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(54) A soleplate for an iron

(57) A soleplate (3) for an iron, having a support (7) provided with a contact layer (9) for ironing a piece of garment. The contact layer comprises a mixture of polyetheretherketone and fluoropolymer for ensuring a good wear resistance and good stain resistance.

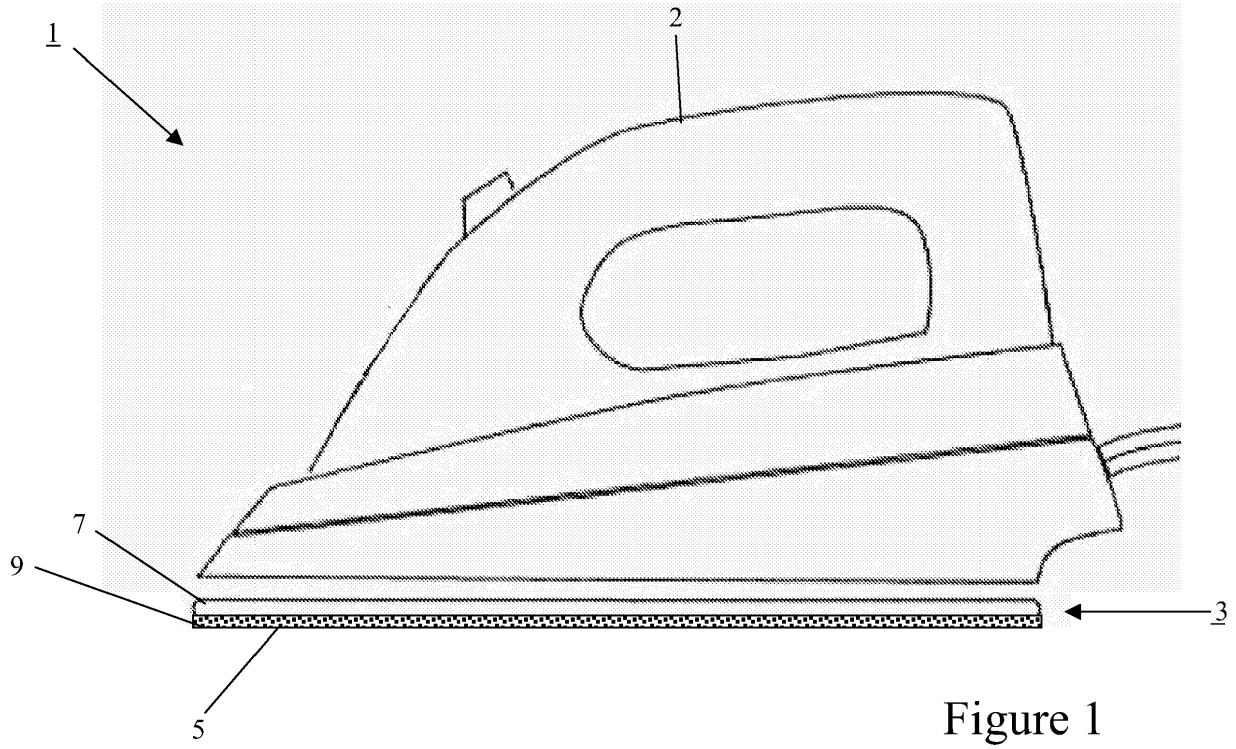

Figure 1

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Description

FIELD OF THE INVENTION

[0001] The invention is related to a soleplate having a support provided with a contact layer for ironing a piece of garment. The invention is further related to an iron and a method of manufacturing a sole plate.

DESCRIPTION OF THE PRIOR ART

[0002] Several materials may be used as soleplate coating materials for an iron, such as solgel, enamel, anodized aluminium and Cr/Ni coatings. Also an organic polymer may be used as soleplate coating, for example polytetrafluoroethylene (PTFE). US-A 6,382,454 describes a non-stick coating with improved scratch resistance comprising an undercoat essentially constituted by Polyether ether ketone (PEEK) and a fluorocarbon resin based outer coat.

[0003] A PTFE soleplate coating has good non-stick, i.e. a good stain resistance, and good ironing smoothness, however the scratch resistance and wear resistance of such a coating are poor.

