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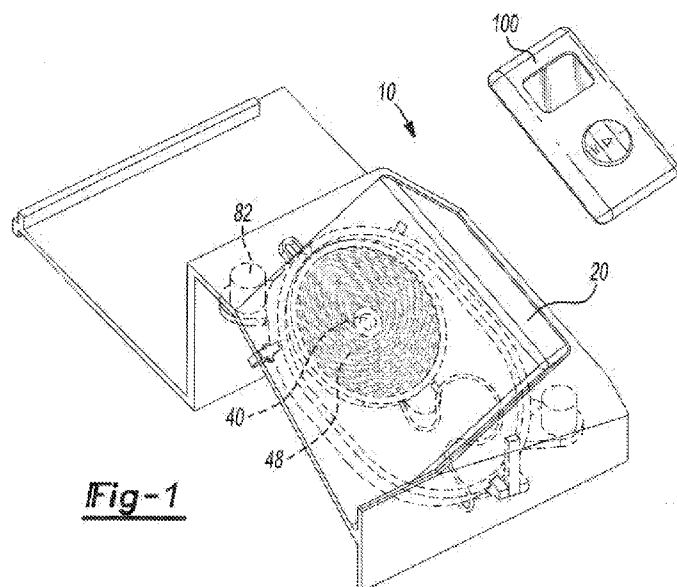
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[Continued on next page]

(54) Title: MOVEABLE MAGNET AND PANEL ASSEMBLY



(57) Abstract: A magnet and panel assembly including at least a first panel 20 having a first surface 22 and a second surface 24 wherein the panel 20 has a configuration such that a magnetic field 61 can extend past the first surface 22; a first magnetic source 40 located on or near the second surface 24 of the first panel 20; one or more magnetic source securing features 80 adapted to hold the magnetic source 40 on or near the second surface 24 of the first panel 20 wherein the magnetic source securing features 80 are adapted to allow the first magnetic source 40 to articulate in the x and y directions along a plane substantially parallel to the plane of the first panel 20.



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Moveable Magnet and Panel Assembly**CROSS REFERENCE TO RELATED APPLICATIONS**

[001] This application claims priority from United States Provisional Application Serial Number 61/290,348 filed December 28, 2009 titled "Movable Magnet and Panel Assembly"; from United States Provisional Application Serial Number 61/290,352 filed December 28, 2009 titled "Recharging or Connection Tray For Portable Electronic Devices" and from United States Provisional Application Serial Number 61/326,893 filed April 22, 2010 titled "Recharging or Connection Tray For Portable Electronic Devices", all incorporated herein by reference.

FIELD OF THE INVENTION

[002] The present invention relates generally to a movable magnet and panel assembly, more particularly to a movable magnet and panel assembly that allow the magnet to articulate in the x and y directions along a plane substantially parallel to the plane of the panel.

BACKGROUND OF THE INVENTION

[003] Magnets have been known and may have numerous uses and functions. In recent years, products have been developed that utilize magnets in conjunction with the efforts to provide an electrical power supply and charging function (e.g. induction charging) for any number of electronic devices (e.g. cordless power trays), for example as taught in U.S. 7,211,986; U.S. 2007/0290645; U.S. 2008/0224655. These products and systems function when a properly equipped electrical device (e.g. phone, PDA, tool, adapted for induction charging) are placed in proximity to the magnet (or magnetic source/magnetic field source/induction source) in such a way that induction charging can occur over time (e.g. recharging a rechargeable battery). It is believed that the relative placement of the device, in proximity to the induction source, is important to the function of the charging of the device. It is also believed that keeping the device secured in-place, in proximity to the induction source, over the charging time is important.

SUMMARY OF THE INVENTION

[004] The present invention meets one or more of the above needs by providing a system that is adapted to make placement and securing of devices more user friendly and robust. The present invention may provide for a system that allows a user to place many differently configured devices (e.g. comprised of a ferrous containing metal such as: a note pad, a clip board, a picture holder, a compact disk holder, a waste receptacle) on a panel in a number of positions and to be held in place. It may also allow, in the case of a "charging" system, for induction charging and for securing the device (e.g. electronic devices) to the panel. The present invention may achieve this goal with the combination of a movable magnet and a panel that allows a magnetic field (created by the magnet) to extend past at least a portion of the exterior surface of the panel.

DESCRIPTION OF THE DRAWINGS

- [005] Figure 1 is a perspective view of an illustrative example of a magnet and panel assembly with the first panel partially transparent.
- [006] Figure 2 is a top perspective view of an illustrative example of a magnet and panel assembly with the first panel not shown.
- [007] Figure 3 is a bottom perspective view of an illustrative example of a magnet and panel assembly with the first panel not shown.
- [008] Figure 4 is a bottom perspective view of an illustrative example of a magnet and panel assembly with a first panel shown.
- [009] Figure 5 is another bottom perspective view of an illustrative example of a magnet and panel assembly with a first panel shown.
- [0010] Figure 6 is side view of an illustrative example of a magnet and panel assembly with a first panel shown.
- [0011] Figure 7 is a view of an assembly of the invention having a tray to support an object thereon.

