United States Patent [19]

Levin et al.

[11] **3,905,378**

[45] **Sept. 16, 1975**

[54] **HAIRPIECE WITH MOLECULARLY BONDED FOUNDATION AND METHOD FOR MAKING SAME**

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[22] Filed: **Mar. 29, 1974**

[21] Appl. No.: **456,277**

[52] **U.S. Cl.** **132/5**; 132/7

[51] **Int. Cl.**[2] **A41G 3/00**

[58] **Field of Search** 132/5, 53, 54; 46/172; 28/74

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[57] **ABSTRACT**

A method for making a man's hairpiece comprising a nonwoven network foundation and weighing approximately 6 grams is described. Monofilament nylon strands are molecularly bonded to form a rectangular network which is then shaped and cut to form a foundation. Hair fibers are secured to the bond points in a manner simulating natural growth.

6 Claims, 10 Drawing Figures

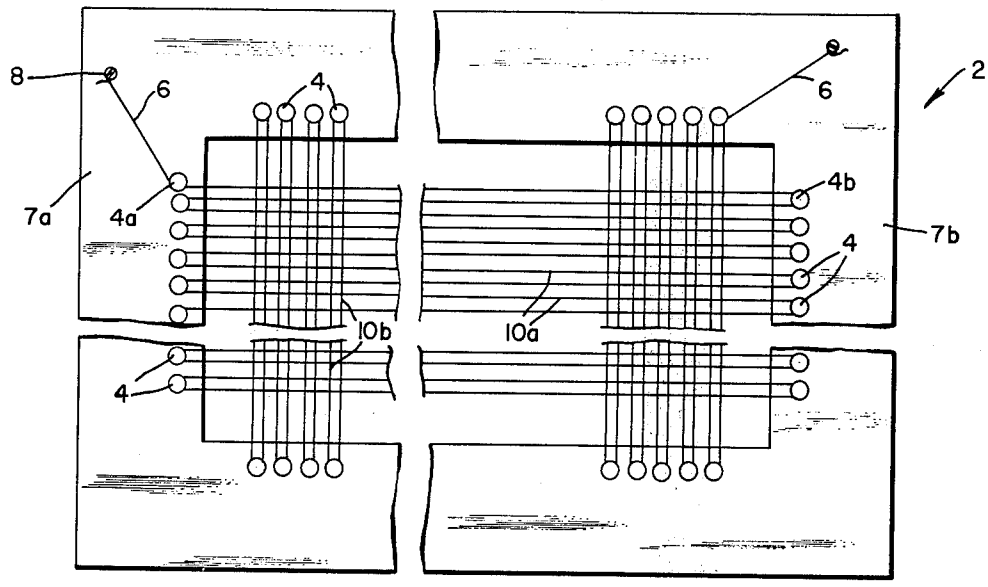


Fig. 1.

