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(54) **PXI CHASSIS WITH BACKWARDS COMPATIBILITY FOR EXISTING PXI DEVICES**

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(58) **Field of Classification Search** 361/686, 361/760, 810, 807, 788, 792, 802, 784
See application file for complete search history.

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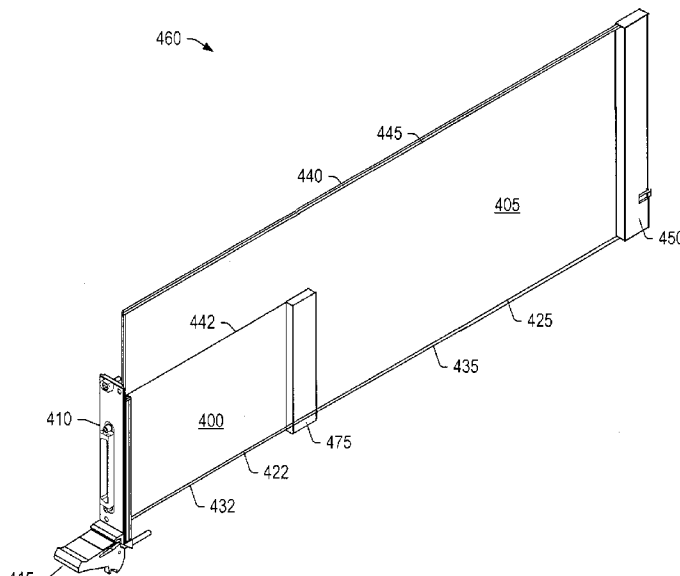*Primary Examiner*—Elvin Enad
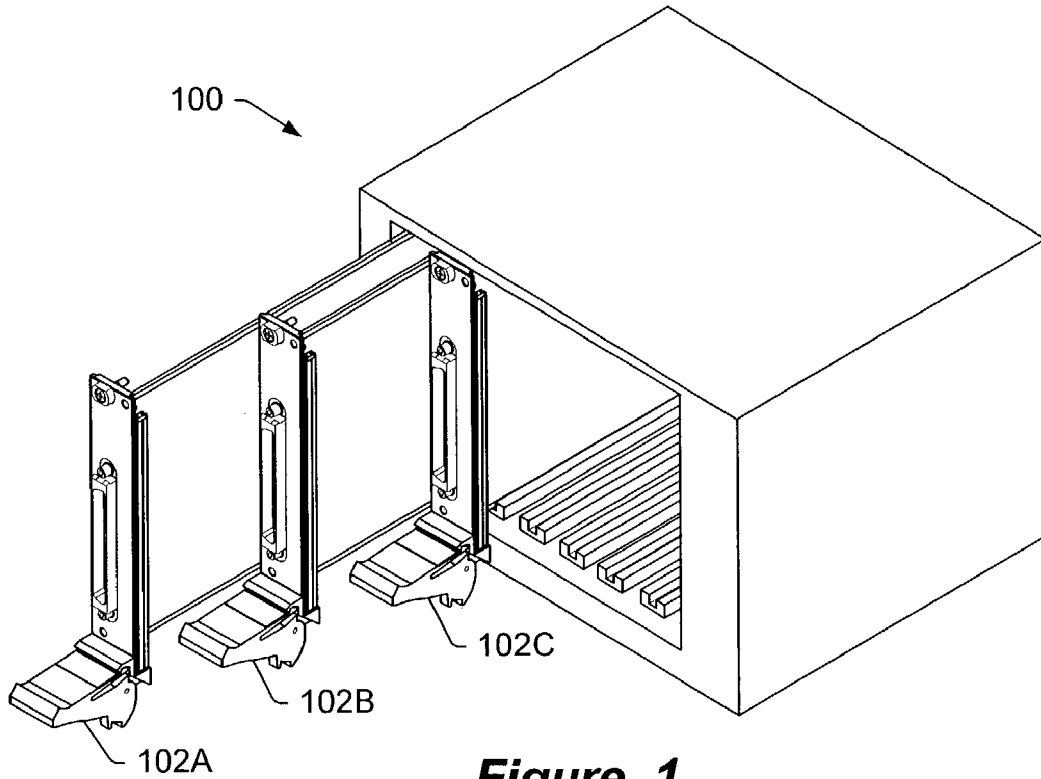*Assistant Examiner*—Hung S. Bui
(74) *Attorney, Agent, or Firm*—Meyertons Hood Kivlin Kowert & Goetzel, P.C.; Jeffrey C. Hood; Russell E. Henrichs
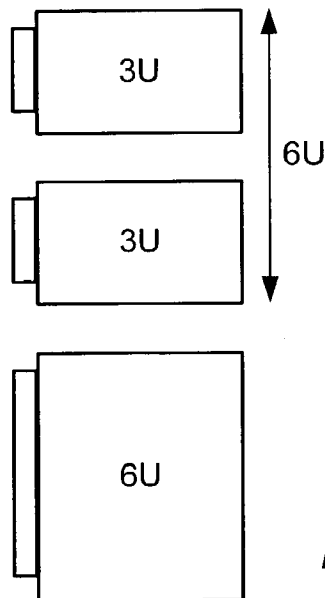
(57) **ABSTRACT**

