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(54) **OFFICE FURNITURE SYSTEM WITH INTEGRAL ELECTRONIC COMPONENTS**

**Publication Classification**

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(57) **ABSTRACT**

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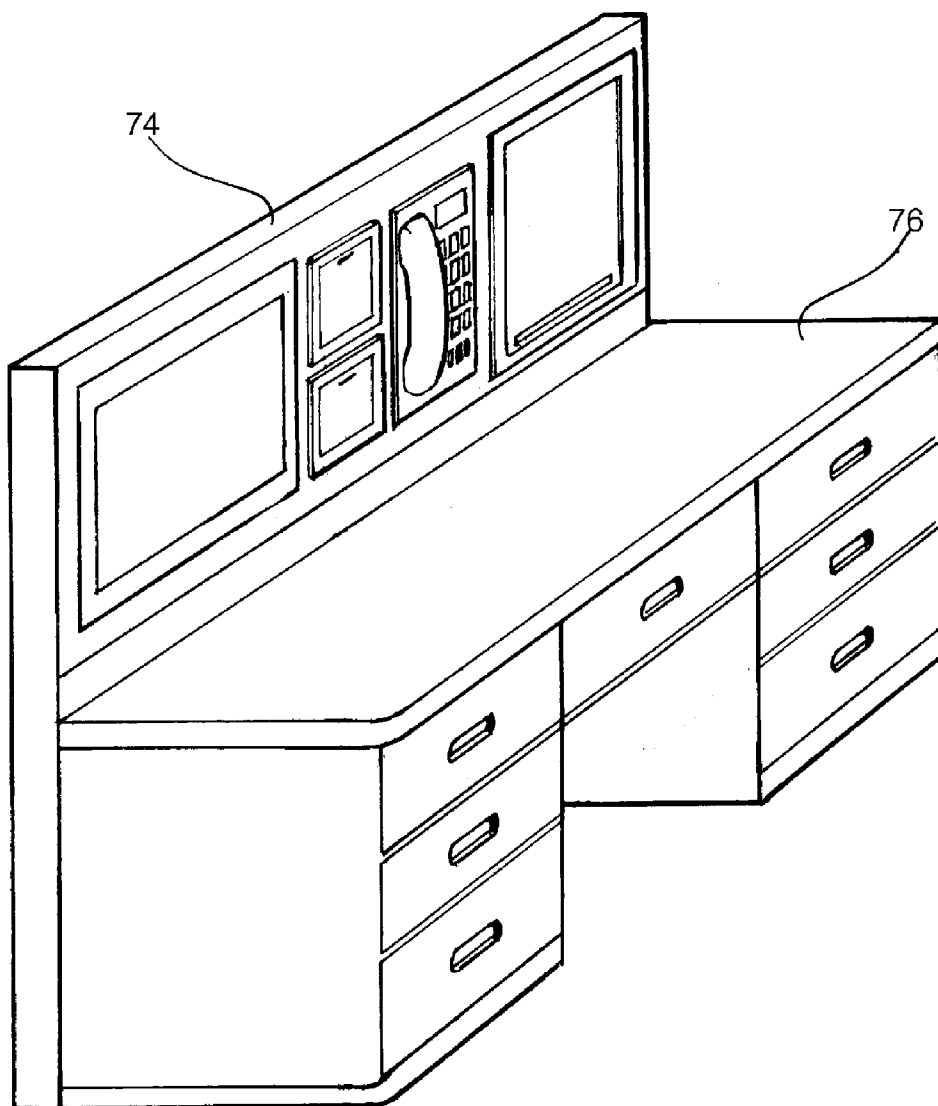
An office furniture system with integral electronic components comprises at least one vertically oriented prefabricated furniture panel. The panel can be free standing or wall or desk mounted, and has a structural frame providing a hollow interior to the panel. The panel is thick enough to house electronic components in its interior, and the frame has compartments for separately housing computer components, so that each component can be replaced separately. The system also includes one or more work surface components mounted on the vertical furniture panels that are not obstructed by the computer components mounted in the vertical panel. The panel also can include pivotal storage bins for files or the like.

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**Related U.S. Application Data**

