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TREATMENT OF HUMAN HAIR

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2 Claims. (Cl. 167—88)

My invention relates to a method for removing dye from living hair upon the human head and to materials in a form adaptable for application thereto.

The increase in the number of persons who color or dye their hair has resulted in increased efforts to find dyes which are non-toxic, quick acting, permanent and which do not harm or injure the hair. Similarly this increase in the number of persons who color or dye their hair has created a demand for dye removers which are safe and non-injurious to the hair and person.

Various methods have been devised for decolorizing dyes applied to living human hair but so far as I am aware none of these methods have proved entirely satisfactory. The majority of these methods involve the use of decolorizing agents primarily applicable to organic dyeings and consisting essentially of hydrogen peroxide, or acid, or alkali compounds whose action cannot be limited to the dye film and which inevitably affect the natural pigment and texture of the hair. Again, while other decolorizing agents may be used which do not harm the hair the decolorizing action is but temporary and the color shade of the hair darkens merely on exposure to the air. Another objection to the known decolorizing agents is that most of them give off offensive odors. It should also be noted that these so called dye removing treatments are essentially dye decolorizing treatments in that the dye is merely altered chemically and changed to a colorless form as opposed to being actually removed as in my invention. A further disadvantage with the known decolorizing treatments is that the hair is left harsh and brittle and in such weakened condition that it cannot be immediately treated but must be left to rest for periods ranging up to several days before it can be waved or redyed, with the consequent inconvenience or humiliation of the subject. So far an applicant is aware, there is no satisfactory method for the removal of vegetable, metal salt or organic dyes from living hair and no method applicable to the removal of hair dyes generally from living human hair.

In this connection it should be noted that the treatment of living human hair is to be carefully distinguished from the treatment of dead hair, for while similar in some respects there are substantial differences between the two, foremost among which may be noted the conditions under which the treatment occurs. In one case the human element is present, in the other it is not. Thus, treatments applicable to dead hair may not be applicable to living human hair, because of the harmful effect on the subject and this even though the treatment causes no injury to dead or living human hair.

Hair may posses any one of the six natural shades which, as well known in the art, consist of black, brown, dark chestnut brown, light chestnut brown, blond and light blond. It will be understood, of course, that the above named shades may have various tints and that there may be different strengths of these shades as half or quarter shades. By my invention hair may be lightened to any desired extent, one, two or more shades being removable depending upon the shade of the hair undergoing treatment. This toning down of the dye hair to any desired natural color shade is a feature of my invention. By it hair dyed a deep black, for example, may be toned down to a shade very nearly approaching the shade it possessed before dyeing or some intermediate natural color shade. Applied to virgin hair my invention has no effect, consequently virgin hair is not lightened in shade by my process or hair that has been dyed toned down to a shade lighter than it possessed before dyeing. To illustrate, black hair which has been bleached to a blond shade and subsequently dyed will not be restored to its original black shade but to the blond shade upon complete removal of the dye. Restoration to the black shade is impossible to such case as the bleaching has affected the natural coloring matter in the hair.

So far as I am aware the known methods of treating living human hair do not permit of the gradual shading or toning down of the hair. By means of my invention, however, the dye may be completely removed from the hair and the hair restored to its natural shade or the dye may be incompletely removed and the hair toned down to any desired lighter natural color shade, without the necessity of decolorizing and redyeing the hair. Upon completion of the treatment the hair may be washed or shampooed to remove the treating agents, dried and subjected to any further treatment desired, such as dyeing or waving. After treatment in accordance with my invention the hair will be found more supple and bright and to possess an even, natural shade, free from streaks.

Hair dyeing, as well as so called dye removing treaments, is usually conducted by operators having little or no knowledge of the chemistry of the dyeing or removing treatment or of the materials used in such treatments. Even though

these operators may be skilled in the art of applying hair dyes or so called dye removers their lack of chemical knowledge makes it necessary that dyes and dye removers which are free from the danger of harming or injuring the hair or person be used. Further since the hair may have been dyed on different occasions with different dyes requiring different treatment for their removal there is need for a single dye removing composition capable of removing any dye, regardless of type. Again the operator may not know with what dye or dyes the air has been dyed with the result that the trial and error method may have to be resorted to. My invention overcomes these difficulties in that it provides a compound useful in connection with the method of the invention whereby all dyes which may have been applied to the hair may be removed in a single treatment, eliminating the necessity for trial and error methods in dye removing and with it the danger of harming the hair or the individual by repeated treatments.

