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20 February 2019

Dear Mr Strijker,

We would like you to file an opposition on behalf of our company Domonia Ltd against European patent EP 3 020 234 (Annex 1). We trust that the enclosed Annexes 2 to 6 are of use to you in this regard.

Annex 1 claims the priority of NL 2013806. The application as filed is identical to the priority document, except for claims 6 and 7 and paragraphs [0017] and [0018] of the description, which were added when filing Annex 1.

We note that claim 1 as originally filed read: "Ironing device comprising an aluminium soleplate (1) coated on its ironing side with a Kera type layer, the Kera type layer being a KeraMa layer or a KeraSi layer."

No further amendments were made during examination.

Best regards,
Joyce K. Oats

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Enclosures:

Annex 1: EP 3 020 234

Annex 2: FR 2 775 570

Annex 3: US 2015/0042569

Annex 4: Properties of coated metallic baseplates of dry irons

Annex 5: EP 2 003 547

Annex 6: EP 1 568 600

[0006] Therefore in a first aspect of the invention we have developed a coating on the ironing side of an aluminium soleplate with the aim of protecting it against deterioration. A particular type of ceramic coating, the Kera type coating, e.g. KeraTix, KeraSi or KeraMa, has been found to be particularly suitable for that purpose. In addition we have found that this coating, or layer, can be easily applied to an aluminium soleplate, optionally on top of an intermediate coating. The intermediate coating provides good adhesion between the aluminium soleplate and the Kera type coating. Furthermore our tests show that a KeraMa coating improves gliding.

[0007] For steam irons, we apply KeraMa to an intermediate coating of Yur56. In addition, in a preferred embodiment of the first aspect of the invention, the iron has grooves in the soleplate to distribute the steam to the fabric.

[0008] Figure 1 represents the soleplate 1 of a steam iron in accordance with this preferred embodiment of the first aspect of the invention.

[0009] Steam is released from steam outlets 2, also called steam nozzles, formed in the soleplate. As the iron is pressed onto the fabric, the released steam flows mostly to the area of the fabric directly below the outlets 2, and then through the fabric. Hence there is a risk that some areas of the fabric receive too much steam, while other areas do not receive enough steam. Thus there is a need to improve steam distribution to the fabric. Grooves 3, i.e. open channels, in the form of shallow, elongated recesses starting at the steam outlets 2 address this problem by allowing the steam to be distributed over the surface of the soleplate beyond the area of the outlets 2 to a bigger surface area of the fabric.

[0001] Ironing devices are used both at home and in laundries to remove creases from fabrics. Such devices may be for example in the form of a press or a hand iron. A major element of a hand iron, also commonly termed iron, is the soleplate or baseplate, which is moved with its ironing side over the surface to be ironed.

[0002] Irons may be dry irons or steam irons. A steam iron always comprises a means of containing water, i.e. a tank, a means of generating steam from this water, and a means of dispensing the steam to the fabric to be ironed. The steam is normally dispensed through outlets located in the soleplate, these outlets being suitably connected to the means for generating steam.

[0003] As ironing is a burden for most users, there is a need to make ironing easier and more efficient.

[0004] In particular the gliding properties of the soleplate have a major impact on ironing. Gliding properties for ironing devices can be assessed either by measuring the force necessary to move the iron over fabrics such as cotton or silk, or by asking professional users to rank the gliding performance.

[0005] The soleplate may be made of metal, such as aluminium or steel, which is polished to a high quality to obtain a smooth surface. Aluminium is a low density metal, hence allowing the production of lightweight ironing devices. However aluminium is not very hard metal so the bottom surface of the aluminium soleplate can be scratched by e.g. zip fasteners during ironing. A scratched surface cannot glide that easily over fabri In addition reactions between aluminium and steam may modify the structure of the aluminium surface and create stains, which can also impede gliding.

[0010] The grooves can be made by various processes, such as cold working of the metallic soleplate, or casting the molten metal in a permanent mould having the required shape for obtaining a soleplate with grooves and using forced-air cooling. Among the available processes of casting in a permanent mould, low-pressure die casting, which means filling the mould by means of an overpressure of 0.5 bar, is preferred because it can easily be implemented. Coatings are subsequently deposited onto the grooved soleplate.

[0011] In a second aspect of the invention we have developed a steam iron with an internal water tank having a specific distribution of steam outlets which allows for a more efficient use of steam. A steam iron with an internal water tank is designed for domestic use. The tank has a small capacity, thus a more efficient use of steam will reduce the frequency with which the water tank has to be refilled.

[0012] The iron according to the second aspect of the invention is provided with a region at the tip of the soleplate with a high density of steam outlets together with a region at the back of the soleplate without steam outlets. This distribution of steam outlets has proved effective in preventing waste of steam. In the technical field of ironing devices, a high density corresponds to at least five outlets per ten square centimetres of surface.

[0013] Figure 2 represents the soleplate 11 of an iron according to the second aspect of the invention. The soleplate 11 has a longitudinal axis (XX'), a tip region 14 with a high density of steam outlets 12 and a back region 15 without outlets.

[0014] With region 14 at the tip of the soleplate 11 and region 15 at the back of the soleplate 11, efficient use of steam is achieved. Therefore good ironing quality can be obtained with a low steam-flow rate.

[0015] In a preferred embodiment of the iron according to the second aspect of the invention, the steam dispensing system is designed to avoid damaging delicate fabrics. In known steam irons, the steam outlets are formed as part of ducts running through the soleplate. Such ducts are generally oriented perpendicularly to the ironing surface of the soleplate, thus at an angle of 90° with respect to the ironing surface. In that configuration, the direction and pressure of the steam flow force the steam to go through the fabric, which increases the risk of damaging delicate fabrics.

