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ENHANCED HAIR PRODUCT APPLICATION WITH CONCURRENT STYLING

Abstract

Embodiments of hair care apparatus and methods are provided generally comprising a location to provision hair care product, an applicator and a manipulator configured to enable concurrent product application and hair manipulation, and may comprise a product heater, configured to heat product provisioned therein, or be configured for use with an external heating source such as a microwave oven, and provide application of heated product at temperatures both safe for hair health and enhanced absorption. Apparatus may comprise a source of pressure, such as a pump or piston, to generate hair product flow through an applicator, and may be configured to receive product in user fillable or prepackaged product cartridges usable in the apparatus, a product chamber within the apparatus or a removable product reservoir useable in the apparatus. An apparatus may further be configured to support a plurality of manipulators, active applicators and passive applicators.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application claims the benefit of U.S. Provisional Application No. 63/614,426, filed Dec. 22, 2023, and is a continuation-in-part of copending U.S. patent application Ser. No. 18/620,679, filed Mar. 28, 2024, which is a continuation of U.S. patent application Ser. No. 17/570,169, filed Jan. 6, 2022, which is a continuation of U.S. patent application Ser. No. 16/358,816, filed Mar. 20, 2019, now U.S. Pat. No. 11,259,625, which claims the benefit of U.S. Provisional Application No. 62/734,530, and is a continuation of U.S. patent application Ser. No. 16/278,091, filed Feb. 16, 2019, which claims the benefit of U.S. Provisional Application No. 62/734,530, filed Sep. 21, 2018, all of which are incorporated by reference herein in their entirety.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT
[0002] Not Applicable
THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT Not Applicable
INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC OR AS A TEXT FILE VIA THE OFFICE ELECTRONIC FILING SYSTEM (EFS-WEB)
[0003] Not Applicable
BACKGROUND
[0004] The subject matter of this disclosure generally relates to apparatus and methods for hair care, and more specifically relates to apparatus and methods for enhanced hair product application with concurrent styling.
[0005] There has been a growing trend among women of African descent to wear their hair in its natural state (hereinafter referred to as “natural hair”) choosing to eliminate the use of treatment and styling methods such as relaxing curls and straightening. Women within this growing consumer segment are choosing to preserve and enhance the natural curls present in natural hair. Natural hair requires care routines specifically designed to address the unique characteristics of natural hair. Morphological differences in natural hair comprising texture, shape, strength, elasticity, and thickness complicate the cleansing and styling process and effect the natural hair's ability to retain moisture and maintain health. Furthermore, natural hair is particularly sensitive to treatment and styling processes involving elevated heat. Because natural hair tends to be stiffer, drier, and highly susceptible to breakage, many consumers in this segment expend considerable effort and expense to apply products to care for their hair in ways comprising nourishing their hair, conditioning their hair, repairing damage present in their hair, moisturizing their hair and sealing moisture within their hair. Styling natural hair requires further considerable effort to detangle, enhance and care for

ubiquitous amounts of curls.
[0006] The process for applying hair products to and styling natural hair is painstaking, messy and lengthy involving multiple separate steps comprising detangling a section of the hair using combs and/or brushes and applying hair product into the sectioned hair. This process is repeated section by section and further comprises manipulating the hair to achieve the desired style. The person applying product and manipulating the hair has to frequently pickup and put down hair product and pick up and put down combs and/or brushes. Furthermore, it is difficult to control the application of hair products, particularly low viscosity hair products, resulting in hair product being wasted through runoff and dripping, and requiring cleanup during and after hair product application.
[0007] Absorption of hair product into the hair is expedited and enhanced by the introduction of heat. As a result, methods for caring for natural hair ideally include heated hair product, such as heated oil treatments, which require preheating, thereby reducing the viscosity, and applying the heated product using the current process discussed above, thus making heated product treatments particularly time consuming, unwieldy and prone to mess and waste. Furthermore, maintaining a temperature level which is safe for natural hair yet high enough to result in effective and enhanced absorption throughout a lengthy hair care process is extremely difficult and commonly not achieved. Lastly, moisture in hair has a plasticizing effect which is beneficial in natural hair through the softening of an aforementioned brittle characteristic common therein, and through the provision of elasticity which, in moderation, reduces stress and breakage during manipulation. However under increased levels of a plasticized condition, natural hair begins to lose internal structuring which supports and maintains curls, and furthermore, natural hair will eventually become too elastic and too easily stretched, and thereby prone to stress and damage during manipulation. In the presence of excess moisture, such as that provided by hair products and potentially also provided by recent cleaning of the hair, the rate of plasticization is increased with temperature and the degree of plasticization increases over time. For hair types other than natural hair, where a goal of a hair care procedure may be to add curls to otherwise characteristically straight or wavy hair, the process may be best achieved by first reaching a sufficient degree of plasticization to weaken hair structure, organizing the hair in its desired curl and shape, and then removing moisture, typically assisted with a high level of heat, to remove the plasticized state, thereby returning a supporting structure, or, in terms commonly used in hair care, “set the hair”. As such, many of the procedures which are promoted and used to provide for curls, are in fact detrimental to curls when caring for natural hair. For natural hair, there is a significant departure needed from the hair care procedures used in other hair types. Natural hair should ideally be nourished, moisturized, and plasticized to a first level that overcomes a characteristic brittleness, all through product absorption at temperatures and durations that do not cause plasticization of a second level that results in excessive weakening of hair structure, and furthermore, through product absorption at temperatures and durations that do not cause heat related stress.
[0008] Caring for natural hair outside of the home is problematic and requires a supply of hair product and styling equipment such as combs and/or brushes be present and the process described above to be performed away from home. This results in many women avoiding exercising, swimming and other desirable activities in order to avoid carrying cumbersome hair care equipment and products, followed by washing and a painstaking, messy and lengthy hair care process in a remote location.
[0009] While the above discussion is directed towards natural hair, care of other hair types are associated with the challenges described above.

BRIEF SUMMARY OF THE INVENTION

[0010] According to some possible and illustrative embodiments of the disclosed subject matter, an apparatus and method may provide for a hair care process comprising an application of hair product, hereinafter referred to as “product”, and manipulation of hair. The apparatus may receive a provision of product, of which product may flow through at least one opening to an exposed

surface, hereinafter referred to as an “applicator”, and may be available for contact with and transfer to hair during a hair care process. The apparatus may also be equipped with manipulation features, hereinafter referred to as a “manipulator”. A manipulator may comprise one or more manipulation features, such as teeth, bristles and/or other structures to manipulate hair for detangling, curl enhancing, combing, brushing, shaping, styling and other forms of manipulation during a hair care process. An applicator may be configured to comprise a manipulator. Product may flow to or through an applicator, including a manipulator comprised thereby, and may be available for contact with and transfer to hair concurrently with hair manipulation during a hair care process. An applicator may be configured in an opposing orientation to a manipulator or other surface and capture hair there between, wherein product may flow to or through an applicator and may be available for contact with and transfer to hair concurrently with hair manipulation during a hair care process. One of more applicators may be configured and may be operably coupled to more than one provision of product, wherein more than one type of product may be applied concurrently, and wherein application may be concurrent with hair manipulation during a hair care process.

[0011] A surface of an applicator, manipulator and/or other surface of the apparatus which contacts the hair may comprise one or more product retention features such as a plurality of small well-like structures, ridges, troughs and/or raised perimeters which serve to retain excess product which may be subsequently transferred to hair.

[0012] An apparatus may be configured comprising a handle, at least one manipulator and at least one applicator, wherein at least one of the at least one applicators may comprise one of the at least one manipulators. An apparatus may comprise opposing arms which may be pivotally attached on one end, and which may form an opening and closing clamp feature on the other end, wherein the clamp feature may comprise at least one applicator and at least one manipulator, at least one of the at least one applicators may comprise one of the at least one manipulators, and hair may be captured between the clamp feature when the opposing arms are pivotally drawn towards each other. The at least one applicator and at least one manipulator or combinations thereof may be further configured to close hair product flow openings to prevent product flow when the opposing arms are pivotally drawn together to close the clamp, such as when the apparatus is not in use. The term clamp as it is used in this disclosure and in relation to the aforementioned configuration of moveably joined opposing arms refers to a general structure and does not imply a clamping force is required or intended. In operation, when hair is captured in the clamp, it is generally loosely constrained such that the manipulator may be passed through the hair, and thus a clamping force is not present and is not desirable.

[0013] An apparatus may comprise a product heater, such as a heating element configured to heat product provisioned therein. Alternatively, a product cartridge usable in an apparatus, an apparatus comprising a product chamber, or a removable product reservoir useable in an apparatus, may be constructed such that it may house product which may be heated in a microwave oven or heated liquid bath while housed therein. Whether heating product using a heating source internal or external to the apparatus, absorption of product into hair may be enhanced through a direct heating of product and indirect heating of hair thereby. A product heater may be operable in conjunction with a heat sensor, such as a thermistor, and circuitry to maintain temperature, such as a single predetermined temperature, a plurality of selectable or readable predetermined temperatures, or a variable temperature settable from a predetermined range, which may be predetermined temperatures or predetermined ranges of temperatures determined to both be safe for hair health and enhance product absorption. Circuitry may additionally provide a user indication that an appropriate product temperature is present for application of product. An example of a user indication would be a specific color emitted from an LED. A product heater may be configured to heat product in a product cartridge, reservoir or other vessel. A product heater may be configured to heat product as it flows from a product cartridge, reservoir or other vessel and out of an applicator,

such as in an on-demand heating embodiment. A thermochromatic material may be used in the manufacture a product cartridge, reservoir, or other vessel, or a portion thereof, or a thermochromatic label may be attached to a product cartridge, product reservoir, or other product vessel, such that after heating product contained therein, such as heating in a microwave oven or heated liquid bath, the thermochromatic material or label may emit a specific color or colors, or reveal lettering and/or one or more graphics to indicate an appropriate temperature or range of temperature is present for application of product. Such an appropriate temperature or range of temperature may be that which is determined to both be safe for hair health and enhance product absorption. Throughout this disclosure, the term product vessel may be used to refer to a container which may receive or otherwise comprise a volume of product such as a product reservoir, a product chamber and product cartridge. Various embodiments of apparatus that may receive a volume of product are possible including an apparatus comprising a product reservoir which may be a removable product reservoir, an apparatus comprising a product chamber which may be comprised, at least in part, by a housing of the apparatus, and an apparatus which may receive a product cartridge, such as by an insertion of the product cartridge into a cartridge chamber of the apparatus. A product cartridge can be a product vessel comprising a product reservoir, or a product vessel comprising a product reservoir and a rigid dispensing end, and as such, illustrates that a product vessel may comprise a product vessel. A product cartridge can be comprised by a cartridge shell assembly wherein a product cartridge is received by a cartridge shell and one of the product cartridge and the cartridge shell may comprise a rigid dispensing end. Additionally, a product cartridge can be a product vessel comprising a product reservoir, a rigid dispensing end and an outer shell. As such, a product cartridge shell assembly can also be referred to as a product cartridge. Additionally, product cartridges may be referred to as both being product vessels and as comprising product vessels.

[0014] An apparatus may use gravitational forces and/or acceleration forces generated through movement of the apparatus to move product through an applicator for contact with and transfer to hair. An apparatus may use a source of pressure, such as a pump, piston, pre-pressurized mechanism or other mechanism to generate pressure to create flow of hair product through an applicator. A pump or piston may be manually driven or electrically driven.

[0015] An apparatus may use a user fillable product cartridge. An apparatus may use a prepackaged product cartridge. An apparatus may be configured indicate a remaining product capacity, such as a remaining capacity of product in a product cartridge. A product cartridge may comprise a thermochromatic material or label, such that after heating product contained therein, such as heating in a microwave oven or heated liquid bath, the thermochromatic material or label may indicate product is at an appropriate temperature level or range of temperature for application. An apparatus may comprise a product heater and use a product cartridge. A product cartridge may comprise a readable target temperature feature on the product cartridge, and an apparatus may be configured to read the target temperature and heat product to the target temperature as determined by such reading. A product supplier may supply prepackaged product cartridges comprising product and a readable target temperature, wherein the target temperature may be a preferred or optimal temperature for product application and specified by the product supplier. An apparatus may use a product cartridge and heat product thereof to a fixed, selectable or readable target temperature wherein the target temperature is a single and fixed predetermined temperature, a plurality of selectable or readable predetermined temperatures, or a variable temperature settable or readable and within a predetermined range, all of which may be predetermined temperatures or predetermined ranges of temperatures determined to both be safe for hair health and enhance product absorption. Circuitry may additionally provide a user indication that product of an appropriate product temperature may be applied. An example of a user indication would be a specific color emitted from an LED. An apparatus may be configured to use a product cartridge and dispense product therefrom by applying a positive pressure to the cartridge, such as pressure

generated by application of force from a piston. An apparatus may use a product cartridge and extract product therefrom by applying a negative pressure (vacuum pressure), such as a negative pressure generated by a pump head of a pump follower system.
[0016] An apparatus may be configured for battery powered operation when electrical power may be required, such as needed to power a product heater, LED indicators, an electric pump, or other electrically powered components and circuitry. Battery power may be from a replaceable non-rechargeable battery source or from a removable or non-removable rechargeable battery source. An apparatus configured to use a non-removable rechargeable battery source may be configured for recharging using an external wall power adapter or a USB port. An apparatus configured to use a removable rechargeable battery source may be configured for recharging using an external wall power adapter or a USB port, and/or an external battery charger.
[0017] In the foregoing summary disclosure, a plurality of illustrative embodiments have been described. Each embodiment generally comprises an applicator, a manipulator and a can receive a provision of product and is configured to enable a user to concurrently apply product and style or otherwise manipulate their hair. Some embodiments comprise product delivery systems which may use pressure to generate product flow, and some embodiments comprise product delivery systems which may utilize gravitational forces to deliver product flow. Illustrative embodiments of pressure based product delivery systems are disclosed herein which may comprise mechanical pumps, both air and airless, electrical pumps and spring driven pistons. Some illustrative embodiments disclosed herein may comprise an internal heating system and some illustrative embodiments support a heating of product in a microwave oven or in a heated liquid bath, or other form of external heating of product. Illustrative embodiments disclosed may receive a provision of product in a variety of ways comprising in a housing, in a reservoir and in a cartridge, the latter of which may be a user filled cartridge, or may be a prepackaged cartridge. A detailed disclosure of various illustrative embodiments which may relate to one or more aspects of the foregoing summary disclosure is provided following a brief description of the several views of the drawings.

Description

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS
[0018] The accompanying drawings, which are included to provide a further understanding of the disclosed subject matter, are incorporated in and constitute a part of this specification. The drawings also illustrate embodiments of the disclosed subject matter and together with the detailed description serve to explain the principles of the disclosed subject matter.
[0019] FIG. **1**A is a perspective view of an illustrative embodiment with a handle.
[0020] FIG. **1**B is an exploded view of an illustrative embodiment with a handle.
[0021] FIG. **1**C is a bottom view of an applicator of the embodiment of FIG. **1**A comprising a seal.
[0022] FIG. **1**D is a bottom view of an applicator of the embodiment of FIG. **1**B comprising a seal.
[0023] FIG. **2**A is a perspective view of an illustrative embodiment with an internal heater.
[0024] FIG. **2**B is an exploded view of a handle of the embodiment of FIG. **2**A.
[0025] FIG. **2**C is an exploded view of a head of the embodiment of FIG. **2**A.
[0026] FIG. **2**D is a view of a circuit board assembly of FIG. **2**B.
[0027] FIG. **2**E is a view of a wiring cable of the embodiment of FIG. **2**A.
[0028] FIG. **3**A is a perspective view of an illustrative embodiment with a pump.
[0029] FIG. **3**B is an exploded view of a handle of the embodiment of FIG. **3**A.
[0030] FIG. **3**C is an exploded view of a head of the embodiment of FIG. **3**A.
[0031] FIG. **4**A is a perspective view of a possible configuration of a product retention well.
[0032] FIG. **4**B is a perspective view of a possible configuration of a surface comprising product retention features.

