

Sept. 9, 1969

J. W. HAEFELE
KERATIN MODIFICATION

3,465,759

Filed Sept. 30, 1965

3 Sheets-Sheet 1

Fig. 1

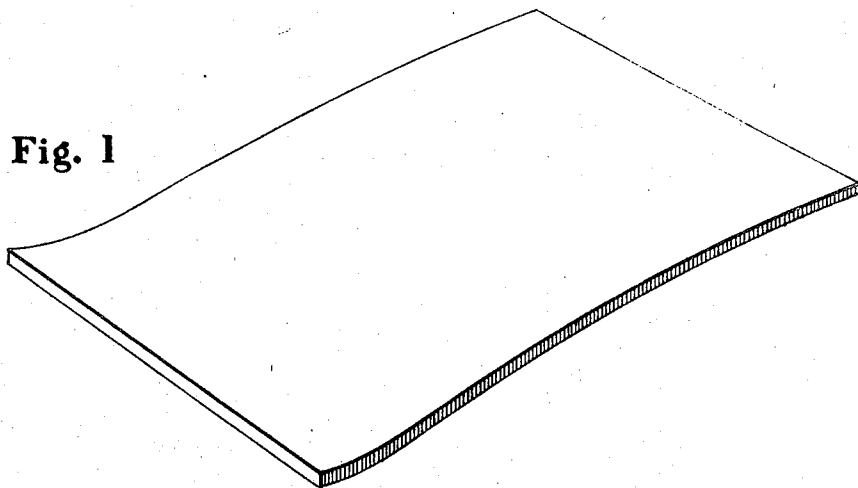
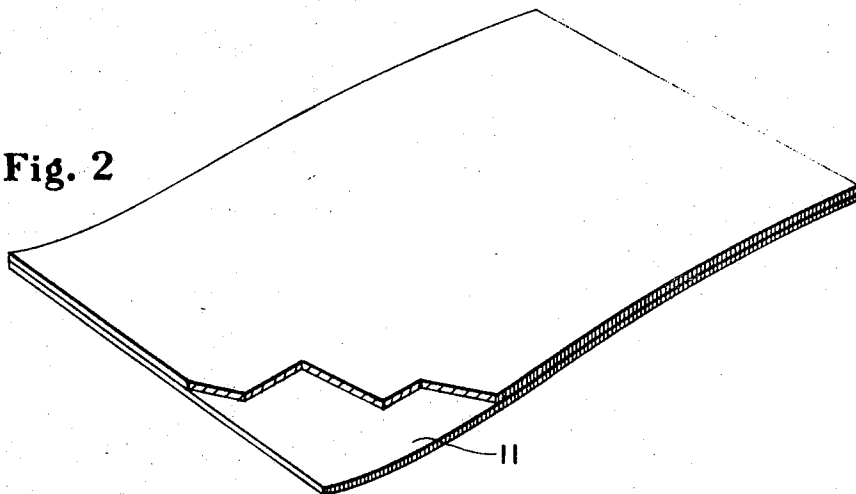


