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(54) **UNIVERSAL MODULAR DOCKING PLATFORM FOR PORTABLE DEVICE**

(76) Inventor: **Michael Joseph Shawver**, Mill Valley, CA (US)

Correspondence Address:
MICHAEL JOSEPH SHAWVER
1989A SANTA RITA RD #239
PLEASANTON, CA 94566 (US)

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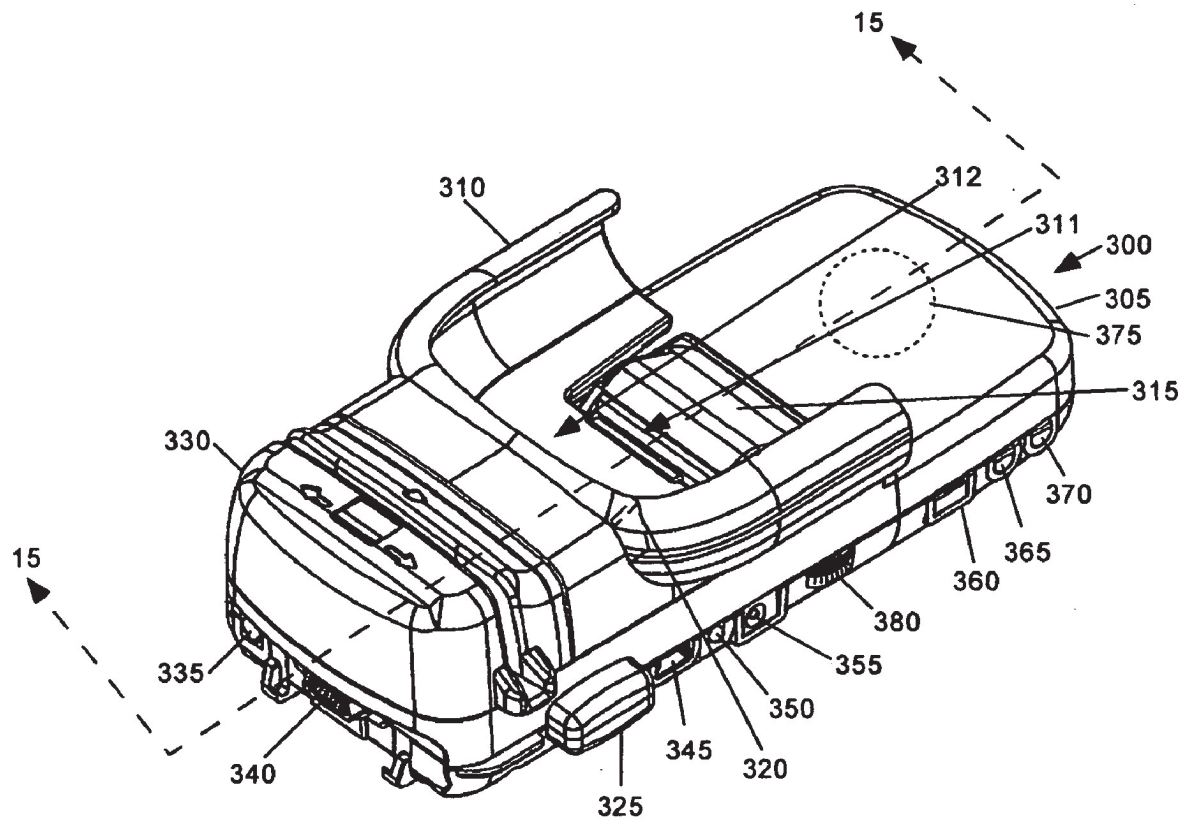
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(57) **ABSTRACT**

An improved mounting platform (**300**) holds a variety of electronic devices (**500, 510, 515**) of differing sizes and shapes. A customized saddle assembly (**310**), designed for a particular electronic device, is affixed to the base (**305**) of the platform. The device is then inserted into the saddle and held securely in place by the top surface (**905**) of a cam assembly (**315**). Buttons (**325, 326**) and shuttle (**925**) control the raising and lowering of the cam. When the platform is in use, a spring (**910**) urges the cam against the back of the device being held. The device is released from the platform by squeezing the buttons together, causing the cam to move away from the device, and sliding the device out of the saddle. In an alternative embodiment, a pressure pad (**1600**) is used in place of the cam. A variety of electronic connections (**335-375**) and other accessories such as a loudspeaker (**376**) and a magnetic-stripe card reader (**330**) can be included in the platform in order to provide useful interfaces to the device.



