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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to conference tables and more specifically to a conference table that has a particularly advantageous shape and dimensions in a specific juxtaposition with respect to a display and whiteboard subassemblies.

[0002] Many different types of conference tables have been designed for use by small groups of people (e.g., 2 to 5 or 6 persons). For instance, some small conference tables are round, some are square, some are rectangular, etc., so that conference attendees around the edges of the table top are generally encouraged by the shape of the table to orient themselves toward the center of the table. In many cases conference attendees bring laptop computers or other types of computing devices to conferences so that they can share information with other attendees. In some cases additional presentation and sharing equipment is employed by attendees. For instance, in at least some cases a projector or flat panel display is used to present electronically stored information. Here, in some cases electronic switching systems may be provided that allow each of several different laptop computers or the like to be linked to a display driver so that multi-source control thereof is easily affected. As another instance, flip charts and whiteboards are often used to generate information and to develop/generate group ideas. Unfortunately, known small group supporting furniture and sharing configurations have several shortcomings.

[0003] First, in cases where a display screen is spaced from a conference table, the table can accommodate people along all edges including the edge adjacent the display. Here, when a conference attendee assumes a position between the table and the display screen, when the screen is employed, the attendee has to either turn around to face the display which causes the attendee to turn his back to other attendees or has to physically move to another location about the table. Either one of these choices is disruptive to communications and the conference as a whole.

[0004] Second, where a space exists between a table and a display screen, the screen and information thereon often takes a background role as opposed to being a more central part of the conference. This is particularly true in cases where flat panel displays of relatively modest size (e.g., 2-3 feet wide) are employed as the distance between the displayed information and the size of that information can cause that information to be relegated to the background. Here, in at least some application larger display screens are cost prohibitive.

[0005] Third, in cases where a switcher is used to allow any attendee to take control of information presented via a common display screen, known switcher hardware requires a large number of cables and control lines that tend to clutter a conference table top and therefore these products, while useful, are generally considered unsightly.

[0006] Fourth, where whiteboards and flip charts are used to generate images, methods and systems for capturing those images are relatively expensive. For instance, some systems include dedicated digital cameras that can be controlled to take pictures of whiteboard images that are then stored for subsequent access. Other systems include sensors for sensing activities with a writing instrument on a whiteboard or flip chart surface which are then used to generate a digital image corresponding to activities. The digital image is stored for subsequent access. Here, the camera and/or sensors are relatively expensive hardware components and therefore are not suitable for many applications.

[0007] Thus, what is needed is a conferencing system for facilitating small group activities where electronic information is to be shared among conference attendees where the orientation of attendees to the information and to each other helps facilitate both attendee discussions as well as attendee viewing of information presented and where whiteboards can be used to present information and where information on the whiteboards can be copied inexpensively using a standard office copy machine. In addition it would be advantageous to have a system of the above kind where display control hardware is substantially concealed.

[0008] JP 2006-122645 relates to a table which is capable of partitioning space.

BRIEF SUMMARY OF THE INVENTION

[0009] It has been recognized that by placing a display screen along one edge of a table top surface and angling table top member edges in a specific fashion, conference attendees along the angled edges can be encouraged to orient themselves in juxtapositions such that they generally face each other and also partially face the information being presented to the conferencing group. Thus, for instance, by providing a table top member that has a rear edge adjacent a display, a front edge opposite the display and first and second lateral edges that traverse the distance between the front and rear edges and that converge from the rear to the front edge, attendees along the lateral edges are optimally oriented to share information via the display and to carry on conversations at the table. It has also been recognized that the top member may also be provided with side portions that help to maintain a comfortable viewing distance between attendees along the lateral edges and the front surface of a display screen.

[0010] Moreover, it has been recognized that whiteboard assemblies can be provided along side edges of the display for sharing information in a more manual fashion. In particularly advantageous embodiments each whiteboard assembly may include two or more relatively small whiteboards for sharing information where the writing surface of each of the whiteboards is sized to be re-

ceived on a copier/'scanner for generating images of the whiteboard information for storage and subsequent retrieval. In at least some embodiments the whiteboards may be mounted to a support structure for quick release for copying/scanning or so that attendees can apply information to the whiteboards in a comfortable orientation (i.e., with the board on the table top surface, in the attendees lap, etc.). In some cases the quick release mechanism may include a magnet and a metallic surface.

[0011] Here, while copier/scanner size whiteboards may be too small for facilitating large group discussions, it has been found that such small scale whiteboards are suitable for sharing in smaller groups where the whiteboards are presented in close proximity to a group/conference table as shown in Fig. 1 and described below.

[0012] Furthermore, it has been recognized that video and/or power and/or display control cables for linking to laptops or the like cables can be provided within a table so that the typical mess associated with multiple source linkage to a common display and to power outlets can be substantially avoided.

[0013] In a first aspect, the present invention provides a table assembly as recited in claim 1.

[0014] In some cases the main side edge further includes a main front edge that is substantially straight and that is substantially parallel to the main rear edge. In some cases a depth dimension between the main rear edge and the main front edge is between four and six feet. In some cases the depth dimension is substantially fifty-six inches and the main front edge has a length dimension that is substantially thirty inches. In some cases the first and second side portions have substantially similar shapes. In some cases the first and second side portions include first and second side rear edges that are aligned with the main rear edge, respectively, and wherein the first and second side portions further include first and second side front edges that are substantially parallel to the first and second side rear edges, respectively.

[0015] In some cases each of the first and second side portions has a depth dimension between the side front edge and the side rear edge that is between eight inches and twenty-four inches. In some cases the depth dimension is substantially twelve inches.

[0016] In some cases first and second side rear edges that are aligned with the main rear edge. In some cases the first and second side portions further include first and second side lateral edges that extend from the distal ends of the first and second side front edges to the first and second side rear edges and wherein the first and second side lateral edges are substantially straight and substantially parallel to the first and second main lateral edges, respectively.

[0017] In some cases the first and second side front edges form obtuse angles with the first and second main lateral edges, respectively. In some cases the acute angles are between sixty and eighty-five degrees and wherein the obtuse angles are between ninety-five and one hundred and twenty degrees.

[0018] Some cases further include a display screen supported adjacent the main rear edge where a front display surface of the display screen is viewable above the top surface of the table top member. In some cases the display screen has a width dimension that is less than a length dimension of the main rear edge and wherein the display screen is substantially centered along the length of the main rear edge. In some cases the display includes first and second substantially vertical lateral display edges and wherein at least first and second whiteboards are supported adjacent the first and second lateral edges, respectively. In some cases the front surfaces of the whiteboards are substantially coplanar with the front surface of the display screen when the whiteboards are mounted adjacent the display lateral edges. In some cases the whiteboards are secured adjacent the lateral edges via a quick release mechanism so that the boards can be quickly removed from the supported positions. Some embodiments further include first and second board support members positioned adjacent the first and second lateral display edges wherein the first and second whiteboards are mountable to the first and second support members, respectively.

[0019] In some cases each of the support members includes at least one metallic surface facing in the same direction as the display screen and wherein each of the whiteboards includes at least one magnet that cooperates with the metallic surface to support the whiteboard in the supported position adjacent the display. In some cases the support members further include a male alignment extension and wherein the first and second boards include female alignment recesses that receive the mail alignment extensions when the whiteboards are mounted to the support members. In some cases the female alignment recesses are openings that form whiteboard handles. In some cases each of the whiteboards has height and width dimensions that are less than two feet and less than two feet, respectively.

[0020] In some cases each of the whiteboards has height and width dimension that are substantially 9 and 11 includes, respectively. In some cases the display includes first and second substantially vertical display lateral edges and wherein at least first and second whiteboards are supported adjacent the first lateral edge and third and fourth whiteboards are supported adjacent the second lateral edge. Some embodiments further include first and second support members that are located adjacent the first and second lateral display edges, respectively, wherein the support members each include a metallic front surface that faces the same direction as the display screen front surface and wherein each of the whiteboards includes magnets for securing the whiteboard to one of the support members via the metallic front surface.

[0021] Other embodiments include a whiteboard assembly further comprising a substantially flat whiteboard member that includes substantially oppositely facing front and rear surfaces and that forms a first whiteboard

aligner, the whiteboard member further including one of a magnet and a metallic coupler and a support member that includes the other of a magnet and a metallic coupler and that forms a first support aligner, wherein the first support aligner is configured to cooperate with the first whiteboard aligner to restrict the orientation of the whiteboard member with respect to the support member when the whiteboard member is mounted to the support member via the magnet and the metallic coupler.

[0022] In some cases the first whiteboard aligner includes at least one female opening and the first support aligner includes at least one male extension that is receivable within the female opening. In some cases the female opening is adjacent an edge of the whiteboard and forms a handle. In some cases the first whiteboard aligner includes first and second female openings and the first support aligner includes first and second male extensions that are receivable within the first and second female openings, respectively. In some cases the whiteboard member is rectilinear and wherein the first and second female openings are formed adjacent first and second oppositely facing edges, respectively. In some cases the first and second female openings form first and second handles.

[0023] In some cases the whiteboard member is substantially rectilinear including height and width dimensions and wherein the height and width dimensions are each less than twenty-four inches. In some cases the height and width dimensions are substantially nine and eleven inches, respectively. In some cases the support member includes the metallic coupler and the whiteboard member includes the magnet. In some cases the support member forms a substantially flat metallic surface and wherein a portion of the metallic surface forms the metallic coupler. In some cases the whiteboard member is substantially rectilinear and is a first whiteboard member, the assembly further including a second substantially rectilinear whiteboard member that includes a second magnet and that forms a second whiteboard aligner, the support member including a second support aligner that cooperates with the second whiteboard aligner to restrict the position of the second whiteboard member with respect to the support member when the second whiteboard member is mounted to the support member via the second magnet and the metallic coupler.

[0024] In some cases the first and second support aligners restrict positions of the first and second whiteboard members such that the first and second whiteboard members are simultaneously mountable to the support member. In some cases, when the first and second whiteboard members are mounted to the support member, adjacent edges of the whiteboard members are substantially parallel.

[0025] In some cases the magnet includes a strip magnet that is secured to the rear surface of the whiteboard member. In some cases the magnet is visually concealed between the front and rear surfaces of the whiteboard member and wherein each of the front and rear surfaces of the whiteboard member is writable/erasable.

