UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF TEXAS

MARSHALL DIVISION

ACCO BRANDS, INC. dba KENSINGTON TECHNOLOGY GROUP,

Plaintiff,

v.

ABA LOCKS MANUFACTURER CO., LTD., and BELKIN COMPONENTS,

Defendants.

Case No. 2:02-CV-112

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 ABA Locks Manufacturer Co., Ltd. ("ABA Locks") and Belkin Components ("Belkin") 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. ABA Locks is a foreign corporation, having a principal place of business in Taipei Hsien, Taiwan, R.O.C.

3. Belkin is a corporation duly organized and existing under the laws of the state of California, having a principal place of business in Compton, California.

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 defendants ABA Locks and Belkin in that ABA Locks and Belkin have established minimum contacts with the forum and the exercise of jurisdiction over ABA Locks and Belkin would not offend traditional notions of fair play and substantial justice.

VENUE

5. ABA Locks and Belkin 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 (d) and 1400(b).

INFRINGEMENT OF U.S. PATENT NO. 5,502,989

6. On April 2, 1996, United States Patent No. 5,502,989 was duly and legally issued to Kensington for a computer physical security device. On April 14, 1998, Reexamination Certificate No. B1 5,502,989 was likewise duly and legally issued to Kensington. Together, the Reexamination Certificate and United States Patent No. 5,502,989 constitute a valid and enforceable patent (referred to herein as the "'989 patent"), solely owned by Kensington. A true and correct copy of the '989 patent is attached hereto as Exhibit A.

7. Upon information and belief, ABA Locks and Belkin have infringed and continue to infringe the '989 patent. The infringing acts include but are not limited to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Security C100 Combination Lock and the Notebook Security K100 Key Lock and inducing and contributing to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Security C100 Combination Lock and the Notebook Security K100 Key Lock. Defendants ABA Locks and Belkin are liable for infringement of the '989 patent pursuant to 35 U.S.C. § 271.

8. Defendants ABA Locks' and Belkin's acts of infringement have caused damage to Kensington and Kensington is entitled to recover from ABA Locks and Belkin the damages sustained by Kensington as a result of ABA Locks' and Belkin's wrongful acts in an amount

subject to proof at trial. ABA Locks' and Belkin's infringement of Kensington's exclusive rights under the '989 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, ABA Locks' and Belkin's infringement of the '989 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

10. 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 B.

11. Upon information and belief, ABA Locks and Belkin 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 Security C100 Combination Lock and the Notebook Security K100 Key Lock and inducing and contributing to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Security C100 Combination Lock and the Notebook Security K100 Key Lock. ABA Locks and Belkin are liable for infringement of the '557 patent pursuant to 35 U.S.C. § 271.

12. ABA Locks' and Belkin's acts of infringement have caused damage to Kensington and Kensington is entitled to recover from ABA Locks and Belkin the damages sustained by Kensington as a result of ABA Locks' and Belkin's wrongful acts in an amount subject to proof at trial. ABA Locks' and Belkin'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.

13. Upon information and belief, ABA Locks' and Belkin'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.

INFRINGEMENT OF U.S. PATENT NO. 5,493,878

14. On February 27, 1996, United States Patent No. 5,493,878 (referred to herein as "the '878 patent") was duly and legally issued to Kensington for a computer physical security device. The '878 patent constitutes a valid and enforceable patent solely owned by Kensington. A true and correct copy of the '878 patent is attached hereto as Exhibit C.

15. Upon information and belief, ABA Locks and Belkin have infringed and continue to infringe the '878 patent. The infringing acts include but are not limited to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Security C100 Combination Lock and the Notebook Security K100 Key Lock and inducing and contributing to the manufacture, use, sale, importation, and/or offer for sale of the Notebook Security C100 Combination Lock and the Notebook Security K100 Key Lock. ABA Locks and Belkin are liable for infringement of the '878 patent pursuant to 35 U.S.C. § 271.

16. ABA Locks' and Belkin's acts of infringement have caused damage to Kensington and Kensington is entitled to recover from ABA Locks and Belkin the damages sustained by Kensington as a result of ABA Locks' and Belkin's wrongful acts in an amount subject to proof at trial. ABA Locks' and Belkin's infringement of Kensington's exclusive rights under the '878 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.

17. Upon information and belief, ABA Locks' and Belkin's infringement of the '878 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 ABA Locks and Belkin as follows:

(a) For judgment that the '989 patent, the '557 patent and the '878 patent have been and continue to be infringed by ABA Locks and Belkin;

(b) For an accounting of all damages sustained by Kensington as the result of ABA Locks' and Belkin's acts of infringement;

(c) For preliminary and permanent injunctions enjoining the aforesaid acts of infringement by ABA Locks and Belkin, their officers, agents, servants, employees, subsidiaries and attorneys, and those persons acting in concert with ABA Locks and Belkin, 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 R Faulkner

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US005502989A

United States Patent [19]

Murray, Jr. et al.

[11] Patent Number: 5,502,989

[45] Date of Patent: Apr. 2, 1996

[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: **Kensington Microware Limited**, San Mateo, Calif.

[21] Appl. No.: **307,113**

[22] Filed: **Sep. 16, 1994**

Related U.S. Application Data

[60] Division of Ser. No. 138,634, Oct. 15, 1993, which is a continuation-in-part of Ser. No. 42,851, Apr. 5, 1993, Pat. No. 5,381,685, which is a continuation of Ser. No. 824,964, Jan. 24, 1992, abandoned, and a continuation-in-part of Ser. No. 6,311, Jan. 19, 1993, abandoned.

[51] **Int. Cl.**[6] **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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Apple Security Bracket Sold in AS Kit.

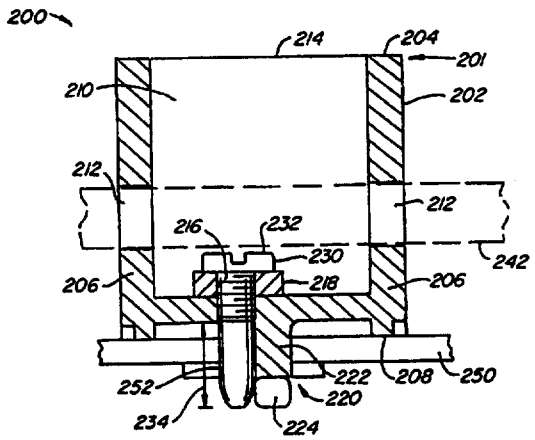
Primary Examiner—Darnell M. Boucher

Attorney, Agent, or Firm—Townsend and Townsend and Crew

[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 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.

12 Claims, 11 Drawing Sheets



EXHIBIT

A

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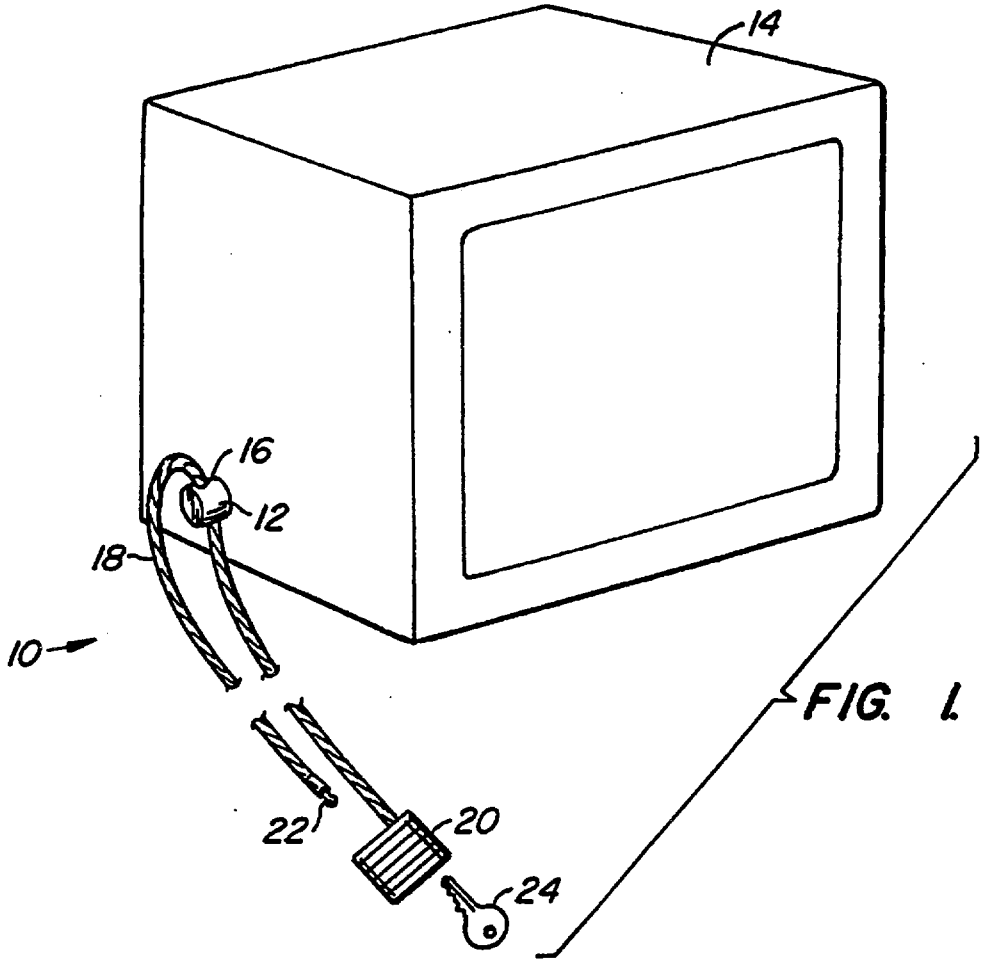

FIG. 1.

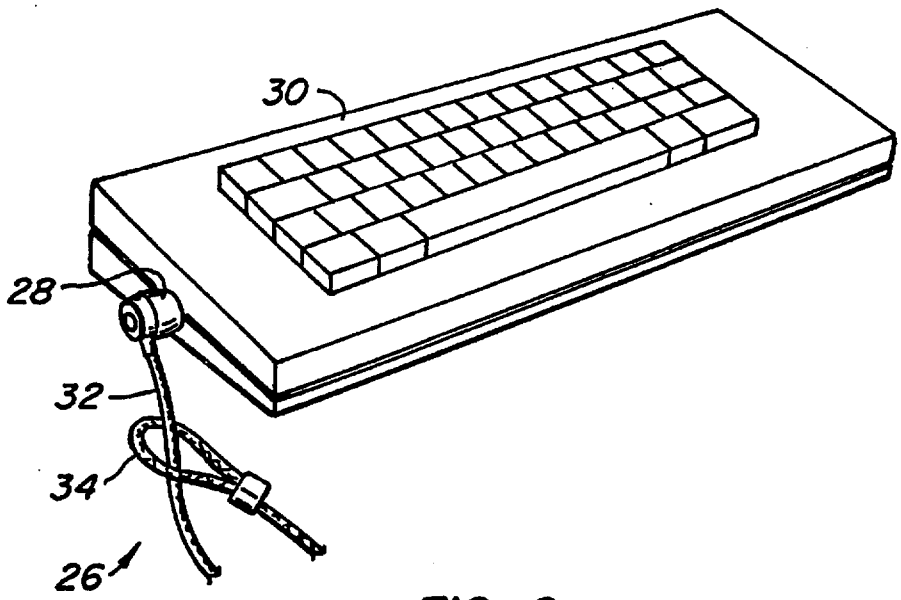

FIG. 2.

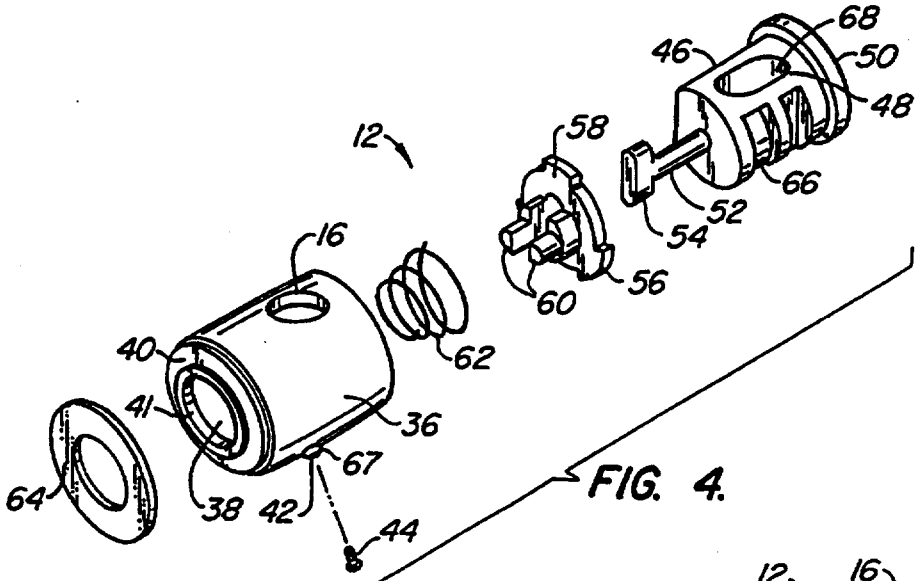

FIG. 4.

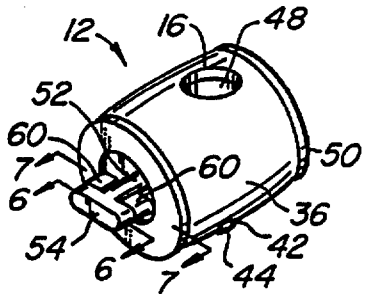

FIG. 3.

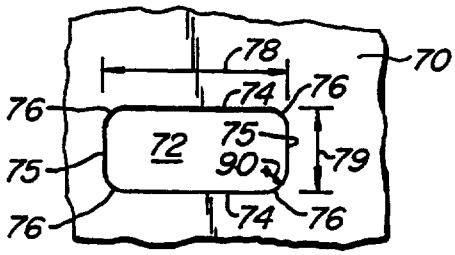

FIG. 5.

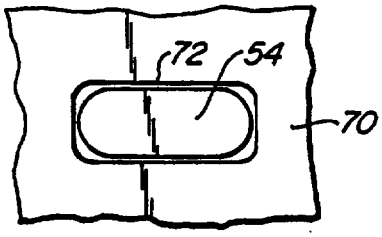

FIG. 8.

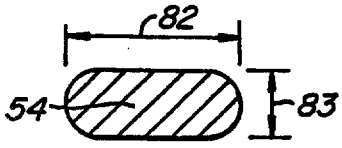

FIG. 6.

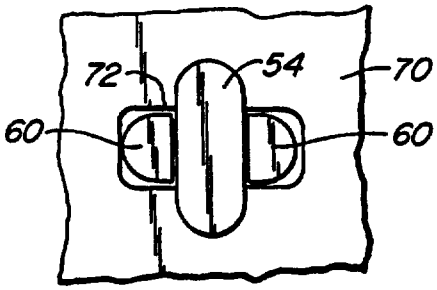

FIG. 9.

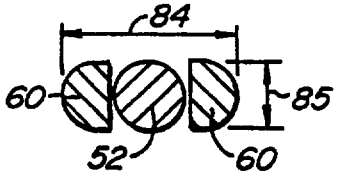

FIG. 7.

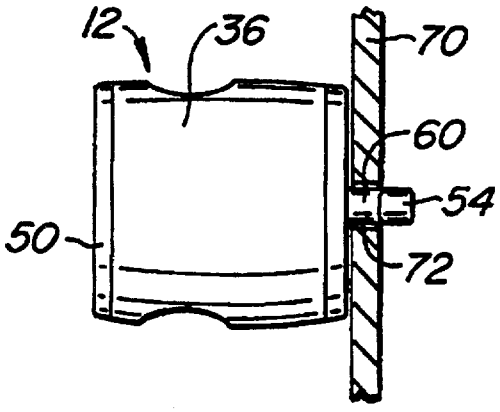

FIG. 10A.

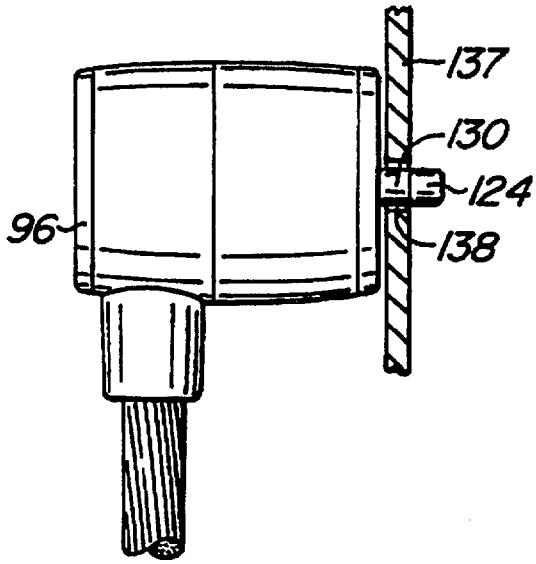

FIG. 13A.

