

PATENT OWNER THINK PRODUCT'S

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EXHIBIT 3

INTER PARTES PROCEEDINGS NO.

IPR2015-01167



US008139356B2

(12) **United States Patent**
Allen

(10) **Patent No.:** **US 8,139,356 B2**
(45) **Date of Patent:** **Mar. 20, 2012**

(54) **PLUNGER SECURITY LOCK AND
PERSONAL ELECTRONIC DEVICE
CONFIGURED TO BE SECURED BY THE
PLUNGER LOCK**

(76) Inventor: **Peter Allen**, Oyster Bay Cove, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 173 days.

(21) Appl. No.: **12/657,670**

(22) Filed: **Jan. 25, 2010**

(65) **Prior Publication Data**

US 2010/0284144 A1 Nov. 11, 2010

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/154,561, filed on May 23, 2008, now Pat. No. 7,724,520, which is a continuation-in-part of application No. 11/454,433, filed on Jun. 15, 2006, now Pat. No. 7,443,665, which is a continuation-in-part of application No. 11/359,871, filed on Feb. 22, 2006, now Pat. No. 7,324,333, and a continuation-in-part of application No. 11/038,591, filed on Jan. 19, 2005, now Pat. No. 7,315,443.

(60) Provisional application No. 60/655,270, filed on Feb. 22, 2005, provisional application No. 60/678,911, filed on May 6, 2005, provisional application No. 60/569,561, filed on May 10, 2004, provisional application No. 60/626,839, filed on Nov. 10, 2004, provisional application No. 60/691,476, filed on Jun. 17, 2005, provisional application No. 60/725,333, filed on Oct. 11, 2005, provisional application No. 60/757,737, filed on Jan. 10, 2006, provisional application No. 60/783,188, filed on Mar. 16, 2006.

(51) **Int. Cl.**

H05K 5/00 (2006.01)

H05K 7/00 (2006.01)

E05B 73/00 (2006.01)

E05B 69/00 (2006.01)

H01L 23/34 (2006.01)

A47B 81/00 (2006.01)

A47B 97/00 (2006.01)

(52) **U.S. Cl.** **361/679.57**; 361/679.58; 312/223.2; 211/8; 211/9; 257/727; 70/15; 70/58

(58) **Field of Classification Search** 361/679.57, 361/679.58; 312/223.2; 257/727; 211/8, 211/9; 70/15, 58

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,181,319 A 5/1965 Hudon

3,275,160 A 9/1966 Zurker

(Continued)

FOREIGN PATENT DOCUMENTS

CA 454901 3/1949

(Continued)

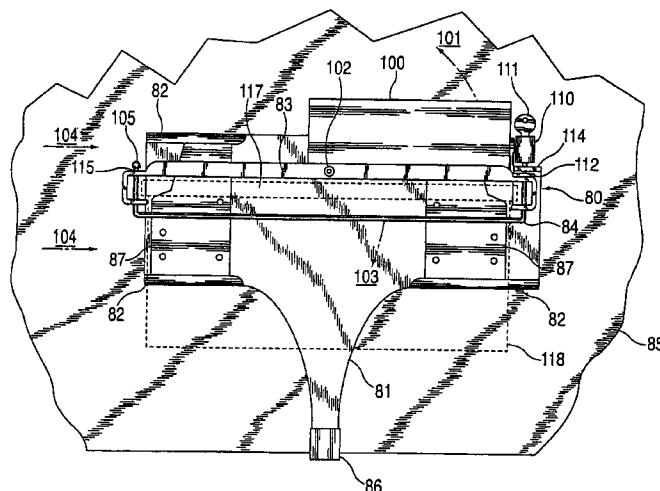
Primary Examiner — Anthony Houghton

(74) *Attorney, Agent, or Firm* — Alfred M. Walker; John F. Vodopia

(57) **ABSTRACT**

A plunger-type security lock includes a slotted, cylindrical sliding key receptacle, a ferrule arranged on an outer cylindrical surface of the sliding key receptacle that is configured for attachment to a locking member, a cylindrical plunger, a sliding key including a hooking end and a plunger-contact end that is configured with a key definition and for slidable spring-loaded operation within the slotted, cylindrical sliding key in cooperation with the cylindrical plunger to extend and hook the flexible locking strip and to retract with and lock the locking strip in locking state and a locking mechanism that defines the locking state in cooperation with the key definition.

22 Claims, 35 Drawing Sheets



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U.S. PATENT DOCUMENTS

| | | | | | |
|---------------|---------|--------------------------|-----------------|---------|----------------------|
| 3,410,122 A | 11/1968 | Moses | 6,612,455 B2 | 9/2003 | Byrne |
| 3,410,580 A | 11/1968 | Longenecker | D485,060 S | 1/2004 | DeCotis |
| 3,535,898 A | 10/1970 | Allport | 6,684,548 B1 | 2/2004 | Petrus |
| 3,707,860 A | 1/1973 | Singer | 6,689,954 B2 | 2/2004 | Vaughan |
| RE28,187 E | 10/1974 | Longenecker | 6,697,252 B2 | 2/2004 | Maeda |
| 3,945,227 A | 3/1976 | Reiland | 6,705,133 B1 | 3/2004 | Avganim |
| 3,965,705 A | 6/1976 | Nadler | 6,708,966 B1 | 3/2004 | Troudt |
| 4,009,599 A | 3/1977 | Patriquin | 6,711,921 B1 | 3/2004 | Yang |
| 4,066,231 A | 1/1978 | Bahner | 6,735,990 B1 | 5/2004 | Murray |
| 4,418,553 A | 12/1983 | Applegate | D491,009 S | 6/2004 | Burdett |
| 4,426,863 A | 1/1984 | Gillette | 6,755,056 B2 | 6/2004 | Igelmund |
| 4,696,449 A | 9/1987 | Woo | 6,763,690 B2 | 7/2004 | Galant |
| 4,733,840 A | 3/1988 | D'Amore | 6,788,216 B2 | 9/2004 | Chen |
| 4,738,428 A | 4/1988 | Themistos | 6,796,536 B1 | 9/2004 | Sevier |
| 4,821,538 A | 4/1989 | Gray | 6,810,698 B2 | 11/2004 | Weinraub |
| 4,856,304 A | 8/1989 | Derman | 6,820,362 B1 | 11/2004 | Petrus |
| 4,870,842 A | 10/1989 | Plumer | D499,546 S | 12/2004 | Smithers |
| 5,052,198 A | 10/1991 | Watts | 6,865,914 B2 | 3/2005 | Irgens |
| 5,052,199 A | 10/1991 | Derman | D503,532 S | 4/2005 | Andre |
| 5,076,079 A | 12/1991 | Monoson | 6,883,694 B2 * | 4/2005 | Abelow 224/666 |
| 5,082,232 A | 1/1992 | Wilson | 6,913,238 B2 | 7/2005 | Bakker |
| 5,085,395 A | 2/1992 | Frater | 6,920,770 B2 | 7/2005 | Lurie et al. |
| 5,135,197 A | 8/1992 | Kelley | 6,926,141 B2 | 8/2005 | Montler |
| 5,169,114 A | 12/1992 | O'Neil | 7,007,912 B1 | 3/2006 | Giuliani |
| 5,265,449 A | 11/1993 | Rashleigh | D519,731 S | 5/2006 | Andre |
| 5,345,219 A | 9/1994 | Rogers | D521,232 S | 5/2006 | Andre |
| 5,351,507 A | 10/1994 | Derman | 7,104,093 B2 | 9/2006 | Ling |
| 5,351,508 A | 10/1994 | Kelley | D533,994 S | 12/2006 | Hussaini |
| 5,361,610 A | 11/1994 | Sanders | 7,255,228 B2 | 8/2007 | Kim |
| 5,381,685 A | 1/1995 | Carl | D553,352 S | 10/2007 | Allen |
| 5,406,809 A | 4/1995 | Igelmund | D559,076 S | 1/2008 | Allen |
| 5,469,726 A | 11/1995 | Rushing | 7,315,443 B2 | 1/2008 | Allen |
| 5,493,878 A | 2/1996 | Murray | D565,839 S | 4/2008 | Allen |
| 5,502,989 A | 4/1996 | Murray | 7,409,842 B2 | 8/2008 | Kuo |
| 5,531,082 A | 7/1996 | Wolk | 7,443,665 B2 | 10/2008 | Allen |
| 5,542,723 A | 8/1996 | Scharf | 7,499,269 B2 | 3/2009 | Allen |
| 5,560,481 A | 10/1996 | Doodson | 7,499,270 B2 | 3/2009 | Allen |
| 5,568,359 A | 10/1996 | Cavello | 7,647,796 B2 | 1/2010 | Francke |
| 5,582,044 A | 12/1996 | Bolich | 7,963,132 B2 | 6/2011 | Andres |
| 5,595,074 A | 1/1997 | Munro | 2001/0049949 A1 | 12/2001 | Igelmund |
| 5,608,605 A | 3/1997 | Siow | 2003/0085143 A1 | 5/2003 | Yatabe |
| 5,645,261 A | 7/1997 | Glynn | 2004/0007651 A1 | 1/2004 | Williams |
| 5,709,110 A | 1/1998 | Greenfield | 2005/0150263 A1 | 7/2005 | Murray |
| 5,762,306 A | 6/1998 | Day | 2005/0161557 A1 | 7/2005 | Heintz |
| 5,787,738 A * | 8/1998 | Brandt et al. 70/58 | 2005/0178173 A1 | 8/2005 | Kuo |
| 5,787,739 A | 8/1998 | Derman | 2005/0247584 A1 | 11/2005 | Lu |
| 5,794,463 A | 8/1998 | McDaid | 2006/0032877 A1 | 2/2006 | Obolo |
| 5,816,076 A | 10/1998 | Biedermann | 2006/0117814 A1 | 6/2006 | Francke |
| 5,836,183 A | 11/1998 | Derman | 2006/0176661 A1 | 8/2006 | Allen |
| D405,348 S | 2/1999 | Orr | 2007/0205125 A1 | 9/2007 | Ikebe |
| 5,927,108 A | 7/1999 | Pierce | 2007/0235493 A1 | 10/2007 | Fortson |
| D415,950 S | 11/1999 | Anderson | 2008/0110217 A1 | 5/2008 | Andrews et al. |
| 6,000,252 A | 12/1999 | Murray | | | |
| 6,006,557 A | 12/1999 | Carl | | | |
| D425,402 S | 5/2000 | Welborn | | | |
| 6,138,483 A | 10/2000 | Galant | | | |
| 6,155,088 A | 12/2000 | Murray | | | |
| D436,310 S | 1/2001 | Arnold | | | |
| 6,178,089 B1 | 1/2001 | Alfonso | | | |
| 6,182,481 B1 | 2/2001 | Nagy | | | |
| 6,185,964 B1 | 2/2001 | Addiego | | | |
| 6,212,921 B1 | 4/2001 | Knighton | | | |
| 6,216,499 B1 | 4/2001 | Ronberg | | | |
| 6,237,375 B1 | 5/2001 | Wymer | | | |
| 6,257,542 B1 | 7/2001 | Westfield | | | |
| 6,275,378 B1 | 8/2001 | Lee | | | |
| 6,308,928 B1 | 10/2001 | Galant | | | |
| 6,317,936 B1 | 11/2001 | McDaid | | | |
| 6,331,934 B1 | 12/2001 | Helot | | | |
| 6,427,499 B1 | 8/2002 | Derman | | | |
| 6,443,417 B2 | 9/2002 | Galant | | | |
| 6,477,870 B1 | 11/2002 | Derman | | | |
| 6,477,871 B1 | 11/2002 | Shaw | | | |
| 6,497,125 B1 | 12/2002 | Necchi | | | |
| 6,560,710 B1 | 5/2003 | Leyden | | | |
| 6,578,394 B2 | 6/2003 | Yin | | | |
| 6,581,420 B1 | 6/2003 | Ling | | | |
| 6,590,767 B2 | 7/2003 | Liao | | | |

FOREIGN PATENT DOCUMENTS

| | | |
|----|----------|---------|
| CA | 791364 | 8/1968 |
| CA | 987121 | 4/1976 |
| DE | 329934 | 12/1920 |
| DE | 335741 | 4/1921 |
| DE | 361068 | 4/1923 |
| DE | 456219 | 2/1928 |
| DE | 577757 | 6/1933 |
| DE | 3202700 | 4/1983 |
| DE | 3407723 | 9/1985 |
| DE | 3824393 | 7/1989 |
| FR | 455740 | 8/1913 |
| FR | 877220 | 12/1942 |
| FR | 1026519 | 4/1953 |
| FR | 1085107 | 1/1955 |
| FR | 2308006 | 11/1976 |
| FR | 2636686 | 3/1990 |
| FR | 2741375 | 5/1997 |
| GB | 4470901 | 5/1936 |
| GB | 1256295 | 12/1971 |
| GB | 1376011 | 12/1974 |
| GB | 2109109 | 5/1983 |
| GB | 2234856 | 2/1991 |
| HU | P0000398 | 6/2000 |
| HU | 224329 | 6/2003 |
| IT | 451949 | 3/1949 |

US 8,139,356 B2

Page 3

| | | |
|----|--------------|---------|
| JP | 49-91096 | 11/1947 |
| JP | 37-7592 | 6/1959 |
| JP | 52-36813 | 3/1977 |
| JP | 57-25092 | 2/1982 |
| JP | 57-179618 | 11/1982 |
| JP | 08-7462 | 1/1996 |
| JP | 087462 | 1/1996 |
| JP | 2000-305845 | 11/2000 |
| JP | 2000-3035845 | 11/2000 |
| JP | 2002149264 A | 5/2002 |
| JP | 2004318426 A | 11/2004 |
| JP | 2000-140948 | 5/2005 |
| NO | 14095 | 5/1905 |

| | | | |
|----|---------------|----|---------|
| WO | WO86/00396 | A1 | 1/1986 |
| WO | WO93/15295 | A1 | 8/1993 |
| WO | WO95/10680 | A1 | 5/1995 |
| WO | WO96/07002 | A1 | 3/1996 |
| WO | WO9615347 | A1 | 5/1996 |
| WO | WO2008/051919 | A2 | 5/2008 |
| WO | WO2008/051930 | A2 | 5/2008 |
| WO | 2008067173 | A2 | 6/2008 |
| WO | WO2008/147818 | A1 | 12/2008 |
| WO | WO2009/026225 | A1 | 2/2009 |
| WO | WO2010/080402 | A1 | 7/2010 |
| WO | 2011/000108 | A1 | 3/2011 |

* cited by examiner

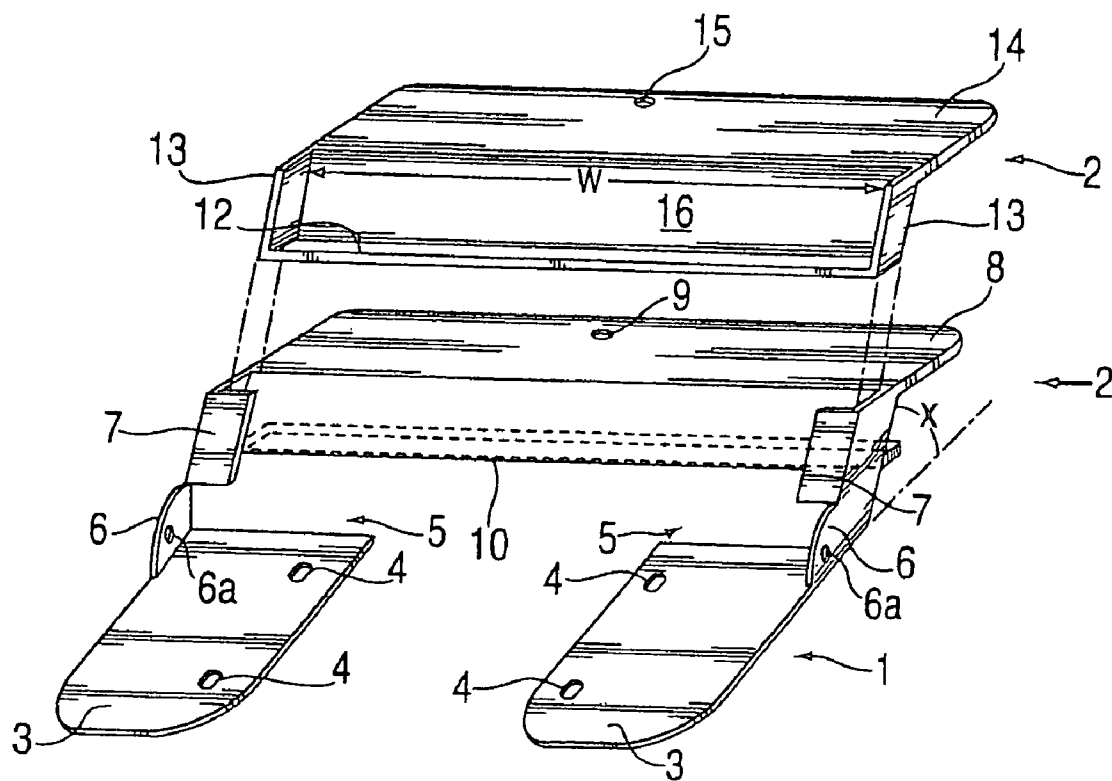
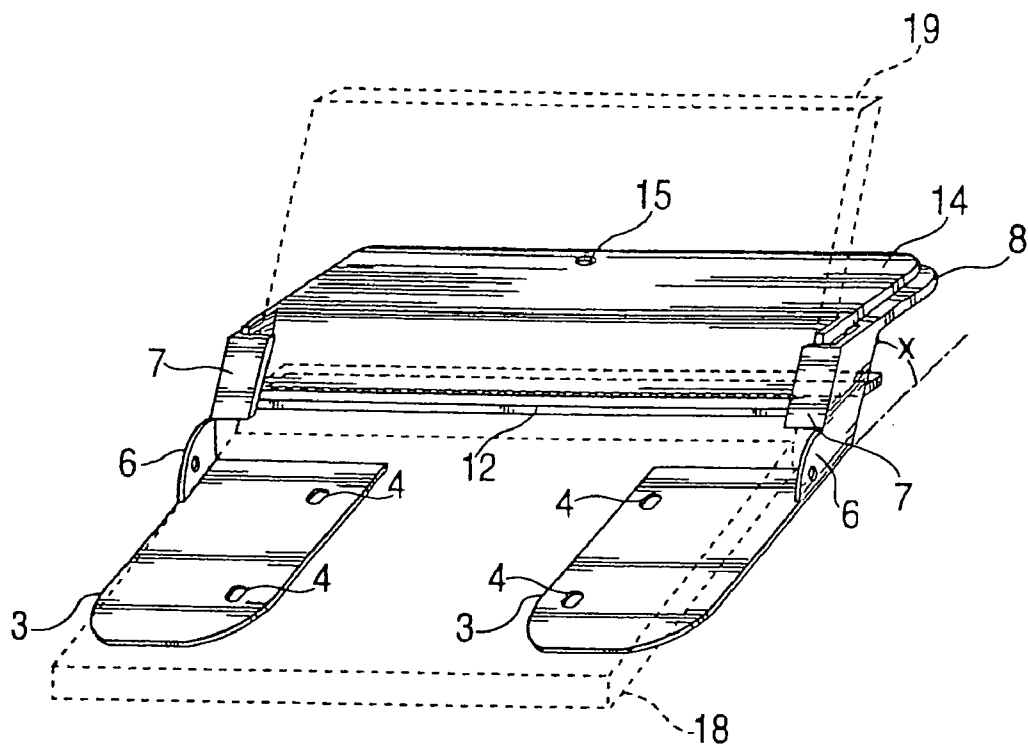
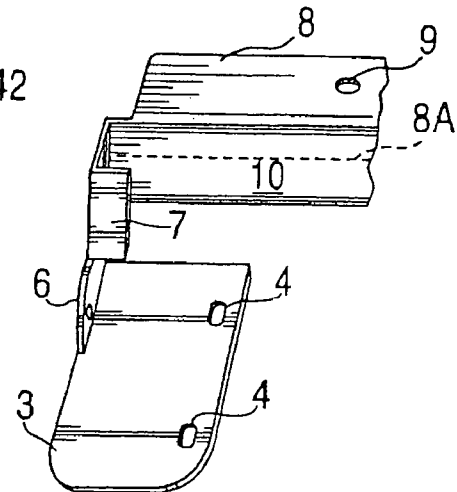
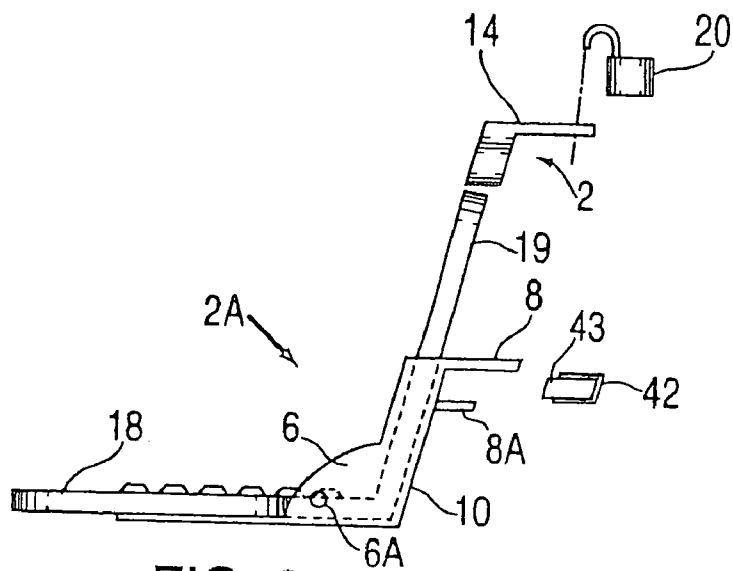


