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- (71) Applicant: **INVUE SECURITY PRODUCTS INC.**  
[US/US]; 15015 Lancaster Highway, Charlotte, NC 28277 (US).
- (72) Inventors: **MOOCK, Andrew, W.**; 4871 Snow Blossom Lane, Brecksville, OH 44141 (US). **FAWCETT, Christopher, J.**; 7449 Rock Island Road, Charlotte, NC 28278 (US). **TAYLOR, Gary, A.**; 3455 Dobys Bridge Road, Fort Mill, SC 29715 (US). **GRANT, Jeffrey, A.**; 1634 Jameston Drive, Charlotte, NC 28209 (US).
- (74) Agent: **KIRK, Trent, A.**; Invue Security Products Inc., 15015 Lancaster Highway, Charlotte, NC 28277 (US).
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(54) Title: PROXIMITY SENSING WITH DOCKING SYSTEMS

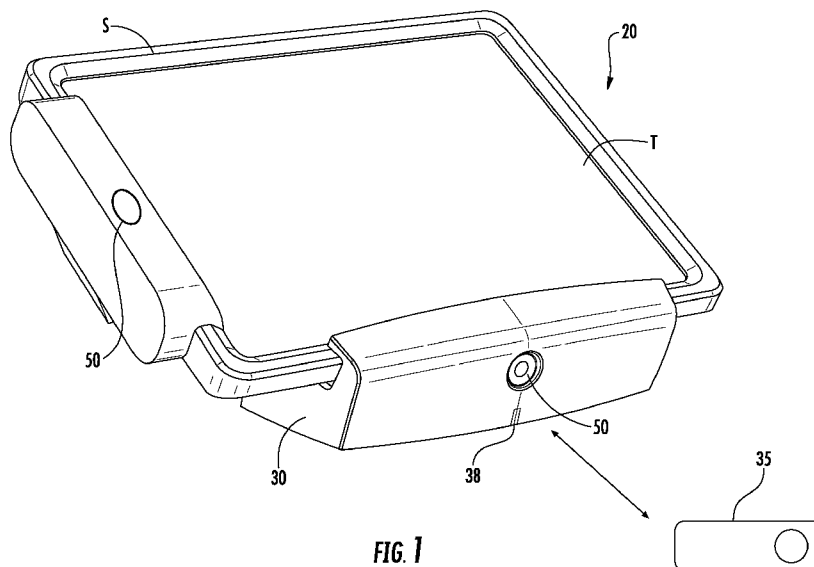
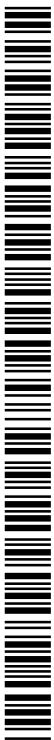


FIG. 1

(57) Abstract: An anti-theft device for protecting a portable electronic device from theft or unauthorized removal in a retail environment is provided. The anti-theft device includes a dock configured to be fixed to a support surface and to secure the portable electronic device from unauthorized removal. The anti-theft device also includes a key configured to communicate with the dock or the portable electronic device for removing the portable electronic device in an authorized manner. The key and/or the portable electronic device are configured to generate a notification signal when the key and the portable electronic device are separated by a predetermined distance.



## PROXIMITY SENSING WITH DOCKING SYSTEMS

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to U.S. Provisional Application No. 61/807,943, filed on April 3, 2013, the contents of which are incorporated by reference herein in their entirety.

### BACKGROUND OF THE INVENTION

[0002] Embodiments of the present invention relate generally to anti-theft devices for protecting consumer or point-of-sale electronic devices.

[0003] A recent trend in retail environments is to use smart devices, sometimes cellphones, but more often handheld tablets, as customer service devices. This usage takes on two forms. One form is using a tablet as a kiosk where customers can interact with the device. This may be used to deliver information about the establishment or its products to the consumer or even act as an interface for customer loyalty programs in lieu of plastic cards. A second usage is for store personnel to take these devices with them around the store to help assist customers. The associate might do things like pull up a store map to show a customer where an item is, check on a price of an item, or pull up specifications on a product a customer is considering buying. In some stores, the tablets are even being used to check out customers on the spot. Restaurants might use these devices at a table for ordering or game playing. Entities such as hospitals may allow doctors and nurses to carry around these smart devices for instant access to patient's health charts. Moreover, schools may also utilize these devices for instructional purposes.

[0004] With the proliferation of handheld tablet computing devices, a new

paradigm has emerged in communal use of these devices. For example, retailers are providing these tablets to store personnel to assist customers or remotely check out a customer. Schools may have students checking out tablets from a pool. Hospitals may have nurses and doctors that carry tablet devices during their work day and return them to a communal pool after their shift. These new use cases require a new way of protecting these tablets from theft. Thus, there is a need for an anti-theft device for protecting and securing portable electronic devices from among a pool of devices.

#### BRIEF SUMMARY

[0005] Embodiments of the present invention are directed to anti-theft devices for protecting portable electronic devices from theft or unauthorized removal. In one embodiment, an anti-theft device comprises a dock configured to be fixed to a support surface and to secure the portable electronic device from unauthorized removal. The anti-theft device also includes a key configured to communicate with the dock or the portable electronic device for removing the portable electronic device in an authorized manner. The key and/or the portable electronic device is configured to generate a notification signal when the key and the portable electronic device are separated by a predetermined distance.