[0016] To overcome this problem, the present embodiment provides tilted ducts, each having a longitudinal axis inclined at an angle of between 25° and 35° with respect to the ironing surface of the soleplate. The steam thus partly flows along the surface of the fabric instead of being forced through the fabric. The integrity of delicate fabrics is maintained. Choosing a smaller angle, and thus longer ducts, would make it more difficult to manufacture the ducts. A much bigger angle would not sufficiently reduce the risk of damaging delicate fabrics. An angle of between 25° and 35° has been found to give the best results.

[0017] In the iron according to the second aspect of this invention, an unexpected effect is obtained when the region devoid of steam outlets extends at least 4 cm along the longitudinal axis (XX') of the soleplate. Where this is the case, a large hot surface at the back of the soleplate is brought into contact with the fabric, which speeds up the ironing process to a surprising degree.

[0018] This iron also preferably comprises an opening in the back of the iron. The water tank can be filled through this opening. There is more space for the opening in the back than on the top of the iron, which is usually narrow and cluttered with temperature and steam control buttons. Hence an opening in the back can be made bigger to allow for easier refilling of the water tank. Appropriate design and orientation of the opening or suitable caps prevent water from spilling when the iron is moved.

Claims:

1. Ironing device comprising an aluminium soleplate (1) coated on its ironing side with a Kera type layer, the Kera type layer being a KeraMa layer and/or a KeraSi layer.

2. Ironing device according to claim 1 being a steam iron wherein the coating on the ironing side of the soleplate (1) comprises, starting from the soleplate (1) in this order, a Yur56 layer and a KeraMa layer as the Kera type layer.

3. Ironing device according to claim 2, wherein the soleplate (1) comprises steam outlets (2) and grooves (3) starting from the steam outlets (2) to distribute the steam, and wherein the grooves (3) are obtainable by low-pressure die casting and forced-air cooling.

4. Steam iron with an internal water tank and a soleplate (11) with steam outlets (12), wherein the soleplate (11) comprises a region (14) at the tip of the soleplate (11) with a high density of steam outlets (12) and a region (15) at the back of the soleplate (11) devoid of steam outlets.

5. Steam iron according to claim 4, wherein the steam outlets (12) are part of steam dispensing ducts each having a longitudinal axis inclined at an angle of between 25° and 35° with respect to the ironing surface of the soleplate (11).

6. Steam iron according to claim 4, wherein the region (15) at the back of the soleplate (11) extends at least 4 cm along the longitudinal axis (XX') of the soleplate (11).

