Feb. 12, 1952 A. F. FLOURNOY 2,584,999

CURLING IRON

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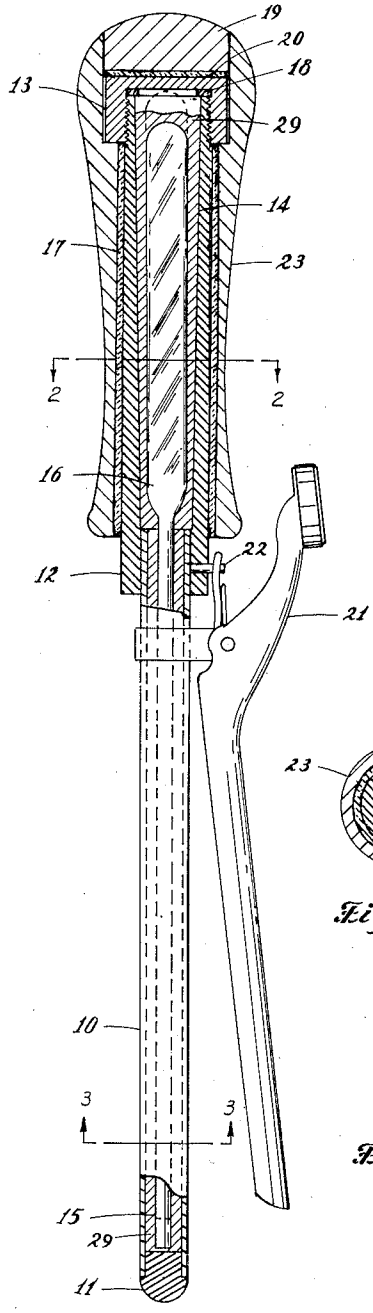

Fig 1

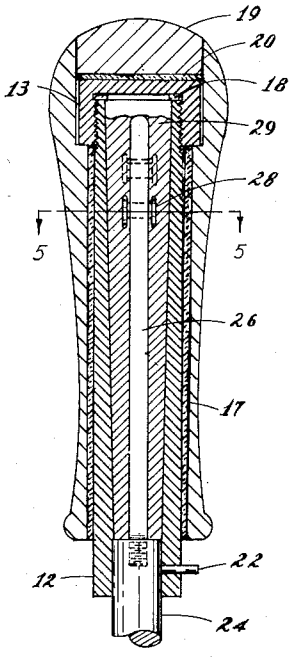

Fig 4

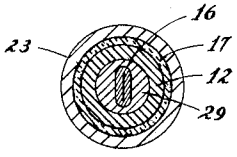

Fig 2

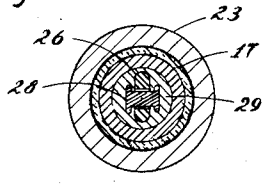

Fig 5

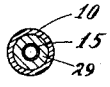

Fig 3

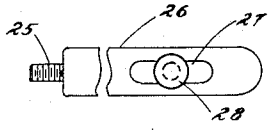

Fig 6

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CURLING IRON

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10 Claims. (Cl. 132—37)

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My invention relates to curling irons and more particularly to a type of curling iron that is adapted to be heated over a flame or in an electric heater.

The art of curling hair is very similar to the heat treatment or tempering of a piece of steel. It consists briefly in an actual breaking down of the structure of the hair by applying heat, whether by chemicals or otherwise; and either allowing it to cool around some form or by applying a chemical dressing to the hair during the cooling period.

The simplest form of hair curling instrument is a mandrel made in the shape of a rod or tube having a handle on one end and a spring clamp arranged to hold the hair against the mandrel after it has been heated. A modification of this type is the well known electric curling iron which consists simply in placing an electric heating element in a tubular portion of its hollow mandrel and extending the conductors up through the handle to a source of electrical supply.

The permanent wave machine is a further modification of the single electric curling iron and is simply a multiplicity of small heating elements arranged to heat various portions of the hair simultaneously.

The so-called "cold wave" method of curling hair consists in rolling the hair around various forms and applying the heat by prepared chemical packs.

In all these methods of curling hair no particular thought has been given as to the amount of heat applied or to maintaining that heat over a period of time at a given, constant temperature.

It is well known in the art of hair culture that the structure of the hair varies with every person and it is almost impossible to ascertain the exact temperature that the hair will break down before actual scorching takes place.

