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(54) STEAM CURLING IRON

(71) We, BRISTOL-MYERS COMPANY, a Corporation organised and existing under the laws of the State of Delaware, United States of America, of 345 Park Avenue, New York, N.Y. 10022, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention pertains to curling irons and, more particularly, to curling irons for steam treating hair wound there-around.

The use of steam for setting hair is well known and many attempts have been made to provide devices such as hair rollers and curling irons with structure to emit steam to improve the results obtained in curling and setting hair with the aid of heat.

Prior art devices for curling hair such as heatable hair rollers heated in a separate electrical heating unit and then applied to the hair, while providing increased setting qualities, require a substantial period of time for setting and do not provide a curl with the permanence to withstand high humidity conditions. Devices utilizing steam along with heat have been found to be superior to the above-mentioned heated hair rollers; however, such devices have not adequately controlled the amount of steam applied to the hair and, accordingly, have not been well accepted for use in setting curls.

Prior art steam curling irons have not been effective in producing permanent curl due to either the continuous application of steam during the setting process, or an unmeted application of steam to the hair to be set. U.S. Patents 2,880,299 and 3,220,421 are exemplary of electrically heated curling irons using continuously emitted steam to enhance the setting of hair. However, while steam aids in plasticizing hair, the subsequent removal of all moisture

in the hair solidifies the hair wound around the curling iron to impart a curl having greater permanence than curls obtainable with any other known methods not using chemical agents. Accordingly, the prior art curling irons using continuously emitted steam do not achieve optimum results. U.S. Patent 2,254,266 is exemplary of electrically heated curling irons dispensing unmeted quantities of steam to the hair to be set; however, while curls obtained with a curling iron have increased qualities when all moisture must be supplied to the hair in order to initially set the curl in the dry wound hair.

Thus, to obtain optimum results with respect to curling and permanence characteristics of hair treated with a steam curling iron, the steam emitted should be within prescribed limits, and prior art devices have suffered from the disadvantage of providing uncontrolled and imprecise quantities of steam to hair during curling and setting. Furthermore, since human hair has a high insulating quality, the steam must be expelled from the heated curling iron under considerable pressure to contact all sections of the hair; and, accordingly, most prior art steam curling irons utilize apertures to emit steam radially from the curling iron. The radial emission of steam has the disadvantage that contact of the steam with the skin of a user could burn or scald the user.

Another problem of prior art steam curling irons is that by utilizing a pivotal clip to clamp the end of a tress of hair to the curling iron, the hair being thereafter wound over the clip, it is difficult to remove the hair after curling and setting since the end of the tress can be released only by pivoting the clip away from the curling iron which presents an obstacle to axial removal of the hair and requires unwinding the hair for removal from the curling iron.

Accordingly, it is a primary object of the present invention to provide a steam curling

iron overcoming the abovementioned disadvantages of the prior art.

Another object of the present invention is to construct a steam curling iron with a liquid dispensing device for applying a metered quantity of liquid for evaporation and application as steam to hair wound around the curling iron thereby optimizing the use of steam in the setting of human hair.

An additional object of the present invention is to provide a device for setting curls in human hair in a very short period, approximately ten seconds, while obtaining a curl having increased permanence even under high humidity conditions.

A further object of the present invention is to utilize a metering mechanism to dispense liquid to a heating chamber in a steam curling iron, the metering mechanism being mounted on an end of the curling iron to be easily operated.

The present invention has an additional object in the use of a clip on a steam curling iron to be pivotal to facilitate initial winding of hair to be set around the curling iron and to be movable in a direction transverse of the longitudinal axis of the curling iron to facilitate axial removal of the set hair from the curling iron.

Yet a further object of the present invention is to mount a clip on a steam curling iron such that the clip is pivotally biased against a hair winding portion of the curling iron to hold a tress of hair and movable from the hair winding portion to a position parallel to the hair winding portion but spaced slightly therefrom to facilitate removal of set hair wound around the curling iron.

An additional object of the present invention is to construct a steam curling iron to permit winding of hair to be set around a substantially cylindrical hair winding portion while the hair winding portion is heated to a temperature in the range of from 60 to 140°C. And then the injection of a metered amount of vaporized liquid into the hair under pressure through small apertures in the hair winding portion such that the vaporized liquid will penetrate the hair shafts to act as a plasticizer and thereafter be removed by the heat from the hair winding portion within a period of from 5 to 15 seconds to set the hair to a new shape.

The present invention has another object in that vaporized liquid is emitted substantially tangentially from the steam curling iron by disposing apertures for emitting the vaporized liquid in the side walls of axial grooves in the curling iron.