7. Steam iron according to claim 6 with an opening in the back of the iron through which the water tank can be filled.

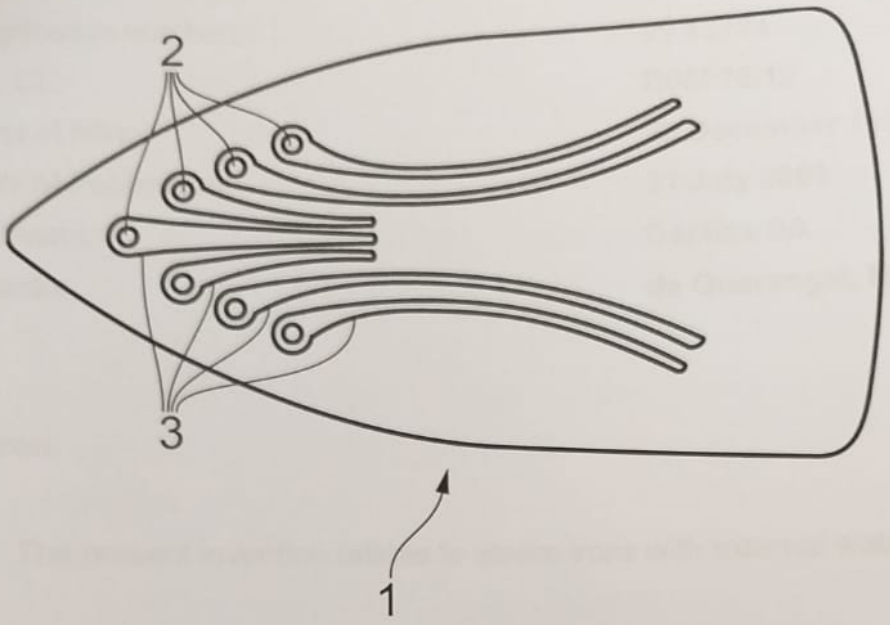

FIG. 1

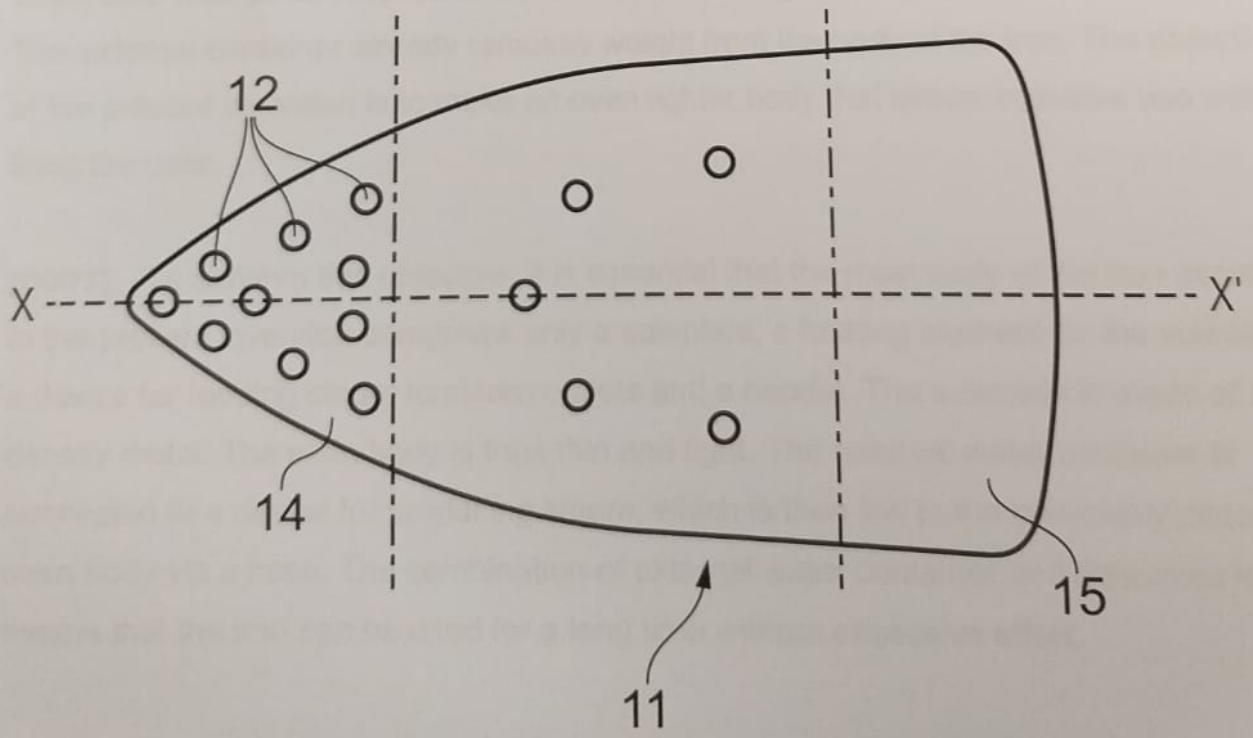

FIG. 2

[0004] An iron according to the invention is illustrated in figure 1. It shows a main body with a handle 21 and a soleplate 22. An external water container 23 is connected to the main body of the iron by a flexible hose 24. Steam is fed via the hose 24 to the main body and then to steam outlets.

[0005] Furthermore it is desirable to reduce use of water and yet obtain good ironing quality. The preferred embodiments of the present invention have been developed to achieve this aim.

[0006] In a first preferred embodiment, steam outlets have a non-homogeneous distribution across the soleplate. Regions of the soleplate which are intended mainly to moisten the fabric have a higher density of steam outlets. Regions of the soleplate which are intended mainly to dry the fabric have a lower density of steam outlets. The regions of higher and lower density can be arranged according to needs.

[0007] It has been observed that it is more efficient to first moisten and then dry the fabric to be ironed. Thus a higher density of outlets is preferably positioned at the tip of the soleplate. This ensures that the fabric is impregnated with sufficient steam before it is pressed and dried. As an example a surface of five square centimetres at the tip may comprise three or four outlets.

[0008] The drying region is preferably at the back of the soleplate. Preferably this region has no steam outlets.

[0009] Consequently with the iron according to the first preferred embodiment, the fabric is moistened with the tip of the soleplate and dried with the back of the soleplate. Therefore only a small quantity of steam is necessary to obtain good ironing quality. Savings in terms of energy and water are hereby achieved.

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(43) Date of Publication: 21 July 2000
(71) Applicant: Depliss SA
(72) Inventor: de Querangal, Maylis

Steam iron

[0001] The present invention relates to steam irons with external water containers.

[0002] In steam irons with external water containers, the container is outside the main body of the iron carried and moved by the user over the clothes. The size of the container is thus chosen to provide a large quantity of steam for a long time between refilling, which makes such irons particularly suitable for professional use. Professional users also wish to be relieved of the burden of moving a heavy body over the clothes. The external container already removes weight from the body of the iron. The objective of the present invention is to make an even lighter body that allows intensive use without tiring the user.

[0003] To achieve this objective, it is essential that the main body of the iron according to the present invention comprises only a soleplate, a heating element for the soleplate, a device for feeding steam to steam outlets and a handle. The soleplate is made of a low density metal. The main body is thus thin and light. The external water container is connected to a device for producing steam, which is then fed to the previously described main body via a hose. The combination of external water container and light main body means that the iron can be used for a long time without excessive effort.

Claim:

1. Steam iron with an external liquid container (23) and a main body, wherein the main body consists of a soleplate (22), a heating element for the soleplate (22), a device for feeding steam from the external container (23) to steam outlets (25) in the soleplate (22), and a handle (21).

