Feb. 7, 1967 L. R. SCAMMAN 3,302,654

CONTINUOUSLY VARIABLE ANGLE HELICAL ROLLER COMB

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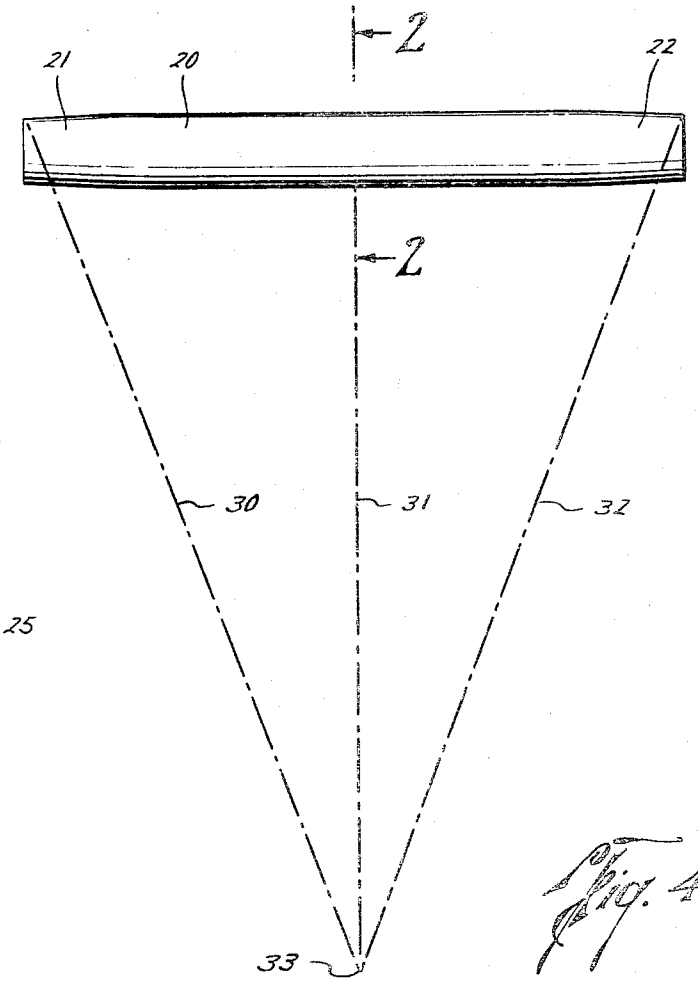


Fig. 1



Fig. 2

Fig. 4

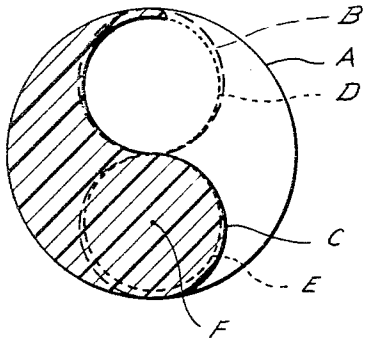
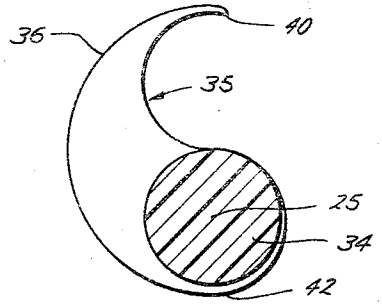