DETAILED DESCRIPTION

[0012] The explanations and illustrations presented herein are intended to acquaint others skilled in the art with the invention, its principles, and its practical application. Those skilled in

the art may adapt and apply the invention in its numerous forms, as may be best suited to the requirements of a particular use. Accordingly, the specific embodiments of the present invention as set forth are not intended as being exhaustive or limiting of the invention. The scope of the invention should, therefore, be determined not with reference to the above description, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. The disclosures of all articles and references, including patent applications and publications, are incorporated by reference for all purposes. Other combinations are also possible as will be gleaned from the following claims, which are also hereby incorporated by reference into this written description.

[0013] Accordingly, pursuant to a first aspect of the present invention, there is contemplated a magnet and panel assembly comprising: a) at least a first panel having a first surface and a second surface wherein the panel has a configuration such that a magnetic field can extend past the first surface; b) a first magnetic source located on or near the second surface of the first panel; c) one or more magnetic source securing features adapted to hold the magnetic source on or near the second surface of the first panel wherein the source securing features are adapted to allow the first magnetic source to articulate in the x and y directions along a plane substantially parallel to the plane of the first panel.

[0014] The invention may be further characterized by one or any combination of the features described herein, such as: the one or more magnet securing features is attached by one or more attachment features to the first panel; the assembly further comprises a second panel located near the second surface of the first panel wherein the magnet securing features is attached to the second panel by one of more attachment features; the second panel is attached to the second surface of the first panel; the second panel defines the range of movement of the first magnet; the magnet securing features comprises one of more of springs, elastic bands, or armatures; the magnet has sufficient strength and the assembly is arranged to allow an object having a magnet or comprising a part of ferrous containing metal to be held in place on the first surface of the first panel; the first panel is part of an instrument panel, a console, sun visor, a headliner, compartment molded into a headliner, a glove box door, a door assembly, a seat of a vehicle; the object or device is an electronic device, a note pad, a clip board, a picture holder, a compact disk holder, a waste receptacle; the first panel is part of a console; the first panel is integrated into the console and is located so that the driver can view an object held on the panel by the magnet; the first panel is located such that there is tray disposed at the bottom of the first panel adapted to carry the weight of an object held in place by the magnet; a means for recharging a rechargeable battery of an electronic device wherein such recharging means is

located in the vicinity of the first magnet such that the magnet is capable of locating the recharging means with respect to the rechargeable electronic device to allow the battery of the rechargeable device to be recharged by the recharging means; the recharging means comprises a connection to the power source of a vehicle, a controller and one or more coils of wire capable of generating an electromagnetic field connected to the controller wherein the first magnet is located within one of the coils of wire.

[0015] Accordingly, pursuant to a second aspect of the present invention, there is contemplated a method of securing an object or device within a vehicle comprising the steps of: a) providing an object having a magnet or a part comprised of a ferrous containing metal; and b) contacting the object with the first panel of an assembly according to the first aspect above in the vicinity of the magnetic field of the one of more magnets; and c) allowing the object to be held in place by the magnet.

[0016] The present invention is directed to a unique solution for a magnet and panel assembly, where the magnet may be able to move in at least the x and y direction relative to a transverse plane of the panel and such that a magnetic field (created by the magnet) can extend past the exterior surface of the panel. The present invention contemplates that the magnet may be moved by a magnetic source securing feature and/or an interaction between the magnet and some external device (e.g. through magnetic field interactions). In general, the present invention (a magnet and panel assembly 10) includes at least three major components: at least one panel 20; at least one magnetic source 40; and at least one magnetic source securing feature 80. It is also contemplated that the assembly 10 may be functionally two sided (e.g. having two generally opposing panels), and that the magnetic field may extend past the exterior surface of both panels. A number of illustrative examples and preferred embodiments are provided in the Figures 1-6 and in the text of the present application.

Panel 20

[0017] It is contemplated that the panel 20 generally functions as a barrier, separating the magnetic source 40 from an area outside of the panel. The panel 20 also should be configured such that it allows a magnetic field (e.g. created by the magnetic source 40) to extend past the exterior of the panel 20, at least in localized areas.

[0018] The panel 20 may be defined as having at least a first panel surface 22, a second panel surface 24 and panel thickness 26. The panel surfaces 22, 24 may have a flat planar profile or may contain one or more contoured areas. The thickness 26 may be uniform or may vary locally (e.g. from about 0.2mm to about 15.0mm). It is contemplated that the panel 20 may include through-holes in selected areas or regions.

[0019] It is contemplated that the second panel surface 24 may be relatively smooth, such that in the case where the magnetic source 40 is in contact with the surface 24, the source 40 can move (in at least the x and y direction) with relative ease (e.g. with a tangential force of less than about 100N).

