



US 20120171929A1

(19) **United States**  
(12) **Patent Application Publication**  
**CHEUNG**

(10) **Pub. No.: US 2012/0171929 A1**  
(43) **Pub. Date: Jul. 5, 2012**

(54) **COMFORTABLE ARC-SHAPED UNDERWIRE**

**Publication Classification**

(75) Inventor: **Suilung CHEUNG,**  
GUANGDONG (CN)

(51) **Int. Cl.**  
*A41C 3/14* (2006.01)  
*A41C 5/00* (2006.01)

(73) Assignee: **KAIPING HUNGHON**  
**GARMENT ACCESSORIES**  
**CO., LTD., GUANGDONG (CN)**

(52) **U.S. Cl.** ..... **450/52; 450/92**

(21) Appl. No.: **13/226,511**

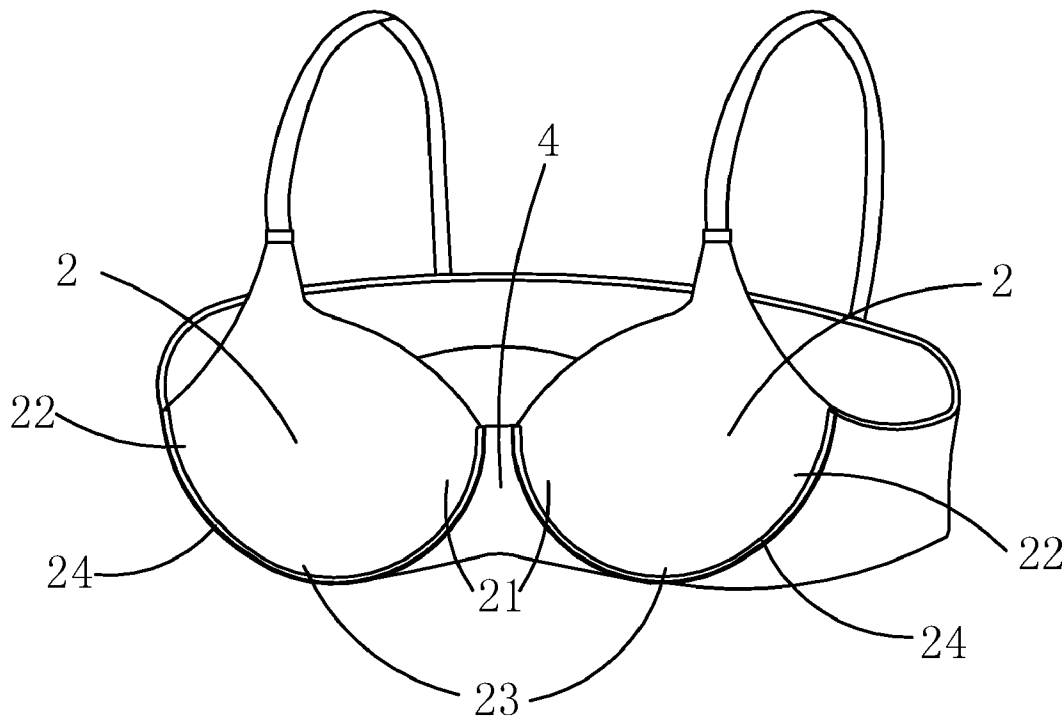
(57) **ABSTRACT**

(22) Filed: **Sep. 7, 2011**

The utility model relates to the field of women's underwear. The technical problem solved by the utility model is to provide a comfortable arc-shaped underwire with simple structure. The arc-shaped underwire, which is embedded in the lower edge of a bra cup for supporting, the underwire is arc-shaped as a whole and is provided with an inner and outer end that respectively faces and deviates from the middle part of the bra, characterized in that at least one end of the outer and inner end deflects in a direction deviating from the body. This structure is different from the traditional one extending upwards which means the end of the underwire maintains a certain gap with the body to ensure that it would not press the users. The structure is comfortable to use.