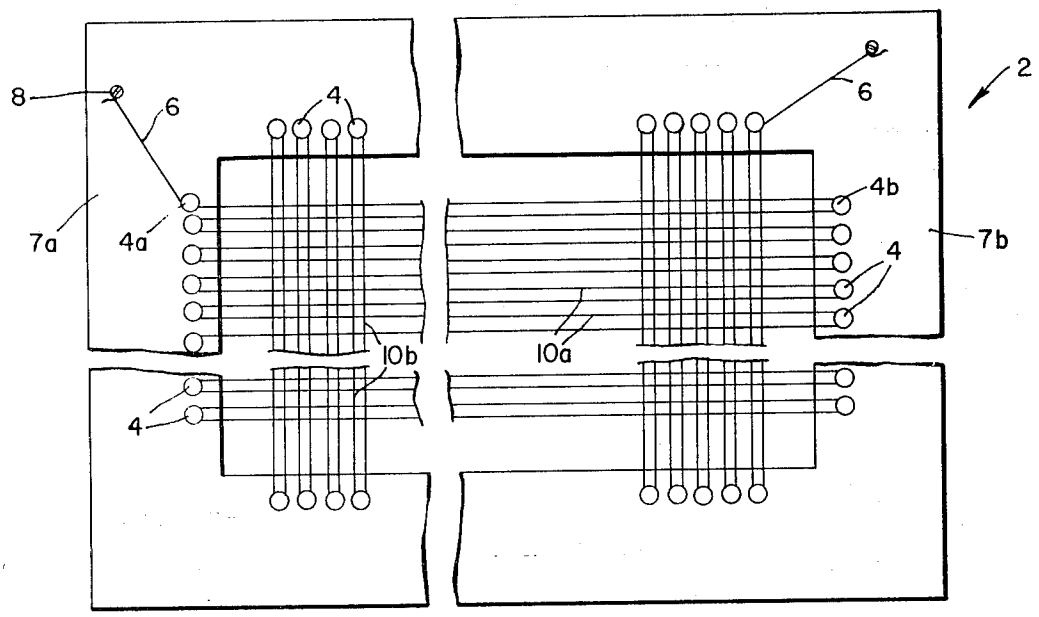


Fig. 4.

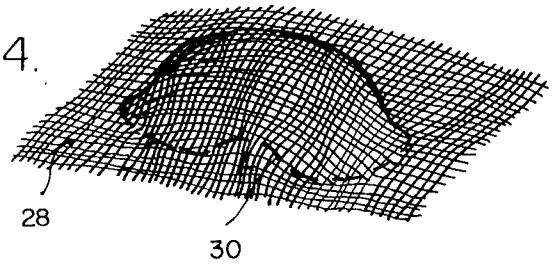


Fig. 2.

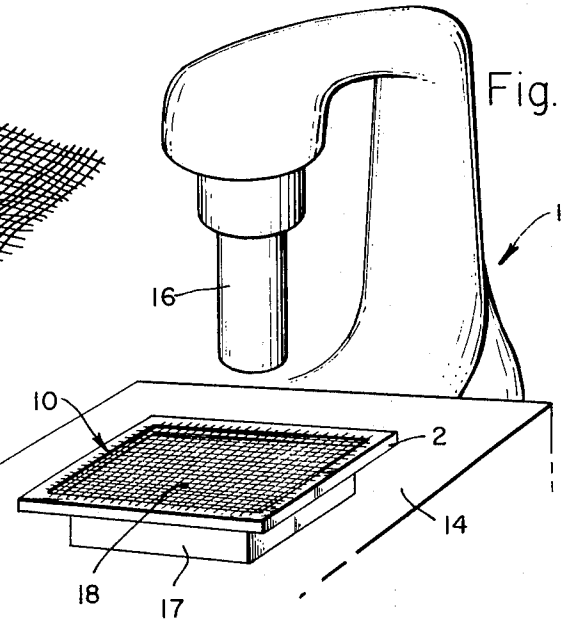


Fig. 6.

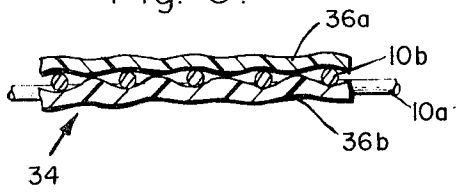


Fig. 5.

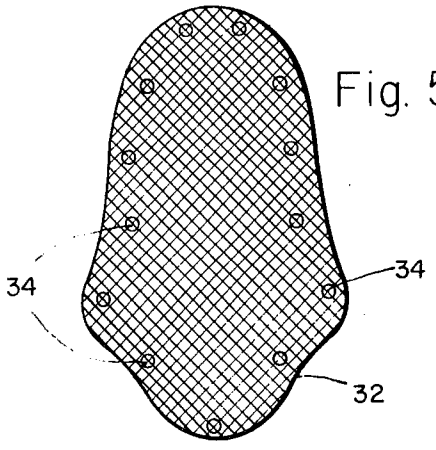
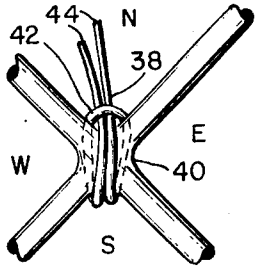


Fig. 7.