In an effort to overcome this serious handicap, a timing mechanism has been added to the permanent wave machine which controls the length of time the current is applied to the heating element; and after the beautician has made a test curl of the hair, he sets the timing mechanism according to his judgment as to the length of time that the heat should be applied.

Some hair, however, is so weak in structure that it will not stand the full heat of the machine

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even at the shortest periods of timing. Since there is no way of lowering the temperature of the heating elements, a permanent curl cannot be placed in the hair with any degree of safety. It is desirable, therefore, in a curling iron, to be able to apply heat to the hair at an even temperature well below the temperature at which actual damage by scorching might occur.

It is also desirable to have a curling iron in which the mean temperature of the iron might be raised or lowered as found necessary by the coiffeur.

An object of my invention is to provide a curling iron adapted to be heated over a flame or in some electric heater for the purpose of curling hair.

Another object of my invention is to provide a curling iron that may be arranged to give off heat at any given temperature, and means for indicating when that temperature has been reached during the heating operation.

Another object of my invention is to provide a curling iron that will produce a flow of heat at a substantially constant temperature when applied to the hair.

My invention consists, briefly stated, in a hollow metal curling iron which includes a closed metal chamber substantially filled with a mass of fusible alloy or other substance having a melting point below 400° Fahrenheit; that is to say, a melting temperature that will effect a proper hair curling temperature on the surface of the mandrel portion of the iron. When the mandrel portion of the iron, which is connected to the metal chamber, is heated the alloy or other substance is melted and in melting it accumulates stored up useful heat, the principal part of which is latent heat of fusion.

When the iron is used the stored up heat is dissipated through the mandrel portion of the iron in hair curling operations. The surface temperature of the mandrel portion of the iron is maintained at a substantially constant temperature after the commencement of the freezing of the alloy or other substance contained in the metal chamber due to the phenomenon of the dissipation of the latent heat of fusion. The temperature of the freezing mass in the metal chamber of the curling iron or like implement stands at its freezing temperature or temperature

range until the entire mass freezes up. This accounts for the fact that the iron will put out heat for a considerable length of time (fifteen minutes by test) at a constant temperature (desired curling temperature).

Other objects and advantages will be found in the following detailed description of my invention and the appended claims when viewed together with the accompanying drawings in which:

Figure 1 is a partially broken elevational view showing an embodiment of my invention.

Figure 2 is a cross-sectional view taken along lines 2—2 of Figure 1.

Figure 3 is a cross-sectional view taken along lines 3—3 of Figure 1.

Figure 4 is a cross-sectional view showing the upper portion of my invention in modified form.

Figure 5 is a cross-sectional view taken along lines 5—5 of Figure 4.

Figure 6 is a detailed view of the conductor element in the modified form.

Referring now to Figure 1 of the drawings, numeral 10 designates a mandrel fashioned out of a length of tube that is common to most curling irons of this type. This mandrel is preferably made of stainless steel or some other corrosion-resistant material that will not only keep a smooth surface unaffected by heat or climatic conditions, but also withstand certain pressures that might develop in the iron.

At the lower portion is a nose piece 11 fitted tightly into the mandrel 10 and rounded to conform with the outside surface of the mandrel 10. This nose piece 11 may be attached by pressing it into the hollow portion of the mandrel 10, as shown by the drawings, or by sweating, welding, pinning, or any method effecting a complete closure of the mandrel against leakage under pressure. The nose piece 11 may be made out of the same material as the mandrel 10.

The upper end of the mandrel 10 is fitted securely into a reservoir 12 (which is made out of the same metal material as the mandrel 10) by any means as described in the fitting of the nose piece 11. This reservoir is provided with external threads on its upper end and has a metal cap 13 adapted to be screwed thereon. An insulating washer 18 which may be made out of fibre or asbestos is placed between the cap 13 and the reservoir 12 for sealing purposes. The inside walls 14 of the reservoir 12 taper downwardly for a purpose that will be explained later in this specification.

Placed within the mandrel 10 is a hollow heat conductor 15 preferably made out of copper having its upper end 16, which extends into the reservoir 12, flattened. This heat conductor 15 is slightly less in length than the distance between the nose piece 11 and the cap 13; thus permitting a movement as shown by the dotted lines in the drawing.

Enclosing the reservoir 12 is a heat insulating tube 17 over which is slipped a handle 23. Asbestos is a good material for making the tube 17 and the disk 20.

