Dec. 16, 1930. P. D. GRISARD 1,785,189

RAZOR

Original Filed April 24. 1929 2 Sheets-Sheet 1

Fig. 1.

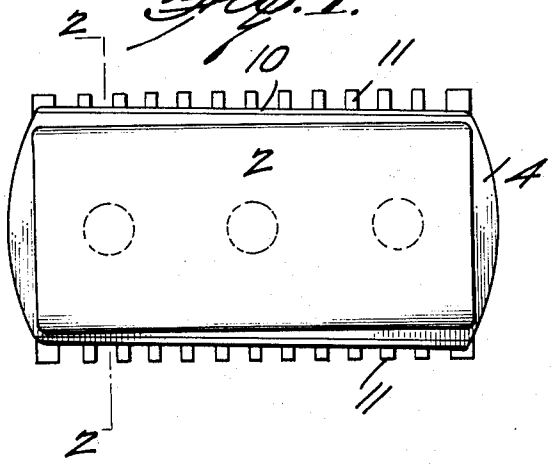


Fig. 2.

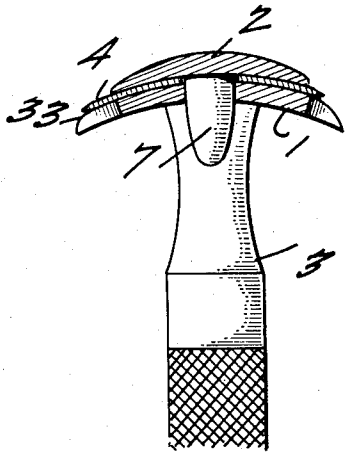


Fig. 3.

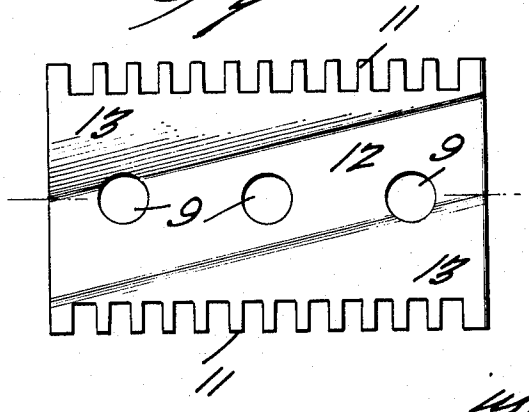


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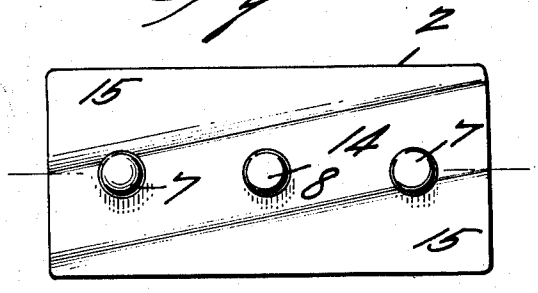


Fig. 5.

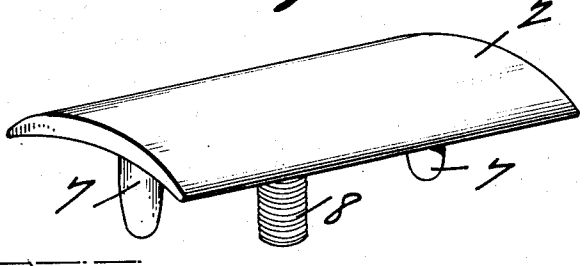
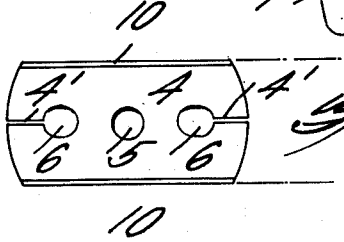


Fig. 6.



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Fig. 7.

