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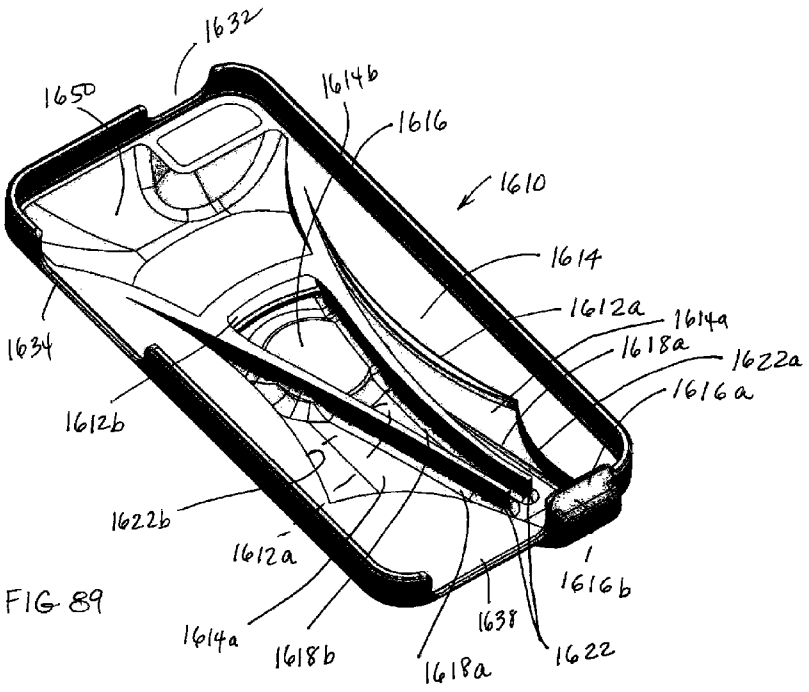

FIG. 89

(57) Abstract: A cover for a hand-held device or a hand-held device housing includes a channel in communication with a speaker of the hand-held device, said channel forming a multi-channel sound duct for redirecting at least a portion of the sound waves emitted from the speaker to a plurality of locations remote from the speaker.

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HAND-HELD ELECTRONIC DEVICE AND/OR COVER FOR A HAND-HELD ELECTRONIC DEVICE

TECHNICAL FIELD AND BACKGROUND OF THE INVENTION

[0001] The expanding cellular smart-phone and tablet PC devices have given rise to an expanding accessory market focused on providing case covers that serve a primary function of protecting the somewhat delicate devices from scratch, dent, and drop impact damage.

[0002] These same devices typically have both an internal headphone jack with which to listen to a listen to music, audible books, interact in phone calls and all other auxiliary audible functions of the devices. Along with the headphone jack, most if not all of these type devices include an internal monophonic or stereophonic set of speakers located somewhere within the device, typically along the perimeter edge or backside of the device.

[0003] Due to the extremely tight size and spatial constraints, and vital importance of the front screen face geometry, most of these internal speaker systems provide a minimal sound quality typically from one monophonic speaker sound source. This sound source is typically located upon the back face of the device, or near one extreme edge of the device. In each case, the majority of sound energy is directed away from the primary user of the device. The remaining sound energy that is directed towards the primary device user typically arrives to the user's ear as a weak monotone and asymmetrical sound source that is easily overpowered by moderate ambient perimeter noise. With the ever-expanding use of these devices to play games, listen to music, and, in some cases, to watch movies, a better sound quality would, therefore, be highly desirable.

SUMMARY OF THE INVENTION

[0004] Accordingly, the present invention provides an accessory or component that improves the sound quality of these hand-held devices.

[0005] In one form of the invention, a sound concentrator is provided that can be incorporated into a device cover, a device cover insert, or into a device itself to improve the quality of the sound emitted from the speakers or sound emitting devices of the device. In one aspect, this can be achieved without power.

[0006] According to another form of the invention, a cover for a hand-held device with a device body and a speaker includes a cover body, which is configured for covering at a portion of the device body and for covering the speaker and which forms an outlet opening. A plenum space is formed by the cover body or by an insert in the cover body, which is in communication with the speaker for directing sound waves or energy from the speaker to the outlet opening.

[0007] In one aspect, the cover or an insert for the cover is configured to form a channeled void space that is in communication with the one or more speakers of the device and that channels or

redirects the sound waves from the speaker or speakers to a location or locations remote from the speaker, for example, around the perimeter of the device.

[0008] In a further aspect, the cover or insert seals around the speaker to capture substantially all, if not all, the sound waves so that the primary sound source energy can be concentrated and redirected to the location(s) remote from the speaker(s) to provide a more concentrated and desired sound quality to the primary use, as compared to what the same device sound source can provide to the primary user without the aid of the sound source manipulating properties of the invention.

[0009] In yet a further aspect, the cover is configured to have an impact absorbing configuration. For example, the cover may include portions that are enlarged or spaced from the device when mounted to the device so that the cover will absorb energy upon impact.

[0010] In another form of the invention, a cover for a handheld device (with a device body and a speaker) includes a cover body, which is configured for covering at a portion of the device body and for covering the speaker or stereo speaker pair. The cover also includes a channel for communication with the speaker and for directing sound waves from the speaker to an outlet opening formed by the cover body, with the channel having a length and a cross section increasing in magnitude along the length of the channel for harnessing and concentrating the sound emitted from the speaker and directing the sound waves to the outlet opening.

[0011] In one aspect, the cover body forms a plenum space, with the channel in communication with the plenum space for directing the sound waves to the plenum space, which is in communication with the outlet opening.

[0012] In another aspect, the cover body includes a base wall and a perimeter wall. The perimeter wall extends around and from the base wall and forms the opening and also an outlet chamber about the opening for positioning adjacent a portion of the device body.

[0013] In a further aspect, the side wall of the cover body forms the outlet chamber at a corner of the cover for positioning adjacent a corner of the device.

[0014] According to another aspect, the side wall of the cover body forms at least three outlet chambers located around the perimeter of the device body.

[0015] In yet another aspect, the cover body includes a base wall and a perimeter wall, with the base wall having the opening.

[0016] According to yet another aspect, the channel is formed by a pair of side walls, which diverge in the direction of the plenum space.

[0017] Optionally, the cover further includes a second channel, the second channel in communication with the plenum space and the same or another outlet opening for directing the sound

waves from the plenum space to the same or other opening. Similarly, the second channel may be formed by a pair of side walls, which diverge in the direction of the same or other opening.

[0018] According to yet other aspects, any of the covers noted above may be formed, such as by molding or stamping, and may be formed from a rigid material, such a metal or plastic, or may be formed from a semi-rigid material, such as an elastomeric polymer, or from a non-rigid material, such a rubber or an elastomeric material, including a silicone based material, polycarbonate or a thermoform polyurethane (TPU).

[0019] In addition, the covers may be made from several materials and also may be formed from two or more components.

[0020] In yet other aspects, a secondary lower density material may be provided as the contact surfaces between the device outer surface, and the cover to serve as an air tight and sound isolating sealant or gasket. The sealant material may be attached by adhesives, mechanically attached, or applied within a secondary molding process or within the primary molding process of a semiflex material. By use of a sealant to isolate the sound energy of the primary sound source speaker(s) mono or stereo, it will be possible to create a more efficient manipulation and redirection of the finite sound energy available with the device.

[0021] Accordingly, the present invention provides a sound concentrator that can be incorporated into a cover or into a device itself to improve the quality of the sound emitted from the speakers or sound emitting devices of the device.

[0022] In yet another form of the invention, an electronic hand-held device includes a device body and a speaker. The device body has a channel which has a closed cross section for harnessing and concentrating sound waves (energy) emitted by the speaker and for directing sound waves from the speaker to an outlet chamber spaced from the speaker.

[0023] According to another form of the invention, a cover for a handheld device with a device body and a speaker includes a cover body, which is configured for covering at a portion of the device body and for covering the speaker and which forms an outlet opening. A plenum space is formed by the cover body or by an insert in the cover body, which is in communication with the speaker for directing sound waves from the speaker to the outlet opening and which increases the perceived volume of the speaker optionally without power.

[0024] In one aspect, the cover body or insert is adapted to absorb and thereby filter a selected range of frequencies of the sound wave. For example, the cover body or insert may include a material or structure that absorbs and thereby filters the selected range of frequencies of the sound wave. The cover body or insert may include a coating applied thereto that absorbs and thereby filters the selected range of frequencies of the sound wave.

[0025] In another aspect, the cover also includes a channel, which is in communication with the plenum space and the speaker for harnessing and concentrating sound waves emitted by the speaker. The plenum space is in direct communication with the outlet opening or indirect communication with the outlet opening by way of another channel.

[0026] In yet another form of the invention, an electronic hand-held device includes a housing with an outlet opening, a speaker spaced from the outlet opening, and a plenum space in communication with the speaker and the outlet opening for directing sound waves emitted from the speaker to the outlet opening.

[0027] In one aspect, the device further includes a channel that is in communication with the speaker and the plenum space for harnessing and concentrating the sound waves emitted from the speaker. For example, the channel may have a closed cross-section that increases in magnitude in the direction from the speaker to the plenum space which increases the perceived volume of the speaker optionally without power.

[0028] In yet another form, a method of directing sound from a speaker in a hand-held device includes harnessing the sound waves emitted from the speaker, adjusting the sound waves, and outputting the adjusted sound waves at a location spaced from the speaker optionally without power.

[0029] For example, the adjusting may include concentrating the sound waves at the location or concentrating the sound waves at two or more locations spaced from the speaker. In another or additional aspect, the adjusting includes absorbing a selected frequency of the sound waves to thereby filter the selected frequency. In addition, the sound waves may be guided along a channel with an increasing cross-section to thereby increase the perceived volume of the speaker optionally without power.

[0030] Accordingly, when mounted to or in a handheld device with one or more speakers, the plenum space or channels of the present invention provide improved sound volume and/or quality.

[0031] These and other objects, advantages, purposes, and features of the invention will become more apparent from the study of the following description taken in conjunction with the drawings.

DESCRIPTION OF THE FIGURES

[0032] FIG. 1 is a perspective view of a cover of the present invention shown mounted to a handheld device in the form of a cell phone;

[0033] FIG. 2 is a second perspective view of the cover and handheld device of FIG. 1;

[0034] FIG. 3 is a top plan view of the cover and handheld device of FIGS. 1 and 2;

[0035] FIG. 4 is a side elevation view of the cover and device of FIG. 1;

[0036] FIG. 5 is a right side elevation view of the cover and device of FIG. 3;

[0037] FIG. 6 is a left end elevation view of the cover and device of FIG. 1;

[0038] FIG. 7 is a right end elevation view of the cover and device of FIG. 1;

[0039] FIG. 8 is a perspective view of the cover of FIG. 2 with the handheld device removed to show the internal structure of the cover;

[0040] FIG. 9 is a cross section view of the cover and device taken through line IX-IX of FIG. 1;

[0041] FIG. 10 is an enlarged view of detail X of FIG. 9;

[0042] FIG. 11 is a bottom plan view of the cover of FIG. 9;

[0043] FIG. 12 is a similar view to FIG. 11 with the channel shown in phantom lines;

[0044] Fig. 13 is an exploded perspective view of the cover of FIG. 8 illustrating a two-piece construction of a cover;

[0045] FIG. 14 is a bottom exploded perspective view of the cover of FIG. 13;

[0046] FIG. 15 is a perspective view of another embodiment of a cover of the present invention shown mounted over a handheld device, such as a cell phone;

[0047] FIG. 16 is a top plan view of the cover and device of FIG. 15;

[0048] FIG. 17 is a bottom perspective view the cover and device of FIG. 15;

[0049] FIG. 17A is a similar view to FIG. 17 showing shading of the cover;

[0050] FIG. 18 is a another perspective view of the cover and device of FIG. 17;

[0051] FIG. 19 is another perspective view of the cover and device of FIG. 15;

[0052] FIG. 20 is a side elevation view of the cover and device of FIG. 15;

[0053] FIG. 21 is a right side elevation view of the cover and device of FIG. 15;

[0054] FIG. 22 is a top perspective view illustrating the cover with the device removed to show the inwardly facing side of the bottom wall of the cover;

[0055] FIG. 23 is a second perspective of the cover of FIG. 21;

[0056] FIG. 24 is a bottom plan view of the cover of FIG. 20;

[0057] FIG. 25 is a top plan view of another embodiment of the cover of FIG. 16 illustrating the cover incorporating sound emitting openings in the forward facing side of the cover;

[0058] FIG. 26 is a plan view of another configuration of the cover of the present invention, which is adapted for covering the back side of another handheld device, such as a pad;

[0059] FIG. 27 is yet another embodiment of the cover of the present invention also configured for covering the back side of a handheld device in the form of a pad; and

[0060] FIG. 28 is another embodiment of the cover of the present invention configured for covering the back side of a handheld device, such as a pad.

[0061] FIG. 29 is a perspective view of another embodiment of a cover of the present invention shown mounted to a handheld device in the form of a cell phone;

[0062] FIG. 30 is a top plan view of the cover with the device removed to show the internal structures of the cover;

[0063] FIG. 31 is a bottom plan view of the cover of FIG. 30;

[0064] FIG. 32 is a side view of the cover of FIG. 30;

[0065] FIG. 33 is an end view of the cover of FIG. 30;

[0066] FIG. 34 is another end view of the cover of FIG. 30;

[0067] FIG. 35 is another side view of the cover of FIG. 30;

[0068] FIG. 36 is a plan view of another embodiment of the cover shown mounted to a handheld device (shown in phantom);

[0069] FIG. 37 is a plan view of the cover with the device removed to show the internal structures of the cover;

[0070] FIG. 38 is a perspective view of the cover of FIG. 36;

[0071] FIG. 39 is a bottom plan view of the cover of FIG. 36;

[0072] FIG. 40 is a side elevation view of the cover of FIG. 36;

[0073] FIG. 41 is a cross section view taken along line XIII-XIII of FIG. 36;

[0074] FIG. 42 is a fragmentary view of the cover of FIG. 36;

[0075] FIG. 43 is a cross section view taken along line XV-XV of FIG. 36;

[0076] FIG. 44 is a cross section view taken along line FIG. XVI-XVI of FIG. 36;

[0077] FIG. 45 is a side view of the cover of FIG. 36;

[0078] FIG. 45A is an exploded perspective view of a modified version of the cover;

[0079] FIG. 45B is a perspective view of the cover of FIG. 45A;

[0080] FIG. 45C is a cross-section through the cover of FIG. 45A;

[0081] FIG. 45D is an enlarged fragmentary view of the cover of FIG. 45A;

[0082] FIG. 46 is a plan view of another embodiment of the cover of the present invention shown mounted to a handheld device in the form of a cell phone;

[0083] FIG. 47 is a perspective view of the cover of FIG. 46 removed from the handheld device illustrating the internal structure of the cover;

[0084] FIG. 48 is a top plan view of the cover of FIG. 47;

[0085] FIG. 49 is a bottom plan view of the cover of FIG. 47;

[0086] FIGS. 50A and 50B are side views of the cover of FIG. 47;

[0087] FIG. 51 is another side view of the cover of FIG. 47;

[0088] FIG. 52 is an end view of the cover of FIG. 47;

[0089] FIG. 53 is a perspective view of another embodiment of a cover the present invention mounted to a handheld device in the form of a cell phone;

[0090] FIG. 54 is a perspective view of the cover removed from the handheld device illustrating the internal structures of the cover;

[0091] FIG. 55 is an exploded perspective view of the cover of FIG. 54;

[0092] FIG. 56 is an enlarge perspective view of the bottom half of the cover of FIG. 54;

[0093] FIG. 57 is a perspective view of another embodiment of a cover the present invention mounted to a handheld device in the form of a cell phone;

[0094] FIG. 58 is a perspective view of the cover removed from the handheld device illustrating the internal structures of the cover;

[0095] FIG. 59 is a perspective view of the back of the cover of FIG. 58;

[0096] FIG. 60 is another perspective view of the back of the cover of FIG. 58;

[0097] FIG. 61 is a perspective view of a device incorporating the sound wave harness and concentrating technology of the present invention;

[0098] FIG. 62 is an exploded perspective view of the removal of a standard back panel and front panel of a device and replacement with a back panel and front panel of the present invention incorporating the sound wave harness and concentrating technology of the present invention; and

[0099] FIG. 63 is a respective view of yet another embodiment of the cover of the present invention;

[00100] FIG. 64 is another perspective view of the cover of FIG. 63;

[00101] FIG. 65 is a rear perspective view illustrating the cover incorporating a stand to position the hand-held device in either a vertical orientation or a horizontal orientation;

[00102] FIG. 66 is an enlarged perspective view of the stand;

[00103] FIG. 67 is a perspective view of an arm band incorporating a magnet for mounting the cover with the present invention;

[00104] FIG. 68 is an exploded perspective view of the removal of a standard back panel and front panel of a device and replacement with a back panel and front panel of the present invention incorporating the sound wave harness and concentrating technology of the present invention;

[00105] FIG. 69 is a perspective view of another embodiment of a cover shown mounted to a handheld device;

[00106] FIG. 70 is a plan view of the cover in FIG. 68;

[00107] FIG. 71 is a bottom plan view of the cover of FIG. 68;

[00108] FIG. 72 is a bottom plan view of the cover of FIG. 68 with the device removed;

[00109] FIG. 73 is a perspective view of the cover with the device removed to show the internal structures of the cover;

[00110] FIG. 74 is another perspective view of the cover with the device removed to show the internal structures of the cover;

[00111] FIG. 75 is a side view of the cover of FIG. 69;

[00112] FIG. 76 is another side view of the cover of FIG. 69;

[00113] FIG. 77 is an end view of the cover of FIG. 69;

[00114] FIG. 78 is another end view of the cover of FIG. 69;

[00115] FIG. 79 is a cross-section through the cover of FIG. 68;

[00116] FIG. 80 is a rear plan view illustrating a cover incorporating another embodiment of a stand to position the hand-held device in either a vertical orientation or a horizontal orientation;

[00117] FIG. 81 is a perspective view of the stand shown in its deployed position;

[00118] FIG. 82 is an enlarged perspective view of the stand;

[00119] FIG. 83 enlarged perspective view of the stand;

[00120] FIG. 84 is an enlarged fragmentary view of detail A of FIG. 80;

[00121] FIGS. 85 and 86 are other enlarged fragmentary views of detail A of FIG. 80;

[00122] FIG. 87 is a rear plan view illustrating another cover incorporating a stand similar to the stand in FIG. 80;

[00123] FIG. 88 is a rear plan view illustrating another cover incorporating another embodiment of a stand to position the hand-held device in either a vertical orientation or a horizontal orientation;

[00124] FIG. 89 is a perspective view of another embodiment of a cover;

[00125] FIG. 90 is a plan view of the cover in FIG. 89;

[00126] FIG.91 is a side view of the cover of FIG. 89;

[00127] FIG. 92 is another perspective view of the cover of FIG. 89;

[00128] FIG. 93 is another plan view of the cover;

[00129] FIG. 94 is another plan view of the cover;

[00130] FIG. 95 is a side view of the cover of FIG. 94;

[00131] FIG. 96 is another side view of the cover of FIG. 94; and

[00132] FIG. 97 is a plan view of yet another the cover.

[00133] Before the embodiments of the invention are explained in detail, it is to be understood that the invention is not limited to the details of operation or to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention may be implemented in various other embodiments and of being practiced or being carried out in alternative ways not expressly disclosed herein. Also, it is to be understood that the phraseology and terminology used herein are for the purpose of description and should not be regarded as limiting. The use of "including" and "comprising" and variations thereof is meant to encompass the items listed thereafter and equivalents thereof as well as additional items and equivalents thereof. Further, enumeration may be used in the description of various embodiments. Unless otherwise expressly

stated, the use of enumeration should not be construed as limiting the invention to any specific order or number of components. Nor should the use of enumeration be construed as excluding from the scope of the invention any additional steps or components that might be combined with or into the enumerated steps or components.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[00134] Referring to FIG. 1, the numeral 10 generally designates a cover for a handheld electronic device. In the illustrated embodiment, the handheld electronic device D comprises a cell phone and is illustrated with its touch screen display identified by the letter T. However, it should be understood that other types of cell phones may be used, and that the cover may be used on other types of handheld devices, such as a pad or a tablet or other electronic devices that emit sound. As will be more fully described below, cover 10 is adapted to harness the sound waves from one or more speakers or other sound emitting component or components on the handheld device and redirect the sound waves to a location or locations remote from the speaker (or sound emitting device) to reduce the "tinny sound" of the sound waves and provide a more pleasing sound for the user of the device. The tiny sound is referred to as a "partial phase cancellation caused by an echo being added to the primary source, typically at higher frequencies within typical users range of hearing.

[00135] As best seen understood from FIGS. 1 and 8, cover 10 is adapted to cover at least a portion of the device and incorporates a channel that directs the sound waves emitted from at least one speaker or audio output component of the device to one or more locations remote from the speaker or output component. While hereinafter reference will be made to a "speaker", it should be understood that the term "speaker" is used broadly and is intended to cover any component that emits audible sound waves for a handheld device to convey, for example, music sounds, sound effects, voice sounds or the like.

[00136] In the illustrated embodiment, channel 12 has a convoluted path that extends across the cover, for example, from one end of the cover to the other end of the cover. Further, channel 12 extends and is in communication with enlarged regions or pockets formed in the cover at the corners of the cover, which envelope the corners of the device. With the exception of pocket 14, each pocket includes a lip or edge that is spaced from the face of the handheld device, such as shown in FIG. 1, to allow the sound waves to be emitted for example at the corners of the handheld device around the outer perimeter of the device. This provides a more concentrated desired sound quality to the primary users as compared to what the same device sound source can be provided to the primary user without the aid of cover 10. Pocket 14 is adapted to enclose the device's speaker, and optionally seal against the front facing side of the handheld device around the speaker. In the illustrated embodiment, pocket 14 includes a downwardly depending wall 22 from its lip 14a that encloses the speaker that is located at that the corresponding corner of the device D. In this manner, a seal may be generated between the

cover and the device around the sound source providing more direct concentrated sound impulse back through the channel to the other corners of the device and/or optionally to the leading edges of the front face of the device so that the sound is directed back toward the primary user from several different sources.

[00137] Referring again to FIG. 8, channel 12 may be formed from upwardly extending flanges 24 that extend up from the back wall 26 of cover 10 and form the convoluted channel that extends across the back wall of the cover. Optionally, the upwardly extending flanges 24 may include a sealing surface or gasket along their upper edges for sealing against the back side of the device to thereby create an airtight and sound duct that isolates the sound so that the sound can be channeled and redirected as noted above. For example, the sealing surface may be formed by the material forming the cover or attached to the cover by an adhesive, mechanically attached, or applied using a secondary molding process, such as by an injection molding. By sealing the channel against the back surface of the device, sound energy of the primary sound source speaker or speakers (mono or stereo) provides a more efficient manipulation and redirection of the finite sound energy available from the device. As noted, the channel when enclosed by the rearward facing side of the device forms a sound duct to create an initial sound source located at or near the device sound source but then redirects the sound energy along and adjacent the back of the device creating one or more secondary sound source locations in and along the entire perimeter of the front leading edge screen perimeter of the device. Further, as the primary sound energy is travels throughout the ducting system, there occurs an attenuation of the sound due to multiple factors.

[00138] One primary factor in the attenuation of the internally ducted sound energy is the increase in distance travelled between the primary sound source and its distance of travel through a medium (in this case atmospheric pressured air). Because of the attenuation of sound energy over a distance between the primary sound source and a secondary source distance, it is necessary to provide a feature that can compensate for and balance out an equal sound energy level to be measured at each sound source location along the sound ducting system the parameters that can be controlled include, for example, the variation and restriction of the ducting cross section and the end orifice size at the primary and/or second, third, fourth or nth sound port. Restriction in duct cross section and/or sound port opening size will allow to balance resulting sound levels at all ports (sound ports) regardless of the level of internal sound energy within adjacent ducting. One goal is to create a balanced and even sound level along the entire screen perimeter.

[00139] The sound quality can also be manipulated running a series of sound ports coming from the ducting system. By maximizing the length of travel of the sound wave from initial primary source sound port to the last sound port within the ducting system series, and providing a single additional or multiple sound ports at equal and varying lengths along the ducting system; it is possible

to have the initial sound wave being delayed from sound port to adjacent sound port as a function of distance of travel from sound port to sound port and the speed of sound. For example, 24" between initial and final sound port can create and approximate a 2 millisecond delay in the same sound energy being transmitted to the device users hearing. This can serve to reinforce the primary sound quality and provide a richer and fuller listening experience for the device user without any manipulation of the device or its electronics.

[00140] To accommodate the buttons, various ports, and other devices, such as cameras, on the handheld device, cover 10 may incorporate several access openings. For example, cover 10 may include an opening 28 along its lateral side edge to accommodate control buttons, an opening 30 along its transverse side to, accommodate a power cord receptor, and, for example, an opening 32 in its back wall 26 to reveal the phone logo. Additional openings may be provided for example opening 34 and its back wall 26 to accommodate for example a camera.

[00141] Cover 10 may be formed from a variety of different materials including a rigid material, a semi-rigid material and a flexible material. For example, suitable materials may include metal, plastics, an elastomeric material or combination thereof, and, further, may be molded, stamped out or formed using a conventional process. Furthermore, the channel may be created by an insert that is separately formed and then inserted into the cover and either adhered to the cover, for example, by an adhesive, welding, or the like, or may be mechanically attached with an optional seal interface between the insert and the cover back wall.

[00142] Referring to FIG. 8, as previously noted, the lips or edges 16a, 18a, and 20a of the pocketed areas may be spaced from the front-facing side of the device. Optionally, the remaining inner perimeter of the cover may be sealed against the front facing side, for example the touch screen display T so that the sound is emitted only from discrete locations, as previously noted, namely at pockets 16, 18, and 20 (between the cover and the device). The inner perimeter 10a of cover may be formed to create the seal between the pockets or may be sealed by a secondary material formed or applied to the cover.

[00143] Although cover 10 is illustrated as extending around and covering only a portion of the devices outer perimeter, cover 10 may be adapted to extend around the full outer perimeter of the device as well but with access opening where needed. Further, as will be more fully described below, the cover may be adapted to extend only across a portion of the back side of the handheld device.

[00144] Referring again to FIGS. 13 and 14, as previously noted, cover 10 may be formed from two components that are snap-fit together or may be permanently joined together, such as by welding or by way of an adhesive. For example, the base 10b of the cover 10 may provide the cover back wall 26 and the channel 12 and, further, form part of the pockets 14, 16, 18, and 20. The other portion of

the pockets may be formed by the top half 10c of cover 10, which also forms the inner perimeter 10a of the cover 10.

[00145] As best understood from FIGS. 9 and 10, in addition to pockets 14, 16, 18, and 20, which provide a space between the cover and the device, cover 10 forms a space between the cover and the back side of the device at the respective pockets as well as along the perimeter of the device, for example, by way of channel 10d, shown on FIG. 11. Therefore, in addition to providing a sound duct, cover 10 also protects device D from impact by providing a space between the cover and the device at strategic locations around the device, which allows the cover to absorb energy should the device be dropped or impacted at least where the device is protected by the cover.

[00146] Referring to FIG. 15, the numeral 110 designates another embodiment of the present invention. Cover 110 similarly incorporates a channel 112 in its back wall 126 that forms a sound duct when the cover is mounted on a device. Cover 110 incorporates cylindrical-shaped pockets 114, 116, 118, and 120 at each of its corners to extend over one or more speakers and, further, to form protection for the device.

[00147] In the illustrated embodiment, channel 112 projects outwardly from back wall 126 to form recessed areas 126a, 126b, and 126c, whose perimeters may then form the sealing surfaces for sealing against the back side of the device. These recessed areas may also include openings.

[00148] Optionally, each pocket 114, 116, 118, and 120 may include openings 114a, 116a, 118a, and 120a to provide the outlet ports to emit the channeled sound, which are spaced around the perimeter of the device.

[00149] Referring to FIG. 25, the numeral 210 generally designates another embodiment of a cover of the present invention. Cover 210 is similar to cover 110 but includes openings 214a, 216a, 218a, and 220a with different diameters to thereby adjust the audio output at various locations around the device.

[00150] Referring to FIGS. 26-28, the numerals 310, 410, and 510 generally designate additional embodiments of a cover of the present invention. Covers 310, 410, and 510 are configured to cover larger hand-held electronic devices, such as (electronic tablets) pads. Each cover similarly incorporates channels 312, 412, 512 that form sound ducts between the back side of the device and the cover back wall 326, 426, and 526. Like the channels in the previous covers, the channels are configured to channel sound waves from one or more speakers of the device to one or more locations around the perimeter of the front facing side of the device.

