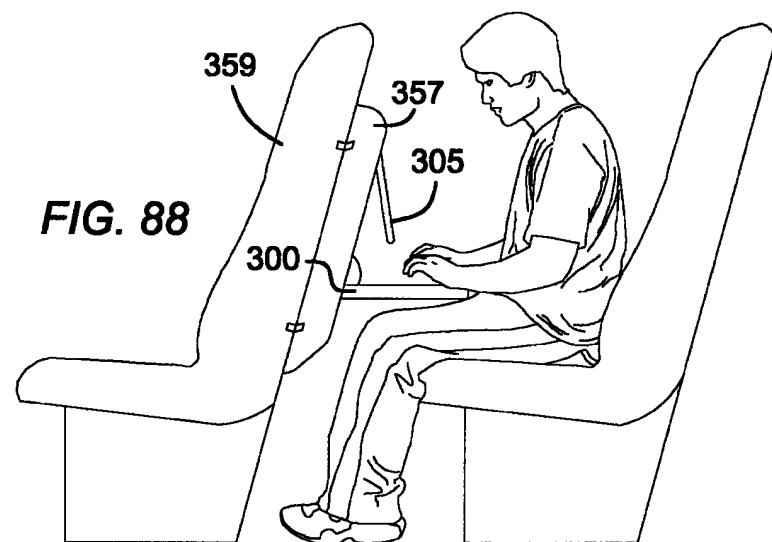


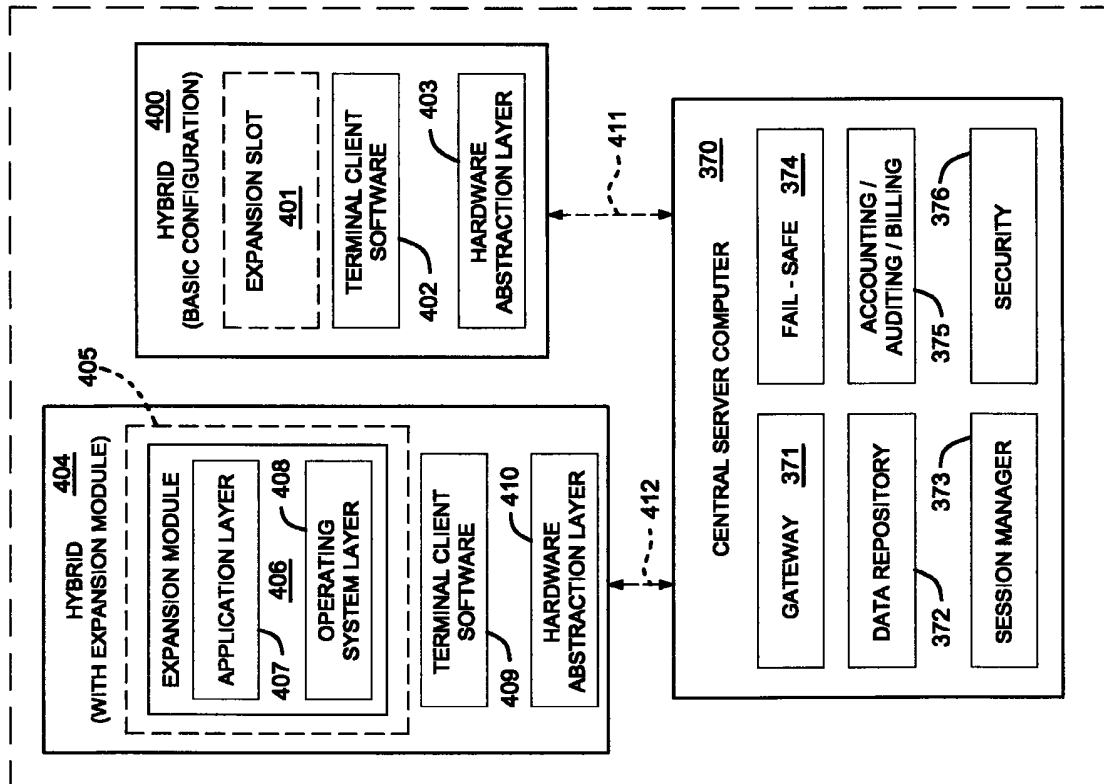
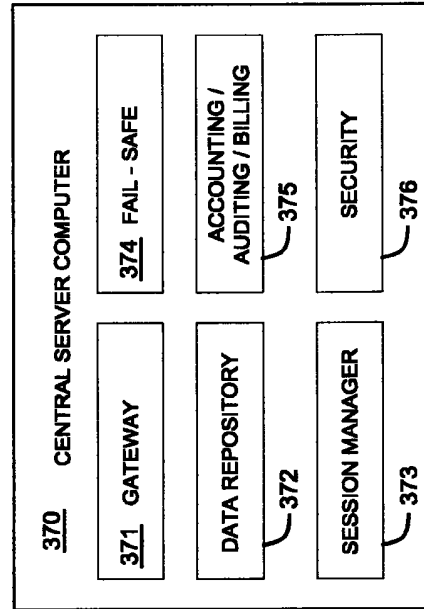
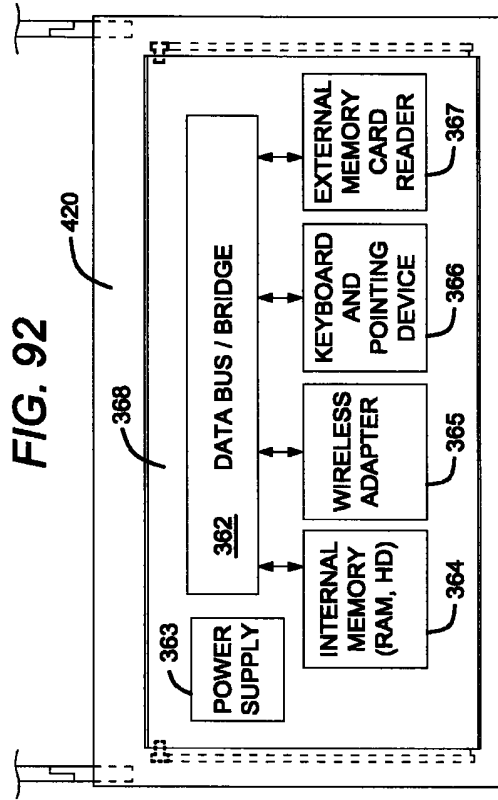
FIG. 78



20/43







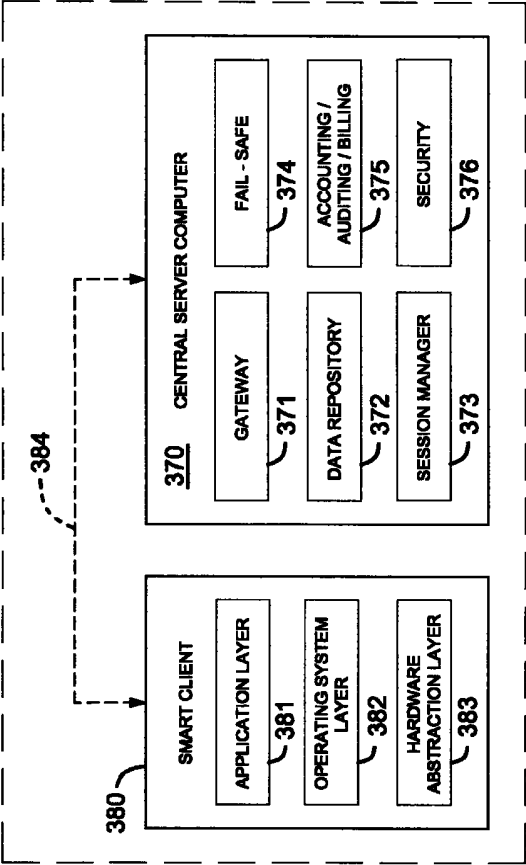
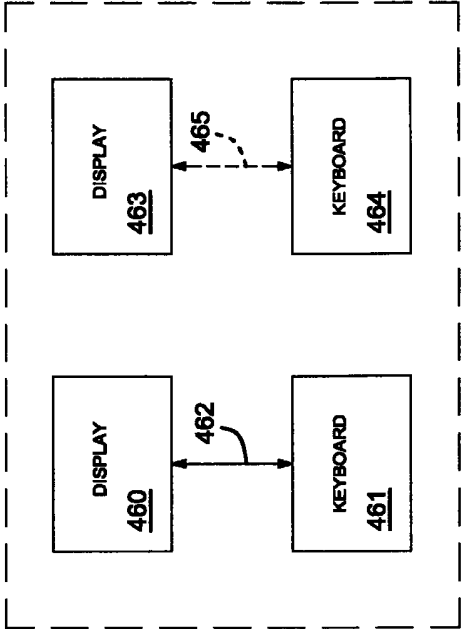
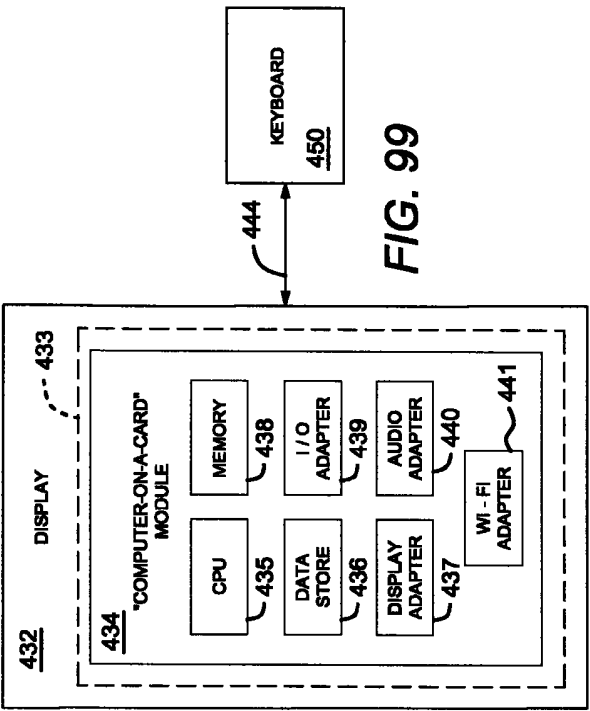
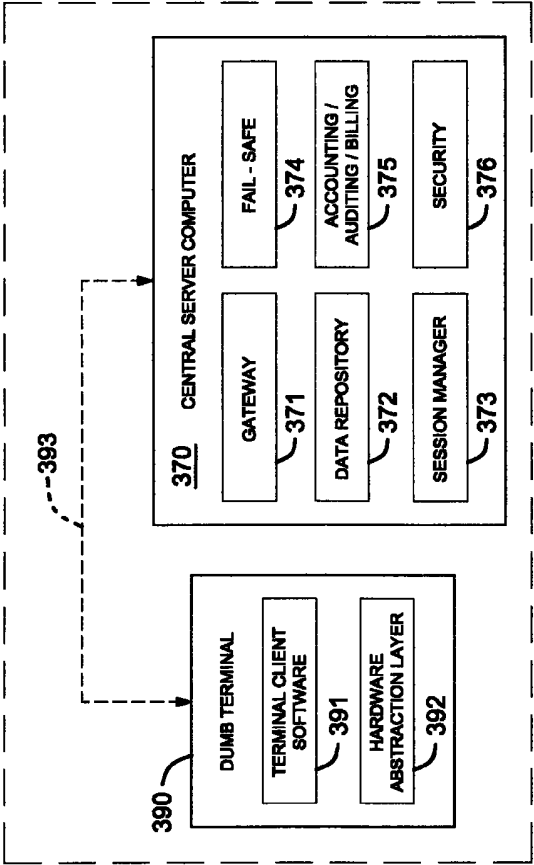


FIG. 95



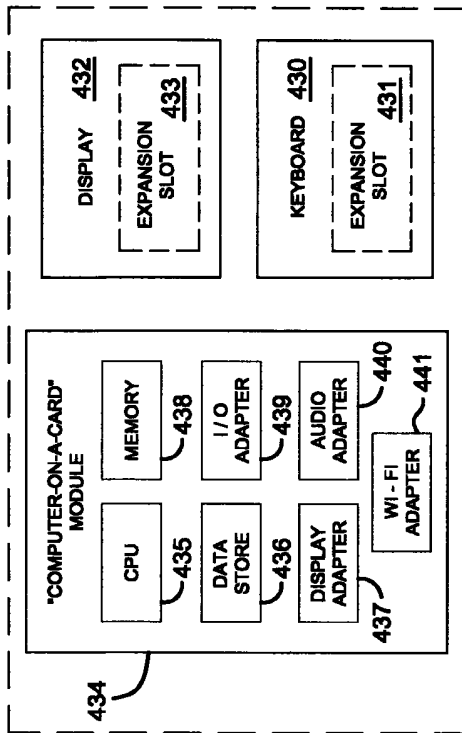


FIG. 97

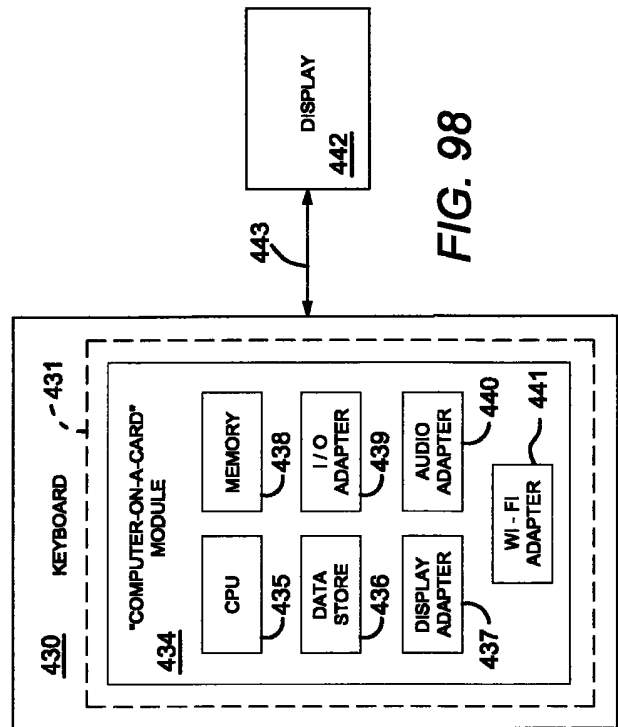


FIG. 98

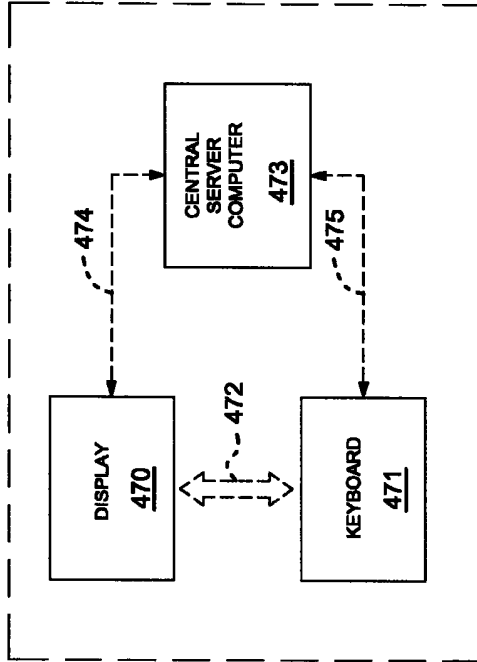


FIG. 101

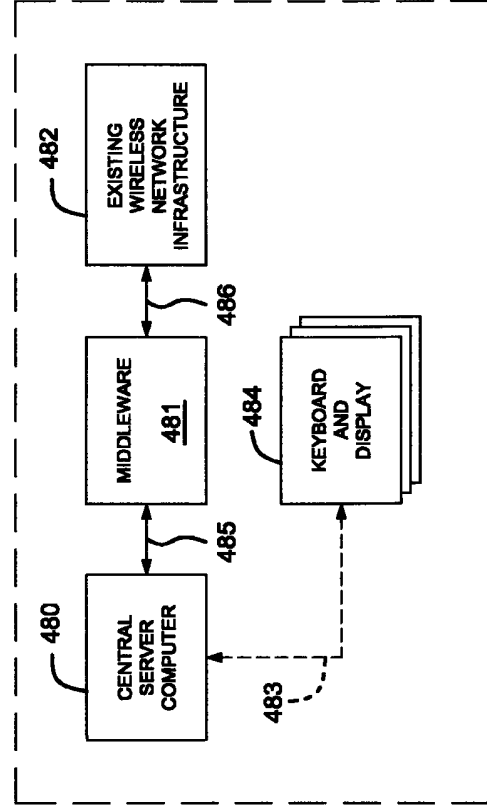


FIG. 102

FIG. 106

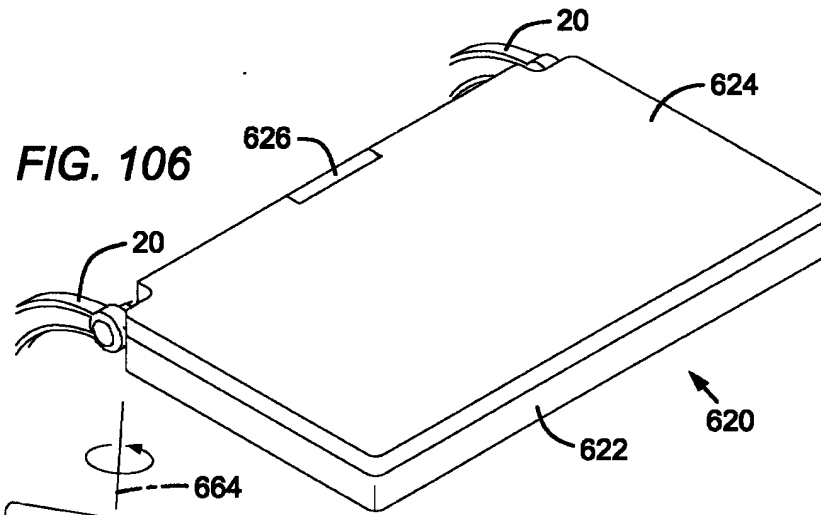


FIG. 105

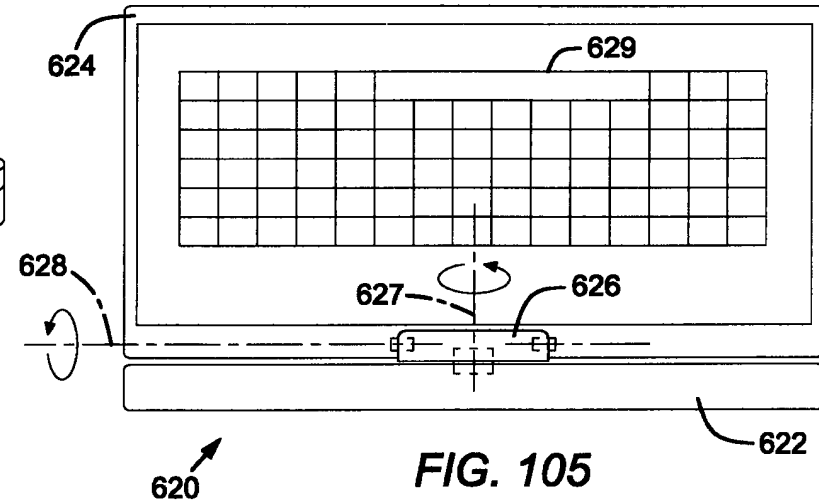


FIG. 112

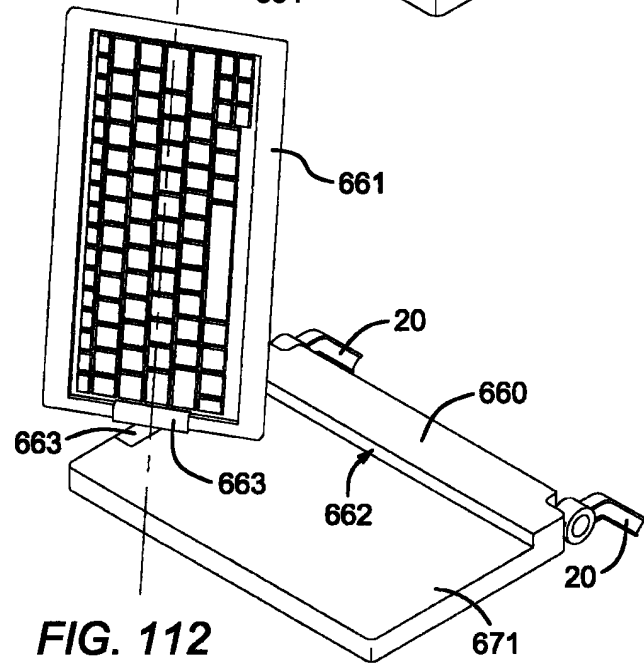
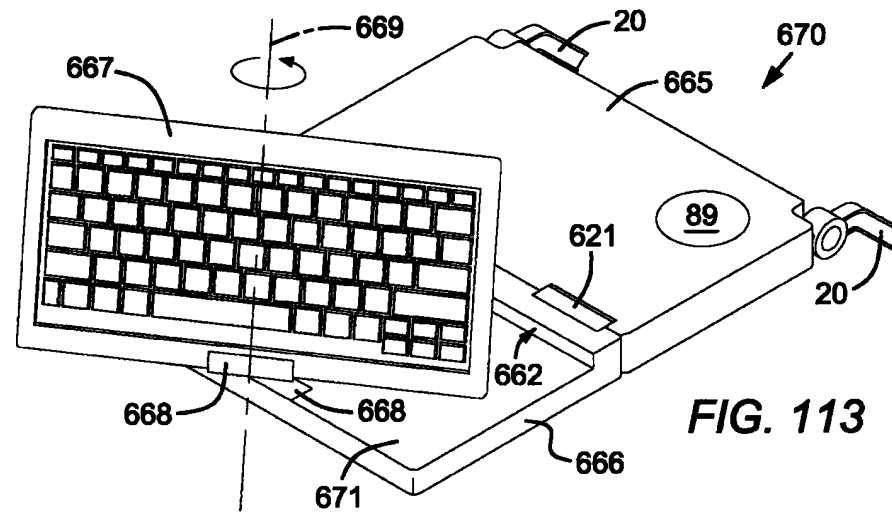