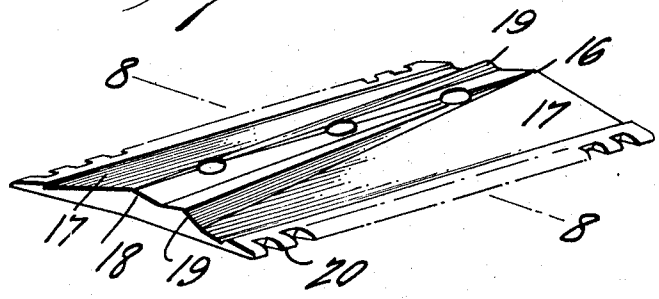


Fig. 8.

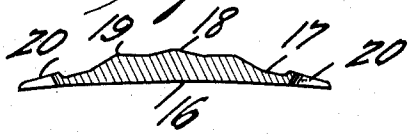


Fig. 9.

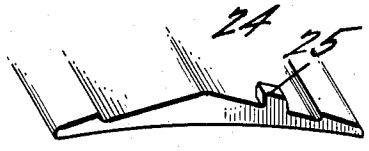


Fig. 11.

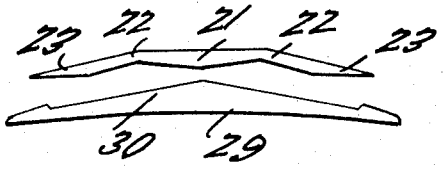


Fig. 10.

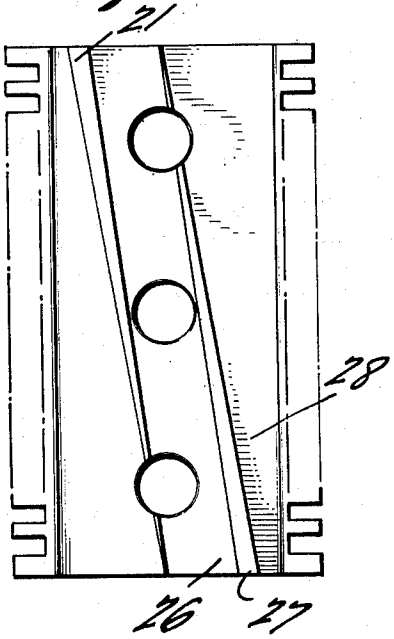


Fig. 12.

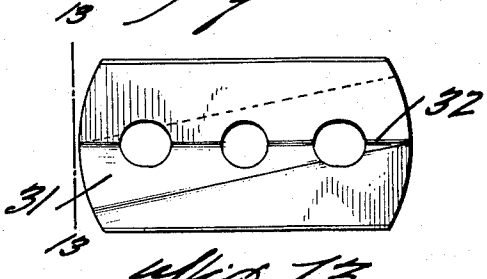
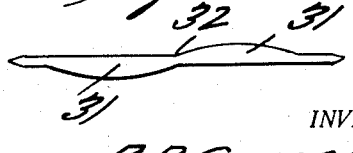


Fig. 13.



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UNITED STATES PATENT OFFICE

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RAZOR

Application filed April 24, 1929, Serial No. 357,789. Renewed October 27, 1930.

This invention is directed to an improvement in safety razors of the type involving a guard plate, a clamping plate and a more or less flexible blade secured in rigid relation between the guard plate and clamping plate.

Safety razors of this type as ordinarily constructed present the respective cutting edges of the blade on lines which are at direct right angles to the axis of the handle of the razor; that is to say, the horizontal plane of the cutting edges is at direct right angles to a plane passing through the axis of the handle parallel to the free edges of the guard teeth while the vertical planes of such cutting edges is directly parallel to such axial plane. Thus, in the ordinary use of a razor of this type, the cutting edges act on a direct line cut as distinguished from a shear or diagonal cut. In order to avoid cutting the flesh, it is imperative that the cutting edge move over the flesh in a plane substantially parallel thereto, for if this plane is deviated from to any appreciable extent, one portion of the blade will cut deeper than the other portion, with the liability of cutting the flesh or imperfect shaving. It is further well understood from a practical standpoint that with cutting tools a shear or diagonal cut is more readily and easily effective than a straight line cut.

