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(54) **Title**: PROVIDING AND DYNAMICALLY MOUNTING AND HOUSING PROCESSING CONTROL UNITS

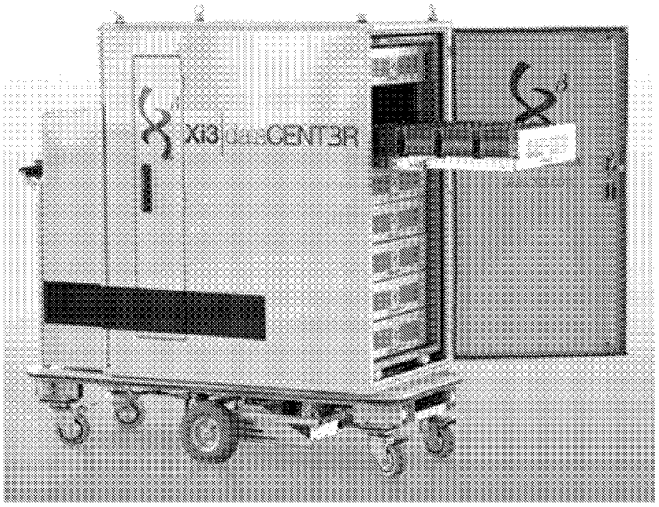

Fig. 56

(57) **Abstract**: Systems and methods for mounting a modular processing unit that is configured to be selectively used alone or with other processing units in an enterprise. A modular processing unit is provided as a platform that is lightweight, compact, and is configured to be selectively used alone or oriented with one or more additional processing units (including base modules and/or peripheral modules) in an enterprise. The one or more processing units are dynamically mounted based upon the particular enterprise needed and corresponding environment. In at least some implementations, shock mounting is included to provide for needed shock and vibe requirements. In some implementations, the mounting system includes a fixed mounting system for environments that need to be fixably secured. In other implementations, a selectively releasable connector is provided to allow for ease in mounting and removing the dynamically modular processing unit. In other implementations, a press-fit connector is provided to allow for ease in mounting and removing the dynamically modular processing unit.

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PROVIDING AND DYNAMICALLY MOUNTING AND HOUSING PROCESSING CONTROL UNITS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to mounting dynamically modular processing units. In particular, the present invention relates systems and methods for mounting a modular processing unit that is configured to be selectively used alone or with other processing units in an enterprise.

2. Background and Related Art

Technological advancements have occurred over the years with respect to computer related technologies. For example, computer systems once employed vacuum tubes. The tubes were replaced with transistors. Magnetic cores were used for memory. Thereafter, punch cards and magnetic tapes were commonly employed. Integrated circuits and operating systems were introduced. Today, microprocessor chips are currently used in computer systems.

The evolution of computer related technologies has included the development of various form factors in the computer industry. One such standard form factor was referred to as Advanced Technology ("AT"), which ran considerably faster than prior systems and included a new keyboard, an 80286 processor, a floppy drive that had a higher-capacity (1.2MB) than prior systems and a 16-bit data bus.

Over time, improvements were made to the AT form factor that included a change in the orientation of the motherboard. The improvements allowed for a more efficient design of the motherboard by locating disk drive connectors closer to drive bays and the central processing unit closer to the power supply and cooling fan. The new location of the central processing unit allowed the expansion slots to all hold full-length add-in cards.

While the developments increased the processing ability, the techniques have only been marginally effective in their ability to upgrade components as the computer technology advances. In fact, the techniques have become increasingly less desirable as a delivery mechanism for computer technologies. Predictable failure patterns have been identified in terms of operating durability, manufacturing, shipping, and support. The systems generate heat, which requires internal cooling systems that are noisy. Moreover, current computer systems are prone to requiring repair.

Thus, while computer technologies currently exist that are configured for use in

processing data, challenges still exist. Accordingly, it would be an improvement in the art to augment or even replace current techniques with other techniques.

SUMMARY OF THE INVENTION

The present invention relates to mounting dynamically modular processing units. In particular, the present invention relates systems and methods for mounting a modular processing unit that is configured to be selectively used alone or with other processing units in an enterprise.

Implementation of the present invention takes place in association with a modular processing unit that is lightweight, compact, and is configured to be selectively used alone or with similar and/or other processing units in an enterprise. In some implementations, each modular processing unit includes a non-peripheral based encasement, a cooling process (e.g., thermodynamic convection cooling, forced air, and/or liquid cooling), an optimized circuit board configuration, optimized processing and memory ratios, and/or a dynamic back plane that provides increased flexibility and support to peripherals and applications.

In one implementation, a dynamically modular processing unit is a cube platform (e.g., approximately 4-inch cube platform or another size and/or configuration) that utilizes an advanced cooling process (e.g., a thermodynamic cooling model that eliminates any need for a cooling fan, a forced air cooling process and/or a liquid cooling process). The unit also includes one or more boards in a motherboard configuration, and optimized processing and memory ratios. The bus architecture of the unit enhances performance and increases both hardware and software stability. A highly flexible back plane provides support to peripherals and vertical applications. Other implementations of the present invention embrace the use of a durable and dynamically modular processing unit that is greater than or less than a 4-inch cube platform. Similarly, other implementations embrace the use of shapes other than a cube.

Implementation of the present invention provides a platform that may be employed in association with all types of computer enterprises. The platform allows for a plethora of modifications that may be made with minimal impact to the dynamically modular unit, thereby enhancing the usefulness of the platform across all type of applications.

In some implementations, a first dynamically modular processing unit is utilized as a base module and is communicatively connected to a second dynamically modular processing unit, which is utilized as a peripheral module to use processing resources of the base module using one or more input/output devices connected to the peripheral module, whereby the

peripheral module facilitates a user's opening a session on the base module while using significantly less power for the peripheral module itself than any existing computer system.

Further implementations provide a system for distributing computing resources that includes a base module having certain processing resources. The system also includes a peripheral module communicatively connected to the base module and configured to utilize processing resources of the base module using one or more input/output devices connected to the peripheral module, wherein the peripheral module utilizes only enough computing resources to pass input/output signals between the input/output devices at the peripheral module and the base module.

Still further implementations provide a system for efficiently managing and distributing computing resources including a base module having certain processing resources and providing a first user with a graphical user interface providing access to a first session of an operating system of the base module. The system also includes a peripheral module communicatively connected to the base module and providing a second user with a graphical user interface providing access to a second session of the operating system of the base module without requiring that a separate instance of the operating system be loaded into memory of the base module.

Additional implementations of the present invention provide intelligent mounting brackets having a structure configured to be mounted to an underlying surface and to securely hold or retain a mounted item. In at least some implementations, the structure retains and/or contains a computer system configured to distribute processing resources from a remote computer system to one or more computer resources proximate to the mounting bracket.

Additional implementations of the present invention relate to mounting dynamically modular processing units (including base modules and/or peripheral modules) in a variety of different enterprises. In at least some implementations, the manner of mounting is determined by the particular enterprise needed and corresponding environment. In at least some implementations, shock mounting is included to provide for needed shock and vibe requirements. In some implementations, the mounting system includes a fixed mounting system for environments that need to be fixably secured. In other implementations, a selectively releasable connector is provided to allow for ease in mounting and removing the dynamically modular processing unit. In other implementations, a press-fit connector is provided to allow for ease in mounting and removing the dynamically modular processing unit.

While the methods and processes of the present invention have proven to be particularly useful in the area of personal and other computing enterprises, those skilled in the art will appreciate that the methods and processes of the present invention can be used in a variety of different applications and in a variety of different areas of manufacture to yield customizable enterprises, including enterprises for any industry utilizing control systems or smart-interface systems and/or enterprises that benefit from the implementation of such devices. Examples of such industries include, but are not limited to, automotive industries, avionic industries, hydraulic control industries, auto/video control industries, telecommunications industries, medical industries, special application industries, electronic consumer device industries, and other industries using a computer device. Accordingly, the systems and methods of the present invention provide massive computing power to markets, including markets that have traditionally been untapped by current computer techniques.

These and other features and advantages of the present invention will be set forth or will become more fully apparent in the description that follows. The features and advantages may be realized and obtained by means of the instruments and combinations provided herein. Furthermore, the features and advantages of the invention may be learned by the practice of the invention or will be obvious from the description, as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to set forth the manner in which the above recited and other features and advantages of the present invention are obtained, a more particular description of the invention will be rendered by reference to specific embodiments thereof, which are illustrated in the appended drawings. Understanding that the drawings depict only typical embodiments of the present invention and are not, therefore, to be considered as limiting the scope of the invention, the present invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Figure 1 illustrates a block diagram that provides a representative modular processing unit in accordance with an embodiment of the present invention;

Figure 2 illustrates a perspective view of a representative modular processing unit;

Figure 3 illustrates another perspective view of the representative modular processing unit of Figure 2;

Figure 4 illustrates a perspective view of a representative encasement of a modular processing unit, and more particularly a representative support chassis of a modular processing unit;

Figure 5 illustrates an exploded view of main support chassis, with inserts and dynamic back plane in accordance with an embodiment of the present invention;

Figure 6 illustrates a representative end plate;

Figure 7 illustrates a representative end cap;

Figure 8 illustrates a representative modular processing unit with dynamic back plane;

Figure 9 illustrates a representative modular processing unit with the end plates removed;

Figure 10 illustrates a modular processing unit operably connecting to an external object of any type;

Figure 11 illustrates a representative computing enterprise;

Figure 12 illustrates a representative enterprise having a modular processing unit coupled to a monitor;

Figure 13 illustrates another representative enterprise having a modular processing unit coupled to a monitor;

Figure 14 illustrates an exploded view of a representative modular processing unit, shown as a representative peripheral module;

Figure 15 illustrates an enterprise having two modular processing units interoperably connected, namely a representative base module and a representative peripheral module;

Figure 16 illustrates an end view of a representative peripheral module;

Figure 17 illustrates a perspective view of a representative peripheral module;

Figure 18 illustrates a perspective view of a representative peripheral module;

Figure 19 illustrates an end view of an outer structural shell of an alternative representative peripheral module;

Figure 20 illustrates a perspective view of a representative mounting plate;

Figure 21 illustrates a representative mounting system;

Figure 22 illustrates another representative mounting bracket;

Figure 23 illustrates a representative manner of mounting a modular processing unit;

Figure 24 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 23;

Figure 25 illustrates another representative manner of mounting a modular processing unit;

Figure 26 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 25;

Figure 27 illustrates another representative manner of mounting a modular processing unit;

Figure 28 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 27;

Figure 29 illustrates a top view of the representative manner of mounting a modular processing unit of Figure 27;

Figure 30 illustrates a perspective view of the representative manner of mounting a modular processing unit of Figure 27;

Figure 31 illustrates a perspective view of another representative mounting bracket;

Figure 32 illustrates a representative manner of mounting a modular processing unit;

Figure 33 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 32;

Figure 34 illustrates a representative manner of mounting modular processing units in a rack or cabinet;

Figure 35 illustrates another representative manner of mounting modular processing units in a rack or cabinet;

Figure 36 illustrates a representative DIN rail mounting system;

Figure 37 illustrates another view of a representative DIN rail mounting system;

Figure 38 illustrates another view of a representative DIN rail mounting system;

Figure 39 illustrates another representative mounting system;

Figure 40 illustrates a representative container in accordance with the representative mounting system of Figure 39;

Figure 41 illustrates the representative container of Figure 40 with a modular processing unit mounted therein;

Figure 42 illustrates mounting the representative modular processing unit into the representative container of Figure 40;

Figures 43 – 44 further illustrate mounting the representative modular processing unit into the representative container of Figure 40;

Figure 45 illustrates another view of the representative mounting system of Figure 39;

Figure 46 illustrates a stacked in wall mounting system;

Figure 47 illustrates a representative container in accordance with a representative mounting system;

Figures 48-54 illustrate representative drawers or trays that selectively receive a plurality of computer devices and utilize a damping system;

Figures 55 – 56 illustrate representative stacking configurations that include drawers or trays that selectively receive a plurality of computer devices;

Figure 57 illustrates a representative tubular configuration that selectively receives a plurality of computer devices; and

Figure 58 illustrates a representative configuration that selectively receives a plurality of computer devices.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to mounting dynamically modular processing units. In particular, the present invention relates systems and methods for mounting a modular processing unit that is configured to be selectively used alone or with other processing units (base modules and/or peripheral modules) in an enterprise.

In at least some embodiments, the manner of mounting is determined by the particular enterprise needed and corresponding environment. In at least some embodiments, shock mounting is included to provide for needed shock and vibe requirements. In some embodiments, the mounting system includes a fixed mounting system for environments that need to be secured. In other embodiments, a selectively releasable connector is provided to allow for ease in mounting and removing the dynamically modular processing unit. In other embodiments, a press-fit connector is provided to allow for ease in mounting and removing the dynamically modular processing unit.

The following portion of the description is broken into several headings for purposes of increasing understanding of the description, and is not intended to be limiting in any way.

Representative Operating Environments

The present invention relates to systems and methods for mounting a dynamically modular processing unit. In particular, embodiments of the present invention take place in association with a modular processing unit that is lightweight, compact, and is configured to be selectively used alone or oriented with one or more additional processing units in an enterprise.

In some embodiments, a modular processing unit includes a non-peripheral based encasement, a cooling process (e.g., thermodynamic convection cooling, forced air, and/or liquid cooling), an optimized layered printed circuit board configuration, optimized processing and memory ratios, and a dynamic back plane that provides increased flexibility and support to peripherals and applications.

Embodiments of the present invention embrace a platform that may be employed in association with all types of computer and/or electrical enterprises. The platform allows for a plethora of modifications that may be made with minimal impact to the dynamic modular unit, thereby enhancing the usefulness of the platform across all types of applications. Moreover, as indicated above, the modular processing unit may function alone or may be associated with one or more other modular processing units in a customizable enterprise to provide enhanced processing capabilities.

Figure 1 and the corresponding discussion are intended to provide a general description of a suitable operating environment in accordance with embodiments of the present invention. As will be further discussed below, embodiments of the present invention embrace the use of one or more dynamically modular processing units in a variety of customizable enterprise configurations, including in a networked or combination configuration, as will be discussed below.

Embodiments of the present invention embrace one or more computer readable media, wherein each medium may be configured to include or includes thereon data or computer executable instructions for manipulating data. The computer executable instructions include data structures, objects, programs, routines, or other program modules that may be accessed by one or more processors, such as one associated with a general-purpose modular processing unit capable of performing various different functions or one associated with a special-purpose modular processing unit capable of performing a limited number of functions.

Computer executable instructions cause the one or more processors of the enterprise to perform a particular function or group of functions and are examples of program code means for implementing steps for methods of processing. Furthermore, a particular sequence of the executable instructions provides an example of corresponding acts that may be used to implement such steps.

Examples of computer readable media include random-access memory ("RAM"), read-only memory ("ROM"), programmable read-only memory ("PROM"), erasable programmable

read-only memory ("EPROM"), electrically erasable programmable read-only memory ("EEPROM"), compact disk read-only memory ("CD-ROM"), any solid state storage device (e.g., flash memory, smart media, etc.), or any other device or component that is capable of providing data or executable instructions that may be accessed by a processing unit.

With reference to Figure 1, a representative enterprise includes modular processing unit 10, which may be used as a general-purpose or special-purpose processing unit. For example, modular processing unit 10 may be employed alone or with one or more other modular processing units as a personal computer, a notebook computer, a personal digital assistant ("PDA") or other hand-held device, a workstation, a minicomputer, a mainframe, a supercomputer, a multi-processor system, a network computer, a processor-based consumer device, a smart appliance or device, a control system, or other computer system. Using multiple processing units in the same enterprise provides increased processing capabilities. For example, each processing unit of an enterprise can be dedicated to a particular task or can jointly participate in distributed processing.

In Figure 1, modular processing unit 10 includes one or more buses and/or interconnect(s) 12, which may be configured to connect various components thereof and enables data to be exchanged between two or more components. Bus(es)/interconnect(s) 12 may include one of a variety of bus structures including a memory bus, a peripheral bus, or a local bus that uses any of a variety of bus architectures. Typical components connected by bus(es)/interconnect(s) 12 include one or more processors 14 and one or more memories 16. Other components may be selectively connected to bus(es)/interconnect(s) 12 through the use of logic, one or more systems, one or more subsystems and/or one or more I/O interfaces, hereafter referred to as "data manipulating system(s) 18." Moreover, other components may be externally connected to bus(es)/interconnect(s) 12 through the use of logic, one or more systems, one or more subsystems and/or one or more I/O interfaces, and/or may function as logic, one or more systems, one or more subsystems and/or one or more I/O interfaces, such as modular processing unit(s) 30 and/or proprietary device(s) 34. Examples of I/O interfaces include one or more mass storage device interfaces, one or more input interfaces, one or more output interfaces, and the like. Accordingly, embodiments of the present invention embrace the ability to use one or more I/O interfaces and/or the ability to change the usability of a product based on the logic or other data manipulating system employed.

The logic may be tied to an interface, part of a system, subsystem and/or used to perform a specific task. Accordingly, the logic or other data manipulating system may allow, for example, for IEEE1394 (firewire), wherein the logic or other data manipulating system is an I/O interface. Alternatively or additionally, logic or another data manipulating system may be used that allows a modular processing unit to be tied into another external system or subsystem. For example, an external system or subsystem that may or may not include a special I/O connection. Alternatively or additionally, logic or other data manipulating system may be used wherein no external I/O is associated with the logic. Embodiments of the present invention also embrace the use of specialty logic, such as for ECUs for vehicles, hydraulic control systems, etc. and/or logic that informs a processor how to control a specific piece of hardware. Moreover, those skilled in the art will appreciate that embodiments of the present invention embrace a plethora of different systems and/or configurations that utilize logic, systems, subsystems and/or I/O interfaces.

As provided above, embodiments of the present invention embrace the ability to use one or more I/O interfaces and/or the ability to change the usability of a product based on the logic or other data manipulating system employed. For example, where a modular processing unit is part of a personal computing system that includes one or more I/O interfaces and logic designed for use as a desktop computer, the logic or other data manipulating system may be changed to include flash memory or logic to perform audio encoding for a music station that wants to take analog audio via two standard RCAs and broadcast them to an IP address. Accordingly, the modular processing unit may be part of a system that is used as an appliance rather than a computer system due to a modification made to the data manipulating system(s) (e.g., logic, system, subsystem, I/O interface(s), etc.) on the back plane of the modular processing unit. Thus, a modification of the data manipulating system(s) on the back plane can change the application of the modular processing unit. Accordingly, embodiments of the present invention embrace very adaptable modular processing units.

As provided above, processing unit 10 includes one or more processors 14, such as a central processor and optionally one or more other processors designed to perform a particular function or task. It is typically processor 14 that executes the instructions provided on computer readable media, such as on memory(ies) 16, a magnetic hard disk, a removable magnetic disk, a magnetic cassette, an optical disk, solid state memory, flash, or from a communication connection, which may also be viewed as a computer readable medium.

Memory(ies) 16 includes one or more computer readable media that may be configured to include or includes thereon data or instructions for manipulating data, and may be accessed by processor(s) 14 through bus(es)/interconnect(s) 12. Memory(ies) 16 may include, for example, ROM(s) 20, used to permanently store information, and/or RAM(s) 22, used to temporarily store information. ROM(s) 20 may include a basic input/output system ("BIOS") having one or more routines that are used to establish communication, such as during start-up of modular processing unit 10. During operation, RAM(s) 22 may include one or more program modules, such as one or more operating systems, application programs, and/or program data.

As illustrated, at least some embodiments of the present invention embrace a non-peripheral encasement, which provides a more robust processing unit that enables use of the unit in a variety of different applications. In Figure 1, one or more mass storage device interfaces (illustrated as data manipulating system(s) 18) may be used to connect one or more mass storage devices 24 to bus(es)/interconnect(s) 12. The mass storage devices 24 are peripheral to modular processing unit 10 and allow modular processing unit 10 to retain large amounts of data. Examples of mass storage devices include hard disk drives, magnetic disk drives, tape drives, flash drive, optical disk drives, and other storage devices.

A mass storage device 24 may read from and/or write to a magnetic hard disk, a removable magnetic disk, a magnetic cassette, an optical disk, or another computer readable medium. Mass storage devices 24 and their corresponding computer readable media provide nonvolatile storage of data and/or executable instructions that may include one or more program modules, such as an operating system, one or more application programs, other program modules, or program data. Such executable instructions are examples of program code means for implementing steps for methods disclosed herein.

Data manipulating system(s) 18 may be employed to enable data and/or instructions to be exchanged with modular processing unit 10 through one or more corresponding peripheral I/O devices 26. Examples of peripheral I/O devices 26 include input devices such as a keyboard and/or alternate input devices, such as a mouse, trackball, light pen, stylus, or other pointing device, a microphone, a joystick, a game pad, a satellite dish, a scanner, a camcorder, a digital camera, a sensor, and the like, and/or output devices such as a monitor or display screen, a speaker, a printer, a control system, and the like. Similarly, examples of data manipulating system(s) 18 coupled with specialized logic that may be used to connect the peripheral I/O devices 26 to bus(es)/interconnect(s) 12 include a serial port, a parallel port, a game port, a

universal serial bus ("USB"), a firewire (IEEE 1394), a wireless receiver, a video adapter, an audio adapter, a parallel port, a wireless transmitter, any parallel or serialized I/O peripherals or another interface.

Data manipulating system(s) 18 enable an exchange of information across one or more network interfaces 28. Examples of network interfaces 28 include a connection that enables information to be exchanged between processing units, a network adapter for connection to a local area network ("LAN") or a modem, a wireless link, or another adapter for connection to a wide area network ("WAN"), such as the Internet. Network interface 28 may be incorporated with or peripheral to modular processing unit 10, and may be associated with a LAN, a wireless network, a WAN and/or any connection between processing units.

Data manipulating system(s) 18 enable modular processing unit 10 to exchange information with one or more other local or remote modular processing units 30 or computer devices. A connection between modular processing unit 10 and modular processing unit 30 may include hardwired and/or wireless links. Accordingly, embodiments of the present invention embrace direct bus-to-bus connections. This enables the creation of a large bus system. It also eliminates hacking as currently known due to direct bus-to-bus connections of an enterprise. Furthermore, data manipulating system(s) 18 enable modular processing unit 10 to exchange information with one or more proprietary I/O connections 32 and/or one or more proprietary devices 34.

Program modules or portions thereof that are accessible to the processing unit may be stored in a remote memory storage device. Furthermore, in a networked system or combined configuration, modular processing unit 10 may participate in a distributed computing environment where functions or tasks are performed by a plurality of processing units. Alternatively, each processing unit of a combined configuration/enterprise may be dedicated to a particular task. Thus, for example, one processing unit of an enterprise may be dedicated to video data, thereby replacing a traditional video card, and provides increased processing capabilities for performing such tasks over traditional techniques.

While those skilled in the art will appreciate that embodiments of the present invention may comprise a variety of configurations, reference is made to Figures 2-3, which illustrate a representative embodiment of a durable and dynamically modular processing unit 90. Modular processing unit 90 comprises a proprietary encasement module 100 (hereinafter referred to as "encasement module 100"), as well as a proprietary printed circuit board design. Modular

processing unit 90, through the specific and calculated design of encasement module 100, provides unparalleled computer processing advantages and features not found in prior art processing units or computers. Indeed, the present invention processing unit as described and claimed herein presents a complete conceptual shift, or paradigm shift, from conventional computers or processing units. This paradigm shift will become evident from the subject matter of the disclosure below, which subject matter is embodied in the appended claims.

Figures 2 – 3 show a representative modular processing unit, identified as modular processing unit 90, in its fully assembled state with many of the primary components generally illustrated. As stated, modular processing unit 90 comprises encasement module 100, which itself has a very specific and unique support structure and geometric configuration or design that is more fully described in Figure 4. In one preferred embodiment, encasement module 100 comprises a main support chassis 114; first insert 166; second insert 170; third insert 174 (not shown); dynamic backplane 134 (not shown); first end plate 138; second end plate 142 (not shown); first end cap 146; and second end cap 150 to provide an enclosed housing or encasement for one or more processing and other computer components, such as printed circuit boards, processing chips, and circuitry.

Figures 4 – 5 illustrate a representative embodiment of main support chassis 114 and some of the component parts of encasement module 100 as designed to attach or couple to main support chassis 114. Preferably, these component parts are removably coupled to chassis 114, as shown, in order to enable some of the unique features and functions of modular processing unit 90 as described and set forth herein. Main support chassis 114 serves as the primary support structure for encasement module 100 and modular processing unit 90. Its small size and proprietary design provide advantages and benefits not found in prior art designs. Essentially, main support chassis 114 provides structural support for the component parts of modular processing unit 90, including any additional physical attachments, processing and other circuit board components, as well as enabling modular processing unit 90 to be adaptable to any type of environment, such as incorporation into any known structure or system, or to be used in clustered and multi-plex environments.

Specifically, as shown in the figures, modular processing unit 90, and particularly encasement module 100, is essentially comprised of a cube-shaped design, wherein first, second, and third wall supports 118, 122, and 126 of main support chassis 114, along with dynamic

backplane 134 when attached, comprise the four sides of encasement module 100, with a union module 154 positioned at each corner of encasement module 100.

Junction center 155 functions to integrally join first, second, and third wall supports 118, 122, and 126, as well as to provide a base to which the end plates discussed below may be attached. End plates are coupled to main support chassis 114 using attachment means as inserted into attachment receipt 90, which is shown in Figure 4 as an aperture, which may be threaded or not depending upon the particular type of attachment means used. Junction center 155 further provide the primary support and the junction center for the proprietary printed circuit board design existing within modular processing unit 90 as discussed below. As shown in Figure 4, printed circuit boards are capable of being inserted into and secured within one or more channeled board receivers 162. The particular design shown in the figures and described herein is merely a representative example of securing or engaging printed circuit boards within modular processing unit 90. Other designs, assemblies, or devices are contemplated and may be used as recognized by one ordinarily skilled in the art. For instance, means for securing processing components may include screws, rivets, interference fits, and other connectors.

Main support chassis 114 further comprises a plurality of channels or slide receivers 182 designed to receive a corresponding insert located on one or more insert members, a dynamic back plane, a chassis, a mounting bracket used to couple two or more processing units together, or to allow the processing unit to be implemented into another structure. Slide receivers 182 may also be used to accept or receive suitable elements of a structure or a structure or device itself, wherein the processing unit, and specifically the encasement module, serves as a load bearing member. The ability of modular processing unit 90 to function as a load bearing member is derived from its unique chassis design. For example, modular processing unit 90 may be used to bridge two structures together and to contribute to the overall structural support and stability of the structure. In addition, modular processing unit 90 may bear a load attached directly to main support chassis 114. For example, a computer screen or monitor may be physically supported and process controlled by modular processing unit 90. As further examples, modular processing unit 90 may be used to physically support and process control various home fixtures, such a lighting fixture, or a breaker box, etc. Moreover, if needed, an additional heat sink assembly may be coupled to modular processing unit 90 in a similar manner. Many other possible load bearing situations or environments are possible and contemplated herein. Thus, those specifically recited herein are only meant to be illustrative and not limiting

in any way. Slide receivers 182 are shown as substantially cylindrical channels running the length of the junction center 155 of main support chassis 114. Slide receivers 182 comprise merely one manner of coupling external components to main support chassis 114. Other designs or assemblies are contemplated and may be used to carry out the intended function of providing means for attaching various component parts such as those described above as recognized by one ordinarily skilled in the art.

Figures 4 – 5 further illustrate the concave nature of main support chassis 114, and particularly first, second, and third wall supports 118, 122, and 126. First, second, and third insert members 166, 170, and 174 comprise corresponding concave designs. Each of these component parts further comprise a specifically calculated radius of curvature, such that first wall support 118 comprises a radius of curvature 120 to correspond to a mating radius of curvature designed into first insert 166. Likewise, second wall support 122 comprises a radius of curvature 124 to correspond to a mating radius of curvature designed into second insert 170, and third wall support 126 comprises a radius of curvature 128 to correspond to a mating radius of curvature designed into third insert 174. End plates 138 and 142, as well as end caps 146 and 150, as illustrated in Figures 6 – 7, each comprise similar design profiles to match the concave design profile of main support chassis 114. In the embodiment shown in the figures, the wall supports and the insert members each comprise a radius of curvature. The concaved design and the calculated radius' of curvature each contribute to overall structural rigidity and strength of main support chassis 114, as well as contributing to the thermodynamic heat dissipating properties of modular processing unit 90. For example in a natural convection cooling system, described in greater detail below, the concaved design facilitates the distribution of heated air to the outer, and primarily upper, corners of encasement module 100, thus allowing heat or heated air to be dispersed away from the top and center of the interior portion of modular processing unit 90 and towards the upper right and left corners, where it may then escape thru ventilation ports 198 or where it may be further conducted through the top of encasement module 100. Other embodiments are contemplated where the radius of curvature of these elements may differ from one another to provide the most optimal design of encasement module 100 as needed.

In a preferred embodiment, main support chassis 114 comprises a full metal chassis that is structured and designed to provide an extremely strong support structure for modular processing unit 90 and the components contained therein. Under normal circumstances, and even extreme circumstances, main support chassis 114 is capable of withstanding very large

applied and impact forces originating from various external sources, such as those that would normally cause disfiguration or denting to prior related computer encasements, or limit their ability to be used in other or extreme environments. Essentially, main support chassis 114 is the main contributor to providing a virtually indestructible computer encasement for modular processing unit 90. This unique feature in a computer encasement is in direct relation to the particular design of the components used to construct encasement module 100, including their geometric design, the way they are fit together, their material composition, and other factors, such as material thickness. Specifically, encasement module 100 is preferably built entirely out of radiuses, wherein almost every feature and element present comprises a radius. This principle of radiuses is utilized to function so that any load applied to modular processing unit 90 is transferred to the outer edges of modular processing unit 90. Therefore, if a load or pressure is applied to the top of encasement module 100, that load would be transferred along the sides, into the top and base, and eventually into the corners of encasement module 100. Essentially, any load applied is transferred to the corners of modular processing unit 90, where the greatest strength is concentrated.

Modular processing unit 90 and its components, namely encasement module 100, main support chassis 114, inserts 166, 170, and 174, dynamic backplane 134, and end plates 138 and 142, are each preferably manufactured of metal using an extrusion process. In one embodiment, main support chassis 114, first, second, and third inserts 166, 170, and 174, dynamic backplane 134, and first and second end plates 138 and 142 are made of high-grade aluminum to provide strong, yet light-weight characteristics to encasement module 100. In addition, using a metal casing provides good heat conducting properties. Although preferably constructed of aluminum or various grades of aluminum and/or aluminum composites, it is contemplated that various other materials, such as titanium, copper, magnesium, the newly achieved hybrid metal alloys, steel, and other metals and metal alloys, as well as plastics, graphites, composites, nylon, or a combination of these depending upon the particular needs and/or desires of the user, may be used to construct the main components of encasement module 100. In essence, the intended environment for or use of the processing unit will largely dictate the particular material composition of its constructed components. As stated, an important feature of the present invention is the ability of the processing unit to adapt and be used for several uses and within several different and/or extreme environments. As such, the specific design of the processing unit relies upon a concerted effort to utilize the proper material. Stated differently, the

processing unit of the present invention contemplates using and comprises a pre-determined and specifically identified material composition that would best serve its needs in light of its intended use. For example, in a liquid cooled model or design, a more dense metal, such as titanium, may be used to provide greater insulative properties to the processing unit.

Given its preferred aluminum composition, encasement module 100 is very strong, light-weight, and easy to move around, thus providing significant benefits extending to both the end user and the manufacturer. For example, from an end user standpoint, modular processing unit 90 may be adapted for use within various environments in which prior related computers could not be found. In addition, an end user may essentially hide, mask, or camouflage modular processing unit 90 to provide a more clean looking, less-cluttered room, or to provide a more aesthetically appealing workstation.

From a manufacturing standpoint, encasement module 100 and modular processing unit 90 are capable of being manufactured using one or more automated assembly processes, such as an automated aluminum extrusion process-coupled with an automated robotics process for installing or assembling each of the component parts as identified above. Equally advantageous is the ability for encasement module 100 to be quickly mass-produced as a result of its applicability to an extrusion and robotics assembly process. Of course, modular processing unit 90 may also be manufactured using other known methods, such as die casting and injection molding, hand assembly depending upon the particular characteristics desired and the particular intended use of the processing unit.

In addition, since encasement module 100 is small in size and relatively light-weight, shipping costs, as well as manufacturing costs, are also greatly reduced.

With reference to Figure 5, shown are the main components of encasement module 100, namely main support chassis 114 and the several inserts that are designed to removably attach or couple to the sides of main support chassis 114. Figure 5 also illustrates dynamic backplane 134 as it is designed to removably attach or couple to the rear portion of main support chassis 114.

Specifically, first insert 166 attaches to first wall support 118. Second insert 170 attaches to second wall support 122. Third insert 174 attaches to third wall support 126. Moreover, each of first, second, and third inserts 166, 170, and 174, and first, second, and third wall supports 118, 122, and 126 comprise substantially the same radius of curvature so that they may mate or fit together in a nesting or matching relationship.

Each of first, second and third inserts 166, 170, and 174 comprise means for coupling main support chassis 114. In one exemplary embodiment, as shown in Figure 5, each insert comprises two insert engagement members 178 located at opposing ends of the insert. Engagement members 178 are designed to fit within a means for engaging or coupling various external devices, systems, objects, etc. (hereinafter an external object) formed within main support chassis 114. In the exemplary embodiment shown, means for engaging an external object comprises a plurality of slide receivers 182 positioned along main support chassis 114 as shown and identified above in Figure 4. Other means are also contemplated, such as utilizing various attachments ranging from snaps, screws, rivets, interlocking systems, and any others commonly known in the art.

Dynamic backplane 134 is also designed for or is capable of releasably coupling main support chassis 114. Dynamic backplane 134 comprises means for engaging main support chassis 114. In the exemplary embodiment shown, means for engaging is comprised of two engagement members 186 positioned at opposing ends of dynamic backplane 134. Engagement members 186 fit within slide receivers 182 at their respective locations along the rear portion of main support chassis 114 (shown as space 130) to removably attach dynamic backplane 134 to main support chassis 114, much the same way inserts 166, 170, and 174 attach to main support chassis 114 at their respective locations. These particular features are intended as one of several possible configurations, designs, or assemblies. Therefore, it is intended that one skilled in the art will recognize other means available for attaching dynamic backplane 134 to main support chassis 114 other than those specifically shown in the figures and described herein.

Means for engaging an external object, and particularly slide receiver 182, is capable of releasably coupling various types of external objects (as will be more fully described below), such as inserts 166, 170, and 174, dynamic backplane 134, mounting brackets, another processing unit, or any other needed device, structure, or assembly. As illustrated in Figure 5, slide receivers 182 engage corresponding engagement members 178 in a releasable manner so as to allow each insert to slide in and out as needed. As stated, other means for coupling main support chassis 114 and means for engaging an external object are contemplated herein, and will be apparent to one skilled in the art.

By allowing each insert and dynamic backplane 134 to be removably or releasably coupled to main support chassis 114, several significant advantages to modular processing unit 90, over prior related computer encasements, are achieved. For example, and not intended to be

limiting in any way, first, second, and third inserts 166, 170, and 174 may be removed, replaced, or interchanged for aesthetic purposes. These insert members may possess different colors and/or textures, thus allowing modular processing unit 90 to be customized to fit a particular taste or to be more adaptable to a given environment or setting. Moreover, greater versatility is achieved by allowing each end user to specify the look and overall feel of their particular unit. Removable or interchangeable insert members also provide the ability to brand (e.g., with logos and trademarks) modular processing unit 90 for any company entity or individual using the unit. Since they are external to main support chassis 114, the insert members will be able to take on any form or branding as needed.

Aside from aesthetics, other advantages are also recognized. On a higher level of versatility, means for engaging an external object provides modular processing unit 90 with the ability to be robust and customizable to create a smart object. For instance, processing unit may be docked in a mobile setting or in a proprietary docking station where it may serve as the control unit for any conceivable object, such as boats, cars, planes, and other items or devices that were heretofore unable to comprise a processing unit, or where it was difficult or impractical to do so.

With reference to Figure 6, shown is an illustration of one of first end plate 138 or second end plate 142 that couple to first and second end portions 140 and 144 of primary chassis 114, respectively, and function to provide means for allowing air to flow or pass in and out of the interior of modular processing unit 90. First and second end plates 138 and 142 function with first and second end caps 146 and 150 (shown in Figure 7), respectively, to provide a protective and functional covering to encasement module 100. Some embodiments do not include end caps. First and second end plates 138 and 142 attach to main support chassis 114, using attachment means 110 (as shown in Figure 2). Attachment means 110 typically comprises various types of screws, rivets, and other fasteners as commonly known in the art, but may also comprise other systems or devices for attaching first and second end plates 138 and 142, along with first and second end caps 146 and 150, to main support chassis 114, as commonly known in the art. In a representative embodiment, attachment means 110 comprise a screw capable of fitting within the respective attachment receivers 190 located in union module 154 at the four corners of main support chassis 114 (attachment receivers 190 and union module 154 are illustrated in Figure 4).

Structurally, first and second end plates 138 and 142 comprise a geometric shape and design to match that of end portions 140 and 144 of main support chassis 114. Specifically, as shown in Figure 6, the perimeter profile of first and second end plates 138 and 142 comprises a series of concave edges, each having a radius of curvature to match those of the respective wall supports and dynamic back plane. Essentially, end plates 138 and 142 serve to close off the ends of encasement module 100 by conforming to the shape of encasement module 100.

One of the primary functions of first and second end plates 138 and 142 is to provide means for facilitating or allowing the influx of air into and efflux of air out of encasement module 100. In an exemplary embodiment as shown in Figure 6, such means comprises a plurality of apertures or ventilation ports 198 intermittently spaced along the surface or face of and extending through end plates 138 and 142. As explained in the thermodynamics section below, in one embodiment, modular processing unit 90 utilizes natural convection to cool the processing components contained therein. By equipping end plates 138 and 142 with ventilation ports 198 ambient air is allowed to enter into the interior of modular processing unit 90, while the heated air, as generated from the processors and other components located within the interior of modular processing unit 90, is allowed to escape or flow from the interior to the outside environment. By natural physics, heated air rises and is forced out of encasement module 100 as cooler air is drawn into encasement module 100. This influx and efflux of ambient and heated air, respectively, allows modular processing unit 90 to utilize a natural convection cooling system to cool the processors and other internal components functioning or operating within modular processing unit 90. Ventilation ports 198 are preferably numerous, and span a majority of the surface area of end plates 138 and 142, and particularly the outer perimeter regions, thus enabling increased and efficient cooling of all internal components in an air-cooled model. Ventilation ports 198 are machined to exact specifications to optimize airflow and to constrict partial flow into encasement module 100. By constricting some flow, dust and other sediments or particles are prohibited from entering the interior of encasement module 100 where they can cause damage to and decreased performance of modular processing unit 90. Indeed, ventilation ports 198 are sized to only allow air particles to flow therethrough.

Because encasement module 100 is preferably made of metal, the entire structure, or a portion of the structure, can be positively or negatively charged to prohibit dust and other particles or debris from being attracted to the encasement. Such an electrostatic charge also prevents the possibility of a static charge jumping across dust and other elements and damaging

the main board. Providing an electrostatic charge is similar to ion filtering, only opposite. By negatively charging encasement module 100, all positively charged ions (i.e. dust, dirt, etc.) are repelled.

Figure 7 illustrates first end cap 146 and second end cap 150, which are designed to fit over first and second end plates 138 and 142, respectively, as well as over a portion of each end portion 140 and 144 of main support chassis 114. These end caps are preferably made of some type of impact absorbing plastic or rubber, thus serving to provide a barrier of protection to modular processing unit 90, as well as to add to its overall look and feel. Some embodiments do not include end caps.

In one embodiment, modular processing unit 90 comprises a rather small footprint or size relative to or as compared with conventional computer encasements. For example, in an exemplary embodiment, its geometric dimensions are approximately 4 inches in length, 4 inches in width, and 4 inches in height, which are much smaller than prior related conventional processing units, such as desktop computers or even most portable computers or laptops. In addition to its reduced dimensional characteristics, modular processing unit 90 comprises rather unique geometrical characteristics as well. Figures 2 – 3 illustrate this unique shape or geometry, most of which has been discussed above. These dimensional and geometrical characteristics are proprietary in form and each contribute to the specific, unique functional aspects and performance of modular processing unit 90. They also provide or lend themselves to significant features and advantages not found in prior related processing units. Stated differently, the proprietary design of modular processing unit 90 as described and shown herein allows it to perform in ways and to operate in environments that are otherwise impossible for prior related conventional computer encasements and processing units.

It is important to describe that modular processing unit 90 can take on any size and/or geometric shape. Although in the preferred embodiment modular processing unit 90 is substantially cube-shaped having a 4 x 4 x 4 size, other sizes and shapes are intended to be within the scope of the present invention. Specifically, as recited herein, the processing unit may be adapted for use in various structures or super structures, such as any conceivable by one ordinarily skilled in the art. In this sense, modular processing unit 90 must be able to comprise a suitable size and structure to be able to take on the physical attributes of its intended environment. For example, if processing unit is to be used within a thin hand-held device, it will be constructed having a thin profile physical design, thus deviating away from the cube-like

shape of the preferred embodiment. As such, the various computer and processing components used within modular processing unit 90 are also capable of associated sizes and shapes and designs.

As described above, the present invention modular processing unit 90 was designed to have certain mainstream components exterior to encasement module 100 for multiple reasons. First, because of its small size, yet powerful processing capabilities, modular processing unit 90 may be implemented into various devices, systems, vehicles, or assemblies to enhance these as needed. Common peripheral devices, such as special displays, keyboards, etc., can be used in the traditional computer workstation, but modular processing unit 90 can also be without peripherals and customized to be the control unit for many items, systems, etc. In other words, modular processing unit 90 may be used to introduce "smart" technology into any type of conceivable item of manufacture (external object), such that the external object may perform one or more smart functions. A "smart function" may be defined herein as any type of computer executed function capable of being carried out by the external object as a result of the external object being operably connected and/or physically coupled to a computing system, namely processing unit.

Second, regarding cooling issues, most of the heat generated within the interior of a computer comes from two places – the computer processor and the hard drive. By removing the hard drive from the encasement module 100 and putting it within its own encasement exterior to modular processing unit 90, better and more efficient cooling is achieved. By improving the cooling properties of the system, the lifespan or longevity of the processor itself is increased, thus increasing the lifespan and longevity of the entire computer processing system.

Third, modular processing unit 90 preferably comprises an isolated power supply. By isolating the power supply from other peripherals more of the supplied voltage can be used just for processing versus using the same voltage to power the processor in addition to one or more peripheral components, such as a hard drive and/or a CD-ROM, existing within the system. In a workstation model, the peripheral components will exist without modular processing unit 90 and will be preferably powered by the monitor power supply.

Fourth, preferably no lights or other indicators are employed to signify that modular processing unit 90 is on or off or if there is any disk activity. Activity and power lights still may be used, but they are preferably located on the monitor or other peripheral housing device. This type of design is preferred as it is intended that the system be used in many applications where

lights would not be seen or where they would be useless, or in applications where they would be destructive, such as dark rooms and other photosensitive environments. Obviously however, exterior lighting, such as that found on conventional computer systems to show power on or disk use, etc., may be implemented or incorporated into the actual modular processing unit 90, if so desired.

Fifth, passive cooling systems, such as a natural convection system, may be used to dissipate heat from the processing unit rather than requiring some type of mechanical or forced air system, such as a blower or fan. Of course, such forced air systems are also contemplated for use in some particular embodiments. It should be noted that these advantages are not all inclusive. Other features and advantages will be recognized by one skilled in the art.

With reference to Figure 8, shown is modular processing unit 90, and particularly encasement module 100, in an assembled state having first end plate 138 and second end plate 142 (not shown), first and second end caps 146 and 150, inserts 166, 170 (not shown), and 174 (not shown), as well as dynamic backplane 134 attached thereto. Dynamic backplane 134 is designed to comprise the necessary ports and associated means for connecting that are used for coupling various input/output devices and power cords to modular processing unit 90 to enable it to function, especially in a workstation environment. While all the available types of ports are not specifically shown and described herein, it is intended that any existing ports, along with any other types of ports that come into existence in the future, or even ports that are proprietary in nature, are to be compatible with and capable of being designed into and functional with modular processing unit 90. Preferably, this is accomplished by designing a different and interchanging backplane 134 as needed.

Specifically, dynamic backplane 134 comprises DVI Video port 120, 10/100 Ethernet port 124, USB ports 128 and 132, SATA bus ports 136 and 140, power button 144, and power port 148. A proprietary universal port is also contemplated that is used to electrically couple two processing units together to increase the processing capabilities of the entire system and to provide scaled processing as identified and defined herein. One ordinarily skilled in the art will recognize the various ports that may be utilized with the processing unit of the present invention.

The highly dynamic, customizable, and interchangeable backplane 134 provides support to peripherals and vertical applications. In the illustrated embodiment, backplane 134 is selectively coupled to encasement 100 and may include one or more features, interfaces, capabilities, logic and/or components that allow processing unit 90 to be dynamically

customizable. Dynamic backplane 134 may also include a mechanism that electrically couples two or more modular processing units together to increase the processing capabilities of the entire system as indicated above, and to provide scaled processing as will be further disclosed below.

Those skilled in the art will appreciate that backplane 134 with its corresponding features, interfaces, capabilities, logic and/or components are representative only and that embodiments of the present invention embrace back planes having a variety of different features, interfaces, capabilities and/or components. Accordingly, modular processing unit 90 is dynamically customizable by allowing one back plane to be replaced by another back plane in order to allow a user to selectively modify the logic, features and/or capabilities of modular processing unit 90.

Moreover, embodiments of the present invention embrace any number and/or type of logic and/or connectors to allow use of one or more modular processing units in a variety of different environments. For example, some environments may include vehicles (e.g., cars, trucks, motorcycles, etc.), hydraulic control systems, structural, and other environments. The changing of data manipulating system(s) on the dynamic back plane allows for scaling vertically and/or horizontally for a variety of environments.

It should be noted that in an embodiment, the design and geometric shape of encasement module 100 provides a natural indentation for the interface of these ports. This indentation is shown in Figure 8. Thus, inadvertent dropping or any other impacts to modular processing unit 90, and encasement module 100, will not damage the system as these ports are protected via the indentation formed within the dynamic back plane. First and second end caps 146 and 150 also help to protect the system from damage.

Power button 144 has three states - system on, system off, and system standby for power boot. The first two states, system on and system off, dictate whether modular processing unit 90 is powered on or powered off, respectively. The system standby state is an intermediary state. When power is turned on and received, the system is instructed to load and boot the operating system supported on modular processing unit 90. When power is turned off, modular processing unit 90 will then interrupt any ongoing processing and begin a quick shut down sequence followed by a standby state where the system sits inactive waiting for the power on state to be activated.

In this preferred embodiment, modular processing unit 90 also comprises a unique system or assembly for powering up the system. The system is designed to become active when a power cord and corresponding clip is snapped into the appropriate port located on dynamic backplane 134. Once the power cord and corresponding clip is snapped into power port 148 the system will fire and begin to boot. The clip is important because once the power source is connected and even if the power cord is connected to the leads within power port 148, modular processing unit 90 will not power on until the clip is snapped in place. Indicators may be provided, such as on the monitor, that warn or notify the user that the power cord is not fully snapped in or properly in place.

SATA bus ports 136 and 140 are designed to electronically couple and support storage medium peripheral components, such as CD-ROM drives, and hard drives.

USB ports 128 and 132 are designed to connect peripheral components like keyboards, mice, and any other peripheral components, such as 56k modems, tablets, digital cameras, network cards, monitors, and others.

The present invention also contemplates snap-on peripherals that snap onto dynamic back plane and couple to the system bus of modular processing unit 90 through a snap on connection system. As stated, other ports and means for connecting peripheral or input/output devices may be included and incorporated into modular processing unit 90 as recognized by one skilled in the art. Therefore, the particular ports and means for connecting specifically identified and described herein are intended to be illustrative only and not limiting in any way.

With reference to Figure 9, the present invention modular processing unit 90 comprises a proprietary computer processing system 150, with encasement module 100 comprising a unique design and structural configuration for housing processing system 150 and the electrical printed circuit boards designed to operate and be functional within modular processing unit 90.

Essentially, processing system 150 includes one or more electrical printed circuit boards, and preferably three electrical printed circuit boards, oriented and formed in a tri-board configuration 152 as shown in Figure 8. Processing system 150, and particularly tri-board configuration 152, comprises first electrical printed circuit board 154, second electrical printed circuit board 158, and third electrical printed circuit board 162 coupled to and housed within encasement module 100 as shown. Processing system 150 further comprises at least one central processor and optionally one or more other processors designed to perform one or more particular functions or tasks. Processing system 150 functions to execute the operations of

modular processing unit 90, and specifically to execute any instructions provided on a computer readable media, such as on a memory device, a magnetic hard disk, a removable magnetic disk, a magnetic cassette, an optical disk (e.g. hard drives, CD-ROM's, DVD's, floppy disks, etc.), or from a remote communications connection, which may also be viewed as a computer readable medium. Although these computer readable media are preferably located exterior to or without modular processing unit 90, processing system 150 functions to control and execute instructions on such devices as commonly known, the only difference being that such execution is done remotely via one or more means for electrically connecting such peripheral components or input/output devices to modular processing unit 90.