FIG. 1



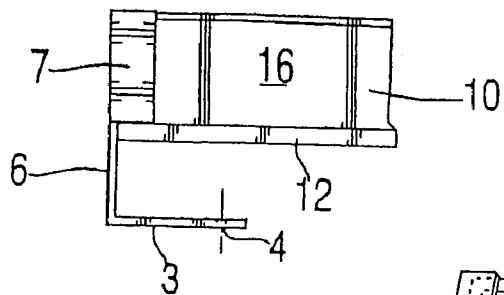


FIG. 2C

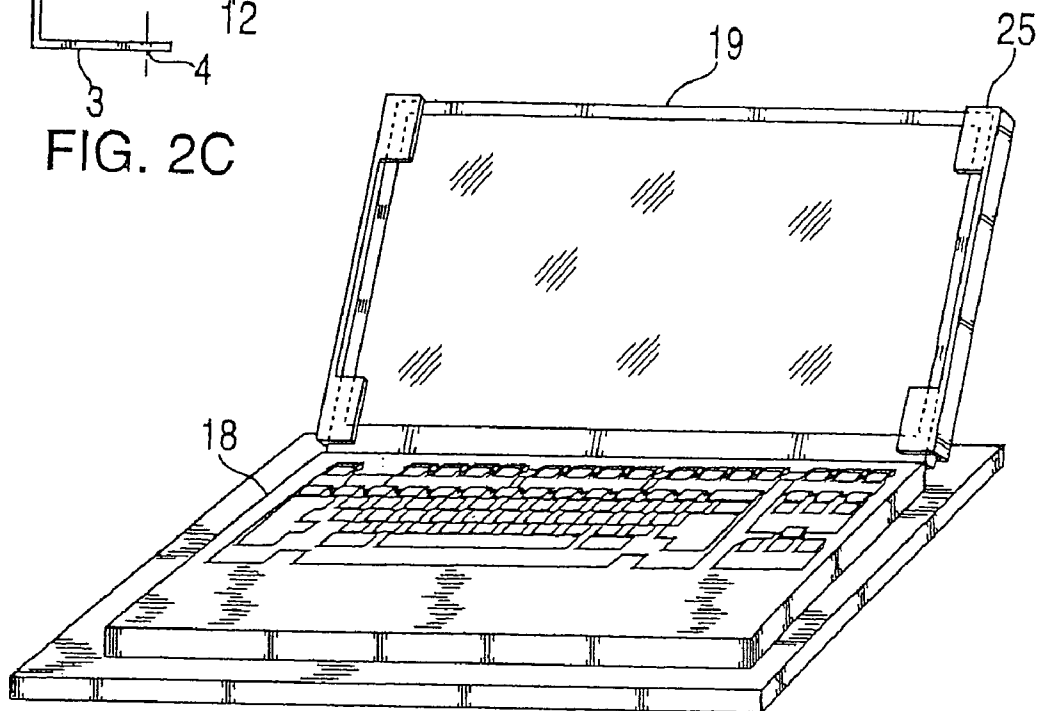


FIG. 3

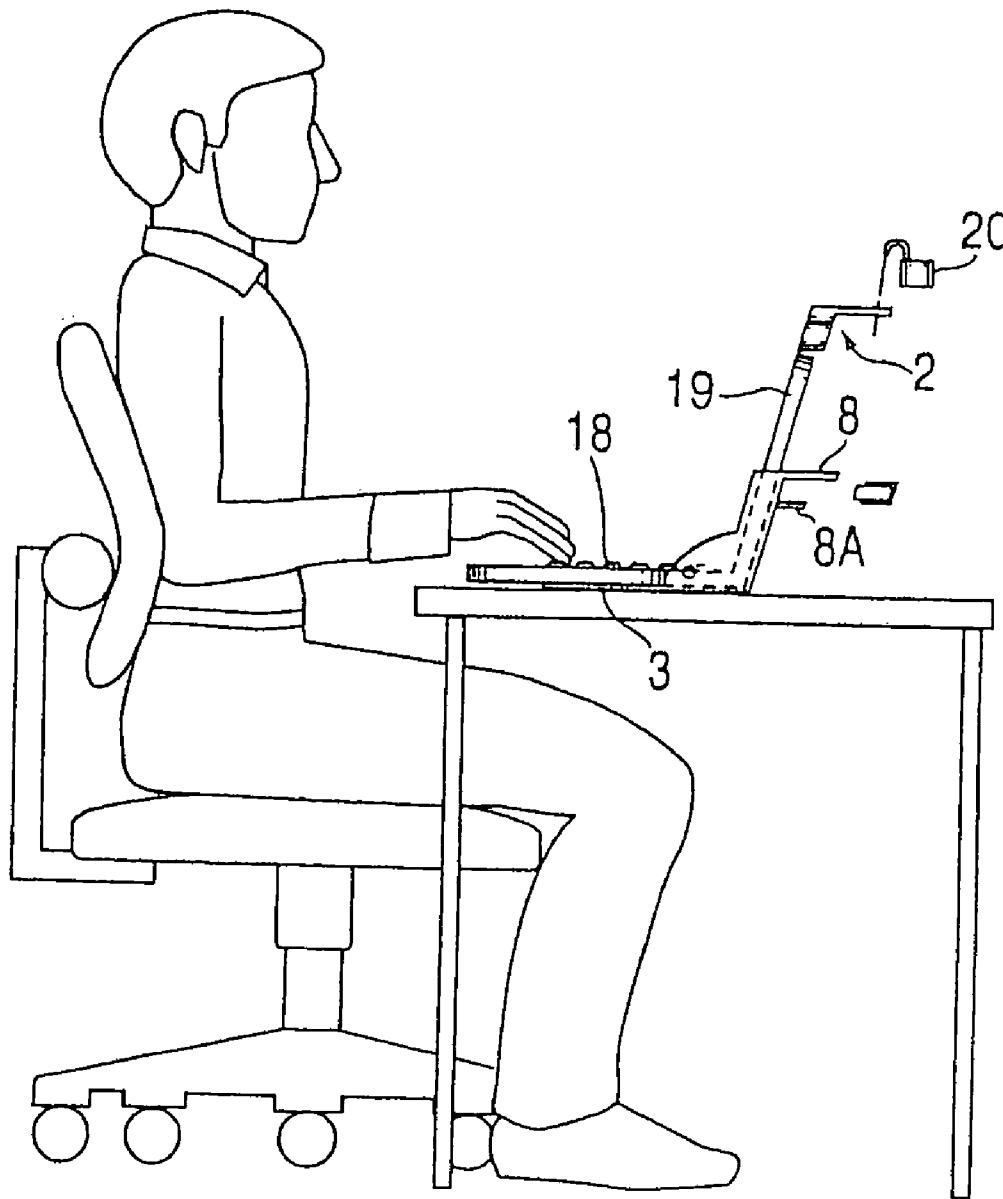


FIG. 2D

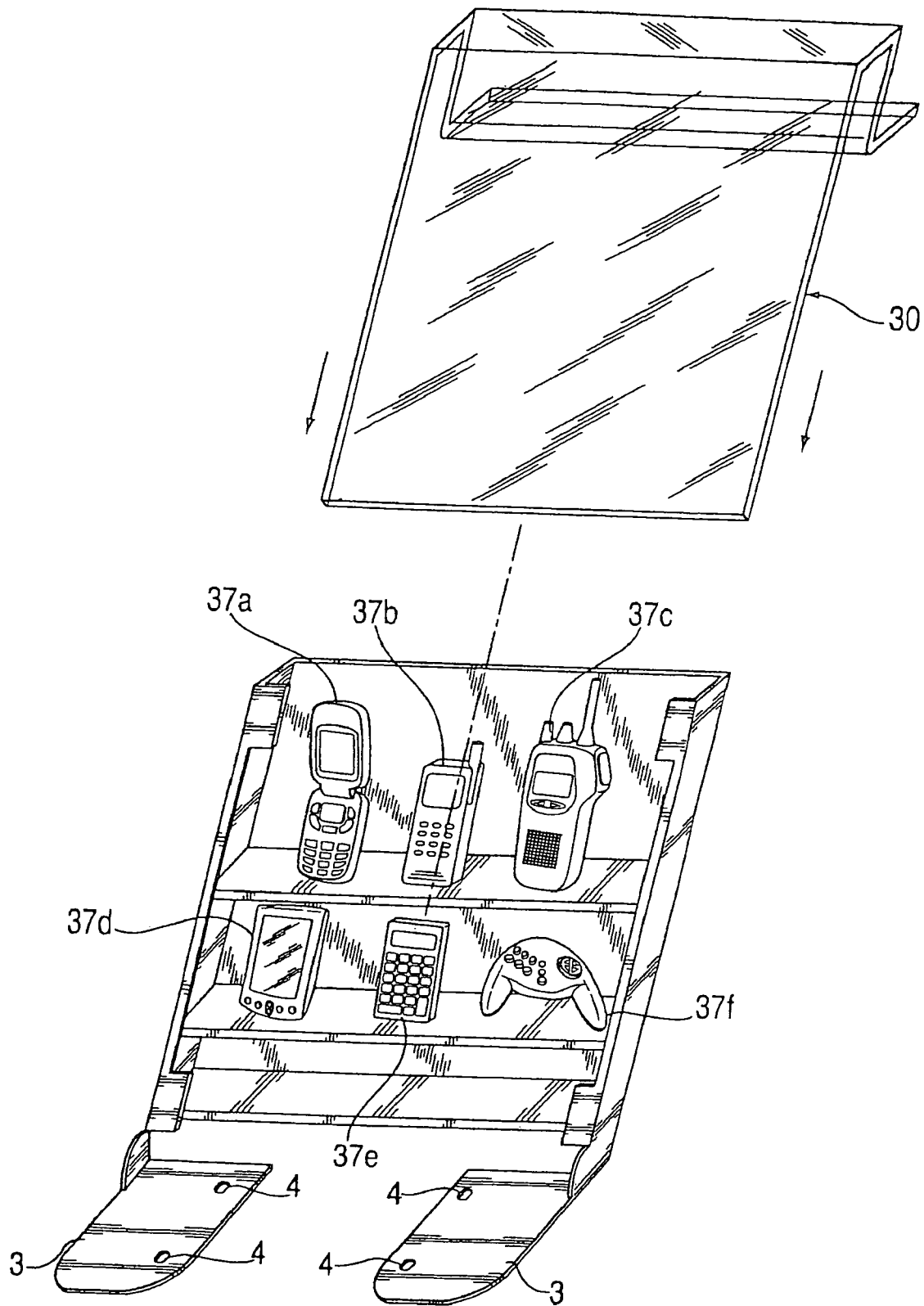


FIG. 3A

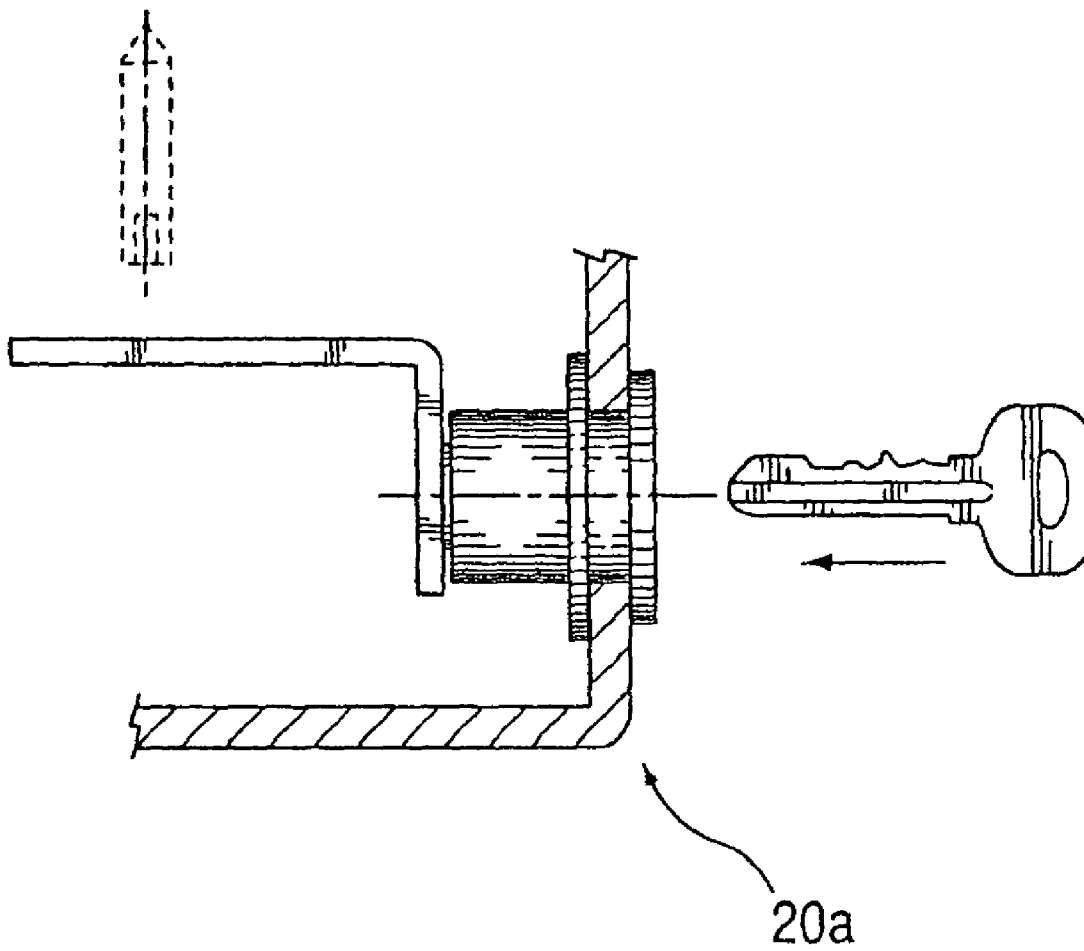


FIG. 3B

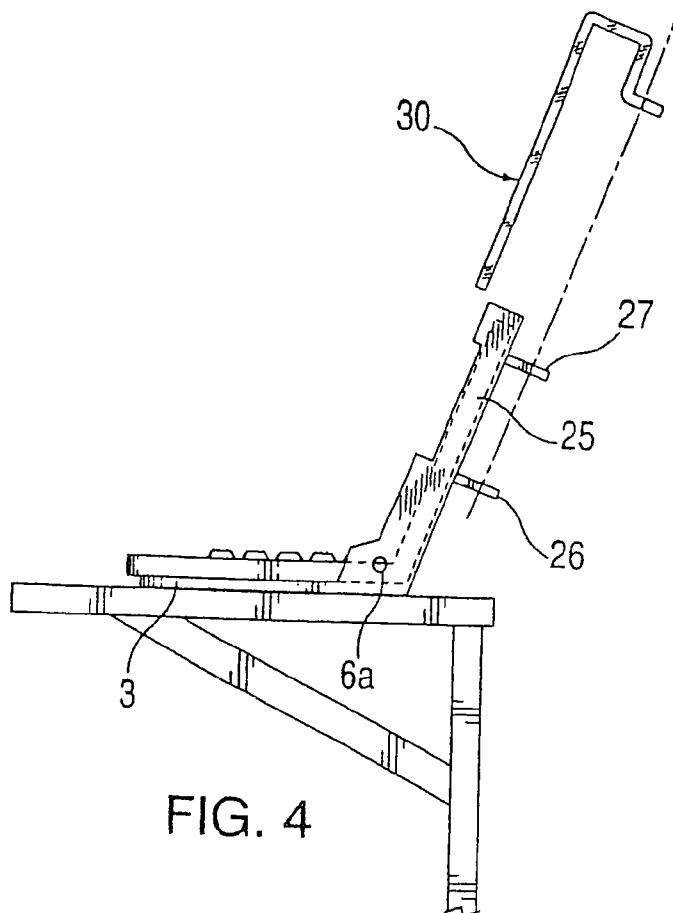


FIG. 4

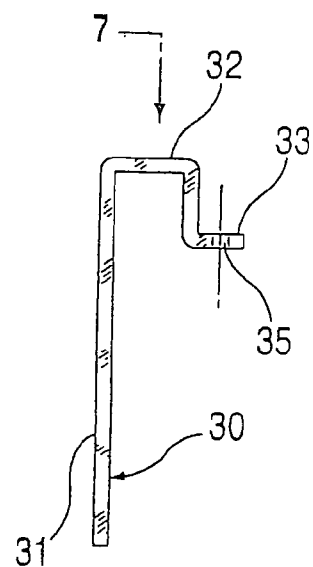


FIG. 6

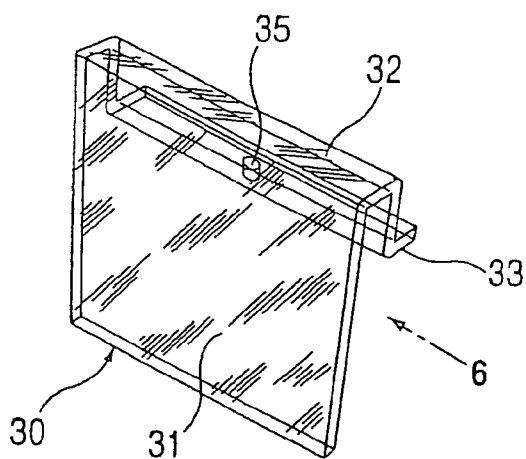


FIG. 5

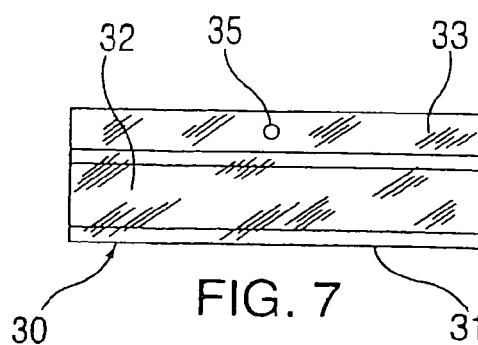
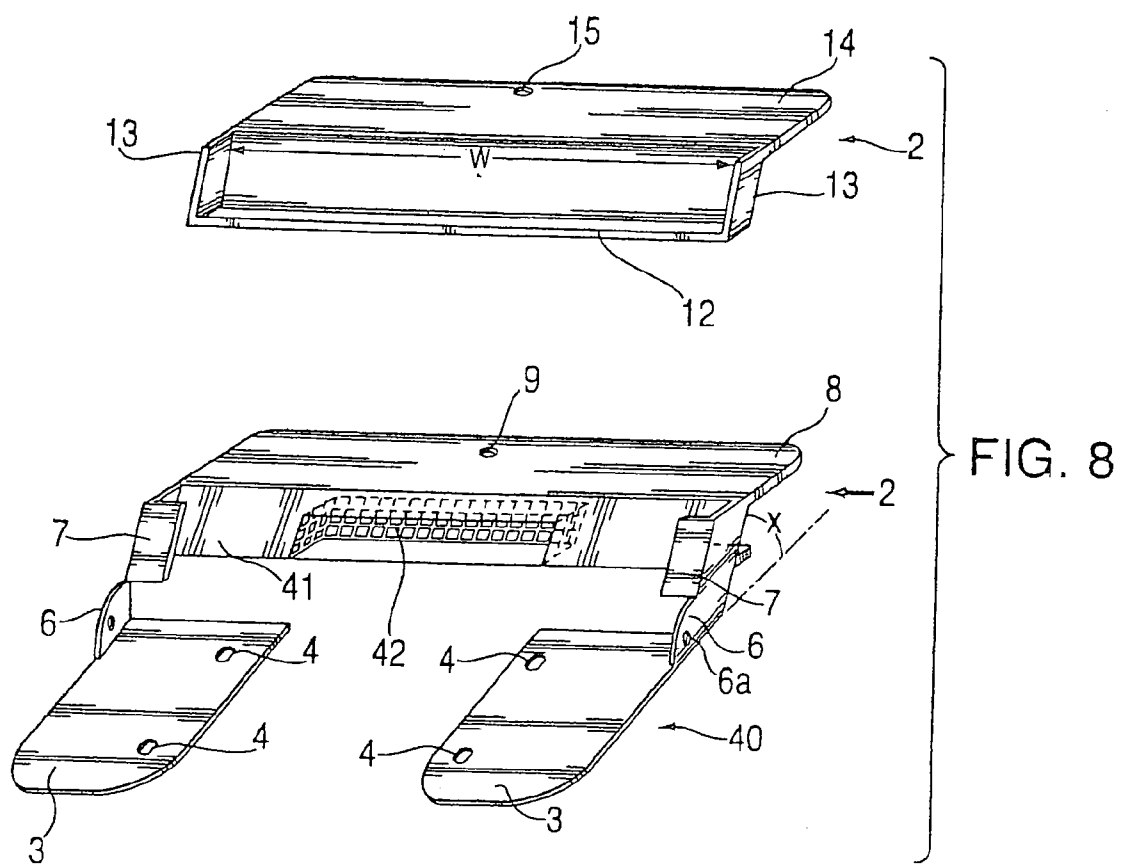


