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(54) **A slide fastener with Infra Red camouflage characteristics**

(57) Slide fastener (1) and components (5,7,9) having specific reflectivity infra red characteristics so that

they are substantially inconspicuous when viewed with a night vision device.

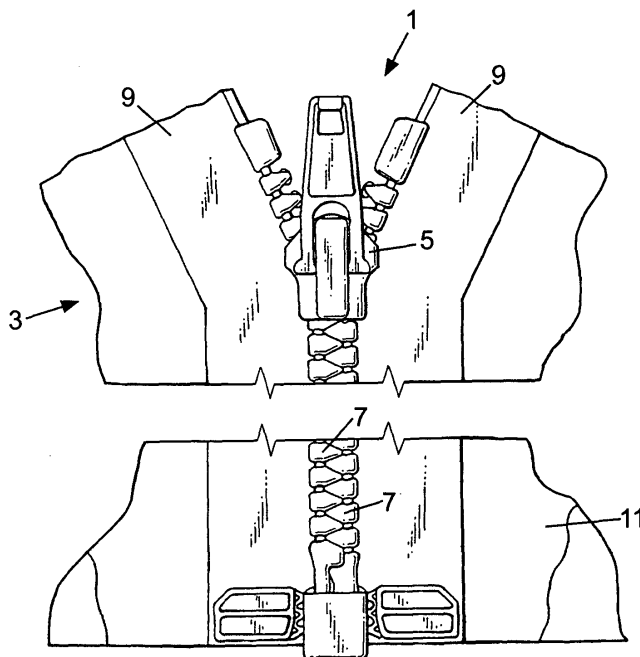


Fig.1

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Description

[0001] This invention relates to a slide fastener. In particular, it relates to a slide fastener having specific reflectivity characteristics.

[0002] A conventional slide fastener comprises two rows of cooperating teeth, each row of teeth mounted on the edge of a tape, and a slider which can move along the rows of teeth to engage/disengage the teeth, as is known in the art. The tapes can be attached to an object such as a garment or a bag.

[0003] Slide fasteners are used on a variety of garments, including combat uniform worn by military personnel. An important consideration when designing military combat uniform is their camouflage characteristics. In particular, combat uniform should be camouflaged from night vision devices. Night vision devices typically detect the amount of infra-red light which is reflected by an observed object. The effective camouflage of combat uniform requires a consideration of the infra-red reflectivity (IRR) properties of the materials from which the uniform is made.

[0004] Hence, when considering the camouflage properties of military combat uniform, the IRR of the uniform should be of the order of ambient levels, so that a person wearing such uniform appears to merge with the background when observed using a night vision device.

[0005] UK Ministry of Defence Defence Standard 00-23 (Issue 3, published 30 May 2001) specifies requirements for infra-red reflective colour for painting military equipment of colour NATO Green (BS 381C Colour no. 285). Figure 2 is a graph showing the reflectance properties of components of a conventional slide fastener of colour NATO Green, over a range of wavelengths from 400 to 1100nm. Defence Standard 00-23 specifies that the reflectance properties of military equipment of colour NATO Green, should lie between specified maximum and minimum target reflectance values over this range, i.e., between the solid black lines on the graph of Figure 2.

[0006] However, it can be seen from Figure 2 that for a conventional slide fastener of colour NATO Green, the reflectance of the tape exceeds the maximum target value below around 415nm and above around 720nm, the reflectance of the teeth is below the minimum target value above 750nm and the reflectance of the slider is below the minimum target value between 750 and around 795nm. Hence, a conventional slide fastener of colour NATO Green does not conform to this Defence Standard's reflectance criteria for certain frequencies. In practice, this would mean that some of the components of a conventional slide fastener of colour NATO Green would stand out when viewed with a night vision device, either as dark regions or as light regions, on the display of the night vision device.

[0007] The Defence Standard referred to above also specifies reflectance requirements for other colours over specified wavelength ranges, as shown in Table 1:

Table 1 - reflectance requirements for various colours

Colour	BS 381C Colour no.	Requirement	Wavelength range
Black	-	$\leq 10\%$	700 to 1200nm
Light Stone	361	$45 \pm 5\%$	750 to 1200nm
Camouflage Desert Sand	380	$45 \pm 5\%$	750 to 1200nm

[0008] UK Ministry of Defence Defence Standard 83-65 (Issue 4, published 28 June 2002) defines the requirements for cloths made from blends of polyester and cotton to be used in the manufacture of uniforms or other military clothing. The tape of a slide fastener is commonly made of polyester and would fall within the scope of this Defence Standard, which specifies, on page 18, that beige cloth, twill, polyester and cotton of disruptively patterned colour Desert should have a reflectance of $65 \pm 5\%$.

[0009] Alternatively, other reflectivity characteristics may be specified. For example, similar reflectivity characteristics may be specified for components of a slide fastener of the same colour, irrespective of the material from which the individual components are made. In such a case, each of the components of the slider fastener would show up to a similar degree when viewed using a night vision device.

[0010] We have realised that it is possible to alter the infra-red reflectance characteristics of components of a slide fastener so that the reflectance characteristics of slide fasteners manufactured by this method fall within desired minimum and maximum levels.

[0011] According to a first aspect of the invention there is provided a slider for a slide fastener, the slider having predetermined reflectance characteristics in the range 1000 to 1200nm, preferably in the range 750 to 1200nm, preferably in the range 400 to 1200nm. Preferably the predetermined reflectance characteristics fall substantially within the scope of UK Ministry of Defence Defence Standard 00-23, or for the wavelength range 1000 to 1200 nm between 60 and 70% for a slider of colour Desert Sand or between 35 and 55% for a slider of colour Woodland Green, or for colours similar to these colours.

[0012] Preferably the coating is formed from a coating mixture comprising a dispersion selected from P27100 NATO Green, P31500 Camouflage Sand, P31501 Woodland Green or P25200 Black or from a coating mixture comprising a powder selected from 36K 938 Woodland Green or 36R 1194 Desert Sand, these dispersions and powders being manufactured by Rockwood Pigments (UK) Limited.

[0013] Preferably for a coating comprising powder 36R 1194 Desert Sand, around 40 parts by weight of powder 36R 1194 Desert Sand is mixed with 100 parts by weight of lacquer to produce a dispersion, and for a coating comprising powder 36K 938 Woodland Green, around 18 parts by weight of powder 36K 938 Woodland Green is mixed with 100 parts by weight of lacquer to produce a dispersion. Preferably the coating mixture further comprises a lacquer and a solvent.