[0033] FIG. **4**C is a perspective view of a possible configuration of an applicator comprising product retention features.
[0034] FIG. **5**A is a perspective view of an illustrative embodiment with opposing arms comprising an application head module and an opposing manipulator module.
[0035] FIG. **5**B is a perspective view of the embodiment of FIG. **5**A with modules removed.
[0036] FIG. **5**C is a perspective view of the embodiment of FIG. **5**A with opposing arms closed.
[0037] FIG. **5**D is an exploded view of the embodiment of FIG. **5**A with opposing arms detached from a pivot bar.
[0038] FIG. **5**E is an exploded view of an application head module.
[0039] FIG. **5**F is a perspective view of a product reservoir having product displacement vanes, wherein displacement vanes are in an open position.
[0040] FIG. **5**G is a perspective view of a product reservoir having product displacement vanes, wherein displacement vanes are in predominantly closed position.
[0041] FIG. **5**H is an exploded view of an opposing manipulator module.
[0042] FIG. **5**I is a perspective view of an opposing manipulator module and an application head module illustrating a storage relationship when opposing arms are in a closed position.
[0043] FIG. **5**J is a perspective view of an opposing manipulator module comprising applicator seals and a storage recess area for an applicator manipulator.
[0044] FIG. **5**K is an exploded view of an opposing arm of the embodiment of FIG. **5**A.
[0045] FIG. **5**L is an exploded view of an application arm of the embodiment of FIG. **5**A.
[0046] FIG. **6**A is a perspective view of a possible configuration of a passive applicator module.
[0047] FIG. **6**B is an exploded view of the passive applicator module of FIG. **6**A.
[0048] FIG. **7**A is a perspective view of an illustrative embodiment with opposing arms comprising an application and on-demand heating module, an opposing manipulator module and a piston driven product cartridge dispensing system.
[0049] FIG. **7**B is a perspective view of the embodiment of FIG. **7**A with an application and on-demand heating module in an open position, a product cartridge and shell assembly partially removed, and an opposing manipulator module depicted in a removed position and in both manipulation and storage orientations.
[0050] FIG. **7**C is a perspective view of the embodiment of FIG. **7**A with opposing arms closed.
[0051] FIG. **7**D is an exploded view of the embodiment of FIG. **7**A with opposing arms detached from a pivot bar.
[0052] FIG. **7**E is an exploded view of the embodiment of FIG. **7**A with an application and on-demand heating module in a detached position, a product cartridge and shell assembly fully removed, and an opposing manipulator module depicted in a removed position and in both manipulation and storage orientations.
[0053] FIG. **7**F is an exploded view of an application and on-demand heating module.
[0054] FIG. **7**G is a perspective view of a product cartridge.
[0055] FIG. **7**H is a perspective view of a product cartridge shell.
[0056] FIG. **7**I is a perspective view of a product cartridge shell assembly depicting a rigid end comprising a readable target temperature feature.
[0057] FIG. **7**J is an alternative perspective view of a product cartridge shell assembly illustrating an exposed end of a collapsible product reservoir.
[0058] FIG. **7**K is an exploded view of an opposing arm of the embodiment of FIG. **7**A.
[0059] FIG. **7**L is an exploded view of an application arm of the embodiment of FIG. **7**A.
[0060] FIG. **7**M is a perspective view of a partial piston assembly of the embodiment of FIG. **7**A comprising a piston, a piston control arm a piston retraction arm.
[0061] FIG. **7**N is a perspective view of a fully collapsed and depleted collapsible product cartridge.
[0062] FIG. **70** is a perspective view of a partial inner application arm assembly comprising an

alternative configuration of the assembly of FIG. **7**L, wherein a piston and cartridge chamber comprises an integrated product cartridge shell.
[0063] FIG. **7**P is a perspective bottom view of a partial inner application arm assembly of the embodiment of FIG. **7**A without a piston assembly installed.
[0064] FIG. **8**A is a perspective view of an illustrative embodiment with opposing arms comprising an application and on-demand heating module, an opposing manipulator module and pump follower driven product cartridge dispensing system, and having modules removed.
[0065] FIG. **8**B is a perspective view of a product cartridge for use in the embodiment of **8**A.
[0066] FIG. **8**C is an exploded bottom view of a partial application arm assembly of the embodiment of FIG. **8**A.
[0067] FIG. **9**A is a perspective view depicting an implementation of a hair care apparatus of the present invention.
[0068] FIG. **9**B is a bottom perspective view depicting the hair care apparatus of FIG. **9**A.
[0069] FIG. **10** is a partially exploded perspective view of the hair care apparatus of FIGS. **9**A and **9**B.
[0070] FIG. **11**A is a perspective view of an implementation of product pod depicted in an exploded view.
[0071] FIG. **11**B depicts a rear perspective view of an assembled plunger comprised by the product pod of FIG. **11**A.
[0072] FIG. **12** is a block diagram of an example implementation of an electrical system of the hair care apparatus of FIG. **9**A, FIG. **9**B and FIG. **10**.
[0073] FIG. **13** is a block diagram of an example implementation of program modules.
[0074] FIG. **14**A depicts a perspective exploded view of some of the components of the example lower arm of the haircare apparatus of FIG. **9**A, FIG. **9**B and FIG. **10** in disassembly.
[0075] FIG. **14**B illustrates the example lower arm of the haircare apparatus of FIG. **9**A, FIG. **9**B and FIG. **10** having the pod door and the product pod removed.
[0076] FIG. **14**C illustrates the example lower arm of the haircare apparatus of FIG. **9**A, FIG. **9**B and FIG. **10** having the product pod installed with the pod door removed.
[0077] FIG. **15** is a perspective view of the example lower arm of the haircare apparatus of FIG. **9**A, FIG. **9**B and FIG. **10** depicting some of the components thereof in a partially exploded view.
[0078] FIG. **16** depicts a perspective view of the haircare apparatus of FIG. **9**A, FIG. **9**B and FIG. **10**, wherein no upper arm is attached thereto, and the lower arm may be used without an upper arm in a brush like configuration.

DETAILED DESCRIPTION OF THE INVENTION

[0079] Detailed illustrative embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely illustrative of the invention that may be embodied in various forms. In addition, each of the examples given in connection with the various embodiments of the invention is intended to be illustrative, and not restrictive.
[0080] The following detailed illustrative embodiments refer to the accompanying drawings. The same reference number may appear in multiple drawings and when appearing in multiple drawings will identify the same or similar elements. For brevity, a reference number and its referenced element will be disclosed in accompanying text herein and in relation to a first appearance in the drawings, but may not be explicitly referred to in accompanying text again when appearing in subsequent drawings.
[0081] Embodiments of a hair care apparatus and method are disclosed. Each embodiment may provide a location to provision product, an applicator and a manipulator which are configured to enable both an application of product and a manipulation of hair. Hair can therefore receive the application of product in a concurrent operation, or in adjacent operations, of hair manipulation using the disclosed apparatus. Hair manipulation can include detangling, curl enhancing, combing, brushing, shaping, styling and other forms of manipulation.

[0082] FIG. **1**A and FIG. **1**B depict illustrative embodiments of hair care apparatus **100** and **101**, respectively. FIG. **1**A is a perspective view of apparatus **100**. FIG. **1**B is an exploded view of apparatus **101** and serves to aid in an understanding of both embodiments of apparatus **100** and **101** due to similar and common features comprised therein. Similar and common features comprise a handle **106**, heads **107** and **109**, applicators **130** and **131**, each of which comprises a manipulator **142**. The embodiment of FIG. **1**B comprises a removable product reservoir **120**, which may also be referred to as a removable product vessel. Alternatively, the housing **112** of the embodiment of FIG. **1**A serves as a product vessel or product reservoir.
[0083] Applicators **130** and **131** are removably attached to housings **112** (FIG. **1**A) and **114** (FIG. **1**B), respectively, and when removed provide access to housing **112** or reservoir **120**, respectively, to dispose product therein. Product can include oils and other liquids produced commercially for hair care, or oils and liquids which may alternatively be used as a hair care product, for example, coconut oil, or may be produced from homemade recipes. Additional forms of product will be disclosed later herein. Applicators **130** and **131** comprise exposed applicator surfaces **132** and **133**, respectively, comprising a plurality of holes **134** and **135**, respectively, and when attached to housing **112** or **114**, respectively, the holes permit product to flow from housing **112** or reservoir **120** to the exposed applicator surfaces **132** and **134** of applicators **130** and **131**, respectively. Briefly referring to FIG. **1**C and FIG. **1**D, FIG. **1**C is a bottom view of applicator **130** which comprises a seal **154** to provide a liquid tight seal between applicator **130** and housing **112**. FIG. **1**D is a bottom view of applicator **131** which comprises a seal **156** to provide a liquid tight seal between applicator **131** and reservoir **120**.
[0084] Returning to FIG. **1**A and FIG. **1**B, reservoir **120** shown in FIG. **1**B is located in housing **114** in a location defined by reservoir guides **122** (only three of four are visible in FIG. **1**B) and is removable improving the convenience of filling it with product and cleanup when a hair care process has completed. Product can be preheated prior to placement in housing **112** or removable reservoir **120**. Alternatively, removable reservoir **120** can be manufactured of a material safely used in a microwave oven in order to permit the microwave heating of product contained therein. Additionally, apparatus **100** can be made of entirely of materials safely used in a microwave oven, allowing for microwave heating of product after it is placed in housing **112**.
[0085] In order to facilitate application of product at predetermined temperatures or temperature ranges, such as temperatures that are both safe for hair health and enhanced absorption by hair, housing **112** or reservoir **120** can be manufactured to comprise a thermochromatic material whereby the material of housing **112** or reservoir **120** provides a visual indication that such predetermined temperatures or temperature ranges are present. Alternatively, housing **112** or reservoir **120** can comprise a thermochromatic device **146** and **148**, respectively, attached thereon, such as an adhesively attached thermochromatic label to provide such visual indication.
[0086] In operation during a hair care procedure, apparatus **100** and **101** may be made to interact with hair such that manipulators **142** of applicators **130** and **131**, respectively, pass through hair to detangle, style, shape, enhance curls or otherwise manipulate the hair. The movement of apparatus **100** and **101** from a resting orientation where applicators **130** and **131** are generally horizontal and above housing **112** and reservoir **120**, respectively, to a generally inverted through generally vertical orientation result in gravitational forces generating flow of product from housing **112** and reservoir **120** through holes **134** and **135** to the exposed applicator surfaces **132** and **134** of applicators **130** and **131**, respectively, and product thereby becoming available for contact with and application to the hair during and concurrently with manipulation thereof.
[0087] FIG. **2**A shows a perspective view of an illustrative embodiment of an apparatus **200** comprising an internal product heater. Apparatus **200** comprises a handle **206** and a head **207**. Head **207** comprises a housing **214** and an applicator **231** removably attached thereto and comprising an exposed applicator surface **232**, which comprises a plurality of holes **233**, and a manipulator **242**. FIG. **2**B is an exploded view of handle **206** having an upper housing **272**, a lower housing **273**, a

circuit board assembly **274**, a battery **278** and a removable battery cover **279**. Lower housing **273** further comprises circuit board mount points **275**, a battery housing **276**, a control opening **280** and an indicator opening **283**. When mounted on mount points **275**, battery terminals **284** of circuit board assembly **274**, shown later in FIG. **2**D, pass through battery terminal openings **285** (only one of two is visible in FIG. **2**B) and are available in battery housing **276** for connection to battery **278** which is accessible through a battery access **277** when battery cover **279** is removed from lower housing **273**.

[0088] FIG. **2**C is an exploded view of head **207** comprising applicator **231** comprising manipulator **242**, exposed applicator surface **232** comprising holes **233** and a reservoir seal **256**, a reservoir **220**, which may also be referred to as a product vessel, and a housing **214**. Housing **214** comprises a heating element **221** having a heating element connector **224** and may be situated above a heating element insulator **292**, wherein both insulator **292** and element **221** can be bordered by reservoir placement guides **222** (only three of four are visible in FIG. **2**C). Housing **214** further comprises a wiring cable access **223**, a thermistor housing **225** and a thermistor **227** having a thermistor connector **226**.

[0089] Referring to FIG. **2**D in conjunction with FIG. **2**C, FIG. **2**D is a bottom view of circuit board assembly **274** and illustrates battery terminals **284**, a wiring cable connector **282**, a control switch **286** and an LED indicator **288**. Circuit board assembly **274** comprises a temperature regulation circuitry, not shown, operably coupled to thermistor **227** and heating element **221**. Additionally referring to FIG. **2**B, when circuit board assembly **274** is mounted on mount points **275**, battery terminals **284** protrude into battery housing **276**, as discussed previously, for connection to battery **278**, and control switch **286** and LED **288** are operable and visible, respectively, through control opening **280** and indicator opening **283**, respectively.

[0090] Referring to FIG. **2**C, FIG. **2**D and FIG. **2**E, FIG. **2**E shows a wiring cable **228** for electrically interconnecting temperature regulation circuitry (not shown) on circuit board assembly **274**, heating element **221** and thermistor **227**. Cable **228** has a circuit board connector **229** for connection to wiring cable connector **282** of circuit board assembly **274**. Cable **228** further comprises a device connector **293** for connection to heating element connector **224** and thermistor connector **226**, wherein connectors **224** and **226** and thermistor **227** are shown in FIG. **2**E for illustration.

[0091] Referring to FIG. **2**A, FIG. **2**B and FIG. **2**C, a user of apparatus **200** removes applicator **231** from housing **214** thereby exposing reservoir **220**. The user can remove reservoir **220** to facilitate disposing product therein, and afterwards return reservoir **220** to the location defined by reservoir guides **222** and on top of heating element **221**, wherein reservoir **220** is in thermal contact with heating element **221**, product disposed therein and thermistor **227**. Reservoir **220** can be made of a metal to efficiently conduct heat generated by heating element **221** to product disposed therein. Alternatively reservoir **220** can be manufactured of a polymer engineered to conduct heat. Once product is in reservoir **220**, applicator **231** may be reattached to housing **214** sealing reservoir **220** to applicator **231** with seal **256**. To initiate heating of product, switch control **286** is positioned to an “on” position thereby causing power from battery **278** to be supplied to circuitry residing on circuit board assembly **274**. If the resistance of thermistor **227** has not achieved a value to indicate a predetermined target product temperature has been reached, power from battery **278** is supplied by circuit board assembly **274** via wiring cable **228** to heating element **221**. If the thermistor **227** resistance indicates a predetermined target temperature is present (or is exceeded), power is not supplied to heating element **221**. Switch control **286** can include additional position settings such that multiple settings corresponding to multiple target temperature levels can be provided, such as a high and low temperature setting. Predetermined temperatures may be established such that product temperatures that are safe for hair health while enhancing product absorption are provided.

