May 3, 1938. W. J. DAVIES 2,116,190

SAFETY RAZOR

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FIG. 1.

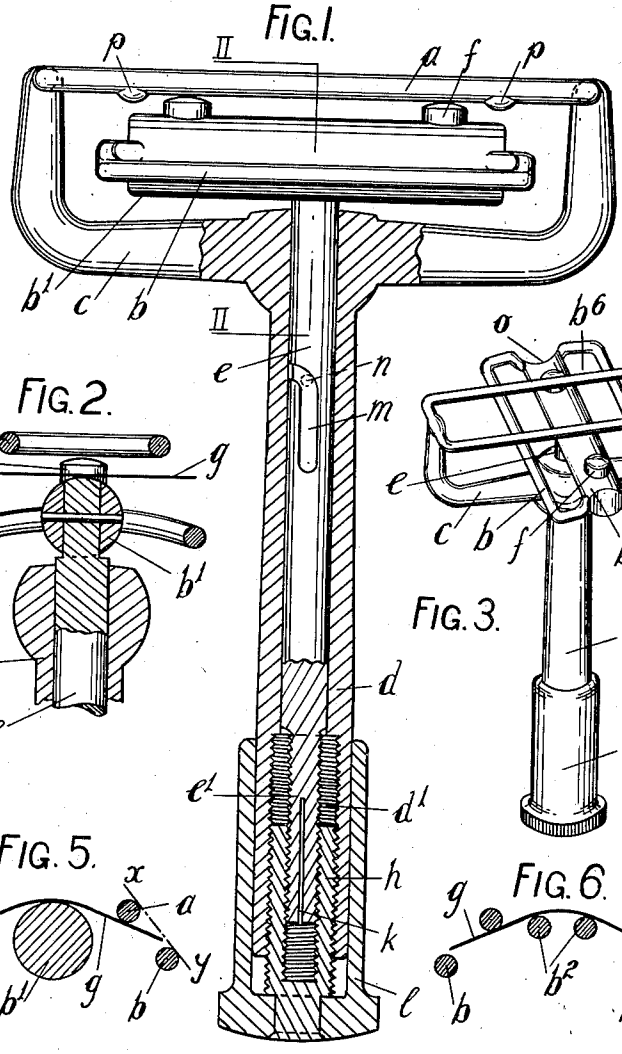

FIG. 2.

FIG. 3.

FIG. 5.

FIG. 6.

FIG. 4.

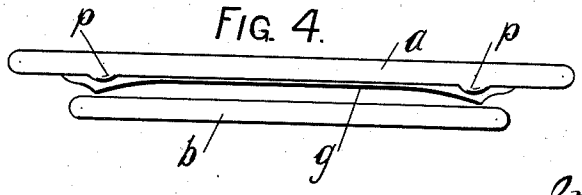

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FIG. 7.

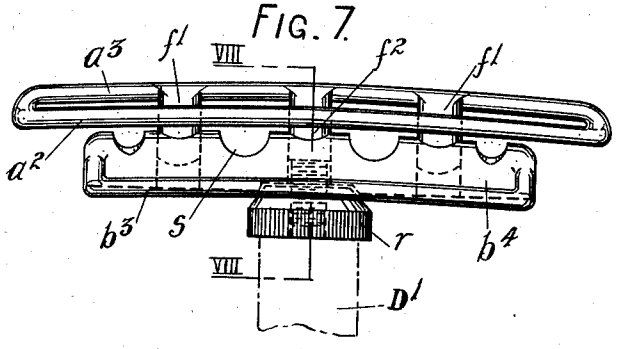


FIG. 8.