[0026] Still other embodiments further include a whiteboard assembly comprising a first substantially flat rectilinear whiteboard member that includes substantially oppositely facing front and rear surfaces, a second substantially flat rectilinear whiteboard member that includes substantially oppositely facing front and rear surfaces and a support member that at least in part defines a board supporting space and that includes at least first and second support aligners that cooperate with the first and second whiteboard members to restrict the juxtapositions of the whiteboard members within the board supporting space so that the first and second whiteboards can be simultaneously located within the board supporting space.

[0027] In some cases the support member further includes a substantially flat support surface that defines one side of the board supporting space and wherein the first and second support aligners extends from the support surface. In some cases the first and second whiteboard members form first and second female openings for receiving the first and second support aligners, respectively.

[0028] To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described. The following description and the annexed drawings set forth in detail certain illustrative aspects of the invention. However, these aspects are indicative of but a few of the various ways in which the principles of the invention can be employed. Other aspects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0029]

Fig. 1 is a perspective view of a table/conferencing configuration that is consistent with at least some aspects of the present invention;

Fig. 2 is a top plan view of the system shown in Fig. 1;

Fig. 3 is a front plan view of the system shown in Fig. 1;

Fig. 4 is a side plan view of the system shown in Fig. 1;

Fig. 5 is a top plan view of the table top member shown in Fig. 1;

Fig. 6 is a perspective view generally showing the front of one of the whiteboard subassemblies of Fig. 1;

Fig. 7 is similar to Fig. 6, albeit showing a perspective view generally of the rear surface of the whiteboard subassembly;

Fig. 8 is a perspective view generally showing the front of one of the support structures or members of

Fig. 1;

Fig. 9 is a perspective view generally showing the rear of one of the support structures or members of Fig. 1;

Fig. 10 is a cross-sectional view taken along the line 10-10 in Fig. 3;

Fig. 11 is a schematic illustrating an exemplary switching/control assembly that may be included as a portion of the table shown in Fig. 1;

Fig. 12 is similar to Fig. 2, albeit showing a second exemplary table/conferencing system;

Fig. 13, which is not according to an aspect the present invention, is similar to Fig. 2, albeit showing a third exemplary table/conferencing system;

Fig. 14 is a simplified perspective view one of the whiteboard subassemblies of Fig. 1 being positioned on a conventional copier/scanner machine;

Fig. 15 is a cross-sectional view taken along the line 15-15 in Fig. 6, albeit showing a second whiteboard assembly embodiment including internally mounted magnetic strips where the whiteboard has two writable/erasable surfaces;

Fig. 16 is similar to Fig. 3, albeit showing a system including additional whiteboard assemblies of a second type;

Fig. 17 shows one of the whiteboard assemblies of the second type of Fig. 16 in an exploded perspective view; and

Fig. 18 shows the assembly of Fig. 17, albeit where whiteboards are mounted to a support structure.

DETAILED DESCRIPTION OF THE INVENTION

[0030] Referring now to the drawings wherein like reference numerals correspond to similar elements throughout several views and, more specifically, referring to Figs. 1 through 10, embodiments of the present invention will be described in the context of an exemplary small group conferencing system 10 that includes a table assembly 12, an electronic flat panel display screen 14 and first and second whiteboard assemblies 16a and 16b, respectively. In at least some embodiments, display screen 14 will be mounted to a permanent or semipermanent wall structure (not labeled) with the whiteboard assembly 16a and 16b on opposite sides thereof and table assembly 12 will be positioned adjacent the wall with a long edge thereof adjacent and below display 14 as best illustrated in Figs. 1 and 2.

[0031] Display 14 includes a front display surface 50 and, while shown as a flat panel monitor, may instead be provided via a projector (front or back) and a projection screen. In advantageous embodiments, a width dimension of display screen 50 is any where between 24 and 48 inches and, in particularly advantageous embodiments, the width of screen 50 is approximately 30 inches. A height dimension of screen 50 is approximately sixteen to twenty-five inches.

[0032] Referring still to Figs. 1 through 5, table assembly includes a top member 20, leg support structure collectively identified by numeral 22 and a control box/switcher hardware (see 60 in Fig 11). Leg support structure 22 can take any of several different forms but must be sufficient to support top member 20 at an appropriate height for use by conference attendees (see phantom in Fig. 4) adjacent table top 20. Top member 20 includes oppositely facing top and bottom surfaces 24 and 26, respectively, and includes a plurality of edges that define a generally T-shaped structure when viewed in top plan view as best seen in Figs. 2 and 5. To this end, referring to Fig. 5, top member 20 includes a main portion 70 and first and second side portions 72 and 74 where main portion 70 is defined by a substantially straight main rear edge 90 and a main side edge where the side edge includes first and second substantially oppositely facing main lateral edges 94 and 96, respectively, and a main front edge 92. The main front and rear edges 92 and 90, respectively, are substantially parallel and define a depth dimension D1 that is between four and six feet in at least some embodiments. In particularly advantageous embodiments, the depth dimension D1 is approximately 56 inches. In addition, in advantageous embodiments, the main rear edge 90 has a width dimension D2 of approximately 48 inches while the main front edge 92 has a width dimension of approximately 30 inches. These table and display screen dimensions are not completely arbitrary and instead have been selected/chosen based on experiments related to the size of information presented via the display 14 and optimal/advantageous viewing distances therefrom. Here, given the size of display 14, optimal viewing distances exist, it is believed, within the space shown in Fig. 2 between phantom arcs 73 and 75 and the table top edges and dimensions encourage viewing from within the arc defined space.

[0033] Referring still to Fig. 5, the main lateral edges 94 and 96 converge toward each other along their lengths from rear edge 90 toward front edge 92 so that each of the main lateral edges 94 and 96 forms an acute angle a1 with main rear edge 90. In at least some embodiments, acute angle a1 is between 60° and 85° and in a particularly advantageous embodiments angle a1 is approximately 75°.

[0034] Referring to Fig. 5, first side portion 72 extends from first main lateral edge 94 adjacent rear edge 90 and includes a first side edge 98 that is aligned with and is substantially integral with rear edge 90. Side portion 72 also includes a first side front edge 106 which is substantially parallel to first side rear edge 98. Portion 72 further includes a first side lateral edge 102 which is substantially parallel to first main lateral edge 94. First side rear edge 98 has a width dimension D4 that is, in at least some embodiments, between 10 and 20 inches and, in particularly advantageous embodiments, is approximately 12 to 13 inches. Portion 72 has a depth dimension D5 between front and rear edge 106 and 98, respectively, that is between 10 and 20 inches in some embodiments and,

in particularly advantageous embodiments, is approximately 12 inches. Referring still to Fig. 5, in at least some embodiments, first side front edge 106 converges toward first side rear edge 98 along the length from edge 94 toward edge 102 so that front edge 106 forms an obtuse angle a2 with the first main lateral edge 94. In at least some embodiments the obtuse angle a2 is between 95° and 120°.

[0035] Referring still to Fig. 5, second side portion 74 has dimensions and a shape that are similar to the dimensions and shape of first side portion 72 and therefore will not be described here in detail. Here, it should suffice to say that second side portion 74 extends laterally from first main lateral edge 96 adjacent rear edge 90 and includes a second side rear edge 100, a second side front edge 108 and a second side lateral edge 104.

[0036] Referring yet again to Fig. 5, in the illustrated embodiment, top member 20 forms first, second and third cable openings 32a, 32b and 32c, respectively, approximately centrally, within main portion 70. As the label implies, cable openings 32a, 32b and 32c are provided to enable power, data and/or video cables to pass from an undersurface of the top member 20 to the space thereabove. In the illustrated embodiment, first, second and third cables 49a, 49b and 49c that include first, second and third cable connectors 48a, 48b and 48c, respectively, are illustrated, where cables 49a, 49b and 49c pass through openings 32a, 32b and 32c, respectively.

[0037] Referring once again to Fig. 5, top member 20 also forms button openings (not separately labeled) through which first, second and third display control buttons 34a, 34b and 34c pass. Control button 34a is located approximately mid-way along the length of first main lateral edge 94 and is adjacent edge 94. Similarly, control button 34b is positioned approximately mid-way along the length of second main lateral edge 96 and adjacent edge 96 and button 34c is positioned approximately midway along the length of main front edge 92 and adjacent edge 92. As will be described in more detail below, control buttons 34a, 34b and 34c can be used by conference attendees to take control of the information displayed via display screen 14 (see again Fig. 1).

[0038] Referring again to Fig. 5, in at least some embodiments indicia are provided on the top surface 24 of top member 20 to help conference attendees associate the control buttons 34a, 34b and 34c with specific ones of the cables 49a, 49b and 49c that pass up through openings 32a, 32b and 32c. To this end, exemplary indicia 80 and 82 in Fig. 5 include arrows adjacent button 34a and opening 32a respectively, that point toward each other indicating that button 34a is associated with the cable 49a and connector 48a that passes up through opening 32a. Here, in at least some embodiments, connector 48a is sized with respect to opening 32a such that the connector 48a cannot pass therethrough. Thus, once installed, when cable 49a is pushed back through opening 32a, connector 48a becomes lodged within opening 32a and remains accessible from the space above top member 20.

[0039] Referring once again to Figs. 3 and 4, control box 60 is mounted to the bottom surface 26 of table top 20 in at least some embodiments. Referring also to Fig. 11, a switcher 69 may be mounted within box 60 in some embodiments. Here, switcher 69 is provided to allow conference attendees to take control of information presented via display 14. To this end, switcher 69 includes, in the illustrated embodiment, three control inputs linked to control buttons 34a, 34b and 34c, three video input ports linked to laptop computers 56a, 56b and 56c via cable 49a 49b and 49c, respectively (see again Fig. 5), and one video output port connected to display 14. Here, when button 34a is selected, video from laptop 56a that is linked to cable 49a where cable 49a is associated with button 34a is provided as to output display 14. Similarly, when either of buttons 34b or 34c is selected, output of the associated one of laptops 56b and 56c is provided to display 14. For example, referring once again to Fig. 2, assuming output from laptop 56a is currently being provided to display 14, if button 34b is selected, the output from laptop 56b is provided to display 14 and the attendee using laptop 56b effectively take control of common display 14. Similarly, if button 34c is selected, the attendee using laptop 56c effectively takes control of display 14.

