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(54) **MERCHANDISE SECURITY SYSTEM INCLUDING RETRACTABLE ALARMING POWER CORD**

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(57) **ABSTRACT**

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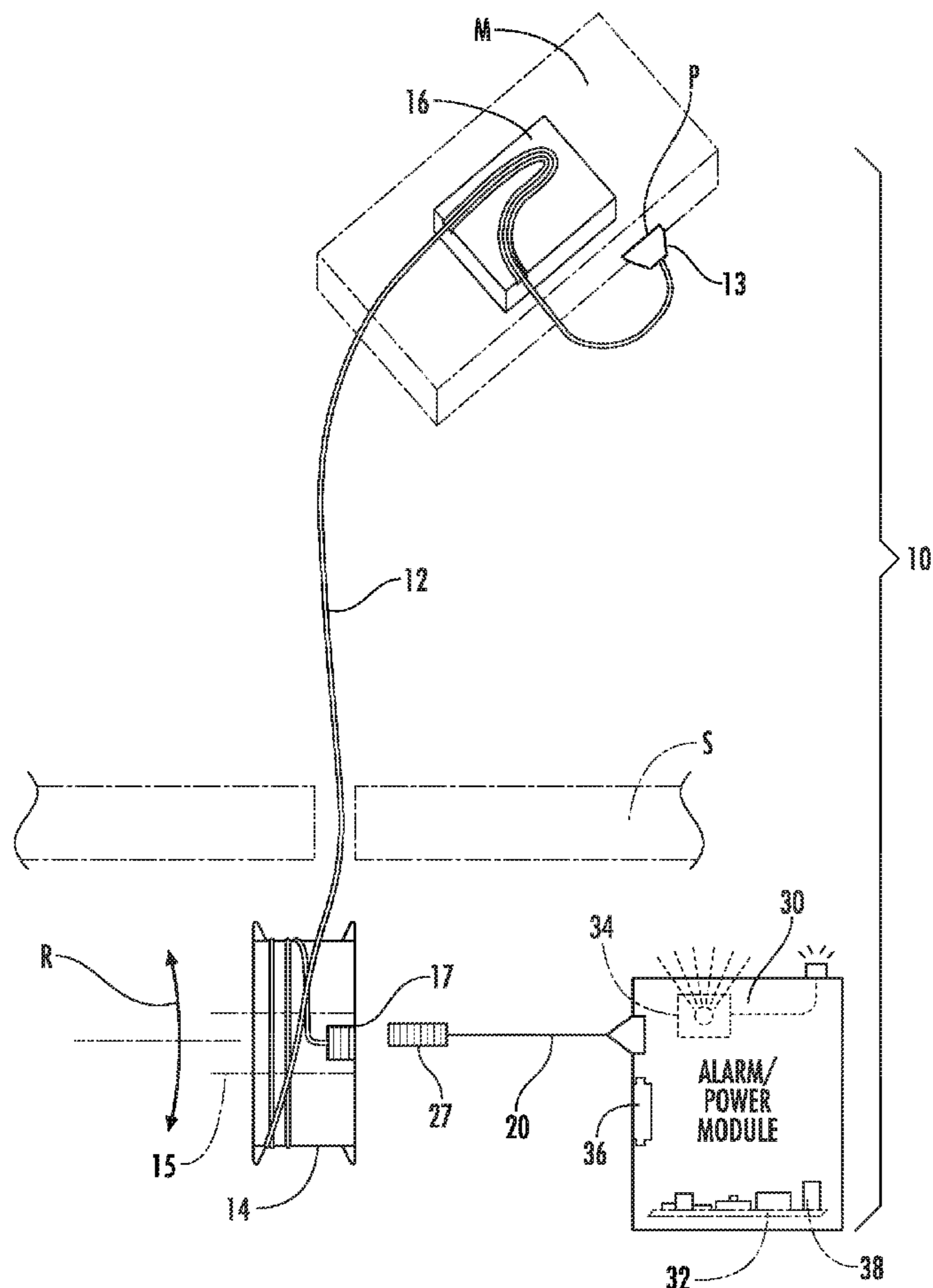
A merchandise security system for an electronic item of merchandise is provided. In one example, the merchandise security system includes a continuous alarming power cord comprising at least one electrical conductor. The alarming power cord has a first end adapted to be electrically connected to the electronic item of merchandise and a second end. The merchandise security system also includes a reel for receiving the second end of the alarming power cord and adapted for storing at least a portion of the alarming power cord thereon. In addition, the merchandise security system includes monitoring circuitry in electrical communication with the alarming power cord and configured to detect an interruption in an electrical signal provided to the alarming power cord.