[0006] In some embodiments, the anti-theft device includes a lock mechanism for locking the portable electronic device to the dock. The anti-theft device may also include a shroud configured to house the portable electronic device, wherein the shroud is configured to engage with the lock mechanism. In some instances, the anti-theft device includes an alarming device operably engaged with the dock. The dock may include a pressure switch operably engaged with the alarming device that is configured to activate in response to engagement and disengagement with the portable electronic device. In one aspect, the dock or the portable electronic device comprises a port for receiving a signal from the key

for permitting authorized removal of the portable electronic device from the dock. In another aspect, the portable electronic device is configured to be secured wirelessly within the dock. The dock and/or portable electronic device may be configured to generate a notification signal when the portable electronic device is separated from the dock in an unauthorized manner. The anti-theft device may also include a sensor operably engaged with the portable electronic device, wherein the sensor is configured to detect at least one of the location of the portable electronic device in relation to the key, or the time that that the portable electronic device is located away from the key. The key may be configured to wirelessly communicate with the portable electronic device. In another aspect, the key and the portable electronic device are configured to be paired. The key and the portable electronic device may be configured to be paired in response to unlocking the portable electronic device from the dock.

[0007] According to another embodiment, a system of anti-theft devices for protecting a plurality of portable electronic devices from theft or unauthorized removal is provided. The system includes a plurality of docks each configured to be fixed to a support surface, wherein each of the docks is configured to secure a respective one of the portable electronic devices from unauthorized removal. The system also includes a plurality of keys, wherein each of the keys is configured to communicate with a respective one of the docks or portable electronic devices for removing a portable electronic device in an authorized manner. The key and/or portable electronic device is configured to generate a notification signal when the key and the portable electronic device are separated by a predetermined distance. According to various aspects of the system, each key is configured to be paired with a respective one of the portable electronic devices. Each key and a respective one of the portable electronic device may be paired with a unique pairing different from the other keys and portable electronic devices.

[0008] According to another embodiment, a method for securing a portable electronic device from theft or unauthorized removal is provided. The method includes allowing a portable electronic device and a key to be paired for communication therebetween, wherein the portable electronic device is configured to be secured within a dock and to be removed from the dock in response to communication with the key. The method also includes determining a distance between the portable electronic device and the key in response to communication therebetween and generating a notification signal when the key and the portable electronic device are separated by a predetermined distance.

[0009] According to some aspects of the method, the determining step includes bi-directionally communicating between the portable electronic device and the key. In one aspect, the determining step includes sending a signal from the portable electronic device to the key or sending a signal from the key to the portable electronic device. The determining step may include determining a signal strength of the portable electronic device with the key. The method may further include rendering the portable electronic device inoperable when the key and the portable electronic device are separated by a predetermined distance.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a front perspective view of an anti-theft device and a portable electronic device according to one embodiment of the present invention.

[0011] FIG. 2 is a side view of the anti-theft device and portable electronic device shown in FIG. 1.

[0012] FIG. 3 is a rear perspective view of the anti-theft device and portable electronic device shown in FIG. 1.

[0013] FIG. 4 is a front perspective view of a dock according to one embodiment of the present invention.

[0014] FIG. 5 is a perspective view of a system of anti-theft devices according to an additional embodiment of the present invention.

#### DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0015] Embodiments of the present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which various embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0016] Reference will now be made to the accompanying drawing figures wherein identical reference numerals denote the same or similar elements throughout the various views. FIGS. 1-4 show embodiments of an anti-theft device, indicated generally by reference character 20, for protecting a tablet or similar portable electronic device, indicated generally by reference character T, against theft or unauthorized removal. As used herein, the term "tablet" is intended to include without limitation all types of portable, personal computers, for example, laptop, notebook, mini-notebook, sub-notebook and netbook type computers, as well as personal data assistant (PDA) type devices and smart devices. However, it is understood that the anti-theft device 20 is capable of being used with any number of portable electronic devices, such as cellular phones or smart phones.

[0017] Embodiments of the present invention are directed to anti-theft devices 20 comprising a dock 30 or docking station configured to temporarily secure the portable electronic device T to the dock. The dock 30 is configured to be fixed to a support surface, counter, or wall, such as with one or more fasteners and/or adhesive. In some instances, the portable electronic device T is configured to be

readily placed within the dock 30 and removed from the dock by an authorized user. For example, a retail associate may utilize a tablet for point-of-sale transactions and wish to temporarily secure the tablet. In addition, the dock 30 may also be configured to be alarmed, locked, and/or otherwise secured so that unauthorized personal cannot remove the portable electronic device T. In one embodiment, the dock 30 includes an alarming device 32 configured to arm when the portable electronic device T is positioned within the dock and to disarm when the portable electronic device is removed by an authorized user. The portable electronic device T may be operably engaged with the dock 30 and/or the alarming device 32 in a wireless manner (i.e., no tether is required), although wired means may be used if desired. FIG. 4 shows one embodiment of a dock 30 configured to support and secure the portable electronic device T, although other shapes and configurations are possible for supporting a variety of portable electronic devices. In some embodiments, the portable electronic device is at least partially enclosed within a shroud S as shown in FIGS. 1-3. The shroud S and portable electronic device T may be configured to be supported by the dock 30 as shown.

[0018] The dock 30 may include a mechanical mechanism, such as a pressure or plunger switch 33, operably engaged with the alarming device 32 and configured to activate in response to engagement and disengagement with the portable electronic device (see, e.g., FIG. 2). The authorized user may utilize a key 35, passcode, or the like to arm and/or disarm the alarming device 32. In some embodiments, the dock 30 is configured to power up and/or charge the portable electronic device T when the device is docked. In this case, the anti-theft device 20 may include a power input cord coupled to the dock 30, inductive charging, or contact charging functionality. An LED or other signaling device 38 may be used to indicate that the anti-theft device 20 is armed and/or disarmed. In addition, the alarming device 32 and/or portable electronic device T may be configured to generate a notification signal or an alarming signal (e.g., a visual

indicator and/or an audible alarm) in response to unauthorized removal of the portable electronic device from the dock.

