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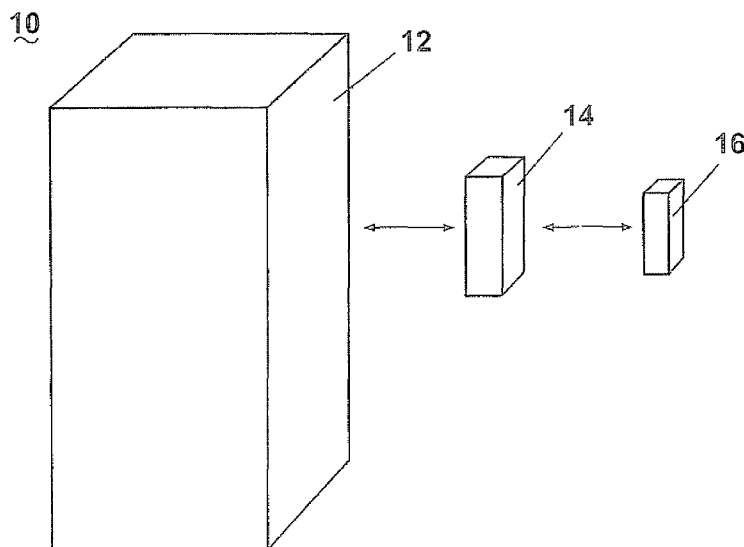
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(57) Abstract: A host or an adapter for a host capable of movably mounting an electronic device for movement between a first orientation, and a second orientation. The first orientation may be more accessible or visible than the second orientation or may be for a different useful purpose. The adapter may move the electronic device in and out of a cavity.

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HOST AND ADAPTER FOR SELECTIVELY POSITIONING A CONSUMER ELECTRONIC DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority from U.S. Patent Application Serial No. 11/619,772 filed January 4, 2007, U.S. Patent Application Serial No. 11/619,767 filed January 4, 2007, and U.S. Patent Application Serial No. 11/619,775 filed January 4, 2007, the disclosures of which are hereby incorporated by reference in their entirety.

BACKGROUND

The invention relates to an adapter for coupling a consumer electronic device to a host for movement between a first orientation, and a second orientation.

Traditionally, appliances, consumer electronic devices, and other useful household machinery is located in a room dedicated to the function supported by the appliance. For example, the kitchen has traditionally been limited to a space for preparing and eating meals and consequently has been mostly occupied by cabinetry and large home appliances such as refrigerators, dishwashers, and ovens. The family room has been designated as a place for leisure activities, and so most entertainment devices, such as televisions and video games are commonly found here. Laundry rooms normally house a washer, dryer, and iron. Devices such as personal computers and printers are often located in another room, such as a dedicated home office or bedroom.

Consumers increasingly own multiple consumer electronic devices, such as hand-held electronic devices, laptops, cell phones, PDAs, digital cameras, video recorders, and digital music players. These devices are typically used in many different rooms in the house and are often carried from room to room throughout the home. Consumers also tend to perform non-traditional tasks in the traditional rooms of the home. For example, consumers also tend to eat in the living room or media room, instead of the dining room. Consumers tend to eat, meet and entertain in the kitchen, not just the dining room and family room. In fact, the kitchen is often the hub of most household activity. Consumers also tend to work in every room of the home with the adoption of laptop computers and wireless networks.

Therefore, there is a trend for consumers to perform non-traditional functions in a household room designed for a traditional function. The invention recognizes this trend and attempts to support the trend.

SUMMARY

According to an embodiment, an adapter mounts a consumer electronic device to a host for movement between a first orientation and a second orientation.

According to another embodiment, a modular system comprises an host, a consumer electronic device removably mounted to the host and having a display, and an adapter mounting the consumer electronic device to the host for movement between a first orientation, where the display is visible to a user, and a second orientation, where the display is concealed from the user.

According to another embodiment, a modular system comprises a host, a consumer electronic device removably mounted to the host and having a user interface for controlling a primary function of the consumer electronic device, and an adapter mounting the consumer electronic device to the host for movement between a first orientation, where the user interface is accessible to a user, and a second orientation, where the user interface is inaccessible to the user.

According to still another embodiment, an adapter having an enclosure defining a cavity is mounted to a host so as to be movable between a first orientation, where the cavity is accessible, and a second orientation, where the cavity is inaccessible. A consumer electronic device is receivable within the cavity. The adapter is configured to supply at least one service to the consumer electronic device when the consumer electronic device is received within the cavity.

According to yet another embodiment, an adapter capable of being mounted to an appliance is provided with an enclosure movable between a first orientation, and a second orientation. A consumer electronic device receiving an electrical service from the adapter may be at least partially disposed in a cavity in the enclosure. The cavity is movable between an accessible orientation and an inaccessible orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIGURE 1 is a schematic illustration of a modular system comprising a host, an adapter, and a consumer electronic device.

FIGURE 2 is a schematic illustration of the modular system of FIGURE 1, illustrating the consumer electronic device coupled with the host through the adapter so that a user interface associated with the consumer electronic device is visible and accessible.

FIGURE 3 is an alternate schematic illustration of the modular system of FIGURE 1, illustrating the consumer electronic device coupled with the host via the adapter.

FIGURE 4 is a perspective view of an embodiment illustrating a refrigerator with an adapter drawer for receiving at least one consumer electronic device, in a closed orientation.

FIGURE 4A is a perspective partial view of the refrigerator and adapter drawer of FIGURE 4 illustrating at least one adapter for coupling with a device service interface for receiving at least one consumer electronic device, in an open orientation.

FIGURE 4B is an enlarged exploded view of the adapter and at least one consumer electronic device illustrated in FIGURE 4.

FIGURE 5 is a perspective partial view of an embodiment illustrating a refrigerator with a chamber closable by a door and an adapter for receiving at least one consumer electronic device coupled to a movable cantilever support arm, showing the adapter in an extended orientation.

FIGURE 5A is a perspective partial view of the refrigerator and adapter of FIGURE 5 showing the adapter in a retracted orientation for closing the chamber door.

FIGURE 6 is a perspective partial view of an embodiment illustrating a refrigerator with a storage chamber and an articulated support frame adapter for selectively positioning at least one consumer electronic device coupled to the articulated support frame, showing the consumer electronic device in a visible orientation.

FIGURE 6A is a perspective partial view of the refrigerator and adapter of FIGURE 6 showing the consumer electronic device in a concealed orientation in the storage chamber.

FIGURE 7 is a perspective partial view of an embodiment illustrating a refrigerator with a storage chamber incorporated into a door and an articulated support frame adapter for selectively positioning at least one consumer electronic device coupled to the articulated

support frame, showing the consumer electronic device in a concealed orientation in the storage chamber.

FIGURE 7A is a perspective partial view of the refrigerator and adapter of FIGURE 7 showing the consumer electronic device in a visible orientation.

FIGURE 8 is a perspective partial view of an embodiment illustrating a refrigerator with a receptacle incorporated into a door and an adapter for biaxial movement of at least one consumer electronic device coupled to the adapter, showing the consumer electronic device in a visible orientation.

FIGURE 9 is a perspective partial view of an embodiment illustrating a refrigerator with a receptacle and an adapter for selective biaxial movement of at least one consumer electronic device into and out of the receptacle, showing the consumer electronic device in a visible orientation.

FIGURE 9A is a perspective partial view of the refrigerator and adapter of FIGURE 9 showing the consumer electronic device being rotated between a visible orientation and a concealed orientation.

FIGURE 9B is a perspective partial view of the refrigerator and adapter of FIGURE 9 showing the consumer electronic device in a concealed orientation.

FIGURE 10A is a perspective view of an embodiment illustrating a refrigerator with a tiltable adapter drawer for receiving at least one consumer electronic device, in a closed orientation.

FIGURE 10B is a perspective partial view of the refrigerator and tiltable adapter drawer of FIGURE 10A illustrating at least one adapter for coupling with a device service interface for receiving at least one consumer electronic device, in an open orientation.

FIGURE 11 is a perspective partial view of an embodiment illustrating a refrigerator with a push-push adapter drawer illustrating at least one device service interface for receiving at least one adapter for coupling with a consumer electronic device, in an open orientation.

FIGURE 12 is an exploded partial view of an embodiment illustrating a refrigerator with a telescopic cantilever arm adapter for rotatably coupling at least one consumer electronic device having a user interface thereto.

FIGURE 12A is a perspective partial view of the refrigerator and telescopic cantilever arm adapter of FIGURE 12 illustrating the at least one consumer electronic device with the user interface in a first orientation.

FIGURE 12B is a perspective partial view of the refrigerator and telescopic cantilever arm adapter of FIGURE 12 illustrating the at least one consumer electronic device with the user interface in a second orientation.

FIGURE 13 is a perspective partial view of an embodiment illustrating a refrigerator with an adapter assembly having a plurality of movable adapter receptacles.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIGURES 1 and 2, a schematic illustration of a modular system 10 is shown and comprises at least one host 12, at least one adapter 14, and at least one consumer electronic device 16 (hereinafter referred to as a “CED”). The host 12 and the CED 16 cannot be directly coupled with each other, and thus are indirectly coupled via the adapter 14. The term “coupled” as used herein includes any type of connection that permits a transfer of a service, as hereinafter defined, between any combination of the host 12, adapter 14, and CED 16. The term “coupled” includes both a fixed and removable coupling, unless expressly stated otherwise.

The host 12 performs a primary function and can provide or receive at least one service to or from the adapter 14 or the CED 16. The host 12 can be an appliance and the primary function can be performing a series of steps to conduct a useful cycle of operation. Preferably, the appliance is a conventional household appliance, such as a refrigerator performing a cooling cycle or an ice making cycle. Other examples of the host 12 include, but are not limited to a freezer, a microwave oven, a dishwashing machine, a stove, a range, an air conditioner, a dehumidifier, a water heater, a furnace, a clothes washing machine, a clothes dryer, a clothes refreshing machine, and a non-aqueous washing apparatus, or any combination thereof.

The CED 16 is a device that also performs a primary function. In most cases, the primary function of the CED is different from the primary function performed by the host 12. The CED 16 can provide or receive at least one service to or from the adapter 14 or the host 12. Examples of the CED 16 include, but are not limited to a display including a television, a video camera, a video recorder, a personal computer, a notebook computer, a computer monitor, a video display, a keyboard, a printer, copying equipment, a calculator, a facsimile machine, a scanner, a digital storage device, a wireless transceiver, an internet router, a power supply, a data recorder, an answering machine, a telephone, a cordless telephone, a cellular

telephone, a video game system, a personal digital assistant, a DVD player, VHS player, a VCR, a cassette deck, an 8 mm video player, a CD player, a Blackberry, a portable digital video player, an MP3 player, a radio, other music players, an audio speaker, a digital picture frame, a weather station, and a scale or balance. The CED can be provided with a user interface 26 to enable the user to interact with the CED 16 or receive a functional output from the CED. The user interface 26 can comprise a video display, a touch screen, control knobs or buttons, a data display, a keypad, a printer or facsimile page output, a microphone, a speaker, a video or still camera, and the like.

The adapter 14 supplies at least one service to either the host 12 or the CED 16. The supply of the service can be uni-directional in that the adapter 14 supplies a service provided by one of the host 12 and the CED 16 to the other of the host 12 and the CED 16. The supply of the service can also be bi-directional in that the adapter 14 can supply a service from the host 12 to the CED 16 and from the CED 16 to the host 12. The adapter 14 can be provided the service by any device, but it is anticipated that the adapter 14 will be provided the service from at least one of the host 12 and CED 16. The adapter 14 itself can also provide a service that is supplied to the host 12, the CED 16, or both, either uni-directionally or bi-directionally. The service supplied by the adapter 14 can be of the same type or a different type than that supplied by either the host 12 or the CED 16.

An adapter can comprise one or more adapter members. Exemplary types of adapter members can include, but are not limited to, extenders and device holders. In general, an extender extends the service provided by the host 12, the adapter 14, or the CED 16. An extender can be coupled between the host 12 and another adapter 14, between the host 12 and a CED 16, between two other adapters 14, or between another adapter 14 and a CED 16 to extend the service. Extenders are useful to allow an adapter 14 to be coupled to one surface of the host 12, while the CED 16 is coupled to a different surface of the host 12 or to simply increase the distance between the host 12 and the CED 16. Device holders physically support a CED 16.

