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- (54) **SECURITY SYSTEM FOR POWER AND DISPLAY OF CONSUMER ELECTRONIC DEVICES**
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- (\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 145 days.

RE37,590 E	3/2002	Leyden et al.
6,380,855 B1	4/2002	Ott
6,386,906 B1	5/2002	Burke
6,476,717 B1	11/2002	Gross et al.
6,570,502 B2	5/2003	Matsuo
6,756,900 B2	6/2004	Leyden et al.
6,761,579 B2	7/2004	Fort et al.
6,799,994 B2	10/2004	Burke
6,896,543 B2	5/2005	Fort et al.
6,946,961 B2	9/2005	Frederiksen et al.
7,002,467 B2*	2/2006	Deconinck et al. .... 340/539.1
7,053,774 B2*	5/2006	Sedon et al. .... 340/568.2
2002/0196143 A1	12/2002	Matsuo
2003/0206106 A1	11/2003	DeConinck et al.

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**G08B 13/14** (2006.01)
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- (58) **Field of Classification Search** ..... 340/568.8, 340/568.1, 568.2, 568.3, 540, 541, 571, 665, 340/686.6; 200/61.18; 439/501, 505, 531, 439/676

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,746,909 A	5/1988	Israel et al.
5,142,269 A	8/1992	Mueller
5,146,205 A	9/1992	Keifer et al.
5,172,098 A	12/1992	Leyden et al.
5,341,124 A	8/1994	Leyden et al.
5,552,771 A	9/1996	Leyden et al.
6,104,289 A	8/2000	Rand

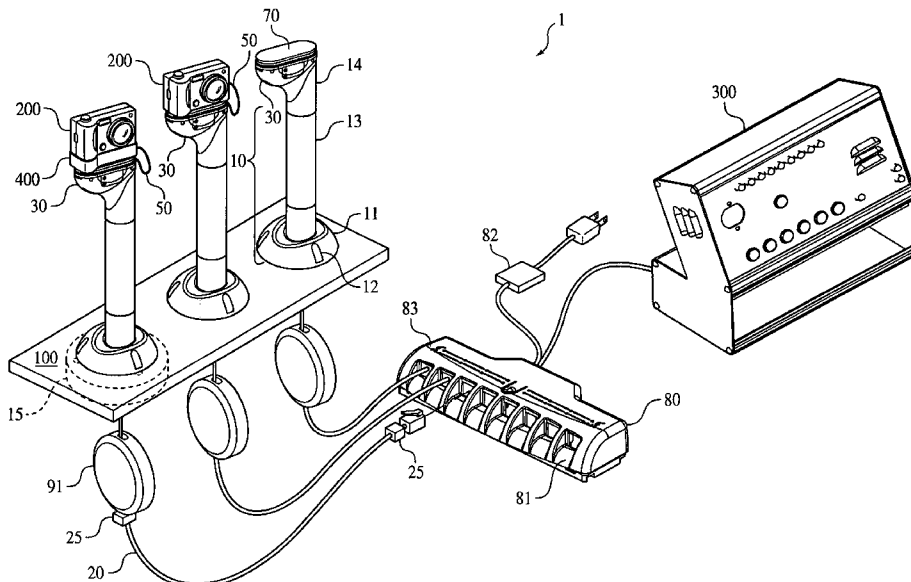
\* cited by examiner

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(57) **ABSTRACT**

A security system for powering and displaying a handheld electronic device includes a stand assembly mounted to a support and a housing removably mounted on a top portion of the stand assembly. The handheld electronic device is secured to a top portion of the housing and a sensor is coupled to the handheld electronic device. The sensor produces a detectable signal if the handheld electronic device is moved from an authorized state. A switch is disposed on the top surface of the housing and indicates whether the handheld electronic device is in contact with the housing. An output voltage controller controls an output voltage to the handheld electronic device which can be set only when the switch indicates that the device is not in contact with the housing. The output voltage is set to zero if device is not brought into contact with the housing within a predetermined time.