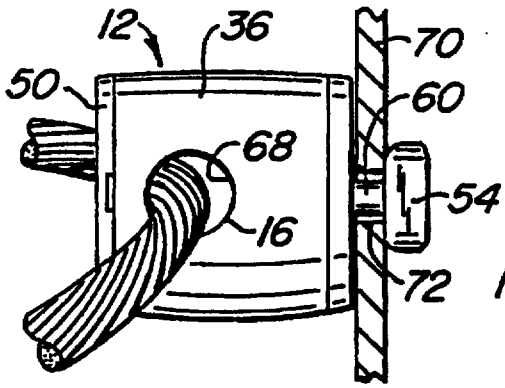

FIG. 10B.

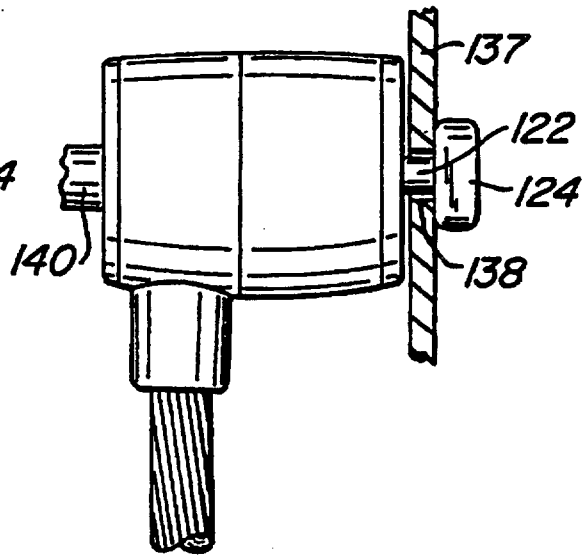

FIG. 13B.

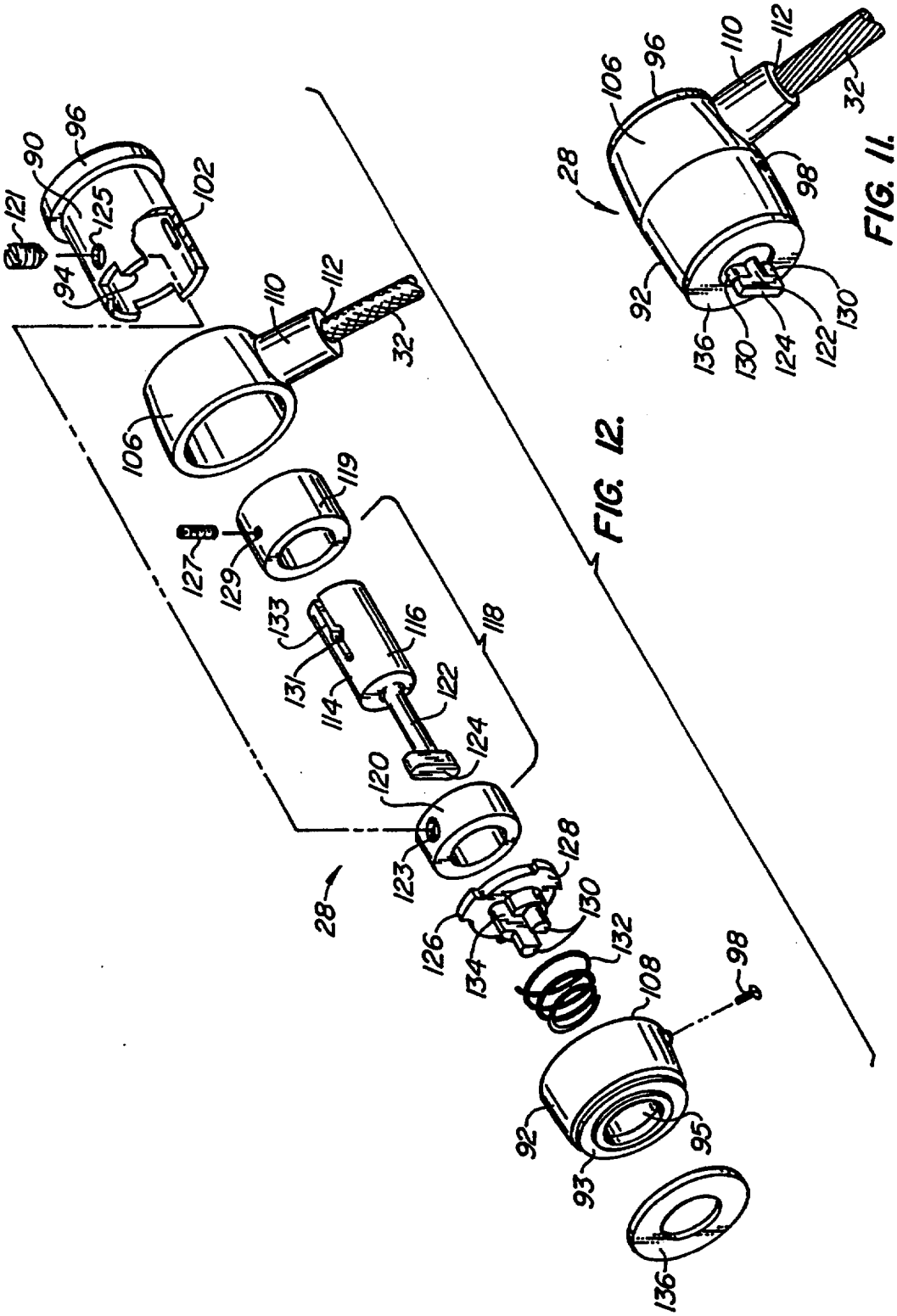
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FIG. 12.

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FIG. 11.

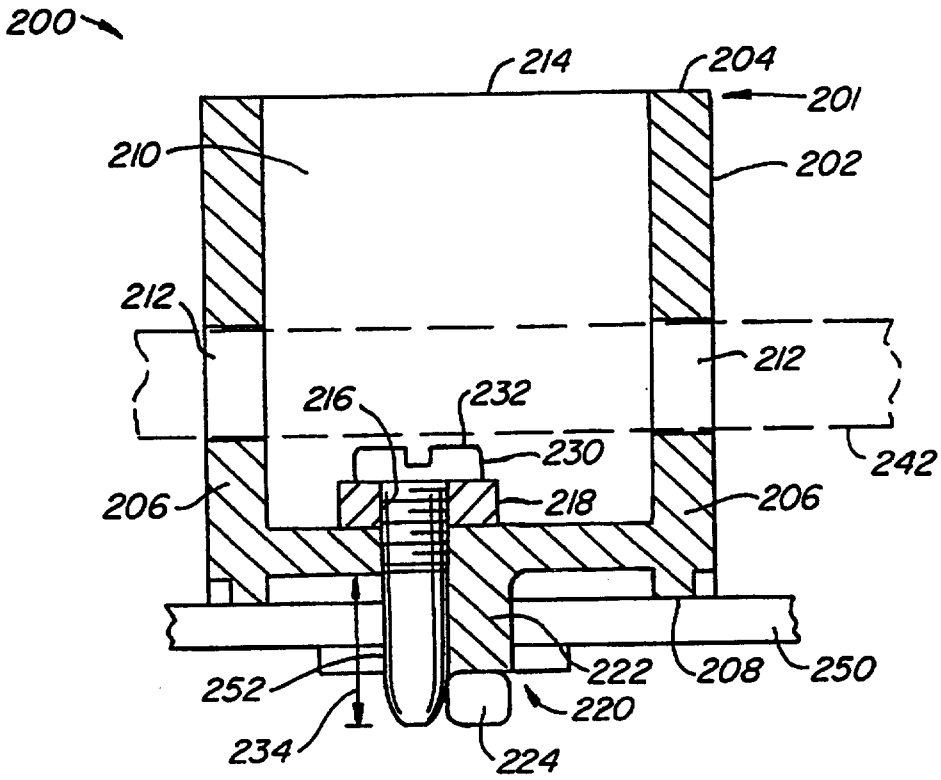
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FIG. 14.

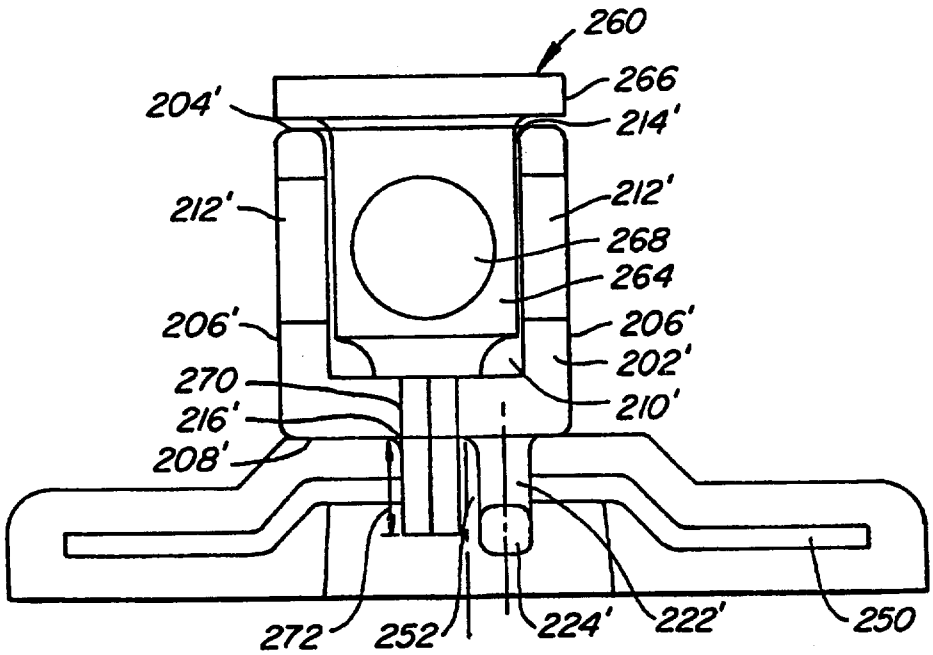
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FIG. 15.

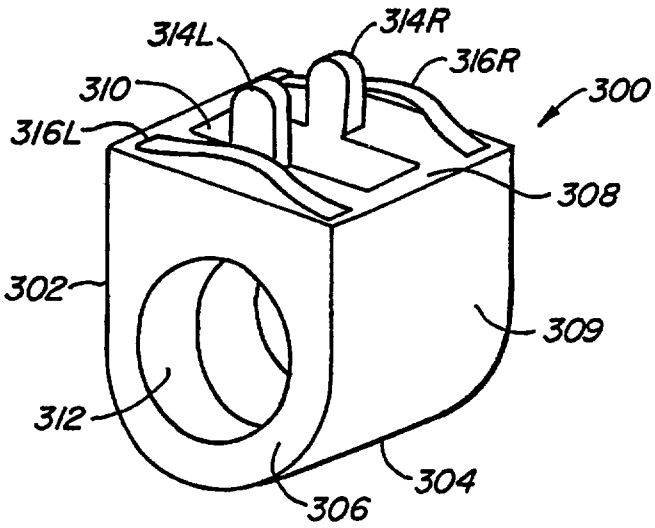

FIG. 16A.

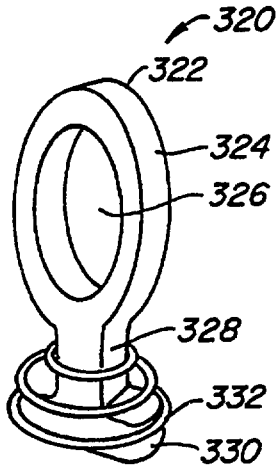

FIG. 16B.

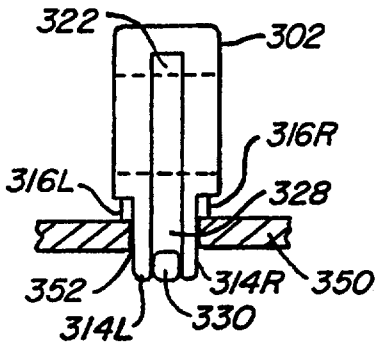

FIG. 16C.

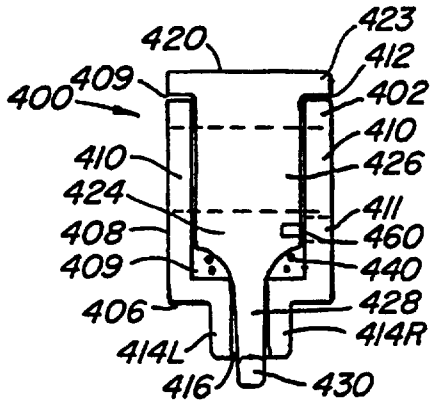

FIG. 17A.

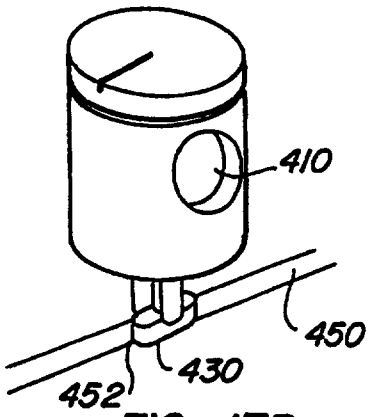

FIG. 17B.

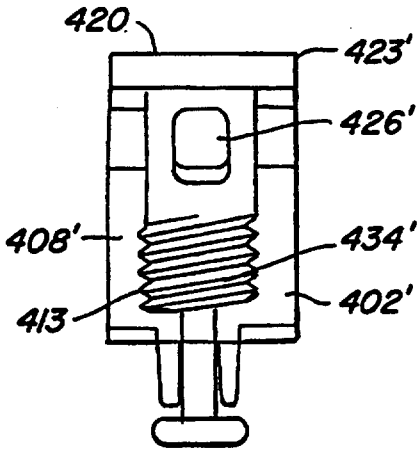

FIG. 18.

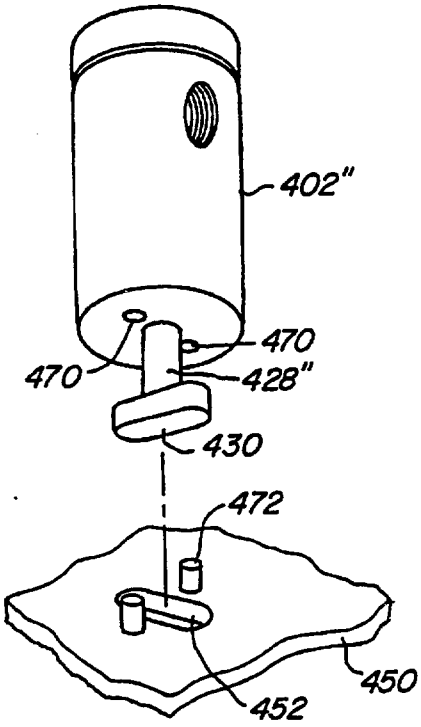

FIG. 19.

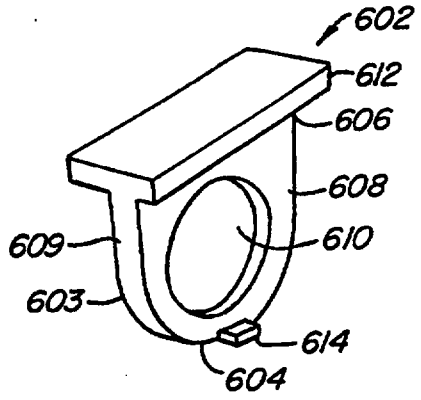

FIG. 20A.

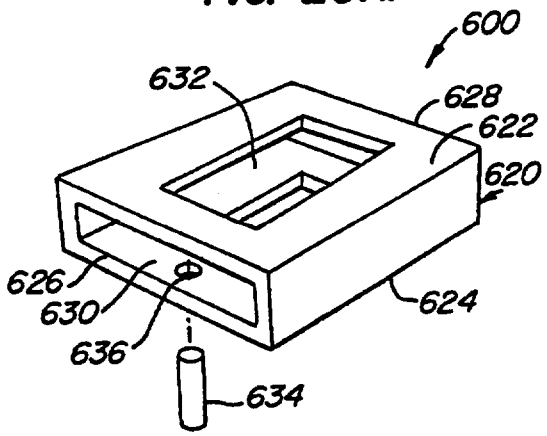

FIG. 20B.

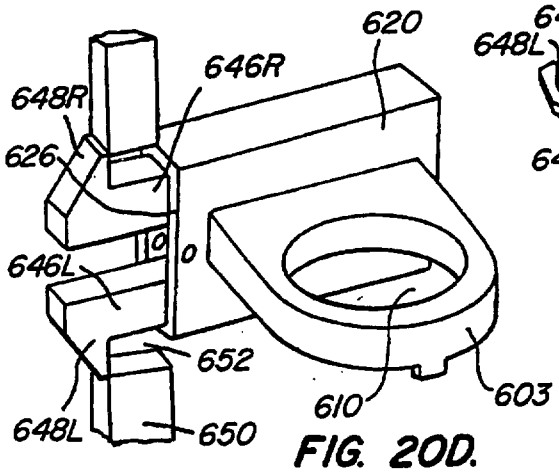

FIG. 20D.