The coupling apparatus couples two circuit cards to fit into a larger chassis. A coupling element can connect two similar sized circuit cards or two different sized circuit cards together by coupling the first circuit card and the second circuit card to effectively form a combined circuit card of a larger size. The larger size may allow for more features, may make it easier to dissipate heat, may make the circuit cards easier to shield, and/or may allow for the use of larger and less expensive components on the circuit cards.

42 Claims, 3 Drawing Sheets

Figure. 1
(Prior Art)
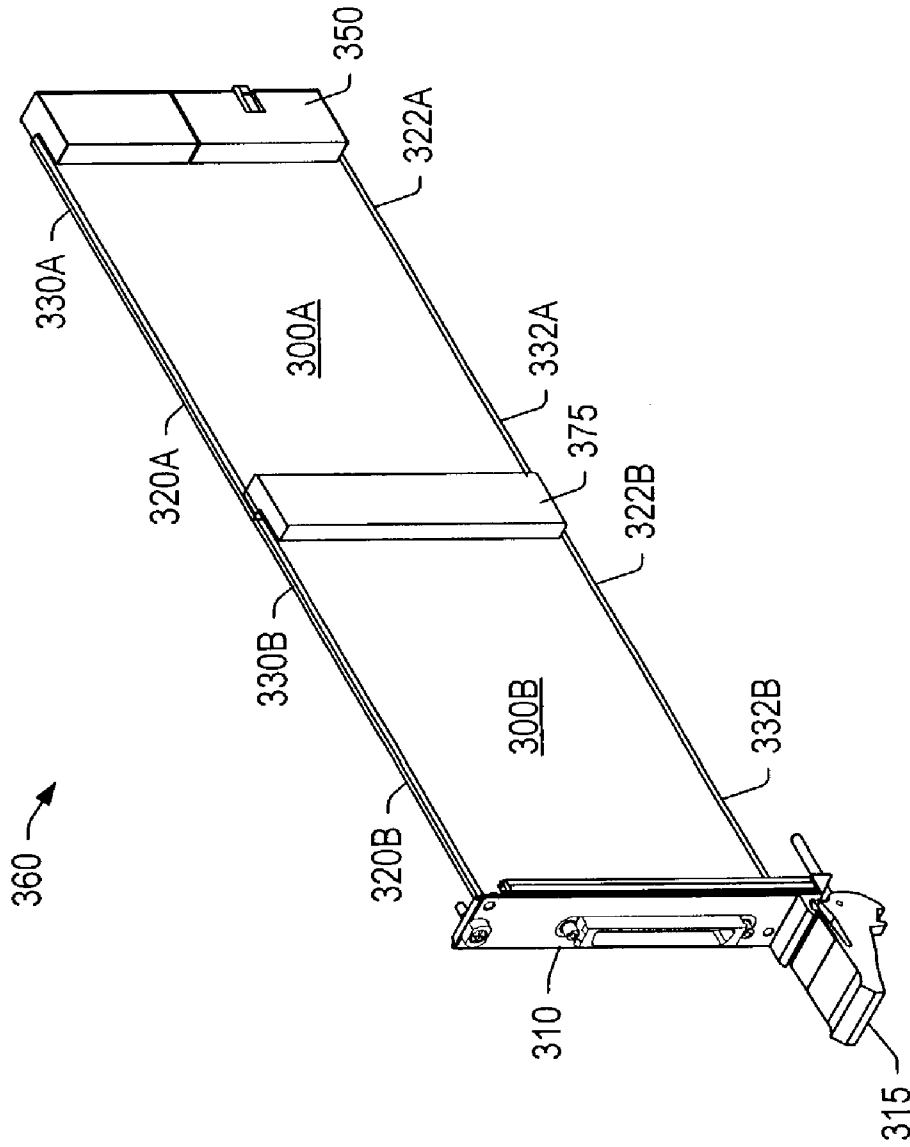

Figure. 2
(Prior Art)