The primary object of the present invention, therefore, is to provide a safety razor in which the cutting edges of the blade are disposed in a plane diagonal to the vertical plane passing axially through the handle and including the longitudinal median line of the guard and clamping plates, while at the same time maintaining the cutting edges of the blade in a horizontal plane which is at direct right angles to the handle plane referred to.

Structurally speaking, the improved razor, in order that the desired object may be attained, is formed so that incident to the clamping operation diagonally opposed portions of the blade will be compelled to move a comparatively greater or less distance than the remaining diagonally opposite portions of the blade, with the result that the cutting edge of the blade will, when in finally clamped position, present an edge which is diagonal to a line joining the free edges of the guard teeth; this result being secured by relative and cooperating formations of the guard and clamping plates or by formation of the blade itself.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of the improved razor, showing the blade clamped in position ready for use, and illustrating particularly the diagonally arranged cutting edges of the blade.

Figure 2 is a section on line 2—2 of Figure 1.

Figure 3 is a plan view of the guard plate formed particularly to insure the desired clamped relation of the blade, the guard plate being otherwise conventional.

Figure 4 is a bottom plan view of a clamping plate formed for cooperation with the guard plate shown in Figure 3.

Figure 5 is a perspective view of the clamping plate.

Figure 6 is a plan view of a razor blade used in the improved razor.

Figure 7 is a perspective view of a somewhat different form of guard plate.

Figure 8 is a section on line 8—8 of Figure 7.

Figure 9 is an edge view of a different form of guard plate.

Figure 10 is a plan view of another form of guard plate.

Figure 11 is an edge view of a further form of clamping plate and guard plate.

Figure 12 is a plan view of a modified form of razor blade.

Figure 13 is an edge view of the same.

With particular reference to Figures 1 to 6 inclusive, it will be noted that the improved razor includes a guard plate 1, a clamping plate 2 and a handle 3 which, so far as external appearances are concerned when the razor parts are assembled, are substantially conventional. That is, the blade shown at 4 in Figure 6 is formed with a central opening 5 and end openings 6 through which, in the assembling of the razor, extend guide studs 7 and a threaded stud 8 depending from the clamping plate 2, the guard plate 1 being formed with open-

ings 9 to permit the passage of these studs, and the handle 3 being interiorly threaded to cooperate with the threaded stud 8 and thereby force the clamping plate onto the blade with the effect of causing the blade to be rigidly held in a form corresponding to the form of the cooperating faces of the clamping plate and guard plate. To facilitate this movement the blade is divided on lines 4' from the openings 6 to proximate ends of the blade. In the ordinary razor, this clamping action causes the blade to assume a true rounded form, the radius of curvature of which is the same at every point, so that under the clamping action, the cutting edges 10 of the blade 4 overlie spaced fingers 11 at the edges of the guard plate and rest in a plane exactly parallel to the free ends of said fingers.

The primary object of the present invention is to insure that the clamping cooperation of the parts in assembling the razor shall be identical with that described except that these parts shall be so relatively formed that during the clamping operation certain portions of the longitudinally opposed edges shall not advance toward the free edges of the guard fingers in the same degree as other portions of such edges, with the result that when the blade is finally in clamped relation, its cutting edges 10 are slightly diagonal with respect to the free edges of the guard teeth, or in other words shall assume the position shown somewhat exaggerated in Figure 1. It is a particular merit of the present invention that, aside from this relative play of the blade to secure this diagonal relation of its cutting edges, the clamping cooperation between the parts and the effective cutting disposition of the cutting edges of the blade with respect to the fingers of the guard plate is substantially identical with that of the conventional razor, and that, aside from the more perfect and easy cutting operation of the blade incident to its shear cut as compared with the direct line cut of the conventional razor, the improved razor acts in all respects as does the conventional safety razor.

