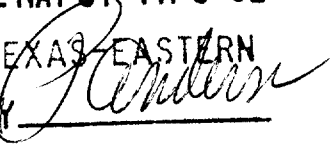


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U.S. DISTRICT COURT

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TEXAS - EASTERN

BY



UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION

ACCO BRANDS, INC. dba KENSINGTON  
TECHNOLOGY GROUP,

Plaintiff,

v.

AMERICAN POWER CONVERSION  
CORPORATION, a Massachusetts corporation  
and KRYPTONITE CORPORATION,  
Massachusetts,

Defendants.

Case No. 2-02CV-113

COMPLAINT FOR PATENT  
INFRINGEMENT

JURY TRIAL DEMANDED

TO THE HONORABLE JUDGE OF SAID COURT:

Plaintiff Acco Brands, Inc. dba Kensington Technology Group ("Kensington") for its complaint against Defendants American Power Conversion Corporation ("APC") and Kryptonite Corporation ("Kryptonite") alleges:

**THE PARTIES**

1. Kensington is a corporation duly organized and existing under the laws of the state of Delaware, having a principal place of business in San Mateo, California.
2. APC is a corporation duly organized and existing under the laws of the state of Massachusetts, having a principal place of business in West Kingston, Rhode Island.
3. Kryptonite is a corporation duly organized and existing under the laws of the state of Massachusetts, having a principal place of business in Canton, Massachusetts.

**JURISDICTION**

4. This Court has subject matter jurisdiction pursuant to 28 U.S.C. § 1331 and 1338(a) because this action arises under the patent laws of the United States, including 35 U.S.C. § 271 *et seq.* The Court has personal jurisdiction over APC and Kryptonite in that APC and Kryptonite have established minimum contacts with the forum and the exercise of jurisdiction over APC and Kryptonite would not offend traditional notions of fair play and substantial justice.

**VENUE**

5. APC and Kryptonite do business in this district, including making sales and providing service and support to their customers in this district. Venue is proper in this district pursuant to 28 U.S.C. §§ 1331, 1338, 1391(b)-(c) and 1400(b).

**INFRINGEMENT OF U.S. PATENT NO. 6,155,088**

6. On December 5, 2000, United States Patent No. 6,155,088 (referred to herein as "the '088 patent") was duly and legally issued to Kensington for a computer physical security device. The '088 patent constitutes a valid and enforceable patent solely owned by Kensington. A true and correct copy of the '088 patent is attached hereto as Exhibit A.

7. Upon information and belief, APC and Kryptonite have infringed and continue to infringe the '088 patent. The infringing acts include but are not limited to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Computer Key Lock and the Notebook Computer Combination Lock and inducing and contributing to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Computer Key Lock and the Notebook Computer Combination Lock. APC and Kryptonite are liable for infringement of the '088 patent pursuant to 35 U.S.C. § 271.

8. APC and Kryptonite's acts of infringement have caused damage to Kensington and Kensington is entitled to recover from APC and Kryptonite the damages sustained by Kensington as a result of APC and Kryptonite's wrongful acts in an amount subject to proof at trial. APC and Kryptonite's infringement of Kensington's exclusive rights under the '088 patent will continue to damage Kensington's business, causing irreparable harm, for which there is no adequate remedy at law, unless it is enjoined by this Court.

9. Upon information and belief, APC and Kryptonite's infringement of the '088 patent is willful and deliberate entitling Kensington to increased damages under 35 U.S.C. § 284 and to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

**INFRINGEMENT OF U.S. PATENT NO. 6,112,562**

10. On September 5, 2000, United States Patent No. 6,112,562 (referred to herein as "the '562 patent") was duly and legally issued to Kensington for a computer physical security device. The '562 patent constitutes a valid and enforceable patent solely owned by Kensington. A true and correct copy of the '562 patent is attached hereto as Exhibit B.

11. Upon information and belief, APC and Kryptonite have infringed and continue to infringe the '562 patent. The infringing acts include but are not limited to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Computer Key Lock and the Notebook Computer Combination Lock and inducing and contributing to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Computer Key Lock and the Notebook Computer Combination Lock. APC and Kryptonite are liable for infringement of the '562 patent pursuant to 35 U.S.C. § 271.

12. APC and Kryptonite's acts of infringement have caused damage to Kensington and Kensington is entitled to recover from APC and Kryptonite the damages sustained by Kensington as a result of APC and Kryptonite's wrongful acts in an amount subject to proof at trial. APC and Kryptonite's infringement of Kensington's exclusive rights under the '562 patent will continue to damage Kensington's business, causing irreparable harm, for which there is no adequate remedy at law, unless it is enjoined by this Court.

13. Upon information and belief, APC and Kryptonite's infringement of the '562 patent is willful and deliberate entitling Kensington to increased damages under 35 U.S.C. § 284 and to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

**INFRINGEMENT OF U.S. PATENT NO. 6,006,557**

1. On December 28, 1999, United States Patent No. 6,006,557 (referred to herein as "the '557 patent") was duly and legally issued to Kensington for a computer physical security device. The '557 patent constitutes a valid and enforceable patent solely owned by Kensington.

A true and correct copy of the '557 patent is attached hereto as Exhibit C.

2. Upon information and belief, APC and Kryptonite have infringed and continue to infringe the '557 patent. The infringing acts include but are not limited to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Computer Key Lock and the Notebook Computer Combination Lock and inducing and contributing to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Computer Key Lock and the Notebook Computer Combination Lock. APC and Kryptonite are liable for infringement of the '557 patent pursuant to 35 U.S.C. § 271.

3. APC and Kryptonite's acts of infringement have caused damage to Kensington and Kensington is entitled to recover from APC and Kryptonite the damages sustained by Kensington as a result of APC and Kryptonite's wrongful acts in an amount subject to proof at trial. APC and Kryptonite's infringement of Kensington's exclusive rights under the '557 patent will continue to damage Kensington's business, causing irreparable harm, for which there is no adequate remedy at law, unless it is enjoined by this Court.

4. Upon information and belief, APC and Kryptonite's infringement of the '557 patent is willful and deliberate entitling Kensington to increased damages under 35 U.S.C. § 284 and to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

#### **PRAYER FOR RELIEF**

WHEREFORE, Kensington prays for judgment and seeks relief against APC and Kryptonite as follows:

- (a) For judgment that the '088 patent, the '562 patent and the '557 patent have been and continue to be infringed by APC and Kryptonite;
- (b) For an accounting of all damages sustained by Kensington as the result of APC and Kryptonite's acts of infringement;
- (c) For preliminary and permanent injunctions enjoining the aforesaid acts of infringement by APC and Kryptonite, their officers, agents, servants, employees, subsidiaries and attorneys, and those persons acting in concert with APC and Kryptonite, including related individuals and entities, customers, representatives,

OEMs, dealers, distributors;

- (d) For actual damages together with prejudgment interest, according to proof;
- (e) For enhanced damages pursuant to 35 U.S.C. § 284;
- (f) For an award of attorneys' fees pursuant to 35 U.S.C. § 285 or as otherwise permitted by law;
- (g) For all costs of suit; and
- (h) For such other and further relief as the Court may deem just and proper.

DATED: May 31, 2002

Respectfully submitted,

By: Otis Carroll *by permission of R. Faulner*

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# United States Patent [19]

[11] Patent Number: **6,155,088**

Murray, Jr. et al.

[45] Date of Patent: **\*Dec. 5, 2000**

## [54] COMPUTER PHYSICAL SECURITY DEVICE

[75] Inventors: **William R. Murray, Jr.**, Redwood City; **Stewart R. Carl**, Palo Alto; **Arthur H. Zarnowitz**, San Jose, all of Calif.

[73] Assignee: **ACCO Brands, Inc.**, Lincolnshire, Ill.

[\*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **08/481,636**

[22] Filed: **Jun. 7, 1995**

### Related U.S. Application Data

[60] Continuation of application No. 08/307,113, Sep. 16, 1994, Pat. No. 5,502,989, which is a division of application No. 08/138,634, Oct. 15, 1993, Pat. No. 6,000,251, and a continuation-in-part of application No. 08/042,851, Apr. 5, 1993, Pat. No. 5,381,685, which is a continuation of application No. 07/824,964, Jan. 24, 1992, abandoned, and a continuation-in-part of application No. 08/006,311, Jan. 19, 1993, abandoned.

[51] Int. Cl.<sup>7</sup> ..... **E05B 65/00**

[52] U.S. Cl. .... **70/58; 70/14; 70/57; 248/551**

[58] Field of Search ..... **70/57, 58, 14, 70/18, 30, 49, 232, 423-430; 248/551, 553, 505; 411/555, 552, 553, 549, 349, 343, 216, 217**

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(List continued on next page.)

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Apple Security Bracket Sold in AS Kit. Retaining Device Incorporated in Apple Computers.

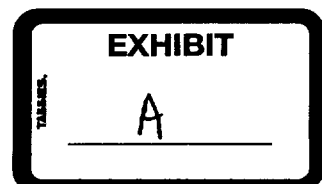
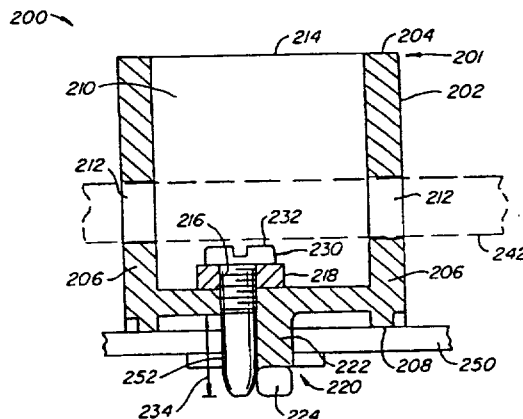
Kensington Product Brochure for Kensington Apple®, LaserWriter® and Macintosh® Portable Security Systems. *Computer and Office Equipment Security Catalog*, ©1990 by Secure-It, Inc. 18 Maple Court, East Longmeadow, MA 01028.

Primary Examiner—Darnell Boucher  
Attorney, Agent, or Firm—McCutchen, Doyle, Brown & Enersen

## [57] ABSTRACT

An apparatus which inhibits the theft of equipment such as personal computers is disclosed. The equipment must have an external wall provided with a specially designed, approximately rectangular slot having preselected dimensions. An attachment mechanism includes a housing for a spindle having a first portion rotatable within the housing, a shaft extending outwardly from the housing, and a cross-member at the end of the shaft having peripheral dimensions closely conforming to the internal dimensions of the slot. An abutment mechanism also emanates from the housing, and is located on opposite sides of the shaft intermediate the housing and the crossmember. The peripheral cross-sectional dimensions of the abutment mechanism and the shaft in combination closely conform to the dimensions of the slot. The length of the shaft from the housing to the crossmember is approximately equal to the thickness of the external wall of equipment. The crossmember is aligned with the abutment mechanism so that the crossmember can be inserted through the slot with the shaft and the abutment mechanism occupying the slot. The spindle is then rotated 90° to misalign the crossmember with the slot, thereby attaching the attachment mechanism rigidly to the external wall. A cable is secured to the housing and to an immovable object so that the equipment cannot be stolen.

**3 Claims, 11 Drawing Sheets**



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Dec. 5, 2000

Sheet 1 of 11

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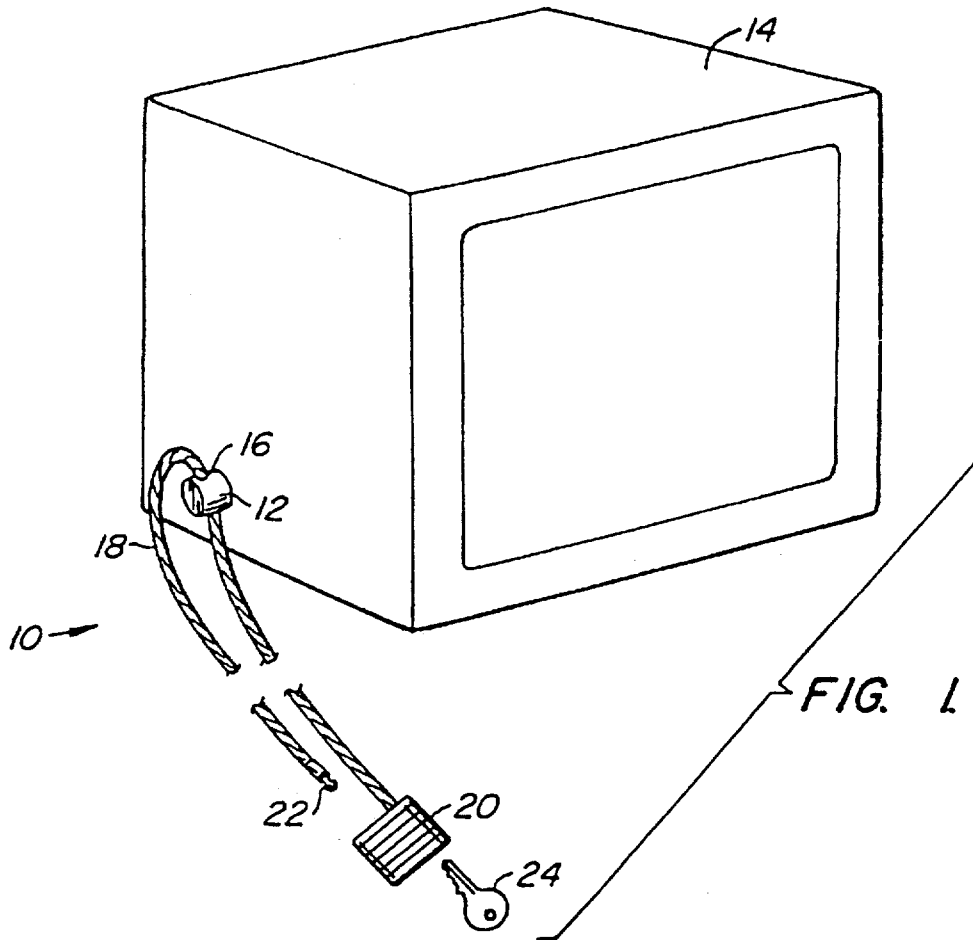


FIG. 1

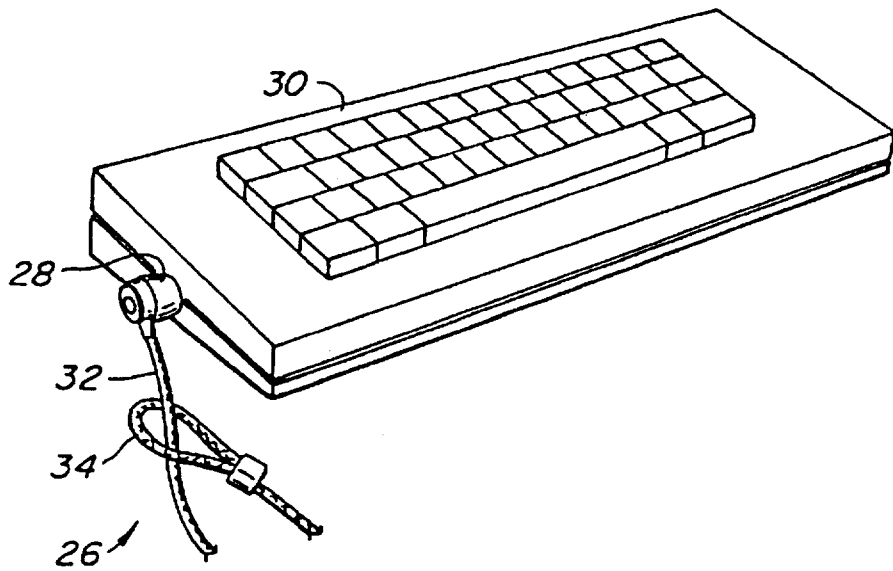


FIG. 2.

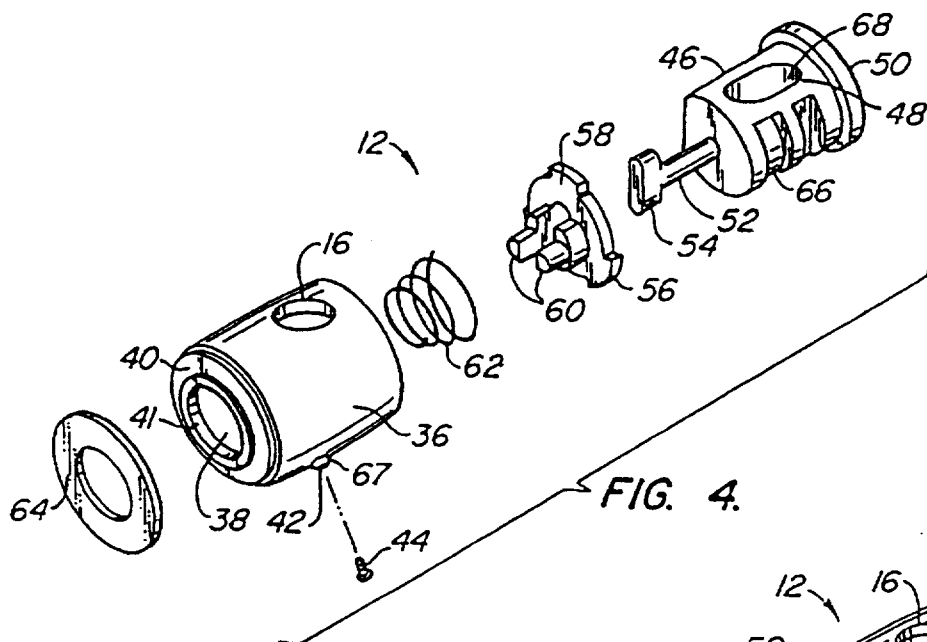


FIG. 4.

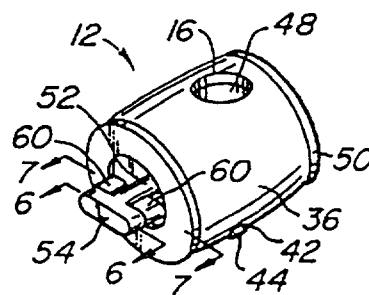


FIG. 3.

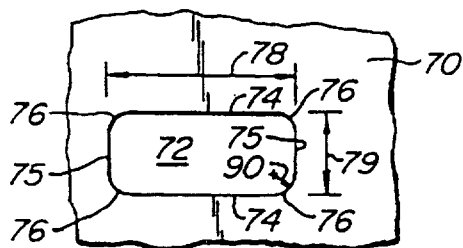


FIG. 5.

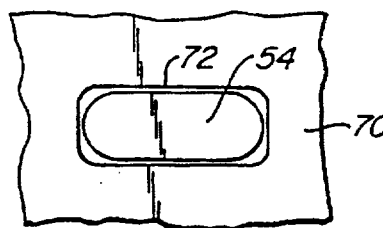


FIG. 8.

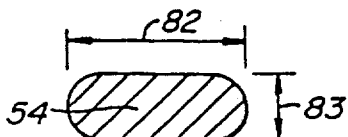


FIG. 6.

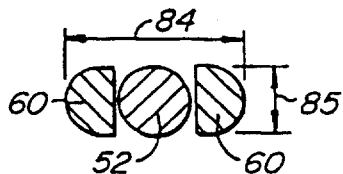


FIG. 7.

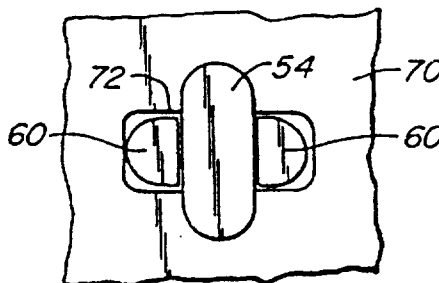


FIG. 9.

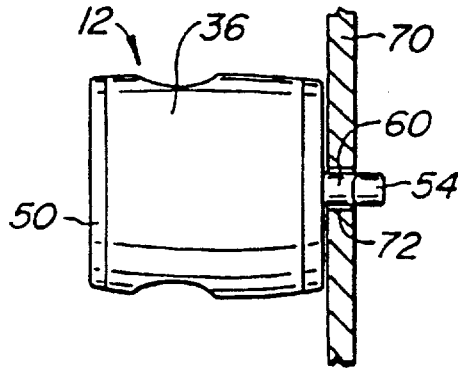


FIG. 10A.

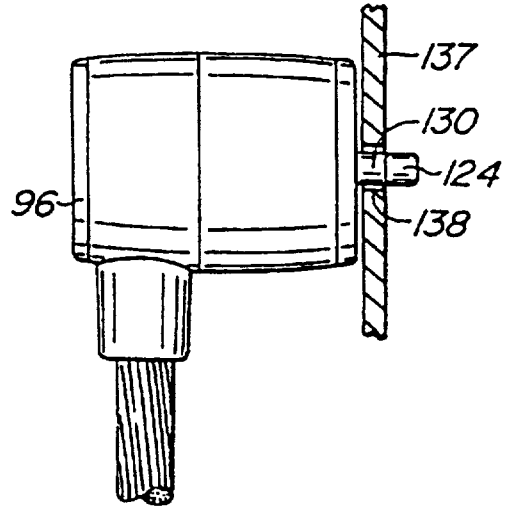


FIG. 13A.

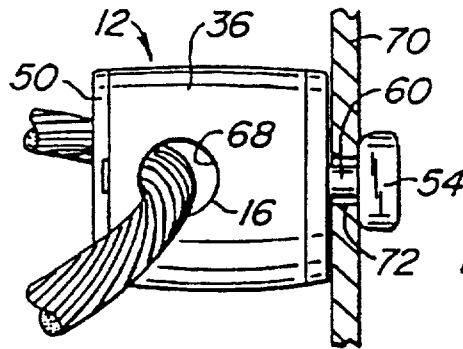


FIG. 10B.

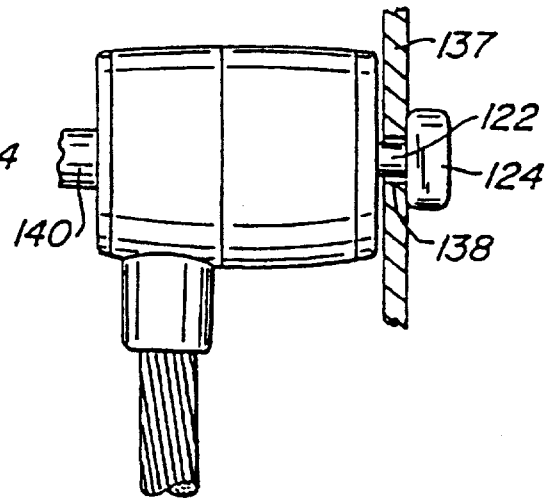


FIG. 13B.

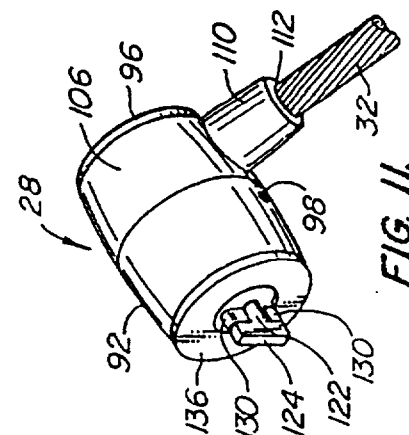
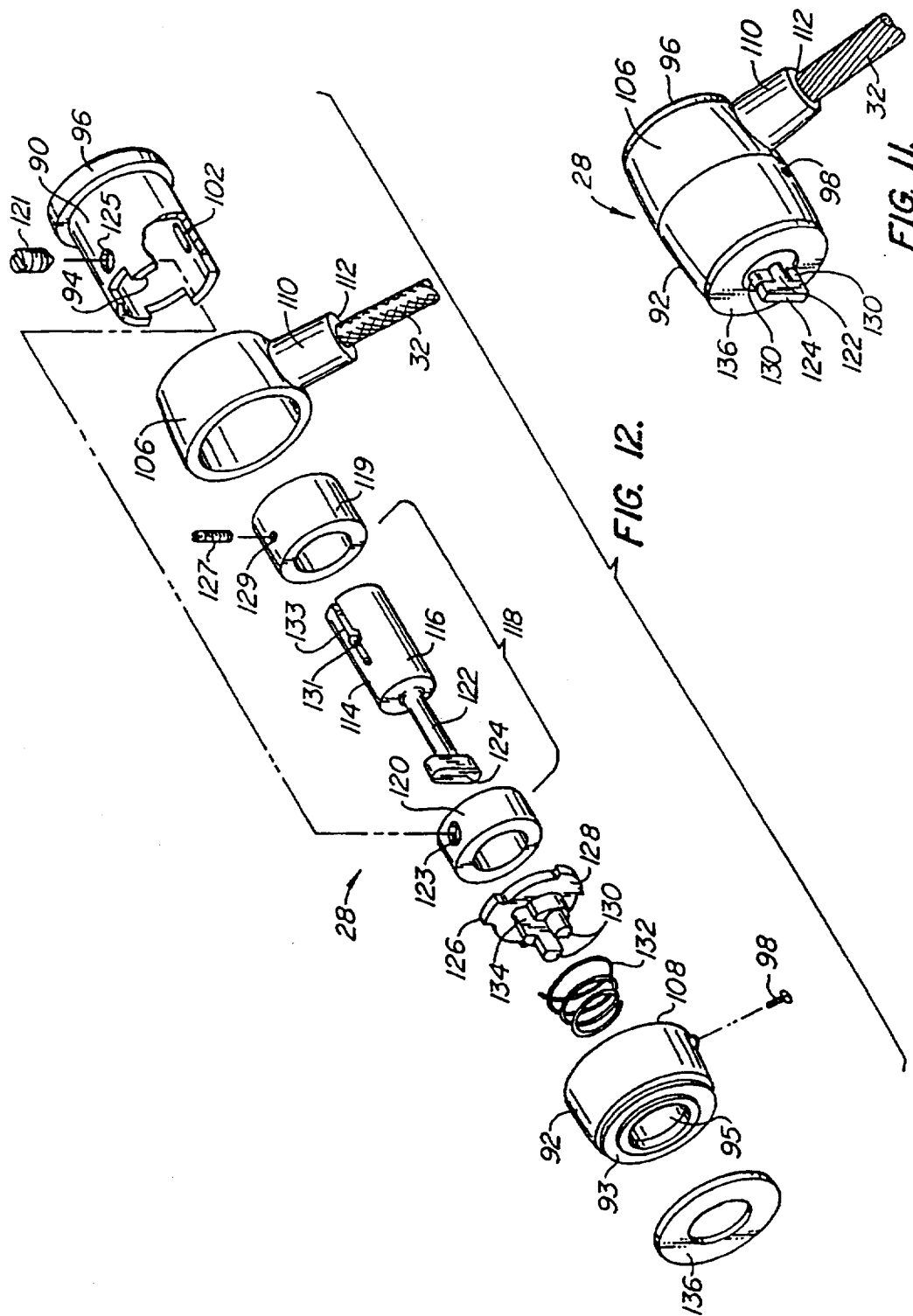


FIG. 12.

FIG. 11.

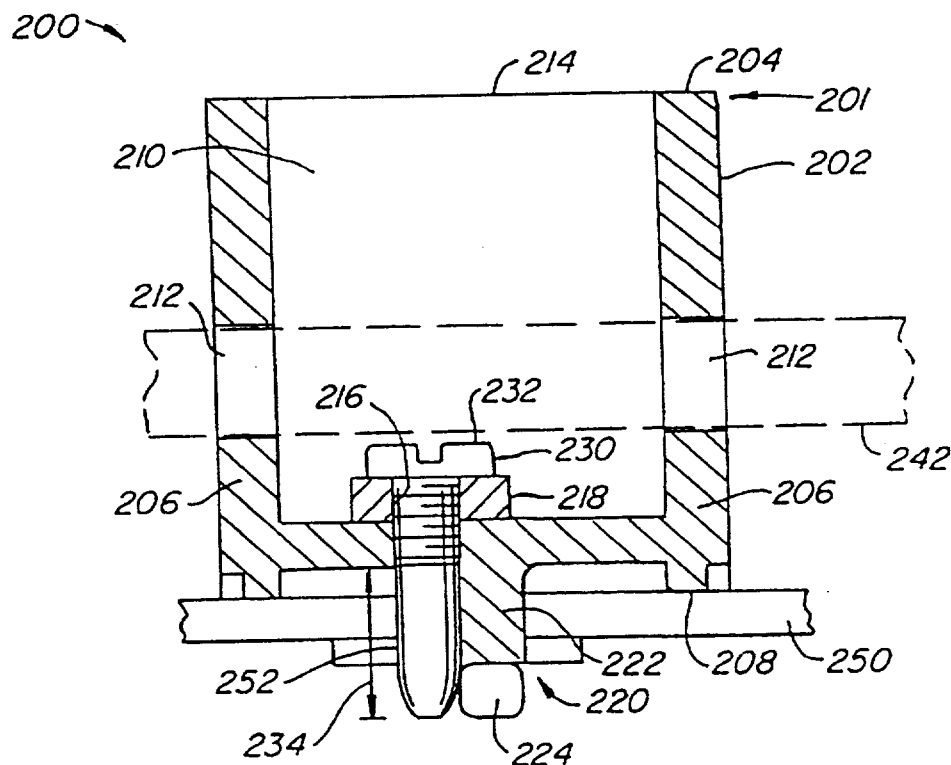


FIG. 14.

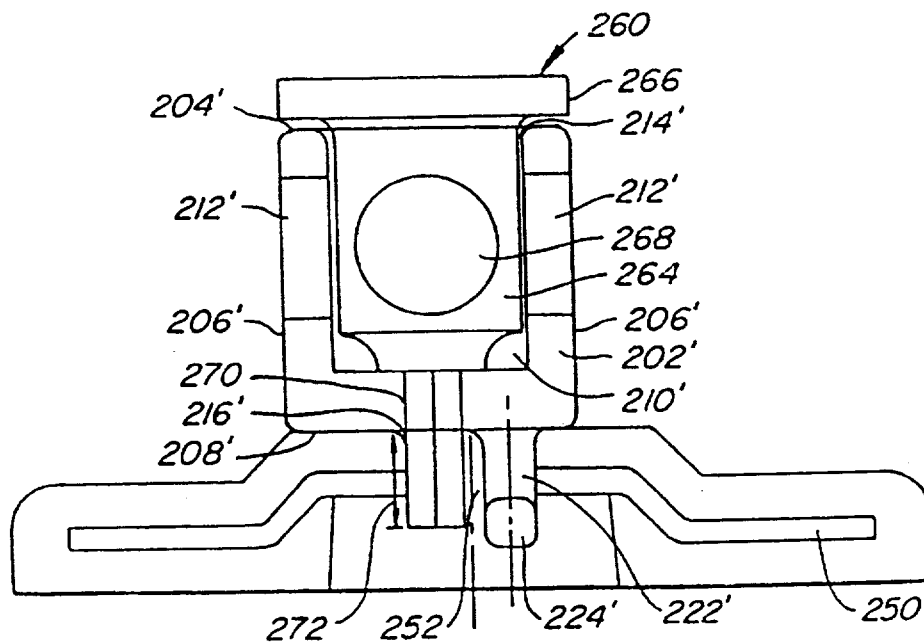


FIG. 15.

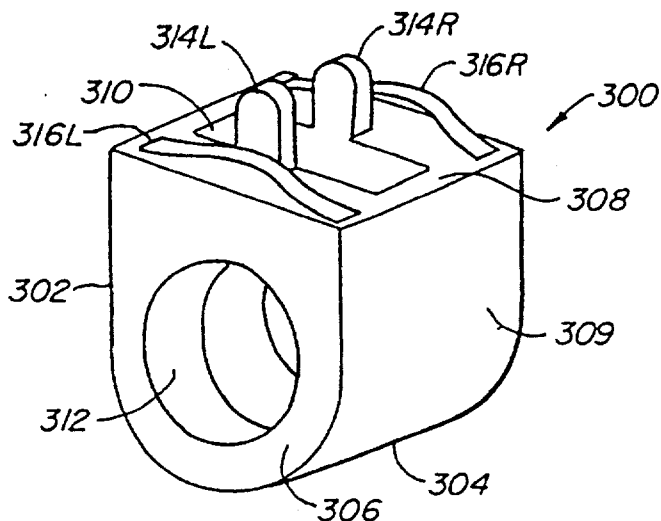


FIG. 16A.

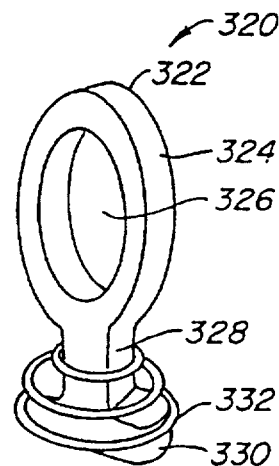


FIG. 16B.

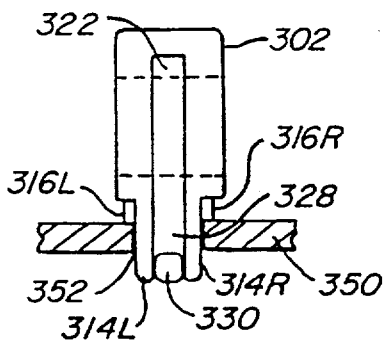


FIG. 16C.