Figure 3

350

322A

330A

300A

332A

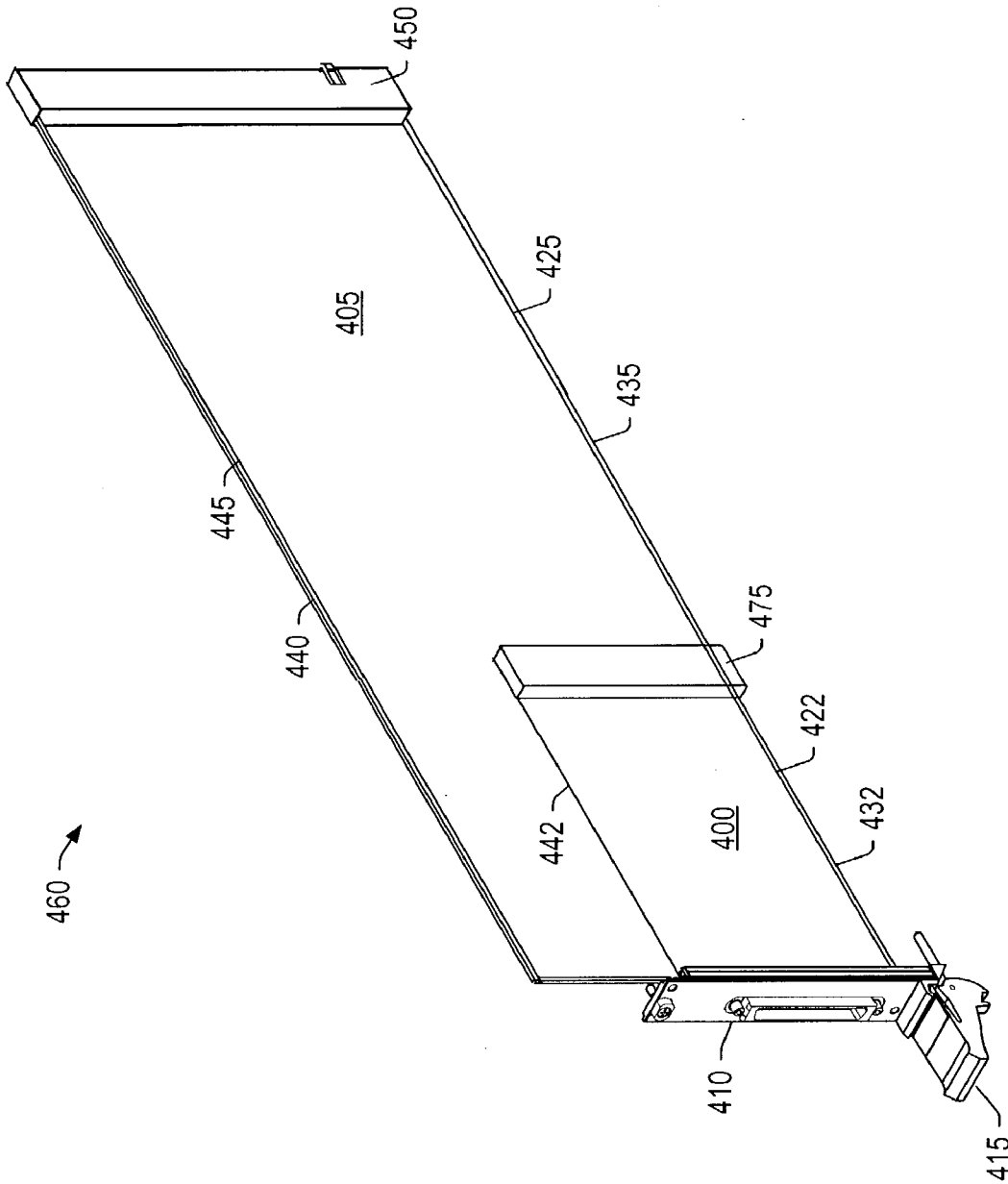375

320A

322B

330B

300B

332B

320B

310

315

360

Figure 4

PXI CHASSIS WITH BACKWARDS COMPATIBILITY FOR EXISTING PXI DEVICES

FIELD OF THE INVENTION

The present invention relates to an adapter for coupling two cards of one size to create a combined card of a second size, and more specifically to create a combined card in a CompactPCI/PXI form factor.