In providing for this result, in the form of the razor illustrated in Figures 1 to 5 the normal curve of the upper or blade engaging surface of the guard plate 1 is interrupted throughout diagonally opposed portions of said surface. Thus, the guard plate at each end is, for a distance beginning adjacent the longitudinal median line of the plate and extending to but not including the guard teeth 11, cut away on a radius greater than that of the normal curvature of the plate. This cut-away portion extends longitudinally of the guard plate but is of gradually decreased dimensions transversely of the guard plate, so that at each end the cut-away portion is of maximum dimension transversely of the plate and gradually decreases in such dimension toward the opposite end of the plate where it merges finally into the normally curved plane of the plate. A cut-away portion is of course formed at each edge of the guard plate and are oppositely disposed with respect to the guard teeth, so that the plate at each end presents a cut-away portion of maximum dimension transversely of the guard plate, with the cut-away portions at the respective ends on opposite sides of the longitudinal median line, the end of the guard plate being otherwise of substantially normal curvature.

Therefore, as will be plain from Figure 3, the guard plate presents in plan view an intermediate section 12 which includes the openings 9 and which extends diagonally of the guard plate throughout its full length, with this portion 12 of normal guard plate curvature. Beyond the marginal edges of the section 12, the guard plate presents further sections 13 which complete the surface of the guard plate and, as stated, are formed on a different radius from that of the normal curvature, their maximum transverse extent at the respectively opposite ends of the guard plate being of gradually decreased transverse dimension and finally merging into the section 12, that is the section of normal curvature.

The inner face of the clamping plate 2, that is the concave face which bears upon the blade 4, is similarly formed to fit over the guard plate with an intermediate section 14 hollowed out to fit the curvature of the clamping face, which section, when the parts are in clamping relation, overlies and is in coincidence with the face 12 of the guard plate. The clamping face of the clamping plate is further formed on each side of the section 14 to provide sections 15 which are complementary in form and oppositely disposed in relation to the sections 13 of the guard plate.

In this particular form, it will be apparent that incident to the clamping action, the blade 4 is compelled to partake of the cooperating curvature of the convex face of the guard plate and the concave face of the clamping plate. As a portion of these faces is formed on a radius exceeding that of the normal radius of the curvature of the faces, it will be apparent that, throughout such range of greater radius, the movement of the clamping plate approaches more nearly a straight line. Obviously, as a result of this, the portion cooperating with these parts of greater radius will, under the clamping action on the blade, move farther out toward the free edges of the guard teeth 11, for the opposite ends of the blade, that is the portions bearing upon the section 12, follow a curve which in a measure takes up the length of the blade to a greater extent than does the more nearly straight portions 13.

As these portions 13 have their maximum transverse dimensions at the respective diagonally opposite edges of the blade, it is apparent that in the clamping action the blade is equally projected toward the free edges of the guard teeth at the relatively diagonal end edges. This permits a bodily spreading out movement of the blade incident to this difference in circumferential movement of the blade during the clamping action, the cutting edge of the blade will necessarily assume a plane which is diagonal to the free edges of the guard teeth 11, that is closer to said free edges at the ends of maximum transverse dimension of the sections 13 and farthest from said edges adjacent the ends of minimum transverse dimension of the portions 13. As this formation is uniform on opposite sides of the median line of the blade, but oppositely disposed with respect to the ends of the blade, it follows that the blade will be in effect splayed out or flattened, and the cutting edges of the blade will have the diagonal relation indicated in Figure 1 of the drawings. In this figure, this relation is somewhat exaggerated in order to more clearly illustrate the arrangement.

It will of course be apparent that the results sought in the improved razor, and illustrated more particularly in Figures 1 to 5, may be readily attained by other specific constructions, and it is to be understood that the present invention contemplates any specific arrangement of the clamping plate, guard plate and blade or any of them by which, in the clamping operation, longitudinally opposed end portions of the blade are caused to travel a relatively greater or less distance than the remaining longitudinally opposed end portions of the blade.

