Dec. 21, 1954 A. G. WELCH 2,697,304

ATTACHMENT OF HAIR TO DOLL HEADS

Filed Nov. 7, 1949 2 Sheets-Sheet 1

FIG. 1

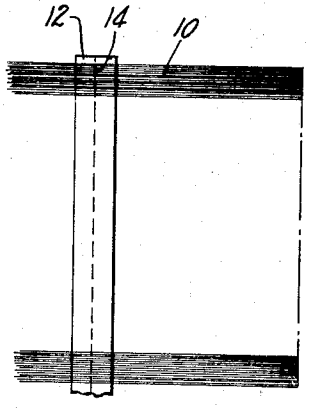

FIG. 2

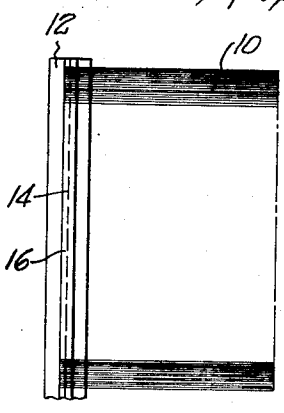

FIG. 3

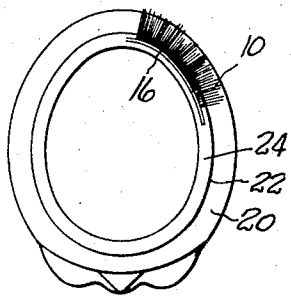

FIG. 4

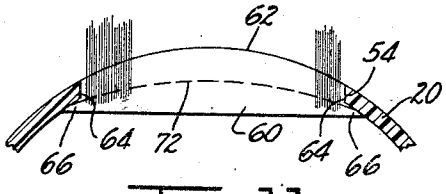

FIG. 11

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ATTACHMENT OF HAIR TO DOLL HEADS

Filed Nov. 7, 1949 2 Sheets-Sheet 2

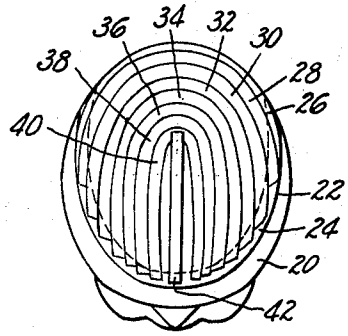

FIG. 5

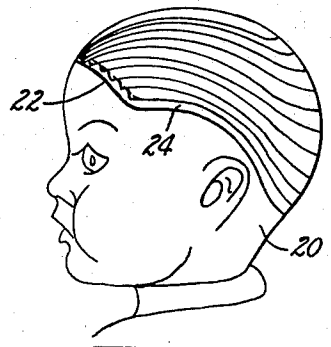

FIG. 6

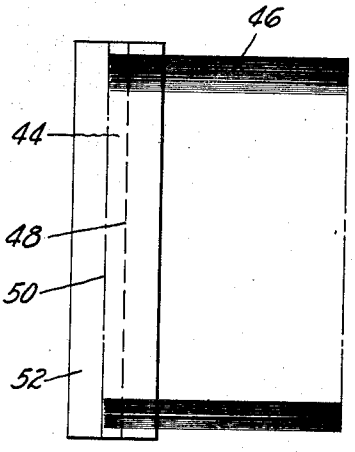

FIG. 7

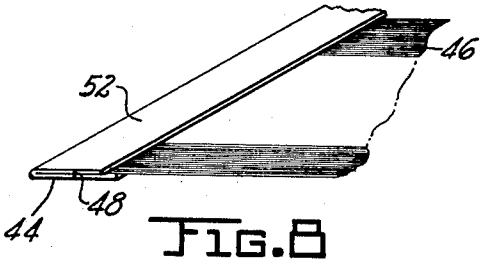

FIG. 8

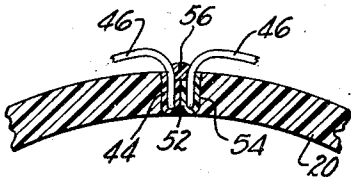

FIG. 9

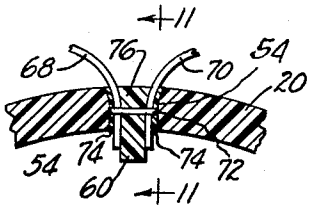

FIG. 10

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ATTACHMENT OF HAIR TO DOLL HEADS

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Application November 7, 1949, Serial No. 125,898

6 Claims. (Cl. 46—172)

This invention relates to a method of attaching hair to three-dimensional figures, and to the product thereof. The method is particularly well suited for attachment of hair to the heads of dolls and other figures, such as manikins and display figures.