Some of the advantages of the present invention over the prior art are that steam is applied in metered quantities to hair wound around the steam curling iron, curls pro-

duced with the steam curling iron have increased permanence, particularly under high humidity conditions, curls can be set in hair in a very short period of time, approximately ten seconds, set hair can be easily removed from the steam curling iron, the metering mechanism can be easily operated by a user, hair can be wound around the steam curling iron while it is hot, the reservoir can be easily refilled, and the structure of the steam curling iron is slim and compact with the liquid dispensing device disposed coaxially at one end of the steam curling iron.

The present invention provides a steam curling iron comprising a tubular body defining a heating chamber therein and having first and second ends and a hair winding portion disposed between said first and second ends and surrounding the heating chamber, said hair winding portion having apertures therein communicating with the heating chamber, liquid dispensing means at said first end of the tubular body and including a reservoir disposed coaxially with said tubular body for storing liquid and metering means for supplying a metered quantity of liquid to the heating chamber from said reservoir, heating means associated with said heating chamber for vaporizing the liquid supplied to said heating chamber, whereby a predetermined amount of vaporized liquid can be applied through the apertures to hair wound on the hair winding portion, and a housing at said second end of said tubular body to form a handle.

Other objects and advantages of the present invention will become apparent from the following description of the preferred embodiments taken in conjunction with the following drawings.

Figure 1 is a longitudinal section of a steam curling iron according to the present invention.

Figure 2 is a broken longitudinal section of the steam curling iron of Figure 1 with the metering mechanism depressed.

Figure 2a is a section taken along line 2a—2a of Figure 2.

Figure 3 is a broken longitudinal section of the steam curling iron of Figure 1 with the clip in a removal position.

Figure 4 is a section taken along line 4—4 of Figure 3.

Figure 5 is a perspective of the clip spring of the steam curling iron of Figure 1.

Figures 6 and 7 are broken sections of a liquid dispensing device according to another embodiment of the present invention.

Figure 8 is a section taken along line 8—8 of Figure 6.

Figures 9 and 10 are broken sections of a liquid dispensing device of a further embodiment of the present invention.

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Figure 11 is a section along line 11—11 of Figure 9.

Figure 12 is a broken section of a liquid dispensing device of an additional embodiment of the present invention.

A steam curling iron 20 according to a preferred embodiment of the present invention, is illustrated in Figure 1 and includes a tubular housing 22 formed of an upper housing member 24 and a lower housing member 26 secured together by screws 27 received in cylindrical guides 28 in the lower housing member 26 and engaging internally threaded bores in cylindrical guides 29 in the upper housing member 24. Housing 22 is configured to define a handle grip, and a button 30 is pivotally mounted in the housing for easy operation with the hand grasping the housing 22. As best shown in Figure 4, button 30 has parallel, flat side walls 32 and 34 extending from a top wall 36, and a cylindrical ear 38 protrudes transversely from the bottom of each of side walls 32 and 34. Top wall 36 slopes upward from a front end 40 to which is secured an elongate clip 42 by means of screws 44 to a rear wall 46 which has an arcuate recess 48 therein and terminates at a stepped end 50. Upper housing member 24 has an opening 52 therein receiving button 30 with the stepped end 50 of the rear wall 46 extending between a stop 54 limiting opening pivotal movement of button 30 and a stepped ledge having surfaces 56 and 58 formed in upper housing member 24.

Upper housing member 24 has a pair of side walls 60 with a recess 62 formed in each side wall. Each recess 62 has arcuate ends with a line connecting the centers of curvature thereof disposed at an angle to the longitudinal axis of the steam curling iron 20. Similarly, lower housing member 26 has a pair of side walls 64 each of which has a recess 66 formed therein with arcuate ends aligned with the arcuate ends of recess 62. Recesses 62 and 66 cooperate to form channels 68 extending angularly away from the axis of the curling iron, the channels 68 having a width to slidably receive ears 38 of button 30 such that the button can be pivoted on ears 38 and moved away from the axis of the curling iron by applying a force to rear wall 46 in parallel with the axis of the curling iron to cause the ears 38 to ride up in the channels 68.

A flat spring 70 has an S-configuration, as shown in Figure 5, and is mounted to bias the button 30 in a counterclockwise direction looking at Figures 1 and 3. Spring 70 has a curved end 72 anchored at the stepped end 50 of button 30 and an end 74 bent twice to be anchored in an opening 76 formed in upper housing member 24. Stepped end 50 of button 30 has a downwardly depending lip 78 which cooperates with a

rib 80 to hold the end 72 of spring 70 in place such that spring 70 not only biases button 30 out of the housing 22 but also biases button 30 toward the rear of the housing to hold ears 38 resiliently in the lower rear ends of channels 68.