Fig. 3



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Fig. 5

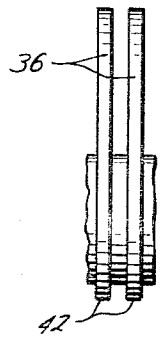


Fig. 6

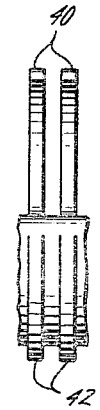


Fig. 7

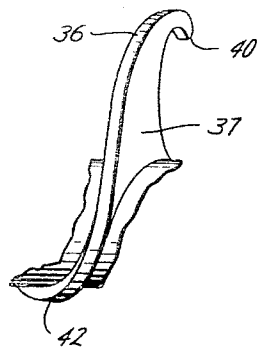


Fig. 8

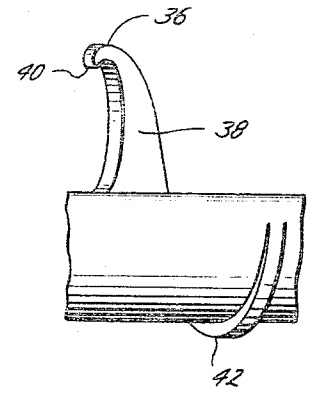
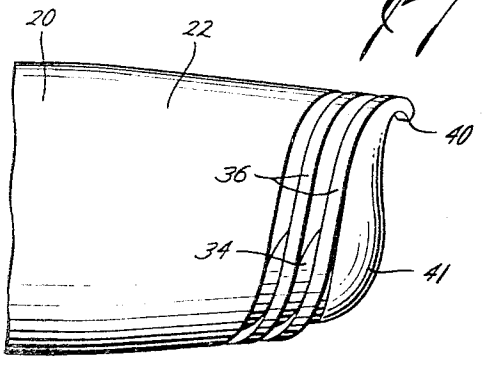


Fig. 9



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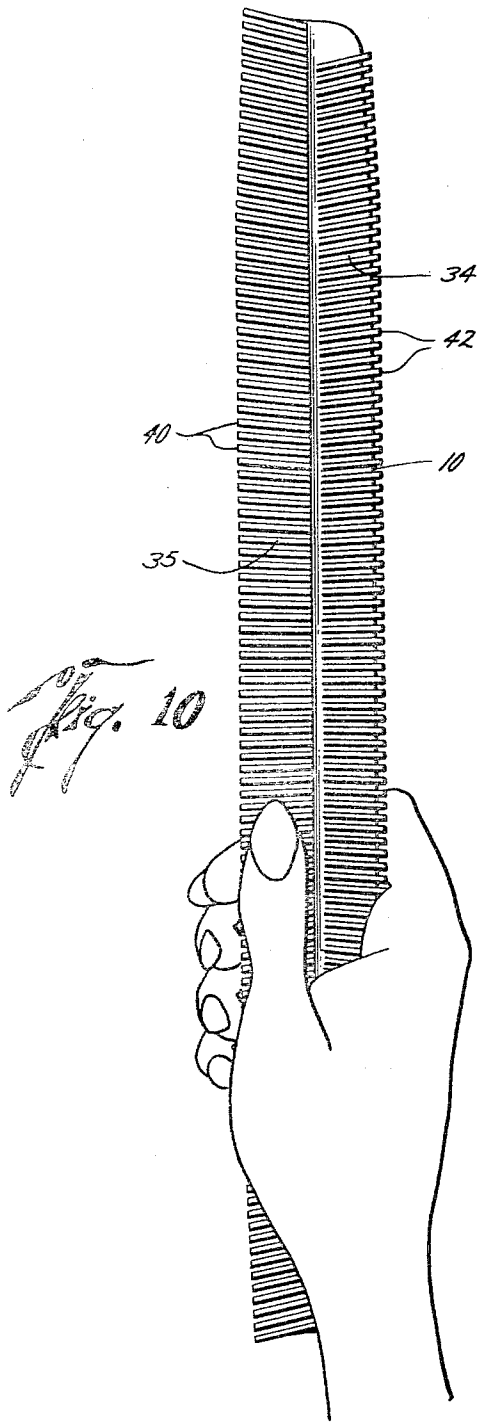


