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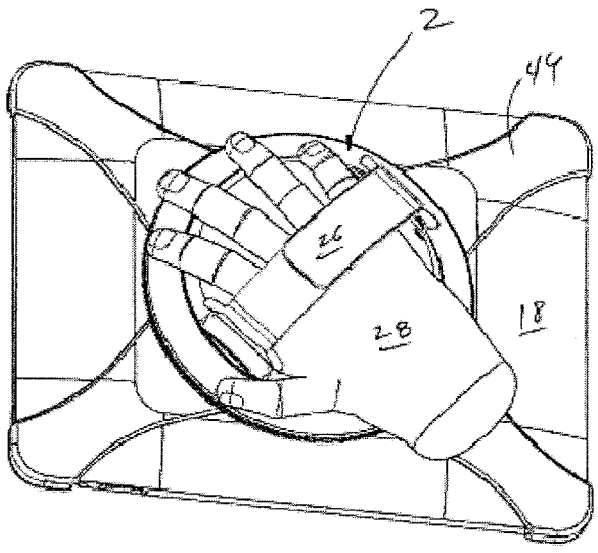

FIG. 11

(57) Abstract: An electronic device interface is provided that is selectively interconnectable to a portable electronic device. The interface is preferably interconnected to the portable electronic device by way of inwardly-biased arms that end in fingers that engage opposing edges or corners of the portable electronic device. The interface may also connect to the electronic device by way of suction. The interface may receive a positioning grip that includes a support having at least one selectively deflectable surface. The interface and/or positioning grip may be used to prop the interconnected electronic device in a preferred viewing orientation.

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MOBILE ELECTRONIC DEVICE POSITIONING UNIT

This application claims the benefit of U.S. Provisional Patent Application Serial No. 61/400,520 filed July 29, 2010, the entire disclosure of which is incorporated by reference herein. This application also claims the benefit of U.S. Provisional Patent Application Serial Nos. 61/414,747, filed November 17, 2010, and 61/424,973, filed December 20, 2010, and 61/503,240, filed June 30, 2011, the entire disclosures of which are incorporated by reference herein.

FIELD OF THE INVENTION

Embodiments of the present invention generally relate to a device for selective interconnection to a mobile electronic device. More specifically, one embodiment of the present invention is adapted for selective interconnection to an iPad®, a Kindle®, a personal computer, a tablet PC, a netbook, an e-reader, a communication device, an iPhone®, an Android® phone; a and other similar electronic devices, which enhances the use thereof.

BACKGROUND OF THE INVENTION

Portable electronic devices such as tablet computers, netbooks, e-readers, iPads®, Kindles®, personal computers, communication devices, and other similar mobile devices (hereafter "electronic device") have become increasingly popular. One drawback of these devices is that in some instances their size and shape renders them difficult to position and use in a hands-free manner. More specifically, it is often desirable to tilt the electronic device to enhance readability or functionality, which is usually done using one or two hands. After holding the electronic device for an extended time the user will often become tired and the amount of holding force and associated stability applied to the electronic device will decrease. Electronic device stability affects readability of the electronic device. Further, stability is directly related to the possibility of dropping the electronic device. Holding an electronic device also does not permit the use of one or both hands for other activities that may be related to the functions being performed by an electronic device, i.e. typing. Further, the nature of some electronic devices, such as iPads®, which are sleek, thin, and lightweight, render them difficult to grasp.

Thus, it is desirable to provide a grip or other device for selective interconnection to the electronic device to facilitate use thereof. Embodiments of the present invention, which will be described in detail below, provide a gripping system for selective interconnection to an electronic device that provides a location for static or dynamic user interaction that also allows the electronic device to be used in a hands-free manner.

Users cellphones, tablet computers, and other similar electronic devices often also want to customize their device by adding a colored cover or other customization elements. It is desirable to provide customization as part of an accessory to a mobile electronic device.

Thus, it is desirable to provide a grip or similar device for selective interconnection to the electronic device to facilitate use thereof. Embodiments of the present invention, which will be described in detail below, provide a dynamic user interface that allows the electronic device to be used in a hands-free manner.

SUMMARY OF THE INVENTION

It is one aspect of embodiments of the present invention to provide a protective storage case for selective interconnection to an electronic device. In one embodiment of the present invention, the storage case is a rigid or semi rigid shell designed to engage the back surface and at least one edge of the electronic device. One of skill in the art will appreciate that the case may be entirely rigid or include non-rigid members that function as shock absorbers that the electronic device from impact damage.

It is another aspect of embodiments of the present invention to provide a positioning unit interconnected to the case. In one embodiment of the present invention, the user interface is a palm rest with an associated strap that maintains the user's hand onto the palm rest. The palm rest may be operably interconnected to the case which allows the case to move relative to the palm rest. More specifically, the case of some embodiments include rails that receive a slide clutch and a slide clutch actuator of the palm rest. In operation, activating the slide clutch actuator will release the slide clutch and allow the palm rest to slide along the rails and thus move along the case. In one embodiment, activation of the slide clutch is initiated when the slide clutch actuator is depressed by a user's finger or thumb. When pressure is released from the slide clutch actuator, the slide clutch locks and maintains the position of the palm grip on the rails. The sliding functionality provided by those embodiments of the invention allows users to find and fix a comfortable electronic device viewing and use position. One of skill in the art will appreciate that the rails may be integrated into the electronic device or interconnected thereto.

It is another aspect of embodiments of the present invention to provide a positioning unit that allows for selective alteration of the angular orientation of the held electronic device. More specifically, some embodiments provide swiveling palm grip. The palm grip employs a swivel clutch that is selectively actuated by the user wherein depression of a swivel clutch actuator allows one portion of the grip to rotate relative to another portion of the grip. Thus, when the swivel clutch is disengaged, the mobile electronic device is able to rotate about its normal axis.

The swivel clutch actuator may be comprised of finger or thumb buttons positioned adjacent to the palm rest. When the swivel clutch is released, the swivel clutch locks and rotation is prevented. In this manner, the swivel clutch allows a user to rotate and fix the use and viewing position of the mobile electronic device.

As one of skill in the art will appreciate, some positioning units of the contemplated invention may employ transitional and rotational functionality. Further, transitioning and rotation of the palm rest relative to the electronic device may be achieved with selective locking mechanisms not necessarily defined as a "clutch."

It is yet another aspect of embodiments of the present invention to provide an ergonomic unit that is easy to use. More specifically, the palm rest may be made of a material that is soft and resilient to enhance user comfort. The material may also reduce the generation of perspiration and associated odors. Further, the material and construction of the palm rest reduces the transmission of heat from the user's hand to the electronic device.

Again, the contemplated device allows the attached electronic device to be positioned in various ways. For example, when slid to the ends of the rails, the palm rest creates a low-profile stand such that is ideal for typing or close up viewing. In addition, in one embodiment of the present invention the palm rest is partially removable from one rail at a time. When dis-associated from one rail, the palm rest is free to pivot about the other rail to form a stand for propping the electronic device on a horizontal surface. Thus, the electronic device can be positioned in a 1) viewing landscape mode (propped about fifteen degrees from vertical), 2) typing landscape mode (supported about fifteen degrees from horizontal), 3) viewing portrait mode (propped about fifteen degrees from vertical), and portrait mode typing (supported about fifteen degrees from horizontal which is a typing mode).

It is another aspect of embodiments of the present invention to provide a device for selectively positioning an interconnected electronic device, comprising: a case that is adapted to selectively receive the electronic device; a first rail interconnected to the case; a second rail interconnected to the case and spaced from the first rail in a parallel relationship; a plate slidingly engaged to the first rail and the second rail; and a palm rest operably interconnected to the plate.

It is still yet another aspect of embodiments of the present invention to provide a device for selective association with an electronic device, comprising: a base portion that is adapted to be selectively associated with the electronic device; a user interface operably interconnected to the base portion, the user interface capable of rotating relative to the base portion and being locked relative to the base portion.

It is another aspect of embodiments of the present invention to provide a system for securing and selectively positioning an electronic device, comprising: a case that selectively receives the electronic device; a base portion that is selectively associated with the case; and a user interface operably interconnected to the base portion, the user interface capable of rotating relative to the base portion and being locked relative to the base portion.

It is another aspect of embodiments of the present invention to provide a system for securing and selectively positioning an electronic device, comprising: a base member having a plurality of arms adapted for selective interconnection with an edge of the electronic device; and a user interface operatively interconnected to said base portion, said user interface capable of rotating relative to said base member.

It is another aspect of embodiments of the present invention to provide a support for securing an electronic device. One embodiment of the present invention is comprised of a housing having a first end and a second end. The housing may be of any shape, but is preferably cylindrical. The first end of the housing is a socket for securing a ball to form an articulating joint. The second end is associated with a clamp that is used to interconnect the housing to another object. A stem having a first end and a second end is also provided. The first end of the stem is interconnected to a hub. The second end of the stem terminates in a ball that cooperates with the socket provided by the housing to form a ball/socket joint that allows for movement of the stem with respect to the housing in at least three degrees of freedom. One of skill in the art will appreciate that the second end of the stem may terminate in a socket that receives a ball provided by the housing. Further, any mechanism that would link, join, or couple the stem and housing or an articulating manner is contemplated, such as a hinges, a clevis, a spherical joint, a screw fitting, or any other similar joint known in the art.

As mentioned above, the first end of the stem is interconnected to a hub. The stem may also be operably associated with the hub as described above. The hub supports at least one support arm that terminates in a series of fingers or other gripping mechanism that secure the electronic device. The gripping mechanism may be custom-made to correspond to a particular electronic device. Alternatively, the gripping mechanism may be selectively deflectable or openable to receive electronic devices of various types and thicknesses. Preferably, the gripping mechanism includes an elastomeric material that enhances engagement with the electronic device and reduces the chances of slippage. The support arms of one embodiment of the invention are telescoping or foldable, thereby facilitating engagement with electronic devices of various sizes. One of skill in the art will appreciate that the arms of the contemplated invention may be rigid and/or spring loaded, or otherwise biased, such that the ends of the arms tend to

meet where the arms are not deflected outwardly to engage the electronic device. The electronic device is thus grasped by the inward force applied by the biasing device. Alternatively, the force may be supplied by a linkage that interconnects adjacent arms such that the gripping mechanisms thereof are located at a predetermined perimeter that generally corresponds with the perimeter of the electronic device being held. The hub of one embodiment of the present invention also may be adapted to secure a grip or other holding appendage emanating from the electronic device. More specifically, some electronic devices may include, or may have incorporated therewith, an appendage such as a grip or other member for support. It is envisioned that those grips or supports may be selectively interconnected to the hub. In addition, the interconnection of the appendage with the hub may be adapted to allow for rotation and angulation of the electronic device.

It is one aspect of embodiments of the present invention to provide a support system that allows the electronic device to be positioned in a myriad of display positions. More specifically, in one embodiment of the present invention, the stem may be angled, swiveled, and/or rotated with respect to the housing via the ball joint. The hub may also be angled, swiveled, and/or rotated relative to an optional ball joint located on the opposite end of the stem to provide additional orientation options. Still further, one of skill in the art will appreciate that the stem and/or housing may be telescoping such that they can selectively extend and retract to provide further display options.

It is yet another aspect of embodiments of the present invention to provide a support that may be associated with a desk, a table, an electronic device, another portable electronic device, etc. Again, the housing includes a clamp on one end that engages a table, for example, when interconnected to a table, the electronic device may be positioned to face a presenter or rotated toward the audience to provide an elevated display. As one of skill in the art will appreciate, the disclosed support may also be scaled in size to fit various electronic devices. As such, the support may be constructed of such a size to accommodate a cellular phone or other wireless communication device wherein the housing is interconnected to a home computer, a laptop, or another electronic device contemplated herein, e.g., an iPad®. Such a device may also include other features such as a key chain, a flashlight or, mace, etc.

Other embodiments of the present invention employ a removable clamp. Alternatively, the clamp may be omitted wherein the housing interfaces directly with a mount, hole (by way of a threaded interconnection, for example), or pivot point positioned on a horizontal or vertical surface, i.e., wall. The contemplated mount may be engaged onto a vertical surface by Velcro®, suction, adhesives, etc. The mount may be weighted and positioned on a table. Still other

mounts are magnetic allowing them to be selectively interconnected to a metallic item, such as a beam or hood of a car, for example. Mount or mounts that are integrated into the interior of a vehicle, such as a automobile, bicycle, train, aircraft, boat, etc., are also contemplated. Further, some mounts are adapted for other uses, such as at a gym, wherein the mounts are selectively interconnectable to a treadmill or other workout equipment. It is also envisioned that the support may be used in conjunction with an extension system that effectively extends the length of the housing. For example, an extension system may be placed on the floor wherein the electronic device is viewed in a chair or in bed. In the mounts that employ suction, a suction indicator may also be incorporated to ensure a proper amount of vacuum is being provided. It is envisioned that such a mount could also provide angular flexibility to the housing by way of a ball or other type of articulating joint. It is also envisioned that the mount be interconnected to a power cable, a phone line, a USB port, an Ethernet cable, etc. to provide information and/or power to the stored electronic device via the support. Still other embodiments of the present invention include an elongated housing that terminates in a spike. For example, a four or five foot long housing is contemplated that is inserted into the ground for use by surveyors, golfers, hunters, nature enthusiasts, etc., to position the electronic device in such a way to enhance their experience. Other embodiments include legs similar to a tripod that are retractable within the housing or positioned externally on the housing and foldable therefrom. The tripod may slide over the clamp onto the housing or be interchangeable with the clamp.

It is another aspect of embodiments of the present invention to provide a support system that is storable. In one embodiment of the present invention, the housing receives the stem, hub, and arms in a sleek, compact manner.

It is another aspect of embodiments of the present invention to provide a housing and/or arm or arms that provides additional functionality. For example, the housing/arm(s) may include a power supply that feeds power to the electronic device; have a port for the receipt of data via a phone line, ISDN-line, an Ethernet cable, or similar line where the support feeds information to the electronic device via a cord or wirelessly; and/or have data storage capability that is accessible by the electronic device via a cord or wirelessly. Still other housings/arm(s) include an internal camera or projection mechanism, internal camera flash, Wi-Fi source or booster, a projector, a battery, a sound system, an antenna, and a data transmitter. Data may also be transferred from the housing/arm(s) via the stem through the arms to a connector that interfaces with the electronic device. Such a connector may be integrated into one of the fingers or gripping mechanisms. The housing/arm(s) may also include or detachably receive a laser pointer. The hubs may also have the capability of interfacing with an SLR or video camera.

It is also one aspect of embodiments of the present invention to provide an apparatus adapted for securing an electronic device, comprising: a housing having a first end and a second end; a stem having a first end and a second end, the stem being capable of selectively moving into and out of the housing; a plurality of arms operably interconnected to the second end of the stem, wherein each arm terminates in a means for grasping the electronic device; a clamp associated with the second end of the housing; and wherein the plurality of arms are foldable with respect to the stem such that they can be stored within the housing when the stem is moved into the housing.

It is yet another aspect of embodiments of the present invention to provide a method of displaying a portable electronic device, comprising: associating a housing with a horizontal surface; deploying a stem from the housing, the stem having a plurality of arms; rotating the plurality of arms away from the stem; engaging ends of the plurality of arms onto opposing edges or corners of the electronic device; and rotating the electronic device relative to the housing.

It is yet another aspect of embodiments of the present invention to provide a multi-functional gripping device that provides an ergonomic and efficient way to hold an electronic device that also functions as a highly versatile and functional stand. Thus, it is one aspect of the present invention to provide a selectively interconnectable grip with a comfortable shape that facilitates grasping and release.

It is another aspect of embodiments of the present invention to provide a device that selectively interconnects to the electronic device. More specifically, one embodiment of the present invention employs suction for selective interconnection. The contemplated suction mechanism of one embodiment is comprised of an elastomeric suction cup that is deflected to create a vacuum between the suction cup and the surface to which it is associated. Examples of suction mechanisms can be found in U.S. Patent Nos. 7,635,111; 4,580,751; 6,648,285; 5,087,005; 6,308,923; 7,021,593; 6,666,420; and 7,661,638 (which are incorporated by reference herein), U.S. Patent Application Publication No. 2008/0217493; (which is incorporated by reference) or any other suction system used in the art that is used for interconnecting GPS systems to vehicle windows, to remove dents, to carry glass panes, etc. The suction mechanism may include a suction indicator that helps the user ensure that proper holding force is applied to the electronic device. Those of skill in the art will appreciate that the device may be interconnected to the electronic device with adhesives, a click-lock mechanism (as used in a Magic Bullet® blender, the ways beaters are attached to a home mixer, or a Nikon® S-Mount), a turn-lock mechanism, or a bayonet fitting, for example. One or more

permanent or semi-permanent mounts may be affixed to the electronic device that selectively receive a removable grip. The mounts may be associated with a panel that is associated with the back side of the electronic device or a case that holds the electronic device.

It is another aspect of embodiments of the present invention to provide a grip that transforms into a stand for positioning the electronic device at various angles. Some examples of viewing angles include positioning for portrait viewing, portrait typing, landscape viewing, and landscape typing. The flexibility and selective interconnectability of embodiments of the present invention will allow for as many viewing angles as possible. One embodiment of the present invention also employs a support having flexible positionable arms and/or surfaces that will allow for comfortable resting on the user's lap, for example.

It is another aspect of embodiments of the present invention to provide a grip that is movable. One embodiment of the present invention employs a suction mechanism for attachment to the back of the electronic device. The suction mechanism is movable from one location to another on the back of the electronic device. Preferably, the suction cup mechanism is small in comparison to the surface area of the electronic device such that a plurality of interconnection locations are provided. As mentioned above, to verify that an ideal suction has been achieved, a visual or audio means may be provided. More specifically, one embodiment of the present invention employs a suction mechanism that allows the user to ascertain when a sufficient amount of suction has been reached so that the grip cannot easily be removed from the electronic device. Other embodiments of the present invention include an audio indicator that clicks, pops, beeps, or otherwise notifies the user when the amount of suction applied by the suction cup has reduced below an unacceptable level (see, for example U.S. Patent No. 7,673,914, which is incorporated by reference herein). One of skill in the art will appreciate that to facilitate interconnection between the grip and the electronic device, an intermediate coating may be applied to the electronic device or a case, which secures the electronic device, may be employed that receives the grip. In addition, the elastomeric material associated with the suction mechanism may be modified depending on the type of electronic device and associated surface texture and/or composition.

It is another aspect of embodiments of the present invention to provide a grip that rotates relative to the interconnected electronic device. More specifically, in one embodiment of the present invention, which will be understood upon viewing of the figures provided herein, provides a grip that has a base that is operably interconnected to the suction mechanism. The suction mechanism may preferably be actuated by rotating of an outer ring that evacuates air from the suction cup. The contemplated grip may also be able to swivel relative to the attached

suction cup. Those skilled in the art will appreciate that an angulating base may be provided that allows the suction cup and electronic device to rotate away from the grip.

It is yet another aspect of embodiments of the present invention to provide a grip that accommodates a case. More specifically, many users store their electronic devices in a protective case. Some embodiments of the present invention are adapted to interconnect directly to the case, wherein a suction mechanism is not used. The contemplated grip thus interconnects to a case via Velcro®, snaps, latches, or other interconnection schemes known in the art. Other contemplated grips employ a suction mechanism that interfaces with a flat plate or a suction-enhancing material that is glued or otherwise affixed to the case. In this embodiment of the present invention, the grip may be removed from the case and used with the electronic device or vice-versa.

It is another aspect of embodiments of the present invention to provide a grip that is ergonomic and easy to use. More specifically, to access stored arms at least one button is pressed that will cause the arms to deploy from the dock. Further, the dock is shaped with curves that correspond to the human hand and that minimizes snag points. Foam over-molded or cushioned material will cover the dock of some embodiments of the present invention which maximizes user comfort. In addition, the positioning grips used in conjunction with some embodiments of the present invention are adapted to rest in a user's hand wherein a stem portion, which extends from a base portion, is placed between the user's fingers or grasped in their fist. In the former example, the base rests comfortably in the user's palm with the stem positioned between two of the user's digits. The base and grip may also be made of a comfortable, spongy, or deformable material that allows for the user to alter the contour thereof to enhance comfort. Still other embodiments of the present invention include a base with a plurality of finger indentations to enhance the user's comfort. Preferably, however, the base is somewhat smooth such that the attached electronic device may be rotated at will with the base "floating" in the user's palm.

In a related aspect of embodiments of the present invention, portions of the grip are made of a specialized material. More specifically, some flexible materials will return to a primary shape when exposed to heat. Thus, some embodiments of the present invention are made of these "memory materials" wherein the grip, support, and base may be selectively altered and formed to fit the user's preference. It is envisioned that the temperature in which this material will return to its primary shape is higher or lower than about 98.6° F. When a user desires to return the grip to its primary shape, the grip may be placed in the refrigerator or in heated water. Still other embodiments of the present invention are made of a resiliently deflectable material

that a user can form and shape and then set permanently by exposure to a preselected temperature. In one embodiment of the present invention, the primary shape of the grip, base, and support associated with the positioning grip changes when exposed to heat, generated from the user or from the attached electrical device.

It is one aspect of embodiments of the present invention to provide a positioning grip that is adapted to rotate, translate, and/or tilt. More specifically, one embodiment of the present invention includes a base that is rotatably interconnected to a hub that is associated with the suction mechanism. In this embodiment of the present invention, the base and associated grip and support are adapted to rotate relative to the fixed suction cup. This embodiment of the present invention would thus allow the connected electronic device to rotate relative to the grip while the user maintains the position of the grip. The contemplated grip fits comfortably in one position in a person's hand, which may be custom molded to that individual's hand, and wherein the interconnected electronic device rotates at will. Those of skill in the art will appreciate that the rotated orientation of the electronic device may be selectively fixed by actuation of a rotational lock that would prevent further rotation of the interconnected electronic device. In one embodiment, the rotational lock is actuated by a user's thumb or other finger. Similarly, one embodiment of the present invention allows the interconnected electronic device to tilt relative to the positioning grip. For example, the hub may include a hinge mechanism that allows the electronic device to be angulated from the grip. Again, a desired angle may be fixed by actuation of a locking mechanism associated with the positioning grip. One skilled in the art will appreciate that the tilting rotating mechanism described herein may be combined into one system that allows for both rotation, translation, and angulation of the interconnected electronic device relative to the grip.

It is another aspect of embodiments of the present invention to provide a positioning grip that allows for secure interconnection to a horizontal or vertical surface. More specifically, one embodiment of the present invention includes a support, which is positioned opposite to the suction mechanism, having a suction cup or other mechanism for interconnecting the grip and interconnected electronic device to a horizontal or vertical surface. This embodiment of the present invention can be used in automobiles, on airplane tray tables, etc. such that the positioning grip and the interconnected electronic device are fixed and unable to move relative to the interconnected surface. Other embodiments of the present invention include a bulbous support that interfaces into a fixed base that is placed on, or integrated into, a table or wall that allows for operable securement of the electronic device. The bulbous nature of the support may

also provide swiveling interconnection that allows the interconnected electronic device to be moved relative to the fixed interconnection point.

It is another aspect of embodiments of the present invention to provide a positioning grip that is fanciful and aesthetically pleasing. More specifically, some embodiments of the present invention employ a base, stem, and/or head (and associated arms, if applicable) that is in the shape of a hand. In some embodiments, the hand may employ selectively deflectable fingers that allow the positioning grip to "grasp" a table or other item. One of skill in the art will appreciate that the positioning grip may be shaped as a skeletal hand, a four-fingered (i.e., alien) hand, a paw, a foot, a claw, a talon, a whale tail, a bunny tail, a monkey tail, a hippo tail, a wolf tail, a gecko tail, a giraffe tail, a horse tail, a pig tail, a Naavi tail (from James Cameron's 2009 film Avatar), a forked devil's tail, a fuzzy tail (i.e., having fir), a textured tail, a tongue, a forked tongue, a spider, a robotic hand, an octopus tentacle, or other shape.

It is still yet another aspect of embodiments of the present invention to provide an extended gripping portion. More specifically, as outlined herein, the positioning grip is generally comprised of a grip that includes a base on one end for association with an electronic device and a support on the other end for association with a horizontal or other surface. In some embodiments of the present invention, the support includes selectively deflectable arms. Thus, one embodiment of the present invention provides an extended grip that is such a length that the support is positioned adjacent to a user's wrist when the base is in the user's palm. Still other embodiments of the present invention position the support adjacent to the user's forearm or elbow when the base is positioned in their palm. In some embodiments of the present invention, the arms associated with the support are then wrapped around the user's wrist and/or forearm to affix the system to the user. For example, it is envisioned that the grip and/or support is made of articulating structures, as disclosed by U.S. Patent Application Publication Nos. 2010\0221062 and 2010\0220992, which allow the grip to be wrapped about the user's wrist and/or arm.

It is yet another aspect of embodiments of the present invention to provide a positioning grip that is severable. More specifically, one embodiment of the present invention is comprised of a mount, which selectively engages the electronic device, and a selectively interconnectable stem with an associated head and base. The mount selectively interconnects with the electronic device in various ways. For example, in one embodiment of the present invention, the mount includes a suction mechanism comprised of a suction cup that is associated with a device for creating a vacuum between the suction cup and the electronic device. In operation, at least one button associated with a device for creating a vacuum is actuated to evacuate air from the mount

such that the suction cup is pulled upwardly to create the contemplated vacuum between the mount and the electronic device. In one embodiment of the present invention, the vacuum-creating device includes a button that is used to move pistons to create the required vacuum. An electronic mechanism may also be used to move the pistons. One of skill in the art will appreciate that various methods may be used to create the required vacuum.

After the mount is interconnected to the electronic device, the base and associated stem is selectively interconnected to the mount via threads, a bayonet fitting, a spring biased bayonet fitting, a twist lock mechanism (similar to how a lens is interconnected to a camera), a push lock mechanism, (often found on cabinet doors), magnets, Velcro®, adhesives, or an electric lock. With respect to the bayonet fitting, the base may include outwardly extending projections that are received within slots incorporated into the mount such that when the base is rotated relative to the mount, the projections enter the slots that prevent removal of the base from the mount. Similarly, the contemplated electronic lock includes movable projections that transition from the mount into apertures or a slot(s) incorporated into the base. One of skill in the art will appreciate that the protrusions, stationary or movable, of the bayonet fitting or the electronic lock may be incorporated into the mount or the base (or directly into the stem, if a base is omitted).

It is still yet another aspect of embodiments of the present invention to provide a device attachment member for selective interconnection to the electronic device. The device attachment member further includes at least one portion that receives the mount as described above. In one embodiment of the present invention, the device attachment member covers a substantial portion of the rear surface of the electronic device and includes a plurality of apertures. The apertures include threads that mate with threads incorporated onto the mount. The mount also includes attachment mechanisms as described above for receipt of the positioning grip. Those of skill in the art will appreciate that the positioning grip may directly interconnect, via threads or other mechanisms described above, to the device attachment member.

It is a further aspect of embodiments of the present invention to provide customization of the mobile electronic device. This customization can be in the form of a special color or shape of one or more elements of the attachment mechanism. This customization can also be in the form of ornamental elements such as those described in US Patent Nos. 7,698,836 and D554,847.

It is another aspect of embodiments of the present invention to provide a positioning device adapted for selective interconnection to an electronic device, comprising: a mount; a

suction device associated with the mount; and a support for selective interconnection with the mount.

It is yet another aspect of embodiments of the present invention to provide a positioning device adapted for selective interconnection to an electronic device, comprising: a protective case for receipt of the electronic device, the protective case having a plurality of interconnection locations; a mount for selective interconnection with at least one of the interconnection locations of the case; and a support for selective interconnection with the mount.

It is another aspect of embodiments of the present invention to provide a multi-functional gripping device that provides an ergonomic and efficient way to hold an electronic device that also functions as a highly versatile and functional stand. Thus, it is one aspect of the present invention to provide a selectively interconnectable grip with an ergonomic and comfortable shape.

It is another aspect of embodiments of the present invention to provide an interface for receiving a grip that selectively interconnects to an electronic device. More specifically, one embodiment of the present invention employs an electronic device interface ("interface") for selective interconnection to the electronic device. The interface includes a docking portion with arms that operably extend therefrom. The arms may extend in a telescoping manner from the interface and may retract, at least partially, within a cavity provided by the interface when not in use. Fingers or other gripping devices are associated with the end of each arm that engage opposite edges or corners of the electronic device.

In operation, a user positions the interface onto the back of the electronic device and extends the arms and engages the fingers onto the edges or corners of the electronic device. It is contemplated that at least one arm is automatically retractable, i.e., spring-biased, similar to a tape measure, or by winding. When released the arms will retract and exert a compressive force on the electronic device. The compressive force generated by the opposing fingers securely interconnects the interface to the electronic device. A positioning grip may also be selectively associated with the dock.

It is another aspect of embodiments of the present invention to provide a grip that is ergonomic. Embodiments of the present invention are adapted to rest in a user's hand wherein a grip or stem portion, which extends from a base portion, is placed between the user's fingers or grasped in their fist. In the former example, the base rests comfortably in the user's palm with the stem positioned between two of the user's digits. The base and grip may also be made of a comfortable, spongy, or deformable material that allows for the user to alter the contour thereof to enhance comfort. Still other embodiments of the present invention include a base with a

plurality of finger indentations to enhance the user's comfort. Preferably, however, the base is somewhat smooth such that the attached electronic device may be rotated at will with the base "floating" in the user's palm. The stem or grip may be positioned symmetrically on the base about one plane, or two planes, i.e., centered. In the latter example, the stem would be placed between the user's fingers so that the base can rotate about the midpoint to provide a feel that is not dependent on the orientation of the electronic device.

It is one aspect of embodiments of the present invention to provide a positioning grip that is adapted to rotate, translate, and/or tilt. More specifically, one embodiment of the present invention is rotatably interconnected to the dock. Thus the base and associated grip and support are adapted to rotate relative to a fixed portion of the dock. Those of skill in the art will appreciate that the rotated orientation of the electronic device may be selectively fixed by actuation of a locking mechanism integrated into the dock that would prevent further rotation of the interconnected electronic device. In one embodiment, the rotational lock is actuated by a user's thumb or finger. Similarly, one embodiment of the present invention allows the interconnected electronic device to tilt relative to the positioning grip. For example, the dock may include a hinge mechanism that allows the electronic device to be angulated relative to the grip. Again, a desired angle may be fixed by actuation of a locking mechanism associated with the dock or positioning grip. The tilting/rotating mechanism described herein may be combined into one system that allows for rotation, translation, and angulation of the interconnected electronic device relative to the grip or dock.

It is another aspect of embodiments of the present invention to provide a positioning grip that allows for secure interconnection to a horizontal or vertical surface. More specifically, one embodiment of the present invention includes a support, with a suction cup or other mechanism for interconnecting the positioning grip, interface and interconnected electronic device, to a horizontal or vertical surface. The contemplated support will interconnect to many surfaces and thus allows the attached electronic device to be used in automobiles, treadmills, on airplane tray tables, etc. The grip may include a support with a bulbous end that is operably interconnected to a fixed base that is placed on, or integrated into, a table or wall. The end bulbous of the support may also allow swiveling or tilting. The dock may, alternatively, be interconnected to a fixed receiving member that is attached to the back of a car seat, a dash board, a wall, a table, a tripod, a telescoping stand, an articulating stand (as often used in conjunction with lamps), etc.

It is one aspect of embodiments of the present invention to provide a device for selectively positioning an electronic device, comprising: a dock; a first arm having a first end operably interconnected to the dock and a second end adapted for interconnection to an edge of

the electronic device, the first arm having a first position of use wherein the second end is located adjacent to the dock and a second position of use wherein the second end is engaged onto the electronic device; a second arm having a first end operably interconnected to the dock and a second end adapted for interconnection to an edge of the electronic device, the second arm having a first position of use wherein the second end is located adjacent to the dock and a second position of use wherein the second end is engaged onto the electronic device; and wherein the dock is adapted to be engaged onto the back surface of the electronic device and the second end of the first arm and the second end of the second arm are engaged to the edge of the electronic device.

It is another aspect of embodiments of the invention to provide a device for selectively positioning an electronic device, comprising: a dock; a first means for extending operably interconnected to the dock, the first means for extending a first end associated with the dock and a second end that has a means for interconnecting that is adapted to engage an edge of the electronic device; a second means for extending operably interconnected to the dock, the second means for extending a first end associated with the dock and a second end that has a means for interconnecting that is adapted to engage an edge of the electronic device; and wherein the dock is adapted to be engaged onto the back surface of the electronic device and the second end of the first arm and the second end of the second arm are engaged to the edge of the electronic device.

It is still yet another aspect of embodiments of the present invention to provide a method of securing an electronic device interface to an electronic device, the electronic device interface comprising: a dock, a first arm that is selectively deployable from the dock, and a second arm that is selectively deployable from the dock, comprising: positioning the dock against a rear surface of the electronic device; extending the first arm from the dock; extending the second arm from the dock; engaging an outer end of the first arm to the electronic device; and engaging an outer end of the second arm to an edge of the electronic device.

The Summary of the Invention is neither intended nor should it be construed as being representative of the full extent and scope of the present invention. Moreover, references made herein to "the present invention" or aspects thereof should be understood to mean certain embodiments of the present invention and should not necessarily be construed as limiting all embodiments to a particular description. The present invention is set forth in various levels of detail in the Summary of the Invention as well as in the attached drawings and the Detailed Description of the Invention and no limitation as to the scope of the present invention is intended by either the inclusion or non-inclusion of elements, components, etc. in this Summary

of the Invention. Additional aspects of the present invention will become more readily apparent from the Detail Description, particularly when taken together with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and together with the general description of the invention given above and the detailed description of the drawings given below, serve to explain the principles of these inventions.