(60) **Provisional application No. 60/903,541, filed on Feb. 26, 2007.**



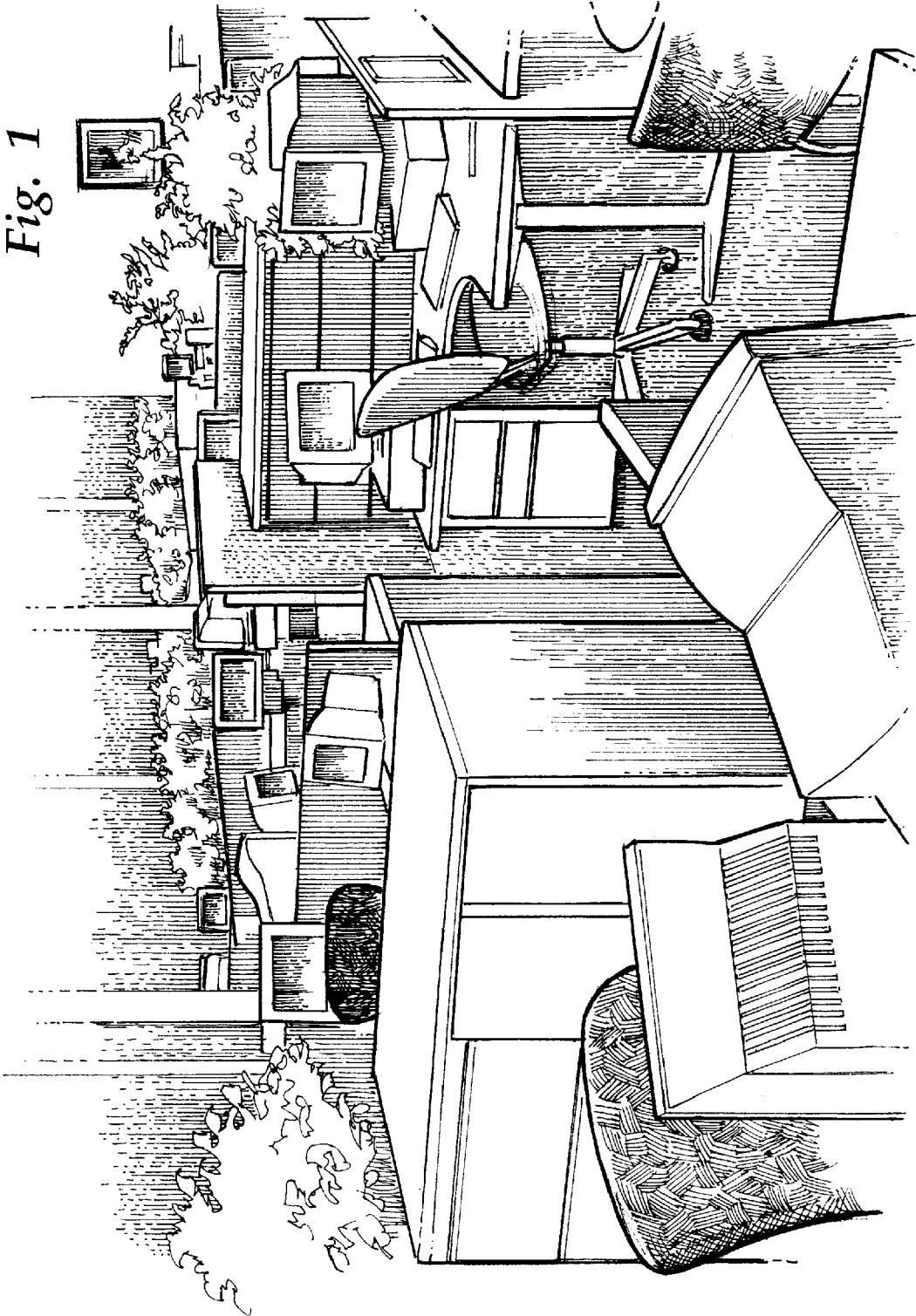


Fig. 1

Fig. 2

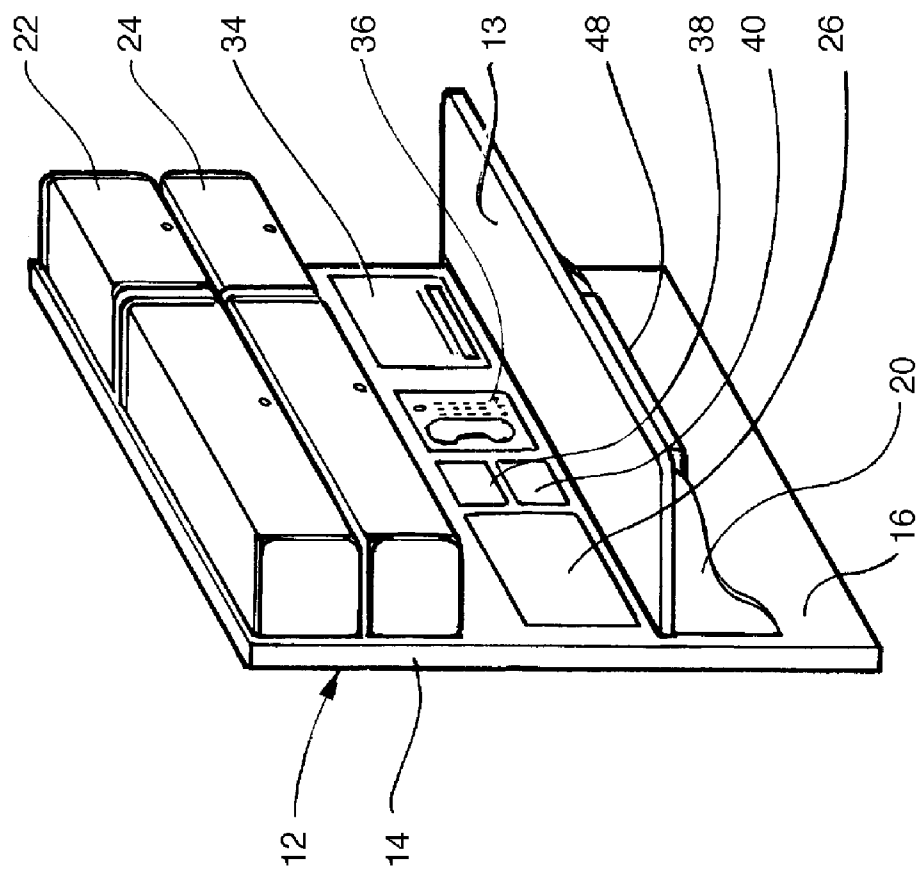


Fig. 3