(30) **Foreign Application Priority Data**

Jan. 1, 2011 (CN) ..... 201120006583.0



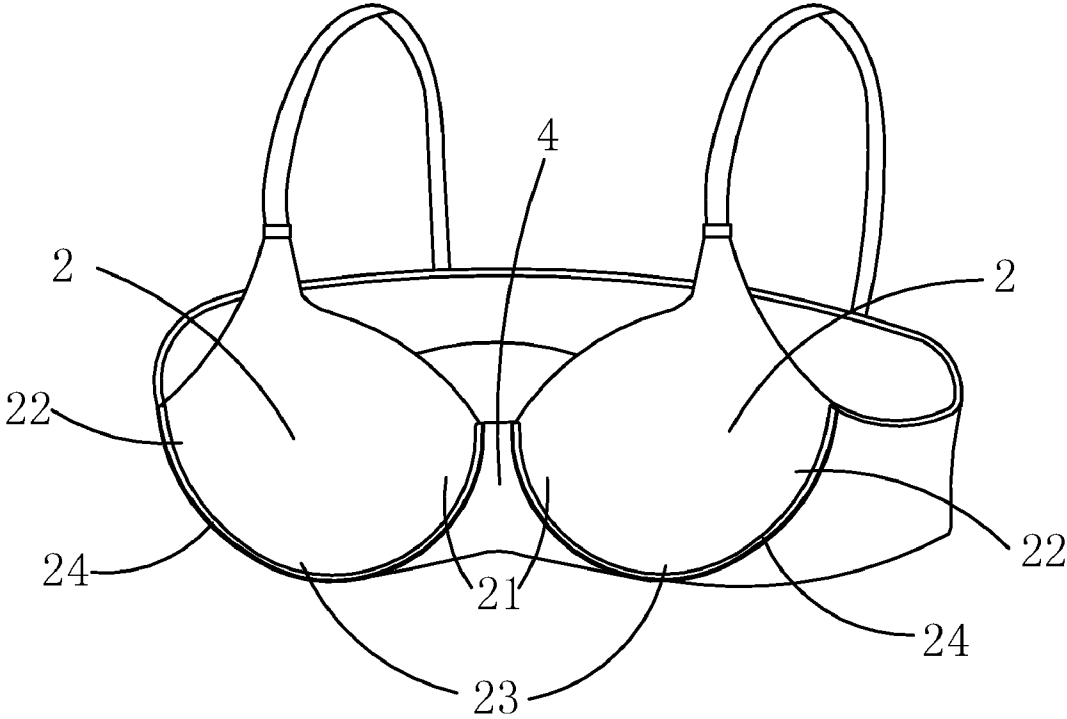


FIG.1

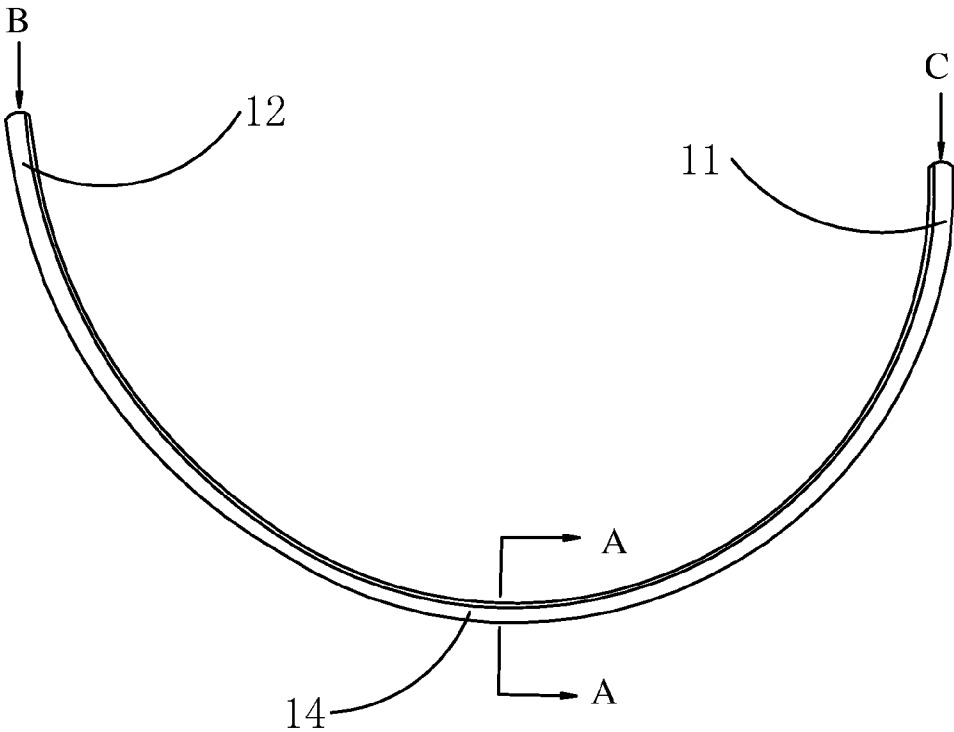


FIG.2

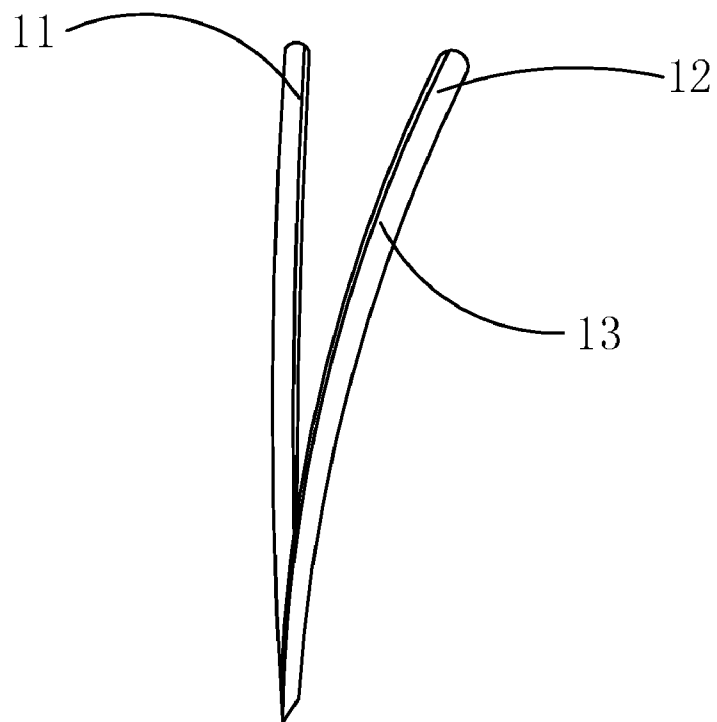