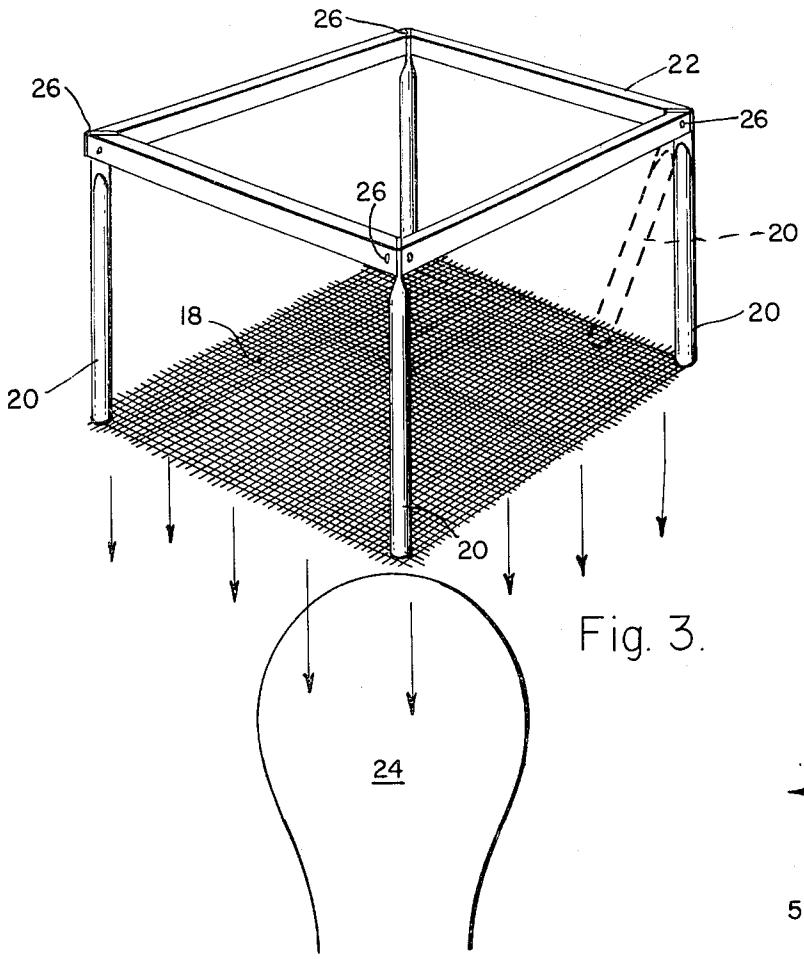


Fig. 3.

Fig. 8.

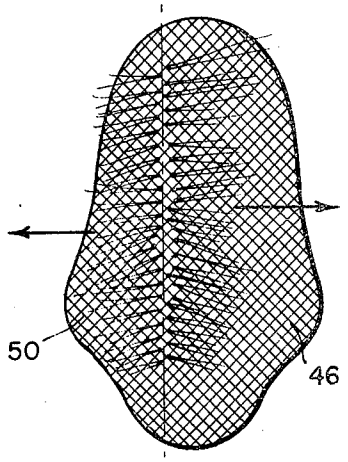


Fig. 9.