Commercially used hair dyes are classified in the three following groups:

1. Vegetable dyes
2. Metal salt dyes
3. Organic dyes

Vegetable dyes comprise dyes essentially composed of vegetable coloring substances, such as henna and indigo. Metal salt dyes comprise dyes consisting essentially of a salt of a metal such as copper, iron, nickel, silver and lead and include dye compositions comprising vegetable constituents associated with a salt of a metal. The organic dyes comprise those dyes constituted by an organic coloring substance, vegetable dyes excepted, and most commonly are of phenolic origin. While vegetable dyes are organic dyes it is not customary to refer to them as organic dyes. The term organic dye as used throughout the specification and claims is not intended to include vegetable dyes. The silver nitrate and copper salt dyes are illustrative of the metal salt dyes while para phenylene diamine and diamino phenol are illustrative of the organic hair dyes.

While my invention is adaptable to the removal of all dyes it is primarily concerned with the removal of metal salt and organic dyes. Vegetable dyes are not as effective as the metal salt and organic dyes and their color shade does not possess the strength and permanency of these latter dyes. Vegetable dyes may act both as a bleach and as a dye. Applied to light hair a dyeing action is obtained whereas applied to dark hair some bleaching or lightening is obtained. Vegetable dyes, henna, for example, are commonly applied to dark hair shades to give the hair what is known as warmth rather than for dyeing purposes. Some vegetable dyeings may be lightened and to some extent removed by shampooing but their complete removal cannot be effected by such treatment. Where bleaching has been effected by the vegetable dye its removal, in accordance with my invention, will not completely restore the hair to its original shade before application of the dye because of that bleaching effect.

While the chemical reaction which occurs during the dye removal treatment may vary, with the varying chemical structure of the dyes, the general method used is the same in each instance. According to my invention the hair is treated with a composition containing a protective agent, a "solubilizing" agent and a "dissolving" or "solvent" agent. The "solubilizing" agent acts upon the dye rendering it soluble in the "dissolving" or "solvent" agent which in turn further acts on the dye rendering it in condition to be removed from the hair by washing and rinsing, for example. The action which renders the dye soluble will hereinafter be referred to as a "solubilizing" action or "solubilization." In the carrying out of the invention solubilization and dissolving of the dye appear to occur progressively. The solubilizing agent appears to attack and render soluble in the solvent agent a minute layer of the dye. This layer of dye is then dissolved in the solvent thus exposing a lower strata of the dye to the action of the solubilizing agent. As this action progresses the hair becomes progressively lighter until all of the dye has been removed or the desired light tone has been reached. The "solubilizing" agent may be a single chemical substance or a mixture of two or more chemical substances. Similarly the dissolving or solvent agent may be a single chemical substance or a mixture of two or more chemical substances as is more fully described herein. According to the invention, as previously stated, the dye may be removed by a single composition adaptable to the removal of all dyes or I may use specific compositions adapted to the removal of either a metal salt, organic or vegetable dye specifically.

In carrying out my process I employ a mixture of solubilizing, dissolving or solvent, and protective agents combined in such relative proportions that the hair dye is removed without affecting either the texture or the natural pigments of the hair. Once the agents to be used have been selected they will be mixed in rather definite proportions. The proportions to be used will vary, however, depending upon the agents selected. From the examples hereinafter given of the dye removing composition of my invention it will be understood how the various agents may be selected and combined to form dye removing compositions suitable for use in the method of my invention. The composition may be applied in liquid, semi-liquid, paste powdered or tablet form. Where it is desired to apply the materials in liquid form water may be employed as a diluent agent. Where the semi-liquid or paste form is desired thickening agents, such as malt flour, oat flour, rosin or mineral oil may be added but it will be understood that other suitable diluent or thickening agents may be used.

