July 7, 1942. S. L. REICHES 2,289,209

PERMANENT HAIR WAVING APPARATUS

Original Filed Dec. 22, 1936 2 Sheets-Sheet 1

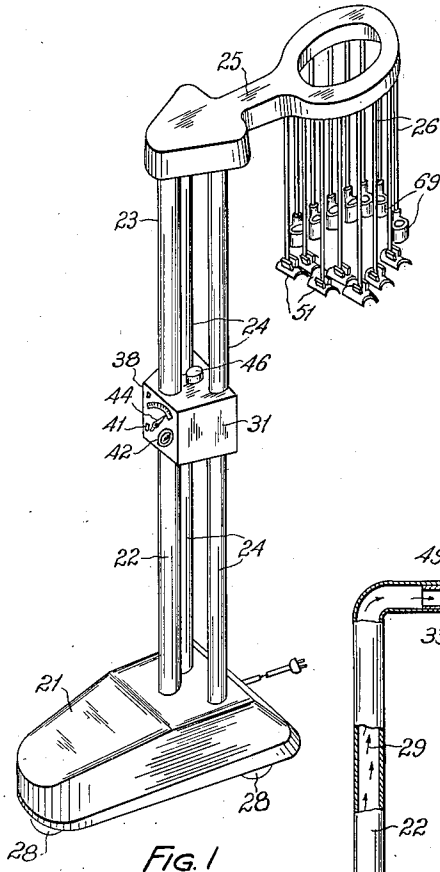



FIG. 1




FIG. 2




FIG. 3

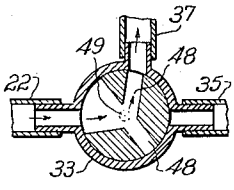



FIG. 5

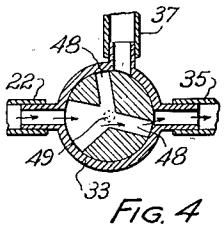



FIG. 4

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PERMANENT HAIR WAVING APPARATUS

Original Filed Dec. 22, 1936 2 Sheets-Sheet 2

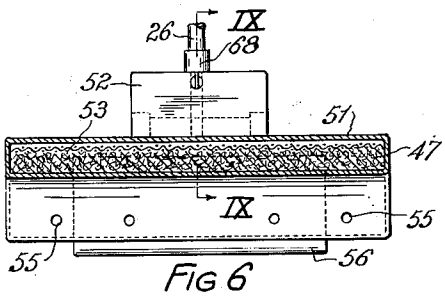



FIG 6

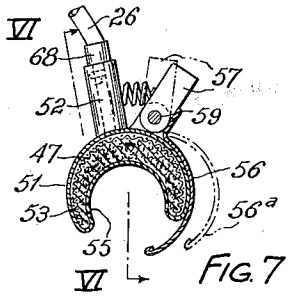



FIG. 7

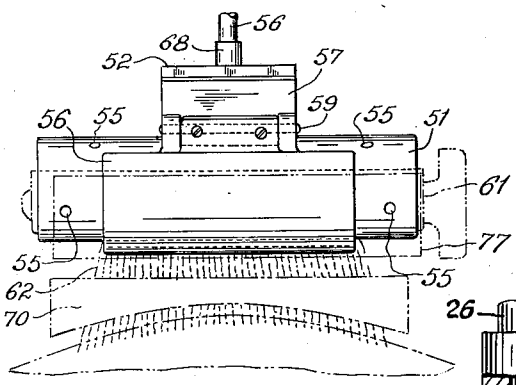



FIG. 8

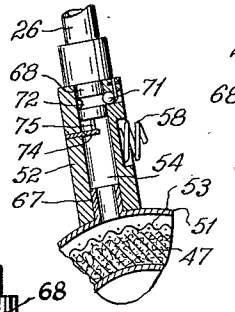



FIG. 9

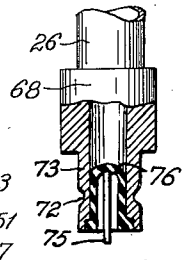



FIG. 10

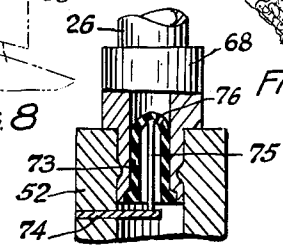



FIG. 10A.