The attachment of hair to three-dimensional figures has presented substantial problems, and previous methods have been subject to serious disadvantages. The usual practice has been to assemble the hair strands to form a wig, as by securing the hair strands to a cloth base, the base being adhesively secured to the head of the figure. Wigs of this type, if manufactured inexpensively to permit their use upon dolls, as distinguished from the hand-manufacturing methods practiced in the art of making toupees, are subject to certain limitations. Thus, the hair cannot be combed, brushed, washed, curled, or otherwise worked or handled, without danger of injury or damage to the wig. In some instances the wigs have been formed from fibers of synthetic resin material, and the cloth base has been rendered water repellent by the use of a waterproof adhesive. While such wigs permit the firm attachment of the fibers to the cloth base so they will not be released upon combing, brushing or washing, such wigs do not have the appearance, workability or "feel" of natural hair.

Another method which has been employed is to form perforations in the head of the doll or figure, into which perforations the hair bunches are inserted and then anchored by means of cement. This method is very expensive because of the necessity for handling individual hair bunches. Also the product of the method reveals the bunched character of the hair and, therefore, has an unnatural appearance. Furthermore, the hair so attached cannot be arranged in a satisfactory coiffure.

The primary object of the present method is to overcome the disadvantages mentioned above and to provide a simple and inexpensive process for attaching natural hair to the head of a doll or other figure in a manner presenting a natural appearance and permitting working of the hair by combing, washing, curling and brushing without damage thereto.

A further object is to provide a process wherein natural hair is preassembled in long strips with the hair extending transversely and anchored along one end only thereof, which strip members can easily, quickly and individually be secured to the head of a figure.

A further object is to provide a process wherein base strips having a plurality of transversely extending hair strands secured thereto and projecting from one side thereof, are secured to the head of a figure, side by side, with their free side margins overlapping, and wherein the central portion of the head has secured thereto a strip from which hair projects laterally and oppositely to overlie the adjacent first named strips and to expose a narrow longitudinal central hair-part simulating portion.

A further object is to provide a hair covering attached to the head of a figure, wherein the hair is arranged in partly overlapping adjacent rows, on each of which the hair strands are arranged in substantial parallelism transverse of the rows and anchored to the figure at the inner ends only thereof, and wherein a central row at which the hair strands extend transversely outwardly from a central anchor point conceals the innermost first named rows.

Other objects will be apparent from the following specification.

In the drawing:

Fig. 1 is a view of the head of a doll to which hair has been attached by my method.

Fig. 2 is a view illustrating one step of the process.

Fig. 3 is a view illustrating a second step of the process.

Fig. 4 is a top plan view of the head of a figure illustrating another step of the process by which preassembled portions of hair are attached to the head of the figure.

Fig. 5 is a top plan view of the figure illustrating diagrammatically the arrangement of hair strand units as applied to the head of the figure.

Fig. 6 is a side view of a doll head, illustrating diagrammatically the same arrangement of hair strand units illustrated in Fig. 5.

Fig. 7 is a view illustrating a step in a modified process.

Fig. 8 is a perspective fragmentary view illustrating the construction of a hair strand formed by the process illustrated partially in Fig. 7.

Fig. 9 is a fragmentary transverse sectional view illustrating the manner of applying hair at the center of the head to simulate a part in the hair.

Fig. 10 is a view similar to Fig. 9 but showing a modified attachment of the hair.

Fig. 11 is a fragmentary sectional view taken on line 11—11 of Fig. 10.

