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InVue Security Products Inc.

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# METHOD FOR CONFIGURING A SECURITY CONNECTOR

## FIELD OF THE INVENTION

[0001] Embodiments of the present invention relate generally to connectors for electronic devices, including connectors for securing electronic devices from theft, and techniques for configuring such connectors.

## BACKGROUND OF THE INVENTION

[0002] Retailers routinely display articles of merchandise, such as portable computers (e.g. notebooks, laptops, tablets, etc.), mobile phones, e-readers, media players, and the like for customers to evaluate before making a purchase. These articles of merchandise are continually being made smaller and lighter in weight due to advances in technology and materials. As a result, such merchandise is increasingly vulnerable and susceptible to theft. At the same time, the retail price and profit margin for such merchandise continues to decline. Accordingly, these articles of merchandise need to be secured by a security device that effectively and cost efficiently protects the merchandise from theft.

[0003] It is common in the retail security industry to have electronic devices tethered to a store fixture to prevent theft yet allow a customer to interact with the device. In addition, it is desirable to provide power to the electronic device so that the device may be charged and operable for use by a potential customer. Some manufacturers provide proprietary connectors that are incapable of providing security to an electronic device. Therefore, there is a need for improved connectors that are capable of providing both power and security to the electronic device without affecting the existing functionality of the connector.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 is a schematic of a security system according to one embodiment of the present invention.

[0005] FIG. 2 is a perspective view of a connector according to an embodiment of the present invention.

[0006] FIG. 3 is a top schematic view of a circuit defined by a connector according to one

embodiment of the present invention.

[0007] FIG. 4 is a top schematic view of a connector according to an embodiment of the present invention.

#### DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0008] Embodiments of the present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, the exemplary embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0009] Reference will now be made to the accompanying drawing figures wherein identical reference numerals denote the same or similar elements throughout the various views. One or more embodiments of a connector 10 for securing an article of merchandise “M” from theft are described below. Some manufacturers manufacture proprietary connectors that are only compatible with the manufacturer’s articles of merchandise. Such proprietary connectors may be used to ensure that the article of merchandise is not damaged due to differences in power requirements or mechanical mismatch. Some proprietary connectors may be “smart” and provide additional functionality beyond simply passing through electrical signals. For example, the proprietary connector may be configured to transmit data and electrical signals for authenticating that the article of merchandise is compatible with the connector.

[0010] However, such proprietary connectors have certain limitations in view of providing security from theft. In this regard, some proprietary connectors do not allow for a sense loop for detecting an unauthorized removal of the connector. In addition, although the connectors are “smart” in the sense that the connectors can communicate with the article of merchandise, such smart connectors may be prone to false alarms. Namely, should the article of merchandise be powered off by a user, the connector is incapable of differentiating between an intentional power off or whether the article of merchandise has been removed from the connector in an authorized manner. Furthermore, should the article of merchandise power down for power conservation, the connector will again be incapable of distinguishing between an intentional power down or an

attempted theft. Therefore, embodiments of the present invention facilitate security capability of proprietary or other “smart” connectors while maintaining the existing functionality of the connector.

[0011] The article of merchandise M may be a display model or an operational sample of electronic merchandise, such as portable computers (e.g. notebooks, laptops, tablets, etc.), e-readers, mobile phones, smart phones, media players, and the like, for a customer to examine before making a decision to purchase the item. The article of merchandise M may be typically displayed in a manner that permits a prospective purchaser to evaluate the operation and features of the merchandise, while protecting the merchandise from a potential thief. A power cord or tether 12 may be operably engaged with the article of merchandise M at one end, and according to one embodiment, a security event (e.g., removal, cutting, or tampering of the power cord) may result in the generation of a security signal (e.g., an audible and/or visual alarm). For example, the power cord 12 may be operably engaged with an alarm device 25 configured to generate a security signal upon detecting a security event. In one embodiment, the power cord 12 includes a connector 14 configured to operably engage an alarm device 25 (see, e.g., FIG. 1).