[0014] Preferably the dispersion comprises between approximately 3 and 10 wt% of the coating mixture.

[0015] There is also provided a method of coating a slider body to produce a slider as defined herein above, comprising the steps of: mixing between 7 and 25 parts by weight of a dispersion with 100 parts by weight of a lacquer; mixing the resulting lacquer and dispersion mixture with a similar weight of a solvent to produce the coating mixture; spraying the slider body with the coating mixture; and curing the coating mixture. Preferably a plurality of coats of coating mixture are applied to the slider body.

[0016] Preferably conventional enamel paint is applied to the slider body in addition to the coat or coats of coating mixture. Preferably the conventional enamel paint is white in colour.

[0017] According to a second aspect of the invention there is provided teeth for a slide fastener, the teeth having predetermined reflectance characteristics in the range 1000 to 1200nm, preferably in the range 750 to 1200nm, preferably in the range 400 to 1200nm. Preferably the predetermined reflectance characteristics fall substantially within the scope of UK Ministry of Defence Defence Standard 00-23, or for the wavelength range 1000 to 1200nm between 60 and 70% for colour Desert Sand or between 35 and 55% for colour Woodland Green, or for colours similar to these colours.

[0018] Preferably the teeth comprise a colourant selected from NATO green PE6 03724, Woodland Green PE6 03725, Sand PEF 01616 or Sand PEF 01604.

[0019] According to a third aspect of the invention there is provided a tape for a slide fastener, the tape having predetermined reflectance characteristics in the range 1000 to 1200nm, preferably in the range 750 to 1200nm, preferably in the range 400 to 1200nm. Preferably the predetermined reflectance characteristics fall substantially within the scope of UK Ministry of Defence Defence Standard 00-23, within the scope of UK Ministry of Defence Defence Standard 83-65, or for the wavelength range 1000 to 1200nm between 60 and 70% for colour Desert Sand or between 35 and 55% for colour Woodland Green, or for colours similar to these colours.

[0020] Preferably the tape has a coating comprising carbon black. Preferably the coating further comprises a binder and a fixing agent. Preferably the coating further comprises one or more of a migration inhibitor, an antifoam agent and a wetting agent.

[0021] According to a further aspect of the invention there is provided a solution for use in the preparation of an IRR tape, the solution comprising one or more of carbon black, a binder, a fixing agent, a migration inhibitor, an antifoam agent and a wetting agent.

[0022] According to a further aspect of the invention there is provided a method of producing an IRR tape, comprising the steps of: preparing a solution as claimed in any one of claims 20 to 26; immersing untreated tape into the solution; removing the tape from the solution; drying the tape; and curing the tape.

[0023] According to a further aspect of the invention there is provided a camouflage uniform incorporating an IRR slide fastener component.

[0024] According to a further aspect of the invention there is provided a slide fastener comprising a pair of tapes, teeth on the tapes, and a slider for coupling opposed teeth, the slide fastener having predetermined reflectance characteristics in the range 1000 to 1200nm, preferably in the range 750 to 1200nm, preferably in the range 400 to 1200nm and further preferably having predetermined reflectance characteristics which fall substantially within the scope of UK Ministry of Defence Defence Standard 00-23, UK Ministry of Defence Defence Standard 83-65, or for the wavelength range 1000 to 1200nm between 60 and 70% for colour Desert Sand or between 35 and 55% for colour Woodland Green, or for colours similar to these colours.

[0025] According to a further aspect of the invention there is provided a military combat garment having a slide fastener, wherein the reflectance characteristics of the slide fastener are similar to the reflectance characteristics of the garment. Preferably the reflectance characteristics of the slide fastener are similar to the reflectance characteristics of the garment over a range of wavelengths 1000 to 1200nm, preferably over a range of wavelengths 750 to 1200nm and preferably in the range of wavelengths 400 to 1200nm.

[0026] The invention will be further described by way of example with reference to the accompanying drawings in which:

Figure 1 is a plan view of an IRR slide fastener according to the invention mounted on military combat uniform;

Figure 2 is a graph showing the reflectance properties of components of a conventional NATO Green coloured slide

fastener;

Figure 3 is a graph showing the reflectance properties of the components of a NATO Green coloured IRR slide fastener;

Figure 4 is a graph showing the reflectance properties of a Desert Sand coloured IRR tape;

Figure 5 is a graph showing the reflectance properties of Desert Sand coloured IRR teeth and a Desert Sand coloured IRR slider;

Figure 6 is a graph showing the reflectance properties of the components of a Woodland Green coloured IRR slide fastener; and

Figure 7 is a graph showing the reflectance properties of the components of a second Desert Sand coloured IRR slide fastener.

[0027] Figure 1 shows a slide fastener 1 mounted on a military combat garment 3, such as a jacket or trousers. The slide fastener 1 comprises a slider 5 and two rows of teeth 7 mounted on the edge of two tapes 9. Each tape 9 is attached to an edge of the garment 3. For this particular embodiment the uniform is coloured NATO Green, and the slide fastener components 5, 7, 9 are also coloured NATO Green. It is also common for military uniform to be coloured black or sand, and the slide fastener 1 may be coloured to match the colour of the garment 3, but the invention is not limited to slide fasteners or slide fastener components of these colours.

[0028] The slider 5 comprises a slider body made of metal, for example zinc, brass or aluminium alloy, and an IRR coating, that is a coating having the predetermined infra-red reflectivity characteristics. A coating mixture is applied to the slider body to produce the IRR coating, and it is this coating which gives the slider 5 the predetermined reflectance properties. The coating mixture is made of a dispersion, a lacquer and a solvent.

[0029] To produce a coating coloured NATO Green, the coating mixture comprises the dispersion P27100 NATO Green, produced by Rockwood Pigments (UK) Limited, the lacquer 907511 Transparent X and the solvent 900104 Diluente, both produced by Gandola of Italy.

[0030] To prepare the coating mixture, between 7 and 25 parts by weight of dispersion is mixed with 100 parts by weight of lacquer. The resulting lacquer and dispersion mixture is then mixed with a similar weight of solvent, to thin the lacquer and dispersion mixture to produce a coating mixture with a viscosity which allows the coating mixture to be applied using conventional spraying apparatus used for spray coating sliders. Hence, the dispersion comprises between approximately 3 and 10 wt% of the coating mixture.