Exemplary services that the adapter 14 can supply include, but are not limited to, mechanical communication, power communication, and data communication. Mechanical communication is the physical coupling of two objects, such as between any combination of the host 12, the adapter 14, and the CED 16. The mechanical communication includes direct and indirect physical mounting, unless expressly stated otherwise. Physical coupling includes

a fixed or removable mounting, unless expressly stated otherwise. Power communication is the coupling of two objects to supply power to at least one of the objects. Data communication is the coupling of two objects to transmit data to at least one of the objects or exchange data between the objects. The mechanical, power, and data communication includes both uni-directional and bi-directional communication, unless stated otherwise, between any combination of the host 12, adapter 14, and CED 16. The mechanical communication includes direct and indirect physical mounting, unless expressly stated otherwise. Physical mounting includes a fixed or removable mounting, unless expressly stated otherwise. The power and data communication includes wired and wireless communication, unless stated otherwise.

Illustrative applications of these services include the physical mounting of the CED 16 to either the host 12 or adapter 14 to place them in mechanical communication with each other. Power communication can include supplying power to the CED 16 from either the host 12 or adapter 14 during operation as well as charging a CED 16 for later use. Wireless power communication can comprise any types of wireless power communication, including, without limitation for illustration purposes, microwave transmission, laser transmission, acoustical transmission, and magnetic fields. Data communication can include exchanging data between the host 12 or the adapter 14 and the CED 16. Wireless data communication can comprise any type of wireless data communication, including, without limitation for illustration purposes, wireless network (a/k/a Wi-Fi), radio transmission, acoustical transmission, and light transmission.

Each service can comprise multiple categories of the service, where one category of a service is different in some way from another category of the same service. As an example, two possible categories of mechanical communication are hanging a CED 16 as opposed to docking the CED 16. Exemplary categories of power communication include the type of power, e.g. AC or DC, supplied to the CED 16, and variations in the characteristics of the power, such as the voltage or current. Exemplary categories of data communication include encrypted and unencrypted data.

The adapter 14 can be configured to transform the service that it supplies. For example, the adapter 14 can be configured to transform the power supplied by changing the voltage, or the amount of available power. An exemplary transformation is changing the voltage of the supplied power from the voltage that is supplied to the adapter, e.g. a step-up in

voltage. Another exemplary transformation is the changing of AC power to DC power. The data communication can be transformed so that the adapter 14 changes unencrypted data to encrypted data, or a standard communication protocol to a proprietary protocol. Data communication also includes communication for different protocols, including physical layer protocols and software layer protocols. One example of a protocol transformation includes wired Ethernet and wireless (i.e. Wi-Fi), which involves a physical layer change in which both physical layers support identical application packet structures. Another example includes Zigbee and Bluetooth, in which a communication adapter can transfer a source Zigbee packet to a well-formed Bluetooth packet as a target. Other anticipated transformations include the changing from wired power to wireless power, from wired data to wireless data, or from standard power or standard data to power with imbedded data.

The service supplied by the adapter 14 can be provided at least in part by the host 12. For example, the mechanical communication for the CED 16 can be provided in part by a horizontal or vertical surface of the host 12, the power supplied by the adapter 14 can be provided through a power connection between the host 12 and an external power source, such as a mains electricity supply, and the data transferred by the adapter 14 can be provided by the host 12, such as from a host controller, or through a data connection between the host 12 and an external source, such as a computer network, a telecommunication network, or another appliance.

Alternately, the service supplied by the adapter 14 can be provided at least in part by the use environment. The use environment, as used herein, is the area surrounding the host 12. For example, in the case where the host 12 is an appliance, the use environment can be a nearby wall of a building or similar structural feature. The use environment can include sources of power and data, such as a mains electricity supply or a computer network.

The term “provide”, and any variation thereof, as used herein denotes the source of the service relative to the modular system 10, and is not limited to the “provider” being the origin of the service. In other words, providing is used to denote the source of the service relative to the host 12, the adapter 14, and the CED 16, regardless of whether the service originates with the object that provides the service. The object that provides the service can simply be passing on the service. For example, for a host 12 comprising an appliance that provides the service of power communication, the appliance can simply pass on electricity it receives from a household outlet. However, the same appliance can provide another service

that originates with the appliance, such as mechanical communication where an adapter 14 and a CED 16 is physically coupled to the appliance. Moreover, the object that the service is provided to is not necessarily the end receiver of the service. The service can simply be transmitted through the object that is provided with the service. An object, such as the adapter 14, can be provided with the service, such as from the host 12, and can transmit or supply the service, such as to the CED 16.

The host 12 and the CED 16 each comprise at least one service interface, referred to hereinafter as a host service interface (hereinafter referred to as an "HSI") and a device service interface (hereinafter referred to as a "DSI"), respectively. The service interfaces can be integrally formed with the host 12 or CED 16, or can be an add-on device. The service interfaces can be removable from or integrated with the host 12 or CED 16. At least one service can be provided to the adapter 14 through the HSI, the DSI, or both, and the adapter 14 can, in turn, supply that service through the other of the HSI and the DSI. As an example, for a uni-directional service where the service is provided from the host 12 to the CED 16 via the adapter 14, the service can be supplied to the adapter 14 through the HSI, and to the CED 16 through the DSI.

While the DSI and HSI can be the same, it is anticipated that, in most cases, the DSI will be different from the HSI. The term "different," when used to describe the host and DSIs, means that the HSI and DSI cannot be directly coupled without one or both interfaces losing some functionality. "Different" can also mean that the two service interfaces are incompatible. For example, the HSI and the DSI can have different physical connectors for one or more of the services, thereby necessitating the adapter 14 to couple the physical connectors to establish the appropriate communication for the service.

The adapter 14 can comprise at least one component that enables a service to be supplied between the host 12 and the CED 16. An adapter component can provide, supply, or receive at least one service. A single adapter component can enable the supply of only one service to the CED 16 or it can enable the supply of multiple services to the CED 16. The adapter 14 can be provided with multiple adapter components that each enable the supply of a different service to the CED 16. One or more adapter components can form an adapter service interface, similar to a HSI or DSI, and can couple with a HSI, a DSI, or another adapter service interface to provide, transmit, or supply at least one service.

An adapter component can couple with the host 12, the CED 16, or neither. An adapter component can comprise a connector component that enables the supply of the service through a physical coupling with the host 12, CED 16, or another adapter 14, e.g. a plug fitting into a socket to enable power delivery, or through a non-physical coupling with the host 12, CED 16, or another adapter 14, e.g. a wireless connection to enable data transfer. An adapter can comprise a non-coupling component. An adapter component can comprise a transformative component, such as an electrical transformer for changing the voltage of the power supply, or an inverter to change the power from DC to AC. An adapter component can comprise a service interface that couples with an HSI or a DSI.

The adapter 14 can further comprise functionality unrelated to supplying the service between the host 12 and CED 16. The adapter functionality can operate independently of the host 12 and the CED 16, or it can enhance one or more of the functions of the host 12 and the CED 16. The functionality can be effected by one or more components of the adapter 14. Examples of adapter functionality include, but are not limited to a speaker, a user interface, a calendar projection, a display projection or amplification, a media manager, a whiteboard, physical storage, application software hosting, communications routing, power storage, microphone, CED, and data storage. An adapter 14 with speaker functionality can comprise at least one audio speaker that intensifies and makes speech or music audible. An adapter 14 with user interface functionality can comprise a display and/or an input array that enables a user to interact with the host 12, adapter 14, CED 16, or an external source. An adapter 14 with calendar projection functionality can enable a calendar or schedule to be projected visually or audibly. An adapter with media manager functionality can enable a user to manage discrete types of media (e.g. music, video, pictures, etc.). An adapter 14 with whiteboard functionality can comprise a conventional whiteboard for temporarily writing messages, and can either be available to the user only when a CED 16 is not coupled to the adapter 14, or be available at all times to the user. An adapter 14 with physical storage functionality can comprise a storage compartment for storing items, and may be particularly useful for storing companion items for the CEDs, such as a remote control for a CED comprising a television, or DVDs for a CED comprising a DVD player. An adapter 14 with power storage functionality can comprise a source of stored power, such as a rechargeable battery. An adapter with CED functionality incorporates the entire functionality of one or more CED as a function of the adapter. An adapter with data storage functionality can

comprise means for storing data, such as a hard drive. An adapter 14 can comprise more than one type of functionality. For example, whiteboard functionality can be combined with physical storage functionality for storing items commonly associated with whiteboards, such as dry-erase markers and erasers.

Referring now to a schematic exploded side view of one configuration of the modular system 10 shown in FIGURE 3, the CED 16 is coupled with the host 12 via the adapter 14. The CED 16 is physically coupled with the adapter 14, which is in turn physically coupled with the host 12. The host 12 comprises an HSI 18 that couples with a first component 22 of the adapter 14, and the CED 16 comprises a DSI 20 that couples with a second component 24 of the adapter 14. At least one service is provided to the adapter 14 through the coupling with the HSI 18 or the DSI 20. At least one service is supplied to the CED 16 through the DSI 20 or to the host 12 through the HSI 18, or, in the case of a bi-directional service, both.

It is anticipated that a common modular system 10 will include a single host 12, a single adapter 14, and a single CED 16. However, it is within the scope of the invention for one or more of the host 12, the adapter 14, and the CED 16 to be in a plural arrangement. An illustrative example includes multiple hosts 12 concurrently coupled to one CED 16 by one or more adapters 14. Another illustrative example includes multiple CEDs 16 coupled to a single host 12 by one or more adapters 14.

For a modular system comprising multiple hosts 12, each host 12 can be provided with a common, standardized HSI 18. For example, competing home appliance manufacturers may have different HSIs 18, but each manufacturer may carry the same standardized HSI 18 throughout its own line of home appliances. For a modular system with multiple adapters 14 and a single host 12, the host 12 can interchangeably couple with any one of the adapters 14. The multiple adapters 14 preferably have a standardized component that is received by the HSI 18 so that the host 12 can interchangeably receive the adapters 14. Manufacturers of CEDs 16 may also choose to carry a standardized DSI 20 throughout their own lines of CEDs 16. Therefore, different adapters 14 can be provided for coupling the standardized interface for a CED 16 of one manufacturer to the standardized interface of a host 12 for another manufacturer and enabling the communication of a service therebetween. This eliminates the need for all CED manufacturers to use the same standardized interface, and increases the utility of the hosts 12 and the CEDs 16.

Specific embodiments of modular systems containing these features, as well as some additional features will now be described. Other examples of modular systems are described in the following related applications filed contemporaneously herewith: U.S. Patent Application Serial No. 11/619,900 entitled "A System for Supplying Service from an Appliance to Multiple Consumer Electronic Devices"; U.S. Patent Application Serial No. 11/619,754 entitled "A System for Connecting Dissimilar Consumer Electronic Devices to a Host"; U.S. Patent Application Serial No. 11/619,836 entitled "An Appliance with an Adapter to Simultaneously Couple Multiple Consumer Electronic Devices"; U.S. Patent Application Serial No. 11/619,907 entitled "Appliance with an Adapter to Alternately Couple Multiple Consumer Electronic Devices"; U.S. Patent Application Serial No. 11/619,922 entitled "An Appliance with a Removable Adapter and a Removable Consumer Electronic Device"; U.S. Patent Application Serial No. 11/619,894 entitled "A Host with Multiple Adapters for Coupling Consumer Electronic Devices"; U.S. Patent Application Serial No. 11/619,806 entitled "An Adapter for Coupling a Host and A Consumer Electronic Device Having Dissimilar Standardized Interfaces"; U.S. Patent Application Serial No. 11/619,817 entitled "A Host with Multiple Adapters for Multiple Consumer Electronic Devices"; U.S. Patent Application Serial No. 11/619,845 entitled "Multiple Hosts with Multiple Adapters for Multiple Consumer Electronic Devices"; U.S. Patent Application Serial No. 11/619,850 entitled "An Appliance Door with a Service Interface"; U.S. Patent Application Serial No. 11/619,912 entitled "A Cabinet Door with a Service Interface"; U.S. Patent Application Serial No. 11/619,873 entitled "Refrigerator Dispenser with a Service Interface and Adapter for a Consumer Electronic Device"; U.S. Patent Application Serial No. 11/619,904 entitled "A Service Supply Module and Adapter for a Consumer Electronic Device"; U.S. Patent Application Serial No. 11/619,767 entitled "Host and Adapter for Docking a Consumer Electronic Device in Discrete Orientation"; U.S. Patent Application Serial No. 11/619,772 entitled "Host and Adapter for Selectively Positioning a Consumer Electronic Display in Visible and Concealed Orientations"; U.S. Patent Application Serial No. 11/619,775 entitled "Host and Adapter for Selectively Positioning a Consumer Electronic Device in Accessible and Inaccessible Orientations"; U.S. Patent Application Serial No. 11/619,718 entitled "Functional Adapter for Consumer Electronic Device"; U.S. Patent Application Serial No. 11/619,731 entitled "Adapter and Consumer Electronic Device Functional Unit"; U.S. Patent Application Serial No. 11/650,222 entitled "Acoustic Chamber as Part of Adapter or

Appliance"; U.S. Patent Application Serial No. 11/649,932 entitled Electrical Accessory Charging Compartment for a Cabinet"; all of which are incorporated herein by reference in their entirety.