**32 Claims, 2 Drawing Sheets**



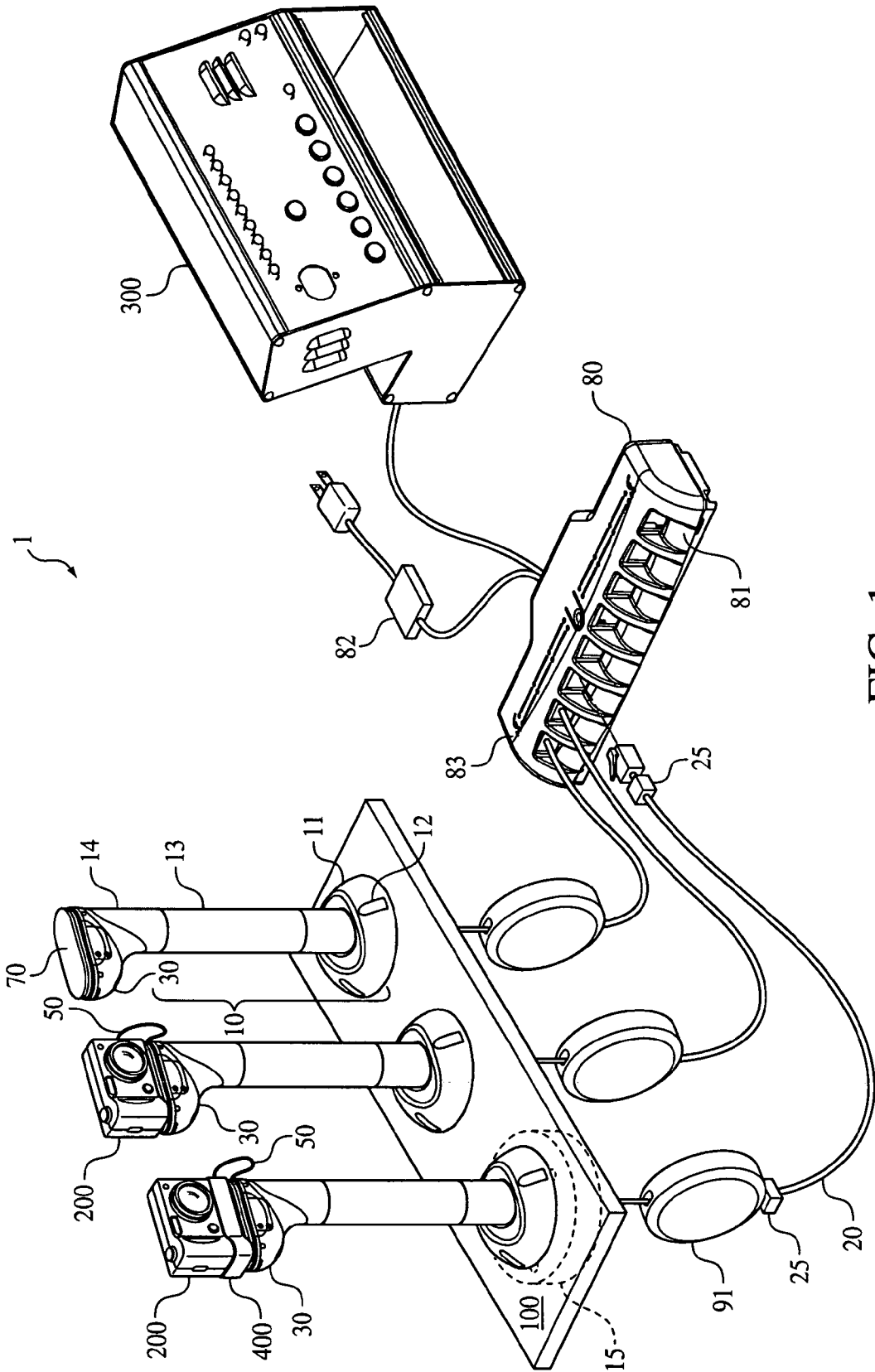


FIG. 1

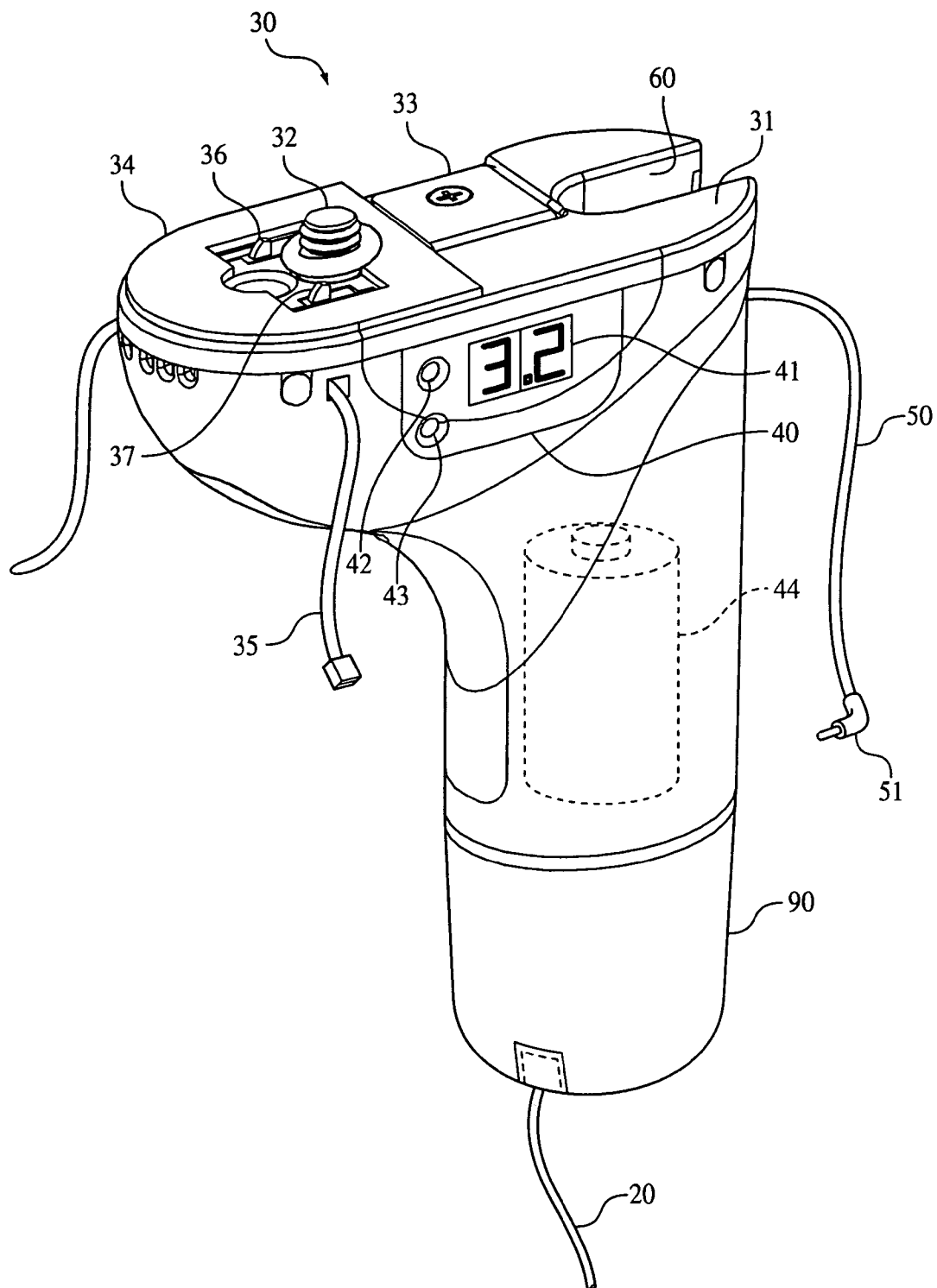


FIG. 2

## SECURITY SYSTEM FOR POWER AND DISPLAY OF CONSUMER ELECTRONIC DEVICES

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates to devices for securing and preventing unauthorized removal of displayed items. In particular, the invention relates to systems for displaying and securing handheld electronic devices wherein power may be provided to a displayed electronic device such that the device may be operated by a prospective purchaser.