[0019] In some embodiments, the anti-theft device 20 comprises a lock mechanism 36 for securing the portable electronic device T within the dock 30, which may include, for example, electrical, magnetic, and/or mechanical interaction. For example, the lock mechanism 36 may be configured to automatically lock when the portable electronic device T is positioned within the dock 30. In one embodiment, the automatic lock may be triggered using a switch (e.g., a mechanical switch or an optical switch). In order to release the portable electronic device T, an authorized user could use a key 35 or some other security means (e.g., a passcode) to disarm the alarming device 32 and/or disengage the lock mechanism 36. In some instances, a customized adapter or shroud S may be operably engaged with the portable electronic device T configured to engage with the lock mechanism 36. This may be carried out using a shroud S that covers the portable electronic device T except for the screen, but could be accomplished in other ways, for example, attaching locking features with adhesive to the back of the portable electronic device for engaging with the dock 30.

[0020] Another embodiment of a lock mechanism 36 comprises an electro-mechanical connection between the dock 30 and the portable electronic device T. For instance, an electro-mechanical lock may be configured to move into place when triggered by the portable electronic device T being docked, such as with one or more pressure switches or similar means of detecting the presence of the portable electronic device. Where the portable electronic device T includes a shroud S, a mechanical lock may then engage the locking features on the shroud. Another embodiment of a lock mechanism 36 is an electromagnetic lock. Again, the portable electronic device T would be detected upon positioning within the dock 30, but in this embodiment, an electromagnet would engage,

holding the portable electronic device to the dock with magnetics.

[0021] An unlocking feature for removing the portable electronic device T or disarming the alarming device 32 may take many forms. One embodiment is an electrical key 35 utilizing radiofrequencies, acoustic waves, magnetic waves, infrared, or some other electronic means to wirelessly communicate or otherwise operably communicate with the dock 30 and/or alarming device 32 to allow the portable electronic device T to be released (see FIG. 1). For example, the dock 30 may include a port 50 for receiving a signal from the key 35 having a unique identifying code recognizable by the dock or the portable electronic device but otherwise unrecognizable by other docks not associated with the code (e.g., in other departments or stores). In another embodiment, the portable electronic device T or shroud S may include a port 50 that facilitates unlocking the portable electronic device from the dock 30. Moreover, in one embodiment, the key 35 may have a limited timeframe in which the key is operable to remove the portable electronic device from the dock. For instance, the key may time out within a predetermined period of time (e.g., 6-10 hours). For example, the key 35 may be similar to that disclosed in United States Patent No. 7,737,845, the contents of which are hereby incorporated by reference in their entirety.

[0022] A sensor 40 may be coupled to the portable electronic device T. The sensor 40 and/or portable electronic device T may be configured to generate a notification signal when the portable electronic device is separated from the sensor. Thus, where the portable electronic device T has been removed from the dock 30 in an unauthorized manner, the sensor 40 may provide an additional and independent means for preventing or deterring theft. In one embodiment, the sensor 40 may be configured to detect a location of the portable electronic device T in relation to the key 35. In other embodiments, the sensor 40 is configured to detect the amount of time that the portable electronic device T is located away from the key 35. The sensor 40 may be attached to the portable

electronic device T using a variety of techniques, such as a pressure-sensitive adhesive, a shroud, a clamp, and/or attaching to one or more ports on the portable electronic device. In one embodiment, the sensor 40 is integrated with the shroud S. The sensor 40 may also include a handle for facilitating more comfortable usage of the portable electronic device T.

[0023] As noted above, in one embodiment, a key 35 may be configured to unlock a portable electronic device T from the dock 30. This act of unlocking may generate a coupling or pairing between the key 35 and the portable electronic device T. In other words, unlocking the portable electronic device T from the dock 30 may initiate pairing with the key 35. The pairing may occur between the key 35 and the electronic device T or between the key and the sensor 40. For example, the pairing may be accomplished using radiofrequency, acoustic waves, magnetic waves, or a variety of other wireless or electronic couplings. In one particular embodiment, the pairing may occur using Bluetooth or Bluetooth low energy (“BLE”) pairing. Once this coupling has occurred, either the key 35 or the portable electronic device T may monitor a specified or predetermined distance therebetween. However, in other embodiments, a pairing is not required, such that any authorized key 35 may be used to unlock a portable electronic device T from a dock 30. Thus, keys 35 may be interchangeable with one another and used to unlock the portable electronic device T without a pairing being generated.

[0024] The key 35 may be held by the user in a pocket or on a lanyard or in any such manner as to attach the key to their person. If a predetermined distance between the portable electronic device T and the key 35 is exceeded, a notification signal (e.g., an audible alarm) may be generated, such as via the portable electronic device T and/or the alarming device 32. In this manner, the anti-theft device 20 is configured to warn a user who has checked out a portable electronic device T from a communal pool that the user is about to accidentally

leave the portable electronic device behind. It may also serve as a warning to any unauthorized user who attempts to steal the portable electronic device T and leaves the proximity of the authorized user. In addition to a notification signal, the portable electronic device T may be rendered inoperable should the portable electronic device not be returned within the allowed distance within a predetermined period of time. Or, the notification signal may become progressively more pronounced should the portable electronic device T not be returned within the allowed distance from the key 35 or as the portable electronic device travels further from the key. It is understood that the term "distance" is not intended to be limiting, as the distance between the portable electronic device T and the key 35 may be represented by a variety of means, such as a measured distance, a detected signal strength, communication therebetween, and/or a proximity therebetween.