Housing 22 has an opening 82 in the rear end thereof receiving a plug 83 carrying electrical wires 84 and 86 which are connected in series through a ceramic, resistance wire, heating element 88, a thermostat 90 and a fusible link 92 with a neon lamp 94 connected in parallel therewith. Neon lamp 94 is held in a receptacle 96 at the top of upper housing member 24 adjacent button 30 and is covered by a colored lens 98 such that when electricity is supplied to the steam curling iron 20, the lamp 94 will be energized and visible through the lens 98.

At the front end of housing 22, lower housing member 26 has an inwardly turned lip 100 contacting an outer tubular member 102 which has holes in a proximal end 104 thereof receiving the cylindrical guides 28 and 29 of the upper and lower member, and an inner tubular member 106 similarly has holes in a proximal end 108 thereof to be mounted on the cylindrical guides 28 and 29 of the housing 22. Outer tubular member 102 forms a tubular body for the curling iron and has a hair winding portion 110 surrounding a heating chamber 112, and inner tubular member 106 terminates at a distal end 114 in heating chamber 112 and supports thereat heating element 88 which has a cylindrical tubular configuration. Heating element 88 has a bore 116 therein mounting a shank 118 of a tip heater 120 therein, the tip heater 120 having a head hermetically sealed to the distal end 114 of the inner tubular member 106 in any suitable manner, such as brazing, with the head having a serrated concavity 122 therein. The tip heater 120 is made of a highly heat conducting metal, such as copper, and the shank 118 is in thermal contact with heating element 88 such that the head of the tip heater reaches a temperature closely approximating the temperature of the heating element well in excess of 100°C. At the other end of bore 116, a small diameter leg 123 of a spring clip 124 is mounted in good mechanical contact with the inner diameter of the bore, the spring clip 124 having a large diameter leg 126 mounting the thermostat 90, which may be a conventional bimetal switch, and the fusible link 92. The spring clip 124 is preferably constructed of a spring metal, such as phosphor bronze or beryllium copper, in order to make good contact with the heating element 88, the thermostat 90 and the fusible link 92 for maximum heat conduction. The inner tubular member 106 is spaced from the outer tubular member 102

such that the outer tubular member 102 is heated by radiation rather than conduction to permit operation of the heating element at higher temperatures required to generate steam, and a seal is formed between the outer and inner tubular members by a gasket 128. The heater, fusible link and thermostat assembly is secured within tubular member 106 to seal the end of the heating element by a high temperature, silicone rubber 130 to provide a water-tight assembly.

The hair winding portion 110 of the tubular body has a plurality of longitudinal axial grooves 132 formed therein, each of the grooves having apertures 134 disposed therealong, as best illustrated in Figure 2a. The grooves 132 are formed with side walls with the apertures disposed in the side walls such that vapors exit from the heating chamber 112 through the apertures 134 in a direction at an angle to the radial direction and almost tangential to prevent scorching of the scalp of a user. The grooves 132 permit distribution of vapors when hair is tightly wound around the hair winding portion 110. The outer tubular member 102 is preferably made of stainless steel or other metallic material treated to inhibit corrosion and the outer surface thereof is preferably coated with a friction reducing material, such as for example polytetrafluorethylene.

Elongate clip 42 extends along the tubular body and is curved in cross-section to make intimate contact therewith. The clip 42 has an elongated slot 136 in the central portion thereof to permit steam to reach successively wound layers of hair, as will be discussed hereinafter, and clip 42 is preferably coated with a friction reducing material such as polytetrafluorethylene. The clip 42 has a step 138 at the proximal end thereof to be secured to button 30 by screws 44; and accordingly, clip 42 is normally biased against the hair winding portion 110 of outer tubular member 102 and can be pivoted away from the hair winding portion by depressing button 30 while being movable away from the hair winding portion 110 in a direction transverse to the longitudinal axis thereof by sliding movement of the ears 38 of the button 30 in channels 68.

A liquid dispensing device 140 is mounted at a distal end 142 of the tubular body and includes a sleeve 144 having longitudinally extending ribs along an end 146 thereof which terminate at a shoulder 148. The end 146 of sleeve 144 is forced into tubular member 102 until the distal end 142 thereof abuts shoulder 148 with the ribs along the end 146 providing a tight press fit. The central bore in sleeve 144 is stepped to provide a small diameter portion 150 run-

ning along a substantial portion of the length thereof and a large diameter portion 152 at end 146. A reservoir cap 154 has an internally threaded skirt 156 extending from a top portion 158 with a key 160 disposed on the outer surface of the skirt 156 to be received in a keyway 162 formed along the inner surface of large diameter portion 152. Cap 154 has a central opening 164 through top portion 158 to communicate with a circular recess 166 formed therein.