The upper end of the handle is closed by a plug 19 and another insulating disk 20. This plug 19 may be cemented in place and finished to conform to the surface contours of the rest of the handle 23. The handle 23 and plug 19 may be made out of wood.

Numeral 21 designates the common metallic spring clamp found in most curling irons of this type and constituting a clamping guard for clamping hair around the mandrel 10. It is usually secured to the mandrel 10 of the iron by a metal strap and held radially by slipping the metallic spring part over a metal pin 22 located in the reservoir 12.

It is well known in the art of metallurgy and other related sciences that heats of fusion of various substances will vary with that substance; some having higher B. t. u.'s per pound at their melting points than others.

Since it is thought that average hair will not stand much over 300° Fahrenheit it is required that some element or alloy be found or produced which has a high British thermal unit (B. t. u.) heat of fusion factor at a substantially low melting temperature.

In actual tests of a model made according to my invention I used, to good effect, a low melting alloy composed of tin, lead, cadmium and antimony, having a melting point of 225° Fahrenheit. Under actual tests my curling iron held a satisfactory temperature for curling hair for at least fifteen minutes before reheating was required.

Let us assume now that a fusible alloy is selected which will be light in weight yet give off a maximum number of B. t. u.'s per cubic inch at a relatively low melting temperature.

The preferred method of placing the alloy in the iron is as follows: With the upper plug 19, the insulating washer 18, insulating disk 20, and the cap 13 removed, the entire iron is heated to a temperature almost equal to that of the melting point of the alloy used. While the iron is still hot, the alloy is melted and poured into the hollow portion of the iron, leaving a space at the top of the reservoir 12 for the purpose of expansion. The washer 18, cap 13, insulating disk 20, and plug 19 are then replaced as formerly described, and the iron is ready for use. Upon heating the mandrel 10 over a flame or in an electric heater, the alloy in the mandrel 10 will begin to melt first and at the same time will conduct heat to the reservoir 12 by means of itself, the mandrel 10 and more effectively by means of the conductor 15, which is made preferably of copper, aluminum, or some other metal having a high heat conductivity factor. During this period of breaking down the alloy or other substance to its melting point, expansion occurs and tends to force the mass upward in the reservoir. The tapered walls 14 in the reservoir 12 offer a minimum amount of frictional resistance to the expansion movement of the alloy mass 29 since a clearance between the expanded mass and the inside wall of the reservoir develops upon even a slight movement of the mass. The tapered construction of the walls 14 provides a frusto-conical chamber into which the alloy may more readily expand with minimum retardation.

An indication that the entire mass of alloy 29 has been melted may be had by shaking the iron. When the conductor 15 strikes the cap 13 and the nose piece 11, giving out a clicking sound, the operator knows the alloy is in the molten state and has, therefore, reached the most efficient temperature for curling hair and that the iron is ready for use.

It can now be readily seen that by storing up heat in the well insulated reservoir 12 in the handle 23, in addition to the heat stored in the mandrel 10, the iron may be used for a considerable length of time before reheating is required. It can also be seen that any additional application of heat beyond the melting point of the enclosed fusible alloy 29 will simply be stored in

the reservoir 12 and mandrel 10 as latent heat. Upon removing the iron from the flame or other heating element the temperature will rapidly drop to the proper working temperature of the iron since simple latent heat dissipates rapidly on a falling temperature. The curling iron will remain at this freezing temperature (proper working temperature) until all of the mass of alloy or other substance has reached a completely frozen state before reheating is required.

In a hair curling operation it is preferred to use two irons—one heating while the other is being used.

Another decided advantage in this invention is the ability to change alloys or other substances to effect a higher or lower hair curling temperature. Hair that will not stand high or even ordinary temperatures in curling might be curled with a low temperature applied for a considerable length of time. The economy of manufacture of this iron permits a coiffeur to supply himself with irons of varying curling temperatures.

Figures 4, 5, and 6 of the drawings show a modification of the structure of my invention. In this modification the hollow mandrel 10 of the preferred form of my curling iron is replaced by a solid rod 24 having internal threads in its upper end to receive the threaded stud portion 25 of a conductor 26. The upper end of this conductor 26 is provided with an elongated slot 27 in which is slidably mounted a rivet 28. When heating an iron made according to this modified form, the alloy or other substance in the reservoir 12 is known to be melted when you can shake the iron and hear the clicking noise made by the slidable rivet 28 in the elongated slot 27.