[0025] The proximity of the portable electronic device T in relation to the key 35 may be determined using a variety of techniques. For example, the key 35 may be configured to monitor the strength of a wireless signal generated by the portable electronic device T. Where the wireless signal becomes too weak due to the portable electronic device T being located beyond a predetermined distance or perimeter from the key 35, a notification signal may be generated. Of course, the key 35 may be configured to generate a wireless signal, and the portable electronic device T or a sensor 40 associated with the portable electronic device may be configured to detect the wireless signal and perform a similar function. In other embodiments, the portable electronic device T may include functionality (e.g., a GPS receiver, gyroscopes, and/or accelerometers) for determining its location and communicating with the key 35 to determine the distance therebetween. Likewise, the key 35 may include such locating functionality. Should the distance between the portable electronic device T and the key 35 be greater than a predetermined distance, a notification signal may be generated.

[0026] In one embodiment, the key 35 and the portable electronic device T may be paired or otherwise linked so as to provide bi-directional communication therebetween. Thus, the key 35 and the portable electronic device T may be wirelessly linked to one another such that separation beyond a predetermined distance results in a notification signal. Alternatively, the key 35 may unilaterally determine whether the portable electronic device T is within a predetermined distance. For example, the key 35 may generate a digital “ping” or signal that is received by the portable electronic device T. Should the portable electronic device T receive the signal from the key 35, the portable electronic device may send a corresponding signal back to the key indicating that the signal was received by the portable electronic device. Should the key 35 not receive a corresponding signal from the portable electronic device 35, a notification signal may be generated. Likewise, the portable electronic device T may be configured to send a signal to the key 35, and the key listens for the signal. Should the portable electronic device T not receive a corresponding signal back from the key 35, a notification signal may be generated.

[0027] It is understood that the communication between the key 35 and the portable electronic device T may alternatively be one-directional. For instance, the key 35 may be configured to send a signal or ping, and if the portable electronic device T does not receive the signal or ping, a notification signal is generated by the portable electronic device. Likewise, the portable electronic device T may be configured to generate a signal or ping, and if the key 35 does not detect the signal or ping, a notification signal is generated by the key. Thus, a return signal from the key 35 or portable electronic device T is unnecessary in this embodiment. Either the key 35 or the portable electronic device T may send such a signal or ping continuously or in desired time increments.

[0028] FIG. 5 shows a system 100 of a plurality of anti-theft devices 20 arranged in a “pool”. The term “pool” used herein is not meant to be limiting and

may be any communal collection of anti-theft devices 20 in a central location. For example, a plurality of anti-theft devices 20 may be provided in a retail store, school, restaurant, hospital, etc. Further, a pool may include a plurality of items of merchandise within a particular subgroup or department (e.g., the electronics department, the home and garden department, etc. within a retail store). Embodiments of the present invention facilitate pairing of a portable electronic device T with a particular key 35 as discussed above. Thus, a user may select one of a plurality of portable electronic devices within the pool, and the pairing provides anti-theft features and user accountability as noted above. Due to the unique pairing between keys 35 and portable electronic devices T, a user may select any one of the portable electronic devices and create a pairing therebetween. Pairings may occur in any desired time period, such as daily. Thus, a user would need to pair a key 35 with a particular portable electronic device T prior to use and removal from the dock 30 each day.

[0029] The foregoing has described one or more embodiments of an anti-theft device for protecting a tablet or similar portable electronic device from theft or unauthorized removal. Those of ordinary skill in the art will understand and appreciate that numerous variations and modifications of the invention may be made without departing from the spirit and scope of the invention. Accordingly, all such variations and modifications are intended to be encompassed by the appended claims.

That which is claimed is:

1. An anti-theft device for protecting a portable electronic device from theft or unauthorized removal, comprising:

a dock configured to be fixed to a support surface and to secure the portable electronic device from unauthorized removal; and

a key configured to communicate with the dock or the portable electronic device for removing the portable electronic device in an authorized manner, wherein the key and/or the portable electronic device is configured to generate a notification signal when the key and the portable electronic device are separated by a predetermined distance.

2. The anti-theft device of Claim 1, further comprising a lock mechanism for locking the portable electronic device to the dock.

3. The anti-theft device of Claim 2, further comprising a shroud configured to house the portable electronic device, wherein the shroud is configured to engage with the lock mechanism.

4. The anti-theft device of Claim 1, further comprising an alarming device operably engaged with the dock.

5. The anti-theft device of Claim 4, wherein the dock comprises a pressure switch operably engaged with the alarming device and configured to activate in response to engagement and disengagement with the portable electronic device.

6. The anti-theft device of Claim 1, wherein the dock or the portable electronic device comprises a port for receiving a signal from the key for permitting authorized removal of the portable electronic device from the dock.

7. The anti-theft device of Claim 1, wherein the portable electronic

device is configured to be secured wirelessly within the dock.

8. The anti-theft device of Claim 1, wherein the dock and/or portable electronic device is configured to generate a notification signal when the portable electronic device is separated from the dock in an unauthorized manner.

9. The anti-theft device of Claim 1, further comprising a sensor operably engaged with the portable electronic device, wherein the sensor is configured to detect at least one of the location of the portable electronic device in relation to the key, or the time that that the portable electronic device is located away from the key.

10. The anti-theft device of Claim 1, wherein the key is configured to wirelessly communicate with the portable electronic device.