In the subsequent illustrations, the host 12 is illustrated as an appliance comprising a refrigerator. However, it should be understood that the invention is not so limited, and the invention can be embodied in other appliances and other hosts that are not appliances.

FIGURES 4, 4A, and 4B illustrate an embodiment of the modular system 100 comprising a refrigerator 102, a CED 90, and an adapter 70. The refrigerator 102 comprises a door 104 having an obverse surface 98, and an adapter drawer 106 having a drawer front 94 with an obverse surface 96. The adapter drawer 106 is configured for movement between a closed orientation, illustrated in FIGURE 4, and an open orientation, illustrated in FIGURE 4A. The drawer obverse surface 96 is adapted with a finish complementary to the finish of the door obverse surface 98 so that an aesthetically pleasing, essentially uninterrupted surface is visible when the drawer 106 is in the closed orientation.

The CED 90, such as a cell phone, PDA, portable music player, and the like, has a user interface 92 and a DSI 116. The DSI 116 is illustrated as comprising a plurality of device service contacts 86 for coupling with a source of one or more services to provide power, data, and the like to the CED 90.

The drawer 106 is provided with at least one HSI 72 having a receptacle 74 configured to couple with a CED and located in a chamber 118 within the drawer 106. The at least one HSI 72 provides power communication and data communication to the CED 90 through a plurality of service contacts 76. The DSI 116 and the HSI 72 are incompatible, and thus the CED 90 cannot be directly coupled with the refrigerator 102. The adapter 70 removably couples the CED 90 to the refrigerator 102. The adapter 70 is removable from both the refrigerator 102 and the CED 90.

The adapter 70 comprises two adapter service interfaces 80, 82. The first adapter service interface 80 comprises at least one service plug 78 that directly mates with a service contact 76 of the HSI 72. The second adapter service interface 82 comprises a plurality of adapter service contacts 84 that directly mate with the device service contact of the DSI 116. Power and data communication are effected between the refrigerator 102 and the CED 90 through the adapter 70, which also provides mechanical communication between the refrigerator 102 and the CED 90.

It should be noted that subsequent description herein of alternate embodiments of the invention will implicitly include the general relationship of refrigerator, CED, and adapter, including adapter service interfaces, described above without repeating the detailed description.

A service source 108, such as a power supply and/or a data handling device such as a router, can be integrated into the refrigerator 102 for providing power communication and/or data communication to the adapter drawer 106 through service leads 110 extending from the service source 108 to the adapter drawer 106. The service leads 110 can terminate in contacts 112 which are adapted for slidable power and data communication with the adapter drawer 106 through drawer service leads 114 extending along a side panel of the adapter drawer 106. Thus, power and data communication can be maintained between the service source 108 and the CED 90 with the adapter drawer 106 in both open and closed orientations.

CEDs, such as music players, cell phones, PDAs, and the like, can be coupled with the adapter 70 for mechanical, power and data communication. The adapter drawer 106 can be configured so that the CEDs can remain in mechanical communication with the adapter 70 when the adapter drawer 106 is in both the open and closed orientations.

The adapter 70, HSI 72, and DSI 116 can be configured to enable data communication between the CEDs. For example, data communication can comprise the transmission of a scheduled event from a cell phone to a PDA, thereby coordinating scheduled events on all CEDs having a calendaring capability.

When the CED 90 is coupled with the adapter 70 and the drawer is in the open orientation, the user interface 92 will be accessible to a user. Conversely, when the CED 90 is coupled with the adapter 70 and the drawer is in the closed orientation, the user interface 92 will be inaccessible to a user. In either case, however, the CED 90 will remain in mechanical, power, and/or data communication with adapter 70 and the refrigerator 102.

It is anticipated that, in most cases, accessibility and inaccessibility of the user interface will be correlative with visibility and concealment of the user interface and the CED itself. However, it is contemplated that the CED can be positioned in an orientation that provide visibility of the CED and/or user interface but renders the user interface effectively inaccessible. Inaccessibility can constitute more than concealment. For example, the CED can be positioned in a first orientation that renders the user interface visible and accessible, and positioned in a second orientation that renders the user interface visible but inaccessible,

such as by activating a controller that suspends the operation of the user interface when the CED is in a preselected orientation.

FIGURES 5 and 5A illustrate an embodiment of the modular system 120 which is similar in some respects to the modular system 100 illustrated in FIGURES 4 and 4A. In this embodiment, the door 104 is provided with a chamber 121 extending inwardly from the obverse surface 98 of the door 104. The chamber 121 houses an adapter 124 coupled to a cantilever support arm 126 configured for slidable extension and retraction of the adapter 124 out of and into the chamber 121. The adapter 124 is provided with at least one DSI 128 for mechanical communication with a CED 130, such as a cell phone, PDA, portable music player, and the like, having a user interface 132. The modular system 120 can be configured so that power and data communication are maintained when the adapter 124 is in both an extended orientation, as illustrated in FIGURE 5, and a retracted orientation, as illustrated in FIGURE 5A. When the adapter 124 is in the retracted orientation, the chamber 121 can be closed by a door 122 which can slidably cover the opening to the chamber 121, thereby concealing the adapter 124, the CEDs 130, and the user interfaces 132. The door 122 can have an exposed surface that is complementary to the obverse surface 98 of the door 104 to provide a generally unbroken continuity of the obverse surface 98 when the door 122 is closed.

The adapter 124 and the at least one DSI 128 can be configured to enable data communication between the CEDs. For example, data communication can comprise the transmission of a scheduled event from a cell phone to a PDA, thereby coordinating scheduled events on all CEDs having a calendaring capability.

When the CED 130 is coupled with the at least one DSI 128 and the door 122 is in the open orientation, the user interface 132 will be accessible to a user. Conversely, when the CED 130 is coupled with the at least one DSI 128 and the door 122 is in the closed orientation, the user interface 132 will be inaccessible to a user. In either case, however, the CED 130 will remain in mechanical, power, and/or data communication with the at least one DSI 128.

FIGURES 6 and 6A illustrate a modular system 160 comprising a refrigerator 102 having a door 104. A CED 162, illustrated as a video display having a user interface 163 comprising a video screen and a control panel, mechanically communicates with the refrigerator 102 through an articulated support frame 172 capable of both translational and

pivotal movement and comprising at least one movable arm 170 terminating in a hinge assembly 173. An adapter 164 comprises the articulated support frame 172, a storage receptacle 166 having a chamber 168 for storing the CED 162 therein. Power and data communication are provided through the adapter 164 between the refrigerator 102 and the CED 162 through suitable wires, cables, wireless networking, and the like, provided through the support frame 172, the hinge assembly 173, and the storage receptacle 166.

The at least one movable arm 170 can translate into and out of the chamber 168 between a first orientation, illustrated in FIGURE 6, wherein the user interface 163 is visible and accessible, and a second orientation, illustrated in FIGURE 6A, wherein the user interface 163 is concealed and inaccessible. The CED 162 can also pivot relative to the movable arm 170 through the hinge assembly 173 for aligning the CED 162 with the chamber 168 and translating the at least one movable arm 170 to store the CED 162 within the chamber 168. A plurality of mounting straps 158, illustrated in FIGURES 6 and 6A as extending over the top of the refrigerator 102, can be utilized to mount the CED 162 and adapter 164 to the refrigerator 102 in a retro-fit or after-market configuration.

FIGURE 6 illustrates the CED 162 pivoted to an orientation generally parallel with the door 104 with the user interface 163 directed outwardly therefrom. However, the CED 162 can be pivoted to an orientation in which the user interface 163 faces at an angle relative to the door 104 for optimizing viewing of the CED 162.

FIGURES 7 and 7A illustrate an embodiment of a modular system 180 similar to that illustrated in FIGURES 6 and 6A, in which the door 104 comprises an adapter comprising a receptacle 174 extending into the interior thereof for receipt of a CED 176, such as a video display, having a user interface 177, such as a screen and a control panel. The CED 176 can be translatably moved between a first orientation illustrated in FIGURE 7, wherein the CED 176 is received within the receptacle 174 so that the user interface 177 is concealed and inaccessible, and a second orientation illustrated in FIGURE 7A, wherein the CED 176 is removed from the receptacle 174 and folded against the door 104 so that the user interface 177 is visible and accessible. Movement of the CED 176 is enabled through a translatable frame and dual hinge assembly 178 providing pivotal movement about two parallel axes and translation of the CED 176 into and out of the receptacle 174. The CED 176 can be stored by pivoting the CED 176 so that it is aligned longitudinally with the receptacle 174 and translated laterally until the CED 176 is fully received in the receptacle 174. Power and/or

data communication can be provided to the CED 176 through the receptacle 174 and the frame and hinge assembly 178.

FIGURE 8 illustrates a similar embodiment of a modular system comprising a single hinged arm assembly 181 supporting a CED 182 having a user interface 184. The single hinged arm assembly 181 is adapted for translation and pivoting between a first orientation, wherein the CED 182 and user interface 184 are received within a receptacle 183 so that the user interface 184 is concealed and inaccessible, and a second orientation, wherein the CED 182 is removed from the receptacle 183 so that the user interface 184 is visible and accessible.

FIGURES 9, 9A, and 9B illustrate an embodiment of a modular system 190 for a CED 192, illustrated as a video display having a reverse face 188 with a user interface 196, and an obverse face 194. The obverse face 194 comprises a surface complementary to the obverse surface 98 of the door 104 when the CED 182 is oriented with the obverse face 194 visible. The user interface 196 can comprise a control panel 198 for controlling the operation of the CED 182.

The door 104 is provided with a receptacle 185 extending inwardly of the obverse surface 98 of the door 104 and adapted for slidable receipt of the CED 182. The CED 182 mechanically communicates with the refrigerator through a hinged adapter 186, which can also provide power and data communication. The hinged adapter 186 is configured to enable the CED 182 to rotate as illustrated in FIGURE 9A about a first axis between a first orientation illustrated in FIGURE 9 in which the user interface 196 is visible and accessible, and a second orientation illustrated in FIGURE 9B in which the obverse face 194 is visible and the user interface 196 is concealed and inaccessible. The hinged adapter 186 also enables the CED 182 to pivot about a generally horizontal axis for both insertion of the CED 182 into the receptacle 185 and orientation of the CED 182 in an orientation which optimizes the observation and operation of the CED 182.

FIGURES 10A and 10B illustrate an embodiment of a modular system 200 comprising a hinged adapter 204. The hinged adapter 204 is provided with an obverse face 208 having a surface complementary to the obverse surface 98 of the door 104. The hinged adapter 204 can be hingedly opened as illustrated in FIGURE 10B to reveal at least one DSI 206 for mechanical, power, and/or data communication with at least one CED 203, such as cell phones, music players, PDAs, and the like, having a user interface 205. The at least one

CED 203 can be placed in mechanical, power, and/or data communication with the at least one DSI 206, which can be effected by inserting the at least one CED 203 into the at least one DSI 206 to engage a cradle (not shown) which can be moved downwardly by pushing down on the at least one CED 203 until the cradle locks into a storage position and the at least one CED 203 is completely received within the at least one DSI 206. The hinged adapter 204 can then be closed to conceal the at least one CED 203. Alternatively, the at least one CED 203 can be placed into the at least one DSI 206 to engage a movable cradle which lowers the at least one CED 203 as the hinged adapter 204 is closed. The hinged adapter 204 can subsequently be opened by first pushing in on the obverse face 208, in the case of a push-push mechanism, or by operating a control panel 202. As the hinged adapter 204 opens, the at least one CED 203 can be raised by movement of the cradle to an orientation facilitating its removal from the at least one DSI 206.

