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(54) **ADJUSTABLE, CLEAVAGE ENHANCING UNDERGARMENT SYSTEM**

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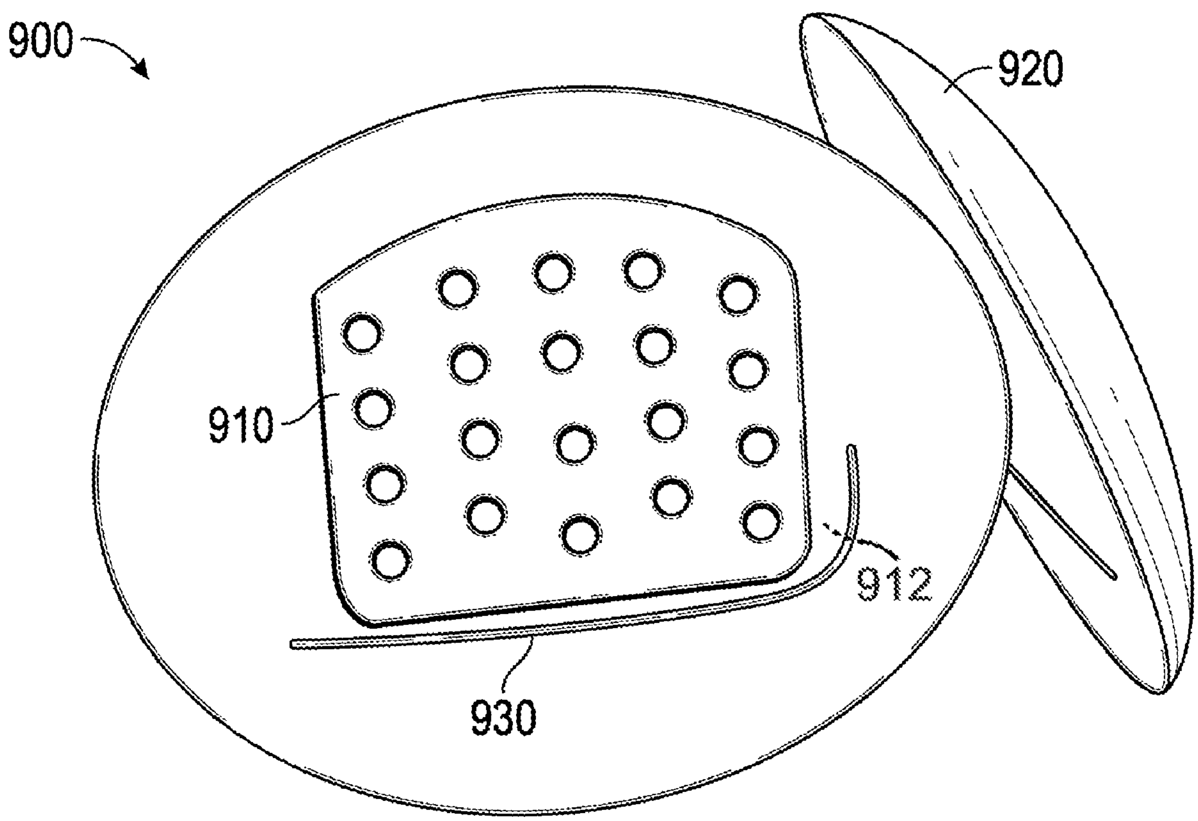
CPC *A41C 3/005* (2013.01)

(57) **ABSTRACT**

An adjustable, cleavage-enhancing undergarment system is described. In one embodiment, a compression paddle includes a first surface contoured to engage with at least a portion of a user's breast. The compression paddle may include a mechanical coupling configured to engage with an end of a force generating member. The compression paddle may include a locking mechanism configured to engage a rotational state wherein the compression paddle is configured to rotate about an axis that is substantially coaxial to the end of the force generating member, and engage a locked state wherein the compression paddle is mechanically locked at an angular position selectable by the user.



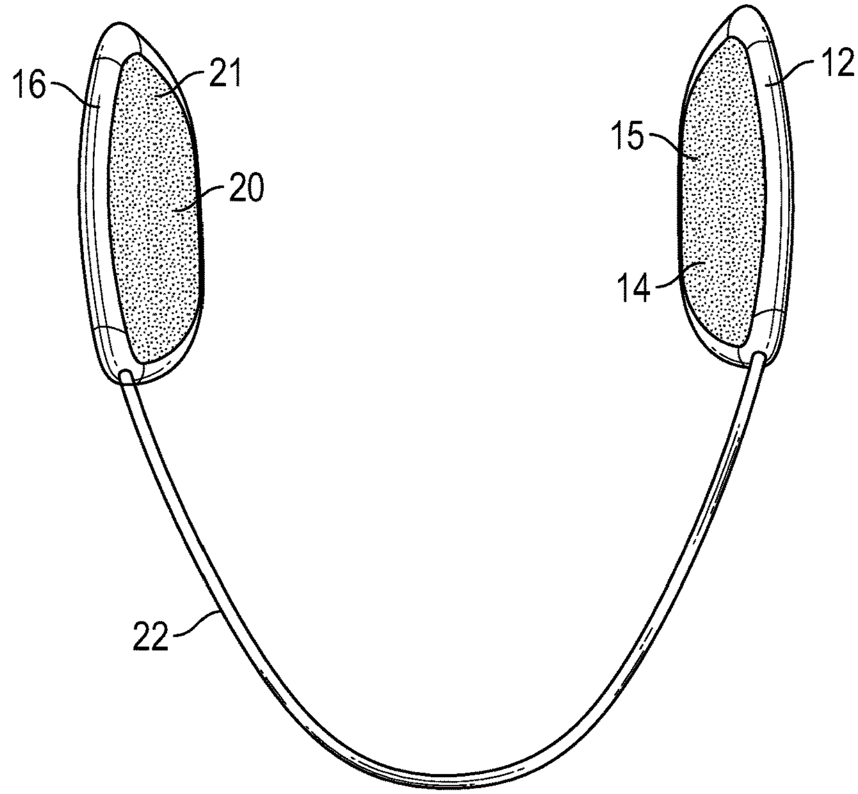


FIG. 1

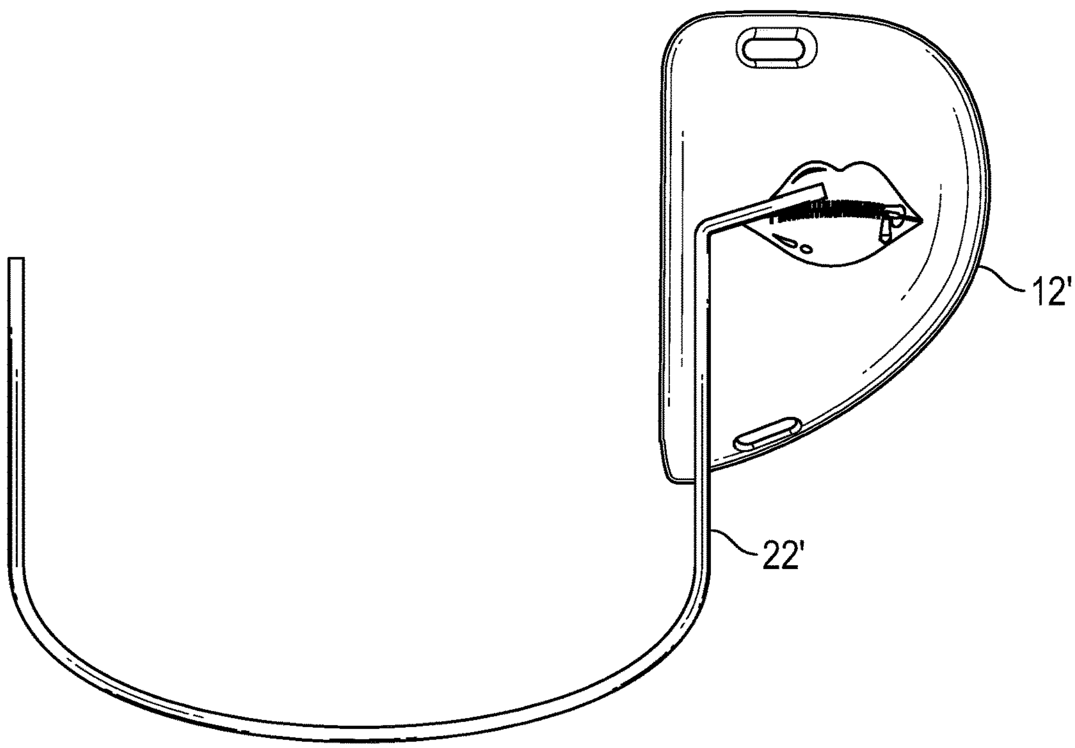


FIG. 2

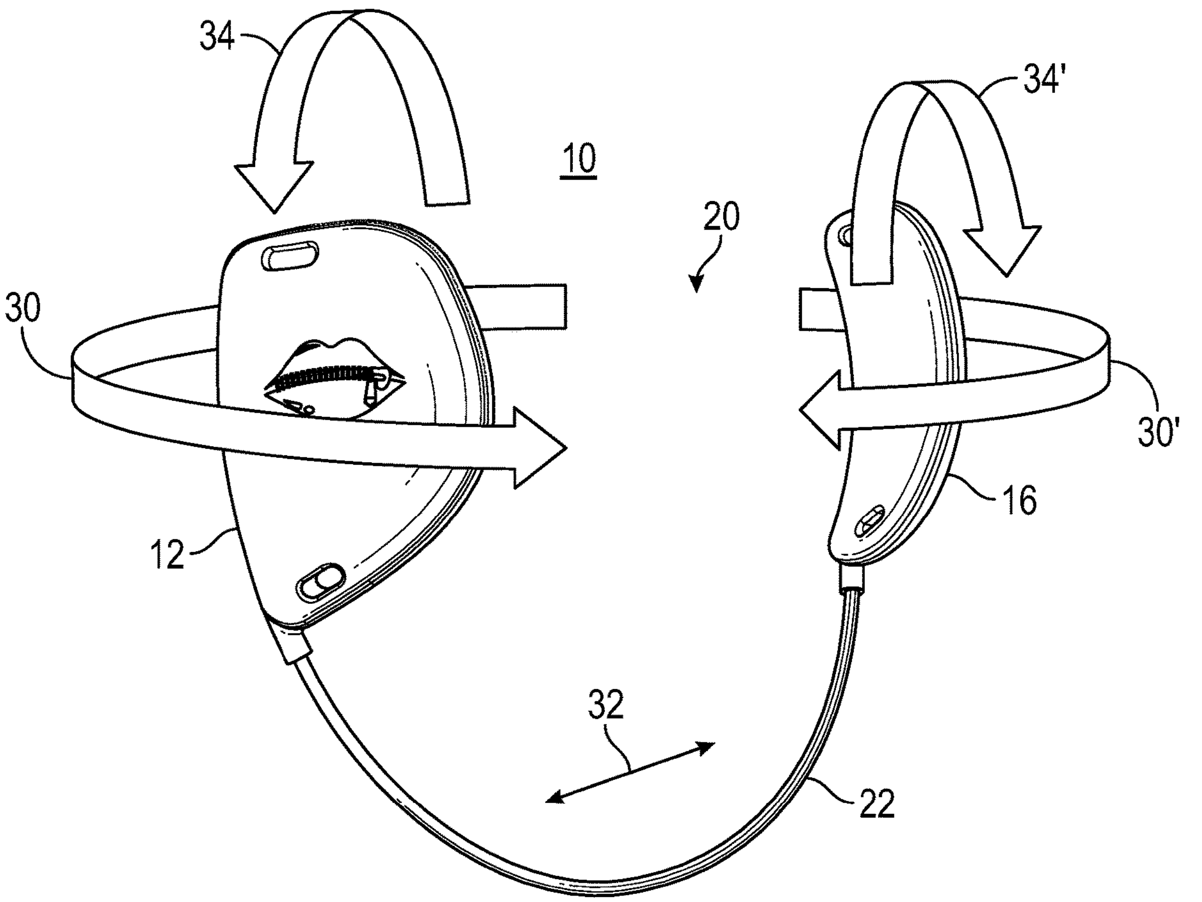
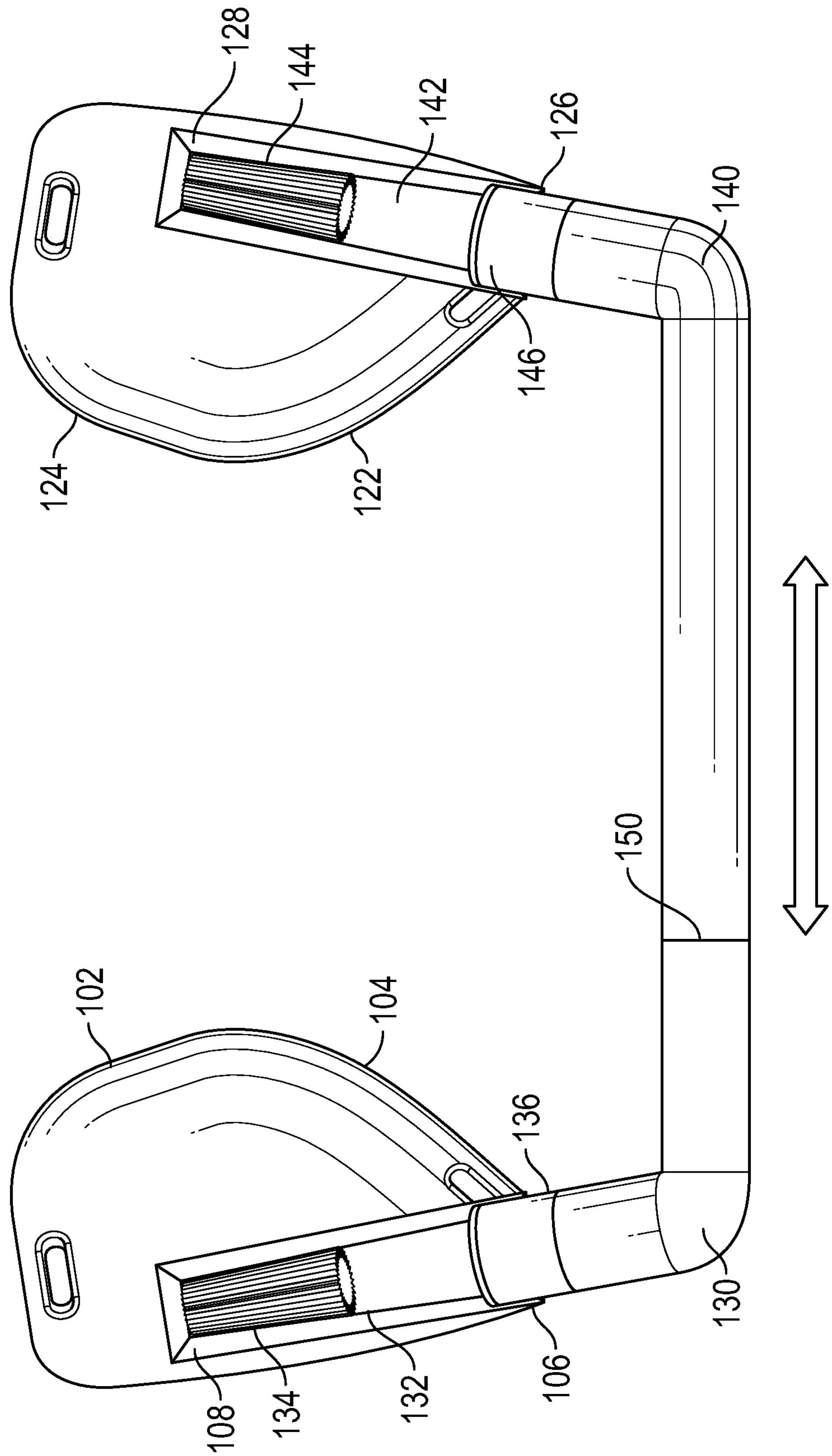


