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(54) **APPARATUS FOR WEARING A WIG**

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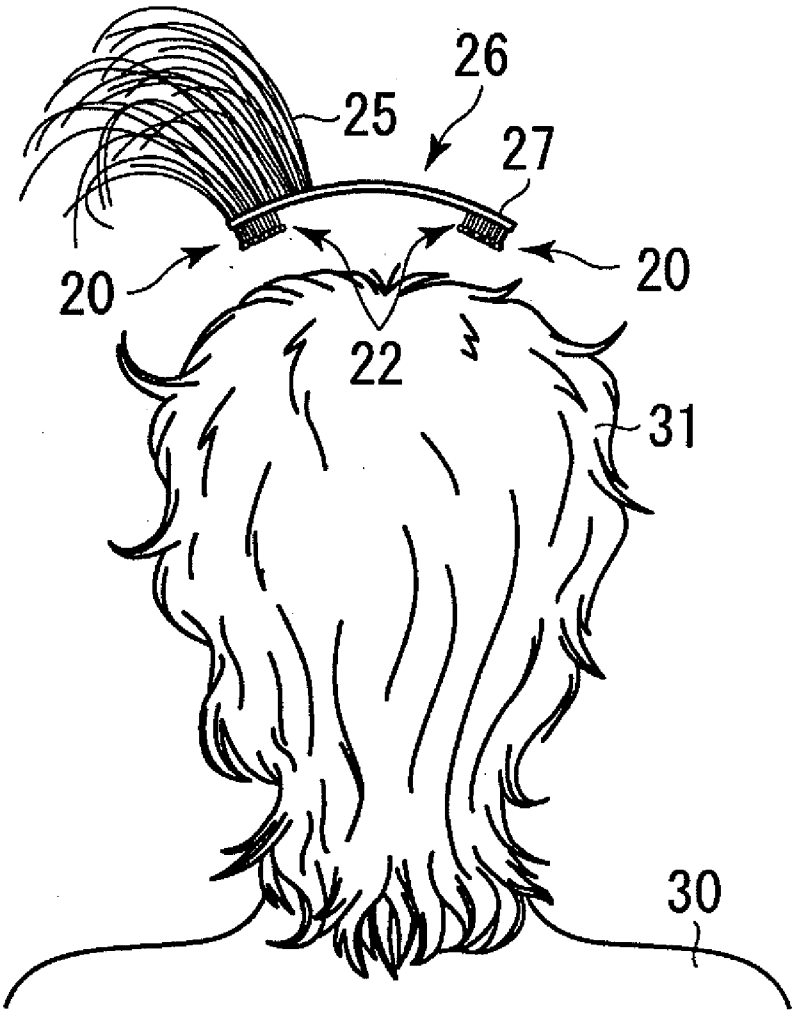
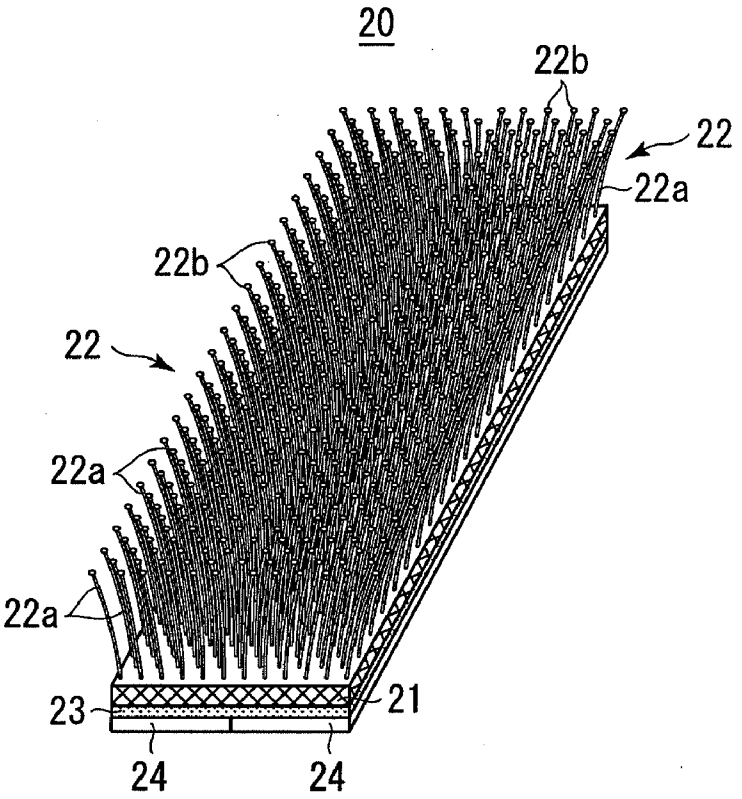
(57) **ABSTRACT**

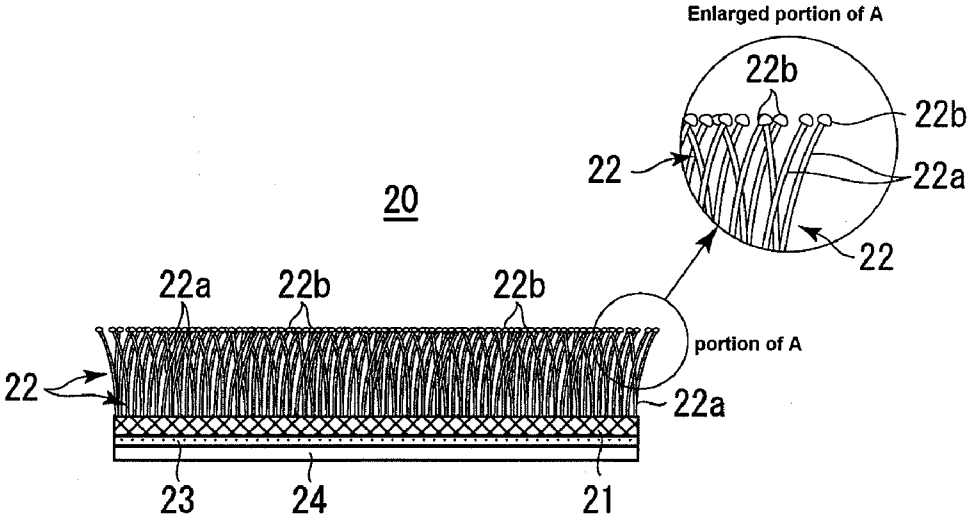
Objects of the present invention is to provide a wig capable of surely and easily being attached only by lightly pressing a wig, which is put on a head of a wearer, from above; to enhance fitness; and to cause no pain in the attaching or detaching operation or while long-time use. A plurality of monofilaments **22**, which get entangled and hooked with natural hair of the wearer, are provided in the form of projection on a first side of a base sheet **21**, and an adhesive layer **23** for bonding to the inside of the wig base is applied on a second side of the base sheet **21**. Each of the monofilaments **22** is composed of a stalk **22***a* extending from the base sheet **21** and a big head **22***b* on the top of the stalk **22***a*. In attaching the wig to the head of the wearer, the monofilaments **22** are deflected by an external pressing force so as to get entangled and hooked with each other, and the natural hair of the wearer gets entangled with the stalk **22***a* or the head **22***b* of the monofilaments **22**, whereby this state of the entanglement is kept to fix the wig onto the head.