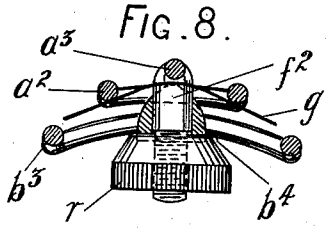
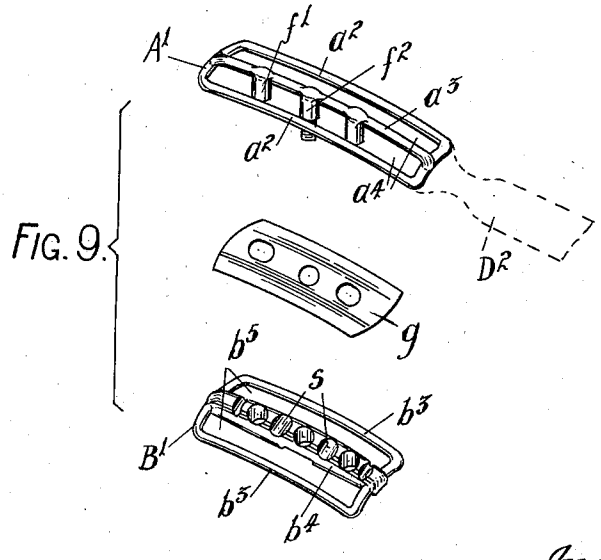


FIG. 9.



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UNITED STATES PATENT OFFICE

2,116,190

SAFETY RAZOR

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15 Claims. (Cl. 30—74.1)

This invention relates to an improved construction of safety razor of the kind employing a thin flexible double-edged razor blade held between a pair of cooperating blade-flexing members, one of which incorporates guards for the cutting edges of the blade.

The invention has for its objects to provide a safety razor which will ensure smooth and easy shaving, and one which is adjustable to suit the user's requirements, while providing for easy removal and replacement of the blade and easy cleansing of the appliance without dismantling the parts thereof.

It is a characteristic feature of the safety razor of the present invention that each of the members between which the blade is positioned comprises a skeleton frame constituted by connected parallel bars with a space between them, the bars of one member being located opposite the spaces between or beyond the bars of the other member. The thin flexible double-edged razor blade is thus held between a plurality of bars which make contact with the blade and which are spaced apart from one another and are disposed on opposite sides of the blade, the said bars being arranged to be pressed against the blade to flex it transversely. No bar at either side of the blade is directly opposite a bar at the opposite side of the blade, so that the blade is not at any point gripped between a pair of directly opposite blade flexing surfaces. One of the blade flexing members incorporates blade-edge guards and for this purpose comprises a pair of outer guard bars connected to a medial or intermediate blade-engaging thrust member which protrudes above the plane of the guard bars, spaces being provided between the said thrust member and the guard bars. Said thrust member may consist of one or more bars bridging a skeleton frame constituted by connecting the ends of the guard bars. The other blade flexing member preferably comprises a pair of spaced parallel connected bars at such a distance apart as to be disposed opposite the spaces between the guard bars and the medial or intermediate thrust member. The space between the two parallel bars at one side of the blade permits free deflection of the blade between them under the thrust of the medial or intermediate thrust member at the other side of the blade. Adjustment of the medial thrust member at right angles to the plane of the two opposed connected parallel bars, enables the flexing of the blade to be adjusted to vary the distance of the blade cutting edges from the blade-edge guards according to the degree of cutting clearance or fineness desired during shaving.

The skeleton formation of the blade flexing members enables them to be rapidly and easily cleansed by immersion in water without it being necessary to dismantle them from one another.

These and other features and advantages of the present invention will be hereinafter more particularly set forth with reference to the accompanying drawings which illustrate examples of safety razors according to the invention.

Fig. 1 is a view of one form of safety razor in elevation, showing the blade carrier retracted and without the blade; the handle is shown in section. Fig. 2 is a fragmentary cross-sectional view on the line II—II of Fig. 1, also showing the blade. Fig. 3 is a perspective view of the razor according to Fig. 1 showing the blade carrier turned through an angle and without the blade. Fig. 4 is a detail view looking on the edge of the blade. Fig. 5 is a diagrammatic representation of the flexing of the blade and Fig. 6 is a diagrammatic representation of a slightly modified construction of blade flexing means.

Fig. 7 is a view of an alternative form of razor in elevation without the blade and with the flexing members partially retracted from each other. Fig. 8 is a cross-sectional view on the line VIII—VIII of Fig. 7, but with the blade clamped in position. Fig. 9 is a perspective view of the parts separated from one another.