FIG. 1

FIG. 2

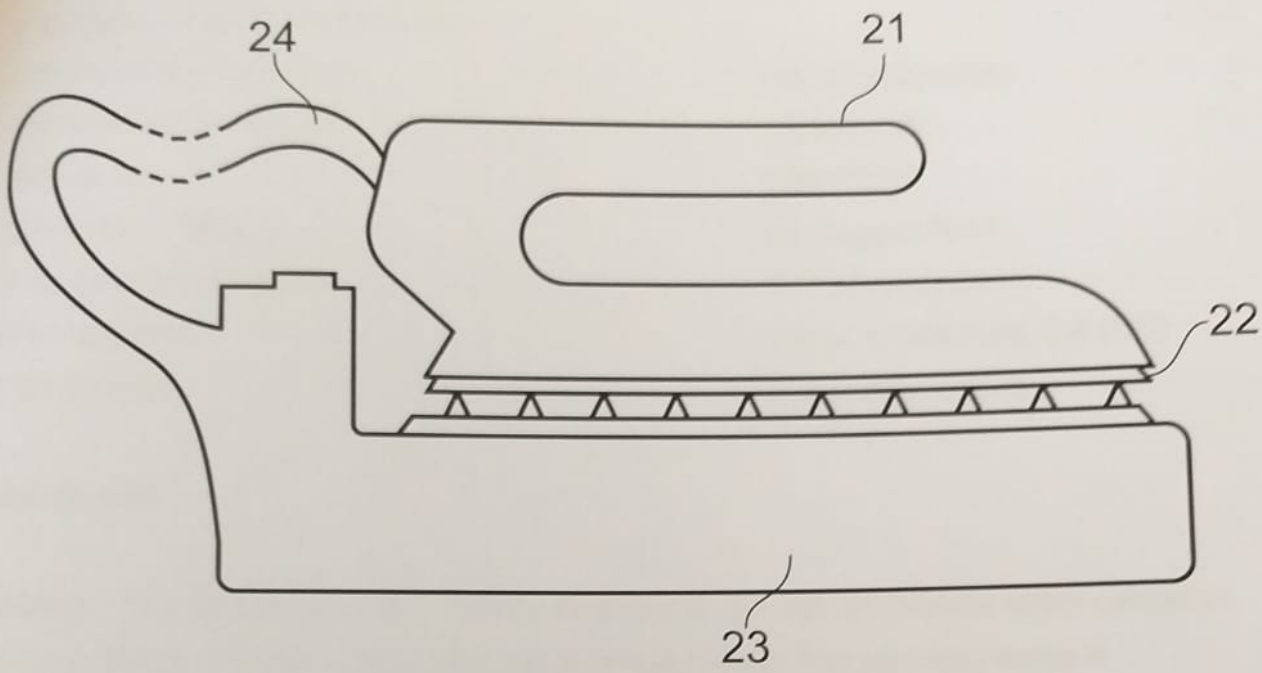

FIG. 1

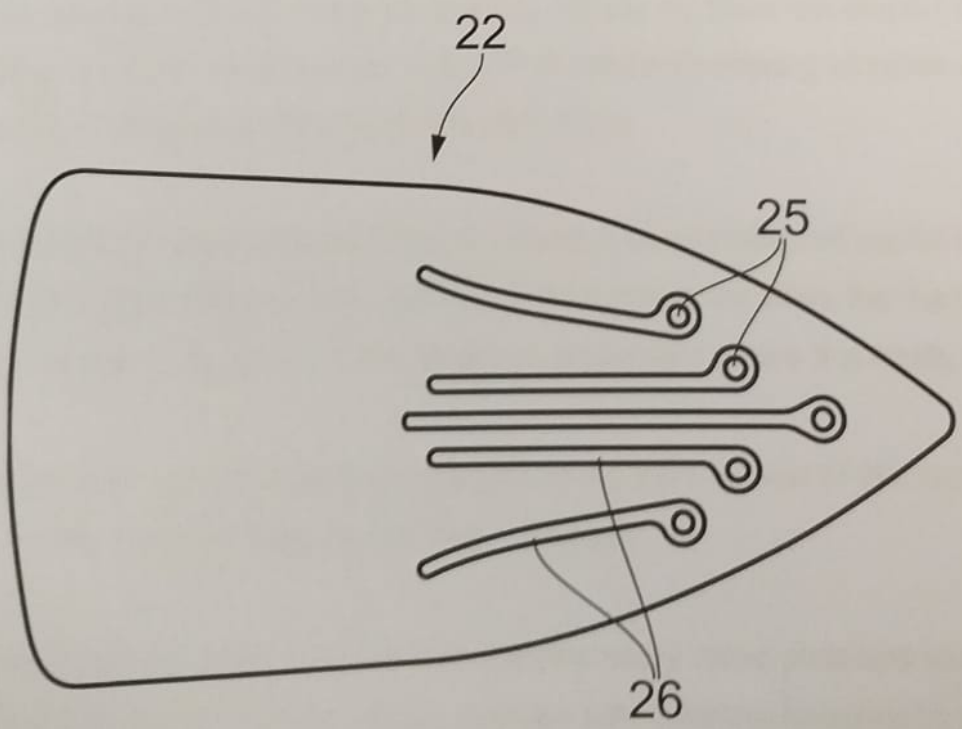

FIG. 2

[0010] In a second preferred embodiment of the invention, the soleplate surface is structured in the vicinity of the steam outlets. It has been noted that when steam is released from an outlet in the bottom of a soleplate without such structuring, steam cannot escape on the sides and is forced to flow through the fabric to the ironing table and surrounding atmosphere. The localised high steam pressure at high temperature may damage delicate fabrics. In addition the steam may condensate into water drops which remain visible on delicate fabrics even after ironing.

[0011] Therefore the soleplate of the second embodiment comprises open channels, preferably with a depth of 0.5 mm to 1 mm. The channels extend from the outlets along a length of from about 2 cm to about 8 cm and guide the steam further away from the outlets, so that the steam is more evenly distributed over the surface of the fabric. Hence the risk of damaging or staining delicate fabrics is reduced. Furthermore as steam is guided along a channel to a large region of the fabric extending beyond the outlet region, a high proportion of the steam is used to moisten the fabric effectively. Thus less steam needs to be produced.