A reservoir member 168 has an end 170 extending from sleeve 144 and has an outer diameter to be slidably received within sleeve 144. Reservoir member 168 has an externally threaded mouth 172 for threadedly engaging reservoir cap 154, and a washer 174 is disposed between mouth 172 and cap 154 to provide sealing engagement therebetween. A wick 176, formed of a high temperature wicking felt, has a shank 178 extending within the reservoir member 168 carrying a bead 179 on the end thereof which provides sufficient weight to cause the end of the shank to bend under the force of gravity to assure contact of the wick with liquid in the reservoir, and the shank 178 extends through opening 164 in cap 154 to a head 180 external of the reservoir having a conical surface mating with the serrated concavity 122 formed in the head of the tip heater 120. A coiled spring 182 is mounted in compression between shoulders formed by grooves 132 in outer tubular member 102 and the reservoir cap 154 in order to bias the liquid dispensing device away from the heater.

In operation, the reservoir formed within member 168 can be filled with liquid for vaporization by unscrewing the member 168 from the cap 154. The member 168 can then be axially slid from the sleeve 144 and filled with liquid to be vaporized. The member 168 is then again slid into the sleeve 144 and screwed into the cap 154 until washer 74 is engaged to provide a seal.

In use, the steam curling iron 20 is preferably first heated to a desired temperature, preferably between 60 and 140°C., the temperature of the heating element 88 being controlled by thermostat 90 in conventional manner with fusible link 92 providing protection against damage to the hair if a high temperature limit is reached by the heating element, such as due to malfunction or failure of the thermostat 90. The neon lamp 94 will be energized to signify to the user that the steam curling iron is being heated and, if desired, the neon lamp can be connected with the thermostat 90 or a suitable timing device such that it is energized only when the steam curling iron 20 has reached the desired temperature.

With the steam curling iron at the desired temperature, a tress of hair to be set is 130

wound around the hair winding portion 110 of the tubular member 102 with the end of the tress clamped to the hair winding portion 110 by depressing the button 30 to pivot the clip 42 away from the hair winding portion, placing the end of the tress under the clip and then releasing the button to permit the bias spring 70 to hold the hair against the hair winding portion, the position of the button and clip being limited by engagement of stepped end 50 of the button with surface 58 of the upper housing member 24. The entire tress is then wound around the steam curling iron over the clip 42 by rotation of the curling iron, it being appreciated that while the hair is being wound around the already heated curling iron 20, the moisture content of the hair is being reduced. After the hair has been completely wound about the hair winding portion, the end 170 of reservoir member 168 is moved axially inwardly of the tubular body against the force of spring 182 until the head 180 of wick 176 contracts the serrated concavity 122 of the tip heater 120. The contact of the head 180 with the serrated concavity 122 vaporizes the liquid in the head 180 to produce a metered amount of steam in heating chamber 112 without any liquid being introduced into the heating chamber other than that carried on the head of the wick. The serrated concave configuration of the head of the tip heater 120 presents increased surface area to contact the wick 176 and, thus, produces steam quicker; and, further, the serrations prevent thermo-insulation by the accumulation of calcium and other impurities in the liquid to be vaporized. The bead 179 on the end of wick 176 will follow gravity and, accordingly, will follow the liquid in the reservoir regardless of the attitude at which the steam curling iron is held. The wick absorbs the liquid and charges the head 180 with the liquid by capillary action such that after the liquid in the head 180 is vaporized to provide a predetermined amount of steam for application to the hair and the reservoir member 168 is released to permit the spring 182 to move the wick away from the tip heater 120, the head will be recharged with liquid.

The heating chamber 112 is defined at one end by cap 154 and at an opposite end by gasket 128 and includes the small space between inner tubular member 106 and outer tubular member 102. Accordingly, the vaporized liquid formed in heating chamber 112 is emitted from the steam curling iron through the substantially tangential apertures 134 in the side walls of axial grooves 132, the vaporized liquid penetrating and plasticizing the hair wound around the steam curling iron and passing through the slot 136 in the clip 42 for access to the hair wound thereabove.

Within a period of from 5 to 15 seconds, normally 10 seconds, the heat from the tubular body will evaporate the moisture applied to the hair to set the curl. The user then unwinds the tress of hair for one half turn and applies a force to the rear wall 46 of button 30, facilitated by gripping arcuate recess 48, to cause the ears 38 of the button to ride up in the channels 68 inclined to the axis of the tubular body such that the clip 42 will be moved transversely to the longitudinal axis of the tubular body to a position parallel with the hair winding portion and spaced approximately 1/16" therefrom, as shown in Figure 3. The stepped end 50 of the button 30 will now be moved to engage surface 56 of the upper housing member 24 to thereby place the button and clip in a stable position, and the wound tress of hair can now be easily, axially removed from the curling iron without interference from the clip 42. The sleeve 144 is preferably formed with a tapered configuration in order to facilitate axial removal of the set hair.