[0040] Referring still to Fig. 11, in at least some embodiments it is contemplated that when one of the buttons 34a, 34b or 34c is selected, in addition to the output of an associated laptop being provided to display 14, switcher 69 may provide signals that cause illumination devices associated with top member 20 to be illuminated thereby indicating which attendee or laptop currently has control of the display 14. To this end, exemplary illumination devices 33a, 33b and 33c that are associated buttons 34a, 34b and 34c are shown. Thus, when button 34a is selected, device 33a may be illuminated, when button 34b is selected, device 33b may be illuminated and when button 34c is selected, device 33c may be illuminated. Although not shown, in at least some embodiments the illumination devices 33a, 33b and 33c may be integrally formed with button 34a, 34b and 34c so that the selectable buttons themselves actually are illuminated when selected. In the alternative, illumination rings or the like around openings 32a, 32b and 32c as seen in Fig. 2 may illuminate when associated buttons are selected. In an alternative embodiment, referring once again to Fig. 5, indicia 80 and 82 may include illumination devices for indicating who has control.

[0041] In particularly advantageous embodiments, a button and an associated illumination device may be separated so that the button is adjacent an edge of the table top member 20 so that it can easily be accessed by an attendee while the associated illumination device is located more centrally with respect to the table top member 20 so that, while still being associated with the general space occupied by the attendee, the illumination device is at a location where others at the table assembly can easily see the device and ascertain who has control.

Thus, for example, in Fig. 5, button 34a is adjacent edge 94 and an illumination device (e.g., 33a in Fig. 11) may be formed as an integral part of indicia 82 at a location easily viewable by attendees along table edges 92 and 96.

[0042] Referring once again to Figs. 1 through 4 and also to Figs. 6 through 10, each of the whiteboard assemblies 16a and 16b is similarly constructed and operates in a similar fashion and therefore, in the interest of simplifying this explanation, only whiteboard assembly 16a will be described in detail. Assembly 16a includes a support/storage structure 42a and first and second whiteboard subassemblies 40a and 40b, respectively. As best seen in Figs. 8 and 9, support structure or member 42a is a box-like structure including a front wall 144, a rear wall 146, a top wall 140 and a bottom wall 142. Front wall 144 is substantially rectilinear including substantially parallel top and bottom edges 162 and 164, respectively, and first and second side edges 166 and 168, respectively, that traverse the distance between opposite ends of top and bottom edges 162 and 164, respectively, and forms a substantially planar front surface 160. First and second support aligners 150 and 152, respectively, extend from front surface 160. In the illustrated embodiment, each of the aligners 150 and 152 includes an elongated extension that extends along a portion of and adjacent edge 166. Each of aligners 150 and 152 extends from surface 160 approximately the thickness dimension of one of the whiteboard assemblies 40a (see Figs. 6 and 7). In at least some embodiments, at least a portion of surface 160 is metallic so that magnetic components or elements can be attached thereto.

[0043] Referring still to Figs. 8 and 9, rear wall member 146, like front wall member 144, is substantially rectilinear and is spaced apart and parallel to front wall member 144 so that a space 180 is formed therebetween. Rear wall member 146 forms mounting holes 148 for receiving screw heads for attaching structure 42a to the front surface of a wall or the like. Top wall member 140 connects the top edges of front and rear wall members 144 and 146, respectively, while bottom wall member 142 similarly connects the bottom edges of wall members 144 and 146. Top and bottom wall members 140 and 142, respectively, have width dimensions between the front and rear wall member 144 and 146, respectively, such that when the whiteboard subassemblies 40a and 40b (see again Fig. 1) are mounted to front surface 160, the combined thickness of structure 42a and whiteboard subassemblies 40a and 40b is substantially equal to the thickness dimension of display screen 14 so that, when display screen 14 and assembly 16a are mounted as shown in Fig. 2, a front surface of each of the whiteboard subassemblies 40a and 40b is substantially co-planar with a front surface 50 of display 14 (see again Fig. 2). In at least some embodiments structured 42a will be formed of bent steel so that entire front surface 160 is metallic.

[0044] Referring once again to Fig. 1, each of the whiteboard subassemblies 40a, 40b, 40c and 40d is similarly constructed and operate in a similar fashion and therefore, in the interest of simplifying this explanation, only subassembly 40a will be described here in detail. Referring also to Figs. 6 and 7, whiteboard subassembly 40a includes a whiteboard member 109 and first and second magnetic strips 130 and 132, respectively. Whiteboard member 109 is a rigid rectilinear member having front and rear surface 110 and 112, respectively that is defined by substantially parallel top and bottom edges 114 and 116, respectively, and first and second lateral edges 118 and 120, respectively. Front surface 110 includes a coating on which dry eraser type ink can be applied and from which ink can be erased as well known in the art.

[0045] Member 109 forms first and second whiteboard aligners 122 and 124. In the illustrated embodiment, aligners 122 and 124 include openings that extend through member 109 where first aligner 122 is an elongated opening that extends along and adjacent a central portion of edge 118 and second aligner 124 is an elongated opening that extends along and adjacent the central portion of edge 120. Referring also to Fig. 8, each of the openings 122 and 124 is sized and dimensioned to relatively snuggly receive either one of the support aligners 150 and 152. To this end, see also Fig. 10 that shows support aligner 150 received within opening 124. Here, it should be appreciated that when aligner 150 is received within opening 124, the aligners 124 and 150 cooperate to restrict the juxtaposition and orientation of board member 109 with respect to support structure 42a.

[0046] Referring still to Fig. 7, magnetic strips 130 and 132 are adhered to rear surface 112 of board member 109. Magnetic strips 130 and 132 cooperate with the magnetic portion of front surface 160 (see again Fig. 8) of support structure 42a to releasably attach or secure board member 109 thereto. As best illustrated in Fig. 2, whiteboard 40a has a width dimension W1 (see also Fig. 6) that is greater than the dimension of surface 160 (see again Fig. 8) between lateral edges 166 and 168 such that, when edge 120 of board 109 is aligned with and substantially adjacent to edge 166 of surface 160, the portion of board 109 adjacent edge 118 extends past edge 168 of surface 160. Thus, when board 109 is mounted to surface 160, the handle formed by opening 122 is easy to grasp for removing board 109 from surface 160.

[0047] Referring to Fig. 6, surface 110 of board 109 has a height dimension H1 perpendicular to width dimension W1. The space between openings 1122 and 124 forms a board width dimension W2 which is smaller than dimension W1. In at least some embodiments, the height H1 and width W2 dimensions are selected such that that portion of surface 110 can be laid on a conventional copier or scanner machine to obtain a picture of any information applied to surface 110. Thus, for example, dimension H1 and W2 may be 8 ½ inches and 11 inches, respectively. In other cases, the dimensions H1 and W2 may correspond to A4 sized paper or any other conventionally sized paper used with typical copies/scanners.

To this end, see also Fig. 14 that shows a copier/scanner 190 having a copy window 192 on which the front surface 110 (see again Fig. 6) of board 40a can be set for obtaining an image of information applied to surface 110.

[0048] Referring once again to Figs. 1 through 4, to configure system 10, display 14 is mounted to a supporting wall structure and whiteboard assemblies 16a and 16b are mounted on opposite sides of display 14 as shown. Table assembly 12 is assembled and is moved into a position with the long rear edge thereof butting up against or substantially immediately adjacent the supporting wall structure so that display 14 is centered along the length of the rear edge (see specifically Fig. 2). Switcher 69 is mounted within control box 60 and the cables 49a, 49b and 49c are linked thereto with distal ends thereof passing through openings 32a, 32b and 32c for connection to laptops above top surface 24. Attendee seating 52a, 52b and 52c is arranged around top member 20 as best shown in Fig. 2.

[0049] At this point, it should be appreciated that, when attendees use system 10, each attendee may bring his own laptop 56a, 56b or 56c to table 12 and link up to switcher 69 via one of cables 49a, 49b or 49c. As information is shared via display 14, the shape of top member 12 naturally causes the attendees to generally face each other and to also, at least in part, be angled toward front surface 50 of display 14. Thus, the attendees can carry on conversations with each other while facing each other or can easily shift their attention to the information presented via display 14 and the table helps to accommodate both types of communication very effectively. In addition, it should be appreciated that, the side portions 72 and 74 as best seen in Fig. 5, cause a comfortable viewing distance to exist between attendees along edges 94 and 96 and the front surface of display 14. Here, it is believed that the dimensions of portions 72 and 74 help users maintain a comfortable distance from surface 50 for viewing purposes while also providing additional work surface for attendee use.

[0050] Referring still to Fig. 1, any of the whiteboard subassemblies 40a, 40b 40c and 40d can be removed from support structures 42 and 42b and information can be applied thereto by any of the attendees. After information is applied to one of the whiteboard subassemblies, the subassembly can easily be re-mounted or attached to the supporting structure by aligning one of the handle openings (see 124 in Fig. 6) of board member 109 with one of the support aligners (see 150 in Fig. 8) and moving the subassembly into a position wherein the magnetic strips 130 and 132 contact the front surface of the associated support structure. When desired, information on the front surface of one of the whiteboard subassemblies 40a, 40b, etc., can be copies by removing the subassembly from the support structure and placing the front surface thereon on a copy machine window as shown in Fig. 14.

[0051] Moreover, referring to Fig. 10, it should be appreciated that, in at least some embodiments, additional whiteboard subassemblies 40x may be provided with each of the whiteboard assemblies (e.g., 16a, 16b) where the additional whiteboard subassemblies 40x can be stored in the space 180 formed by support structure 42a. Thus, an exemplary whiteboard assembly 16a may include three, four or more whiteboard subassemblies like subassembly 40a described above.

[0052] Referring now to Fig. 12, a second exemplary system 10a is illustrated that includes many components that are similar to or are identical to the components described above with respect to system 10. Here, components that are identical or substantially similar to the components described above are identified by the same labels used above. For example, whiteboard subassemblies in Fig. 12 are labeled 16a and 16b, the display is labeled 14, etc. Here, the primary difference between system 10 above and system 10a in Fig. 12 is that the table top 20b has a different shape, includes only two openings 32a and 32b and two cable sets and accommodates only two control buttons 34a and 34b. System 10a is generally provided to accommodate two conference attendees as opposed to three although a third may be located along main front edge 92. In this case, when one of buttons 34a or 34b is selected, selection thereof causes an associated one of the laptops to control information presented on the common display 14.

[0053] Referring to Fig. 13, which is not according to an aspect of the present invention, but is provided for information purposes, one additional system 10b is shown, albeit including a differently shaped table top member 20b where the main portion of top member 20b does not include straight edges and instead has a shape akin to an ellipse. Here it should be appreciated that top 20b still includes first and second side portions that extend from the main portion so that the overall shape is still generally a T-shape.

[0054] Referring now to Fig. 15, a cross-sectional view of another embodiment of a whiteboard subassembly 240a is shown where the cross-section is taken along line 15-15 in Fig. 6. Subassembly 240a includes a rectilinear core structure 250, a writable/erasable cover 252 and magnet strips 246 and 248. Magnets 246 are embedded in the core structure 250 on a first side while magnets 248 are embedded in structure 250 on a second side 244 opposite the first side.