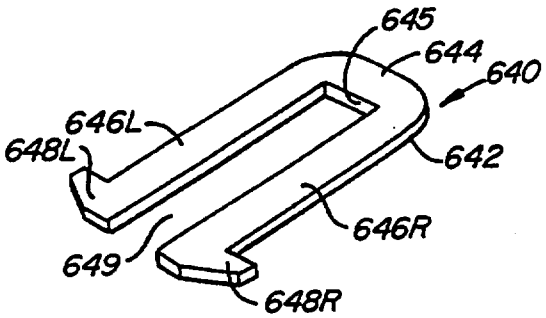

FIG. 20C.

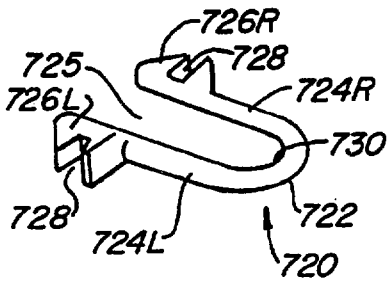

FIG. 21A.

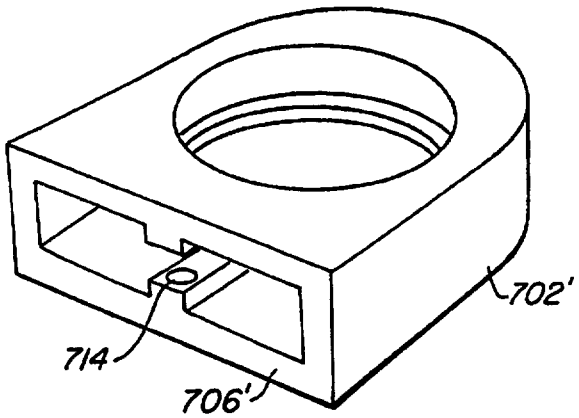

FIG. 22B.

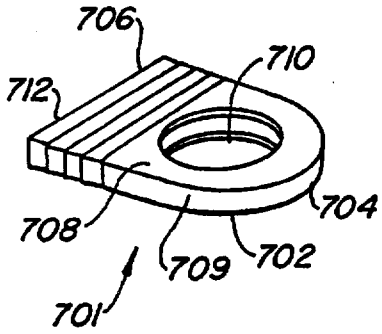

FIG. 21B.

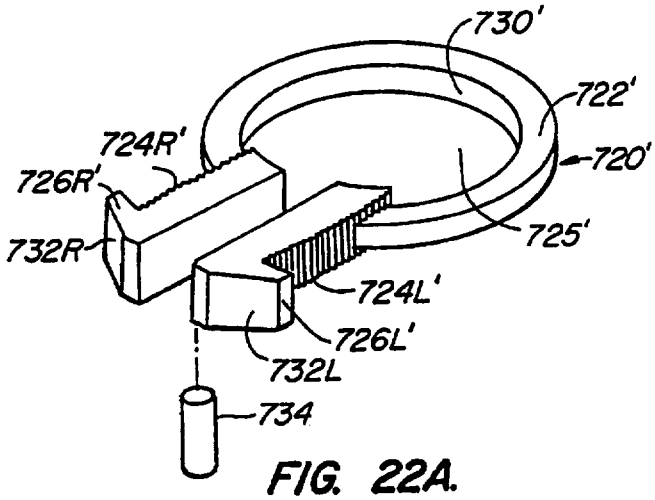

FIG. 22A.

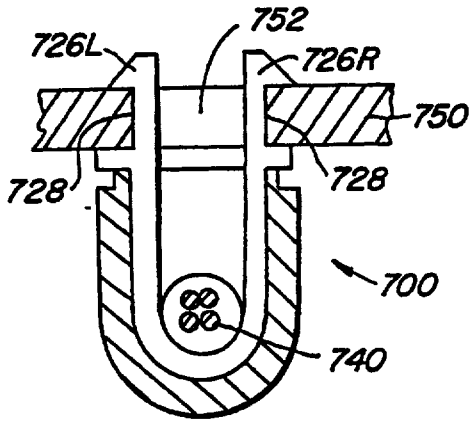

FIG. 21C.

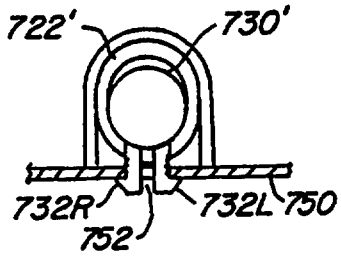

FIG. 22C.

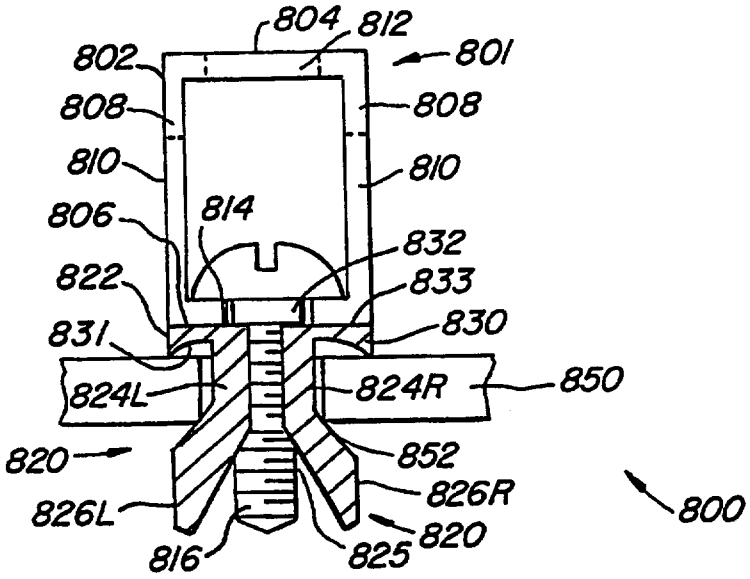

FIG. 23A.

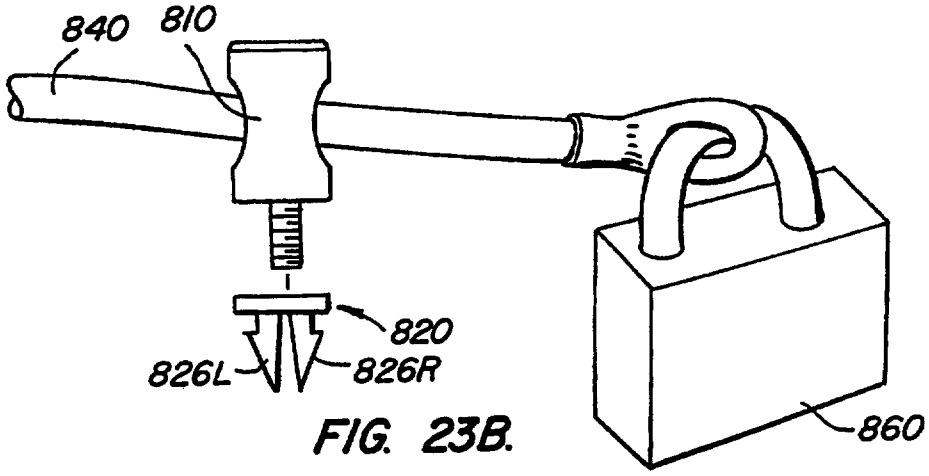

FIG. 23B.

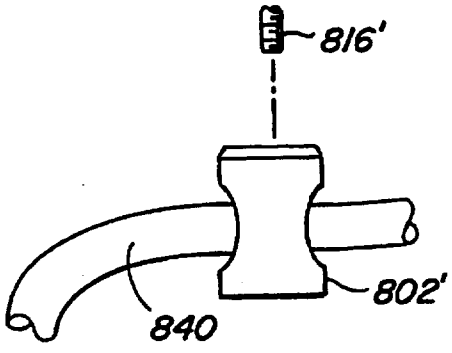

FIG. 24A.

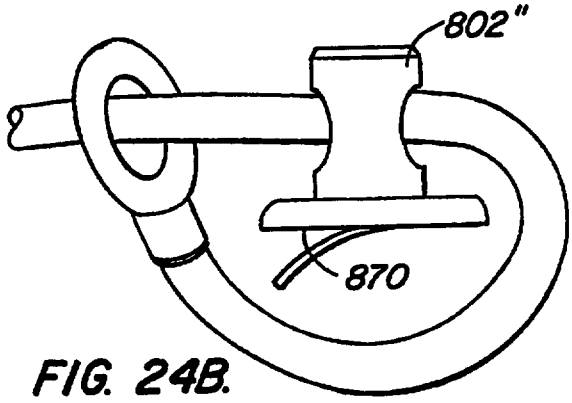

FIG. 24B.

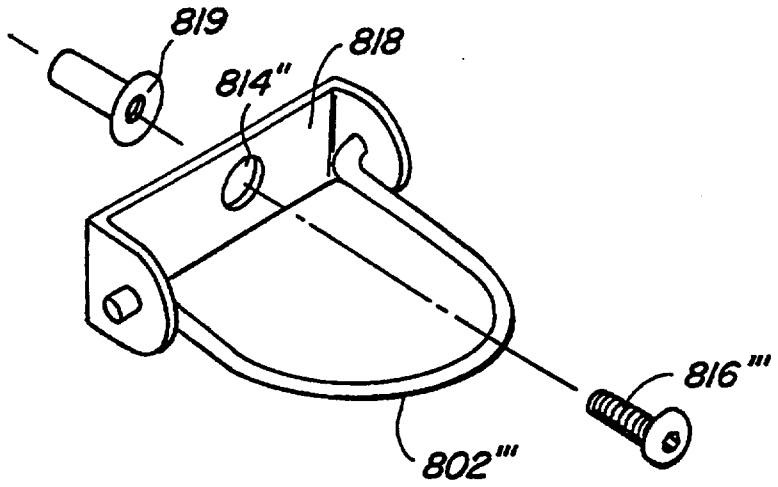

FIG. 25.

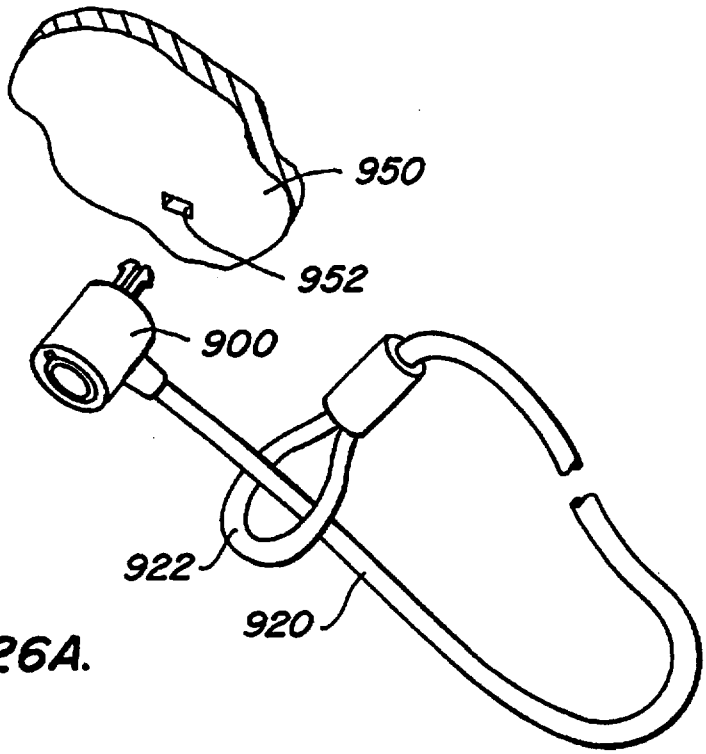

FIG. 26A.

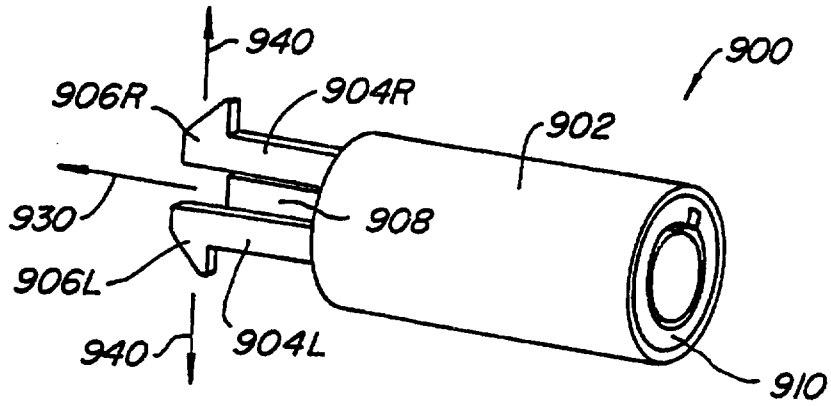

FIG. 26B.

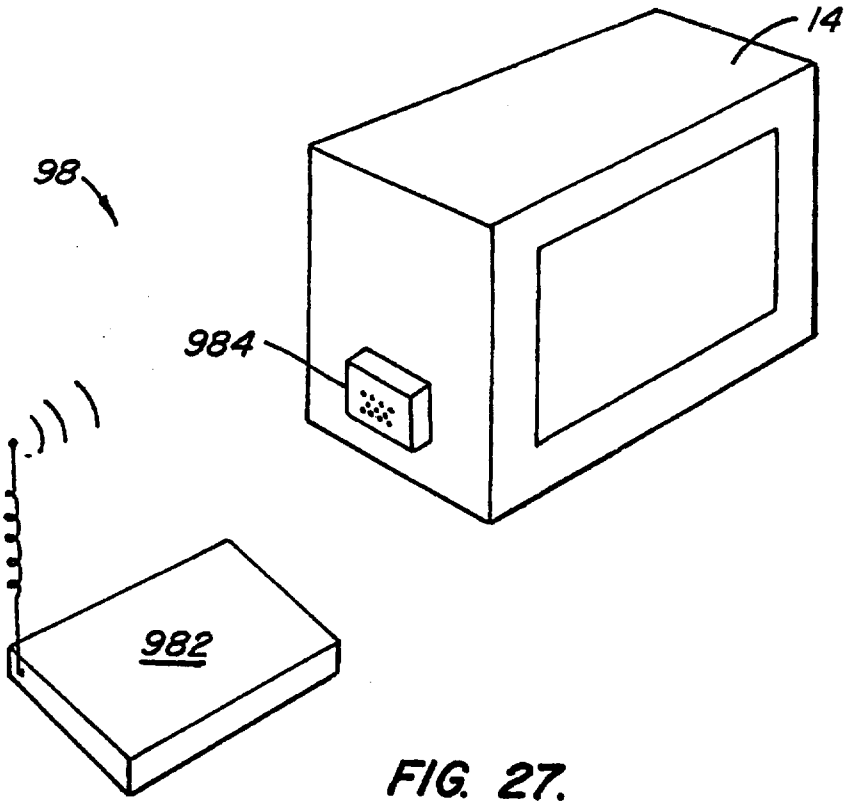

FIG. 27.

COMPUTER PHYSICAL SECURITY DEVICE

This application is a division of Ser. No. 08/138,643 filed Oct. 15, 1993, whic is 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 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 "KĂBLIT", 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, KĂBLIT 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-

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 **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;

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

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 **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 semicircular 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 crossmember can be inserted through the slot until crossmember **54** is completely inside wall **70** (see FIG. **10**A). 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. **13**B) 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 **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. **13** A 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. **13**A, 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 of spindle **114** against spring **132**. Once crossmember **124** has been fully inserted through slot **138**, a key **140** engaging lock mechanism **11**B (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 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** 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 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 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.

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 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 **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**, **22B**, and **22C**. 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. **22A**.

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, 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 cork-screw 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 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 including a slot engagement member having a slot engaging portion provided with a locking member having a peripheral profile complementary to preselected dimensions of a security slot provided in an exterior wall of a portable electronic device which thereby permits said locking member to extend into said security slot, said slot engagement member being rotatable 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 engaging portion when said slot engagement member is in said locked position to thereby inhibit rotation of said slot engagement member to said unlocked position; and

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

2. The apparatus of claim 1 wherein said pin includes a first threaded portion, complementary to a second threaded portion in an aperture in said housing.

3. The apparatus of claim 1 wherein said pin extends a distance into the security slot greater than a wall thickness of the external wall.

4. The apparatus of claim 1 wherein a first side of said housing abuts the external wall, said housing includes a cavity and a second side opposite said first side that is open to access said cavity wherein said pin is insertable through said second side and into said cavity to interlock said first side and the security slot.

5. The apparatus of claim 4 wherein said pin includes a first threaded portion complementary to a second threaded portion in an aperture in said first side of said housing.

6. The apparatus of claim 1 wherein said housing includes sidewalls orthogonal to said first side wherein said sidewalls include opposing apertures to permit an object to extend therethrough after insertion of said pin into the security slot to inhibit removal of said pin from the security slot.