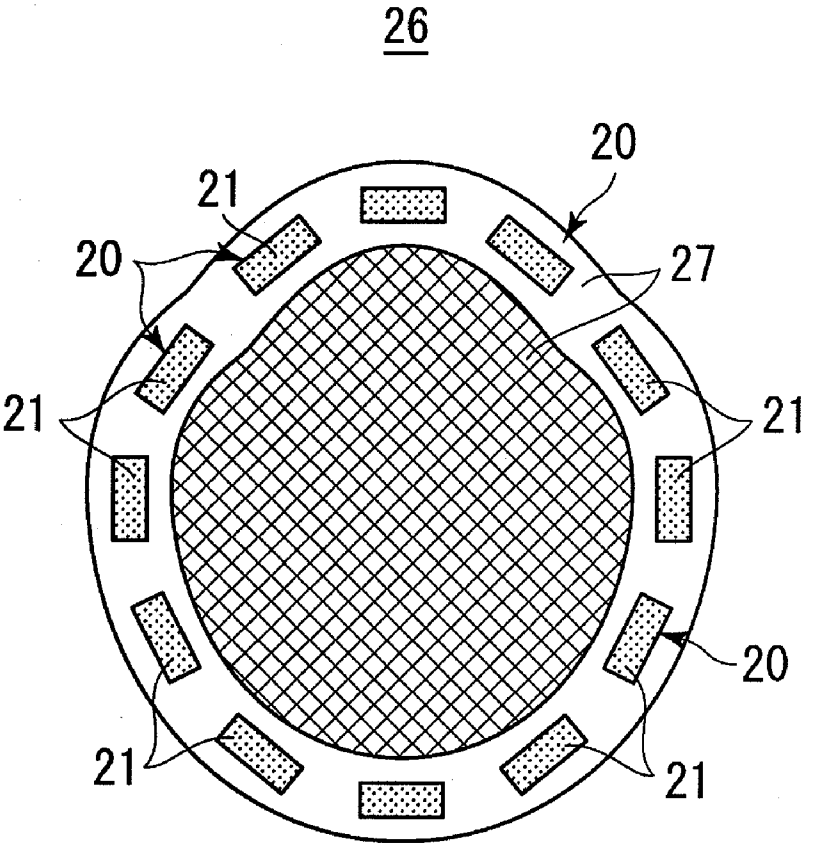
[Fig.1]


20
22b
22
22a
22b
22
22a
22a
23
21
24
24

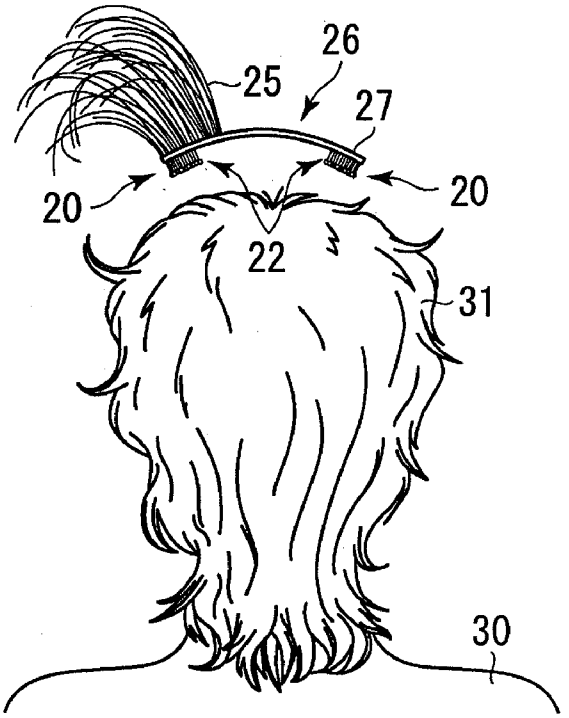
[Fig.2]


Enlarged portion of A
22b
22b
22
22a
22
20
22a
22b
22b
portion of A
22
22a
23
24
21

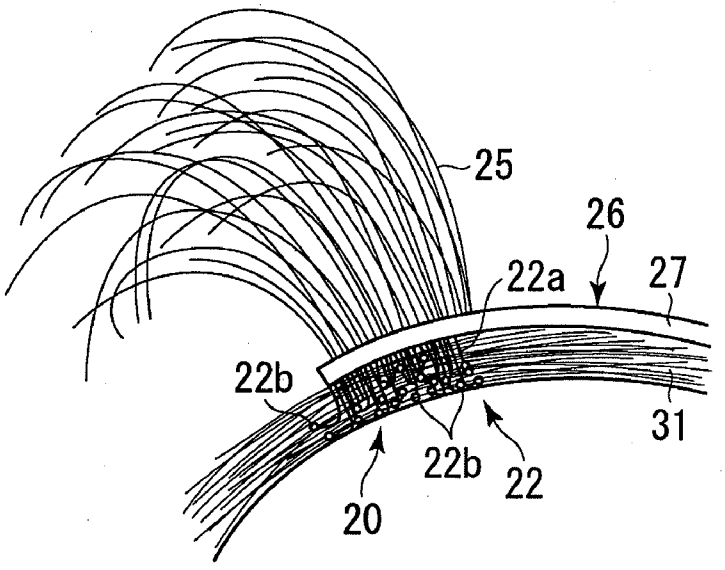
[Fig.3]



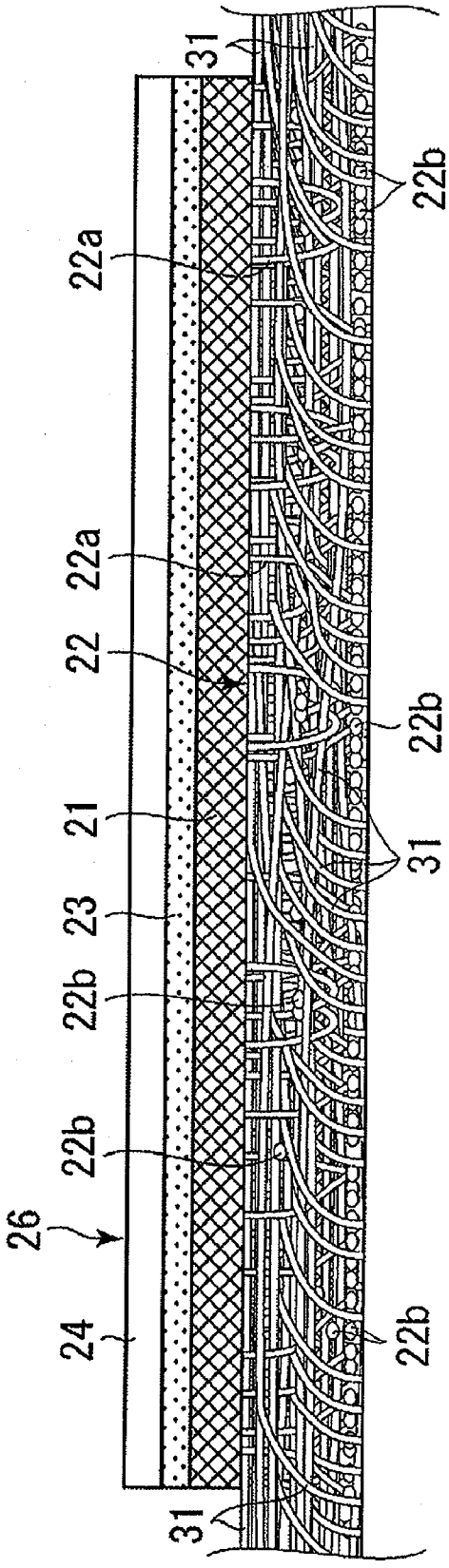
[Fig.4]



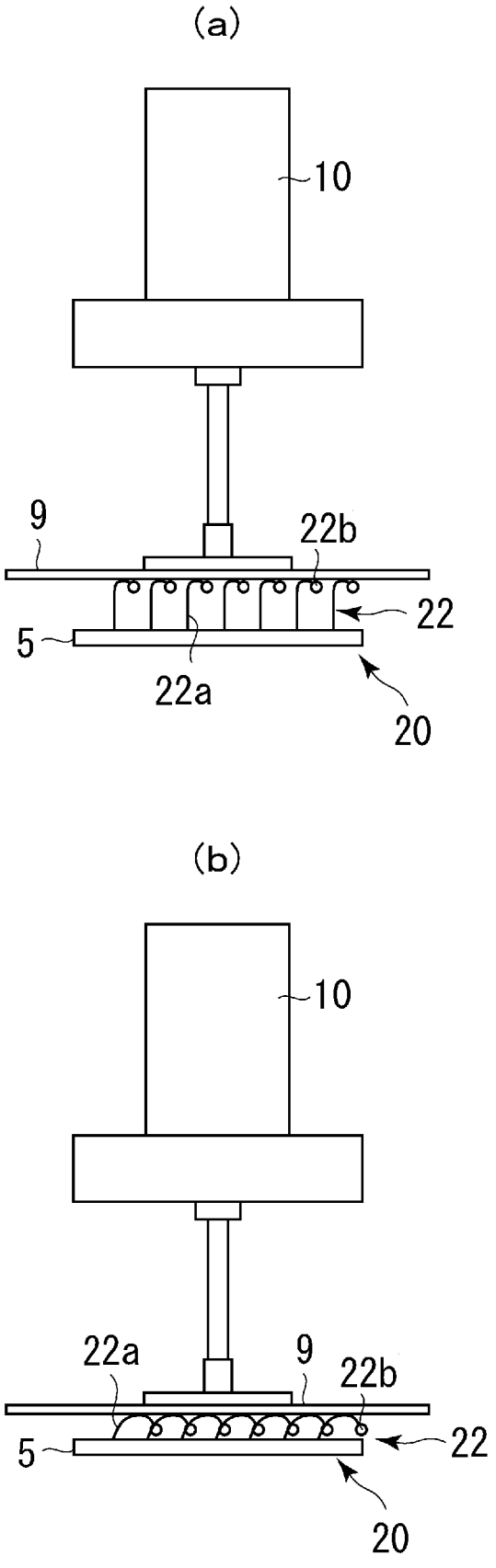
[Fig.5]