[0012] The soleplate with the open channels is made by counterpressure die casting at a pressure of 4 bars, followed by forced-air cooling. In the casting step, molten metal is poured into a permanent mould having protrusions corresponding to the open channels.

[0013] In the soleplate of the second preferred embodiment represented in figure 2, the channels 26 start from the steam outlets 25 positioned at the tip and they extend backwards. The soleplate comprises additional steam outlets (not depicted).

[0014] For the above embodiments we have found it advantageous to apply to the metallic soleplate first a layer of Yur56 and then a layer of KeraTix. KeraTix has an aesthetically appealing glossy finish. Furthermore these Yur56 and Kera type layers can be applied to planar metal surfaces as well as to structured metal surfaces, such as those of the present invention.

[0006] The height of the ribs is such that additional pressure is applied to the fabric. However if the ribs are too high, large areas of the baseplate will no longer be in contact with the fabric, and the ironing quality will be lowered. In addition as it should also be possible to use the iron for delicate fabrics like silk or synthetic fibres, the ribs preferably have a rounded shape.

[0007] The ribs may be formed using any of the methods which have been available for some years to provide the metallic baseplate with structures such as protrusions, e.g. the ribs in the present case, or recesses in the baseplate. These methods include for example counterpressure die casting at a pressure of up to 10 bar or low-pressure die casting in order to fill the mould with the metal. Each of these casting processes is followed by forced-air cooling. The microstructure of the metal and thereby its properties are exclusively determined by the forced-air cooling.

[0008] The baseplate of a preferred embodiment of the present invention is shown in the figure, which is a scale drawing. The baseplate 31 comprises a high density of steam nozzles 32 at the tip, which results in a better moistening of heavy fabrics.

[0009] In the baseplate 31 of the figure, there are three ribs 33 extending along the longitudinal axis (XX') of the baseplate. Each of these ribs 33 has a length (L) of 5 cm.

[0010] Furthermore in the embodiment shown in the figure, there are no steam nozzles in the region beyond the ribs 33. This iron is outstandingly effective on denim. However according to our tests, ribs with a length of 3 cm may be sufficient depending on their number, position and orientation.

[0011] The features of the baseplate of the present invention have been developed for steam irons with internal water containers. However, as stated in the Handbook of Domestic Science of 2001, structures on the ironing side of a baseplate as well as the distribution of steam nozzles can be readily adapted to other types of ironing devices.

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(71) Applicant: **Elecx, Columbus, GA (US)**
(72) Inventor: **Casischke, Laura**

Steam iron

[0001] The present invention relates to a steam iron with an internal water container. Such a device is easy to use, although its limited steam flow rate may make it cumbersome and time-consuming to iron heavy fabrics like denim.

[0002] It is highly desirable to be able to iron with ease all types of fabrics, including denim, a fabric used ever more widely for clothes. Hence we have developed a steam iron with an internal water container with the aim of efficiently ironing all types of fabrics, in particular fabrics which are heavy and difficult to iron.

[0003] The iron of the present invention comprises a combination of useful features: first the tip of the baseplate has a high density of steam nozzles while the back of the baseplate has no steam nozzles. Hence steam is dispensed where it is really needed.

[0004] In addition at least one rib protruding from the ironing side of the baseplate further improves the ironing efficiency for heavy fabrics.

[0005] A reason for this effect may be that the ribs apply more pressure to the fabric being ironed than the rest of the baseplate, thereby fully relaxing tensions in the fabric.