FIG. 7



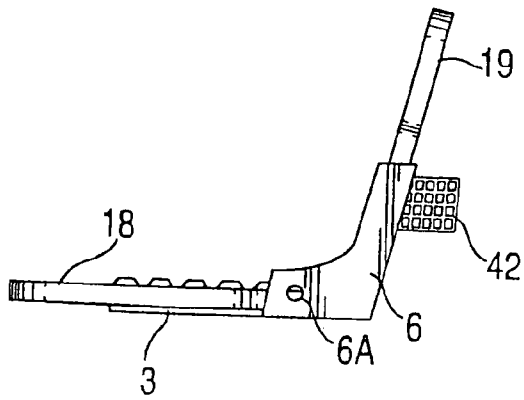


FIG. 9

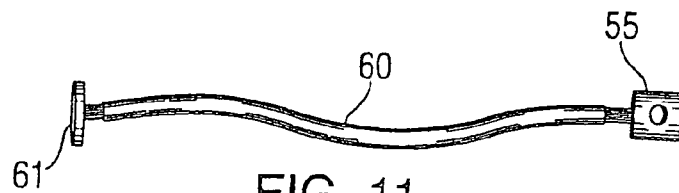


FIG. 11

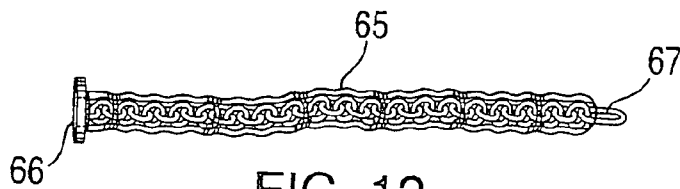


FIG. 12

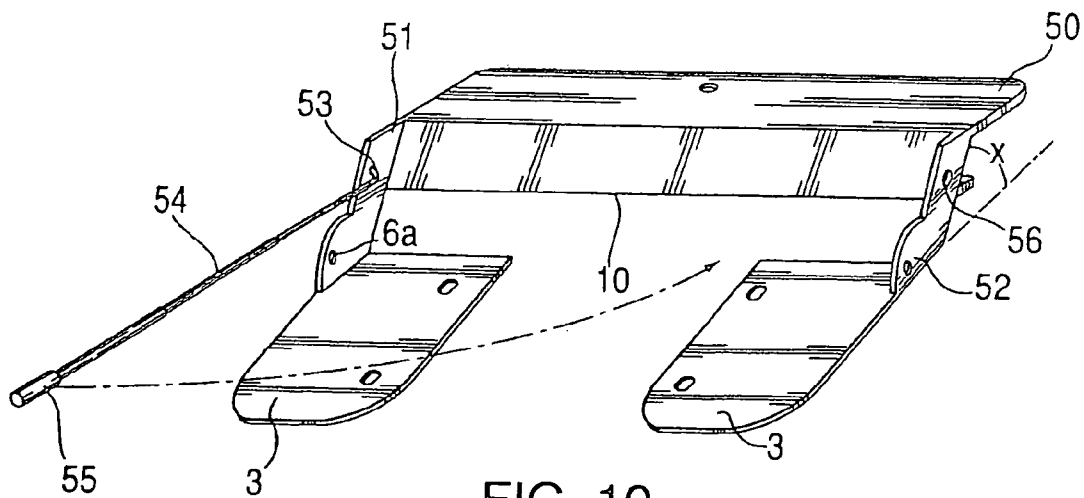


FIG. 10

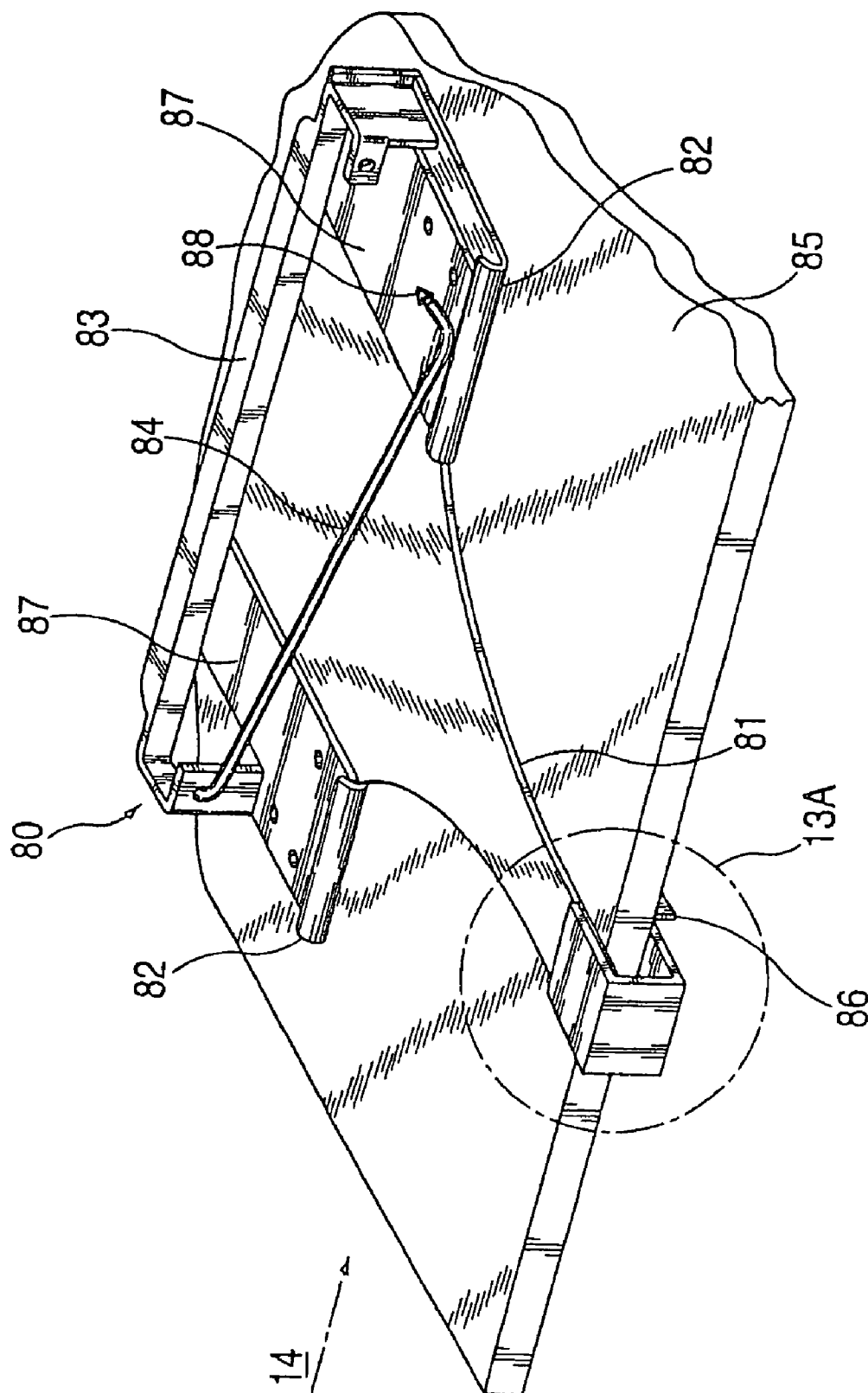


FIG. 13

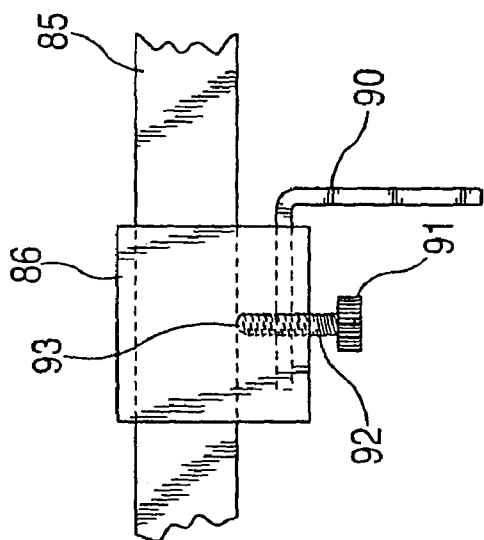


FIG. 13A

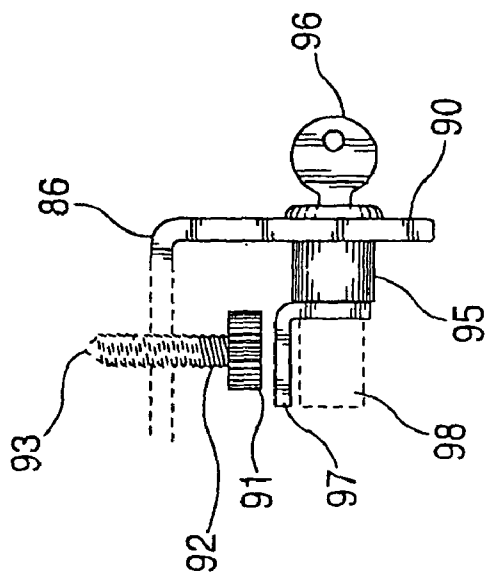


FIG. 13B

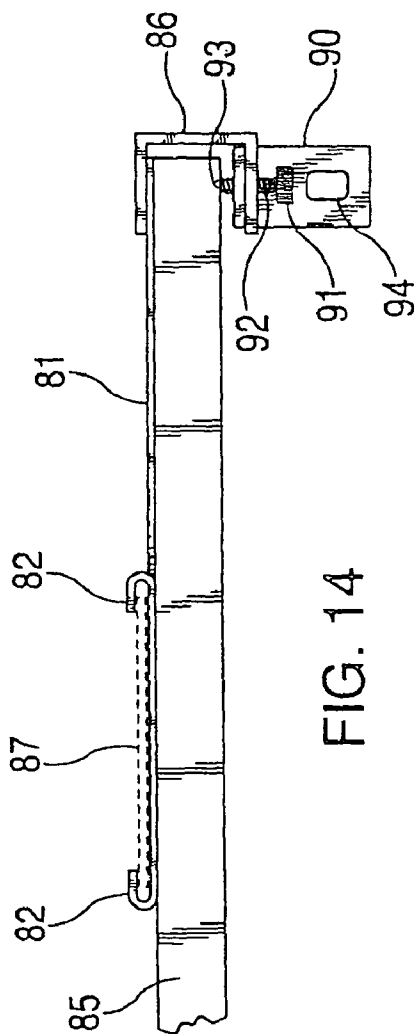


FIG. 14

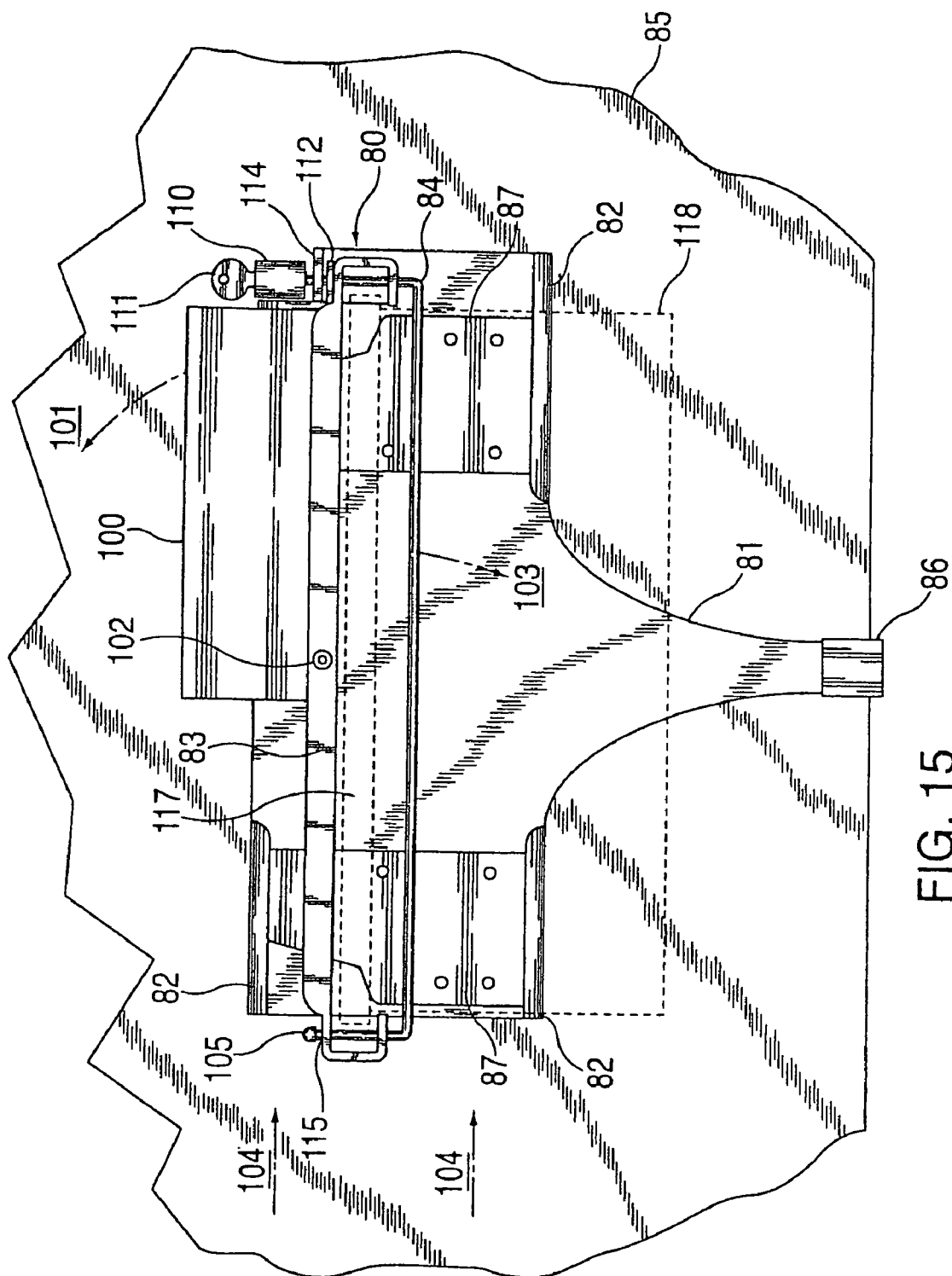


FIG. 15

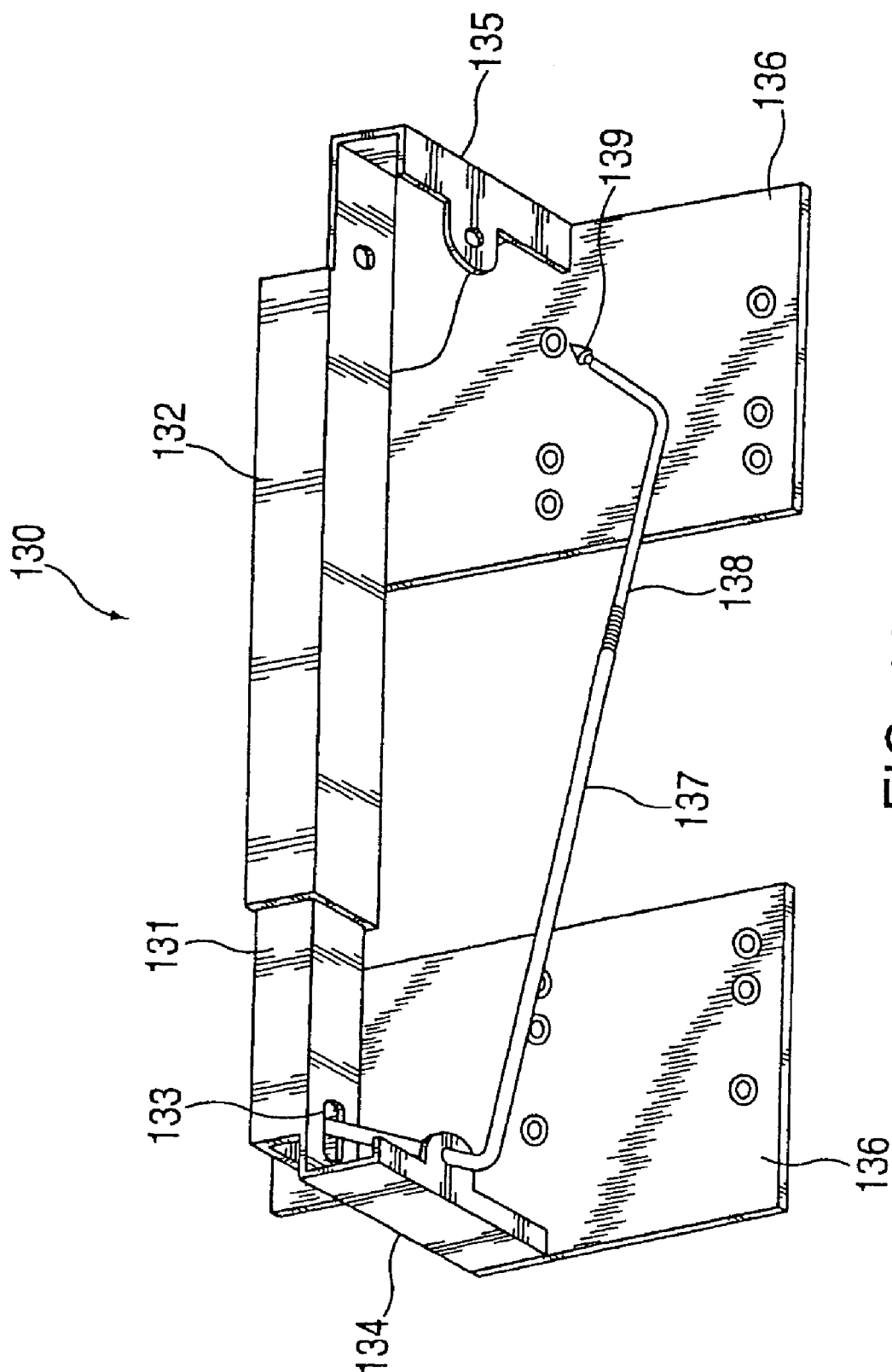


FIG. 16

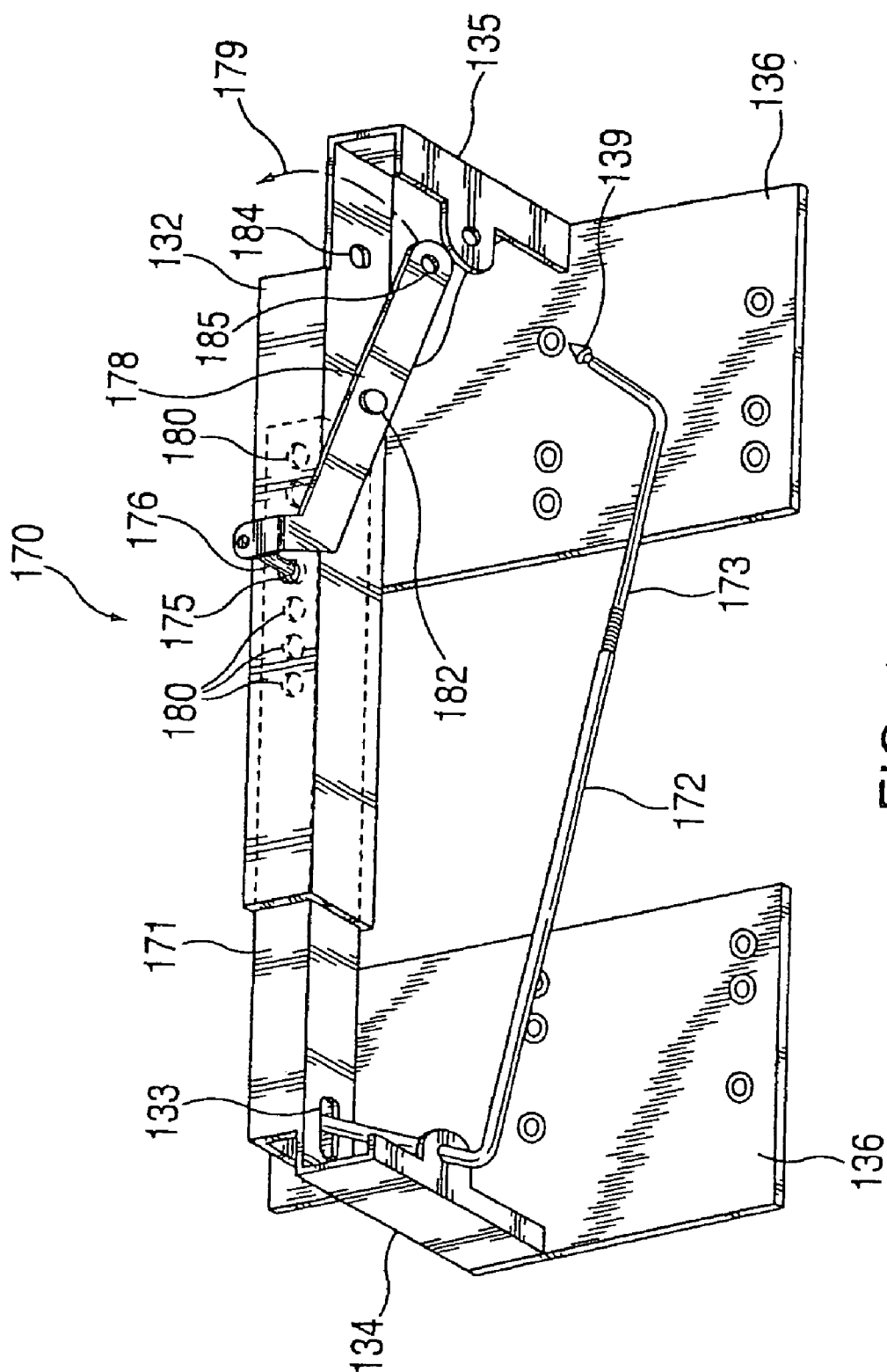
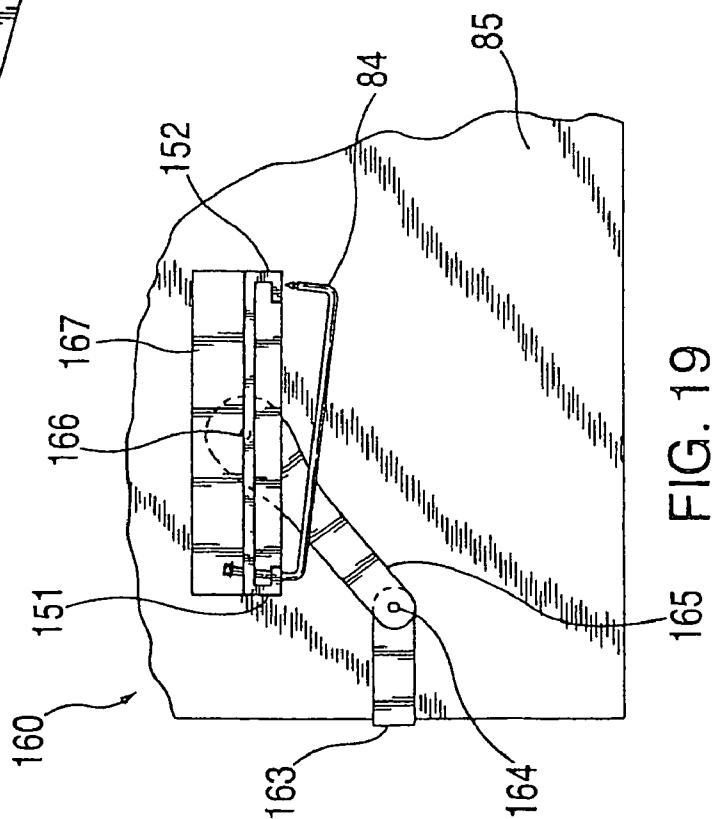
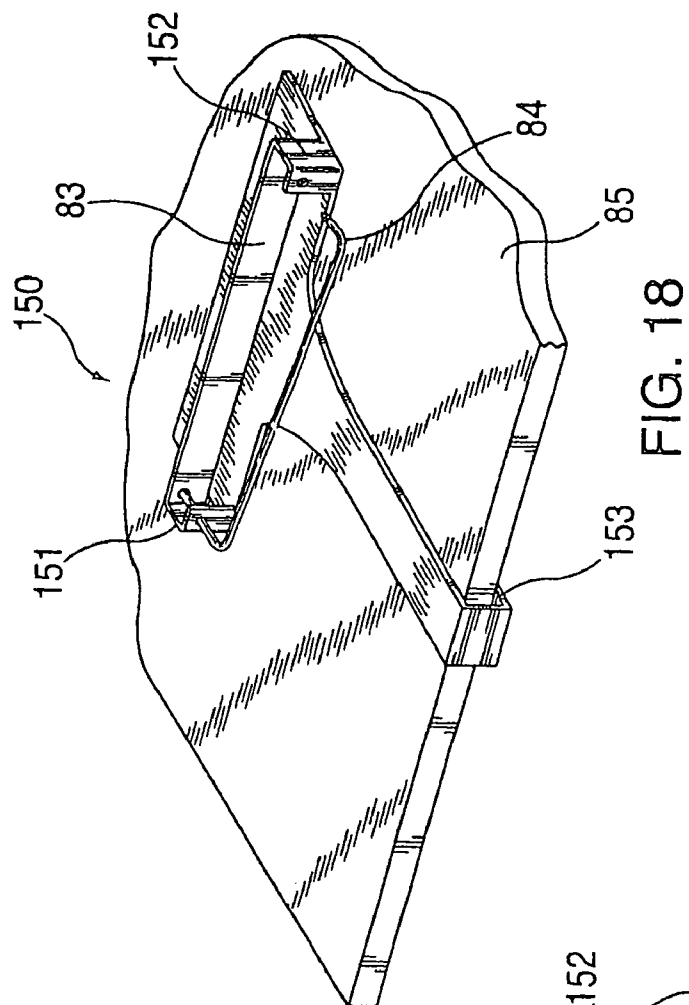
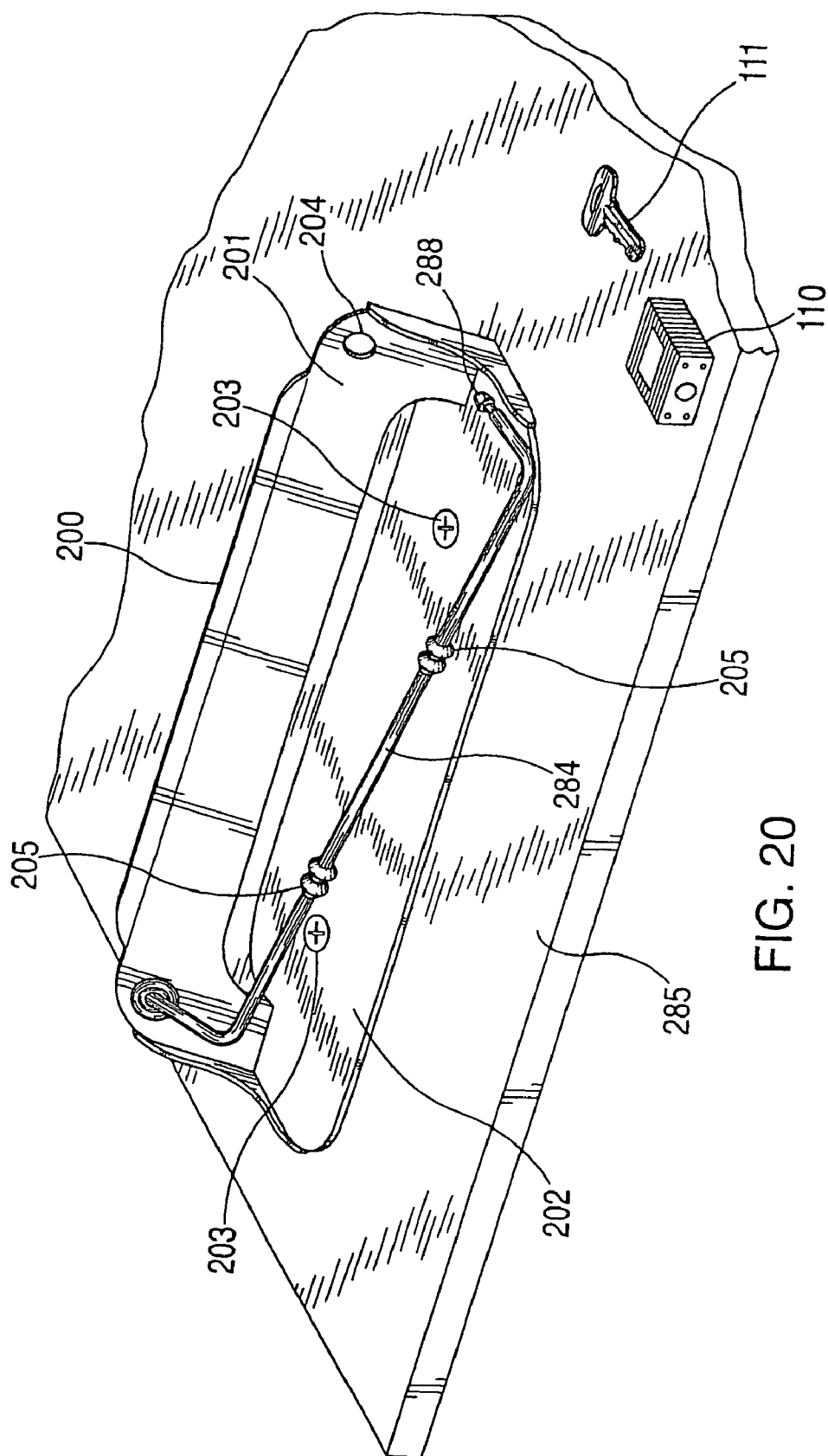