Fig. 1 is a top perspective view of a mobile device positioning grip and associated electronic device storage case;

Fig. 2 is a top perspective view of a mobile device positioning grip and associated electronic device case;

Fig. 3 is a perspective view of a mobile device positioning grip and associated electronic device case of another embodiment of the present invention;

Fig. 4 is a top perspective view of the mobile device positioning grip and associated electronic device case of another embodiment of the present invention;

Fig. 5 is a top perspective view of a mobile device positioning grip and associated electronic device case of yet another embodiment of the present invention;

Fig. 6 is a rear perspective view of a mobile device positioning grip and associated case in a portrait viewing position;

Fig. 7 is a rear perspective view of a mobile device positioning system of another embodiment of the present invention;

Fig. 8 is a top plan view of Fig. 7;

Fig. 9 is a side elevation view of Fig. 7;

Fig. 10 is a perspective view of a user's hand positioned in the mobile device positioning system of Fig. 7;

Fig. 11 is a perspective view of a user's hand positioned in the mobile device positioning system of Fig. 7;

Fig. 12 is a side perspective view showing a mobile device positioning unit and associated electronic device oriented for portrait typing;

Fig. 13 is a rear perspective view showing a mobile device positioning unit and associated electronic device oriented for portrait typing;

Fig. 14 is a rear perspective view showing a mobile device positioning unit and associated electronic device oriented for landscape typing;

Fig. 15 is a side elevation view showing a mobile device positioning unit and associated electronic device oriented for landscape typing;

Fig. 16 is a side elevation view showing a mobile device positioning unit and associated electronic device oriented for landscape typing;

Fig. 17 is a side perspective view showing a mobile device positioning unit having a deployable stand and associated electronic device in a portrait typing position;

Fig. 18 is a front perspective view showing a mobile device positioning unit having a deployable stand and associated electronic device in a portrait typing position;

Fig. 19 is a rear perspective showing a mobile device positioning unit having a deployable stand and associated electronic device in a portrait viewing position;

Fig. 20 is a side elevation view showing a mobile device positioning unit having a deployable stand and associated electronic device in a portrait viewing position;

Fig. 21 is a side perspective view showing a mobile device positioning unit having a deployable stand and associated electronic device in a landscape typing position;

Fig. 22 is a top perspective view showing a mobile device positioning unit having a deployable stand and associated electronic device in a landscape typing position;

Fig. 23 is a front perspective view showing a mobile device positioning unit having a deployable stand and associated electronic device in a landscape viewing position;

Fig. 24 is a rear perspective view showing a mobile device positioning unit having a deployable stand and associated electronic device in a landscape viewing position;

Fig. 25 is a rear perspective view of a mobile device positioning unit and associate a case of yet another embodiment of the present invention;

Fig. 26 is a rear perspective view of the mobile device positioning unit engaged onto a user's hand;

Fig. 27 is a rear perspective view of the mobile device positioning unit of Fig. 25 shown in a portrait viewing position;

Fig. 28 is a rear perspective view of a mobile device positioning unit having a deployable stand shown in a landscape viewing orientation;

Fig. 29 is a perspective view of another embodiment of the of the invention;

Fig. 30 is a perspective view of the embodiment shown in Fig. 29 shown in a deployed state;

Fig. 31 is a perspective view similar to Fig. 30 wherein arms have been deployed;

Fig. 32 is a perspective view showing the embodiment of Fig. 29 holding an electronic device;

Fig. 33 is a bottom perspective view of Fig. 32;

Fig. 34 is a perspective view showing the embodiment of Fig. 29 shown interconnected to a table.

Fig. 35 is a perspective view of another embodiment of the present invention;

Fig. 36 is a bottom perspective view of Fig. 35;

Fig. 37 is a perspective view of the embodiment of Fig. 35 installed on a horizontal surface;

Fig. 38 is a perspective view showing the support in a folded and stored configuration;

Fig. 39 is a perspective view of another embodiment of the present invention that employs two support arms;

Figs. 40 is a side elevation view of Fig. 39;

Fig. 41 is a perspective view of the embodiment of Fig. 39 in a retracted state;

Fig. 42 is a rear elevation view of another embodiment of the present invention;

Fig. 43 is a side elevation view of Fig. 42;

Fig. 44 is a rear elevation view of another embodiment of the present invention;

Fig. 45 is a side elevation view of Fig. 44;

Fig. 46 is a perspective view of another embodiment of the present invention that is associated with a mount;

Fig. 47 is a perspective view of another embodiment of the present invention that is associated with a tripod attachment;

Fig. 48 is a top plan view of one embodiment of the present invention;

Fig. 49 is a cross-sectional view of Fig. 48;

Fig. 50 is a perspective view of another embodiment of the present invention that utilizes selectively positionable surfaces;

Fig. 51 is an elevation view of Fig. 50;

Fig. 52 is a perspective view of another embodiment of the present invention;

Fig. 53 is a front elevation view of Fig. 52;

Fig. 54 is a perspective view of another embodiment of the present invention;

Fig. 55 is a front elevation view of Fig. 54;

Fig. 56 is a perspective view of a positioning grip and associated mount of another embodiment of the present invention;

Fig. 57 is a perspective view of a positioning grip and associated mount of another embodiment of the present invention;

Fig. 58 is a perspective view showing button actuated pistons of one embodiment of the present invention;

Fig. 59 is an exploded view of the mount and associated positioning grip of one embodiment of the present invention;

Fig. 60 is a detailed view of Fig. 59;

Fig. 61 is a rear perspective view of the positioning grip and mount interconnected to an electronic device wherein the electronic device is positioned in a portrait orientation;

Fig. 62 shows the positioning grip and associated mount interconnected to an electronic device in a landscape orientation;

Fig. 63 is an exploded perspective view showing another embodiment of the present invention;

Fig. 64 is a perspective view showing the embodiment of Fig. 63 interconnected to a monkey tail shaped support;

Fig. 65 is a perspective view showing the embodiment shown in Fig. 63 associated with a domed support;

Fig. 66 is a perspective view showing the embodiment of Fig. 63 interconnected to an electronic device;

Fig. 67 is a partial perspective view of the embodiment of Fig. 63 showing an oval shaped piston mechanism wherein a top portion has been omitted for clarity;

Fig. 68 is another embodiment of the present invention that utilizes an electronic pumping mechanism;

Fig. 69 is a detailed view of an alternate click and lock system;

Fig. 70 is a perspective view showing the mount and associated positioning grip of one embodiment of the present invention that utilizes the piston actuated suction mechanism;

Fig. 71 is a perspective view showing a device attachment member of one embodiment of the present invention;

Fig. 72 is a front perspective view of the device attachment member of one embodiment of the present invention;

Fig. 73 is a detail perspective view showing a mount having a click and lock system for interconnection to the device attachment member;

Fig. 74 is an exploded perspective view showing the interconnection of a positioning grip utilizing a click and lock system directly to the device attachment member;

Fig. 75 is a detail view of Fig. 74;

Fig. 76 is an unexploded perspective view similar to that of Fig. 74;

Fig. 77 is a rear perspective view of the device attachment member of one embodiment of the present invention;

Fig. 78 shows a user with a device attachment member and associated positioning grip resting on their lap;

Fig. 79 is a view showing the user's hand engaged on to the positioning grip and mount;

Fig. 80 is a perspective view showing support mounts received onto the device attachment member;

Fig. 81 is a rear perspective view of the device attachment member that has a plurality of rails;

Fig. 82 is a rear perspective view of the device attachment member accommodating a plurality of decorative features;

Fig. 83 is an exploded perspective view of an electronic device interface and associated positioning grip of one embodiment of the present invention;

Fig. 84 is a front elevation view of the electronic device interface shown in Fig. 83;

Fig. 85 is an exploded perspective view of an electronic device interface and associated positioning grip of another embodiment of the present invention;

Fig. 86 is a front elevation view of Fig. 85;

Fig. 87 is an exploded perspective view of an electronic device interface and associated positioning grip of another embodiment of the present invention;

Fig. 88 is a front elevation view of Fig. 87;

Fig. 89 is a perspective view of an electronic device interface with interconnected positioning grip, similar to that shown in Fig. 87;

Fig. 90 is an exploded perspective view of the electronic device interface and associated positioning grip of another embodiment of the present invention;

Fig. 91 is a perspective view of the electronic device interface and associated positioning grip of another embodiment of the present invention;

Fig. 92 is a perspective view showing the electronic device interface of Fig. 91 interconnected to an electronic device;

Fig. 93 is an exploded perspective view of an electronic device interface and associated positioning grip of another embodiment of the present invention;

Fig. 94 is a rear elevation view of an interface of another embodiment of the present invention;

Fig. 95 is a perspective view of an electronic device interface of another embodiment interconnected to an electronic device;

Fig. 96 is a front elevation view of Fig. 95;

Fig. 97 is a top plan view of the electronic device interface of Fig. 95 in a collapsed state;

Fig. 98 is a side elevation view of Fig. 97;

Fig. 99 is a top plan view of the electronic device interface similar to that of Fig. 95 wherein a top portion of the dock has been removed;

Fig. 100 is a perspective cross section of the dock of the embodiment shown in Fig. 95 in a first, open position;

Fig. 101 has a perspective view of the dock wherein primary arms are deployed;

Fig. 102 is a perspective cross section of Fig. 101 wherein a top portion of the dock is in a second, closed position of use wherein the primary arms are locked relative to the dock;

Fig. 103 is a perspective cross sectional view showing the top portion of the dock is in a second locked position of use;

Fig. 104 is a detailed view of a deployed primary arm and a partially deployed secondary arm;

Fig. 105 is a top perspective view showing one of the primary and secondary arms fully deployed and associated with an edge of the electronic device;

Fig. 106 is a detail view showing the fingers of the secondary arm associated with the edge of an electrical device;

Fig. 107 is a top perspective view showing the release button;

Fig. 108 is a perspective view showing a grip interconnected to the dock;

Fig. 109 is a perspective view of an electronic device interface of another embodiment interconnected to an electronic device;

Fig. 110 is a front elevation view of Fig. 109;

Fig. 111 is a top perspective view of Fig. 109 wherein a top portion of the dock is omitted for clarity and the arms are in a non-deployed state;

Fig. 112 is a top perspective view similar to Fig. 111 wherein a top portion of the dock is omitted for clarity and the arms are deployed and interconnected to the electronic device;

Fig. 113 is a bottom perspective view of a mount interconnected to a small electronic device such as a cellular phone;

Fig. 114 is a top perspective view of Fig. 113; and

Fig. 115 is a rear perspective view of Fig. 113 showing the support propping the electronic device.

To assist in the understanding of one embodiment of the present invention the following list of components and associated numbering found in the drawings is provided herein:

#	Component	#	Component
2	Mobile device positioning unit	304	Device attachment member
6	Base plate	308	Primary surface
10	Rail	312	Lip
14	Storage case	316	Aperture
18	Electronic device	320	Thread
22	Palm rest	324	Thread
26	Strap	328	Hand
28	Hand	332	Fingers
30	Slide trigger	336	Thumb
34	Rotation trigger	340	Mount
38	Release trigger	344	Strap
42	Border	348	Rail
44	Arm	352	Decorative feature
46	Clip	402	Electronic device interface
50	Ring	406	Electronic device
54	Stand	410	Dock
58	Groove	414	Arm
102	Support system	418	Finger
106	Stem	422	Edge
110	Housing	426	Fitting
114	First end	430	Base
118	Second end	434	Grip
122	Ball	438	Stem
126	Socket	442	Support
130	Hub	446	Positionable surface
134	Arm	450	Recess
138	Gripping mechanism	454	Cavity
142	Electronic device	458	Back surface
146	Clamp	462	Longitudinal axis
148	Ratcheting Mechanism	466	Outer surface

#	Component	#	Component
150	Flat surface	470	Connector
154	Notch	472	Straps
158	Mount	474	Hand
162	Tripod	478	Finger
166	Leg	482	Thumb
202	Positioning grip	502	Electronic device interface
204	Electronic device	506	Electronic device
206	Stem	510	Dock
210	Support	518	Finger
214	Base	522	Edge
218	Flange	526	Fitting
222	Suction mechanism	554	Cavity
224	Suction cup	558	Hinge
226	Ring	562	Button
230	Piston	566	Spring housing
234	Arm	570	Screw
238	Positionable surfaces	572	Rail
246	Head	576	Toothed portion
250	Tapered edge	580	Outer wall
254	Lever	586	Top portion
258	Mount	590	Bottom portion
262	Cylinder	594	Top latch
266	Piston	598	Bottom latch
270	Button	602	Primary arm
274	Recess	606	Cavity
278	Outer threads	610	Secondary arm
282	Internal threads	620	Sliding hinge
286	Ball	624	Protrusion
290	Ring	628	Grip
294	Pin	632	Teeth
298	Actuating ring	636	Release button
302	Protrusion		

It should be understood that the drawings are not necessarily to scale. In certain instances, details that are not necessary for an understanding of the invention or that render other details difficult to perceive may have been omitted. It should be understood, of course, that the invention is not necessarily limited to the particular embodiments illustrated herein.

DETAILED DESCRIPTION

Fig. 1 shows a mobile device positioning unit 2 ("unit") of one embodiment of the present invention. The unit 2 is comprised of a base plate 6 that is selectively interconnected to rails 10. The rails are interconnected to a storage case 14 that receives and protects an electronic device 18. The base plate 6 is also interconnected to a palm rest 22 that fits comfortably in a user's palm. The palm rest 22 may be capable of being inflated or deflated to accommodate hands of different sizes and shapes. Further, the palm grip, or other portions of the unit, may include a speaker system that amplifies the sound provided by the electronic device. The palm rest may also have one or more storage areas for the storage of batteries, screen wipes, business cards, etc. The user's hand is secured to the palm rest 22 by a strap 26. A plurality of sliding triggers 30 are provided that when depressed allow the base plate 6 to slide along the rails 10. Further, rotation triggers 34 are included that when depressed allow the palm rest 22 to rotate relative to the base plate 6. In some embodiments of the present invention the base plate 6 is selectively releasable from one or both rails 10. When released from one rail, the base plate 6 may be rotated away from the storage case and about the other to become a stand for positioning the storage case 14 and associated electronic device in portrait or landscape orientation, which will be described in further detail below.

When one or both slide triggers 30 are depressed, in some embodiments by a user's thumb, the palm rest is able to slide along the rails 10. Released of the slide triggers 30 will lock the palm rest in place. Similarly, when the rotation trigger 34 is depressed, the electronic device will rotate relative to the palm rest. Plate release triggers 38 may also be integrated into the base plate 6 that release the base plate 6 from a corresponding rail. When released, the base plate 6 is able to rotate away from the case 14 about the still-connected rail such that the base plate 6 becomes a stand that supports the electronic device for horizontal and vertical viewing. When both release triggers 38 are depressed, the base plate 6 is removable and can be mounted to another storage case 14. The base plate 6 may also include friction-enhancing border 42, i.e., mode of rubber, which prevents slippage when the base plate is used as a stand. Although the rotation, release, and slide triggers are shown in particular locations, such triggers may be

incorporated in any manner on the unit 2. For example, the release triggers may be incorporated into a clip associated with the strap 26 instead of located under the base plate.

Fig. 2 shows another embodiment of the present invention wherein the slide triggers 30 are recessed to allow the user's thumb to be more comfortably positioned. The slide triggers 30 may also be located inside a palm rest. The rotation trigger 34 of the is embodiment of the present invention is positioned as shown in the embodiment of the invention described above.

Referring to Fig. 3, another embodiment of the present invention is shown similar to those described above. However, the slide triggers 30 are recessed and activated by pressing against a clip that secures the strap 26. Further, additional ergonomic support has been added to increase the shape of the palm rest 22. Here the rotation trigger 34 is recessed and may also be hidden within the fabric of which the palm rest 22 is comprised.

Fig. 4 shows yet another embodiment of the present invention wherein the slide triggers 30 are positioned outside of the palm rest fabric and the clip 46 to which the strap 26 is interconnected functions as a slide trigger 30. This embodiment combines the trigger mechanism of the first and third embodiment described above. Further, the rotation trigger 34 is brought outside and blends in with the slide triggers 30.

Fig. 5 shows yet another embodiment of the present invention wherein the slide triggers 30 are smooth and are actuated by pressing inwardly. The strap 26 attaches inside the slide triggers 30. In addition, the rotation trigger 34 is also smooth. All triggers are flush on the top surface allowing the device to sit flat when turned over. When the mobile device positioning unit 2 is transitioned towards an end of the rails 10, the stored electronic device will be positioned for portrait typing orientation. As one of skill in the art will appreciate, by moving the palm rest 22 along the rails 10, the angle of inclination of the electronic device will be altered.

Fig. 6 shows how the positioning unit 2 may be used as a stand for viewing wherein the base plate 6 has been separated from one rail by pressing one of the release buttons 38. The base plate 6 is then rotated away from the storage case to form a stand for supporting the storage case 14 in a portrait position. A border edge 42 of the base engages a horizontal surface which orients the electronic device for landscape viewing.

Figs. 7-11 show yet another embodiment of the present invention that is secured to the electronic device 18 (or storage case) by a plurality of arms 44. Here, the storage case 14 employs a palm rest 22 that is rotatably interconnected to a base plate 6. A strap 26 is also provided to help secure a user's hand 28. This embodiment also does not employ multiple

trigger mechanisms. This embodiment may include one or more triggers and associated mechanisms that allow the palm rest 22 to rotate relative to the arms 44.

Figs. 12-16 show how this embodiment of the present invention can be used for portrait typing (Figs. 12 and 13), landscape viewing (Fig. 16), landscape typing (Figs. 14 and 15), etc. Here, the palm rest 22 is rotated away from the storage case 14 and the ring 50. The angle between the palm rest 22 and a fixed ring 50 will define the electronic device 18 inclination. For example, for viewing, the palm rest 22 is rotated away from the fixed ring 50 so that a portion of the palm rest 22 can be engaged onto a table which will prop the electronic device at a desired angle.

Figs. 17-24 show an embodiment of the present invention that employs a deployable stand that allow the user to effectively alter the length of the palm rest 22. The stand 54 has an edge that engages a table to prop the electronic device 18 at a desired inclination. The stand 54 can be used to hang the electronic device 18.

Figs. 25-28 show yet another embodiment of the present invention wherein the rails are more aptly described as recesses, channels, or grooves 58 that are integrated into the storage case 14. The base plate 6 includes protrusions that are inserted into the grooves 58, thereby allowing the base plate 6 to move laterally along the length of the storage case 14. In this embodiment, as shown in Figs. 27 and 28, the palm rest 22 is selectively removable from the ring 50 to provide a stand for viewing. The palm rest 22 may also employ a stand 54.

Referring now to Figs. 29-34, a mobile electronic device support system 102 of another embodiment of the present invention is shown that includes a stem 106 that is rotatably interconnected to a housing 110. In addition, a clamp 146 is selectively deployable from the housing 110 and is used to associate the support system 102 with a table, for example. The stem 106 includes at least two arms 134 that selectively deflect outwardly to accept the electronic device 142. The clamp 146 is connected via a ratcheting mechanism 148 to the housing 110 and is deployed therefrom to interconnect with a table or other similar surface 150. To provide a plurality of viewing angles, the arms are connected to a hub 130 that is able to rotate relative to the stem 106. Upon review of the related embodiments described below, one of skill in the art will appreciate that other devices, such as an image projector, speakers, a power source, etc., may be integrated into the housing 110, arms 134, or stem 106 of this embodiment of the present invention.

Referring now to Fig. 35, the mobile electronic support system 102 of another embodiment of the present invention is shown that includes a stem 106 that is rotatably interconnected to a housing 110. The stem 106 comprises a first end 114 and a second end 118

wherein the second end comprises a ball 122 that interfaces with a socket 126 of the housing 110. The ball 122 along with the stem is able to retract into the housing 110 and is locked into place relative to the housing 110 when in use with a locking ring, chuck, or collet (not shown). The stem 106 is thus able to translate along the longitudinal axis of the housing 110 for storage when the locking mechanism is not engaged. The first end 114 of the stem 106 is interconnected to a hub 130. The hub 130 rotatably receives a plurality of arms 134 that terminate in fingers or other gripping mechanisms 138 for association with an electronic device 142. The arms 134 may be somewhat flexible or telescoping. Further, the housing 110 includes a clamp 146 or other mechanism for association with a table or other piece of furniture.

Fig. 36 shows the support system 102 associated with a flat surface 150, such as a table. Here, the clamp 146 is used to grasp the flat surface 150 wherein the housing 110 extends therefrom. The stem 106 also extends from the housing 110 and is adapted to rotate and angulate as shown in Fig. 36. Fig. 36, more specifically, shows the stem 106 angulated relative to the housing 110 wherein the arms 134 position the electronic device 142 in an orientation that emulates a podium. Referring now to Figs. 37 and 38, storage of the support system 102 is shown wherein the arms 134 are folded downwardly such that the gripping mechanisms 38 are positioned adjacent to the stem 106. The hub 130 and first end 114 of the stem 106 are then transitioned downwardly into the housing 110 to conceal the same. The resultant configuration is designed to fit in a purse, for example, and is sleek and streamlined.

Figs. 39-45 show other configurations of the support that includes two, three, and four arms 134, respectively. Each of the arms terminate in a gripping member that preferably engages the corners of the electronic device. The gripping members shown are designed such that they are adapted to secure the corners of the electronic device. However, those skilled in the art will appreciate that the gripping mechanisms may be multi-faceted, such that the outer edges of the electronic device may also be engaged with equal holding force. The arms of this configuration are spring loaded or biased towards each other such that when not holding electronic device, the ends tend to meet for storage within the housing. The biasing mechanism of these embodiments are such that a user can easily deploy the arms for receipt of the electronic device.

Other embodiments of the present invention do not employ a biasing mechanism wherein the arms are fixed relative to each other by other means, such as a locking ring or linkage (not shown). For example, after the gripping members or mechanisms are engaged onto the electronic device, the locking device is used to maintain the position of the arms. Further, the arms may be associated with each other and/or the stem with disks having serrated teeth that

mesh. A pin, a bolt, a screw, or other fastening device is used to selectively secure one disk and associated arm relative to another (see, for example, U.S. Patent No. 4,620,532, which is incorporated by reference herein). It is contemplated that electronic devices of various sizes coincide with differing arm positions. Once the gripping mechanisms or members are placed around an electronic device, the screw is tightened to lock the disks and arms relative to each other, thereby firmly securing the electronic device.

The arms shown in Figs. 37-45 are also more rigid than those described above, but can possess some inherent flexibility. Further, the arms may be telescoping to accommodate electronic devices of various sizes. A ball 122 is also included that interfaces with the housing 110. In this embodiment of the present invention, the housing 110 is interconnected to a desk or other piece of furniture by way of a clamp 146 that is comprised of a notch 154 in the housing and a bolt 158 that selectively interfaces with the end of the housing 110.

Fig. 46 shows another embodiment of the present invention that does not utilize a clamp. More specifically, a mount 158 is provided that is weighted, suctioned, or otherwise associated with a table. The mount 158 may be fixed to the table. In one embodiment of the present invention, a suction indicator is used to ensure proper suction is maintained so that the support system 102 does not topple over and damage the often-expensive electronic device 142. Those of skill in the art will appreciate that a swivel joint, such as a ball joint may be employed between the mount 58 and the housing 10 to provide additional display functionality.

Fig. 47 shows the support 102 of one embodiment selectively interconnected to a tripod 162 having a plurality of legs 166. The tripod 162 is selectively interconnected to the housing 110 and may be fixed thereto by a set screw, a pin, etc. The legs 166 are capable of folding adjacent to the housing when not in use. One of skill in the art will appreciate that the legs 166 may be integrated directly into the housing 110.

In one embodiment of the present invention, the housing is made of injection-molded plastic and is less than about 12 inches long and less than about 2.75 inches in diameter. It can also be made of metal or any other material used for mechanical components. The stem of this embodiment of the present invention is made of injection-molded plastic and is about 3 inches long. It can also be made of metal or any other material used for mechanical components. The ball associated with the stem is approximately 1.8 inches in diameter, which generally coincides with the inner diameter of the housing. The arms of the embodiments shown in Figs. 1-3 are made of sheet metal while the arms shown in Figs. 7-9 are made of injection-molded plastic. The elastomeric material used in conjunction with the gripping mechanism is a thermoplastic elastomer with a Shore Durometer of between about 10 and 90 on the A scale and a coefficient

of friction of greater than about 0.4 when in contact with the surfaces of materials typically used for electronic device housings or their covers such as aluminum, various types of injection-molded plastic, painted surfaces, plastic sheeting, foams, and elastomers, but can be any other gripping material known in the art. The length of the arms should be long enough to accommodate an electronic device, but may be telescoping to accomplish this task. This embodiment is capable of clamping onto electronic devices having widths from about 50mm (2 inches) to about 300mm (12 inches) and thicknesses from about 1mm to about 10mm. This embodiment is capable of clamping onto the sides of the electronic device or on its corners. In addition, the arms must be easily folded downwardly adjacent to the stem to fit within the housing. The present invention can have an element that can be tightened to ensure that the arms securely grip the electronic device. Embodiments of the present invention can have a rotation control element that allows the gripped electronic device to be easily rotated from a portrait to a landscape viewing mode or vice versa. The rotation control element could be self powered, it could also be remote or voice controlled. The present invention can include a carrying strap.

Figs. 48 and 49 show a positioning grip 202 of one embodiment of the present invention that selectively interconnects to an electronic device 204. The positioning grip 202 includes a stem 206 having a support 210 on one end and a base 214 on the other end. The base 214 is interconnected to a flange 218 that is associated with a suction cup mechanism 222, which may be comprised of an elastomeric suction cup 224, and a rotating ring 226 that actuates the suction cup mechanism 222. More specifically, a piston 230, which is associated with the ring 226, is deflected upwardly when the ring 226 is rotated to pull the suction cup upwardly and to create a vacuum between the suction cup 224 and the interconnected electronic device 204. Those skilled in the art will appreciate, that a lever mechanism interconnected to the piston 230 may be employed without departing from the scope of the invention (see, for example, Fig. 6). To release the suction, a suction cup release 232 is pulled or otherwise actuated to allow air to enter the space between the suction cup 224 and the electronic device, thereby breaking the seal.

The support 210 may include at least one arm 234 that is adapted to engage a surface. Those of skill in the art will appreciate that the arms 234 may also be used to hang the portable electronic device from a vertical surface, for example. One of skill in the art will also appreciate that any number of arms 234 may be provided.

In one embodiment of the present invention shown in Figs. 50 and 57, selectively positionable surfaces 238 are employed that may be made of a flexible wire frame that is overmolded with a soft, comfortable material, such as silicone. The positionable surfaces 238

may thus be selectively formed to facilitate support of the electronic device. Further, the surfaces 238 may be interconnected to a flexible stem 206 to provide additional interconnection schemes. One of skill in the art will appreciate that the positionable surfaces 238 may be selectively interconnected to the stem 206 wherein supports of different shapes may be interchangeably interconnected to the stem 206 depending on the desires of the user. For example, a support 210 that is ideal for use in typing or viewing of the portable electronic device may not be suitable for selectively interconnecting the device to a podium or treadmill.

Referring again to Figs. 48-51, in operation, a user places the positioning grip 2 onto the back surface of the electronic device 242 and rotates the ring 226 to actuate the suction mechanism 222 that firmly interconnects the positioning grip 202 to the electronic device 242. The positioning grip 202 remains in place until the suction cup release 232 is actuated. The user is then able to move the arms 234 (or surfaces 238) of the support 210 to position the electronic device 242 as desired. One skilled in the art will appreciate that the base 214 may also be adapted to rotate and/or angulate relative to the electronic device 242. For example, the base may be rotatably and/or hingedly interconnected to the flange 218 to provide further positioning options.

Figs. 52-55 show an alternate embodiment of the present invention wherein the base 214 is associated with an elongated stem 206 and head 246. The head 246 may have a tapered edge 250 to facilitate engagement of the positioning device onto a table. For example, the head 246 may also interconnect to a stationary base with a socket (not shown) that provides rotation and angulation to the positioning grip 202 and interconnected electronic device, similar to a ball and socket joint. The base 214 may be of such a size and shape to fit comfortably in a user's palm. The base may also include padding or be made of a compliant material to increase user comfort. The embodiment of Fig. 6 further employs a suction mechanism 222 wherein suction is created when a lever 254 is actuated, a system well known in the art.

Referring now to Figs. 56-70, another embodiment of the present invention is shown wherein the positioning grip 202 is selectively interconnectable to a mount 258 that further interconnects to the electronic device 204. The mount 258 accommodates the suction mechanism 222 or other interconnection device. The suction cup 224 of the suction mechanism 222 may be actuated in any fashion known, including those described above. In one embodiment, however, the suction cup 224 is pneumatically associated with at least one cylinder 262 having a finger-actuated piston 266. The piston 266 may be associated with a single button 270 or a plurality of buttons wherein movement of the piston 266 evacuates air from the mount

258, thereby producing a vacuum between the suction cup 224 and the electronic device 204. In one embodiment, however, the suction cup 224 is actuated by an electronically actuated piston.

The mount 258 includes a recess 274 or other attachment point for receipt of the base 214 of the positioning grip 202. The base 214 as shown may be smaller than those shown in Figs. 48-55. The base may be omitted wherein the stem 206 interconnects directly into the mount 258. Furthermore, the base 214 includes a plurality of outer threads 278 that engage internal threads 282 incorporated into the mount 258 to secure the positioning grip 202 onto the mount 258. As described above, the base 214 is associated with a stem 206, which may be selectively deflectable, and that terminates in head and/or arms 234, which also may be selectively deflectable. One of skill in the art will appreciate that the base 214 may be interconnected to the mount 258 by various ways, such as a bayonet fitting, magnets, Velcro®, twist locks, snap locks, clock and lock systems, or any other similar interconnection schemes. The embodiment of the present invention shown in Figs. 9-16, thus, has the advantage of allowing the positioning grip to be altered at will.

Figs. 59 and 60 show another embodiment of the present invention that uses a click and lock system to secure the positioning grip 202 to the mount 258. More specifically, one way contemplated to interconnect the base 214 of the positioning grip to the mount 258 is via a series of selectively movable members that move radially with respect to the base 214. Here, as shown in Fig. 21, a series of selectively positionable spring biased balls 286 are integrated into a ring 290 that fits within the recess 274 of the mount 258. The mount 258 includes a plurality of holes or slots (not shown) for receipt of the balls 286. In operation, the base 214, which is interconnected to the ring 290, is rotated, or the orientation of the ring 290 relative to the mount 258 is otherwise modified, to move the balls 286 into the slots provided by the mount 258 to lock the positioning grip 202 relative to the mount 258. The balls 290 may also be moved or released by actuation of a button integrated onto the positioning grip or the mount. In other embodiments, the balls 290 are moved so that the positioning grip can be interconnected to the mount by a downward force that deflects the balls 290 inwardly into the ring 286 so that the ring 286 can pass into the recess 274. After the ring 286 is positioned in the mount 258, the balls 290 are then able to deflect outwardly into a hole, a groove, or slot associated with the recess 274 when slots or grooves are used, the base 214 is able to rotate relative to the mount 258.

With specific reference to Fig. 69, a series of pins 294 are utilized along with an actuating ring 298 that is associated with the positioning grip 202. The actuating ring 298 includes a plurality of protrusions 302 that are designed to engage with the pins 294 such that

movement of the actuating ring 298, i.e., rotation, will move the pins 294 in such a way to allow for selective interconnection of the positioning grip 202 to the mount 58.

Figs. 63-68 show yet another embodiment of the present invention that employs a mount 258 that conceals a suction mechanism 222 similar to that described above. Here, however, the suction mechanism 222 is shaped as an oval and may include one or a plurality of individual pistons (not shown). The button 270 used to actuate the pistons is spring-loaded relative to the mount 258. The mount has a recess 274 for the receipt of a positioning grip 202 and base 214 similar to that shown in Figs. 59 and 60, for example. The interconnection system shown is similar to that of a bayonet fitting (see also Figs. 83-108 for similar interconnection methods). The tail may be of a whale shape, as shown above, or take on various other shapes such as a monkey tail (Fig. 64) or a dome (Fig. 65).

Other embodiments of the present invention employ an electrical motor that provides a vacuum instead of a plurality of pistons. Figs. 66 and 68 show one of those embodiments wherein a user depresses a button or other similar mechanism to create suction that interconnects the mount 258 to the electronic device 204. Alternatively, the electric motor may be turned on and off with a magnet.

This, and other embodiments of the present invention described and shown herein, may employ visual or audio notification means, such as LED lights, that respond to user actions, indicate battery levels, indicate an incoming calls and text messages, etc. Again, this and other embodiments described herein may accommodate a Bluetooth device, speakers, memory storage devices, etc. Still further, this embodiment and other embodiments of the present invention may be capable of communicating with the electronic device to which it is associated. For example, the device attachment member, electronic device interface, support, etc. may use Near Field Communication (NFC) to transmit to the attached electronic device. Such transmission may include sending instruction manuals automatically when the device is attached to the electronic device.

Figs. 71 and 72 show another embodiment of the present invention that utilizes a device attachment member 304. The device attachment member 304 includes a primary surface 108 with a lip 312 extending from at least a portion thereof. The device attachment member 304 is used to envelope and secure a portion of an electronic device and protect the same. More specifically, in one embodiment of the present invention, the device attachment member 304 is made of a shock-resistant material that protects the electronic device if it impacts a hand surface. The device attachment member 304 may also protect the electronic device from the elements. Although shown herein, the device attachment member partially envelopes a least a portion of

the back and sides of an electronic device, one skilled in the art will appreciate that a cover may be associated with the device attachment member 304 to protect the front part of the electronic device. The cover may be opaque or clear and remain associated with the electronic device when in use.

The device attachment member 304 includes at least one aperture 316 that extends through the thickness of the primary surface 308 or that terminates partially therethrough. In one embodiment of the present invention, the aperture 316 includes an internal thread 320 that engages a threaded 324 portion of the mount 258. The base 214 then engages the mount as described above with respect to Figs. 56-70. Again, one skilled in the art will appreciate that the mount may interconnect to the device attachment member 304 in any fashion. For example, bayonet fittings, magnets, click and lock systems, electronic locks, or any other similar system described herein or known in the art may be used.

Similar to that described above with respect to the above, the mount 258 may include a click and lock system for interconnection to the device attachment member 304. Alternatively, the ring 290, which is directly interconnected to the base 214, may be placed directly into the aperture 316 of the device attachment member 304 similar to that described above. Further, with respect to Figs. 75 and 76, the actuating ring 298 having a plurality of protrusions 302 may be provided that actuate pins 294 as described above. In operation, the ring 290 is placed within the aperture 316 such that rotation of the base 214 and associated actuating ring 298 will cause the protrusions 302 to engage the pins 294 to lock them into the slots, for example, provided by the device attachment member 304. One of skill in the art will appreciate that the pins 294 may be spring-loaded such that rotation of the positioning grip will allow the pins 294 to recoil and allow for removal of the positioning grip 202 from the device attachment member 304.

