April 28, 1964 J. F. WAHL 3,130,609

METHOD FOR MAKING A DRY SHAVER BLADE

Filed Nov. 30, 1961

FIG. 7

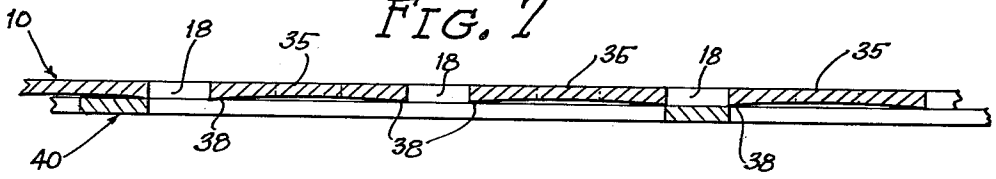


FIG. 6

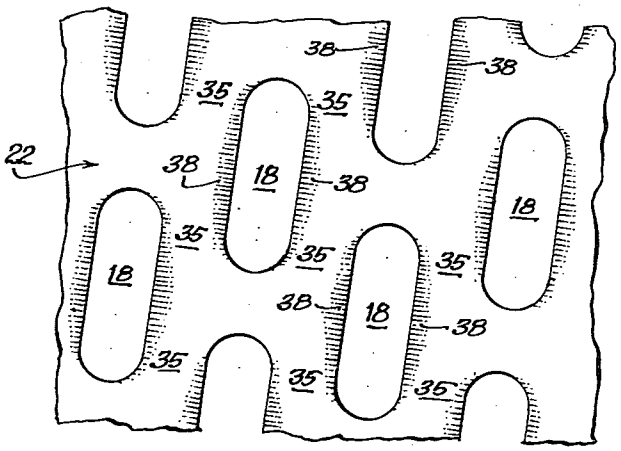
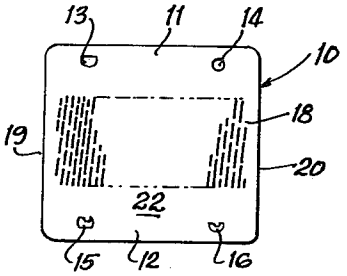


FIG. 1



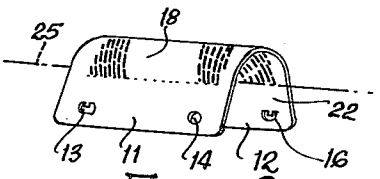


FIG. 2

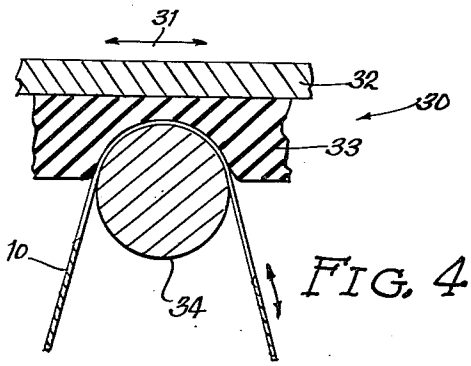


FIG. 4

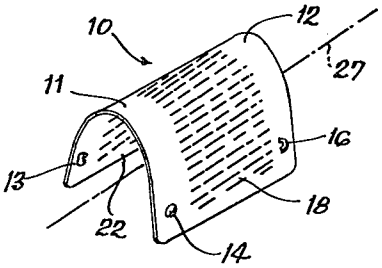


FIG. 3

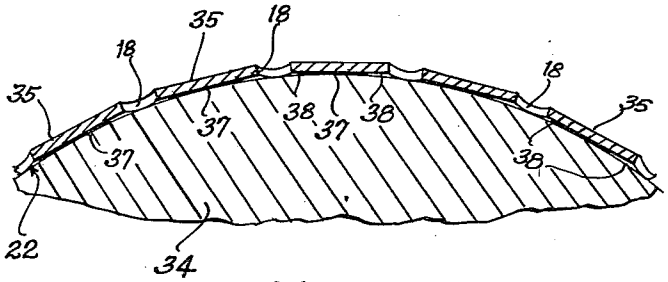


FIG. 5

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METHOD FOR MAKING A DRY SHAVER BLADE

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This invention relates to a method for making a dry shaver blade, and more particularly to a method for making a curved shaver blade wherein the cutting edges of the blade project beyond the blade surface which defines average blade curvature.

