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(54) **SAFETY RAZORS**
SICHERHEITSRASIERER
RASOIRS DE SURETE

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(56) References cited:
US-A- 4 516 320
US-A- 4 976 028
US-A- 5 003 694
US-A- 5 031 316
US-A- 5 070 612

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Description

This invention is concerned with safety razors which comprise a flexible razor blade unit secured to a handle by connecting means arranged to permit flexure of the unit when the razor is used.

The blade unit is flexible in the sense that it is readily flexible, in response to forces encountered during normal use, about an axis or axes parallel with the plane of the blade unit and extending substantially perpendicular to the cutting edge(s) of the blade(s). Safety razors of this kind are described for example, in British Specifications 1589591 and 2119690.

One form of blade unit for such a safety razor comprises a flexible blade or tandem flexible blades with a flexible spacer therebetween, which blade or blades and spacer are mounted in a moulded plastics housing providing a comb-like guard portion and a comb-like cap portion, the teeth of the two comb-like portions being interconnected by a web which is sufficiently thin to be flexible. The blade unit is connected to a razor handle by connecting means which permit flexing of the blade unit in use.

We have now developed an improvement of such a safety razor in which a comb-like moulding of a mixture of polyethylene oxide and a structural polymer, such as polystyrene, is positioned between the teeth of the comb-like cap portion, the teeth of the polyethylene oxide-containing moulding being narrower than the space between the teeth of the cap portion so that the blade unit can flex concavely.

According to the present invention, there is provided a safety razor which comprises a razor blade unit which is readily flexible, in response forces encountered during normal use, about an axis or axes parallel with the plane of the blade or blades and extending substantially perpendicular to the cutting edge(s) thereof, a handle, and connecting means connecting the blade unit to the handle which means permit flexing of the blade unit, the blade unit comprising a moulded plastics housing providing a comb-like guard portion and a comb-like cap portion between which the blade or tandem blades with a spacer therebetween is/are clamped, the teeth of the two comb-like portions being interconnected by a web which is sufficiently thin to be flexible, and the blade unit further comprising a comb-like moulding of a mixture of polyethylene oxide and a structural polymer, positioned between the teeth of the comb-like cap portion, the teeth of the polyethylene oxide-containing moulding being narrower than the space between the teeth of the cap portion so that the blade unit can flex concavely.

The teeth of the polyethylene oxide-containing moulding are preferably level with or project above the teeth of the cap portion.

The use of inserts formed of a mixture of polyethylene oxide and a structural polymer, such as polystyrene, in the cap and/or the guard portions of razors and blade units to improve shaving performance is known and has been described, for example, in British Specification 2024082. Such inserts typically contain, by weight, 80% of polyethylene oxide and 20% of structural polymer. The present invention provides a particularly convenient way of incorporating polyethylene oxide-containing inserts in a flexible blade unit of the kind described.

A currently preferred embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective exploded view of the razor, and

Figure 2 is a similar view of the assembled razor.

The illustrated razor comprises a flexible blade unit 10 which comprises a moulded plastics housing 11 (made, for example, from polystyrene) which has a comb-like guard portion 12 and a comb-like cap portion 13 between which a combination of tandem single edged razor blades 14 with a spacer 15 therebetween is clamped. The blades 14 and spacer 15 are retained in the correct position by protrusions (not shown) in the housing and protrusions (not shown) on the spacer 15 which engage in slots 16 in the blades. Slots are used so as to allow relative movement of the blades and spacer during flexing. The teeth of the comb-like portions 12 and 13 are interconnected by a web 17 which is sufficiently thin for the blade unit 10 to be flexible.

The blade unit further comprises a comb-like polyethylene oxide-containing moulding 18, the teeth 19 of which are positioned between the teeth of the cap portion 13, the width of the teeth 19 being less than the space between the teeth of the cap portion (when the blade unit is unflexed) so that the blade unit can flex concavely.