[0092] LED **288** can comprise more than one color capability and be activated to emit one color to indicate apparatus **200** is on and product is heating (e.g. red) and another color to indicate apparatus

200 is on and product is not heating (e.g. green), and more specifically, to indicate that product has achieved a desired temperature level and is ready for application.
[0093] In operation during a hair care procedure, apparatus **200** may be made to interact with hair such that the manipulator **242** passes through the hair to detangle, style, shape, enhance curls or otherwise manipulate the hair. The movement of apparatus **200** from a resting orientation where applicator **231** is generally horizontal and above reservoir **220**, to a generally inverted through generally vertical orientation, results in gravitational forces generating flow of heated product, having a predetermined safe and absorption enhancing temperature, from reservoir **220** through holes **233** to the exposed applicator surface **232** of applicator **231**, and heated product thereby becoming available for contact with, application to, and indirect heating of the hair during and concurrently with manipulation thereof.
[0094] FIG. **3**A shows a perspective view of an illustrative embodiment of an apparatus **300** comprising a product pump. Apparatus **300** comprises a handle **306** and a head **307**. Head **307** comprises a housing **314** and an applicator **331** removably attached thereto and comprising a manipulator **342** and an exposed applicator surface **332** which comprises a plurality of holes **333**. FIG. **3**B is an exploded view of handle **306**. Handle **306** comprises an upper housing **364**, a squeezable air filled pump **371** comprising squeezable sides **372**, a pump inlet check valve **373**, a pump outlet **374** and outlet flange **375**, and a lower housing **376** comprising an outlet flange housing **377**.
[0095] FIG. **3**C is an exploded view of head **307** comprising applicator **331** comprising manipulator **342**, exposed applicator surface **332** which comprises holes **333**, and a reservoir seal **356**. Head **307** further comprises a reservoir **320**, which may also be referred to as a product vessel, comprising a pump outlet check valve **357** and a pump outlet connection tube **358**, and housing **314** comprising reservoir placement guides **322** (only three of four are visible in FIG. **3**C) and a pump outlet access **323**. Reservoir **320** is removable improving the convenience of disposing product therein and cleanup when a hair care process has completed. Product can be preheated prior to placement in reservoir **320**. Reservoir **320** can be manufactured of a material safely used in a microwave oven in order to permit the microwave heating of product contained therein. In order to facilitate the application of product at predetermined temperatures or temperature ranges, such as temperatures that are both safe for hair health and enhanced absorption by hair, reservoir **320** can be manufactured to comprise a thermochromatic material whereby the material of reservoir **320** provides a visual indication that such predetermined temperatures or temperature ranges are present. Alternatively, reservoir **320** can comprise a thermochromatic device **348** attached thereon, such as an adhesively attached thermochromatic label, to provide such visual indication.
[0096] Referring to FIG. **3**C in conjunction with FIG. **3**B, pump outlet connection tube **358** inserts into pump outlet **374** and provides an airtight seal thereto. Pump outlet check valve **357** and pump outlet connection tube **358** are attached to reservoir **320** to provide a seal thereto and one-way flow of air into reservoir **320** through outlet connection tube **358**. Pump inlet check valve **373** provides one-way flow of air into pump **371**. When squeezable sides **372** are squeezed, inlet check **373** valve blocks air flow and air is forced out of pump **371** through outlet **374**, through pump outlet connection tube **358**, through pump outlet check valve **357** and into reservoir **320**. When squeezable sides **372** are relaxed, pump outlet check valve **357** prevents flow of air and product into pump **371**, and inlet check valve **373** allows flow of air into pump **371** to replace air that has been displaced from within pump **371** and into reservoir **320**.
[0097] Additionally referring to FIG. **3**A, a user of apparatus **300** may remove applicator **331** from housing **314** thereby exposing reservoir **320**. The user can remove reservoir **320** to facilitate disposing product therein and afterwards, insert connection tube **358** of reservoir **320** into pump outlet **374** which is secured in housing **377** by flange **375** and return reservoir **320** to the location defined by reservoir guides **322**. As earlier noted, product can be preheated prior to placement in removable reservoir **320**, or should removable reservoir **320** be manufactured of a material safely

used in a microwave oven, microwave heating of product can be accomplished directly therein. Should reservoir **320** comprise a thermochromatic indicator such as a label **348**, the user can ensure a safe and effective temperature for product use is present by a visual indication therefrom.
[0098] In operation during a hair care procedure, apparatus **300** may be made to interact with hair such that manipulator **342** passes through the hair to detangle, style, shape, enhance curls or otherwise manipulate the hair. The movement of apparatus **300** from a resting orientation where applicator **331** is generally horizontal and above reservoir **320**, to a generally inverted through generally vertical orientation results in gravitational forces generating flow of product from reservoir **320** to applicator holes **333**, whereupon the squeezing of pump sides **372** generates flow of air into reservoir **320**, thereby generating an increase of pressure therein and displacing product from reservoir **320** through applicator holes **333** to exposed applicator surface **332** of applicator **331**. As such, product thereby becomes available for contact with and application to the hair during and concurrently with manipulation thereof. Pump **371** of apparatus **300** thereby provides added control in the hair care procedure by allowing a user to expedite delivery of hair product by actuating pump **371** by squeezing pump sides **372**.
[0099] An exposed surface of an applicator, manipulator and/or other surface which contacts hair can comprise one or more product retention features such as a plurality of small well-like structures, ridges, troughs and/or raised perimeters which serve to retain excess product for subsequent transfer to hair. FIG. **4**A shows a possible configuration for a product retention well **400** for retaining product comprising a bowl shaped outer area **401** comprising concentric ridges **402** and a central well **403**. As a surface containing retention well **400** is moved through the hair during hair manipulation and product application, the bowl **401**, ridges **402** and well **403** wipe excess product from hair and capture the excess product therein. When dryer hair is subsequently encountered by retention well **400**, product retained therein may be transferred and applied to the dryer hair.
[0100] FIG. **4**B shows a possible configuration for a surface **406** comprising a plurality of product retention features comprising ridges **404** which form retention troughs **405**. Retention troughs **405** further comprise a plurality of retention wells **400**. As surface **406** containing retention features **404**, **405** and **400** is moved through the hair during hair manipulation and product application, retention ridges **404** wipe excess product from hair and capture the excess product within retention troughs **405**. Hair and gravitational forces may move excess product captured within retention troughs **405** to retention wells **400** which additionally wipe and capture product as described above. When dryer hair is subsequently encountered by retention troughs **405** and retention wells **400**, product retained therein may be transferred and applied to the dryer hair.
[0101] FIG. **4**C shows a possible configuration of an applicator **431** comprising plurality of product retention features. Applicator **431** comprises an exposed applicator surface **407** bounded by a retention perimeter **408** formed by a raised perimeter of applicator **431**. Applicator **431** further comprises a plurality of retention ridges **404** forming retention troughs **405**. Retention troughs **405** comprise a plurality of retention wells **400**. Applicator **431** additionally comprises a plurality of holes **433** in exposed applicator surface **407** through which product may flow, and a manipulator **442**. As applicator **431** comprising retention features **408**, **404**, **405** and **400** is moved through hair to manipulate hair with manipulator **442** and apply product which may flow through holes **433**, retention perimeter **406** may wipe excess product from hair and serves to retain excess product on the exposed applicator surface **407** of applicator **431**. Furthermore, retention ridges **404** may wipe excess product from hair and capture the excess product within retention troughs **405**. Additionally, hair and gravitational forces may move excess product captured within retention troughs **405** to retention wells **400** which may further wipe and capture product as described above. When dryer hair is subsequently encountered by exposed applicator surface **407** comprising product retention troughs **405** and retention wells **400**, product retained thereon and therein may be transferred and applied to the dryer hair.

[0102] With the addition of product retention features, a surface which regularly contacts hair during a hair care process, other than an active applicator surface through which product flows, can serve as a passive applicator, whereby the passive applicator can collect, retain and apply excess product. In doing so, passive applicators can reduce product waste, by collecting excess product that may otherwise drip from the hair, and speed the application process by applying the excess product in addition to product being applied by an active applicator applying product directly therefrom A possible configuration of a passive applicator is disclosed later herein.
[0103] FIG. **5**A illustrates a perspective view of an illustrative embodiment of an apparatus **500** comprising opposing arms pivotally attached on one end (a pivot end) thereby forming a clamp on the other end (a clamp end). Apparatus **500** comprises an application arm **504**, an opposing arm **505**, a pivot cap **506**, an application head module **507** and an opposing manipulator module **508** (partially hidden). Apparatus **500** further comprises a control switch **501**, an LED indicator **502** and an application control button **503**. FIG. **5**B illustrates a perspective view of apparatus **500** showing application head module **507** and opposing manipulator module **508** removed from application arm **504** and opposing arm **505**, respectively. Opposing manipulator module **508** is shown in both a manipulation orientation **509** and a storage orientation **510**. FIG. **5**C is a perspective view of apparatus **500** when application arm **504** and opposing arm **505** are in a closed position. FIG. **5**D depicts apparatus **500** in an exploded view with pivot cap **506** removed and arms **504** and **505** detached. Apparatus **500** further comprises a pivot bar **511** and a pivot spring **512**. Pivot bar **511** slides through pivot spring **512** and is seated between pivot sockets **513** of application arm **504** and pivot sockets **514** (only one of two is visible in FIG. **5**D) of opposing arm **505**. Pivot spring **512** provides an opening force which radially separates application head **507** and opposing manipulator **508** of the clamp end of arms **504** and **505**, about pivot bar **511** of the pivot end such that the user only has to apply or not apply a closing force to arms **504** and **505** to close and open the clamp end, respectively. The term clamp as it is used in this disclosure and in relation to the aforementioned configuration of moveably joined opposing arms **504** and **505** refers to a general structure and does not imply a clamping force is required or intended. In operation, when hair is captured in the clamp, it is generally loosely constrained such that the manipulators may be passed through the hair, and thus a clamping force and action, which can imply the hair is physically retrained rather that loosely constrained, is not present and is not desirable. Additionally, the manipulators present on the opposing faces of the clamp, as can be seen in FIG. **5**A, prevent a full closure when the apparatus is in a configuration having opposing manipulator **508** in a manipulation orientation **509** (FIG. **5**B) and requires opposing manipulator be inserted into opposing arm **505** in a storage orientation **510** for the clamp end to be fully closed as in FIG. **5**C, which will be explained in more detail later herein.
[0104] FIG. **5**E illustrates an application head module **507** of apparatus **500** in an exploded view comprising an applicator **531** and a product reservoir **520**, which may also be referred to as a product vessel. Applicator **531** is configured to be removably attached to product reservoir **520** and/or application arm **504** (FIG. **5**B) in conjunction with reservoir **520**, and comprises a manipulator **542**, an exposed applicator surface **532** which comprises holes **533**, and a seal **536**. Reservoir **520** comprises a vane assembly **527** comprising vanes **522** attached by hinges **524** to a vane mounting bar **523** which is attached to a reservoir base **521** comprising an inlet **525**. Inlet **525** comprises a check valve (not shown) which allows air to flow through inlet **525** in a direction into reservoir **520**, but does not allow return flow through inlet **525** in a direction out of reservoir **520**.
[0105] FIG. **5**F shows a perspective view of product reservoir **520** comprising a reservoir base **521**, product displacement vanes **522**, vane mounting bar **523**, vane hinges **524** and inlet **525**. Base **521** has a cross sectional shape in the planes perpendicular to the long axis of vane mounting bar **523** comprising two quarter circles separated by the width of bar **523**. Such separation creates two outermost tangentially connected points, one for each quarter circle, allowing reservoir **520** to remain upright when placed on a flat horizontal surface, and allows each hinge **524** to reside along

the radial center line of one of the quarter cylinders defined by the cross section. Product displacement vanes **522** have a length and width of the inner dimensional length and radius, respectively, of the quarter cylinders of reservoir base **521** and, in FIG. **5**F, are in an open position, projecting downward from hinges **524**, thereby allowing the volume for each quarter cylinder of reservoir base **521** to be filled with product. FIG. **5**G depicts a perspective view of product reservoir **520** where product displacement vanes **522** are in positions which have displaced a majority of an available volume for product within base **521**. Vanes **522** have reached their maximum displacement position when they have reached vane stops **526**.

[0106] FIG. **5**H is an exploded view of an opposing manipulator module **508** comprising a manipulator **543**, a base **544** comprising a surface **545**, and applicator seals **534** comprising compressible edges **535**. Referring to both FIG. **5**B and FIG. **5**I, FIG. **5**I shows in perspective view, the relationship between opposing manipulator module **508** and application head module **507** when opposing manipulator module **533** is inserted in opposing arm **505** in storage orientation **510**, application head module **507** is inserted in application arm **504** and arms **504** and **505** are in a closed position as shown in FIG. **5**C. FIG. **5**J shows a bottom view of opposing manipulator **508**. When situated on head **507** as shown in FIG. **5**I, compressible edges **535** pass through manipulator **542** and press against holes **533** thereby closing holes **533** and preventing any product contained in reservoir **520** from leaking through holes **533**. In a reciprocal fashion, manipulator **542** passes through and around applicator seals **534** such that opposing manipulator module **508** provides a storage location for manipulator **542**.

[0107] FIG. **5**K and FIG. **5**L are exploded views of arms **505** and **504**, respectively, and do not show opposing manipulator **508** or application head **507** modules of FIG. **5**B, respectively, nor pivot bar **511**, pivot spring **512** and pivot cap **506** of FIG. **5**D. FIG. **5**K is an exploded view of opposing arm **505** comprising an outer housing **563** comprising pivot sockets **514** (only one of two is visible in FIG. **5**K), an electric pump **551** comprising an outlet **552**, a pump tube **553**, which is connected to pump outlet **552** and comprises a pump tube flange **554**, a pump electrical connector **555** and an inner housing **564** comprising a receptacle **564***a* for opposing manipulator **508**.

[0108] FIG. **5**L is an exploded view of application arm **504** comprising an inner housing **562**, a circuit board assembly **581**, an outer housing **561**, rechargeable batteries **567** and a battery cover **568**. Inner housing **562** comprises a heating element **571** and a heating element insulator **572**. Heating element **571** comprises a connector **573** and is situated on heating element insulator **572**. Inner housing **561** further comprises a pump tube flange housing **577** which receives pump tube flange **554** of FIG. **5**K, and a thermistor housing **574** which receives a thermistor **576** having a connector **575**. Circuit board assembly **581** comprises a pump connector **582**, a heating element connector **583**, a thermistor connector **584**, battery terminals **585** (only two of four are visible in FIG. **5**L), a switch **501**, an on/heating LED indicator **502**, a charging connector **588**, a charging LED indicator **589**, a first pump button switch **503** and a second pump button switch **592**. Outer housing **561** comprises pivot sockets **513**, a battery housing **565**, battery terminal access holes **566**, a switch opening **593**, an on/heating LED opening **594**, a first pump button switch opening **595**, a second pump button switch opening **596**, a charging LED opening **597** and a charging connector opening **598**.

[0109] Referring to FIG. **5**B, FIG. **5**E, FIG. **5**K and FIG. **5**L, in operation, a user removes application head module **507** from application arm **504**. Applicator **531** is configured to be removably attached to product reservoir **520** and/or application arm **504** in conjunction with reservoir **520**. Applicator **531** is then removed from reservoir **520** and product is disposed therein. Application head module **507** is then reassembled by returning applicator **531** to reservoir **520**, and collectively securing them as application head module **507** to application arm **504**, which results in the insertion of reservoir inlet tube **525** into pump tube flange **554**, and thermal contact between reservoir base **521**, heating element **571**, product disposed therein and thermistor **576**. Switch **501** is positioned to an “on” position thereby causing power from rechargeable batteries **567** to be

supplied to circuitry residing on circuit board assembly **581**. If the resistance of thermistor **576** has not achieved a value to indicate a predetermined target product temperature has been reached, power from rechargeable batteries **567** is supplied by circuit board assembly **581** to heating element **571** via heating element connectors **583** and **573**. If the thermistor **576** resistance indicates that a predetermined target temperature is present (or is exceeded), power is not supplied to heating element **571**. Switch control **501** can include additional position settings such that multiple settings corresponding to multiple target temperature levels can be provided, such as a high and low temperature setting. Predetermined temperatures may be established such that product temperatures that are safe for hair health while enhancing product absorption are provided.

