

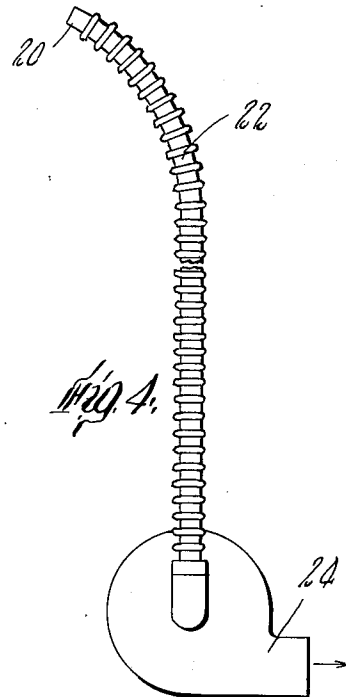
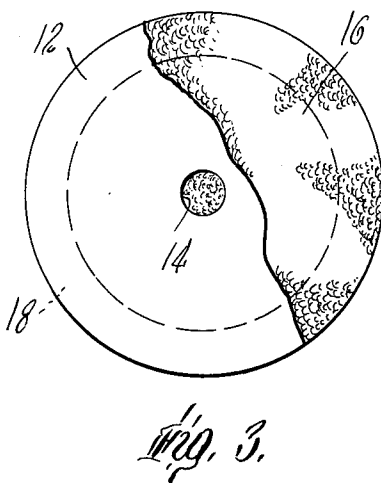
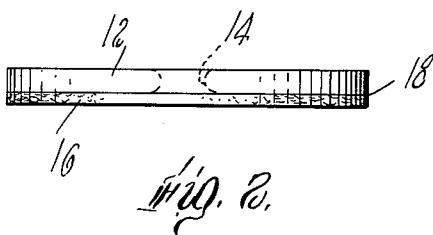
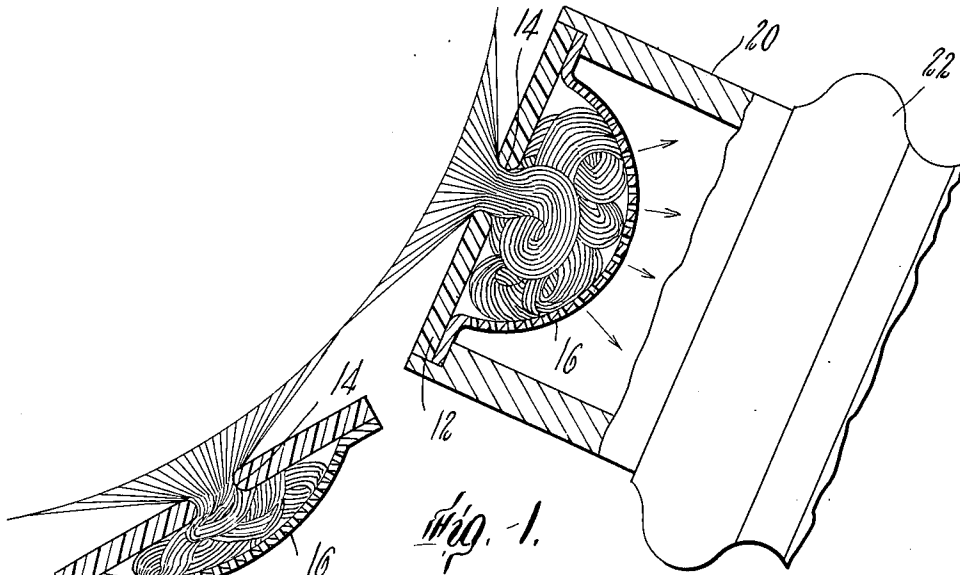
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SUCTION OPERATED HAIR CURLER

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3,213,862

## SUCTION OPERATED HAIR CURLER

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1 Claim. (Cl. 132—38)

This invention relates to hair curling and more particularly provides novel hair curling devices for utilizing a directed air flow in the winding of hair tresses and for thereby forming, and for retaining, the tresses in controlled coiled form suitable for imparting thereto a permanent wave or a temporary set as may be desired.

Hair curling as practiced in the past has involved the fundamental operations of winding the hair tress about a core or rod or even a finger to place the hair in curled form, and fastening the so-coiled tress to maintain the coiled form until the desired wave or curl retention is imparted. In permanent waving, the hair while so wound is subjected to the action of chemicals which require for effective action that the hair be under substantial strain, induced by a tight wind and clamping of the tress. For temporary set or styling, the coil may be looser, but the tress must be held in the coiled form until the hair takes the temporary set.