While I have described my invention in detail as applied to a curling iron, it is to be understood that modifications and arrangements may be made in the shape and arrangement of its element to produce similar heating devices in which heat should be dissipated at a substantially constant temperature without departing from the spirit and scope of my invention as defined by the appended claims.

Having thus described my invention, I claim:

1. A curling iron comprising a hollow mandrel connected to a hollow metal cylinder that is nearly filled with a body of alloy or other substance having a marked latent heat of fusion, said alloy having a melting point less than 400° F. and said mandrel and cylinder by their communicating interconnection providing a flow path for said alloy.

2. A curling iron comprising a hollow mandrel; a clamping guard combined with said mandrel in a position to clamp hair or the like that is wrapped around said mandrel; said mandrel being connected to a hollow metal cylinder extending coaxially with respect to said mandrel and nearly filled with a body of alloy or other substance having a marked latent heat of fusion factor, said alloy having a melting point below approximately 400° F.

3. A curling iron comprising a mandrel; a clamping guard combined with said mandrel in a position to clamp hair or the like that is wrapped around said mandrel; said mandrel connected to a hollow metal cylinder nearly filled with a body of alloy or other substance having a marked latent heat of fusion factor, said alloy having a melting point below approximately 400° F. and a mass condition indicator comprising a rod positioned inside of said metal cylinder in said mass of alloy or other substance and operative to contact a fixed portion of said mandrel for indicating a change in the physical condition of the alloy or other substance from a solid to a molten state and vice versa.

4. A curling iron comprising a mandrel; a clamping guard combined with said mandrel in a position to clamp hair or the like that is wrapped around said mandrel; said mandrel connected to a metal cylinder nearly filled with a body of alloy or other substance having a relatively high latent heat of fusion factor, said alloy having a melting temperature below approximately 400° F. a mass condition indicator positioned inside of said metal cylinder in said body of alloy or other substance adapted to indicate a change in the physical condition of the alloy or other substance from a solid to a molten state and vice versa; said mass condition indicator comprising a slidably mounted metal member located in said metal cylinder and in said body of alloy or other substance, said metal member being aligned in said chamber in a position to strike a metal surface inside of said metal cylinder under the force of its own momentum when said metal chamber is shaken and said body of alloy or other substance is heated to a molten condition.

5. A device as claimed in claim 4, wherein said metal member comprises a rod formed from a heat conductor; said rod having its end aligned with said mandrel and being operative to establish contact therewith under conditions of increases in temperature.

6. A curling iron comprising a hollow mandrel; a clamping guard combined with said hollow mandrel in a position to clamp hair or the like that is wrapped around the same; said hollow mandrel being connected to a metal cylinder closed at one end and having a hollow portion which is in communication with the hollow portion of said hollow mandrel; said hollow mandrel being completely filled, and said metal cylinder being substantially filled with an alloy or other substance having a relatively high latent heat of fusion factor, said alloy having a melting temperature below approximately 400° F.

7. A device as claimed in claim 6, wherein said metal cylinder and said hollow mandrel are adapted to receive a heat conductor slidably mounted in the communicating hollow portions thereof.

8. A device as claimed in claim 6, wherein said metal cylinder and said hollow mandrel are provided with a heat conductor slidably mounted in the communicating hollow portions of the same; said heat conductor being mounted in a position to strike the end of the mandrel with one of its ends and the closed end of the metal cylinder with the other of its ends to give out a clicking sound indicative of a molten condition of the alloy or other substance.

9. The device as claimed in claim 1, wherein said metal cylinder has its inside wall surface tapered substantially in the shape of a frustum of a cone

10. A curling iron comprising a mandrel; a clamping guard combined with said mandrel in a position to clamp hair or the like that is wrapped around said mandrel; said mandrel connected to a closed metal cylinder nearly filled with a body of alloy or other substance having a relatively high latent heat of fusion factor, said alloy having a melting temperature below approximately 400° F. a heat conductor provided with an elongated slot connected to the upper

end of said mandrel and extending into said metal cylinder and into the mass of said alloy or other substance; a metal member slidably mounted in the elongated slot of said heat conductor; said metal member being adapted to strike said conductor when shaken and give out a clicking sound indicative of the physical change of the mass of alloy or other substance from a solid to a liquid state.

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