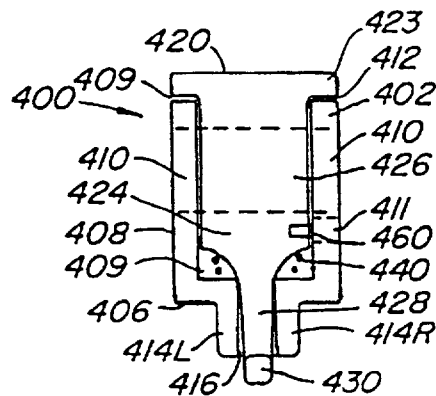


FIG. 17A.

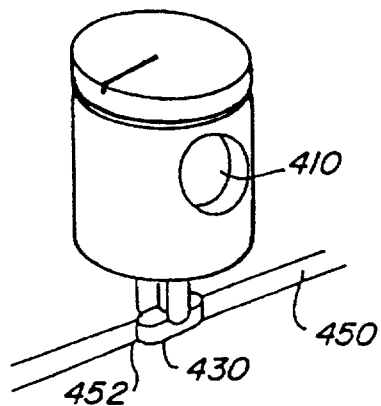


FIG. 17B.

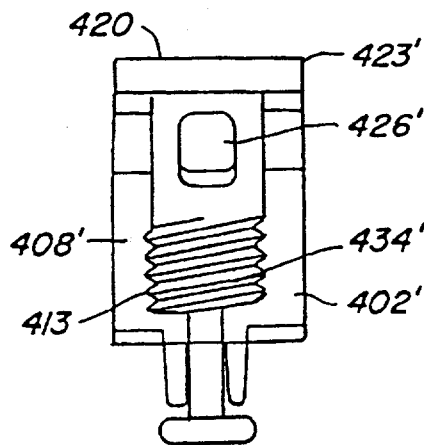


FIG. 18.

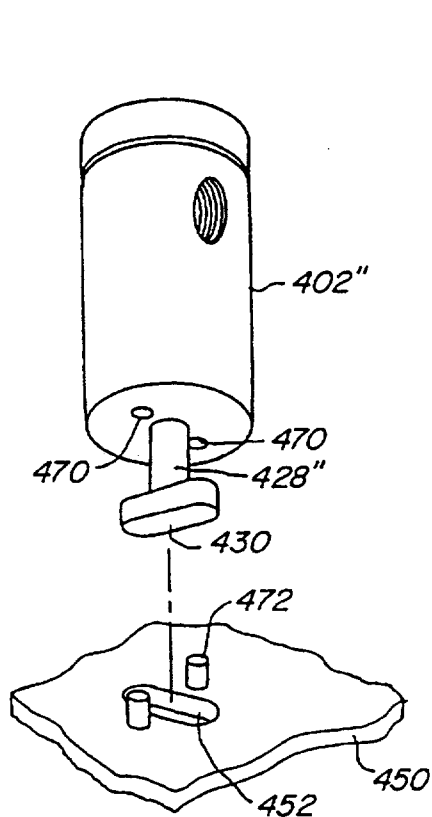


FIG. 19.

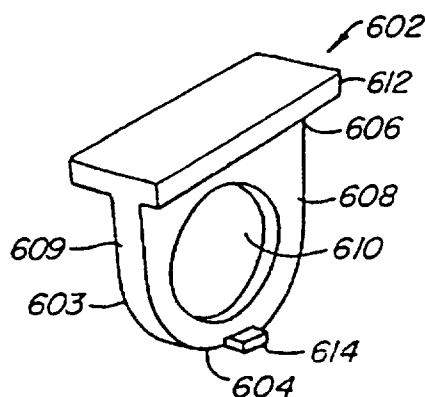


FIG. 20A.

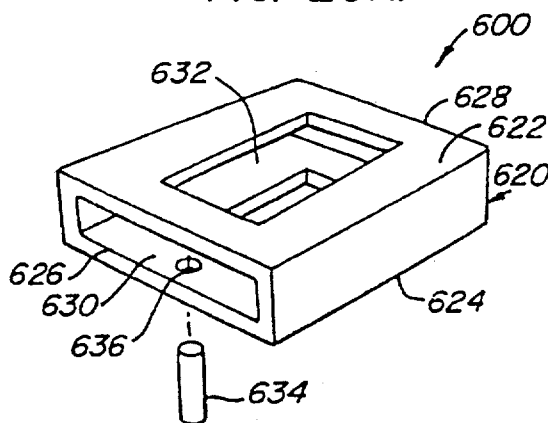


FIG. 20B.

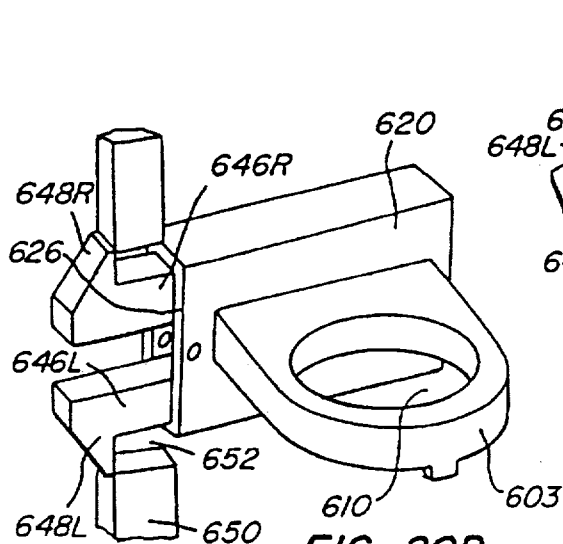


FIG. 20D.

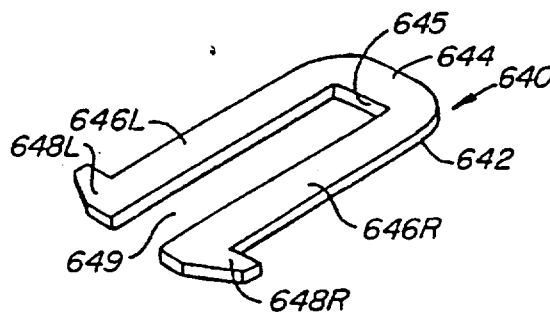


FIG. 20C.

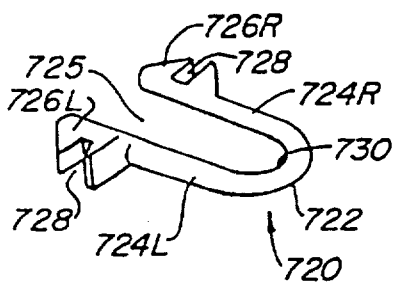


FIG. 21A.

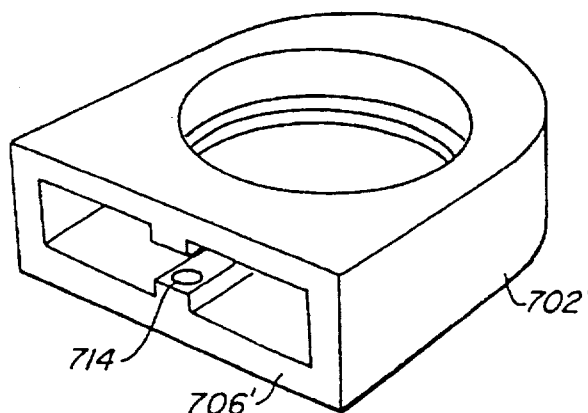


FIG. 22B.

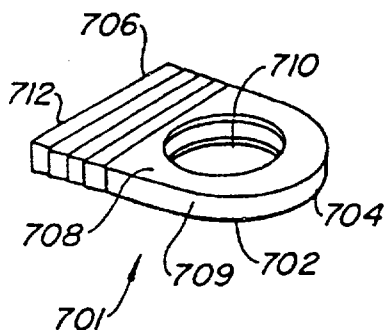


FIG. 21B.

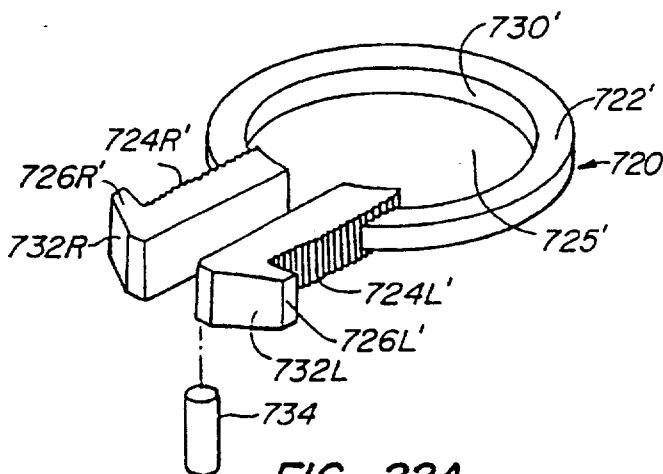


FIG. 22A.

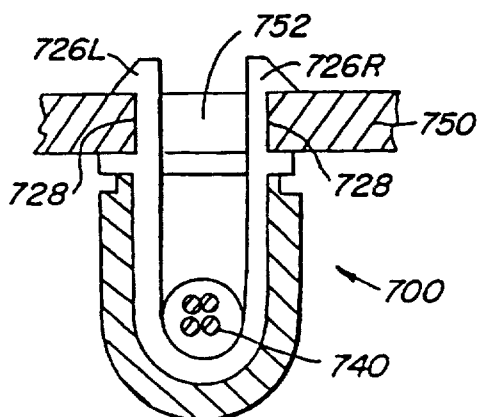


FIG. 21C.

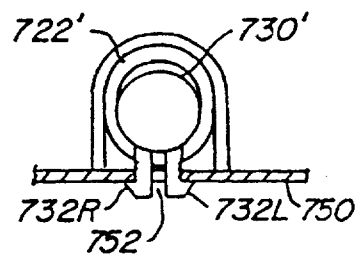


FIG. 22C.



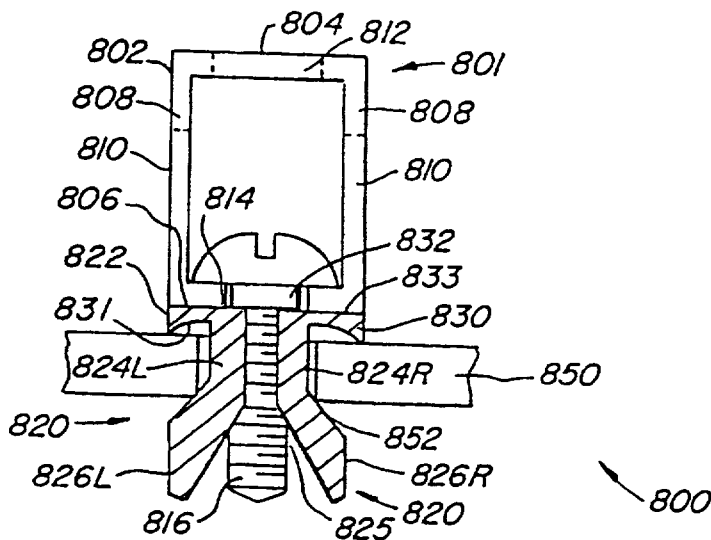


FIG. 23A.

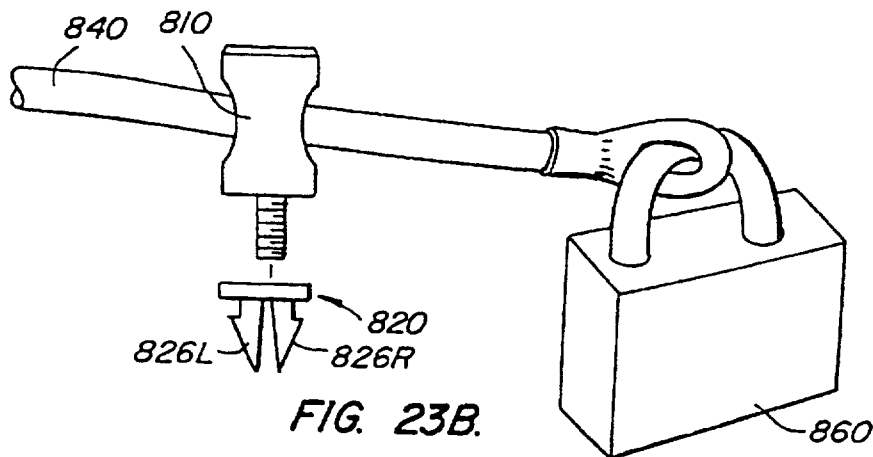


FIG. 23B.

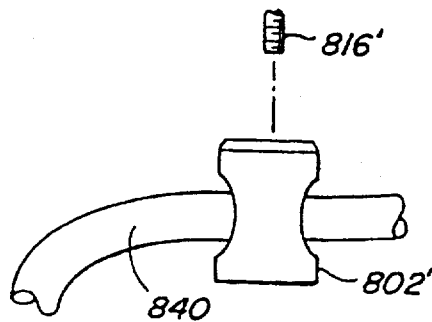


FIG. 24A.

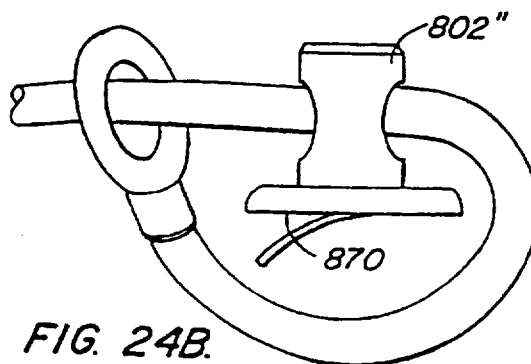


FIG. 24B.

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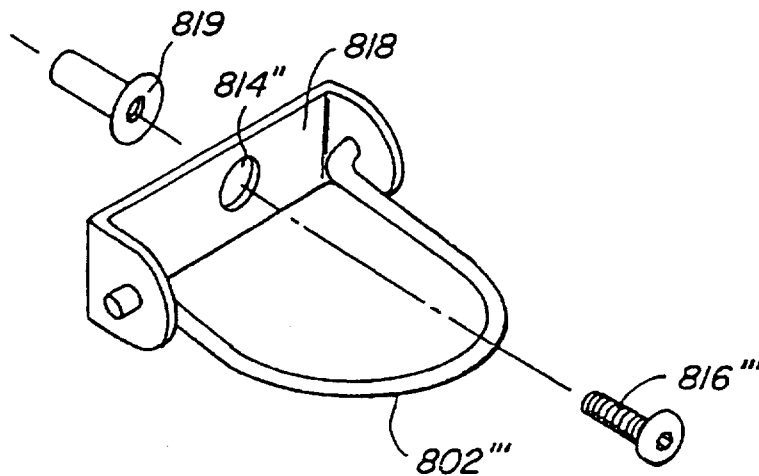


FIG. 25.

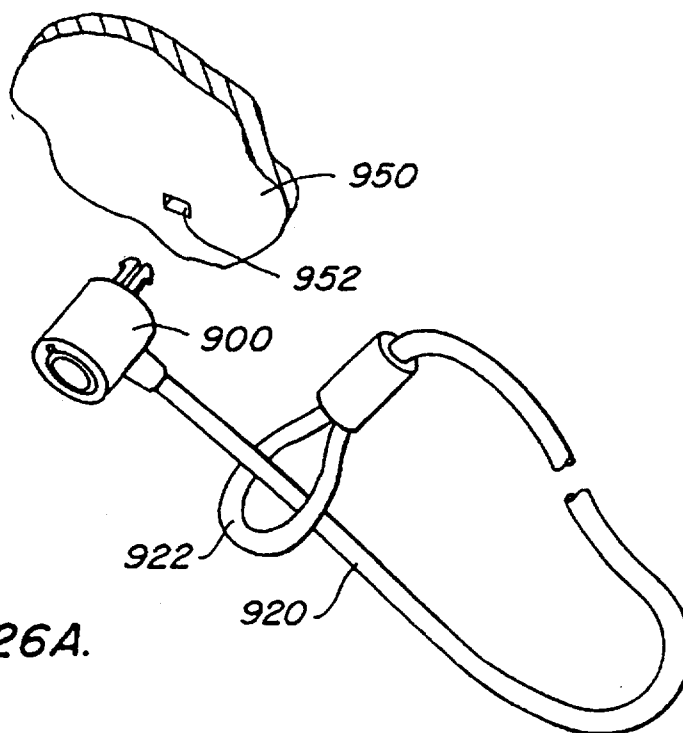


FIG. 26A.

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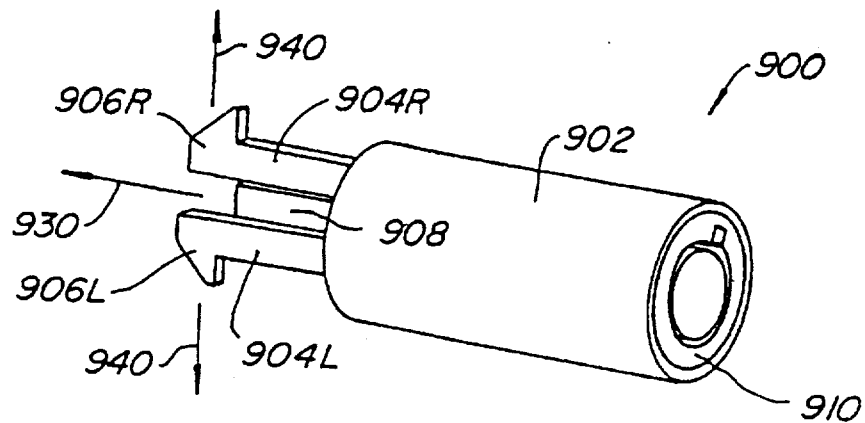


FIG. 26B.

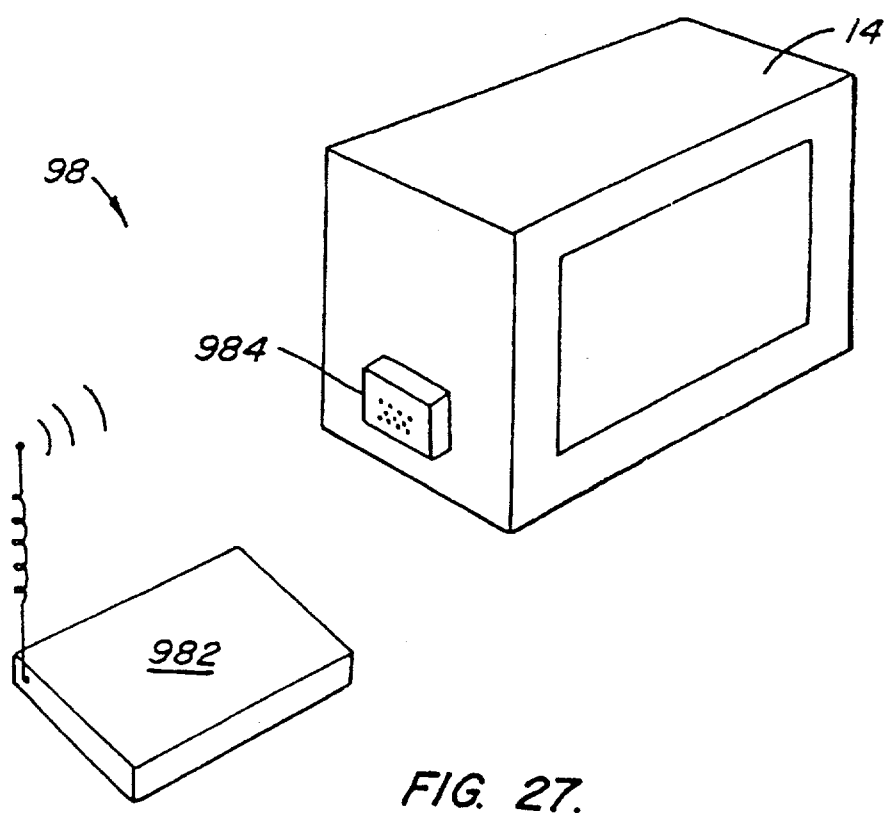


FIG. 27.

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**COMPUTER PHYSICAL SECURITY DEVICE**

This appln is a con of Ser. No. 08/307,113 Sep. 16, 1994 U.S. Pat. No. 5,502,989 which is a Div of Ser. No. 08/138, 634 Oct. 15, 1993, now U.S. Pat. No. 6,000,251 and a continuation-in-part of Ser. No. 08/042,851, filed Apr. 5, 1993, entitled **COMPUTER PHYSICAL SECURITY DEVICE**, now U.S. Pat. No. 5,381,685 which is a continuation of Ser. No. 07/824,964, filed Jan. 24, 1992 (now abandoned), entitled **COMPUTER PHYSICAL SECURITY DEVICE**, and a continuation-in-part of Ser. No. 08/006,311, filed Jan. 19, 1993, now abandoned entitled **COMPUTER PHYSICAL SECURITY DEVICE**, all the above applications are hereby expressly incorporated by reference for all purposes.

**BACKGROUND OF THE INVENTION**

The present invention relates to devices for inhibiting the theft of relatively small but expensive pieces of equipment.

Computers have evolved rather rapidly from large, expensive machines usable only by a few, to relatively small, portable machines which are usable by many. In particular, the development of desk top computers with significant processing power has made computers available to the general population. It is now common for college and even high school students to have their own computer, and desk top computers are in wide spread use as word processors and work stations in almost all forms of business. Desk top computers are relatively small and easily transportable, and an undesirable side effect of their proliferation is the fact that the theft of such computers is a significant problem.

A variety of devices have been developed to inhibit the theft of desk top computers and similar equipment. Since desk top computer systems involve several components, typically including the computer itself, a separate monitor, keyboard and often a printer, such security systems often employ a cable which attaches each of the components to each other and to a relatively immovable object such as a desk. The principal difficulty in such systems is providing an effective and convenient method for attaching the cable itself to the equipment.

Kensington Microware Limited, assignee of this application, currently provides a security system which is especially designed for use with particular Apple computers. Certain Apple computer components have slots and internal brackets designed to capture a specially designed tab inserted through the slot so that the tab is not removable. While this system is effective for particular types of Apple computers, it does not work for those Apple computer components and other computer brands which do not have the special designed slots and brackets.

It is undesirable to require a computer to have specially designed slots and internal capture brackets because the brackets occupy a significant amount of space in an item of equipment which is intended to be as space efficient as possible. Different items of Apple equipment require different sized slots, meaning that the security mechanism must provide a variety of different sized tabs. The tabs, once inserted, cannot be removed without damage to the equipment, meaning that the security system cannot be moved from one computer to the other. Even Apple computers with specially designed slots are typically used with peripheral equipment which does not have them, and, the Kensington system provides screws requiring a special screwdriver which replace the screws used to attach the existing communication cables, securing the peripheral

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equipment to the base computer by preventing unauthorized removal of the communication cables. This last aspect of the system has a drawback in that the peripheral equipment cannot be removed from the base computer without the special screwdriver, which can be lost or misplaced.

Other vendors provide security systems which are not required to interface directly with special slots and capture mechanisms as provided in certain Apple computers. For example, Secure-It, Inc., under the trademark "KÄBLIT", provides a variety of brackets attached to the computer component using existing mounting screws, i.e., screws which are already used to secure items of equipment within the cabinet. Typically, the bracket is apertured so that passage of the cable through the aperture prevents access to the mounting screw and thus prevents removal of the bracket from the equipment. A deficiency of this type of system is that it requires the removal of the existing mounting screw, which may cause some damage to the internal components of the computer. Suitable existing screws are not always available on certain peripherals for convenient attachment of the fastener. For this latter reason, KÄBLIT also provides glue-on disks which, unfortunately, are permanently secured to the equipment.

The theft of small but expensive equipment such as desk top computers is a growing problem. Existing devices are simply too inefficient or ineffective, or their application is too limited. As a result, the use of such security systems is rare, computer equipment is typically left unprotected, and it is all too often stolen.

**SUMMARY OF THE INVENTION**

The present invention provides apparatus which inhibits the theft of equipment such as personal computers. The equipment must have an external wall provided with a specially designed, approximately rectangular slot having preselected dimensions. An attachment mechanism includes a housing for a spindle having a first portion rotatable within the housing, a shaft extending outwardly from the housing, and a crossmember at the end of the shaft having peripheral dimensions closely conforming to the internal dimensions of the slot. An abutment mechanism also emanates from the housing, and is located on opposite sides of the shaft intermediate the housing and the crossmember. The peripheral cross-sectional dimensions of the abutment mechanism and the shaft in combination closely conform to the dimensions of the slot. The length of the shaft from the housing to the crossmember is approximately equal to the thickness of the external wall of equipment. The crossmember is aligned with the abutment mechanism so that the crossmember can be inserted through the slot with the shaft and the abutment mechanism occupying the slot. The spindle is then rotated 90° to misalign the crossmember with the slot, thereby attaching the attachment mechanism rigidly to the external wall. A cable is secured to the housing and to an immovable object so that the equipment cannot be stolen.

The apparatus of the present invention is far more adaptable and convenient to use than existing systems. The only required modification of the equipment to be protected is a small (preferably about 3 by 7 millimeter) slot in an external wall. Additional brackets, capture mechanisms or the like are not necessary. This small slot can easily be molded into computer systems at essentially no cost and without degrading the integrity of the equipment. The attachment mechanism can readily be installed on the equipment, and removed when appropriate by an authorized user. In one embodiment, a key-operated attachment attaches a single item of equip-

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ment to an immovable object with the cable. In a second embodiment, the cable passes through mating apertures in the spindle and the housing of one or more attachment mechanisms to prevent their removal once they have been attached to the equipment and the cable has been installed.

The attachment mechanism of the present invention is surprisingly difficult to remove from an item of equipment once it has been installed. In the preferred embodiments, the mechanism is quite small, and it is difficult to apply sufficient leverage to break the mechanism away from the equipment to which it is attached. Forcibly removing the mechanism will result in significant, highly visible damage to the exterior wall, identifying the equipment as stolen and making it difficult to resell, greatly reducing its theft potential.

Several alternative embodiments of the invention are provided in which there are shown several different combinations of attachment mechanisms which are either integrally connected or separately coupled to engagement mechanisms for securing the attachment mechanism proximate the external wall of the object of equipment. Further embodiments of the invention provide an attachment mechanism that can be directly coupled to the external wall of the object of equipment without the need to provide a specially designed slot in the wall.

The novel features which are characteristic of the invention, as to organization and method of operation, together with further objects and advantages thereof will be better understood from the following description considered in connection with the accompanying drawings in which a preferred embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of the limits of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a first embodiment of the present invention attached to a computer monitor;

FIG. 2 is a perspective view of a second embodiment of the present invention attached to a computer keyboard;

FIG. 3 is a perspective view of the attachment mechanism of the first embodiment;

FIG. 4 is an exploded view of the attachment mechanism of FIG. 3;

FIG. 5 is a fragmentary elevation view of a slot in a piece of equipment specially designed to accept the attachment mechanism of either embodiment of the present invention;

FIG. 6 is a section view taken along lines 6—6 of FIG. 3;

FIG. 7 is a section view taken along lines 7—7 of FIG. 3;

FIG. 8 is a fragmentary section view from inside an item of equipment illustrating insertion of a crossmember of the embodiment of FIG. 3 into the slot of FIG. 5;

FIG. 9 is a view similar to that of FIG. 8 with the crossmember misaligned;

FIGS. 10A and 10B are elevation views illustrating the installation of the attachment mechanism of FIG. 3 on an item of equipment;

FIG. 11 is a perspective view of the attachment mechanism of the second embodiment of the present invention;

FIG. 12 is an exploded view of the attachment mechanism of FIG. 10;

FIGS. 13A and 13B are side elevation views illustrating the installation of the attachment mechanism of FIG. 11 on an item of equipment;

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FIGS. 14 and 15 are side elevational views of alternative embodiments of an attachment mechanism and an engagement mechanism;

FIGS. 16A and 16B are respective perspective views of another alternative embodiment of an attachment mechanism and an engagement mechanism of the invention;

FIG. 16C is a side elevational view of the attachment mechanism and the engagement mechanism of FIGS. 16A and 16B assembled together proximate the external wall of an item of equipment;

FIG. 17A is a side elevational view of another embodiment of the invention;

FIG. 17B is a corresponding perspective view of the embodiment of FIG. 17A;

FIG. 18 is a side elevational view of a slightly modified version of the embodiment of FIGS. 17A and 17B showing a threaded engagement between the spindle and the housing;

FIG. 19 is a perspective view of another slightly modified version of the embodiment of FIGS. 17A and 17B showing a pin and pin hole engagement between the attachment mechanism and the external wall of an item of equipment;

FIGS. 20A, 20B, and 20C are perspective views of component parts of another embodiment of the invention showing a separate attachment mechanism, housing, and engagement mechanism respectively;

FIG. 20D is perspective view of the embodiment of FIGS. 20A, 20B, and 20C showing the three component parts in an assembled configuration;

FIGS. 21A and 21B are perspective views of component parts of another embodiment of the invention showing an engagement mechanism and a separate attachment mechanism respectively;

FIG. 21C is a side elevational view of the embodiment of FIGS. 21A and 21B with the engagement mechanism coupled to the attachment mechanism;

FIGS. 22A and 22B are perspective views of slightly modified version of the perspective component parts of FIGS. 21A and 21B;

FIG. 22C is a side elevational view of the embodiment of FIGS. 22A and 22B with the attachment mechanism shown coupled to a slot in the external wall of an item of equipment;

FIG. 23A is a side elevational view of an attachment mechanism coupled to an engagement mechanism according to another embodiment of the invention;

FIG. 23B is a perspective view of the embodiment of FIG. 23A with the attachment mechanism and engagement mechanism shown coupled to a cable and a separate locking device;

FIG. 24A is a perspective view of the attachment mechanism of FIGS. 23A and 23B which can be directly coupled to an external wall of an item of equipment;

FIG. 24B is a perspective view of another embodiment of the attachment mechanism of FIGS. 23A and 23B which can be directly coupled to an external wall with the use of an adhesive;

FIG. 25 is another embodiment of an attachment mechanism which can be directly coupled to an external wall of an item of equipment;

FIG. 26A is a perspective view of another embodiment of the present invention with a conventional lock assembly and a retractable spindle;

FIG. 26B is a perspective view of the spindle and lock assembly of FIG. 26A showing the spindle in its retracted position; and

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FIG. 27 is perspective view of another embodiment of the preferred embodiment including a base unit and an attachment unit.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

A first preferred embodiment 10 of the security device of the present invention is illustrated generally by way of reference to FIG. 1. Security device 10 includes an attachment mechanism 12 designed to attach to a component of a computer system, such as computer monitor 14. Attachment mechanism 12 has an aperture 16, and a cable 18 which passes through the aperture when the attachment mechanism 12 is attached to a component such as monitor 14. A lock 20 is fixed to one end of cable 18. The free end of cable 18 may be of the type having a "mushroom" head 22 adapted to penetrate and be secured within lock 20 using key 24. With mushroom head 22 detached from lock 20, cable 18 can be threaded through the apertures 16 of one or more attachment mechanisms 12, and wrapped around a relatively immovable object (not shown) such as the cross bar spanning two legs of a desk. Mushroom head 22 is then inserted into lock 20 and the lock closed using key 24 to secure the computer components to the immovable object.

A second embodiment 26 of the present invention, designed primarily to secure single rather than multiple items of computer equipment, is illustrated generally by way of reference to FIG. 2. Embodiment 26 includes an attachment mechanism 28 designed to be secured to a computer component such as keyboard 30. Attachment mechanism 28 is affixed to one end of a cable 32 which has a closed loop 34 at its other end. Cable 32 is first wrapped around a relatively immovable object, such as a cross piece between two legs of a desk or table, and attachment mechanism 28 is passed through loop 34 and attached to the item to be protected such as keyboard 30 to make it difficult to steal the item of equipment.

Attachment mechanism 12 of first embodiment 10 is illustrated in more detail by way of reference to FIGS. 3 and 4 in combination. Mechanism 12 includes a housing 36 having a hollow interior cylindrical cavity 38. An annular plate 40 forms one end of housing 36 and has an aperture 41. A pair of apertures such as aperture 16 are located on opposite sides of housing 36. A small raised aperture 42 is also provided in housing 36 to accommodate a pin 44, as explained in more detail hereinafter.

A spindle 46 includes a cylindrical portion 48 adapted to fit within the cylindrical cavity of housing 36. Spindle 48 includes a raised plate 50 at one end which forms the aft end of the mechanism when assembled as illustrated in FIG. 3. Spindle 46 also includes a shaft 52 extending outwardly through the aperture 41 in housing 36. A crossmember 54 is located on the distal end of shaft 52.

An abutment mechanism 56 includes an abutment plate 58 designed to be received within the cylindrical interior cavity of housing 36, and a pair of pins 60 adapted to extend outwardly through the aperture 41 in housing 36. A spring 62 biases abutment plate 58 and spindle 46 rearwardly when the mechanism is assembled, as illustrated in FIG. 3. A plastic bushing 64 designed to prevent scarring of the equipment to which mechanism 12 is attached is affixed to the plate 40 on housing 36 circumscribing aperture 41.