It has been found that the cutting action of dry shaver blades and overall shaver efficiency can be improved substantially by having the cutting edges of the fixed and movable cutting blades contact each other on as small a total area as possible. In addition to providing more positive cutting action, this arrangement minimizes the sliding friction between the blades and thus enables the use of smaller and less expensive motors. Further, the arrangement provides a more efficient use of the available bias or pressure which necessarily is used between the blades to give desired cutting action.

By way of example, the method of this invention is illustrated and described in connection with making a curved outer blade, i.e. the stationary blade or comb, of a dry shaver. The blade made by the illustrated method is perforated, and it is intended to be mounted in the shaver in such a way that at least the perforated portion is curved.

A curved outer blade made in accordance with the method of this invention has cutting edges which project inwardly beyond the inside curved surface of the blade, and it is these cutting edges which engage the outside curved surface of the associated inner movable blade of the dry shaver. These projecting cutting edges are located at opposite sides of the perforations in the outer blade and they extend in a direction which is generally normal to the direction of movement of the reciprocating inner blade. As will be seen, these inwardly projecting cutting edges are easily and economically formed by using the method of this invention.

Other objects, advantages and details of the invention will be apparent as the description proceeds, reference being had to the accompanying drawing which illustrates various aspects and steps of the invention. It will be understood that the description and drawing are illustrative only and that the scope of the invention is to be measured by the appended claims.

In the drawing:

FIG. 1 is a plan view of a partially formed blade member used in the method of the invention;

FIG. 2 is a perspective view of a completed blade showing the curvature of the blade when mounted for use in a dry shaver;

FIG. 3 is a perspective view of a partially formed blade showing the curvature given to the blade preparatory to the step of lapping the inside surface;

FIG. 4 is a transverse sectional view of a lapping rod in operative relation with a partially formed blade, the blade being supported in a resilient back-up means which also is shown in section;

FIG. 5 is an enlarged sectional view showing the relationship between the lapping rod and a partially formed blade at the initiation of the lapping step;

FIG. 6 is a fragmentary enlarged plan view of the inside surface of a blade made by the method of this invention; and

FIG. 7 is a fragmentary longitudinal sectional view showing the relationship in a dry shaver between an outer blade made by the method of this invention and a cooperating inner blade.

Referring to the drawing, FIG. 1 shows a partially formed blade 10 used in the method of this invention. Blade 10 is an initially flat, thin sheet of metal. Although the method of this invention advantageously can be used with metal which is not prehardened, it is preferable for obvious reasons to use prehardened stock.

Side portions 11 and 12 of blade 10 respectively engage the dry shaver when the blade is curved as shown in FIG. 2 and mounted in the shaver. Side portion 11 has apertures 13 and 14 which receive projections extending from one side of the shaver and side portion 12 has apertures 15 and 16 for projections extending from the other shaver side.

The central portion of blade 10 is provided with suitable hair receiving perforations 18 which, as shown in FIG. 6, may be generally elongated. The perforations, however, may be round, or of other desired shape. Perforations 18 as illustrated are arranged in rows, with the perforations in one row being staggered with respect to the perforations in adjacent rows. In addition, the illustrated rows are parallel and inclined at a small angle to the blade ends 19 and 20 (FIG. 1).

FIG. 2 shows a finished blade curved to the shape possessed by the blade when mounted in a shaver. The inside surface of the blade is designated 22. The blade shown in FIG. 2 is curved about an axis 25, and at least the perforated part of the blade is generally concentric with this axis. It will be noted that the projected directions of the rows of perforations and the long dimensions of the individual perforations (if elongated) are approximately at right angles or normal to axis 25.

The characterizing aspect of the illustrated method resides in the step of lapping in a novel manner the inside surface 22 of the partially formed blade 10. As will be seen, blade 10 is lapped in a direction which is at an approximate angle of 90 degrees to the direction in which blades of this type customarily are lapped. Thus, the present lapping step might be termed "cross lapping."

FIG. 3 shows the manner in which blade 10 is curved preparatory to the lapping, or "cross lapping," step. The blade is curved in the same direction as the curvature employed in mounting the blade, but it is curved on an axis 27 which is approximately at right angles or normal to the axis 25 about which the blade is curved when mounted in a shaver. Thus, as illustrated in FIG. 3, the rows of perforations in the blade as curved for lapping extend parallel to the curvature axis 27. The radius of curvature given to blade 10 during the lapping step by the lapping rod is preferably generally the same or slightly smaller than the radius of curvature used when the blade is mounted in a shaver. Within limits, the smaller the radius of the lapping rod, the more pronounced are the inwardly projecting cutting edges, as will be seen.