#### 2. The Prior Art

Handheld consumer electronic devices, for example digital cameras, camcorders, cellular phones, personal digital assistants, calculators and the like are preferably displayed in a manner such that prospective purchasers may handle and manipulate the device when contemplating a purchase. Additionally, it is desirable to provide electronic power to such displayed devices so that prospective purchasers may operate the displayed device.

Due to their small size, accessibility and value, displayed handheld consumer electronic devices are often targeted for theft. As a result, retailers often provide displayed electronic devices with an alarm sensor which produces a recognizable signal in the event of an unauthorized removal of a particular electronic device. Displayed electronic devices may also be physically secured to a support, for example with a cable or tether.

A number of systems and devices for securing displayed electronic equipment are known. U.S. Pat. No. 6,761,579 to Fort et al.; U.S. Pat. No. 6,386,906 and U.S. Pat. No. 6,799,994 to Burke; 6,756,900 to Leyden et al.; U.S. Pat. No. 6,476,717 to Gross et al. and U.S. Pat. No. 5,146,205 to Keifer et al. relate to mounting assemblies for video cameras. U.S. Pat. No. 5,142,269 to Mueller relates to an anti-theft system for a printer or computer.

U.S. Pat. No. 4,746,909 to Israel et al. relates to an electronic security system for monitoring merchandise. U.S. Pat. No. 5,172,098 and U.S. Pat. No. 5,341,124 to Leyden et al. relate to an alarm system having a plurality of sensors. U.S. Reissued Patent No. RE37,590 to Leyden et al. relates to a retractable sensor assembly for use with an alarm system.

U.S. Pat. No. 6,104,289 to Rand relates to an anti-theft product display system including a command module, a plurality of satellites and a group of sensors. U.S. Patent Application Publication No. US 2003/0206106 to DeConinck et al. relates to an alarm interface for a merchandise security system which is coupled to an alarm system. U.S. Patent Application Publication No. US 2002/0196143 to Matsuo relates to a shoplifting monitoring apparatus including an attachment unit for attachment to an article and an alarm device that issues an alarm when the attachment unit is detached from the article.

### SUMMARY OF THE INVENTION

This invention relates to devices for securing and preventing unauthorized removal of displayed items. In particular, the invention relates to systems for displaying and securing handheld electronic devices wherein power may be provided to a displayed electronic device such that the device may be operated by a prospective purchaser.

A security system according to an embodiment of the invention includes a stand assembly which is mounted to a

support such as a counter, tabletop or wall. A housing is removably mounted to a top portion of the stand assembly. The housing includes a top surface which is adapted to receive a handheld electronic device, for example a digital camera, camcorder, cellular phone, personal digital assistant, or calculator. A top portion of the stand assembly may comprise a collar having a cavity which is adapted to receive a portion of the housing such that the housing is centered in the stand assembly. The stand assembly may include one or more sections having a bore for routing a retractable cable coupled to the housing.

The handheld electronic device may be secured to the housing with a fastener, for example a threaded fastener which extends through a portion of the housing and engages an associated threaded aperture disposed on the handheld electronic device. In addition to or in place of a threaded fastener, a flexible locking band and/or an adhesive tape may be used to secure the handheld electronic device to the housing. A bracket may be provided on the top surface of the housing for preventing the handheld electronic device from rotating relative to the housing.

A sensor is adapted to be coupled to the handheld electronic device. The sensor produces a detectable signal when the handheld electronic device is moved from an authorized state, for example if the handheld electronic device is removed from the housing and/or is transported outside a predetermined zone.

A switch is disposed on the top surface of the housing. The switch is movable between a first position wherein the handheld electronic device is not in contact with the housing and a second position wherein the handheld electronic device is in contact with the housing. The switch may include, for example an upwardly biased contact-type switch or a folding sensor disposed between the housing and the electronic device. The folding sensor may include circuitry capable of indicating whether the electronic device is in contact with the housing. For example, the folding sensor may indicate that the electronic device is in contact with the housing when the folding sensor is in a folded state and the folding sensor may indicate that the electronic device is not in contact with the housing when the sensor is in an open, unfolded or broken state.

An output voltage controller for controlling an output voltage provided to the handheld electronic device is disposed in the housing. An output voltage may be set only when the switch is in the first position, corresponding to the condition where the handheld electronic device is not in contact with the housing. Once set, an output voltage may return to zero volts if the switch is not moved to a second position, corresponding to the condition where the handheld electronic device is in contact with the housing, within a predetermined time after the output voltage has been set.

The output voltage controller may include one or more inputs for selecting a desired output voltage. The output voltage controller may include a display for displaying a selected output voltage. Preferably, the output voltage controller has an output voltage range of approximately 0.1 to approximately 10.0 volts and an output voltage may be selected in increments of approximately 0.1 volts.

The output voltage controller is coupled to the handheld electronic device with a power cable. The power cable may include a coaxial barrel plug at one end which engages with the housing and a plug at another end for engaging the handheld electronic device. A notch may be provided in a portion of the housing where the power cable engages the housing.

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A satellite is in electrical communication with the output voltage controller and may receive the detectable signal from the sensor. In a security system according to an embodiment of the invention the satellite may receive a detectable signal from the sensor via a wireless communication. The satellite may include one or more audible and/or visible indicators for indicating a status of the sensor and/or switch.

The satellite includes a plurality of output jacks which are coupled to a retractable cable. The retractable cable is also coupled to the housing. A detangler may be coupled to the retractable cable. A power supply and a command module are coupled to the satellite.

In a security system according to an embodiment of the invention, the sensor may comprise a second switch disposed on the top surface of the housing, wherein the switch is movable between a first position wherein the handheld electronic device is not in contact with the housing and a second position wherein the handheld electronic device is in contact with the housing. The sensor switch may comprise, for example, an upwardly biased contact-type switch. A lever may be provided between the handheld electronic device and the housing, wherein the lever maintains one or more of the switches in a position corresponding to the handheld electronic device being in contact with the housing. A housing cover may be secured over the top surface of the housing when an electronic device is not in contact with the housing, wherein the housing cover maintains the second switch in a position as if the handheld electronic device was in contact with the housing.

