Feb. 6, 1962 R. E. REED 3,019,796

HAIR WAVING DEVICE

Filed Aug. 19, 1957

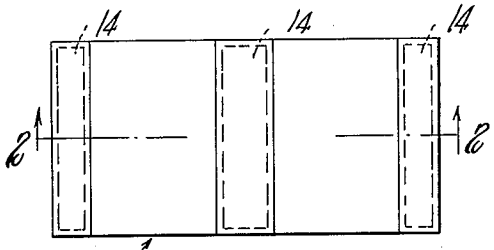


Fig. 1.

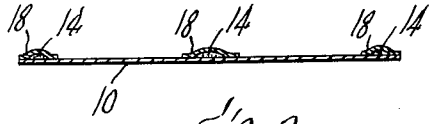


Fig. 2.

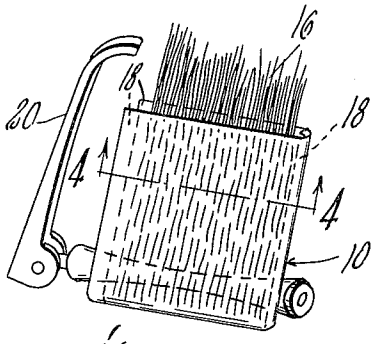


Fig. 3.



Fig. 4.

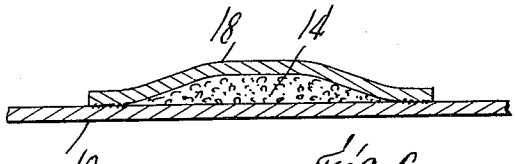


Fig. 6.

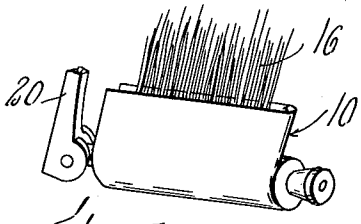


Fig. 5.

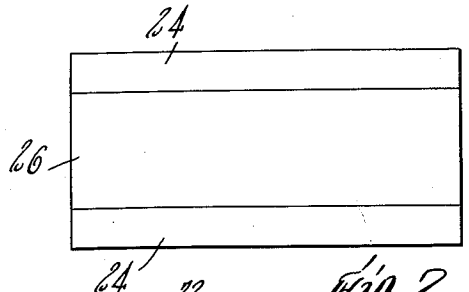


Fig. 7.



Fig. 8.

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HAIR WAVING DEVICE

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This invention relates to a device for use in the permanent waving of hair and pertains more specifically to a web carrying both a waving agent and a neutralizer in position to be dissolved or leached from the device by a solubilizing liquid medium applied to the hair.

The permanent wave process conventionally involves application to the hair of an aqueous solution of a chemical waving agent capable of softening hair keratin, permitting the softened hair to assume a wound shape, then hardening the hair in its wound curled configuration by applying thereto an aqueous solution of a "neutralizer" to set or harden the hair in its new configuration. While such a procedure has been widely used, it suffers from certain disadvantages. In particular, aqueous solutions of the reducing agents normally employed as waving agents tend to be unstable when exposed to atmospheric oxygen and must be kept in tightly closed containers during shipment and storage. The conventional processes in which such solutions are used generally require presaturation of the tress prior to winding on a curler, and since the lotion has a "slippery" feel due to its alaline nature, difficulty is encountered in manipulating the hair tress after saturation. There is also difficulty in penetrating the wrapped curls with the second saturation of wave lotion normally required for a thorough wave or with neutralizing agents to "fix" or harden the hair in curled condition, both of which operations are preferably carried out without unwinding the hair. In both the second saturation and the neutralization steps, the flow of each chemical agent should preferably be from inside the center of the curled tress to the outside. Heretofore the desired flow pattern could not be easily accomplished. As a result, the ends of the hair tress, which are at the center of the wound curl, frequently are insufficiently reacted with the wave lotion or insufficiently neutralized with the neutralizer so that an uneven wave is imparted to each tress. Another problem arises in the mechanics of application of these solutions to the wound hair, since such application is difficult to carry out without contacting the skin or the clothing with the solutions. Also, since the neutralizer, usually an oxidizing agent, is customarily supplied in concentrated form for dissolution in water, some consumers may find the preparation of a solution of the neutralizer a troublesome procedure.