FIG. 113



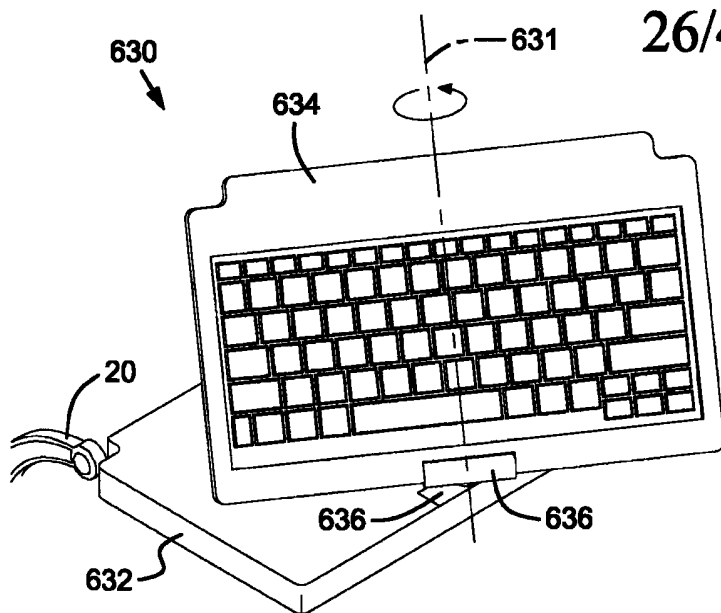


FIG. 110

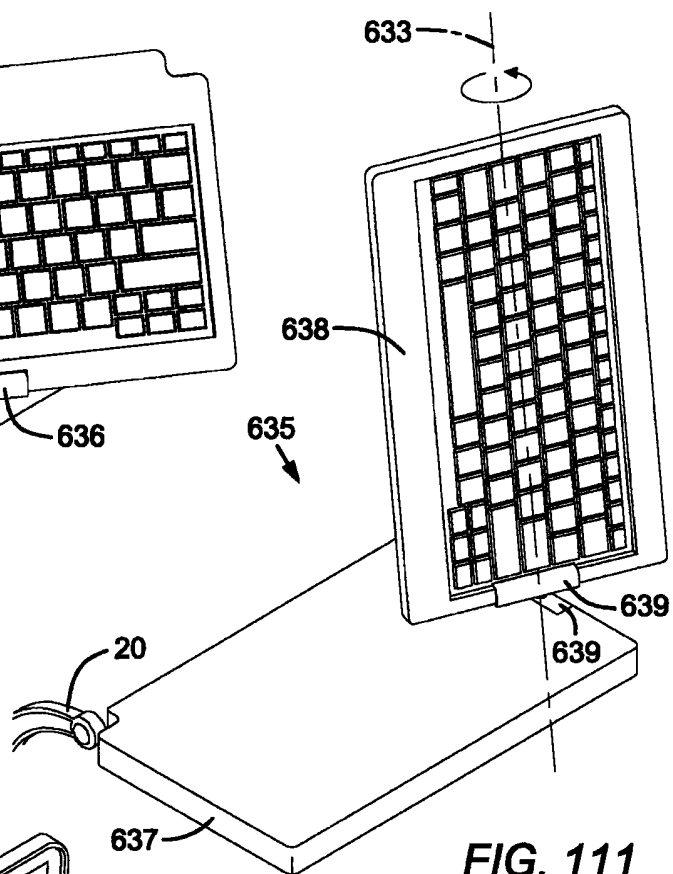


FIG. 111

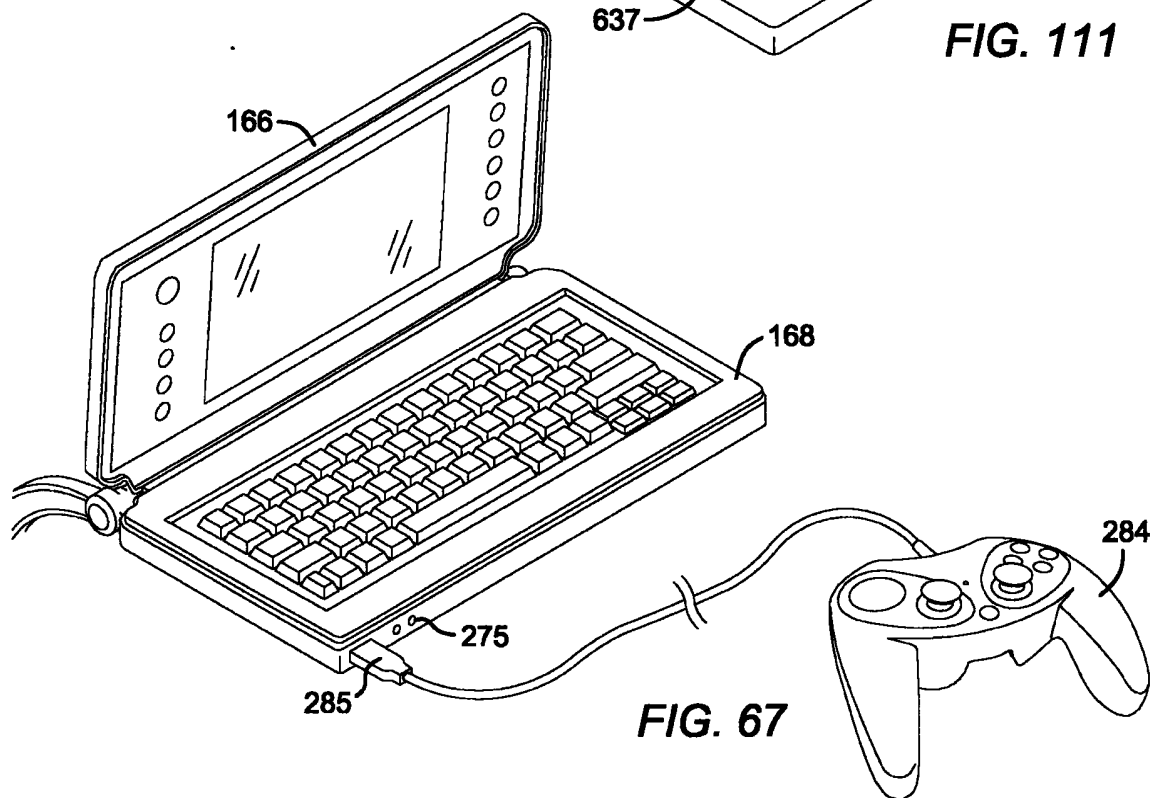
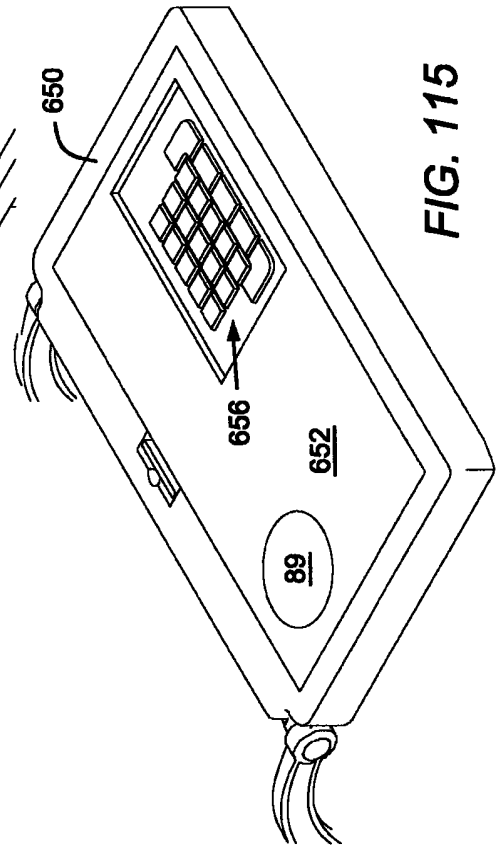
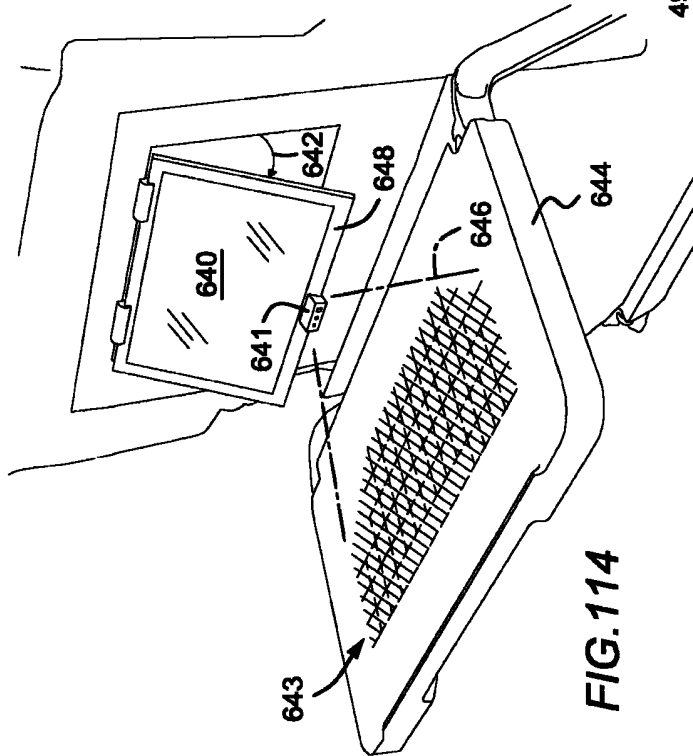
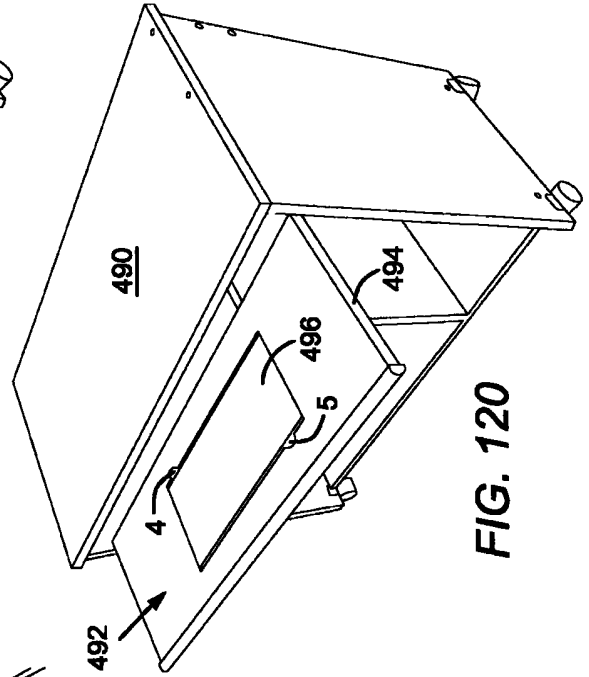
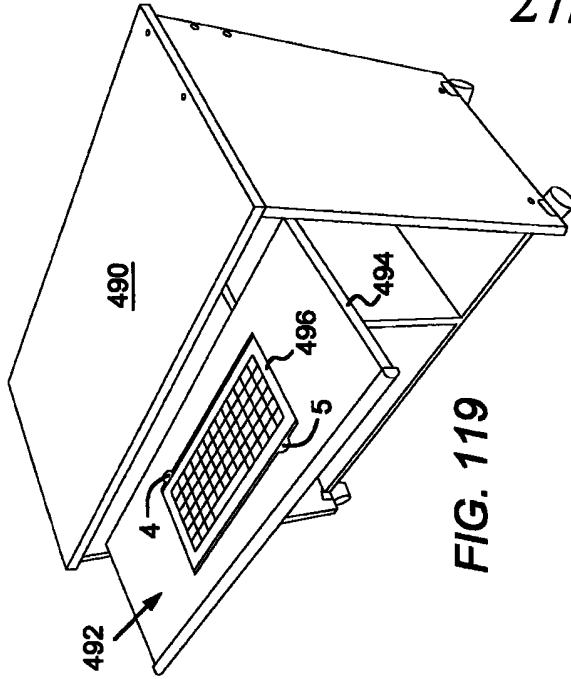
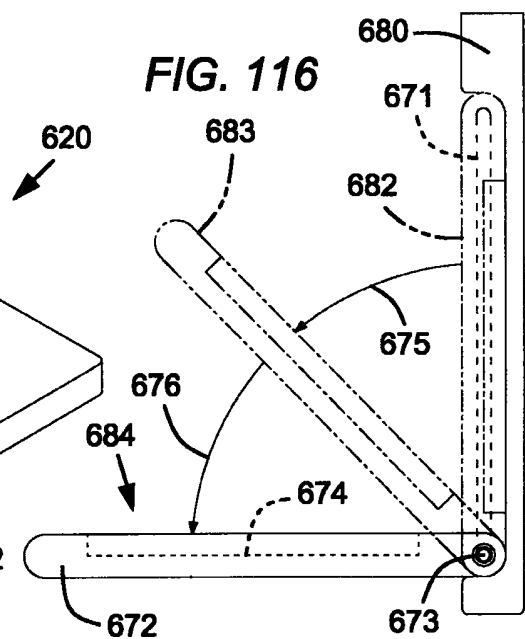
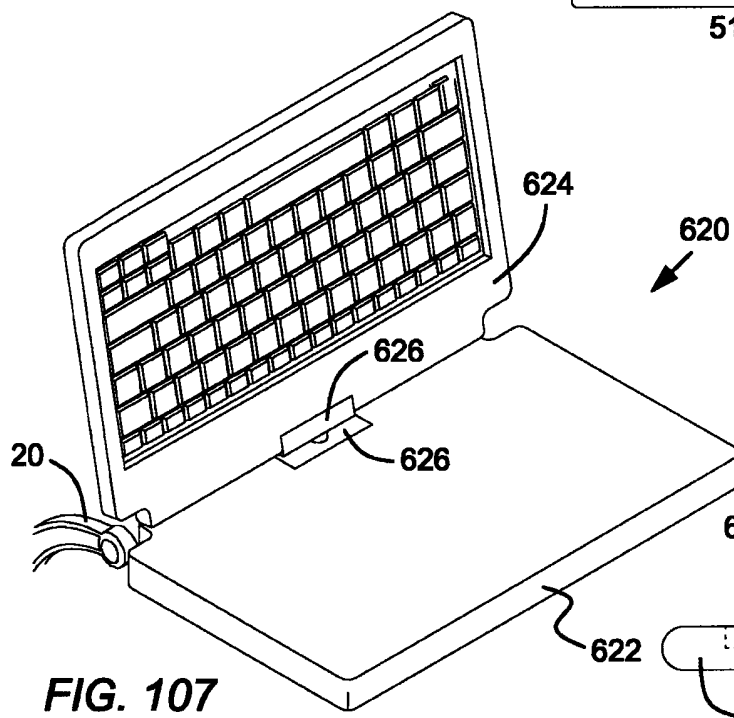
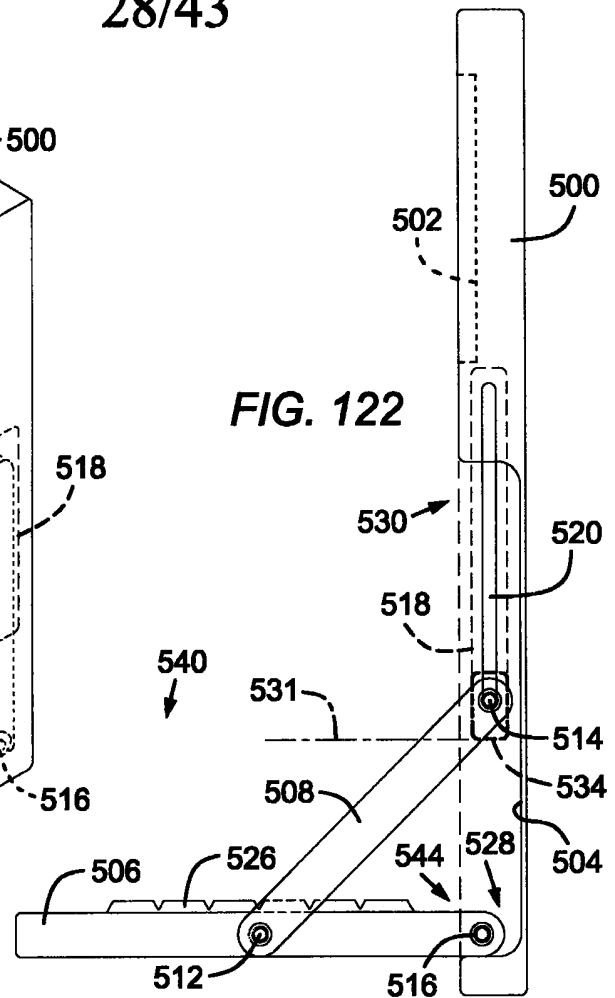
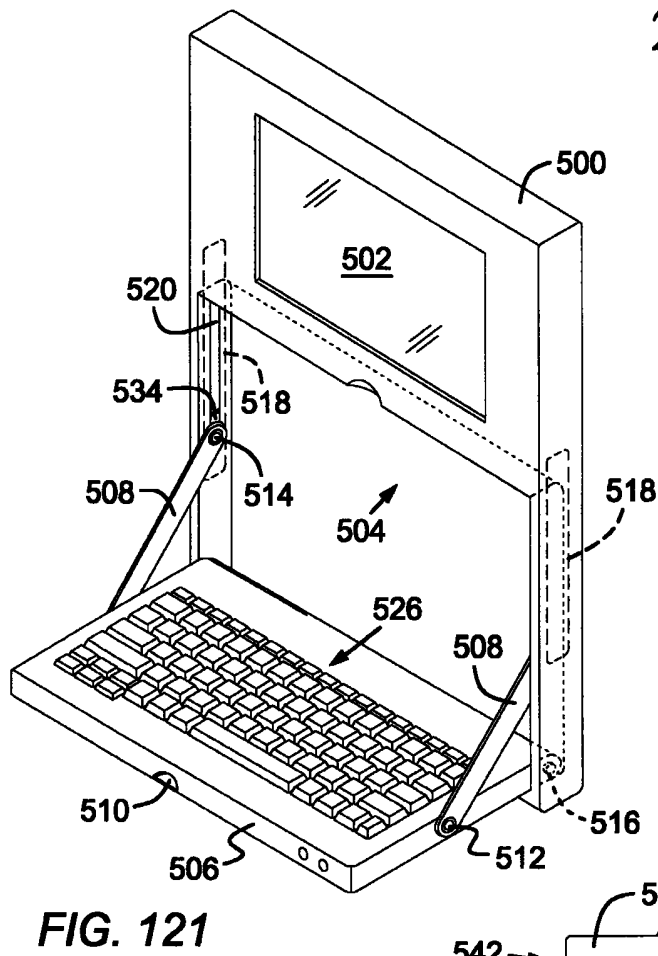
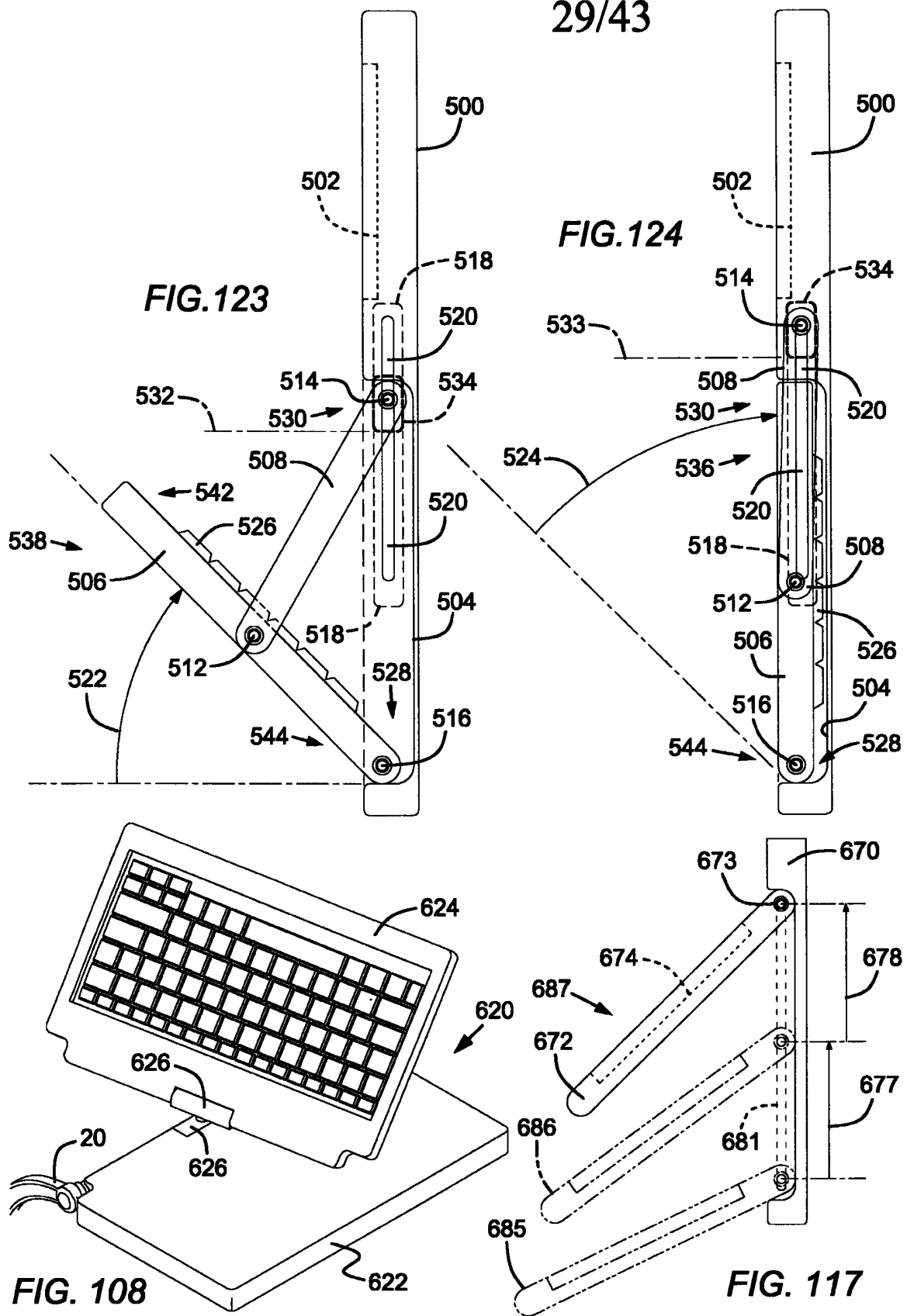


FIG. 67







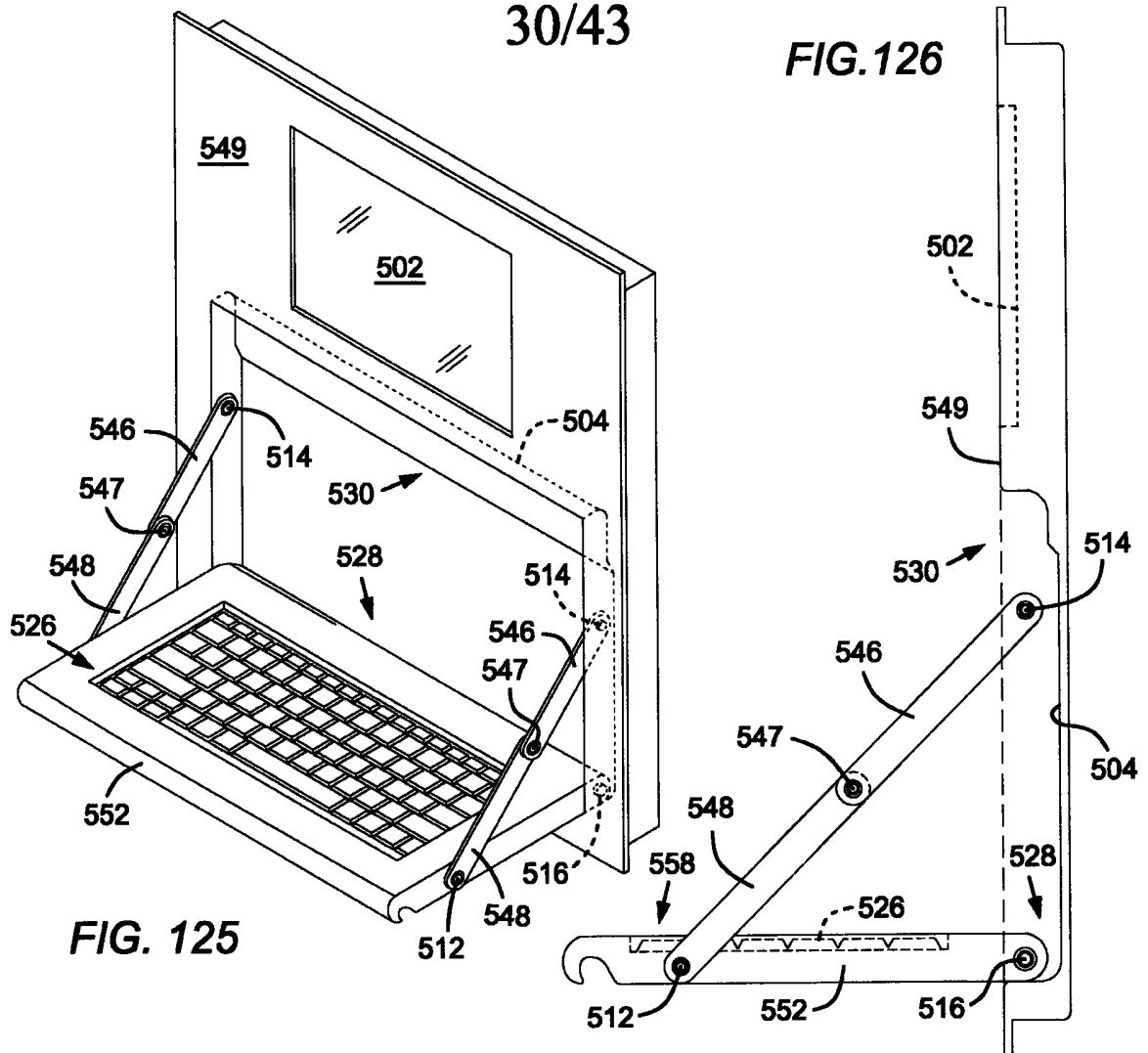


FIG. 125

FIG. 126

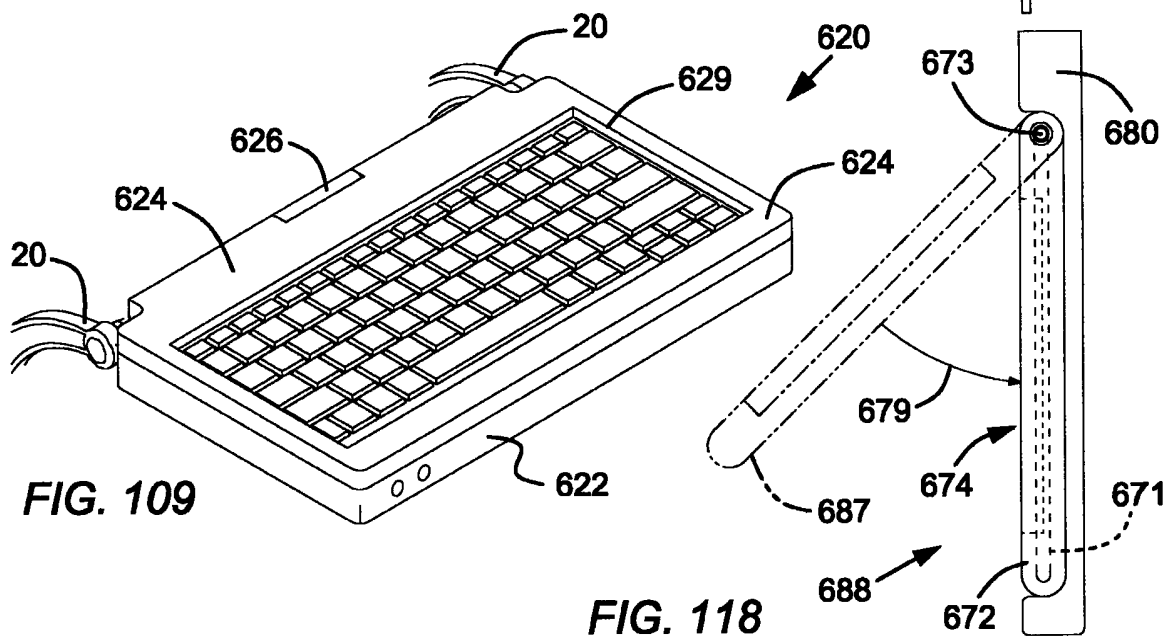


FIG. 109

FIG. 118

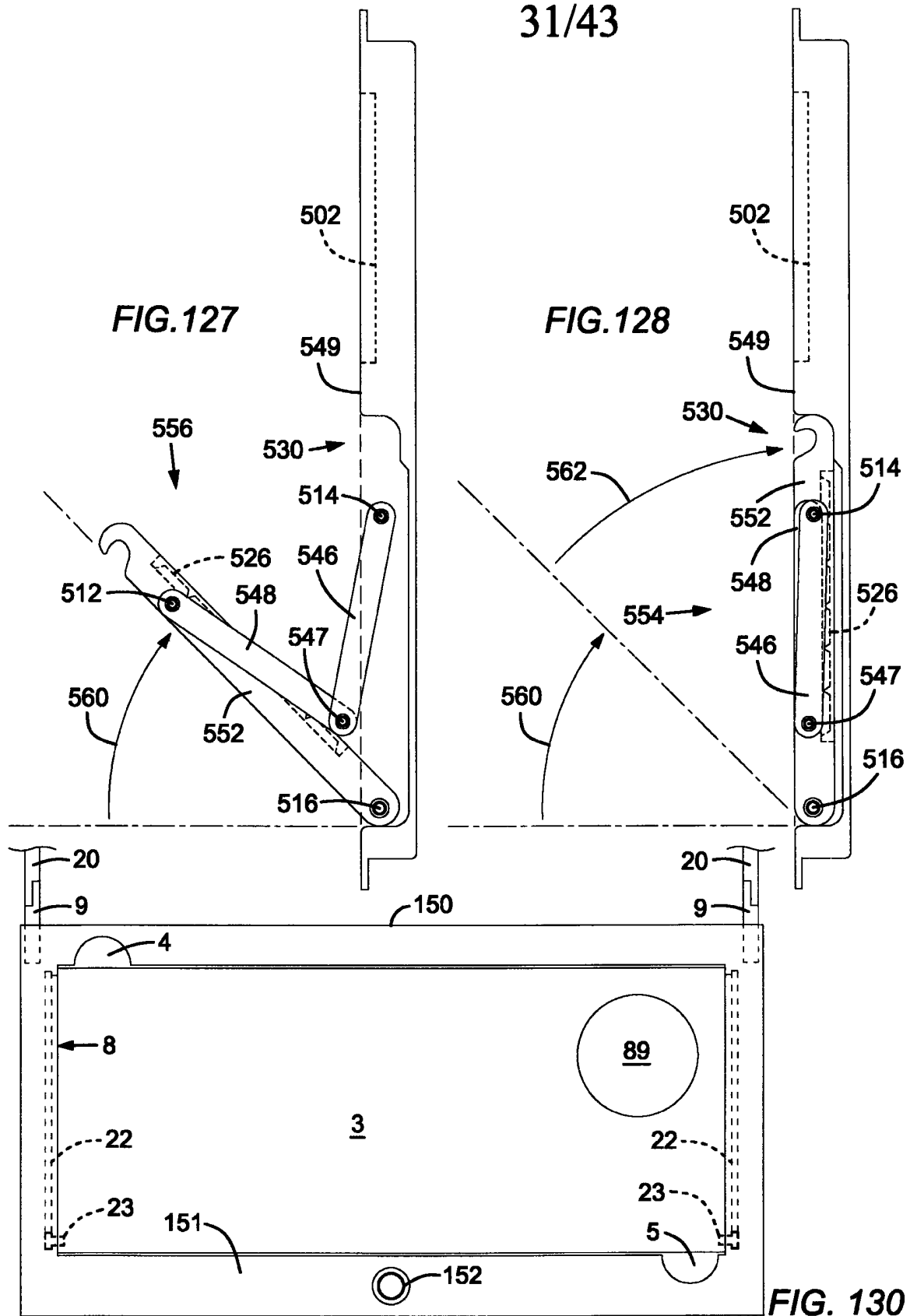
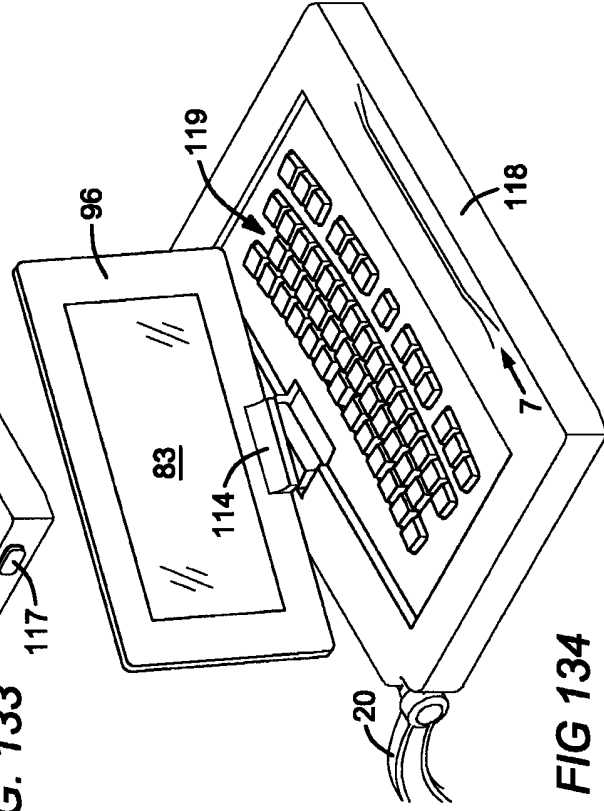
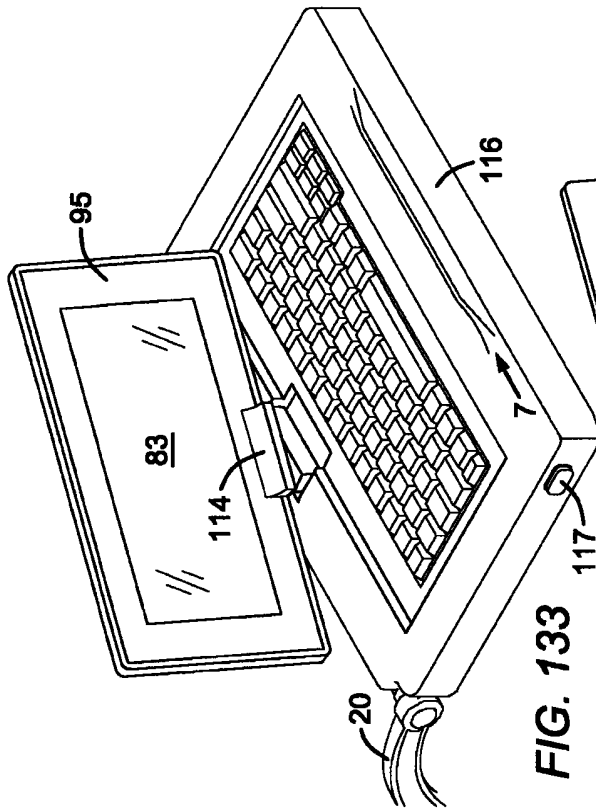
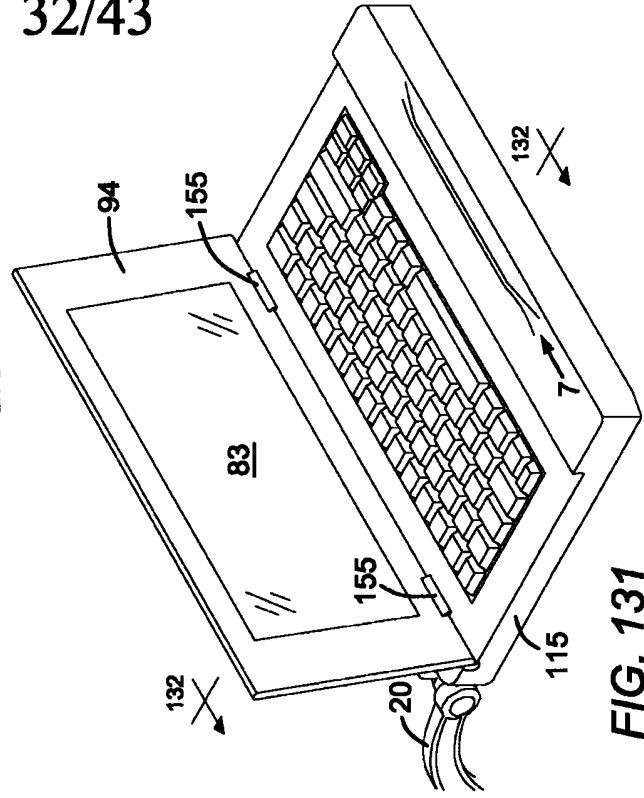
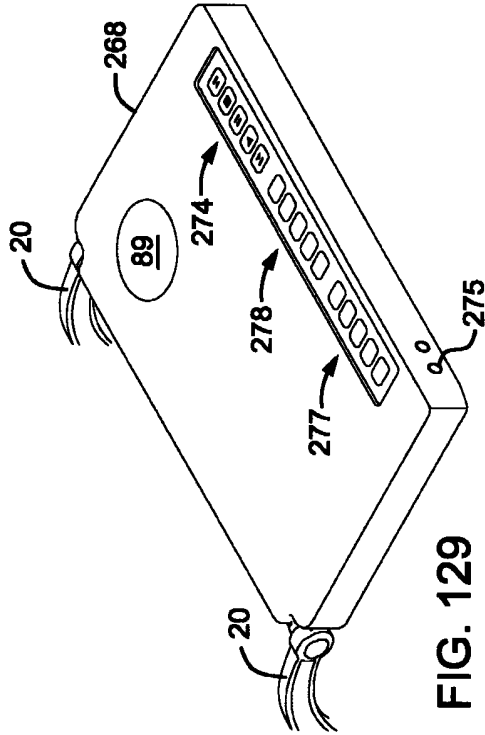
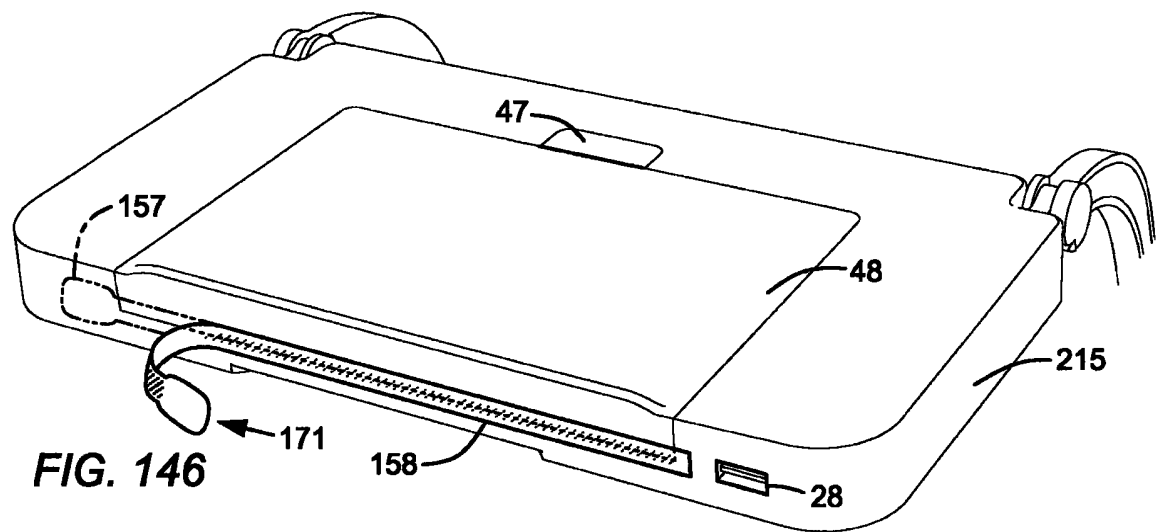
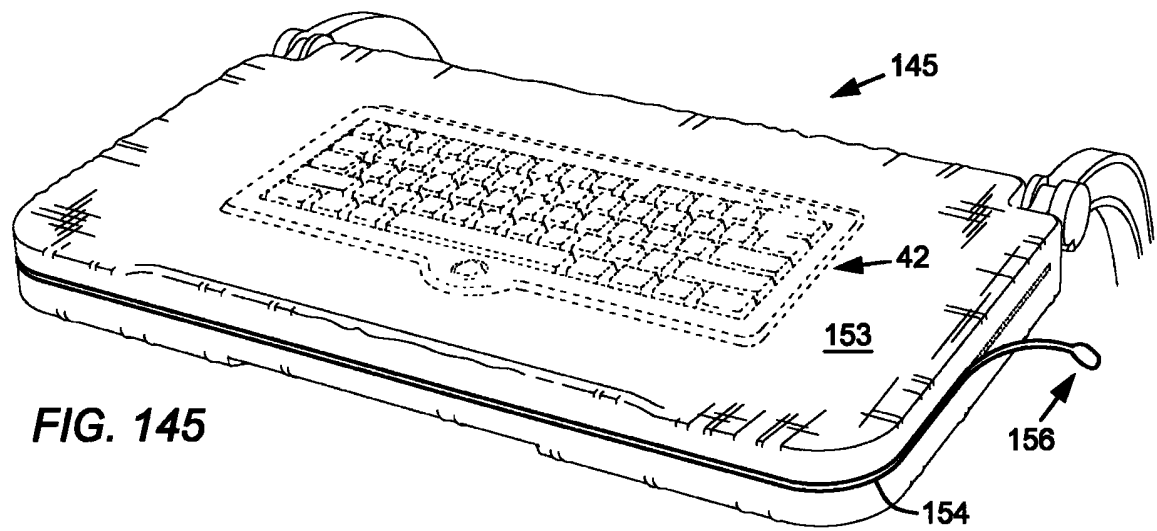
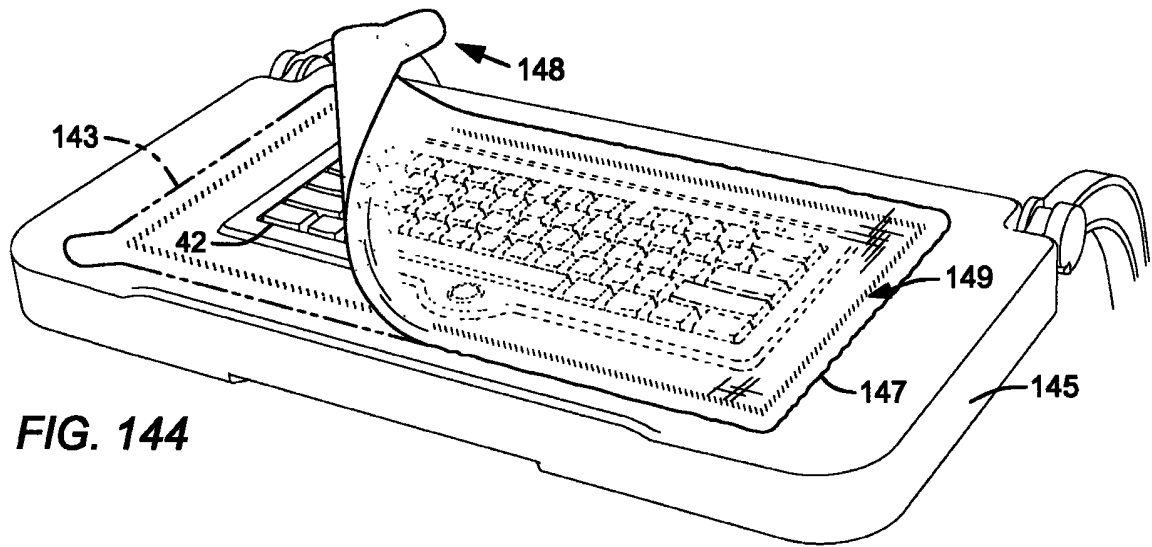
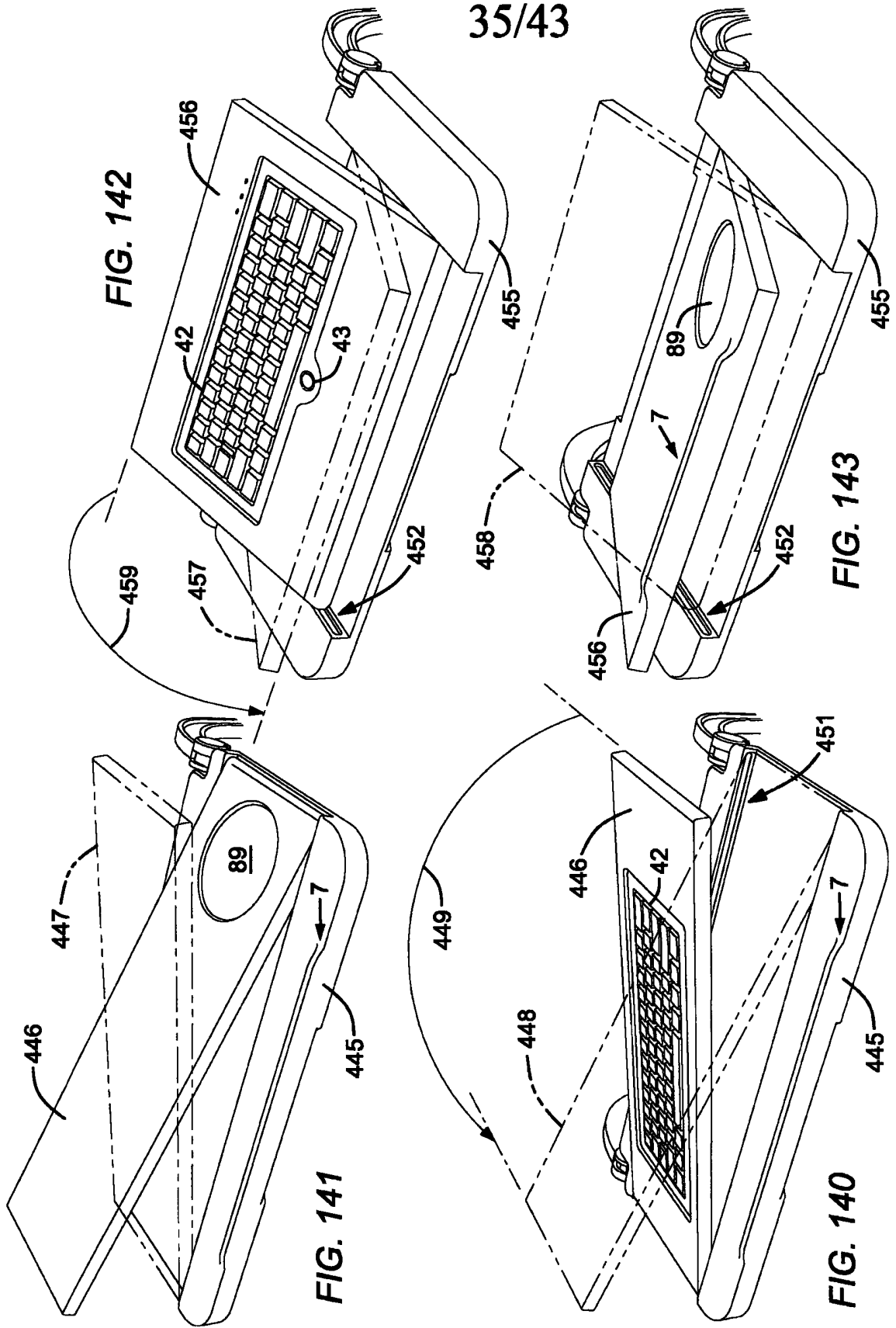