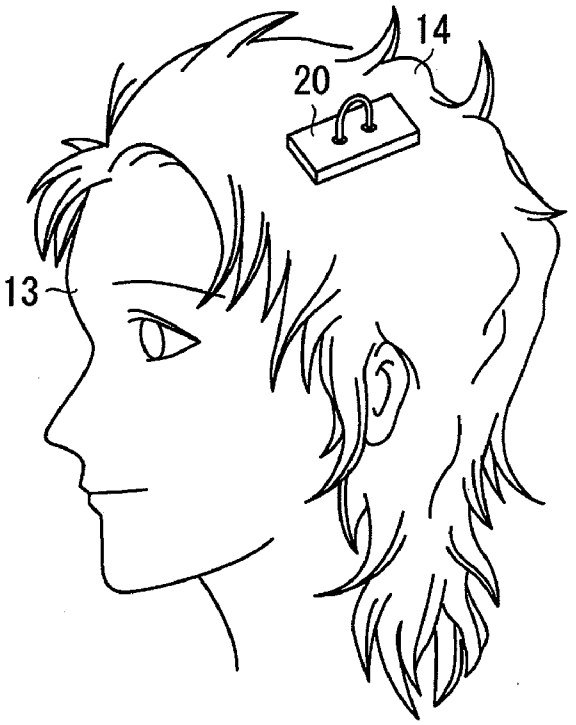
[Fig.6]



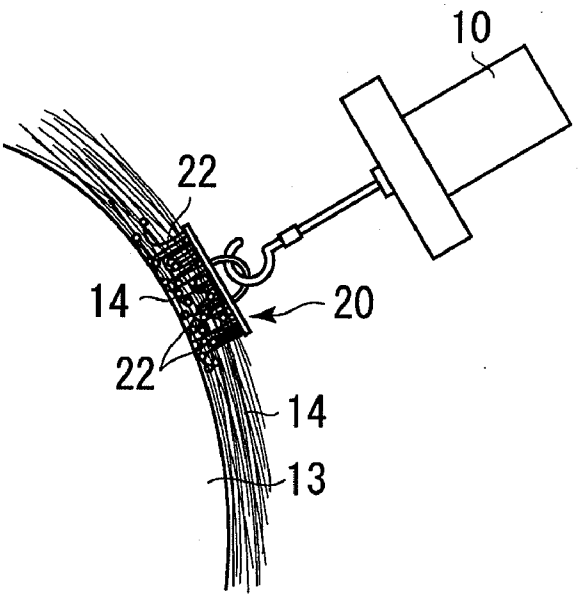
[Fig.7]



[Fig.8]



[Fig.9]



APPARATUS FOR WEARING A WIG

TECHNICAL FIELD

[0001] The present invention relates to an apparatus for wearing a wig that is bonded to the inside of a wig base, to which imitation hairs such as artificial hairs or human hairs are implanted, for easily and surely wearing a wig on a head of a wearer.

BACKGROUND ART

[0002] The followings have been known, as an apparatus for mounting head accessories, such as a wig, a hat and a hair band, onto a head of a wearer. An inversion clip that is made of a metal or synthetic resin and fixed to the inside of a wig base, wherein the inversion clip is so bent as to hold the hairs of a wig wearer with teeth of the inversion clip (Patent Document 1); an apparatus on a back surface of a hair band having a structure, like a male sheet of a hook-and-loop fastener, in which a great number of monofilaments are disposed on a base sheet in the form of projection as an anti-slip tape (Patent Document 2); an apparatus having an head accessory put on a head such as a wig or a hat and a band-like member that elastically surrounds a head, wherein the band-like member and the head accessory put on the head can be attached to and detached from each other by means of attaching means such as a hook-and-loop fastener, hook, or the like (Patent Document 3).

[0003] However, according to the apparatus using inversion clip disclosed in the Patent Document 1, finger strength to some extent is necessary for inverting the inversion clip, and thus an elderly person having a weak finger strength or a person who cannot freely use his/her fingers cannot freely attach or detach a wig by himself/herself. Further, the apparatus entails a problem that the clipped hairs of the wearer are pulled since the inversion clip clips the natural hairs of the wearer, by which the wearer feels pain. The Patent Document 2, which discloses the use of a male sheet of a hook-and-loop fastener for fixing a hair band, describes preferable length and width of a projecting member and its disposal density. This device is used only to prevent a light head accessory put on a head, such as a hair band, from being slipped off from hairs with the structure of the monofilaments by being inserting into the hairs like teeth of a comb. Therefore, this device has weak fixing force to be used as an apparatus for wearing a wig, thus technically insufficient.

[0004] According to an apparatus disclosed in the Patent Document 3, in which a head accessory put on a head and the band-like member are combined, the band-like member is interposed between the head of the wearer and the wig base. Therefore, the wig is not fitted to the head of the wearer, but lifts up, and thus, other persons might notice that a wig is worn. When the hook-and-loop fastener is used as the attaching means, both of the male sheet and the female sheet are interposed between the head of the wig wearer and the wig base to increase the thickness, resulting in that it is difficult for the wig to be fitted to the head. Further, the band-like member is attached to the head of the wig wearer with its elastic force, like a hair band. Therefore, if the elastic force is weak, the wig is easily detached, while if the elastic force is increased, the head of the wig wearer is tightened, which makes it difficult to wear the wig for a long time.

[0005] Patent Document 1: Japanese Utility Model Registration No. 1418657

[0006] Patent Document 2: Japanese Utility Model Registration No. 2591881

[0007] Patent Document 3: Japanese Unexamined Patent Application No. HEM-286821

DISCLOSURE OF THE INVENTION

Problem that the Invention is to Solve

[0008] The present invention is accomplished in view of the foregoing circumstances, and the object is to provide, with low cost, an apparatus for wearing a wig that can easily and surely attach a wig only by lightly pressing the wig, which is put on a head of a wig wearer, from above. Further, the apparatus for wearing a wig is excellent in fitness, and that does not cause pain in the attaching/detaching operation or for a long-time use.

Means to Solve Problems

[0009] In order to solve the above-mentioned problems, an apparatus for wearing a wig according to the present invention includes a base sheet, a plurality of monofilaments in the form of projection disposed on a first side of the base sheet, each having a stalk extending from the base sheet and a big head on the top of the stalk, and an adhesive layer applied on a second side of the base sheet for bonding to the inside of the wig base, whereby the plurality of monofilaments gets entangled and hooked with natural hair of the wearer in wearing the wig and this state of entanglement is kept by hooking force.

[0010] In the present invention, a film having a larger coefficient of friction as compared with a material of the plurality of monofilaments may be applied on the surface of the monofilaments. It is preferable that a peeling force in detaching the apparatus for wearing a wig from the head of the wig wearer is in the range of not less than 0.29 N (30 gf) to not more than 0.98 N (100 gf), the deflecting force of the monofilaments in the vicinity of their tops is in the range of not less than 1.91 N (195 gf) to not more than 6.08 N (620 gf) and the deflecting force of the monofilaments in the vicinity of their bottoms is in the range of not less than 3.73 N (380 gf) to not more than 8.14 N (830 gf), and a disposal density of the monofilaments is in the range of not less than 50 pieces/cm^2 to not more than 120 pieces/cm^2. Further, in the present invention, it is preferable that the height of the stalk of each of the monofilaments is set to be not less than 3 mm and not more than 6 mm, the diameter of the stalk of each of the monofilaments is set to be not less than 0.1 mm and not more than 0.5 mm, and the diameter of the big head of each of the monofilaments is set to be not less than 0.2 mm and not more than 1 mm.