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Related U.S. Application Data

(63) Continuation of application No. 14/793,051, filed on Jul. 7, 2015, now Pat. No. 9,430,922, which is a continuation of application No. 13/965,525, filed on Aug. 13, 2013, now Pat. No. 9,105,167.

(60) Provisional application No. 61/695,107, filed on Aug. 30, 2012.



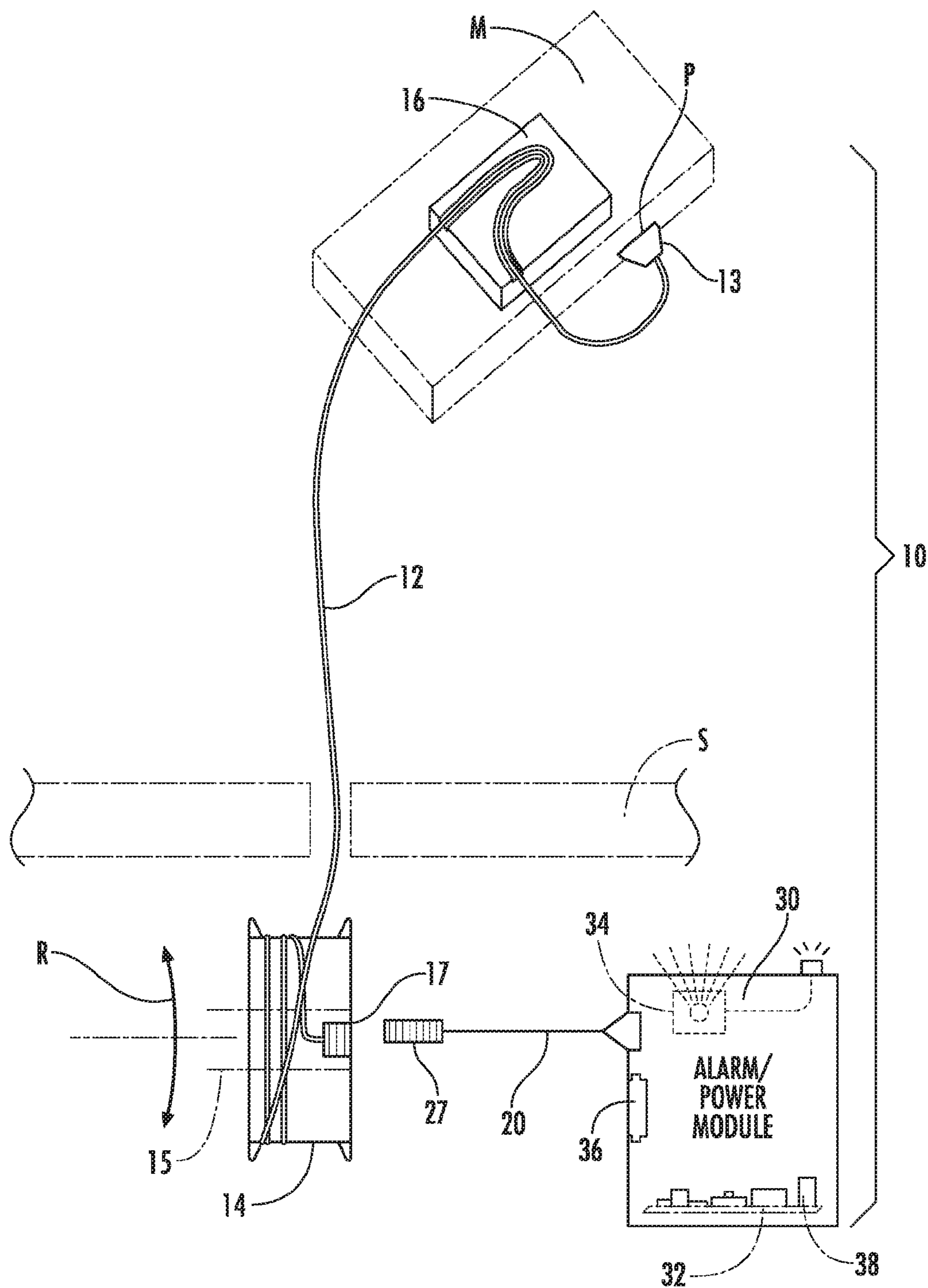


FIG. 1

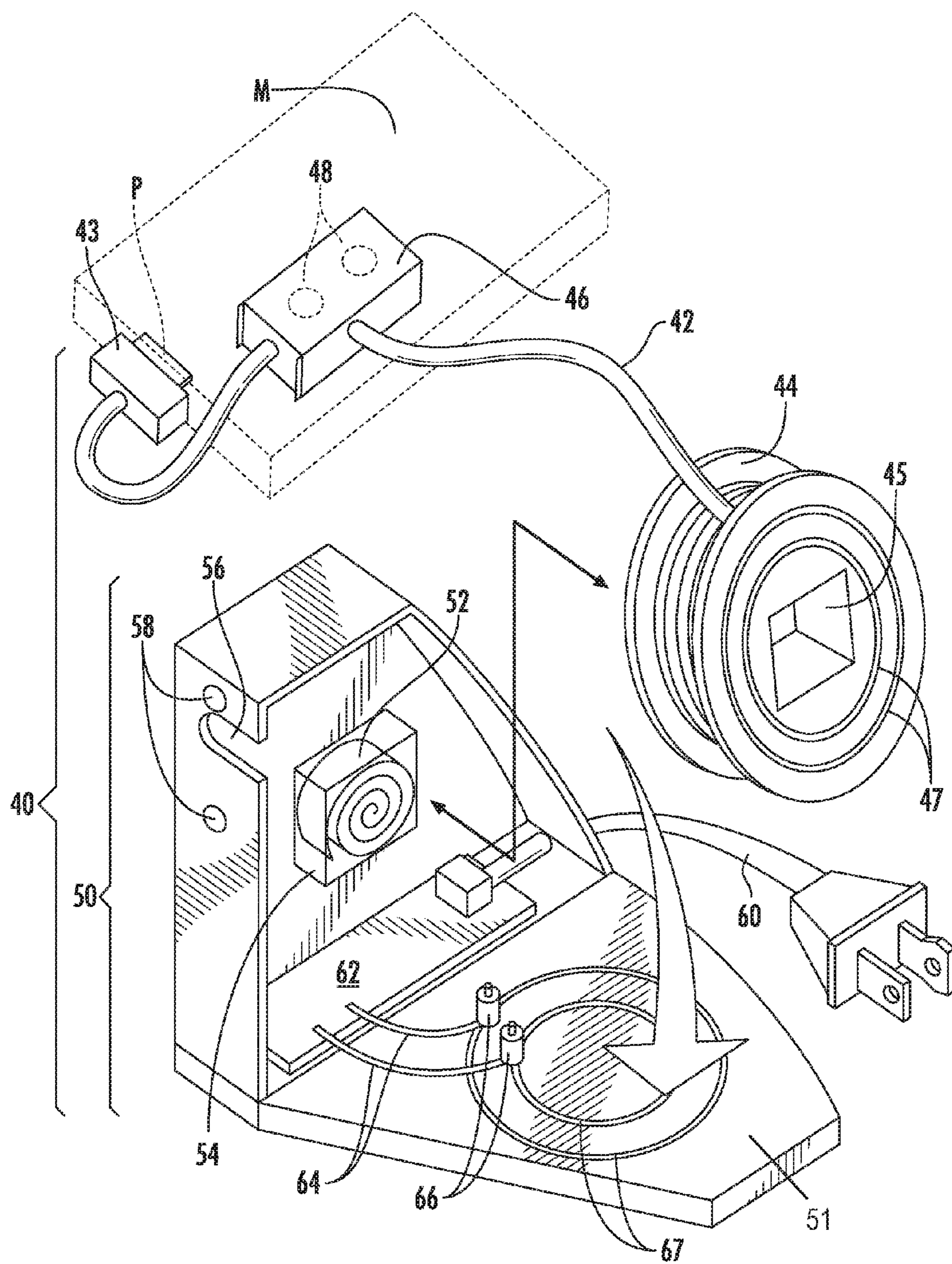


FIG. 2

**MERCHANDISE SECURITY SYSTEM
INCLUDING RETRACTABLE ALARMING
POWER CORD**

CROSS REFERENCE To RELATED
APPLICATIONS

[0001] This application is a continuation of U.S. application Ser. No. 14/793,051 filed on Jul. 7, 2015, which is a continuation of U.S. application Ser. No. 13/965,525 filed on Aug. 13, 2013, and now U.S. Pat. No. 9,105,167, which claims the benefit of priority of U.S. Provisional Application No. 61/695,107, filed on Aug. 30, 2012, each of which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] Embodiments of the present invention relate generally to merchandise systems that provide power and security for an item of merchandise.