[0055] Cover 252 completely covers sides 242 and 244 and is formed of a material (e.g., plastic) that enables magnetic attraction to occur therethrough. Here, when mounting subassembly 240a to a metallic support structure, either side 242 or 244 can be butted up against the metallic surface (see 160 in Fig. 8) and information can be applied to either surface 242 or 244 or both of the surfaces.

[0056] Referring to Fig. 16, another table system 10c is illustrated that is similar to the system of Fig. 1, albeit including two additional whiteboard assemblies 16c and 16d that have a slightly different design than the assemblies 16a and 16b. Referring also to Figs. 17 and 18,

exemplary assembly 16c is illustrated that includes a support structure or member 260 and two whiteboard subassemblies 40e and 40f. Subassemblies 40e and 40f are similar to assembly 40a described above.

[0057] Structure 260 is different than structure 42a described above in that structure 260 includes aligners 262 and 264 spaced apart along a central portion of a metallic front surface 266 to accommodate whiteboards 40e and 40f in a horizontally aligned fashion as seen in Fig. 18. As seen in Fig. 16, the additional assemblies 16c and 16d provide additional whiteboard space for use by attendees.

[0058] One or more specific embodiments of the present invention have been described above. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of design, fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

Claims

1. A table assembly (12) for use in a space including a supporting surface, the assembly comprising:

a table top member (20) having oppositely facing top (24) and bottom (26) surfaces, a main portion and first (72) and second (74) side portions, the main portion (70) including at least a substantially straight main rear edge (90) and a main side edge that together at least in part define the shape of the main portion (70), the main side edge including first (94) and second (96) substantially oppositely facing main lateral edges, the first (72) and second (74) side portions including first (98) and second (100) side rear edges that are aligned with the main rear edge (90), respectively, the first (72) and second (74) side portions further including first (106) and second (108) side front edges that extend from the first (94) and second (96) main lateral edges to distal ends of the side front edges (106, 108) and that converge toward the first (98) and second (100) side rear edges, respectively, **characterized in that**,

the first (94) and second (96) main lateral edges are substantially straight edges that form acute angles with the main rear edge and that converge toward each other opposite the main rear edge (90), and the first (72) and second (74) side portions extending in substantially opposite directions from the main portion adjacent the main rear edge (90).

2. The assembly of claim 1 wherein the main side edge further includes a main front edge (92) that is substantially straight and that is substantially parallel to the main rear edge (90).

3. The assembly of claim 2 wherein the first (72) and second (74) side portions include first (98) and second (100) side rear edges that are aligned with the main rear edge (90), respectively, and wherein the first (72) and second (74) side portions further include first (106) and second (108) side front edges that are substantially parallel to the first (98) and second (100) side rear edges, respectively.

4. The assembly of claim 1 wherein the first (98) and second (100) side rear edges are aligned with the main rear edge (90).

5. The assembly of claim 3 wherein the first (72) and second (74) side portions further include first (102) and second (104) side lateral edges that extend from the distal ends of the first (106) and second (108) side front edges to the first (98) and second (100) side rear edges and wherein the first (102) and second (104) side lateral edges are substantially straight and substantially parallel to the first (94) and second (96) main lateral edges, respectively.

6. The assembly of claim 3, wherein the first (106) and second (108) side front edges form obtuse angles with the first (94) and second (96) main lateral edges, respectively.

7. The assembly of claim 6 wherein the acute angles are between sixty and eighty-five degrees and wherein the obtuse angles are between ninety-five and one hundred and twenty degrees.

8. The assembly of claim 1 further including a display screen (14) supported adjacent the main rear edge (90) where a front display surface (50) of the display screen (14) is viewable above the top surface (24) of the table top member (20).

9. The assembly of claim 8 wherein the display screen (14) has a width dimension that is less than a length dimension of the main rear edge (90) and wherein the display screen (14) is substantially centered along the length of the main rear edge (90).

10. The assembly of claim 9 wherein the display (14) includes first and second substantially vertical lateral display edges and wherein at least first and second whiteboards (40a, 40b, 40c, 40d) are supported adjacent the first and second lateral edges, respective-

ly.

11. The assembly of claim 10 wherein front surfaces of the whiteboards (40a, 40b, 40c, 40d) are substantially coplanar with the front surface of the display screen (14) when the whiteboards (40a, 40b, 40c, 40d) are mounted adjacent the display lateral edges.

12. The assembly of claim 9 wherein the whiteboards (40a, 40b, 40c, 40d) are secured adjacent the lateral edges via a quick release mechanism so that the boards can be quickly removed from the supported positions.

13. The assembly of claim 12 further including first and second board support members (42a, 42b) positioned adjacent the first and second lateral display edges wherein the first and second whiteboards (40a, 40b, 40c, 40d) are mountable to the first and second support members (42a, 42b), respectively.

14. The assembly of claim 13 wherein the support members (42a, 42b) further include a male alignment extension and wherein the first and second boards (40a, 40b, 40c, 40d) include female alignment recesses that receive the mail alignment extensions when the whiteboards are mounted to the support members (42a, 42b).

15. The assembly of claim 14 wherein the female alignment recesses are openings that form whiteboard handles.

Patentansprüche

1. Tischanordnung (12) zur Verwendung in einem Raum, die eine Haltefläche aufweist, wobei die Anordnung umfasst:

ein Tischplattenelement (20) mit einer Oberseite (24) und einer Unterseite (26), die einander gegenüberliegen, einem Hauptteil und erstem (72) und zweitem (74) Seitenteil, wobei der Hauptteil (70) mindestens eine im Wesentlichen gerade Haupthinterkante (90) und eine Hauptseitenkante aufweist, die zusammen mindestens teilweise die Form des Hauptteils (70) definieren, wobei die Hauptseitenkante eine erste (94) und zweite (96) im Wesentlichen einander gegenüberliegende laterale Hauptkante aufweist, wobei der erste (72) und zweite (74) Seitenteil erste (98) und zweite (100) Seitenhinterkante aufweisen, die jeweils auf die Haupthinterkante (90) ausgerichtet sind, wobei der erste (72) und zweite (74) Seitenteil weiterhin eine erste (106) und zweite (108) Seitenvorderkante aufweisen, die sich von der ersten (94) und zweiten (96) lateralen Hauptkante zu distalen Enden der Seitenvorderkanten (106, 108) erstrecken und die jeweils mit der ersten (98) und zweiten (100) Seitenhinterkante zusammenlaufen, **dadurch gekennzeichnet, dass**

die erste (94) und zweite (96) laterale Hauptkante im Wesentlichen gerade Kanten sind, die mit der Haupthinterkante spitze Winkel bilden und die gegenüber der Haupthinterkante (90) gegenseitig zusammenlaufen und sich der erste (72) und zweite (74) Seitenteil von dem an die Haupthinterkante (90) angrenzenden Hauptteil in im Wesentlichen entgegengesetzte Richtungen erstrecken.

2. Anordnung nach Anspruch 1, wobei die Hauptseitenkante ferner eine Hauptvorderkante (92) aufweist, die im Wesentlichen gerade ist, und die im Wesentlichen parallel zur Haupthinterkante (90) ist.

3. Anordnung nach Anspruch 2, wobei der erste (72) und zweite (74) Seitenteil eine erste (98) und zweite (100) Seitenhinterkante aufweisen, die jeweils auf die Haupthinterkante (90) ausgerichtet sind, und wobei der erste (72) und zweite (74) Seitenteil ferner eine erste (106) und zweite (108) Seitenvorderkante aufweisen, die im Wesentlichen parallel zu jeweils der ersten (98) und zweiten (100) Seitenhinterkante sind.

4. Anordnung nach Anspruch 1, wobei die erste (98) und zweite (100) Seitenhinterkante auf die Haupthinterkante (90) ausgerichtet sind.

5. Anordnung nach Anspruch 3, wobei der erste (72) und zweite (74) Seitenteil ferner eine erste (102) und zweite (104) laterale Seitenkante aufweisen, die sich von den distalen Enden der ersten (106) und zweiten (108) Seitenvorderkante zu der ersten (98) und zweiten (100) Seitenhinterkante erstrecken, und wobei die erste (102) und zweite (104) laterale Seitenkante im Wesentlichen gerade und im Wesentlichen parallel zu der jeweils ersten (94) und zweiten (96) lateralen Hauptkante sind.

6. Anordnung nach Anspruch 3, wobei die erste (106) und zweite (108) Seitenvorderkante stumpfe Winkel mit jeweils der ersten (94) und zweiten (96) lateralen Hauptkante bilden.

7. Anordnung nach Anspruch 6, wobei die spitzen Winkel zwischen sechzig und fünfundachtzig Grad sind, und wobei die stumpfen Winkel zwischen fünfundneunzig und einhundertzwanzig Grad sind.

8. Anordnung nach Anspruch 1, die ferner einen Anzeigebildschirm (14) aufweist, der angrenzend an die Haupthinterkante (90) gehalten wird, bei dem ei-

ne vordere Anzeigefläche (50) des Anzeigebildschirms (14) oberhalb der Oberseite (24) des Tischplattenelements (20) sichtbar ist.

9. Anordnung nach Anspruch 8, wobei der Anzeigebildschirm (14) eine Breitenabmessung hat, die kleiner als eine Längenabmessung der Haupthinterkante (90) ist, und wobei der Anzeigebildschirm (14) entlang der Länge der Haupthinterkante (90) im Wesentlichen mittig ist.

10. Anordnung nach Anspruch 9, wobei der Bildschirm (14) eine erste und zweite im Wesentlichen senkrechte laterale Anzeigekante aufweist, und wobei mindestens erste und zweite Whiteboards (40a, 40b, 40c, 40d) jeweils angrenzend an die erste und zweite laterale Kante gehalten werden.

11. Anordnung nach Anspruch 10, wobei Vorderflächen der Whiteboards (40a, 40b, 40c, 40d) im Wesentlichen komplanar mit der Vorderfläche des Anzeigebildschirms (14) sind, wenn die Whiteboards (40a, 40b, 40c, 40d) an den lateralen Anzeigekanten angrenzend montiert werden.

12. Anordnung nach Anspruch 9, wobei die Whiteboards (40a, 40b, 40c, 40d) angrenzend an die lateralen Kanten über einen Schnellspannmechanismus gesichert werden, damit die Boards schnell aus den Haltestellungen entfernt werden können.