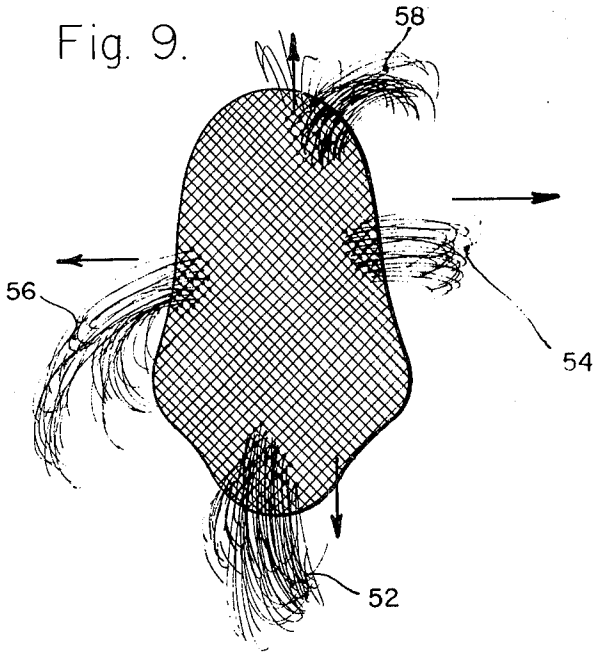


Fig. 10.

HAIRPIECE WITH MOLECULARLY BONDED FOUNDATION AND METHOD FOR MAKING SAME

This invention relates generally to hairpieces and more specifically to a hairpiece having a nonwoven patterned foundation. In particular, it relates to a method for making a man's hairpiece which is lightweight and airy and which can be washed and combed while affixed to the scalp.

Hairpieces having patterned foundations are well known. Typically, the foundation is woven of a light material such as silk and then shaped and cut to fit the shape and size of a human head. Often the foundation comprises a second layer of material, such as a coating of rubber. This is usually done in an effort to add sturdiness to the foundation, since the woven mesh is easily torn or warped. However, it makes the hairpiece heavy, causing discomfort to the user. It would be desirable to have a hairpiece which is light and essentially undetectable when worn and which does not warp or tear under normal use.

Typical hairpieces are made with vitually no density control of the hair fibers which are spaced microscopically close together in an effort to hide the foundation. As a result, the hairpieces all resemble a thick head of hair. It would be desirable to have a method for making hairpieces which provides for density control of the hair fibers without rendering the foundation detectable. This would allow the manufacture of hairpieces resembling a thin head of hair.

In the usual woven hairpiece, strands of hair or fibers are individually attached to the patterned portion of the foundation and then cut and styled as desired. Styling is generally accomplished by curling and setting of the hairs in the hairpiece. However, the natural growth pattern of human hair on human heads is ignored. It would be desirable to have a hairpiece whose styling contemplates natural hair growth patterns.

A typical complaint about hairpieces is that they must be removed and reapplied each day. This is because the oil in the scalp causes the hairpiece to slip and slide. It would be desirable to have a hairpiece sufficiently ventilated and strongly secured to the scalp so that the scalp could be washed and excess oil removed without loosening the hairpiece.

Accordingly, it is an object of this invention to provide a hairpiece having a nonwoven foundation that is lightweight and not easily warped or torn by normal use.

It is another object of this invention to provide a hairpiece which can be worn for several days at a time and which can be washed and combed like a real head of hair without removal from the scalp.

Yet another object of the present invention is to provide a method for making hairpieces which incorporates simulated natural growth patterns in the styling and shaping of the hair fibers.

A further object of this invention is to provide a method for making a hairpiece foundation comprising a nonwoven molecularly bonded network.

These and other objects and advantages of the present invention are achieved by a method for making hairpieces comprising forming a nonwoven network which is essentially rectangularly patterned. This is accomplished by: spacing a plurality of first strands essentially parallel to one another in a first plane in a frame; spacing a plurality of second strands essentially parallel to one another in a second plane in the frame, the first strands being essentially perpendicular and directly above the second strands, and the first and second planes being paralle; and molecularly bonding the first and second strands at their intersections. The method further comprises shaping the network to conform to a predetermined head shape; cutting the shaped network according to a predetermined pattern to form a foundation; securing anchors to the foundation; and affixing hair fibers to the foundation according to a predetermined style.