One object of the present invention is to eliminate the necessity for preparing, shipping or storing solutions of waving agents or of neutralizers.

Another object is to provide a device in the form of a web which carries both a supply of waving agent capable of softening the hair and a supply of a neutralizer, the device being arranged so that it may be wound with the hair upon a curler, whereupon the waving agent and neutralizer may be successively leached from the device by a solubilizing medium applied to the hair wound on the curler.

Another object is to provide the desired flow pattern in the hair, wherein the solution of waving agent and neutralizer are formed immediately adjacent the hair fibers deep in the interior of the curl and then flow outwardly.

Still another object is to provide a hair waving device having good manipulatory features.

A further object is to provide a hair waving device having the ability to penetrate a hair tress evenly and

thoroughly with a wave lotion and a neutralizer solution, thereby imparting an even wave throughout each wound tress from the ends of the hair tress near the center of the curl to the outside of the curl.

Still a further object is to provide a web for use on a hair tress in the cold permanent waving of hair by the application of an aqueous medium to the hair, which web carries a supply of alkaline material and reducing agent distributed substantially uniformly over a major portion of the exposed surface of the web and also carries a supply of neutralizer together with means for confining the neutralizer to a localized zone, whereby there is first formed an alkaline solution of reducing agent in the interior of the curl which diffuses to the outside, and there is subsequently formed a neutralizer solution which likewise migrates or diffuses from the locus of its original formation deep within the curl to the exterior thereof.

Still a further object is to provide a device in the form of an end paper carrying both a waving agent and a neutralizer in position to be leached from the end paper by contact with a solubilizing medium, the components being so arranged that the waving agent is first leached from the end paper and the neutralizer is leached therefrom subsequently.

Other and further objects will be apparent from the drawing and from the description which follows.

It has now been found, surprisingly enough, that despite the mutual incompatibility of waving agents and neutralizers, which would lead one to expect that they would destroy each other if placed in proximity to each other, it is possible in accordance with the present invention to provide a supply of both waving agent and neutralizer in close physical proximity but separate from each other arranged to provide, successively, a solution of waving agent and a solution of neutralizer generated deep within the tress of hair wound on the curler.

In the drawing:

FIG. 1 is a plan view of one embodiment of the device of the present invention;

FIG. 2 is a view in section taken along line 2—2 of FIG. 1;

FIG. 3 is an isometric view showing application of the device to the hair as the hair is being wound upon a curler;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a view corresponding to FIG. 3 showing a further stage in the application of the device to the hair and the winding of the hair into curled form;

FIG. 6 is a view on an enlarged scale corresponding to the central portion of FIG. 2;

FIG. 7 is a plan view of another embodiment of the invention; and

FIG. 8 is a view in section of still another embodiment.

In the embodiment of the device shown in FIG. 1, the web indicated generally by the numeral **10** which is employed as a carrier for holding the supply of waving material and neutralizer in position may comprise an elongated rectangular sheet of water-pervious or bibulous fibrous material such as paper or woven or unwoven bonded or unbonded webs made of cotton, cellulose, cellulose acetate, Dynel, or other fibrous or filamentary materials. The web may, if desired, be simply a conventional end paper of the type now used for enfolding the end of a hair tress as it is wrapped upon a curling rod. The web may be perforated, if desired, to provide for reduced bulk, greater flexibility, and increased speed of penetration of the solubilizing medium with consequently accelerated leaching or dissolution of the waving agent.

As indicated in the drawing, the waving agent, which preferably is in dry solid form, is distributed substan-

tially uniformly over a major portion of the exposed surface of the end paper and may indeed extend throughout the integral one-piece web **10** of fibrous material which forms the body of the device. Inasmuch as many waving agents in order to be most effective should be employed in an alkaline medium, it is desirable also to provide a supply of soluble alkaline material, preferably in dry solid form, on the exposed surface of the web along with the waving agent.