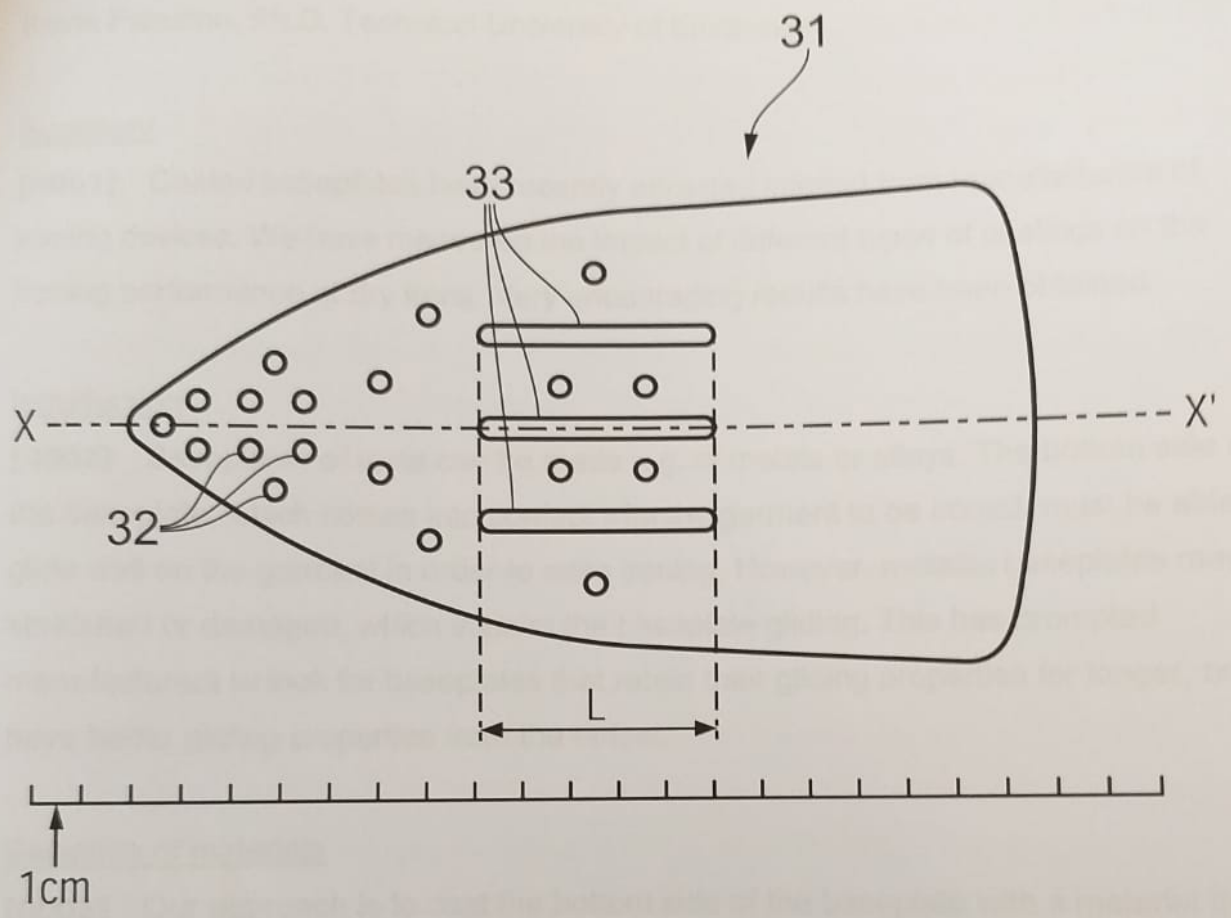

FIG.

Claim:

1. Steam iron with internal water container comprising a baseplate (31) with steam nozzles (32), wherein the tip of the baseplate (31) has a high density of steam nozzles (32) and the back of the baseplate (31) does not comprise steam nozzles, and wherein the baseplate (31) further comprises at least one rib (33) for pressing the fabric to be ironed.

Properties of coated metallic baseplates of dry irons

Wonderful Household 1994, vol.3, p.14-16
Kevin Fabullon, Ph.D, Technical University of Eindhoven

Summary

[0001] Coated baseplates have recently attracted interest from manufacturers of ironing devices. We have measured the impact of different types of coatings on the ironing performance of dry irons. Very encouraging results have been obtained.

Introduction

[0002] Baseplates of irons can be made e.g. of metals or alloys. The bottom side of the baseplate, which comes into contact with the garment to be ironed, must be able to glide well on the garment in order to ease ironing. However, metallic baseplates may be scratched or damaged, which impairs the baseplate gliding. This has prompted manufacturers to look for baseplates that retain their gliding properties for longer, or that have better gliding properties from the outset.

Selection of materials

[0003] Our approach is to coat the bottom side of the baseplate with a material that protects the metal, and preferably enhances gliding. When selecting appropriate materials, we have in particular considered the following aspects: resistance to high temperatures (at least 250°C), availability and cost, as well as compatibility with the metallic baseplate. Suitable coating materials include ceramics, enamels and certain polymers.

Results

[0004] In a first test series we tested a polymer, namely PTFE, and two ceramic coatings, namely KeraTix and KeraMa. In the tests presented here, the coatings were applied to the baseplate of a prototype dry ironing device. This very simplified device comprises a heating element covering the whole top surface of the baseplate and a handle. The baseplate is made of aluminium, which is a low density metal. The results were compared to those of a reference experiment where no coating was applied.

[0005] An intermediate coating chosen from among Yur52, Yur54, Yur56 and Yur58 was added to promote adhesion of the polymer or ceramic coating to the aluminium baseplate. These versatile intermediate coatings are compatible with aluminium, most ceramic coatings, in particular the Kera type coatings, and with certain polymers like PTFE. Other intermediate coatings may be suitable. For example Yur74 can be used as an intermediate coating on various metals. However in this first test series Yur74 should be avoided because it does not adhere to aluminium.

[0006] The force needed to move the ironing device over various fabrics was measured and translated into index values. The results (from 0 for poor gliding to 4 for excellent gliding) are provided in the table below both for cotton and silk. As the type of intermediate coating does not significantly affect the gliding properties, results are given only for the ironing devices with Yur56.

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(51) Int. Cl.: D06F69/00
(71) Applicant: SFF
(72) Inventor: Resa, Yasmina
(74) Representative: Morisonn, Tony
(84) Designated Contracting States: BE, DE, FR, IE

Steam ironing machine for delicate fabrics

[0001] The present invention relates to a steam ironing machine, such as an ironing press, for handling delicate fabrics without damaging them. While the invention has been developed primarily for professional ironing machines of large size, it may also be applied with equivalent advantages to all types of non-professional ironing devices.

[0002] Steam is used in ironing machines to moisten the fabric to be ironed, in order to ease removal of creases. Steam is led from a steam generator through ducts in a soleplate to openings in the ironing surface of the soleplate, and then to the fabric. The general direction of these passages in the soleplate, and hence the general direction of the outgoing steam, is usually perpendicular to the ironing surface. The steam is thus induced to pass directly through the fabric, the force of which may damage delicate fabrics.

[0003] Therefore there is a need to further develop steam ironing machines, such as presses, to allow for proper ironing of delicate fabrics while reducing the risk of damaging them.