7. The apparatus of claim 6 wherein said object is a cable.

8. The apparatus of claim 4 further comprising a spindle adapted for insertion into said cavity, said spindle incorporating said pin at a first end such that insertion of said spindle into said cavity inserts said pin into the security slot through an aperture in said first side.

9. The apparatus of claim 8 wherein said housing includes sidewalls orthogonal to said first side wherein said sidewalls include apertures and a second end of said spindle includes a transverse aperture collinear with said opposing apertures in said sidewalls, said opposing apertures and said transverse apertures permitting an object to extend therethrough after insertion of said pin into the security slot to inhibit removal of said pin from the security slot.

10. A removable, lockable, portable electronic device attachment system, comprising:

a cable for attaching to a first object other than a portable electronic device;

a housing, proximate to said electronic device and including a slot engagement member having a slot engaging portion provided with a locking member having a peripheral profile complementary to preselected dimensions of a security slot provided in an exterior wall of said portable electronic device to thereby permit said locking member to extend into said slot, said slot engagement member being rotatable between an unlocked position wherein said locking member is removable from the slot, and a locked position wherein said locking member is retained within the slot;

a pin, coupled through said housing, for extending into said security slot proximate said slot engaging portion when said slot engagement member is in said locked position to thereby inhibit rotation of said slot engagement member to said unlocked position; and

means, coupled to said housing, for attaching said cable to said housing.

11. A cable attachment apparatus, comprising:

a portable electronic device having an exterior wall provided with a security slot;

a housing, adapted to abut said exterior wall adjacent said security slot, said housing including a slot engagement member having a slot engaging portion provided with a locking member having a peripheral profile complementary to said security slot, to permit said locking member to extend into said security slot, said slot engagement member being rotatable 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 adjacent to said slot engagement member, for extending into said security slot proximate said slot engaging portion when said slot engagement member is in said locked position to thereby inhibit rotation of said slot engagement member to said unlocked position; and

means, coupled to said housing, for retaining said cable to said housing.

12. The apparatus of claim 1 wherein said locking member is "T-shaped."

* * * * *

US005502989B1

REEXAMINATION CERTIFICATE (3496th)

United States Patent [19]

Murray, Jr. et al.

[11] B1 5,502,989

[45] Certificate Issued Apr. 14, 1998

[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: **Kensington Microware Limited**, San Mateo, Calif.

Reexamination Request:
No. 90/004,538, Feb. 4, 1997

Reexamination Certificate for:

Patent No.:	5,502,989
Issued:	Apr. 2, 1996
Appl. No.:	307,113
Filed:	Sep. 16, 1994

Related U.S. Application Data

[60] Division of Ser. No. 138,634, Oct. 15, 1993, which is a continuation-in-part of Ser. No. 42,851, Apr. 5, 1993, Pat. No. 5,381,685, which is a continuation of Ser. No. 824,964, Jan. 24, 1992, abandoned, and a continuation-in-part of Ser. No. 6,311, Jan. 19, 1993, abandoned.

[51] **Int. Cl.**[6] **E05B 65/00**

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

[58] **Field of Search** 70/57, 58, 424, 70/430; 411/85, 910, 216, 217

[56] **References Cited**

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Primary Examiner—Darnell M. Boucher

[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 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 mechanisms 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.

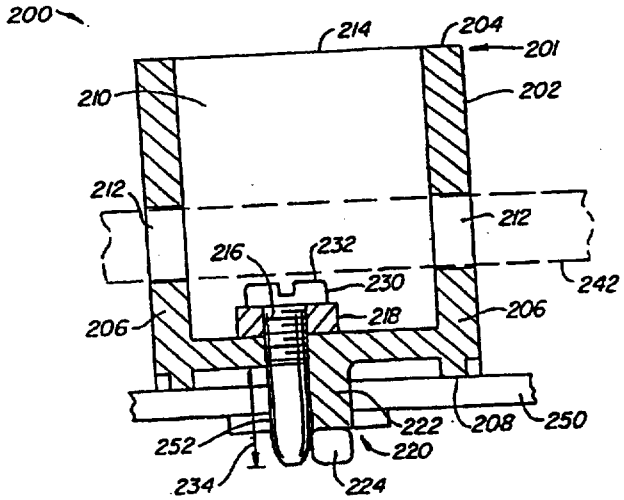

EXHIBIT
A

REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claims 7 and 11 are cancelled.

Claims 1–6, 8–10 and 12 are determined to be patentable as amended.

New claim 13 is added and determined to be patentable.

1. A locking [apparatus] *system*, comprising:

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

a housing including a slot engagement member having a slot engaging portion provided with a locking member having a peripheral profile complementary to preselected dimensions of [a] *said* security slot [provided in an exterior wall of a portable electronic device] which thereby permits said locking member to extend into said security slot, said slot engagement member being rotatable 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] *and* extending into said security slot proximate said slot engaging portion [when] *after* said slot engagement member is in said locked position to thereby inhibit rotation of said slot engagement member to said unlocked position; [and]

cable attachment means, coupled to said housing, for attaching a cable to said housing; *and*

a cable, coupled to said cable attachment means, for securing said portable electronic computer to an object other than to said housing.

2. The [apparatus] *system* of claim 1 wherein said pin includes a first threaded portion, complementary to a second threaded portion in an aperture in said housing.

3. The [apparatus] *system* of claim 1 wherein said pin extends a distance into the security slot greater than a wall thickness of the external wall.

4. The [apparatus] *system* of claim 1 wherein a first side of said housing abuts [the] *said* external wall, *and wherein* said housing includes a cavity and a second side opposite said first side that is open to access said cavity wherein said pin is insertable through said second side and into said cavity to interlock said first side and [the] *said* security slot.

5. The [apparatus] *system* of claim 4 wherein said pin includes a first threaded portion complementary to a second threaded portion in an aperture in said first side of said housing.

6. The [apparatus] *system* of claim 1 wherein said housing includes sidewalls orthogonal to said first side wherein said sidewalls include opposing apertures to permit [an object] *said cable* to extend therethrough after insertion of said pin into the security slot to inhibit removal of said pin from [the] *said* security slot.

8. The [apparatus] *system* of claim 4 further comprising a spindle adapted for insertion into said cavity, said spindle incorporating said pin at a first end such that insertion of said spindle into said cavity inserts said pin into [the] *said* security slot through an aperture in said first side.

9. The apparatus of claim 8 wherein said housing includes sidewalls orthogonal to said first side wherein said sidewalls include apertures and a second end of said spindle includes a transverse aperture collinear with said opposing apertures in said sidewalls, said opposing apertures and said transverse apertures permitting [an object] *said cable* to extend therethrough after insertion of said pin into the security slot to inhibit removal of said pin from the security slot.

10. A [removable, lockable, portable electronic device attachment] *locking* system, comprising:

a portable electronic device including an exterior wall defining a security slot;

[a] cable *means* for attaching to a first object other than [a] *to the* portable electronic device;

a housing, proximate to said electronic device and including a slot engagement member having a slot engaging portion provided with a locking member having a peripheral profile complementary to preselected dimensions of [a] *said* security slot [provided in an exterior wall of said portable electronic device] to thereby permit said locking member to extend into said slot, said slot engagement member being rotatable between an unlocked position wherein said locking member is removable from the slot, and a locked position wherein said locking member is retained within the slot;

a pin, coupled through said housing, for extending into said security slot proximate said slot engaging portion when said slot engagement member is in said locked position to thereby inhibit rotation of said slot engagement member to said unlocked position; and

means, coupled to said housing, for attaching said cable to said housing.

12. The [apparatus] *system* of claim 1 wherein said locking member is "T-shaped."

13. A cable attachment system, comprising:

a portable computer including an exterior wall provided with a security slot having dimensions of about 3 mm by about 7 mm;

a locking structure, coupled to said cable, for attaching to said security slot, said locking structure comprising:

a housing, adapted to abut said wall adjacent said security slot, said housing including a slot engagement member having a slot engaging portion provided with a locking member having a peripheral profile complementary to said security slot to permit said locking member to extend into said security slot, said slot engagement member being rotatable 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; and

a pin coupled through said housing adjacent to said slot engagement member and extending into said security slot proximate said slot engaging portion after said slot engagement member is in said locked position to thereby inhibit rotation of said slot engagement member to said unlocked position; and

a cable for securing said portable computer to an object other than to said housing.

* * * * *

US006006557A

United States Patent [19]

Carl et al.

[11] Patent Number: 6,006,557

[45] Date of Patent: Dec. 28, 1999

[54] **COMPUTER PHYSICAL SECURITY DEVICE**

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

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

[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.**[6] **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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Retaining Device Incorporated in Apple Computers.

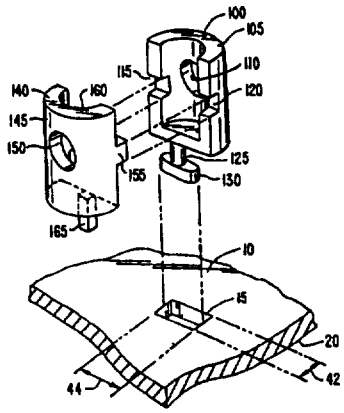
Primary Examiner—Darnell M. Boucher

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 crossmember 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



EXHIBIT

B

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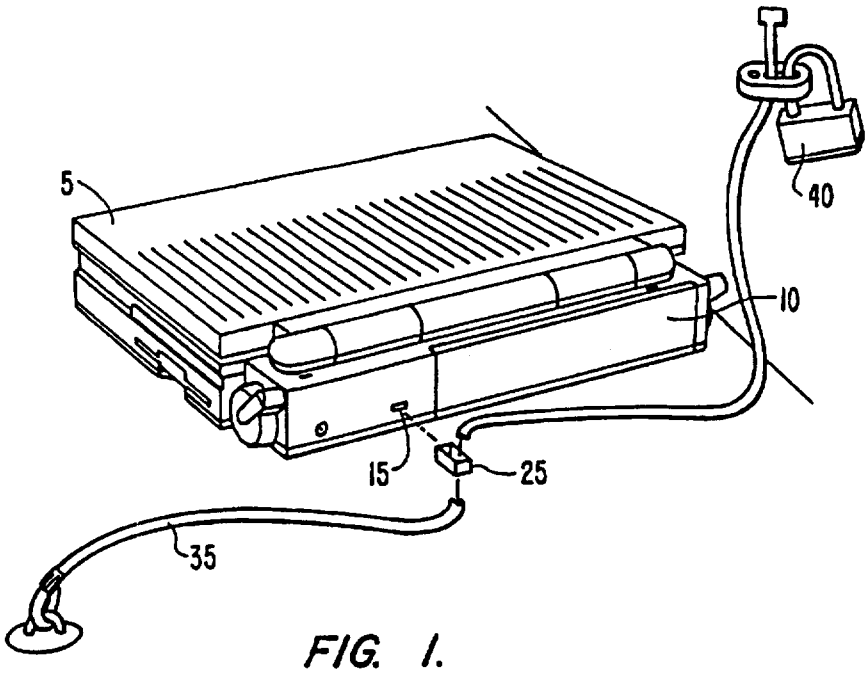
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FIG. 1.

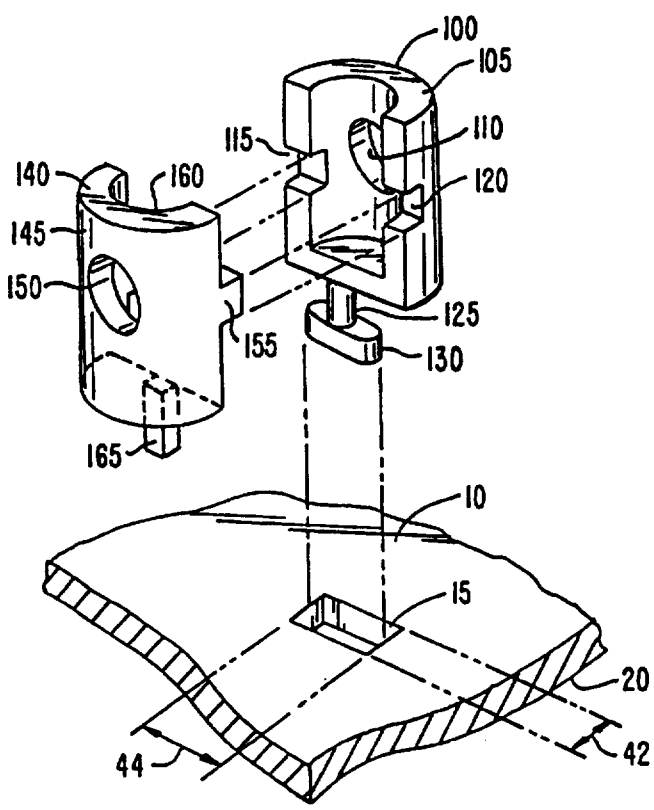
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FIG. 2.

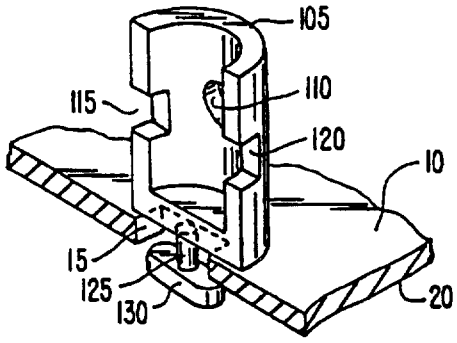

FIG. 3.

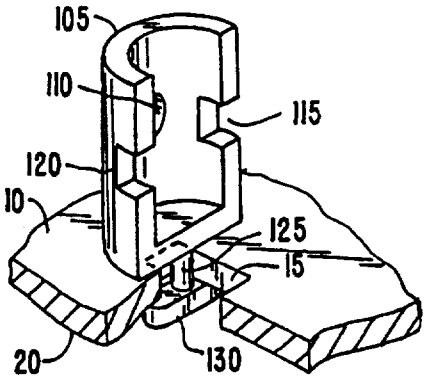

FIG. 4.

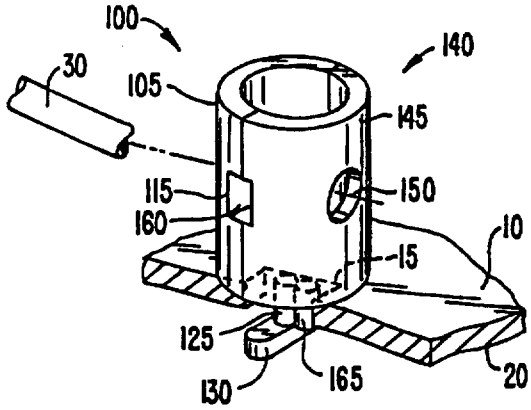

FIG. 5.

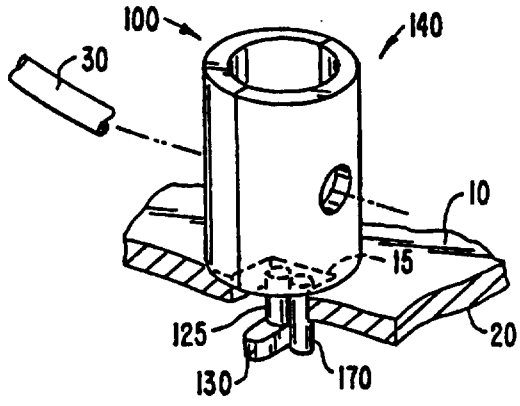

FIG. 6.

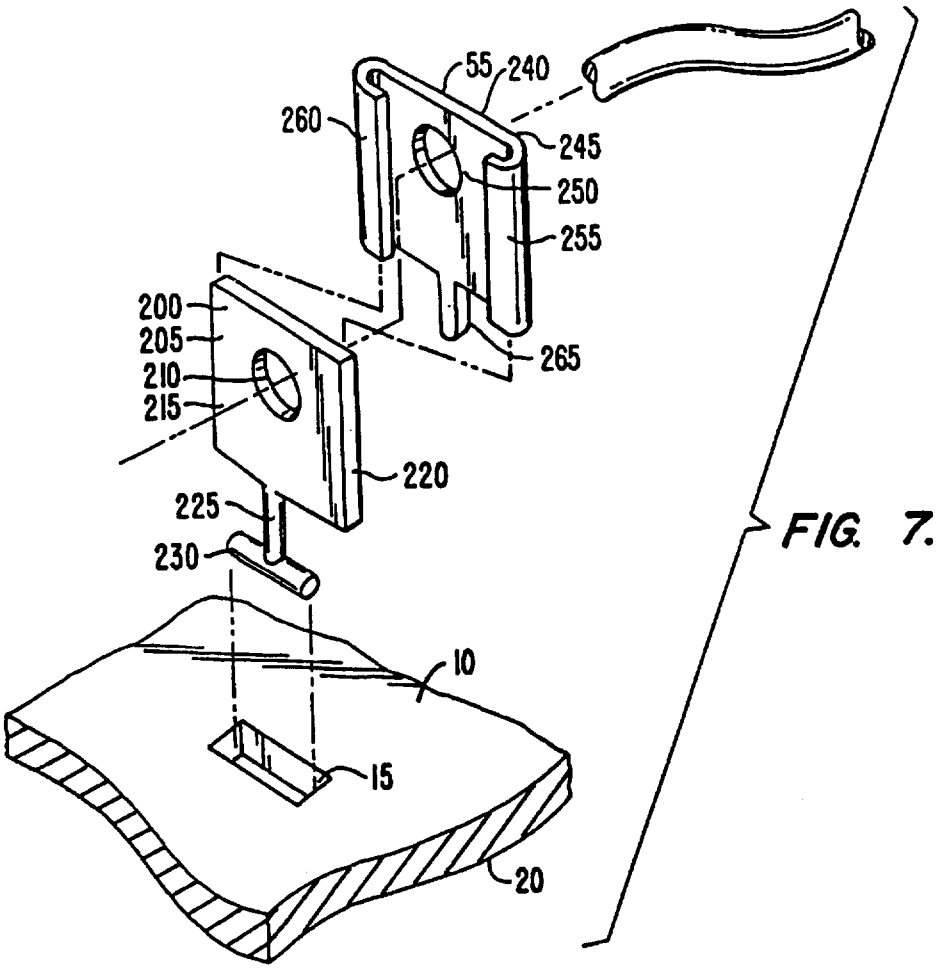
55
240
260
245
250
255
200
205
210
215
265
220
225
230
10
15
20

FIG. 7.