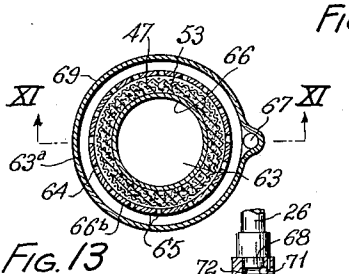



FIG. 13

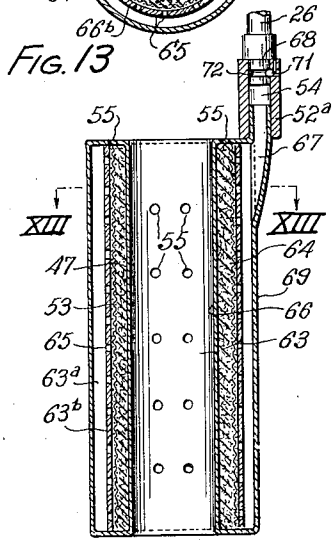



FIG 11

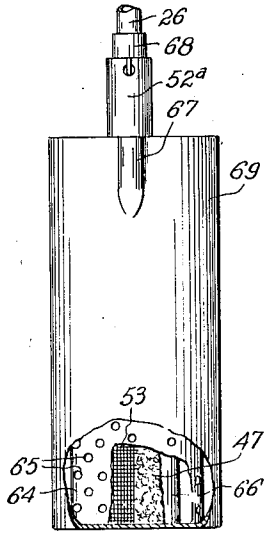



FIG. 12

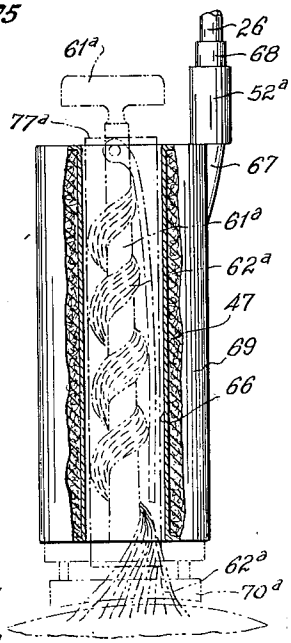



FIG. 14

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Patented July 7, 1942 2,289,209

# UNITED STATES PATENT OFFICE

2,289,209

## PERMANENT HAIR-WAVING APPARATUS

Sol Louis Reiches, Cleveland, Ohio

Substituted for abandoned application Serial No. 117,133, December 22, 1936. This application March 28, 1939, Serial No. 264,580. In Canada April 4, 1938

10 Claims. (Cl. 132—36)

This invention relates to the art of beauty culture and particularly to improvements in hair waving apparatus in which pre-formed locks of hair are subjected to heat generated by an exothermic compound so as to cause a permanent wave to be set in the hair.

This application is a substitute for the application which was filed on December 22, 1936, known as Serial No. 117,133 for a Permanent hair waving apparatus, and which application was abandoned on the 7th day of May, 1938.

In the art of curling or waving natural human hair, it has been the general practice to; first, moisten or treat the hair with a hair setting liquid, usually ammonia, or with a saline solution such as borax and water; second, to coil a lock of treated hair around a spindle of the desired shape, and; third, to apply heat thereto for definite periods of time. The heat causes the steam from the hair setting solution to enter the hair cells, which expand and cause the hair to become wavy.

Of the various methods of applying the necessary heat, electricity is the most commonly used. The external application of steam is also used to cause the hair setting solution to vaporize. A third method in common use, utilizes a pad containing chemicals, which when moistened after being wrapped around a pre-treated lock of hair, activates or re-acts sufficiently to create the necessary heat.

I have found that when air is mixed with a vaporous organic hydroxide such as alcohol vapors the gas formed is highly combustible and may be ignited or engendered by the mere presence of a metallic catalytic agent, such as platinum or palladium. It is to the application of a vaporous exothermic compound engendered by a metallic catalyst, for the purpose of creating heat in the waving process that my invention is particularly directed.