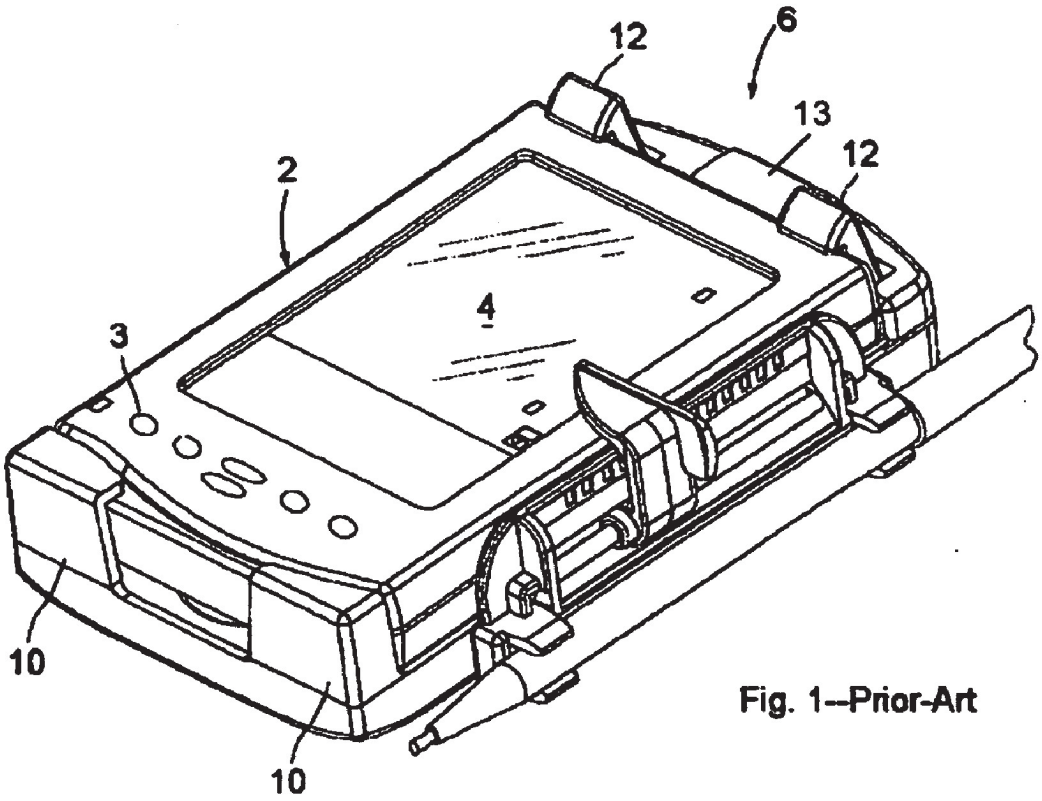


Fig. 1--Prior-Art

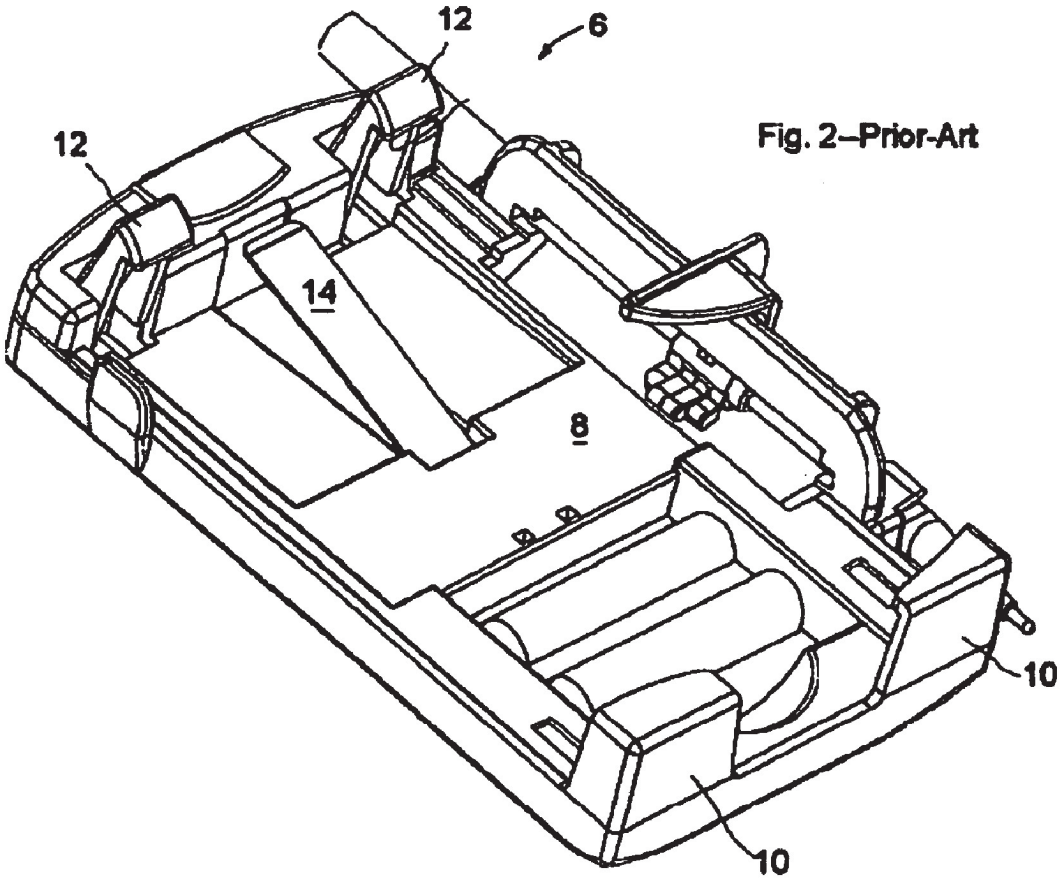


Fig. 2--Prior-Art

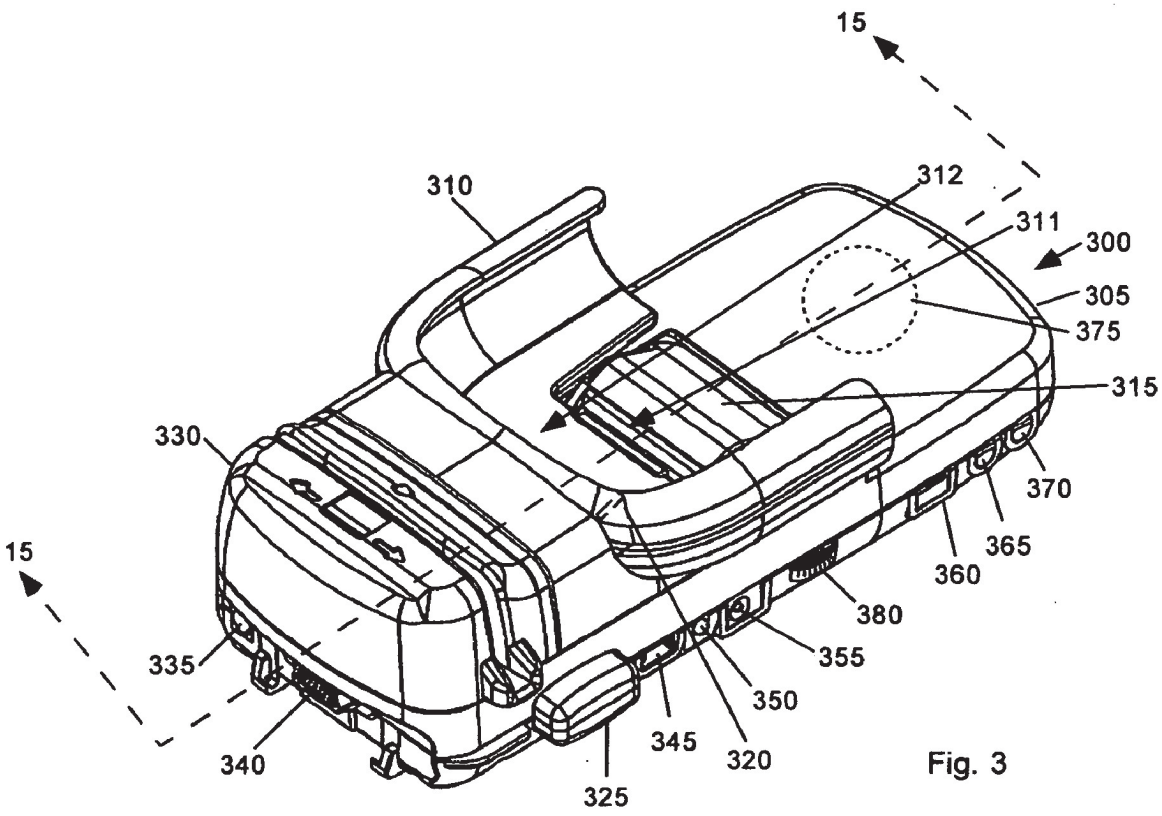

15
310
312
311
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355
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345
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335
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15

Fig. 3

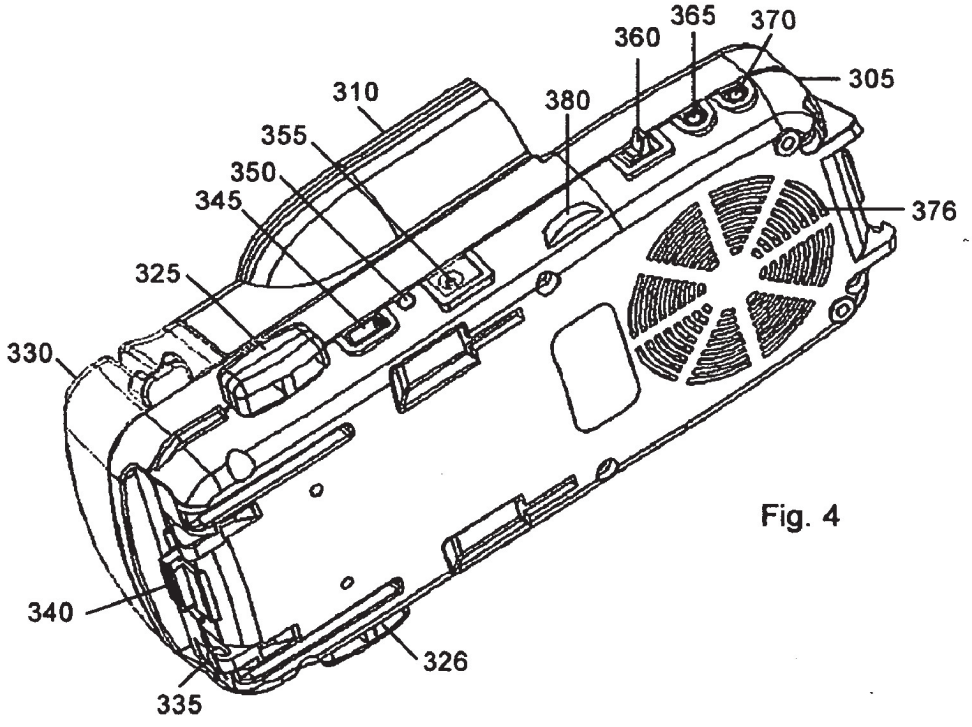

365
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326
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Fig. 4

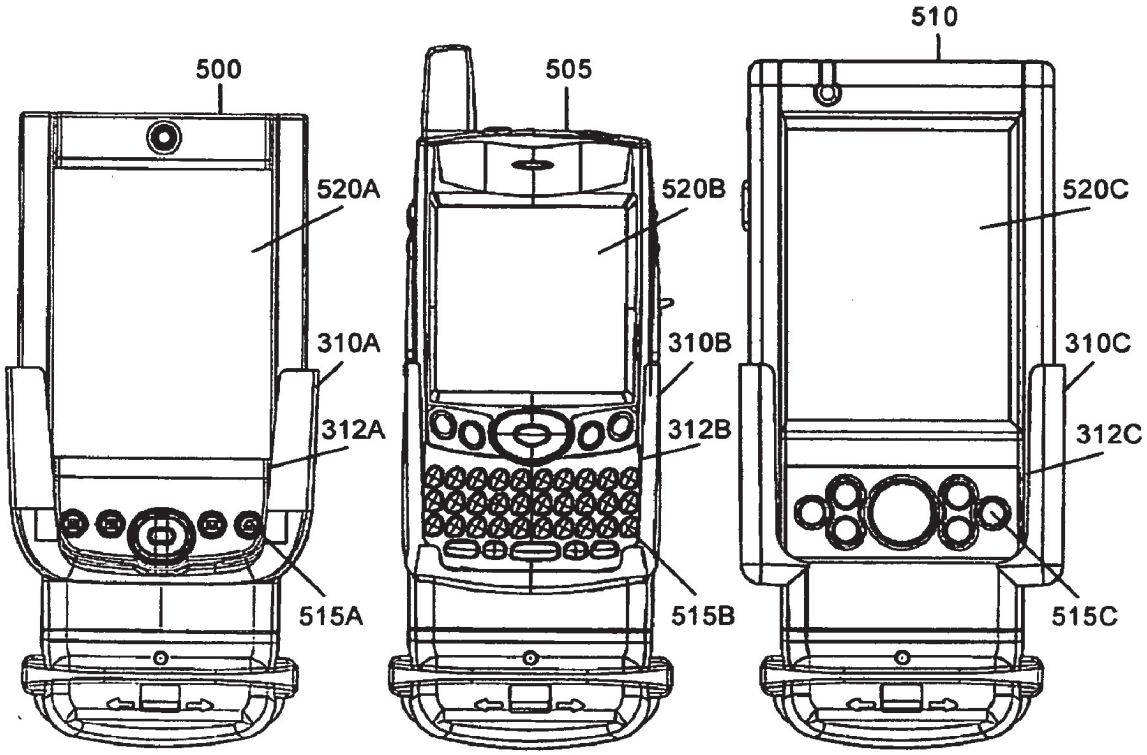


Fig. 5A Fig. 5B Fig. 5C

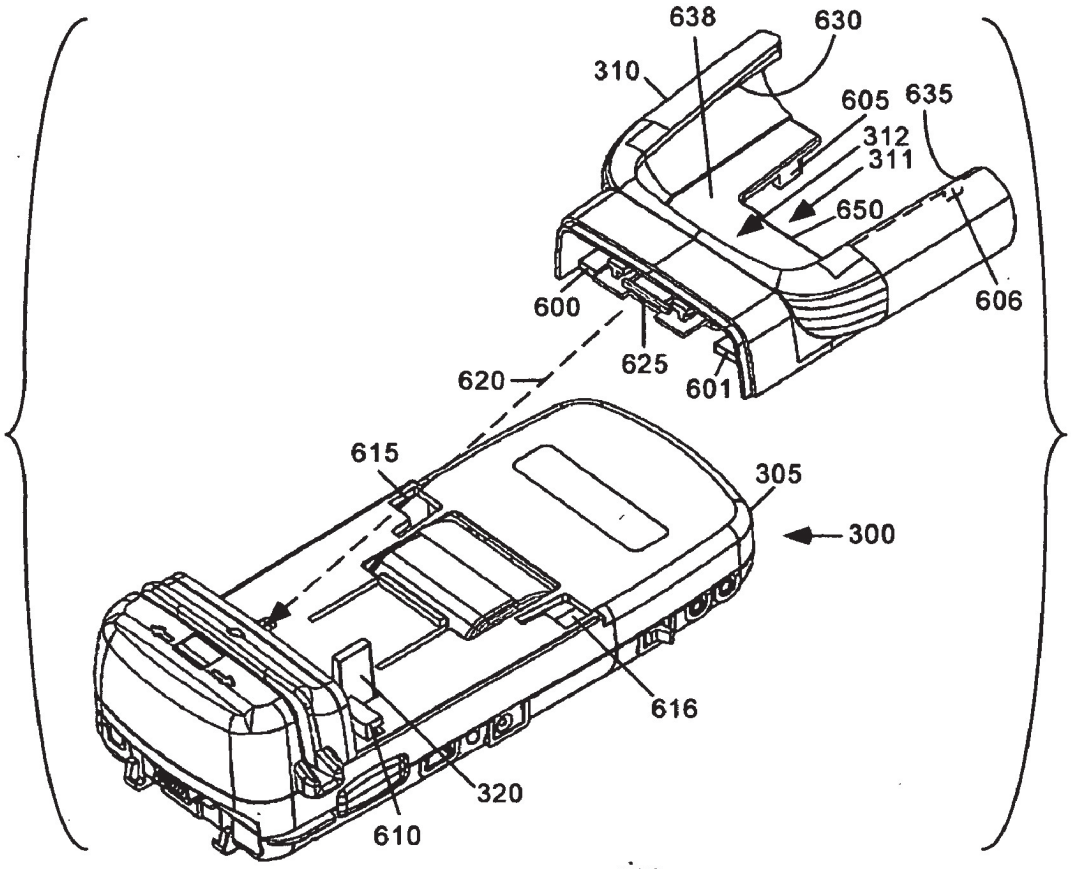

638
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606
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320
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Fig. 6