[0110] LED indicator **502** may be emit more than one color and emit a first color when apparatus **500** is on and thermistor **576** registers a temperature below a target temperature to indicate product is being heated. Once thermistor **576** registers that the target temperature has been reached and the heating element is no longer powered by rechargeable batteries **567** via circuitry on circuit board assembly **581**, LED indicator **502** may emit a second color to indicate apparatus **500** is on and product has reached the target temperature and is ready for application.

[0111] During a hair care procedure, apparatus **500** is caused to interact with hair. A section of hair may be placed between the application head module **507** and opposing manipulator module **508** located on the clamp end of apparatus **500**. Opposing arms **504** and **505** can be drawn together to establish a desired distance between modules **507** and **508**. The clamp can be moved along the section of hair captured therein such that manipulators **542** and **543** (FIG. **5**H) of modules **507** and **508**, respectively, pass through the hair to detangle, style, shape, enhance curls or otherwise manipulate the hair. When a user wishes to apply product to their hair, either pump button switch **503** or **592** may be pressed, depending on convenience and which hand is being used to grasp apparatus **500**, thereby causing circuitry on circuit board assembly **581** to supply power from rechargeable batteries **567** to pump **551** via pump connectors **582** and **555** thereby causing air pressure and air to flow from pump **551** through pump outlet **552**, through tube **553**, through flange **554**, through reservoir inlet **521** and into reservoir **520**. As air moves into reservoir **520**, pressure is generated causing displacement vanes **522** to rotate on displacement vane hinges **524**, thereby decreasing the available volume in reservoir base **521** for product contained therein. As the volume is reduced by an amount, an equivalent amount of product, which may be heated to a predetermined safe temperature, passes through applicator holes **533** of applicator **531** of application head module **507** to exposed applicator surface **532** and is made available for contact with, application to, and indirect heating of the hair during and concurrently with manipulation thereof. When the user ceases press one of the pump button switches **503** and **592**, power to pump **551** ceases and air pressure and flow into reservoir **520** ceases, and further product displacement through applicator holes **533** ceases. Check valve (not shown) of inlet **525** of reservoir **520** prevents a return flow and may alternatively be comprised in pump **521** or as a redundant measure in both inlet **525** and pump **521**.

[0112] Rechargeable batteries **567** can be charged by connecting charging connector **588** to a power source such as a USB connector (not shown) using a charging cable (not shown). When connected to a charging source, charging LED indicator **589** can emit a color to indicate rechargeable batteries **567** are charging and emit a different color to indicate when rechargeable batteries **567** are fully charged.

[0113] In an embodiment comprising a clamp similar to the apparatus of **500**, many configurations are possible. For example, an opposing arm may or may not be configured with an opposing manipulator. The opposing arm will serve to capture hair between itself and an application arm regardless of an opposing manipulator being present. Alternatively, an application module may be configured such as not to comprise a manipulator and an opposing manipulator may be present. Varying styles of manipulators and combinations thereof may be used. For example, a user may find their particular hair characteristics are best managed by using a broadly spaced, large tooth

manipulator geometry comprised by an applicator, and a tightly spaced, finer bristle on an opposing manipulator module. The user may find that the large tooth applicator manipulator can be favored when detangling and applying an initial application of product, and a tighter closure of the clamp and a combined emphasis of both manipulators is expeditious to distribution of product and finer manipulation of a section of hair once detangled and an initial application of product is disposed thereon. Furthermore, such a tooth geometry of an applicator manipulator may provide less resistance to an intimate contact between some hair types and the applicator surface, whereas a finer bristle geometry on an opposing manipulator will be effective is directing hair to the surface of the applicator when the clamp is drawn closer together.

[0114] An apparatus may be marketed with a plurality of manipulator options and geometries. An apparatus may use applicator manipulators and opposing manipulators which are interchangeable. Referring to FIG. **5**E and FIG. **5**H, an opposing manipulator base **544** may be alternatively configured to receive an applicator **531** having a manipulator **542** in lieu of manipulator **543**. While there is no general function to holes **533** and seal **536** of an applicator **531** when so used, a reduction in unique parts to be manufactured, inventoried and distributed may be achieved by the manufacturer and product distributors, and the user of an apparatus may have fewer unique parts to purchase and manage while still achieving a higher degree of configurability.

[0115] As described in conjunction with FIG. **4**A, FIG. **4**B and FIG. **4**C, any surface with which hair may come into contact, may comprise product retention features such that excess product is retained thereon and therein, and may be subsequently applied to dryer hair encountered thereby. For example, a surface of an opposing manipulator module may comprise product retention features. In such a configuration, the opposing manipulator module is a passive applicator module and speeds the product application process by retaining and applying excess product. FIG. **6**A depicts an illustrative passive applicator module **608** which can be used in conjunction with apparatus **500** and be inserted in opposing arm **505** in place of an opposing manipulator module **508** (see FIG. **5**B). In such a configuration, passive applicator module **608** is opposing active application head module **507**. FIG. **6**B depicts an exploded view of passive applicator module **608** comprising a manipulator **643**, a base **644** comprising a surface **645** and applicator seals **634** comprising compressible edges **635**. Surface **645** comprises a retention perimeter **606** formed by a raised perimeter of passive applicator module surface **645**. Passive applicator module surface **645** further comprises a plurality of retention ridges **604** forming retention troughs **605**. Retention troughs **605** comprise a plurality of retention wells **600**. As passive applicator module **608** comprising retention features **606**, **604**, **605** and **600** is moved through hair to manipulate hair with manipulator **643**, retention perimeter **606** may wipe excess product from hair received from application head module **507** and serves to retain excess product on the surface of passive applicator module **608**. Furthermore, retention ridges **604** may wipe excess product from hair received from application head module **507** and capture the excess product within retention troughs **605**. Additionally, hair and gravitational forces may move excess product captured within retention troughs **605** to retention wells **600** which may further wipe and capture excess product received from application head module **507**. When dryer hair is subsequently encountered by surface **645** and product retention troughs **605** and retention wells **600**, product retained thereon and therein, respectively, may be transferred and applied to the dryer hair. As such, as hair which is captured in the clamp passes through and between passive applicator module **608** and the active applicator of the application head module **507**, it receives product from both sides of the clamp, thereby speeding the product application process.

[0116] Similar to the aforementioned alternate configuration of opposing manipulator base **544** (FIG., passive applicator base **644** of passive applicator module **608** may be alternatively configured to receive an applicator **531** having a manipulator **542** in lieu of manipulator **643** (FIG. **5**E and FIG. **6**B). While there is no general function to holes **533** and seal **536** of an applicator **531** when so used, a reduction in unique parts to be manufactured, inventoried and distributed may be

achieved by the manufacturer and product distributors, and the user of an apparatus may have fewer unique parts to purchase and manage while still achieving a higher degree of configurability.
[0117] In an alternate embodiment, multiple applicators can be configured wherein the opposing manipulator module **508** or passive applicator module **608** is instead a second active application head module. In such an embodiment, the rate of application may be further increased as both sides of a section of hair captured within the clamp can receive an active flow of product. Furthermore, two different types of product can be applied concurrently. For example, an individual may apply a favorite hair nourishing product and a favorite hair moisturizing product concurrently.
[0118] FIG. **7**A depicts a perspective view of an illustrative embodiment of an apparatus **700** comprising opposing arms pivotally attached on one end (pivot end) thereby forming a clamp on the other end (clamp end) similar to apparatus **500** of FIG. **5**A, and also similarly comprises an application arm **701**, an opposing arm **702**, a pivot cap **703** and an opposing manipulator module **708** (partially hidden). Dissimilar to apparatus **500**, apparatus **700**, comprises an application and on-demand heating module **707**, and a spring driven piston, not visible in FIG. **7**A, and further comprises a piston retraction lever **704** and a piston release bar **705**, wherein the spring driven piston can be used to create a flow of product from a prepackaged or user fillable product cartridge, also not visible in FIG. **7**A. Apparatus **700** also comprises a switch **709** and an LED indicator **710**. FIG. **7**B provides another perspective view of apparatus **700** showing opposing manipulator module **708** removed from opposing arm **702**. Opposing manipulator **708** is shown in both a manipulation orientation **708***a* and a storage orientation **708***b*. FIG. **7**B additionally shows application and on-demand heating module **707** in a raised or open orientation allowing removal (and insertion) of a product cartridge shell assembly **706** from (into) application arm **701**.
[0119] FIG. **7**C provides a perspective view of apparatus **700** when application arm **701** and opposing arm **702** are in a closed position. Opposing manipulator **708** can have a similar construction to opposing manipulator **508** of FIG. **5**H or passive applicator module **608** of FIG. **6**B, wherein opposing manipulator **708** may be in a storage orientation and allow storage for a manipulator comprised by application and on-demand heating module **707**, in between and adjacent to applicator seals **534** (FIG. **5**H and FIG. **5**J) or **634** (FIG. **6**B) when arms **701** and **702** of apparatus **700** are in the closed position of FIG. **7**C. FIG. **7**D depicts apparatus **700** in an exploded view with pivot cap **703** removed and arms **701** and **702** detached. Apparatus **700** further comprises a pivot bar **711** and a pivot spring **712**. Pivot bar **711** slides through pivot spring **712** and is seated between pivot sockets **713** of application arm **701** and pivot sockets **714** (only one of two is visible in FIG. **7**D) of opposing arm **702**. Pivot spring **712** provides an opening force which radially separates application and on-demand heating module **707** and opposing manipulator **708** of the clamp end of arms **701** and **702**, about pivot bar **711** of the pivot end such that the user only has to apply or not apply a closing force to arms **701** and **702** to close and open the clamp end, respectively. The term clamp as it is used in this disclosure and in relation to the aforementioned configuration of moveably joined opposing arms **701** and **702** refers to a general structure and does not imply a clamping force is required or intended. In operation, when hair is captured in the clamp, it is generally loosely constrained such that the manipulators may be passed through the hair, and thus a clamping force and action, which can imply the hair is physically retrained rather that loosely constrained, is not present and is not desirable. Additionally, the manipulators present on the opposing faces of the clamp, as can be seen in FIG. **7**A, prevent a full closure when the apparatus is in a configuration having opposing manipulator **708** in a manipulation orientation **708***a* (FIG. **7**B) and requires opposing manipulator be inserted into opposing arm **702** in a storage orientation **708***b* for the clamp end to be fully closed as in FIG. **7**C, as discussed in conjunction with opposing manipulator **508** of FIG. **5**J and FIG. **5**H, and FIG. **5**I and FIG. **5**C of apparatus **500**.
[0120] FIG. **7**E illustrates apparatus **700** in a perspective view wherein application and on-demand heating module **707** and product cartridge shell assembly **706** are removed, and shows a piston **715** in an extended position. Application and on-demand heating module **707** comprises mounting

sockets **748** which may receive mounting tabs **749** of application arm **701**, and further comprises locking recesses **737** (only one of two is visible in FIG. **7**E) which may lock on clip latches **739** (partially visible in FIG. **7**E) of application arm **701**, wherein mounting sockets **748**, mounting tabs **749**, locking recesses **737** and clip latches **739** collectively enable a secure, pivotal and removable attachment of application and on-demand heating module **707** to application arm **701**.

[0121] FIG. **7**F depicts application and on-demand heating module **707** in an exploded view comprising an applicator **731**, a seal **738** and a product heating and distribution plate **740**. Applicator **731** comprises an exposed applicator surface **732** comprising applicator holes **733**, a manipulator **734**, an applicator locking edge **735** and an application and on-demand heating module locking clip **736** comprising locking recesses **737** (only one of two is visible in FIG. **7**F). Seal **738** may be adhered to either the bottom of applicator **731** or the top, as viewed in FIG. **7**F, of heating and distribution plate **740**, but preferably not both, such that application and on-demand heating module **707** may be more easily disassembled and cleaned when desired.

[0122] Heating and distribution plate **740** comprises a u-shaped product distribution channel **741** comprising a product inlet **742**, which receives product from product cartridge and shell assembly **706** through a compression seal of a cartridge access and seal feature (not visible), which is situated on the underside of plate **740** and provides access and a seal to cartridge and shell assembly **706** when collectively installed in application arm **701** (FIG. **7**E), and a plurality of outlets **743** (only one of fourteen is referenced in FIG. **7**F), each of which leads to a well **744** (only one of fourteen is referenced in FIG. **7**F), each of which is situated beneath applicator holes **733** when application and on-demand heating module **707** is assembled. Outlets **743** of channel **741** become progressively larger based on an increased outlet position as registered from inlet **742** in order to present a uniform rate of product flow into each well **744**, despite decreasing product fluid pressure as product flows through and out of channel **741**. A heating element **745**, partially visible in FIG. **7**F and referenced in two locations by reference number **745**, runs along the bottom of u-shaped channel **741** and is accordingly u-shaped, wherein each the two open ends of the u-shaped heating element terminate in a heating element terminal, comprised by a heating and distribution plate electrical interface **746**. Heating and distribution plate **740** further comprises an applicator locking bar **747** which may receive applicator locking edge **735**, application and on-demand heating module mounting sockets **748** which may receive mounting tabs **749** of application arm **701** as described in conjunction with FIG. **7**E, and a thermistor **750** electrically connected to thermistor terminals comprised by heating and distribution plate electrical interface **746**.

[0123] FIG. **7**G depicts a product cartridge **720** which can be inserted into a product cartridge shell **724** of FIG. **7**H and thereby form a product cartridge shell assembly **706** as depicted in FIG. **7**E. Product cartridge **720** comprises a collapsible product reservoir **721**, which can also be referred to as a collapsible product vessel, and a rigid dispensing end **722***a* comprising a product outlet **723**. Product outlet **723** can be configured to have a seal that can be punctured by cartridge access and seal feature of application and on-demand heating module **707** to allow product contained in collapsible reservoir **721** to be dispensed and applied. Such a configuration with a puncturable seal may be suitable for a disposable prepackaged product cartridge where the seal will no longer be required once product has been accessed. In an alternative embodiment, product cartridge **720** can be configured to have a product outlet **723** comprising a reusable flexible and elastic seal which can be moved by cartridge access and seal feature of application and on-demand heating module **707** to unseal and allow product to be dispensed from or disposed into reservoir **721**, and which will elastically reseal once a cartridge access and seal feature is removed therefrom. This alternative embodiment may be suitable for a reusable user fillable product cartridge **720**, which may be filled using a syringe device with a cartridge access and seal feature, not shown, which may gain temporary access to to product cartridge outlet **723** via the reusable flexible and elastic seal and dispose product therein. Reservoir insertion end **725** of cartridge shell **724** of FIG. **7**H comprises a mating shape to accept product cartridge **720** comprising rigid dispensing end **722***a* of FIG. **7**G, or

alternatively as depicted in FIG. **7**I, a product cartridge shell assembly **706** comprising an alternative rigid dispensing end **722***b*. Rigid dispensing end **722***b* comprises a readable target temperature level feature **726**, having one or more readable indicators **727**. FIG. **7**I illustrates a rigid dispensing end **722***b* comprising two such indicators **727**, which can represent a binary value of 0 or 1 depending on a physical characteristic, such as a recess or no recess, respectively. A binary reading of **00**, indicating two recesses, could indicate that no cartridge is present and no heating should be applied, and values 01, 10, and 11 could indicate target application temperatures of low, medium and high, respectively, each having a predetermined temperature level which may be a temperature which is both a safe temperature for hair health and a temperature that is effective for enhanced absorption of product by hair. Readable indicators **727** of readable target temperature level feature **726** may be read by miniature tactile switches, not shown, comprised on the bottom of heating and distribution plate **740** of application and on-demand heating module **707** of FIG. **7**F, and electrically connected to electrical interface **746** comprised thereon. Miniature tactile switches may be actuated in the absence of a recessed indicator **727** or not actuated in a presence of a recessed indicator, and as such, no actuation of any switch may be used to indicate the absence of a cartridge. FIG. **7**J depicts an alternative view of product cartridge shell assembly **706** which shows the exposed end of collapsible product reservoir **721** within shell **724** on which spring loaded piston **715** of FIG. **7**E can exert pressure when cartridge shell assembly **706** is inserted into application arm **701**.