In one embodiment, illustrated in FIGURE 10B, the hinged adapter 204 is hinged along a lower edge for outward tilting of the hinged adapter 204 away from the door 104 to reveal the at least one DSI 206. The at least one CED 203 can be completely received within the at least one DSI 206 so that the hinged adapter 204 can be closed with the at least one CED 203 inside. Thus, the hinged adapter 204 can be tilted between a first orientation, illustrated in FIGURE 10A, wherein the at least one CED 203 is received within the at least one DSI 206 and the hinged adapter 204 is closed so that the user interface 205 is concealed and inaccessible, and a second orientation, illustrated in FIGURE 10B, wherein the hinged adapter 204 is open and the at least one CED 203 is removable from the at least one DSI 206 so that the user interface 205 is visible and accessible. An optional control panel 202 can be incorporated into the modular system 200 to control the operation of the hinged adapter 204, and other functionalities of the refrigerator, such as an ice maker and chilled water dispenser.

The adapter 204 and DSIs 206 can be configured to enable data communication between the CEDs. For example, data communication can comprise the transmission of a scheduled event from a cell phone to a PDA, thereby coordinating scheduled events on all CEDs having a calendaring capability.

FIGURE 11 illustrates an alternate embodiment of the modular system 200 illustrated in FIGURES 10A and 10B, comprising a push-push adapter 210 comprising at least one DSI 214 and having a known push-push mechanism for opening and closing the adapter 210. The push-push adapter 210 can be retracted into the door 104 by pushing the adapter 210 into the

door. Subsequently pushing the adapter 210 will release the adapter to extend outwardly away from the door 104, revealing the at least one DSI 214. The outer, obverse face 212 of the adapter 210 is provided with a surface complementary to the surface of the door 104.

At least one CED (not shown) can be received within the at least one DSI 214, and the push-push adapter 210 can be closed in a first orientation so that the user interface of the CED is concealed and inaccessible in a manner as generally described above. The push-push adapter 210 can be opened in a second orientation so that the at least one CED is removable from the at least one DSI 214 so that the user interface is visible and accessible.

The push-push adapter 210 and DSIs 214 can be configured to enable data communication between the CEDs. For example, data communication can comprise the transmission of a scheduled event from a cell phone to a PDA, thereby coordinating scheduled events on all CEDs having a calendaring capability.

FIGURES 12, 12A, and 12B illustrates an embodiment of a modular system 220 comprising a CED 222, having a user interface 225 and an opposed obverse face 221, attached to an adapter 224 comprising a cantilever arm 229 which is adapted for selective retraction of the CED 222 against the door 104, as illustrated in FIGURE 12B, and extension of the CED 222 away from the door 104, as illustrated in FIGURE 12A. The adapter 224 is provided with a suitable mechanism, such as a telescopic device 223 for slidably extending and retracting the adapter 224 alternately toward and away from the door 104. The adapter 224 terminates in at least one service lead 226 incorporated into a pivot connection 227 providing mechanical communication, power communication, and data communication through the adapter 224 between the refrigerator 102 and the CED 222. Mechanical communication between the CED 222 and the adapter 224 can include the pivot connection 227 for pivoting the CED 222 relative to the adapter 224 about a generally vertical axis.

The adapter 224 enables the CED 222 to be translatably and pivotally moved between a first orientation illustrated in FIGURE 12A, wherein the CED 222 is extended away from the refrigerator 102 and rotated so that the user interface 225 is visible and accessible, and a second orientation illustrated in FIGURE 12B, wherein the CED 222 retracted against the door 104 with the obverse face 221 facing outward so that the user interface 225 is concealed and inaccessible.

Another embodiment of a modular system 230 illustrated in FIGURE 13 comprises a refrigerator 232 having a door 234 comprising an adapter assembly 236 having a plurality of

movable adapter receptacles 238. The adapter receptacles 238 define a chamber 239, which can be moved between a first, open orientation in which the user interface 248 is visible and accessible (illustrated in FIGURE 13 as the center adapter receptacle 238), and a second, closed orientation in which the user interface 248 is concealed and inaccessible (illustrated in FIGURE 13 as the right-most adapter receptacle 238). The adapter receptacles 238 are configured to communicate with an adapter 242, which, in turn, communicates with a CED 240 having a user interface 248. The adapter receptacle 238 is illustrated as a box-like structure wherein the chamber 239 communicates with the adapter 242. The adapter receptacle 238 is configured to provide power and data services to the adapter 242. The adapter 242 is configured for mechanical communication with the adapter receptacle 238 and with the CED 240, and to provide power and data communication between the adapter receptacle 238 and the CED 240. The adapter receptacle 238 can be removed from the adapter assembly 236 and reinstalled in the first orientation so that an obverse face 246 is revealed and the user interface 248 is concealed and inaccessible. The obverse face 246 can be provided with a surface complementary to the obverse surface 98 of the door 234. When the adapter receptacle 238 is in the closed orientation, the adapter 242 can be configured to selectively continue to supply, or terminate, power and data communication between the refrigerator 232 and the CED 240.

The adapters 242 and adapter receptacles 238 can be configured to enable data communication between the CEDs 240 when the adapter receptacle 238 is in either the open or closed configuration. For example, data communication can comprise the transmission of a scheduled event from a cell phone to a PDA, thereby coordinating scheduled events on all CEDs having a calendaring capability.

The invention solves the problems attending the storage and use of multiple consumer electronic devices by providing a modular system comprising a device-specific adapter for organizing the consumer electronic devices into a single location. The adapter can provide power communication for operation and recharging, data communication for use of the device, alone or in conjunction with other devices, and mechanical communication providing a secure storage area which is readily accessible, thereby eliminating the clutter associated with devices located in different areas of the home, or the misplacement common with such devices.

The modular system also enables devices to be utilized in the kitchen/dining area of the home when the kitchen/dining area is occupied, thereby enhancing the functionality and usability of the devices. When the devices are not coupled with the host appliance, the adapter can be concealed by a door, drawer, panel, or similar structure, to maintain an aesthetically pleasing appearance to the host appliance.

While the invention has been specifically described in connection with certain specific embodiments thereof, it is to be understood that this is by way of illustration and not of limitation, and the scope of the appended claims should be construed as broadly as the prior art will permit.

CLAIMS

What is claimed is:

1. An adapter configured to mount to an electrical appliance and to provide power to an independently operable portable electronic device; the adapter comprising:
 - a main body;
 - a first electrical service interface for interconnecting the adapter to the electrical appliance;
 - a second electrical service interface for interconnecting the adapter to the portable electronic device, the second electrical service interface receiving power from the first electrical service interface; and
 - a support structure movable relative to the main body, the support structure movably mounting the portable electronic device to the appliance for movement between a use orientation, and a non-use orientation.
2. The adapter of claim 1 wherein the portable electronic device has a display, wherein the display is visible to a user in the use orientation and wherein the display is concealed from the user in the non-use orientation.
3. The adapter of claim 2, wherein the display faces the adapter in the use orientation and wherein the adapter faces away from the adapter in the non-use orientation.
4. The adapter of claim 1 wherein the adapter provides power to the portable electronic device in the use orientation and wherein the adapter does not provide power to the portable electronic device in the non-use orientation.
5. The adapter of claim 1 further comprising a data channel between the electrical appliance and the portable electronic device.
6. The adapter of claim 1, wherein the support structure comprises a swivel connector to swivel the display between the use orientation and the non-use orientation.
7. The adapter of claim 1, further comprising an articulated support frame for selectively moving the portable electronic device into a storage enclosure to place the portable electronic device in the non-use orientation, and removing the portable electronic device from the storage enclosure to place the portable electronic device in the use orientation.

8. The adapter of claim 1, further comprising a movable arm for selectively extending the portable electronic device away from the appliance in the use orientation and retracting the portable electronic device adjacent the appliance in the non-use orientation.

9. An adapter configured to mount to an electrical appliance and to provide power to an independently operable portable electronic device; the adapter comprising:

a main body;

a first electrical service interface for interconnecting the adapter to the electrical appliance;

a second electrical service interface for interconnecting the adapter to the portable electronic device, the second electrical service interface receiving power from the first electrical service interface;

a storage enclosure within the main body capable of enclosing the portable electronic device; and

a support structure movable relative to the main body, the support structure movably mounting the portable electronic device to the appliance for movement between a first orientation generally within the storage enclosure and a second orientation generally outside of the storage enclosure .

10. The adapter of claim 9 wherein the portable electronic device has a display, wherein the display is visible to a user in the first orientation and wherein the display is concealed from the user in the second orientation.

11. The adapter of claim 10, wherein the display faces the main body in first orientation and wherein the adapter faces away from the main body in the second orientation.

12. The adapter of claim 9 wherein the adapter provides power to the portable electronic device in the first orientation and wherein the adapter does not provide power to the portable electronic device in the second orientation.

13. The adapter of claim 9 further comprising a data channel between the electrical appliance and the portable electronic device.

14. The adapter of claim 9, wherein the support structure comprises a swivel connector to swivel the display between the first orientation and the second orientation.

15. The adapter of claim 9, further comprising an articulated support frame for selectively moving the portable electronic device generally into the storage enclosure to place the portable electronic device in the second orientation, and generally removing the portable

electronic device from the storage enclosure to place the portable electronic device in the first orientation.

16. The adapter of claim 9, further comprising a movable arm for selectively extending the portable electronic device away from the appliance and retracting the portable electronic device adjacent the appliance.

17. A modular system comprising:
an appliance conducting a useful cycle of operation;
an adapter mounted to the appliance, and
a portable electronic device removably mounted to the adapter, the portable electronic device having a display;

the adapter movably mounting the portable electronic device to the appliance for movement between a first orientation, where the display is visible to a user, and a second orientation, where the display is concealed from the user.

18. The modular system of claim 17, wherein the appliance provides at least a first electrical service to the adapter and the adapter provides at least a second electrical service to the portable electronic device.

19. The modular system of claim 17, wherein the at least a second electrical service is supplied by the adapter in the first orientation and is not supplied by the adapter in the second orientation.

20. The modular system of claim 18, wherein the at least a second electrical service is selected from a power service and a data service.

21. The modular system of claim 17, wherein the adapter further comprises a swivel connector to swivel the display between the first orientation and the second orientation.

22. The modular system of claim 21 wherein the swivel connector directly couples the portable electronic device to the appliance.

23. The modular system of claim 17, wherein the display faces the adapter in the first orientation and wherein the adapter faces away from the adapter in the second orientation.

24. The modular system of claim 17, wherein the adapter further comprises an articulated support frame for selectively moving the portable electronic device into a storage enclosure to place the portable electronic device in the second orientation, and removing the

portable electronic device from the storage enclosure to place the portable electronic device in the first orientation.

25. The modular system of claim 17, wherein the adapter further comprises a movable arm for selectively extending the portable electronic device away from the appliance and retracting the portable electronic device adjacent the appliance.

26. A modular system comprising:
an appliance conducting a useful cycle of operation;
an adapter mounted to the appliance;
a portable electronic device removably mounted to the adapter, the portable electronic device having a display; and
the adapter movably mounting the portable electronic device to the appliance for movement between a first orientation, where the display faces away from the appliance, and a second orientation, where the display faces the appliance.

27. The modular system of claim 26, wherein the appliance provides at least a first electrical service to the adapter and the adapter provides at least a second electrical service to the portable electronic device.

28. The modular system of claim 26, wherein adapter provides an electrical service to the portable device in the first orientation and does not provide the electrical service in the second orientation.

29. The modular system of claim 28, wherein the electrical service is selected from a power service and a data service.

30. The modular system of claim 26, wherein the adapter comprises a swivel connector to swivel the display between the first orientation and the second orientation.

31. The modular system of claim 30 wherein the swivel connector directly couples the display to the appliance.

32. The modular system of claim 26, wherein the adapter comprises a movable arm for selectively extending the portable electronic device away from the appliance and retracting the portable electronic device adjacent the appliance.

33. A modular system comprising:
an appliance conducting a useful cycle of operation;
a portable electronic device removably mounted to the appliance and having a user interface for controlling a primary function of the portable electronic device; and

an adapter mounting the portable electronic device to the appliance for movement between a first orientation, where the user interface is accessible to a user, and a second orientation, where the user interface is inaccessible to the user.

34. The modular system of claim 33, wherein the portable electronic device is removably mounted to the adapter to effect the removable mounting of the portable electronic device to the appliance.

35. The modular system of claim 33, wherein the adapter is removably mounted to the appliance to effect the removable mounting of the portable electronic device to the appliance.

36. The modular system of claim 33, wherein the portable electronic device remains mounted to the adapter as it is moved between the first and second orientations.