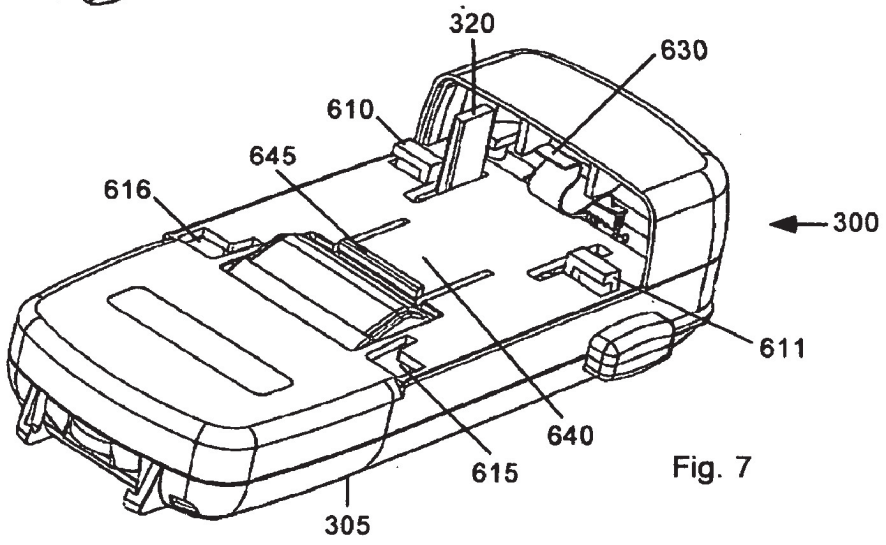

320
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610
645
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611
640
615
305