Referring firstly to Figs. 1 to 6, the razor comprises a pair of members designated by the general reference characters A and B in Fig. 3. The member A consists of a pair of parallel bars a spaced apart and connected together at their ends to a yoke piece c which is carried at the upper end of a tubular handle d. The member B comprises a pair of guard bars b connected at their ends to a medial bar b^1 carried at the upper end of a spindle e. It will be seen that the members A and B are of skeleton formation, and that when their bars are parallel to one another as shown in Figs. 1 and 2, the bars a are opposite spaces b^6 between the bars b and b^1. Likewise the bar b^1 is opposite the space between the bars a. The handle d and spindle e provide a convenient means of holding the members A and B and of adjusting them towards and away from each other, as hereinafter described, but the two members A and B may be carried and relatively adjustable in any convenient manner, as will be apparent from the subsequent description of the modification shown in Figs. 7–9.

The medial bar b^1 is provided with blade engag-

ing and positioning means, such as projections f for engaging apertures in the usual thin flexible double-edged blade g which may be laid flat upon the bar b^1 over the projections f when the latter are below the plane of the underside of the bars a, that is to say, when the member B has been sufficiently retracted as in Fig. 1. When the members are brought closer together, the bar b^1 will thrust the blade between the bars a which engage the blade at a distance from the blade cutting-edges. Preferably the bars a engage the blade at lines approximately midway between the cutting edges and the lines of contact of the blade with the medial bar b^1. When the members are brought still closer together, the parts substantially assume the position shown in Fig. 5, the blade being flexed until its cutting edges almost coincide with a plane denoted by the line x—y in Fig. 5 tangential to the bars a and guard bars b. The blade cutting edges do not come into contact with the guard bars b, but are spaced at a greater or less distance or cutting clearance therefrom according to the degree to which the blade is flexed. In this manner the razor can be adjusted to give a finer or a coarser cut. It will be noted that, to this end, the medial bar b^1 protrudes above the plane of the guard bars b.

Fig. 6 illustrates a slight modification in which a single medial bar is replaced by a pair of parallel bars b^2 which function in the same manner as the bar b^1 of Figs. 1–5.

As shown more particularly in Fig. 1, the adjustment of the members may be accomplished by providing the spindle e with a screw-threaded end portion e^1 engaging an internal screw-thread in a sleeve h which is externally screw-threaded with an opposite thread in an internally screw-threaded portion d^1 of the handle d. The end of the spindle is split and slightly opened at k to ensure frictional engagement of the screw threads. The sleeve h is fixed at its outer end to a cap member l over the end of the handle. By turning the cap member l in either direction, the spindle e will be either retracted within or projected from the handle d.

In order to enable the blade to be readily fitted into position or removed, the member B is adapted to be turned with respect to the member A after it has been retracted until the projections f are clear of the bars a of the member A. To effect this mechanically, the spindle e is formed with a groove m engaged by a pin or projection n on the handle d. The groove m is curved at its upper end, so that the pin n, in conjunction with the binding action of the screw-threaded connection between e and h, turns the spindle into the position shown in Fig. 3 during the final part of the receding movement of the spindle e. Likewise the pin n will mechanically turn the member B into its operative position when the spindle e is caused to commence its outward movement. The angle through which the member B is turned may be 90 degrees or less so long as it is sufficient to enable the unsharpened edges of the blade to be grasped between the fingers. The medial bar b^1 may be slightly shorter than the length of the blade and may terminate in concave recesses o to facilitate the lifting of the blade from the projections f.

It will be apparent that the members A and B are of skeleton formation permitting them to be rapidly and easily cleaned by immersing the razor in water without any operation other than the removal of the blade.

In order to avoid any injury to the person using the razor, which might be caused by the corners of the blade, it is preferred to provide means for effecting localized downward flexing of the four corners of the blade with respect to the body of the blade when in position for use. For this purpose, the bars a are shown provided on their undersides with protuberances p in the region of the four corners of the blade so that each cutting edge of the blade will present, when in use, a substantially straight cutting edge terminating at its ends in a downward curvature. If desired, the guard bars b may be locally recessed in the region of the four corners of the blade.