[0011] The apparatus for wearing a wig according to the present invention is bonded to the inside of the wig base with the adhesive layer applied on the second side of the base sheet, and the monofilaments project toward the head. When the wig is put on the head of the wearer, and light pressing force is applied thereon, the natural hairs of the wig wearer and the monofilaments are aligned in the inserting direction to each other. The insertion is further advanced, the natural hairs are bent toward the lateral direction, whereby the monofilaments deflect in the direction substantially parallel to the base sheet or in the direction of the base sheet in the form of U shape or J shape to thereby get entangled with the natural hair of the wearer. In this entanglement, the stalk and the big head on the top of the stalk of each of the monofilaments get

entangled and hooked with natural hairs of the wearer, and the entanglement state between the monofilaments and the natural hairs is kept by a force to keep the hooked state, which is hooking force, whereby the wig is fixed to the head of the wig wearer.

[0012] The monofilaments may be surely entangled to prevent the entanglement from being loosed or from being released by irregularly providing the monofilaments to the base sheet, or applying a film having a larger coefficient of friction as compared with a material of the monofilaments on the surface of the monofilaments. For example, in case where the base sheet is made of nylon, and the monofilament is made of polypropylene, the friction force may be increased to enhance a fixing strength by applying an elastomer solution having a friction coefficient larger than that of the monofilament to form a film. In forming a film, the thickness of the film covering the surface of the monofilament is preferably not more than 10 μm. When the thickness of the film is 10 μm or more, the film on the stalk and the film on the head of the stalk become too thick to decrease the gap between the monofilaments. As a result, the natural hairs cannot go in between the monofilaments, so that the natural hairs are pressed by the head of the stalk, which makes it difficult for the monofilaments to entangle with the natural hair. Thus, it is non-preferable. As the elastomer solution, a 5 wt % solution obtained by dissolving a pellet of a styrene-based thermoplastic elastomer, specifically Quintac QTCSL-125 by Zeon Corporation, into toluene can be applied to the monofilaments.

[0013] The monofilament of the apparatus for wearing a wig has flexibility to some extent for getting entangled with the natural hairs of the wig wearer. Because of this flexibility, the stalk of the monofilament suitably deflects, whereby the big head on the top of the stalk get entangled and hooked with the stalk or the big head of other monofilaments, and the natural hairs get entangled between the monofilaments. This entanglement is kept. Accordingly, the monofilament of the apparatus for wearing a wig needs suitable flexibility. When the flexibility is low, the monofilaments do not deflect, so that the monofilaments might damage the head skin. When the flexibility of the monofilament is too high, the monofilaments get entangled with the natural hairs more than necessary, and thus the natural hair is pulled to cause pain in detaching the wig. Accordingly, the monofilament needs appropriate flexibility.

[0014] The qualitative features of the apparatus for wearing a wig found by the present inventors are as follows.

[0015] (1) Compared to the aligned monofilaments, the monofilaments irregularly arranged are more easily bent in U-shape or J-shape when the monofilaments come in contact with hairs or head skin, whereby the monofilaments get entangled with each other and with the hairs more easily. Accordingly, the peeling force and the fixing force tend to increase. The reason for this can be given below. The aligned monofilaments cause themselves to get entangled with other monofilaments and the hairs in one pattern. Therefore, the state of the entanglement is easily released, whereby the monofilaments return to I-shape (namely, original condition) from the U-shape or J-shape after a long-time use. On the other hand, the irregularly arranged monofilaments cause themselves to get entangled with other monofilaments and the hairs in several patterns. Therefore, the latter can strongly keep each pattern due to the interaction between several patterns as compared with the former, and thus the state of the entanglement can be kept for a long time.

[0016] (2) There is a tendency that, as the diameter of the stalk is large, the deflecting force increases (the stalk becomes rigid), while as the diameter of the stalk is small, the deflecting force decreases (the stalk becomes flexible). When the diameter of the stalk is small, the stalks get entangled with each other or broken after the repeated use, and the peeling force tends to decrease (the durability is reduced).

[0017] (3) There is a tendency that, as the height of the stalk is large, the deflecting force decreases, and thus the stalk easily get entangled with natural hairs, but the wig is liable to lift up from the head. When the height of the stalk is small, the deflecting force tends to increase, and thus it is difficult for the stalk to get entangled with natural hairs. Further, the height required for getting entangled with the natural hair is not achieved, whereby the sufficient entanglement is difficult to be established.

[0018] (4) When the diameter of the head of the stalk is increased, the power for keeping the entanglement with the natural hair is enhanced, but the surface of the apparatus becomes close to the flat plane, which result in that it is difficult for the head of the stalk to come in the gap between the natural hairs. When the diameter of the head of the stalk is decreased, the head of the stalk easily come in the gap between the natural hairs, but if the diameter of the head of the stalk is too small, the state of the entanglement cannot be kept.

[0019] (5) When the disposal density of the monofilaments is high and the diameter of the head of the stalk is large, the monofilaments cannot go in the gap between the natural hairs, and hence, it is difficult for the monofilaments are to get entangled with the natural hairs. When the disposal density of the monofilaments is high and the diameter of the head of the stalk is small, the monofilaments go in the gap between the natural hairs, and then the monofilaments tend to excessively get entangled with the natural hairs. When the disposal density of the monofilaments is low, there is a tendency that the state of the entanglement cannot be kept, even if the monofilaments get entangled with the natural hairs, resulting in that the peeling force decreases.

[0020] (6) When the deflecting force is low (flexible), the monofilaments tend to easily get entangled with the natural hairs. When the deflecting force is high (rigid), the monofilaments tend not to get entangled with the natural hairs.

EFFECT OF THE INVENTION

[0021] An apparatus for wearing a wig according to the present invention has a structure in which a plurality of monofilaments, each having a predetermined shape, flexibility, and size, are disposed on a base sheet in the form of projection, wherein a wig can surely be attached to the head of the wig wearer only by lightly pressing the wig, which is put on the head of the wig wearer, from above. Accordingly, the apparatus is suitable for an elderly person having weak finger strength or a person who cannot freely use his/her fingers. Further, the wig can be attached without being lifted up from the head of the wearer, whereby the apparatus is excellent in fitness, and does not cause pain in the attaching/detaching operation and for a long-time use.

BRIEF EXPLANATION OF DRAWINGS

[0022] FIG. **1** is a perspective view showing an apparatus for wearing a wig according to an embodiment of the present invention.

[0023] FIG. **2** is a front view showing an apparatus for wearing a wig according to the embodiment of the present invention.

[0024] FIG. **3** is an inside view of a wig to which the apparatus for wearing a wig according to the embodiment of the present invention is bonded.

[0025] FIG. **4** is a view for explaining a state of attaching a wig using the apparatus for wearing a wig according to the embodiment of the present invention.

[0026] FIG. **5** is a view showing the state in which the wig is attached according to the embodiment of the present invention.

[0027] FIG. **6** is an enlarged view of FIG. **5** according to the embodiment of the present invention.

[0028] FIG. **7** is a view for explaining a manner of a test for flexibility according to the present invention.

[0029] FIG. **8** is a view for explaining a manner of a test for peeling according to the present invention.

[0030] FIG. **9** is a view for explaining a manner of a test for peeling according to the present invention.