[0012] Embodiments of the present invention provide for the delivery of at least power to the article of merchandise M on display through a power cord, cable, or the like. The power cord 12 may include a plurality of conductors 16. For example, a pair of conductors 16 in the power cord 12 (e.g., a positive power line and a ground line) may provide power to the article of merchandise M. An input power source or controller 18 may be in electrical communication with the power cord for transmitting power and other signals through the cord 12 and to the article of merchandise M. The power cord 12 may include additional conductors 16 if desired, such as for transmitting data, audio, video, optical and/or communication signals. Moreover, in one embodiment, the power cord 12 includes at least one conductor 16 for transmitting a security signal. For example, the power cord 12 may include a plurality of conductors 16, one of which for transmitting a signal to the connector 10, and a second conductor for returning the signal back through the power cord. Should the signal be disrupted (e.g., the cord 12 is removed or cut), a security signal may be generated. For instance, an audible and/or a visible signal may be generated. In addition, the functionality of the article of merchandise M may be interrupted and locked from further use without being overridden by an authorized user, such as by inputting a

passcode or using an appropriate key.

[0013] One end of the power cord 12 includes a connector 10 configured to electrically couple to the article of merchandise M. The opposite end of the power cord is configured to be coupled to a power source 18, such as a USB-port on another electronic device or an electrical outlet. Thus, the power cord 12 may include a USB connector or the like that is electrically connected to the connector 10 at the opposite end of the cord. In other embodiments, the power cord 12 may be electrically coupled to an alarm device 25 or sensor, as explained in further detail below. The connector 10 is configured to provide at least power and security signals to the article of merchandise. In some embodiments, the connector 10 is similar to those disclosed in U.S. Patent Publ. No. 2014/0335730, entitled Security Connector and filed May 1, 2014, U.S. Patent Publ. No. 2012/0272297, entitled Cross-Transport Authentication and filed June 29, 2012, U.S. Patent Publ. No. 2013/0089290, entitled Hybrid Optical Connector and filed November 29, 2012, and U.S. Patent Publ. No. 2013/0087690, entitled Optical Connection of Devices and filed November 29, 2012, U.S. Patent Publ. No. 2013/0117470, entitled Techniques for Configuring Contacts of a Connector and filed November 16, 2012, U.S. Patent Publ. No. 2013/0115821, entitled Dual Orientation Connector with External Contacts and Conductive Frame and filed November 16, 2012, and U.S. Patent Publ. No. 2013/0115817, entitled Techniques for Configuring Contacts of a Connector and filed November 16, 2012, each of which is incorporated by reference herein in its entirety.

[0014] Generally, the connector 10 may include a body portion 20 and a connection portion 22 extending outwardly therefrom (see, e.g., FIG. 2). The body portion 20 and connection portion 22 may be separate members coupled to one another or integrally formed as a single component. Although the body portion 20 and the connection 22 portion may be various sizes and configurations, the connection portion is illustrated as having a smaller cross-sectional dimension than the body portion. The power cord 12 is coupled to the body portion 20, while the connection portion 22 is configured to be inserted within an input port of the article of merchandise M so as to be electrically connected thereto. The body portion 20 may be hard wired to the power cord 12 or connected using a suitable releasable coupling. The connection portion 22 comprises a plurality of conductors 24, contacts, or pins that correspond to the conductors 16 in the power cord, as discussed above. The connection portion 22 may include

any number of conductors 24, such as 2, 4, 6, 8, etc. The conductors 24 may be embedded within or otherwise integrated within a conductive shield 26 and extend from a first surface of the shield to a second opposite surface such that the conductors are exposed on both the first and second surfaces. Thus, the shield 26 may surround the conductors 24 and form an outer surface of the connection portion 22. An outer perimeter 28 of the shield 26 extending between the first and second surfaces may also surround the conductors 24 and include a conductive material that is electrically connected to the conductive shield. The outer perimeter 28 may include one or more engagement features (e.g., recesses) that facilitate engagement with corresponding engagement features in the input port of the article of merchandise M. In one embodiment, the conductive shield 26 and outer perimeter 28 are a conductive metal material. The shield 26 and/or body portion 20 may house a processor 30 for communicating with the article of merchandise M. The processor 30 may be configured to perform a variety of functions, such as authenticating that the connector is compatible with the article of merchandise. The processor 30 could also be configured to detect the orientation of the connector 10. In this regard, the connector 10 may be bi-directional in that the connector may be inserted into an input port of the article of merchandise M in a first orientation and a second opposite orientation, which is unlike conventional USB and micro-USB connectors. For example, the connector 10 may be inserted in orientations 180 degrees opposite from one another. The processor 30 may, in turn, detect the orientation of the connector so that the electrical signals may be routed to the proper conductors in the connection portion.

