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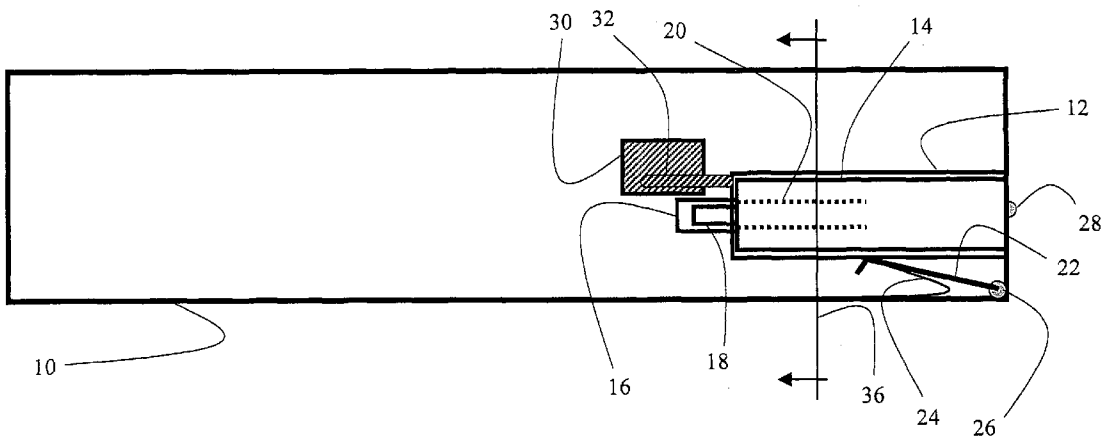


(57) Abstract: The present invention discloses a system including: (a) a host device including: (i) a cavity; and (ii) a socket, recessed in the cavity; and (b) a UFD configured to be reversibly operationally connected to the host device via the socket, wherein the UFD is configured to physically reside substantially in the cavity when the UFD is operationally connected to the socket. Also disclosed is a UFD system including: (a) a first part having components of a UFD, wherein the components include a primary connector and an electronics assembly; and (b) a second part having a UFD holder and a secondary connector, wherein the UFD holder is configured to reversibly accommodate the first part, wherein a dimension of the first part parallel to an insertion direction of the primary connector is shorter than a dimension of the second part parallel to an insertion direction of the secondary connector.

WO 2007/135674 A2

INTERNAL UFD

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to systems and methods for accommodating an internal UFD (USB flask disk) in a host system such that the UFD does not significantly protrude beyond the exterior of the host system.

A UFD is a well-known device for portable data storage. A typical shape of a UFD resembles a short, straight, flat stick, making the UFD easy to grip by a user, hang on a key chain, and store in a pocket. When plugged into a host system, typically a notebook computer or a digital TV, a prior art UFD generally significantly protrudes beyond the exterior of the host system. The UFD typically protrudes perpendicular to the panel containing the USB socket.

This configuration makes it easy to plug the UFD into the host, see that the UFD is plugged in, and unplug the UFD when desired. In this configuration, however, the UFD alters the natural form factor of the host system, making it cumbersome and risky to handle the host system while the UFD is plugged in. In addition, the protrusion of the UFD presents an increased risk of damage to both the host system and the UFD. Furthermore, in situations where the aesthetic appearance of the host system is important, such as an expensive digital TV in a living room, the protrusion of the UFD from the panel is considered a noticeable problem as well.

Traditionally, this was not considered a significant issue, as the UFD was a short-term "guest" to the host system, which was operated most of the time without a resident UFD. Recently, with the proliferation of large-capacity UFDs, which sometimes include not only data files but applications and operating systems as well, there are cases where a UFD has to remain coupled to the host system for a long period of time, including when the host system is being powered down, or when host system is placed in (or removed from) the system carrying case. This is practically impossible with the current state-of-the-art UFD.

Many home entertainment devices are designed to be used in living rooms, and are considered as "part of the furniture". This implies that the device facade is carefully designed to be aesthetic and safe. When such devices require a UFD for device operation, such as a digital TV that uses a dongle (i.e. socket connection and controller) for porting of content, the dongle is preferably used on the facade of the device. This configuration is chosen for the

convenience of the user, and to enable a good line-of-sight connection with a wireless remote control.

Prior art dongles are typically long enough to be conveniently held by a user (e.g. 40-80 mm), and stick out when plugged into the USB socket on the front panel of a device. This not only interferes with the aesthetic design of the device, but also creates a practical problem as the dongle may be accidentally pulled out or damaged by user passing by the device. In addition, the entertainment room is a location frequented by young children. A television is typically located at an elevation that is accessible to a child's reach. An easily-removable device protruding from a television is a both a safety hazard and a candidate for domestic vandalism.

It would be desirable to have an internal UFD that does not protrude beyond the exterior contour of a host system.

SUMMARY OF THE INVENTION

It is the purpose of the present invention to provide systems and methods for a UFD that does not protrude beyond the contour of a host system.

For the purpose of clarity, several terms which follow are specifically defined for use within the context of this application. The term "UFD" is used in this application to refer to a USB flash disk. The term "dongle" is used in this application to refer to a relatively small physical device, rigidly or semi-rigidly supported by a socket of a host system, containing data storage, and typically (but not necessarily) having one or more controls. The term "host panel" is used in this application to refer to a panel that hosts a USB socket in a device that has one or more generally planar panels and a USB socket in one of the panels. The expression "reside substantially in a cavity" is used in this application to refer a UFD with more than half of the volume of the UFD inside the cavity.

In a preferred embodiment of the present invention, the shape of the UFD is configured to match a deep cavity in the contour of the host panel, so that practically all of the UFD's volume is contained within the cavity when the UFD is inserted in the host system.

In another preferred embodiment of the present invention, the UFD is configured to have a very low profile, spreading the functional components of the UFD inside and around the socket with minimal protrusion beyond the host panel.

As the UFD in that preferred embodiment may be too small to be handled when not engaged in the host system, another preferred embodiment of the present invention includes a

UFD holder configured to accommodate the small UFD when the UFD is outside the host system. This configuration enables the UFD to be safely and conveniently carried and used with other host systems. In a variation of this embodiment, the UFD holder connects to the small UFD at an end of the UFD holder, thus changing the form factor of the combined UFD/UFD holder unit into the form factor of a standard UFD.

In another preferred embodiment of the present invention, the UFD holder encompasses the small UFD when the UFD is engaged in the UFD holder. In this embodiment, the original size of the UFD holder is not altered.

In another preferred embodiment of the present invention, when the UFD is engaged in the host panel, an ejection mechanism ejects the UFD out of the cavity of the host panel only when the host system is instructed by the user or by the host software. This mechanism serves two purposes: The mechanism eliminates untimely ejection of the UFD from the host panel during file transfer, and enables easy removal of the UFD from the host panel without using tools.

In another preferred embodiment of the invention, the UFD has an aperture or a recess near the outer edge of the UFD. In the event that the ejection mechanism that ejects the UFD from the cavity fails to operate, the user can extract the UFD from the host panel by pulling the UFD out with a hooked tool via the aperture or recess.

In another preferred embodiment of the present invention, the cavity of the host panel is configured to have at least one parallel alignment guide, and the UFD is configured to have a matching tunnel. Thus, when the UFD is inserted into the cavity, the UFD slides accurately into place as the UFD tunnel aligns with the cavity's alignment guide, ensuring a smooth engagement of the UFD plug into the USB socket.

In another preferred embodiment of the present invention, the USB socket of the host panel is recessed in the host panel cavity by an amount that is slightly more than the width of a typical UFD (typically 20 mm), and has a mechanism for rotating approximately 90 degrees in a vertical or horizontal plane. When a general-purpose UFD is plugged into a USB socket, the UFD typically protrudes beyond the contour of the host panel by an amount that is approximately the difference between the length of the UFD and the depth of the host panel cavity. After engaging the UFD in the USB socket, the user can rotate the UFD and the USB socket together to a position in which the major plane of the UFD is practically parallel to the major plane of the host panel, and is completely accommodated in the recess. An optional door or shutter can cover the recess in order to hide the UFD.

In other preferred embodiments of the present invention, an internal UFD for a host system is part of a host panel of the host system. In such embodiments, the UFD is inserted into a slot or compartment of the host panel, providing a unobtrusive, and yet easily accessible, UFD for the host system.