First, second, and third electrical printed circuit boards 154, 158, and 162 are supported within main support chassis 114 using means for engaging or coupling or supporting electrical printed circuit boards. In the embodiment shown in Figure 8, means for engaging electrical printed circuit boards comprises a series of board receiving channels 62 located in each junction center of encasement module 100. Board receiving channels 62 are adapted to accept an end portion 166 of an electrical printed circuit board. Several orientations may exist for placing electrical printed circuit boards within encasement module 100, but preferably end portion 166 of first electrical printed circuit board 154 fits within board receiving channel 162 located adjacent first wall support 118. End portions 166 of second and third electrical printed circuit boards 158 and 162 fit in a similar manner within board receiving channel 162 located adjacent second and third wall supports 122 and 126, respectively, to comprise the orientation as shown in Figure 9.

Board configuration 152 and printed circuit boards are not supported by and preferably do not rest upon any of the wall supports of primary chassis 114. Each of the electrical printed circuit boards are specifically supported within primary chassis 114 by board receiving channels 62 located within junction centers. Primary chassis 114 is designed this way to provide a gap or space between each of the electrical printed circuit boards and the opposing wall supports to allow for the proper airflow within modular processing unit 90 according to the unique natural convection cooling properties provided herein. As such, each radius of curvature calculated for each wall support is designed with this limitation in mind.

Board configuration 152 provides significant advantages over prior art board configurations. As one advantage, board configuration 152 is configured in three multi-layer

main boards instead of one main board as found in conventional computer systems. In addition, less real estate is taken up as the boards are able to be configured within different planes.

Another advantage is in the way two of the main boards couple to a third main board. By coupling each of the first, second, and third electrical printed circuit boards 154, 158, and 162 together in this manner, the chance for detachment of each of these boards from their proper place within primary chassis 114 and encasement module 100 is significantly decreased. In virtually any circumstance and condition modular processing unit 90 is exposed to, tri-board configuration 152 will remain intact and in working order, thus maintaining or preserving the integrity of the system. This is true even in impact and applied loading situations.

Preferably, first and third electrical printed circuit boards 154 and 162 are attached to third electrical printed circuit board 158 during manufacture and prior to board configuration 152 being placed within encasement module 100. Once board configuration 152 is assembled it is inserted into and secured to main support chassis 114 as shown. It should be noted that not all of board receiving channels 62 are necessarily utilized.

Figure 9 illustrates the preferred embodiment, wherein only four of these channels are used to support the respective end portions of the electrical printed circuit boards. However, Figure 9 is only illustrative of a one exemplary embodiment. Other configurational designs for processing system 150 are contemplated. For example, modular processing unit 90 could comprise one board only, or two or more boards. Moreover, processing system 150 may comprise a layered design configuration, in which the included printed circuit boards exist in a multi-planar configuration. One skilled in the art will recognize the several configurations and possibilities.

In addition to the many advantages discussed above, the present invention features other significant advantages, one of which is that due to encasement module 100 comprising a full metal chassis or a main support chassis 114, there is very little or no radiation emission in the form of electromagnetic interference (EMI). This is in large part due to the material properties, the small size, the thickness of the structure, and the close proximity of the processing components in relation to the structural components of encasement module 100. Whatever EMI is produced by the processing components is absorbed by encasement module 100, no matter the processing power of the processing components.

Another significant advantage is that encasement module 100 enables a much cleaner, more sterile interior than prior art computer encasement designs. Because of the design of

encasement module 100, particularly the small size, ventilation ports, and the heat dissipating properties, it is very difficult for dust particles and other types of foreign objects to enter the encasement. This is especially true in a liquid cooled model, wherein the entire encasement may be sealed. A more sterile interior is important in that various types of foreign objects or debris can damage the components of and/or reduce the performance of modular processing unit 90.

Although modular processing unit 90 relies on natural convection in one exemplary embodiment, the natural influx and efflux of air during the natural convection process significantly reduces the influx of dust particles or other debris into modular processing unit 90 because there is no forced influx of air. In the natural convection cooling system described herein, air particles enter the interior of encasement module 100 according to natural principles of physics, and are less apt to carry with them heavier foreign object as there is less force to do so. This is advantageous in environments that contain such heavier foreign objects as most environments do.

The unique cooling methodology of modular processing unit 90 will allow it to be more adaptable to those environments prior related encasements were unable to be placed within.

Still another significant advantage of the present invention modular processing unit 90 is its durability. Because of its compact design and radius-based structure, encasement module 100 is capable of withstanding large amounts of impact and applied forces, a feature which also contributes to the ability for modular processing unit 90 to be adaptable to any type of conceivable environment. Encasement module 100 can withstand small and large impact forces with little effect to its structural integrity or electrical circuitry, an advantage that is important as the small size and portability of modular processing unit 90 lends itself to many conceivable environments, some of which may be quite harsh.

In addition to the structural components of encasement module 100 being very durable, the electrical printed circuit design board and associated circuitry is also extremely durable. Once inserted, the printed circuit boards are very difficult to remove, especially as a result of inadvertent forces, such as dropping or impacting the encasement. Moreover, the boards are extremely light weight, thus not possessing enough mass to break during a fall. Obviously though, encasement 100 is not entirely indestructible. In most circumstances, encasement module 100 will be more durable than the board configurations, therefore the overall durability of modular processing unit 90 is limited by the board configuration and the circuitry therein.

In short, encasement module 100 comprises a high level of durability not found in prior related encasement designs. Indeed, these would break, and often do, at very slight impact or applied forces. Such is not so with modular processing unit 90 described herein.

The durability of encasement module 100 is derived from two primary features. First, encasement module 100 is preferably built with radiuses. Each structural component, and their designs, are comprised of one or more radiuses. This significantly adds to the strength of encasement module 100 as a radius-based structure provides one of the strongest designs available. Second, the preferred overall shape of encasement module 100 is cubical, thus providing significant rigidness. The radius-based structural components combined with the rigidness of the cubical design, provide a very durable, yet functional, encasement.

The durability of the individual processing units/cubes allows processing to take place in locations that were otherwise unthinkable with traditional techniques. For example, the processing units can be buried in the earth, located in water, buried in the sea, placed on the heads of drill bits that drive hundreds of feet into the earth, mounted on unstable surfaces, mounted to existing structures, placed in furniture, etc. The potential processing locations are endless.

The processing unit of the present invention further features the ability to be mounted to, or to have mounted onto it, any structure, device, or assembly using means for mounting and means for engaging an external object (each preferably comprising slide receiver 182, as existing on each wall support of main support chassis 114). Any external object having the ability to engage modular processing unit 90 in any manner so that the two are operably connected is contemplated for protection herein. In addition, one skilled in the art will recognize that encasement module 100 may comprise other designs or structures as means for engaging an external object other than slide receivers 182.

Essentially, the significance of providing mountability to processing unit, no matter how this is achieved, is to be able to integrate modular processing unit 90 into any type of environment as discussed herein, or to allow various items or objects (external objects) to be coupled or mounted to modular processing unit 90. The unit is designed to be mounted to various inanimate items, such as multi-plex processing centers or transportation vehicles, as well as to receive various peripherals mounted directly to modular processing unit 90, such as a monitor or LCD screen.

In at least some embodiments, the mountability feature is designed to be a built-in feature, meaning that modular processing unit 90 comprises means for engaging an external object built directly into its structural components. Both mounting using independent mounting brackets (e.g. those functioning as adaptors to complete a host-processing unit connection), as well as mounting directly to a host (e.g. mounting the unit in a car in place of the car stereo) are also contemplated for protection herein.

Another capability of modular processing unit 90 is its ability to be mounted and implemented within a super structure, such as a Tempest super structure, if additional hardening of the encasement module is effectuated. In such a configuration, modular processing unit 90 is mounted within the structure as described herein, and functions to process control the components or peripheral components of the structure. Modular processing unit 90 also functions as a load bearing member of the physical structure if necessary. All different types of super structures are contemplated herein, and can be made of any type of material, such as plastic, wooden, metal alloy, and/or composites of such.

Other advantages include a reduction in noise and heat and an ability to introduce customizable "smart" technology into various devices, such as furniture, fixtures, vehicles, structures, supports, appliances, equipment, personal items, etc. (external object). These concepts are discussed in detail below.

As provided above, the present invention processing unit is unlike any other prior related computing processing system in that, because of its unique design and configuration, the processing unit may be associated with, integrated into, or otherwise operably connected with an external object to introduce customizable "smart" technology into the external object, thus allowing the external object to perform many smart functions that it would otherwise not be able to perform. In addition, the robust customizable computing system may be applicable to various identified types of enterprise applications, such as computers and computing systems, electronics, home appliances, applications in various industries, etc. This section details the ability of the processing unit described above to provide such robust customizable computing systems and their applicability in several exemplary enterprise applications.

Embodiments of the present invention feature the ability for integrating, incorporating, or otherwise operably connecting a proprietary processing unit into any conceivable system, device, assembly, apparatus, or object (collectively referred to as an "external object") to introduce intelligence into the external object or to perform one or more computing functions for

the external object or to fulfill other functions with respect to the external object as recognized by those skilled in the art. By doing so, the item essentially becomes or is transformed into a "smart" item, meaning that the external object may perform many functions and tasks not hitherto possible. Specifically, through the operable connection of the processing unit to an external object, the external object becomes capable of being much more functional than without a processing unit present. For instance, if an electronic external object, the processing unit can integrate with the circuitry, if any, of the electronic external object to provide added computing and processing power. If incorporating into a mechanical assembly or device or system, the addition of a processing unit may allow the mechanics to be controlled by computer or more specifically controlled, or may allow several other computing functions to be possible. If incorporated into an existing structure, the addition of a processing unit may allow the structure to perform computing functions not otherwise possible. Moreover, the processing unit may serve as a support component to a structure, or support a load itself. Essentially, there is no limit to the types of functions that the external object may be caused to perform as a result of the processing unit being operably connected thereto. However, such capabilities will be limited by the design and processing capabilities built into the processing unit as will be recognized by one of ordinary skill in the art. This ability or capability to be operably connected with various external objects is a unique feature not found in conventional prior related computing devices and is made possible by the design, structure, and processing capabilities combination of modular processing unit 90.

Incorporating or operably connecting a processing unit into an external object may be accomplished with the processing unit physically attached or not. In some instances it may not be desirable to physically attach the unit. Regardless of the type of physical attachment, the processing unit is operably connected to the external object, meaning that the processing unit is somehow functional with the external object itself to provide computing capabilities to or for the external object. As stated, this may be through existing or built-in circuitry, or installed circuitry, or through other means.

In one exemplary embodiment, modular processing unit 90 is physically connected to the external object. The physical connection is made possible due to the "slide-on" or "snap-on" capabilities of modular processing unit 90. By "slide-on," and "snap-on" it is meant that modular processing unit 90 may accept various brackets, mounts, devices, etc. by sliding or snapping them into a suitable acceptor or receiver, respectively, located on modular processing

unit 90, such as slide receivers 182. In addition, an entire modular processing unit 90 may be slid or snapped into another structure using the same receivers. Essentially, the present invention provides means of allowing modular processing unit 90 to accept different peripheral items, or to be incorporated into another structure. In other embodiments, the particular methods and/or systems employed to mount the processing unit to an external object may be those well known in the art.

Having said this, the processing unit, due to its unique and proprietary design, can essentially function as the engine that drives and controls the operation of many components, structures, assemblies, equipment modules, etc.

Figure 10 illustrates one embodiment for coupling modular processing unit 90 to external object 280. In the embodiment shown, modular processing unit 90 is operably coupled in an electrical and physical manner to external object 280. Physical connection is achieved by locating engagement members 278 formed on external object 280 and fitting or inserting these into slide receivers 182 located on modular processing unit 90 (see discussion above with respect to Figure 5). Inserting engagement members 278 into slide receivers 182 effectively functions to physically connect modular processing unit 90 to external object 280, such that processing unit may serve as a structural component (e.g., load bearing or non-load bearing) of the external object itself, or as the support for one or more external objects. Of course, as one ordinarily skilled in the art will recognize, other methods and systems may be used to physically connect processing unit to external object 280, each of which are intended to be covered and protected herein.

Figure 10 further illustrates means for operably connecting modular processing unit 90 to external object 280 as comprising a connection cord connecting the circuitry present about or within external object 280 with that of modular processing unit 90. This is preferably done through one or more ports of modular processing unit 90.

The processing unit is capable of being arranged in countless ways to provide a robust customizable computing system. Several such systems are provided below for illustrative purposes. It should be noted that the following examples are not to be construed as limiting in any way, as one ordinarily skilled in the art will recognize the virtually endless conceivable arrangements and systems that may comprise one or more processing units to create a robust customizable computing system, as well as the many different types of enterprise applications that may utilize such a system.

With reference now to Figure 11, a representative enterprise 370 is illustrated, wherein a dynamically modular processing unit 340 having a non-peripheral based encasement, is employed alone in a personal computing enterprise. In the illustrated embodiment, processing unit 340 includes power connection 371 and employs wireless technology with the peripheral devices of enterprise 370. The peripheral devices include monitor 372 having hard disk drive 374, speakers 376, and CD ROM drive 378, keyboard 380 and mouse 382. Those skilled in the art will appreciate that embodiments of the present invention also embrace personal computing enterprises that employ technologies other than wireless technologies.

Processing unit 340 is the driving force of enterprise 370 since it provides the processing power to manipulate data in order to perform tasks. The dynamic and customizable nature of the present invention allows a user to easily augment processing power. In the present embodiment, processing unit 340 is a 4-inch cube that utilizes thermodynamic cooling and optimizes processing and memory ratios. However, as provided herein, embodiments of the present invention embrace the use of other cooling processes in addition to or in place of a thermodynamic cooling process, such as a forced air cooling process and/or a liquid cooling process. Furthermore, while the illustrated embodiment includes a 4-inch cube platform, those skilled in the art will appreciate that embodiments of the present invention embrace the use of a modular processing unit that is greater than or less than a 3½-inch cube platform. Similarly, other embodiments embrace the use of shapes other than a cube.

In particular, processing unit 340 of the illustrated embodiment includes a 2GHz processor, 1.5G RAM, a 512 L2 cache, and wireless networking interfaces. So, for example, should the user of enterprise 370 determine that increased processing power is desired for enterprise 370, rather than having to purchase a new system as is required by some traditional technologies, the user may simply add one or more modular processing units to enterprise 370. The processing units/cubes may be selectively allocated by the user as desired for performing processing. For example, the processing units may be employed to perform distributive processing, each unit may be allocated for performing a particular task (*e.g.*, one unit may be dedicated for processing video data, or another task), or the modular units may function together as one processing unit.

While the present example includes a processing unit that includes a 2GHz processor, 1.5G RAM, and a 512 L2 cache, those skilled in the art will appreciate that other embodiments of the present invention embrace the use of a faster or slower processor, more or less RAM,

and/or a different cache. In at least some embodiments of the present invention, the capabilities of the processing unit depends on the nature for which the processing unit will be used.

While Figure 11 illustrates processing unit 340 on top of the illustrated desk, the robust nature of the processing unit/cube allows for unit 340 to alternatively be placed in a non-conspicuous place, such as in a wall, mounted underneath the desk, in an ornamental device or object, etc. Accordingly, the illustrated embodiment eliminates traditional towers that tend to be kicked and that tend to produce sound from the cooling system inside of the tower. No sound is emitted from unit 340 as all internal components are solid states when convection cooling or liquid cooling is employed.

With reference now to Figure 12, another example is provided for utilizing a modular processing unit in a computing enterprise. In Figure 12, an ability of modular processing unit 340 to function as a load-bearing member is illustrated. For example, a modular processing unit may be used to bridge two or more structures together and to contribute to the overall structural support and stability of the structure or enterprise. In addition, a modular processing unit may bear a load attached directly to a primary support body. For example, a computer screen or monitor may be physically supported and the processing controlled by a modular processing unit. In the illustrated embodiment, monitor 390 is mounted to modular processing unit 340, which is in turn mounted to a stand 392 having a base 394.

With reference now to Figure 13, another representative enterprise is illustrated, wherein a dynamically modular processing unit 340 having a non-peripheral based encasement, is employed computing enterprise. In Figure 13, the representative enterprise is similar to the embodiment illustrated in Figure 12, however one or more modular peripherals are selectively coupled to the enterprise. In particular, Figure 13 illustrates mass storage devices 393 that are selectively coupled to the enterprise as peripherals. Those skilled in the art will appreciate that any number (e.g., less than two or more than two) and/or type of peripherals may be employed. Examples of such peripherals include mass storage devices, I/O devices, network interfaces, other modular processing units, proprietary I/O connections; proprietary devices, and the like.

Figure 14 illustrates another example of a dynamically modular processing unit. In Figure 14, the dynamically modular processing unit is shown in an exploded perspective view of one illustrative embodiment of peripheral module 452. The peripheral module 452 includes a bus port 460 for connecting a bus (not shown) to be connected to the base module 450. In one example, the bus port 460 is a USB port, but as mentioned above, the bus may be any type of

bus. The bus is used to drive input/output commands (e.g. keyboard, mouse, and video commands) between the base module 450 (Figure 15) and the peripheral module 452, and faster buses simply allow more commands to pass between the modules, but only enough is required to take in inputs and display or otherwise output the outputs from the base module 450.

The peripheral module 452 also includes several other types of ports to allow the connection of the input/output devices 454. For example, the illustrated embodiment includes a video port 462, an audio input port 464, an audio output port 466, and some additional bus (e.g. USB) ports 468. The audio input port 464 and the audio output port 466 of this embodiment allow this embodiment to be used, for example, in a call center. The USB or other bus ports 468 may be used to connect other input/output devices such as a keyboard and mouse. The illustrated ports are intended to be only illustrative and not restrictive. The peripheral module 452 uses and manages these various ports to create a user experience essentially as a session on the base module 450.

Figure 14 shows how the peripheral module 452 may be constructed. As may be seen in this Figure, the peripheral module 452 includes an outer structural shell 470 and two end caps 472. The structural shell 470 and end caps 472 serve to enclose and protect a system board 474 of the peripheral module 452. The structural shell 470 may be made of a variety of materials, including plastics and metals, including aluminum and/or metal alloys, and may be formed in a way so as to provide structural functions as discussed in the related applications. Additionally, the structural shell 470 may be formed so as to mate with the structure of the base module 450 as is illustrated in Figure 15. As shown in Figure 14, the various ports discussed above are attached to the system board 474. A port cover plate 476 may serve to cover any gaps between the different ports.

Figures 16 and 17 show end and perspective views of the peripheral module 452, respectively. In these views, some features of the structural shell 470 are visible that show one way in which mating with the base module 450 or other peripheral modules 452 may be accomplished. As may be seen in Figures 16 and 17, the structural shell 470 may be formed (e.g. extruded) to have a pair of mating protrusions 478 on one major side of the peripheral module 452. As may be seen in Figure 18, the opposite major side of the structural shell 470 in this embodiment is formed to have a corresponding pair of mating channels 479 that can accept the mating protrusions 478. As may also be seen in Figures 16 through 18, the end caps 472 do not include either the mating protrusions 478 or the corresponding mating channels 479. The

base module 450 includes corresponding mating channels 479 on at least one of its sides, and possibly on as many as three of its sides (but again, not on its end caps).

To structurally attach the peripheral module 452 to the base module 50 in the manner shown in Figure 15, an end cap 480 of the base module 450 is removed (tamper-resistant fasteners may be used to deter theft or vandalism), and the mating protrusions 478 of the peripheral module 452 are slidingly engaged with the corresponding mating channels 479 of the base module 450. The peripheral module 452 slides until it is fully mated with the base module 450. The end cap 480 of the base module 450 is reattached to the base module 450 and thereby locks the peripheral module 452 to the base module 450. Additional peripheral modules 452 or other components may be attached to the system using the mating channels 479 of either the peripheral module 452 or of other sides of the base module 450 as desired, with the corresponding end cap (472 or 480) being removed to facilitate such attachment.

The illustrated embodiments shown in Figures 14-18 are merely illustrative of ways that embodiments may be constructed to permit structural connections between modules and with other devices. Thus, for example, while the illustrated peripheral module 452 has mating protrusions 478 on one major side and mating channels 479 on another major side, another embodiment may have mating channels 479 on both major sides, as illustrated in the end view depiction of an alternate outer structural shell 470 shown in Figure 19.

The structural shell 470 of the peripheral module 452 may be load bearing as disclosed in one or more of the related applications. The peripheral module 452 may therefore be used as a mount from which to hang a monitor or other device, may be embedded or mounted in a wall, may be a part of a frame, and may perform any of the structural functions disclosed in the related applications. For example, a plate may be mounted to a wall and another plate may be mounted to a monitor, and the two plates may be connected together through the structural features of the peripheral module 452. One illustrative embodiment of a plate 481 is shown in Figure 20. The plate 481 is an extruded and cut plate that has mating protrusions 478 similar to those discussed above, although it could alternatively have mating channels 479. The plate 481 could be mounted to any of a variety of modules discussed herein such as the peripheral module 452. Thus, the peripheral module 452 may essentially serve as an intelligent mounting bracket.

A system including peripheral modules 452 differs somewhat from a system composed entirely of base modules 450, even if the base modules 450 are of varying types. For example, as disclosed in the related applications, base modules 450 may be connected to each other and

may include varying features (such as one or more cubes containing a GPU instead of a CPU) so as to increase the processing abilities of the combined units. For example, some combinations of units may essentially work together to form a supercomputer or provide supercomputer-like functions. In contrast, the addition of peripheral modules 452 to the system (regardless of the number and configuration of base modules 450) primarily functions to allow the distribution of computing capabilities of the base module(s) 450 through the peripheral modules 452. (As discussed above, peripheral modules 452 having more than a minimum computing capability may be used and may therefore add some processing capability to the system, and additional system resources (e.g. printers, mass storage devices, web cameras and the like) may be attached to the peripheral modules 452 and thus become available to the combined system.)

Thus, the addition of peripheral modules 452 to the system allows resources to be shared to the human element by driving graphical user interfaces (GUIs) using that power. Thus, the users are thereby permitted to view and manipulate data that is available on the one or more connected base modules. The peripheral modules 452 need not be designed to do work at the peripheral modules 452 other than passing data to and from the input/output devices 454. The peripheral modules 452 instead permit the accessing of a GUI session on the base module 450, thereby providing access to the data, programs, and other resources available on the base module 450. The primary computing functions are handled by the base module(s) 450, and each peripheral module 452 serves to open a window to access the resources of the base module(s) 450.

Representative Mounting Brackets

Figure 21 illustrates a representative mounting system 500, which includes mounting plate 502, mounting connector 510 and chassis 520. Mounting plate 502 includes apertures that are configured to align with a VESA mount on a monitor, television, or other device. Alternatively, plate 520 can be used to be secured to any surface or object. Plate 502 includes apertures that are aligned to apertures 512 in connector 510. Further, connector 514 includes protrusions that are configured to slide into channels 522 of chassis 520, which can be any type of modular processing unit (including a base module or a peripheral module). Further, chassis 520 includes protrusions 524 to be able to slide into channels of another chassis of a modular processing unit.

Figure 22 illustrates another representative mounting bracket 530, which can comprise any metal, metal alloy, aluminum, aluminum alloy, nylon, hybrid material, polymer, or other

durable material. Bracket 530 includes apertures 532 that are configured to align with a VESA mount on a monitor, television, or other device. Bracket 530 further includes apertures 534 that are configured to selectively mount one or more connectors 510 along with one or more corresponding modular processing units.

Figure 23 illustrates a representative manner of mounting a modular processing unit. System 540 includes monitor 542 that has mounted thereon bracket 530 using the VESA mount apertures 532. Apertures 534 are used to mount connector 510 onto bracket 530, and modular processing unit 520 is mounted onto connector 510 using the channel/protrusion system. Figure 24 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 23.

Figure 25 illustrates another representative manner of mounting a modular processing unit, wherein bracket 530 is dynamic in that it allows connection to monitor 542 in a variety of orientations, namely in 90 degree orientations – rotated either clockwise or counterclockwise. Figure 26 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 25.

Figure 27 illustrates another representative manner of mounting a modular processing unit, wherein monitor 542 has bracket 530 mounted thereon. Also mounted to bracket 530 is mounting arm 550, having corresponding VESA apertures 552, hinged arm 554, and surface 556. Moreover, connector 510 is used to mount modular processing unit 520 onto bracket 530. Figure 28 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 27. Figure 29 illustrates a top view of the representative manner of mounting a modular processing unit of Figure 27. Figure 30 illustrates a perspective view of the representative manner of mounting a modular processing unit of Figure 27.

Figure 31 illustrates a perspective view of another representative mounting bracket 560, which can comprise any metal, metal alloy, aluminum, aluminum alloy, nylon, hybrid material, polymer, or other durable material. Bracket 560 includes apertures 562 that are configured to align with a VESA mount on a monitor, television, or other device. Bracket 560 further includes apertures 564 that are configured to selectively mount one or more connectors 510 along with one or more corresponding modular processing units. Bracket 560 further includes end 570 having apertures 572 and end 580 having apertures 582. Apertures 572 and 582 are configured to selectively mount one or more connectors 510 along with one or more corresponding modular processing units.

Figure 32 illustrates a representative manner of mounting a modular processing unit. In Figure 32, bracket 560 is mounted on monitor 590 using VESA mount apertures 562. Apertures 572 and 582 are used to mount connectors 510 onto bracket 560 using a screw or other attachment device. Further, protrusions on connectors 510 are slid into corresponding channels of modular processing units 520 to mount units 520 onto corresponding connectors 510. Figure 33 illustrates an assembled view of the representative manner of mounting a modular processing unit of Figure 32. Bracket 560 can be dynamically mounted onto television/monitor 590 in 90 degree increments of rotation.

Connecting Modular Processing Units in Cabinets or Other Configurations

While Figure 34 illustrates a cabinet 630 that includes drawers configured to receive the individual processing units 632, other embodiments of the present invention include the use of a mounting bracket that may be used in association with a processing unit to mount the unit onto a bar. The illustrated embodiment further includes a cooling system (not show) that allows for temperature control inside of cabinet 634, and utilizes vents 638.

Figure 35 illustrates another representative manner of mounting modular processing units in a rack, in a cabinet, or on a surface. In Figure 35, modular processing units 710 are mounted into cabinet 700 using a DIN rail mounting system.

With reference to Figure 36, cabinet 700 is a wall-mount cabinet that includes one or more DIN rails 730. A DIN rail connector 720, which comprises a polymer materal, metal alloy, hybrid material, nylon or other material, is used to selectively mount a modular processing unit 710 onto the DIN rail.

With reference to Figure 37, the modular processing unit 710 comprises chassis 712 having channels 714. DIN rail connector 720 has protrusions 722 that are configured to slide into channels 714 and are secured upon securing endplates onto unit 710. Din rail connector 720 further includes handle 726 that selectively causes connector 720 to flex in order to use surfaces 724 to clip onto surfaces 732 of DIN rail 730. By causing the handle 726 to come toward chassis 712, the connector can be selectively connector or disconnected from rail 730.

Figure 38 illustrates another view of a representative DIN rail mounting system, wherein modular processing units 710 are mounted onto DIN rails 730, which are mounted in cabinet 700.

Figure 39 illustrates another representative mounting system 800 having container 810 and lid 812. As illustrated in Figure 40, container 810 includes pressure fit protrusions 814 that

can be pushed into corresponding channels of a modular processing unit 820, as shown in Figures 41 – 45. Container 810 can comprise any material, including a polymer material, nylon, hybrid, metal, metal alloy, or other material. Thus, unit 820 can be easily mounted and/or removed from container 810

The modular nature of the processing units/cubes is illustrated by the use of the processing units in the various representative enterprises illustrated. Embodiments of the present invention embrace chaining the units/cubes in a copper and/or fiber channel design, coupling the cubes in either series or parallel, designating individual cubes to perform particular processing tasks, and other processing configurations and/or allocations.

Each unit/cube includes a completely re-configurable motherboard. In one embodiment, the one or more processors are located on the back plane of the motherboard and the RAM modules are located on planes that are transverse to the back plane of the motherboard. In a further embodiment, the modules are coupled right to the board rather than using traditional sockets. The clock cycle of the units are optimized to the RAM modules.

While one method for improving processing powering an enterprise includes adding one or more additional processing units/cubes to the enterprise, another method includes replacing planes of the motherboard of a particular unit/cube with planes having upgraded modules. Similarly, the interfaces available at each unit/cube may be updated by selectively replacing a panel of the unit/cube. Moreover, a 32-bit bus can be upgraded to a 64-bit bus, new functionality can be provided, new ports can be provided, a power pack sub system can be provided/upgraded, and other such modifications, upgrades and enhancements may be made to individual processing units/cubes by replacing one or more panels.

With reference now to Figures 45 – 46, an in wall mounting system is provided. Figure 46, illustrates a representative container or cabinet that is configured to dynamically mount one or more computer devices. In accordance with at least some embodiments, the computer devices are snapped into and/or slid onto a bracket. In at least some embodiments, the brackets or connectors are dynamic in nature to allow for the computer device to be mounted in a variety of orientations and/or configurations. Further, in at least some embodiments, the brackets or connectors receive the computer devices, wherein the computer devices comprise different dimensions or configurations. Thus, multiple mounting options are available in the same space or footprint. Further, the computer devices can face each other, can face out toward the user, or can face away from another computer device. Moreover, the container, cabinet or box is

modular in nature to allow for stacking of such containers, cabinets or boxes. An example of such stacking is provided in Figure 46.

While the illustrated embodiments show mounting in-wall, those of ordinary skill in the art will appreciate that embodiments of the present invention embrace the utilization of containers, cabinets or boxes that can be coupled to any secure or stable device or surface. For example, some embodiments embrace mounting one or more computer devices in cabinet, a rack, a container, or the like.

In one embodiment, the container or rack includes shelves, platforms, tubes or other receiving devices or structures to hold or otherwise receive the computer devices. By way of example, reference is made to Figures 48-58, which illustrate representative drawers, trays, tubes or other structures that selectively receive a plurality of computer devices, storage devices, and/or peripheral devices. In Figure 48, multiple computer devices are received by the drawer or tray surface. In some embodiments, a cabinet or container (such as the representative cabinets illustrated in Figures 55 – 56) holds a plurality of drawers or trays of computer devices. In Figure 49, an exploded view is provided to illustrate the tray, the plurality of computer devices and a damping system to allow for and encourage the dissipation of heat and/or to cool the computer devices. With reference to Figure 50, the damper system is illustrated to show the utilization of the damper system. In one embodiment, warm air escapes through the top of a vertically aligned array of computer devices. In another embodiment, cool air is forced from the bottom or from one side of the tray and allowed to move through the damping system in such a way as to allow all of the computer devices to cool at the same time. In one embodiment, the dampers are manually adjusted. In another embodiment, the dampers are adjusted to the individual computer device depending on its location in the array. In another embodiment, the dampers are automatically adjusted depending on the heat of the associated computer device. In another embodiment, the dampers are adjusted by the corresponding computer device depending upon the temperature of that particular computer device.

With reference to Figures 51 – 53, another embodiment is provided, wherein a tray of computer devices that are operably connected are cooled using a damping technology. Cool air enters into one end and is channeled by the dampers under and into the computer devices. The dampers allow for the warm air to exit an end of each of the computer devices and escape as the warm air rises away and out of the computer devices. In one embodiment, the cool air is allowed to enter by use of one or more fans. In another embodiment, a closed environment allows for an

amount of pressure (e.g., a bar of pressure or another amount) to be placed on one end or side to allow airflow. The dampers are manually or automatically adjusted to evenly and efficiently cool the computer devices and/or allow the warm air to escape.

With reference now to Figure 54, a tray is illustrated that includes an inside channel. Ambient or cool air is drawn into the inside channel. A plurality of computer devices are mounted or otherwise coupled to a top surface of the tray. The computer devices are separated by a separator that is mounted at an egress location of the tray. Accordingly, air flows from the inside channel of the tray and out the egress locations in the top surface of the tray. The air exiting the egress locations is channeled by the separators to cause the air to enter the computer devices. The air then exits the computer devices and flows up the backside of the separators to a surface located above this tray of computer devices, which may be another tray of computer devices that is stacked above this tray. Therefore the warm air is collected at the surface above the tray of computer devices and is drawn away, such as by fans or by pressure. In some embodiments, air flow is created by inserting air and/or by drawing the warm air out. In some embodiments, the air flow is created by pressure.

Accordingly, at least some embodiments of the present invention embrace dynamic cooling. For example, all of the computer devices are cooled at the same time with the same input temperature.

In some embodiments, air is driven or otherwise drawing through the plurality of computer devices to provide inside cooling and air is driven over or otherwise about the outside of the computer devices to provide cooling to the chassis of the plurality of computer devices.

Moreover, while the computer devices are show in Figure 54 to be mounted or otherwise coupled horizontally, in other embodiments the computer devices are mounted or otherwise coupled so as to be oriented vertically to allow vents on the top and bottom surfaces of the computer devices to allow for the flow of air from the inside channel of the tray, through an egress of the tray, up through vertically oriented computer devices.

Accordingly, in some embodiments all of the computer devices receive airflow based upon the diameter of the airflow channel that is created by the damper system for each corresponding computer device. In some embodiments, the airflow channel includes apertures that are cut to appropriate diameters. In some embodiments, the diameters are created by automated control of the dampers. In further embodiments, each computer device controls its own associated airflow diameter created by the damper system.

In some embodiments, a closed environment is provided. A pressure is provided on one end, such as a bar of pressure or another amount. The pressure allows for the flow of air through the array in accordance with the damper system, thereby allowing for the warm air to escape and the computer devices to be cooled.

In some embodiments, the container is a mobile container that contains a plurality of computer devices and allows for the container to move into position. In some embodiments, the mobile container includes a motor and/or drive mechanism to allow for movement. In some embodiments, the container is driven from one location to another. In some embodiments, the container is a closed container that is air conditioned to maintain a desired temperature. In another embodiment, the container is shock mounted. In another embodiment, an amount of pressure is provided on one side or end (such as a bar of pressure or another amount) to allow for air flow. In some embodiments, the container includes a plurality of shelves or trays of computer devices. In some embodiments, all of the computer devices are cooled at the same time. In some embodiments, the computer devices are cooled through an air dam, air duct, or air damper system, or other system that allows for air flow.

In some embodiments, the container is a truck trailer. In some embodiments, the container is as provided in Figure 34. In some embodiments, the container is a dynamically modular container that allows for the selectively coupling to one or more other trailers. In at least some embodiment, the computer devices of the container are operably connected. Moreover, in at least some embodiments, the computer devices can be mounted in one of a variety of positions within the same footprint or space of the computer device in the container and/or on the tray.

In some embodiments, the container, cabinet or rack is on a movement device, such as on wheels, a track system, or other device to allow for mobility of the container, cabinet or rack. Moreover, some embodiments further include a motor or drive mechanism to allow for mobility of the container, cabinet or rack. In some embodiments, the container allows for a particular multiple of the computer devices based on a desired configuration. In some embodiments, the container includes a hinged door to allow the container to be selectively opened or closed. In some embodiments, the in wall unit is an air conditioned unit.

Embodiments of the present invention embrace a variety of organizational structures. By way of example, and as mentioned above, some embodiments of the present invention embrace a cabinet having a plurality of trays having a plurality of computer devices. Representative

examples are illustrated in Figures 55 – 56. Figures 57 – 58 illustrate other representative configurations.

In Figure 57, a representative tubular configuration is illustrated that selectively receives a plurality of computer devices. The representative configuration is mounted in a structure, such as in a wall or vault. Computer devices are mounted or otherwise coupled to a structure that includes a central tube. Accordingly, air can be drawn through the computer devices and received into a central tube to be drawn out of the system, thereby simultaneously cooling all of the plurality of computer devices. Alternatively, air can be supplied from the central tube and forced through the computer devices to simultaneously cool all of the plurality of computer devices. In some embodiments the air movement is caused by the establishment of air pressure.

In Figure 58, another representative configuration is illustrated that selectively receives a plurality of computer devices. The representative configuration is a wagon-wheel type of a structure. Computer devices are mounted or otherwise coupled to the structure that includes a central tube. Accordingly, air can be drawn through the computer devices and received into the central tube to be drawn out of the system, thereby simultaneously cooling all of the plurality of computer devices. Alternatively, air can be supplied from the central tube and forced through the computer devices to simultaneously cool all of the plurality of computer devices. In some embodiments the air movement is caused by the establishment of air pressure.

Thus, embodiments of the present invention embrace the separation of warm and cool air for cooling. Further, embodiments of the present invention embrace an inlet for the introduction of air and an outlet for the escape of warmed air, thereby cooling a plurality of computer devices simultaneously. In some embodiments, separators are provided between computer devices so that air from one computer device does not enter another computer device.

In one embodiment, the configuration shown in Figure 58 is located in a room or structure that is pressurized to cause the air to flow.

In some embodiments, the devices that are being cooled are computer devices, storage devices and/or peripheral devices.

The configurations, such as those shown, allow for an enterprise that has computer devices very close to other computer devices. Accordingly, faster busses can be used because of the closer proximity.

In one embodiment, a high speed super computer is provided near the internal tube of the configuration illustrated in Figure 58, with storage devices and peripherals connected at a radial distance that is farther away from the internal tube.

In at least some embodiments, the warm air is captured and harvested for a particular purpose. By way of example, in some embodiments, the warm air comes from the computer devices and into the central tube. The warm air then travels down the central tube and is used to drive a turbine to generate energy that is supplied to the computer devices. In some embodiments, the energy generated is sufficient to power the computer devices of the enterprise. In other embodiments, the energy generated reduces the amount of energy that is needed to power the computer devices of the enterprise. In some embodiments, the captured warm air is used to heat or preheat water, or to provide a heat exchange. This reduces the amount of energy needed to provide hot water. In some embodiments, the captured warm air is used to provide heat for a particular purpose, such as to warm an environment or to melt snow. The diameter of the internal tube can be a factor in determining the velocity of the air flow. Additionally, pressure and the introduction of fuel into the warm air flow can also determine the needed velocity of the warm air flow. In some embodiments, the warm air flow drive stacked turbines. In some embodiments, the pitch of the blade is adjusted to create mechanical movement.

In at least some embodiments, a plethora of air inputs exist (through each of the computer devices) and one output exists (the central tube that gathers all of the warm air) in a structure that allows for the simultaneous cooling of a plurality of computer devices and/or other devices.

Thus, as discussed herein, embodiments of the present invention embrace systems and methods for providing a dynamically modular processing unit. In particular, embodiments of the present invention relate to providing a modular processing unit that is configured to be selectively oriented with one or more additional units in an enterprise. In at least some embodiments, a modular processing unit includes a non-peripheral based encasement, a cooling process (e.g., a thermodynamic convection cooling process, a forced air cooling process, and/or a liquid cooling process), an optimized layered printed circuit board configuration, optimized processing and memory ratios, and a dynamic back plane that provides increased flexibility and support to peripherals and applications.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The present invention may be embodied in other

specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A computing enterprise comprising:

a plurality of computer devices coupled to an air flow structure such that all of the computer devices are simultaneously cooled by the air flow structure.

5

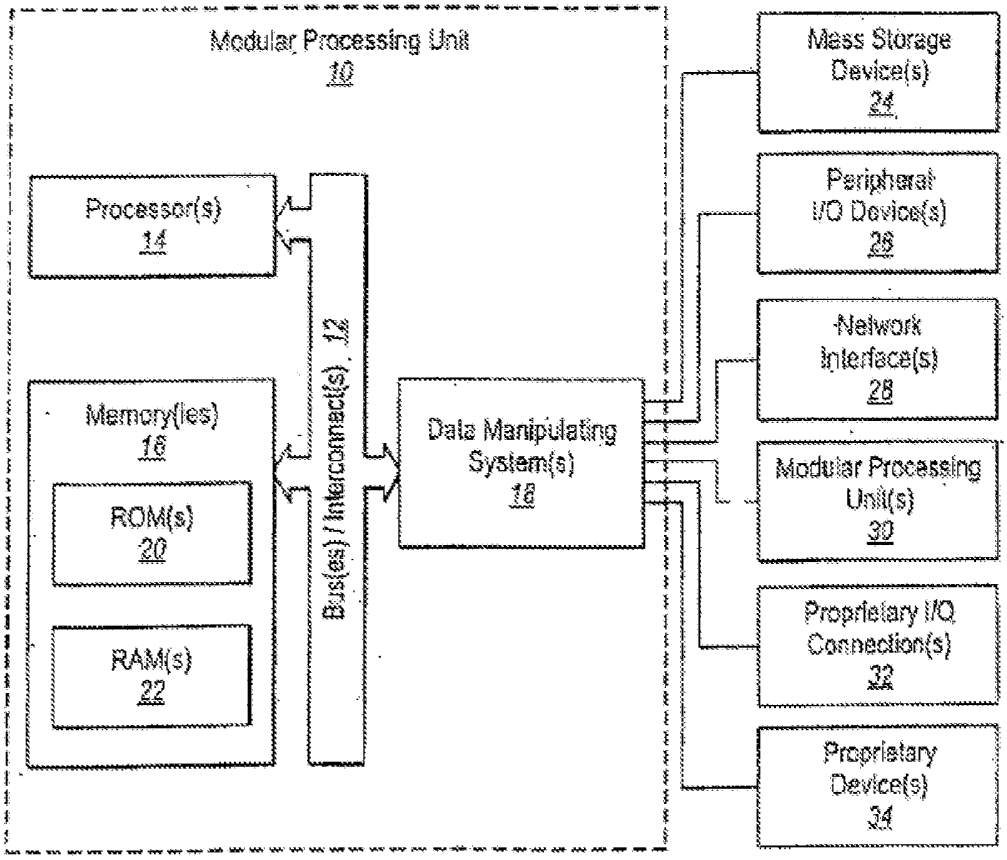
Modular Processing Unit
10
Processor(s)
14
Memory(ies)
16
ROM(s)
20
RAM(s)
22
Bus(es) / Interconnect(s) 12
Data Manipulating System(s)
18
Mass Storage Device(s)
24
Peripheral I/O Device(s)
26
Network Interface(s)
28
Modular Processing Unit(s)
30
Proprietary I/O Connection(s)
32
Proprietary Device(s)
34