When mechanism 12 is assembled as illustrated in FIG. 3, crossmember 54 and shaft 52, together with pins 60 on either side of the shaft, extend outwardly beyond housing 46 through aperture 41. Pin 44 engages a groove 66 in spindle

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46 so that the mechanism cannot be disassembled without removing the pin. The head of pin 44 is conformed to the shape of a boss 67 on the surface of housing 36 so that the pin cannot be removed without special equipment. Groove 66 has a preselected width allowing limited axial movement of spindle 46 relative to housing 36 with pin 44 engaged so that the axial position of crossmember 54 relative to the housing is somewhat adjustable. Spring 62 biases plate 58 and spindle 46 rearwardly to bias crossmember 54 toward housing 36.

Groove 66 extends around about 25% of the periphery of spindle 46 so that the spindle can be rotated approximately 90° relative to the housing. A transverse aperture 68 through the cylindrical portion 48 of spindle 46 is aligned with aperture 16 in housing 36 when crossmember 54 is misaligned from pin 60 (see FIG. 4). With spindle 46 rotated 90°, as allowed by pin 44 in groove 68, crossmember 54 is aligned with pin 60, and aperture 68 is not aligned with aperture 16. Cable 18 (see FIG. 1) can only be inserted through the aligned apertures 16, 68 when crossmember 54 is misaligned with pins 60, i.e., when attachment mechanism 12 is attached to the piece of equipment, as explained hereinbelow. With cable 18 passing through aligned apertures 16 and 68, rotation of spindle 46 so as to align crossmember 54 with pins 60 and allow removal of the attachment mechanism is effectively prevented.

The preferred embodiments 10 and 26 of the present invention are designed to operate with items of equipment provided by a special slot, as illustrated in FIG. 5. The exterior wall 70 of the piece of equipment is typically made of sheet metal, or molded plastic, either of which is compatible with the present invention. A relatively small slot 72 is formed in wall 70, by molding or otherwise as appropriate. In the preferred embodiment of slot 72, the slot has a generally rectangular configuration, i.e., the slot is generally rectangular having long parallel sides 74, short parallel sides 75 and rounded corners 76. Slot 72 is relatively small, having a long dimension 78 of seven millimeters, and a short dimension 79 of three millimeters, in the preferred embodiment of the present invention. Corners 76 have a radius of curvature 90 from 0.30 mm. to a maximum of 1.5 millimeters. If the radius of curvature 90 is 1.5 mm., the short sides 75 disappear and the slot has a straight-sided oval configuration.

The peripheral dimensions of crossmember 54 are closely conformed to the interior dimensions of slot 72, as illustrated in FIG. 6. The crossmember 4 of attachment mechanism 12 has a straight-sided oval configuration, i.e., the crossmember is generally rectangular, having straight sides and semi-circular ends. In the preferred embodiment, the long dimension 82 of crossmember 54 is 6.75 millimeters, while the short dimension 83 is 2.75 millimeters, each being slightly less than the corresponding dimension of slot 72. As illustrated in FIG. 7, the peripheral dimensions of the pins 60 and shaft 52 also closely conform to the interior dimensions of slot 72. As with crossmember 54, pins 60 in shaft 52 have a long dimension 84 of 6.75 millimeters, and a short dimension 85 of 2.75 millimeters.

The insertion of crossmember 54 of attachment mechanism 12 into slot 72 of external wall 70 is illustrated by reference to FIGS. 8 and 10A. Before insertion, spindle 46 must be rotated so that crossmember 54 is aligned with pins 60, as illustrated in FIG. 3. With the spindle in this position, the periphery of crossmember 54 and that of pins 60 and shaft 52 are essentially congruent. Since the peripheral dimension of crossmember 54 and pins 60 and shaft 52 in combination are less than the dimensions of slot 72, the

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crossmember can be inserted through the slot until crossmember 54 is completely inside wall 70 (see FIG. 10A). If necessary, the plate 50 on spindle 46 can be pressed to compress spring 62 so that crossmember 54 is completely inside wall 70.

As illustrated in FIG. 9, upon insertion of crossmember 54 completely through slot 72, the spindle is rotated by manipulating plate 50 so that crossmember 54 is 90° misaligned with respect to pins 60. The aperture 16 in the side wall of housing 36 will be aligned with the aperture 68 in the spindle, providing a passageway completely through the housing. In this configuration, cable 18 can easily be threaded through the aperture, and the presence of the cable prevents the spindle from being rotated back so as to disengage crossmember 54 from slot 72.

The attachment mechanism 28 of the second embodiment 26 of the present invention is illustrated in more detail by way of reference to the perspective view of FIG. 11 and the exploded view of FIG. 12. Attachment mechanism 28 includes a hollow shell 90 and a nose-piece 92 which, in combination, form a housing. Shell 90 has a hollow cylindrical interior cavity 94, and an integral apertured plate 96 at one end. A pin 98 is inserted through an aperture (not shown) in nose-piece 92 to engage a slot 102 in shell 90. Pin 98 is designed to shear when torque is applied to nose-piece 92 so that an unauthorized attempt to remove the attachment mechanism will simply shear the pin and allow the nose-piece to freely rotate without degrading the attachment of the attachment mechanism to the component to be protected. Slot 102 is axially elongate so that limited axial movement is allowed between shell 90 and nose-piece 92. The forward end of nose-piece 92 has a plate 93 having a central aperture 95.

A cylindrical collar 106 circumscribes the outer portion of shell 90 and occupies the slot laterally defined by plate 96 and the aft surface 108 of nose-piece 92. Collar 106 has an integral tab 110 with an aperture 112 adapted to receive one end of cable 32. Cable 32 is dead-ended into tab 110 and attached so that it cannot be removed.

A spindle 114 has a cylindrical portion 116 adapted to be received within a cylindrical lock 118 in shell 90. Cylindrical lock 118 includes a front cylinder 119, and a back cylinder 120. A blunt pin or set screw 121 is inserted through an aperture 125 in shell 90, and through a corresponding aperture 123 in back cylinder 120, to lock the front cylinder rotationally with respect to shell 90. Correspondingly, pin or set screw 127 engages a relatively smaller aperture 129 in front cylinder 119, and a widening 131 in slot 133 in the cylindrical portion 116 of spindle 114. Front cylinder 119 is thus fixed rotationally with respect to spindle 114.

As with conventional cylindrical locks, a plurality of pins normally span the interface between front cylinder 119 and back cylinder 120 so that the cylinders are rotationally locked together, thus preventing relative rotation between locking shell 90 and spindle 114. However, a key 140 (see FIG. 13B) is insertable through the apertured plate 96 of shell 90 to engage front cylinder 119. The correct key will have bosses located to depress the pins passing between cylinders 119 and 120 so that such pins do not span the interface between the cylinders, allowing the cylinders to rotate with respect to one another. In this fashion, spindle 114 can be rotated with respect to shell 90 only upon insertion and rotation of the appropriate key.

Spindle 114 also includes a shaft 122, and a crossmember 124 at the free end of the shaft. An abutment mechanism 126 has an abutment plate 128 adapted to fit within nose-piece

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92, and a pair of pins 130 adapted to extend outwardly through aperture 95. A spring 132 is located between abutment plate 128 and nose-piece 92 to bias the cylindrical portion 116 of spindle 114 and the abutment plate rearwardly. Abutment plate 126 has an elongate aperture 134 which allows crossmember 124 to extend through the aperture plate. A plastic bushing 136 is fixed to the surface of plate 93 so that the mechanism does not scar the equipment to which it is attached.

The insertion of attachment mechanism 28 into the exterior wall 137 of a piece of equipment is illustrated by way of reference to FIGS. 13A and B. Wall 136 has a slot 138, which is identical to the slot 72 illustrated in FIG. 8. The peripheral dimensions of crossmember 124, and also those of pins 130 and shaft 122 in combination, are identical to the corresponding parts in FIGS. 6 and 7. Simply put, attachment mechanism 28 is designed to fit into the same slot as attachment mechanism 12.

As illustrated in FIG. 13A, crossmember 124 is aligned with pins 30 so that the crossmember can be inserted into slot 138. When fully inserted, the space in the slot is essentially occupied by pins 130 and shaft 122. If necessary, plate 96 can be depressed to push the cylindrical portion 116 of spindle 114 against spring 132. Once crossmember 124 has been fully inserted through slot 138, a key 140 engaging lock mechanism 118 (see FIG. 12) is used to rotate the spindle 90° and misalign crossmember 124 and slot 138.

In operation, both attachment mechanism 12 and attachment mechanism 28 are attached to an item of computer or other equipment which has a specially designed slot 72, 138. First, the crossmember 54, 124 is aligned with the pins 60, 130, for insertion to the crossmember through the slot. The spindle 46, 114 is then rotated relative to the housing to misalign the crossmember 54, 124 relative to the slot. The spindle is locked in this configuration by passing the cable 18 through the mating slot 16, 48 in the first embodiment, or using the key 140 in the second embodiment. Either way, the attachment mechanism is extremely difficult to disengage by anyone not having the appropriate key 24, 140. Any unauthorized attempt to remove the attachment mechanism from the computer component will most likely result in significant damage to the computer housing, making the computer difficult to resell and greatly reducing its theft potential.

FIG. 14 illustrates another embodiment of the invention. Security device 200 includes an attachment mechanism 201 designed to be attached to a portable object of equipment, such as a personal computer (not shown), having an external wall 250. Attachment mechanism 201 comprises a housing 202 which generally includes a top end 204, a bottom end 208, and a generally cylindrical side wall 206, which in combination define internal hollow cavity 210. Side wall 206 has a pair of apertures 212 which are aligned with one another and which are sized to allow a cable 242 to pass through the apertures. Top end 204 is provided with an opening 214 which extends to proximate bottom end 208 to provide access for screw 230 into cavity 210, as will be described in more detail hereinafter. A raised plate 218 having a threaded aperture 216 is provided in bottom end 208 of the housing to accommodate insertion of screw 230.

Integral with bottom end 208 of housing 202 is an engagement mechanism 220 which includes a generally cylindrical shaft 222 and a crossmember 224 attached to the shaft at the distal end of the shaft. As previously described with reference to prior embodiments of the invention, the peripheral dimensions of the crossmember conform closely to the internal dimensions of slot 252. The crossmember 224

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is generally rectangular, having straight sides and semi-circular ends, as previously described.

To secure attachment mechanism 201 proximate external wall 250, housing 202 must first be rotated prior to insertion of screw 230 so that crossmember 224 is aligned with slot 252. Since the peripheral dimensions of crossmember 224 and shaft 222 are less than the dimensions of slot 252, crossmember 224 can be inserted through the slot until the crossmember is completely inside external wall 250, with shaft 222 occupying a portion of slot 252. Housing 202 may then be rotated by grasping onto side wall 206 and turning housing 202 until crossmember 224 is 90 degrees misaligned with respect to the slot. In this position of the crossmember, screw 230 can be inserted through opening 214 in the housing and threaded into aperture 216 in raised plate 218 of the housing. With screw head 232 firmly pressed against the upper surface of plate 218, a length of the screw 234 external the housing will extend beyond the housing for a distance that is slightly greater than the thickness of external wall 250. Further, the peripheral dimension of the screw portion 234 and the shaft 222 in combination is slightly less than the dimensions of the slot. In this way, screw portion 234 and shaft 222 occupy slot 252 when the screw is threadably engaged with aperture 216 in the housing so as to prevent rotation of the housing relative to the external wall and thereby prevent disengagement of crossmember 224 from slot 252. In this configuration, cable 242 can easily be threaded through apertures 212 to secure the housing to an external object (not shown). Once the cable is inserted through apertures 212 in the housing, screw 230 cannot be removed.

FIG. 15 illustrates another embodiment of the invention which has a similar configuration to the embodiment of FIG. 14 except that a spindle 260 is used instead of a screw to prevent rotation of housing 202'. Spindle 260 includes a cylindrical portion 264 adapted to be rotatably mounted within the cylindrical cavity 210' of the housing. An aperture 268 is formed through cylindrical portion 264 and is sized to allow a cable (not shown) to pass through the aperture. Spindle 260 includes a raised plate 266 at a proximal end of the spindle which forms the aft end of the spindle. Spindle 260 also includes a pin member 270 extending outwardly through aperture 216' in housing 202'. The length of the pin member 272 external the housing is slightly greater than the thickness of external wall 250.

In operation, with the crossmember misaligned from the slot as described above with reference to the embodiment of FIG. 14, spindle 260 is positioned in the housing so that base pin 270 is inserted through aperture 216' and into slot 252 proximate shaft 222'. The peripheral dimension of the shaft and the pin in combination is less than the dimension of the slot so that the pin and shaft occupy the slot with the crossmember misaligned 90 degrees. In this position, spindle 260 is rotated by manipulating raised plate 266 so that apertures 212' in the side wall 206' of housing 202' will be aligned with aperture 268 in cylindrical portion 264 of the spindle, providing a passageway completely through the housing. In this configuration, a cable (not shown) can easily be threaded through the apertures, and the presence of the cable prevents spindle 260 from being separated from the housing.

FIGS. 16A, 16B and 16C illustrate another embodiment of the invention in which the attachment mechanism 300 is a separate component from the engagement mechanism 320. Attachment mechanism 300 comprises a housing 302 having a top end 304, a bottom end 308, spaced apart side walls 306, and a peripheral edge wall 309, as seen in an inverted

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configuration in FIG. 16A. Bottom end 308 includes a generally rectangular opening 310 which extends the length of the housing to closed top end 304. Opening 310 is configured to permit passage of engagement mechanism 320 into housing 302, as will be described in more detail hereinafter. Apertures 312 through side wall 306 are spatially coupled to opening 310 and are sized to allow a cable (not shown) to pass through the apertures. Housing 302 also preferably includes first and second springs 316L and 316R mounted on either side of bottom end 308 of the housing which are used to adjust the relative position of the housing proximate the external wall 350, as best seen in FIG. 16C. Housing 302 further includes first and second, spaced apart abutment plates 314L and 314R located on opposite sides of opening 310.

Engagement mechanism 320, which is configured to fit within housing 302 through opening 310, is shown by way of reference to FIG. 16B and generally includes a spindle 322. Spindle 322 has an upper portion 324 which includes aperture 326 sized to permit passage of a cable (not shown) through aperture 326. Connected to the distal end of upper portion 324 of the spindle is a shaft 328 which has generally rectangular crossmember 330 attached to the shaft at the distal end of the shaft. The dimensions of the crossmember conform closely to the dimensions of the slot 352, as previously described. Engagement mechanism also preferably includes a spring 332 located around the periphery of shaft 328.

In operation, crossmember 330 is aligned with slot 352 and is inserted therein until crossmember 330 is completely inside external wall 350, as seen in FIG. 16C. If necessary, the upper portion 324 of spindle 322 can be firmly pressed to compress spring 332 so that crossmember 330 is completely inside wall 350.

Upon insertion of crossmember 330 completely through slot 352, spindle 322 is rotated so that crossmember 330 is 90 degrees misaligned with slot 352. In this configuration, housing 302 is placed over the spindle 322, so that the spindle is received within opening 310 in the housing. Abutment plates 314L and 314R are inserted into the slot on both sides of shaft 328 extending from spindle 322. With the upper portion 324 of the spindle completely received within the housing, aperture 326 in spindle 322 will be aligned with apertures 312 in housing 302, providing a passageway completely through the housing. In this configuration, a cable (not shown) can be easily threaded through the apertures, and the presence of the cable secures the spindle to the housing. As best seen in FIG. 16C, the peripheral dimension of the abutment plates 314L, 314R and shaft 328 of the spindle in combination closely conform to the dimensions of the slot and thereby occupy the slot. In this way, the housing is fixed relative to the spindle and neither can be rotated back so as to disengage crossmember 330 from slot 352. Springs 316L, 316R are biased against the lower end of the housing to firmly secure housing 302 proximate the external wall 350.

Another embodiment of the invention is shown by way of reference to FIGS. 17A and 17B in which a spindle 420, a housing 402, and a spring 440 are assembled to operate as a single unit. Attachment mechanism 400 comprises housing 402 which generally includes top end 404, bottom end 406, and cylindrical side wall 408, which in combination define internal cylindrical cavity 409. A cylindrical opening 412 in the top end 404 of the housing extends to proximate closed bottom end 406 of the housing and is configured to allow engagement mechanism 420 to be rotatably mounted within the housing. Side wall 408 has a pair of apertures 410 which



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are sized to allow passage of a cable (not shown) through the apertures. Attached to bottom end 406 of the housing are two abutment plates 414L and 414R which are spaced apart from aperture 416 in bottom end 406 and which are adapted to be inserted into slot 452 in external wall 450 (See FIG. 17B).

Spindle 420 includes a cylindrical portion 424 rotatably mounted within the cylindrical cavity 409 of housing 402. Spindle 420 includes a raised plate 423 at one end which forms the aft end of the spindle. Spindle 420 also includes a shaft 428 extending outwardly through aperture 416 in housing 402. A crossmember 430 is located at the distal end of shaft 428. Aperture 426 through cylindrical portion 424 of the spindle 420 is sized to allow a cable (not shown) to pass through aperture 426. A spring 440 is located at the distal end of cylindrical portion 424 of the spindle and biases the spindle away from the bottom end of housing 402 so that crossmember 430 will firmly engage the inner surface of external wall 450, as will now be described.

When the apparatus is assembled as illustrated in FIG. 17A, crossmember 430 and shaft 428, together with abutment plates 414L and 414R on either side of the shaft, extend outwardly beyond the bottom end 406 of housing 402. Prior to insertion of crossmember 430 into slot 452, spindle 420 must be rotated via raised plate 423 so that crossmember 430 is aligned with slot 452, as seen in FIG. 17B. With the spindle in this position, the crossmember can be inserted through the slot as previously discussed. If necessary, plate 423 can be pressed to compress spring 440 so that crossmember 430 is completely inside wall 450. In this position of the crossmember, shaft 428 and abutment plates 414L, 414R occupy the slot to prevent rotation of the housing relative to external wall 450.

Upon insertion of crossmember 430 completely through slot 452, the spindle is rotated by manipulating plate 423 so that crossmember 430 is 90 degrees misaligned with slot 452. Side wall 408 of housing 402 preferably includes at least one small hole 411 on either side of the housing through which a pin 460 engages a groove (not shown) in the cylindrical portion 424 of the spindle, the groove extending around about 25% of the periphery of cylindrical portion 424 so that the spindle can be rotated substantially only 90 degrees relative to the housing. With the crossmember misaligned from the slot, apertures 410 in the side wall of housing 402 will be aligned with aperture 426 in the spindle providing a passageway completely through the housing. In this configuration, a cable (not shown) can easily be threaded through the aligned apertures, and the presence of the cable prevents the spindle from being rotated back so as to disengage crossmember 430 from slot 452.

The embodiment of FIGS. 17A and 17B can be slightly modified to provide a threaded cylindrical portion 424' of the spindle 420', as seen in FIG. 18. In this embodiment, the internal peripheral surface 413 of side wall 408' is also threaded so that the cylindrical portion 424' engages threaded surface 413. This engagement variation between spindle 420' and housing 402' can be used instead of spring 440 in FIG. 17A to adjust the relative lateral displacement between the spindle and the housing.

FIG. 19 illustrates another alternative embodiment of a housing 402" which is used to prevent rotation of the housing relative to the external wall 450 when the crossmember is misaligned with the slot. In this embodiment, pins 472 are mounted to the outer surface of the external wall on either side of slot 452 and engage pin holes 470 located on opposite sides of shaft 428" to prevent rotation of the housing relative to external wall 450 when crossmember 430" is located completely within slot 452 and is misaligned from the slot.

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Other embodiments of the invention are described with reference to FIGS. 20-23 wherein the engagement mechanism includes at least two engagement portions for engaging with the inner surface of the external wall proximate the slot to prevent removal of the attachment mechanism from proximate the external wall.

FIGS. 20A, 20B, 20C and 20D illustrate another embodiment of the invention 600 including three separate components, an attachment mechanism 602 (see FIG. 20A), a housing 620 (see FIG. 20B), and a separate engagement mechanism 640 (see FIG. 20C). Attachment mechanism 602 includes attachment member 603 shown in an inverted position in FIG. 20A. Attachment member 603 generally includes a top end 604, a bottom end 606, spaced apart side walls 608, and a peripheral edge wall 609. An aperture 610 is provided through side walls 608 and is sized to permit passage of a cable (not shown) through aperture 610. Base portion 612 is integrally connected to attachment member 603 proximate bottom end 606 of the attachment member. A retaining flange 614 is provided proximate top end 604 to retain attachment member 603 within housing 620, as will be described in more detail hereinafter.

Housing 620 is shown by way of reference to FIG. 20B and generally includes a top wall 622, a bottom wall 624, and four separate spaced apart side walls including a front end 626 and a back end 628. A pair of substantially rectangular openings 632 are provided through both top wall 622 and bottom wall 624 of the housing and are configured to allow passage of the attachment member 603 through openings 632. A separate, generally rectangular aperture 630 is provided in front end 626 of housing 620 and extends the length of the housing to the closed back end 628. Aperture 630 is configured to permit passage of engagement mechanism 640 into the aperture, as will be described in more detail hereinafter. Bottom wall 624 is also provided with a pin hole 636 proximate front end 626 which is sized to receive a retaining pin 634 therein. The housing is preferably made from cast metal, but any other suitable material may be used.

Engagement mechanism 640 is shown by way of reference to FIG. 20C and includes an engagement member 642. Engagement member 642 includes first and second, spaced apart engagement arms 646L, 646R which have first and second engagement portions 648L, 648R integrally connected to the arms at the distal end of arms 646L, 646R. A transverse member 644 connects the two engagements arms 646L, 646R together at the proximal end of the arms and defines an abutment surface 645 located towards the distal end of transverse member 644. Engagement arms 646L, 646R and transverse member 644 in combination define clearance space 649 which is sized to permit passage of attachment member 603 through clearance space 649, as will now be described.

To assemble device 600 prior to securing the device proximate external wall 650, engagement member 642 is initially inserted into rectangular aperture 630 in housing 620 until transverse member 644 abuts against back end 628 of the housing. Retaining pin 634 is subsequently inserted into pin hole 636 in the housing and secured thereto so that engagement member 642 cannot be removed from the housing without removing the pin. Attachment member 603 is then inserted into rectangular openings 632 in the housing and through clearance space 649 of the engagement member so that the attachment member extends outwardly through opening 632 in bottom wall 624 of the housing. Base portion 612 of the attachment member engages the upper surface of top wall 622 of the housing to prevent passage of attachment

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member 603 completely through housing 620. Retaining flange 614 prevents attachment member 603 from being separated from the housing. Further, abutment surface 645 of transverse member 644 engages with attachment member 603 to secure engagement member 642 to attachment member 603.

When device 600 is assembled as illustrated in FIG. 20D, engagement portions 648L, 648R and a lower portion of engagement arms 646L, 646R extend outwardly beyond front end 626 of housing 620. In this configuration, engagement portions 648L, 648R may be pressed firmly against slot 652 until the engagement portions bend sufficiently inward to fit within slot 652. The inwardly sloped peripheral dimensions of the engagement portions permit easier access into slot 652. Upon insertion of engagement portions 648L, 648R completely within the slot, with a portion of the engagement arms 646L, 646R occupying the slot, the arms will spread back to their natural configuration and thereby engage the internal surface of the external wall 650 proximate slot 652 to secure the device 600 proximate the external wall. A cable (not shown) can then be inserted through aperture 610 in attachment member 603, and the presence of the cable prevents the attachment member 603 from moving relative to housing 620.

FIGS. 21A, 21B, and 21C depict another embodiment of the invention, device 700, in which there are two major component parts, attachment mechanism 701 and engagement mechanism 720.

Attachment mechanism 701 of FIG. 21B generally includes an attachment member 702 having a closed top end 704, a bottom end 706, a peripheral edge wall 709, and spaced apart side walls 708. An aperture 710 is provided through side walls 708 and is sized to permit a cable to pass through aperture 710. A generally rectangular opening 712 is further provided in bottom end 706 of attachment member 702 and extends the length of the attachment member to closed top end 704 opening 712 is configured to accommodate passage of the engagement mechanism 720 into opening 712, as will be described in more detail hereinafter.

Engagement mechanism 720 is shown by way of reference to FIG. 21A and generally includes engagement member 722 having first and second, spaced apart engagement arms 724L and 724R connected at the proximal end of engagement member 702 and defining a clearance space 725 between the arms sized large enough to permit a cable to pass through clearance space 725. Abutment surface 730 is located adjacent the proximal end of the engagement arms. Engagement portions 726L, 726R are integral with engagement arms 724L, 724R at the distal end of the arms. A pair of grooves 728 is provided in engagement portions 726L, 726R, with the length of the groove being substantially equal to the thickness of external wall 750 (See FIG. 21C). Engagement member 722 is preferably injection molded and made from a plastic material to enhance its resiliency. However, it is to be noted that the engagement member may be made from other materials, such as metal, provided that the material is sufficiently resilient to allow engagement arms 724L, 724R to be bent inward sufficiently far enough to allow engagement portions 726L, 726R to be inserted into slot 752.

To utilize device 700, engagement arms 724L, 724R are pressed towards one another so that engagement portions 726L, 726R are positioned sufficiently close to one another to allow the engagement portions to be inserted into slot 752. As seen in FIG. 21C, grooves 728 engage with external wall 750 when engagement portions 726L, 726R are within slot

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752 and have spread back to their natural configuration. In this way, engagement member 722 is firmly secured to external wall 750. Subsequently, attachment member 702 is positioned over engagement member 722 until clearance space 725 is aligned with aperture 710 in the housing. In this configuration, a cable 740 can easily be threaded through aperture 710 in the housing and clearance space 725, and the presence of the cable 740 prevents attachment member 702 from being separated from engagement member 722.

FIGS. 22A, 22B, and 22C illustrate a slightly modified version of the embodiment of FIGS. 21A, 21B, and 21C. In this embodiment, housing 702' preferably includes a retaining pin hole 714. Engagement mechanism 720' is also slightly modified to include a retaining pin 734 which engages with pin hole 714 proximate bottom end 706' of housing 702' to prevent engagement member 722' from being separated from housing 702' prior to insertion of a cable (not shown). Side walls 732L, 732R forming part of alternative engagement portions 726L', 726R' will spread back to their natural configuration once inserted into slot 752 to thereby engage the inner surface of external wall 750 proximate the slot to affix the engagement member to the external wall. Engagement member 722' of FIGS. 22A and 22C is adapted to engage with a slot having substantially smaller peripheral dimensions than the slot necessary to engage with engagement member 722 of FIG. 21A.

FIGS. 23A and 23B illustrate another embodiment of the invention 800 in which there are also substantially only two component parts, an attachment mechanism 801 and an engagement mechanism 820. Attachment mechanism 801, shown by way of reference to FIG. 23A, generally includes an attachment member 802 having a top end 804, a bottom end 806, and a cylindrical side wall 808. A pair of apertures 810 are provided through side wall 808 and are sized to permit a cable 840 to pass through apertures 810 (See FIG. 23B). A generally cylindrical opening 812 is further provided in top end 804 of attachment member 802 and extends the length of the attachment member to a substantially smaller screw opening 814 in bottom end 806 of the attachment member. Opening 812 is configured to accommodate passage of screw 816 through opening 812 to bottom end 806 of the attachment member, as will be described in more detail hereinafter.

Engagement mechanism 820 is used in conjunction with attachment member 802, as is also illustrated in FIG. 23A. Engagement mechanism 820 generally includes engagement member 822 having first and second, spaced apart engagement arms 824L and 824R connected to base portion 830 at the proximal end of engagement member 822 and defining a clearance space 825 between the arms sized large enough to permit screw 816 to pass through clearance space 825. Base portion 830 has a top surface 833 and a bottom surface 831 and is provided with a screw hole 832 through the surfaces. Engagement portions 826L, 826R are integral with engagement arms 824L, 826R at the distal end of the arms. In the preferred embodiment of device 800, engagement portions 826L, 826R have inwardly sloped side walls which facilitate insertion of the engagement portions into slot 852, as previously described.

In operation, engagement portions 826L, 826R are inserted into slot 852 until lower surface 831 of base portion 830 engages the outer surface of external wall 850. In this position of engagement member 822, attachment member 802 is positioned proximate upper surface 833 of base portion 830 until screw hole 832 is aligned with opening 814 in the attachment member. Screw 816 is then inserted through each of opening 812 in the attachment member,

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opening 814 at the bottom end 806 of the housing, hole 832 in base portion 830, and clearance space 825. The screw will force engagement arms 824L, 824R to spread apart so that engagement portions 826L, 826R will engage the inner surface of external wall 850 proximate slot 852. In this configuration, cable 840 (See FIG. 23B) can be threaded through apertures 810 in the attachment member and attached to an external object, such as lock 860, to secure the attachment member to the lock. The cable will also prevent removal of screw 816.

It is to be understood that an attachment member 802' can be used independently of engagement mechanism 820 provided that an appropriate screw hole or screw insert is provided in the external wall (not shown) sized to permit screw 816' to engage with the hole (or insert), as is apparent from FIG. 24A. Further, an attachment member 802" may also be secured to an external wall by any other suitable engagement means, as for example providing a double-sided adhesive pad 870 for engaging both the bottom end of the attachment member 802" and the outer surface of the wall (not shown), as seen in FIG. 24B.

In still another embodiment of the same device 800, attachment member 802'" can be hingably connected to a base portion 818 having a screw hole 814'" so that the attachment member 802'" will swing away from the external wall when not in use, as seen in FIG. 25. In this embodiment, base portion 818 may be secured proximate the external wall of an item of equipment via screw 816'" and a threaded insert 819.

The attachment mechanism concept of FIGS. 23A and 23B can also be modified to include a conventional lock assembly 910 (as previously described by way of reference to the embodiment of FIG. 2) in combination with a retractable spindle arm 908. As illustrated in FIG. 26A, attachment mechanism 900 is affixed to one end of a cable 920 which has a closed loop 922 at its other end. Cable 920 is first wrapped around a relatively immovable object (not shown) and attachment mechanism 900 is passed through loop 922 and attached to the item to be protected such as external wall 950 to make it difficult to steal.

Attachment mechanism 900 is shown in its retracted position in FIG. 26B and generally includes a housing 902 and first and second, resilient engagement arms 904L and 904R which are mounted to the bottom end of housing 902 and extend outwardly therefrom. Engagement arms 904L, 904R have first and second, inwardly angled engagement portions 906L and 906R at the distal end of each of the arms which are configured so as to be easily received within slot 952 in the retracted position of spindle arm 908, as will be described in more detail hereinafter. At the other end of housing 902 from the engagement arms is a conventional cylindrical lock assembly 910, an example of which was described in detail by reference to FIG. 13B. A spindle arm 908 is adapted to be mounted to cylindrical lock assembly 910 at one end, with the opposite end of arm 908 extending between engagement arms 904L and 904R external of housing 902. Spindle arm 908 is connected to lock assembly 910 in such a manner that rotation of lock assembly 910 with an appropriate key (not shown) will cause translational movement of spindle arm 908 in the direction of arrow 930 (see FIG. 26B). This movement of arm 908 can be accomplished in any manner as is well known in the art, as for example having spindle arm 908 received within a corkscrew shaped cam attachment mounted to lock assembly 910 so that rotation of the lock will cause corresponding translational movement of spindle arm 908.

In operation, with spindle arm 908 in the retracted position of FIG. 26B, engagement portions 906L and 906R are

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insertable into slot 952. Once inside of slot 952, a key can be inserted into lock assembly 910 and rotated so that spindle arm 908 will be moved in the direction of arrow 930 to its extracted position. The movement of spindle arm 930 along arrow 930 permits engagement arms 904L and 904R to flex outwards in the direction of arrow 940 so that engagement portions 906L and 906R will move outwards to engage the inner surface of slot 952. In this way, attachment mechanism 900 will be secured proximate external wall 950.

To subsequently detach attachment mechanism 900 from proximate external wall 950, the appropriate key is reinserted into lock assembly 910 and rotated to retract spindle arm 908. This will cause engagement arms 904L, 904R to relax back to their natural configuration of FIG. 26B to thereby permit engagement portions 906L, 906R to be separated from slot 952.

FIG. 27 is a perspective view of an alternate preferred embodiment of the present invention. There are occasions that cables and locks are inappropriate or a certain amount of mobility for protected equipment is necessary. In those instances, using a proximity detecting system 980 can protect portable computer equipment. Proximity detecting system 980 includes a base unit 982 and a remote unit 984 relatively permanently attached to monitor 14 by use of a standardized slot 72 (as shown in FIG. 5 for example). The various embodiments shown in FIGS. 1-27 provide examples of different attachment schemes for remote unit 984. Base unit 982 and remote unit 984 operate together to control a separation distance between them. There are many different ways to implement proximity detecting system 980 as well known in the art. One way provides base unit 982 with a transmitter for periodically transmitting a signal to remote unit 984.

In operation, remote unit 984 includes a receiver and a self-powered siren (not shown). Should remote unit 984 fail to receive the periodic transmission, the siren activates to indicate unauthorized removal of the protected equipment. Optionally, remote unit 984 includes a transmitter transmitting a unique ID code allowing base unit 982 to activate a siren and to identify a particular piece of protected equipment.