In the practice of the process, the first step is to preassemble the strands or fibers, preferably of natural hair, into strips in which the hair strands are distributed uniformly in substantially parallel relation transverse of the strips and in which the hair strands are anchored together lengthwise of the strip at a limited area only of each. One sequence of operations for performing this part of the process is illustrated in Figs. 2 and 3. The first step in the process is to arrange the individual hair strands **10** in a long row overlying a tape or strip **12** with the hair strands positioned transversely of the length of the tape or strip 12. The part **12** is preferably formed of paper, although it may be formed of cloth or any other flexible sheet material. One or more lines of stitching **14**, preferably formed by a sewing machine, are utilized to anchor the hair strips **12** in the desired arrangement. The hair strands **10** will be substantially uniformly distributed along the strip so that no interruptions occur, and the strip is preferably of a thickness equal to at least the thickness of two superimposed strands of hair.

The next step of the process is to apply to the hair strip, assembled as described above, a cement or adhesive in a narrow band **16**, as shown in Fig. 3. The adhesive **16** is applied at the surface of the hair strands **10** opposite the surface against which the tape or strip **12** bears, to completely cover the stitching **14** and a narrow portion of the hair strands parallel to said stitching along opposite sides of said stitching. Sufficient cement or adhesive is applied to cause bonding or adhering of each individual hair strand or fiber, thus supplementing the mechanical connection between the hair strands or fibers formed by the stitching **14**. While sufficient adhesive is employed to make certain that each individual hair strand is anchored to the others, care should be exercised to avoid the application of the cement to the sheet material **12**. After the cement band **16** has set, the sheet material **12** may be removed from the preassembled strip. In the case of paper this may be accomplished simply by tearing the paper from the preassembled strip. In cases of other material, such as cloth, it may be necessary to cut the cloth from the preassembled strip, taking care, however, not to sever the stitching **14**.

The strips are made in any convenient length, such as lengths of six to 12 inches, although these dimensions are illustrative and not limiting, and, if desired, the strips may be formed continuously. Where natural hair is used, care must be taken to insure that it is graded for color so that all of the hair used in making one given strip or series of strips will be of the same color. The hair strands or fiber should preferably be of a length of three inches or more. In cases where short strands of approximately three inches are used, the stitching and interconnection of the strands in forming the strips occurs along only one side of the strip. Where longer hair strands are available, for instance

strands of a length of four inches or more, the stitching and cement anchor at 16 will preferably occur along the center of the strip of hair strands. Figs. 2 and 3 illustrate the process as used to form strips of short hair strands, and in this process an additional step is to trim the ends of the hair strands adjacent to and alongside the band of adhesive 16. The opposite ends of the hair strands can also be trimmed in substantial parallelism with the bands of cement 16, if desired. The cement 16 employed may be any waterproof cement which will bond or anchor the hair strands together.

When a sufficient number of hair strips have been formed to cover the head of the figure, such as the head 20, the head is prepared for attachment of the hair by marking thereon a line 22 which constitutes the hairline for that head. In the case of a doll head or figure formed of composition material, ceramic, wood or the like, a cement is applied to cover the complete portion of the head outlined by the hairline 22. Thereupon the preformed hair strips, of the character illustrated in Figs. 2 and 3, are applied to the head 20 by means of the cement, said hair strips being the narrow strips which are anchored along one edge thereof. Each strip is cemented to the head along that narrow line of anchorage thereof.

The first step in the process of applying the strips to the doll head is to apply a strip or strips to extend in a row or band continuously around the head just within the hairline 22. Thus, as diagrammatically illustrated in Figs. 5 and 6, the outermost strip just mentioned will be cemented to the head at the zone or band 24 thereof. The free margin or portion of the hair strip will extend outwardly relative to the zone 24 at which it is anchored to the head. This arrangement is illustrated in Fig. 4. In addition to the cement which has been applied to coat the doll head, additional cement may be applied over the inner margin of each hair strip to assure firm cementing of each strip through a band of a width of one-quarter inch or more. This cement, in addition to securing the strip to the head, also serves to improve the anchorage of the hair strands within the strip and to prevent separation of the hair from the strip or from the head. The application of cement to the hair strips as they are applied to the head has the further advantage of enabling the ends of the hair to be covered or sealed in, thus avoiding any free hair ends at the margin of the hair strip which is cemented to the head.