Another embodiment of a liquid dispensing device for use with a steam curling iron according to the present invention is illustrated in Figures 6, 7 and 8, the liquid dispensing device being generally indicated at 200 and including a supply member 202 having an end 204 with a diameter to be press fit in the distal end 142 of the outer tubular member 102 of the steam curling iron of Figure 1. The supply member 202 has a cylindrical nipple 206 slidably receiving a reservoir housing 208 in sealing engagement by an O-ring 210 carried in an annular groove therearound. Reservoir housing 208 carries a thin walled elastic reservoir bag 212 therein to be filled with liquid to be vaporized, and air vents 214 are formed in the end of reservoir housing 208 to subject the reservoir bag 212 to atmospheric pressure. Reservoir housing 208 has an annular shoulder 216 formed therein and a circular piston 218 slidably engages the inner surface of reservoir housing 208 by means of an O-ring 220 and clamps the lip of reservoir bag 212 against shoulder 216. A core member 222 is centrally disposed in an opening in piston 218 and has four equally spaced peripheral grooves 224 therein communicating between the reservoir and a chamber 226 formed between piston 218 and the end of nipple 206. Core member 222 has a diametral passage 228 therein to provide communication between chamber 226 and an axial passage 230 which communicates with the heating chamber 112 in the tubular body of the steam curling iron through a resilient duck-bill valve 232 and a passage 234 in the supply member 202. A coil spring 236 is mounted in compression between piston 130

218 and the end of nipple 206 to normally bias the piston away from the nipple 206 to provide chamber 226 with a predetermined volume.

5 In order to fill the reservoir in the liquid dispensing device 200, the reservoir housing containing the thin elastic reservoir bag 212 is removed from the steam curling iron by pulling it from the nipple 206. The reservoir housing is then filled to the brim with a liquid to be vaporized and the piston 218 and core member 222 are then pushed into the reservoir housing such that the liquid displaced by the insertion of the piston and core member expands the elastic reservoir bag and fills the chambers and passages of the metering mechanism. The O-ring 220 in the piston 218 provides an interference fit with the bore of the reservoir housing 208 to hold the reservoir housing onto the nipple 206 and the body of the steam curling iron.

After hair has been wound around the steam curling iron, the liquid dispensing device 200 is operated by pushing reservoir housing 208 toward the body of the steam curling iron to depress spring 236 and expel liquid through passages 228 and 230, as shown in Figure 7, the piston 218 and core member 222 forming a pump for discharging a metered amount of liquid. The force of the liquid in passage 230 will open the resiliently closed duck-bill valve 232; and, thus, a predetermined quantity of liquid will be supplied to heating chamber 112 for evaporation and application to the hair through the apertures in the tubular body of the steam curling iron. When the reservoir housing 208 is released, spring 236 will move piston 218 back to its original position illustrated in Figure 6, and the elastic force of the reservoir bag 212 coupled with atmospheric pressure will force liquid from the reservoir through passages 224 into chamber 226 and passages 228 and 230; however, the force from the elastic reservoir bag 212 coupled with atmospheric pressure received through vents 214 is not sufficient to open resilient valve 232.

50 A further embodiment of a liquid dispensing device for use with a steam curling iron according to the present invention is illustrated in Figures 9, 10 and 11, the liquid dispensing device being generally indicated at 300 and including a supply member 302 press fit into the tubular body of the steam curling iron of Figure 1 such that the distal end 142 of outer tubular member 102 abuts an annular shoulder 304 formed around the periphery of the supply member 302. Supply member 302 has a small diameter portion 306 with a central cylindrical chamber 308 therein, and a sleeve fixed with an annular shoulder 314 of the supply member 302 and the reservoir member 312 and has a

recess 318 formed therein to receive a head 320 of a plunger 322 carrying a piston 324 which is movable in chamber 308. A piston 326 is slidable axially on plunger 322 and is biased away from cap 316 by a coiled spring 328 mounted in compression therebetween. A passage 330 provides communication between chamber 308 and passages 332 and 334 in the supply member 302 with the heating chamber 112 of the steam curling iron under the control of a valve member 336 resiliently biased against a valve seat 338 by a coiled spring 340 mounted in compression between the valve member 336 and a screw 342 for adjusting the force with which the valve member 336 is biased against the valve seat 338.