The invention is described in greater detail in conjunction with the accompanying drawings in which:

FIG. **1** is a partial plan view of a rigid frame used in the process of the invention to prepare the network for bonding;

FIG. **2** is a perspective view of an ultrasonic bonding machine used in the process of the invention to bond the network;

FIG. **3** is a perspective view of a collapsible frame and a heating form used in shaping the network of FIG. **2**;

FIG. **4** is a perspective view of the network of FIG. **2** shaped as desired;

FIG. **5** is a plan view of a foundation formed in accordance with this invention with anchor pads disposed thereon;

FIG. **6** is a cross-sectional elevational view of the anchor pads of FIG. **5**;

FIG. **7** is a plan view of a hair fiber secured to a bonded joint on the foundation of FIG. **5**;

FIGS. **8** and **9** show distinct stylings of hairpieces made according to this invention; and

FIG. **10** is a plan view of a completed hairpiece in accordance with this invention.

Referring now to FIG. **1**, there is shown a rigid rectangular frame **2** with nails **4** embedded on each side thereof. Foundation material in the form of transparent extruded monofilament plastic **6** is anchored to a corner anchor **8** and then strung tautly on the frame as follows. The extruded plastic **6** is wrapped about the first nail **4***a* in one vertical side **7***a* of the frame **2**, drawn horizontally across the frame **2** to the opposite vertical side **7***b* thereof where it is wrapped around the first nail **4***b* thereof. Thereafter, the process is repeated and the plastic filament **6** wound back and forth over the frame **2** and about the nails **4** in the vertical sides **7***a* and **7***b* until a series of horizontal filament portions **10***a* are tautly disposed in a first plane in the frame **2**. This procedure is repeated in a second plane parallel to and above the first plane to produce a series of vertical filament portions **10***b* tautly disposed in the frame **2** directly above and perpendicular to the horizontal filament portions **10***a*. The result is an essentially rectangular pattern of filaments held taut in the frame **2**.

A typical frame **2** may be about **15** inches square with about **150** nails **4** along each side. The filament material may be of any suitable lightweight transparent plastic material such as monofilament nylon, for example. For a uniform arrangement of the filament portions **10**, the nails **4** should be uniform in size and spacing. Thus, for example, if the nails were **0.055** inches in diameter and spaced **0.110** inches apart from center to center, the filament portions **10** would all be spaced **0.055** inches center to center. If the filament portions **10** were **0.005** inches thick, the clearance between adjacent filament portions would be **0.050** inches.

For reasons which will be made clear subsequently, precise uniformity of spacing between filament portions **10** may not be desired. In such case, the nails **4** may be varied in size and spaced in such a manner as will produce the actually desired pattern of filament portions **10.** In any event, however, the filament portions **10***a* will be essentially parallel to one another, and the filament portions **10***b* will also be essentially parallel to one another and essentially perpendicular to filament portions **10***a*.

FIG. **2** shows an ultrasonic bonding machine **12** comprising a base **14**, a press **16**, and a platform **17.** The frame **2** fits over the platform **17** so that the filament portions **10** rest thereon. The press **16** is brought down on the filaments **10** with a pressure of approximately between **53,000** and **63,000** psi. The temperature applied by the press to the filaments is set at approximately between **400°** and **435°** Fahrenheit, and the machine is turned on for a period of time not exceeding essentially **2** seconds. The pressures, temperatures, and times designated above are intended to be used for filaments essentially of the size mentioned hereinbefore. If the filament size is appreciably larger, then greater pressures, temperatures and/or lengths of time than are designated may be required. The ultrasonic bonding machine **12** shown forms molecular bonds between the vertical filaments and the horizontal filaments at their intersections. Other molecular bonding machines which are otherwise compatible with the process of this invention are also satisfactory. Molecular bonding provides for stronger bonds between intersecting filaments **10** which will not separate or shred under normal use. This eliminates the need for stiff boundary structure around the perimeter of the foundation or for underlying or overlying layers of rubber or other structural material as are used in conventional hairpieces. The foundation herein is thereby rendered more than an order of magnitude lighter than conventional hairpiece foundations. Specifically, the foundation herein may weigh approximately from **2** to **7** grams, as opposed to **50** grams or more for conventional hairpieces.