After the strip of hair, diagrammatically represented by the portion 24, has been applied, then strips are successively applied, working from the sides and rear of the head upwardly and inwardly. These strips of hair are preferably arranged in U-shape, as best seen in Figs. 5 and 6, wherein the areas at which each is secured to the head are represented by the substantially U-shaped zones 26, 28, 30, 32, 34, 36, 38 and 40. The number of such zones may be any number required to cover the head when the bands at which the preformed strips are cemented to the head 20 are positioned in close spaced arrangement side by side. Each of the strips secured at the zones 26—40 has the free marginal portions of the hair thereof extending outwardly. Thus the free hair of each strip overlaps at least the zone of anchorage of the next outermost strip to conceal the zones 24—38. In this connection, the free ends of the zones 26—40 will preferably partially or fully overlap the zones 24 at their ends. The hair thus covers the head, lying in a substantially natural manner projecting from the point of anchorage substantially at a tangent to the head at that surface. The free ends of hair of the hair strands, being substantially unrestrained, will fluff quite naturally and lie in much the same arrangement that natural hair assumes upon the human head.

The head 20 is now substantially completely covered with hair except at the central line along the top thereof extending from the front center of the band or zone 24 to a point at the crown of the head. It will, of course, be understood that, if desired, this uncovered portion may be spaced laterally from the exact center of the head so that it may be located at a point corresponding to a natural point for occurrence of a part in the hair. This off-centered arrangement can be accomplished quite simply by applying more strips to one side of the head than to the other, rather than to use the uniformly interpositioned U-shaped strips arranged as shown in Fig. 5.

The final step in the process is the step of applying to this central portion a wide strip of pre-assembled hair formed from hair strands four inches or more in length anchored centrally thereof by the stitching and cement described previously. This center strip of hair is applied to the head at the zone 42, shown in Fig. 5, extending at one end substantially over the marginal zone 24, and extending at its opposite end over the zone 40. In this instance the band 16 of cement or adhesive is kept narrow and, when the hair is cemented along said band, the hair is caused to have, at said band, the appearance of a part in a natural head of hair. The hair strands extending at opposite sides of the cement band cover and conceal the adjacent strips or anchor zones 40 and 24 which previously remained exposed, and consequently a complete head of hair with a part therein is provided.

The use of natural hair, coupled with the firm anchorage of the hair strands in each individual strip, and the cementing of the preformed strips to the head by water-proof cement, produces a construction formed from natural hair in which the hair fully covers the head and lies in a natural manner conforming to the shape of the head. The hair has a part therein which remains at all times and, except as the cement is revealed at the part, there is nothing in the construction which reveals to the user the construction or the means of anchorage or attachment of the hair covering. The waterproof character of the cement permits the hair to be washed, and the use of natural hair permits the hair to be curled, especially where the curling process does not entail the use of heat to an extent which would be detrimental or injurious to the cement employed.

One possible variation of the process which may be advantageous to insure firm anchorage of the hair is to immerse into a body of liquid cement the margin of the preassembled hair strip, in the case of narrow strips where the strands are anchored along one edge of the strip. The extent of immersion would be limited, as to one-quarter of an inch, and would preferably be such that it would fully cover the previously applied band 16 of adhesive. This step is, of course, alternative to the procedure previously described and, while possessing certain advantageous features, is not essential to the practice of the process. Care must be exercised in this case, however, to permit the adhesive at each zone to dry before hair at another zone is applied to the head, in order to prevent the adhesion of the free portions of the successive upwardly and inwardly positioned hair strips at the zones of hair attachment overlapped thereby. Specifically, it will be apparent that hair cannot be applied to zone 26 until the cement applied at zone 24 has dried, where this immersion method is practiced or where cement is applied to the strip at any point except at the surface thereof in contact with the head.