It is common knowledge in the art that excessive uncontrolled heat is apt to cause damage or injury, not only to the scalp, but also to the hair itself. Excessive heat may dry the hair to such an extent that it becomes brittle which causes the hair to take on a harsh, lifeless and bleached appearance. Insufficient heat on the other hand, slows up the operation considerably and decreases the permanency of the wave.

It has been found that different types of hair and different kinds of hair setting solutions require correspondingly different temperatures and different periods of time for treatment. Of the various methods utilizing chemical reaction for this purpose, prior to my invention, none of them were controllable during the operation. That is, the chemicals used for the exothermic reaction are packed with the lock of hair and the heat once pre-determined by the amounts of and the combination of chemicals could not be varied or controlled, neither could the hair be exposed and examined during the operation. The prior art devices allowed the chemicals to come in direct contact with the hair or scalp, often to the annoyance, if not actual damage or injury to the person.

It is, therefore, the main object of this invention to provide an improved and safer means and method for applying heat to hair curlers and wavers.

Another object is to utilize for heating purposes in a hair waving machine the phenomenon of slow spontaneous combustion of a vaporous exothermic compound, such as a volatile organic hydroxide, engendered by a metallic catalyst.

Another object is to provide a permanent wave machine with exothermic heaters that are free from moisture, obnoxious odors, and injurious chemicals, as well as, being light in weight and economical to operate.

A further object is to provide an apparatus of this sort with heaters that are speedily and easily applied and are fast in operation; that is, quick heating and quick cooling.

A still further object is to provide the wave heaters with automatic shut-off means, that will enable the operator to use less than the maximum number of heaters without waste of heat or loss of fuel.

Another object is to provide a permanent wave machine with heat controls that are exact in operation, and which are simple and easy to manipulate.

A further object is to provide a permanent wave machine with removable heaters to enable the operator to apply them individually and without the annoyance of attached cords and cables, and also to permit them to be easily cleaned and sterilized.

Other objects and features, and a practical embodiment of my invention are more fully set forth in the following description and claims, reference being made to the accompanying drawings in which like parts are designated by like reference characters, and in which:

Figure 1 is a perspective view of the permanent wave machine;

Figure 2 is a diagrammatic view of the apparatus;

Figure 3 is a front view of the control chamber;

Figure 4 is a cross-sectional view of the regulating valve showing approximate position of parts when the valve handle is set for a temperature of about 200° Fahrenheit;

Figure 5 is a view similar to that of Figure 4, and showing valve set for "cold" position;

Figure 6 is a side sectional view of a wave heater taken along the lines VI—VI of Figure 7;

Figure 7 is a cross-sectional view of a wave heater;

Figure 8 is a side view of a wave heater showing how it is attached to a lock of hair;

Figure 9 is an enlarged view of the heater attachment means, taken along the lines IX—IX of Figure 6;

Figure 10 is an enlarged sectional view of the automatic valve within the nozzle which is attachable to a heater;

Figure 10A is an enlarged sectional view of the valve of the Figure 10 opened;

Figure 11 is a side sectional view of a curl heater, taken along the lines XI—XI of Figure 13;

Figure 12 is a side view of a curl heater with parts broken away to show inner construction;

Figure 13 is a cross-sectional view of a curl heater taken along the lines XIII—XIII of Figure 11; and

Figure 14 is a side view of a curl heater showing method of applying it to a lock of pre-treated hair.

In the Figure 1, I show a base **21**, from which there rises pipes **22** and **23**, and suitable supports **24**. A manifold **25**, is attached to the supports **24**, and connected to the pipe **23**. A plurality of heaters **51** and **69**, are suspended from and connected to the manifold **25**, by flexible tubes **26**.

The base **21** contains a supply or a source of air **27**, which may be either a simple blower or a tank of oxygen. The base **21** is also mounted on rollers **28**, for convenience in moving the apparatus around. The supports **24** are rather substantial braces solid enough to hold the manifold **25** without straining the pipes **22** and **23**.

The manifold **25** consists of a hollow chamber and may be of the general shape and design shown in the Figure 1. The manifold may be easily constructed of light metal, but the base **21** should be of cast metal heavy enough to make a rather solid and substantial foundation.