[0020] It is also contemplated that at least the exterior surface (e.g. the first surface 22) of the panel 20 have areas that function to create additional friction between the panel 20 and any device 100 that may be placed on it. For example, having a rubber (natural or synthetic) or tacky coating.

[0021] The panel 20 may be a unitary structure (e.g. comprising a single layer of material) or be constructed of multiple layers (e.g. a layered assembly of materials). It is contemplated that, at least locally, the panel 20 may contain materials and/or structures that aid in controlling the relative strength or intensity of the magnetic field that can extend past the exterior surface of the panel. Exemplary materials contemplated include: Plastics, rubbers, metals (ferrous and otherwise), and ceramics.

Magnetic Source 40

[0022] The magnetic source 40 functions to provide a means for providing the magnetic field that extends past the exterior surface of the panel 20 (e.g. for charging a device 100, for example as taught in WO 2004/038887 – incorporated herein by reference). It is contemplated that the source may be a permanent magnet (e.g. an object made from a material that is magnetized and creates its own persistent magnetic field), an electromagnet (e.g. made from a coil of wire which acts as a magnet when an electric current passes through it, but stops being a magnet when the current stops) or a combination of both. It may be of any number of shapes or sizes (e.g. cylindrical, rectangular, disk, square, or polygonal). It may have dimensions, such as lengths and/or widths of about 10 to 50 mm and thicknesses of about 2 to 30 mm.

[0023] The magnetic source 40 may also function as a securing means for a device 100 (e.g. a phone, MP3 player, PDA or other electronic device, or any article with a ferrous component, preferably the device has a mass of up to about 1.0 Kg) that is placed on or near (e.g. with about 10.0 mm) of the first panel surface 22. Preferably, the magnet source 40 is capable of preventing the device from becoming dislodged when subjected to a normal or tangential force between about 5 to about 100N. It is also preferable that the magnetic source 40 be as small and as light weight as possible to accomplish its desired functions.

[0024] It is contemplated that the source 40 may be positioned on or near (e.g. within about 15.0 mm) the second surface 24 of the panel 20 (e.g. first panel). It may be secured to the

panel 20 via a magnetic source securing feature 80 or to another optional component (e.g. a mounting structure such as a backing plate 60 or a bridge component 70).

[0025] In one illustrative example, shown in Figs. 1-3, the magnet source 40 is an electromagnet that is in the form of a planer disk with a disk diameter 42 of 25 mm and a disk thickness 3 mm of YY. In this example, the panel 20 is not shown, and the backing plate 60 is used to ultimately secure the source 40 to the magnet and panel assembly 10. Also shown in this example, is an electrical supply source 46 (e.g. a wire) that has a length that is sufficient to allow for the movement of the source 40 in the x and y directions.

[0026] In another illustrative example, shown in Figs. 4-6, the magnet source is a permanent magnet that is generally cylindrical in shape, with a cylinder diameter 42' of 12 mm and a cylinder thickness 44' mm' of 12. In this example, the first panel 20 is used to ultimately secure the source 40 to the magnet and panel assembly 10 (via a bridge component 70).

Magnetic Source Securing Feature 80

[0027] The magnetic source securing feature 80 functions to hold the magnet source 40 (e.g. ultimately to the magnet and panel assembly 10) and allow for the magnetic source 40 to articulate in the x and y directions along a plane substantially parallel (e.g. plus or minus 10 degrees) to the plane of the panel 20. It is contemplated that the feature 80 may be comprised of primarily springs, elastic bands, or armatures that can move or flex when subjected to a tangential force created by interaction of the magnetic field 61 of the source 40 and any device 100. The feature 80 may be directly or indirectly connected to the first panel 20, a backing plate 60 or some other intermediate structure by means of one or more attachment features 82. It may also be connected to the source 40 via any number of means capable of holding it in place (e.g. mechanical fasteners, adhesive, or some other intermediate structure). It is contemplated that the movement or flexing of the feature 80 allows the source 40 to move to a location that better facilitates providing the magnetic field required to interact with the device and to provide a desired result (e.g. securing and/or charging of the device). Preferably, the tangential force required to move the feature 80 is less than about 300N, more preferably less than about 150N and most preferably less than about 100N.

[0028] In one illustrative example, shown in Figs. 1-3, the feature 80 is a coil spring attached on opposing sides of a backing plate 60 near its top end 62 (spanning therebetween) utilizing one or more attachment features 82'. The source 40 is secured to the feature 80 near the middle of its span, through a slot 64 in the plate 60. This configuration allows for the movement of the source 40 (from its initial position 66) almost anywhere (x and y movement) within the periphery of the slot, when the source 40 is subjected to a tangential force created by interaction of the

magnetic field 61 of the source 40 and any device 100. In this example, the feature 80 also returns the source 40 to its initial position 66 when the force interaction is removed (e.g. the coil spring 80 returns to "un-sprung" state). In this example, the second panel may also function to limit the movement of the at least one magnetic source 40 by use of a wall 68.

