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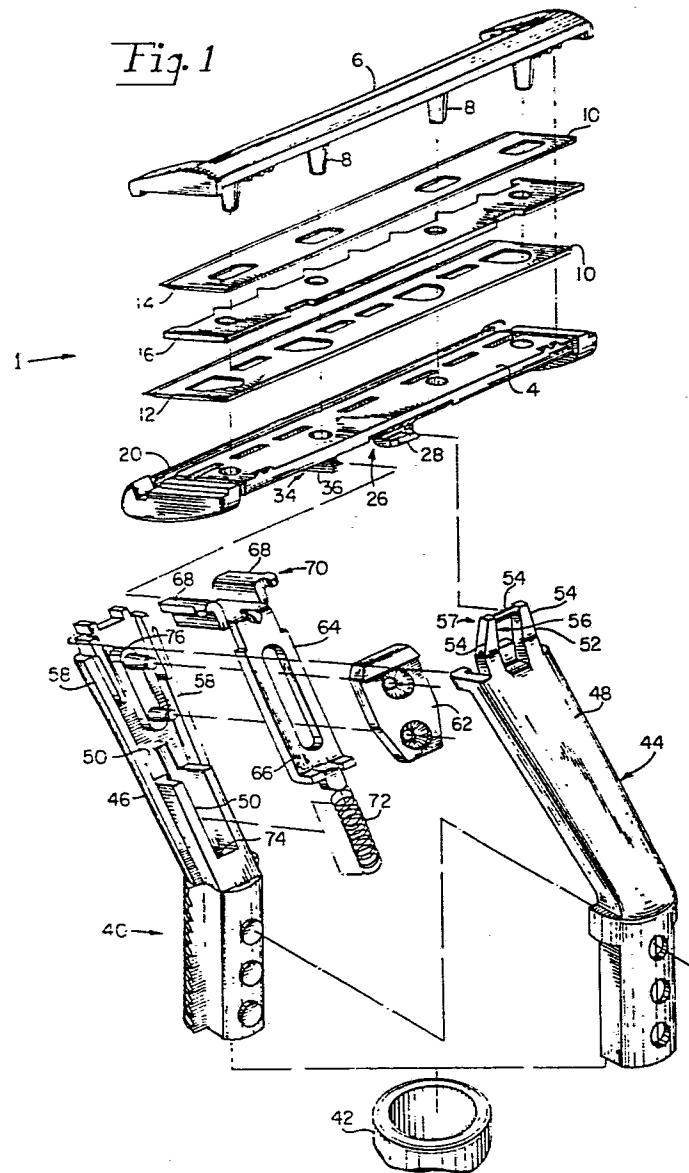
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54 **Shaving system.**

57 A shaving system including a handle and a blade assembly. The handle (40) has first and second connecting portions (57, 70) extending from an end thereof. The blade assembly (1) comprising a body portion (2, 4) having at least one blade (10) permanently fixed therein, a first blade assembly connecting portion (26) pivotally engaged with the first handle connecting portion (57), and a second blade assembly connecting portion (34) fixedly connected to the second handle connection portion (70) to facilitate dynamic change of shaving geometry during a shaving operation.

Fig. 1



SHAVING SYSTEM

This invention relates to wet shaving systems, and is directed more particularly to such systems in which a replaceable blade assembly is moveably attached to a
5 handle.

Safety razors conventionally comprise a guard member and a cap member between which, in use, a disposable razor blade is sandwiched, and a handle, the guard member, the cap member, and the handle being fixed relative to one
10 another. The latter feature is present in the conventional one-piece and "three-piece" razors designed to take disposable double-edged blades. Safety razors have recently appeared on the market which comprise, instead of disposable razor blades, a disposable razor blade assembly, or head,
15 having a guard member, one or more blades, and a cap member held rigidly together. The disposable razor blade assembly is rigidly attached to a handle so that the razor edges are at a fixed angular attitude relative to the handle. The blade assembly is replaced as a whole when the razor cutting
20 edge (or edges) becomes dull.

Continuing efforts are being made to improve the shaving characteristics of such implements and/or to accommodate individual preferences. A factor in shaving efficiency and effectiveness is the orientation of the active
25 components of the shaving system relative to the skin surface being shaved. The surface frequently has undulations or is in a relatively inaccessible or awkward area to reach and the shaving action is reduced in efficiency because the

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relationship of the active element to the skin surface being shaved significantly departs from the optimum value. Razors in which there is a fixed relationship between the shaving unit and the handle call for considerable dexterity on the part of the user and substantial changes in the disposition of the handle in order to maintain the shaving unit at its optimum attitude on the shaver's face, particularly when negotiating areas, such as the jaw line, where there are gross changes in facial contours.

Recent improvements have resulted in a shaving system as described in U.S. Patent No. 4,026,016 in which a blade assembly is pivotally mounted on a handle such that the blade assembly is movable relative to the grip portion of the handle in a manner conformable or responsive to the surface of the skin being shaved. While such shaving system has been imminently successful from a commercial standpoint, there are shavers who prefer the stability of a blade assembly fixed to a handle, as opposed to a freely pivotable blade assembly.

