Sept. 4, 1928. 1,682,972

W. S. LEWIS

PERMANENT WAVING APPARATUS

Filed April 6, 1927

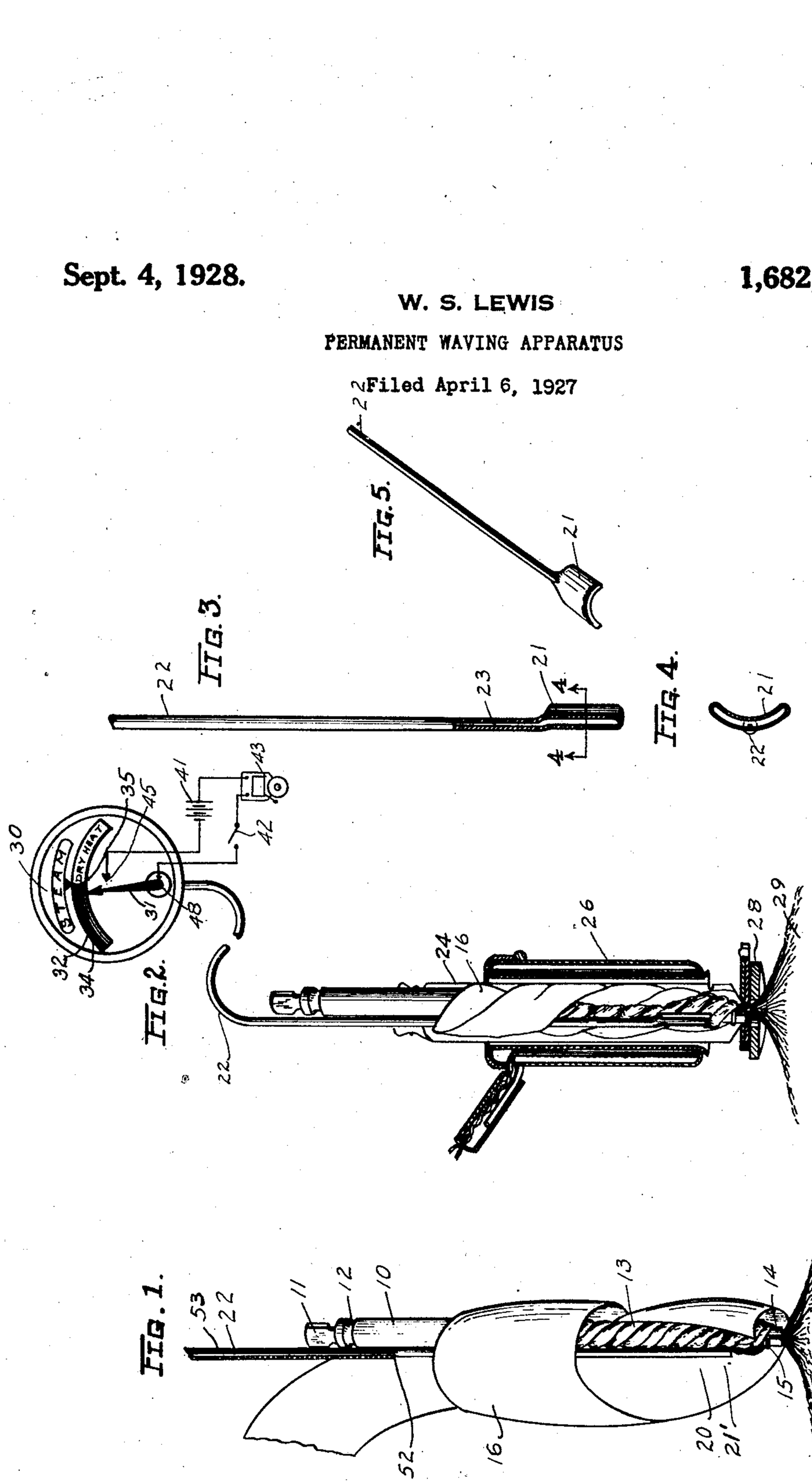

FIG. 2.