11. The anti-theft device of Claim 1, wherein the key and the portable electronic device are configured to be paired.

12. The anti-theft device of Claim 11, wherein the key and the portable electronic device are configured to be paired in response to unlocking the portable electronic device from the dock.

13. A system of anti-theft devices for protecting a plurality of portable electronic devices from theft or unauthorized removal, comprising:

a plurality of docks each configured to be fixed to a support surface, each of the docks configured to secure a respective one of the portable electronic devices from unauthorized removal; and

a plurality of keys, each of the keys configured to communicate with a respective one of the docks or portable electronic devices for removing a portable electronic device in an authorized manner, wherein the key and/or portable electronic device is configured to generate a notification signal when the key and the portable electronic device are separated by a predetermined

distance.

14. The system of Claim 13, wherein each key is configured to be paired with a respective one of the portable electronic devices.

15. The system of Claim 14, wherein each key and a respective one of the portable electronic device are paired with a unique pairing different from the other keys and portable electronic devices.

16. A method for securing a portable electronic device from theft or unauthorized removal, the method comprising:

allowing a portable electronic device and a key to be paired for communication therebetween, the portable electronic device configured to be secured within a dock and to be removed from the dock in response to communication with the key;

determining a distance between the portable electronic device and the key in response to communication therebetween; and

generating a notification signal when the key and the portable electronic device are separated by a predetermined distance.

17. The method of Claim 16, wherein determining a distance comprises bi-directionally communicating between the portable electronic device and the key.

18. The method of Claim 16, wherein determining a distance comprises sending a signal from the portable electronic device to the key or sending a signal from the key to the portable electronic device.

19. The method of Claim 16, wherein determining a distance comprises determining a signal strength of the portable electronic device with the key.

20. The method of Claim 16, further comprising rendering the portable electronic device inoperable when the key and the portable electronic device are separated by a predetermined distance.

