(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 348 627 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89107307.4**

(51) Int. Cl.[4]: **B26B 21/44**

(22) Date of filing: **22.04.89**

The title of the invention has been amended (Guidelines for Examination in the EPO, A-III, 7.3).

(30) Priority: **02.05.88 TR 22895/88**

(43) Date of publication of application: **03.01.90 Bulletin 90/01**

(84) Designated Contracting States: **AT BE CH DE ES FR GB GR IT LI LU NL SE**

(71) Applicant: **PERMATIK CELIK VE PLASTIK SANAYI A.S.**
Ikitelli Köyü Mehmet Akif Mahallesi Tas Ocaklari Yolu, No. 9-11-13
Bakirköy Istanbul(TR)

(72) Inventor: **Amram, Jak Ikitelli Köyü**
Mehmet Akif Mahallesi Tas Ocaklari, No. 9-11-13
Bakirköy Istanbul(TR)

(74) Representative: **LOUIS, PÖHLAU, LOHRENTZ & SEGETH**
Kesslerplatz 1 Postfach 3055
D-8500 Nürnberg-1(DE)

(54) Shaving unit incorporating a shaving aid.

(57) A Disposable shaving unit having one or more razor blades (4) that creates a smooth surface on the skin as a result of friction and contact with water without using other shaving aid materials wherein the production of an entire platform (5) and cap section (7) uses an injection process which defines a skin engaging surface composed of a blend of water insoluble polymer in an amount of 50-90% by weight that is polystyrene, thermoplastic rubber (with or withour filler) with or without polystyrene, polyethylene, polypropylene and polyacetal, water soluble polymer in an amount of 9-40% by weight and polyethylene glycol in an amount of 1-10 % by weight.

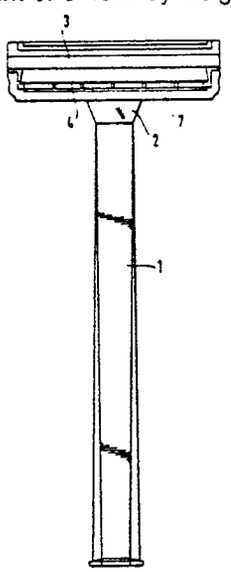

Fig. 1

EP 0 348 627 A1

A SHAVING UNIT WITH ONE OR MORE RAZOR BLADES AND HAVING BLADE SUPPORT STRUCTURE AND CAP MANUFACTURED WITH WATER-LEACHABLE SHAVING AID COMPOSITION THAT PROVIDES A SMOOTH SURFACE FOR SHAVING

This invention relates to shaving units that provide a comfortable shaving whatever the holding position and angle is, as a result of supplying a shaving composition which is water soluble or soluble in shaving foam or soap with the friction of cap and platform sections to the skin.
The complete shaving unit or its cartridge is disposable and it comprises of one or more razor blades.

PRIOR ART

Except for the razor blades the whole shaving unit as well as the cartridge section that is engaged with the handle are disposable and made of water insoluble polymer polystyrene based material.
These types of shaving units do not consist of a shaving aid material. In the prior art the use of shaving aid material that helps the razor blade to slide smoothly along the skin and facilitates shaving is known. The shaving unit described in the U.S. Patent No. 4 624 051 may be given as example. This patent discloses a shaving aid member (strip) composed of water soluble polymer material having the area of surface in the range of 20-70 mm^2 and that is disposed through the aperture on the cap protruding at least 0.1 mm above the cap surface.

The invention suggests that the polymer blend includes a water soluble polymeric material in an amount of at least about 50% by weight selected from the class consisting of polyethylene oxide, polyvinyl pyrrolidone, polyacrylamides, hydroxypropyl cellulose, polyvinyl imidazonline and polyhydroxyethyl-methacrylate and a water insoluble polymer in an amount of at least 50% by weight selected from the class consisting of polyethylene, polypropylene, polystyrene and polyacetal and preferably a blend of water soluble polyethylene oxide in an amount of 80% by weight and water insoluble polystyrene in an amount of 20% by weight. The member consisting of water soluble polymer that is present in the shaving units manufactured in accordance with this technique is placed on the cap that is above the razor blade. During shaving as a result of the frictional drag of the razor across the skin the water soluble polymer present in the member is leached and provides a smooth surface.