[0004] Alternatively, PEEK may be considered as top coating on a soleplate material. PEEK has known favorable properties like a low friction coefficient, good mechanical properties and a good wear resistance compared to PTFE coatings. However, PEEK soleplate coatings are susceptible to stain. In case a stain (e.g. dyes and / or burned fabric which are released from the garments upon ironing) is attached to the soleplate, the gliding properties of the coating may be affected negatively (gliding becomes draggy, less smooth). Furthermore no the stain is desired from an aesthetical point of view.

SUMMARY OF THE INVENTION

[0005] It is an object of the invention provide a soleplate comprising a contact layer having a good wear resistance and good stain resistance.

[0006] This object is surprisingly achieved applying a contact layer comprising a mixture of a polyetheretherketone and a fluoropolymer. The soleplate according to the invention is defined in claim 1.

[0007] The contact layer comprises a garment contact surface for contacting a piece of garment during ironing.

[0008] A mixture of two polymers is also referred to as a blend.

[0009] Examples of a fluoropolymer are polytetrafluoroethylene (PTFE) and polyfluoroalkoxy (PFA).

[0010] Experiments have shown that the soleplate according to the invention having the contact layer from a PEEK/PTFE blend has the good wear resistance of PEEK and the good stain resistance of PTFE.

[0011] In experiments carried out the amount of PTFE in the contact layer was less than the amount of PEEK. The stain resistance of the PEEK/PTFE blend was comparable to this resistance of PTFE, while good wear resistance was comparable to that of PEEK.

[0012] The experiments proved that the object of the invention is achieved.

[0013] In an embodiment of the soleplate according to the invention the layer comprises 60 - 90 wt % polyether ether ketone, 10 - 40 wt % fluoropolymer. The layer may further comprise for instance additives and / or colorants. A binder may be present. In case more than 40 wt % fluoropolymer is present the contact layer may be too soft and the wear performance may be reduced.

[0014] A fluoropolymer content of less than 10% may reduce the stain resistance to an undesired level.

[0015] In an embodiment of the soleplate according to the invention the fluoropolymer is polytetrafluoroethylene or polyfluoroalkoxy or a mixture thereof. The heat resistance of these fluoropolymers makes these polymers suitable for use a soleplate for an iron.

[0016] In an embodiment of the soleplate according to the invention the soleplate comprises an intermediate layer interposed between the soleplate and the contact layer. The intermediate layer may increase the corrosion resistance of the soleplate. The intermediate layer preferably comprises a polytetrafluoroethylene, a polyetheretherketone or a mixture thereof. In case both the contact layer and the intermediate layer comprise the blend of PEEK and the fluoropolymer, both layer have the good wear and stain resistant properties. These properties have a favourable effect on the lifetime of the soleplate, wherein the soleplate has good wear resistance and good stain resistance properties for a prolonged lifetime. Multiple intermediate layers may be applied.

[0017] In an embodiment of the soleplate according to the invention the contact layer is provided with a cladding layer, the cladding layer having the garment contact surface. In this embodiment the contact layer and the cladding layer together form a composite contact layer.

[0018] The cladding layer may be a PTFE layer or a PFA or PEEK layer.

[0019] In an embodiment of the soleplate according to the invention the contact layer has a thickness in a range of 10-100 micron.

[0020] The contact layer having a thickness of at least 10 micron ensures that a layer of homogeneous thickness, over the surface it is applied to, is obtained (± 10 % layer thickness).

[0021] A layer having a thickness of maximum ca. 40 micron may be applied in one spray layer. A practical contact layer is the contact layer in a range of 10- 40 micron.

[0022] A way to obtain the contact layer having a thickness of at least 45 micron is to apply multiple layers. A first layer may be applied on the substrate and dried, subsequently a second layer may be applied on the first layer and dried, and thereafter a third layer may be applied on the second layer. To obtain the contact layer the three layer are cured.

[0023] The iron according to the invention has a body comprising a soleplate having a contact layer comprising a mixture of polyetheretherketone and a fluoropolymer.

[0024] The soleplate on the iron may have any of the features described above.

[0025] The iron has the benefits of the soleplate according to the invention.

[0026] The iron may be a dry iron or a steam ironing device.

[0027] The temperature of the soleplate is kept at a desired temperature by means of a thermostat and a temperature dial. The number of dots on the temperature dial indicates the temperature of the soleplate of iron:

- 1 dot, average 110°C this is the Low setting on most irons,
- 2 dots, average 150°C this is the Medium setting on most irons,
- 3 dots, average 200°C this is the High setting on most irons.