FIG. 3


100
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108

FIG. 4

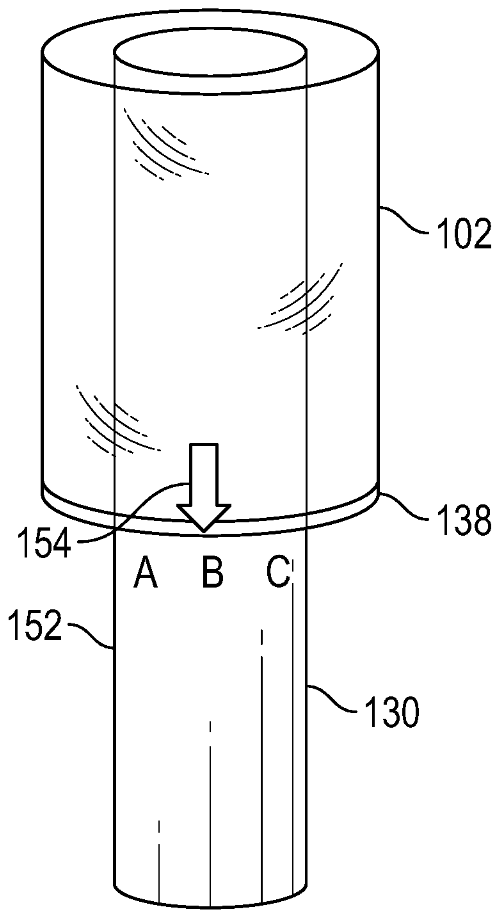


FIG. 5

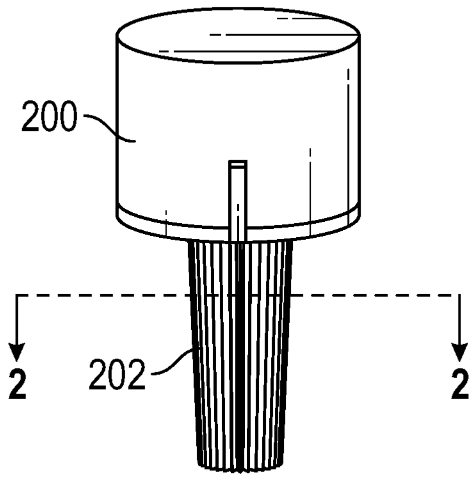


FIG. 6A

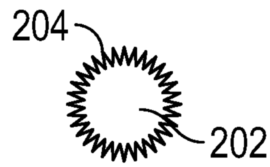


FIG. 6B

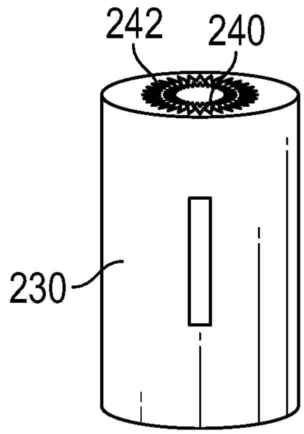


FIG. 6C

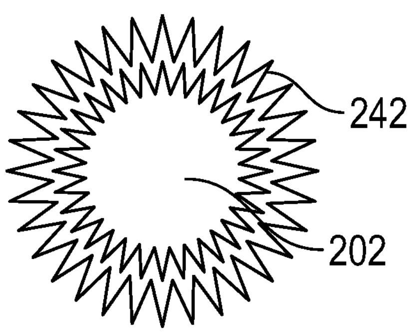


FIG. 6D

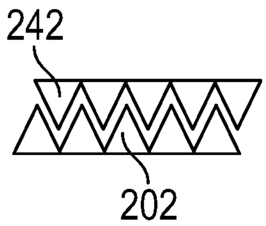


FIG. 7A

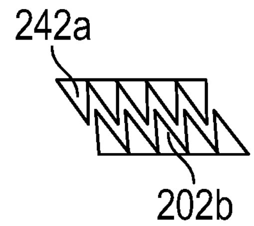


FIG. 7B

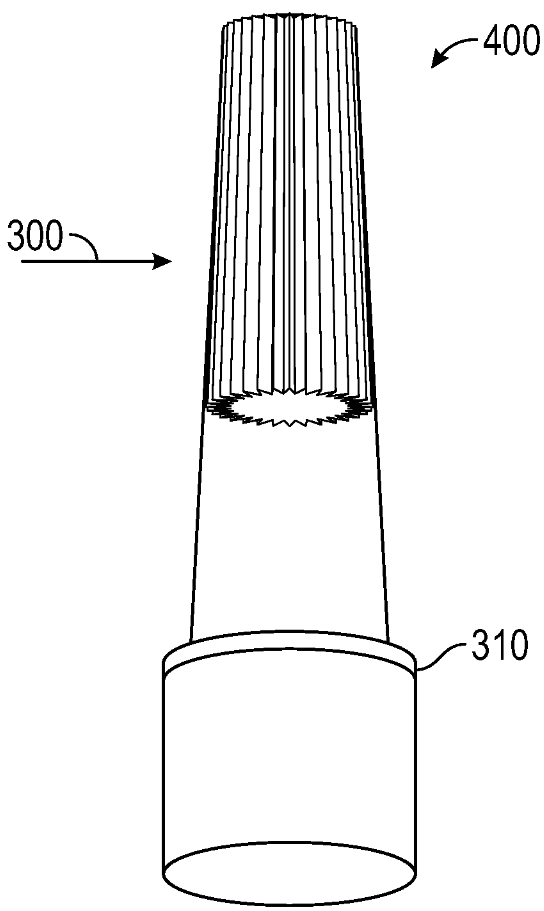


FIG. 8A

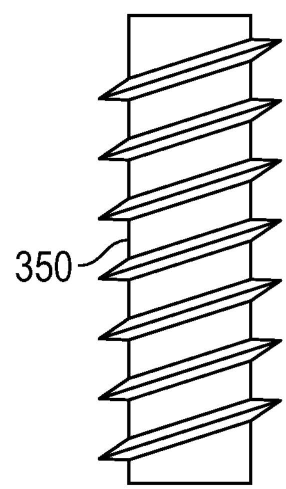


FIG. 8B