FIG. 3.

FIG. 5.

FIG. 4.

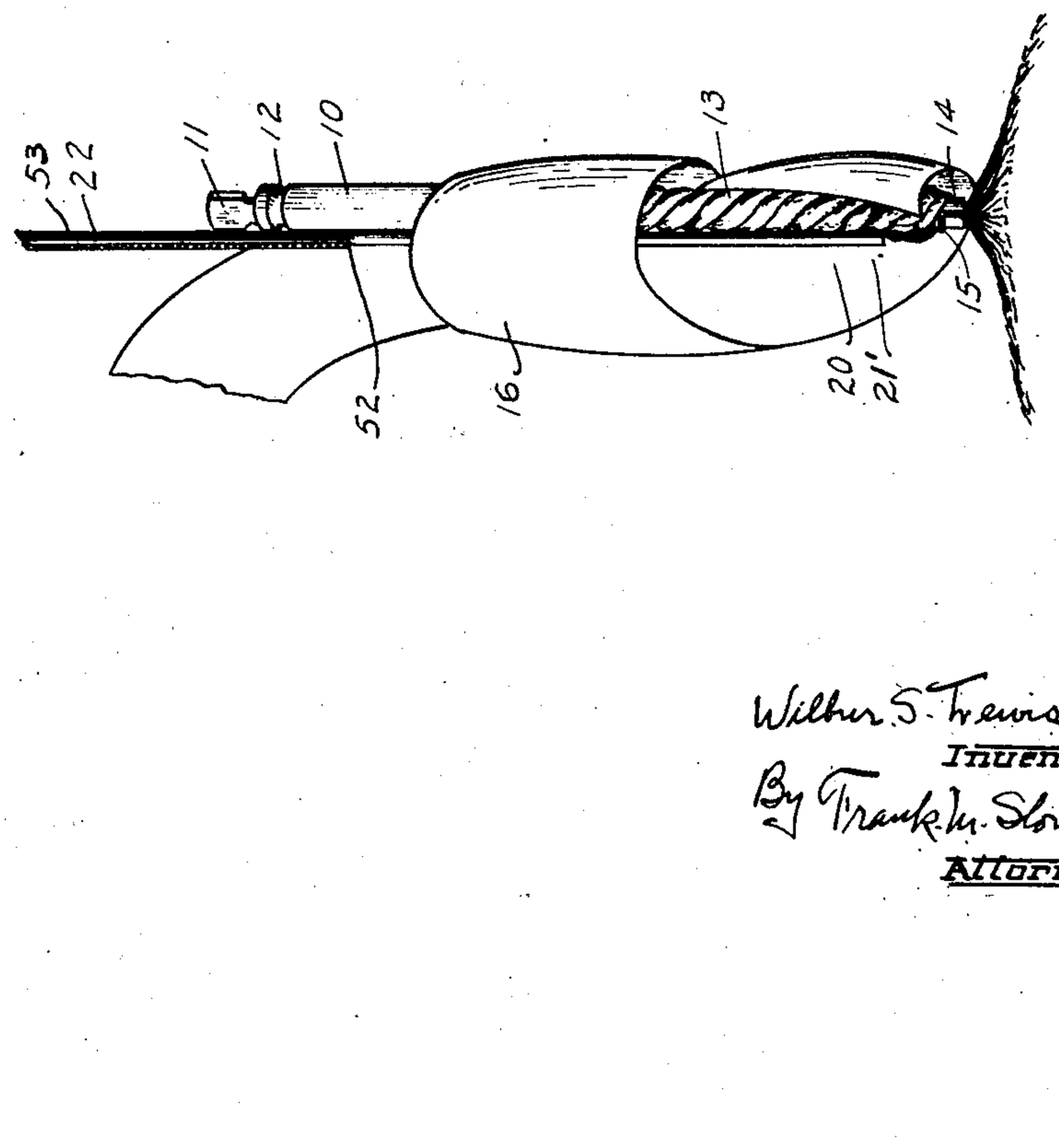

FIG. 1.