[0029] In another illustrative example, shown in Figs. 4-6, the feature 80 is a pair of interconnected armatures (upper arm 72, lower arm 74). The armatures 80 are rotatably attached to a bridge component 70 and the bridge component is attached to the first panel 20. The source 40 is secured to the feature 80 near the end of the lower arm 74. This configuration allows for the movement of the source 40 almost anywhere (x and y movement) within the span of the interconnected armatures 72, 74, when the source 40 is subjected to a tangential force created by interaction of the magnetic field 61 of the source 40 and any device 100. It is also contemplated that the armatures may include geometric features (e.g. tabs, projections, or the like) that may function to limit the relative movement of a given armature (e.g. to less than 360 degrees rotation). It also may include features that allow for one or more of the arms 72, 74 to be "locked" in place, for example for preventing movement during sudden acceleration (or deceleration).

[0030] The first panel may have connected thereto a tray adapted to carry the weight of an object placed thereupon. The tray can be located in any location with respect to the first panel so as to support the weight of the an object and to help retain the object on the first panel. The tray can be affixed to the first panel or the first panel and the tray can be formed or molded into a unitary element. The angle between the surface of the tray and the first panel is selected to facilitate holding of an object on the first panel, preferably the angle is about 90 degrees. Figure 7 illustrates one embodiment of a first panel 20 having a tray 28 with an object 100 disposed thereon. The object 100 is held in place by a magnet 40 (not shown in this view). Preferably the tray is located at the bottom of the panel.

[0031] The assemblies of the invention may comprise a means for recharging a rechargeable battery. Any means for recharging a battery may be incorporated into the assemblies. In a preferred embodiment the means for recharging a battery is a device that generates an electromagnetic field. Preferably such means is a coil of wires which when electricity is flowed through the coil an electromagnetic field is generated. Objects with batteries which can be regenerated can be equipped with devices which convert electromagnetic field to electricity which can be used to recharge the batteries. These devices are well known in the art. Examples of such systems are disclosed in Baarman et. al. US Patent Publication 2008/0001572; Baarman et. al US Patent Publication 2009/0212637; Baarman et. al. US

2009/0106567; Arai US Patent Publication 2008/0122297; and Azancot et. al. WO 2009/040807 all incorporated herein by reference. To enable locating the object to be recharged in the proper position, the means for recharging a battery is located near the one or more magnets. The relative relationship of the magnetic source and means for recharging a battery is chosen such that the object with the rechargeable battery will be held in place with respect to the recharging means so that it can be recharged. In a preferred embodiment at least one magnet is located in the center of a coil of wires adapted for generating an electromagnetic field. Figures 1 and 2 illustrate one embodiment of the invention wherein the assemblies contain a means for recharging a battery 48 in the form of a coil of wires. Located in the center of the coil of wires is a magnetic source 40 in the form of a magnet. The assembly further comprises a connection 46 between the recharging means and the power source of the vehicle and a controller that controls communication and or the flow of power between the recharging source and the vehicle. Figures 1 and 2 show a connection 46 from the recharging means 48 and a power source (not shown).

[0032] Unless stated otherwise, dimensions and geometries of the various structures depicted herein are not intended to be restrictive of the invention, and other dimensions or geometries are possible. Plural structural components can be provided by a single integrated structure. Alternatively, a single integrated structure might be divided into separate plural components. In addition, while a feature of the present invention may have been described in the context of only one of the illustrated embodiments, such feature may be combined with one or more other features of other embodiments, for any given application. It will also be appreciated from the above that the fabrication of the unique structures herein and the operation thereof also constitute methods in accordance with the present invention.

[0033] The preferred embodiment of the present invention has been disclosed. A person of ordinary skill in the art would realize however, that certain modifications would come within the teachings of this invention. Therefore, the following claims should be studied to determine the true scope and content of the invention.

[0034] Any numerical values recited in the above application include all values from the lower value to the upper value in increments of one unit provided that there is a separation of at least 2 units between any lower value and any higher value. As an example, if it is stated that the amount of a component or a value of a process variable such as, for example, dimensions, time and the like is, for example, from 1 to 90, preferably from 20 to 80, more preferably from 30 to 70, it is intended that values such as 15 to 85, 22 to 68, 43 to 51, 30 to 32 etc. are expressly enumerated in this specification. For values which are less than one, one unit is considered to

be 0.0001, 0.001, 0.01 or 0.1 as appropriate. These are only examples of what is specifically intended and all possible combinations of numerical values between the lowest value and the highest value enumerated are to be considered to be expressly stated in this application in a similar manner.

[0035] Unless otherwise stated, all ranges include both endpoints and all numbers between the endpoints. The use of "about" or "approximately" in connection with a range applies to both ends of the range. Thus, "about 20 to 30" is intended to cover "about 20 to about 30", inclusive of at least the specified endpoints.