EXPLANATION OF REFERENCE NUMBERS

[0031] **20** . . . Apparatus for wearing a wig
[0032] **21** . . . Base sheet
[0033] **22** . . . Monofilament
[0034] **22***a* . . . Stalk of monofilament **22**
[0035] **22***b* . . . Head of monofilament **22**
[0036] **23** . . . Adhesive layer
[0037] **24** . . . Releasing paper
[0038] **25** . . . Imitation hair
[0039] **26** . . . Wig
[0040] **27** . . . Wig base
[0041] **30** . . . Wearer
[0042] **31** . . . Natural hair of wearer **30**

BEST MODE FOR CARRYING OUT THE INVENTION

[0043] A best mode of an apparatus for wearing a wig according to the present invention will be explained below with reference to FIGS. **1** to **6**. FIG. **1** is a perspective view of the apparatus for wearing a wig, FIG. **2** is a front view of the apparatus for wearing a wig, FIG. **3** is an inside view of a wig to which the apparatus for wearing a wig is attached, FIG. **4** is a view for explaining the state of attaching the wig using the apparatus for wearing a wig, FIG. **5** is a view showing the state in which the wig is attached, and FIG. **6** is an enlarged view of FIG. **5**.

[0044] As shown in FIGS. **1** and **2**, an apparatus for wearing a wig **20** is formed with a base sheet **21** made of nylon and cut into a rectangle of 1.5 cm×3.5 cm with a thickness of 0.5 mm, for example, on a first side of which, a plurality of monofilaments **22** are irregularly implanted with a density of not less than 50 and not more than 120 pieces per square centimeters, on a second side of the base sheet **21**, an adhesive layer **23** is applied, and a releasing sheet **24** is bonded onto the outer face of the adhesive layer **23**.

[0045] As shown in detail in the enlarged view of A portion in FIG. **2**, each of the monofilaments **22** is made of a synthetic resin same as or different from the base sheet **21**, and is formed in a velvet shank shape including a stalk **22***a* extending from the first side of the base sheet **21** having a diameter of not less than 0.1 mm and not more than 0.5 mm and a length of not less than 3 mm and not more than 6 mm, and a big head **22***b* like an umbrella on the top of the stalk **22***a* having a diameter of not less than 0.2 mm to not more than 1 mm. The whole of the monofilament **22** is made of polypropylene, and an elastomer solution having a friction coefficient larger than that of the polypropylene is applied on its surface, for example.

[0046] The deflecting force of the stalk **22***a* of the monofilament **22** in the vicinity of the top thereof is preferably set in the range of not less than 1.91 N (195 gf) to not more than 6.08 N (620 gf), more preferably set in the range of not less than 2.96 N (302 gf) to not more than 5.51 N (562 go, and further preferably set in the range of not less than 4.01 N (409 gf) to not more than 4.94 N (504 gf). The deflecting force of the stalk **22***a* of the monofilament **22** in the vicinity of the bottom thereof is preferably set in the range of not less than 3.73 N (380 gf) to not more than 8.14 N (830 gf), more preferably set in the range of not less than 4.78 N (488 gf) to not more than 7.82 N (798 go, and further preferably set in the range of not less than 5.84 N (596 gf) to not more than 7.51 N (766 gf). The monofilament **22** gets entangled and hooked with natural hair **31** of a wig wearer **30** by the deflecting force set to the stalk **22***a* and the head **22***b* having the diameter larger than that of the stalk **22***a*.

[0047] As shown in FIG. **3**, plural apparatuses for wearing a wig **20** thus configured are bonded at equal intervals to the outer periphery of the inside of a wig base **27**, which composes a wig **26** together with imitation hairs **25**, by means of the adhesive layer **23** from which the releasing sheets **24** are removed. As shown in FIG. **4**, the wig **26**, to which the apparatus for wearing a wig **20** is attached, is put on a desired portion of the head with the monofilaments **22** facing the head of the wearer **30**, and then, the wig **26** is lightly pressed from the outside.

[0048] The monofilaments **22** of the apparatus for wearing a wig **20**, which project toward the head from the outer periphery of the inside of the wig base **27**, go into the natural hairs **31** of the wearer **30**, by putting the wig **26** on the head of the wearer **30** as shown in FIG. **5**. Then the natural hairs **31** and the monofilaments **22** get further inserted into each other by lightly pressing the wig **26** from the outside. When the natural hairs **31** and the monofilaments **22** get more further inserted, and hence, the natural hairs **31** are brought into contact with the wig base **27** or the base sheet **21** of the apparatus for wearing a wig **20**, the natural hairs **31** are bent toward the lateral direction before the monofilaments **22**. Each of the monofilaments **22** is brought into contact with or gets entangled with the head skin or the natural hairs **31** of the wearer **30** or the other monofilaments **22**, whereby each of the monofilaments **22** deflects in the direction generally parallel to the base sheet **21** or the direction in which the monofilaments **22** return toward the base sheet **21**, in a U-shape or J-shape.

[0049] The monofilaments **22** that deflect and deform toward the base sheet **21** randomly get entangled with each other, as the stalk **22***a* and the big head **22***b* on the top thereof nip the natural hairs **31** of the wearer **30** between the stalk **22***a* or the head **22***b* of other monofilaments **22**. The head **22***b* having the diameter larger than the outer diameter of the stalk **22***a* gets entangled and hooked with the stalk **22***a* and the head **22***b* of other monofilaments **22**, while nipping the natural hairs **31** between the big head **22***b* and the other monofilaments **22**. The state of the entanglement is kept by the force that keeps this state of the entanglement, whereby the wig **26** is fixed onto the head of the wig wearer **30**.

[0050] The fixing force applied to the apparatus for wearing a wig **20** fixed onto the head of the wig wearer **30** as described above is preferably set in the range of not less than 1.27 N (130 gf) to not more than 1.96 N (200 gf), more preferably set in the range of not less than 1.39 N (142 gf) to not more than 1.82 N (186 gf), and further preferably set in the range of not less than 1.50 N (153 gf) to not more than 1.68 N (171 gf). When the fixing force is less than 1.27 N (130 gf), the entanglement between the apparatus for wearing a wig **20** and the hairs is not sufficient, and thus the wig is misaligned in the horizontal direction. When the fixing force exceeds 1.96 N (200 gf), the peeling force exceeds 0.98 N (100 gf), which makes it difficult to be used by an elderly person having a weak finger strength or a person who cannot freely use his/her fingers, thus non-preferable.

[0051] The peeling force applied to the apparatus for wearing a wig **20** in detaching the wig **26** fixed onto the head of the wig wearer **30** as described above is preferably set in the range of not less than 0.29 N (30 gf) to not more than 0.98 N (100 gf), more preferably set in the range of not less than 0.46 N (47 gf) to not more than 0.89 N (91 gf), and further preferably set in the range of not less than 0.63 N (64 gf) to not more than 0.79 N (81 gf). By setting the peeling force within the range described above, the wig can easily be detached by an elderly person having a weak finger strength or a person who cannot freely use his/her fingers.

EXAMPLES

[0052] Four Examples and nine Comparative Examples were prepared for the apparatus for wearing a wig **20**, and a test for attaching and detaching the wig **26** to and from the head of the wearer was conducted with these apparatuses. The manner of the test is as follows. Specifically, the wig **26** was actually attached and detached to evaluate the practicability, and the flexibility of the monofilaments **22** and the peeling force of the apparatus for wearing a wig **20** in detaching the wig **26** were measured by a tester. The peeling force corresponds to the fixing strength in the vertical direction caused by the entanglement between the monofilaments **22** of the apparatus for wearing a wig **20** or the hook between the monofilaments **22** and the natural hairs of the wig wearer, i.e., the hooking force. The fixing strength in the horizontal direction caused by the entanglement between the monofilaments **22** of the apparatus for wearing a wig **20** or the hook between the monofilaments **22** and the natural hairs of the wig wearer is defined as a fixing force. FIGS. **7** to **9** show the manner of the test by the tester, wherein FIGS. **7**(*a*) and (*b*) show the manner of the test for the flexibility of the monofilaments **22**, and FIGS. **8** and **9** show the manner of the test of the peeling force of the monofilaments **22** in detaching the apparatus for wearing a wig **20** using a mannequin.

Examples 1 and 2

[0053] The conditions described below were set for the apparatus for wearing a wig **20** used in Example 1.

[0054] Base sheet **5**: A sheet made of synthetic resin, having a rectangular shape of 1.5 cm×3.5 cm with thickness of 0.5 mm

[0055] Arrangement of monofilaments **22**: Irregularly

[0056] Film covering monofilament **22**: Provided (10 μm)

[0057] Diameter of stalk **22***a* of monofilament **22**: 0.3 mm

[0058] Height of stalk **22***a* of monofilament **22**: 4 mm

[0059] Diameter of head **22***b* of monofilament **22**: 0.5 mm

[0060] Disposal density of monofilaments **22**: 80 pieces/cm^2

[0061] The apparatus for wearing a wig **20** used in Example 2 was the same as that of Example 1 except that the monofilaments **22** were aligned.