According to the present invention there is provided a shaving system comprising a handle and a blade assembly, characterized in that the handle has first and second connections extending from an end thereof to receive the blade assembly and in that said blade assembly has a first body portion provided with a first handle engaging connection and a second body portion provided with a second handle engaging connection, the first handle engaging connection being pivotally connected to said first connection on the handle and the second handle engaging connection being fixedly connected to said second connection on the handle.

According to the present invention there is further provided a razor blade assembly for use in such a shaving system characterized by a body portion having at least one blade permanently fixed therein, a first handle engaging connection disposed on said body portion and adapted to engage a razor handle to form a pivotal connection therebetween, and a second handle engaging connection dis-

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posed on said body portion and adapted to fixedly interconnect with a mounting on said razor handle.

According to a still further aspect of the invention there is provided a razor handle for use in such a shaving system, said razor handle being characterized by grip portion, a neck portion extending from said grip portion, a first connection extending from a free end of said neck portion and adapted to engage said blade assembly to form a pivotal connection therebetween and a second connection extending from said free end of said neck portion and adapted to fixedly interconnect with a mounting on said blade assembly.

The invention, including various novel details of construction and combinations of parts, will now be more particularly described with reference to the accompanying drawings, in which

Fig. 1 is an exploded perspective view of a shaving system embodying the invention;

Fig. 2 is a top plan view of a blade assembly forming part of the shaving system;

Fig. 3 is a front elevational view of the blade assembly of Fig. 2;

Fig. 4 is a back elevational view of the blade assembly;

Fig. 5 is a bottom view of the blade assembly;

Fig. 6 is a side elevational view, in part cut away, of the blade assembly;

Fig. 7 is a front elevational view of a head portion of a razor handle forming part of the shaving system;

Fig. 8 is a side elevational view of the handle head portion of Fig. 7;

Fig. 9 is a back elevational view of the handle head portion;

Fig. 10 is a side sectional view of the razor handle and blade assembly interconnected for a shaving operation, and shown in a first position; and

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Fig. 11 is similar to Fig. 10, but showing a second position.

Referring to the drawings, it will be seen that an illustrative razor blade assembly 1 comprises a body 2, which may be of molded plastic. The body 2 may comprise a platform portion 4 to which is fixed a cap portion 6, as by rivet means 8. Permanently fixed between the platform and cap portions 4, 6 are blade means 10 which may, as illustrated, include first and second blades 12, 14 separated by a spacer means 16. Preferably, the rivet means 8 extend through the blades 12, 14 and spacer 16 to securely join the blade assembly components.

Connected to the platform portion 4 by means of a relatively thin molded web 18 is a guard portion 20. The web 18 is an integrally molded portion of the body portion which hingedly interconnects the platform portion 4 and the guard portion 20. Thus, a first portion 22 of the body 2 is pivotally joined, by way of the web 18, to a second portion 24 of the body.

Disposed on the first portion 22 of the body 2 is a first connecting means 26 by which the blade assembly may be pivotally connected to a razor handle, as will be further described hereinbelow. The first connecting means, as illustrated, comprises a projection 28 extending downwardly and rearwardly (to the right as viewed in Fig. 6). The projection 28 is disposed centrally of the blade assembly, extending from an undersurface 32 of the platform portion 4.

Disposed on the second portion 24 of the body 2 is a second connecting means 34 by which the blade assembly may be fixedly connected to the razor handle, as will be further described hereinbelow. The second connecting means, as illustrated, comprise a pair of parallel elongated rails 36 extending from the guard portion 20, width-wise of the blade assembly, i.e., extending forwardly and rearwardly. The rails 36 define opposed grooves 38 which comprise a blade assembly slide means and are adapted to slidably receive a razor handle slide means.

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Accordingly, the first portion 22 of the body 2 is adapted to be pivotally connected to the razor handle, while the second portion 24 is adapted to be fixedly connected to the razor handle, the first and second portions 22, 24 being pivotally joined to each other.

A razor handle 40 suitable for use with the illustrative blade assembly includes a grip portion 42 and a neck portion 44. Preferably, the neck portion comprises a front plate 46 and a back plate 48 connected together to form a chamber 50. The back plate 48, at its free end, is provided with an extension 52 comprising a frame portion 54 having an aperture 56 therein, the aperture 56 being adapted to receive the projection 28 extending from the blade assembly 1 to form a pivotal connection between the blade assembly and the handle. The extension 52 is immovably disposed on the neck portion. Thus, the frame portion 54 comprises a handle first connecting means 57 adapted to engage the blade assembly first connecting means 26 to form a pivotal connection.

The front plate 46 is preferably formed with a pair of parallel elongated runners 58 forming a slideway 60 covered by a top plate 62 disposed in the chamber 50. Slidingly disposed in the slideway 60 is a razor handle slide member 64 comprising a bar 66 from which extends a pair of tongues 68. The tongues 68 are adapted to be received by the grooves 38 of the blade assembly. The tongues 68 accordingly constitute a razor handle second connecting means 70 adapted to be fixedly connected to the blade assembly second connecting means 34. The bar 66 is biased toward the free end of the neck portion by a coil spring 72 disposed in the chamber 50, the spring extending between an end of the bar 66 and a surface 74 formed in the front plate 46.