BACKGROUND OF THE INVENTION

[0003] U.S. Pat. No. 6,799,994 assigned to Telefonix, Inc. of Waukegan, Illinois discloses an apparatus and a method for the convenient management of cords associated with the retail display of an electronic item of merchandise, such as a video camera. The apparatus includes a multi-conductor power cable and a reel for dispensing and retracting the power cable. The apparatus further comprises an adapter cord selected from a plurality of adapter cords for electrically connecting the power cable to a variety of items of merchandise having different power and connection requirements. The power cable is directly coupled to an alarm module that activates an alarm in response to an electronic circuit being opened in the event that the power cable is cut or disconnected.

[0004] U.S. Patent Application Publication No. 2012/0043936 A1 assigned to RTF Research & Technologies, Inc. of Caledon, Ontario Canada discloses a charging and monitoring system for handheld electronic items of merchandise, such as cell phones, Blackberry's, PDAs, cameras and the like. The system includes a coaxial security and power cable having a conductive core. A portion of one end of the coaxial power cable is accumulated on a reel of a recoiler assembly, while the other end of the coaxial power cable is adapted to mechanically and electrically engage a preferred mounting pad for a handheld electronic item of merchandise. The end of the coaxial cable accumulated on the reel is electrically coupled to a power and alarm cable through an electrical connector, such as a conventional registered jack (RJ) plug and socket. The free end of the power and alarm cable is electrically coupled to a power and alarm router having multiple ports for electrical connection to multiple power and alarm cables. The mounting pad is adapted to provide power to a power input port of the handheld electronic item of merchandise by means of a conventional electrical connection, such as a standard USB cable extending from the mounting pad.

BRIEF SUMMARY OF THE INVENTION

[0005] Embodiments of the present invention are directed to merchandise security systems for an electronic item of merchandise. In one embodiment, the merchandise security system includes a continuous alarming power cord comprising at least one electrical conductor. The alarming power

cord has a first end adapted to be electrically connected to the electronic item of merchandise. The merchandise security system also includes a reel for receiving a second end of the alarming power cord that is adapted for storing at least a portion of the alarming power cord thereon. The merchandise security system further includes monitoring circuitry in electrical communication with the alarming power cord and configured to detect an interruption in an electrical signal provided to the alarming power cord. Thus, the alarming power cord may not require a second cable selected from a plurality of adapter cables to provide an appropriate operating voltage and/or current to the electronic item of merchandise.

[0006] In one embodiment, the merchandise security system includes an alarm module comprising the monitoring circuitry and a power cable having a first end electrically coupled to the second end of the alarming power cord and a second end electrically connected to the alarm module. The second end of the alarming power cord and the first end of the power cable may each terminate in a transformer comprising a coiled spool of wire configured to electrically connect the alarming power cord and the power cable. Thus, the alarming power cord and the power cable may not be in direct wire-to-wire electrical communication. According to one example, the reel comprises a central hub portion for receiving the second end of the alarming power cord, wherein the first end of the power cable is electrically coupled to the second end of the alarming power cord at the central hub portion of the reel. The alarm module may be configured to generate an audible and/or a visible alarm in response to interruption of the electrical signal. Moreover, the second end of the alarming power cord may include a connector and the first end of the power cable may include a socket or plug configured to mate with the connector.

[0007] According to one embodiment, the merchandise security system further comprises a display stand for housing the reel and providing electrical power to the alarming power cord. The electronic item of merchandise may be configured to be removably secured on the display stand. Each of the reel and the display stand may include electrical traces configured to electrically couple with one another for providing electrical power through the alarming power cable to the electronic item of merchandise.