[00151] For example cover 312 includes a back cover with a cross-shaped channel 312 with arms that extend from the central portion of the back wall to medial portions of each side of the device. Each arm of the channel is then is in communication with ports that are located on the front facing side of the device, which may be formed from similar structures described in reference to the previous

embodiments. Further, channel 312 may similarly project outwardly from the cover base wall 326. The recessed regions 326a, 326b, 326c, 326d adjacent channel 312 may be solid or may have openings (e.g. 330 for a camera). Similarly, one or more openings 328 may be provided in channel 312, for example, to accommodate a logo or a device.

[00152] Cover 410 is similar to cover 310 but with an asymmetrical cross-shape channel where the ports are offset along at least one side of the device. Again, cover 410 may incorporate a plurality of openings (e.g. 428, 430) to accommodate, for example, a phone stand leg or a camera.

[00153] Cover 510 also incorporates an asymmetrical cross-shaped channel 512 but with an extra leg 512a to extend over a speaker located at the back of the device (but toward the perimeter at one of the corners of the device).

[00154] Referring to FIG. 29, the number 610 generally designates another embodiment of a cover for a handheld electronic device, which is configured to harness the sound emitted from one or more the speakers of the device and, further, to direct the sound to one or more locations remote from the speaker. Additionally, as will be more fully described below, cover 610 may also be adapted to absorb some of the sound frequencies, for example some of the high frequency sounds, to reduce the tinny sound and provide a more pleasing sound for the user of the device.

[00155] As best understood from the FIGS. 29 and 30, cover 610 is configured to cover at least a portion of the device and further form outlet openings or ports at two or more selected, discrete locations around the device through which the sound from the speaker is directed. For example, in the illustrated embodiment, a first group of outlet openings 612 is located at the corners of the device D facing the user. However, it should be understood that the outlet openings may be formed at different locations around the device, depending on the device configuration and/or the preference of sound direction. With the outlet openings oriented at the front face of the device, cover 610 directs the sound waves from the speaker in the direction of the user and, further, as will more fully described below, in a manner that gives the perception of increased volume, but optionally without the use of power.

[00156] In the illustrated embodiment, cover 610 includes a cover body with a base wall 614, which when mounted to the device is spaced from the device body, and an upwardly extending perimeter side wall 616 which together form a plenum space between the device body and the cover. Further, the cover may be configured and arranged to seal against the device body around the speaker (or speakers) so that essentially all of the potential audible sound energy developed by the speaker (or speakers) of the device can be harnessed and concentrated by the cover so that essentially all of the sounds wave can be directed to the listener's ear.

[00157] Referring again to FIG. 29, side wall 616 includes a downwardly extending lip 616a that optionally seals against the device body along the front facing sides and ends of the device but which then diverges away from the device body over several discrete regions to form the outlet

openings or ports or spaces 612 between the cover and the device body and further to form the outlet chambers 613 around openings 612, which direct the sound harnessed in the plenum space out from cover 610. As noted, in the illustrated embodiment, these outlet chambers are formed at the three corners of the device and face the user so that sounds harnessed in the plenum space can travel from the chambers in the direction of the user.

[00158] In the illustrated embodiment, side wall 616 includes flared regions that form chambers 613 at three corners of the device, which configuration creates gripping surfaces 613a around the cover, which may be especially desirable when using the device as a gaming device. The side wall 616 also includes an extended flange or wall 616b over the fourth corner to cover and optionally seal around the speaker and direct substantially all the sound from the speaker into to the plenum space formed between the base wall of the cover and the device body.

[00159] Referring to FIG. 30, to redirect the sound from the speaker to the plenum space and then to the corners of the device, cover 610 incorporates at least one channel 618 which is in communication with the speaker on one end and in communication with a chamber 620, which forms part of the plenum space, at its distal end. The chamber 620 may be directly in communication with each of the outlet chambers 613 or may be in communication with one or more outlet chambers 613 by way of additional channels described below. Channel 618 is formed by upwardly standing flanges or side walls 622, which are optionally integrally formed with base wall 614 of cover 610, such as by molding or by being post applied using an adhesive. Further, upwardly standing side walls 622 are sized such that the upper distal edge of the respective side wall 622 extends to and optionally seals against the back of the device body (when the cover is mounted to the device) so that all of the sound waves emitted from the speaker are directed along the channel. Thus substantially all of the sounds waves emitted from the speaker will travel up channel 618 from its proximal end (adjacent to the speaker) to its distal end adjacent central chamber 620 and thereafter travel to outlet chambers 613.

[00160] Optionally, channel 618 may be configured to operate like an internalized megaphone within the handheld device case or within the handheld device itself (as described more fully below). For example, walls 622 may be a tapered so that channel 618 concentrates and naturally amplifies the sounds waves and thus create a more centrally directed and naturally amplified sound energy to the user. Optionally base wall 614 of cover may be flat or may have a slope, such as shown in FIG. 32, to thereby form a generally cone or horn shaped channel. In addition, walls 622 may be curved to reduce interference with the sound waves.

[00161] Referring again to FIG. 30, cover 610 optionally includes additional secondary channels 624 which provide communication between central chamber 620 and outlet chambers 613 to further enhance the transmission of the sound waves from the central chamber 620 to the outlet chambers 613. Cover 610 may also incorporate openings or ports 630 in base wall 614 to allow the

sound waves to emanate from the back of the cover 610, which may also help with reducing echoes, which will be more fully described below. To direct the sound waves to openings 630, cover 610 may incorporate another set of secondary channels or may locate them at the end of channels 624, such as shown in FIG. 30, which can create a coffered space. Additionally channels 624 may also be tapered such their respective side walls or flanges 625 diverge and concentrate the sound waves as they travel from the central chamber 620 to chambers 613 and optional openings 630. Similarly, back wall 614 may taper from the proximal end of the respective channels 624 to the distal end of the respective channels to thereby form generally cone or horn shaped channels to further enhance the concentration of the sound waves.

[00162] In the illustrated embodiment, channels 624 are formed upwardly standing walls 625, 627, which are also optionally integrally formed with base wall 614 of cover 610 (such as by molding, stamping etc. (see below for various methods for forming the cover) or by being post applied using an adhesive or mechanical attachment) and further are sized such that the upper distal edge of the respective side walls 625 extends to and optionally seals against the back of the device body (when the cover is mounted to the device). To direct the some of the sound waves to openings 630, walls 627 terminate before reaching outlet openings 612, which forms a coffered space and directs some of the sound waves to openings 630 and reduces, if not eliminates, reflections or echoes that may occur. The terminal end of that channel is then optionally closed by another upstanding wall 629, which is also size to extend to and optionally seal against the back of the device.

[00163] In addition, similar to walls 622, walls 625 and 627 are curved to create a smooth pathway for the sound waves. Further, wall 622a transitions into wall 627 forming a continuous smooth curve. Similarly, the curve of the opposed wall 622b projects onto and aligns with the curve of wall 625, which again creates a smooth pathway for the sound waves. With this configuration, it has been found that echoes are significantly reduced if not eliminated and further the sound transmission is more efficient so the perceived volume of the sound waves as they exit the cover is noticeably increased in volume to the user.

[00164] As would be understood, therefore, all the walls forming the respective channels extend up to and optionally contact the rearward facing surface of the device and, further, optionally thereby seal the respective channels to the back side of the device so that essentially all the sound waves which are emitted from the speaker are directed through the respective channels to the outlet openings. For example, the height of the respective wall 622, 625, 627, and 629 may range from about 1 mm to 15 mm within a smartphone assembly, optionally from 2 mm to 50 mm within a tablet assembly. Furthermore, the thickness of the respective walls may vary in a range from about 0.5 mm to 3 mm. The length of the channels also may vary. For example, the length of the respective channels 618 and 624 may range from about 10 mm to 175 mm within a smartphone assembly,

optionally from about 10 mm to 400 mm within a tablet assembly. Additionally, when base wall 614 is sloped, the height of the respective walls may vary to follow the taper of the back wall and therefore may range about 2 mm to 15 mm at their shortest height to about 5mm to 30 mm at their tallest height within a smartphone assembly, which typically corresponds to their locations adjacent base central chamber 620. Further, the angle of taper on the channels may vary. For example, the angle of taper may vary from about 0.5 to 45 degrees.

[00165] Referring again to FIG. 30, each side of the walls forming the channels has a smooth transition with the base wall to avoid any sharp angles, which could distort the sound waves. Similarly, the walls of adjacent channels may be joined with smooth transitions, again to avoid any sharp angles and minimize sound distortion.

[00166] Depending on the particular device, cover 610 may also include various access openings 632, 634, 636, and 638 to provide access to the controls of the phone, ports and further not to interfere with a camera of the device. In each case, the cover extends to and optionally seals against the device body around each access opening to minimize or prevent sound leakage.

[00167] Depending on the material forming cover 610 (see below), cover 610 may have a split construction with an upper half 610a and a lower half 610b which couple together by way of a friction fit or snap fit connection. For example, lower half 610b may include a flange that extends into upper half 610a and then frictionally engages the inwardly facing surface of the lower end of upper cover half 610a. While the term “half” is used, it is used loosely to mean that the cover has two parts. It should be understood that the location of the split 610c is not necessarily in the middle and. therefore, each half of the housing is necessarily not of equal size.

[00168] Similarly, the cover may be formed out of a semi-flexible or flexible material that will allow the smartphone or tablet to be placed inside of the case by way of stretching and flexing the perimeter of the case around the perimeter of the smartphone/tablet, and creating a secure post-stressed tensioned fit between the case and smartphone/tablet.

[00169] Referring to FIG. 36, the numeral 710 generally designates another embodiment of a cover of the present invention. Cover 10 is similar to cover 610 and includes a plurality of outlet openings or ports 712 and outlet chambers 713 formed at three of the corners of the device for directing sound outwardly from the face of the device. Cover 712 further includes two side chambers 713a, which form additional outlet openings or ports, located at the front face of the device along the sides of the device, which are generally located midway along the length of the sides of the device and which similarly direct sound outwardly from the face of the device.

[00170] In a similar manner to the first embodiment, cover 710 includes a back wall 714 with one or more channels 718 that capture and direct the sound waves from the speaker (which is also located in the lower right hand corner of the device) to a central chamber 720, which in turn is in

communication with a plurality of channels 724 and 726 for directing the sound waves to the respective forwardly facing chambers 713 and 712a. The shape of chambers 713 and 712a also provide pronounced griping surfaces, which are formed by the transition regions of the cover's side wall adjacent chambers 713 and 712a.

[00171] Channel 718, 724 and 726 are also similarly formed by upstanding walls 722, 725, and 727, which extend to and optionally seal against the device body. In a similar manner the respective walls of the channels diverge and are tapered to concentrate the sound waves emitted from the speaker(s) so the volume of sound emitted from the outlet chambers of the cover appears to be greater than the sound from the device without the cover. Again, cover 710 incorporate several openings 728, 730, and 732 to provide access to the ports and controls of the phone, as well as the camera, which are optionally sealed to the device body around the respective accessory. Further, cover 710 may also incorporate a split construction.

[00172] Referring to FIGS. 41-44, and as noted in reference to cover 610, all the walls forming the respective channels of cover 710 extend up to and contact the rearward facing surface of the device to thereby seal the respective channels to the back side of the device so that essentially all the sound waves which are emitted from the speaker are directed through the respective channels to the outlet chambers adjacent to the corners on the sides of the device. For examples of suitable dimensions reference is made to cover 610.

[00173] Additionally, cover 710 may be adapted to hold articles, such as credit cards, business cards to name a few. For example, some of the walls forming the channels may be shortened and then joined by a web to close the channels and also to form a shelf on which a card may be supported. Alternately, the walls may be simply shorted, with the card(s) then closing the channel. In the case of a cover with a split construction, one half of the cover may be mounted to the device, and then the card inserted into the space between the web (or upper edges of the walls) and the device, and then the other half can be slipped over the card and then inserted into or onto the other half of the cover. Alternately, the cover may incorporate an external pocket for receiving articles, such as credit cards, personal driver's license, and/or key.

[00174] Referring to FIGS. 45A-45D, cover 710', a slightly modified version of cover 710, includes a shelf 729' formed by the upper edges 731' of walls 725' and 727' of the respective channels 724' and 726', which are formed with regions of shorter height during the cover forming process or shorted after the cover forming process so as to create a recessed shelf for receiving a credit card C. In this manner, when cover 710' is mounted to a device D, the credit card will be held between the cover and the device but in a manner not to interfere with the sound wave harnessing and concentration described above.

[00175] Referring to FIG. 46-52, the numeral 810 generally designates yet another embodiment of the cover of the present invention. Cover 810 is similar to cover 710 in that it includes outlet chambers 813 at three corners of the device and side outlet chambers 813a along the side of the device D, which may be generally located midway along the length of the sides of the device. Referring to FIG. 47, cover 810 similarly includes a base wall 814 with upwardly standing walls 822 which form channels 818, 824, and 826 for directing the sound from the speaker (which is also located at the right hand corner) to the various chambers around the perimeter of the device. In contrast to cover 710, each respective chamber 812 and 812a is generally smaller than the corresponding chambers for cover 710 to provide a more streamlined cover, but which also eliminates the pronounced griping surfaces provided by the transition region formed adjacent chamber 712 and 712a of cover 710. Cover 810 may also incorporate a split construction.

[00176] Referring to FIGS. 53-55, the numeral 910 generally designates yet another embodiment of a cover the present invention. Similar to cover 710, cover 910 includes enlarged chambers 913 of three of the respective corners of the device D, which tend to further increase the sound output from the cover and device. In the illustrated embodiment, cover 910 includes a single channel 918 that is in communication with a speaker (which is similarly located at the lower right hand side of the device as viewed from FIG. 53), which directs the sound from the speaker inwardly behind the device between the device body and the cover into the central enlarged chamber 920 which is in communication with the respective chambers located around the three corners of the device. In this manner, cover 910 adopts a simplified approach to harnessing and concentrating the sound waves and further distributing the sound waves to its respective outlet chambers located remotely from the speaker. Again, each of the covers may incorporate different access openings to accommodate the various devices. For example, cover 910 includes two rearwardly extending openings 928 and 930 which are configured to provide access to allow use of the camera and visibility of smartphone logo. Additional access openings 932, 934 and 936 may also be provided to allow access to the ports and controls of the specific device to which cover 910 is mounted. Again, to minimize sound leakage the cover may be sealed against the device body around each of the access openings.

[00177] Similar to the previous embodiments, cover 910 optionally incorporates a split construction with an upper half 910a and lower half 910b, which couple together by way of a friction fit or snap fit connection between a flange 940 formed on lower cover half 910b and the inwardly facing surface 942 of the lower end of upper cover half 910a. Optionally, flange 940 may incorporate a recess or other surface relief for cooperating with a corresponding relief 946, such as raised relief, on upper cover half 910a to provide a snap fit coupling between the two cover halves.

[00178] Referring to FIGS. 57-60, the numeral 1010 generally designates yet another embodiment of a cover the present invention. Cover 1010 is similar to cover 610 but is formed as a

unitary cover. Thus, as noted, the base wall 1014 of cover 1010 may be formed from sections 1014a, 1014b, 1014c and 1014d, which are preformed as inserts from a relatively rigid polymeric material, such as a plastic, and which are placed into a mold and then molded with a second material over the inserts, which forms the back wall 1014e and balance of the base wall 1014. Back wall 1014e is formed from a more flexible and energy absorbing material, such as a structural gel, silicone, rubber or other elastomeric materials so that the cover can be stretched or bent to fit over the device. Alternately, cover 1010 may be formed from two shot molding with a first material for forming section 1014a, 1014b, 1014c and 1014d and the second material for forming the more flexible back wall. For further details of cover 1010 reference is made to cover 610.

[00179] Further, back wall 1014e is formed with a more defined offset from base wall 1014 so that the depth of the channels 1018 and 1024 may be increased and further more rounded to further increase the smoothness of the respective channels. In this configuration, it has been found that echoes are even more reduced if not eliminated and further the sound transmission is even more efficient so the perceive volume of the sound waves as they exit the cover is noticeably increased, even over the other illustrated embodiments.

[00180] In an alternate embodiment, the plenum space and/or channels for sound harnessing and concentrating the sound of the cover may be incorporated into a separate insert that is inserted between the cover and the device body or interiorly of the device itself. Further, as described below, the plenum space and/or channels may be incorporated into the device body itself. For example, the inside of the device body or the device body wall itself may incorporate a plenum and /or internal channels that are in communication with the speaker(s) and with one or more outlet chambers formed in the device body, for example, formed at the corners and/or sides of the device body and/or at the back side of the device body.

[00181] Referring to FIGS. 61 and 62, the numeral 1110 designates a device incorporating the sound wave harness and concentrating technology of the present invention. For example, a standard front panel or bezel (not shown) may be removed and replaced with a modified front panel 1112 that incorporates one or more outlet opening 1113. Similar to the covers described herein, the outlet openings may be located adjacent the corners of the device and along the sides so that the sound is directed the user. To harness the sound waves from a speaker or speakers S supported in the device, for example on a clip C, an insert 1114 may be placed between a standard back panel P (or a modified back panel) and the clip, which includes a plenum space and one or more channels 1118 of the types described above in reference to the covers.

[00182] For example, insert 1114 includes a base wall 1116 with a plurality of upwardly extending walls 1122 that form the channels (1118) for harnessing sound from speakers S and directing the harnessed and concentrated sound waves to openings 1113. Similar to cover 1010, some

of the outlet openings may share a channel and be located at the end of the shared channel or as may have their own channels so each channel is associated with an outlet opening.

[00183] In each of the above covers or inserts or panels, the covers or inserts or panels may be formed from a variety of different materials, including multiple materials. For example, the covers or inserts or panels or parts of the covers or inserts or panels may be molded from a plastic, wood, metal, polymers, rubber, including clear or translucent material, such as clear or translucent plastics. Further, each of the covers or inserts or panels may be formed from injection molding, rotational molding, blow molding, compression molding, thermoforming, multishot molding, stamping, die casting, machining, or forging, including an insert molding process where one or more portions of the cover is preformed from one material, and another portion of the cover is molded over the preformed part(s) from another material.

[00184] For example, referring FIG. 31, the base wall 614 of cover 610 may be formed from inserts 614a, 614b, 614c and 614d which are preformed from a relatively rigid polymeric material, such as a plastic, which is placed into a mold and then molded with a second material over the inserts forming the balance of the back wall 614e. For example, wall 614e may be formed from a more flexible and energy absorbing material, such as a structural gel, silicone, rubber or other elastomeric materials.

[00185] Referring to FIG. 63, the numeral 1210 designates yet another embodiment of the cover of the present invention. Similar to the previous embodiments, cover 1210 includes a plurality of pockets 1213 located at the four corner of the cover to align with the corners of the hand-held device, with one of the pockets including an upper wall or flange 1213a to cover and optionally seal the speaker of the hand-held device. As described above in reference to the other embodiments, each of the other pockets include or form sound ports 1212, which in the illustrated embodiment are defined by the lips or edges of the respective pockets. Cover 1210 also includes one or more channels of the types described above so that the sound waves emanated from the speaker are redirected by the channel(s) formed in the cover (or by an insert between the cover and the hand-held device) to the respective sound ports.

[00186] Referring to FIG. 65, cover 1210 (as well as any of the previously described covers), may incorporate a stand 1250. For example, stand 1250 may be formed from a rigid material such as plastic, metal, or the like and is formed with a mounting portion 1252 and an extended angled leg 1254. Mounting portion 1252 may incorporate a coupler 1258, such as an earth magnet, which releasably mounts to the cover. Coupler 1258 may be molded in or secured to the mounting portion by a fastener, such as an adhesive or a snap-fit coupling. Cover 1210 similarly may include an earth magnet, which is either mounted (such as by an adhesive or a snap-fit connection) to the cover at its back wall or molded or potted therein. Consequently, stand 1250 may be mounted to the cover and repositioned in a number of different orientations, with two such orientations shown in FIG. 65. In this manner, stand

1250 may be quickly and easily mounted to a cover and just as quickly and easily removed from the cover.

[00187] Alternately, stand 1250 may be flexible and formed from, for example, a material with shape memory so that the configuration of the stand may be changed to change orientation of the cover and hand-held device supported therein. For example, stand 1250 may incorporate a living hinge 1256 to allow the leg 1254 to be moved between multiple orientations to adjust the angle of the hand-held device cover and hand-held device.

[00188] Furthermore, stand 1250 may be integrally formed with cover 1210. For example, stand 1250 may be orientated in a planar arrangement when in a stowed position for example in a recess formed at the back of the cover, but then partially deployed, for example leg 1254 may be deployed from the recess to support the cover and the hand-held device.

[00189] Referring to FIG. 67, as noted above, cover 1210 may incorporate an earth magnet. The earth magnet may be also used to mount the cover to a band 1270, for example, an arm band so that the cover and hand-held device may be mounted to a person's arm wearing band 1270. For example, band 1270 may be formed from a conventional arm band strap with a fastener, such as Velcro straps, to secure the band around a wearer's arm. The earth magnet 1272 may be mounted to the band by a fastener, such as adhesive, which can then releasably couple to the earth magnet of the cover. For example, suitable earth magnets may require a pull force of 30 pounds or more to decoupled the magnets.

[00190] Referring to FIG. 68, optionally cover 1210 may incorporate a transverse opening through the cover to allow a lanyard 1280 to be looped through and secured to the cover. Optionally, lanyard 1280 may incorporate a loop 1282 for extending around a user's wrist, for example. In the illustrated embodiment, the transverse opening 1262 extends through the cover at one of the pockets, namely the pocket that extends over the speaker. However, it should be understood that the transverse opening 1262 may be provided at other locations of the cover.

[00191] While described as providing a mount to an arm band, it should be understood that the earth magnet may also be used to mount the cover to other surfaces, such as a dashboard, windshield, a wall petition, or the like to allow a user to mount the cover and hand-held device in whatever environment the user is present. Furthermore, the cover may be sold with a separate mounting device that cooperates with the mounting device on the cover so that the cover and mounting device may be sold as a kit. For example, an earth magnet may be sold with the cover, which includes a removable backing strip to reveal an adhesive layer, which allows the user to mount the magnet to whichever surface they desire to allow the cover then to be supported by the magnet. Furthermore, while described as a magnet, other mounting devices may also be used.

[00192] Consequently, the mounting device allows a user to use the cover and hand-held device supported therein in a variety of different settings or environments and also allows a hands-free operation of the hand-held device and hands-free listening.

[00193] Referring to FIGS. 69-79, the numeral 1310 generally designates yet another embodiment of a cover the present invention. Cover 1310 is also optionally formed as a unitary cover and may be formed from a single relatively flexible material or may be formed from two or more materials in a similar manner as described above. Similar to the previous embodiments, cover 1310 includes a cover body with a base wall 1314, which when mounted to the device is spaced from the device body form a plenum space between the device body and the cover, and an upwardly extending perimeter side wall 1316. Further, the cover may be configured and arranged to seal against the device body around the speaker (or speakers) so that essentially all of the potential audible sound energy developed by the speaker (or speakers) of the device can be harnessed and directed into the plenum space for redirecting, in this case, to back side of the cover.

[00194] Referring again to FIG. 69, side wall 1316 includes a lip 1316a that extends around the perimeter and optionally generally seals against the device body. Side wall 1316 includes an enlarged region to form a chamber 1316b' adjacent the device body and the speaker, with lip 1316a still generally following the outer perimeter of the device body. Back wall 1314 extends from the corners of the side wall inwardly and includes inwardly extending side walls that extend to and optionally seal against the back of the device but terminate short of the back of the device over one or more discrete regions to form outlet openings 1312 that face in a direct generally parallel to the back side of device D. In the illustrated embodiment base wall 1314 has a generally dog-boned shaped configuration which is spaced inwardly and optionally disconnected from side walls 1316 between the corners of the cover to form openings 1314a through cover 1310. Optionally, these openings can be eliminated by a second material, for example, an impact absorbing material, such as gel, foam, or the like, that joins or fills the space between the disconnected or rail portions of the side wall 1316 and the back wall 1314.

[00195] Referring to FIGS. 72-74, to redirect the sound from the speaker to the outlet openings 1312, cover 1310 incorporates at least one channel 1318 which is in communication with the speaker on one end by way of chamber 1316b' and in communication with another chamber 1320 at its distal end, which forms part of the plenum space. In the illustrated embodiment, chamber 1320 is in direct communication with each of the outlet openings 1312.

[00196] Channel 1318 is formed by upwardly standing side walls 1322, which are optionally integrally formed with base wall 1314 of cover 1310, such as by molding or by being post applied using an adhesive. Further, upwardly standing side walls 1322 are sized such that the upper distal edge of the respective side wall 1322 extends to and optionally seals against the back of the device body (when the cover is mounted to the device) so that the sound waves emitted from the speaker are directed

along the channel to chamber 1320 and then out openings 1312. Thus essentially all of the sounds waves emitted from the speaker are directed into chamber 1316b' and then down channel 1318 from its proximal end to its distal end adjacent central chamber 1320 and thereafter travel to outlet openings 1312.

[00197] Optionally, channel 1318 is configured to operate like an internalized megaphone for natural amplification within the handheld device case or within the handheld device itself (as described more fully below). For example, walls 1322 may be a tapered so that channel 1318 concentrates the sounds waves and thus prevents them from scattering. Optionally base wall 1314 of cover may be flat or may have a slope, such as shown in FIG. 75, to thereby form a generally cone or horn shaped channel. In addition, walls 1322 may be curved to reduce interference with the sound waves.

[00198] Referring to FIG. 80, another embodiment of a cover 1410 the present invention is shown with a deployable and optionally removable stand 1450. Although cover 1410 is illustrated as a cover similar to cover 1210, it should be understood that the cover may be configured like any of the other covers described and illustrated herein, including other covers not disclosed herein. For example, stand 1450 may be formed from a rigid material such as plastic, metal, or the like and is formed with a mounting portion 1452 and a leg 1454. In the illustrated embodiment, mounting portion 1452 comprises a bifurcated mounting portion with two arms 1452a and 1452b, which are pinned to the back wall of cover 1410. As best seen in FIG. 81, when stand 1450 is pivoted outwardly from the back of the cover, leg 1454 can be used to prop the hand-held electronic device supported in cover 1410. And, the angle of tilt depends on which portion of leg 1454 is used to prop up the cover and hand-held electronic device.

[00199] Optionally, the back of the cover may have one or more recessed or relief portions 1460 that can partially of fully receive the stand when it is returned to its stored position so that the stand may be generally flush with the cover wall and generally follow the surface topology of the cover so that when stowed cover 1410 will have a similar surface topology to cover 1210 except for the gaps that would be formed between the stand and the cover.

[00200] Further, as best seen in FIGS. 80-82, arms 1452a and 1452b and leg 1454 may be tapered to further facilitate stand following the surface topology of the cover. To that end, the space between arms 1452a and 1452b may be size to straddle the portion of cover 1410 that forms the channel 1418, which as described and generally shown is similar to channel 1218.

[00201] In the illustrated embodiment, arms 1452a and 1452b may extend into recesses 1458a and 1458b formed in back wall of cover 1410, which may be optionally configured to allow mounting portion 1452 to be disconnected and reconnected. Further, arms 1452a and 1452b and recesses 1458a and 1458b may be configured to provide resistance over one or more ranges of motion. For example, when the stand is in its stowed position, arms 1452a and 1452b and recesses 1458a and

1458b may be configured to provide initial resistance to pulling the stand out from its stowed position. Similarly, arms 1452a and 1452b and recesses 1458a and 1458b may be configured to provide resistance to moving leg 1454 to specified stand positions and similarly provide initial resistance to pulling the stand out from its specified stand positions.

[00202] Referring to FIG. 84, each arm 1452a and 1452b may include a projecting pin 1462 for extending into a corresponding socket in the recess to thereby pivotally connect the arms to the cover. Further, the ends of the arms and the shape of the recesses may be configured to have similar profiles when the arms are in their closed positions (such as shown in the dotted lines in FIG. 84) with one or more flatted sections 1460a, 1460b, 1464a, 1464b and one or more enlarged lobes 1464c on the end of the arms, which are located so they when the arms are pivoted the surfaces frictionally interact to increase the friction at discrete positions of the arms (such as noted above) but then allow free unrestricted movement (or with reduced frictional interaction) of the arms over other ranges of motion.

[00203] In addition, referring to FIGS. 85-86, recesses 1460 may include ramped surfaces 1466 to guide the ends of the arms into the recesses and further so that pins 1462 align with sockets 1468 to thereby pivotally couple the arms to the cover. In addition, sockets 1468 and pins 1460 may have diverging sides so that when a force is applied to the arms or mounting portion, the diverging sides generate a lateral force on the respective arms, which are formed from a material with sufficient resilience (such as a polycarbonate, including thermal polycarbonate (TPE)) to allow the arms to deflect and allow the pins to disengage from the sockets to thereby provide a removable stand and a stand that can be reconnected. In this manner, stand 1450 may be quickly and easily mounted to a cover and just as quickly and easily removed from the cover.