While several embodiments of the present invention have been illustrated by way of example, it is apparent that further embodiments could be developed within the spirit and scope of the present invention. However, it is to be expressly understood that such modifications and adaptations are within the spirit and scope of the present invention, as set forth in the following claims.

What is claimed is:

1. A locking apparatus, comprising:

- a housing having a top end, a bottom end, and a generally cylindrical sidewall therebetween, said bottom end including a slot engagement member provided with a locking member insertable within a security slot provided in a wall of a portable device wherein said locking member extends into said security slot, said slot engagement member being moveable between an unlocked position wherein said locking member is removable from said security slot, and a locked position wherein said locking member is retained within said security slot;
- a pin, coupled through said housing, for extending into said security slot proximate said slot engagement member when said slot engagement member is in said locked position to thereby inhibit movement of said slot engagement member to said unlocked position,

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wherein said pin includes a first threaded portion, complementary to a second threaded portion in an aperture in said bottom end; and

a cable attachment mechanism, coupled to said housing, for attaching a cable. 5

2. The apparatus of claim 1 wherein said bottom end abuts the external wall, said housing includes a cavity and a top end opposite said bottom end that is open to access said cavity wherein said pin is insertable through said top end and into said cavity to interlock said bottom end and the security slot. 10

3. A locking apparatus, comprising:

a housing having a top end, a bottom end, and a generally cylindrical sidewall therebetween, said bottom end including a slot engagement member provided with a locking member insertable within a security slot provided in a wall of a portable device wherein said locking member extends into said security slot, said 15

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slot engagement member being moveable between an unlocked position wherein said locking member is removable from said security slot, and a locked position wherein said locking member is retained within said security slot;

a pin, coupled through said housing, for extending proximate said security slot and proximate to said slot engagement member when said slot engagement member is in said locked position to thereby inhibit movement of said slot engagement member to said unlocked position, wherein said pin includes a first threaded portion, complementary to a second threaded portion in an aperture in said bottom end; and

a cable attachment mechanism, coupled to said housing, for attaching a cable.

\* \* \* \* \*



US006112562A

**United States Patent** [19]

[11] **Patent Number:** **6,112,562**

**Murray, Jr. et al.**

[45] **Date of Patent:** **\*Sep. 5, 2000**

[54] **COMPUTER PHYSICAL SECURITY DEVICE**

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[73] Assignee: **Acco Brands, Inc.**, Lincolnshire, Ill.

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[\*] Notice: This patent is subject to a terminal disclaimer.

*Primary Examiner*—Darnell Boucher  
*Attorney, Agent, or Firm*—Townsend and Townsend and Crew LLP

[21] Appl. No.: **09/038,668**

[57] **ABSTRACT**

[22] Filed: **Feb. 27, 1998**

**Related U.S. Application Data**

[63] Continuation of application No. 08/474,452, Jun. 7, 1995, which is a continuation of application No. 08/307,964, Sep. 16, 1994, Pat. No. 5,493,878, which is a division of application No. 08/138,634, Oct. 15, 1993, which is a continuation-in-part of application No. 08/042,851, Apr. 5, 1993, Pat. No. 5,381,685, and a continuation-in-part of application No. 08/006,311, Jan. 19, 1993, abandoned.

An apparatus which inhibits the theft of equipment such as personal computers is disclosed. The equipment must have an external wall provided with a specially designed, approximately rectangular slot having preselected dimensions. An attachment mechanism includes a housing for a spindle having a first portion rotatable within the housing, a shaft extending outwardly from the housing, and a cross-member at the end of the shaft having peripheral dimensions closely conforming to the internal dimensions of the slot. An abutment mechanism also emanates from the housing, and is located on opposite sides of the shaft intermediate the housing and the crossmember. The peripheral cross-sectional dimensions of the abutment mechanism and the shaft in combination closely conform to the dimensions of the slot. The length of the shaft from the housing to the crossmember is approximately equal to the thickness of the external wall of equipment. The crossmember is aligned with the abutment mechanism so that the crossmember can be inserted through the slot with the shaft and the abutment mechanism occupying the slot. The spindle is then rotated 90° to misalign the crossmember with the slot, thereby attaching the attachment mechanism rigidly to the external wall. A cable is secured to the housing and to an immovable object so that the equipment cannot be stolen.

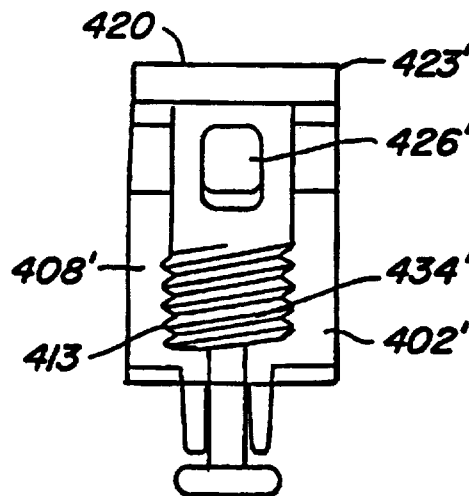
[51] Int. Cl.<sup>7</sup> ..... **E05B 69/00**  
[52] U.S. Cl. .... **70/58; 70/58; 70/18; 70/14**  
[58] Field of Search ..... **70/14, 18, 57, 70/58, 424; 248/551, 553**

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**7 Claims, 11 Drawing Sheets**

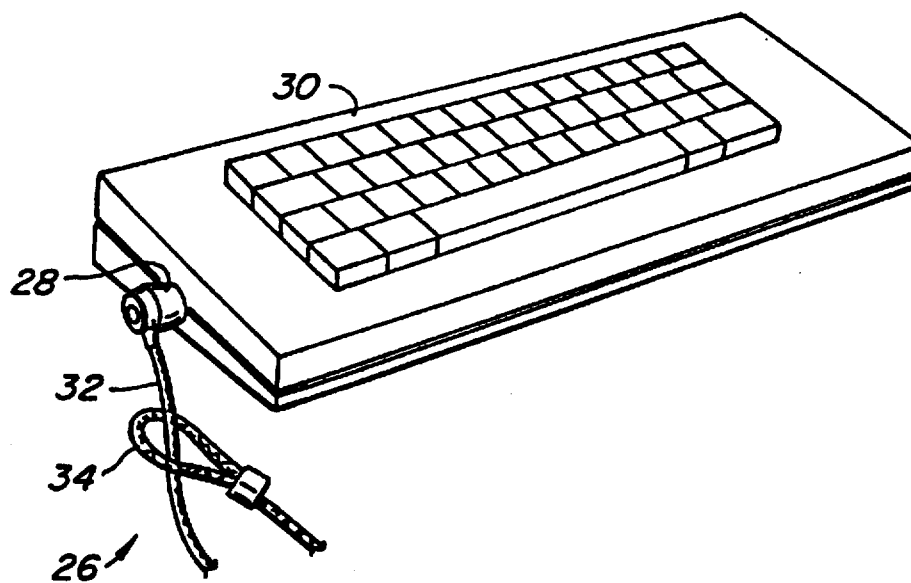
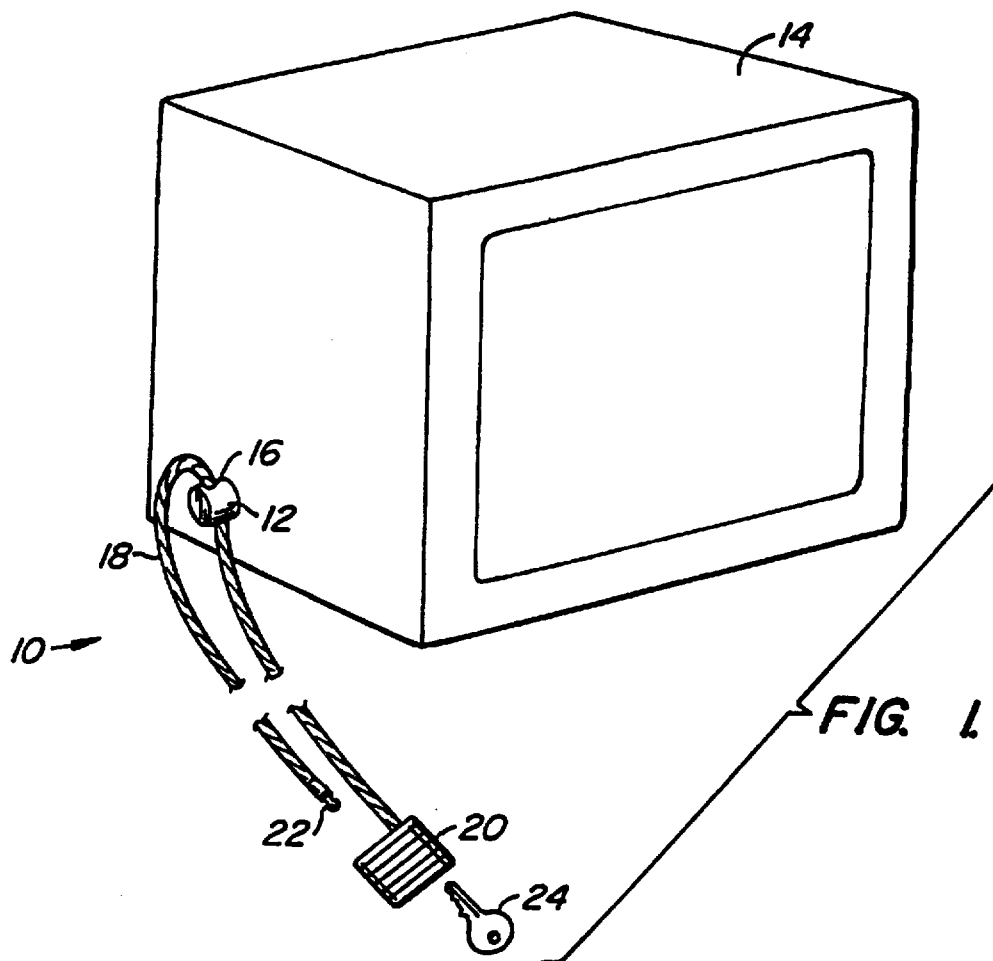


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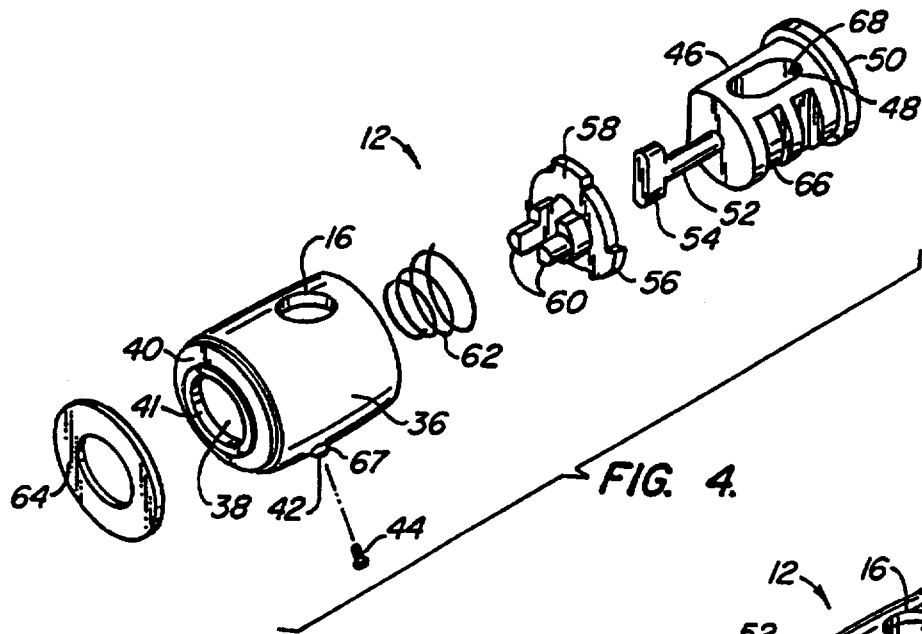


FIG. 4.

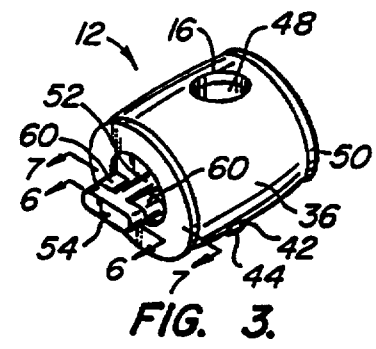


FIG. 3.

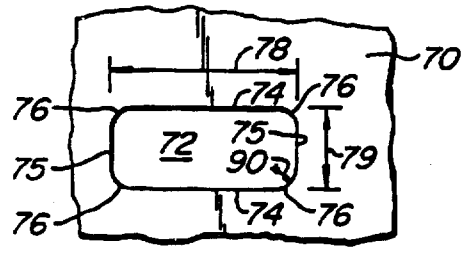


FIG. 5.

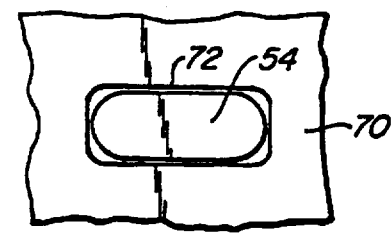


FIG. 8.

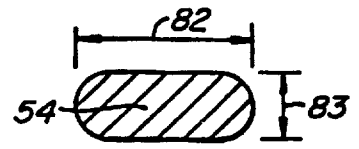


FIG. 6.

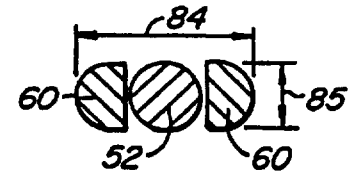


FIG. 7.

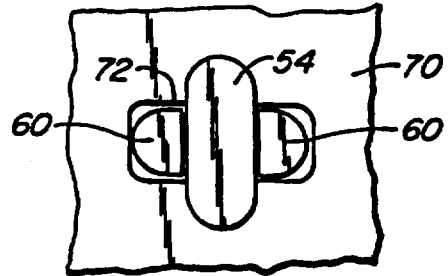


FIG. 9.

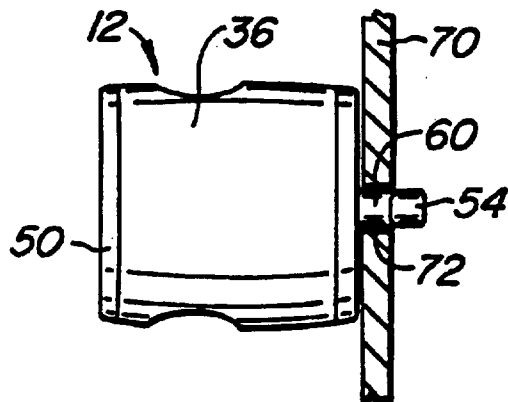


FIG. 10A.

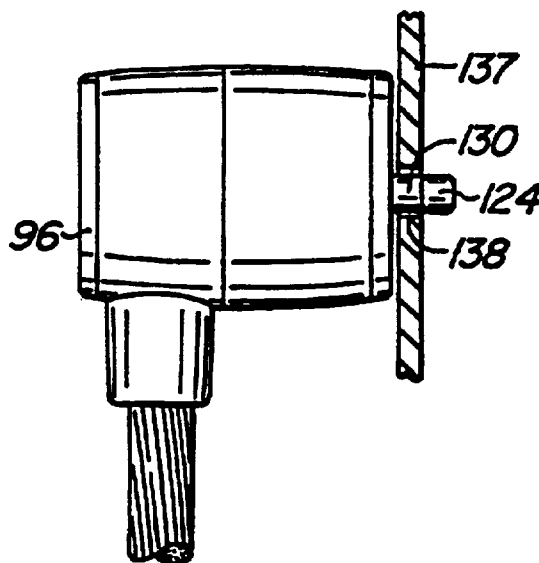


FIG. 13A.

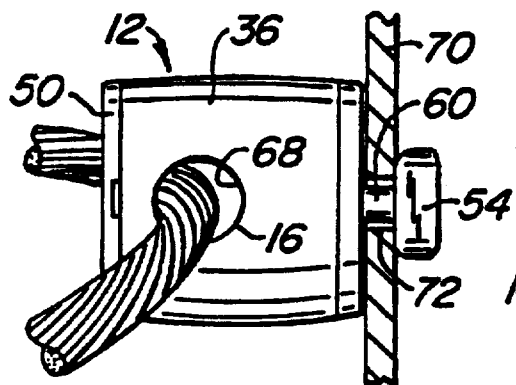


FIG. 10B.

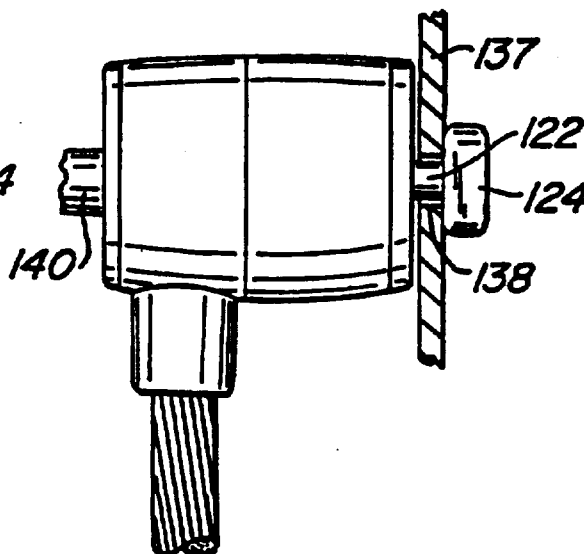


FIG. 13B.



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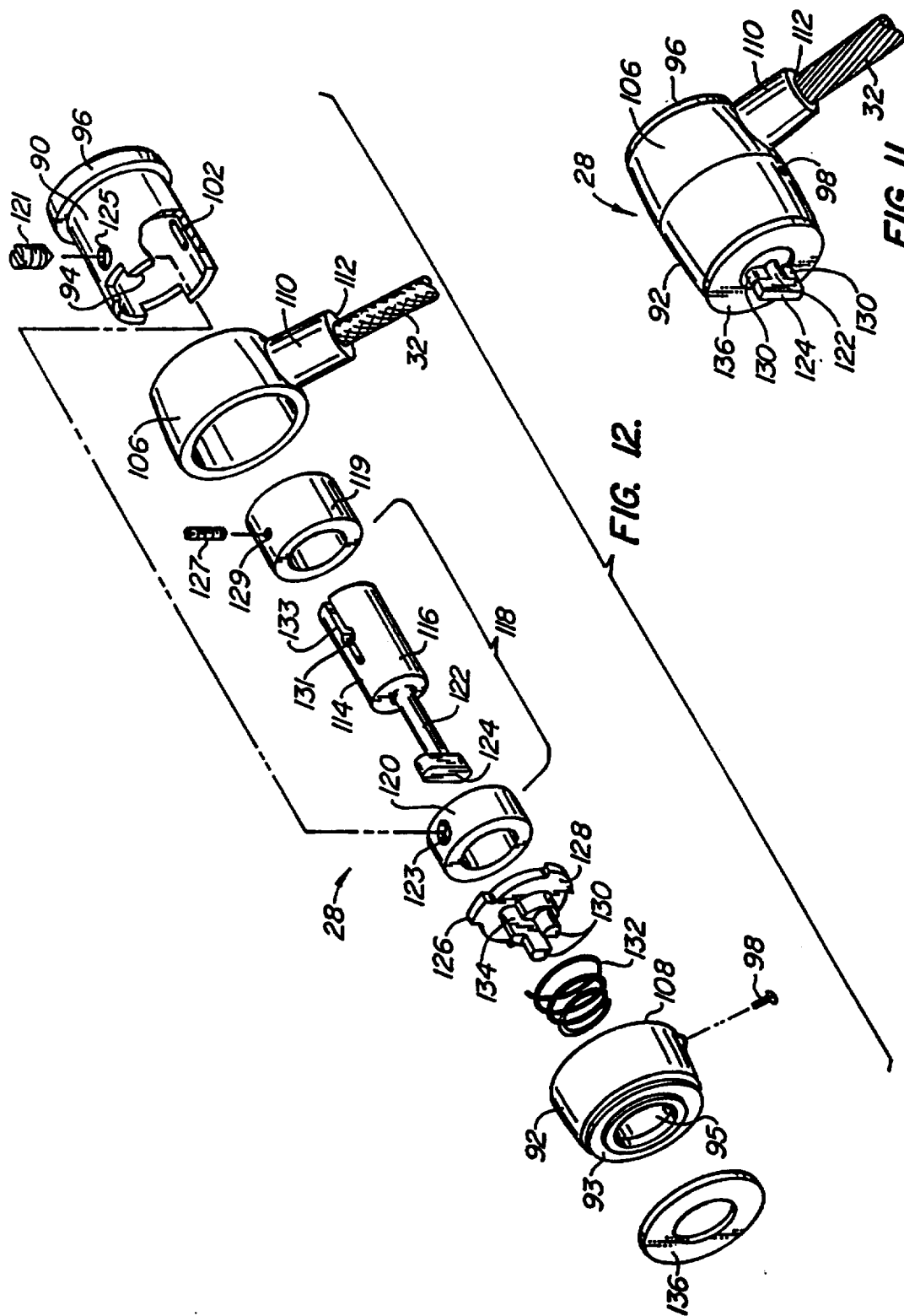


FIG. 12.

FIG. 11.

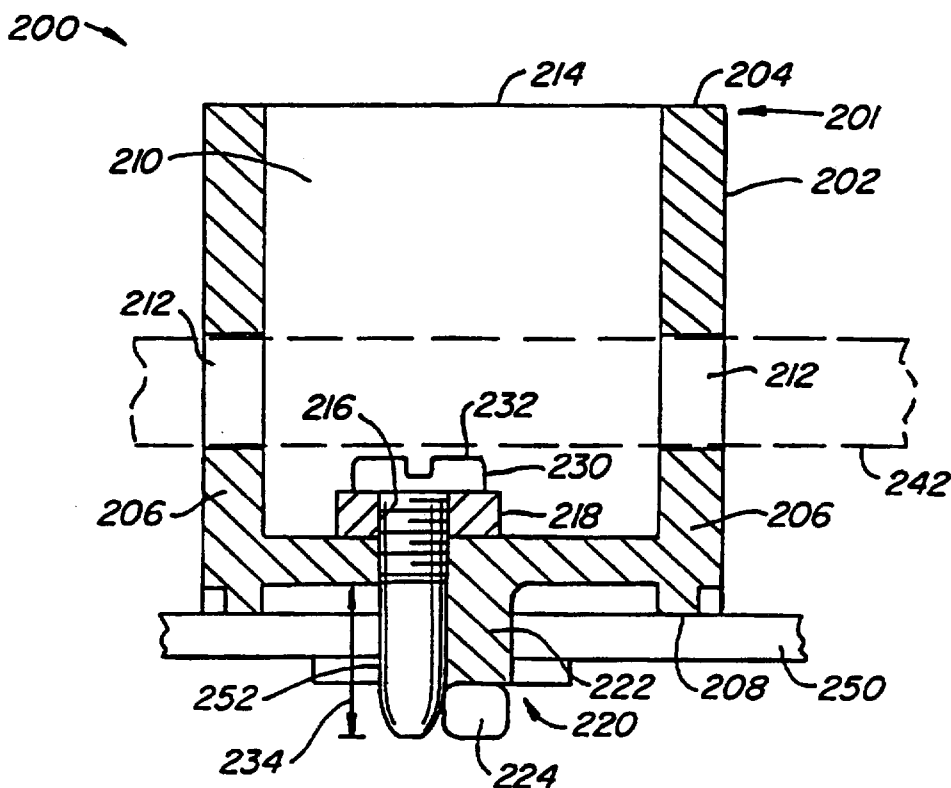


FIG. 14.

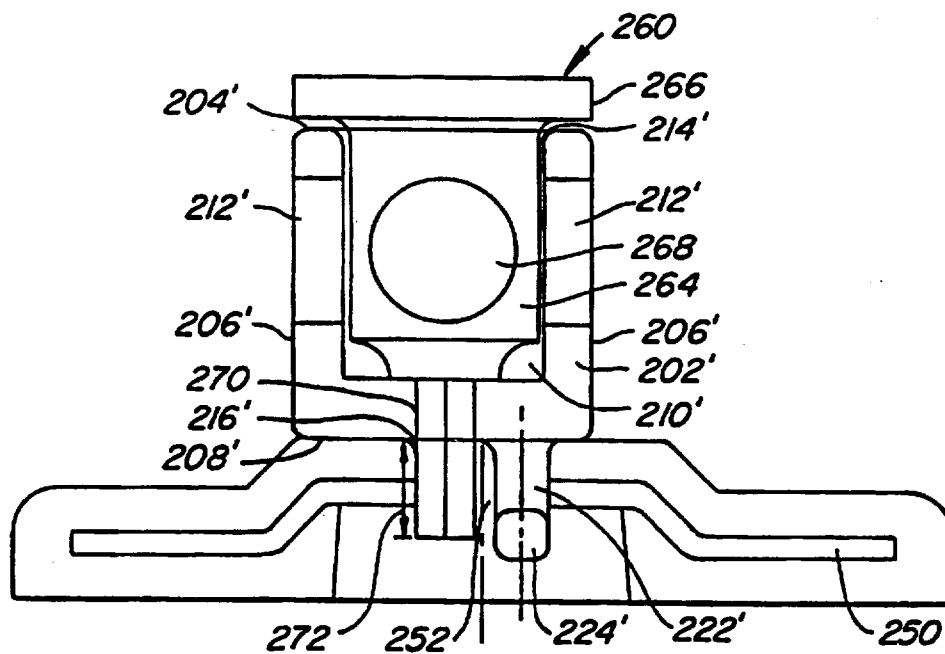


FIG. 15.

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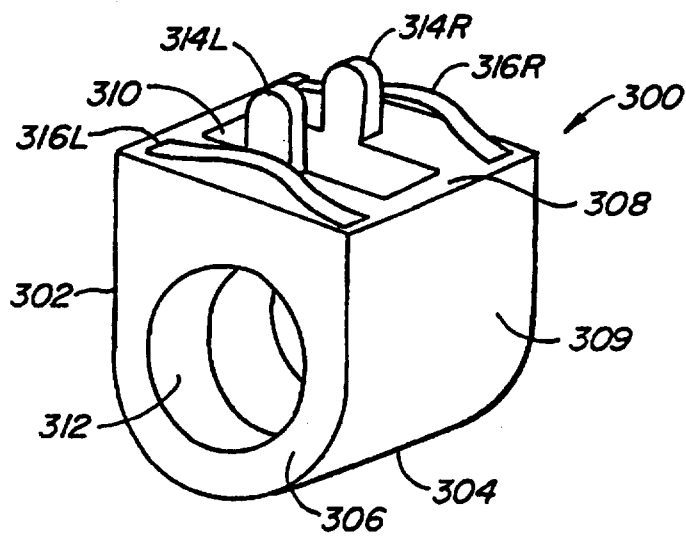


FIG. 16A.

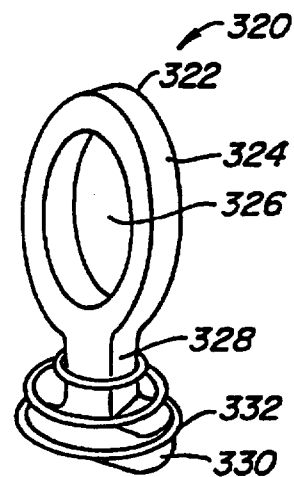


FIG. 16B.

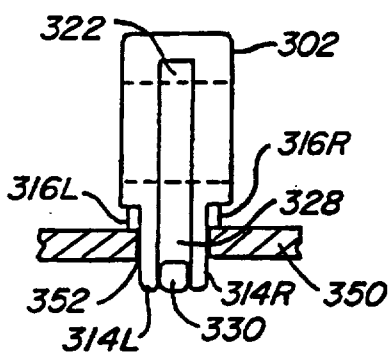


FIG. 16C.

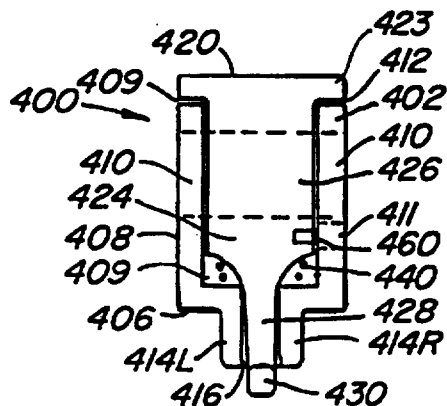


FIG. 17A.

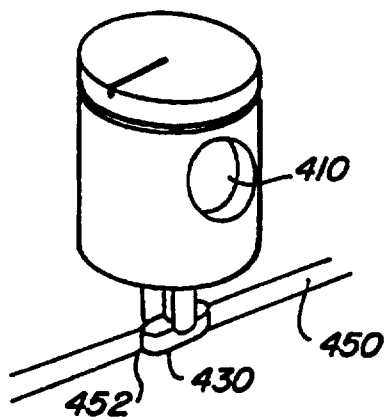


FIG. 17B.

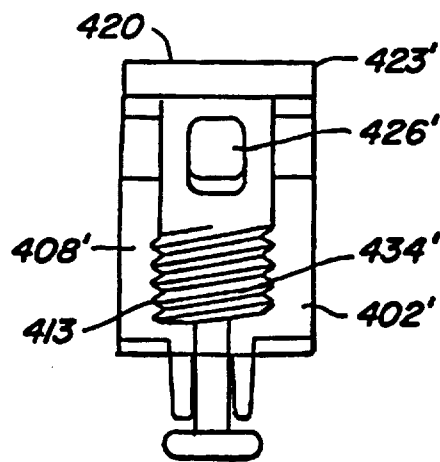


FIG. 18.

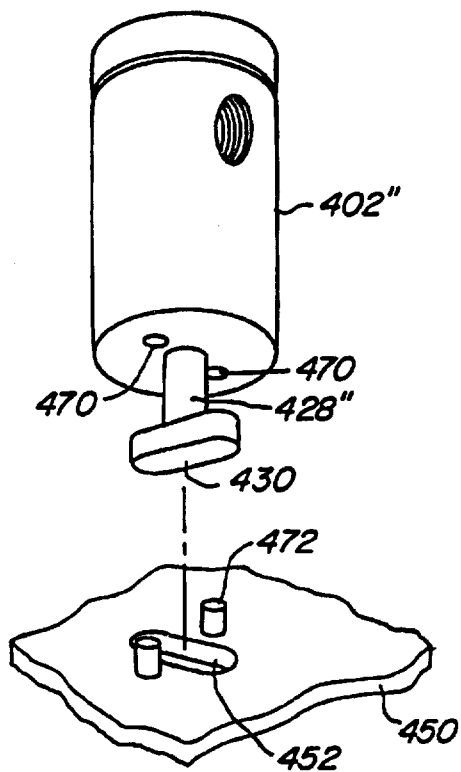


FIG. 19.

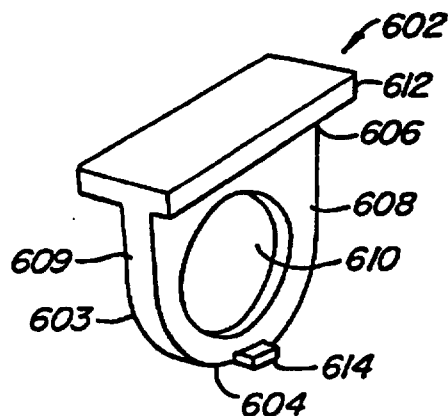


FIG. 20A.

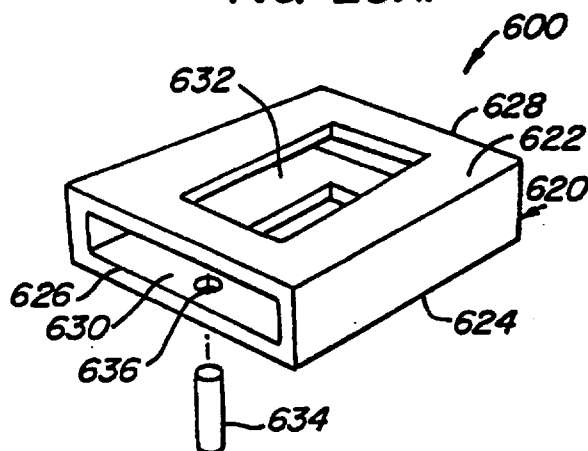


FIG. 20B.

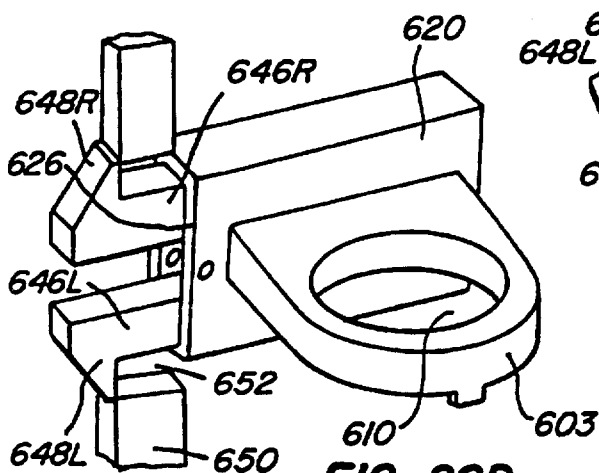


FIG. 20D.