Conventional adjuvants may be mixed with the dry solid waving agent, including such agents as solubilizing aids, surface active substances which promote wetting of the hair and diffusion of aqueous media therethrough, perfumes, buffering agents or salts, oleaginous materials, sequestering agents or metal complexing agents, drying agents or absorbents such as silica gel, and the like.

The waving agent and alkaline material, when both are present, may be applied to the web either simultaneously or successively. For example, a conventional end paper tissue may be saturated with a solution containing the desired waving agent and alkaline material in the desired relative proportions, then permitted to dry either at room temperature at low humidity or at a moderately elevated temperature up to about 60° to 100° C. The saturated paper may be passed, if desired, between a pair of squeeze rolls prior to the drying step in order to remove excess solution and provide better control of the quantity of waving agent in the dried end paper. The amount of waving agent required will be of the order of 0.1 to 1.5 gram milliequivalents on each individual end paper tissue for each tress of hair along with the proportional quantity of alkaline material. The relative proportions of waving agent and alkaline material are not critical, but the proportion is preferably from 0.3 to 1.0 equivalent weight of alkaline material for each equivalent weight of waving agent.

While any conventional waving agent which is capable of softening hair and which is sufficiently stable and of low volatility may be employed in the device of the present invention, it is preferred to employ as the waving agent a reducing agent capable of splitting the disulfide bonds in hair keratin, such as a mercaptan. It has been found that best results are obtained by employing magnesium thioglycolate having the composition

$$(HS—CH_2—COO)_2Mg$$

or a hydrate thereof, particularly the dihydrate, all of which are water-soluble. Similarly, while a large number of alkaline materials of low volatility are known to the art which may be employed together with the waving agent in the present invention, such as sodium or potassium hydroxide, sodium or potassium glycinate, etc., best results have been obtained when a water-soluble organic amine of low volatility is employed, such as 2-amino-2-methyl-1,3-propanediol, diethanolamine, monoisopropanolamine, diisopropanolamine, or combinations of these.

The supply of soluble neutralizer which is also carried by the web may, on the other hand, be confined to one or more localized zones of the web in order to retard leaching or dissolution of the neutralizer by the solubilizing medium and to permit the waving agent to effect the hair before the solution of neutralizer comes in contact therewith. It will be understood that the neutralizer usually is an oxidizing agent which not only restores the disulfide bonds of the hair keratin which have been split by the reducing agent (when the latter is used as a waving agent), but which also destroys any reducing agent with which it comes in contact. Accordingly, in the embodiment shown in FIGS. 1 and 2, the supply **14** of dry, solid, particulate neutralizer is confined to elongated, narrow, localized, spaced zones extending parallel to a shorter margin of the end paper.

Any conventional neutralizing agent may be employed which serves to harden or set the softened hair in its new configuration. For example, sodium or potassium bromate, sodium iodate, sodium perborate, urea peroxide, and the like, or mixtures thereof.

The solubilizing medium employed to saturate the hair and to leach or dissolve the supply of waving agent and neutralizer may be any suitable liquid such as water, alcohol or the like. Preferably the solubilizing medium contains at least a small proportion of water, i.e., is an aqueous medium, and may indeed consist entirely of water.

In order further to retard dissolution or leaching of the supply of neutralizer from its position on the end paper, it is preferred to employ a liquid-pervious barrier which serves to confine the supply of neutralizer to the desired localized zones and also serves to retard leaching of the neutralizer by the solubilizing medium. This barrier may take the form of a strip **18** of sheet fibrous material or web, such as a strip of paper identical with that employed in web **10**, secured along its margins to the face of web **10**, thus providing a pouch or enclosure having a wall of water-pervious fibrous sheet material.