[0124] FIG. **7**K is an exploded view of opposing arm **702** which comprises an outer assembly **702***a* and an inner component **702***b*. Outer assembly **702***a* comprises a housing **761** comprising pivot sockets **714** (only one of two is visible in FIG. **7**K) and a battery compartment **762**. Battery compartment **762** may receive rechargeable batteries **764** and a battery compartment door **763**, and comprises battery terminal openings **765** (one of four is visible in FIG. **7**K) through which battery terminals **766** of a circuit board assembly **767** may pass and connect to batteries **764**. Circuit board assembly **767** additionally comprises a battery charging connector **768**, a charging LED indicator **769**, an application and on-demand heating module connector **770***a*, a switch **709**, an LED indicator **710** and a remaining product level sensor connector **772***a*. Inner component **702***b* comprises a housing **773** comprising a receptacle **773***a* for opposing manipulator **708** of FIG. **7**B, and can receive opposing manipulator **708** in a storage orientation **708***b* and a manipulation orientation **708***a*.

[0125] FIG. **7**L is an exploded view of application arm **701** comprising an inner assembly **701***b* and an outer assembly **701***a*. Inner assembly **701***b* comprises housing **775** having a piston and cartridge chamber **776**, wherein a piston **715** comprising a front portion **717** and a rear portion **777** can be moveably located and pass through a piston and cartridge chamber wall opening **785**. Rear piston portion **777** is open such that a telescoping piston rod **778**, having an inner rod **778***a* which may pass freely within an outer rod **778***b* of telescoping piston rod **778**, and thereby make alterable the overall length of piston rod **778**, may pass into piston **715** through rear portion **777**, and be secured or otherwise retained by a piston rod mount, not visible, within and at the front portion **717** of piston **715**. Piston rod **778** comprises a fixed end **779** mounted to a housing mount **781** and secured thereto by a fastener **782**. Prior to such mounting to mount **781** and securing to piston **715**, piston rod **778** is assembled within spring **780** which comprises a larger inner diameter than outer diameter of outer piston rod **778***b* such that spring **780** may move freely along piston rod **778**. Piston **715** comprises a piston control arm **716** which is attached to piston **715** at the bottom of piston rear **777** and is otherwise situated having a gap space between itself and piston **715**, such that piston **715** may enter into a product cartridge shell assembly **706** of FIG. **7**J and piston control arm **716** may maintain a fixed relative position to piston **715** yet remain external to product cartridge shell assembly **706**. A piston retraction arm **783** is attached to piston control arm **716** and extends therefrom at a point relative to the front portion **717** of piston **715** and through a slot, not visible, on the bottom of piston and cartridge chamber **776**. Piston retractor arm **783** can be

retracted such that the body of piston **715** moves through piston and cartridge chamber wall opening **785** and towards mount **781**, thereby compressing spring **780** and storing elastic potential energy therein. This elastic potential energy can be selectively released and used to selectively dispense and apply hair product, as will be described later herein.

[0126] Piston **715** comprises a remaining product level conductor layer **784**, partially visible in FIG. **7**L. A wiper contact block **772***d* is attached to the rear wall of piston and cartridge chamber **776** such that as piston **715** moves through piston and cartridge chamber wall opening **785** and further into piston and cartridge chamber **776**, conducting layer **784** is moved selectively out of electrical contact with wiper contacts **774** of wiper contact block **772***d*. Such selective electrical contact is thereby in relation to a location of piston **715** within piston and cartridge chamber **776**, as will be later described in further detail in conjunction with FIG. **70**. Wiper contact block **772***d* is electrically interconnected with connector **772***b* by wiring cable **772***c*. Connector **772***b* may be connected to remaining product level sensor connector **772***a* of circuit board assembly **767** of FIG. **7**K.

[0127] Inner assembly **701***b* of application arm **701** further comprises an application and on-demand heating module wiring cable **770***c* and connector **770***b* which may be connected to application and on-demand heating module connector **770***a* of circuit board assembly **767** of FIG. **7**K. Wiring cable **770***c* is additionally connected to a spring loaded connector block, not visible, by a connector, not visible, which collectively provide electrical connection to heating and distribution plate electrical interface **746** of heating and distribution plate **740** (FIG. **7**E) of application and on-demand heating module **707** of FIG. **7**F, as will later be disclosed in more detail in conjunction with FIG. **7**P.

[0128] Outer assembly **701***a* of application arm **701** comprises a brake assembly **792** and housing **791** comprising pivot sockets **713**, piston retractor lever **704**, which is attached to piston retraction arm **783**, and piston release bar **705**. Brake assembly **792** is operatively connected to piston release bar **705** and is releasably engaged to piston control arm **716**, and allows a user to use piston release bar **705** to selectively release elastic potential energy comprised by spring **780** to control flow of product from product cartridges which may be inserted into piston and cartridge chamber **776** and engaged with piston **715**, and selectively dispense and apply hair product. Brake assembly **792** comprises brake pad **795** comprising a ratcheted upper surface which allows a retraction movement directed out of piston and cartridge chamber **776** of a corresponding mating surface of piston control arm **716**, and restricts a forward product dispensing motion directed into piston and cartridge chamber **776**. Brake pad **795** is attached to a brake pivot arm **793**. Brake pivot arm **793** is pivotally attached to a brake assembly pivot mount, not visible, of housing **791** at a pivot attachment hole **794**, and further attached to piston release bar **705** at a release bar attachment hole **797**. Brake pivot arm comprises brake engagement spring **796** which when installed is partially compressed between brake pivot arm **793** and housing **791** and maintains pressure and engagement between ratchet surfaces of brake pad **795** and piston control arm **716**. Sufficient pressure applied to piston release bar **705**, causes brake pivot arm to pivot about pivot attachment hole **794** and further compresses spring **796**, thereby releasing engaged ratcheted surfaces of brake pad **795** and control arm **716**, allowing piston **715** to move under force created by expending elastic potential energy of spring **780** and as permitted by depleting product volume within product reservoir **721**.

[0129] FIG. **7**M depicts a piston **715** comprising a front portion **717** comprising an inwardly sloped front perimeter, a recessed collapsible reservoir collection area **718** and a central protrusion **719**. Also referring to FIG. **7**J, piston **715** is configured to cause excess collapsible reservoir wall material from a depleting collapsible product reservoir **721** to collapse and collect in recessed collapsible reservoir collection area **718** wherein it will not interfere with the forward movement of piston **715** and the corresponding dispensing and application of product. As piston **715** enters cartridge shell **724**, protrusion **719** and perimeter of front portion **717** apply pressure to collapsible reservoir **721**. This pressure creates fluid pressure within the product reservoir **721** which creates

product flow out of product reservoir **721**, through outlet **723** and into application and on-demand heating module **707** of FIG. **7**E, thereby depleting product volume contained therein, and additionally creates outward fluid product pressure which forces collapsible reservoir material made excess by the depletion of product volume therein, into recessed collapsible reservoir collection area **718**. Perimeter of front portion **717** can be inwardly sloped to mechanically assist the movement of excess reservoir wall material into recess area **718**. As the reservoir wall material collapses and collects in recess area **718**, any pressure thereon is transferred to the inner surfaces of recessed area **718** of piston **715** and therefore does not contribute to any friction or contact between collapsed reservoir material and the walls of cartridge shell **724**, and thus allows piston **715** to otherwise move freely, and elastic spring energy applied to reservoir **721** is generally directed toward generating flow of product and collapsing reservoir **721**, and not expended as frictional energy loss between reservoir **721** and cartridge shell **724**. A resulting fully collapsed reservoir is depicted in FIG. **7**N. The depth of recess area **718** can be such that collapsed reservoir material of a fully depleted product cartridge fills the recess and therefore minimal residual product remains after the product cartridge **720** is otherwise depleted.

[0130] FIG. **70** is a perspective view of a partial inner application arm assembly **701***c* comprising an alternative configuration to assembly **701***b* of FIG. **7**L, wherein a piston and cartridge chamber **776** comprises an integrated product cartridge shell **799**, such that cartridge **720** of FIG. **7**G may be inserted directly into application arm **701** without the requirement to first assemble a product cartridge shell assembly **706** of FIG. **7**H. This configuration may be preferable when product cartridge **720** can be stored and handled without risk of potential puncturing or rupturing. Alternatively, if such a risk is present, product cartridge can be preferably assembled in shell **724** which can offer protection against potential puncturing or rupturing, and stored, handled and loaded as a product cartridge and shell assembly **706** into an inner assembly of the embodiment of **701***b* shown in FIG. **7**L, as previously described.

[0131] FIG. **70** illustrates components which are additionally comprised by inner application arm assembly **701***b*, as they may appear when piston **715** is retracted, as indicated by the location of piston rear **777** in close proximity to mount **781** and the location of retraction lever **783** in close proximity to piston and cartridge chamber wall opening **785**. As briefly discussed in conjunction with FIG. **7**L, piston **715** comprises a remaining product level conductor layer **784**. A wiper contact block **772***d* is attached to the rear wall of piston and cartridge chamber **776** such that as piston **715** moves through piston and cartridge chamber wall opening **785** and further into piston and cartridge chamber **776**, conducting layer **784** is moved selectively out of electrical contact with wiper contacts **774** of wiper contact block **772***d*. Such selective electrical contact is thereby in relation to a location of piston **715** within piston and cartridge chamber **776** and thereby can indicate a remaining product level. As illustrated in FIG. **70**, electrical connection between wiper contacts **774***c* and **774***a* is provided by conducting layer **784** until layer edge **784***a* passes beyond electrical connection with wiper contact **774***a* and further towards piston and cartridge chamber wall opening **785**. Similarly, electrical contact between wiper contacts **774***c* and **774***b* is present until layer edge **784***b* is encountered. Layer edges **784***a*, **784***b* and **784***c* and wiper contacts **774***a*, **774***b*, and **774***c* can be positioned such that loss of electrical connection between contacts **774***c* and **774***a*, but not **774***c* and **774***b* can indicate a low amount of product is remaining in a product cartridge present in piston and cartridge chamber **776**, and a loss of electrical connection between contacts **774***c* and **774***b* can indicate an empty product cartridge is present in piston and cartridge chamber **776**. Wiper contact block **772***d* is electrically interconnected with connector **772***b* by wiring cable **772***c*. Connector **772***b* may be connected to product level sensor connector **772***a* of circuit board assembly **767** of FIG. **7**K. Cable **772***c* may be secured to a location outside of piston and cartridge chamber **776** by tape **768***a*.

[0132] FIG. **7**P depicts inner application arm assembly **701***d* from a bottom view without a piston installed, thus providing a view of application and on-demand heating module wiring cable **770***c*

and connector **770***b* which may be connected to application and on-demand heating module connector **770***a* of circuit board assembly **767** of FIG. **7**K. As disclosed briefly in conjunction with FIG. **7**L, wiring cable **770***c* is additionally connected to a spring loaded connector block **770***e* by a connector **770***d*, which collectively provide electrical connection to heating and distribution plate electrical interface **746** of heating and distribution plate **740** of application and on-demand heating module **707** (FIG. **7**E). The bottom view of inner application arm assembly of FIG. **7**P additionally shows retraction arm slot **787** though which retraction arm **783** (FIG. **7**L) may pass and along which retraction arm **783** may travel both during a retraction of piston **715** and an application of product. FIG. **7**P additionally shows tape **786***b*, **786***c* and **786***c* which secures and maintains a location for cables **770***c* and **772***c*.

[0133] Referring to FIG. **7**E, FIG. **7**F, FIG. **7**K, FIG. **7**L and FIG. **70** in operation, a user retracts piston **715** by moving piston retraction lever **704** towards the pivot cap **703** end of the application arm **701**, if not already positioned there. The user then releases locking recesses **737** of clip **736** of application and on-demand heating module **707** from clip latches **739** and pivots the clip **736** and module **707** upward, pivoting on mounting tabs **749**. The user then inserts into piston and cartridge chamber **776**, a product cartridge shell assembly **706**, or simply a product cartridge **720** in the case of the configuration of FIG. **70**, wherein piston and cartridge chamber **776** comprises an integrated shell **799**. The user then secures clip **736** back to a latched position which causes cartridge access and seal feature of application and on-demand heating module **707** to gain access to product through product outlet **723** and seal of product cartridge **720**, and seal thereto, and permit product flow into inlet **742** of product distribution and heating plate **740**. The user then positions switch **709** to an "on" position, thereby causing power from batteries **764** to be supplied to circuitry residing on circuit board assembly **767**. If no cartridge is detected from a "00" reading from micro switches attempting to read a non-present cartridge or target application temperature feature **726**, or a cartridge is present but determined to be empty by measuring the electrical connectivity status of wiper contacts of wiper contact block **772***d*, LED indicator **710** may indicate a warning that no available product is present by, for example, emitting a flashing red color of light. Should a cartridge be present and wiper contacts of wiper contact block **772** indicate product is available therein, LED indicator **710** may indicate a favorable apparatus status, such as by first emitting one, two or three flashes of green light to indicate a target temperature of low, medium or high, respectively, as read from readable target temperature indicator **726** or as indicated by a position of switch **709**, followed by a non-flashing color of green. A user may previously have moved or may now move opposing manipulator **708** to a manipulation orientation **708***a*.

[0134] To apply product, a user may press piston release bar **705** thereby disengaging brake pad **795** ratchet surface from piston control arm **716** ratchet surface, allowing piston **715** to move towards piston and cartridge chamber **776** and transfer force from spring **780** to collapsible reservoir **721** generating pressure therein and causing product to flow out of reservoir **721** and into inlet **742** and distribution channel **741** of product distribution and heating plate **740**. As product distribution and heating plate **740** and thermistor **750** comprised therein encounter unheated product, a resistance level indicating a temperature below a target level as indicated by a position of switch **709** or a readable target temperature indicated by indicator **726** is registered by circuitry of circuit board assembly **767** which then supplies power from batteries **764** to heating element **745** until such time that the target temperature is achieved. Power is applied to heating element **745** in proportion to the negative delta between the measured temperature indicated by thermistor **750** and the target temperature, wherein negative delta means the amount by which the measured temperature is lower than the target temperature. Any time a zero or positive delta is encountered, no power is applied. As such, when product is not flowing and product within the application and on-demand warming module **707** simply needs to be maintained near or at the target temperature, power will be minimally applied in response to a gradual cooling and an observed small negative delta between measured and target temperatures. Alternatively, when product begins to flow and

the negative delta increases, power will be applied in an increasing amount proportional to the amount of the negative delta, thereby controlling the temperature to a minimized delta and thus regulating the temperature to the target temperature.

[0135] Retraction lever **704** will traverse a slot (not visible) in application arm **701** as product in product cartridge **720** is being depleted and piston **715** and piston control arm **716**, to which it is attached via retraction arm **783**, advance position within piston and cartridge chamber **776**. The slot can be appropriately marked to provide a user with a convenient indication of remaining product. Apparatus **700** may additionally comprise a remaining product level sensor which can provide one or more additional indications such as indicating remaining product is at a low amount or product is fully depleted. Such indications could be made by flashing LED indicator **710** with a green color to indicate a low amount remains or flashing red to indicate product is fully depleted.