Fig. 7

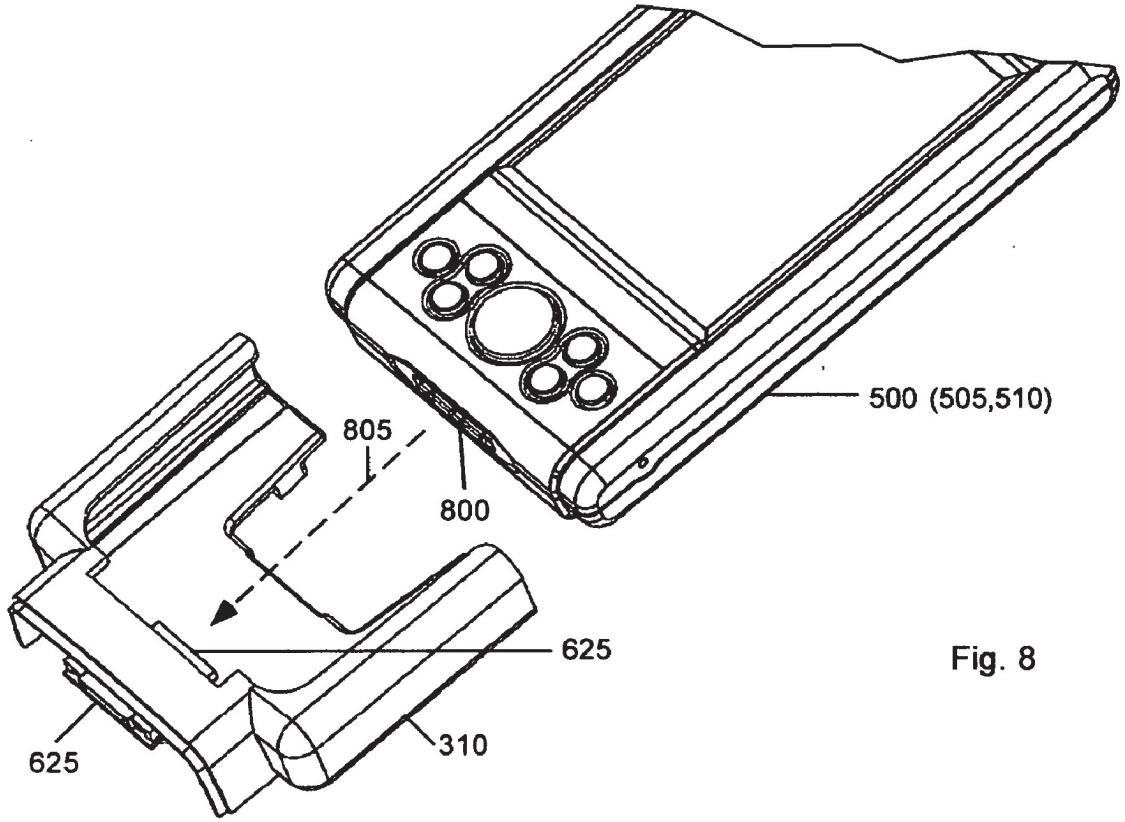


Fig. 8

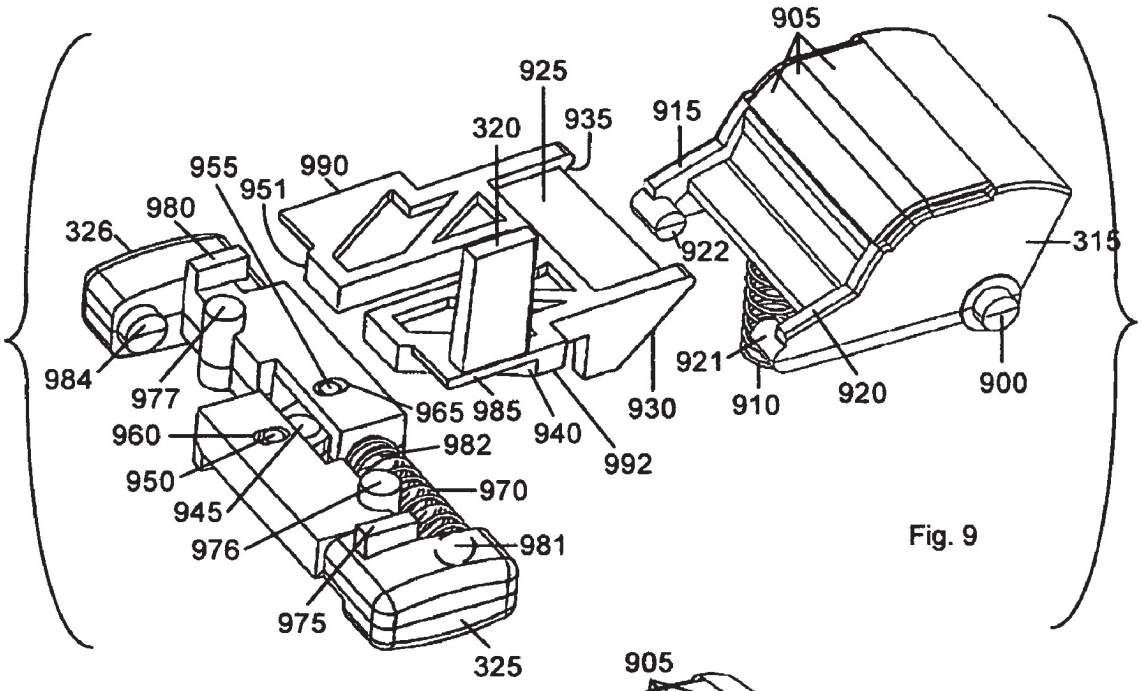


Fig. 9

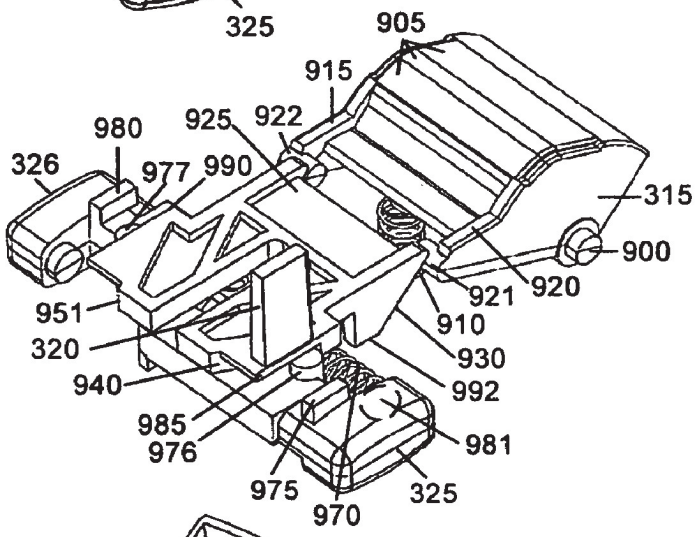


Fig. 10

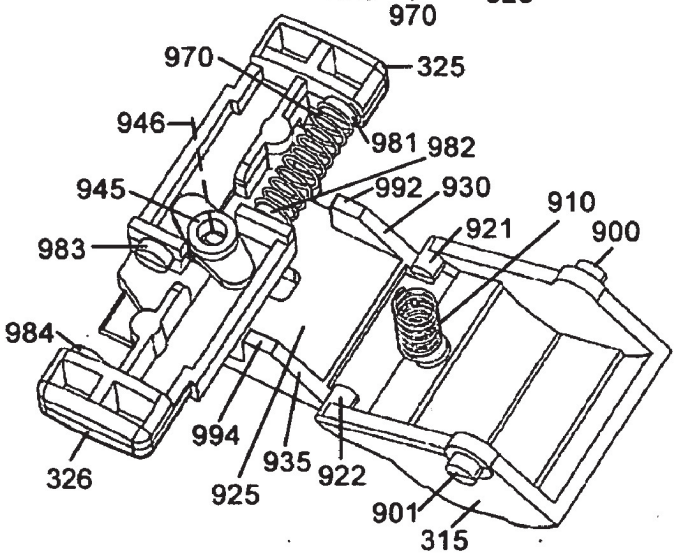


Fig. 11

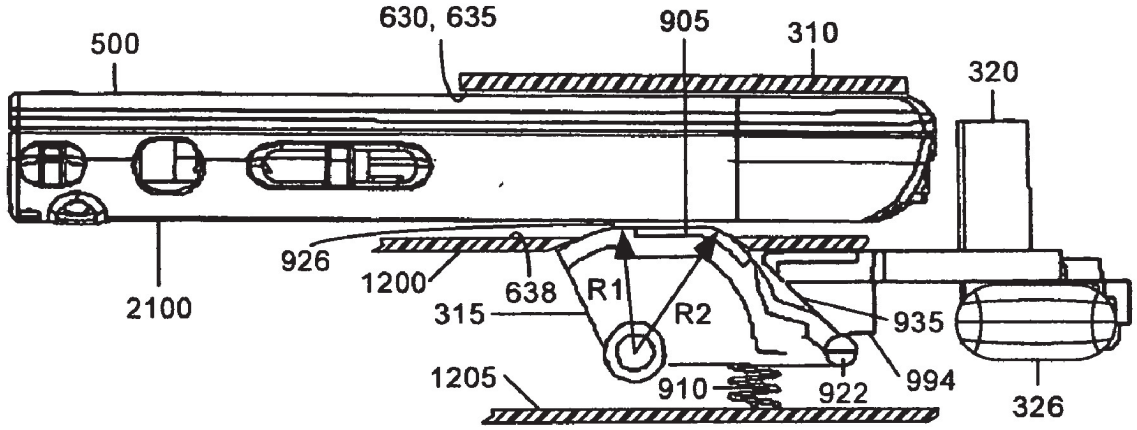


Fig. 12

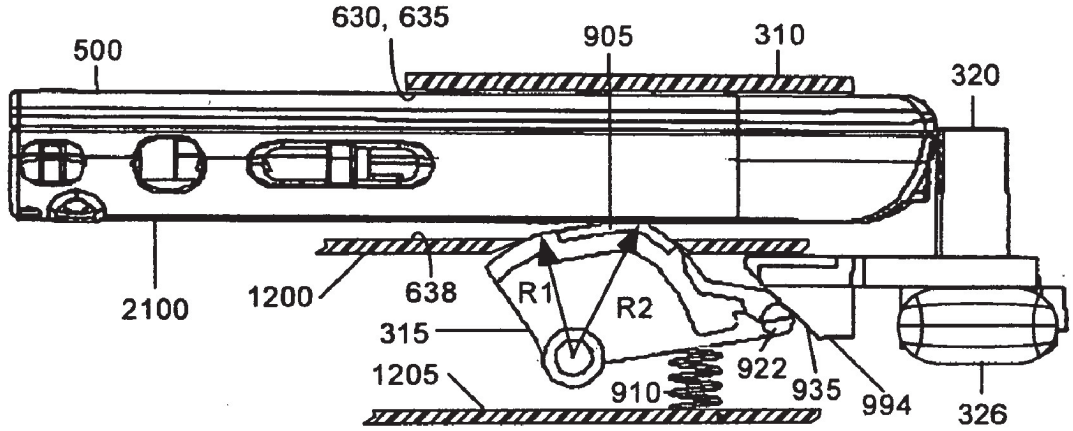


Fig. 13

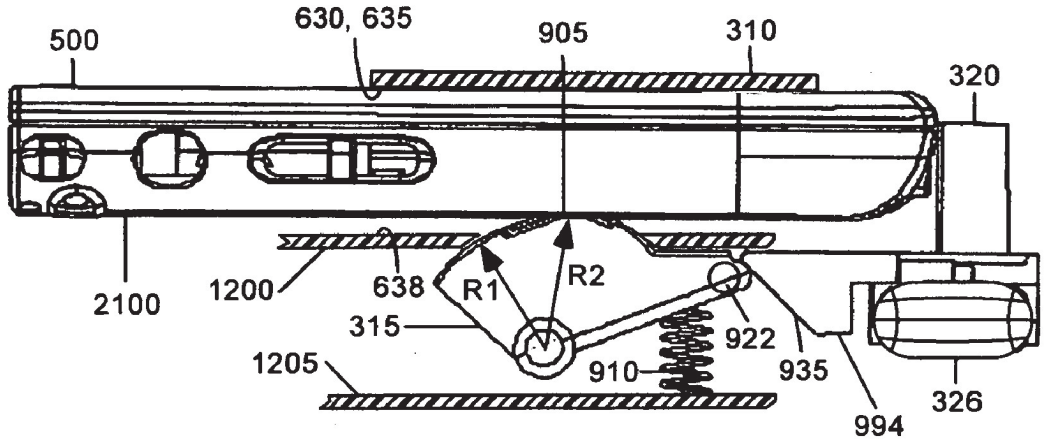


Fig. 14

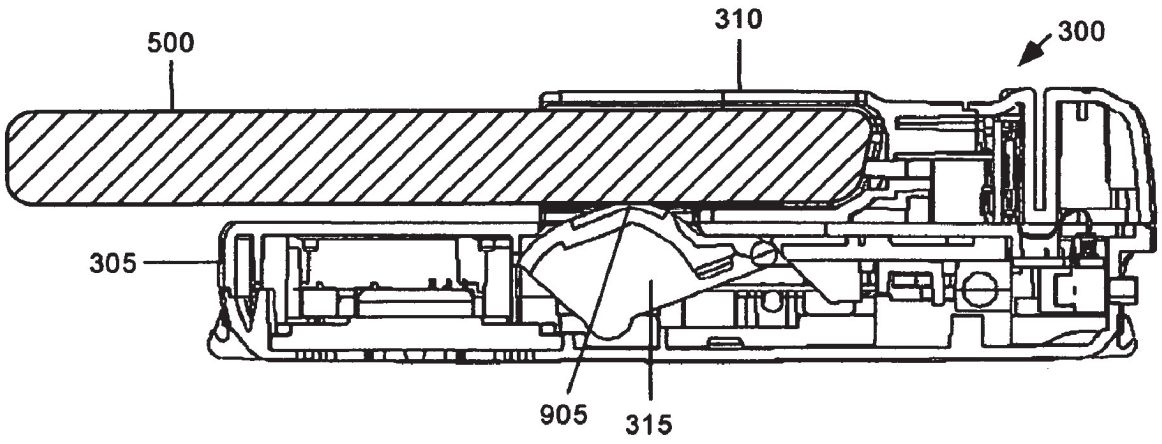


Fig. 15

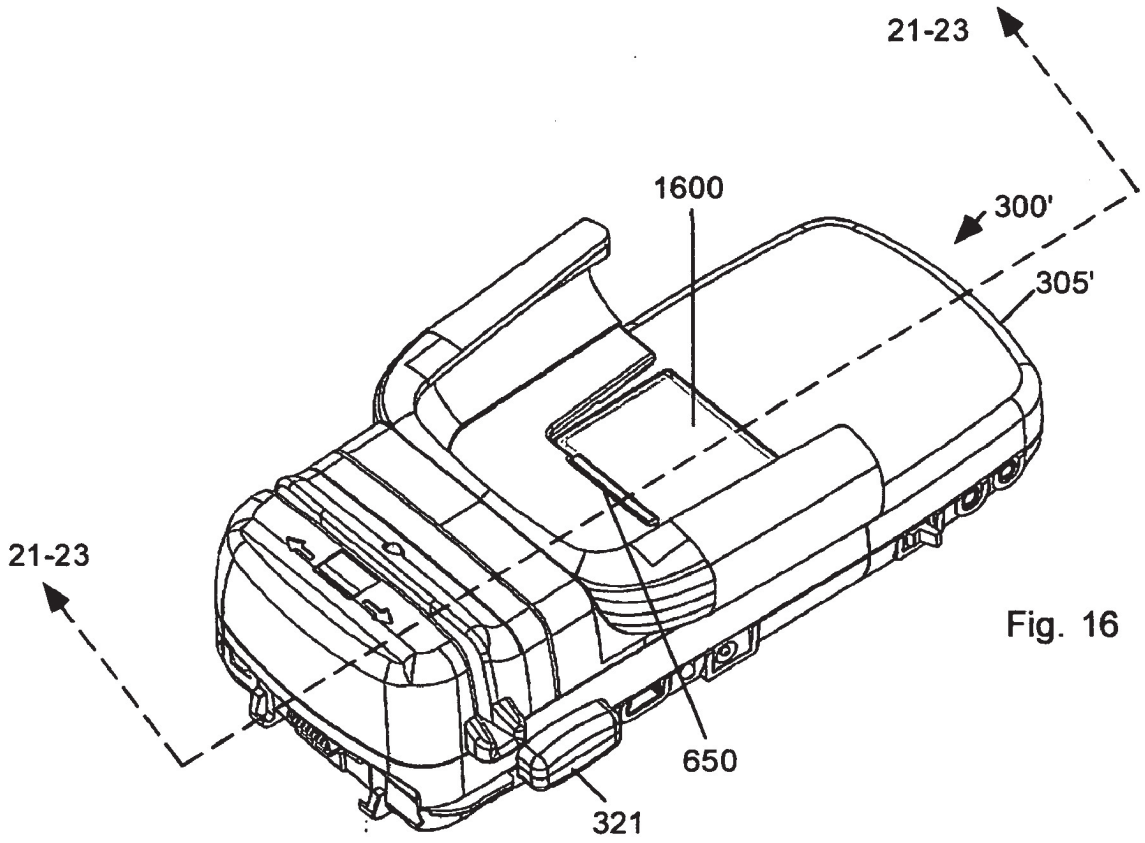


Fig. 16

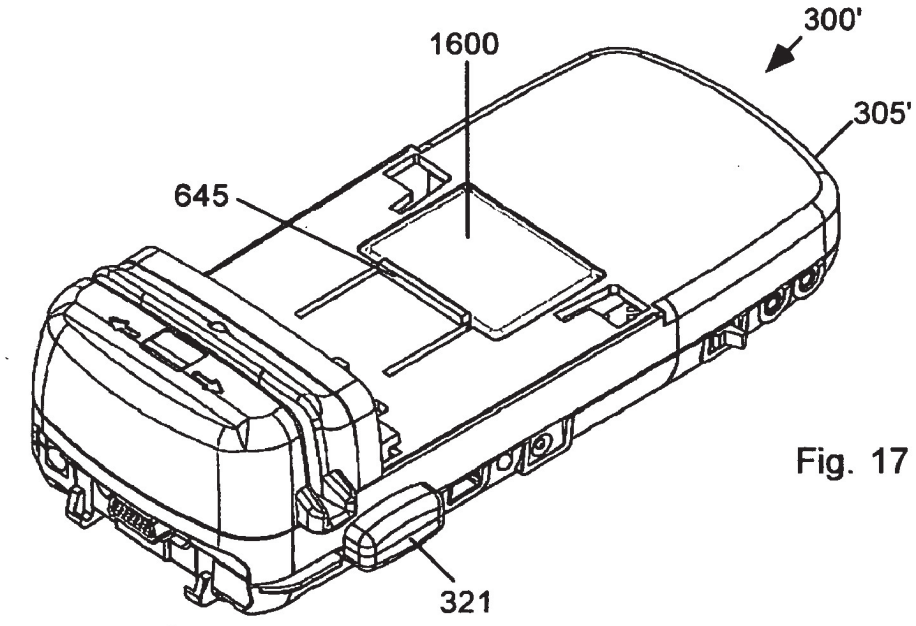


Fig. 17

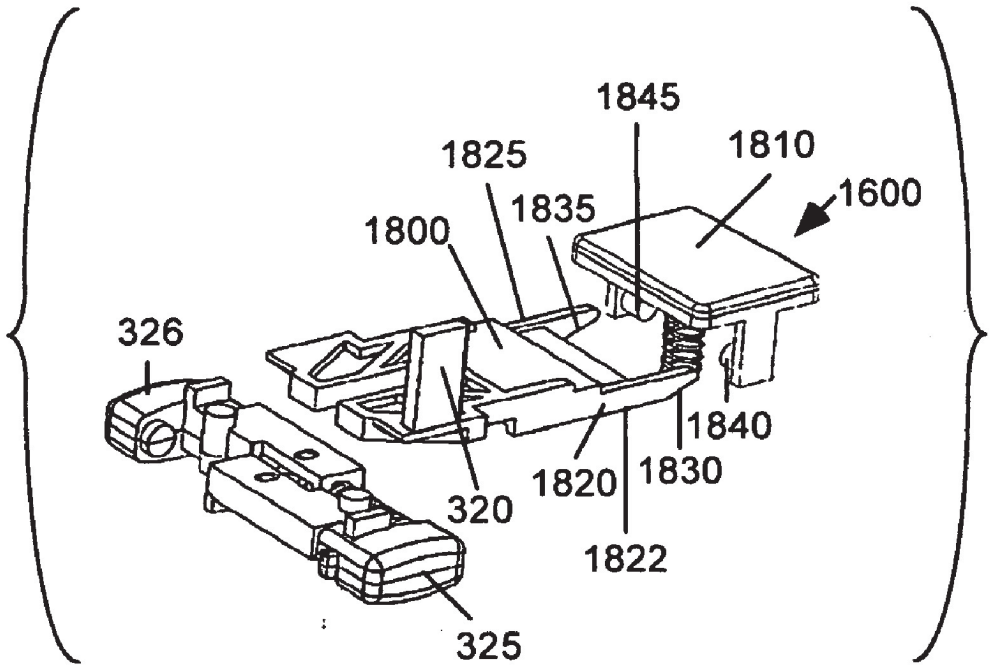


Fig. 18

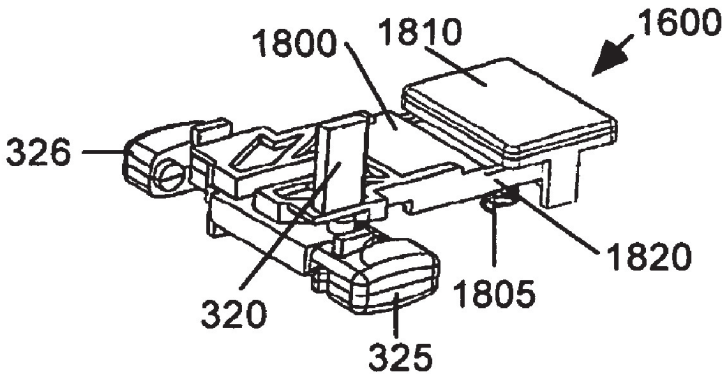


Fig. 19

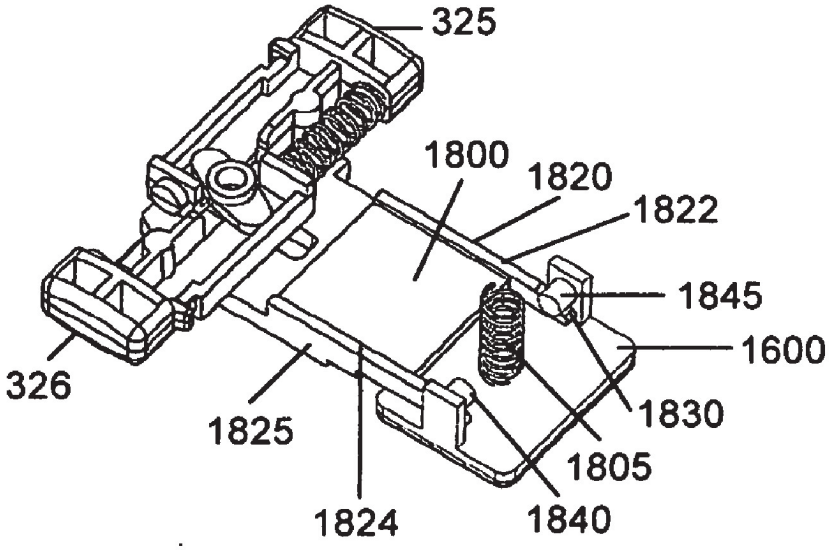


Fig. 20

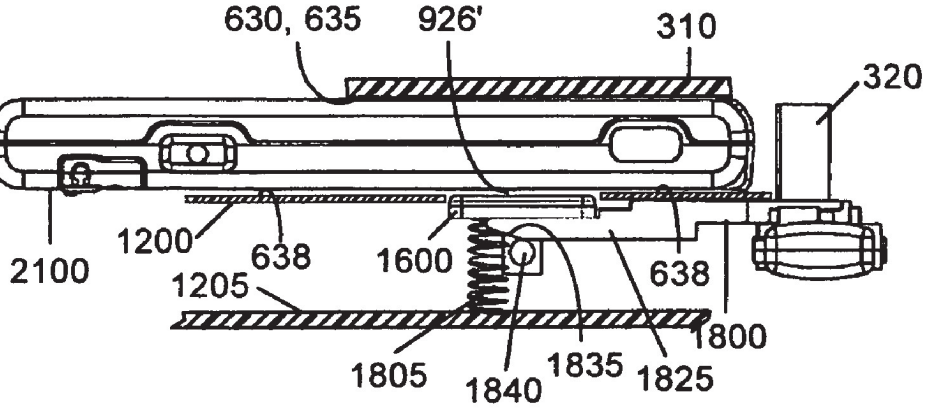


Fig. 21

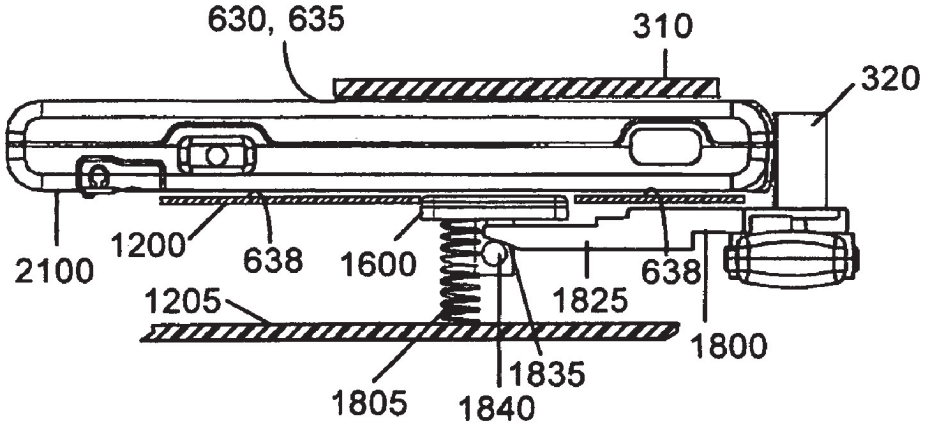


Fig. 22

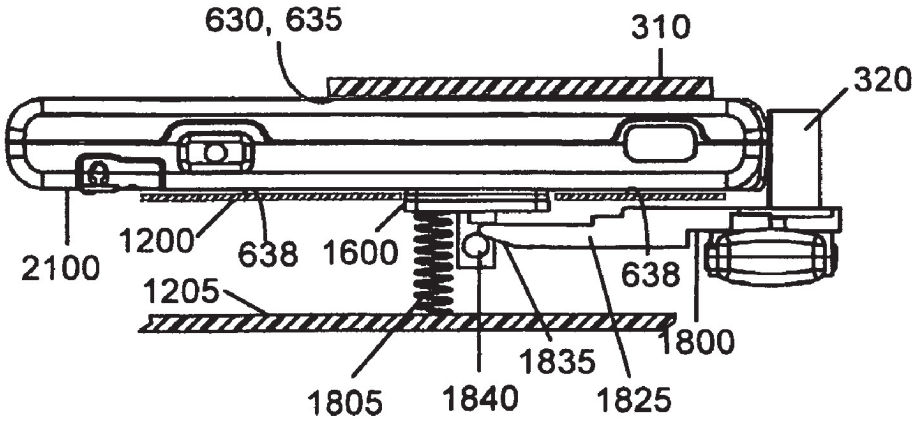


Fig. 23

UNIVERSAL MODULAR DOCKING PLATFORM FOR PORTABLE DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This patent is based on an application that claims priority of provisional patent application Ser. No. 60/631,006, filed Nov. 24, 2004.

BACKGROUND—FIELD OF INVENTION

[0002] This invention relates to mounting or docking platforms, in particular those used to contain and interact with portable devices such as personal digital assistants (PDAs), cell phones, global positioning system (GPS) receivers, and other hand-held devices.

BACKGROUND—NEED FOR PORTABLE-DOCKING PLATFORMS