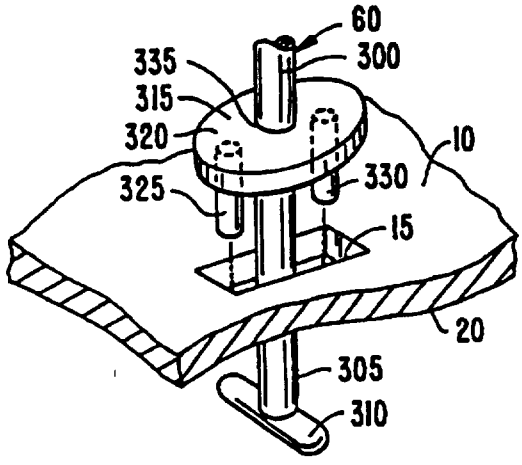
60
335
300
315
320
10
330
325
15
20
305
310

FIG. 8.

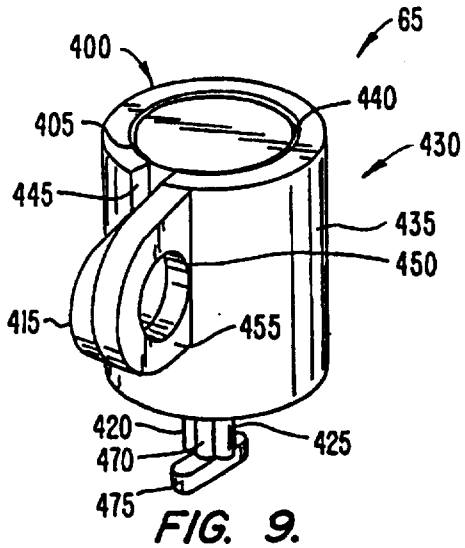

FIG. 9.

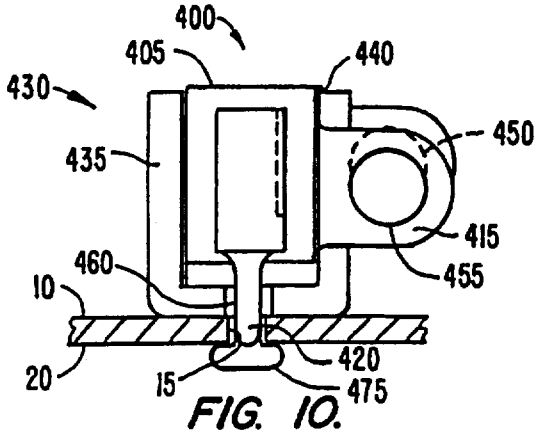

FIG. 10.

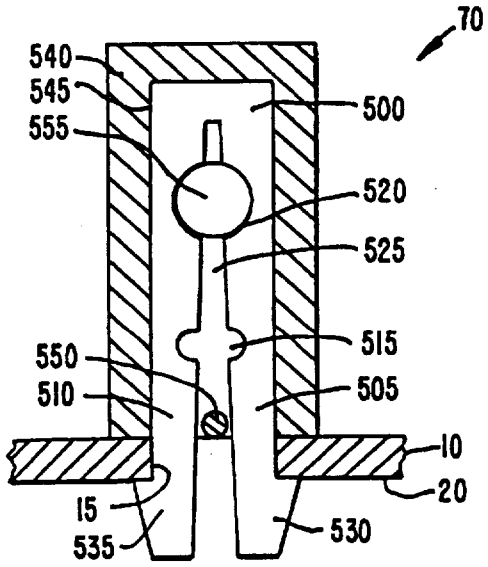

FIG. 11.

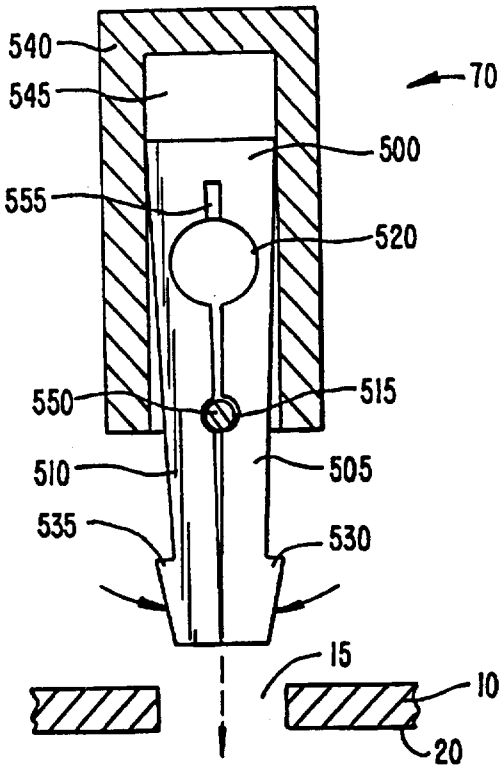
540
545
70
500
555
520
550
515
510
505
535
530
15
10
20

FIG. 12.

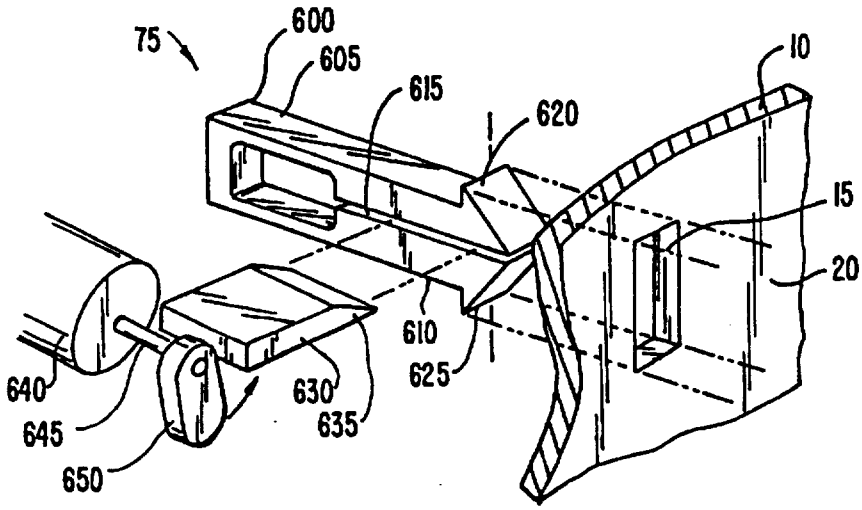
75
600
605
615
620
10
15
20
610
625
640
645
650
630
635

FIG. 13.

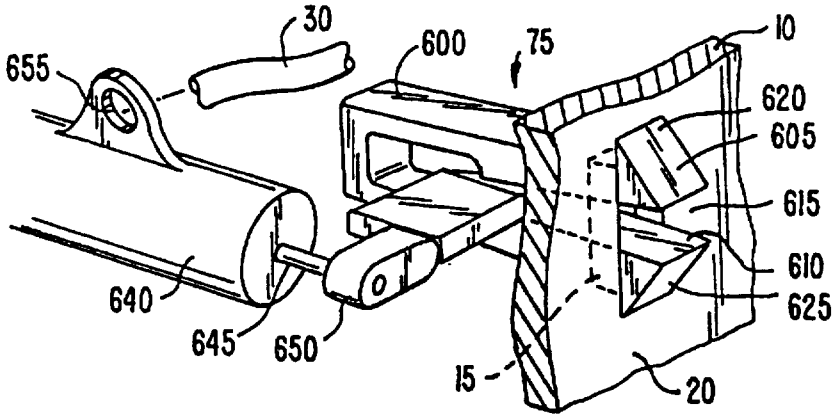

FIG. 14.

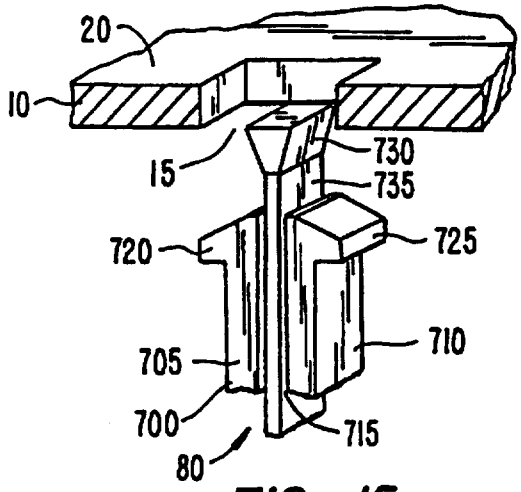

FIG. 15.

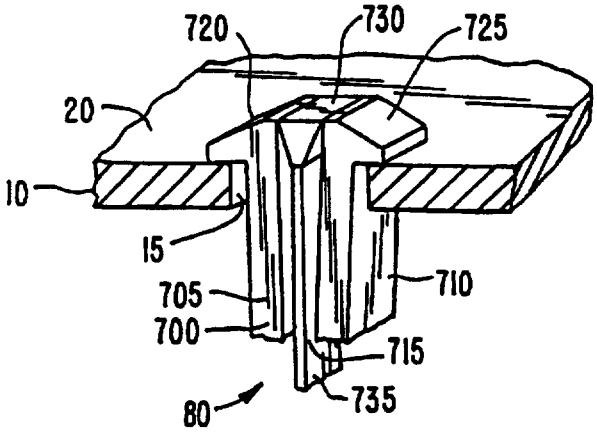

FIG. 16.

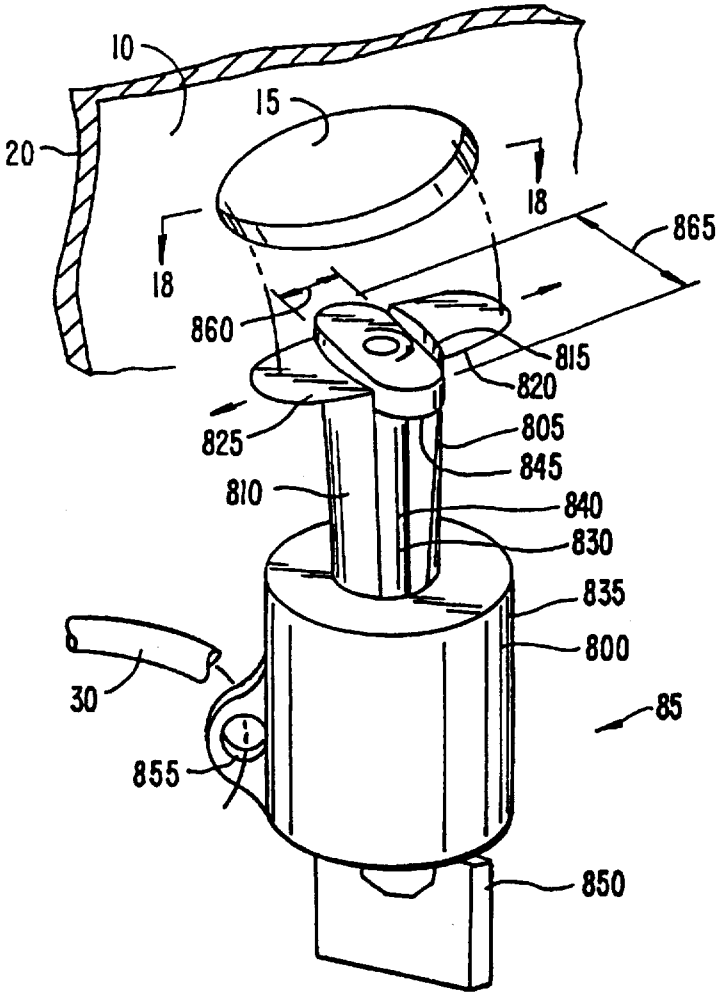
10
15
20
18
18
865
860
815
820
825
805
845
810
840
830
835
800
30
85
855
850

FIG. 17.

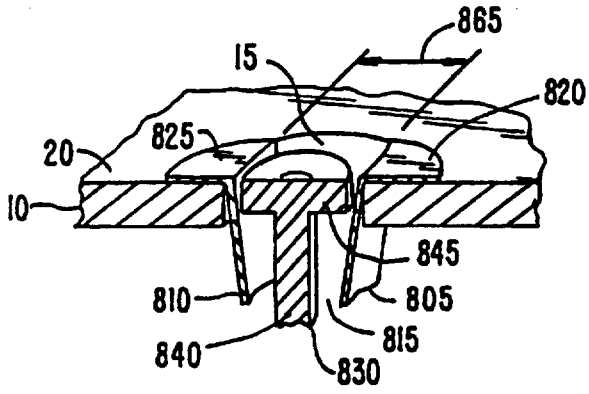
865
15
820
825
20
10
845
810
805
815
840
830

FIG. 18.

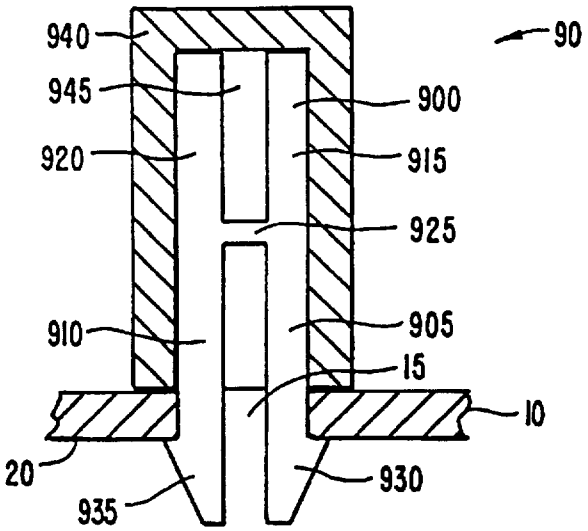
940
945
920
910
90
900
915
925
905
15
10
20
935
930

FIG. 19.

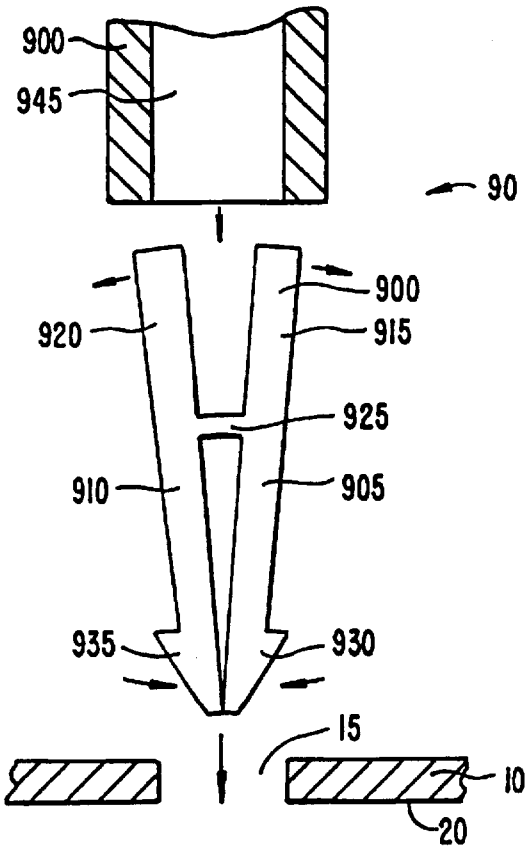
900
945
90
900
920
915
925
910
905
935
930
15
10
20

FIG. 20.