FIG. 1

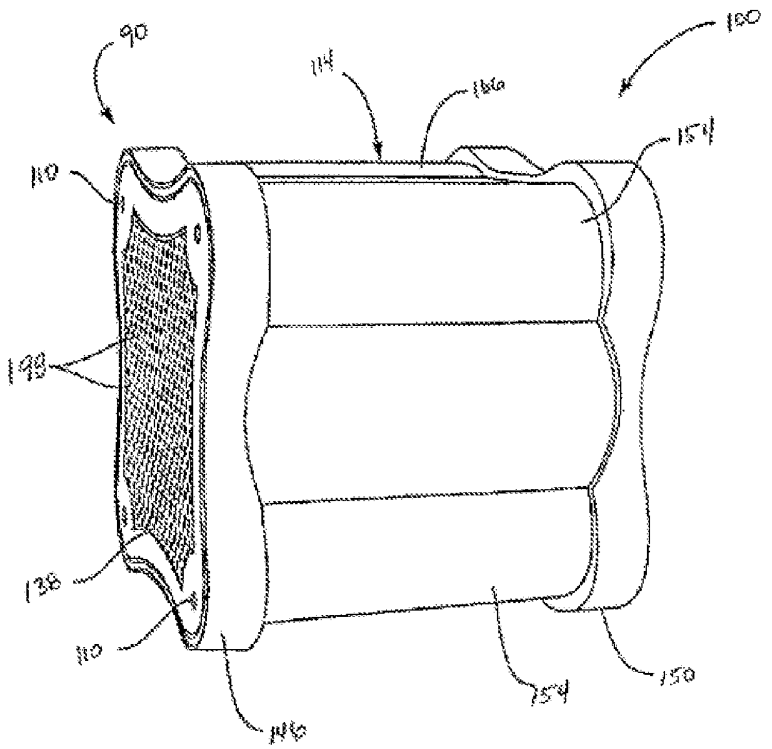

FIG. 2

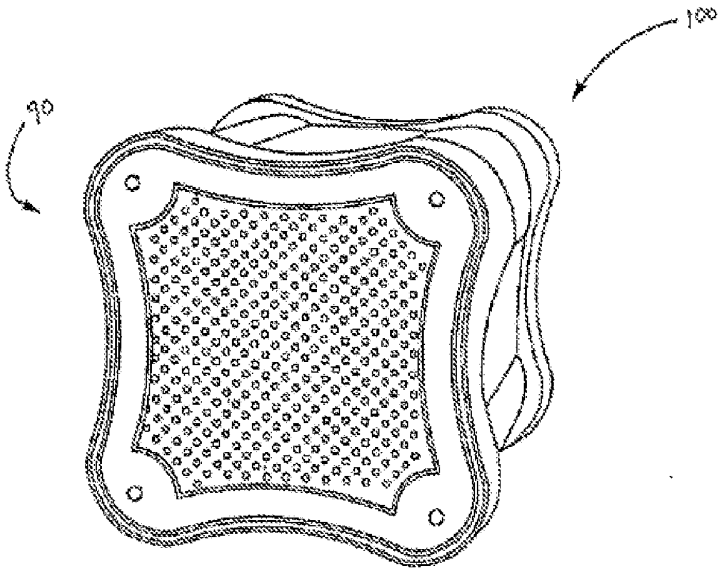

FIG. 3

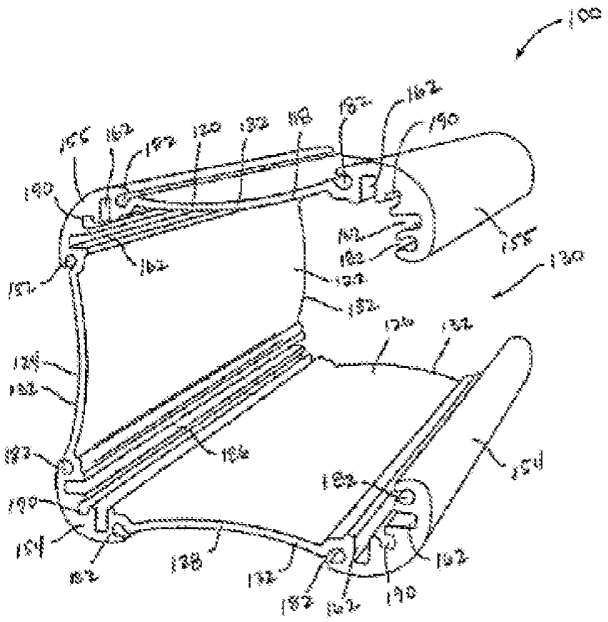

FIG. 4

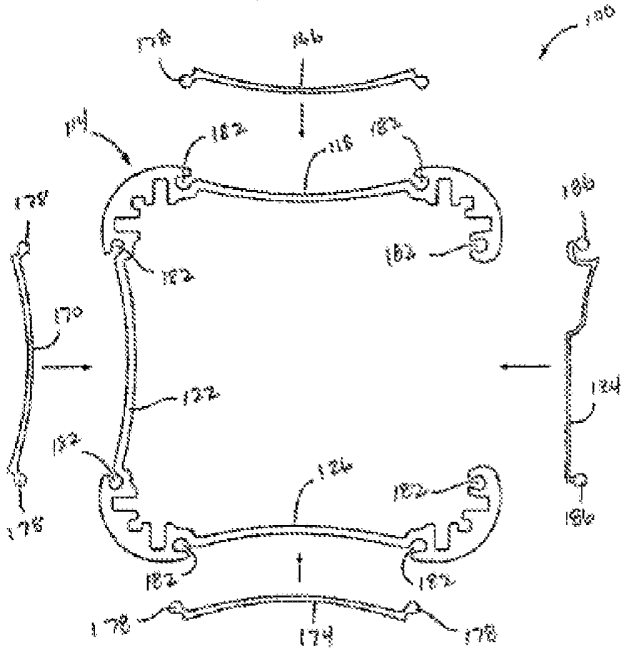

FIG. 5

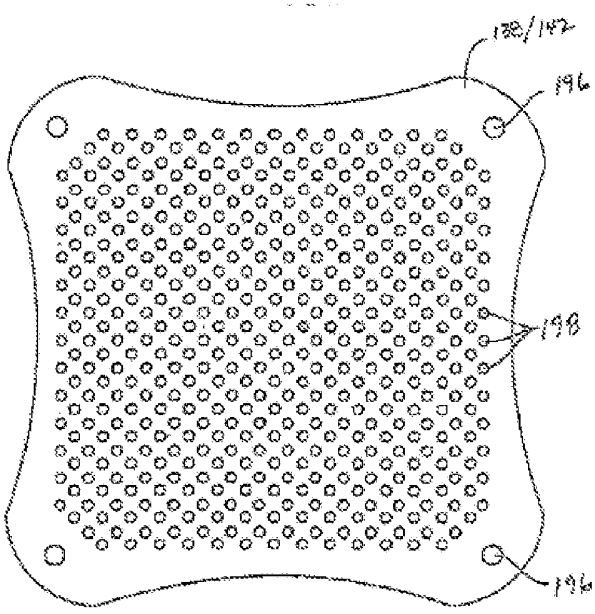

FIG. 6

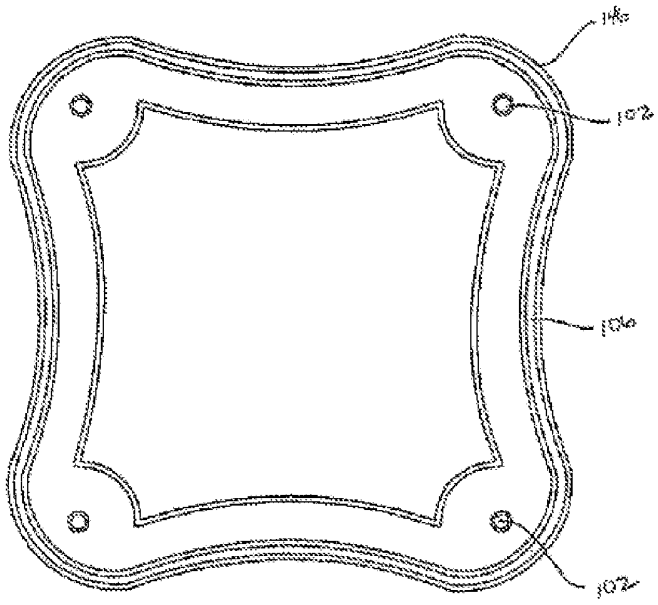

FIG. 7

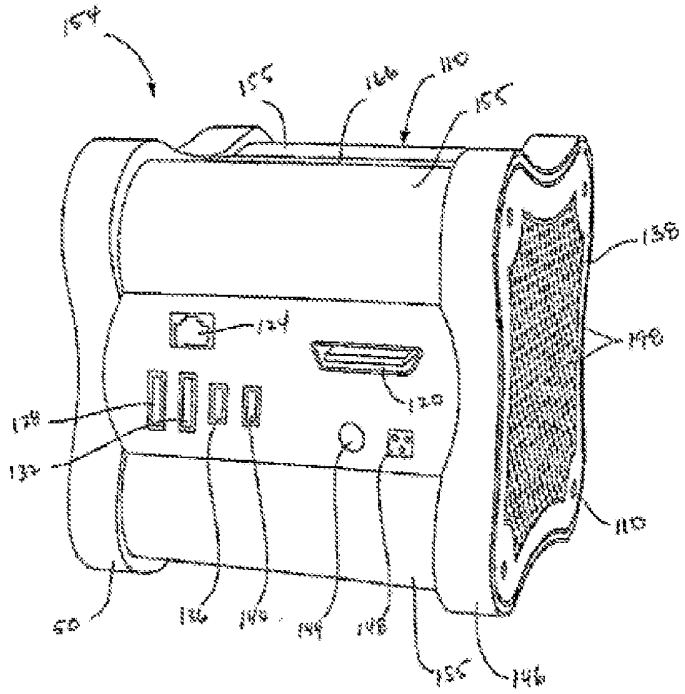

FIG. 8

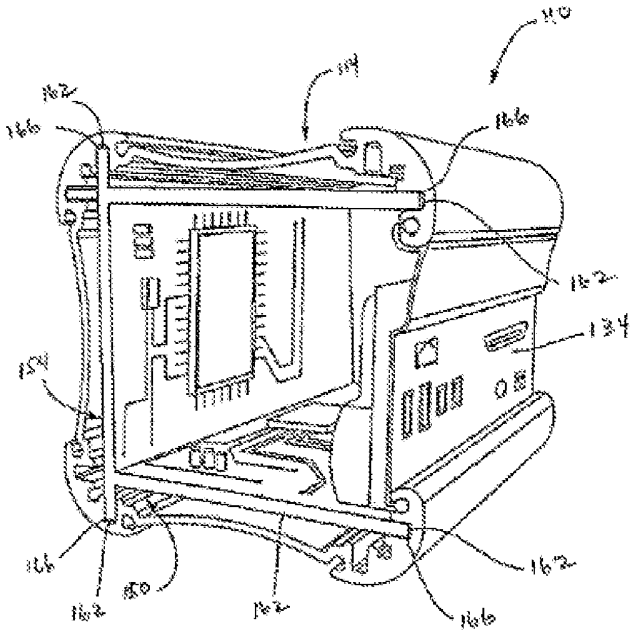

FIG. 9

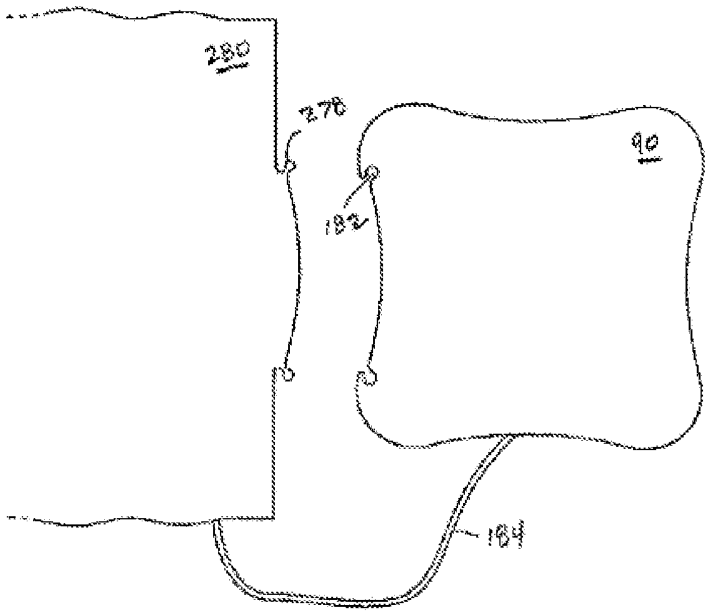

FIG. 10

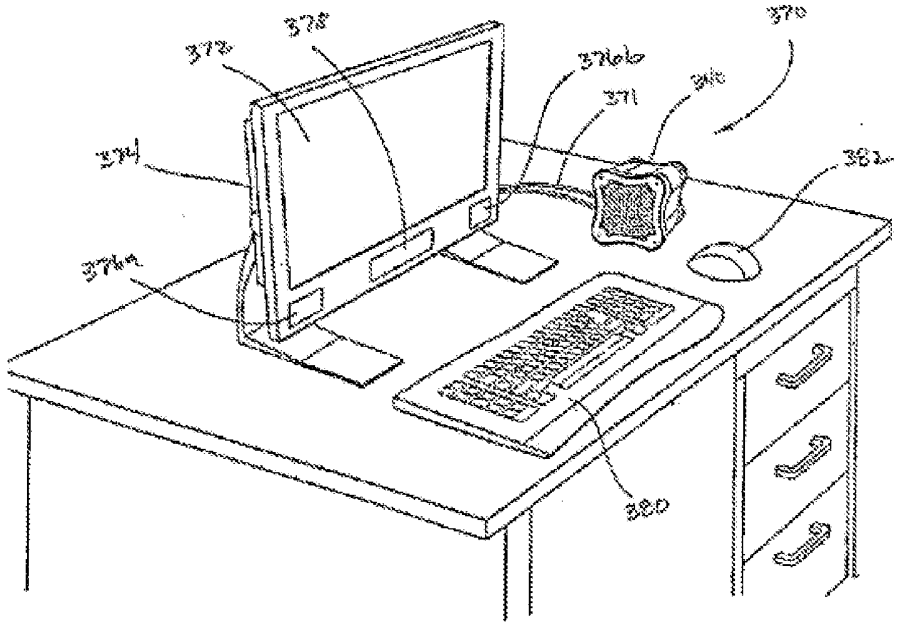

FIG. 11

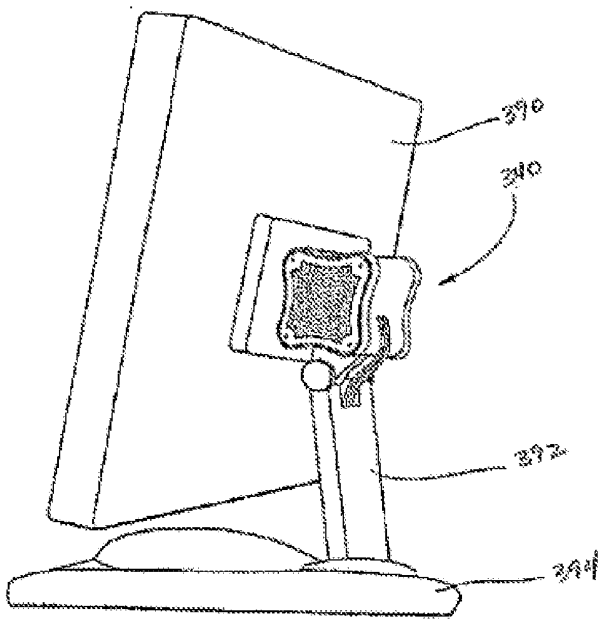

FIG. 12

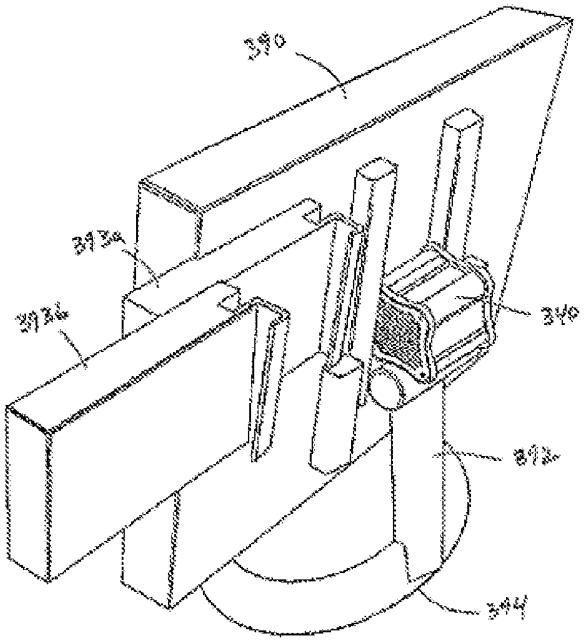

FIG. 13

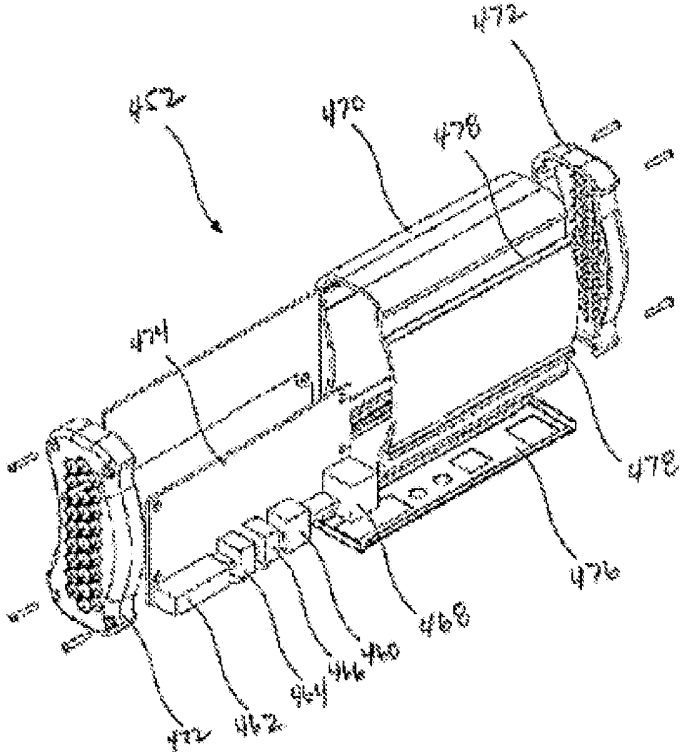

FIG. 14

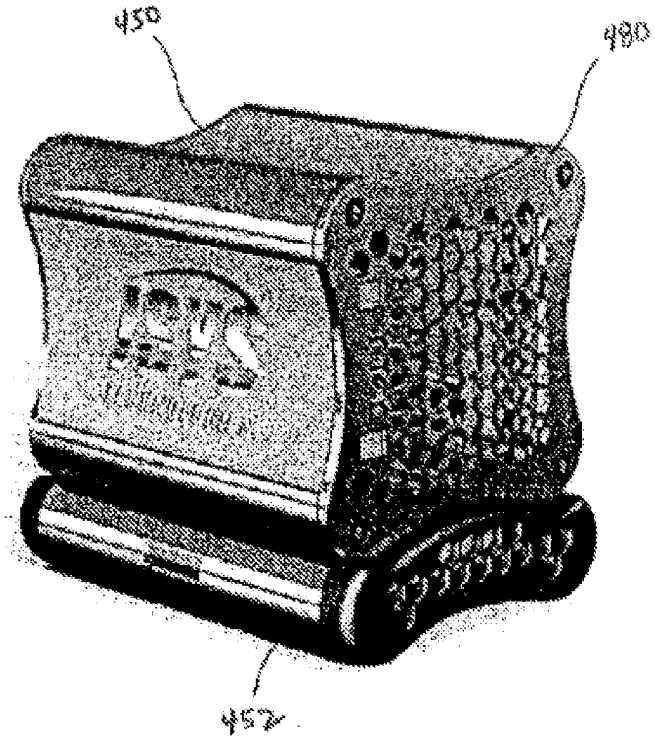

FIG. 15

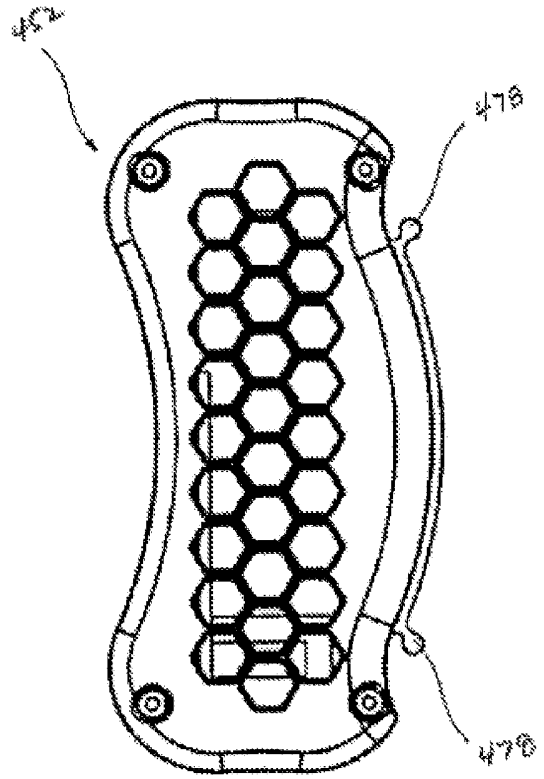

FIG. 16

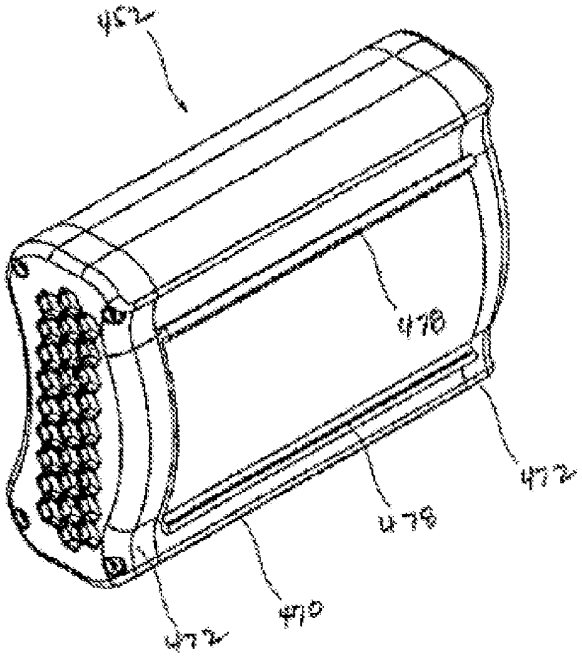

FIG. 17

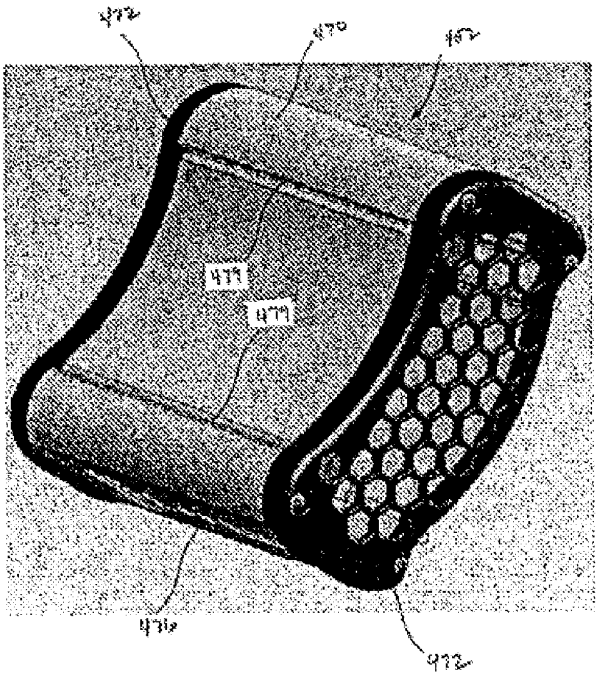

FIG. 18

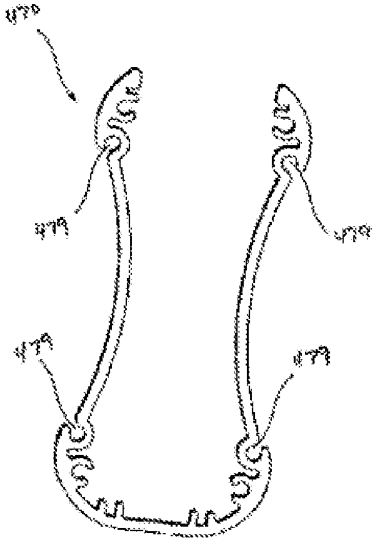

FIG. 19

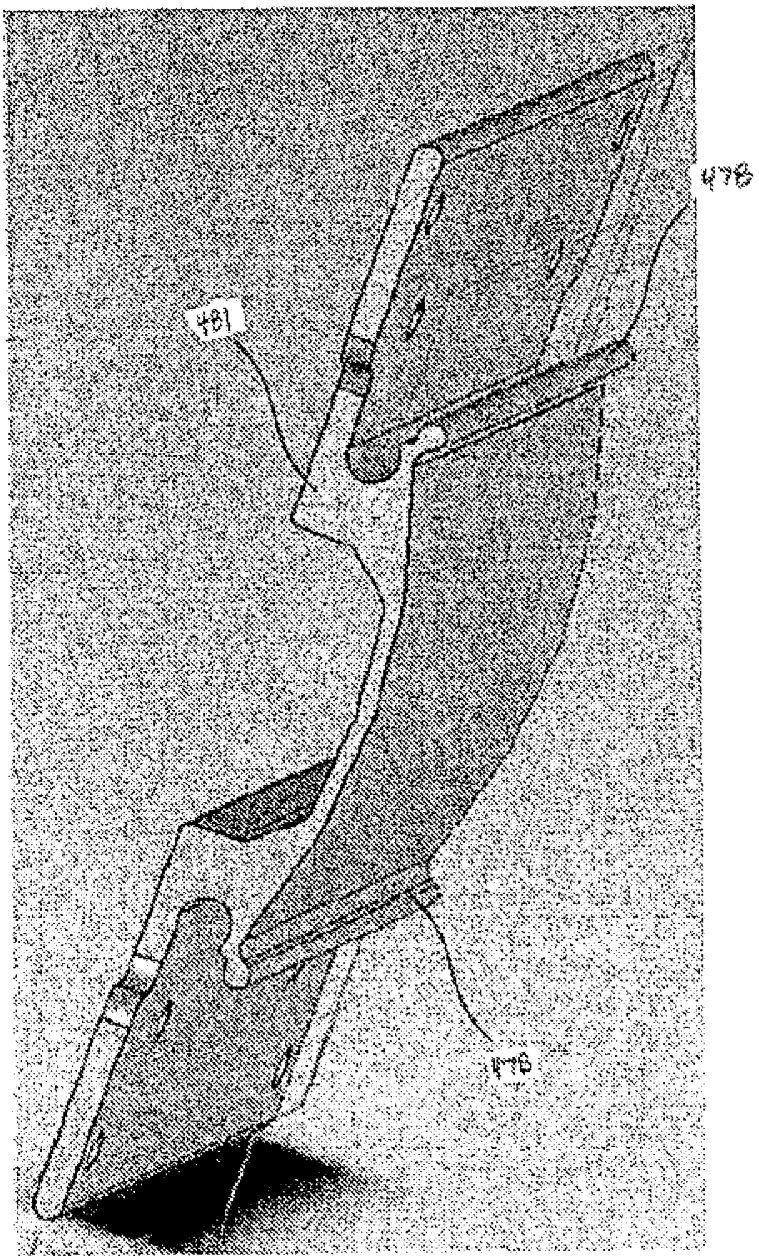

FIG. 20

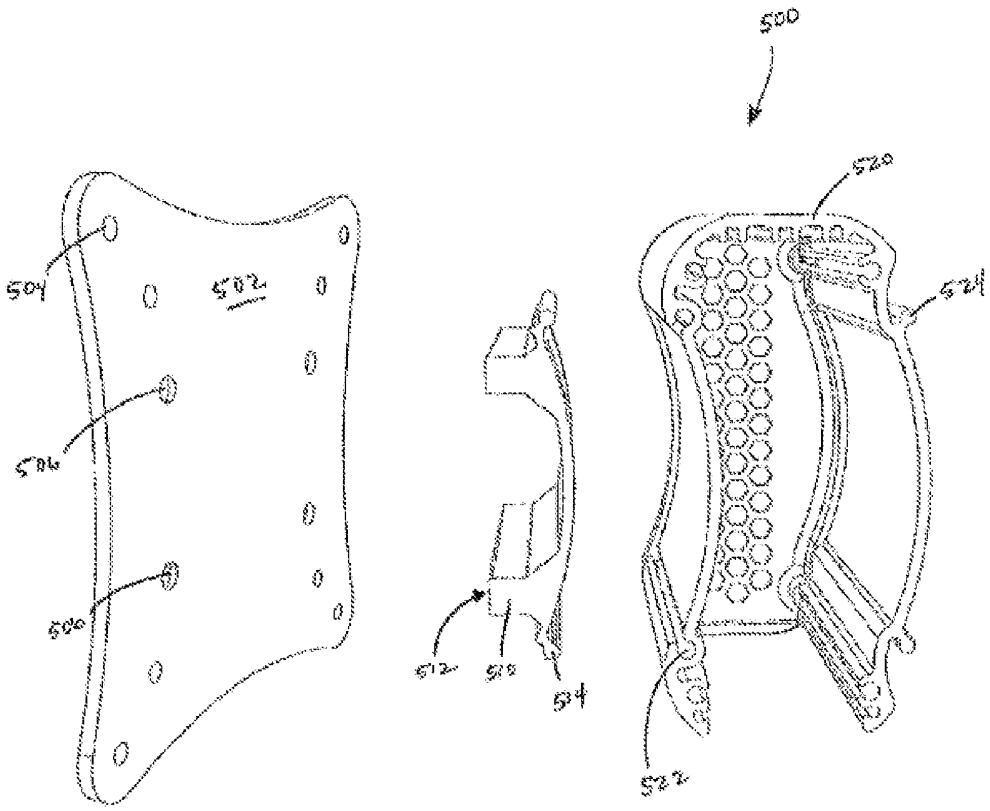

FIG. 21

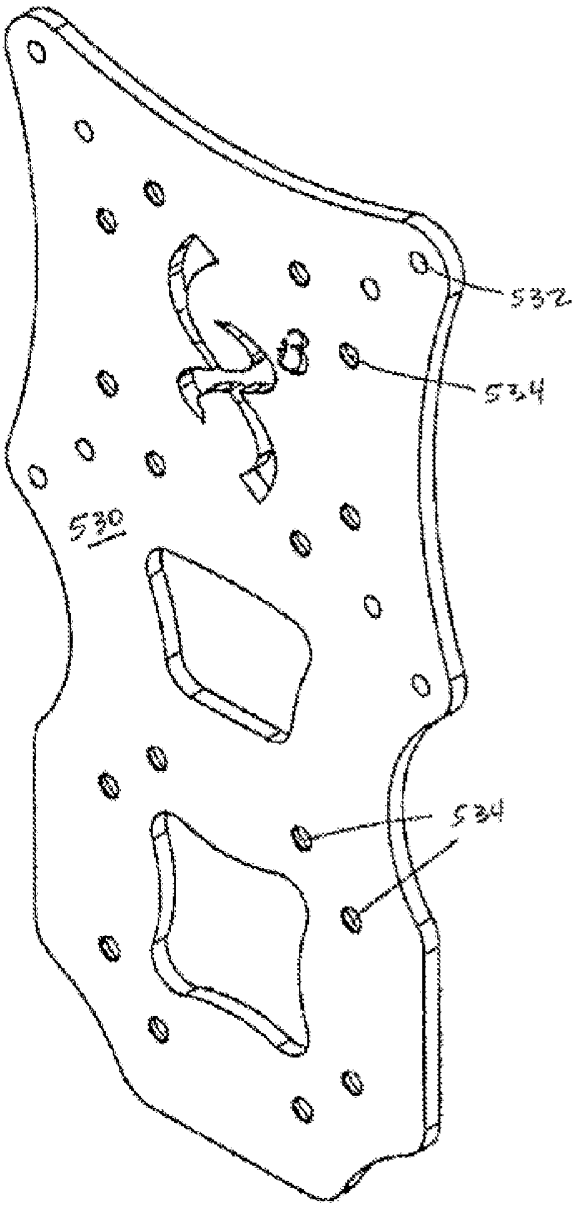

FIG. 22

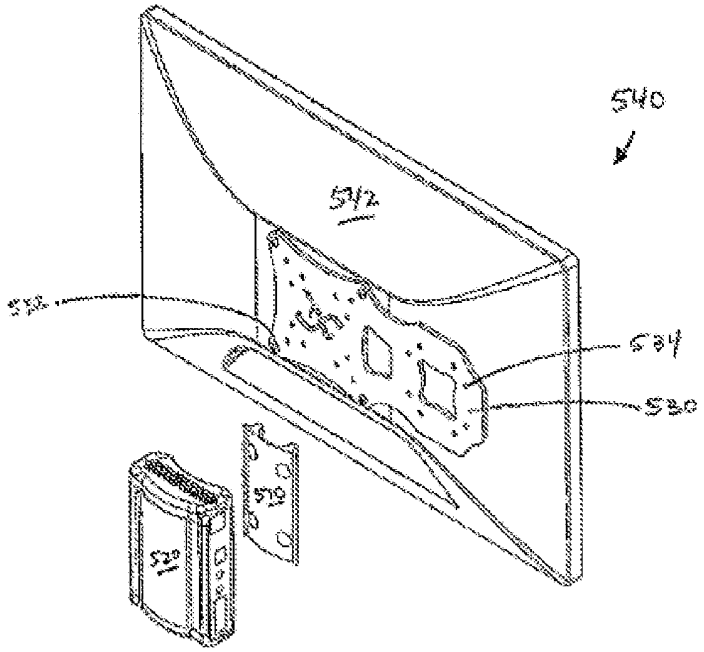

FIG. 23

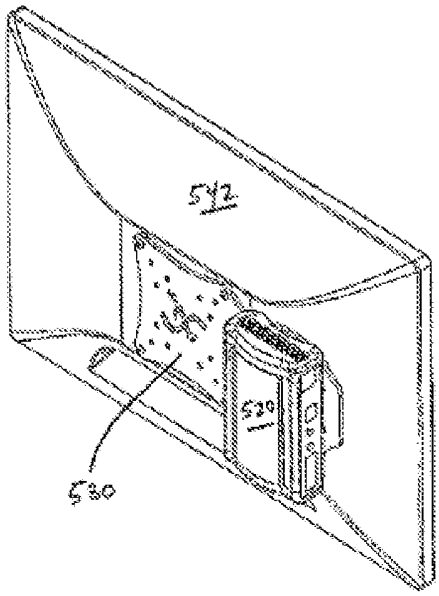

FIG. 24

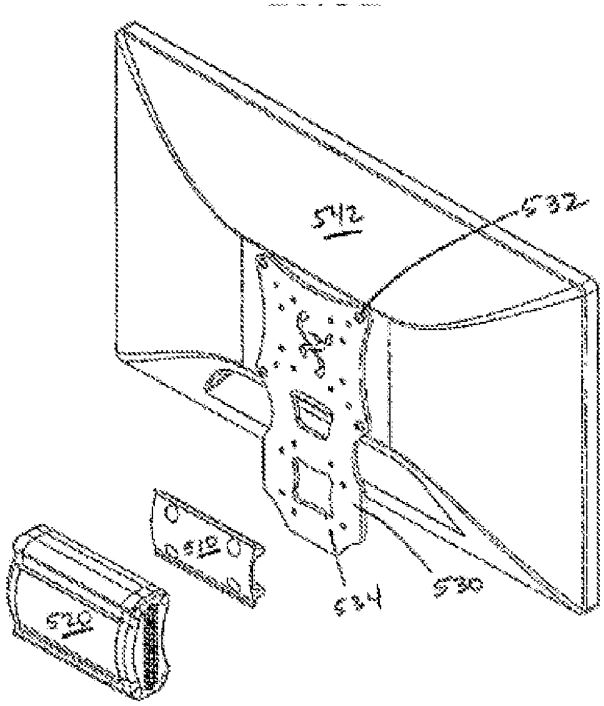

FIG. 25

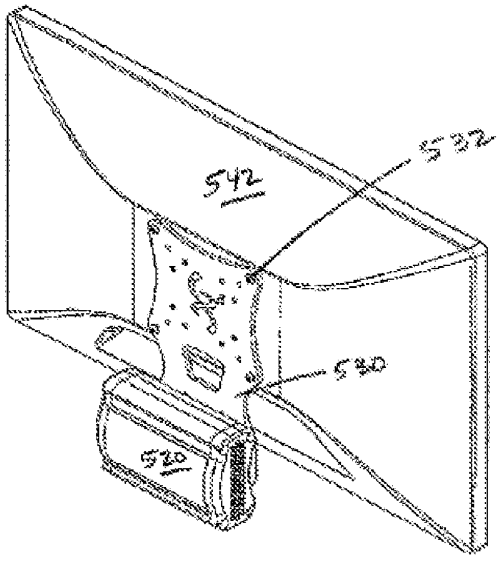

FIG. 26

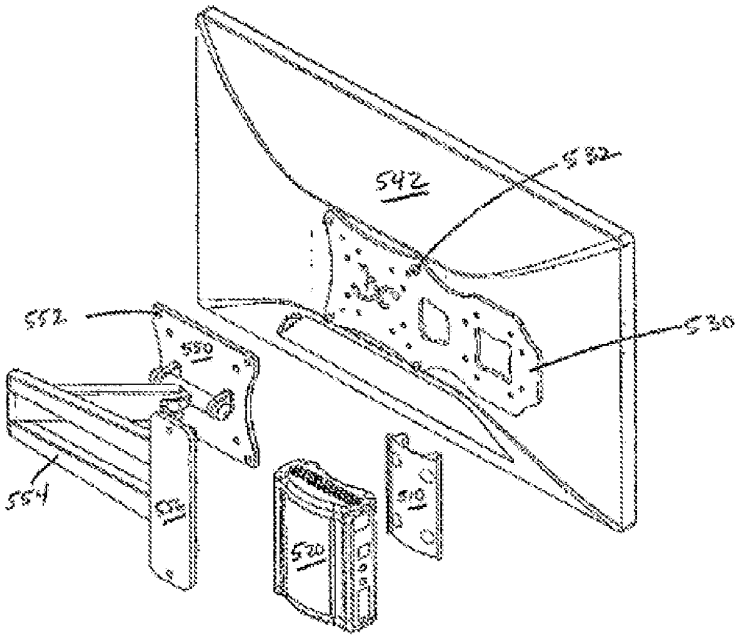

FIG. 27

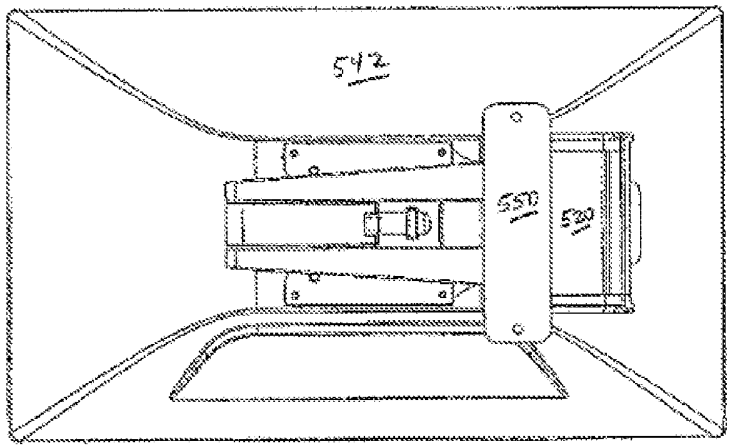

FIG. 28

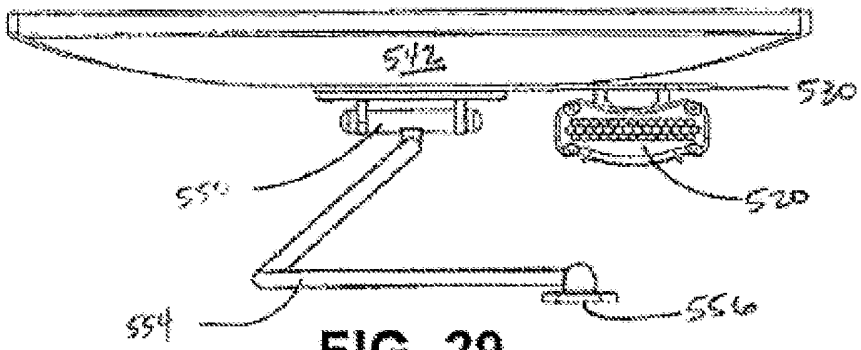

FIG. 29

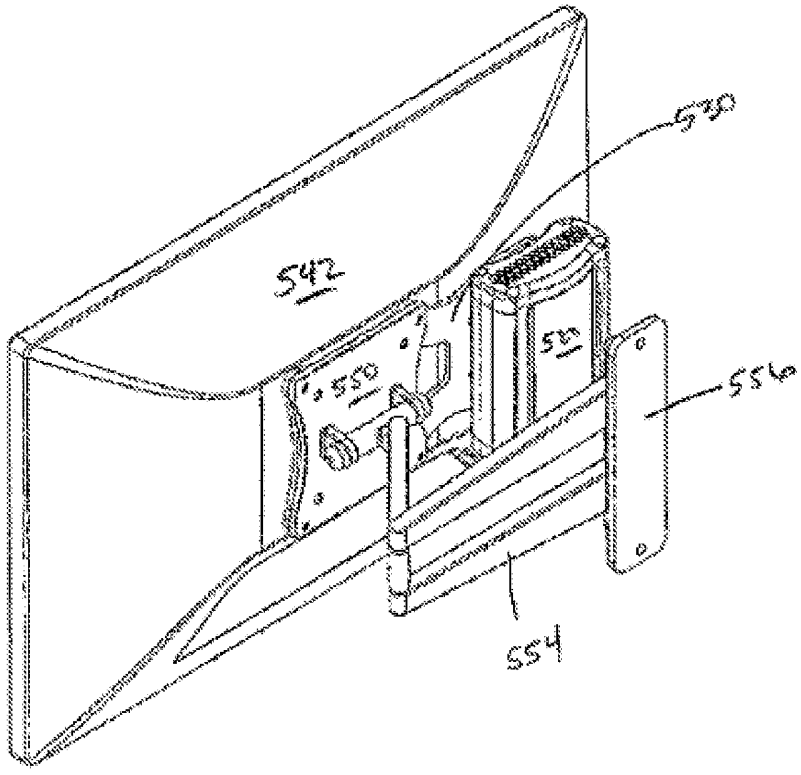

FIG. 30

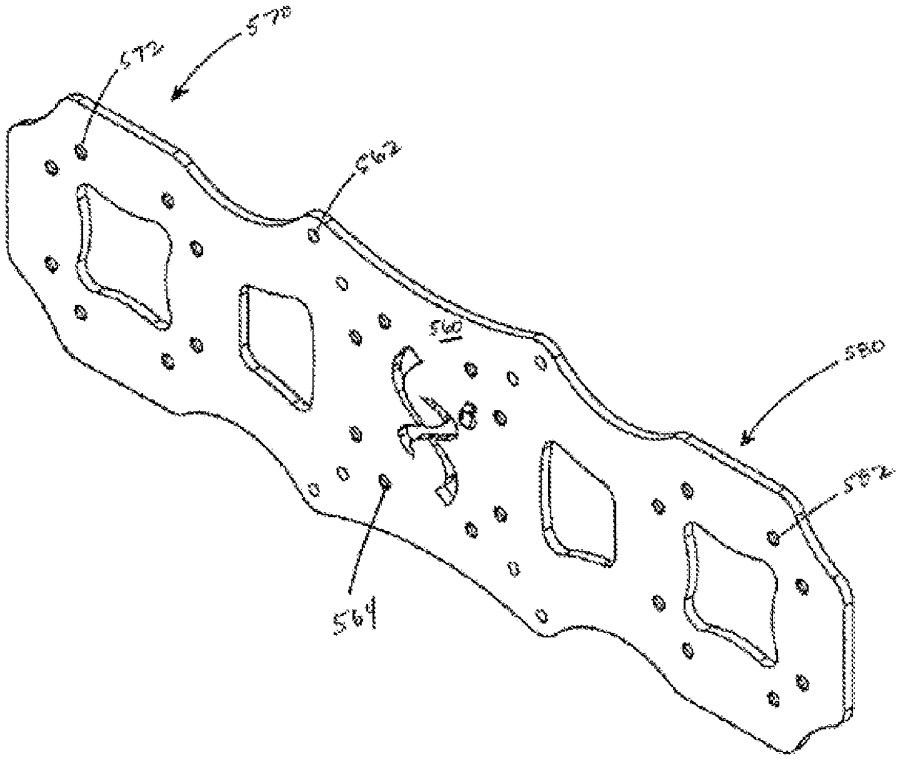

FIG. 31

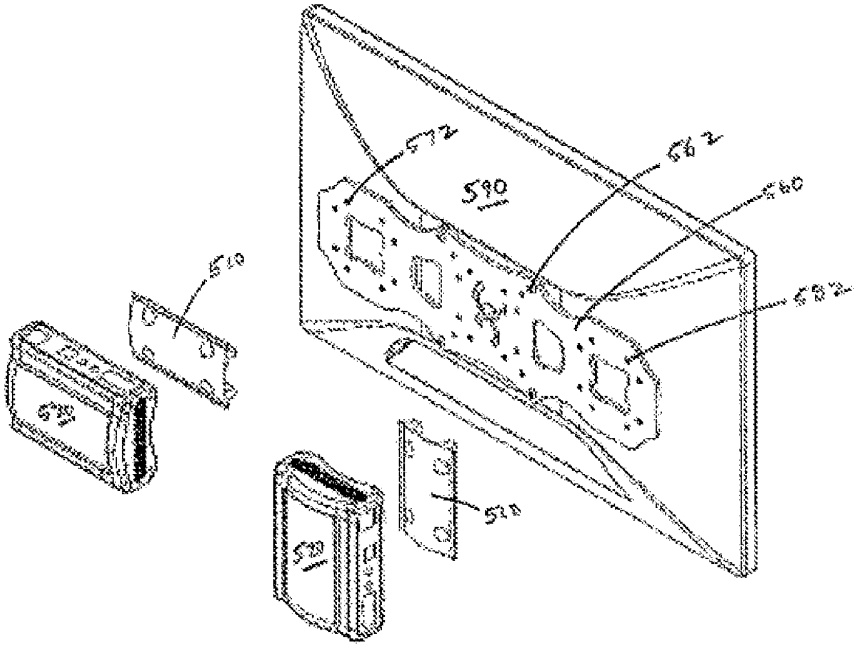

FIG. 32

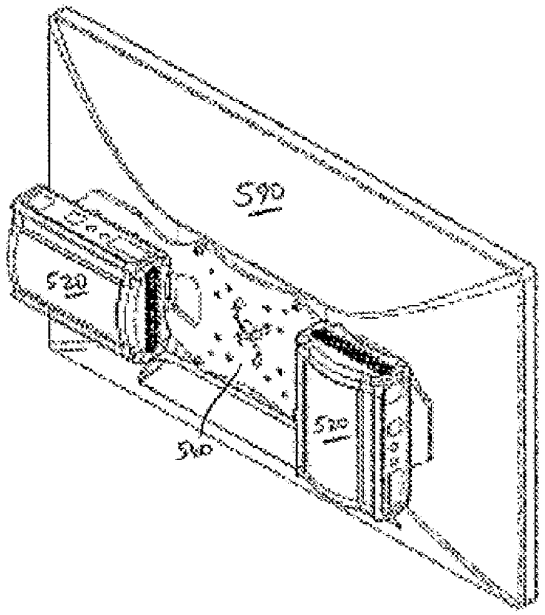

FIG. 33

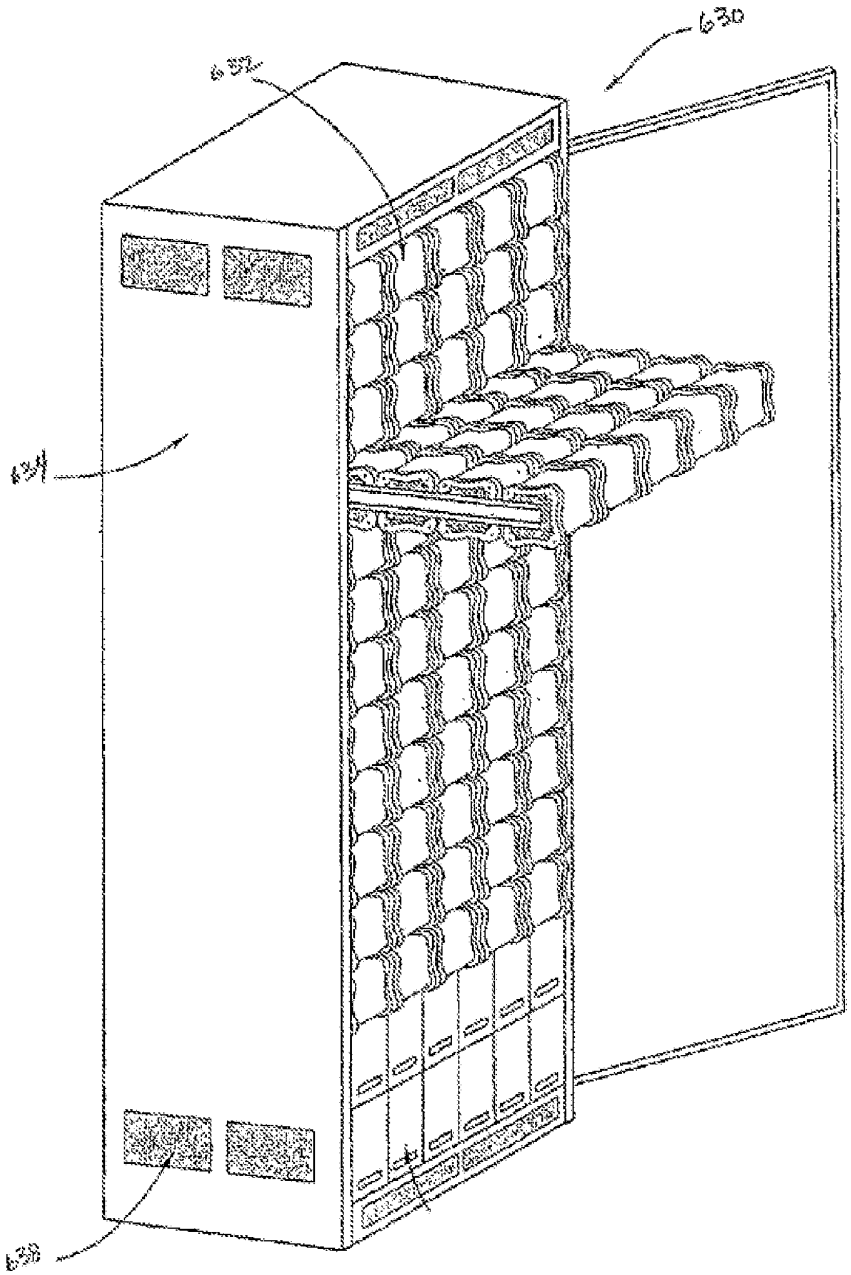

FIG. 34

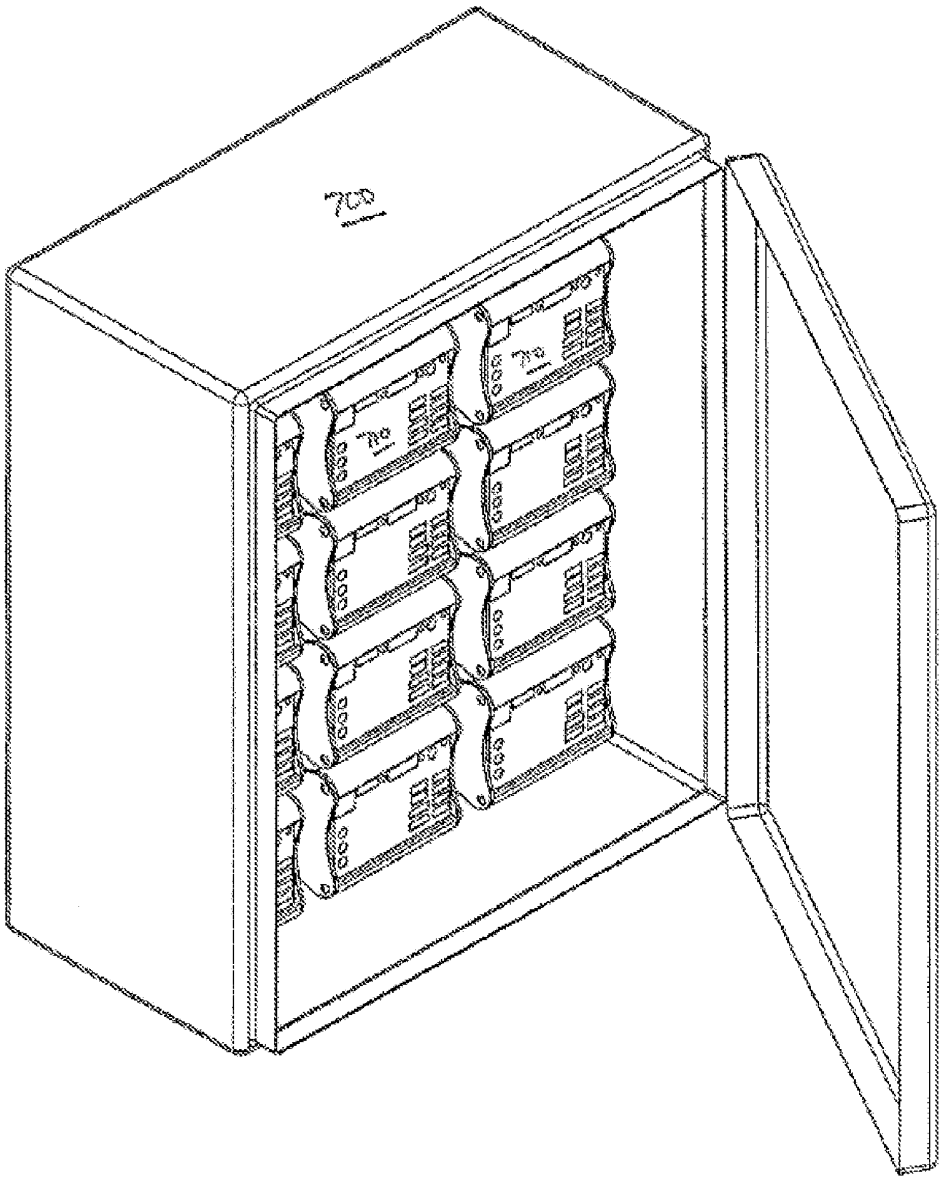

FIG. 35

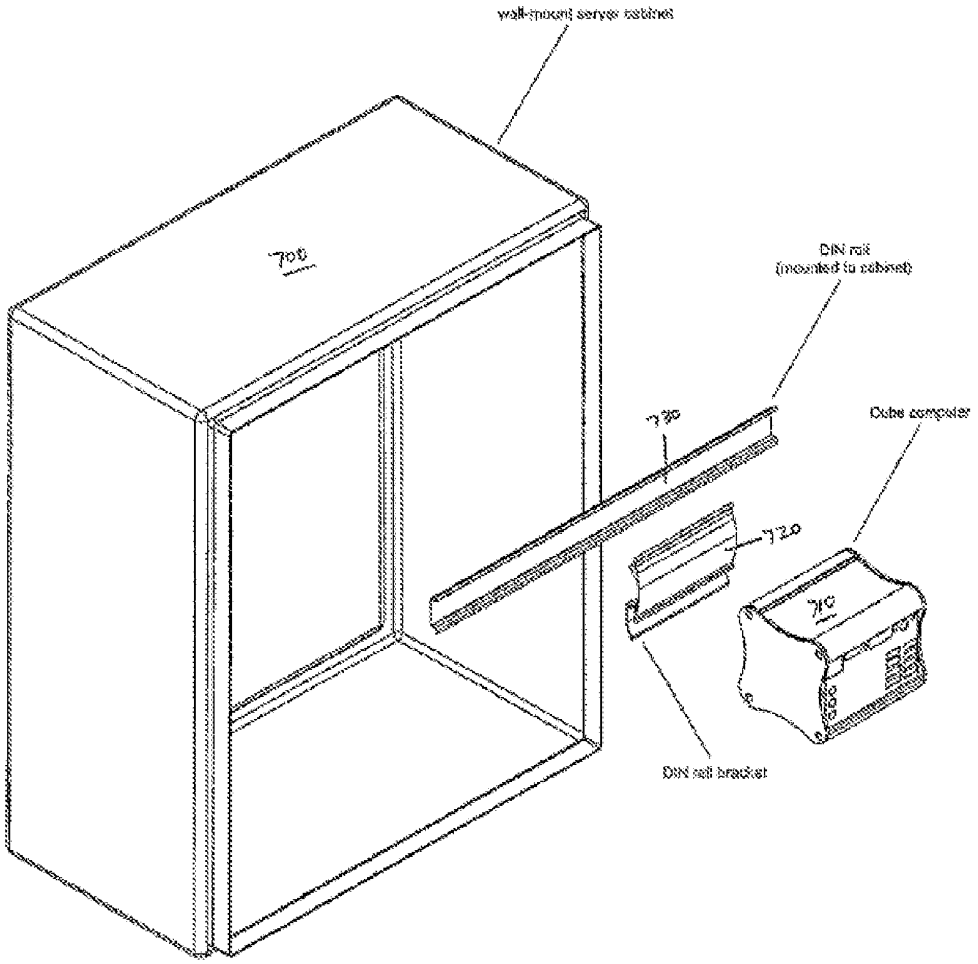
wall-mount server cabinet
708
DIN rail
(mounted to cabinet)
730
Cube computer
720
710
DIN rail bracket