Therefore, according to the present invention, there is provided for the first time a system including: (a) a host device including: (i) a cavity; and (ii) a socket, recessed in the cavity; and (b) a UFD configured to be reversibly operationally connected to the host device via the socket, wherein the UFD is configured to physically reside substantially in the cavity when the UFD is operationally connected to the socket.

Preferably, the UFD is configured to substantially occupy the cavity when the UFD is operationally connected to the socket.

Preferably, the UFD is configured to physically reside completely in the cavity when the UFD is operationally connected to the socket.

Preferably, the UFD includes at least one recess for connecting an extraction tool to the UFD.

Preferably, the UFD includes a handle for removing the UFD from the cavity.

Preferably, the UFD includes at least one ridge for removing the UFD from the cavity.

Preferably, the UFD includes at least one clip for securing the UFD in the cavity.

Preferably, the system further includes: (c) a wicket for reversibly covering the cavity when the UFD is not occupying the cavity, the wicket configured to uncover the cavity when the UFD is inserted in the cavity.

Preferably, the host device includes an ejection mechanism for automatic ejection of the UFD from the socket.

More preferably, the ejection mechanism is operative to eject the UFD in such a way that the UFD can then be manually extracted from the cavity.

More preferably, the ejection mechanism is controlled by a user-activated key.

More preferably, the ejection mechanism is controlled by a software program of the host device.

Most preferably, the software program is configured to verify that the automatic ejection is safe to perform.

According to the present invention, there is provided for the first time a host panel of a host device, the host panel including: (a) a recess for accommodating a UFD; (b) a socket,

in the recess, for operational connection of the UFD; and (c) a socket-swivel mechanism for positioning the socket alternately in: (i) a first position in which the UFD is substantially perpendicular to the host panel for operational connection and disconnection of the UFD from the socket, and (ii) a second position in which the UFD is substantially parallel with the host panel.

Preferably, the recess is configured to accommodate the UFD in a way that the UFD substantially occupies the recess.

Preferably, the host panel further includes: (d) a wicket for reversibly covering the recess when the UFD is not occupying the recess, the wicket configured to uncover the recess when the UFD is inserted in the recess.

According to the present invention, there is provided for the first time a UFD including: (a) an end cap for housing electronic circuitry of the UFD; and (b) a connector, wherein a dimension of the end cap parallel to an insertion direction of the connector is smaller than a dimension of the connector parallel to an insertion direction of the connector.

According to the present invention, there is provided for the first time a UFD system including: (a) a first part having components of a UFD, wherein the components include a primary connector and an electronics assembly; and (b) a second part having a UFD holder and a secondary connector, wherein the UFD holder is configured to reversibly accommodate the first part, wherein a dimension of the first part parallel to an insertion direction of the primary connector is shorter than a dimension of the second part parallel to an insertion direction of the secondary connector.

Preferably, the UFD system is configured to be operational upon satisfying at least one condition of: (a) the first part being operationally engaged in a host device; and (b) the first part being operationally engaged in the second part, and the second part being engaged in the host device.

According to the present invention, there is provided for the first time a UFD including: (a) a UFD body; and (b) a connector, wherein a dimension of the UFD body parallel to an insertion direction of the connector is smaller than at least one other dimension of the UFD body.

According to the present invention, there is provided for the first time a method for configuring a host device for unobtrusive operational connection of a UFD, the method including the steps of: (a) recessing a cavity in a host panel of the host device; and (b)

providing a socket in the cavity for reversibly operationally connecting the UFD to the host device.

These and further embodiments will be apparent from the detailed description and examples that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 shows a cross-sectional view of a notebook computer having an internal UFD slot, according to a preferred embodiment of the present invention;

Figure 2 is a schematic block diagram of a UFD compatible with the computer shown in Figure 1, according to a preferred embodiment of the present invention;

Figure 3A shows a rear view of the UFD shown in Figure 2 plugged into the computer of Figure 1, according to a preferred embodiment of the present invention;

Figure 3B shows a cross-sectional view of the UFD shown in Figure 2 plugged into the computer of Figure 1, according to a preferred embodiment of the present invention;

Figure 3C shows an end view of the recess shown in Figure 1, according to a preferred embodiment of the present invention;

Figure 3D shows a front view of the recess shown in Figure 1 when a UFD is not present, according to a preferred embodiment of the present invention;

Figure 4 is a schematic block diagram of a mini-UFD plugged into a host system, according to another preferred embodiment of the present invention;

Figure 5A shows a side view of the mini-UFD shown in Figure 4, according to a preferred embodiment of the present invention;

Figure 5B shows a top view of the mini-UFD shown in Figure 4, according to a preferred embodiment of the present invention;

Figure 5C is a schematic block diagram of an empty mini-UFD holder, according to a preferred embodiment of the present invention;

Figure 5D is a schematic block diagram of the mini-UFD holder shown in Figure 5C containing the mini-UFD shown in Figure 5A, according to a preferred embodiment of the present invention;

Figure 6A shows an example of a television having an internal UFD compartment, according to a preferred embodiment of the present invention;

Figure 6B shows the television shown in Figure 6A with a UFD inside the recess, according to a preferred embodiment of the present invention;

Figure 7A shows a top view of a host panel, of a host system, having an internal UFD slot in an edge of the host panel, according to a preferred embodiment of the present invention;

Figure 7B shows a cut-away side view of the host system having an internal UFD slot in an edge of the host panel, shown in Figure 7A, according to a preferred embodiment of the present invention;

Figure 7C shows a top view of a UFD for the host panel shown in Figure 7A, according to a preferred embodiment of the present invention;

Figure 7D shows a side view of the UFD, shown in Figure 7C, for the host panel shown in Figure 7A, according to a preferred embodiment of the present invention;

Figure 8A shows a top view of a host panel, of a host system, having an internal UFD slot in an edge of the host panel, according to another preferred embodiment of the present invention;

Figure 8B shows a top view of a UFD for the host panel shown in Figure 8A, according to a preferred embodiment of the present invention;

Figure 8C shows a side view of the UFD shown in Figure 8B, according to a preferred embodiment of the present invention;

Figure 9A shows a top view of a host panel, of a host system, having an internal UFD compartment in the host panel, according to a preferred embodiment of the present invention;

Figure 9B shows a top view of a UFD for the host panel shown in Figure 9A, according to a preferred embodiment of the present invention;

Figure 9C shows a side view of the UFD shown in Figure 9B, according to a preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to systems and methods for accommodating an internal UFD in a host system such that the UFD does not protrude beyond the exterior of the host

system. The principles and operation for an internal UFD, according to the present invention, may be better understood with reference to the accompanying description and the drawings.

Referring now to the drawings, Figure 1 shows a cross-sectional view of a notebook computer having an internal UFD slot, according to a preferred embodiment of the present invention. A notebook computer **10**, having a form factor similar to a ThinkPad™ computer (available from Lenovo™ Group Ltd., 1 Manhattanville Rd., Suite PH, Purchase, New York) is configured to have a deep recess **12**, long enough to accommodate the full length of a UFD **14** (typically 4-7 cm). A USB socket **16** is installed in the inner wall of recess **12**, accommodating a USB connector **18** of UFD **14**. Longitudinal guide rails **20** (shown in phantom) on the side walls of recess **12** accommodate two longitudinal guide supports (not shown) on the sides of UFD **14**, guiding UFD **14** into USB socket **16** when UFD **14** is inserted into recess **12**. Longitudinal guide rails **20** are presented more clearly in Figure 3C. Returning to Figure 1, a wicket **22**, which is pushed by a spring **24**, turns on an axis **26**. Wicket **22** normally shuts the opening of recess **12** when UFD **14** is not inserted in recess **12**. UFD **14** pushes wicket **22** down upon insertion of UFD **14**.

An ejection button **28** on the host panel (not explicitly shown) of computer **10**, or on the exposed end of UFD **14**, is used to initiate ejection of UFD **14**. A software application (not shown) senses the depression of ejection button **28**, and activates an actuator **30** to push a pin **32** against UFD **14**, pushing UFD **14** slightly out of recess **12**. A user can then grab and remove UFD **14**. Once UFD **14** is removed, wicket **22** shuts the opening of recess **12**, leaving computer **10** with a "closed" aesthetic appearance. Optionally, the activation of ejection button **28** initiates a software program that verifies that it is safe to extract UFD **14**, before mechanically ejecting UFD **14**. Such software is available, among others, from MicroSoft® in the Windows® operating system.