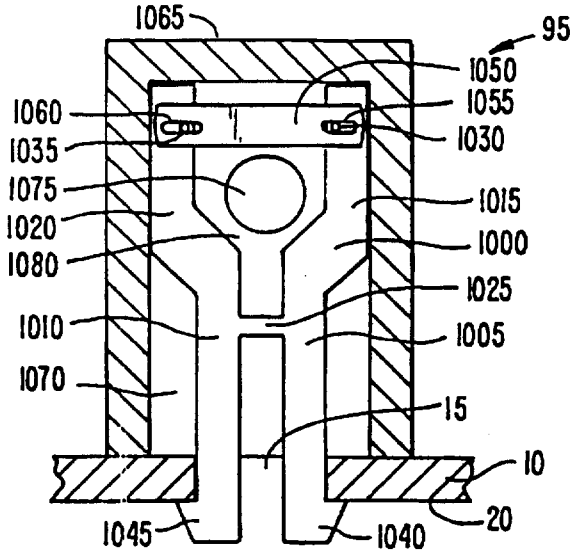
1065
95
1050
1055
1060
1030
1035
1075
1015
1020
1000
1080
1025
1010
1005
1070
15
10
20
1045
1040

FIG. 21.

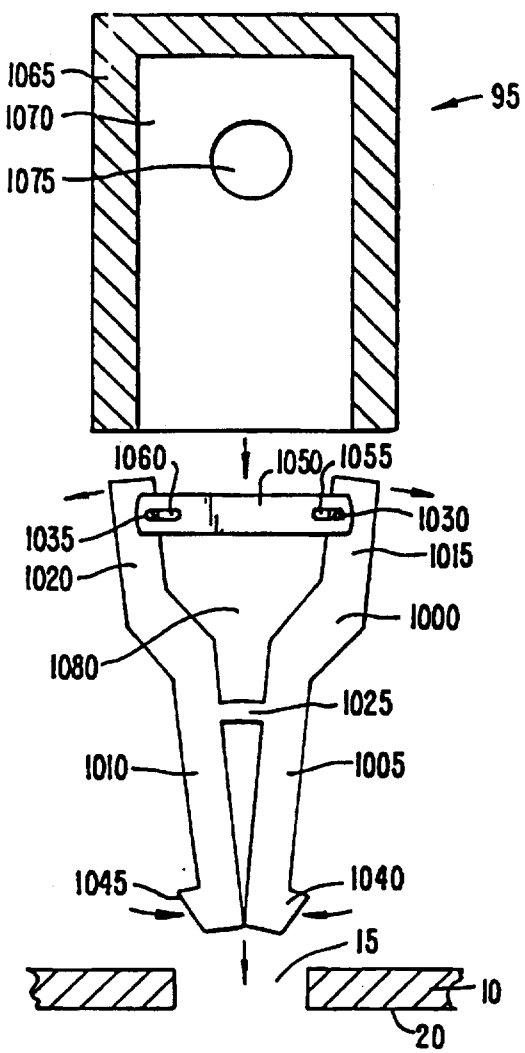
1065
95
1070
1075
1060
1050
1055
1030
1035
1015
1020
1000
1080
1025
1010
1005
1045
1040
15
10
20

FIG. 22.

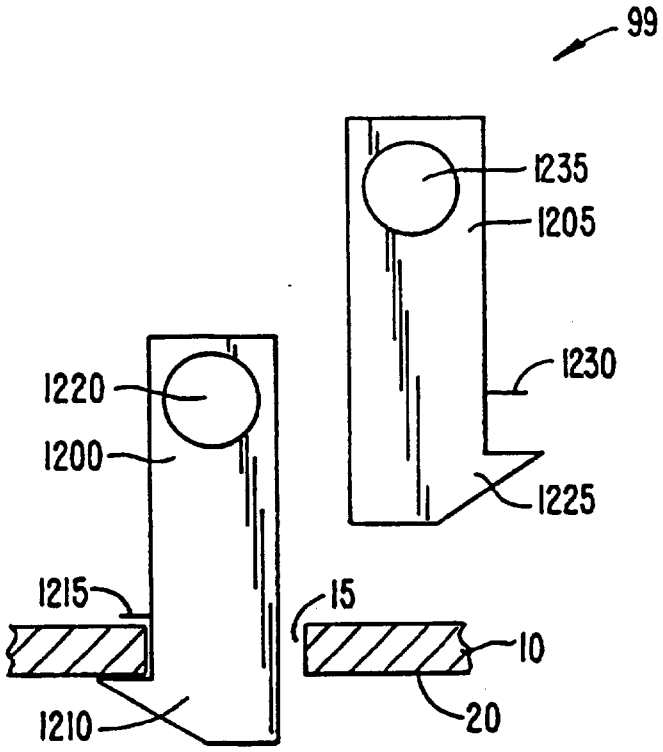
99
1235
1205
1230
1220
1200
1225
1215
15
10
1210
20

FIG. 23.

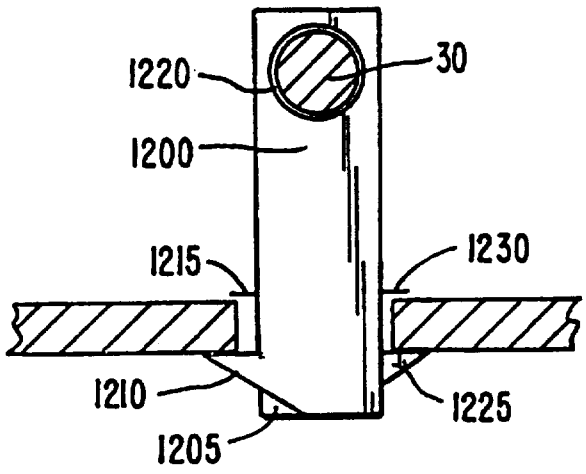
1220
30
1200
1215
1230
1210
1225
1205

FIG. 24.

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

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

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** 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

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 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.

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 engagable 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 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**.

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 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 thereunto 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

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.

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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United States Patent [19]

Murray, Jr. et al.

[11] Patent Number: 5,493,878

[45] Date of Patent: Feb. 27, 1996

[54] **COMPUTER PHYSICAL SECURITY DEVICE**

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[73] Assignee: **Kensington Microware Limited**, San Mateo, Calif.

[21] Appl. No.: **307,964**

[22] Filed: **Sep. 16, 1994**

Related U.S. Application Data

[60] Division of Ser. No. 138,634, Oct. 15, 1993, which is a continuation-in-part of Ser. No. 6,311, Jan. 19, 1993, abandoned, and Ser. No. 42,851, Apr. 5, 1993, Pat. No. 5,381,685, which is a continuation of Ser. No. 824,964, Jan. 24, 1992, abandoned.

[51] **Int. Cl.**[6] **E05B 65/00**

[52] **U.S. Cl.** **70/58**; 70/14; 70/57; 248/553

[58] **Field of Search** 411/41, 55, 60; 70/58, 14, 57, 428, 427, 434, 439, 441; 248/553, 551

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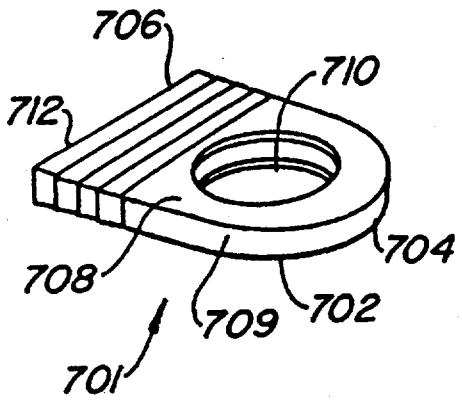
Primary Examiner—Darnell M. Boucher

Attorney, Agent, or Firm—Townsend and Townsend and Crew

[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 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.

6 Claims, 11 Drawing Sheets



EXHIBIT

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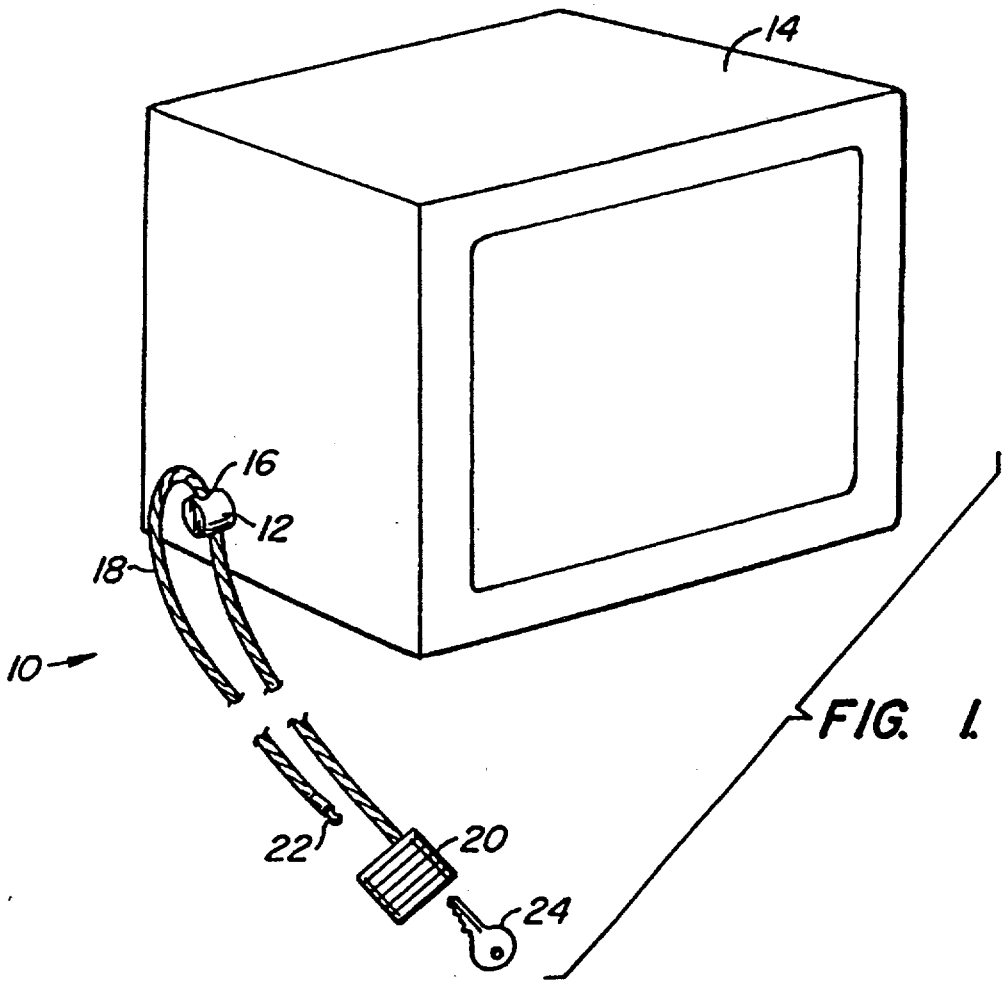

FIG. 1.

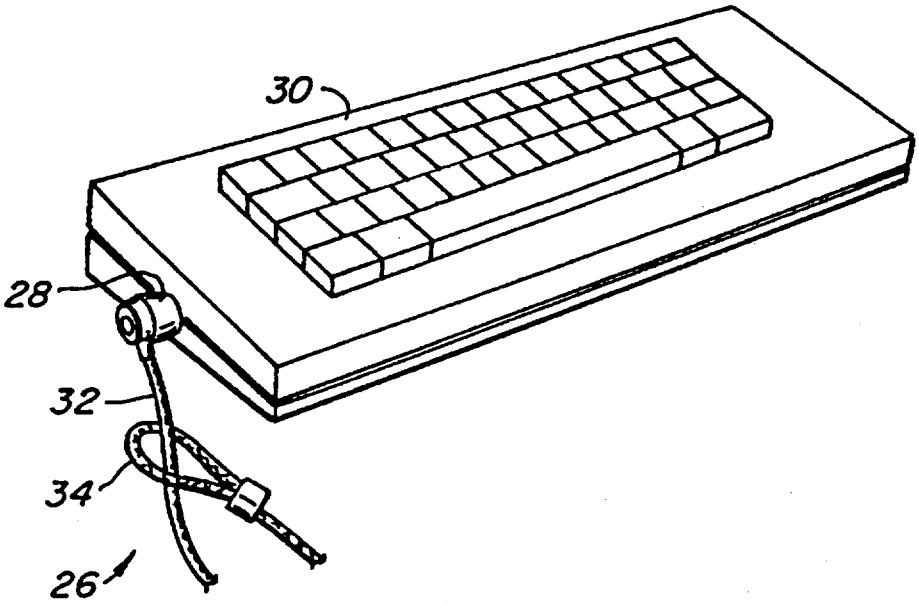

FIG. 2.

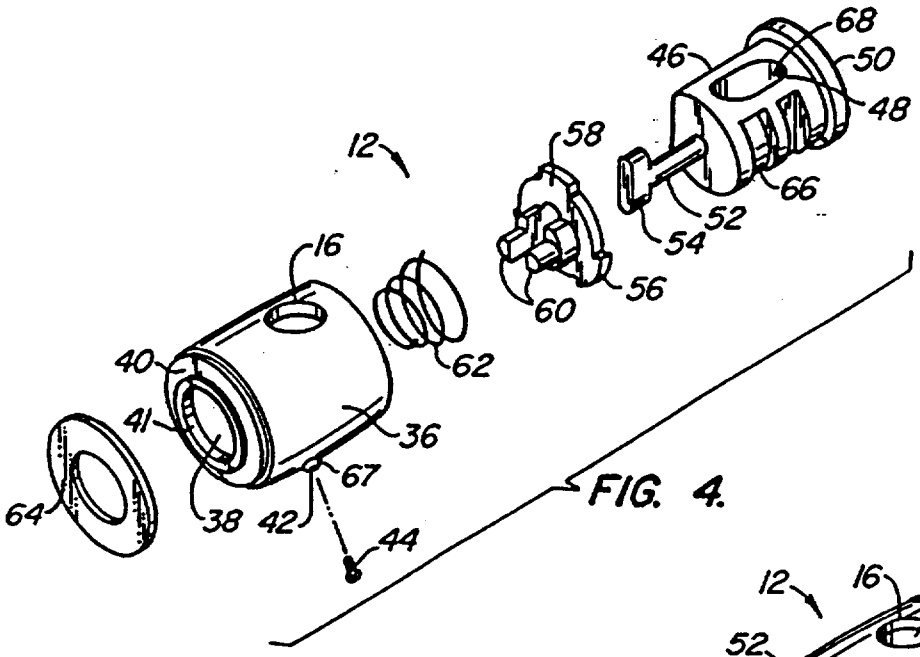

FIG. 4.

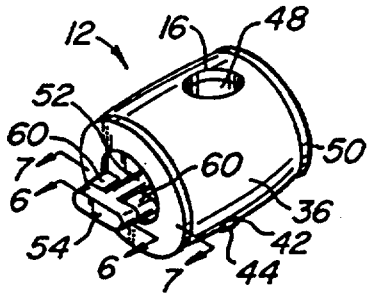

FIG. 3.

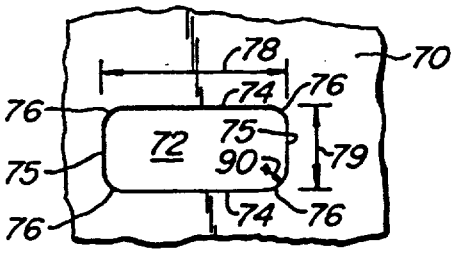

FIG. 5.

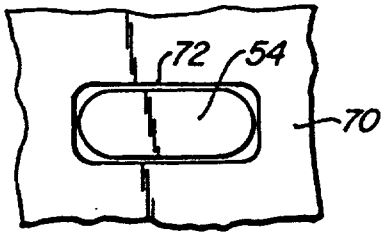

FIG. 8.

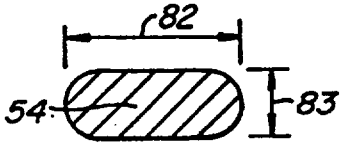

FIG. 6.

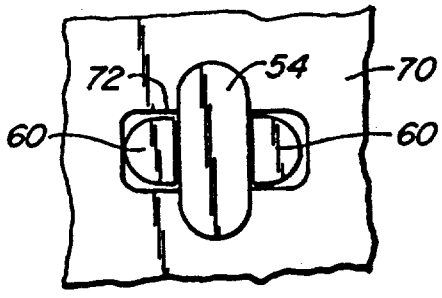

FIG. 9.

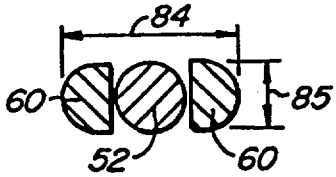

FIG. 7.

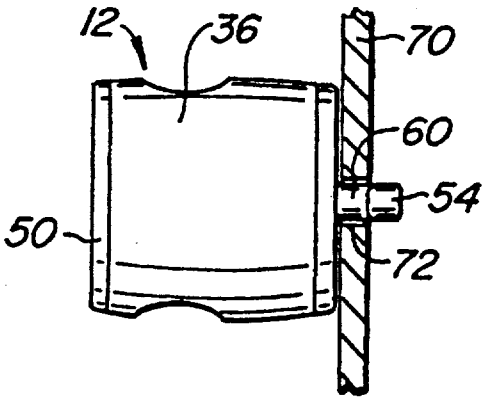

FIG. 10A.