[0036] The disclosures of all articles and references, including patent applications and publications, are incorporated by reference for all purposes.

[0037] The term "consisting essentially of" to describe a combination shall include the elements, ingredients, components or steps identified, and such other elements ingredients, components or steps that do not materially affect the basic and novel characteristics of the combination.

[0038] The use of the terms "comprising" or "including" to describe combinations of elements, ingredients, components or steps herein also contemplates embodiments that consist essentially of the elements, ingredients, components or steps.

[0039] Plural elements, ingredients, components or steps can be provided by a single integrated element, ingredient, component or step. Alternatively, a single integrated element, ingredient, component or step might be divided into separate plural elements, ingredients, components or steps. The disclosure of "a" or "one" to describe an element, ingredient, component or step is not intended to foreclose additional elements, ingredients, components or steps.

CLAIMS

What is claimed is:

Claim 1. A magnet and panel assembly comprising:

- a) at least a first panel 20 having a first surface 22 and a second surface 24 wherein the first panel 20 has a configuration such that a magnetic field 61 can extend past the first surface 22;
- b) a first magnetic source 40 located on or near the second surface 24 of the first panel 20;
- c) one or more magnetic source securing features 80 adapted to hold the magnetic source 40 on or near the second surface 24 of the first panel 20 wherein the source securing features 80 are adapted to allow the first magnetic source 40 to articulate in the x and y directions along a plane substantially parallel to the plane of the first panel 20.

Claim 2. An assembly according to Claim 1 wherein the one or more magnet securing features 80 is attached by one or more attachment features 82 to the first panel 20.

Claim 3. An assembly according to Claim 1 wherein the assembly further comprises a second panel 60 located near the second surface 24 of the first panel 20 wherein the magnet securing features 80 are attached to the second panel 60 by one or more attachment features 82.

Claim 4. An assembly according to Claim 3 wherein the second panel 60 is attached to the second side 24 of the first panel 20.

Claim 5. An assembly according to Claim 3 or 4 wherein the second panel 60 defines the range of movement of the first magnetic source 40.

Claim 6. An assembly according to any of the preceding Claims wherein the magnet securing features 80 comprises one or more of springs, elastic bands, or armatures.

Claim 7. An assembly according to any one of the preceding claims wherein the magnetic source 40 has sufficient strength and the assembly is arranged to allow an object 100 having a magnet or comprising a part of ferrous containing metal to be held in place on the first surface 22 of the first panel 20.

Claim 8. An assembly according to any one of the preceding claims wherein the first panel 20 is part of an instrument panel, a console, sun visor, a headliner, compartment molded into a headliner, a glove box door, a door assembly, a seat of a vehicle.

Claim 9. An assembly according to Claim 7 wherein the object 100 is an electronic device, a note pad, a clip board, a picture holder, a compact disk holder, a waste receptacle.

Claim 10. An assembly according to Claim 8 wherein the first panel 20 is part of a console.

Claim 11. An assembly according to a Claim 9 wherein the first panel 20 is integrated into the console and is located so that the driver can view an object 100 held on the panel 20 by the magnetic source 40.

Claim 12. An assembly according to Claim 11 wherein the first panel 20 is located such that there is tray 28 disposed at the bottom of the first panel 20 adapted to carry the weight of an object 100 held in place by the magnetic source 40.

Claim 13. An assembly according to any one of the preceding claims which further comprises a means for recharging a rechargeable battery 48 of an electronic device 100 wherein such recharging means 48 is located in the vicinity of the first magnetic source 40 such that the magnetic source 40 is capable of locating the recharging means 48 with respect to the rechargeable electronic device 100 to allow the battery of the rechargeable device 100 to be recharged by the recharging means 48.

Claim 14. An assembly according to Claim 13 wherein the assembly comprises a connection 46 to the power source of a vehicle, a controller and one or more coils of wire 48 capable of generating an electromagnetic field connected to the controller wherein the first magnetic source 40 is located within one of the coils of wire 48.

Claim 15. A method of securing an object within a vehicle comprising
a) providing an object 100 having a magnet or a part comprised of a ferrous containing metal;

- b) contacting the object 100 with the first panel 20 of an assembly according to any one of Claims 1 to 14 in the vicinity of the magnetic field 61 of the one of more magnets 40; and
- c) allowing the object 100 to be held in place by the magnet 40.