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UNITED STATES PATENT OFFICE.

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PERMANENT-WAVING APPARATUS.

Application filed April 6, 1927. Serial No. 181,328.

My invention relates to permanent waving apparatus and more particularly it relates to means for determining the temperature to which a hair strand is subjected during a permanent waving process.

An object of my invention is to accomplish permanent hair waving, involving a heating operation, with less danger of injuring the hair, at the same time ensuring that the heating operation will be properly continued until its purpose has been accomplished.

Another object of my invention is to provide for permanent hair waving wherein a critical temperature, to which the hair strand being saved is subjected, will be reliably made known to the operator or to the observer.

Another object of my invention is to provide for the audible indication of such a critical temperature.

Another object of my invention is to provide, by suitable means disposed with relation to one hair strand, a critical temperature of other hair strands simultaneously subjected to heating during a permanent waving process, the temperature of the one hair strand acting as a pilot to indicate the temperature of other hair strands being simultaneously operated upon.

Another object of my invention is to accomplish the foregoing and other objects of my invention, hereinafter more fully explained, by indicating means which may be disposed exteriorally of casings, wrappings, and the like, which may surround the hair strand, and which will reliably indicate the temperature existing within such enclosures to which the hair strand is subjected.

These and other objects of my invention and the invention itself will become apparent from reference to the following description of an embodiment thereof and in which description reference will be had to the accompanying drawings forming a part of this specification.

Referring to the drawings:

Fig. 1 is a perspective view of an embodiment of my invention illustrating the same applied to a wound strand of hair during the steaming operation of a permanent waving process, some of the parts of the heating apparatus being broken away and illustrated in section.

Fig. 2 shows a perspective view of a fragment of another embodiment of my invention associated with the wound strand of hair during the assembling and enclosing thereof prior to the steaming operation of a permanent waving process;

Fig. 3 is a fragmentary partially sectional view of the thermal-expansive fluid-containing element forming a part of the foregoing embodiment.

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 3; and

Fig. 5 is a perspective view of the thermal-expansive fluid-containing element of Figs. 2 to 4, inclusive.

Referring now first to the embodiment illustrated in Figs. 2 to 5, inclusive, in all of which like parts are designated by like reference characters, I provide, preferably, a curler rod comprising an outer cylindrical tube member 10 and an inner solid rod portion 11 telescoped within the tube and preferably secured against longitudinal movement relative thereto by virtue of an inwardly extending rib 12 of the tube projecting within a corresponding annular groove on the exterior surface of the rod, preferably according to the construction illustrated in my co-pending application, Serial No. 109,077, filed May 14, 1926, the rod and tube just as herein illustrated and described being relatively rotatable in order that a strand of hair, shown at 13, wound upon the tube 11, may be tightened in accordance with the disclosure of the said prior application. The hair may be secured to the bifurcated end 14 of the rod by tying it with a cord 15. The hair is then moistened by a hair treating solution and a substantially concavo-convex thermal-expansive fluid-containing element 20, is disposed closely adjacent to the wound strand of hair at its thicker base portion. The element 20 comprises an enlarged cell portion 21, having parallel concave and convex side walls, the concave walls of which engage and substantially conform to the rounded form of the engaged wound strand of hair 13 adjacent to its base, to partially surround the same. A small flexible tube 22 having a small bore 23 extends upwardly from the relatively large cell sectional 21, being preferably formed integral therewith, beyond the strand of hair and curler rod and substantially parallel with the wound strand of hair and the curler rod. The wound strand of hair and the cell are then preferably wrapped

by a moistened flannel strip 16 which completely covers and encloses the strand of hair and the relatively large cell portion 21 of the element 20 and all of the curler rod except, usually, the upwardly projected end.