[0008] In other embodiments, the merchandise security system further comprises means for retracting the alarming power cord onto the reel, wherein the reel and the portion of the alarming power cord stored thereon are detachable from the means for retracting. The means for retracting the alarming power cord onto the reel may be biased by a biasing force to automatically retract the portion of the alarming power cord in the absence of a tensile pulling force that exceeds the biasing force. In one embodiment, the reel is rotatable for dispensing and collecting a predetermined portion of the alarming power cord. In addition, the first end of the alarming power cord may include a connector adapted to engage a power input port of the electronic item of merchandise. In one embodiment, the merchandise security system further comprises a strain relief block configured to be attached to the electronic item of merchandise, wherein a portion of the alarming power cord is configured to be routed through the strain relief block.

[0009] In one embodiment, a merchandise security system for an electronic item of merchandise is provided. The merchandise security system includes a continuous alarming

power cord comprising at least one electrical conductor, wherein the alarming power cord has a first end including a connector adapted to engage a power input port of the electronic item of merchandise. The merchandise security system also includes a rotatable reel connected to a second end of the alarming power cord that is adapted for dispensing and collecting at least a portion of the alarming power cord thereon. The merchandise security system further includes monitoring circuitry in electrical communication with the alarming power cord.

[0010] According to another embodiment, a method for securing an electronic item of merchandise from theft is provided. The method may include electrically connecting a first end of a continuous alarming power cord to the electronic item of merchandise, wherein a second end of the alarming power cord is connected to a reel for storing at least a portion of the alarming power cord thereon. The method may also include electrically coupling the second end of the alarming power cord to a power source such that an electrical signal is provided to the alarming power cord, wherein an interruption in the electrical signal is detectable by monitoring electronics.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is an environmental perspective view of a merchandise security system including a retractable alarming power cord and a rotatable reel according to the invention.

[0012] FIG. 2 is an exploded perspective view of a merchandise security system according to another embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0013] The accompanying drawing figures, wherein like reference numerals denote like elements throughout the various views, illustrate embodiments of a merchandise security system for providing power and/or security to an item of merchandise. By way of example and not limitation, the item of merchandise may be an electronic device, such as a mobile (e.g. cellular) telephone, media player, handheld game console, personal data assistant (PDA), global positioning satellite (GPS) device, handheld digital camera or video recorder, tablet computer, e-reader and the like, that requires electrical power for a potential purchaser to operate before making a decision whether to purchase the merchandise while the item is being displayed in a display area of a retail store and protected from theft by the merchandise security system.

[0014] Embodiments of the present invention are directed to a merchandise security system for protecting an electronic item of merchandise from theft, while providing power to the merchandise. In one embodiment, the merchandise security system includes an alarming power cord adapted for electrical connection to a power input port of the item of merchandise and a reel for retractably storing at least a portion of the alarming power cord. The alarming power cord may be electrically coupled to a power cable extending between a powered alarm module and a core portion of the reel. Power from the alarm module may be transferred to the alarming power cord by a conventional electrical connector (e.g. RJ type plug and socket), or alternatively, by induction via, for example, a transformer.

[0015] FIG. 1 shows a merchandise security system 10 according to one embodiment of the invention including an alarming power cord (also commonly referred to as an “alarming pigtail”) 12 that is retractably wound on a rotatable reel 14, such that at least a portion of the alarming power cord is retractable onto the reel. The rotatable reel 14 is configured to dispense and collect a predetermined portion of the alarming power cord 12 and is biased to automatically retract the alarming power cord onto the reel in a known manner when a potential purchaser returns an item of merchandise M to a display support S, such as a stand, counter or the like. As such, the rotatable reel functions in the same or similar manner as a conventional recoiler or retractor of the type commonly employed with a retail merchandise display system. As shown in FIG. 1, the rotatable reel 14 and the means for retracting R the alarming power cord 12 on the reel may be separate such that the reel and the alarming power cord are detachable from the means for retracting to remove and replace the alarming power cord with a different alarming power cord configured for use with a different item of merchandise M.

[0016] In one embodiment, the alarming power cord 12 comprises at least one conductor (e.g., two conductors) for providing power at an appropriate current and/or voltage to the electronic item of merchandise M. As such, the alarming power cord 12 has a relatively small platform and is flexible relative to a mechanical security cable or a multi-conductor electrical power cable of the type disclosed in U.S. Pat. No. 6,799,994. The free end of the alarming power cord 12 may comprise an electrical connector 13, such a conventional micro-USB type power connector or a 30-pin Apple type power connector, adapted to engage a power input port P of the electronic item of merchandise M. If desired, a portion of the alarming power cord 12 adjacent the free end may be routed through an appropriately sized channel formed in a strain relief block 16 adapted to be attached to a surface of the electronic item of merchandise M, for example by a pressure sensitive adhesive (PSA). The strain relief block 16 prevents the electrical connector 13 of the alarming power cord 12 from being removed, disconnected or dislodged from the power input port P of the electronic item of merchandise M when tension is applied to the alarming power cord during extension and retraction of the alarming power cord from the reel 14 by a potential purchaser examining and/or operating the item of merchandise.