Fig. 2



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3 Sheets-Sheet 2

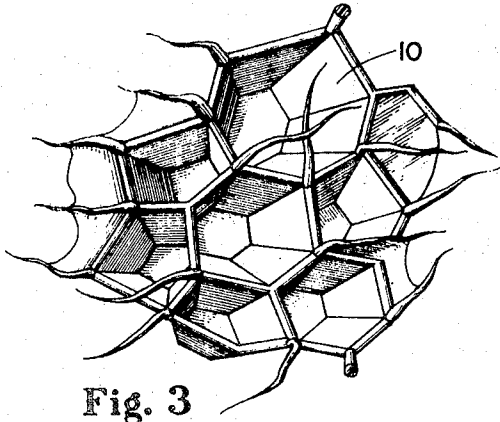


Fig. 3

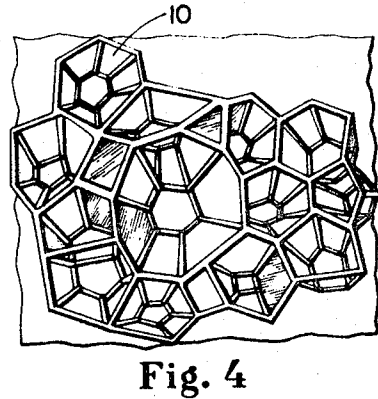


Fig. 4

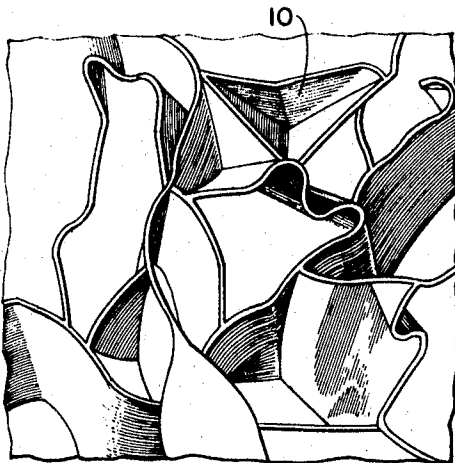


Fig. 5

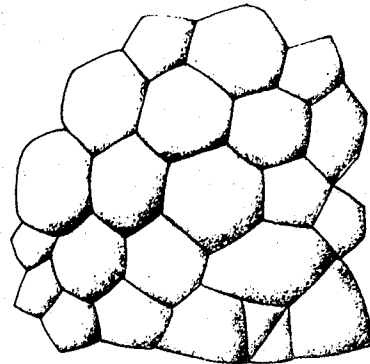


Fig. 6

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3 Sheets-Sheet 3

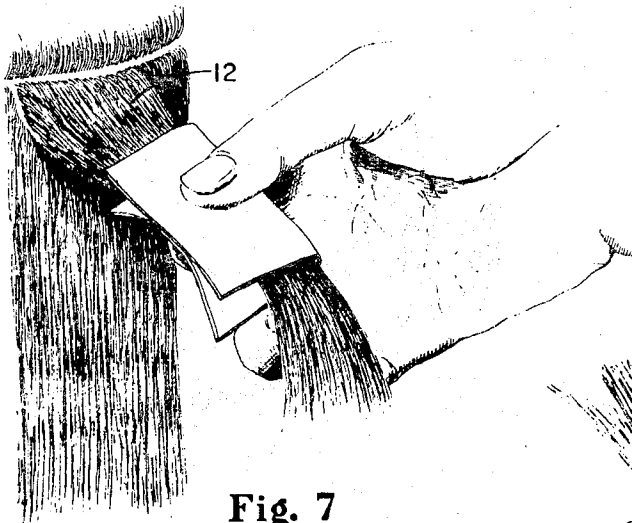


Fig. 7

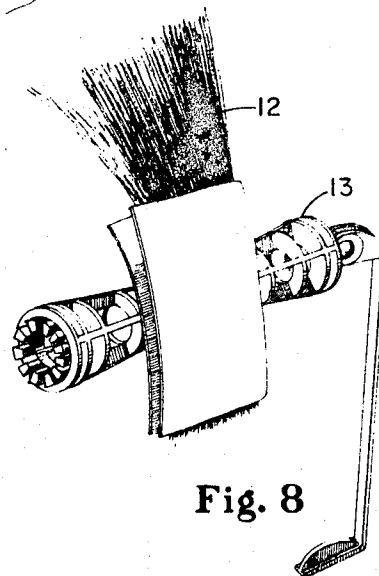


Fig. 8

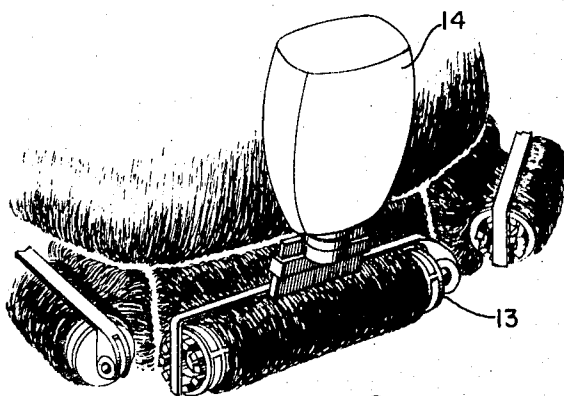


Fig. 9

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3,465,759

KERATIN MODIFICATION

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Int. Cl. A45d 2/00

U.S. Cl. 132-7

5 Claims

ABSTRACT OF THE DISCLOSURE

A flexible wrap comprising a wafer of impermeable plastic foam of specific size, shape, thickness, resiliency, density and average pore incidence employed to protect selected hair segments from exposure to keratin-modifying solutions and to facilitate the winding of hair tresses on curlers in the cold permanent waving of hair, and a permanent waving process in which the hair tresses are wound upon curlers with the aid of such wraps preventing exposure of selected segments of the hair to keratin-modifying solutions.