Fig. 70 shows a device attachment mechanism 304 that interconnects directly with the positioning grip 202. That is, the base 214 of the positioning grip 202 interconnects directly with the aperture 316 or mounting location provided by the device attachment member 304. Fig. 70 shows how the positioning grip 202 may be supported by the user's leg to prop the electronic device 204 for use (see Fig. 78).

Fig. 79 illustrates the way a user's hand 328 can engage with the positioning grip 202 and/or a base 214 and mount 258 as described herein. Here, it is illustrated that the user can place the stem 206 between fingers 332 or the fingers and a thumb 336. Alternatively, the user can grip the head or arms, whatever the case may be.

As illustrated by Fig. 80, multiple positioning grips 202, with or without a mount 258, or mounts 340 may interface with one or more apertures 316 or mounting locations to provide

robust interconnection schemes. For example, brackets that are designed to associate with common surfaces may be interconnected to the device attachment member 304 to interconnect the electronic device with an airplane seat tray, the back of a car seat, a piece of gym equipment, a podium, a stand, a tripod, etc. Here, the mounts 340 receive a strap 344 so that the user can strap the electronic device to their hand or use it as a carrying member, i.e., a handle. One of skill in the art will appreciate with respect to the foregoing, that the mounts 340 may be selectively interconnected to the device attachment member via a click and lock system as described above. Further, it is to be appreciated that the user could remove a positioning grip from a mount 258 and interconnect a support thereto to form a strap-receiving mount 340.

In addition, the apertures of the device attachment member may receive hooks or other attachment devices associated with a flexible restraining member, such as a bungee cord. In operation, one end of the flexible restraining member would be associated with one aperture 316 and another end of the flexible restraining member would be associated with another aperture 316 such that the flexible restraining member is taut and positioned adjacent to the primary surface 308. To hold the device attachment member and the associated electronic device, the user would pull the flexible attachment member away from the primary surface 308 and position their hand between the flexible restraining member and the device attachment member. One of skill in the art will appreciate that the flexible restraining member may have a plurality of hooks or other devices for interconnection to the device attachment member and configured similar to a spider web, for example.

As shown in Fig. 81, the device attachment member may include at least one rail 348 for sliding engagement with the mount 258 (or positioning grip, if the mount 258 is omitted). Alternatively, the mounting locations, i.e., apertures 316, may receive rails that may be operatively interconnected to a mount or the base of a positioning grip 202 to allow the positioning grip 202 to slide back and forth in one direction.

Fig. 82 shows that the apertures 116 or mounting locations of the device attachment member 104 may receive decorative items 152 to enhance visual appeal.

Referring now to Figs. 83-108, an electronic device interface 402 is provided that selectively interconnects to an electronic device 406. The electronic device interface 402 is generally comprised of a dock portion 410 with selectively adjustable arms 414. The arms 414 end in fingers 418 that engage edges 422 or corners of the electronic device 406, which secures the electronic device interface 402 to the electronic device 406. To view the electronic device, a user can simply hold the interface. Alternatively, the dock portion 410 includes a fitting 426 that selectively mates with a complimentary fitting of a base portion 30 of a positioning grip

434. The positioning grip 434 further includes a stem 438 that is interconnected to a support 442. One of skill in the art will appreciate that although a bayonet type fitting is shown, other types of selective interconnection systems may be employed without departing from the scope of the invention, such as click lock, magnets, suction, or other selectively interconnection mechanisms known in the art. The arms 414 may also be used to hang or otherwise support the portable electronic device 6 from a vertical surface, for example. One skilled in the art will appreciate that any number of arms may be provided.

The support 442, and stem 438, may be made of flexible wire frame that is over-molded with soft, comfortable material, such as silicone. Further, selectively positionable surfaces 446 associated with the support 442 may be deformed to facilitate support of the electronic device 406 and to provide additional interconnection schemes. One skilled in the art will appreciate that the stem 438 and associated support 442 may be selectively interconnected to the base 430 wherein supports of different shapes may be interchangeably interconnected to the base 430 depending on the desires of the user. For example, support that is ideal for use in typing or viewing of the portable electronic device may not be suitable for selectively interconnecting the device to a podium, wheelchair, treadmill, inside surface of the car, or a movable support.

The stem 438 may be rotatably interconnected to the base 430. Alternatively, the base 430 may be rotatably interconnected to the fitting 426 and/or dock 410. For example, it is contemplated that the base 430 may be able to rotate relative to the dock 410 once interconnected, thereby providing the user with an alternate positioning schemes. Furthermore, some embodiments of the present invention include a base/stem interconnection comprised of a ball and socket joint that allows the stem 438 and interconnected support 442 to angulate relative to the electronic device 406. Although a positioning grip 434 is primarily shown and described in this application, one of skill in the art will appreciate that the electronic device interface 402 may selectively interconnect to other members, devices, or apparatus, such as a mount positioned on a table or a wall, a podium, a telescoping member, a tripod, etc.

Referring now specifically to Figs. 83, 84 and 92, one embodiment of the present invention is shown. Here, the electronic device interface 402 includes a dock 410, which may be shaped somewhat like a puck. The dock includes a fitting 426 that is positioned in a recessed portion 450 of the dock 410 that is adapted to receive the base 430 of the positioning grip 434. The arms 414 are comprised of telescoping members. In some embodiments of the present invention, the arms 414 may be completely concealed within a cavity 454 provided by the dock 410 when not in use.

In operation, the interface 402 is positioned against a back surface 458 of the electronic device 406. Next, the arms 414 are deployed and the fingers 418 are engaged onto the outer edges 422 or corners of the electronic device 406. The fingers 418 may be made entirely or at least partially of an elastomeric material, such as rubber, that enhances the engagement between the fingers 418 and the electronic device. It is contemplated that the arms 414 be biased inwardly wherein they retract into the dock after the fingers 418 are released from the edge, somewhat similar to the mechanism that causes a tape of a tape measure to retract when released. It follows that after the fingers 418 are engaged onto the edge 422 of the electronic device 406, the arms 414 will retract in the same manner, thereby compressing the electronic device 406 between the fingers which secures the interface 402 to the electronic device 406. The contemplated arm tension may be generated by rotating a knob associated with the dock, or rotating another portion of the dock 410, to "wind" the arms into the dock. Other embodiments of the present invention are comprised of at least two deployable resilient bands that function with mechanisms similar to those found on tape measures that interconnect with the edges 422 or corners of the electronic device 406 (see Fig. 94). Furthermore, those of skill in the art will appreciate that although two arms are provided, any number of arms may be employed by the electronic device interface 402 without departing from the scope of the invention.

After the interface is securely engaged onto the electronic device, the positioning grip 434 may be interconnected. In the embodiment shown, the positioning grip 434 is placed upon the fitting 426, which may comprise a bayonet fitting, rotated, and locked in place. Again, other interconnection schemes may be employed.

Figs. 85 and 86 show an alternative embodiment of the present invention wherein the arms 14 are offset relative to each other so that they retract more easily into the dock 410. Further, the fingers 418 associated with this embodiment of the present invention are able to rotate along a longitudinal axis 462 thereof.

Referring now to Figs. 87-89, yet another embodiment of the present invention is shown that employs arms 414 that are of a different configuration than those shown above. Here, the arms 414 include elongated connection points for association with the dock 410. As a result, the fingers 418 are longer and provide increased engagement with an edge of the electronic device.

Fig. 90 shows an embodiment having telescoping arms 414. Furthermore, the fitting 426 portion of this embodiment is extended away from the outer surface 66 of the dock 10. In this instance, the base 30 would have a recess (not shown) for receiving the fitting 426. This embodiment illustrates that other interconnection schemes may be employed without departing from the scope of the invention.

Figs. 91 and 92 show an embodiment of the present invention that is similar to those described above where elongated fingers 418 are provided. In operation, the positioning grip 434 is interconnected to the dock 410 of the electronic device interface 402. One of skill in the art will appreciate that the interconnection between the grip 434 and the interface 402 may be achieved after the interface is interconnected to the electronic device. Next, the arms 414 are deployed and the fingers 418 are engaged onto the outer edge 422 of the electronic device 406 wherein the interface 402 contacts the rear surface 458 of the electronic device. One of the arms is not biased and manually slides in and out of the dock 406. The other arm is biased, which is apt to automatically recoil into the cavity provided by the interface 402. In Fig. 92, for example, the arm on the right is the biased arm that applies the compressive load described above that is connected by the non-biased arm. Again, the tension applied to the electronic device 6 may be selectively altered by twisting a portion of the interface 402, for example.

Fig. 93 shows another embodiment of the present invention. Here, the arms 414 are fixed relative to the dock 410. The fitting 426 is similar to that shown above with respect to Figs. 83 and 84 and the base 430 is received within a recess 450 associated with the dock. Another difference of this embodiment of the present invention is that instead of fingers, a connector 470 is associated with the ends of the arms 414.

Fig. 94 shows another embodiment of the present invention that employs four straps 472 operably interconnected to the dock 410. The straps 472 end in fingers 418, or other interconnection devices that engage the corners or edges of the electronic device 406. The straps 472 recoil into the dock 410 when not in use. Again, the compressive force provided by the straps 472 and associated fingers secure the interface to the electronic device 406.

Referring now to Figs. 95-108 another embodiment of the electronic device interface 502 is shown that employs a two-part dock 510 having a top portion 586 that moves relative to, and selectively locks to, a bottom portion 590. The top portion 586 is spring-biased with respect to the bottom portion 590 and is selectively locked relative thereto by the interconnection of a top latch 594 to a bottom latch 598. The top portion of the dock 586 includes a fitting 526 for receiving a positioning grip similar to the embodiments described above. The bottom portion 590 rests against the electronic device 506. A cavity 554 is provided between the top portion 586 and the bottom portion 590 that selectively receives primary arms 602. The primary arms 602 also include a cavity 606 for receipt of secondary arms 610. The secondary arms 610 terminate in fingers 618 that engage an outer edge of the electronic device. The secondary arms 610 may be designed to rotate relative to the primary arms 602. More specifically, in one embodiment, the secondary arms are free to travel about 30 degrees from parallel. The secondary arms

terminate in fingers 518 that rotate on hinges 558 outwardly to receive the outer edge of the electronic device 506.

Figs. 97-99 show the electronic device interface 502 in a collapsed state, wherein the primary arms 602 and secondary arms 610 are positioned completely within an outer envelope of the dock 510. The telescoping arms contemplated by embodiments of the present invention may expand to reach over twice the diameter of the dock 510, about 2.1:1 ratio of expanded to collapsed width, to engage the outer edges of the electronic device 506. In one embodiment of the present invention, the height of the dock 510 is about 20-24 mm and the diameter is 92 mm. To access the arms, a user initially presses at least one button associated with the dock 510 that exposes the primary 540 and secondary arms 610. The primary arms account for up to 70 mm of expansion of the arms.

Deployment of the primary arms 602 is shown in Figs. 100-102. More specifically, Fig. 100 shows the top portion 586 of the dock 510 in a first, open position of use wherein the top portion 586 is located away from the bottom portion 590 of the dock 510. The top portion 586 of the dock 510 is spring-loaded away from the bottom portion 590 by a spring that is located in a spring housing 566. A screw 570 may be used to alter the spring tension. When the top portion is in this first position of use, an enlarged opening is provided between the top portion 586 and the bottom portion 590 that allow the primary arms 602 to deploy. The primary arms 601 include rails 572 that are received within toothed portions 576 (see Fig. 107). The top portion 586 of the dock 510 has an outer wall 580 that prevents the primary arms 602 from being completely removed from the dock 510. When fully deployed the respective toothed portions 576 of the primary arms 602 are separated from each other. When in a collapsed state, the toothed portions 576 are positioned generally adjacent to each other. The rails act as guides that provide and maintain a significant bearing surface when the primary arms are fully extended. Further, the primary arms account for up to 70 mm of arm expansion.

Referring now to Figs. 104-106, the secondary arms are interconnected to sliding hinges 620 that are accommodated within the primary arms 602. The sliding hinges 620 have two orientations: 1) imbedded within the primary arms and 2) fully extended. When fully extended, the secondary arms are maintained by a spring plunger and detent. The secondary arms are also able to rotate with respect to the primary arms 602 and allow an enhanced engagement between the fingers 518 and the edge of the electronic device 506.

The fingers 518 may include protrusions 624 for engagement with the outer surface of the electronic device as shown in Fig. 105. Further, the fingers 518 include a grip 628 for engagement onto an edge of the electronic device. The grips may be constructed of pads made

of a compressible material such as rubber. The fingers are also hingedly interconnected to the secondary arms and are biased by torsion springs. When the fingers are not engaged onto the electronic device, they automatically retract which allows the secondary arms to be collapsed within the primary arms. In one embodiment the grip is about 50 mm wide.

Once the fingers 518 are located on the edges of the electronic device, the top portion 586 of the dock 510 is deflected towards the bottom portion 590 which forces the top latch 594 into engagement with the spring-loaded bottom latch 598 to lock bottom the top portion 586 of the dock 510 relative to the bottom portion 590.

As shown in Fig. 102, when the top portion 586 is brought downwardly, teeth 632 thereon interface with the toothed portions 576 of the primary arms 602. More specifically, a set of teeth of the primary arms engage with a complimentary set of teeth on the top portion 586 to prevent lateral movement of the sliding arms. Figs. 103 and 107 show a release button 636 that moves the bottom latch 598 inwardly, which separates the bottom latch 598 from the top latch and allows the top portion 586 to move away from the bottom portion. Further, as the top portion 586 moves away from the bottom portion 590, the teeth 632 of the top portion 586 disengage from the toothed portions 576 of the primary arms 602 which allows the primary arms 602 to be collapsed within the dock 510. In operation, after the top portion of the dock is released, the primary arms 602 are initially further expanded to allow the fingers 518 to be removed from the edge of the electronic device. Once the fingers 518 are removed, they are collapse into the secondary arms 610 which are stored within the primary arms 602. The primary arms 602 are then collapsed within the dock 510 for storage.

Fig. 108 shows the interconnected electronic device 506 and interface 502. The interface 502 of this embodiment is designed to hold mobile devices weighing up to about 2.5 pounds, which is the approximate weight of an iPad® in a protective case. The interface is also designed to hold electronic devices ranging in width from about 6-7.5 inches.

Figs. 109-112 show and embodiment that is similar to Fig. 95-108. In this embodiment the secondary arms 610 are arcuate and rotate relative to primary arms 602. The primary arms 602 are similar to the rails described above and may be locked relative to the dock. As shown in Figs. 111 and 112, the primary arms 602 are received within a bottom portion 590 and the secondary arms 610 are folded relative to the primary arms 602, which allows the arms to be completely concealed within the cavity 606.

Figs. 113-115 show a mount 258 that receives a support 202 similar to that shown in Figs. 63-68. Here, the mount 258 is adhered, or otherwise interconnected, to the electronic device 204. Alternatively, the mount 258 may be integrated into the electronic device housing

or an associated protective case. In addition, the mount 258 and/or support 202 may include an auxiliary power source.

While various embodiments of the present invention have been described in detail, it is apparent that modifications and alterations of those embodiments will occur to those skilled in the art. For example, the features and aspects of the provisional applications listed above may be combined with those described herein to yield various ways to provide any number of systems for selective interconnection with an electronic device. However, it is to be expressly understood that such modifications and alterations are within the scope and spirit of the present invention, as set forth in the following claims. Further, the invention(s) described herein is capable of other embodiments and of being practiced or of being carried out in various ways. In addition, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of "including," "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items.

What is claimed is:

1. A device for selectively positioning an electronic device, comprising:

a dock;

a first arm having a first end operably interconnected to said dock and a second end adapted for interconnection to an edge of said electronic device, said first arm having a first position of use wherein said second end is located adjacent to said dock and a second position of use wherein said second end is engaged onto the electronic device;

a second arm having a first end operably interconnected to said dock and a second end adapted for interconnection to an edge of said electronic device, said second arm having a first position of use wherein said second end is located adjacent to said dock and a second position of use wherein said second end is engaged onto the electronic device; and

wherein said dock is adapted to be engaged onto the back surface of the electronic device and said second end of said first arm and said second end of said second arm are engaged to the edge of the electronic device.

2. The device of claim 1, wherein said second end of said first arm and said second end of said second arm comprise an interconnection member that is rotatable from their respective arm.

3. The device of claim 1, wherein said dock includes a fitting that receives a positionable grip.

4. The device of claim 1, wherein said arms are comprised of retractable bands.

5. The device of claim 1, wherein said second end of said first arm and said second end of said second arm include a resiliently deflectable material.

6. The device of claim 1, wherein said dock is rotatable with respect to said arms.

7. The device of claim 1, wherein said first arm and said second arm comprise a primary arm that is selectively received within said dock and a secondary arm that is selectively received within said primary arm.

8. The device of claim 7, wherein said secondary arms are spring biased with respect to said primary arms such that said secondary arms are normally positioned at least partially within said primary arms.

9. The device of claim 7, wherein said dock is comprised of a top portion and a bottom portion that are operably interconnected, said top portion having a first position of use wherein said upper portion is located a first distance from said bottom portion and a second

position of use wherein said upper portion is located a second distance from said bottom portion, said first distance being greater than said second distance, and wherein when said top portion is in said second position of use it is selectively interconnected to at least one primary arm to fix the position of the same.

10. The device of claim 7, wherein said secondary arms are operably interconnected to said primary arms by a sliding hinge that allows said secondary arms to angulate relative to said primary arms.

11. The device of claim 7, wherein said second ends of said secondary arms comprise a finger that is rotatably interconnected to said secondary arm.

12. A device for selectively positioning an electronic device, comprising:

a dock;

a first means for extending operably interconnected to said dock, said first means for extending a first end associated with said dock and a second end that has a means for interconnecting that is adapted to engage an edge of the electronic device;

a second means for extending operably interconnected to said dock, said second means for extending a first end associated with said dock and a second end that has a means for interconnecting that is adapted to engage an edge of the electronic device; and

wherein said dock is adapted to be engaged onto the back surface of the electronic device and said second end of said first arm and said second end of said second arm are engaged to the edge of the electronic device.

13. The device of claim 12, wherein said first means for extending and said second means for extending may be substantially concealed within said dock.

14. The device of claim 13, wherein said dock includes a release button that when depressed expels at least one of said first means for extending and said second means for extending from said dock.

15. The device of claim 12, wherein said first and second means for extending comprise primary arms that are selectively received within said dock and secondary arms that are selectively received within said primary arms.

16. The device of claim 14, wherein said secondary arms are spring-biased with respect to said primary arms such that said secondary arms are normally positioned at least partially within said primary arms.

17. A method of securing an electronic device interface to an electronic device, said electronic device interface comprising a dock, a first arm that is selectively deployable from said dock, and a second arm that is selectively deployable from said dock, comprising:

positioning said dock against a rear surface of said electronic device;

extending said first arm from said dock;

extending said second arm from said dock;

engaging an outer end of said first arm to said electronic device; and

engaging an outer end of said second arm to an edge of said electronic device.

18. The method of claim 17, wherein said first arm and said second arm are spring-biased such that they are normally urged towards said dock.

19. The method of claim 17, further comprising fixing the position of said first arm and said second arm to said dock.

20. The method of claim 17, further comprising interconnecting a grip to said dock.

21. A positioning device adapted for selective interconnection to an electronic device, comprising:

a mount;

a suction device associated with said mount; and

a support for selective interconnection with said mount.

22. The device of claim 21, wherein said suction device is comprised of at least one button actuated piston that facilitates evacuation of air above a suction cup to firmly interconnect said suction cup to the electronic device.

23. The device of claims 21, wherein said support is interconnected to said mount by way of a threaded connector.

24. The device of claim 21, wherein said support is interconnected to said mount by way of a quick disconnect coupling.

25. The device of claim 21, wherein said support comprises a base for selective interconnection with said mount, a stem interconnected to said base, and a first arm and a second arm interconnected to said stem.

26. The device of claim 25, wherein at least one of said stem and said arms are selectivelt shapable.

27. The device of claim 21, wherein said support is comprised of a base with an interconnected member that is adapted to contact a horizontal surface when said mount is interconnected to the electronic device.

28. The device of claim 27, wherein said member is shaped like a whale's tail, a monkey's tail, a jelly fish, skeletal hand, a four-fingered (i.e., alien) hand, a paw, a foot, a claw, a talon, a bunny tail, a hippo tail, a wolf tail, a gecko tail, a giraffe tail, a horse tail, a pig tail, a

devil's tail, a fuzzy tail, a textured tail, a tongue, a forked tongue, a spider, a robotic hand, or an octopus tentacle.

29. The device of claim 21, wherein said suction device is comprised of a suction cup that is associated with a motor that is positioned within said mount wherein said motor creates a vacuum between said suction cup and the electronic device.

30. The device of claim 21, wherein said suction device is comprised of a button actuated oval-shaped piston that cooperates with a suction cup to secure said mount to the electronic device.

31. A positioning device adapted for selective interconnection to an electronic device, comprising:

a protective case for receipt of the electronic device, said protective case having a plurality of interconnection locations;

a mount for selective interconnection with at least one of said interconnection locations of said case; and

a support for selective interconnection with said mount.

32. The device of claims 31, wherein said support is interconnected to said mount by way of a threaded connector.

33. The device of claim 31, wherein said support is interconnected to said mount by way of a quick disconnect coupling.

34. The device of claim 31, wherein said support comprises a base for selective interconnection with said mount, a stem interconnected to said base, and a first arm and a second arm interconnected to said stem.

35. The device of claim 34, wherein at least one of said stem and said arms are selectively shapeable.

36. The device of claim 31, wherein said support is comprised of a base with an interconnected member that is adapted to contact a horizontal surface when said mount is interconnected to the electronic device.

37. The device of claim 36, wherein said member is shaped like a whale's tail, a monkey's tail, a jelly fish, skeletal hand, a four-fingered (i.e., alien) hand, a paw, a foot, a claw, a talon, a bunny tail, a hippo tail, a wolf tail, a gecko tail, a giraffe tail, a horse tail, a pig tail, a devil's tail, a fuzzy tail, a textured tail, a tongue, a forked tongue, a spider, a robotic hand, or an octopus tentacle.

38. A system for securing and selectively positioning an electronic device, comprising:

a base member having a plurality of arms adapted for selective interconnection with an edge of the electronic device; and

a user interface operatively interconnected to said base portion, said user interface capable of rotating relative to said base member.

39. The system of Claim 38, wherein said user interface may be locked relative to said base member.

40. The system of Claim 38, wherein said user interface includes an actuator that, when depressed, allows at least a portion of said user interface to rotate relative to said base member.

41. The system of Claim 38, wherein said user interface comprises a ring and a palm rest that selectively rotates within said ring.

42. The system of Claim 38, wherein said user interface includes a release actuator that, when depressed, releases a portion of said palm rest from said ring.

43. The system of Claim 38, wherein said palm rest further includes a selectively deployable stand.

44. A device for selectively positioning an interconnected electronic device, comprising:

a case that is adapted to selectively receive the electronic device;

a first rail interconnected to said case;

a second rail interconnected to said case and spaced from said first rail in a parallel relationship;

a plate slidingly engaged to said first rail and said second rail; and

a palm rest operably interconnected to said plate.

45. The device of Claim 44 wherein said palm rest includes an actuator that when pressed allows said base to selectively move along the rails.

46. The device of Claim 44 wherein said palm rest includes an actuator that, when pressed, allows said palm rest to rotate relative to the base plate.

47. The device of Claim 44, further comprising a strap that is associated with said palm rest wherein a space is provided between said strap and said palm rest that is adapted to receive a user's hand.

48. The device of Claim 44, further comprising at least one plate release actuator associated with said base plate that, when pressed, releases a first portion of said base plate from a corresponding rail.

49. The device of Claim 44, wherein said palm rest includes an extendable arm.

50. The device of Claim 44, wherein said base plate is comprised of a ring and wherein said palm rest is adapted to rotate within the ring.

51. A device for selective association with an electronic device, comprising:

a base portion that is adapted to be selectively associated with the electronic device;

a user interface operably interconnected to said base portion, said user interface capable of rotating relative to said base portion and being locked relative to said base portion.

52. The device of Claim 51, wherein said user interface includes an actuator for releasing a locking mechanism, which is integrated into at least one of said base portion and said user interface, wherein release of said locking mechanism allows said user interface to rotate relative to said base portion.

53. The device of Claim 51, wherein said base portion is interconnected to a case that is adapted to receive the electronic device.

54. The device of Claim 53 wherein said base portion is selectively interconnected to rails that are interconnected with said case.

55. The device of Claim 51, wherein said user interface is hingedly interconnected to said base portion.

56. The device of Claim 55, further comprising a second actuator for releasing a second locking mechanism, which is integrated into at least one of said base portion and said user interface, wherein release of said second locking mechanism allows said user interface to rotate away from said base portion.

57. An apparatus adapted for securing an electronic device, comprising:

a housing having a first end and a second end;

a stem having a first end and a second end, said stem being capable of selectively moving into and out of said housing;

a plurality of arms operably interconnected to said second end of said stem, wherein each arm terminates in a means for grasping the electronic device;

a clamp associated with said second end of said housing; and

wherein said plurality of arms are foldable with respect to said stem such that they can be stored within said housing when said stem is moved into said housing.

58. The apparatus of claim 57, wherein said stem is able to angulate relative to said housing when said second end of said stem is positioned adjacent to said first end of said housing.

59. The apparatus of claim 57, wherein said arms are flexible.

60. The apparatus of claim 57, wherein said housing includes at least one of a speaker, a projection device, a data storage device, and a power source.

61. The apparatus of claim 57, wherein said arms include a first end that are rotatably interconnected to said second end of said stem, said stem further having a locking means that prevents movement of said arms when said means for grasping are engaged on the electronic device.

62. The apparatus of claim 57, wherein said means for grasping are adapted to engage the corners of said electronic device.

63. The apparatus of claim 57, wherein said second end of the stem terminates in a ball that cooperates with the socket provided by the housing to form a ball/socket joint that allows for movement of the stem with respect to the housing in at least three degrees of freedom.

64. The apparatus of claim 57, wherein said plurality of arms are associated with a hub that is rotatably interconnected to said first end of said stem.

65. A method of displaying a portable electronic device, comprising:

associating a housing with a horizontal surface;

deploying a stem from said housing, said stem having a plurality of arms;

rotating said plurality of arms away from said stem;

engaging ends of said plurality of arms to opposing edges or corners of said electronic device; and

rotating said electronic device relative to said housing.