Comparative Examples 1 to 4

[0062] The apparatus for wearing a wig **20** used in Comparative Example 1 was the same as that of Example 1 except that the diameter of the stalk **22***a* of the monofilament **22** was set to 0.6 mm, the height of the stalk **22***a* of the monofilament **22** was set to 2 mm, the diameter of the head **22***b* of the monofilament **22** was set to 1.1 mm, the disposal density of the monofilaments **22** was set to 40 pieces/cm^2, and the monofilaments **22** having comparatively low flexibility were used. The apparatus for wearing a wig **20** used in Comparative Example 2 was the same as that of Example 1 except that the diameter of the stalk **22***a* of the monofilament **22** was set to 0.08 mm, the height of the stalk **22***a* of the monofilament **22** was set to 7 mm, the diameter of the head **22***b* of the monofilament **22** was set to 0.1 mm, the disposal density of the monofilaments **22** was set to 130 pieces/cm^2, and the monofilaments **22** having comparatively high flexibility were used. The apparatus for wearing a wig **20** used in Comparative Example 3 was the same as that of Example 1 except that the disposal density of the monofilaments **22** was set to 130 pieces/cm^2. The apparatus used in Comparative Example 4 was the same as that of Example 1 except that the disposal density of the monofilaments **22** was set to 40 pieces/cm^2.

Examples 3 and 4

[0063] The apparatus for wearing a wig **20** used in Example 3 was the same as that of Example 1 except that the film was absent. The apparatus for wearing a wig **20** used in Example 4 was the same as that of Example 2 except that the film was absent.

Comparative Examples 5 to 9

[0064] The apparatus for wearing a wig **20** used in Comparative Example 5 was the same as that of Comparative Example 1 except that the film was absent. The apparatus for wearing a wig **20** used in Comparative Example 6 was the same as that of Comparative Example 2 except that the film was absent. The apparatus for wearing a wig **20** used in Comparative Example 7 was the same as that of Comparative Example 3 except that the film was absent. The apparatus for wearing a wig **20** used in Comparative Example 8 was the same as that of Comparative Example 4 except that the film was absent. The apparatus for wearing a wig **20** used in Comparative Example 9 was the same as that of Comparative Example 1 except that the thickness of the film was set to 15 μm.

[0065] The conditions in Examples 1 to 4 and Comparative Examples 1 to 9 are shown in Table 1.

TABLE 1

	Examples/ Comparative examples					
	Example 1	Example 2	Comparative example 1	Comparative example 2	Comparative example 3	Comparative example 4
How disposed	Irregularly	Regularly	Irregularly	Irregularly	Irregularly	Irregularly
Film	10 μm in thickness	10 μm in thickness	10 μm in thickness	10 μm in thickness	10 μm in thickness	10 μm in thickness
Diameter of stalk	0.3 mm	0.3 mm	0.6 mm	0.08 mm	0.6 mm	0.08 mm
Height of stalk	4 mm	4 mm	2 mm	7 mm	2 mm	7 mm
Diameter of stalk's head	0.5 mm	0.5 mm	1.1 mm	0.1 mm	1.1 mm	0.1 mm
Disposal density	80 pieces/cm^2	80 pieces/cm^2	40 pieces/cm^2	130 pieces/cm^2	130 pieces/cm^2	40 pieces/cm^2
Deflecting force of stalk around the top	4.01N(409gf)	4.94N(504gf)	6.19N(632gf)	1.90N(194gf)	7.16N(731gf)	1.56N(159gf)
Deflecting force of stalk around the bottom	5.84N(596gf)	7.51N(766gf)	8.26N(843gf)	3.71N(379gf)	9.25N(944gf)	3.37N(344gf)
Peeling force	0.79N(81gf)	0.63N(64gf)	0.28N(29gf)	1.20N(122gf)	0.19N(19gf)	0.21N(21gf)
Fixing force	1.68N(171gf)	1.37N(140gf)	0.58N(59gf)	1.25N(128gf)	0.42N(43gf)	0.45N(46gf)
Evaluation In attaching	◎	◎	Δ	X	X	X
During wearing	◎	○	X	Δ	X	X
In detaching	◎	◎	Δ	X	X	X

	Examples/Comparative examples						
	Example 3	Example 4	Comparative example 5	Comparative example 6	Comparative example 7	Comparative example 8	Comparative example 9
How disposed	Irregularly	Regularly	Irregularly	Irregularly	Irregularly	Irregularly	Irregularly
Film	Non	Non	Non	Non	Non	Non	15 μm in thickness
Diameter of stalk	0.3 mm	0.3 mm	0.6 mm	0.08 mm	0.6 mm	0.08 mm	0.3 mm
Height of stalk	4 mm	4 mm	2 mm	7 mm	2 mm	7 mm	4 mm
Diameter of stalk's head	0.5 mm	0.5 mm	1.1 mm	0.1 mm	1.1 mm	0.1 mm	0.5 mm
Disposal density	80 pieces/cm^2	80 pieces/cm^2	40 pieces/cm^2	130 pieces/cm^2	130 pieces/cm^2	40 pieces/cm^2	80 pieces/cm^2
Deflecting force of stalk around the top	3.86N(394gf)	4.83N(493gf)	6.09N(621gf)	1.74N(178gf)	7.0N(714gf)	1.30N(133gf)	5.03N(513gf)
Deflecting force of stalk around the bottom	5.66N(578gf)	7.39N(754gf)	8.14N(831gf)	3.54N(361gf)	9.04N(922gf)	3.18N(324gf)	6.87N(701gf)
Peeling force	0.74N(75gf)	0.56N(57gf)	0.23N(23gf)	0.99N(101gf)	0.1N(10gf)	0.12N(12gf)	1.01N(103gf)
Fixing force	1.50N(153gf)	1.28N(131gf)	0.46N(47gf)	1.07N(109gf)	0.28N(29gf)	0.28N(29gf)	1.97N(201gf)
Evaluation In attaching	◎	◎	Δ	X	X	X	Δ
During wearing	○	○	X	Δ	X	X	◎
In detaching	◎	○	Δ	Δ	X	X	Δ

NOTE:
◎ Excellent
○ Good
Δ Poor
X Bad

[0066] As the flexibility of the monofilaments **22**, the deflecting force in the vicinity of the top and the deflecting force in the vicinity of the bottom were measured. As shown in FIGS. **7**(*a*) and (*b*), the test was carried out in such a manner that an pressure equalizing plate **9** was placed on each test piece with its monofilaments **22** facing upward, and pressure was applied from above the pressure equalizing plate **9** by the tester **10** so as to measure the force when the monofilaments **22** were deflected. FIG. **7**(*a*) shows the case in which the portion in the vicinity of the bottom of the head **22***b* on the top of the stalk **22***a* of the monofilament **22** was deflected, while FIG. **7**(*b*) shows the case in which the portion in the vicinity of the bottom of the base of the stalk **22***a* of the monofilament **22** was deflected. The tester described below was used.

[0067] Tester: Digital force gauge (DFG-1K) by Nidec-Shimpo Corporation

[0068] Pressure equalizing plate: A plate made of synthetic resin with a weight of 1.3 g having a size larger than the size of test pieces

[0069] The result of the test is as follows. As shown in Table 1, the force causing deflection in the vicinity of the bottom of the head **22***b* on the top of the stalk **22***a* of the monofilament **22** was 4.01 N (409 gf), and the force causing deflection in the bottom of the base of the stalk **22***a* of the monofilament **22** was 5.84 N (596 gf) in Example 1 of the present invention. Example 1 exhibited the most satisfactory result in attaining the object of the present invention. The force causing deflection in the vicinity of the bottom of the head **22***b* on the top of the stalk **22***a* of the monofilament **22** was 4.94 N (504 gf), and the force causing deflection in the bottom of the base of the stalk **22***a* of the monofilament **22** was 7.51 N (766 gf) in Example 2 of the present invention. Example 2 exhibited the satisfactory result in attaining the object of the present invention.