I then, preferably, enclose the wrapper and the cell 21 and a portion of the tube 22 by a cylindrical container 24, constructed preferably as illustrated in Patent No. 1,611,416, dated December 21, 1926, granted to Lewis and Murray, the said container being preferably crimped or otherwise operated upon at its upper end and lower end to provide a sealed enclosure for the wound strand of hair. A heat insulating pad 28 is preferably interposed between the scalp 29 and the curler rod to protect the scalp against injury. An electrical or other heating element 26 is now telescoped over the container 24 and the wound strand of hair is now heated by energizing the electric heater 26.

The tube 22 having been placed within the wrapper and the container, extends free of the same and may be of variable desired length. The opposite end of the tube communicates with a fluid pressure gauge 30, which gauge is adapted to actuate an indicating needle 31, which needle may be swung to the right or left, depending upon whether or not the electric heater circuit is closed. As illustrated, I divide the scale 32 of the gauge into two parts, the left hand portion 34 being relatively dark in color and of some such color as blue or green, and the right-hand portion of the scale being relatively light in color and preferably with some such inscription of "Dry heat" or "Danger", the junction between the two portions of the scale indicated by the black line 35 having an inscription such as "Steam" closely adjacent to the line 35. Various other manners of marking the gauge scale may be employed, but it is highly desirable that the scale be so graduated as to emphasize variations from a critical temperature substantially beyond which injury to the hair strand may be had.

A thermal-expansive fluid is contained within the relatively large concave-convex cell 21 and the bore 23 of the tube 22, and the gauge 30. The relatively large cell having a large fluid capacity will, when heat is applied to the hair, expand causing an increase of fluid pressure to actuate the expansible element of gauge 30, not shown, to actuate the indicating needle 31 to cause the same to swing to the right. If the heater generates heat to such a temperature that if much exceeded the hair may be injured, the needle will swing further to the right closing the electrical contacts 45, to sound an audible signal to warn the operator.

For operating the audible signal, I provide, preferably, an electric circuit comprising a source of electric energy 41, a hand switch 42, and an electric annunciator 43, such as, for example, a one-stroke bell, which circuit may be connected to the contacts 45 of the gauge 30. At normal non-injurious temperatures the circuit is continuously broken. Contact 45 may be disposed on the gauge adjacent the needle 31 whereby the needle may close the circuit when swung to the right to simultaneously indicate by a visual signal when a dangerous heat is approached, which might be injurious to the hair, and then subsequently close the circuit to the bell 43 to give an audible signal to warn an operator that a danger point has been reached on a particular strand of hair. By employing a gauge actuatable by a fluid responsive element containing a thermal-expansive fluid, I am enabled to actuate an indicating needle with greater power, whereby the needle 31 may be actuated with sufficient force to positively close the electric circuit.

Such a gauge is positive and accurate and is not expensive to manufacture, and is not so delicate as to be easily put out of adjustment nor will it readily become damaged in use to destroy its accuracy.

Referring now to Fig. 1, I show therein a second embodiment of my invention comprising a cell 21′ of substantially tubular form and having an axial bore united at 52, preferably, to the tube 22 leading, as in Fig. 2, to the pressure gauge 30. I contemplate sometimes continuing the tube 22 in a continuous pass to the base of the hair strand, but prefer in all cases to enlarge the bore of the tube in the portion contained within the enclosure 23 or the wrapper 16 or both whereat the actual temperature to which the hair strand is subjected and prefer to reduce the bore of the tube portion 22 so as to minimize the effect of outside temperatures on the communicating tube extraneously of the enclosure. Also, I prefer, as shown in Fig. 1, to reduce the outside diameter of the tube portion 22 and I preferably enclose the tube portion 22, as indicated in Fig. 1, with a textile sleeve 53 which may be made of wool, cotton, silk or the like, those materials which less efficiently conduct heat being preferred.