13. Anordnung nach Anspruch 12, die ferner erste und zweite an die erste und zweite laterale Anzeigekante angrenzend positionierte Boardhalteelemente (42a, 42b) aufweist, wobei das erste und zweite Whiteboard (40a, 40b, 40c, 40d) an dem jeweils ersten und zweiten Halteelement (42a, 42b) montierbar sind.

14. Anordnung nach Anspruch 13, wobei die Halteelemente (42a, 42b) ferner eine Steckerweiterung aufweisen, und wobei das erste und zweite Board (40a, 40b, 40c, 40d) Aufnahmeaussparungen aufweisen, die die Steckerweiterungen aufnehmen, wenn die Whiteboards an die Halteelemente (42a, 42b) montiert werden.

15. Anordnung nach Anspruch 14, wobei die Aufnahmeaussparungen Öffnungen sind, die Whiteboard-Handgriffe bilden.

Revendications

1. Ensemble de table (12) destiné à être utilisée dans un espace qui comprend une surface de support, l'ensemble comprenant :

un élément de dessus de table (20) qui possède des surfaces opposées supérieure (24) et inférieure (26), une partie principale et des première (72) et seconde (74) parties latérales, la partie principale (70) comprenant au moins un bord arrière principal sensiblement droit (90) et un bord latéral principal qui, ensemble, définissent au moins en partie la forme de la partie principale (70), le bord latéral principal comprenant des premier (94) et second (96) bords latéraux principaux sensiblement opposés, la première (72) et la seconde (74) parties latérales comprenant des premier (98) et second (100) côtés arrières latéraux qui sont alignés avec le bord arrière principal (90), respectivement, la première (72) et la seconde (74) parties latérales comprenant en outre des premier (106) et second (108) côtés avant latéraux qui s'étendent du premier (94) et du second (96) bords latéraux principaux aux extrémités distales des bords avant latéraux (106, 108), et qui convergent vers le premier (98) et le second (100) côtés arrières latéraux, respectivement, **caractérisée en ce que**

le premier (94) et le second (96) bords latéraux principaux sont des bords sensiblement droits qui forment des angles aigus avec le bord arrière principal et qui convergent l'un vers l'autre à l'opposite du bord arrière principal (90), et la première (72) et la seconde (74) parties latérales s'étendent dans des directions sensiblement opposées depuis la partie principale adjacente au côté arrière principal (90).

2. Ensemble selon la revendication 1, dans lequel le bord latéral principal comprend en outre un bord avant principal (92) qui est sensiblement droit et qui est sensiblement parallèle au bord arrière principal (90).

3. Ensemble selon la revendication 2, dans lequel la première (72) et la seconde (74) parties latérales comprennent des premier (98) et second (100) bords arrières latéraux qui sont alignés avec le bord arrière principal (90), respectivement, et dans lequel la première (72) et la seconde (74) parties latérales comprennent en outre des premier (106) et second (108) bords avant latéraux qui sont sensiblement parallèles au premier (98) et au second (100) côtés arrières latéraux, respectivement.

4. Ensemble selon la revendication 1, dans lequel le premier (98) et le second (100) bords arrières latéraux sont alignés avec le bord arrière principal (90).

5. Ensemble selon la revendication 3, dans lequel la première (72) et la seconde (74) parties latérales comprennent en outre des premier (102) et second (104) bords latéraux qui s'étendent des extrémités

distales du premier (106) et du second (108) bords avant latéraux au premier (98) et au second (100) bords arrières latéraux, et dans lequel le premier (102) et le second (104) bords latéraux sont sensiblement droits et sensiblement parallèles au premier (94) et au second (96) bords latéraux principaux, respectivement.

6. Ensemble selon la revendication 3, dans lequel le premier (106) et le second (108) bords avant latéraux forment des angles obtus avec le premier (94) et le second (96) bords latéraux principaux, respectivement.

7. Ensemble selon la revendication 6, dans lequel les angles aigus sont compris entre soixante et quatre-vingt-cinq degrés, et dans lequel les angles obtus sont compris entre quatre-vingt-quinze et cent vingt degrés.

8. Ensemble selon la revendication 1, qui comprend en outre un écran d'affichage (14) supporté de manière adjacente au bord arrière principal (90), une surface d'affichage avant (50) de l'écran d'affichage (14) étant visible au-dessus de la surface supérieure (24) de l'élément de dessus de table (20).

9. Ensemble selon la revendication 8, dans lequel l'écran d'affichage (14) possède une dimension de largeur inférieure à une dimension de longueur du bord arrière principal (90), et dans lequel l'écran d'affichage (14) est sensiblement centré le long de la longueur du bord arrière principal (90).

10. Ensemble selon la revendication 9, dans lequel l'écran (14) comprend des premier et second bords d'affichage latéraux sensiblement verticaux, et dans lequel au moins un premier et un second tableaux blancs (40a, 40b, 40c, 40d) sont supportés de manière adjacente au premier et au second bords latéraux, respectivement.

11. Ensemble selon la revendication 10, dans lequel les surfaces avant des tableaux blancs (40a, 40b, 40c, 40d) sont sensiblement coplanaires avec la surface avant de l'écran d'affichage (14) lorsque les tableaux blancs (40a, 40b, 40c, 40d) sont montés de manière adjacente aux bords latéraux d'affichage.

12. Ensemble selon la revendication 9, dans lequel les tableaux blancs (40a, 40b, 40c, 40d) sont fixés de manière adjacente aux bords latéraux à l'aide d'un mécanisme à libération rapide de sorte que les tableaux puissent être rapidement retirés des positions supportées.

13. Ensemble selon la revendication 12, qui comprend en outre des premier et second éléments de support de tableaux (42a, 42b) positionnés de manière adjacente au premier et au second bords d'affichage latéraux, le premier et le second tableaux blancs (40a, 40b, 40c, 40d) pouvant être montés sur le premier et le second éléments de support (42a, 42b), respectivement.

14. Ensemble selon la revendication 13, dans lequel les éléments de support (42a, 42b) comprennent en outre une extension d'alignement mâle, et dans lequel le premier et le second tableaux (40a, 40b, 40c, 40d) comprennent des renfoncements d'alignement femelles qui reçoivent les extensions d'alignement mâles lorsque les tableaux blancs sont montés sur les éléments de support (42a, 42b).

15. Ensemble selon la revendication 14, dans lequel les renfoncements d'alignement femelles sont des ouvertures qui forment des poignées de tableaux blancs.

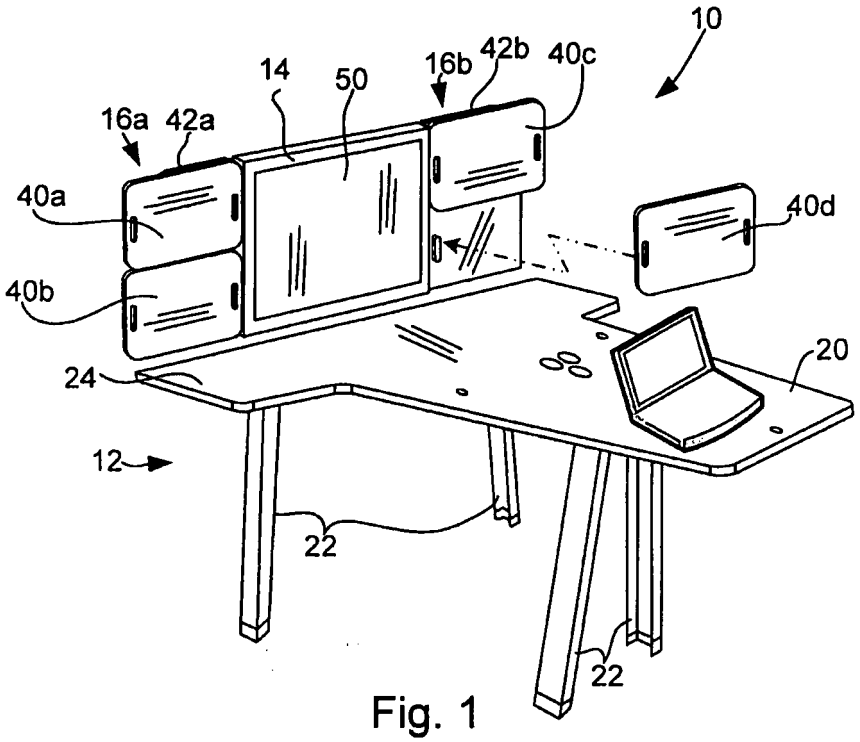

10
14
50
16b
42b
40c
16a
42a
40a
40d
40b
20
24
12
22
22

Fig. 1

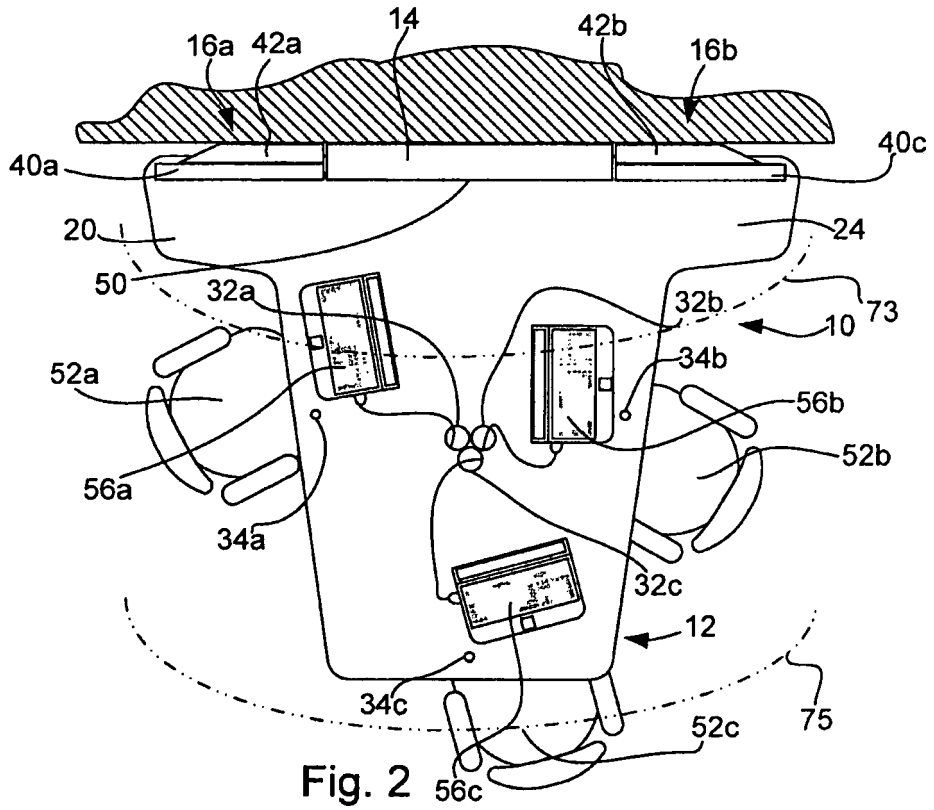

14
16a
42a
42b
16b
40c
40a
20
24
50
32a
32b
10
73
34b
52a
56b
52b
56a
34a
32c
12
34c
52c
75
56c