It is also possible to disperse the neutralizer throughout a soft mass or solution of a cohesive binder soluble in the solubilizing medium, preferably a plymeric binder composition which may include a suitable plasticizer, and extrude such a dispersion (which may contain a volatile solvent or diluent) in the form of a strip of a suitable size onto each individual web so that when the solvent or diluent (if present) is evaporated there remains the neutralizer dispersion in the form of a localized mass or cake of material which is both cohesive and adhesive to the face of the web **10**, so that the necessity for a supplemental web to enclose the supply is eliminated, the binder itself serving as the solvent-pervious barrier. If desired, of course, the supplemental web or sheet of paper may be retained in the construction to serve as an additional barrier. Among binders which are found satisfactory are readily soluble, solid, cohesive, polymeric materials, preferably those which are water-soluble, such as polymers of vinyl alcohol, vinyl pyrollidone, vinyl acetate, methyl acrylate, copolymers of these materials as well as of other copolymerizable monomers, etc.

It will be understood, of course, that the supply of neutralizer material instead of being provided in the form of a mass of loose, granular, finely divided particles may also be carried in the same manner as the waving agent; i.e., by impregnating a portion of web **10** or by impregnating an elongated narrow strip of paper or other bibulous material such as cellulose sponge which may then be secured to a face of web **10** in the same manner as the cover sheets employed to form the enclosure shown in FIG. 2. It is desirable but not essential to confine the supply of waving agent and alkaline material to that portion of web **10** which is not in contact with the supply of neutralizer. Such a construction is more difficult to manufacture, and satisfactory results may be obtained even though the supply of waving agent extends throughout the entire extent of web **10**, provided the supply of neutralizer is confined to a location separate from the location of the waving agent, i.e., in the embodiment of FIGS. 1 and 2, that the neutralizer supply be not impregnated in the same part of web **10** as the waving agent.

In using the embodiment of the present invention shown in FIGS. 1 and 2, it is folded about a tress of hair in the same fashion as a conventional end paper, being positioned adjacent the free end of the hair tress **16**, as shown in FIG. 3, with the elongated narrow localized zones of neutralizer under strips **18** being disposed adjacent and parallel to each margin of hair tress **16** and with the web **10** which carries the supply of waving agent and of alkaline material extending across the body of the hair tress in contact therewith, as appears best in FIGS. 3 and 4.

The hair tress may be wet with water or other solubilizing liquid medium immediately prior to the application thereto of the device of the present invention, although such pre-wetting of the hair tress is not essential.

After positioning of the device of the present invention upon the hair tress as shown in FIGS. 3 and 4, the tress, together with the device, is wound upon a conventional hair curling rod **20** so that the device is adjacent the curling rod and is enveloped by the hair tress wound thereon. After fastening the curling rod in position in the usual manner, the wound tress is saturated with water or with a solubilizing medium containing any desired adjuvants such as perfumes, wetting agents, and the like and allowed to stand.

As the water or solubilizing medium flows through and around the hair tress and comes into contact with the web, the waving agent (and alkaline material, when present) being present on the exposed surfaces of a major portion of the web, is quickly and rapidly leached from its position to form a solution which then immediately begins reacting with the individual fibers of the hair tress in the usual manner to split the disulfide linkages and soften the hair. The solution of waving agent also begins diffusing through the wound hair tress from deep within the interior of the curl near its center to the exterior of the curl. The supply of neutralizer, being confined to localized zones which are not in contact with the hair tress, does not have an opportunity to come in contact with the individual fibers of the tress so quickly as does the solution of waving agent. Furthermore, when a liquid-pervious barrier is employed, the rate of dissolution of the neutralizer is retarded even more, and the time when the neutralizer solution begins to affect the hair and/or the solution of waving agent is delayed still further, thus giving the solution of waving agent ample opportunity to complete its task. Furthermore, the solution of neutralizer formed by the leaching operation in zones removed from the hair tress itself will be unable to react with the individual hair fibers until the intervening solution of waving agent has first been disposed of by reaction with a portion of the neutralizer.