FIG. 17





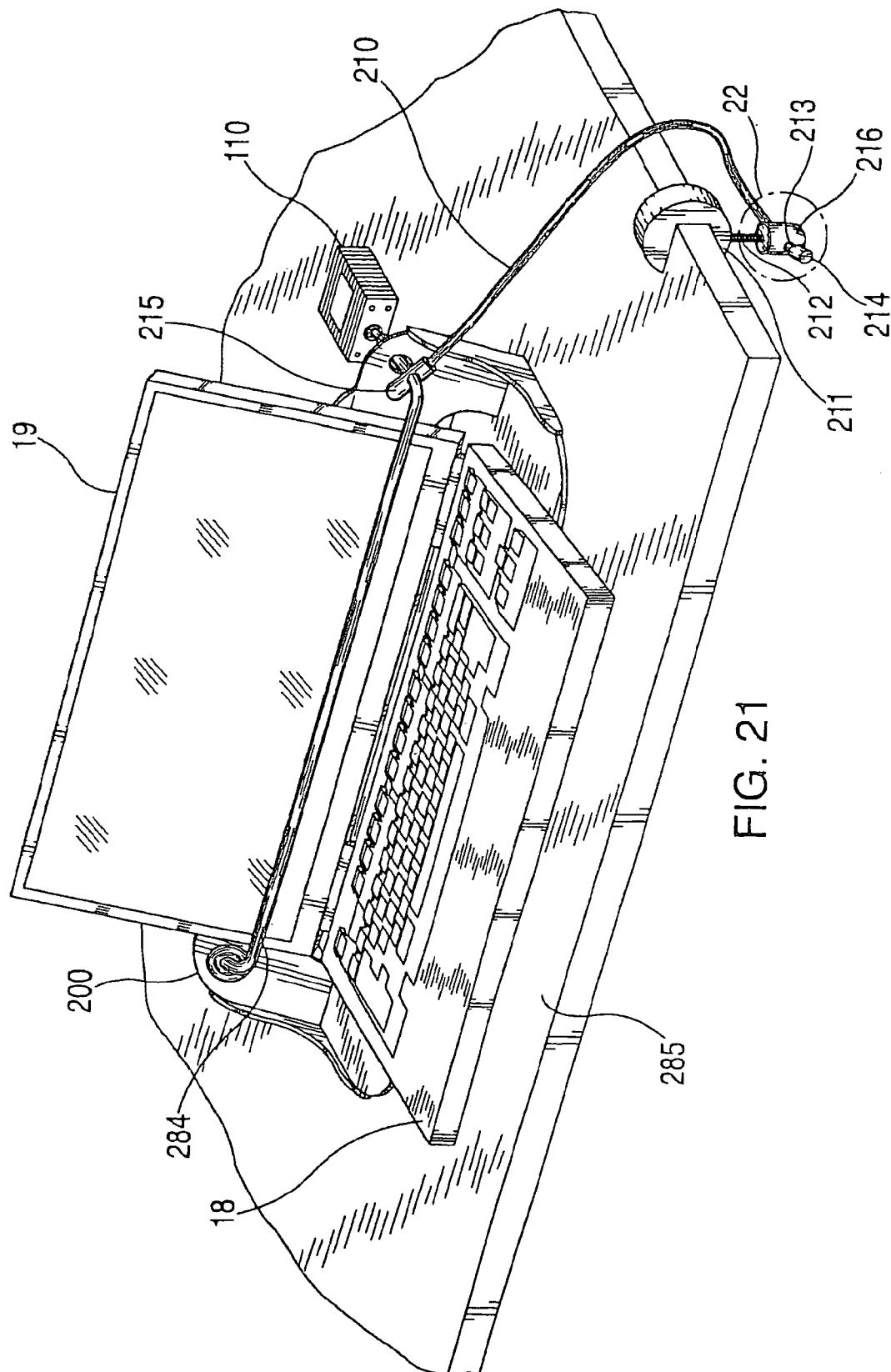


FIG. 21

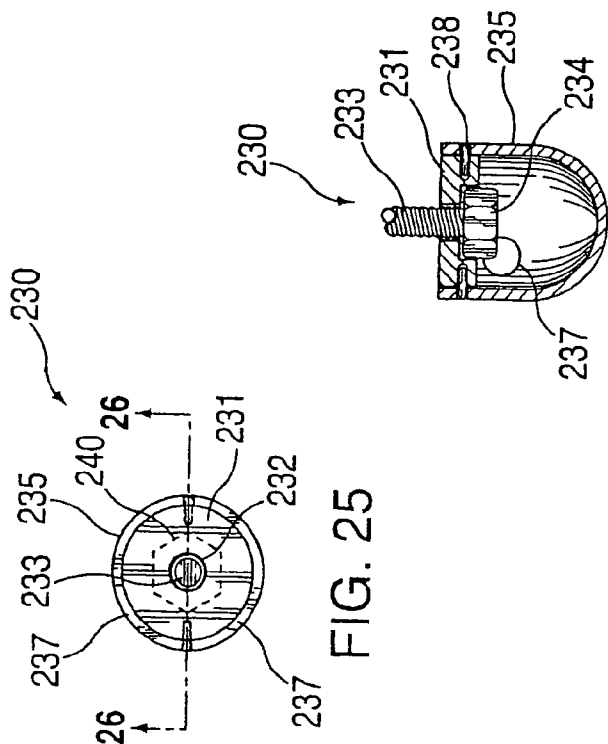


FIG. 26

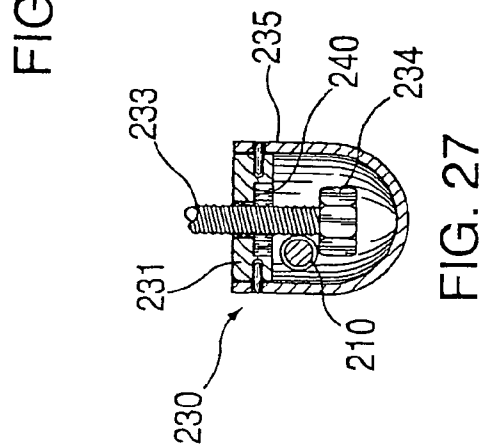
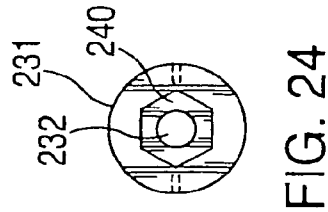
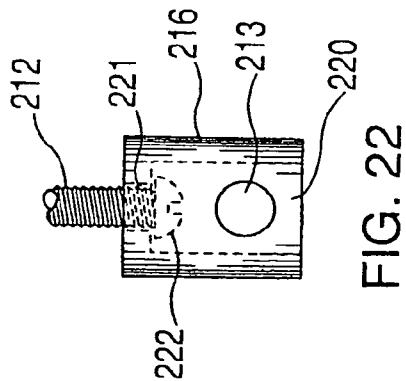
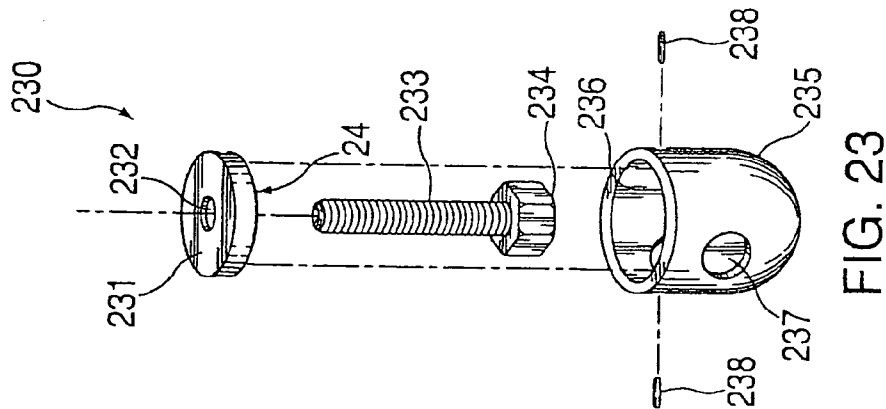
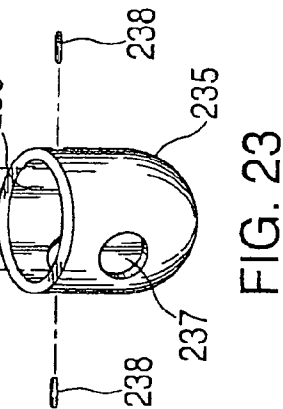


FIG. 27



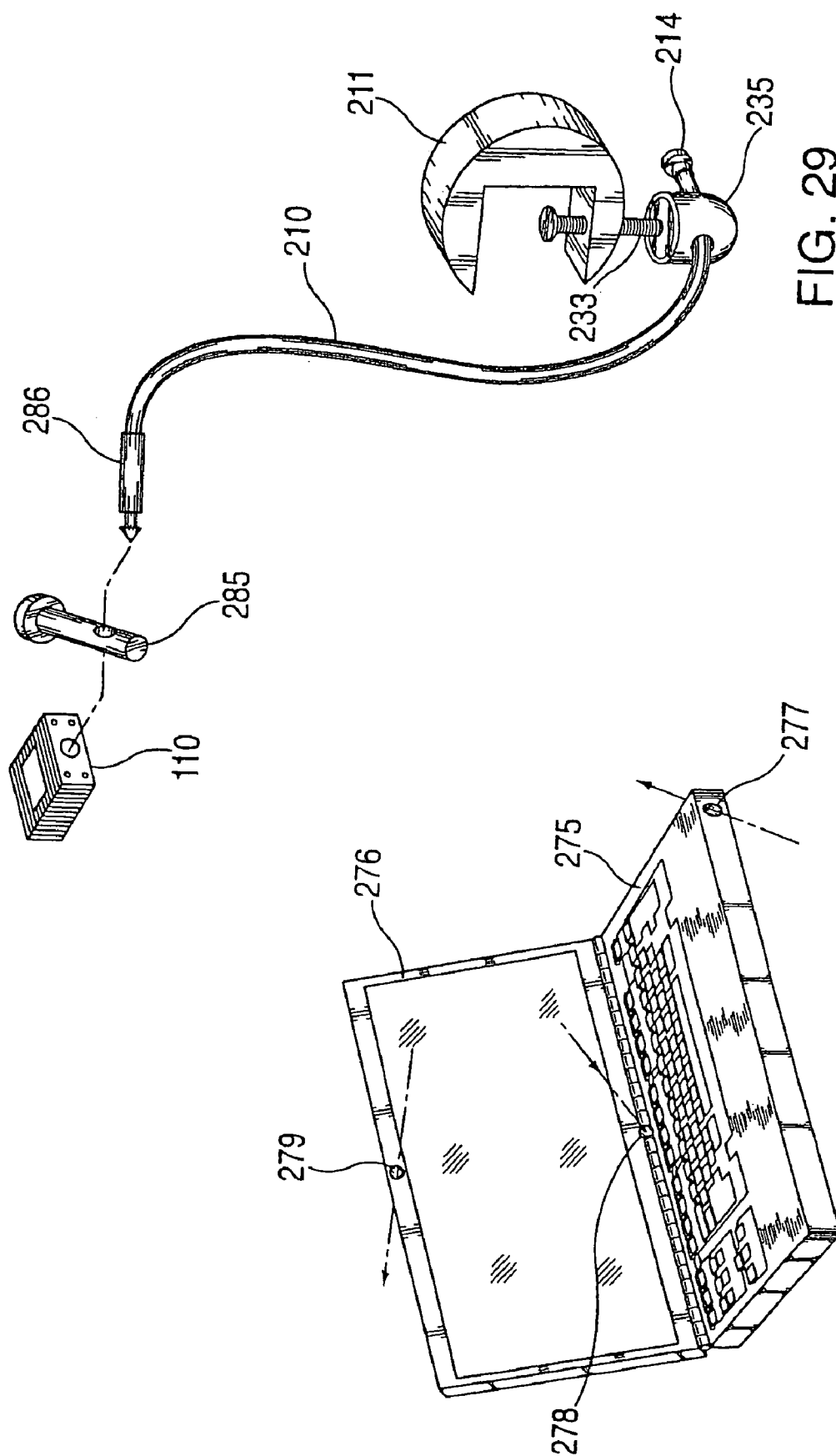


FIG. 29

FIG. 28

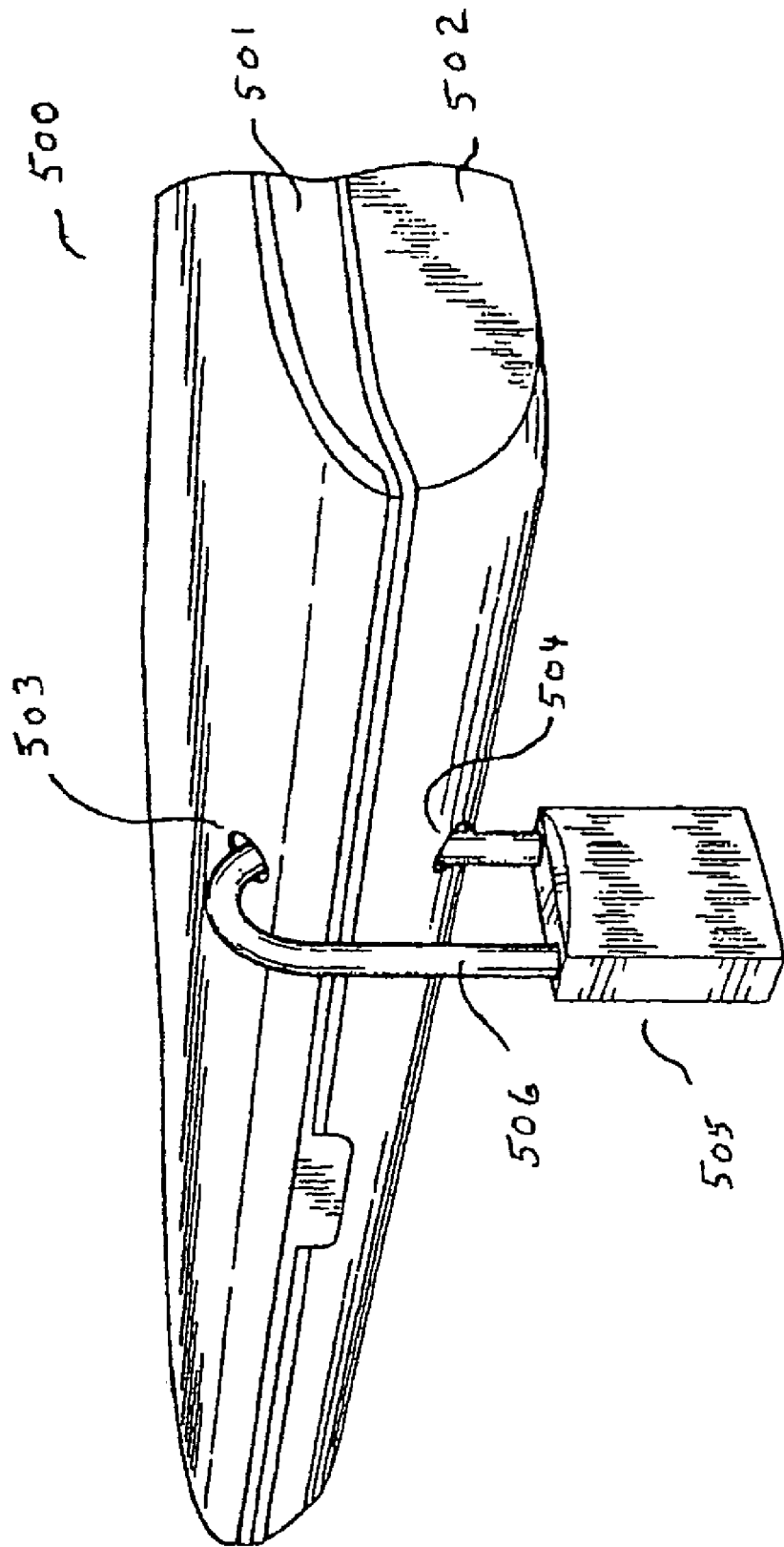


FIG. 28A

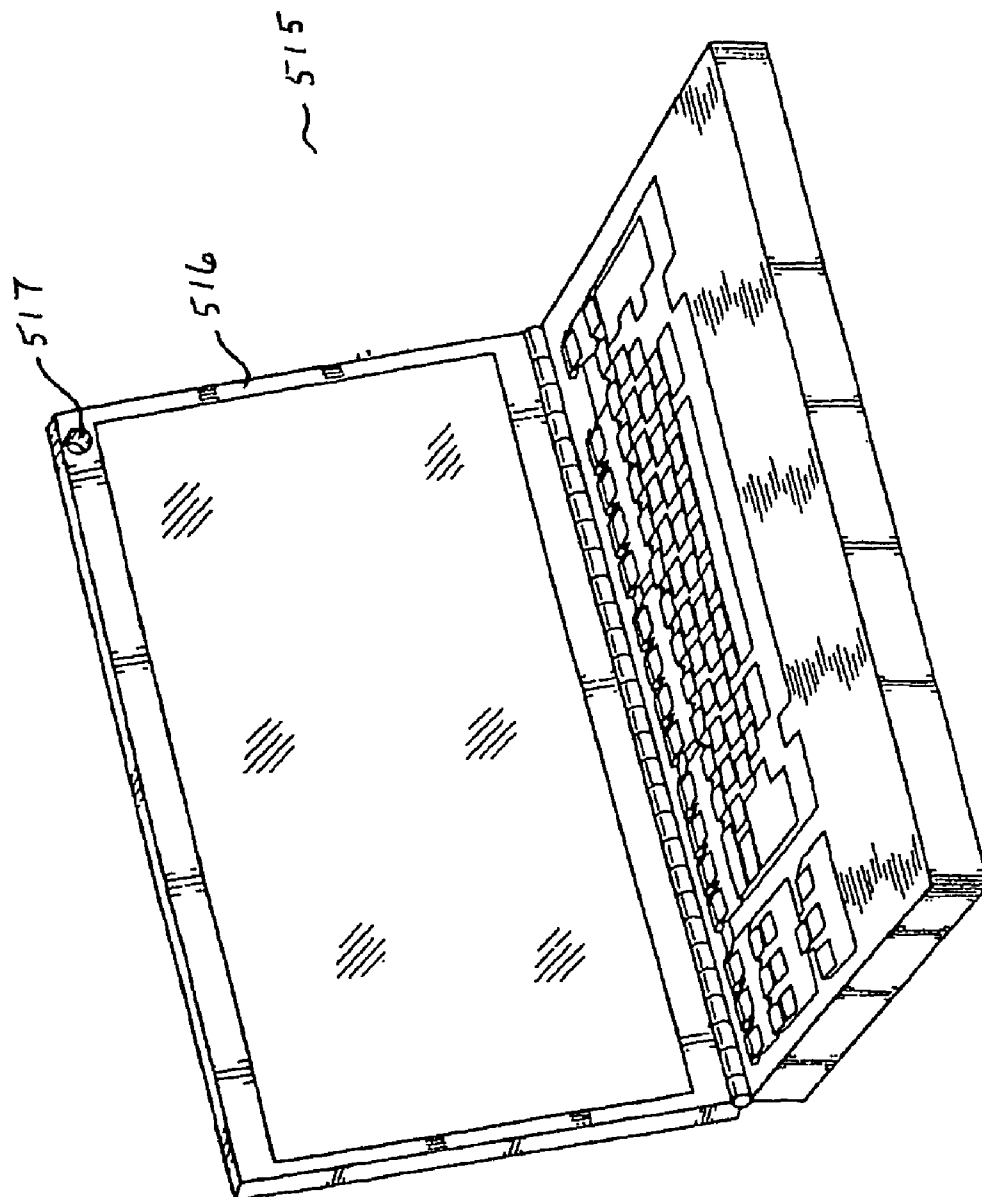
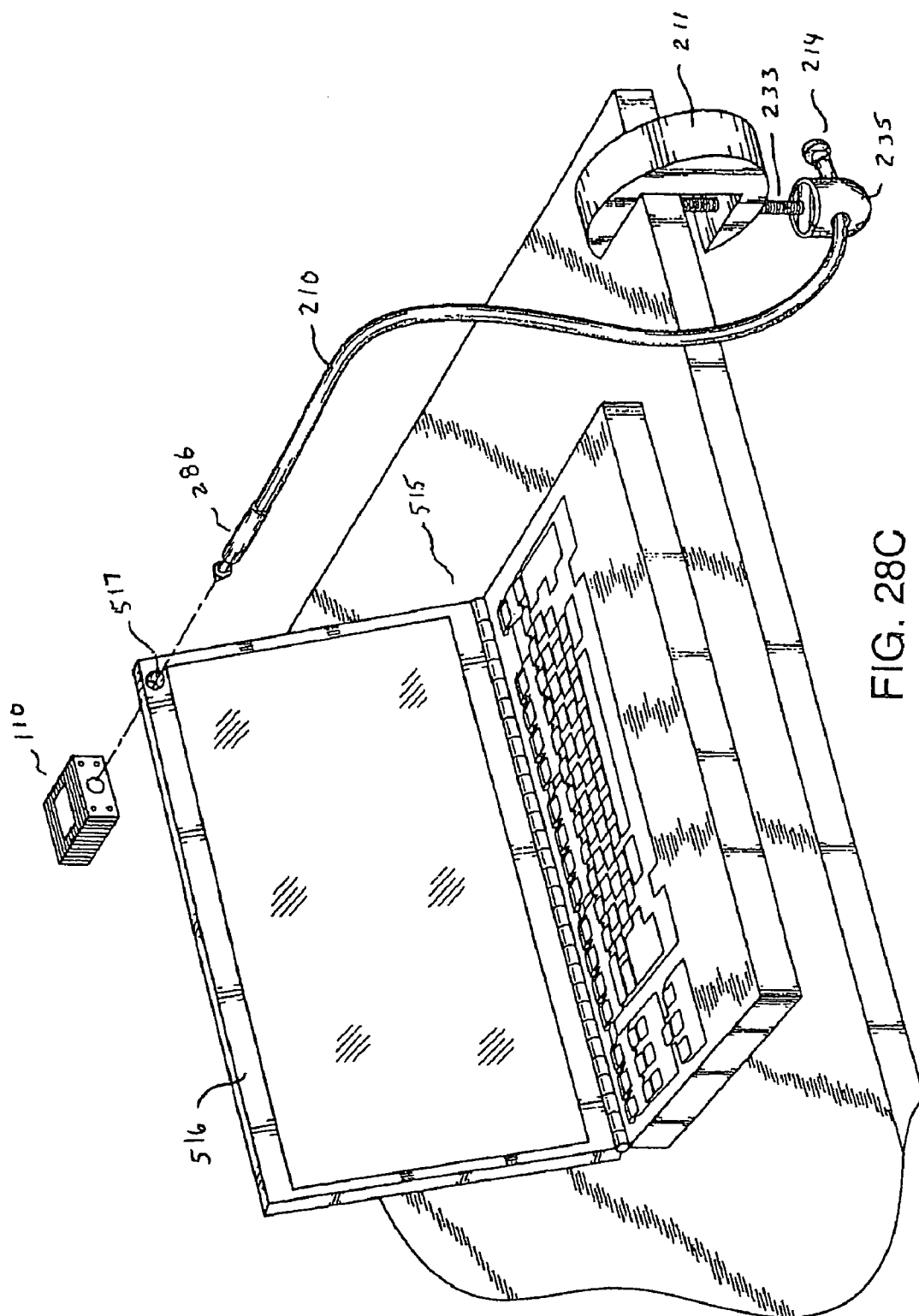
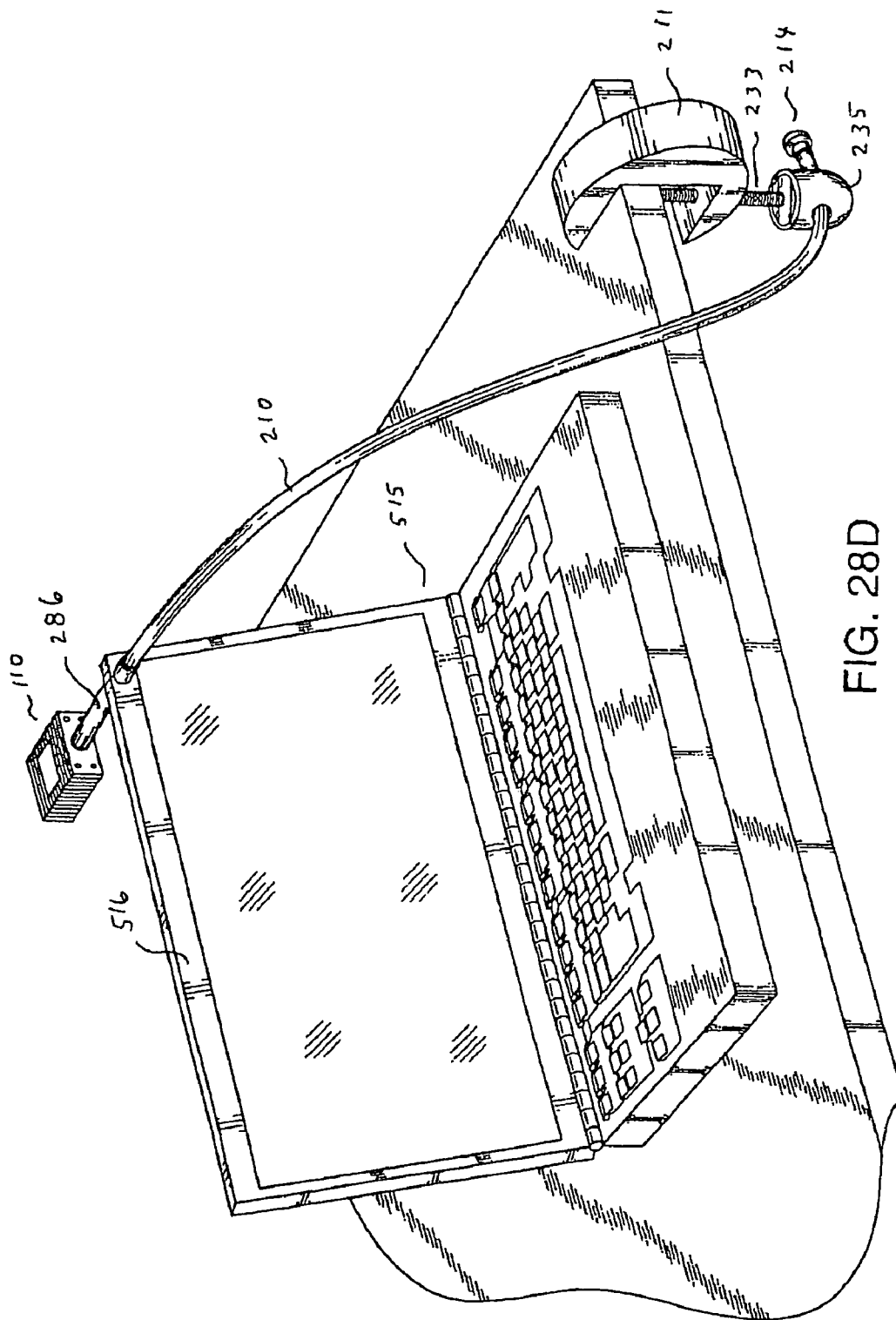