Once the bonding is completed, the bonded filaments form a rectangular network **18.** The network **18** is removed from the frame **2** by cutting the ends of the filaments **10** near the nails **4.**

Styling of the hairpiece actually begins with the formation of the network **18.** The spacing of the filaments **10** in the frame **2** is determined by the density of hair desired. The closer the filaments **10** are to one another, the greater will be the density of hair and therefore the thicker will be the hairpiece. If a thin look is desired at the top and a thick look at the sides, the filaments will be spaced closer at the sides and farther apart at the center.

The network **18** is now tautly secured to the arms **20** of a shaping frame **22** shown in FIG. **3.** It is then brought firmly into contact with a heated form **24,** causing the network **18** to conform to the shape of the form **24.** The purpose of this step is to make the network **18** conform to a human head shape. There are approximately **10** or **12** basic human head shapes, of which the form **24** will be one. The arms **20** are hinged at the corners **26** of the frame **22** so that when the network **18** is forced against the form **24,** the arms **20** can move inwardly, as shown in the dotted position in FIG. **3.** This allows the network **18** to follow the shape of the form **24** without stretching or warping. The heat applied to the network **18** by the form **24** causes the network **18** to hold the shape of the form **24.** FIG. **4** shows a shaped network **28** after it is shaped by the form **24.**

The customer is now fitted with a shape network **28** which conforms essentially to the shape of his head. Since there are about **10** or **12** basic head shapes, the manufacturer may have several of each shape on hand so that no matter who the customer, there would be a shaped network **28** to substantially fit him. Furthermore, each of the several networks **28** of the same shape may be of varied filament spacing, so that the customer could choose a network **28** to fit the hair style he desires. Alternatively, the network **28** could be tailor-made to the customer's specifications. In any case, when the proper network **28** is fitted on the customer's head, an outline **30** is traced thereon to conform to his hairline. The network **28** of FIG. **4** is then trimmed along the outline **30** to form the hairpiece foundation **32** shown in plan view in FIG. **5.**

In order to be able to secure the finished hairpiece to the scalp, several anchors **34** are secured to the foundation **32** at various strategic points. Anywhere from ten to sixteen anchors **34** will generally suffice. Each anchor **34,** shown in elevational cross-section in FIG. **6,** comprises an upper pod **36***a* and a lower pod **36***b* which are applied above and below the aforesaid strategic points of the foundation **32** and are bonded together thereat by means of a solvent bond. The solvent is applied between the pods **36,** which are then squeezed together. When the finished hairpiece is to be affixed to the scalp, an adhesive material such as medical adhesive or transparent double-sided tape, for example, is applied to the underside of the anchors **34** and the hairpiece is positioned on the scalp as desired.

Each pod **36** may be one-quarter to three-eighths inches in diameter and about **0.003** inches thick. If the extruded material used for the filaments were **0.005** inches thick, the thickness of a molecular bond point would be about **0.007** inches. The maximum thickness through the anchor **34** after the solvent bond is formed would then be approximately **0.011** inches and would occur at the molecular bond point.

A suitable material for the pods **36** would be, for example, clear vinyl, although other similar material otherwise compatible with this invention would be satisfactory. A suitable solvent for bonding pods **36** made of the aforementioned vinyl would be, for example, vinyl solvent adhesive. If other pod material is used, the solvent would have to be chosen compatible therewith.