In the prior art shaving units, this smooth surface can only be realized on friction of the razor head on skin.
It would be necessary to move the member across the skin in order to enhance the comfort of shaving and to provide smoothness. Also, comfortable shaving is impossible with certain handling positions and angles.
The general feature in the prior art shaving units is to manufacture the shaving aid member which consists of shaving aid material separately, placing on top of the blade in form of strip; the blend includes 50% (preferably 80%) water soluble polymer and 50% (preferably 20%) water insoluble polymer.
U.S. Patent No. 4, 170, 821 discloses a disposable razor cartridge having a shaving aid containing lubricant as micro-encapsulated silicone oil, polyethylene oxide in the range of molecular weight between 100 000 - 6 000 000, non-ionic polyacrylamide, natural polysaccaride from plants such as guar gum, hair softening agent, cleaning agent, medicinal agent and blood coagulant. This patent does not claim any percentages for mixing of water soluble and insoluble materials in the mixture. In low percentages of water soluble polymer which is polyethylene oxide, the slippery feature will be hardly felt during shaving.
The mixture contains non-ionic polymer polyacrylamid which is not a polyethylene oxide plasticizer as a non-ionic polymer.
In this patent specification mixing process is not mentioned therefore homogeneous distribution of water soluble and insoluble polymer in the shaving unit during injection moulding process may not be obtained.
United Kingdom Patent No. 2,183,523 discloses a razor cartridge of which one or more of the skin contacting surfaces is/are composed of a self lubricating plastics material comprising a moulded thermo-plastics polymer containing a water insoluble migratable slip or lubricating agent, preferably free slicone oil (up to 5 percent by weight) or polytetrafluoroethylene (up to 20 percent by weight).

A shaving unit described in the United Kingdom Patent No. 2,024,082 comprises the guard and cap surfaces formed wholly in part of a moulded mixture of at least oon hydrophobic material and at least one water leachable hydrophilic polymeric material. The mixture of polymeric materials comprises 85 to 5% by weight of the hydrophobic material(s) and 15 to 95% by weight of the hydrophilic material(s), or from 50 to 60% by weight of the hydrophobic material(s) and 50 to 40% by weight of hydrophilic material(s). The hydrohpobic polymeric materials described in the patent are polystyrene, polyethylene, polypropylene or

polmyacetal. The hydrophilic polymeric materials are polyethylene oxide, polyviniyl pyrolidone, polyacrylamide, hydroxypropyl cellulose, polyvinyl imidazoline or polyhydroxyethyl methacrylate. These hydrophilic materials do not contain polyethylene glycol as being plasticizer of polyethylene oxide and flow modifier

OBJECTS OF THE INVENTION

The objective of this invention is to provide comfortable and easy shaving by making the surface smooth during shaving before the friction of the blade with the skin and keeping it smooth afterwards. This smoothness is defined as coating the whisker or hair by gel type of water soluble polymer so as not to feel cutting action during shaving. This objective of the invention can be reached by the manufacture of platform and cap portions of the shaving units that can be totally or partly disposable with the addition of polyethylene glycol that makes the solving easier and that is surface active during the injection process into the mixture prepared with water soluble and insoluble polymers because it is a plasticizer for polyethylene oxide and non-ionic polymer.

DETAILED DESCRIPTION OF THE INVENTION

The invention will be clearly understood by the following description and accompanying drawings, in which

FIGURE 1, is a front view of the disposable shaving unit.
FIGURE 2, is a side view of the disposable shaving unit.
FIGURE 3, is a bottom view of the platform section of the shaving unit
FIGURE 4, is the top view of the platform of the shaving unit
FIGURE 5, is the bottom view of the cap section of the shaving unit
FIGURE 6, is a top view of the cap section of the shaving unit.
FIGURE 7, is a view of the cartidge of the shaving units that can be attached to the handle.

THE PARTS

1. Handle
2. The portion that engages the platform to the handle
3. Cap
4. Razor blade
5. Platform
6. The pins on the cap
7. The protection bar in front of the platform

This invention discloses an improved technique that uses polyethylene glycol in addition to the water soluble and insoluble polymers in the blend used in the manufacture of platform 5 and cap 3 as being plasticizer of polyethylene oxide and flow modifier for the injection moulding process.

The composition of the blend that forms the cap 3 and platform structure may be summarized as follows:

1. Water insoluble polymer material : polystyrene, thermoplastic rubber (with or without filler) mixed with polystyrene or not, all types of plastics that can be used in the injection process such as polyethylene, polypropylene and polyacetal.