FIG. 28B





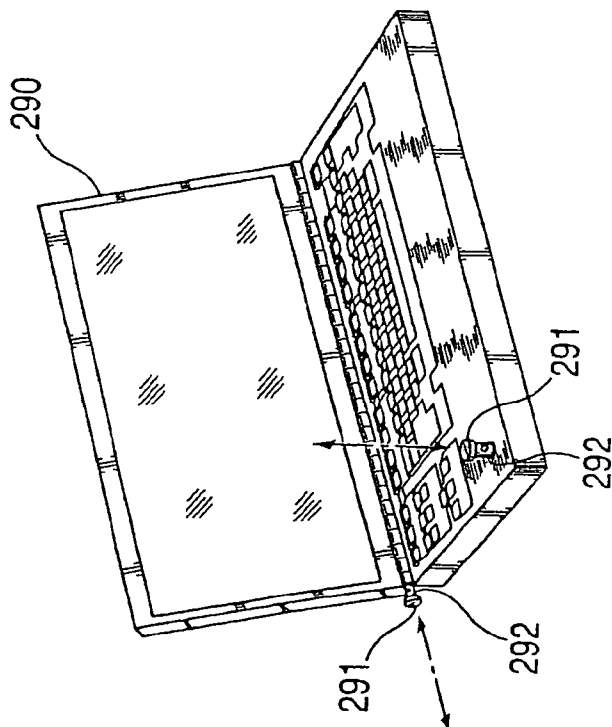


FIG. 30

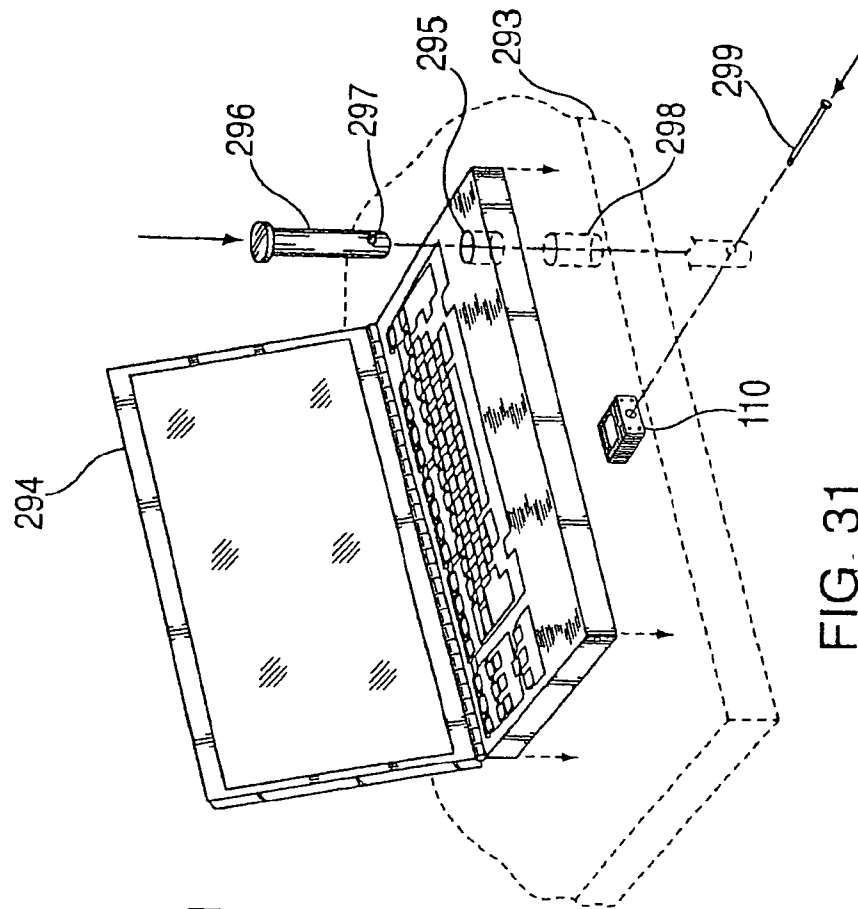
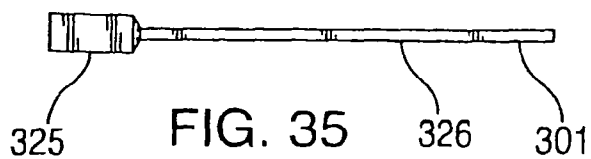
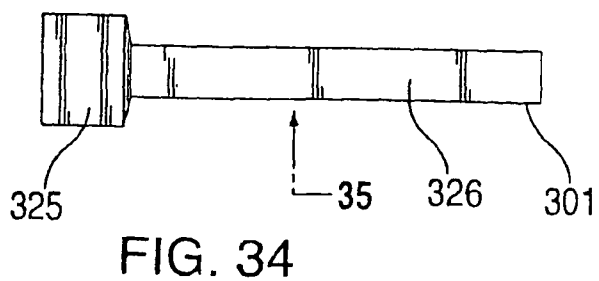
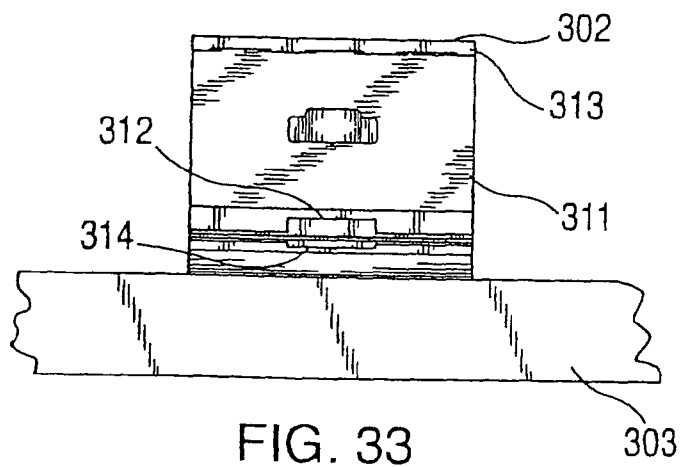
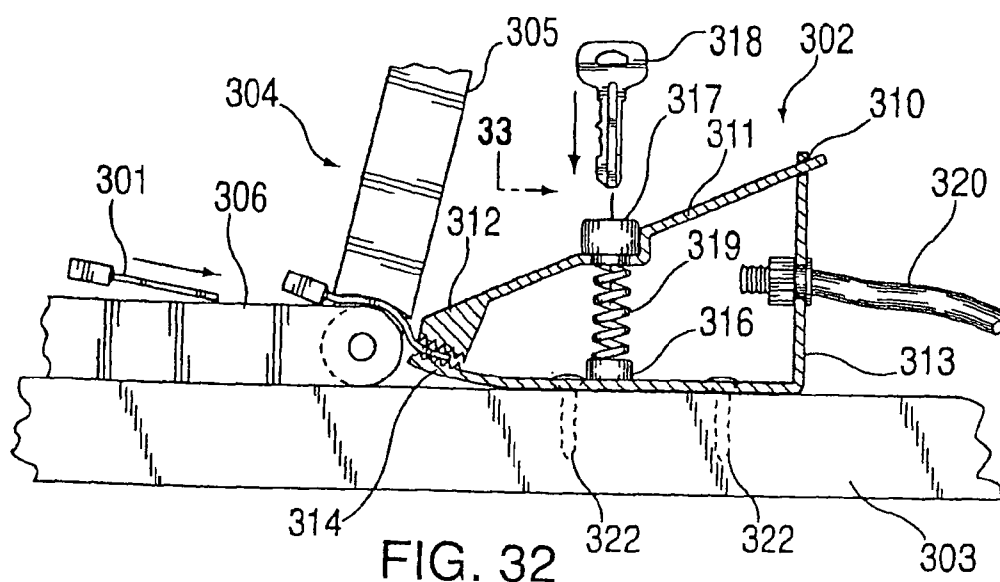
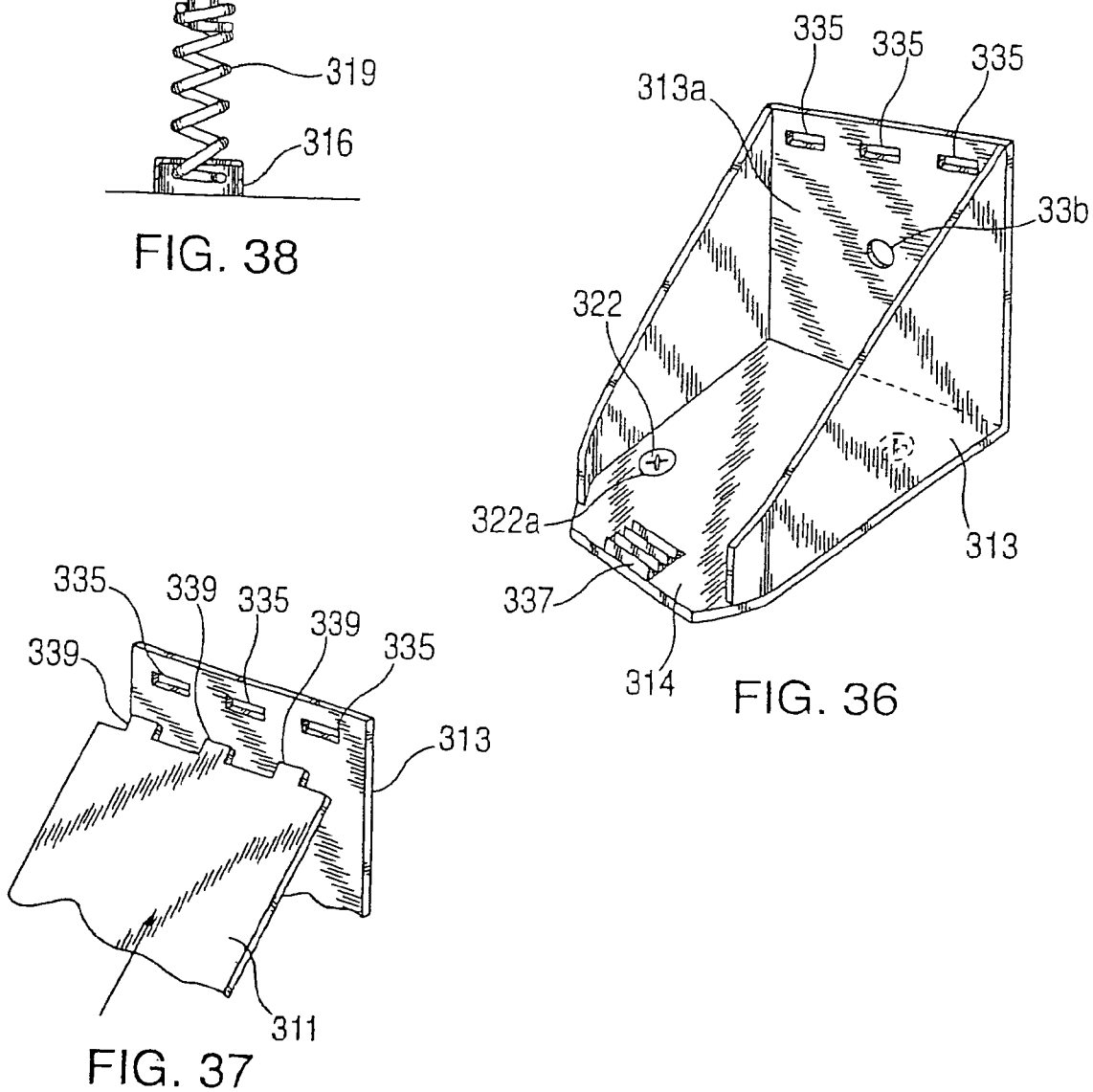
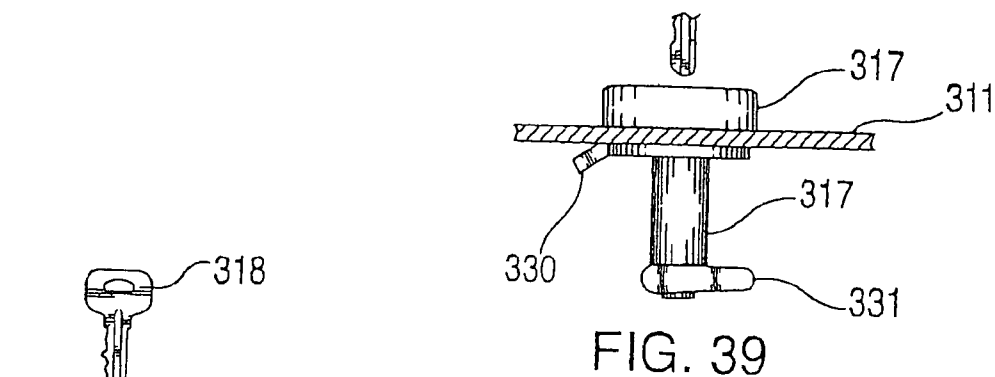
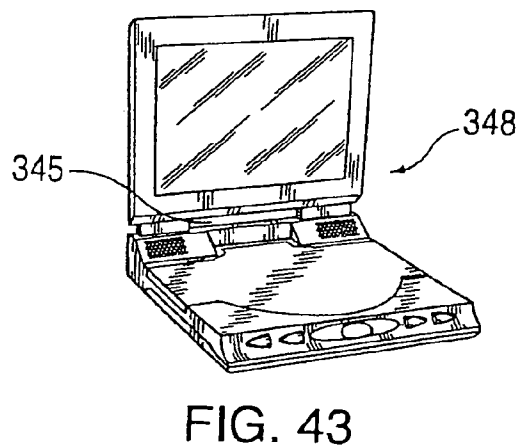
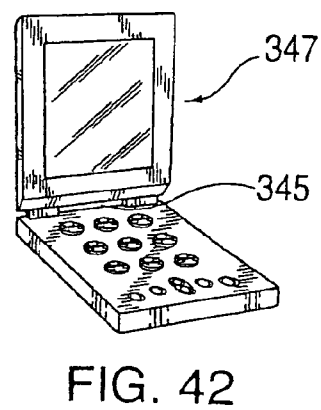
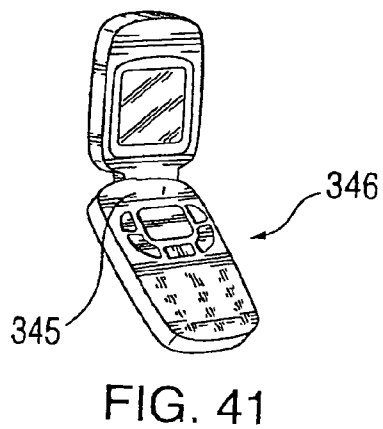
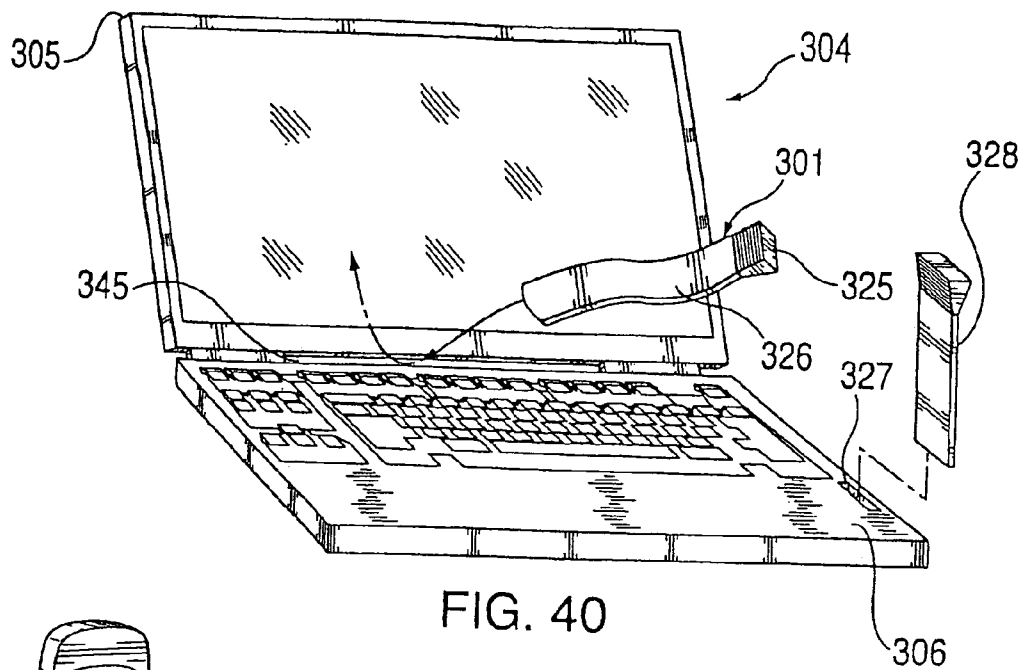