FIG. 3

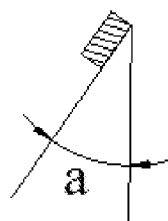


FIG. 4

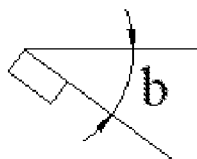


FIG. 5

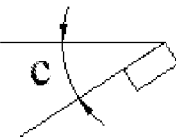


FIG. 6

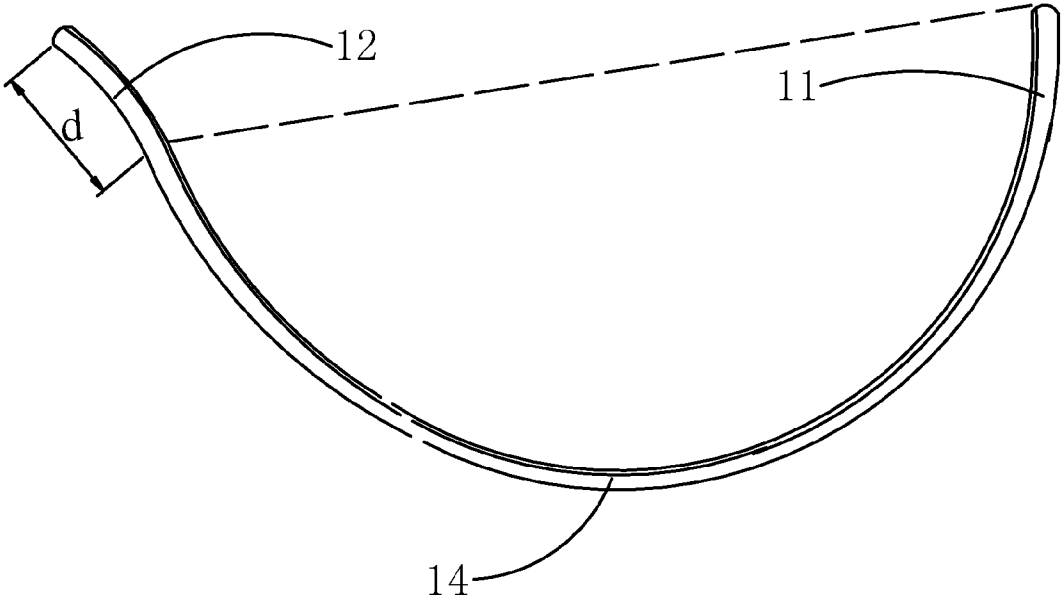


FIG. 7