In the preferred embodiment, the front plate 46 is of plastic and the backplate 48 is of metal.

The razor handle 40 may be connected to the blade assembly 1 by engaging the tongues 68 with the rails 36,

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simultaneously causing engagement of the frame portion 54 with the projection 28, thereby effecting a first pivotal connection between the handle and the blade assembly body first portion 22, and effecting a second fixed connection
5 between the handle and the blade assembly body second portion 24.

In use, the blade assembly behaves in much the same manner as blade assemblies of the type fixedly and immovably connected to their handles, until a particular
10 force level is exerted on the razor. When the blade assembly is urged by the operator against the surfaces being shaved with sufficient force to overcome the bias of the spring 72, the bar 66, and the tongues 68 with it, moves in the neck portion 44 towards the grip portion 42, permitting
15 the blade assembly first portion 22 to pivot about the frame portion 54 of the handle. The blade assembly second portion 24, however, is fixedly connected to the tongues 68 and therefore moves with the tongues, causing the pivotal movement between the first and second portions of the blade
20 assembly. Such movement between the first and second portions of the blade assembly has the effect of relatively withdrawing the first blade rearwardly behind a plane P extending from the cutting edges of the second blade to a guard portion tangent point, and further, of decreasing the
25 angle α formed by a first line b extending through the plane of the first blade 12 and a second line c extending from the cutting edge of the first blade to a tangent point on the guard portion. Thus, as excess pressure is applied by the operator, the "exposure" of the blades is decreased
30 and the "blade tangent angle" is decreased.

"Exposure" and "blade tangent angle" are defined and discussed in U.S. Patent 3,786,563, issued January 22, 1974 in the names of Francis W. Dorion, Jr., et al. "Blade tangent angle" is defined as the angle between the bisector
35 of the included angle of the cutting edge (the plane of the blade if the cutting edge is symmetrical) and a line from the cutting edge tangent to the skin engaging surface immedi-

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ately forward of that cutting edge (in this instance, the guard portion). "Exposure" is defined as the distance, measured perpendicularly to a reference plane defined by skin engaging surfaces immediately in front of and behind the cutting edge (the plane P), from the cutting edge to that plane, the exposure being considered positive when the cutting edge is located on the outer (skin) side of that plane and being considered negative when the cutting edge is further from the skin than that plane.

10 Thus, excessive pressure, which normally might endanger the operator, causes a marked decrease in the exposure of the first cutting edge and a marked decrease in the blade tangent angle, thereby rendering the system safer and much less likely to inflict harm on the operator. The more forceful the operator becomes, the safer the system becomes. The shaving geometry is varied inversely with the force of the blade assembly on the surface being shaved. The system, however, becomes force sensitive only after a specific force, or load travel, is reached. Before such force level is reached, the shaving geometry of the cartridge is static and similar to the geometry of systems now in public use.

 In a preferred embodiment, after the force level is reached, the blade assembly starts to automatically adjust the blade tangent angle of the first blade from approximately 26° to approximately 15°, and the exposure of the first blade from .0015 inch to -.004 inch. When the razor is lifted from the surface being shaved, a force load is no longer exerted on the blade assembly and the shaving geometry reverts to its normal static geometry.

 It is preferred that the threshold sensing force be about 50 grams. Thus, with forces up to 50 grams, the blade assembly geometry remains in its static condition, with forces exceeding 50 grams, the razor starts decreasing the blade assembly geometry (blade tangent angle and exposure).

 The front plate 46 is provided with stop means

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76 which limit the downward movement of the bar 66, and thereby limit the extent to which the blade means 10 can be "retracted".

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C L A I M S

1. A shaving system comprising a handle and a blade assembly, characterized in that the handle (40) has first and second connections (57, 70) extending from an end thereof to receive the blade assembly (1) and in that said blade assembly has a first body portion (2) provided with a first handle engaging connection (26) and a second body portion (4) provided with a second handle engaging connection (34), the first handle engaging connection (26) being pivotally connected to said first connection (57) on the handle (40) and the second handle engaging connection (34) being fixedly connected to said second connection (70) on the handle.
2. A shaving system according to claim 1, characterized in that the first and second body portions (2, 4) of the blade assembly are pivotally interconnected (18).
3. A shaving system according to claim 1 or 2, characterized in that said second connection (70) is reciprocally movable in said handle.
4. A shaving system according to claim 3, characterized in that said reciprocally movable second connection (70) is spring (72) biased and is movable upon application of pressure sufficient to overcome the force exerted by said spring bias.
5. A shaving system according to claim 3 or 4, characterized in that movement of said second connection (70) causes pivotal movement of said blade assembly (1) about said first connection (57) and pivotal movement between said first and second blade assembly body portions (2, 4) to reduce exposure and blade tangent angle of said system.
6. A shaving system according to any of claims 3 to 5, characterized in that the reciprocally movable second connection (70) is located at one end of a first slide (66) longitudinally displaceable in said handle, and in that the blade assembly is attached to the first slide by means of a second slide (68) located at one end of said first slide.
7. A shaving system according to any of claims 1 to 6,

characterized in that the handle (40) includes a grip portion (42) and a neck portion (44), said first and second connections (57, 70) extending from the free end of said neck portion.