Alternatively or additionally, the sensor may include a folding sensor disposed between the housing and the electronic device. The folding sensor may include circuitry capable of indicating whether the electronic device is moved from an authorized to an unauthorized state, for example if the electronic device is separated from the housing or transported beyond a predetermined area or zone. For example, the folding sensor may indicate that the electronic device is in contact with the housing when the folding sensor is in a folded state and the folding sensor may indicate that the electronic device is not in contact with the housing when the sensor is in an open, unfolded or broken state. The sensor may further comprise a resistance and/or capacitance type sensor, an optical sensor, a transducer, a Hall effect sensor, a magnetic sensor or any other suitable device capable of producing a detectable signal when the electronic device is moved from an authorized state.

In a security system according to a further embodiment of the invention, a top surface of a housing is adapted to receive a docking station of a handheld electronic device. An output voltage controller disposed on the housing controls an output voltage to the docking station. An output voltage to the docking station can be set only when a switch disposed on the top surface of the housing is in a position corresponding to the condition where the docking station is not in contact with the housing. Once set, an output voltage may return to zero volts if the switch is not moved to a second position, corresponding to the condition where the docking station is in contact with the housing, within a predetermined time after the output voltage has been set. The docking station is coupled to the housing with a power cord. A sensor is adapted to be coupled to the handheld electronic device which engages the docking station. The sensor produces a detectable signal which is received by a satellite when the handheld electronic device is moved from an authorized state.

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An advantage of a security system according to an embodiment of the invention is that an output voltage controller is provided for selecting an appropriate voltage to be delivered to a displayed electronic device. As voltage is selected and regulated via an adjustable output voltage controller, rather than by a power cable, the need for multiple power cables adapted for powering various electronic devices having differing input voltage requirements is eliminated.

Another advantage of a security system according to an embodiment of the invention is that an output voltage controller is provided wherein an output voltage may be set only when an electronic device to be powered is not coupled to a housing. Furthermore, an output voltage to an electronic device is returned to zero if: 1) an electronic device is not coupled to the housing within a predetermined period of time of setting an output voltage; or 2) if power to an electronic device has been enabled and the electronic device is removed from the housing. These features greatly reduce the likelihood of providing an inappropriate voltage level to an electronic device via the output voltage controller, thereby damaging the electronic device.

Another advantage of a security system according to an embodiment of the invention is that an internal battery is provided for powering an output voltage controller disposed in a portable housing, so that a voltage level may be set and retained without the portable housing or output voltage controller being coupled to an external power source.

Another advantage of a security system according to an embodiment of the invention is that an adjustable stand assembly is provided which permits secured electronic devices to be displayed at various heights and in various orientations. The stand assembly may include a collar portion which interacts with a removable housing to which an electronic device is mounted such that the removable housing automatically centers itself upon insertion into the stand assembly.

Another advantage of a security system according to an embodiment of the invention is that a bracket may be provided in a housing to which an electronic device is secured, wherein the bracket prevents the electronic device from rotating with respect to the housing, thereby preventing and/or inhibiting an unauthorized removal of the electronic device from the housing.

Another advantage of a security system according to an embodiment of the invention is that a notch may be provided in a portion of a housing where a power cable supplying power to a secured electronic device is coupled to the housing. The notch may serve to prevent or inhibit an unauthorized removal of the power cord once the electronic device has been secured to the housing.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other benefits and features of the present invention will become apparent from the following detailed description considered in connection with the accompanying drawings. It is to be understood, however, that the drawings are designed as an illustration only and not as a definition of the limits of the invention.

In the drawings, wherein similar reference characters denote similar elements throughout the several views:

FIG. 1 shows a schematic view of a security system according to an embodiment of the invention; and

FIG. 2 shows a perspective view of a housing according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE  
PREFERRED EMBODIMENTS

Referring now in detail to the drawings and, in particular, FIG. 1 shows a schematic view of a security system for displaying a handheld electronic device according to an embodiment of the invention. As shown in FIG. 1, security system 1 may include a stand assembly 10 which is mounted to a support 100, for example a display counter, tabletop or wall. Stand assembly 10 supports housing 30 and displayed handheld electronic device 200 and conceals a retractable cable 20 which is routed to housing 30.

Stand assembly 10 may be mounted to support 100 using a flange 15 positioned under support 100 and one or more fasteners, for example threaded fasteners or screws, which pass through notches provided in a base portion 11 of stand assembly 10. By using fasteners of appropriate lengths, the base 11 and flange 15 combination is adaptable to supports of various thicknesses. In this way stand assembly 10 is compatible with and may be mounted to a wide range of supports, for example display counters, tabletops and/or walls having various configurations and thicknesses.

Base portion 11 may serve to conceal the stand assembly mounting hardware and provide an aesthetically pleasing, streamlined look to the stand assembly. Molded caps 12 may be inserted into the notches to conceal the presence of the screws. By rotating the components of stand assembly 10, the assembly may be positioned to selectively display a preferred side of handheld electronic device 200.

Stand assembly 10 may comprise one or more sections 13 wherein each section 13 includes a bore for routing a retractable cable 20 which is coupled to a housing 30. Sections 13 may comprise one or more tubular sections of various lengths. For example, sections 13 may have lengths of approximately three inches and six inches and may be combined to produce stand assemblies of various heights. In this way, stepped displays of handheld electronic devices may be created. This feature is particularly advantageous when multiple stand assemblies are arranged in rows, wherein a stand assembly in a rear row may be arranged with a greater height than a stand assembly in a front row for greater visibility of the displayed handheld electronic devices.

Sections 13 may include internal and/or external threaded surfaces for engaging adjacent sections. A bottom section may engage with a threaded boss which extends through support 100 and may be secured by an anti-rotation screw disposed in base portion 11 which prevents the bottom section of the stand assembly 10 from loosening.

Housing 30 is removably mounted a top portion of stand assembly 10. Collar 14 comprises the uppermost section of stand assembly 10. Collar 14 may have a cavity adapted to receive a lower portion of housing 30 which rests in collar 14. The cavity in collar 14 and lower portion of housing 30 may be shaped such that housing 30 is centered in stand assembly 10 when removably mounted thereon. For example, an internal surface of collar 14 may be contoured so as to guide a lower portion of housing 30 into stand assembly 10 as a lower portion of housing 30 is inserted into collar 14 and to maintain housing 30 in a preferred centered orientation when a lower portion of housing 30 is fully inserted into collar 14.