Table 1:

	Cotton	Silk
Without coating	2	2
PTFE	3	4
KeraTix	2	3
KeraMa	3	4

[0007] In a second test series we tested a similar prototype ironing device with a baseplate made of Medur alloy. This alloy provides an outstanding compromise between strength, ease of shaping and cost. Starting from this essential element of the ironing device, we applied Yur74 as the intermediate coating and KeraSi as the outer coating.

Table 2:

	Cotton	Silk
Without coating	2	2
KeraSi	3	3

Conclusions

[0008] Particularly good gliding properties were obtained with PTFE and KeraMa. Tests on other types of coatings are ongoing. We intend to investigate the gliding properties of coated baseplates that could be used in steam irons at a later stage. However care must be taken to choose coatings that can withstand steam. For example, KeraSi is not compatible with steam because it rapidly corrodes.

[0004] This aim is achieved with an ironing machine as defined in claim 1. The machine comprises a soleplate with steam outlets and passages extending through the soleplate. The steam generator and its connection to the passages are well known and will not be further described. Instead of being perpendicularly oriented with respect to the ironing surface of the soleplate, the generally straight passages according to the present invention are tilted so that an angle well below 90° is formed between their main direction (i.e., longitudinal axis) and the ironing surface. As a consequence, steam is guided along the angled passages so that it flows from the outlets mostly along the surface of the fabric. Thus even when high steam pressure is used, the delicate textiles are not damaged or prematurely worn.

[0005] In the ironing machine of the invention, the angle is between 15° and 45°, preferably from 20° to 30°. Different angles may be chosen for different areas of the ironing surface of the soleplate, for instance the periphery and the centre. However, when designing the passages at the periphery, care must be taken to orient the passages such that the user could not be burnt by steam. Thus these passages should be angled towards the central region of the ironing surface of the soleplate.

[0006] The figure represents the details of the cross section of a soleplate 51 of a machine according to the present invention. The soleplate 51 comprises an ironing surface 51a and sides 51b. The steam outlets 52 on the ironing surface 51a are at the exit of the passages 53 extending through the soleplate. The figure shows two different angles γ_1 and γ_2. It can be seen that the passage 53 close to the side 51b is oriented towards the central region of the ironing surface 51a. Thus the risk of releasing hot steam in the direction of the user's body is reduced.

Claims:

1. Steam ironing machine comprising a soleplate (51) with steam outlets (52) and steam passages (53) extending through the soleplate (51) to an ironing surface (51a), characterised in that the steam passages (53) have a main direction forming an angle of between 15° and 45° with respect to the ironing surface (51a).

2. Steam ironing machine according to claim 1, wherein the steam passages (53) located close to the sides (51b) of the soleplate (51) are angled towards the centre of the ironing surface (51a).

(19) **European Patent Office**

(12) **European Patent Application**

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(51) Int. Cl.: **D06F75/14**

(71) Applicant: **HomeClean SA**

(72) Inventor: **Lury, Alison**

(74) Representative: **Hasse, Ella**

(84) Designated Contracting States: **BE DE FR GB**

Steam iron with internal water reservoir

[0001] Use of steam has been a major improvement in ironing devices. Dry irons are of simple design but are not very efficient. Steam irons are of a different and much more sophisticated design. Additional functions relating to steam production and distribution as well as constraints linked to the combination of steam and high temperature necessarily result in an entirely new type of iron.

[0002] The present invention relates to steam irons for domestic use, comprising an internal reservoir for containing the water which is transformed into steam by heating. A drawback of such irons is the frequent need to fill the reservoir.

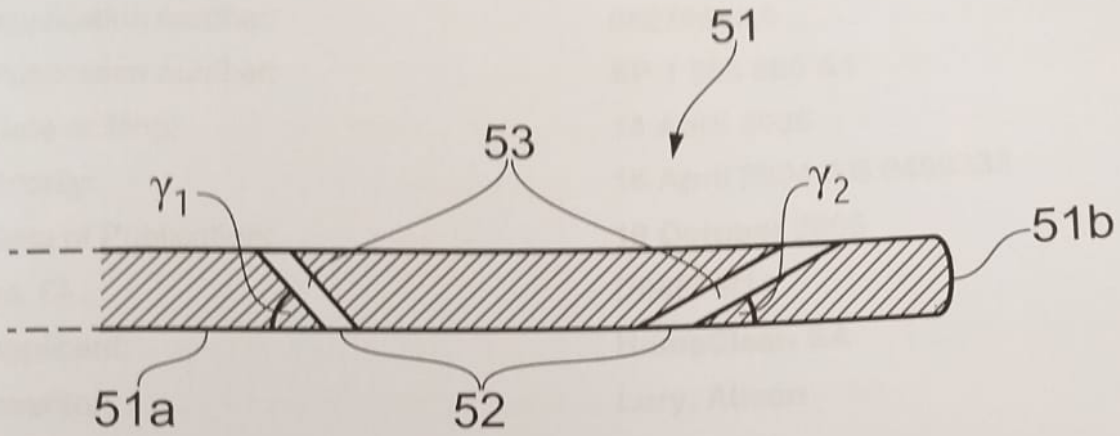

FIG.

[0003] In known steam irons with an internal reservoir, the opening used to fill the reservoir is positioned at the front of the iron so that the liquid does not flow out when the iron is in its resting position on its back. The opening is usually provided with closing means to prevent the liquid from splashing out when the iron is moved. However as the front of the iron is V-shaped, there is little space for the opening and its closing means. As a consequence the size of the opening is small. The user must fill the reservoir slowly and with great care to avoid spilling water.