The teeth 19 of the polyethylene oxide-containing moulding 18 are interconnected by a web 20 which is adhesively secured to the back of the web 17. As can be seen from Figure 2, in the assembled condition, the teeth 19 of the polyethylene oxide-containing moulding 18 are level with the teeth 13 of the cap portion.

Figures 1 and 2 further illustrate a preferred manner of assembling the blade unit, that is the polyethylene oxide-containing moulding 18 is not separated from the sprue 21 with which it is moulded until the moulding 18 has been bonded to the housing 11; the sprue 21 is then cut away (see Figure 2).

The blade unit 10 is connected to a handle 22 by means of three posts 23,24 depending integrally from the underside of the housing 11 which slidably engage in corresponding slots 25,26 in the head of the handle. The posts 23,24 extend perpendicularly to the parallel planes of the blades and are positioned directly underneath the blade edges, i.e. passing through a region bordered by the blade edges. The central post 24 is guided for rectilinear sliding movement within the slot 26; this post therefore centralises the unit longitudinally, without interfering with its flexure. The outer posts 23 each have a pivot pin 27 projecting through them, parallel with the axis or axes of flexure of the blade unit, and these pins 27 are received in and guided by elongate slots 28 formed in

the walls of the slots 26, so that they accommodate flexure of the blade unit, which is accompanied by movement of the ends of the unit towards and away from each other. The pins 27 also prevent withdrawal of the blade unit from the handle.

The posts 23 are set in from the ends of the unit so as to permit the blade unit to flex convexly if one or both ends encounter larger forces during shaving than the medial portion of the unit.

In order to protect the blade unit from damage due to excessive flexure in both concave and convex modes it has been found necessary to limit deflection both at the centre and at the ends of the cartridge.

In the concave mode, deflection from the unflexed plane is limited by abutment of the underside of the platform with the centre of the head of the handle. In the convex mode, deflection of the outer portions of the blade unit is limited by abutment of the underside of the outer portions of the platform with outer portions of the handle head.

In a particular embodiment the concave deflection is limited to 2.5 mm at the centre, and the convex deflection is limited to 3 mm at the ends, of the blade unit. The spacing of the outer posts 23 is preferably 2/3 of the overall length of the blade unit.

The main forces encountered during shaving are directed perpendicular to the plane of the blades (or blade) and passing through a region bordered by the cutting edges of a tandem blade unit. Since the posts 23,24 are aligned with those forces, they do not encounter any substantial bending moment which would otherwise tend to tilt them and create a tendency for the pins 27 to bind in the guide slots 28.

Whilst we have described an embodiment in which the polyethylene oxide-containing moulding is made separately from the housing 11 and is adhesively bonded to the latter, the polyethylene oxide-containing moulding can be made in situ by a two stage moulding process, namely a process in which different materials are moulded into a single component by moulding one material first and then moulding the second in situ. This process can be used to mould the housing and the polyethylene oxide-containing moulding as a single component (spacing pieces being inserted into the mould before the injection of the polyethylene oxide-containing mixture to provide the desired gaps between the cap teeth and the teeth of the polyethylene oxide-containing moulding. This eliminates the need for adhesive bonding and the reduction in the flexibility of the unit which might arise from the use of an adhesive.

Claims

1. A safety razor which comprises a razor blade unit (10) which is readily flexible, in response to forces encountered during normal use, about an axis or axes parallel with the plane of the blade or blades (14) and extending substantially perpendicular to the cutting edge(s) thereof, a handle, and connecting means connecting the blade unit to the handle which means permit flexing of the blade unit, the blade unit comprising a moulded plastics housing providing a comb-like guard portion (12) and a comb-like cap portion (13) between which the blade or tandem blades (14) with a spacer (15) therebetween is clamped, the teeth of the two comb-like portions (12, 13) being interconnected by a web (17) which is sufficiently thin to be flexible and the blade unit (10) further comprising a comb-like moulding (18) of a mixture of polyethylene oxide and a structural polymer positioned between the teeth of the comb-like cap portion (13), the teeth (19) of the polyethylene oxide-containing moulding (18) being narrower than the space between the teeth of the cap portion (13) so that the blade unit (10) can flex concavely.