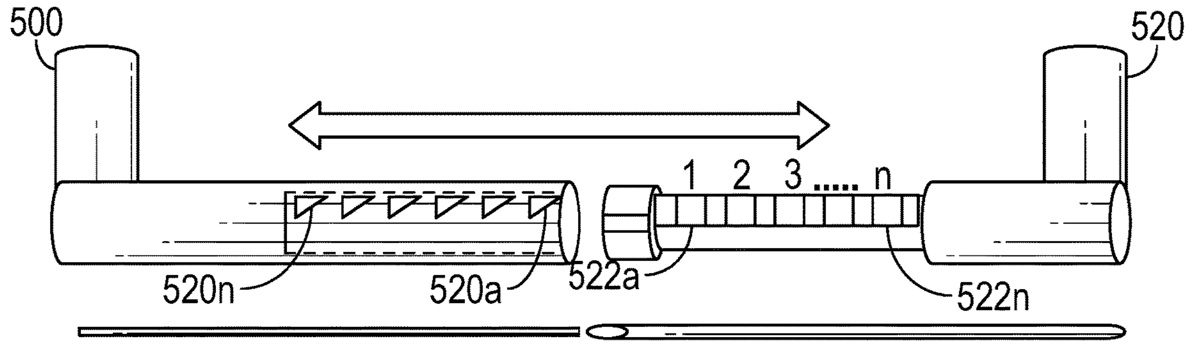


FIG. 9A

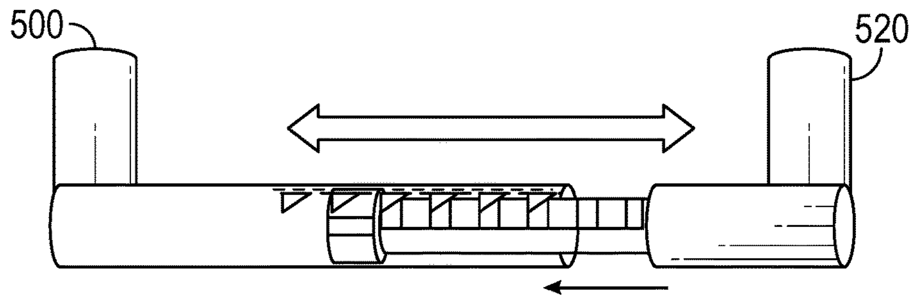


FIG. 9B

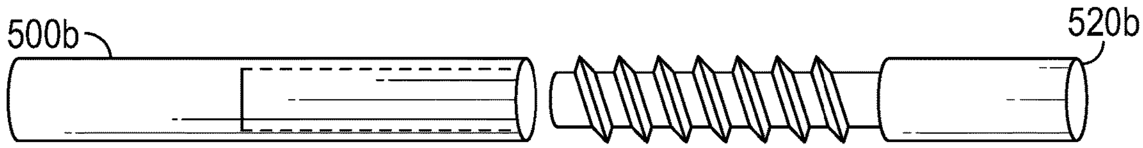


FIG. 10A

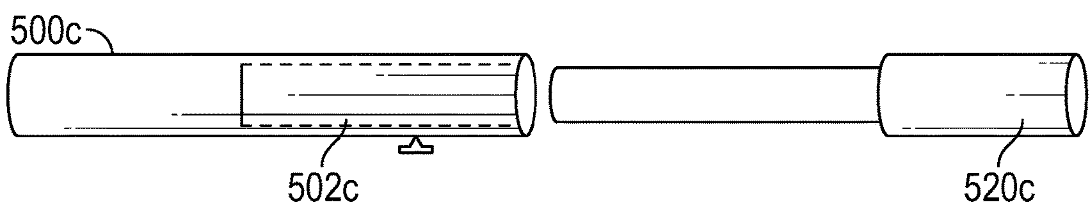


FIG. 10B

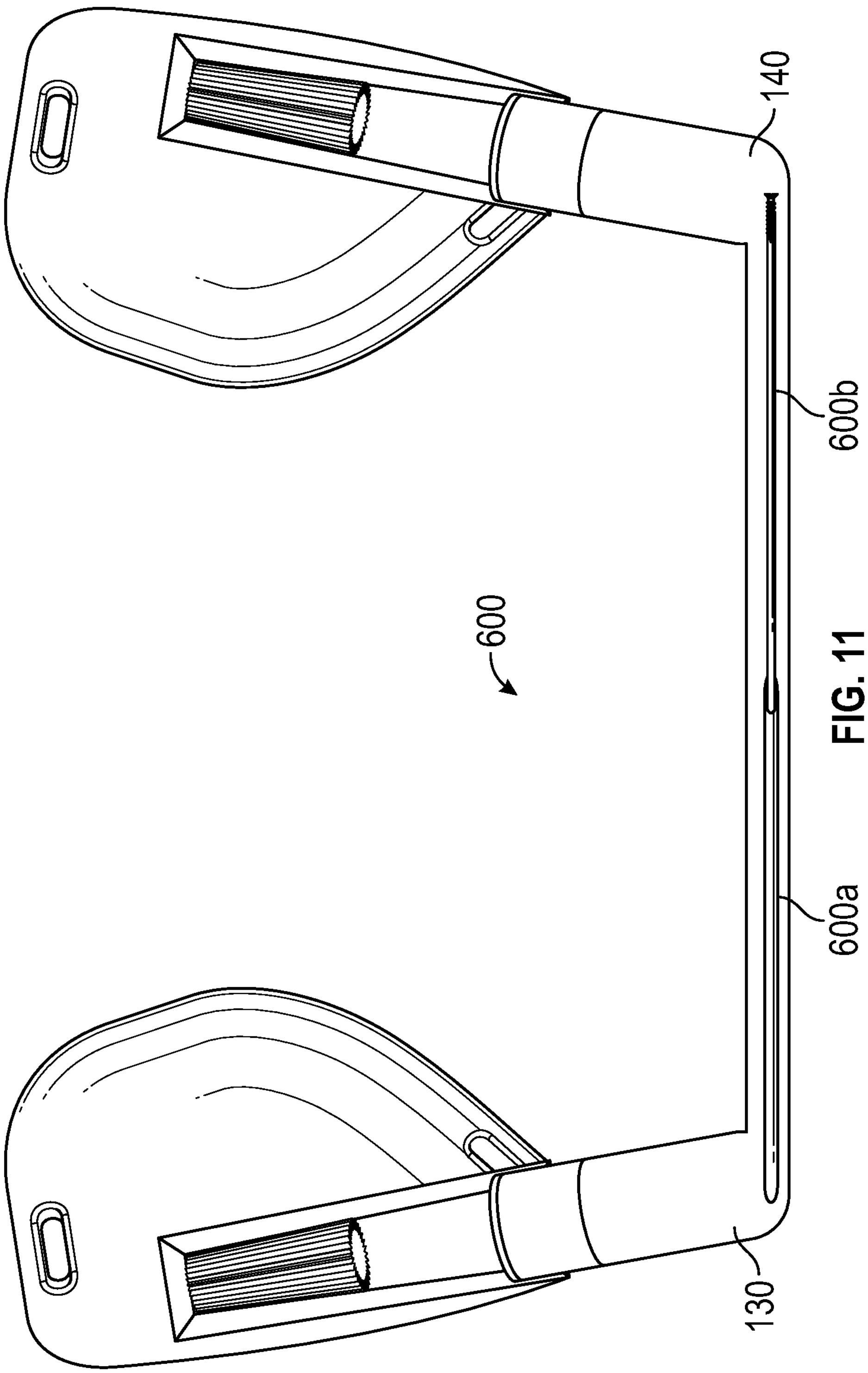


FIG. 11

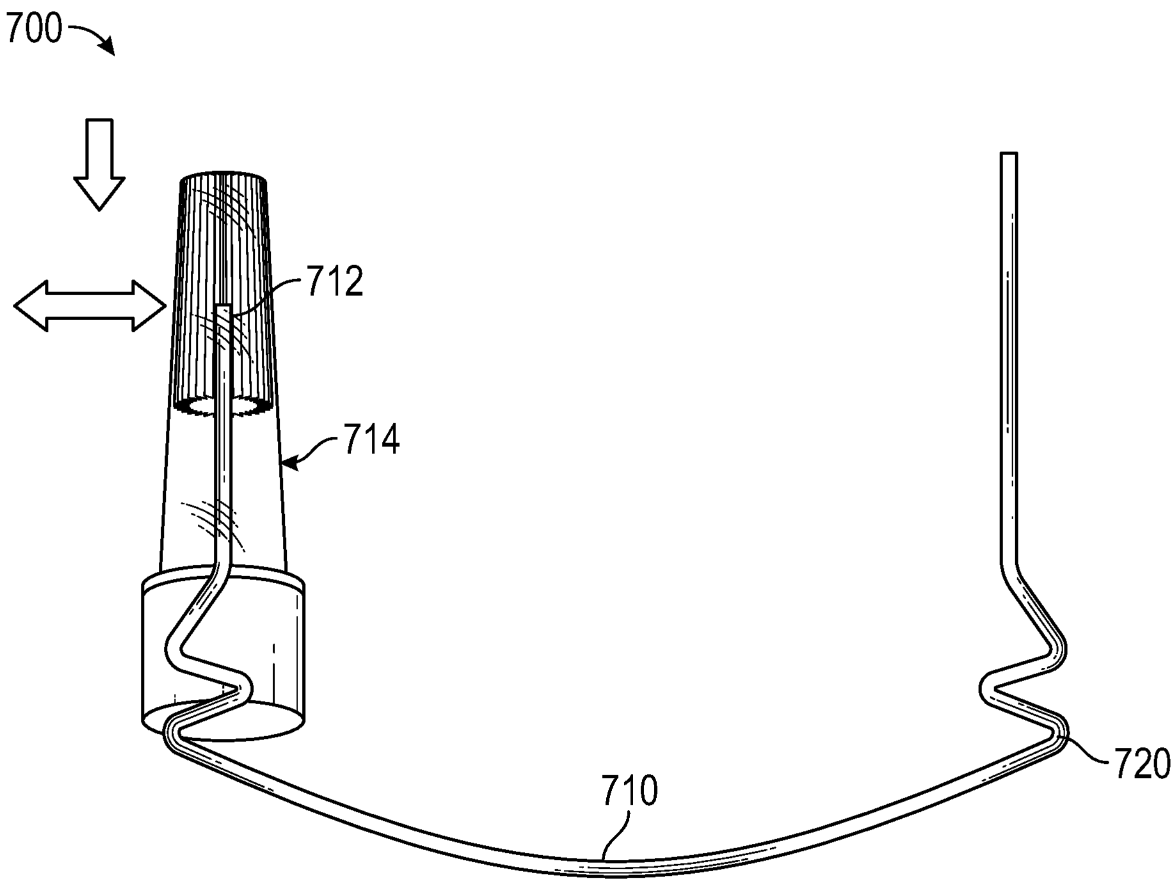


FIG. 12

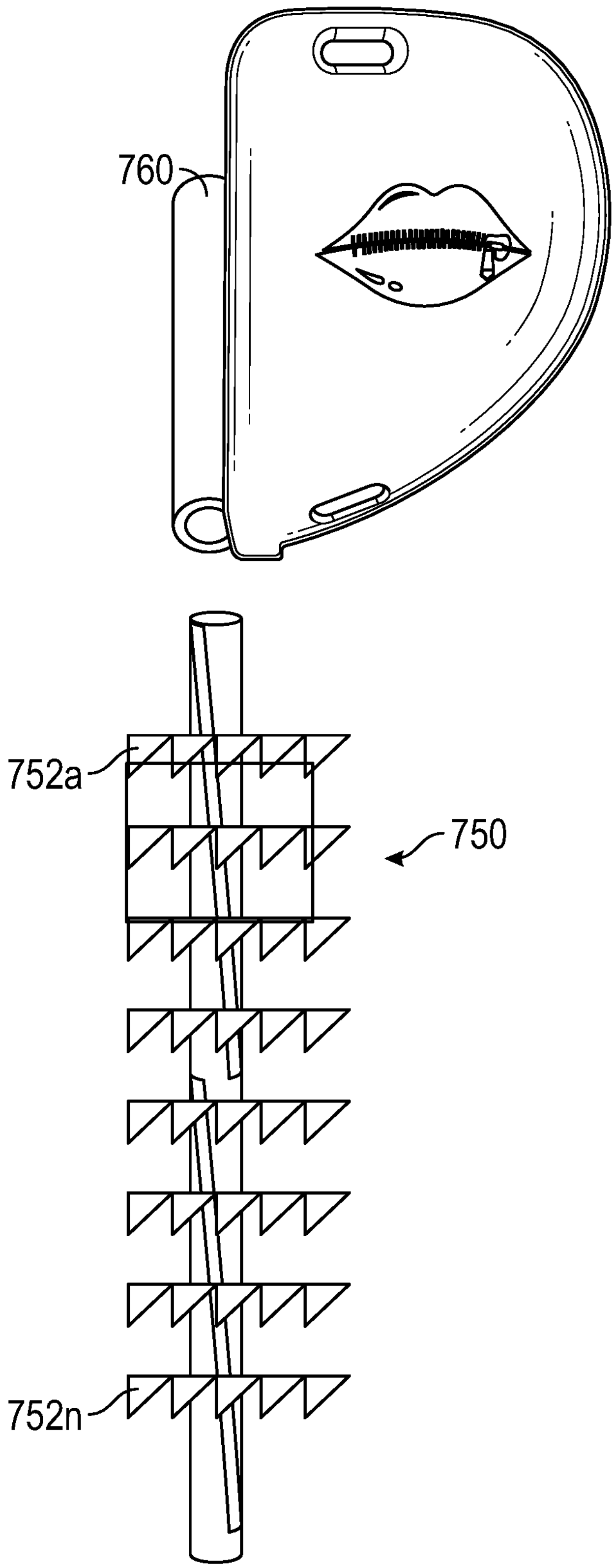


FIG. 13

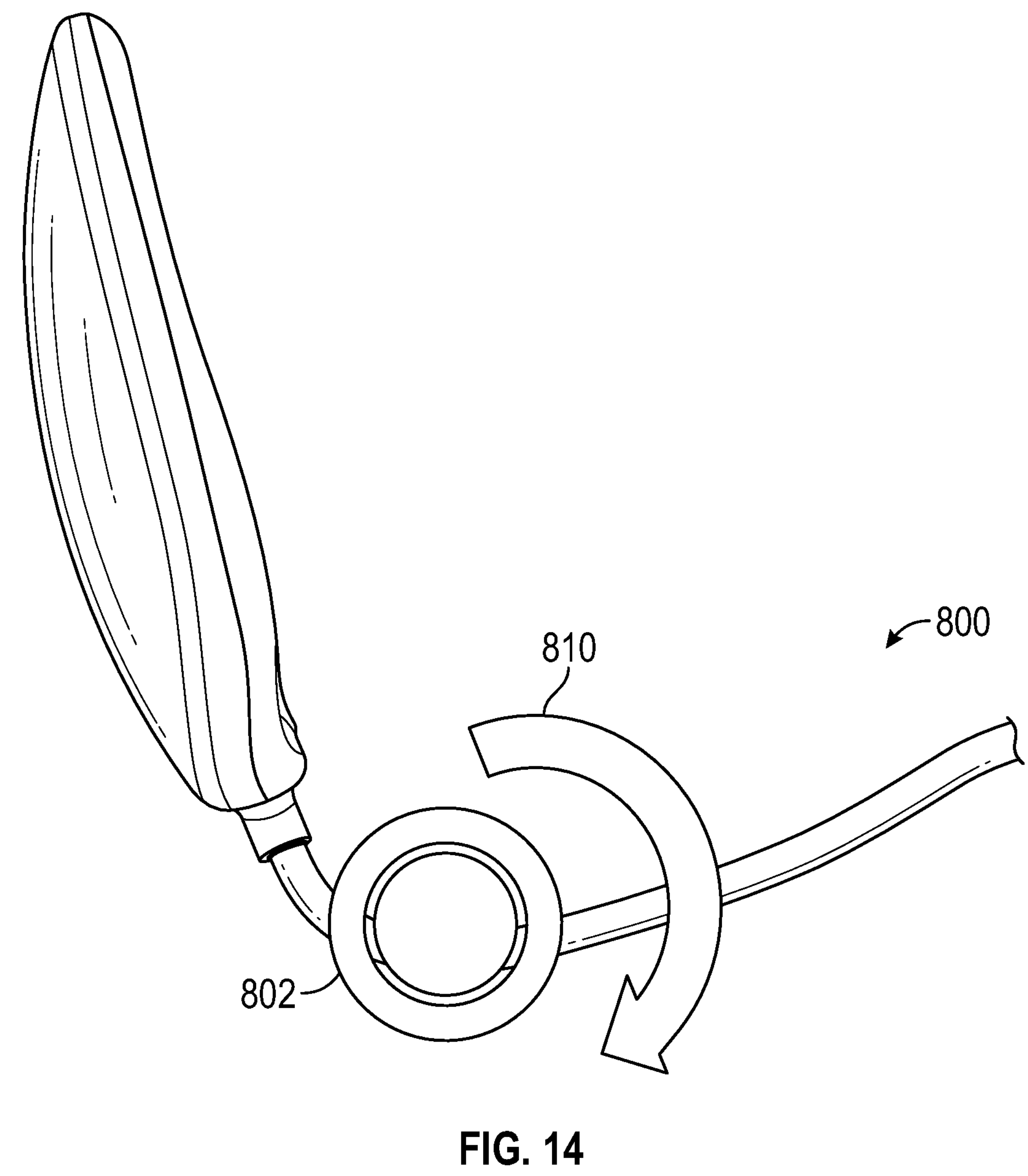


FIG. 14

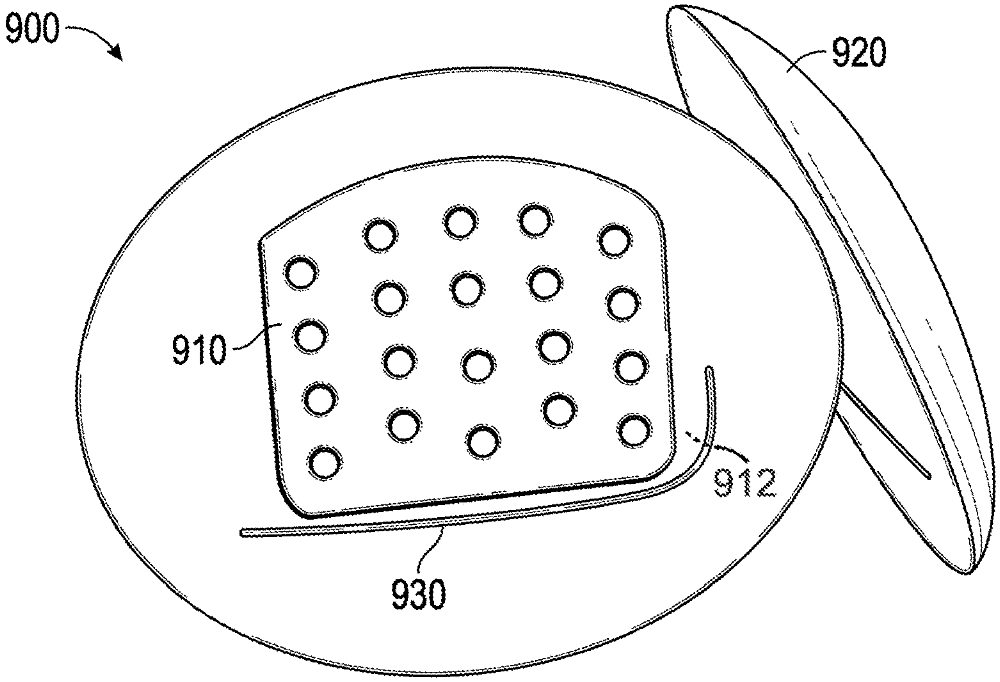


FIG. 15

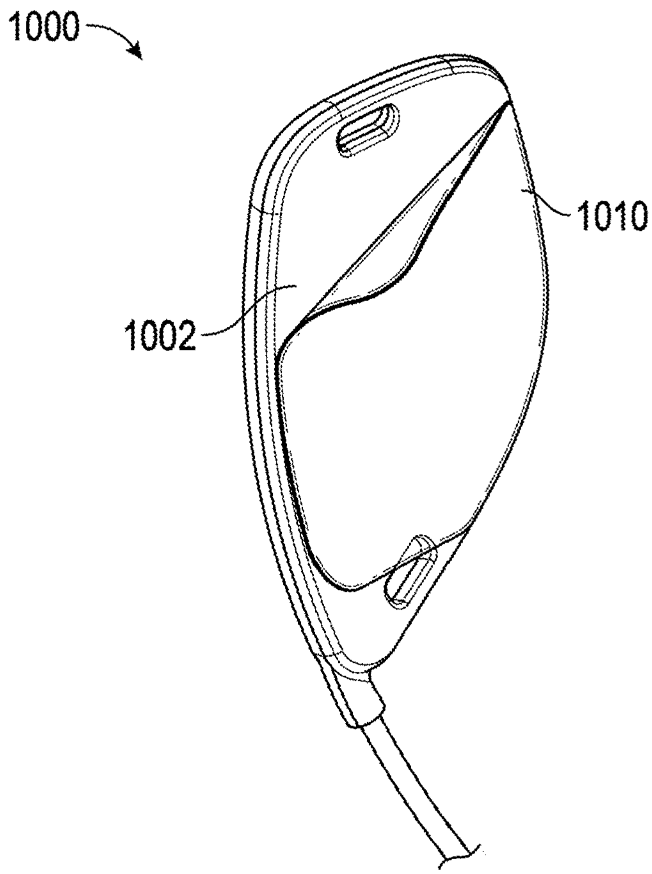
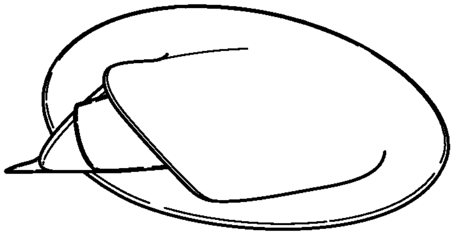