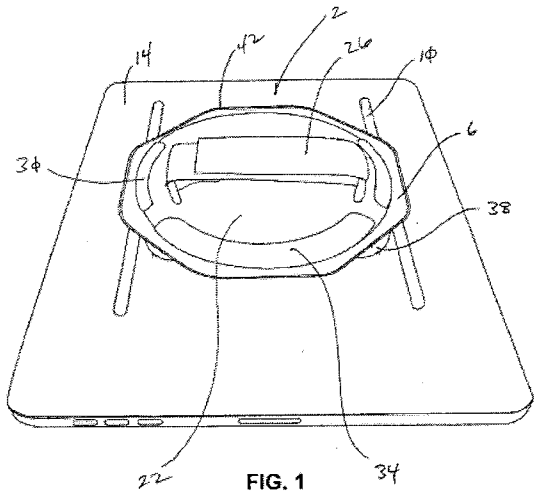

FIG. 1

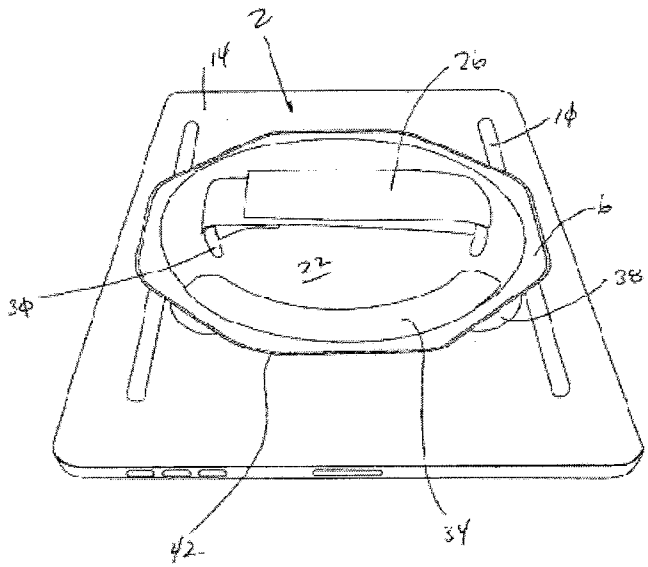

FIG. 2

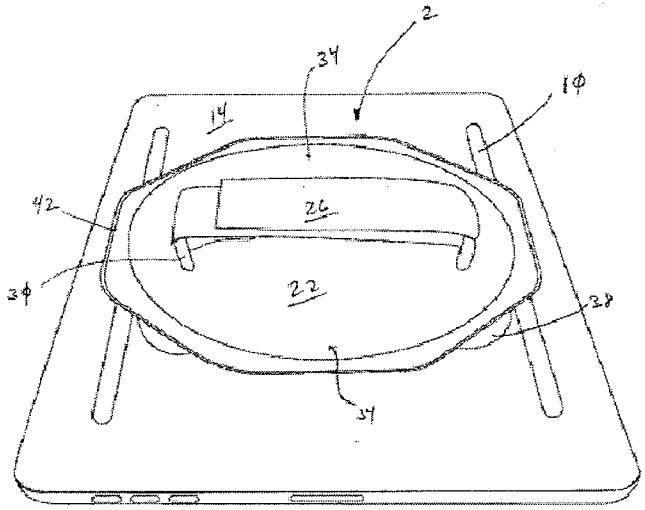

FIG. 3

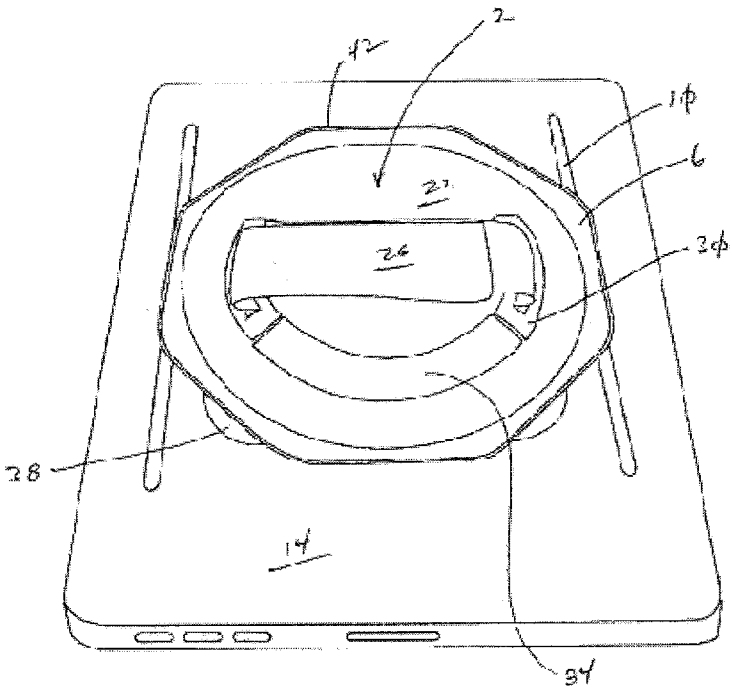

FIG. 4

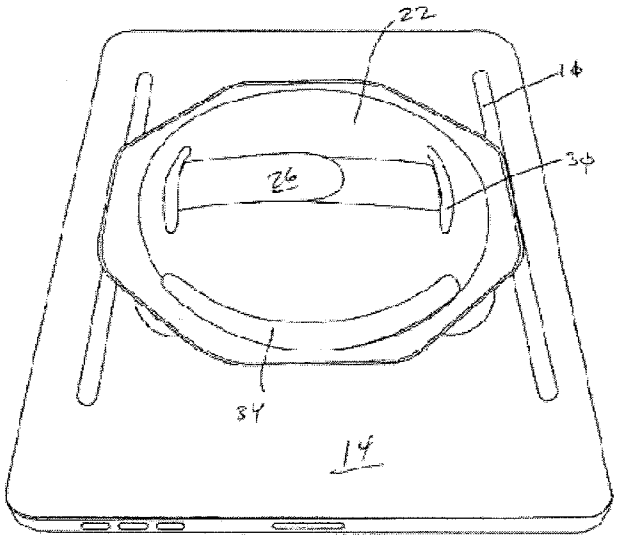

FIG. 5

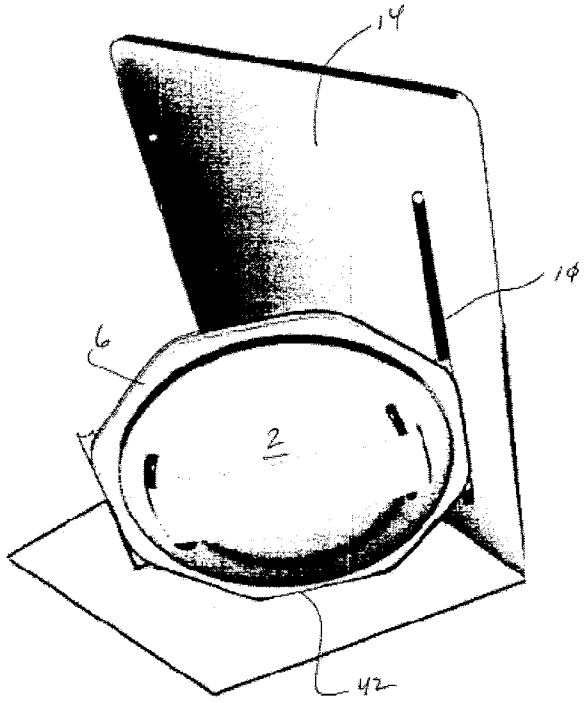

FIG. 6

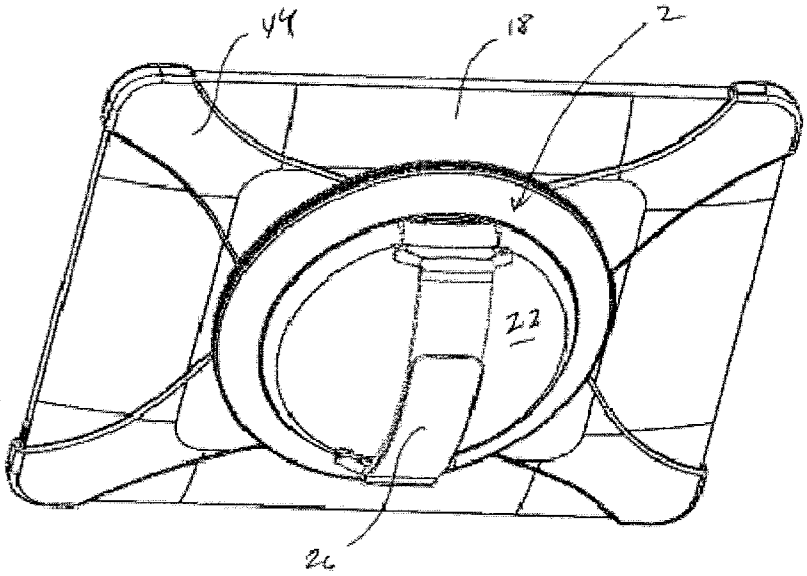

FIG. 7

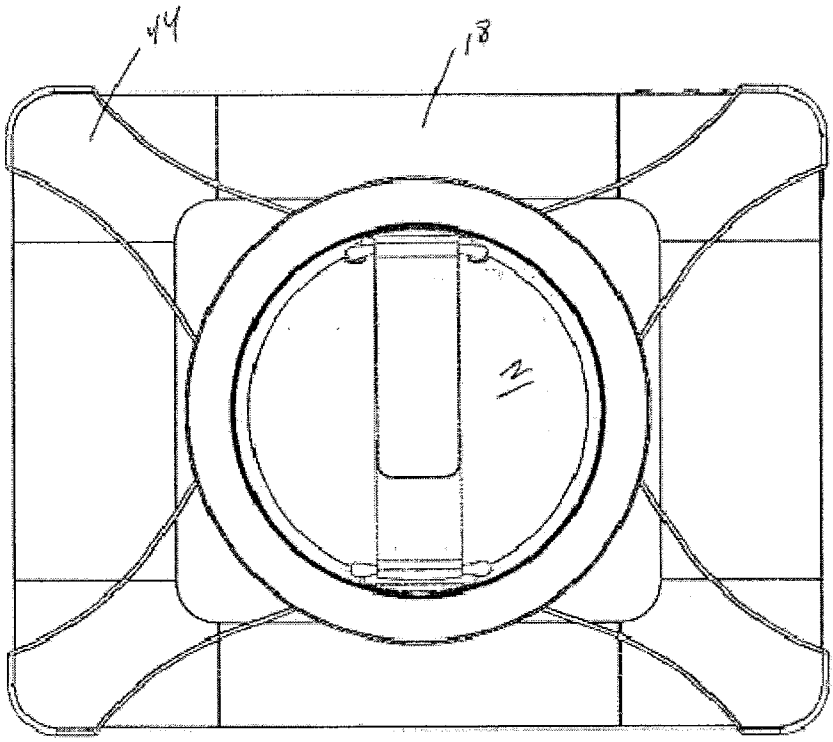

FIG. 8

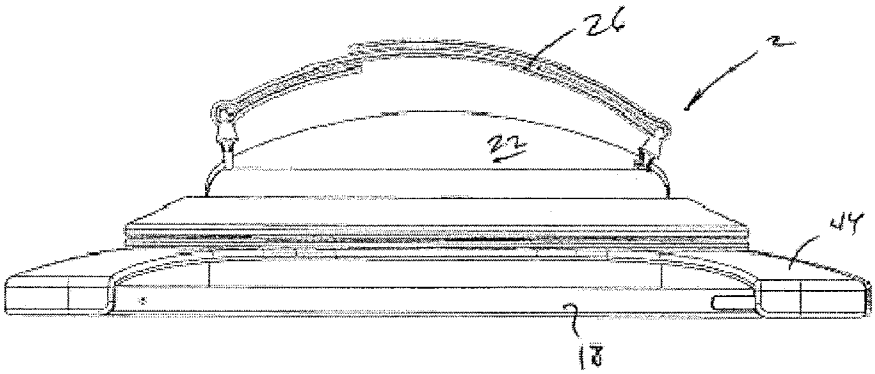

FIG. 9

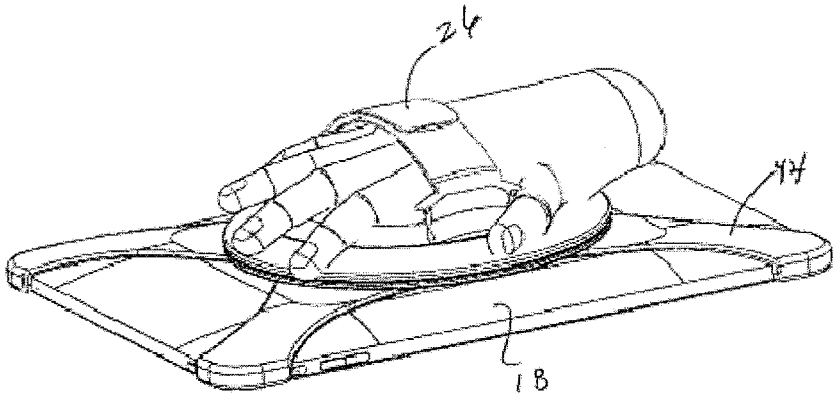

FIG. 10

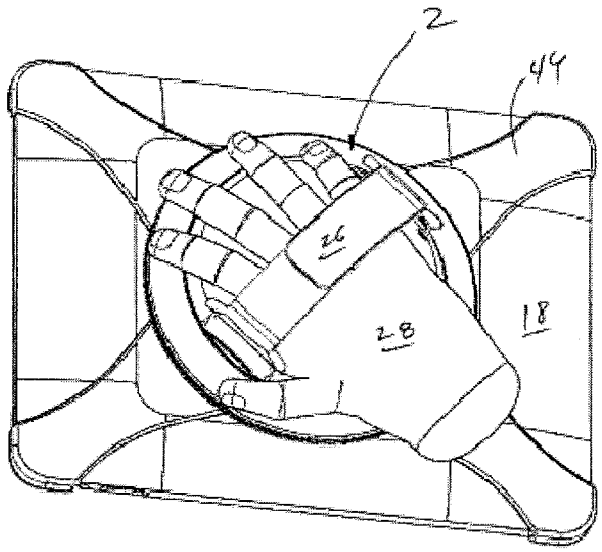

FIG. 11

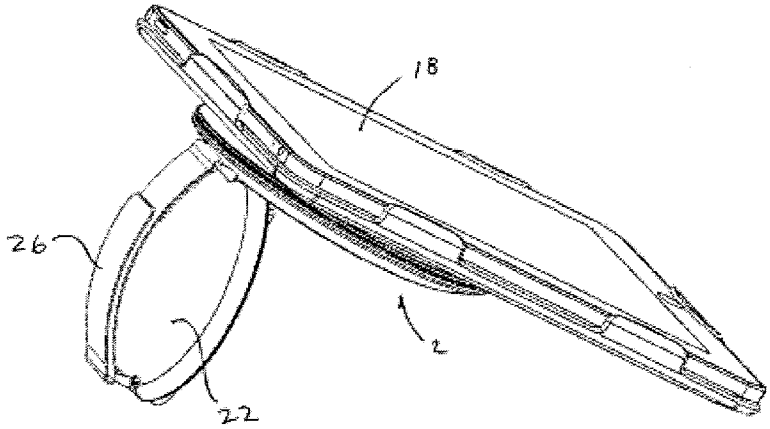

FIG. 12

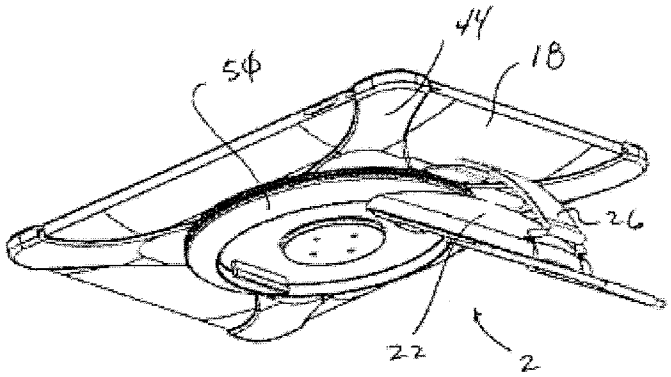

FIG. 13

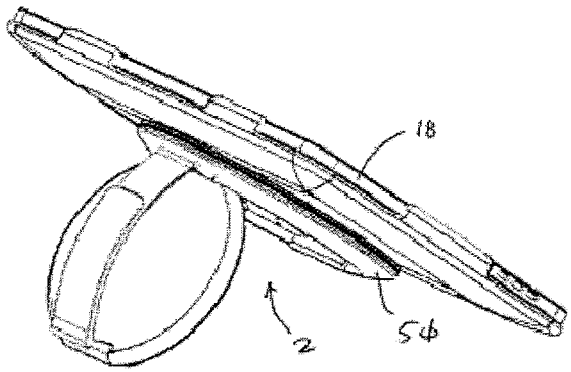

FIG. 14

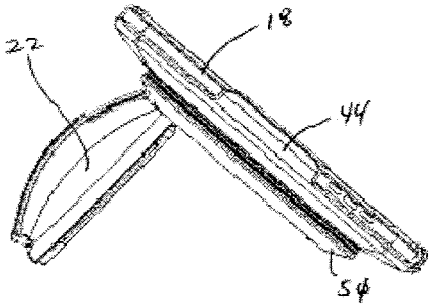

FIG. 15

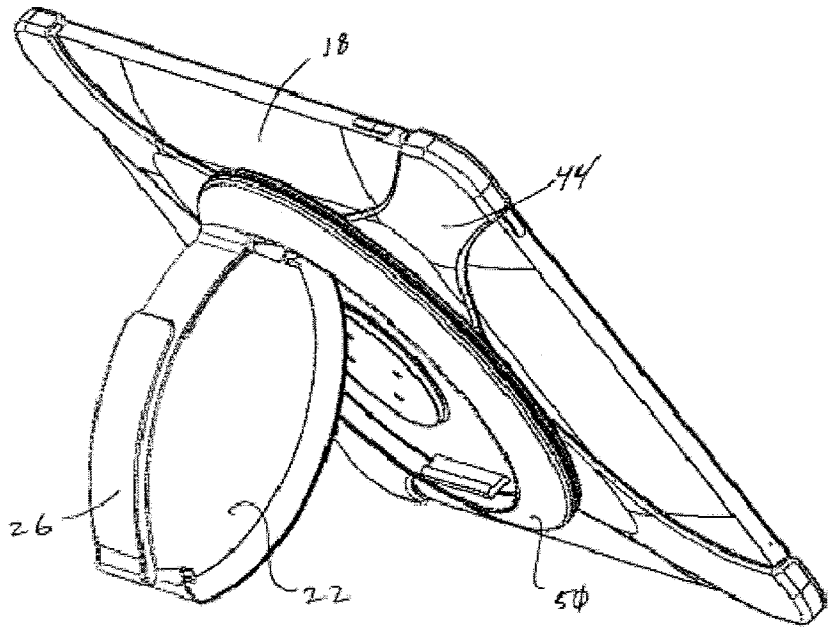

FIG. 16

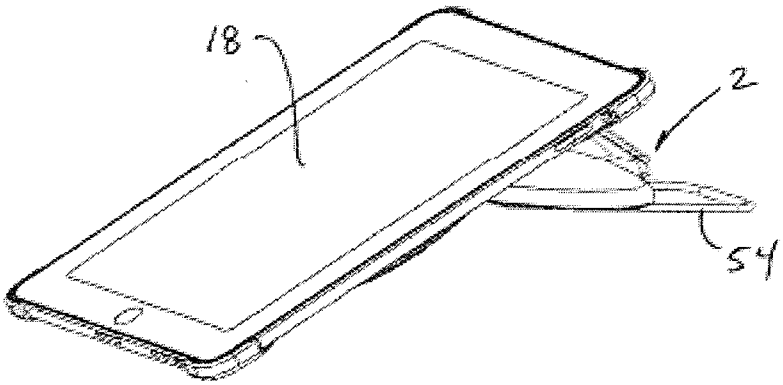

FIG. 17

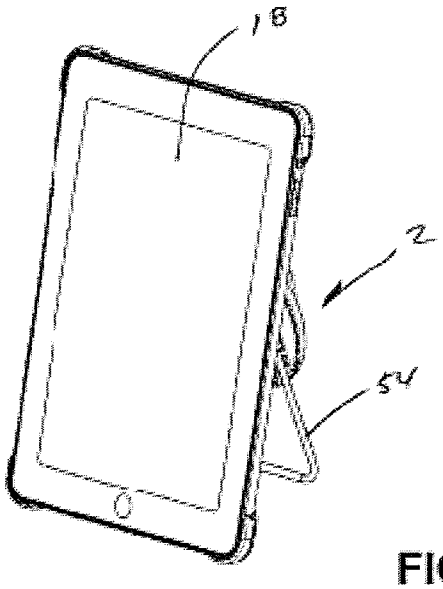

FIG. 18

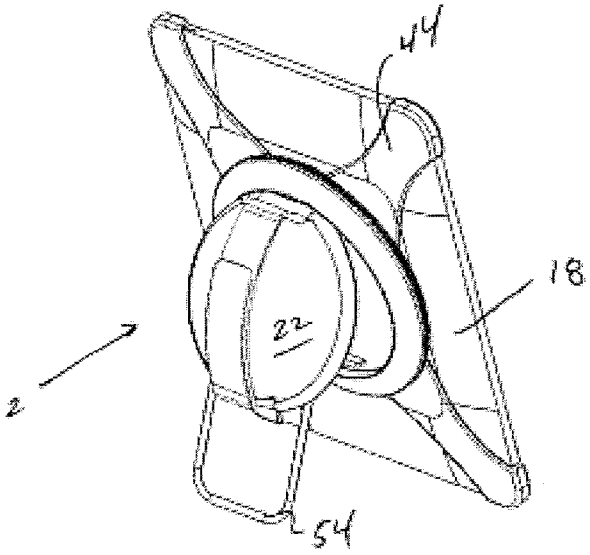

FIG. 19

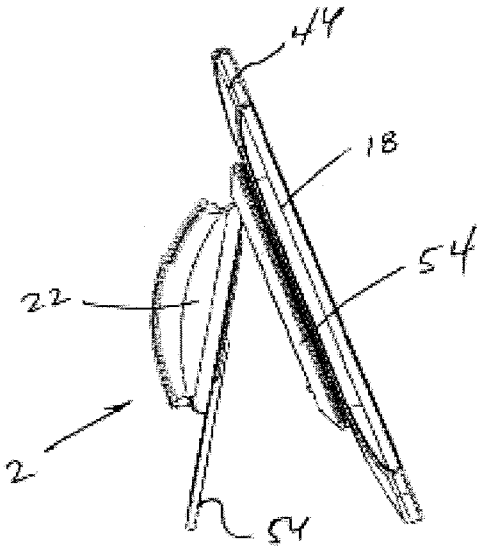

FIG. 20

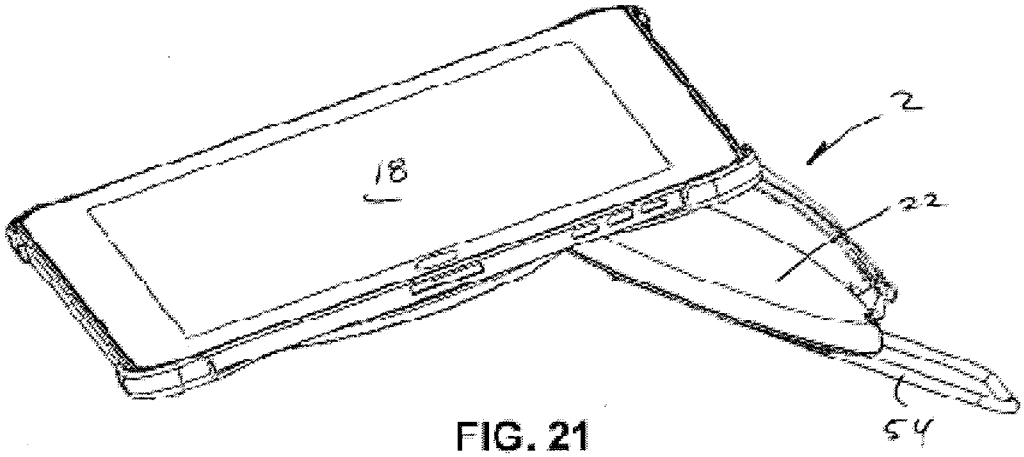

FIG. 21

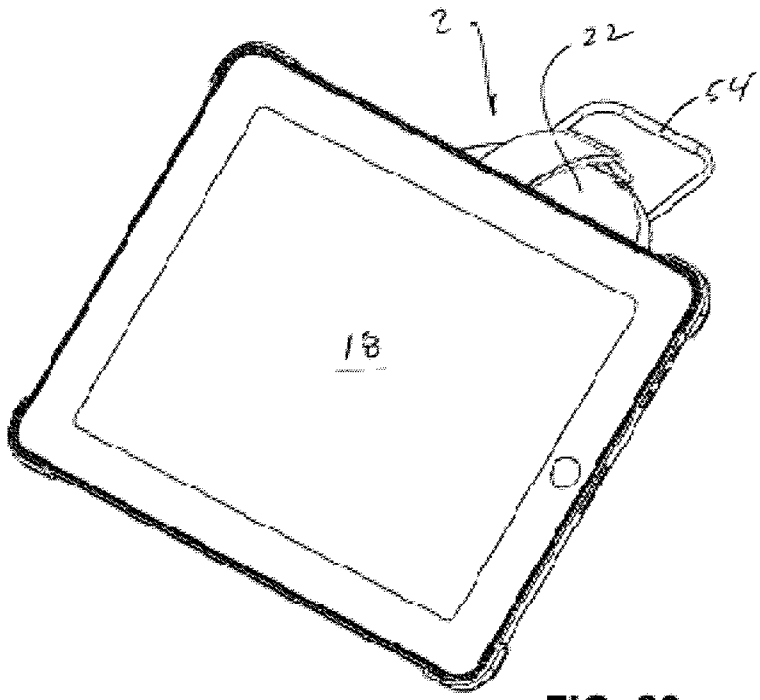

FIG. 22

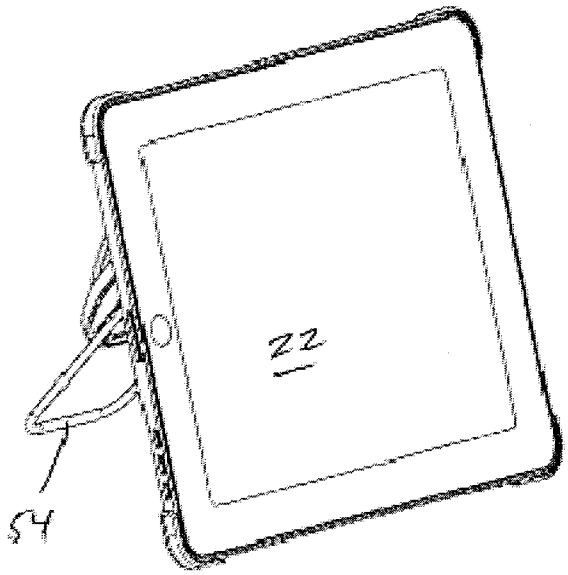

FIG. 23

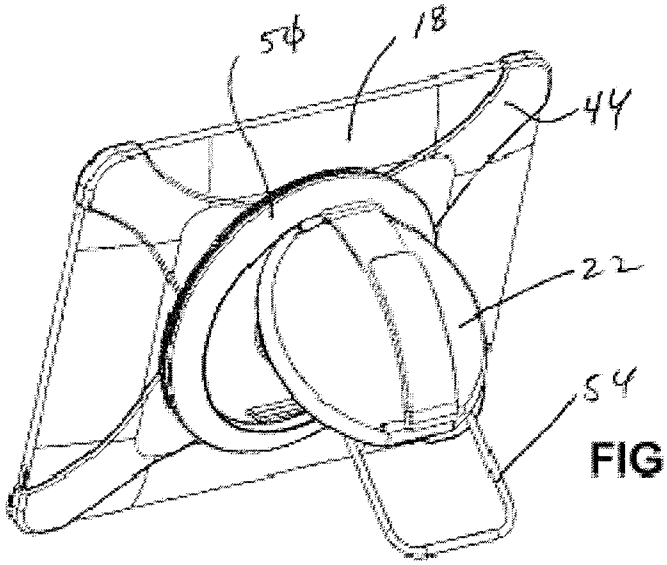

FIG. 24

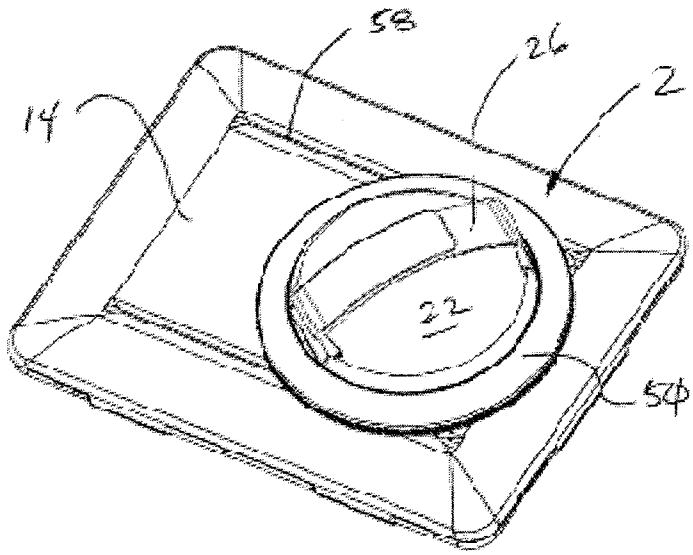

FIG. 25

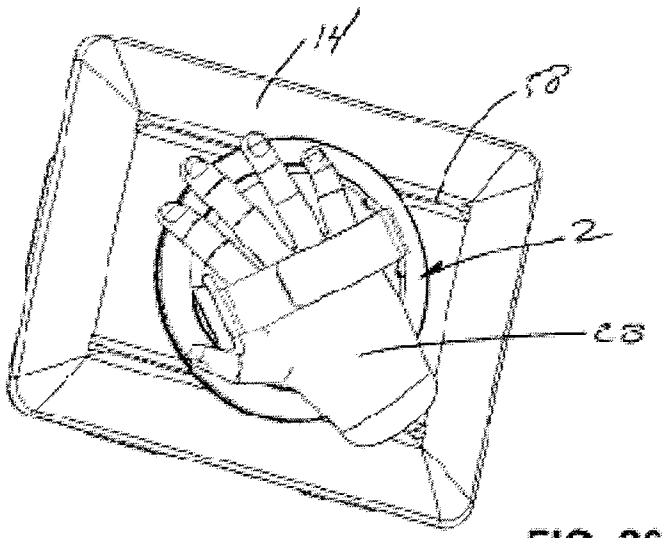

FIG. 26

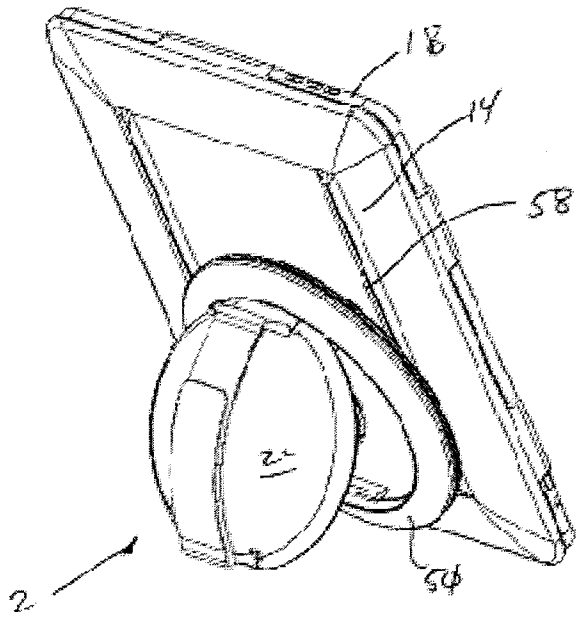

FIG. 27

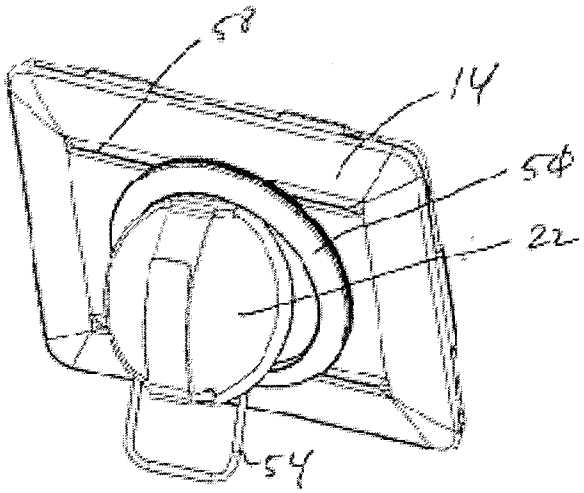

FIG. 28

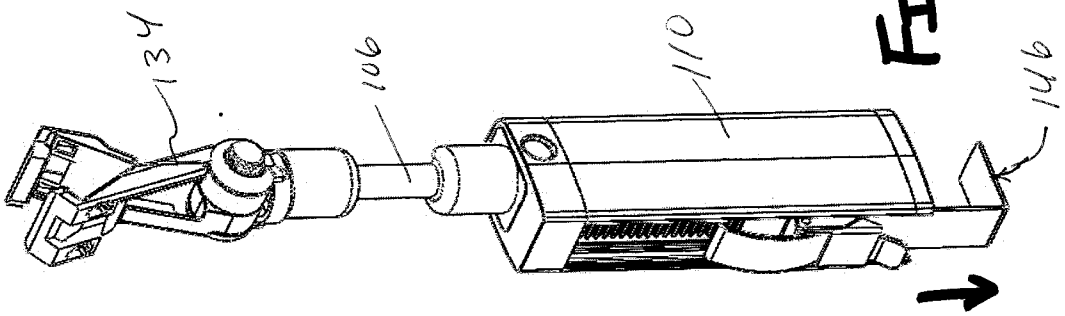

FIG. 30

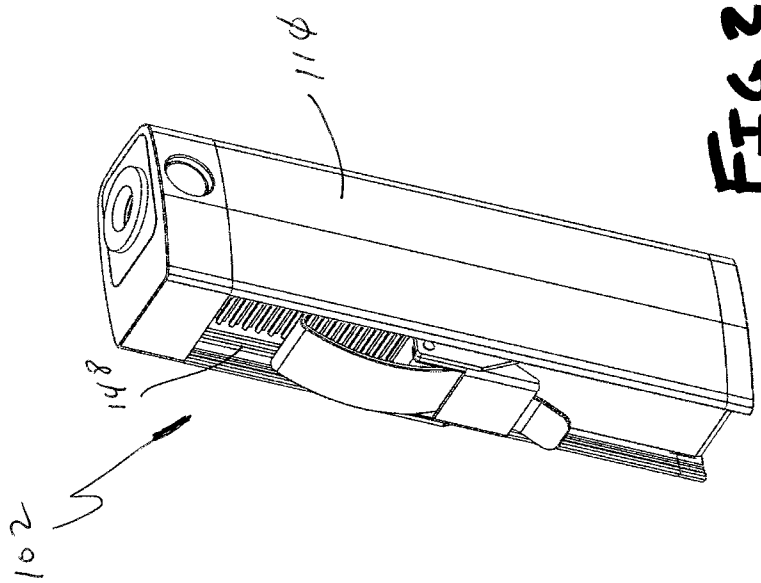

FIG. 29

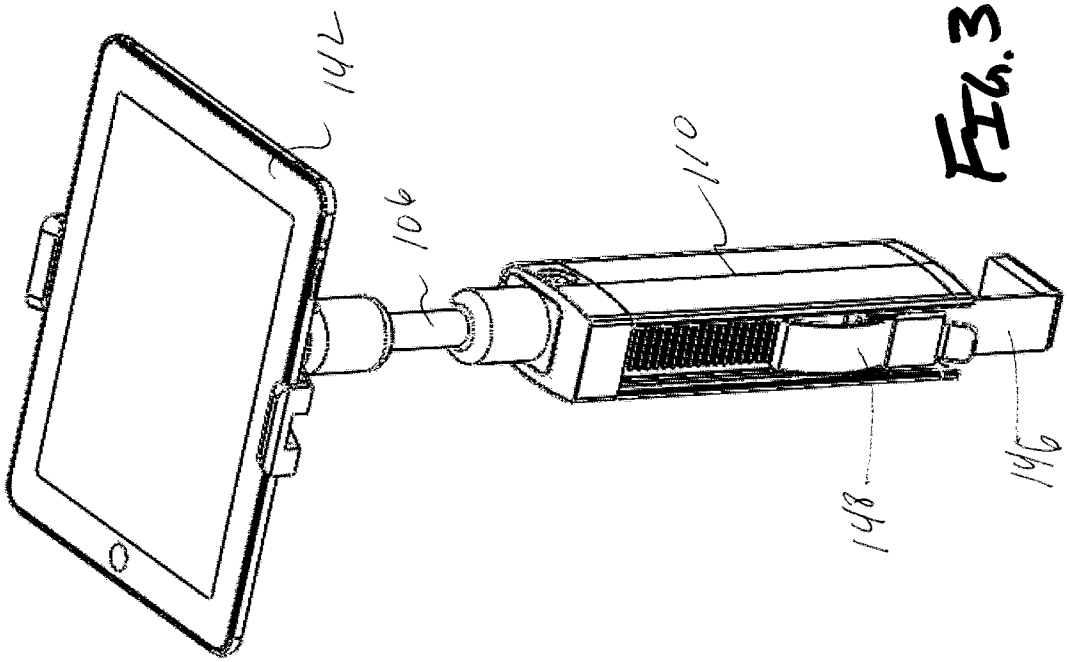

FIG. 32

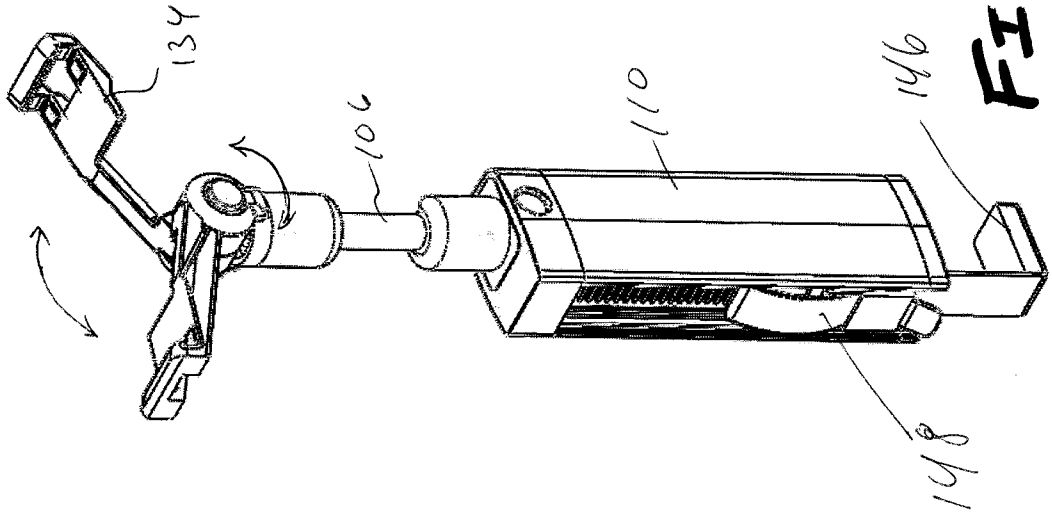

FIG. 31

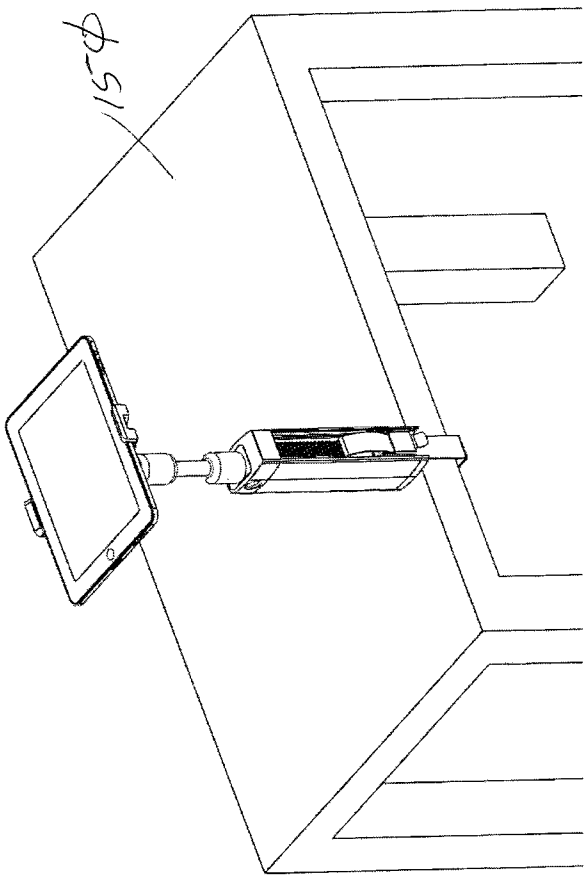

FIG. 34

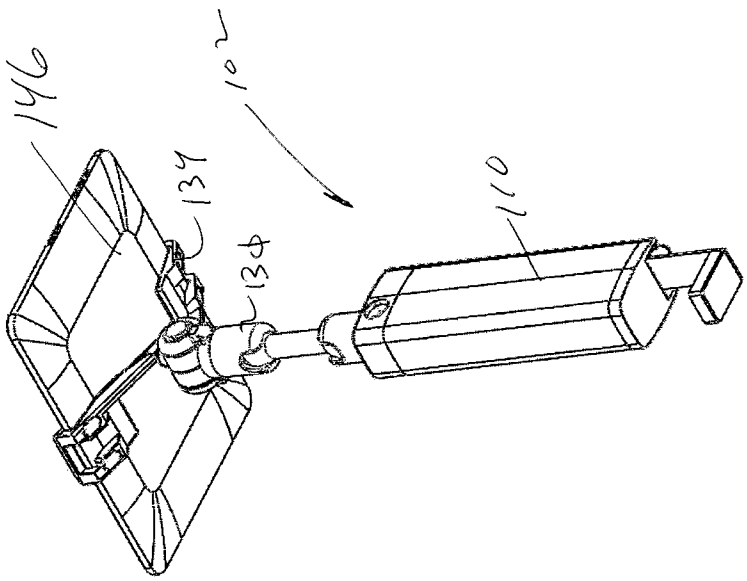

FIG. 33

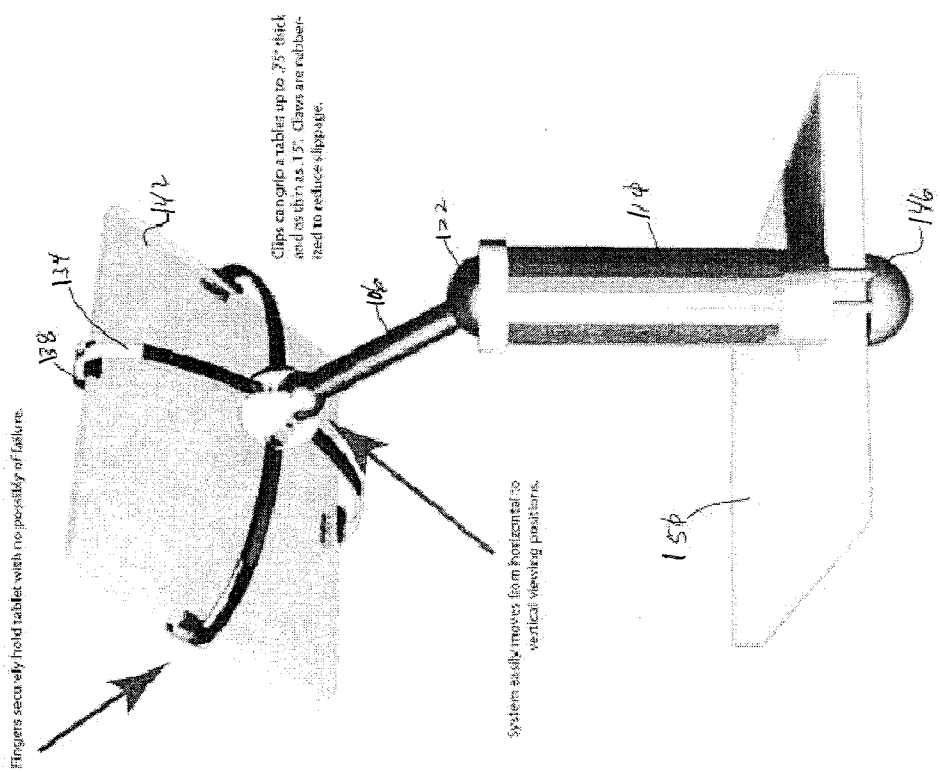
Fingers securely hold tablet with no possibility of failure.
Clips engage a tablet up to .75" thick and as thin as 15". Claws are rubber-lined to reduce slippage.
System easily moves from horizontal to vertical viewing positions.
142
134
138
106
122
110
146
150