[0028] Steam is generated by a steam generator, which comprises a water tank, a water-dosing pump, and a steam chamber. The water pump pumps water from the water tank to the steam chamber (as drips rather than a large flow of water) via a hose under command of a pump signal from an electric control device. The rate at which water is supplied dictates the amount of steam being produced, and the amount of steam is sufficiently low that the temperature of the sole plate is not significantly affected.

[0029] Instead of a pumped system, water can be dosed to the steam chamber under gravity.

[0030] The steam chamber is typically heated by the soleplate comprising a heating element, but an auxiliary heating element may instead be provided.

[0031] The steam from the steam chamber reaches steam outlet opening or openings provided in the soleplate of the iron.

[0032] The steam ironing device may be a steam iron or a so-called boiler ironing system, comprising a steam iron and a boiler for heating water which is separately arranged from the steam iron, wherein the water tank is attached to a stand comprising the boiler. In many cases, the water tank is removably arranged, so that a user of the device comprising the water tank is capable of bringing the water tank to a tap or the like in order to fill the water tank, without having to move the entire device.

[0033] The method according to the invention of manufacturing a soleplate having a contact layer, comprises the steps:

- providing a substrate having a surface, thereafter
- providing a coating composition comprising polyetheretherketone, fluoropolymer and a binder, on the surface, thereafter
- curing the coating composition and thus obtaining the contact layer.

[0034] The substrate is preferably made from stainless steel or aluminium. When aluminium is mentioned in this application both aluminium and aluminium alloys are meant. Suitable choices are for example Aluminium 1100, Aluminium alloy 5052, Aluminium alloy 5754.

[0035] In an embodiment of the method according to the invention the coating composition comprises 60-90% wt % polyetheretherketone and 10 - 40% wt % fluoropolymer.

[0036] In an embodiment of the method according to the invention the coating composition is obtained by mixing a polyetheretherketone (PEEK) and a fluoropolymer. The PEEK may be provided as a PEEK dispersion. The PEEK dispersion may further comprise for example additives. The fluoropolymer may be provided as powder or as a dispersion. The fluoropolymer dispersion may further comprise for example additives and / or a binder.

[0037] The invention also includes any possible combination of features or subject matter as claimed in any one of the claims.

[0038] The invention will now be exemplarily described with reference to the accompanying drawings. In principle aspects can be combined.

BRIEF DESCRIPTON OF DRAWINGS

[0039] Figure 1 schematically depicts a first embodiment of the iron according to the invention.

[0040] Figure 2 schematically depicts a second embodiment of the iron according to the invention.
[0041] Figure 3 schematically depicts a third embodiment of the iron according to the invention.

DETAILED DESCRIPTON OF DRAWINGS

[0042] In figure 1 the first embodiment of the iron according to the invention is schematically depicted. The iron 1 has a body 2 and a soleplate 3 connected to the body. Usually, the body has the form of a housing having a handle and accommodating several components of the iron. The soleplate 3 has a support 7 provided with a contact layer 9. The contact layer 9 has a garment contact surface 5. In a practical embodiment the support comprises a metal plate made from aluminium, aluminium alloy or stainless steel. The contact layer comprises a mixture of polyetheretherketone and fluoropolymer
[0043] In figure 2 the second embodiment of the iron according to the invention is schematically depicted. The iron 11 has a body 12 and a soleplate 13 connected to the body. The sole plate 13 has a metal support 17 provided with a contact layer 19. The contact layer 19 has a garment contact surface 15. An intermediate layer 20 is present between the support 17 and the contact layer 19. The contact layer 19 comprises a mixture of polyetheretherketone and fluoropolymer. The intermediate layer 21 comprises material selected form a group comprising polytetrafluoroethylene, a polyetheretherketone or a mixture thereof.
[0044] In figure 3 the third embodiment of the iron according to the invention is schematically depicted. The iron 111 has a body 112 and a soleplate 113 connected to the body. The sole plate 113 has a metal support 117 provided with a contact layer 119. The contact layer 119 comprises a mixture of polyetheretherketone and fluoropolymer. The contact layer 119 is provided with a cladding layer 123, the cladding layer comprises the garment contact surface 115. In this embodiment the contact layer and the cladding layer together form a composite contact layer.