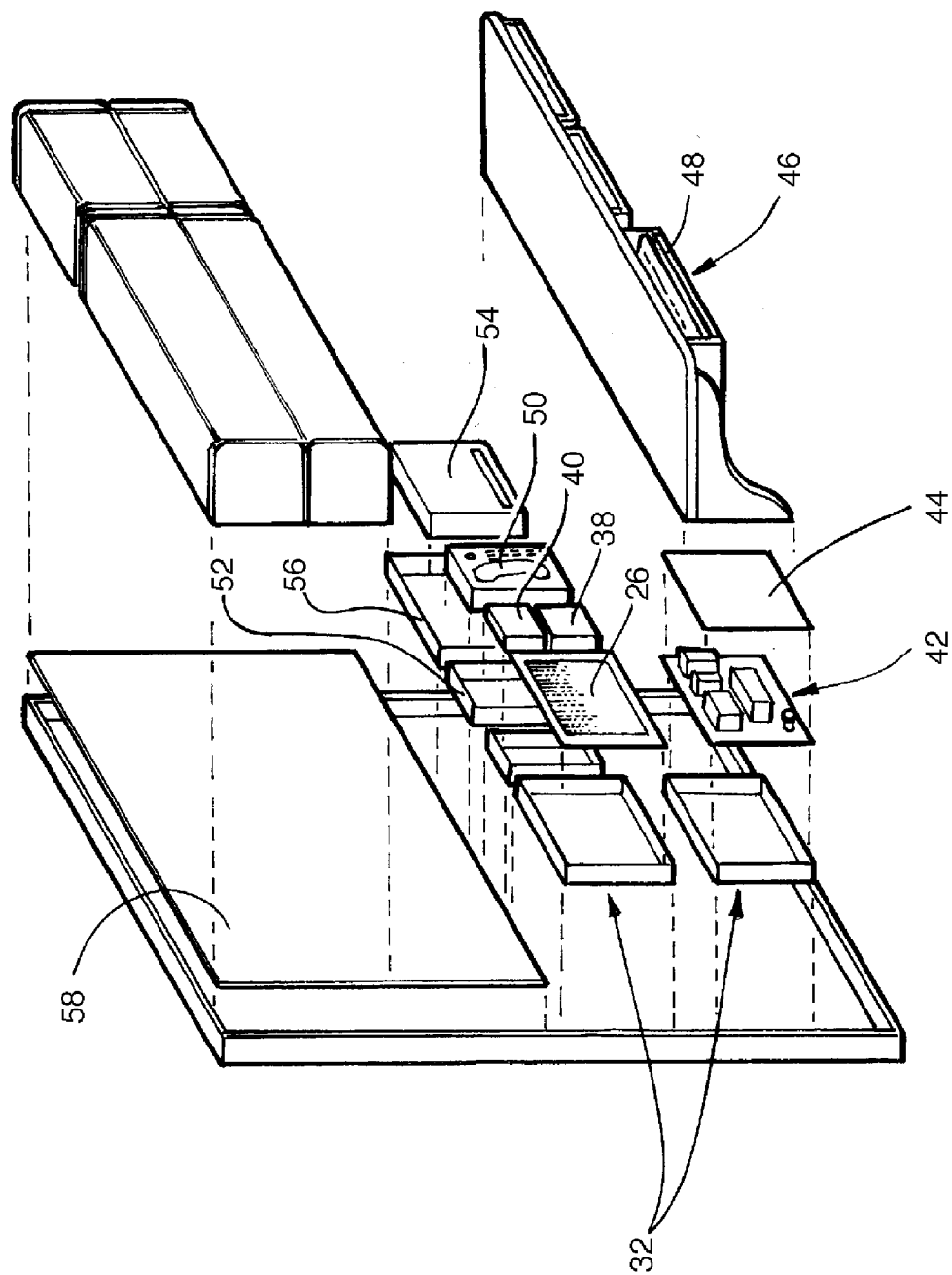


Fig. 6

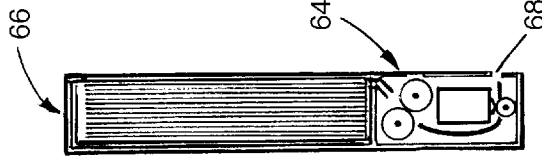


Fig. 6A

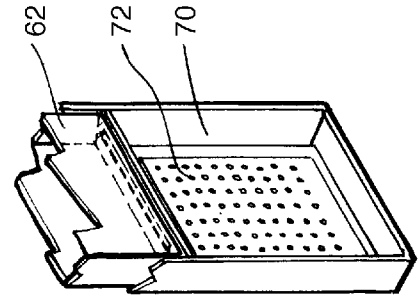


Fig. 5

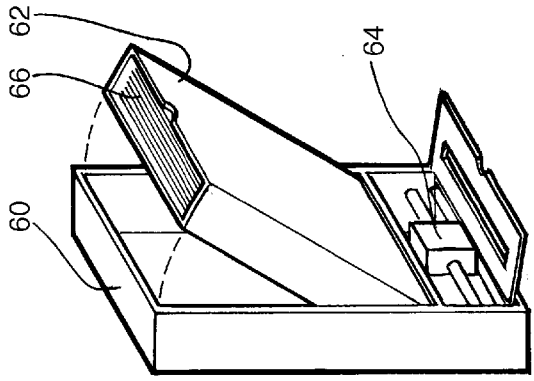


Fig. 4