Approximately midway between the base **21** and the manifold **25** is a compartment **31**. This compartment contains a fuel container **32**, a valve **33**, and connecting pipes **35**, **36**, and **37**.

The fuel container **32** is simply a small tank in which there is a wick or a loose cotton packing saturated with the liquid fuel. Methyl alcohol has been found to be a very satisfactory fuel for this purpose. A filler cap **46** is provided for the tank and it extends outside the compartment for easy filling. The tank also has an inlet for air **29**, and an outlet for the exothermic gas **39**, created therein.

The valve **33** is of a simple design and has for its essential feature the ability to control the volume of air **29**, entering either the fuel tank **32**, by way of the pipe **35**, or entering the manifold **25**, by way of the pipes **37** and **23**. The elements comprising the fuel container **32**, valve **33**, and connecting pipe may be substituted with a carburetor similar to those used on automobiles for vaporizing gasoline. The carburetor I do not show in the drawings because its general construction and operation are well known.

On the outside of the compartment **31**, there is a governor or a control panel **38**, on which there is an electric switch **41**, for starting or stopping the blower mechanism **27**; a scale **43**, calibrated for temperature degrees; a handle **44**, which operates the valve **33**, and a time switch **42**, which after a pre-determined set period automatically opens the switch **41**, or which can be made to operate the handle **44**, so that after the set time the valve **33** is turned to the "cool" position automatically.

The handle **44** is attached to the valve **33**, at the shaft **49**, and it also has a pointer **45**, which is readable on the scale **43**. This pointer **45** may be set for definite operating temperatures to suit a particular permanent wave solution, and the automatic time switch can be set to accommodate a particular type or texture of hair. For example a hair setting solution containing ammonia may have a low boiling point and a solution such as borax and water may have a comparatively high boiling point. Also coarse wiry hair may require a shorter heating time than soft fluffy hair. In any event excessive or unduly prolonged heat may remove the natural hair oils and cause the hair to become brittle. The operator can regulate the temperature and time to suit the setting solution used and the texture of the patrons' hair by merely manipulating only the valve handle **44** and the time switch handle **40**. The temperature range for setting normal and average hair may be easily controlled between 125° F. and 350° F.

The diagrammatic illustration of the Figure 2 clearly shows how the exothermic vapors are created and controlled. The source of air **29** is constant during operating; that is, its volume and pressure once set remain the same for all operations. The air **29** travels up through the pipe **22**, through the valve **33**, then through the pipe **35**, and into the fuel container **32**, there it is mixed with the alcohol vapors. The resulting gas **39** travels through pipes **36** and **23**, to the manifold **25**, where it is distributed by means of the flexible tubes **26**, to the heaters **51** and **69**.

The heaters **51** and **69**, which I will presently describe contain a catalyst **47**, and when the gas **39** enters them slow oxidation takes place. The resulting heat is controlled by the amount of air **29** allowed to mix with the alcohol vapors, and this in turn is regulated by the valve **33**. To increase the heat turn the handle **44** counter-clockwise, and to decrease the heat or to quickly cool the heaters turn the valve handle **44** clockwise, or to the right.

In the Figure 3, I show the handle **44**, at a point on the scale **43**, marked 350° Fahrenheit. This position of the handle would correspond with the positions of the ports **48**, in the valve **33**, shown in Figure 2. In this view the maximum amount of air **29** is passed through to the container **32**. Also in the Figure 3, I show alternate positions of the handle **44**. In one such alternate position the pointer **45** indicates 200° Fahrenheit on the scale **43**, and would correspond approximately to the position of the ports **48**, as shown in the Figure 4. The other alternate position of the handle **44** points to "cold" on the scale. When in such position the valve port **48** would appear as indicated in the Figure 5. In the Figure 5, it will be noticed that only the air **29** would enter the manifold **25**, and the heat-

ers 51 and 69, without mixing with the alcohol vapors. With the handle 44 in this position the heaters would quickly cool and prevent over heating of the hair. The operator also would then be able to handle the heaters safely and conveniently without the loss of time otherwise taken for normal cooling.