[0031] The coating mixture described above produces a coating of colour NATO Green, and the reflectance properties of a slider coated with this NATO Green coloured coating are shown in Figure 3.

[0032] To produce a Sand coloured coating mixture, the dispersion used is P31500 Camouflage Sand or 36R 1194 Desert Sand. The reflectance properties of a slider coated with a coating mixture comprising dispersion P31500 Camouflage Sand are shown in Figure 5. Alternatively, to produce a Sand coloured coating mixture, around 40 parts by weight of powder 36R 1194 Desert Sand is mixed with 100 parts by weight of lacquer to produce a dispersion/paste. The reflectance properties of a slider coated with a coating mixture comprising dispersion produced from powder 36R 1194 Desert Sand are shown in Figure 7.

[0033] To produce a Woodland Green coloured coating mixture, the dispersion used is P31501 Woodland Green. Alternatively, to produce a Woodland Green coloured coating mixture, around 18 parts by weight of powder 36K 938 Woodland Green is mixed with 100 parts by weight of lacquer to produce a dispersion/paste. The reflectance properties of a slider coated with a coating mixture comprising dispersion produced from powder 36K 938 Woodland Green are shown in Figure 6.

[0034] To produce a black coloured coating mixture, the dispersion used is P25200 Black.

[0035] Each of the above mentioned dispersions and powders are produced by Rockwood Pigments (UK) Limited.

[0036] To prepare a coating mixture with dispersions P31500 Camouflage Sand, P31501 Woodland Green, and P25200 Black, or with dispersions produced from powders 36K 938 Woodland Green and 36R 1194 Desert Sand, between 7 and 25 parts by weight of dispersion is mixed with 100 parts by weight of lacquer. In each case, the resulting lacquer and dispersion mixture is subsequently mixed with a similar weight of solvent, as above.

[0037] To coat the slider body, the slider body is first sprayed with conventional enamel paint, of the desired final colour, with a spray gun, as is known in the art. The paint is then cured at around 185 to 200°C for around 15 minutes and the slider is left to cool down for about 5 minutes. A second coat of conventional enamel paint is applied on top of the dry, first coat and the curing process is repeated. The coatings of conventional enamel paint provide a sound surface of a good texture on which the IRR coating mixture can be evenly applied, to give a desirable final surface texture. The

cycle of spraying, curing and cooling is repeated three more times, this time using the IRR coating mixture. The overall thickness of the resulting coating is typically between about 20 and 25µm.

[0038] According to an alternative method, the conventional enamel paint is not the same colour as the desired final colour of the slider body, but is white in colour. According to an alternative method, conventional enamel paint is not applied, but approximately seven layers of the IRR coating mixture are applied.

[0039] The dispersion, lacquer and solvent described above produce an acrylic coating. However, epoxy resin based dispersion, lacquer and solvent may also be used to produce a suitable coating.

[0040] The NATO Green coloured teeth 7 of the slide fastener 1 of Figure 1 are made from a polymer resin and a colourant. The resin may be either a homo-polymer (e.g. Dupont 7056) or a copolymer (e.g. Asahi's Tenac 7056 or Mitsubishi's Yupital 7511). Alternatively, other suitable polymers can be used. A granular colourant of NATO Green PE6 03724, produced by Clariant Masterbatch, is added to the polymer in proportions 97 wt% polymer:3 wt% colourant. The colourant contains carbon black, which affects the IRR characteristics of the polymer. The polymer is mixed with the colourant at 180°C in an automated V-tumbler for about ten minutes, to produce a liquid which can be injection molded to produce the teeth 7 of the slide fastener 1.

[0041] The teeth 7 described above are produced in a NATO Green colour and the reflectance properties of teeth comprising colourant NATO Green PE6 03724 are shown in Figure 3.

[0042] To produce Woodland Green coloured teeth, the colourant used is Woodland Green PE6 03725. The reflectance properties of teeth comprising colourant Woodland Green PE6 03725 are shown in Figure 6.

[0043] To produce Sand coloured teeth, the colourant used is Sand PEF 01604 or Sand PEF 01616. The reflectance properties of teeth comprising colourant Sand PEF 01604 are shown in Figure 5. The reflectance properties of teeth comprising colourant Sand PEF 01616 are shown in Figure 7.

[0044] These colourants are also produced by Clariant Masterbatch.

[0045] The NATO Green coloured tape 9 of the slide fastener 1 of Figure 1 is typically made of polyester or nylon, but other suitable materials can be used. The tape 9 is treated with a solution comprising carbon black, to provide the tape 9 with a coating so that the tape 9 has predetermined reflectance characteristics.

[0046] The base colour of the untreated tape is chosen to be slightly lighter than the ultimately desired colour of the tape 9, to compensate for the darkening effect of the carbon black colouring. The tape may be woven or knitted from coloured yarn or fibre, but typically is dyed the required colour. The coloured tape is treated in a bath containing the following compounds, produced by BASF, which are dissolved in water, each compound providing the stated function:

Product name	Proportion	Function
Helizarin black 444	0.1-0.5 g/l	Pigment - alters the reflectivity characteristics of the polymer.
Helizarin Binder ET95	30-70 g/l	Binder - binds the pigment to the tape
Siligen FA	10-30 g/l	Migration inhibitor - ensures even distribution of pigment
Condensol M	5-10 g/l	Antifoam agent - controls foam in the pad bath
Keiralon Jet-B	0.5-1.5 g/l	Wetting agent - improves bonding
Helizarin Fixing agent LF	5-20 g/l	Fixing agent - ensures good wash fastness of finished product

[0047] The binder and the fixing agent help the pigment bond with the tape. The other bath additives ensure that the pigment adheres to the tape in a uniform manner.

[0048] After the tape is removed from the bath, the tape is dried at 130°C for about 90 seconds and then cured at 180°C for about 90 seconds. Alternatively, if the drying and curing temperatures are varied then the drying and curing times are altered accordingly.

[0049] The slide fastener 1 is assembled from the components manufactured as above. An assembled slide fastener 1 can then be attached to a garment 11, as shown in Figure 1.

[0050] The graph in Figure 3 shows the reflectance characteristics of the NATO Green coloured IRR slider 5, tape 9 and teeth 7 shown in Figure 1. The reflectance data was measured using a Microflash MF45 IR spectrophotometer, produced by Datacolor.