Many dolls and figures are now being formed of plastic material, such as cellulose acetate or cellulose acetate butyrate, and where the hair is to be applied to a figure formed of such material, certain changes in the process may be necessary. Among such changes is the use of a cement which will effectively anchor the hair to the plastic. The cements satisfactory for this purpose are usually of the type containing solvents for the plastic, such as acetone or acetic acid. A very common type cement is formed by dissolving some of the plastic of the character of which the doll is formed, that is, cellulose acetate or cellulose acetate butyrate, with the solvent to form a fluid or semi-fluid material, which serves as a cement. There are other cements available commercially for use upon plastic, and any such which are intended for use with the particular plastic material of which the figure is formed, may be employed. A common material which will serve in many cases is known as gel lacquer. The process may be performed in the manner mentioned above where the band of cement 16 is formed from a cement which will adhere to the plastic, such as a cement of the character just described above. Alternatively, the plastic type cement may be used only for the purpose of anchoring the hair strips to the plastic doll head, in cases where the plastic type cement utilized does not react unsatisfactorily with the cement 16 which bonds the hair in strip form. The use of the plastic type cement solely for anchoring the preformed hair

strips to the head is especially well suited in cases where the step of immersing the edge of the hair strip, as mentioned above, is practiced. In this connection it will be apparent that the rate of evaporation of the solvent from the cement and the time required for the cement to set can be controlled by the amount of solvent which is employed in the cement, and, consequently, the step of immersion of the edges of the hair strips in such cement preliminary to application thereof to the doll head may be more practical in working with plastic doll heads than in working with doll heads formed of composition material, at least to the extent or in the respect that rapid setting of said cement may occur, which will reduce the amount of time required to elapse between the application of successive adjacently attached strips as is necessary to avoid cementing of any given strip to the adjacent or next outermost strip.

An alternative process which is particularly well suited for use in forming a hair strip for application to a plastic head or figure is illustrated in Figs. 7 and 8. In this case a thin film or tape 44 of plastic material, preferably corresponding to the plastic of which the head or figure is made, for instance a film of cellulose acetate or cellulose acetate butyrate, of a width of three-eighths inch to three-fourths of an inch, is employed. This film will preferably be of a thickness in the range from .002 of an inch to .01 of an inch, and preferably will be approximately .005 of an inch in thickness. Films of this thickness have inherent flexibility and workability and are readily pierced. The strands of hair 46 are applied in parallel relation overlying the tape 44, said hair extending transversely of the tape and being uniformly distributed and arranged as described above, with the major portions of the hair strands extending free and clear of the plastic tape 44. The hair strands 46 are then secured to the plastic tape 44 by stitching lengthwise of the tape along the line 48 which preferably is positioned slightly off of the transverse center of the plastic strip. After this stitching operation, the hair 46 is preferably trimmed along a line 50 spaced between the stitching line 48 and the left-hand edge of the strip 44, as illustrated in Fig. 7. Thereupon the plastic film 44 is folded transversely substantially along the line 50 so that the portion 52 thereof overlies the inner ends of the hair, said portion 52 being preferably of a width to extend past the line of stitching 48, as best illustrated in Fig. 8. A cement, such as a mixture of glacial acetic acid and acetone, preferably applied directly to the hair and the plastic strip causes adhesion or bonding of the base strip portion 44 and the overlying flange portion 52. It will be understood, however, that any other type of adhesive or cement may be employed to bond or adhere the hair to the plastic film and to form an end attachment member of the character illustrated in Fig. 8. The hair strip unit constructed in this manner is attached to the head 20 by the use of suitable plastic cement which will bond the plastic film 44 to the head 20. In the construction shown in Figs. 7 and 8 it is not necessary that the plastic strip include the fold-over flange 52. Thus a narrower strip than shown may be employed, and the hair arranged thereon in the same manner described, then being stitched thereto, adhesively secured thereto and trimmed along the edge conforming with the edge 50.