Figure 2 is a schematic block diagram of a UFD compatible with the computer shown in Figure 1, according to a preferred embodiment of the present invention. UFD **14** is shown with USB connector **18**, which connects to internal USB socket **16** (shown inside computer **10** in Figure 1), using longitudinal guide supports **38**, located on both sides of UFD **14**, to slide into recess **12** of Figure 1, and safely connect to USB socket **16** of Figure 1. Ejection button **28** enables safe ejection of UFD **14**.

Figure 3A shows a rear view of UFD **14** of Figure 2 plugged into computer **10** of Figure 1, according to a preferred embodiment of the present invention. A UFD rear panel **42** is visible as shown when UFD **14** is plugged into computer **10**. Ejection button **48** helps to

safely remove UFD **14**. Apertures **44** and **46** are available in the event that ejection button **48** is not activating ejection, enabling a user to mechanically hook a tool (not shown) through apertures **44** and **46**, and extract UFD **14** manually. Moreover, indicator lights **50** provide indications about the status of UFD **14**.

A better understanding of the structure of recess **12** may be gained by inspection of Figures 3B and 3C, which show a cross-sectional view and end view (with and without UFD **14** engaged in recess **12**, respectively) taken along a perspective line **36** shown in Figure 1. Figure 3B shows a cross-sectional view of UFD **14** of Figure 2 plugged into computer **10** of Figure 1. Figure 3B shows recess **12** when UFD **14** is engaged in recess **12** of computer **10**. For smooth insertion, UFD **14** slides along longitudinal grooves **52** and **54**. The electronics **56** of UFD **14** are located inside UFD body **58**.

Figure 3C shows an end view of recess **12** of Figure 1, according to a preferred embodiment of the present invention. Figure 3C shows recess **12** when UFD **14** is not engaged in recess **12** of computer **10**. USB socket **16**, which is located substantially within computer **10**, as well as longitudinal guide rails **20**, which help UFD **14** to reach USB socket **16** at the proper angle for insertion, are shown. Figure 3D shows a front view of the recess shown in Figure 1 when a UFD is not present. Figure 3D shows recess **12** when UFD **14** is not engaged in computer **10**. In this case, wicket **26** is shown covering recess **12** of computer **10**.

Figure 4 is a schematic block diagram of a mini-UFD plugged into a host system, according to another preferred embodiment of the present invention. A mini-UFD **60** is shown engaged in a host system **62**. A USB connector **64** is shown engaged in a USB socket **66** of a host system **62**. USB connector slots **68** are shown as well. Electronics assembly **69** is shown as a dotted box which includes a portion that extends into USB connector **64** indicating that electronics assembly **69** is partially located inside USB connector **64**. Electronics assembly **69** includes a printed circuit board (not shown). In order to minimize changes in appearance and dimensions of the exterior of host system **62**, a UFD end cap **70** contours to the exterior of host system **62**.

Figure 5A shows a side view of mini-UFD **60** of Figure 4, according to a preferred embodiment of the present invention. Both USB connector **64** and UFD end cap **70** are shown. USB connector **64** meets the USB 2.0 industry specification. USB connector **64** can be a Mini-A or Mini-B connector within the USB 2.0 specification. Dimension **L** (connector length), dimension **W** (connector width), dimension **C** (cap diameter), and dimension **D** (cap

depth) of mini-UFD **60** are also shown in Figure 5A. Dimension **D** is less than any of dimension **L**, dimension **W**, and dimension **C**. The electronic circuitry of mini-UFD **60** resides primarily in end cap **70**.

Figure 5B shows a top view of the mini-UFD shown in Figure 5A, according to a preferred embodiment of the present invention. Dimensions **C** and **W** of mini-UFD **60** are shown. Other elements of mini-UFD **60** from Figure 5A are not shown in Figure 5B to emphasize dimension **C** and dimension **W**. While end cap **70** is indicated in Figure 5B with dimension **C** representing cap diameter, it is noted that end cap **70** can have contours other than a circle.

Figure 5C is a schematic block diagram of a UFD holder, according to a preferred embodiment of the present invention. An empty UFD holder **72** is shown with a USB connector **74** and a carrying aperture **76**. UFD holder **72** also includes a dedicated opening **78** and a USB socket **79** (located inside UFD holder **72**), which can accommodate a mini-UFD, such as mini-UFD **60** of Figure 5A. Figure 5D is a schematic block diagram of mini-UFD holder **72** of Figure 5C containing mini-UFD **60** of Figure 5A, according to a preferred embodiment of the present invention. In order to convert the form factor of mini-UFD **60** into the form factor of a standard UFD, mini-UFD **60** is inserted into UFD holder **72** in dedicated opening **78**, and USB connector **64** is engaged in USB socket **79**. As was mentioned above, USB connector **64** can be a Mini-A or Mini-B USB connector. Once inserted, a user can use the device (i.e. UFD holder **72** containing mini-UFD **60**) as a regular UFD, and transport the device easily using carrying aperture **76**.

Figure 6A shows an example of a television having an internal UFD compartment, according to a preferred embodiment of the present invention. A television **80** is shown with a screen **82** on a host panel **84**, and a dedicated recess **86** having a USB socket **88**. Socket **88** is shown in an orientation where the insertion direction is perpendicular to host panel **84**. Since a UFD is not inserted into socket **88** in Figure 6A, a back plate **90** of recess **86**, which is parallel to host panel **84**, is visible. To engage a UFD (not shown) into television **80**, the UFD is inserted into socket **88**, and then rotated, as will be explained in Figure 6B.

Figure 6B shows television **80** of Figure 6A with a UFD inside recess **86**, according to a preferred embodiment of the present invention. A UFD **92**, having a connector **94**, has been rotated, after insertion into socket **88** of Figure 6A (not shown in Figure 6B), to become parallel to host panel **84**, thus residing inside recess **86**, and not changing the form factor of television **80**. When UFD **92** is in this orientation, the status of UFD **92** can be viewed via a

UFD indication panel **96** that is integral with UFD **92**, and changed via a UFD control button **98** that is integral with UFD **92**.

Figure 7A shows a top view of a host panel, of a host system, having an internal UFD slot in an edge of the host panel, according to a preferred embodiment of the present invention. A host panel **100** of a host system (not shown) having a UFD slot **102** with a concealed socket region **104** is shown. An example of a host system suited for this embodiment is a laptop computer. For example, host panel **100** may be the cover of the laptop computer. UFD slot **102** is shown vacant, but is occupied when a UFD (not shown) is engaged in UFD slot **102**. UFD slot **102** can also be occupied by a slot protector (not shown) when no UFD is engaged in UFD slot **102**.

Figure 7B shows a cut-away side view of the host system having an internal UFD slot in an edge of the host panel, shown in Figure 7A, according to a preferred embodiment of the present invention. A host system side cut-away **106** is shown with UFD slot **102**. The top edge cut-away **106** represents host panel **100**. A UFD socket **108**, having a contact-engaging spring, is shown in concealed socket region **104**.

Figure 7C shows a top view of a UFD for the host panel shown in Figure 7A. A UFD **112** is shown having a UFD connector **114** at one end for operationally connecting UFD **112** to UFD socket **108** of Figure 7B. UFD connector **114** is located on the bottom side of UFD **112**, as shown by the dashed line in Figure 7C. UFD **112** has ridges **116** for grasping UFD **112** when inserting and removing UFD **112** from UFD slot **102** (shown in Figure 7A). An arrow indicates the direction in which UFD **112** is inserted into and removed from UFD slot **102**.

Figure 7D shows a side view of the UFD, shown in Figure 7C, for the host panel shown in Figure 7A, according to a preferred embodiment of the present invention. UFD **112** is configured to have a very thin profile. An arrow indicates the direction in which UFD **112** is inserted into and removed from UFD slot **102** (shown in Figure 7B). UFD **112** of Figure 7D and UFD slot **102** of Figure 7B are shown at different scales.

In another preferred embodiment a UFD of the present invention is configured to operate with a different insertion/extraction mechanism. Figure 8A shows a top view of a host panel, of a host system, having an internal UFD slot in an edge of the host panel, according to another preferred embodiment of the present invention. A host panel **120** of a host system (not shown) having a UFD slot **122** with a UFD socket **124** is shown. Support elements **126** and clip recesses **128** secure a UFD (not shown) when engaged in UFD slot

122. In this embodiment, UFD socket **124** is configured to serve as an engaging spring as well.

Figure 8B shows a top view of a UFD for the host panel shown in Figure 8A. A UFD **130** having ridges **132** is shown. An arrow, incorporated into ridges **132**, indicates the direction in which UFD **130** is inserted into and removed from UFD slot **122** (shown in Figure 8A). Figure 8C shows a side view of the UFD shown in Figure 8B, according to a preferred embodiment of the present invention. It can be seen that the side profile of UFD **130** has a slight curvature which enables a user to insert and remove UFD **130** with his/her fingertip by pressing on ridges **132**. Clips **134** engage in clip recesses **128** of UFD slot **122** (shown in Figure 8A) in order to secure UFD **130** in host panel **120**, and to make contact between a UFD connector **136** and UFD socket **124**.