2. A razor according to claim 1, in which the teeth of the polyethylene oxide-containing moulding (18) are level with or project above the teeth of the cap portion (13).

Patentansprüche

1. Sicherheitsrasierer, umfassend eine Rasierklingeneinheit (10), die sich unter den beim normalen Gebrauch auftretenden Kräften leicht um eine Achse bzw. um Achsen biegen läßt, die parallel zur Ebene der Klinge bzw. Klingen (14) verläuft bzw. verlaufen und im wesentlichen senkrecht zu deren Schneidkante(n) ist bzw. sind, einen Handgriff, und eine die Klingeneinheit mit dem Handgriff verbindende Verbindungseinrichtung, die eine Biegung der Klingeneinheit zuläßt, wobei die Klingeneinheit ein geformtes Kunststoffgehäuse umfaßt, das einen kammartigen Schutzabschnitt (12) und einen kammartigen Kappenabschnitt (13) besitzt, zwischen die die Klinge bzw. die Tandemklingen (14) mit einem Abstandshalter (15) dazwischen eingespannt ist bzw. sind, wobei die Zähne der beiden kammartigen Abschnitte (12, 13) durch einen Steg (17) miteinander verbunden sind, der so dünn ist, daß er sich biegen läßt, und wobei die Klingeneinheit (10) des weiteren ein kammartiges Formteil (18) aus einer Mischung aus Polyethylenoxid und einem Strukturpolymer umfaßt, das zwischen den Zähnen des kammartigen Kappenabschnitts (13) angeordnet ist, wobei die Zähne (19) des polyethylenoxidhaltigen Formteils (18) schmäler sind als der Abstand zwischen den Zähnen des Kappenabschnitts (13), so daß die Klingeneinheit (10) sich konkav biegen kann.

2. Rasierer nach Anspruch 1, bei dem die Zähne des polyethylenoxidhaltigen Formteils (18) mit den Zähnen des Kappenabschnitts (13) bündig sind oder über diese hinausragen.

Revendications

1. Rasoir de sûreté qui comporte un ensemble (10) à lame de rasoir qui est très flexible, sous l'action des forces rencontrées pendant l'utilisation normale, autour d'un ou plusieurs axes parallèles au plan de la lame ou des lames (14) et qui est pratiquement perpendiculaire au bord ou aux bords de coupe, un manche, et un dispositif de raccordement de l'ensemble à lame au manche, ce dispositif permettant une flexion de l'ensemble à lame, l'ensemble à lame comprenant un boîtier de matière plastique moulée formant une partie protectrice (12) en forme de peigne et une partie de capuchon (13) en forme de peigne entre lesquelles la lame ou les lames montées en tandem (14), avec une entretoise intermédiaire (15) sont serrées, les dents des deux parties en forme de peigne (12, 13) étant interconnectées par une joue (17) qui est suffisamment mince pour être flexible, et l'ensemble à lame (10) comprenant en outre un élément moulé (18) en forme de peigne constitué d'un mélange d'oxyde de polyéthylène et d'un polymère résistant placé entre les dents de la partie (13) de capuchon en forme de peigne, les dents (19) de l'élément moulé (18) contenant de l'oxyde de polyéthylène étant plus étroites que l'espace compris entre les dents de la partie de capuchon (13) de manière que l'ensemble à lame (10) puisse fléchir à une forme concave.

2. Rasoir selon la revendication 1, dans lequel les dents de l'élément moulé (18) contenant de l'oxyde de polyéthylène sont au niveau des dents de la partie de capuchon (13) ou dépassent au-dessus de ces dernières dents.

