Patented May 10, 1938 2,116,521

UNITED STATES PATENT OFFICE

2,116,521

HAIR DYEING METHOD AND COMPOSITION

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No Drawing. Application May 7, 1934, Serial No. 724,393

12 Claims. (Cl. 167—88)

My invention relates to the coloring of hair. It relates more in particular to a method of and materials for coloring human hair on human heads or animal hair on the bodies of animals or, in other words, fur.

The concept of dyeing hair is in general an extremely old one. Although many different types of dyes have been and are used at the present time for dyeing hair, most of them used up to the present time have been unsatisfactory from one of several standpoints. The conventional hair dye employs inorganic salts, usually lead or silver salts, which produce the desired shades by forming sulphides or oxides. This type of dye is unsatisfactory, because it is poisonous and, secondly, because it produces unnatural shades. Actually, this form of dye coats the hair rather than dyes it, and so it will be substantially impossible to obtain suitable effects by the use of dyes of this character.

There are a number of organic base dyes now being sold commercially with fair satisfaction to obtain suitable colors and natural appearance in dyeing of human hair. But heretofore most of the dyes of this class have been found to be poisonous and so should not be used on the hair for that reason. Dyes of this class, of which paraphenyldiamine and para-amidophenol may be taken as examples, are applied to the hair with hydrogen peroxide or other oxidizing agent which oxidizes the bases to form colored compounds having a wide variety of shades. The poisonous character of these dyes manifests itself in general by getting into the blood stream and reducing the blood and by forming rashes on the skin. While every user of this class of dye does not feel the effects of poison, the proportionate number of users directly affected is sufficiently high to makes these dyes very unsatisfactory.

A number of coal tar dyes are known which are non-poisonous and which may be used very satisfactorily to dye human hair if the dyeing is carried on at an elevated temperature. In view of the fact that hair cannot be dyed in situ at a temperature high enough to be uncomfortable to the head, and since further conditions are not such as to permit the use of large concentrations of alkali or acid, which otherwise could be used to produce proper results, the non-poisonous coal tar dyes have not been used to any great extent. They will color the hair, but substantially only a surface coating of the color is applied and this will wash off quite readily, leaving the hair without dye.

The object of my invention is to overcome the objections found in the use of hair dyes known heretofore.

Another object is the provision of means for coloring the hair with a natural appearing dye which is not too readily removed and which is non-poisonous.

Another object is the provision of means for dyeing the hair which can be made available to ordinary users and which can be used by the person of ordinary intelligence and experience in dyeing.

In carrying out my invention, I have made the discovery that if a proportion of a derivative of carbamic acid is employed with a dye, that dye can be used much more satisfactorily for coloring the human hair due to the presence and action of the carbamic acid derivative. A number of advantages attend the use of the carbamic acid derivative, but in general these may be classified as the ability to dye at a lower temperature, the production of a faster and more permanent color on the hair, and the possibility of using dyes for coloring the hair which heretofore were entirely unsatisfactory for the purpose. The carbamic acid derivative seems to function specifically in promoting contact between the hair and dye. Adherence is better, evener, more natural appearing, and in every other way more satisfactory final results obtained. While the carbamic derivative may be used with any type of dye which can be used to dye the hair, the invention makes possible the selection of dyes which in themselves are non-irritating to the skin and non-poisonous to the human body. The carbamic acid derivative does not affect the toxicity of the dye; in other words, if a normally non-toxic dye is used, it will be non-toxic in the presence of the carbamic acid derivative.

My invention obviously does not concern itself with the use of any particular types of dyes. The carbamic acid derivative, which may be termed a hair dyeing assistant, promotes contact between any type of dye that I have investigated and the human hair. I may accordingly use any suitable coal tar dye, vegetable dye or dye of animal origin. The dye may be synthetically prepared or it may be a natural dye; acid, direct and basic dyes produce equally satisfactory results whether they belong to the azo group, anthraquinone group, triphenylmethane group, etc.

An advantage of the use of the carbamic acid derivative is the promotion of solubility of the dyes and the possibility of using dyes which normally are so slightly soluble as to be unavailable for the dyeing of human hair. It is well known that

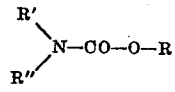
as a rule dyes containing sulphonic acid groups in the form of sodium potassium or ammonium salts are the most soluble. Dyes comprising the salts of calcium, iron, etc., or salts of dyes and organic bases or mixtures thereof, usually soluble in water with difficulty, can be used for my purpose. I have found that insoluble bases of basic dyes seem to form salts with carbamic acid derivatives which are soluble in water; at least, these insoluble bases become soluble in water in the presence of carbamic acid derivatives.

Although aqueous solutions have been referred to, it is by no means necessary that hair be dyed with a water solution of the dye. Non-aqueous solvents may be used where and if indicated and the carbamic acid derivative will function in substantially the same manner as a hair dyeing assistant.