[0051] Unlike the conventional components, whose reflectance characteristics are shown in Figure 2, the IRR components generally conform to the target reflectance characteristics, except for the IRR tape in the region of 750nm and the IRR teeth in the region of 800nm.

[0052] Figure 4 shows the reflectance properties of a Desert Sand coloured IRR tape, from which it can be seen that the reflectance properties conform to the requirements ($65 \pm 5\%$) for polyester defined in UK Ministry of Defence Defence Standard 83-65, in the range 1000 to 1100nm.

[0053] Figure 5 shows the reflectance properties of Desert Sand coloured IRR teeth and a Desert Sand coloured IRR slider, from which it can be seen that the reflectance properties generally conform to the requirements ($45 \pm 5\%$) for polyester defined in UK Ministry of Defence Defence Standard 00-23, in the range 750 to 1100nm.

[0054] Figure 6 shows the reflectance properties of the teeth, tape and slider of a Woodland Green coloured IRR slide fastener. The coating of the slider contains dispersion produced from powder 36K 938 Woodland Green and the teeth contain colourant Woodland Green PE6 03725. From the graph it can be seen that the reflectance properties generally lie within the range of $45 \pm 10\%$ in the range 1000 to 1100nm.

[0055] Figure 7 shows the reflectance properties of the teeth, tape and slider of a second Desert Sand coloured IRR slide fastener. The coating of the slider contains dispersion produced from powder 36R 1194 Desert Sand and the teeth contain colourant Sand PEF 01616. From the graph it can be seen that the reflectance properties lie within the range of $65 \pm 5\%$ in the range 1000 to 1100nm.

[0056] If a slide fastener comprising these components is incorporated into military combat uniform having similar IRR characteristics, the slide fastener is substantially inconspicuous when viewed with a night vision device, thereby providing improved camouflage for military personnel wearing such garments.

[0057] Various modifications will be apparent to those in the art and it is desired to include all such modifications as fall within the scope of the accompanying claims.

Claims

1. A slide fastener or slide fastener component such as a slider, a tape or teeth, the slide fastener or component having predetermined reflectance characteristics in the range 1000 to 1200nm, preferably in the range 750 to 1200nm, preferably in the range 400 to 1200nm.
2. A slide fastener or slide fastener component as claimed in claim 1, the slide fastener or component having reflectance characteristics which fall substantially within the scope of UK Ministry of Defence Defence Standard 00-23.
3. A tape as claimed in claim 1, the tape having reflectance characteristics which fall substantially within the scope of UK Ministry of Defence Defence Standard 83-65.
4. A slide fastener or slide fastener component as claimed in claim 1, wherein the reflectance characteristics in the range 1000 to 1200nm are between 60 and 70% for a slide fastener or component of colour Desert Sand, or wherein the reflectance characteristics in the range 1000 to 1200nm are between 35 and 55% for a slide fastener or component of colour Woodland Green.
5. A slider as claimed in claim 1 or 2, wherein a coating on the slider is formed from a coating mixture comprising a dispersion selected from P27100 NATO Green, P31500 Camouflage Sand, P31501 Woodland Green or P25200 Black.
6. A slider as claimed in claim 4, wherein a coating on a slider of colour Desert Sand is formed from a coating mixture comprising a powder 36R 1194 Desert Sand, or wherein a coating on a slider of colour Woodland Green is formed from a coating mixture comprising a powder 36K 938 Woodland Green.
7. A slider as claimed in claim 6, wherein for the coating of colour Desert Sand around 40 parts by weight of powder 36R 1194 Desert Sand is mixed with 100 parts by weight of lacquer to produce a dispersion, and for the coating of colour Woodland Green around 18 parts by weight of powder 36K 938 Woodland Green is mixed with 100 parts by weight of lacquer to produce a dispersion.
8. A slider as claimed in claim 5 or 7, wherein the coating mixture further comprises a lacquer and a solvent.
9. A slider as claimed in claim 8, wherein the dispersion comprises between approximately 3 and 10 wt% of the coating mixture.
10. A method of coating a slider body to produce a slider as claimed in any one of claims 1, 2, 4, 5 or 7 to 9, comprising the steps of:

mixing between 7 and 25 parts by weight of a dispersion with 100 parts by weight of a lacquer;
mixing the resulting lacquer and dispersion mixture with a similar weight of a solvent to produce the coating

mixture;
spraying the slider body with the coating mixture; and
curing the coating mixture.

- 5 **11.** A method as claimed in claim 10, wherein a plurality of coats of coating mixture are applied to the slider body.
- 12.** A method as claimed in claim 10 or 11, wherein conventional enamel paint is applied to the slider body in addition to the coat or coats of coating mixture.
- 10 **13.** A method as claimed in claim 12, wherein the conventional enamel paint is white in colour.
- 14.** Teeth as claimed in claim 1 or 2, comprising a colourant selected from NATO green PE6 03724, Woodland Green PE6 03725 or Sand PEF 01604.
- 15 **15.** Teeth as claimed in claim 1 or 4, comprising a colourant Sand PEF 01616 for teeth of colour Desert Sand or comprising a colourant Woodland Green PE6 03725 for teeth of colour Woodland Green.
- 16.** A tape as claimed in any one of claims 1 to 4, the tape having a coating comprising carbon black.
- 20 **17.** A tape as claimed in claim 16, the coating further comprising a binder and a fixing agent.
- 18.** A tape as claimed in claim 16 or 17, the coating further comprising one or more of a migration inhibitor, an antifoam agent and a wetting agent.
- 25 **19.** A tape as claimed in any one of claims 16, 17 or 18, wherein Helizarin black 444 is used as carbon black.
- 20.** A solution for use in producing the tape of claim 19, wherein the solution comprises between 0.1 and 0.5g of Helizarin black 444 per litre of water.
- 30 **21.** A solution as claimed in claim 20, the solution further comprising a binder and a fixing agent.
- 22.** A solution as claimed in claim 21, wherein Helizarin Binder ET95 is used as the binder.
- 23.** A solution as claimed in claim 21, wherein Helizarin fixing agent LF is used as the fixing agent.
- 35 **24.** A solution as claimed in claim 22, wherein the solution comprises between 30 and 70g of Helizarin Binder ET95 per litre of water.
- 25.** A solution as claimed in claim 23, wherein the solution comprises between 5 and 20g of Helizarin fixing agent LF per litre of water.
- 40 **26.** A solution as claimed in any one of claims 20 to 25, wherein the solution further comprises one or more of a migration inhibitor, an antifoam agent and a wetting agent.
- 45 **27.** A method of producing a tape as claimed in any one of claims 16 to 19, comprising the steps of:
 preparing a solution as claimed in any one of claims 20 to 26;
 immersing untreated tape into the solution;
 removing the tape from the solution;
50 drying the tape; and
 curing the tape.
- 28.** A camouflage uniform incorporating a slide fastener or slide fastener component as claimed in any one of claims 1 to 9 or 14 to 19.
- 55 **29.** A military combat garment having a slide fastener, wherein the reflectance characteristics of the slide fastener are similar to the reflectance characteristics of the garment.