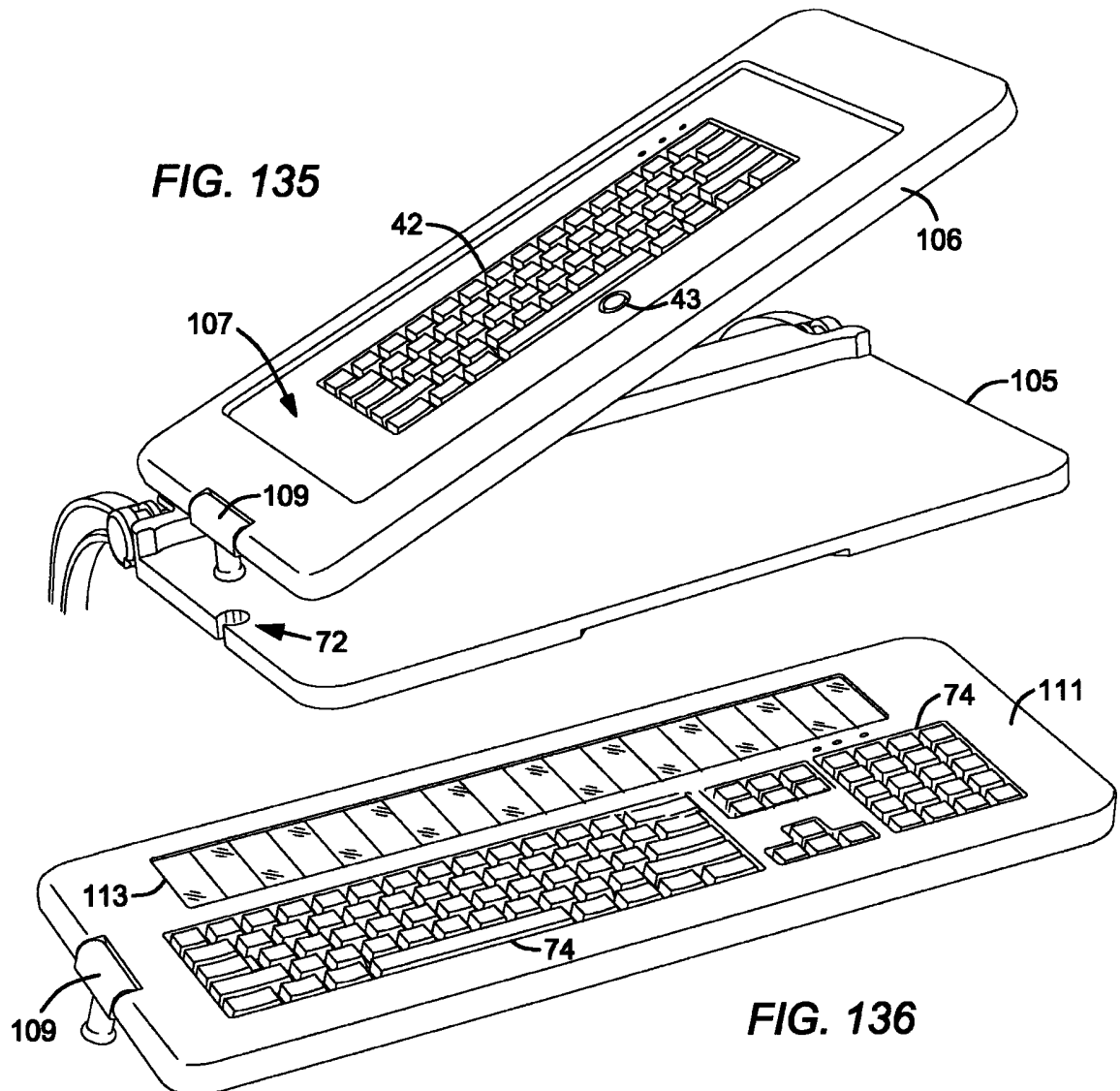
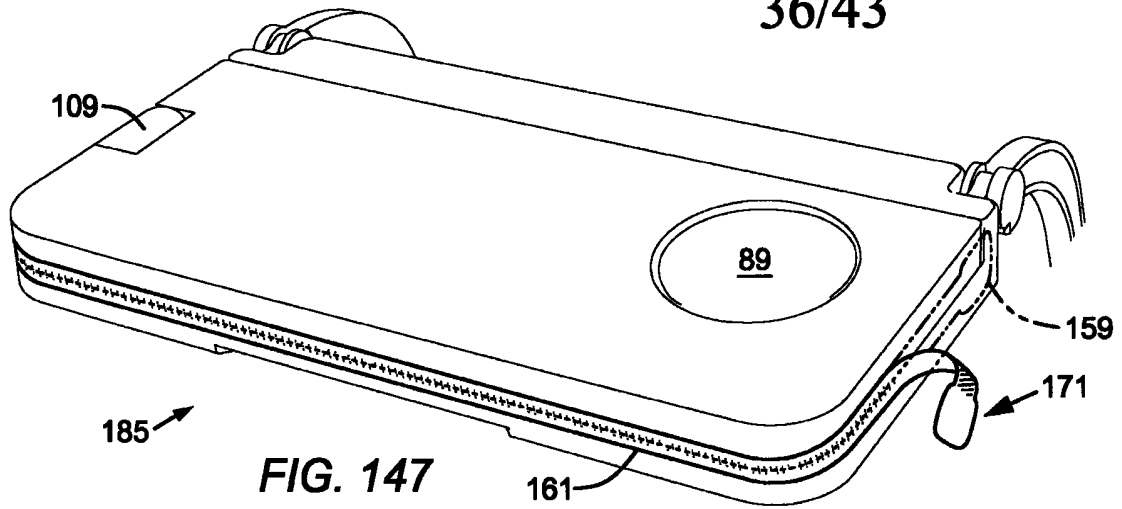
FIG. 130







36/43



37/43

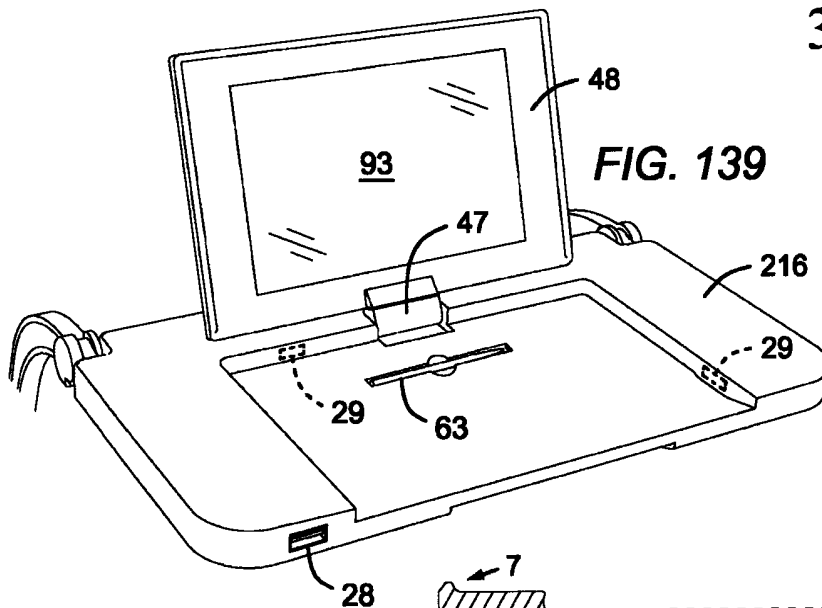
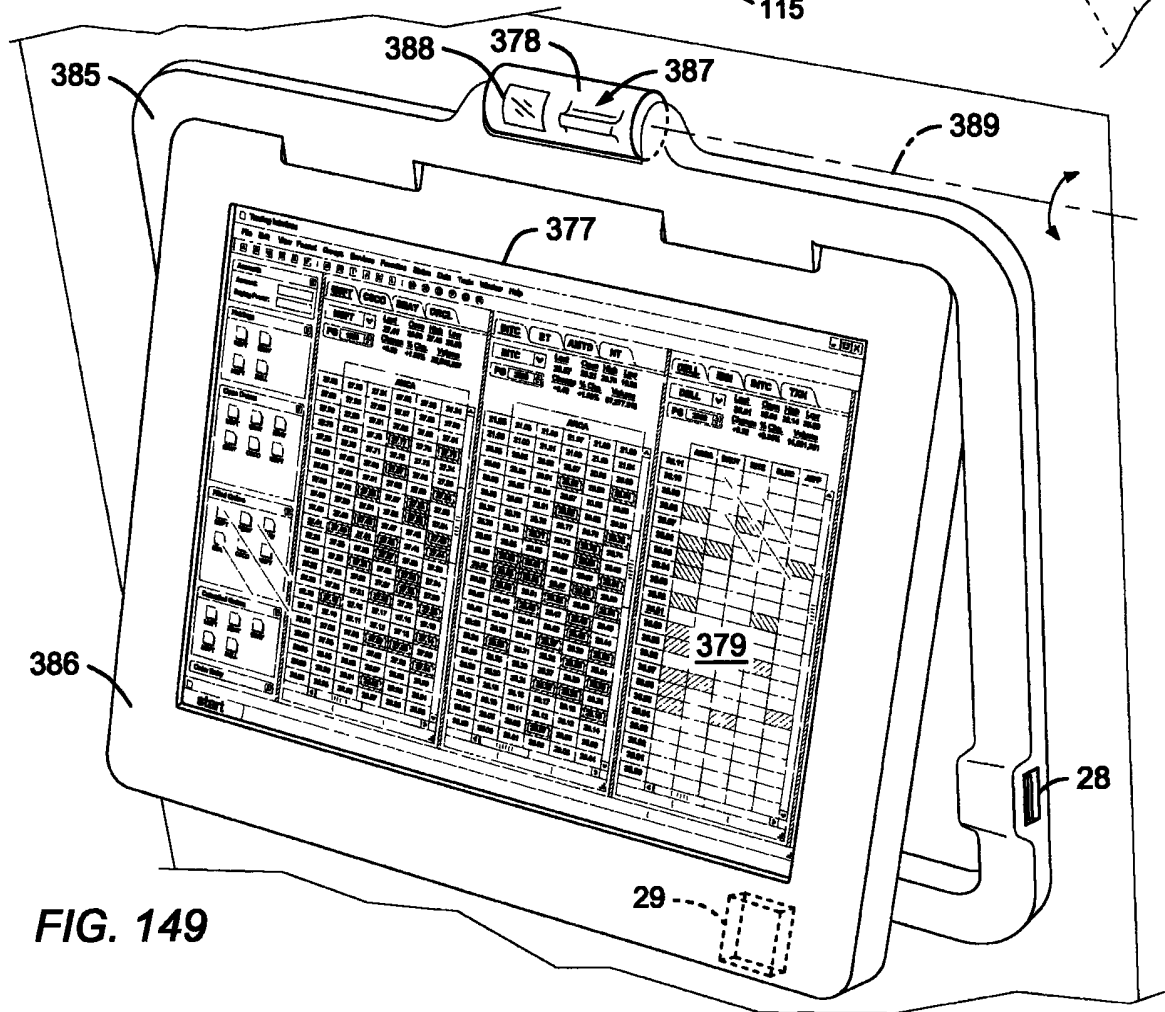
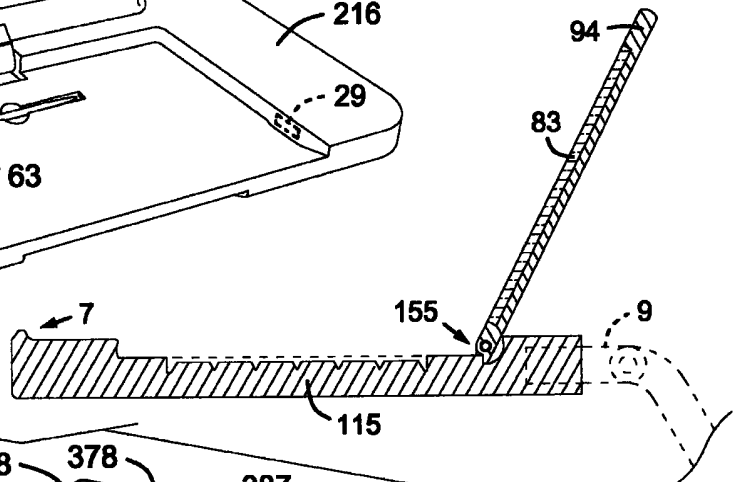
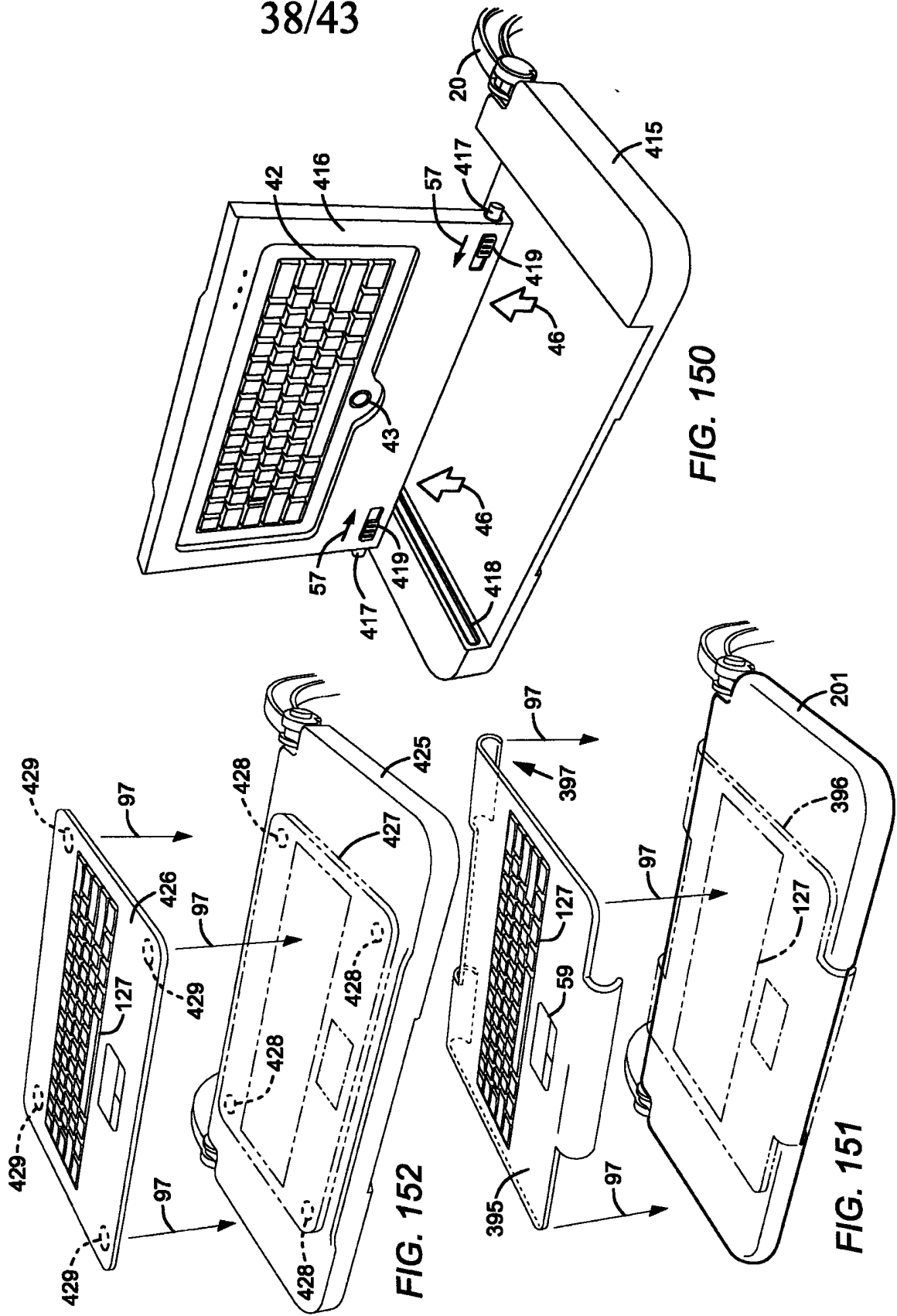


FIG. 132





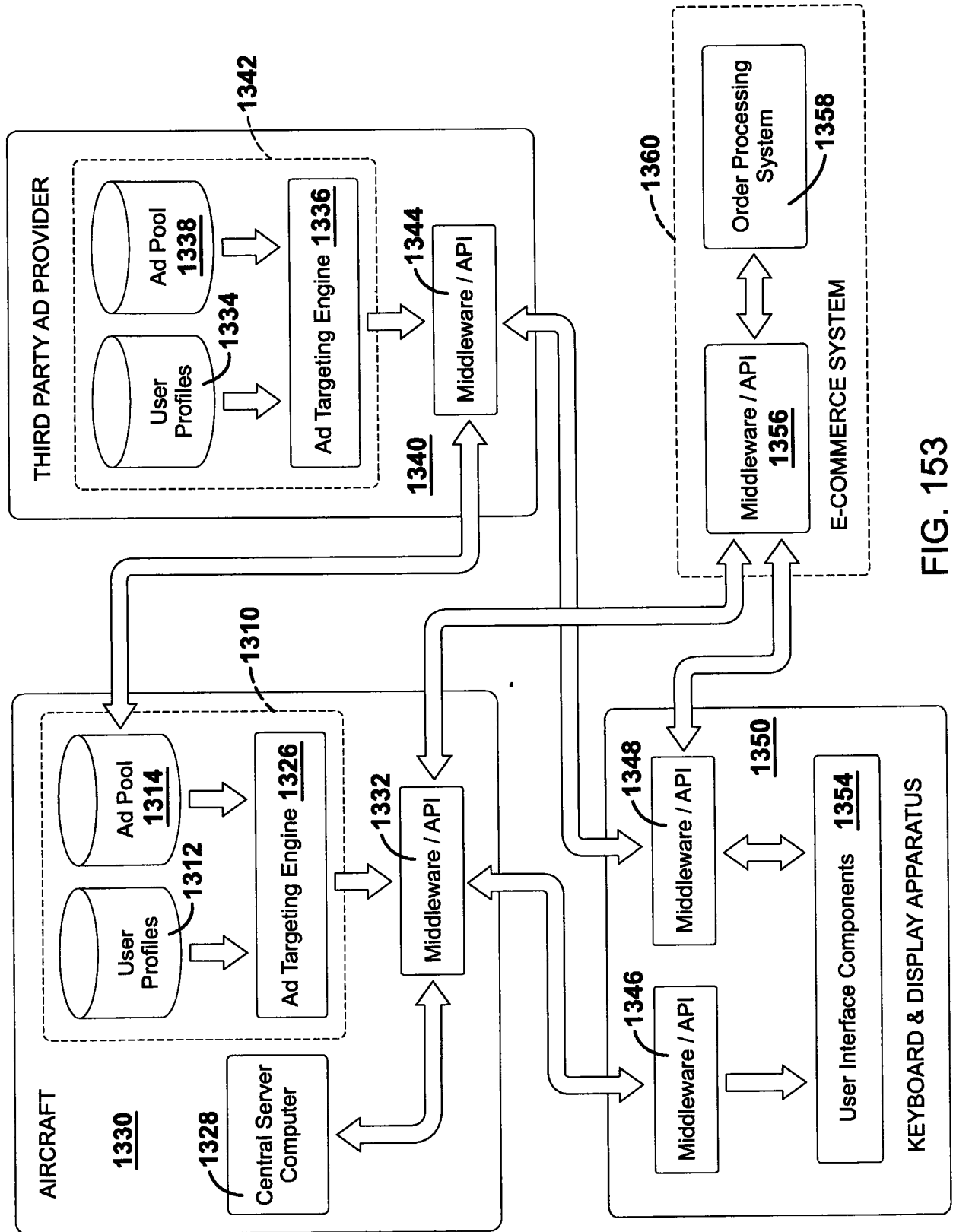


FIG. 153

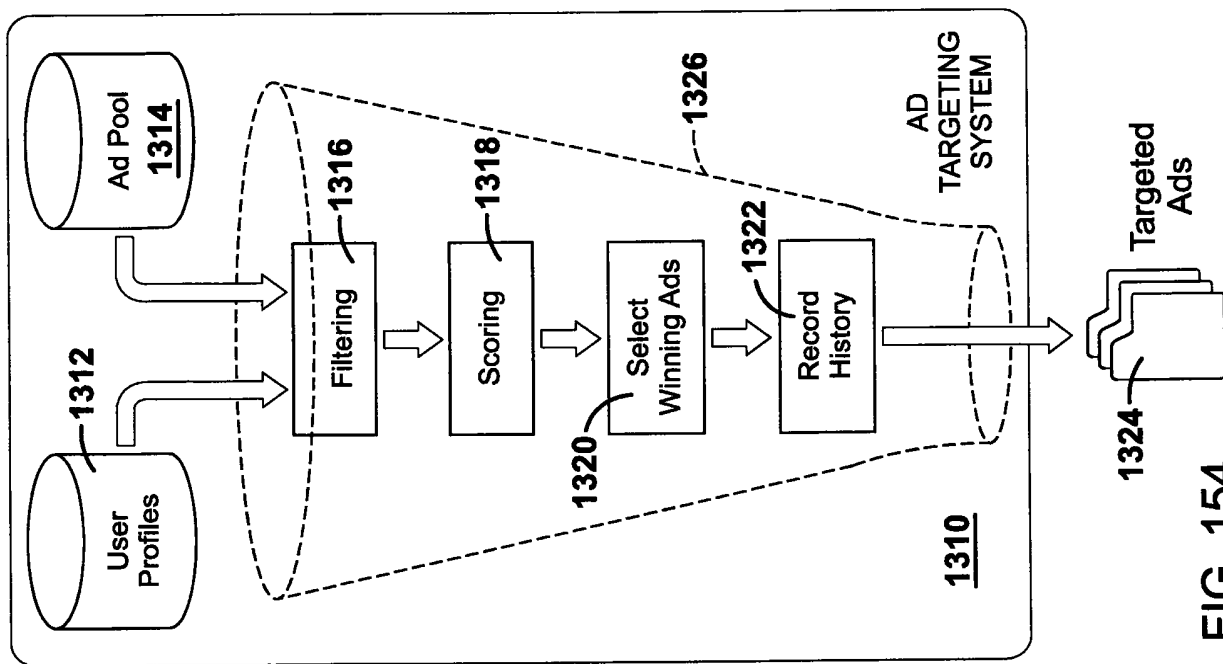
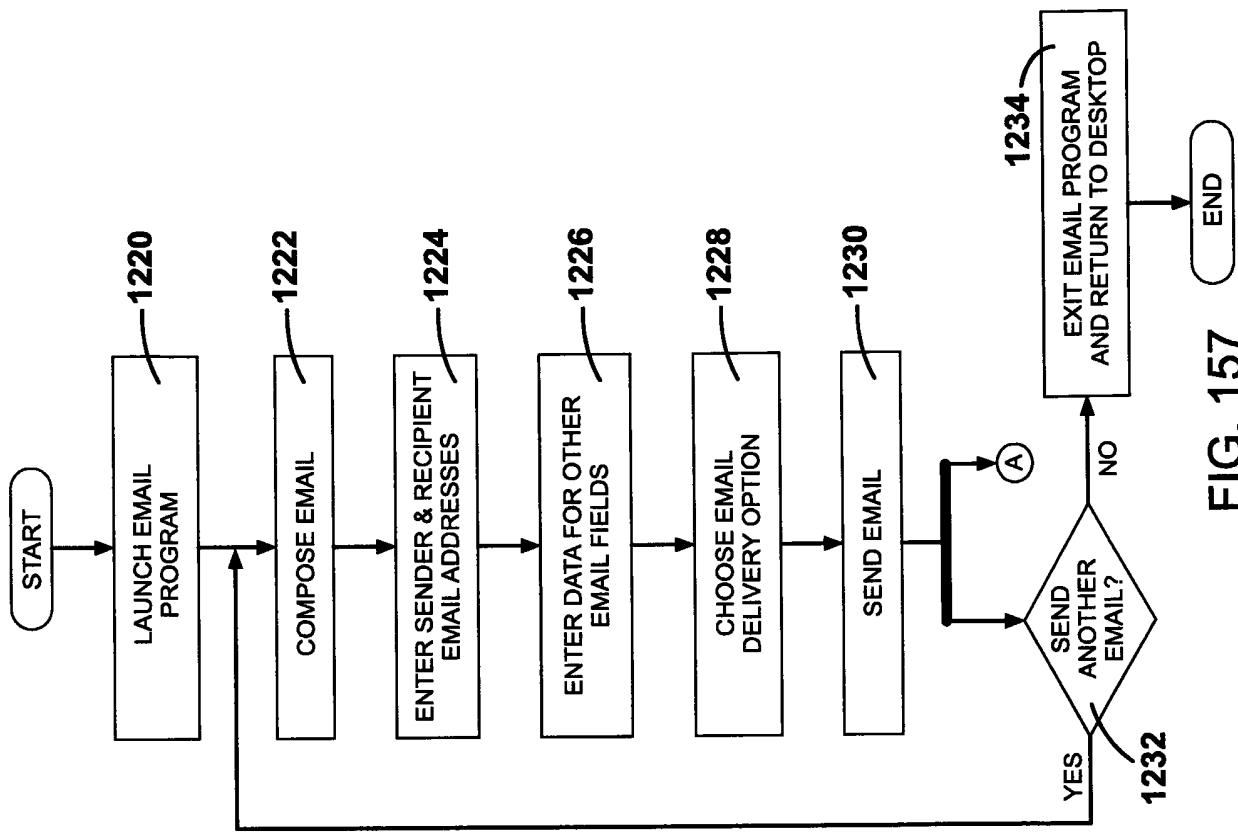