8. For use in a shaving system according to claim 1, a razor blade assembly characterized by a body portion (2, 4) having at least one blade (10) permanently fixed therein, a first handle engaging connection (26) disposed on said body portion and adapted to engage a razor handle to form a pivotal connection therebetween, and a second handle engaging connection (34) disposed on said body portion and adapted to fixedly interconnect with a mounting on said razor handle.

9. A razor blade assembly, according to claim 8, characterized in that the first handle engaging connection (26) is mounted on a first body portion (2) of said assembly and the second handle engaging connection (34) is mounted on a second body portion of said assembly, said first and second body portions being pivotally joined to each other.

10. A razor blade assembly according to claim 8 or 9, characterized in that a guard (20) is pivotally connected to said body portion, and in that said first handle engaging connection (26) is adapted to engage a pivot connection (57) on a razor handle (40) to facilitate pivotal movement of said assembly about said handle pivot connection and said second handle engaging connection (34) is disposed on said guard portion and adapted to interconnect with a mounting (70) on said razor handle.

11. A razor blade assembly according to claim 10, characterized in that the or each blade (10) is secured between a platform (4) and a cap (6), and in that said guard (20) is disposed forwardly of said platform and connected thereto by a web (18).

12. A razor blade assembly according to claim 11, characterized in that the first handle engaging pivot connection (26) comprises a projection (28) extending downwardly

and rearwardly to form a recess centrally of said assembly and open rearwardly thereof.

13. A razor blade assembly according to any of claims 10 to 12, characterized in that said second handle engaging connection (34) includes a slide extending from said guard to engage a cooperating slide on said handle.

14. A razor blade assembly according to claim 13, characterized in that said slide comprises parallel rails (36) forming grooves (38) on an underside of said guard to receive complimentary tongues (68) on said handle slide.

15. For use in a shaving system according to claim 1, a razor handle characterized by grip portion (42), a neck portion (44) extending from said grip portion, a first connection (57) extending from a free end of said neck portion and adapted to engage said blade assembly to form a pivotal connection therebetween and a second connection (70) extending from said free end of said neck portion and adapted to fixedly interconnect with a mounting on said blade assembly.

16. A razor handle according to claim 15, characterized in that the first connection (57) is immovably disposed on said neck portion (44) and the second connection (70) is movably disposed on said neck portion.

17. A razor handle according to claim 15 or 16, characterized in that the first connection (57) comprises a frame portion (54) defining an aperture (56) adapted to receive a projection (28) extending from said blade assembly, said frame portion forming said pivotal connection with said projection.

18. A razor handle according to claim 17, characterized in that the second connection (70) comprises a first slide (66) displaceable in said handle neck (44) and in that a second slide (68) carried at the free end of said first slide is adapted to receive said blade assembly.

19. A razor handle according to claim 18, characterized in that the first slide (66) is spring biased for controlled displacement between stops.

20. A razor handle according to claim 18 or 19, characterized in that said neck portion (44) comprises a front plate (46) and a back plate (48), and in that the first slide (66) is slidably connected to said front plate.

21. A razor handle according to claim 20, characterized in that the frame portion (54) is formed as an extension of said back plate (48).