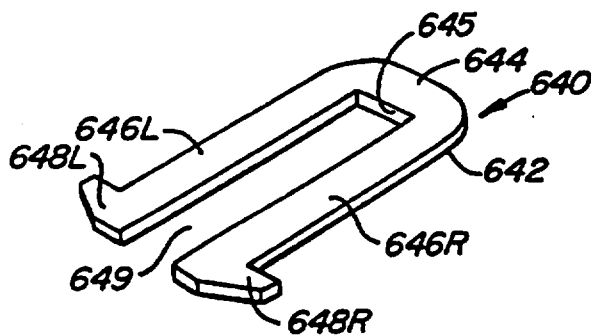


FIG. 20C.

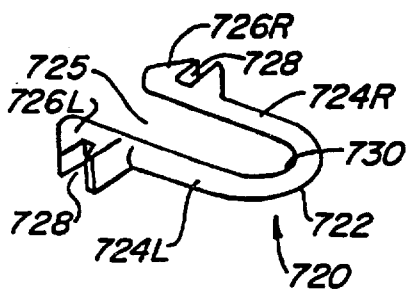


FIG. 21A.

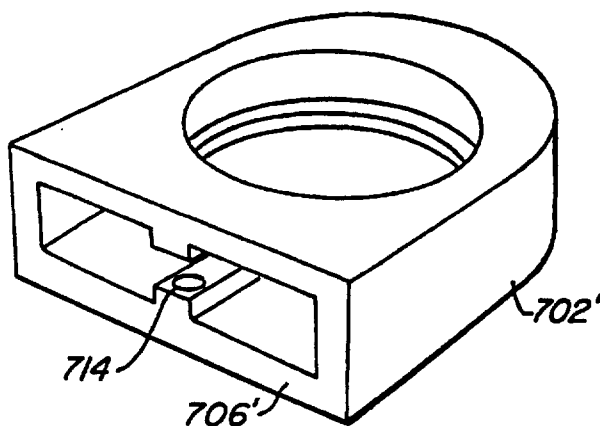


FIG. 22B.

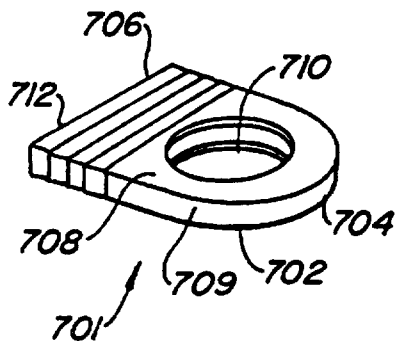


FIG. 21B.

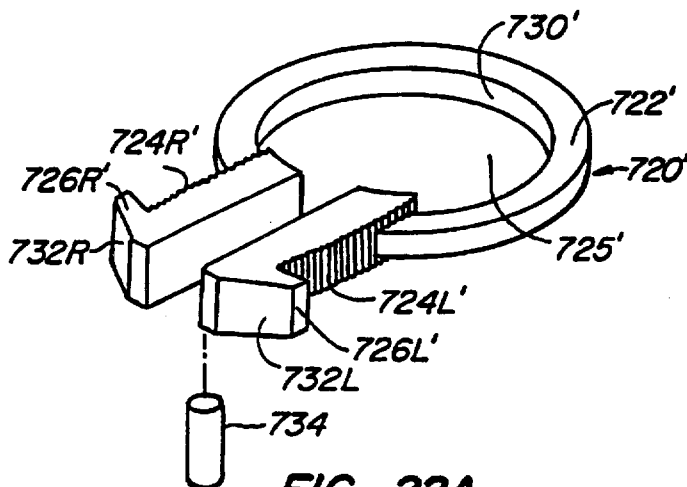


FIG. 22A.

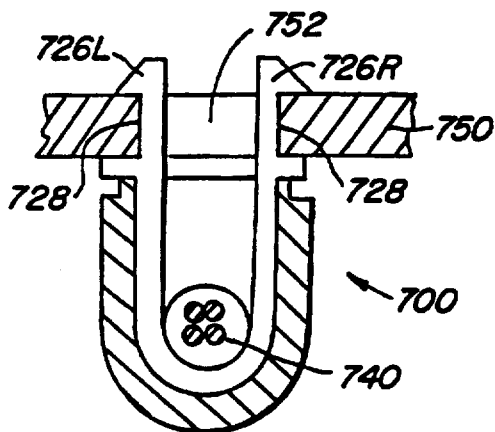


FIG. 21C.

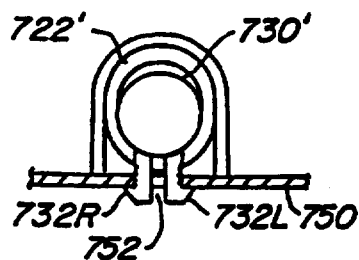


FIG. 22C.

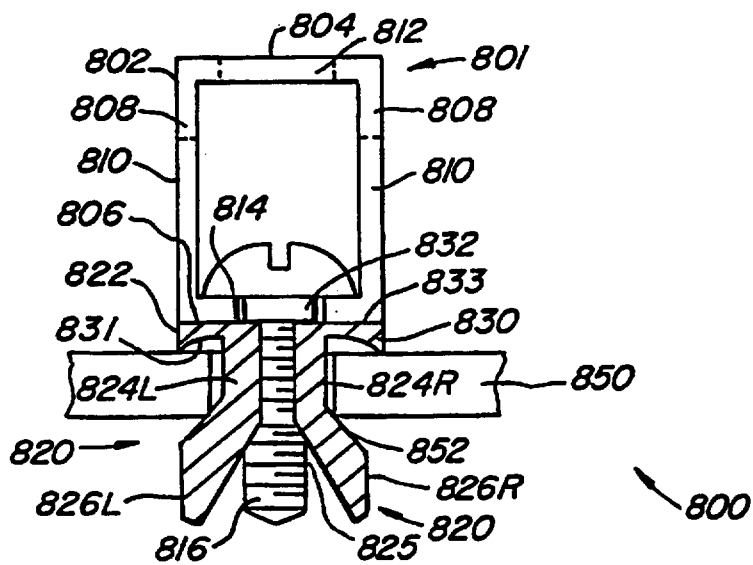


FIG. 23A.

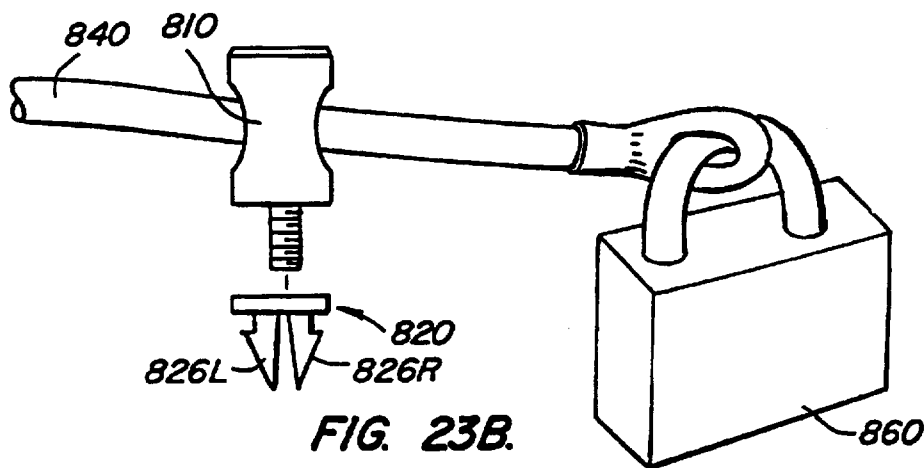


FIG. 23B.

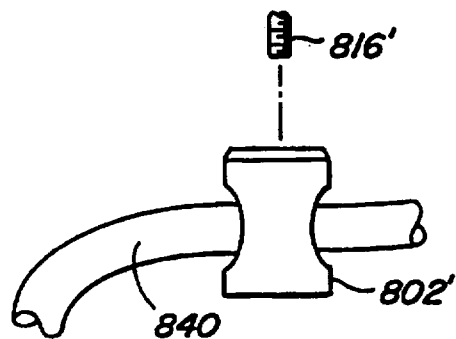


FIG. 24A.

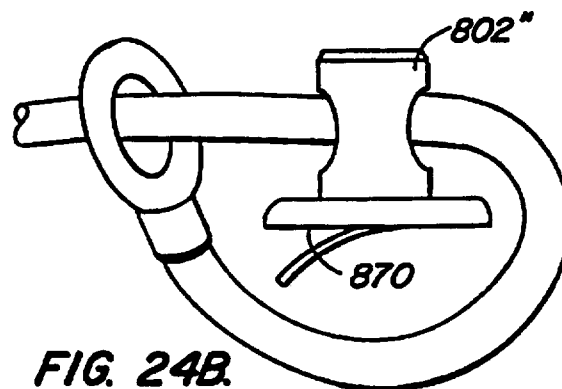


FIG. 24B.

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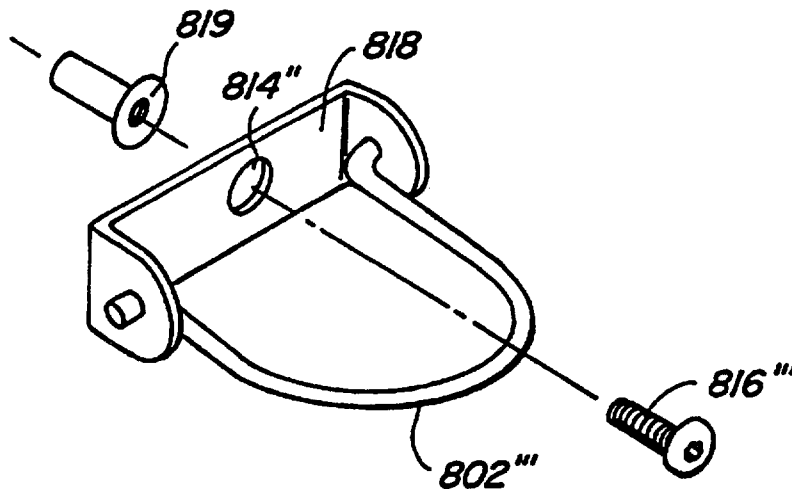


FIG. 25.

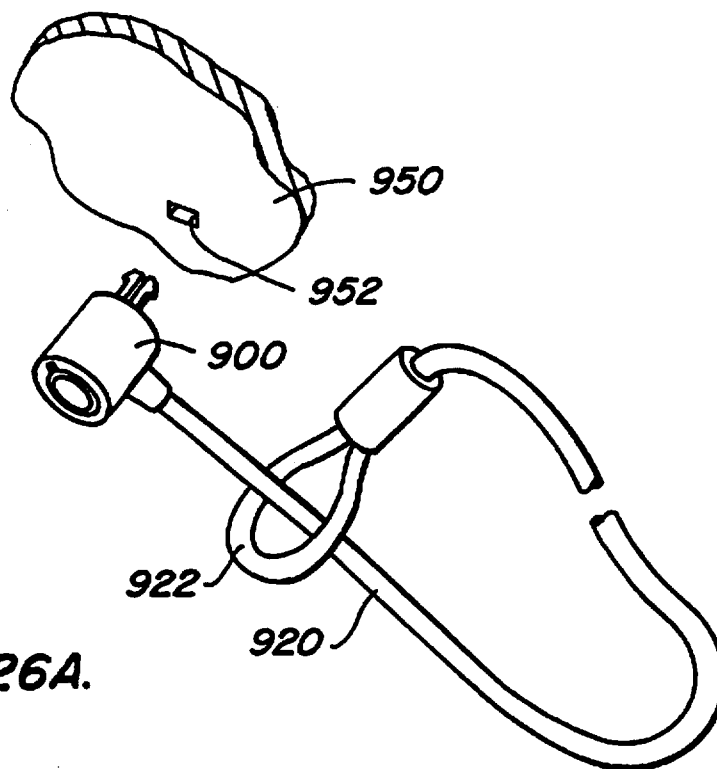


FIG. 26A.

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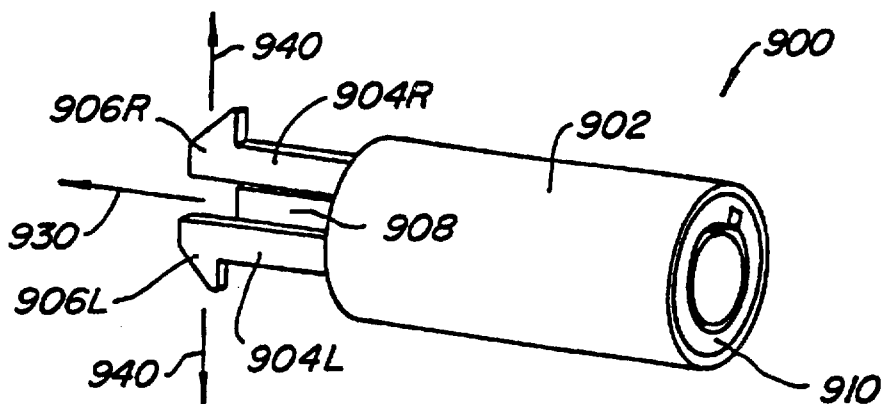


FIG. 26B.

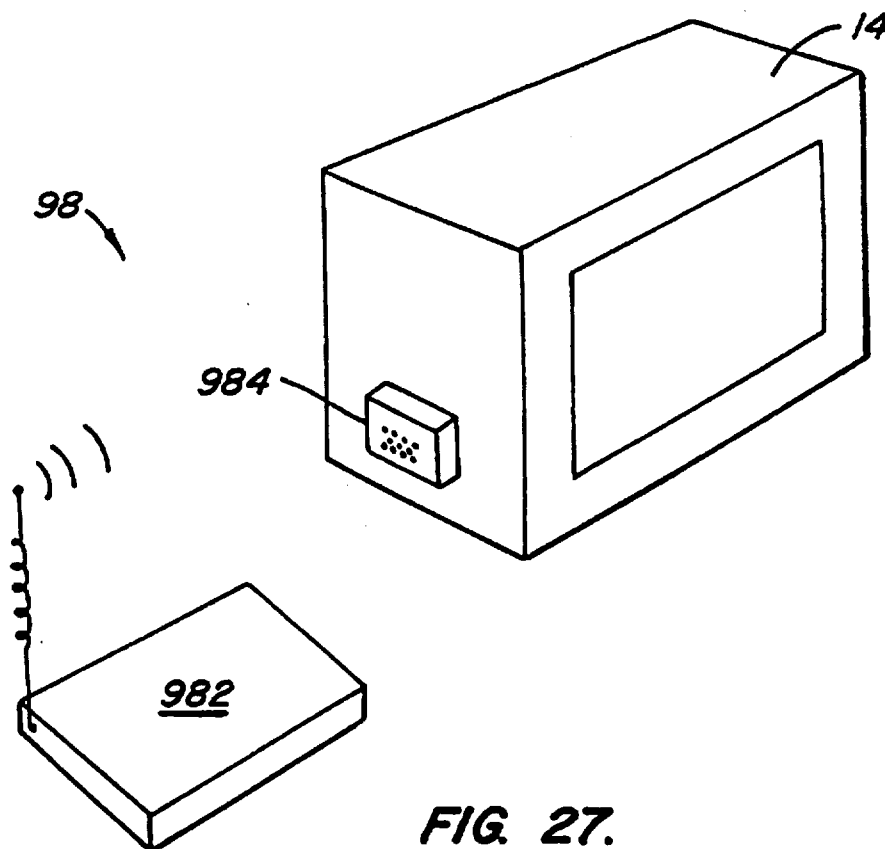


FIG. 27.



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**COMPUTER PHYSICAL SECURITY DEVICE**

This application is a continuation of Ser. No. 08/474,452, filed Jun. 7, 1995, entitled COMPUTER PHYSICAL SECURITY DEVICE, which is a continuation of Ser. No. 08/307, 964, filed Sep. 16, 1994, U.S. Pat. No. 5,493,878, entitled COMPUTER PHYSICAL SECURITY DEVICE, which is a divisional of Ser. No. 08/138,634, filed Oct. 15, 1993, entitled COMPUTER PHYSICAL SECURITY DEVICE, which is a continuation-in-part of Ser. No. 08/042,851, filed Apr. 5, 1993, U.S. Pat. No. 5,381,685, entitled COMPUTER PHYSICAL SECURITY DEVICE and a continuation-in-part of Ser. No. 08/006,311, filed Jan. 19, 1993, now abandoned entitled COMPUTER PHYSICAL SECURITY DEVICE, all the above applications are hereby expressly incorporated by reference for all purposes.

**BACKGROUND OF THE INVENTION**

The present invention relates to devices for inhibiting the theft of relatively small but expensive pieces of equipment.

Computers have evolved rather rapidly from large, expensive machines usable only by a few, to relatively small, portable machines which are usable by many. In particular, the development of desk top computers with significant processing power has made computers available to the general population. It is now common for college and even high school students to have their own computer, and desk top computers are in wide spread use as word processors and work stations in almost all forms of business. Desk top computers are relatively small and easily transportable, and an undesirable side effect of their proliferation is the fact that the theft of such computers is a significant problem.

A variety of devices have been developed to inhibit the theft of desk top computers and similar equipment. Since desk top computer systems involve several components, typically including the computer itself, a separate monitor, keyboard and often a printer, such security systems often employ a cable which attaches each of the components to each other and to a relatively immovable object such as a desk. The principal difficulty in such systems is providing an effective and convenient method for attaching the cable itself to the equipment.

Kensington Microware Limited, assignee of this application, currently provides a security system which is especially designed for use with particular Apple computers. Certain Apple computer components have slots and internal brackets designed to capture a specially designed tab inserted through the slot so that the tab is not removable. While this system is effective for particular types of Apple computers, it does not work for those Apple computer components and other computer brands which do not have the special designed slots and brackets.

It is undesirable to require a computer to have specially designed slots and internal capture brackets because the brackets occupy a significant amount of space in an item of equipment which is intended to be as space efficient as possible. Different items of Apple equipment require different sized slots, meaning that the security mechanism must provide a variety of different sized tabs. The tabs, once inserted, cannot be removed without damage to the equipment, meaning that the security system cannot be moved from one computer to the other. Even Apple computers with specially designed slots are typically used with peripheral equipment which does not have them, and, the Kensington system provides screws requiring a special screwdriver which replace the screws used to attach the

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existing communication cables, securing the peripheral equipment to the base computer by preventing unauthorized removal of the communication cables. This last aspect of the system has a drawback in that the peripheral equipment cannot be removed from the base computer without the special screwdriver, which can be lost or misplaced.

Other vendors provide security systems which are not required to interface directly with special slots and capture mechanisms as provided in certain Apple computers. For example, Secure-It, Inc., under the trademark "KABLIT", provides a variety of brackets attached to the computer component using existing mounting screws, i.e., screws which are already used to secure items of equipment within the cabinet. Typically, the bracket is apertured so that passage of the cable through the aperture prevents access to the mounting screw and thus prevents removal of the bracket from the equipment. A deficiency of this type of system is that it requires the removal of the existing mounting screw, which may cause some damage to the internal components of the computer. Suitable existing screws are not always available on certain peripherals for convenient attachment of the fastener. For this latter reason, KABLIT also provides glue-on disks which, unfortunately, are permanently secured to the equipment.

The theft of small but expensive equipment such as desk top computers is a growing problem. Existing devices are simply too inefficient or ineffective, or their application is too limited. As a result, the use of such security systems is rare, computer equipment is typically left unprotected, and it is all too often stolen.

**SUMMARY OF THE INVENTION**

The present invention provides apparatus which inhibits the theft of equipment such as personal computers. The equipment must have an external wall provided with a specially designed, approximately rectangular slot having preselected dimensions. An attachment mechanism includes a housing for a spindle having a first portion rotatable within the housing, a shaft extending outwardly from the housing, and a crossmember at the end of the shaft having peripheral dimensions closely conforming to the internal dimensions of the slot. An abutment mechanism also emanates from the housing, and is located on opposite sides of the shaft intermediate the housing and the crossmember. The peripheral cross-sectional dimensions of the abutment mechanism and the shaft in combination closely conform to the dimensions of the slot. The length of the shaft from the housing to the crossmember is approximately equal to the thickness of the external wall of equipment. The crossmember is aligned with the abutment mechanism so that the crossmember can be inserted through the slot with the shaft and the abutment mechanism occupying the slot. The spindle is then rotated 90° to misalign the crossmember with the slot, thereby attaching the attachment mechanism rigidly to the external wall. A cable is secured to the housing and to an immovable object so that the equipment cannot be stolen.

The apparatus of the present invention is far more adaptable and convenient to use than existing systems. The only required modification of the equipment to be protected is a small (preferably about 3 by 7 millimeter) slot in an external wall. Additional brackets, capture mechanisms or the like are not necessary. This small slot can easily be molded into computer systems at essentially no cost and without degrading the integrity of the equipment. The attachment mechanism can readily be installed on the equipment, and removed when appropriate by an authorized user. In one embodiment,

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a key-operated attachment attaches a single item of equipment to an immovable object with the cable. In a second embodiment, the cable passes through mating apertures in the spindle and the housing of one or more attachment mechanisms to prevent their removal once they have been attached to the equipment and the cable has been installed.

The attachment mechanism of the present invention is surprisingly difficult to remove from an item of equipment once it has been installed. In the preferred embodiments, the mechanism is quite small, and it is difficult to apply sufficient leverage to break the mechanism away from the equipment to which it is attached. Forcibly removing the mechanism will result in significant, highly visible damage to the exterior wall, identifying the equipment as stolen and making it difficult to resell, greatly reducing its theft potential.

Several alternative embodiments of the invention are provided in which there are shown several different combinations of attachment mechanisms which are either integrally connected or separately coupled to engagement mechanisms for securing the attachment mechanism proximate the external wall of the object of equipment. Further embodiments of the invention provide an attachment mechanism that can be directly coupled to the external wall of the object of equipment without the need to provide a specially designed slot in the wall.

The novel features which are characteristic of the invention, as to organization and method of operation, together with further objects and advantages thereof will be better understood from the following description considered in connection with the accompanying drawings in which a preferred embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of the limits of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a first embodiment of the present invention attached to a computer monitor;

FIG. 2 is a perspective view of a second embodiment of the present invention attached to a computer keyboard;

FIG. 3 is a perspective view of the attachment mechanism of the first embodiment;

FIG. 4 is an exploded view of the attachment mechanism of FIG. 3;

FIG. 5 is a fragmentary elevation view of a slot in a piece of equipment specially designed to accept the attachment mechanism of either embodiment of the present invention;

FIG. 6 is a section view taken along lines 6—6 of FIG. 3;

FIG. 7 is a section view taken along lines 7—7 of FIG. 3;

FIG. 8 is a fragmentary section view from inside an item of equipment illustrating insertion of a crossmember of the embodiment of FIG. 3 into the slot of FIG. 5;

FIG. 9 is a view similar to that of FIG. 8 with the crossmember misaligned;

FIGS. 10A and B are elevation views illustrating the installation of the attachment mechanism of FIG. 3 on an item of equipment;

FIG. 11 is a perspective view of the attachment mechanism of the second embodiment of the present invention;

FIG. 12 is an exploded view of the attachment mechanism of FIG. 10;

FIGS. 13A and 13B are side elevation views illustrating the installation of the attachment mechanism of FIG. 11 on an item of equipment;

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FIGS. 14 and 15 are side elevational views of alternative embodiments of an attachment mechanism and an engagement mechanism.

FIGS. 16A and 16B are respective perspective views of another alternative embodiment of an attachment mechanism and an engagement mechanism of the invention;

FIG. 16C is a side elevational view of the attachment mechanism and the engagement mechanism of FIGS. 16A and 16B assembled together proximate the external wall of an item of equipment;

FIG. 17A is a side elevational view of another embodiment of the invention;

FIG. 17B is a corresponding perspective view of the embodiment of FIG. 17A;

FIG. 18 is a side elevational view of a slightly modified version of the embodiment of FIGS. 17A and 17B showing a threaded engagement between the spindle and the housing;

FIG. 19 is a perspective view of another slightly modified version of the embodiment of FIGS. 17A and 17B showing a pin and pin hole engagement between the attachment mechanism and the external wall of an item of equipment;

FIGS. 20A, 20B, and 20C are perspective views of component parts of another embodiment of the invention showing a separate attachment mechanism, housing, and engagement mechanism respectively;

FIG. 20D is perspective view of the embodiment of FIGS. 20A, 20B, and 20C showing the three component parts in an assembled configuration;

FIGS. 21A and 21B are perspective views of component parts of another embodiment of the invention showing an engagement mechanism and a separate attachment mechanism respectively;

FIG. 21C is a side elevational view of the embodiment of FIGS. 21A and 21B with the engagement mechanism coupled to the attachment mechanism;

FIGS. 22A and 22B are perspective views of slightly modified version of the respective component parts of FIGS. 21A and 21B;

FIG. 22C is a side elevational view of the embodiment of FIGS. 22A and 22B with the attachment mechanism shown coupled to a slot in the external wall of an item of equipment;

FIG. 23A is a side elevational view of an attachment mechanism coupled to an engagement mechanism according to another embodiment of the invention;

FIG. 23B is a perspective view of the embodiment of FIG. 23A with the attachment mechanism and engagement mechanism shown coupled to a cable and a separate locking device;

FIG. 24A is a perspective view of the attachment mechanism of FIGS. 23A and 23B which can be directly coupled to an external wall of an item of equipment;

FIG. 24B is a perspective view of another embodiment of the attachment mechanism of FIGS. 23A and 23B which can be directly coupled to an external wall with the use of an adhesive;

FIG. 25 is another embodiment of an attachment mechanism which can be directly coupled to an external wall of an item of equipment;

FIG. 26A is a perspective view of another embodiment of the present invention with a conventional lock assembly and a retractable spindle;

FIG. 26B is a perspective view of the spindle and lock assembly of FIG. 26A showing the spindle in its retracted position; and

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FIG. 27 is perspective view of another embodiment of the preferred embodiment including a base unit and an attachment unit.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

A first preferred embodiment 10 of the security device of the present invention is illustrated generally by way of reference to FIG. 1. Security device 10 includes an attachment mechanism 12 designed to attach to a component of a computer system, such as computer monitor 14. Attachment mechanism 12 has an aperture 16, and a cable 18 which passes through the aperture when the attachment mechanism 12 is attached to a component such as monitor 14. A lock 20 is fixed to one end of cable 18. The free end of cable 18 may be of the type having a "mushroom" head 22 adapted to penetrate and be secured within lock 20 using key 24. With mushroom head 22 detached from lock 20, cable 18 can be threaded through the apertures 16 of one or more attachment mechanisms 12, and wrapped around a relatively immovable object (not shown) such as the cross bar spanning two legs of a desk. Mushroom head 22 is then inserted into lock 20 and the lock closed using key 24 to secure the computer components to the immovable object.

A second embodiment 26 of the present invention, designed primarily to secure single rather than multiple items of computer equipment, is illustrated generally by way of reference to FIG. 2. Embodiment 26 includes an attachment mechanism 28 designed to be secured to a computer component such as keyboard 30. Attachment mechanism 28 is affixed to one end of a cable 32 which has a closed loop 34 at its other end. Cable 32 is first wrapped around a relatively immovable object, such as a cross piece between two legs of a desk or table, and attachment mechanism 28 is passed through loop 34 and attached to the item to be protected such as keyboard 30 to make it difficult to steal the item of equipment.

Attachment mechanism 12 of first embodiment 10 is illustrated in more detail by way of reference to FIGS. 3 and 4 in combination. Mechanism 12 includes a housing 36 having a hollow interior cylindrical cavity 38. An annular plate 40 forms one end of housing 36 and has an aperture 41. A pair of apertures such as aperture 16 are located on opposite sides of housing 36. A small raised aperture 42 is also provided in housing 36 to accommodate a pin 44, as explained in more detail hereinafter.

A spindle 46 includes a cylindrical portion 48 adapted to fit within the cylindrical cavity of housing 36. Spindle 48 includes a raised plate 50 at one end which forms the aft end of the mechanism when assembled as illustrated in FIG. 3. Spindle 46 also includes a shaft 52 extending outwardly through the aperture 41 in housing 36. A crossmember 54 is located on the distal end of shaft 52.

An abutment mechanism 56 includes an abutment plate 58 designed to be received within the cylindrical interior cavity of housing 36, and a pair of pins 60 adapted to extend outwardly through the aperture 41 in housing 36. A spring 62 biases abutment plate 58 and spindle 46 rearwardly when the mechanism is assembled, as illustrated in FIG. 3. A plastic bushing 64 designed to prevent scarring of the equipment to which mechanism 12 is attached is affixed to the plate 40 on housing 36 circumscribing aperture 41.

When mechanism 12 is assembled as illustrated in FIG. 3, crossmember 54 and shaft 52, together with pins 60 on either side of the shaft, extend outwardly beyond housing 46 through aperture 41. Pin 44 engages a groove 66 in spindle

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46 so that the mechanism cannot be disassembled without removing the pin. The head of pin 44 is conformed to the shape of a boss 67 on the surface of housing 36 so that the pin cannot be removed without special equipment. Groove 66 has a preselected width allowing limited axial movement of spindle 46 relative to housing 36 with pin 44 engaged so that the axial position of crossmember 54 relative to the housing is somewhat adjustable. Spring 62 biases plate 58 and spindle 46 rearwardly to bias crossmember 54 toward housing 36.

Groove 66 extends around about 25% of the periphery of spindle 46 so that the spindle can be rotated approximately 90° relative to the housing. A transverse aperture 68 through the cylindrical portion 48 of spindle 46 is aligned with aperture 16 in housing 36 when crossmember 54 is misaligned from pin 60 (see FIG. 4). With spindle 46 rotated 90°, as allowed by pin 44 in groove 68, crossmember 54 is aligned with pin 60, and aperture 68 is not aligned with aperture 16. Cable 18 (see FIG. 1) can only be inserted through the aligned apertures 16, 68 when crossmember 54 is misaligned with pins 60, i.e., when attachment mechanism 12 is attached to the piece of equipment, as explained hereinbelow. With cable 18 passing through aligned apertures 16 and 68, rotation of spindle 46 so as to align crossmember 54 with pins 60 and allow removal of the attachment mechanism is effectively prevented.

The preferred embodiments 10 and 26 of the present invention are designed to operate with items of equipment provided by a special slot, as illustrated in FIG. 5. The exterior wall 70 of the piece of equipment is typically made of sheet metal, or molded plastic, either of which is compatible with the present invention. A relatively small slot 72 is formed in wall 70, by molding or otherwise as appropriate. In the preferred embodiment of slot 72, the slot has a generally rectangular configuration, i.e., the slot is generally rectangular having long parallel sides 74, short parallel sides 75 and rounded corners 76. Slot 72 is relatively small, having a long dimension 78 of seven millimeters, and a short dimension 79 of three millimeters, in the preferred embodiment of the present invention. Corners 76 have a radius of curvature 90 from 0.30 mm. to a maximum of 1.5 millimeters. If the radius of curvature 90 is 1.5 mm., the short sides 75 disappear and the slot has a straight-sided oval configuration.

The peripheral dimensions of crossmember 54 are closely conformed to the interior dimensions of slot 72, as illustrated in FIG. 6. The crossmember 54 of attachment mechanism 12 has a straight-sided oval configuration, i.e., the crossmember is generally rectangular, having straight sides and semi-circular ends. In the preferred embodiment, the long dimension 82 of crossmember 54 is 6.75 millimeters, while the short dimension 83 is 2.75 millimeters, each being slightly less than the corresponding dimension of slot 72. As illustrated in FIG. 7, the peripheral dimensions of the pins 60 and shaft 52 also closely conform to the interior dimensions of slot 72. As with crossmember 54, pins 60 in shaft 52 have a long dimension 84 of 6.75 millimeters, and a short dimension 85 of 2.75 millimeters.

The insertion of crossmember 54 of attachment mechanism 12 into slot 72 of external wall 70 is illustrated by reference to FIGS. 8 and 10A. Before insertion, spindle 46 must be rotated so that crossmember 54 is aligned with pins 60, as illustrated in FIG. 3. With the spindle in this position, the periphery of crossmember 54 and that of pins 60 and shaft 52 are essentially congruent. Since the peripheral dimension of crossmember 54 and pins 60 and shaft 52 in combination are less than the dimensions of slot 72, the

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crossmember can be inserted through the slot until crossmember 54 is completely inside wall 70 (see FIG. 10A). If necessary, the plate 50 on spindle 46 can be pressed to compress spring 62 so that crossmember 54 is completely inside wall 70.

As illustrated in FIG. 9, upon insertion of crossmember 54 completely through slot 72, the spindle is rotated by manipulating plate 50 so that crossmember 54 is 90° misaligned with respect to pins 60. The aperture 16 in the side wall of housing 36 will be aligned with the aperture 68 in the spindle, providing a passageway completely through the housing. In this configuration, cable 18 can easily be threaded through the aperture, and the presence of the cable prevents the spindle from being rotated back so as to disengage crossmember 54 from slot 72.