In either permanent waving or temporary setting the tress when wound may be removed from the core or rod, provided it is securely fastened against unwinding, as in the familiar practice of "finger waving," by winding the tress about a finger, slipping the coil from the finger and fastening it in coiled form by means of a bobby pin.

Permanent waving as practiced in recent years using conventional rods has several difficulties. First of all, few women find it easy to roll their hair on the rods by themselves. Secondly, end papers normally must be used at the tips of the hair tresses to facilitate the start of the winding around the rod. The bunching of the hair around the rod also makes it difficult for waving lotions to penetrate to the tips of the hair first wound around the rod.

For temporary set or hair styling purposes, looser curls are desired. The most common practice is for women to use their fingers for this purpose; but because of lack of adeptness many women are unable to wrap uniform curls. They are also unable to tuck the tips of hair in the curl in order to obtain satisfactory end curls. At the present time, large diameter curlers are used for styling, but they too suffer from the difficulty mentioned above; namely, that women have trouble in rolling hair, particularly at the back of the head, on the curlers.

It has been found that a hair tress may be sucked into a curler having the form of a suitably air-permeable receptacle by a stream of air constrained to move in a path generally axially through the receptacle, the tress being packed in the curler by air flow. This procedure has great advantages over manual winding procedures, not only because it eliminates the laborious task of rod winding tresses, but also because it makes possible the elimination of the stress-separation or "blocking" operation which normally precedes winding or, in some cases, setting. Other advantages are greatly increased speed, elimination of end papers to provide greatly increased openness of the packed hair tress, and removal of some of the moisture from a wet hair tress by the air stream to facilitate uniform penetration of the tress by subsequently applied lotions, as in waving, for example.

However, this procedure has certain handicaps in that the hair tress coiled and so packed within the receptacle must somehow be secured therein after the air stream has been turned off and during the time the receptacle remains

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on the head with the hair tress packed within for treatment with a waving lotion, for example. This can be accomplished by the use of conventional hair pins or the like, but the necessary manipulation still requires a degree of skill, as well as requiring considerable time, since the receptacles needed to perform a complete permanent wave, for example, may number forty or more.

Accordingly, it is a major object of the present invention to provide improved curlers and means for utilizing an air current, by which the tress is packed within a receptacle and positively but releasably retained therein even in the absence of an air stream utilized for the packing.

It is a feature of the invention that the curler provided may be disposable after a single use, eliminating any need for sterilization between uses, for example.

The present invention involves a hair curling device having, in combination with a source of suction, a curler receptacle having wall means elastically urged together desirably with portions through which an air stream, produced by said source of suction, may freely flow to expand said wall means and maintain it in elastically expanded condition while the air stream continues to flow. This provides a suitable chamber within which a hair tress entrained in the air stream may be coiled and packed under pressure in convolutions of a size and shaped suitable for curling. After the tress has been coiled and packed as desired, interruption of the air flow permits the wall means elastically to retract so that the packed hair tress will be secured in the receptacle by elastic clamping forces, entirely automatically, without the need for any additional securing means such as hair pins, or the like. Nevertheless, at any desired time, the tress may easily be pulled out of the receptacle, as after waving with suitable lotions introduced through the perforations therein.

The invention, then, not only eliminates the laborious task of manually winding tresses, which has been essential for many years, but, at the same time, makes it possible to achieve the desired results by an entirely automatic procedure, including the positive retaining of the tress coiled configuration for as long as may be desired for permanent waving treatment or the like.

As will be appreciated, the hair curlers of this invention are useful not only in permanent waving of hair but also in the setting of hair into the desired ultimate configuration after it has, if necessary, received a permanent wave. In such case, the tress may be treated entirely in the dry state or may be wet with water and permitted to dry in the coiled state, or any of the conventional setting aids or agents may be used. Tests have demonstrated that utilizing the air stream method of coiling the hair in the curler, permanent waves or temporary sets are obtainable which are equivalent to those produced with conventional rod waving and setting procedures used heretofore.

Other and further objects of the invention will become apparent from the drawings and from the following detailed description.

In the drawings:

FIG. 1 is a cross-section showing a preferred embodiment of the curling device of the invention in use, both during operation to introduce a tress into the receptable by means of an air stream and after interruption of said air flow with the tress elastically retained therein;

FIG. 2 is a side view of the curling device of FIG. 1 in its normal unexpanded configuration;

FIG. 3 is a plan view partly broken away of the curling device of FIG. 2; and

FIG. 4 is a view in elevation showing the device of FIGS. 1-3 in combination with a suction pump for producing an air stream.