In order to fill the reservoir of the liquid dispensing device 300, the cap 316 is unscrewed from the reservoir member 312, and the reservoir member is filled with a liquid to be vaporized. The plunger is then inserted in the reservoir and the cap screwed onto the reservoir member 312, it being appreciated that piston 326 thereby defines a movable wall of the reservoir to maintain the liquid therein under pressure.

After hair is properly wound around the steam curling iron as discussed above, the user merely depresses the head 320 into the recess 318 of the cap to move piston 324 in chamber 308 and discharge a predetermined quantity of the liquid to be vaporized through passage 330, the piston 324 forming with the supply member 302 a pump for discharging a metered amount of liquid. The force from depression of the plunger overcomes the bias of spring 340 to move valve member 336 away from valve seat 338 and permit the liquid to be supplied through passages 332 and 334 to the heating chamber 112 of the steam curling iron of Figure 1 for evaporation and application to the hair through the apertures in the tubular body of the steam curling iron, as best illustrated in Figure 10.

When the plunger is released, the force from spring 321 will return the plunger to its initial position, and the pressure from spring 328 will fill chamber 308 with liquid for the next application, it being appreciated that the force from spring 328 is not sufficient to overcome the force from spring 340 to open the valve.

An additional embodiment of a liquid dispensing device for use with a steam curling iron according to the present invention is illustrated in Figure 12, the liquid dispensing device being generally indicated at 400 and including a supply member 402 having an end 404 press fit in the distal end of the outer tubular member 102 of the steam curling iron. The supply member 402 has a nipple 405 with a central capillary passage 406 therein for dispensing liquid

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from a reservoir formed by a hollow cap 408 having an internally threaded mouth engaging an externally threaded portion of the nipple 405. The reservoir is formed between the end of the cap 408 and the end of nipple 405, and the external surface of the end of cap 408 preferably has an index mark thereon to facilitate the dispensing of a metered amount of liquid for vaporizing in the steam curling iron.

In order to fill the reservoir, the hollow cap 408 is merely unscrewed from the nipple 405 and filled with a liquid to be vaporized. The cap 408 is then screwed onto the nipple 405 until there is no air space left in the reservoir, it being appreciated that liquid in the reservoir will not be supplied to the heating chamber in the steam curling iron due to the capillary size of the central passage 406 in the supply member 402.

After hair has been properly wound around the steam curling iron, the user rotates the cap 408 one complete rotation by use of the index mark, such rotation decreasing the size of the reservoir a predetermined amount dependent upon the pitch of the threads of the cap and the nipple. The decrease in the size of the reservoir forces a predetermined quantity of liquid through the capillary passage 406 into the heating chamber for vaporization and application to hair wound around the tubular body of the steam curling iron.

From the above, it will be appreciated that the coaxial alignment of the liquid dispensing devices with the tubular body of the steam curling iron at one end thereof facilitates operation of the metering mechanism to supply a predetermined amount of vaporized liquid to the hair without interfering with axial removal of the hair after setting. Furthermore, the support for the elongate clip 42 to permit both pivotal and parallel movement thereof relative to the tubular body provides full utilization of the clip as a retainer to clamp the end of a tress of hair prior to winding about the steam curling iron without presenting an obstacle to axial removal of the hair after setting. Any of the embodiments of the liquid dispensing devices described above can be utilized with the tubular body, housing, and clip and button structure specifically described with respect to the embodiment of Figure 1 since all of the liquid dispensing devices are adapted to be mounted on an end of the tubular body opposite the housing and do not protrude from the tubular body so as to form an obstacle to axial removal of said hair.

Inasmuch as the present invention is subject to many variations, modifications and changes in detail, it is intended that all matter described above or shown in the

accompanying drawings be interpreted as illustrative and not in a limiting sense.

WHAT WE CLAIM IS:—

1. A steam curling iron comprising a tubular body defining a heating chamber therein and having first and second ends and a hair winding portion disposed between said first and second ends and surrounding said heating chamber, said hair winding portion having apertures therein communicating with said heating chamber;

liquid dispensing means at said first end of said tubular body and including a reservoir disposed coaxially with said tubular body for storing liquid and metering means for supplying a metered quantity of liquid to said heating chamber from said reservoir;

heating means associated with said heating chamber for vaporizing the liquid supplied to said heating chamber, whereby a predetermined amount of vaporized liquid can be applied through said apertures to hair wound on said hair winding portion; and

a housing at said second end of said tubular body to form a handle.

2. A steam curling iron according to Claim 1 wherein said liquid dispensing means is mounted on said first end of said tubular body in alignment therewith coaxially with respect to the longitudinal axis thereof.