This invention relates to flexible wafers of plastic foam and to methods of employing these wafers in keratin-modification processes. More particularly, the invention concerns impermeable wafers of plastic foam which are useful in aligning hair in tresses and which prevent keratin-modifying solutions from contacting any desired hair-tress segment.

The word "impermeable" is used herein in its common dictionary sense, e.g., Webster's Seventh New Collegiate Dictionary, page 419, "impermeable—not permitting passage (as of a fluid) through its substance." Also, "impervious" is used interchangeably herein with "impermeable."

This invention is particularly applicable to cold permanent waving of hair, which is in part accomplished by treating the hair with a reducing composition which will break the disulfide linkages present in keratin and thereby soften the plasticize the hair. The reduced hair is then placed in a desired configuration and the disulfide linkages are replaced during an oxidation (neutralizing) step, and the hair tends to remain in the new configuration. In commonly used cold waving processes, the hair is saturated with a keratin-reducing solution and after sufficient time has elapsed to effect the desired keratin reduction, the hair is rinsed or neutralized by chemical or air oxidation.

Generally, a "wave" is imparted to the hair by means of forming tresses and winding each tress about a cylindrical body, i.e., a curler. However, difficulty is often encountered in wrapping the free ends of the hair tress upon the curler. To cope with this problem most commercial permanent waving kits contain small square or rectangular pieces of paper called "end wraps" which are folded, placed about a hair tress, and moved to a position wherein they embrace the hair tress and extend beyond the free end thereof. Permeable polyurethane foam wraps as described by Haeefe in U.S. Patent 3,345,993, issued Oct. 10, 1967 and water impervious plastic end papers as described by Gillette in British Patent 973,289, issued Oct. 21, 1964, have also proved useful for this purpose. Thus, end wraps (generally referred to herein as "wraps") were originally devised and are useful to facilitate rolling the hair on the curler.

It is well known that conventional end wraps per se, although helpful in facilitating the winding process, do not prevent waving solutions from contacting and reacting upon the wrapped segments of the hair tress. In-

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deed there are several references relating to special end wraps which are chemically treated so that the waving solution is "neutralized" or in other ways counteracted before reaching the hair ends. (See, for instance, U.S. Patent 2,991,790 issued July 11, 1961 to Bonilla.)

The desirability of protecting the hair ends in conventional permanent waving stems from fact that repeated use of conventional cold permanent wave procedures is often accompanied by an overexposure of the hair ends, which ends retain the effect of prior hair waving treatments. Such ends, when subjected to renewed cold waving treatment, generally exhibit undue frizzing, curling, harshness, and dryness because frequent treatment is believed to unduly stress and overexpose the hair ends in renewing or repeating the cold waving procedure.

In addition, such a procedure as the usual cold waving process described above, with or without conventional end wraps, tends to promote a comparative excess of the waving solution to hair nearest the core of the curler because of the smaller diameter of the wind at this point. This also effects an undesirable over-treatment of the hair ends, a result which this invention effectively alleviates.

Accordingly, it is an object of this invention to provide flexible wafers of impermeable plastic foam which are useful in keratin-modification processes.

It is another object of this invention to provide flexible wafers of impermeable plastic foam which, when wrapped about a hair tress segment, substantially completely impede the flow of solutions to the wrapped segment.

It is still another object of this invention to provide flexible wafers of impermeable plastic foam which, when used as end wraps in cold permanent waving processes, substantially completely impede the flow of the keratin-reducing solution to the hair ends.

It is a further object of this invention to provide novel permanent waving and other keratin-modification processes.