FIG. 156

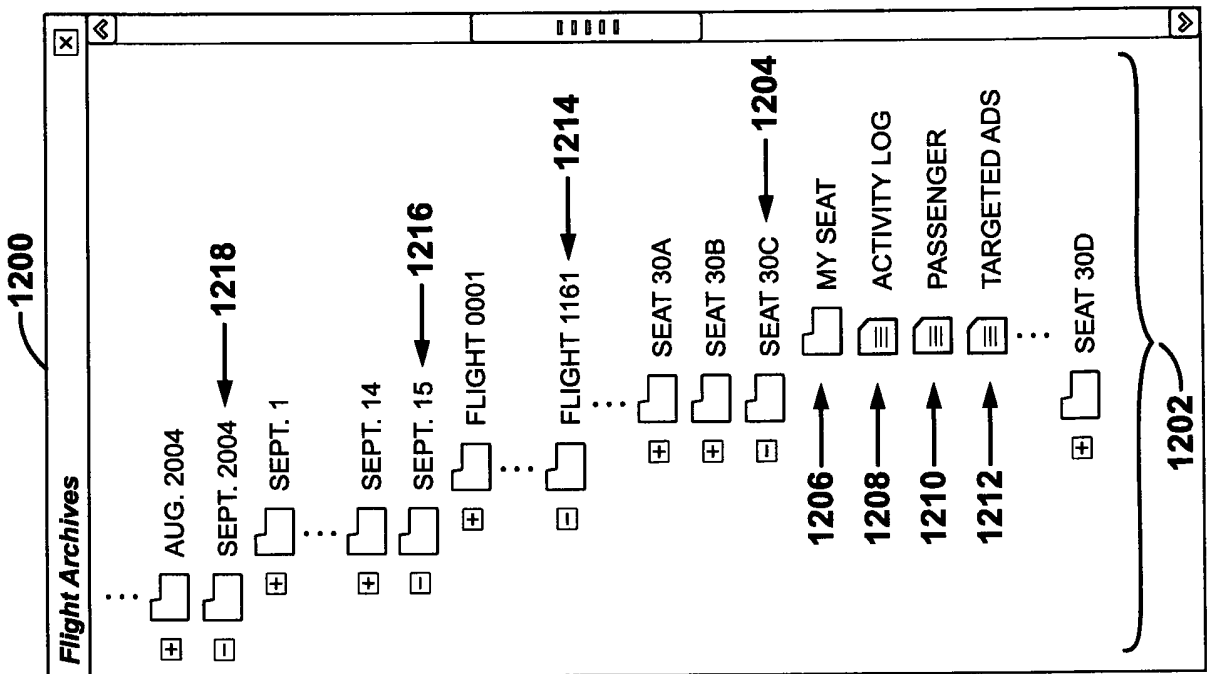
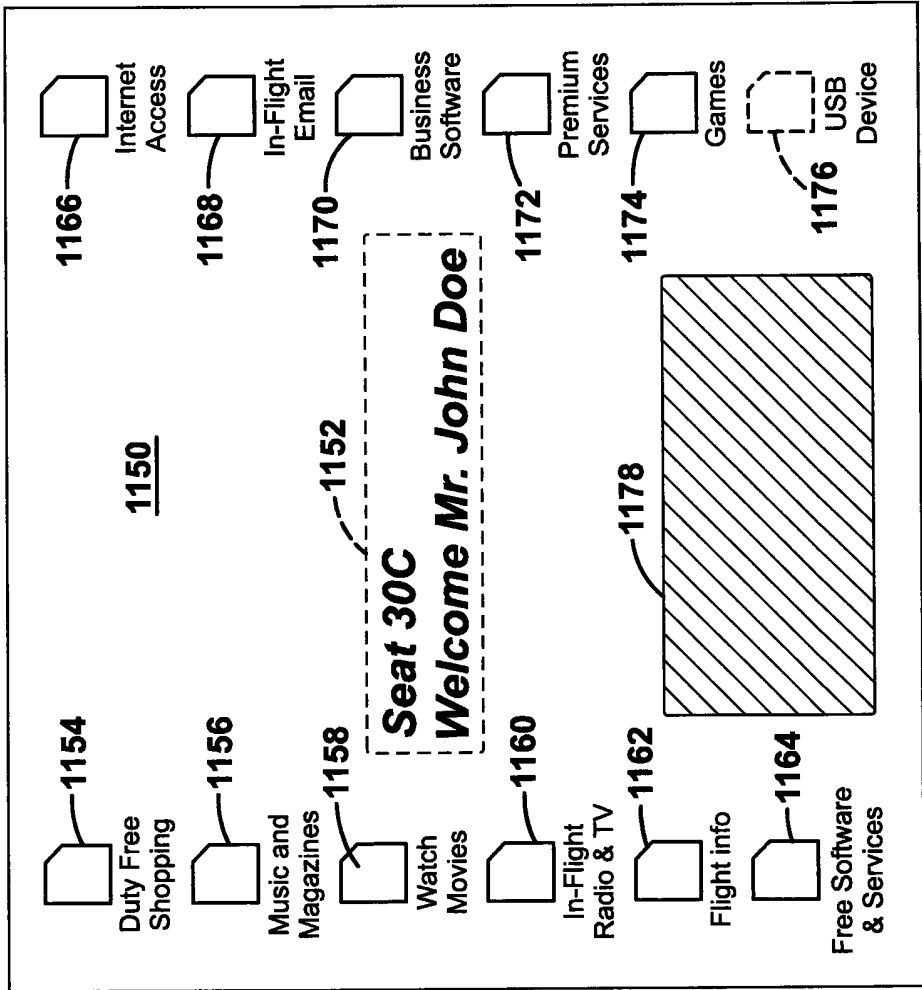


FIG. 155



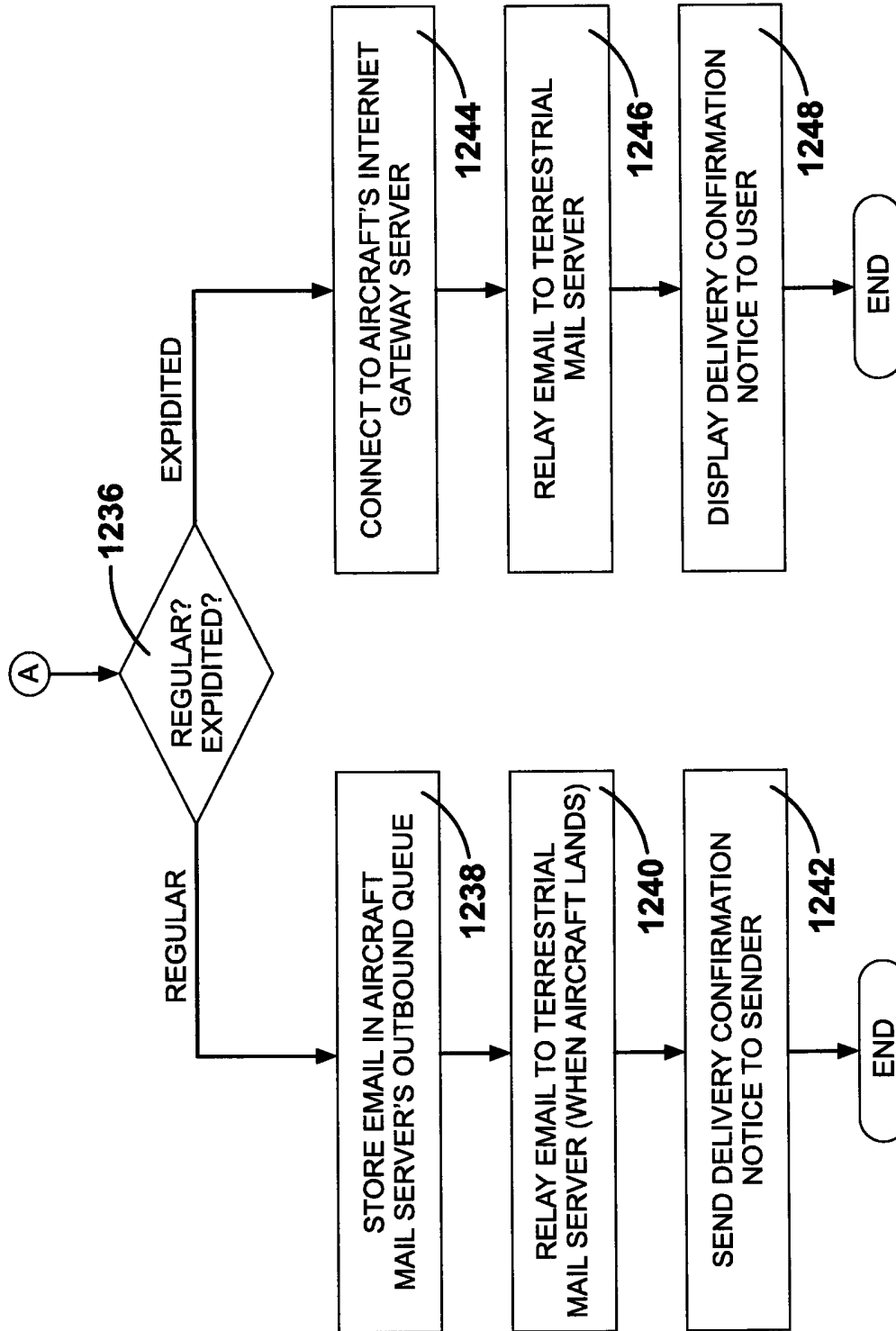


FIG. 158

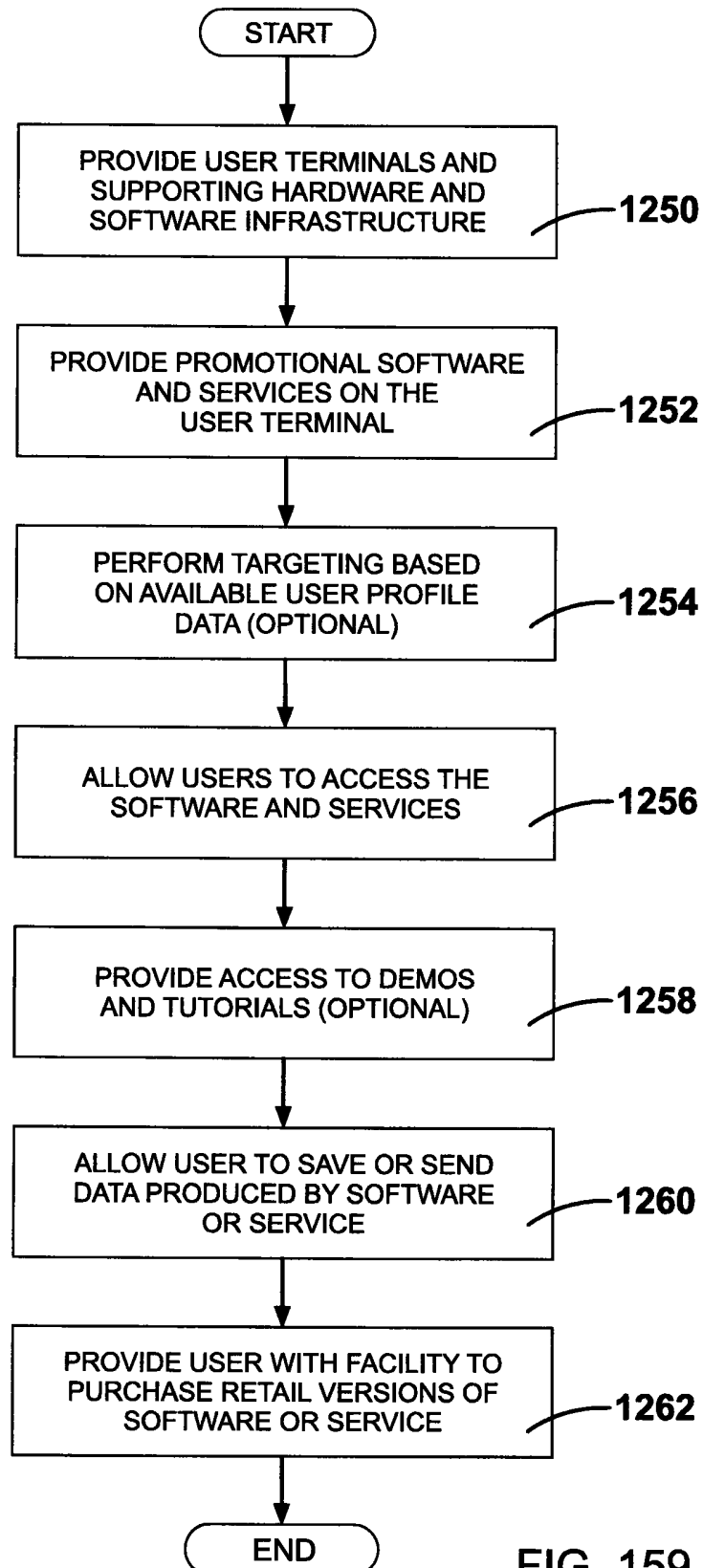


FIG. 159

PASSENGER KEYBOARD AND DISPLAY APPARATUS, AND A SYSTEM AND METHOD FOR DELIVERING CONTENT TO USERS OF SUCH APPARATUS.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Provisional Patent Application Ser. No. 60/613214 entitled "Passenger keyboard tray & display apparatus," filed Sept. 28, 2004. The contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

This invention relates generally to keyboard and display apparatus, and systems that facilitate the use of such apparatus, and more particularly, to an arrangement of keyboard and display apparatus attached to, or integrated on or within, the passenger seats of a passenger vehicle or vessel such as an aircraft, and systems and methods for delivering promotional software, services, and content to the users of such keyboard and display apparatus.

BACKGROUND OF THE INVENTION

Computer keyboards and displays are typically discreet apparatus placed on a table, or integrated within a laptop. As computer use grows, there is a need for convenient and continuous access to a variety of software applications and services even while a passenger is in transit or on a moving vessel or vehicle traveling to a destination.

Although internet access is becoming available on trains, aircraft, and the like, the available systems require that the user bring their own access devices such as a laptop PC. When keyboards are provided for internet access, they are typically not provided to users in economy class. Furthermore, economy class passengers are often limited in their ability to open laptop devices while seated next to other passengers. Wires associated with a laptop power adapter or an external mouse are also susceptible to being damaged by other passengers entering or exiting from adjacent seats to the user of such devices.

The inconvenience of security checks at airports, the possibility of theft, and limits on the weight of carry-on items also deter some passengers from bringing laptop devices during their travels.

There is a need for a foldable table apparatus that will serve a dual role, that of the conventional foldable table that passengers are familiar with on an airplane or train, and that of a foldable table keyboard apparatus and display apparatus to permit passengers to access a variety of entertainment services, software applications, and other services during their transit in a convenient and safe manner.

SUMMARY OF THE INVENTION

One aspect of the present invention is to provide a foldable table apparatus that may be used to conveniently access a variety of software and services on a passenger vehicle or vessel such as an aircraft, a bus, a train, a ferry, and the like. Embedded within the table apparatus is a keyboard apparatus, a display apparatus, or both, and typically, connectors may be provided to permit the user to open, edit, and save data files while in transit.

The foldable table apparatus is typically mounted to an array of seats such as that provided in an aircraft, bus, train, but the foldable table apparatus may also be used within theatres, auditoriums, and the like. The foldable keyboard table apparatus may be used as a conventional foldable food table of the type found in an aircraft or train and, when the keyboard or display apparatus is in a closed position, a food tray can be placed on the table apparatus surface without affecting the function of the apparatus. Thus, the passenger may be served food or drinks on the table apparatus at their convenience.

A further aspect of the present invention pertains to a foldable table apparatus that can be embedded with an easy-to-access and easy-to-store flippable keyboard. Typically the keyboard apparatus functions as a wireless keyboard and is associated with a specific display. The keyboard apparatus is readily removable and replaceable if food or beverages affect its function.

Another aspect of the present invention pertains to a foldable table apparatus that can be embedded with various easy-to-access and easy-to-store computer devices such as a Touchpad, Trackpoint, digital camera or web cam, CD/DVD player, gaming and entertainment software, or game controller, thus, enabling a user or passenger to have wide choices in accessing a network or program or for entertainment.

Another aspect of the present invention pertains to a clamshell type foldable table apparatus having a keyboard cover or keyboard lid that protects the inside of the foldable table apparatus in case of spillage.

Another aspect of the present invention pertains to a two-piece foldable table apparatus that can be embedded with various computer devices, a flippable display enclosure and/or a sliding keyboard. The two-piece foldable table apparatus may be used in constrained areas in combination as a foldable table apparatus with an embedded computer device and a foldable food table.

The present invention provides various easy-to-access and easy-to-store keyboard tables such as a foldable armrest keyboard table, rotating keyboard table, retractable keyboard table, hinged keyboard table, and compartment type foldable keyboard table.

The present invention also provides an accessible keyboard or display apparatus mountable to a wall or a horizontal surface. As contemplated by the invention, a foldable keyboard and display apparatus that can be retracted and opened via a keyboard support arm may be mounted to a wall in public areas or to a rear seat of an aircraft.

The present invention also provides an easy-to-access and easy-to-store flippable display panel enclosure having a flippable display panel with an embedded display screen that can be mounted to a horizontal surface in outdoors or in factories.

The present invention further provides an easy-to-access and easy-to-store computer apparatus inconspicuously integrated within a horizontal surface such as a conference table or podium, which is useful for meetings or presentations. In a similar manner, a flippable keyboard may also be inconspicuously integrated within a keyboard drawer of a computer table preventing any clutter or trip hazards caused by unsightly cable connections.

A further aspect of the present invention is to permit the foldable table apparatus or the keyboard apparatus to be cleaned, sterilized, or sealed for each new passenger to prevent the transmission of disease from one user to another. As such, the keyboard apparatus may be easily removed and replaced with a new or cleaner unit.

A further aspect of the present invention is to provide users of an array of such foldable table apparatus a system and method of obtaining internet access, and access to entertainment during their transit. As passengers are typically seated during transit, the system provides third party software vendors and service providers to provide promotional content and access to software applications that passengers may try and purchase if they choose. The passengers

may compose emails that may be delivered in real time or when the passenger vessel reaches its destination.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1–10 show views of a foldable table apparatus with an integrated flippable keyboard and associated display screen; and progressions relative to flipping, rotating, and then sliding a flippable keyboard of a foldable table apparatus from an upright table position to an open horizontal position.

FIG. 11 is a schematic top view of an alternative example of a flippable keyboard incorporating a Touchpad.

FIG. 12 is a partial isometric view right side of a foldable table apparatus showing in detail how a groove pin is secured inside a groove.

FIG. 13 is a top view of a further alternative example of a flippable keyboard incorporating a Trackpoint device.

FIG. 14 is an isometric view of a clamshell foldable table apparatus mounted to the rear of an aircraft passenger seat in a closed and open position.

FIGS. 15–18 show views of examples and alternative examples of a foldable table apparatus incorporating a Touchpad input device, digital camera or webcam, and wireless keyboard.

FIGS. 19–22 illustrate examples of a keyboard insert embedded onto a foldable table apparatus showing securing and releasing mechanism.

FIGS. 23–25 show views of examples and alternative examples of a blank insert, PDA insert, and game controller insert.

FIGS. 26–27 are top views of an alternative example of a foldable table apparatus with an embedded Trackpoint device and navigation buttons, and Touchpad device.

FIGS. 28–29 illustrate an example of a clamshell foldable table apparatus and associated display screen incorporating a keyboard cover.

FIGS. 30–33 are cross sectional views of the foldable table assemblies shown in FIGS. 28, 29, and 36.

FIGS. 34–35 are schematic cross sectional views of a clamshell foldable table apparatus and a variation of a section taken from FIGS. 28 and 29.

FIGS. 36–39 illustrate alternative examples of a clamshell foldable table apparatus and associated display screen incorporating a keyboard cover.

FIGS. 40–42 are isometric views of an integrated computer apparatus embedded on a conference table, a square table, and a podium.

FIGS. 43–52 show examples and alternative examples of a two-piece foldable table apparatus incorporating an embedded Trackpoint device, keyboard, flippable display enclosure, and sliding keyboard.

FIG. 53 is a cross sectional view of foldable table apparatus taken from FIG. 51.

FIGS. 54–56 show another alternative example of a two-piece foldable table apparatus incorporating a flippable display enclosure and a sliding keyboard.

FIG. 57 is a cross sectional view of a foldable table apparatus taken from FIG. 55.

FIGS. 58 shows further alternative example of a two-piece foldable table apparatus incorporating a flippable display enclosure and a sliding keyboard,

FIGS. 59–66 illustrate examples and alternative examples of a foldable table apparatus with an embedded display screen, built-in CD/DVD player, gaming and entertainment software, swivel display enclosure, and flippable gaming console.

FIG. 67 is an isometric view of an alternative example of a foldable table apparatus with a game controller.

FIG. 68–69 show side views of an example of a foldable armrest keyboard table.

FIGS. 70–91 illustrate examples and alternative examples of a rotating keyboard table, a retractable keyboard table, a hinged keyboard table, and a compartment type foldable keyboard table.

FIG. 92 shows a block diagram of a “System on a Chip” module of a keyboard table enclosure embedded on a foldable table apparatus.

FIG. 93 is a block diagram of the primary functions of a central server computer.

FIGS. 94–102 are block diagrams of architectural approaches for a wireless computer network in an aircraft.

FIGS. 103–104 are cross sectional views of a table top with an embedded keyboard in a closed and open cover positions.

FIGS. 105–113 depict examples and alternative examples of a swivel 180-degree twisting keyboard panel embedded within a foldable table apparatus.

FIG. 114 is a perspective view of an example of a foldable table apparatus upon which a keyboard pattern is projected.

FIG. 115 is an isometric view of an example of a foldable table apparatus incorporating an embedded key FrogPad™ style keyboard.

FIGS. 116–118 illustrate an example of a flippable display panel with an embedded display screen; and progressions as aforementioned flippable display panel is rotated from a closed vertical position to an open horizontal position.

FIG. 119–120 illustrate an example of an integrated flippable keyboard embedded and integrated on a keyboard drawer of a computer table in an open and closed positions.

FIGS. 121–124 illustrate an example of a foldable keyboard that is supported by a pair of keyboard support arms and a display screen that is integrated within a foldable keyboard and display apparatus in open, partially open, and closed positions.

FIGS. 125–128 illustrate an alternative example of a foldable keyboard and display apparatus incorporating a foldable keyboard that is supported by a two-piece keyboard support arm.

FIG. 129 shows an isometric view of a simplified foldable table apparatus.

FIG. 130 shows a top view of a foldable table apparatus with a Trackpoint style strain-guage device integrated on its table surface.

FIG. 131 shows an isometric view of clamshell style foldable table apparatus.

FIG. 132 shows a cross-sectional view of foldable table apparatus taken along lines 132-132 of FIG. 131.

FIG. 133 shows an isometric view of a clamshell style foldable table apparatus.

FIG. 134 shows an isometric view of a clamshell style foldable table apparatus with a custom keyboard.

FIG. 135 shows a perspective view of foldable table apparatus with a removable swivel keyboard.

FIG. 136 shows a perspective view of a removable swivel keyboard with a solar cell array.

FIGS. 137 and 138 show a perspective view of a clamshell style foldable table apparatus in its closed position and open position respectively.

FIG. 139 shows a perspective view of a clamshell style foldable table apparatus incorporating a touch sensitive display screen.

FIGS. 140-143 show two possible variations of the foldable table apparatus and flippable keyboard design of FIGS. 1-10.

FIGS. 144-147 shows a variety of packaging solutions for maintaining a foldable table apparatus in a hygienic state prior to use.

FIG. 148 shows a perspective view of a clamshell style foldable table apparatus utilizing a touch sensitive display screen.

FIG. 149 shows a partial perspective view of a forward seat mounted display apparatus with an embedded video camera.

FIG. 150 shows a perspective view of a foldable table apparatus with its flippable keyboard detached from the table apparatus.

FIG. 151 shows a perspective view of a snap-on keyboard apparatus.

FIG. 152 shows a perspective view of a magnetically attached keyboard apparatus.

FIG. 153 shows the architecture of an Advertisement Targeting System adapted for use in the system of the present invention.

FIG. 154 shows the internal structure of the Advertisement Targeting System.

FIG. 155 shows a representation of a desktop user interface presented to a typical passenger on a display screen.

FIG. 156 shows a preferred embodiment of a user interface for organizing and presenting archive data associated with users of the passenger keyboard and display apparatus of the present invention.

FIGS. 157-158 show a flowchart for sending and delivering emails from an aircraft.

FIG. 159 shows a preferred method of promoting software and services to a captive audience such as the passengers aboard an aircraft.

DETAILED DESCRIPTION OF THE INVENTION

A keyboard apparatus, typically integrated within a foldable keyboard table apparatus, an associated display apparatus, a system for receiving wired or wireless data input from and for sending or transmitting data output to such apparatus, and methods for providing complimentary or subscription based software or services to an array of such apparatus fall within the scope of the present invention. The various mechanical forms of the keyboard and display apparatus also fall within the scope of the present invention. Typically, the present invention is directed towards passengers and transient users.

The apparatus is suitable for applications, such as mounted to a seat in a passenger aircraft, a bus, train, ferry, car or taxi, an auditorium, a theatre, a hallway, and the like where it is desirable to have a keyboard and display apparatus that may be accessed, operated, and stored quickly and conveniently. For example, the foldable keyboard table and display apparatus may be set up in the economy class of an aircraft despite the constrained space. The foldable keyboard table and display apparatus can also be adapted to passenger seats

inside cars, trains, marine vessels like ferries and boats, or any moving transportation vehicle or vessel. For example, luxury cars or limousines may have a wireless Internet or network connection to the vehicle when it is moving or stationary and such a vehicle may provide a keyboard tray for the traveler. In the same manner, owners and operators of buses, trucks, boats, ferries or trains may provide a similar service. The foldable keyboard table and display apparatus may also be applied in a theater or lecture hall in a university where it serves a dual purpose in that it can access the Internet for research work or display content in line with a presentation. Access to a network, be it wired or wireless, may be provided free of charge or on pay per use or per time scheme. When there is a cost associated with the network access, the system can be adapted to obtain payment from a smart card, prepaid card, credit card, or be billed to a third party.

In one embodiment, a foldable table apparatus is provided having an integrated easy-to-access and easy-to-store flippable keyboard with an associated display screen preferably attached to the rear of a passenger seat in an aircraft or any moving vehicle or passenger vessel and that may be accessed and stored quickly and conveniently while on board. The flippable keyboard may be embedded with computer devices such as a Touchpad (TM) or Trackpoint (TM) style input devices or electronic devices to enhance its functionality and its wireless capability to the host system.

Accordingly, FIG. 1 is a perspective view of a foldable table apparatus 1 incorporating a flippable keyboard 3 and an associated display screen 15. Flippable keyboard 3 is flippably attached to foldable table apparatus 1 and may be flipped from an open position (shown) to a closed position by means of a flipping motion with a finger inserted at 2nd table depression 5. Reversely, flippable keyboard 3 may be flipped from a closed position to an open position by flipping the back of the keyboard with a finger inserted at 1st table depression 4. Typically, flippable keyboard 3 may be used by a passenger seated immediately behind forward seat 12 to facilitate access to a network such as Internet, a specific website or service, an email application, business and other job related programs, music files, or movie files; get attention or request assistance from flight crew attendant and airline staff; or facilitate control of an optional secondary display screen 16 that is dedicated to a particular function such as displaying in-flight movies or accessing and viewing airline or aircraft specific content and in-flight messages for a specific or for all passengers. When no flippable keyboard 3 is present, such as when flippable keyboard 3 is in a closed position, foldable table apparatus 1

resembles a typical foldable food table of the type attached to the rear of a passenger seat in an aircraft.

Flippable keyboard 3 and its data output, and any cursor-pointing device are associated with display screen 15 that is embedded on display panel 77. Display screen 15 is intended for use with flippable keyboard 3 in a manner similar to how a laptop keyboard is associated with a laptop display screen. The result of any keyboard action, command or prompt is displayed on display screen 15. Items that may be seen on display screen 15 include (but not limited to) program applications, data file contents, digital images, contents of internal and external storage devices, media players, and airline contents of general or specific nature directed to the user. Display screen 15 may have a touch-sensitive screen or a screen that responds to inputs from a stylus pen. Display panel 77 is rotatably attached may be pivoted or rotated essentially along display panel rotation direction arrow 18 relative to its default position on forward seat 12; such movements of display panel 77 may improve contrast of displayed images in display screen 15 enhancing comfort of user, reducing glare, and improving legibility.

Flippable keyboard 3 and its associated display screen 15 may be customized and adapted for one or more languages, age groups, or interests. For example, English speaking passengers may use a standard 104-key keyboard while a teenager may prefer a keyboard adapted to listening to music or watching movies. A child may prefer a keyboard adapted for a specific game, zoo animals, TV program, or other interests suitable to the child's age group. A passenger can even request from the flight crew for a specific language keyboard, for example, Chinese or Hindi language keyboards. These language keyboards differ significantly from the English language keyboard typically used.

Foldable table apparatus 1 may be stored in its upright position by compacting it along support arm 9 and upward relative to securing arm 20 and securing it using table latch 19. A food tray (not shown) may be placed on foldable table apparatus 1. The bottom of any food tray placed on foldable table apparatus 1 is prevented from touching any key of keyboard keys 6 by means of the recessed structure of keyboard keys 6. The top of keyboard keys 6 may be lower than table surface 2 so as not to touch the bottom of any food tray placed on foldable table apparatus 1 and thus, prevent any keystroke action. Tray stop 7 prevents items such as a food tray from sliding off onto the lap of the user or passenger. The construction of foldable table apparatus 1 and its component parts will require some measure of protection from corrosion, liquid spillage, dust, and rough handling. Corporate advertisers can use

foldable table apparatus 1 as an advertising medium by putting customized graphics and presentations to promote their products or services to the travelers. For example, flippable keyboard 3, keyboard keys 6, and table surface 2 may contain the advertiser's logo or they may contain printed graphics, symbols, letterings, numberings, or instructions in a variety of colors, typefaces, and languages.

FIG. 2 is an isometric view of three foldable table apparatus 1 of FIG. 1 each mounted to the rear of a passenger seat in an aircraft. Forward seat 10 illustrates the attached foldable table apparatus 1 in an upright stored position. Foldable table apparatus 1 may be secured and released by turning table latch 19. The bottom of table apparatus 1 is prominently visible when it is folded upright as illustrated. Display screen 15 may be turned on to display images even when flippable keyboard 3 is in a closed or open position. An optional secondary display screen 16 is also visible and may be powered independently of the position of foldable table apparatus 1 or flippable keyboard 3 (whether closed or open). Forward seat 11 shows foldable table apparatus 1 in a horizontal position with flippable keyboard 3, integrated on foldable table apparatus 1, in a closed position. In a closed position, the bottom of flippable keyboard 3 is prominently visible and flushed with table surface 2 while keyboard keys 6 are not visible. Forward seat 11 also shows foldable table apparatus 1 resembling a typical foldable food table mounted to the rear of a passenger seat in an aircraft. While in the closed position, foldable table apparatus 1 may be used as a table to hold pocket books, magazines, newspapers, portable electronics, food items, food containers, beverages, and the like. Forward seat 12 illustrates foldable table apparatus 1 in a horizontal position, with flippable keyboard 3 in an open position. In this position, keyboard keys 6 of flippable keyboard 3 are prominently visible. The height of table surface 2 is higher than that of keyboard keys 6 in such a way that a food tray could be placed on top of foldable table apparatus 1 without accidentally pressing any key of keyboard keys 6. Thus, a user may pause and have a meal or snack without the inconvenience of removing the keyboard. Forward seats 10, 11, 12 are seats directly in front of the user in a typical aircraft. They may also refer to a commercial or private train, car, or any moving vehicle as mentioned in alternative examples of the present invention.

FIG. 3 is a top view of foldable table apparatus 1 of FIG.1 showing flippable keyboard 3 in a closed position. In the closed keyboard position as shown in FIG. 3, the visible bottom surface of keyboard 3 and table surface 2 are flushed. Thus, in this position, passengers may see what appears to be a typical foldable table with no visible keyboard. As earlier

mentioned, the flip-to-open and flip-to-close actions of flippable keyboard 3 may be effected by a flipping means with the passenger holding the edge of flippable keyboard 3 and sliding it via groove pin 23 along groove 22 located on each side of recessed enclosure 8 of foldable table apparatus 1. Supplying power to flippable keyboard 3 may be done either by batteries internal to flippable keyboard 3 or by an external power supply by means of a metallic groove 22 and groove pin 23 to conduct electricity from an external power supply or a recharger to the electronics within flippable keyboard 3. Electronics data may also be transferred to and from the electronics within flippable keyboard 3 using a wireless connection or by conducting signals along metallic groove 22 and groove pin 23.

FIG. 4 is a top view of foldable table apparatus 1 of FIG. 1 showing flippable keyboard 3 in an open position. When flippable keyboard 3 is in an open position, it may be used to run application programs, to access the Internet or aircraft on-board entertainment system, to view movies, listen to music, view flight information, or request for the attendant's assistance. Visible on the open flippable keyboard 3 are keyboard keys 6, one or more LED status indicator lights 24, power supply button 25, USB connection jack 26, and flash memory card reader slot 27. Flippable keyboard 3 is shown flippably attached to foldable table apparatus 1 via groove pin 23.