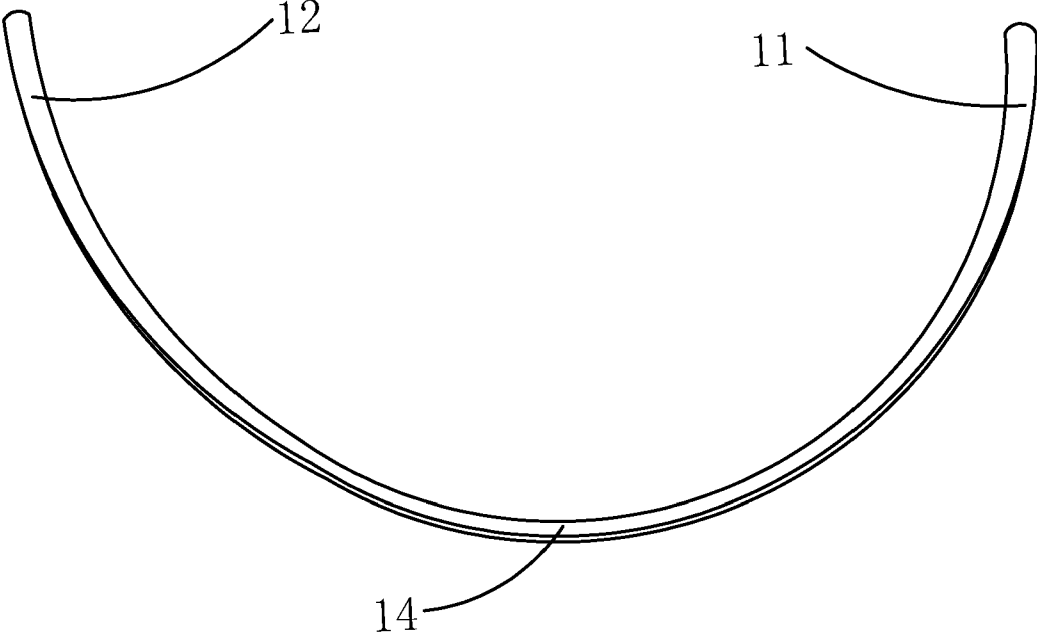


FIG.8

**COMFORTABLE ARC-SHAPED UNDERWIRE**

**BACKGROUND OF THE INVENTION**

[0001] The utility model relates to the field of women’s underwear, in particular to a comfortable arc-shaped underwire.