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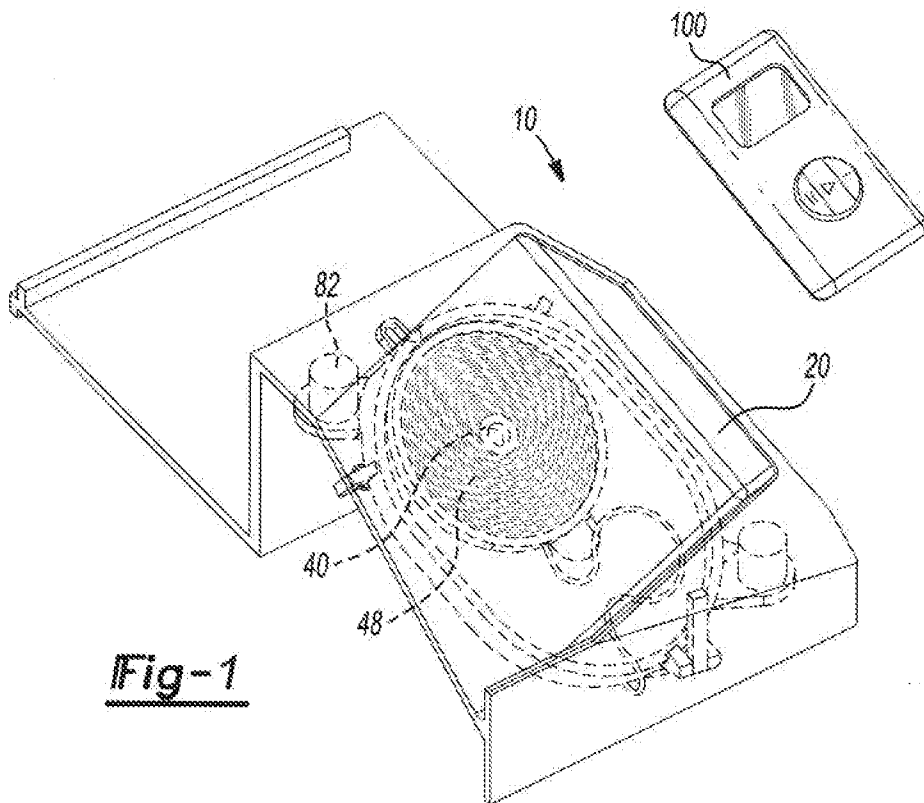


Fig-1