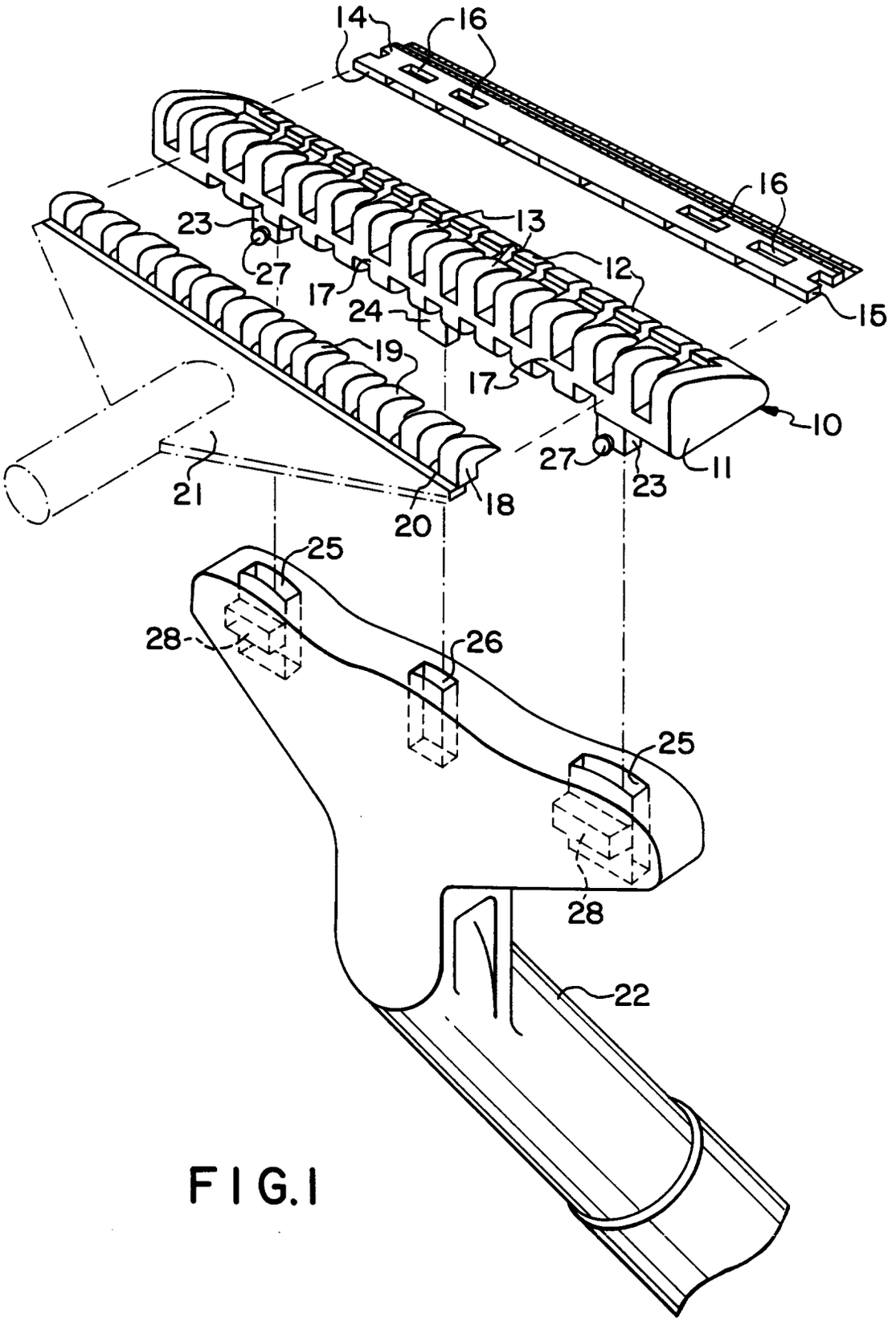

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