FIG. 31







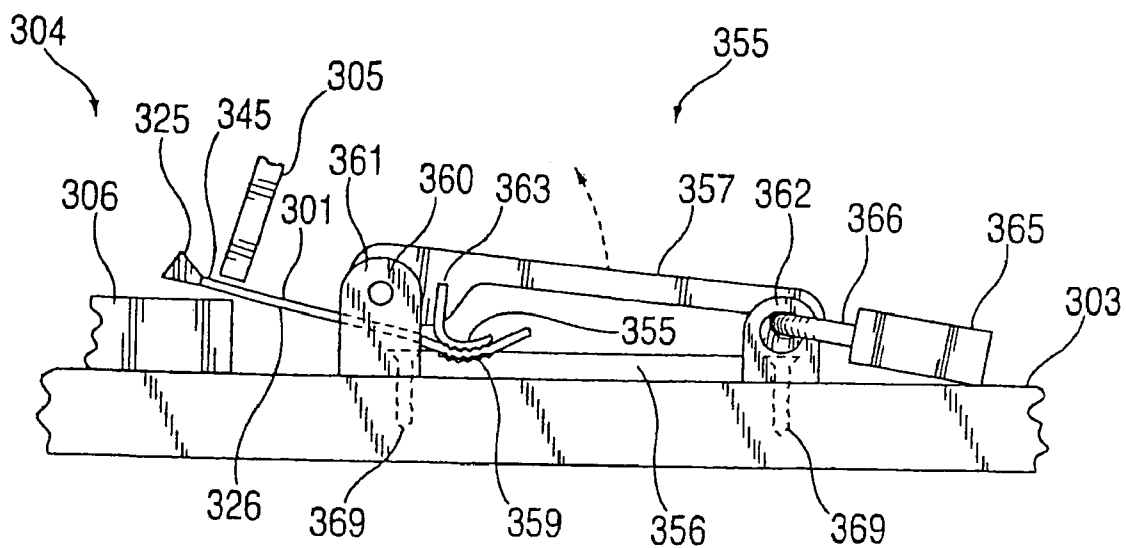


FIG. 44

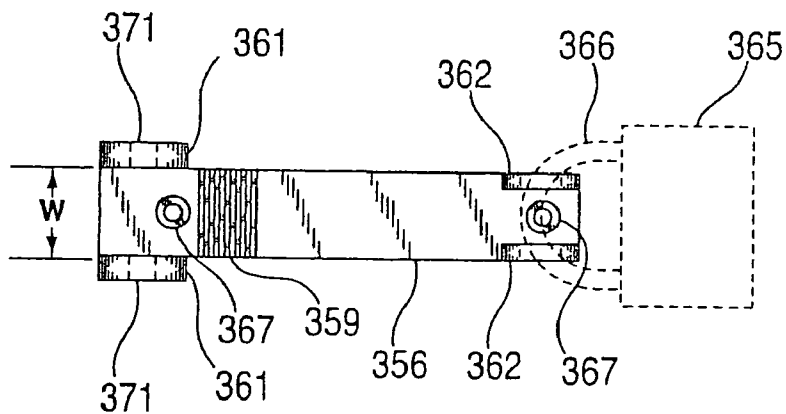


FIG. 45

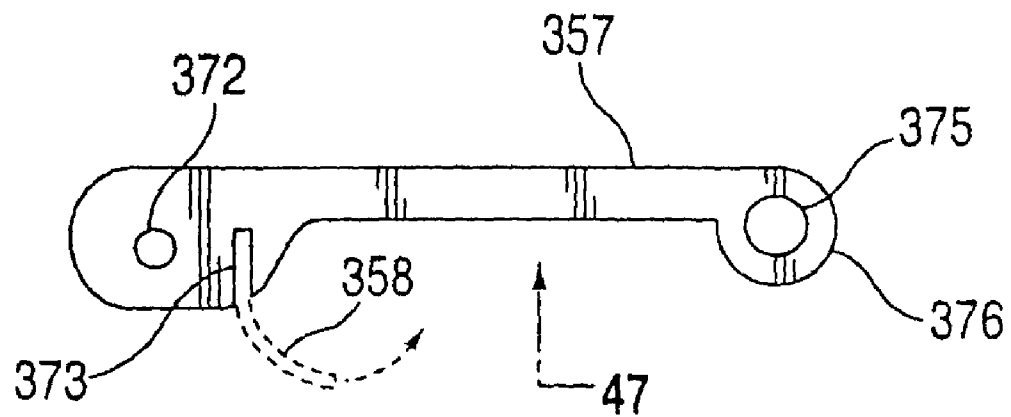


FIG. 46

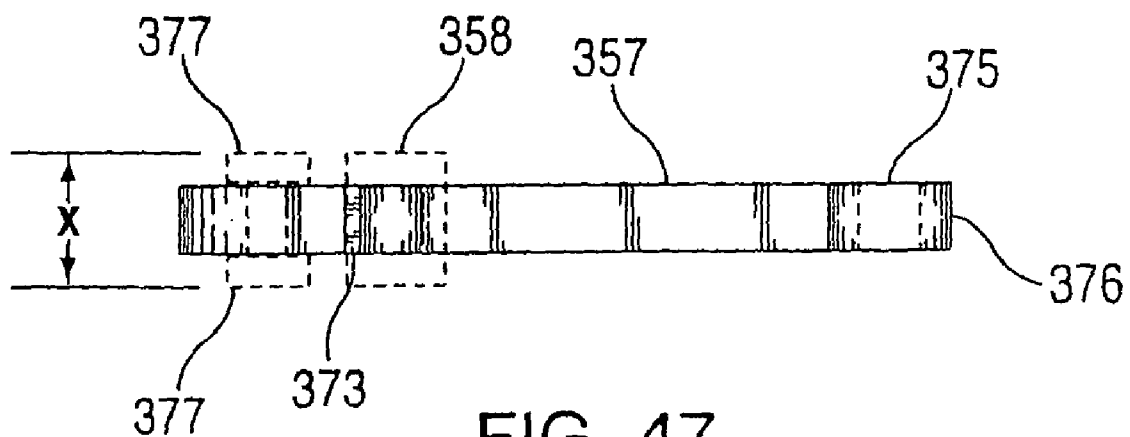


FIG. 47

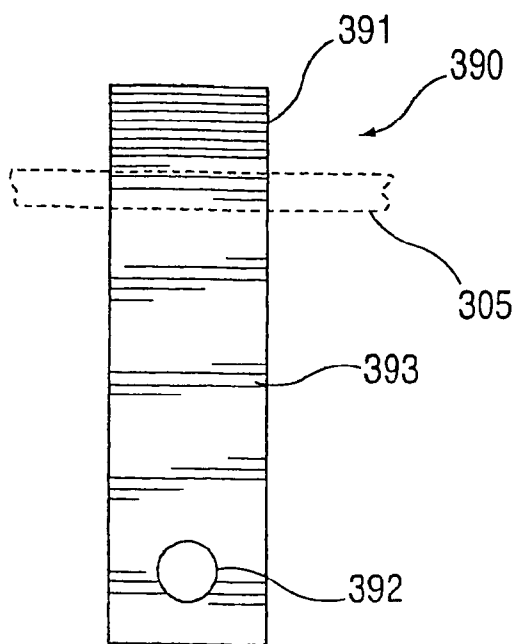


FIG. 48

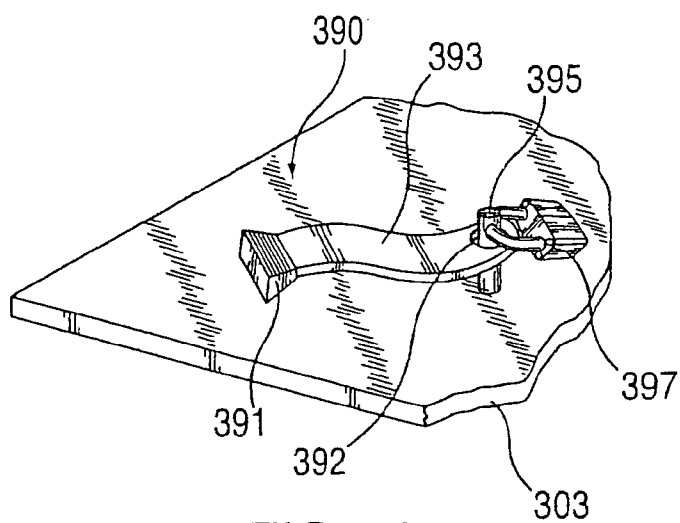


FIG. 49

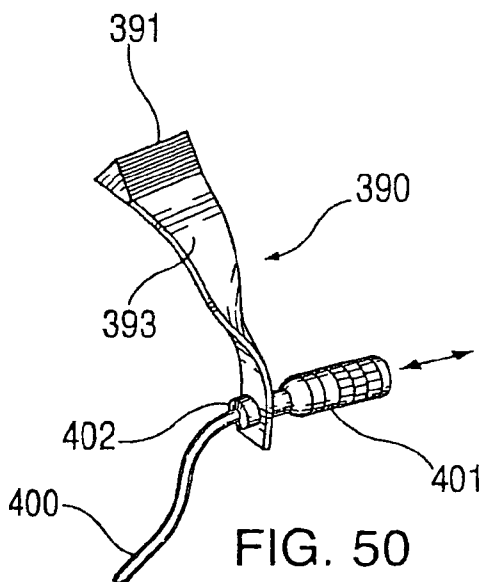


FIG. 50

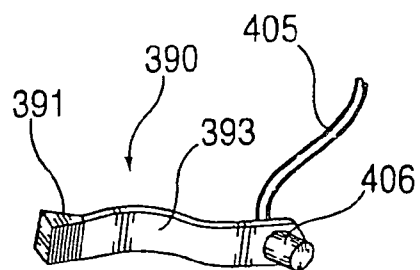


FIG. 51

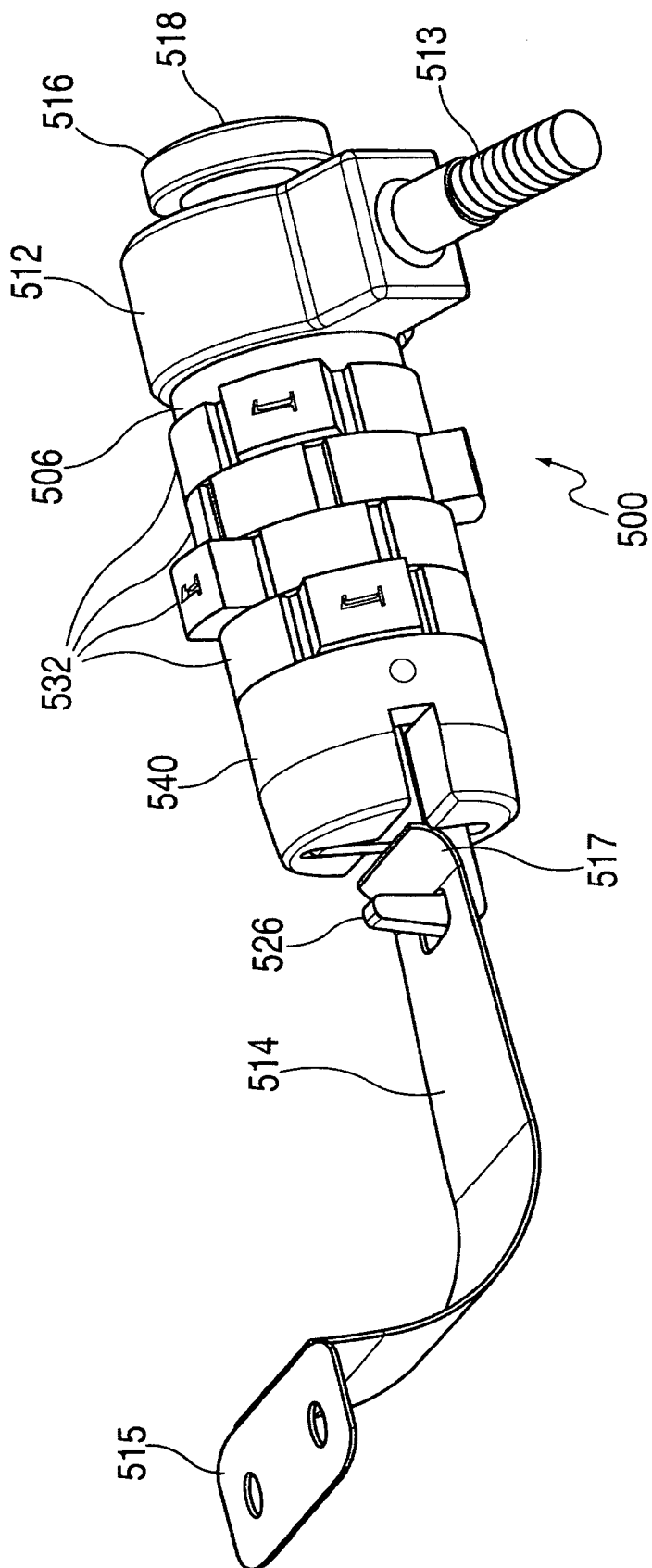


FIG. 52

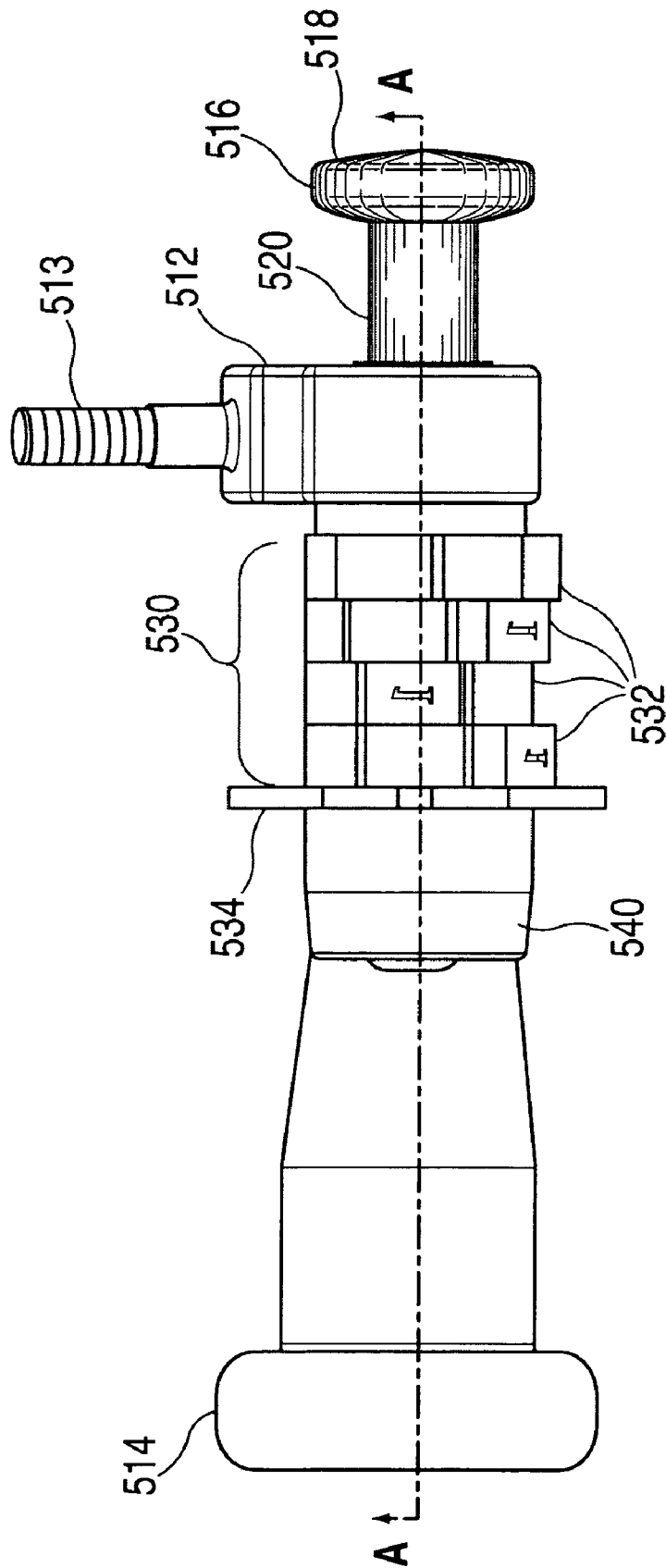


FIG. 53

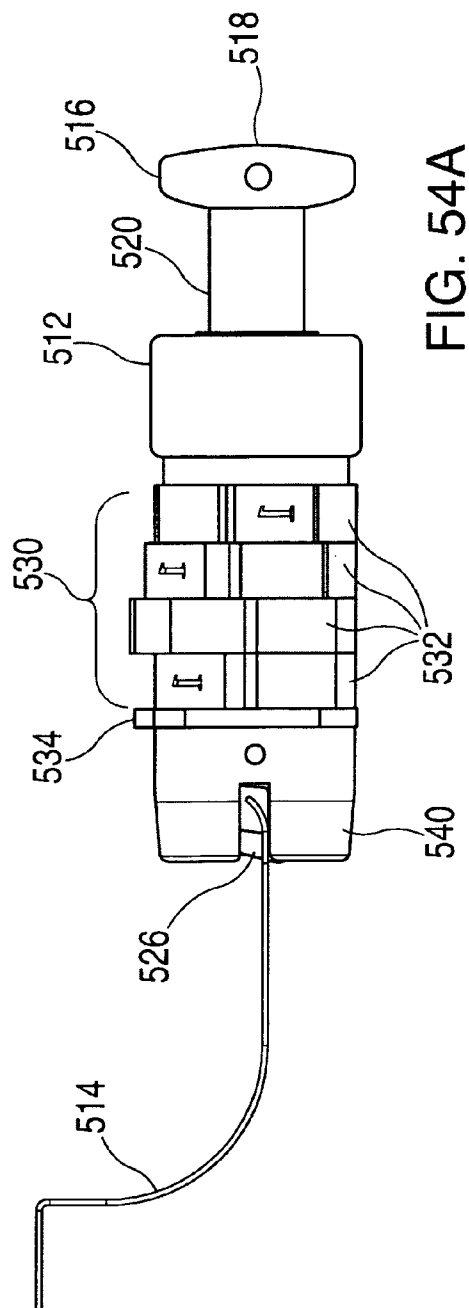


FIG. 54A

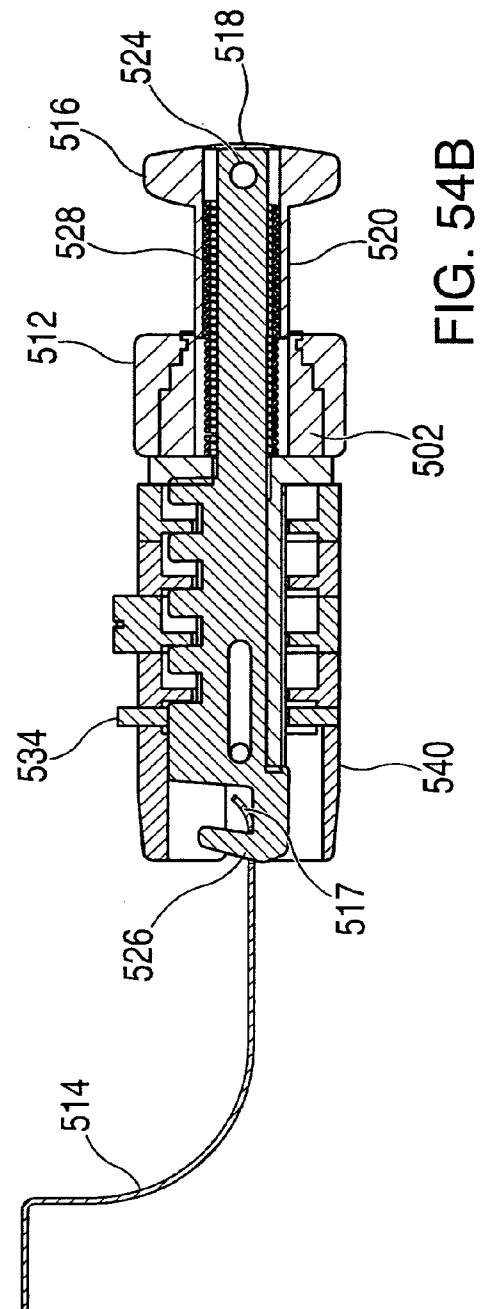


FIG. 54B

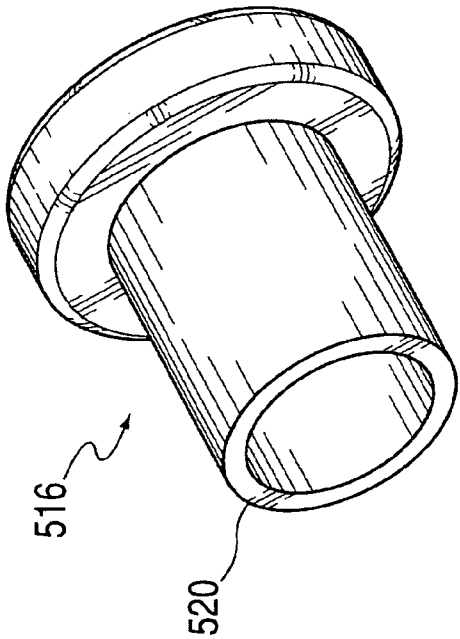


FIG. 56

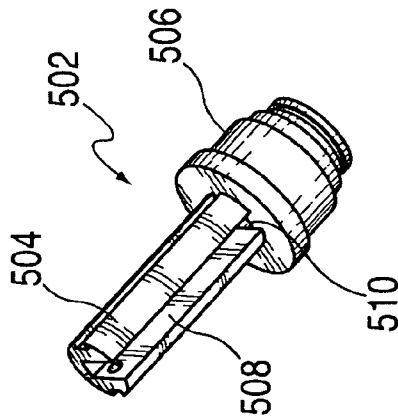


FIG. 55A

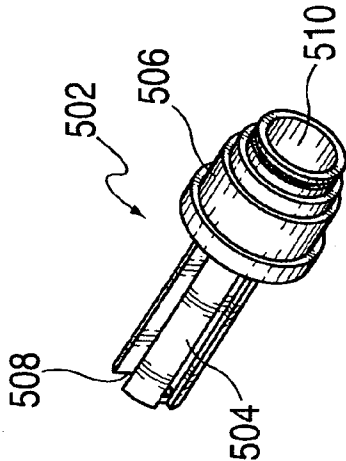


FIG. 55B

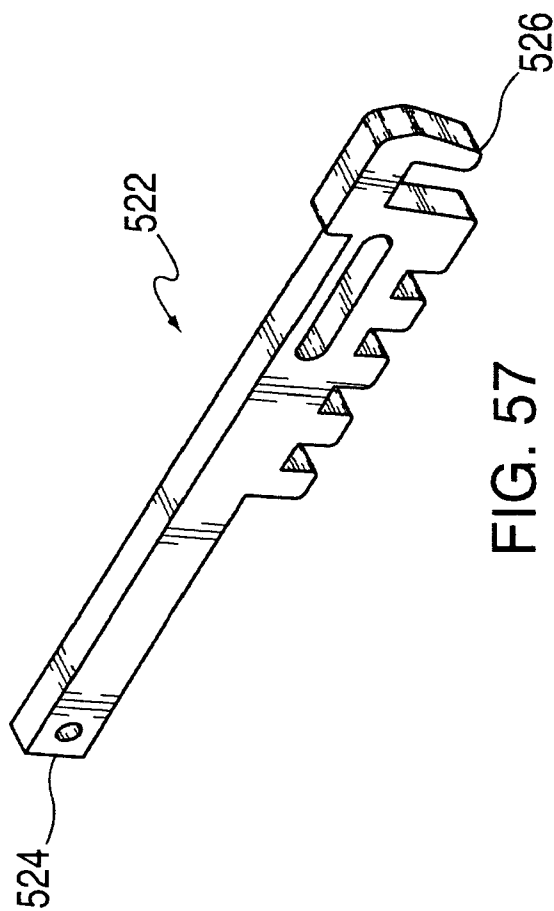


FIG. 57

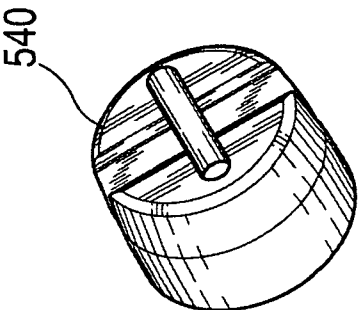


FIG. 58B

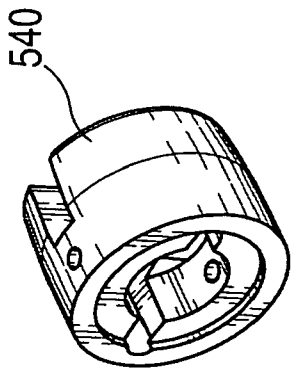


FIG. 58A

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PLUNGER SECURITY LOCK AND PERSONAL ELECTRONIC DEVICE CONFIGURED TO BE SECURED BY THE PLUNGER LOCK

RELATED APPLICATIONS

This application is a continuation-in-part ("CIP") of U.S. application Ser. No. 12/154,561, filed May 23, 2008 now U.S. Pat. No. 7,724,520 ('561 application), which '561 application is a CIP application of U.S. application Ser. No. 11/454,433, filed Jun. 15, 2006 ('433 application), now U.S. Pat. No. 7,443,665 which '433 application is a CIP application of U.S. application Ser. No. 11/359,871, filed Feb. 22, 2006 ('871 application), now U.S. Pat. No. 7,324,333 which '871 application is a CIP application that claims priority from a) U.S. Provisional Appln. No. 60/655,270, filed Feb. 22, 2005, b) Provisional Appln. No. 60/678,911, filed May 6, 2005 and c) U.S. application Ser. No. 11/038,591, filed Jan. 19, 2005 ('591 application), now U.S. Pat. No. 7,315,443 which '591 application claims priority from i) U.S. application Ser. No. 60/569,561, filed May 10, 2004 and ii) Provisional Appln. No. 60/626,839, filed Nov. 10, 2004. The '433 application further claims priority from A) Provisional Appln. No. 60/691,476 filed Jun. 17, 2005, B) Provisional Appln. No. 60/725,333 filed Oct. 11, 2005, C) Provisional Appln. No. 60/757,737, filed Jan. 10, 2006, and D) Provisional Appln. No. 60/783,188, filed Mar. 16, 2006.

FIELD OF THE INVENTION

The present invention relates to a plunger security lock, and to laptop computers, notebook computers and other handheld electronic devices such as cell phones, personal digital assistants, personal music players (i.e. iPod®), etc., without limitation, which are configured for operational use with such a plunger security lock.

BACKGROUND OF THE INVENTION

Notebook computer or other personal electronic devices are increasingly used by students at educational institutions. They are also used by workers at job sites. Notebook computers are often referred to as laptop computers, meaning a portable, foldable computer which can be used while positioned upon the user's lap. In some instances, "laptop computer" refers to the term used in the trade for an older version of a larger portable computer. However, with increasing streamlining and downsizing of portable computers, compact, smaller versions are referred to as "notebook computers", but the terms are generally interchangeable.