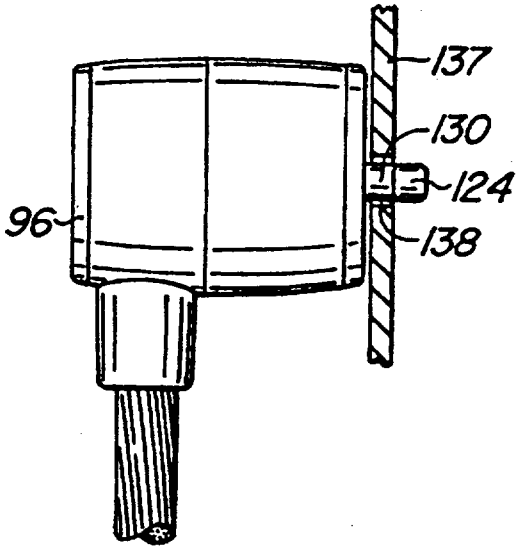

FIG. 13A.

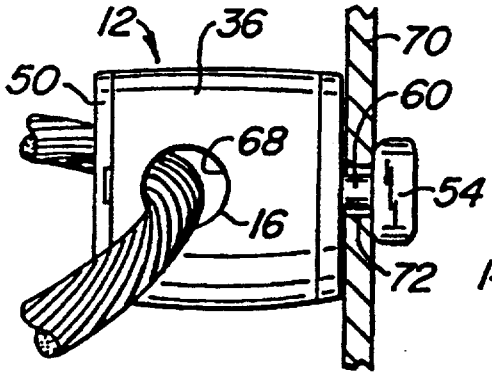

FIG. 10B.

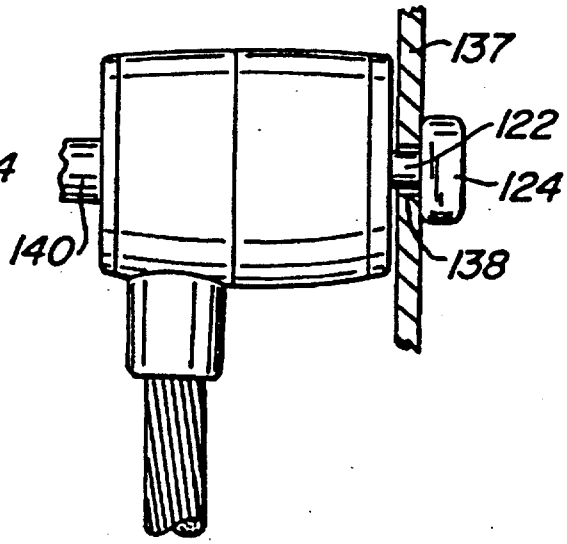

FIG. 13B.

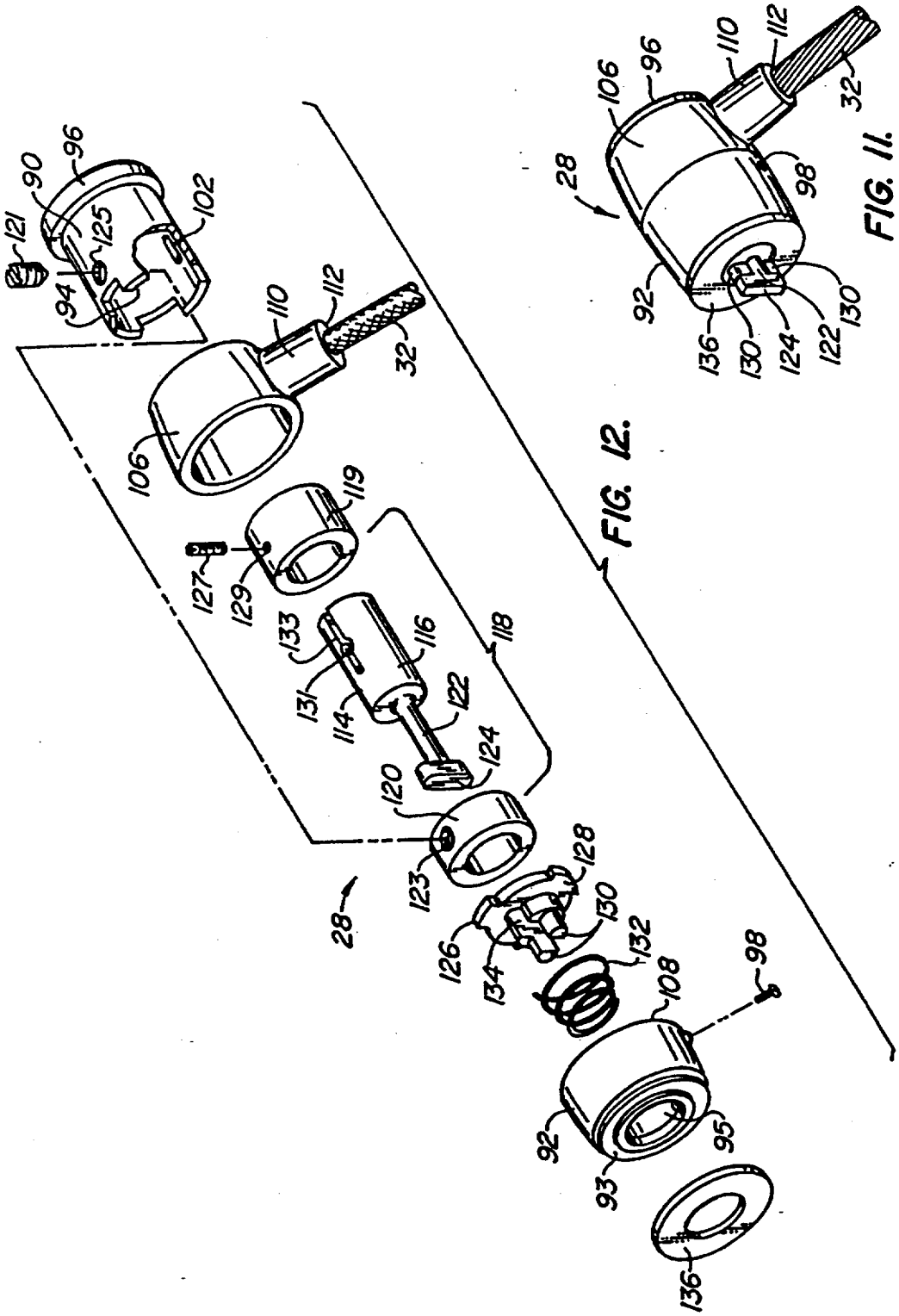
28
106
96
110
112
32
98
92
136
130
124
122

FIG. 11.

121
90
96
125
102
94
110
112
32
106
119
127
129
133
116
118
131
114
122
124
120
123
28
128
130
126
134
132
108
98
92
95
93
136

FIG. 12.

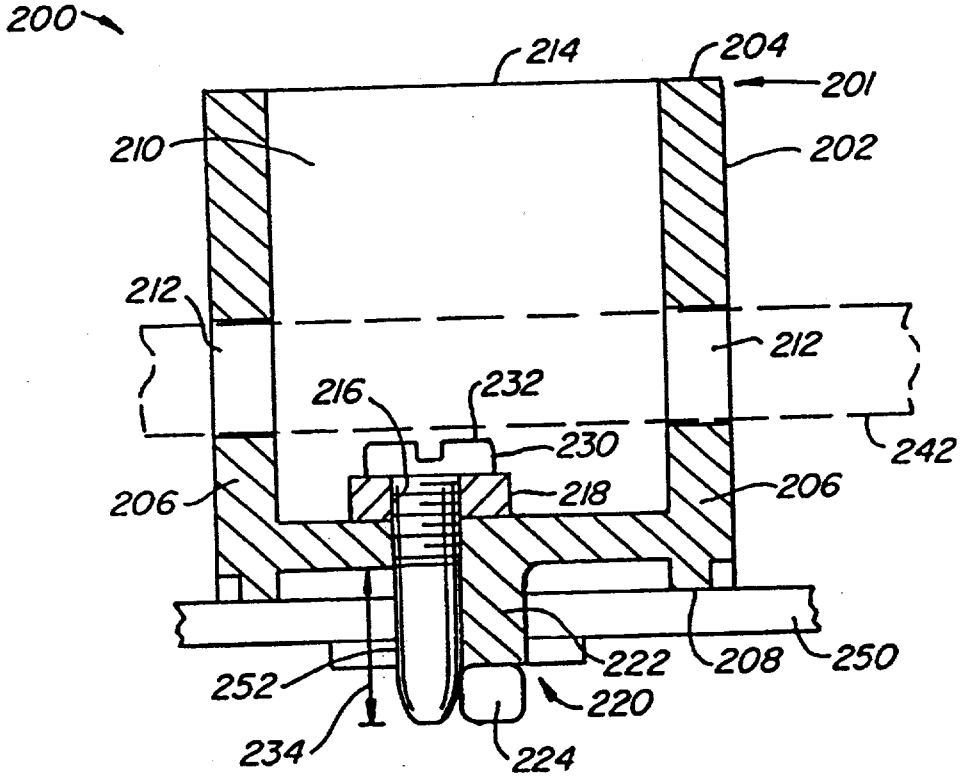
200
214
204
201
210
202
212
212
216
232
230
242
206
218
206
222
208
250
252
220
234
224

FIG. 14.

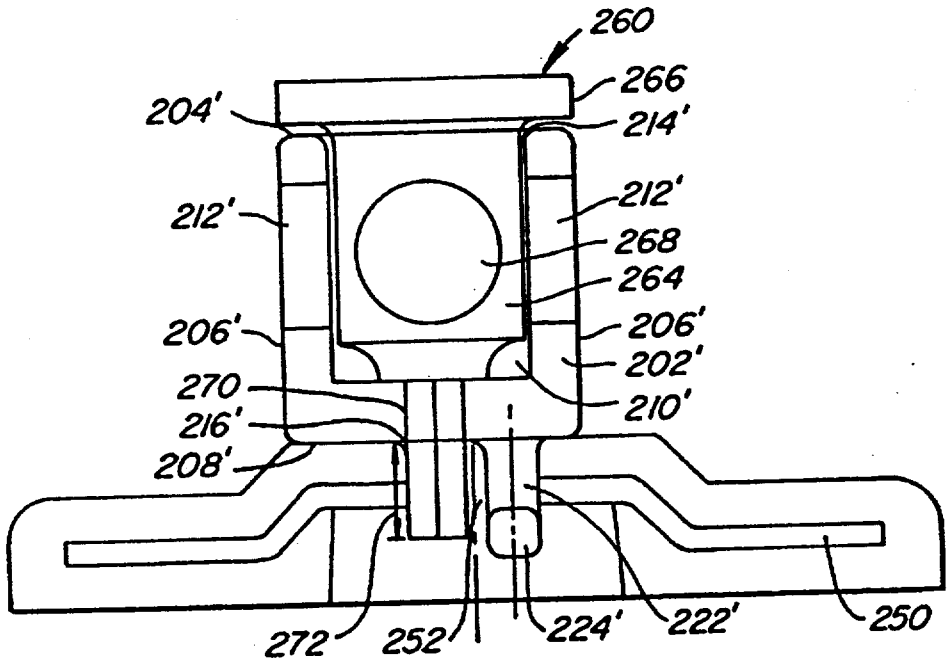
260
266
204'
214'
212'
212'
268
264
206'
206'
202'
270
210'
216'
208'
272
252
224'
222'
250

FIG. 15.

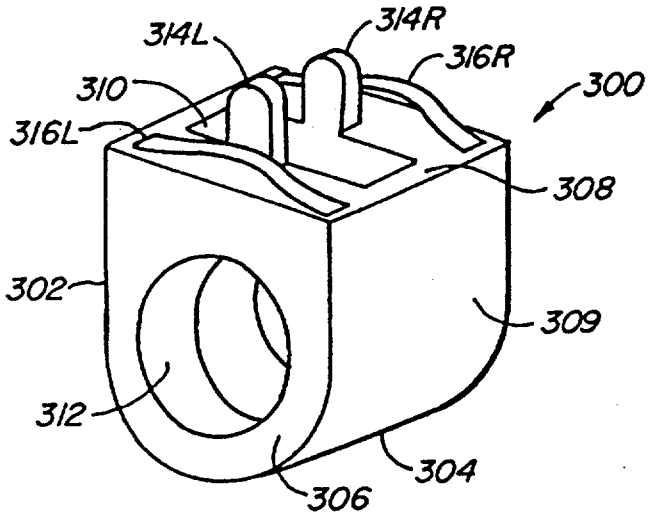

FIG. 16A.

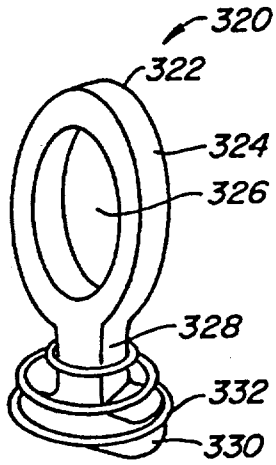

FIG. 16B.

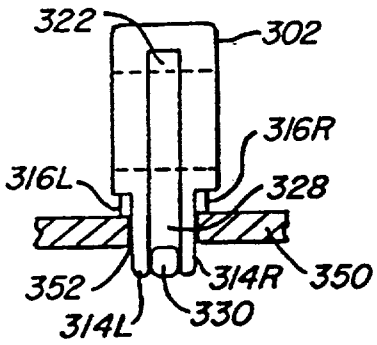

FIG. 16C.

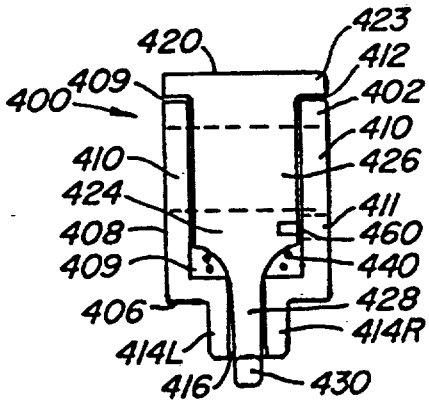

FIG. 17A.

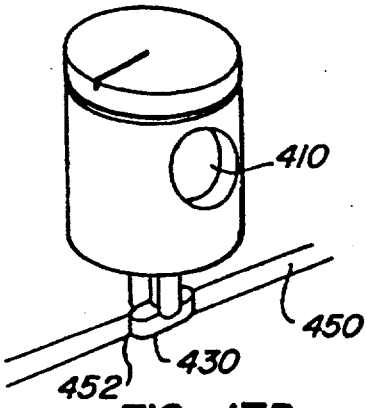

FIG. 17B.

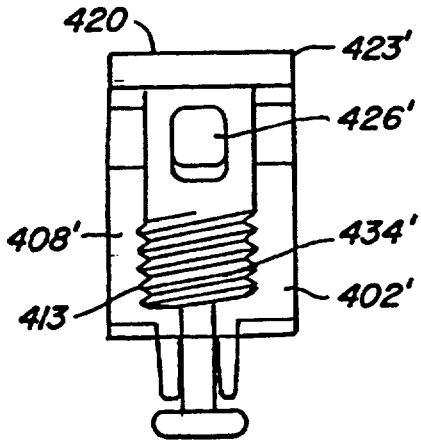

FIG. 18.

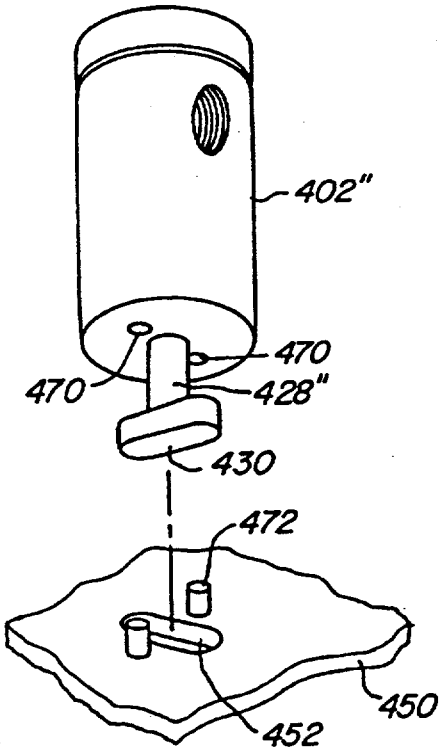

FIG. 19.

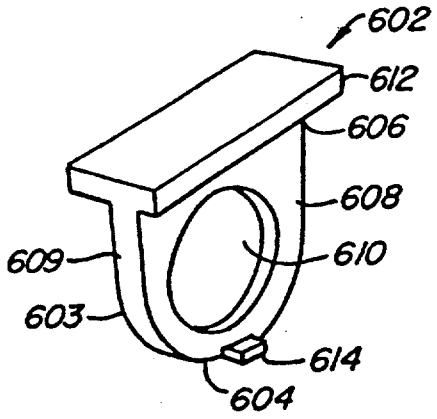

FIG. 20A.