Housing 30 sits atop stand assembly 10. As shown in FIG. 2, housing 30 may have an ergonomic shape such that is comfortable for a prospective purchase to hold in his or her hand. A top surface 31 of housing 30 is adapted to receive

a handheld electronic device 200, for example a digital camera, camcorder, cellular phone, personal digital assistant, or calculator.

Handheld electronic device 200 may be secured to housing 30 to prevent its removal from housing 30. For example, as shown in FIG. 2 a threaded fastener 32 may be disposed in housing 30 and extend through top surface 31. Threaded fastener 32 may engage a corresponding threaded aperture in handheld electronic device 200. In one embodiment, threaded fastener 32 may comprise a ¼-20 screw which engages a tripod mounting aperture disposed on an under-surface of handheld electronic device 200.

A bracket 33 maybe disposed on top surface 31 of housing 30 for preventing rotation of handheld electronic device 200 relative to housing 30. When handheld electronic device 200 is secured to housing 30, bracket 33 may prevent handheld electronic device 200 from rotating such that threaded fastener 32 is disengaged from handheld electronic device 200, thereby permitting removal of handheld electronic device 200 from housing 30. When not in use, bracket 33 may be flipped over and stored within housing 30 as shown in FIG. 2.

Handheld electronic device 200 may be secured to housing 30 with adhesive tape 34. As shown in FIG. 2, adhesive tape 34 is disposed on top surface 31 of housing 30. Adhesive tape 34 may comprise a double sided adhesive tape and may be used in addition to threaded fastener 32 or as an alternative to threaded fastener 32.

A locking flexible band 35 may be used to secure handheld electronic device 200 to housing 30. Locking flexible band 35 may extend through an aperture provided in housing 30 as shown. Alternatively, locking flexible band 35 may extend through an aperture provided in a plug or fastener disposed in an opening in the housing, such as an opening provided for threaded fastener 32 or may be looped around a portion of housing 30. Locking flexible band 35 is further looped around handheld electronic device 200 and secured so as to secure device 200 to housing 30. Locking flexible band 35 may comprise, for example a tie wrap or wire wrap-style connector.

A switch 36 is disposed on top surface 31 of housing 30. Switch 36 is movable between a first position when handheld electronic device 200 is not in contact with housing 30 and a second position when handheld electronic device 200 is in contact with housing 30. For example, switch 36 may be upwardly biased such that it is in an open position when no handheld electronic device 200 is in contact with switch 36 and such that it is pushed downward into a closed position by an under surface of handheld electronic device 200 when handheld electronic device 200 is mounted to housing 30. Alternatively, a switch may include a folding sensor disposed between the housing and the electronic device. The folding sensor may include circuitry capable of indicating whether the electronic device is in contact with the housing.

An output voltage controller 40 is disposed in housing 30. Output voltage controller controls an output voltage which is provided to power handheld electronic device 200 via power cable 50. Various handheld electronic devices each have a specific input voltage requirement. Output voltage controller 40 allows a user to select an appropriate voltage from a plurality of available voltages for powering the particular handheld electronic device 200 secured to the associated housing 30. Output voltage controller 40 eliminates the need for multiple, voltage specific-power cords which must be selected and matched with each handheld electronic device to be powered and displayed. Output

voltage controller **40** similarly eliminates the need for individual, device specific batteries to power displayed electronic devices.

Output voltage controller **40** may include a display unit **41** which displays a current voltage output. Output voltage controller may also include one or more inputs **42**, **43** for setting a desired output voltage. Inputs may comprise, for example, two buttons disposed on a side of housing **30**. One input button **42** may increase an output voltage of the output voltage controller **40** when depressed and another button **43** may decrease an output voltage of output voltage controller **40** when depressed. Output voltage controller **40** may have a speed scroll function, wherein if one or more of input buttons **42**, **43** is depressed for a set period of time, output voltage control **40** scrolls through output voltages at an increased rate.

Output voltage controller **40** may also comprise a mechanically controlled device. For example, an output voltage may be selected from a plurality of available voltages by inserting an appropriate pin-type connector or jumper into a portion of the output voltage controller. The pin-type connector completes a circuit to deliver an appropriate output voltage. A plurality of pin-type connectors may be provided wherein each is associated with a particular output voltage. Furthermore, an output voltage may be selected via a mechanical dial having a plurality of settings each corresponding to a desired output voltage.

Output voltage controller **40** may have an output voltage range of approximately 0.1 to 10.0 volts and may be adjustable in increments of approximately 0.1 volts. As a result, a security system according to an embodiment of the invention may be used to provide power to a wide variety of handheld electronic devices to be powered and displayed. Additionally, an appropriate voltage for powering a particular electronic device can be selected from an available voltage range with a high degree of precision.

A battery **44** may be disposed in housing **30** and coupled to output voltage controller **40**. Battery **44** provides power to output voltage controller **40** such that an output voltage can be set and retained without housing **30** and output voltage controller **40** being connected to an external power supply. In this way a housing and associated handheld electronic device may be moved, shelved or otherwise disconnected from the remaining components of the security system without loss of the voltage setting.

If an output of battery **44** runs down and housing **10** is connected to an external power supply, display unit **41** may display a message indicating that battery **44** is low, for example the symbol "LO". Such display may be continuous or periodic, for example appearing once every two minutes. Additionally, an audible signal, for example a chirp, may be produced to indicate a low battery **44**.

Battery **44** may comprise a rechargeable battery, wherein stand assembly **10** may include a wireless, induction-type charger for charging battery **44**. Battery **44** may supply power to handheld electronic device **200** and/or to a sensor which provides a detectable signal when handheld electronic device **200** is moved from an authorized state.

Output voltage controller **40** is coupled to switch **36** such that an output voltage can be set only when switch **36** is in a first position corresponding to a condition wherein handheld electronic device **200** is not in contact with housing **30**.