These and other objects and advantageous features will be apparent from the detailed description which follows hereinafter.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is the present invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of an impermeable wrap having a closed cell plastic foam structure.

FIGURE 2 is a perspective view of an impermeable wrap partially broken away to reveal a bottom layer of impermeable film adhered to a plastic foam cell structure.

FIGURE 3 is an enlarged fragmentary plan view of an impermeable wrap showing a closed cell plastic foam structure.

FIGURE 4 is an enlarged fragmentary plan view of an impermeable wrap showing a closed cell plastic foam structure with a bottom layer of impermeable film adhered thereto.

FIGURE 5 is an enlarged fragmentary plan view of an impermeable wrap showing an open cell plastic foam structure with a bottom layer of an impermeable skin formed on the cell structure.

FIGURE 6 is an enlarged fragmentary bottom plan view of an impermeable wrap showing an impermeable skin formed on an open cell plastic foam structure.

FIGURE 7 is a perspective view showing the application of an impermeable plastic wrap to a hair tress of the head.

FIGURE 8 is a perspective view of an impermeable plastic foam wrap at the lower end of a hair tress prior to winding the wrapped tress on a curler.

FIGURE 9 is a perspective view of a hair tress with an impermeable plastic foam wrap covering a segment thereof and wound on a curler with a keratin-modifying solution being applied to the exposed portion of the hair tress from a container.

In accordance with the present invention, novel impermeable foam wafers have been discovered which are useful in improved and unique methods of cold permanent waving.

In general, this invention comprises a wrap for aligning and preventing exposure of selected hair tress segments to solutions during a keratin-modification process, said wrap consisting of a flexible wafer of impermeable plastic foam having a thickness ranging from about 0.01 to about 0.2 inch and a resiliency ranging from about 15% to about 50%.

"Plastic foam" or "plastic foam material," as used herein, refers to porous, resilient, plastic or similar material having a density of less than about 30 pounds per cubic foot and an average pore incidence ranging from about 30 to about 150 pores per linear inch. Preferred plastic foam for use herein has a density ranging from about 1 to about 10 pounds per cubic foot, most preferably about 2 pounds per cubic foot, and has a pore incidence ranging from about 35 to about 100 pores per linear inch, most preferably about 50 pores per linear inch.

The plastic foam wraps of this invention, exemplified in FIGURES 1 and 2, can have two basic types of cell structure commonly referred to as "open-cell," FIGURE 4 or "closed-cell," FIGURES 3 and 5, depending on whether the pores are interconnecting or distinct from each other. Foam having a substantially closed-cell structure, i.e., having more than 75% of its pores distinct and non-interconnecting, is generally impermeable to solutions. This invention requires the use of impermeable plastic foam. Therefore, for the purposes of this invention, substantially closed-cell plastic foam is desired. Open-cell plastic foam (which is generally permeable) is also useful herein when it has been coated on at least one surface with an impermeable film 11 of a material such as polyethylene, polyvinyl alcohol, cellophane or the like or when it has an impermeable skin FIGURE 6 on at least one surface. Thus, "impermeable plastic foam," as used herein, means either substantially closed-cell plastic foam, or foam which has an impermeable film or skin on at least one surface.

As stated above, this invention comprises a flexible wafer of impermeable plastic foam material having a thickness ranging from about 0.01 to about 0.20 inch. Foam wafers which are thinner than about 0.01 inch do not have sufficient tear strength to permit repeated use, and are usually difficult to prepare in an impermeable form. Foam wafers having a thickness greater than about 0.20 inch yield too large a curl and are too bulky for use in the winding processes hereinabove described. The preferred thickness for the wafers of this invention ranges from about 0.02 inch to about 0.04 inch with a thickness of 0.03 inch being especially desirable.

It is especially important to this invention that the plastic foam be of a resilient or elastic nature. Indeed, this is why a "foam" material as herein described is required. The criticality of this element can be seen from the fact that other impervious materials such as waxed paper, aluminum foil, polyethylene film or the like do not protect wrapped hair tress segments from attack by keratin-modifying solutions as illustrated hereinafter in Example I. These and other non-foam materials appear to admit solutions through channels or furrows formed during the winding process. The flow of solutions under the edges of the foam wafers of this invention to hair tress segments wrapped therewith is substantially im-

peded apparently by a tourniquet-type effect due to the resilient characteristics of the foam wafers.