3. A steam curling iron according to Claim 1 or Claim 2 and further comprising a button pivotally mounted on said housing adjacent said second end of said tubular body, and an elongate clip secured to said button and extending along said hair winding portion of said tubular body whereby said clip is pivotal with said button to be moved away from said hair winding portion to permit a tress of hair to be initially wound around said hair winding portion and to be moved toward said hair winding portion to hold hair wound therearound.

4. A steam curling iron according to Claim 3 comprising means to move said clip away from said hair winding portion in a direction transverse to the longitudinal axis of said tubular body.

5. A steam curling iron according to Claim 4 wherein said housing has channels formed therein disposed at an angle to the longitudinal axis of said tubular body, and said button has protrusions extending therefrom and riding in said channels, said button being pivotal about said protrusions and being slidable relative to said housing with said protrusions riding in said channels to move said clip away from said hair winding portion of said tubular body without pivoting whereby hair wound around said hair winding portion can be substantially axially removed therefrom.

from a reservoir formed by a hollow cap 408 having an internally threaded mouth engaging an externally threaded portion of the nipple 405. The reservoir is formed between the end of the cap 408 and the end of nipple 405, and the external surface of the end of cap 408 preferably has an index mark thereon to facilitate the dispensing of a metered amount of liquid for vaporizing in the steam curling iron.

In order to fill the reservoir, the hollow cap 408 is merely unscrewed from the nipple 405 and filled with a liquid to be vaporized. The cap 408 is then screwed onto the nipple 405 until there is no air space left in the reservoir, it being appreciated that liquid in the reservoir will not be supplied to the heating chamber in the steam curling iron due to the capillary size of the central passage 406 in the supply member 402.

After hair has been properly wound around the steam curling iron, the user rotates the cap 408 one complete rotation by use of the index mark, such rotation decreasing the size of the reservoir a predetermined amount dependent upon the pitch of the threads of the cap and the nipple. The decrease in the size of the reservoir forces a predetermined quantity of liquid through the capillary passage 406 into the heating chamber for vaporization and application to hair wound around the tubular body of the steam curling iron.

From the above, it will be appreciated that the coaxial alignment of the liquid dispensing devices with the tubular body of the steam curling iron at one end thereof facilitates operation of the metering mechanism to supply a predetermined amount of vaporized liquid to the hair without interfering with axial removal of the hair after setting. Furthermore, the support for the elongate clip 42 to permit both pivotal and parallel movement thereof relative to the tubular body provides full utilization of the clip as a retainer to clamp the end of a tress of hair prior to winding about the steam curling iron without presenting an obstacle to axial removal of the hair after setting. Any of the embodiments of the liquid dispensing devices described above can be utilized with the tubular body, housing, and clip and button structure specifically described with respect to the embodiment of Figure 1 since all of the liquid dispensing devices are adapted to be mounted on an end of the tubular body opposite the housing and do not protrude from the tubular body so as to form an obstacle to axial removal of said hair.

Inasmuch as the present invention is subject to many variations, modifications and changes in detail, it is intended that all matter described above or shown in the

accompanying drawings be interpreted as illustrative and not in a limiting sense.

WHAT WE CLAIM IS:—

1. A steam curling iron comprising a tubular body defining a heating chamber therein and having first and second ends and a hair winding portion disposed between said first and second ends and surrounding said heating chamber, said hair winding portion having apertures therein communicating with said heating chamber;

liquid dispensing means at said first end of said tubular body and including a reservoir disposed coaxially with said tubular body for storing liquid and metering means for supplying a metered quantity of liquid to said heating chamber from said reservoir;

heating means associated with said heating chamber for vaporizing the liquid supplied to said heating chamber, whereby a predetermined amount of vaporized liquid can be applied through said apertures to hair wound on said hair winding portion; and

a housing at said second end of said tubular body to form a handle.

2. A steam curling iron according to Claim 1 wherein said liquid dispensing means is mounted on said first end of said tubular body in alignment therewith coaxially with respect to the longitudinal axis thereof.

3. A steam curling iron according to Claim 1 or Claim 2 and further comprising a button pivotally mounted on said housing adjacent said second end of said tubular body, and an elongate clip secured to said button and extending along said hair winding portion of said tubular body whereby said clip is pivotal with said button to be moved away from said hair winding portion to permit a tress of hair to be initially wound around said hair winding portion and to be moved toward said hair winding portion to hold hair wound therearound.

4. A steam curling iron according to Claim 3 comprising means to move said clip away from said hair winding portion in a direction transverse to the longitudinal axis of said tubular body.