My invention will now be illustrated by examples of specific compositions which I have found advantageous in carrying out the method of my invention.

Example I.—(For the removal of vegetable, organic, or metal salt dyes)

	Percent
Nitric acid 40° Bé	3
Hydrochloric acid	1
Oxalic acid	1
Acetic ether	1
Cholesterol	0.02
Diethylene filycol	3
Sodium formaldehyde sulphoxylate	1
Distilled water (approx.)	90

Example II.—(For the removal of metal salt dyes)

	Per cent
Hydrochloric acid	3
Nitric acid 40° Bé	1
Diethylene glycol	3
Sodium nitrate	3
Glucose	5
Water	85

Example III.—(For the removal of organic and vegetable dyes)

	Per cent
Hydrochloric acid	0.75
Oxalic acid	0.75
Diethylene glycol	3.00
Powdered zinc	5.00
Sodium formaldehyde sulphoxylate	3.00
Malt flour	4.00
Oat flour	15.00
Water	68.50

Example IV.—(For the removal of silver nitrate dyes)

	Per cent
Mineral oil	40
Nitric acid 40° Bé	4
Diethylene glycol	2
Cholesterol	2
Water	52

In Examples I and II the composition is in the liquid form, in Example III the composition is in the paste form and in Example IV the emulsion form is illustrated. Again in the compositions of Examples II and III involving the use of liquids and powders, the powders and liquids should be kept separately and the two mixed at the time of use. It will be understood that the compositions of the above examples are merely illustrative and that the invention is not limited thereto. Malt flour and oat flour could, for example, be omitted from the composition of Example III and some other suitable thickening agent substituted therefor, or in the event that the liquid form was desired a thickening agent could be entirely omitted and a correspondingly greater amount of water added. Similarly glycerine can be substituted for diethylene-glycol and acetic acid be used in place of acetic ether.

In the foregoing examples the relation of the ingredients is expressed in percent by weight. The percent hydrochloric acid referred to in the specification and claims is based on pure HCl unless otherwise indicated, thus while a solution of HCl in water will be used, a sufficient amount should be used as contains the percent HCl indicated.

As a further indication of the wide variation permitted by my invention, mixtures of sodium nitrate and sulfuric acid or potassium bichromate and sulfuric acid in chemically reacting proportions may be substituted for nitric acid, while a mixture, for example, of two parts of acetic acid to one part of formic acid may be substituted for oxalic acid. Similarly sodium sulfite or sulfurous acid may be used in place of sodium formaldehyde sulphoxylate.

It should be noted that a number of substances disclosed as being useful in the dye remover of my invention will undergo reaction with each other. When employing substances which will react with one another they should not be permitted to be in contact with each other for any period of time which would result in a reaction impairing or destroying the effectiveness of the dye removing composition to any material extent. Substances which will react with one another are advantageously kept in separate containers and mixed at or just prior to use. Each substance of the dye removing composition may, of course, be kept in a separate container until the time of use, if desired. In the composition of Example I, for example, an aqueous solution of nitric acid, hydrochloric acid and acetic ether may be kept in one container and an aqueous solution of the remaining substances in a separate container.

As acid agents may be harmful to the hair if improperly used, care must be taken in their use. I have found that acid agents may be safely employed in hair dye removers in the presence of the protective agents described herein, provided the hydrogen ion concentration is not too great. Advantageously, where acid agents are employed in the dye removers of the invention, the compounding of the materials is effected in such relative proportions as to give a pH value of 5.00–5.50. The specific composition of Example I has, for example, a pH value of 5.00–5.50. The acid concentration may be greater or less than the value given and satisfactory results be obtained, but an acid concentration as indicated is advantageous. With weaker acid concentration the reaction will be slower. With high acid concentrations the reaction will be faster but there is danger of injury to the hair.

Although my invention has been illustrated in connection with dye removers involving the use of acid agents, alkaline agents may be safely employed. Advantageously, where alkaline agents are used, the compounding of the materials is effected in such relative proportions as to give a pH value of 9.00–10.00. In order that my invention may be clearly understood in connection with the use of alkaline agents a specific composition involving the use of these agents will now be given.