The impervious plastic foam wraps of this invention must exhibit a resiliency of from about 15% to about 50%, preferably from about 25% to about 40%, with a resiliency of about 35% being especially preferred. Resiliency values expressed herein refer to the "Ball Rebound Resilience Value," as determined by the resilience test described in ASTM:D1564-59, Suffix R. Basically, this test consists of releasing a 16.3 gram, $\frac{5}{16}$ " diameter steel ball from a height of 18 inches and measuring the height of rebound from the material being tested. Further details of this test are found in ASTM Standards 1961, Part II, pages 705-706.

In addition to the above mentioned resiliency characteristics, the impermeable foam wraps preferably have a tensile strength not less than about ten pounds per square inch so that they do not tear easily in the course of usage.

The wafers of this invention are of a size and shape that they can completely encircle tresses of hair. Preferably, they are square or rectangular in shape and have dimensions within the range from 1 inch x 1 inch to 5 inches x 5 inches. An especially preferred size and configuration is a rectangular shape wafer having the dimensions 3 inches x 2 inches.

The impermeable, resilient foam material of this invention can be comprised of various synthetic resins, such as various vinyl derivatives and other polymers such as "isocyanate" and polyurethane, and also various forms of foam rubber, both natural and synthetic, all of which materials may be generically termed plastic foam.

More particular illustrations of operable plastic foams are the following: urethane foams (polyether or polyester polyurethanes) which are produced by polymerizing a diisocyanate and a polyol in the presence of a blowing agent; polystyrene foam which is produced by heating high molecular weight polystyrene containing an integral expanding or blowing agent; cellular vinyl, either chemically blown, extruded or mechanically blown; epoxy foams; cellular polyethylene, produced by heating an expandable polyethylene compound until the resin softens and the blowing agent particles, dispersed throughout the resin, release tiny cells of gas at a great number of points within the mass; foamed phenolics; foamed silicones; cellular cellulose acetates and the like. For more specific plastic foams and methods for their production reference is made to Modern Plastics Encyclopedia 1965, volume 42, No. 1A, pages 293-324 and citations listed therein.

A preferred plastic foam for use in the novel wraps of this invention consists essentially of closed-cell polyurethane which is prepared, for example, by the processes described in U.S. Patent 2,772,245, granted Nov. 27, 1956 to Simon et al.

Another preferred plastic foam for use in the novel wraps of this invention consists essentially of closed-cell polyethylene which is prepared, for example, by the process described in U.S. Patent 2,256,483, granted Sept. 23, 1941 to Johnston.

A further type of plastic foam material which is preferred for this invention consists essentially of open-cell polyurethane, sponge rubber, or polyethylene foam, laminated or coated on at least one surface with a thin, i.e., from 0.001 to 0.10 inch, impermeable film of a material such as polyvinyl chloride, polyvinyl alcohol, "Mylar," cellophane, rubber, polyethylene, cellulose acetate or the like. Such an impermeable plastic foam product is prepared, for example, by the process described in U.S. Patent 2,963,388, granted Dec. 6, 1960 to Landour or by the process described in U.S. Patent 3,011,218, granted Dec. 5, 1961 to Mitten.

Another type of impermeable plastic foam which is useful herein can be prepared by heating the surface of an open cell pervious foam to a temperature above its melting point and thereby causing a closed cell impermeable skin to form on the surface thereof.

Closed-cell foam with a "skin" on the surface thereof is particularly preferred because this type of material can be cut relatively thinner than closed-cell foam without skin, i.e., thinner than the average pore diameter, without losing its imperviousness. This impervious "skin" is formed, for example, by the uniform application of heat to the surface of the closed-cell foam material.