Fig. 10

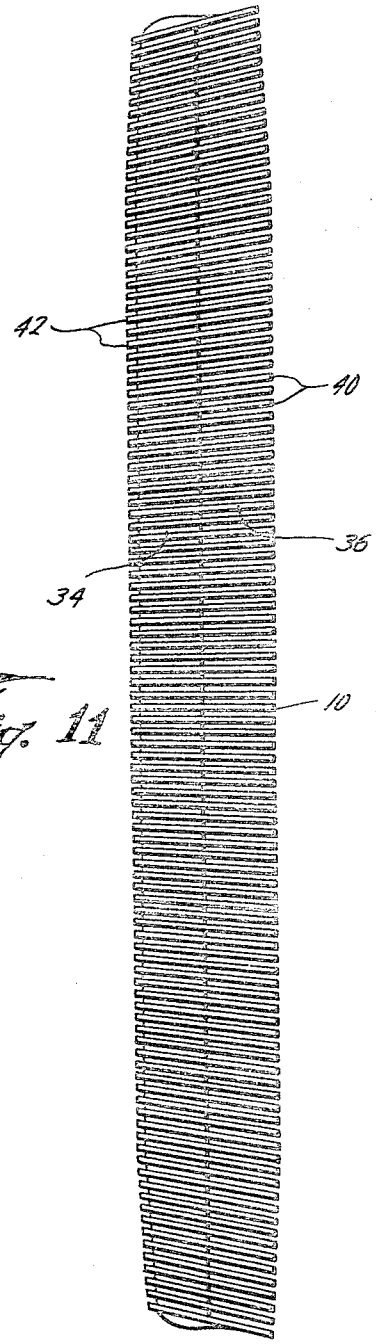


Fig. 11

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United States Patent Office 3,302,654 Patented Feb. 7, 1967

3,302,654

CONTINUOUSLY VARIABLE ANGLE HELICAL ROLLER COMB

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Filed Mar. 30, 1964, Ser. No. 355,757
8 Claims. (Cl. 132—122)

This invention pertains to combs and more especially to curling combs, that is, to combs useful in rolling hair curls.

The principal object of the invention is to provide a curling comb which will have variable resistance to the hair passing through it depending on the part of the comb being used, whereby the user can pick a portion of the comb suitable for the particular condition of hair encountered at the moment and suitable for the particular curl form desired. The variable resistance property will also be helpful in straightening kinky or unruly curls.

A further object of the invention is to provide a curling comb which can be used either for clockwise rolling followed by counterclockwise release of the comb or for counterclockwise rolling followed by clockwise release of the comb. This gives the user the option of making inward or outward turning curls at either side of the head.

A further object of the invention is to provide a curling comb which is easily handled by the user in order that curls may be rolled rapidly.

Yet another object of the invention is to provide a curling comb which can also be used for conventional combing and which will not break or fray the hair in combing out tangles or ratted hair.

Another important object of the invention is to provide a curling comb attaining the aforementioned objects which will also be durable.

Other objects and advantages of the invention will appear from the following description of a preferred embodiment thereof.

Briefly the invention includes a comb having a straight cylindrical body with a single row of longitudinally aligned laminars, hemi-crescent shaped teeth that curve in substantially the same rotative direction around the body, the roots of the teeth being continued around the body to largely encircle same. The side faces of the teeth are helical convolutes. The directrix helix for each convolute lies on the surface of the cylindrical body coaxial therewith. The helix angles of the directrix helixes of the convolute surfaces of the teeth are all different, the complements of the helix angles varying gradually from zero degrees for teeth at the middle of the comb to about plus twenty degrees at one end of the comb and minus twenty degrees at the other end of the comb. When the several generatrices of the several helical convolute surfaces lie in a common plane they intersect at a common center lying on a perpendicular bisector of the axis of the body at a distance from the body axis of the same order of magnitude as the length of the body.

The inside radius of the hemi-crescent shaped teeth is such that the distance from the tips of the teeth to the body is of the order of magnitude of the width of a user's thumb to facilitate gripping the curler comb, for example said radius may be ¼ inch. The outside radius of the teeth, which as noted above had roots largely encircling the body, is of the same order of magnitude, e.g. ½ inch, as the radius of a user's grip between finger tips and roots of the fingers (as distinct from a full grip between finger tips and base of palm). The roots of the teeth extending around the body of the comb, provide a corrugated surface and in combination with the finger grip diameter of the comb and the thumb rest channel at the

inner radius of the teeth there is provided an exceptionally conveniently handled comb.

The outside radius of the teeth at the ends of the comb is preferably somewhat less than that over the major part of the length of the comb, whereby the overall configuration or envelope of the comb is cigar shaped, tapering at both ends. This facilitates insertion of the comb in an existing curl.

An important advantage of the invention lies in the fact that the end teeth, whose sides lie at an angle to the body of the comb, extend axially beyond the ends of the bodily so that they form convenient hooks for picking up the hair close to the head with the body of the comb held perpendicular to the surface of the head.

A preferred material for the comb is a synthetic resin or plastics material such as methylmethacrylate, which is both strong and tough. The transparency of this material, combined with the geometrical shape thereof, combine to produce multiple refractions and reflections of light, making the comb useful as a toy or advertising device in addition to its utility as a comb and roller comb.