[0003] Hand-held portable devices are used in a variety of circumstances—at a desk, in one's hand, and in moving vehicles, for example. When used by the driver of a moving vehicle, it is both convenient and much safer for the device to be rigidly mounted on the vehicle's dashboard or console, rather than held in the user's hand. Portable-device docking platforms also provide connections to external power sources and various accessories such as printers and wireless modems. These platforms may also include on-board audio amplifiers, speakers, magnetic card readers, bar-code scanners, and the like, that are not normally part of the device.

BACKGROUND—PRIOR ART—CELLULAR TELEPHONE CONNECTION DEVICE

[0004] In U.S. Pat. No. 5,535,274 (1996), Braitberg et al. teach a holder and connecting host device for use with cellular telephones. Base assemblies of various designs hold removable pocket adapters of various designs. Each pocket adapter is designed to hold a particular cellular telephone. The pocket adapter is held in place on the base assembly by a clip which mates with a latching assembly. The cellular telephone is held in the pocket adapter by a phone retainer latch 286 which secures the telephone in place in the adapter. Various electrical connections are facilitated between the cellular telephone, the base assembly, and the pocket adapter. Braitberg's holder and pocket adapters are designed for cellular telephone use only, and each separate pocket adapter must contain a custom phone retainer latch for each phone accommodated.