FIG. 16



Volumizing Pad Outside

Pocket Wall

Paddle

Pocket Wall W Embedded Anti Skid

Breast

FIG. 17A

Volumizing Pad Outside

Pocket Wall

Paddle W High Friction

Pocket Wall

Anti Skid

Breast

FIG. 17B

Volumizing Pad Outside

Pocket Wall

Paddle

Anti Skid

Pocket Wall

Anti Skid

Breast

FIG. 17C

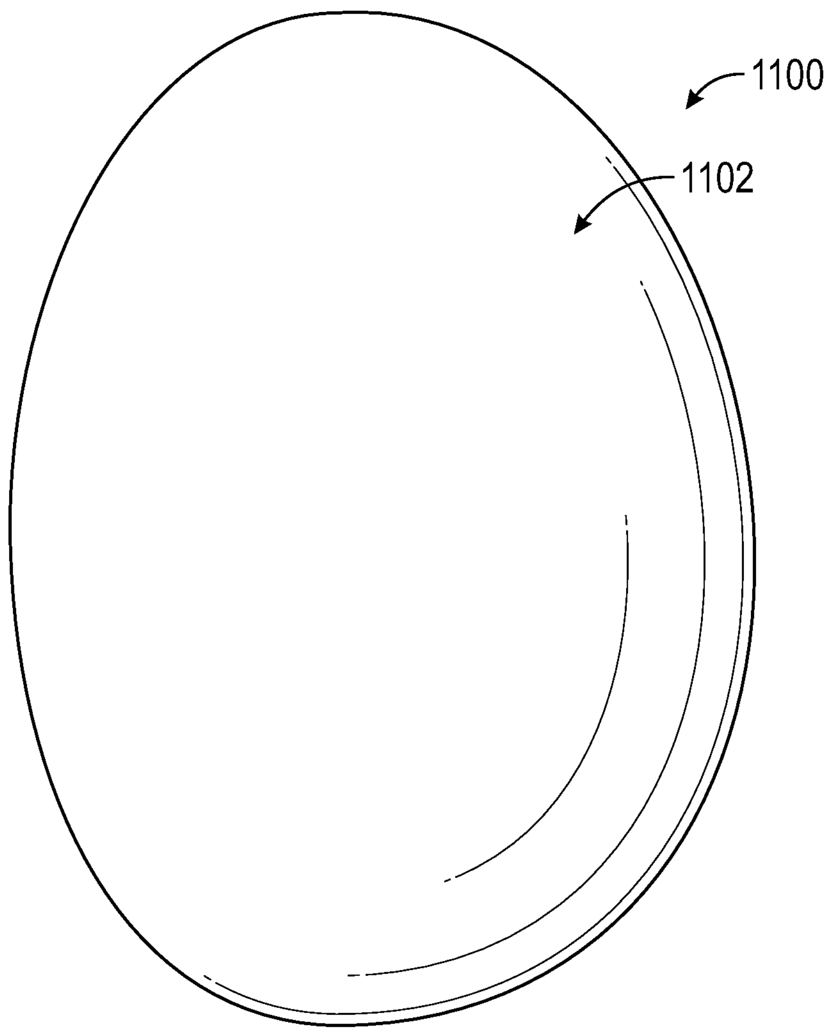


FIG. 18A

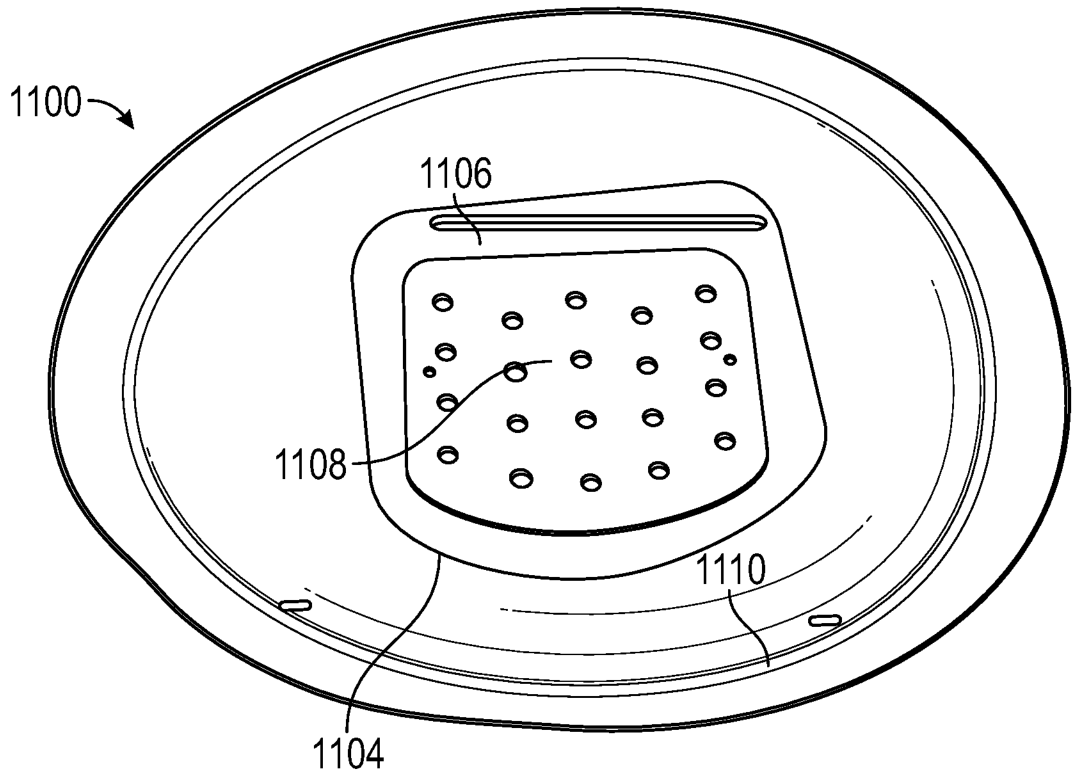


FIG. 18B

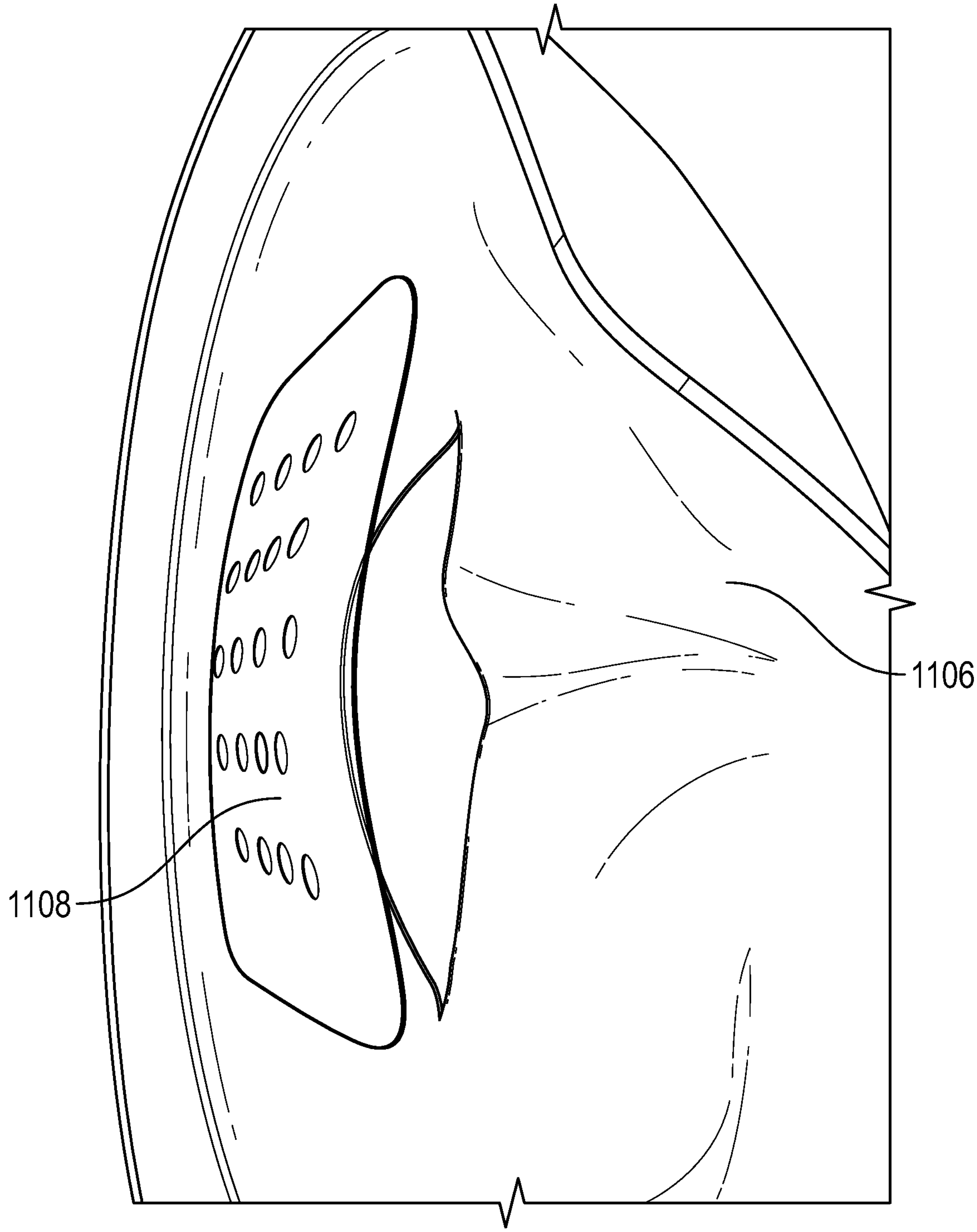


FIG. 18C

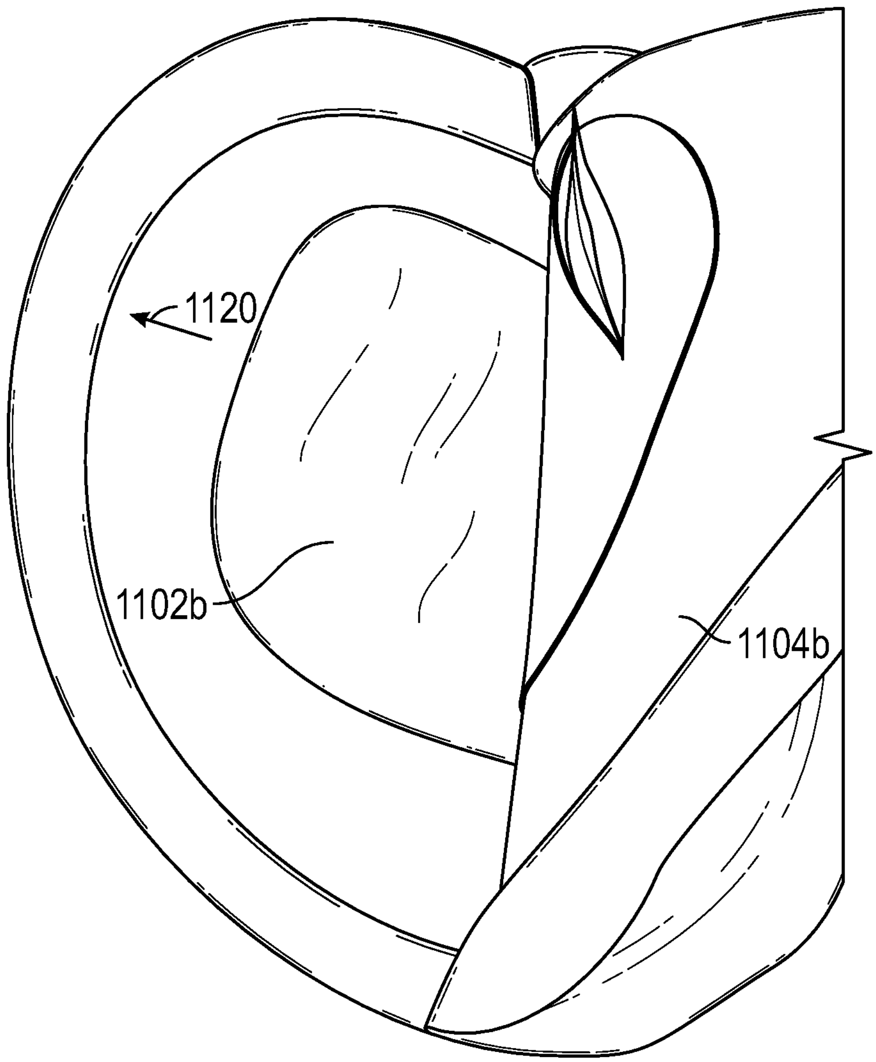


FIG. 18D

ADJUSTABLE, CLEAVAGE ENHANCING UNDERGARMENT SYSTEM

RELATED APPLICATIONS

[0001] The present disclosure is part of a non-provisional patent application claiming the priority benefit of U.S. Patent Application No. 63/237,713, filed on Aug. 27, 2021, which is incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present invention relates generally to the field of undergarment systems worn by women, and particularly to such a system having an open front and an enhancing element that adjustably increases the cleavage, as well as give the appearance of lift by plumping the breasts of a woman wearing the undergarment.

BACKGROUND

[0003] Bras have been used to cover, support and enhance a woman's breasts for many years. Bras typically have over-the-shoulder straps, cups for each breast, a strap or straps around the back and a strap connecting the cups in the front.

[0004] Bras are typically worn under clothing and are not visible to others. Over the years, the bra has undergone many changes. For example, while the bra was at one time a method of concealment, it has more recently become a tool to enhance the shape lines of the wearer. This has been evidenced in recent years by the extreme popularity of cleavage enhancing bras. A trend in women's clothes has been toward more revealing clothes, driving a similar trend in bras to be smaller, thinner and less obtrusive. For example, strapless bras are useful for women wearing clothing that reveals the upper part of the shoulders. Even so, presently available bras which are designed to enhance a wearer's cleavage are either not structured to be worn or unable to work effectively when worn under certain elegant, stylish garments which are strapless, or which offer a lowcut plunging neckline or a bare back look. Lowcut dresses with plunging necklines that reveal the area on the chest of a woman between the breasts must sometime be worn braless. Typically, this exposes a gap between the breasts of the wearer and does not provide desired cleavage or extra enhancement of actual breast size.

[0005] As such types of dresses and other garments have become popular, there remained a need in the art for bras or other types of undergarments that not only enhance the wearer's breast size and cleavage, but which further can effectively do so without the use of straps about the shoulders or the wearer's back or beneath the breasts of the wearer.

[0006] Several conventional bras known in the art utilize various inserts and bindings to achieve the enhancement of the wearer's cleavage. However, many of these devices are uncomfortable to the wearer and further have resulted in surface irregularities such as one or more bumps or protrusions that are visible and highly noticeable even through the wearer's clothing or outer garments. Thus, until recently, there remained a need in the art for a bra that not only enhances the wearer's breast size and cleavage but also provides the appearance of lift and further which is comfortable to wear, will not create back bulge due to the force of the straps pushing into the flesh of the wearer, will not have heavy straps that cut into the shoulders of the wearer causing pain, and which will not cause surface irregularities that would be visible through a wearer's clothing or other garments.