FIG. 36

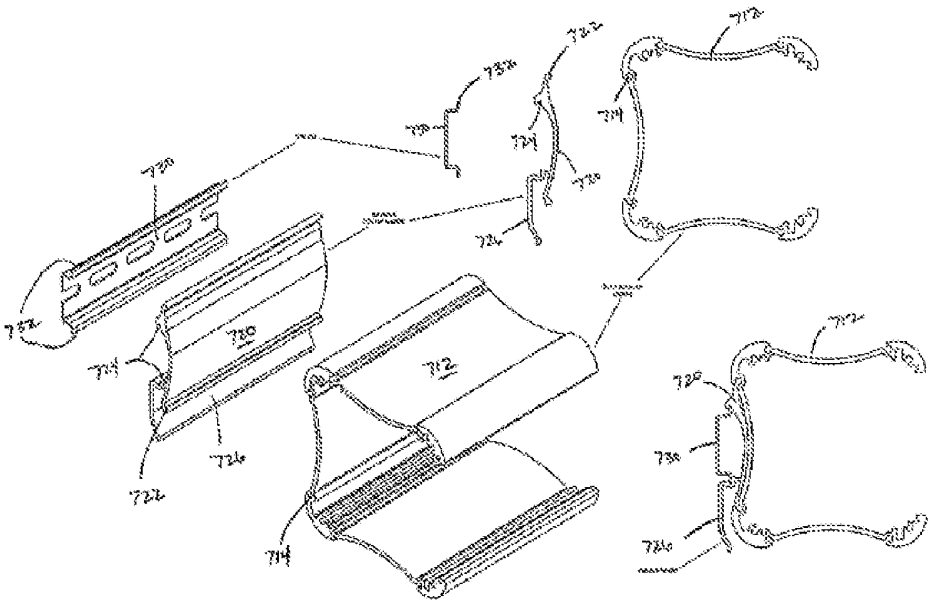

FIG. 37

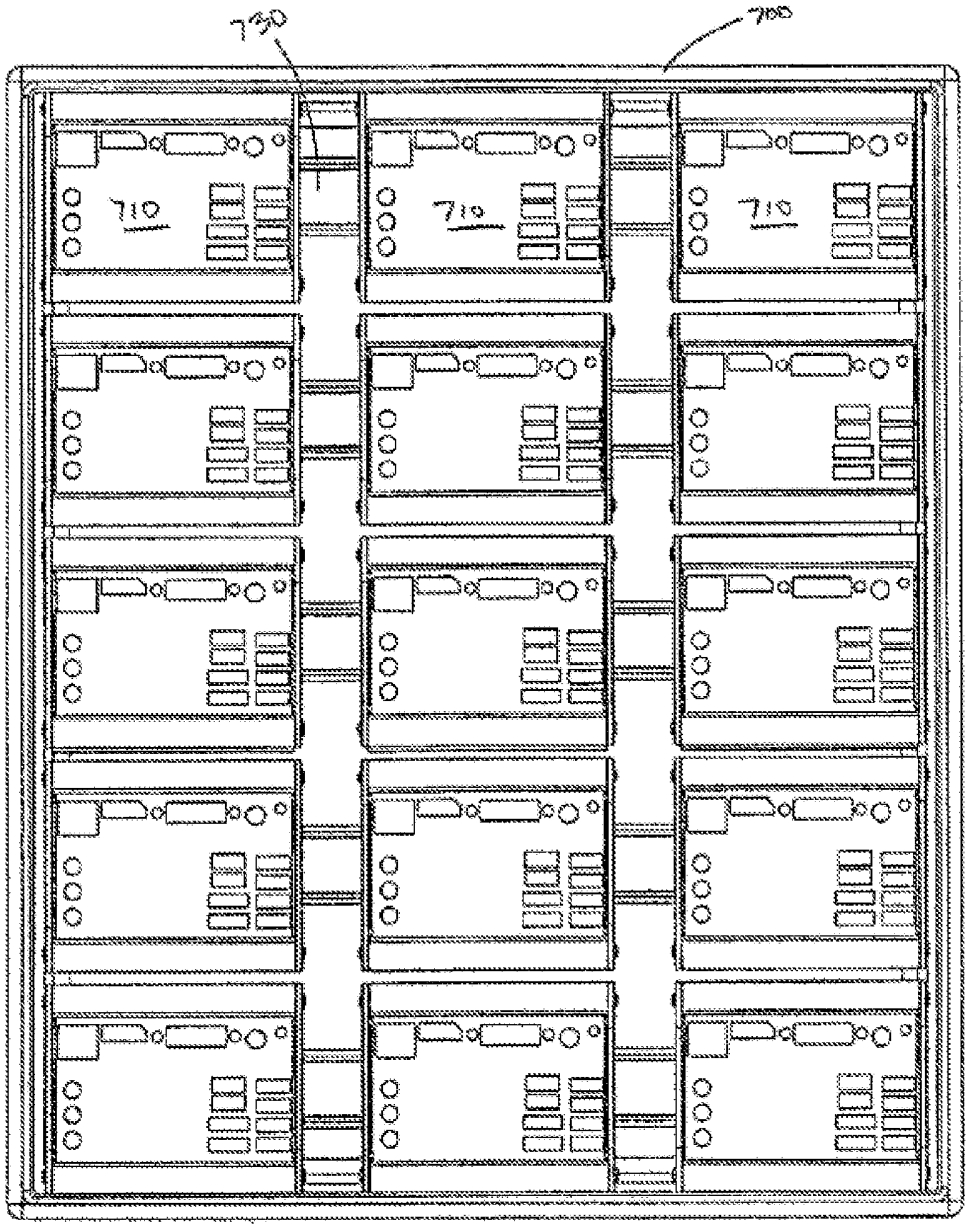

FIG. 38

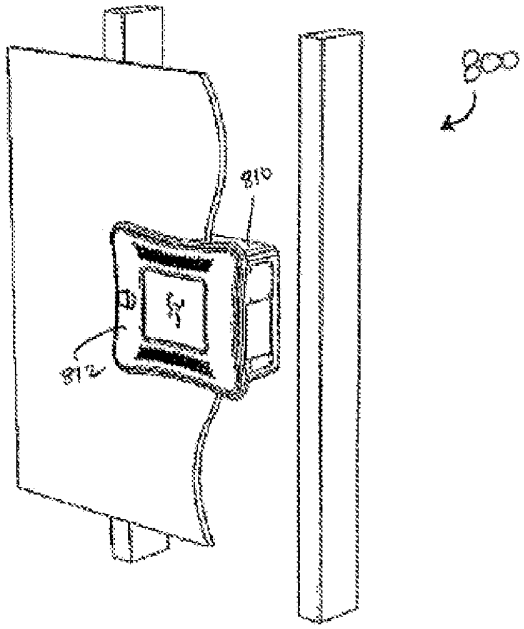

FIG. 39

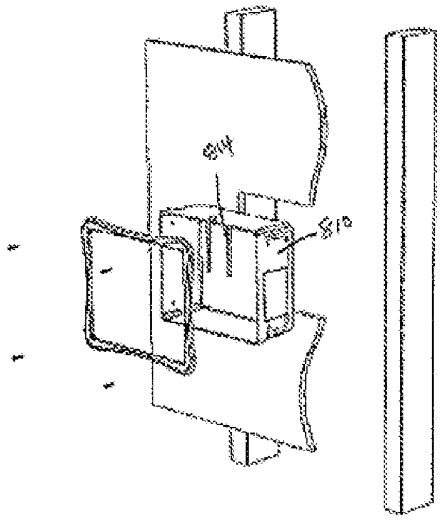

FIG. 40

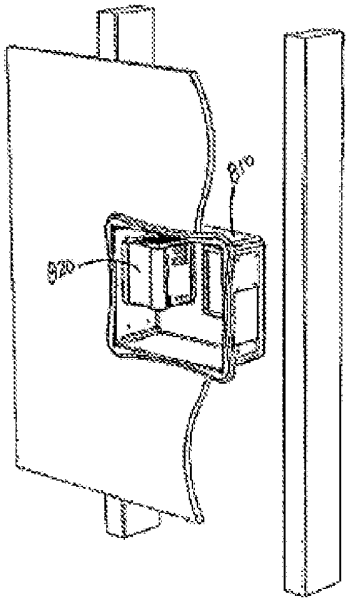

FIG. 41

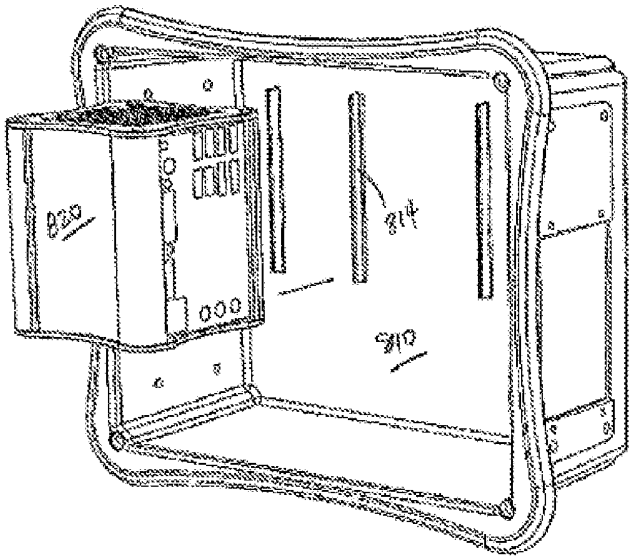

FIG. 42

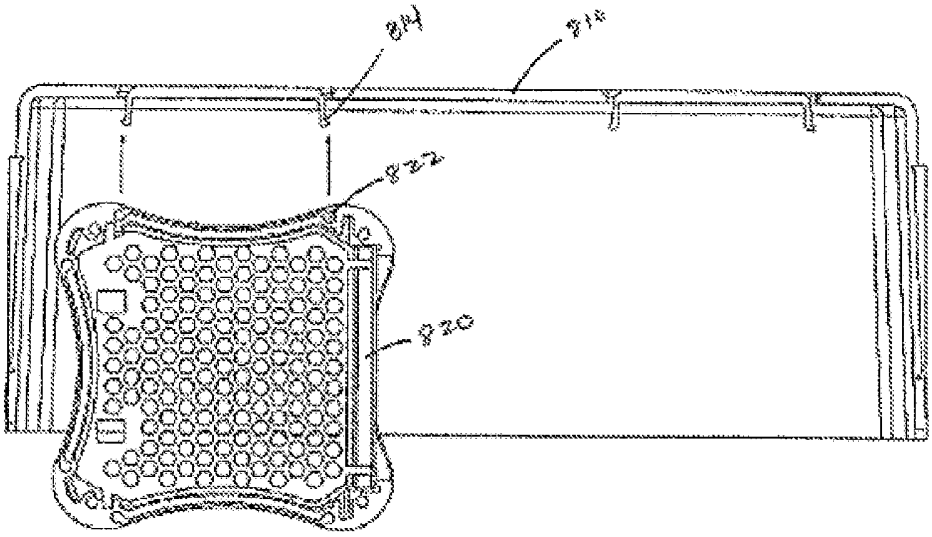

FIG. 43

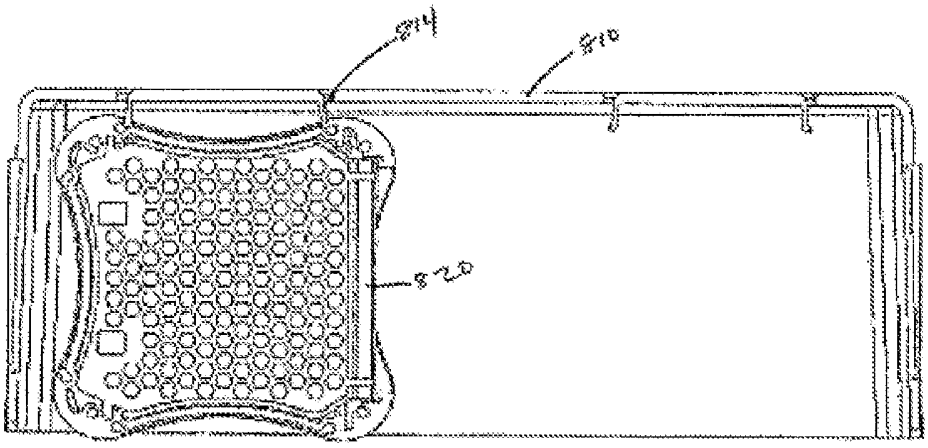

FIG. 44

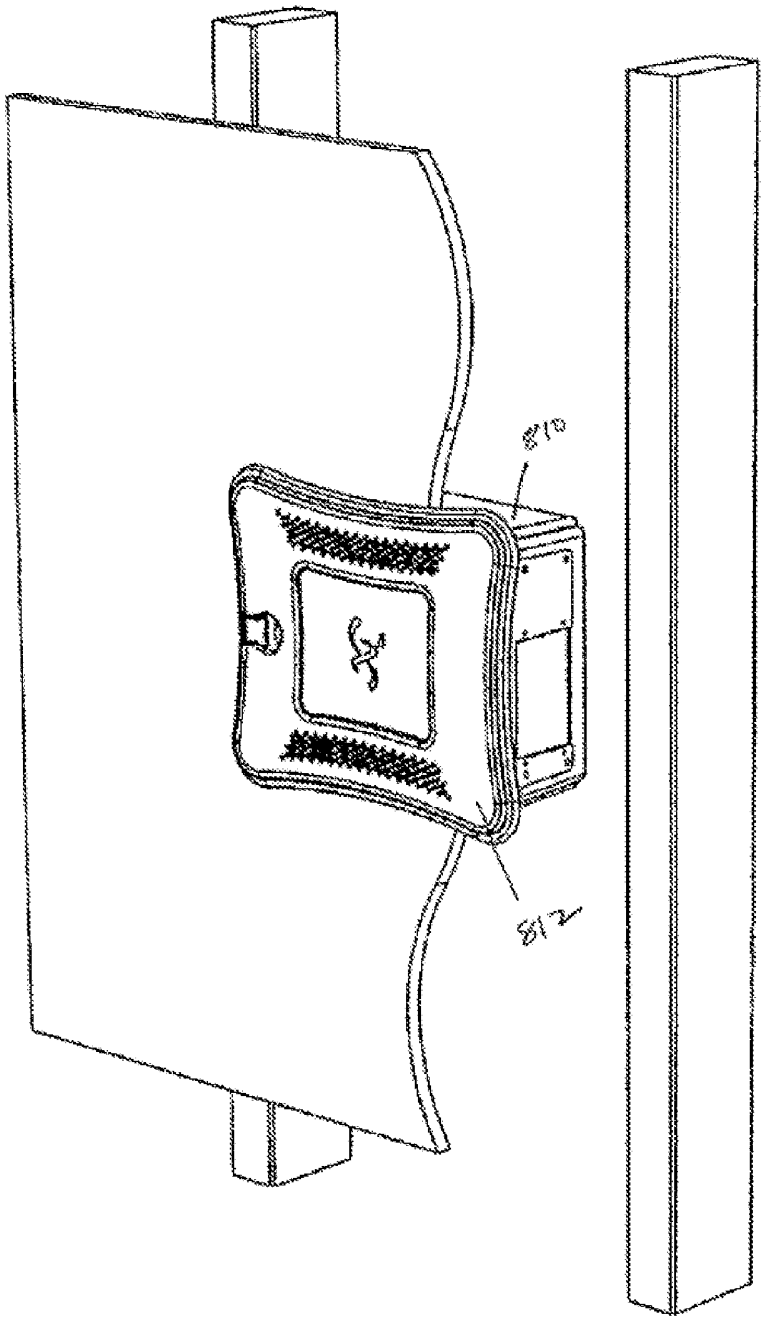

FIG. 45

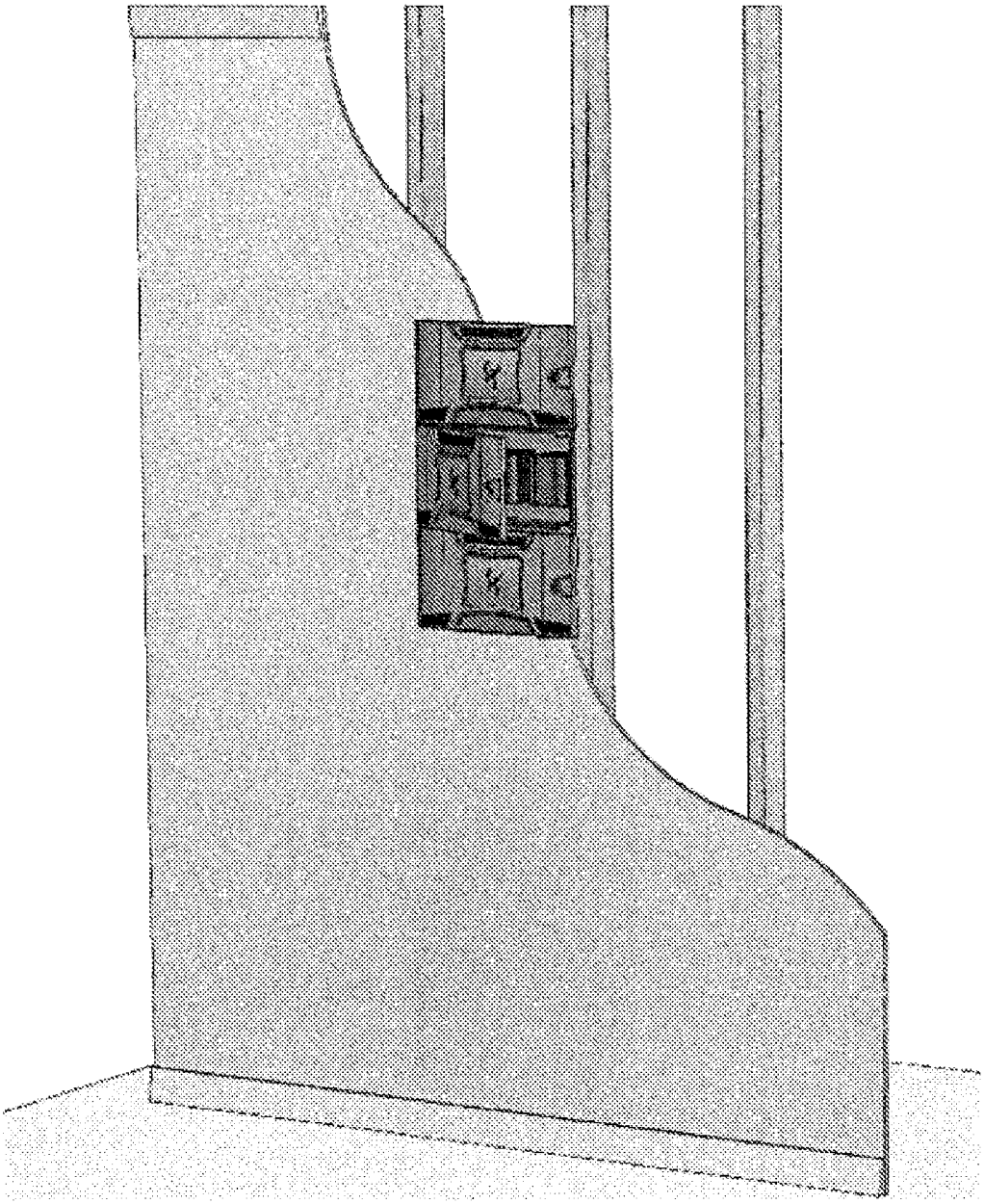

Fig. 46

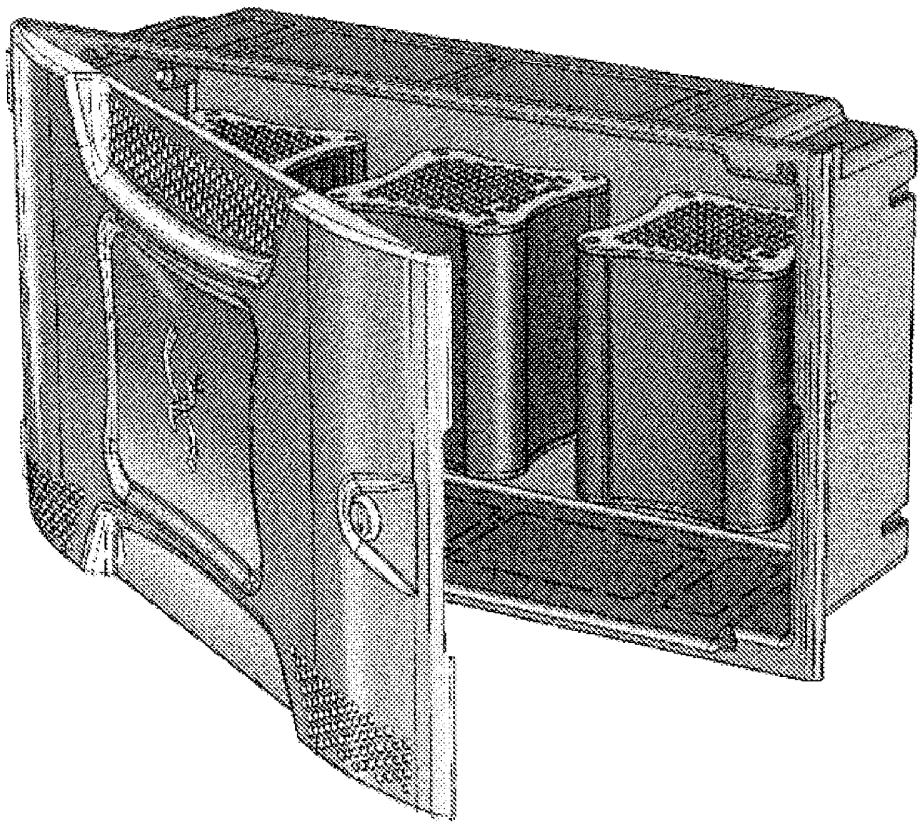

Fig. 47

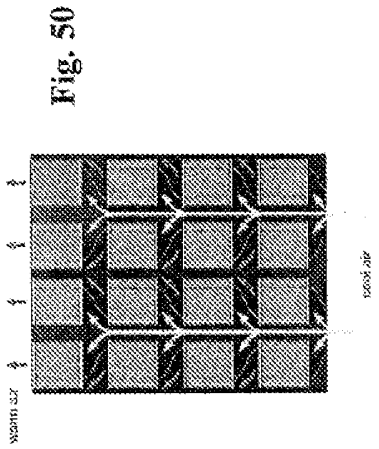

Fig. 50

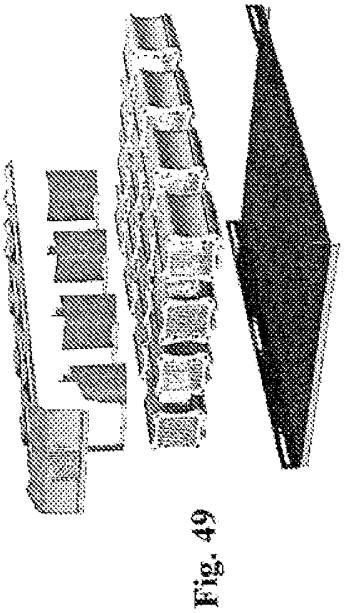

Fig. 49

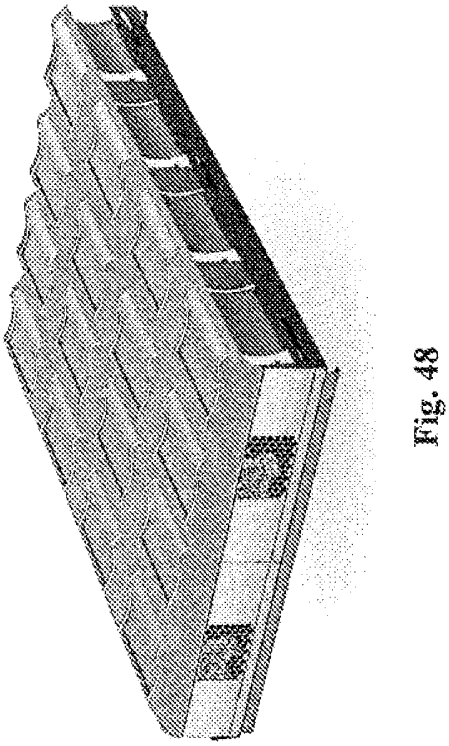

Fig. 48

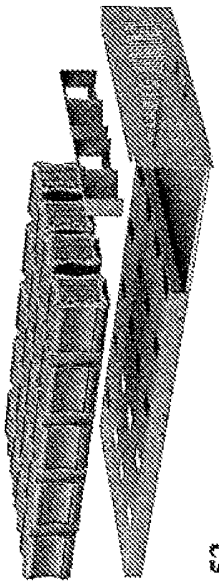

Fig. 52

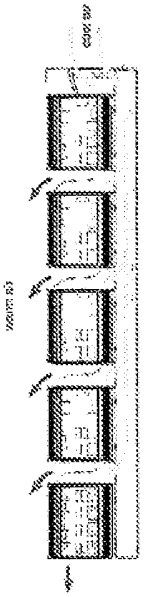

Fig. 53

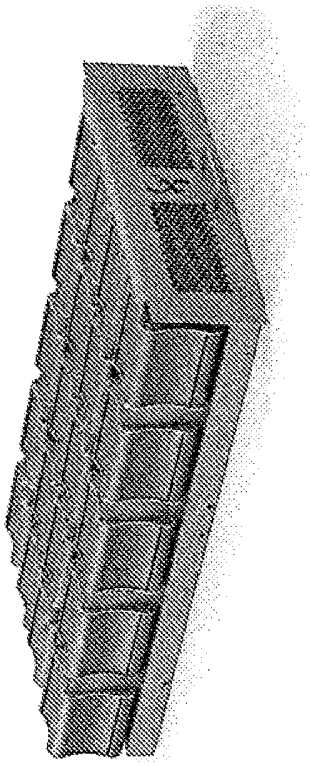

Fig. 51

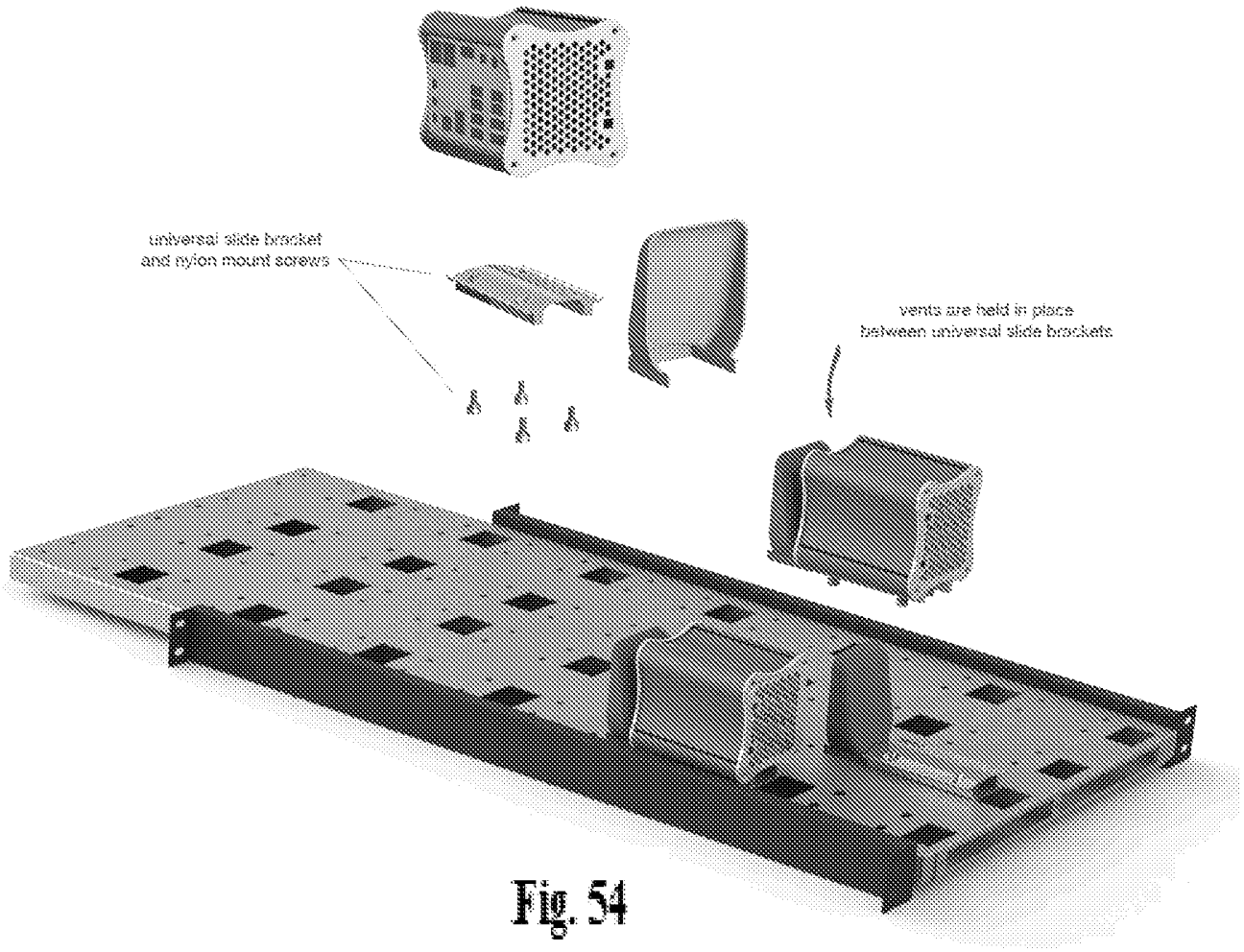
universal slide bracket
and nylon mount screws
vents are held in place
between universal slide brackets

Fig. 54

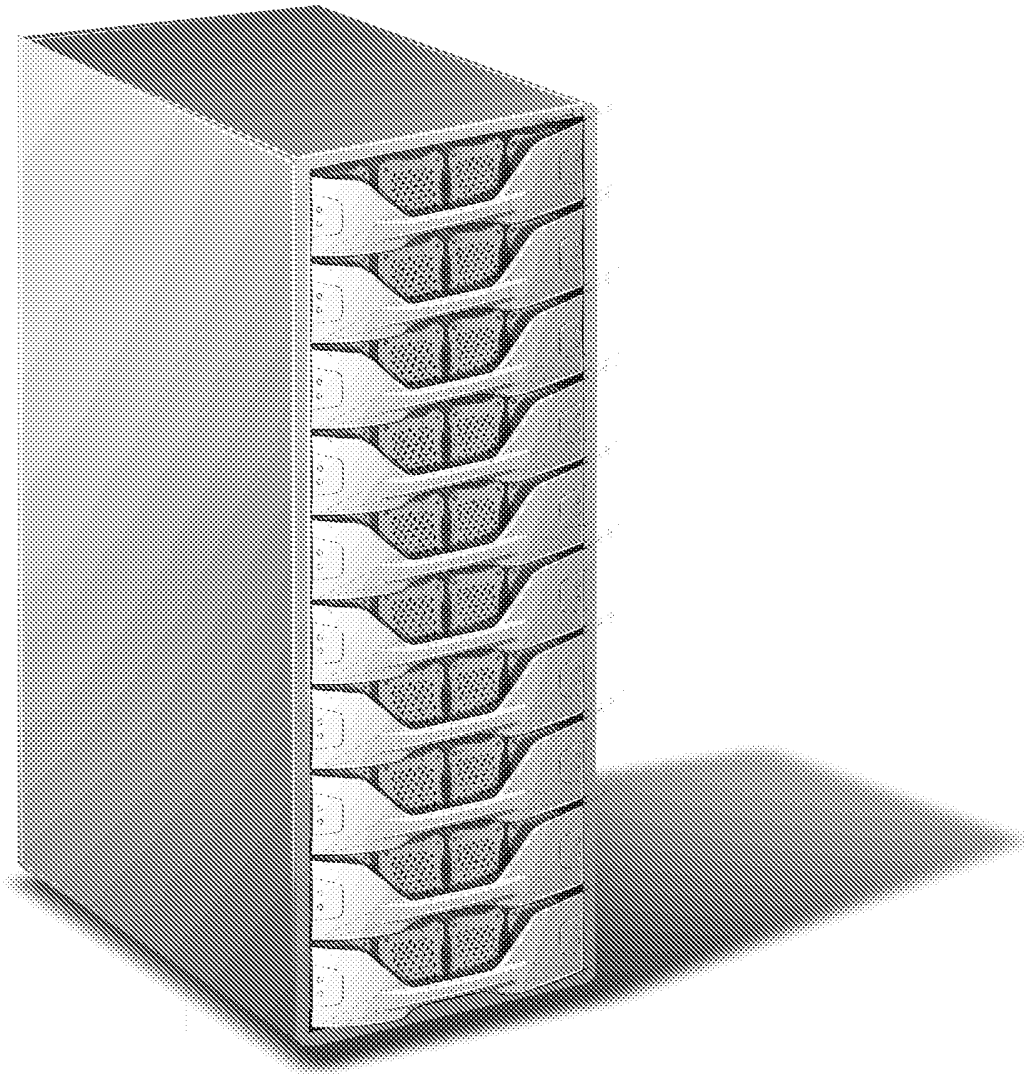

Fig. 55

Fig. 56

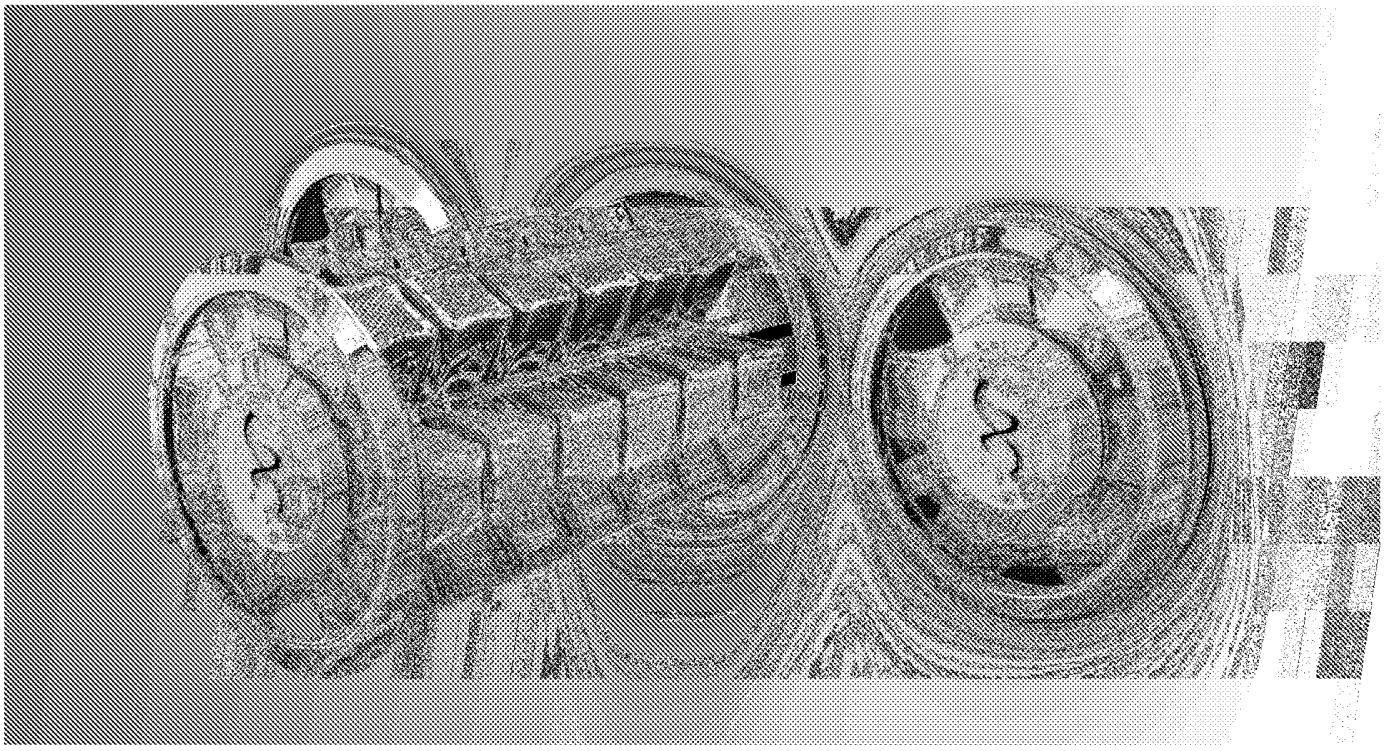

Fig. 57

37/37

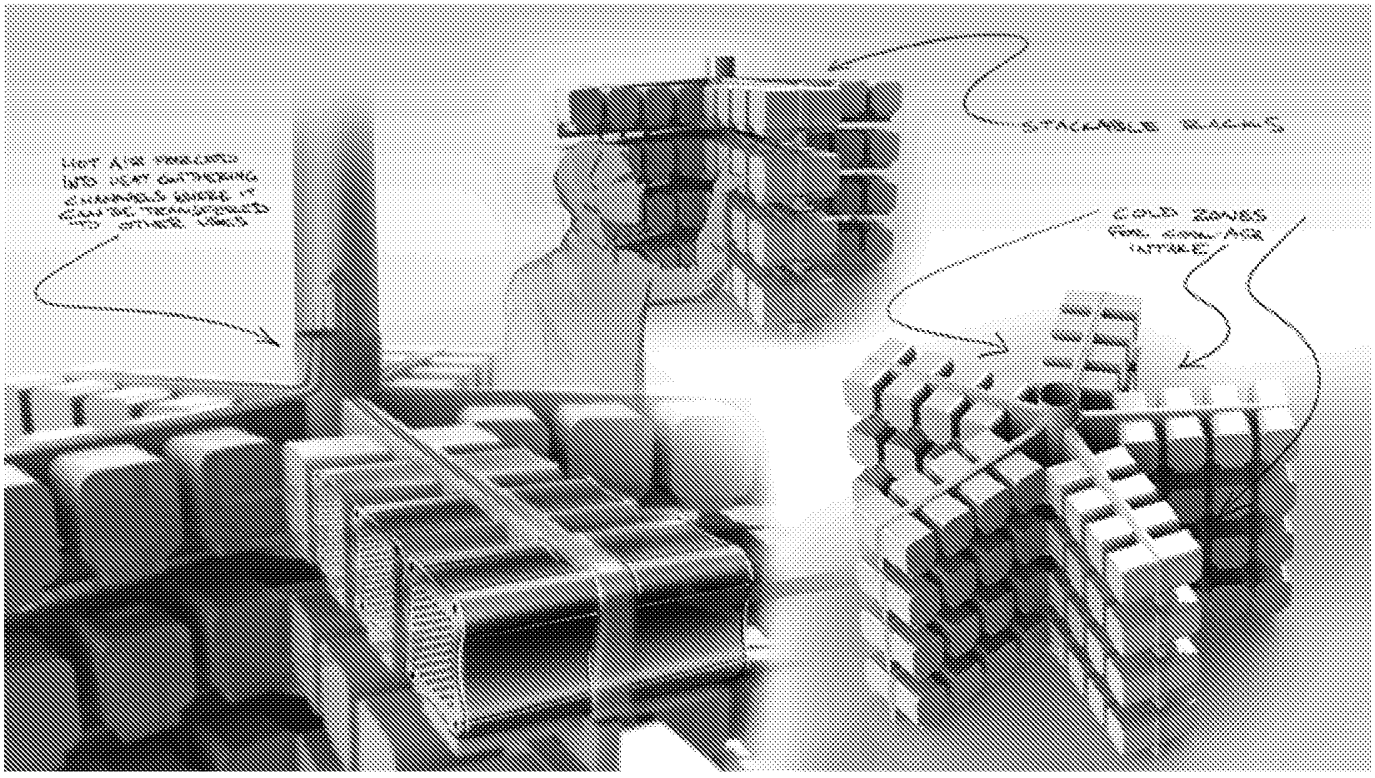

Fig. 58

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/064679

A. CLASSIFICATION OF SUBJECT MATTER

G06F 1/20(2006.01)i, G06F 1/16(2006.01)i, H05K 7/20(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F 1/20; F04D 1/00; H05K 7/20; G06F 17/60; G06F 1/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: air fan, tray, server blade, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02-07037 A1 (NEUTILITY CORPORATION) 24 January 2002 See page 14, lines 14-34; and figures 6-7.	1
A	US 2010-0129208 A1 (CHEN, HUNG-JEN et al.) 27 May 2010 See paragraph [0029] and figure 2.	1
A	US 6714411 B2 (THOMPSON, DANIEL T. et al.) 30 March 2004 See column 2, line 67 - column 3, line 9; claim 1; and figures 1-2.	1
A	US 2006-0256522 A1 (WEI, WEN et al.) 16 November 2006 See paragraphs [0015]-[0017]; claim 1; and figures 1-3.	1
A	US 6388880 B1 (EL-GHOBASHY, NOHA et al.) 14 May 2002 See column 2, lines 47-64 and figure 1.	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 FEBRUARY 2013 (28.02.2013)	**04 MARCH 2013 (04.03.2013)**
Name and mailing address of the ISA/KR Facsimile No. 82-42-472-7140	Authorized officer KIM, Byoung Sung Telephone No. 82-42-481-8403

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/064679

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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(19)中华人民共和国国家知识产权局

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H05K 7/20(2006.01)

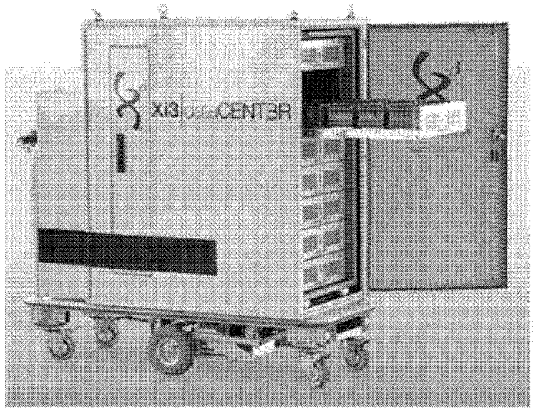
权利要求书1页 说明书27页 附图34页

(54)发明名称

提供和动态地安装以及容纳处理控制单元

(57)摘要

用于安装模块化处理单元的系统和方法，所述模块化处理单元被配置成用于选择性地单独使用或与企业中的其他处理单元一起使用。提供一个模块化处理单元作为一个平台，所述平台重量轻、紧凑并且被配置成用于选择性地单独使用或与企业中的一个或多个额外处理单元（包括基本模块和/或外围模块）一起定向。所述一个或多个处理单元是基于所需的特定企业以及相应环境而动态地安装。在至少一些实现方式中，包括防震安装以满足所需的防震和防振动要求。在一些实现方式中，安装系统包括用于需要固定地紧固的环境的一个固定安装系统。在其他实现方式中，提供一个可选择性释放的连接器以允许容易地安装和移除动态模块化处理单元。在其他实现方式中，提供一个压入配合连接器以允许容易地安装和移除所述动态模块化处理单元。



CN 104094188 A

1. 一种计算企业，包括：

多个计算机装置，连接到一个气流结构，从而使得通过所述气流结构同时对所有这些计算机装置进行冷却。

提供和动态地安装以及容纳处理控制单元

技术领域

[0001] 本发明涉及安装动态模块化处理单元。具体来说，本发明涉及用于安装模块化处理单元的系统和方法，所述模块化处理单元被配置成用于选择性地单独使用或与企业中的其他处理单元一起使用。

背景技术

[0002] 多年来关于计算机相关技术已发生技术的进步。举例来说，计算机系统曾经采用真空管。这些管被晶体管取代。磁芯曾用于存储器。随后，通常采用穿孔卡和磁带。曾引入集成电路和操作系统。当今，在计算机系统中当前使用微处理器芯片。

[0003] 计算机相关技术的演进包括计算机行业中的各种形状因数的发展。一种此类标准形状因数称为先进技术（“AT”），它的运行比现有系统快得多并且包括新键盘、80286 处理器、具有比现有系统高的容量 (1.2MB) 的软驱动器以及 16 位数据总线。

[0004] 随着时间推移，对 AT 形状因数做出了改进，包含母板的定向的改变。这些改进通过将磁盘驱动器连接器定位成更靠近驱动器槽并且将中央处理单元定位成更靠近电源和冷却风扇，而允许母板的更高效设计。中央处理单元的新位置允许扩展槽全部保持全长插入卡。

[0005] 虽然这些发展增加了处理能力，但这些技术仅在随着计算机技术进步而升级组件的能力方面有限地起作用。事实上，这些技术作为用于计算机技术的传递机制而变得越来越不合需要。在操作耐久性、制造、装运和支持方面已经看出可预测的故障模式。系统产生热，这需要内部冷却系统，而内部冷却系统有噪音。而且，当前计算机系统易于需要修理。

[0006] 因此，虽然当前存在被配置成用于处理数据的计算机技术，但挑战仍然存在。因此，现有技术中的改进将是增强当前技术或甚至用其他技术取代当前技术。

发明内容

[0007] 本发明涉及安装动态模块化处理单元。具体来说，本发明涉及用于安装模块化处理单元的系统和方法，所述模块化处理单元被配置成用于选择性地单独使用或与企业中的其他处理单元一起使用。

[0008] 本发明的实现方式与一个模块化处理单元相关，所述模块化处理单元重量轻、紧凑并且被配置成用于选择性地单独使用或与企业中的类似和 / 或其他处理单元一起使用。在一些实现方式中，每个模块化处理单元包括一个非基于外围的外壳、一个冷却过程（例如，热力学对流冷却、受迫空气和 / 或液体冷却）、一个经优化电路板配置、经优化处理和存储器比率，和 / 或对外围设备和应用提供增加的灵活性和支持的一个动态背板。

[0009] 在一个实现方式中，一个动态模块化处理单元是一个立方体平台（例如，近似 4 英寸立方体平台或另一种尺寸和 / 或配置），它利用一种先进冷却过程（例如，避免了对冷却风扇的任何需要的一个热力学冷却模型，一个受迫空气冷却过程和 / 或一个液体冷却过程）。所述单元还包括呈母板配置的一个或多个板，以及经优化的处理和存储器比率。所述

单元的总线架构增强了性能并增加了硬件和软件稳定性。一个高度灵活的背板提供了对外围设备和垂直应用的支持。本发明的其他实现方式涵盖使用大于或小于一个 4 英寸立方体平台的一个耐久并且动态模块化的处理单元。类似地，其他实现方式涵盖使用除了立方体之外的形状。

[0010] 本发明的实现方式提供了一个平台，所述平台可与所有类型的计算机企业相关联来使用。所述平台允许在对动态模块化单元具有最小影响的情况下可做出的大量修改，由此增强所述平台在所有类型的应用上的有用性。