Keratin-modification processes in which this invention finds utility are performed with solutions in the following general manner:

The hair to be treated is formed into tresses as shown in FIGURE 7; the impervious plastic foam wraps disclosed herein are wrapped about a selected segment of each tress 12 prior to the winding thereof; each tress 12, so wrapped, is as shown in FIGURE 8 wound about a cylindrical body, i.e., a curler 13; each tress 12 is then saturated with the keratin-modifying agent from a container 14 or a sequential series of agents as shown in FIG. 9. The keratin-modifying agent can be applied to the hair both before and after (resaturation) the hair is rolled upon the curlers, or in many instances, the agent is applied only after the hair is wound upon the curlers. This novel wrapping step of the process effectively prevents the keratin-modifying agent subsequently applied from contacting or acting upon the selected wrapped segment thereby enabling novel methods of treatment to be effected. Thus, this invention provides a process for differential modification of hair by selective exposure of hair tress segments to keratin-modifying solutions.

A preferred embodiment of this invention relates to cold permanent waving. Use of this invention's impervious plastic foam wraps in the same manner as conventional "end wraps" in cold permanent waving substantially completely impedes the flow of the keratin-reducing solution to the hair ends. Thus, the hair ends are desirably and conveniently protected, especially during the resaturation step of the home waving process.

More specifically, in regard to the aspect of cold permanent waving processes, this invention comprises the steps of forming the hair into tresses, wrapping about each tress the wafer of impermeable plastic foam of the type disclosed herein, winding each tress about a cylindrical body, i.e., a curler, saturating each tress with a keratin-reducing composition and thereafter neutralizing the action on the hair of said keratin-reducing composition.

Alternatively, the keratin-reducing composition is applied to the hair both before and after the hair is rolled upon curlers. The use of the impermeable foam wraps of this invention will protect the hair ends from overexposure in either case described above.

If desired, the hair may be given further treatment after the wraps are removed. For instance, when the procedure of applying the keratin-reducing composition both before and after winding is followed, it is beneficial to apply "neutralizer" after the wraps have been removed to insure complete neutralization treatment of the ends.

Practice of the above-described process allows a looser wave which is often times very fashionable, but at the same time it allows a longer lasting wave. The wave is looser because the hair ends are less treated or effected than conventionally. The wave is longer lasting because the rest of the hair can be subjected to more strenuous treatment than is conventionally feasible, the vulnerable ends being completely protected by the impermeable wraps of this invention from any extra stress. Such treatment will serve to make the wave on the unprotected (non-wrapped) portion of the tress tighter, and tighter waves take longer to relax.

If desired, novel and unique types of waves can be obtained by placing the impermeable wraps at selected segments of the tress other than at the end of the hair strands.

The keratin-reducing compositions which are preferably used in the permanent wave processes of this in-

vention contain a water-soluble, non-volatile mercaptan such as mercapto-alkanoic acids, mercapto-acetic acid, mercapto-propionic acid, mercapto-butyric acid and water-soluble salts thereof. Examples of other suitable mercaptans are thioglycolic acid, sodium thioglycolate, potassium thioglycolate, monoethanolamine thioglycolate, β -mercaptobutyric acid, thiohydric acid, β -mercapto-n-butyric acid, mercaptocaproic acid, thioglycerol, and thiolactic acid. These compositions have a pH of 7.0 to 9.5 which can be provided with alkaline agents such as ammonia, monoethanolamine, diisopropylamine, sodium hydroxide, potassium hydroxide, and the like.

In addition to the mercaptans, it is often desirable, but not essential, to include in the keratin-reducing composition a water-soluble disulfide of the mercaptan used such as dithiodiglycolic acid, dithiodilactic acid, the disulfides of β -mercaptobutyric acid, β -mercaptobutyric acid, dithiodihydric acid, or a water-soluble salt of these acids to protect against excessive reduction and damage to the hair, in accordance with the disclosures in U.S. Patent 2,719,814 issued to Haefele and U.S. Patent 2,719,815 issued to Sanders on Oct. 4, 1955.

The permanent waving processes of this invention can also be used to advantage in conjunction with pressurized hair waving compositions which are applied to the hair as a fast-breaking foam. Examples of such compositions are disclosed by Banker et al. in U.S. Patent 3,099,603, issued July 30, 1963 and Shepard et al. in U.S. Patent 3,103,468, issued Sept. 10, 1963.

The action on the hair of the keratin-reducing compositions can be neutralized by chemical compounds such as bromates, perborates, hydrogen peroxide or the action of air alone.