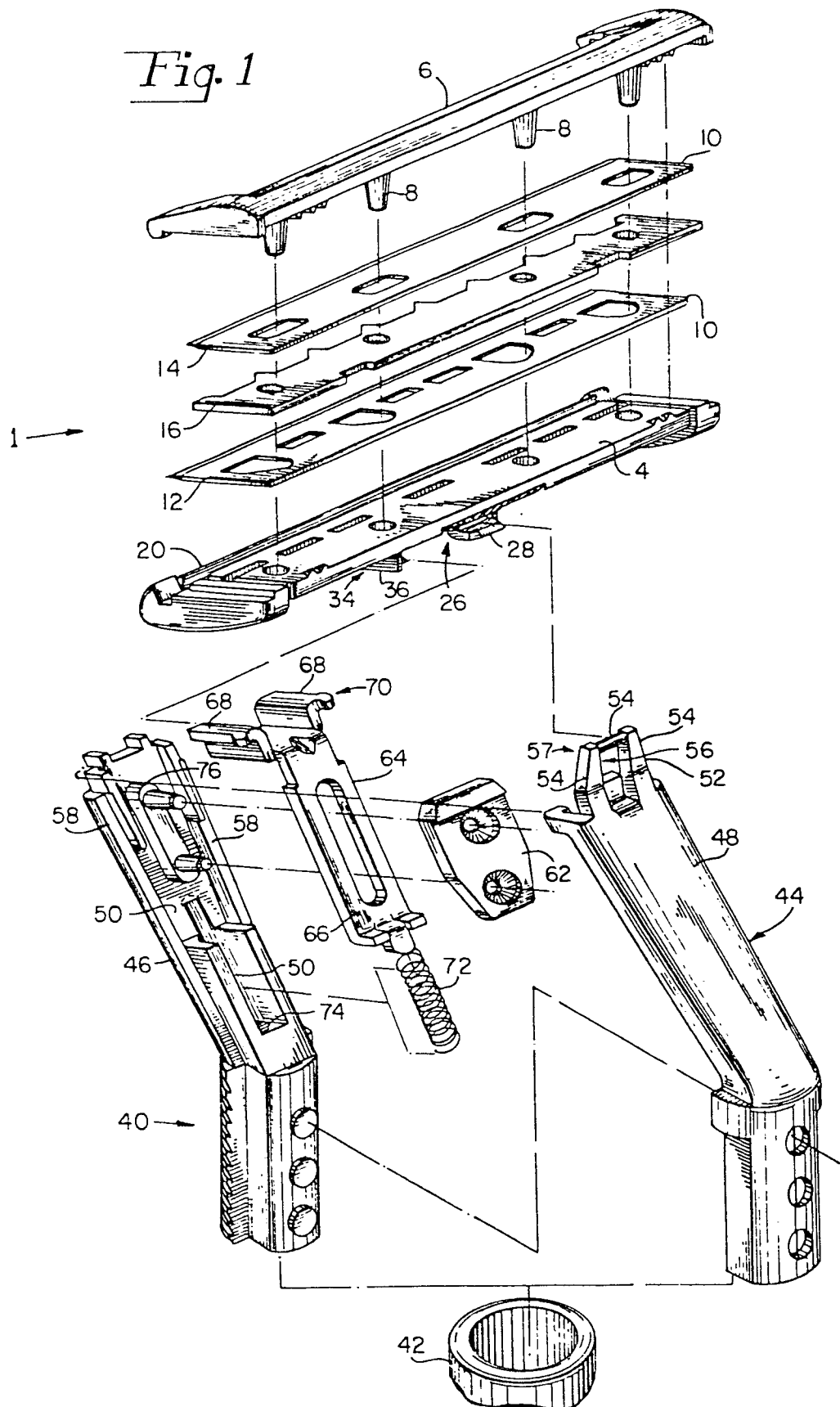
Fig. 1

Fig. 2

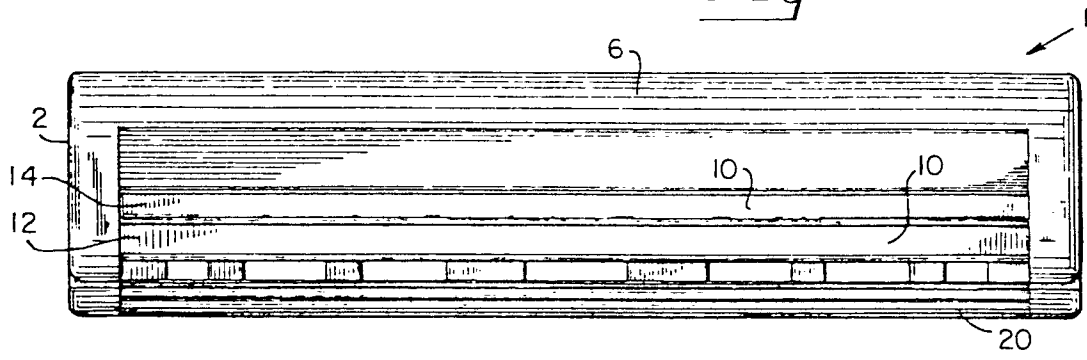


Fig. 3

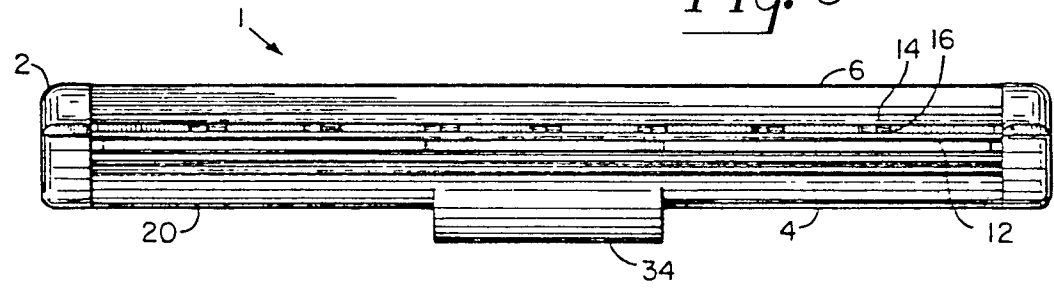


Fig. 4