[0017] The other end of the alarming power cord 12 may terminate adjacent a central hub 15 of the rotatable reel 14. In one embodiment, the alarming power cord 12 terminates in an electrical transformer 17 comprising a coiled spool of wire. Alternatively, the alarming power cord 12 may terminate in a conventional electrical connector, such as a registered jack (RJ) type plug or socket. The merchandise security system 10 may further comprise a power cable 20 that extends between an alarm/power module 30 and the central hub 15 of the rotatable reel 14 to electrically connect the alarm/power module to the alarming power cord 12. Likewise, the end of the power cable 20 adjacent the hub 15 of the reel 14 may terminate in an electrical transformer 27 comprising a coiled spool of wire. Alternatively, the end of the power cable 20 may terminate in an electrical connector that is adapted to electrically couple the power cable 20 to the alarming power cord 12, such as a compatible registered jack (RJ) socket or plug. Regardless, the power cable 20 provides an electrical signal, including a power signal, to the

alarming power cord **12** for charging and/or powering the electronic item of merchandise **M** via the electrical connector **13** and the power input port **P** of the item of merchandise. The alarm/power module **30** comprises monitoring electronics **32** that monitor the electrical signal in the power cable **20** and the alarming power cord **12** to determine whether the electrical signal has been interrupted, for example, by disconnecting the alarming power cord from the power input port **P** of the item of merchandise **M**, or by electrically decoupling the alarming power cord **12** from the power cable **20** at the central hub **15** of the rotatable reel **14**, or by cutting/severing the alarming power cord **12** or the power cable **20** at any point between the alarm/power module **30** and the item of merchandise **M**. In the event that the electrical signal is interrupted, the alarm/power module **30** may activate an audible and/or a visible alarm **34** to alert store personnel to a potential theft of the electronic item of merchandise **M**. The alarm/power module **30** may be electrically connected to an external power supply (not shown), such as a standard 110 Volt Alternating Current (AC) outlet, or alternatively, may include an internal power supply, such as a conventional rechargeable battery **36**, for providing power to the electronic item of merchandise **M** through the power cable **20** and the alarming power cord **12**. Furthermore, the alarm/power module **30** may comprise voltage regulating electronics **38** adapted to convert the voltage and/or current provided by the power supply to an appropriate voltage and/or current for operating the electronic item of merchandise **M**.

[0018] It is important to note that the merchandise security system **10** comprises an alarming power cord **12** that extends continuously from the power input port **P** of the electronic item of merchandise **M** to an electrical coupling (e.g. **17**, **27**) disposed at the central hub **15** of the rotatable reel **14**. Accordingly, the alarming power cord **12** does not comprise a first cable configured for electrical connection to a second cable selected from a plurality of adapter cables to provide an appropriate operating voltage and/or current to the electronic item of merchandise **M**. Furthermore, the alarming power cord **12** may not be in direct wire-to-wire electrical communication with the power cable **20** since the alarming power cord and the power cable may each comprise a corresponding electrical transformer **17**, **27** formed by a coiled spool of wire. In addition, the merchandise security system **10** of the present invention further comprises a strain relief block **16** for preventing the electrical connector **13** at the free end of the alarming power cord **12** from being removed, disconnected or dislodged from the power input port **P** of the electronic item of merchandise **M**.

[0019] FIG. 2 shows another embodiment of a merchandise security system **40** according to the invention including an alarming power cord (also commonly referred to as an “alarming pigtail”) **42** that is retractably wound on a rotatable reel **44**, such that at least a portion of the alarming power cord is retractable onto the reel. The rotatable reel **44** is configured to dispense and collect a predetermined portion of the alarming power cord **42** and is biased to automatically retract the alarming power cord in a known manner when a potential purchaser returns an item of merchandise **M** to a display support, such as a stand, counter or the like. As such, the rotatable reel functions in the same or similar manner as a conventional recoiler or retractor of the type commonly employed with a retail merchandise display system. As shown in FIG. 2, the merchandise security system **40** further