[0004] The present invention aims to make it easier to fill an internal reservoir so that it is not a burden for the user even if it needs to be done frequently.

[0005] This aim is achieved by providing an opening at the back of the iron, the opening being connected to the water reservoir. As the back is wider than the front, the opening can be made bigger than if it were at the front. Thus the risk of spilling water on the user or on the already ironed clothes is reduced.

[0006] In this invention, the soleplate of the iron is made of Prex2000, a composite material which is extremely resistant to abrasion and corrosion and cannot be coated.

[0007] The figure represents a steam iron according to the invention. The iron 61 comprises a soleplate 62 with steam outlets (not depicted) and a water reservoir 63. The soleplate 62 is heated by a resistor positioned above the soleplate. The iron further comprises a system for producing steam and directing it to the outlets, which is not depicted here. For better understanding, the water reservoir 63 is shown in the figure although in reality it may not be visible if the body of the iron is opaque. The large opening 64 at the back 65 of the iron 61 may be covered with a closing means 66.

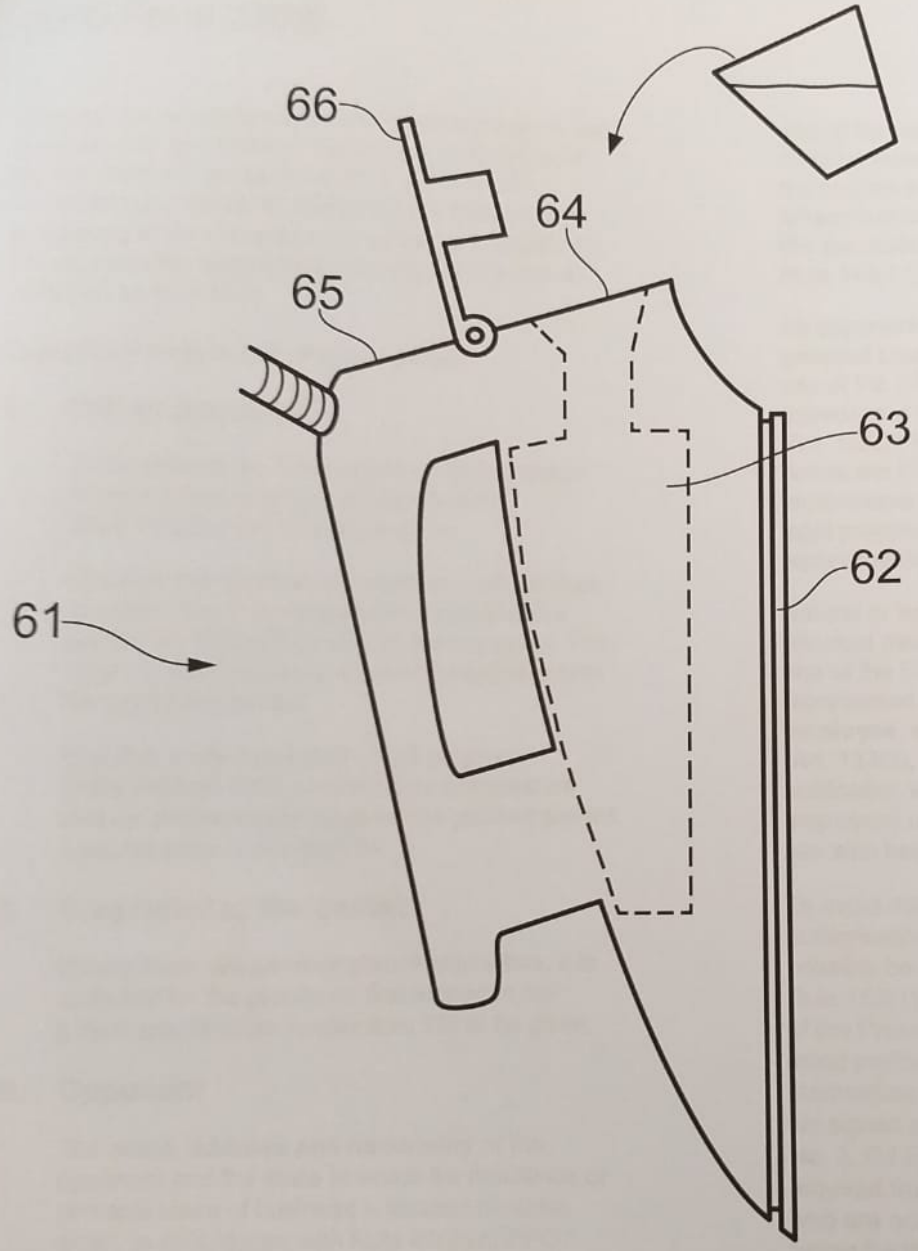

FIG.

[0008] The type of closing means is freely determinable, as long as it sufficiently blocks the passage to the water reservoir and is easy to open and close. It is preferable to have a closing means which remains attached to the iron even in its open position, as removable caps can be easily lost. A lid hinged to the body of the iron is therefore preferred. It can be made of hard plastic, which is cheap and robust.

Claims:

1. Iron (61) comprising a soleplate (62) with steam outlets, an internal water reservoir (63), an opening (64) with a closing means (66) at the back (65) of the iron (61), wherein the opening (64) is connected to the water reservoir (63).

2. Iron (61) according to claim 1, wherein the closing means (66) is a lid hinged to the back (65) of the iron.