The attachment mechanism 28 of the second embodiment 26 of the present invention is illustrated in more detail by way of reference to the perspective view of FIG. 11 and the exploded view of FIG. 12. Attachment mechanism 28 includes a hollow shell 90 and a nose-piece 92 which, in combination, form a housing. Shell 90 has a hollow cylindrical interior cavity 94, and an integral apertured plate 96 at one end. A pin 98 is inserted through an aperture (not shown) in nose-piece 92 to engage a slot 102 in shell 90. Pin 98 is designed to shear when torque is applied to nose-piece 92 so that an unauthorized attempt to remove the attachment mechanism will simply shear the pin and allow the nose-piece to freely rotate without degrading the attachment of the attachment mechanism to the component to be protected. Slot 102 is axially elongate so that limited axial movement is allowed between shell 90 and nose-piece 92. The forward end of nose-piece 92 has a plate 93 having a central aperture 95.

A cylindrical collar 106 circumscribes the outer portion of shell 90 and occupies the slot laterally defined by plate 96 and the aft surface 108 of nose-piece 92. Collar 106 has an integral tab 110 with an aperture 112 adapted to receive one end of cable 32. Cable 32 is dead-ended into tab 110 and attached so that it cannot be removed.

A spindle 114 has a cylindrical portion 116 adapted to be received within a cylindrical lock 118 in shell 90. Cylindrical lock 118 includes a front cylinder 119, and a back cylinder 120. A blunt pin or set screw 121 is inserted through an aperture 125 in shell 90, and through a corresponding aperture 123 in back cylinder 120, to lock the front cylinder rotationally with respect to shell 90. Correspondingly, pin or set screw 127 engages a relatively smaller aperture 129 in front cylinder 119, and a widening 131 in slot 133 in the cylindrical portion 116 of spindle 114. Front cylinder 119 is thus fixed rotationally with respect to spindle 114.

As with conventional cylindrical locks, a plurality of pins normally span the interface between front cylinder 119 and back cylinder 120 so that the cylinders are rotationally locked together, thus preventing relative rotation between locking shell 90 and spindle 114. However, a key 140 (see FIG. 13B) is insertable through the apertured plate 96 of shell 90 to engage front cylinder 119. The correct key will have bosses located to depress the pins passing between cylinders 119 and 120 so that such pins do not span the interface between the cylinders, allowing the cylinders to rotate with respect to one another. In this fashion, spindle 114 can be rotated with respect to shell 90 only upon insertion and rotation of the appropriate key.

Spindle 114 also includes a shaft 122, and a crossmember 124 at the free end of the shaft. An abutment mechanism 126 has an abutment plate 128 adapted to fit within nose-piece

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92, and a pair of pins 130 adapted to extend outwardly through aperture 95. A spring 132 is located between abutment plate 128 and nose-piece 92 to bias the cylindrical portion 116 of spindle 114 and the abutment plate rearwardly. Abutment plate 126 has an elongate aperture 134 which allows crossmember 124 to extend through the aperture plate. A plastic bushing 136 is fixed to the surface of plate 93 so that the mechanism does not scar the equipment to which it is attached.

The insertion of attachment mechanism 28 into the exterior wall 137 of a piece of equipment is illustrated by way of reference to FIGS. 13A and B. Wall 136 has a slot 138, which is identical to the slot 72 illustrated in FIG. 8. The peripheral dimensions of crossmember 124, and also those of pins 130 and shaft 122 in combination, are identical to the corresponding parts in FIGS. 6 and 7. Simply put, attachment mechanism 28 is designed to fit into the same slot as attachment mechanism 12.

As illustrated in FIG. 13A, crossmember 124 is aligned with pins 30 so that the crossmember can be inserted into slot 138. When fully inserted, the space in the slot is essentially occupied by pins 130 and shaft 122. If necessary, plate 96 can be depressed to push the cylindrical portion 116 of spindle 114 against spring 132. Once crossmember 124 has been fully inserted through slot 138, a key 140 engaging lock mechanism 118 (see FIG. 12) is used to rotate the spindle 90° and misalign crossmember 124 and slot 138.

In operation, both attachment mechanism 12 and attachment mechanism 28 are attached to an item of computer or other equipment which has a specially designed slot 72, 138. First, the crossmember 54, 124 is aligned with the pins 60, 130, for insertion to the crossmember through the slot. The spindle 46, 114 is then rotated relative to the housing to misalign the crossmember 54, 124 relative to the slot. The spindle is locked in this configuration by passing the cable 18 through the mating slot 16, 48 in the first embodiment, or using the key 140 in the second embodiment. Either way, the attachment mechanism is extremely difficult to disengage by anyone not having the appropriate key 24, 140. Any unauthorized attempt to remove the attachment mechanism from the computer component will most likely result in significant damage to the computer housing, making the computer difficult to resell and greatly reducing its theft potential.

FIG. 14 illustrates another embodiment of the invention. Security device 200 includes an attachment mechanism 201 designed to be attached to a portable object of equipment, such as a personal computer (not shown), having an external wall 250. Attachment mechanism 201 comprises a housing 202 which generally includes a top end 204, a bottom end 208, and a generally cylindrical side wall 206, which in combination define internal hollow cavity 210. Side wall 206 has a pair of apertures 212 which are aligned with one another and which are sized to allow a cable 242 to pass through the apertures. Top end 204 is provided with an opening 214 which extends to proximate bottom end 208 to provide access for screw 230 into cavity 210, as will be described in more detail hereinafter. A raised plate 218 having a threaded aperture 216 is provided in bottom end 208 of the housing to accommodate insertion of screw 230.

Integral with bottom end 208 of housing 202 is an engagement mechanism 220 which includes a generally cylindrical shaft 222 and a crossmember 224 attached to the shaft at the distal end of the shaft. As previously described with reference to prior embodiments of the invention, the peripheral dimensions of the crossmember conform closely to the internal dimensions of slot 252. The crossmember 224

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is generally rectangular, having straight sides and semi-circular ends, as previously described.

To secure attachment mechanism 201 proximate external wall 250, housing 202 must first be rotated prior to insertion of screw 230 so that crossmember 224 is aligned with slot 252. Since the peripheral dimensions of crossmember 224 and shaft 222 are less than the dimensions of slot 252, crossmember 224 can be inserted through the slot until the crossmember is completely inside external wall 250, with shaft 222 occupying a portion of slot 252. Housing 202 may then be rotated by grasping onto side wall 206 and turning housing 202 until crossmember 224 is 90 degrees misaligned with respect to the slot. In this position of the crossmember, screw 230 can be inserted through opening 214 in the housing and threaded into aperture 216 in raised plate 218 of the housing. With screw head 232 firmly pressed against the upper surface of plate 218, a length of the screw 234 external the housing will extend beyond the housing for a distance that is slightly greater than the thickness of external wall 250. Further, the peripheral dimension of the screw portion 234 and the shaft 222 in combination is slightly less than the dimensions of the slot. In this way, screw portion 234 and shaft 222 occupy slot 252 when the screw is threadably engaged with aperture 216 in the housing so as to prevent rotation of the housing relative to the external wall and thereby prevent disengagement of crossmember 224 from slot 252. In this configuration, cable 242 can easily be threaded through apertures 212 to secure the housing to an external object (not shown). Once the cable is inserted through apertures 212 in the housing, screw 230 cannot be removed.

FIG. 15 illustrates another embodiment of the invention which has a similar configuration to the embodiment of FIG. 14 except that a spindle 260 is used instead of a screw to prevent rotation of housing 202'. Spindle 260 includes a cylindrical portion 264 adapted to be rotatably mounted within the cylindrical cavity 210' of the housing. An aperture 268 is formed through cylindrical portion 264 and is sized to allow a cable (not shown) to pass through the aperture. Spindle 260 includes a raised plate 266 at a proximal end of the spindle which forms the aft end of the spindle. Spindle 260 also includes a pin member 270 extending outwardly through aperture 216' in housing 202'. The length of the pin member 272 external the housing is slightly greater than the thickness of external wall 250.

In operation, with the crossmember misaligned from the slot as described above with reference to the embodiment of FIG. 14, spindle 260 is positioned in the housing so that base pin 270 is inserted through aperture 216' and into slot 252 proximate shaft 222'. The peripheral dimension of the shaft and the pin in combination is less than the dimension of the slot so that the pin and shaft occupy the slot with the crossmember misaligned 90 degrees. In this position, spindle 260 is rotated by manipulating raised plate 266 so that apertures 212' in the side wall 206' of housing 202' will be aligned with aperture 268 in cylindrical portion 264 of the spindle, providing a passageway completely through the housing. In this configuration, a cable (not shown) can easily be threaded through the apertures, and the presence of the cable prevents spindle 260 from being separated from the housing.

FIGS. 16A, 16B and 16C illustrate another embodiment of the invention in which the attachment mechanism 300 is a separate component from the engagement mechanism 320. Attachment mechanism 300 comprises a housing 302 having a top end 304, a bottom end 308, spaced apart side walls 306, and a peripheral edge wall 309, as seen in an inverted

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configuration in FIG. 16A. Bottom end 308 includes a generally rectangular opening 310 which extends the length of the housing to closed top end 304. Opening 310 is configured to permit passage of engagement mechanism 320 into housing 302, as will be described in more detail hereinafter. Apertures 312 through side wall 306 are spatially coupled to opening 310 and are sized to allow a cable (not shown) to pass through the apertures. Housing 302 also preferably includes first and second springs 316L and 316R mounted on either side of bottom end 308 of the housing which are used to adjust the relative position of the housing proximate the external wall 350, as best seen in FIG. 16C. Housing 302 further includes first and second, spaced apart abutment plates 314L and 314R located on opposite sides of opening 310.

Engagement mechanism 320, which is configured to fit within housing 302 through opening 310, is shown by way of reference to FIG. 16B and generally includes a spindle 322. Spindle 322 has an upper portion 324 which includes aperture 326 sized to permit passage of a cable (not shown) through aperture 326. Connected to the distal end of upper portion 324 of the spindle is a shaft 328 which has generally rectangular crossmember 330 attached to the shaft at the distal end of the shaft. The dimensions of the crossmember conform closely to the dimensions of the slot 352, as previously described. Engagement mechanism also preferably includes a spring 332 located around the periphery of shaft 328.

In operation, crossmember 330 is aligned with slot 352 and is inserted therein until crossmember 330 is completely inside external wall 350, as seen in FIG. 16C. If necessary, the upper portion 324 of spindle 322 can be firmly pressed to compress spring 332 so that crossmember 330 is completely inside wall 350.

Upon insertion of crossmember 330 completely through slot 352, spindle 322 is rotated so that crossmember 330 is 90 degrees misaligned with slot 352. In this configuration, housing 302 is placed over the spindle 322, so that the spindle is received within opening 310 in the housing. Abutment plates 314L and 314R are inserted into the slot on both sides of shaft 328 extending from spindle 322. With the upper portion 324 of the spindle completely received within the housing, aperture 326 in spindle 322 will be aligned with apertures 312 in housing 302, providing a passageway completely through the housing. In this configuration, a cable (not shown) can be easily threaded through the apertures, and the presence of the cable secures the spindle to the housing. As best seen in FIG. 16C, the peripheral dimension of the abutment plates 314L, 314R and shaft 328 of the spindle in combination closely conform to the dimensions of the slot and thereby occupy the slot. In this way, the housing is fixed relative to the spindle and neither can be rotated back so as to disengage crossmember 330 from slot 352. Springs 316L, 316R are biased against the lower end of the housing to firmly secure housing 302 proximate the external wall 350.

Another embodiment of the invention is shown by way of reference to FIGS. 17A and 17B in which a spindle 420, a housing 402, and a spring 440 are assembled to operate as a single unit. Attachment mechanism 400 comprises housing 402 which generally includes top end 404, bottom end 406, and cylindrical side wall 408, which in combination define internal cylindrical cavity 409. A cylindrical opening 412 in the top end 404 of the housing extends to proximate closed bottom end 406 of the housing and is configured to allow engagement mechanism 420 to be rotatably mounted within the housing. Side wall 408 has a pair of apertures 410 which

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are sized to allow passage of a cable (not shown) through the apertures. Attached to bottom end 406 of the housing are two abutment plates 414L and 414R which are spaced apart from aperture 416 in bottom end 406 and which are adapted to be inserted into slot 452 in external wall 450 (See FIG. 17B).

Spindle 420 includes a cylindrical portion 424 rotatably mounted within the cylindrical cavity 409 of housing 402. Spindle 420 includes a raised plate 423 at one end which forms the aft end of the spindle. Spindle 420 also includes a shaft 428 extending outwardly through aperture 416 in housing 402. A crossmember 430 is located at the distal end of shaft 428. Aperture 426 through cylindrical portion 424 of the spindle 420 is sized to allow a cable (not shown) to pass through aperture 426. A spring 440 is located at the distal end of cylindrical portion 424 of the spindle and biases the spindle away from the bottom end of housing 402 so that crossmember 430 will firmly engage the inner surface of external wall 450, as will now be described.

When the apparatus is assembled as illustrated in FIG. 17A, crossmember 430 and shaft 428, together with abutment plates 414L and 414R on either side of the shaft, extend outwardly beyond the bottom end 406 of housing 402. Prior to insertion of crossmember 430 into slot 452, spindle 420 must be rotated via raised plate 423 so that crossmember 430 is aligned with slot 452, as seen in FIG. 17B. With the spindle in this position, the crossmember can be inserted through the slot as previously discussed. If necessary, plate 423 can be pressed to compress spring 440 so that crossmember 430 is completely inside wall 450. In this position of the crossmember, shaft 428 and abutment plates 414L, 414R occupy the slot to prevent rotation of the housing relative to external wall 450.

Upon insertion of crossmember 430 completely through slot 452, the spindle is rotated by manipulating plate 423 so that crossmember 430 is 90 degrees misaligned with slot 452. Side wall 408 of housing 402 preferably includes at least one small hole 411 on either side of the housing through which a pin 460 engages a groove (not shown) in the cylindrical portion 424 of the spindle, the groove extending around about 25% of the periphery of cylindrical portion 424 so that the spindle can be rotated substantially only 90 degrees relative to the housing. With the crossmember misaligned from the slot, apertures 410 in the side wall of housing 402 will be aligned with aperture 426 in the spindle providing a passageway completely through the housing. In this configuration, a cable (not shown) can easily be threaded through the aligned apertures, and the presence of the cable prevents the spindle from being rotated back so as to disengage crossmember 430 from slot 452.

The embodiment of FIGS. 17A and 17B can be slightly modified to provide a threaded cylindrical portion 424' of the spindle 420', as seen in FIG. 18. In this embodiment, the internal peripheral surface 413 of side wall 408' is also threaded so that the cylindrical portion 424' engages threaded surface 413. This engagement variation between spindle 420' and housing 402' can be used instead of spring 440 in FIG. 17A to adjust the relative lateral displacement between the spindle and the housing.

FIG. 19 illustrates another alternative embodiment of a housing 402" which is used to prevent rotation of the housing relative to the external wall 450 when the crossmember is misaligned with the slot. In this embodiment, pins 472 are mounted to the outer surface of the external wall on either side of slot 452 and engage pin holes 470 located on opposite sides of shaft 428" to prevent rotation of the housing relative to external wall 450 when crossmember 430" is located completely within slot 452 and is misaligned from the slot.

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Other embodiments of the invention are described with reference to FIGS. 20-23 wherein the engagement mechanism includes at least two engagement portions for engaging with the inner surface of the external wall proximate the slot to prevent removal of the attachment mechanism from proximate the external wall.

FIGS. 20A, 20B, 20C and 20D illustrate another embodiment of the invention 600 including three separate components, an attachment mechanism 602 (see FIG. 20A), a housing 620 (see FIG. 20B), and a separate engagement mechanism 640 (see FIG. 20C). Attachment mechanism 602 includes attachment member 603 shown in an inverted position in FIG. 20A. Attachment member 603 generally includes a top end 604, a bottom end 606, spaced apart side walls 608, and a peripheral edge wall 609. An aperture 610 is provided through side walls 608 and is sized to permit passage of a cable (not shown) through aperture 610. Base portion 612 is integrally connected to attachment member 603 proximate bottom end 606 of the attachment member. A retaining flange 614 is provided proximate top end 604 to retain attachment member 603 within housing 620, as will be described in more detail hereinafter.

Housing 620 is shown by way of reference to FIG. 20B and generally includes a top wall 622, a bottom wall 624, and four separate spaced apart side walls including a front end 626 and a back end 628. A pair of substantially rectangular openings 632 are provided through both top wall 622 and bottom wall 624 of the housing and are configured to allow passage of the attachment member 603 through openings 632. A separate, generally rectangular aperture 630 is provided in front end 626 of housing 620 and extends the length of the housing to the closed back end 628. Aperture 630 is configured to permit passage of engagement mechanism 640 into the aperture, as will be described in more detail hereinafter. Bottom wall 624 is also provided with a pin hole 636 proximate front end 626 which is sized to receive a retaining pin 634 therein. The housing is preferably made from cast metal, but any other suitable material may be used.

Engagement mechanism 640 is shown by way of reference to FIG. 20C and includes an engagement member 642. Engagement member 642 includes first and second, spaced apart engagement arms 646L, 646R which have first and second engagement portions 648L, 648R integrally connected to the arms at the distal end of arms 646L, 646R. A transverse member 644 connects the two engagement arms 646L, 646R together at the proximal end of the arms and defines an abutment surface 645 located towards the distal end of transverse member 644. Engagement arms 646L, 646R and transverse member 644 in combination define clearance space 649 which is sized to permit passage of attachment member 603 through clearance space 649, as will now be described.

To assemble device 600 prior to securing the device proximate external wall 650, engagement member 642 is initially inserted into rectangular aperture 630 in housing 620 until transverse member 644 abuts against back end 628 of the housing. Retaining pin 634 is subsequently inserted into pin hole 636 in the housing and secured thereto so that engagement member 642 cannot be removed from the housing without removing the pin. Attachment member 603 is then inserted into rectangular openings 632 in the housing and through clearance space 649 of the engagement member so that the attachment member extends outwardly through opening 632 in bottom wall 624 of the housing. Base portion 612 of the attachment member engages the upper surface of top wall 622 of the housing to prevent passage of attachment

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member 603 completely through housing 620. Retaining flange 614 prevents attachment member 603 from being separated from the housing. Further, abutment surface 645 of transverse member 644 engages with attachment member 603 to secure engagement member 642 to attachment member 603.

When device 600 is assembled as illustrated in FIG. 20D, engagement portions 648L, 648R and a lower portion of engagement arms 646L, 646R extend outwardly beyond front end 626 of housing 620. In this configuration, engagement portions 648L, 648R may be pressed firmly against slot 652 until the engagement portions bend sufficiently inward to fit within slot 652. The inwardly sloped peripheral dimensions of the engagement portions permit easier access into slot 652. Upon insertion of engagement portions 648L, 648R completely within the slot, with a portion of the engagement arms 646L, 646R occupying the slot, the arms will spread back to their natural configuration and thereby engage the internal surface of the external wall 650 proximate slot 652 to secure the device 600 proximate the external wall. A cable (not shown) can then be inserted through aperture 610 in attachment member 603, and the presence of the cable prevents the attachment member 603 from moving relative to housing 620.

FIGS. 21A, 21B, and 21C depict another embodiment of the invention, device 700, in which there are two major component parts, attachment mechanism 701 and engagement mechanism 720.

Attachment mechanism 701 of FIG. 21B generally includes an attachment member 702 having a closed top end 704, a bottom end 706, a peripheral edge wall 709, and spaced apart side walls 708. An aperture 710 is provided through side walls 708 and is sized to permit a cable to pass through aperture 710. A generally rectangular opening 712 is further provided in bottom end 706 of attachment member 702 and extends the length of the attachment member to closed top end 704. Opening 712 is configured to accommodate passage of the engagement mechanism 720 into opening 712, as will be described in more detail hereinafter.

Engagement mechanism 720 is shown by way of reference to FIG. 21A and generally includes engagement member 722 having first and second, spaced apart engagement arms 724L and 724R connected at the proximal end of engagement member 702 and defining a clearance space 725 between the arms sized large enough to permit a cable to pass through clearance space 725. Abutment surface 730 is located adjacent the proximal end of the engagement arms. Engagement portions 726L, 726R are integral with engagement arms 724L, 724R at the distal end of the arms. A pair of grooves 728 is provided in engagement portions 726L, 726R, with the length of the groove being substantially equal to the thickness of external wall 750 (See FIG. 21C). Engagement member 722 is preferably injection molded and made from a plastic material to enhance its resiliency. However, it is to be noted that the engagement member may be made from other materials, such as metal, provided that the material is sufficiently resilient to allow engagement arms 724L, 724R to be bent inward sufficiently far enough to allow engagement portions 726L, 726R to be inserted into slot 752.

To utilize device 700, engagement arms 724L, 724R are pressed towards one another so that engagement portions 726L, 726R are positioned sufficiently close to one another to allow the engagement portions to be inserted into slot 752. As seen in FIG. 21C, grooves 728 engage with external wall 750 when engagement portions 726L, 726R are within slot

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752 and have spread back to their natural configuration. In this way, engagement member 722 is firmly secured to external wall 750. Subsequently, attachment member 702 is positioned over engagement member 722 until clearance space 725 is aligned with aperture 710 in the housing. In this configuration, a cable 740 can easily be threaded through aperture 710 in the housing and clearance space 725, and the presence of the cable 740 prevents attachment member 702 from being separated from engagement member 722.

FIGS. 22A, 22B, and 22C illustrate a slightly modified version of the embodiment of FIGS. 21A, 21B, and 21C. In this embodiment, housing 702' preferably includes a retaining pin hole 714. Engagement mechanism 720' is also slightly modified to include a retaining pin 734 which engages with pin hole 714 proximate bottom end 706' of housing 702' to prevent engagement member 722' from being separated from housing 702' prior to insertion of a cable (not shown). Side walls 732L, 732R forming part of alternative engagement portions 726L', 726R' will spread back to their natural configuration once inserted into slot 752 to thereby engage the inner surface of external wall 750 proximate the slot to affix the engagement member to the external wall. Engagement member 722' of FIGS. 22A and 22C is adapted to engage with a slot having substantially smaller peripheral dimensions than the slot necessary to engage with engagement member 722 of FIG. 21A.

FIGS. 23A and 23B illustrate another embodiment of the invention 800 in which there are also substantially only two component parts, an attachment mechanism 801 and an engagement mechanism 820. Attachment mechanism 801, shown by way of reference to FIG. 23A, generally includes an attachment member 802 having a top end 804, a bottom end 806, and a cylindrical side wall 808. A pair of apertures 810 are provided through side wall 808 and are sized to permit a cable 840 to pass through apertures 810 (See FIG. 23B). A generally cylindrical opening 812 is further provided in top end 804 of attachment member 802 and extends the length of the attachment member to a substantially smaller screw opening 814 in bottom end 806 of the attachment member. Opening 812 is configured to accommodate passage of screw 816 through opening 812 to bottom end 806 of the attachment member, as will be described in more detail hereinafter.

Engagement mechanism 820 is used in conjunction with attachment member 802, as is also illustrated in FIG. 23A. Engagement mechanism 820 generally includes engagement member 822 having first and second, spaced apart engagement arms 824L and 824R connected to base portion 830 at the proximal end of engagement member 822 and defining a clearance space 825 between the arms sized large enough to permit screw 816 to pass through clearance space 825. Base portion 830 has a top surface 833 and a bottom surface 831 and is provided with a screw hole 832 through the surfaces. Engagement portions 826L, 826R are integral with engagement arms 824L, 826R at the distal end of the arms. In the preferred embodiment of device 800, engagement portions 826L, 826R have inwardly sloped side walls which facilitate insertion of the engagement portions into slot 852, as previously described.

In operation, engagement portions 826L, 826R are inserted into slot 852 until lower surface 831 of base portion 830 engages the outer surface of external wall 850. In this position of engagement member 822, attachment member 802 is positioned proximate upper surface 833 of base portion 830 until screw hole 832 is aligned with opening 814 in the attachment member. Screw 816 is then inserted through each of opening 812 in the attachment member,



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opening 814 at the bottom end 806 of the housing, hole 832 in base portion 830, and clearance space 825. The screw will force engagement arms 824L, 824R to spread apart so that engagement portions 826L, 826R will engage the inner surface of external wall 850 proximate slot 852. In this configuration, cable 840 (See FIG. 23B) can be threaded through apertures 810 in the attachment member and attached to an external object, such as lock 860, to secure the attachment member to the lock. The cable will also prevent removal of screw 816.

It is to be understood that an attachment member 802' can be used independently of engagement mechanism 820 provided that an appropriate screw hole or screw insert is provided in the external wall (not shown) sized to permit screw 816' to engage with the hole (or insert), as is apparent from FIG. 24A. Further, an attachment member 802" may also be secured to an external wall by any other suitable engagement means, as for example providing a double-sided adhesive pad 870 for engaging both the bottom end of the attachment member 802" and the outer surface of the wall (not shown), as seen in FIG. 24B.

In still another embodiment of the same device 800, attachment member 802'" can be hingably connected to a base portion 818 having a screw hole 814'" so that the attachment member 802'" will swing away from the external wall when not in use, as seen in FIG. 25. In this embodiment, base portion 818 may be secured proximate the external wall of an item of equipment via screw 816'" and a threaded insert 819.

The attachment mechanism concept of FIGS. 23A and 23B can also be modified to include a conventional lock assembly 910 (as previously described by way of reference to the embodiment of FIG. 2) in combination with a retractable spindle arm 908. As illustrated in FIG. 26A, attachment mechanism 900 is affixed to one end of a cable 920 which has a closed loop 922 at its other end. Cable 920 is first wrapped around a relatively immovable object (not shown) and attachment mechanism 900 is passed through loop 922 and attached to the item to be protected such as external wall 950 to make it difficult to steal.

Attachment mechanism 900 is shown in its retracted position in FIG. 26B and generally includes a housing 902 and first and second, resilient engagement arms 904L and 904R which are mounted to the bottom end of housing 902 and extend outwardly therefrom. Engagement arms 904L, 904R have first and second, inwardly angled engagement portions 906L and 906R at the distal end of each of the arms which are configured so as to be easily received within slot 952 in the retracted position of spindle arm 908, as will be described in more detail hereinafter. At the other end of housing 902 from the engagement arms is a conventional cylindrical lock assembly 910, an example of which was described in detail by reference to FIG. 13B. A spindle arm 908 is adapted to be mounted to cylindrical lock assembly 910 at one end, with the opposite end of arm 908 extending between engagement arms 904L and 904R external of housing 902. Spindle arm 908 is connected to lock assembly 910 in such a manner that rotation of lock assembly 910 with an appropriate key (not shown) will cause translational movement of spindle arm 908 in the direction of arrow 930 (see FIG. 26B). This movement of arm 908 can be accomplished in any manner as is well known in the art, as for example having spindle arm 908 received within a corkscrew shaped cam attachment mounted to lock assembly 910 so that rotation of the lock will cause corresponding translational movement of spindle arm 908.

In operation, with spindle arm 908 in the retracted position of FIG. 26B, engagement portions 906L and 906R are

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insertable into slot 952. Once inside of slot 952, a key can be inserted into lock assembly 910 and rotated so that spindle arm 908 will be moved in the direction of arrow 930 to its extracted position. The movement of spindle arm 930 along arrow 930 permits engagement arms 904L and 904R to flex outwards in the direction of arrow 940 so that engagement portions 906L and 906R will move outwards to engage the inner surface of slot 952. In this way, attachment mechanism 900 will be secured proximate external wall 950. To subsequently detach attachment mechanism 900 from proximate external wall 950, the appropriate key is reinserted into lock assembly 910 and rotated to retract spindle arm 908. This will cause engagement arms 904L, 904R to relax back to their natural configuration of FIG. 26B to thereby permit engagement portions 906L, 906R to be separated from slot 952.

FIG. 27 is a perspective view of an alternate preferred embodiment of the present invention. There are occasions that cables and locks are inappropriate or a certain amount of mobility for protected equipment is necessary. In those instances, using a proximity detecting system 980 can protect portable computer equipment. Proximity detecting system 980 includes a base unit 982 and a remote unit 984 relatively permanently attached to monitor 14 by use of a standardized slot 72 (as shown in FIG. 5 for example). The various embodiments shown in FIGS. 1-27 provide examples of different attachment schemes for remote unit 984. Base unit 982 and remote unit 984 operate together to control a separation distance between them. There are many different ways to implement proximity detecting system 980 as well known in the art. One way provides base unit 982 with a transmitter for periodically transmitting a signal to remote unit 984.

In operation, remote unit 984 includes a receiver and a self-powered siren (not shown). Should remote unit 984 fail to receive the periodic transmission, the siren activates to indicate unauthorized removal of the protected equipment. Optionally, remote unit 984 includes a transmitter transmitting a unique ID code allowing base unit 982 to activate a siren and to identify a particular piece of protected equipment.

While several embodiments of the present invention have been illustrated by way of example, it is apparent that further embodiments could be developed within the spirit and scope of the present invention. However, it is to be expressly understood that such modifications and adaptations are within the spirit and scope of the present invention, as set forth in the following claims.

What is claimed is:

1. An attachment apparatus comprising:

- a portable electronic device having a portion of an external wall defining a security slot, said security slot having a predetermined shape and said shape further having at least one section wherein the section's length is greater than its width; and
- an attachment device for attaching to said portable electronic device, comprising:
  - a housing having an internal hollow cavity;
  - a spindle having:
    - a first portion contained within said cavity;
    - a shaft coupled to said first portion and extending away from said housing; and
    - a locking member at a distal end of said shaft outside of said housing, said locking member having a shape generally conforming to the security slot;
  - a locking mechanism for maintaining rotation of said shaft of said spindle fixed in said cavity relative to said housing; and



a pin, displaced laterally from said shaft and extending outwardly from said housing; said pin insertable into said security slot independent from said shaft, wherein said locking member is insertable within the security slot when aligned to the shape of the security slot and wherein said locking member resists removal from the security slot when misaligned with the shape of the security slot, and wherein said pin maintains a rotational orientation of said housing fixed relative to said security slot when said locking member is inserted into and misaligned with the shape of the security slot.

2. A locking device for attaching to a portable device having a security slot in a portion of an external wall of said portable device, said security slot having a predetermined shape and said shape further having at least one section wherein the section's length is greater than its width, comprising:

- a housing having an internal hollow cavity and a first transverse aperture through said housing;
- a spindle rotatably mounted within said cavity and including:
  - a first portion provided with a second transverse aperture through said first portion;
  - a shaft fixed to said first portion and extending outwardly from said housing; and
  - a locking member at a distal end of said shaft outside of said housing, said locking member having a perimeter shape conforming to the security slot; and
  - a pin projecting from said housing and displaced laterally from said shaft with said locking member and insertable independent from said shaft, said pin for maintaining a fixed rotational relationship between said housing and the security slot when said pin is inserted into the security slot of the portable device, wherein said locking member is insertable within the security slot when the locking member is in a first position and said apertures are misaligned, with said locking member retained within the portable device and said pin retained in the portable device when said locking member is in a second position and said apertures are aligned to permit an object to extend through said apertures to inhibit movement of said locking member from said second position to said first position while said object extends through said apertures.

3. A method for attaching a locking device to a portable device, comprising the steps of:

- equipping into an external wall of said portable device a security slot, said security slot having a predetermined shape and said shape further having at least one section wherein the section's length is greater than its width;
- inserting a spindle, said spindle including a shaft having a slot conforming locking member fixed to a distal end of said shaft, into the security slot when said spindle is in an unlocked position; thereafter
- inserting a pin independent of said spindle insertion, said pin emanating from a housing having an internal hollow cavity containing a first portion of said spindle, into the security slot to thereby fix a relative rotational orientation between said housing and the security slot;
- rotating said locking member to a locked position while said locking member and said pin extend into the security slot by rotating said spindle relative to said housing wherein said spindle is retained within the portable device and wherein a first transverse aperture through said first portion of said spindle is aligned with a second transverse aperture through said housing; and

holding said spindle in said locked position relative to said housing by passing an object through said apertures when they are aligned to maintain alignment of said apertures and to inhibit rotation of said locking member to said unlocked position.

4. The attaching method of claim 3 wherein said object is a cable and further comprising the step of attaching said cable to a second object different from the portable device.