The Figures 6 to 14 inclusive illustrate the heaters intended for use with my permanent wave machine. The Figures 6, 7, and 8 show a type of heater used to fix a marcel wave commonly known as the Croquignole. The Figures 11, 12, 13, and 14 show a variation type of heater suitable for fixing a spiral curl.

The wave heater consists of a hollow concave metal chamber 51, to which is rigidly attached a grip 52. Adjacent to the grip 52, is a lever 57, which is pivoted to the chamber by the pins 58. The lever 57 and the grip 52 are kept apart or held in a normal position by a small spring 59. By squeezing the grip 52 and the lever 57 together the curved clamp 56 can be opened, the purpose of the clamp 56 being to hold the heater 51 in place after it is positioned over a lock of hair. In the Figure 7, I show the clamp 56, in an open position and designate this alternate position by the character 56*a*.

Inside the chamber 51, and close to its larger wall there is a wire screen 53, extending for almost the entire length of the heater. Between the wire screen and the inside or more concave wall is the catalytic agent 47. The catalytic agent 47 consists of pulverized or granulated platinum or palladium interspersed in a packing of metallic wool, asbestos fibres or other suitable material.

Through the grip 52, and entering the chamber 51, is an opening designated by the character 54, through which the exothermic gas 39, or the air 29, may enter. The wire screen 53 serves as a distributor of the gas or air to permit more even combustion or cooling. This screen 53 also prevents the catalyst 47 from falling out of the chamber 51. In addition it prevents any flame which might be caused by the combustion from leaving the chamber by way of the opening 54 or by way of the burnt gas outlets or exhausters 55.

If a fuel such as methyl alcohol is used, the fumes caused by combustion may contain formaldehyde. It has been found, however, in practice that the amount of formaldehyde so formed is so negligible that no possible harm or deleterious effects can be attributed to its use. The ammonia water or borax water saturated pads 77 or 77*a* in which the locks of hair are wrapped for moistening during the curling or waving operation, absorbs the small amount of formaldehyde thus created, and converts it into a harmless compound before it can possibly injure anyone. Aqua-ammonia particularly will convert formaldehyde into a harmless and odorless compound. Furthermore, it has been found that at relatively high temperature and with proper carburetion, the formaldehyde so formed is decomposed into hydrogen and carbon monoxide, in imperceptible harmless quantities. The basis for the above finding is contained in a treatise by Ford R. Lowdermilk and Allan R. Day, printed in the Journal of the American Chemical Society, volume 53, pages 3335 to 3339 (1930) and entitled A Study of Vapor-Phase Oxidation of Organic Compounds, Using Rare Earth Oxides as Catalysts, and I. Methyl and Ethyl Alcohols.

Persons familiar with the art have discovered that formaldehyde is such an agent that when brought into contact with human hair, in a suitable manner, at proper degrees of both concentration and temperature and for a sufficient length of time, will bring the hair into a superior condition and will render it fit to take a desired form, such as curls or waves. In addition, the application of formaldehyde to the hair renews its natural luster and considerably increases its strength.

It has also been found that formaldehyde created by this apparatus, before it is slowly decomposed, has the correct properties and characteristics for imparting to the hair the desirable quality of luster and strength. The time the formaldehyde is allowed to act upon the hair is naturally dependent on various factors; for instance, the thickness of the hair, its normal moisture content and the nature of previous treatments with other chemicals. However, after the hair has been treated, any excess or undesirable accumulations of formaldehyde may be easily rinsed out with water before it can do any possible injury or harm. Thereafter the hair may be dried in the regular way either in the open air or by applying gentle heat as the situation may require.

The curl type of heater consists of a hollow tubular chamber made up of an outer cylindrical wall 69, an inner cylindrical wall 66, and an intermediate cylindrical wall 64, the formation and construction of which form sub-chambers 63*a* and 63*b*. The middle wall 64 is perforated so as to permit the gas 39 to evenly enter the inner chamber 63*b*, after it has entered the outer chamber 63*a*, through the opening 54. The Figure 12 shows the perforations or evenly spaced holes 65 through which the gas enters the inner chamber 63*b*.