[0070] Comparing to Example 1 and Example 2, the flexibility of the monofilament **22** in Comparative Example 1 was lower than that of the monofilament **22** in Example 1 and Example 2, i.e., the monofilament **22** in Comparative Example 1 was more rigid. Therefore, the force causing

deflection in the vicinity of the bottom of the head **22***b* on the top of the stalk **22***a* of the monofilament **22** was 6.19 N (632 gf), and the force causing deflection in the bottom of the base of the stalk **22***a* of the monofilament **22** was 8.26 N (843 gf). Since the rigidity of the monofilaments **22** was too high, the monofilaments **22** might not sufficiently deflect when the monofilaments **22** were brought into contact with the head skin of the wig wearer and thus, the monofilaments **22** might damage the head skin. Further, the monofilaments **22** could not get sufficiently entangled with the natural hairs, thereby entailing a problem that a predetermined fixing strength could not be obtained. This is because the deflecting force is high, i.e., the monofilaments **22** are rigid, due to the large diameter and small height of the stalk.

[0071] The flexibility of the monofilament **22** in Comparative Example 2 was higher than that of the monofilament **22** in Example 1 and Example 2, i.e., the monofilament **22** in Comparative Example 2 was flexible. Therefore, the force causing deflection in the vicinity of the bottom of the head **22***b* on the top of the stalk **22***a* of the monofilament **22** was 1.9 N (194 gf), and the force causing deflection in the bottom of the base of the stalk **22***a* of the monofilament **22** was 3.71 N (379 gf). Since the monofilaments **22** were too flexible, they got entangled with the natural hairs more than required. Therefore, the peeling force in detaching the wig becomes high, whereby the wig could not be detached easily. This is because the deflecting force is low, i.e., the monofilaments **22** are flexible, due to the small diameter and great height of the stalk.

[0072] In Comparative Example 3, the disposal density of the monofilaments **22** in Comparative Example 1 was increased. Thus, the force causing deflection in the vicinity of the bottom of the head **22***b* on the top of the stalk **22***a* of the monofilament **22** was 7.16 N (731 gf), and the force causing deflection of the stalk **22***a* of the monofilament **22** was 9.25 N (944 gf). Since the flexibility was further low, i.e., more rigid than that in Comparative Example 1, the satisfactory result could not be obtained.

[0073] In Comparative Example 4, the disposal density of the monofilaments **22** in Comparative Example 2 was decreased. Thus, the force causing deflection in the vicinity of the bottom of the head **22***b* on the top of the stalk **22***a* of the monofilament **22** was 1.56 N (159 gf), and the force causing deflection of the stalk **22***a* of the monofilament **22** was 3.37 N (344 gf). Since the flexibility was further high, i.e., more flexible than that in Comparative Example 2, the satisfactory result could not be obtained.

[0074] The result of the influence given by the presence or absence of the film and the thickness thereof to each force is as shown in Table 1. The comparison of Examples 1 and 2 and Comparative Examples 1 to 4 provided with the film and Examples 3 and 4 and Comparative Examples 5 to 8 having no film is described below.

[0075] (1) The monofilaments were irregularly arranged both in Examples 1 and 3. However, since Example 1 was provided with the film, a higher fixing strength could be obtained.

[0076] (2) The monofilaments **22** were aligned in Examples 2 and 4. Therefore, the fixing strength was lower than the same in Examples 1 and 3 in which the monofilaments were irregularly arranged, but the fixing strength in Example 2 was 1.37 N (140 gf) and the fixing strength in Example 4 was 1.28 N (131 gf), which were sufficient fixing strength.

[0077] (3) In Comparative examples 1 and 5, the height of the stalk was small, and the disposal density was low, and thus it was difficult for the monofilaments to get entangled, the peeling force did not become 0.29 N (30 gf) or more, and the fixing force was lower than 1.27 N (130 gf), whereby a sufficient fixing strength could not be obtained.

[0078] (4) In Comparative examples 2 and 6, the diameter of the stalk was small, and the disposal density was high. Therefore, the monofilaments easily get entangled with the hairs, and thus the peeling force became not less than 0.98 N (100 gf), which means that a strong force was necessary for detaching the apparatus. Moreover, since the height of the stalk was large, the monofilaments were lifted up from the hairs with the lapse of time, and hence, the apparatus is liable to be movable in the horizontal direction together with the movement of the hairs. Therefore, the fixing strength became not more than 1.27 N (130 gf), which means that sufficient fixing force could not be obtained.

[0079] The film in Example 1 is in 10 μm, while the film in Comparative Example 9 is in 15 μm. Therefore, the friction coefficient increased, and thus the peeling force became not less than 0.98 N (100 gf), which means that a strong force was needed to detach the apparatus. Further, since the film applied on the stalk and the head was too thick, the gap between the monofilaments to each other was reduced. Therefore, the natural hairs could not go in between the monofilaments in attaching, but the natural hairs were pressed by the head of the stalk, which results in that it is difficult for the monofilaments to get entangled with the natural hairs.

[0080] The favorable order of Examples is as below.

[0081] 1. Example 1: "Monofilaments were irregularly arranged, and film was provided."

[0082] 2. Example 3: "Monofilaments were irregularly arranged, and film was not provided."

[0083] 3. Example 2: "Monofilaments were regularly arranged, and film was provided."

[0084] 4. Example 4: "Monofilaments were regularly arranged, and film was not provided."

[0085] From the result of the measurement, it was found that the deflecting force on the top of the monofilaments of the apparatus for wearing a wig is preferably set in the range of not less than 1.91 N (195 gf) to not more than 6.08 N (620 gf), more preferably set in the range of not less than 2.96 N (302 gf) to not more than 5.51 N (562 gf), and further preferably set in the range of not less than 4.01 N (409 gf) to not more than 4.94 N (504 gf). Further, it was found that the deflecting force in the vicinity of the bottom is preferably set in the range of not less than 3.73 N (380 gf) to not more than 8.14 N (830 gf), more preferably set in the range of not less than 4.78 N (488 gf) to not more than 7.82 N (798 gf), and further preferably set in the range of not less than 5.84 N (596 gf) to not more than 7.51 N (766 gf).

[0086] Next, the peeling force of the apparatus for wearing a wig **20** was measured. As shown in FIGS. **8** and **9**, the test was carried out in such a manner that test pieces, respectively having monofilaments **22** varying in height and diameter of the stalk, diameter and shape of the head, flexibility, and disposal density, were attached to the hairs **14** of the mannequin **13** for getting the monofilaments **22** entangled with the hairs **14**, the tester **10** was coupled to test pieces in the vertical direction, and the tester **10** was pulled in the vertical direction with speed of 2 cm/second to 3 cm/second so as to measure the maximum force in the period until test pieces are completely detached from the hairs. The measurement was car-

ried out five times for each test piece, and the average value was obtained. Next, the fixing force of the apparatus for wearing a wig **20** was measured. The test of the fixing force was carried out in the same manner as in the test of the peeling force except that the tester was coupled to test pieces in the horizontal direction and then pulled in the vertical direction.

[0087] The result of the test is as follows. As shown in Table 1, the peeling force in Example 1 in the present invention was 0.79 N (81 gf), which is the most satisfactory result in attaining the object of the present invention. The peeling force in Example 2 was 0.63 N (64 gf), which is lower than the peeling force in Example 1 since the monofilaments were aligned. However, this result was satisfactory in attaining the object of the present invention. As shown in Table 1, the peeling force was 0.79 N (81 gf), and the fixing force was 1.68 N (171 gf) in Example 1 provided with a film, which was formed by applying solution. The peeling force was 0.74 N (75 gf), and the fixing force was 1.50 N (153 gf) in Example 3 having no film, which means that the peeling force was increased by 0.05 N (6 gf) and the fixing force was increased by 0.18 N (18 gf) due to the application of the solution. As described above, the more satisfactory range of the peeling force and the fixing force for attaining the object of the present invention can be achieved by forming a film on the monofilament through the application of the solution.