5. A method for inhibiting a theft of a portable device, the method employing an attachment mechanism having a housing having an internal hollow cavity with a first transverse aperture through said housing, a rotatable shaft extending outwardly from the housing and having a locking member at a distal end of the rotatable shaft wherein a portion of the shaft inside the housing includes a second transverse aperture through said portion of the shaft, the locking member having peripheral dimensions generally conformed to the shape of the security slot, the attachment mechanism including a pin displaced laterally from the shaft, comprising the steps of:

- equipping, in an external wall of the portable device, a specially designed security slot having preselected peripheral dimensions, the dimensions further having at least one section where the section's length is greater than the section's width;
- inserting the locking member through the security slot into the interior of the portable device;
- inserting the pin into the security slot independent from the shaft while the locking member is inserted into the security slot to inhibit rotation of the attachment mechanism relative to the security slot;
- rotating the shaft while the locking member is inserted into the security slot to misalign the locking member and the security slot to thereby prevent withdrawal of the locking member from the security slot wherein said rotating step also aligns the apertures with each other;
- maintaining a rotary position of the shaft fixed relative to the security slot by use of the pin by passing a cable through both the first transverse aperture and the second transverse aperture while they are aligned; and
- securing the attachment mechanism to an object other than the portable device by use of the cable to inhibit the theft of the portable device.

6. An attachment apparatus comprising:

- a portable electronic device;
- a security slot defining a portion of an external wall of said portable electronic device;
- an attachment device for attaching to said security slot, comprising:
  - a housing having an internal hollow cavity;
  - a spindle having:
    - a first portion contained within said cavity;
    - a shaft fixed to said first portion and extending outwardly from said housing; and
    - a locking member at a distal end of said shaft outside of said housing, said locking member having a perimeter shape conforming to the security slot; and
    - a pin emanating from said housing and laterally displaced from said shaft, said pin insertable into said security slot independent from said shaft,

wherein the attachment device further includes a locking mechanism for maintaining rotation of said shaft fixed relative to said pin, and wherein said locking member is insertable within the security slot when aligned with



**United States Patent** [19]  
**Carl et al.**

[11] **Patent Number:** 6,006,557  
 [45] **Date of Patent:** Dec. 28, 1999

- |                                                                                                                                                         |         |         |                |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|----------------|--------|
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| [75] Inventors: Stewart R. Carl, Palo Alto; Alice Kasahara, Hayward; Arthur H. Zarnowitz, San Jose; William R. Murray, Jr., Redwood City, all of Calif. | 577757  | 5/1933  | Germany        |        |
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| [73] Assignee: ACCO Brands, Inc., Lincolnshire, Ill.                                                                                                    | 1256295 | 12/1971 | United Kingdom |        |
|                                                                                                                                                         | 1376011 | 12/1974 | United Kingdom |        |
|                                                                                                                                                         | 2109109 | 5/1983  | United Kingdom |        |

[21] Appl. No.: 08/927,334  
 [22] Filed: Sep. 11, 1997

**Related U.S. Application Data**

- [63] Continuation of application No. 08/385,715, Feb. 8, 1995, abandoned.
- [51] Int. Cl.<sup>6</sup> ..... F05B 69/00  
 [52] U.S. Cl. .... 70/58; 70/14; 70/57  
 [58] Field of Search ..... 70/58, 14, 57, 70/423-430, 18, 232; 248/553, 551, 505; 411/552, 553, 555, 549, 349, 343, 216, 217

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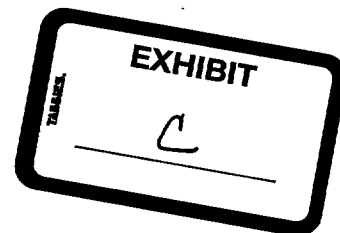
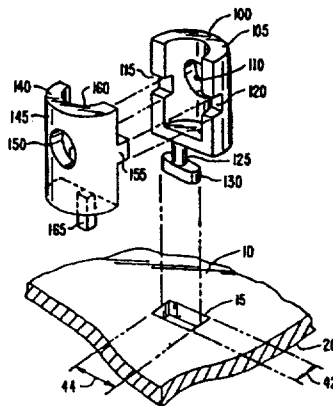
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*Primary Examiner*—Darnell M. Boucher  
*Attorney, Agent, or Firm*—Michael E. Woods; Townsend and Townsend and Crew

[57] **ABSTRACT**

An apparatus which inhibits the theft of equipment such as personal computers is disclosed. The equipment typically includes an external wall provided with a specially designed, approximately rectangular slot having preselected dimensions. An attachment mechanism includes a housing for a spindle having a first portion rotatable within the housing, a shaft extending outwardly from the housing, and a cross-member at the end of the shaft having peripheral dimensions closely conforming to the internal dimensions of the slot. The spindle is then rotated 90° to misalign the crossmember with the slot, thereby attaching the attachment mechanism rigidly to the external wall. A cable is secured to the housing and to an immovable object so that the equipment cannot be stolen.

12 Claims, 10 Drawing Sheets



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Dec. 28, 1999

Sheet 1 of 10

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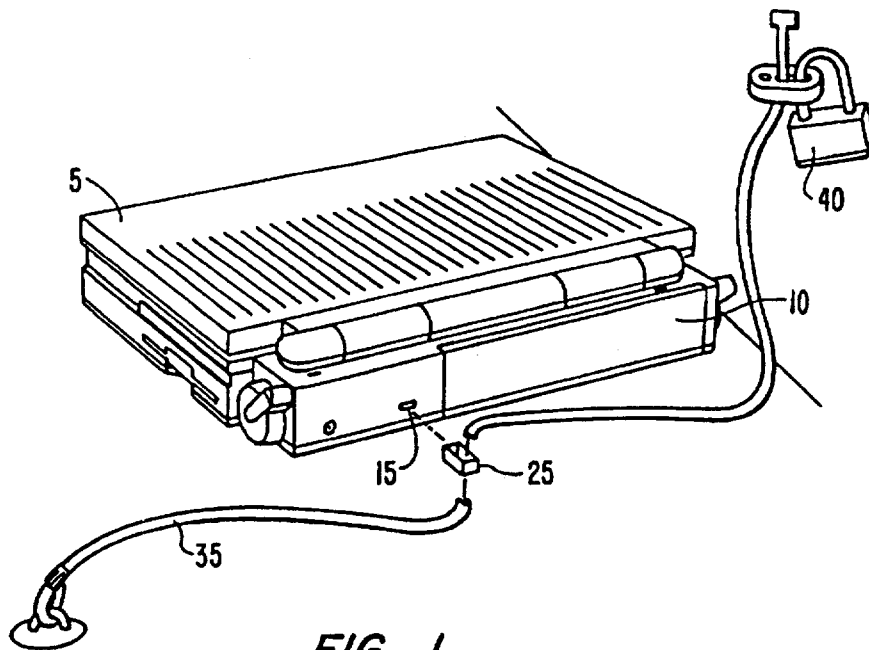


FIG. 1.

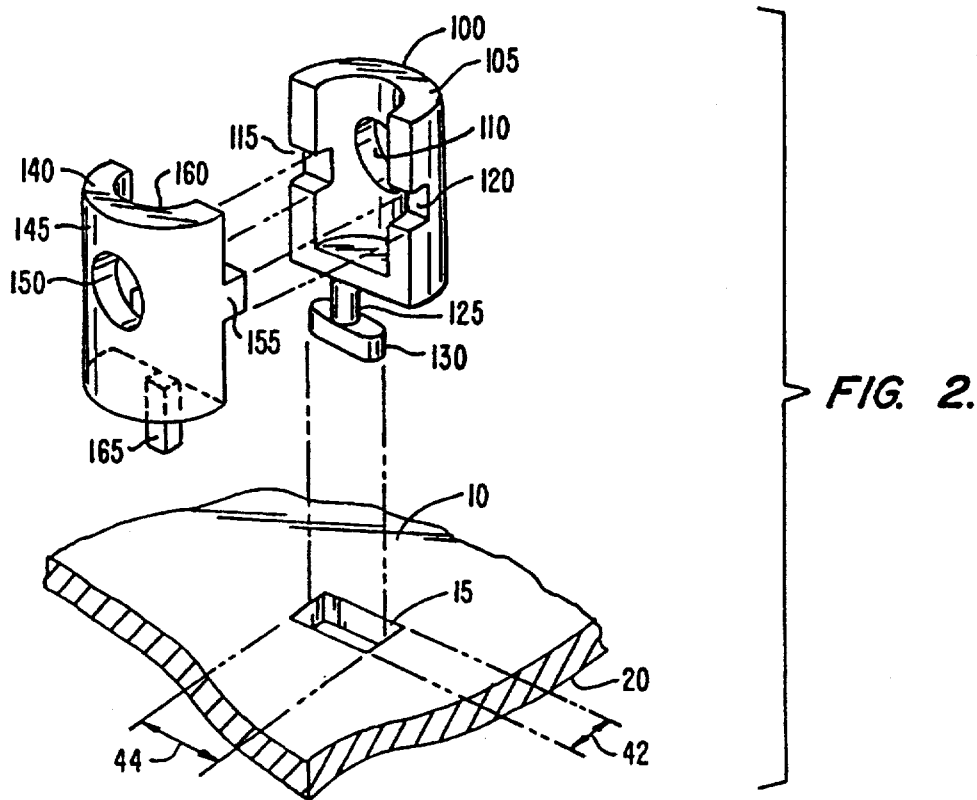


FIG. 2.

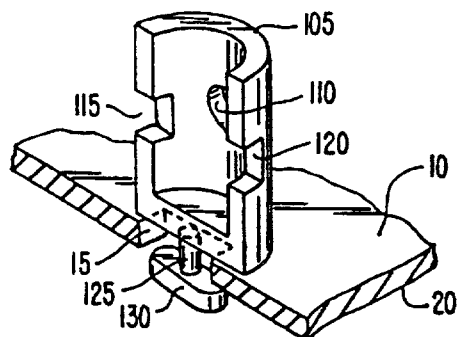


FIG. 3.

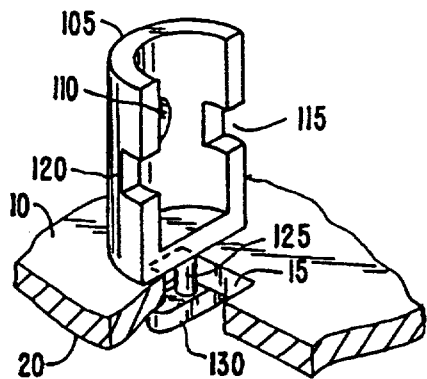


FIG. 4.

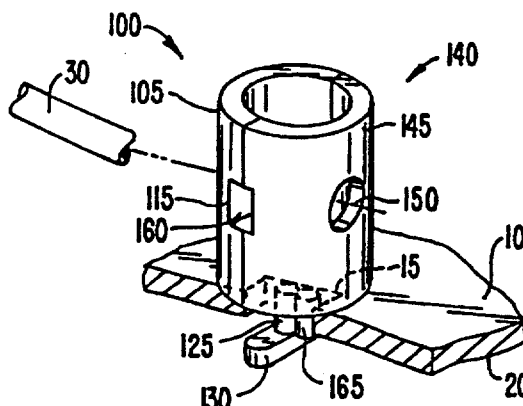


FIG. 5.

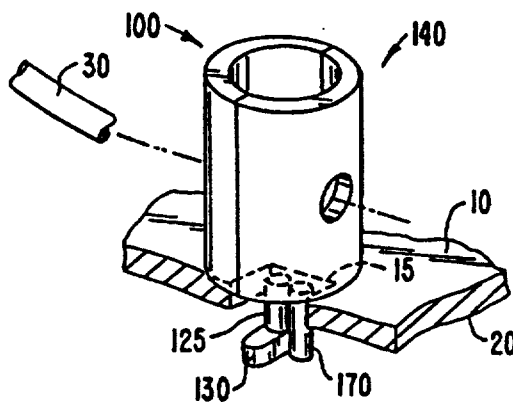


FIG. 6.

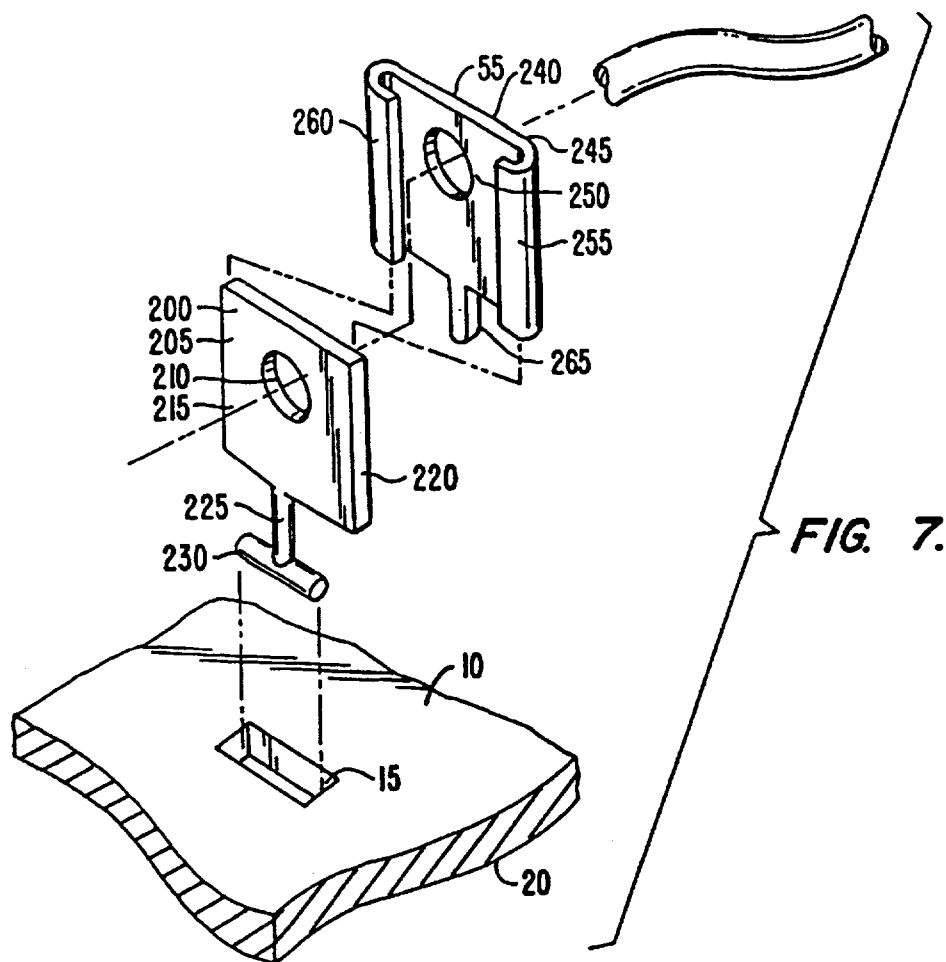


FIG. 7.

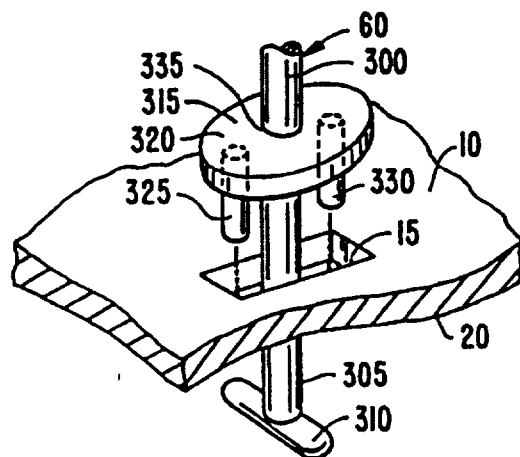


FIG. 8.

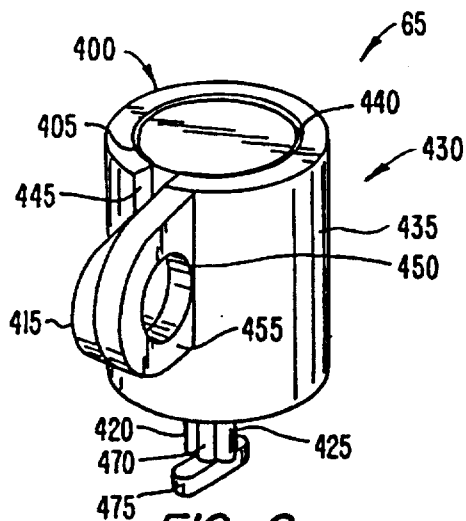


FIG. 9.

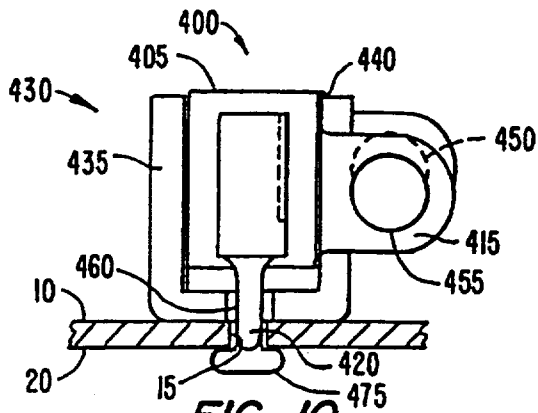


FIG. 10.

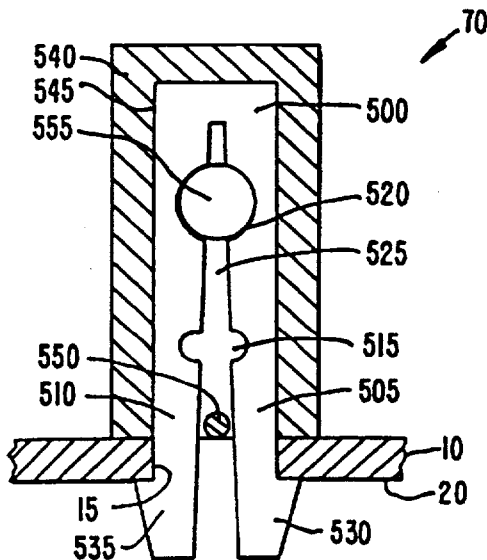


FIG. 11.



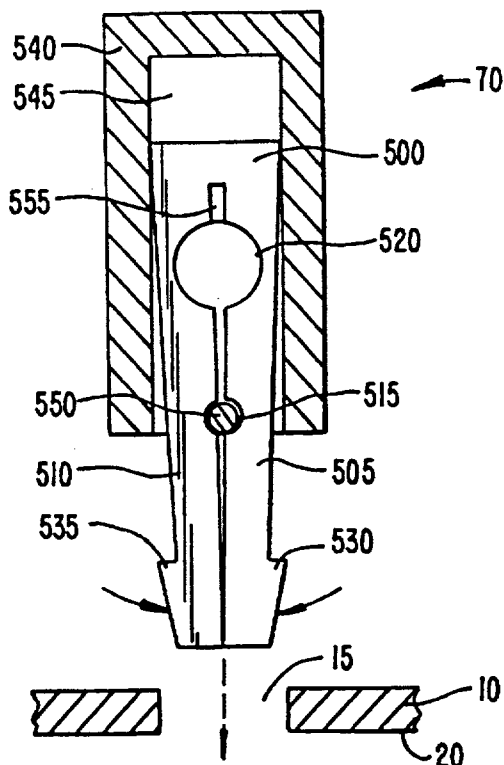


FIG. 12.

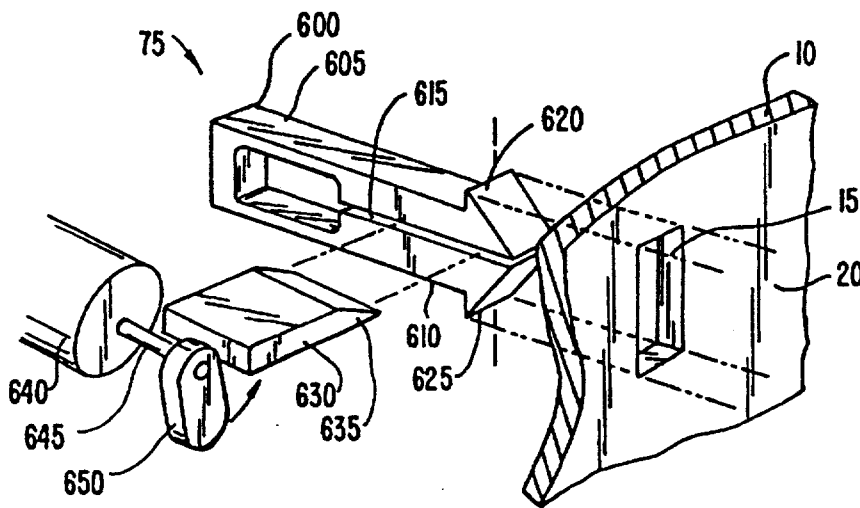


FIG. 13.

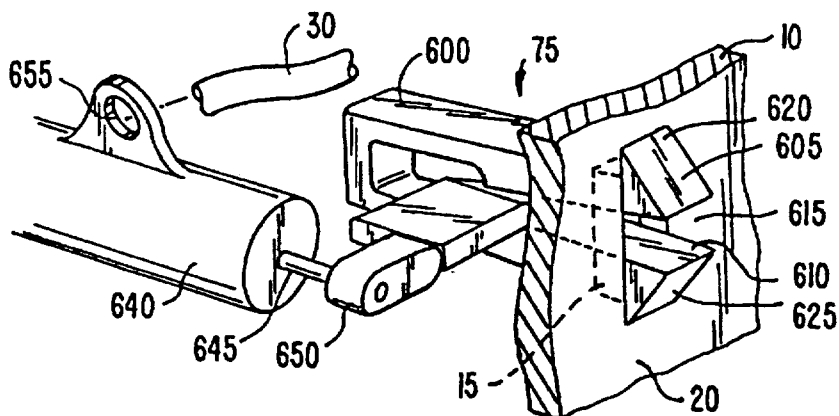


FIG. 14.

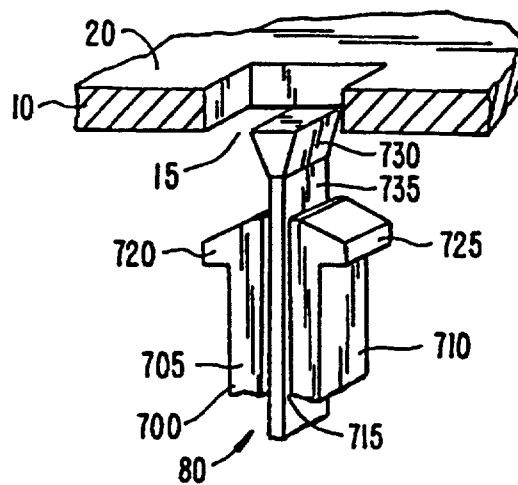


FIG. 15.

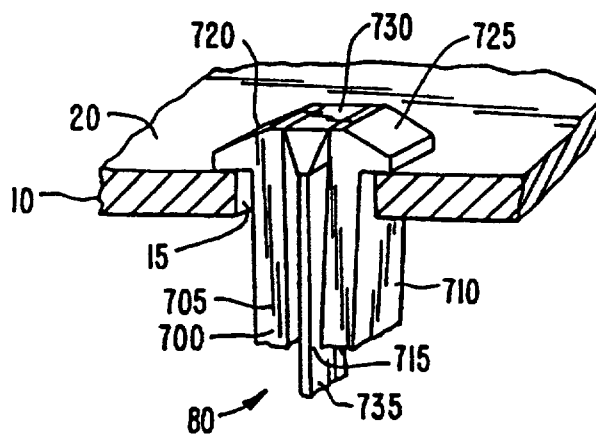


FIG. 16.

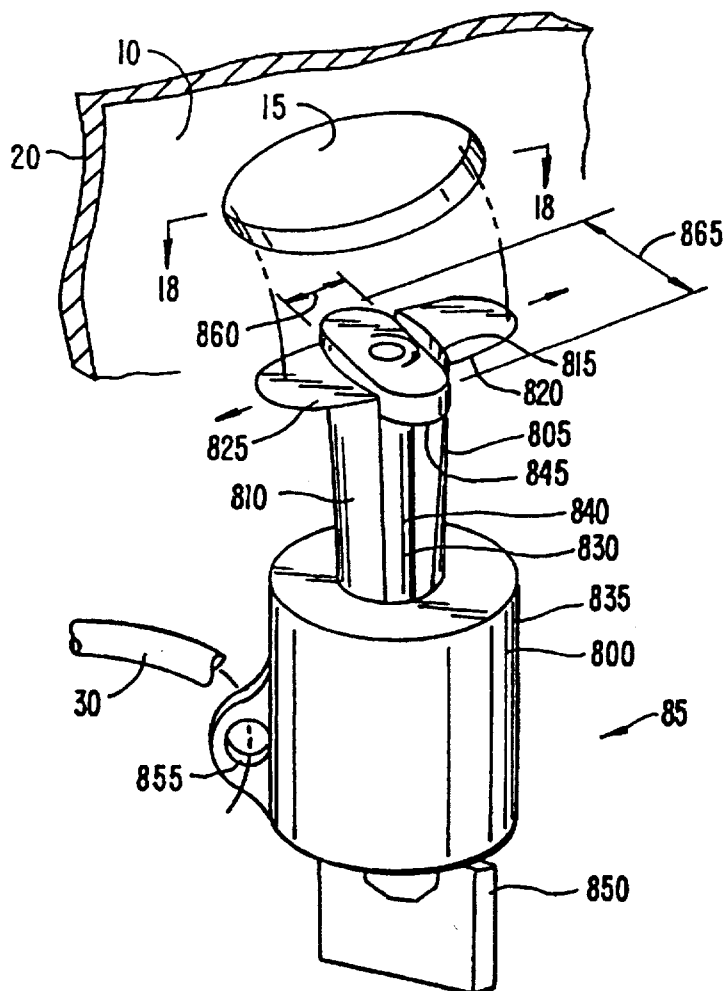


FIG. 17.

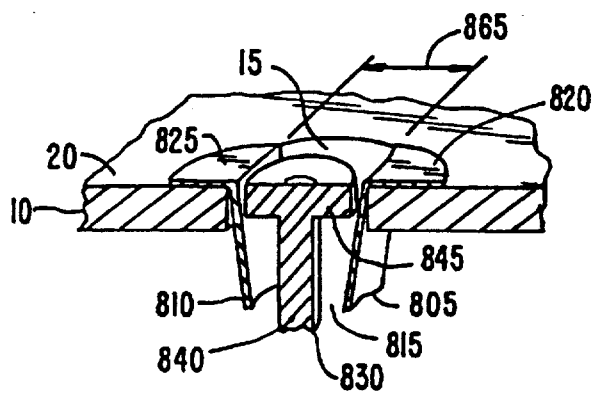


FIG. 18.

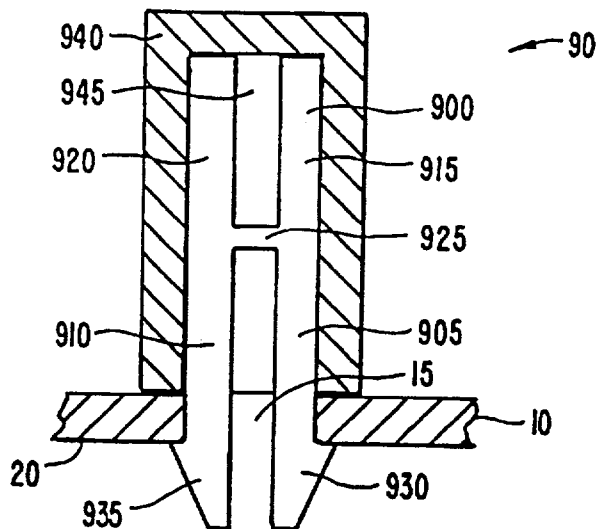


FIG. 19.

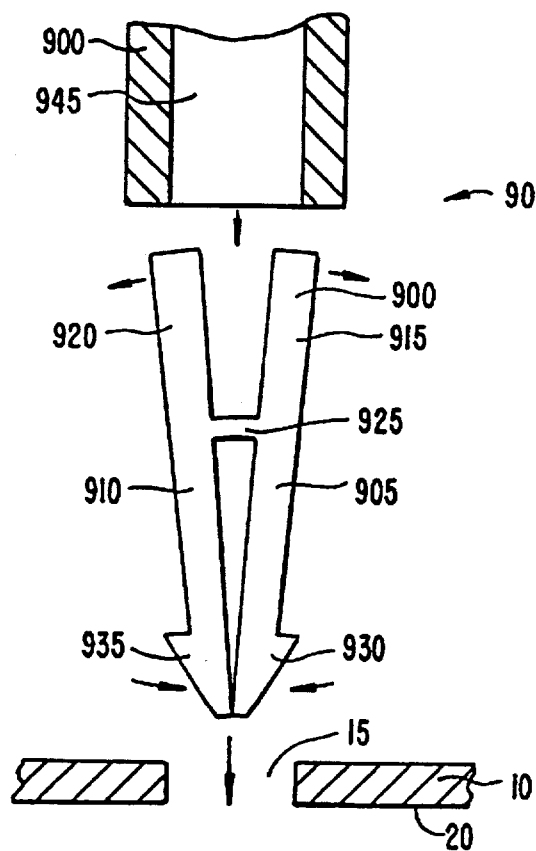


FIG. 20.

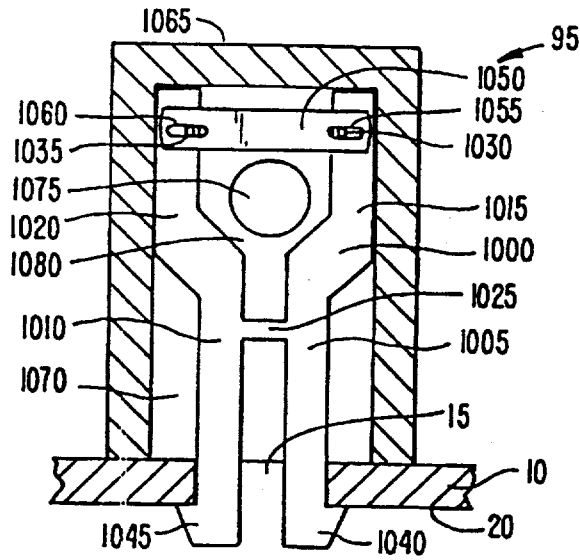


FIG. 21.

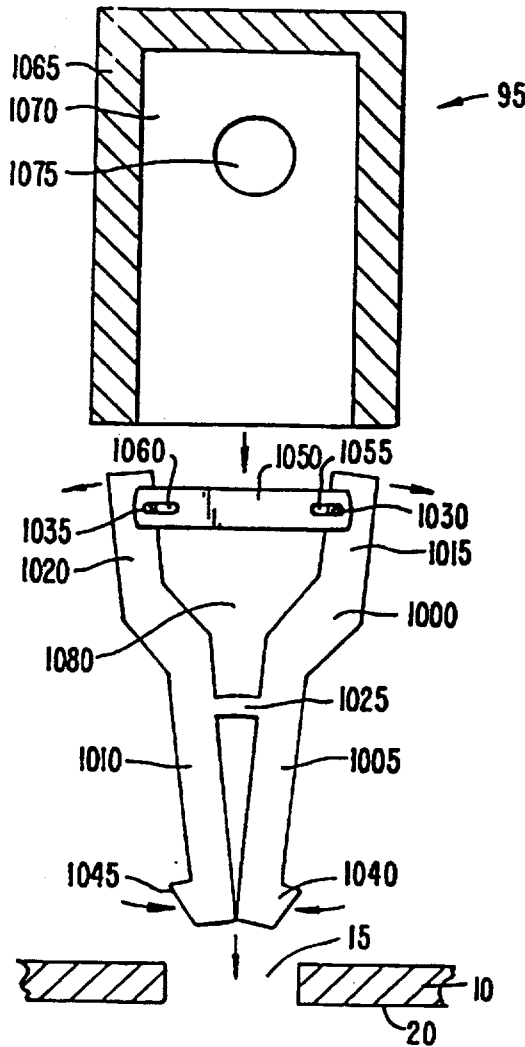


FIG. 22.

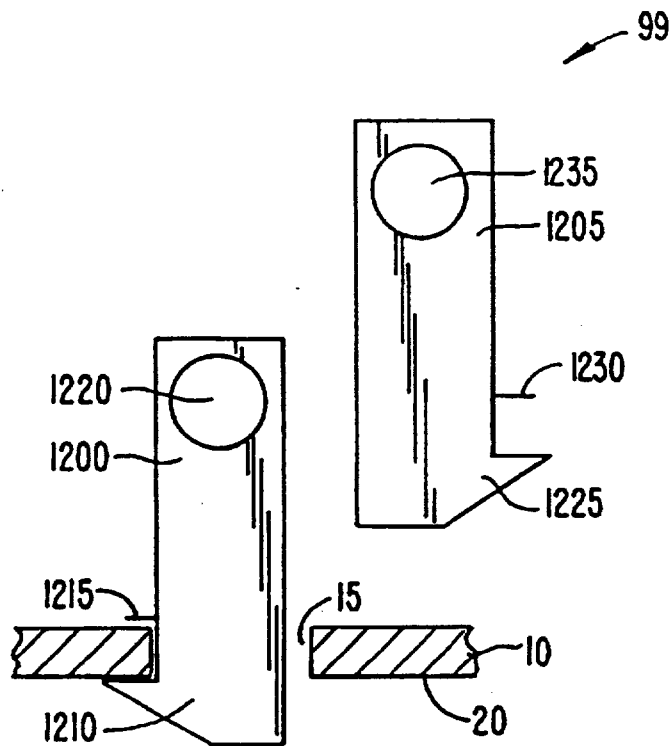


FIG. 23.