Once an output voltage is set, output voltage controller **40** resets the output voltage to zero volts if switch **36** is not moved to a second position, corresponding to the condition where handheld electronic device **200** is in contact with housing **30**, within a predetermined time after the output

voltage has been set. For example an output voltage may be reset to zero automatically if a handheld electronic device is not brought into contact with housing **30** such that switch **36** is tripped within two minutes of setting an output voltage. Additionally, an output voltage of output voltage controller **40** may be reset to zero if handheld electronic device **200** is removed from housing **30**, such that switch **36** is moved to a position corresponding to this condition.

This "auto-zeroing" function of output voltage controller **40** protects against inadvertently providing an inappropriate voltage to a handheld electronic device. This inadvertent mispowering could otherwise occur, for example, when one handheld electronic device is removed from a housing and replaced with another handheld electronic device having a different input voltage requirement or when an output voltage is set and the housing is left unattended for a period of time without securing a handheld electronic device to the housing. Accordingly, the auto-zeroing capability of output voltage controller **40** prevents damage to handheld electronic devices which might otherwise result from applying an inappropriate voltage level to the device.

In the event that an output voltage is reset to zero due to the handheld electronic device not being brought into contact with housing **30** within a required time or a handheld electronic device being removed from a housing, an audible signal, for example a buzzing sound, may be produced and display **41** may turn off. Toggling one or both of switches, **36**, **37** may extend the time limit for bringing the handheld electronic device into contact with housing for an additional amount of time, for example an additional two minutes.

Once an output voltage has been set and a handheld electronic device **200** has been brought into contact with housing **30**, the output voltage to handheld electronic device **200** may not be enabled until handheld electronic device **200** has been coupled to housing for a predetermined period of time, for example for thirty seconds. Once an output voltage is enabled, display unit **41** may turn off. Depressing either or both of the voltage up and/or down inputs **42**, **43** may awaken display **41** such that display **41** shows the selected voltage output for a period of time, for example ten seconds, for power verification. However, once power to handheld electronic device is enabled, a voltage output may not be edited or changed.

The functions of the output voltage controller may be controlled by a micro controller. Output voltage may be regulated by a buck topology controller or any other suitable controller.

Output voltage controller **40** is coupled to handheld electronic device **200** with power cable **50**. Power cable **50** may include a coaxial barrel plug at one end which engages with housing **30** and a plug **51** at another end for engaging handheld electronic device **200**. Plug **51** may be adapted to fit a plurality of handheld electronic devices or a specific handheld electronic device. Since an output voltage for an associated handheld electronic device is set by output voltage controller **40** and not by power cable **50**, multiple power cables with the same plug but differing output voltages are not required. This feature greatly reduces the number of power cables which a user of a security system according to an embodiment of the invention must stock in order to accommodate various handheld electronic devices.

If a short circuit occurs in power cable **50** or retractable cable **20**, display unit **41** may display a message indicating this condition, for example display unit **41** may display the message "OL" and output voltage controller **40** will disable the output voltage to handheld electronic device **200**.

A notch 60 may be provided in a portion of the housing 30 where power cable 50 engages housing 30. Power cable 50 may be coupled to housing 30 within notch 60 and coupled to handheld electronic device 200 at an under surface of handheld electronic device 200. In this way, power cable 50 may be secured against removal during use as it is trapped under handheld electronic device 200 which is secured to housing 30. Thus power cable 50, once installed, can be removed only when handheld electronic device 200 is removed from housing 30.

A sensor adapted to be coupled to handheld electronic device 200 produces a detectable signal when handheld electronic device 200 is moved from an authorized state, as for example when a shoplifter attempts to remove handheld electronic device 200 from housing 30 or when handheld electronic device 200 is transported outside a predetermined zone.

The sensor may comprise, for example a switch 37 disposed on top portion 31 of housing 30 as shown in FIG. 2, wherein switch 37 is moveable between a first position wherein handheld electronic device 200 is not in contact with housing 30, and corresponding to an alarm condition, and a second position, wherein handheld electronic device 200 is in contact with housing 30, and corresponding to a non alarmed condition. A single switch may serve both as means for determining whether a handheld electronic device 200 is in contact with the housing 30 and as a means for producing a detectable signal when handheld electronic device 200 is removed from housing 30 in an unauthorized manner.

Alternatively, a sensor for producing a detectable signal when handheld electronic device 200 is moved from an authorized state may comprise an inductance, resistance and/or capacitance type sensor, a magnetic or acousto-magnetic-type sensor, an etched circuit folding tag, and/or a pressure or optical sensing transducer.

A sensor may include a mechanically activated sensor, for example an outwardly biased plunger mechanism which is secured to handheld electronic device 200 such that a plunger portion is inwardly displaced. Such a sensor may indicate an alarm condition when removed from handheld electronic device 200, thereby allowing a plunger portion to return to its normally outwardly biased position.

A sensor for producing a detectable signal when handheld electronic device 200 is moved to an unauthorized state may communicate with a satellite 80 and/or a command module 300 via an electrically conducting wire or wirelessly. For example, a sensor may communicate with satellite 80 and/or command module 300 by radio frequency or microwave frequency signals. Transmitters, receivers and/or transceivers may be provided on the sensor, housing 30, satellite 80 and/or command module 300 for wireless communication.

A plurality of light emitting diodes (LEDs) may be disposed on housing 30 for indicating a power and/or sensor status. For example, an amber LED may be disposed on a back portion of housing 30 and may light when power to handheld electronic device is enabled. A green LED disposed on a front portion of housing 10 may light when a sensor is not producing a detectable signal indicating that handheld electronic device has been moved from an authorized state (a non-alarm condition). A red LED disposed on a front portion of housing 10 may light when a sensor is producing a detectable signal indicating that handheld electronic device has been moved from an authorized state (an alarm condition).

A lever may be provided for use when handheld electronic device 200 has a narrow or thin profile such that a bottom

portion of handheld electronic device 200 does not contact one or both of switch 36 and switch 37 when handheld electronic device 200 is secured to housing 30. The lever may comprise a thin strip positioned between handheld electronic device 200 and top surface 31 of housing 30. The lever may extend across a width of top surface 31 of housing 30 and contact one or both of switches 36, 37 such that switches 36, 37 are triggered when handheld electronic device 200 is mounted to housing 30.