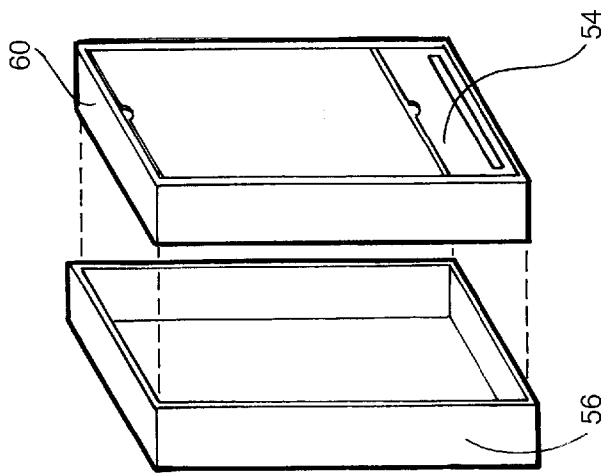


Fig. 7

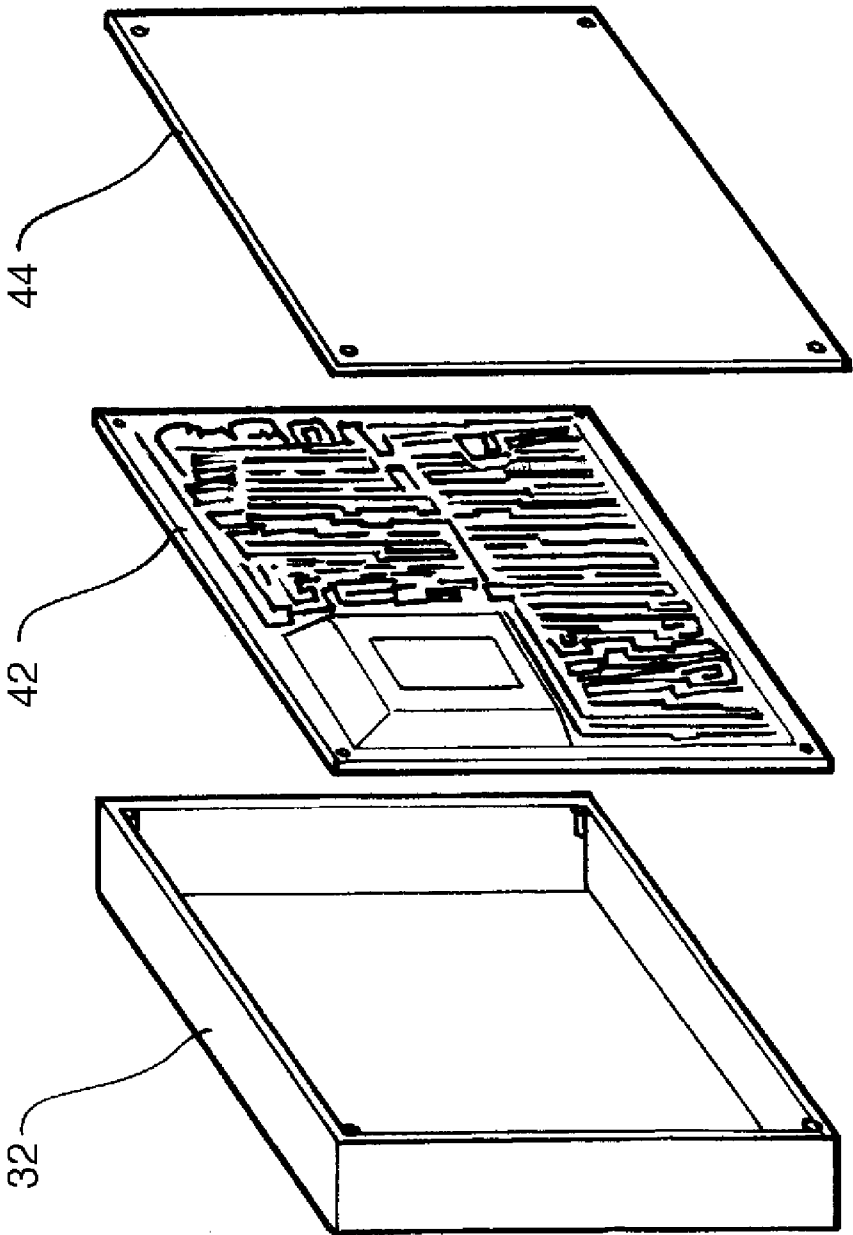


Fig. 8

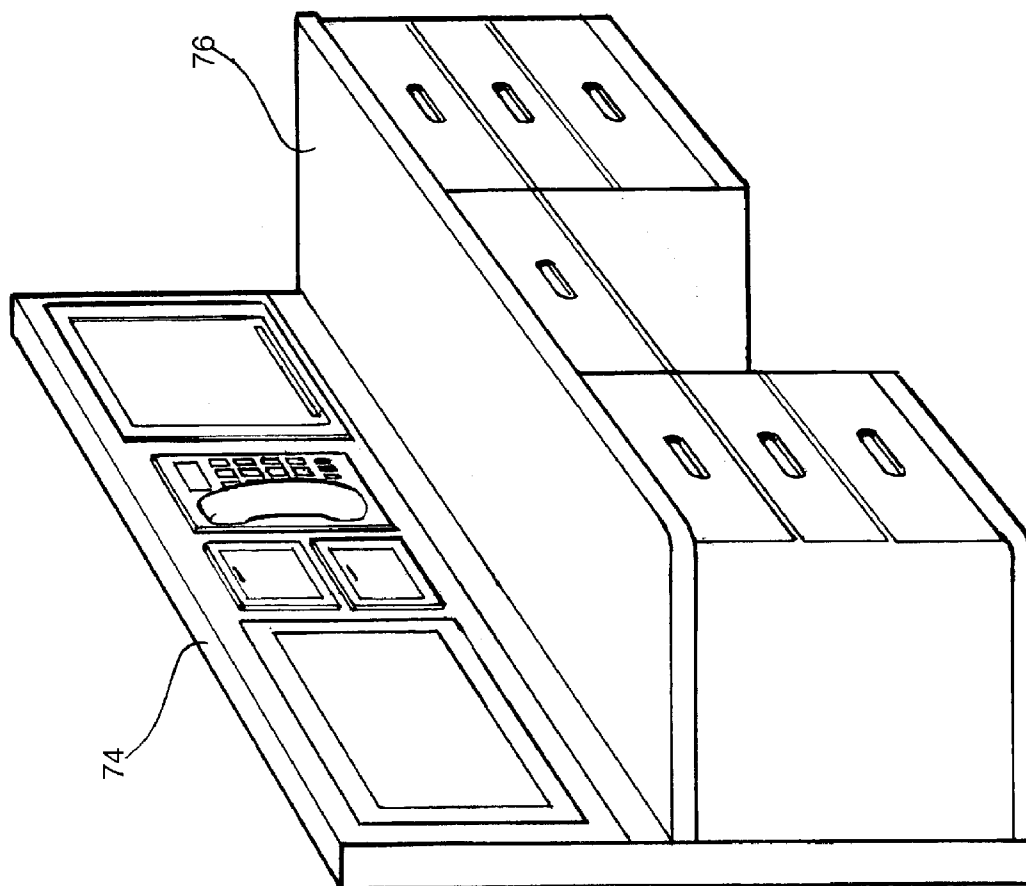
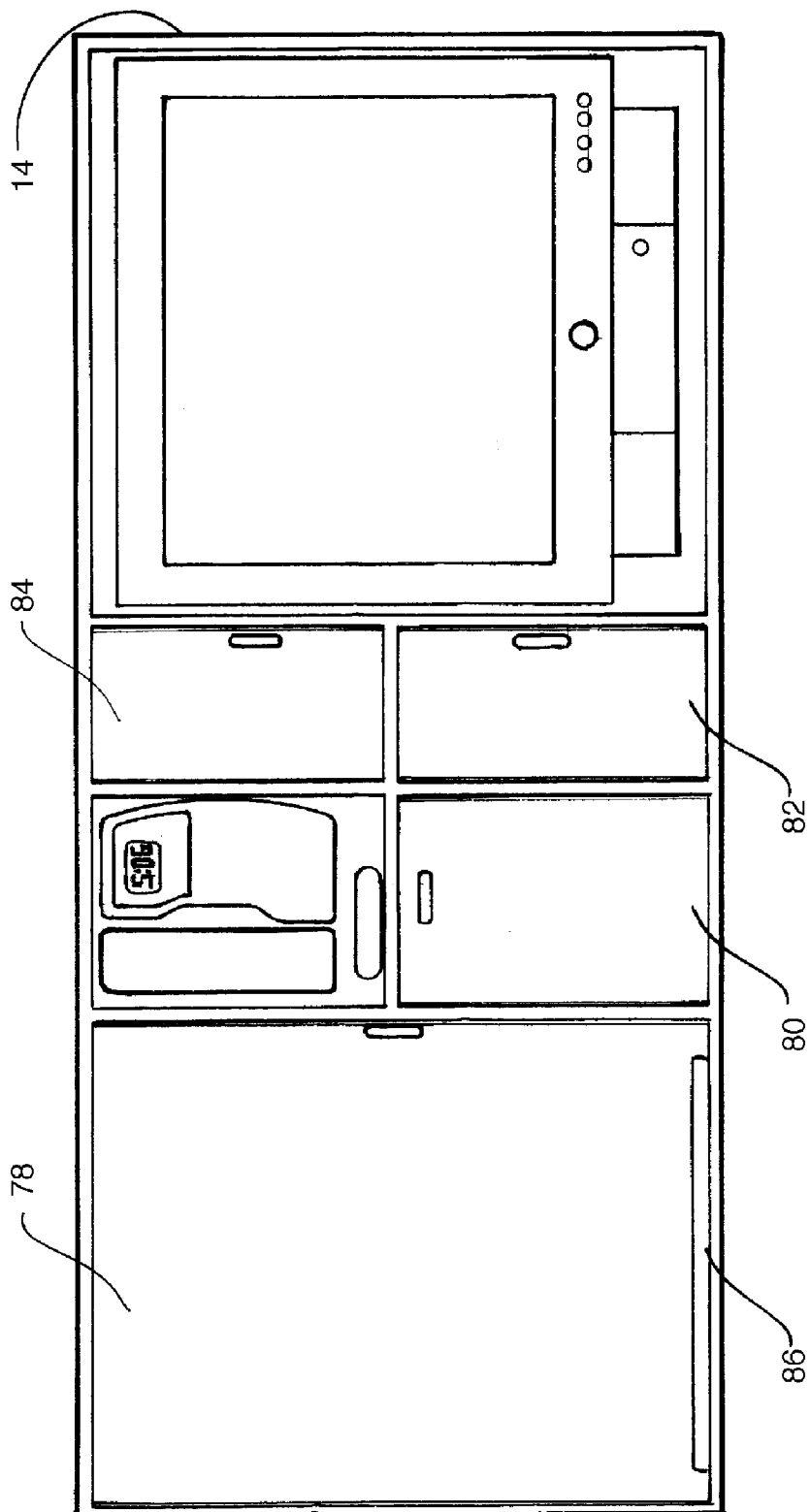
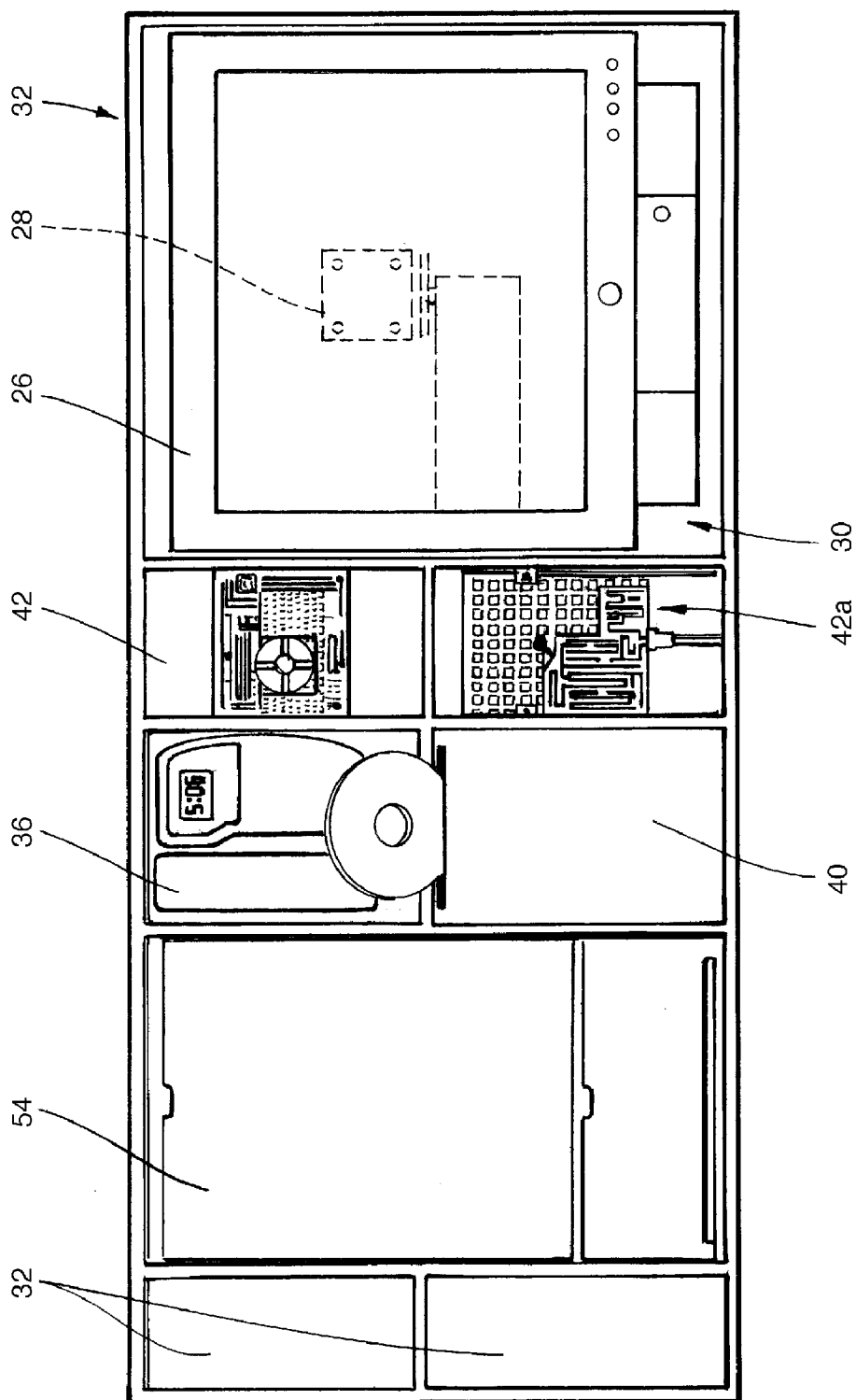