BACKGROUND—PRIOR ART—FIGS. 1 AND 2

[0005] PDAs and other hand-held electronic devices are sold in a variety of shapes and sizes. Because of this, prior-art mounting platforms designed to hold one device were unsuitable for use with another device of a different size or shape. However some prior-art mounting platforms were able to hold devices comprising a range of sizes. However, these platforms suffered from various deficiencies, such as not securely gripping the device in the platform, not being custom-fit to the device, and being awkward to use. These deficiencies are especially important when the platform is mounted in a moving vehicle. Previous attempts at overcoming these deficiencies resulted in a large number of platform designs, each of which would rapidly become obsolete.

[0006] For example, in my U.S. Pat. No. 5,996,956 (1999), I teach a mounting platform for holding (docking) and interacting with various electronic devices, such as PDAs of the kind sold by Palm Computing of Mountain View, Calif., USA, and others. The platform secures the device to a convenient location in a vehicle, for example. The location can be the vehicle's windshield, dashboard, cigarette lighter socket, and the like.

[0007] The user interacts with the PDA by pressing the tip of a hand-held stylus against a touch screen at various predetermined locations. In the past, such devices normally required two hands to operate. Prior to my invention, one hand was required to hold the device, while the other hand manipulated the stylus. When my mounting platform is used to hold the device, the PDA can be operated by a single hand. This is especially useful when the device is to be used in a moving vehicle, for example.

[0008] A front view of the platform of my '956 patent in use is shown in **FIG. 1**. A PDA **2** with screen **4** and buttons **3** is secured in platform **6** by fixed tabs **10** and movable tabs **12**. The bottom edge of PDA **2** is first inserted behind fixed tabs **10**. PDA **2** is then rotated toward platform **6** about an axis lying between tabs **10** and containing the bottom edge of PDA **2**. The top edge of PDA **2** engages the lower surface of movable tabs **12**, springably urging tabs **12** upward. When PDA **2** is fully seated in platform **6**, tabs **12** move downward thus clamping PDA **2** in place in platform **6**.

[0009] To remove PDA **2** from platform **6**, the user pushes button **13**, which lifts movable tabs **12** upward. This frees PDA **2** to rotate about an axis between fixed tabs **10** in a direction away from platform **6**. PDA **2** is then lifted in a direction away from platform **6**.

[0010] **FIG. 2** shows platform **6** without PDA **2**. Spring **14** extends outward from a front mounting surface **8** in order to force PDA **2** (**FIG. 1**) into firm contact with tabs **10** and **12**.

[0011] While this platform provides convenient and secure mounting for PDA **2**, it can accommodate only PDA models with near-identical dimensions. PDAs which are thicker or thinner, or wider or narrower, require individually tailored platforms. This limits application of this platform to specific PDA models for which it is intended. Many PDAs of different sizes and shapes are produced by a number of manufacturers and their sizes and shapes are continually changing. Thus the present platform may not accommodate all models, including future models.

BACKGROUND—PRIOR-ART

[0012] A variety of mounting platforms, also called docks or cradles, are available from distributors such as Seidio, Inc. of Houston, Tex. USA, Arkon Resources, Inc. of Arcadia, CA, USA, National Products Inc., of Seattle, Wash., USA, Brodit AG, of Karlsborg, Sweden, Gomadic Corporation, of Herndon, Va., USA, and others.

[0013] These platforms suffer from one or more deficiencies, such as being designed to securely hold only a limited number of otherwise hand-held devices, being awkward to use, or failing to securely hold the device.

SUMMARY

[0014] An improved platform according to one aspect of my invention includes a base, a detachable saddle, a lever,

buttons, and a movable restraining member so that when an electronic device is inserted into the saddle, the restraining member is activated by the lever, thereby securing the device to the base. Squeezing the buttons releases the device, allowing it to be removed from the base.

ADVANTAGES

[0015] The present invention may have one or more of the following advantages. In one aspect, one advantage is to provide a mounting platform that improves the ease of access to and use of an electronic device, especially one that facilitates single-handed use of the device. Another advantage of one or more aspects is to reduce the problem of obsolescence by providing a standardized base platform with a replaceable custom saddle that accommodates a variety of individual hand held devices comprising various sizes and shapes. These can include, but are not limited to, PDAs, cell phones, Global Positioning System (GPS) receivers, and the like. A further advantage of one or more aspects is to provide a clamping feature that is easily operated by one hand, thus reducing the amount of effort required to insert and remove a device from the mounting platform.

[0016] These mounting platforms may be held in a user's hand, attached in vehicles, or otherwise used for holding a PDA for viewing or for interacting with the PDA without the need to hold the PDA in the users hand. Common use of the platform is in the practice of law enforcement, transportation, field service and sales, as well as consumer use for GPS voice navigation, hands-free speakerphone interaction, amplified electronic audio file output, and other uses.

[0017] Other advantages and features of various aspects of the present invention will become apparent by a review of the specification, claims, and appended figures.

DRAWING FIGURES

[0018] **FIG. 1** shows a prior-art mounting platform holding a PDA.

[0019] **FIG. 2** shows the platform of **FIG. 1** without a PDA.

[0020] **FIG. 3** shows a top view of a preferred embodiment of a mounting platform of the present invention.

[0021] **FIG. 4** shows a bottom view of the platform of **FIG. 3**.

[0022] **FIGS. 5A-5C** show various electronic devices mounted in the platform of **FIGS. 3 and 4**.

[0023] **FIG. 6** shows an exploded view of a base and saddle of the mounting platform.

[0024] **FIG. 7** shows an assembled view of the base and saddle of **FIG. 6**.

[0025] **FIG. 8** shows details of the mating electrical connectors in the saddle of the preferred embodiment and a typical hand-held electronic device.

[0026] **FIG. 9** shows an exploded view of the locking and release mechanism of the preferred embodiment.

[0027] **FIG. 10** shows a top assembly view of the mechanism of **FIG. 9**.

[0028] **FIG. 11** shows a bottom assembly view of the mechanism of **FIG. 9**.

[0029] **FIGS. 12-14** are sequential views showing capture and release of an electronic device with the mechanism of **FIG. 9**.

[0030] **FIG. 15** is a cross-sectional view taken along the line **15-15** of **FIG. 3** of the platform holding and locking an electronic device.

[0031] **FIG. 16** is a top view of an alternative embodiment of the mounting platform showing the saddle in place.

[0032] **FIG. 17** is the view of **FIG. 16** with the saddle removed.

[0033] **FIG. 18** shows an exploded view of the locking and release mechanism of the alternative embodiment.

[0034] **FIG. 19** shows a top assembly view of the mechanism of **FIG. 18**.

[0035] **FIG. 20** shows a bottom assembly view of the mechanism of **FIG. 18**.

[0036] **FIGS. 21-23** are sequential views showing capture and release of an electronic device with the mechanism of **FIG. 18**.

DRAWING FIGURE REFERENCE NUMERALS

2	PDA	3	Buttons
4	Screen	6	Prior-art platform
8	Prior-art mounting surface	10	Prior-art tabs
12	Prior-art tabs	13	Prior-art button
14	Prior-art spring	300	Platform
305	Base	310	Saddle
311	Opening	312	Opening
315	Cam	320	Lever
325	Button	326	Button
330	Magnetic card reader	335	Jack
340	Connector	345	Connector
350	Light	355	Jack
360	Switch	365	Jack
370	Jack	375	Speaker
376	Grill	380	Volume control
500, 505, 510	Device	515	Key
520	Screen	600	Tab
601	Tab	605	Hook
606	Hook	610	Hook
611	Hook	615	Tab
616	Tab	620	Arrow
625	Connector	630	Surface
635	Surface	638	Surface
640	Tab	645	Vertical surface
650	Vertical surface	800	Connector
805	Arrow	900	Pivot
901	Pivot	905	Wedge surface
910	Spring	915	Surface
920	Surface	921	Pin
922	Pin	925	Shuttle
926	Gap	930	Ramp
935	Ramp	940	Ramp
945	Synchronizing link	946	Axis
950	Pin	951	Ramp
955	Pin	960	Slotted hole
965	Slotted hole	970	Spring
975	Stop	976	Pin
977	Pin	980	Stop
981	Post	982	Post
983	Post	984	Post
985	Edge	990	Edge
992	Surface	994	Surface

-continued

DRAWING FIGURE REFERENCE NUMERALS			
1200	Top of base	1205	Datum, Bottom of base
1600	Pressure pad	1800	Shuttle
1805	Spring	1810	Surface
1820	Arm	1822	Surface
1824	Surface	1825	Arm
1830	Ramp	1835	Ramp
1840	Pin	1845	Pin
2100	Surface		

DESCRIPTION

Preferred Embodiment—FIGS. 3 to 5

[0037] **FIGS. 3 and 4** show top and bottom views, respectively, of a preferred embodiment of a mounting platform **300** of the present invention. The mounting platform comprises a custom, replaceable saddle assembly **310**, and a universal base **305** having a movable restraining member in the form of cam **315**, a cam trigger lever **320**, and release buttons **325** and **326** (**FIG. 4**). Base **305** is designed to accommodate a variety of configurations of saddle **310**, as described below. A number of optional handheld device (PDA) interface features are associated with platform **300**. These include a magnetic card reader **330**, a PDA battery charging, voltage-converter circuit (not shown), a PDA audio output amplifier circuit (not shown), power input jack **335**, a serial port connector **340**, a universal serial bus (USB) connector **345**, a power indicator light **350**, a power output jack **355**, a switch **360**, a microphone jack **365**, an audio input jack **370**, a speaker **375**, and a volume control **380**. A grill **376** (**FIG. 4**) permits sound from speaker **375** to emanate from platform **300**. These features can be located at other positions and in other orientations on base **305**, if desired.

[0038] Platform **300** is preferably about **14** cm long, **6** cm wide, **4** cm high at its proximal (left) end) and 2 cm high at its distal (right) end, as shown in **FIG. 3**. Platform **300**, base **305**, saddle assembly **310**, cam **315**, cam trigger lever **320**, and release buttons **325** and **326** are all made of a strong, engineering-grade plastic material, such as ABS or acetal, manufactured by E.I. DuPont de Nemours Company, of Wilmington, Del., USA, and others.

[0039] As shown in **FIG. 5A**, saddle **310**A holds the sides and bottom of an electronic device **500** mounted on platform **300**. Saddle **310** is available in a wide variety of sizes and shapes (**310**A in **FIG. 5A, 310B** in **FIG. 5B**, and **310**C in **FIG. 5C**), each of which designed to fit a particular respective electronic device (**500**, **505**, **510**), to be held by platform **300**. In general, saddles **310**A, **310**B, and **310**C have a U-shape with parallel legs and a base or bight portion. The lower side of saddle **310**A (**FIG. 5A**) has a concave round shape so as to mate with device **520**A, which has a rounded bottom. Saddle **310**B (**FIG. 5B**) has narrow sides to permit access to all of keys **515**B of device **520**B. Saddle **310**C (**FIG. 5C**) has a square bottom to mate with device **520**C, which also has a square bottom.