[0088] Compared to Example 1 and Example 2, the peeling forces in Comparative Example 1, Comparative Example 3, and Comparative Example 4 were respectively 0.28 N (29 gf), 0.19 N (19 gf), and 0.21 N (21 gf), all of which were lower than those in Example 1 and Example 2. On the other hand, the peeling force in Comparative Example 6 was 0.99 N (101 gf), which was higher than those in Example 1 and Example 2.

[0089] From the result described above, when the peeling force applied to the apparatus for wearing a wig **20** in detaching the wig from the natural hairs (hairs) **14** becomes 0.28 N (29 gf), the entanglement between the natural hairs (hairs) **14** and the monofilaments **22** is insufficient, whereby the wig on the head is easily misaligned. On the contrary, when the peeling force applied to the apparatus for wearing a wig **20** becomes 0.99 N (101 gf) or more, the fixing strength of the wig is too strong, so that it is difficult for an elderly person having a weak finger strength or a person who cannot freely use his/her fingers to detach the wig. It is also found that the load more than required is applied to the natural hairs (hairs) **14**. Therefore, it is impractical when the peeling force exceeds 0.99 N (101 gf).

[0090] From the above-mentioned result, it was found that the peeling force applied to the apparatus for wearing a wig **20** in detaching the wig from the head of the wig wearer is preferably set in the range of not less than 0.29 N (30 gf) to not more than 0.98 N (100 gf), more preferably set in the range of not less than 0.46 N (47 gf) to not more than 0.89 N (91 gf), and further preferably set in the range of not less than 0.63 N (64 gf) to not more than 0.79 N (81 gf).

[0091] The disposal density of the monofilaments **22** of the apparatus for wearing a wig **20** is preferably set in the range of not less than 50 pieces/cm^2 to not more than 120 pieces/cm^2. When the disposal density of the monofilaments **22** is 130 pieces/cm^2 that exceeds 120 pieces/cm^2, the monofilaments **22** are densely arranged to reduce the gap between the monofilaments **22**. Therefore, the natural hairs of the wig wearer cannot go in between the monofilaments, whereby the fixing force is weakened, thus non-preferable. On the other hand, when the disposal density of the monofilaments **22** is 40 pieces/cm^2 that is less than 50 pieces/cm^2, the number of the monofilaments is too small, whereby the natural hairs of the wig wearer slip off the monofilaments **22**. Therefore, the fixing force is weakened, thus non-preferable. Accordingly, the suitable range of the disposal density of the monofilaments **22** is 50 pieces/cm^2 or more to 120 pieces/cm^2 or less.

[0092] The height of the stalk **22***a* of the monofilament **22** is preferably set in the range of not less than 3 mm to not more than 6 mm. For example, when the height of the monofilament **22** is 7 mm that exceeds 6 mm, it is difficult for the monofilaments **22** are to closely contact with the natural hairs or the head, and thus a great gap is formed between the monofilaments and the natural hairs or the head. Therefore, the wig is liable to lift up from the head, which might let other persons to notice the use of the wig. On the contrary, when the length of the stalk **22***a* of the monofilament **22** is 2 mm that is less than 3 mm, the length is insufficient for the monofilaments **22** to get entangled with the natural hairs, and thus the sufficient entanglement cannot be established. Accordingly, it is difficult to obtain a predetermined fixing strength.

[0093] The diameter of the stalk **22***a* of the monofilament **22** is preferably set in the range of not less than 0.1 mm to not more than 0.5 mm. For example, when the diameter of the stalk **22***a* of the monofilament **22** is 0.6 mm that exceeds 0.5 mm, the rigidity of the monofilament **22** is increased, and thus it is difficult for the monofilaments **22** to deflect. Therefore, it is difficult for the monofilaments to sufficiently get entangled with the natural hairs of the wig wearer. On the contrary, when the diameter of the stalk **22***a* of the monofilament **22** is 0.08 mm that is less than 0.1 mm, and that is generally equal to the popular thickness of the Japanese hair, the monofilaments get entangled with the natural hairs more than required. Therefore, the peeling force in detaching the wig is increased, which result in that the natural hairs are pulled to cause pain. Thus, it is not preferable.

[0094] When the diameter of the stalk **22***a* is less than 0.1 mm, the stalk **22***a* is folded due to the long-time use, and thus the stalks get entangled with each other to reduce the peeling force. Therefore, the predetermined fixing strength might not be obtained, thus non-preferable. In order to prove this fact, the peeling test was repeated 100 times using Example 1, Comparative Example 1, and Comparative Example 2, and the force before the test and the data after the test was repeated 100 times were compared. Table 2 shows the result.

TABLE 2

		Examples/Comparative examples		
		Example 1	Comparative example 1	Comparative example 2
Peeling force	Before test	0.79N(81gf)	0.28N(29gf)	1.20N(122gf)
	After test	0.76N(78gf)	0.27N(28gf)	0.17N(17gf)
Fixing force	Before test	1.68N(171gf)	0.58N(59gf)	1.25N(128gf)
	After test	1.63N(166gf)	0.54N(55gf)	0.20N(20gf)
Evaluation	In attaching	◎	Δ	X
	In detaching	◎	Δ	X

NOTE:
◎ Excellent
○ Good
Δ Poor
X Bad

[0095] As shown in Table 2, in Example 1, only a very slight change was recognized, such as from 0.79 N (81 gf)

before the test to 0.76 N (78 gf), which was satisfactory result in durability. On the other hand, in Comparative Example 2, an extreme change was recognized, such as from 1.20 N (122 gf) to 0.17 N (17 gf), since the entanglement between the stalks was caused due to the small diameter and large height of the stalk **22***a*, which means that the durability was remarkably deteriorated. On the contrary, in Comparative Example 1, only a slight change was recognized, such as from 0.28 N (29 gf) to 0.27 N (28 gf), since the diameter of the stalk **22***a* was large and the height thereof was small. However, this test piece originally has a very small peeling force, which means that the entanglement with the natural hairs is insufficient, which result in that it cannot be put to practical use as described above. Accordingly, the diameter and height affect durability, and thus the stalk **22***a* are required to be set to a predetermined diameter and height.

INDUSTRIAL APPLICABILITY

[0096] According to the present invention, a wig can surely be worn on a head only by lightly pressing the wig, which is put on the head of a wig wearer, from above, and a strong force is not needed in detaching the wig. Therefore, the present invention can provide an apparatus for wearing a wig suitable for use by an elderly person having weak finger strength or a person who cannot freely use his/her fingers.

1. An apparatus for wearing a wig including a wig base on a head of a wearer, comprising:

a base sheet;

a plurality of monofilaments in the form of projection disposed on a first side of the base sheet, each having a stalk extending from the base sheet and a big head on the top of the stalk; and

an adhesive layer applied on a second side of the base sheet for bonding to the inside of the wig base,

whereby the plurality of monofilaments get entangled and hooked with natural hair of the wearer in wearing the wig and this state of entanglement is kept by hooking force.

2. The apparatus according to claim **1**, further comprising a film applied on the surface of the plurality of monofilaments, the film having a larger coefficient of friction as compared with a material of the plurality of monofilaments.

3. The apparatus according to claim **1**, wherein a peeling force in detaching the plurality of monofilaments from natural hair of the wearer is in the range of not less than 0.29 N (30 gf) to not more than 0.98 N (100 gf).

4. The apparatus according to claim **1**, wherein a deflecting force of the plurality of monofilaments in the vicinity of the top of the stalk is smaller than the deflecting force in the vicinity of the bottom thereof, and the deflecting force of the plurality of monofilaments is in the range of not less than 1.91 N (195 gf) to not more than 6.08 N (620 gf) in the vicinity of the top of the stalk and in the range of not less than 3.73 N (380 gf) to not more than 8.14 N (830 gf) in the vicinity of the bottom of the stalk.

5. The apparatus according to claim **1**, wherein the disposal density of the plurality of monofilaments is in the range of not less than 50 pieces/cm^2 to not more than 120 pieces/cm^2.

6. The apparatus according to claim **1**, wherein a height of the stalk is in the range of not less than 3 mm to not more than 6 mm.

7. The apparatus according to claim **1**, wherein a diameter of the stalk is in the range of not less than 0.1 mm to not more than 0.5 mm.

8. The apparatus according to claim **1**, wherein a diameter of the big head is in the range of not less than 0.2 mm to not more than 1 mm.

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