37. The modular system of claim 33, wherein the adapter supplies at least a first service to the portable electronic device.

38. The modular system of claim 37, wherein the at least a first service comprises multiple services.

39. The modular system of claim 37, wherein the at least a first service comprises at least one of power communication and data communication.

40. The modular system of claim 39, wherein the at least a first service is wireless.

41. The modular system of claim 37, wherein the appliance provides the at least a first service to the adapter.

42. The modular system of claim 38, wherein the adapter provides at least a second service and supplies the at least a second service to the portable electronic device.

43. The modular system of claim 42, wherein the at least a second service is different than the at least a first service.

44. The modular system of claim 43, wherein the adapter is a transformative adapter and transforms one of the at least a first service and the at least a second service prior to the supply of the transformed service to the portable electronic device.

45. The modular system of claim 33, wherein inaccessibility of the second orientation comprises at least one of physical, operational, and functional inaccessibility.

46. The modular system of claim 43, wherein the adapter comprises a container which is open in the first orientation and closed in the second orientation.

47. The modular system of claim 46, wherein the container comprises at least one of a drawer and a box.

48. The modular system of claim 33, wherein the adapter comprises a door which is open in the first orientation and closed in the second orientation.

49. The modular system of claim 48, wherein the door defines a recess for receiving the portable electronic device.

50. The modular system of claim 49, wherein the recess is sized to completely receive the portable electronic device.

51. The modular system of claim 50, wherein the door defines a top edge and the recess opens onto the top edge.

52. The modular system of claim 33, wherein the adapter further comprises an articulated support frame for selectively moving the portable electronic device into a storage enclosure to place the portable electronic device in the second orientation, and removing the portable electronic device from the storage enclosure to place the portable electronic device in the first orientation.

53. The modular system of claim 52, wherein the articulated support frame pivots the portable electronic device about at least one axis and linearly translates the portable electronic device to move the portable electronic device between the first orientation and the second orientation.

54. The modular system of claim 53, wherein the articulated support frame pivots the portable electronic device about at least two axes to move the portable electronic device between the first orientation and the second orientation.

55. The modular system of claim 33, wherein the adapter further comprises a movable arm for selectively extending the portable electronic device away from the appliance and retracting the portable electronic device adjacent the appliance.

56. The modular system of claim 55, wherein the movable arm further comprises a pivot connection for pivoting the portable electronic device about at least one axis.

57. The modular system of claim 33, wherein the portable electronic device is aesthetically complementary to the host when the portable electronic device is in the second orientation and the user interface is inaccessible to the user.

58. An adapter for removably mounting a portable electronic device using at least a first service selected from a power service and a data service and having a user interface for

controlling a primary function of the portable electronic device to a host providing at least a second service and conducting a useful cycle of operation, the adapter comprising:

an adapter main body capable of being mounted to the host and adapted to removably hold the portable electronic device for movement between a first orientation, where the user interface is accessible to a user, and a second orientation, where the user interface is inaccessible to the user, wherein inaccessibility of the second orientation comprises at least one of physical, operational, and functional inaccessibility;

a first adapter interface depending from the adapter main body and adapted to receive the second service from the host; and

a second adapter interface depending from the adapter main body and adapted to provide the first service to the portable electronic device.

59. The adapter of claim 58, wherein the adapter main body further comprises a container which is open in the first orientation and closed in the second orientation.

60. The adapter of claim 58, wherein the adapter main body further comprises an articulated support frame for selectively moving the portable electronic device into a storage enclosure to place the portable electronic device in the second orientation, and removing the portable electronic device from the storage enclosure to place the portable electronic device in the first orientation/

61. The adapter of claim 58, wherein the adapter main body further comprises a movable arm for selectively extending the portable electronic device away from the host and retracting the portable electronic device adjacent the host.

62. An adapter for removably mounting to a host and for removably holding a portable electronic device having a display, the adapter comprising:

an adapter main body capable of being removably mounted to the host and capable of removably supporting the portable electronic device;

a storage compartment at least partially defined by the adapter main body;

an articulated support frame for the main body selectively articulating relative to the host when the adapter is mounted to the host between a first orientation where the display is substantially outside of the storage compartment, and a second orientation where the display is contained within the storage compartment.

63. The adapter of claim 62, wherein the articulated support frame pivots the portable electronic device about at least one horizontal axis to move the portable electronic device between the first orientation and the second orientation.

64. The adapter of claim 62, wherein the articulated support frame pivots the portable electronic device about at least one axis and linearly translates the portable electronic device to move the portable electronic device between the first orientation and the second orientation.

65. The adapter of claim 62, wherein the articulated support frame pivots the portable electronic device about at least two axes to move the portable electronic device between the first orientation and the second orientation.

66. The adapter of claim 62, wherein the articulated support frame further comprises a movable arm for selectively extending the portable electronic device away from the host and retracting the portable electronic device adjacent the host.

67. The adapter of claim 62, wherein the adapter supplies at least one service to the portable electronic device.

68. The adapter of claim 62, wherein the host provides at least a first service to the adapter and the adapter provides at least a second service to the portable electronic device.

69. The adapter of claim 62, wherein the articulated support frame pivots the portable electronic device about at least one vertical axis to move the portable electronic device between the first orientation and the second orientation.

70. An adapter for removably mounting to a host conducting a useful cycle of operation and for removably holding a portable electronic device having a display, the adapter comprising:

an adapter frame capable of being removably mounted to the host; and

an arm movably mounted to the adapter frame and capable of removably supporting the portable electronic device, for selectively extending the portable electronic device away from the host in a first orientation extending from the host and retracting the portable electronic device to a second orientation adjacent the host.

71. The adapter of claim 70, wherein the at least one axis comprises a vertical axis.

72. The adapter of claim 70, wherein the host provides at least a first service to the adapter and the adapter provides at least a second service to the portable electronic device.

73.. The adapter of claim 70, wherein the adapter comprises a recess and further wherein the display is received within a recess in the adapter in the second orientation.

74. The adapter of claim 70, wherein the arm further comprises a pivot connection for pivoting the portable electronic device about at least one axis.

75. A modular system comprising:
an appliance conducting a useful cycle of operation;
an adapter mounted to the appliance and having an enclosure defining a cavity and movable between a first orientation, where the cavity is accessible exteriorly of the appliance, and a second orientation, where the cavity is received within the appliance; and
a consumer electronic device receivable within the cavity;
wherein the adapter is configured to supply at least one service to the consumer electronic device when the consumer electronic device is received within the cavity.

76. The modular system of claim 75, wherein the at least one service comprises multiple services.

77. The modular system of claim 76, wherein at least one of the multiple services is not supplied by the adapter in the second orientation.

78. The modular system of claim 76, wherein the multiple services comprise at least one of power communication and data communication.

79. The modular system of claim 78, wherein the at least one of the power communication and data communication is wireless.

80. The modular system of claim 75, wherein the appliance provides the at least one service to the adapter.

81. The modular system of claim 75, wherein the enclosure is open in the first orientation and closed in the second orientation.

82. The modular system of claim 819, wherein the enclosure comprises one of a drawer and a box.

83. The modular system of claim 75, wherein the adapter further comprises a door defining at least a portion of the cavity and further wherein the door is open in the first orientation and closed in the second orientation.

84. The modular system of claim 83, wherein the door defines a top edge and the cavity opens onto the top edge.

85. The modular system of claim 75, wherein the cavity is sized to completely receive the consumer electronic device.

86. A modular system comprising:
an electrically powered appliance capable of conducting a useful cycle of operation, the appliance having an external surface;
an adapter with an enclosure, the adapter being capable of being mounted to the external surface of the appliance;
a cavity in the enclosure, the enclosure being movable between a first orientation, where the cavity is accessible exteriorly of the appliance, and a second orientation, where the cavity is substantially enclosed by the modular system;
an electrical service interface within the cavity; and
a consumer electronic device at least partially receivable within the cavity; the consumer electronic device being capable of receiving at least one electrical service from the electrical service interface.

87. The modular system of claim 86, wherein the electrical service interface provides multiple services, wherein at least one of the multiple services is supplied by the electrical service interface in the first orientation and is not supplied by the electrical service interface in the second orientation.

88. The modular system of claim 86, wherein the electrical service interface provides a service selected from a power service and a data service to the consumer electronic device.

89. The modular system of claim 86, wherein the electrically powered appliance provides the at least one electrical service to the adapter.

90. The modular system of claim 86, wherein the enclosure is open in the first orientation and closed in the second orientation.

91. The modular system of claim 86, wherein the adapter comprises a door defining the cavity and which is open in the first orientation and closed in the second orientation.

92. The modular system of claim 91, wherein the door defines a top edge and the cavity opens onto the top edge.

93. The modular system of claim 86, wherein the cavity is sized to completely receive the consumer electronic device.

94. The modular system of claim 86 wherein the adapter comprises a drawer defining the cavity and further wherein the drawer is open in the first orientation and closed in the second orientation.

95. An adapter for mounting a consumer electronic device to an electrically powered appliance capable of conducting a useful cycle of operation, the adapter comprising:
an adapter main body capable of being mounted to the appliance;
a movable enclosure movably connected to the main body; the movable enclosure being movable between a first orientation, and a second orientation;
a cavity in the movable enclosure being capable of at least partially receiving the consumer electronic device therein, the cavity being physically accessible exteriorly of the appliance in the first orientation and being physically inaccessible from the exterior of the appliance in the second orientation; and
an electrical service interface capable of providing an electrical service to the consumer electronic device.

96. The adapter of claim 95, wherein the electrical service interface provides multiple services, and further wherein at least one of the multiple services is supplied by the electrical service interface in the first orientation and is not supplied by the adapter in the second orientation.

97. The adapter of claim 95, wherein the electrical service interface provides service selected from a power service and a data service to the consumer electronic device.

98. The adapter of claim 95, wherein the electrical service interface provides a data communication channel between the appliance and the consumer electronic device.

99. The adapter of claim 95 wherein the adapter is capable of receiving the electrical service from the appliance.

100. The adapter of claim 95, wherein the enclosure is open in the first orientation and closed in the second orientation.

101. The adapter of claim 95, further comprising a door at least partially defining the cavity and which is open in the first orientation and closed in the second orientation.

102. The adapter of claim 101, wherein the door defines a top edge and the cavity opens onto the top edge.

103. The adapter of claim 95, wherein the cavity is sized to completely receive the consumer electronic device.

104. The adapter of claim 95, wherein the adapter comprises a drawer defining the cavity and further wherein the drawer is open in the first orientation and closed in the second orientation.

105. A modular system for mounting to a host providing at least a first service selected from a power service and a data service, the modular system comprising:

- a portable electronic device adapted to use at least a second service selected from a power service and a data service and having a user interface for controlling a primary function of the portable electronic device; and

- an adapter comprising:

- an adapter main body capable of holding the portable electronic device, the adapter main body being capable of being mounted to the host and the portable electronic device being capable of being removably and movably mounted to the adapter for movement between a first orientation, where the user interface is accessible to a user, and a second orientation, where the user interface is inaccessible to the user, wherein the inaccessibility of the second orientation comprises at least one of physical, operational, and functional inaccessibility;

- a first adapter interface depending from the adapter main body and capable of receiving the at least first service from the host, and

- a second adapter interface depending from the adapter main body and capable of providing the at least second service to the portable electronic device.

106. The modular system of claim 105, wherein the adapter main body further comprises an articulated support frame for selectively moving the portable electronic device into a storage enclosure to place the portable electronic device in the second orientation, and removing the portable electronic device from the storage enclosure to place the portable electronic device in the first orientation.

107. The modular system of claim 105, wherein the adapter main body further comprises a movable arm for selectively extending the portable electronic device away from the host and retracting the portable electronic device adjacent the host.