Certain particular embodiments of the invention are illustrated in the following examples but the invention is not intended to be limited thereto.

Example I

This example illustrates how the impermeable foam wraps of this invention substantially completely impede the flow of keratin-modifying solutions to a hair tress segment wrapped therewith.

Hair swatches, each seven inches long and containing 2 grams of hair, were moistened with water. An end wrap of each of the types shown in the following table was placed about the free end of each swatch and the hair was then wound about a mandrel in the conventional hair waving manner. Each test end wrap had a small piece of paper, 0.3 inch square, fastened at its center. The wound swatches were then saturated with a mercaptan waving lotion containing 5% thioglycolic acid, 2% dithiodiglycolic acid, and monoethanolamine to achieve a pH of 9.3. The swatches were later unwound. The pieces of paper were detached and soaked in 3 ml. portions of water. Each 3 ml. portion of solution was then treated with ammonia and nitroprusside which develops color in the presence of mercaptan. The data were tabulated as follows:

		Color showing presence of
Wrap (all 2 inches x 3 inches):		mercaptan under wrap
Open-cell polyurethane foam (pervious)	-----	Yes
Closed-cell polyethylene foam (impervious) ¹	--	No
Paper end wrap (pervious)	-----	Yes
Aluminum foil (impervious)	-----	Yes
Wax paper (impervious)	-----	Yes
Polyethylene film (impervious)	-----	Yes
"Saran" wrap (impervious)	-----	Yes

¹ Closed-cell polyethylene foam having 40-50 pores per linear inch, a density of 1.8-2.6 pounds per cubic foot, a resilience of 33%-37%, and a tensile strength of 20-40 pounds per square inch. This foam had a thickness of 0.03 inch and had an impervious polyethylene 0.01 inch thick skin on one surface.

Thus, only the impervious foam wrap of this invention substantially completely impeded the flow of the waving solution to the wrapped segment of the hair tress.

Example II

This example illustrates how the impermeable plastic foam wraps of this invention can be effectively used in cold permanent waving processes to yield a looser but long lasting wave.

A waving lotion containing 5% thioglycolic acid, 2% dithiodiglycolic acid and monoethanolamine to achieve a pH of 9.3 was used for the following tests.

Eight models were chosen; after a shampoo, their towel-dried hair was separated into tresses and each tress was treated (saturated) with the waving lotion. The free ends of the tresses on one side of the head were wrapped with a pervious plastic foam wrap¹. The free ends of the tresses on the other side of the head were wrapped with an impervious plastic foam wrap¹. All of the tresses were then wound upon curlers in the conventional hair waving manner and the waving lotion was again applied (saturated) to each tress. The wave was completed by waiting 10 minutes, rinsing with water, waiting 30 minutes, and neutralizing.

The models were each observed to have an excellent wave, looser on the side where the impermeable wraps were used, but the wave on both sides was equally long lasting as was determined in the following manner:

The tresses on the two sides of each head were rated for wave in two ways: First, by comparing individual tresses to a standard set of photographs of waved tresses showing increasing wave on a scale from 1 for virgin hair to 7 for a tight wave (illustrated in the drawing of U.S. Patent 2,869,559, granted Jan. 20, 1959 to Moore), and second, by counting the number of wave crests in several tresses selected from parallel areas of the head on both sides wherein a larger number of crests denotes more wave. The results were averaged and are shown in the following table:

	Side with pervious wraps	Side with impervious wraps
Number of crests.....	104	94
Wave grade.....	4.5	3.7

These differences remained when the two sides of each head were again observed at three and seven weeks after the wave was given. Thus, the wave obtained with the impervious wraps was looser but equally as long lasting as a conventional wave.

The waving experiments of Example II can be repeated with similar results when any of the following impervious plastic foam wraps are substituted for the wraps used therein.

A. 1.5 inch x 3 inch x 0.02 inch closed-cell polyethylene foam having 50 pores per linear inch, a density of 2 pounds per cubic foot, a resilience of 35%, and a tensile strength of 62 pounds per square inch.

B. 4 inch x 5 inch x 0.2 inch 95% closed-cell polyether polyurethane foam having 140 pores per linear inch, a density of 5.5 pounds per cubic foot, a resilience of 15%, and a tensile strength of 10 pounds per square inch.