DESCRIPTION OF THE RELATED ART

An instrument is a device which collects data or information from an environment or unit under test and displays this information to a user. An instrument may also perform various data analysis and data processing on acquired data prior to displaying the data to the user. Examples of various types of instruments include oscilloscopes, digital multimeters, pressure sensors, etc., and the types of information which might be collected by respective instruments include voltage, resistance, distance, velocity, pressure, frequency of oscillation, humidity or temperature, among others.

The various hardware interface options currently available for instrumentation systems can be categorized into various types, including IEEE 488-controlled instruments (GPIB instruments), Virtual Machine Environment (VME) Extensions for Instrumentation (VXI) bus instruments, Peripheral Component Interconnect (PCI) Extensions for Instrumentation (PXI) bus instruments, plug-in data acquisition (DAQ) boards, and RS-232-controlled (serial) instruments, among others.

The PXI bus is a platform for instrumentation systems that was introduced in 1997. PXI combines the high-speed PCI bus with integrated timing and triggering designed specifically for measurement and automation applications to deliver significant performance improvements over older architectures. PXI is built on the modular and scalable CompactPCI specification and the high-speed PCI bus architecture. As a result, PXI products maintain complete interoperability with CompactPCI, offering superior mechanical integrity, easy systems integration, and more expansion slots than desktop computers.

FIG. **1** (Related Art) Exemplary Chassis

FIG. **1** illustrates an exemplary chassis of either VXI, VME, CompactPCI, or PXI type. Cards **102**A, **102**B, and **102**C are designed to physically connect with the chassis backplane (not shown). The chassis **100** comprises a housing which is configured to define a plurality of slots. The backplane is comprised in the housing and is adapted for transmitting electrical signals. Cards **102**A, **102**B, and **102**C can be of either 3U or 6U size, such as described below with reference to FIG. **2**.

FIG. **2** (Related Art) Various Card Formats

FIG. **2** illustrates different card formats as defined by the IEEE 1101.10, CompactPCI, and PXI specifications. The IEEE 1101.10, CompactPCI, and PXI specifications define two card sizes, referred to as 3U and 6U, and two chassis sizes, referred to as 3U and 6U, designed to accept 3U and 6U cards, respectively. The IEEE 1101.10, CompactPCI, and PXI specification define 6U card size to be more than twice as tall as the 3U card size.

Since there are different chassis sizes and different card sizes, it would be advantageous to allow different sized cards

3687471 from Rittal may allow users to connect two 3U cards into a single 6U slot in a 6U chassis. However, Rittal and related solutions may require a pre-defined set of mounting holes on the cards **102**A, **102**B, and **102**C in order to use the adapter. The pre-defined holes may not be universal to all CompactPCI cards **102**A, **102**B, and **102**C, thus making the adapter difficult to utilize properly. Other related art includes solutions for a 6U chassis with a pre-defined number of 3U slots, such as products from Adlink, Ziatech, and Diversified Technologies.

SUMMARY OF THE INVENTION

In one embodiment, a first module and a second module may be combined using a coupling element to provide a larger circuit area. For example, the first module and the second module may have similar circuit areas and coupling the first module to the second module may provide double the circuit area as provided by either the first module or the second module. In another embodiment, the first module may be larger than the second module. Other module sizes are also contemplated.

In one embodiment, the first module may be an adapter card such as, but not limited to a Riser Card with a PCI Express to PCI Bridge. In one embodiment, the PCI Express to PCI Bridge may convert a PCI Express signal to a PCI signal. The first module may also pass along PXI-specific trigger and clocking signals and provide additional depth to interface a Legacy PXI card to a PCI Express backplane.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention can be obtained when the following detailed description of the preferred embodiment is considered in conjunction with the following drawings, in which:

FIG. **1** illustrates a prior art chassis of VXI/VME/CompactPCI/PXI type;

FIG. **2** illustrates prior art various card formats;

FIG. **3** illustrates an exemplary embodiment of the apparatus, according to one embodiment; and

FIG. **4** illustrates another exemplary embodiment of the apparatus, according to one embodiment.

Although the system and method of the present invention has been described in connection with the preferred embodiment, it is not intended to be limited to the specific form set forth herein, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents, as can be reasonably included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Incorporation by Reference

U.S. Pat. No. 5,995,376 titled "Chassis which includes configurable slot **0** locations" filed May 20, 1997, is hereby incorporated by reference as though fully and completely set forth herein.

U.S. Pat. No. 6,198,633 B1 titled "Computer system and enclosure thereof" filed Jul. 17, 1998, is hereby incorporated by reference as though fully and completely set forth herein.

FIG. **3**—Exemplary embodiment of the apparatus

FIG. **3** illustrates an exemplary embodiment of an appa-

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