[00204] Referring to FIG. 87, a stand 1450' similar to stand 1450 is illustrated mount to a cover that is configured for use on a tablet or another large electronic device. Stand 1450' may be constructed in a similar manner to stand 1450 (and therefore reference is made to stand 1450 for mounting details) but enlarged to accommodate the large cover. FIG. 88 illustrates a modified stand 1550, which is mounted by a single mounting arm 1552 and further includes an enlarged leg with a trapezoidal shaped body that provides two flattened landing surfaces 1554a and 1554b, which are generally parallel to each other, with landing 1554a providing a greater tilt to the cover and hand-held device supported in the cover as compared to landing surface 1554b, which may hold the cover and hand-held device close to vertical.

[00205] Referring to FIGS. 89-97, the numeral 1610 generally designates yet another embodiment of a cover the present invention. As will be described below, cover 1610 is configured to provide a multi- channel sound duct which splits the sound waves from a single speaker into multiple channels and directs the split sound waves to a corresponding number of sound outlets. Though it should be understood that one or more of the channels may direct the split sound waves to more than

one sound outlet. Further, the same or similar construction may be used for multiple speakers so that the output of each speaker may be split in to multiple channels.

[00206] Cover 1610 is optionally formed as a unitary cover and may be formed from a single relatively flexible material or may be formed from two or more materials in a similar manner as described above. Further, in the illustrated embodiment, cover 1610 is formed with a spilt construction with two sections joined at a seam 1610a (FIG. 90). However, as noted, cover 1610 may have a unitary construction.

[00207] Similar to the previous embodiments, cover 1610 includes a cover body with a base wall 1614, which when mounted to the device is spaced from the device body to form a plenum space between the device body and the cover, and an upwardly extending perimeter side wall 1616. Further, the cover may be configured and arranged to seal against the device body around the speaker (or speakers) so that essentially all of the potential audible sound energy developed by the speaker (or speakers) of the device can be harnessed and directed into the plenum space for redirecting, in this case, to the back wall of the cover.

[00208] Referring again to FIG. 89, side wall 1616 includes a lip 1616a that extends around the portion of the device body where the speaker (or speakers are) is located to form a chamber 1616b adjacent the speaker, with lip 1616a optionally sealing against the edge or face of the device body where the speaker is located. In the illustrated embodiment, side wall 1616 extends to the edge of the device adjacent the front face of the device, thought it should be understood that it may also include a lip that wraps over the edge to the front face of the device. Side wall 1616 also may include openings or recesses 1632, 1634, and 1638 to accommodate controls and ports of the device.

[00209] Back wall 1614 is configured with a recessed area or areas 1614a, which form part of the channels for directing the sound waves from the speaker to one of more openings 1612a, 1612b formed in back wall 1614, which form sound outlets. In the illustrated embodiment, recessed area 1614a is defined between upstanding portions of back wall 1614 that form interior walls 1622a, 1622b, which forms a primary or feeder channel 1618. Further, a portion of recessed area 1614a is divided into three regions by projecting walls or ribs 1622 to form three separate, generally parallel channels 1618a, 1618a, and 1618b, which are in communication with openings 1612a, 1612b and in communication with channel 1618, and which split the sound ways into the three channels. Thus, the sound waves from a single speaker are split into multiple channels and are directed to a corresponding number of sound outlets.

[00210] Walls 1622 are optionally integrally formed with base wall 1614 of cover 1610, such as by molding, or may be post applied using an adhesive. Further, walls 1622 may be formed by an insert. In this manner, channels 1618, 1618a and 1618b are open channels but form closed channels immediately adjacent the device body when the cover is mounted to the device. However, it should be

understood that an intermediate wall or membrane may be formed or provided so that channels 1618a and 1618b are closed. As noted, channels 1618a and 1618b are communication with openings 1612a and 1612b formed in back wall 1614, which form outlet openings for the sound waves.

[00211] Referring to FIG. 96, as noted, channels 1618a and 1618b split the sound waves that are emitted by the speaker into channel 1618, to redirect the sound from the speaker to the openings 1612a and 1612b. Walls 1622 extend the full length of the channels 1618a and 1618b and terminate adjacent channel 1618 which is in communication with chamber 1616b. Walls 1622 are sized so that they extend from base wall 1614 to contact the back of the device body when cover 1610 is mounted to the device so that essentially all the sound waves emitted from the speaker are directed into channels 1618a and 1618b. Similarly, back wall 1614 is configured so that it contacts the back of the device body (at least at the upper edge of walls 1622a, 1622b) when cover 1610 is mounted to the device so that, as noted, channels 1618a and 1618b are closed when cover 1610 is mounted to the device.

[00212] In the illustrated embodiment, openings 1612a are formed in the upstanding walls 1622a of back wall 1614 and further start at the widest part of channels 1618a and extend over essentially the remainder of the length of the respective channel. As best seen in FIG. 94, walls 1622a and 1622b are curved with a first radius of curvature and diverge away from each other initially (over the portion with the first radius of curvature) and then are redirected inwardly with a curvature of a second larger radius of curvature than the first radius. Openings 1612a start at the juncture of the two curved potions of walls 1622a and 1622b and extend the full length of the portions of the walls with the larger radius of curvature. Similarly, walls 1622 are curved with a multi radius curvature and also diverge, but diverge over their full lengths so that at least the width of central channel 1618b expands over its full length. Further, the depth of the central channel generally increases over its length, except over a discrete region as noted below. Each channel 1618a and 1618b is therefore is configured to operate like an internalized megaphone for natural amplification within the handheld device. Further, all the surfaces surrounding each channels may be curved to reduce interference with the sound waves.

[00213] As best seen in FIGS. 89, 91, 95 and 96, back wall 1614 is curved. Recess 1614a is therefore also curved so the heights of walls 1622, 1622a and 1622b are tapered to maintain contact with the back of the device body. Further, central portion 1614b of base wall 1614 may include an offset portion to form a cavity for holding, for example, a magnet 1658, which can be used to mount cover 1610. Therefore, at least central channel 1618b will have a reduced depth over a discrete portion adjacent outlet opening 1612b.

[00214] Optionally, back wall 1614 may include discrete projections or nubs (or recesses) 1614c, which may be used to align the device and cover, for example, on a bracket with corresponding

recesses (or projections). Projections or nubs 1614c may be aligned along the central and vertical axes of the cover (and hence device) so that they can be used to provide a tactile indication of when the phone is in a horizontal or vertical orientation.

[00215] In the illustrated embodiment, openings 1612a and 1612b and channels 1618a and 1618b are located in one side of the device to accommodate additional features. For example, as noted above, the space 1650 adjacent opening 1612b may be used for storage or the cover may incorporate a stand. Referring to FIG. 97, cover 1710, which is of similar construction to cover 1610 (and therefore reference is made to cover 1610 for details not repeated herein), includes an elongated recess 1714d in its base wall 1714. Positioned in recess 1714d is an arm 1750, which is deployable from a stowed position (shown in FIG. 97) to a deployed position where the distal end 1750a is extended outwardly of recess 1714d so that arm 1750 can prop up cover (and the device supported therein). Arm 1750 includes a pair of mounting arms 1752, which are pinned and pivotally mount arm 1750 to base wall 1714. For example, mounting arms 1752 may incorporate the cam or detent mechanisms described above, which can be used to define preset fixed (though releasable) orientations for the arm so that it can be used as a stand.

[00216] As best understood from FIG. 97, when arm is return to its stowed position, its outer surface is generally flush with the base wall 1714 surrounding recess 1714d so that the outer surface of arm 1750 generally follows the surface topology of the cover. To facilitate deployment of arm 1750, base wall 1714 may include a recess 1714e adjacent the distal end of the arm, so that a user may use their finger or fingernail to pull the arm out of the recess.

[00217] Alternately, recess 1714e may support a spring catch to retain the distal end 1750a of arm 1750, which when depressed may be used to release arm 1750 from recess 1714d. F or example, a suitable catch may comprise a spring tab formed in base wall 1714 which includes a projecting rib or tooth that engages a corresponding recess in distal end 1750a of arm 1750. For further details of how mounting arms 1752 may be mounted to cover, reference is made to the above description.

[00218] In addition, arm 1750 may also include a recess 1750c for holding a magnet 1758 for mounting cover 1710 (and the device which is covers) to a metal surface.

[00219] The covers, inserts, and panels may be molded using two shot molding with one or more portions of the covers, inserts, and panels being molded with a first material and another or other portions of the covers, inserts, and panels being molded from a second material. In this manner, the covers, inserts, and panels may be formed using materials that can optimize it for the desired function. For example, at least a portion of the covers, inserts, and panels may be formed from a flexible elastic material to provide a more energy absorbing characteristic for the covers, inserts, and panels, while, for example, the base wall or at least the inwardly facing side of the base wall may be formed from a more rigid material to direct the sound waves and limit the absorption of the sound waves into the cover.

Additionally, portions of the channels may be selectively formed from materials with more sound absorbing characteristics, such a s less dense material or rubber or rubberized material, to absorb selected frequencies (or frequency) of the sound waves to adjust the tone emitted by the covers, inserts, and panels and thereby filter out one or more desired frequencies. For example, the respective base walls or side walls of the channels may be formed from materials that absorb some of the high frequency range sound waves thereby reduce the tininess of the sound waves emitted from the respective chambers or openings of the covers, inserts, and panels. Alternately, the base wall or side walls of the respective channels may be formed from material that absorb some of the low frequency sounds of the sound waves to reduce the base sounds of the sound waves emitted by covers, inserts, and panels. In addition to concentrating the sound waves, the respective covers, inserts, and panels may be configured by way of material selection or geometric selection (e.g. forming the channel from thin, flexible walls) to enhance or suppress certain frequencies of the sound waves emitted by the speaker. Further, a sound absorbing material may be applied thereto, for example, by dipping, spraying, or by way of an adhesive.

[00220] In addition, although the various base walls and channels have been described as being curved, the base walls and walls that define the channels may be flat or planar. Further, the curvature may limited or isolated to regions adjacent the channels so that the base wall is generally flat and the channels have a uniform depth.

[00221] While several of the covers are illustrated with a split construction, as described, the covers may be formed from materials that are sufficiently flexible to allow a unitary construction. For example, when made from a flexible material such as gel or silicone, the channels may be formed from inserts that are pre-molded or formed during two shot molding.

[00222] Accordingly, when mounted to or in a handheld device with one or more speakers, the plenum space and/or channels of the present invention provide improved sound volume (perceived volume) and/or quality. The channels naturally amplify the sound energy by the use of creating a naturally occurring standing wave to amplify the sound energy.

[00223] While several forms of the invention have been shown and described, other changes and modifications will be appreciated by those skilled in the relevant art. For example, in some devices the speakers may be provided at other locations, therefore, the number, size, shape and locations of the outlet channels and access may vary from device to device. Therefore, it will be understood that the embodiments shown in the drawings and described above are merely for illustrative purposes, and are not intended to limit the scope of the invention which is defined by the claims which follow as interpreted under the principles of patent law including the doctrine of equivalents. For example, and without limitation, any individual element(s) of the described invention may be replaced by alternative elements that provide substantially similar functionality or otherwise provide adequate operation. This

includes, for example, presently known alternative elements, such as those that might be currently known to one skilled in the art, and alternative elements that may be developed in the future, such as those that one skilled in the art might, upon development, recognize as an alternative. Further, the disclosed embodiments include a plurality of features that are described in concert and that might cooperatively provide a collection of benefits. The present invention is not limited to only those embodiments that include all of these features or that provide all of the stated benefits, except to the extent otherwise expressly set forth in the issued claims. Any reference to claim elements in the singular, for example, using the articles “a,” “an,” “the” or “the,” is not to be construed as limiting the element to the singular.

The embodiments of the invention in which an exclusive property right or privilege is claimed are defined as follows:

1. A cover for a hand-held device, the hand-held device having a device body and a speaker, the speaker having an output, said cover comprising:

a cover body, said cover body configured for covering a portion the device body and for covering the speaker, said cover body having a base wall and a perimeter wall extending from said base wall;

said cover including a pair of openings for forming a first pair of sound outlets and including a second opening forming a third sound outlet, and each outlet being remote from the speaker; and

said base wall having a recess configured to form a plurality of channels when mounted adjacent the back side of the device body, said channels for communicating with the speaker when the cover is mounted to the hand-held device and for redirecting the sound waves emitted from the speaker to each sound outlet without the use of power.

2. The cover according to claim 1, wherein said recess forms a primary channel, said primary channel in communication with said plurality of channels.

3. The cover according to claim 1, in combination with a handheld device, said device having a back side and a front side, said front side having a display screen, when said cover is mounted to said device, said channels are configured to extend along said back side of said device body.

4. The cover according to claim 1, wherein each of said three sound outlets are located in said base wall inward of said perimeter wall.

5. A cover for a handheld device, the handheld device having a device body and a speaker, the speaker having an output, said cover comprising:

a cover body, said cover body configured for covering at a portion of the device body and for covering the speaker, said cover body forming an outlet opening remote from the speaker; and

a channel for being communication with the speaker and for harnessing and concentrating sound waves from the speaker to said outlet opening; and

an arm mounted to said cover body for supporting said cover on a surface.

6. The cover according to claim 6, wherein said cover body has a base wall, said base wall including a recess forming said channel, and said base wall optionally including a second recess for

receiving said arm, said arm being movable between a stowed positron in said second recess and a deployed position wherein at least a portion of said arm is extended from said recess.

7. The cover according to claim 6 , said arm has an outer surface generally flush with an outer surface of said base wall when moved to said stowed position.

8. The cover according to claim 5, wherein said arm is pivotally mounted to said cover body in a recess and movable between a stowed position and a deployed position, and said arm optionally pivotally mounted to said cover body by a pair of mounting arms.

9. The cover according to claim 8, wherein said arm or said recess configured to provide resistance over one or more ranges of motion of said arm.

10. The cover according to claim 8, wherein said arm or said recess may be configured to provide initial resistance to pulling the arm out from its stowed position.

11. The cover according to claim 8, wherein one of said arm or said recess each includes a projecting pin for extending into a corresponding socket in the other of said arm or said recess to thereby pivotally connect the arms to the cover.

12. The cover according to claim 8, wherein said mounting arms and said recesses are configured to have similar profiles when said arms are in their stowed positions, with the mounting arms having one or more flatted sections and one or more enlarged lobes so they when said arms is pivoted said flatted section or sections and said enlarge lobe or lobes frictionally interact to increase the friction at discrete positions of said arm.

13. A cover for a handheld device, the handheld device having a device body and a speaker, the speaker having an output, said cover comprising:

a cover body, said cover body configured for covering at a portion of the device body and for covering the speaker, said cover body forming a sound outlet remote from the speaker;

a channel for being communication with the speaker and for harnessing and concentrating sound waves from the speaker to said sound outlet; and

a magnet mounted to said cover body for supporting said cover on a surface.

14. The cover according to claim 13, wherein said cover body includes a recess, said magnet mounted in said recess.

15. The cover according to claim 14, wherein said cover body includes a plurality of raised surfaces or a plurality of recesses surrounding said magnet.

16. The cover according to claim 15, wherein said plurality of raised surfaces or a plurality of recesses are aligned first and second central axes of said cover.

17. The cover according to any one of claims 13-16, further comprising an arm mounted to said cover body for supporting said cover on a surface, said arm supporting said magnet, and said arm optionally pivotally mounted to said cover.

18. A cover for a hand-held device, the hand-held device having a device body and a speaker, the speaker having an output, said cover comprising:

a cover body, said cover body configured for covering a portion the device body and for covering the speaker, said cover body having a base wall;

said cover including a plurality of openings for forming sound outlets at locations remote from the speaker; and

a plurality of channels for communicating with the speaker when the cover is mounted to the hand-held device, said channels being generally parallel and for splitting and redirecting the sound waves emitted from the speaker to each sound outlet.

19. The cover according to claim 18, wherein said channels are formed in said base wall.

20. The cover according to claim 18, wherein said base wall has an outer perimeter, and each of said sound outlets are located inward of said perimeter.

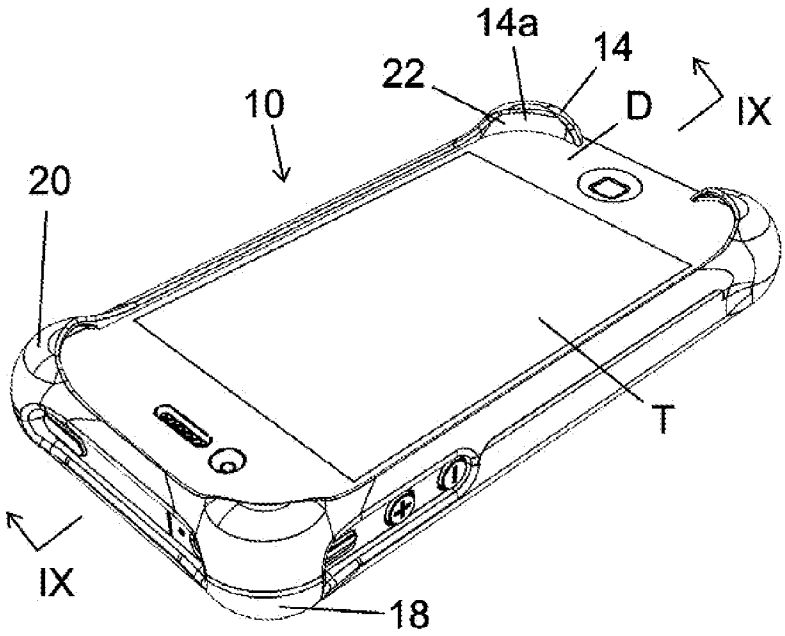


FIG. 1

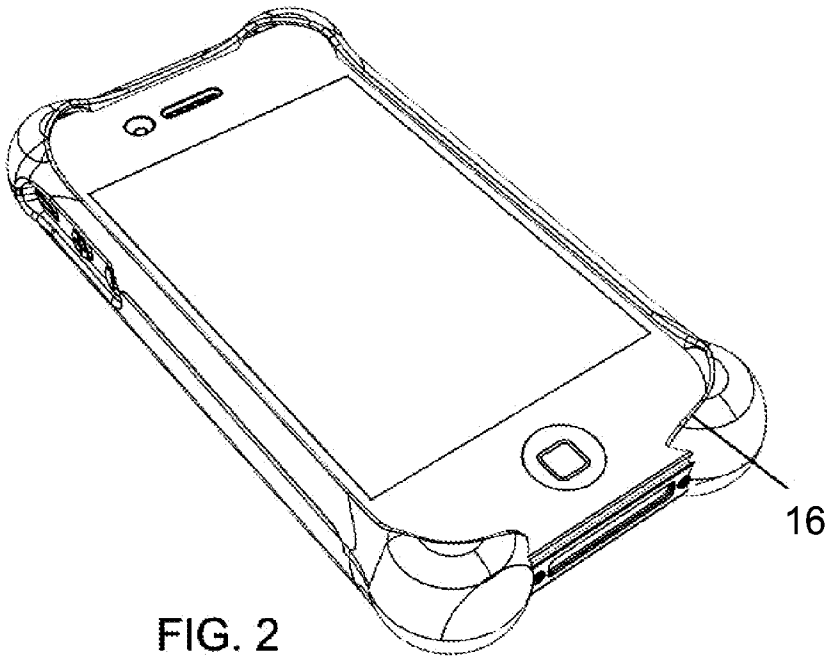


FIG. 2

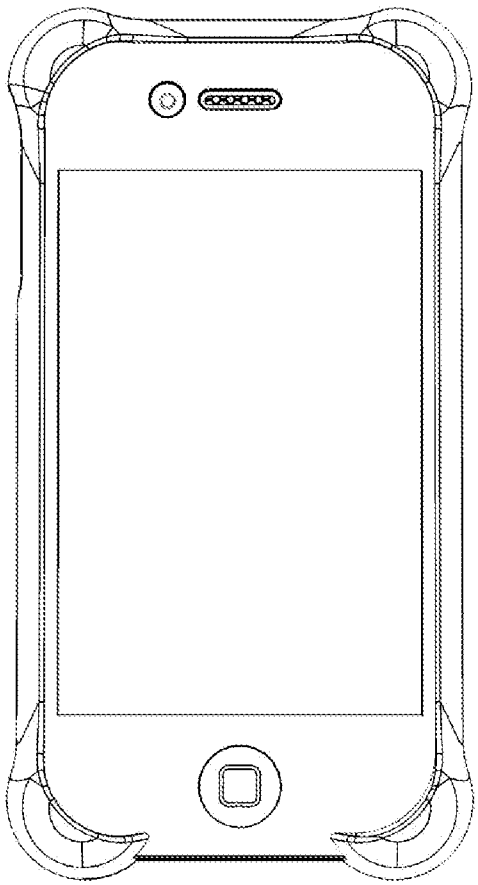


FIG. 3

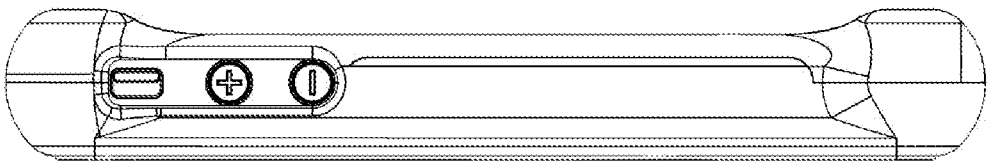


FIG. 4

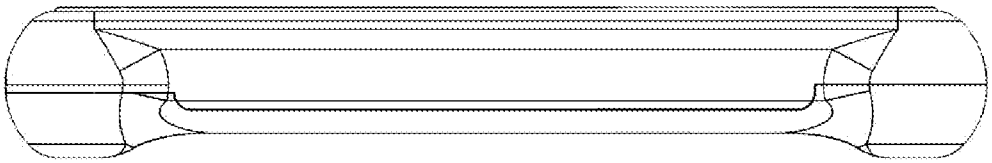


FIG. 5

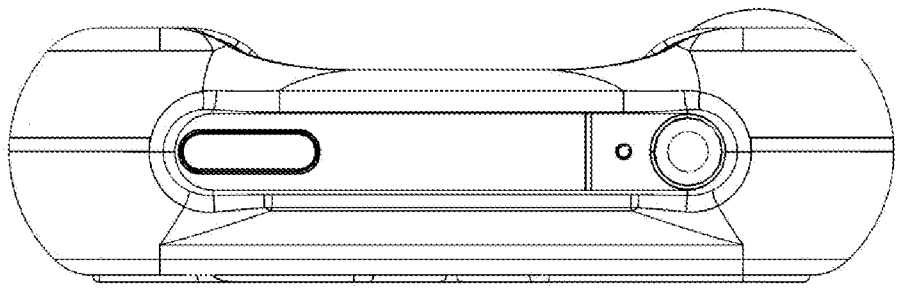


FIG. 6

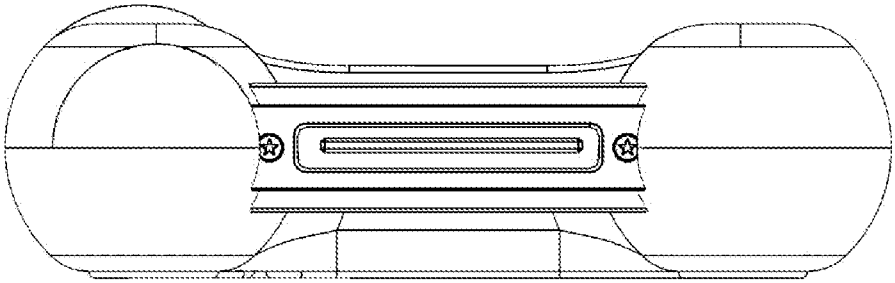


FIG. 7

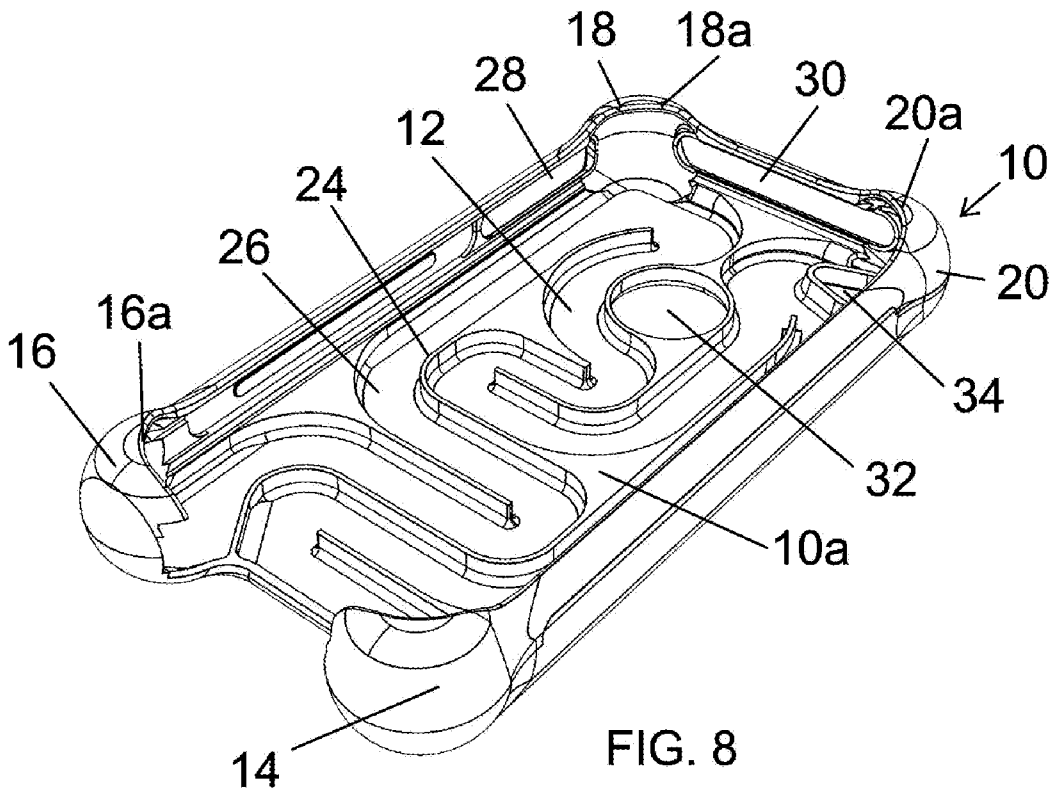


FIG. 8

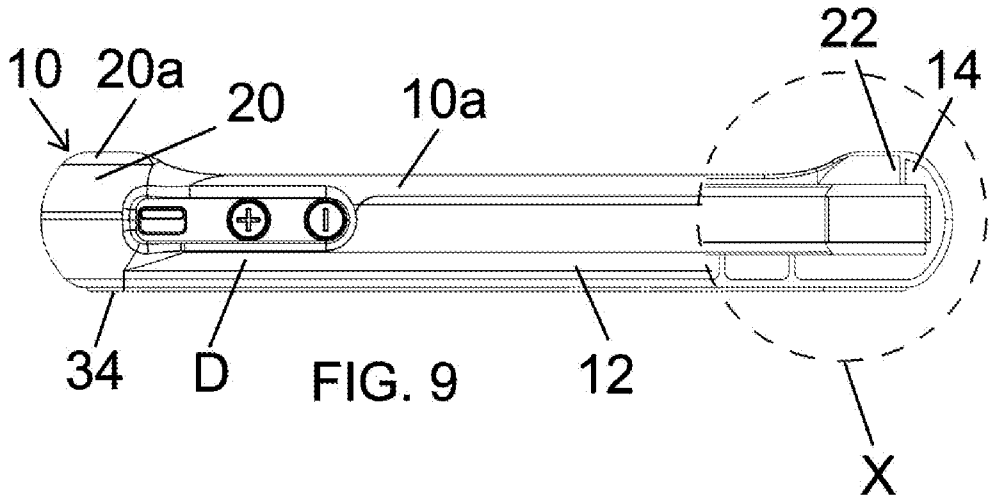


FIG. 9

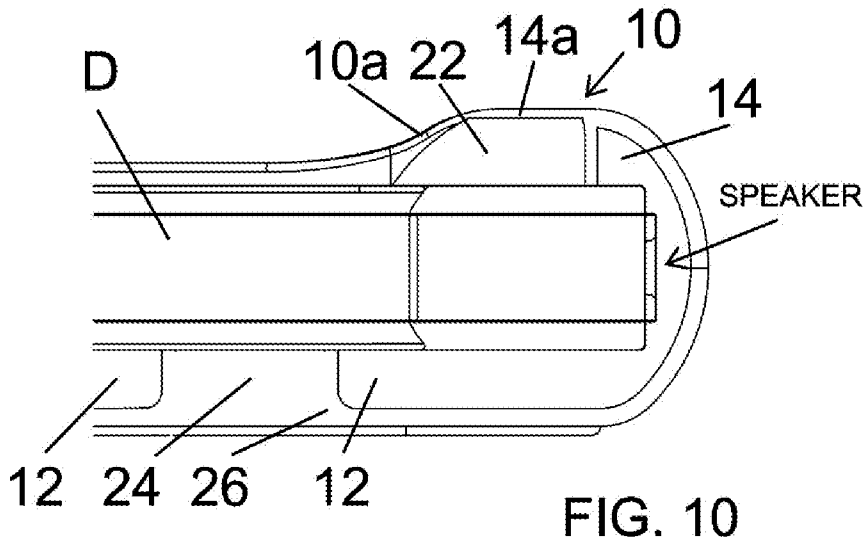


FIG. 10

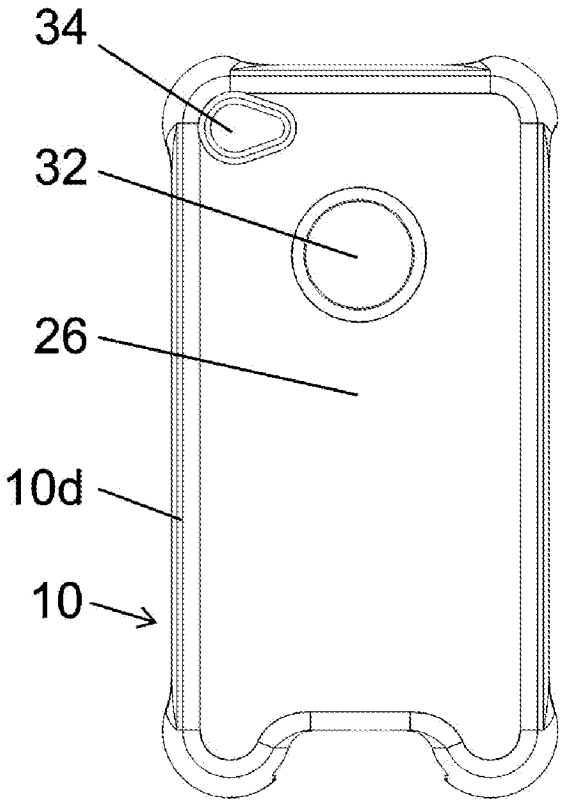
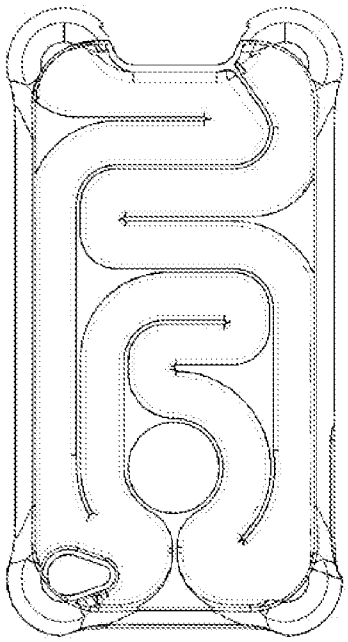