The hairpiece is completed by securing hair fibers to the foundation as follows: FIG. **7** shows a hair fiber **38** secured to one of the molecularly bonded intersections in the foundation **32.** The molecular bond **40** generates four reference quadrants, e.g. north, south, east, and west. The fiber **38** shown is secured conventionally with a simple loop knot having a loop **42** through which are drawn the ends **44** of the fiber **38.** In FIG. **7** the ends **44** and the loop **42** lie in the north quadrant of the bond **40.** To complete the hairpiece, a fiber **38** is attached to each molecular bond point **40** in the foundation **32,** including those covered by the anchors **34.** As will become clear subsequently, however, not all the fiber ends **44** of these secured fibers **38** will lie in the same direction.

As stated previously, styling begins with the formation of the network **18.** It continues with the placement of hair fibers in the foundation **32.** By securing fibers

38 in certain areas of the foundation so that they lie in certain directions in accordance with a predetermined pattern, this invention generates the appearance of a simulated natural growth pattern for the hair fibers **38.**

A typical hair growth pattern for a person with a full head of hair includes several growth directions. For example, the hair in the back of the head grows downwardly toward the neck, while the hair on the sides of the head grows toward the ears. The hair in the front top of the head often grows forward. Thus, typically, normal hair growth follows essentially four general directions. Use of this fact is made in the formation of hairpieces according to this invention in order to simulate a natural growth pattern.

By way of example, FIG. **8** shows a hairpiece being formed with a part to one side. The loops of the fibers secured to bonds to one side **46** of a dividing line **48** on the foundation **32** lie in the east quadrants of the bonds, while the loops of fibers secured to bonds to the other side **50** of the line **48** lie in the west quadrants. The part along line **48** in this hairpiece will be sharp and well defined because the fibers on either side of the line lie in opposite directions. This effect will be more pronounced if the hair fibers are straight rather than curly or wavy. If a less well defined part is desired, the fibers on the side **46** of the line **48** could be secured to lie in the north quadrants of their respective bond points, and then combed to lie away from the line **48.**

FIG. **9** shows a hairpiece being formed with wavy, curly hair fibers. The selection of wavy or curly hair fibers rather than straight fibers is part of the styling process. The loops of one group **52** of fibers secured to bonds in the front of the hairpiece lie in the south quadrants, the loops of a second group **54** of fibers secured to bonds to one side of the hairpiece lie in the east quadrants, the loops of a third group **56** of fibers secured to bonds to the other side of the hairpiece lie in the west quadrants, and the loops of a fourth group **58** of fibers secured to bonds in the rear lie in the north quadrants. After the fibers are secured to lie in various quadrants as indicated, they may be curled and waved, if necessary. They are then combed so that the ends of the fibers lying in the east quadrants can be partially interspersed with the ends of fibers lying in the north quadrants. In this way, there will be no clear demarcation between fibers in the north quadrants and adjacent fibers in the east quadrants, and a wavy hair style is achieved.

The hairpiece **60** shown in FIG. **10** is an example of a full thick wavy hair style formed according to FIG. **9.** Additional thickness may be achieved by securing two, instead of only one, fibers to each bond point and making them lie in separate quadrants of the same bond point. Thus, by combining various spacings of filaments **10,** various arrangements of the fibers **38** in the foundations **32** and various curling and waving patterns, various hair styles can be achieved by this invention.

The hairpieces produced by the method described hereinabove are extremely lightweight, being on the order of from **3** to **7** grams and no heavier than **11** grams, compared to an average of **60** grams for conventional hairpieces. This is primarily due to the extreme lightness of the foundation, as was previously discussed. Since the hair fibers usually weigh on the order of **2** or **3** grams, the heaviest part of a conventional hairpiece, by far, is the foundation which usually weighs **50** grams or more. The weight of the foundation herein, however, is essentially about the same as the hair fibers attached thereto, i.e. no heavier than **7** grams, making for an altogether more comfortable hairpiece than the heavy conventional hairpieces.