[0011] 在一些实现方式中，一个第一动态模块化处理单元用作一个基本模块，并且通信地连接到一个第二动态模块化处理单元上，所述第二动态模块化处理单元用作一个外围模块以使用连接到外围模块上的一个或多个输入 / 输出装置来使用基本模块的处理资源，借此所述外围模块便于使用者在基本模块上打开一个会话，同时为外围模块本身使用的电力显著少于任何现有的计算机系统。

[0012] 另外的实现方式提供了一种用于分布计算资源的系统，包括具有特定处理资源的一个基本模块。所述系统还包括一个外围模块，所述外围模块通信地连接到所述基本模块上并且被配置成用于使用连接到所述外围模块上的一个或多个输入 / 输出装置来利用所述基本模块的处理资源，其中所述外围模块仅利用足够的计算资源来在所述外围模块和所述基本模块处的输入 / 输出装置之间传递输入 / 输出信号。

[0013] 再另外的实现方式提供了一种用于高效地管理和分配计算资源的系统，所述系统包括具有特定处理资源的一个基本模块并且为一个第一使用者提供一个图形用户接口，所述图形用户接口提供对所述基本模块的操作系统的第一会话的接入。所述系统还包括一个外围模块，所述外围模块通信地连接到所述基本模块上并且为一个第二使用者提供一个图形用户接口，所述图形用户接口提供对所述基本模块的操作系统的第二会话的接入，而不需要将操作系统的一个单独实例加载到所述基本模块的存储器中。

[0014] 本发明的额外实现方式提供了具有一种结构的智能安装托架，所述结构被配置成用于安装到一个下层表面并且紧固地固持或保持一个安装物件。在至少一些实现方式中，所述结构保持和 / 或包含一个计算机系统，所述计算机系统被配置成用于将处理资源从一个远程计算机系统分配到接近于所述安装托架的一个或多个计算机资源。

[0015] 本发明的额外实现方式涉及在多种不同企业中安装动态模块化处理单元（包括基本模块和 / 或外围模块）。在至少一些实现方式中，安装方式是由需要的特定企业和相应环境决定的。在至少一些实现方式中，包括防震安装以满足所需的防震和防振动要求。在一些实现方式中，安装系统包括用于需要固定地紧固的环境的一个固定安装系统。在其他实现方式中，提供一个可选择性释放的连接器以允许容易地安装和移除动态模块化处理单元。在其他实现方式中，提供一个压入配合连接器以允许容易地安装和移除所述动态模块化处理单元。

[0016] 虽然本发明的方法和过程已经被证明为在个人和其他计算企业的领域中尤其有用，但本领域技术人员将了解，本发明的方法和过程可以在多种不同应用中以及在多种不同制造领域中使用以产生可定制的企业，包括用于利用控制系统或智能接口系统的任何行业的企业和 / 或得益于实施此类装置的企业。此类行业的示例包括但不限于汽车行业、航空电子行业、液压控制行业、音频 / 视频控制行业、电信行业、医疗行业、特殊应用行业、电

子消费型装置行业，以及使用计算机装置的其他行业。因此，本发明的系统和方法对市场提供了大量计算能力，包括传统上当前计算机技术尚未开发的市场。

[0017] 在随后的说明中将陈述或将更完全明了本发明的这些和其他特征与优点。这些特征和优点可以借助于本文提供的工具和组合来实现和获得。此外，本发明的特征和优点可以通过本发明的实践学习到，或者将从下文陈述的说明中明显。

附图说明

[0018] 为了陈述获得本发明的上述和其他特征与优点的方式，可通过参考本发明的特定实施例来得到本发明的更具体描述，这些实施例在附图中示出。理解了图式仅描绘本发明的仅有典型实施例并且因此不应被视为限制本发明的范围之后，将通过使用附图用额外具体情况和细节来说明和阐释本发明，附图中：

[0019] 图 1 示出了提供根据本发明的实施例的代表性模块化处理单元的框图；

[0020] 图 2 示出了一个代表性模块化处理单元的透视图；

[0021] 图 3 示出了图 2 的代表性模块化处理单元的另一透视图；

[0022] 图 4 示出了一个模块化处理单元的一个代表性外壳的透视图，以及更具体示出了一个模块化处理单元的一个代表性支撑底盘；

[0023] 图 5 示出了根据本发明的实施例的具有插入件和动态背板的主支撑底盘的分解图；

[0024] 图 6 示出了一个代表性端板；

[0025] 图 7 示出了一个代表性端盖；

[0026] 图 8 示出了具有动态背板的一个代表性模块化处理单元；

[0027] 图 9 示出了端板被移除的一个代表性模块化处理单元；

[0028] 图 10 示出了可操作地连接到任意类型的一个外部物体上的一个模块化处理单元；

[0029] 图 11 示出了一个代表性计算企业；

[0030] 图 12 示出了具有连接到一个监视器的一个模块化处理单元的一个代表性企业；

[0031] 图 13 示出了具有连接到一个监视器的一个模块化处理单元的另一个代表性企业；

[0032] 图 14 示出了示出为一个代表性外围模块的一个代表性模块化处理单元的分解图；

[0033] 图 15 示出了具有可互操作地连接的两个模块化处理单元、即代表性基本模块和代表性外围模块的企业；

[0034] 图 16 示出了一个代表性外围模块的端视图；

[0035] 图 17 示出了一个代表性外围模块的透视图；

[0036] 图 18 示出了一个代表性外围模块的透视图；

[0037] 图 19 示出了一个替代的代表性外围模块的外部结构壳的端视图；

[0038] 图 20 示出了一个代表性安装板的透视图；

[0039] 图 21 示出了一个代表性安装系统；

[0040] 图 22 示出了另一个代表性安装托架；

[0041] 图 23 示出了安装一个模块化处理单元的代表性方式；

[0042] 图 24 示出了图 23 的安装一个模块化处理单元的代表性方式的组装视图；

[0043] 图 25 示出了安装一个模块化处理单元的另一代表性方式；

[0044] 图 26 示出了图 25 的安装一个模块化处理单元的代表性方式的组装视图；

[0045] 图 27 示出了安装一个模块化处理单元的另一代表性方式；

[0046] 图 28 示出了图 27 的安装一个模块化处理单元的代表性方式的组装视图；

[0047] 图 29 示出了图 27 的安装一个模块化处理单元的代表性方式的俯视图；

[0048] 图 30 示出了图 27 的安装一个模块化处理单元的代表性方式的透视图；

[0049] 图 31 示出了另一个代表性安装托架的透视图；

[0050] 图 32 示出了安装一个模块化处理单元的代表性方式；

[0051] 图 33 示出了图 32 的安装一个模块化处理单元的代表性方式的组装视图；

[0052] 图 34 示出了在一个机架或机柜中安装模块化处理单元的代表性方式；

[0053] 图 35 示出了在一个机架或机柜中安装模块化处理单元的另一代表性方式；

[0054] 图 36 示出了一个代表性 DIN 轨道安装系统；

[0055] 图 37 示出了一个代表性 DIN 轨道安装系统的另一视图；

[0056] 图 38 示出了一个代表性 DIN 轨道安装系统的另一视图；

[0057] 图 39 示出了另一个代表性安装系统；

[0058] 图 40 示出了根据图 39 的代表性安装系统的代表性容器；

[0059] 图 41 示出了其中安装有一个模块化处理单元的图 40 的代表性容器；

[0060] 图 42 示出了将代表性模块化处理单元安装到图 40 的代表性容器中；

[0061] 图 43 和图 44 进一步示出了将代表性模块化处理单元安装到图 40 的代表性容器中；以及

[0062] 图 45 示出了图 39 的代表性安装系统的另一视图；

[0063] 图 46 示出了一个堆叠在壁内的安装系统；

[0064] 图 47 示出了根据代表性安装系统的代表性容器；

[0065] 图 48 至图 54 示出了选择性接收多个计算机装置和利用阻尼系统的代表性抽屉或托盘；

[0066] 图 55 和图 56 示出了包括选择性接收多个计算机装置的抽屉或托盘的代表性堆叠配置；

[0067] 图 57 示出了选择性接收多个计算机装置的代表性管状配置；以及

[0068] 图 58 示出了选择性接收多个计算机装置的代表性配置。

具体实施方式

[0069] 本发明涉及安装动态模块化处理单元。具体来说，本发明涉及用于安装模块化处理单元的系统和方法，所述模块化处理单元被配置成用于选择性地单独使用或与企业中的其他处理单元（基本模块和 / 或外围模块）一起使用。

[0070] 在至少一些实施例中，安装方式是由需要的特定企业和相应环境决定的。在至少一些实施例中，包含防震安装以满足所需的防震和防振动要求。在一些实施例中，安装系统包括用于需要紧固的环境的一个固定安装系统。在其他实施例中，提供一个可选择性释放

的连接器以允许容易地安装和移除动态模块化处理单元。在其他实施例中，提供一个压入配合连接器以允许容易地安装和移除动态模块化处理单元。

[0071] 说明的以下部分为了便于对说明的理解而分为若干标题，并且不希望以任何方式进行限制。

[0072] 代表性操作环境

[0073] 本发明涉及用于安装动态模块化处理单元的系统和方法。具体来说，本发明的实施例与一个模块化处理单元相关，所述模块化处理单元重量轻、紧凑并且被配置成用于选择性地单独使用或与企业中的一个或多个额外处理单元一起定向。在一些实施例中，一个模块化处理单元包括一个非基于外围的外壳、一个冷却过程（例如，热力学对流冷却、受迫空气和/或液体冷却）、一个经优化分层的印刷电路板配置、经优化处理和存储器比率，以及对外围设备和应用提供增加的灵活性和支持的一个动态背板。

[0074] 本发明的实施例涵盖一个平台，所述平台可与所有类型的计算机和/或电企业相关联来使用。所述平台允许在对动态模块化单元具有最小影响的情况下可做出的大量修改，由此增强所述平台跨所有类型的应用的有用性。而且，如上文指示，模块化处理单元可单独起作用或可以与可定制企业中的一个或多个其他模块化处理单元相关联以提供增强的处理能力。

[0075] 图 1 和对应讨论旨在提供根据本发明实施例的一个合适操作环境的一般描述。如下文将进一步讨论，本发明的实施例涵盖在多种可定制企业配置中（包括在联网或组合配置中）使用一个或多个动态模块化处理单元，如下文将讨论。

[0076] 本发明的实施例涵盖一种或多种计算机可读介质，其中每一介质可以被配置成用于包括其上的数据或用于操纵数据的计算机可执行指令。计算机可执行指令包括可以由一个或多个处理器存取的数据结构、对象、程序、例程或其他程序模块，例如与通用模块化处理单元相关联的能够执行各种不同功能的计算机可执行指令或者与专用模块化处理单元相关联的能够执行有限数量的功能的计算机可执行指令。

[0077] 计算机可执行指令致使企业的一个或多个处理器执行一个特定功能或功能群组，并且是用于实施处理方法的步骤的程序代码装置的示例。此外，可执行指令的一个特定序列提供可以用来实施这些步骤的相应动作的示例。

[0078] 计算机可读介质的示例包括随机存取存储器（“RAM”）、只读存储器（“ROM”）、可编程只读存储器（“PROM”）、可擦除可编程只读存储器（“EPROM”）、电可擦除可编程只读存储器（“EEPROM”）、压缩光盘只读存储器（“CD-ROM”）、任何固态存储装置（例如，快闪存储器，智能介质等等），或能够提供可以由处理单元存取的数据或可执行指令的任何其他装置或组件。

[0079] 参见图 1，一个代表性企业包括模块化处理单元 10，所述模块化处理单元可以用作一个通用或专用处理单元。举例来说，模块化处理单元 10 可以单独或与一个或多个其他模块化处理单元一起使用，例如个人计算机、笔记本计算机、个人数字助理（“PDA”）或其他手持式装置、工作站、微型计算机、大型计算机、超级计算机、多处理器系统、网络计算机、基于处理器的消费型装置、智能电器或装置、控制系统或其他计算机系统。在同一企业中使用多个处理单元提供增加的处理能力。举例来说，一个企业的每一个处理单元都可以专用于一个特定任务或者可联合地参与分布式处理。

[0080] 在图 1 中，模块化处理单元 10 包括一条或多条总线和 / 或互连（多条）12，它们可以被配置成用于连接所述模块化处理单元的各种组件并且使得能够在两个或更多个组件之间交换数据。总线（多条）/ 互连（多条）12 可包括多种总线结构中的一种，包括存储器总线、外围总线或者使用多种总线架构中的任一种的局部总线。由总线（多条）/ 互连（多条）12 连接的典型组件包括一个或多个处理器 14 和一个或多个存储器 16。其他组件可以通过使用逻辑、一个或多个系统、一个或多个子系统和 / 或一个或多个 I/O 接口（在下文称为“数据操纵系统（多个）18”）而选择性地连接到总线（多条）/ 互连（多条）12 上。而且，其他组件可以通过使用逻辑、一个或多个系统、一个或多个子系统和 / 或一个或多个 I/O 接口而在外部连接到总线（多条）/ 互连（多条）12 上，和 / 或可以充当逻辑、一个或多个系统、一个或多个子系统和 / 或一个或多个 I/O 接口，例如模块化处理单元（多个）30 和 / 或专用装置（多个）34。I/O 接口的示例包括一个或多个大容量存储装置接口、一个或多个输入接口、一个或多个输出接口和类似物。因此，本发明的实施例涵盖使用一个或多个 I/O 接口的能力和 / 或基于所采用的逻辑或其他数据操纵系统而改变产品的可用性的能力。

[0081] 所述逻辑可以连接到一个接口、系统的一部分、子系统和 / 或用以执行一个特定任务。因此，所述逻辑或其他数据操纵系统可以允许例如 IEEE1394（火线），其中所述逻辑或其他数据操纵系统是 I/O 接口。可替代地或另外，可以使用允许将一个模块化处理单元连接到另一外部系统或子系统中的逻辑或另一数据操纵系统。举例来说，可以包括或可以不包括特殊 I/O 连接的一个外部系统或子系统。可替代地或另外，可以使用没有外部 I/O 与逻辑相关联的逻辑或其他数据操纵系统。本发明的实施例还涵盖使用特殊逻辑，例如用于车辆、液压控制系统等等的 ECU 的特殊逻辑，和 / 或向处理器告知如何控制一件特殊硬件的逻辑。而且，本领域技术人员将了解，本发明的实施例涵盖利用逻辑、系统、子系统和 / 或 I/O 接口的大量不同系统和 / 或配置。

[0082] 如上所述，本发明的实施例涵盖使用一个或多个 I/O 接口的能力和 / 或基于所采用的逻辑或其他数据操纵系统而改变产品的可用性的能力。举例来说，在一个模块化处理单元是被设计成用作桌上型计算机的包括一个或多个 I/O 接口和逻辑的一个个人计算系统的一部分的情况下，所述逻辑或其他数据操纵系统可以被改变成包括快闪存储器或逻辑以执行用于一个音乐台的音频编码，所述音乐台希望经由两个标准 RCA 取得模拟音频并将它们广播到一个 IP 地址。因此，由于对模块化处理单元的背板上的数据操纵系统（多个）（例如，逻辑、系统、子系统、I/O 接口（多个）等等）做出的修改，模块化处理单元可以是用作一个电器的一个系统的一部分而不是一个计算机系统的一部分。因此，对背板上的数据操纵系统（多个）的修改可以改变模块化处理单元的应用。因此，本发明的实施例涵盖极度可适配的模块化处理单元。

[0083] 如上所述，处理单元 10 包括一个或多个处理器 14，例如中央处理器，并任选地包括被设计成执行一个特定功能或任务的一个或多个其他处理器。典型地是处理器 14 执行在例如存储器（多个）16、磁性硬盘、可装卸式磁盘、磁带盒、光盘、固态存储器、快闪存储器等计算机可读介质上或者从也可以视为一个计算机可读介质的一个通信连接提供的指令。

[0084] 存储器（多个）16 包括可以被配置成用于包括其上的数据或用于操纵数据的指令并且可以由处理器（多个）14 通过总线（多条）/ 互连（多条）12 存取的一个或多个计算机可读介质。存储器（多个）16 可以包括例如用以永久存储信息的 ROM（多个）20，和 / 或用

以临时存储信息的 RAM(多个)22。ROM(多个)20 可以包括具有一个或多个例程的基本输入 / 输出系统 (“BIOS”),这些例程用以例如在模块化处理单元 10 的启动期间建立通信。在操作期间,RAM(多个)22 可以包括一个或多个程序模块,例如一个或多个操作系统、应用程序和 / 或程序数据。

[0085] 如所说明,本发明的至少一些实施例涵盖一个非外围外壳,所述外壳提供一个更稳健的处理单元,使得能够在多种不同应用中使用所述单元。在图 1 中,一个或多个大容量存储装置接口 (图示为数据操纵系统 (多个)18) 可以用以将一个或多个大容量存储装置 24 连接到总线 (多条)/ 互连 (多条)12 上。大容量存储装置 24 对于模块化处理单元 10 是外围的,并且允许模块化处理单元 10 保持大量数据。大容量存储装置的示例包括硬盘驱动器、磁盘驱动器、磁带驱动器、快闪驱动器、光盘驱动器以及其他存储装置。

[0086] 大容量存储装置 24 可以从一个磁性硬盘、一个可装卸式磁盘、一个磁带盒、一个光盘或另一计算机可读介质进行读取和 / 或写入。大容量存储装置 24 及其相应的计算机可读介质提供可以包括一个或多个程序模块的非易失性的数据和 / 或可执行指令的存储,这些程序模块例如为一个操作系统、一个或多个应用程序、其他程序模块或程序数据。这些可执行指令是用于实施本文披露的方法步骤的程序代码装置的示例。

[0087] 可以采用数据操纵系统 (多个)18,以使得能够通过一个或多个相应外围 I/O 装置 26 与模块化处理单元 10 交换数据和 / 或指令。外围 I/O 装置 26 的示例包括例如键盘和 / 或例如鼠标、跟踪球、光笔、触笔或其他指向装置、麦克风、操纵杆、游戏板、圆盘式卫星电视天线、扫描仪、摄录机、数码相机、传感器和类似物等替代输入装置的输入装置,和 / 或例如监视器或显示屏、扬声器、打印机、控制系统和类似物等输出装置。类似地,与可以用来将外围 I/O 装置 26 连接到总线 (多条)/ 互连 (多条)12 的专用逻辑连接的数据操纵系统 (多个)18 的示例包括串行端口、并行端口、游戏端口、通用串行总线 (”USB”)、火线 (IEEE1394)、无线接收器、视频适配器、音频适配器、并行端口、无线发射器、任何并行或串行化 I/O 外围设备或另一接口。

[0088] 数据操纵系统 (多个)18 使得能够在一个或多个网络接口 28 上交换信息。网络接口 28 的示例包括使得能够在多个处理单元之间交换信息的一个连接、用于连接到局域网 (“LAN”) 或调制解调器的一个网络适配器、一条无线链路,或用于连接到例如互联网等广域网 (“WAN”) 的另一适配器。网络接口 28 可以与模块化处理单元 10 结合或者在它的外围,并且可以与 LAN、无线网络、WAN 和 / 或处理单元之间的任何连接相关联。

[0089] 数据操纵系统 (多个)18 使得模块化处理单元 10 能够与一个或多个其他本地或远程模块化处理单元 30 或计算机装置交换信息。模块化处理单元 10 与模块化处理单元 30 之间的连接可以包括硬连线和 / 或无线链路。因此,本发明的实施例涵盖直接的总线到总线连接。这使得能够产生一个较大的总线系统。这还避免了当前已知的由于企业的直接总线到总线连接所致的黑客攻击。此外,数据操纵系统 (多个)18 使得模块化处理单元 10 能够与一个或多个专用 I/O 连接 32 和 / 或一个或多个专用装置 34 交换信息。

[0090] 处理单元可以访问的程序模块或程序模块的多个部分可以存储在一个远程存储器存储装置中。此外,在一种联网系统或组合配置中,模块化处理单元 10 可参与一种分布式计算环境,其中功能或任务由多个处理单元执行。可替代地,一个组合配置 / 企业的每一个处理单元可以专用于一个特定任务。因此,举例来说,一个企业的一个处理单元可以专用

于视频数据，由此代替一个传统的视频卡，并且提供用于通过传统技术执行这些任务的增加的处理能力。

[0091] 虽然本领域技术人员将了解，本发明的实施例可以包括多种配置，但对图 2 到图 3 做出参考，示出了一个耐久并且动态模块化的处理单元 90 的一个代表性实施例。模块化处理单元 90 包括一个专用外壳模块 100（下文称为“外壳模块 100”），以及一个专用印刷电路板设计。模块化处理单元 90 通过外壳模块 100 的特定和经过计算的设计提供了现有技术处理单元或计算机中不存在的非并行计算机处理优点和特征。实际上，如本文描述和要求的本发明的处理单元呈现了从常规计算机或处理单元的完全概念转移或例证转移。此例证转移将从下文披露的主题变得明显，所述主题在所附权利要求书中体现。

[0092] 图 2 到图 3 示出了被识别为模块化处理单元 90 的处于完全组装状态的一个代表性模块化处理单元，其中大体上示出了许多主要组件。如所说明，模块化处理单元 90 包括外壳模块 100，所述外壳模块自身具有一个非常特定并且唯一的支撑结构和几何配置或设计，这在图 4 中更完整地描述。在一个优选实施例中，外壳模块 100 包括一个主支撑底盘 114 ；第一插入件 166 ；第二插入件 170 ；第三插入件 174（未示出）；动态背板 134（未示出）；第一端板 138 ；第二端板 142（未示出）；第一端盖 146 ；以及第二端盖 150，从而为例如印刷电路板、处理芯片和电路系统等一个或多个处理和其他计算机组件提供一个封闭壳体或外壳。

[0093] 图 4 到图 5 示出了主支撑底盘 114 以及被设计成附接或连接到主支撑底盘 114 上的外壳模块 100 的一些组件部分的一个代表性实施例。优选地，这些组件部分以可装卸方式连接到底盘 114 上，如示出，以便实现如本文描述和陈述的模块化处理单元 90 的一些唯一特征和功能。主支撑底盘 114 用作用于外壳模块 100 和模块化处理单元 90 的主要支撑结构。它的小尺寸和专用设计提供了现有技术设计中不存在的优点和益处。基本上，主支撑底盘 114 为模块化处理单元 90 的组件部分提供结构支撑，包括任何额外的物理附件、处理以及其他电路板组件，以及使得模块化处理单元 90 能够适配于任何类型的环境，例如结合到任何已知的结构或系统中，或者在群集和多路复用环境中使用。

[0094] 具体来说，如图中所示，模块化处理单元 90 并且尤其是外壳模块 100 基本上由一种立方体形设计组成，其中主支撑底盘 114 的第一壁支撑件 118、第二壁支撑件 122 和第三壁支撑件 126 连同在附接时的动态背板 134 一起构成外壳模块 100 的四个侧面，其中在外壳模块 100 的每一个拐角处定位有一个联合模块 154。

[0095] 汇接中心 155 用以一体地接合第一壁支撑件 118、第二壁支撑件 122 和第三壁支撑件 126，以及提供下文讨论的端板可以附接到的一个基座。端板使用插入到附件接纳口 90 的附接装置连接到主支撑底盘 114 上，所述附件接纳口在图 4 中示出为一个孔口，所述孔口可以带螺纹或者不取决于所使用附接装置的特定类型。汇接中心 155 进一步为模块化处理单元 90 内存在的专用印刷电路板设计提供主要支撑和汇接中心，如下文讨论。如图 4 中所示，印刷电路板能够插入到一个或多个带通道板接收器 162 中并且紧固于其中。图中示出并且在本文描述的特定设计仅是模块化处理单元 90 内的紧固或接合印刷电路板的一个代表性示例。考虑到了其他设计、组合件或装置，并且可以如由本领域普通技术人员所认识到的来使用。举例来说，用于紧固处理组件的装置可以包括螺钉、铆钉、过盈配合以及其他连接器。

[0096] 主支撑底盘 114 进一步包括多个通道或滑动接收器 182，这些通道或滑动接收器被设计成接纳位于一个或多个插入构件上的一个对应插入件；一个动态背板；一个底盘；一个安装托架，所述安装托架用以将两个或更多个处理单元连接在一起，或允许将处理单元实施到另一结构中。滑动接收器 182 还可以用以接受或接收一个结构的合适元件或一个结构或装置本身，其中所述处理单元、并且尤其是外壳模块用作一个负载支承构件。模块化处理单元 90 用作一个负载支承构件的能力是从它的唯一底盘设计得到的。举例来说，模块化处理单元 90 可以用以将两个结构桥接在一起，并且对结构的总体结构支撑和稳定性有贡献。另外，模块化处理单元 90 可以支承直接附接到主支撑底盘 114 上的负载。举例来说，一个计算机屏幕或监视器可以由模块化处理单元 90 物理上支撑并进行过程控制。作为另外的示例，模块化处理单元 90 可以用以物理上支撑和过程控制各种家用器材，例如照明器材或开关箱等等。而且，如果需要，一个额外的散热器组合件可以用类似方式连接到模块化处理单元 90。许多其他可能的负载支承情形或环境是可能的并且在本文考虑到了。因此，本文具体陈述的那些仅意味着说明性的，并且不以任何方式进行限制。滑动接收器 182 示出为实质上圆柱形通道，延伸主支撑底盘 114 的汇接中心 155 的长度。滑动接收器 182 包括仅一种将外部组件连接到主支撑底盘 114 上的方式。考虑到了其他设计或组合件，并且可以用以实施提供用于附接例如上文所述的各种组件部分的装置的既定功能，如本领域的普通技术人员所认识。

[0097] 图 4 到图 5 进一步示出了主支撑底盘 114 的凹入特征，以及尤其是第一壁支撑件 118、第二壁支撑件 122 和第三壁支撑件 126。第一插入构件 166、第二插入构件 170 和第三插入构件 174 包括相应的凹入设计。这些组件部分中的每一者进一步包括一个特定计算的曲率半径，从而使得第一壁支撑件 118 的曲率半径 120 将对应于被设计到第一插入件 166 中的配合曲率半径。同样，第二壁支撑件 122 包括曲率半径 124 从而对应于被设计到第二插入件 170 中的配合曲率半径，并且第三壁支撑件 126 包括曲率半径 128 从而对应于被设计到第三插入件 174 中的配合曲率半径。如图 6 到图 7 中示出的每一个端板 138 和 142 以及端盖 146 和 150 各自包括类似的设计型面，以匹配主支撑底盘 114 的凹入设计型面。在图中所示的实施例中，壁支撑件和插入构件各自包括曲率半径。凹入设计和计算的曲率半径各自贡献于主支撑底盘 114 的总体结构刚性和强度，以及贡献于模块化处理单元 90 的热力学散热性质。举例来说，在下文更详细描述的一个自然对流冷却系统中，凹入设计促进了受热空气向外壳模块 100 的外部并且主要是上部拐角的分配，因此允许热或受热空气从模块化处理单元 90 的内部部分的顶部和中心散布离开并且朝向右上和左上拐角散布，在此所述空气可以随后逸出通过通风口 198 或者可以进一步被引导通过外壳模块 100 的顶部。考虑到了其他实施例，其中这些元件的曲率半径可以彼此不同，从而按需要提供外壳模块 100 的最佳设计。

[0098] 在优选实施例中，主支撑底盘 114 包括一个全金属底盘，所述底盘被结构化并设计成为模块化处理单元 90 和其中包含的组件提供一个极结实的支撑结构。在正常情况并且甚至是极端环境下，主支撑底盘 114 能够承受源自各种外部来源的极大施加力和冲击力，例如将通常对现有相关的计算机外壳造成损形或凹痕的那些力，或者将它们的能力限制于在其他或极端环境中使用。基本上，主支撑底盘 114 是为模块化处理单元 90 提供实际上不可破坏的计算机外壳的主要贡献者。计算机外壳中的此唯一特征与用以构造外壳模块

100 的组件的特定设计直接相关，所述特定设计包括它们的几何设计、它们配合在一起的方式、它们的材料组成以及其他因素，例如材料厚度。具体来说，外壳模块 100 优选地完全在多种半径之外建立，其中几乎所存在的每个特征和元件都包括一种半径。利用这种半径原理来起作用，这样使得施加到模块化处理单元 90 的任何负载都被传送到模块化处理单元 90 的外部边缘。因此，如果一个负载或压力施加到外壳模块 100 的顶部，所述负载将沿着侧面被传送到顶部和基座中，并且最终进入外壳模块 100 的拐角中。基本上，所施加的任何负载都被传送到模块化处理单元 90 的拐角，最大强度集中于此处。

[0099] 模块化处理单元 90 及其组件（即外壳模块 100、主支撑底盘 114、插入件 166、170 和 174、动态背板 134 以及端板 138 和 142）各自优选地使用挤压工艺用金属制成。在一个实施例中，主支撑底盘 114、第一插入件 166、第二插入件 170 和第三插入件 174、动态背板 134 以及第一端板 138 和第二端板 142 是由高等级铝制成，以对外壳模块 100 提供结实的并且重量轻的特性。另外，使用金属壳提供了良好的热传导性质。虽然优选地由铝或各种等级的铝和 / 或铝组合物构成，但考虑到了各种其他材料，取决于使用者的特定需要和 / 或要求例如为钛、铜、镁、新实现的混合金属合金、钢以及其他金属和金属合金，以及塑料、石墨、复合物、尼龙或这些材料的组合，可以用来构造外壳模块 100 的主要组件。本质上，使用处理单元的既定环境将较大程度地规定所述处理单元的构成组件的特定材料组成。如所述，本发明的一个重要特征是处理单元适配并且用于若干用途并在若干不同和 / 或极端环境内的能力。照此，处理单元的特殊设计依赖于利用适当材料的协同努力。换句话说，本发明的处理单元考虑到了使用并且包括一种预定并且特殊标识的材料组合物，所述材料组合物在它的预期用途方面将最好地满足它的需要。举例来说，在一种液体冷却模型或设计中，例如钛等密度较大的金属可以用来对处理单元提供较大的绝缘性质。

[0100] 给定其优选的铝组合物，外壳模块 100 非常结实、重量轻并且容易四处移动，因此提供延伸到最终使用者和制造者两者的显著益处。举例来说，从最终使用者的观点，模块化处理单元 90 可以被适配成在无法找到现有相关计算机的各种环境内使用。另外，最终使用者可以基本上隐藏、掩蔽或伪装模块化处理单元 90 以提供较清洁的外观、较不混乱的空间，或者提供较具有美学吸引力的工作站。

[0101] 从制造观点，外壳模块 100 和模块化处理单元 90 能够使用一种或多种自动化组装工艺制造，例如自动化铝挤压工艺结合用于安装或组装如上所述的每一个组件部分的自动化机器人工艺。同样有利的是外壳模块 100 由于适用于挤压和机器人组装工艺所带来的快速大量生产的能力。当然，模块化处理单元 90 还可以使用其他已知方法来制造，取决于处理单元的特定所需特性以及特定预期用途例如为模铸和注射模制、手动组装。

[0102] 另外，由于外壳模块 100 尺寸小并且相对重量轻，装运成本以及制造成本也大大降低。

[0103] 参见图 5，示出了外壳模块 100 的主要组件，即主支撑底盘 114 和被设计成以可装卸方式附接或连接到主支撑底盘 114 的侧面上的若干插入件。图 5 还示出了动态背板 134 被设计成以可装卸方式附接或连接到主支撑底盘 114 的后部部分。

[0104] 具体来说，第一插入件 166 附接到第一壁支撑件 118 上。第二插入件 170 附接到第二壁支撑件 122 上。第三插入件 174 附接到第三壁支撑件 126 上。而且，第一插入件 166、第二插入件 170 和第三插入件 174 以及第一壁支撑件 118、第二壁支撑件 122 和第三壁支撑

件 126 中的每一者包括实质上相同的曲率半径，这样使得它们可以成一种嵌套或匹配关系配合或装配在一起。

[0105] 第一插入件 166、第二插入件 170 和第三插入件 174 中的每一者包括用于连接主支撑底盘 114 的装置。在一个示例性实施例中，如图 5 中所示，每一个插入件包括位于所述插入件的相对末端处的两个插入接合构件 178。接合构件 178 被设计成配合在一个用于接合或连接形成于主支撑底盘 114 内的各种外部装置、系统、物体等等（下文中称为外部物体）的装置内。在所示的示例性实施例中，用于接合外部物体的装置包括沿着主支撑底盘 114 定位的多个滑动接收器 182，如以上图 4 中所示和标识。也考虑到了其他方式，例如利用范围是卡扣、螺钉、铆钉、互锁系统和本领域中通常已知的任何其他附件的各种附件。

[0106] 动态背板 134 也被设计成或能够可释放地连接主支撑底盘 114。动态背板 134 包括用于接合主支撑底盘 114 的装置。在所示的示例性实施例中，用于接合的装置由定位于动态背板 134 的相对末端处的两个接合构件 186 构成。接合构件 186 沿着主支撑底盘 114 的后部部分（图示为空间 130）在它们的对应位置处配合在滑动接收器 182 内，以将动态背板 134 可装卸地附接到主支撑底盘 114 上，与插入件 166、170 和 174 在它们的对应位置处附接到主支撑底盘 114 的方式几乎相同。这些特定特征旨在是若干可能的配置、设计或组合件之一。因此，预期本领域技术人员将认识到除了图中具体示出以及本文描述的方式之外的可用于将动态背板 134 附接到主支撑底盘 114 的其他方式。

[0107] 用于接合一个外部物体、并且尤其是滑动接收器 182 的装置能够可释放地连接各种类型的外部物体（如下文将更完整描述），例如插入件 166、170 和 174、动态背板 134、安装托架、另一处理单元或者任何其他所需装置、结构或组合件。如图 5 中示出，滑动接收器 182 以可释放方式接合相应的接合构件 178，以便允许每一插入件在需要时滑入和滑出。如所述，本文考虑到了用于连接主支撑底盘 114 的其他装置和用于接合一个外部物体的装置，并且将对本领域技术人员而言是明显的。

[0108] 通过允许每一插入件和动态背板 134 可装卸地或可释放地连接到主支撑底盘 114 上，实现模块化处理单元 90 优于现有相关计算机外壳的若干显著优点。举例来说，并且旨在不以任何方式进行限制，第一插入件 166、第二插入件 170 和第三插入件 174 可以出于美学目的而被移除、替换或互换。这些插入构件可以拥有不同的颜色和 / 或纹理，因此允许定制模块化处理单元 90 以适合特定品味或者更适合于给定环境或设置。而且，通过允许每一最终使用者指定他们的特定单元的外观和总体感觉而实现较大的多样性。可装卸或可互换的插入构件还提供了为使用模块化处理单元 90 的任何公司实体或个人扩展所述单元的品牌（例如，用标志和商标）的能力。由于它们在主支撑底盘 114 的外部，插入构件将能够在需要时采取任何形式或品牌。

[0109] 除了美学之外，还认识到其他优点。在较高水平的多样性上，用于接合一个外部物体的装置为模块化处理单元 90 提供了使创建智能物体稳健并且可定制的能力。举例来说，处理单元可以对接在一个移动设备中或一个专用对接台中，在此处所述处理单元可以用作用于任何可设想的物体的控制单元，所述物体例如为船、汽车、飞机和至此无法包括一个处理单元或执行起来困难或不实际的其他物件或装置。

[0110] 参见图 6，示出了分别连接到主底盘 114 的第一末端部分 140 和第二末端部分 144 并且用以提供用于允许空气流动或传递进出模块化处理单元 90 的内部的装置的第一端板

138 或第二端板 142 中的一者的图示。第一端板 138 和第二端板 142 分别以第一端盖 146 和第二端盖 150（图 7 中所示）起作用，以对外壳模块 100 提供保护性和功能覆盖。一些实施例不包括端盖。第一端板 138 和第二端板 142 使用附接装置 110（如图 2 所示）附接到主支撑底盘 114 上。附接装置 110 典型地包括各种类型的螺钉、铆钉和本领域中通常已知的其他紧固件，但是也可以包括用于将第一端板 138 和第二端板 142 连同第一端盖 146 和第二端盖 150 一起附接到主支撑底盘 114 的其他系统或装置，如本领域中通常已知。在一个代表性实施例中，附接装置 110 包括能够在主支撑底盘 114 的四个拐角处配合在位于联合模块 154 中的对应附接接收器 190 内的一个螺钉（附接接收器 190 和联合模块 154 在图 4 中示出）。

[0111] 在结构上，第一端板 138 和第二端板 142 包括用以与主支撑底盘 114 的末端部分 140 和 144 的几何形状和设计匹配的几何形状和设计。具体来说，如图 6 中所示，第一端板 138 和第二端板 142 的周边型面包括一系列凹入边缘，每一凹入边缘的曲率半径匹配于对应壁支撑件和动态背板的曲率半径。基本上，端板 138 和 142 用以通过符合外壳模块 100 的形状来封闭外壳模块 100 的末端。

[0112] 第一端板 138 和第二端板 142 的主要功能之一是提供用于便利或允许空气流入和空气流出外壳模块 100 的装置。在如图 6 所示的示例性实施例中，此装置包括沿着端板 138 和 142 的表面或面间歇性地间隔并且延伸穿过这些端板的多个孔口或通风口 198。如下文的热力学部分中阐释，在一个实施例中，模块化处理单元 90 利用自然对流来冷却其中包含的处理组件。通过为端板 138 和 142 配备通风口 198，允许周围空气进入模块化处理单元 90 的内部，而从处理器和位于模块化处理单元 90 内部之内的其他组件产生的受热空气被允许从内部逸出或流动到外部环境。通过自然物理学，在较冷空气被吸入外壳模块 100 中时，受热空气上升并且受迫离开外壳模块 100。这种周围空气和受热空气分别的流入和流出允许模块化处理单元 90 利用一个自然对流冷却系统来冷却在模块化处理单元 90 内起作用或操作的处理器和其他内部组件。通风口 198 优选为多个，并且跨越端板 138 和 142 的大多数表面区域，并且尤其是外部周边区，因此实现空气冷却模型中的所有内部组件的增加并且高效的冷却。通风口 198 是根据确切的规范加工以优化空气流并且约束进入外壳模块 100 的部分流。通过约束一些流动，防止灰尘和其他沉积物或颗粒进入外壳模块 100 的内部，如果进入，则它们可造成模块化处理单元 90 的损坏以及性能降低。实际上，通风口 198 经过尺寸设定以仅允许空气颗粒流过其中。

[0113] 因为外壳模块 100 优选地由金属制成，整个结构或结构的一部分可以被正充电或负充电以便防止灰尘和其他颗粒或碎屑被吸引到外壳。这种静电电荷还防止静电荷跳过灰尘和其他元件并且损坏主板的可能性。提供静电电荷类似于离子过滤，仅仅是相反的。通过对外壳模块 100 负充电，排除了所有带正电的离子（即，灰尘、污垢等）。

[0114] 图 7 示出了第一端盖 146 和第二端盖 150，这些端盖被设计成分别配合在第一端板 138 和第二端板 142 上，以及主支撑底盘 114 的每一末端部分 140 和 144 的一部分上。这些端盖优选地由某种类型的减震塑料或橡胶制成，因此用以对模块化处理单元 90 提供保护屏障，以及增加它的总体外观和感觉。一些实施例不包括端盖。

[0115] 在一个实施例中，模块化处理单元 90 的占据面积或尺寸相对于常规计算机外壳或与之相比相当小。举例来说，在一个示例性实施例中，它的几何尺寸近似为 4 英寸长、4 英

寸宽以及 4 英寸高，这远小于现有相关的常规处理单元，例如桌上型计算机或甚至最便携的计算机或膝上型计算机。除了它减小的尺寸特性之外，模块化处理单元 90 还包括相当独特的几何特性。图 2 到图 3 示出了此独特形状或几何形状，它的大部分已经在上文讨论。这些尺寸和几何特性在形状上是专属的并且各自贡献于模块化处理单元 90 的特定独特的功能方面和性能。它们还提供或有助于现有相关处理单元中未发现的显著特征和优点。换句话说，如本文描述和展示的模块化处理单元 90 的专门设计允许所述单元以多种方式表现并且在多种环境中操作，这些方式和环境原本对于现有相关的常规计算机外壳和处理单元来说是不可能的。

[0116] 描述模块化处理单元 90 可以采取任何尺寸和 / 或几何形状是重要的。虽然在优选实施例中，模块化处理单元 90 实质上是 4x4x4 大小的立方体形状，但其他尺寸和形状预期在本发明的范围内。具体来说，如本文所述，处理单元可以被适配成在各种结构或超结构中使用，例如本领域的普通技术人员可设想的任何结构。在此意义上，模块化处理单元 90 必须能够包括合适的尺寸和结构以便能够采取它预期的环境的物理属性。举例来说，如果处理单元将在一个薄手持式装置内使用，它将被构造为具有薄型面物理设计，因此偏离了优选实施例的立方体状形状。照此，在模块化处理单元 90 内使用的各种计算机和处理组件也能够具有相关联的尺寸和形状和设计。

[0117] 如上所述，本发明的模块化处理单元 90 被设计成出于多个原因而具有在外壳模块 100 外部的某些主流部件。首先，由于小尺寸而有力的处理能力，模块化处理单元 90 可以实施到各种装置、系统、车辆或组合件中以按需要增强这些装置。例如特殊显示器、键盘等等常见外围装置可以在传统的计算机工作站中使用，但模块化处理单元 90 还可以在无外围设备的情况下使用，并且被定制为用于许多物件、系统等等的控制单元。换句话说，模块化处理单元 90 可以用于将“智能”技术引入到任何类型的可设想的制造物件（外部物体）中，使得外部物体可以执行一个或多个智能功能。“智能功能”可以在本文被定义为由于外部物体可操作地连接和 / 或物理上连接到计算机系统，即处理单元，而能够由外部物体执行的任何类型的计算机执行功能。

[0118] 第二，关于冷却问题，在一个计算机内部之内产生的大部分热来自两个地方—计算机处理器和硬盘驱动器。通过从外壳模块 100 移除硬盘驱动器并且将它放在模块化处理单元 90 外部的自身的外壳内，实现更好并且更高效的冷却。通过改善系统的冷却性质，处理器自身的寿命或使用期限增加，因此增加了整个计算机处理系统的寿命和使用期限。

[0119] 第三，模块化处理单元 90 优选地包括一个隔离电源。通过隔离电源与其他外围设备，所供应电压中可以刚好用于处理的部分超过了使用相同电压对除了一个或多个外围部件之外的处理器进行供电，这些外围部件例如为系统内存在的硬盘驱动器和 / 或 CD-ROM。在工作站模型中，外围组件将在无模块化处理单元 90 的情况下存在，并且将优选地由监视器电源供电。

[0120] 第四，优选地不采用灯或其他指示器来表明模块化处理单元 90 接通或断开或者是否存在任何磁盘活动。仍可以使用活动和电力灯，但是它们优选地位于监视器或其他外围壳体装置上。这种类型的设计是优选的，因为预期的是系统在将看不见灯或灯将无用的许多应用中或在灯将是破坏性的应用例如暗室和其他光敏环境中使用。然而显然，例如在常规计算机系统上存在以展示加电或磁盘使用的外部照明可以被实施或结合到实际的模

块化处理单元 90 中，如果如此需要。

[0121] 第五，例如自然对流系统等被动冷却系统可以用以从处理单元散热而不是需要某种类型的机械或受迫空气系统，例如鼓风机或风扇。当然，也考虑到了这些受迫空气系统用于一些特定实施例中。应注意，这些优点不是全包含的。本领域技术人员将认识到其他特征和优点。

[0122] 参见图 8，示出了处于组装状态的模块化处理单元 90 以及尤其是外壳模块 100 附接有第一端板 138 和第二端板 142（未示出）、第一端盖 146 和第二端盖 150、插入件 166、170（未示出）和 174（未示出），以及动态背板 134。动态背板 134 被设计成包括必要端口和相关联装置，用于将用于连接各种输入 / 输出装置和电力线的装置连接到模块化处理单元 90 以使得所述模块化处理单元能够尤其在工作站环境中起作用。虽然本文未具体示出和描述所有可用类型的端口，但预期任何现有端口连同未来将存在的任何其他类型的端口或甚至本质上专用的端口都将与模块化处理单元 90 兼容并能够被设计到所述单元中并且与所述单元一起作用。优选地，这是通过按需要设计一个不同并且互换的背板 134 来实现。

[0123] 具体来说，动态背板 134 包括 DVI 视频端口 120、10/100 以太网端口 124、USB 端口 128 和 132、SATA 总线端口 136 和 140、电源按钮 144 和电源端口 148。也考虑到了一个专用通用端口，用以将两个处理单元电连接在一起以增加整个系统的处理能力并且提供如本文指出和定义的经缩放的处理。本领域的普通技术人员将认识到可以与本发明的处理单元一起使用的各种端口。

[0124] 高度动态的可定制并且可互换的背板 134 对外围设备和垂直应用提供支持。在图示的实施例中，背板 134 选择性地连接到外壳 100 上，并且可以包括允许处理单元 90 成为动态可定制的一个或多个特征、接口、能力、逻辑和 / 或组件。动态背板 134 也可以包括一个机构，所述机构如上所述将两个或更多个模块化处理单元电连接在一起以增加整个系统的处理能力并且提供如下文将进一步披露的经缩放的处理。

[0125] 本领域技术人员将了解，具有相应的特征、接口、能力、逻辑和 / 或组件的背板 134 仅是代表性的，并且本发明的实施例涵盖具有多种不同特征、接口、能力和 / 或组件的背板。因此，通过允许一个背板由另一个背板替换以便允许使用者选择性地修改模块化处理单元 90 的逻辑、特征和 / 或能力，模块化处理单元 90 是动态可定制的。

[0126] 而且，本发明的实施例涵盖任何数量和 / 或类型的逻辑和 / 或连接器以允许在多种不同环境中使用一个或多个模块化处理单元。举例来说，一些环境可包含车辆（例如，汽车、卡车、摩托车等等）、液压控制系统、结构的和其他环境。数据操纵系统（多个）在动态背板上的改变允许针对多种环境垂直地和 / 或水平地缩放。

[0127] 应注意，在一个实施例中，外壳模块 100 的设计和几何形状提供这些端口的接口的自然凹痕。此凹痕在图 8 中示出。因此，无意中的掉下或对模块化处理单元 90 以及外壳模块 100 的任何其他冲击都将不会损坏系统，因为这些端口经由形成于动态背板内的凹痕而受保护。第一端盖 146 和第二端盖 150 也帮助保护系统不受损坏。

[0128] 电源按钮 144 具有三个状态—系统接通、系统断开，以及用于电力引导的系统备用。前两个状态系统接通和系统断开分别规定模块化处理单元 90 是否被加电或断电。系统备用状态是中间状态。当接通并接收到电力时，指示系统加载和引导模块化处理单元 90 上支持的操作系统。当断开电力时，模块化处理单元 90 将随后中断任何进行中的处理，并且

开始一个快速关断序列，之后是一个备用状态，其中系统保持不活动，等待激活加电状态。

[0129] 在此优选实施例中，模块化处理单元 90 还包括用于对系统加电的一个唯一系统或组合件。所述系统被设计成在将一根电力线和相应夹具卡扣到位于动态背板 134 上的适当端口中时变为活动的。一旦将电力线和相应夹具卡扣到电源端口 148 中，系统便将启动并开始引导。所述夹具是重要的，因为一旦电源连接并且即使电力线连接到电源端口 148 内的引线上，在夹具卡扣到适当位置之前模块化处理单元 90 也将不加电。可以例如在监视器上提供指示器，警告或通知使用者电力线未完全卡扣或正确地处于适当位置。

[0130] SATA 总线端口 136 和 140 被设计成电子地连接和支撑存储介质外围组件，例如 CD-ROM 驱动器和硬盘驱动器。

[0131] USB 端口 128 和 132 被设计成连接例如键盘、鼠标和任何其他外围组件等外围组件，其他外围组件例如为 56k 调制解调器、平板计算机、数码相机、网络卡、监视器和其他组件。

[0132] 本发明还考虑到了卡扣外围设备，这些卡扣外围设备卡扣到动态背板上并且通过卡扣连接系统连接到模块化处理单元 90 的系统总线。如所述，用于连接外围或输入 / 输出装置的其他端口和装置可以被包括和结合到模块化处理单元 90 中，如本领域技术人员所认识。因此，用于连接本文具体识别并且描述的特定端口和装置旨在仅是说明性的，并且不以任何方式进行限制。

[0133] 参见图 9，本发明的模块化处理单元 90 包括一个专用计算机处理系统 150，具有外壳模块 100，包括用于容纳被设计成在模块化处理单元 90 内操作和起作用的处理系统 150 和电印刷电路板的一种唯一设计和结构配置。

[0134] 基本上，处理系统 150 包括一个或多个电印刷电路板，优选为三个电印刷电路板，它们以如图 8 所示的三板配置 152 来定向和形成。处理系统 150 以及尤其是三板配置 152 包括如图示连接到外壳模块 100 并容纳于其中的第一电印刷电路板 154、第二电印刷电路板 158 以及第三电印刷电路板 162。处理系统 150 进一步包括至少一个中央处理器并且任选地包括被设计成执行一个或多个特定功能或任务的一个或多个其他处理器。处理系统 150 用以执行模块化处理单元 90 的操作，并且具体是执行在例如存储器装置、磁性硬盘、可装卸式磁盘、磁带盒、光盘（例如，硬盘驱动器、CD-ROM、DVD、软磁盘等）上或者从也可以视为计算机可读介质的一个远程通信连接提供的任何指令。虽然这些计算机可读介质优选地位于模块化处理单元 90 外部或无所述单元而定位，但处理系统 150 用以控制和执行通常已知的这些装置上的指令，仅有的差异在于此执行是经由用于将这些外围组件或输入 / 输出装置电连接到模块化处理单元 90 上的一个或多个装置在远程完成。