Figure 9A shows a top view of a host panel, of a host system, having an internal UFD compartment in the host panel, according to a preferred embodiment of the present invention. A host panel **140** of a host system (not shown) having a UFD compartment **142** is shown. Within UFD compartment **142**, there are a fingertip recess **144**, a deep recess **146**, clip recesses **148**, and a UFD socket **150**. In this embodiment, UFD socket **150** is configured to serve as an engaging spring as well.

Figure 9B shows a top view of a UFD for the host panel shown in Figure 9A. A UFD **152** is shown with clips **154**. Clips **154** are located on the bottom side of UFD **152,** as shown by the dashed in Figure 9B. Figure 9C shows a side view of the UFD shown in Figure 9B. UFD **152** is shown with clips **156** for securing UFD **152** in UFD compartment **142** (shown in Figure 9A). A UFD connector **158** operationally connects to UFD socket **150** when UFD **152** is engaged in UFD compartment **142**. It can be seen in Figure 9C that UFD **152** has a finger catch **160** with a loop handle **162** for inserting and removing UFD **152** from UFD compartment **142**. Finger catch **160** and loop handle 162 reside in fingertip recess **144** and deep recess **146**, respectively, when UFD **152** is engaged in UFD compartment **142**.

While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications, and other applications of the invention may be made.

WHAT IS CLAIMED IS:

1. A system comprising:

(a) a host device including:

(i) a cavity; and

(ii) a socket, recessed in said cavity; and

(b) a UFD configured to be reversibly operationally connected to said host device via said socket, wherein said UFD is configured to physically reside substantially in said cavity when said UFD is operationally connected to said socket.

2. The system of claim 1, wherein said UFD is configured to substantially occupy said cavity when said UFD is operationally connected to said socket.

3. The system of claim 1, wherein said UFD is configured to physically reside completely in said cavity when said UFD is operationally connected to said socket.

4. The system of claim 1, wherein said UFD includes at least one recess for connecting an extraction tool to said UFD.

5. The system of claim 1, wherein said UFD includes a handle for removing said UFD from said cavity.

6. The system of claim 1, wherein said UFD includes at least one ridge for removing said UFD from said cavity.

7. The system of claim 1, wherein said UFD includes at least one clip for securing said UFD in said cavity.

8. The system of claim 1, the system further comprising:

(c) a wicket for reversibly covering said cavity when said UFD is not occupying said cavity, said wicket configured to uncover said cavity when said UFD is inserted in said cavity.

9. The system of claim 1, wherein said host device includes an ejection mechanism for automatic ejection of said UFD from said socket.

10. The system of claim 9, wherein said ejection mechanism is operative to eject said UFD in such a way that said UFD can then be manually extracted from said cavity.

11. The system of claim 9, wherein said ejection mechanism is controlled by a user-activated key.

12. The system of claim 9, wherein said ejection mechanism is controlled by a software program of said host device.

13. The system of claim 12, wherein said software program is configured to verify that said automatic ejection is safe to perform.

14. A host panel of a host device, the host panel comprising:

(a) a recess for accommodating a UFD;

(b) a socket, in said recess, for operational connection of said UFD; and

(c) a socket-swivel mechanism for positioning said socket alternately in:

(i) a first position in which said UFD is substantially perpendicular to the host panel for operational connection and disconnection of said UFD from said socket, and

(ii) a second position in which said UFD is substantially parallel with the host panel.

15. The host panel of claim 14, wherein said recess is configured to accommodate said UFD in a way that said UFD substantially occupies said recess.

16. The host panel of claim 14, the host panel further comprising:

(d) a wicket for reversibly covering said recess when said UFD is not occupying said recess, said wicket configured to uncover said recess when said UFD is inserted in said recess.

17. A UFD comprising:

(a) an end cap for housing electronic circuitry of the UFD; and

(b) a connector, wherein a dimension of said end cap parallel to an insertion direction of said connector is smaller than a dimension of said connector parallel to an insertion direction of said connector.

18. A UFD system comprising:

(a) a first part having components of a UFD, wherein said components include a primary connector and an electronics assembly; and

(b) a second part having a UFD holder and a secondary connector, wherein said UFD holder is configured to reversibly accommodate said first part, wherein a dimension of said first part parallel to an insertion direction of said primary connector is shorter than a dimension of said second part parallel to an insertion direction of said secondary connector.

19. The UFD system of claim 18, wherein the UFD system is configured to be operational upon satisfying at least one condition of:

(a) said first part being operationally engaged in a host device; and

(b) said first part being operationally engaged in said second part, and said second part being engaged in said host device.

20. A UFD comprising:

(a) a UFD body; and

(b) a connector, wherein a dimension of said UFD body parallel to an insertion direction of said connector is smaller than at least one other dimension of said UFD body.

21. A method for configuring a host device for unobtrusive operational connection of a UFD, the method comprising the steps of:

(a) recessing a cavity in a host panel of the host device; and

(b) providing a socket in said cavity for reversibly operationally connecting the UFD to the host device.