EXPERIMENTS

[0045] To illustrate the effect of selecting a certain material the following examples are given herein after:

Manufacturing of soleplates

[0046] A PEEK dispersion (by Cuckoo containing Vicote™ 804 Blk dispersion by Victrex®) was sprayed on an aluminium soleplate support. The coating was cured by heating. This resulted in a soleplate, further indicated by S1, having a contact layer of ca. 40 micron thickness.
[0047] A PEEK-PTFE dispersion (by Cuckoo containing Vicote™ dispersion by Victrex®) was sprayed on an aluminium soleplate support. The coating was cured by heating. This resulted in a soleplate, further indicated by S2, having a contact layer of ca. 40 micron thickness. The contact layer comprises ca. 15% PTFE , PEEK and < 6% additives the total amounting to 100 wt%.
[0048] Three layers of a PTFE coating system (Ceralon® coating from Dupont) were sprayed on an aluminium soleplate support: a primer, a mid coat and a top coat. After curing by heating a soleplate, further indicated by soleplate S3, was obtained having a contact layer of ca. 40 micron thickness. after curing. The primer, mid coat and top coat together form the contact layer, each of these three sub-layers having a thickness of 10-15 micron.
[0049] The soleplates S1 - S3 were each mounted on an iron and the performance of the contact layers was tested.
[0050] The wear resistance of the contact layers was determined by ironing a piece of cloth using irons comprising the soleplates S1 - S3. The ironing was continued until the aluminum support was at least partly visible. The time from the start until the visibility of the aluminium was recorded.
[0051] The stain resistance was tested by ironing - using irons comprising the soleplates S1 - S3 - a dark coloured fabric at 3 dots temperature setting for several hours. The soleplate was treated with a wet cloth and the soleplate was subjected to visual inspection.
[0052] If no stain was visible it was marked: stain resistance OK: complete removal of stain using a wet cloth.
[0053] If a stain was visual the result was marked: stain resistance not OK: not possible to remove al stain using a wet cloth.
[0054] The scratch resistance was tested based on IEC standard 60311, excellent: <0.15 mm, good: 0.15-0.3 mm, poor: >0.3 mm.
[0055] The scratch through was tested based on ISO standard 1518.

Test results of soleplates

Soleplate nr	Wear resistance	Stain resistance	IEC scratch resistance (mm)	Scratch through (kg)
S1:PEEK	Ca. 250 hrs	Not OK	0.27 (good)	>6
S2: PEEK-PTFE	Ca. 250 hrs	OK	0.28 (good)	>6
S3: PTFE	< 100 hrs	OK	0.36 (poor)	4-6

[0056] While the invention has been illustrated and described in detail in the drawings and foregoing description, illustration and description are to be considered illustrative or exemplary and not restrictive. The invention is not limited to the disclosed embodiments. Variations to the disclosed embodiments can be understood and effected by the skilled person in practicing the claimed invention, from a study of the drawings, the description and the claims. The word "comprising" does not exclude other elements, and the indefinite article "a" or "an" does not exclude a plurality. Any reference sign in the Claims should not be construed as limiting the scope.

Claims

1. A soleplate (3, 13, 113) having a support (7,17,117) provided with a contact layer (9, 19, 119) for ironing a piece of garment, **characterised in that** the contact layer comprises a mixture of a polyetheretherketone and a fluoropolymer.

2. A soleplate (3, 13, 113) according to claim 1, **characterised in that** the contact layer (9, 19, 119) comprises 60 - 90 wt % polyetheretherketone, 10 - 40 wt % fluoropolymer.

3. A soleplate (3, 13, 113) according to claim 1, **characterised in that** the fluoropolymer is polytetrafluoroethylene or polyfluoroalkoxy or a mixture thereof.

4. A soleplate (13) according to claim 1 **characterised in that** the soleplate comprises an intermediate layer (21) interposed between the support (17) and the contact layer (19).

5. A soleplate (13) according to claim 1, **characterised in that** the intermediate layer (21) comprises a polytetrafluoroethylene, a polyetheretherketone or a mixture thereof.

6. A soleplate (113) according to claim 1 **characterised in that** the contact layer (119) is provided with a cladding layer (123), the cladding layer comprising a garment contact surface (115).