A housing cover 70 may be provided for use when a handheld electronic device is not disposed on housing 30, as shown in the assembly on the right hand side in FIG. 1. Housing cover 70 is adapted to be secured to top surface 31 of housing 30 in the manner of handheld electronic device 200. Housing cover may maintain switch 37 in a position as if a handheld electronic device were in contact with housing 30, thereby simulating a non-alarmed condition. Housing cover 70 may have a profile corresponding to that of top surface 31 of housing 30 and may comprise a relatively thin sheet of material, for example approximately 0.25 inches in thickness.

As shown in FIG. 1, a satellite 80 has a plurality of output jacks 81. For example satellite 80 may include eight output jacks as shown. Satellite 80 receives the detectable signal produced by a sensor when handheld electronic device 200 is moved from an authorized state. Satellite 80 may receive a detectable signal from sensor via a wireless communication or via a wire or cable.

Retractable cable 20 is coupled at one end to an output jack 81 of satellite 80 and at another end to housing 30. As shown in FIG. 2, a detangler 90 may be provided where retractable cable 20 couples to housing 30. Detangler 90 permits housing to be freely rotated when coupled to retractable cable 20 without tangling retractable cable 20 and interfering with the recoiling of retractable cable 20. Retractable cable 20 may be coupled to a retractor 91 for recoiling retractable cable 20. Retractable cable may comprise one or more discrete lengths of cable, for example one length of cable may extend between housing 30 or detangler 90 and retractor 91 and another length of cable may extend between retractor 91 and satellite 80. Strain relief mechanisms 25 may be provided at one or more terminal ends of retractable cable 20 to prevent disconnection or decoupling of retractable cable 20.

Retractable cable 20 may be a single or multiconductor cable and may be flat, round or any suitable shape. Retractable cable 20 may have a suitable connection element at one or both terminal ends adapted to couple retractable cable 20 to output jack 81, housing 30, detangler 90 and retractor 91. Retractable cable 20 may provide power to handheld electronic device 200 and/or a means for communicating with a sensor which produces a detectable signal when the handheld electronic device 200 is moved from an authorized state. Alternatively, separate, discrete cables may be provided, wherein one cable provides electrical power to handheld electronic device 200 and another cable provides communication with a sensor. Power to handheld electronic device 200 and communication with sensor may both be provided wirelessly, in which case retractable cable 20 may serve only as a mechanical tether for securing housing 30 to the system.

Satellite 80 is in electrical communication with output voltage controller 40 via retractable cable 20. A power supply 82 is coupled to satellite 80. Power supply 82 provides power to satellite 80 and to output voltage controller 40 via retractable cable 20. Each satellite may power and secure multiple housings and associated handheld elec-



tronic devices. For example one satellite may power and secure eight housings and associated handheld electronic devices. Multiple satellite may be coupled together, for example ten satellites may be daisy chained together for powering and securing up to eighty handheld electronic devices.

Satellite **80** may include a visible and or audible indicator for indicating a status of the sensor. Satellite **80** may include a visible or audible indicator for indicating a status of switch **36**. For example a plurality of light emitting diodes (LEDs) **83** may be disposed on satellite **80** behind an output jack **81** associated with a particular housing and handheld electronic device. A green LED may light if a sensor is in a non-alarmed state indicating that a corresponding handheld electronic device has not been moved from an authorized state. A red LED may light if a sensor is in an alarmed state indicating that a corresponding handheld electronic device has been moved from an authorized state. Additionally, an amber LED may light if power supply **82** is supplying power to satellite **80** and an output jack **81** associated with the LED is coupled to a retractable cable **20** which does not have a short circuit or other fault. If such a fault is present, the amber LED will not light and power will not be delivered to the particular output jack. An internal resettable fuse may be provided to protect the output jack in the event of a short or other fault. Each satellite may have a local audible alarm which sounds when an alarm condition exists in a sensor associated with that satellite, that is when a sensor produces a detectable signal indicating that a handheld electronic device coupled to the alarming sensor has been moved from an authorized state. Each satellite **80** may include a manual reset for a local alarm, for example by a push button disposed on satellite **80**.

A command module **300** is coupled to satellite **80**. Command module **300** provides a central control hub for the security features of the system. Security information, including sensor status, is communicated between command module **300** and connected satellites **80**. Security system **1** may be armed and disarmed using command module **300**. For example, command module **300** may be provided with a keypad input or mechanical key input for arming and disarming security system **1**. Command module **300** may also control an alarm volume, alarm type, local alarm, and local alarm reset. Command module **300** may also have an external horn for indicating an alarm condition.

A further embodiment of the invention is shown in the left hand assembly illustrated in FIG. **1**. This embodiment is similar to the system described above, however a docking station for a handheld electronic device as well as the device itself is powered. Here, a top portion of a housing receives a docking station **400** for a handheld electronic device **200**. Power is supplied to docking station **400** via power cable **50**. A switch on a top surface of the housing **30** is movable between a first position when docking station **400** is not in contact with housing **30** and a second position when docking station **400** is in contact with housing **30**. Handheld electronic device **200** is coupled to docking station **400** and powered via docking station **400**. An output voltage controller provides an appropriate output voltage to docking station **400** as described above. Both docking station **400** and handheld electronic device **200** may be secured to housing **30**.

Accordingly, while several embodiments of the present invention have been shown and described, it is obvious that many changes and modifications may be made thereunto without departing from the spirit and scope of the invention.