[0002] In order to get better body shape, the lower edge of the cup of the existing bra, shape wear and other women’s underwear is lined with the semi-circular underwire. Most of the current underwires are made by bending the banded metal strip into the semi-circular one. However, the planar underwire cannot be matched with the hemispherical cup, so the exertion of the functions of the underwire is influenced, which means the underwire has bad supporting effects. What’s more, traces of the underwire tend to be left on the body of the uses who wear the bra, influencing the comfort when wearing. In addition, the both ends of the current arc-shaped underwire are extended upwards, so it tends to twist under pressure when using and makes the users have the feelings of being oppressed and sick.

[0003] In order to wear comfortably, the current underwires are made close to the body curve of the chest, which could get more contact area between the corsage supported by underwire and the breast. However, each female has different curve of chest, the current underwires are made by elastic material. After a period of wearing, the underwire can match the curve of the chest through the body activity. This technology has been used for long time, as U.S. Pat. No. 3,884,244, and the Chinese patent of the present inventor CN200620058554.8, CN200710029877.3, CN200720055986.8, CN200720055985.3, CN200910040015.X. But the period from starting to wear this kind of underwire to matching the curve of chest is long, the user could feel uncomfortable even the user is wearing for long time.

[0004] There are many underwires made by inelastic material and made into the shape matched with the curve of chest, as the U.S. Pat. No. 6,346,028B1 and No. 7,425,170B1. However, this kind of underwire made by inelastic material can not meet the users’ variety requirements. The consumer will fell uncomfortable when taking activities with the corsage worn.

**BRIEF SUMMARY OF THE INVENTION**

[0005] The technical problem solved by the utility model is to overcome the shortcomings of the prior art and to provide a comfortable arc-shaped underwire with simple structure.

[0006] In order to solve the aforementioned technical problem, the technical protocol adopted by the utility model is as follows:

[0007] A comfortable arc-shaped underwire which is embedded in the lower edge of a bra cup for supporting, the underwire is arc-shaped as a whole and is provided with an inner and outer end that respectively faces and deviates from the middle part of the bra, wherein at least one end of the outer and inner end deflects in a direction deviating from the body. This structure is different from the traditional one with no deflection, which means the end of the underwire fits the curves of a women’s chest better to ensure that the ends of the underwire would not press the users, so that the structure is comfortable to use. In Regard of the actual contact between the cup and the body, the structure in which the outer end deflects in a direction deviating from the body is preferred. The scheme of present invention is based on the underwire

made by existing elastic material, the underwire is provided with pre-deformation when making, as the outer or inner end which matches the curve of chest deflects in a direction deviating from the body. The advantage to the users is the underwire based on the pre-deformation can deform and match the body curve rapidly, and there is bigger contact area between the corsage supported by the underwire and breast in a short time, so that the uncomfortable wearing process can be shortened.

[0008] In order to ensure the maximum comfort for using, the deflection is as follows: the underwire starts to deflect gradually towards the outer or inner end from the side of the cup to form an inclined section that has a smooth transition with other parts of the underwire. The smooth transition is to ensure that there is no bending or bumps on the underwire, that is, there is no obvious over-rotation angle and the underwire sheath of the cup won’t be worn when used and washed, further facilitating the improvement of the comfort when wearing. Preferably, the inclined section is an arc-shaped section that gradually deflects in a direction deviating from the body. The arc-shaped structure is adopted to avoid the contact of the end of the underwire to the body when using. What’s more, during movement, the arc-shaped section is the main section to contact the human body so that the contact area is larger, thereby reducing the pressure on the human body and enhancing the comfort.

[0009] In order to ease the squeeze of both ends of the arc-shaped underwire on the chest, the inner or outer end of the arc-shaped underwire extends towards both sides of the cup to form an arc-shaped section that bends outward. This structure fits the aforementioned deflected structure and also has the effect of increasing the contact area, greatly improving the wearing comfort and reducing the pressure on the chest and other body parts.