[0135] 第一电印刷电路板 154、第二电印刷电路板 158 以及第三电印刷电路板 162 是使用用于接合或连接或支撑电印刷电路板的装置支撑于主支撑底盘 114 内。在图 8 所示的实施例中，用于接合电印刷电路板的装置包括位于外壳模块 100 的每一汇接中心中的一系列板接纳通道 62。板接纳通道 62 被适配成用于接受一个电印刷电路板的一个末端部分 166。将电印刷电路板放置于外壳模块 100 内可存在若干定向，但优选地，第一电印刷电路板 154 的末端部分 166 配合在邻近于第一壁支撑件 118 定位的板接纳通道 162 内。第二电印刷电路板 158 和第三电印刷电路板 162 的末端部分 166 以类似方式配合在分别邻近第二壁支撑件 122 和第三壁支撑件 126 定位的板接纳通道 162 内，从而包括如图 9 中所示的定向。

[0136] 板配置 152 和印刷电路板不被主底盘 114 的任何壁支撑件支撑并且优选不搁置在任何壁支撑件上。每一个电印刷电路板具体通过位于汇接中心内的板接纳通道 62 支撑在主底盘 114 内。主底盘 114 以此方式被设计成在每一个电印刷电路板与相对的壁支撑件之间提供一个间隙或空间以根据本文提供的唯一自然对流冷却性质来允许模块化处理单元 90 内的适当空气流。照此，谨记此限制来设计针对每一壁支撑件计算的每一曲率半径。

[0137] 板配置 152 提供优于现有技术板配置的显著优点。作为一个优点，板配置 152 被配置于三个多层主板中，而非配置于常规计算机系统中存在的一个主板中。另外，采用较少的占据面积，因为这些板能够配置在不同平面内。

[0138] 另一优点是以此方式，主板中的两者连接到一个第三主板上。通过以此方式将第一电印刷电路板 154、第二电印刷电路板 158 以及第三电印刷电路板 162 中的每一者连接在一起，这些板中的每一者从它们在主底盘 114 和外壳模块 100 内的适当位置脱离的机会显著降低。在模块化处理单元 90 所暴露于的实际上任何情况和条件下，三板配置 152 都将保持完整并且成工作顺序，因此维持或保留系统的完整性。这即使在冲击和所施加负载的情形中也是真实的。

[0139] 优选地，第一电印刷电路板 154 和第三电印刷电路板 162 在制造期间以及在板配置 152 放置于外壳模块 100 内之前附接到第三电印刷电路板 158 上。一旦组装完板配置 152，便将它插入到主支撑底盘 114 中并紧固到所述底盘上，如图示。应注意，不一定利用所有板接纳通道 62。

[0140] 图 9 示出了优选实施例，其中仅使用这些通道中的四个来支撑电印刷电路板的对应末端部分。然而，图 9 仅示出了一个示例性实施例。考虑到了用于处理系统 150 的其他配置设计。举例来说，模块化处理单元 90 可以仅包括一个板，或者两个或更多个板。而且，处理系统 150 可以包括分层设计配置，其中所包括的印刷电路板以多平面配置存在。本领域技术人员将认识到若干配置和可能性。

[0141] 除了上文讨论的许多优点之外，本发明特征在于其他显著优点，其中之一是由于外壳模块 100 包括一个全金属底盘或一个主支撑底盘 114，因此呈电磁干扰 (EMI) 形式的辐射放射极少或不存在。这较大程度地是由于处理组件相对于外壳模块 100 的结构组件的材料性质、小尺寸、结构的厚度以及紧密接近。处理组件产生的任何 EMI 都由外壳模块 100 吸收，无论处理组件的处理功率如何。

[0142] 另一显著优点在于，外壳模块 100 实现了与现有技术计算机外壳设计相比清洁得多的较卫生的内部。由于外壳模块 100 的设计，尤其是小尺寸、通风端口以及散热性质，灰尘颗粒和其他类型的异物很难进入外壳。在整个外壳可以被密封的液体冷却模型中尤其如此。一个较卫生的内部是重要的，因为各种类型的异物或碎屑可以损坏模块化处理单元 90 的组件和 / 或降低它的性能。

[0143] 虽然模块化处理单元 90 在一个示例性实施例中依赖于自然对流，但在自然对流过程期间的空气自然流入和流出显著减少了灰尘颗粒或其他碎屑流入模块化处理单元 90，因为不存在受迫空气流入。在本文描述的自然对流冷却系统中，根据自然物理学原理，空气颗粒进入外壳模块 100 的内部，且较不易于用它们携带较重的异物，因为只有较少的力来用于此。这在如大多数环境那样包含这些较重异物的环境中是有利的。

[0144] 模块化处理单元 90 的独特冷却方法将允许它较适合于现有相关外壳无法放置于

内的那些环境。

[0145] 本发明的模块化处理单元 90 的再另一个显著优点是它的耐久性。由于紧凑设计和基于半径的结构，外壳模块 100 能够承受大量冲击和所施加的力，这是也贡献于模块化处理单元 90 适于任何类型的可设想环境的能力的特征。外壳模块 100 可以承受小的和大的冲击力，对它的结构完整性或电路系统只有极少影响，与模块化处理单元 90 的小尺寸和便携性一样重要的优点有助于许多可设想的环境，其中一些环境可能相当恶劣。

[0146] 除了外壳模块 100 的结构组件是非常耐久的之外，电印刷电路设计板和相关联电路系统也是极为耐久的。一旦插入，印刷电路板便很难移除，尤其是由于无意中的力，例如掉下或冲击外壳。而且，这些板重量极轻，因此在下落期间没有足够质量来摔坏。然而显然，外壳 100 不是完全不可破坏的。在多数情况下，外壳模块 100 将比板配置更耐久，因此模块化处理单元 90 的总体耐久性受到其中的板配置和电路系统的限制。

[0147] 简单来说，外壳模块 100 包括现有相关外壳设计中不存在的高度耐久性。实际上，这些设计将在非常轻的冲击或所施加力下损坏并且经常这样。本文描述的模块化处理单元 90 不是这样。

[0148] 外壳模块 100 的耐久性是从两个主要特征导出。首先，外壳模块 100 优选地以多种半径来建立。每一个结构组件和它们的设计由一种或多种半径组成。这显著增加了外壳模块 100 的强度，因为基于半径的结构提供了可用最结实设计之一。第二，外壳模块 100 的优选总体形状是立方体的，因此提供了显著刚性。与立方体设计的刚性相结合的基于半径的结构组件提供非常耐久又起作用的外壳。

[0149] 单个处理单元 / 立方体的耐久性允许处理在传统技术原本不可想象的位置进行。举例来说，处理单元可以埋入土中、位于水中、埋入海中、放置于驱动到土中数百英尺的钻头的头部上、安装在不稳定表面上、安装到现有结构上、放置于家具中等等。潜在的处理位置是无限的。

[0150] 本发明的处理单元进一步特征在于能够使用用于安装的装置和用于接合一个外部物体（各自优选地包括滑动接收器 182，如主支撑底盘 114 的每一壁支撑件上所存在）的装置而安装到或被安装任何结构、装置或组合件。能够以任何方式接合模块化处理单元 90 以使得两者可操作地连接在一起的任何外部物体是预期在此受保护的。另外，本领域技术人员将认识到，外壳模块 100 可以包括其他设计或结构作为除了滑动接收器 182 之外的用于接合一个外部物体的装置。

[0151] 基本上，无论如何实现，对处理单元提供可安装性的重要性是能够将模块化处理单元 90 集成到如本文讨论的任何类型的环境中，或允许将各种物件或物体（外部物体）连接或安装到模块化处理单元 90 上。所述单元被设计成安装到各种无生命物件，例如多路复用处理中心或运输车辆，以及接纳直接安装到模块化处理单元 90 上的各种外围设备，例如一个监视器或 LCD 屏幕。

[0152] 在至少一些实施例中，可安装性特征被设计成一个内建特征，意味着模块化处理单元 90 包括用于接合直接建立到它的结构组件中的一个外部物体的装置。使用独立安装托架（例如，用作适配器以完成主机处理单元连接的那些安装托架）的安装以及直接安装到一个主机上（例如，将单元安装在汽车中，而不是汽车立体声系统中）也预期在此受保护。

[0153] 模块化处理单元 90 的另一能力是在实现外壳模块的额外硬化的情况下能够安装并实施于一个超结构内，例如 Tempest 超结构。在此配置中，模块化处理单元 90 安装在如本文描述的结构内，并且用以对结构的组件或外围组件进行过程控制。模块化处理单元 90 还在必要时用作物理结构的一个负载支承构件。本文考虑到了所有不同类型的超结构，并且可以由任何类型的材料制成，例如塑料、木材、金属合金和 / 或这些的复合物。

[0154] 其他优点包括噪声和热的减少以及能够引入可定制的“智能”技术到各种装置中，例如家具、器材、车辆、结构、支撑件、电器、设备、个人物件等等（外部物体）。这些概念在下文详细讨论。

[0155] 如上文提供，本发明处理单元不同于任何其他现有相关计算处理系统之处在于，由于它独特的设计和配置，处理单元可以与一个外部物体相关联、集成到所述外部物体中或另外可操作地与所述外部物体连接以引入可定制的“智能”技术到所述外部物体中，因此允许所述外部物体执行它原本将无法执行的许多智能功能。另外，稳健的可定制计算系统可以适用于各种所识别类型的企业应用，例如计算机和计算系统、电子器件、家用电器、各种行业中的应用等等。此部分详细描述上述处理单元能够提供这些稳健的可定制计算系统以及它们在若干示例性企业应用中的适用性。

[0156] 本发明的实施例特征在于能够将一个专用处理单元集成、结合或另外可操作地连接到任何可设想的系统、装置、组合件、设备或物体（统称为“外部物体”）中以将智能引入到外部物体中或者针对外部物体执行一个或多个计算功能或者相对于外部物体满足其他功能，如本领域技术人员所认识。通过此做法，物件基本上变为或转变成“智能”物件，意味着外部物体可以执行原本不可能的许多功能和任务。具体来说，通过处理单元到一个外部物体的可操作连接，外部物体变为能够比不存在一个处理单元的情况起到更多作用。举例来说，如果是电子外部物体，处理单元可以与所述电子外部物体的电路系统（如果存在）集成以提供增加的计算和处理能力。如果结合到一个机械组合件或装置或系统中，一个处理单元的添加可以允许由计算机控制或更具体地控制力学，或者可以允许若干其他计算功能成为可能。如果结合到一个现有结构中，一个处理单元的添加可以允许所述结构执行原本不可能的计算功能。而且，处理单元可以用作对一个结构的一个支撑组件，或本身支撑一个负载。基本上，对由于可操作地连接处理单元而可以使外部物体执行的功能的类型不存在限制。然而，这些能力将受到建立到处理单元中的设计和处理能力限制，如本领域的普通技术人员所认识。将与各种外部物体可操作地连接的这种能力是常规现有相关计算装置中不存在的独特特征，并且通过模块化处理单元 90 的设计、结构和处理能力组合而成为可能。

[0157] 将一个处理单元结合或可操作地连接到一个外部物体上可以在处理单元物理地附接或不附接的情况下实现。在一些情况下，可能不希望物理地附接所述单元。无论物理附接的类型如何，处理单元都可操作地连接到外部物体上，意味着处理单元在某种程度上与外部物体自身一起作用以对外部物体提供计算能力。如所述，这可以通过现有或内建的电路系统或安装的电路系统或者通过其他方式实现。

[0158] 在一个示例性实施例中，模块化处理单元 90 物理地连接到外部物体上。所述物理连接由于模块化处理单元 90 的“滑动接通”或“卡扣接通”能力而成为可能。通过“滑动接通”和“卡扣接通”，意味着模块化处理单元90可以接受各种托架、底座、装置等等，方式是将它们分别滑动或卡扣到位于模块化处理单元 90 上的一个合适的接受器或接收器中，例如

滑动接收器 182。另外，一个完整模块化处理单元 90 可以使用相同接收器滑动或卡扣到另一结构中。基本上，本发明提供允许模块化处理单元 90 接受不同外围物件或结合到另一结构中的方式。在其他实施例中，用以将处理单元安装到一个外部物体上的特定方法和 / 或系统可以是本领域中众所周知的。

[0159] 因此，处理单元由于它独特和专用的设计而可以基本上用作驱动并控制许多组件、结构、组合件、设备模块等等的操作的引擎。

[0160] 图 10 示出了用于将模块化处理单元 90 连接到外部物体 280 的一个实施例。在所示的实施例中，模块化处理单元 90 以电和物理方式可操作地连接到外部物体 280 上。物理连接是通过定位形成于外部物体 280 上的接合构件 278 并且将它们配合或插入到位于模块化处理单元 90 上的滑动接收器 182 中来实现（参见上文关于图 5 的讨论）。将接合构件 278 插入到滑动接收器 182 中有效地用以将模块化处理单元 90 物理上连接到外部物体 280，从而使得处理单元可以用作外部物体自身的一个结构组件（例如，负载支承或非负载支承）或用作用于一个或多个外部物体的支撑件。当然，如本领域的普通技术人员将认识到，可以使用其他方法和系统来将处理单元物理上连接到外部物体 280，这些方法和系统中的每一者旨在在此被涵盖和受保护。

[0161] 图 10 进一步示出了用于将模块化处理单元 90 可操作地连接到外部物体 280 的装置包括一个连接绳，所述连接绳将外部物体 280 周围或内部存在的电路系统与模块化处理单元 90 周围或内部的存在的电路系统连接在一起。这优选地是通过模块化处理单元 90 的一个或多个端口来完成。

[0162] 处理单元能够以无数的方式被安排以提供一个稳健的可定制计算系统。下文为了图示目的提供了若干此类系统。应注意，以下示例不应解释为以任何方式进行限制，因为本领域的普通技术人员将认识到实际上无限可设想的安排和系统，它们可以包括一个或多个处理单元来产生一个稳健的可定制计算系统，以及可以利用此系统的许多不同类型的企业应用。

[0163] 现在参见图 11，示出了一个代表性企业 370，其中在一个个人计算企业中单独采用具有非基于外围的外壳的一个动态模块化处理单元 340。在图示的实施例中，处理单元 340 包括电力连接 371，并且对于企业 370 的外围装置采用无线技术。外围装置包括具有硬盘驱动器 374、扬声器 376 和 CD ROM 驱动器 378 的监视器 372、键盘 380 以及鼠标 382。本领域技术人员将了解，本发明的实施例还涵盖采用除了无线技术之外的技术的个人计算企业。

[0164] 处理单元 340 是企业 370 的驱动力，因为它提供了操纵数据以便执行任务的处理能力。本发明的动态和可定制特征允许使用者容易地增强处理能力。在本实施例中，处理单元 340 是一个 4 英寸立方体，所述管利用热力学冷却并且优化处理和存储器比率。然而，如本文提供，本发明的实施例涵盖除了热力学冷却过程之外或替代于热力学冷却过程使用其他冷却过程，例如受迫空气冷却过程和 / 或液体冷却过程。此外，虽然示出的实施例包括一个 4 英寸立方体平台，但本领域技术人员将了解，本发明的实施例涵盖使用大于或小于 $3^1/_2$ 英寸立方体平台的一个模块化处理单元。类似地，其他实施例涵盖使用除了立方体之外的形状。

[0165] 具体来说，示出的实施例的处理单元 340 包括 2GHz 处理器、1.5G RAM、512L2 高速

缓冲存储器以及无线联网接口。因此例如，如果企业370的使用者确定对于企业370需要增加的处理能力，而不是如某些传统技术所需那样必须购买一个新系统，那么所述使用者可以简单地添加一个或多个模块化处理单元到企业370。处理单元/立方体可以由使用者按执行处理所需来选择性地分配。举例来说，处理单元可以用以执行分布式处理，每一单元可以被分配用于执行一个特定任务（例如，一个单元可以专用于处理视频数据或另一任务），或者模块化单元可以共同用作一个处理单元。

[0166] 虽然本示例包含一个包括2GHz处理器、1.5G RAM和512L2高速缓冲存储器的处理单元，但本领域技术人员将了解，本发明的其他实施例涵盖使用一个更快或更慢的处理器、更多或更少RAM和/或一个不同的高速缓冲存储器。在本发明的至少一些实施例中，处理单元的能力取决于处理单元将用于的特征。

[0167] 虽然图11示出了在图示桌面上的处理单元340，但处理单元/立方体的稳健特征允许单元340可替代地放置于不明显位置中，例如墙壁中、安装在桌子下方、装饰装置或物体中等等。因此，示出的实施例避免了往往被踢倒以及往往从塔内的冷却系统产生声音的传统的塔。没有声音从单元340发出，因为当采用对流冷却或液体冷却时所有内部组件都是固态的。

[0168] 现在参见图12，提供了在一个计算企业中利用一个模块化处理单元的另一示例。在图12中，示出了模块化处理单元340用作一个负载支承构件的能力。举例来说，一个模块化处理单元可以用以将两个或更多个结构桥接在一起，并且对结构或企业的总体结构支撑和稳定性有贡献。另外，一个模块化处理单元可以支承直接附接到一个主支撑体上的一个负载。举例来说，一个计算机屏幕或监视器可以由一个模块化处理单元物理上支撑并进行处理控制。在示出的实施例中，监视器390安装到模块化处理单元340上，所述模块化处理单元又安装到具有一个基座394的一个支架392上。

[0169] 现在参见图13，示出了另一个代表性企业，其中在计算企业中采用具有非基于外围的外壳的一个动态模块化处理单元340。在图13中，代表性企业类似于图12中示出的实施例，然而一个或多个模块化外围设备选择性地连接到企业上。具体来说，图13示出了作为外围设备选择性地连接到企业的大容量存储装置393。本领域技术人员将了解，可采用任何数量（例如，少于两个或多于两个）和/或类型的外围设备。这些外围设备的示例包括大容量存储装置、I/O装置、网络接口、其他模块化处理单元、专用I/O连接、专用装置和类似物。

[0170] 图14示出了一个动态模块化处理单元的另一示例。在图14中，动态模块化处理单元是在外围模块452的一个说明性实施例的分解透视图中示出。所述外围模块452包括一个总线端口460，用于将一条总线（未示出）连接到基本模块450。在一个示例中，总线端口460是一个USB端口，但如上文提到，所述总线可以是任何类型的总线。所述总线用以在基本模块450（图15）与外围模块452之间驱动输入/输出命令（例如，键盘、鼠标和视频命令），并且较快的总线简单地允许较多命令在模块之间传递，但在输入和显示中仅需要采用足够的命令或者另外输出来自基本模块450的输出。

[0171] 外围模块452还包括若干其他类型的端口以允许输入/输出装置454的连接。举例来说，示出的实施例包括一个视频端口462、一个音频输入端口464、一个音频输出端口466以及一些额外总线（例如，USB）端口468。此实施例的音频输入端口464和音频输出端

口 466 允许例如在一个呼叫中心使用此实施例。USB 或其他总线端口 468 可以用以连接其他输入/输出装置，例如键盘和鼠标。示出的端口旨在仅是说明性的而不是限制性的。外围模块 452 使用并管理这些各种端口以产生基本上作为基本模块 450 上的会话的用户体验。

[0172] 图 14 示出了可如何构造外围模块 452。如此图中可见，外围模块 452 包括一个外部结构壳 470 和两个端盖 472。结构壳 470 和端盖 472 用以封闭和保护外围模块 452 的一个系统板 474。结构壳 470 可以由多种材料制成，包括塑料和金属，包括铝和/或金属合金，并且可以用一种方式形成以便提供如相关应用中讨论的结构功能。另外，可以形成结构壳 470 以便与如图 15 中示出的基本模块 450 的结构配合。如图 14 中所示，上文讨论的各种端口附接到系统板 474 上。一个端口盖板 476 可以用于覆盖不同端口之间的任何间隙。

[0173] 图 16 和图 17 分别示出了外围模块 452 的端视图和透视图。在这些视图中，结构壳 470 的一些特征是可见的，示出了与基本模块 450 或其他外围模块 452 的配合可以实现的一种方式。如图 16 和图 17 中可见，结构壳 470 可以被形成（例如，挤压）为具有一对配合突出部 478，位于外围模块 452 的一个主要侧上。如图 18 中可见，结构壳 470 的相对主要侧在此实施例中被形成为具有相应的一对配合通道 479，可以接受配合的突出部 478。如图 16 到图 18 中还可见，端盖 472 不包括配合突出部 478 或相应的配合通道 479。基本模块 450 在它的至少一侧上、并且可能在它的多达三侧上（但再次，不在它的端盖上）包括相应的配合通道 479。

[0174] 为了以图 15 所示的方式将外围模块 452 结构上附接到基本模块 50，移除基本模块 450 的一个端盖 480（可以使用防篡改紧固件来阻止偷窃或破坏），并且外围模块 452 的配合突出部 478 与基本模块 450 的相应配合通道 479 滑动地接合。外围模块 452 滑动直到它与基本模块 450 完全配合。将基本模块 450 的端盖 480 重新附接到基本模块 450 上，并且由此将外围模块 452 锁定到基本模块 450。额外的外围模块 452 或其他组件可以按需要使用外围模块 452 或基本模块 450 的其他侧的配合通道 479 附接到系统上，其中相应的端盖 (472 或 480) 被移除以便于这种附接。

[0175] 图 14 到图 18 中所示的实施例仅说明可以构造实施例以准许模块之间以及与其他装置的结构连接的方式。因此，举例来说，虽然示出的外围模块 452 在一个主要侧上具有配合突出部 478 并在另一主要侧上具有配合通道 479，但另一实施例可以在两个主要侧上具有配合通道 479，如图 19 所示的一个替代外部结构壳 470 的端视图描绘中示出。

[0176] 外围模块 452 的结构壳 470 可以是一个或多个相关申请中披露的负载支承。外围模块 452 因此可以用作用来悬挂监视器或其他装置的一个支架，可以嵌入或安装在墙壁中，可以是一个框架的一部分，并且可以执行相关申请中披露的任何结构功能。举例来说，可以将一个板安装到墙壁上并且可以将另一个板安装到监视器上，并且可以通过外围模块 452 的结构特征将这两个板连接在一起。图 20 中示出了一个板 481 的一个说明性实施例。板 481 是一个挤压切割板，具有类似于上文讨论的多个配合突出部 478，但它可以替代地具有多个配合通道 479。板 481 可以安装到本文讨论的多个模块中的任一者，例如外围模块 452。因此，外围模块 452 可以基本上用作一个智能安装托架。

[0177] 一个包括外围模块 452 的系统在某种程度上不同于一个完全由基本模块 450 构成的系统，即使基本模块 450 具有多种类型。举例来说，如相关申请中披露，基本模块 450 可以彼此连接并且可以包括各种特征（例如包含 GPU 而非 CPU 的一个或多个立方体）以便增加

组合单元的处理能力。举例来说，一些单元组合可以基本上一起作用以形成一个超计算机或提供类似超计算机的功能。相比之下，将外围模块 452 添加到系统（无论基本模块 450 的数量和配置如何）主要用以允许通过外围模块 452 来分布基本模块 450 的计算能力。（如上文讨论，具有超过最小计算能力的外围模块 452 可以被使用并且因此可以对系统增加一些处理能力，并且额外的系统资源（例如，打印机、大容量存储装置、网络摄像机和类似物）可以附接到外围模块 452 上并因此变为可供组合系统使用。）

[0178] 因此，将外围模块 452 添加到系统允许通过使用所述能力驱动图形用户接口 (GUI) 来将资源共享到人的要素。因此，由此准许使用者查看和操纵在所述一个或多个连接的基本模块上可用的数据。外围模块 452 无需被设计成在外围模块 452 处进行除了向输入 / 输出装置 454 传递数据以及从这些装置传递数据之外的工作。而是外围模块 452 准许对基本模块 450 上的 GUI 会话的接入，由此提供对基本模块 450 上可用的数据、程序和其他资源的接入。主要计算功能由基本模块（多个）450 处置，并且每一外围模块 452 用以打开一个窗口来接入基本模块多个）450 的资源。

[0179] 代表性安装托架

[0180] 图 21 示出了一个代表性安装系统 500，包括安装板 502、安装连接器 510 和底盘 520。安装板 502 包括被配置成用于与安装在一个监视器、电视机或其他装置上的 VESA 对准的多个孔口。可替代地，板 520 可以用以紧固到任何表面或物体上。板 502 包括被对准于连接器 510 中的孔口 512 的多个孔口。此外，连接器 514 包括被配置成用于滑动到底盘 520 的通道 522 中的多个突出部，它可以是任何类型的模块化处理单元（包括一个基本模块或一个外围模块）。此外，底盘 520 包括能够滑动到一个模块化处理单元的另一底盘的通道中的多个突出部 524。

[0181] 图 22 示出了另一代表性安装托架 530，它可以包括任何金属、金属合金、铝、铝合金、尼龙、混合材料、聚合物或其他耐久的材料。托架 530 包括被配置成用于与安装在一个监视器、电视机或其他装置上的 VESA 对准的多个孔口 532。托架 530 进一步包括被配置成用于选择性地安装一个或多个连接器 510 以及一个或多个相应模块化处理单元的多个孔口 534。

[0182] 图 23 示出了安装一个模块化处理单元的代表性方式。系统 540 包括使用 VESA 安装孔口 532 已安装有托架 530 的监视器 542。孔口 534 用以将连接器 510 安装到托架 530 上，并且使用通道 / 突出部系统将模块化处理单元 520 安装到连接器 510 上。图 24 示出了图 23 的安装一个模块化处理单元的代表性方式的组装视图。

[0183] 图 25 示出了安装一个模块化处理单元的另一代表性方式，其中托架 530 是动态的，因为它允许在多种定向、即顺时针或逆时针旋转 90 度定向上到监视器 542 的连接。图 26 示出了图 25 的安装一个模块化处理单元的代表性方式的组装视图。

[0184] 图 27 示出了安装一个模块化处理单元的另一代表性方式，其中监视器 542 上面安装有托架 530。安装臂 550 也安装到托架 530，所述安装臂具有相应的 VESA 孔口 552、铰链连接的臂 554、以及表面 556。而且，连接器 510 用以将模块化处理单元 520 安装到托架 530 上。图 28 示出了图 27 的安装一个模块化处理单元的代表性方式的组装视图。图 29 示出了图 27 的安装一个模块化处理单元的代表性方式的俯视图。图 30 示出了图 27 的安装一个模块化处理单元的代表性方式的透视图。

[0185] 图 31 示出了另一代表性安装托架 560 的透视图，它可以包括任何金属、金属合金、铝、铝合金、尼龙、混合材料、聚合物或其他耐久的材料。托架 560 包括被配置成用于与安装在一个监视器、电视机或其他装置上的 VESA 对准的多个孔口 562。托架 560 进一步包括被配置成用于选择性地安装一个或多个连接器 510 以及一个或多个相应模块化处理单元的多个孔口 564。托架 560 进一步包括具有多个孔口 572 的末端 570 以及具有多个孔口 582 的末端 580。孔口 572 和 582 被配置成用于选择性地安装一个或多个连接器 510 以及一个或多个相应模块化处理单元。

[0186] 图 32 示出了安装一个模块化处理单元的代表性方式。在图 32 中，托架 560 是使用 VESA 安装孔口 562 安装在监视器 590 上。孔口 572 和 582 用以使用一个螺钉或其他附接装置将连接器 510 安装到托架 560 上。此外，连接器 510 上的突出部滑动到模块化处理单元 520 的相应通道中以将单元 520 安装到相应连接器 510 上。图 33 示出了图 32 的安装一个模块化处理单元的代表性方式的组装视图。托架 560 可以用 90 度旋转增量动态地安装到电视机 / 监视器 590 上。

[0187] 在机柜或其他配置中连接模块化处理单元

[0188] 虽然图 34 示出了一个机柜 630，包括被配置成用于接纳单个处理单元 632 的多个抽屉，但本发明的其他实施例包括使用可以与一个处理单元相关联使用以将单元安装到一个杆上的一个安装托架。示出的实施例进一步包括一个冷却系统（未示出），所述冷却系统允许对机柜 634 内的温度控制，并利用通风口 638。

[0189] 图 35 示出了在一个机架中、在一个机柜中或在一个表面上安装模块化处理单元的另一代表性方式。在图 35 中，模块化处理单元 710 是使用一个 DIN 轨道安装系统安装到机柜 700 中。

[0190] 参见图 36，机柜 700 是一个壁装式机柜，包括一个或多个 DIN 轨道 730。包括聚合物材料、金属合金、混合材料、尼龙或其他材料的 DIN 轨道连接器 720 用以选择性地将一个模块化处理单元 710 安装到 DIN 轨道上。

[0191] 参见图 37，模块化处理单元 710 包括具有多个通道 714 的底盘 712。DIN 轨道连接器 720 具有多个突出部 722，这些突出部被配置成用于滑动到通道 714 中并且在将端板紧固到单元 710 上之后被紧固。Din 轨道连接器 720 进一步包括把手 726，所述把手选择性地使连接器 720 弯曲以便使用表面 724 来夹到 DIN 轨道 730 的表面 732 上。通过使把手 726 朝向底盘 712 接近，连接器可以选择性地从轨道 730 连接或断开连接。

[0192] 图 38 示出了一个代表性 DIN 轨道安装系统的另一视图，其中模块化处理单元 710 安装到 DIN 轨道 730 上，这些轨道安装在机柜 700 中。

[0193] 图 39 示出了具有容器 810 和盖 812 的另一个代表性安装系统 800。如图 40 中示出，容器 810 包括多个压入配合突出部 814，这些突出部可以被推入到一个模块化处理单元 820 的相应通道中，如图 41 到图 45 所示。容器 810 可以包括任何材料，包括聚合物材料、尼龙、混合物、金属、金属合金或其他材料。因此，单元 820 可以容易地从容器 810 安装和 / 或移除

[0194] 通过在所图示的各种代表性企业中使用处理单元来示出处理单元 / 立方体的模块化特征。本发明的实施例涵盖在铜和 / 或纤维通道设计中链接单元 / 立方体，串联或并联连接这些立方体，指定单个立方体执行特定处理任务，以及其他处理配置和 / 或分配。

[0195] 每一个单元 / 立方体包括一个完全可重新配置的母板。在一个实施例中，所述一个或多个处理器位于母板的背板上，并且 RAM 模块位于与母板的背板垂直的平面上。在又一实施例中，这些模块垂直连接到板上而非使用传统的插座。对 RAM 模块优化了单元的时钟循环。

[0196] 虽然一种用于改善企业的处理能力的方法包括对所述企业添加一个或多个额外处理单元 / 立方体，但另一方法包括用具有经过升级的模块的平面替换一个特定单元 / 立方体的母板的平面。类似地，在每一个单元 / 立方体处可用的接口可以通过选择性地替换单元 / 立方体的一个面板来更新。而且，32 位总线可以升级成 64 位总线，可以提供新功能性，可以提供新端口，可以提供 / 升级电源组子系统，并且可以通过替换一个或多个面板对单个处理单元 / 立方体做出其他此类修改、升级和增强。

[0197] 现在参照图 45 和图 46，提供了一个壁内安装系统。图 46 示出了被配置成用于动态地安装一个或多个计算机装置的代表性容器或机柜。根据至少一些实施例，这些计算机装置卡扣到和 / 或滑入托架内。在至少一些实施例中，托架或连接器本质上是动态的以允许以各种定向和 / 或配置安装计算机装置。进一步地，在至少一些实施例中，托架或连接器接收计算机装置，其中，这些计算机装置包括不同的尺寸或配置。因此，在同一空间或占地面积中可使用多种安装选项。进一步地，这些计算机装置可以面对面，可以面向用户，或可以背离另一个计算机装置。此外，所述容器、机柜或箱本质上是模块化的，以允许这种容器、机柜或箱堆叠。图 46 提供了这种堆叠的示例。

[0198] 虽然所示实施例示出了壁内安装，但本领域普通技术人员将认识到本发明的实施例包括了可以连接到任何固定或稳定装置或表面上的容器、机柜或箱的使用。举例来说，一些实施例包括将一个或多个计算机装置安装在机柜、机架、容器诸如此类中。

[0199] 在一个实施例中，容器或机架包括架子、平台、管或其他接收装置或结构以固持或以另外的方式接收计算机装置。举例来讲，参照图 48 至图 58，其示出了选择性接收多个计算机装置、存储装置、和 / 或外围装置的抽屉、托盘、管或其他结构。图 48 中，抽屉或托盘表面接收了多个计算机装置。在一些实施例中，机柜或容器（如图 55 和图 56 中所示的代表性机柜）固持计算机装置的多个抽屉或托盘。图 49 中，提供了一个分解图以示出托盘、多个计算机装置和阻尼系统以允许和促进散热和 / 或对这些计算机装置进行冷却。参照图 50，示出了阻尼器系统以示出所述阻尼器系统的使用。在一个实施例中，暖空气通过计算机装置的竖直对齐阵列的顶部逃逸。在另一个实施例中，冷空气被迫从托盘的底部或从其一侧出来并且被允许以一种允许同时冷却所有计算机装置的方式移动通过所述阻尼器系统。在一个实施例中，手动地调整阻尼器。在另一个实施例中，取决于单独计算机装置在所述阵列中的位置，根据单独计算机装置调整这些阻尼器。在另一个实施例中，取决于相关联的计算机装置的热量自动地调整这些阻尼器。在另一个实施例中，通过相应的计算机装置取决于那个具体计算机装置的温度调整这些阻尼器。

[0200] 参照图 51 至图 53，提供了另一个实施例，其中，使用阻尼技术对可操作地连接的计算机装置托盘进行冷却。冷空气进入到一端内并且通过这些阻尼器被输送到这些计算机装置下面与其内。这些阻尼器允许暖空气退出这些计算机装置中的每个计算机装置的一端并且当暖空气上升时逃离和逃出这些计算机装置。在一个实施例中，通过使用一个或多个风扇允许冷空气进入。另一个实施例中，封闭的环境允许在一端或一侧上施加一定量的压

力（例如，一巴的压力或另一个量值）以允许空气流动。手动地或自动地调整阻尼器以均匀且高效地冷却计算机装置和/或允许暖空气逃逸。

[0201] 现在参照图 54，示出了包括一个内部通道的托盘。将环境空气或冷空气牵引到所述内部通道内。多个计算机装置安装到或以另外的方式连接到所述托盘的顶面上。这些计算机装置被安装在所述托盘的出口位置处的隔板分离开。相应地，空气从所述托盘的内部通道流出并且流出所述托盘的顶面中的出口位置。退出这些出口位置的空气通过隔板输送以引起空气进入这些计算机装置。然后空气退出这些计算机装置并且向上流过这些隔板的背面至位于此计算机装置托盘上方的表面，此托盘可以是堆叠在此托盘上方的另一个计算机装置托盘。因此，在所述计算机装置托盘上方的表面处收集暖空气并且通过风扇或通过压力将其牵引离开。在一些实施例中，通过注入空气和/或通过将暖空气牵引出去来创造气流。在一些实施例中，通过压力创造气流。

[0202] 相应地，本发明的至少一些实施例包括动态冷却。举例来说，以相同的输入温度同时冷却所有计算机装置。

[0203] 在一些实施例中，空气被驱动或以另外的方式牵引通过所述多个计算机装置以提供内部冷却，并且空气被驱动这些计算机装置的外侧上或以另外的方式驱动到其上方以向所述多个计算机装置的底盘提供冷却。

[0204] 此外，虽然图 54 中显示计算机装置水平地安装或以另外的方式连接，但在其他实施例中，安装或以另外的方式连接计算机装置，以便被竖直地定向以允许计算机装置的顶面和底面上的通风孔允许空气从托盘的内部通道通过托盘的出口向上流动通过竖直定向的计算机装置。

[0205] 相应地，在一些实施例中，所有计算机装置基于阻尼器系统为每个相应的计算机装置创造的气流通道的直径接收气流。在一些实施例中，所述气流通道包括被切割成合适直径的多个孔口。在一些实施例中，通过阻尼器的自动化控制创造这些直径。在进一步的实施例中，每个计算机装置控制阻尼器系统创造的其自己的相关联的气流直径。

[0206] 在一些实施例中，提供了一种封闭环境。在一端提供了压力，如一巴的压力或另一个量值。所述压力允许根据所述阻尼系统流动通过所述阵列，由此允许暖空气逃逸和冷却计算机装置。

[0207] 在一些实施例中，所述容器为包含多个计算机装置的移动式容器并且允许所述容器移动到位。在一些实施例中，所述移动式容器包括允许移动的电机和/或驱动机构。在一些实施例中，将所述容器从一个位置驱动到另一个位置。在一些实施例中，所述容器为空调式以保持所希望温度的封闭容器。在另一个实施例中，所述容器为防震安装的。在另一个实施例中，在一侧或一端提供一定量的压力（如一巴的压力或另一个量值）以允许空气流动。在一些实施例中，所述容器包括多个计算机装置架子或托盘。在一些实施例中，同时冷却所有计算机装置。在一些实施例中，通过空气阻尼、空气管、或空气阻尼器系统、或允许空气流动的其他系统来冷却这些计算机装置。

[0208] 在一些实施例中，所述容器为货车挂车。在一些实施例中，所述容器与图 34 中所提供的相同。在一些实施例中，所述容器是允许选择性连接到一个或多个其他挂车上的动态模块化容器。在至少一些实施例中，所述容器的计算机装置可操作地连接。此外，在至少一些实施例中，这些计算机装置可以安装在所述容器中和/或所述托盘上的计算机的相同

占地面积或空间内的各种位置其中之一上。

[0209] 在一些实施例中，所述容器、机柜或机架在移动装置（如在车轮上）、轨道系统、或允许所述容器、机柜或机架移动的其他装置上。此外，一些实施例进一步包括允许所述容器、机柜或机架移动的电机或驱动机构。在一些实施例中，所述容器基于所希望的配置允许这些计算机装置中的具体多个计算机装置。在一些实施例中，所述容器包括一个铰链门以允许选择性的打开或封闭所述容器。在一些实施例中，壁内单元是空调单元。

[0210] 本发明的实施例包括各种组织结构。举例来讲，并且如上所述，本发明的一些实施例包括具有多个托盘的一种机柜，这些托盘具有多个计算机装置。图 55 和图 56 中示出了代表性示例。图 57 和图 58 示出了其他代表性配置。

[0211] 图 57 中，示出了选择性接收多个计算机装置的代表性管状配置。所述代表性配置安装在一个结构内，如在壁或拱顶内。计算机装置安装或以另外的方式连接到包括一个中心管的结构上。相应地，空气可以被牵引通过这些计算机装置并且被接收到中心管内以被牵引出所述系统，由此同时冷却所述多个计算机装置中的所有计算机装置。可替代地，可以从所述中心管供应空气或迫使其通过这些计算机装置以同时冷却所述多个计算机装置中的所有计算机装置。在某些实施例中，气压的建立引起空气移动。

[0212] 图 58 中，示出了选择性接收多个计算机装置的另一个代表性配置。所述代表性配置是货车车轮式结构。计算机装置安装或以另外的方式连接到包括一个中心管的所述结构上。相应地，空气可以被牵引通过这些计算机装置并且被接收到中心管内以被牵引出所述系统，由此同时冷却所述多个计算机装置中的所有计算机装置。可替代地，可以从所述中心管供应空气或迫使其通过这些计算机装置以同时冷却所述多个计算机装置中的所有计算机装置。在某些实施例中，气压的建立引起空气移动。

[0213] 因此，本发明的实施例包括用于冷却的暖空气和冷空气的分离。进一步地，本发明的实施例包括一个用于引入空气的入口和一个用于暖空气的逃逸的出口，由此同时冷却多个计算机装置。在一些实施例中，隔板设置在计算机装置之间，从而使得来自一个计算机装置的空气不进入另一个计算机装置。

[0214] 在一个实施例中，图 58 中所示的配置位于被加压以引起空气流动的空间或结构中。

[0215] 在一些实施例中，被冷却的装置为计算机装置、存储装置和 / 或外围装置。

[0216] 这些配置（如所示的那些配置）允许企业使计算机装置与其他计算机装置非常近。相应地，因为更近的距离，所以可以使用更快的总线。

[0217] 在一个实施例中，将高速超级计算机设置在图 58 中所示的配置的内部管附近，其中，存储装置和外围装置在距离所述内部管更远的径向距离处连接。

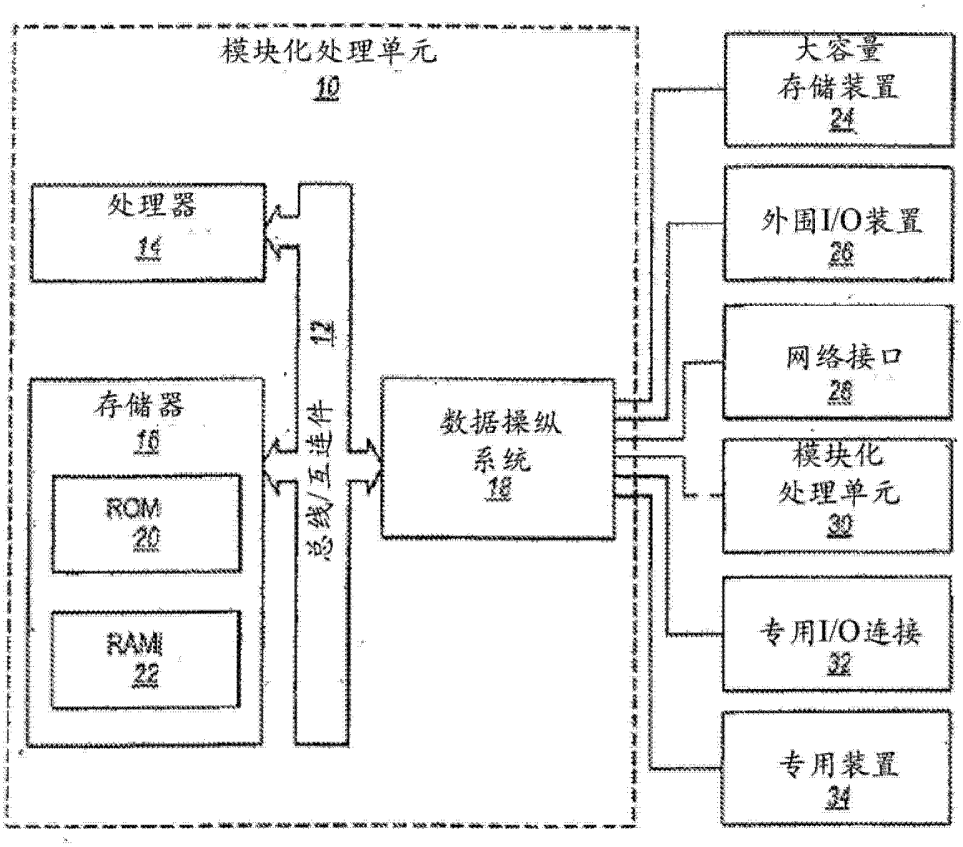
[0218] 在至少一些实施例中，暖空气被捕获和收获用于特殊目的。举例来讲，在一些实施例中，暖空气来自这些计算机装置并且进入所述中心管。然后，暖空气沿着所述中心管并且用于驱动涡轮机来生成供应到这些计算机装置的能量。在一些实施例中，所能成的能量足够对企业的计算机装置进行供电。在其他实施例中，所能成的能量足够对企业的计算机装置进行供电。在一些实施例中，所捕获的暖空气用于对水进行加热或预加热，或用于提供热交换。这减少了提供热水所需的能量值。在一些实施例中，所捕获的暖空气用于提供热量用于特殊目的，如使环境变暖或融雪。所述内部管的直径可以是确定气流的速度的一个因

素。另外，压力和到暖气流内的燃料的引入也可以确定所需的暖气流速度。在一些实施例中，暖气流驱动堆叠的涡轮机。在一些实施例中，调整叶片的间距来创造机械移动。

[0219] 在至少一些实施例中，结构中存在过多空气输入端（通过这些计算机装置中的每个计算机装置）和存在一个输出端（收集所有暖空气的中心管），所述结构允许同时冷却多个计算机装置和/或其他装置。

[0220] 因此，如本文讨论，本发明的实施例涵盖用于提供动态模块化处理单元的系统和方法。具体来说，本发明的实施例涉及提供一个模块化处理单元，所述模块化处理单元被配置成用于选择性地与企业中的一个或多个额外单元一起定向。在至少一些实施例中，一个模块化处理单元包括一个非基于外围的外壳、一个冷却过程（例如，一个热力学对流冷却过程、一个受迫空气冷却过程和/或一个液体冷却过程）、一个经优化分层印刷电路板配置、经优化处理和存储器比率，以及对外围设备和应用提供增加的灵活性和支持的一个动态背板。

[0221] 在不脱离本发明的精神或基本特征的情况下，本发明可以用其他具体形式体现。所描述的实施例在所有方面中将被视为仅说明性的而不是限制性的。在不脱离本发明的精神或基本特征的情况下，本发明可以用其他具体形式体现。所描述的实施例在所有方面中将被视为仅说明性的而不是限制性的。因此本发明的范围由所附权利要求书而非前述说明指示。在权利要求书的等效性的意义和范围内的所有改变将涵盖于它们的范围内。


模块化处理单元
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处理器
14
存储器
16
ROM
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RAM
22
总线/互连件
12
数据操纵
系统
18
大容量
存储装置
24
外围I/O装置
26
网络接口
28
模块化
处理单元
30
专用I/O连接
32
专用装置
34

图 1

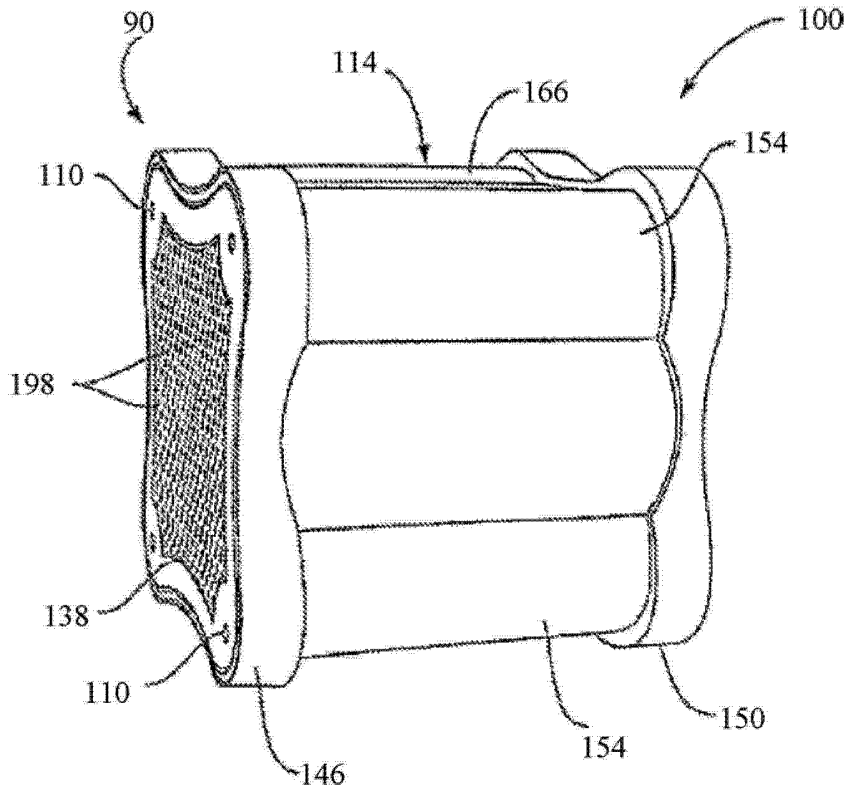
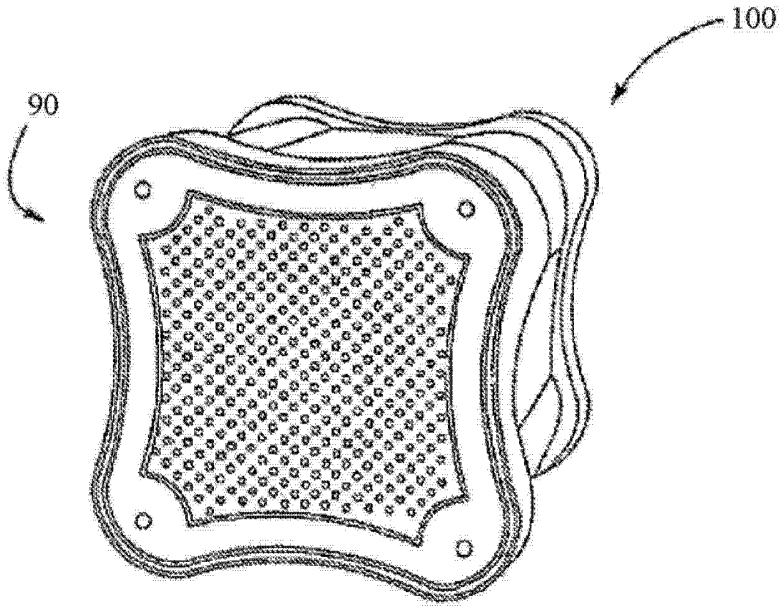