The dye composition employed may in addition to the dye proper and carbamic acid derivative contain ingredients like diluents, salt, sugar, assistants, waterproofing agents, fixatives, and the like, now used in the dyeing industries. Gums can also be used which are soluble in carbamic acid or in the solvent used with the dye. Gum may be used in such a manner as to form a coating on the hair along with the dye, so that upon drying the coating becomes substantially insoluble. Small proportions of gum damar, rezyls, glyptals, urea resins, etc., can be used.

The hair dye may be made in the form of a powder, cake or stick, to be dissolved in water or other solvent, or in the form of a solution or paste. So far as the present invention is concerned, this may be considered a matter of convenience not affecting the results obtained by the combination of the dye and derivative of carbamic acid.

By derivatives of carbamic acid, I refer to a group of compounds in which one or more of the hydrogens of carbamic acid, NH_2COOH, is replaced by another radical producing a compound having the general formula



in which R' and R'' represent hydrogen or organic aliphatic, aromatic and/or hydroaromatic radicals and their substitution products like hydroxy derivatives, halogen, sulphur, nitrogen, sulphonic acid and aralkyl derivatives. R' and R'' may be the same radical or different. In the simplest form of compound coming under this general formula, R' and R'' are hydrogen, but they may be alkyl derivatives, as defined above, acyl derivatives, and the like. Except in carbamic acid itself, which may be used with fair results under some conditions, R represents an organic radical.

Numerous examples may be given, but a few illustrative examples will be sufficient to teach those skilled in the art the class of compound which may be used satisfactorily. One sub-class is the esters of mono-hydric or poly-hydric alcohols, wherein R' and R'' are hydrogen and R is the alcohol residue. Specific examples are methylcarbamate, ethylcarbamate (urethane), amyl carbamate, duodecyl carbamate, stearyl carbamate, phenyl carbamate, etc. As an example of a carbamate in the form of an ester of a polyhydric alcohol, the following derivative of glycerine is given:

$CH_2(OCONH_2)—CH(OCONH_2)—CH_2(OCONH_2)$

In these examples, the R is a residue resulting from esterification with alcohol. Substitution products may be employed also in which R is a group like an ethanol group (C_2H_4OH), a propanol group, or in which the R may stand for other radicals of the general character indicated.

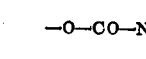
In other words, examples might be cited to illustrate the types of groups that R' and R'' could represent in addition to hydrogen previously referred to. R' and R'' may represent a phenyl group, an ethanol group, a propanol group, or in fact substantially any of the groups described hereinabove which can be used in place of R. In other words, each of the radicals R, R' and R'' may be a group of a class consisting of alkyl, halogen alkyls, amino alkyls, substituted amino alkyls with either positive or negative groups, etc., alkylol, esters of alkylol groups, ethers of alkylol groups, and the like. The above radicals may be aliphatic, aromatic, hydroaromatic, or heterocyclic.

These latter types of compounds in which R' and R'' represent a radical other than hydrogen may be considered as derivatives of urethanes. For example, I may use one of a sub-class, all of which are derivatives of urethane. As an example, if R' is C_6H_5, the compound resulting as a derivatives of urethane is phenyl N urethane. If on the other hand, R' is an ethanol group, then the urethane derivative will be written as follows:

$C_2H_5—O—CONH—C_2H_4—OH$

Similarly, derivatives of the glycerine tricarbamate referred to above and other carbamates may be formed.

The carbamic acid derivative should be soluble in the solvent employed with the dye. Normally, water is employed and so the carbamic acid derivative is preferably water soluble. Those which are freely water soluble like urethane are also usually soluble in alcohol and for the most part in ether and other organic solvents. The effect of the carbamic acid derivative in the dyeing of hair appears to be due to the presence of the



group, the radicals attached thereto being of apparently minor importance in effect.

Carbamic acid derivatives may be used in proportions varying from 1% to 25% and even higher on the basis of the solvent employed. The amount of dye used may range from a fraction of 1% of the solvent up to 10% and more, depending upon the density of the shade desired. When solid preparations are produced, and merchandised as such, they can be made up either of the dye and carbamic acid derivative alone, or mixtures of the dye, carbamic acid derivatives and salt, sugar, Glauber's salt, or other organic or inorganic salt, gum, waterproofing agent, diluent, fixative, and the like, used when dyeing.

Mechanics of the method consist of dissolving the hair dye in water or other solvent to make a solution of suitable strength, depending upon the shade desired. This solution is applied to the hair with a brush, sponge, or by other means of contact, such as dipping until the hair is properly saturated with the solution. The temperature may be modified somewhat to suit the particular dye used, but it should not be sufficiently high to be markedly uncomfortable to the head. The product can be made in the form of a paste which can be put on the head as a pack. Whatever the means of application, the dye solution should

be allowed to dry thoroughly and the hair then thoroughly rinsed with warm water. After this, the hair is dried again. As an example of the use of my invention, the following compositions may be considered.