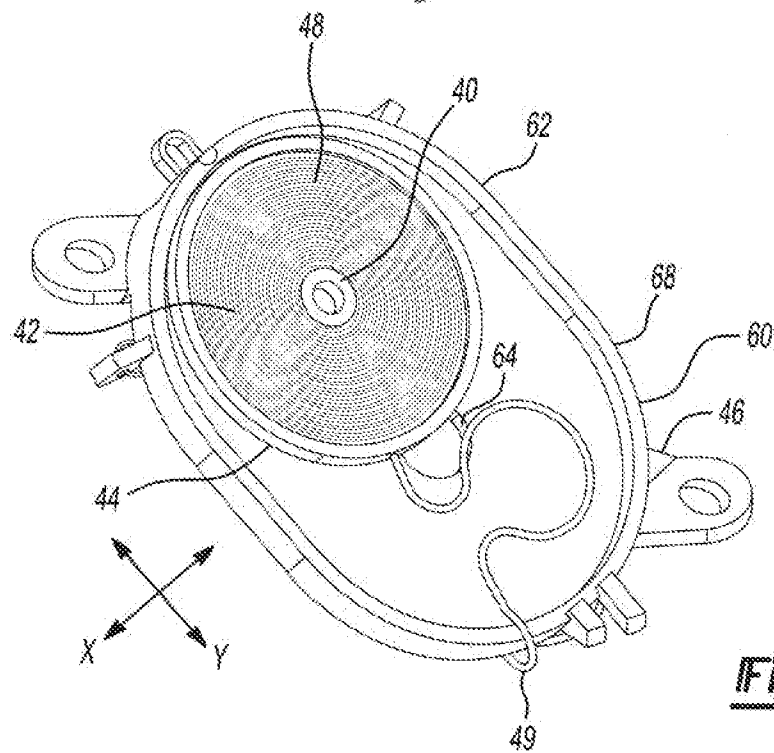
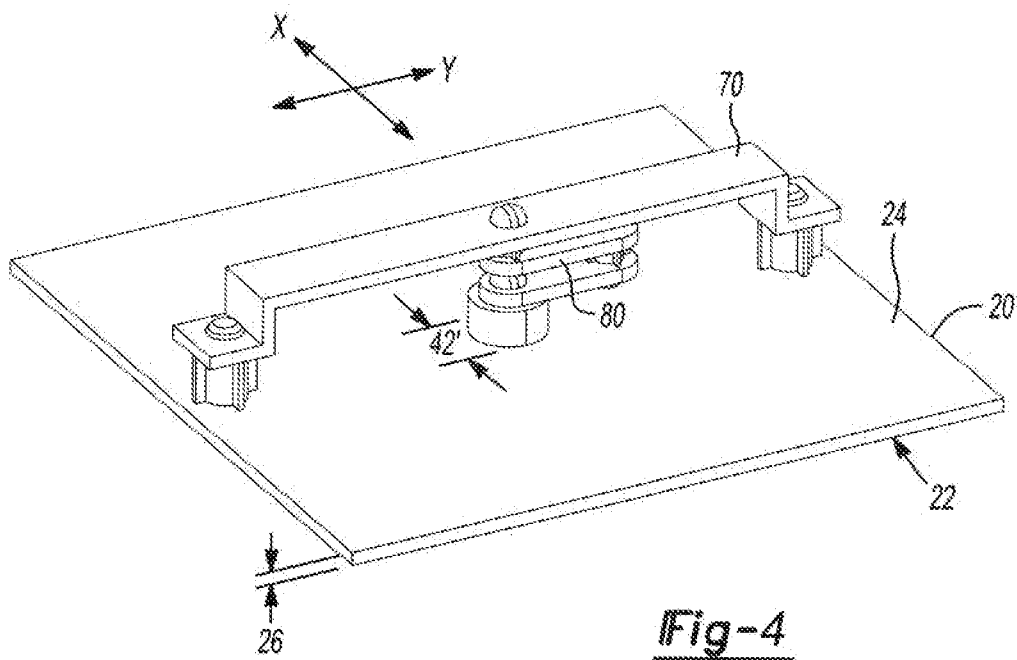
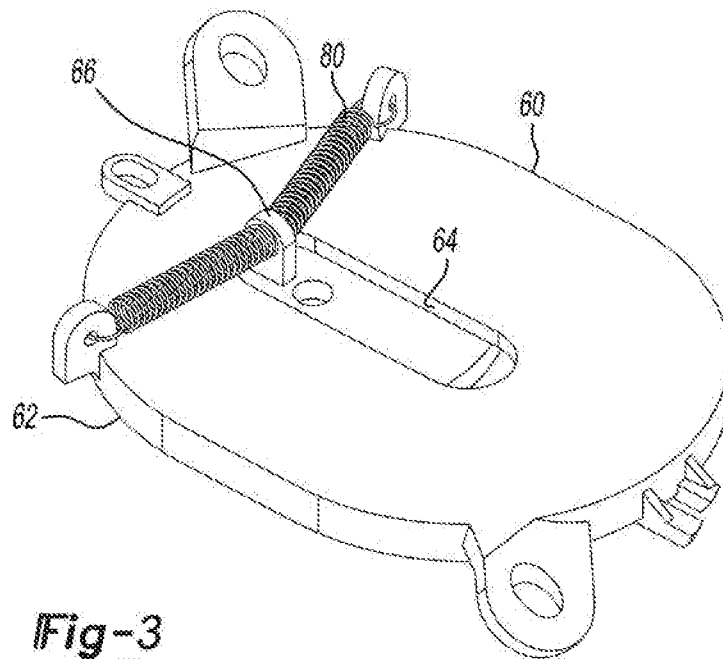