comprises a generally hollow display stand **50** configured for housing the rotatable reel **44** and for providing electrical power to the alarming power cord **42**, and consequently, to the item of merchandise **M**. The display stand **50** comprises means for retracting the alarming power cord **42** onto the reel **44** in the form of a torsion spring **52** fixed at one end to the display stand and attached at the other end to a hub **54**. Hub **54** has an exterior shape (e.g. rectangular, square, polygonal, etc.) that corresponds to a center sprocket **45** on the rotatable reel **44** such that the hub of the display stand **50** engages the center sprocket of the reel when the reel is inserted into the hollow interior of the display stand with the extensible and retractable portion of the alarming power cord **42** wound onto the reel **44**.

[0020] The free end of the alarming power cord **42** may comprise an electrical connector **43**, such a conventional micro-USB type power connector or a 30-pin Apple type power connector, adapted to engage a power input port **P** of an electronic item of merchandise **M**. If desired, a portion of the alarming power cord **42** adjacent the free end may be routed through an appropriately sized channel formed in a strain relief block **46** adapted to be attached to an exterior surface of the electronic item of merchandise **M**, for example, by a pressure sensitive adhesive (PSA) such as double sided tape. The strain relief block **46** prevents the electrical connector **43** of the alarming power cord **42** from being removed, disconnected or dislodged from the power input port **P** of the electronic item of merchandise **M** when tension is applied to the alarming power cord during extension and retraction of the alarming power cord from the reel **44** by a potential purchaser examining and/or operating the item of merchandise. An opening or recess **56** is formed in display stand **50** for permitting the portion of the alarming power cord **42** to be extended and retracted from the reel **44** within the hollow interior of the display stand **50**. When a potential purchaser picks up the item of merchandise **M**, reel **44** rotates on hub **54** and torsion spring **52** is wound (i.e. tightened) as the alarming power cord **42** is unwound from the reel. As a result, reel **44** is biased by the wound torsion spring **52** to automatically retract the portion of the power alarming cord onto the reel as the potential purchaser returns the item of merchandise **M** to the display stand **50**. As shown, the strain relief block **46** may optionally comprise one or more magnets **48** for engaging corresponding magnets **58** provided on the display stand **50** to position the item of merchandise **M** in a desired orientation on the display stand **50**.

[0021] The merchandise security system **40** further comprises a power cable **60** that extends between a power source, such as a power strip, terminal or the like, that is electrically connected to a conventional 110 Volt Alternating Current (AC) power outlet. Alternatively, the power cable **60** may be directly connected to the power outlet. Regardless, the power cable **60** is electrically coupled to an electrical circuit, for example a printed circuit board (PCB), **62** disposed within the hollow interior of the display stand **50**. As shown, PCB **62** may have electrical leads **64** that terminate in electrical terminals **66** configured to engage and electrically couple with electrical traces **67** formed on the interior surface of a door **51** of the display stand **50**. Door **51** is adapted to be opened to receive reel **44** within the hollow interior of the display stand **50** and to be closed to retain the reel within the interior of the display stand. Electrical traces **67** are configured to electrically couple with corresponding

electrical traces **47** provided on an exterior surface of reel **44**. In turn, the electrical traces **47** of the reel **44** electrically couple with the electrical conductors disposed within the alarming power cord **42**. As such, the power cable **60** is operable to provide electrical power to the item of merchandise M. As illustrated, the electrical traces **67** may be circular in configuration to facilitate electrical communication as the reel **44** rotates.

[0022] As previously described, the power cable **60** provides an electrical signal, including a power signal, to the alarming power cord **42** for charging and/or powering the electronic item of merchandise M via the electrical connector **43** and the power input port P of the item of merchandise. The merchandise security system **40** comprises monitoring electronics on the PCB **62** that monitor the electrical signal in the power cable **60** and the alarming power cord **42** to determine whether the electrical signal has been interrupted, for example, by disconnecting the alarming power cord from the power input port P of the item of merchandise M, or by electrically decoupling the alarming power cord **42** from the power cable **60** at the electrical traces **47**, **67** of the rotatable reel **44** and the display stand **50**, respectively, by opening the door **51**, or by cutting/severing the alarming power cord **42** or the power cable **60** at any point between the power source and the item of merchandise M. In the event that the electrical signal is interrupted, PCB **62** may activate an audible and/or a visible alarm to alert store personnel to a potential theft of the electronic item of merchandise M, as previously described.