Fig. 9

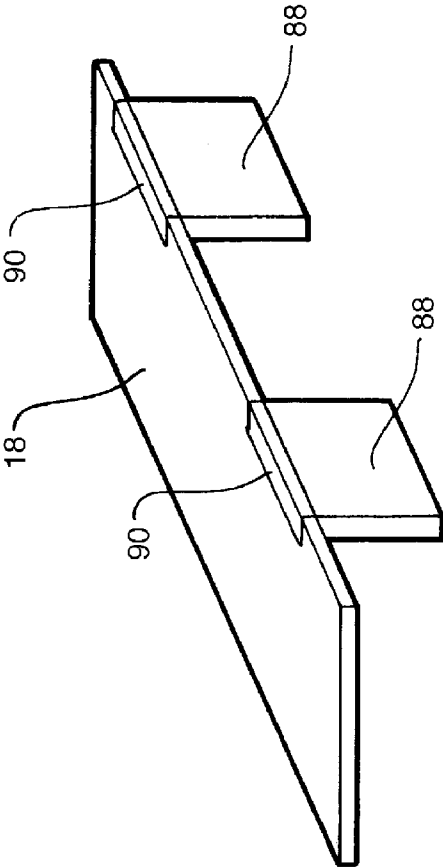




*Fig. 10*



*Fig. 11*



*Fig. 12*

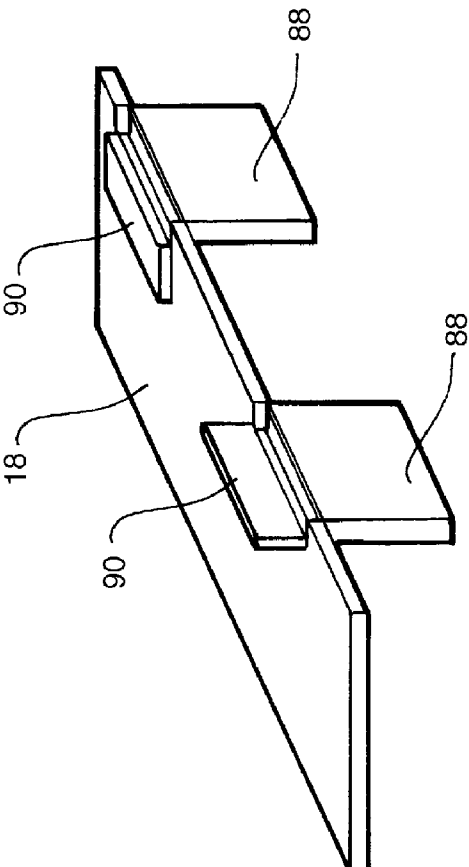


Fig. 13

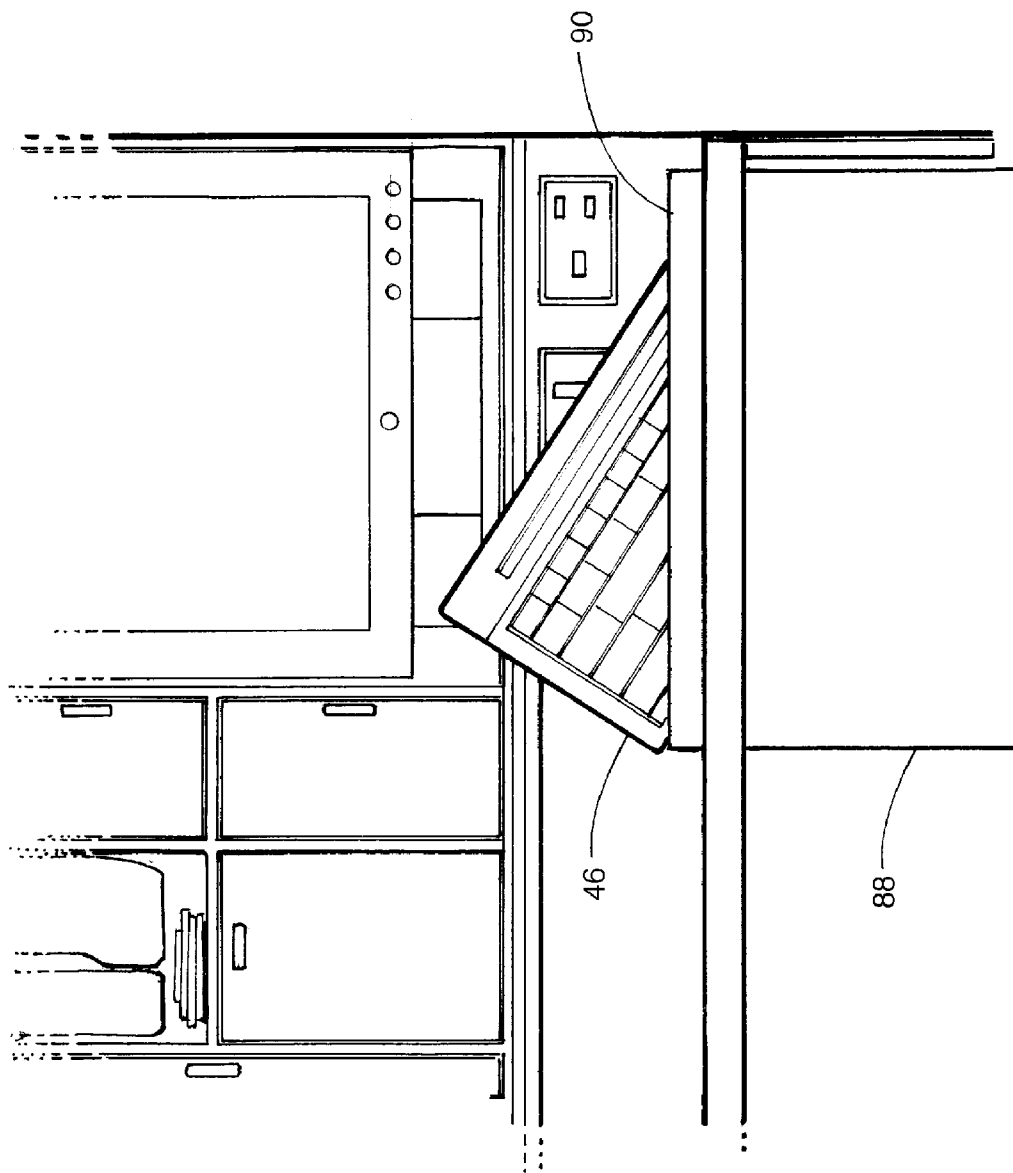


Fig. 15

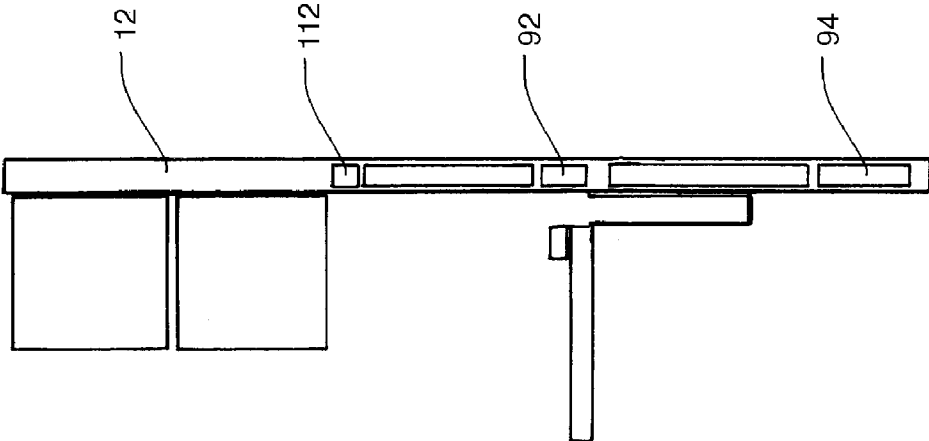
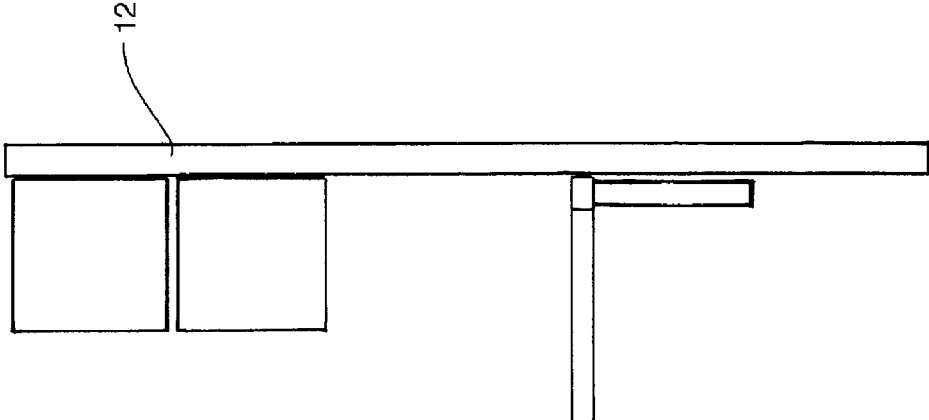
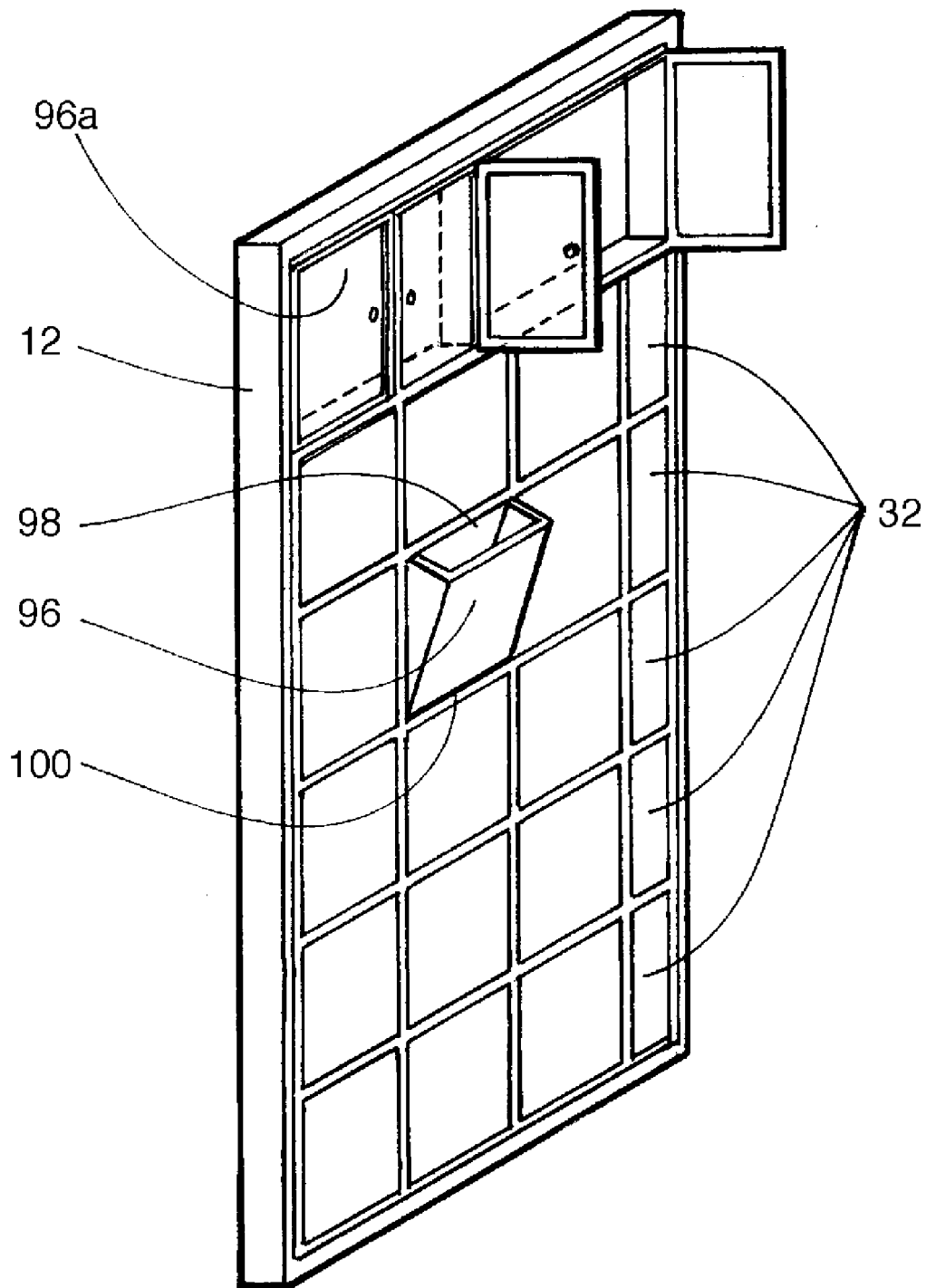