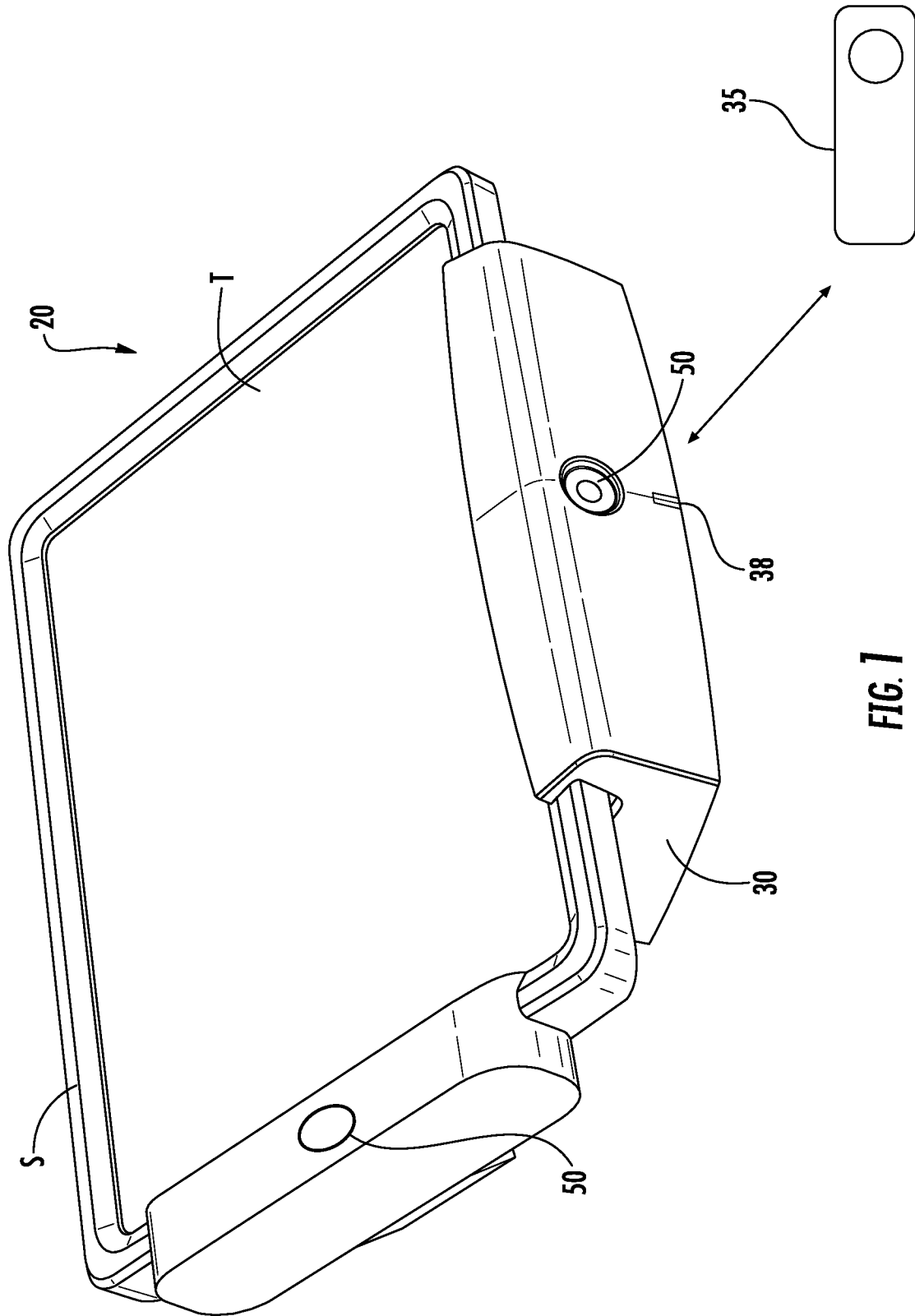


FIG. 1