[0136] FIG. **8**A is a perspective view of an illustrative embodiment of an apparatus **800**, comprising opposing arms similar to apparatus **500** and apparatus **700**, namely an application arm **801** and an opposing arm **802**. Apparatus **800** further comprises an opposing manipulator **808**, which may be inserted in opposing arm **802** in a manipulating orientation **808***a* or a storage orientation **808***b*, and an application and on-demand heating module **807** similar to apparatus **700**. Dissimilar to apparatus **700**, apparatus **800** comprises a pump follower mechanism, comprising a pump head **822** and a product cartridge **820**, for generating product flow. Pump head **822** and product cartridge **820** can be of a conventional pump follower design, wherein the action of pressing cartridge **820** against a spring action and into pump head **822**, displaces product therein and causes it to flow out of an outlet **823** of pump head **820**. When the spring action returns cartridge **820** from its encroached position within pump head **822**, a check valve prevents any backflow, product is pulled into pump head **822** from cartridge **820** to replace the volume occupied by the previously encroaching cartridge **820**, and a one-way inwardly traveling floor within product cartridge **822** travels inward in an equivalent volumetric response to the volume of product pulled from cartridge **820** and into pump head **822**. In order to apply the action required to pump product, a pump actuation lever is configured on each side of application arm **801**. A right pump actuation arm **805***a* is visible in FIG. **8**A.

[0137] Aside from the pump follower mechanism, apparatus **800** is largely similar to apparatus **700** and most of the details common to both embodiments will not be repeated. However it will be noted that further similar to apparatus **700**, and as shown if FIG. **8**A, apparatus **800** further comprises a pivot cap **803**, a switch **809**, an LED indicator **810**, application and on-demand heating module **807** mounting sockets **848** which receive mounting tabs **849** of application arm **801**, and application and on-demand heating module **807** locking recesses **837** (only one of two is visible in FIG. **8**A) which lock on clip latches **839** (partially visible in FIG. **8**A) of application arm **801**, wherein mounting sockets **848**, mounting tabs **849**, locking recesses **837** and clip latches **839** collectively enable a secure, pivotal and removable attachment of application and on-demand heating module **807** to application arm **801**.

[0138] FIG. **8**B depicts product cartridge **820**, which can also be referred to as a product vessel, comprising a neck **826** and a cartridge product outlet **827**, wherein, neck **828** in inserted into pump head **822** and product flows from cartridge **820** to pump head **822** as described in the aforementioned disclosure through outlet **827**. FIG. **8**C depicts a bottom and exploded perspective view of application arm **801** comprising an outer assembly **801***a* and an inner assembly **801***b*. Outer assembly **801***a* comprises a housing **861** comprising a product cartridge access **863** which may receive a product cartridge **820** and an access door **864**. Housing **861** further comprises a pump actuation lever slot on each side, of which slot **866** is visible in FIG. **8**A, and clip latches **839**. Inner assembly **801***b* comprises housing **862** comprising an inner pump actuator slot on each side, of which 865 is visible, and further comprises pump actuation levers **805***a* (not visible) and **805***b*, pump head **822** and product cartridge **820**. In use, product is pumped by depressing either lever **805***a* or **805***b*, depending on which is most convenient and which hand is grasping apparatus

800.

[0139] FIG. **9**A is a perspective view depicting an implementation of a hair care apparatus **90** of the present invention, wherein hair care apparatus **90** comprises a lower arm **900** having an arm face **902** and an upper arm **910** having an arm face **912**, wherein arm **900** and arm **910** are moveably joined together by a pivot attachment **922** (not visible in FIG. **9**A) which may moveably secure a lower hinge plate **923** of lower arm **900** to an upper hinge plate **924** (not visible in FIG. **9**A) of upper arm **910**. Lower arm **900** may comprise an applicator **932** disposed on arm face **902** and may comprise one or more orifices (which may also be referred to as through-holes), such as orifice **934**, through which liquid hair product may flow and be dispensed for application to a user's hair. Lower arm **900** may further comprise a manipulator **942** having a plurality of manipulator members (e.g., bristles, teeth and the like), such as manipulator member **944**, which may be used to manipulate (e.g., brush, comb, style and the like) a user's hair, wherein a user may apply hair product dispensed through orifices of applicator **932** to their hair and concurrently manipulate their hair with manipulator **942**. Lower arm **900**, upper arm **910**, arm face **902**, arm face **912** and pivot attachment **922** are configured to create a clamp-like action, wherein arm face **902** and arm face **912** may be drawn towards each other and separated away from each other and a full closing of the clamp-like action between arm face **902** and arm face **912** is prevented at least by manipulator **942**. By preventing a full closing (i.e., a meeting of arm face **902** and arm face **912**) a pressing of curls which may be present in hair receiving application of hair product and being manipulated (e.g., styled) using apparatus **90** may be limited or prevented, wherein curls may be preserved or enhanced when applying hair product and concurrently manipulating hair using apparatus **90**. Lower arm **900** may further comprise user controls, such as button **952** and button **954**, wherein in some implementations, button **952** may be usable to turn on and turn off a heating function configured to heat hair product prior to dispensing and application, and button **954** may be usable to retract and engage a dispenser arm mechanism (which may also be referred to as a piston arm mechanism) for a loading and unloading of a pod within lower arm **900**, namely for installing and removing a hair product pod which may be a vessel comprising liquid hair product and may be housed within lower arm **900** and accessible by removing a pod door **972** of lower arm **900**. Lower arm **900** may further comprise visual indicators such as light emitting diodes (LEDs), wherein, in some implementations, an LED **962** may visually indicate a state of a heating function for heating hair product comprised by an installed product pod, and in some implementations, an LED **964** may visually indicate a state of a product pod loading and unloading function. Lower arm **900** may further comprise a cable **980** which may supply electrical power for operation of electrical components of apparatus **90**. In some implementations, apparatus **90** may comprise batteries such that cable **980** may not be required for operation, wherein cable **980** may be removably attachable and used for supplying power to recharge the batteries or operate apparatus **90** when such batteries are insufficiently charged.

[0140] Upper arm **902** may comprise a manipulator **992** having a plurality of manipulator members (e.g., bristles, teeth and the like) such as manipulator member **994** which may be used to manipulate (e.g., brush, comb, style and the like) a user's hair, wherein a user may apply hair product dispensed through applicator **932** to their hair and concurrently manipulate or style their hair using manipulator **992**, and a full closing of the clamp-like action between arm face **902** and arm face **912** is prevented at least by manipulator **992**. In some implementations, only one manipulator may be configured, wherein only manipulator **942** may be present or only manipulator **992** may be present and a full closing of the clamp-like action between arm face **902** and arm face **912** is prevented at least by the manipulator that is present. FIG. **9**B is a bottom perspective view depicting the hair care apparatus **90** of FIG. **9**A, wherein a dispensing user control **156** is visible on the bottom of lower arm **900**. Also visible in FIG. **9**B is product pod window **974** disposed on pod door **972** of lower arm **900**. Product pod window may allow a user to view a product pod status while enclosed behind product pod door **972**, such as a presence of a product pod or a remaining

capacity of a present product pod.
[0141] FIG. **10** is a partially exploded perspective view of hair care apparatus **90**, depicting hardware components thereof and together with the following discussion, FIG. **10** conveys the interoperation, assembly and features of various components. In the partially exploded view of FIG. **10**, upper arm **910** is separated from lower arm **900** and lower arm **900** is shown in an exploded view in which a lower arm top housing **1004** and lower arm bottom housing **1006** are separated and various components housed therein are shown. In some implementations, upper arm **910** may be removably attachable such that pivot attachment **922** which may be comprised by upper hinge plate **924** may be secured in a pivot attachment pocket **1025** of lower hinge plate **923** to removably attach upper arm **910** to lower arm **900**. In implementations having a removably attachable upper arm **910**, apparatus **90** may be called a convertible hair care device wherein upper arm **910** may be attached for use in a two-arm configuration, and upper arm **910** may be detached and removed thereby converting apparatus **90** for use in a single-arm brush-like configuration. Lower arm **900** may comprise a spring **1026** and spring cap **1027** wherein upward travel of spring cap **1027** is limited by a lower flange thereof being captured by hinge plate **923**. When upper arm **910** is attached to lower arm **900**, namely when pivot attachment **922** is inserted into pivot attachment pocket **1025**, spring cap **1027** is configured to exert a force that is received by upper arm **910** at well **1028** thereby spreading the arms about pivot attachment **922** unless a sufficient counter force is present, such as a user grasping apparatus **90** about the arms and applying a sufficient grip force to overcome the force applied by spring **1026**.
[0142] An applicator bristle plate **1030**, which may also be referred to as an “applicator and manipulator plate” or “applicator manipulator plate”, may be configured to comprise applicator **932** (referenced in FIG. **10** by a side that is interior to apparatus **90** when installed and comprises channels **1033**, such as channel **1034** which is in fluid communication with orifice **934**) and manipulator **942**. Applicator bristle plate **1030** may be further configured to be removably attached to a top side of lower arm **900** with, for example, a tongue and grove attachment structure to lower arm top housing **1004**, wherein applicator bristle plate **1030** may be removed by sliding it off apparatus **90** thereby facilitating a thorough cleaning of applicator **930** and manipulator **942**. In some implementations, a provision and use of differently configured applicator bristle plates may be enabled my removably attachable applicator bristle plates such as applicator bristle plate **1030**, wherein the manipulator members may differ from those of other applicator bristle plates (e.g., finer, thicker, more sparsley spaced, more densely spaced, shorter, longer, more flexible, less flexible, etc. manipulator members) and/or applicator orifices may differ from those of other applicator bristle plates (e.g., more orifices, fewer orifices, larger diameter orifices, smaller diameter orifices, etc.) such that, in some implementations, a user may select a preferred manipulator configuration and/or a preferred applicator orifice configuration. A heating plate **1052** may be attached to lower arm bottom housing **1006** and capture therebetween one or more heating elements, such as heating elements **1054**, and a thermistor **1056**, such that heating plate **1052** may be heated on a heated side by heating element(s) **1054**, conduct heat therefrom to a product flow side and in turn heat hair product which may flow through channels **1033** to orifices (e.g., channel **1034** to orifice **934**) of applicator bristle plate **1030**. Heating elements **1054** and thermistor **1056** may be electrically connected to circuit board assembly **1008** which may apply power to heating elements **1054** to heat heating plate **1052** and hair product which may be present in channels **1033** in response to a temperature indicated by thermistor **1056**.
[0143] A product pod **1000** which may comprise a provision of hair product may be received within a pod chamber **1080** of lower arm bottom housing **1006** and be secured therein with pod door **972**. A pod dispensing spout **1035** may pass through a spout access opening **1007** of lower arm bottom housing **1006** and be seated against a spout gasket **1036** disposed in heating plate orifice **1053**, wherein heating plate orifice **1053** may be situated under channels **1033** and spout gasket **1036** may be captured between heating plate **1052** and lower arm bottom housing **1006**. A

dispenser arm **1073** may be actuated by circuit board assembly **1008** applying power to a motor **1075** which in response rotates a threaded motor shaft **1076**. A rotating threaded motor shaft **1076** may act on a threaded insert **1074** comprised by dispenser arm **1073** and cause dispenser arm **1073** to move forward (away from motor **1075**) and apply a force to product pod **1000**. Force applied to product pod may cause product to dispense therefrom through spout **1035** and flow through gasket **1036**, through heating plate orifice **1053**, through channels **1033** and through applicator orifices (e.g., orifice **934**) for application to a user's hair. Motor **1075** may be secured to a motor mount **1077**, and dispenser arm **1073** may be guided and moveably secured by a lower dispenser arm guide **1078** and an upper dispenser arm guide **1079**. Dispenser arm **1073** passes through a dispenser arm opening **1082** of a wall of pod chamber **1080** as illustrated in FIG. **10** by a dotted line representation **1073***a* of dispenser arm **1073** which indicates a general location of dispenser arm **1073** when apparatus **90** is assembled and dispenser arm **1073** is partially extended into pod chamber **1080**. Dispenser arm **1073** may comprise a dispenser arm tip **1071**, wherein a rounded distal end of dispenser arm tip **1071** may facilitate an engagement of dispenser arm tip **1071** with a plunger assembly comprised by product pod **1000** as will be disclosed later herein. Circuit board assembly **1008** may comprise limit switches such as lever actuated limit switches configured to indicate the presence of an installed product pod **1000** (e.g., a pod present switch **1010**), a reset (i.e., fully retracted) dispenser arm **1073** (e.g., a dispenser arm reset switch **1012**) and a fully extended dispenser arm, wherein the latter may also indicate an expended or depleted product pod (e.g., a pod empty switch **1014**). In some implementations, product pod **1000** may comprise a pod present switch actuation tab **1150** (see FIG. **11**A) which, when product pod **1000** is inserted into pod chamber **1080** and pod door **972** is installed, actuation tab **1150** may actuate switch **1010** and provide a readable signal to indicate the presence of product pod **1000** in product pod chamber **1080**. In some implementations, dispenser arm **1073** may comprise a dispenser arm switch actuation tab **1072** which, when dispenser arm **1073** is fully retracted, may actuate dispenser arm reset switch **1012**, and when dispenser arm **1073** is fully extended, may actuate pod empty switch **1014**.

[0144] FIG. **11**A is a perspective view of an implementation of product pod **1000** depicted in an exploded view. Product pod **1000** may comprise a barrel **1105** having an oval cross section which may prevent it from rolling when set down on a generally horizontal or slightly inclined surface. Product pod **1000** of FIG. **11**A further comprises a plunger base **1110** which may be fitted into a plunger gasket **1120** prior to insertion into barrel **1105**. FIG. **11**B depicts a rear perspective view of an assembled plunger **1100** comprising plunger base **1110** and plunger gasket **1120**, wherein plunger base **1110** comprises a dispenser arm interface **1115** configured to receive dispenser arm tip **1071** (see FIG. **10**), and plunger gasket **1120** comprises a one or more sealing ribs, such as sealing rib **1125** which forms a moveable seal about the inner circumference of barrel **1105**. Barrel **1105** may comprise an inner rib **1106** disposed at least partially about its inner circumference (shown as a dashed line in FIG. **11**A on the exterior of barrel **1105**) at its plunger end **1107**, wherein plunger **1100** may be inserted into a dispensing end **1108** of barrel **1105**, be pushed the length of barrel **1105** and be seated against inner rib **1106** during assembly of product pod **1000**. Product pod **1000** may further comprise a pod cap **1130** comprising pod dispensing spout **1035**, wherein pod cap **1130** may comprise one or more O-rings **1140** (shown disassembled from O-ring recesses **1145** of pod cap **1130** in FIG. **11**A) which form a seal about the inner circumference of barrel **1105**. Pod dispensing spout **1035** may be fitted with a user removable seal (e.g., an adhesively attached foil seal comprising a pull tab, a removeable—e.g., snap on/off-cap, or the like—not shown in FIG. **11**A). In some implementations, product pod **1000** may be assembled by inserting plunger **1100** into dispensing end **1107** and pressing it through barrel **1105** to plunger end **1107** and seating it against internal rib **1106**, then filling barrel **1105** with liquid hair product, capping barrel **1105** with pod cap **1130** (comprising O-rings **1140**) and sealing pod dispensing spout **1035** with a user removable seal, thereby sealing liquid hair product within product pod **1000**.