5. A steam curling iron according to Claim 4 wherein said housing has channels formed therein disposed at an angle to the longitudinal axis of said tubular body, and said button has protrusions extending therefrom and riding in said channels, said button being pivotal about said protrusions and being slidable relative to said housing with said protrusions riding in said channels to move said clip away from said hair winding portion of said tubular body without pivoting whereby hair wound around said hair winding portion can be substantially axially removed therefrom.





6. A steam curling iron according to Claim 5 and further comprising biasing means mounted in engagement with said button and said housing to bias said clip toward said hair winding portion of said tubular body and to bias said protrusions extending from said button away from said first end of said tubular body.

7. A steam curling iron according to any of Claims 1 to 6 wherein said handle contains wiring to supply electrical current to said heating means.

8. A steam curling iron according to any of Claims 1 to 7 wherein said hair winding portion of said tubular body has a plurality of longitudinal grooves therein and said apertures are disposed in said grooves and oriented to emit vapor in a nonradial direction.

9. A steam curling iron according to any of Claims 1 to 8 wherein said metering means includes a wick having a portion extending within said reservoir, and means for moving said wick toward said heating means to evaporate a metered amount of liquid for application to hair wound around said hair winding portion of said tubular body.

10. A steam curling iron according to Claim 9 wherein said wick has a shank extending within said reservoir and a head disposed external of said reservoir, said heating means includes a heater having a heating surface aligned with said wick head, and said wick moving means moves said wick head to contact said heating surface to evaporate a metered quantity of liquid therefrom.

11. A steam curling iron according to Claim 10 wherein said heating means includes a heating element having a central bore therein and a tip heater having a shank extending within said bore and a head aligned with and adjacent said head portion of said wick.

12. A steam curling iron according to Claim 11 wherein said head portion of said wick and said head of said tip heater have mating configurations.

13. A steam curling iron according to Claim 11 or Claim 12 wherein said head of said tip heater has a serrated surface for engaging said head portion of said wick.

14. A steam curling iron according to Claim 13 wherein said head portion of said wick has a convex configuration and said head of said tip heater has a serrated concave configuration to contact said external portion of said wick.

15. A steam curling iron according to any of Claims 11 to 14 wherein said liquid dispensing means includes a sleeve mounted on said one end of said tubular body, said reservoir includes a hollow reservoir member slidably mounted in said sleeve and

a cap threadedly engaging said reservoir member and having a central opening therein, said shank extending through said opening in said cap into said reservoir member and said wick head engaging the top surface of said cap, said metering means further including a coiled spring mounted in compression between said tubular body and said cap to bias said cap and said wick head away from said tip heater.

16. A steam curling iron according to any of Claims 1 to 8 wherein said metering means includes a supply member having a capillary passage therethrough, said supply member being mounted on said first end of said tubular body and having a threaded end, and said reservoir includes a cap having a threaded mouth engaging said threaded end of said supply member, said cap being hollow to define with said end of said supply member a reservoir for storing liquid and said cap being rotatable relative to said supply member to dispense a metered quantity of liquid to said heating chamber through said capillary passage for each complete rotation of said cap.

17. A steam curling iron according to any of Claims 1 to 8 wherein said metering means includes pump means having a discharge chamber capable of being filled with liquid from said reservoir, a piston movable in said discharge chamber to expel liquid therefrom and valve means disposed between said discharge chamber and said heating chamber to control liquid flow from said discharge chamber to said heating chamber.

18. A steam curling iron according to Claim 17 wherein said valve means includes means resiliently biasing said valve means to a closed position, and said pump means includes means for moving said piston in said discharge chamber to force liquid through said valve means overcoming said resilient biasing means.

19. A steam curling iron comprising a tubular body containing a heating chamber therein, a hair winding portion externally of said heating chamber, said hair winding portion having apertures therein communicating with said heating chamber, an electrical heater disposed within said heating chamber, a liquid storage reservoir in fluid communication with said heating chamber, means for repeatedly on demand transferring a metered amount of liquid from said liquid storage reservoir to said heating chamber, said metering means including a wick having one end at said reservoir and another end at said heating chamber, and means for creating relative movement between said wick and said heating chamber to bring part of the wick into contact with said heating chamber, said wick being dimensioned to release upon such contact a predetermined amount of liquid into the

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heating chamber where said liquid is converted into steam and is released outwardly through the apertures.

20. A steam curling iron according to Claim 19 wherein as a result of the contact between the wick and the heating chamber a predetermined amount of liquid is squeezed out and evaporated from the wick into the heating chamber.

- 10 21. A steam curling iron according to Claim 19 or Claim 20 wherein the said one end of the wick is in contact with the liquid

in the reservoir regardless of the position of the curling iron.

22. A steam curling iron substantially as herein described with reference to Figures 1 to 5, or 6 to 8, or 9 to 11, or Figure 12 of the accompanying drawings.

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