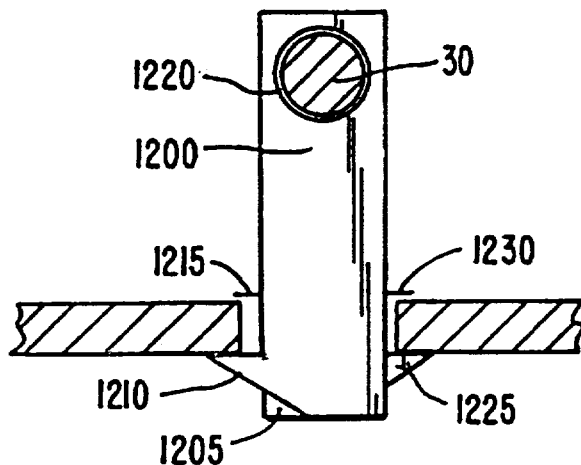


FIG. 24.

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**COMPUTER PHYSICAL SECURITY DEVICE**

This is a Continuation of application Ser. No. 08/385, 715, filed Feb. 8, 1995 now abandoned, the disclosure of which is incorporated by reference.

**BACKGROUND OF THE INVENTION**

The present invention relates generally to devices for inhibiting the theft of relatively small but expensive pieces of equipment. More specifically, the invention relates to a lock interface for a specially designed slot having predetermined dimensions.

Computers have evolved rather rapidly from large, expensive machines usable only by a few, to relatively small, portable machines which are usable by many. In particular, the development of desktop computers with significant processing power has made computers available to the general population. It is now common for college and even high school students to have their own computer, and desktop computers are in wide spread use as word processors and work stations in almost all forms of business. Desktop computers are relatively small and easily transportable, and an undesirable side effect of their proliferation is the fact that the theft of such computers is a significant problem.

A variety of devices have been developed to inhibit the theft of desktop computers and similar equipment. Since desktop computer systems involve several components, typically including the computer itself, a separate monitor, keyboard and often a printer, such security systems often employ a cable which attaches each of the components to each other and to a relatively immovable object such as a desk. The principal difficulty in such systems is providing an effective and convenient method for attaching the cable itself to the equipment.

Kensington Microware Limited, assignee of this application, currently provides a security system which is especially designed for use with particular Apple computers. Certain Apple computer components have slots and internal brackets designed to capture a specially designed tab inserted through the slot so that the tab is not removable. While this system is effective for particular types of Apple computers, it does not work for those Apple computer components and other computer brands which do not have the special designed slots and brackets.

It is undesirable to require a computer to have specially designed slots and internal capture brackets because the brackets occupy a significant amount of space in an item of equipment which is intended to be as space efficient as possible. Different items of Apple equipment require different sized slots, meaning that the security mechanism must provide a variety of different sized tabs. The tabs, once inserted, cannot be removed without damage to the equipment, meaning that the security system cannot be moved from one computer to the other. Even Apple computers with specially designed slots are typically used with peripheral equipment which does not have them, and, the Kensington system provides screws requiring a special screwdriver which replace the screws used to attach the existing communication cables, securing the peripheral equipment to the base computer by preventing unauthorized removal of the communication cables. This last aspect of the system has a drawback in that the peripheral equipment cannot be removed from the base computer without the special screwdriver, which can be lost or misplaced.

Other vendors provide security systems which are not required to interface directly with special slots and capture

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mechanisms as provided in certain Apple computers. For example, Secure-It, Inc., under the trademark "KABLIT", provides a variety of brackets attached to the computer component using existing mounting screws, i.e., screws which are already used to secure items of equipment within the cabinet. Typically, the bracket is apertured so that passage of the cable through the aperture prevents access to the mounting screw and thus prevents removal of the bracket from the equipment. A deficiency of this type of system is that it requires the removal of the existing mounting screw, which may cause some damage to the internal components of the computer. Suitable existing screws are not always available on certain peripherals for convenient attachment of the fastener. For this latter reason, KABLIT also provides glue-on disks which, unfortunately, are permanently secured to the equipment.

The theft of small but expensive equipment such as desktop computers is a growing problem. Existing devices are simply too inefficient or ineffective, or their application is too limited. As a result, the use of such security systems is rare, computer equipment is typically left unprotected, and it is all too often stolen.

**SUMMARY OF THE INVENTION**

The present invention provides a simple yet efficient solution to the prior art problem of inhibiting theft of portable equipment. Specifically, the present invention discloses lock interfaces for a specially designed slot having predetermined dimensions and methods of providing a locking interface to a specially designed slot.

According to a preferred embodiment of the invention, a lock interface includes an anchor spindle and a locking spindle. The anchor spindle includes a neck portion and a head portion, and the locking spindle includes a locking pin. The head portion is adapted for insertion and removal from the specially designed slot when the head portion is aligned with the slot, with the locking pin adapted for insertion and removal from the slot after misaligning the head portion with the slot.

In operation, a user aligns the head portion with the slot, inserts the head portion into the slot, and then misaligns the head portion with the slot. The user then inserts the locking spindle into the slot, thereby inhibiting re-alignment of the head portion with the slot.

Alternative embodiments of the invention include: a lock interface with a first leg and an optional second leg, each having flanges that engage the inner surface of the slot in a locked position but not when the legs are in an unlocked position, and a spacer is interposed between the legs inhibiting the legs from moving from the locked position to the unlocked position; and a lock interface with a first and second legs as above and including a first handle, a second handle, and a retainer coupled to the handles inhibiting the legs from moving from the locked position to the unlocked position.

The preferred embodiment of the invention includes a method of attaching a locking interface to a slot in a computer device having the steps of: aligning a head portion of an anchor spindle with the slot, inserting the head portion into the slot, mis-aligning the head portion with the slot to inhibit removal of the head portion from the slot, and inserting a locking pin of a locking spindle into the slot to inhibit the head portion from aligning with the slot.

Further understanding of the nature and advantages of the invention may be realized by reference to the remaining

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portions of the Specification and Drawings. In the drawings, similarly numbered items represent the same or functionally equivalent structures.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a typical use of an embodiment of the present invention;

FIG. 2 is a perspective view of an embodiment of the present invention;

FIG. 3 is a perspective view illustrating the head portion of an embodiment of the present invention aligned and inserted into the slot;

FIG. 4 is another perspective view illustrating the head portion of an embodiment of the present invention inserted and misaligned with the slot;

FIG. 5 is a perspective view illustrating the head portion of an embodiment of the present invention engaging the inner surface and the locking pin inserted in the slot;

FIG. 6 is a lock interface that is an alternative embodiment to the lock interface shown in FIGS. 2-5;

FIG. 7 illustrates another embodiment of a lock interface;

FIG. 8 illustrates another embodiment of a lock interface;

FIG. 9 illustrates another embodiment of a lock interface;

FIG. 10 is an elevation of FIG. 9, illustrating the head portion engaging the inner surface and the locking pin inserted into the slot;

FIG. 11 illustrates another embodiment of a lock interface;

FIG. 12 is another view of the lock interface in FIG. 11 with the first leg and the second leg in the first position;

FIG. 13 illustrates another embodiment of lock interface;

FIG. 14 is another view of the lock interface in FIG. 13 with the first leg and the second leg in the second position;

FIG. 15 illustrates another embodiment of lock interface;

FIG. 16 is another view of the lock interface in FIG. 15 with the first leg and the second leg in the second position;

FIG. 17 illustrates another embodiment of a lock interface;

FIG. 18 is another view of the lock interface in FIG. 17 with the first leg and the second leg in the second position;

FIG. 19 illustrates another embodiment of lock interface;

FIG. 20 is another view of the lock interface in FIG. 19 with the first leg and the second leg in the first position;

FIG. 21 illustrates another embodiment of lock interface;

FIG. 22 is another view of the lock interface in FIG. 21 with the first leg and the second leg in the second position;

FIG. 23 illustrates another embodiment of a lock interface; and

FIG. 24 is another view of the lock interface in FIG. 23 with the flange and the flange engaging the inner surface.

#### DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

FIG. 1 illustrates a typical use of an embodiment of the present invention. A portable computer 5 has a wall 10 provided with a slot 15. Wall 10 includes an inner surface 20. A lock interface 25 is engageable with wall 10 through slot 15. A locking mechanism 30, according to the preferred embodiment, includes a cable 35 and a lock 40. In operation, a user inserts lock interface 25 into slot 15 and engages lock interface 25 with inner surface 20. Once engaged, a user can attach lock interface 25 to a stationary object with cable 35

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and lock 40. Locking mechanism 30 may include other objects, such as a shackle of padlock coupling a cable to the stationary object.

FIG. 2 is a perspective view of an embodiment of the present invention including a lock interface 25. Slot 15 has a small dimension 42 and a large dimension 44. Lock interface 25 includes an anchor spindle 100 having a body portion 105. Body portion 105 includes an aperture 110, two engagement members (engagement member 115 and engagement member 120), a neck portion 125, and a head portion 130. Neck portion 125 has a length exceeding a thickness of wall 10, enabling head portion 130 to be fully inserted into slot 15. In the preferred embodiment, head portion 130 preferably has a shape conforming to slot 15. Lock interface 25 also includes a locking spindle 140 having a body portion 145. Body portion 145 includes an aperture 150, two engagement members (engagement member 155 and engagement member 160), and a locking pin 165.

In operation, a user aligns head portion 130 with slot 15 and inserts head portion 130 into slot 15. FIG. 3 is a perspective view illustrating head portion 130 of an embodiment of the present invention aligned and inserted into slot 15. FIG. 4 is another perspective view illustrating head portion 130 of an embodiment of the present invention inserted and misaligned with slot 15. Mis-aligning head portion 130 with slot 15 engages head portion 130 with inner surface 20 of wall 10, thereby inhibiting removal of lock interface 25 from computer 5. Subsequent insertion of locking pin 165 into slot 15 inhibits re-alignment of head portion 130 with slot 15. FIG. 5 is a perspective view illustrating head portion 130 of an embodiment of the present invention engaging inner surface 20 and locking pin 165 inserted into slot 15. Engaging engagement member 115 with engagement member 160, and engagement member 120 with engagement member 155 (not shown) engages anchor spindle 100 with locking spindle 160. In the preferred embodiment, the size of neck portion 125 together with locking pin 165 exceeds small dimension 42 of slot 15, inhibiting rotation of locking spindle 140 and anchor spindle 100 together as a unit into slot 15, thereby inhibiting realignment of head portion 130 with slot 15. Inserting a locking mechanism 30 through aperture 110 and aperture 150 maintains the engagement of anchor spindle 100 with locking spindle 140, and can be used to lock the computer 5 to a stationary object.

FIG. 6 is a lock interface that is an alternative embodiment to the lock interface shown in FIGS. 2-5. Lock interface 50 does not have engagement members 115, 120, 155, or 160 on anchor spindle 100 or locking spindle 140. Lock interface 50 includes a locking pin 170 that has a depth at least equal to the depth of neck portion 125 including head portion 130.

In operation, a user aligns head portion 130 with slot 15 and inserts head portion 130 into slot 15. Misaligning head portion 130 with slot 15 engages head portion 130 with inner surface 20 of wall 10, thereby inhibiting removal of lock interface 50 from computer 5. Subsequent insertion of a locking pin 165 into slot 15 inhibits realignment of head portion 130.

In the preferred embodiment, the locking pin 170 physically inhibits rotation of head portion 130 within slot 15, thereby inhibiting re-alignment of head portion 130 with slot 15. Inserting a locking mechanism 30 through aperture 110 and aperture 150 maintains insertion of locking pin 165 and head portion 130 into slot 15, and can be used to lock the computer 5 to a stationary object



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FIG. 7 illustrates another embodiment of a lock interface 55. Lock interface 55 includes an anchor spindle 200 having a body portion 205. Body portion 205 includes an aperture 210, two engagement members (engagement member 215 and engagement member 220), a neck portion 225, and a head portion 230. The vertical sides of anchor spindle 200 form engagement member 215 and engagement member 220. Neck portion 225 has a length exceeding the thickness of wall 10 enabling head portion 230 to be fully inserted into slot 15. Head portion 230 preferably has a shape conforming to slot 15. Lock interface 55 also includes a locking spindle 240 having a body portion 245. Body portion 245 includes an aperture 250, two engagement members (engagement member 255 and engagement member 260), and a locking pin 265. The curved portions of locking spindle 240 form engagement member 255 and engagement member 260.

In operation, a user aligns head portion 230 with slot 15 and inserts head portion 230 into slot 15. Misaligning head portion 230 with slot 15 engages head portion 230 with inner surface 20 of wall 10, thereby inhibiting removal of lock interface 55 from computer 5. Subsequent insertion of locking pin 265 into slot 15 inhibits realignment of head portion 230 with slot 15. Sliding engagement member 220 over engagement member 255 and engagement member 215 over engagement member 260 engages locking spindle 240 with anchor spindle 200.

In the preferred embodiment, the size of neck portion 223 together with locking pin 265 exceed smaller dimension 42 of slot 15, inhibiting rotation of locking spindle 240 and anchor spindle 200 together as a unit within slot 15, thereby inhibiting re-alignment of head portion 230 with slot 15. Inserting a locking mechanism 30 through aperture 210 and aperture 250, maintains the engagement of anchor spindle 200 with locking spindle 240, and can be used to lock the computer 5 to a stationary object.

FIG. 8 illustrates another embodiment of a lock interface 60. Lock interface 60 includes an anchor spindle 300 having a neck portion 305 and a head portion 310. Head portion 310 preferably has a shape conforming to slot 15. Lock interface 60 also includes a locking spindle 315 having a body portion 320. Body portion 320 includes two locking pins (locking pin 325 and locking pin 330), and an engagement aperture 335. Neck portion 305 is adapted to engage locking spindle 335.

In operation, a user aligns head portion 310 with slot 15 and inserts head portion 310 into slot 15. Subsequent insertion of neck portion 305 through engagement aperture 335 allows movement of locking spindle 315 down neck portion 305 until locking pin 325 and locking pin 330 protrude into slot 15. Mis-aligning head portion 310 with slot 15, engages head portion 310 with inner surface 20 thereby inhibiting removal of lock interface 60 from computer 5. Attaching a locking mechanism 30 to anchor spindle 300 maintains engagement of head portion 310 with inner surface 20, and can be used to lock the computer 5 to a stationary object.

An alternative embodiment of the invention shown in FIG. 8, the locking spindle 315 may include a single locking pin 325.

FIG. 9 illustrates another embodiment of a lock interface 65. Lock interface 65 includes a locking spindle 400 having a cylindrical shaped body 405. Cylindrical shaped body 405 includes an aperture 410 in an engagement handle 415, and two locking pins (locking pin 420 and locking pin 425). Lock interface 65 also includes an anchor spindle 430 having a hollow cylindrical shaped body 435. Hollow cylindrical shaped body 435 includes a central cavity 440, an

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engagement slot 445, an aperture 450 in a handle 455, two locking pin apertures, locking pin aperture 460 and locking pin aperture 465 (not shown), a neck portion 470, and a head portion 475. Neck portion 470 has a length exceeding the thickness of wall 10 enabling head portion 470 to be fully inserted into slot 15. Head portion 475 has a shape conforming to slot 15 in dimensions. FIG. 10 is an elevation of FIG. 9, illustrating head portion 470 engaging inner surface 20 and locking pin 420 inserted into slot 15.

Locking spindle 400 is inserted in central cavity 440 with engagement handle 415 slidably insertable into engagement slot 445. Anchor spindle 430 is adapted to allow locking spindle 400 to move co-axially within anchor cavity 440 towards and away from head portion 475 so as to insert and withdraw locking pin 420 and locking pin 425 from locking pin aperture 460 and locking pin aperture 465.

In operation, a user aligns head portion 475 with slot 15 and inserts head portion 475 into slot 15. Aligning locking pin aperture 460 and locking pin aperture 465 with slot 15 mis-aligns head portion 475 with slot 15, thereby engaging head portion 475 with inner surface 20 and inhibiting removal of lock interface 65 from computer 5. Subsequent insertion of locking spindle 400 into central cavity 440 and insertion of engagement handle 415 in engagement slot 445, moves locking spindle 400 co-axially in central cavity 440 towards wall 10 until locking pin 420 protrudes through locking pin aperture 460 and into slot 15 and until locking pin 425 protrudes through locking pin aperture 465 and into slot 15.

In the preferred embodiment, the size of neck portion 470 together with locking pin 420 exceed smaller dimension 42 of slot 15, inhibiting rotation of locking spindle 400 and anchor spindle 430 within slot 15, thereby inhibiting re-alignment of head portion 475 with slot 15. Locking a locking mechanism 30 through aperture 410 and aperture 450 maintains the engagement of locking spindle 400 to anchor spindle 430, and can be used to lock the computer 5 to a stationary object.

FIG. 11 illustrates another embodiment of a lock interface 70. Lock interface 70 includes an engagement member 500. Engagement member 500 includes a first leg 505, a second leg 510, a first aperture 515 between first leg 505 and second leg 510, a second aperture 520 between first leg 505 and second leg 510, and a space 525 between first leg 505 and second leg 510. First leg 505 includes a flange 530 at a distal end that is flanged away from second leg 510, and second leg 510 includes a flange 535 at a distal end that is flanged away from first leg 505. Lock interface 70 also includes a retainer 540. Retainer 540 includes a cavity 545, a spacer 550, and an aperture 555.

Engagement member 500 is slidably disposed within cavity 545 with spacer 550 being fixed in relation to retainer 540. Spacer 550 is small enough to freely slide within space 525, but is large enough to inhibit first leg 505 and second leg 510 from being squeezed together as illustrated in FIG. 11. When spacer 550 is located at first aperture 515 or second aperture 520, first leg 505 and second leg 510 can be squeezed together. This squeezed position defines a first position, and the unsqueezed position defines a second position. FIG. 12 is another view of the lock interface in FIG. 11 with first leg 505 and second leg 510 in the first position. When first leg 505 and second leg 510 are in the first position, flange 530 and flange 535 are insertable and removable from the slot 15. FIG. 11 illustrates that when first leg 505 and second leg 510 are in the second position, flange 530 and flange 535 are engageable with inner surface 20.

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In operation, a user withdraws engagement member 500 from cavity 545 until spacer 550 is located at first aperture 515 (or second aperture 520). Squeezing first leg 505 and second leg 510 together moves first leg 505 and second leg 510 into the first position, allowing insertion of flange 530 and flange 535 into slot 15. Returning first leg 505 and second leg 510 to the second position allows flange 530 and flange 535 to engage inner surface 20. Subsequent movement of retainer 545 towards wall 10 until retainer 545 abuts wall 10, locates spacer 550 in space 525 but not within first aperture 515 or second aperture 520 and co-aligns aperture 555 with second aperture 520. In the preferred embodiment, locating spacer 550 in space 525 but not within first aperture 515 or second aperture 520, inhibits moving first leg 505 and second leg 510 into the first position. Locking a locking mechanism 30 through aperture 555 and second aperture 520 maintains the engagement of engagement member 500 with inner surface 20, and can be used to lock the computer 5 to a stationary object.

FIG. 13 illustrates another embodiment of lock interface 75. Lock interface 75 includes an engagement member 600. Engagement member 600 includes a first leg 605, a second leg 610, and a space 615 between first leg 605 and second leg 610. First leg 605 includes a flange 620 at a distal end that is flanged away from second leg 610, and second leg 610 includes a flange 625 at a distal end that is flanged away from first leg 605. Lock interface 75 also includes a spacer 630 having a ramped portion 635, and a spacer mover 635. Spacer mover 635 includes a housing 640, a rotatable shaft 645, a cam 650, and an aperture 655.

Spacer 630 is slidably disposable within space 615 by the movement of cam 650. When spacer 630 is not disposed between first leg 605 and second leg 610, this default position defines a first position, and when spacer 630 is disposed between first leg 605 and second leg 610 the position defines a second position. FIG. 13 illustrates that when first leg 605 and second leg 610 are in the first position, flange 620 and flange 625 are insertable and removable from the slot 15. FIG. 14 is another view of the lock interface in FIG. 13 with first leg 605 and second leg 610 in the second position. When first leg 605 and second leg 610 are in the second position, flange 620 and flange 625 are engageable with inner surface 20. A ramped portion 635 of spacer 630 is used to smoothly move first leg 605 and second leg 610 from the first position to the second position.

In operation, when first leg 605 and second leg 610 are in the first position, a user inserts flange 620 and flange 625 into slot 15. Rotating rotatable shaft 645 relative to housing 640 causes cam 650 to insert spacer 630 into space 615 which causes first leg 605 and second leg 610 to move into the second position. When first leg 605 and second leg 610 reach the second position, flange 620 and flange 625 engage inner surface 20. Locking a locking mechanism 30 through aperture 655 maintains the engagement of engagement member 600 with inner surface 20, and can be used to lock the computer 5 to a stationary object.

FIG. 14 illustrates another embodiment of lock interface 80. Lock interface 80 includes an engagement member 700. Engagement member 700 includes a first leg 705, a second leg 710, and a space 715 between first leg 705 and second leg 710. First leg 705 includes a flange 720 at a distal end that is flanged away from second leg 710, and second leg 710 includes a flange 725 at a distal end that is flanged away from first leg 705. Lock interface 80 also includes a spacer 730 and a shaft 735.

Spacer 730 is slidably disposable within space 715 in response to the movement of shaft 735 in space 715. When

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spacer 730 is not disposed between first leg 705 and second leg 710, this default position defines a first position, and when spacer 730 is disposed between first leg 705 and second leg 710 the position defines a second position. FIG. 14 illustrates that when first leg 705 and second leg 710 are in the first position, flange 720 and flange 725 are insertable and removable from the slot 15. FIG. 16 is another view of the lock interface in FIG. 14 with first leg 705 and second leg 710 in the second position. When first leg 705 and second leg 710 are in the second position, flange 720 and flange 725 are engageable with inner surface 20.

In operation, when first leg 705 and second leg 710 are in the first position, a user inserts spacer 730, flange 720, and flange 725 into slot 15. Withdrawing shaft 735 partially from slot 15 while maintaining the position of first leg 705 and second leg 710 to the slot 15, forces spacer 730 into space 715 which causes first leg 705 and second leg 710 to move into the second position. When first leg 705 and second leg 710 reach the second position, flange 720 and flange 725 engage inner surface 20.

FIG. 17 illustrates another embodiment of a lock interface 85. Lock interface 85 includes an engagement member 800. Engagement member 800 includes a first leg 805, a second leg 810, and a space 815 between first leg 805 and second leg 810. First leg 810 includes a flange 820 at a distal end that is flanged away from second leg 810, and second leg 810 includes a flange 825 at a distal end that is flanged away from first leg 805. Lock interface 85 also includes a spacer mechanism 830. Spacer mechanism 830 includes a housing 835, a shaft 840, a head portion 845, a removable knob 850, and an aperture 855. Head portion 845 is oval in shape and has a smaller diameter 860 and a larger diameter 865.

First leg 805 and second leg 810 are fixed to housing 835 with shaft 840 and head portion 845 rotatably interspersed in space 815 between first leg 805 and second leg 810. When smaller diameter 860 is interposed between first leg 805 and second leg 810, the position defines a first position, and when larger diameter 865 is interposed between first leg 805 and second leg 810, the position defines a second position. FIG. 18 illustrates that when first leg 805 and second leg 810 are in the first position, flange 820 and flange 825 are insertable and removable from the slot 15. FIG. 18 is another view of the lock interface in FIG. 17 with first leg 805 and second leg 810 in the second position. When first leg 805 and second leg 810 are in the second position, flange 820 and flange 825 are engageable with inner surface 20. Smaller diameter 860 and larger diameter 865 of head portion 845 are interposed between first leg 805 and second leg 810 by rotating removable knob 850 relative to housing 835. Rotating removable knob 850 causes shaft 840 and head portion 845 to rotate relative to first leg 805 and second leg 810.

In operation, when first leg 805 and second leg 810 are in the first position, a user inserts head portion 845, flange 820, and flange 825 into slot 15. Rotating removable knob 850, shaft 840, and head portion 845 relative to housing 835 causes larger diameter 865 to be interposed between first leg 805 and second leg 810 and causes first leg 805 and second leg 810 to move into the second position. When first leg 805 and second leg 810 reach the second position, flange 820 and flange 825 engage inner surface 20. Removing removable knob 850 and locking a locking mechanism 30 through aperture 855 maintains the engagement of engagement member 800 with inner surface 20, and can be used to lock the computer 5 to a stationary object.

FIG. 19 illustrates another embodiment of lock interface 90. Lock interface 90 includes an engagement member 900.

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Engagement member 900 includes a first leg 905, a second leg 910, a first handle 915, a second handle 920, and an articulation point 925. First leg 905 includes a flange 930 at a distal end that is flanged away from second leg 910, and second leg 910 includes a flange 935 at a distal end that is flanged away from first leg 905. Lock interface 90 also includes a retainer 940 having a cavity 945.

First leg 905 and second leg 910 are coupled to each other at articulation point 925. When first leg 905 and second leg 910 move towards each other, defining a first position, first handle 915 and second handle 920 are moved away from each other, and when first handle 915 and second handle 920 are moved towards each other, first leg 905 and second leg 910 move away from each other, defining a second position. FIG. 20 is another view of the lock interface in FIG. 19 with first leg 905 and second leg 910 in the first position. When first leg 905 and second leg 910 are in the first position, flange 930 and flange 935 are insertable and removable from slot 15. FIG. 19 illustrates that when first leg 905 and second leg 910 are in the second position, flange 930 and flange 935 are engageable with inner surface 20.

In operation, a user squeezes first leg 905 and second leg 910 into the first position, and inserts flange 930 and flange 935 into slot 15. Returning first leg 905 and second leg 910 to the second position allows engaging flange 930 and flange 935 with inner surface 20. Subsequent movement of retainer 940 towards wall 10 until retainer 545 abuts wall 10, prevents access to engagement member 900. In the preferred embodiment, access to first leg 905, second leg 910, first handle 915 and second handle 920 is prevented, maintaining the second position of first leg 905 and second leg 910, thereby maintaining the engagement of flange 930 and flange 935 with inner surface 20.

FIG. 21 illustrates another embodiment of lock interface 95. Lock interface 95 includes an engagement member 1000. Engagement member 1000 includes a first leg 1005, a second leg 1010, a first handle 1015, a second handle 1020, and an articulation point 1025. First handle 1015 includes a retaining pin 1030, and second handle 1020 includes a retaining pin 1035. First leg 1005 includes a flange 1040 at a distal end that is flanged away from second leg 1010, and second leg 1010 includes a flange 1045 at a distal end that is flanged away from first leg 1005. Lock interface 95 also includes a retaining clip 1050 having a first aperture 1055 and a second aperture 1060 and a retainer 1065 having a cavity 1070 and an aperture 1075. Retaining clip 1050, first handle 1015, and second handle 1020 together define an aperture 1080.

Retaining pin 1025 and retaining pin 1030 are inserted into first aperture 1055 and into second aperture 1060, respectively. Retaining clip 1050 limits the range of motion of first handle 1015 and second handle 1020. First leg 1005 and second leg 1010 are coupled to each other at articulation point 1025. When first leg 1005 and second leg 1010 move towards each other, defining a first position, first handle 1015 and second handle 1020 are moved away from each other, and when first handle 1015 and second handle 1020 are moved towards each other, first leg 1005 and second leg 1010 move away from each other, defining a second position. FIG. 21 illustrates that when first leg 1005 and second leg 1010 are in the first position, flange 1040 and flange 1045 are insertable and removable from slot 15. FIG. 22 is another view of the lock interface in FIG. 21 with first leg 1005 and second leg 1010 in the second position. When first leg 1005 and second leg 1010 are in the second position, flange 1040 and flange 1045 are engageable with inner surface 20.

In operation, a user squeezes first leg 1005 and second leg 1010 into the first position, and inserts flange 1040 and

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flange 1045 into slot 15. Returning first leg 1005 and second leg 1010 to the second position allows engaging flange 1040 and flange 1045 with inner surface 20. Subsequent insertion of engagement member 1000 into cavity 1070 and movement of retainer 1065 until retainer 1065 abuts wall 10, co-aligns aperture 1075 and aperture 1080, and prevents access to engagement member 1000. In the preferred embodiment, access to first leg 1005, second leg 1010, first handle 1015, and second handle 1020 is prevented, maintaining positioning of first leg 1005 and second leg 1010 in the second position, thereby maintaining engagement of flange 1040 and flange 1045 with inner surface 20. Inserting a locking mechanism 30 through aperture 1075 and aperture 1080 maintains positioning of retainer 1065 to engagement member 1000, and can be used to lock the computer 5 to a stationary object.

FIG. 23 illustrates another embodiment of a lock interface 99. Lock interface 99 includes a first engagement member 1200 and a second engagement member 1205. First engagement member 1200 includes a flange 1210 at a distal end, a catch 1215, and an aperture 1220. Second engagement member 1205 includes a flange 1225 at a distal end, a catch 1230 and an aperture 1235.

First engagement member 1200 and second engagement member 1205 are independently insertable and removable from slot 15. When inserted into slot 15, flange 1210 and flange 1225 are engageable with inner surface 20. Catch 1215 and catch 1230 inhibit first engagement member 1200 and second engagement member 1205 from being fully inserted into slot 15, respectively. FIG. 23 illustrates flange 1210 of first engagement member 1200 engaging the inner surface 20 whereas second engagement member 1205 has not been inserted from slot 15. FIG. 24 is another view of the lock interface in FIG. 23 with flange 1210 and flange 1225 engaging inner surface 20.

In operation, a user inserts flange 1210 of first engagement member 1200 into slot 15 and engages flange 1210 with inner surface 20. Subsequent insertion of flange 1225 of second engagement member 1205 into slot 15, with flange 1225 pointing in a direction opposite that of flange 1210, engages flange 1225 with inner surface 20. Inserting a locking mechanism 30 through aperture 1210 and 1220 maintains engagement of flange 1210 and flange 1225 with inner surface 20 and can be used to lock the computer 5 to a stationary object.

In the foregoing specification, the invention has been described with reference to a specific exemplary embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the invention as set forth in the claims.

Many changes or modifications are readily envisioned, for example, changing the shape of the slot and the shape of the head portion, adding catches to the engagement members, and changing the shape of the flanges among other changes. The specification and drawings are, accordingly, to be regarded in an illustrative rather than in a restrictive sense.

We claim:

1. A security lock system, comprising:
  - a portable electronic device having an external wall defining a security slot;
  - locking means for attaching to a first object other than to the portable electronic device;
  - a locking member having a peripheral profile complementary to preselected dimensions of said security slot, said locking member adapted for insertion into and

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withdrawal from said slot when in a first position and for engagement with an interior surface of said wall when in a second position such that said locking member is associated with said portable device while in said second position;

a pin adapted for insertion into and withdrawal from said slot when said locking member is in said second position, said pin inhibiting transition of said locking member from said second position to said first position; and

means, coupled to said pin, for attaching to said locking means and for inhibiting removal of said pin from said slot.

2. The security lock of claim 1 wherein said peripheral profile matches said security slot.

3. A security lock system, comprising:

a portable electronic device having an external wall defining a security slot;

a locking member having a peripheral profile complementary to preselected dimensions of said security slot, said locking member adapted for insertion into and withdrawal from said slot when in a first position and for engagement with an interior surface of said wall when in a second position such that said locking member is associated with said portable device while in said second position;

a pin adapted for insertion into and withdrawal from said slot when said locking member is in said second position, said pin inhibiting transition of said locking member from said second position to said first position; and

pin retaining means coupled to said pin for inhibiting removal of said pin from said slot.

4. The security lock of claim 3 further comprising:

a cable attachment mechanism for associating a cable with the engagement member.

5. The security lock of claim 1 wherein said security slot is rectangular having a length dimension greater than a width dimension.

6. The security lock of claim 1 wherein said locking means is a cable and lock.

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7. The security lock of claim 6 wherein said means for attaching to said locking means further comprises a cable attachment mechanism for associating said pin with said cable.

8. The security lock of claim 3 wherein said security slot is rectangular having a length dimension greater than a width dimension.

9. A security lock system, comprising:

a portable electronic device having an external wall defining a security slot;

a locking spindle having a body portion and a head portion, said head portion having a peripheral profile complementary to said security slot, said head portion adapted for insertion into and withdrawal from said slot when in a first position and for engagement with an interior surface of said wall when in a second position such that said head portion is associated with said portable device while in said second position;

an anchor spindle having a body portion and an anchor portion, said anchor portion adapted for insertion into and withdrawal from said slot when said head portion of the locking spindle is in said second position, said anchor portion inhibiting transition of said head portion from said second position to said first position, and said anchor spindle body portion adapted for association with said locking spindle body portion; and

a locking mechanism, adapted for engaging said anchor spindle body portion and said locking spindle body portion, inhibiting disassociation of said locking spindle and said anchor spindle.

10. The security lock of claim 9 wherein said anchor spindle body portion has at least one engagement member adapted for engaging said anchor spindle body portion to said locking spindle body portion.

11. The security lock of claim 9 wherein said security slot is rectangular having a length dimension greater than a width dimension.

12. The security lock of claim 9 wherein said locking mechanism is a cable for attaching to an object other than to said portable electronic device.

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