[0015] The connector 10 is further configured to facilitate detection of a security event, such as removal or cutting of the power cord 12. In this regard, FIG. 3 shows an embodiment of a connector 10 that includes a ground conductor 32 that is not electrically connected to a first conductor 34 (e.g., for transmitting an input sense signal via a sense line), the shield 26, or any other conductors 24 in the connection portion 22 when the connector is not connected to the article of merchandise M. The first conductor 34 may be one of the conductors 24 integrated into or otherwise electrically connected to the conductive shield 26 or could be a separate conductor that is electrically coupled to the shield (e.g., via soldering). When the connector 10 is inserted within the input port of the article of merchandise M, the ground conductor 32 becomes electrically connected to the first conductor 34, another conductor(s) 36 in the connector, and/or the conductive shield 26 due to interaction with the conductors of the input port, thereby

completing an electrical circuit. In other words, the conductive shield 26 and/or at least one other conductor is shorted to the ground conductor 32. As noted above, the power cord 12 may include a plurality of conductors 16, one of which is for transmitting a signal to the connector 10 (e.g., via the first conductor 34), and a second conductor for returning the signal back through the power cord (e.g., via the ground conductor 32). As long as the connector 10 is electrically connected to the article of merchandise M, the sense loop through one conductor 34 and the ground conductor 32 is uninterrupted. Should the sense loop be disrupted (e.g., the cord 12 is removed or cut), a security signal may be generated. Thus, as soon as the connector 10 is removed from the article of merchandise M, the shorted conductors would open, resulting in the generation of a security signal. FIG. 3 also shows that the connector 10 includes a conductor 36 that allows power to be provided to the connector, which may be used to provide power to the article of merchandise M. Thus, the article of merchandise M may be charged via the connector 10.

[0016] The input port of the article of merchandise M may include a plurality of conductors, pins, or contacts that are configured to electrically connect to corresponding conductors 24 on the connection portion 22 and/or conductive shield 26 when the connection portion is engaged with the input port. In one embodiment, the input port includes a plurality of conductors that are configured to electrically connect to the conductors 24 and/or the conductive shield 26 of the connector. For example, the input port may include a pair of conductors connected to a common ground, with one conductor configured to electrically connect to the ground conductor 32 of the connector and the other conductor 34 configured to electrically connect to the conductive shield 26 or one or more of the remaining conductors 36 of the connector. As such, coupling the connector 10 with the input port results in each of the conductors 24 of the connector (including the ground conductor 32), the conductive shield 26, and the article of merchandise M to be in electrical communication with one another.

[0017] In some embodiments, the power cord 12 is coupled to an alarm device 25 or sensor. For instance, the power cord 12 may electrically connect an alarm device 25 or sensor to the article of merchandise M. Thus, upon the occurrence of a security event, the alarm device 25 may include circuitry for detecting the security event and generating an appropriate security signal. For example, the alarm device 25 may be similar to those manufactured by InVue

Security Products Inc. For example, the alarm device may include a display module or mounting member configured to removably support the article of merchandise M, as well as provide power and security to the article of merchandise. According to some embodiments, the alarm device may be similar to those disclosed in U.S. Patent Nos. 7,710,266, entitled Security System with Product Power Capability and issued May 4, 2010, and U.S. Patent No. 7,727,843, entitled Programmable Alarm Module and System for Protecting Merchandise and issued June 15, 2010, each of which is incorporated by reference herein in its entirety. Moreover, the alarm device 25 could be integrated with an input power source or controller 18, such as for providing and/or receiving power and/or security signals from the connector 10 and/or the article of merchandise M.