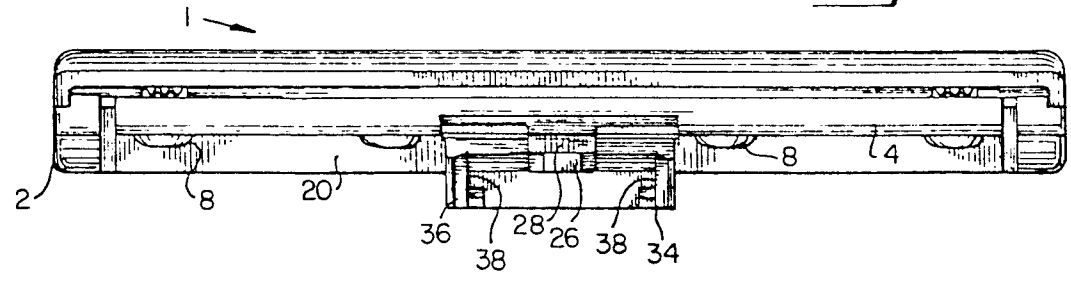


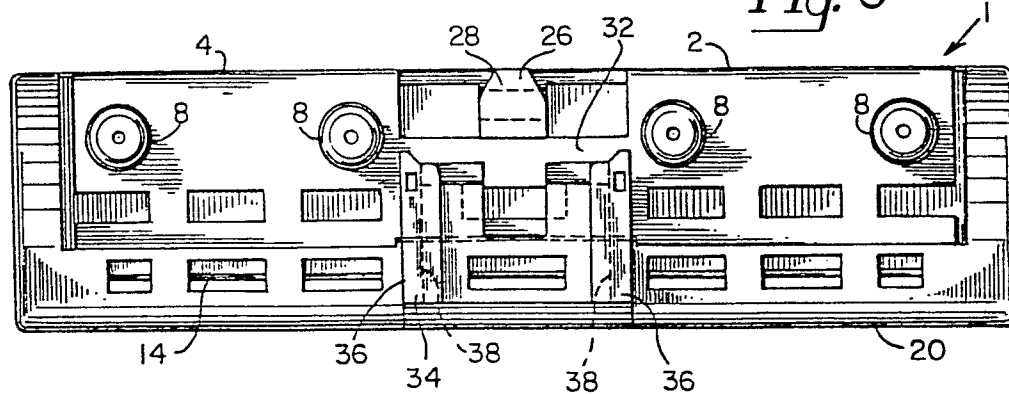
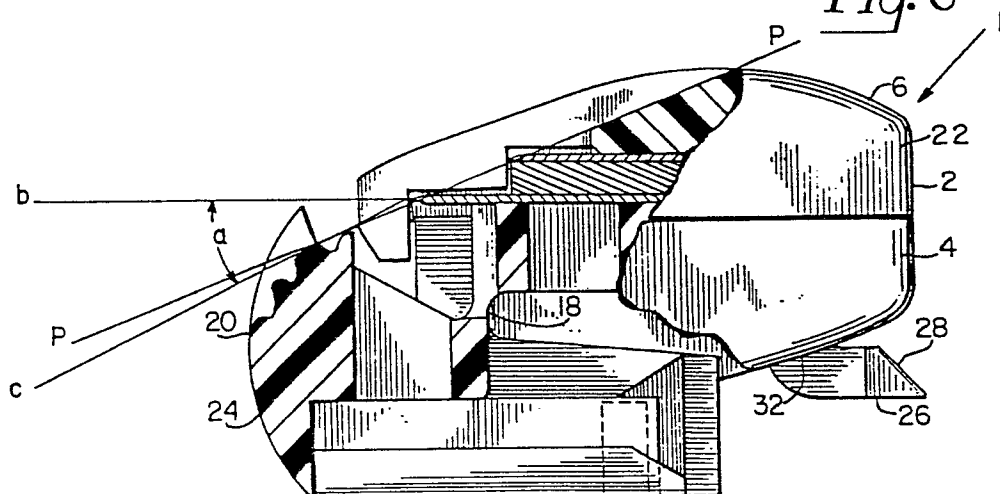
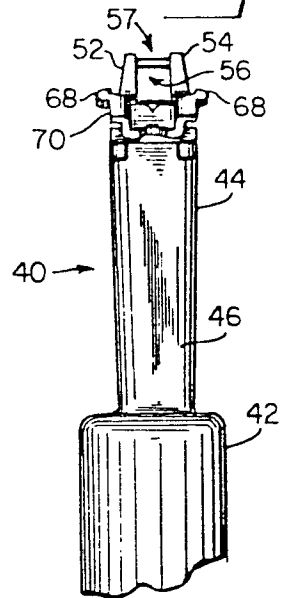