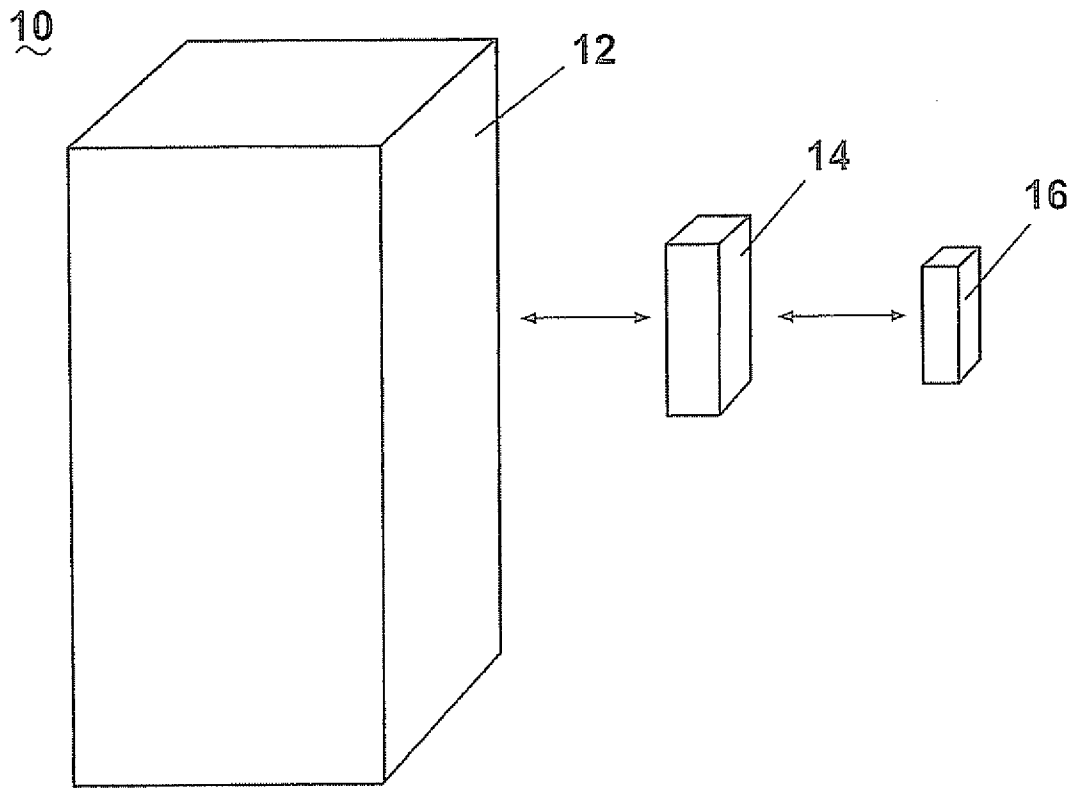


Fig. 1

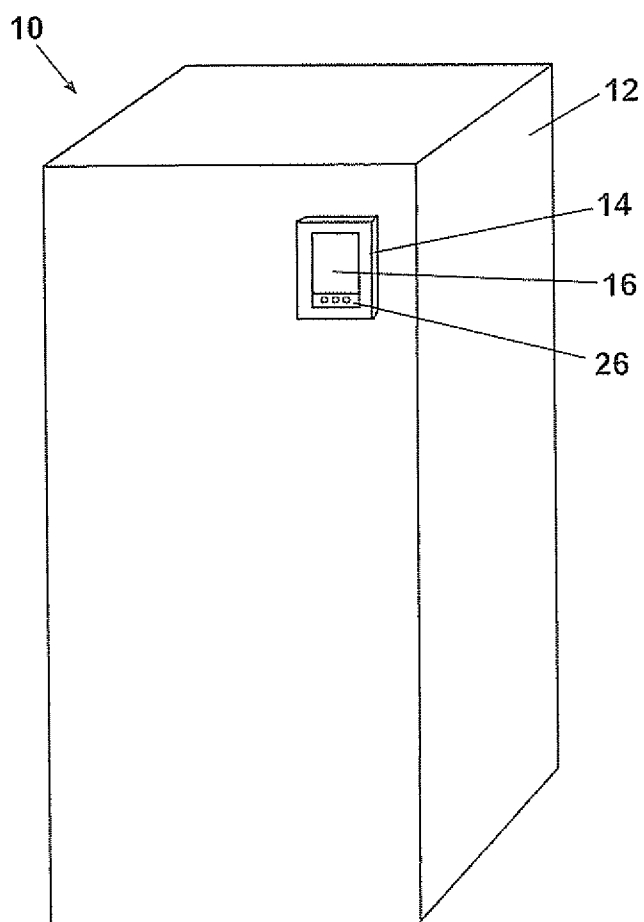


Fig. 2

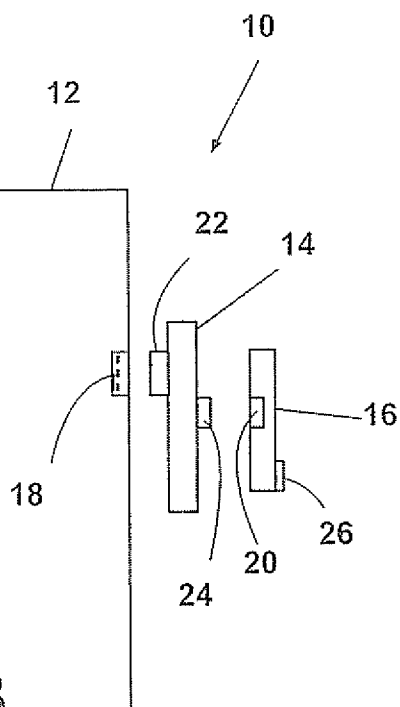


Fig. 3

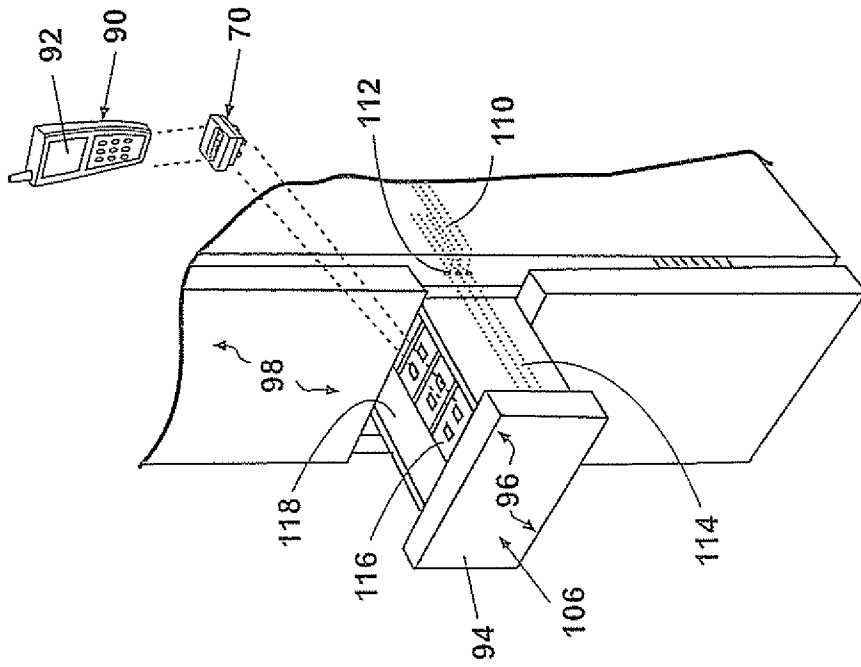


Fig. 4A

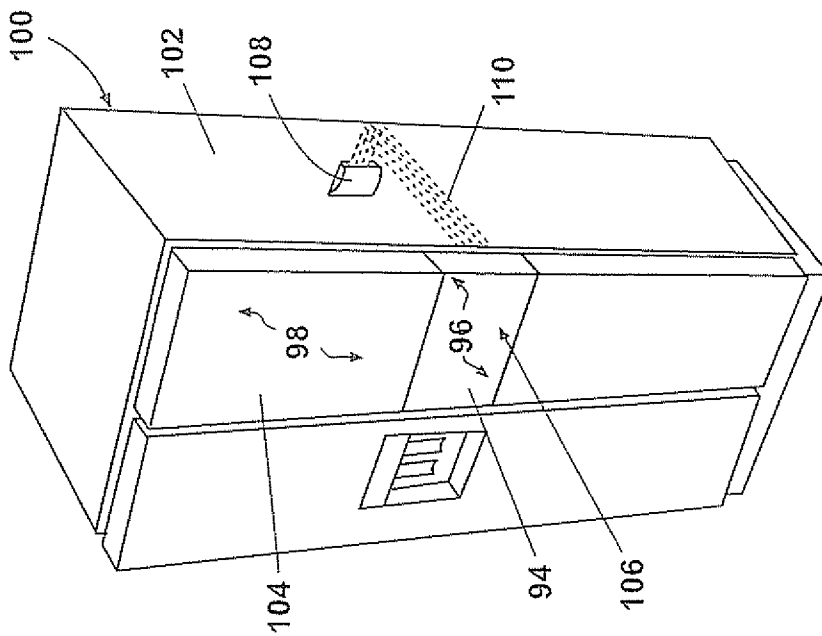


Fig. 4

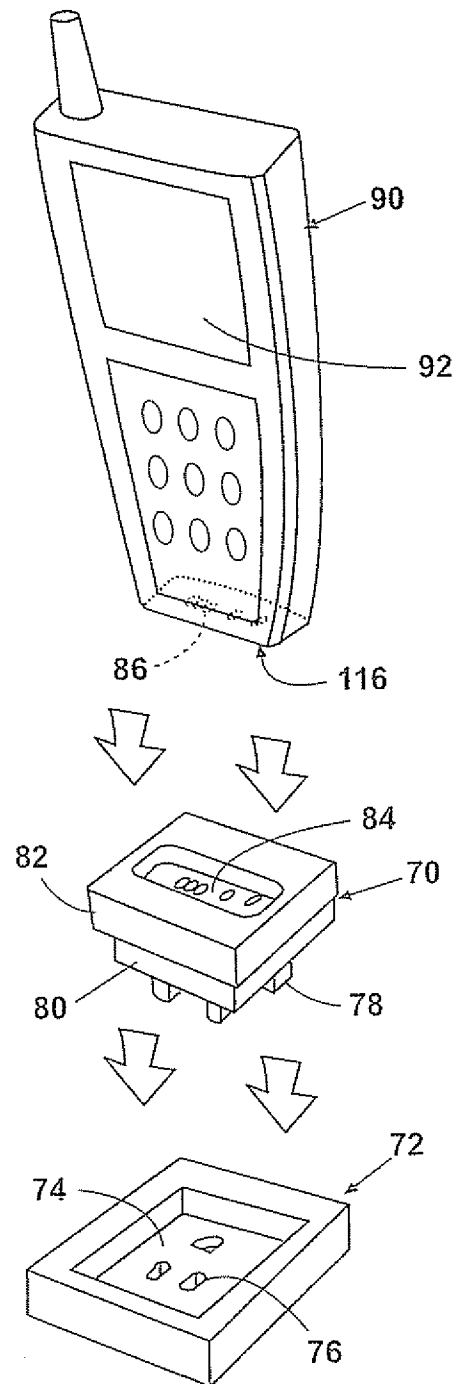


Fig. 4B

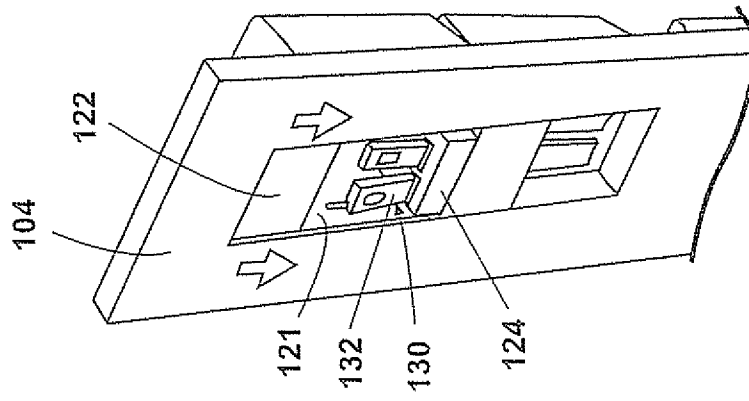


Fig. 5A

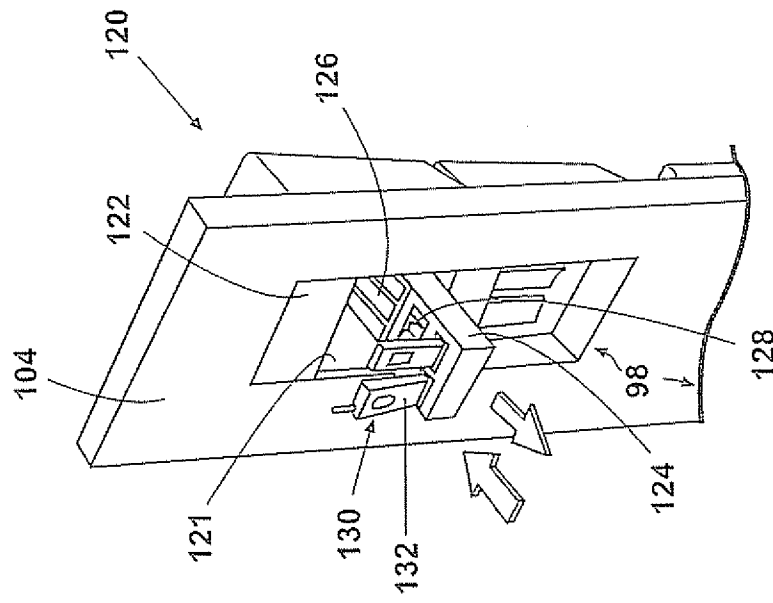