2. Water soluble polymer material : WRPA 5769 compound containing plasticizer , antibacterial, anti oxidant and heat stabilizer. WSR-301 polyethylene oxide coagulant to reduce melt flow, increase slippery and pituity feature.

The blend used in this invention was examined by size exclusion chromatography. The somples (from TSK Toyo Sodo monufacturing Co. Ltd., Japan) having following properties:

PEO Mol. Weight		MW/Mn
39.000	———	1.07
145.000	———	1.03
252.000	———	1.04
594.000	———	1.04
996.000	———	1.05

were examined under the following operational conditions:

Column Set	:	10^5. 10^6 Angstrom Ultrastyragel
Temperature	:	40 ° C
Solvent	:	Tetrahydrofuran (THF)
Flow rate	:	1 ml/min

There log M is plotted against retention volume (Vr) in ml. Among the chromatographic solvents including THF, Toluene and Dimenthyl formamide used in the system PEO polymer dissolved only in chloroform and the dissolved polymer was in the form of a gel with a fully crosslinked appearance. On the other hand, PEO sample was fully dissolved in THF by gentle heating. The results obtained from the evaluation of chromatogram were Mn = 94 000, Mw = 416 000 and heterogeneity index (Mw/Mn) = 4.43 for the soluble portion of this PEO in THF.

The results obtained by heating the same sample to 90 ° C and injecting to the system under the identical conditions were Mn = 164.000, MW = 483.000 and MW/Mn = 2.94 for the soluble part of this commercial PEO in THF.

3. Non-ionic water soluble polymer: polyethylene glycol (PEG) with a molecular weight of 3000 to 30 000 preferably polyethylene glycol (PEG 6000) with a molecular weight of 6000. This non-ionic polymer acts as a plasticizer for polyethylene oxide, flow modifier for mixture.

The preferred weight percentages of the blend used in the manufacture of the platform and cap are as follows:

60%	water insoluble polymer
35%	water soluble polymer
5%	polyethylene glycol

Water soluble polymer is prepared by mixing 80% by weight WRPA 5769 and 20% by weight WSR 301. This water soluble polymer is mixed with polyethylene glycol with the weight percentage ratio 7:1. Water insoluble polymer which is polystyrene is humidified with a plasticizer dibutyl phatalat. 50-100 ml of dibutyl phatalat is used per 100 kilogram of polystyrene as premix. Then 60% by weight of humidified polystyrene is mixed with 40% by weight of water soluble polymers. As the final mixture for injection moulding process, the weight percentages of the polymers become 60% polystyrene, 35% water soluble polymer and 5% polyethylene glycol.

The cap 3 and platform 5 of the shaving unit is manufactured by injection moulding process at 190-200 ° C temperature, under 50-100 bar injection pressure with screws that have a diameter of 35-45 mm. The cap 3 and platform 5 that were taken out of the mould as hard pieces at 30-40 ° C would become the main shaving part of the shaving unit after inserting the razor blade(s)4 between them and riveting the pins 6 on the cap 3 by cold riveting process.

Since polyethylene glycol is not compatible with polystyrene and being plasticizer for polyethylene oxide, after the injection moulding process it tends to take place at the surface of polystyrene component with some of the polyethylene oxide. This feature makes the water soluble polymer dissolve easier and create a thin gel layer on the skin to provide a comfortable and smooth shaving.

During shaving using this type of shaving unit the protection bar 7 in front of the platform 5 made of the above described blend is moved along the skin just before the razor blade(s) 1 touch(es) the skin.

Also, after the contact of the razor blade(s) 1 to skin, the cap 3 made of the same blend that is disposed on the blade(s) 4 continues to contact the skin and it makes the skin smooth that may be required for blade(s)-

's second pass from the same spot by dissolving the platform 5 as well as the protection bar 7. Thus all surfaces of the shaving unit will dissolve in water as a result of friction and provides the skin with a continuous smoothness and a very comfortable shaving.

Although the section 2 on the platform 5 of the shaving unit that provides the engagement with the handle 1 consists of water soluble polymer blend material and it contacts with water since it is not exposed to water there would be no slippery surface on the handle 1. The same applies to the handle because the water soluble polymer and polyethylene glycol is not present in the blend of the handle 1.

The forming of the smoothness on the skin during shaving is first started with the contact of the platform 5 with skin and continues with the contact of the cap the parts that are made of the said blend may continue to contact with the skin whatever the handling position and angle may be so it provides the user with the opportunity to enjoy a very comportable shaving. The compounds of the blend of which platform and cap is consisted of the lowest and highest limits of weight percentages and the characteristics of the blend will be defined below.