Fig-2

2/4



3/4

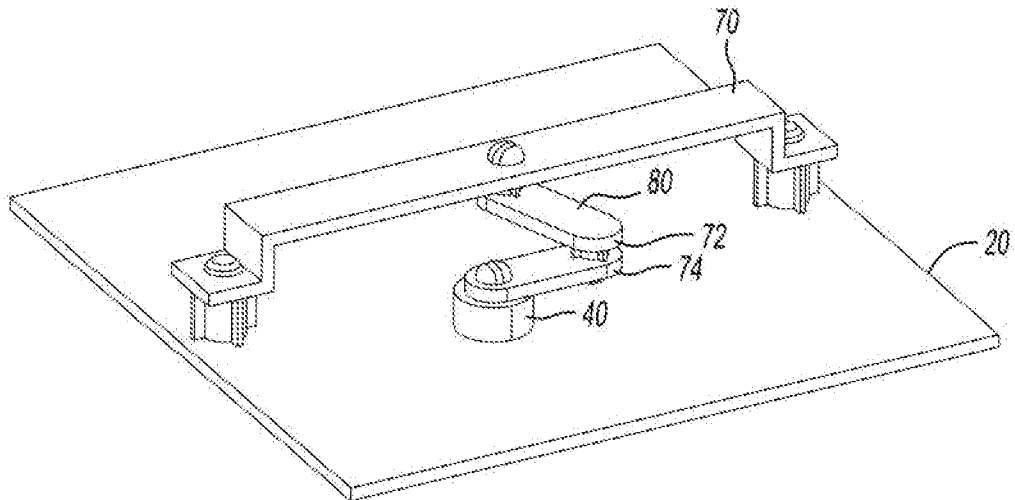


Fig-5

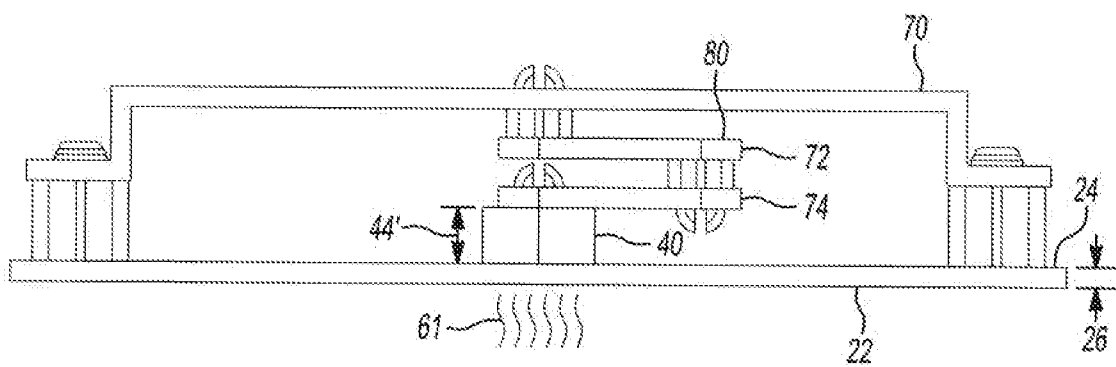


Fig-6

4/4

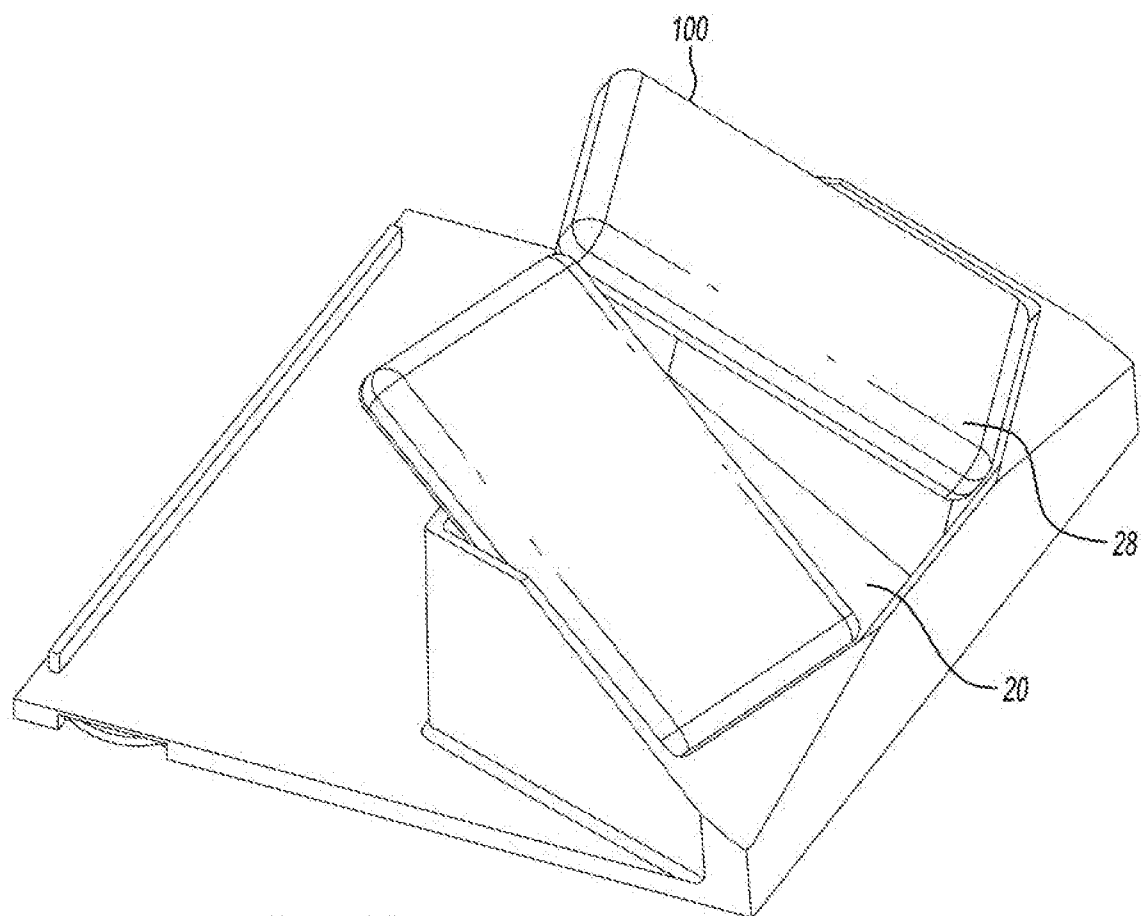


Fig-7

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/060779

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60R11/02 H02J7/00 H02J7/02
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60R H02J

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/153098 A1 (TOYA SHOICHI [JP] ET AL) 18 June 2009 (2009-06-18)	1-6,8,10
A	paragraphs [0042], [0044] - [0049], [0054] figures 1-4	13,14
X	----- EP 2 043 226 A2 (SEIKO EPSON CORP [JP]; SONY ERICSSON MOBILE COMM JP [JP]) 1 April 2009 (2009-04-01)	1-6
A	paragraphs [0018] - [0024], [0119] figures 1A,1B,12A,14 ----- -/-	13,14

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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

"E" earlier document but published on or after the international filing date

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

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