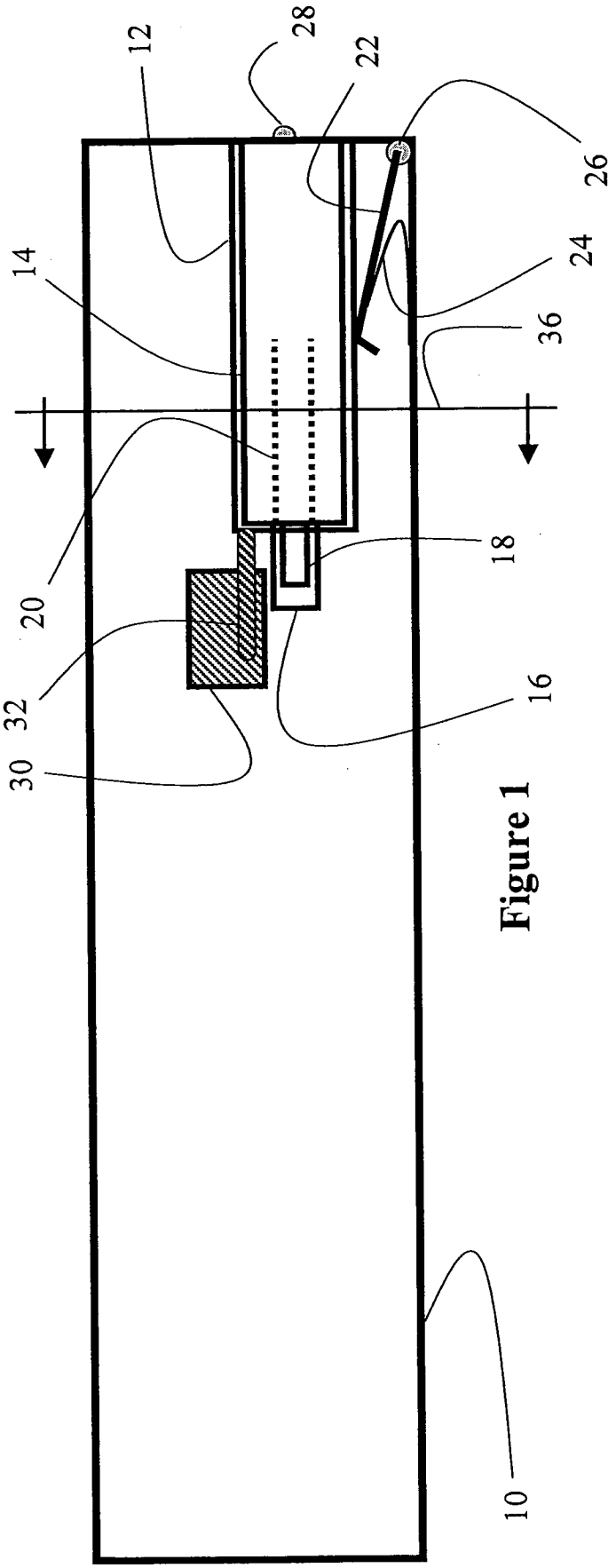


Figure 1

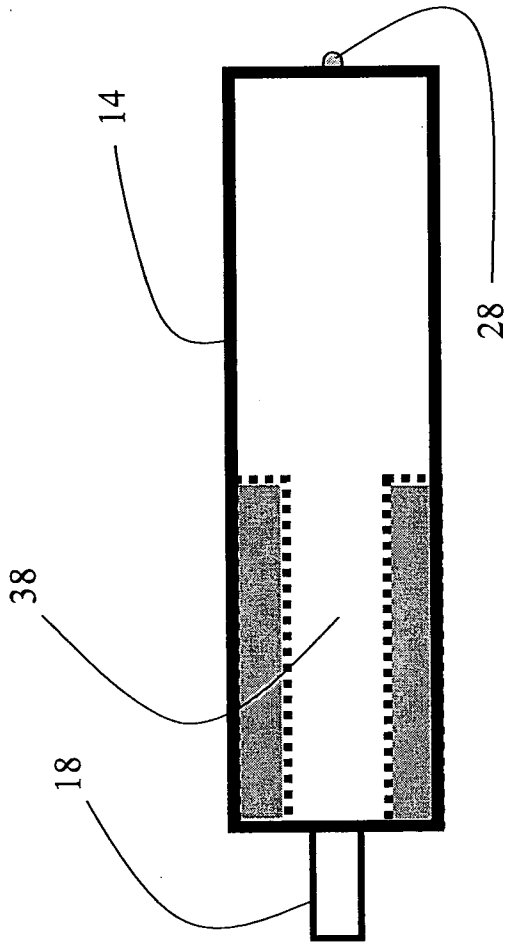


Figure 2

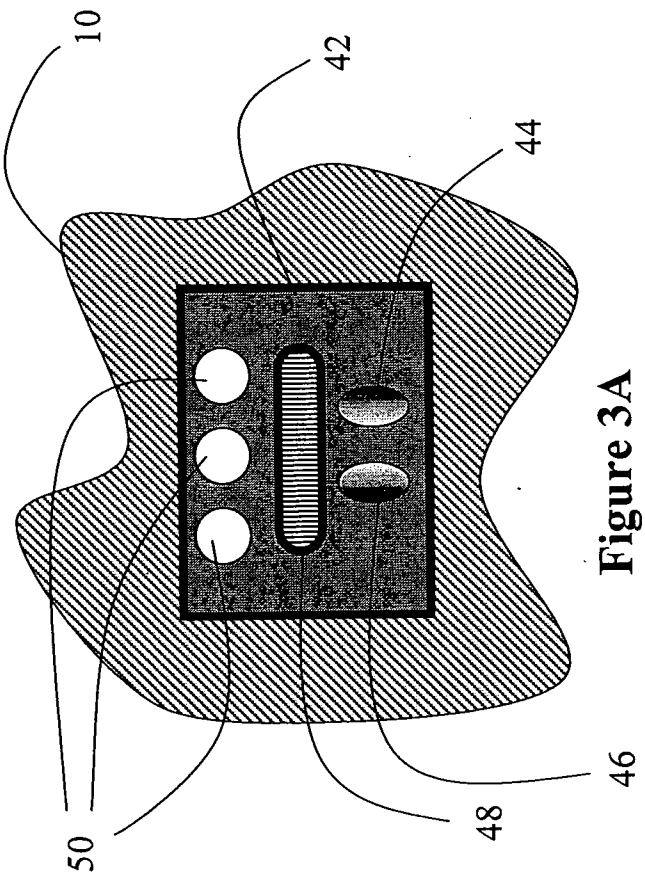


Figure 3A

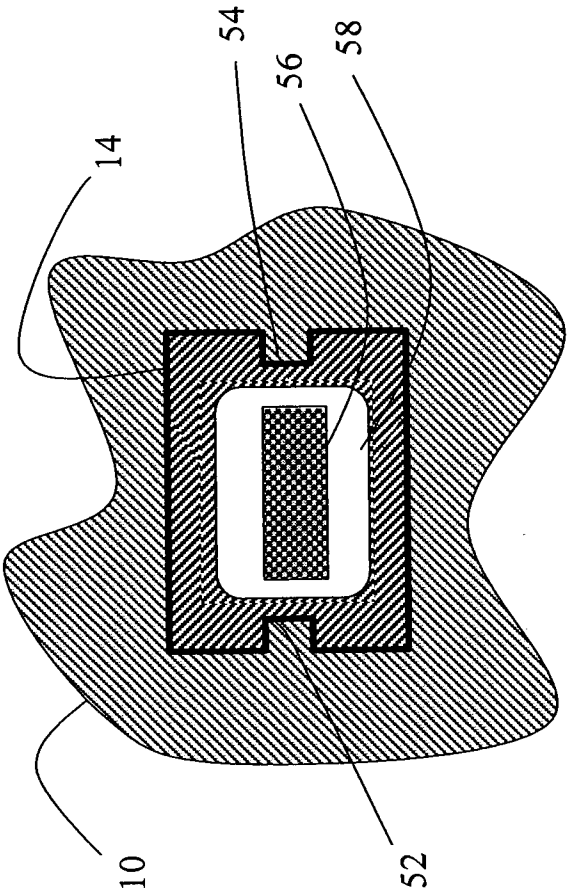