Personal electronic devices, such as cell phones, personal digital assistants, personal music players (i.e. iPod®), etc. without limitation, can be used just about anywhere.

In order to safeguard the personal electronic device, such as a notebook computer or personal music player, it must be shut down, closed and transported is by the user.

However, it is often advantageous for the user of a notebook computer or other personal electronic device to take a break and leave the device/computer open and operable at a work station, library study carrel, etc., with other papers and books left at their current open position. This leaves the personal electronic device, such as a notebook computer, vulnerable to theft.

Moreover, in the commercial retail environment, it is advantageous to display consumer electronic devices, such as

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notebook computers, cell phones or personal digital assistants in a secure but visually accessible display.

For that matter, various security devices are known for securing personal electronic devices configured for use with the known security devices.

For example, U.S. Pat. No. 6,755,056 (the '056 patent), discloses a security device (e.g., male lock fitting **100**) for securing portable equipment having a security slot in the chassis of the equipment, and adaptor for adapting electronic portable equipment without a slot for use with the security device. The security device (**100**, **100'**) is tethered to a piece of heavy furniture or otherwise immovable structure, typically with a braided cable or like means, and includes an attachment with a slot mating head and an axial movable head locking member. This is inserted into the slot in the housing of the electronic equipment (or in the adaptor affixed to the housing where there is no slot) after the slot mating head to prevent rotation and removal of the head from the slot.

For example, the FIG. 7 security device (**100'**) is inserted into a lock fitting receptacle **106** where pin **104** passes through the head locking aperture **25** into mounting end **22** and into slot opening **12**. When fully inserted, the housing lockably engages the fitting by way of conventional locking mechanisms, such as fixed or retractable teeth **108**, **108'** on the male lock fitting and teeth engaging notches **110** within the receptacle, so the pin is secured in the head locking position.

One of the shortcomings of the '056 patent, however, is that the security provided is only as strong as either the housing material and therefore slot integrity, or the adhesive adhering the adaptor to the housing. A thin, sheet-metal housing is pliable and a plastic housing is frangible, allowing for easy removal of the attachment with slot mating head and axial moveable head locking member, once in place.

U.S. Pat. No. 6,513,350 (the '350 patent), discloses a physical security system comprising a combination lock for connecting specially designed security slots in portable electronic devices, such as a notebook computer. Like the '056 patent, the security device of '350 patent operates with a portable computer with a wall **10** having an inner surface **20**, which wall is configured with a slot **15**. A lock interface **25** is engageable with wall **10** through slot **15**. A locking mechanism **30** comprising a tethering cable and lock **40** allows that, upon inserting lock interface **25** in slot **15** and engaging the interface with inner surface **20**, the lock interface is then attached to a stationary object with lock **40** and cable **40**.

FIG. 6 shows an alternative locking system **600**, including a housing **605** and slot engagement member **610** with locking member **615** and retaining member **620**. Engagement member **610** is coupled to the housing **605** so that it moves between an extended and retracted position. Two pins **625** extend from the housing **605** and are located on opposing sides of a shaft of engagement member **610**. The housing **605** includes a combination lock mechanism **630** for interacting with the engagement member **610** and retaining in the retracted position until the correct combination code is dialed in to the lock mechanism.

Also like the '056 patent, however, the security provided by the '350 patent is only as strong as the housing material and therefore slot integrity. Moreover, and as is readily apparent in FIG. 6, there does not appear to be a means for effecting retraction and extension of pins **625** to/from housing **605**, or means for comfortably grasping the lock mechanism to articulate slot engagement member in the slot **660** in wall **650** (FIG. 6).

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a plunger-type security lock, and an electronic device config-

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ured to be secured in cooperation with the plunger-type security lock, which overcome the shortcomings of the prior art.

In one embodiment, the invention comprises a plunger-type security lock comprising a combination lock and locking mechanism in a housing, a connector connecting permanently connecting the locking housing to a tether, a plunger operational in cooperation with locking mechanism and a sliding key operate to lock the tether to a one end of a locking strip, which end extend part way through the electronic device. The other end of the locking strip comprises wedge stop, to prevent the locking strip from passing all the way through the housing, for example, a hinge gap between upper and lower housings.

The plunger-type security lock operates by grasping the housing, dialing in a correct combination and pushing the plunger to extend the sliding key from a housing in order to engage a portion of the locking member. Once engaged, and upon release of the pushing force, the sliding key retracts the engaged portion of the locking member at least partially into the housing, and maintains it until the combination locking mechanism is unlocked.

In another embodiment, the invention comprises an electronic device configured for allowing a locking member to pass partially through, but not completely through some part of the electronic device chassis or housing, a locking member and a plunger-type security lock configured for lockingly engaging some part of the locking member once passed through the chassis or housing part.

Other objects which become apparent from the following description of the present invention.

When locked in place, the notebook computer or other personal electronic device is secure from being taken away from the surface to which it is locked. Furthermore, taking advantage of software and/or software/biometric security systems, the computer or other personal electronic device will also be unusable by unauthorized individuals when its owner is away from the area for a break, telephone call, or other short-term pursuits. With a few keystrokes, the owner of the computer or other personal electronic device can resume activity in exactly the same place as when activity had been suspended. This is especially useful for leaving an active computer or other personal electronic device on a study desk or library carrel.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can best be understood in connection with the accompanying drawings. It is noted that the invention is not limited to the precise embodiments shown in drawings, in which:

FIG. 1 is a perspective view of a locking base and locking collar of one of the embodiments for a notebook computer lock of this invention;

FIG. 2 is a side view of the embodiment of FIG. 1, taken along in the direction of arrow "2" of FIG. 1, showing a typical notebook computer locked with a locking base and locking collar to a work surface with a padlock;

FIG. 2A is a partial fragmentary view of the locking base as in FIG. 2, taken along in the direction of arrow "2A" of FIG. 2;

FIG. 2B is a partial perspective view of the typical notebook computer locked in place between the locking base and locking collar of FIG. 2;

FIG. 2C is a partial front elevational view of the locking base and locking collar as in FIG. 2;

FIG. 2D is a side elevational view of the notebook computer shown used by a person at a work station;

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FIG. 3 is a perspective view of an alternate embodiment showing a typical notebook computer in the locking base with an elongated back side;

FIG. 3A is an exploded perspective view of a further embodiment, showing handheld electronic accessories displayed upon respective shelves, added to the front side of the locking base of FIG. 3;

FIG. 3B is a close-up of one type of key lock used with the notebook computer lock of the present invention;

FIG. 4 is a side view of alternate embodiment for a notebook computer lock of FIG. 3, showing dual locking flanges;

FIG. 5 is a perspective view of a transparent locking panel of the alternate embodiment shown in FIG. 4;

FIG. 6 is a side edge view of the transparent locking panel showing a locking flange, taken along in the direction of arrow "6" of FIG. 5;

FIG. 7 is a top plan view of the transparent locking panel showing a padlock hole in the locking flange, taken along in the direction of arrow "7" of FIG. 6;

FIG. 8 is an exploded perspective view showing the addition of an optional battery pack housing cage feature to the locking apparatus of the embodiment shown in FIG. 1, although it can be used with any of the embodiments herein;

FIG. 9 is a side view of the locking apparatus of FIG. 8 used on a notebook computer showing the housing cage feature;

FIG. 10 is a perspective view of a further alternate swing arm embodiment using a swinging arm, such as a telescoping bar, to secure a typical notebook computer;

FIG. 11 is a top plan view of a clad steel cable used as a locking element for the further alternate swinging arm embodiment;

FIG. 12 is a top plan view of a chain inside a flexible tube as an alternate locking element in the embodiment of FIG. 10;

FIG. 13 is a perspective view of an alternate embodiment of a notebook computer lock using a separate "over the table" locking base and a computer lock using a captive swinging locking bar, which fits across lower portion of the display;

FIG. 13A is a front elevation of a clamp detail of the locking base shown in FIG. 13, taken along the ellipse 13A of FIG. 13;

FIG. 13B is a clamp bracket side elevational view thereof, showing use of a key lock;

FIG. 14 is a side edge view of the locking base of FIG. 13, shown attached to a work surface;

FIG. 15 is a top plan view of the computer lock of FIG. 13, secured within a locking base, also showing the position of the notebook computer with dashed lines;

FIG. 16 is a perspective view of one embodiment for a width adjustable notebook computer lock;

FIG. 17 is a perspective view of a further embodiment for a discrete width adjustable notebook computer lock;

FIG. 18 is a perspective view of an integrated locking base/computer lock embodiment;

FIG. 19 is a top plan view of another integrated locking base/computer lock with two pivot links;

FIG. 20 is a perspective view of a preferred embodiment for a low profile notebook computer, shown attached by fasteners, such as screws, down to the work surface;

FIG. 21 is a perspective view of the locking base of FIG. 20 used as a portable device secured to the work surface via a cable and clamp;

FIG. 22 is a detail side view of the clamp screw subassembly used in

FIG. 21, shown in the ellipse "22" of FIG. 21;

FIG. 23 is an exploded perspective view of the components of an alternate embodiment with a socket wrench type clamp screw subassembly;

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FIG. 24 is a bottom view of the end cap of the embodiment of FIG. 23, showing the recess which forms the socket wrench element;

FIG. 25 is a top view of the clamp screw assembly as in FIG. 23, shown with the captive screw;

FIG. 26 is a side view cross-section of the clamp screw assembly as in FIG. 23, taken along line "26-26" of FIG. 25, shown with the screw head seated in the socket wrench recess and preventing insertion of the cable;

FIG. 27 is a side view in cross-section of the clamp screw assembly as in FIG. 23, shown with the cable preventing seating of the screw head in the socket wrench recess.

FIG. 28 is a perspective view showing the possible locations of through-holes for use of an alternate protrusion spike embodiment security feature used with a cable;

FIG. 28A is a perspective detail showing the closed front section of a notebook computer wherein a security feature is two through holes which align upon closing display lid permitting a padlock with an elongated hasp to lock the display to the keyboard base.

FIG. 28B is a perspective view of a notebook computer with a security hole in the top right corner of the display section.

FIG. 28C is a perspective view of the computer of FIG. 28B with a pin lock and locking ferrule aligned prior to insertion through security hole.

FIG. 28D is a perspective view of the computer of FIG. 28C after pin lock is used to secure ferrule thereby using a cable to secure computer to a table top.

FIG. 29 is a perspective view of the spike with a cable attached ferrule, pin lock, and secure cable clamp used to secure a notebook computer;

FIG. 30 is a schematic perspective view of a notebook computer with captive security rods for cable attachment;

FIG. 31 is a schematic perspective view of a notebook computer with a hole downward through the base for use with a long protrusion spike and a transverse locking pin;

FIG. 32 is a diagrammatic side elevational view of one embodiment for a flexible strip lock for a computer;

FIG. 33 is a front elevational view thereof, taken in the view direction of arrow "33" shown in FIG. 32;

FIG. 34 is a top plan view of the shim strip of the flexible lock;

FIG. 35 is a side elevational view taken in the view direction of arrow "35" of FIG. 34;

FIG. 36 is a perspective view of a lower protective shoe of the flexible lock;

FIG. 37 is a diagrammatic perspective view illustrating a flexible locking means;

FIG. 38 is a diagrammatic exploded view of a key locking means with a spring;

FIG. 39 is a partial view of a key locking means;

FIG. 40 is a perspective view of a notebook computer showing the hinge gap and the path of weaving the distal end of a locking strip through the hinge gap, as well a slot in the housing of the notebook computer permitting access to a rigid protruding locking strip therein;

FIG. 41 is a perspective view of a "flip top" cellular phone showing the hinge gap;

FIG. 42 is a perspective view of a PDA showing the hinge gap;

FIG. 43 is a perspective view of a personal DVD player showing the hinge gap;

FIG. 44 is a side elevation of an alternative embodiment of a strip captivating locking clamp of this invention, shown using an ordinary padlock;

FIG. 45 is a top view of the base portion of FIG. 44;

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FIG. 46 is a side elevation of the handle portion of the alternate embodiment clamp of FIG. 44;

FIG. 47 is a bottom view (in the direction of arrow "47" in FIG. 46) of the handle of FIG. 46;

FIG. 48 is a top plan view of a further alternate embodiment for a locking strip of this invention;

FIG. 49 is a perspective view of the locking strip of FIG. 48 secured to a stud attached to the work surface by the use of a padlock;

FIG. 50 is a perspective of an alternate method of securing the locking strip of FIG. 48 by the use of a secure cable and a cable lock;

FIG. 51 is a perspective view of yet another method of securing the locking strip of FIG. 48 by virtue of a free cable with attached stop member;

FIG. 52 is a perspective view of one embodiment of a plunger-type security lock of the invention;

FIG. 53 is a plan view of another embodiment of a plunger-type security lock of the invention;

FIG. 54A is a plan view of the plunger-type security lock of FIG. 53, seen along A-A therein;

FIG. 54B is a cut away view of the plan view of the plunger-type security lock as shown in FIG. 54A;

FIGS. 55A and 55B are alternative perspective views of a cylindrical sliding key receptacle;

FIG. 56 is a perspective view of a cylindrical plunger;

FIG. 57 is a perspective view of a sliding key; and

FIGS. 58A and 58B are bezels.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows locking base 1 for a notebook computer lock, which is secured to a working surface by fastener holes, such as screw through holes 4 in base mounting pads 3. A back surface 10 is tilted at angle "X" to provide a good viewing angle of the computer screen. Side panel members 6 with bent tabs 7 provide a space for sliding locking collar 2. Locking flange 8 with a locking hole, such as padlock hole 9, is used to secure locking collar 2 with flange 14 via hole 15, which is in positional registration with hole 9 when mated. Width "W" is wider to than the widest notebook computer or other personal electronic device to be accommodated by this locking base system. Locking bar 12, attached to the distal ends of sides 13, actually secures the notebook computer or other personal electronic device. This is the preferred embodiment. The display screen portion rests within space 16 between sides 13. In use, the keyboard portion of a notebook computer or other personal electronic device would deny access to the fasteners, such as retaining screws, in holes 4.

Side panel members 6 may have one or more ports 6a to accommodate computer cables therethrough.

FIGS. 2, 2A, 2B and 2C show how locking collar 2 is placed over notebook computer screen 19 and then upon flange 14, and is locked to lower flange 8 via a lock, such as padlock 20. Keyboard 18 fits between sides 6. Space 5 is created by a raised back panel 10 so as to permit access to a variety of connectors at the back of computer keyboard portion 18. FIG. 2 also shows an optional compartment 42 for a power source accessory 43, such as an auxiliary battery charger or battery eliminator, wherein compartment 42 extends between power flange 8 and further lower flange 8A.

FIG. 2D shows the notebook computer being used by a person at a work station;

In an alternate embodiment shown in FIG. 3, upright portion 25 supports the entire height of screen 19 above raised back panel 10 mounted upon base pads 3. This can also be

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shown in FIG. 4. FIG. 3B shows another example of a lock 20a, which can be used in lieu of padlock 20.

FIG. 3A shows a further alternate embodiment where shelves 36 and 36a are depicted supporting electronic handheld devices such as folding cell phone 37a, upright cell phone 37b, marine VHF radio 37c, personal digital assistant 37d, calculator 37e and video game pad controller 37f.

A transparent panel, such as LEXAN® polycarbonate panel 30, shown in FIG. 5, is used as a locking frame, by sliding it over screen 19 within the four tabs shown in FIG. 3 at the distal corners of upright 25.

Panel 30, shown in FIGS. 4-7, has a top portion 32 and a locking flange 33 with padlock hole 35. In use, this hole is in positional registration with that of upper locking flange 27 shown in FIG. 4. A padlock 20 or other small lock 20a can be used to secure the two members together. Front face 31 of transparent panel 30 protects the surface of computer screen 19. This can be used to advantage in a retail demo environment. Alternately, the locking collar of FIG. 1 can be used with base of FIG. 3 by locking into lower locking tab 26; this would offer a better unencumbered view of screen 19.

FIG. 8 shows the addition of an optional battery pack housing cage 42 feature to the locking apparatus of the embodiment shown in FIG. 1, although it can be used with any of the embodiments herein;

The optional power source component 42 of FIGS. 2 and 8 can be added to any of the embodiments of this invention, including those shown in FIGS. 3-51. It is preferably a cage made of heavy duty wire screen or perforated metal that is attached (as by welding or rivets) to a rear panel, such as panel 41 in FIG. 8. This provides a secure compartment 42 for a power source accessory 43, such as an auxiliary battery, charger, or battery eliminator.

Compartment 42 is also shown in the side view of FIG. 9.

In a further alternate embodiment, shown in FIG. 10, a locking base using a telescoping rod 54 is shown. In this embodiment, there is no member such as locking collar 2 or transparent panel 30 that can be readily removed from the locking base when a computer or other personal electronic device is not secured to the base. This should reduce the incidence of vandalism or theft of the removable item which would render the base unusable. In FIG. 10, one end of bar 54 is attached to the left side panel member 51 of base 50 via a pivotable fastener, such as ball joint 53. After the notebook computer or other personal electronic device is inserted between sides 51 and 52, bar 54 is swung over the lower (hinge) portion of the notebook computer's screen, such as a liquid crystal display (LCD) screen and is elongated so as to insert lock plug 55 through locking hole 56 in right side 52. A lock (not shown), such as padlock 20, is then inserted through the hole in plug 55 thus locking computer to base.

Alternate locking members include locking members such as vinyl clad steel cable 60 shown in FIG. 11, and the flexible tubing clad chain 65 shown in FIG. 12. These two devices do not require a ball joint attachment to left flange 51. Cable 60 can be simply inserted through a hole in flange 51 and then retaining washer 61 can be permanently attached as by spot welding. Lock plug 55, used as for telescoping rod, is attached to the distal end of cable 60. Chain 65 can be attached to flange 51 in a similar fashion by attaching washer 66 to its proximal end after threading through a hole. The distal end of chain 65 has an elongated link 67 with stop washer attached. The padlock is engaged through this link after it emerges through hole 56 in side 52.

FIG. 13 shows an alternate embodiment using a separate locking base 81 used with a notebook computer or other personal electronic device lock 80 which slides in from the

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left so that one or more base pads 87 are retained by one or more brackets 82 on base 81. FIGS. 13 and 14 also show a clamp 86 which secures the lock in place by clamping the lock over a working surface, such as a table top 85.

A better view of this is the side edge view of FIG. 14. Clamp 86 slips over the edge of work surface 85. Locking bar 84 is captive in left bracket of computer or other personal electronic device lock 80, but it can swing out to permit access of computer or other personal electronic device display. The distal end 88 is grooved to accommodate a key lock to secure the computer or other personal electronic device as well as lock 80 to base 81. The long neck portion of base 81 from clamp 86 to brackets 82 positions the computer or other personal electronic device at a convenient distance from the front edge of table working surface 85. The detail of clamp 86 in FIG. 13A shows how screw 92 with optional security head 91 is screwed into the bottom surface of table working surface 85 via pointed end 93.

FIG. 13B shows how tang 97 prevents screw 91 from being loosened when lock 95 is locked via key 96. Lock 95 can be easily removed from hole 94 in lock bracket 90. When tang 97 is turned to position 98, screw head 91 is not obstructed so that it can be removed or tightened.

FIG. 15 is a top plan view showing details of notebook computer or other personal electronic device lock 80 locked to base 81 with a computer or other personal electronic device display shown in dashed lines in position 117 and keyboard shown in dashed lines in position 118. Power supply box 100 can pivot open in the direction of arrow 101 on shaft 102 with a retaining cap; it is locked via tang 112. Notebook computer or other personal electronic device lock 80 is slid into a captive position within brackets 82 retaining the edges of base plates 87 in the direction of arrow 104. The left end of swinging locking bar 84 (which can swing out in the direction of arrow 103) is retained via retaining cap 105 within slotted hole 115 and an oversize hole on front of the left bracket. Key lock 110 grasps rod end 88 of swinging locking bar 84, which maintains the security of the assemblage via bracket tang 114, which is part of locking base 81. Key 111 can be used to remove the lock body from the end of swinging locking bar 84.

While FIG. 13-15 shows a separate over the table locking base 81 used with a notebook computer or other personal electronic device lock 80 which slides in from the left so that base pads 87 are retained by brackets 82 on base 81 of notebook computer or other personal electronic device lock 80, it is contemplated that a further alternate embodiment includes attaching notebook computer or other personal electronic device lock 80 directly to a work surface 85, such as a study desk, by providing fastener receptacles within base pads 87, wherein fasteners, such as screws or bolts fasten base 81 directly to an upper side of the work surface 85, without the use of over the table base 81.

FIG. 16 shows another embodiment of a notebook computer or other personal electronic device lock 130 with a telescoping width adjusting feature to accommodate computer or other personal electronic devices of varying widths more securely. Base pads 136 are compatible with the use of locking base 81 of the previous embodiment to retain this continuous adjustment feature. Locking bar portions 137 and 138 are adjustable in size.

For example, as in FIG. 17, incrementally spaced detents or pins and holes may be used to facilitate width adjustment.

Alternatively, as in FIG. 16, locking bar 137 may be hollow and threaded with a coarse thread; it is captive within left bracket 134 and slotted back hole 133. Right section of locking bar 138 is screwed into portion 137 and can be quickly

length adjusted by twisting it clockwise or counter-clockwise. Horizontal section 131 fits into section 132 in a telescoping fashion. After the notebook or laptop computer or other personal electronic device display is placed between the spread-apart brackets, the brackets are pushed against its sides and swinging locking bar portions 137 and 138 are adjusted accordingly to fit into holes in right bracket 135 for locking.

FIG. 17 shows a different width adjustable computer or other personal electronic device lock 170 with a discrete locking mechanism including pivoted flange 178 with peg 176 at its distal end. Flange 178 is pivoted on pivot 182, such as a rivet, attached to outer telescoping member 132 of notebook computer or other personal electronic device lock 170. When swung in the direction of arrow 179, flange 178 will force peg 176 through hole 175 in telescoping section 132 and further into one of the holes 180 in inner telescoping member 171 when in positional registration. Flange 178 is locked in position when hole 185 is in positional registration with hole 184 and locking bar 173 end 139 is passed through both. The swinging locking bar includes hollow side section 172 and inner, preferably solid, side section 173, which is telescopic within outer hollow side section 172.

FIG. 18 shows another embodiment 150 of this invention wherein the locking base has been integrated with the notebook computer or other personal electronic device lock. Clamp 153 locks onto work surface 85 as described in a previous embodiment with a separate locking base 81 (see FIGS. 13-14). Upright brackets 151 and 152 with bar 83 between capture the notebook computer or other personal electronic device display which is then locked via swinging locking bar 84 and a key lock (not shown).

A related embodiment in FIG. 19 shows integrated base/computer or other personal electronic device lock 160 which has one or more pivot points 164 and 166 (on base part 167). Link 165 now pivots in relation to clamp section 163 such that the notebook computer or other personal electronic device lock 160 can be more conveniently positioned on work surface 85.

In FIG. 19, for example, clamp 163 is placed on the edge to the side of computer or other personal electronic device lock base 167 instead of directly in front of it as would be necessary in the embodiment of FIG. 18.

The preferred low profile locking base embodiment of this invention for consumer use is detailed in FIGS. 20-27.

FIG. 20 shows a low profile locking base 200 with narrow base 202 and low rise back 201. It is screwed to work surface 285 via fasteners, such as screws 203. Locking bar 284 with optional rubber or elastomer grommets 205 and machined end 288 is used to lock the display of a notebook or laptop computer or other personal electronic device (not shown) to locking base 200. End 288 is passed through hole 204 and locked with pin lock 110. Key 111 is used to unlock and remove the computer or other personal electronic device.

The preferred simpler method of use of a locking base is not to screw it down as shown in FIG. 20 but instead to create a portable locking kit by adding a clamp 211 and cable 210 as shown in FIG. 21.

Due to the low profile design with a narrow base, all components of the portable kit conveniently fit into a tubular carrying case (not shown).

