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

(11) **EP 2 213 784 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.08.2010 Bulletin 2010/31

(51) Int Cl.:
D06F 75/38 *(2006.01)* ***H05B 3/26*** *(2006.01)*

(21) Application number: **09151715.1**

(22) Date of filing: **30.01.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA RS

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(54) **Soleplate and iron comprising such a soleplate**

(57) Soleplate for an iron **characterized in that** a substrate (2) of the soleplate (15) is made of a magnesium alloy, said alloy also comprising aluminium.

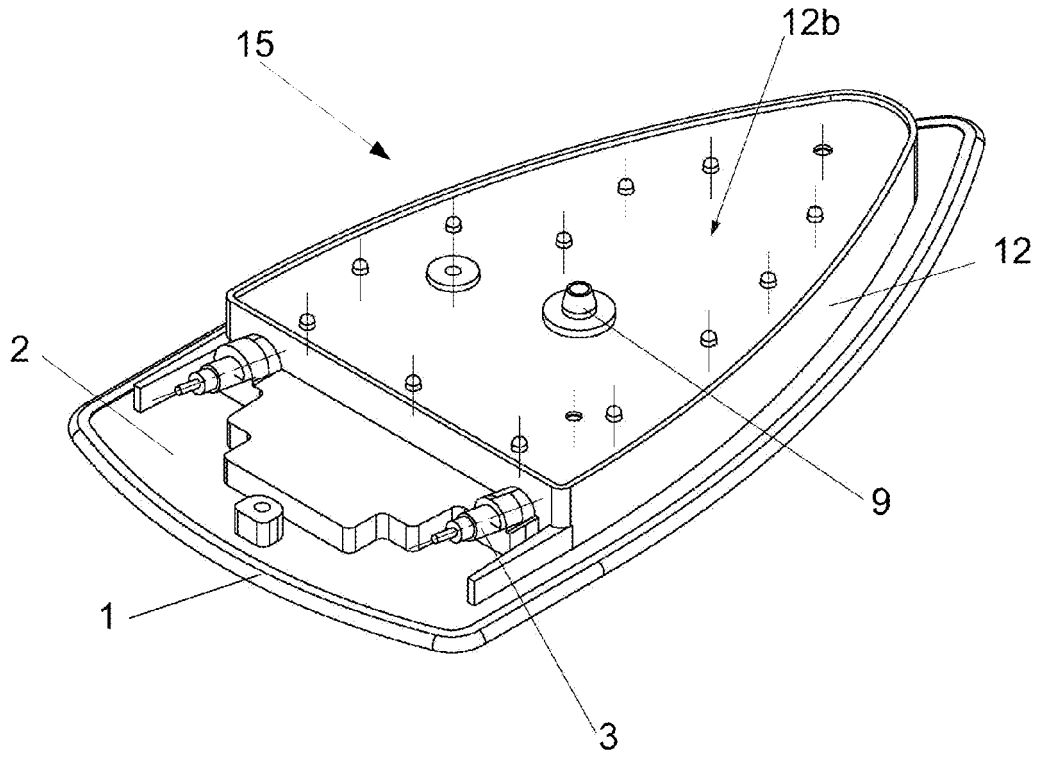

Figure 1

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Description

[0001] The present invention relates to a soleplate for an iron and an iron comprising such a soleplate.

[0002] Irons for ironing clothes are provided with a soleplate, which is the element of the iron that is in contact with the fabric being ironed. The soleplate is heated by a heating element, which conventionally is formed by an ohmic resistance. The soleplate thus has to have good thermal conduction. Often, the iron comprises a steam generator, in which case the soleplate comprises steam outlets.

[0003] The soleplate's outer surface should slide smoothly on the fabric and has to be able to cope with both high temperatures and sudden changes in temperature. Moreover, the soleplate should be resistant to blows and scratches.

[0004] Soleplates are usually made of an aluminium substrate coated with a layer of stainless steel, anodized aluminium or enamelled aluminium. In this case, the aluminium substrate is used for its weight and thermal conductivity and the coating is used for protection against scratches.

[0005] The use of aluminium alloys in (substrates of) soleplates is also known. US 5,105,525 for example describes using one of the alloys GD-Al Si 10 Mg, GD-Al Mg 9, GD-Al Si 12 or GD-Al Si 12(Cu). The ironing side of the soleplate body portion is subsequently coated with a hard nickel alloy. WO 01/82652 describes a soleplate made of an alloy of aluminium with magnesium, which comprises less than 0.01% magnesium.