Fig. 2

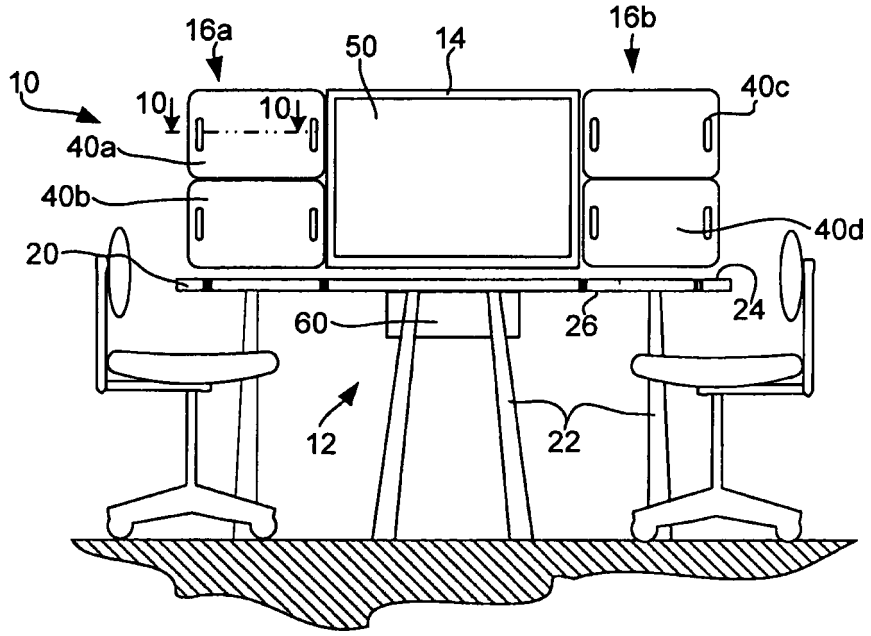

16a
50
14
16b
10
10
10
40c
40a
40b
40d
20
24
60
26
12
22

Fig. 3

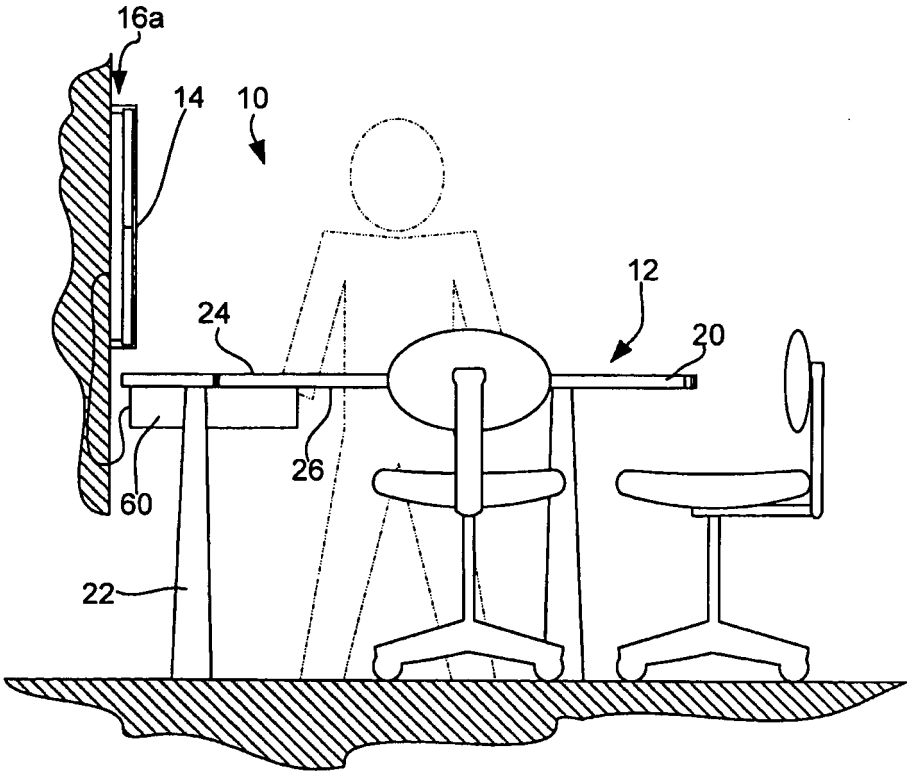

16a
14
10
12
24
20
26
60
22

Fig. 4

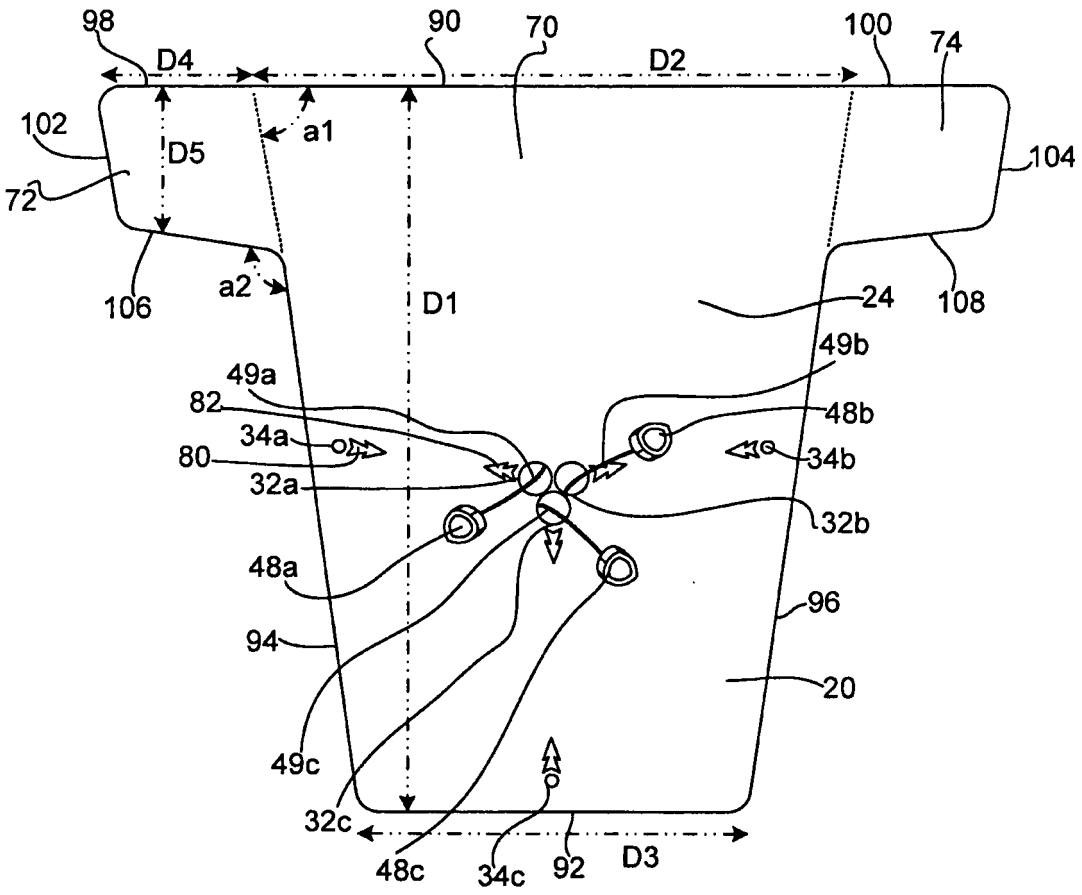

98
90
70
100
74
D4
D2
102
D5
a1
104
72
106
a2
D1
24
108
49b
49a
82
48b
34a
80
34b
32a
32b
48a
96
94
20
49c
32c
48c
34c
92
D3

Fig. 5

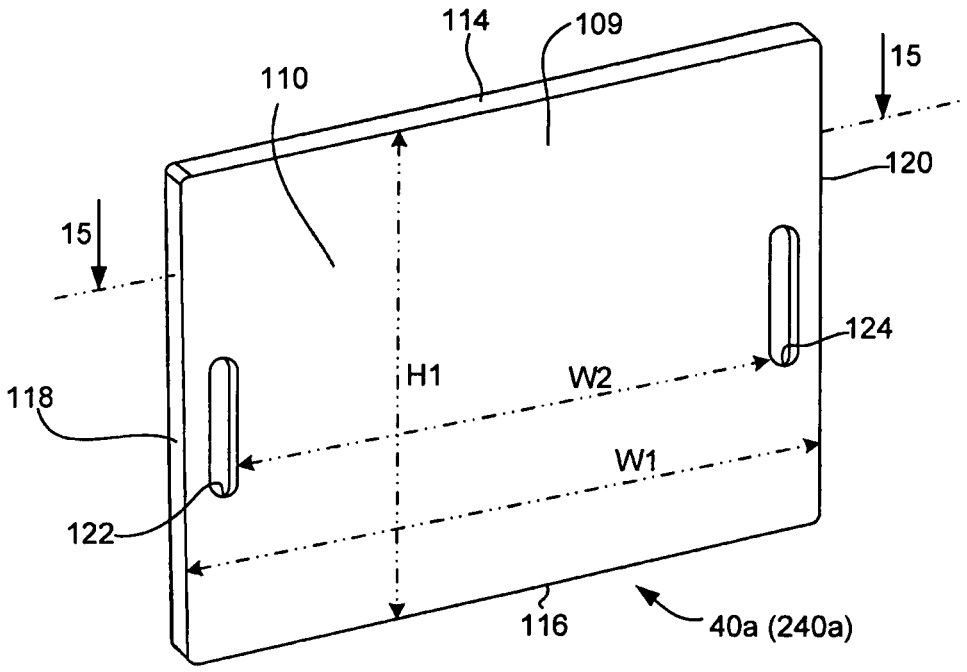

114
109
110
15
120
15
124
H1
W2
118
W1
122
116
40a (240a)