FIG. 11

FIG. 12



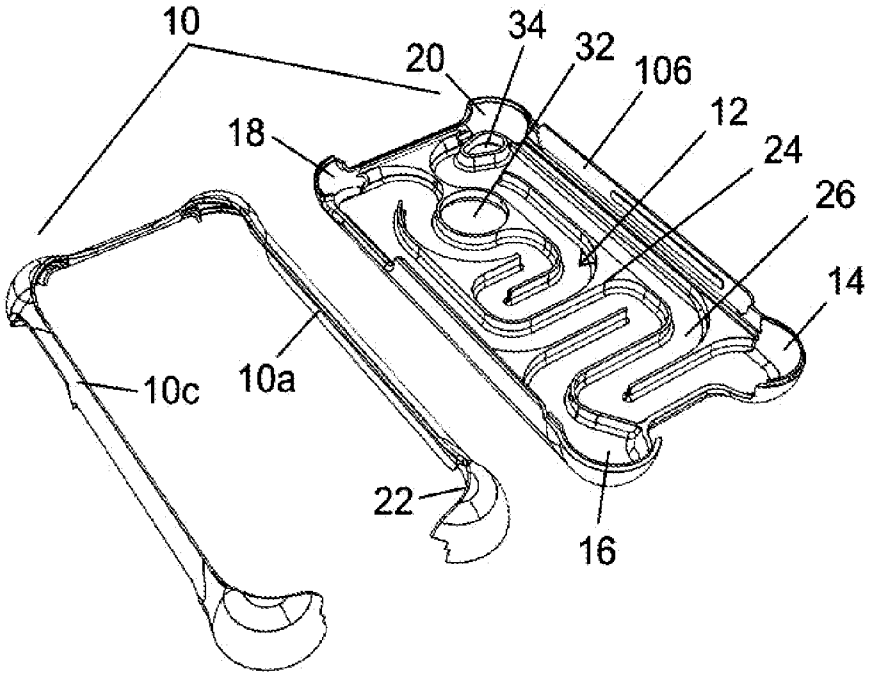


FIG. 13

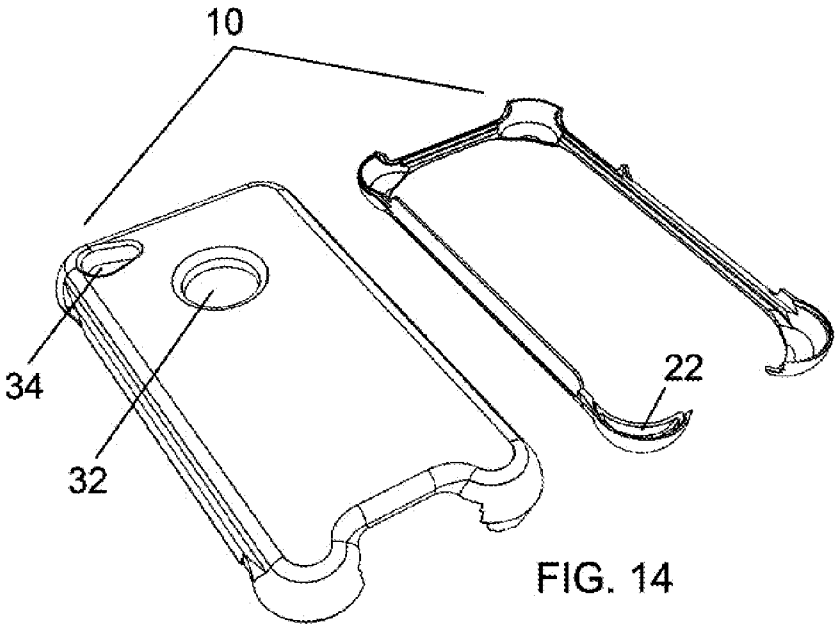


FIG. 14

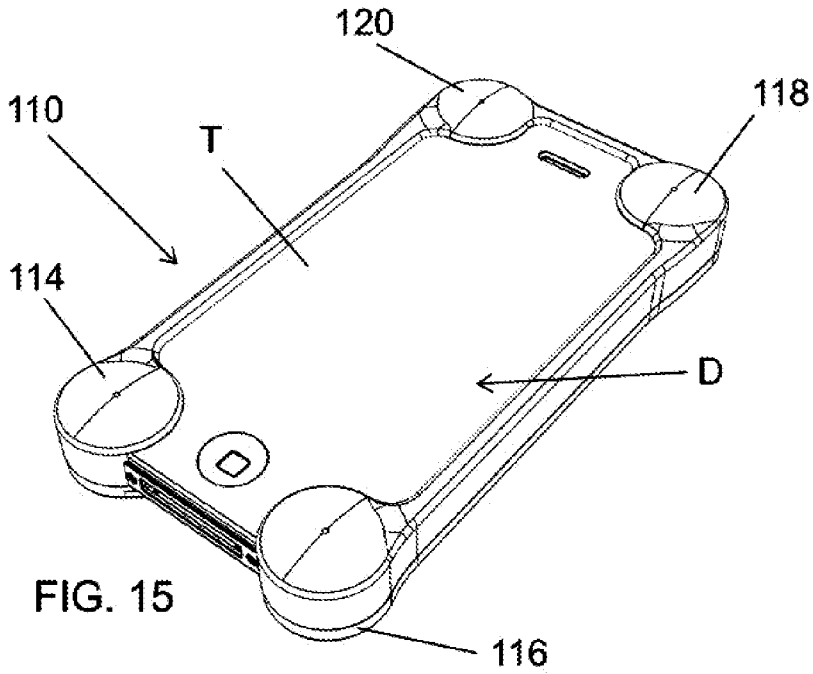


FIG. 15

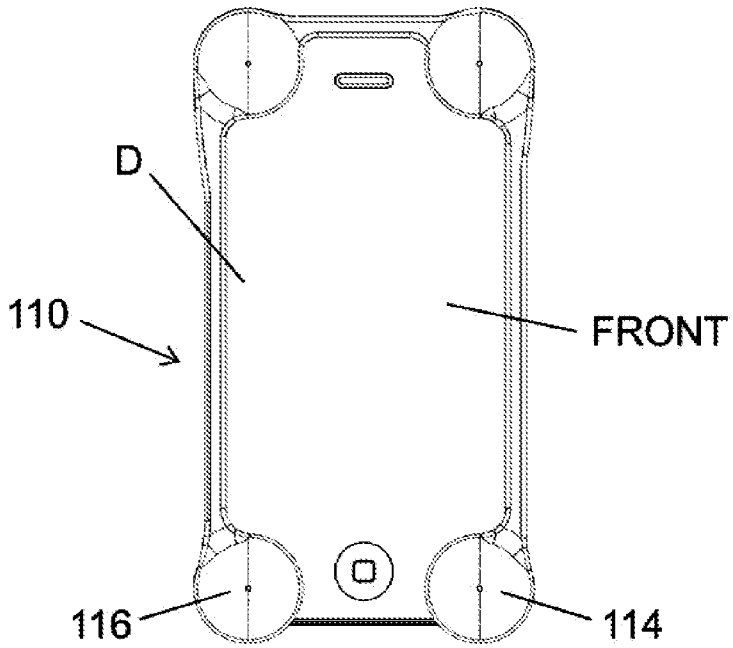


FIG. 16

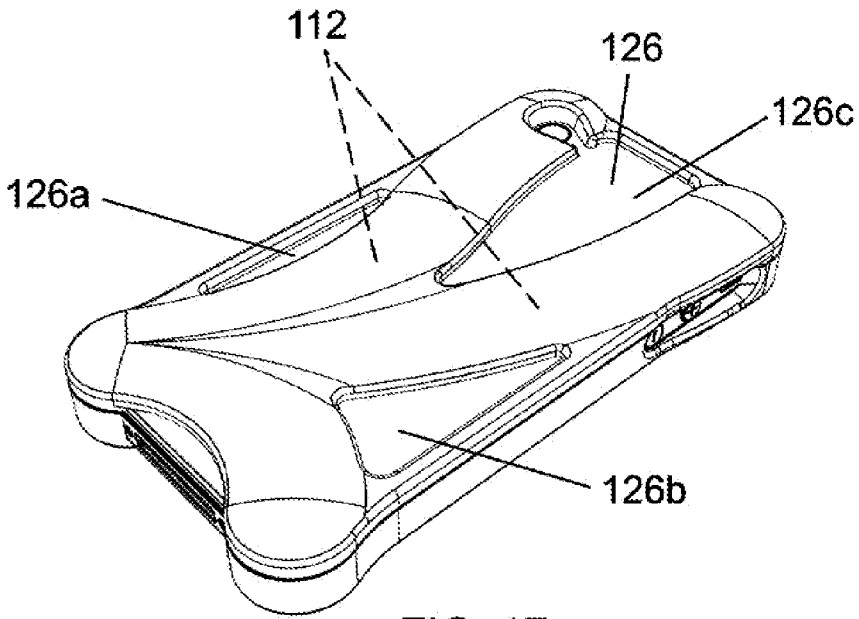


FIG. 17

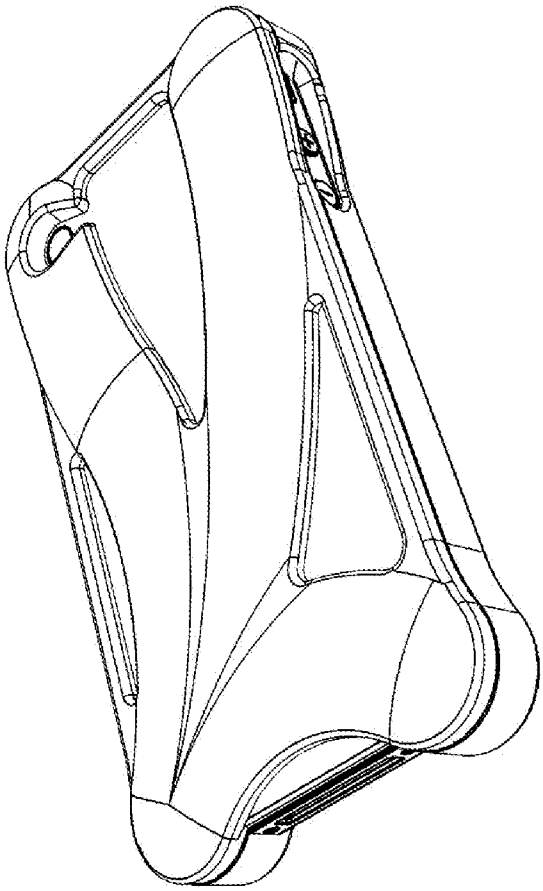


FIG. 17A

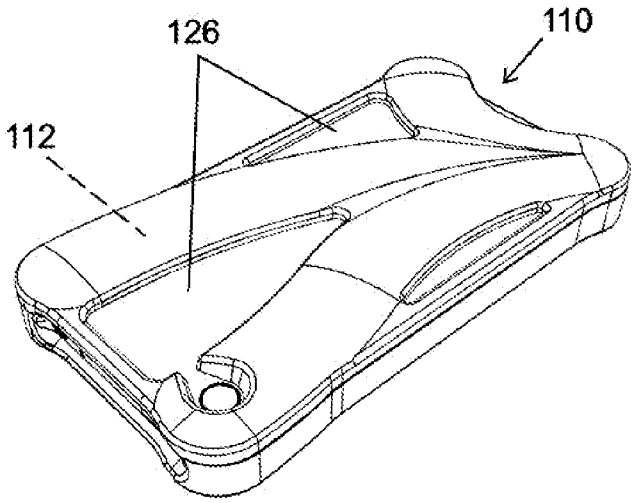


FIG. 18

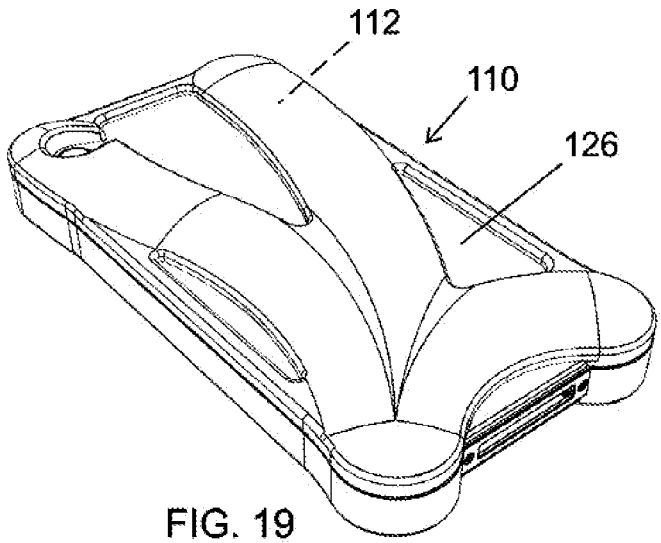


FIG. 19

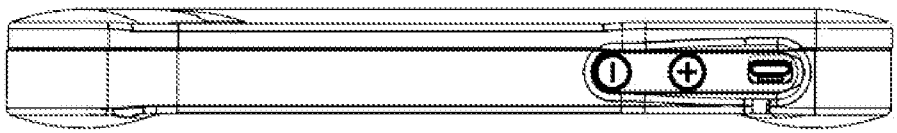


FIG. 20

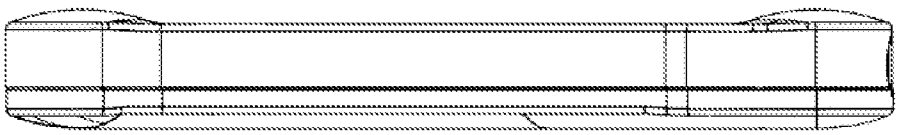


FIG. 21

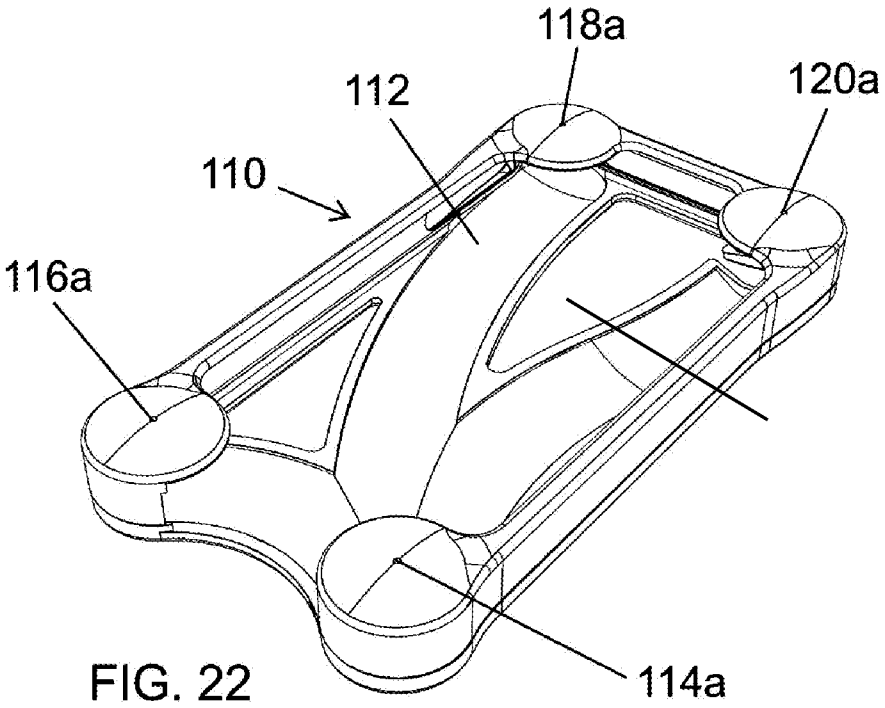


FIG. 22

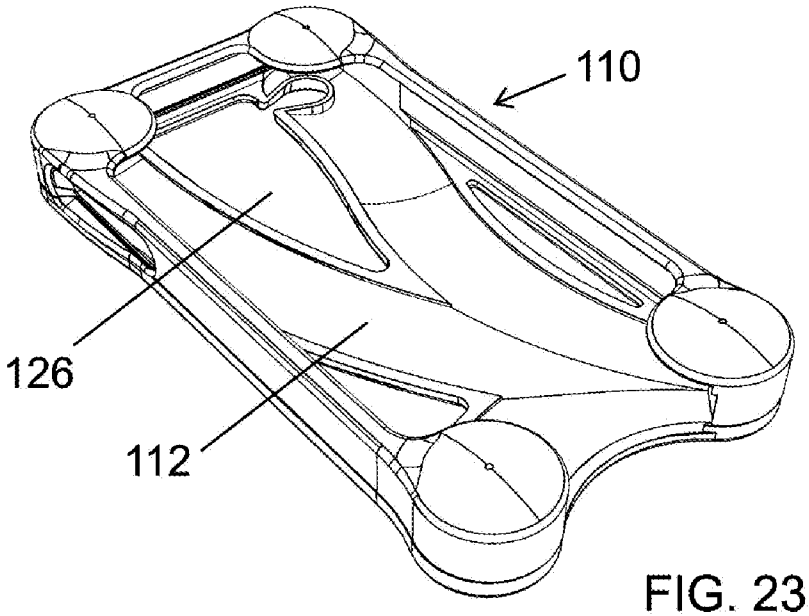


FIG. 23

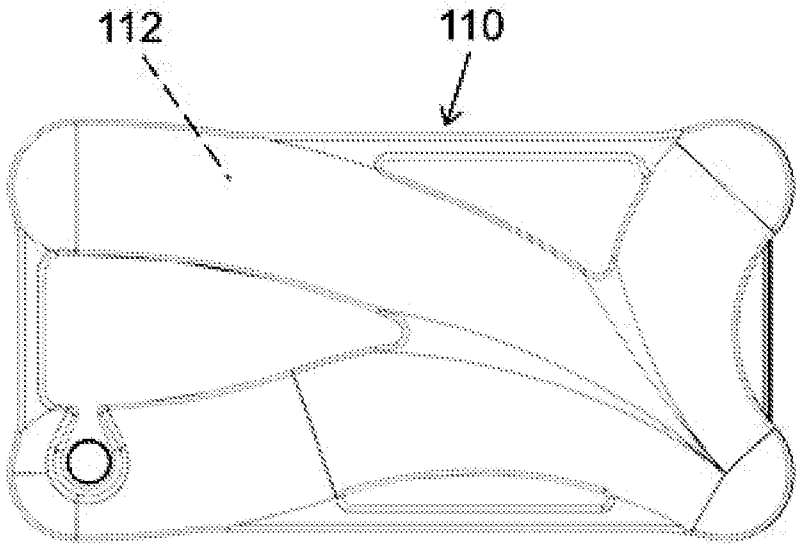


FIG. 24

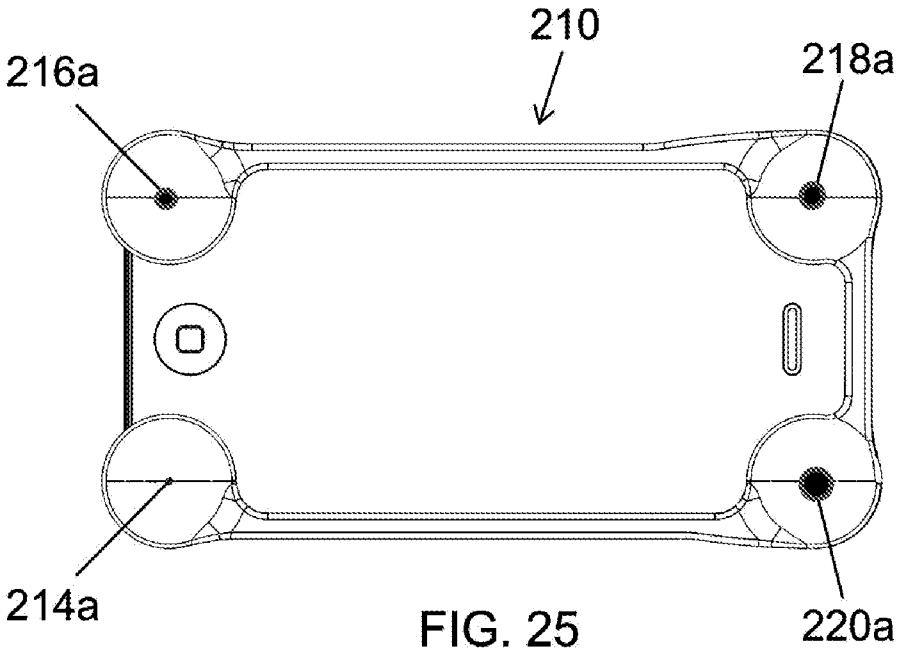


FIG. 25

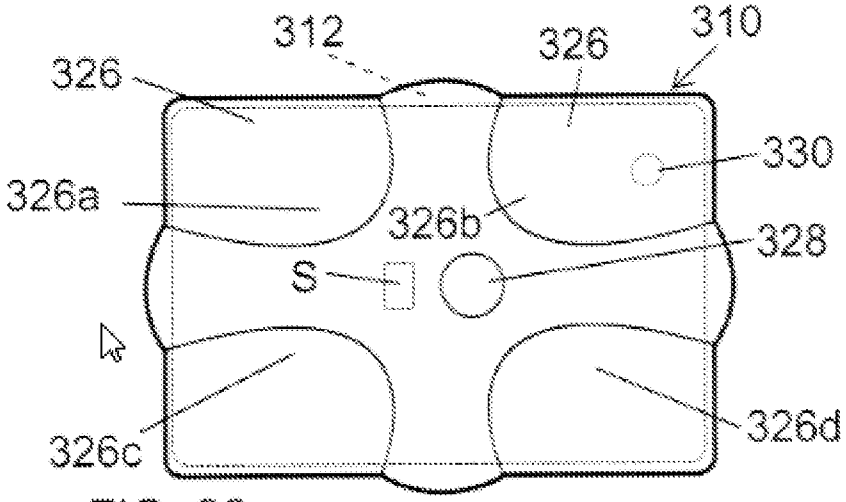


FIG. 26

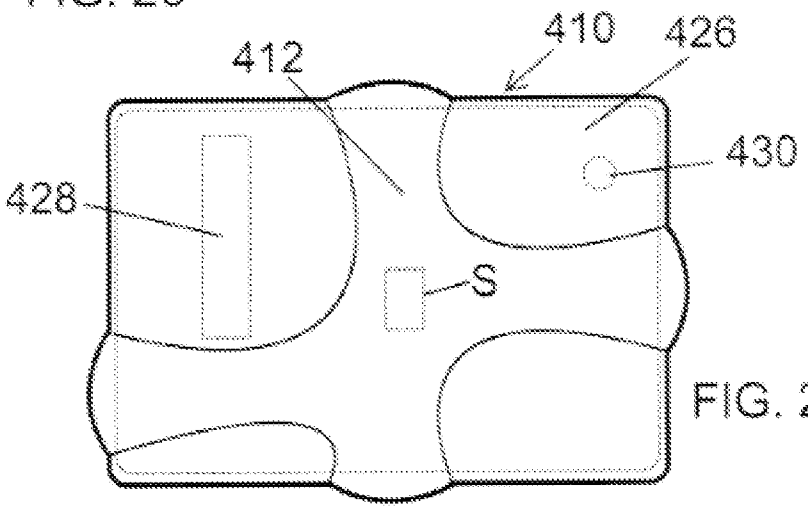


FIG. 27

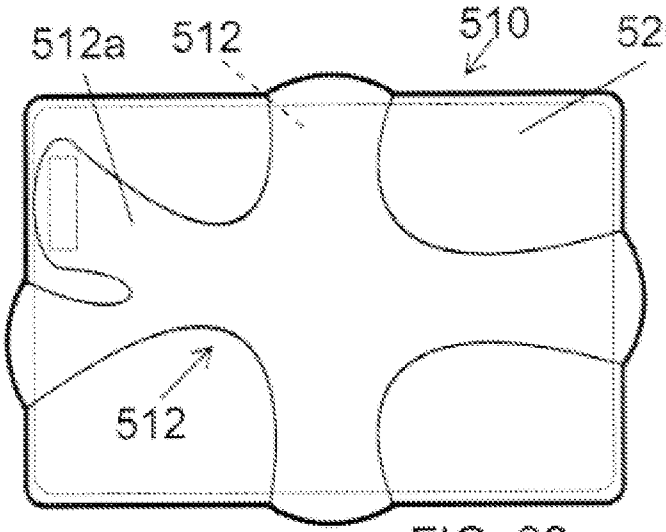


FIG. 28

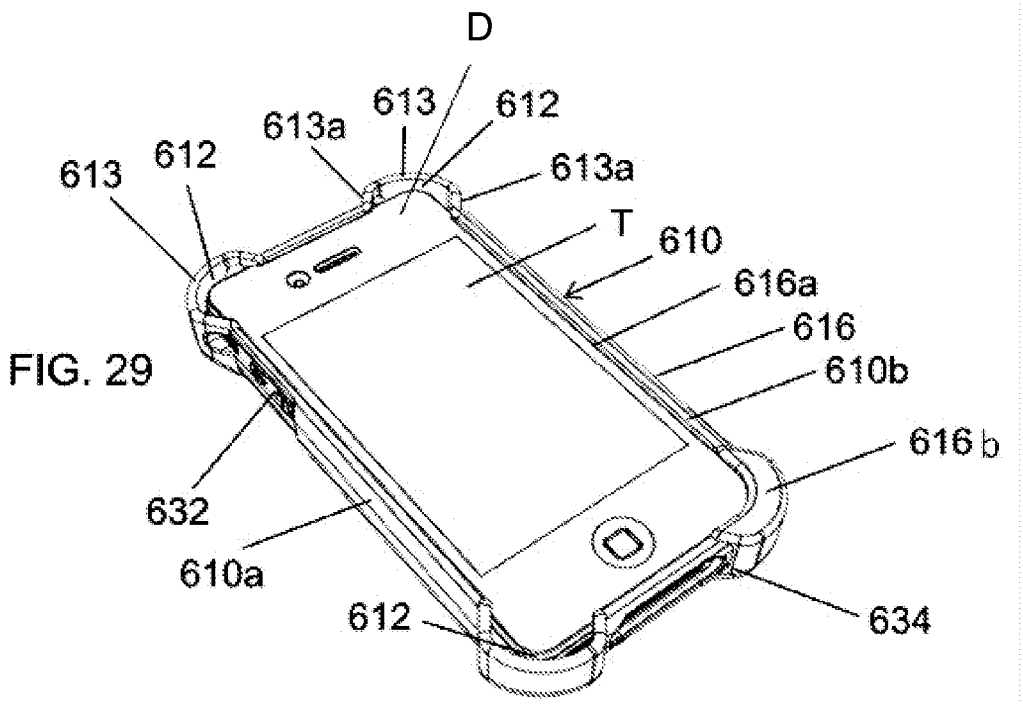
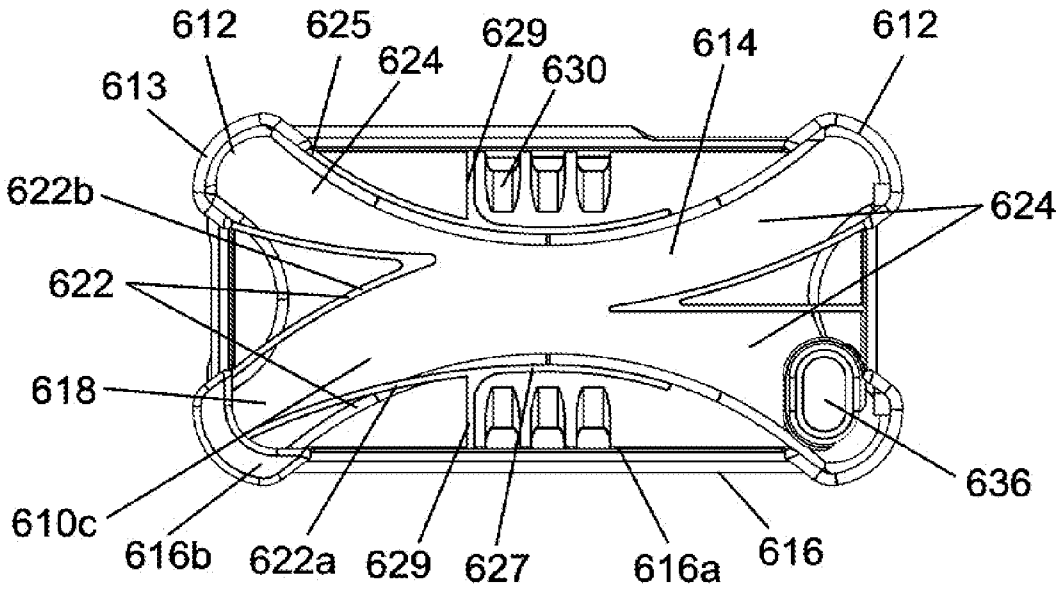

