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METHOD OF MANUFACTURING OPEN-END BLADES

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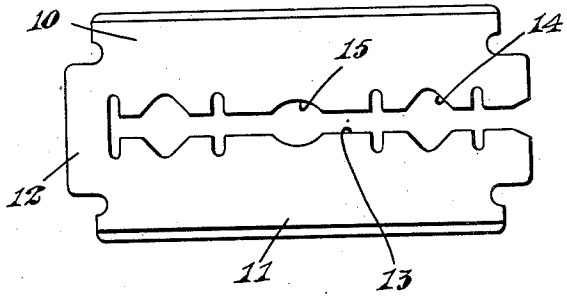

Fig. 1.

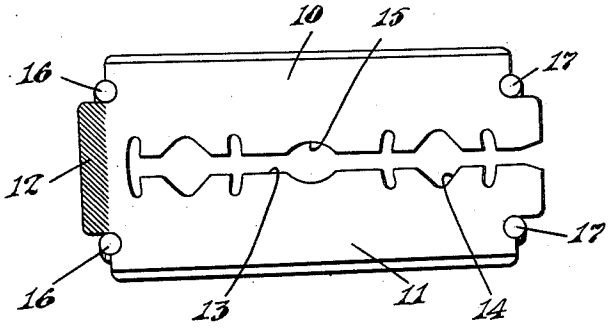

Fig. 2.

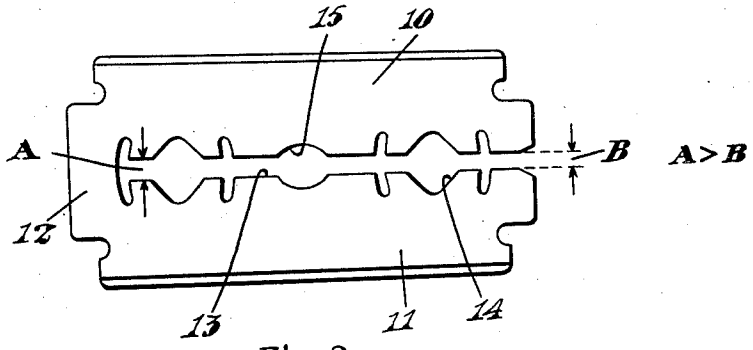

Fig. 3.

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METHOD OF MANUFACTURING OPEN-END BLADES

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4 Claims. (Cl. 76—104)

This invention consists in a new and improved method of manufacturing open-end safety razor blades, that is to say, blades having a medial longitudinal slot opening out through one of the transverse end edges of the blade.

Open-end blades may be employed in safety razors in which the cap and guard members are detachably associated, but they have the additional advantage that they may be also presented by endwise movement in safety razors wherein the cap and guard members are connected to permit only a limited separation.

It has been found that in safety razors of the type wherein the blade is transversely flexed when it is clamped in shaving position, as in the "Gillette" type safety razors, the cutting edges of an open-end blade are frequently deflected out of their normal parallel relation. Whereas, the two sharpened longitudinal edges may be disposed accurately in parallel relation when the outline of the blade is initially determined, the two edges are often found to diverge toward the open-end of the blade when the blade is flexed and clamped in the razor. This is due partly to the fact that the hinge portion at the closed or solid end of the blade has a restraining effect on the two side portions which is entirely absent at the open-end of the blade. Going more into detail, the side portions are tied together at the closed end of the blade by a flexible connection which, when curved by the cooperating clamping elements of the razor, causes the cutting edges of the blade to draw together. However, inasmuch as the side portions of the blade adjacent to its open end are free and unconnected the free ends are not subjected to this drawing-in action. These differences in structure and behavior, and possibly other causes, often result in a departure from parallelism of the two sharpened cutting edges in an open-end blade when finally clamped in shaving position. Such variation detracts from the precision of the assembled razor and produces irregularities in the edge exposure of the blade that may even become so excessive as to be dangerous in some cases.

I have improved the structure and operation of open-end razor blades and eliminated uneven edge exposure by causing the two side portions of the blade to draw together resiliently in the clamping operation at the open end of the blade and thus to compensate for any drawing-in of the other ends of the sharpened edges that may occur from any cause whatever.

In one aspect the present invention consists in a method of manufacturing open-end blades in which initial convergence is imparted to the two side portions of the blade, more particularly to their sharpened outer edges and incidentally to the longitudinal slot which separates the sharpened portions of the blade.

The method of my invention follows the usual preliminary steps employed in the commercial manufacture of double-edged blades, whether of closed-end or open-end type, that is to say, the steps of outlining, hardening and tempering blade blanks and grinding, stropping and honing the outer edges thereof in parallel relation. I have discovered, however, that by a series of subsequent novel steps I am able to impart to an open-end blade, produced up to this point by the conventional steps of commercial manufacture, a permanent and resiliently maintained convergence of its sharpened cutting edges. This is accomplished in accordance with my invention by first contracting the side portions of the blade at the open-end to less than the initial width of the slot and then heating the blade to set its side portions in the position thus determined.

The most convenient way of carrying out these steps now known to me is positively to gauge the two side portions in contracted condition with their sharpened edges converging to the desired degree toward the open end of the blade and then heating the hinge portion of the blade and thereby setting the side portions in the gauged position. Preferably and as herein shown this is effected by contracting the side portions by placing gauge pins in engagement with shoulders at the contracted open end of the blade and then heating the hinge portion while the blade is so engaged. The heating is carefully limited in its intensity so that it effects the desired setting of the two side portions of the blade, but does not destroy the resiliency of the hinge portion of the blade, that is to say, sufficient residual resiliency is retained in the hinge portion to maintain the gauged position of the side portions of the blade and leave them with an effective tendency to return to that position in opposition to any disturbing or spreading force that the blade might encounter in ordinary use.