图 2



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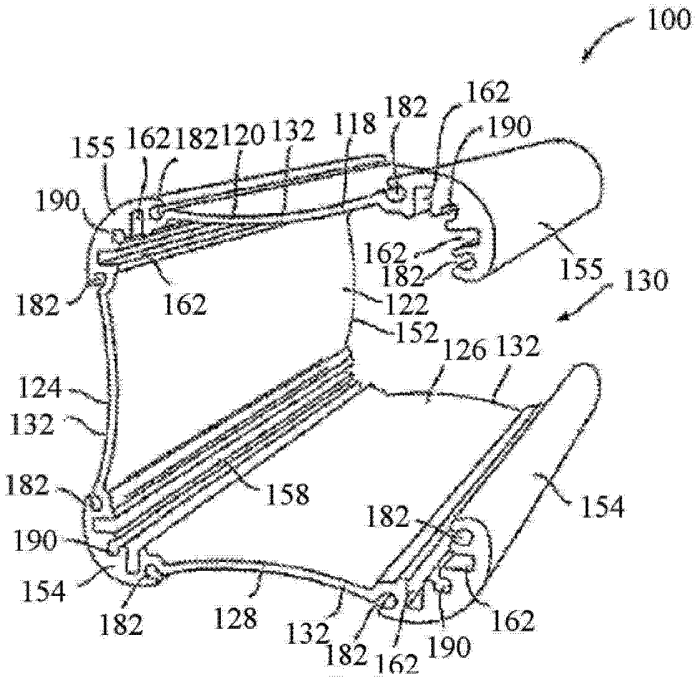
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图 4

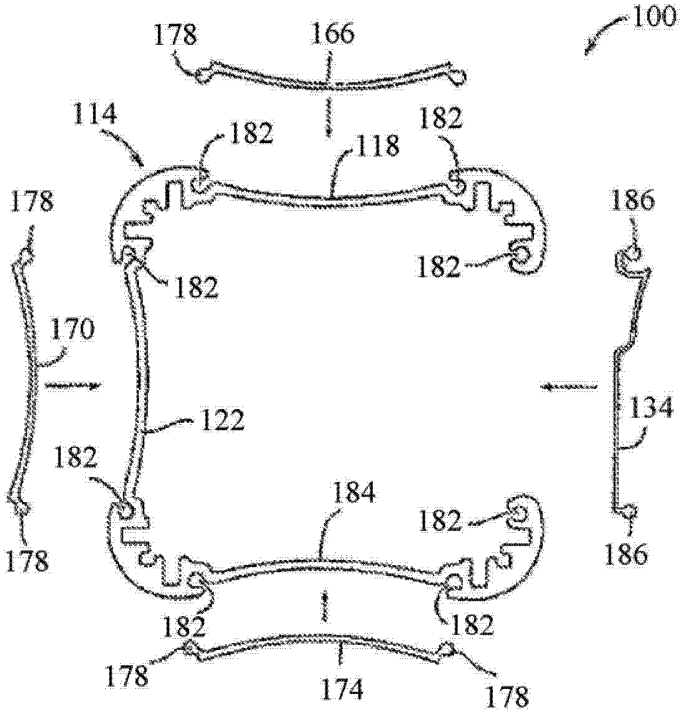
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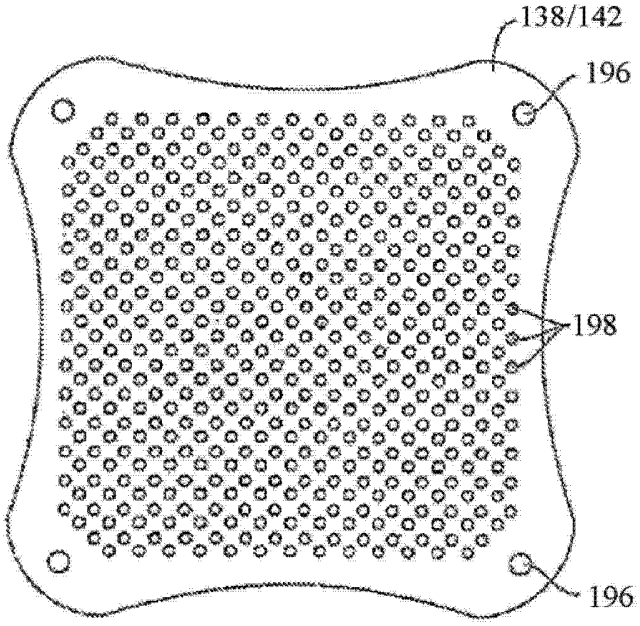
图 5



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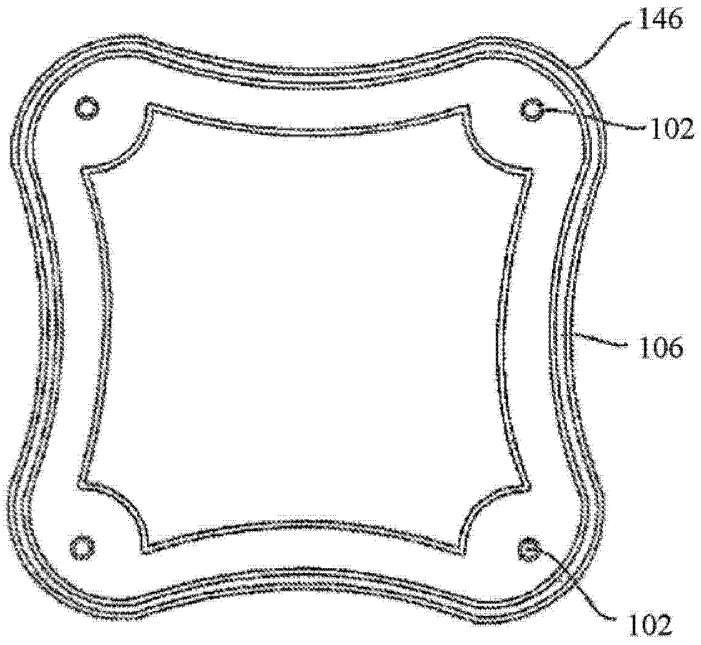

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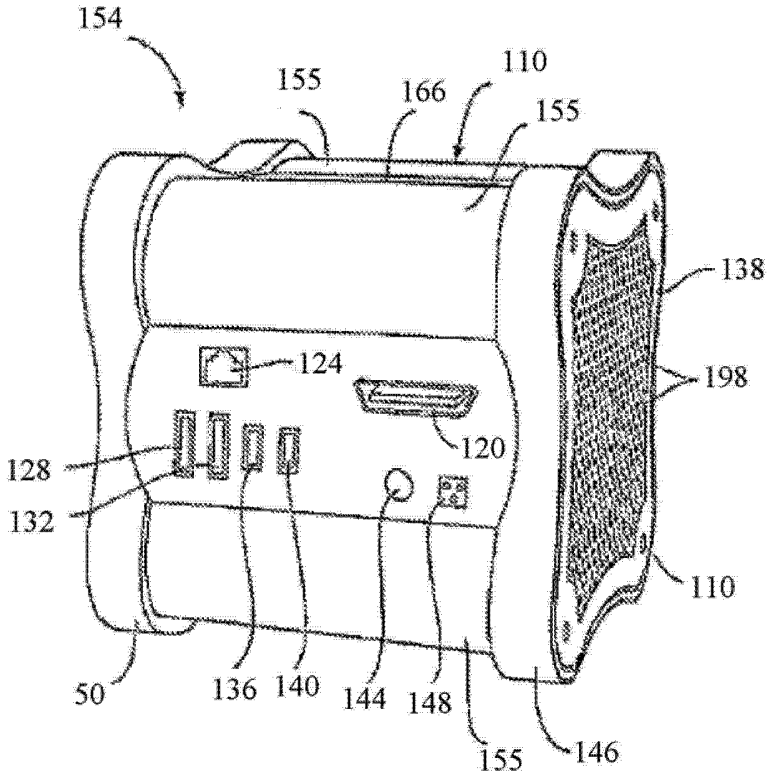
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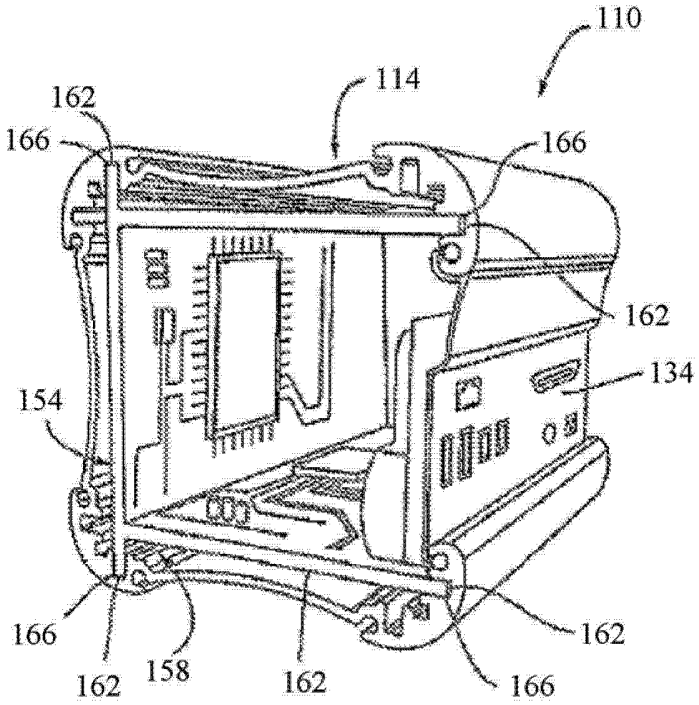
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图 9

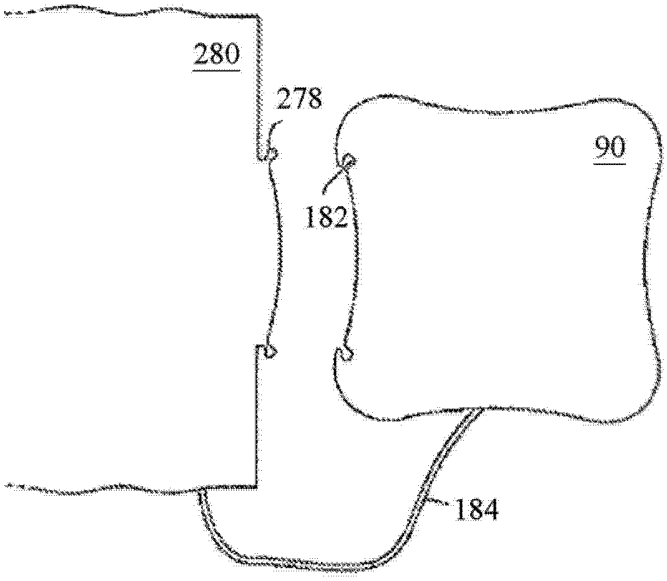
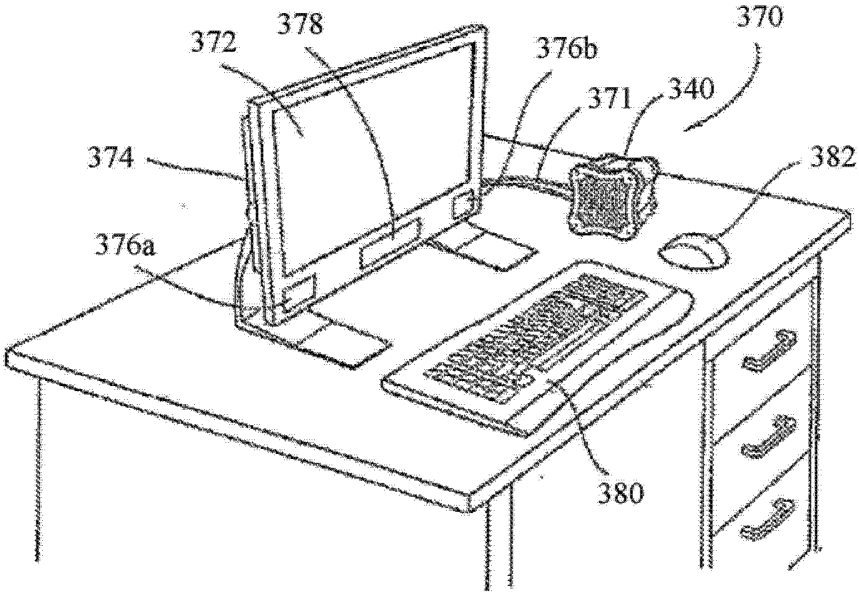


图 10



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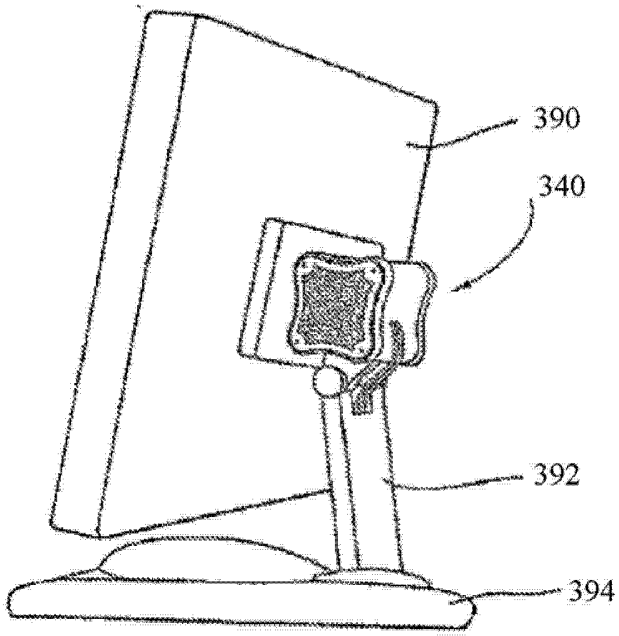

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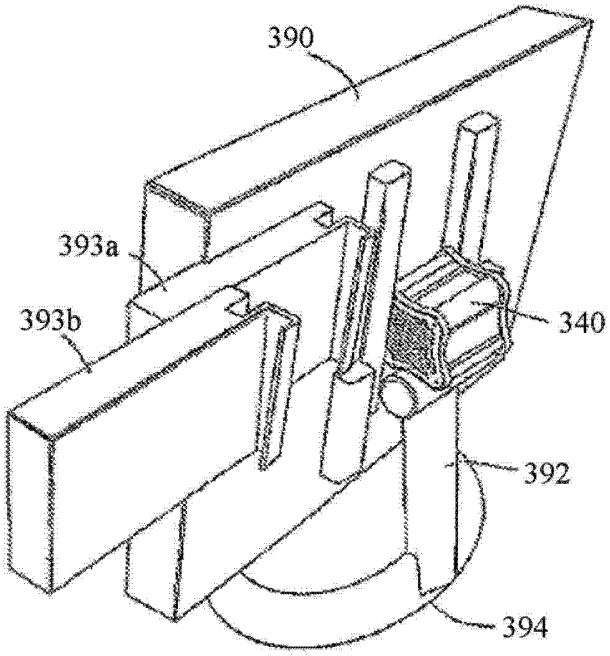

图 13

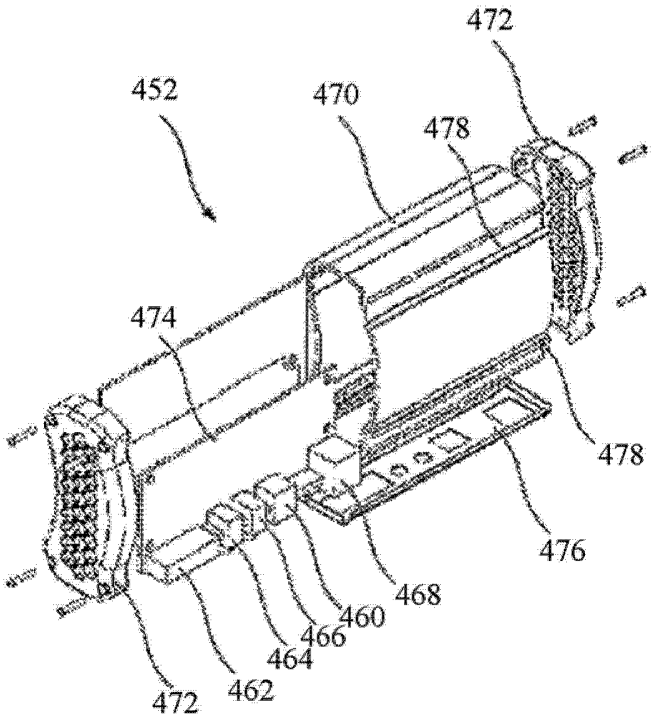
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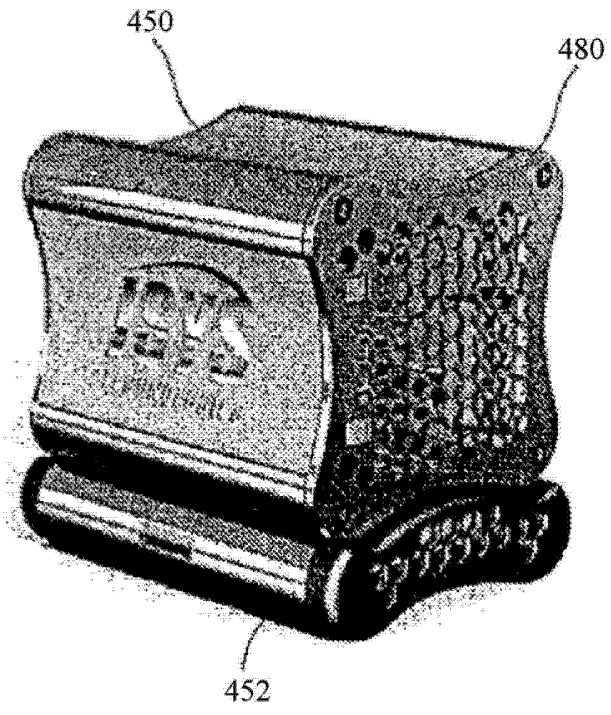
图 14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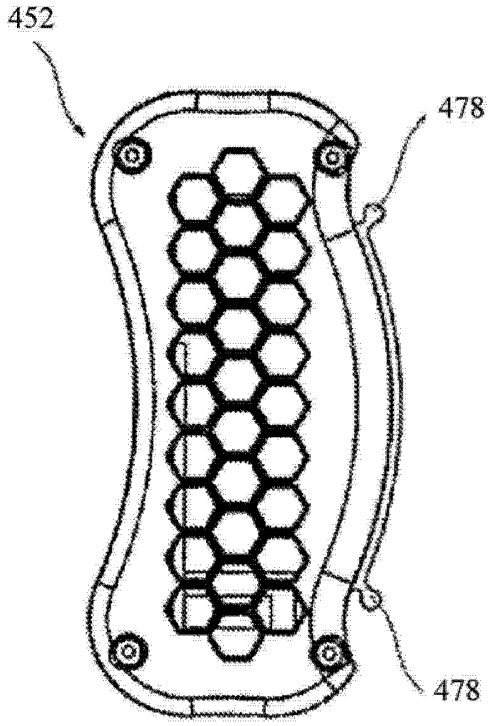
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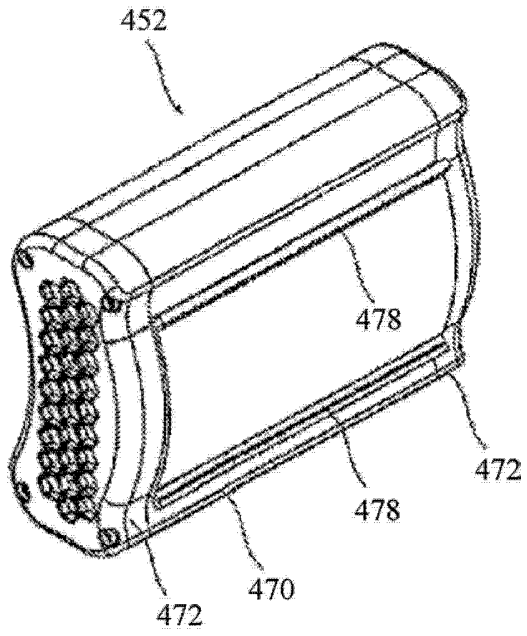
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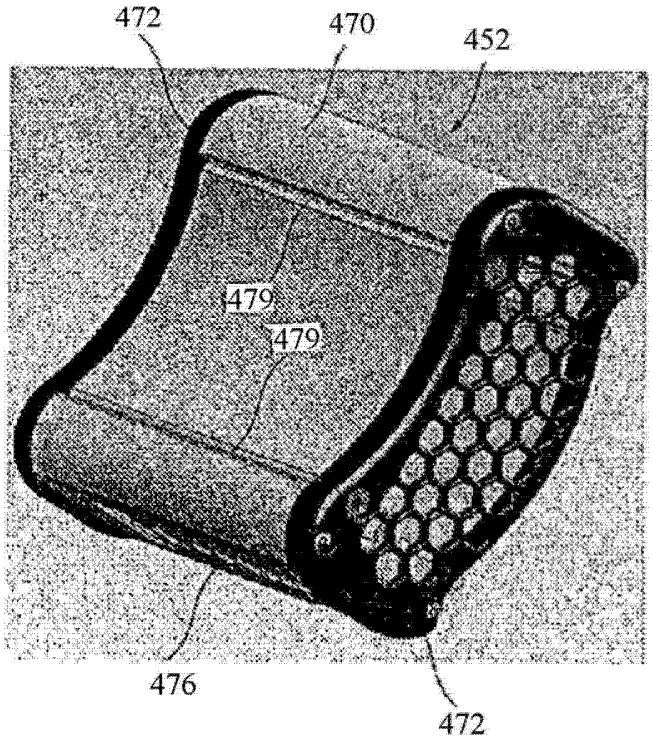
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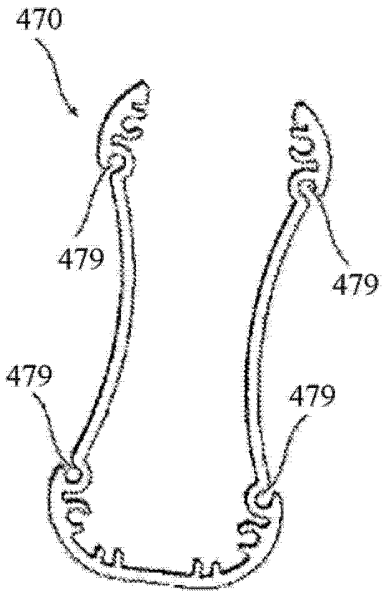
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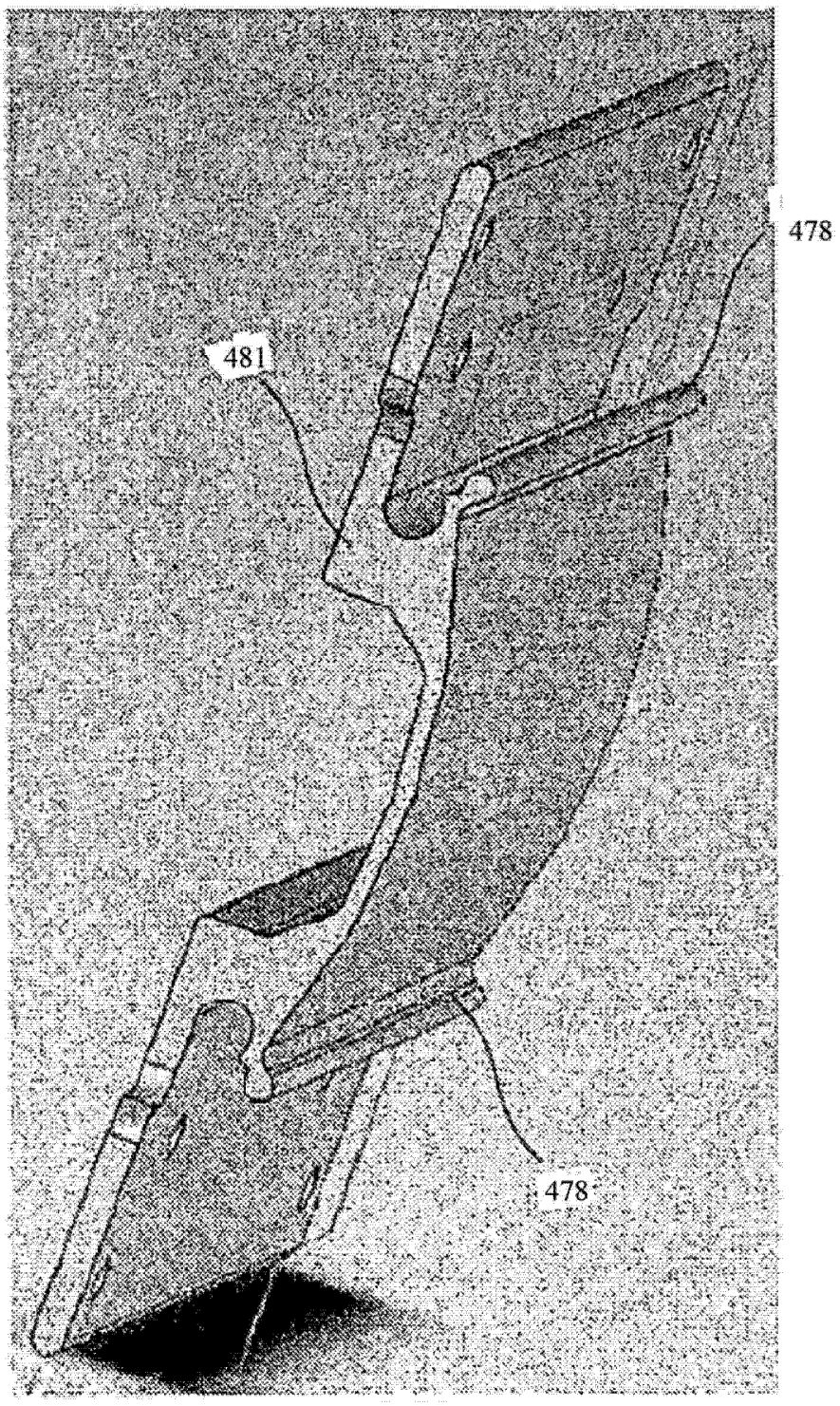

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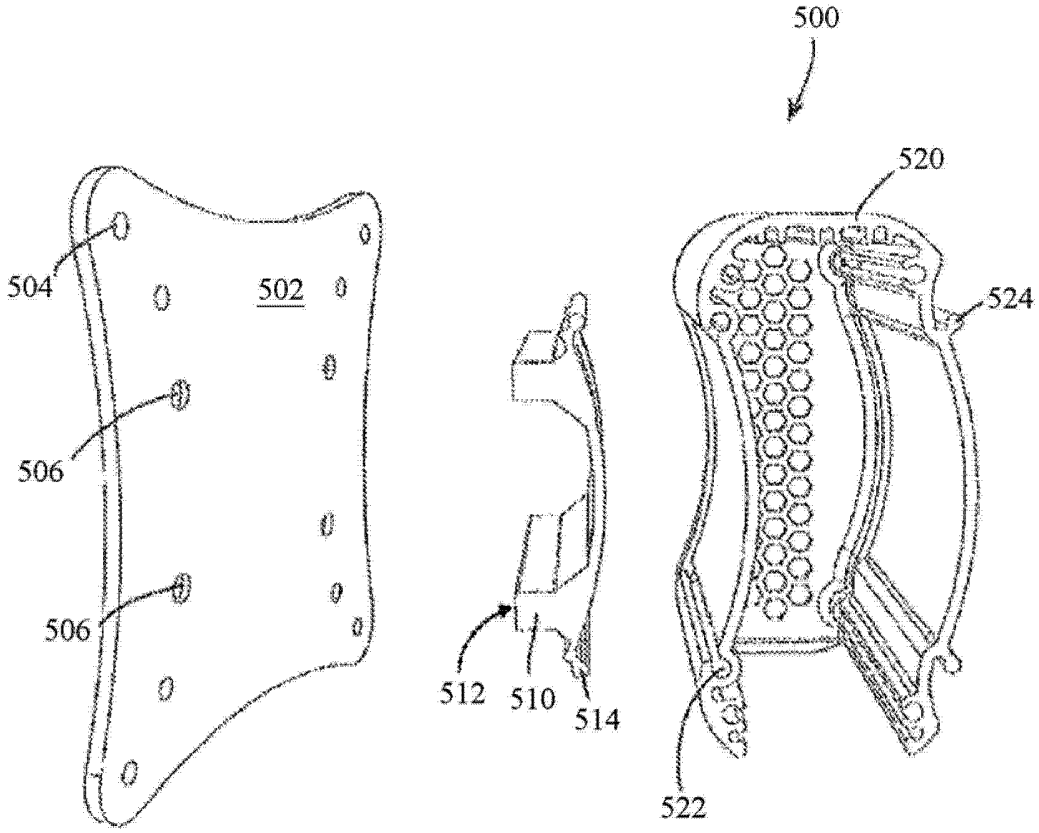

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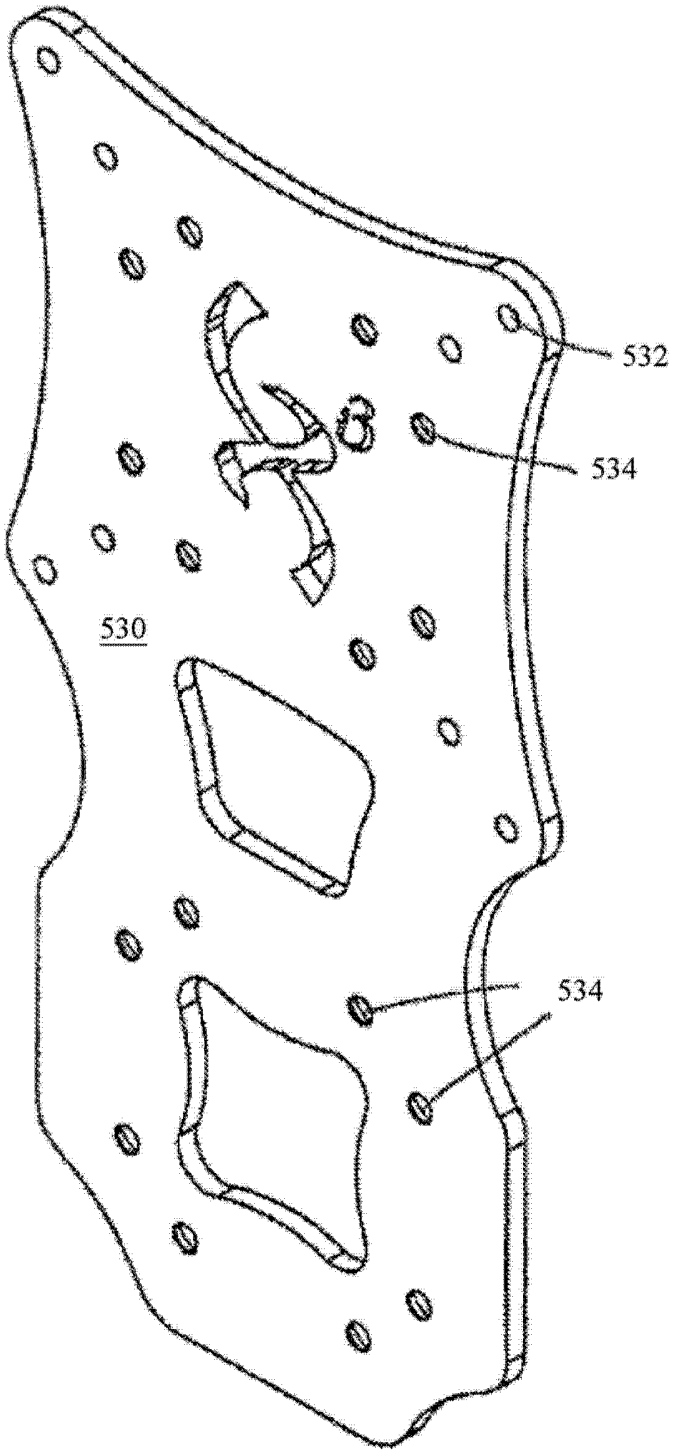

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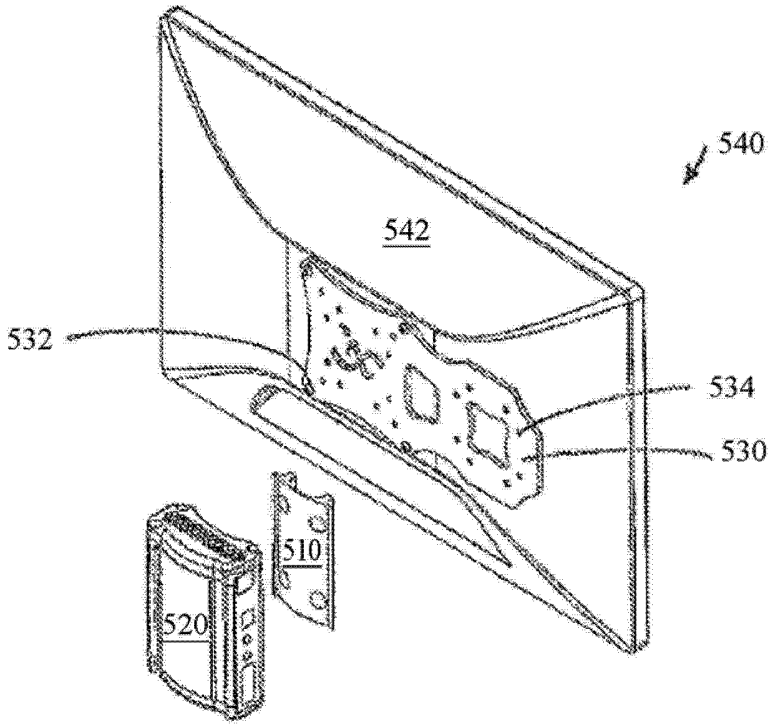

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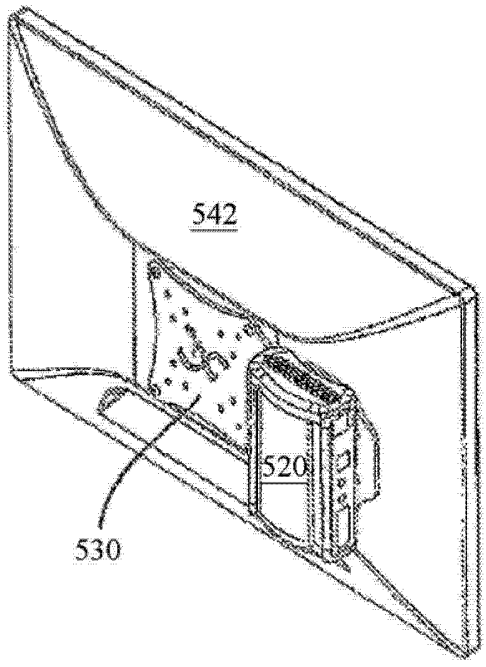

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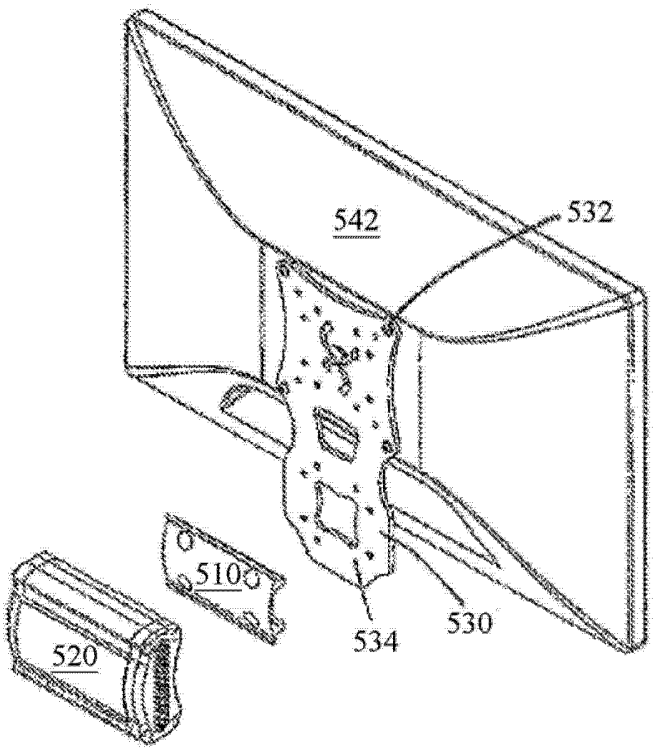

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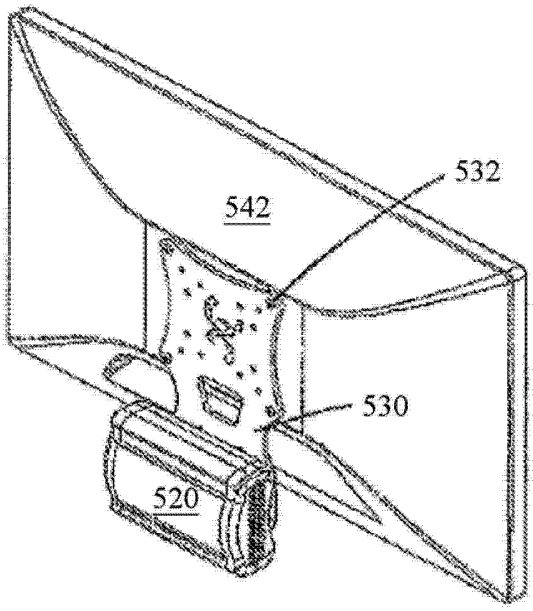

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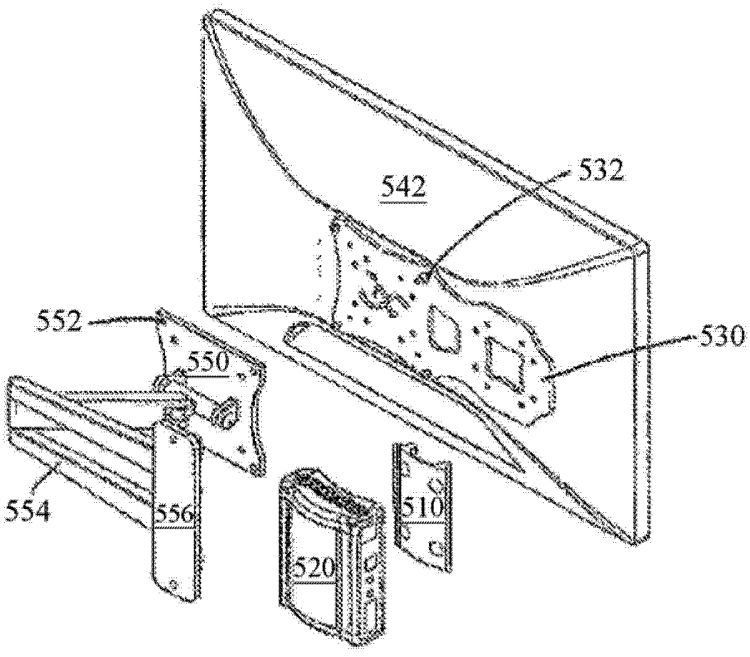

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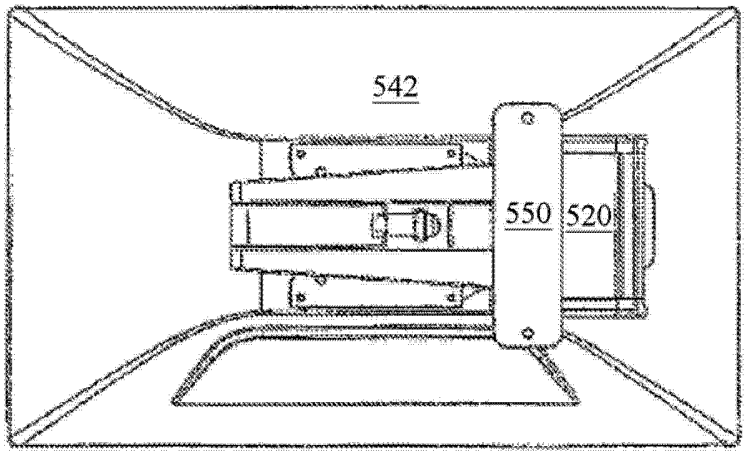

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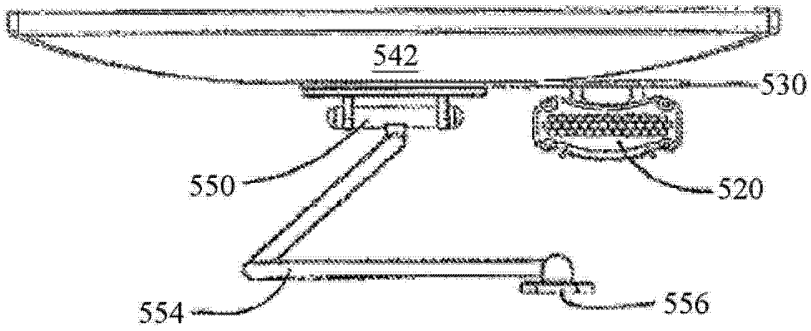

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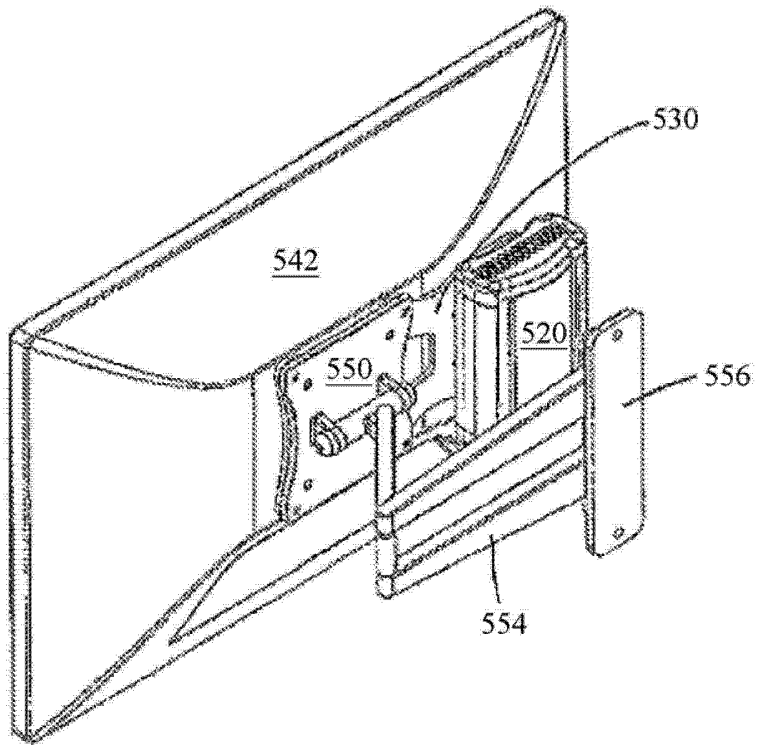

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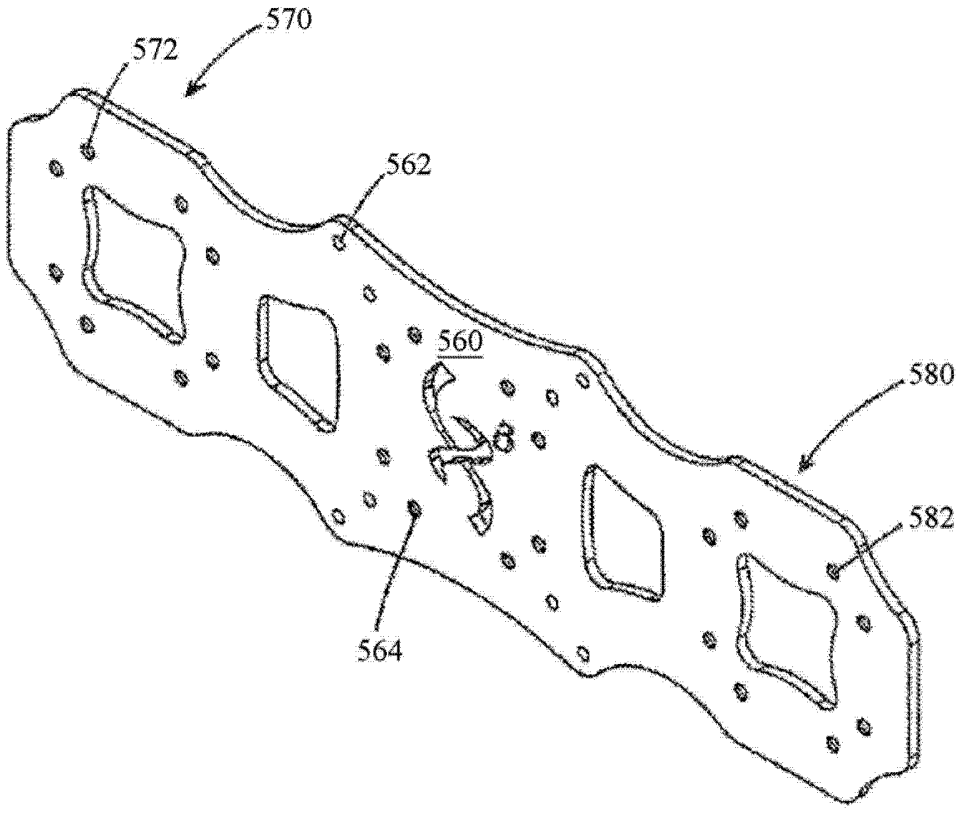

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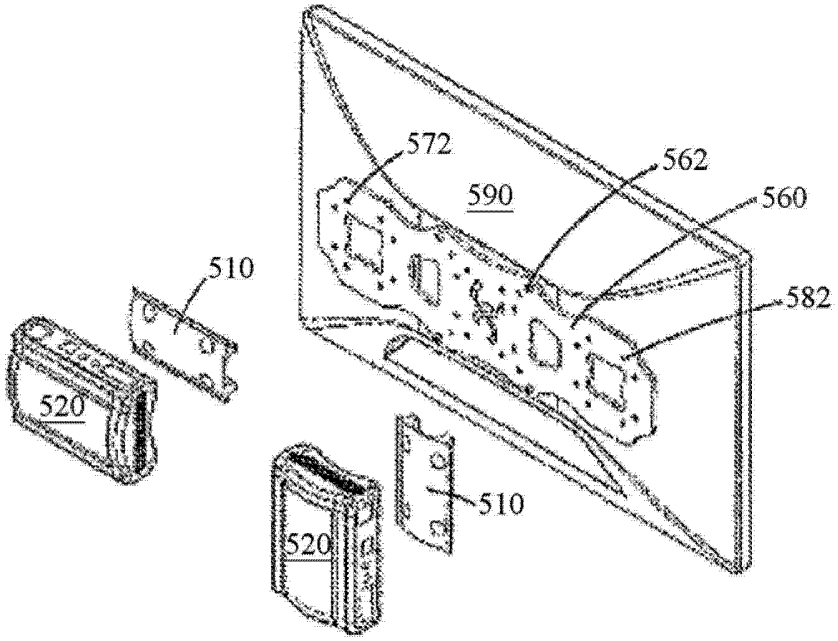

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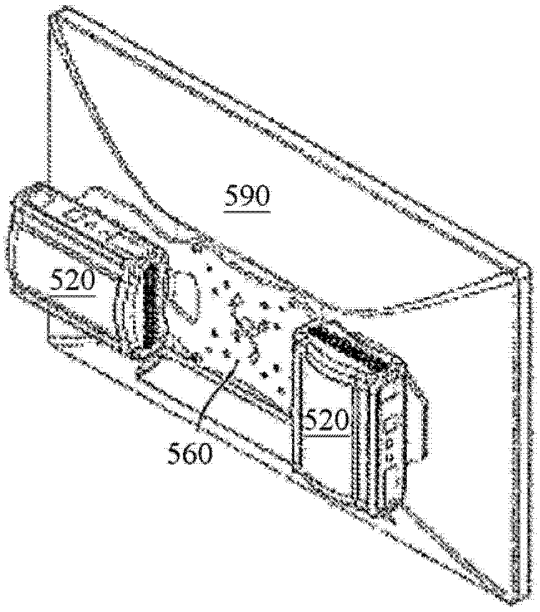