Figure 3B

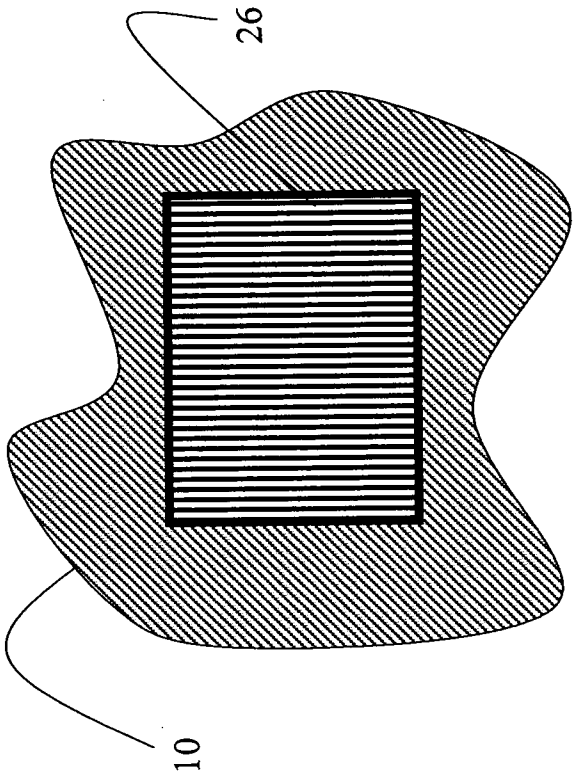


Figure 3D

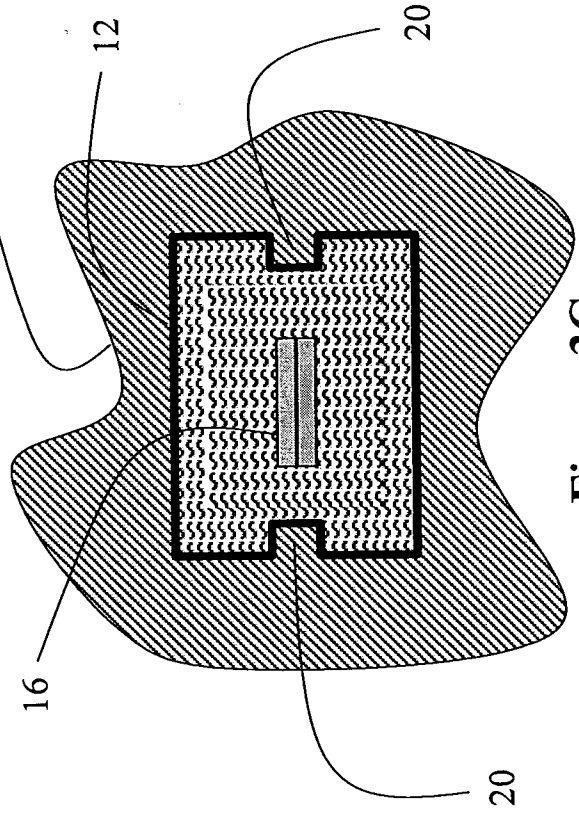


Figure 3C

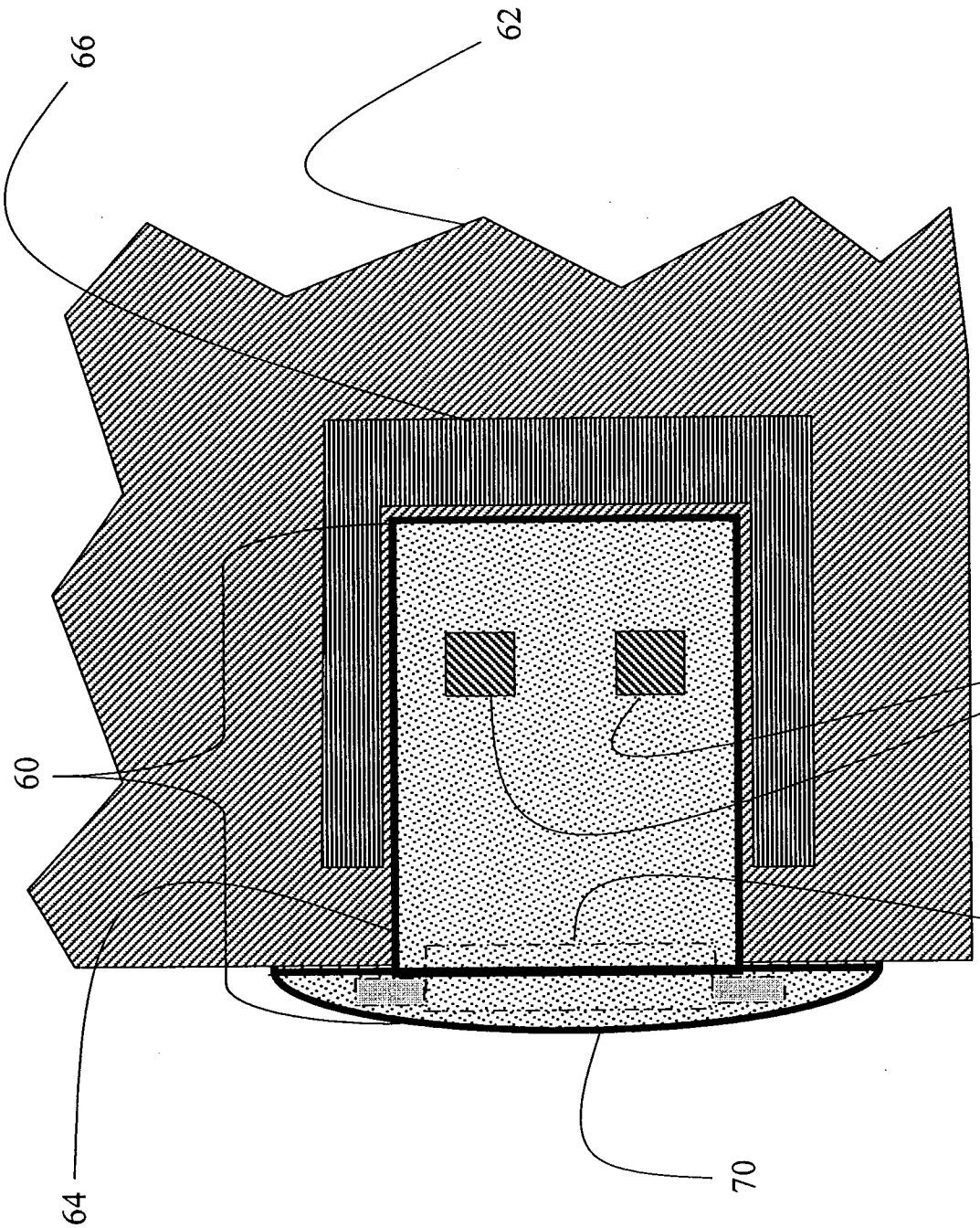
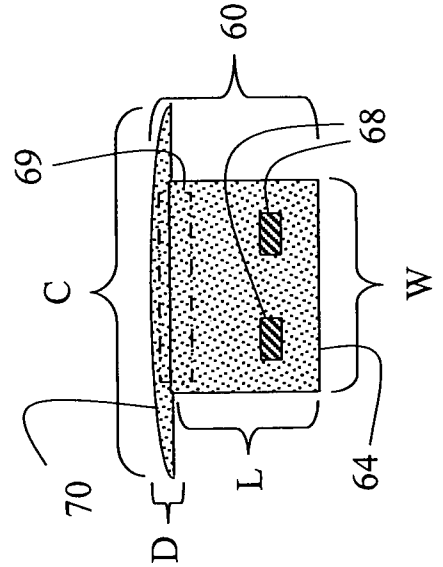