[0145] FIG. **12** is a block diagram of an example implementation of an electrical system **1200** of hair care apparatus **90**, wherein in some implementations, a plurality of electrical components of electrical system **1200** may be comprised by circuit board assembly **1008** and one or more electrical components of electrical system **1200** may be remote and electrically connected to circuit board assembly **1008**, e.g., temperature sensor **1056**. Electrical system **1200** may comprise a microcontroller unit (MCU) **1210**, user interface components **1220**, sensors and system control components **1230**, a motor driver **1240** and power components **1250**. In some implementations, MCU **1210** may comprise a processor, onboard program memory comprising program instruction code, such as writable nonvolatile memory (e.g., flash memory) and random access memory (RAM), wherein the former may comprise instructions that when executed by the processor cause the processor to perform functions associated with the operation and use of apparatus **90**, and the latter may comprise data values associated with the current state of operation of apparatus **90**. Electrical system **1200** may comprise user interface components **1220**, such as switches **1222** which may include a dispense switch mechanically connected to dispense button **956**, a heat/no heat switch mechanically connected to button **952** and a load/unload switch mechanically connected to button **954**, and LEDs **1224** which may include LED **962** which may visually indicate a state of a hair product heating function and LED **964** which may visually indicate a state of a product pod loading and unloading function. Electrical system **1200** may comprise sensor and system control components **1230**, such as switches **1232** which may include pod present switch **1010**, dispenser arm reset switch **1012** and pod empty switch **1014**, and sensors **1234** which may include thermistor **1056** and a thermal fuse sensor. Electrical system **1200** may comprise a motor driver integrated circuit (IC) **1240** which drives motor **1075**. Electrical system **1200** may comprise power components **1250**, such as power conditioning and voltage regulation **1252** which may include one or more capacitors, one or more transient voltage suppressors and one or more voltage regulators, and one or more heating element drivers, such as one or more field-effect transistors (FET) and one or more heating element(s) **1054**.

[0146] FIG. **13** is a block diagram of an example implementation of program modules **1300** comprising a main program module **1310**, a motor program module **1320** and a heating program module **1330**, which may be an on-demand heating program which may act on product as it flows through channels defined by the applicator bristle plate and the heating plate. Program modules **1310**, **1320** and **1330** comprise program instructions which may reside in non-volatile memory within MCU **1210**. In some implementations, main program module **1310** may be a state machine which governs overall system functionality of apparatus **90** and comprises program instructions which may be organized by one or more functions, wherein program instructions of a given function may be executed by a processor of MCU **1210** (in other words, a function may be executed by MCU **1210**) causing MCU **1210** to perform operations of the given function. In the example implementation of FIG. **13**, main program module **1310** and MCU **1210** may configured to perform a plurality of functions comprising:

[0147] a systems check function, which may be executed by MCU **1210** and may initialize state machine variables, read inputs (e.g., buttons, switches, sensors, etc.) and update state machine variables accordingly and, in some implementations, update LEDs accordingly;

[0148] a wait for user function, which may be executed by MCU **1210** and may read state variables and read inputs (e.g., pod present switch **1010**) and, in some implementations, update LEDs to indicate a status directing user preparation of apparatus **90** for use (e.g., to load a pod);

[0149] a main prime function, which may be executed by MCU **1210** when an unexpended pod is determined to potentially be present (e.g., pod present switch **1010** is actuated and pod empty switch **1014** is not actuated) and the user presses load/unload button **954**, wherein, in some implementations, the main prime function requests motor program module **1320** to prime the dispenser system and the priming function monitors for a pod empty condition;

[0150] a product ready function, which may be executed by MCU **1210** following a priming

function and may display a product ready status on the LEDs and wait for the user to actuate load/unload button **954** or dispense button **956**;

[0151] a main dispense product function, which may be executed by MCU **1210** and may read a dispense switch that is mechanically connected to dispense button **956**, and upon a short button press, (e.g., less than one second or some other suitable short predetermined duration) may request motor program module **1320** execute a brief dispense function (of a brief predetermined duration, and upon a long button press, (e.g., greater than one second or some other suitable duration) may request motor program module **1320** execute an automated dispense function, wherein in some implementations, load/unload button **952** and heat/no heat button **954** may be ignored (i.e., effectively disabled) while dispense button **956** is actuated, and when dispense button **956** is released, program control may return to a product ready function;

[0152] a main pod empty function, which may be executed by MCU **1210** when an expended pod condition is determined to be present, i.e., pod empty switch **1014** is actuated by dispenser arm switch actuation tab **1072**; wherein, in some implementations, the main pod empty function confirms the motor has stopped, confirms the heating element is off, may display a pod empty status on the LEDs and may cause program execution by MCU **1210** to move to the unload function; and an unload function, which may be executed by MCU **1210** following the main pod empty function, wherein, in some implementations, the unload function may display an unload empty pod status on the LEDs, request that motor program module **1320** move dispenser arm **1073** to the reset position (i.e., to where dispenser arm reset switch **1012** is actuated by dispenser arm switch actuation tab **1072**) and may cause program execution by MCU **1210** to move to the wait for user function.

[0153] In some implementations, motor program module **1320** may be a state machine which governs operations of motor **1075** of apparatus **90** and thereby controls the position of dispenser arm **1073** in relation to dispenser arm reset switch **1012**, pod empty switch **1014** and pod plunger **1100** of an installed product pod **1000**, and comprises program instructions which may be organized by one or more functions, wherein program instructions of a given function may be executed by a processor of MCU **1210** (in other words, a function may be executed by MCU **1210**) causing MCU **1210** to perform operations of the given function. In the example implementation of FIG. **13**, motor program module **1320** and MCU **1210** may configured to perform a plurality of functions comprising:

[0154] a motor wait function, which may be executed by MCU **1210** and cause motor program module **1320** to wait for receipt of a motor request from main program module **1310**;

[0155] a reset function, which may be executed by MCU **1210** upon a request from main program module **1310** (e.g., as may be requested by the unload function of main program module **1310**), wherein, in some implementations, the reset function may execute the following steps to reset the motor **1075** and dispenser arm **1073**: set the motor to a backwards direction, set the motor speed to a suitable speed such as a maximum speed, turn on motor **1075**, wait for reset switch **1012** to be actuated by dispenser arm switch actuation tab **1072**, turn off motor **1075** and return to the motor wait function;

[0156] a motor prime function, which may be executed by MCU **1210** upon a prime request from main program module **1310** (e.g., as may be requested by the main prime function of main program module **1310**), wherein, in some implementations, the prime function of motor program module **1320** may execute the following steps to prime apparatus for dispensing product: set the motor to a forwards direction, set the motor speed to a suitable speed such as a maximum speed, turn on motor **1075**, monitor a motor current value, turn off motor **1075** upon detecting that the motor current value has reached a contact current limit value and return to the motor wait function;

[0157] a motor dispense product function, which may be executed by MCU **1210** upon a dispense request from main program module **1310** (e.g., as may be requested by the main dispense product function of main program module **1310**), wherein, in some implementation, a dispense request may

specify a brief dispense product operation or an automated dispense function, and the motor dispense function may execute the following steps to dispense product: set the motor to a forwards direction, set the motor speed to a suitable first speed such as a maximum speed, turn on the motor, wait a suitable first duration such as 900 milliseconds, set the motor speed to a suitable second speed, such as 75% of maximum, wait for a suitable second duration of 900 milliseconds, turn off the motor, if the dispense request was an automated dispense request, repeat the previous six steps (i.e., set the motor speed to a suitable first speed such as a maximum speed, turn on the motor, wait a suitable first duration such as 900 milliseconds, set the motor speed to a suitable second speed, such as 75% of maximum, wait for a suitable second duration of 900 milliseconds, turn off the motor) until the dispense button is released, and return to the motor wait function, wherein, the motor dispense product function monitors pod empty switch **1014** and if pod empty switch is actuated, the motor dispense product function calls a motor pod empty function; and a motor pod empty function, which may be executed by MCU **1210** upon a motor pod empty request from main program module **1310** (e.g., as may be requested by the main pod empty function of main program module **1310**), wherein, in some implementation, the motor pod empty function may execute the following steps: set the motor to a backwards direction, set the motor speed to a suitable speed such as 50% of maximum speed, turn on the motor, wait a suitable first duration such as 900 milliseconds, set the motor speed to a suitable second speed, such as 75% of maximum, wait for a suitable second duration of 900 milliseconds, turn off the motor and return to the motor wait function.

[0158] In some implementations, heating program module **1330** may be a state machine which governs the operation of heating elements(s) **1054** of apparatus **90** and thereby the on-demand heating of product which may be present in or flowing though channels **1033**, and comprises program instructions which may be organized by one or more functions, wherein program instructions of a given function may be executed by a processor of MCU **1210** (in other words, a function may be executed by MCU **1210**) causing MCU **1210** to perform operations of the given function. In the example implementation of FIG. **13**, heating program module **1330** and MCU **1210** may configured to perform a plurality of functions comprising:

[0159] an initialize function, which may be executed by MCU **1210** may read thermistor **1056** and initialize and/or update a state machine variable accordingly and, in some implementations, update LEDs accordingly, wherein if a temperature indicated by thermistor **1056** exceeds a predetermined maximum cooled temperature, such as 95 degrees F. or some other suitable predetermined maximum cooled temperature, the initialize function transfers program control to a cooling function given below, and if a temperature indicated by thermistor is at or below the predetermined maximum cooled temperature, the initialize function transfers program control to a cooled function given below; [0160] a heat function, which may be executed by MCU **1210** may be entered upon a user pressing heat/no heat button **952** when a state machine variable, heating system, is set to off, whereupon the heat function sets the heating system variable to on, enables power delivery to heating element(s) **1054** and may indicate the heating system is on with LED **962** such as, in some implementations, by slow pulsing LED **962** with an orange color. The heat function may then continually monitor thermistor **1056** to see if the temperature is at or above a target heat temperature, such as 125° F., whereupon the heating program heated function is called; [0161] a heated function, which may be executed by MCU **1210** is called by the heat function, and the heated function may indicate that the product temperature is at a desired temperature for application via LED **962**, such as, in some implementations, moving to a solid orange color from a slow pulsing of LED **962** as may be displayed by the heat function prior to its calling the heated function. The heated function may then engage a proportional-integral-derivative (PID) controller function **1332** to maintain a desired target temperature, such as 125° F.; [0162] a cool function, which may be executed by MCU **1210** may be entered upon a user pressing heat/no heat button **952** when a state machine variable, heating system, is set to on, whereupon the cool function sets the

heating system variable to off, disables power delivery to heating element(s) **1054** and disables PID controller **1332**, and may indicate the heating system is off and cooling with LED **962** such as by, in some implementations, slow pulsing LED **962** with a blue color. The cool function may then continually monitor thermistor **1056** to see if a temperature indicated by thermistor **1056** is at or below a predetermined maximum cooled temperature, such as 95 degrees F. or some other suitable predetermined maximum cooled temperature, whereupon the heating program cooled function is called; and [0163] a cooled function, which may be executed by MCU **1210** is called by the cool function. The cooled function may indicate that the product temperature is at a cooled temperature and a temperature indicated by thermistor **1056** is at or below a predetermined maximum cooled temperature, such as 95 degrees F. or some other suitable predetermined maximum cooled temperature, by moving to a solid blue color from a slow pulsing of LED **962** as may be displayed by the cool function prior to its calling the cooled function.

[0164] FIG. **14**A, FIG. **14**B and FIG. **14**C illustrate the example lower arm **900** in various levels of disassembly and may be useful in describing the dispensing operation of hair product including the action of motor **1075** on dispenser arm **1073** and, in turn, dispenser arm **1073** on product pod **1000**. FIG. **14**A depicts a perspective exploded view **900***a* of some of the components of lower arm **900**, comprising lower arm bottom housing **1006** having dispenser arm opening **1082** and spout access opening **1007**, dispense button **956**, lower dispenser arm guide **1078** comprising a dispense button seat **1410** and a dispense switch actuator **1412**, motor **1075** comprising threaded motor shaft **1076**, motor mount **1077** usable to secure motor **1075**, dispenser arm **1073** having threaded insert **1074** (shown removed from dispenser arm **1073**) dispenser arm tip **1071** and dispenser arm switch actuation tab **1072**, and upper dispenser arm guide **1079**. In operation, when apparatus **90** is in a product ready state as discussed in conjunction with FIG. **13**, and a user depresses dispense button **956**, features of lower dispenser arm guide **1079**, namely dispense button seat **1410** and dispense switch actuator **1412** which are at opposite ends of a moveable arm of lower dispenser arm guide **1079** collectively move in response to the depression of dispense button **956** to actuate a dispense switch of circuit board assembly **1008** (not shown in FIG. **14**A). MCU **1210** detects dispense switch actuation **1222** (see FIG. **12**) of user interface components **1220** and, according to main program module **1310** initiates main dispense product function which in turn directs motor program **1320** to run dispense product function, thereby causing MCU **1210** to control motor driver **1240** to in turn actuate motor **1075**. Motor **1075** turns threaded motor shaft **1076** counterclockwise which in turn acts on threaded insert **1074** of dispenser arm **1073** thereby causing dispenser arm **1073** to move outward and away from motor **1075**.

[0165] FIG. **14**B depicts a perspective view **900***b* of lower arm **900** having pod door **972** and pod **1000** removed. Note that dispenser arm **1073** is not shown in FIG. **14**B to show the interaction between pod present switch actuation tab **1150** and pod present switch **1010**, namely, when product pod **1000** is installed in lower arm **900**, pod present switch actuation tab **1150** locates and presses against pod present switch **1010** thereby actuating pod present switch **1010**. Product pod door **972** and lower arm housing comprise a tongue and groove slide attachment mechanism, wherein product pod door **972** comprises product pod door tongues **1422** and lower arm housing comprises product pod door grooves **1424**, such that product pod door **972** may be slid onto lower arm **900**. Product pod door **972** further comprises product pod ramps **1420** which act on the bottom of product pod **1000** and in the final travel of assembling product pod door **972** to lower arm **900**, product pod ramps **1420** force product pod **1000** upward and press pod dispensing spout **1035** further through spout access opening **1007** and into spout gasket **1036** (not shown in FIG. **14**B, see FIG. **10**) which is disposed in heating plate orifice **1053** of heating plate **1052** (not shown in FIG. **14**B, see FIG. **10**), thereby facilitating a seal between pod dispensing spout and heating plate orifice **1053**.

[0166] FIG. **14**C depicts a perspective view **900***c* of lower arm **900** having product pod **1000** installed with pod door **972** removed. Note that dispenser arm **1073** and pod plunger **1100** are

shown in dotted lines within FIG. **14**C to show the interaction therebetween and reflect a position of approximately more than half of the product being dispensed from product pod **1000**. In some implementations, the walls of product pod **1000** may be transparent, and plunger **1100** may be of a bright color to enhance its visibility through product pod door window **974** such that a user may easily see a remaining capacity of product pod **1000** when in use.

[0167] FIG. **15** is a perspective view of some of the components of lower arm **900** in a partially exploded view and may be useful in discussing the heating of product dispensed from product pod **1000** through heating plate **1052** and applicator bristle plate **1030**. Also shown in FIG. **15** are heat on/heat off switch **1512** which is mechanically connected to heat on/heat off button **952** and load/unload switch **1514** which is mechanically connected to load/unload button **954**. Further shown are pod present switch **1010**, pod empty switch **1014** and dispensing arm reset switch **1012**. When motor program **1320** executes the dispense product function, plunger **1100** is moved forward into product pod **1000** by dispensing arm **1073** forcing product through pod dispensing spout **1035**, through spout gasket **1036**, through heating plate orifice **1053** into bristle plate channels **1033** and out orifices of bristle plate **1030**, such as orifice **934** of channel **1034**, wherein heating elements **1054** may heat heating plate **1052** which may in turn heat product within channels **1033** and the temperature of the product may be regulated by MCU **1210** acting on temperature sensed by thermistor **1056** under program control of heating program **1330** and acting on power components **1250** and heating element driver(s) **1254** accordingly.