From a practical standpoint in working with doll heads formed of plastic material, such as cellulose acetate or cellulose acetate butyrate, the following method has been found to be very satisfactory. The wefts of hair are arranged with one end portion overlying a plastic or other strip, the wefts extending transversely of said strip and being stitched thereto. The stitched ends of the hair are then covered with acetone which serves to soften the plastic strip and also serves to remove oil from the hair and to render the hair responsive to adhesion. The head of the doll is then coated along one of the areas 24—40, illustrated in Figs. 5 and 6, with a cement formed from a mixture of a solvent for the material of which the head is formed and plastic dissolved therein, said cement being applied in a thin layer and serving somewhat to soften the material of which the head is formed at the point at which the cement is applied. The margin of a hair strip is then applied to soften a zone of the head and is subjected to pressure to force the stitching and the hair into the softened head of plastic. As the material sets up, a firm bond is established between the hair of the strip and the head of the doll, the softened plastic of the doll head having been forced into an intimate

bonding contact with the hairs and between and around the hairs. Then a pressure type of applicator, such as a gun for applying a calking material, can be employed to apply a strip of the dissolved plastic to the anchored strip of margin to complete the necessary adhesion of the parts.

Another variation of the process of covering the head of the figure with hair which may be practiced advantageously in many cases, and particularly in cases where the hair strips are constructed as in Fig. 8, entails the formation of a groove or slot 54 in the head 20, as shown in Fig. 9. This slot or groove 54 will preferably extend either completely through the head, in the case of a hollow construction, or will be of a depth equal to the width of the binding 44, 52. The width of the slot 54 will be sufficient to receive snugly the attachment margins of two hair strips. Cement of any suitable character is utilized to anchor the attachment margins of the hair strips to the walls of the slot or groove 54, and the hair of the two strips is separated in the manner intended for a part and a bead of plastic cement 56 is applied between these deflected or diverted hair strands, as seen in Fig. 9. The advantage of this process is that the use of long strands of hair is not required, and the stitching is not revealed as in the embodiment of the process mentioned previously. The plastic bead 56 will preferably contain a color which corresponds to the color of which the doll head is formed, so the plastic 56 will have a natural appearance simulating the part in a head of hair.

Another method by which a center part may be formed is illustrated in Figs. 10 and 11. In this process the groove or slot 54 is formed in the head as described above in connection with the process illustrated in Fig. 9. Within this groove or slot is inserted a preassembled unit or strip having a center member 60 in the nature of a film or sheet of plastic material, such as cellulose acetate or cellulose acetate butyrate, thick enough to possess substantial strength and to resist fracture upon the application of tensile stresses thereto, but not too thick to prevent machine sewing of hair wefts thereto. For this purpose I prefer to employ sheet stock having a thickness in the order of from .008" to .015". The strip 60 is preferably shaped as illustrated in Fig. 11, having a width at its center greater than the wall thickness of the doll head 20, and being provided with a curved edge portion 62 and with notched edge portions 64 defining shoulders 66. A layer or row of hair strands 68 is applied transverse of the strip 60 at one face thereof, and a row of hair strands 70 is applied to the strip 60 at the opposite face thereof. These hair strands are anchored to the strip 60 by stitching, as at 72. Each of the rows of hair strands 68, 70 is also adhesively anchored to the strip 60 by the use of a cement or solvent for the plastic in any of the manners disclosed above. The width of the slot 54 is great enough to permit the insertion of the preassembled hair plastic unit 60, 68, 70 therein, for which purpose the strip is fed through the slot endwise, and the hair strands 68, 70 are used to manipulate the plastic strip 60 to the position illustrated in Fig. 11, wherein the shoulders 66 underlie the head at the opposite ends of the slot 54, and the notched edges 64 of the plastic strip 60 seat in and bear against the ends of the slot walls. The spacing between the notches 64 may be a few thicknesses greater than the overall length of the slot 54 so that somewhat of a wedge fit is provided for the part 60 within the opening, serving to mechanically hold the parts in place until a cement 74 applied to the notch serves to anchor the unit 60, 68, 70 positively in place. After the unit 60, 68, 70 has been applied in place a heated iron or similar member may be run along the edge 76 of the plastic insert 60 to slightly deform that edge by spreading it and thus forcing the hair strands of the row 68, 70 outwardly away from each other so that they do not extend strictly perpendicularly from the head. This process serves to define the hair part and to permanently arrange the manner in which the hair projects from the part.