When the blend is composed of 50-90% water soluble polymer, 9-40% water soluble polymer and 1-10% polyethylene glycol, it provides the manufacture of the platform 5 and cap 3 for a comfortable shaving.

9-40% presence of water soluble polymer, polyethylene oxide with high molecular weight, 1-30% coagulant polyethylene oxide (WSR -301) and minor amounts of additives such as colorants, odorants, in the blend ensures a comfortable shaving.

There is a loss of material from the platform and cap during each shaving operation which is approximately between 7.2 and 10.5 ppm because of the solution of water soluble polymer in the blend and polyethylene glycol on the surface however these losses are not as much as to impair the mechanical features and structural quality of the platform and cap and to limit the useful life of the shaving unit.

That means there would always be enough water soluble polymer in the structure of platform and cap during the shaving operations over the useful life of the shaving unit.

Claims

1. Disposable shaving units having one or more razor blades that creates a smooth surface on the skin as a result of friction and contact with water without using other shaving aid materials characterized in that the production of the entire platform and cap sections uses injection process that defines skin engaging surface composed of a blend of water insoluble polymer in an amount of 50-90% by weight that is polystyrene, thermoplastic rubber (with or without filler) with or without polystyrene, polyethylene, polypropylene and polyacetal, water soluble polymer in an amount of 9-40% by weight and polyethylene glycol in an amount of 1-10% by weight.

2. Shaving unit of Claim 1 having a disposable cartridge unit with one or more razor blades and that may be engaged with a handle.

3. Shaving units according to Claim 1 and 2 characterized in that polyethylene oxide, coagulant WSR-301 odorant and bacteriacid is present in the water soluble blend used in the production of the sections of the shaving units that contact skin.

4. Shaving units according to Claim 1 and 2 characterized in that WSR-301 polyethylene oxide coagulant is present in the water soluble polymer blend in an amount of 1-30% by weight.

5. Shaving units according to Claim 1 and 2 characterized in that polyethylene glycol is present in the blend used in the manufacture of the sections of the shaving units that contact with skin and that has a molecular weight in the range of 3000-30000 and that does not mix with other polymers.

6. Shaving units according to Claim 1 and 2 characterized in that the platform has a protection bar that contacts with skin directly and that includes blade or blades in it.