FIG. 36

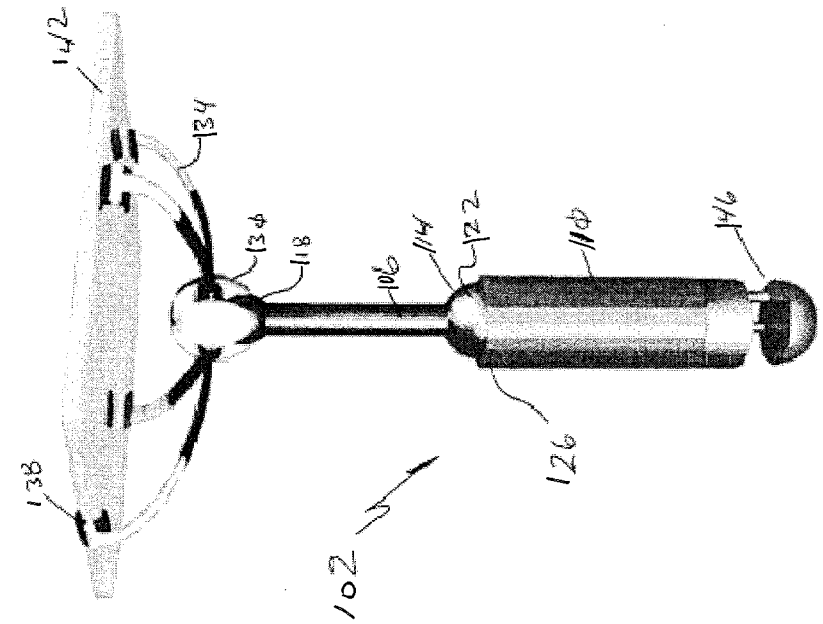
142
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FIG. 35

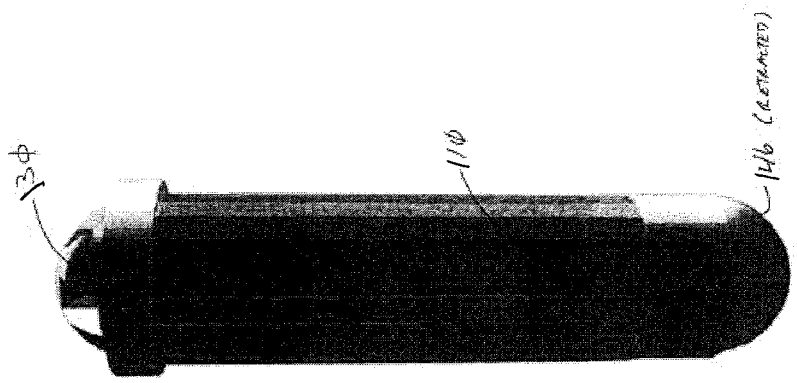


FIG. 38

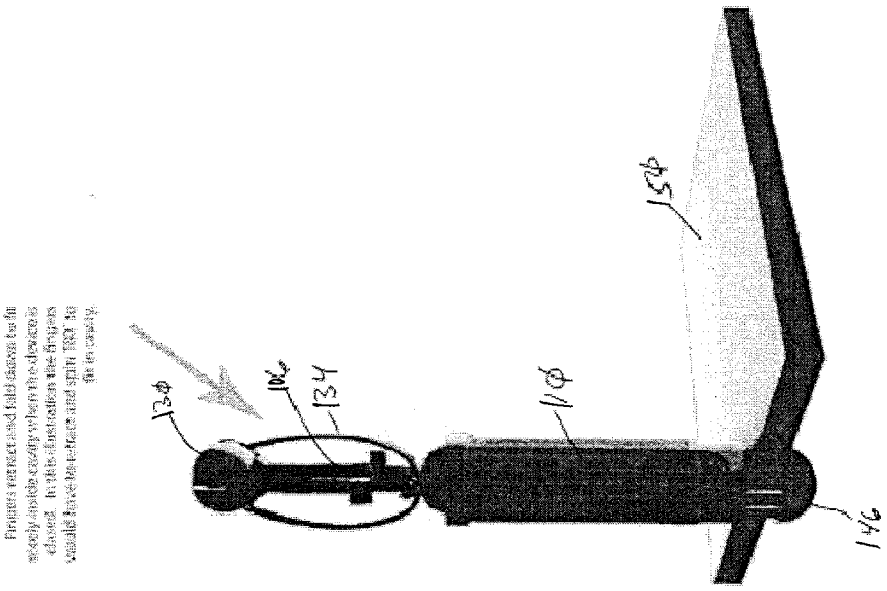


FIG. 37

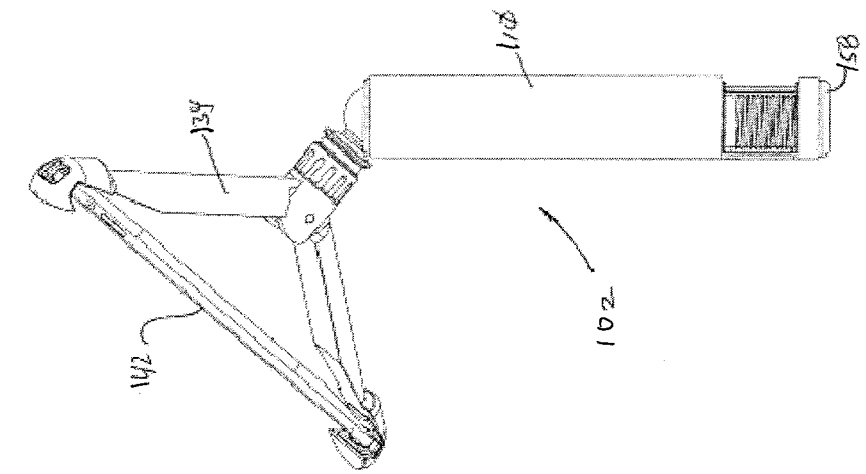


FIG. 40

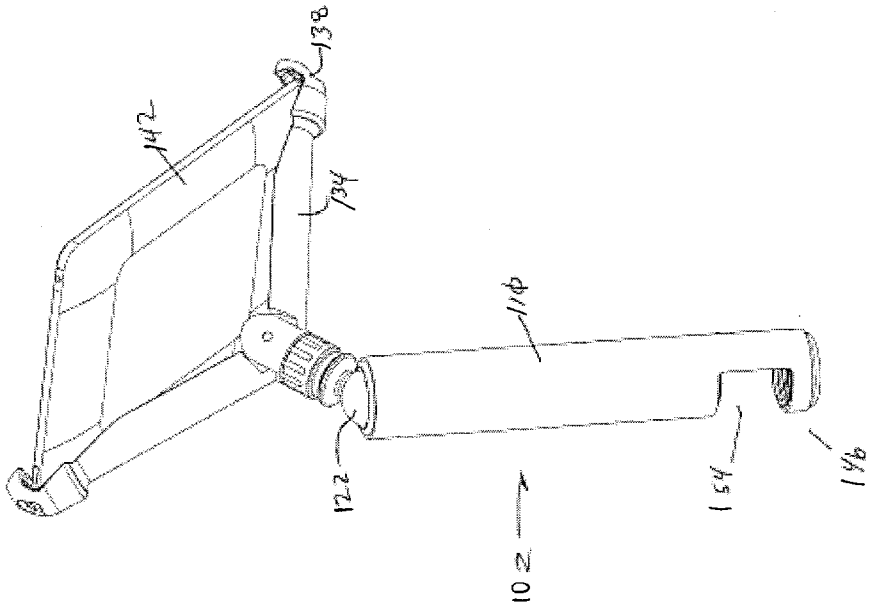


FIG. 39

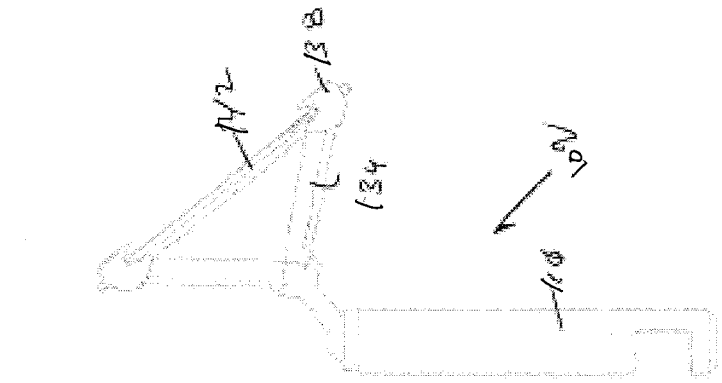


FIG. 43

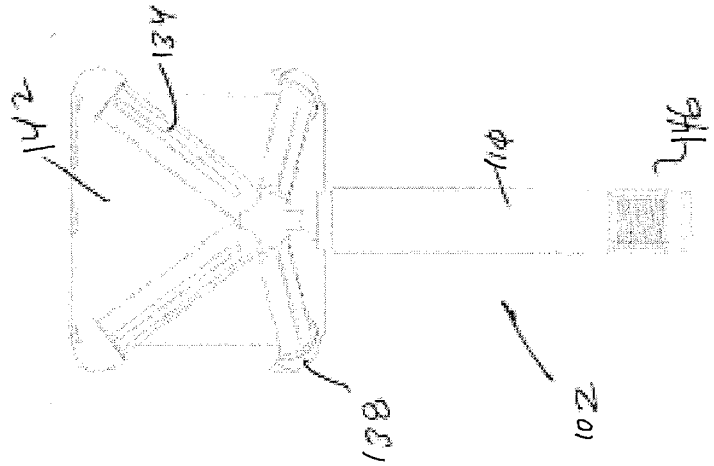


FIG. 42

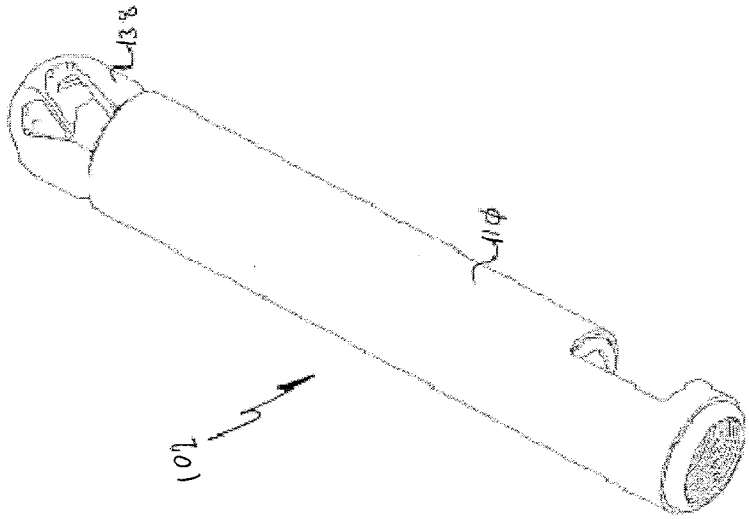


FIG. 41

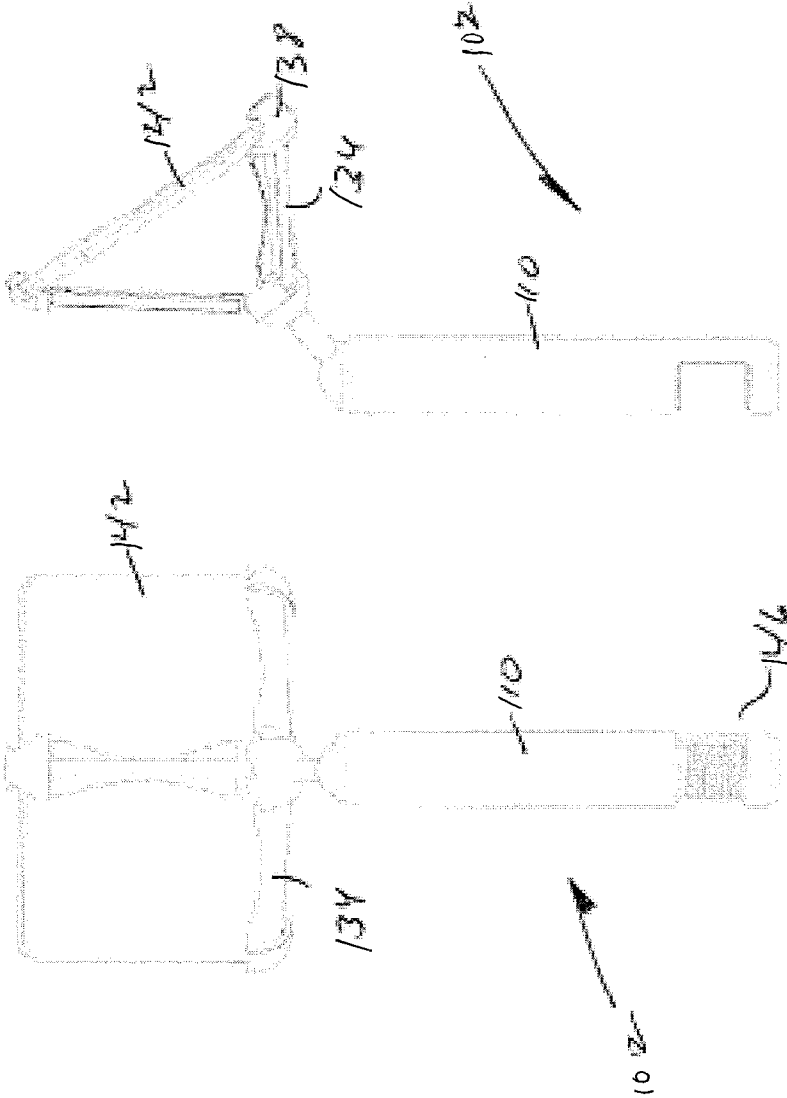


Fig. 4A

Fig. 4B

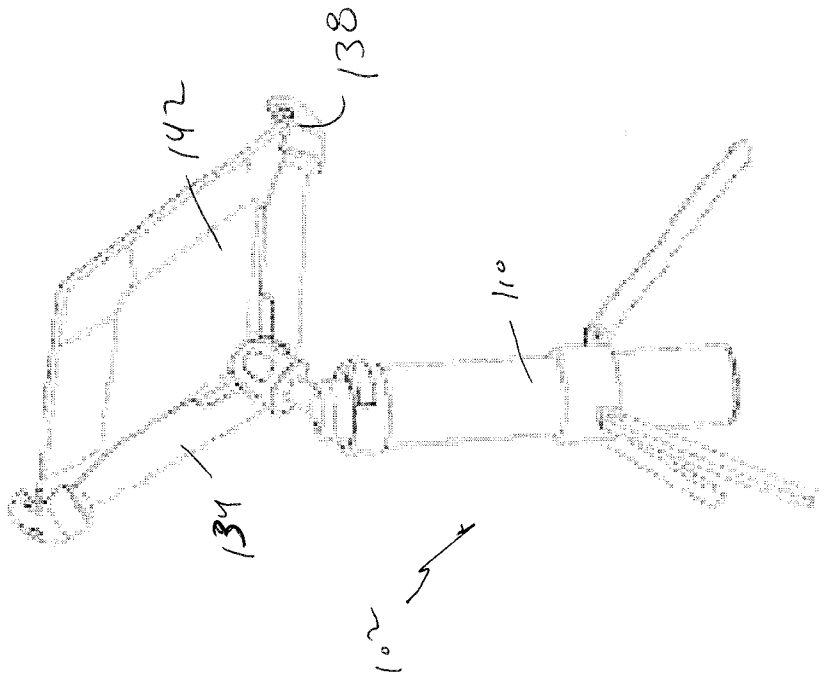


FIG. 47

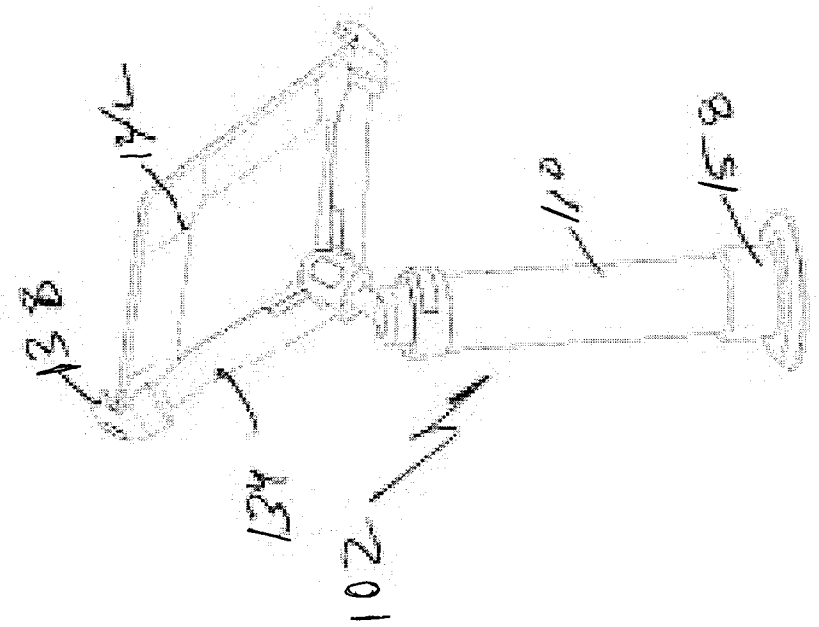


FIG. 46

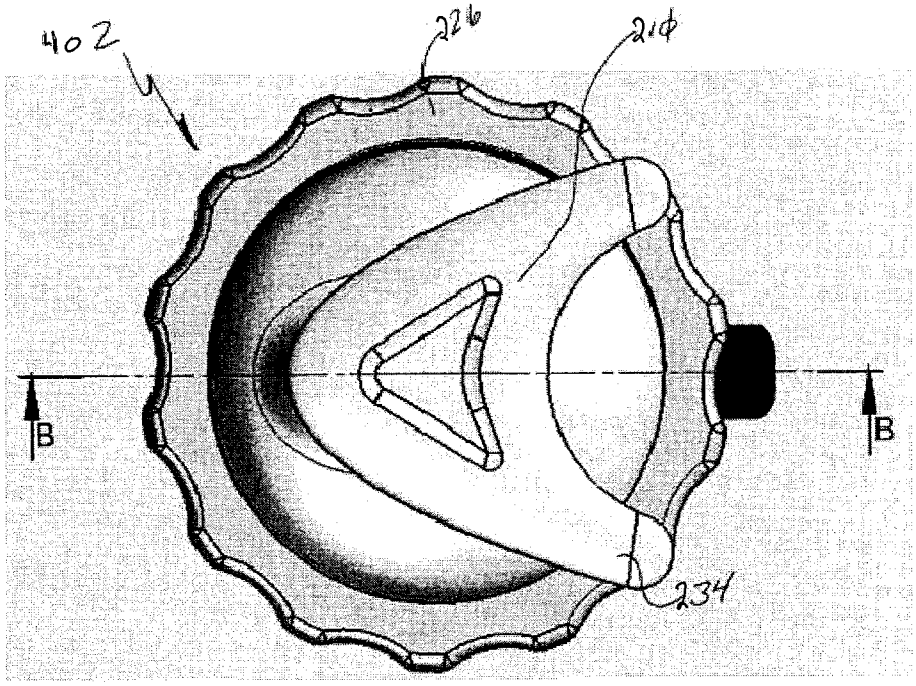

402
226
210
B
B
234

FIG. 48

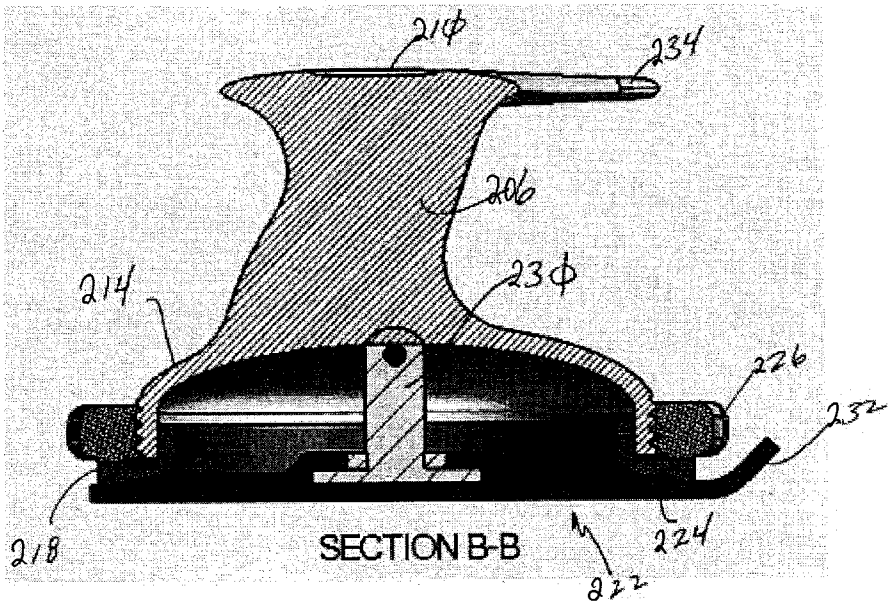

210
234
206
214
230
226
232
218
SECTION B-B
224
222

FIG. 49

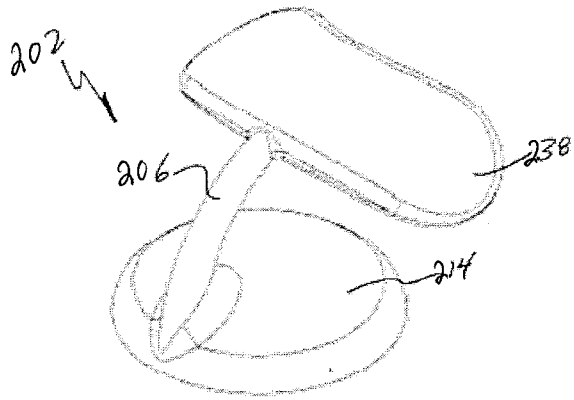


FIG. 50

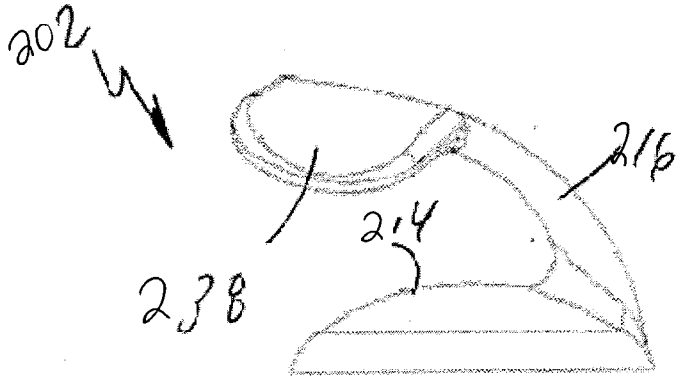


FIG. 51

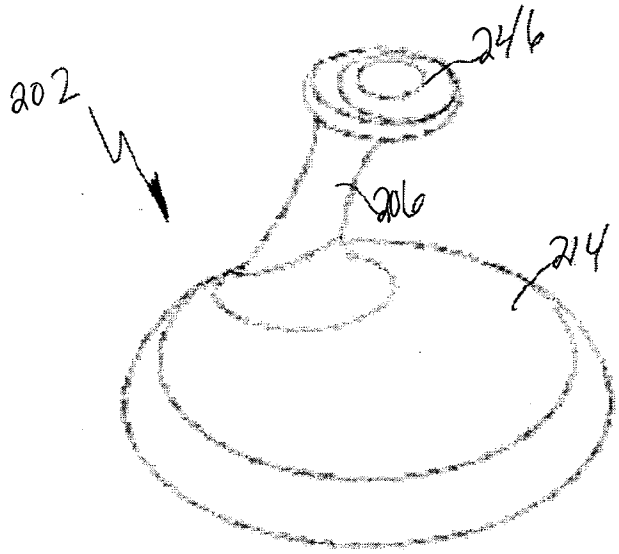


FIG. 52

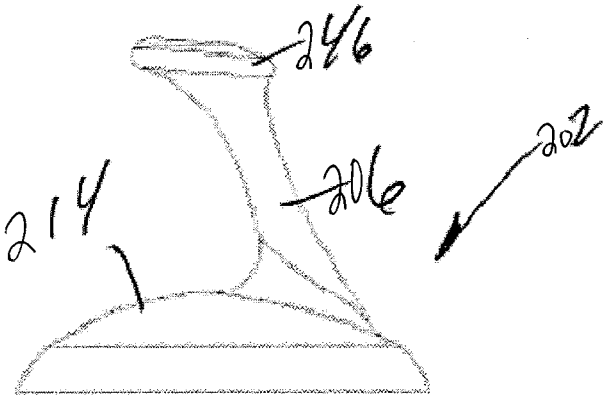


FIG. 53

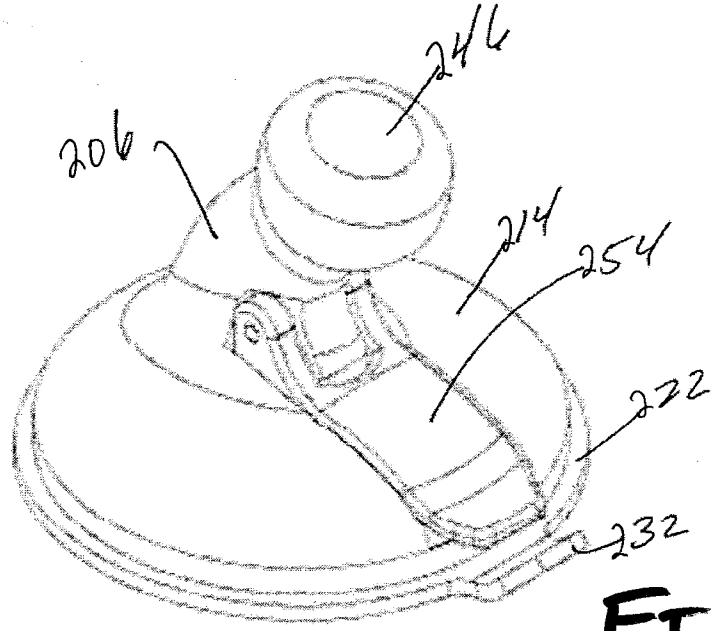


FIG. 54

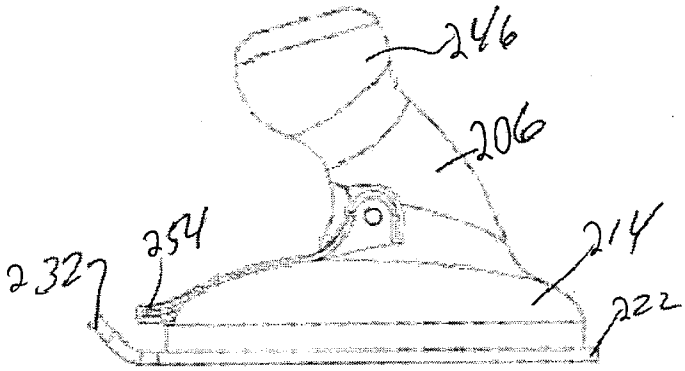


FIG. 55

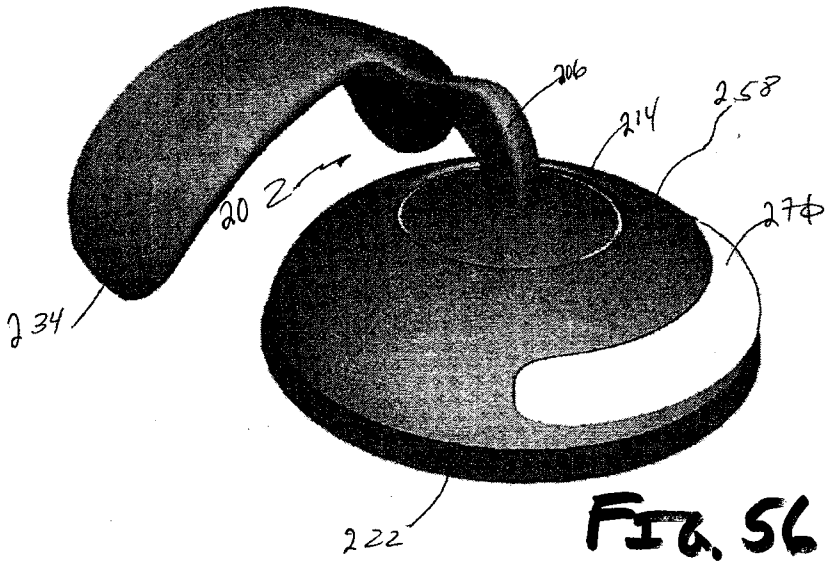


FIG. 56

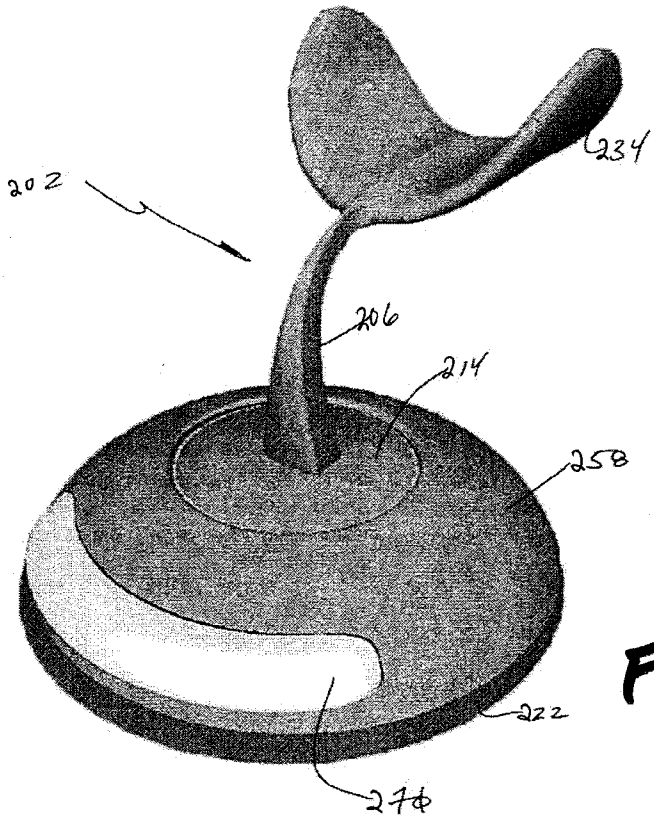
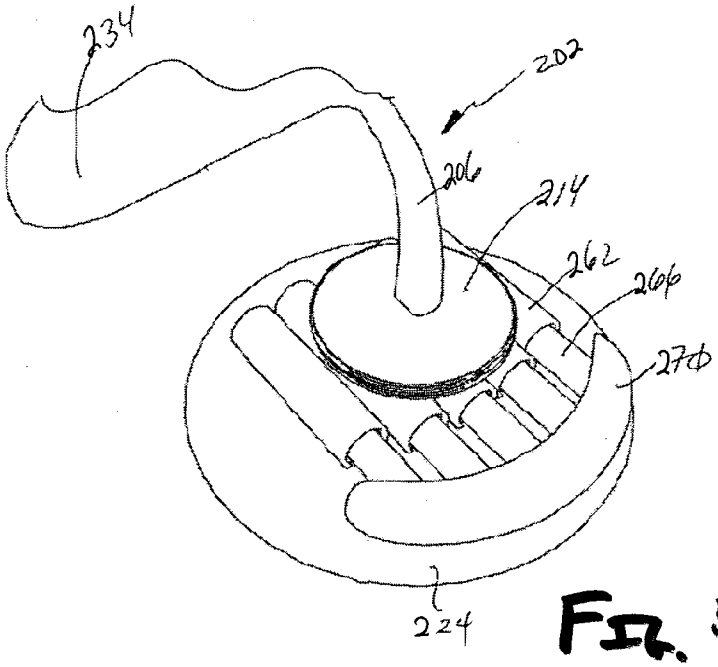