Having thus described my invention in certain specific embodiments, I am aware that numerous and extensive departures may be made from the embodiments herein illustrated and described but without departing from the spirit of my invention.

I claim:

1. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of a fluid-containing cell, of a wrapper enclosing the wound strand of hair and the cell and a container telescoped over the wound strand of hair and

cell, means to heat the wound strand of hair in the presence of moisture through the walls of the container, a fluid pressure indicator means disposed exteriorally of the container and a tube interconnecting the said cell and the said indicator means.

2. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of a fluid-containing cell, of means enclosing the wound strand of hair in the presence of moisture, means to heat the wound strand of hair, fluid pressure indicator means disposed exteriorally of the container, and a tube interconnecting the said cell and the said indicator means, said fluid pressure indicator responsive to expansion of the thermal-expansive fluid, to indicate a critical temperature of the strand.

3. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of a fluid-containing cell, of a wrapper enclosing the wound strand of hair and the cell and a container telescoped over the wound strand of hair and cell, means to heat the wound strand of hair in the presence of moisture through the walls of the container, a fluid pressure indicator means disposed exteriorally of the container, and a tube interconnecting the said cell and the said indicator means, said cell having concavo-convex side walls, the concave walls of which being contiguous with the wound strand of hair.

4. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of a fluid-containing cell, of a container telescoped over the wound strand of hair and cell, means to heat the wound strand of hair in the presence of moisture through the walls of the container, fluid pressure indicator means disposed exteriorally of the container, and a tube interconnecting the said cell and the said indicator means.

5. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of a fluid-containing cell, of a container telescoped over the wound strand of hair and cell, means to heat the wound strand of hair in the presence of moisture through the walls of the container, fluid pressure indicator means disposed exteriorally of the container, and a tube interconnecting the said cell and the said indicator means, said cell comprising an enlargement of the bore of the conduit.

6. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of an enclosure for the wound strand, means to heat the strand in the presence of moisture, from the exterior of the enclosure, a fluid conduit closed at both ends, having a portion projected within the enclosure and disposed adjacent the wound strand of hair so as to be subjected to substantially the same thermal conditions as the strand, a fluid pressure indicator disposed exteriorally of the enclosure, said conduit containing a fluid responsive to the thermal effects of said heating means to effect an increase of fluid pressure in the conduit, said conduit terminating within the indicator, and means in the indicator responsive to variations in pressure in the conduit, to effect variable indications controlling the operation of the indicator.

7. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of an enclosure for the wound strand, means to heat the strand in the presence of moisture, from the exterior of the enclosure, a fluid conduit closed at both ends, having a portion projected within the enclosure and disposed adjacent the wound strand of hair so as to be subjected to substantially the same thermal conditions as the strand, said conduit containing a fluid responsive to the thermal effects of said heating means to effect an increase of fluid pressure in the conduit, said conduit terminating exteriorally of the enclosure, and means responsive to the effects of fluid pressure in the conduit, disposed exteriorally of the enclosure, adapted to indicate a critical degree of heat to which the said conduit portion is subjected within the enclosure.

8. In apparatus for permanent "waving", the combination with a chamber containing a moistened strand of hair to be "waved", of heating means for the strand, and of indicating means to indicate a predetermined heating effect produced upon the strand by the heating means, comprising a conduit containing an expansible fluid, having a portion projected within the chamber and subjected to the effects of heat therein, and a portion extending exteriorally of the chamber, and means communicating with the said exteriorally extending portion, responsive to the effects of fluid pressure therein, to indicate the pressure in the conduit effected by reason of a critical temperature communicated to the conduit portion disposed within the chamber.