Referring to FIG. 4, the curved blade 10 is supported in a resilient back-up means 30 which may reciprocate as indicated by the arrow 31. As shown, back-up means 30 may comprise a metal or wood plate 32 covered by a layer 33 of resilient material such as sponge rubber. The lapping step is carried out with a lapping rod 34 which reciprocates longitudinally or rotates, or both reciprocates and rotates.

As shown in enlarged FIG. 5, the blade metal extending transversely between perforations 18 of curved blade 10, which metal constitutes teeth 35, deviates somewhat from the average surface of curvature. The blade metal adjacent the edges of perforations 18 stands away or outwardly from the surface of average blade curvature which is represented generally by the surface of lapping rod 34.

From the foregoing it will be understood that as the lapping step proceeds, less metal is removed from teeth

edges 38 (FIGS. 5 and 6) than is removed from elsewhere on inner surface 22 of blade 10.

In other words, referring to FIG. 5, the arcuate surface of lapping rod 34 is effective to remove more metal from central portion 37 of teeth 35 and elsewhere than is removed from teeth edges 38. Thus, after the lapping step is completed, teeth edges 38 project inwardly beyond an imaginary arcuate surface defined by the portions of the blade surface from which the greater amount of metal has been removed.

FIG. 6 is an enlarged fragmentary plan view of the inner surface 22 of the blade after completion of the lapping step. The shaded areas 38 adjacent the long edges of perforations 18 indicate those portions of the blade surface where less metal is removed than elsewhere in the course of the lapping step. These edges 38 constitute the cutting edges of teeth 35.

As previously mentioned, a blade made by the foregoing method is curved to the shape shown in FIG. 2 when mounted in a shaver. The axis of this curvature is, of course, approximately at right angles or normal to the curvature axis used during the lapping step.

FIG. 7 is a fragmentary enlarged sectional view of a fixed outer blade 10 curved above axis 25 (FIG. 2) to the shape it possesses when mounted on a shaver. For illustrative purposes FIG. 7 also shows in section an inner movable blade 40 in effective relation with fixed outer blade 10. It will be noted that edges 38 of teeth 35 project inwardly and constitute the portions of blade 10 which mainly engage the outer surface of inner movable blade 40.

Teeth edges 38 constitute the cutting edges of blade 10 and the relationship thereof with movable blade 40 insures improved cutting action. The relationship also minimizes sliding friction between the blades and thus enables the use of smaller and less expensive motors. In addition, the relationship provides a more efficient use of the available cutting bias which necessarily is provided between the blades to give desired cutting action.

From the above description it is thought that the procedures and advantages of the invention will be readily apparent to those skilled in the art. Various changes in detail may be made without departing from the spirit or losing the advantages of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. The method for making a curved outer blade for a dry shaver comprising the steps of:

selecting an initially flat, thin, resilient prehardened sheet of metal;

perforating said sheet with rows of elongated hair receiving perforations, the perforations in adjacent rows staggered;

curving said sheet on an axis generally parallel to said rows whereby the metal along the long edges of said perforations stands outwardly from the surface of average sheet curvature, said sheet engaging resilient back-up means;

lapping the interior of said sheet with a lapping rod having generally the said average curvature whereby less metal is removed from said sheet along the long edges of said perforations than elsewhere; and

curving said sheet with the perforated portion of the sheet curved on an axis generally normal to the axis of curvature used during the lapping step whereby the metal along the long edges of said perforations projects inwardly beyond the surface of average sheet curvature to provide cutting edges.

2. The method for making a dry shaver blade comprising the steps of:

curving a thin sheet of perforated metal about a first axis whereby metal at perforation edges generally parallel to said axis stands outwardly from the surface of average sheet curvature;

lapping the interior of said sheet with a lapping rod having generally the said average curvature whereby less metal is removed from said sheet at said perforation edges than elsewhere; and

curving said sheet with the perforated portion curved on a second axis generally normal to said first axis whereby the metal at said perforation edges projects inwardly beyond the surface of average sheet curvature to provide cutting edges.

3. The method for making a dry shaver blade comprising the steps of:

resiliently supporting a thin sheet of perforated metal against a cylindrical lapping tool whereby metal at perforation edges generally parallel to the axis of said tool stands outwardly from the surface of average sheet curvature;

lapping the interior of said sheet whereby less metal is removed from said sheet at said perforation edges than elsewhere; and

curving said sheet with the perforated portion curved on an axis generally normal to the axis of said tool whereby metal at said perforation edges projects inwardly beyond the surface of average sheet curvature to provide cutting edges.

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