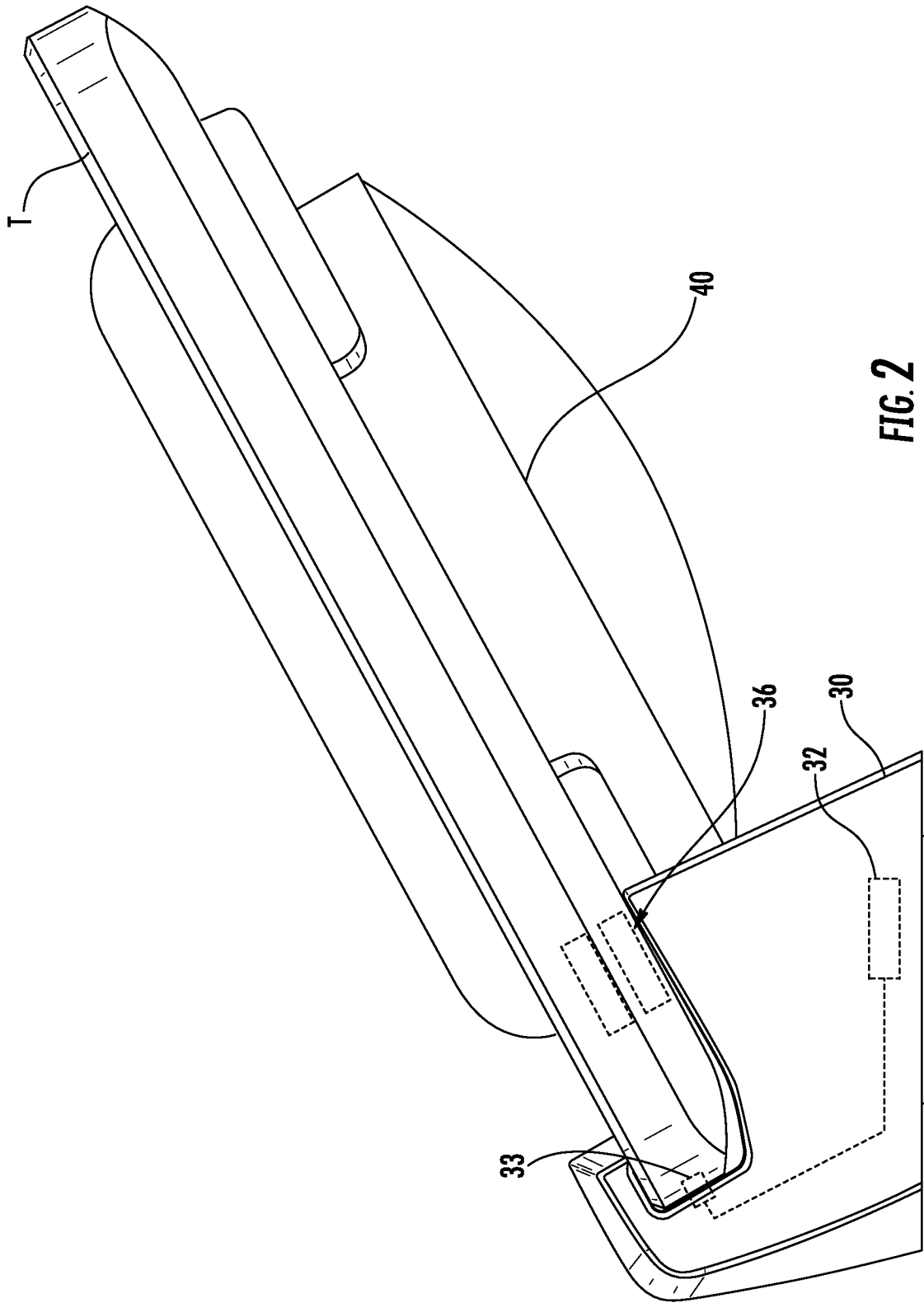
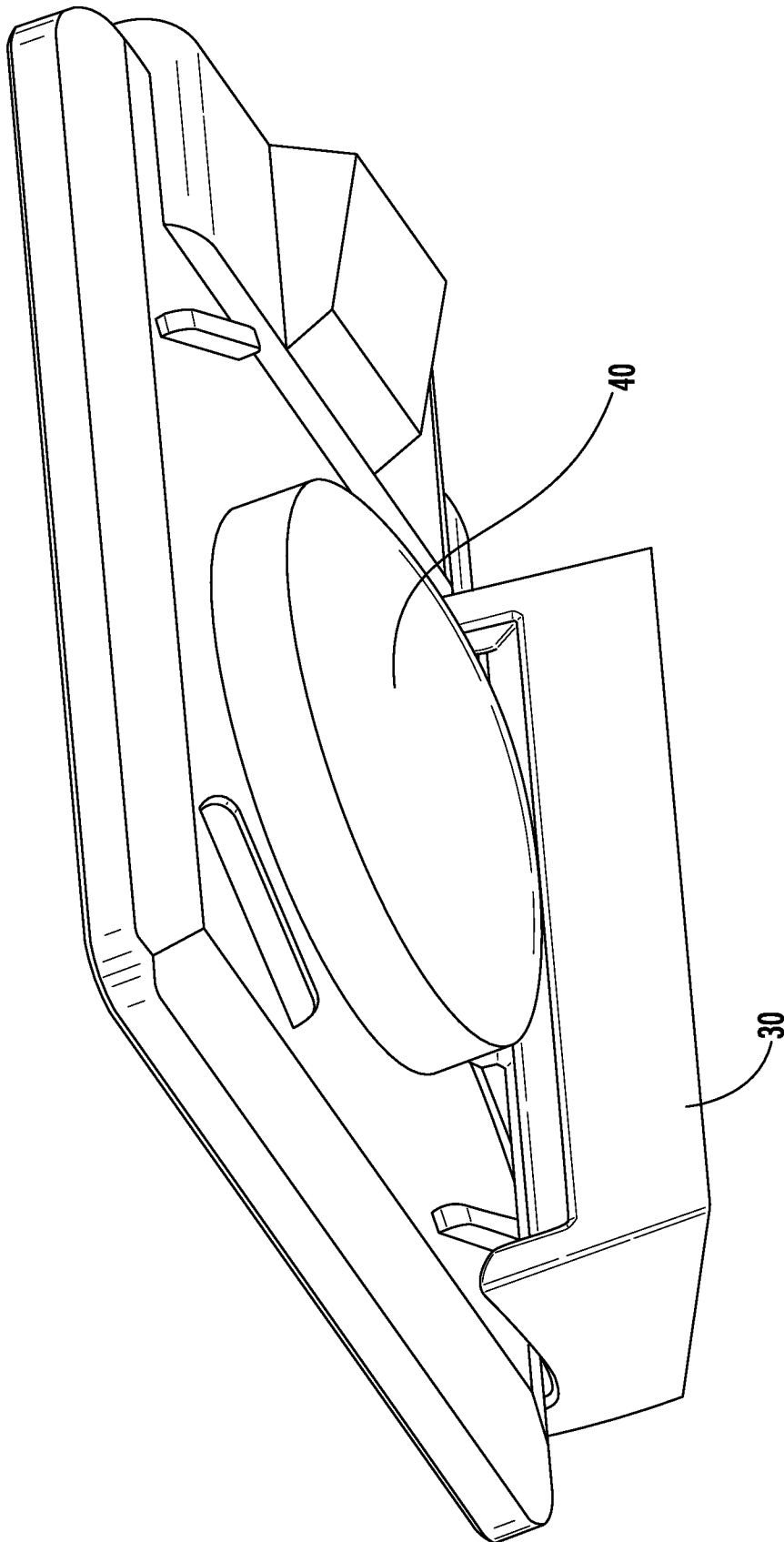