Fig. 6

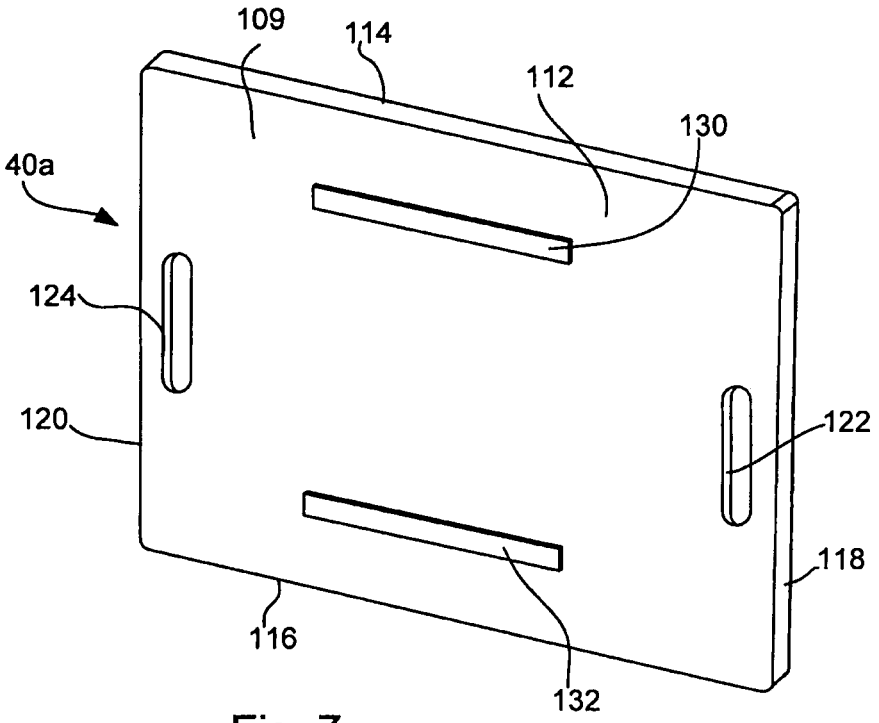

109
114
112
130
40a
124
120
122
118
116
132

Fig. 7

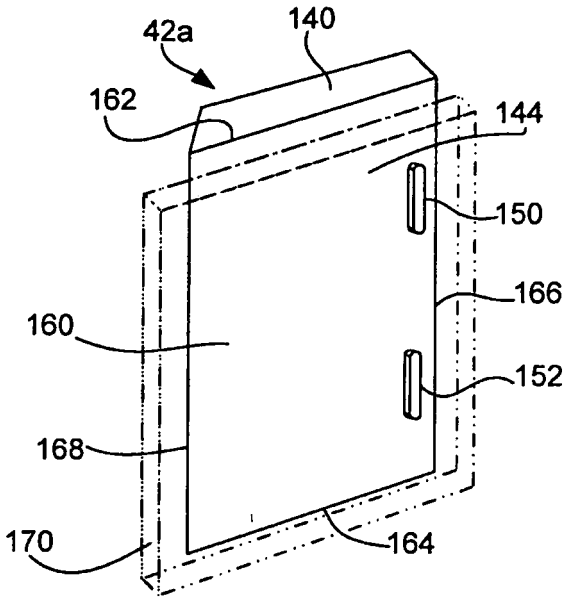

42a
140
162
144
150
166
160
152
168
170
164

Fig. 8

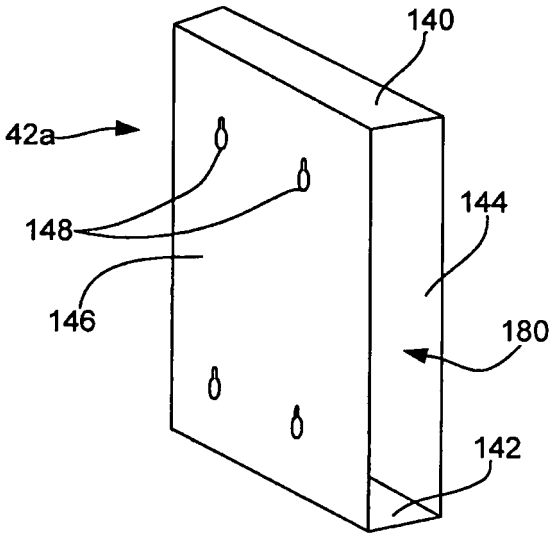

140
42a
144
148
146
180
142

Fig. 9

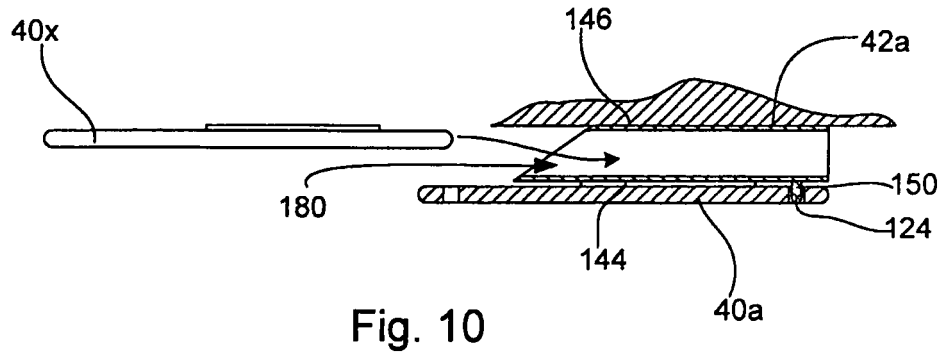

40x
146
42a
180
150
124
144
40a

Fig. 10

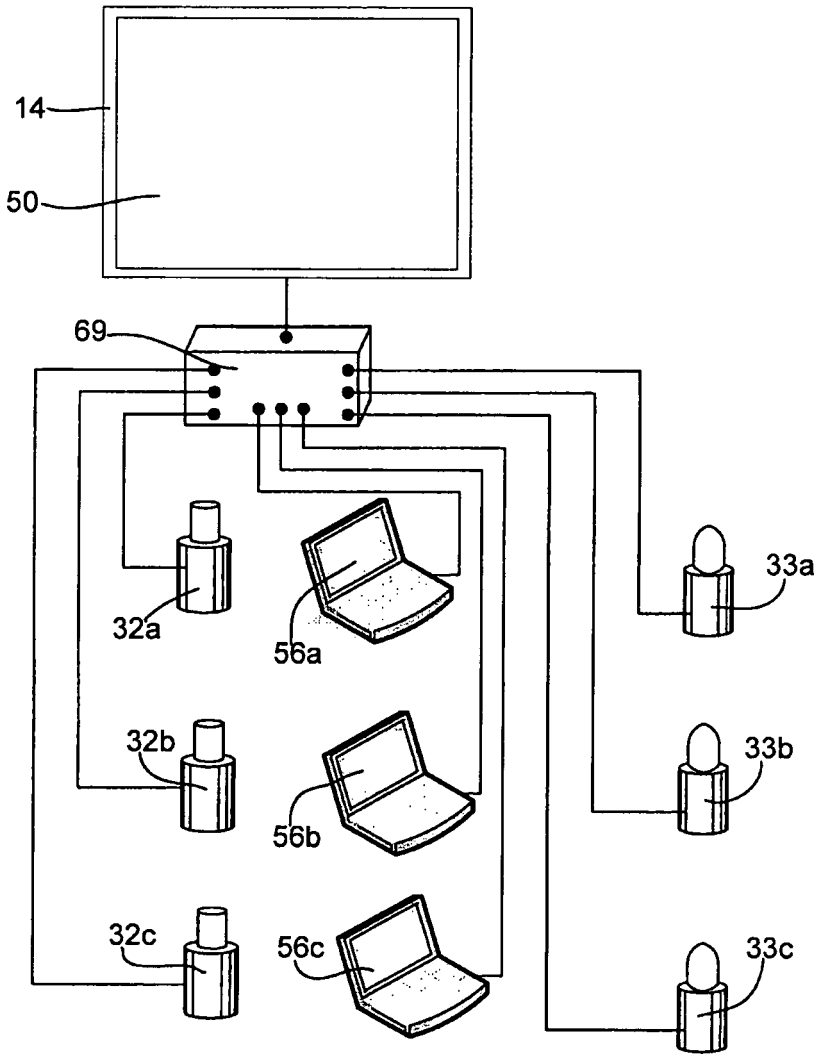

14
50
69
32a
56a
33a
32b
56b
33b
32c
56c
33c

Fig. 11

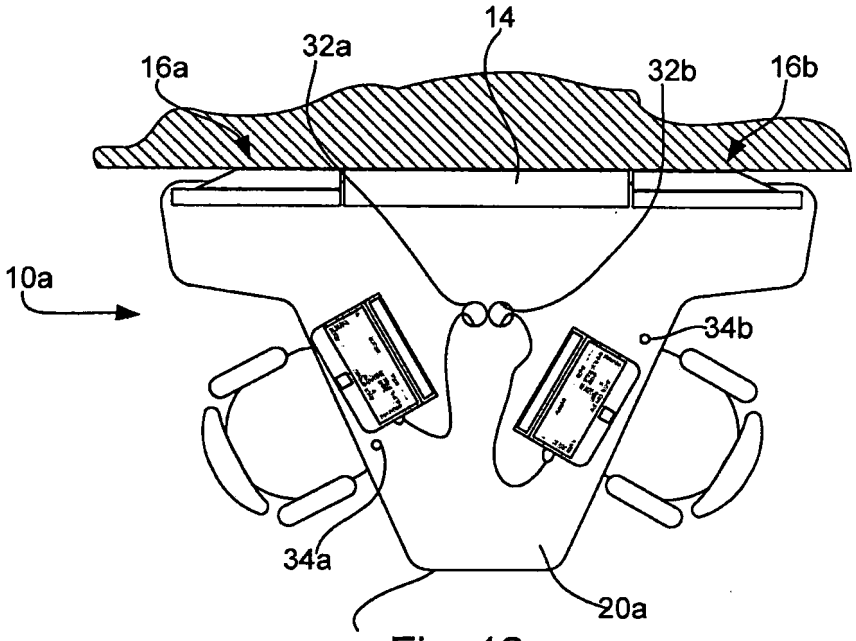


Fig. 12