If desired, the comb may be made electrically conductive, thereby grounding the hair being combed to the body of the user of the comb, thereby facilitating use of the comb by avoiding accumulation of static electricity. To this end the comb may be made of metal, or a metalizing coating may be applied to its surface.

For a detailed description of a preferred embodiment of the invention reference will be made to the accompanying drawings wherein,

FIGURE 1 is an elevation showing the outside of a blank from which a comb embodying the invention may be cut;

FIGURE 2 is a cross section taken at plane 2—2 of the blank;

FIGURE 3 is a diagram explaining the shape of the blank;

FIGURE 4 is a cross section similar to that of FIGURE 2 after the blank has been cut to form the finished comb;

FIGURES 5 and 6 are fragmentary elevations showing the outside and inside of a portion of the comb near the middle thereof;

FIGURE 7 is a fragmentary view similar to FIGURE 5 showing the outside of the comb near one end of the comb;

FIGURE 8 is a fragmentary view of the inside of the part of the comb shown on FIGURE 6 with all but one tooth omitted for clarity;

FIGURE 9 is a fragmentary view of the outside of the comb at one end thereof after only the two teeth at the end have been cut in the blank;

FIGURE 10 is an elevation looking at the inside of a comb according to the invention;

FIGURE 11 is an elevation looking at the outside of the comb shown in FIGURE 9.

Referring now to FIGURES 1 and 2, the blank 20 is an elongated member of comma shaped cross-section, the cross-section being uniform except at the ends 21, 22 which are similar in cross-section to the rest of the blank but taper down slightly in area. Referring to FIGURE 3, the comma shape is defined by the shaded part of the area of outer circle A within which two major tangent circles B, C of half the diameter of outer circle A have been inscribed, two minor tangent circles D, E of slightly smaller diameter being inscribed in circles B, C.

To produce the comb of the invention from the blank shown in FIGURES 1 and 2, the blank may be rotatably mounted on an axis 25 only slightly eccentric to the center of the head of the comma shaped cross-section of the blank, such axis being displaced toward the tip of the tail of the comma a distance equal to half the width of

the tail at its extremity, such axis passing through center F of minor circle E of FIGURE 3. Successive saw cuts are made in the surface of the blank while the blank is rotated about axis **25**. The strokes of the saw making the cuts are straight lines, such as **30**, **31**, **32**, radiating from center **33** (see FIGURE 1) and start at equally spaced apart points on the surface of the blank corresponding to circle A and continued down to the surface of the cylinder whose axis is at **25**, and whose radius is that of minor circle E.

Referring now to FIGURE 4, the cylindrical body **34** of the comb is thus formed with a radius of the minor circle E. At the same time, the single row of longitudinally aligned, laminar hemi-crescent shaped teeth **35** are formed which curve in substantially the same rotative direction about the body **34**, each with its outer periphery **36** lying in a cylindrical surface or envelope having the radius of circle A of the blank and its inner periphery having the radius of circle D. Due to the fact circles B and C are ½ the diameter of circle A and tangent to circle A and each other, the arcuate extent of the outer peripheries of teeth **35** is about 180 degrees, exclusive of the roots **42**.

Referring now to FIGURES 7 and 8, the sides **37**, **38** of the teeth are helical convolutes. For each side the line of the cutting edge of the saw is the generatrix and a helix on the surface of body **34** is the directrix. In the latter regard it is to be noted that once a saw cut has been made in the blank **20**, the sides of the cut hold the saw so that as the blank turns the saw is caused to move axially of the blank due to the initial pitch of the saw. This axial movement, combined with the path of the saw being required to pass through center **33**, would soon cause the saw to bind if the blank were to rotate more than one revolution. For the sides of the initial cut tend to keep the saw at a fixed angle to elements of the cylindrical surface of the body of the comb (helix angle) whereas the axial movement of the part of the saw in the blank as the blank rotates, coupled with the fixed position **33** of part of the saw path, tends to cause the angle of the saw to change. However, the saw is removed from the cut and a new cut started at each revolution of the blank.