7. Shaving units according to Claim 1 and 2 characterized in that the cap is placed on the blade or blades.

8. Shaving units according to Claim 1 and 2 characterized in that cap and platform is manufactured as one piece.

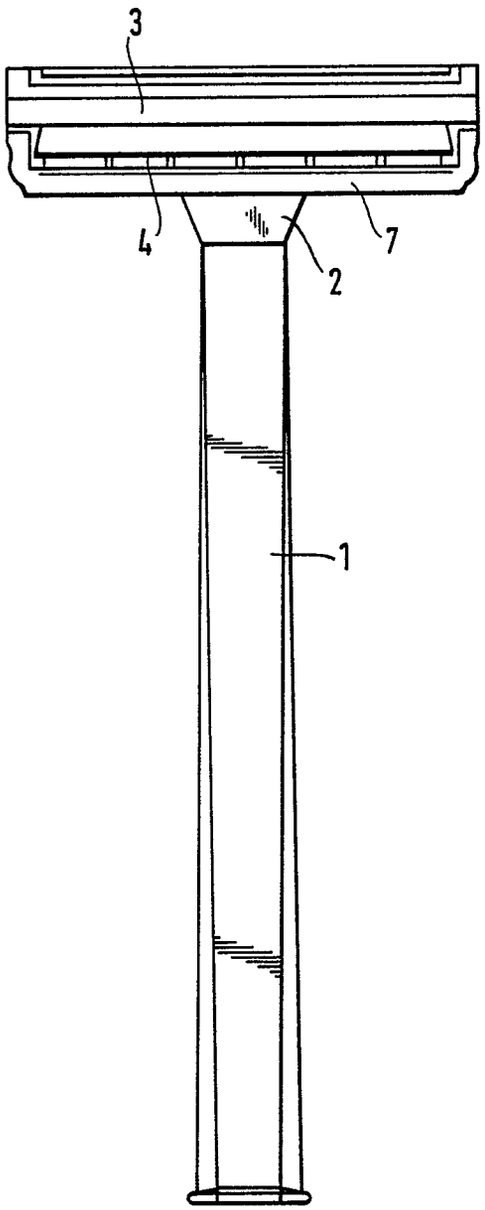

Fig. 1

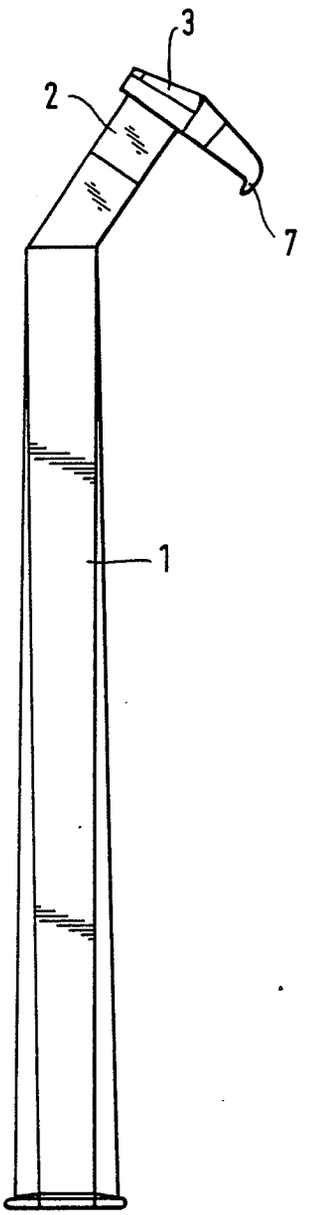

Fig. 2

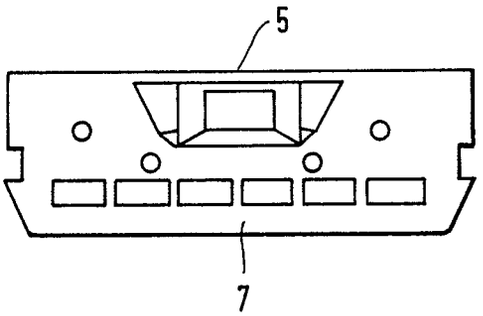

Fig. 3

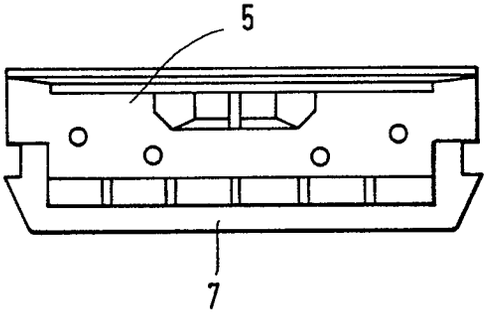

Fig. 4

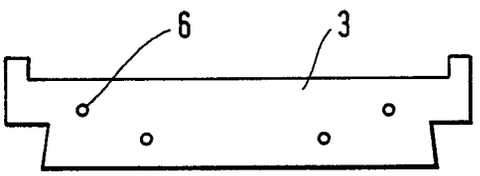

Fig. 5

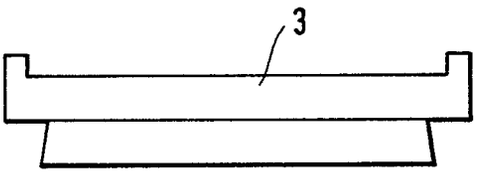

Fig. 6

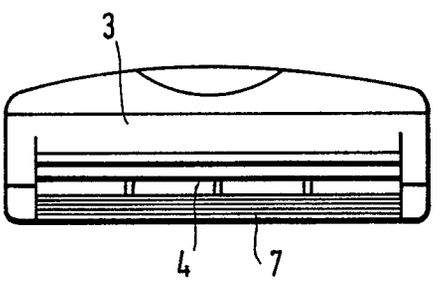

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 10 7307

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y,D	GB-A-2183523 (WILKINSON SWORD LTD) * page 2, lines 10 - 14; claims 1-5; figure *	1-8	B26B21/44
Y	US-A-4170821 (WARNER-LAMBERT CO.) * column 3, line 26 - column 4, line 63; figure 4 * * column 4, lines 45 - 60 *	1-8	
A	FR-A-2229389 (WAKEMAN L.R.) * page 6, line 31 - page 7, line 8 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B26B A61K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	08 AUGUST 1989	WOHLRAPP R.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)

1