D
613
612
613a
613
612
613a
T
610
616a
616
610b
616b
632
610a
612
634

FIG. 29


612
625
624
629
630
614
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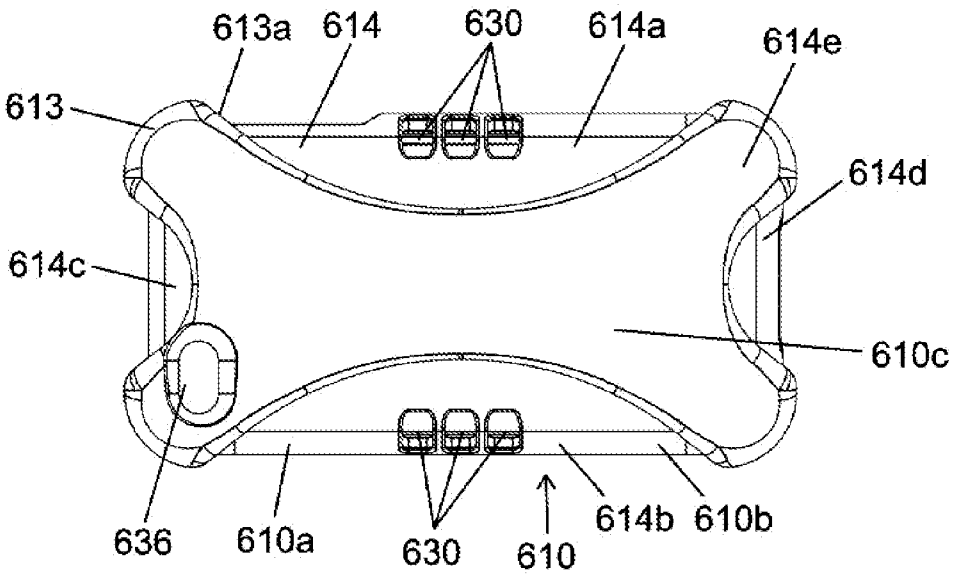
613
622b
624
622
618
636
610c
616b
622a
629
627
616a
616

FIG. 30


613a
614
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614a
614e
613
614d
614c
610c
636
610a
630
610
614b
610b

FIG. 31

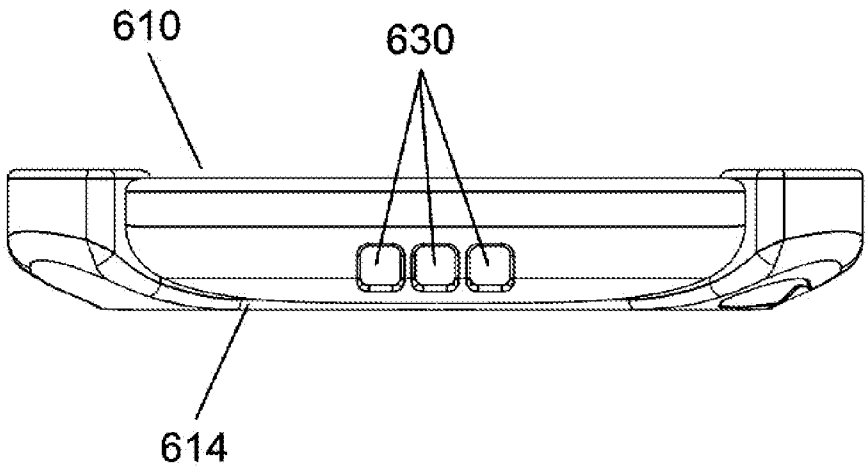

610
630
614

FIG. 32

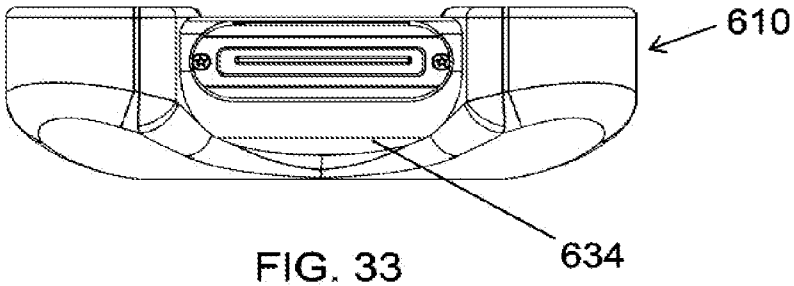


FIG. 33

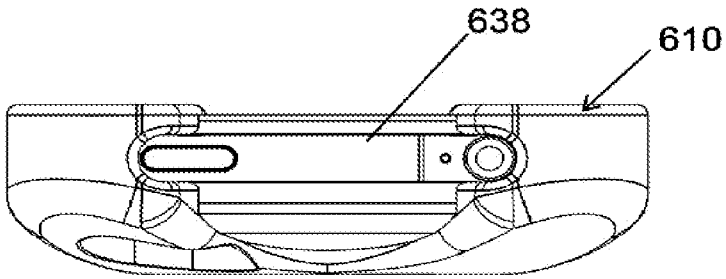


FIG. 34

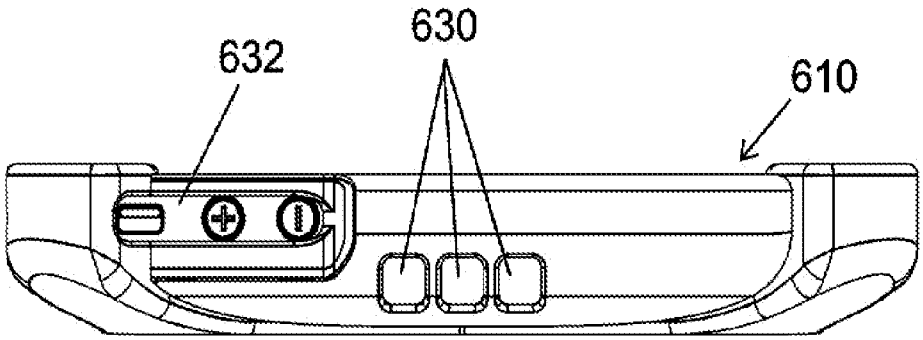
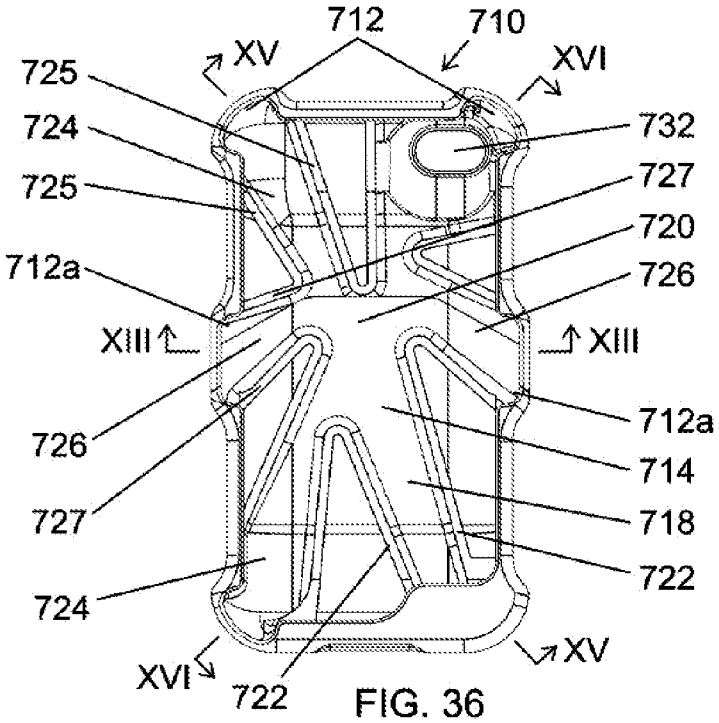


FIG. 35


712
710
XV
XVI
725
724
725
712a
XIII
XIII
726
727
724
XVI
722
XV
732
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720
726
712a
714
718
722