FIG. 2



**FIG. 3**

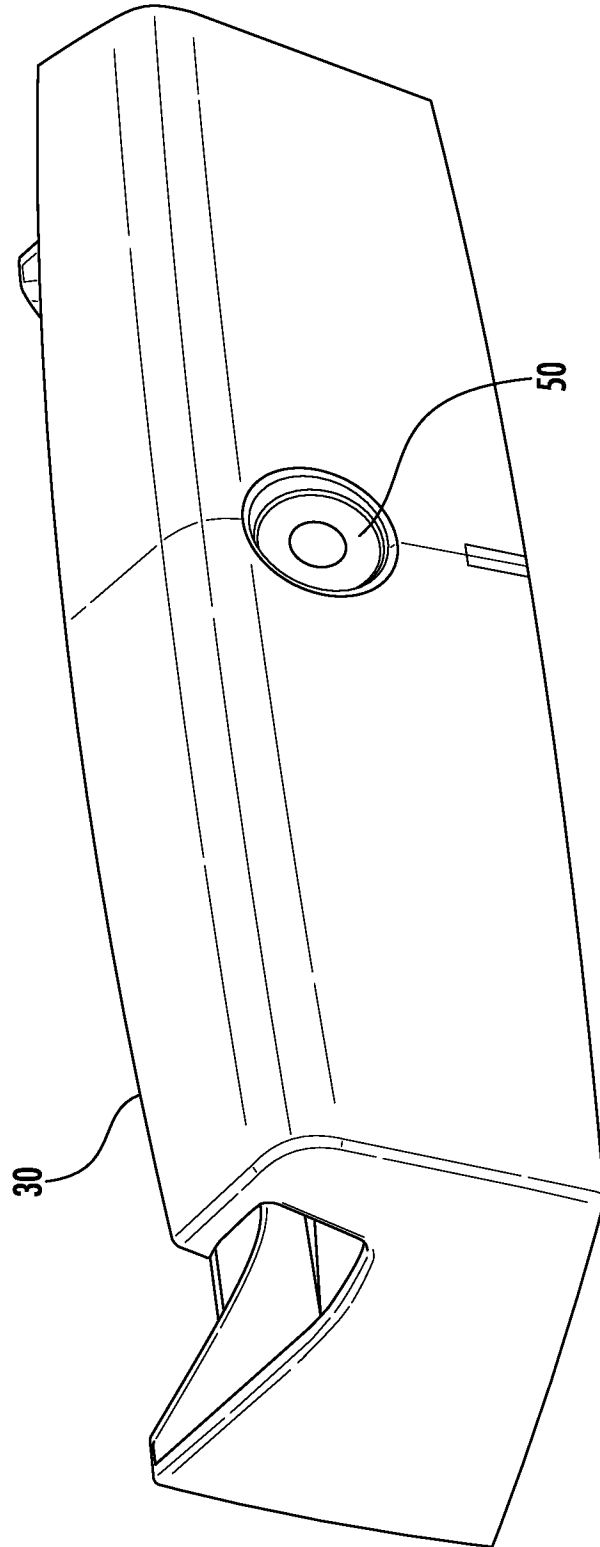


FIG. 4

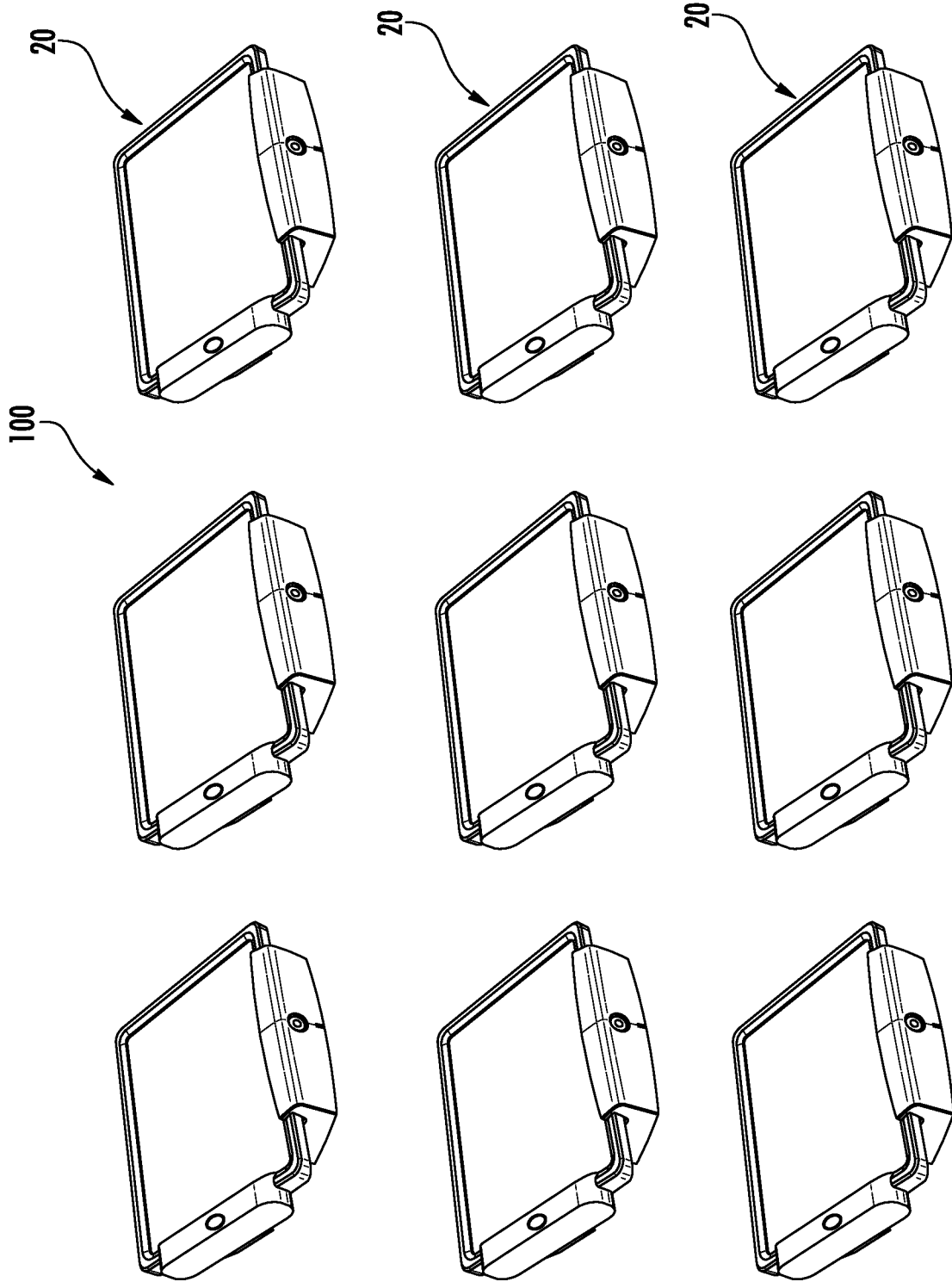


FIG. 5

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US14/32499

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(8) - G08B 13/14; E05B 67/38 (2014.01)

USPC - 340/568.1; 70/57.1

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC(8): G08B 13/22, 13/14; E05B 67/38, 73/02 (2014.01); CPC: G08B 13/1427; E05B 73/0017, 73/0082; USPC: 340/568.8, 568.1; 70/57.1, 58

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

MicroPatent (US Granted, US Applications, EP-A, EP-B, WO, JP, DE-G, DE-A, DE-T, DE-U, GB-A, FR-A); Google Scholar; ProQuest; IP.com; theft, portable, wireless, detection, device, unauthorized, docking station, removal, key, notification, distance, separate, predetermined, lock

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/0266089 A1 (HAREN, E et al.) October 30, 2008, Figure 1, paragraph [0016], paragraph [0012], paragraph [0019], paragraph [0007], paragraph [0020], paragraph [0008].	16-20
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Y		1-15
Y	US 2004/0177658 A1 (MITCHELL, T) September 16, 2004, Abstract, paragraph [0043], paragraph [0012].	1-15
Y	US 2007/0284402 A1 (GRUNDY, R) December 13, 2007, Abstract, paragraph [0011].	5
A	US 8226459 B2 (BARRETT, S et al.) July 24, 2012, entire document	1-20

Further documents are listed in the continuation of Box C.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents  
P.O. Box 1450, Alexandria, Virginia 22313-1450  
Facsimile No. 571-273-3201

Authorized officer:

Shane Thomas

PCT Helpdesk: 571-272-4300  
PCT OSP: 571-272-7774