[0168] FIG. **16** depicts a perspective view of apparatus **90***a*, wherein no upper arm **910** is attached to lower arm **900**. In some implementations, lower arm **900** may be used without an upper arm in a brush like configuration. As such, apparatus **90** of FIG. **9**A and FIG. **9**B may be called a convertible apparatus, and FIG. **16** depicts apparatus **90***a* in a converted form and usable as a brush capable of dispensing and applying hair product concurrently with styling hair. User controls such as heat/no heat button **952**, load/unload button **954**, heat LED **962**, load LED **964** and dispense button **952** (not visible in FIG. **16**) are available for user operation as discussed herein when apparatus **90** is configured as a convertible apparatus **90***a*. Manipulator **942** comprising manipulator members such as manipulator member **944** is usable to brush and style hair and applicator **932** comprising orifices such as orifice **932** is usable to apply product to hair concurrently with styling hair. To convert brush apparatus **10***a* back to two arm apparatus **90**, an upper arm **910** may be attached to pivot attachment **922** of lower hinge plate **923**. It should be noted that in some implementations, various upper arms **910** having different manipulator styles or simply an opposing face **912** with no manipulator may be configured.

[0169] In the foregoing detailed disclosure, a plurality of illustrative embodiments (which may also be referred to as implementations) have been described. Each embodiment generally comprises an applicator, a manipulator and a can receive a provision of product and is configured to enable a user to concurrently apply product and style or otherwise manipulate their hair. Some embodiments comprise product delivery systems which use pressure to generate product flow, some embodiments comprise product delivery systems which use gravitational forces to deliver product flow, and one illustrative embodiment uses both pressure and gravitational forces to generate product flow. Illustrative embodiments of pressure based product delivery systems are disclosed herein which comprise mechanical pumps, both air and airless, electrical pumps (including electically screw driven pistons) and spring driven pistons. Some illustrative embodiments disclosed herein comprise an internal heating system and some illustrative embodiments support a heating of product in a microwave oven or in a heated liquid bath, or other forms of external heating of product. Illustrative embodiments disclosed may receive a provision or volume of product in a variety of ways comprising in a housing, in a reservoir and in a cartridge, the latter of which may be a user filled cartridge, or may be a prepackaged cartridge, and all can be generally referred to as comprising or receiving a volume of product in a product vessel. Disclosure of additional material which may be further explanatory and illustrative and relate to one or more of

the foregoing detailed disclosed embodiments is now provided.
[0170] Holes or openings (also called orifices), and patterns thereof, in an applicator surface can be varied to vary the rate of flow of product therethrough. In embodiments where product flows primarily due to gravitational forces, such as described in apparatus **100**, **101** and **200**, which comprise gravity driven systems, applicators will generally require larger applicator openings than in embodiments where product flows primarily due to applied pressure, such as pressure applied from a pump or a piston, as described in apparatus **300**, **500**, **700**, **800** and **90**, which comprise pressure driven systems. The viscosity of product varies considerably from light oils to heavy oils to creams and softened butters. Heating product produces additional variations in product viscosities. Fluid flow in a gravity system is primarily dependent on product viscosity and a compromise in a suitable opening size and pattern must be found to accommodate a range of product viscosities and resulting range of flow rates. Furthermore, gravity systems may be less effective for use with high viscosity products than with low viscosity products, and not suitable for use with softened butters and thick creams. In a pressure system, fluid flow is primarily dependent not on the viscosity of the product, but rather the specific gravity of the product, which is relatively consistent across types of product. In a pressure system, an opening geometry can be chosen which minimizes leaking of the product by way of a mechanism of surface tension across the opening, yet provides optimal flow under pressure for a wide range of product viscosities.
[0171] Apparatus **300** provides a pump mechanism where a user can expedite delivery of product, but since it requires product to be in contact with the applicator openings for such expediting, and it is dependent on gravitational forces to deliver product to applicator openings where air pressure can then assist in the flow of product through the applicator openings, it is more effectively used with lower viscosity oils which can move to the applicator openings more freely under gravitational forces. When high viscosity products such as creams and softened butters are used, the pressure systems of apparatus **500**, **700** and **800** are more effective than systems that rely, at least partially, on gravitational forces, as the systems of apparatus **500**, **700** and **800** provide positive delivery of product under pressure to and through applicator openings regardless of orientation of the apparatus and gravitational forces.
[0172] Electric pump systems can be envisioned that work directly on the product, namely, the product moves through the electric pump, as opposed to the system of apparatus **500** where the electric pump moves air to a reservoir to provide pressure to generate product flow. In systems where an electric pump acts directly on the product, an inline flow sensor can be configured to provide for a measurement of and regulation of flow of product. Such systems could include a user controllable variable flow rate control. In such systems where an electric pump acts directly on the product, the electric pump will reside between the product vessel and the applicator, and an application and on-demand heating module is preferably used to heat product, such as that used in embodiments **700**, **800** and **90**. In contrast, a less desirable alternative of heated product being pumped from a reservoir allows for the product to cool as it is pumped through the system, and anytime the system is paused between user applications of product, the product is allowed to cool further.
[0173] In gravity systems such as those of apparatus **100**, **101** and **200** the flow rate may be controlled by varying the aperture of the applicator openings. For example, a shutter comprising an appropriate pattern of openings could be positioned behind and against the applicator pattern of openings and be operatively coupled to an actuator button that operates against a spring to slide the shutter and release the shutter to slide back, thereby varying apertures of the applicator openings through a range from completely closed to completely opened to control the product flow rate from a rate of zero flow to a rate of maximum flow, respectively.
[0174] A varied selection of manipulator structures can be provided, such as teeth, bristles and/or other structures to manipulate hair for detangling, curl enhancing, combing, brushing, shaping, styling and other forms of manipulation during a hair care process. An apparatus may be marketed

with a plurality of manipulator options including user exchangeable, user configurable manipulators (e.g., a variety of applicator manipulator plates). In this manner and depending on the particular characteristics of the hair and preferences of an individual using the apparatus, a given manipulator or plurality of manipulators can be selected for optimizing the hair care process. In embodiments such as those of apparatus **500**, **700**, **800** and **90** comprising an opposing manipulator, a combination of two different manipulator types can be used when deemed advantageous by an individual using the apparatus. Additionally, applicators and user selectable options thereof, can comprise manipulators which can comprise openings for product flow. For example, teeth manipulators can be hollow providing a piping action from the applicator surface to surfaces of the teeth, such as the sides or tips of the teeth or both. An apparatus comprising an applicator and opposing manipulator such as **500**, **700**, **800** and **90** may be configured to use applicator manipulators and opposing manipulators which are interchangeable. When so configured, a reduction in unique parts to be manufactured, inventoried and distributed may be achieved by the manufacturer and product distributors, and the user of an apparatus may have fewer unique parts to purchase and manage while still achieving a higher degree of configurability.

[0175] At least one manipulator on an apparatus should serve to detangle and comb or brush hair in order to efficiently distribute and apply product as well as style and manipulate hair. As such a plurality of teeth, bristles, fins or other such protruding structures capable of passing through strands of hair are needed on at least one manipulator on the apparatus. In combination with this manipulator comprising a plurality of structures, a manipulator useful for sectioning hair, wherein sectioning hair generally means parting hair and defining a section of hair for current attention of the hair care process, may be useful. In this case, an additional manipulator comprising a single or lesser number of protruding structures may be useful to section hair.

[0176] A user of an apparatus comprising an applicator and opposing manipulator such as **500**, **700**, **800** and **90** may find their particular hair characteristics are best managed by using a broadly spaced, large tooth manipulator geometry comprised by an applicator, and a tightly spaced, finer bristle on an opposing manipulator module. The user may find that the large tooth applicator manipulator can be favored when detangling and applying an initial application of product, and a tighter closure of the clamp and a combined emphasis of both manipulators is expeditious to distribution of product and finer manipulation of a section of hair once detangled and an initial application of product is disposed thereon. Furthermore, such a tooth geometry of an applicator manipulator may provide less resistance to an intimate contact between some hair types and the applicator surface, whereas a finer bristle geometry on an opposing manipulator will be effective is directing hair to the surface of the applicator when the clamp is drawn closer together.

[0177] Alternative embodiments for apparatus similar to apparatus **700** and apparatus **800** can be considered, wherein lower cost alternative embodiments are manufactured and marketed which comprise fewer electrical components or do not comprise any electrical components. For example, application and on-demand heating modules can be alternatively configured as non-heating applicators and product cartridges can be manufactured to support alternative heating in a microwave oven or liquid bath, and optionally comprise a thermochromatic device or material to indicate a temperature that is both safe for hair health and enhanced absorption by hair is present. As an additional alternative example, an external cartridge heater which can receive a plurality of cartridges and run off wall power can be provided. Furthermore, in an alternative embodiment for apparatus similar to apparatus **700**, regardless of the heating method being a heater comprised by the apparatus or an external heating source, lower cost prepackaged product can be achieved by configuring the cartridge shell to additionally comprise the rigid dispensing end, such that the prepackaged product is simply a collapsible product reservoir, which can also be called a collapsible product vessel or be referred to as the product cartridge, and is filled with a volume of product. In this configuration, the cartridge shell comprising the rigid dispensing end can be reused to lower the total cost of use of the apparatus and consumables including prepackaged product

cartidges, and when an external heating source is used, the reusable cartridge shell comprising the rigid dispensing end can further optionally comprise a thermochromatic device or material to indicate a temperature that is both safe for hair health and enhanced absorption by hair is present.
[0178] The United States Consumer Product Safety Commission notes that a thermostat setting of 120° F. (49° C.) may be necessary for residential water heaters to reduce or eliminate the risk of most tap water scald injuries. As such, a temperature level of 120 degrees Fahrenheit (49° C.) can be used as a target temperature level for a “high” setting or upper temperature level of a range of temperature, as it is a safe temperature for hair health and is additionally safe for incidental short term skin contact with product heated to that temperature, while providing for indirect heating of hair and enhanced product absorption thereby.
[0179] A practical size for the capacity of a product vessel is between 2 ounces to 3.4 ounces (100 milliliters), where the latter is the limit imposed by the Transportation Security Administration for individual items of liquids, creams and gels for acceptance through security checkpoints.
[0180] The various illustrative embodiments disclosed herein should not be construed as an exhaustive list. Rather the various embodiments presented serve to illustrate only some of the various ways to practice the invention and many additional combinations of features and configurations are possible within the scope of the invention disclosed herein.

Claims

1. A hair care apparatus product distribution system comprising: a threaded shaft; a selectively and bidirectionally actuatable motor coupled to the threaded shaft; a dispensing arm comprising threads engaged with the threaded shaft, wherein the motor may be selectively actuated to move the dispensing arm in a dispensing direction and selectively actuated to move the dispensing arm in a reverse direction from the dispensing direction; a product pod or cartridge comprising a reservoir having product therein, the product pod engageable by the dispensing arm, wherein: when the dispensing arm is engaged with a product pod and the motor is actuated to move the dispensing arm in a dispensing direction, the capacity of the reservoir is reduced and a flow of product is forced from the product pod; and when engaged with a product pod and the motor is actuated to move the dispensing arm in a reverse direction from the dispensing direction, the dispensing arm is disengaged from the product pod.
2. A hair care apparatus product pod interface configured to removably receive a product pod, provide a liquid tight seal between the product pod and the hair care apparatus for liquid hair product flowing from the product pod to the hair care apparatus when the product pod is received, and facilitate heating of a flow of hair product after its dispensing from the product pod and prior to a dispensing from the hair care apparatus, the product pod interface comprising: a pod spout; a heating plate comprising a hair product flow side and a heated side upon which one or more heating elements are disposed; a heating plate orifice passing through the heated side to the hair product flow side; a spout gasket comprising a gasket opening though a central portion thereof and disposed on the heated side of the heating plate orifice, wherein: the pod spout of a received product pod is seated against the spout gasket providing a liquid seal between the pod spout and the heating plate orifice wherein: hair product dispensed from the product pod flows through the pod spout and through the gasket to the product flow side of the heating plate and is heated prior to a dispensing from the hair care apparatus.
3. A hair care apparatus product heating and distribution system comprising on-demand heating of dispensing product, the product heating and distribution system further comprising: a heating plate; a thermistor in thermal contact with the heating plate; at least one heating element in thermal contact with a heated side of the heating plate; and an applicator plate, wherein: the applicator plate comprises a channel side and a dispensing side; the channel side is situated against a product flow side of the heating plate, wherein the heating plate and the applicator plate form at least one

channel, having at least one applicator orifice, in which a flow of product may flow while in direct contact with the product flow side of the heating plate prior to a dispensing through the at least one applicator orifice to the dispensing side; the at least one channel is in fluid communication with a heating plate orifice which may receive the flow of product; the at least one channel is in fluid communication with an applicator orifice configured to dispense product from the dispensing side; and the at least one heating element is selectively energized to heat the heating plate and the flow of product that is in direct contact with the heating plate based on a temperature indicated by the thermistor being below a predetermined temperature or predetermined temperature range, thereby providing on-demand heating of dispensing product.

4. The hair care apparatus product heating and distribution system of claim 3, wherein the heating plate orifice is an opening between the heated side and the product flow side.

5. The hair care apparatus product heating and distribution system of claim 4, further comprising a spout gasket, wherein: the spout gasket is seated against at least a perimeter of the heated side heating plate orifice and comprises a central opening through which product may flow from the heated side to the product flow side; the spout gasket may receive a product pod spout and provide a liquid seal between the product pod spout and the heating plate proximate to the heating plate orifice; and product may flow through the product pod spout, through the spout gasket and through the heating plate orifice to the product flow side of the heating plate.

6. The hair care apparatus product heating and distribution system of claim 3, further comprising a microcontroller unit and program code executable by the microcontroller, wherein upon execution of the program code, the microcontroller is configured to execute a heating program.

7. The hair care apparatus product heating and distribution system of claim 6, wherein the heating program is executed in response to a pressing of a heat/no heat button.

8. The hair care apparatus product heating and distribution system of claim 6, wherein the heating program is configure to indicate a status of the heating program on an LED.

9. The hair care apparatus product heating and distribution system of claim 6, wherein the heating program comprises an on-demand heating function.

10. The hair care apparatus product heating and distribution system of claim 9, wherein the on-demand heating function comprises a proportional-integral-derivative (PID) controller.

11. The hair care apparatus product heating and distribution system of claim 3, wherein the at least one heating element is two heating elements and the thermistor is disposed on the heating plate and located between two heating elements.

12. The hair care apparatus product heating and distribution system of claim 3, wherein the at least one channel comprising at least one orifice is a plurality of channels, and the at least one orifice is a plurality of orifices comprised by the plurality of channels.

13. The hair care apparatus product heating and distribution system of claim 3, wherein the applicator plate is an applicator manipulator plate further comprising a plurality of manipulator members disposed on a projecting outwardly from the dispensing side.

14. The hair care apparatus product heating and distribution system of claim 13, wherein the applicator manipulator plate is removably mountable to a hair care apparatus comprising the hair care apparatus product heating and distribution system.

15. The hair care apparatus product heating and distribution system of claim 14, wherein the applicator manipulator plate comprises a first mating component of a tongue and groove mount and the hair care apparatus comprising the hair care apparatus product heating and distribution system comprises a second mating component of a tongue and groove mount, wherein the first mating component is mateable to the second mating component when mounting the applicator plate to the hair care apparatus.

16. The hair care apparatus product heating and distribution system of claim 14, wherein the applicator plate is an applicator manipulator plate further comprising a plurality of manipulator members disposed on a projecting outwardly from the dispensing side and the hair care apparatus

product heating and distribution system further comprises a plurality of applicator manipulator plates having a variety of different manipulator member configurations or a variety of different applicator orifice configurations or both thereof.

17. The hair care apparatus product heating and distribution system of claim 3, wherein the hair care apparatus product heating and distribution system is configured to cease heating the heating plate and the flow of product that is in direct contact with the heating plate when the temperature based on a temperature indicated by the thermistor reaches the predetermined temperature.

18. The hair care apparatus product heating and distribution system of claim 3, wherein the predetermined temperature is 125° F.

19. The hair care apparatus product heating and distribution system of claim 3, wherein the predetermined temperature is 120° F.

20. The hair care apparatus product heating and distribution system of claim 3, further comprising a thermally conducting compound applied between the thermistor and the heating plate.