Example V.—(For the removal of vegetable, organic, or metal salt dyes)

	Per cent
Sodium chlorate	1.50
Sodium hydroxide	8.00
Sodium hydrosulfite	2.00
Sodium nitrate	10.00
Sodium sulfate	10.00
Glucose	5.00
Diethylene glycol	5.00
Water	58.50

The use of an alkaline dye remover is not as satisfactory as that of an acid dye remover since it affects the natural pigment and texture of the hair somewhat. Where there is no objection to this effect on the hair an alkaline dye remover could be used in place of an acid dye remover. In accordance with my invention, involving the use of a protective agent, the effect of alkaline dye removers on the hair is minimized and their use made practical, although the use of an acid dye remover is considered more advantageous.

While my invention does not depend for its operation upon any theory, the following comments are offered as a possible explanation of the operation when using acid agents. In the case of metal salt dyes, solubilization appears to be effected primarily by a combination of two mineral acids—nitric acid and hydrochloric acid—in dilute solution. Organic and vegetable hair dyes appear to be solubilized primarily by a reducing agent—sodium formaldehyde sulphoxylate—which is capable of acting in acid solution. In the case of Example III showing the use of powdered zinc, the reducing action is aided by the action of nascent hydrogen liberated by the action of acid upon the zinc. Following solubilization the solubilized dye is acted upon by a dissolving or solvent agent such as oxalic acid, acetic ether, acetic acid or hydrochloric acid, which is capable of rendering the solubilized dye in a form in which it can be removed by

washing or rinsing. Throughout the treatment the hair is protected by a protective agent such as diethylene glycol or cholesterol or both which prevents the hair from being weakened or otherwise harmed by any agents which might otherwise harm the hair.

Solubilizing agents suitable for use in my invention include sodium formaldehyde sulphoxylate, sodium nitrate, hydrochloric acid, nitric acid and powdered zinc. The dissolving agents include nitric acid, hydrochloric acid, tartaric acid, oxalic acid, acetic acid and formic acid while the protective agents include diethylene glycol, cholesterol, mineral oil and glycerine. It will be understood that the invention is not limited to the above named agents but that other suitable equivalent agents might be used in place of those named.

In the solubilizing action the solubilizing agents act upon the hair dye rendering part or substantially all the hair dye soluble depending upon the intensity of treatment. In the dissolving action the solvent or dissolving agents convert the solubilized dye to a form in which it can be removed by washing and rinsing. During this simultaneous solubilizing and dissolving treatment decoloration of the dye occurs and as the treatment proceeds the shade of the hair can be observed to become progressively brighter. Because the dye is progressively attacked and destroyed, shading or toning down of the hair can be effected by my invention. Further as the progress of the treatment can be followed the desired shading or toning down can be accurately obtained by merely removing the dye remover the moment the desired result has been reached. Whether the action of the dissolving or solvent agent is chemical or physical is immaterial.

In carrying out the invention the dye remover is applied to the hair by means depending upon the form of the composition employed. This means may be a small brush or wad of cotton, for example. Treatment with the dye remover is continued until the hair reaches the desired color shade, after which the solubilized and dissolved dye and any excess dye remover is removed by washing and rinsing. The hair is then washed with a mild alkali shampoo to remove all traces of acids which may be present when acid agents are employed in the dye remover and following this treatment the hair is rinsed with water. Similarly a mild acid wash may be used to remove any alkali when an alkaline dye remover is used.

The time of application of the dye remover will depend upon the intensity of the treatment desired. Generally this time will vary from 15 to a maximum of 60 minutes. In some cases a longer or shorter time may be required. No difficulty is experienced in controlling the treatment as the action of the dye remover can be readily followed and the action stopped by removal of the dye remover when the hair has been toned down or lightened to the extent desired.