Fig. 14



*Fig. 16*



*Fig. 17*

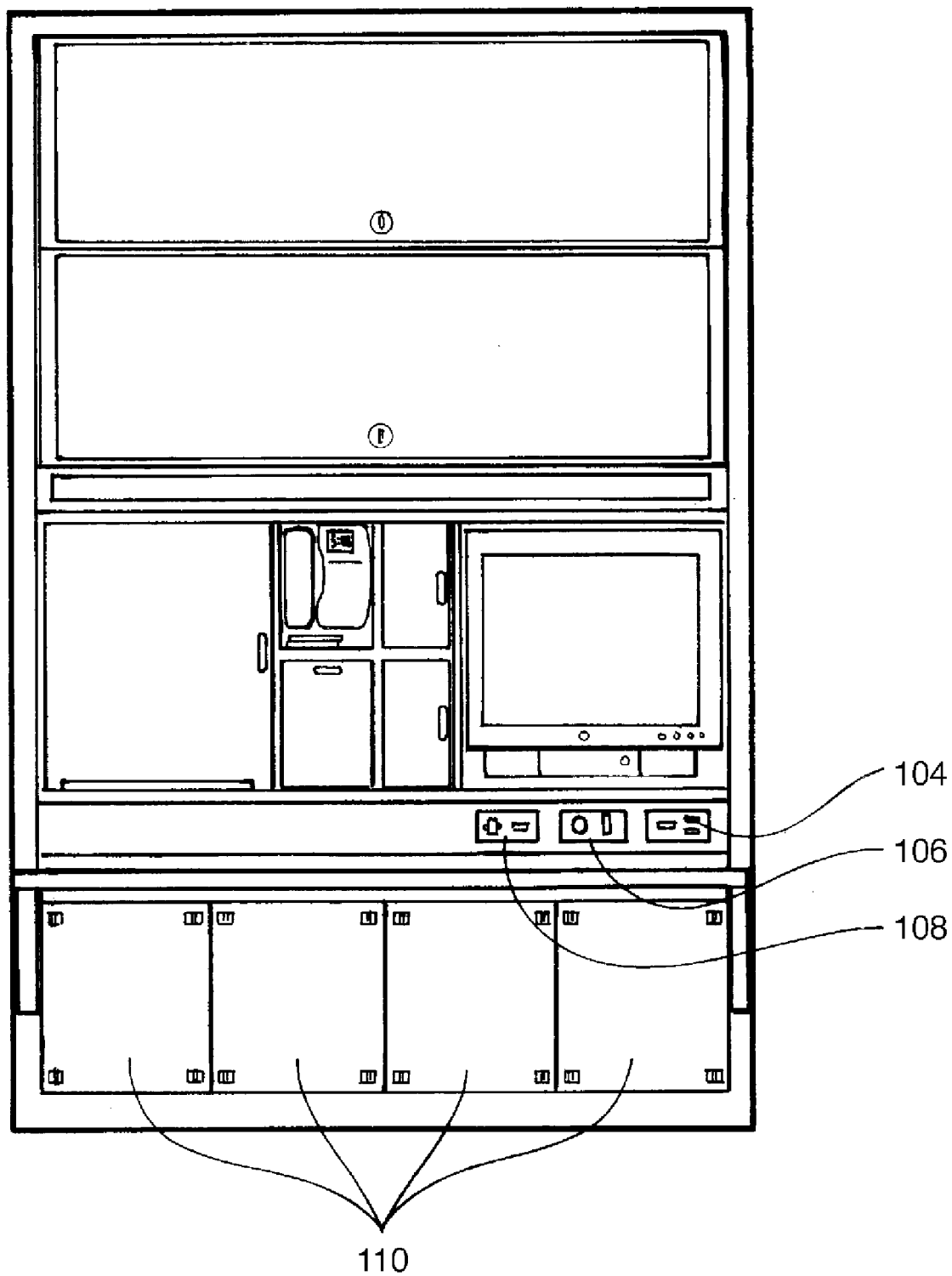


Fig. 19B

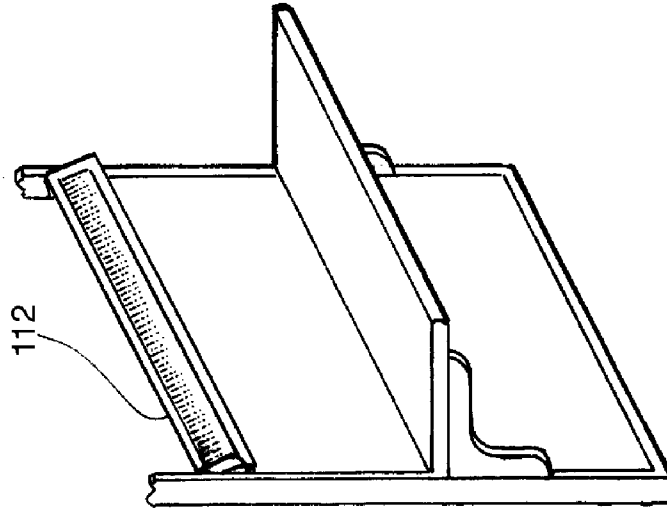


Fig. 19A

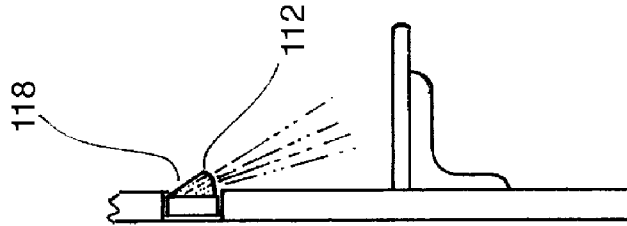


Fig. 18B

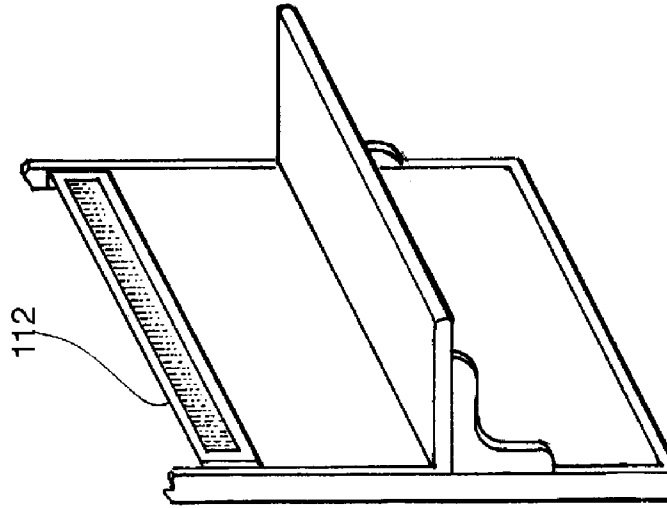


Fig. 18A

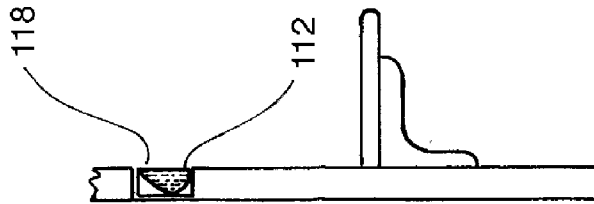


Fig. 20

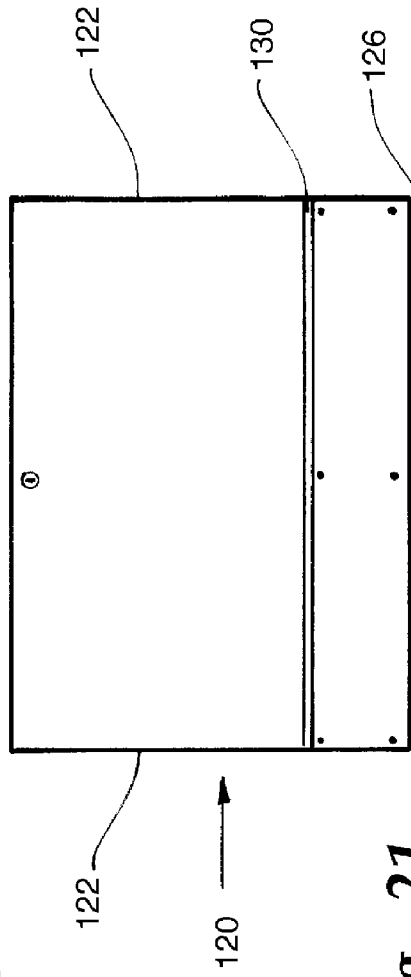


Fig. 21

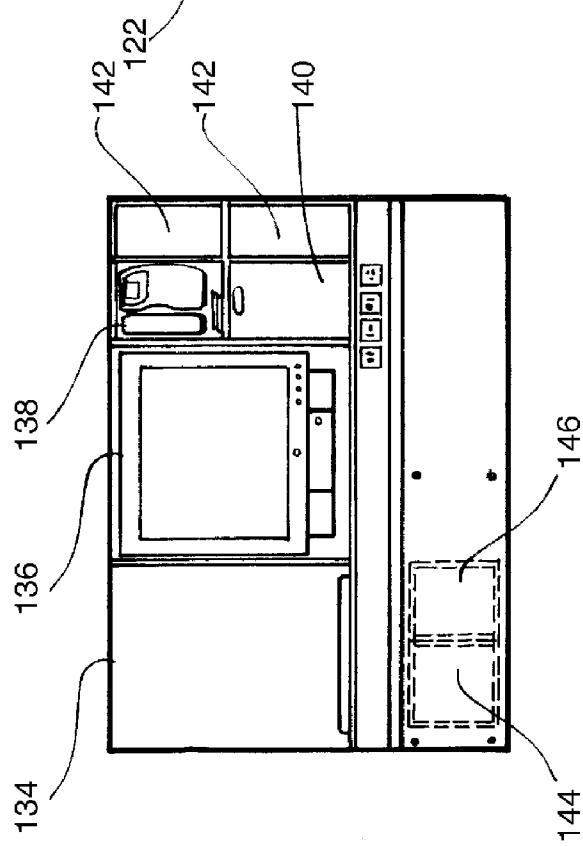
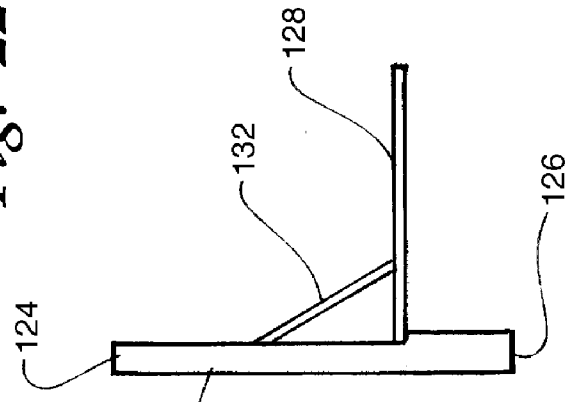


Fig. 22





**OFFICE FURNITURE SYSTEM WITH INTEGRAL ELECTRONIC COMPONENTS**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

**[0001]** The present application is based on and claims the filing date of applicant’s co-pending provisional application Ser. No. 60/903,541, filed Feb. 26, 2007, which is incorporated herein by reference.

**STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

**[0002]** Not Applicable.

**PARTIES TO A JOINT RESEARCH AGREEMENT**

**[0003]** Not Applicable.

**REFERENCE TO A SEQUENCE LISTING**

**[0004]** Not Applicable.

**BACKGROUND OF THE INVENTION**

**[0005]** Office furniture systems were first introduced in 1965. Prior to that date, office furniture was limited mainly to the traditional desk, filing cabinet and bookshelf. These furniture objects equipped the working offices, whether partitioned rooms or open space in which desks were lined up in rows. The working environment was noisy, unproductive and lacked privacy for the end-users. At that time, the common office equipment was limited mainly to the telephone and the typewriter. A few offices also had a desk calculator. Both the furniture and the equipment were designed as objects—a finished product that could only be repaired or replaced if damaged.

**[0006]** The first office furniture systems were introduced in 1965. These systems are sets of components that can be assembled in a wide variety of configurations to meet the needs of different functions. Periodically, they can be disassembled and reassembled in new configurations to meet the evolving needs. Their flexibility allowed them to remain the state-of-the-art for over four decades, defying obsolescence with their adaptability to the changing world.

**[0007]** When the office furniture systems were first introduced in the mid 1960’s, administrative work was processed on paper. Documents were handwritten then typed on typewriters, if necessary. The office furniture systems were designed to meet paper-processing requirements. They provided writing work surfaces, shelves and filing bins hung on partition panels or wall tracks. Most offices were stationed on the work surfaces, like they were on the traditional desk. The telephone occupied a small space on the work surface, which was not a big problem for the end-user, and secretarial desks were dedicated mainly to typing and answering the phone.