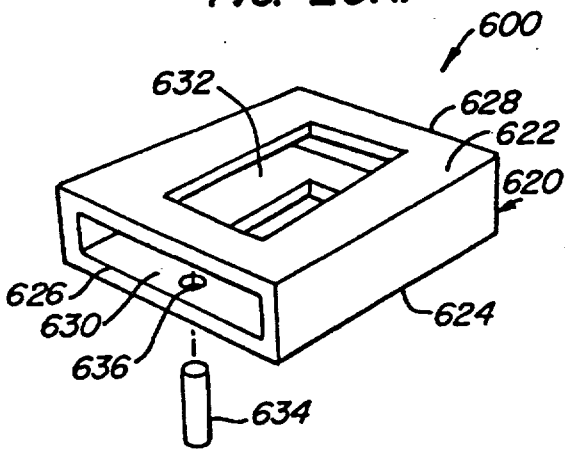

FIG. 20B.

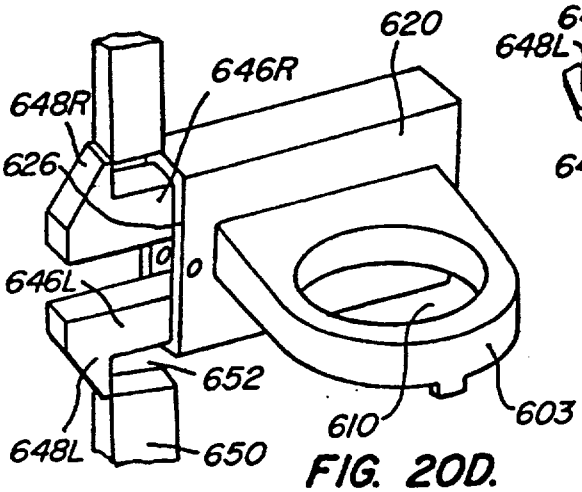

FIG. 20D.

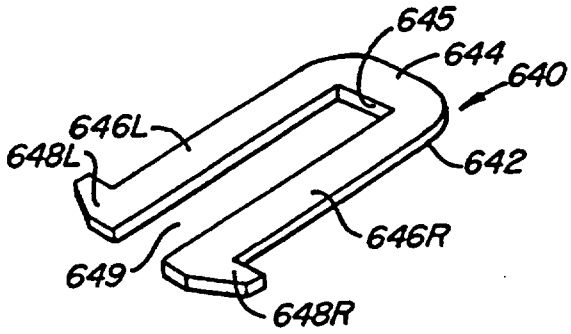

FIG. 20C.

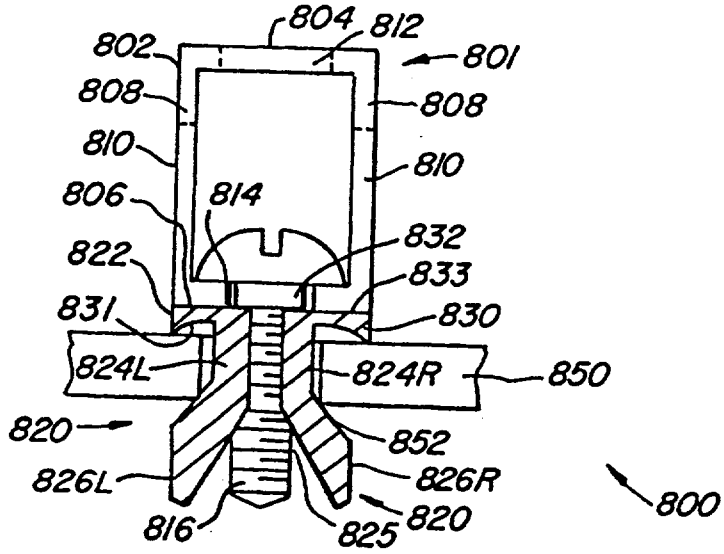

FIG. 23A.

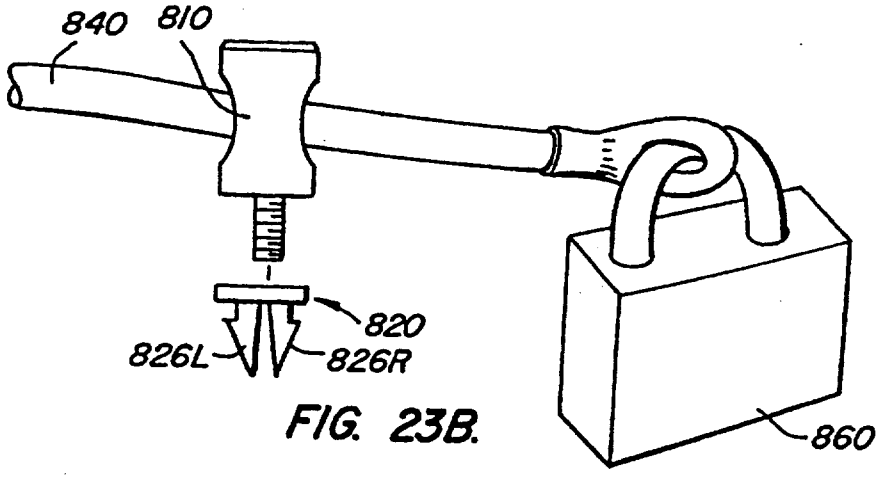

FIG. 23B.

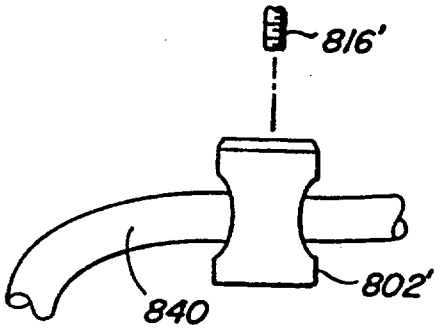

FIG. 24A.

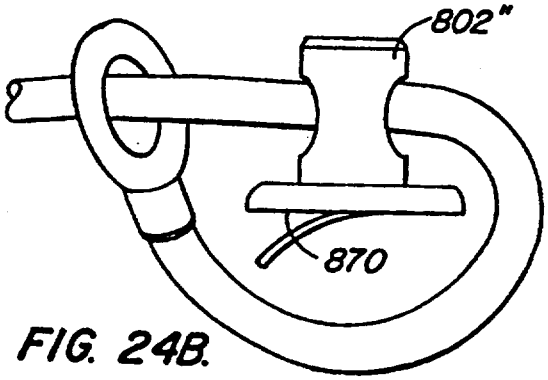

FIG. 24B.

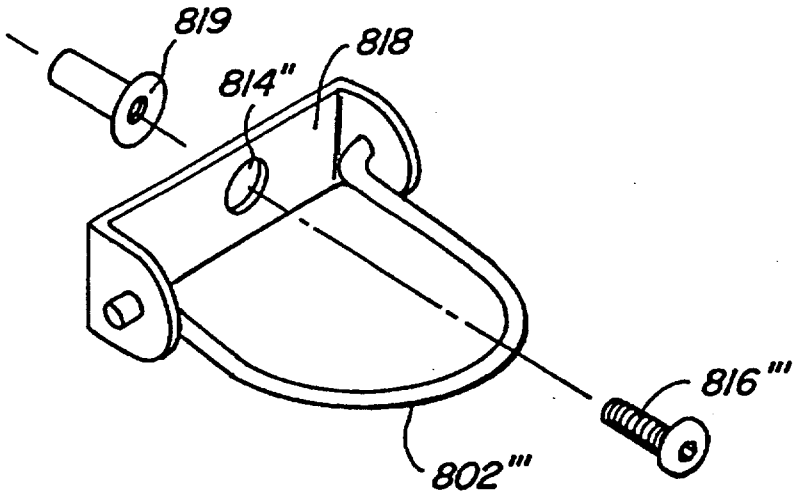

FIG. 25.

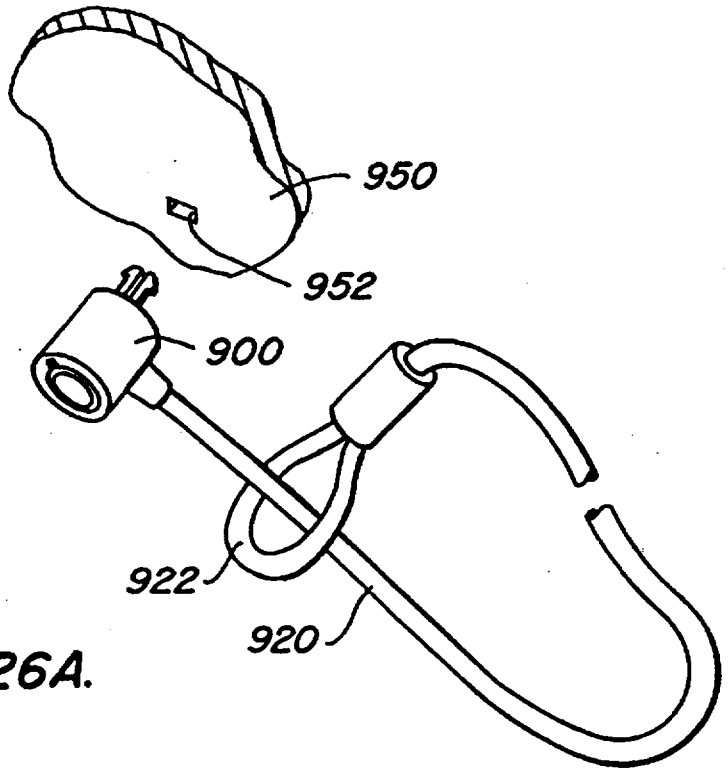

FIG. 26A.

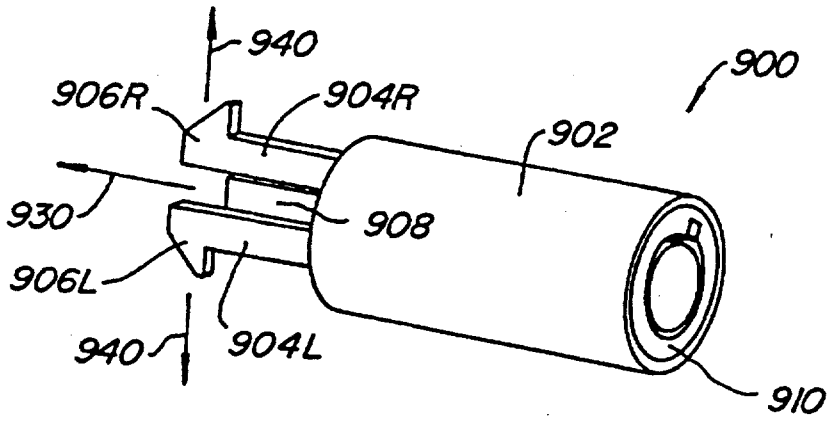

FIG. 26B.

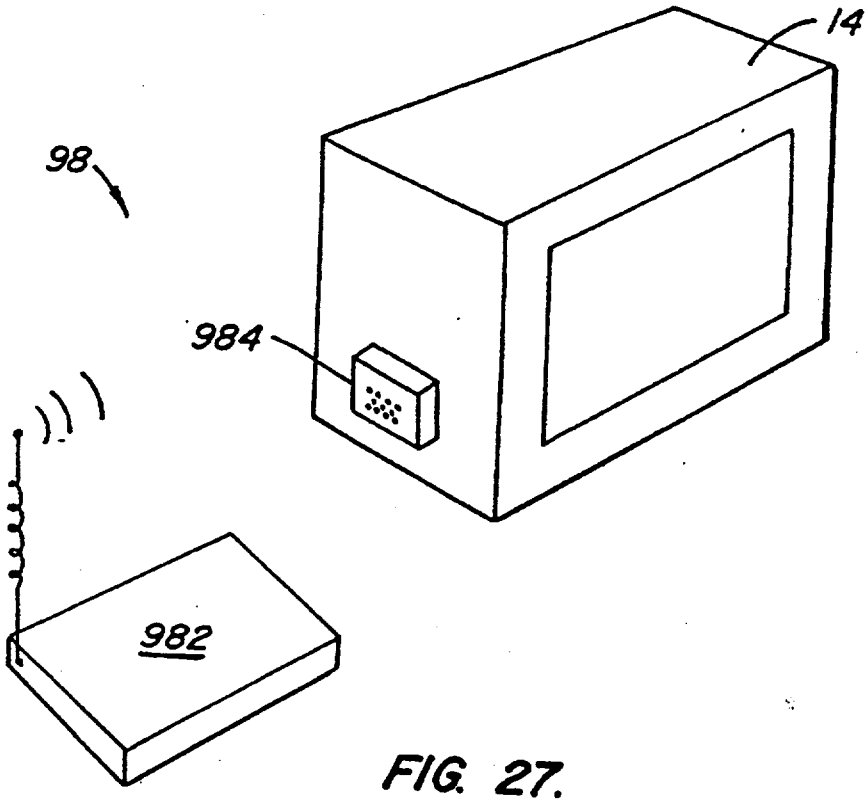

FIG. 27.

COMPUTER PHYSICAL SECURITY DEVICE

This application is a Division of application Ser. No. 08/138,634 filed Oct. 15, 1993, which application is a continuation-in-part of Ser. No. 08/042,851, now U.S. Pat. No. 5,381,685, filed Apr. 5, 1993, entitled COMPUTER PHYSICAL SECURITY DEVICE, which is a continuation of Ser. No. 07/824,964, now abandoned, filed Jan. 24, 1992, entitled COMPUTER PHYSICAL SECURITY DEVICE, and a continuation-in-part of Ser. No.08/006,311, now abandoned, filed Jan. 19, 1993, 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 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-

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 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;

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 22B;

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;

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 **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 semicircular 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 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 **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. **13** A 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** 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 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 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.

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 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 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. 22A.

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, 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 cork-screw 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 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 apparatus for connecting to a portable device having an external wall provided with a specially designed generally rectangular slot having preselected dimensions, comprising:

a housing, said housing including a cable attachment mechanism;

a first and a second locking leg generally parallel to each other and adapted for movement between an unlocked position and a locked position, each locking leg secured within said housing and extending from said housing a distance greater than a thickness of the external wall, said first locking leg including a first locking flange at

a distal end and said second locking leg including a second locking flange at a distal end wherein said locking flanges oppose each other and are adapted to engage an inner surface of the external wall through the security slot;

a key-actuated lock within said housing, said lock operable from a first position to a second position;

a locking member, coupled to said key-actuated lock and responsive to operation of said lock, for moving between a retracted position within said housing when said lock is in said first position to an extended position between said locking legs when said lock is in said second position, said locking member moving said locking legs from said unlocked position to said locked position when moving from said retracted position to said extended position; and

a cable, coupled to said cable attachment mechanism, for securing said housing to an object other than to the portable device.

2. A cable attaching apparatus, comprising:

a housing for abutting to an exterior wall of a portable electronic device, said exterior wall including a security slot, said housing including a cable attachment mechanism;

a first and a second locking leg generally parallel to each other and adapted for movement between an unlocked position and a locked position, each locking leg secured within said housing and extending from said housing a distance greater than a thickness of said external wall, said first locking leg including a first locking flange at a distal end and said second locking leg including a second locking flange at a distal end wherein said locking flanges oppose each other and are adapted to engage an inner surface of said external wall through the security slot;

a key-actuated lock within said housing, said lock operable from a first position to a second position;

a locking member, coupled to said key-actuated lock and responsive to operation of said lock, for moving between a retracted position within said housing when said lock is in said first position to an extended position between said locking legs when said lock is in said second position, said locking member moving said locking legs from said unlocked position to said locked position when moving from said retracted position to said extended position; and

a cable, coupled to said cable attachment mechanism, for attaching to an object other than said portable electronic device.

3. A cable attaching apparatus, comprising:

a portable electronic device having an exterior wall provided with a security slot;

a housing including a cable attachment mechanism;

a first and a second locking leg generally parallel to each other and adapted for movement between an unlocked position and a locked position, each locking leg secured within said housing and extending from said housing a distance greater than a thickness of said external wall, said first locking leg including a first locking flange at a distal end and said second locking leg including a second locking flange at a distal end wherein said locking flanges oppose each other and are adapted to engage an inner surface of said external wall through the security slot;

a lock within said housing, said lock operable from a first position to a second position;

a locking member, coupled to said lock and responsive to operation of said lock, for moving between a retracted position within said housing when said lock is in said first position to an extended position between said locking legs when said lock is in said second position, said locking member moving said locking legs from said unlocked position to said locked position when moving from said retracted position to said extended position; and

a cable, coupled to said cable attachment mechanism, for attaching to an object other than said portable electronic device.

4. The cable attaching apparatus of claim 3 wherein said security slot is rectangular.

5. The cable attaching apparatus of claim 3 wherein said lock is key-actuated.

6. The cable attaching apparatus of claim 3 wherein said lock is actuated by a quarter-turn rotation to move from said unlocked position to said locked position.

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