Referring to the drawings, the curler receptacle therein

shown comprises an end member 12 of plastic or the like with a central circular mouth opening 14 and a perforate elastic body member 16 attached to said end member about the periphery thereof, as by adhering the two elements together within the peripheral annular area 18. In use, a surrounding cylindrical guide member 20 is provided to receive said curler receptacle and hold it across the open end of said guide member, with member 12 of the curler receptacle facing outwardly. Guide member 20 at its other end is provided with a flexible hose 22 connected to a suitable source of suction such as pump 24.

In operation, with the above described elements assembled as shown in FIG. 1 and connected to a suitable source of suction as shown in FIG. 4, air will be caused to flow into the receptacle through its mouth 14 and through the perforate elastic material of member 16. With air flow at a suitable speed, say of the order of upwards of 100 feet per second, and with the elastic material of member 16 having a substantial amount of elongation, the material will be expanded by the air flow through its perforations to provide a chamber between members 12 and 16 of dimensions large enough to accommodate a hair tress entrained in the air stream and introduced therein through mouth opening 14.

Thus, with the curler so operating, it is introduced to the vicinity of a hair tress with its mouth 14 in position to receive the hair tress which is preferably wet or damp although it may be dry. Under the influence of the suction, the hair tress will be sucked into the receptacle.

By advancing the tubular member and curler toward the tress, the air stream is permitted to suck the tress into the expanded curler and, as it does so, the action of the air automatically lays the tress in convolutions, either in the form of uniform helical curls with aligned hair coils falling one upon another in either clockwise or counter-clockwise direction, or in the form of loops, turns or the like, under pressure against both the end and side walls of the curler. When the encaging or packing of the hair is complete within the curler, the suction may be turned off, if desired, and the curler with its tress is withdrawn or ejected from the end of tubular member 20 with the hair tress securely clamped therein between members 12 and 16 by the elastic retraction of member 16. In this manner the convolutions of the hair are under a strain of at least the same order of magnitude as that obtained in wrapping the tress on a core in a conventional way, and are under a strain of a substantially greater order of magnitude than is normally obtainable with an inelastic receptacle, especially if the latter be of a somewhat greater size than is necessary to contain the tress. The tress is now held in a configuration to receive a permanent wave or temporary set and, if treating agents are to be applied, this may be readily done through the porous material of member 16. The process is repeated until the entire head of hair has been enclosed in the curlers.

In providing a curling receptacle according to the invention such as is shown in the drawings herein, it is important that body member 16 be of a suitably porous, elastically extensible material so that it can be expanded by an air stream passing therethrough from its normal position lying along the end member 12 in a generally flat plane to a bulged, expanded position to provide a chamber of adequate size for receiving a hair tress. It is preferable that the material not be unduly slack in its unexpanded condition, but a degree thereof can be tolerated so long as clamping occurs in the receptacle with a tress therein. The apertures of such material may be distributed generally uniformly over its area, and be of sufficient size so that for permanent waving, for example, suitable lotions may be introduced to the hair tress through the material. As a typical preferred example of such a material, a polyurethane open cell foam sheet, having an elastic extensibility of from about 40 to 100 percent may be used. Such material also has the advan-

tage, by reason of its sponge-like nature, of retaining lotions as may be required for a substantial time during the waving process. Other such elastically extensible natural or synthetic organic plastic open cell foams and sponges may be used, including rubber, and other materials, such as woven or non-woven textile materials, having the required characteristics, may be used as well.

It is important in the proper functioning of the device that the mouth end of the curler and the inlet opening of the tubular connection to the suction device be so correlated that substantially all of the air entering the inlet opening first passes through the mouth of the curler. In the embodiment shown, this is accomplished by dimensioning the opening within member 20 closely to surround the end member 12 of the curler, in which case none of the open portions in the curler wall project outwardly beyond member 20. When this is done, we have found that an air current of adequate velocity flowing into the curler acts to expand body member 16 and to gather a tress into a tight strand or rope and to feed it through mouth opening 14 smoothly into the chamber provided by the expanded disk.