The helix angle of each helical convolute thus changes with each new cut and when the saw is at the part of the blank midway between its ends the helix angle is ninety degrees so that the helix is the same as a circle, while the sides of the teeth **36** become planes (see FIGURES 5 and 6), a special case of the helical convolute. Progressing on down toward end **21** of the blank **20**, the helix angle of the saw cuts again increases. Instead of speaking of the helix angle, one may speak of the complement of the helix angle, in which case the angle is zero at the mid-part of the comb and a positive angle at one end and a negative angle at the other. The complement of the helix angle at each end of the comb is preferably about 15 to 20 degrees, a 17 degree angle being a desirable angle for a comb having a body 9½ inches long. This provides a sufficient range of helix angles to the teeth of the comb to meet any normal requirement for resistance to passage through the hair of the curl being rolled and released. Also, as shown best on FIGURE 9, this provides enough axial extension of the tip **40** of the last tooth beyond the end **41** of the body of the comb to provide a convenient hook for picking up locks of hair with the comb held perpendicular to the head.

It is to be noted that the roots **42** of the teeth continue around the body **34** and nearly encircle same. They form a corrugated surface along the body of the comb to assist in gripping the comb as previously explained. This is best shown in FIGURE 10 wherein the hand of a user is shown grasping the comb with the comb held with the fingers encircling it and the thumb resting inside the teeth.

Referring now to FIGURE 11, which shows the outside of the comb, due to the transparency of the material of which it is made and the small diameter of the body **34** and the high refractive index of the material, a considerable amount of light entering the comb is totally reflected within the body giving it a silver appearance This combines with the unique geometrical shape of the comb to provide an object attractive to both the eye and the mind as a toy or advertising device.

In use of the comb as a roller-comb, the comb is passed through a bundle of long hair and then rotated, winding up the hair on the comb forming a curl. The curl is then held from the outside and the comb rotated in the opposite direction and gradually moved axially out of the curl. Due to the helical nature of the teeth and the gap between the tips **40** of the teeth and the body **34**, the axial motion needed to release the comb is possible without the curl being destroyed.

Although the comb has been described as being cut from a blank, it would be commercially preferable to produce it by injection molding if made of plastic, or by casting if made of a metal such as aluminum.

While a preferred embodiment of the invention has been shown and described, modifications thereof can be made by one skilled in the art without departing from the spirit of the invention.

That being claimed is:

1. A roller comb comprising

a generally cylindrical body, and

only a single row of longitudinally aligned, laminar, hemi-crescent shaped teeth extending outwardly from the body transverse to the axis of the body and curving about the body in substantially the same rotative direction,

the outer peripheries of said teeth lying on circles of larger diameter than said body,

said outer peripheries of the teeth having arcuate extents of the order of 180 degrees,

said body lying entirely within said circles and being substantially tangent thereto,

the diameter of said body being substantially half that of said circles,

the inner peripheries of said teeth lying on circles of substantially the same diameter as said body that are substantially tangent to said circles defining the outer peripheries of said teeth and substantially tangent to said body at points substantially diametrically opposed on said body from the points of tangency with the body of said circles defining the outer peripheries of said teeth.

2. The roller comb of claim **1** wherein

each laminar tooth lies substantially in a plane transverse to the axis of the body,

the plane of each tooth lying at a different angle to the axis of the body,

the planes of the teeth radiating from a common center line which extends transverse to the axis of the body and which is disposed to one side of the comb between the ends thereof.

3. The roller comb of claim **2** wherein the sides of the teeth are helical convolutes and the complements of the helix angles of the several helical convolutes forming the sides of the teeth vary from zero degrees at the middle of the comb to about 15 to 20 degrees at the ends thereof.

4. The roller comb of claim **3** wherein the diameter of the envelope of the comb tapers down toward each end of the comb and the teeth at the ends of the comb extend axially beyond the ends of the body of the comb providing helical hooks for picking up locks close to the head with the comb held with its cylinder axis perpendicular to the head.

5. The roller comb of claim **1** wherein the diameter of the envelope of the teeth of the comb is about one inch which is of the same order of distance as the grip of a human hand between finger tips and roots of the

fingers and the distance between the tips of the teeth and the adjacent portion of the body of the comb is about ½ inch which is of the same order of distance as the width of a human thumb.

6. The roller comb of claim 5 wherein the roots of the teeth extend substantially around the body of the comb providing a corrugated surface on the body opposite the tips of the teeth.

7. The roller comb of claim 3 wherein the comb is made of methyl methacrylate and is transparent, the diameter of the body of the comb being about ½ inch, whereby light entering the body of the comb is totally reflected internally thereof to give it a silvery appearance.

8. The roller comb of claim 1 wherein the comb is made of electrically conductive material.

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