What is claimed is:

1. A security system for displaying a handheld electronic device, the security system comprising:
  - a) a stand assembly mounted to a support;
  - b) a housing removably mounted on a top portion of said stand assembly, said housing comprising a top surface adapted to receive the handheld electronic device;
  - c) a switch disposed on said top surface of said housing, wherein said switch is movable between a first position when the handheld electronic device is not in contact with said housing and a second position when the handheld electronic device is in contact with said housing, and wherein said switch produces a detectable signal when said switch is in said first position;
  - d) an output voltage controller coupled to said housing for controlling an output voltage to the handheld electronic device, wherein said output voltage can be set only when said switch is in said first position and wherein said output voltage is set to zero if said switch is not moved to said second position within a predetermined time after setting said output voltage;
  - e) a power cable coupling said output voltage controller to the handheld electronic device;
  - f) a satellite for receiving the detectable signal from said switch, wherein said satellite is in electrical communication with said output voltage controller;
  - g) a retractable cable coupled to said housing;
  - h) a power supply coupled to said satellite; and
  - i) a command module coupled to said satellite.
2. A security system for displaying a handheld electronic device, the security system comprising:
  - a) a stand assembly mounted to a support;
  - b) a housing removably mounted on a top portion of said stand assembly, said housing comprising a top surface adapted to receive the handheld electronic device;
  - c) a sensor adapted to be coupled to the handheld electronic device, said sensor producing a detectable signal when the handheld electronic device is moved from an authorized state;
  - d) a switch disposed on said top surface of said housing, wherein said switch is movable between a first position when the handheld electronic device is not in contact with said housing and a second position when the handheld electronic device is in contact with said housing;
  - e) an output voltage controller coupled to said housing for controlling an output voltage to the handheld electronic device, wherein said output voltage can be set only when said switch is in said first position and wherein said output voltage is set to zero if said switch is not moved to said second position within a predetermined time after setting said output voltage;
  - f) a power cable coupling said output voltage controller to the handheld electronic device;
  - g) a satellite for receiving the detectable signal from said sensor, wherein said satellite is in electrical communication with said output voltage controller;
  - h) a retractable cable housing;
  - i) a power supply coupled to said satellite; and
  - j) a command module coupled to said satellite.
3. The security system according to claim 2, wherein said output voltage is set to zero if said switch is moved to said second position within said predetermined time after setting said output voltage and said switch is subsequently moved to said first position.
4. The security system according to claim 2, wherein said sensor comprises a second switch disposed on said top

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surface of said housing, wherein said second switch is movable between a first position when the handheld electronic device is not in contact with said housing and a second position when the handheld electronic device is in contact with said housing, and wherein said second switch produces a detectable signal when said second switch is in said first position.

5. The security system according to claim 4, further comprising a lever disposed between the handheld electronic device and said housing, wherein said lever maintains one or both of said switch and said second switch in said second position.

6. The security system according to claim 4, further comprising a housing cover adapted to be secured to said top surface of said housing, wherein said housing cover maintains one or both of said first switch and said second switch in a position as if the handheld electronic device was in contact with said housing.

7. The security system according to claim 2, wherein said satellite receives the detectable signal from said sensor via a wireless communication.

8. The security system according to claim 2, wherein said stand assembly comprises one or more sections, each of said one or more sections having a bore for routing said retractable cable.

9. The security system according to claim 8, wherein said one or more sections comprise a plurality of sections which are secured together in an interlocking manner.

10. The security system according to claim 9, wherein one or more of said plurality of sections comprise a threaded portion.

11. The security system according to claim 9, wherein said plurality of sections includes one or more sections of differing lengths.

12. The security system according to claim 2, wherein said top portion of said stand assembly further comprises a collar having a cavity adapted to receive a portion of said housing and wherein said collar and said housing are shaped such that said housing is centered in said stand assembly when mounted thereon.

13. The security system according to claim 2, further comprising a fastener for securing the handheld electronic device to said top portion of said housing.

14. The security system according claim 13, wherein said fastener comprises a threaded fastener extending through a portion of said housing and engaging a threaded aperture in the handheld electronic device.

15. The security system according to claim 13, further comprising a bracket disposed on said top surface of said housing for preventing rotation of the handheld electronic device relative to said housing.

16. The security system according to claim 13, wherein said fastener comprises an adhesive tape.

17. The security system according to claim 13, wherein said fastener comprises a flexible locking band.

18. The security system according to claim 17, wherein said flexible locking band extends through an aperture provided in said housing.

19. The security system according to claim 17, wherein said flexible locking band extends through an aperture provided in a plug or fastener disposed in an opening in said housing.

20. The security system according to claim 2, wherein said housing has a notch disposed in said housing and said power cable is coupled to said housing within said notch.

21. The security system according to claim 2, wherein said output voltage controller further comprises a display for displaying a selected output voltage.

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22. The security system according to claim 2, wherein said output voltage controller further comprises one or more inputs for selecting an output voltage.

23. The security system according to claim 2, wherein said output voltage controller has an output voltage range of from approximately 0.1 volts to approximately 10 volts.

24. The security system according to claim 2, wherein said output voltage controller controls an output voltage to the handheld electronic device in increments of approximately 0.1 volts.

25. The security system according to claim 2, wherein said power cable comprises a first connection disposed at an end of said power cable for engaging said housing and a second connection disposed at another end of said power cable for engaging the handheld electronic device.

26. The security system according to claim 2, wherein said satellite further comprises a visible indicator for indicating a status of said sensor.

27. The security system according to claim 2, wherein said satellite further comprises an audible indicator for indicating a status of said sensor.

28. The security system according to claim 2, wherein said satellite further comprises a visible indicator for indicating a status of said switch.

29. The security system according to claim 2, wherein said satellite further comprises an audible indicator for indicating a status of said switch.

30. The security system according to claim 2, further comprising a detangler coupled to said retractable cable.

31. The security system according to claim 2, further comprising a battery disposed in said housing for powering said output voltage controller.

32. A security system for displaying a handheld electronic device engaged with a docking station, the security system comprising:

- a) a stand assembly mounted to a support;
- b) a housing removably mounted on a top portion of said stand assembly, said housing comprising a top surface adapted to receive the docking station;
- c) a sensor adapted to be coupled to the handheld electronic device, said sensor producing a detectable signal when the handheld electronic device is moved from an authorized state;
- d) a switch disposed on said top surface of said housing, wherein said switch is movable between a first position when the docking station is not in contact with said housing and a second position when the docking station is in contact with said housing;
- e) an output voltage controller coupled to said housing for controlling an output voltage to the docking station, wherein said output voltage can be set only when said switch is in said first position and wherein said output voltage is set to zero if said switch is not moved to said second position within a predetermined time after setting said output voltage;
- f) a power cable coupling said output voltage controller to the docking station;
- g) a satellite for receiving the detectable signal from said sensor, wherein said satellite is in electrical communication with said output voltage controller;
- h) a retractable cable coupled to said housing;
- i) a power supply coupled to said satellite; and
- j) a command module coupled to said satellite.