Provided the curler mouth is of proper size, we have found it is actually possible to use the apparatus automatically to select the correct amount of hair for the tress and thus dispense with the tedious blocking and sectioning steps which have normally preceded winding in the prior art. In such operation the device with the suction turned on is brought with the curler-containing open inlet end of the tubular member into proximity to the hair in an area of the head in which a curl is to be produced. A tress of hair of the desired mass is automatically selected and drawn into and coiled in the curler by the air stream. The process is repeated with another curler inserted in the suction device until all desired curls have been formed and fastened in the curlers. This automatic tress forming is particularly effective and accurate when the hair is wet, apparently because the hair in the zone influenced by the air stream tends to stick together and be fed in a smooth, rope-like body into the open mouth of the curler.

The curlers of the invention are particularly unique in that the volume of the hair tress retaining chamber provided by the curler of the present invention is defined by the hair tress enclosed thereby, after the air stream has been interrupted, so that the chamber is precisely as large as is required properly to restrain the tress, but no larger. Because of this, it is much less important to use receptacles of a specific volume in order to achieve optimum waving, or, conversely and more important as a practical matter, to select a hair tress of the proper size for coiling and packing into a receptacle of a given size, a difficult problem, especially as to hair tresses of different lengths.

For the above reasons the dimensions of the curlers of the present invention are variable over considerable ranges, depending upon a number of factors. The diameter of the curler mouth may be related to the width or diameter of the hair tress which it is desired to treat in the curler. For a hair tress of given size there is a corresponding minimum diameter which the curler mouth ought to have in order to pass the tress properly therethrough. Where the air stream device is used for tress forming or selection, the diameter of the curler mouth should not greatly exceed the minimum for the tress size which it is desired to form. The curler body diameter and length are less critical, but should provide a volume when expanded such that the desired tress length can be firmly coiled and packed therein by the air flow. If the curler is too small to receive the entire length of tress, it will nevertheless function normally as respects the length that can be coiled therein. On the other hand, if the curler be somewhat too large, the tightness of the coiled tress contained therein will nevertheless be adequate because of the elasticity thereof. Thus, a single size of

curler can be used for a considerable range of tress lengths and sizes.

As a typical example, the expanded diameter of the curler chamber for a 3 to 6 inch long, about 1 to 2 gram tress, which may be taken as a usual tress size for the main part of the head of hair for producing by the present invention a permanent wave comparable to what is considered a medium to tight wave in rod waving and which is substantially uniform throughout the tress length, may be of the order of two inches, with a mouth opening of about one-fourth inch, and a mouth opening length of at least about 0.1 inch or longer, with rounded edges.

In general, for obtaining on such tresses the full range of curl diameters which are desirable in permanent waving today, the expanded diameter of the curler may range up to, but will not substantially exceed, about 2½ inches nor be less than ½ inch. Curl diameters which are desired for temporary set may be somewhat larger and for this purpose the curler diameter range for results acceptable to most women may exceed those recited above. Normally, the curler length will not exceed about 2½ inches, but substantially longer curlers may be employed where unusually long tresses are to be waved. Preferably, the cross-sectional shape of the interior of the curler body is substantially a circle or regular polygon. It is important, too, in order to obtain best results that the side wall or walls of the curler be at least in major part spaced from the wall of tubular member 20 in order to permit free flow of air through the curler.

The use of the curler of the invention requires an air stream of considerable velocity, 100 feet per second being about a minimum at the beginning of the coiling operation. We prefer a velocity of about 130–600 feet per second. Pumping equipment capable of producing such velocity may comprise, for example, a one- or two-stage radial or mixed flow vaned impeller of a diameter be-

tween 4 and 6 inches driven by a universal type A.C. electric motor. This motor may require up to 1000 watts input for a curler used for a single tress of hair.

Although a specific embodiment of the invention has been described herein, it is not intended to limit the invention solely thereto, but to include all of the obvious variations and modifications within the spirit and scope of the appended claim.

What is claimed is:

- 10 A hair curler for use with a source of suction comprising a substantially flat rigid member having a hair receiving mouth therethrough spaced from its edge, and an elastic member on one side of said rigid member covering said mouth and surrounding and extending a substantial distance from said mouth, said elastic member being sealed to said rigid member at the perimeter of the elastic member, said elastic member being freely exposed for extension and retraction to the extent of its elasticity, said elastic member having small perforations there-  
20 through and being adapted to be extended by the suction to form a tress receiving chamber and to retract when the suction is discontinued to collapse said chamber, thereby compressing the tress in wound form within said chamber and restraining withdrawal of the tress  
25 therefrom to automatically secure the curler to the tress.

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