When the solution of neutralizer finally comes into contact with the individual hair fibers by leaching and diffusion or migration of the solution of neutralizer from its initial position within the interior of the hair tress wound on the curler, the hair fibers which have thus had an opportunity to become softened and to conform to the wound or curled configuration are then hardened or set, as by restoration of the disulfide linkages, in their permanently curled configuration.

Another embodiment of the invention is shown in FIG. 7 in which the neutralizer supply is in the form of a dispersion in extruded strips or bands **24** of polyvinyl pyrolidone adhered to elongated, narrow, localized, spaced zones extending along the longer margins of the web **26**, at right angles to the locations in the embodiment shown in FIGS. 1 and 2. The waving agent supply, on the other hand, is distributed throughout the main body of web **26**. In the embodiment of FIG. 7, the strips of neutralizer supply will extend transversely across the hair tress during use of the device, which is otherwise the same as in the case of the embodiment of FIGS. 1 and 2.

Still another embodiment is shown in the laminated construction of FIG. 8 in which a central layer **30** consisting of paper impregnated with neutralizer is plied up with two layers **32, 32** of plain paper serving as liquid-pervious barriers and with two other layers **34, 34** consisting of paper impregnated with waving agent such as magnesium thioglycolate dihydrate, all of the layers being substantially coextensive in area and adhered together with an adhesive soluble in the solubilizing liquid medium. This embodiment is used in the same way as that shown in FIGS. 1 and 2 by folding about the hair tress. Application of an aqueous or other solubilizing liquid medium to the hair first leaches the waving agent from the outer layers and subsequently, after penetration of barrier layers **32, 32**, leaches the neutralizer from layer **30**.

Although specific embodiments of the invention have been described herein, it is not intended to limit the invention solely thereto, but to include all of the obvious variations and modifications within the spirit and scope of the appended claims.

What is claimed is:

1. A device for use in the permanent waving of hair comprising a water-pervious web carrying a water-soluble alkaline material together with a water-soluble reducing agent selected from the class consisting of magnesium thioglycolate having the composition

$$(HS—CH_2—COO)_2Mg$$

and hydrates thereof, said alkaline material and agent being present in dry solid form and being distributed substantially uniformly throughout a major portion of said web, said web carrying in addition a supply of water-soluble neutralizer in solid form, said supply of neutralizer being confined to a localized zone of said web, whereby contact of said web with an aqueous medium when wrapped with a hair tress results in leaching of said water-soluble solid components from said web and successive exposure of the hair tress to the resultant aqueous solutions of alkaline material and reducing agent and of neutralizer.

2. A device as defined in claim 1 in which said supply of neutralizer is enclosed within a water-pervious barrier member.

3. A device as defined in claim 1 in which said supply of neutralizer is enclosed within a pouch having a wall of water-pervious fibrous sheet material.

4. A device as defined in claim 1 in which said supply of neutralizer is confined to said zone by a water-soluble cohesive binder.

5. An end paper for use on a hair tress in the permanent waving of hair by the application of an aqueous medium to the hair comprising a sheet of flexible, water-pervious, fibrous material carrying a supply of water-soluble alkaline material and a supply of solid water-soluble mercaptan reducing agent capable of splitting the disulfide bonds of hair keratin, said alkaline material and agent being present in dry solid form and being distributed substantially uniformly over a major portion of the exposed surface of said sheet in a position readily accessible to said aqueous medium, said sheet also carrying a supply of water-soluble neutralizer in dry solid form and means for confining said neutralizer supply to a localized zone of said sheet.

6. An end paper as defined in claim 5 in which said neutralizer comprises sodium bromate.

7. An end paper as defined in claim 6 in which said reducing agent comprises a member of the class consisting of magnesium thioglycolate having the composition $(HS—CH_2—COO)_2Mg$ and hydrates thereof, and said neutralizer comprising sodium bromate.

8. An end paper as defined in claim 7 in which said neutralizer is confined to an elongated, narrow, localized zone adjacent an exposed margin of said end paper during use thereof.

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