Adjacent to and inside the intermediate wall 64 there is a wire screen 53 which functions the same as the wire screen described in connection with the wave heaters. Between the screen 47 and the inner wall 66 is the packing sprinkled with the pulverized catalyst 47. At the top of the inner chamber 63*b* are exhausts 55 to permit the burnt gas to escape. The curl type heater also has a grip which is round instead of flat like the one on the wave heater. This grip is firmly attached to the chamber wall 69, and is designated by the character 52*a*.

In the curl heater the outer chamber 63*a* serves two purposes; one, to cause a more even distribution of the gas 39, and the other to keep the outer chamber wall 69 cool and comfortable at all times.

When using either type of heater, the locks of hair designated as 62 and 62*a* in the drawings, are wound around the spindles 61 and 61*a*. A flannel cloth pad saturated with hair setting solution is wrapped around or with the lock of coiled hair. It has been the usual practice in the past, when heaters not of this invention are used, to place heat insulating pads next to the scalp to prevent skin burns. Similar pads may be employed with the heaters of this invention also to prevent possible injury or annoyance to the person, if the setting solution happens to seep through the pads 77 or 77*a* and drips down to the skin. The heat insulating or skin protecting pads referred to are designated by the characters 79 and 79*a* in the Figures 8 and 14 respectively. After the pads 79, 79*a* 77 and 77*a* are

applied, the heaters are attached as illustrated in the Figures 8 and 14 of the drawings.

To further make my invention practical I provide for a means of conveniently attaching or removing the heaters from the flexible tubes **26**. I, therefore, equip the tubes **26**, with nozzles **68**, which nozzles fit into the grips **52** and **52***a*. The nozzles **68** have a circumferential groove **72**, enabling a small ball **71**, or some other form of clip to hold the nozzles **68**, within the grips **52** or **52***a*. The lower or grooved portions of the nozzles **68** are also referred to herein as clasp members.

In order to prevent a loss of gas **39**, when the nozzles **68**, and the grips **52** or **52***a* are separated, I place a small valve within the orifice of the nozzles **68**, and also insert a pin **74**, into the opening **54**. The valve **73** is simply a small resilient cap-like closure which fits tightly into the end of the nozzle **68**. The valve **73** can be easily made of soft rubber, and has a diagonal slot **76** through which the gas **39** can pass when the valve stem **75** is pressed inwardly. The top end of the stem **75** is embedded and held in the cap-like valve **73** and its lower end extends centrally through the hollow valve body and projects outwardly thereof for a short distance, the assembly being such that when the nozzle **68** is inserted in a grip and held in place therein, the fixed and rigid pin **74** will depress the valve stem **75**, thereby opening the slot **76**. The Figure 10 illustrates a closed valve **73** as it is normally. The Figure 10A shows the same valve opened inside a grip portion of the heater, this latter arrangement being particularly desirable for occasions when the operator desires to use only a few or a limited number of heaters.

An outstanding advantage of the invention herein described and claimed over the prior art devices which use quick lime and water for their exothermic agents, is that the gases used or the liquids resulting from their combination are harmless to the hair and person. In fact, they have certain therapeutic and detersive values as well as being analeptic and restorative in nature; as distinguished from the harmful effects of the quick lime saturated water and steam heretofore used. It is a well known fact that quick lime has a deleterious effect on living organisms and particularly has a tendency to make human hair dry and brittle and also causes it to lose its life-like natural color and texture.

It will now be clear that I have provided a permanent wave machine of the character described, which will accomplish the objects of the invention hereinbefore stated. It is to be understood that the embodiment of the invention herein disclosed is merely illustrative and is not to be considered in a limiting sense as various changes may be made without departing from the spirit of the invention. It is further to be understood that the device may be modified to accommodate exothermic compounds and catalytic agents other than those specifically mentioned herein, as no limitations upon the invention are intended other than those imposed thereon by the scope of the appended claims.

Having thus described my invention I now claim:

1. A permanent hair waving device comprising in combination a support, a plurality of heaters attached to the support, a means providing a controllable supply of air, a container providing a supply of vaporous organic hydroxide, a means for mixing the air with the vaporous organic hydroxide, a catalyst in the heaters, and a means for emitting the gas created by the mixture of the air and vapor from the said mixing means to the heaters whereby exothermic combustion takes place therein upon contact with the said catalyst.