It will be understood that, while the preferred procedure entailing the method and the preferred construction of the product of that method have been illustrated and described herein, changes in such procedure and in such construction may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. The method of attaching hair to the head of a three dimensional figure, consisting of the steps of assembling

a plurality of elongated strips of parallel hair strands extending transversely of the strip and secured together along one margin thereof, adhering the last named margin of a strip to the head at the hair line of said head in a band with the free marginal portions of the hair strands extending outwardly, and successively adhering the last named margins of additional strips to said head side by side in bands with the free margin of each strip overlying and movable relative to the adhered marginal band of the adjacent outwardly disposed strips.

2. The method of attaching hair to the head of a three dimensional figure, consisting of the steps of adhering adjacent to the hair line of said head at a band of selected width the inner margin only of a substantially continuous strip of parallel hair strands extending crosswise of said strip, and then successively adhering the inner margins only of additional strips side by side at bands of selected width within the area of the head outlined by said first strip in a manner whereby the adhered marginal band of each strip is overlapped and concealed by the free edge portion of the adjacent inwardly disposed strip.

3. The method of attaching hair to the head of a three dimensional figure, consisting of the steps of adhering adjacent to the hair line of said head at a band of selected width the inner margin only of a substantially continuous strip of parallel hair strands extending crosswise of said strip, and then successively adhering the inner margins only of additional strips side by side at bands of selected width within the area of the head outlined by said first strip in a manner whereby the adhered marginal band of each strip is overlapped and concealed by the free edge portion of the adjacent inwardly disposed strip, and covering the central portion of the head by a strip fabricated from parallel hair strands joined to each other and to the head by a narrow band of adhesive down the center of the strip simulating a hair part.

4. The method of attaching hair to the head of a three dimensional figure, consisting of the steps of adhering adjacent to the hair line of said head at a band of selected width the inner margin only of a substantially continuous strip of parallel hair strands extending crosswise of said strip, and then successively adhering the inner margin only of additional strips side by side at bands of selected width within the area of the head outlined by said first strip in a manner whereby the adhered marginal band of each strip is overlapped and concealed by the free edge portion of the adjacent inwardly disposed strip, imbedding the marginal portions of two hair strips within the head and in face engagement, and separating said last named strips by applying a narrow band of cement therebetween.

5. The method of attaching hair to the head of a three dimensional figure, consisting of the steps of adhering adjacent to the hair line of said head at a band of selected width the inner margin only of a substantially continuous strip of parallel hair strands extending crosswise of said strip, and then successively adhering the inner margins only of additional strips side by side at bands of selected width within the area of the head outlined by said first strip in a manner whereby the adhered marginal band of each strip is overlapped and concealed by the free edge portion of the adjacent inwardly disposed strip, and imbedding within the head a sheet member having a row of transversely arranged hair strands secured at one end only to each face thereof with the free ends of said last named strands overlying the innermost adhered margins of said first named strips.

6. In a head of a three dimensional figure, a head member having an elongated passage therein, a plurality of strips of parallel transversely extending hair strands anchored to said head member at narrow bands along the inner margin only of each strip, said strips being arranged with the free margin of each overlying the anchored margin of an adjacent strip and cooperatively covering the top of said head member around said passage, an insert seated in said passage, and a pair of strips of parallel transversely extending hair strands anchored to said insert at opposite faces of said insert and each adhesively secured to said insert and to said head member, the free ends of said last named strips overlying the adjacent anchored margins of said first named strips.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,194,874	Peterson	Aug. 15, 1916
1,311,066	Goldman	July 22, 1919
1,620,340	Fruedenberg	Mar. 8, 1927
1,741,415	Harris	Dec. 31, 1929
2,129,176	Holman	Sept. 6, 1938
2,165,476	Greneker	July 11, 1939
2,175,693	Jacoby	Oct. 10, 1939
2,294,480	Rohweder	Sept. 1, 1942
2,310,186	Abrams	Feb. 2, 1943
2,405,791	Lamoureux	Aug. 13, 1946

FOREIGN PATENTS

Number	Country	Date
207,786	Canada	Jan. 25, 1921