Figs. 7–9 illustrate a modified construction of safety razor which may be used, for example, by surgeons and others for shaving concave skin surfaces. In this construction the blade flexing members are curved in the longitudinal direction, so that the blade is flexed both transversely and longitudinally. The two blade flexing members A^1 and B^1 are of skeleton formation, the member A^1 comprising a pair of parallel bars a^2 connected together at their ends to form a skeleton frame, which in this case is bridged by a medial bar a^3 from which project blade engaging and positioning pins f^1 and f^2. The bars a^2 and a^3 are curved longitudinally and the medial bar a^3 is out of the plane of the bars a^2 so that the blade can be flexed transversely between the bars a^2. The member B^1 comprises a pair of guard bars b^3 curved longitudinally and connected together at their ends to form a frame bridged by a medial bar b^4. Spaces a^4 between the bars a^2 and a^3 and spaces b^5 between the bars b^3 and b^4 enable the members to be readily cleansed by immersion in water. The medial bar b^4 is apertured to receive the pins f^1 and f^2. The central pin f^2 is screw-threaded and passes through the bar b^4 to receive a clamping nut r which bears against the bar b^4. The medial bar b^4 is curved longitudinally and is above the plane of the bars b^3 so that it presses on the blade g and flexes it both longitudinally and transversely between the bars a^2. Either of the members A^1 or B^1 may be mounted on a handle at right angles to it as indicated by the broken lines D^1 or with the axis of the handle forming a continuation of the medial bar a^3 or b^4 as indicated by the broken lines D^2.

Any of the bars which make line contact with the blade g may make broken line contact therewith instead of continuous line contact. For this purpose the bars may be notched at intervals as shown, for example, by the notches s in the bar b^4 in Fig. 7. For example, the bars a and b^1 in Figs. 1–5 and the bar a^3 in Figs. 7–9 may be similarly notched or serrated, to permit the blade to possess greater resiliency when clamped in position for use.

I claim:

1. A safety razor having a thin flexible double-edged blade positioned between a pair of members each comprising a skeleton frame constituted by spaced parallel bars connected at their ends, the bars of one member being located opposite the spaces between or beyond the bars of the other member.

2. In a safety razor employing a thin flexible double-edged blade, a blade flexing member comprising a pair of spaced parallel connected bars, and a guard member comprising more than two spaced parallel connected bars, the bars of the flexing member being opposite the spaces between the bars of the guard member and the two outermost bars of the guard member constituting guard

bars for the razor blade edges and being in a plane from which the other bar or bars of the guard member are offset towards the flexing member.

3. In a safety razor employing a thin flexible double-edged blade, a pair of connected spaced parallel blade flexing bars, and a pair of blade-edge guards connected to a medial or intermediate blade thrust member protruding above the plane of the blade-edge guards, said thrust member being opposite the space between the bars and the said bars being opposite spaces between the blade-edge guards and the thrust member.

4. In a safety razor employing a thin flexible double-edged blade, a pair of connected spaced rigid parallel upper bars and a pair of blade-edge guards connected to a medial thrust member protruding above the plane of said guards, said rigid upper bars being opposite spaces between the guards and the thrust member, and blade-engaging and positioning means on said thrust member.

5. In a safety razor employing a thin flexible double-edged blade, a blade flexing member comprising a pair of spaced parallel connected bars, and a guard member comprising more than two spaced parallel connected bars, the bars of the flexing member being opposite the spaces between the bars of the guard member and the two outermost bars of the guard member constituting guard bars for the razor blade edges and being in a plane from which the other bar or bars of the guard member are offset towards the flexing member, and means on the flexing member for effecting localized downward flexing of the four corners of the blade.

6. In a safety razor employing a thin flexible double-edged blade, a blade flexing member comprising a pair of spaced parallel connected bars, and a guard member comprising more than two spaced parallel connected bars, the bars of the flexing member being opposite the spaces between the bars of the guard member and the two outermost bars of the guard member constituting guard bars for the razor blade edges and being in a plane from which the other bar or bars of the guard member are offset towards the flexing member, and protuberances on the undersides of the bars of the flexing member in the region of the four corners of the blade to effect downward flexing of the four corners of the blade.

7. In a safety razor employing a thin flexible double-edged blade positioned between a blade flexing member and a blade carrier, a handle substantially at right angles to and attached to said member, adjusting means on said handle for adjusting the blade carrier with respect to the handle to enable the blade carrier to be retracted from the flexing member until the blade carrier and the blade carried thereby are free to be turned with respect to the flexing member, and means associated with said adjusting means for mechanically turning the blade carrier with respect to the flexing member during the final retracting movement of the blade carrier, and for returning the blade carrier into cooperative relationship with the flexing member.