In order, however, to demonstrate the feasibility of other detailed construction to accomplish the same result, I have illustrated several different modifications which will now be more specifically referred to.

In Figure 7, the guard plate, here indicated at 16, is formed on its clamping or blade engaging surface with plain surfaces 17 inclining downwardly from the longitudinal median line 18 of the plate. At the respective opposite ends the opposing plain portions 16 of the plate are formed with substantially triangular projections 19 which rise above the surface 17 with maximum altitude and base proportions at opposite ends of the plate, these projections 19 being then gradually diminished both as to base line and altitude until merging into the plain surfaces 17 of the plate adjacent the opposite transverse end of the plate. The projections 19 are preferably arranged about mid-width the surfaces 17 at their portion of maximum base and altitude and incline with respect to the free edges of the guard teeth 20 until, at the minimum end or that end merging into the normal surface of the plate, the projection is coincident with the longitudinal median line of the plate.

The clamping plate for use with this particular type of guard plate is illustrated more particularly in Figure 11, the studs to be used in connection with this clamping plate being understood as conventional though omitted from the figure in order to avoid confusion. Here the clamping plate, indicated at 21, has its lower surface formed on opposite sides of the longitudinal median line with depressions 22 extending longitudinally of the clamping plate and having their maximum dimensions at the respective opposite ends and gradually merging therefrom into the normal plane 23 of the plate which corresponds to and more or less accurately fits the plain surfaces 17 of the guard plate. The recesses 22 of the clamping plate are designed to more or less accurately fit over the projections 19 of the guard plate, compelling the blade, in the clamping cooperation of these parts, to follow the plane defined by the projections. Obviously the blade, when projected under the clamping action, is retarded in that projection to a greater extent at the point of maximum area of the projection than at the opposite end of the blade. Thus, the diagonally opposite ends of the blade are projected somewhat in advance of the remaining diagonally opposite ends, with the same effective diagonal relation in a final position as defined in connection with the preferred form.

Figure 9 shows a form of guard plate in which said plate, here indicated at 24, is formed on the blade engaging surface with diagonally related posts 25, serving to deflect the blade in the clamping operation to secure the diagonal cutting edge.

In Figure 10 is illustrated a further modified form in which the guard plate, here indicated at 26, is formed in opposed diagonal relation with rectangular projections 27, the relative width and height beyond the surface of the guard plate of such projections being gradually reduced longitudinally of the guard plate until at the end opposite that of maximum dimension, the said projections merge into the normal surface 28 of such plate, the merger being substantially at the longitudinal median line of such plate.

The clamping plate illustrated in Figure 11 may be used with this particular type of guard plate, it being apparent that under clamping action the relative projection of the diagonally opposite edges of the blade will be such as to insure the diagonal cutting edge indicated in the preferred form.

In Figure 11 there is illustrated another form of guard plate indicated at 29 in which the upper or blade engaging surface inclines downwardly from the longitudinal median line, as at 30. This surface is uniform throughout the length and width of the plate,

and is designed to be used in connection with clamping plate 21, also illustrated in Figure 11.

A particular type of blade is to be used with this form of guard plate, this blade being illustrated more particularly in Figures 12 and 13. The blade is formed on opposite sides of the longitudinal median line, at opposite ends of the blade and on opposite surfaces of said blade, with rounded protuberances 31 having their maximum projection at opposite ends of the blade, and being of gradually reduced dimensions longitudinally of the blade until at their opposite ends they merge into the natural curvature of the blade substantially at the longitudinal median line thereof, as at 32. With this blade in use, it is apparent that the same variation in the advancement of the blade under clamping action is provided for as in the other forms, and hence the diagonal line of the cutting edge is secured with the same certainty as in the other forms.