Fig. 5

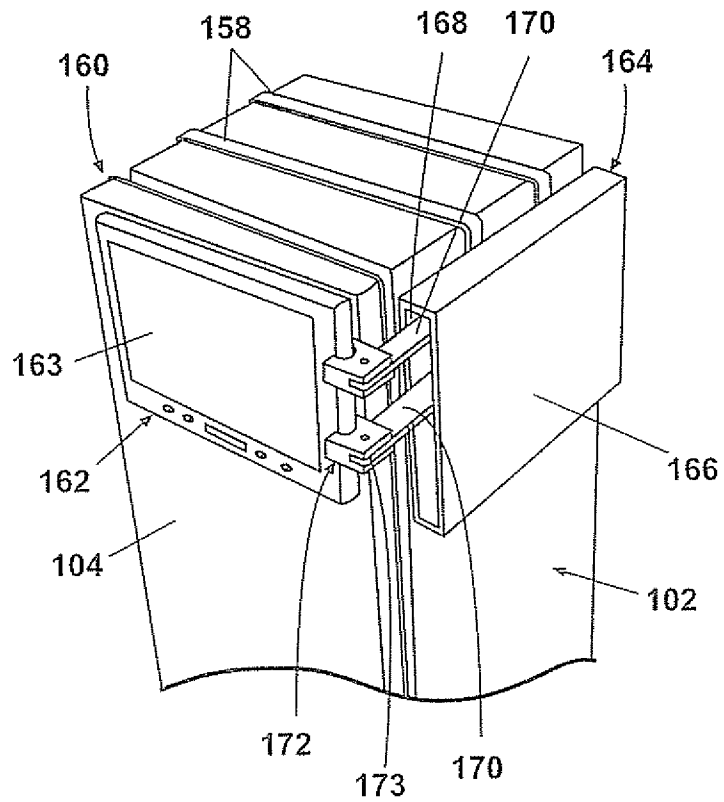


Fig. 6

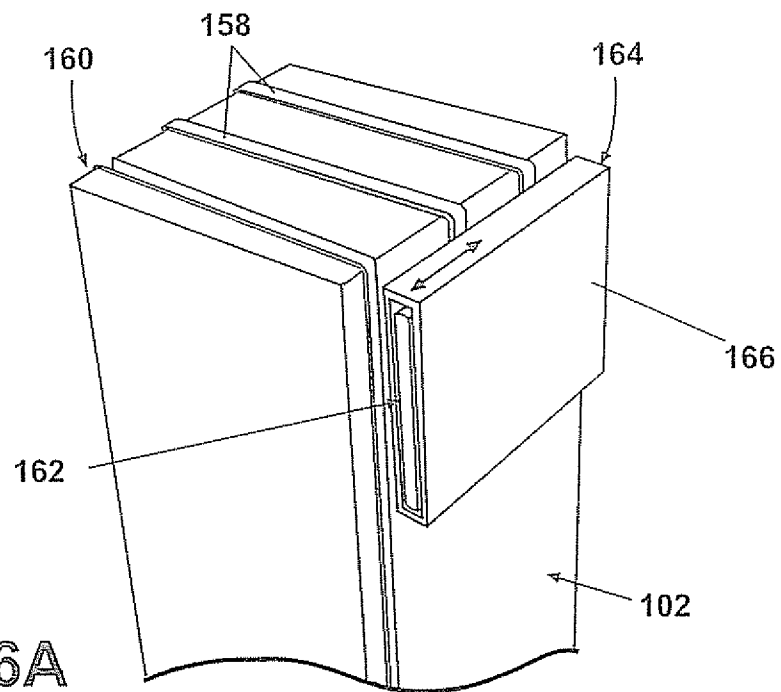


Fig. 6A

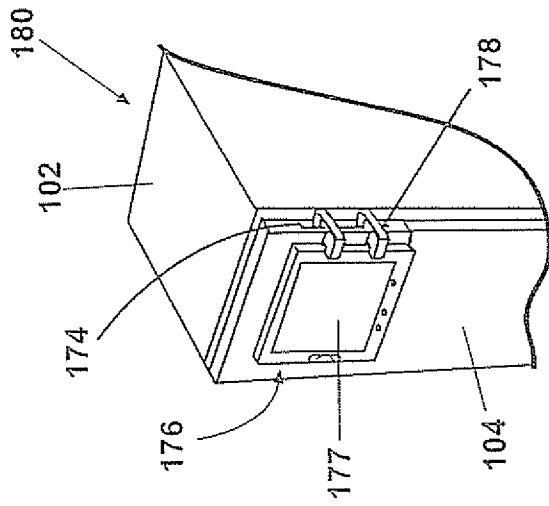


Fig. 7A

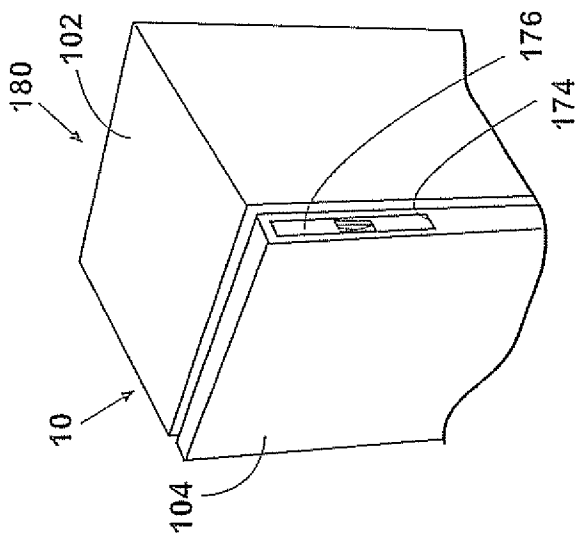


Fig. 7

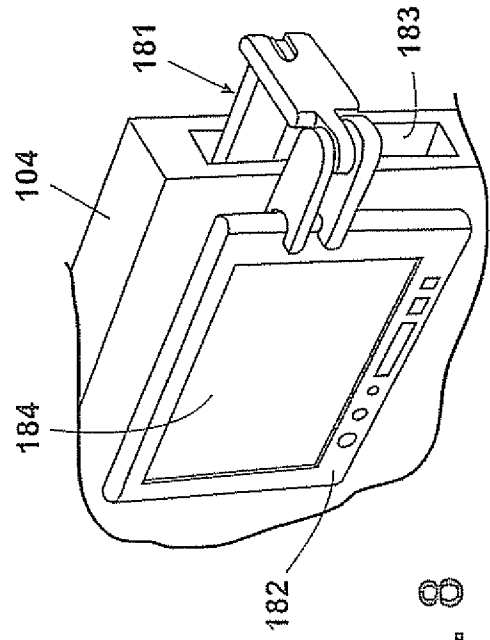
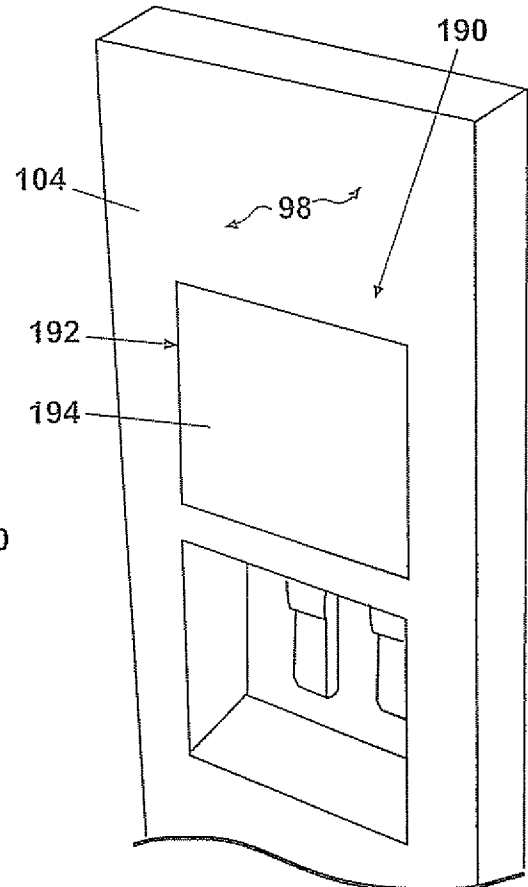
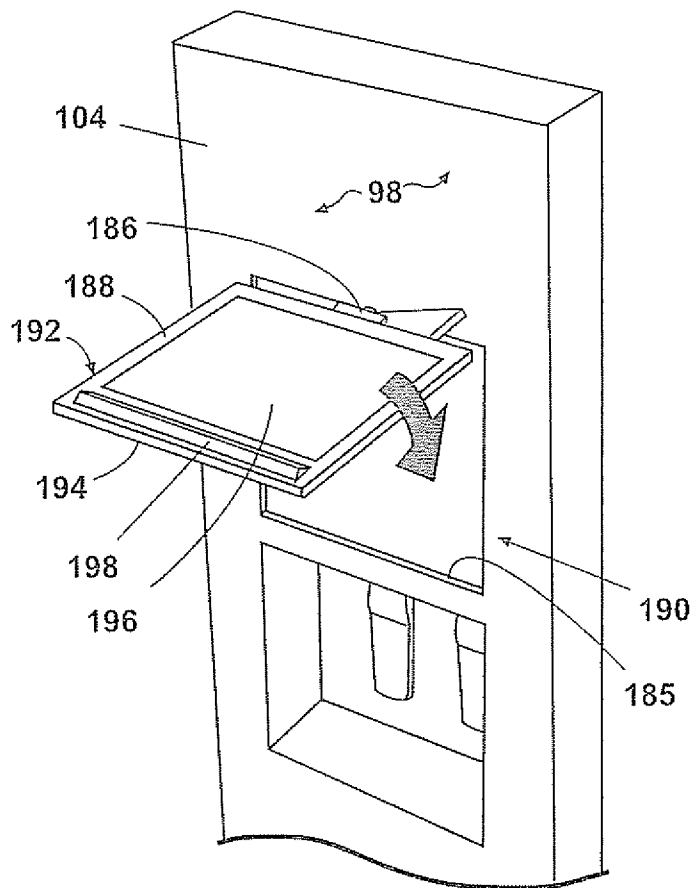
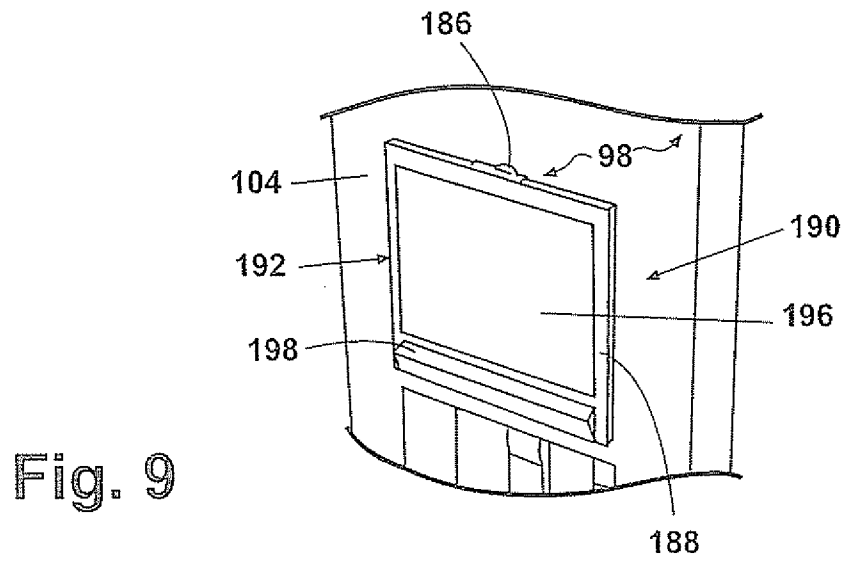