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30. A military combat garment as claimed in claim 29, wherein the reflectance characteristics of the slide fastener are similar to the reflectance characteristics of the garment over a range of wavelengths 1000 to 1200nm, preferably over a range of wavelengths of 750 to 1200nm, preferably over a range of wavelengths of 400 to 1200nm.

5 **31.** A zip fastener component comprising carbon black.

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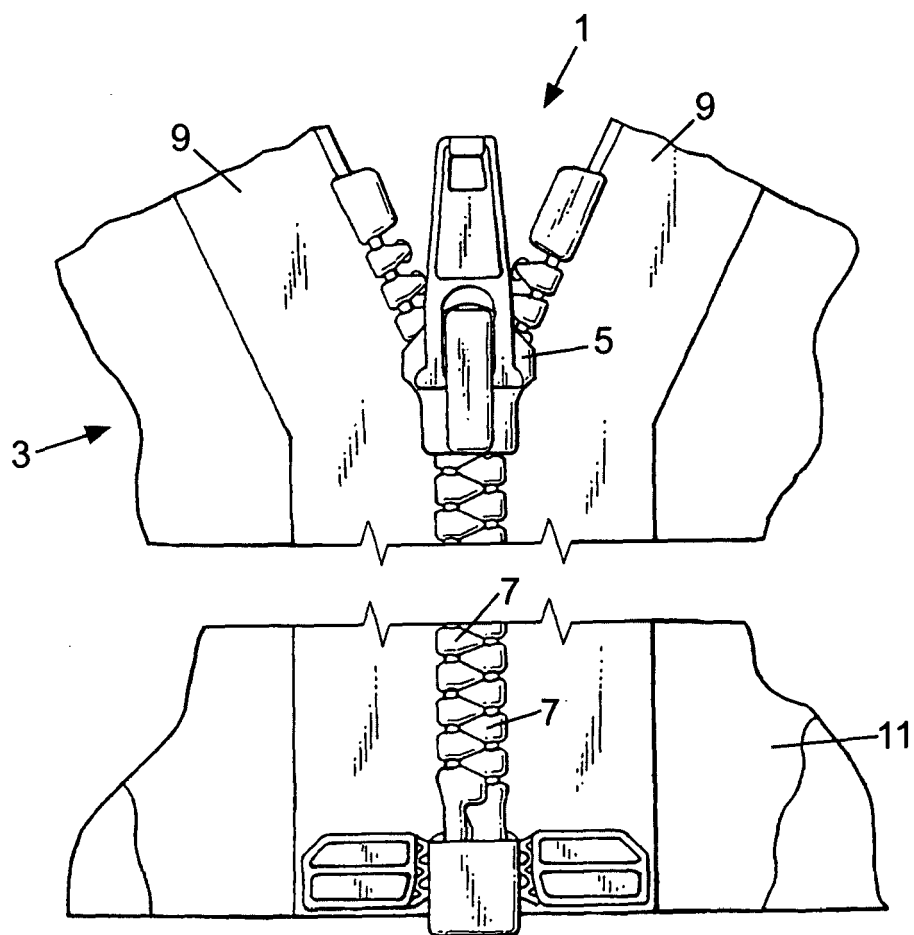
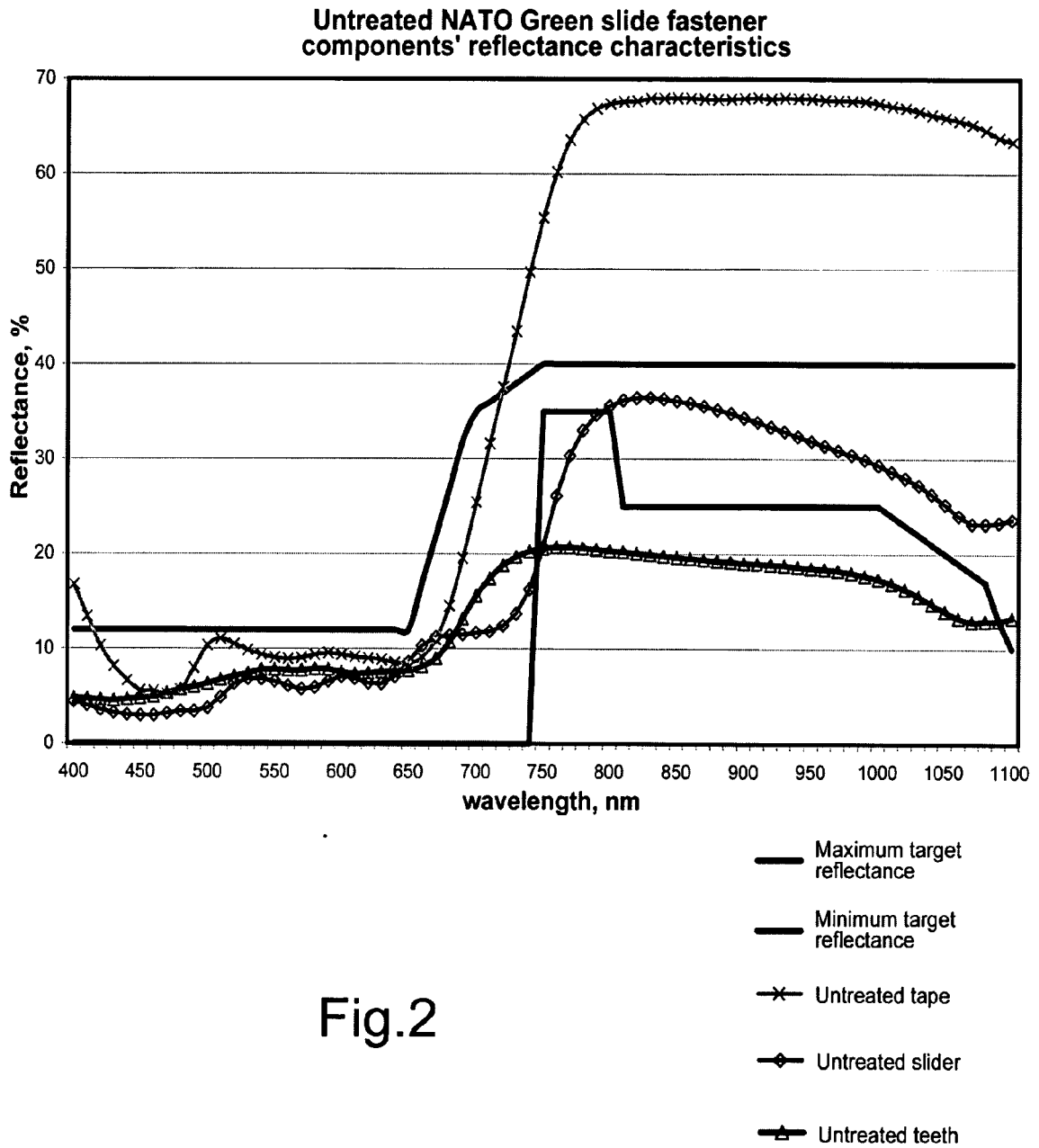
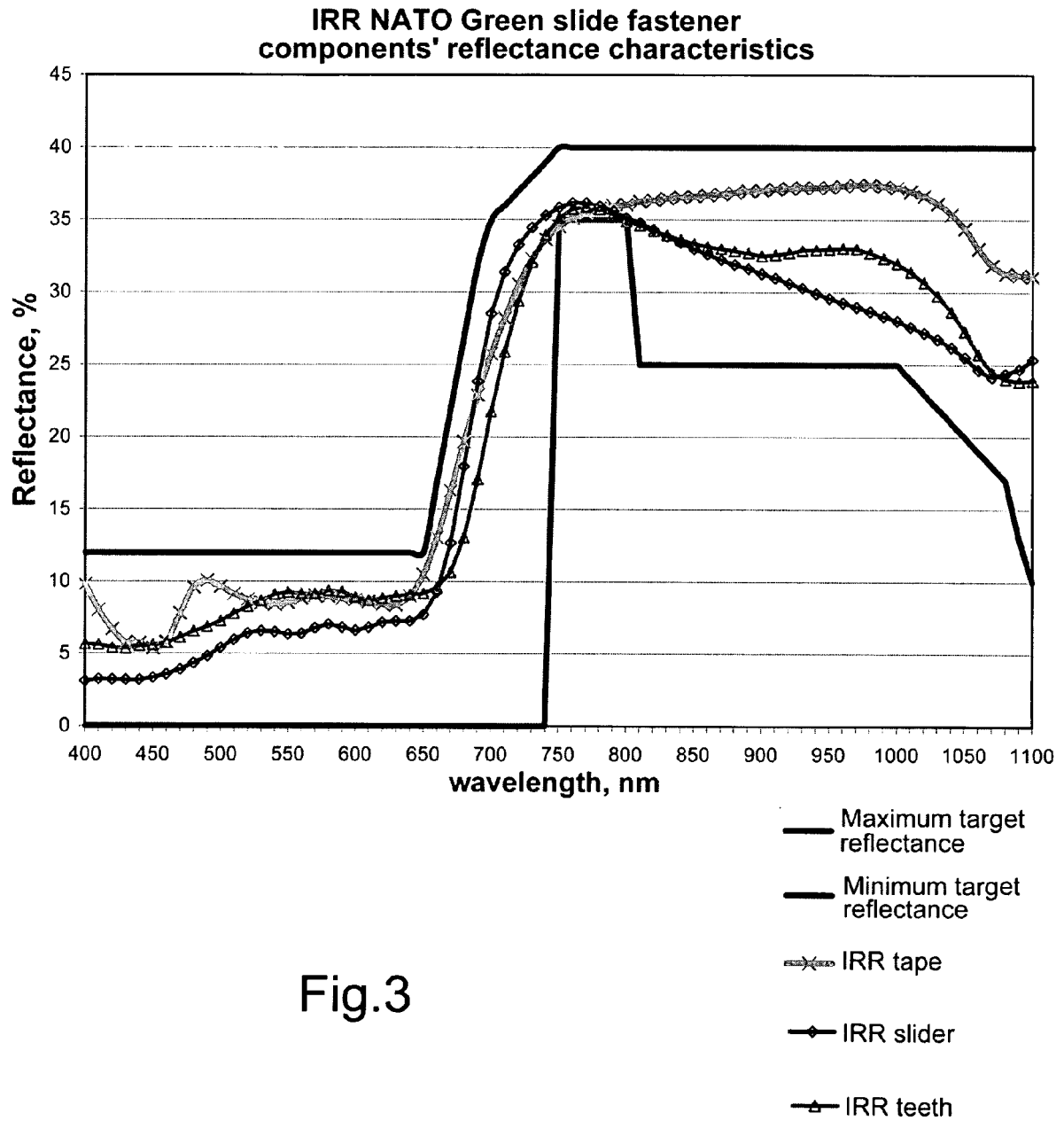
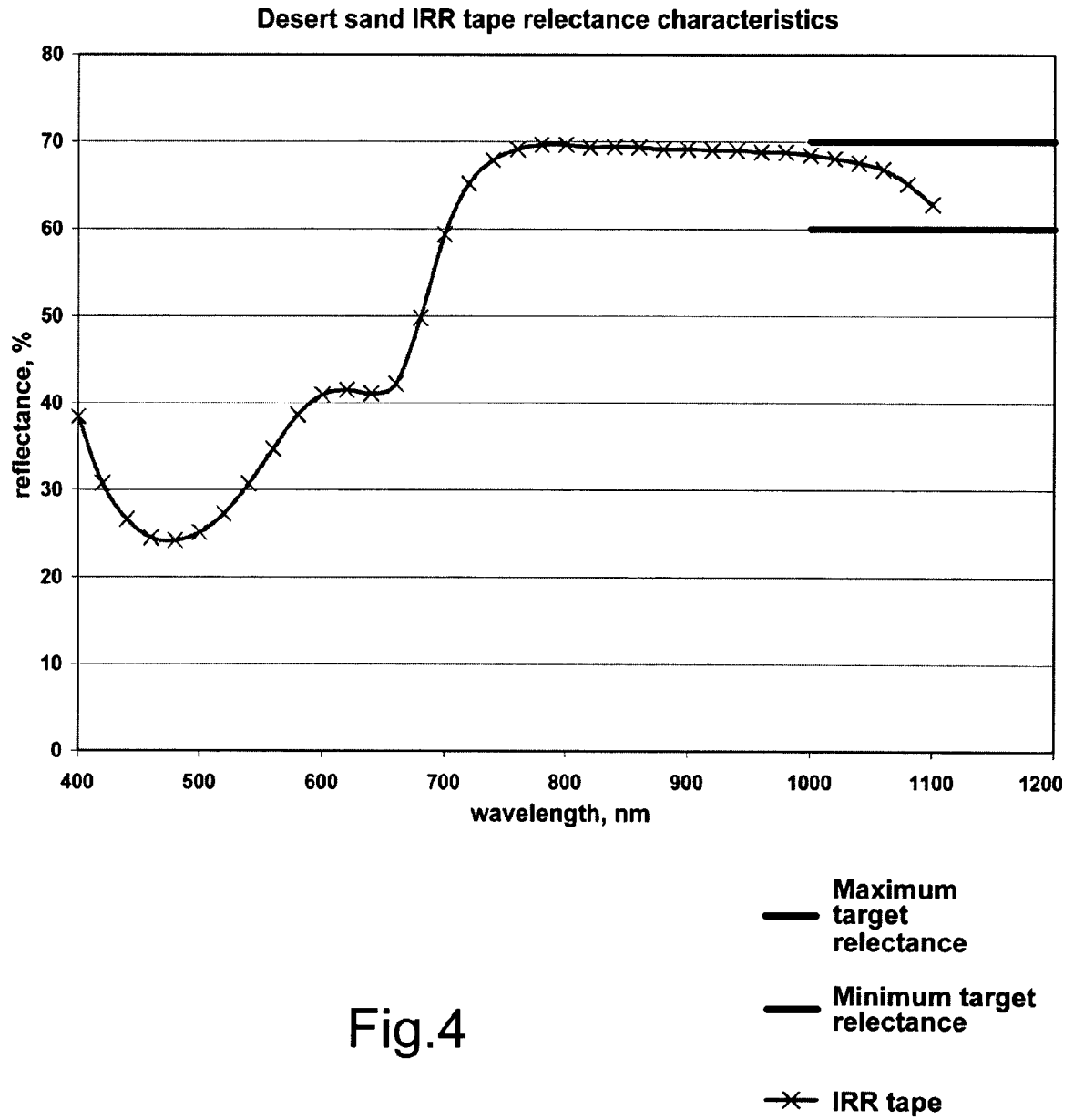
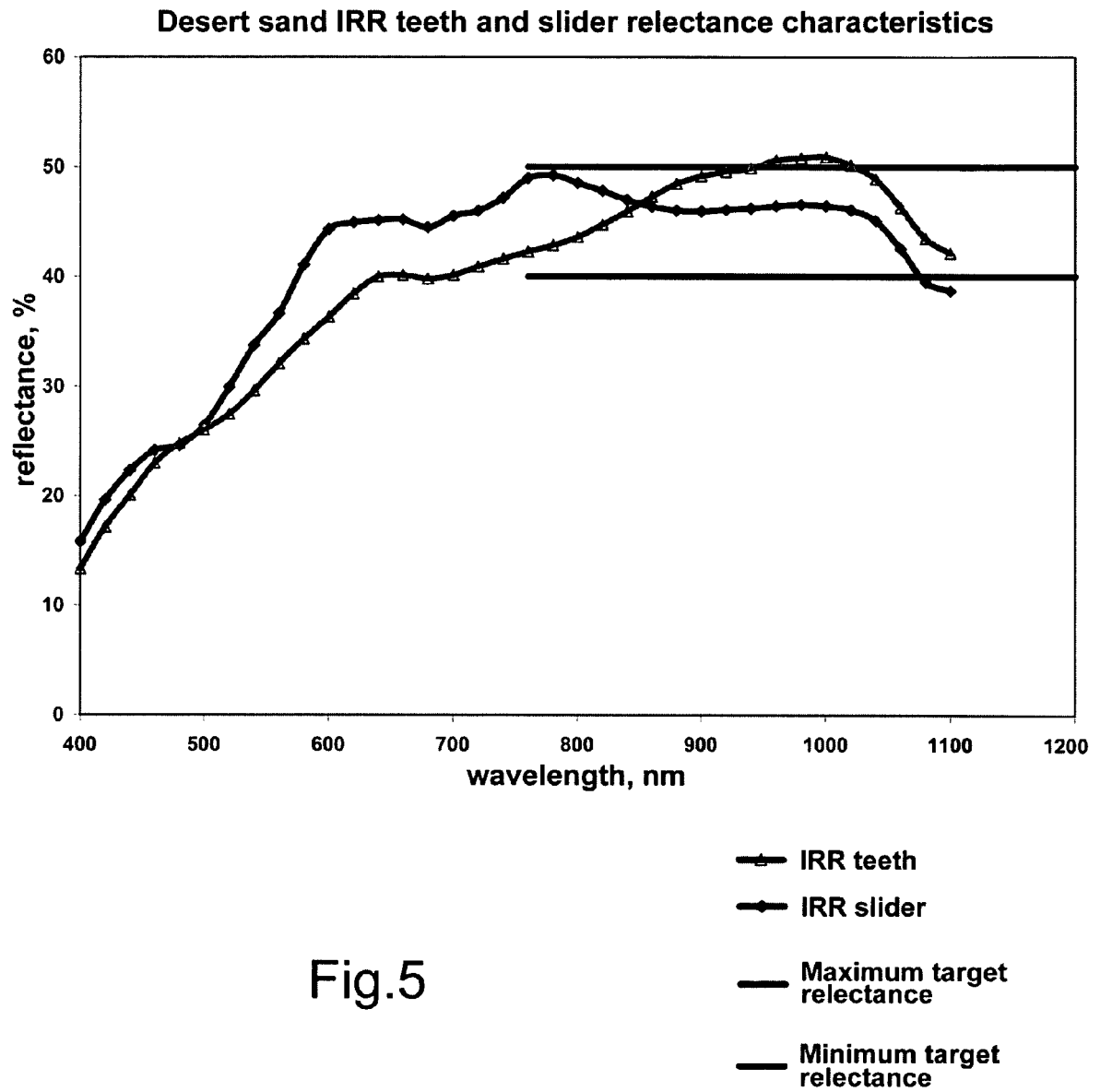