[0010] The inner and outer end of the arc-shaped underwire can be designed as the asymmetric structure and the outer end of the arc-shaped underwire extend continuously along the direction of arc-shaped tangent exceed 0.5~5 cm out of the inner end, forming an exceeding section. The length of the exceeding section that is slightly curved is preferably 1~2.5 cm. According to the characteristics of the human body, the outer contour line of the female bust is extended to the armpit, while the inner contour line is only extended to the chest, so the outer edge of the cup has a longer extension compared with the inner edge thereof in order to make bras or underwear that fits human engineering better. This patent is to make the arc-shaped underwire with exceeding section according to the structural characteristics of the human body so that the arc-shaped underwire fits the women’s breast shape better and is more comfortable when wearing.

[0011] The steel wire constituting the arc-shaped underwire is a flat structure with a width. The flat structure makes the underwire have the rigidity according to the arc method, which means on one hand, the underwire is not easily deformed; on the other hand, the fit area between the underwire and the human body curve is increased. What’s more, the underwire sheath can also be made into a sheath with flat structure so as to have the effect of “invisible” underwire. The structure improves the supporting effects of the underwire so that it is more comfortable to wear and more pleasing in appearance. In order to apply to different breast shape or using effects, the flat steel wire can be made into the following three structures:

[0012] The first structure: the flat steel wire of at least one side of the cup has an inclination, while the flat steel wire at the bottom of the cup is vertical without an inclination, wherein the connection between the flat steel wire with the inclination and the flat steel wire without the inclination is gradually transitional. The inclination is defined as the included angle between the horizontal plane and the vertical plane of the flat steel wire when used.

[0013] The second structure: the flat steel wire of at least one side of the cup is vertical without an inclination, while the flat steel wire at the bottom of the cup has an inclination, wherein the connection between the flat steel wire with the inclination and the flat steel wire without the inclination is gradually transitional.

[0014] The third structure: the steel wire constituting the arc-shaped underwire is a flat structure with a width and the flat steel wire has an inclination.

[0015] The third structure is the most preferable structure that can optimize the matching with the human body curve and improve the supporting effects of the underwire.

[0016] The inclination can be 15 to 85 degrees. But generally the inclination of the inclined section ranges preferably from 20 to 75 degrees according to the requirements of different users. If the user has a small chest, the smaller inclination is more appropriate, that is, 30 to 40 degrees are generally taken; if the user has a big chest, the bigger inclination is more appropriate, that is, 60 to 75 degrees are generally taken. For the size of most users, the inclination of the inclined section is preferably  $38\pm 4$  or  $26\pm 6$  degrees.

[0017] In order to ensure that both ends of the underwire are difficult to prick the bra supporter at the lower edge of the cup so as to prolong the service life of the underwear and to increase wearing comfort, the end of the underwire is coated with the paint protection layer, epoxy resin layer or polyurethane layer, or covered by nylon layer or thermoplastic elastomer.

[0018] In order to further enhance the structural safety of the underwire and increase comfort of the using, the end of the underwire can further be covered by at least one layer of thermoplastic sleeve made of polyethylene.

[0019] The wire constituting the underwire of the bra can be stainless steel, high carbon steel, titanium metal wire, resin plastics or polyester plastics. The advantage of using these elastic materials is that the underwire has the possibility of deformation which can transfer and match the curve of chest finally. Additionally, the elastic material has the function of resetting to some extent, that is, the elastic material can restore to its original shape which is suitable to use when taking activity and can not bring the uncomfortable feeling of squeeze.