FIG. 21 also shows Clamp 211 having a fastener, such as a screw subassembly, including screw 212 and short container, such as a cylinder 216, with transverse cable attachment hole 213. At the first end of cable 210 is a ferrule 215 with a transverse hole. This fits through hole 213. The cable is threaded through hole 213 after clamp 211 is secured using

the appropriate tool to tighten screw 212. The distal end of cable 210 has ferrule 214 with enlarged end which does not fit through hole 213.

FIG. 22 shows the arrangement more clearly. It is noted that cylinder 216 has distal hole 220 which accommodates the screw head and also has a screw clearance hole 221 on its top surface. After cable 210 is threaded through hole 213, a tool cannot reach screw head 222 to loosen clamp 211 since access is denied through distal hole 220. After cable 210 is installed through cylinder 216, the end 288 of locking bar 284 is passed through the transverse hole in ferrule 215 prior to locking bar 284 to base 200.

In an alternate embodiment of the clamp screw subassembly no tool is required to tighten or loosen clamp 211.

For example, an exploded view of subassembly 230 is shown in FIG. 23 with end cap 231 pushed down over clamp screw 233 and press fit into the end of knob 235. Optional pins 238 can be driven radially to insure positive attachment. Cap 231 has screw clearance hole 232 at its center. Screw 233 becomes captive as a subassembly with tall head 234 within knob 235 once cap 231 is attached. Offset transverse hole 237 in knob 235 goes through both walls and is sized for cable attachment.

FIG. 24 shows the underside of cap 231 revealing hexagonal recess 240 sized to engage bolt head 234.

FIG. 25 is a top view of subassembly 230. In the side cross-section of FIG. 26, bolt head 234 is seated in recess 240 of cap 231. This is prior to the insertion of cable 210 through holes 237. Clamp 211 can be tightened in this depicted configuration by turning knob 235 since recess 240 acts as a socket wrench to bolt 233. It is noted also that the size of head 234 interferes with the placement of hole 237 thereby preventing insertion of cable 210 while head 234 is seated in recess 240.

If knob 235 is pushed up as shown in FIG. 27, cable 210 can now be easily inserted through holes 237 adjacent to screw 233 and spacing head 234 away from recess 240. In this configuration with cable 210 installed through knob 235, if turned, knob 235 will spin freely regardless of the up or down forces exerted. Clamp 211 can only be removed after cable 210 is removed and head 234 is re-seated in recess 240. In lieu of a non-standard screw 233 with tall head 234, a standard hex screw can be used with a nut screwed up against the head and adhesively bonded as a unit. A washer between the nut and the screw head would only enhance the operation creating a more positive barrier with cable 210.

In an alternate protruding member locking embodiment of this invention, spikes, security rods or strips are used to secure a personal electronic device, such as a notebook computer, cell phone, personal digital assistant (PDA) or electronic music player (i.e. iPod®).

For example, in FIG. 28, a notebook computer or other personal electronic device with base 275 and display 276 is shown. One of the three through-holes is required for this embodiment. Hole 278 is at the hinge line, while hole 279 is through the display housing; hole 277 is diagonally through one of the front or rear corners of the base.

In the alternate locking embodiment shown in FIG. 28A, a notebook computer 500 has a through hole 503 in the display portion which aligns in positional register with through hole 504 in the base or keyboard portion 502 when in the closed position. A protruding lock, such as, for example, padlock 505 with elongated hasp 506, is used to prevent display portion 501 from being opened in a usable position. In addition, if a secure cable with a loop on its distal end is in the vicinity, this loop can also be engaged by hasp 506 thereby securing computer 500 to fixed location. Other protruding locks, such

as spikes, security rods or strips, can also be used to lock display portion 501 with keyboard portion 502 when in the closed position.

FIGS. 28B-D illustrate yet another locking embodiment for notebook computer 515 with display 516 which has a security hole 517 in the upper right corner of display portion 516. Hole 517 is a through hole. FIGS. 28C and 28D illustrate how the apparatus of FIG. 29 (without spike 285) is used to secure computer 515. Ferrule 286 is passed through hole 517 and locked by pin lock 110. In this manner cable 210 attaches computer 515 to secure table top clamp 211 or to another securing member, such as a table leg of the work surface upon which notebook computer 500 is placed.

It is further noted that ferrule 286 can also be used to lock notebook computer 500 in place in the closed position as in FIG. 28A, or the hasp 506 of FIG. 28A can also be used to lock the display portion 516 of notebook computer 500 instead of ferrule 286 and pin lock 110 shown in FIG. 28C.

FIG. 29 shows locking rod or spike 285 which is inserted in any of the three hole locations discussed. Ferrule 286 with a groove near its distal end is then inserted through the transverse hole of spike 285 and locked with pin lock 110. Ferrule 286 is securely attached to cable 210 which had been passed through knob 235 after clamp 211 had been tightened at the edge of a table or desk top. In this manner, the illustrated notebook computer or other personal electronic device is secured via a secure cable.

In a variation of this embodiment, the separate spike 285 is replaced by a captive security rod 291 as shown in FIG. 30. Note that rod 291 may be attached either to one end of the hinge or alternatively to the top surface of the base of computer or other personal electronic device 290 at any convenient location where space permits. Rods 291 are stored in a recessed position with only a small knob protruding so that they may be easily grasped to unlock into the extended position to expose a transverse hole. Ferrule 286 and lock 110 are then used in the same manner as with the separate spike 285.

In another spike variation shown in FIG. 31, long spike 296 is used to secure computer or other personal electronic device 294 which has a hole 295 through its base. Hole 295 is placed over pre-existing hole 298 through table top 293; then spike 296 is inserted such that transverse hole 297 is accessible beneath table top 293. Then transverse pin 299 with a groove adjacent its distal end is inserted through hole 297 and locked with pin lock 110. Thus this variation locks a notebook computer or other personal electronic device using a spike without the aid of a cable.

In another embodiment shown in FIG. 32 with a flexible locking strip 301, a detail of notebook computer 304 with display 305 and keyboard portion 306 is shown adjacent to clamp 302. Flexible locking strip 301 is shown prior to insertion through the hinge gap between display 305 and keyboard 306 (not shown) and further between bottom jaw 314 and top movable jaw 312 of clamp 302.

In lieu of being inserted within a hinge gap, flexible locking strip 301 may be inserted within a thin, longitudinally extending slot, similar to holes 277, 278, 279 for rod 285 of FIG. 29.

FIGS. 33, 36 and 37 show other features of clamp 302 with movable top 311 and stationary base 313. Locking strip 301 is clearly shown in top view and side view in FIGS. 34 and 35 respectively. Wedge stop 325 is shown at one the proximal end with narrow rectangular strip 326 at the distal end. Wedge stop 325 is preferably plastic which is bonded to strip 326 as by overmolding. It is noted that base portion 313 of clamp 302 is typically screwed to work surface 303 via screws 322, however, alternatively security cable 320 with secured distal end (not shown) can be used.

Gripping means, such as serrations 337 in FIG. 36, form lower static jaw 314 of FIGS. 32 and 33; they engage strip 301. Hole 336 is used for optional cable 320. Holes 322a accommodate fasteners 322, such as screws. Rectangular holes 335 accept tabs 339 of upper movable jaw 311 to form a hinge. The vertical wall 313a of base 313 can be alternatively joined to movable section 311 via ordinary hinges.

As in FIGS. 38 and 39, spring 319 tends to keep jaws 312 and 314 slightly apart unless lock 317 is locked via key 318. In that case if key 318 is rotated while moving member 311 is pressed down, lock tang 331 will engage lock recess 316 at the distal end of spring 319; recess 316 is attached to base 313. This action will lock locking strip 301 between jaws 312 and 314. Note that lock 317 is attached to hinged part 311 via a fastener, such as lock nut 330.

FIGS. 40-43 show notebook computer 304, cellular phone 346, PDA 347 and personal DVD player 348 each with hinge gap 345. In addition, the entry path of locking strip 301 is shown by arrows in FIG. 40.

FIG. 40 also shows a further alternate embodiment whereby the housing of notebook computer 304 contains a slot 326 for insertion of a flexible or rigid locking strip 328 therethrough.

FIGS. 44-47 relate to an alternate embodiment of clamp 355 which incorporates a leaf spring 358 to impart locking force to locking strip 301 when shackle 366 of padlock 365 is passed through lock loops 362 and handle loop 376 (as in FIG. 46). In this embodiment, shallow recess 359 with transverse serrations aggressively grasps strip end 326 under bending force of spring 358, which itself can have optional transverse serrations on its contact surface.

When handle 357 is free to swing up, strip end 326 can be easily passed between brackets 371 which are spaced apart a distance "W" (as in FIG. 45) to accommodate the width of strip end 326. Base 356 is secured to work surface 303 via fasteners, such as screws 369, which are passed through countersink holes 367 (as in FIG. 45). Leaf spring 358 is swaged or brazed at region 363 within slot 373 of handle 357. Hole 375 in loop 376 accommodates shackle 366. It is noted that spring 358 has to be bent somewhat for handle 357 to be in registration with the holes in padlock brackets 362. This bending also permits clamp 355 to accommodate strip ends 326 of varying thicknesses. Also, with respect to the geometry of spring 358 in FIG. 44, if a pulling force is placed on locking strip 301, frictional forces will tend to rotate the free end of spring 358 in a counter-clockwise direction thereby increasing clamping force on strip end 326; this further counteracts the pull-out force. Since spring 358 is wider than handle 357 (as in FIG. 47), centering washers 377 are used on either side of it to increase the combined width to X which is just slightly smaller than W. Rivet 360 in brackets 361 acts as an axle for handle 357; hole 372 is a clearance fit for rivet 360.

FIG. 48 illustrates alternate embodiment locking strip 390 with locking wedge 391, strip 393 and end hole 392. Locking strip 390 may be rigid or flexible.

Dashed lines 305 of FIG. 48 show the position of a computer display if this is being secured. Added hole 392 permits at least three non-clamp locking methods to be used. These are illustrated in FIGS. 49-51; for clarity, no item is shown being locked in these FIGS. 49-51.

It is understood that instead of being inserted through a hinge gap, locking strip 390 may be first passed through a thin, longitudinally extending slot in the housing of the personal electronic device, such as a notebook computer, instead of a round hole provided for a rod 285 or 296, as is shown in FIGS. 29-31. In this case, the thinness of the slot 327 for strip 328 minimizes any intrusion into the interior of the walls of

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the personal electronic device, such as a notebook computer 305 and the like, with its intricate wiring located in a tight space within the walls of the notebook computer 305, or other personal electronic device.

The strip 390 may be a rigid rectangle or other geometric shape. Additionally strip 390 may be flexible. If flexible, strip 390 may pass through a slot in the housing of the personal electronic device, or if the device is hinged, through a hinge gap between the display of the device and the main body of the device being secured.

In FIG. 49, stud 395 is attached to and protrudes from work surface 303. Hole 392 is simply passed over the distal end of stud 395 and then the shackle of to padlock 397 is passed through the transverse hole in stud 395 to lock strip 390.

In FIG. 50, secure cable 400 with collar 402 and a rigid stud 15 at its distal end is used to secure strip 390. After the rigid stud is passed through hole 392, cable lock 401 is snapped over the end of the stud thereby securing strip 390.

In FIG. 51, free cable 405 with lock member 406 permanently attached is passed through hole 392. Since member 406 is a bulge larger than the diameter of hole 392, locking strip 390 will be secured when the distal end of cable 405 is looped or otherwise secured to work surface 303 or to some point adjacent to it.

The plunger type security lock will now be described with reference to FIGS. 52, 53, 54A, 54B, 55A, 55B, 56, 57, 58A and 58B.

FIG. 52 depicts a perspective view of a plunger-type security lock 500 of the invention. While security lock 500 is designed for use with electronic devices such as notebook computers and like devices, e.g., those with a base connected by a hinge to an upper section typically comprising a display device, the invention is not limited thereto. The invention is not limited to what is to be locked or secured, but only that the object to be locked or secured have a hinge or through hole 35 through which a flexible locking strip may pass to its stopping means (e.g., wedge), which is then hooked or captured by the end of the sliding key of the security lock, as will now be described in detail.

Plunger-type security lock 500 includes a cylindrical sliding key receptacle 502, shown in the perspective views of FIGS. 55A and 55B. The cylindrical sliding key receptacle comprises a slotted, first cylindrical portion 504 and a second cylindrical portion 506. The slotted, first cylindrical portion 504 includes a first end formed with a slot 508 extending longitudinally through to its other end, and opening into the second cylindrical portion. The second cylindrical portion is formed as an open cylindrical cavity 510 that is contiguous with the first cylindrical portion's open slot 508.

A locking member 512 (for example, a ferrule) is arranged on an outer cylindrical surface of the second cylindrical portion 504 of the sliding key receptacle 502 that is configured for attachment to a cable 513. The cable is then attached to a stationary object such as a post, pillar, heavy desk, or other fixture that is substantially immobile.

A cylindrical plunger 516, having a pushing end 518 and a cylindrical plunger end 520, is configured for insertion into the second cylindrical portion of the sliding key receptacle 502. A sliding key 522, comprising a flat, longitudinal member constructed with a rectangular cross-section that includes a hooking end 524 and a plunger-contact end 526, which sliding key is configured with a key definition (see rectangular cut out teeth) and for slidable spring-loaded operation within (slot 508) the slotted, first cylindrical portion 504 in cooperation with the cylindrical plunger 516 and spring 528 65 in order to extend and hook a flexible locking strip and retract with and lock the locking strip 514 in locking state.

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A locking mechanism 530 defines the locking state in cooperation with the key definition. Locking mechanism 30 comprises a plurality of number dials 532 (four in the embodiment shown) arranged about an outer surface of the slotted, first cylindrical portion 508 to prevent the extending of the sliding key 522 when arranged in the locking state and to allow extending of the sliding key when in an unlock state. The locking state and unlock state are correlated to a numerical setting of the number dials in cooperation with the key definition. Spring washers (not shown in the drawing) are included to maintain the number dials, as well as a finger grip flange 534 (not shown in the FIG. 51 embodiment).

The locking member 512 or ferrule preferably comprises a cable for tethering the security lock to an anchoring means, such as a desk or stanchion, without limitation. The locking strip 514 for which the hooking end 526 of the sliding key 522 is configured to hook when extending from the sliding key receptacle 502 is configured with a blocking end 515, and to slide through an electronic device (304; FIG. 40), i.e., via a through opening, up to the blocking end. For example, a through opening may comprise a hinge gap between two parts. The blocking end may be formed as a wedge. In this way, the electronic device is secured to the plunger-type security lock (500) when in a locking state.

A bezel 540 is arranged about an outside diameter of the open end of the slotted, first cylindrical portion 504 of the sliding key receptacle 502, through which a portion of the longitudinal member of the sliding key 522 extends and retracts. Spring 528 is positioned to cooperate with the sliding key 522, the sliding key receptacle 502 and the plunger 516 to provide the spring loaded sliding key movement in cooperation with locking mechanism 530.

In another embodiment, the invention comprises an electronic device with security locking system. The electronic device 305 is required to have a through slot, such as a hinge gap (FIG. 40). A flexible locking strip 514 includes an insertion end 517 and a stopping end 515, configured for insertion partially through the through slot or hinge gap up to the stopping end 515. A plunger-type security lock (500) comprising a cylindrical sliding key receptacle 502 with a slotted, first cylindrical portion 504 and a second cylindrical portion 506, a locking member 512 arranged on an outer cylindrical surface of the second cylindrical portion 506 of the sliding key receptacle 502 is configured for attachment to a tether means (i.e., cable, chain, etc.) 513, a cylindrical plunger 516, a sliding key 522 including a hooking end 526 and a plunger-contact end 524 that is configured with a key definition (cut out teeth) and for slidable spring-loaded operation within the slotted, first cylindrical portion 504 in cooperation with the cylindrical plunger 516 to extend and hook the flexible locking strip 514 and to retract with and lock the locking strip 514 in locking state and a locking mechanism 530 that defines the locking state in cooperation with the key definition.

In another embodiment, the invention includes a locking assembly for a notebook computer or other personal electronic device having a visual display portion attached to a keyboard base portion by a hinge. The assembly includes a notebook computer or other personal electronic device with visual display portion separated from a keyboard base portion by a hinge. A flexible locking strip including an insertion end and a stopping end, configured for insertion partially through the hinge up to the stopping end.

A plunger-type security lock 500 comprising a slotted, cylindrical sliding key receptacle 502, a locking member 512 or ferrule is arranged on an outer cylindrical surface of the sliding key receptacle 502 and is preferably attached to a tether means (e.g., cable or chain) 513. A cylindrical plunger

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516 is included, as well as a sliding key 522 formed to include a hooking end 526 and a plunger-contact end 524. The sliding key is configured with a key definition to capture the numbers dialed in via the locking mechanism. A spring 528 is included to provide for spring loaded sliding key cooperation with the plunger and locking mechanism 530 within the slotted, cylindrical sliding key receptacle to extend and hook the flexible locking strip 514 and to retract with and lock the locking strip 514 in locking state.

In the foregoing description, certain terms and visual depictions are used to illustrate the preferred embodiment. However, no unnecessary limitations are to be construed by the terms used or illustrations depicted, beyond what is shown in the prior art, since the terms and illustrations are exemplary only, and are not meant to limit the scope of the present invention.

It is further known that other modifications may be made to the present invention, without departing the scope of the invention.

What is claimed is:

1. A plunger-type security lock, comprising:
 - a cylindrical sliding key receptacle with a slotted, first cylindrical portion and a second cylindrical portion;
 - a locking member arranged on an outer cylindrical surface of the second cylindrical portion of the sliding key receptacle that is configured for securely attaching to a stationery object;
 - a cylindrical plunger having a pushing end and a cylindrical plunger end, wherein the cylindrical plunger end is configured for insertion into the second cylindrical portion of the sliding key receptacle;
 - a sliding key comprising a flat, longitudinal member constructed with a rectangular cross-section that includes a hooking end and a plunger-contact end, which sliding key is configured with a key definition and for slidable spring-loaded operation within the slotted, first cylindrical portion in cooperation with the cylindrical plunger in order to extend and hook a flexible locking strip and retract with and lock the locking strip in locking state; and
 - a locking mechanism that defines the locking state in cooperation with the sliding key.
2. The plunger-type security lock as set forth in claim 1, wherein the sliding key receptacle's slotted, first cylindrical portion includes a first end formed with an open slot extending longitudinally through to its other end, and opening into the second cylindrical portion, which second cylindrical portion is formed as an open cylindrical cavity that is contiguous with the first cylindrical portion's open slot.
3. The plunger-type security lock as set forth in claim 1, wherein the locking mechanism comprises a plurality of number dials arranged about the slotted, first cylindrical portion to prevent the extending of the sliding key when arranged in the locking state and to allow extending when in an unlock state, which locking state is correlated to a numerical setting of the number dials in cooperation with the key definition.
4. The plunger-type security lock as set forth in claim 1, wherein the locking member to which the ferrule is configured to attach is a cable.
5. The plunger-type security lock as set forth in claim 1, wherein locking strip for which the hooking end of the sliding key is configured to hook when extending from the sliding key receptacle is configured with a blocking end and to slide through an electronic device through opening, up to the blocking end, such that the electronic device is secured to the plunger-type security lock when in a locking state.

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6. The plunger-type security lock as set forth in claim 1, wherein the sliding key comprises a flat, longitudinal member constructed with a rectangular cross-section configured with the key definition and for slidable insertion in the slotted, first cylindrical portion.

7. The plunger-type security lock as set forth in claim 1, further comprising a bezel arranged about an outside diameter of the open end of the slotted, first cylindrical portion of the sliding key receptacle, through which a portion of the longitudinal member of the sliding key extends and retracts.

8. The plunger-type security lock as set forth in claim 1, further comprising a spring positioned to cooperate with the sliding key, the sliding key receptacle and the plunger to provide the spring loaded sliding key movement in cooperation with locking mechanism.

9. The plunger-type security lock as set forth in claim 1, wherein the hooking end of the longitudinal member of the sliding key is configured for hooking and connecting with the flexible locking strip, stoppingly inserted through a hinge of an electronic device.

10. The plunger-type security lock as set forth in claim 9, wherein the flexible locking strip comprises wedge stop for stopping or otherwise preventing the locking strip from passing all the way through a hinge gap of the electronic device.

11. The plunger-type security lock as set forth in claim 10, wherein the hinge gap is between upper and lower electronic device housings.

12. An electronic device with security locking system, comprising:

- an electronic device having a through slot;
- a flexible locking strip including an insertion end and a stopping end, configured for insertion partially through the through slot up to the stopping end; and
- a plunger-type security lock comprising a cylindrical sliding key receptacle with a slotted, first cylindrical portion and a second cylindrical portion, a ferrule arranged on an outer cylindrical surface of the second cylindrical portion of the sliding key receptacle configured for attachment to a locking member, a cylindrical plunger, a sliding key including a hooking end and a plunger-contact end that is configured with a key definition and for slidable spring-loaded operation within the slotted, first cylindrical portion in cooperation with the cylindrical plunger to extend and hook the flexible locking strip and to retract with and lock the locking strip in locking state and a locking mechanism that defines the locking state in cooperation with the sliding key.

13. The electronic device with security locking system, as set forth in claim 12, wherein the cylindrical plunger has a pushing end and a cylindrical plunger end and wherein the cylindrical plunger end is configured for insertion into the second cylindrical portion of the sliding key receptacle.

14. The electronic device with security locking system, as set forth in claim 12, wherein the sliding key comprises a flat, longitudinal member constructed with a rectangular cross-section that includes the hooking end and the plunger-contact end.

15. The electronic device with security locking system, as set forth in claim 12, wherein the sliding key comprises a flat, longitudinal member constructed with a rectangular cross-section configured with the key definition and for slidable insertion in the slotted, first cylindrical portion.

16. The electronic device with security locking system, as set forth in claim 12, further comprising a bezel arranged about an outside diameter of the open end of the slotted, first

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cylindrical portion of the sliding key receptacle, through which a portion of the longitudinal member of the sliding key extends and retracts.

17. The electronic device with security locking system, as set forth in claim 12, further comprising a spring positioned to cooperate with the sliding key, the sliding key receptacle and the plunger to provide the spring loaded sliding key movement in cooperation with locking mechanism.

18. The electronic device with security locking system, as set forth in claim 12, wherein the flexible locking strip comprises wedge stop for stopping or otherwise preventing the locking strip from passing all the way through the through-slot in the electronic device.

19. The electronic device with security locking system, as set forth in claim 12, wherein the through slot is a hinge gap between upper and lower electronic device housings.

20. The electronic device with security locking system, as set forth in claim 12, wherein the locking mechanism comprises a plurality of number dials arranged about the slotted, first cylindrical portion to prevent the extending of the sliding key when arranged in the locking state and to allow extending when in an unlock state, which locking state is correlated to a numerical setting of the number dials in cooperation with the key definition.

21. The electronic device with security locking system, as set forth in claim 12, wherein the locking member to which the ferrule is configured to attach to a cable for tethering the security lock.

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22. A locking assembly for a notebook computer or other personal electronic device having a visual display portion attached to a keyboard base portion by a hinge, comprising:

a notebook computer or other personal electronic device with visual display portion separated from a keyboard base portion by a hinge,

a flexible locking strip including an insertion end and a stopping end, configured for insertion partially through the hinge up to the stopping end; and

a plunger-type security lock comprising a slotted, cylindrical sliding key receptacle, a ferrule arranged on an outer cylindrical surface of the sliding key receptacle configured for attachment to a locking member, a cylindrical plunger, a sliding key including a hooking end and a plunger-contact end that is configured with a key definition and for slidable spring-loaded operation within the slotted, cylindrical sliding key receptacle in cooperation with the cylindrical plunger and a locking mechanism that defines the locking state in order to extend the sliding key, hook the locking end with the flexible locking strip and retract the sliding key so hooked to lock it in a locking state in cooperation with the key definition.

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