[0018] FIG. 4 shows another embodiment of a security connector 10. In this embodiment a portion 40 of the conductive shield 26 is removed for decoupling the ground conductor 32 from the shield. In this regard, the ground conductor 32 may be electrically connected to one or more conductors 42 within the conductive shield 26. In some cases and in its original form, the conductor(s) 42 is biased into engagement with the inner surface of the conductive shield 26 for establishing an electrical connection. Thus, the ground conductor 32 is electrically connected to the conductive shield 26. Because a sense loop cannot be formed with the ground conductor 32 grounded to the conductive shield 26, embodiments of the present invention allow the ground conductor to form a sense loop with another conductor 34 when the connector is inserted within an input port of the article of merchandise M. In this regard, by removing a portion 40 of the conductive shield 26, the ground conductor 32 becomes electrically connected to the first conductor 34 and the conductive shield 26 due to interaction with the conductors of the input port, thereby completing an electrical circuit. In other words, the conductive shield 26 and/or at least one other conductor is shorted to the ground conductor 32. The portion 40 of the conductive shield 26 may be removed using a variety of techniques, such as with a laser or a CNC machine. The portion 40 may be an exterior surface of the conductive shield 26 for exposing an interior surface of the connection portion 22. In some cases, a portion of the sidewall of the conductive shield 26 may be removed for decoupling the ground conductor 32. FIG. 4 shows that a pair of portions 40 are removed, but it is understood that one or more portions may be removed for exposing one or more conductors 42 connected to respective ground conductors 32 and decoupling the ground conductors 32 from the conductive shield 26.

Where the connector is bi-directional as discussed above, one or more portions 40 may be removed on each side of the conductive shield 26 for electrically decoupling a plurality of conductors 42 from the conductive shield.

[0019] Embodiments of the present invention provide advantages over similar connectors that may otherwise be incapable of providing security to the article of merchandise. This functionality is advantageous in a retail environment where articles of merchandise are on display for inspection by a customer. As discussed above, some proprietary connectors include conductive materials that do not enable a security signal to be transmitted through the connector since the ground conductor is always electrically connected to the conductive shield and/or other conductors. Thus, a sense loop is not possible with some current connector designs since there is no means to detect an interruption in the sense loop. By decoupling at least one conductor of the sense loop from the other conductors and/or the conductive shield, the ability to provide a sense loop is provided, thereby providing security capability. Furthermore, the sense loop is uninterrupted when the device is powered down thereby reducing the incidence of false alarms. The functionality of the connector is also unaffected. As such, proprietary connectors including “smart” functionality are not affected by the presence of the sense loop.

[0020] The foregoing has described one or more embodiments of a connector for securing an article of merchandise from theft or unauthorized removal. Those of ordinary skill in the art will understand and appreciate that numerous variations and modifications of the invention may be made without departing from the spirit and scope of the invention. Accordingly, all such variations and modifications are intended to be encompassed by the appended claims.

That which is claimed is:

1. A method for configuring a connector for securing an article of merchandise from theft or unauthorized removal, the method comprising:

providing a connector configured to provide power and data signals to an article of merchandise, the connector comprising a plurality of conductors and a conductive shield electrically connected to a plurality of the conductors when the connector is not engaged with the article of merchandise; and

removing one or more portions of the conductive shield so that at least one conductor is not electrically connected to the conductive shield when the connector is not engaged with the article of merchandise, the conductive shield configured to be electrically connected to, and cooperate with, the at least one conductor to define a sense loop when the connector is engaged with the article of merchandise.

2. The method of Claim 1, further comprising connecting a conductor to the conductive shield for defining a sense line, the conductor electrically connected to the conductive shield when the connector is not engaged with the article of merchandise.

3. The method of Claim 1, wherein the conductive shield comprises a first surface and a second opposing surface, and wherein a plurality of the conductors extend from the first surface and to the second opposing surface such that the connector may be electrically connected with the article of merchandise in different orientations.

4. The method of Claim 3, wherein removing comprises removing one or more portions of the conductive shield on each of the first and second surfaces.

5. The method of Claim 1, wherein the at least one conductor is a ground conductor.

6. The method of Claim 1, wherein the connector is proprietary and is only compatible with a corresponding proprietary input port on the article of merchandise.

7. The method of Claim 1, wherein removing comprises removing one or more portions of an exterior surface of the conductive shield for exposing an interior portion of the connector.