8. In a safety razor employing a thin flexible double-edged blade, a pair of spaced parallel connected bars, a handle supporting said bars at one of its ends, a blade carrier constituted by a pair of connected blade-edge guards and an intermediate blade supporting and positioning element spaced from and connected to said guards, adjusting means for adjusting said element with respect to said handle in the axial direction of the handle, to traverse said element with respect to said bars, and means associated with said adjusting means for mechanically turning said element about the axis of the handle during the traversing movement of said element.

9. In a safety razor employing a thin flexible double-edged blade, a tubular handle, a yoke member at one end of said handle, a blade flexing member carried by said yoke, a spindle traversing the handle, a blade carrier supported by said spindle, traversing means for traversing the spindle, and means associated with said traversing means for turning the spindle during the final part of the inward travel of the blade carrier towards the handle.

10. In a safety razor employing a thin flexible double-edged blade, a pair of cooperating blade flexing members, each comprising a skeleton frame constituted by longitudinally curved spaced parallel bars connected together at their ends, with the bars of one member located opposite the spaces between the bars of the other member, a medial bar of one of the members being offset from the general plane of its member to transversely flex the blade while the blade is longitudinally flexed between the members.

11. In a safety razor employing a thin flexible double-edged blade, a pair of connected spaced parallel upper bars, a pair of blade-edge guards connected to a medial thrust bar protruding above the plane of said guards and serrated on its blade-engaging surface, said upper bars being opposite spaces between the guards and the thrust member, and blade-engaging and positioning means on said thrust member.

12. In a razor employing a thin flexible double-edged blade, a tubular handle, a yoke member at one end thereof, a blade flexing member supported by said yoke, a spindle traversing the handle and rotatable therein, a blade carrier supported at one end of said spindle, the other end of said spindle having a screw-threaded portion, an internally screw-threaded sleeve threaded upon the screw-threaded portion of said spindle, said sleeve being externally screw-threaded with a thread of opposite hand, a socket portion at the free end of the handle, said socket portion being internally screw-threaded for threaded engagement with the external screw-thread of said sleeve, and a manually rotatable cap member journaled upon the free end of said handle and fixed to one end of said sleeve.

13. In a razor employing a thin flexible double-edged blade, a tubular handle, a yoke member at one end thereof, a blade flexing member supported by said yoke, a spindle traversing the handle and rotatable therein, a blade carrier supported at one end of said spindle, a pin-and-slot connection between the spindle and handle, the slot having an axially disposed portion terminating in a curved circumferentially disposed portion whereby axial displacement of the spindle will rotate the spindle with respect to the handle, and means for axially adjusting the spindle within the handle.

14. In a razor employing a thin flexible double-edged blade, a tubular handle, a yoke member at one end thereof, a blade flexing member supported by said yoke, a spindle traversing the handle and rotatable therein, a blade carrier supported at one end of said spindle, the other end of said spindle having a screw-threaded por-

tion, an internally screw-threaded sleeve threaded upon the screw-threaded portion of said spindle, said sleeve being externally screw-threaded with a thread of opposite hand, a socket portion at the free end of the handle, said socket portion being internally screw-threaded for threaded engagement with the external screw-thread of said sleeve, a manually rotatable cap member journaled upon the free end of said handle and fixed to one end of said sleeve, a groove in said spindle, said groove comprising an axial portion terminating at the end nearer the blade carrier in a curved circumferentially disposed portion, and a pin projecting internally from the handle into said groove.

15. In a safety razor employing a thin flexible double-edged blade, a rigid frame-shaped blade-engaging and flexing member comprising a pair of spaced parallel rigid bars connected together only at their ends and providing between them an unobstructed opening throughout the length of the space between them, a pair of blade-edge guards connected to a medial thrust member which protrudes above the plane of and is parallel to said guards, for transversely flexing the blade between the bars of the frame-shaped flexing member, said bars being opposite the spaces between the guards and the thrust member, and blade-engaging and positioning means on said thrust member.

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