FIG. 57


234
202
206
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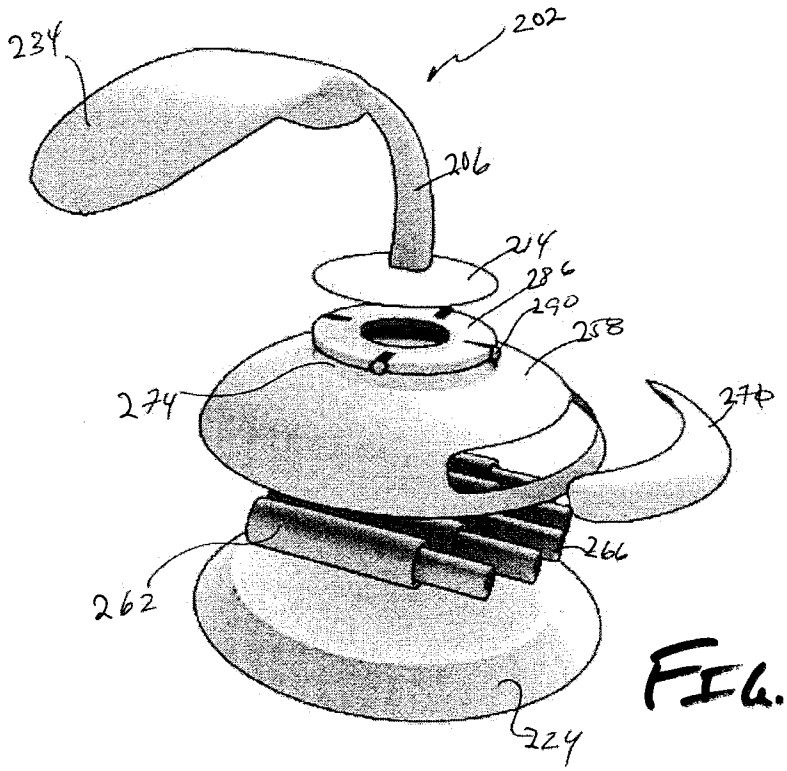
262
266
270
224

FIG. 58


234
202
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286
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224

FIG. 59

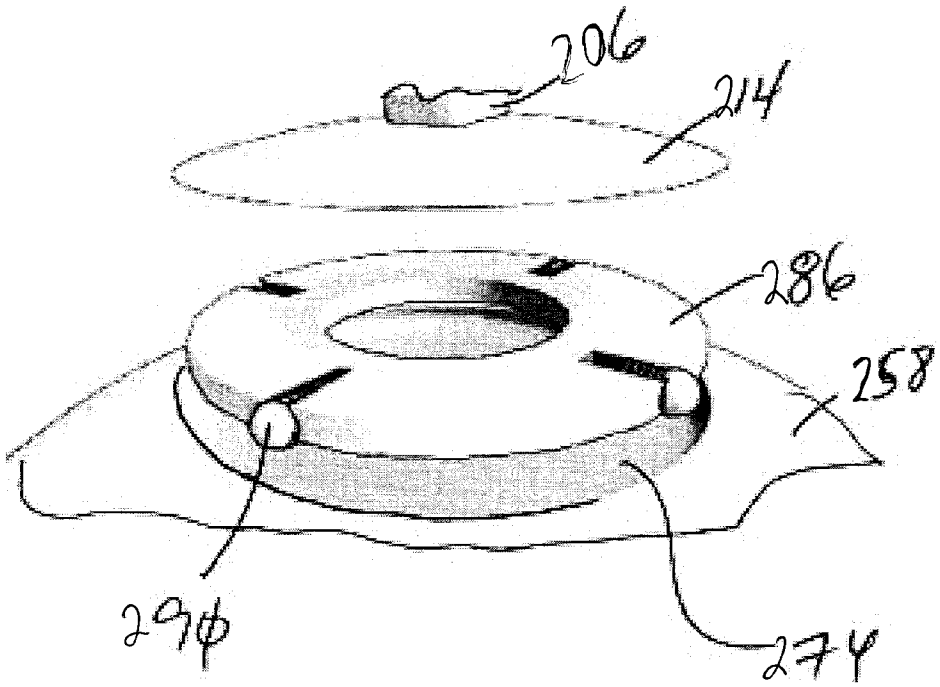

FIG. 6D

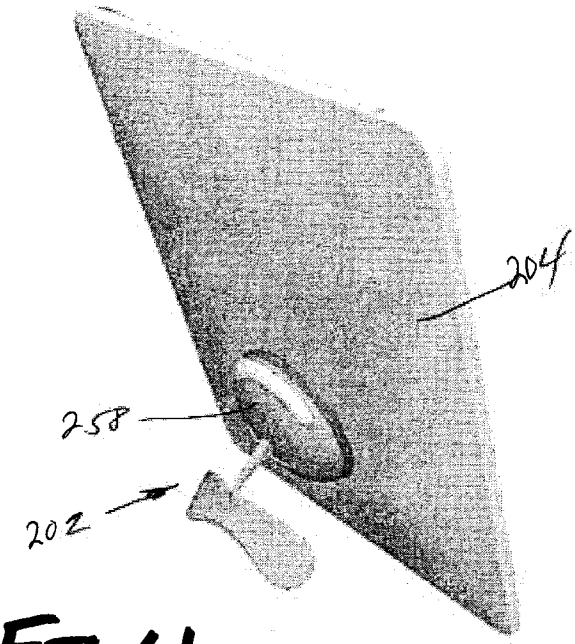

FIG. 61

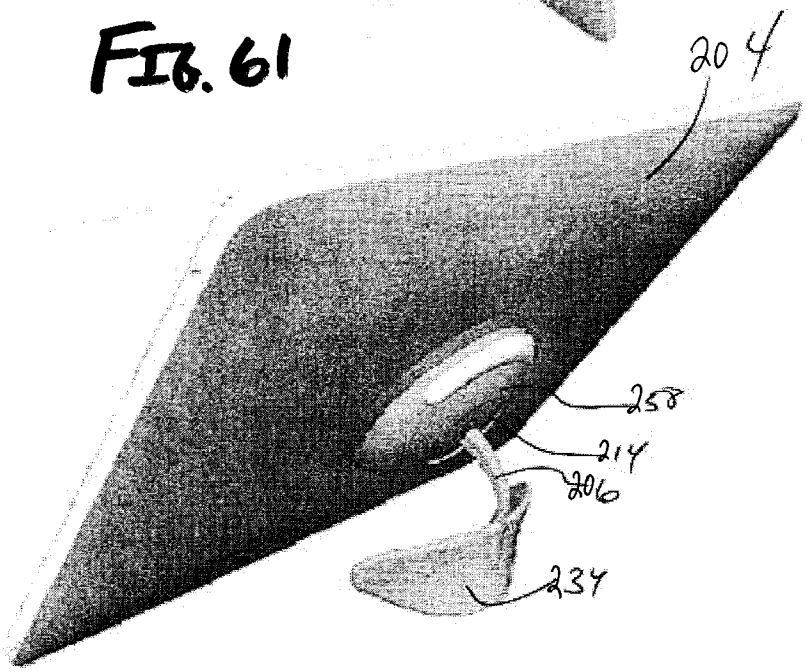

FIG. 62

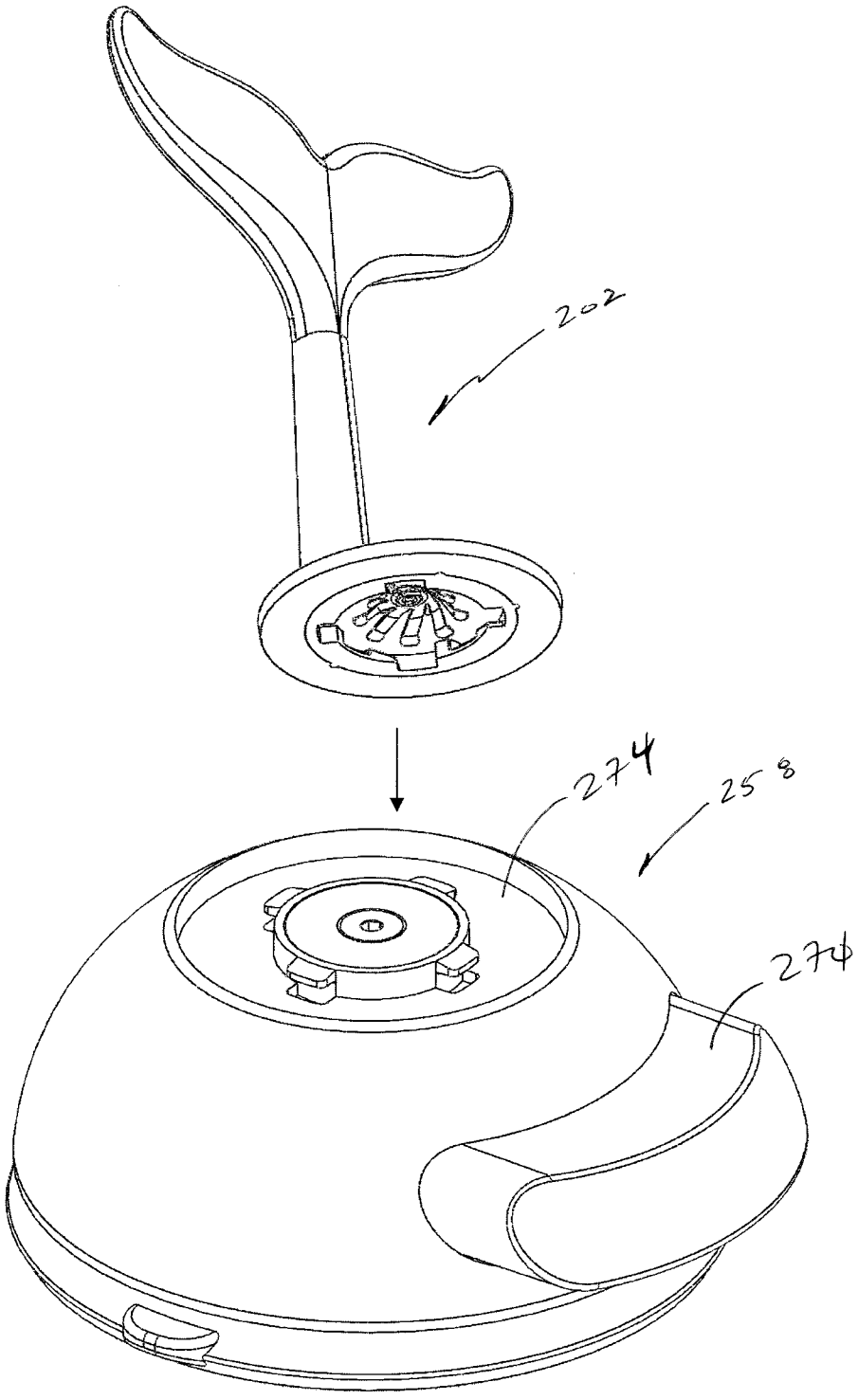

FIG. 63

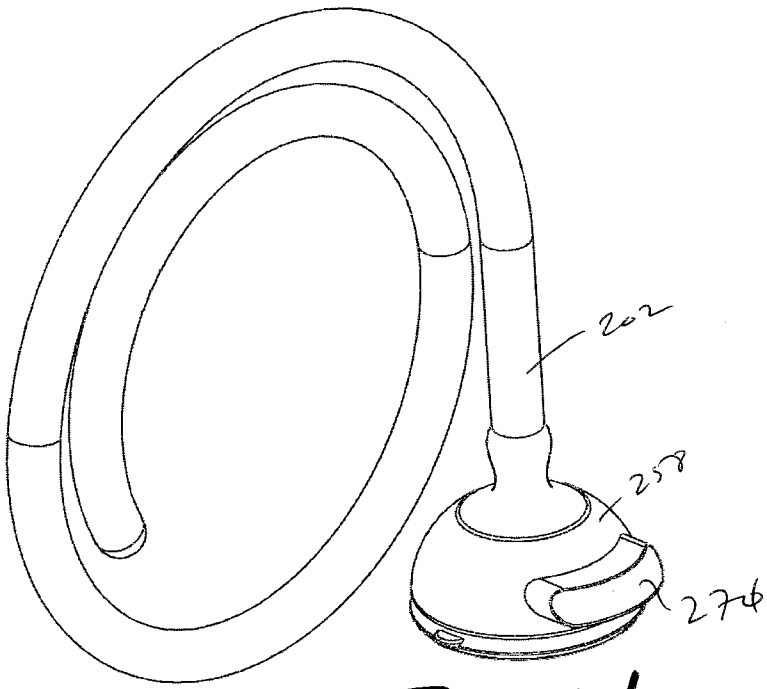

FIG. 64

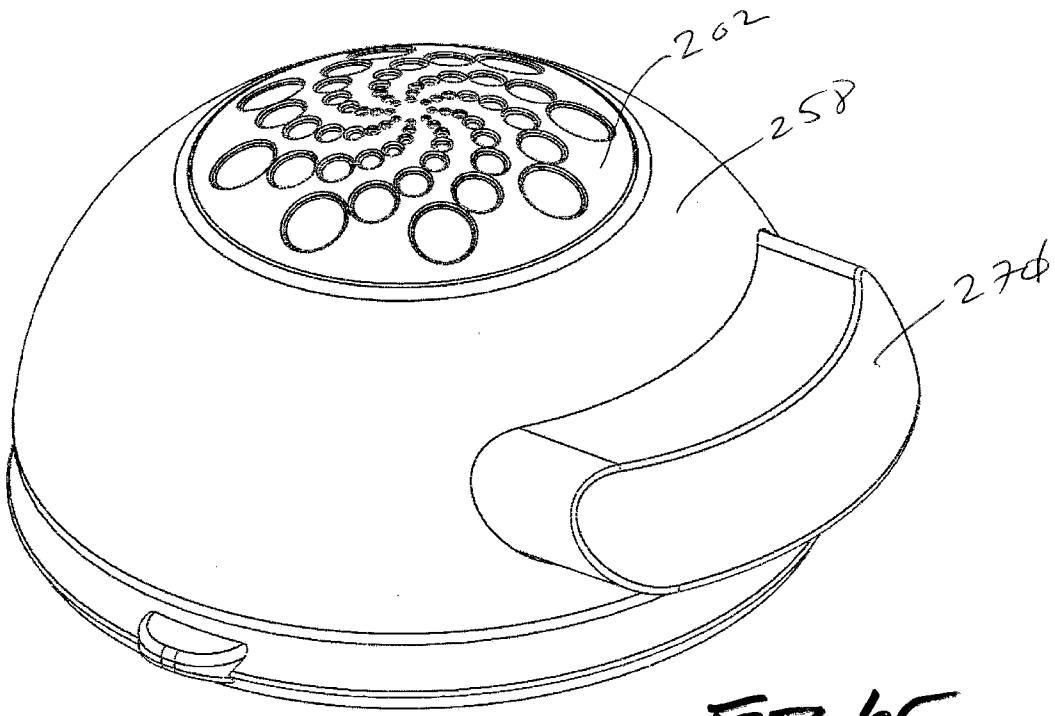

FIG. 65

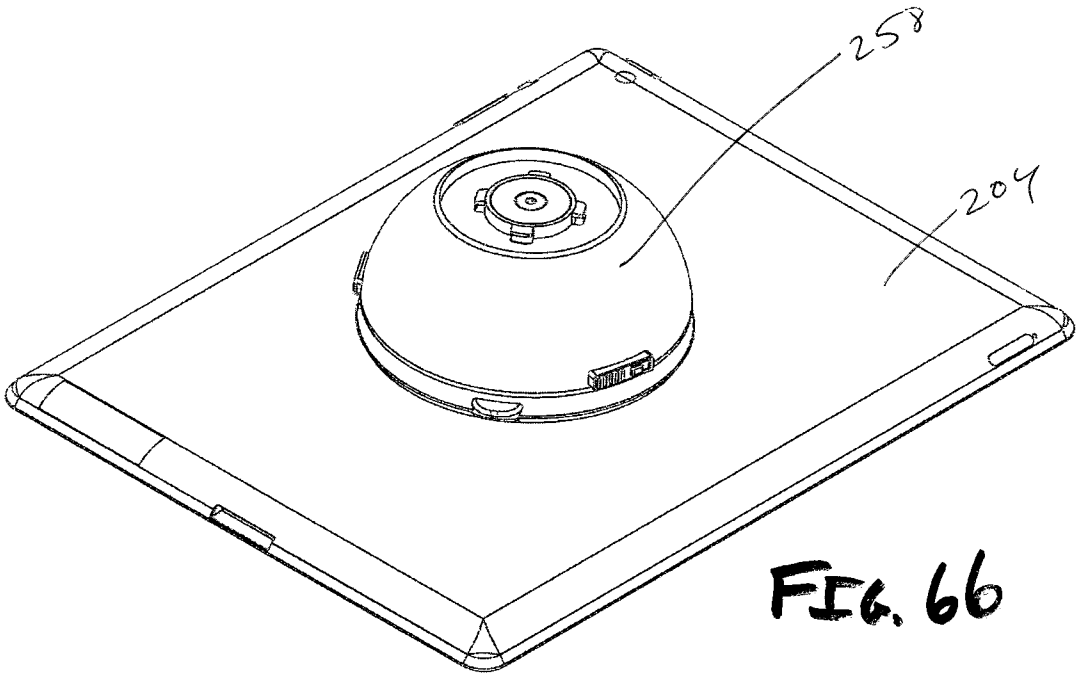

FIG. 66

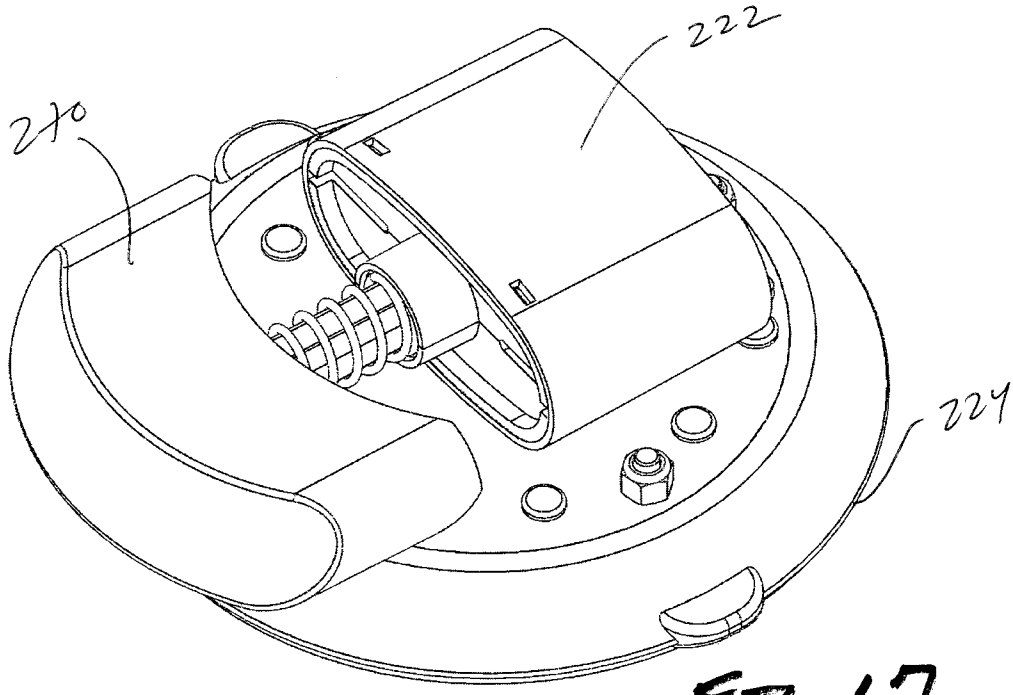

FIG. 67

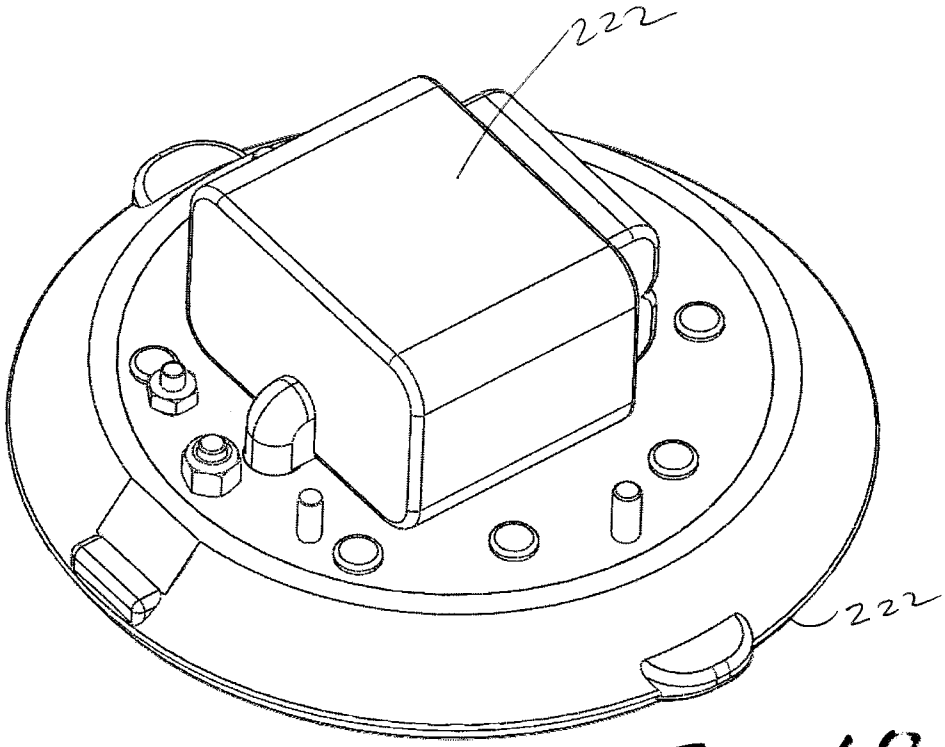

FIG. 68

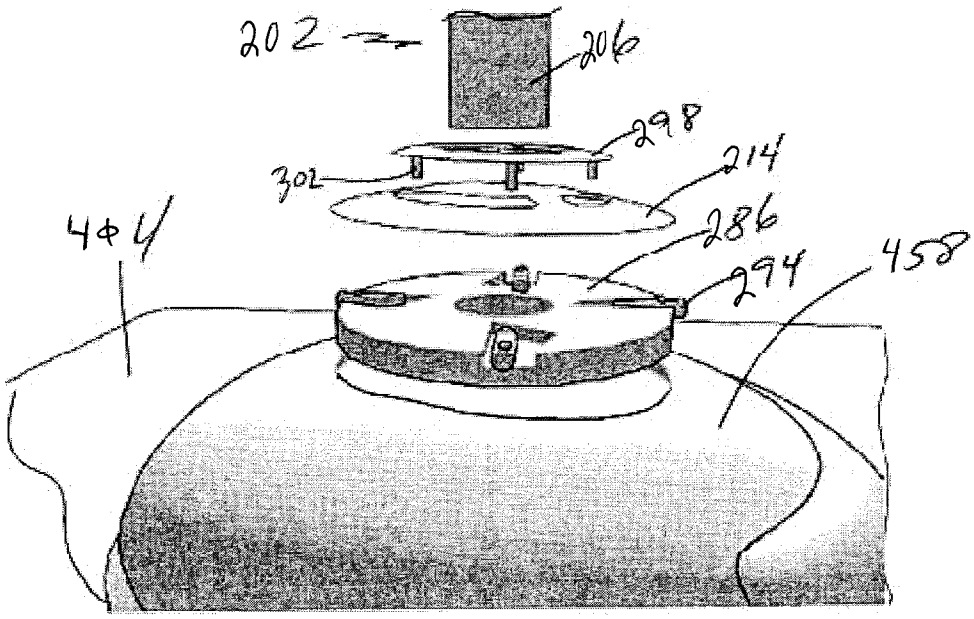

FIG. 69

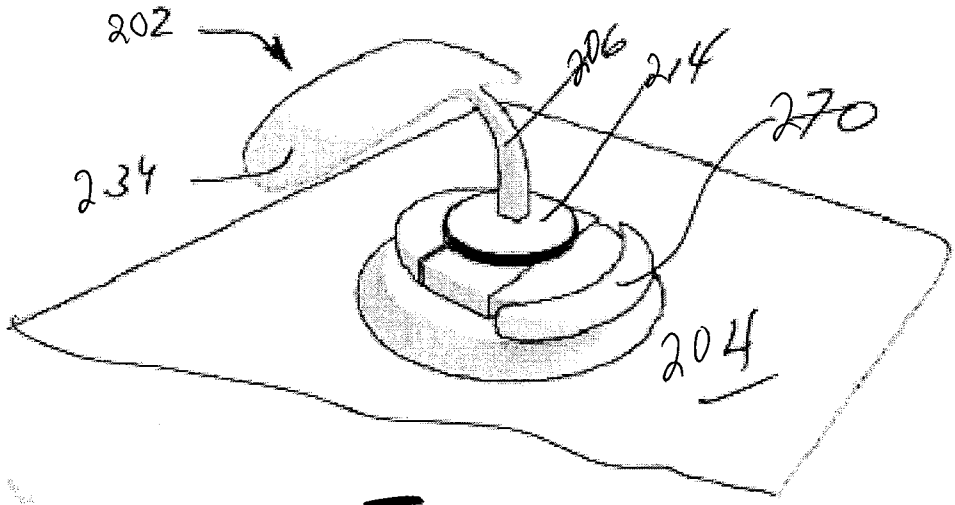

FIG. 70

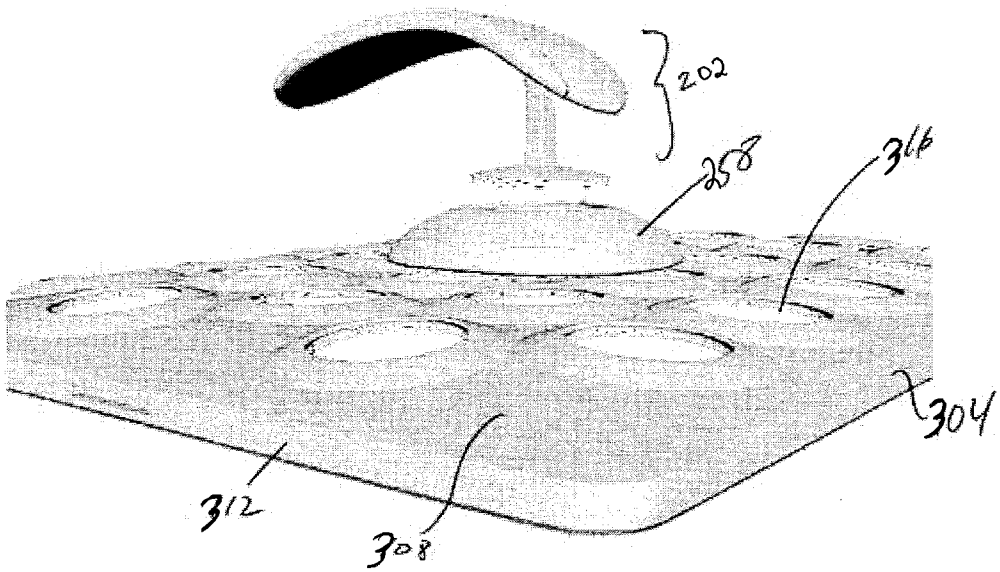

FIG. 71

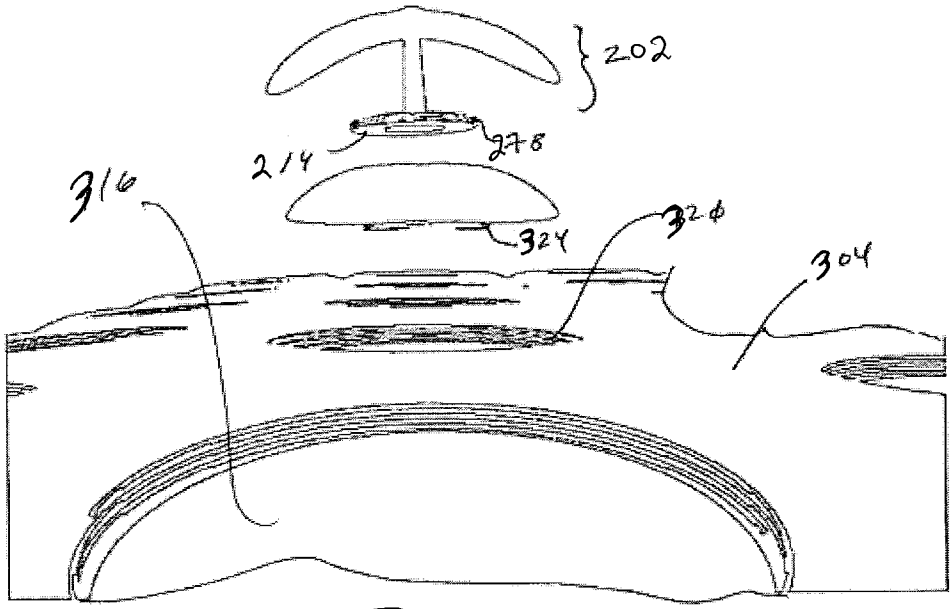
202
214
276
316
324
320
304

FIG. 72

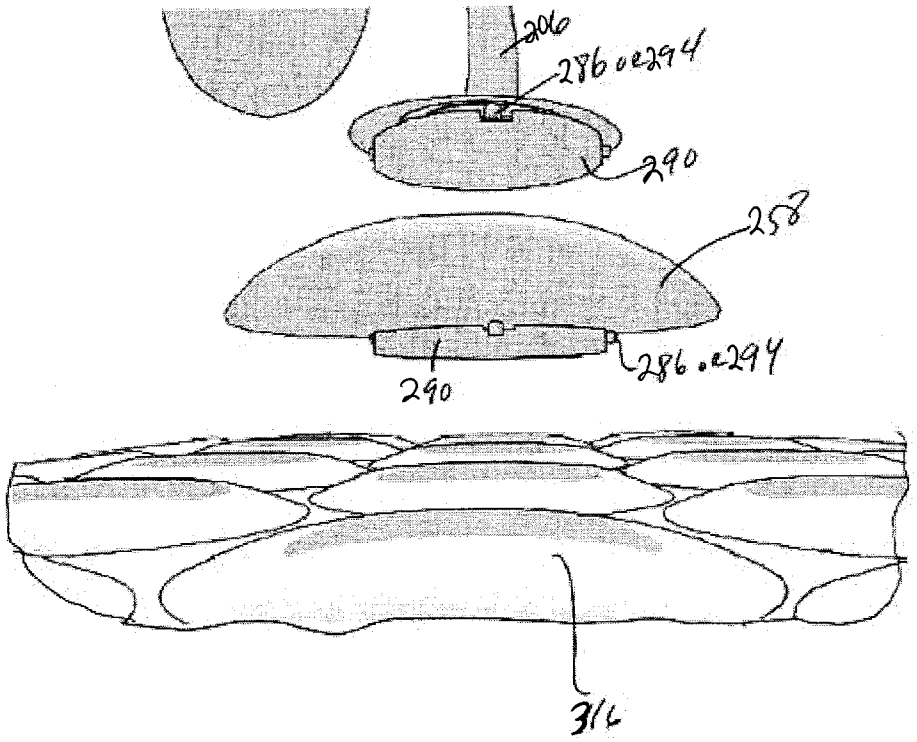
206
286 or 294
290
258
290
286 or 294
314