Where the liquid form of the dye remover is used the dye removal will ordinarily be carried out in 15 minute stages since the action of the dye remover will be practically spent at the expiration of this period of time. Where the paste form is used, the dye removal will ordinarily be effected in one application as in this form the dye remover is not usually entirely spent until the expiration of about one hour. This variation in the length of the period of activity between the dye remover applied in liquid form and in paste form is probably caused by more rapid evaporation of the dye remover when applied in liquid form. Intermediate washing and rinsing of the hair is not required when using the liquid form even though a treatment longer than 15 minutes be desired since a fresh application of the dye remover can be made without removal of any dye remover remaining from a previous application. As illustrative of the time of treatment a 15 minute application of the dye remover will ordinarily brighten up by two shades dark dyeings applied to light hair, a 30 minute treatment will effect a brightening up of four shades and a 45 minute treatment five or possibly six shades. If the dye removing treatment is continued for one hour the hair, in the illustration selected, will be brightened up nearly the maximum of the color shade scale and the texture of the hair before dyeing nearly restored.

Heat is not necessary for the successful carrying out of my invention, but the action of the dye remover can be speeded up by the application of heat to the surface of the hair. The manner of applying heat to the hair is no part of my invention, but if the use of heat is desired it may be applied in any one of the ways commonly employed in the hair treating art, as by means of a hair dryer, for example. By the application of heat the time of treatment may be reduced to approximately one-half that necessary when heat is not employed.

From the foregoing it will be seen that the method of my invention comprises broadly the removal of dye from living hair on the human head by treating the hair in the presence of a protective agent with a solubilizing agent for a sufficient length of time to effect solubilization of the dye and progressively acting upon the solubilized dye by treatment with a solvent or dissolving agent.

While the term dissolving or solvent agents has been applied to the materials used to treat the solubilized dye, these terms are used interchangeably herein and include materials suitable for removing the solubilized dye regardless of whether the action be chemical or purely physical. To protect the texture or natural pigment of the hair from injury the dye removing treatment is carried out in the presence of a protective agent, as diethylene glycol, cholesterol or glycerine. These protective agents probably act by forming a film or cover about the hair, thereby shielding the pigmented sheath of the hair and preventing its being weakened or discoloured by the action of the dye remover, but my invention is not limited to any theory as to how these protective agents act.

My invention possesses many advantages. By the solubilization treatment, dyes may be completely or partially removed from the hair, thereby permitting the hair to be restored to its original color shade or toned down to some intermediate natural color shade. Following the removal of the dye the hair may be immediately subjected to any further treatment desired, such as bleaching, redyeing or permanent waving. Immediate treatment of the hair after the known decolorizing treatments cannot be successfully conducted. Again due to the fact that the dye has been actually removed from the hair subsequent treatment of the hair is easier and generally more successful than in those cases where mere discoloration is effected. The composition of my invention possesses advantages, in that it does not give

off offensive odors rendering its use objectionable, and is readily and simply applied. Further, since the dye is removed, instead of being merely altered chemically, the treatment is permanent and there is no danger of the hair being darkened on exposure to the air. My invention possesses further advantages in that the materials used are present in such relative proportions that there is no harm or injury to the hair or person, the texture and natural pigment of the hair being unaffected by the treatment.

The word hair as used throughout the specification and claims is intended to refer only to living hair on the human head. Mineral oil as used throughout the specification and claims has reference to a highly refined mineral oil—preferably a colorless paraffin mineral oil.

I claim:

1. A composition for removing dye from living hair on the human head without injury to the hair or person which comprises nitric acid (40° Bé.) 3%, hydrochloric acid 1%, oxalic acid 1%, acetic ether 1%, cholesterol 0.02%, diethylene glycol 3%, sodium formaldehyde sulphoxylate 1%, and water 89.98%.

2. A composition for removing dye from living hair on the human head without affecting the texture or natural pigment of the hair, which comprises nitric acid, hydrochloric acid, oxalic acid, acetic ether, chloesterol, diethylene glycol, sodium formaldehyde sulphoxylate, and distilled water.

EDMOND SOUSSA.

CERTIFICATE OF CORRECTION.

Patent No. 2,149,319. March 7, 1939.

EDMOND SOUSSA.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 64, in the table, for "filycol" read glycol; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of April, A. D. 1939.

Henry Van Arsdale

Acting Commissioner of Patents.

(Seal)