[0040] An opening **311** on the rear or bottom side of saddle **310** (**FIG. 3**) allows a cam **315** to project above the inner surface of saddle **310**. Opening **311** is preferably about 2.5 cm wide and 2.5 cm high.

[0041] A second opening **312** on the front side of saddle **310** permits access to all components, view screens (**520**A, **520**B, **520**C), and other buttons, keys, and the like (**515**A, **515**B, **515**C), on the front side of the device (**312**A, **312**B, **312**C, in **FIG. 5**) being held in platform **300**. Saddles **310**A, **310**B, and **310**C are sized and shaped to provide a snug, sliding fit for their intended devices **500**, **505**, **510**, respectively.

Custom, Replaceable Saddle—FIGS. 6 to 8

[0042] **FIG. 6** shows saddle **310** for holding a device **500**, **505**, or **510** (**FIG. 5**), separated from base **305**. **FIG. 7** shows another view of base **305**. A single base **305** is suitable for use with a plurality of saddles **310** of the same or different sizes and shapes. Although saddles **310** have different sizes and shapes to accommodate the various devices, they all are arranged to mount on base **305**. Surfaces **630** and **635** restrain device **500** when it is pushed from behind by cam **315** (**FIG. 3**). Surfaces **630** and **635** preferably are made of a material that has a high coefficient of friction to restrain the top surface of device **500**. Saddles **310** have mounting tabs **600** and **601**, and hooks **605** and **606** located symmetrically on the other side of opening **311**. Base **305** has hooks **610** and **611** (**FIG. 7**), and tabs **615** and **616**.

[0043] When it is desired to join a saddle **310** to base **305**, saddle **310** is first moved into position above base **305**. Saddle **310** is then lowered toward base **305** and tabs **600** and **601**, and hooks **605** and **606** (not visible in this view) are inserted into their respective hooks **610** and **611**, and tabs **615** and **616**. Hooks **605** and **606** are relieved in such a way that their undersides (not shown) slide beneath tabs **615** and **616** on base **305** as saddle **310** is urged, in the direction shown by arrow **620**, into firm contact with base **305**. Once saddle **310** is slid to its extreme position on base **305**, flexible locking tab **640** (**FIG. 6**) rotates up and vertical surface **645** of tab **640** rests against vertical surface **650** of saddle **310**, blocking saddle **310** from sliding off base **305**. Saddle **310** is thus securely installed onto base **305**.

[0044] Saddle **310** contains an electrical connector **625** (**FIG. 6**) which connects to a flexible printed-circuit ribbon conductor assembly **630** (**FIG. 7**) in base **305**. The other end of connector **625** connects to an electrical connector **800** (**FIG. 8**) generally available at the bottom of the device (**500**, **505**, **510**, **FIG. 5**) to be held by saddle **310**. Thus all pertinent electrical connections available at the connector of device **500**, **505**, **510**, etc. are routed into base **305** for further use.

[0045] **FIG. 8** shows connector **625** as it is seen from the device side of saddle **310**, and a connector **800** at the bottom of a generic electronic device. Connectors **625** and **800** are electrically and mechanically joined when device **500** (or **505** or **510**) is fully inserted into saddle **310**, as indicated by arrow **805**.

Cam, Shuttle, and Release Button Assembly—FIGS. 9 to 11

[0046] FIGS. **9** to **11** show the components of the mechanism that urges cam **315** to move. **FIG. 9** shows an exploded view of a shuttle **925**, a synchronizing link **945**, release buttons **325** and **326**, and cam **315**. Shuttle **925** and link **945** are preferably made of the same material as release buttons **325** and **326**. Cam **315** comprises a wedge surface **905**, two

symmetrically disposed pivots **900** and **901** (**FIG. 11**), two bearing surfaces **915** and **920**, and two bearing pins **921** and **922**, discussed below. Cam **315** rotates about an axis through pivots **900** and **901**. Cam **315** is springably urged to rotate clockwise in this view by a spring **910**. The bottom end of spring **910** compressibly rests against a rigid datum or base **1205** (**FIGS. 12-14**) on the interior of the bottom of base **305**. Two bearing surfaces **915** and **920** are formed on the sides of cam **315**. Surfaces **915** and **920** bear against the inside of top **1200** (**FIGS. 12-14**) of base **305** when cam **315** is free to rotate, thus preventing rotational over travel of cam **315**. Wedge surface **905** is arranged to have a high coefficient of friction to the bottom surface **2100** of device **500** and has a side profile including radii R1 and R2 from the axis defined by the centerline of pins **900** and **901**. In this case, R2 is greater than R1. Forced contact between wedge surface **905** and bottom surface **2100** of device **500** (**FIGS. 12-14**) which has been inserted into platform **300** implements capture of device **500**, as explained below.

[0047] Cam trigger lever **320** is part of shuttle **925**. Shuttle **925** includes two frontal ramps **930** and **935**, two flat surfaces **992** and **994** which lie parallel to the direction travel of shuttle **925**, and two rear ramps **940** and **951** (**FIG. 10**).

[0048] Release buttons **325** and **326** are constrained to move along an axis that lies parallel to their long dimensions. A synchronizing link **945** is constrained to rotate about an axle (not shown) located on an axis **946** (**FIG. 11**) positioned halfway between the outer edges of buttons **325** and **326**. Pins **950** and **955** on synchronizing link **945** are normally positioned in slotted holes **960** and **965** of buttons **325** and **326**, respectively. Axis **946** is located at the common center line of cam **315** and shuttle **925**. The purpose of synchronizing link **945** is to facilitate the synchronized movement of release buttons **325** and **326**. A spring **970** springably urges buttons **325** and **326** away from each other. Spring **970** slides over and is held in place by posts **981** (shown with dashed lines) and **982** on buttons **325** and **326**, respectively. An optional extra spring (not shown) can be mounted on posts **983** and **984** (**FIG. 11**) of buttons **325** and **326**, respectively, if desired. Normally, spring **970** provides adequate force to return buttons **325** and **326** to their resting positions, as restrained by the inner wall of base **305** through which they extend (**FIGS. 3 and 4**), and stops **975** and **980**. Stops **975** and **980** prevent over-travel of buttons **325** and **326**. Buttons **325** and **326** further include bearing pins **976** and **977**, discussed below in connection with **FIG. 10**. When buttons **325** and **326** are urged in a direction toward one-another, their travel is limited by contact between stops **975** and **980** and edges **985** and **990** of shuttle **925**.

[0049] **FIG. 10** shows a top view of the components of **FIG. 9** in their proper positional relationship when cam **315** is in its "released" position, i.e. urged to its maximum rotational position by spring **910**.

[0050] **FIG. 11** shows a bottom view of the components of **FIGS. 9 and 10** when cam **315** is in its "released" position.

OPERATION

Preferred Embodiment—FIGS. 10 and 12 to 15

Cam, Shuttle, and Release Button Assembly

[0051] **FIG. 10** shows cam **315** in its full-clockwise, raised position. Shuttle **925** and therefore cam trigger lever **320** are at their left-most position in this figure, i.e., farthest from cam **315**. In this position, ramps **940** and **951** are resting against pins **976** and **977**. In the absence of downward forcing by shuttle **925**, spring **910** urges cam **315** to remain in its uppermost possible position. In the absence of an inserted device, bearing surfaces **915** and **920** rest against the inside top of base **305**, preventing further rotation of cam **315**.

[0052] To prepare platform **300** for a first insertion of a device **500**, or to release an already-held-in-place device **500**, the user squeezes buttons **325** and **326** together, causing pins **976** and **977** to slide along ramps **940** and **951**, forcing shuttle **925** in the direction of cam **315**. As shuttle **925** moves toward cam **315**, ramps **930** and **935** move slidably on pins **921** and **922**, respectively, forcing cam **325** to rotate counter-clockwise (CCW) against the force exerted by spring **910**. When buttons **325** and **326** reach their closest point, cam **315** has been rotated to its most CCW, lowest profile position, fully lowering wedge surface **905**. In the position shown in **FIG. 12**, radius RI is directly below lower surface of device **500**, creating a clearance gap **926** between wedge surface **905** and device **500**.

[0053] **FIGS. 12 through 14** show the operation of the cam, ramp, and release assembly during insertion and removal of a device **500**. Saddle **310** (**FIG. 6**) and various other components have been removed from these three figures for clarity.

[0054] Prior to insertion of device **500**, release buttons **325** (not shown in this view) and **326** have been depressed or squeezed together to their closest position. To insert device **500** (**FIG. 12**) it is slid from left to right along the inner surface **638** of saddle **310**. As described above, shuttle **925** has forced cam **315** to its lowest profile position with the surface of cam **315** lying beneath the inner surface **638** of saddle **310**. Cam **315** is rotationally held in place by pins **921** and **922** landing on flat surfaces **992** and **994**. Once released from being squeezed, release buttons **325** and **326** are then urged back to their outermost positions by spring **970**. Pins **921** and **922** rest on **992** and **994** respectively, causing cam **315** to remain in its cocked position.

[0055] As device **500** is inserted further (**FIG. 13**) and in contact with inside surfaces **630** and **635** of saddle **310**, its right-hand end urges lever **320** to move to the right, away from cam **315** and urges pins **921** and **922** away from flat surfaces **992** and **994** and onto ramps **930** and **935**. This permits cam **315** to rotate CCW, urged by spring **910**, thus raising wedge surface **905** toward device **500**. As cam **315** is urged to rotate CCW, pins **921** and **922** induce a force on ramps **930** and **935**, thus urging lever **320** of shuttle **925** to its left-most position and away from contact with device **500**.

[0056] **FIG. 14** shows device **500** fully inserted. Cam **315** is at its highest position above the inner surface **638** of saddle **310** and wedge surface **905** is in firm contact with the back side of device **500**, urged by spring **910**. Device **500** is restrained from moving in a direction normal to the top surface of platform **300** by inside surfaces **630** and **635** of saddle **310**. Since wedge surface **905** has a high coefficient of friction, any force introduced to move device **500** to the left will cause cam **315** to rotate CCW. Since the profile of wedge surface **905** has an increasing radius as it rotates CCW, the normal forces between surface **630** and **635** and

wedge surface **905** and device **500** upper and lower surfaces are increased. In this way, device **500** is securely captured in platform **300**.

[**0057**] Device **500** is removed by squeezing buttons **325** and **326** together, reversing the process discussed above in connection with **FIGS. 12 through 14**.

[**0058**] **FIG. 15** shows a cross-sectional view of device **500** installed in platform **300** having a saddle **310** and a base **305**. Device **500** is securely held in place by inside surfaces **630** and **635** of saddle **310** and surface **905** of cam **315**.