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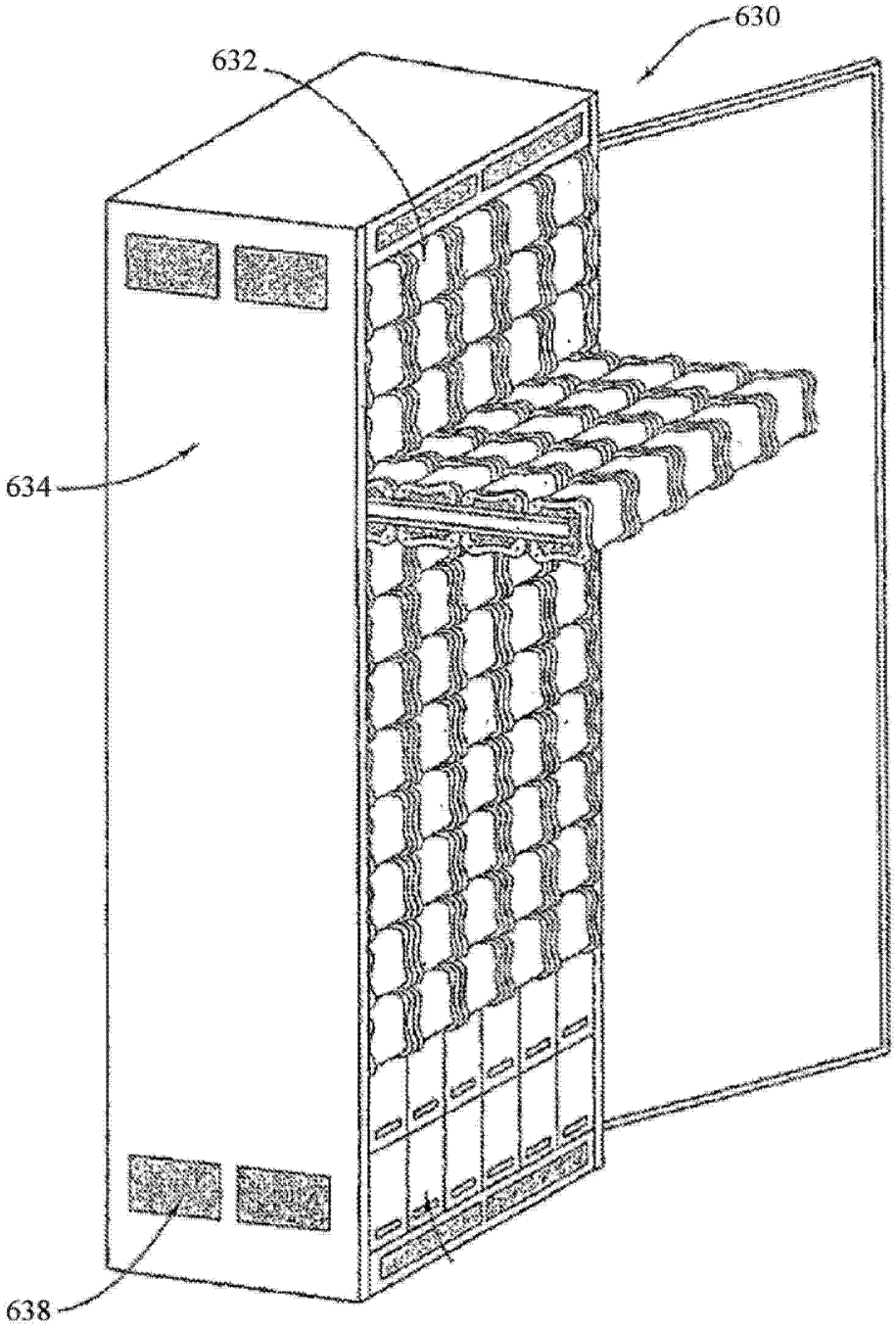

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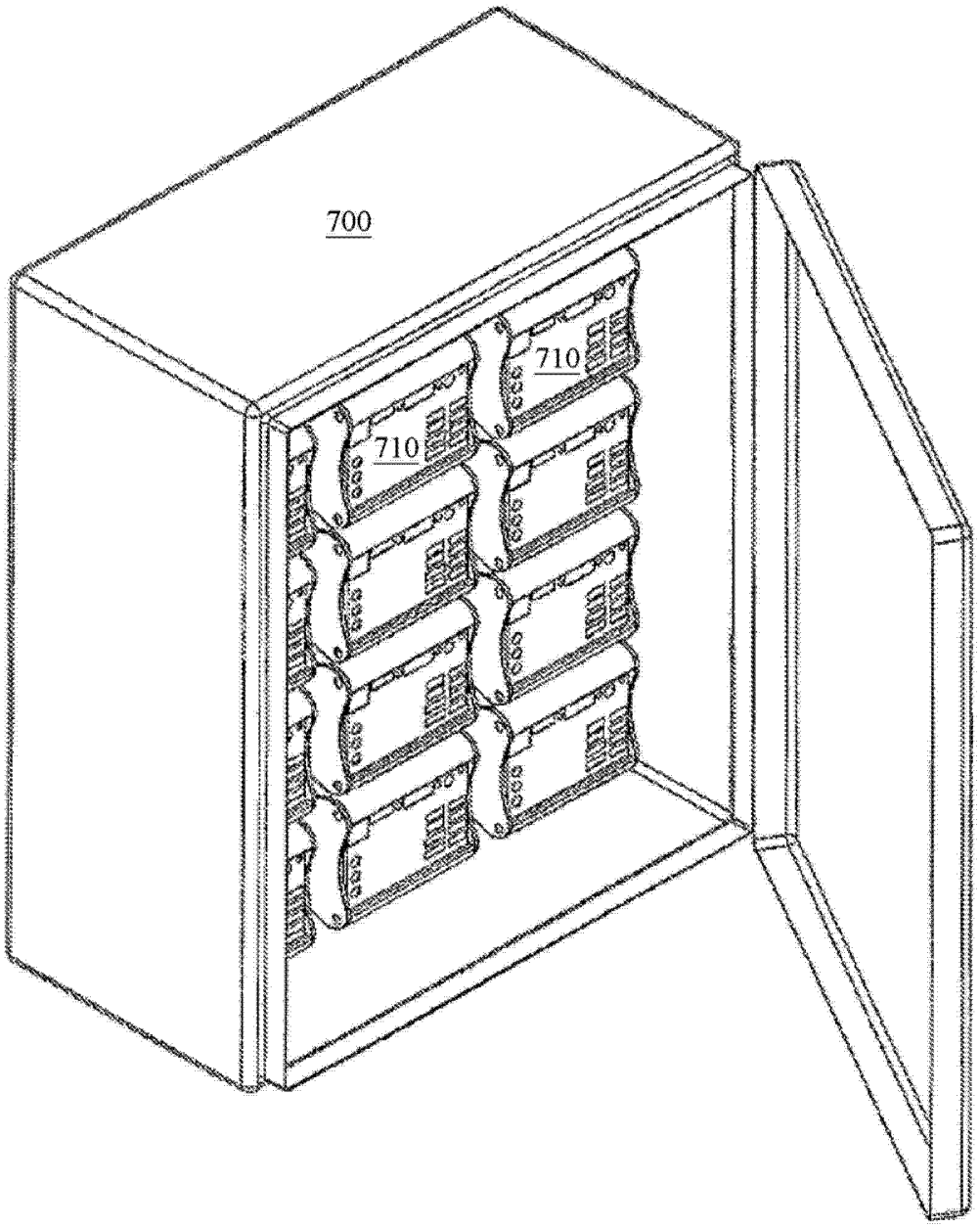

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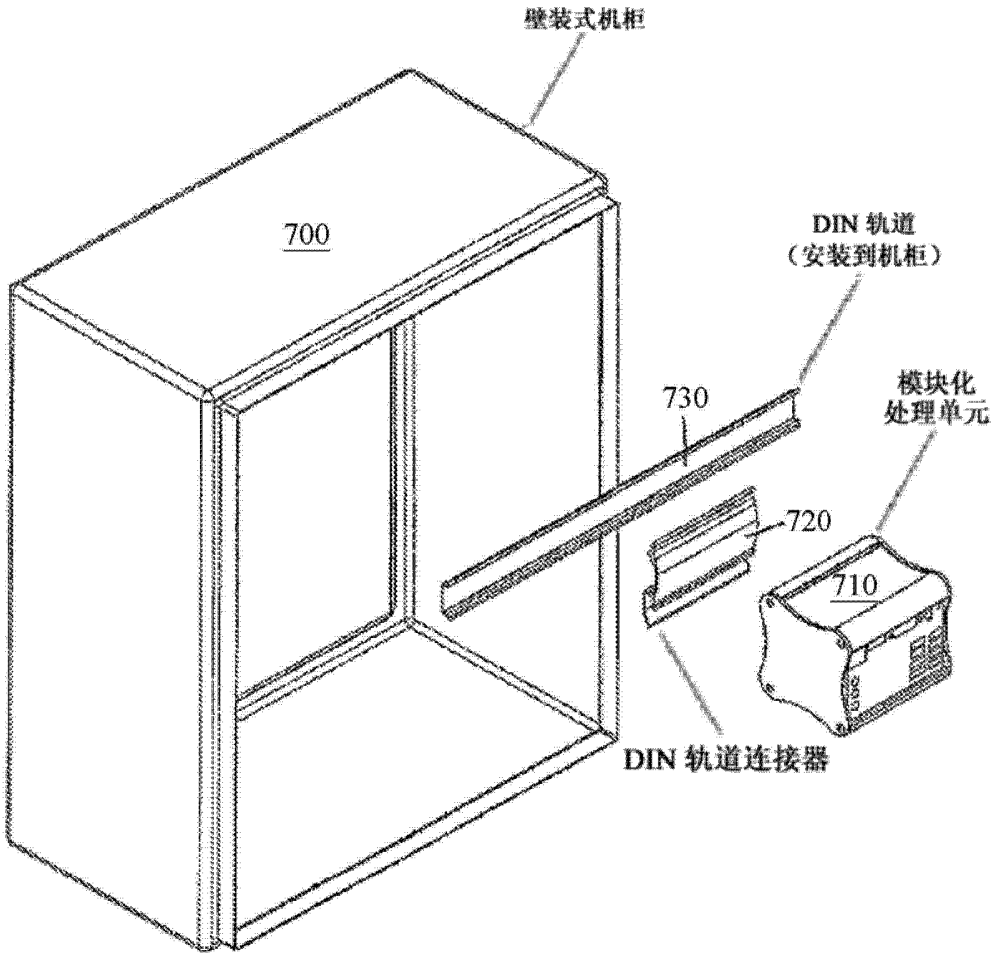

图 36

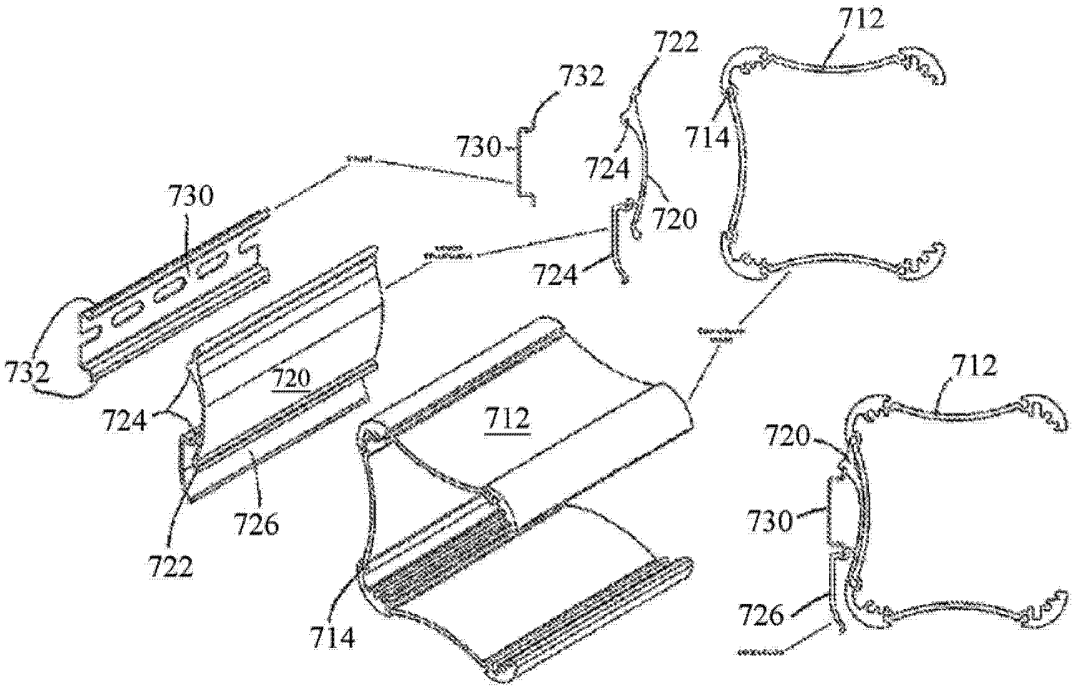
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图 37

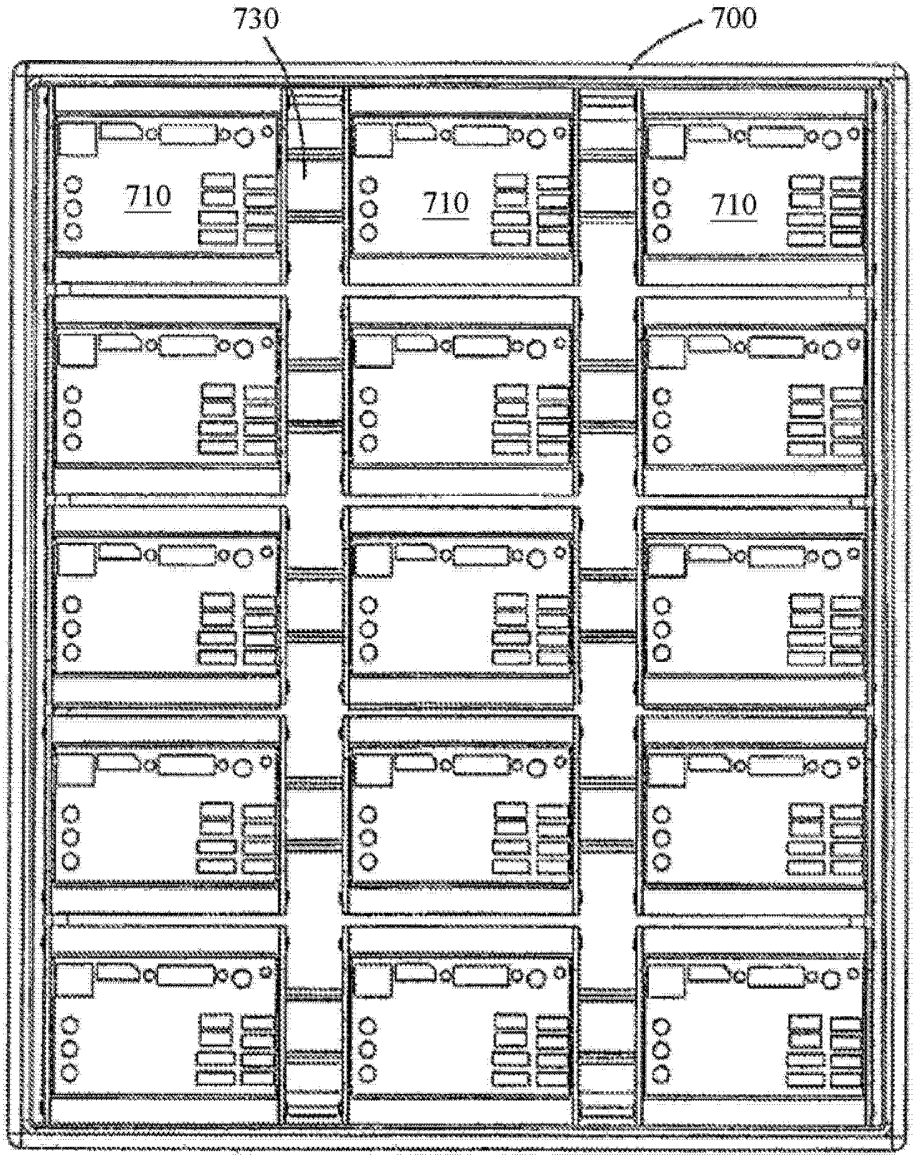

图 38

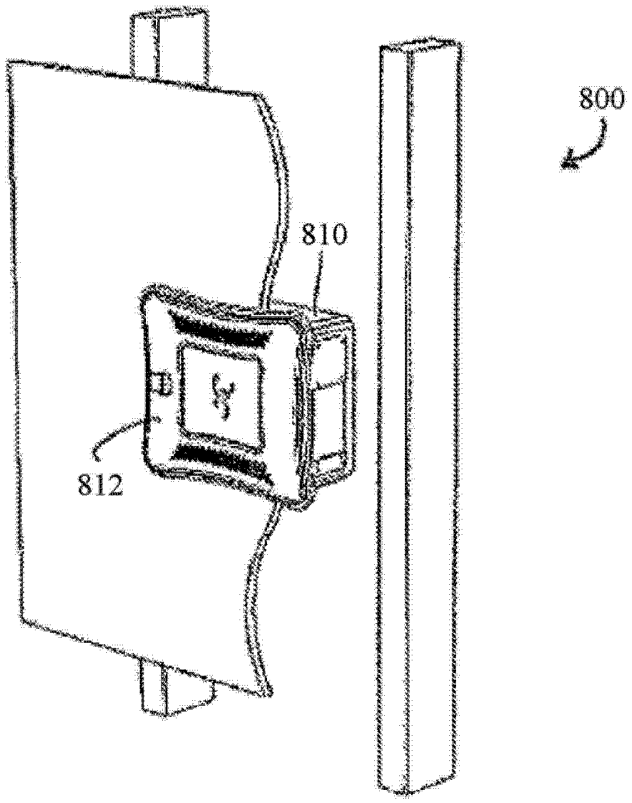

图 39

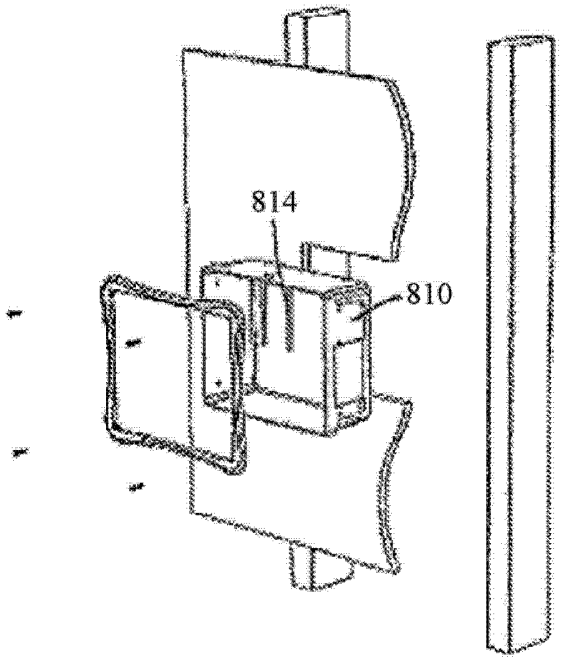

图 40

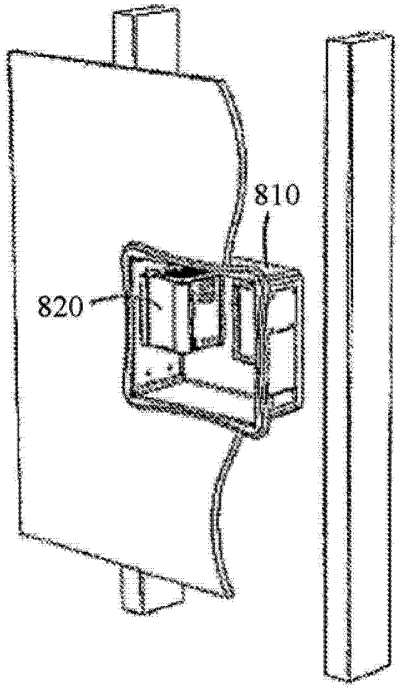

图 41

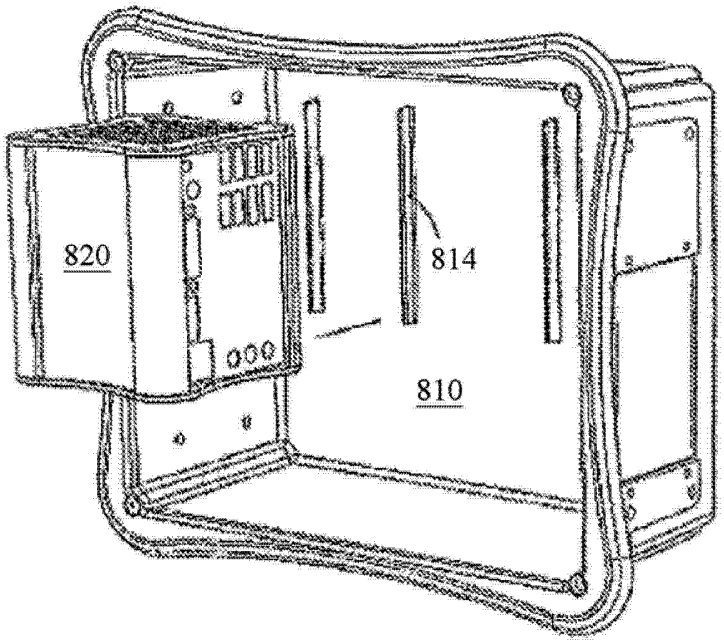

图 42

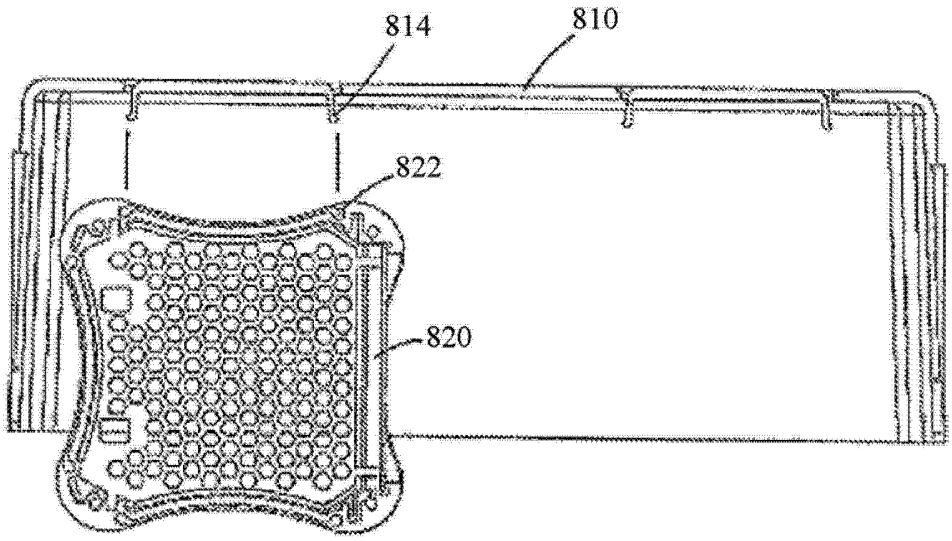

图 43

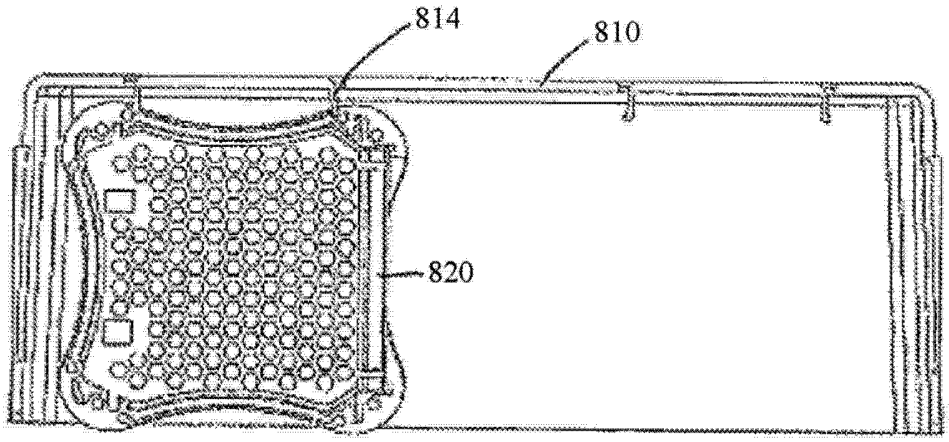

图 44

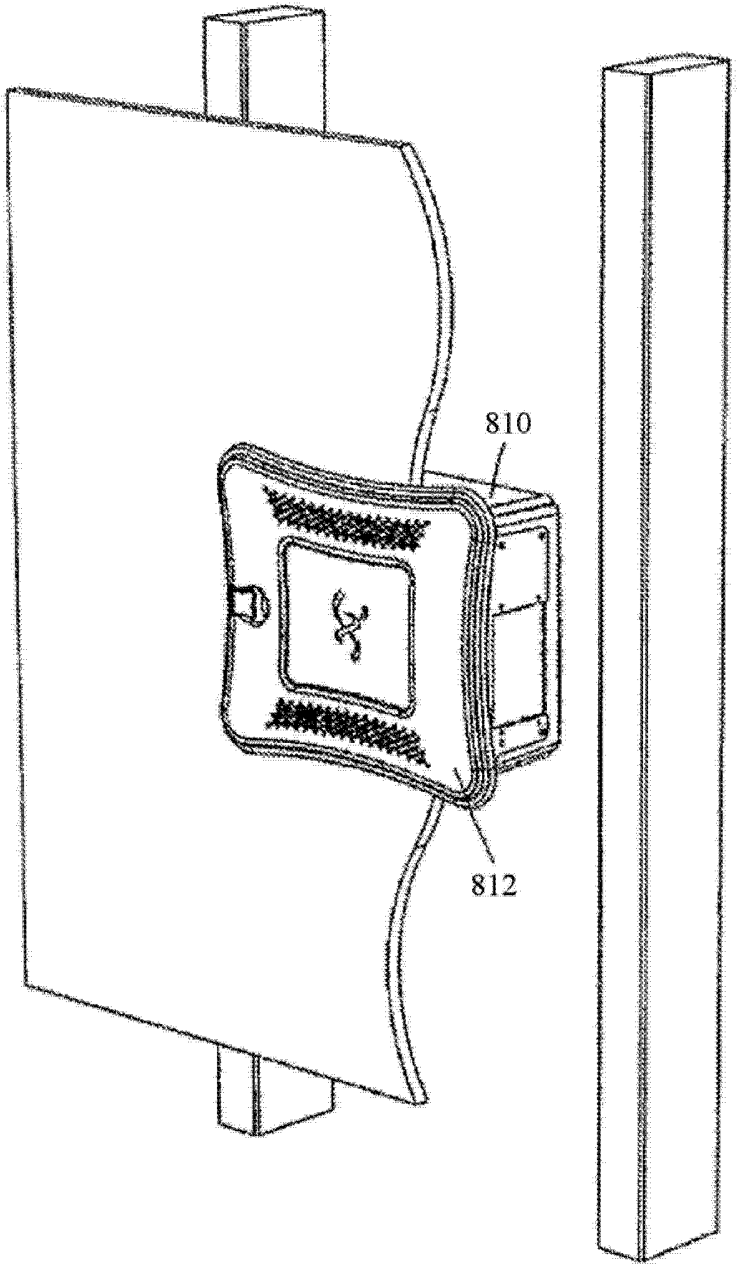

图 45

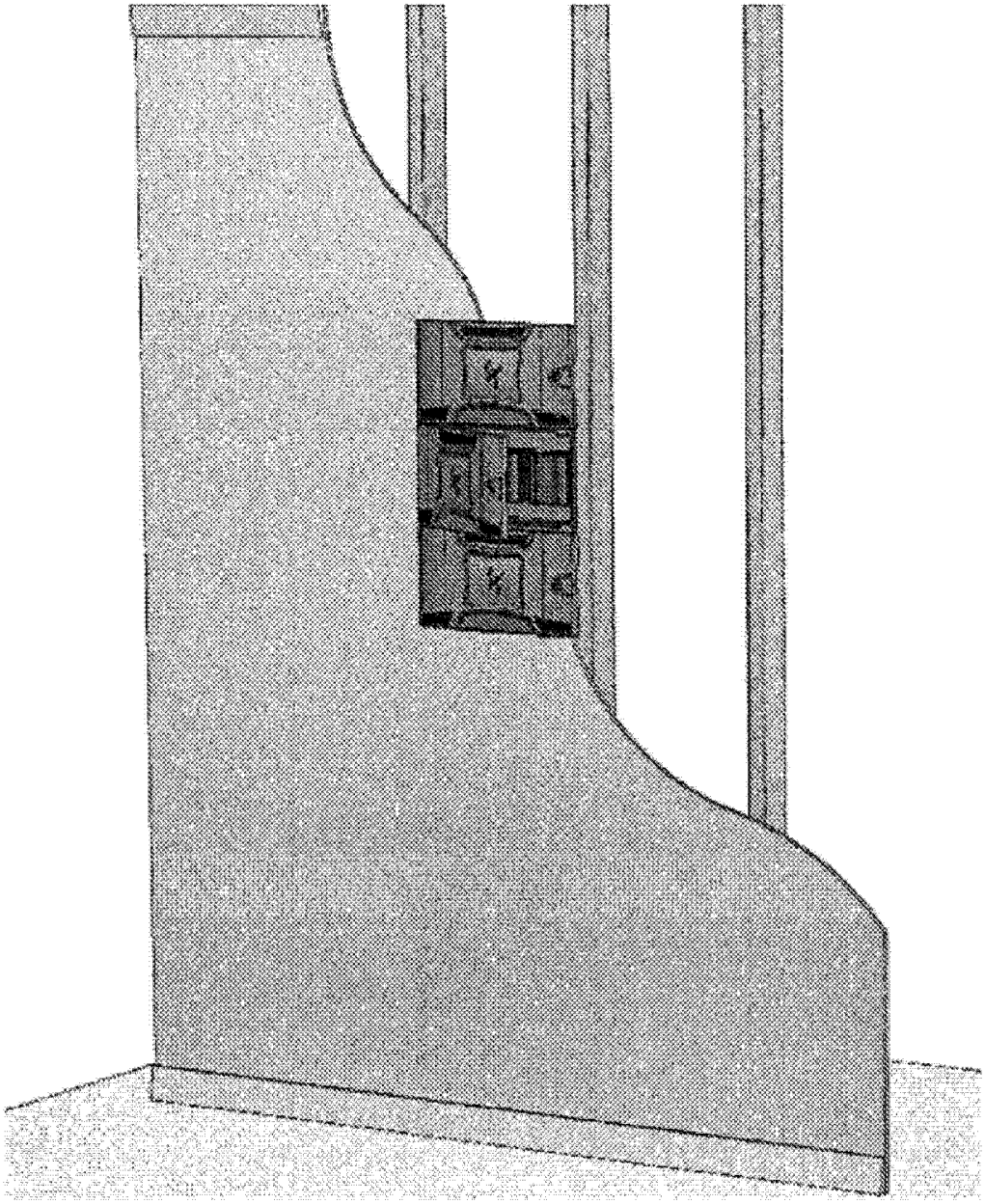

图 46

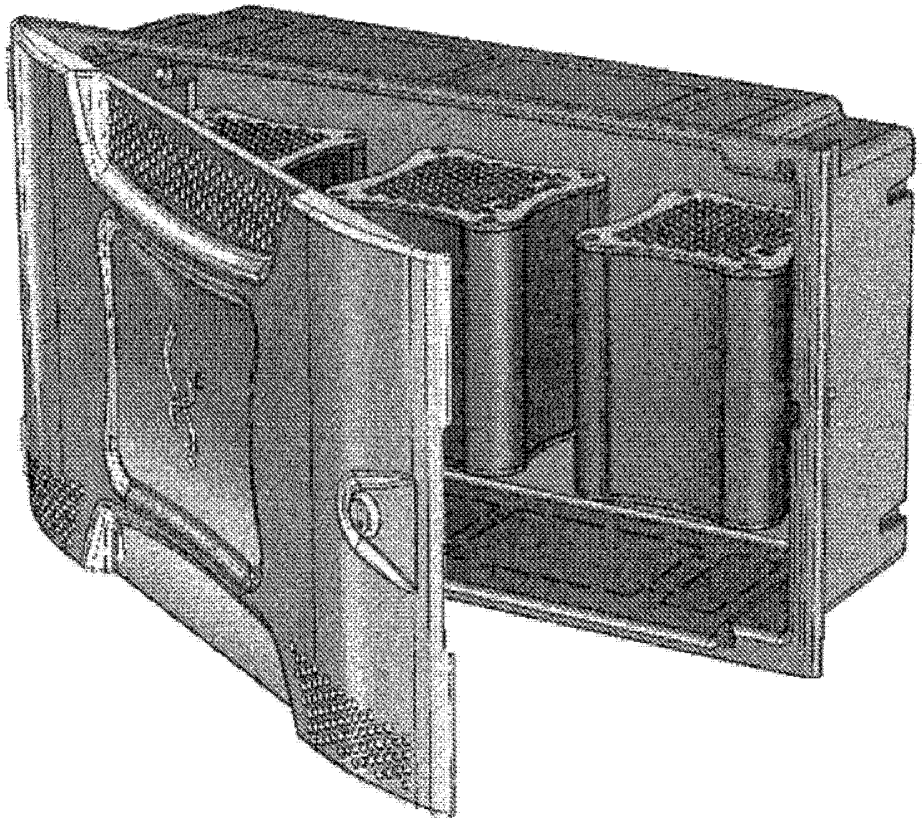

图 47

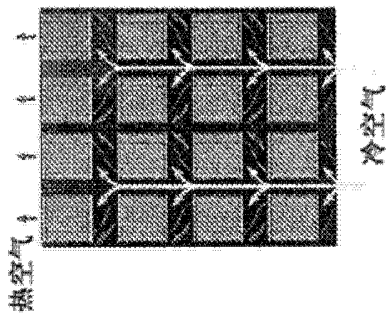

图 50

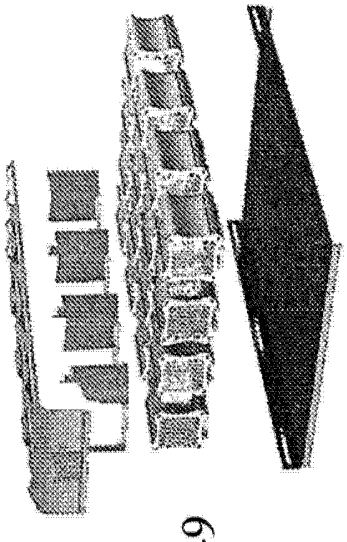

图 49

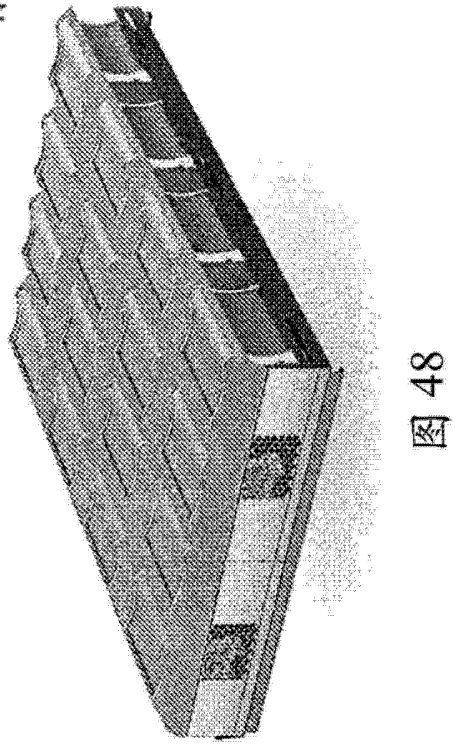

图 48

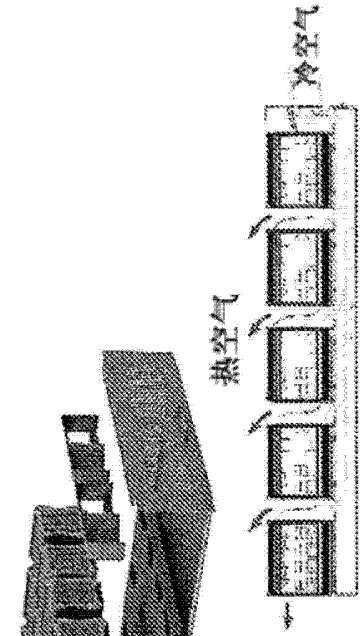

图 52

图 53

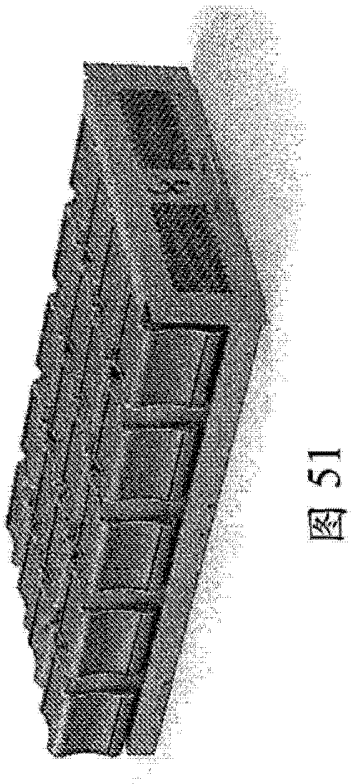

图 51

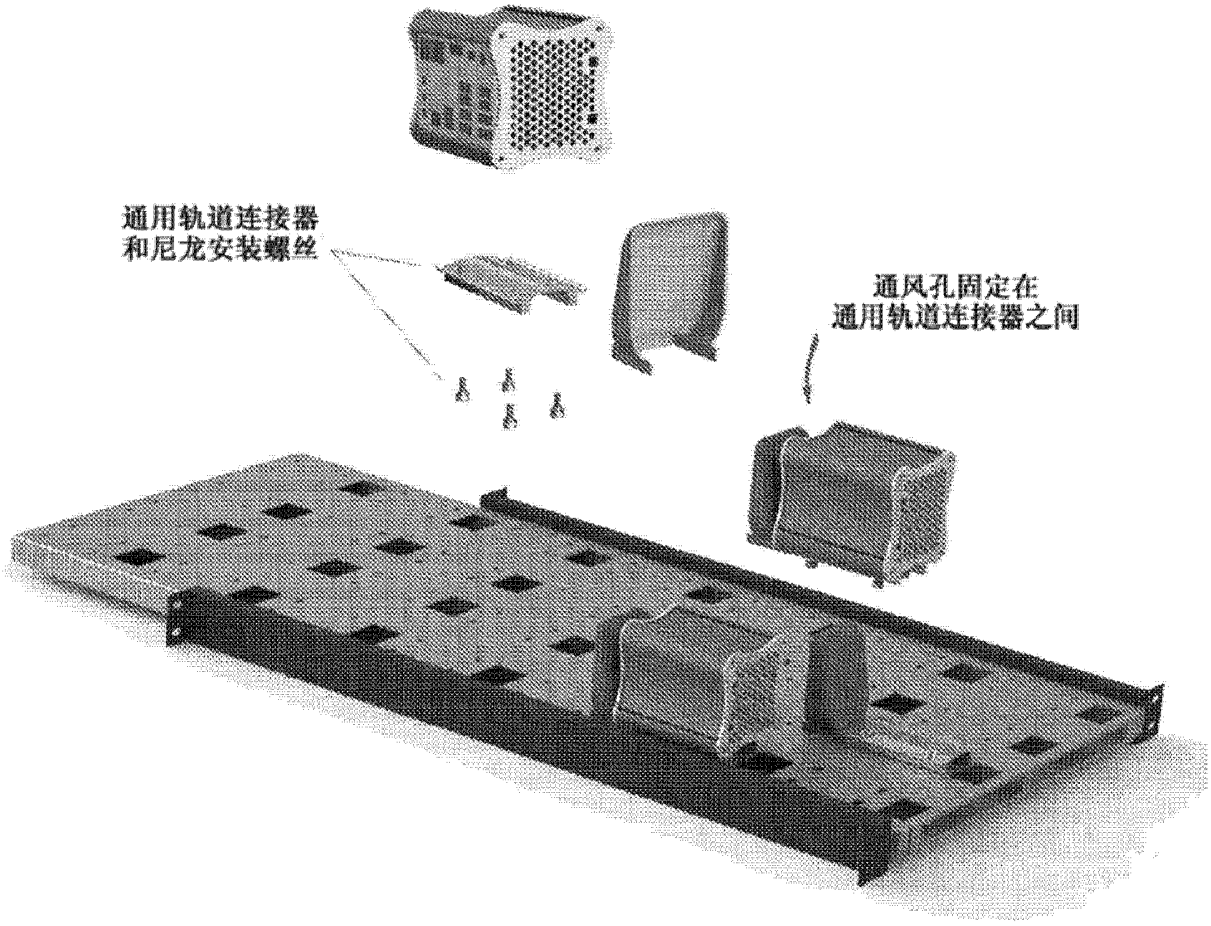

图 54

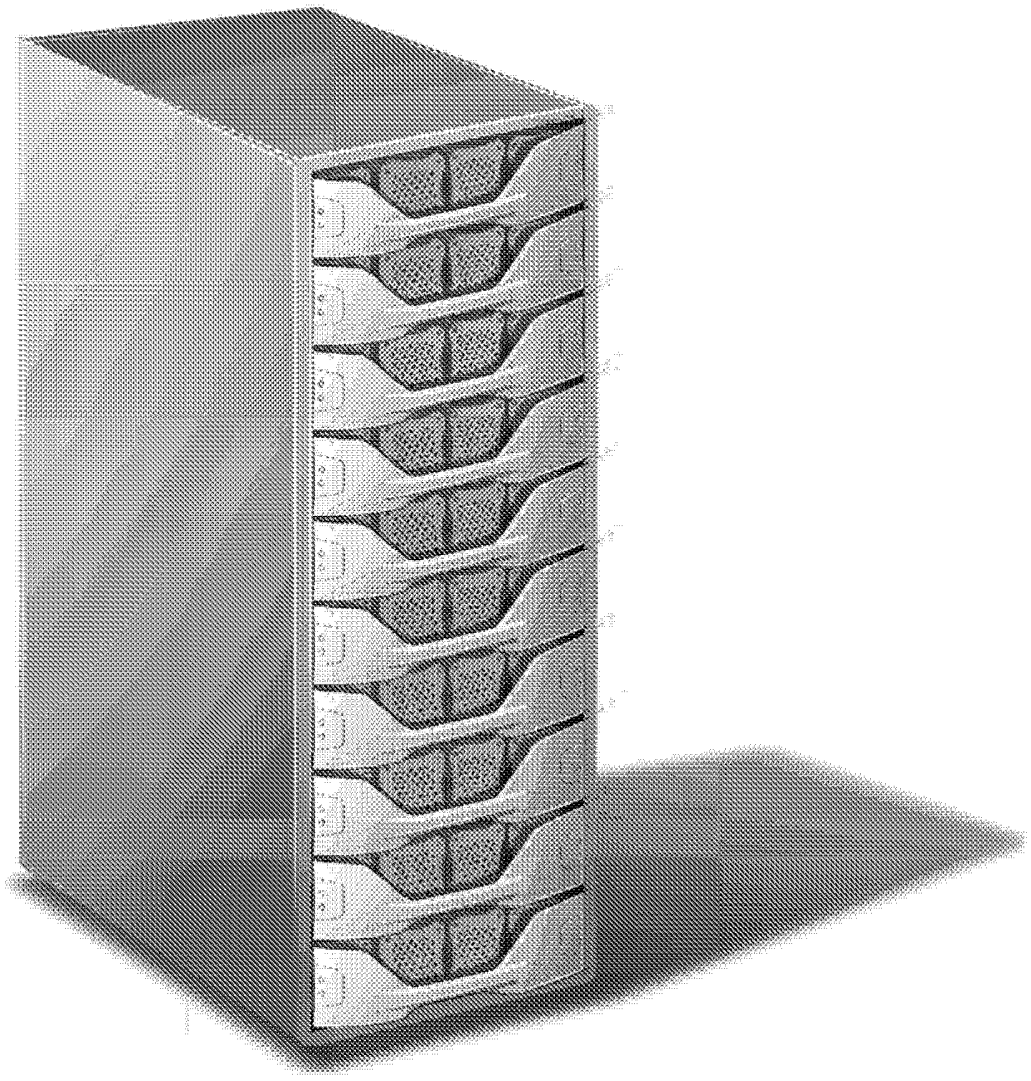

图 55

图 56

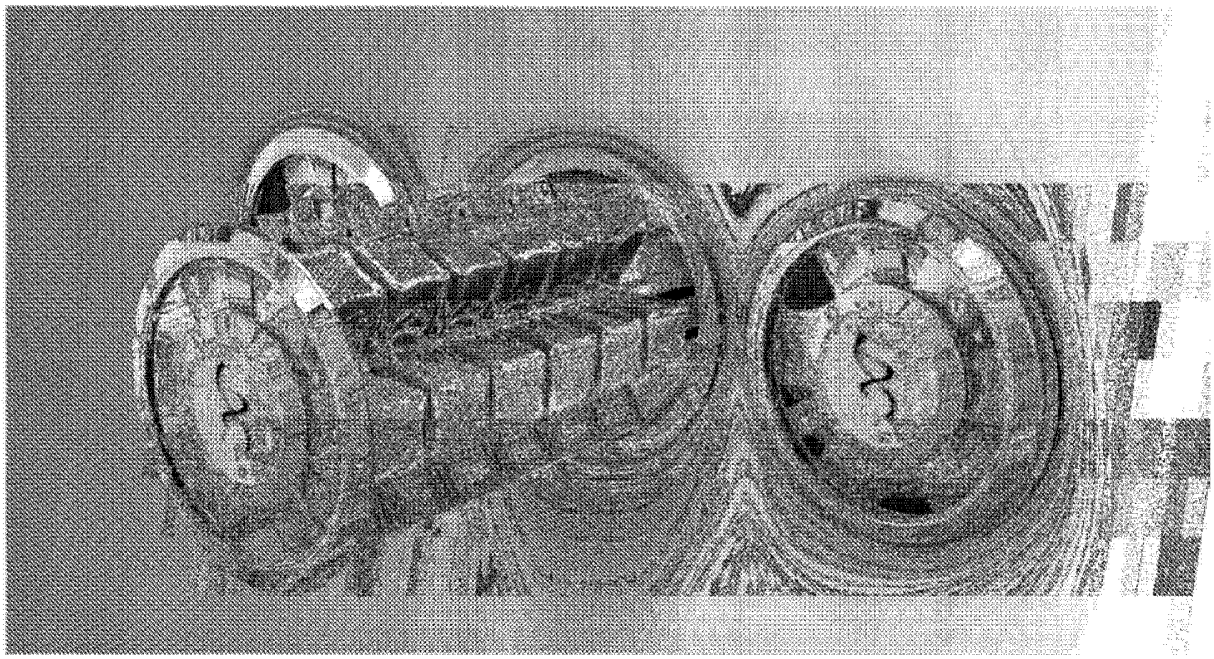

图 57

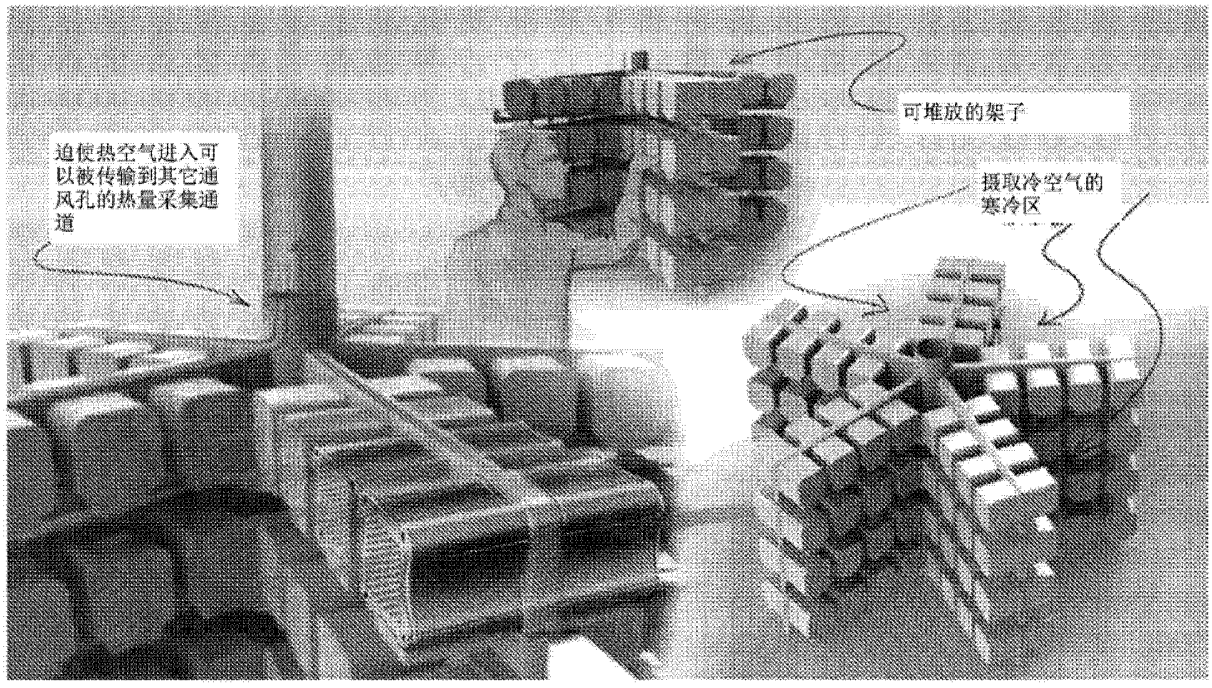

图 58