**[0008]** The radical change in the office environment took place in the late seventies with the introduction of the personal computer. With it came a monitor, a keyboard, and a printer. A mouse and a scanner would be added later. All these items were designed as objects that sat on the work surface. By the 1990’s they became the main tools in most offices, occupying the work surface that was designed for working with paper. Clerical offices, which represent over seventy percent of offices, are limited to one 2’x6’ work surface, or two 2’x4’ work surfaces. These limited work surfaces have little

room left with a telephone, a monitor, a keyboard, a mouse, and possibly a printer occupying them. One would also find a pencil cup, one or two family pictures on the work surface. And whether the equipment is in use, or sitting idle, the work surface remains occupied, leaving no space for opening files and working with paper. The equipment and the paper have been hard to manage in such an environment, which has become known as the “cluttered cubical.”

**[0009]** Another problem addressed by the present invention is the rate at which the equipment is becoming obsolete—three years on average. Although it is possible to replace a component of the computer, its design as an object, a finished product sealed in a box, makes the public at large treat it as an object discarded and replaced for convenience. Some four hundred million computers are produced worldwide every year, of which two hundred thirty million for the US market. The present invention provides the convenience of replacing a component without discarding the housing structure, the other functioning components, or the rest of the computer hardware. The financial and environmental impact of discarding perfectly functional equipment for updating is considerable.

**SUMMARY OF THE INVENTION**

**[0010]** The present invention relates to an office furniture system designed with the following criteria.

**[0011]** 1. The office processing equipment are designed as independent functional components, such as hard drive, motherboard and processor, DVD/CD drive, monitor, wiring harnesses, laptop dock or network outlet, on/off switches, plug outlets, printing plate, refillable or disposable ink cartridges, telephones, interphones, recorders, electronic drawing boards and others.

**[0012]** 2. The system integrates the furniture components and the electronic processing components, fitting coherently together in one and same system.

**[0013]** 3. The hollow space of the panel frames is utilized to fit storage cupboards or cabinets, filing bins and casing for the electronic components inside the panels.

**[0014]** 4. The system clears the work surfaces from the equipment traditionally stationed on their surface by integrating the equipment inside the system’s panels. This applies also to wall-hung work stations where the equipment would be inside casings hung on the wall or on wall track, or to traditional desks in which the equipment would be inside casings fixed to the back panel of the desk, or under the work surface.

**[0015]** 5. The invention extends the functional life of the equipment and reduces its fast obsolescence by breaking the equipment into plug-in components that are easily accessible and replaceable.

**[0016]** 6. The invention also reduces the generated waste by disposing of a single component that requires updating, instead of disposing of a full unit of equipment. The replaced components are easily pre-sorted for recycling or reinstalling for different application with lesser requirement.

**[0017]** 7. The system provides storage cabinets and multiple filing bins for files in process, within easy reach of the end-user.

**[0018]** 8. The system provides prefabricated or custom made kits of casings with electronic components to modify existing furniture installations.

**[0019]** 9. The system provides prefabricated or custom made kits of storage cabinets and filing bins to modify existing furniture installations.

**[0020]** 10. The system enhances the utilization of the working space and reduces the financial cost of replacing fully assembled equipment.

**[0021]** The system includes the following:

**[0022]** an open panel frame in different widths and heights.

**[0023]** a work surface with keyboard storage bins and hinged lids, or with hinged lids to access the keyboard stored in a bin inside the panel;

**[0024]** a series of modular storage and/or display cupboards that fit inside the panel frame;

**[0025]** a series of modular filing bins that fit inside the panel frame;

**[0026]** an articulated, extendable and height-adjustable monitor support arm that fits inside the panel frame;

**[0027]** a casing frame for the DVD/CD drive, with doors or tilt-bin;

**[0028]** a casing frame for the hard drive, with doors or tilt-bin;

**[0029]** a casing frame for the motherboard and the processor, with doors or secured access cover;

**[0030]** a casing frame for the printer with doors;

**[0031]** an ambient/task light inserted inside the panel frame;

**[0032]** a prefabricated wall hung workstation with the electronic components; and

**[0033]** a printer with full page print plate, full page print in one pulse, that fits inside the panel frame.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0034]** FIG. 1 is a perspective view of a prior art office environment, wherein computers are positioned on horizontal work surfaces.

**[0035]** FIG. 2 is a perspective view of a furniture system of the present invention, wherein a vertical furniture panel includes a computer monitor, CD drive, DVD drive, telephone, and printer, as well as a motherboard in open compartments in an open interior of the panel.

**[0036]** FIG. 3 is an exploded view showing the panel of FIG. 2.

**[0037]** FIG. 4 is an exploded view showing the manner in which a printer is mounted in a casing or compartment positioned inside the frame of a vertical furniture panel.

**[0038]** FIG. 5 is a perspective view showing a paper holding bin pivoted outwardly from the furniture panel for reloading paper into the paper holder.

**[0039]** FIG. 6 is a cross sectional side view showing the interior of the printer and paper holder of FIGS. 4 and 5.

**[0040]** FIG. 6A is a perspective view of a full page ink jet printer in accordance with the present invention.

**[0041]** FIG. 7 is a perspective view showing a computer casing or compartment having a motherboard and attached computer components mounted therein.

**[0042]** FIG. 8 is a perspective view showing a desk having a vertical panel mounted on the rear of the desk, with the vertical panel having electronic components mounted in separate compartments in an open interior of the panel.

**[0043]** FIG. 9 is an elevational view of a vertical panel having compartments therein for a computer monitor, hard drive, DVD/CD drive, motherboard and processor, telephone, cell phone and charger, and printer.

**[0044]** FIG. 10 is a view similar to FIG. 9 wherein the printer, DVD/CD drive, hard drive, and motherboard are shown with covers removed.

**[0045]** FIG. 11 is a perspective view of a work surface having keyboard storage bins mounted in the rear edge of the work surface, with closed lids.

**[0046]** FIG. 12 is a perspective view of the work surface and keyboard storage bins of FIG. 11, with the keyboard storage lids shown in an open position.

**[0047]** FIG. 13 is a pictorial view showing the work surface and keyboard storage bins of FIGS. 11 and 12 with a keyboard mounted therein.

**[0048]** FIG. 14 is a side view showing a vertical panel and work surface of the present invention, with shelves mounted on an upper portion of the vertical panel and with various components mounted in the interior of the panel, with on/off switch outlets mounted above the work surface, and with a keyboard receptacle being mounted at the lower rear edge of the work surface.

**[0049]** FIG. 15 is a sectional view similar to FIG. 14, wherein a wire channel is disclosed, the keyboard bin cover is shown in an open position, and wherein a compartment for the motherboard and processor and a wire channel compartment are shown mounted below the position of the work surface.

**[0050]** FIG. 16 is a perspective view of a vertical panel of the present invention wherein the panel includes a plurality of file storage bins, wherein storage bins are pivotally mounted in separate compartments for movement between open and closed positions.

**[0051]** FIG. 17 is a perspective view of the panel shown in FIGS. 14 and 15, showing a single shelf instead of two rows of shelves.

**[0052]** FIG. 18 is a schematic perspective view showing a vertical panel of the present invention incorporating a pivotal light fixture that pivots inwardly and outwardly from the panel.

**[0053]** FIG. 19 is a partial sectional view taken along lines 19-19 of FIG. 18.

**[0054]** FIG. 20 is a perspective view of another embodiment of the present invention, wherein computer components, a phone, and a printer are mounted in a closeable cabinet that is portable, such that the cabinet can be attached to a wall in a dormitory room or the like.

**[0055]** FIG. 21 is a perspective view of the portable storage unit shown in FIG. 18, with a door on the front of the cabinet being opened to a horizontal position, wherein the door serves as a work surface for the unit.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

**[0056]** Referring now to the drawings, a conventional open plan office layout employing free standing furniture partitions in combination with free standing (or partition-mounted) work surfaces is shown in FIG. 1. From this figure, it can be seen that computer monitors and central processing units and keyboards take up a majority of the available horizontal work surface space in each of the work stations, leaving little room for work papers.

**[0057]** An open office furniture system 10 having integral electronic components, constructed in accordance with the present invention is shown in FIGS. 2-21. A single, vertical, prefabricated furniture panel 12 is shown for exemplary purposes in FIG. 2. It is understood that these partition panels may be arranged in cubicles or other layouts, as shown in FIG.

1. Furniture panel **12** can be a typical prefabricated furniture panel of the type used in open office systems. Panel **12** typically will have a metal frame **14** covered by cover panels **16** on both sides of the frame, leaving a hollow interior. In most applications, most of the hollow interior is wasted space. In the present application, the hollow interior is used for mounting components so that the work surfaces can remain relatively free of obstructions.

**[0058]** As shown in FIG. 2, a work surface **18** is mounted by brackets **20** to the panel in a conventional manner. Shelving units **22** and **24** are mounted on upper portions of panel **12** in a conventional manner. All of the electronic components are mounted in compartments in the hollow interior of panel **12**. A screen **26** in the form of a flat panel display is mounted in a compartment in the interior of a panel by means of an articulating mounting bracket or support arm **28** mounted in the interior of a monitor compartment **30**. Support arm **28** permits the flat panel display to be moved inwardly and outwardly and upwardly and downwardly with respect to compartment **30** and permits display **26** to be rotated or pivoted. The entire display and mounting bracket are substantially recessed into the panel when desired. As shown in FIG. 3, the various electronic components described herein are mounted in the open interior of panel **12** inside casings or compartments **32** of the same type used for the monitor. The compartments can be hollow frames or flat pans with only one side open, depending upon the component. Generally, the compartments will be flat pans having open sides facing the front of the panel. The compartments are attached in the interior of the hollow panel by attachment to the framework of the panel.