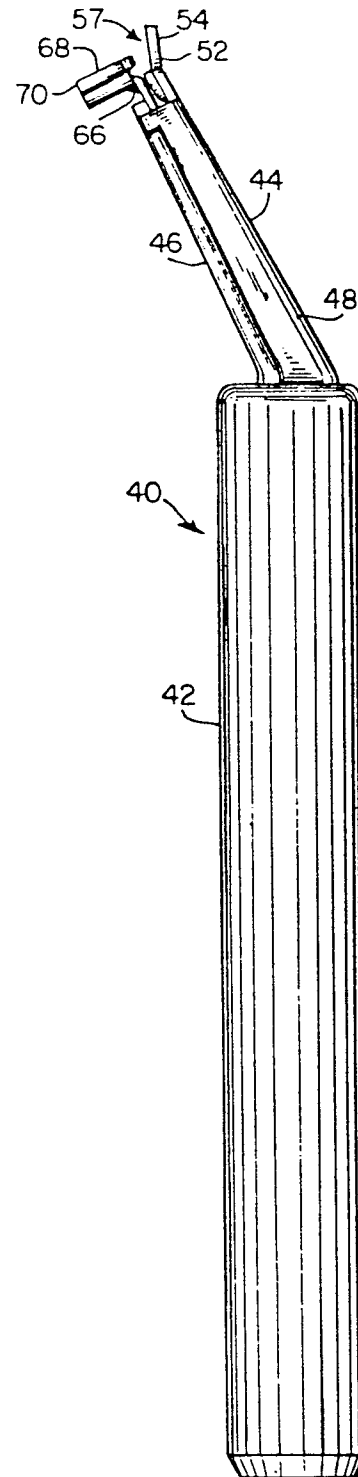
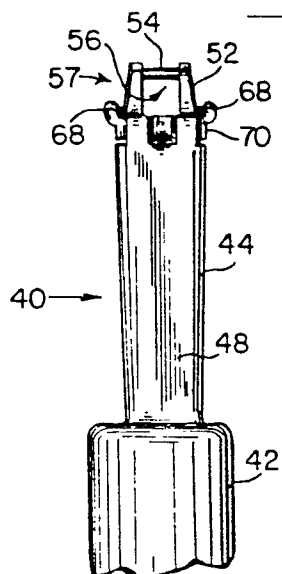
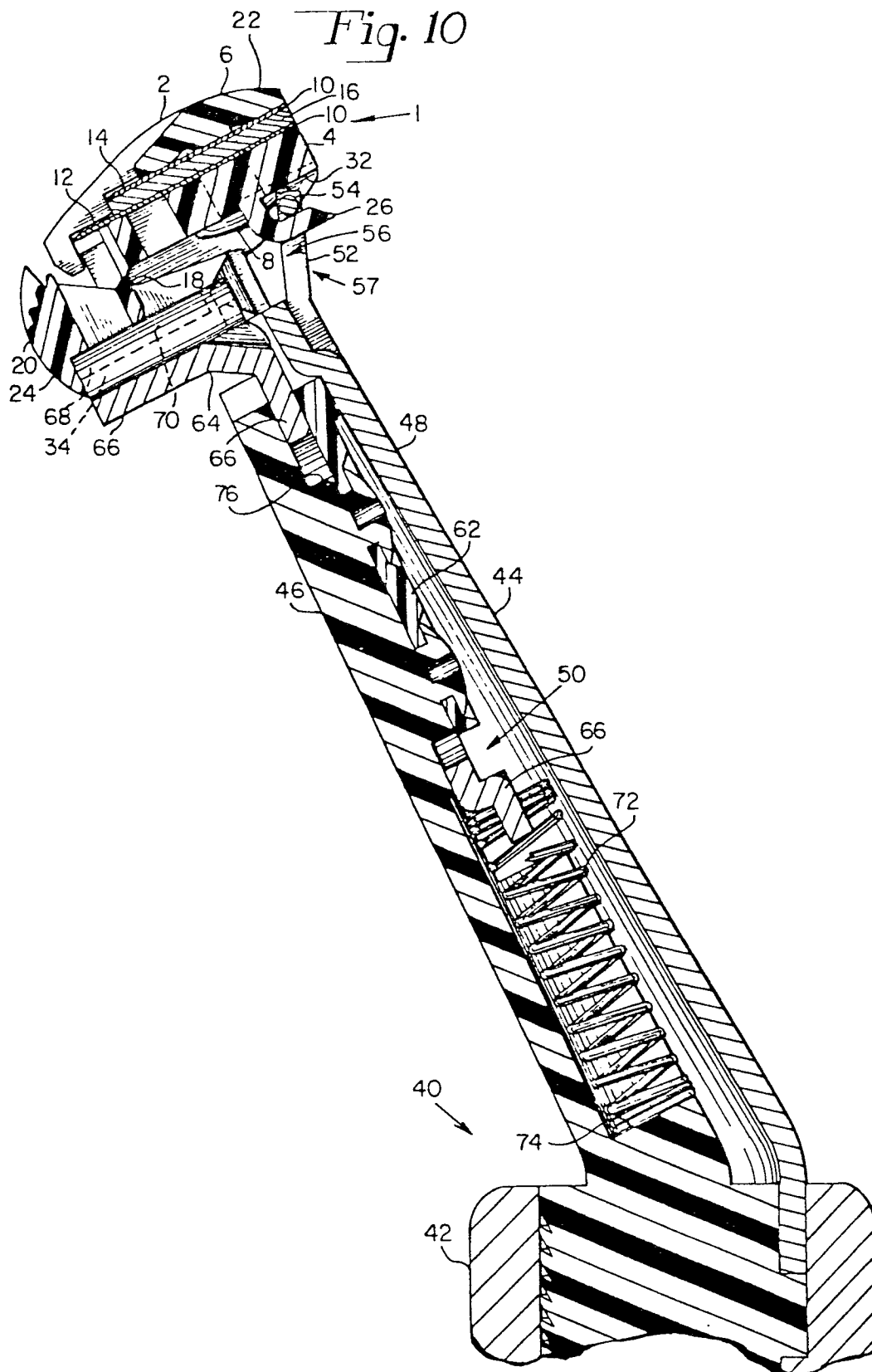
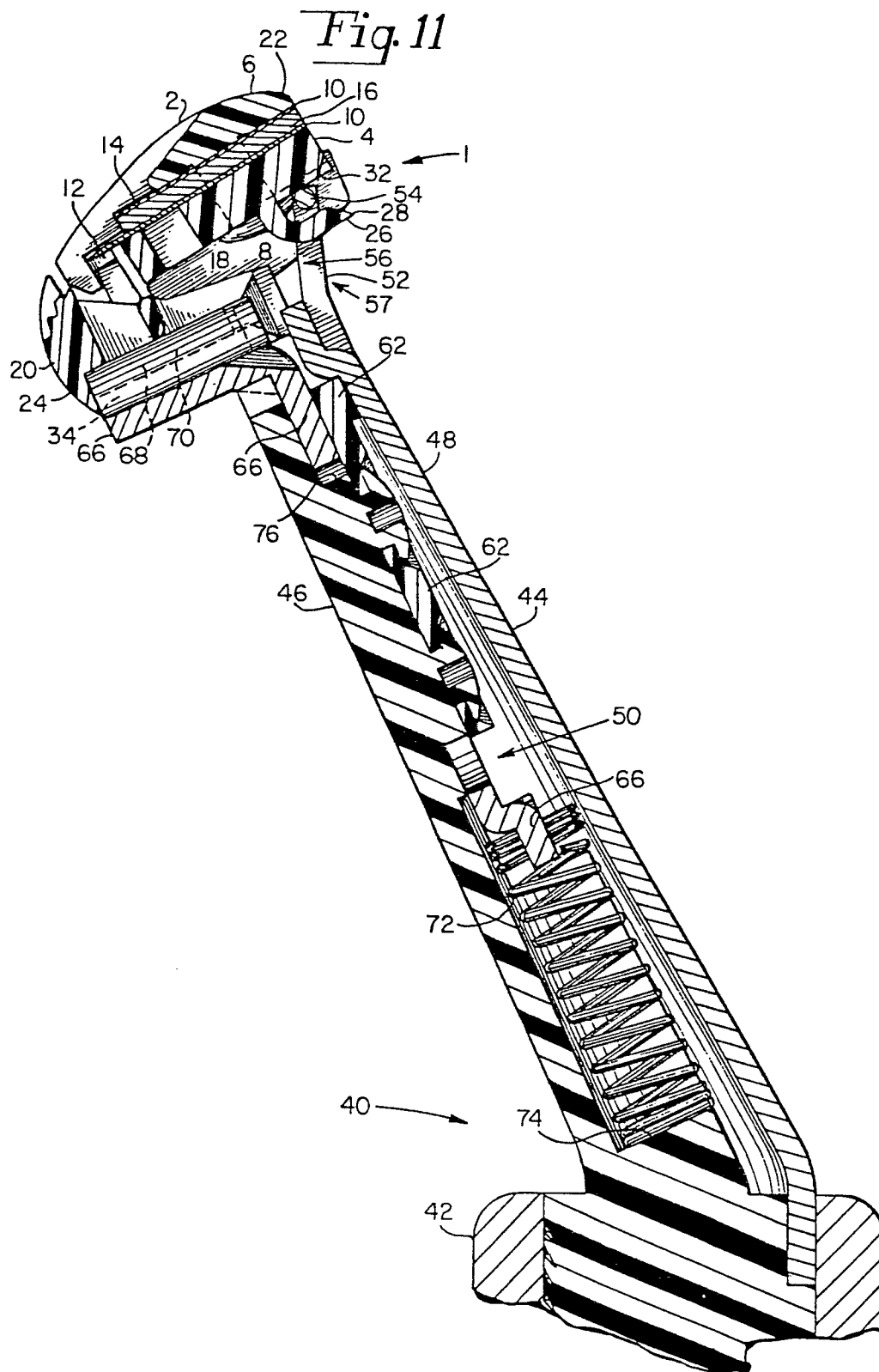
Fig. 5*Fig. 6*