FIG. 5 is a front view of foldable table apparatus 1 of FIG. 4. Shown in hidden outline is the relative position of groove pin 23 that is attached to flippable keyboard 3 and slidably attached to groove 22. Also shown in hidden outline is recessed enclosure 8 that serves as a housing cavity for flippable keyboard 3. The height of keyboard keys 6 is lower than table surface 2 permitting a food tray to be placed on top of foldable table apparatus 1 without touching any key of keyboard keys 6, thus, foldable table apparatus 1 may also be used as a foldable table.

FIG. 6 is a cross-sectional view of foldable table apparatus 1 taken along lines 6-6 of FIG. 4. With reference to FIG. 6, groove 22, located on both sides of foldable table apparatus 1, secures groove pin 23. The contour of groove 22 follows the shape groove pin 23 to contain the movement of the latter with minimal friction. Keyboard printed circuit board 30, located at front left portion of flippable keyboard 3, contains the electronics necessary for the proper functioning of flippable keyboard 3 and its associated communications and data storage circuitry.

FIGS. 7-10 illustrate progressions relative to flipping, rotating, and then sliding flippable keyboard 3 of foldable table apparatus 1 from the upright table position to the open horizontal

position. The progressions illustrate the ease and almost effortless means in opening flippable keyboard 3 from within foldable table apparatus 1.

Referring now to FIG. 7. FIG. 7 is a schematic side view progression of flippable keyboard 3 of foldable table apparatus 1 as it is rotated from the upright table position to its horizontal table position. As can be seen in FIG. 7, flippable keyboard 3 is rotated from its upright table position 32 as shown in phantom line representation to its horizontal table position 33 essentially along table rotation direction arrow 31. While in the horizontal table position 33, flippable keyboard 3 remains secured in recessed enclosure 8 and stationary relative to foldable table apparatus 1. In this position, the bottom of flippable keyboard 3 may be used as a foldable table of the type mounted to the rear of a passenger seat in an aircraft.

FIG. 8 is a schematic side view progression of flippable keyboard 3 as it is rotated from its 1st keyboard position through a 2nd keyboard position then to a 3rd keyboard position. Flippable keyboard 3 is shown rotated about groove pin 23 while within recessed enclosure 8 from the phantom line representation of 1st keyboard position 50 (closed position), through an essentially diagonal phantom line representation of 2nd keyboard position 51, as indicated by table rotation direction arrow 37, then to an essentially vertical phantom line representation of 3rd keyboard position 52, as indicated by table rotation direction arrow 38. Keyboard bottom surface 36 and keyboard top surface 35 of flippable keyboard 3 are also shown in an essentially vertical orientation. Keyboard top surface 35 contains the embedded keyboard keys 6.

FIG. 9 is a schematic side view linear progression of flippable keyboard 3 as it is moved from one end to the opposite end of recessed enclosure 8. Flippable keyboard 3 is rotated further towards the user from its vertical 3rd keyboard position 52 as shown in FIG. 8, to phantom line representation of 4th keyboard position 53, thereto slid along and rotated about groove 22 to phantom line representation of 5th keyboard position 54 along table rotation direction arrow 40, and continues to progress along groove 22 along table rotation direction arrow 41 to a 6th keyboard position 55. In the 6th keyboard position 55, flippable keyboard 3 is firmly attached to foldable table apparatus 1 by groove pins 23 positioned on respective right and left sides of flippable keyboard 3. Each groove pin 23 is slidably received and secured by its associated groove 22 along each side of recessed enclosure 8 of foldable table apparatus 1.

FIG. 10 is a schematic side view progression of flippable keyboard 3 as it is rotated to its open position. With reference to FIG. 10, flippable keyboard 3 is rotated downwards via groove pin 23 from its 6th keyboard position 55 as shown in phantom line representation to a horizontal 7th keyboard position 56 essentially along table rotation direction arrow 45. It should be noted that groove pin 23 has moved from one end of groove 22 to the opposite end of groove 22 as flippable keyboard 3 is moved from a closed position (1st keyboard position 50) to an open keyboard position (7th keyboard position 56). The mechanical movements of foldable table apparatus 1 and flippable keyboard 3, as illustrated in FIGS. 7- 10, may be effected either by a manual effort of a passenger or attendant typically using the arms, hands or fingers, or by electric motors incorporated within or about foldable table apparatus 1, which may effect similar mechanical movements at a press of a button or by remote control. A review of FIGS. 8-10 shows that keyboard top surface 35 of flippable keyboard 3 is progressively rotated and moved from the closed 1st keyboard position 50, where the keyboard top surface 35 is not visible and keyboard bottom surface 36 is visible as shown in FIG. 8, to the open 7th keyboard position 56, where keyboard top surface 35 is visible and keyboard bottom surface 36 is not visible as shown in FIG. 10.

FIG. 11 is a schematic top view of an alternative example of flippable keyboard 3 of FIG. 4 incorporating a Touchpad 58. With reference to FIG. 11, an input device Touchpad 58 is embedded in flippable keyboard 3 positioned medially near front edge of flippable keyboard 3. Touchpad 58, with its associated hardware and software components, functions both as a cursor-pointing device and a scroll control device. Also visible in FIG. 11 are 1st table depression 4, 2nd table depression 5, groove pin 23, and groove 22, the mechanisms for these parts are similar to those described in FIG. 1 and FIG.3.

FIG. 12 is a partial isometric view right side of foldable table apparatus 1 showing in detail how groove pin 23 is secured inside groove 22 (only one side of flippable keyboard 3 is shown). Flippable keyboard 3 may be flipped to an open and closed position by means of groove pin 23 that is shaped in such a way that it is able to slide freely along groove 22 without being snapped off in place. The shape of groove 22 may be formed, cut or preferably molded into foldable table apparatus 1. Alternatively, groove 22 may be formed as a separate part, such as a pin guide rail 21, which is subsequently attached to foldable table apparatus 1 as shown in FIG. 12. Groove 22 may be constructed from a stamped sheet of metal fixed within foldable table apparatus 1. When flippable keyboard 3 is rotated to an open or closed

position, groove 22 slidably receives groove pin 23 as groove pin 23 slides from one end to the opposite end of pin guide rail 21 similar to that shown in FIG. 9.

FIG. 13 is a top view of a further alternative example of the flippable keyboard 3 of FIG. 11 incorporating a Trackpoint style device 70. Located at essentially the center of flippable keyboard 3 is Trackpoint device 70. Trackpoint device 70 and its associated circuitry and software may function as a cursor-pointing device or as a window content scroll control device of flippable keyboard 3. It consists of a visible finger pad and an embedded four strain gauges that serve as directional pressure sensitive sensors similar in function to the IBM Trackpoint device typically found on the keyboards of IBM branded laptop computers. Shown in hidden outline in FIG. 13 are the embedded electronic devices that include a wireless adapter 60 to enable flippable keyboard 3 to communicate wirelessly with the host PC or with other electronic devices within one or more established wireless networks, an internal communications antenna 62 to transmit and receive RF signals, power supply regulator 61, rechargeable battery 64 to supply power to flippable keyboard 3 and foldable table apparatus 1, data bus/bridge controller chip 65 to enable the keyboard data to communicate with the host PC through wireless adapter 60, mini hard drive 66 for storing data, keyboard and pointing device chip 67, memory chip 68 for storing data or program instructions in the computer and for retrieving them, and microphone/audio chip 69. The addition of embedded devices within flippable keyboard 3 enhances its functionality and its wireless capability to the host system. The embedded devices may function as peripheral devices connected via a USB or network connection to the host PC and under the control of the host PC. Flippable keyboard 3 and its peripheral devices may communicate to the host PC, PDA, or computer device using a wired or wireless connection. With the addition of a built-in CPU and its associated circuitry within foldable table apparatus 1, the embedded devices and CPU may be integrated into an autonomous computing device with wired or wireless connectivity to the other computing devices on a network. Rechargeable battery 64 provides a suitable voltage and current for flippable keyboard 3 and other peripheral electronic devices placed within foldable table apparatus 1. The battery may be recharged by an AC/DC recharger unit or from a powered USB connection cable. In addition, an AC/DC power adapter attached to a wall receptacle may supply power. Mini hard drive 66 may have a typical capacities range for holding data from 1.5 GB to 4 GB and a size of 1-2 inches across. It may be adapted to store data files over a USB and wireless connection. Memory chip 68 is similar in use to the memory cards typically utilized to store and transport data in

digital cameras, camera phones, music players and other consumer electronics. Memory cards are manufactured in postage stamp and matchbook sizes and currently use flash memory. Data from the embedded memory component of such devices may be transferred to and from the host PC, PDA, or related computer device via a wireless connection such as a Wi-Fi connection or via a wired connection such as a USB connection.

In another embodiment of the present invention, a clamshell type foldable table apparatus that functions as a typical foldable food table of the type found in an aircraft passenger seat in a closed position is provided. When used as such, its keyboard cover renders impervious the keyboard keys and the foldable table apparatus in case of spillage.

Accordingly, FIG. 14 is an isometric view of three clamshell foldable table apparatus 81 each mounted to the rear of an aircraft passenger seat. Forward seat 88 illustrates clamshell foldable table apparatus 81 in a storage position with display enclosure 85 adjacent and parallel with foldable table apparatus 84 in a face-to-face relation and locked via table latch 19. The bottom of foldable table apparatus 84 is prominently visible when clamshell foldable table apparatus 81 is folded in an upright position as illustrated in forward seat 88, while attached display enclosure 85 is hidden. Also shown is secondary display screen 16 that may be powered to display instructions or to post announcements. Forward seat 87 illustrates clamshell foldable table apparatus 81 as it is rotated downwardly to an essentially horizontal position with attached display enclosure 85 prominently visible. In this position, the top surface of display enclosure 85 may be used as a foldable table to hold books, magazines, newspapers, portable electronics, food items, and the like or it may also be used to hold an airline food tray or a beverage with its recessed beverage area indent 89. Forward seat 86 illustrates the open horizontal position of clamshell foldable table apparatus 81 with associated display screen 83 integrated within display enclosure 85 and keyboard 82 integrated within foldable table apparatus 84. Clamshell foldable table apparatus 81 functions as a typical foldable table or as a computer keyboard and display.

Aside from the flippable keyboard, the foldable keyboard table apparatus described in the present invention may also incorporate other computer devices such as a Touchpad or Trackpoint devices, a digital camera or webcam, wireless keyboard, and a keyboard insert, in accordance with yet another embodiment of the present invention. The keyboard insert suits specific needs and preferences of users or passengers and enables more choices in using a computer as well as uninterrupted entertainment while on flight.

Accordingly, FIG. 15 is a perspective view of an alternative example of a foldable table apparatus incorporating a Touchpad 58. With reference to FIG. 15, keyboard 90 is integrated within foldable table apparatus 92, the latter mounted to the rear of forward seat 14. Keyboard 90 function is supplemented by a Touchpad 58 and a numeric keypad 91 of type found on a standard 104 keys computer keyboard. Typically, a passenger seated immediately behind forward seat 14 uses keyboard 90. Associated display screen 15 may be used with keyboard 90 and may display computer graphics, content, and feedback to user. Foldable table apparatus 92 may have a tray stop 7 that is sufficient to prevent a food tray from slipping off onto lap of a user and thereby facilitate simultaneous viewing of display screen 15 and utilizing a food tray to eat or drink.

FIG. 16 is a perspective view of a further alternative example of a foldable table apparatus incorporating an embedded digital camera or webcam 104. As shown in FIG. 16, digital camera or webcam 104 is embedded in display panel 78 of foldable table apparatus 75. Digital camera or webcam 104 may be used like an ordinary digital camera or webcam, such as for real-time video conferencing while on board the aircraft. Located along the front side of foldable table apparatus 75 are connector jacks 102, 103 to connect peripheral devices such as headphones, a PC headset (compatible with a conventional PC headset) for VOIP, IM audio or video chat communications, and the like. Display panel 78 may receive its video signal using a wired or wireless connection and is attached to forward seat 14 through display panel hinges 17. Display panel 78 is adjustable and able to pivot along display panel rotation direction arrow 18 so the user may adjust display screen 15 for optimum viewing.

FIG. 17 is a perspective view of yet a further alternative example of a foldable table apparatus incorporating a wireless keyboard 110. As shown in FIG. 17, wireless keyboard 110 is positioned on top of foldable table apparatus 80. An associated display screen 15 and digital camera or webcam 104 (embedded within display panel 78), and a PC headphone, PC headset jack, are shown in FIG. 17. A magazine pouch 112 that is attached to the rear of a forward seat below display panel 78 is used to store wireless keyboard 110 when not in use (shown in FIG. 18). The input data and output data to and from the keyboard may be communicated to a CPU or computer by wired or wireless connection. Wireless keyboard 110 may be connected to its associated computer or display panel 78 by a radio frequency (RF) connection such as Bluetooth or Wi-Fi or an infra-red (IR) connection. Antenna or optical sensor or other data sensors for wireless keyboard 110 may be located inconspicuously near the associated computer or display enclosure 78; it could be mounted to

the rear of forward seat or near a server device taking input and giving output to a group of keyboards or display devices. Data and/or power may also be transferred to and from the keyboard via a fiber optic cable and electro-optical sensors. The keyboard connections may also be wired constant with a suitable storage means or pouch to hold the keyboard when it is not in use or when a passenger desires to position the keyboard out of sight as in FIG. 17; or by an insertable connector such as a USB, DIN, PS2, or similar computer, data, or audio style detachable connector. A connector jack may be located on an armrest, forward seat, or a nearby wall, ceiling, or floor area. Supplying power to the keyboard electronics or to recharge on board batteries by wired connections may be accomplished by a conspicuous cable link or by routing cable through the support arms and securing arms. For example, data and power may be transmitted via the groove pins in the case of a flippable keyboard. Alternating or direct current may be utilized in a suitable voltage range to avoid interference and to improve safety.

FIG. 18 is a perspective view of foldable table apparatus 80 of FIG. 17 showing wireless keyboard 110 stored in magazine pouch 112. As shown in FIG. 18, wireless keyboard 110 is stored in a magazine pouch 112 located below display enclosure 78. In this position, foldable table apparatus 80 may be used as a foldable table of the type mounted to the back of a forward seat to hold pocket books, magazines, newspapers, portable electronics, food items, food containers, beverages, and the like. The use of wireless keyboard 110 permits passengers to have easy access and storage to a keyboard. The wireless keyboard may use an optical signal such as IR or an RF connection such as a Bluetooth, wireless-USB, or a proprietary RF connection.

Connection jacks 102, 103 on the foldable table apparatus 80 or display apparatus 78 permit headphones, PC headsets, USB devices, micro-optical display devices, and other peripheral devices to be conveniently connected to the host electronics associated with each seat. Shown in FIG. 18 is a micro-optical display device 100 with its associated eyewear 98, display cable 99, and connector plug 101.

FIGS. 19–22 illustrate examples of a keyboard insert embedded onto a foldable table apparatus utilizing a device comprising of a clip and release clip slot to release and secure such a keyboard insert.

Accordingly, FIG. 19 is an isometric view of an example of a keyboard insert 122 embedded onto foldable table apparatus 120. As shown in FIG. 19, keyboard insert 122 is inserted and secured to foldable table apparatus 120. Keyboard insert 122 may be released

from foldable table apparatus 120 by means of release clip 124 that is pressed against and then pulled in upward motion. The embedded keyboard keys of keyboard insert 122 are recessed so that a food tray may be placed on top of foldable table apparatus 120 without effecting any keystroke.

FIG. 20 is an isometric view of a variation of the keyboard insert of FIG. 19 incorporating an alternative location of release clip 124. Shown in FIG. 20 is keyboard insert 123 embedded onto foldable table apparatus 121. Release clip 124 is located medially front side of keyboard insert 123 unlike in FIG. 19 where release clip 124 is located at rear side of keyboard insert 123. The function of release clip 124 in FIG. 20 is similar to that shown in FIG. 19.

FIG. 21 is an isometric view of the foldable table apparatus of FIG. 19 without keyboard insert 122. With reference to FIG. 21, keyboard insert 122 (shown in FIG. 19) is detached from foldable table apparatus 120. As keyboard insert 122 is inserted onto foldable table apparatus 120, it is locked by means of a locking motion as release clip 124, which is attached to keyboard insert 122, is inserted onto release clip catch 126 located medially at rear portion of foldable table apparatus 120. Also shown in FIG. 21 is keyboard insert cavity 125 that receives keyboard insert 122. When keyboard insert 122 is detached as in FIG. 21, foldable table apparatus 120 may also function as a foldable table of the type mounted to the rear of a passenger seat in an aircraft to hold pocket books, magazines, newspapers, portable electronics, food items, food containers, beverages, and the like.

FIG. 22 is an isometric view of an example of a detached keyboard insert 122. With reference to FIG. 22, keyboard insert 122 is comprised of three securing tabs 128 that are of equidistant position at front side of keyboard insert 122, and a release clip 124 located at rear side of keyboard insert 122. Keyboard insert 122 is fastened to foldable table apparatus 120 by means of securing tabs when the former is inserted onto foldable table apparatus 120 (shown in FIG. 19) while release clip 124 facilitates release of keyboard insert 122.

FIGS. 23–25 illustrate three kinds of table inserts that may be embedded onto the enclosure of a foldable table apparatus mounted to the back of a forward seat, such inserts to suit specific needs and preferences of users or passengers such as a typical foldable table, a foldable table with a PDA, or a foldable table with a controller for computer games. The keyboard inserts permit passengers to have more choices in using a computer and an uninterrupted entertainment while on flight. For example, passengers can easily signal a flight attendant to replace a keyboard insert in case of a defect or malfunction.

Accordingly, FIG. 23 is an isometric view of an example of a blank insert 130. In FIG. 23, blank insert 130 is particularly useful when a passenger wants to eat or drink during a flight. When inserted onto foldable table apparatus 120, such as that shown in FIG. 21, blank insert 130 resembles a typical foldable table of the type mounted to the rear of a passenger seat in an aircraft.

FIG. 24 is an isometric view of an example of a PDA insert 132. In FIG. 24, an attached conventional PDA 133 with an embedded 5-way navigation buttons 139 is located in center of PDA insert 132. PDA 133 is hingely attached to PDA insert 132 via hinge pivot pins 137 positioned at adjacent left and right corners of PDA 133. PDA 133 is pivotable about hinge pivot pins 137 between a closed position as shown in FIG. 24 and an open position. To effect an open position, the embedded PDA 133 is pivoted towards the user via finger groove 138 to an upright or inclined orientation such that PDA display screen 131 is visible to the user to adjust for comfortable viewing. PDA insert 132 may be inserted onto foldable table apparatus 120 such as that shown in FIG. 21. The beverage area indent 89 at right portion of PDA insert 132 supplements the functionality of PDA insert 132 when used in combination as a foldable table. The 5-way navigation buttons 139 may be used to scroll contents of an active window, navigate menu items on a display, or serve as a cursor-pointing device. They are similarly utilized in mobile phones, digital cameras and camcorders and contain a center button that functions as a select or enter key.

FIG. 25 is an isometric view of an example of a game controller insert 134. In FIG. 25, game controller insert 134 includes a set of seat function keys 135, game controller buttons 136, and beverage area indent 89. When it is desired, a user or an aircraft passenger may relax and play a computer game and eat or drink simultaneously without interruption. Game controller insert 134 may be inserted onto foldable table apparatus 120 such as that shown in FIG. 21.

FIG. 26 is a top view of an alternative example of a foldable table apparatus with an embedded Trackpoint device 142 and navigation buttons 141, a variation of the foldable table apparatus of FIG. 15. With reference to FIG. 26, foldable table apparatus 140 comprises of an embedded Trackpoint device 142 (similar to that used in IBM laptop computers) and navigation buttons 141 for easy browsing and toggling respectively of computer menus, USB slot 144 for connecting keyboard (not shown), beverage area indent 89, and tray stop 7. A user or aircraft passenger may operate Trackpoint device 142 and navigation buttons 141 while having a meal or snack without interruption.

FIG. 27 is a top view of an alternative example of a foldable table apparatus with an embedded Touchpad 58, a variation of foldable table apparatus 140 of FIG. 26. With reference to FIG. 27, Touchpad 58 is embedded onto foldable table apparatus 146; USB slot 144, tray stop 7, and beverage area indent 89 are also included. Touchpad 58, with its associated hardware and software components, functions as both a cursor-pointing device and a scroll control device. A user or aircraft passenger may operate Touchpad 58 while having a meal or snack without interruption.

FIGS. 28–38 illustrate other examples of a clamshell foldable table apparatus and associated display screen in accordance with a preferred embodiment of the present invention. In a storage or closed position, the clamshell foldable table apparatus may function as foldable table of the type found mounted to the back of a forward seat in an aircraft that can function for example, to hold pocket books, magazines, newspapers, portable electronics, food items, beverages, and the like. The keyboard cover also functions as a lid to seal and render impervious the keyboard keys and the foldable table apparatus.

Accordingly, FIG. 28 is an isometric view of a foldable table apparatus 160 showing keyboard cover 162 of FIG. 30 in a closed position. With reference to FIG. 28, keyboard cover 162 is prominently visible and flushed with foldable table apparatus 160, thus, resembling a foldable table of the type mounted to the back of a forward seat in an aircraft. When a keyboard cover 162 is flushed with top surface of foldable table apparatus 160, the latter is rendered impervious to any liquid in case of a spillage.

FIG. 29 is an isometric view of a foldable table apparatus 160 and a keyboard cover 162 of FIG. 28 rotated to an open position. Keyboard cover 162 of foldable table apparatus 160 may be rotated back and forth for fine viewing adjustment. Even in an open position, foldable table apparatus 160 may be used as a foldable table by placing a food tray on top of the recessed keyboard keys without touching any key, permitting a passenger to operate the computer and eat or drink without interruption. Tray stop 7 prevents a food tray from slipping onto the lap of a passenger when placed on top of foldable table apparatus 160 in the open position.

FIG. 30 is a cross sectional view of foldable table apparatus 160 taken along lines 30-30 of FIG. 28. Keyboard cover 162 of FIG. 30 is shown folded, in parallel proximity with foldable table apparatus 160. In the closed position (FIG. 30), keyboard cover 162 may be used as a foldable table of the type found mounted to the back of a forward seat in an aircraft. The top surface of keyboard cover 162, which is flushed with foldable table apparatus 160,

prevents liquid seepage into foldable table apparatus 160. The embedded keyboard keys of foldable table apparatus 160 are recessed so that keyboard cover 162 protects the keyboard keys without touching any key when in a closed position.

FIG. 31 is a cross sectional view of foldable table apparatus 160 taken along lines 31-31 of FIG. 29. With reference to FIG. 31, foldable table apparatus 160 includes a rotatably and pivotally attached keyboard cover 162 that may be rotated or pivoted upward to effect an open position. Visible in an open position is a paper ledge 163 located at lower portion of keyboard cover 162 that may be used for placing manuscripts or papers while operating the keyboard. A clip (not shown) to secure documents or paper in paper ledge 163 may be included in the design.

FIG. 32 is a cross sectional view of foldable table apparatus 165 taken along lines 32-32 of FIG. 36. As shown in FIG. 32, keyboard lid 164 encompasses front and rear edges of foldable table apparatus 165 in a closed position. Keyboard lid 164 also functions as a lid that wraps around foldable table apparatus 165 thereto renders impervious foldable table apparatus 165 in case of spillage. In a storage position (as in FIG. 32), keyboard lid 164 is in a face-to-face relation with foldable table apparatus 165 as it protects the recessed keyboard keys against damage.

FIG. 33 is a cross sectional view of foldable table apparatus 165 taken along lines 33-33 of FIG. 36. In FIG. 33, keyboard lid 164 encompasses left and right edges of foldable table apparatus 165 in a closed position similar to that shown in FIG. 32. Hence, keyboard lid 164 functions as a lid that wraps around foldable table apparatus 165 thereto renders impervious foldable table apparatus 165 in case of spillage. Material for keyboard lid 164 may be of hard plastic to permit its table surface to bear the weights of items placed on it when foldable table apparatus 165 is alternatively used as a foldable table.

FIG. 34 is a schematic cross sectional view of a clamshell foldable table apparatus in a closed position similar to that shown in FIG. 14 and a variation of a section taken along lines 30-30 of FIG. 28 and lines 31-31 of FIG. 29. With reference to FIG. 34, display screen 83 is embedded in display enclosure 85 and rotatably and pivotally attached to foldable table apparatus 84 via hinge area 155. Display enclosure 85 is rotatable and pivotable between a closed position as shown and an open position (shown in FIG. 35) via hinge area 155. In a closed position, display screen 83 is folded horizontally and sandwiched between display enclosure 85 and foldable table apparatus 84. Hinge area 155 is shown flushed with display enclosure 85 and foldable table apparatus 84, thus, permitting the bottom of display enclosure

85 to function as a foldable table. The bottom of display enclosure 85 may also function as a lid to protect the keyboard keys.

FIG. 35 is a schematic cross sectional view of a clamshell foldable table apparatus as shown in FIG. 34 in an open position and a variation of a section taken along lines 30-30 of FIG. 28 and lines 31-31 of FIG. 29. Display enclosure 85 may be rotated via hinge area 155 to a comfortable viewing position of display screen 83. A food tray may be placed on top of foldable table apparatus 84 without pressing any key of the keyboard keys, thus, permitting a user to have a meal or snack while watching display screen without interruption.

FIG. 36 is an isometric view of a foldable table apparatus 165 and an attached keyboard lid 164 of FIGS. 32-33 in a closed position. Keyboard lid 164 of FIG. 36 wraps around foldable table apparatus 165 and functions as a lid to seal and render impervious foldable table apparatus 165 in case of spillage when keyboard lid 164 is optionally used as a foldable table. Also visible in a closed position are beverage area indent 89 and tray stop 7 to supplement the functionality of keyboard lid 164 when used as a foldable table. Keyboard lid 164 encompasses foldable table apparatus 165 as shown in FIGS. 32-33.

FIG. 37 is an isometric view of a foldable table apparatus 165 of FIG. 36 in an open position. As shown in FIG. 37, keyboard lid 164 is rotated to an open position. The edges of keyboard lid 164 is concave and function as a lid to seal foldable table apparatus 165, thus, protecting the recessed keyboard keys against damage. It may also serve as a posting area for important instructions to passengers. In an open position, a food tray may be placed on top of the recessed keyboard keys of foldable table apparatus 165 without touching any key.

FIG. 38 is an isometric view of a foldable table apparatus 168 and an alternative example of a display cover similar to that shown in FIG. 37. As shown in FIG. 38, display cover 166 of foldable table apparatus 168 is rotated to an open position. Located at left and right portion of the interior portion of display cover 166 are two groups of function keys 169 used for easy browsing over the computer menus. Also visible on interior portion of display cover 166 are display screen 83, power button 167, and function keys 169. In an open position, a food tray may be placed on the keyboard enclosure without touching any key of the keyboard keys and the user can still operate the computer via function keys simultaneous with having a meal or snack without interruption. To return to a closed position, display cover 166 is rotated towards the user. The concave shaped edges of display cover 166 function as a lid to seal foldable table apparatus 168 when in a closed position similar to that shown in FIGS. 36-37.

FIG. 39 is a schematic top view of an alternative example of a foldable table apparatus incorporating an embedded PDA 172. The embedded PDA 172, similar to the keyboard insert shown in FIG. 24, is rotatably and pivotally attached to foldable table apparatus 170 via a pair of hinge pivot pins 137. An embedded PDA display screen 131 is associated with PDA 172. PDA display screen 131 is intended for use with PDA 172 in a manner similar to how a display screen is associated with a keyboard such as the flippable keyboard and display screen shown in FIG. 1. The 5-way navigation buttons 139 located outside of PDA 172 may be used to scroll contents of an active window, navigate menu items on a display, or serve as a cursor-pointing device. The top surface of foldable table apparatus 170 with a beverage indent 89 may be used as a foldable table for eating or drinking simultaneous with operating the computer without interruption, similar to that shown in FIG. 24.

FIGS. 40–42 are isometric views of an integrated computer apparatus embedded on a flat surface, preferably a conference table, a typical table or a podium, for use mainly during meetings and presentations or as an alternative to the computers mounted to the back of a forward seat in an aircraft. When embedded on a flat surface, such as a conference table, the display cover of the computer apparatus (in a non-operating position) is flushed so that the computer apparatus and the table surface is in one plane and forms a continuous surface. The display cover of the computer apparatus and table surface may be laminated of the same color and made of the same material permitting the computer apparatus to be inconspicuous when in a non-operating position. An integrated computer apparatus embedded in a flat surface may effectively eliminate clutter on the table that may be caused by hasty cable connection set-ups such as when conventional computers are provided to attendees during meetings or press conferences. The integrated computer apparatus may also be made interactive so that the users may send or share data with one another or may be used during presentations where a presenter needs to project uniform images or texts on screen.

Accordingly, FIG. 40 is an isometric view of examples of six integrated computer apparatus embedded onto a conference table in a non-operating and operating position. The integrated computer apparatus 175, 176, 177, 178 are shown in a non-operating position 181 flushed with conference table surface 184 and the edge of conference table 180 to effect a continuous surface, while integrated computer apparatus 174, 173 are in a forward operating position 183. To effect a forward operating position 183, a user may pull forward the outer edge of an integrated computer apparatus as indicated in forward operating position 183. As the integrated computer apparatus is pulled forward, a space at back of the integrated

computer apparatus is created such that display cover 186 will not touch the surrounding conference table surface 184 as it is rotated to a forward operating position 183. The electronics for keyboard 188 is housed in base enclosure 182 that may include a Touchpad 58 input device or other additional electronics. The integrated computer apparatus also includes a display screen 187 that may be adjusted for convenient viewing by rotating display cover 186.

FIG. 41 is an isometric view of examples of integrated computer apparatus 195, 196 embedded on opposite sides of a square table. The embedded integrated computer apparatus 195, 196 are in a forward operating position 183 on opposite sides of table 192. Integrated computer apparatus 195, 196 are rotated to an operating position in the same manner as the integrated computer apparatus shown in FIG. 40. Both the base enclosure 182 and display cover 186 function similarly to that described in FIG. 40. Integrated computer apparatus 195, 196 are ideal for individual use, for example, in aircrafts as an alternative to the computers mounted to the back of forward seats, or in hotel lobbies, coffee shops, train stations, and other areas where foot traffic is high. For security sensitive settings, integrated computer apparatus 195, 196 may include a key lock 194 embedded on table 192, in which only those who have keys and authorized users can access integrated computer apparatus 195, 196.

FIG. 42 is an isometric view of an example of an integrated computer apparatus 197 embedded on a podium 190. With reference to FIG. 42, integrated computer apparatus 197 is embedded on a raised platform podium 190 and may be used primarily to address an audience such as during an audio-visual presentation, a product presentation, a speech or as a teleprompter. Key lock 194 may be included where only a user can access integrated base enclosure 182. The mechanisms for integrated computer apparatus 197 and its associated parts are similar to the integrated computer apparatus shown in FIGS. 40-41.

FIGS. 43–50 illustrate a two-piece foldable table apparatus that when in an open position may be used as a combination of foldable table apparatus with an embedded computer device and a foldable food table in one. The two-piece foldable table apparatus may be used in constrained areas to maximize the available space such as for example in an economy class of an aircraft. It functions similarly to a foldable keyboard table apparatus in that it permits the user or passenger to operate the keyboard or computer device while having a meal simultaneously. One piece of the two-piece foldable table apparatus may contain a computer device or keyboard while the other piece may be used as a foldable food table or a display screen.

Accordingly, FIG. 43 is a top view of an example of a two-piece foldable table apparatus 200 with an embedded Trackpoint device 142 in an open position. Two-piece foldable table apparatus 200 of FIG. 43 includes 1st table piece 211 and 2nd table piece 212 of equal size that are attached at both ends by means of joining plate 204, with the 2nd table piece 212 positioned in front of user. Tray stop 7 is located medially in front edge of 2nd table piece 212 adjacent to an embedded Trackpoint device 142. Trackpoint device 142 is used as a device for cursor pointing or for window scrolling. A user can move the cursor through Trackpoint device 142 to select icons or text, and scroll software contents within a window in a quick, accurate, and comfortable manner. In place of a Trackpoint device 142, a 5-way navigation buttons 139 (not shown) that is used in some latest models of cellular phones, may also be embedded. In an open position (FIGS. 43-44), two-piece foldable table apparatus 200 may be used as a combination of a foldable table with an input device and a foldable food table in one, typically mounted to the back of a forward seat, thus, permitting a user to operate computer and have a meal and drinks simultaneously without interruption. Beverage area indent 89 in 1st table piece 211 enhances the functionality of two-piece foldable table apparatus 200.