Figure 4



* D < L, W, and C

Figure 5A

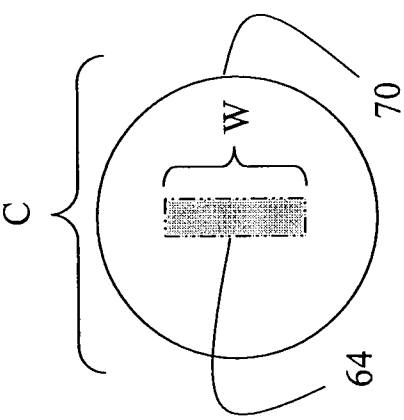


Figure 5B

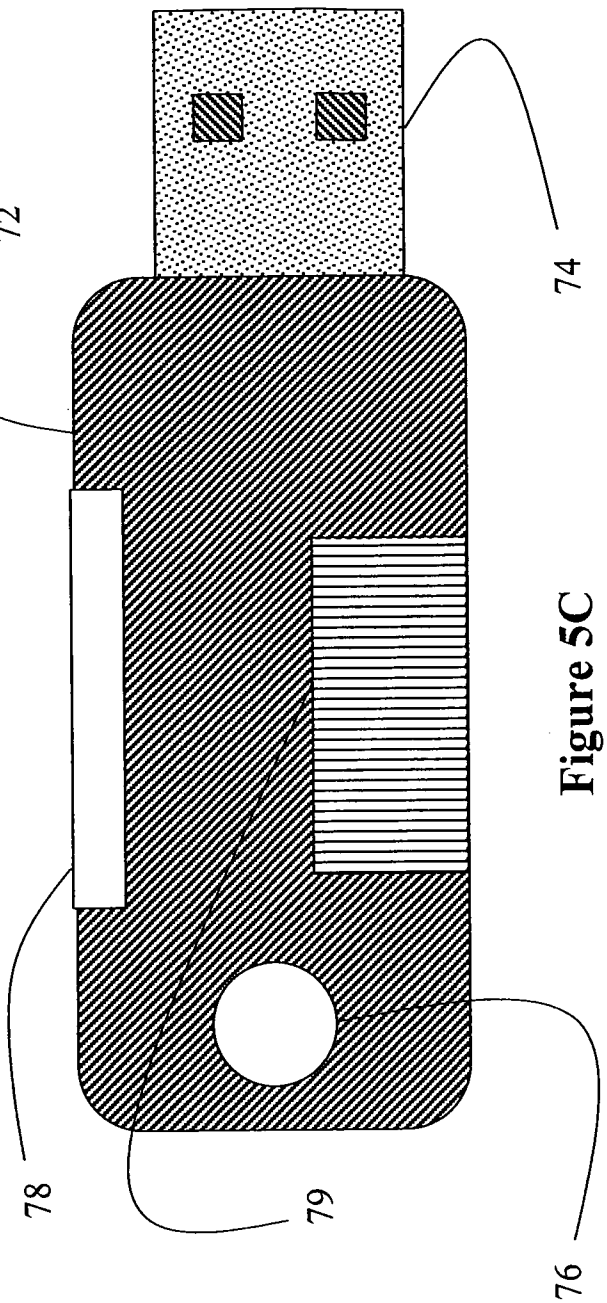


Figure 5C

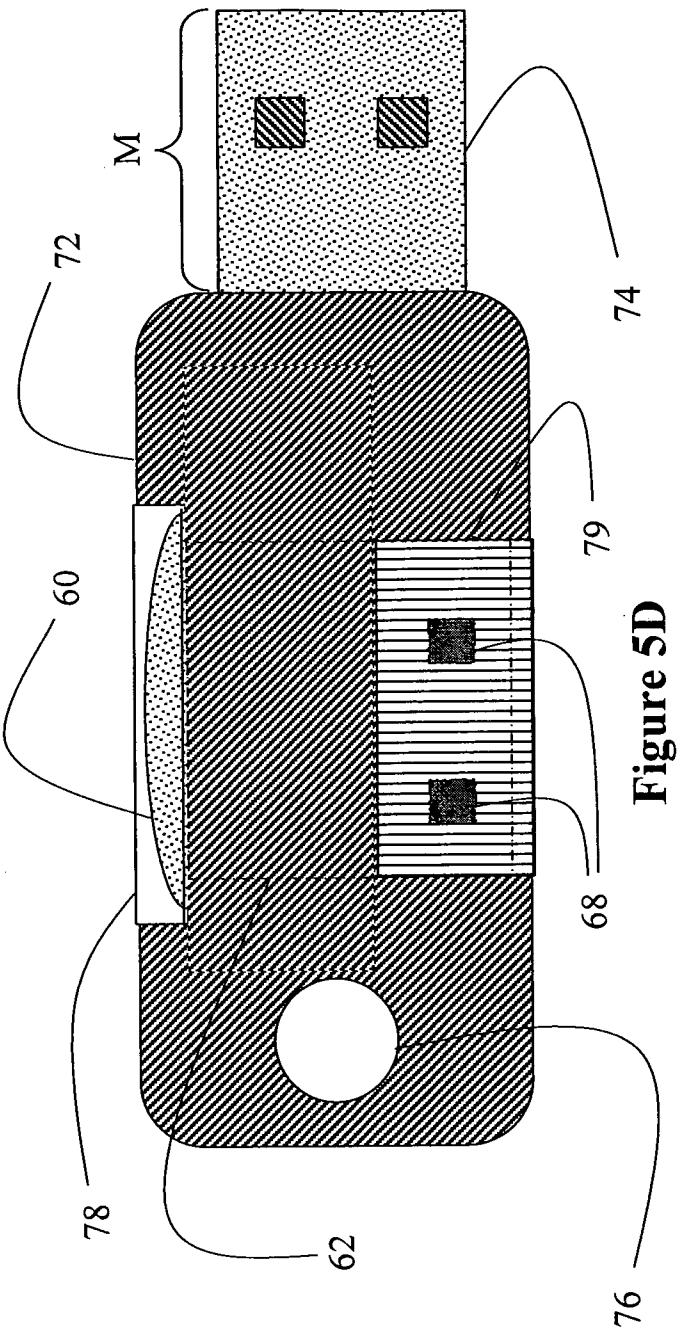


Figure 5D

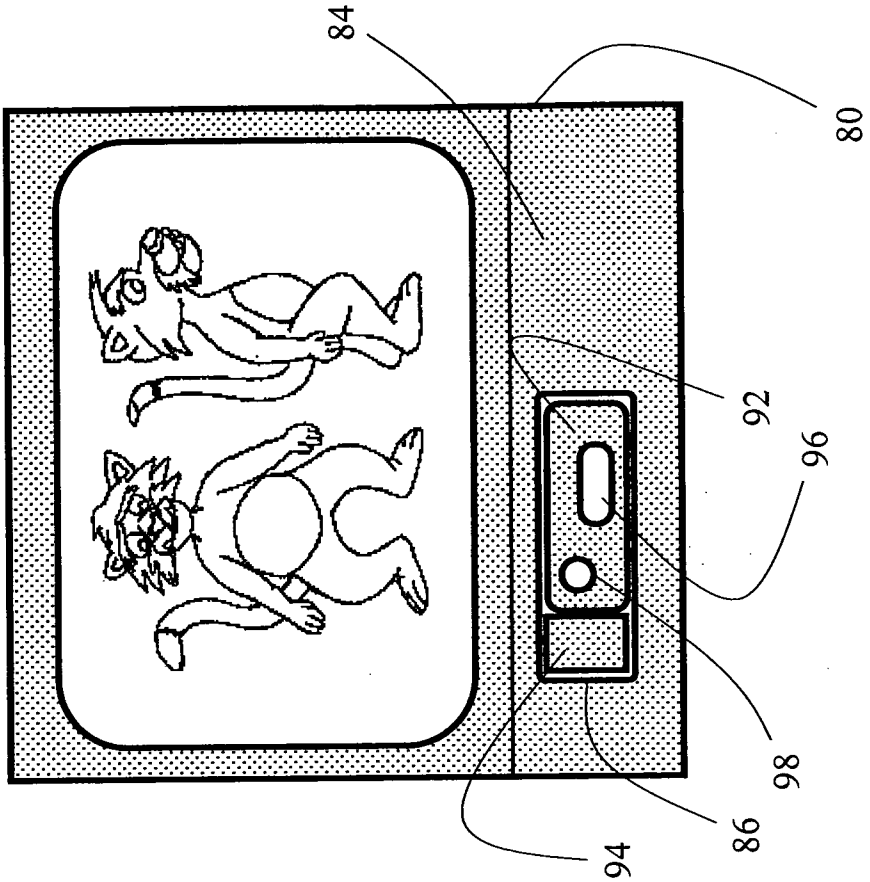


Figure 6B

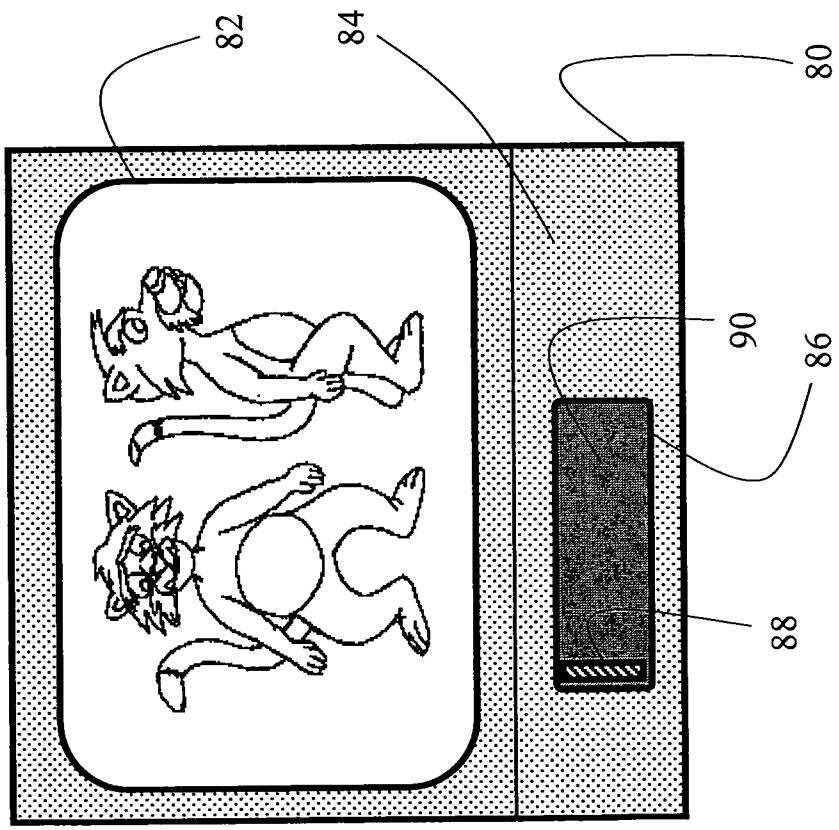


Figure 6A

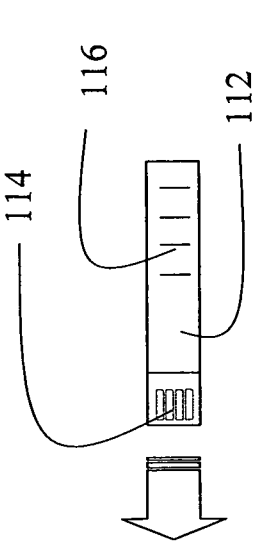


Figure 7C

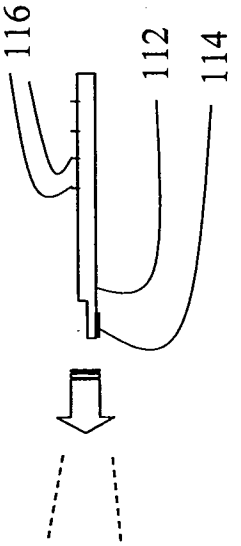


Figure 7D