**[0059]** As shown in FIG. 2, monitor screen **26**, a printer **34**, a telephone **36**, a CD drive **38**, and a DVD drive **40** are mounted in separate casings or compartments in the interior of the panel, so that these components are basically flush with the surface of the panel and do not obstruct the use of the work surface **18**. Computer components **42**, as shown in FIG. 3, are mounted in compartments below the work surface, because access to these components on a daily basis is not required. The components are covered by a cover **44**. The keyboard **46** (shown in phantom in FIG. 3) is mounted in a retractable keyboard drawer **48**. A telephone **50** is mounted in a telephone component **52**, while a printer **54** is mounted in a printer compartment **56**. A panel cover **58** covers portions of the panel that are not covered by the compartments for the computer components.

**[0060]** The printer **54** and printer compartment **56** are shown in more detail in FIGS. 4-6. The printer **54** shown comprises an inkjet printer and is mounted at the lower portion of printer case **60**, which has an open outer side. A paper holder **62** is pivotally mounted in the case **60** above inkjet cartridge **64** of printer **54**, with the paper case being an open top bin in which paper **66** is inserted when the case is pivoted outwardly from the case **60**. A paper exit **68** is positioned at the bottom of the printer so as to discharge paper forwardly from the printer. Case **60** is rectangular in shape so that it fits completely inside panel **12**. Paper drive rollers transport paper from paper holder **62** through the inkjet printer to paper exit **68**.

**[0061]** Another feature of the invention is that the inkjet printer can be a full page printer **70** as shown in FIG. 6A instead of the traveling print head reflected in FIG. 5. As shown in FIG. 6A, instead of a print head that slides along a bar to print one line at a time, the printer of FIG. 6A comprises

a matrix of inkjet outlet nozzles **72** that forms the entire side of a page. Thus, as soon as a page is in position in printer unit **70** of FIG. 6A, all of the inkjet nozzles discharge simultaneously and print the page all at once. The page can thus be printed much more quickly.

**[0062]** As shown in FIG. 7 and in FIG. 2, one of the computer casings **32** is designed to hold computer components **42**. Computer components **42** can include the motherboard and central processing units that would be conventionally mounted on the motherboard.

**[0063]** As shown in FIG. 8, the same electronic components described above can be mounted in a vertical panel **74** that is attached to the back of a desk **76**. A computer panel also can be attached directly to a wall or other vertical support.

**[0064]** The various computer components are shown in more detail in FIG. 9, mounted in a typical layout in a furniture panel **12**. The printer, DVD/CD drives, hard drive, and motherboard and processor can all be covered by covers **78**, **80**, **82**, and **84**, which desirably are pivotally mounted in the individual casings or compartments in which they are mounted. The printer paper outlet **86** is shown as a slot at the bottom of printer cover **78**.

**[0065]** As shown in FIGS. 11-13, when a keyboard drawer is not employed, one or more keyboard storage bins **88** can be provided at the rear of the work surface **18**. Storage bins can have pivotally mounted covers or lids **90**. Keyboard **46** can be stowed in storage bin **88** when not in use, if a keyboard drawer is not provided.

**[0066]** The components of the present invention are shown in side view and side sectional view in FIGS. 14 and 15. Wire channels **92** and **94** may be positioned inside hollow vertical panels **12** in addition to the other components discussed above.

**[0067]** As shown in FIG. 16, where the interior of furniture panel **12** is not used for storage of electronic components, the interior can be fitted with compartments or casing for file storage bins **96**. Each wire storage bin can be pivotally mounted in a casing **98** by a hinge **100** in the form of a living hinge (preferably) or a regular hinge pivotally mounted at the front of a compartment. File storage can be accommodated in a separate panel (as shown in FIG. 16) or it can be incorporated in available space in panels that are otherwise used to store electronic components. A separate file storage panel is shown in FIG. 16.

**[0068]** A pictorial view of an exemplary panel incorporating various elements desirable at a work station is shown in FIG. 17. In addition to the components discussed above, the panel **102** of FIG. 17 includes a USB plug **104**, a reboot switch **106**, and a microphone plug or Ethernet outlet **108**. Optional secure casings **110** for a motherboard or processor and hard drive are mounted at a lower position of panel **102**.

**[0069]** The incorporation of pivotal lighting elements **112** in a panel system of the present invention is shown in FIGS. 18 and 19. Panels **114** with shelf units **116** mounted at an upper portion thereof include lighting units **112** mounted in horizontal openings extending into the interior of the panels, as shown in FIG. 19. The lighting units are mounted on pivot pins **116**, so that they can be pivoted inwardly to the position shown in phantom in FIG. 19, where they are not visible. Alternatively, they can be pivoted outwardly to the solid line position shown in FIG. 19, where the light is directed downwardly down to the work surface. An automatic switch can be

incorporated into the lighting so that the lighting turns off automatically when it is pivoted inwardly to its storage position.

[0070] When the features of the present invention are to be used in a temporary storage location, such as a college dorm room, all of the elements of the invention can be incorporated into a separate portable case 120, as shown in FIGS. 20 and 21. Case 120 has sides 122 and a top 124 and a bottom 126. A door 128 opens on a hinge 130 and is held in a horizontal position by arms 132. The interior of the case includes printer 134, display 136, telephone 138, disc drives 140, storage spaces 142, and the other components included in the cabinets described above. With cabinet 120, the whole cabinet and components can be provided as a unit, so that a person can carry the entire unit to the location where it is to be used. This can be, as stated above, a dorm room or the like, or it can be used at a trade show or other temporary location where such equipment is necessary. When the use is through, the whole unit can be dismantled from a wall or panel and moved to a different location.

[0071] It should be understood that the foregoing is merely exemplary of the preferred practice of the present invention and that various other features and advantages of the invention will be apparent to a person skilled in the art.

What is claimed is:

1. An office furniture system with integral electronic components comprising:

at least one vertically oriented prefabricated furniture panel, the panel being free standing or wall or desk mounted, the panel having a structural frame providing a hollow interior to the panel, the panel having a thickness sufficient to house electronic components in the interior thereof, the frame having compartments for separately housing computer components, such that each component can be replaced separately; and one or more work surface components mounted on the vertical furniture panels, the work surface being unobstructed by the computer components mounted in the vertical panel.

2. A furniture system as in claim 1 wherein the vertical panel has separate compartments for one or more of a computer motherboard, a hard drive, a DVD or CD or other replaceable memory drive, a computer monitor, a printer, and a cell phone charger.

3. A furniture system as in claim 2 wherein the vertical panel also has one or more compartments in the form of bins for files or the like wherein a container having an open top is pivotally mounted in a compartment opening in the panel for movement between a closed position, wherein the container is enclosed in the panel, and an open position, wherein the top of the container is pivoted outwardly from the panel so as to be accessible for insertion or removal of materials in the bin.

4. A furniture system as in claim 3 wherein the bin is mounted to the compartment for pivotal movement by means of a living hinge wherein a flexible sheet material is folded along a hinge axis and the material on the opposite sides of the

hinge axis are attached to a bottom of the bin and to a lower interior surface of the compartment.

5. A furniture system as in claim 2 wherein a computer monitor in the form of a flat panel display is mounted in a compartment by means of a movable mounting arm that permits the display to move inwardly and outwardly from the compartment and to move vertically and to tilt or swivel with respect to the compartment.

6. A furniture system as in claim 2 wherein the system has separate compartments for computer components in the nature of removable memory, a hard drive or hard drives, a motherboard, and a monitor, with the system including wiring for electrically connecting the components.

7. A furniture system as in claim 2 wherein the system includes a compartment for a printer and a printer is mounted in the compartment, the printer being flat enough to fit into the compartment and having a paper outlet slot at a lower edge that directs printed sheets outwardly from the front of the panel at a lower edge of the printer compartment.

8. A furniture system as in claim 7 wherein the printer is an inkjet printer having an array of inkjet nozzles that cover the surface of entire an sheet of regular paper such that the discharge of the inkjet array prints an entire sheet of paper at one time.

9. A furniture system as in claim 1 wherein the work surface has a receptacle for a keyboard at a rear edge thereof, such that a keyboard can be stored therein when not in use.

10. A furniture system as in claim 9 wherein the keyboard receptacle has a door pivotally mounted thereon, the door closing an open top of the receptacle when the door is closed.

11. A furniture system as in claim 1 wherein the panel includes a light compartment for an elongated task light, the task light being pivotable about a longitudinal axis between an open position, wherein a light transmitting panel is exposed and directed at the work surface, and a closed position wherein the light transmitting panel is directed into the interior of the light compartment and a non-light transmitting panel faces out from the light compartment.

12. An office furniture system with integral electronic components comprising:

at least one vertically oriented prefabricated furniture in the form of a cabinet with a downwardly pivotal front panel, the cabinet being free standing or wall or desk mounted, the cabinet having a structural frame providing a hollow interior to the cabinet, the cabinet having a thickness sufficient to house electronic components in the interior thereof, the interior of the cabinet having compartments for separately housing computer components, such that each component can be replaced separately, the downwardly pivotal front panel being restrained to stop at a horizontal position so that it serves as a work surface when the cabinet is opened, the work surface being unobstructed by the computer components mounted in the vertical panel.

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