2. A permanent wave machine comprising in combination, a base, an oxygen supply means, a plurality of heaters, a catalyst member in the heaters, a chamber, a vaporous organic hydroxide supply device, a means for combining the oxygen and the vapor in the chamber, a manifold for distributing the exothermic gas formed by the oxygen and the vapor to the heaters, a means on the said chamber for controlling the combustion of the gas engendered by the catalyst member whereby various temperatures may be obtainable, an automatic timing mechanism for controlling the period of combustion in the chamber, and supports for mounting the chamber, the manifold and heaters on the said base.

3. In a permanent wave machine of the type utilizing as an exothermic compound a vaporous organic hydroxide, a heater comprising in combination, a hollow chamber having a concave heating surface, a granulated metallic catalyst material within the chamber, a means for spreading the granulated catalyst material evenly within the chamber, the said chamber having an inlet for admitting the vaporous exothermic compound and also having outlets in the said concave heating surface for expelling the catalysed vapor, a means for evenly circulating the vaporous exothermic compound, and a retaining means attached to the chamber for engagement with a lock of hair.

4. In a permanent wave machine, a heater, comprising in combination, a tubular chamber, a granulated metallic catalyst material evenly distributed within the chamber, a valve for variably admitting a vaporous exothermic compound to the chamber, and a means for evenly circulating the vaporous exothermic compound within the chamber, the said chamber having outlets for expelling the catalysed vapor and also having an air space for cooling its outer surface.

5. In a permanent wave machine utilizing a vaporous exothermic compound for heating purposes, a control cabinet comprising in combination, a compartment, a container for an organic hydroxide, an inlet pipe for admitting air to the compartment, a carburetor for vaporizing the organic hydroxide and for combining the same with the air, an outlet pipe for emitting the vaporous exothermic compound thus created, a by-pass connected to the outlet pipe for emitting air alone, a two-way valve for regulating the volume of the exothermic vapor emitted through the outlet pipe or for regulating the volume of air emitted through the by-pass and the outlet pipe, a scale calibrated for temperature degrees, the said valve having a handle and a pointer readable on the scale, and an automatic time switch for operating the valve after a pre-determined period of time.

6. In a permanent wave machine of the type having removable heaters and utilizing a vaporous exothermic compound for heating the same, a connector, comprising in combination, a flexible hose, a nozzle at the loose end of the flexible hose attachable to a heater, a clasp member for retaining the nozzle in the heater, a valve within the nozzle operable by the heaters for permitting

the exothermic vapor to enter the said heater when the nozzle is inserted and clasped therein and for stopping the emission of the said vapor from the said hose when the nozzle and the heater are separated.

7. In a permanent hair waving machine, a heater comprising in combination, a longitudinally curved hollow chamber member having a concave curling surface, a means for admitting a vaporous exothermic compound to the inside of the chamber member, a granulated catalyst member within the chamber member capable of activating the exothermic compound sufficiently to heat the concave curling surface of the chamber member, the said chamber member having a plurality of vents in the concave portion thereof for emitting the decomposed gases therefrom, and a means for attaching the chamber member to a prepared lock of hair.

8. A hair waving device, comprising in combination, a support member, a plurality of heaters attached to the support member, a device providing a supply of vapor, a means providing a supply of air, a means for combining the vapor and the air into a regulative combustible gas, a means for emitting the said gas to the heaters, and a catalyst member in the heaters capable of spontaneously activating the combustible gas.

9. A hair waving device, comprising in combination, a support member, a manifold having a plurality of heaters connected therewith mounted on the said support member, a means providing a supply of exothermic gas, the said gas being transmissible to the said manifold heaters, a means for regulating the potency and a means for controlling the quantity of the gas transmitted, and a catalytical material in the said heaters kindling the gas therein.

10. A hair waving device, comprising in combination, a support member having a plurality of calefactory chambers connected therewith, a means providing a supply of exothermic gas, the said gas being transmissible to the said chambers, a governor on the said support for regulating the potency and controlling the duration of the efficacy of the said gas transmitted to the said chambers, and a means in the said chambers for exciting the said gas therein.

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