Fig. 8



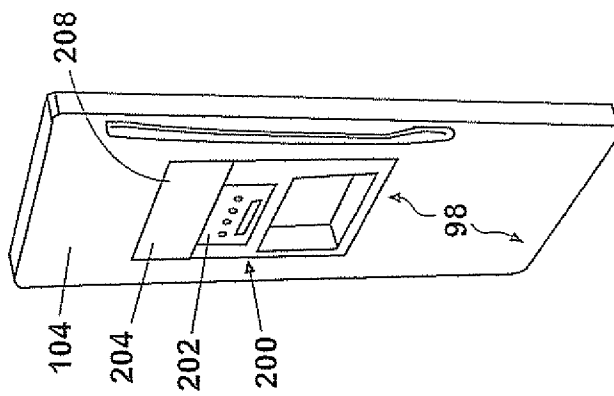


Fig. 10A

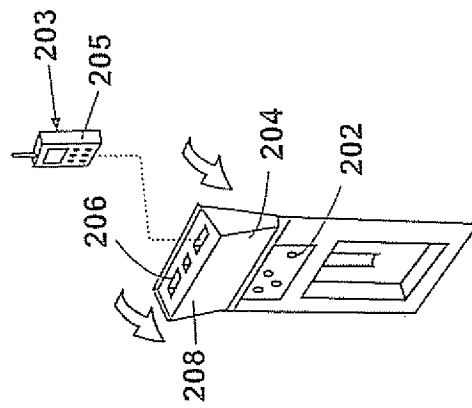


Fig. 10B

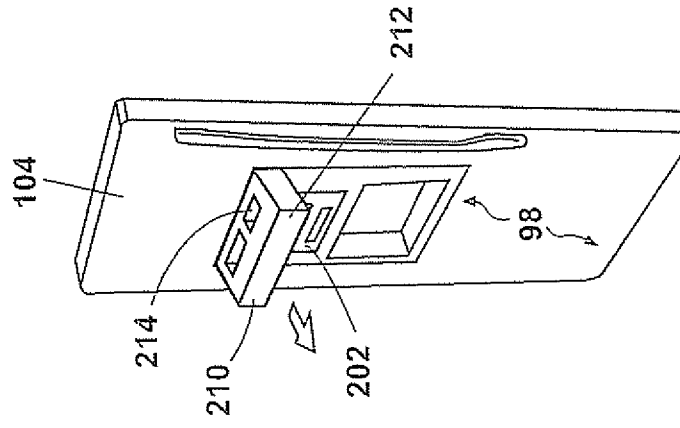


Fig. 11

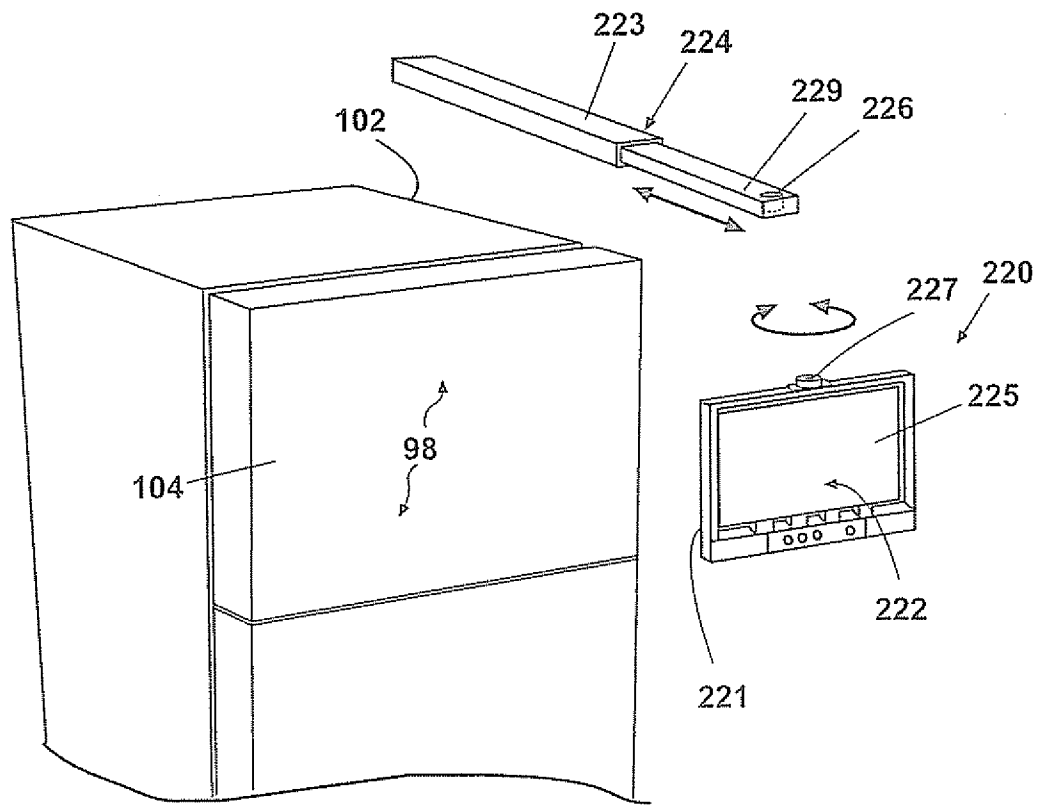
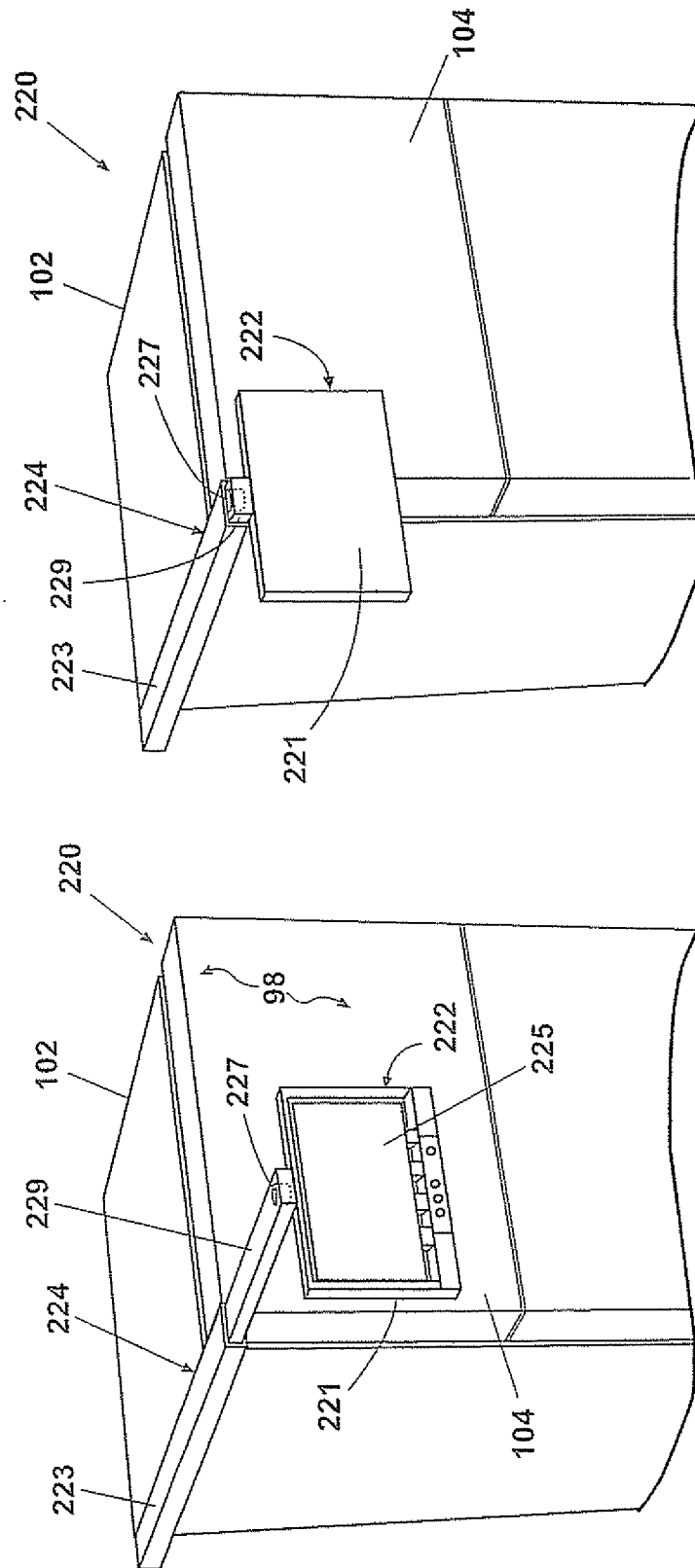


Fig. 12



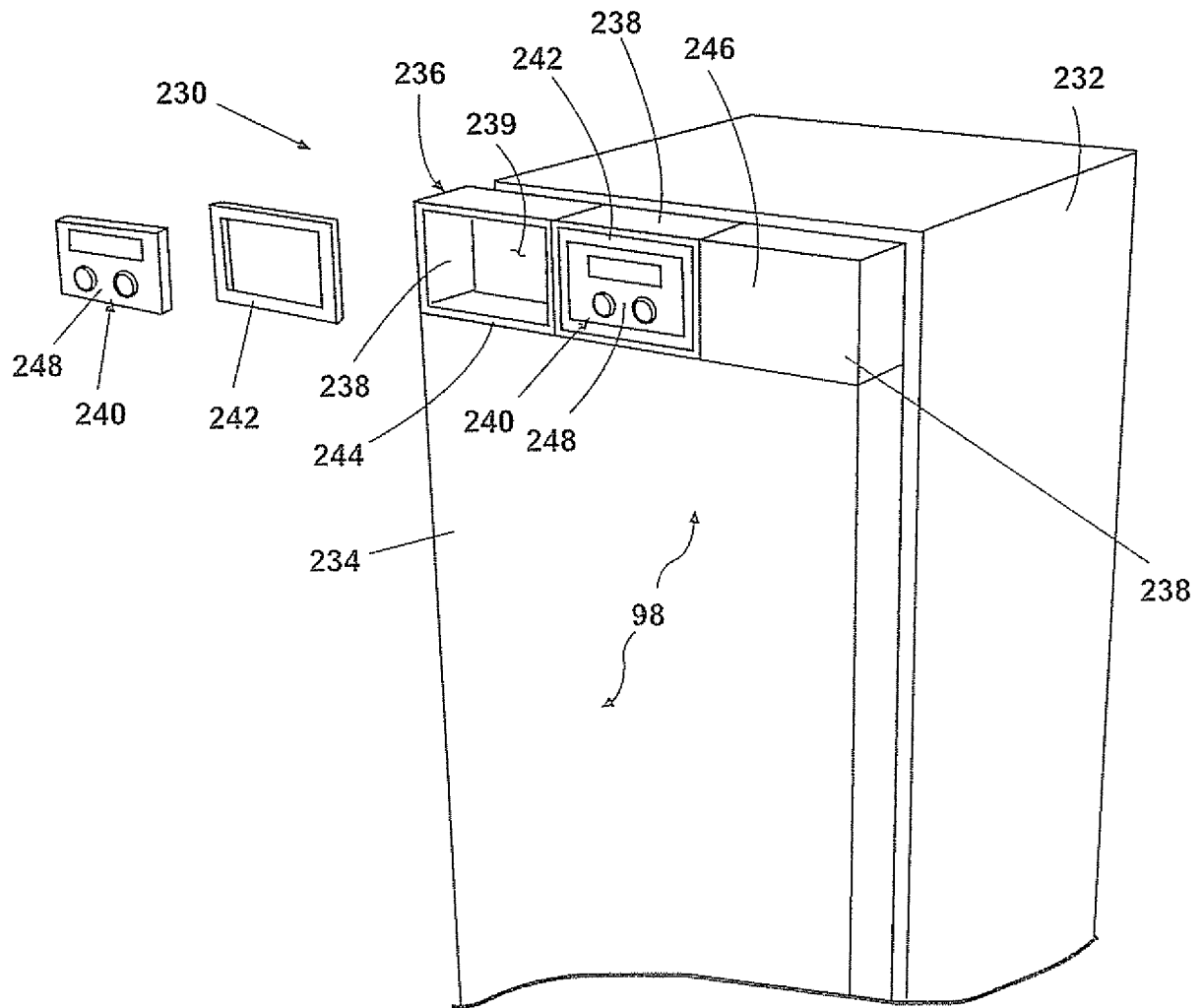


Fig. 13