In connection with the use of a blade of diagonally arranged cutting edge, it will be apparent that the cutting edge nearest the free edge of the teeth of the guard plate will approach closer to the flesh in the use of the razor and that for this reason there is liability of an imperfect shaving operation at one end or a possible cutting of the flesh at the opposite end. To avoid this possible result, it is preferred that the guard teeth of the guard plate be so formed as to insure that the edge of the blade which is closest to the edge of the teeth shall, during the shaving operation, be substantially the same distance from the face of the user as at the other end. In order to provide for this result, the teeth which coincide with the portion of the blade closest approaching the edge of the teeth are, in advance of where the edge of the blade bears on said teeth, slightly thickened, as indicated at 33, as compared with the thickness of the teeth adjacent the retracted end of the blade. The thickness of the teeth in advance of the retracted end of the cutting blade is of normal razor thickness and the respective teeth intermediate the end teeth present a relative thickness which is on a line merging from the thickest tooth at the projected end of the blade into the normal tooth at the retracted end of the blade. Thus, in the use of the blade, the respective ends of the blade are spaced substantially the same distance from the skin and the cutting effect, so far as the cutting distance is concerned, is uniform for both ends of the blade.

It is to be particularly noted that the razor resulting from the use of any of the above forms presents a straight cutting edge, that is an edge which is parallel to the surface over which it is operating but which edge is diagonally arranged with reference to the line of cut, thereby insuring that shearing cut which is most easily and completely effective in a cutting operation where a moving element cooperates with a relatively fixed element to be cut. There is no twisting or distortion of the cutting edge as such. There is no divergence from a straight line edge and thus, as a shaving implement, the razor may be used exactly as is the ordinary razor and with all the efficiency of the ordinary razor coupled with the added efficiency of a cleaner and more effective cutting operation.

While the improvement is designed more particularly for use in connection with razors, it is to be understood that the inventive thought underlying the present invention is equally applicable to other cutting tools involving a removable blade, where such blade, by its inherent characteristics, is capable of being strained in the clamping operation to a degree to permit the presentation of a diagonal cutting edge for such blade.

What is claimed to be new is:

1. A safety razor including clamping elements, a flexible blade with which the clamping elements cooperate, the blade in its initial cooperation with such elements having its cutting edge in parallel relation to the edges of such elements, and means formed on said elements to compel the cutting edge of the blade to assume a diagonal relation to the edges of said clamping means.

2. A safety razor including clamping elements and a flexible blade to be interposed between in both clamping and non-clamping relation of the elements, said blade in the non-clamping relation of the elements having its cutting edge in straight parallel relation to the adjacent edges of the elements, and means on said elements and effective in clamping cooperation of such elements and blade to cause the cutting edge of the blade to assume a straight line diagonal to the adjacent edges of the elements.

3. A cutting implement including a flexible blade having a cutting edge, clamping elements for securing the blade to maintain at all times a substantially rigid straight cutting edge, and means on said elements for advancing one portion of the blade with respect to another portion in the clamping action of the elements to thereby present such straight cutting edge diagonal with respect to the median line of the clamping elements.

4. A cutting element including a flexible blade having opposed cutting edges, and clamping means to secure said blade to present such cutting edges in substantially rigid straight-line form, said clamping means being formed with means to act on the blade in the clamping operation to simultaneously advance diagonally opposed portions of the blade relative to the remaining portions, to

thereby present diagonal straight-line form cutting edges.

5. A cutting implement including a flexible blade, and clamping means for securing said blade in a substantially rigid form, with the cutting edge of the blade lying in a flat plane, the cooperating faces of the clamping means presenting complementary portions to engage the blade and compel that movement of the blade during the clamping operation whereby the cutting edge will be finally in a diagonal relation and in a flat plane.

6. A cutting implement including a flexible blade, and clamping means for the blade, said clamping means including a guard plate and a clamping plate, the proximate faces of the clamping plate and guard plate being formed throughout determinate areas with complementary formations tending to influence the blade during the clamping operation to present the edge of the blade in a diagonal relation while maintaining such edge in substantial contact with the guard plate and in a straight line.

In testimony whereof I affix my signature.

PAUL D. GRISARD. [L. S.].