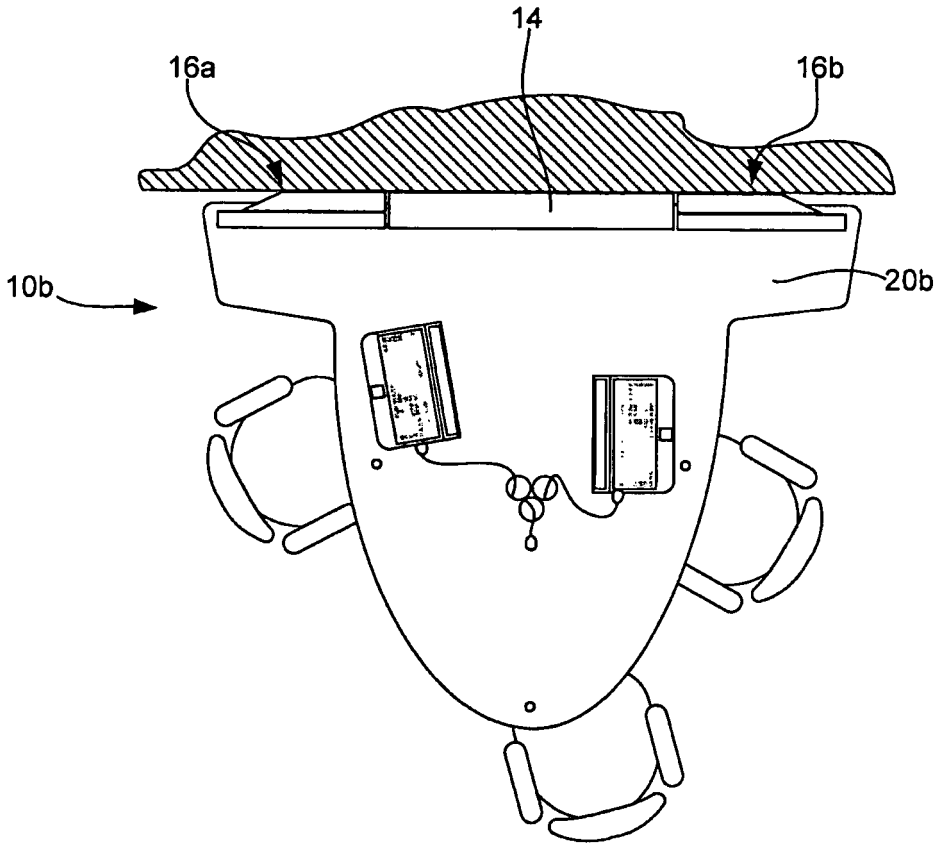


Fig. 13

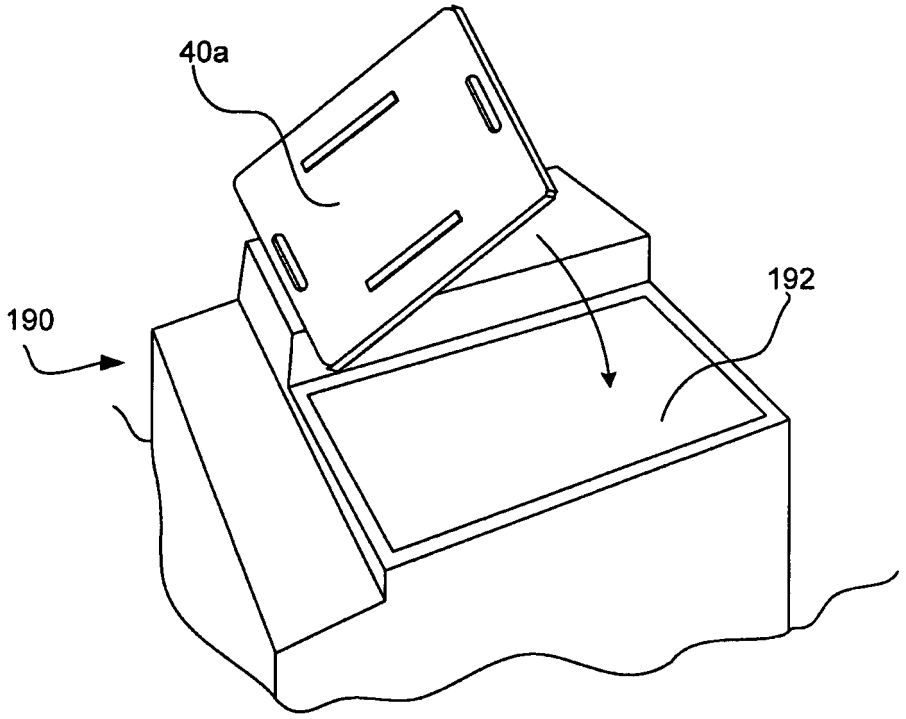


Fig. 14

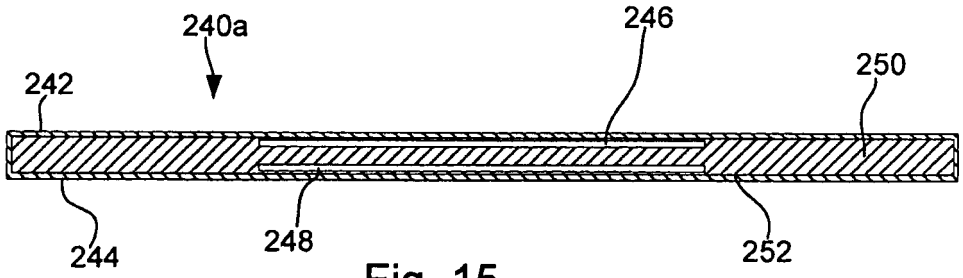

240a
246
250
242
244
248
252

Fig. 15

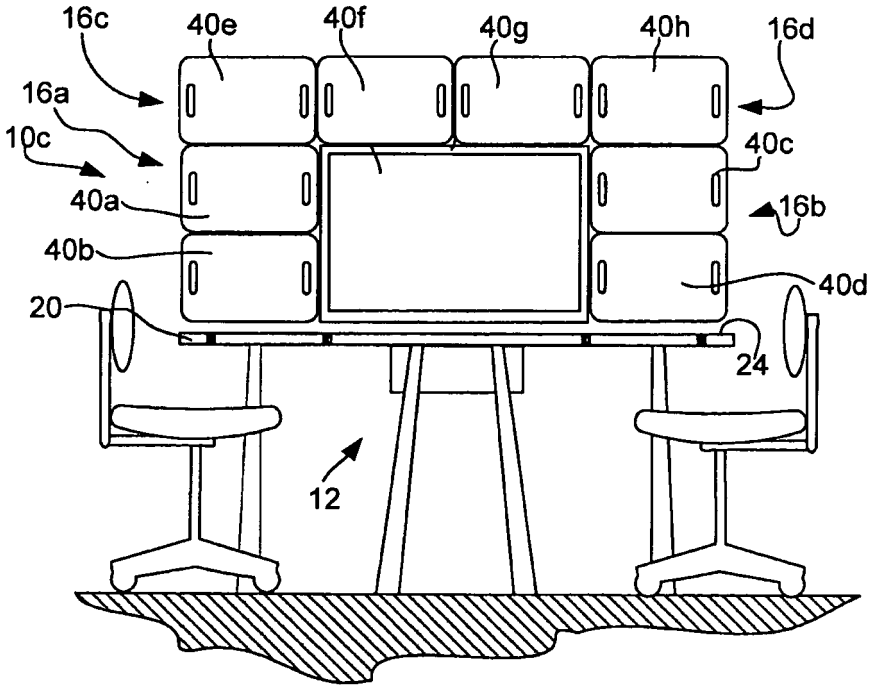

16c
40e
40f
40g
40h
16d
16a
10c
40c
40a
16b
40b
40d
20
24
12

Fig. 16

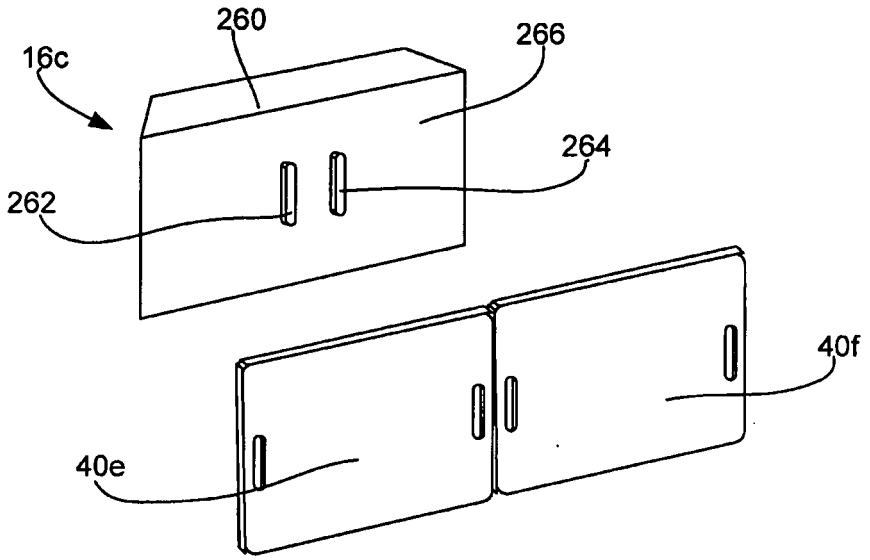


Fig. 17

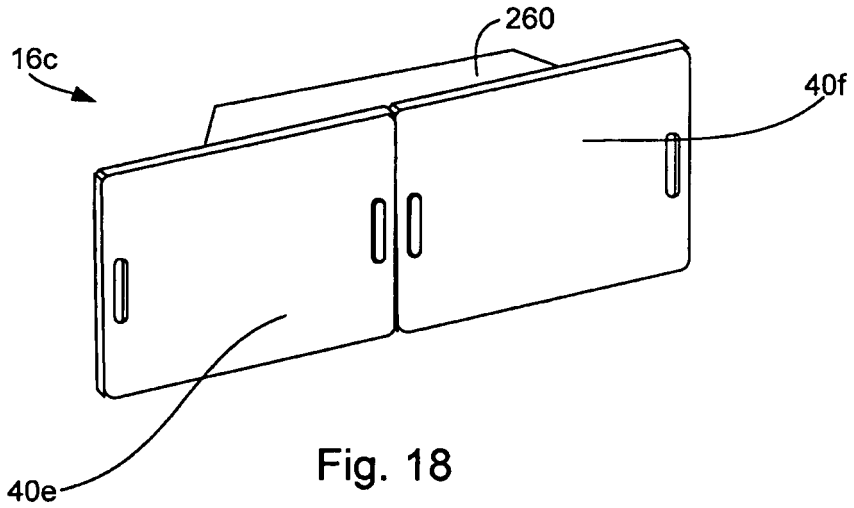


Fig. 18

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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