[0007] U.S. Pat. No. 10,058,132 to Harris, et al, titled "Cleavage Enhancing Undergarment System" ("the '132 Patent") effectively addressed these problems and more by disclosing a revolutionary bra-like undergarment design the inventors therein called a "braette" that does not require any straps over the wearer's shoulders or around the back or between the breasts supporting portions of the garment. Instead, the '132 Patent discloses a frontless, backless and strapless braette design adapted to provide enhanced breast size appearance and cleavage of the breasts of a wearer by including a first compression "pad" (in the present invention described hereinafter, this component is called a "paddle" or "compression paddle") having an inner and outer surface, the inner surface being contoured to engage the outer side of one breast of the wearer, a second compression pad having an inner and an outer surface, the inner surface being contoured to engage the outer side of the other breast of the wearer, and a force-generating member having first and second ends connected to said first and second compression pads, respectively, and extending downwardly, away from the breast of the wearer toward the abdomen of the wearer to push the breasts of the wearer toward each other to provide the enhanced breast size appearance and cleavage. Various embodiments of the inventive braette are disclosed in the '132 Patent.

[0008] In the '132 Patent, FIGS. 1-4 and corresponding description from column 3, line 40 to column 4, line 18, explain the function and operation of the force-generating member **22** in conjunction with the compression pads (herein referred to as "paddles") of the inventive braette. FIG. **1** (which is a reproduction of FIG. 3 of the '132 Patent), shows a perspective view of a braette according to that invention having a force-generating member **22** that is preferably a shaped, deformable metal beam or rod having its ends permanently connected to or molded into compression pads **12** and **16** that supply the inward-directed forces to the outer sides of the breasts of the wearer. FIG. **2** conceptually shows how, in one Misses Kisses™ production model, one end of the force-generating metal rod member **22'** is secured to and bent inside a paddle **12'**. The rod end is sonic welded in a clamshell closure paddle design. Accordingly, the '132 Patent explains: "The preferred manner in which the compression pads are connected to the first and second ends (not shown in FIGS. **1** through **3**) of the force-generating member is by in situ injection molding of the compression pads **10** [sic] and **16** around the ends of the force-generating member **22**. The force-generating member **22** is preferably a beam or rod constructed of metal in this embodiment and more preferably that metal is steel and can be cold rolled steel or spring steel, or if desired, the steel may be heat treated in manners well known to the prior art. The function of the force-generating member **22** is to apply an inwardly directed force to the compression pads **10** [sic] and **16** to cause them to push the breasts together and also to provide the appearance of lift to the breasts to enhance the breast size and cleavage. It is therefore an important feature of the present invention that the metal beam or rod retain its resilience so it can be repeatedly used. Also, the wearer may adjust the amount of force to be applied to the breasts by bending the beam or rod." ('132 Patent, col. 3, line 41-line 59, emphasis added.)