[0020] Compared with the prior art, the beneficial effects of the technical protocol of the utility model are as follows: at least one end of the outer and inner end of the underwire of the utility model deflects in a direction deviating from the body to form an arc-shaped section that gradually deflects in a direction deviating from the body for avoiding the pressure of the end of the underwire on the body so as to feel comfortable when wearing; Meanwhile, the inner or outer end of the underwire extends towards both sides of the cup to form an arc-shaped section that bends outward to ease the squeeze on the chest, improving the wearing comfort; In addition, the underwire is designed to have a certain inclination, which is

more consistent with the body curve, improving the wearing comfort and having better supporting effects.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. 1 is the diagram of application of the utility model;

[0022] FIG. 2 is the structure diagram of embodiment 1;

[0023] FIG. 3 is the left view of FIG. 2;

[0024] FIG. 4 is the sectional schematic view taken along the direction of A-A of FIG. 1;

[0025] FIG. 5 is the end schematic view taken along the direction of B of FIG. 1;

[0026] FIG. 6 is the end schematic view taken along the direction of C of FIG. 1;

[0027] FIG. 7 is the structure diagram of embodiment 2;

[0028] FIG. 8 is the structure diagram of embodiment 3.

#### DETAILED DESCRIPTION OF THE INVENTION

[0029] The technical protocols of the utility model will be further described below in conjunction with the attached drawings.

##### Embodiment 1

[0030] As shown in FIG. 1 that is the diagram of the application of the utility model, the underwire is embedded in the bra supporter 24 of the lower edge of a bra cup 2 for supporting. The cup 2 comprises an inner side 21 that is close to the middle part of the bra 4, an outer side 22 that deviates from the middle part of the bra 4 and a bottom part 23. FIG. 2 is the underwire in the left cup in FIG. 1. One end of the underwire that is close to the middle part 4 of the bra is the inner end 11, while the other end is the outer end 12. The underwire is arc-shaped as a whole and the outer end thereof deflects in a direction deviating from the body, as shown in the left view of FIG. 3. The underwire starts to deflect gradually towards the outer end 12 from the outer side of the cup 22 to form an arc-shaped inclined section 13 that has a smooth transition with other parts of the underwire.

[0031] The steel wire constituting the underwire has a flat structure with a width and the flat steel wire has a certain inclination, wherein the inclination a of the middle part 14 of the underwire (namely, a section of underwire at the bottom of the cup 23) is 42 degrees, as shown in the sectional schematic view taken along the direction of A-A of FIG. 4. The inclination b of the underwire at the outer side of the cup 22 is 38 degrees, as shown in the end schematic view taken along the direction of B of FIG. 5. The inclination c of the underwire at the inner side of the cup 21 is 40 degrees, as shown in the end schematic view taken along the direction of C of FIG. 6. Each part of the underwire with different inclinations is connected each other in the manner of a smooth transition.

##### Embodiment 2

[0032] Embodiment 2 is similar to embodiment 1. As shown in FIG. 7, the difference only lies in that the inner end 11 and the outer end 12 of the underwire are asymmetric and the outer end 12 of the underwire extends towards the outer side 22 of the cup to form an arc-shaped section that bends outward. In addition, the outer end 12 of the underwire extends continuously along the direction of arc-shaped tangent to exceed 1 cm out of the inner end, forming an exceeding section whose length d is 1 cm. Embodiment 2 is identical

with the left view of embodiment 1, so it can be seen from FIG. 3 that the sides of the exceeding section are slightly curved.

Embodiment 3

[0033] Embodiment 3 is similar to embodiment 1. As shown in FIG. 8, the difference lies in that the middle part 14 of the underwire that is only located at the bottom 23 of the cup is an inclined section with an inclination of 30 degrees, while the underwire that is located at both sides of the cup is a flat section, the flat section is connected with the inclined section by a transition section. The twist angle of the transition section is continually changed starting from the joint with the flat section until the twist angle is identical with the angle of the slope section.