9. In a hair waving apparatus, the combination with a wound strand of hair subjected to the effects of heat during a waving process within an enclosure, the combination with a pressure gauge disposed extraneously of the enclosure, of a tube containing a fluid expansible under the influence of heat projected within the enclosure so as to be subjected substantially to the same degree of heat as the hair strand in its enclosed portion and communicating the fluid pressure resulting from expansion of the fluid under the influence of heat in the enclosure to the pressure gauge.

10. In a hair waving apparatus, the com-

bination with a wound strand of hair subjected to the effects of heat during a waving process within an enclosure, the combination with a pressure gauge disposed extraneously of the enclosure, of a tube containing a fluid expansible under the influence of heat projected within the enclosure so as to be subjected substantially to the same degree of heat as the hair strand in its enclosed portion and communicating the fluid pressure resulting from expansion of the fluid under the influence of heat in the enclosure to the pressure gauge, said tube having its bore enlarged in a portion thereof projected within the enclosure.

11. In a hair waving apparatus, the combination with a wound strand of hair subjected to the effects of heat during a waving process within an enclosure, the combination with a pressure gauge disposed extraneously of the enclosure, of a tube containing a fluid expansible under the influence of heat projected within the enclosure so as to be subjected substantially to the same degree of heat as the hair strand in its enclosed portion and communicating the fluid pressure resulting from expansion of the fluid under the influence of heat in the enclosure to the pressure gauge, and heat insulating means applied to the exterior of the tube in portions thereof exteriorally of the enclosure.

12. In a hair waving apparatus, the combination with a wound strand of hair subjected to the effects of heat during a waving process within an enclosure, the combination with a pressure gauge disposed extraneously of the enclosure, of a tube containing a fluid expansible under the influence of heat projected within the enclosure so as to be subjected substantially to the same degree of heat as the hair strand in its enclosed portion and communicating the fluid pressure resulting from expansion of the fluid under the influence of heat in the enclosure to the pressure gauge, said tube comprising an enlarged cell disposed within the enclosure.

13. In a hair waving apparatus, the combination with a wound strand of hair adapted to be subjected to the effects of heat during a waving process within an enclosure, and means responsive to a critical temperature to which the wound strand of hair is subjected to audibly indicate such temperature.

14. In a hair waving apparatus, the combination with a wound strand of hair contained within an enclosure, of means to heat the strand through a wall of the enclosure, of means contained within the enclosure responsive to a critical thermo condition therein adapted to effect an audible indication of such thermo condition.

15. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of a fluid-containing cell, of a wrapper enclosing the wound strand of hair and the cell and a container telescoped over the wound strand of hair and cell, means to heat the wound strand of hair in the presence of moisture through the walls of the container, a fluid pressure operated means disposed exteriorally of the container, a tube interconnecting the said cell and the said pressure operated means, and an alarm device operable upon a predetermined temperature of the strand of hair under the control of the said pressure operated means.

16. In a hair waving apparatus, the combination with a curler rod upon which is wound a strand of hair, of a fluid-containing cell, of a wrapper enclosing the wound strand of hair and the cell and a container telescoped over the wound strand of hair and cell, means to heat the wound strand of hair in the presence of moisture through the walls of the container, a fluid pressure operated means disposed exteriorally of the container, a tube interconnecting the said cell and the said pressure operated means, and an audible sound producing alarm device operable upon a predetermined temperature of the strand of hair under the control of the said pressure operated means.

17. In a hair waving apparatus, the combination of a plurality of enclosures adapted to contain separately wound strands of hair, of electrical heating means adapted when energized to simultaneously heat all of the hair strands, each through a wall of its respective enclosure, and audible indicating means associated with one of the enclosures adapted to audibly indicate a critical temperature to which the hair strand enclosed thereby is subjected, said audible indicating means when operated serving to indicate to the operator the critical temperature of all of the simultaneously heated strands.

In testimony whereof I hereunto affix my signature this 4th day of April, 1927.

WILBUR S. LEWIS.