DESCRIPTION AND OPERATION

Alternative Embodiment—FIGS. **16-23**

[**0059**] Instead of a radiused, rotating cam (**315** in **FIG. 9**), **FIGS. 16 and 17** use a movable restraining member comprising a flat pressure pad **1600** to hold an electronic device (not shown) in base **305'** and saddle **310** of platform **300'**. As in the preferred embodiment, saddle **310** is designed to accommodate a particular electronic device, such as a PDA (not shown). Saddle **310** is secured in base **305'** using vertical surfaces **645** and **650**, as described above. Pad **1600** moves to positions slightly above and below the upper surface of base **305'** in order to hold and release an electronic device, as explained below.

[**0060**] **FIG. 18** shows an exploded view of a shuttle **1800**, release buttons **325** and **326**, and pressure pad assembly **1600**. The mechanism incorporating buttons **325** and **326**, lever **320**, and their operational relationship to shuttle **1800** are the same as described above in connection with the preferred embodiment.

[**0061**] Pad **1600** is springably urged upward by a spring **1805**. The upper surface of pad **1600** comprises a surface **1810** that presents a high coefficient of friction to the back side of an electronic device **500** (not shown in this view).

[**0062**] **FIG. 19** shows the elements of **FIG. 18** in their assembled condition. Spring **1805** bears against a datum comprising the inner surface of the bottom of base **305'** at one end, and pad **1600** at the other end. Shuttle **1800** includes a pair of arms **1820** and **1825** which terminate in ramps **1830** and **1835** (**FIG. 18**), respectively and two flat surfaces **1822** and **1824** which lie parallel to the direction travel of shuttle **1800**. Squeezing buttons **325** and **326** together forces ramps **1830** and **1835** to push against pins **1840** and **1845**, respectively. As shown, this causes pad **1600** to be lowered, compressing spring **1805**.

[**0063**] **FIGS. 21-23** show insertion of an electronic device into saddle **310**. Other components have been removed from this figure for clarity. In **FIG. 21**, buttons **325** and **326** have previously been squeezed together, releasing device **500**. Now, device **500** is to be inserted into saddle **310** and base **300**.

[**0064**] In **FIG. 21**, device **500** is first inserted into saddle **310**. It has not yet contacted lever **320**. Pad **1600** is at its lowest position beneath the inner surface **638** of saddle **310**, creating a clearance gap **926'** between pad **1600** and device **500**. Pad **1600** is held in position by pins **1840** and **1845** resting on surfaces **1822** and **1824** of arm **1825** of shuttle **1800**. As in the first embodiment, the bottom end of spring **1805** rests on datum **1205**.

[**0065**] In **FIG. 22**, device **500** has contacted lever **320** and moved it an intermediate distance to the right. Pin **1840** has begun to ride up the surface of ramp **1835**. Under the urging of spring **1805**, pad assembly **1600** has moved an intermediate distance toward the back surface **2100** of device **500**.

[**0066**] In **FIG. 23**, device **500** is fully installed in platform **300'**. Pad **1600** rises above inner surface **638** of saddle **310** and presses against back side **2100** of device **500**. Surfaces **630** and **635** of saddle **310** contstrain device **500** in a direction normal to the top surface of platform **300**. Top surface **1810** of pad **1600** presents a high coefficient of friction to back side **2100** of device **500**, thereby holding it securely in place in platform **300**.

[**0067**] The above steps are reversed to remove device **500** from platform **300**.

SUMMARY, RAMIFICATIONS, AND SCOPE

[**0068**] Thus it is seen that I have provided an improved universal docking platform for a portable device. A plurality of saddles, each uniquely adapted to the requirements of a particular device, are arranged to mount onto the same platform base with a common clamping means. Instead of a unique platform for each device, only the saddle is changed. In view of the constantly changing sizes and shapes of electronic devices, this results in considerable savings in design, tooling, and manufacturing costs, as well as reducing time to market.

[**0069**] While the above description contains many specificities, it will be apparent that the inventive system is not limited to these and can be practiced with the use of additional hardware and combinations of the various components described. For example, the platform is not limited to electronic devices but can be used to securely hold any portable device or article that can be accommodated by a custom saddle. The platform can be mounted on a surface or hand-held. Instead of or in addition to a magnetic card reader, an optical card reader, a bar-code reader, and the like can be included. Other features, such as an RFID (radio-frequency identification) circuit, a video camera, a disk drive, an extended power source battery, and an audio recorder can be included. Instead of providing two buttons for releasing the movable restraining element, a single button can be used. Instead of a coil spring, a leaf spring, torsion spring, extension spring, or another energy-storing member can be used. The materials, sizes, and shapes of the components can be varied from those shown and described.

[**0070**] Accordingly the full scope of the invention should be determined by the appended claims and their legal equivalents, rather than the examples given. Also, while the present system employs elements that are well known to those skilled in the art of mechanical engineering and hardware design, it combines these elements in a novel way, which produces a new result not heretofore discovered.

1. A platform for holding a portable device, comprising:

a base with a movable restraining member,

a saddle mountable on said base, said saddle having an inside surface and an opening to permit passage of said restraining member through said opening,

said restraining member being movable between a first position beneath said inside surface of said saddle and a second position above said inside surface of said saddle,

a lever having first and second positions, said first position of said lever corresponding to said first position of said restraining member, and said second position of said lever corresponding to said second position of said restraining member, said lever being arranged to urge said restraining member from said first to said second positions when said lever is moved from said first to said second positions, and

a plurality of buttons, which when squeezed together, urge said lever and said restraining member from their said second positions to their said first positions,

whereby when said saddle is mounted on said base and said electronic device is inserted into said saddle, said device urges said lever to move from said first to said second position, in turn urging said restraining member to move from said first to said second position, thereby wedging and securely capturing said device, when inserted into said saddle, between said restraining member and said inside surface of said saddle, and when said buttons are squeezed together, said lever and said restraining members return to their respective said first positions, thereby releasing said device.

2. The platform of claim 1 wherein said restraining member is selected from the group consisting of cams and pressure plates.

3. The platform of claim 1 wherein the surface of said restraining member is overlaid with a high-coefficient-of-friction material.

4. The platform of claim 1 wherein at least a portion of the inner surface of said saddle is coated with a high-coefficient-of-friction material.

5. The platform of claim 1 wherein said saddle arranged to be removably mounted on said base so that any of a plurality of different saddles can be mounted on said base to hold a respective a plurality of sizes and shapes of devices.

6. The platform of claim 1, further including a plurality of accessories selected from the group consisting of magnetic card readers, power input jacks, serial port connectors, universal serial bus connectors, power indicator lights, power output jacks, switches, microphone jacks, audio input jacks, speakers, and volume controls mounted within said platform.

7. The platform of claim 6, further including an electrical connector mounted in said saddle for connecting said device to said electrical connector mounted in said platform.

8. The platform of claim 6, further including an electrical connector mounted in said platform for connecting said accessories to said electrical connector mounted in said saddle.

9. The platform of claim 1 wherein said saddle is generally U-shaped and comprises a base or bight portion and a pair of generally parallel legs.

10. The platform of claim 9 wherein the opening between said legs is smaller on the bottom side than on the top side.

11. The platform of claim 1 wherein said saddle is secured to said platform by fasteners selected from the group consisting of hooks and tabs.

12. A method for holding an electronic device, comprising:

providing a platform having a base with a movable restraining member,

providing a saddle mounted on said base, said saddle having an inside surface and an opening to permit passage of said restraining member through said opening,

said restraining member being movable between a first position beneath said inside surface of said saddle and a second position above said inside surface of said saddle,

providing a lever having first and second positions, said first position of said lever corresponding to said first position of said restraining member, and said second position of said lever corresponding to said second position of said restraining member, said lever being arranged to urge said restraining member from said first to said second positions when said lever is moved from said first to said second positions,

providing a plurality of buttons, which when squeezed together, urge said lever and said restraining member from their said second positions to their said first positions,

inserting said device into said saddle so that said device urges said lever to move from said first to said second position so as to urge said restraining member to move from said first to said second position, thereby wedging and securely capturing said device between said restraining member and said inside surface of said saddle, and

squeezing said buttons together, thereby causing said lever and said restraining members to return to their respective first positions, thereby releasing said device.

13. The method of claim 12 wherein said restraining member is selected from the group consisting of cams and pressure plates.

14. The method of claim 12 wherein said saddle arranged to be removably mounted on said base so that any of a plurality of different saddles can be mounted on said base to hold a respective a plurality of sizes and shapes of devices.

15. The method of claim 12 wherein said platform further includes a plurality of accessories selected from the group consisting of magnetic card readers, power input jacks, serial port connectors, universal serial bus connectors, power indicator lights, power output jacks, switches, microphone jacks, audio input jacks, speakers, and volume controls.

16. The platform of claim 15, further including an electrical connector mounted in said saddle for connecting said device to said electrical connector mounted in said platform.

17. The platform of claim 15, further including an electrical connector mounted in said platform for connecting said accessories to said electrical connector mounted in said saddle.

18. A platform for holding an electronic device, comprising:

a base with a movable restraining member,

a saddle mountable on said base, said saddle having an inside surface and an opening to permit passage of said restraining member through said opening,

said restraining member being movable between a first position beneath said inside surface of said saddle and a second position above said inside surface of said saddle,

a lever having first and second positions, said first position of said lever corresponding to said first position of said restraining member, and said second position of said lever corresponding to said second position of said restraining member, said lever being arranged to urge said restraining member from said first to said second positions when said lever is moved from said first to said second positions,

means for urging said lever and said restraining member from their said second to their said first positions,

whereby when said saddle is mounted on said base and said electronic device is inserted into said saddle, said device urges said lever to move from said first to said second position so as to urge said restraining member to move from said first to said second position, thereby wedging and securely capturing said device between said restraining member and said inside surface of said saddle, and when said buttons are squeezed together, said lever and said restraining members return to their respective said first positions thereby releasing said device.

19. The platform of claim 18 wherein said restraining member is selected from the group consisting of cams and pressure plates.

20. The method of claim 18 wherein said saddle arranged to be removably mounted on said base so that any of a plurality of different saddles can be mounted on said base to hold a respective a plurality of sizes and shapes of devices.

21. The platform of claim 18, further including a plurality of accessories selected from the group consisting of magnetic card readers, power input jacks, serial port connectors, universal serial bus connectors, power indicator lights, power output jacks, switches, microphone jacks, audio input jacks, speakers, and volume controls.

22. The platform of claim 21, further including an electrical connector mounted in said saddle for connecting said device to said electrical connector mounted in said platform.

23. The platform of claim 21, further including an electrical connector mounted in said platform for connecting said accessories to said electrical connector mounted in said saddle.

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