Fig.1









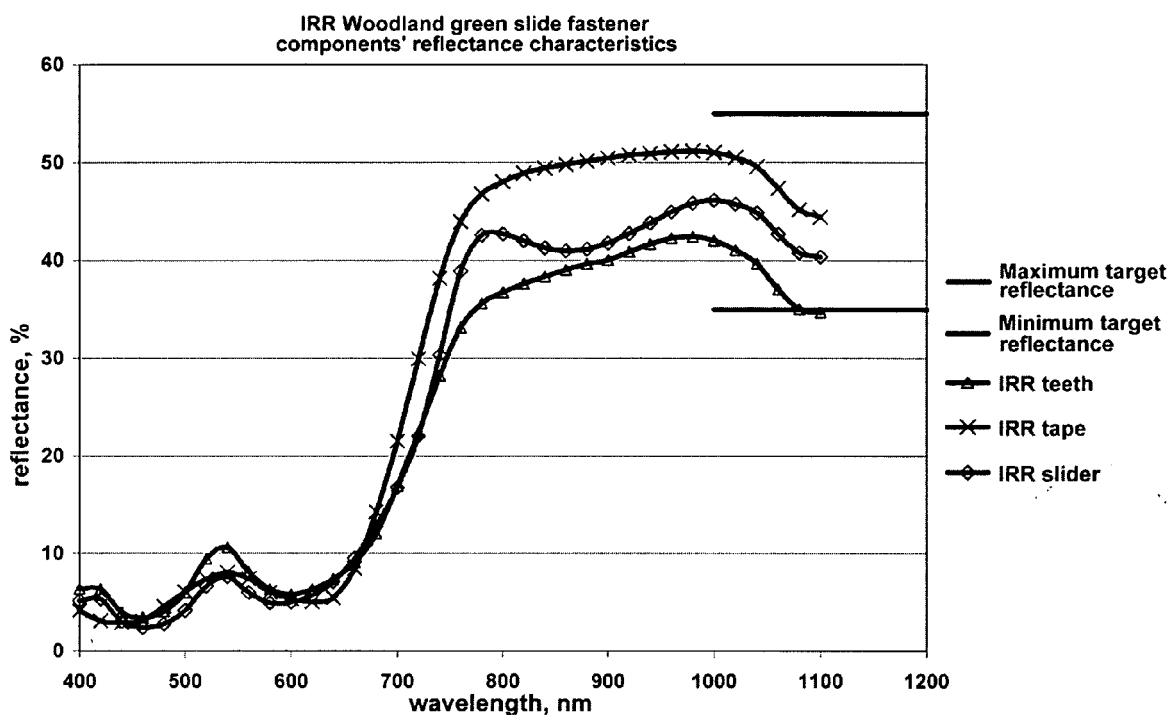


Fig.6

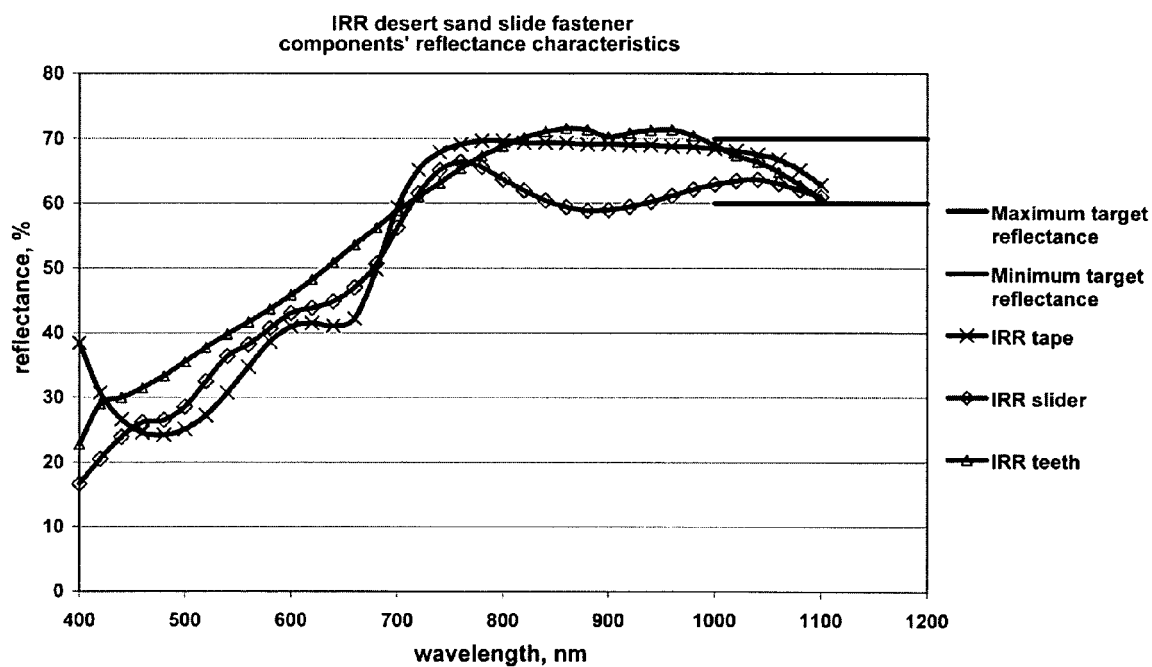


Fig.7



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 25 7502

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 199 11 227 A1 (FORBO-STAMOID AG, EGLISAU; LANZ-ANLIKER AG, ROHRBACH) 14 September 2000 (2000-09-14) * abstract *	1,28-30	A44B19/00
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Y	* page 6, paragraph 35 * -----	17,18	
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X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 080 (C-0689), 15 February 1990 (1990-02-15) & JP 01 297463 A (TECH RES & DEV INST OF JAPAN DEF AGENCY; others: 01), 30 November 1989 (1989-11-30) * abstract *	14,15	

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 January 2006	Examiner Thomson, S
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			

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EPO FORM 1503 03.82 (P04C01)



DOCUMENTS CONSIDERED TO BE RELEVANT			
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