When the hairpiece is secured to the scalp by satisfactory adhesive, such as double-backed surgical adhesive tape for example, approximately **98%** of the area of the scalp subtended by the hairpiece is exposed to the atmosphere. The scalp is covered only at the anchor points. For this reason, it is easy to wash the scalp and remove the oils that are normally exuded there, with the exception of the small amount of oil exuded beneath the anchors. As a result, the hairpiece may be worn for a week and longer without removal. By contrast, conventional hairpieces must be removed and reapplied almost daily, since the scalp cannot be washed while they are being worn.

Because of the molecular bonding of the filaments in the foundation, the hairpiece can withstand various abuse accompanying shampooing, combing, drying, brushing, scratching and massaging. Therefore, the hairpiece, when being worn, may be treated in these respects like an ordinary real head of hair.

There has thus been shown and described a method for making and styling a hairpiece with a nonwoven molecularly bonded foundation. Although specific embodiments of the invention have been described in detail, other variations of the embodiments shown may be made within the spirit, scope and contemplation of the invention.

Accordingly, it is intended that the foregoing disclosure and drawings shall be considered only as illustrations of the principles of this invention and are not to be construed in a limiting sense.

What is claimed is:

1. A method for simultaneously making and styling a hairpiece according to a predetermined hair style, comprising:

a. forming a non-woven essentially rectangularly patterned network by steps comprising:

spacing a plurality of first filaments essentially parallel to one another in a first plane in a rectangular frame;

spacing a plurality of second filaments essentially parallel to one another in a second plane in said frame, said second filaments being essentially perpendicular to and directly above said first filaments, said first and second planes being parallel; and

placing said frame in a molecular bonding machine and molecularly bonding said first and second filaments at their intersections to form bond points thereat, said bonding comprising joining said first and second filaments together at their intersections under a temperature of essentially between **400°** and **435°** Fahrenheit and a pressure of essentially between **53,000** psi and **63,000** psi for no longer than essentially **2** seconds;

b. shaping said network to conform to a predetermined head shape;

c. cutting said shaped network according to a predetermined pattern to form a foundation;

d. securing anchors to said foundation; and

e. affixing hair fibers to said foundation according to a predetermined style.

2. The method claimed in claim **1** wherein:

said machine is an ultrasonic bonding machine; and

said filaments are of extruded monofilament nylon essentially **0.005** inches in diameter.

3. The method claimed in claim **2** wherein shaping said network comprises:

tautly connecting said network to hinged arms of a shaping frame, said arms being essentially perpendicular to said shaping frame and movable inwardly thereof; and

pressing said network against a heated form having said predetermined head shape until said network assumes said head shape, said arms moving inwardly toward said shaping frame to allow said network to assume said head shape.

4. The method claimed in claim **3** wherein securing said anchors comprises:

positioning upper pods and lower pods respectively above and beneath points near the periphery of said foundation, said pods being of vinyl;

applying a vinyl solvent adhesive between each pair of upper and lower pods; and

squeezing each said pair of pods together to form a solvent bond therebetween.

5. A hairpiece comprising:

a non-woven essentially rectangularly patterned network foundation shaped to conform to a predetermined head shape and size comprising a plurality of spaced first filaments essentially parallel to one another, and a plurality of spaced second filaments essentially parallel to one another and essentially perpendicular to and directly above said first filaments, said first and second filaments being molecularly bonded at their intersections;

anchor means for securing said hairpiece to the scalp of the user comprising upper pods and lower pods respectively positioned above and beneath points near the periphery of said foundation and secured to one another by a solvent bond, said pods being of vinyl and said solvent being a vinyl solvent adhesive; and

a plurality of hair fibers secured to said foundation according to a predetermined style.

6. The hairpiece claimed in claim **5** wherein said filaments are of extruded monofilament nylon essentially **0.005** inches in diameter.

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