FIG. 73

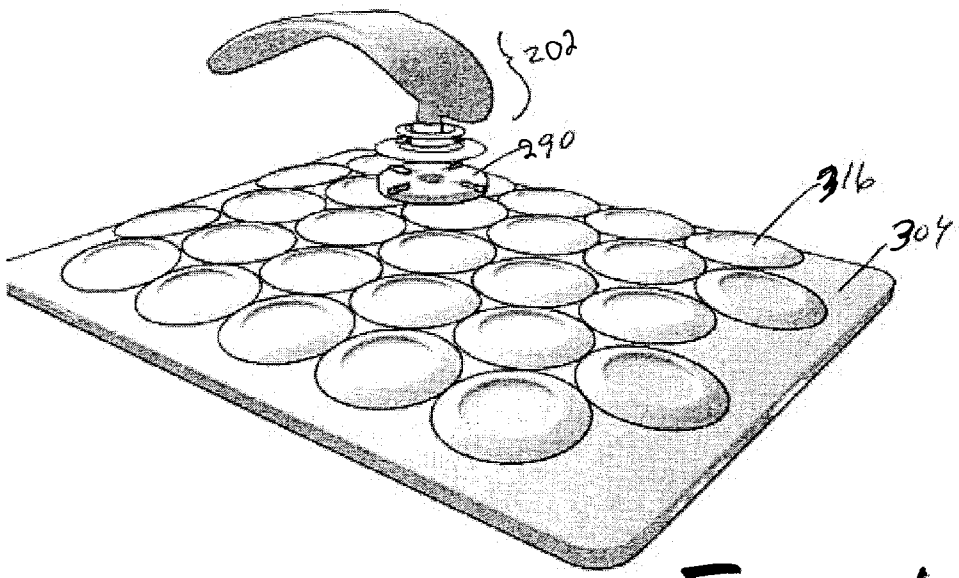

FIG. 74

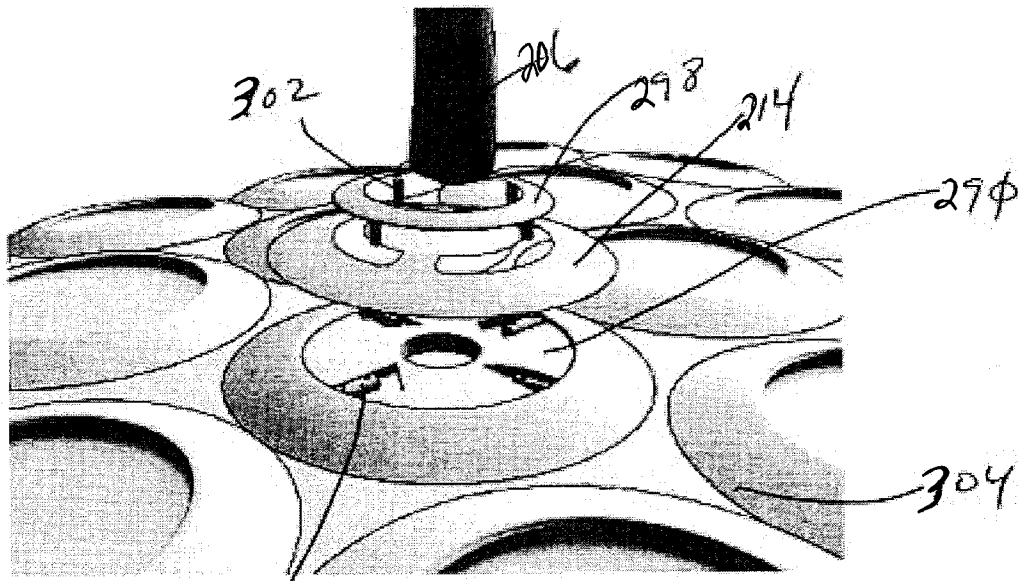

FIG. 75

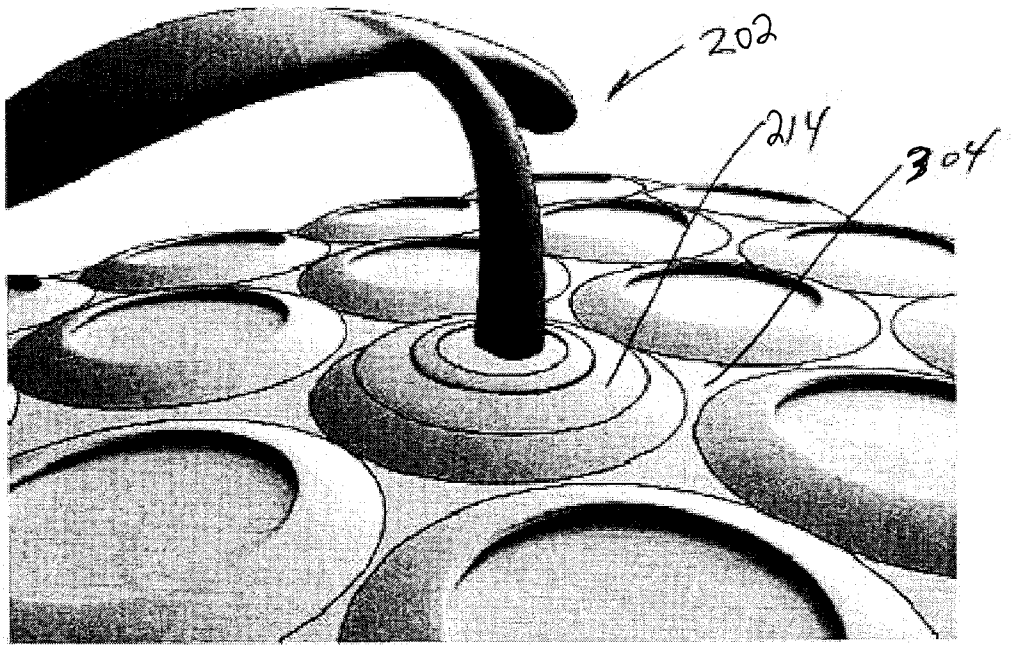

FIG. 76

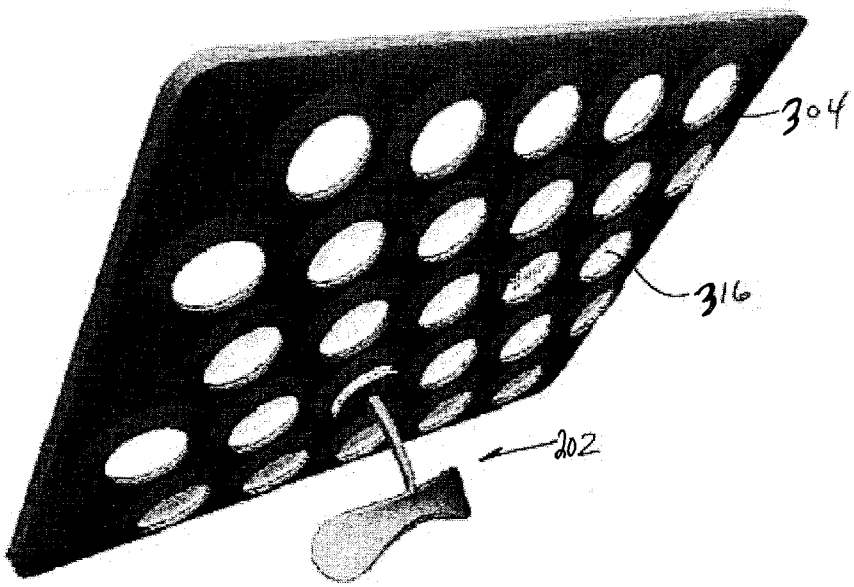

FIG. 77

FIG. 78

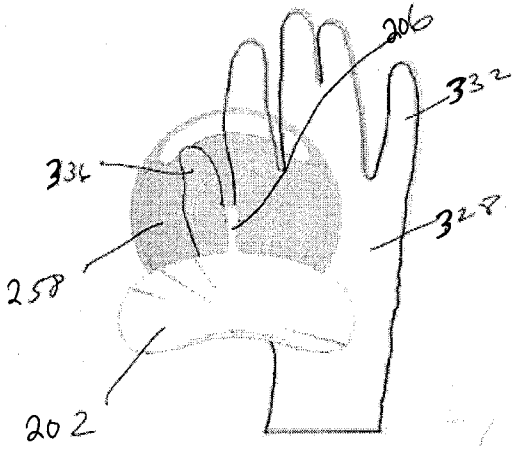

FIG. 79

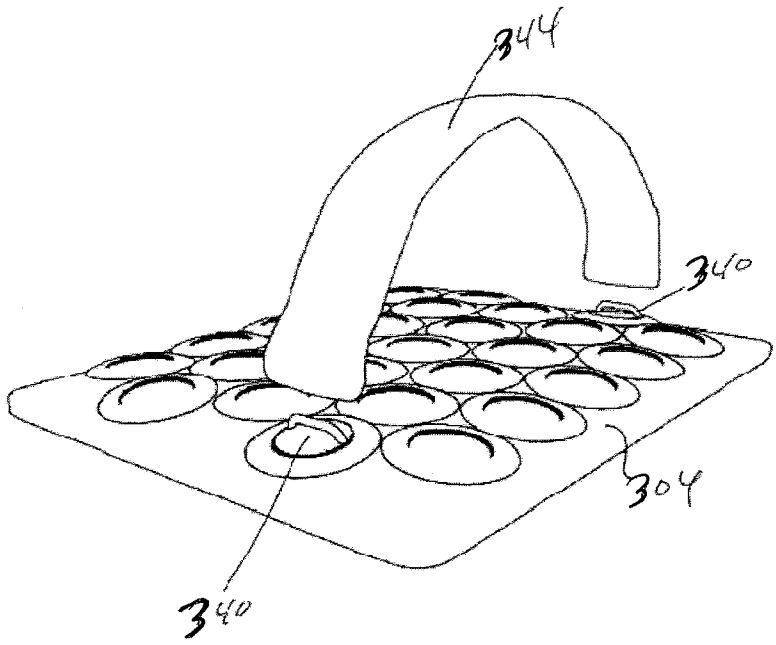

FIG. 8b

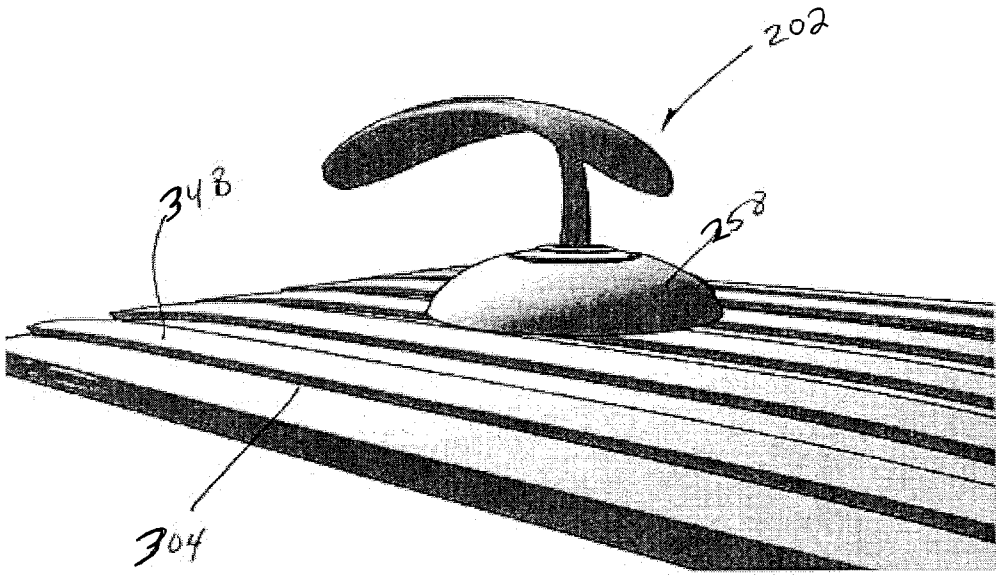

FIG. 81

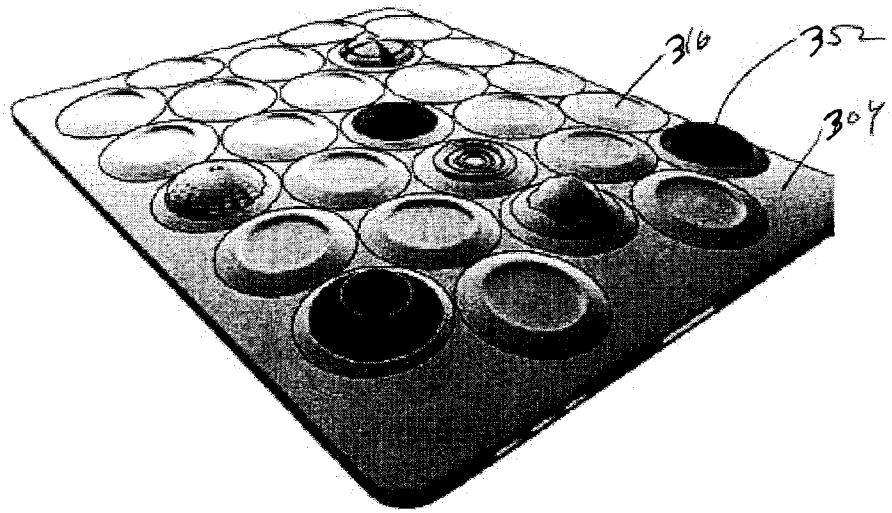

FIG. 82

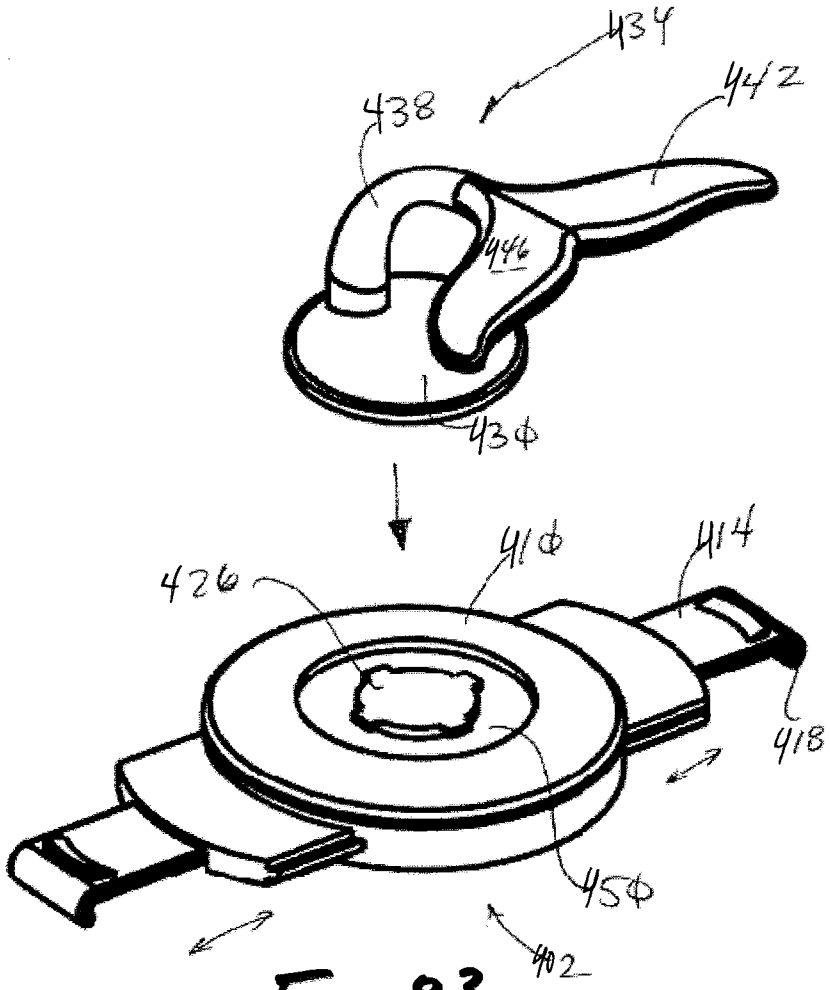

FIG. 83

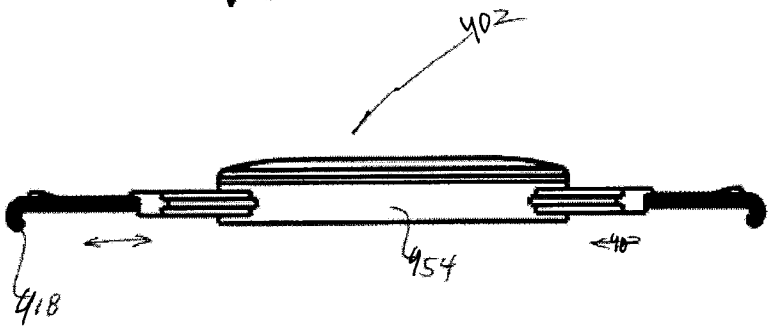

FIG. 84

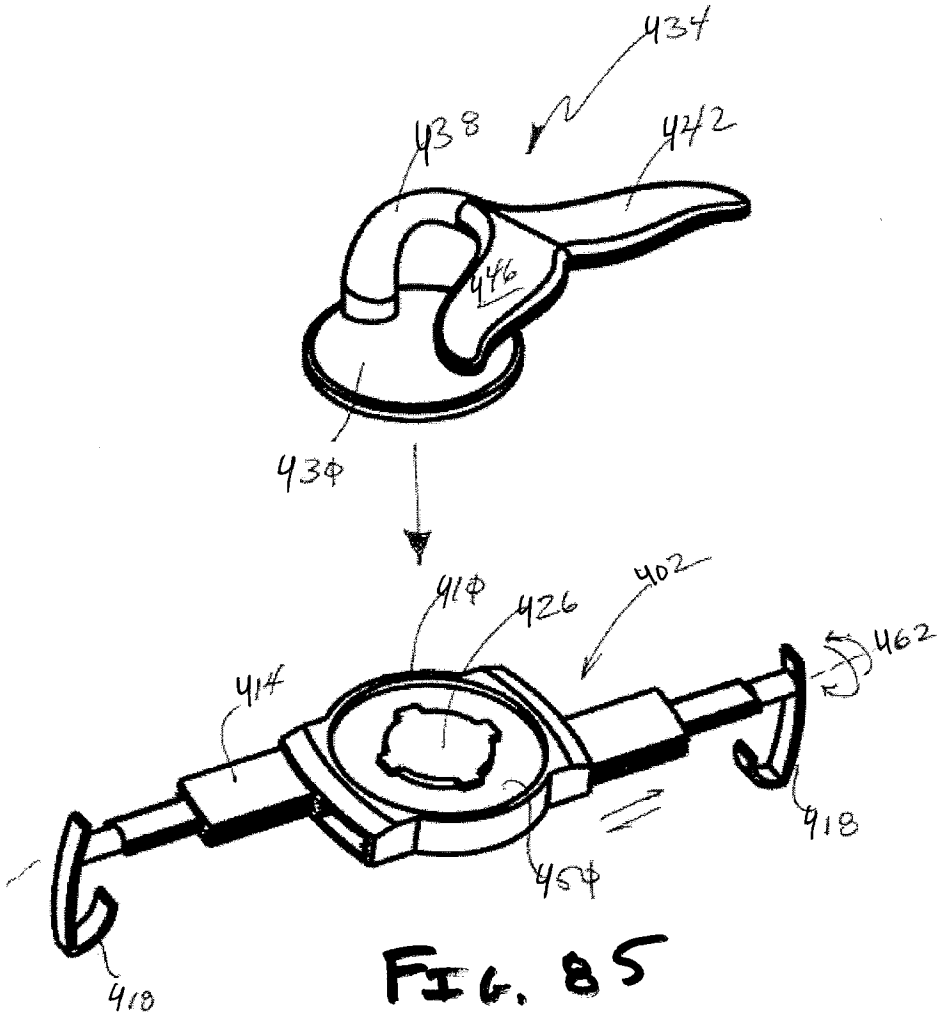
434
438
442
446
430
410
426
402
462
414
418
454
418