[0009] Thus, as seen in the illustrative perspective view of a genuine Misses Kisses™ production bra design (without cover pads) of FIG. **3**, braette **10** may be adjusted in a number of directions. Arrows **30** and **30'** indicate that paddles **12** and **16** may be forcibly rotated in the direction shown or in the opposite direction to fit larger or smaller breast sizes, respectively ("rotational adjustment"). Moreover, metal rod **22** may be manually bent outwardly in the direction shown by arrow **32** to reduce the amount of inward force applied to the outer sides of both breasts. Or, rod **22** may be bent inwardly-positioning paddles **12**, **16** closer together in order to increase the force on the breasts to increase the cleavage effect ("compression force adjustment"). Finally, paddles **12** and **20** may be "splayed" outwardly in the directed shown by arrows **34**, **34'** or in the opposite direction ("splay adjustment").

[0010] As further explained in the '132 Patent, "In utilization of the structure as illustrated in FIGS. 1 through 3 [of the '132 Patent], the wearer would separate the compression pads **10** [sic] and **16** by pulling them outward and would then apply the inner surfaces **14** and **20** of the compression pads to the outer surface of the wearer's breasts and release the compression pads **12** and **16**. At this point, the metal force-generating member would urge the compression pads toward each other and apply a force, typically between 1 and 5 lbs., directed inwardly against the outer surfaces of the breasts of the wearer, causing the breasts to be pushed together to enhance the cleavage and to provide the appearance of lift to the breasts of the wearer to enhance the breast size." ('132 Patent, col. 3, line 59-col. 4, line 4.) Thus, two features of the disclosed metal beam force-generating member **22** are resilience and adjustability: resilience, so that it can repeatedly hold the compression pads **10** [sic] and **16** in the same place with the same inward force and orientation use after use; and adjustability, so that the wearer, at an initial set up or "fitting," can bend the beam member in at least two dimensions, by (a) twisting the ends of the beam connected to the pads so that the pads are rotationally oriented relative to the size and shape of the breasts of the wearer; and (b) bending the beam itself, so that the paddles are more or less pushed together.

[0011] Referring back to FIG. **2**, (and as seen in FIG. 4 of the '132 Patent), in order to enable secure rotational adjustment, the terminal portions **28**, **30** of metal beam **22** ". . . are bent at substantially right angles to the longitudinal axis of the metal beam **22** . . . . Such configuration is then totally encapsulated within the molded plastic compression pads **10** [sic] and **16**. By being bent in this manner, the metal beam **22** is securely retained within the compression pads **10** [sic] and **16** at all times." ('132 Patent, col. 4, lines 11-18.) This design enabled a one-size-fits-all system, enabling the user at initial set up to rotationally bend the beam by forcibly rotating the paddles a new position that best fits the wearer's breasts' size and shape. This set-up operation is demonstrated by co-inventor Harris in her explainer video using a braette made according to the '132 Patent found at https://vimeo.com/484916793 (see, e.g, from time-stamp 3:35 (minutes:seconds) to 5:26). As explained therein, the smaller the breasts of wearer, the "flatter" the compression paddles need to be relative to the chest of the wearer. By contrast, the larger the breasts of the wearer, the more perpendicular the pads need to be relative to chest of the wearer. Indeed, in the video Ms. Harris demonstrates approximate degrees of pad rotation appropriate for various breast sizes (e.g., B, C, D, etc.). The video also shows the substantial force needed to both rotate the paddles to fit the user and the force needed to bend the metal beam to adjust for cleavage amount. Finally, the video shows the use and application of soft, shaped pads into which the paddles are inserted in order to create comfort and to compensate for the loss of the natural shape of the outer side of the breasts that are compressed by the paddles.

[0012] Thus, while the pliable metal beam designs disclosed in the '132 Patent, whose ends are permanently affixed to the paddles, accomplish these functions, they all require the person setting up the braette for the specific user (typically, the user herself) to manually apply a good amount of rotational and compression forces on the beam, which may be difficult for some users. The paddle adjustments are also imprecise: It may require multiple rounds of "trial and error" rotation in order to get the braette system to "fit" the user perfectly. Moreover, permanently integrating a twistable metal beam into paddles add significant weight to the system, can be difficult and costly to manufacture, has a significant manufacturing weakness in the case of sonic weld and is bulky to ship.

[0013] Accordingly, it would be desirable to have a solution that accomplishes the goals of the cleavage enhancing designs disclosed in the '132 Patent, while overcoming the aforementioned drawbacks. It would also be desirable to have a force-generating member that is not permanently connected to the paddles, such that it can be easily replaced by the user herself with a replacement or with force-generating members having different plunge sizes and shapes (e.g., shallow plunge, medium plunge, or deep plunge).

[0014] It would be further desirable to have pads that are placed over the bra paddles that are easy to insert and provide an even more natural look to the breasts when wearing the systems of the present invention.

SUMMARY

[0015] The present invention meets these needs and more by disclosing cleavage enhancing bra systems and kits that incorporate selective adjustment features discussed herein in one or more dimensions. In one dimension, male-female mating mechanisms at the junctions of the ends of the force-generating member and the left and right paddles of the system enables selective rotation of the paddles to easily adjust and fix the paddles at angles appropriate to the user's breast size. In one preferred embodiment, each end of the force-generating member preferably terminates in a round, toothed, ratcheted nub or pin. Then, in the location of the left and right pads where the metal ends of the force-generating member in the '132 Patent are inserted, female, toothed, ratcheted openings are adapted to removably receive ratcheted nubs or pins of the force-generating member.

[0016] In some embodiments, the bra system of the present invention includes improved compression force adjustment mechanisms by disclosing a force-generating member having an extendible crossbar to enabling its length to be adjusted. This enables the bra system to be easily made narrower or wider to create more or less cleavage action on the breasts.

[0017] The present invention also discloses improved pad technologies that provide a truly seamless look to the breasts when worn under clothing.

[0018] It is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components described hereinafter and illustrated in the drawings and photographs. Those skilled in the art will recognize that various modifications can be made without departing from the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Further advantages of the present invention may become apparent to those skilled in the art with the benefit of the following detailed description of the preferred embodiments and upon reference to the accompanying drawings in which

[0020] FIG. **1** is a diagrammatic perspective view of a cleavage-enhancing braette as disclosed in the prior art,

[0021] FIG. **2** is a partial cutaway perspective view of an illustrative rendition of part of a Misses Kisses™ "braette" in the prior art;

[0022] FIG. **3** is perspective view of a Misses Kisses™ braette showing optional adjustments addressed by the present invention;

[0023] FIG. **4** is an illustrative perspective view of one embodiment of the present invention incorporating several inventive features;

[0024] FIG. **5** is an illustrative perspective view of one selectably rotatable paddle solution for the system show in FIG. **4** in accordance with an embodiment of the present invention;

[0025] FIGS. **6**A-**6**D show illustrative views of an adjustable, ratcheted male-female joint employed at a paddle-bar end junction enabling precise paddle rotational adjustment in accordance with one embodiment of the present invention;

[0026] FIGS. **7**A and **7**B show further details and alternative selectably rotatable paddle solution disclosed in FIGS. **6**A-**6**D;

[0027] FIGS. **8**A and **8**B show alternative options that may be implemented for the selectably rotatable paddle solution according to embodiments of the invention;

[0028] FIGS. **9**A and **9**B show one preferred embodiment of a bar width adjuster in unassembled and assembled states, respectively, in accordance with the present invention;

[0029] FIGS. **10**A and **10**B show alternative embodiments of a bar width adjuster in accordance with the present invention;

[0030] FIG. **11** shows a metal-plastic hybrid compression bar embodiment of the present as an alternative to the inventive design shown in FIG. **4**;

[0031] FIG. **12** shows an optional features for a metal-plastic hybrid solution according to embodiments of the invention;

[0032] FIG. **13** shows another optional inventive solution to the paddle-bar interface in accordance with another embodiment of the present invention;

[0033] FIG. **14** shows yet another inventive optional adjustable feature of the bra of the present invention;

[0034] FIG. **15** shows an illustrative diagram of a volumizing pad in accordance with one embodiment of the present invention;

[0035] FIG. **16** shows an illustrative diagram of a paddle with the disposition of anti-skid material attached thereon;

[0036] FIGS. **17**A-**17**C conceptually shows component layering options at the paddle/pad interfaces in accordance with embodiments of the present invention; and

[0037] FIGS. **18**A-**18**D show the design of an improved pad in accordance with embodiments of the present invention

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0038] Referring now to the drawings, like reference numerals designate identical or corresponding features throughout the several views.

[0039] In one preferred embodiment of the present invention, FIG. **4** shows a front, partial cutaway view of an illustrative, frontless, backless and strapless bra system **100** that functions to support a wearer's breasts while exposing front, back and shoulder portions of her body, and to provide an enhanced cleavage look. In this embodiment, system **100** combines two optional inventive features of user adjustability, namely, improved rotational adjustability and improved compression force adjustability. As seen, system **100** comprises four basic components, in the present embodiment preferably all made of lightweight but sufficiently sturdy injection-molded plastic: right breast paddle **102**, left breast paddle **122**, right support bar **130** and left support bar **140**. It should be understood, however, that in some embodiments, only one of the two inventive adjustability features may be implemented, and different materials may be used for the components. For example, system **100** may optionally only provide the improved paddle rotational adjustability feature, in which case, a single force-generating support bar may replace the two support bar components **130**, **140**. In such embodiment, the support bars **130**, **140** may optionally be replaced with a single bar or wire comprising, a pliable metal material as disclosed in the prior art, enabling the bar to offer conventional compression force adjustability, namely, by forcibly bending the bar as disclosed in the '132 Patent. In yet other embodiments, the wire may not comprise the entire bar, but rather only a portion of the bar, with the wire ends connecting to other bar components that connect to paddles **102**, **122**.

[0040] As further seen in FIG. **4**, right breast paddle **102** includes outer surface **104** and inner surface **106** (not shown) that when in use presses against the outer side of the user's right breast. Left breast paddle **122** has outer surface **124** and inner surface **126** (not shown) that when in use presses against the outer side of the left breast. Conically tapering cavities **108**, **128**, extend into the bodies of paddles **102**, **122** respectively from openings **106**, **126**, respectively. Support bar components **130**, **140** are, but need not be, elbow shaped and adjustably connect with each other at junction **150** as discussed further below. At their ends opposite junction **150**, support bar components **130**, **140** terminate in "pins" (alternatively herein called "posts" or "pegs") **132**, **142**, respectively, that, as seen in this embodiment conically taper to their respective ends **134**, **144**. Moreover, when assembling the components together, pin **132** may be inserted all the way into cavity **108** until an optional snap ring **136** snaps it into place. Likewise, when end **144** of pin **142** of left support bar **140** is inserted into cavity **128**, pin **142** may optionally snap into cavity **128** via snap ring **146**. Numerous design options for implementing rotational adjustability of paddles **102**, **124**, all obviating the need to forcibly twist metal force-generating members, and opening the option to use different materials for the system components, will now be discussed.

[0041] Rotational Adjustability: "Conical Friction"—In one embodiment of the rotational adjustability feature of the present invention, as seen in FIG. **4**, when assembling system **100** together, paddles **102**, **122** can be selectively fixed at desired angles relative to the plane defined by the assembled support bars **130**, **140** (and the front chest and torso of the wearer) by simply pressing support bars **130**, **140** into its mating paddle cavity **108**, **128** at those desired angles. The paddle positions are kept from freely rotating about the axes defined their mating pegs based on the friction forces caused by the engagements of the pegs against the inner walls of the cavities into which they are inserted. As seen in this embodiment in which the bar ends are not yet fully pressed into their mating cavities, pegs **132**, **142** preferably are conically tapered moving to their ends, and correspondingly, peg-receiving cavities **108**, **128** are likewise conically tapered, each with a depth that is slightly deeper than the length of its mating peg. Thus, the deeper conical pin **132** is pressed into paddle cavity **108**, the greater the wall friction created between outer surface of pin **132** and the inner circumference of the cavity **108**. The force required to overcome the pin outer wall-to-paddle inner wall friction—i.e. the friction coefficient—can vary, but at a minimum it preferably should be sufficient to prevent the paddle from rotating off its selected position when placing the paddles on the wearer's breasts and when wearing the system **100**. It should also be understood to one skilled in the art that the conical pin outer surface, its mating cavity inner circumference surface or both may have finishes that are not smooth or may include coatings that provide the desired coefficient of friction between the components when assembled. It should also be understood that when fitting the system for a particular user, the rotational angle of a paddle may be easily adjusted by simply pulling the paddle off its pin and reinserting it at a different angle. This enables the user to achieve a perfect fit with minimal effort. Note that in the case of the tapered pin, the disengagement of the peg from the cavity can be achieved by pulling the two apart only a small distance. This pulling apart can be achieved by hand or by a mechanical mechanism designed into the peg and cavity system such as a lever, button, or twisting spacer mechanism. Using a mechanism such as a twisting spacer will give the user an easy method of reducing the friction so the adjustment can be made with minimal effort. The mechanism when twisted the other way will then snap the peg and cavity together more tightly and freeze the paddle at the desired angle with respect to the front of the user.