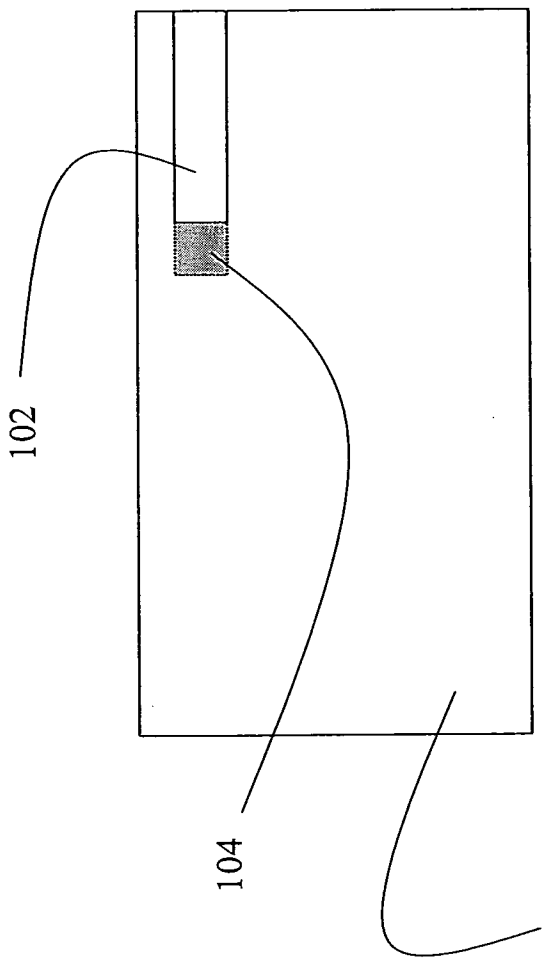


Figure 7A

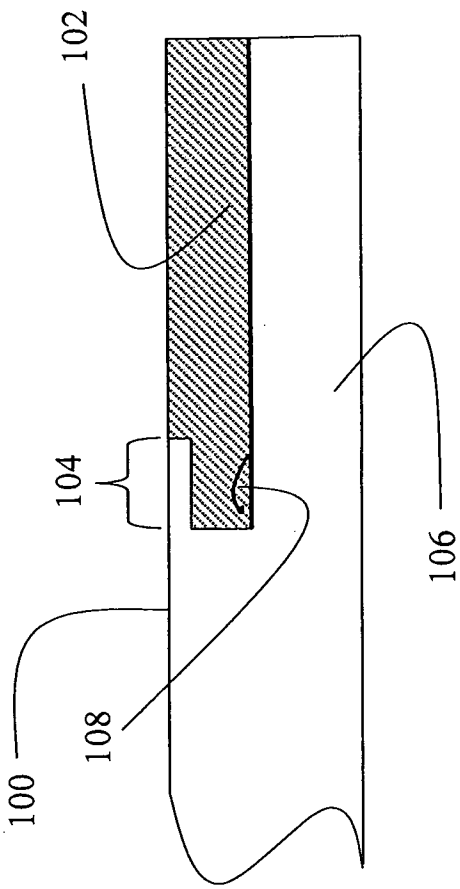


Figure 7B

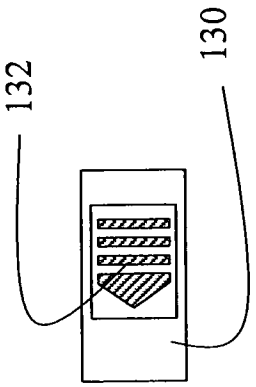


Figure 8B

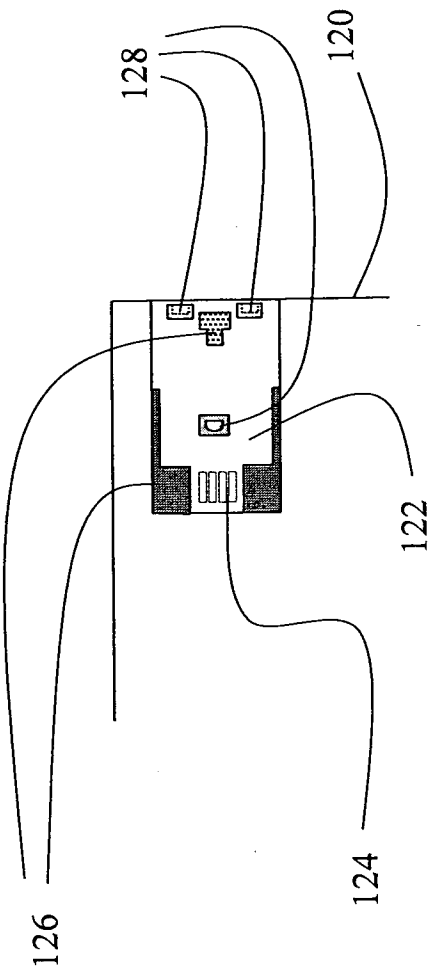


Figure 8A

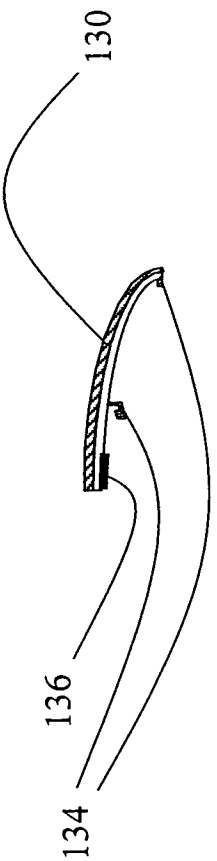


Figure 8C

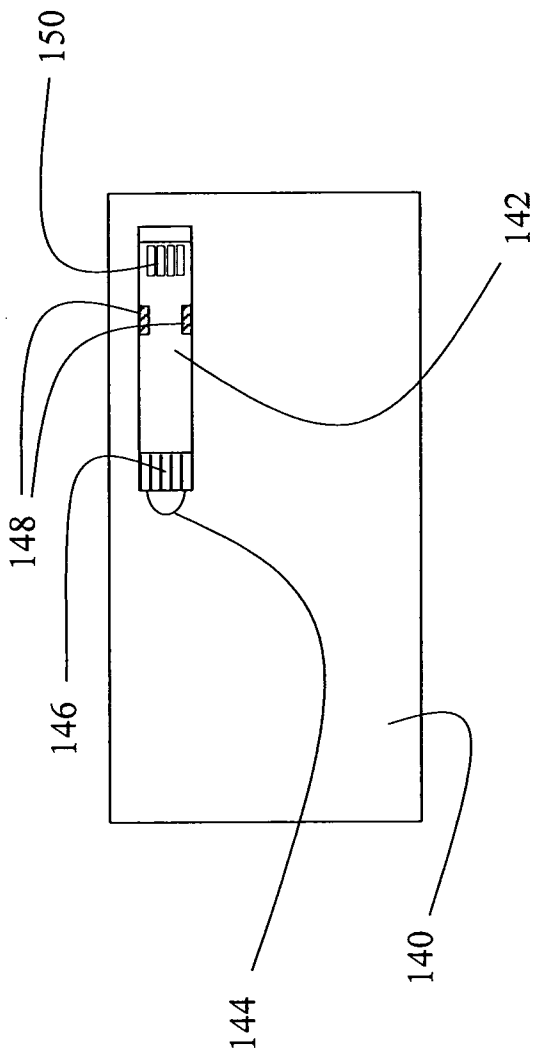


Figure 9A

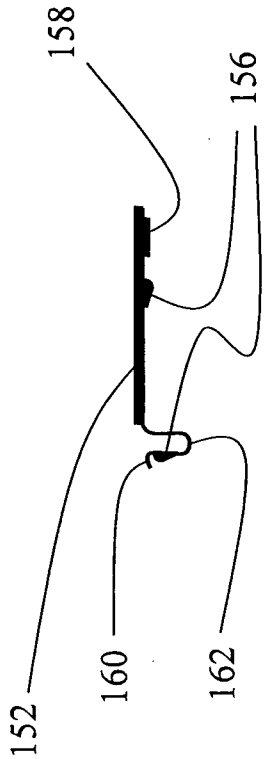


Figure 9C

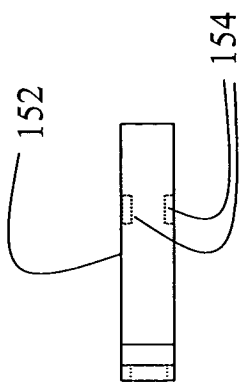


Figure 9B