8. The method of Claim 1, wherein removing comprises removing one or more portions of a sidewall of the conductive shield

9. A connector for providing security to an article of merchandise, the connector comprising:

a body portion configured to be connected to a cord;

a connection portion engaged with the body portion;

a plurality of conductors; and

a conductive shield electrically connected to a plurality of the conductors when the connection portion is not engaged with the article of merchandise,

wherein one or more portions of the conductive shield are removed so that at least one of the plurality of conductors is not electrically connected to the conductive shield when the connector is not engaged with the article of merchandise, and

wherein the at least one conductor is configured to be electrically connected to, and cooperate with, the conductive shield to define a sense loop when the connector is engaged with the article of merchandise, and

wherein interruption of the sense loop is indicative of a security event.

## ABSTRACT

In one example, method for configuring a connector for securing an article of merchandise from theft or unauthorized removal is provided. The method includes providing a connector configured to provide power and data signals to an article of merchandise, wherein the connector includes a plurality of conductors and a conductive shield electrically connected to a plurality of the conductors when the connector is not engaged with the article of merchandise. The method also includes removing one or more portions of the conductive shield so that at least one conductor is not electrically connected to the conductive shield when the connector is not engaged with the article of merchandise. The conductive shield is configured to be electrically connected to, and cooperate with, the conductive shield to define a sense loop when the connector is engaged with the article of merchandise.

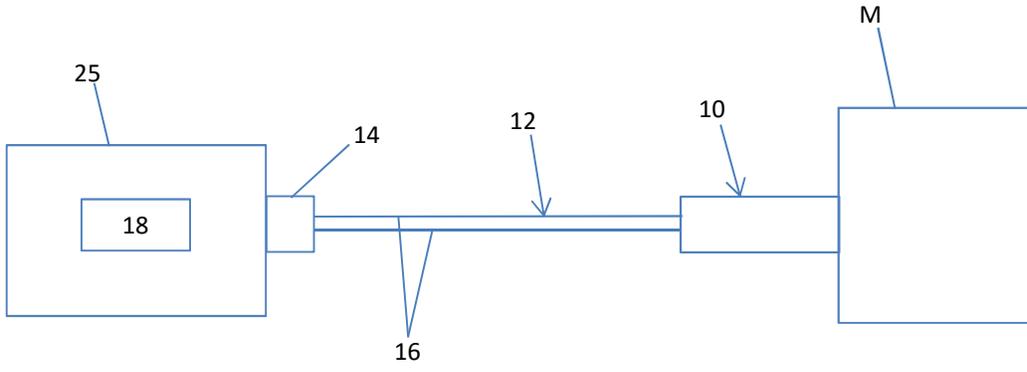


FIGURE 1

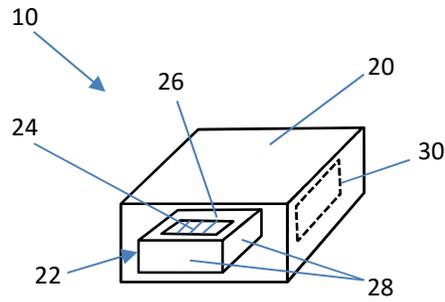


FIGURE 2

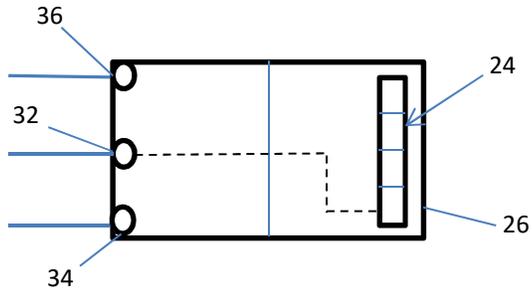


FIGURE 3

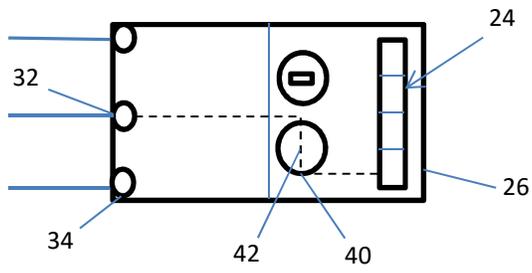


FIGURE 4