FIG. 44 is a top view of an alternative example of a two-piece foldable table apparatus 200 with an embedded Touchpad 58 in an open position. As shown in FIG. 44, two-piece foldable table apparatus 206 includes tray stop 7 located medially in front edge of 2nd table piece 212 adjacent to an embedded Touchpad 58, while 1st table piece 211 includes a beverage area indent 89 similar to that shown in FIG. 43. Touchpad 58 functions both as a cursor-pointing and/or scrolling device. In the open position (FIGS. 43-44), two-piece foldable table apparatus 206 may function as a combination of foldable table with an input device and foldable food table in one.

FIG. 45 is a schematic left side view of a two-piece foldable table apparatus 208 with an embedded keyboard 214 in a closed position. The 2nd table piece 212 is folded in a face-to-face relation with 1st table piece 211 in a closed position of the two-piece foldable table apparatus 208. Shown in hidden outline is an embedded keyboard 214 recessed so as not to touch 1st table piece 211. In a closed position (FIG. 45), the bottom of 2nd table piece 212 may be used as a foldable table of the type mounted to the back of a forward seat in an aircraft or in tight situations, such as for example, a passenger using two-piece foldable table apparatus 208 may easily rotate 2nd table piece 212 to the top of 1st table piece 211 to create more space when a co-passenger wants to pass by the passenger's seat. In FIG. 45, 2nd table

piece 212 may be rotated to an open position as shown by open direction arrow 219, as shown in FIG. 46.

FIG. 46 is a schematic left side view of a two-piece foldable table apparatus 208 of FIG. 45 in an open position. With reference to FIG. 46, 2nd table piece 212 pivots about joining plate 204, as indicated in open direction arrow 210, after which joining plate 204 are tensed as the lower edges of 1st table piece 211 and 2nd table piece 212 meet, thus preventing 2nd table piece 212 from rotating further downwards. The joining edges of 1st table piece 211 and 2nd table piece 212 are concave at joining plate 204 to accommodate for their rotation to a closed position. In the open position, two-piece foldable table apparatus 208 may be used as a combination foldable table with a keyboard and a foldable food table in one. Tray stop 7 may also be used to lock 1st table piece 211 onto 2nd table piece 212 when folded in the closed position.

FIG. 47 is a schematic top view of a two-piece foldable table apparatus 208 of FIG. 46 in an open position. As shown in FIG. 47, 2nd table piece 212 includes a recessed embedded keyboard 214 and associated parts such as power supply button 25, LED status indicator lights 24, flash memory card reader slot 27, and USB connection jack 26, and tray stop 7, while 1st table piece 211 includes a beverage area 89. A user may place a food tray on top of keyboard 214 without touching any key of keyboard 214 and continue using the computer while eating or drinking, or may place a food tray on top of 1st table piece 211 and use the keyboard while eating or drinking.

FIG. 48 is a schematic left side view example of a two-piece foldable table apparatus 220 incorporating an embedded keyboard 214 and a flippable display enclosure 222 in a closed position. With reference to FIG. 48, two-piece foldable table apparatus 220 includes 2nd table piece 212 folded in face-to-face relation via joining plate 204 with 1st table piece 211. Shown in hidden outline are keyboard 214 and flippable display enclosure 222 embedded in 2nd table piece 212 and 1st table piece 211 respectively. Embedded keyboard 214 is upside down, while flippable display enclosure 222 is folded onto 1st table piece 211. While in the closed position, the bottom of 2nd table piece 212 may be used as a foldable table of the type mounted to the rear of a forward seat in an aircraft, similar to that shown in FIG. 45.

FIG. 49 is a schematic side view of a two-piece foldable table apparatus 220 of FIG. 48 in an open position. An open position may be effected by rotating 2nd table piece 212 about joining plate 204 towards the user, thus, exposing the bottom of flippable display enclosure 222 of 1st table piece 211. Flippable display enclosure 222 may then be flipped and rotated

upward via groove pin 226 at essentially along display panel rotation direction arrow 255, thereon to be slid along sliding groove 224 essentially from the phantom line representation of flippable display enclosure 700 to at any point along display position direction arrow 223. Flippable display enclosure 222 may be slidably positioned along the length of sliding groove 224 essentially along display position direction arrow 223 to adjust display screen 221 for convenient viewing. The mechanism for sliding flippable display enclosure 222 along groove 224 is similar to that described in FIG. 54 and FIG. 58.

FIG. 50 is a schematic left side view of an alternative example of a two-piece foldable table apparatus 227 incorporating a hinged display enclosure 228 and an embedded keyboard 229 in an open position. With reference to FIG. 50, hinged display enclosure 228 and embedded keyboard 229 are included in 2nd table piece 212 of the two-piece foldable table apparatus 227. Hinged display enclosure 228 may be rotated to an open position essentially along display panel rotation direction arrow 255 and may be adjusted for convenient viewing. Embedded keyboard 229 is recessed so that hinged display enclosure 228 does not touch embedded keyboard 229 when in the closed position. While in the open position, 1st table piece 211 may be used as a foldable table to hold books, magazines, newspapers, food items, beverages, and the like simultaneous with using keyboard 229 and display screen 221.

FIG. 51 is a left side view of an example of a two-piece foldable table apparatus 230 with a sliding keyboard 232 in the closed position. Foldable table apparatus 230 includes sliding keyboard 232 located below foldable table apparatus 230 and a protruding keyboard handle 233 attached to sliding keyboard 232 for easy pull out. The keyboard keys and movable sliding arms 234 are hidden from view when sliding keyboard 232 is in the closed position. In the closed position, foldable table apparatus 230 functions as a typical foldable table mounted at the back of a forward seat, for example, in an aircraft, similar to the two-piece foldable table apparatus depicted in FIG. 45 and FIG. 48.

FIG. 52 is a left side view of the foldable table apparatus 230 of FIG. 51 in the open position. The open position may be effected by extending sliding keyboard 232 by means of the extending motion of a pair of sliding arms 234 positioned at between respective left and right sides of sliding keyboard 232 and foldable table apparatus 230 along extending sliding keyboard direction arrow 231. Essentially, a portion of sliding arm 234 is visible when sliding keyboard 232 is extended to an open position. Sliding keyboard 232 may be prevented from falling off the unit by means of the detent function of sliding arm 234. The entire portion of sliding keyboard 232 may be extended as sliding arm 234 prevents sliding

keyboard 232 from falling off. Sliding arm 234 slides along the sides of sliding keyboard 232 and foldable table apparatus 230 when sliding keyboard 232 is slid to an open or closed position. The keyboard keys of sliding keyboard 232 are recessed so as not to touch the bottom of foldable table apparatus 230 when slid back in. Foldable table apparatus 230 and sliding keyboard 232 permit the user or the passenger to operate the computer and have an uninterrupted meal or snack at the same time. To pause from using the keyboard, sliding keyboard 232 may be easily slid back in, and the passenger may continue eating or drinking. Tray stop 7 prevents any drinks or food items from spilling onto the keyboard.

FIG. 53 is a cross sectional view of foldable table apparatus 230 taken along lines 53-53 of FIG. 51. With reference to FIG. 53, sliding arm 234 sits in a groove formed by sliding keyboard 232 and foldable table apparatus 230. Sliding arm 234 is shaped similar to a rectangular C facing each other on opposite sides. When sliding keyboard 232 is extended, sliding arm 234 slides through sliding keyboard 232 and foldable table apparatus 230 stopping only at a point when the entire portion of sliding keyboard 232 is out of foldable table apparatus 230, thus, preventing sliding keyboard 232 from falling off. In the closed position (FIG. 53), the keyboard keys are recessed to prevent them from touching the bottom of foldable table apparatus 230.

FIG. 54 is a schematic left side view of an alternative example of a foldable table apparatus 236 incorporating a flippable display enclosure 222. Foldable table apparatus 236 of FIG. 54 is similar to that shown in FIG. 52. In FIG. 54, sliding keyboard 232 of foldable table apparatus 236 is extended towards the user via sliding arm 234 effecting an open position essentially along sliding keyboard direction arrow 231, therefrom flippable display enclosure 222 is rotated upward to an open position via groove pin 226 essentially in the direction indicated by display panel rotation arrow 225, then may be slidably positioned along the length of sliding groove 224 essentially along display position direction arrow 223. To go to a closed position, flippable display enclosure 222 is slid back towards the opposite end and rotated downwards, permitting the bottom of flippable display enclosure 222 to be used as a foldable table of the type mounted to the rear of a forward seat in an aircraft. The sliding mechanism for flippable display enclosure 222 is similar to that described in FIG. 49.

FIGS. 55–58 depict alternative examples of the foldable table apparatus and sliding keyboard shown in FIGS. 51-54.

FIG. 55 is a left side view of an alternative example of a foldable table apparatus and sliding keyboard 242 in a closed position. Foldable table apparatus 240 houses sliding

keyboard 242 located between two sliding arms 244 within table apparatus 240. The keyboard keys and movable sliding arm 244 are hidden from view when sliding keyboard 242 is in the closed position. Keyboard cavity 243 (FIGS. 56-57) receives sliding keyboard 242 and sliding arm 244 when foldable table apparatus 240 is in the closed position.

Foldable table apparatus 240 functions as a foldable table of the type mounted to the rear of a forward seat in an aircraft. Tray stop 7 enhances the functionality of foldable table apparatus 240 when it is used to hold a food tray. Foldable table apparatus 240 is similar to that shown in FIGS. 51-54 in that sliding keyboard 242 may be extended via sliding arm 244. Unlike the two-piece foldable table apparatus shown in FIGS. 51-54, in which the sliding keyboard is located underneath, in FIG. 55 sliding keyboard 242 is enclosed within foldable table apparatus 240.

FIG. 56 is a left side view of a foldable table apparatus 240 of FIG. 55 in the open position. The open position of FIG. 56 may be effected by extending sliding keyboard 242 via sliding arm 244 sliding through foldable table apparatus 240 essentially along extending sliding keyboard direction arrow 241. Essentially half the length of sliding arm 244 is attached at respective left and right sides of sliding keyboard 242. As in FIG. 52, the entire portion of sliding keyboard 242 may be extended out of foldable table apparatus 240 without falling off. Sliding arm 244 also functions as a detent mechanism to prevent sliding keyboard 242 from falling off. The keys of sliding keyboard 242 are also recessed so as not to touch the bottom of foldable table apparatus 240 when slid back in. Foldable table apparatus 240 and sliding keyboard 242 permit the user or passenger to operate a computer or keyboard and have an uninterrupted meal or snack at the same time. To pause from using the computer or keyboard, sliding keyboard 242 may be easily slid back in and the passenger may continue eating or drinking. Tray stop 7 prevents any drinks or food items from spilling onto the keyboard.

FIG. 57 is a cross sectional view of foldable table apparatus 240 taken along lines 57-57 of FIG. 55. As shown in FIG. 57, foldable table apparatus 240 encapsulates sliding keyboard 242 and sliding arm 244. Sliding keyboard 242 sits in a groove formed by foldable table apparatus 240 while the end of sliding keyboard 242 is attached to the inner portion of sliding arm 244. The two sliding arms 244 are shaped like a rectangular letter C facing each other on opposite sides similar to the shape of the sliding arm shown in FIG. 53. In the closed position (as in FIG. 55), keyboard cavity 243 is shown receiving sliding keyboard 242. Shown also

are the recessed keys of sliding keyboard 242 to prevent the inner portion of foldable table apparatus 240 from touching it.

FIG. 58 is a schematic left side view of an alternative example of a foldable table apparatus 246 incorporating a flippable display enclosure 222 and a sliding keyboard 242. In FIG. 58, sliding keyboard 242 is extended towards the user via sliding arm 244 as indicated by sliding keyboard direction arrow 241 effecting an open position, similar to the isometric view shown in FIG. 62. Flippable display enclosure 222 of foldable table apparatus 246 is rotated upward via groove pin 226 as indicated by display panel rotation arrow 225 thereon may be slidably positioned from the phantom line representation of flippable display enclosure 700 to any point along the length of groove 224 essentially along display position direction arrow 223 for fine viewing of display screen 221. In the closed position, flippable display enclosure 222 is slid back and rotated downwardly, permitting its bottom to be used as a foldable table of the type mounted at the rear of a forward seat in an aircraft. The sliding mechanism for flippable display enclosure 222 is similar to that described in FIG. 49.

FIGS. 59–60 illustrate an example of a foldable table apparatus with an embedded display screen. When a display screen is embedded within a foldable table apparatus, as shown in FIGS. 59-60, the display screen and its associated electronics are accessible in a manner that makes maintenance or replacement as simple as replacing the foldable table apparatus. The need to call maintenance or a computer technician is eliminated in that the user can just replace the entire foldable table apparatus.

Accordingly, Fig. 59 is a right side view of a foldable table apparatus 250 with an embedded display screen 252 in a closed horizontal position. In this position, embedded display screen 252 faces the floor and is not visible to the user. Thus, foldable table apparatus 250 may be used as a conventional foldable food table of the type found on trains and aircrafts to hold beverages, books, magazines, newspapers, electronic items and the like. It is assumed that additional peripheral devices such as RAM memory, mini hard drives, and wireless communications adapters may be embedded within foldable table apparatus 250. Headphone and PC headset connection jacks may also be embedded within foldable table apparatus 250. The video signal for an embedded display screen of a foldable table apparatus may be communicated by a wired or wireless connection. The power for an embedded display screen may be supplied by rechargeable batteries located within a foldable table apparatus or by an external source. For example, the securing arms may be used to conduct electricity to embedded display screen.

FIG. 60 is a right side view of the foldable table apparatus 250 of FIG. 59 as it is pivoted to its upright open position. As shown in Fig. 60, embedded display screen 252 is visible in the upright position enabling the user or passenger to watch a movie, browse the Internet, view flight information, and to do similar activities. To effect an upright open position, foldable table apparatus 250 is rotated upward from the closed position of phantom line representation of foldable table apparatus 702 essentially along table rotation direction arrow 253. Entertainment may be stopped or paused while display screen 252 is not visible such as when foldable table apparatus 250 is used in the closed horizontal position. The embedded display screen 252 may utilize a touch sensitive screen. The user may navigate menus or touch a displayed keyboard on embedded display screen 252 to select visual content and entertainment choices available. A touch sensitive screen is ideal for cramped areas (such as in the economy class areas of an aircraft) where the use of a physical keyboard or remote control may result in expensive replacement or retrofitting of existing seats.

FIG. 61 is an isometric view of the foldable table apparatus 240 with sliding keyboard 242 of FIG. 56. As shown in FIG. 61, sliding keyboard 242 is extended towards the user via attached sliding arm 244, thereon effecting an open position. The keyboard keys are shown recessed to prevent damage when sliding keyboard 242 is slid back in, the sliding motion may be done either manually or automatically. In the open position, an aircraft passenger may use foldable table apparatus 240 as a typical foldable table to hold books, magazines, newspapers, food items, beverages, and the like while operating the keyboard without interruption.

FIG. 62 is an isometric view of the foldable table apparatus 246 with sliding keyboard 242 and flippable display enclosure 222 of FIG. 58. With reference to FIG. 62, sliding keyboard 242 of foldable table apparatus 246 is extended towards the user via sliding arm 244 effecting an open position, while flippable display enclosure 222 is flipped and rotated upward thereon slid back and forth along sliding groove 224. Flippable display enclosure 222 may be slidably positioned along the length of sliding groove 224 to adjust for fine viewing of display screen 221. Beverage area indent 89 is included in foldable table apparatus 246 so that the latter may be used as a foldable table of the type mounted to the rear of a forward seat in an aircraft, thus, the user can operate the keyboard and have a meal or snack simultaneously without interruption.

FIG. 63 is an isometric view of an example of a foldable table apparatus incorporating a built-in CD/DVD player 272. As shown in FIG. 63, the top surface of foldable table

apparatus 270 may be used as a typical foldable table to hold books, magazines, newspapers, food items, beverages, and the like. Function buttons 274 for CD/DVD player 272 and headphone jack 275 are also built-in and located at right front portion of foldable table apparatus 270. Headphone jack 275 may be used to maintain privacy of a passenger while using CD/DVD player 272. This set-up is ideal for those who prefer, for example, to watch a movie or listen to music instead of operating a keyboard.

FIG. 64 is an isometric view of an alternative example of the foldable table apparatus of FIG. 63 incorporating an embedded gaming and entertainment software. As shown in FIG. 64, gaming and entertainment software may be embedded in foldable table apparatus 276 and may be accessed via audio video control buttons 278 and function buttons 274. Also included are beverage area indent 89 that may be used when foldable table apparatus 276 is used as a foldable table to hold books, magazines, newspapers, food items, beverages, and the like; and flight attendant buttons 277 when a passenger needs to call the flight attendant for assistance such as for example, to request for a juice, water, blanket, or to report a defect.

FIG. 65 is a front view of an example of a foldable keyboard apparatus showing a swivel display enclosure 262. With reference to FIG. 65, display screen 264 is embedded in swivel display enclosure 262, the latter is swivelly attached to foldable keyboard apparatus 260 by means of a twisting swivel hinge 266. Foldable keyboard apparatus 260 is similar to that shown in FIG. 14. In the open position (FIG. 65), twisting swivel hinge 266 permits swivel display enclosure 262 to be rotated or pivoted from side to side essentially along swivel hinge rotation axis 263. Twisting swivel hinge 266 also permits swivel display enclosure 262 to be rotated or pivoted to an open or closed position in an up or down motion essentially along swivel hinge rotation axis 265. A passenger may operate keyboard 261 to send input to display screen 264 and show it to a seatmate who may also read display screen 264 at the same time.

FIG. 66 is an isometric view of an alternative example of a flippable gaming console embedded onto foldable table apparatus 280 similar to that shown in FIG. 25. With reference to FIG. 66, flippable gaming console 282 is embedded onto foldable table apparatus 280. Similar to game controller insert 134 as shown in FIG. 25, flippable gaming console 282 also comprises of function keys 135 located at rear left portion, game controller buttons 136 in center, and beverage area indent 89 at rear right portion of foldable table apparatus 280. In this position, the user may relax and play a computer game and eat or drink simultaneously. The user may also choose to flip over flippable gaming console 282 by lifting it with a finger

inserted at 2nd table depression 5. The bottom of flippable gaming console 282 may contain an embedded keyboard or a similar gaming console that the passenger may operate. To return to flippable gaming console 282, a finger is inserted at 1st table depression 4 to flip back flippable gaming console 282.

FIG. 67 is an isometric view of an alternative example of a foldable table apparatus with a game controller 284 similar to the foldable table apparatus and display cover depicted in FIGS. 37-38. As shown in FIG. 67, foldable table apparatus 168 includes a headphone jack 275, game controller plug 285, game controller 284, and an attached display cover 166. The concave edges of display cover 166 serve as a lid to seal foldable table apparatus 168 and to protect the recessed keyboard keys against damage when in the closed position. A food tray can be placed on top of foldable table apparatus 168 in the open position (FIG. 67) and the user may continue to play computer games or chat while having a meal or snack without interruption.

FIGS. 68-69 depict an application of the foldable table apparatus located inside an armrest of an aircraft passenger seat, a theater seat, or a vehicle seat and that can easily be accessed by a lifting motion and then rotated to a horizontal position. It is stored back just as easily.

Accordingly, FIG. 68 is a schematic side view of an example of a foldable armrest keyboard table 290 as it is moved from a storage position to an operating position. With reference to FIG. 68, foldable armrest keyboard table 290, initially positioned inside armrest 292 (storage position) as indicated by phantom line representation of foldable armrest keyboard table 298, is rotated out from table storage cavity 291 of armrest 292 and brought forward via pivot pin 297 and attached elongated support rod 293 as indicated by table egress direction arrow 295, therefrom foldable armrest keyboard table 290 may be rotated to a horizontally closed position along table rotation axis 296. The elongated support rod 293 is attached to foldable armrest keyboard table 290 off center to enable the latter to occupy a space of table storage cavity 291 when in the storage position. Support rod 293 is also attached at the other end to armrest 292 through pivot pin 297 that permits support rod 293 to be rotated and prevented from further going downwards. Foldable armrest keyboard table 290 may be positioned at the left side or right side armrest of the passenger seat. Hence, a left-handed or right-handed passenger can choose matching foldable armrest keyboard table 290.

FIG. 69 is a schematic side view of the foldable armrest keyboard table 290 of FIG. 68 in an operating position. From its final position in FIG. 68, in which foldable armrest keyboard table 290 is horizontally positioned, hinged display enclosure 294 is pivoted to an operating position essentially along rotation direction arrow 299. Hinged display enclosure 294, with an embedded display screen, allows a passenger for example, to watch a movie or browse the Internet. The embedded display screen may utilize a touch sensitive screen to navigate menus or touch a displayed keyboard.

FIGS. 70–85 illustrate five examples of a foldable keyboard table mounted to the rear of a car seat or a passenger seat in a train, marine vessels such as a ferry or boat, or aircraft, in accordance with a further preferred embodiment of the present invention. Safety and comfort of the passenger were primary considerations in designing the foldable keyboard table, for example, a retractable keyboard table that draws back to avoid impact caused by collision.

Accordingly, FIG. 70 is a schematic side view of an example of a keyboard table 300 incorporating a hinged display enclosure 305 embedded in forward seat 309 in an upright closed position. The J-shaped keyboard table 300 is supported by rotatable keyboard support disc 288 and support disc pivot pin 310 permits the keyboard table 300 to rotate between its closed and open positions shown in FIGS. 70 and 71 respectively.

In this position, keyboard table 300 is safely locked through table nib seated in nib indent 303 in location 302 forming a cavity 301. Hinged display enclosure 305 and keyboard table 300 are folded in a face-to-face relation with only the bottom of keyboard table 300 visible in the upright closed position. Forward seat 309 is the seat directly in front of the user that may be found in a typical aircraft, train, marine vessel or car.

FIGS. 71–72 are schematic side views of keyboard table 300 as it is rotated from an upright closed position (as shown in FIG. 70) to an open position (as shown in FIGS. 71–72). FIG. 71 shows keyboard table 300 as it is rotated downwards to phantom line representation 287 of keyboard table 300 then to its horizontal operating position; the motion indicated by opening direction arrow 304. In the horizontal position of keyboard table 300, keyboard keys 308 is visible to the user. Hinged display enclosure 305 may be rotated upward towards the user essentially along rotation direction arrow 306 for a comfortable viewing angle of display screen 307. In the open position (FIGS. 71–72), keyboard table 300 is locked horizontally through table nib seated in nib indent 303 in location 302, thus, filling up cavity 301 and preventing keyboard table 300 from further going downwards. A portion of rotatable keyboard support disc 288 is visible in this position. It should be understood that keyboard

keys 308 are recessed allowing the user to put a food tray or table on top of keyboard keys 308 and to use it as a foldable table to hold pocket books, magazines, newspapers, food items, beverages and the like. The user or passenger may also use the computer and have a meal or snack at same time. FIG. 72 shows keyboard table 300 in the open horizontal position.

FIG. 73 is a schematic side view of an example of a retractable keyboard table 312. A semi-oval shaped retractable keyboard table 312 with an embedded keyboard keys 314 is fitted in cavity 313 reaching its maximum depth and securely locked via table nib seated in nib indent 318 in location 317. Table handgrip 316 of retractable keyboard table 312 is shown protruding in this position and may be pulled outwardly essentially along direction arrow 319. Also shown in FIG. 73 is table guide 320 at the bottom of cavity 313 that slides along groove guide rail 311 and allows retractable keyboard table 312 to be drawn out (shown in FIG. 74). Retractable keyboard table 312 may be mounted within forward seat 315.

FIGS. 74–75 are schematic side views of the retractable keyboard table 312 of FIG. 73 as it is moved to an open position. As can be seen in FIG. 74, retractable keyboard table 312 is moved via table handgrip 316 to an open position. In this position, retractable keyboard table 312 is securely locked through table nib seated in nib indent 318 location 317, thus, preventing retractable keyboard table 312 from further going downwards.

FIG. 75 shows a schematic side view of the retractable keyboard table 312 of FIG. 73 in an open horizontal position. Keyboard keys 314 are recessed so as not to touch the inner portion of cavity 313 when retractable keyboard table 312 is drawn back. The associated hinged display enclosure 305 may be rotated outwardly essentially along rotation direction arrow 306 for a comfortable viewing angle of display screen 307. Retractable keyboard table 312 is designed primarily with the safety of the passenger in mind in case of an accident such as a collision. In such an instance, retractable keyboard table 312 draws back into cavity 313 when the passenger hits it, thus, avoiding impact caused by the collision and minimizing or preventing possible injury to the passenger.

FIG. 76 is a side view of an example of a hinged keyboard table 322 in a closed or storage position. With reference to FIG. 76, hinged keyboard table 322 is folded in a face-to-face relation with hinged display enclosure 305. Hinged keyboard table 322 may be attached to the rear of forward seat 321 via table hinge 324. Hinged display enclosure 305 is not visible in this position while the back of hinged keyboard table 322 is prominently visible.

FIGS. 77–78 are side views of the hinged keyboard table 322 of FIG. 76 in the open horizontal position. The open position may be effected by rotating downwardly hinged keyboard table 322 via table hinge 324 as indicated by pivot rotation direction arrow 325. The edge at the back of hinged keyboard table 322 is concave so as not to touch or damage forward seat 321 when it is rotated, while lower margin is angled to support and keep hinged keyboard table 322 in place and preventing it from further going downwards. With reference to FIG. 77, hinged display enclosure 305 may be rotated outwardly as indicated by rotation direction arrow 306 for a comfortable viewing angle of display screen 307. In the horizontal open position (FIG. 78), a food tray may be placed on top of hinged keyboard table 322 and the user can have a meal or snack while operating the keyboard without interruption.

FIG. 79 is a side view of an example of a compartment type foldable keyboard table 330 stored within keyboard table enclosure 332 in the storage or closed position. As shown in FIG. 79, foldable keyboard table 330 is in an essentially upright storage position inside keyboard table enclosure 332. In the storage position, foldable keyboard table 330 is parallel with supporting arm 334. An L-shaped grooved plate 336 connects foldable keyboard table 330 and supporting arm 334. Vertical groove 337 of grooved plate 336 is slidably attached at the lower portion of foldable keyboard table 330 via keyboard table pin 331, while the circular end of grooved plate 336 is rotatably attached to the circular end of supporting arm 334 via support arm pivot 333. Keyboard table pin 331 may be slidably positioned along groove 337 of grooved plate 336 when foldable keyboard table 330 is extended (FIGS. 80–81). Keyboard table pin 331 rests at the lower end of groove 337 while in the upright storage position.

FIG. 80 is a schematic side view progression of foldable keyboard table 330 of FIG. 79 as it is extended essentially midway to an open position. As shown in FIG. 80, foldable keyboard table 330 is extended in an upward motion essentially along table extending direction arrow 327 effecting keyboard table pin 331 to slide upwards from one end to the opposite end of groove 337. Keyboard table pin 331 may be slidably positioned along groove 337 of grooved plate 336 when foldable keyboard table 330 is extended (FIGS. 80–81). In this position, foldable keyboard table 330 is essentially midway out of keyboard table enclosure 332 while supporting arm 334 and grooved plate 336 are stationary.

FIG. 81 is a schematic side view progression of foldable keyboard table 330 of FIG. 80 as its entire portion is exited from keyboard table enclosure 332. From the position in FIG. 80, in which keyboard table pin 331 has moved from one end to the opposite end of groove 337,

foldable keyboard table 330 is further extended essentially along table extending direction arrow 327, therefrom entire portion of foldable keyboard table 330 has exited from keyboard table enclosure 332. The movement causes keyboard table pin 331 to pull up grooved plate 336 and supporting arm 334 in the same motion, after which supporting arm 334 pivots out of keyboard table enclosure 332, from the phantom line representation of supporting arm 706 to an essentially diagonal position, as indicated by supporting arm pivot direction arrow 328, after which it positions itself into an angle to receive the bottom of foldable keyboard table 330 through supporting arm catch 338 (shown in FIG. 82).

FIG. 82 is a schematic side view of foldable keyboard table 330 of FIG. 81 as it is rotated to an essentially open horizontal position. With reference to FIG. 82, foldable keyboard table 330 is rotated to an essentially open horizontal position along keyboard table direction arrow 329. Foldable keyboard table 330 rests on supporting arm 334 as supporting arm tip 339 (shown in FIG. 81) of supporting arm 334 is inserted into supporting arm catch 338 of foldable keyboard table 330 to firmly support foldable keyboard table 330 and maintain its horizontal orientation.

FIG. 83 is a schematic side view of an alternative example of a foldable keyboard table similar to the compartment type foldable keyboard table shown in FIGS. 79-82. In the storage essentially upright position (FIG. 83), foldable keyboard table 340 is parallel with supporting arm 345 within keyboard table enclosure 341. As shown in FIG. 83, grooved plate 342 and supporting arm 345 are not attached in contrast to that shown in FIGS. 79-82. Groove 343 of grooved plate 342 is slidably attached to foldable keyboard table 340 via keyboard table pin 344. Keyboard table pin 344 is slidably positioned along groove 343 when foldable keyboard table 340 is extended. Supporting arm 345 is comprised of a movable portion and a fixed portion joined via support arm hinge 351. The movable portion of supporting arm 345 includes support arm notches 349 similar to a large set of saw teeth that is adjusted when foldable keyboard table 340 is in an open horizontal position (FIG. 85). The movable portion is attached to keyboard table enclosure 341 via support arm pin 347 while the fixed portion is attached to foldable keyboard table 340.

FIG. 84 is a schematic side view of the foldable keyboard table 340 of FIG. 83 as it is fully extended from its upright storage position. As shown in FIG. 84, foldable keyboard table 340 is extended in one motion essentially along extending direction arrow 352 effecting keyboard table pin 344 to slide along groove 343 and to move from one end to the opposite end of groove 343. In FIG. 84, foldable keyboard table 340 and supporting arm 345 have

reached their maximum extendable length as the upward movement of grooved plate 342 is momentarily stopped by keyboard enclosure pin 350 as it comes in contact with protruding end of grooved plate 342, and keyboard table pin 344 that rests on opposite end of groove 343. The upward movement of supporting arm 345 is also stopped as support arm pin 347 is in contact with support arm stop 348 preventing supporting arm 345 from further movement.

FIG. 85 is a schematic side view of the foldable keyboard table 340 of FIG. 83 as it is rotated to an open horizontal position. From the maximum extendable lengths of foldable keyboard table 340 and supporting arm 345 in FIG. 84, foldable keyboard table 340 is rotated essentially along table rotation direction arrow 354 to an open horizontal position as supporting arm 345 slides down from support arm stop 348 essentially along support arm drop direction arrow 353. Grooved plate 342 and groove 343 maintain their positions as in FIG. 84 relative to keyboard enclosure pin 350 and keyboard table pin 344 respectively. Support arm notches 349 may be moved back and forth at this position via support arm pin 347 to adjust the horizontal level of foldable keyboard table 340.

FIG. 86 is a schematic front view of the foldable keyboard table 330 of FIG. 82. With reference to FIG. 86, foldable keyboard table 330 rests on supporting arm 334 in an open horizontal position with supporting arm tip 339 shown in hidden outline at the bottom of foldable keyboard table 300. Visible in FIG. 86 is table enclosure notch 335 that serves as entry and exit area for foldable keyboard table 330 and supporting arm 334. Shown in hidden outline is grooved plate 336 that is attached to supporting arm 334 via support arm pivot rod 333.

FIG. 87 is a schematic front view of the foldable keyboard table 340 of FIG. 85. With reference to FIG. 87, foldable keyboard table 340 rests on supporting arm 345 in an open horizontal position. Also shown is table enclosure notch 356 that serves as entry and exit area for foldable keyboard table 340 and supporting arm 345. Keyboard table pin 344, which is attached to foldable keyboard table 340, is shown in hidden outline. Also shown in hidden outline is grooved plate 342 on respective left and right sides of foldable keyboard table 340 in contact with keyboard enclosure pin 350.