[0042] An additional option (in any rotational adjustability embodiment) to assist the user in selecting the best angular position of a paddle to match the breast size is the inclusion of an alphanumeric or other marking system at each paddle-support bar junction. Thus, as seen in the illustrative diagram of FIG. **5**, paddle **102** (partial view) may include a downwardly oriented arrow **154** at its open end **138**, and support bar **130** may include a set of letters, say A through F around its circumference (shown here in partial view A through C), at a location that aligns with arrow **154** when bar **130** is inserted into paddle **102**. Thus, when the user assembles paddle **102** onto bar **130**, before pressing and fixing them together, she can rotate the paddle so that arrow **154** aligns with the letter (or a number) that corresponds to her breast size. This may help eliminate the trial-and-error guesswork involved when setting up system **100** for the user, or at least reduce the number of times the user will need to adjust the paddles to obtain a good fit.

[0043] Rotational Adjustability—Teeth-to-Teeth Adjustment FIGS. **6A**-**6C** disclose another rotational adjustability design, namely a teeth-to-teeth securing solution. This solution may replace or may preferably complement the "conical friction" embodiment disclosed in connection with FIG. **4**. Similar to that design, pin **202** of force-generating bar component **200** (FIG. **6A**) is inserted into paddle **230** cavity **240** (FIG. **6C**) at a desire rotational angle. But now, as seen in the FIG. **6B** birds-eye, cross-sectional view of pin **202** at **2-2**, pin **202** has teeth **204** disposed around its tapered circumference. Correspondingly, the interior circumference of the wall defined by cavity **240** is disposed with mating teeth **242**. Thus, when pin **202** is inserted into cavity **240**, teeth **202** and **242** interlock, as seen in illustrative cross-sectional view of FIG. **60**, and hold the paddle at the desired rotational angle relative to pin. This design effectively "locks" the paddle in place and prevents unwanted rotation under pressure in use.

[0044] One advantage of this design is that rotational adjustment of a paddle relative to its mating pin can be made without separating or lifting the paddle away from the peg. This is demonstrated in the examples shown FIGS. **7A** and **7B**. In FIG. **7A**, mating teeth **202**, **242** are straight so that paddle **230** may be rotated around pin **202** of bar **200** in either a clockwise or counterclockwise direction with precision "clicks," as the mating teeth forcibly pass over each other. As will be understood, the number of teeth **202**, **242** on the components are a matter of design choice, with the greater the number of teeth corresponding to more positional granularity—i.e., each rotational "click" corresponds to a smaller angular displacement—and the fewer the teeth, the coarser the angular displacement. It is also understood that the conical friction design shown in FIGS. **4** and **6** need not be present in this teeth-to-teeth embodiment. However, it still may be desired to have the conical taper in this design as well and use the techniques described for the friction approach depending on the overall design goals. Instead, pin **202** and its mating cavity **240** may be cylindrical. In any of these alternatives, paddle **230** may be clamped to pin **202** using any suitable technique as will be understood by those skilled in the art. For example, a horizontally disposed set screw or regular screw may be provided in paddle **230** to enable the user to securely tighten paddle **230** to pin **202**.

[0045] In an alternative interlocking teeth design shown in FIG. **7B**, interlocking teeth **202***b* and **242***a* may be biased at an angle off the horizontal creating a one-way, "sawtooth" ratchet effect as shown. In this "ratchet-like" design, paddle **230** will rotate around pin **202** in one direction when the user applies sufficient rotational force, but will lock—not rotate—in the reverse direction. However, if a locking mechanism as describe above is provided and used, paddle **230** could be difficult to rotate even in the intended rotational direction.

[0046] In a variation of the interlocking teeth "ratchet design shown in FIG. **7B**, the rotational adjustment components of the bra of the present invention, may be implemented in a metal-on-metal design. That is the force-generating bar may comprises a metal wire having pin ends that are conditioned to create a connection with the paddle that will not slip. In particular, each pin end terminates in a sleeve that is assembled over the end of the wire and is secured against rotational movement with respect to the wire. The pin has a larger diameter than the wire so there is more teeth that a wire-only design, and thus more resolution to adjustment of the paddle. The metal pin has metal teeth disposed around its circumference that interface with the metal teeth in the cavity. In this way, a ratchet effect is created between the teeth on the pin and the teeth in the cavity. The paddle cavity itself can be formed of a metal receptacle that is secured to the inside the paddle to not move. Alternatively, the cavity can be all plastic and part of the paddle molding itself.

[0047] Moreover, in this variation (and other metal wire variations), it is noted that the pin ends of the force generating member, that is the wire-sleeve combination, can optionally be made in such a way that each wire end can be inserted and removed from its mating sleeve so that different wire bars can be used with the same paddles. Thus, in operation, the wire bars can be made to be replaceable while the sleeve remains in (or is pre-assembled into) the paddle cavity as part of the paddle assembly. This adds flexibility for the user and can reduce the overall cost of the system. Thus, in this embodiment, the bra system may be sold as kit, with interchangeable wires of different shapes and depths. For example, such a kit can come with three force-generating wire components one that, when assembled creates a shallow plunge bra system, another wire that creates a mid-plunge system and a third that creates a deep plunge bra system.

[0048] Rotational Adjustability—Post+Screw. Other rotational adjustment embodiments are shown in FIGS. **8**A and **8**B. FIG. **8**A shows pin **300** of a compression bar as a simple post inserted into paddle cavity. Pin **300** may be a simple cylinder that is free to rotate in the cavity and may be set in place at the desired angular rotation simple by a screw, such as a set screw. In another embodiment pin **300** may be multi-sided, such as in the shape of a hexagon with a corresponding hexagonal mating cavity. The user simply inserts pin **300** into paddle cavity at a desire détente angle. Pin **300** may be plastic or metal. In either embodiment snap ring **310** acts to snap pin **300** into its mating cavity. In yet another embodiment shown in FIG. **8**B, pin **350** is a threaded post. Pin **350** then screws into paddle cavity with a mating threaded inner circumference. Preferably included in this design is a stop nut that allows paddle angular adjustment to a desired angle A horizontal set screw may also be used in this embodiment to help prevent rotation under pressure. It should be noted that the descriptions contained herein regarding the rotational adjustability do not limit the options only to those described. For example, it can also be envisioned that the pin is part of the paddle, and the cavity is contained in the force-generating member. All of the options and capabilities described previously can be applied to this new configuration except pin and cavity relationship reversed.

[0049] Compression force adjustability—Translation of the Bar. Turning to the second dimension of bra adjustment, compression force adjustability, as discussed above in connection with FIG. **4**, the present invention contemplates, in some embodiments, a telescoping compression force bar system, where one of bar components **130** and **140** may slide into a hollow inner cavity of the other. FIGS. **9**A and **9**B show one such embodiment, whereby left bar component **520** having notched holes **522***a*-**522***n* slides into right bar component **500** having angled-teeth like structures **502***a*-**502***n*. Each tooth **502** snaps into a notched hole **522** as it passes over it as the two components are pressed together. Moreover, as seen, left bar component **520** may have a visible numbering system printed on it, 1 . . . n, with each number corresponding a translational position of the bar system, with the higher the number corresponding to a greater degree of compression force. Thus, sliding left bar component **520** into right bar component **500** until the first notched hole **522***a* engages first tooth **520***a* resulting in the widest bar adjustment. At the other extreme, sliding component **520** into component **500** the maximum distance, such that tooth **520***n* snaps in hole **522***a* and the tooth **520** (n−1) is notched into hole **522***b* and so forth may results in shortest compression bar that provides the greatest compression force on the wearer's breasts. Since the teeth **520** are biased as shown, translational adjustment in this embodiment can only be made to move in one direction—inward, or from longer to shorter bar system. Thus, to enable the two components **500**, **520** to be separated, the present design envisions a release mechanism, such as a twisting action that releases all engaged teeth **502***a*-**502***i* by twisting the components and pulling them apart.

[0050] Compression force adjustability—Other Translation Options. FIGS. **10**A and **10**B show other options for adjusting the length of the bar component system. FIG. **10**A contemplates a simple screw-in design, wherein left bar component **520***b* is threaded and screws into the threaded cavity of right bar component **500***b*. The user simply stops screwing the components together at the desired component pair length corresponding to the desire compression force. FIG. **10**B shows another simple design whereby left bar component **520***c* is inserted into the cavity of right bar component **500***c* and a trap pin **502***c* is inserted through holes in each component to secure them together. Other options are contemplated and are within the scope of the present invention. Anyone skilled in the art will note that there are many known mechanisms of creating translation in a plastic or metal bar.

[0051] The present invention is not limited to using one class of material for all components. Thus, while plastic components may be desirable from the perspectives of producibility (plastic extrusion), weight (low) and cost (low), these designs may also incorporate metal components to improve the strength and integrity of some aspects of the design. Thus, referring to FIG. **11**, the base configuration bra system shown in FIG. **4** may be modified with a modified plastic support bar structure that incorporates a metal or other stiff material such as carbon steel, pin subassembly **600***a*, **600***b* through the inner portion of support bar components **130'**, **140'**. As seen, this subassembly may comprise a first thin steel tube **600***a* that receives steel pin **600***b*, providing an increase in the strength of the bar, and, as seen, enabling a potentially very large reduction in the overall diameter of the horizontal mating parts of bar components **130'**, **140'**. In operation, as support bar component **140'** is pressed into or pulled away from support bar component **130'**, pin **600***b* corresponding slides into or away from bar **600***a*, enabling the bra system to provide the desired compression force on the outer sides of the breasts. In this example the any of the mechanisms shown in FIGS. **9** and **10** can be used to translate the length of the bar, while the steel pin subassembly creates the strength required to make the bar much smaller than would otherwise be possible with plastic alone.

[0052] The present invention may also use another inventive metal-plastic hybrid solution for the force-generating bar system. As seen in the illustrative cutaway view of FIG. **12**, compression bar assembly **700** includes a single stiff metal wire **710** (thus, this configuration does not offer translational adjustment but instead depends on the bending of the wire bar to achieve width adjustment), with an end **712** that is fixed (preferably during manufacturing) into conically-shaped plastic paddle pin **714**. Then, typically during user assembly, pin **714** is inserted into the cavity of its mating paddle and rotationally adjusted using any of the configurations discussed above in connection with FIGS. **4**-**8**. As further seen in this hybrid plastic-wire compression bar system, metal wire **710** is configured with a "squiggle-like" bend **720** at the location where wire **710** is wedged into plastic pin **714** as shown. This squiggle configuration stabilizes and provides torque control at the metal-plastic interface to help prevent slipping when a user forcibly rotates a paddle. In another variant of this solution, the plastic pin is molded directly onto the wire and the "squiggle" is employed to create a strong connection of the wire to the pin thus preventing rotation or translation of the plastic pin relative to the wire. It should be noted that the anti-rotation function of the squiggle can be achieved on other ways as well. Approaches such as flattening the bar, splitting the bar or otherwise deforming the bar before molding the wire into the pin assembly may be used to create the means to prevent rotation of the pin assembly with respect to the wire during use of the bra due to torque generated on the paddle during use, translating to the plastic pin and then to the wire.

[0053] One further option to the configuration shown in FIG. **12** may be whereby wire **710** is extended through pin **714** and sticks out of its top a short distance. In this case, where pin **714** is inserted into paddle **102**, pin **714** will connect further into paddle **102** improving the transfer of force from paddle **102** to wire **710** within force-generating assembly **700**.