7. A soleplate (3,13,113) according to claim 1, **characterised in that** the contact layer (9,19,119) has a thickness in a range of 10-100 micron.

8. An iron (1,11,111) having a body (2,12,112) comprising the soleplate (3,13,113) according to claim 1.

9. A method of manufacturing a soleplate (3,13,113) having a contact layer (9,19,119), the method comprising the steps:

   - providing a substrate (7,17,117) having a surface, thereafter
   - providing a coating composition comprising polyetheretherketone, fluoropolymer and a binder, on the surface, thereafter
   - curing the coating composition for obtaining the contact layer.

10. A method according to claim 9, **characterised in** the coating composition comprises 60-90% wt % polyetheretherketone and 10 - 40% wt % fluoropolymer.

11. A method according to claim 9, **characterised in that** the coating composition is obtained by mixing a polyetheretherketone and a fluoropolymer

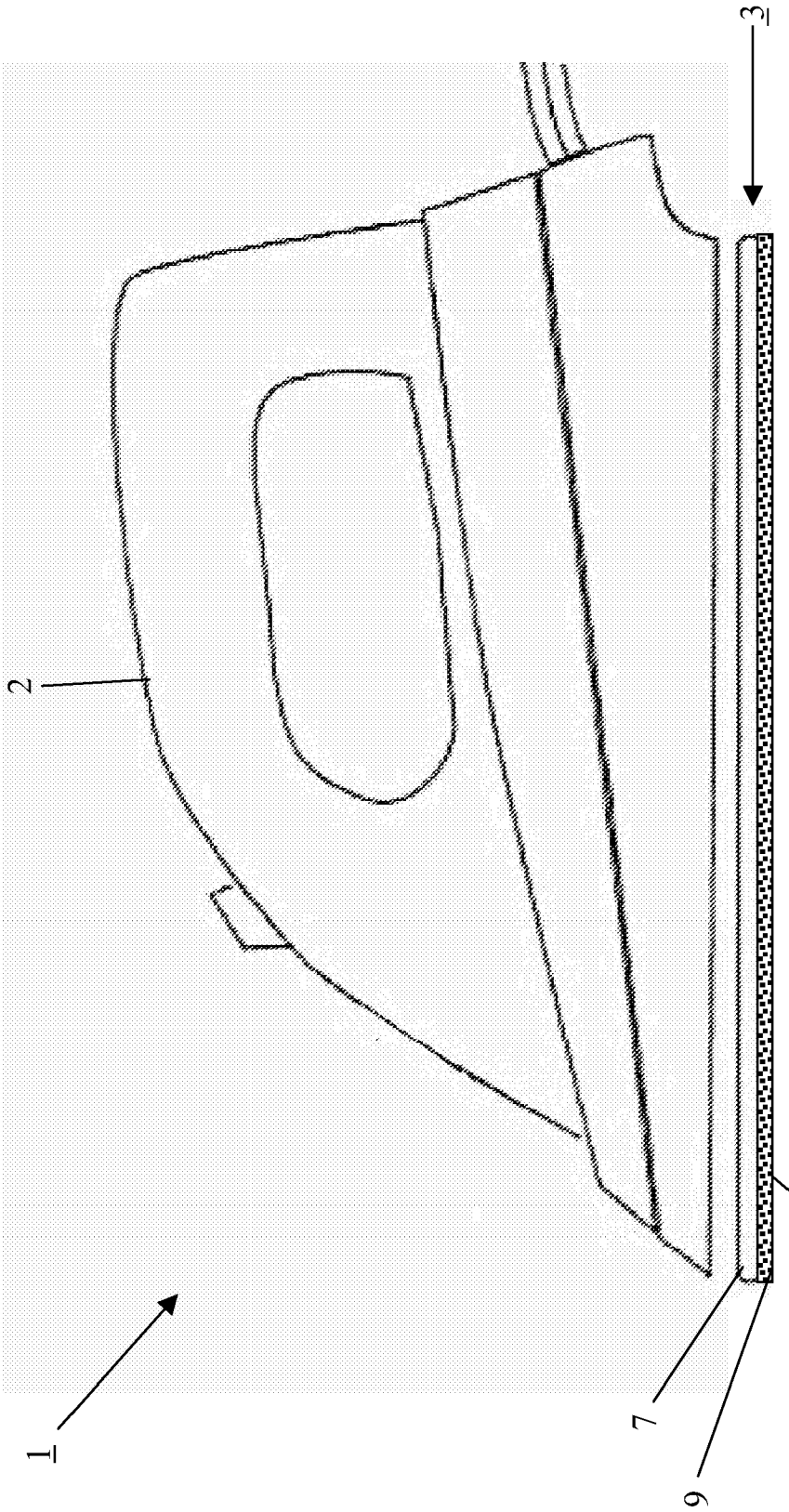

Figure 1

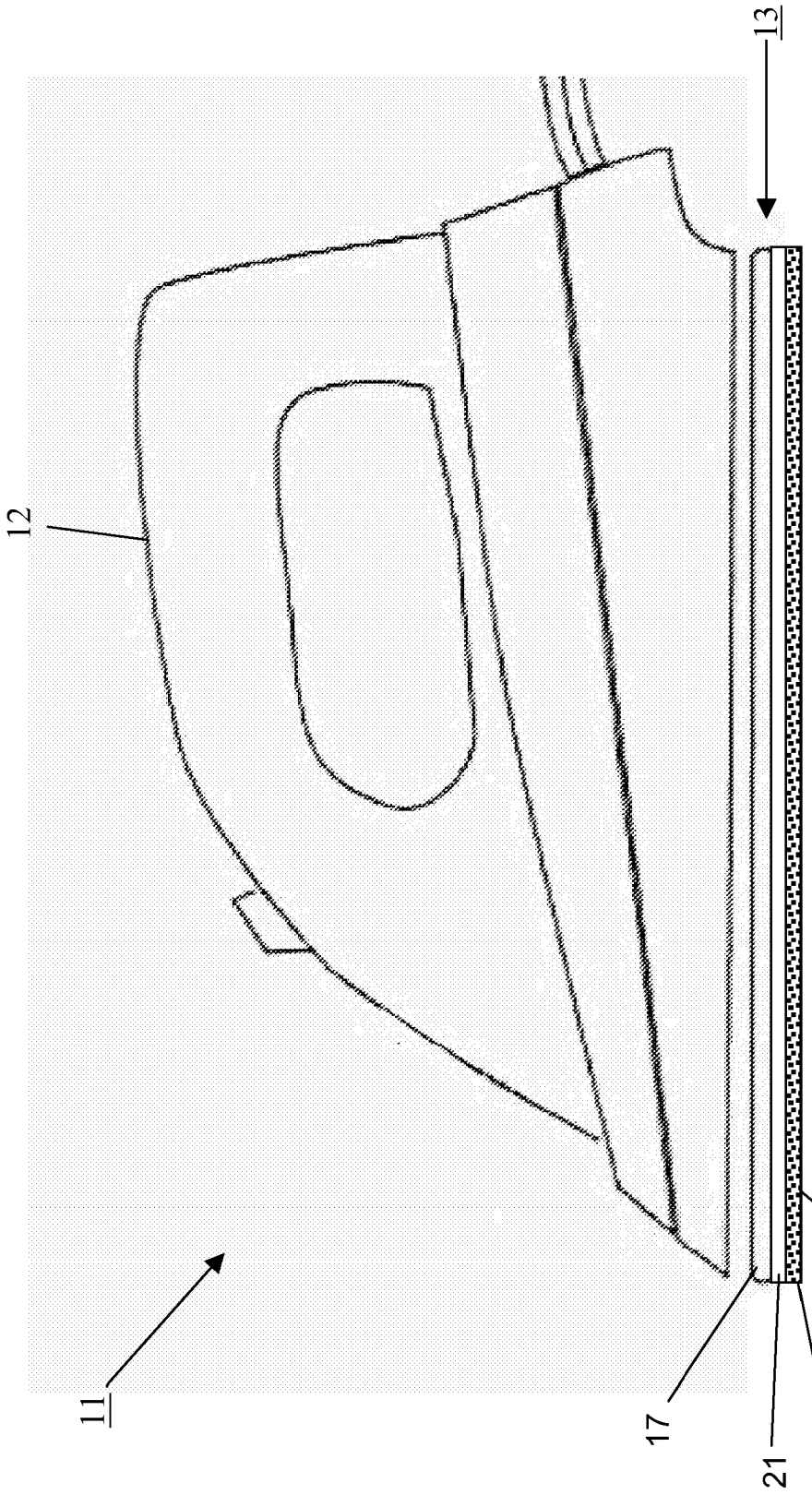

Figure 2

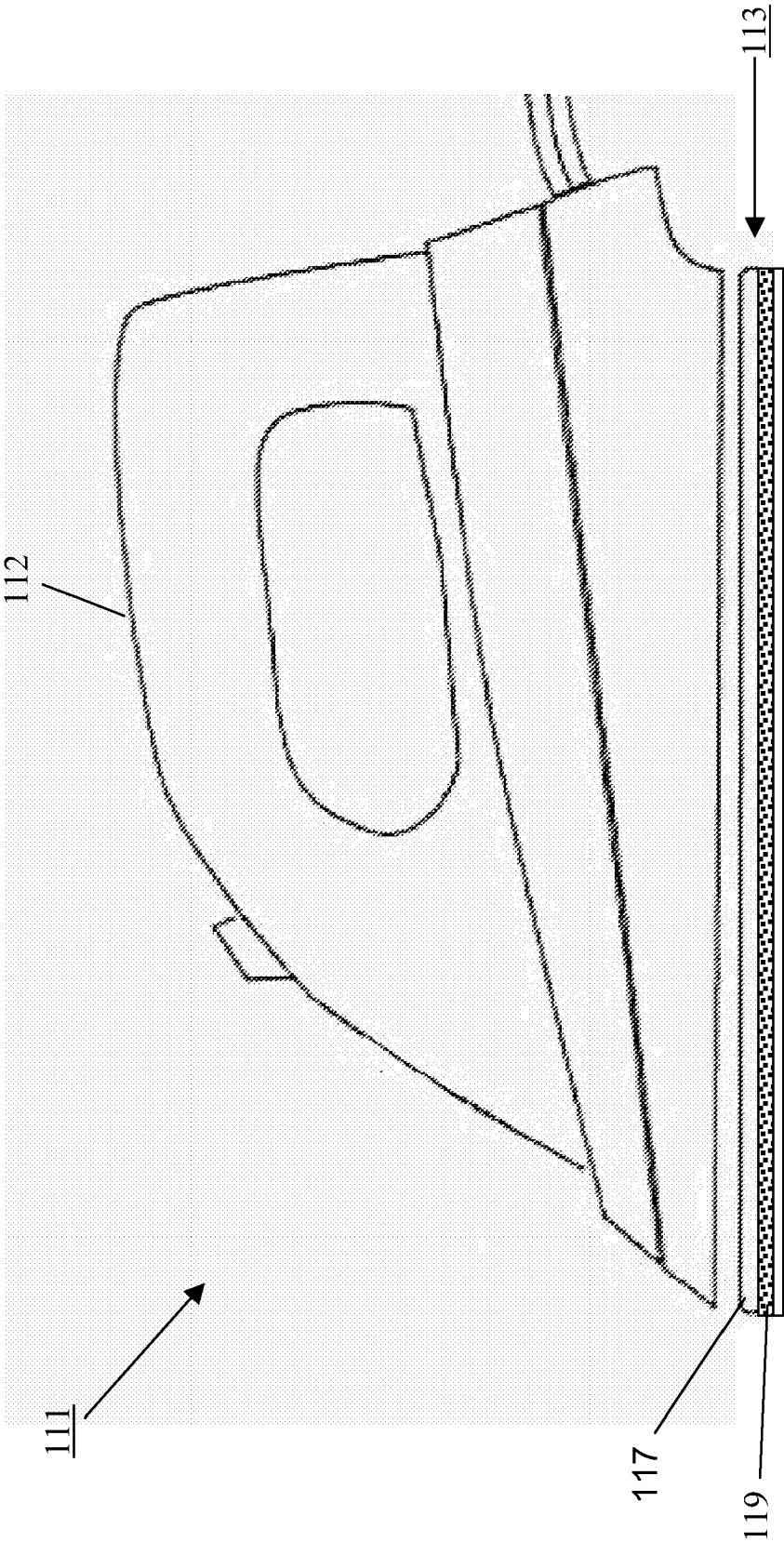

Figure 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 3933

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 April 2007	Prosig, Christina

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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