Fig. 7*Fig. 8**Fig. 9*







European Patent
Office

EUROPEAN SEARCH REPORT

0025326

Application number

EP 80 30 3025

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>GB - A - 1 470 386 (WILKINSON SWORD)</u> * Page 2; figures 7,9 * --	1,2,5,8-16	B 26 B 21/22 21/24 21/52
X	<u>US - A - 4 026 016 (NISSEN)</u> Column 3, lines 20-68; figure 2 * -- <u>GB - A - 1 496 149 (GILLETTE)</u> * Pages 3,4; figures 3,4,8 * -- <u>GB - A - 1 456 179 (WARNER-LAMBERT)</u> * Page 2, lines 30-42; figure 2 * --	1,3,4,6,7,16-20 1,2,5,8,10,11,13,14 1,2,11	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) B 26 B
A	<u>US - A - 4 063 354 (OLDROYD et al.)</u> * Column 2, lines 32-68; figures 1-4 * --	1	
A	<u>FR - A - 2 379 357 (GILLETTE)</u> * Page 4, figures 7,9 * --	1	
A	<u>FR - A - 2 406 504 (GILLETTE)</u> * Page 4, figures 4-6 * ----	1	
☒ The present search report has been drawn up for all claims			CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons &: member of the same patent family, corresponding document
Place of search		Date of completion of the search	Examiner
The Hague		06-12-1980	WOHLRAFF