[0023] It is important to note that the merchandise security system **40** comprises an alarming power cord **42** that extends continuously from the power input port P of the electronic item of merchandise M to an electrical coupling (e.g. electrical traces **47**, **67**) disposed adjacent the central socket **45** of the rotatable reel **44** and the hub **54** of the display stand **50**. Accordingly, the alarming power cord **42** does not comprise a first cable configured for electrical connection to a second cable selected from a plurality of adapter cables to provide an appropriate operating voltage and/or current to the electronic item of merchandise M. Furthermore, the alarming power cord **42** is not in direct wire-to-wire electrical communication with the power cable **60** since the alarming power cord and the power cable are separated by PCB **62**, electrical leads **64**, electrical terminals **66** and electrical traces **67**, **47**. In addition, the merchandise security system **40** of the present invention further comprises a strain relief block **46** for preventing the electrical connector **43** at the free end of the alarming power cord **42** from being removed, disconnected or dislodged from the power input port P of the electronic item of merchandise M.

[0024] The foregoing has described one or more embodiments of a merchandise security system. Embodiments according to the invention have been shown and described herein for purposes of illustrating and enabling the best mode of the invention. Those of ordinary skill in the art, however, will readily 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 merchandise security system for an electronic item of merchandise comprising:
 - a cord configured to be coupled to the electronic item of merchandise;
 - a reel configured to store at least a portion of the cord thereon, the reel comprising at least one electrical coupling on an outer surface thereof; and
 - a housing defining an interior for receiving the reel therein, the reel configured to be removably inserted within the housing, the housing comprising at least one electrical coupling configured to engage with and electrically connect to the at least one electrical coupling of the reel when the reel is received within the housing.
2. The merchandise security system of claim 1, wherein each of the reel and the housing comprises a plurality of electrical couplings.
3. The merchandise security system of claim 1, wherein the at least one electrical coupling of the reel comprises an electrical trace.
4. The merchandise security system of claim 1, wherein the at least one electrical coupling of the housing comprises an electrical terminal.
5. The merchandise security system of claim 1, wherein the at least one electrical coupling of the housing is electrically connected to a printed circuit board disposed within the interior of the housing.
6. The merchandise security system of claim 1, wherein the cable comprises at least one electrical conductor configured to electrically couple to the at least one electrical coupling of the reel.
7. The merchandise security system of claim 6, wherein the at least one electrical coupling of the reel and the housing are configured to electrically couple with one another for providing electrical power through the cable to the electronic item of merchandise.
8. The merchandise security system of claim 1, wherein the cable is configured to be electrically connected to the electronic item of merchandise.
9. The merchandise security system of claim 1, wherein the housing is a display stand configured to removably secure the electronic item of merchandise thereon.
10. The merchandise security system of claim 1, wherein the housing further comprises means for retracting the cord onto the reel.
11. The merchandise security system of claim 10, wherein the means for retracting comprises a torsion spring.
12. The merchandise security system of claim 1, wherein the reel is rotatable for dispensing and collecting a predetermined portion of the cord.
13. The merchandise security system of claim 1, further comprising a strain relief block configured to be attached to the electronic item of merchandise, wherein a portion of the cord is configured to be routed through the strain relief block.
14. The merchandise security system of claim 1, wherein the cord comprises a continuous cord extending between the reel and the electronic item of merchandise.
15. The merchandise security system of claim 1, further comprising a connector coupled to the cord and adapted to engage a power input port of the electronic item of merchandise.

16. The merchandise security system of claim **1**, further comprising monitoring circuitry configured to detect an interruption in a signal provided to the cord.

17. The merchandise security system of claim **1**, wherein the housing comprises a barrier configured to cover an opening to the interior of the housing for containing the reel therein and to be removed from the opening for inserting and removing the reel through the opening.

18. The merchandise security system of claim **17**, wherein the barrier comprises a door.

19. A method for securing an electronic item of merchandise from theft, the method comprising:

coupling a cord to the electronic item of merchandise, wherein the cord is coupled to a reel for storing at least a portion of the cord thereon; and

inserting a reel within an interior of a housing such that at least one electrical coupling of the housing engages with and electrically connects to at least one electrical coupling on an outer surface of the reel; and

covering the interior of the housing for retaining the reel therein.

20. The method of claim **19**, further comprising accessing the interior of the housing for removing the reel from the housing.

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