FIG. 36

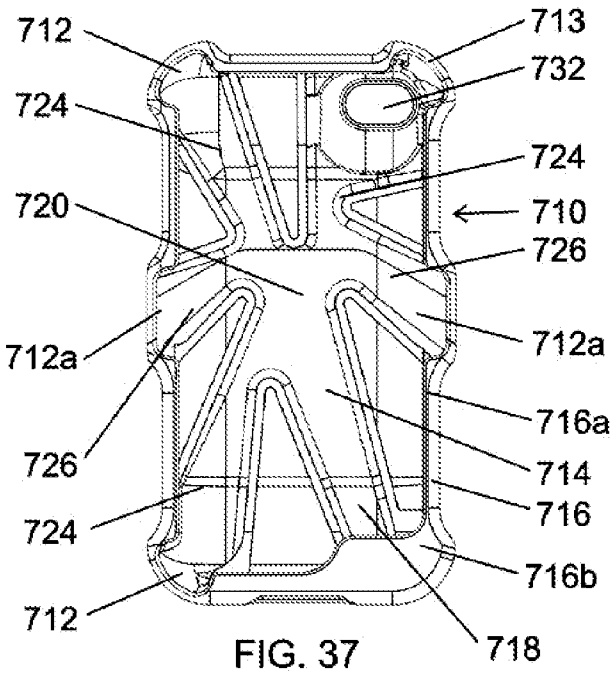

712
724
720
712a
726
724
712
713
732
724
710
726
712a
716a
714
716
716b
718

FIG. 37

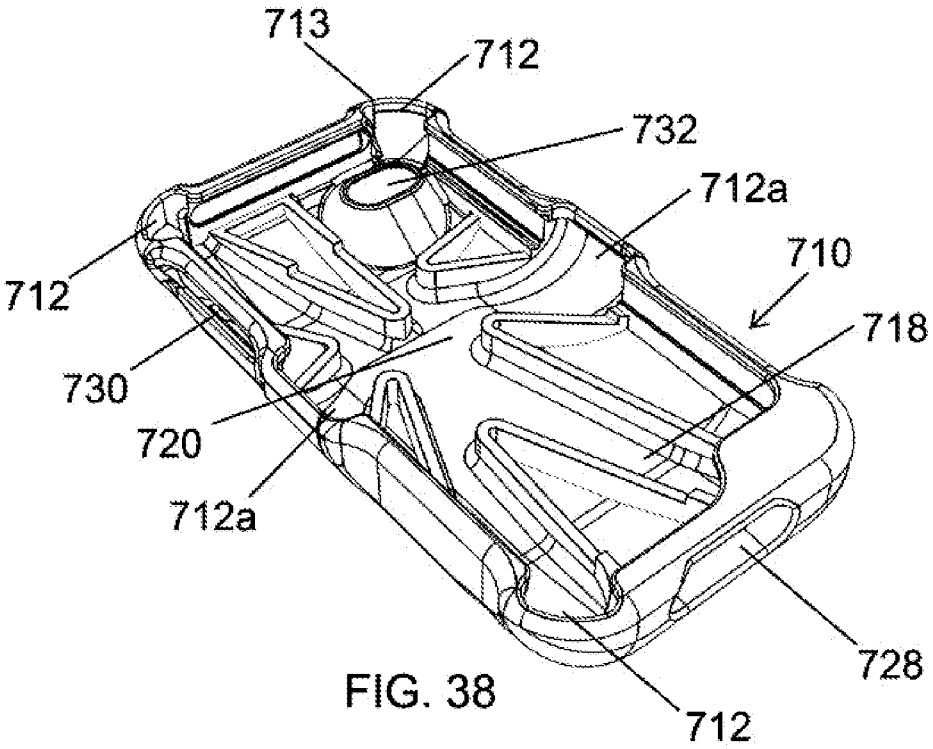

713
712
732
712a
710
712
718
730
720
712a
728
712

FIG. 38

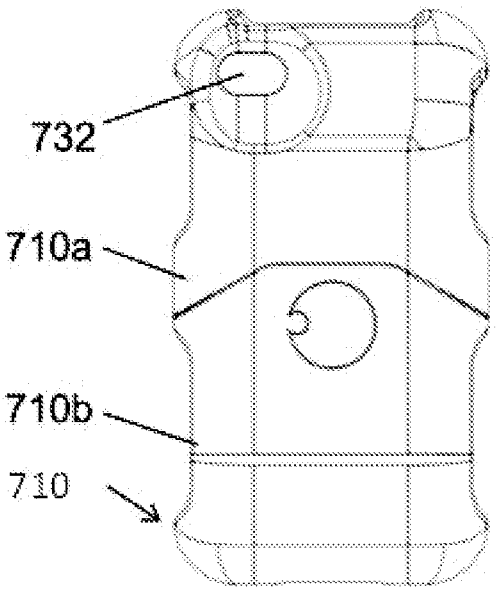

732
710a
710b
710

FIG. 39

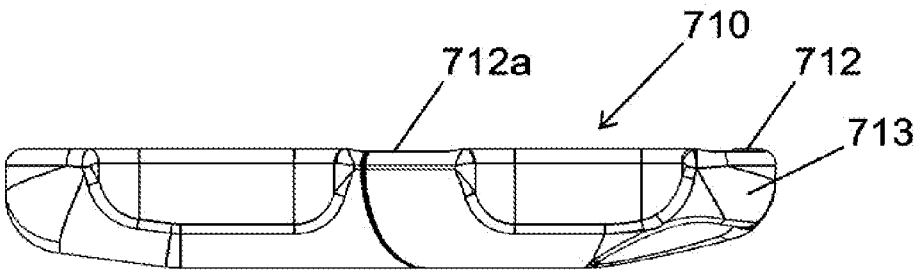


FIG. 40

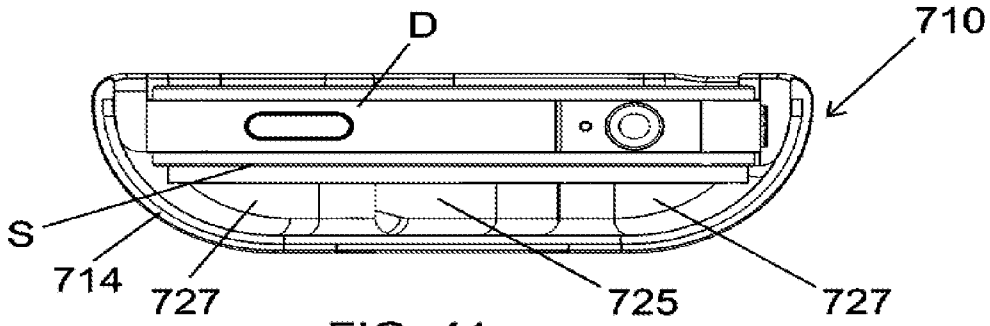


FIG. 41

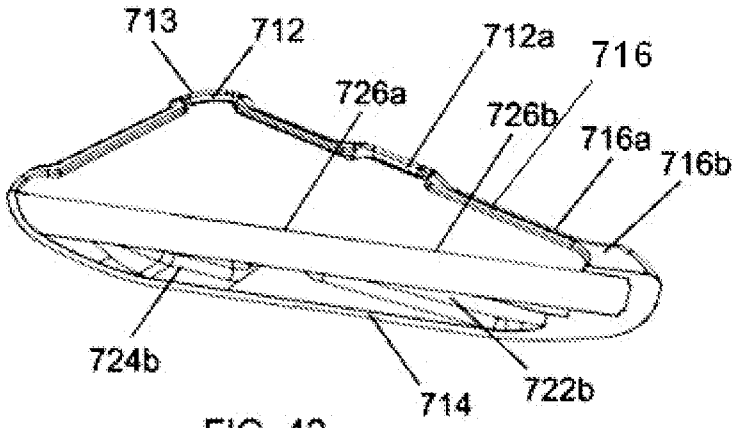

713
712
712a
716
726a
726b
716a
716b
724b
714
722b

FIG. 42

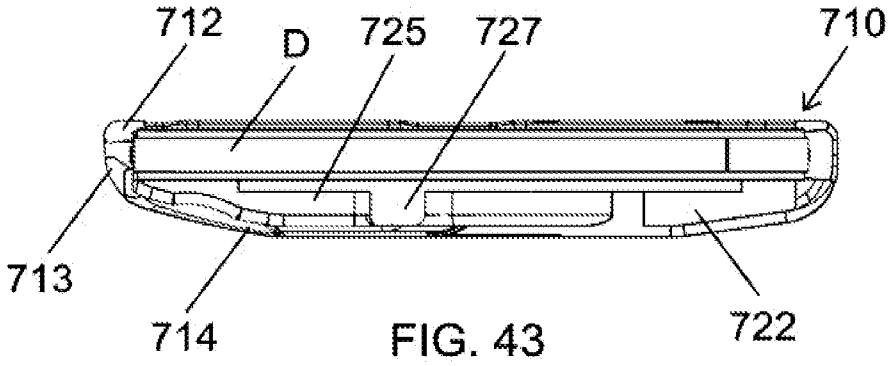

712
D
725
727
710
713
714
722

FIG. 43

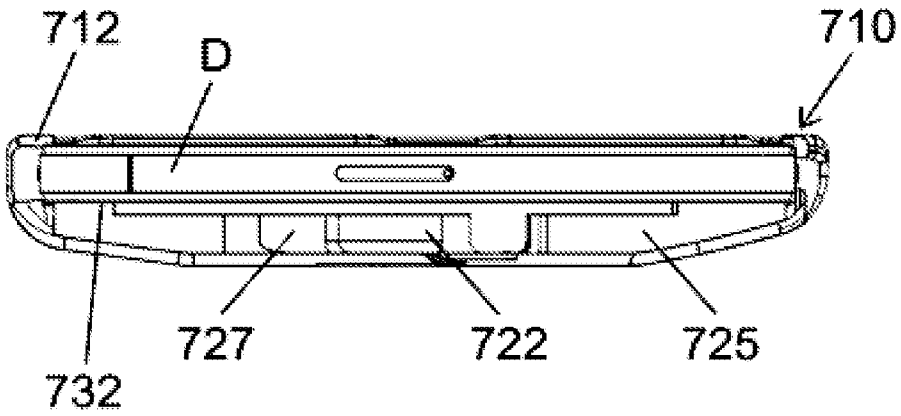


FIG. 44

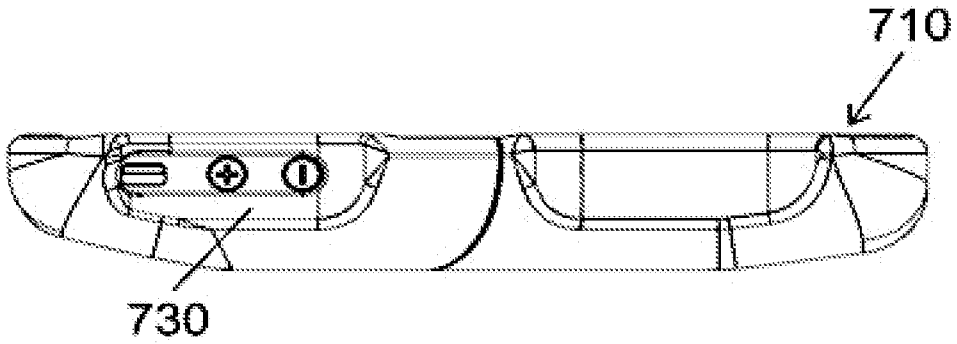


FIG. 45

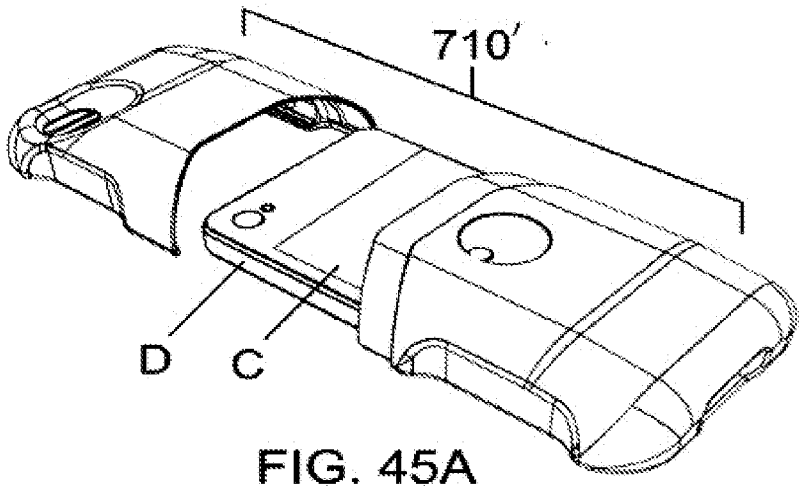


FIG. 45A

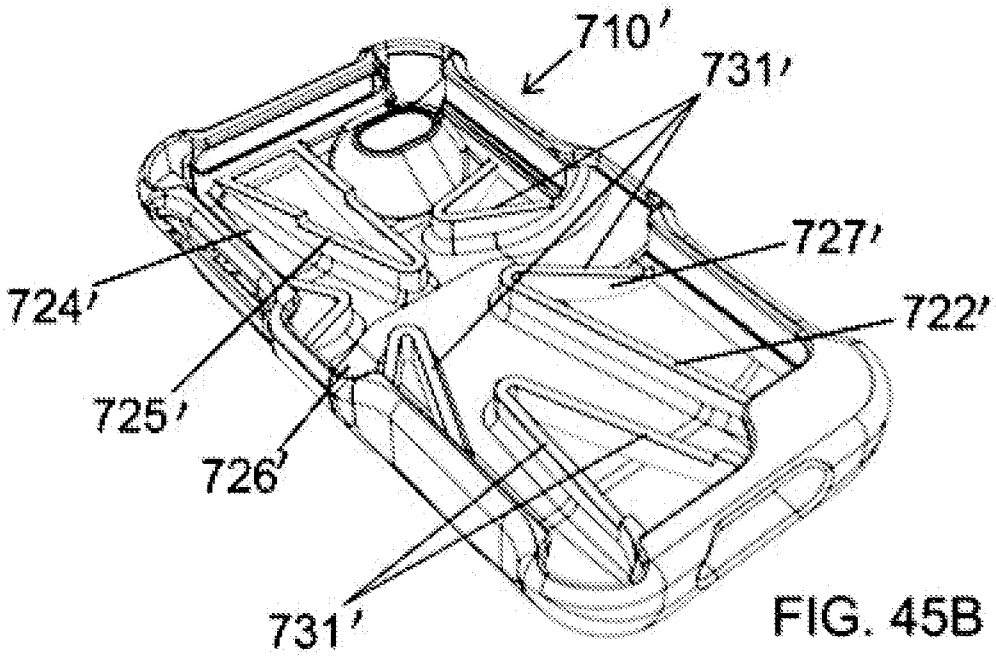


FIG. 45B

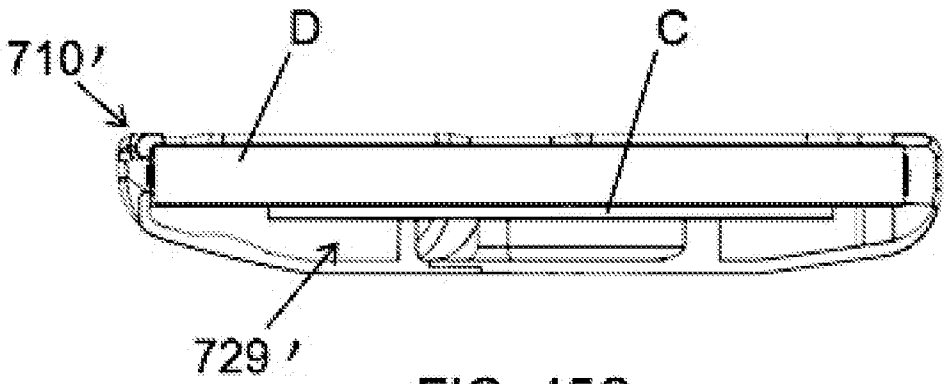


FIG. 45C

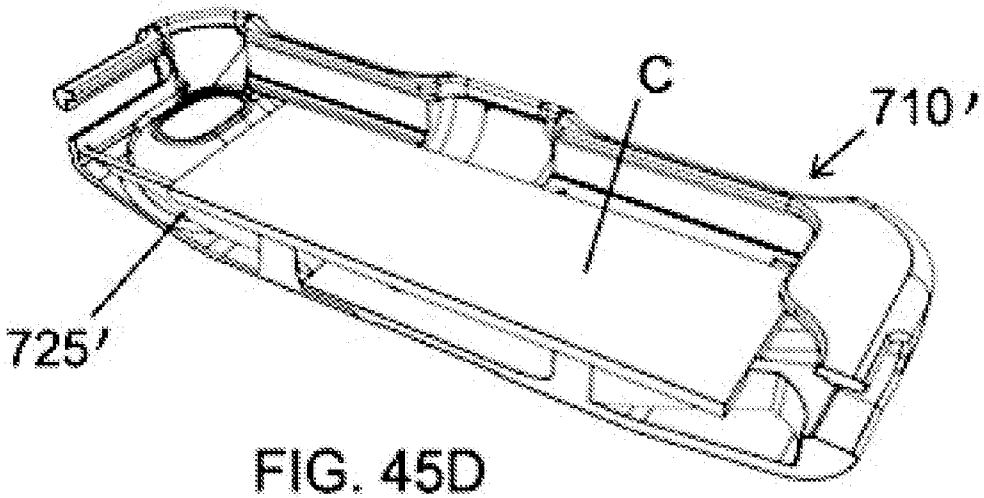


FIG. 45D

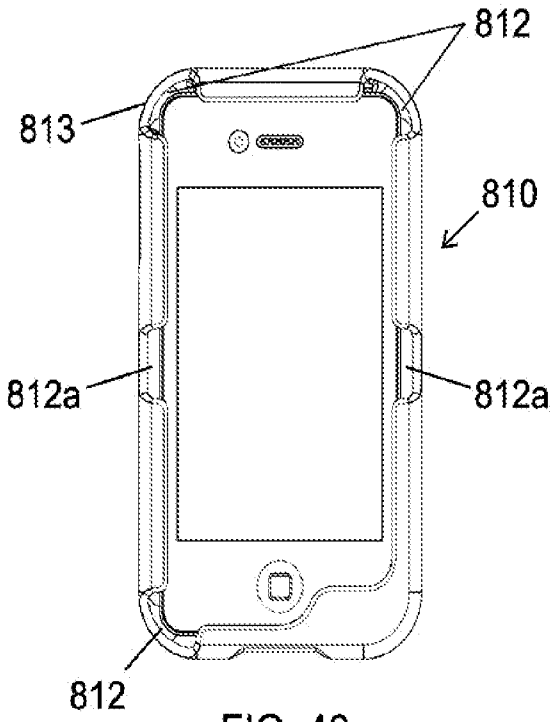

812
813
810
812a
812a
812

FIG. 46

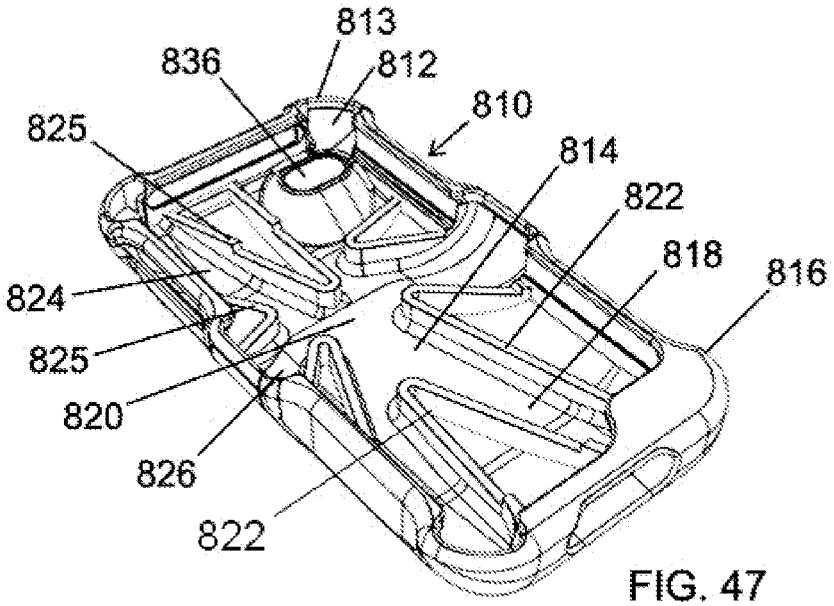

813
836
812
810
825
814
822
818
816
824
825
820
826
822

FIG. 47

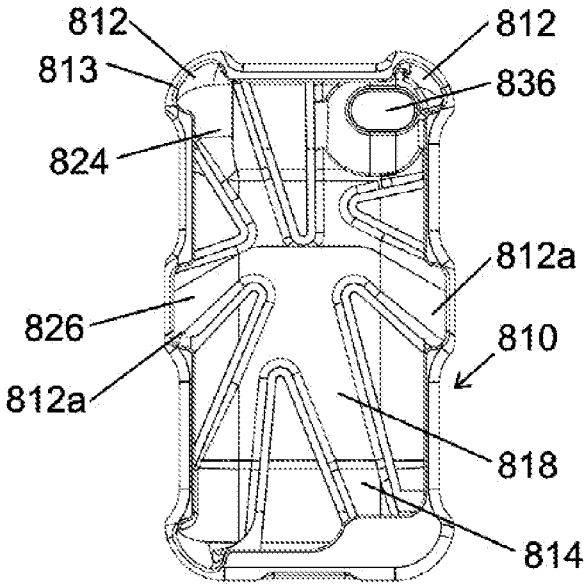


FIG. 48

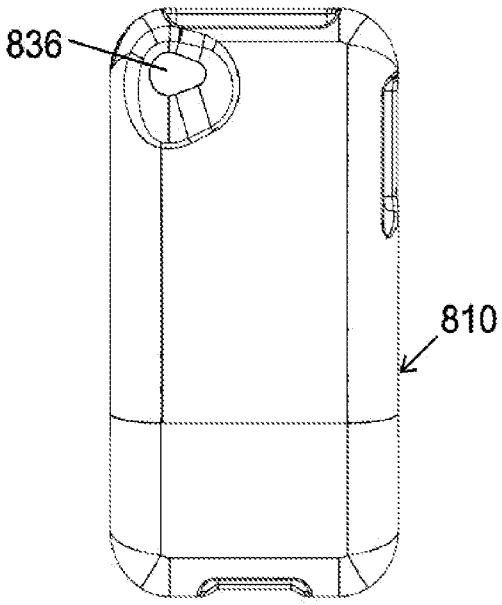


FIG. 49

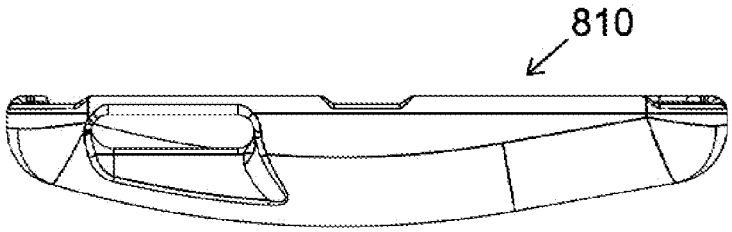


FIG. 50A

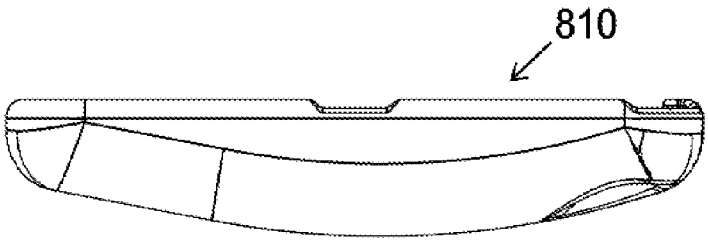


FIG. 50B

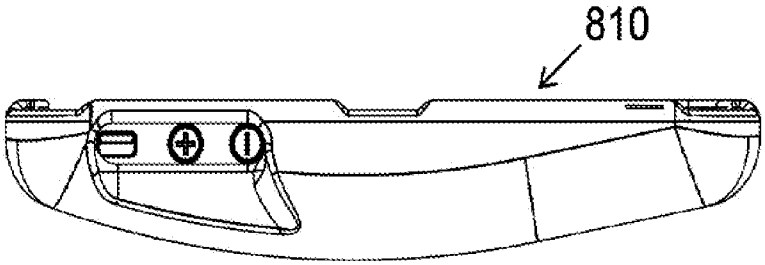


FIG. 51

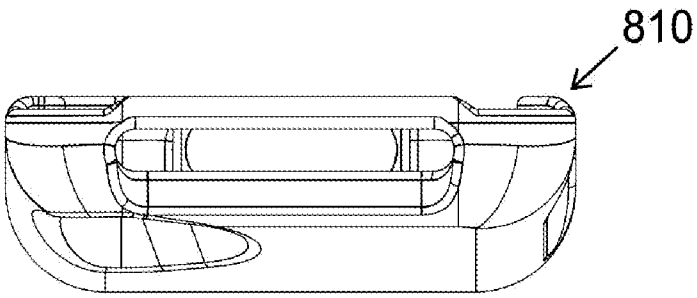


FIG. 52

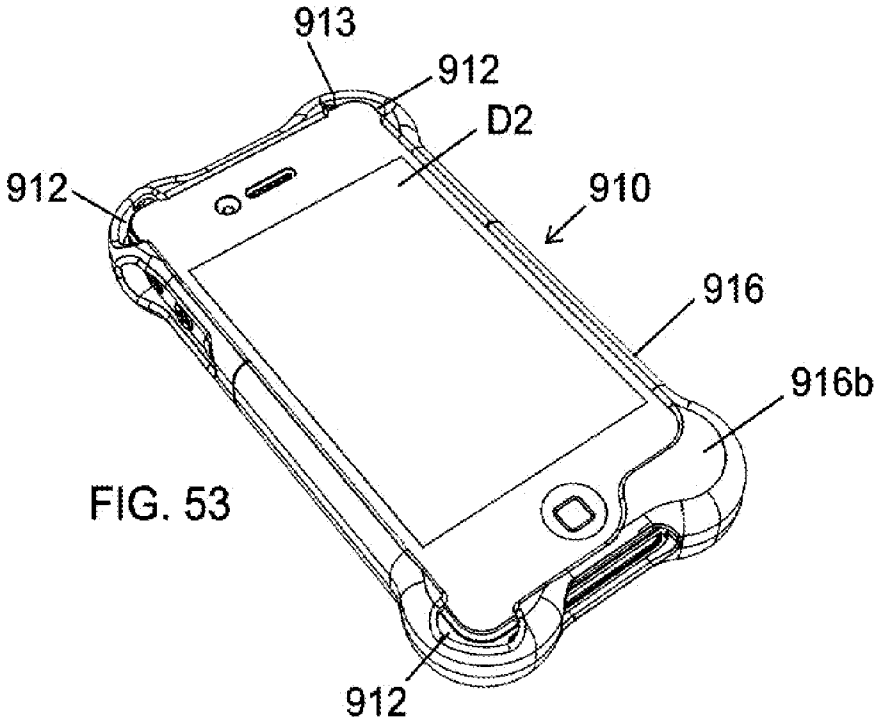

913
912
D2
912
910
916
916b
912

FIG. 53

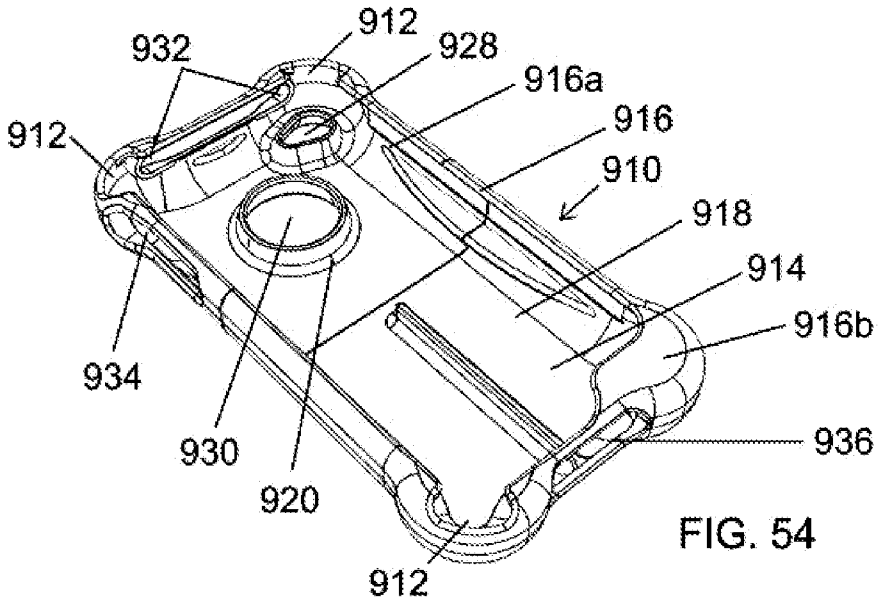

912
932
928
916a
912
916
910
918
914
916b
934
930
920
936
912

FIG. 54

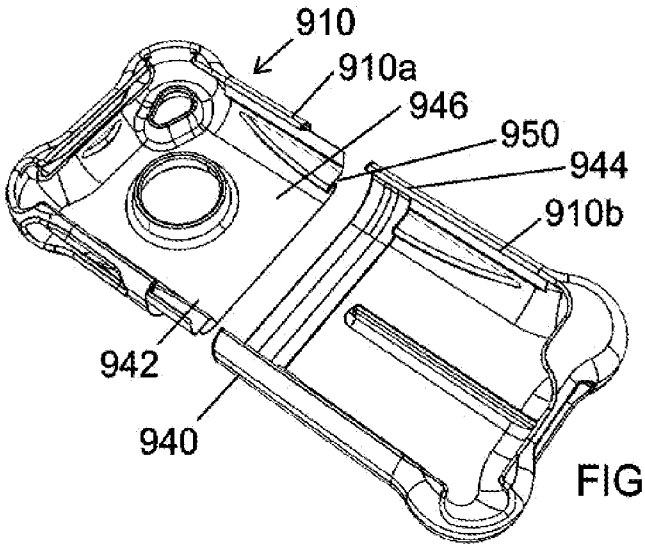


FIG. 55

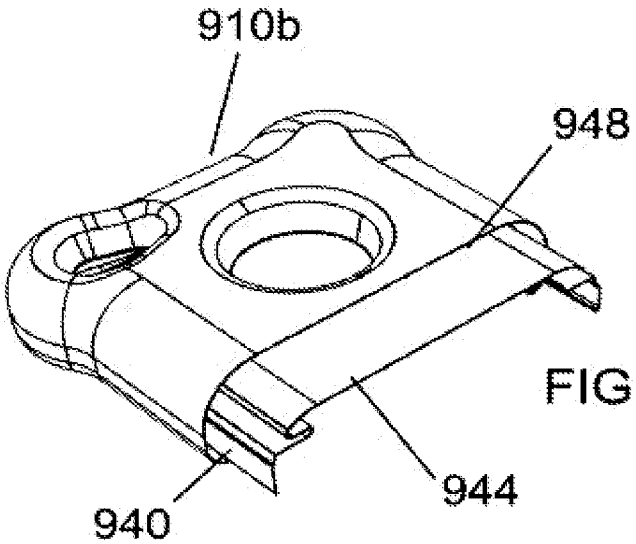


FIG. 56

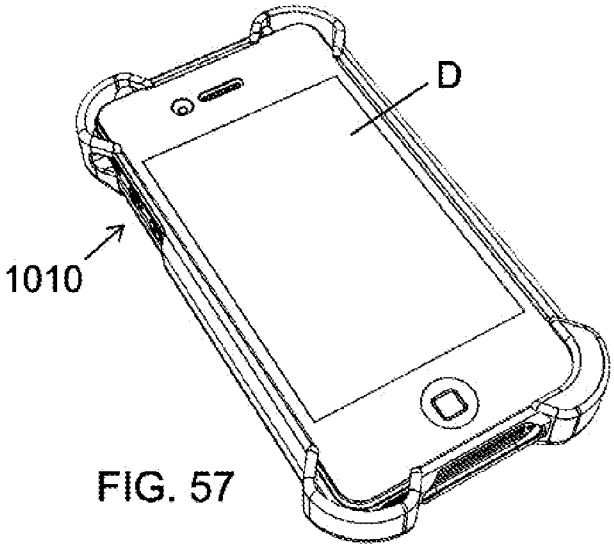


FIG. 57

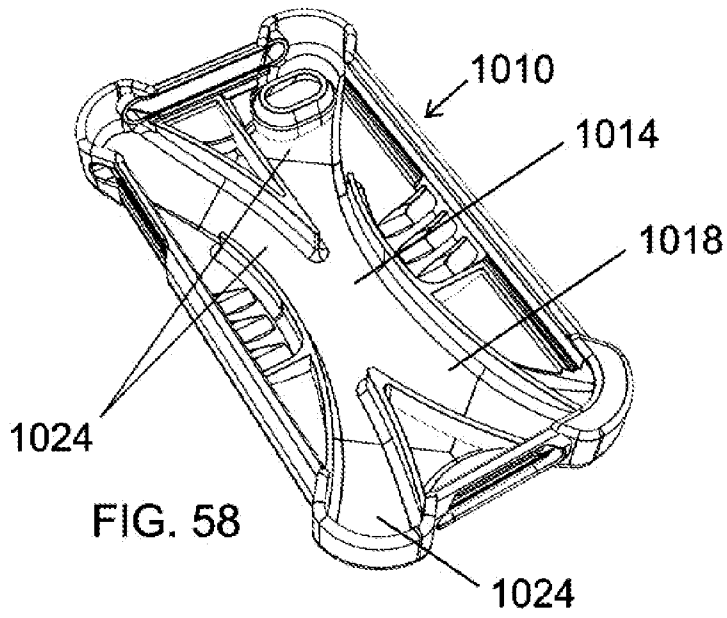


FIG. 58

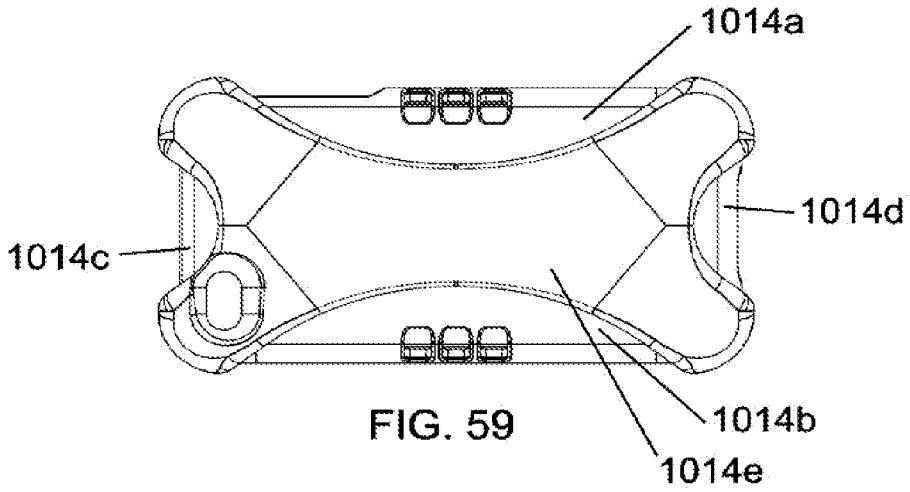


FIG. 59

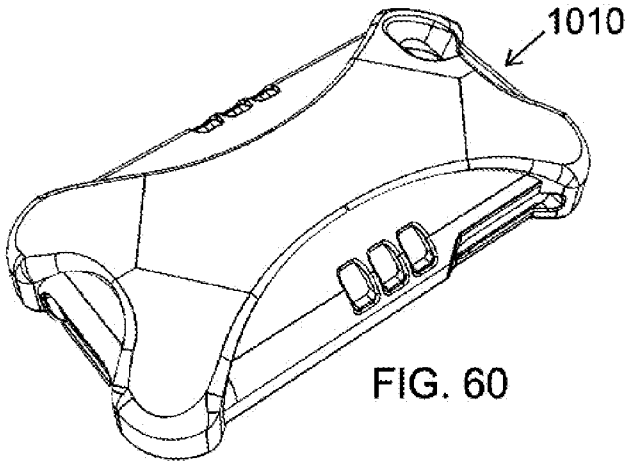


FIG. 60

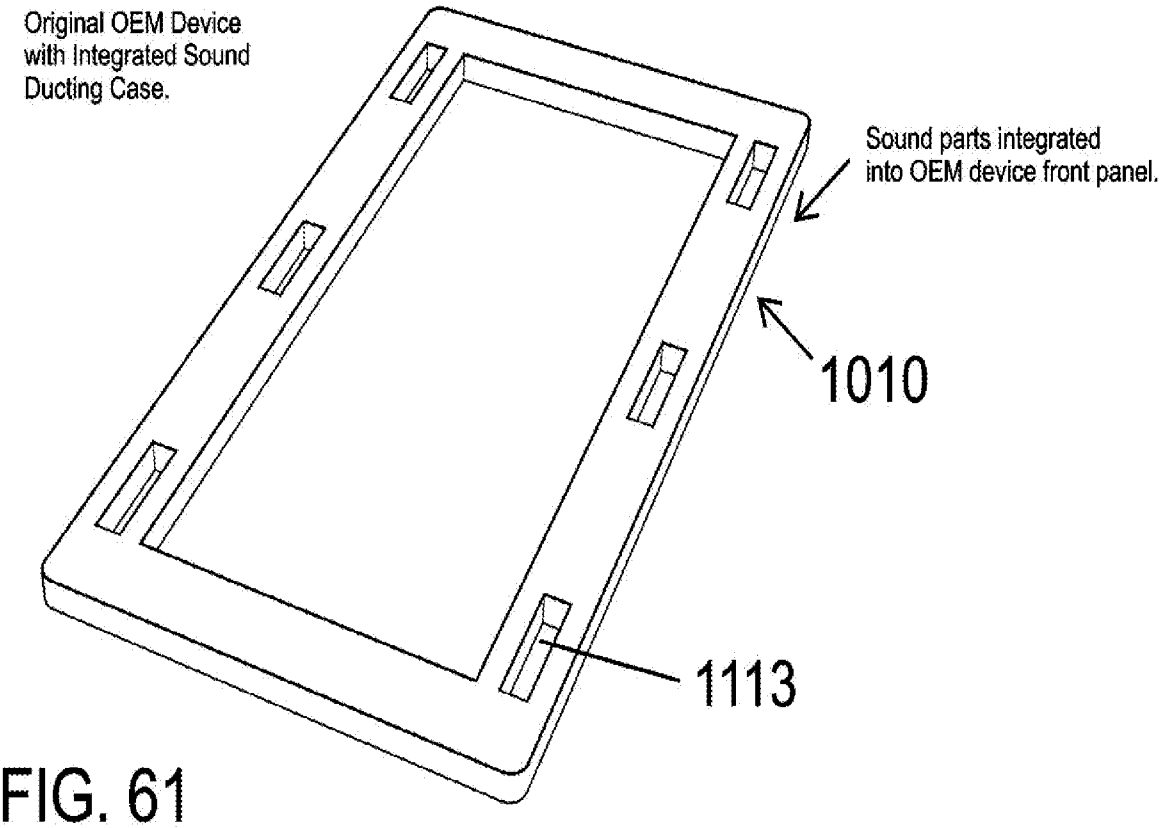

Original OEM Device with Integrated Sound Ducting Case.
Sound parts integrated into OEM device front panel.
1010
1113

FIG. 61

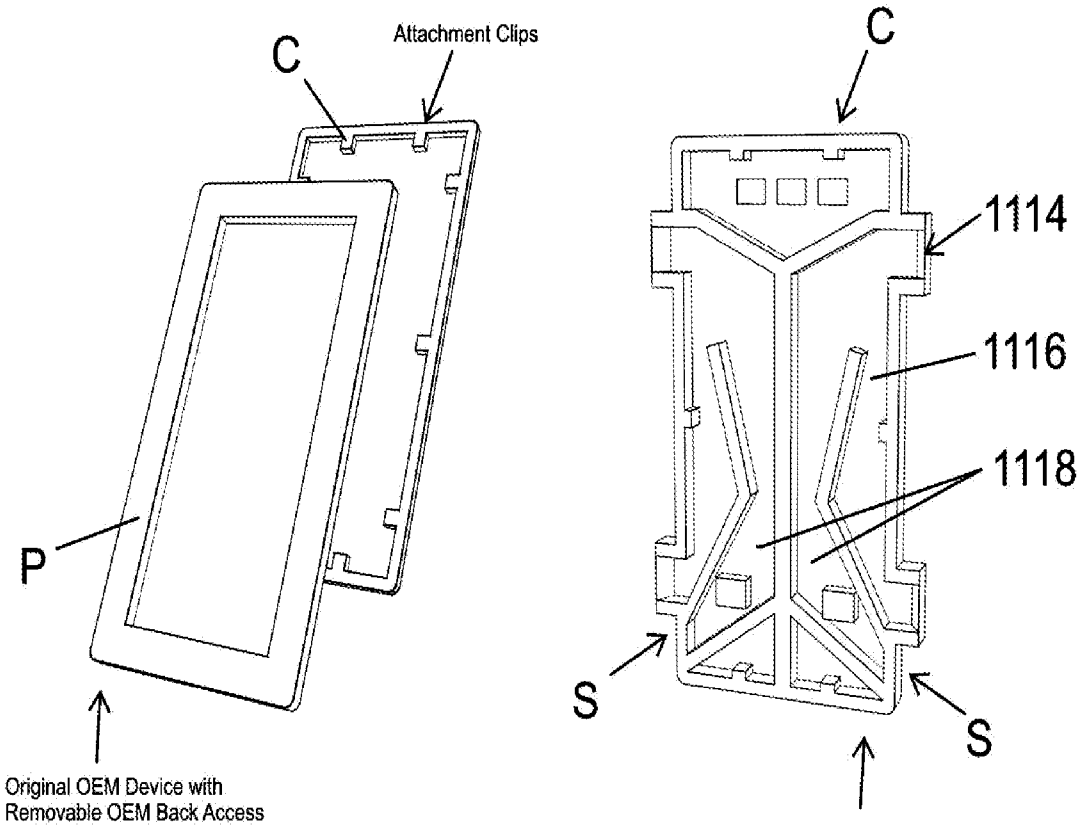

C
Attachment Clips
P
Original OEM Device with Removable OEM Back Access Panel
C
1114
1116
1118
S
S
Replacement Sound Ducting Access Panel With Sound Ports at Perimeter Sides