For blond hair:

	Parts
Urethane	10
Cupranil Brown C. I. 560	1

The above to be dissolved in 89 parts of water.

For reddish brown hair:

	Parts
Methyl carbamate	10
Direct Brown G X C. I. 606	1
Cupranil Brown B C. I. 560	1
Pontacyl Black 5 R X C. I. 289	.5

This is dissolved in a suitable amount of water depending upon the shade desired, 87.5 parts of water giving a medium shade.

For black hair:

	Parts
Direct brown C. I. 606	5
Direct green C. I. 583	1
Phenyl N Carbamate	10
Dimethylcellulose	2
Water	60
Alcohol	22

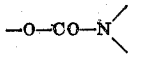
While most of the examples given are used in water solution, compositions are readily made for use with a mixture of water and organic solvents, or for use with pure organic solvents.

It should be understood that the invention is not limited to use with any particular class of dyes or with any particular process. Any dye suitable for the purpose can be used with the carbamic acid derivative and when applied to the hair in the form of a solution or paste, will produce a hair coloring of greatly improved character. While my invention does not, in general, contemplate the use of toxic dyes on the human head due to their deleterious effect upon body tissue, nevertheless carbamic acid derivatives of the character described, when used in accordance with my invention, will improve the action of such dyes when used in hair dyeing. Moreover, it is fairly obvious that although my invention has its greatest application to the dyeing of hair growing on the head, it may be used with good results for other purposes, for example, for dyeing animal hair. My invention is limited, therefore, only by the claims.

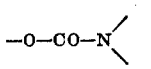
Whenever the term "hair" is employed in the claims, it will be understood to mean hair on the human head or fur.

What I claim as new and desire to protect by Letters Patent of the United States is:

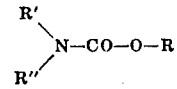
1. The method of dyeing hair which comprises treating the hair with a composition including an organic dye and a chemical having the nucleus



2. The method of dyeing hair which comprises treating the hair with a composition including a water soluble organic dye and a chemical having the nucleus

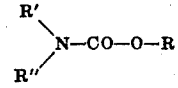


3. The method of dyeing hair which comprises treating the hair with a composition including an organic dye, and a chemical having the general formula



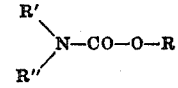
wherein R is an organic hydrocarbon radical or a derivative thereof, and R′ and R″ are hydrogen, or organic hydrocarbon radicals, or derivatives thereof.

4. The method of dyeing hair which comprises treating the hair with a composition including an organic dye, and a chemical having the general formula



wherein R is an alkylol radical, and R′ and R″ are hydrogen, or organic hydrocarbon radicals or derivatives thereof.

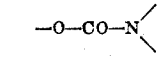
5. The method of dyeing hair which comprises treating the hair with a composition including an organic dye and a chemical having the general formula



wherein R is a radical of a class consisting of alkyl, halogen alkyl, amino alkyl, a substituted amino alkyl, alkylol, an ester of an alkylol group, an ether of an alkylol group, and R′ and R″ are hydrogen, or organic hydrocarbon radicals, or derivatives thereof.

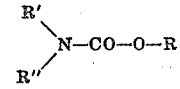
6. The method of treating the hair which comprises treating the hair with a composition including a water soluble organic dye having an acidic group and urethane.

7. A hair dyeing composition comprising an organic dye and a chemical compound having the nucleus



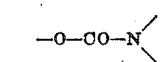
said chemical compound being devoid of carboxyl or sulphonic acid groups and salts thereof.

8. A hair dyeing composition comprising an organic dye and a chemical compound having the general formula



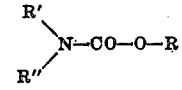
wherein R is an organic hydrocarbon radical or a derivative thereof, and R′ and R″ are hydrogen, or organic hydrocarbon radicals or derivatives thereof, said chemical compound being devoid of carboxyl or sulphonic acid groups and salts thereof.

9. A hair dyeing composition comprising a water soluble organic dye and a chemical compound having the nucleus



said chemical compound being devoid of carboxyl or sulphonic acid groups and salts thereof.

10. A hair dyeing composition comprising a water soluble organic dye and a chemical compound having the general formula



wherein R is an organic hydrocarbon radical or a derivative thereof, and R′ and R″ are hydrogen, or organic hydrocarbon radicals, or derivatives thereof, said chemical compound being devoid af carboxyl or sulphonic acid groups and salts thereof.

11. A hair dyeing composition comprising a mixture of urethane and a water soluble dye.

12. A hair dyeing composition containing an organic dye, a carbamic acid derivative, and a solvent, the carbamic acid derivative comprising between approximately one percent and twenty-five percent, and the organic dye comprising between approximately a fraction of one percent and ten percent, the percentages being by weight and based upon the amount of the solvent, said carbamic acid derivative being devoid of carboxyl or sulphonic acid groups and salts thereof.

WOLF KRITCHEVSKY.