FIG. 88 is a side view of the keyboard table 300 of FIG. 72 as applied to a passenger seat. With reference to FIG. 88, keyboard table 300 and hinged display enclosure 305 are mounted in a separate enclosure, detachable compartment 357, which may be mounted by screws or hang bars to the rear of forward seat 359. Detachable compartment 357 may be

disengaged from forward seat 359. The electronics and hardware for the computer may be housed in forward seat 359.

FIG. 89 is a side view of the retractable keyboard table 312 of FIG. 75 as applied to a passenger seat. With reference to FIG. 89, retractable keyboard table 312 is contained in a separate enclosure, detachable compartment 360, while hinged display enclosure 305 is built-in in forward seat 361. Detachable compartment 360 may be disengaged from forward seat 361. The electronics and hardware for the computer may be housed in forward seat 361. It should be noted that in case of an accident or a sudden stop and the passenger or user slumps into retractable keyboard table 312, the latter would only retract or draw back into cavity of detachable compartment 360 thereby preventing serious damage to the passenger or user.

FIG. 90 is a side view of the hinged keyboard table 322 of FIG. 78 as applied to a passenger seat. Hinged keyboard table 322 and associated display enclosure 305 are mounted to the rear of forward seat 321. Also shown is hinged display enclosure 305 built-in in forward seat 321.

FIG. 91 is a side view of the foldable keyboard table 340 of FIG. 85 as applied to a passenger seat. Both keyboard table enclosure 341 and hinged display enclosure 305 may be mounted to the rear of forward seat 358, the former houses foldable keyboard table 340.

FIG. 92 shows a block diagram of a "System on a Chip" module of a keyboard table enclosure 368 embedded on a foldable table apparatus 420. The "System on a Chip" includes the following components: internal memory 364, wireless adapter 365, keyboard and pointing device 366 and external memory 367 all located within keyboard table enclosure 368 of foldable table apparatus 420. The components contained within the "System on a Chip" module may be located separately within either the keyboard enclosure or display enclosure, or external to both. In such an arrangement, the electronics associated with each component may be mounted to a single printed circuit board to save manufacturing costs and to improve reliability. The CPU and video components are not shown within the block diagram of Fig. 92. The CPU and video components are located elsewhere -- within the display enclosure or external to both display enclosure and keyboard enclosure. The primary function of wireless adapter 365, in case of a wireless keyboard, is to enable the computer keyboard data and the "System on a Chip" module data to communicate wirelessly with the host PC or with the other electronic devices within one or more established wireless networks. The primary function of data bus/bridge, in case of a wireless keyboard, is to enable the computer keyboard data and the "System on a Chip" module data to communicate, through the

embedded wireless adapter 365, with the host PC or other electronic devices within one or more established wireless networks.

FIG. 93 is a block diagram of the primary functions of central server computer 370. Central server computer 370 is essentially a high-performance computer with the following primary functions:

- Data Repository 372 – central repository and control access for resources such as data files, emails, multimedia files, etc.
- Gateway 371 – network gateway for Internet connections; and management of Wi-Fi network infrastructure
- Session Manager 373 – management of client terminal sessions
- Fail-safe 374 – management of fail-safe mechanisms of the system
- Accounting/Billing/Auditing 375 – implementation of the usage accounting and auditing functions for billing purposes
- Security 376 – management of security by incorporating appropriate authentication and authorization measures; and guarding against network intrusion attacks and viruses

The central server computer 370 typically runs a high-end version of a server operating system such as Windows Server 2003 Data Center Edition, or various versions of UNIX. It also uses system management software such as IBM's Tivoli™, or HP's Insight Manager™ to monitor the health of all computers and devices on Wi-Fi computer network.

FIGS. 94–102 are block diagrams of the architectural approaches in the implementation of a computer network on an aircraft utilizing a wireless network, such as for example, a Wi-Fi network as the physical transport. The architectural approaches described in FIGS. 94-102 all depend (in varying degrees) on the services provided by central server computer 370. A common feature to such architectural approaches is the presence of a high-performance central server computer 370. The approaches differ only in the configuration of the client computers, as central server computer 370 is adaptable to various client computer configurations.

Accordingly, FIG. 94 is a block diagram of the composition of a “smart client” 380 configuration. “Smart client” 380 is composed of the following technology stack: hardware abstraction layer 383, operating system layer 382, and application layer 381. Hardware abstraction layer 383 also includes low-level device drivers that interface with the physical hardware. Operating system layer 382 includes software that runs and controls the devices

installed on the system; it manages the graphical and input output functions of the computer; it provides services (such as printing, multimedia, graphics, etc.) to the applications that the user runs. Application layer 381 maps to application software typically used, such as Microsoft Word, Microsoft Excel, Microsoft Internet Explorer, etc. In the “smart client” 380 configuration, the client computer is practically a laptop-class computer: it has a hard drive, processor, memory, keyboard and pointing device, Wi-Fi adapter, display card and associated display device, operating system, and locally installed application software. This hardware configuration is similar to a Tablet PC. “Smart client” 380 computer can make a Wi-Fi connection 384 to central server computer 370 via Wi-Fi access points installed at strategic locations inside the airplane. The “smart client” 380 computer is similar in capabilities to a laptop or desktop computer: the user can view, edit, and delete documents, and save them either to the local hard drive or to the network accessible storage on central server computer 370; the user can stream multimedia files (such as movies) hosted on central server computer 370, perhaps on a pay-per-view basis; the user can play interactive games; the user can surf the Internet, send email, chat, upload/download files to or from the Internet hosts. The “smart client” 380 configuration may be distinguished from the other configurations in its ability to function (sans network connectivity) even when disconnected from central server computer 370 because the “smart client” 380 computer is essentially a standalone PC.

FIG. 95 is a block diagram of the composition of a “dumb terminal” 390 client. With reference to FIG. 95, “dumb terminal” 390, which communicates to central server computer 370 through Wi-Fi connection 393, is composed of the following technology stack: hardware abstraction layer 392 that is made up of all hardware components (such as Wi-Fi circuitry) and their requisite device drivers, and terminal client software 391 that acts as a rudimentary operating system. Terminal client software 391 can be compared to a web browser in that it doesn’t perform any processing logic. “Dumb terminal” 390 merely displays output of applications running remotely on central server computer 370, and accepts inputs coming from the user and forwards them to the remotely running application. In the “dumb terminal” computer configuration, the client computer is an inexpensive network computer. Basically, “dumb terminal” 390 client computer will only include a boot-enabled Wi-Fi adapter, a processor, memory, keyboard and pointing device, and a display card and associated display device. It will boot from central server computer 370, through standard network boot protocols. While it is possible to outfit “dumb terminal” with a hard drive for local data storage, this is not normally done. During the boot process, “dumb terminal” 390 downloads

the operating system image to its main memory and then runs it, effectively booting operating system locally. Typically, “dumb terminal” 390 runs applications on central server computer 370, with just the user interface displayed on “dumb terminal’s” 390 screen; every user action such as entering commands are buffered and then sent back to the application running on central server computer 370; the application in turn, interprets command and may then update the user interface displayed on screen of “dumb terminal” 390. “Dumb terminal” 390 client computer functions similarly like the “smart client” 380 client computer except the former typically runs slower since all applications software run on central server computer 370 and every action made by the user against the user interface may require a round-trip to central server computer 370. This drawback makes “dumb terminal” 390 completely dependent on central server computer 370. Without central server computer 370, “dumb terminal” 390 will not function.

FIG. 96 is a block diagram of the compositions of hybrid with expansion module 404 client and basic hybrid configuration 400 client. Hybrid with expansion module 404 client is essentially similar to “smart client” 380 computer (shown in FIG. 94). Both have the same technology stack that function similarly. However, hybrid with expansion module 404 client has an additional expansion module 406 attached to its expansion slot 405, and the terminal client software 409 (unused). In FIG. 96, have client may communicate to central server computer 370 through wireless connection 412. As shown in FIG. 96, basic hybrid configuration 400 client may communicate to central server computer 370 through wireless connection 411. It is essentially similar to “dumb terminal” 390 client computer and is composed of the following technology stack – hardware abstraction layer 403 that is made up of all hardware components (such as Wi-Fi circuitry) and their requisite device drivers, and terminal client software 402 that acts as a rudimentary operating system. In the “hybrid” configuration, the client computer is initially configured similar to a “dumb terminal” 390. However, basic hybrid configuration 400 client computer has an expansion slot 401 that accommodates an expansion module 406. By attaching expansion module 406 into expansion slot 401 basic hybrid configuration 400 is automatically upgraded to become a “smart client” 380. The “hybrid” client configuration combines the capabilities of “smart client” 380 and “dumb terminal” 390 configurations.

FIG. 97 is a block diagram of a “computer-on-a-card” module 434 that is used in the keyboard 430/display 432 system. The system can be manufactured in a highly modular fashion, with each of the components – keyboard 430, display 432, and “computer-on-a-card”

module 434 (as well as other components such as a DVD-ROM drive) – being fabricated or outsourced separately. The “computer-on-a-card” module 434 is the result of the integration of the core electronics of keyboard 430/display 432 system into a single, integrated module such as CPU 435, memory 438, data store 436 (hard drive or non-volatile memory), display adapter 437, audio adapter 440, input/output (I/O) adapter 439, and Wi-Fi adapter 44.

FIG. 98 is a block diagram of a “computer-on-a-card” module 434 attached to the expansion slot 431 of keyboard 430. When assembled, “computer-on-a-card” module 434 may simply be attached to either keyboard 430 or display 432, through expansion slots 431 (FIG. 98) and expansion slot 433 (FIG. 99). Expansion slot electronics can be accommodated either within display housing, within keyboard housing, or within housing for both components. This modularity facilitates maintenance and upgrade of system. In the configuration of FIG. 98, display 442 need not have expansion slot electronics.

FIG. 99 is a block diagram of a “computer-on-a-card” module 434 attached to the expansion slot 433 of display 432. In the configuration of FIG. 99, keyboard 450 need not have expansion slot electronics.

FIG. 100 is a block diagram of the direct connectivity option for linking the keyboard to the display. There are two connectivity options for linking the keyboard to the display: direct or indirect. Physical cables (wired connection 462) can accomplish a direct connection between keyboard 461 and display 460. A direct connection between keyboard 464 and display 463 can also be accomplished without the need for physical cables (wireless connection 465) using a suitable wireless technology such as Bluetooth or infrared. With direct connection option, the keyboard-and-display system functions as a unit and do not depend on the external components to establish a communication link.

FIG. 101 is a block diagram of the indirect connectivity option for linking the keyboard to the display. Establishing an indirect connection between keyboard 471 and display 470 requires the participation of central server computer 473 and the presence of Wi-Fi hardware on both keyboard 471 and display 470. In this configuration, keyboard 471 and display 470 are considered independent devices that have been “paired” dynamically. Keyboard 471 connects to its complementary device (i.e. a display 470) by sending a “pairing” request via a Wi-Fi connection 475 to central server computer 473. Central server computer 473 then dynamically searches for appropriate complementary device, and upon finding one, performs a “pairing” operation that establishes a virtual connection 472 between keyboard 471 and its complementary display 470. Conversely, the same process can also be initiated by display

470, as follows: a display sends a “pairing” request via a Wi-Fi connection 474 to central server computer 473 that then dynamically searches for and assigns an appropriate keyboard 471 to display 470. This connection option requires that both keyboard and display have an integrated Wi-Fi hardware, and both should have the capability to establish a connection with central server computer 473.

FIG. 102 is a block diagram showing the integration to an existing wireless networking infrastructure 482. If a wireless networking infrastructure 482 (for example, Connexion) is already in place inside the aircraft, central server computer 480 can be configured to seamlessly interface with it by adapting the same (or compatible) hardware, software, and communication protocols that it uses. Such interfacing can be accomplished by a “middleware” 481 – that can be a hardware device, a software application, or both. “Middleware” 481 acts as a “translator” and enables central server computer 480 to communicate efficiently with existing wireless networking infrastructure 482. Keyboard-and-display units 484 communicate with central server computer 480 through Wi-Fi connections 483.

FIG. 103 is a cross sectional view of table top 600 with an embedded keyboard 602, a variation of a section taken along lines 30-30 of FIG. 28 and lines 31-31 of FIG. 29 in a closed cover position. Keyboard cover 604 protects embedded keyboard 602 when the latter is not in use or in a closed position and permits table top surface 610 above embedded keyboard 602 to retain its functionality as a table for placing items on and bearing their weights. Keyboard cover 604 is attached to a second smaller cover segment 612 via pivot pin 606 that in turn is attached to hinge pin 608. Pivot pin 606 and hinge pin 608 permit keyboard cover 604 and second smaller cover segment 612 to be lifted and rotated in such a manner that keyboard cover 604 hangs off side of table. It should be understood that hinge pin 608 may be attached to embedded keyboard 602 as shown in FIGS. 103-104 or may be attached to a portion of table top 600. Hinge pin 608, which secures keyboard cover 604, may also be located to the left or right side of embedded keyboard 602 rather than being positioned near the bottom of embedded keyboard 602 as shown in FIGS. 103-104.

FIG. 104 is a cross sectional view of table top 600 of FIG. 103, a variation of a section taken along lines 30-30 of FIG. 28 and lines 31-31 of FIG. 29 in an open cover position. Pivot pin 606 and hinge pin 608 permit keyboard cover 604 and second smaller cover segment 612 to be lifted and rotated in such a manner that keyboard cover 604 hangs off the side of the table from its phantom line representation of table surface 708 as shown in FIG.

104. It may be expected that in the open cover position 614, keyboard cover 604 may rest on the lap or waist of the user. The open cover position 614 permits a user to have unencumbered access to embedded keyboard 602. The keyboard arrangement depicted in FIGS. 103-104 is useful if keyboard cover 604 is on a table of limited depth and it is not practical to pivot keyboard cover 604 away from the user in the manner depicted in FIGS. 30-31.

FIGS. 105–113 depict an example of a swivel 180-degree twisting keyboard panel embedded within a foldable table apparatus, in accordance with a further preferred embodiment of the present invention. Such an arrangement presents a clean and esthetically pleasing foldable table apparatus when the keyboard panel is in the closed position. The keyboard panel is also firmly secured when it is flipped and rotated about 180 degrees to its open position.

Accordingly, FIG. 105 is a front view of an example of a foldable table apparatus 620 incorporating a swivel 180-degree twisting keyboard panel 624 in an open position. In the figure, twisting keyboard panel 624 is shown in an essentially vertical position similar to the isometric view depicted in Fig. 107. Swivel hinge 626 permits twisting keyboard panel 624 to rotate or pivot essentially along swivel hinge rotation axis 627, 628. It should be understood that keyboard keys 629 face upside down and are not visible when twisting keyboard panel 624 is in the closed position as shown in FIG. 106. In FIG. 105, twisting keyboard panel 624 is swivelly attached to lower table panel 622 by means of swivel hinge 626 the same as in further examples of a twisting keyboard panel that is attached to a lower table panel within the scope of the present invention.

FIG. 106 is an isometric view of the foldable table apparatus 620 of FIG. 105 in a closed position. Securing arms 20 attaches to lower table panel 622 and permits the latter and twisting keyboard panel 624 to be folded in an upright position. In keeping with the present invention, tray stop 7 may be incorporated on both the top surfaces of twisting keyboard panel 624 and lower table panel 622. The swivel 180-degree twisting keyboard movement is accomplished by means of swivel hinge 626. Swivel twisting hinges are commonly used in attaching the LCD viewfinders of digital cameras, digital video camcorders, or cellular phones to the main electronics housing or keypad. Samsung SGH-P400 DigitAll Twist GSM cell phone, for example, uses such a swivel twisting hinge.

FIG. 107 is an isometric view of foldable table apparatus 620 in which twisting keyboard panel 624 is pivoted about swivel hinge 626 to an essentially vertical position from the flat closed keyboard position as shown in FIG. 106.

FIG. 108 is an isometric view of foldable table apparatus 620 in which twisting keyboard panel 624 is pivoted about swivel hinge 626 in a clockwise fashion from the essentially vertical keyboard position of FIG. 107. The keyboard keys of twisting keyboard panel 624 remain in an inverted position in FIGS. 107-108.

FIG. 109 is an isometric view of foldable table apparatus 620 in which twisting keyboard panel 624 is further rotated about swivel hinge 626 in a clockwise fashion and lowered onto lower table panel 622 until the keyboard panel is oriented to the user in a normal flat manner relative to the somewhat vertical keyboard panel position as depicted in FIG. 108. In FIG. 109, keyboard keys 629 are in an open and flat position. Keyboard keys 629 may either protrude or be recessed relative to the keyboard panel surface. When keyboard keys 629 are recessed, a food tray may be placed on the keyboard panel surface without accidentally pressing on the keyboard keys. The upper twisting keyboard panel 624 may be securely attached to the lower table panel 622 by means of mechanical hooks and table latches, spring tensioning in swivel hinge 626, molded indents and alignment guides, magnetic attraction, and the like. A secured attachment between twisting keyboard panel 624 and lower table panel 622 is necessary to avoid the noise caused by the vibration of panels 622, 624 during turbulence and during take-off and landing of the aircraft. Further, a secured attachment of panels 622, 624 avoids accidental slippage of food tray while passengers are eating, beverage spills while they are consuming refreshments, and spills from passengers bumping foldable table apparatus 620 while entering and exiting their seats.

FIG. 110 is an isometric view of an alternative example of a foldable table apparatus in which swivel hinge 636 is mounted at the front as twisting keyboard panel 634 is rotated about in an essentially vertical keyboard position. Swivel hinge 636 is mounted at the front sides of twisting keyboard panel 634 and lower panel 632. When swivel hinge 636 is mounted at the front of foldable table apparatus 630, it is less likely that rotating twisting keyboard panel 634 will cause it to meet the rear of the forward seat on which securing arms 20 are mounted. In FIG. 110, twisting keyboard panel 634 can be rotated sideways via swivel hinge 636 essentially along swivel hinge rotation axis 631.

FIG. 111 is an isometric view of a foldable table apparatus in which swivel hinge 639 is mounted to the right as twisting keyboard panel 638 is rotated about in an essentially vertical.

keyboard position. Swivel hinge 639 is mounted to the right sides of twisting keyboard panel 638 and lower panel 637. When swivel hinge 639 is mounted at the side of foldable table apparatus 635, it is less likely that rotating twisting keyboard panel 638 will cause it to meet the rear of the forward seat on which securing arms 20 are mounted. In FIG. 111, twisting keyboard panel 638 can be rotated sideways via swivel hinge 639 essentially along swivel hinge rotation axis 633.

FIG. 112 is an isometric view of an example of a foldable table apparatus incorporating table ledge 662 and twisting keyboard panel 661. Swivel hinge 663 is mounted medially on left side of keyboard panel 661 and medially on left side of foldable table apparatus 660. Below table ledge 662 is a recessed table top surface 671 that receives keyboard panel 661 in its horizontal position (either closed or open position). Table ledge 662 permits keyboard panel 661 to fit flush with the thicker back portion of foldable table apparatus 660. The keyboard panel being used may be slightly smaller than the keyboard panel of FIG. 111. In FIG. 112, keyboard panel 661 can be rotated about sideways by means of swivel hinge 663 essentially along swivel hinge rotation axis 664 to an essentially vertical manner to place keyboard panel 661 in an open or closed position on recessed table top surface 671. To move keyboard panel 661 to its closed position, twisting keyboard panel 661 is rotated essentially 180 degrees about swivel hinge 663 and lowered onto foldable table apparatus 660 to a flat position similar to the twisting keyboard panel 624 shown in FIG. 106.

FIG. 113 is an isometric view of an example of a two-piece foldable table apparatus 670 showing table ledge 662 and twisting keyboard panel 667. As shown in FIG. 113, two-piece foldable table apparatus 670 includes a 1st table piece 665 that is connected to 2nd table piece 666 via a pair of table hinges 621. Swivel hinge 668 is mounted medially in front of 2nd table piece 666 and medially in front of twisting keyboard panel 667. Table ledge 662 has two primary functions: 1) it forms a recessed table top surface 671 that receives twisting keyboard panel 667, in its closed or open horizontal position, and 2) it facilitates efficient functioning of table hinge 621 by leveling the hinged edges of 1st table piece 665 and 2nd table piece 666. It should be noted that table hinge 621 appears more esthetically pleasing and functions to fold both table pieces 666, 665 if both hinged edges are flushed and of the same thickness. In FIG. 113, twisting keyboard panel 667 can be rotated about sideways by means of swivel hinge 668 essentially along swivel hinge rotation axis 669 to an essentially vertical manner to place twisting keyboard panel 667 in an open or closed position on recessed table top surface 671.

FIG. 114 is a perspective view of an example of a foldable table apparatus 644 upon which keyboard pattern 643 is projected 646. Keyboard pattern 643 is generated and projected 646 onto the flat tabletop surface of foldable table apparatus 644 by using the Canesta keyboard™ Perception Chipset™ that is especially suited to the low ambient light of some aircraft cabin environments. The use of such a system to input data to a computer ensures that the conventional foldable table apparatus 644 does not require replacement and remains easy to clean. The Canesta keyboard™ Perception Chipset™ is contained within pivoting housing 641, the latter contains a Canesta Sensor Module, Light Source, and Pattern Projector (for example, SM-CK100, IR-CK100, PP-CK100 chipset modules from Canesta or their functional equivalents). The power supply and data communication to and from Canesta chipset within pivoting housing 641 are provided by a wired connection to display screen 640 and its associated electronics. The orientation of pivoting housing 641 may be rotated to project a legible keyboard pattern 643 with each adjustment positions of foldable table apparatus 644 and display housing 648. Display screen 640 may also be pivoted essentially along display rotation direction arrow 642 to adjust for the reclining seat position of the passenger seated in front.

FIG. 115 is an isometric view of an example of a foldable table apparatus of the type shown in FIG. 19 incorporating an embedded key FrogPad™ style keyboard 656. Also shown in FIG. 115 is the attached keyboard insert module 652 that contains a beverage holder area 654 and an embedded key FrogPad™ style keyboard 656 typically associated with FrogPad, Inc. The easy to replace keyboard insert module system permits passengers to use special keyboard types such as a FrogPad™ style keyboard 656 within foldable table apparatus 650. The aforementioned keyboard insert module may be customized for left or right handed individuals and may be developed for other languages or for special functions. In some instances, fonts and software specific to the keyboard may be embedded within a keyboard insert module or keyboard packaging. Should a keyboard insert module become defective or dirty, it may be replaced quickly and conveniently by the passenger or the aircraft attendant. There is no need for the maintenance crew to be scheduled for a service call, thus, saving the airline carrier considerable time and costs. As with any of the keyboard devices depicted in the present invention, input and output data to and from the keyboard may be communicated to the CPU or computer using a wired or wireless connection. Keyboard insert module 652, for example, typically contains all keyboard electronics, power supply,

and peripheral communications circuitry to establish wired or wireless contact with the passenger's associated computer processor, display, and/or server.

FIGS. 116–118 illustrate an example flippable display panel with an embedded display screen. Such an example is ideal in areas, especially outdoors, where access to a display screen is frequent and needs to be protected against damage, such as in factories, elevators, airports, schools, banks, malls, and similar establishments. The display screen is protected against damage and kept clean because it is easily returned to a closed position after use.

Accordingly, FIG. 116 is a schematic side view of an example of a display panel enclosure 680 incorporating a flippable display panel 672 with an embedded display screen 674 progression as it is rotated from its closed vertical position to a horizontal position. As shown in FIG. 116, flippable display panel 672 is flipped and rotated about groove pin 673 essentially halfway to a horizontal position as indicated by phantom line representation of flippable display panel 710 in downward motion essentially along rotation direction arrow 675, therefrom rotated further downward to a horizontal position essentially along rotation direction arrow 676. In this position, flippable display panel 672 is securely attached to display panel enclosure 680 via groove pin 673.

FIG. 117 is a schematic side view progression of the display panel enclosure 680 of FIG. 116 showing flippable display panel 672 as it is rotated about and moved from one end to the opposite end of groove 681. From the horizontal position as shown in FIG. 116, flippable display panel 672 is rotated about groove pin 673 further downward as indicated by phantom line representation of flippable display panel 712. Flippable display panel 672 may be slidably positioned along the length of groove 681 essentially along sliding direction arrow 677 to phantom line representation of flippable display panel 714 and may continue to progress along groove 681 essentially along sliding direction arrow 678. Thus, flippable display panel 672 has moved from one end to the opposite end of groove 681. In this position (FIG. 117), display screen 674 is prominently visible.

FIG. 118 is a schematic side view of the display panel enclosure 680 of FIG. 117 showing flippable display panel 672 as it is rotated about to a final open vertical position. As shown in FIG. 118, flippable display panel 672 is rotated about groove pin 673, from its former position as shown in FIG. 117 to phantom line representation of flippable display panel 716 to its final vertical position essentially along rotation direction arrow 679. Flippable display panel 672 may be rotated back and forth to adjust for fine viewing display

screen 674. In keeping with the present invention, display panel enclosure 680 may include a security lock (not shown) where access to display panel enclosure 680 may be monitored.

FIG. 119–120 illustrate an example of an integrated flippable keyboard similar to that shown in FIG. 1, embedded and integrated on a keyboard drawer of a computer table in an open and closed positions. In the example, the integrated flippable keyboard is fixed in one area on keyboard drawer so that a user is spared the inconvenience of changing the position of the keyboard from one place to another within the computer drawer or within the computer table. A flippable keyboard integrated within a sliding keyboard drawer enhances the aesthetic appeal and the neat appearance of the computer table as a whole. The clutter caused by the visible cable connections and tripping hazards can be avoided.

Accordingly, FIG. 119 is a perspective view of an example of an integrated flippable keyboard 496 embedded on a keyboard drawer 494 of computer table 490 in an open position. The integrated flippable keyboard 496 is embedded in keyboard drawer 494 of computer table 490. Integrated flippable keyboard 496 includes keyboard keys 6 that are recessed, 2nd table depression 5 and 1st table depression 4, the last two are used for flipping integrated flippable keyboard 496 from an open to a close position and vice versa. The mechanisms for supplying power to integrated flippable keyboard 496 and for transferring the electronic data using wired or wireless connection are similar to those described in FIGS. 1-13. The integrated flippable keyboard 496 may also be embedded in a conference table, a typical table, or a podium, similar to those described in FIGS. 40-42.

FIG. 120 is a perspective view of the integrated flippable keyboard 496 of FIG. 119 in a closed position. In the closed position, the bottom of integrated flippable keyboard 496 is flushed with keyboard drawer surface 492 of keyboard drawer 494 to effect a continuous surface. The material and lamination finish of the bottom of keyboard drawer 494 may be the same as keyboard drawer surface 492, thus, to retain the functionality of keyboard drawer 494 as a drawer to place documents or papers and to make integrated flippable keyboard 496 inconspicuous. In a closed position, the recessed keyboard keys of integrated flippable keyboard 496 are protected against damage.

FIGS. 121–124 illustrate an example of a foldable keyboard supported by a pair of keyboard support arms and a display screen integrated within a foldable keyboard and display apparatus in an open, partially open, and closed position. The slim structure of foldable keyboard and display apparatus makes it ideal to be mounted on a flat vertical surface such as a wall or to the rear of a forward seat in an aircraft. It could also be set up in public areas

such as in hotel lobbies, airports, malls or banks. A user may facilitate access to a network such as the Internet, website, email application, business or other job related programs through foldable keyboard and display apparatus. The display screen may function as a posting area for important announcements or instructions even when foldable keyboard is in a closed position. A lock key may be included in the design for security purpose.

Accordingly, FIG. 121 is a schematic isometric view of an example of a foldable keyboard and display apparatus 500 with an integrated foldable keyboard 506 and display screen 502 in an open horizontal position 540. In the open horizontal position 540 (FIGS. 121-122), foldable keyboard 506 is supported by a pair of keyboard support arms 508, the lower end portion of keyboard support arm 508 is attached to the respective left and right sides of foldable keyboard 506 through lower support arm pin 512, while the upper end of keyboard support arm 508 is attached to groove 520 of foldable keyboard and display apparatus 500 through upper support arm pin 514. Respective right and left rear edges of foldable keyboard 506 is also attached to foldable keyboard and display apparatus 500 at lower portion 528 of keyboard cavity 504 through keyboard pivot pin 516. Also shown in FIG. 121 is indent 510 that assists in opening foldable keyboard 506. An associated display screen 502 is located at upper portion of foldable keyboard and display apparatus 500. Display screen 502 is essentially fixed within foldable keyboard and display apparatus 500. Alternatively, a pair of hinges may be included at its upper margin to adjust display screen 502 for convenient viewing. The functions of display screen 502 are similar to that shown in FIG. 1. Foldable keyboard and display apparatus 500 may be powered by AC batteries or by an AC from a wall receptacle. The keyboard input and output data communications may be transmitted using cabled connections or wireless connections to the computer or display.

FIG. 122 is a schematic right side view of the foldable keyboard and display apparatus 500 of FIG. 121. As shown in FIG. 122, keyboard support arm 508 is fully extended as it securely supports and maintains the horizontal position of foldable keyboard 506 in the open horizontal position 540. Also shown in hidden outline is support arm slide 534 positioned at one end of slide guide rail 518. Support arm slide 534 is attached to keyboard support arm 508 via upper support arm pin 514. Support arm slide 534 is slidably positioned along slide guide rail 518 when keyboard support arm 508 is extended or retracted. Projected line 531 shows the position of support arm slide 534 stationary at one end of slide guide rail 518. It should be noted that the rear ends of foldable keyboard 506, located at the rear portion of foldable keyboard 544, is circular to give space for the retraction of foldable keyboard 506.

FIG. 123 is a schematic right side view of the foldable keyboard and display apparatus 500 of FIG. 122 in a partially open position 538. Foldable keyboard 506 is rotated upward via keyboard pivot pin 516 essentially along keyboard rotation direction arrow 522 causing keyboard support arm 508 to be retracted along groove 520 via upper support arm pin 514 and its attached support arm slide 534. In a partially open position 538 (FIG. 123), keyboard support arm 508 is retracted essentially at upper portion 530 of keyboard cavity 504. Support arm slide 534 rises as keyboard support arm 508 is retracted to make room for the latter until it is fully retracted in a closed vertical position (shown in FIG. 124). Projected line 532 shows the progression of support arm slide 534 as it is moved up along slide guide rail 518 from its previous position in FIG. 122.

FIG. 124 is a schematic right side view of foldable keyboard and display apparatus 500 of FIG. 123 showing foldable keyboard 506 as it is retracted to a closed vertical position 536. As shown in FIG. 124, foldable keyboard 506 is rotated from an open horizontal position 540 (FIG. 122) via retraction of keyboard support arm 508, to a partially open position 538 (FIG. 123), thereafter foldable keyboard 506 is further retracted to a closed vertical position 536. In the closed vertical position 536, support arm slide 534 and upper support arm pin 512 had moved from one end to the opposite end of slide guide rail 518 and groove 520 respectively. Projected line 533 shows the position of support arm slide 534 as it is moved from one end to the opposite end of slide guide rail 518. Keyboard cavity 504 receives foldable keyboard 506 in the closed position (FIG. 124).

FIGS. 125–128 illustrate an alternative example of the foldable keyboard and display apparatus of FIGS. 121-124 incorporating a foldable keyboard that is supported by a two-piece keyboard support arm. The foldable keyboard and display apparatus of FIGS. 125-128 may be mounted to a wall recess so that in a closed position it becomes inconspicuous and blends with the surrounding area.

Accordingly, FIG. 125 is a schematic isometric view of an alternative example of the foldable keyboard and display apparatus of FIGS. 121-124 incorporating a foldable keyboard 552 that is supported by a two-piece keyboard support arm in an open horizontal position 558. As shown in FIG. 125, foldable keyboard 552 is rotatably attached to foldable keyboard and display apparatus 549 through keyboard pivot pin 516. In the open horizontal position 558 (FIGS. 125-126), foldable keyboard 552 is supported by a pair of two-piece keyboard support arms that include lower 2nd support arm 548 and upper 1st support arm 546 rotatably attached via support arm pin 547 in an overlapping manner such that upper 1st support arm

546 is facing outward as in FIG. 125 to give space when foldable keyboard 552 is retracted or extended. The lower 2nd support arm 548 is attached at respective left and right sides of foldable keyboard 552 via lower support arm pin 512 while upper 1st support arm 546 is attached at respective left and right inner sides of upper portion 530 of keyboard cavity 504 via upper support arm pin 514.