FIG. 85

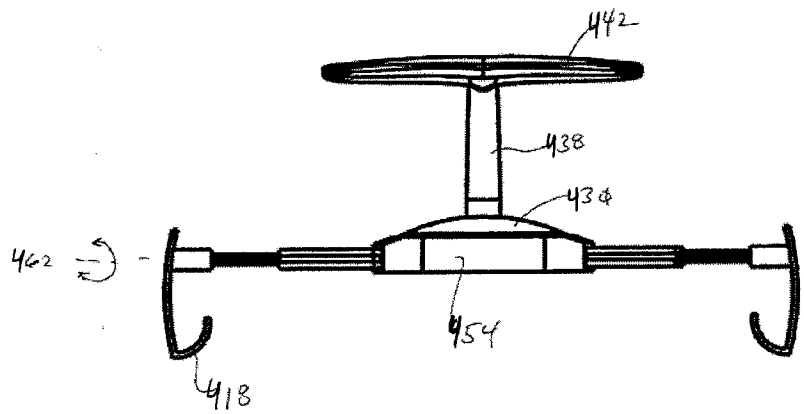
442
438
430
462
454
418

FIG. 86

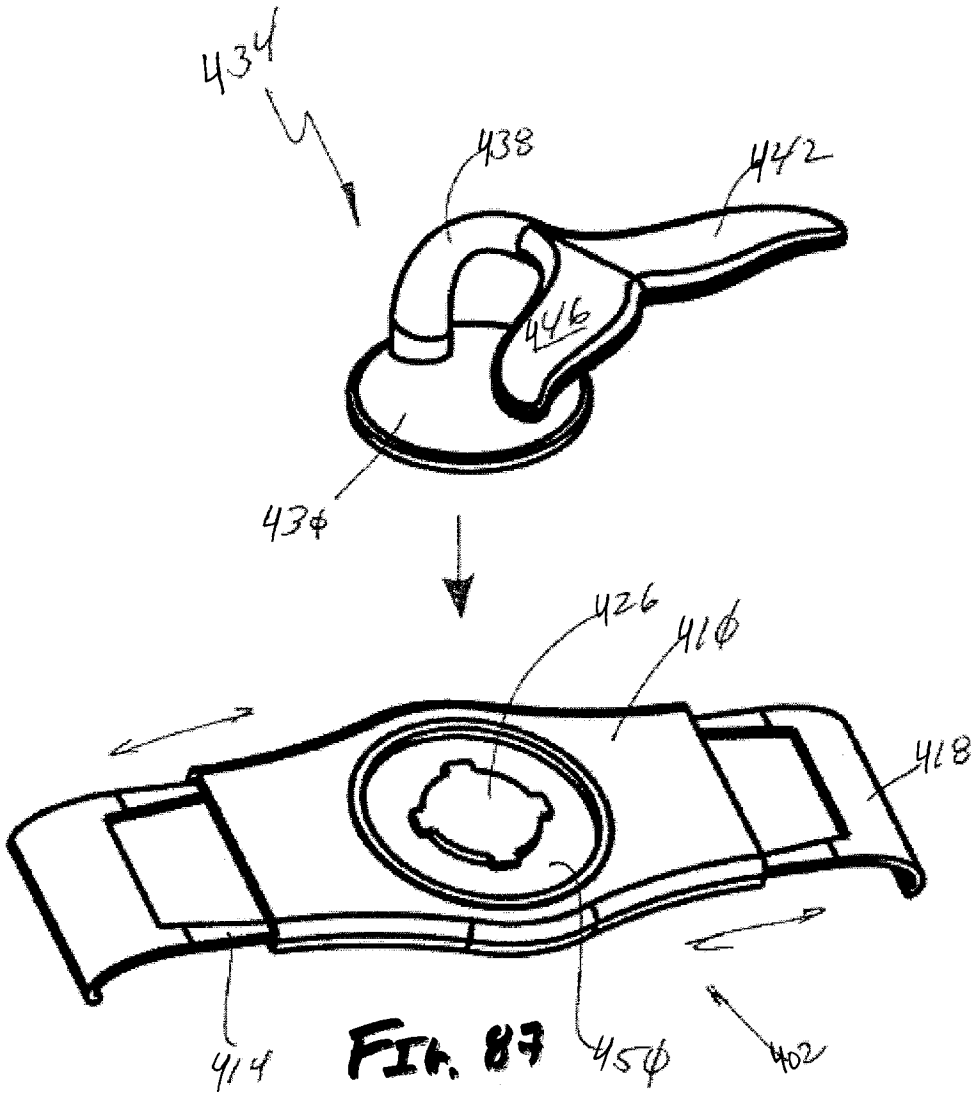

FIG. 87

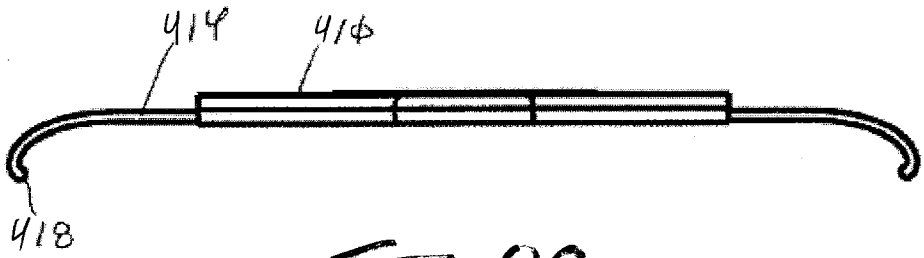

FIG. 88

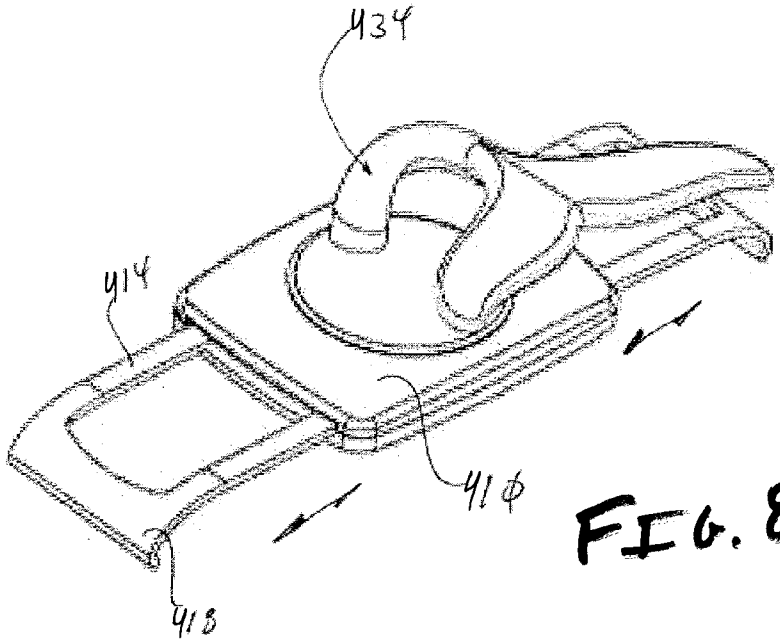

FIG. 89

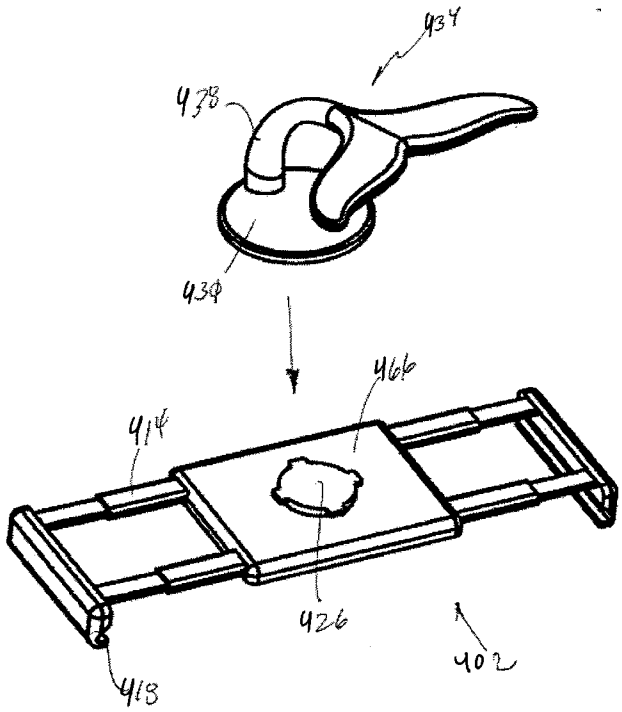

FIG 90

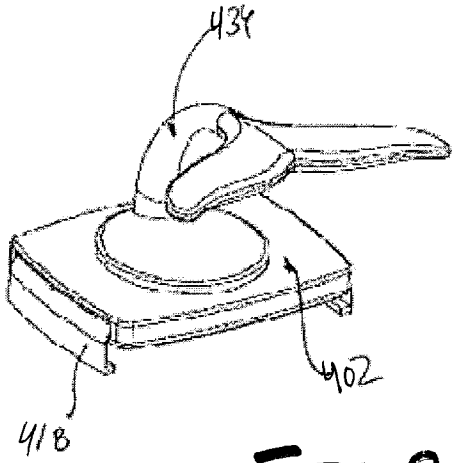

FIG. 91

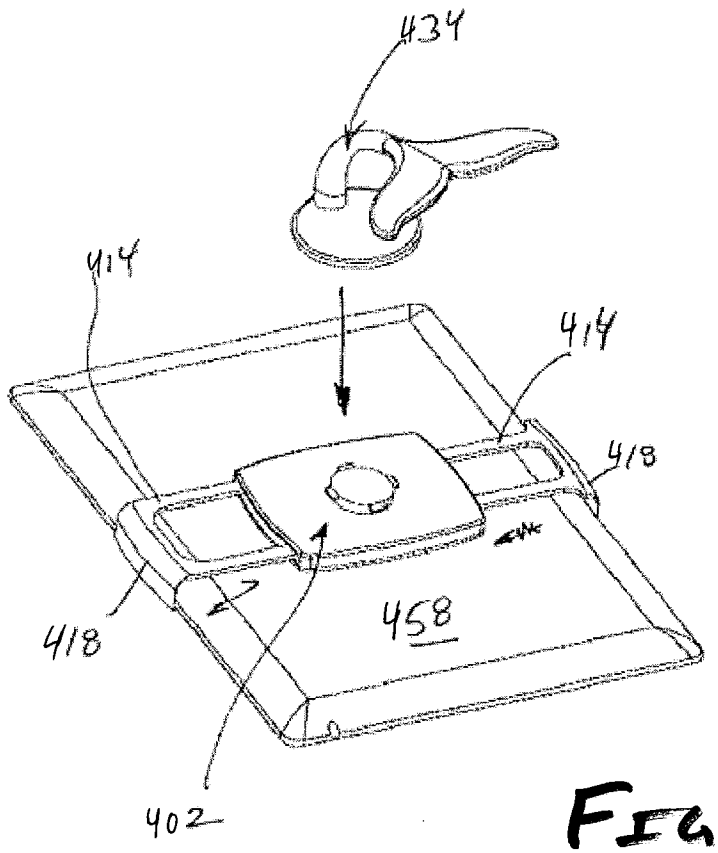

FIG. 92

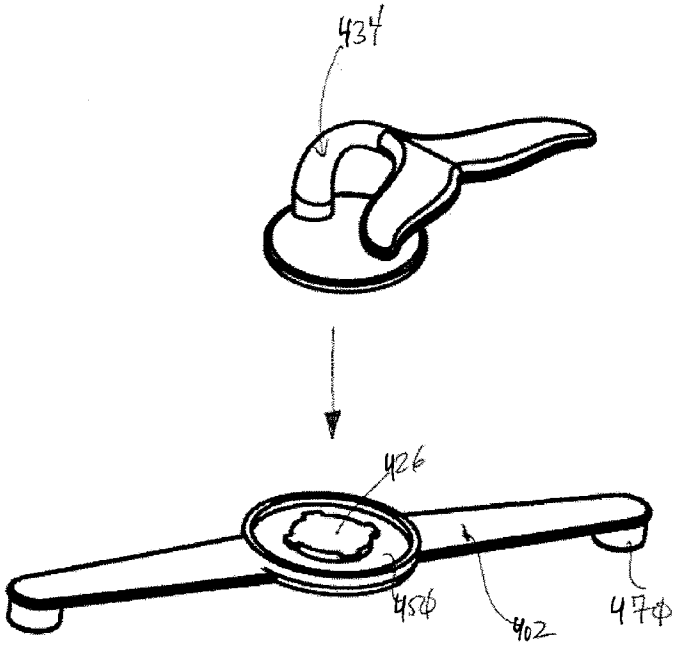

FIG. 93

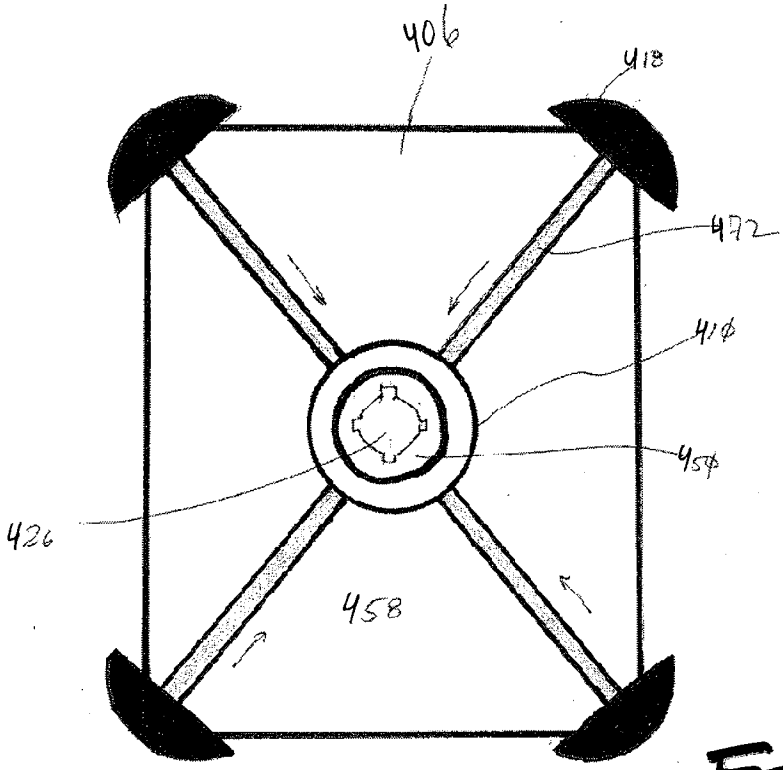

FIG. 94

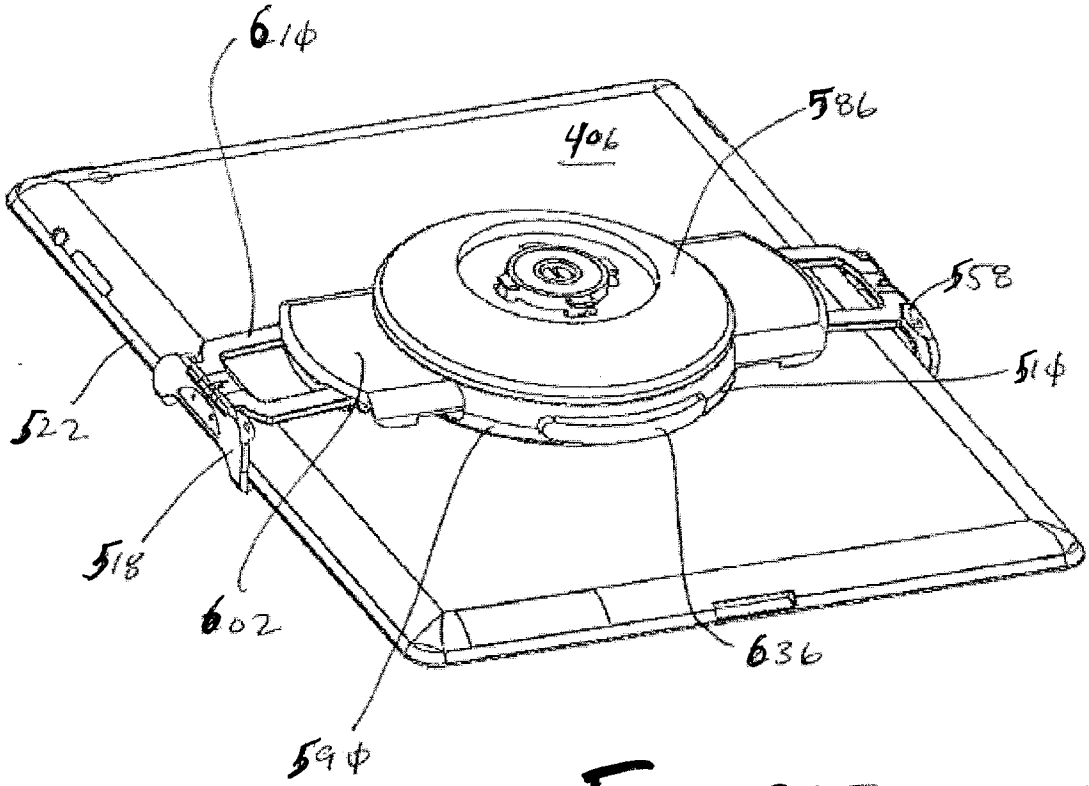

FIG. 95

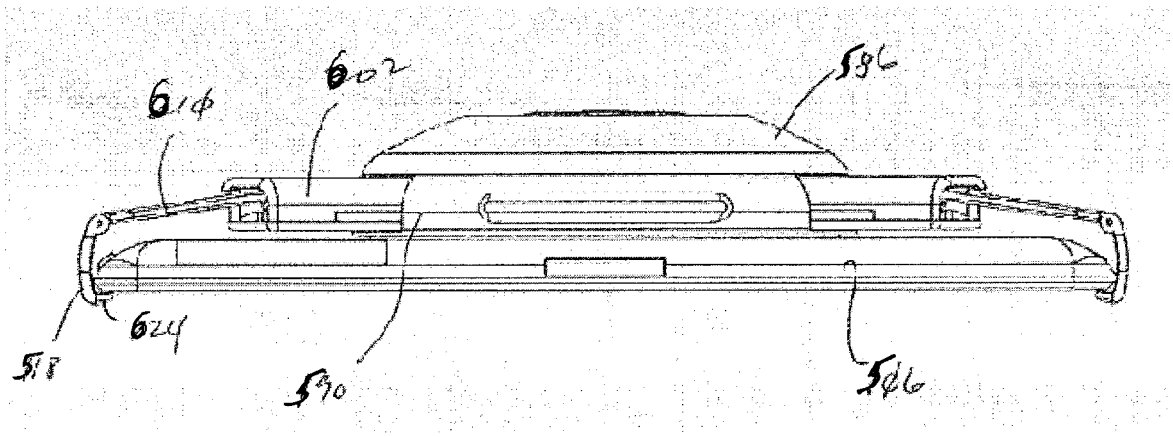

FIG. 96

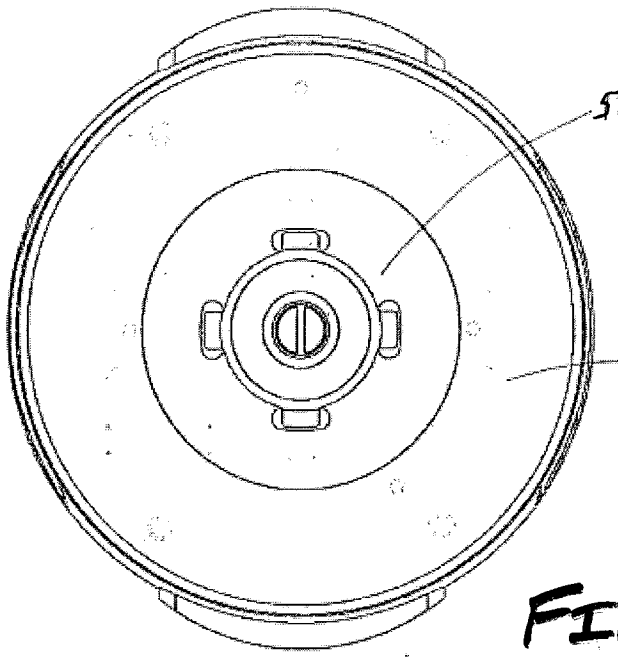

FIG. 97

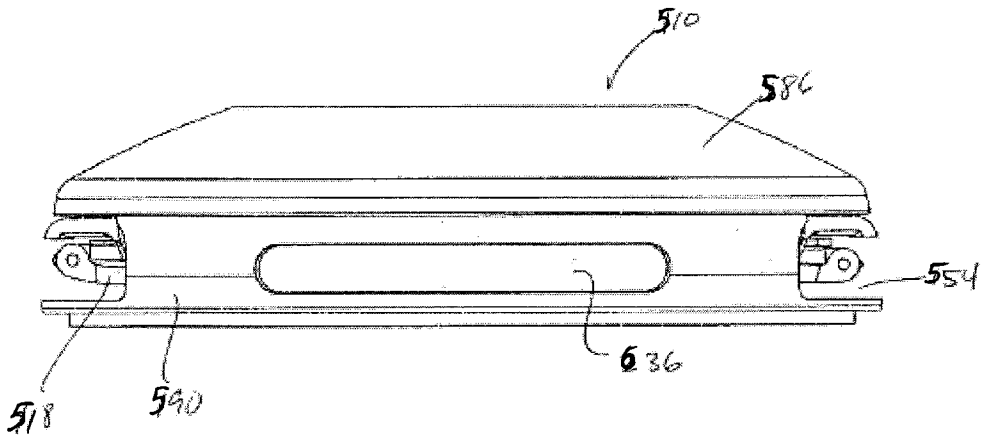

FIG. 98

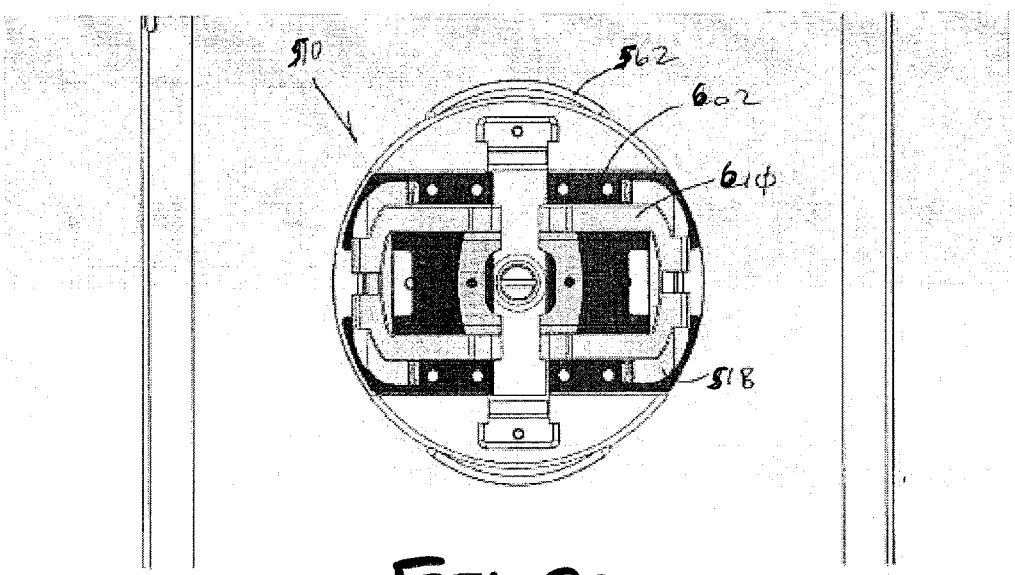

FIG. 99

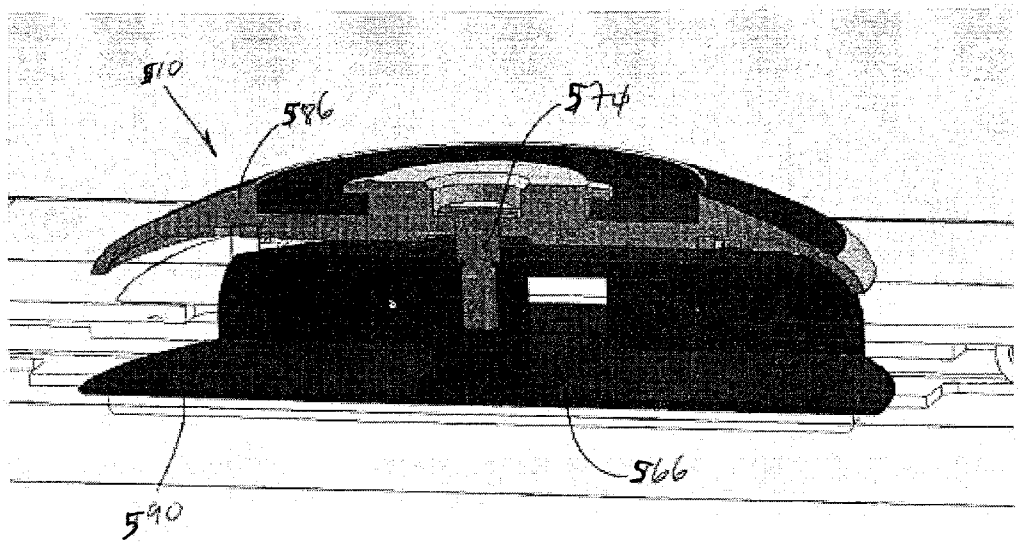

FIG. 100

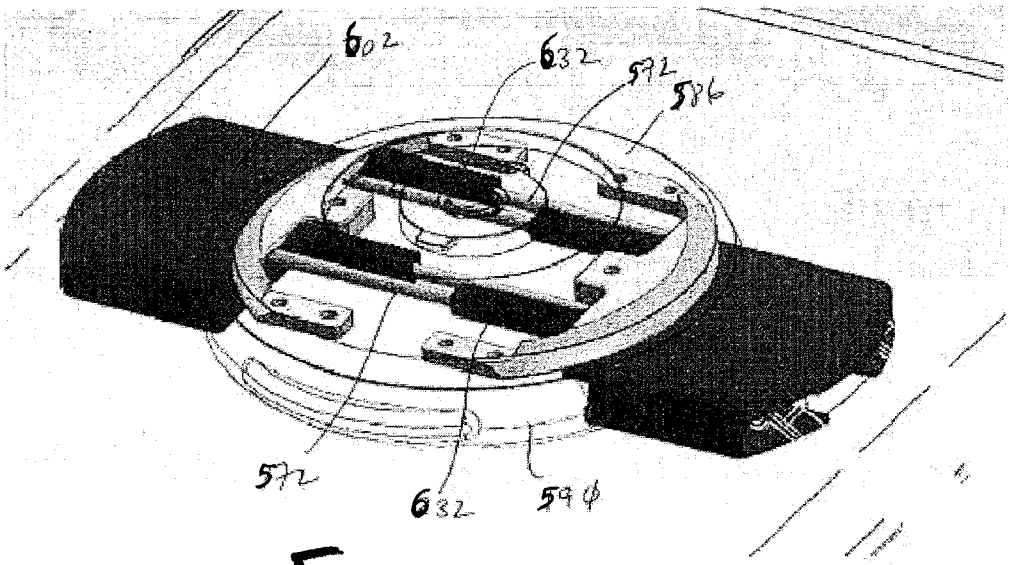

FIG. 101

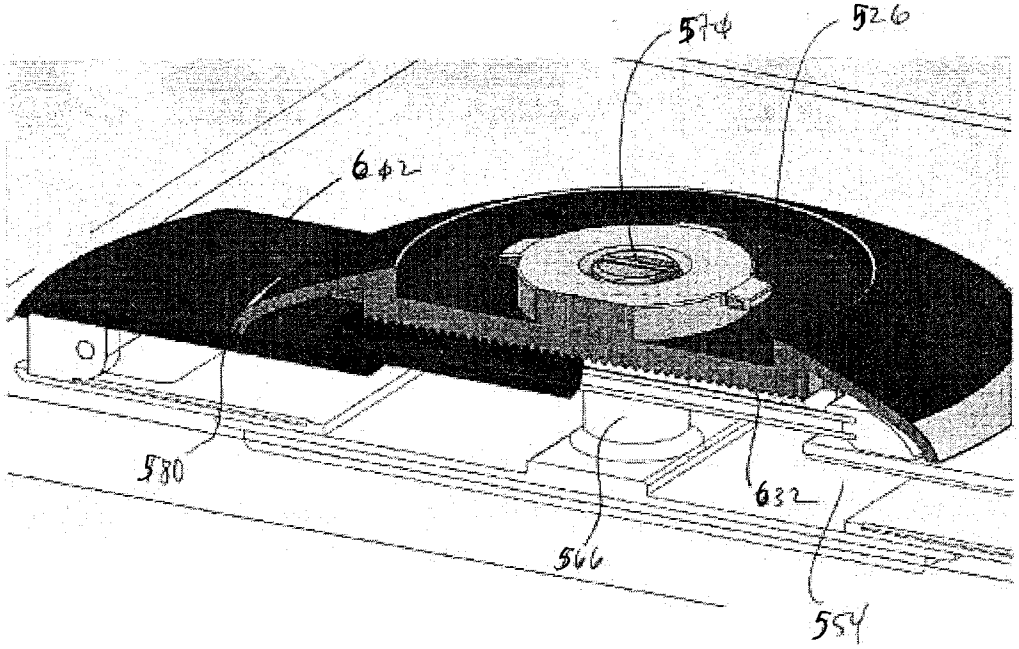

FIG. 102

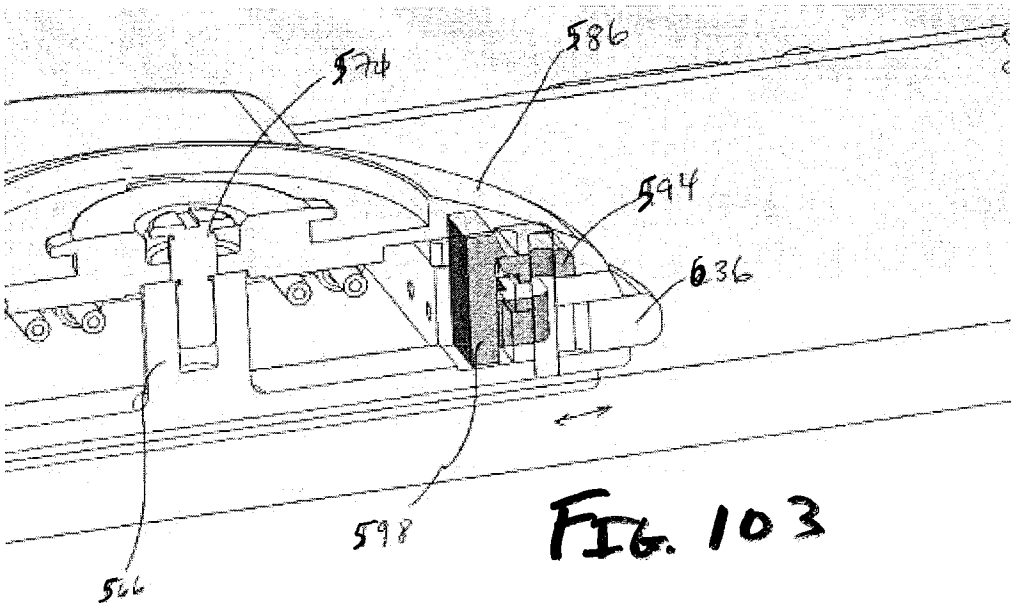

FIG. 103

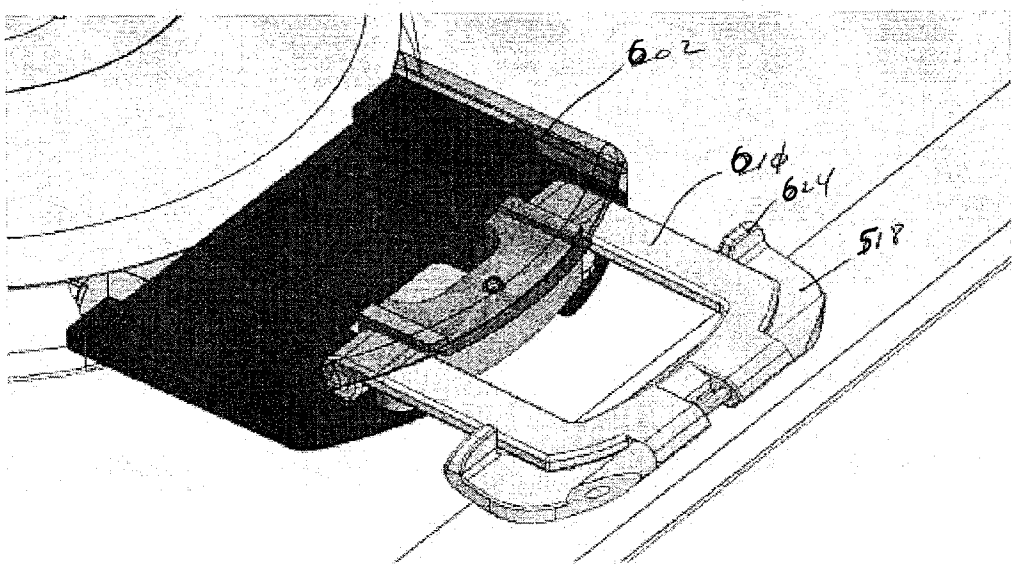

FIG. 104

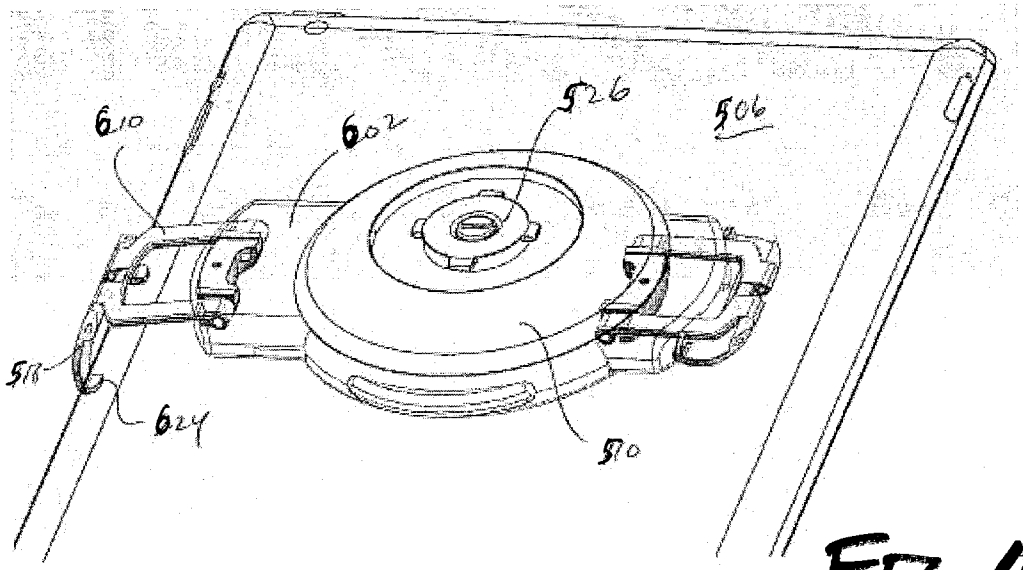

FIG 105

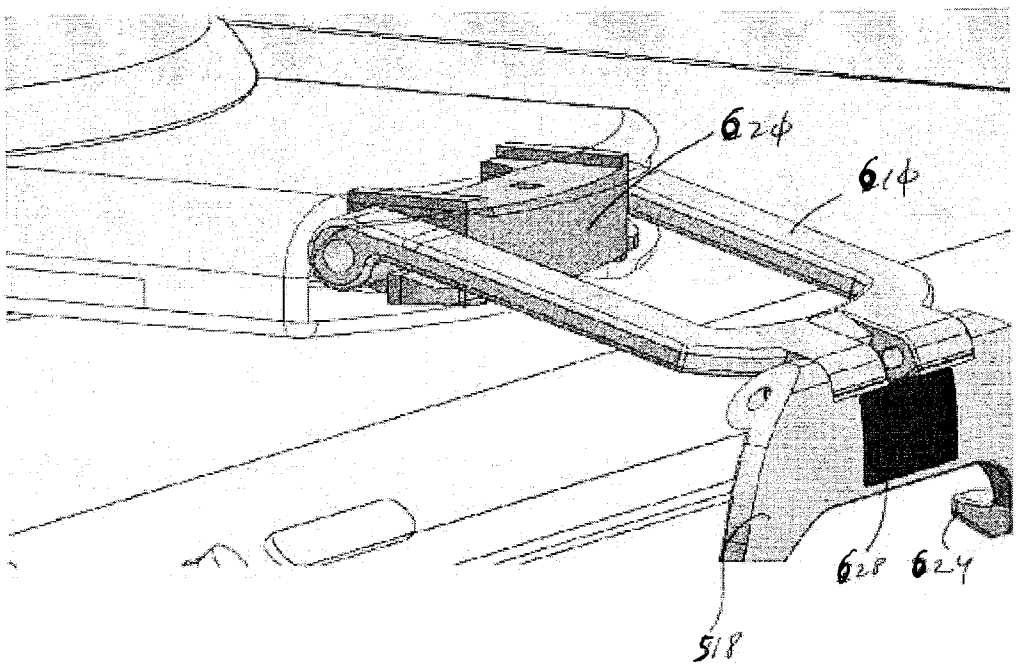

FIG. 106

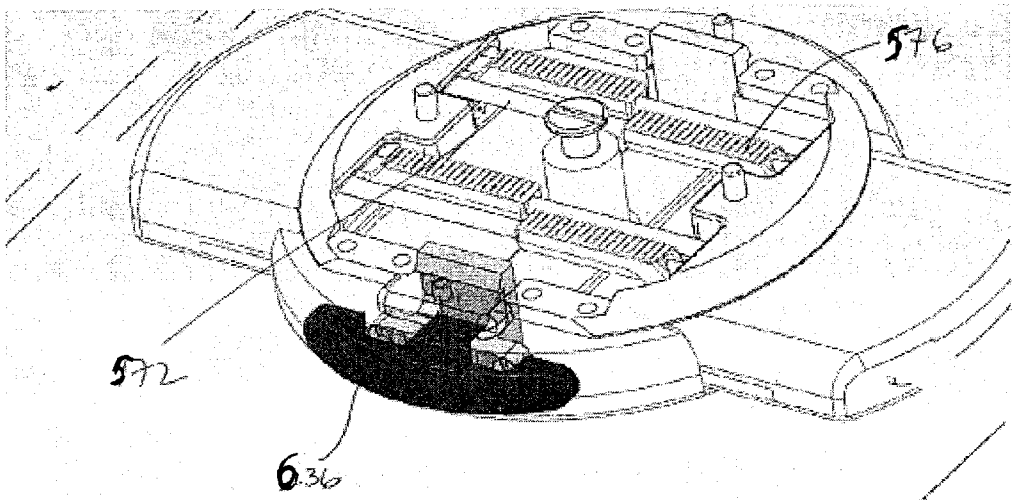

FIG. 107

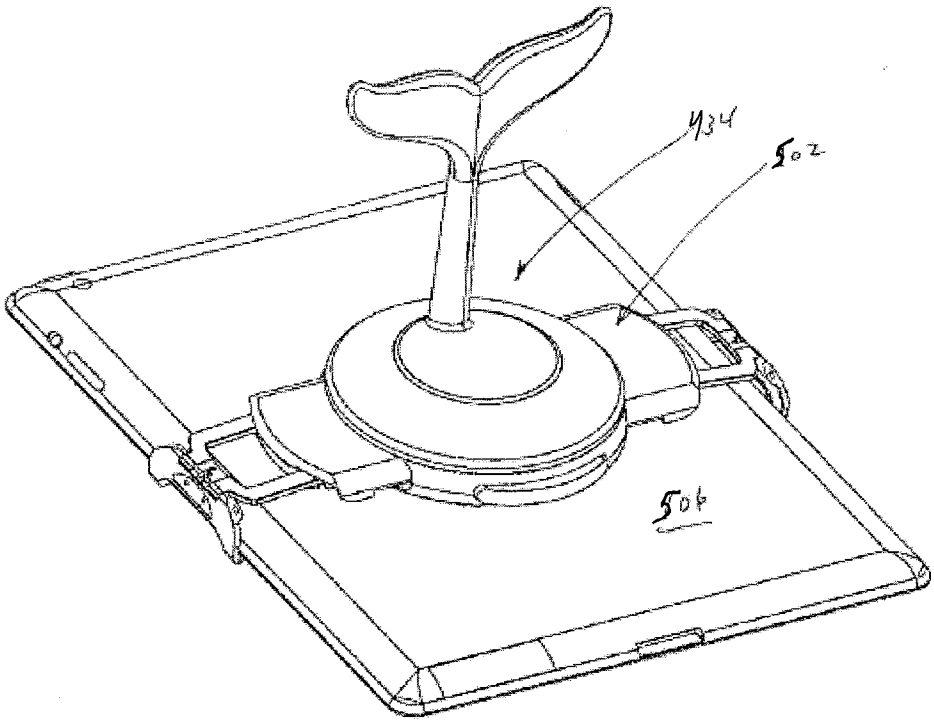

FIG. 108

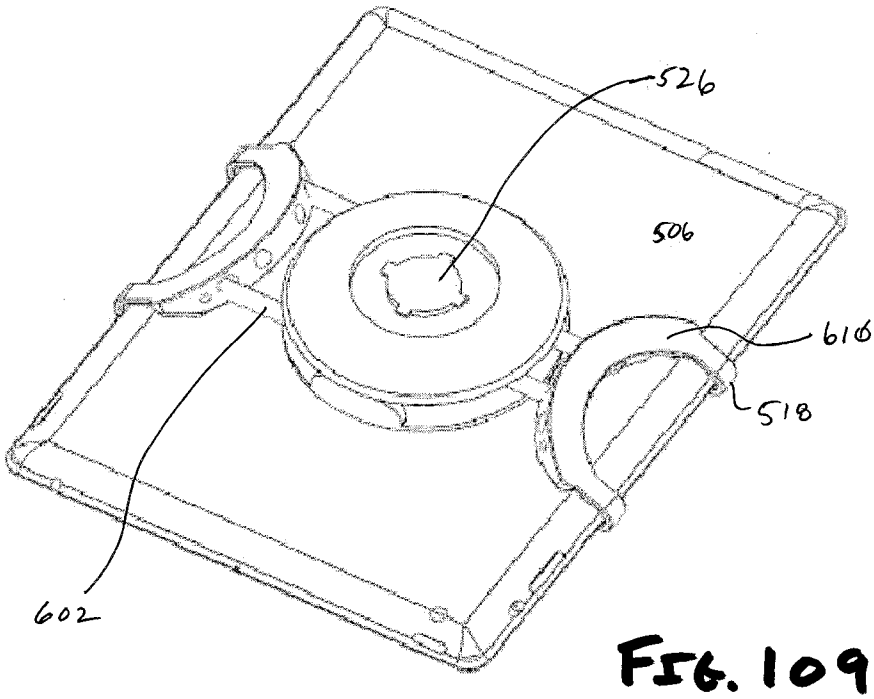

FIG. 109

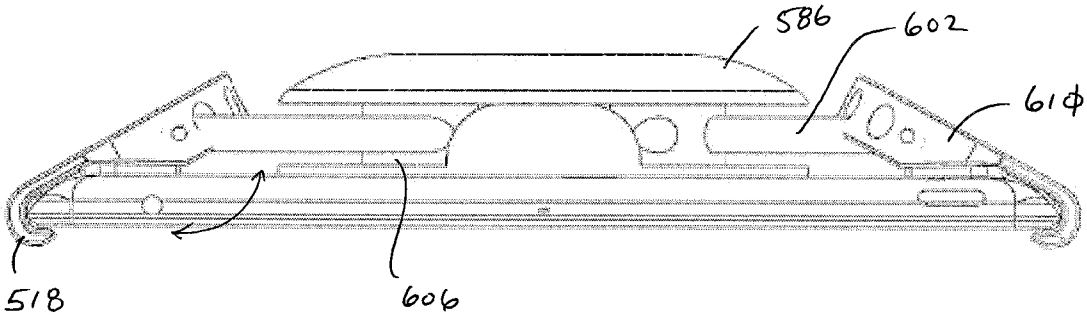

FIG. 110

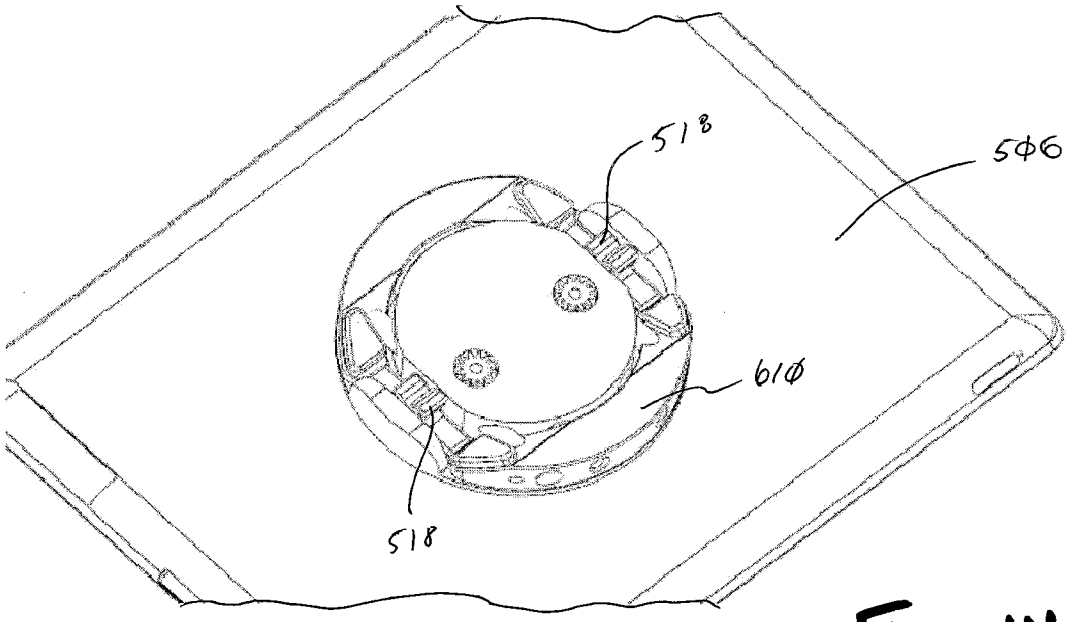

FIG. 111

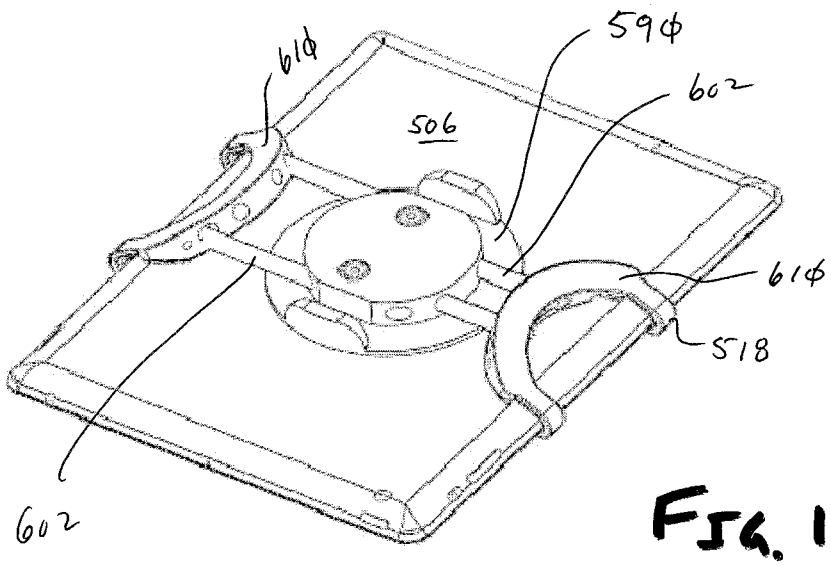

FIG. 112

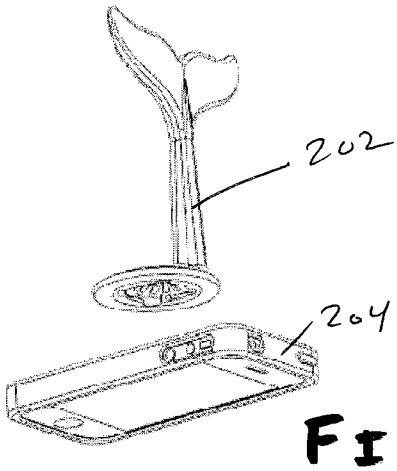

FIG. 113

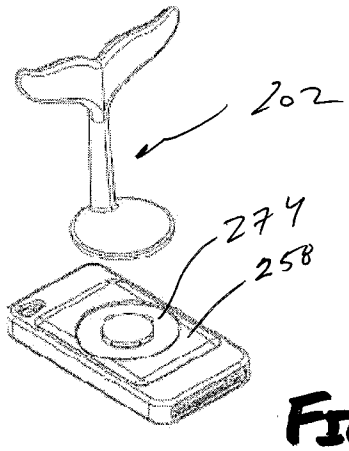

FIG. 114

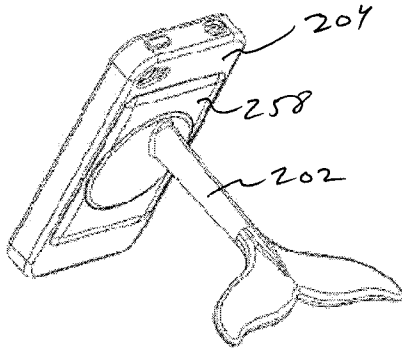

FIG. 115