FIG. 62

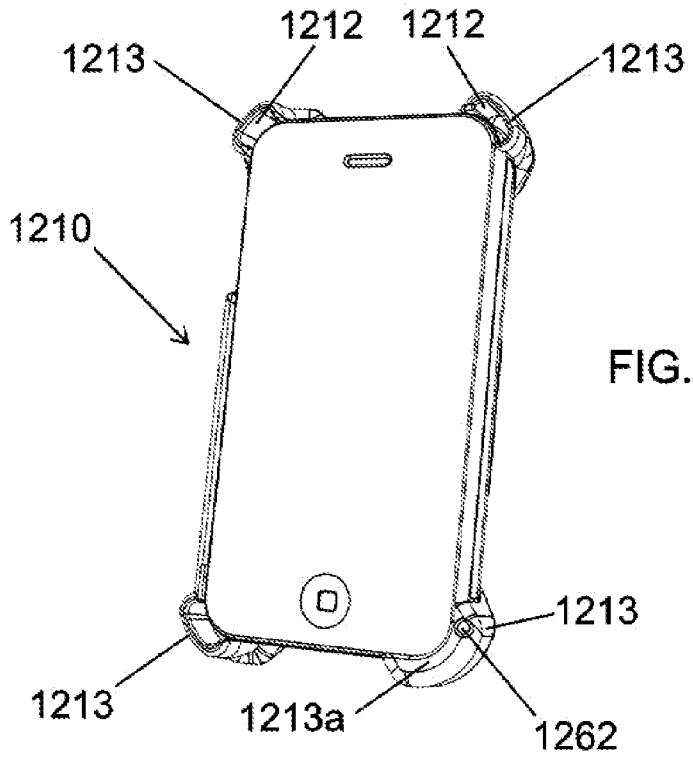


FIG. 63

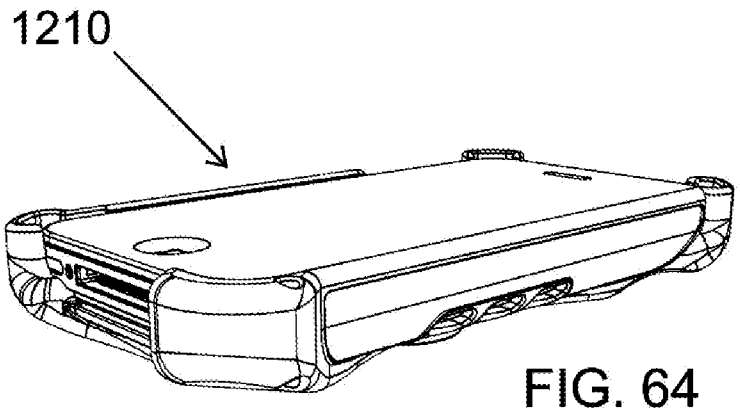


FIG. 64

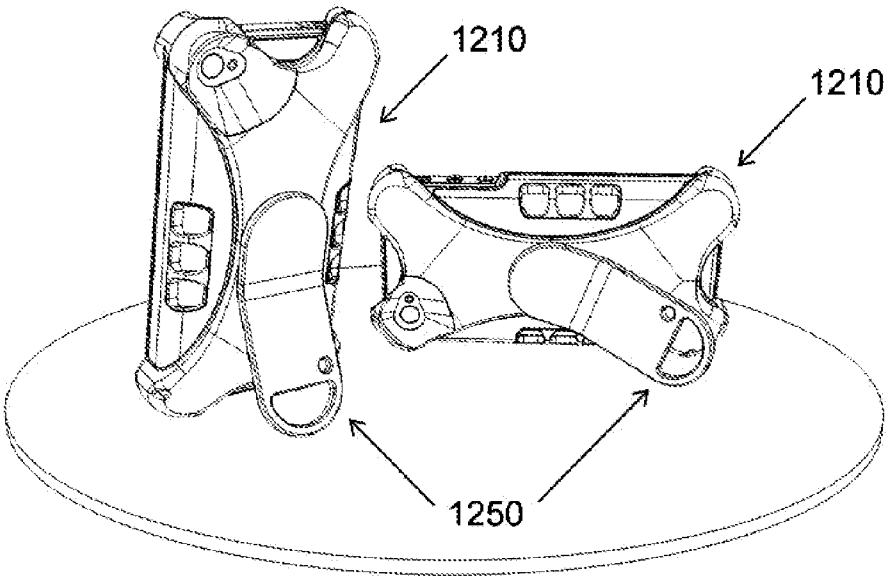


FIG. 65

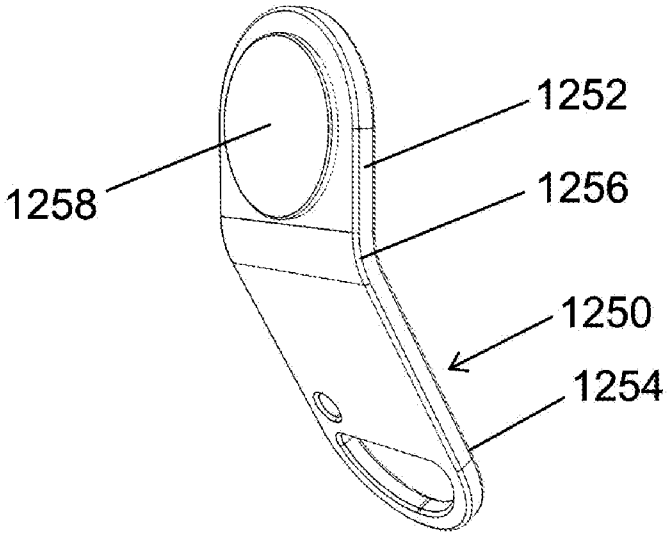


FIG. 66

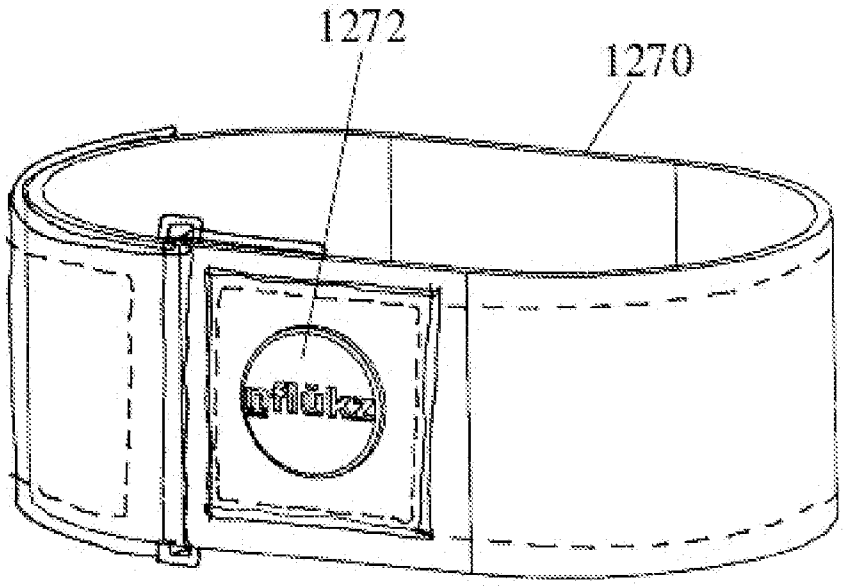


FIG. 67

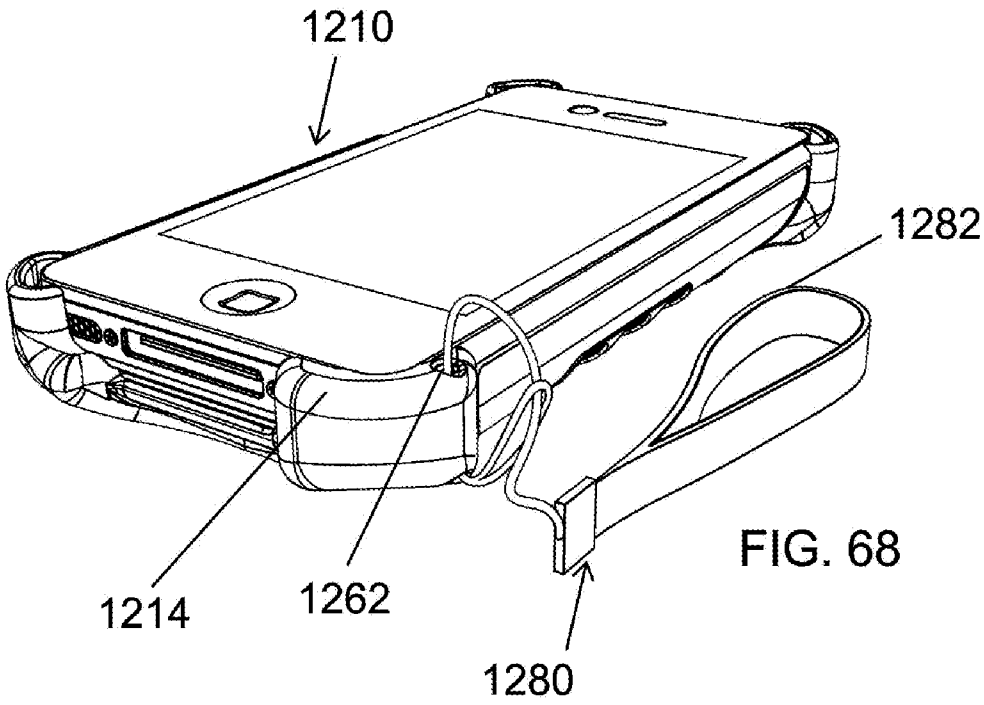


FIG. 68

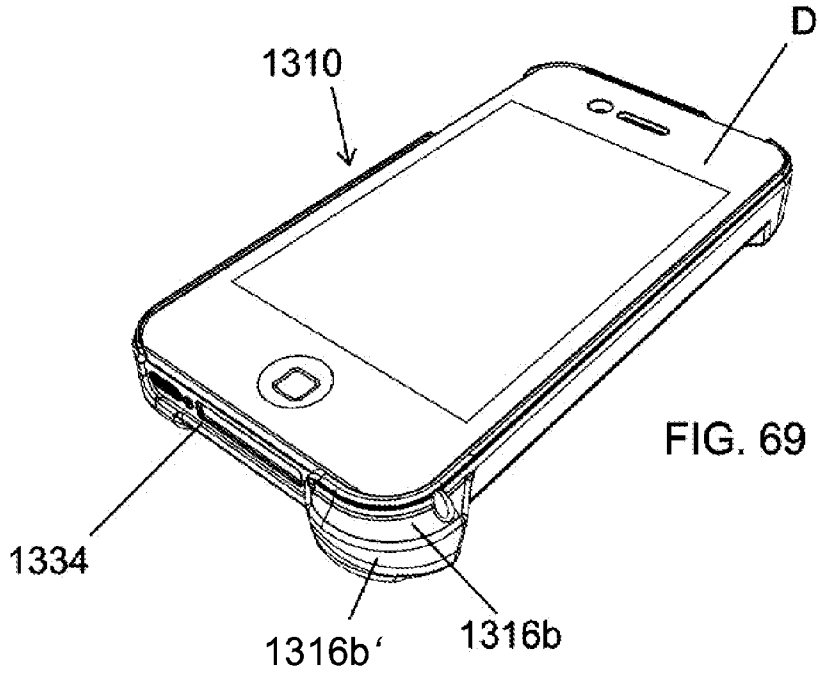


FIG. 69

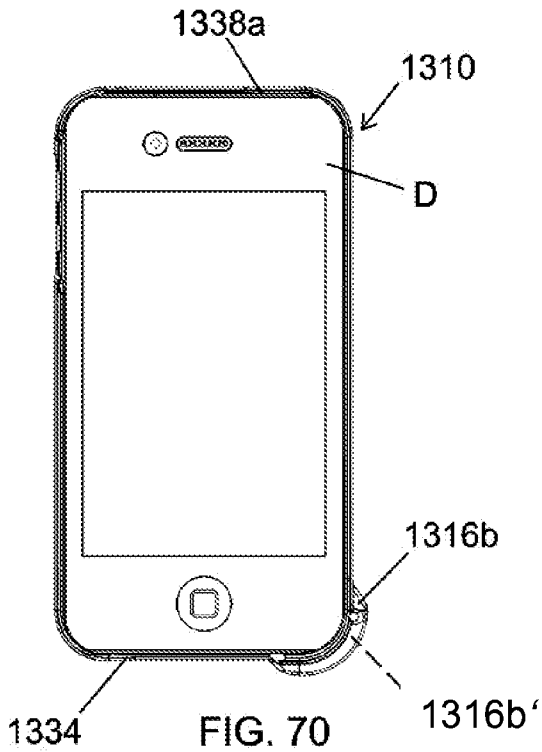


FIG. 70

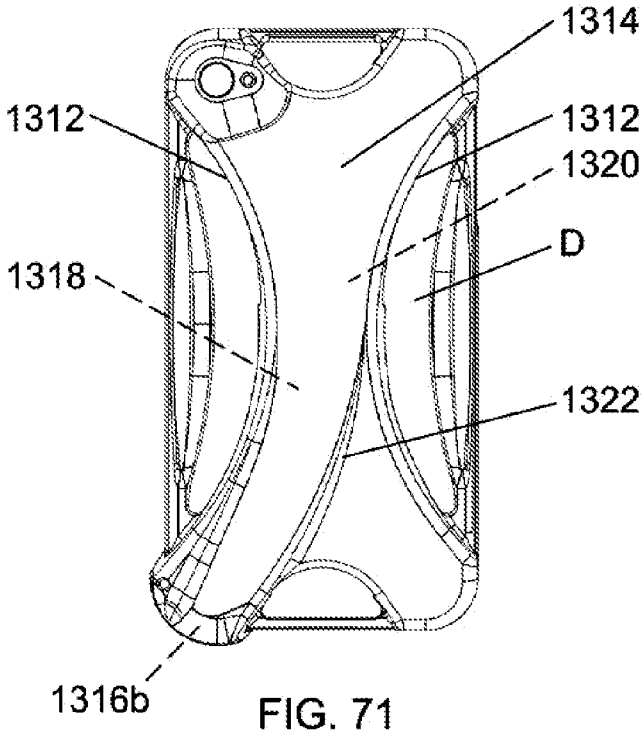

1314
1312
1312
1320
D
1318
1322
1316b

FIG. 71

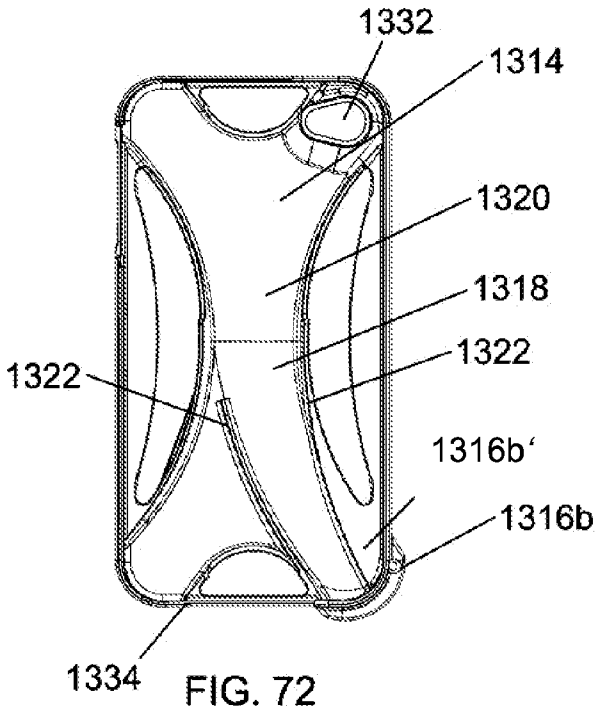

1332
1314
1320
1318
1322
1322
1316b'
1316b
1334

FIG. 72

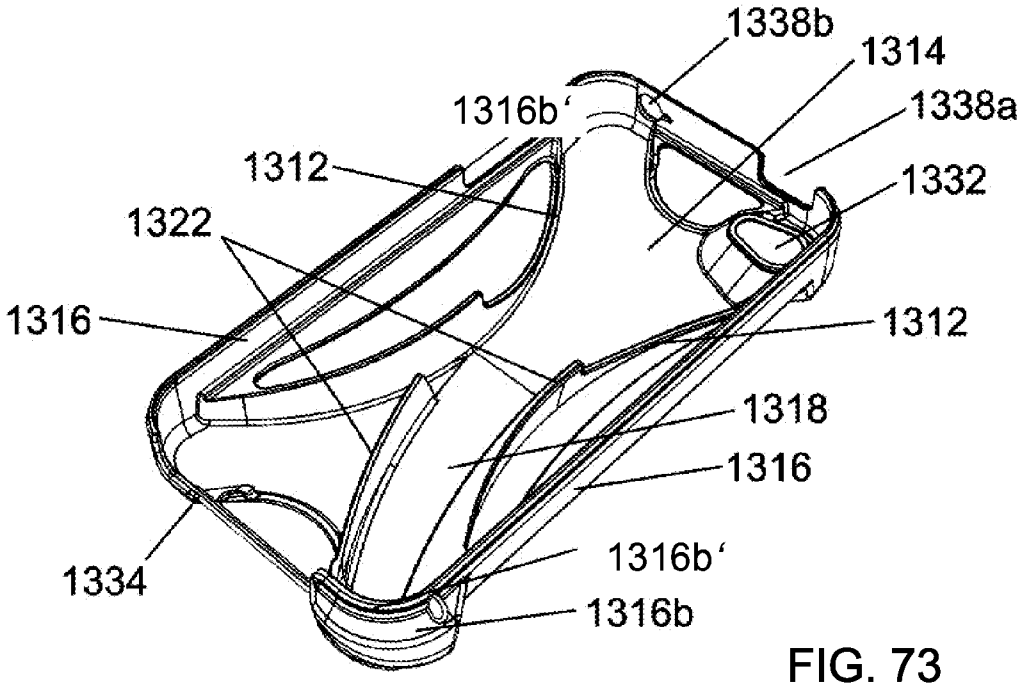
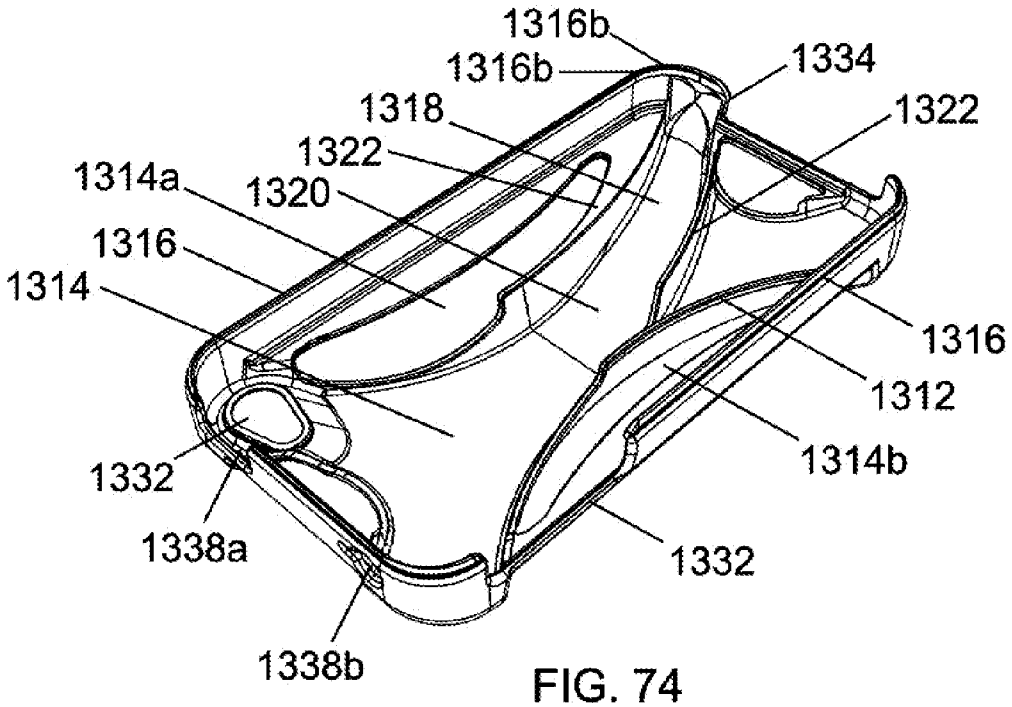

1338b
1314
1316b'
1338a
1312
1332
1322
1316
1312
1318
1316
1316b'
1334
1316b

FIG. 73


1316b
1316b
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1312
1314b
1332
1338a
1332
1338b

FIG. 74

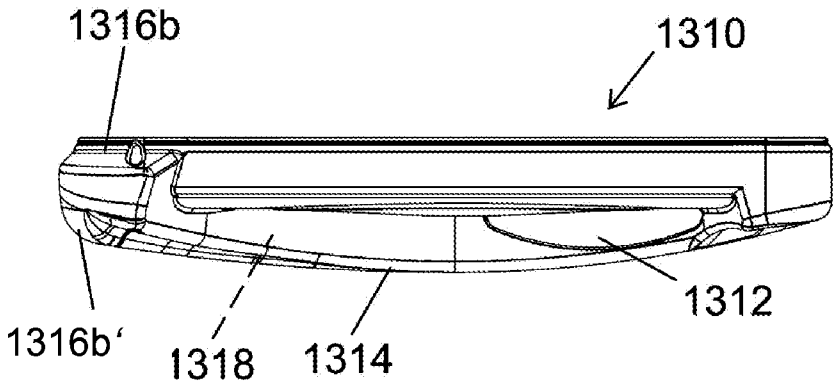

FIG. 75

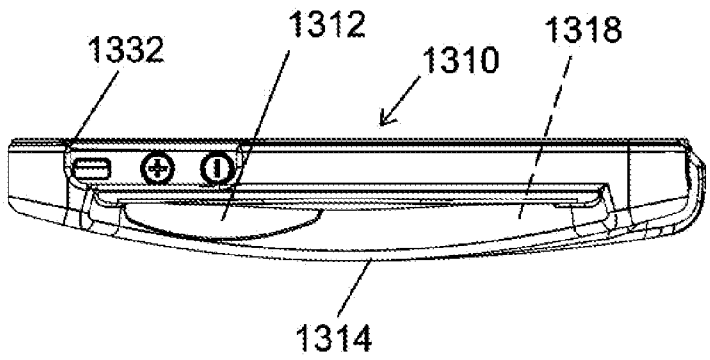

FIG. 76

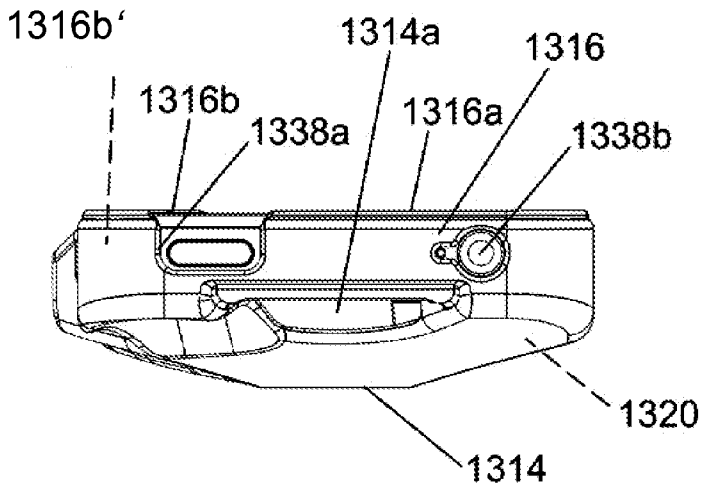

FIG. 77

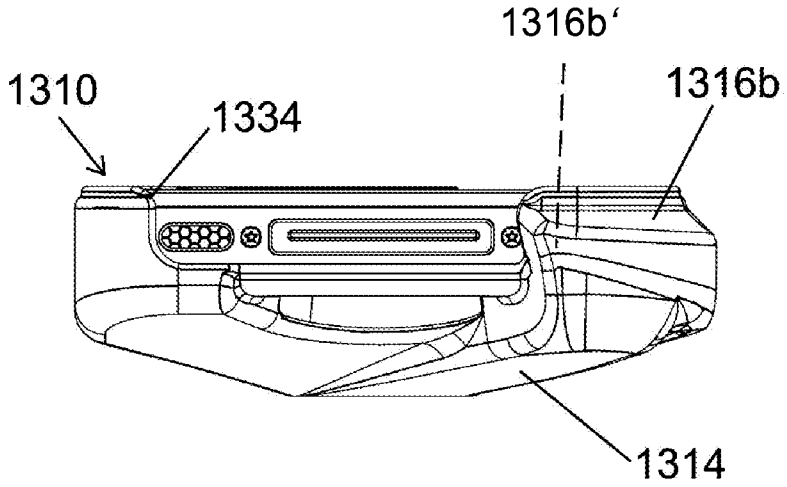

FIG. 78

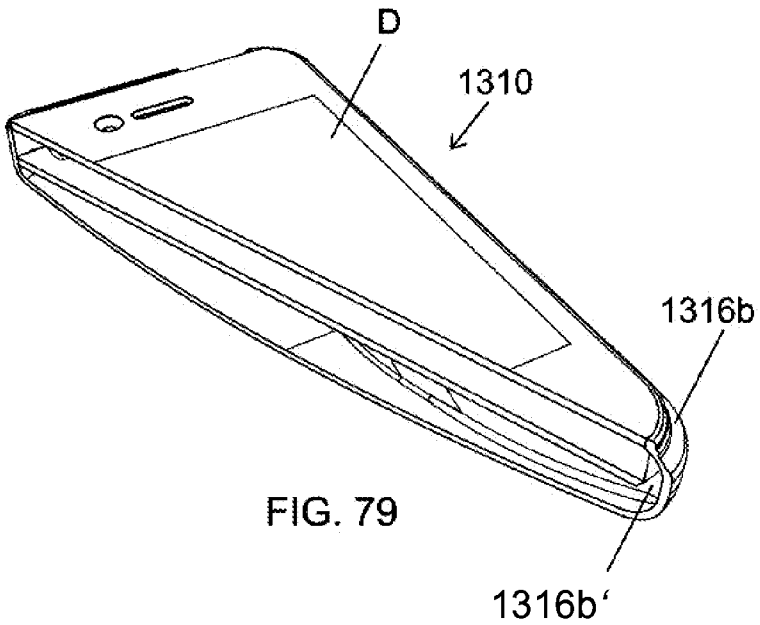

FIG. 79

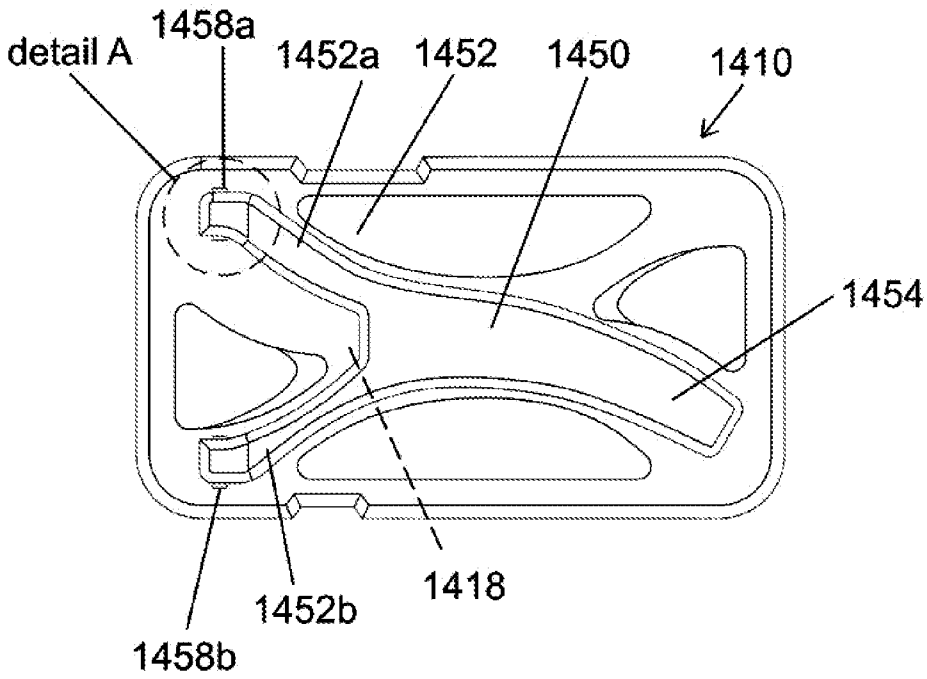
detail A
1458a
1452a
1452
1450
1410
1454
1418
1452b
1458b

FIG. 80

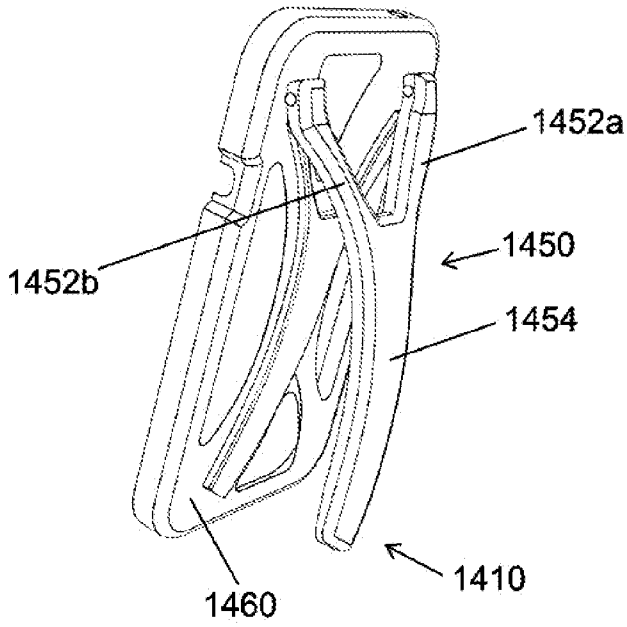
1452a
1452b
1450
1454
1460
1410

FIG. 81

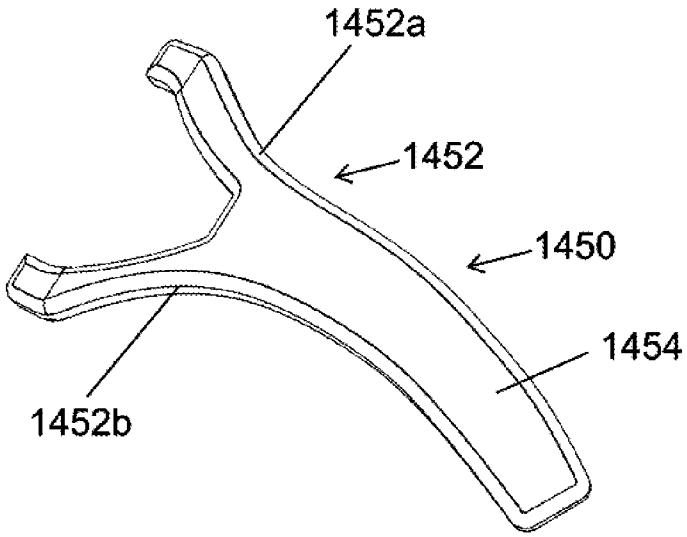

FIG. 82

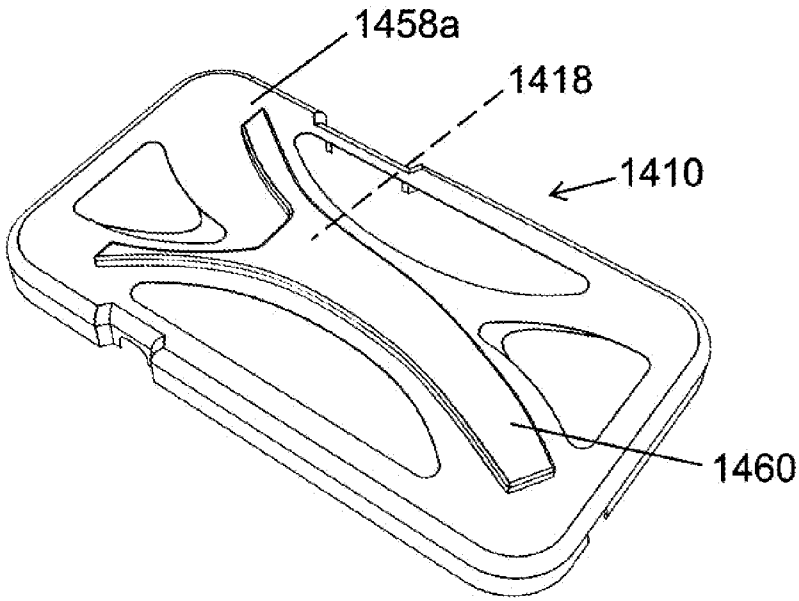

FIG. 83

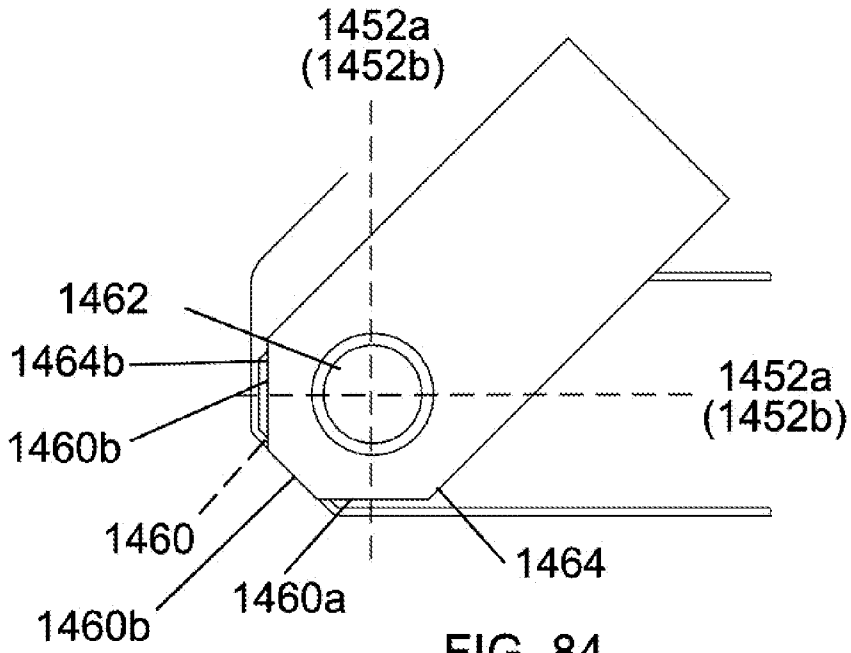
1452a
(1452b)
1462
1464b
1460b
1460
1460b
1460a
1464
1452a
(1452b)