[0054] A further configuration shown in FIG. **13**, may complement or replace the embodiment shown in FIG. **12**. As seen, metal sleeve **750** having multiple teeth **752*a*-752*n*** is inserted and fixed into paddle cavity **760**. A metallic (or other) wire may also have surface conditioning on the sections that are pressed into paddle cavity **760**, such that the conditioned sections engage teeth **752*a*-752*n***. Thus, in assembly, a metal-to-metal ratchet interface is created between the conditioned bar and the metal sleeve **740**. The end of the bar may be held tightly in the paddle cavity **760** via a press fit with the friction generated between the insert and the cavity wall. In this way a strong support for the paddles are created with an adjustment that occurs between the press fit metal insert and the conditioned metal bar. Due to the small diameter of the wire in this case, a vernier method may be used whereby the teeth are offset within the cavity and the 'ratchet' action is engaged at different physical distances along the wire depending on the angle of the paddle.

[0055] The present invention also discloses a means for adjusting the "splay" of the paddle relative to the compression bar. Splay is the amount of outward rotation of the paddle relative to the part of the bar that crosses across the user's body. This is shown conceptually in the partial bar view of FIG. **14**, where the bend **802** of compression bar **800** includes a selectable rotation mechanism **810**, similar in concept to the rotatable ratchet design discussed above.

[0056] Thus present invention has thus far been disclosed with respect to paddle and compression bar adjustment. It should be understood however, that in preferred embodiments, while the inventive bra is worn, the paddles, typically plastic, will not directly engage, or touch, the user's breasts. Instead, some soft material, such as soft pads and or fabric and anti-skid or anti-slip material, is typically employed between the inner surfaces of the paddles and the outer sides of the wearer's breasts, as well as on the outer surface of the paddles. In present invention now discloses numerous configurations for these pads as used with any of the embodiments discussed above.

[0057] As seen in FIG. **15**, in one configuration, a volumizing pad **900** is shown having an inner side **910** that interfaces directly with the breasts of the wearer, and outer side **920** that would generally contact the inner side of clothing of the wearer. Antiskid or antislip material may optionally be used by the present invention and it would be attached to the inner side of the volumizing pad. As seen, pad **900** has a hollow pocket **912** between inner side **910** and outer side **920** into which a paddle is inserted via pad slot **930**. The paddle may be shifted inside the pocket to affect the best fit of the volumizing pad to the shape of the breast. As further seen in FIG. **16**, inner surface **1002** of paddle **1000** may optionally have an anti-skid material **1010** applied to it in order to prevent slippage of pad **900** with respect to paddle **1000** when the paddle is inserted to pad **900** via slot **130** and positioned on it.

[0058] In alternative embodiments, a volumizing pad may also be fixed directly to the outside of paddle **1000** without the pocket configuration shown in FIG. **15**. in a number of ways. The inner side of the pad may be glued, "Velcroed", or secured using a specialized connection between the pad and the outer side of paddle, such as a slot or a hook formed directly into the plastic paddle outside, or some other connection mechanism as will be understood by those skilled in the art.

[0059] Referring back to FIG. **16**, anti-skid or anti-slip material **1010** may be attached to the inner side **1002** of the paddle and can take many forms including but not limited to: a thin slice or sticker of material that is sticky on both sides; a coating added to at minimum the inside of the paddle that remains sticky; a sticky material that can flow some amount that is applied to inside of paddle; or a rough surface on inner side of paddle which can grip the volumizing pad directly. This latter embodiment may remove the need for anti-skid material altogether, particularly in cases where the paddle is inserted into the pocket of the volumizing pad. Also, in some implementations sticky material may also be applied to the volumizing pads.

[0060] It should be understood that volumizing pad **900** with pocket **912** in FIG. **15**, along with one or more pieces of anti-skid material may take numerous configurations when interfacing with its mating paddle. These layered configurations are symbolically disclosed in FIGS. **17**A, **17**B and **17**C. Thus, in one inventive option seen in FIG. **17**A, a novel volumizing pad with a paddle inserted therein has a voluming pad portion whose volumizing outer side is designed to round out the look of the compressed breast and engages the clothing the wearer and an inner side, called here "pocket wall" that meets the outer side of the paddle. The inner side of the pad is novelly constructed with anti-skid or anti-slip material that is embedded directly into and throughout the pad fabric. In this way, this inner side pocket wall can "stick" or stay in place against the inner surface of the paddle, while at the same time the opposite side this inner side of the pad that directly engages the breast can "stick to" the breast. FIG. **17**B is similar, but with a few changes including the use a separate anti-skid application on the side of the pad that engages the breast. Also, as seen, there may be no need for additional structure to keep the paddle in place relative to the pad into which it is inserted with the use of a high friction paddle that naturally "grabs" the inner pocket walls of the pad. Finally, FIG. **17**C shows a configuration in which anti-skid material is added to both sides of the inner pocket wall of the pad to achieve the needed "sticking" friction of the pad to both the paddle and the wearer's breast.

[0061] In yet further optional improvements to the pads of the present invention that encase the paddles of the bra system of the present invention, FIGS. **18**A-D disclose a two-piece volumizing pad **1100** that is seamless and completely smooth when worn by a user. Pad **1100** comprises a domed, volumizing outer pad component **1102** and a thin inner pad **1104** component having a back side **1104***b*, whose outer perimeter is sealed to the outer perimeter of the back side **1102***b* of outer pad component **1102**. Inner pad **1004** has a slot **1106** disposed across a portion of its body serving (as best shown in FIG. **18***c*) as the insertion point for a paddle. When a paddle is first inserted through slot **1106**, pad **1100** may be positioned (rotated) about the paddle in accordance with the volumizing shaped desired by the wearer. In some embodiments, once pad **1100** is positioned relative to its inserted paddle, the frictional force applied by the breast that is being forced inward (to create the cleavage effect) will be sufficient keep the pad from moving relative to its paddle. Optionally, to prevent slippage, a small sheet of sticking material may be attached to either the back side **1102***b* of pad **1100** or the back side **1104***b* of thin inner pad **1104**, which will engage and hold either the outer surface of the paddle (in the case of the sticking sheet being on the back side **1002***b*) or the inner surface of the paddle.

[0062] Moreover, the shape of volumizing pad **1100** is novel and inventive in its own right. In particular, as best seen in FIG. **18***a*, the outer side of volumizing outer pad component **1102** is egg-shaped. This adds great versatility to pad **1100** because it is not only rotatable on a paddle to create the look desired by the wearer's appropriate to her particular breast shape, it is also reversible in the sense that it may be place over either the left breast paddle or right breast paddle.

[0063] As further seen in FIG. **18***b*, a sheet of sticky material **1108** that stuck to the outer side of think inner pad **1004** may be provided to provide a sticky friction for the portion of the breast that engages this inner side of pad **1100** so that pad **1100** does not slide down off the breast when worn. In the present embodiment, sheet **1108** comes with a peel-off cover sheet that is peeled off right before wearing. Sheet **1108** may comprise different materials. In one embodiment, it is made from "biogel", which is highly and repeatedly effective to keep engagement against the skin—even with swimming or dancing. Alternatively, sheet **1108** may comprise anti-slip, medical-grade silicon stickers. Sheet **1108** may also include holes across its surface in order to allow the skin to "breath" and sweat.

[0064] Now will discuss the unique pad design that eliminates bumps or ridges visible over the clothing that covers the bra of the present invention. Turning back to top, back and side views of pad **1100** shown in FIGS. **18***a*-**18***c*, the perimeter of pad **1100** has no seams and flares slightly inward such that when placed firmly on a breast the perimeter engages the breast first and slightly deforms to make a smooth pad-breast transition. This is achieved in manufacturing as best seen in FIG. **18***d* by forming outer pad component with a slight ridge **1120** on its inner side **1102***b*. Then, when the inner side **1104***b* of inner pad component **1104**, whose area and shape matches that of inner sider **1104***b*, is glued (or otherwise permanently attached) to inner side **1102***b*, the assembly is perfectly smooth and rounded.

[0065] It should be understood that the pads of the present invention may be made in any appropriate soft material that provides sufficient volume while being lightweight and comfortable to wear. The pads may also be offered in different sizes to match the size of the user's breasts. In some embodiments, a single Misses Kisses bra kit comprising paddle, compression bar and pad components according to the present invention, four different sized pad sets (or more or less) may be included in one kit covering, for example, petite, regular, large and curvy (extra large) breasts.

[0066] While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Various changes, modifications, and alterations in the teachings of the present invention may be contemplated by those skilled in the art without departing from the intended spirit and scope thereof. It is intended that the present invention encompass such changes and modification.

What is claimed is:

1. A volumizing pad configured to provide contouring to a support system to support a breast of a wearer, the volumizing pad comprising:

- a first surface configured to make contact with the clothing of the wearer;
- a second surface configured to make contact with the breast, the second surface including:
  - a first subsurface configured to make contact with the breast, the first subsurface including a first high-friction portion configured to minimize motion between the first subsurface and the breast; and
  - a second subsurface including a pocket configured to enclose a paddle associated with the support system; and
- a padded section sandwiched between the first surface and the second surface, wherein the padded section is configured to provide contouring to the volumizing pad.

2. The volumizing pad of claim **1**, wherein the first surface and the second surface are contoured such that an edge formed from an intersection between the first surface and the second surface forms a visually seamless interface between the edge and the breast as viewed through the user's clothing.

3. The volumizing pad of claim **1**, wherein the first subsurface includes a perforated layer to facilitate perspiration by the wearer.

4. The volumizing pad of claim **1**, wherein the volumizing pad is dome-shaped.

5. The volumizing pad of claim **1**, wherein the second surface includes a slot that provides access to the pocket.

6. The volumizing pad of claim **1**, wherein the first high friction portion is incorporated onto the first subsurface.

7. The volumizing pad of claim **1**, wherein the first high friction portion is adhered onto the first subsurface.

8. The volumizing pad of claim **1**, wherein the second high friction portion is incorporated onto the second subsurface.

9. The volumizing pad of claim **1**, wherein the second high friction portion is adhered onto the second subsurface.

10. The volumizing pad of claim **1**, wherein a volume of the pocket is larger than a volume of the paddle to facilitate user adjustment of the volumizing pad relative to the paddle.

11. The volumizing pad of claim **1**, wherein the second subsurface further includes a second high-friction portion configured to minimize motion between the second subsurface and the paddle.

12. A volumizing pad configured to provide contouring to a support system to support a breast of a wearer, the volumizing pad comprising:

a first surface configured to make contact with the clothing of the wearer; and

a second surface configured to make contact with the breast, the second surface including:

a first subsurface configured to make contact with the breast, the first subsurface including a first high-friction portion configured to minimize motion between the first subsurface and the breast;

a second subsurface including a pocket configured to enclose a paddle associated with the support system, the second subsurface further including a second high-friction portion configured to minimize motion between the second subsurface and the paddle; and

one or more layers of padding material to provide cushioning and contouring functions for the volumizing pad.

13. The volumizing pad of claim **12**, wherein the first surface and the second surface are contoured to provide a substantially seamless interface between an edge of the first subsurface and the breast, as viewed through the user's clothing.

14. The volumizing pad of claim **12**, wherein the first subsurface includes a perforated layer to facilitate perspiration by the wearer.

15. The volumizing pad of claim **12**, wherein the volumizing pad is dome-shaped.

16. The volumizing pad of claim **12**, wherein the second surface includes a slot that provides access to the pocket.

17. The volumizing pad of claim **12**, wherein the first high friction portion is incorporated onto the first subsurface.

18. The volumizing pad of claim **12**, wherein the first high friction portion is adhered onto the first subsurface.

19. The volumizing pad of claim **12**, wherein the second high friction portion is incorporated onto the second subsurface.

20. The volumizing pad of claim **12**, wherein the second high friction portion is adhered onto the second subsurface.

21. The volumizing pad of claim **12**, wherein a volume of the pocket is larger than a volume of the paddle to facilitate user adjustment of the volumizing pad relative to the paddle.

22. A volumizing pad configured to provide contouring to a body part of a wearer, the volumizing pad comprising:

a first surface configured to make contact with the clothing of the wearer;

a second surface configured to make contact with the body part, wherein the second surface is a substantially continuous surface; and

a padded section sandwiched between the first surface and the second surface, wherein the padded section is configured to provide contouring to the volumizing pad, wherein the first surface is designed to flare towards the body part to engage the body part, wherein the first surface includes a ridge configured to interface with the second surface, wherein the ridge makes contact with the body part, and wherein an edge of the first surface forms a visually seamless interface between the first edge and the body part as viewed through the user's clothing.

23. The volumizing pad of claim **22**, wherein the body part is a breast of the user.

24. The volumizing pad of claim **22**, wherein the body part is a buttock of the user.

25. The volumizing pad of claim **22**, wherein the body part is a hip of the user.

* * * * *