Embodiment 4

[0034] Embodiment 4 is similar to embodiment 1. The difference only lies in that the middle part 14 of the underwire that is located at the bottom 23 of the cup is the flat section with no inclination, that is, it is parallel with the vertical plane when used. However, the underwire that is located at both sides of the cup is an inclined section with a certain inclination, the inclination b at the outer side 22 of the cup is 35 degrees, while the inclination c at the inner side 21 of the cup is 50 degrees. The way of connecting the flat section with the inclined section is identical with embodiment 3, namely, through transition section.

What is claimed is:

- 1. A comfortable arc-shaped underwire, which is embedded in the lower edge of a bra cup for supporting, the underwire is arc-shaped as a whole and is provided with an inner and outer end that respectively faces and deviates from the middle part of the bra, characterized in that at least one end of the outer and inner end deflects in a direction deviating from the body.
- 2. The comfortable arc-shaped underwire according to claim 1, characterized in that the underwire starts to deflect towards the outer or inner end gradually from the side of the cup to form an inclined section that has a smooth transition with other parts of the underwire.
- 3. The comfortable arc-shaped underwire according to claim 2, characterized in that the inclined section is an arc-shaped section that gradually deflects in a direction deviating from the body.
- 4. The comfortable arc-shaped underwire according to claim 1, characterized in that the inner and outer end of the arc-shaped underwire are asymmetric and the outer end of the arc-shaped underwire extends continuously along the direction of arc-shaped tangent to exceed 0.5~5 cm out of the inner end, forming an exceeding section.
- 5. The comfortable arc-shaped underwire according to claim 4, characterized in that the length of the exceeding section is 1~2.5 cm.
- 6. The comfortable arc-shaped underwire according to claim 5, characterized in that the exceeding section is slightly curved.

7. The comfortable arc-shaped underwire according to claim 1, characterized in that the inner or outer end of the arc-shaped underwire extends towards both sides of the cup to form an arc-shaped section that bends outward.

8. The comfortable arc-shaped underwire according to claim 1, characterized in that the steel wire constituting the arc-shaped underwire is a flat structure with a width, wherein the flat steel wire of at least one side of the cup has an inclination, while the flat steel wire at the bottom of the cup is vertical without an inclination and the connection between the flat steel wire with the inclination and the flat steel wire without the inclination is gradually transitional.

9. The comfortable arc-shaped underwire according to claim 1, characterized in that the steel wire constituting the arc-shaped underwire is a flat structure with a width, wherein the flat steel wire of at least one side of the cup is vertical without an inclination, while the flat steel wire at the bottom of the cup has an inclination and the connection between the flat steel wire with the inclination and the flat steel wire without the inclination is gradually transitional.

10. The comfortable arc-shaped underwire according to claim 1, characterized in that the steel wire constituting the arc-shaped underwire is a flat structure with a width and the flat steel wire has an inclination.

11. A method of matching rapidly between arc-shaped underwire and body curve of human, wherein embedding the underwire into the lower edge of the bra cup for supporting, the underwire is provided with an inner and outer end that respectively faces and deviates from the middle part of the bra, making at least one end of the outer and inner end deflect in a direction deviating from the body.

12. The method according to claim 11, characterized in that making the said underwire start to deflect towards the outer or inner end gradually from the side of the cup to form an inclined section which has a smooth transition with other parts of the underwire.

13. The method according to claim 12, characterized in that making the said inclined section an arc-shaped section that gradually deflects in a direction deviating from the body.

14. The method according to claim 11, characterized in that making the inner and outer end of the arc-shaped underwire asymmetric, wherein the outer end of the arc-shaped underwire extends continuously along the direction of arc-shaped tangent to exceed 0.5-5 cm out of the inner end to form an exceeding section.

15. The method according to claim 14, characterized in that the length of the exceeding section is 1-2.5 cm.

16. The method according to claim 15, characterized in that making the exceeding section curved slightly.

17. The method according to claim 11, characterized in that making the inner or outer end of the arc-shaped underwire extend towards both sides of the cup to form an arc-shaped section that bends outward.

\* \* \* \* \*