FIG. 84

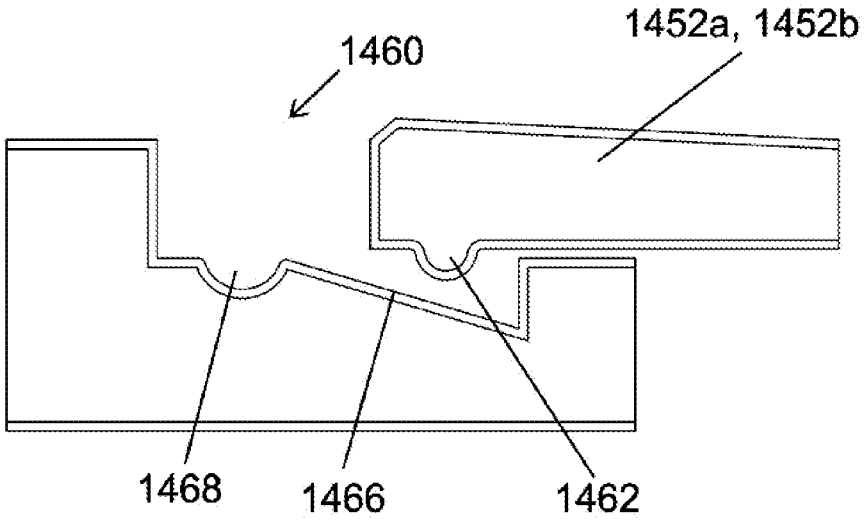
1460
1452a, 1452b
1468
1466
1462

FIG. 85

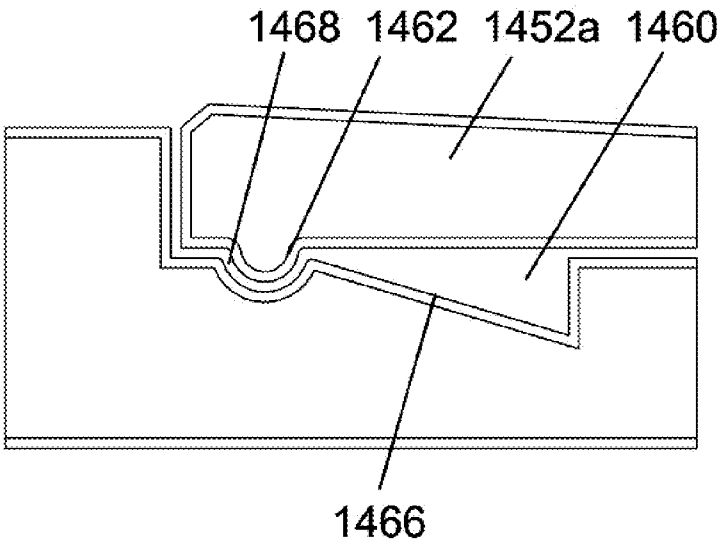

FIG. 86

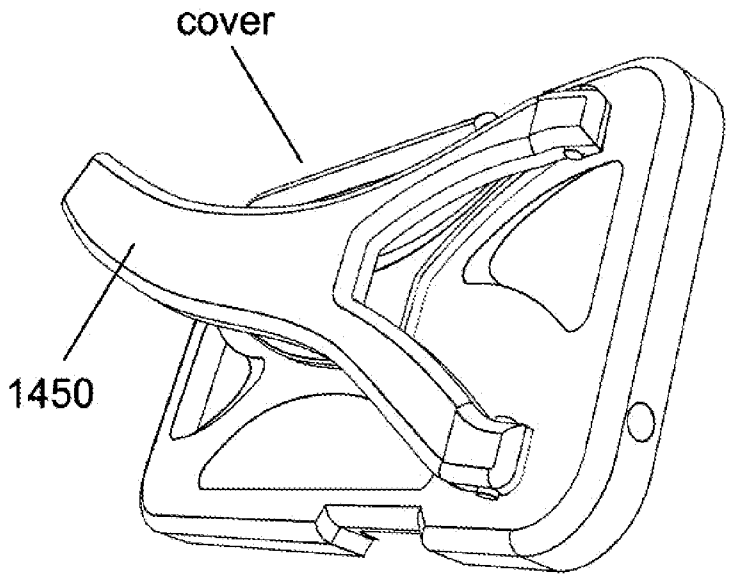

FIG. 87

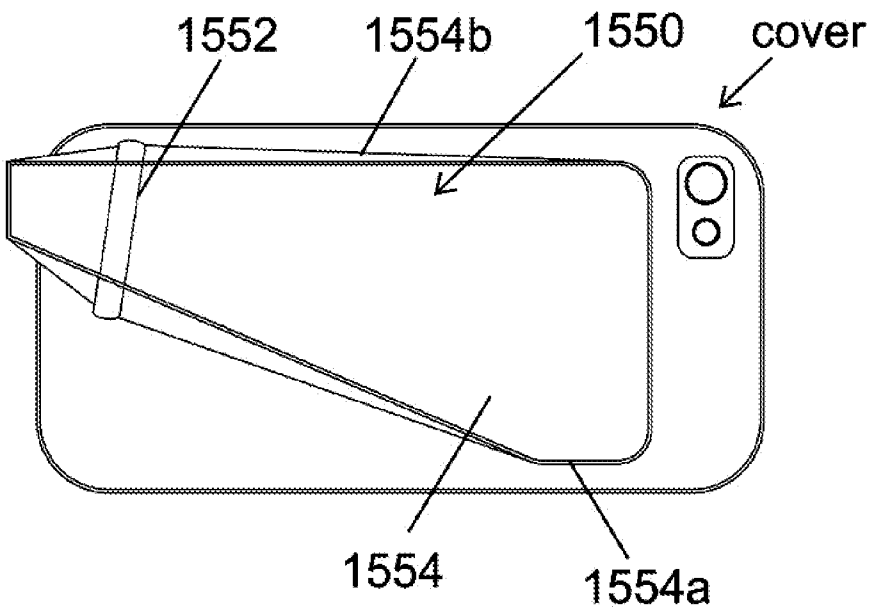

FIG. 88

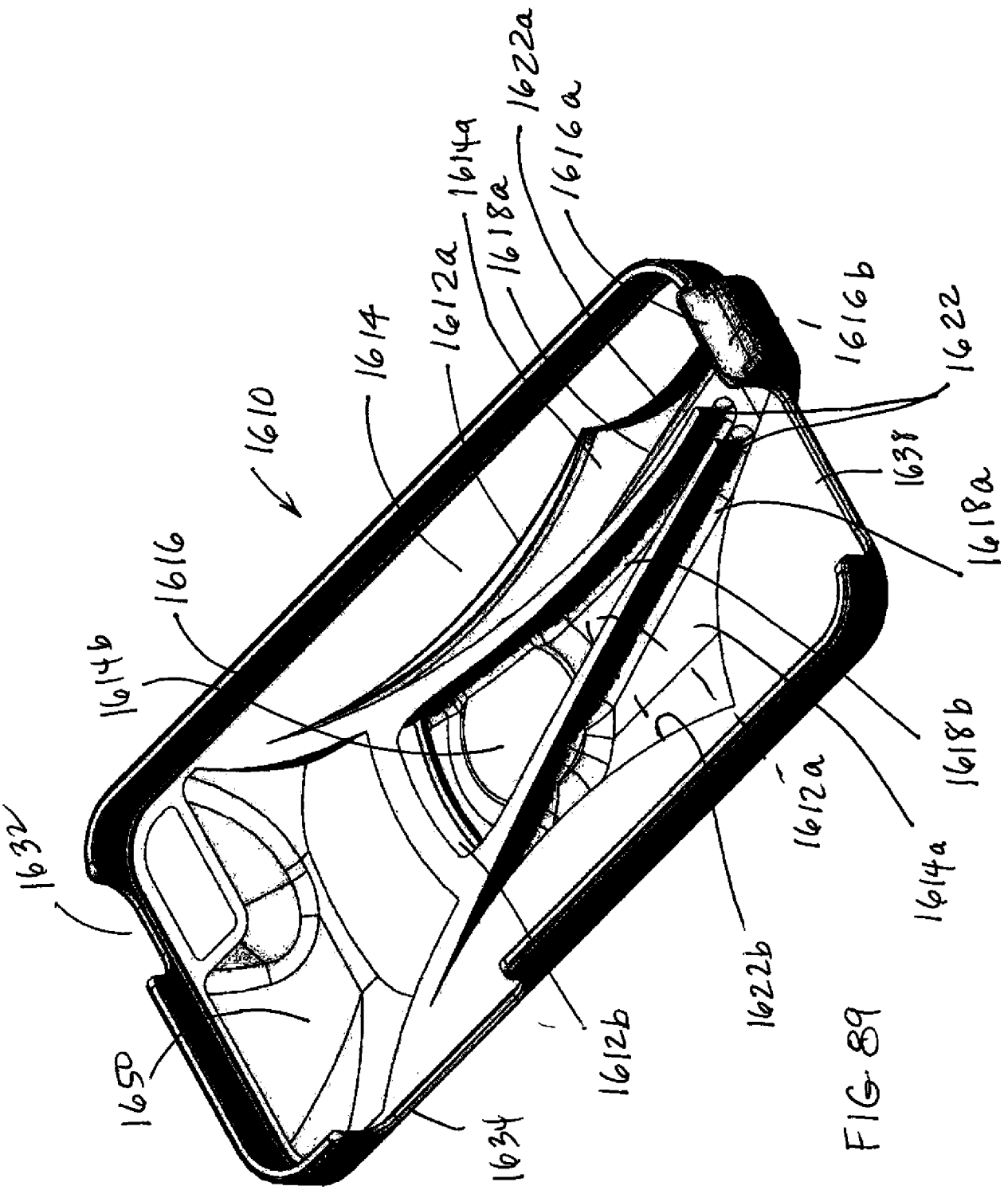
1610
1614
1612a
1614a
1618a
1622a
1616a
1616b
1622
1638
1618a
1618b
1614a
1612a
1622b
1612b
1634
1650
1616
1614b
1632

FIG. 89

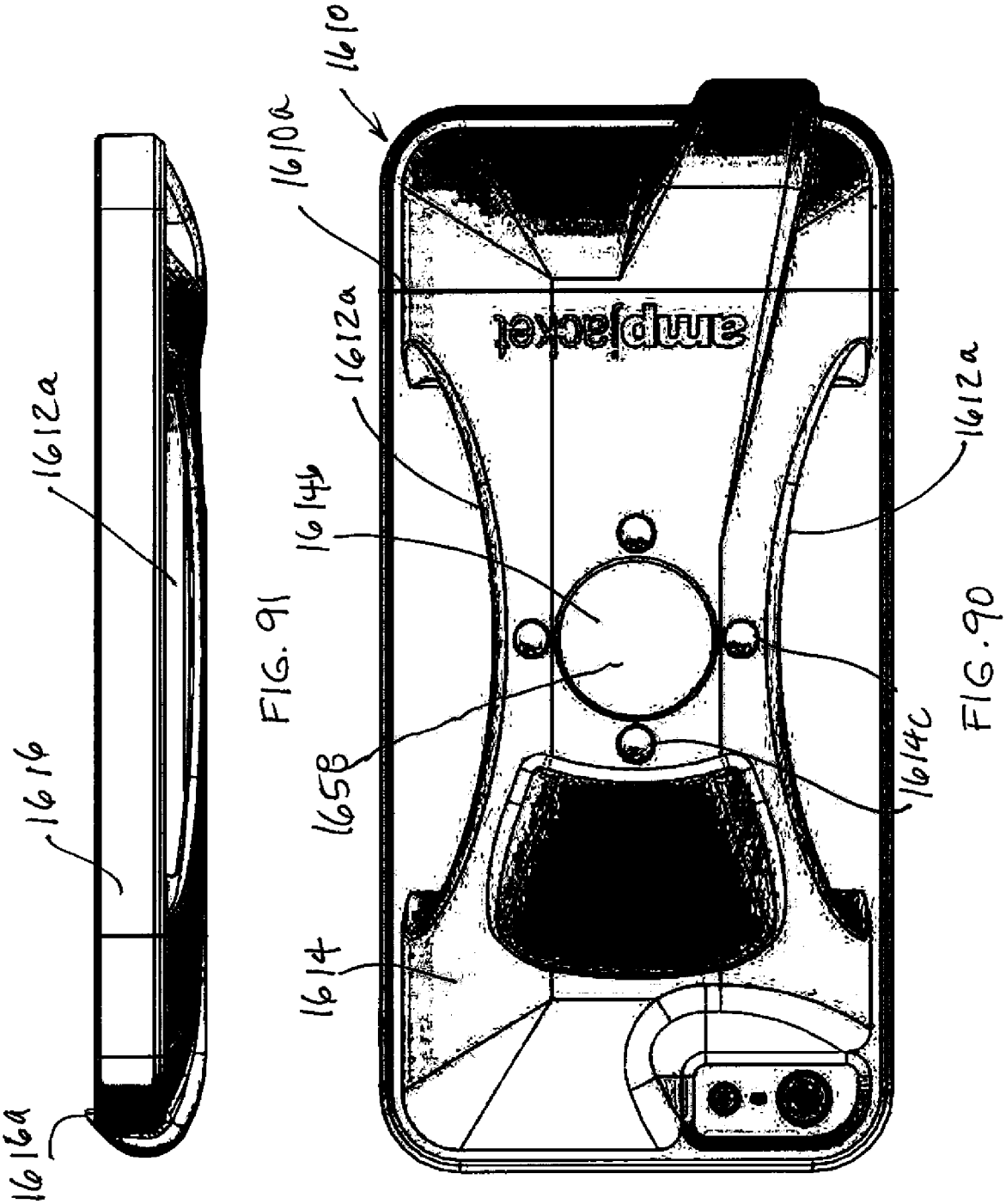
1610
1610a
1612a
1614b
1614c
1658
1614
1616
1616a
ampjacket

FIG. 91

FIG. 90

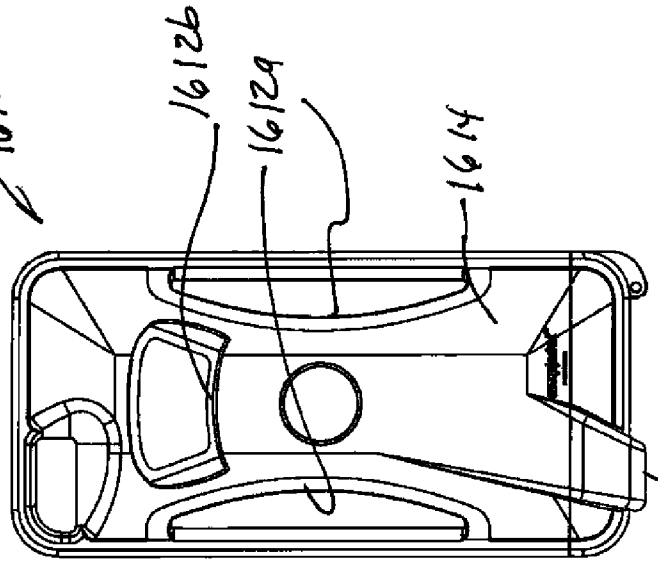
1610
16126
16129
1614
1616a

FIG. 93

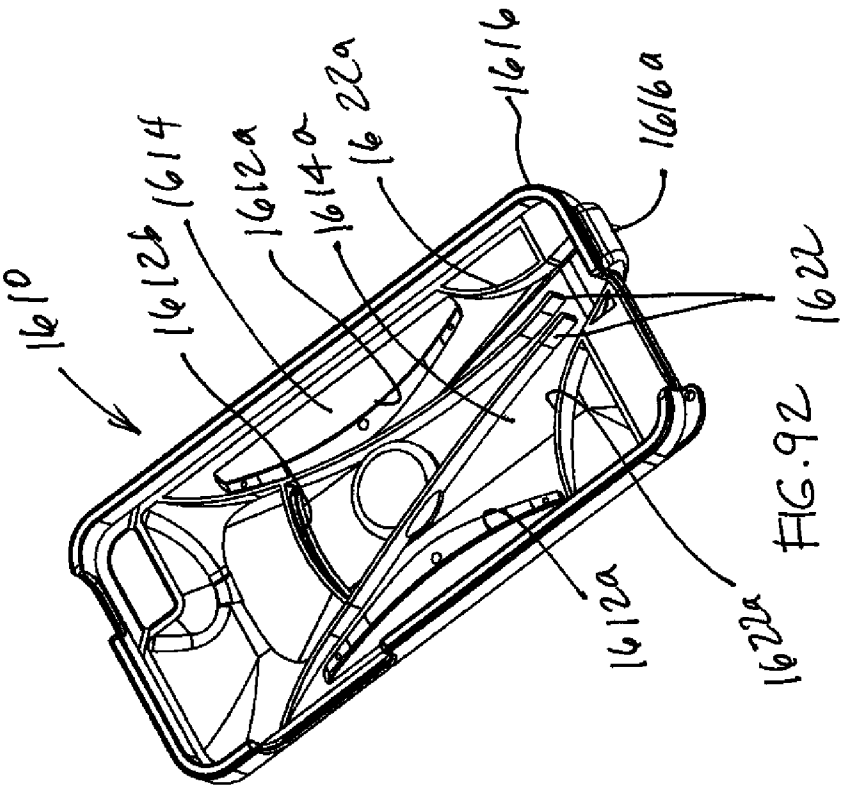
1610
16126
1614
16128
16140
16220
1616
1616a
1622
16128
1622a

FIG. 92

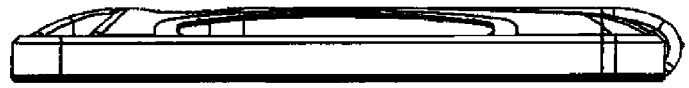

FIG. 96

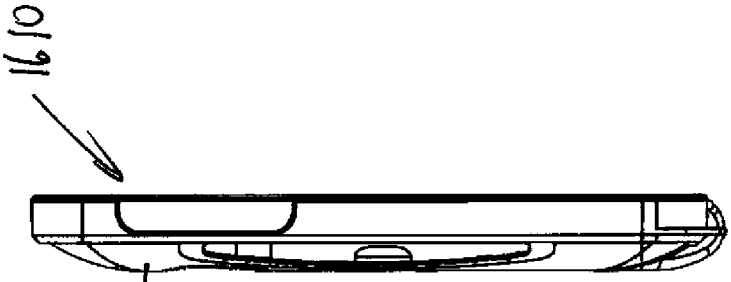

FIG. 95

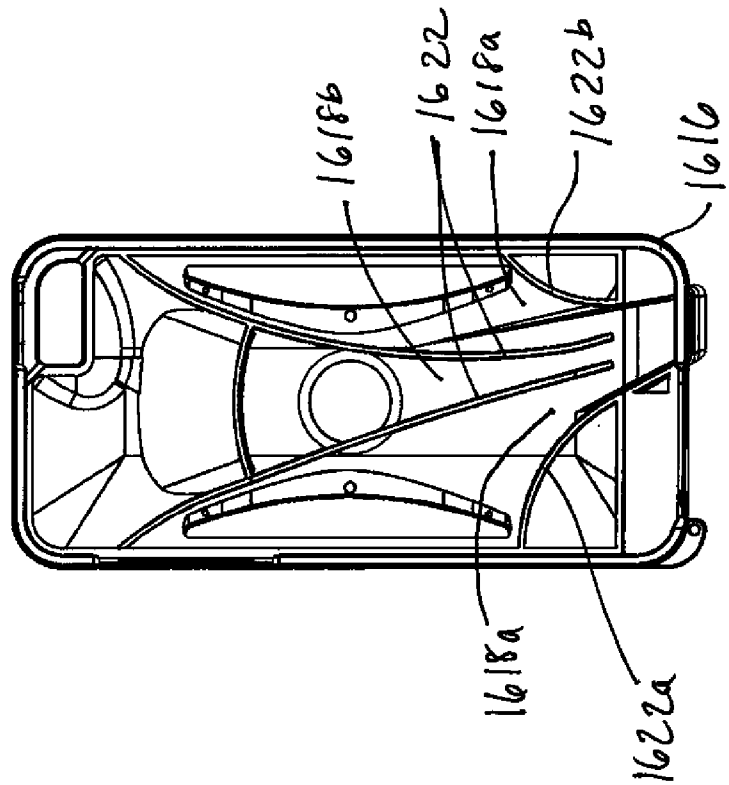

FIG. 94

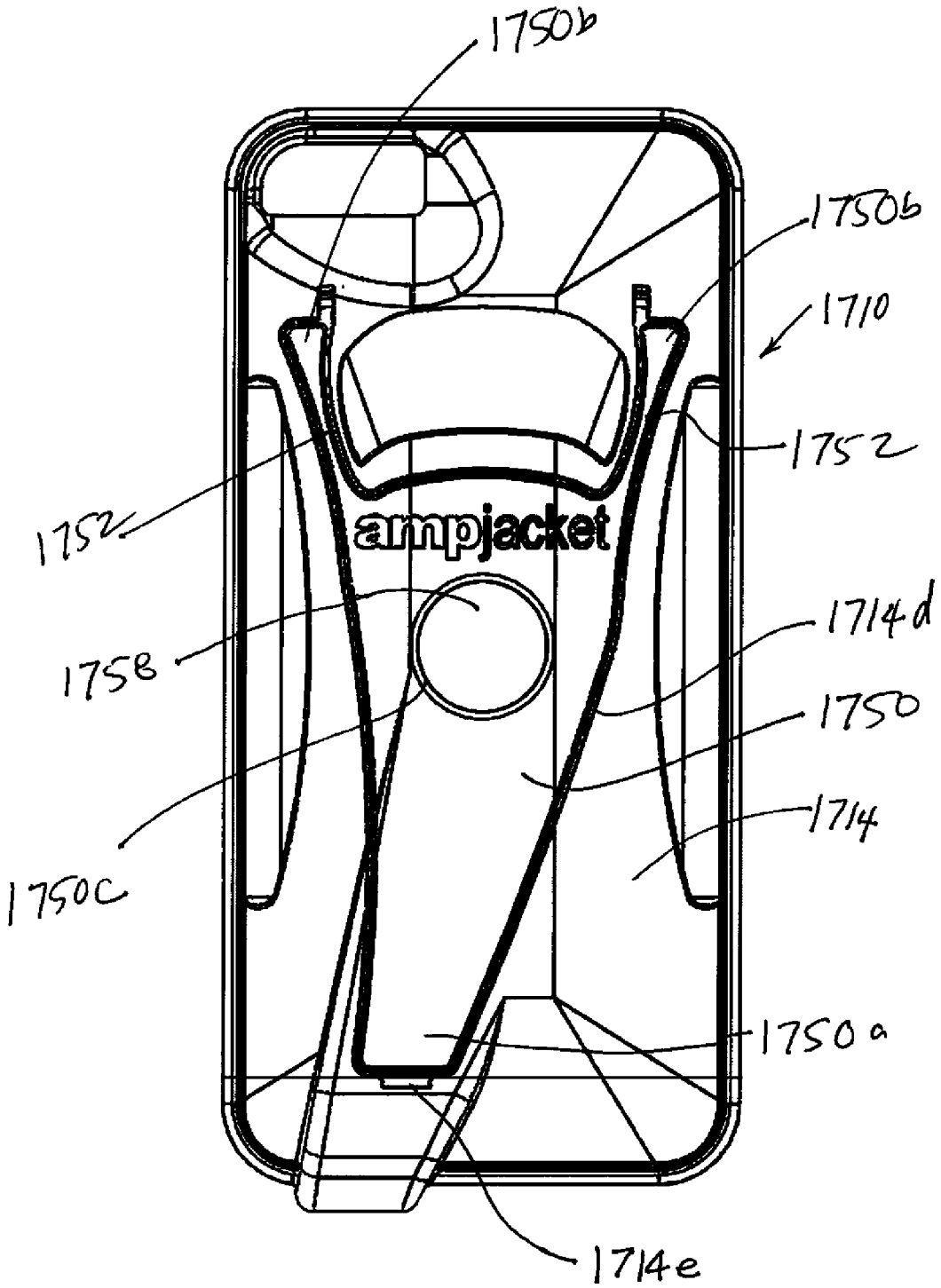
1750b
1750b
1710
1752
1752
ampjacket
1714d
1758
1750
1714
1750c
1750a
1714e

FIG. 97

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/030324

A. CLASSIFICATION OF SUBJECT MATTER

A45C 11/00(2006.01)i

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)
A45C 11/00; H04R 25/00; H04R 1/02; H04M 9/00; H04M 1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: hand-held device, cover, wall, opening, channel, arm, magnet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012-0294469 A1 (WEAVER III, ROBERT B.) 22 November 2012 See paragraphs [0052], [0055]-[0056], [0059]; claims 1, 10, 20; and figures 1 3-14, 22.	1-4,18-20
Y		5-6,13-14
A		7-12,15-17
Y	US 2007-0223745 A1 (FENG, HUI et al.) 27 September 2007 See paragraphs [0030], [0034]; claims 1, 5; and figures 1-2.	5-6
Y	KR 10-2011-0121205 A (KO, SE HOON) 07 November 2011 See paragraph [0029]; claim 1; and figure 2.	13-14
A	US 7630491 B1 (UYEHARA, CHAD TYLER) 08 December 2009 See claim 1.	1-20
A	US 2006-0084468 A1 (KIM, HEE-JUN) 20 April 2006 See claim 1.	1-20

☐ 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 application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 August 2014 (14.08.2014)	**14 August 2014 (14.08.2014)**

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Authorized officer
KANG, Hee Gok
Telephone No. +82-42-481-8264

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2014/030324

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012-0294469 A1	22/11/2012	None	
US 2007-0223745 A1	27/09/2007	US 7778431 B2	17/08/2010
		WO 2007-111650 A1	04/10/2007
KR 10-2011-0121205 A	07/11/2011	KR 10-1146442 B1	18/05/2012
US 7630491 B1	08/12/2009	None	
US 2006-0084468 A1	20/04/2006	AT 472893 T	15/07/2010
		CN 1770787 A	10/05/2006
		CN 1770787 B	15/06/2011
		DE 602005022027 D1	12/08/2010
		EP 1655929 A1	10/05/2006
		EP 1655929 B1	30/06/2010
		JP 04181161 B2	12/11/2008
		JP 2006-135961 A	25/05/2006
		KR 10-0595691 B1	03/07/2006
		KR 10-2006-0040206 A	10/05/2006
		US 7583938 B2	01/09/2009