C. 2 inch x 3 inch x 0.01 inch 75% closed-cell polyester polyurethane foam having 35 pores per linear inch, a density of 1.5 pounds per cubic foot, a resilience of 25%, and a tensile strength of 150 pounds per square inch.

D. 1 inch x 4 inch x 0.08 inch open-cell sponge rubber

¹ Each wrap was 2 inches x 3 inches x 0.03 in. The pervious wrap was comprised of open-cell polyurethane foam of the type described in Example I of copending application Ser. No. 389,479, filed Aug. 13, 1964. The impervious wrap was closed-cell polyethylene foam having 40-50 pores per linear inch, a density of 1.8-2.6 pounds per cubic foot, a resilience of 33%-37%, and a tensile strength of 20-40 pounds per square inch. This foam had a thin impervious 0.01 inch thick skin of closed-cell polyethylene on one surface.

foam having an impervious 0.005 inch polyvinyl chloride film on one surface thereof, and having 75 pores per linear inch, a density of 10 pounds per cubic foot, a resiliency of 48%, and a tensile strength of 500 pounds per square inch.

In this example, the impervious foam wraps can be used on a segment of the tress other than the free end, e.g., the center, whereby unique and unusual types of permanent waves are obtained.

Example III

This example is illustrative of how the impervious wraps of this invention can be effectively used to prevent the hair ends from being treated during a permanent waving process. In this process, the ends already possess a tight wave due to a previous permanent.

The hair is shampooed and towel dried until damp. Tresses are then formed and wound in the conventional manner using end wraps consisting of 2 inch x 3 inch x 0.03 inch flexible wafers of impermeable closed-cell polystyrene foam having 50 pores per linear inch, a density of 4 pounds per cubic foot, a resiliency of 37%, and a tensile strength of 12 pounds per square inch.

Each wound tress is then saturated with a commercially available waving lotion, allowed to stand for ten minutes, rinsed with water, and neutralized with 1.2% H₂O₂.

When the hair is taken down, the portion of the hair not covered by the end wraps has an excellent permanent wave, but the ends, having been wrapped with the impervious foam, are unchanged in appearance and are not affected by the waving lotion.

As will be readily apparent to those skilled in the art, the impervious foam wraps of this invention are useful in hairkeratin-modification processes other than permanent waving. For example, the impervious wraps could well be used in bleaching, dyeing, or other coloring processes.

What is claimed is:

1. A wrap for aligning hair tresses and preventing exposure of selected segments thereof to solutions in a keratin-modification process, said wrap having a rectangular shape, a thickness ranging from about 0.01 to about 0.20 inch and consisting of a flexible wafer of an impermeable plastic closed-cell foam selected from the group consisting of polyester polyurethane, polyether polyurethane and polyethylene, said foam having a density ranging from about 1 to about 10 pounds per cubic foot, an average pore incidence ranging from about 35 to about 100 pores per linear inch, and a resiliency of from about 25% to about 40%.

2. The wrap of claim 1 wherein the foam material has an impervious 0.01 inch thick skin of closed-cell polyethylene on one surface, a density of about 2 pounds per cubic foot, an average pore incidence of about 50 pores per linear inch and a resiliency of about 35%.

3. A process for differential modification of hair by selective exposure of hair tress segments to keratin-modifying solutions, comprising the steps of forming the hair into tresses, wrapping about a selected segment of each tress a flexible wafer of impermeable foam having a rectangular shape with dimensions of from about 1 inch by 1 inch to about 5 inches, by 5 inches, a thickness ranging from about 0.01 to about 0.20 inch and a resiliency of from about 15% to about 50%, winding each tress about a cylindrical body, and saturating each wound tress with a keratin-modifying solution.

4. The process of claim 3 wherein the keratin-modifying solution is a cold permanent waving agent and the selected hair tress segment is the free end of the tress.

5. The process of claim 3 wherein the wafer of impermeable plastic foam is selected from the group consisting of closed-cell polyester polyurethane, closed-cell polyether polyurethane, and closed-cell polyethylene.

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ROBERT PESHOCK, Primary Examiner

U.S. Cl. X.R.

132—36.2