FIG. 126 is a schematic right side view of the foldable keyboard and display apparatus 549 of FIG. 125. In the open horizontal position 558, the two-piece keyboard support arm is extended in an essentially diagonal orientation, thus, firmly supporting foldable keyboard 552 and preventing it from further going downwards. The flange around the edges of foldable keyboard and display apparatus 549 enables it to be mounted easily on a wall recess. The hook shaped rim of foldable keyboard 552 permits foldable keyboard 552 to be extended or retracted smoothly.

FIG. 127 is a schematic right side view of the foldable keyboard and display apparatus 549 of FIG. 126 as foldable keyboard 552 is retracted to a partially open position 556. As shown in FIG. 127, foldable keyboard 552 of foldable keyboard and display apparatus 549 is rotated upward via keyboard pivot pin 516 essentially along keyboard rotation direction arrow 560 causing the lower 2nd support arm 548 and upper 1st support arm 546 of the two-piece keyboard support arm to be retracted via support arm pin 547, lower support arm pin 512 and upper support arm pin 514.

FIG. 128 is a schematic right side view of the foldable keyboard and display apparatus 549 of FIG. 127 as foldable keyboard 552 is retracted to a closed vertical position 554. From the partially open position 556 as shown in FIG. 127, foldable keyboard 552 of foldable keyboard and display apparatus 549, is further retracted via keyboard pivot pin 516 essentially along keyboard rotation direction arrow 562 to a closed vertical position 554. In the closed vertical position 554, foldable keyboard 552 and the two-piece keyboard support arms snugly fit in keyboard cavity 504 with upper 1st support arm 546 in a slightly diagonal position and 2nd support arm in a vertical position. Foldable keyboard and display apparatus 549 may easily be detached and replaced in case of a malfunction or defect. It may be powered by AC batteries or by an AC from a wall receptacle. The keyboard input and output data communications may be transmitted using cabled connections or wireless connections to the computer or display. The associated display screen functions similarly to that shown in FIG. 1.

FIG. 129 shows an isometric view of a simplified foldable table apparatus 268. Foldable table apparatus 268 is similar to the foldable table apparatus 276 of FIG. 64, however the function buttons 274, flight attendant buttons 277, and audio video control buttons 278 are integrated on the top surface of the foldable table apparatus 268.

FIG. 130 shows a top view of a foldable table apparatus 150 shown with a flippable keyboard 3 in its closed position and with a Trackpoint style strain-gauge device 152 integrated on its table surface 151. Although the foldable table apparatus 150, is similar to the foldable table apparatus 1 shown in FIG. 3, the position of the Trackpoint style strain-gauge device 152 permits the user to select or interact with items on display screen 15 without the need for the flippable keyboard 3 to be in an open position. The Trackpoint style strain-gauge device 152 may be recessed or below table surface 151 to avoid unintentional movement due to items placed on table surface 151.

FIG. 131 shows an isometric view of a clamshell style foldable table apparatus 115 with an integrated display enclosure 94. The design of the foldable table apparatus 115 provides the user with a clean surface appearance as the display enclosure hinge area 155 does not protrude when the display enclosure 94 is closed.

FIG. 132 shows a cross-sectional view of foldable table apparatus 115 taken along lines 132-132 of FIG. 131. The display enclosure hinge area 155 is placed below the table surface in such a manner that the hinge area 155 is not visible to the user when the display enclosure 94 is closed. The bottom edge of display enclosure 94, fits flush along its associated table top ledge when the display enclosure 94 is pivoted down to its closed position.

FIG. 133 shows an isometric view of a clamshell style foldable table apparatus 116, its display enclosure 95, display enclosure release button 117, and swivel hinge 114. The display enclosure is tensioned when it is closed so that when release button 117 is pressed, the enclosure 95 raises gently to the open position. The swivel hinge 114 permits display enclosures 95, 96 to be pivoted to an open or closed position as well as swiveled left and right so an adjacent passenger may also view display screen 83.

FIG. 134 shows an isometric view of foldable table apparatus 118 with a custom keyboard 119. Keyboards associated with the foldable table apparatus of the present invention may come in a variety of forms from the conventional "104 key keyboard" to specific keyboards for special needs, different languages, different age groups, and the like.

FIG. 135 shows a perspective view of foldable table apparatus 105 with a removable swivel keyboard 106. Swivel hinge 109 is received by hinge receptacle 72. With sufficient

force, the swivel keyboard 106 will detach from hinge receptacle 72. The swivel keyboard 106 is associated with a recessed keyboard cavity 107 which permits the keyboard keys to be placed below the top surface so that the swivel keyboard 106 when stored in its closed position (keyboard face down) will lay flat on table apparatus 105.

It should be understood that other methods of detaching the keyboard from the table apparatus may be employed. For example, the swivel keyboard may be secured to the table apparatus by a bayonet mount similar to the manner in which a camera lens is attached to a camera body. A button or lever may be pressed or slid to free the keyboard from the table apparatus so it may be repaired, replaced, or cleaned.

FIG. 136 shows a perspective view of a removable swivel keyboard 111 with a solar cell array 113 to supplement the power requirements of the keyboard circuitry. The solar cell array 113 should be sufficiently efficient to meet the power needs of the keyboard. Recessed keyboard cavity 74 permits the keyboard to lay flat on the table apparatus in the open or closed position in a manner similar to that discussed for the removable swivel keyboard 106 of FIG. 135.

FIG. 137 shows a perspective view of a clamshell style foldable table apparatus 215 in its closed position. The display enclosure 48 is horizontal and flush with the table apparatus top surface. On the exterior surface of the table apparatus 215 is a USB connection jack 28 for inserting USB flash memory devices, digital cameras, cell phones, PDAs, and the like. Other connection jacks may be integrated within the table apparatus as their connection technology becomes broadly adopted and supported by manufacturers of electronic devices. Alternative USB jack locations 29 are shown in FIGS. 138, 139, and 149.

FIG. 138 shows a perspective view of a clamshell style foldable table apparatus 215 in its open position. With the display enclosure 48 in the open position the display screen 83 is visible, as are recessed keyboard 42 and Trackpoint style device 43. Swivel hinge 47 serves two roles; it permits the display enclosure to pivot up and down and it permits the display enclosure to swivel left and right to share the display with an adjacent passenger.

FIG. 139 shows a perspective view of a clamshell style foldable table apparatus 216 incorporating a touch sensitive display screen 93. A touchscreen stylus 63 is also provided to permit the user to conveniently select items on the touch sensitive display screen 93. Touch sensitive display screens may be present regardless of the presence or absence of a keyboard as they provide an alternative input method should the keyboard become defective. If a keyboard is desired, a connection to the foldable table apparatus 216 may be made using the

USB connection jack 28. Similarly, an RF or IR keyboard may be used to communicate with the foldable table apparatus 216 if there are suitable sensors embedded within or near the table apparatus 216 or display enclosure 49.

FIGS. 140-143 show two possible variations of the foldable table apparatus and flippable keyboard design of FIGS. 1-10. Both designs provide for a recessed keyboard 42 on one side and a beverage area indent 89 on the other side of the flippable keyboard.

FIG. 140 shows a perspective view of foldable table apparatus 445 incorporating a sideways mounted flippable keyboard 446. As in FIGS. 1-10, the flippable keyboard 446 is able to flip from an open position to a closed position by moving along the length of a groove 451 located within the foldable table apparatus 445. The flippable keyboard 446 pivots and slides from an almost open position shown in FIG. 140 to an almost closed position shown in FIG. 141. Direction arrow 449 indicates the flippable keyboard 446 direction and its arching motion as it is moved from one side of the table apparatus 445 to the other. Phantom line representations 448 and 447 of flippable keyboard 446 indicate the keyboard's almost closed position and almost open position respectively in FIGS. 140 and 141.

FIG. 142 shows a perspective view of foldable table apparatus 455 incorporating a full length flippable keyboard 456. As in FIGS. 1-10, the flippable keyboard 456 is able to flip from an open position to a closed position by moving along the length of a groove 452 located within the foldable table apparatus 455. The flippable keyboard 456 pivots and slides from an almost open position shown in FIG. 142 to an almost closed position shown in FIG. 143. Direction arrow 459 indicates the flippable keyboard 456 direction and its arching motion as it is moved from one side of the table apparatus 455 to the other. Phantom line representations 457 and 458 of flippable keyboard 456 indicate the keyboard's almost closed position and almost open position respectively in FIGS. 142 and 143. A Trackpoint style device 43 is shown in FIG. 142, and a tray stop 7 is shown in FIG. 143.

FIGS. 144-147 shows a variety of packaging solutions for maintaining a foldable table apparatus in a hygienic state prior to use. Keyboards are generally unhygienic environments and need to be cleaned on a regular basis. The design of the keyboard and table apparatus allow for easy removal for cleaning and sterilization.

FIG. 144 shows a perspective view of foldable table apparatus 145 with a partially opened plastic or paper film 147 surrounding the recessed keyboard 42. A sterile seal 149 is used to secure the plastic or paper film 147 to the table apparatus 145 surface. This seal may be in the form of an adhesive or some form of bonding using chemicals, heat, ultrasonic

welding, and the like. When the recessed keyboard 42 has not been used, the plastic or paper film 147 lays flat on the table apparatus 145, as shown by phantom line representation 143.

To use the keyboard, a user pulls on pull tab 148 to remove the plastic or paper film 147.

FIG. 145 shows a perspective view of a foldable table apparatus 145 with a plastic or paper wrap 153 surrounding the recessed keyboard 42 and the foldable table apparatus 145. A tear strip 154 and its pull tab 156 facilitate the easy removal of the protective or sterile plastic or paper wrap 153. A reusable zippered cover may also be employed to help keep the keyboard surfaces clean.

FIG. 146 shows a perspective view of foldable table apparatus 215 with an adhesive tape 158 over the closed display enclosure 48. When the table apparatus 215 has not been used, the adhesive tape 158 lays flat across the opening of the display enclosure 48 as shown by phantom line representation 157 of adhesive tape 158. To use the keyboard 42 and display 83, a user pulls on the pull tab 171 to remove adhesive tape 158. Typically, the adhesive tape does not leave a residue and is not reusable. A passenger is assured of using a clean keyboard device if the tape 158 is in place. The flight crew can replace dirty keyboards or table apparatus as necessary during transit or on a rotating regular basis.

FIG. 147 shows a perspective view of foldable table apparatus 185 with an adhesive tape 161 across the length of the swivel keyboard opening. When the table apparatus 185 has not been used, the adhesive tape 161 lays flat across the opening of the swivel keyboard as shown by phantom line representation 159 of adhesive tape 161. To use the swivel keyboard, a user first pulls on the pull tab 171 and removes adhesive tape 161.

FIG. 148 shows a perspective view of a clamshell style foldable table apparatus 217 utilizing a touch sensitive display screen 93. Display screen 93 may be stored in a face-up (shown) or face-down position as it may swivel 180 degrees about swivel hinge 47. As display screen 93 is a touch sensitive screen, the user may desire to use the screen 93 in a slightly inclined manner as shown by phantom line representation 701 of the table apparatus 217 in such an inclined position. This is accomplished by pushing release button 73 which serves to unlock the table apparatus 217 from its horizontal position so the user may view the display screen 93 at a slight incline. Pressing release button 73 allows the table apparatus 217 to pivot downwards about pivot axis 71. A touch screen stylus 63 is located within the table apparatus 217 beneath display enclosure 49.

FIG. 149 shows a partial perspective view of a forward seat mounted display apparatus 385 with an embedded video camera 378. The video camera 378 facilitates video chat and

video conferencing calls between passengers and to terrestrial users. Typically, the video services are used with a PC headset to ensure privacy and not inconvenience other passengers. The video camera lens 388 may be pivoted to adjust the composition of the frame. Video camera pivot tab 387 is moved up or down to rotate the video camera 378 and its associated camera lens 388 about video camera pivot axis 389. Display enclosure 386 contains the display screen area 377. If a real-time data connection is available, the user may participate in IM text chat or VOIP chat or telephone calls. They may also watch real-time news or television programming or participate in online trading using, for example, the graphical trading interface 379 shown within display screen area 377.

FIG. 150 shows a perspective view of a foldable table apparatus 415 with its flippable keyboard 416 detached from the table apparatus 415. It is desirable that keyboards are easily removed from their associated table apparatus in situations where beverages are accidentally spilled onto them, or they malfunction during a flight. To remove a keyboard, the user or a flight attendant moves the keyboard release levers 419 in the direction of direction arrows 57. Such an action retracts groove pins 417 from the groove 418 on each side of the table apparatus 415 permitting the user or flight attendant to lift the keyboard 416 vertically in the direction of direction arrows 46. A replacement keyboard is installed in a similar fashion using the reverse sequence of steps. Approaches to replacing the keyboard using more subtle methods may be used if it is desired that the user should not be able to easily remove the keyboard apparatus.

FIG. 151 shows a perspective view of a snap-on keyboard apparatus 395 with its associated slim membrane keyboard 127 and a Touchpad style 59 cursor pointing device. The keyboard apparatus 395 is generally lowered in the direction of direction arrows 97 and typically attached to the back of a conventional table apparatus 201 before being snapped into place at the front of the table apparatus 201. The attached centered placement is indicated by phantom line representation 396. The front and back of the snap-on keyboard apparatus 395 are curled, as indicated at 397, in such a manner as to anchor the keyboard apparatus to the sides of the conventional table apparatus 201. The keyboard apparatus 395 communicates wired or wirelessly with a nearby access point or USB connector. The design permits the keyboard apparatus 395 to stay secure should the flight encounter turbulence.

FIG. 152 shows a perspective view of a magnetically attached keyboard apparatus 426 with its associated slim membrane keyboard 127. The keyboard apparatus 426 is generally lowered in the direction of direction arrows 97 and magnetically attached to the top of table

apparatus 425. The placement of the keyboard apparatus 426 on table apparatus 425 is indicated by phantom line representation 427. Rare earth magnets 429 are embedded within the keyboard apparatus 426. Rare earth magnets 428 are also embedded within the table apparatus 425 in such a manner as to align with the rare earth magnets 429 of the keyboard apparatus 426. Thus, the keyboard apparatus 426 is magnetically attracted and held stationary when placed on the top of table apparatus 425. The keyboard apparatus 426 communicates wired or wirelessly with a nearby access point or through a USB connector. The design permits the keyboard apparatus 426 to stay secure should the flight encounter turbulence.

FIG. 153 shows the architecture of an Advertisement Targeting System adapted for use in the system of the present invention. An airline can operate an Advertisement Targeting System 1310 aboard an aircraft 1330 to deliver targeted advertisements to aircraft's passengers via the keyboard and display apparatus 1350 accessible to each passenger. The targeted advertisements produced by the Advertisement Targeting System 1310 are typically delivered to the keyboard and display apparatus 1350 using a middleware Application Programming Interface (API) whose components are shared by the Advertisement Targeting System 1310 and the keyboard and display apparatus 1350. The middleware API 1332 which is installed close to the Advertisement Targeting System 1310, and the middleware API 1346 which is installed with the keyboard and display apparatus 1350 typically implement optimized functions for delivering targeted advertisements to the keyboard and display apparatus 1350.

The aircraft 1330 maintains a User Profiles 1312 database containing detailed information about its passengers. The aircraft 1330 also maintains an Ad (i.e. Advertisements) Pool 1314 containing advertisements that are generated in-house by the airline company, and advertisements that are outsourced from third party companies such as Third Party Ad Provider 1340. The User Profiles 1312 database and the Ad Pool 1314 are inputs to the Advertisement Targeting Engine 1326, which implements the logic for selecting advertisements that closely match the interests of a given passenger.

The aircraft 1330 may grant permission to a Third Party Ad Provider 1340 to deliver targeted advertisements directly to the aircraft's 1330 passengers. The Third Party Ad Provider 1340 typically operates its own Advertisement Targeting System 1342. To facilitate the delivery of targeted advertisements, the Third Party Ad Provider 1340 typically employs middleware API 1344 which is installed close to the Advertisement Targeting System 1342,

and middleware API 1348 which is installed with the keyboard and display apparatus 1350. The middleware API 1344 and middleware API 1348 ensure data compatibility between the data format used by the Third Party Ad Provider 1340 and the data format that is understood by the keyboard and display apparatus 1350.

The Third Party Ad Provider 1340 typically maintains its own Ad Pool 1338 and it may also maintain its own User Profiles 1334 database. The Third Party Ad Provider 1340 typically does not have detailed profile information about the aircraft's 1330 passengers, as a result the advertisements that the Third Party Ad Provider 1340 delivers directly to the aircraft's 1330 passengers may not accurately match the passengers' interests. The User Profiles 1334 database and the Ad Pool 1338 are inputs to the Ad Targeting Engine 1336, which implement the logic for selecting advertisements that closely match the interests of passengers. The Third Party Ad Provider 1340 may also deliver targeted advertisements to the aircraft 1330 for redistribution by the latter to its passengers. In this scenario, the aircraft 1330 uses the Third Party Ad Provider 1340's middleware API 1344 to receive advertisements which the aircraft 1330 may then store in its Ad Pool 1314.

The targeted advertisements delivered by the aircraft 1330 and/or Third Party Ad Provider 1340 to the keyboard and display apparatus 1350 are typically displayed to the passenger using suitable user interface technologies such as HTML, Macromedia™ Flash, Portable Document Format (PDF), and the like. The User Interface Components 1354 that are installed with the keyboard and display apparatus 1350 are responsible for displaying the targeted advertisements to the passenger. The User Interface Components 1354 typically capture statistical data pertaining to the display of the advertisement, such as the time the passenger spends viewing an advertisement, the time it takes to browse through a list of advertisements, the time it takes for the passenger to purchase the advertised product or service, and other related metrics. The User Interface Components 1354 typically communicates the statistical data that it captures to the Advertisement Targeting System 1310, using middleware API 1346 and middleware API 1332.

When a passenger using the keyboard and display apparatus 1350 responds to a targeted advertisement by executing an action such as clicking on the Uniform Resource Locator (URL) associated with the targeted advertisement, the passenger is typically directed to an E-Commerce System 1360, which is a system that facilitates the online purchase of products and services. The E-Commerce System 1360 may be operated by the aircraft 1330, or the E-Commerce System 1360 may be operated by a third party company, for example the seller or

provider of the product or service being advertised. The E-Commerce System 1360 typically employs a middleware API 1356 to facilitate communication with the keyboard and display apparatus 1350 and the Advertisement Targeting System 1310 operated by the aircraft 1330. The Order Processing System 1358 is responsible for processing the purchase transactions that may be initiated by passengers using the the Front-end Trading System 1350.

Typically, the Advertisement Targeting System 1310, the User Interface Components 1354, the Order Processing System 1358, and the various middleware API's work together to facilitate purchase transactions, to perform business-related auditing, to gather statistical information about the purchasing behavior of passengers, and to perform other related functions.

FIG. 154 shows the internal structure of the Advertisement Targeting System. The Advertisement Targeting System 1310 typically uses a User Profiles 1312 database and an Ad Pool 1314 as inputs. The User Profiles 1312 database contains detailed information about passengers and their respective interests/preferences, demographics, purchasing history, and any other information that the owner of the Advertisement Targeting System 1310 consider relevant. A data record in the User Profiles 1312 database may represent a single person or entity, or a group of persons or entities categorized together based shared characteristics.

The Ad Pool 1314 is a database of advertisements containing information about the specifications of a product or service, purchasing information, images, referral-tracking information, and other merchandise-related information. The User Profiles 1312 database and the Ad Pool 1314 are typically generated and maintained by the owner of the Advertisement Targeting System 1310. The owner of the Advertisement Targeting System 1310 may also obtain the contents of the User Profiles 1312 database and the Ad Pool 1314 from third party companies such as market research firms, advertising firms, and the like.

The output of the Advertisement Targeting System 1310 is a set of Targeted Ads 1324 that match the interests of a given passenger. The Targeted Ads 1324 are typically packaged in a suitable data exchange format, such as XML. At the core of the Advertisement Targeting System 1310 is the Advertisement Targeting Engine 1326, which can be visually depicted as a funnel. A large set of potential advertisements retrieved from the Ad Pool 1314 are fed to the Advertisement Targeting Engine 1326. The Advertisement Targeting Engine 1326 gradually narrows down the set of advertisements by applying filtering and scoring rules to the set of advertisements until only a small set of advertisements is left.

The Advertisement Targeting Engine 1326 executes several steps to generate Targeted Ads 1324 that match the interests of a given passenger. The Filtering 1316 step quickly removes advertisements from the initial set of potential advertisements. In this step the Advertisement Targeting Engine 1326 applies broad rules, for example a date range or demographic criteria such as the gender or age of the target market for the advertisements. The Scoring 1318 step involves the application of computational methods, business rules, and other criteria, to evaluate how closely an advertisement matches the interests of a given passenger. During this step a score is associated with each advertisement based on the results of the aforementioned computational methods / business rules. An example of a business rule used during this step is the assignment of a higher score to advertisements made by a preferred company.

The Select Winning Ads 1320 step involves the application of further business rules against the set of advertisements generated by the previous steps, in order to rank the set of advertisements according to some criteria. An example of a business rule used during this step is to select the top N paid advertisements that maximize profits for the owner of the Advertisement Targeting System 1310. The Record History 1322 step involves the recording of the final output of the Advertisement Targeting Engine 1326 in the User Profile record of a given passenger. This information is typically used during subsequent executions of the Advertisement Targeting Engine 1326, for example to exclude advertisements that have been previously delivered to a given passenger.

FIG. 155 shows a representation of a desktop user interface 1150 presented to a typical passenger, for example, on display screen 15 of FIG. 1. During and after boarding of the passenger vessel, each seat's associated display screen may show the appropriate seat number and designated passenger name 1152 to avoid confusion and facilitate boarding and navigation within the vessel. A variety of general and targeted services are available to the passenger. For example, they may choose to browse and order items by clicking on duty free shopping icon 1154 to access the duty free catalog. Similarly, the user may listen to music or read online magazines 1156, watch an assortment of movies 1158, listen to radio or TV programs 1160, obtain flight info 1162 such as travel time remaining, obtain access to free software and services 1164 provided by the airline or software developers, access the internet 1166, compose and send email 1168, use software applications 1170 to open, edit, and save work files, access premium or prepaid services 1172, play online games 1174, and the like. General or targeted advertisements 1178 offering products or services may be presented to

each passenger during the course of their flight. If the passenger is carrying a device with data files or flash memory, the device may be connected to the terminal's host electronics via a wired or wireless connection. For example, if a flash memory device is connected to the keyboard USB jack, a USB device icon 1176 will appear on the desktop allowing the user to access stored files as well as to save data to the flash memory device.

FIG. 156 shows a preferred embodiment of a user interface for organizing and presenting archive data associated with users of the passenger keyboard and display apparatus of the present invention. The user interface window 1200 uses a graphical user interface component commonly known as TreeView component 1202 to represent the hierarchical organization of archive data associated with users of the keyboard and display apparatus. The TreeView component 1202 uses a hierarchical arrangement of icons (such as folder icons, document icons, and the like) to represent the categorization of archive data into groups. The TreeView component 1202 uses folder icons to represent groups of data, and document icons to represent specific data items such as text files, audio files, binary files, and the like. Typically, the archive data is categorized by seat number, by flight number, and by month and year. However, other methods for organizing and presenting archive data may also be used. It should be noted that the information presented in the user interface window 1200 is accessible only to authorized personnel, such as members of an airline's Flight Operations group.

The SEAT 30C folder icon 1204 represents archive data associated with the passenger who accessed the passenger keyboard and display apparatus installed on seat 30C, during a specific flight represented by the FLIGHT 1161 folder icon 1214, a specific date represented by SEPT. 15 folder icon 1216, and a specific month and year represented by the SEPT. 2004 folder icon 1218. The SEAT 30C folder icon 1204 contains the MY SEAT folder icon 1206, the ACTIVITY LOG document icon 1208, the PASSENGER document icon 1210, and the TARGETED ADS document icon 1212. It is understood that the SEAT 30C folder icon 1204 may contain other types of icons in addition to the aforementioned list. It is also understood that every passenger seat will be associated with a similar set of icons as the ones shown for seat 30C.

The MY SEAT folder icon 1206 contains data (such as Microsoft Word documents, multimedia files, and the like) saved by the user of the passenger keyboard and display apparatus installed on seat 30C.

The ACTIVITY LOG document icon 1208 represents data about the actions (such as visiting a website, viewing a movie, listening to music) performed by the user of the passenger keyboard and display apparatus. The PASSENGER document icon 1210 represents check-in information associated with the passenger. The TARGETED ADS document icon 1212 represents data about the advertisements that were shown to the user of the passenger keyboard and display apparatus.

FIGS. 157-158 show a flowchart for sending and delivering emails from an aircraft. FIG. 157 represents the sequence of actions that are performed by a user of the present invention in order to send emails using the passenger keyboard and display apparatus. FIG. 158 represents the sequence of actions that are performed by the system of the present invention in response to the sequence of user actions shown in FIG. 157.

In step 1220, the user of the passenger keyboard and display apparatus launches an email program (for example, Microsoft Outlook Express) that is accessible on the desktop user interface of the display apparatus. In step 1222, the user of the passenger keyboard and display apparatus composes an email by activating a Compose New Mail command available on the email program and entering the text of the email. Optionally, the user may also insert an attachment to the email during this step.

In step 1224, the user enters one or more recipient email addresses, and optionally a sender email address. If supplied, the sender email address is used by the system of the present invention to send a delivery confirmation notice to the user when the email is delivered. It is to be noted that the system of the present invention may automatically assign a virtual email address to a user of the passenger keyboard and display apparatus. The virtual email address is typically valid only for the duration of the flight, and is typically used to provide two-way email communication to the users of the present invention without requiring each user to have an actual email address. In step 1226, the user enters data for the other fields of the email, such as email addresses for the CC and BCC fields.

In step 1228, the user chooses an email delivery option. The user can choose between two options: Regular or Expedited. In the Regular email delivery option the email is temporarily stored in the aircraft email server's outbound queue, and is only relayed to a terrestrial mail server for delivery to the email's recipients when the aircraft lands. In the Expedited email delivery option the email is immediately relayed to a terrestrial mail server for delivery to the email's recipients. It is understood that the system of the present invention is not limited to the two email delivery options described herein, as other suitable methods may be used

without departing from the characteristics of the present invention. The Regular email delivery option is typically offered as a free service to the aircraft's passengers, while the Expedited email delivery option is typically offered as a paid service, or as a free service available only to First Class passengers.

In step 1230, the user sends the email by activating a Send command available on the email program. This step initiates background processing tasks performed by the system of the present invention on behalf of the user. The sequence of actions representing the background processing tasks performed by the system is shown in FIG. 158. In step 1232 the system of the present invention displays a dialog box asking the user if he/she wants to send another email. If the user responds with Yes, he/she is redirected to step 1222. If the user responds with No, the user is directed to step 1234 in which the email program is automatically closed by the system and the user is returned to the desktop user interface.

FIG. 158 represents the sequence of actions that are performed by the system of the present invention in response to the sequence of actions performed by the user, as shown in the flowchart of FIG. 157. In step 1236, the system of the present invention determines the email delivery option chosen by the user in step 1228 of the flowchart shown in FIG. 157. If the user chose Regular, the system performs step 1238; if the user chose Expedited, the system performs step 1244.

In step 1238, the system stores the email in the aircraft mail server's outbound queue. It is understood that the email server on board the aircraft has sufficient data storage capacity to store emails. The step 1240 is performed only when the aircraft lands. In step 1240, the system of the present invention automatically relays the email to a suitable terrestrial mail server for eventual delivery to the email's intended recipients.

In step 1242, the system optionally sends a delivery confirmation notice to the sender of the email. Note that the system will perform this step if the user entered a sender email address in step 1224 of the flowchart shown in FIG. 157. In step 1244, the system connects to the aircraft's on board Internet gateway server for the purpose of establishing a connection to a terrestrial mail server. In step 1248, the system displays a delivery confirmation notice to the user, in the form of a pop up window or an icon in the desktop user interface of the present invention.

FIG. 159 shows a preferred method of promoting software and services to a captive audience such as the passengers aboard an aircraft. The sequence of actions described herein are performed by the system of the present invention and the operator of the system, i.e. the

airline company. It is to be noted the the method described herein is not limited in applicability to passengers aboard an aircraft, but can be applied to passengers of other passenger vessels.

The step 1250 involves the installation of user terminals and supporting infrastructure necessary for the operation of the system. Supporting infrastructure includes but is not limited to server computers, local area network, connectivity to the Internet, fail over system, data backup system, operating systems, network security software, point of sales software, monitoring software, administrative software, and the like.

The step 1252 involves the installation of promotional software (also known as evaluation software) and services on the user terminals. Promotional software may also be installed to a shared location on a central server computer and accessed from that location by the users. The step 1254 involves the execution of targeting logic in order to select promotional software and services that closely match the user's interests, thereby increasing the chances of the user purchasing the software or subscribing to the service being promoted. It is to be noted that this step is optional, as targeting typically requires the availability of user profile data.

The step 1256 represents typical usage scenarios for promotional software and services. During this step the user typically forms impressions about the value of the software or services being promoted, affecting his/her decision to purchase the software or subscribe to the service. The step 1258 is an optional step that involves the installation of demos and tutorials to a location that can be accessed by the users of the system of the present invention.

In the step 1260, users are allowed to save or send data that may be produced by the promotional software or service. The data is typically saved in non-volatile memory, and may be archived for future reference. Typically, a printing service is also made available to users of the system to enable them to create hard copies of their data. The step 1262 involves making available facilities to enable users to purchase retail versions of promotional software or to subscribe to services. Typically, the aircraft operator employs facilities for secure payments, point-of-sales, shipping, and related facilities, to enable users to easily pay for items that they want to purchase.

As will be apparent to those skilled in the art, the present invention may be embodied in other specific forms and variations without departing from the essential characteristics and true spirit thereof. Accordingly, the foregoing description is intended to be illustrative, but not limiting. The intended scope of the invention may thus include other embodiments that do

not differ from the literal language of the claims. The scope of the present invention is accordingly defined as set forth in the following claims.

CLAIMS

What is claimed is:

1. A foldable table apparatus comprising a keyboard apparatus embedded within a table surface, at least one securing arm attached to said table apparatus, a display apparatus associated with said keyboard, electronics associated with the function of the keyboard apparatus, the display apparatus, or both, and a wired or wireless connection to a host PC or host computer system.
2. The foldable table apparatus of claim 1 wherein said table apparatus, or said keyboard apparatus, or said display apparatus provide a USB connector jack to connect a USB device.
3. The foldable table apparatus of claim 1 wherein the keyboard apparatus is a flippable keyboard.
4. The foldable table apparatus of claim 1 wherein the keyboard apparatus and the display apparatus are both located within said table apparatus.
5. The foldable table apparatus of claim 1 wherein the keyboard apparatus and the display apparatus may be used to access promotional software applications provided by said host PC or host computer system.
6. The foldable table apparatus of claim 1 wherein the keyboard apparatus and the display apparatus may be used to compose and send an email.

69

Application No: GB0519779.3

Examiner: Dr Mark Shawcross

Claims searched: 1-6

Date of search: 2 December 2005

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6	US 2003/0184957 A1 (STAHL et al.) see figures 1 & 2
X	1-6	WO 01/30607 A1 (WILSON) see figures
X	1-6	US 4584603 A (HARRISON) see figures
X	1-6	US 2168880 A (MESSERSCHMITT) see figure 4
X	1-6	US 5975780 A (FUKAMI) see abstract and figures
X	1-6	GB 2382980 A (SHINING) see figures 4 & 5
X	1-6	US 2003/0197451 A1 (MICHAEL) see figures 1 & 2
X	1-6	DE 10133470 A1 (ELEMENT) see abstract and figure 1
X	1-6	DE 19825356 A1 (STOLZE) see figures 5 & 6
X	1-6	DE 19533494 A1 (ROEMER) see figures 1 & 2

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| combined with one or more other documents of same category. | before the filing date of this invention. |
| & Member of the same patent family | E Patent document published on or after, but with priority date earlier than, the filing date of this application. |

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

G4A

Worldwide search of patent documents classified in the following areas of the IPC⁰⁷

B60N; B60R; B64D; G06F

The following online and other databases have been used in the preparation of this search report

Online: EPODOC, WPI