FIG.1

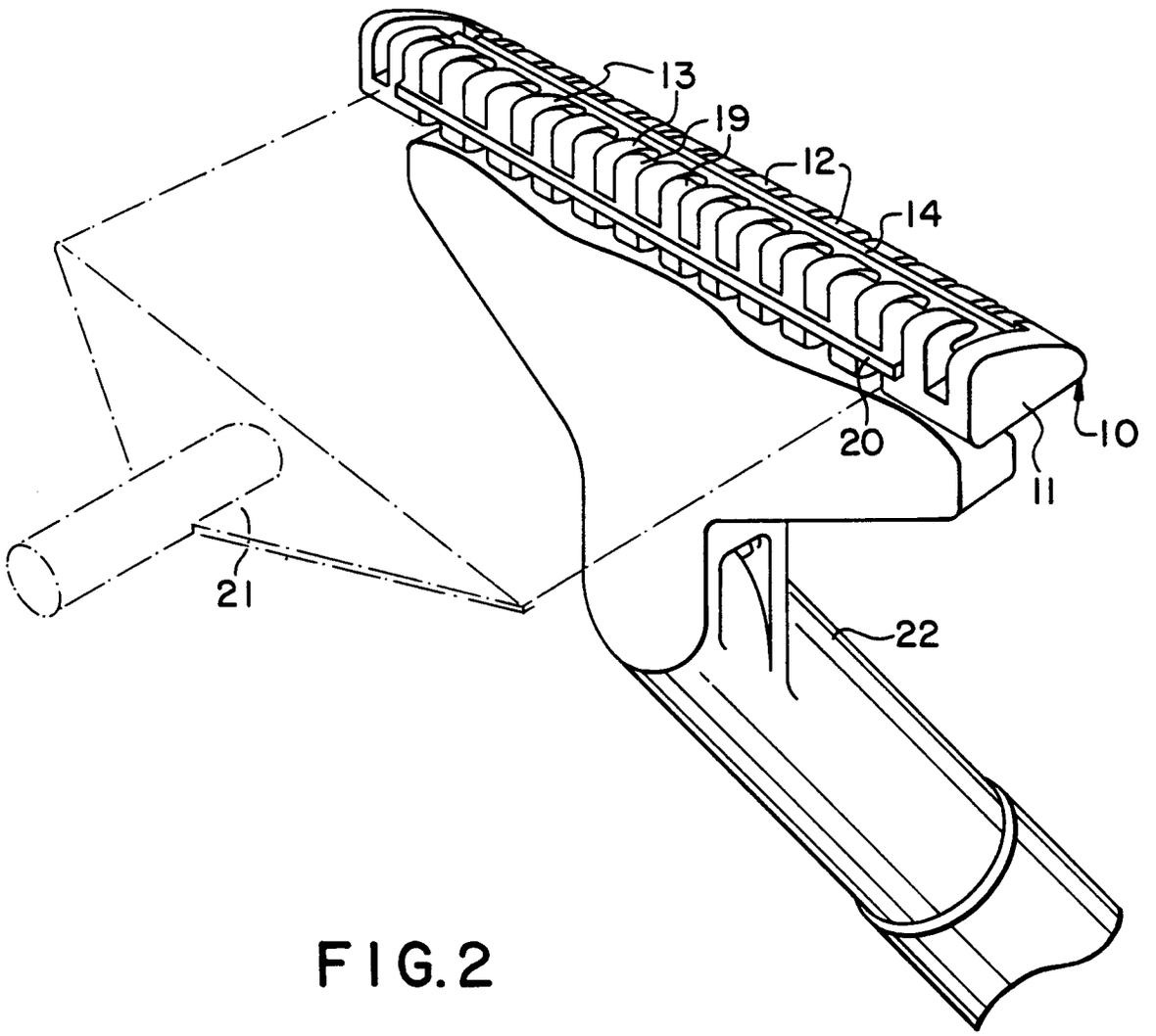


FIG.2