These and other characteristics of my improved method will be best understood and appreciated from the following detailed description of a preferred manner of carrying it out as suggested in the accompanying drawing, in which:

Fig. 1 is a plan view of the blade as it appears at the conclusion of the usual grinding, stropping and honing steps;

Fig. 2 is a similar view of the blade held in

gauged position and suggests the heating step; and

Fig. 3 is a similar view of the finished blade.

The blade shown in Fig. 1 may be advantageously manufactured in strip formation, a series of blades being outlined in a strip of thin steel by punching so as to form the two similar side portions 10 and 11, the connecting transverse hinge 12 and the elongated medial slot 13. The slot 13 extends to the right-hand end edge of the blade and is provided with intermediate enlargements 14, for receiving the blade-locating projections of the razor in which the blade is to be used, and with a central enlargement forming a circular perforation for the passage of the shank of the razor cap. The outline of the blade includes reentrant corners which define elongated unsharpened end portions in the blade, one of these constitutes the solid hinge portion 12 while the slot 13 opens out through the other end. It will be understood that the blade blanks as thus outlined are maintained in strip formation by being connected at their end edges.

The blade strip is now hardened and then drawn to the temper best suited for cutting. Its longitudinal edges are then ground, stropped and honed and thus brought to the keen cutting edge required for shaving. The blades are then separated one from another by breaking on the transverse line of their end edges. The steps above explained are now generally followed in the commercial manufacture of razor blades and from the standpoint of the present invention it is immaterial in what order they occur.

Having produced the tempered and sharpened blade as shown in Fig. 1 its two side portions may be contracted, as suggested in Fig. 2, by engaging the blade in a fixture between a pair of stop or gauge pins 16 and a pair of stop or gauge pins 17 located and arranged to fit the reentrant corner recesses of the blade. The gauge pins 16 are spaced substantially in accordance with the outline of the finished blade, that is to say, they fit the recesses of the blade without in any way modifying its outline. The gauge pins 17, however, are located somewhat closer together and accordingly impose a contraction of .006" to .010" in the width of the blade at its open end. The gauge pins 17, therefore, forcibly hold together the two side portions of the blade and impart a convergence to the opposed edges of the slot 13 and to the sharpened outer edges of the blade. While the blade is held in this condition the hinge portion 12 is subjected to heat by being engaged between hot plates or from any other source of heat and is heated throughout an area substantially that suggested by the hatching in Fig. 2. The effect of this heating continued for less than half a second is that the blade is set with its side portions in the convergent relation determined accurately and uniformly in each case by the gauge pins 17, and this setting is effected without substantially reducing the resiliency of the hinge portion 12.

At the conclusion of the heating step the blade is removed from the gauge pins and will be found to maintain naturally and of its own resiliency the shape shown in Fig. 3. The inner walls of the slot 13 are convergent and the outer sharpened edges present the same degree of convergence. Graphically this is illustrated by the equation $A > B$, where A indicates the full initial width of the slot and B its contracted width.

The blade thus produced may be presented to a safety razor having a gauge stop slightly wider than the dimension B and in this case the sides of the slot 13 will resiliently hug the faces of the stop and will expand the open-end of the blade sufficiently to bring the cutting edges into exact parallelism. Moreover, the blade by its natural resiliency will tend to resist any force tending to spread the open-end of the blade and will compensate for any lag in contraction that may occur between the two ends of the blade when the blade is flexed transversely between the members of the safety razor in which it is used.

It will be apparent that the novel method of my invention may be carried out without requiring any change whatever in the present commercial manufacture of blades from strip steel and without requiring any modification of the steps of grinding, stropping and honing parallel edges in the blade strip. On the contrary, these steps may be carried out with the full advantage of accuracy and convenience incident to dealing with the straight parallel edges, and these supplemented by the step characterizing my novel method.

Having thus disclosed my invention and described in detail one illustrative manner in which it may be carried out I claim as new and desire to secure by Letters Patent:

1. The method of manufacturing open-end safety razor blades, which includes the steps of providing a blade having two side sections separated by a medial longitudinal slot, contracting the slot at the open end of the blade to less than its initial width, and heating the blade to set its side portions in the position thus determined.

2. The method of manufacturing open-end safety razor blades, which includes the steps of providing a blade having two side sections separated by a central longitudinal slot and connected at one end by a flat hinge portion, contracting the slot at its open end to less than its initial width, heating the hinge portion of the blade and thereby setting its side portions in the position thus determined.

3. The method of manufacturing open-end safety razor blades, which includes the steps of providing a blade having two side sections separated by a central longitudinal slot, sharpened at their outer longitudinal edges and connected at one end by a transverse hinge portion, positively gauging the side portions in contracted condition with their sharpened edges converging toward the open end of the blade, heating the said hinge portion and thereby setting the side portions of the blade in gauged position.

4. The method of manufacturing double-edged, open-end safety razor blades, which includes the steps of providing a blade having two sharpened side portions separated by a medial slot, connected at one end by a transverse hinge portion and terminating in unsharpened elongated end portions presenting projecting shoulders, contracting the side portions at the open end of the blade by gauge pins engaged with the shoulders at that end of the blade, heating the hinge portion while the blade is so gauged and thereby setting the side portions in the contracted position thus determined.

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