[0006] There still exists a need for an improved soleplate. According to the invention, such a need is fulfilled by a soleplate according to claim 1. Namely, by a soleplate comprising a substrate made of a magnesium alloy, said alloy also comprising aluminium. The principal element of such an alloy is thus magnesium. Aluminium may thus be the second most important element in the alloy. It has been found that such an alloy exhibits advantageous properties, such as good thermal conductivity, light weight, and appropriate strength and stiffness. Furthermore, it has surprisingly been found that it is possible to manufacture a substrate of such a soleplate made of such an alloy that maintains a good connection with the heating element it covers. Besides, the alloy is sufficiently corrosion resistant. However, in embodiments of the invention, the substrate of the soleplate may further be protected by layers of different materials like silicon based coatings, anodized layers, etc.

[0007] Preferably, the substrate of the soleplate is made of the alloy AZ91D. Said alloy is one of the cheapest available magnesium-aluminium alloys. The alloy AZ91D comprises the following elements: 8.3 - 9.7 % of aluminium, 0.15 - 0.5% of manganese, 0.35 - 1.0 % zinc, maximum 0.1 % of silicon, maximum 0.03% copper, maximum 0.002% nickel, maximum 0.005 % of iron, and a maximum of 0.02% of other metals, and the rest magnesium (all percentages being weight percentages).

[0008] Preferably, said substrate is provided with an ironing face of a different material. Said ironing face may be formed by a separate element connected to the soleplate through fixation means or by a coating provided on the soleplate. By providing the soleplate with an ironing face (the face actually comes into contact with the clothing), the functions of the soleplate and the ironing face may be advantageously separated. The material of the ironing face may thus be chosen to be particularly smooth and scratch resistant.

[0009] In some embodiments of the invention the soleplate comprises an integrated steam generator.

[0010] In other embodiments of the invention, an iron comprises a soleplate and a separate steam generator with separate heating element. A similar configuration of an iron has been described in patent application EP 1561855. In these embodiments, preferably also the separate steam generator is made of a magnesium alloy, said alloy also comprising aluminium. In this way, the overall weight of the iron may further be reduced.

[0011] Particular embodiments of the present invention will be described in the following, only by way of non-limiting example, with reference to the appended drawings, in which:

Figure 1 is a perspective view of a first embodiment of a soleplate according to the present invention;
Figure 2 shows a partly cut open view of the soleplate of figure 1;
Figure 3 shows a perspective view of the bottom of the soleplate of figure 1;
Figure 4 is a cross-section view of the soleplate of figure 1
Figure 5 is a perspective view of a second embodiment of a soleplate according to the invention, the iron furthermore comprising a separate steam generator;
Figure 6 is a perspective view of the soleplate of figure 5;
Figure 7 shows a partly cut open view of the soleplate of figure 5;
Figure 8 shows a soleplate of figure 5 indicating a detail A ;
Figure 9 shows a perspective view of the cross-section of detail A, indicated in figure 8;
Figure 10 shows a perspective view of the bottom of a soleplate of figure 5;

[0012] Figure 1 shows a first embodiment of a soleplate 15 according to the present invention. Reference sign 2 is used to indicate the substrate of the soleplate made of an alloy of magnesium with aluminium. The soleplate 15 comprises an ironing face 1 (which actually comes into contact with the clothing to be ironed). In this embodiment, the ironing face is formed by a separate element made of stainless steel. The stainless steel element has been folded over the soleplate. This can more clearly be seen in figure 4.

[0013] In other embodiments of the invention, the ironing face may be made of a different material and/or thickness. For example, the ironing face may be made of an aluminium element of 2mm with a hard anodized layer of 20-60μm. Additionally it is possible that the ironing face does not constitute a separate element as such, but merely is a coating on the bottom of the soleplate.

[0014] Figure 1 furthermore shows that in this embodiment, the soleplate 15 comprises an integrated steam generator 12. In use, the chamber 12a of the steam generator may be filled with water through water inlet 9 (see figure 2). The steam generator 12 furthermore comprises a lid 12b. A heating element 3 is provided for heating up the soleplate, and simultaneously (in this embodiment) heating up the water in chamber 12a.

[0015] Heating element 3 may suitably be formed by an ohmic resistance with a metal sheath. Said metal sheath may be made of an iron alloy. By administering current through said resistance, the heating element is heated up. This in turn heats up its metal sheath, the substrate of the soleplate 2, ironing face 1 and the water in steam generator chamber 12a. Steam can thus be generated in steam generator 12.

[0016] Figures 3 and 4 further illustrate how the steam generated in steam generator 12 is finally vented through steam outlets 1a provided in the soleplate and ironing face. Figure 4 also illustrates the use of sealing 7, which may be formed as a layer of silicone, for avoiding leaks of water and/or steam.

[0017] Figure 5 shows a second embodiment of a soleplate according to the present invention. In this embodiment, substrate 2 comprises an ironing face 1, formed by a separate element that is connected to the substrate 2 through the use of fasteners 4, 5, 6. The separate element 1 is fastened to the substrate through bolts 4 and corresponding nuts. In the embodiment shown in figure 5, in the centre of the soleplate, ironing face 1 may be connected through a pin 5 and fitting washer 6. Optionally, an adhesive may further be applied between ironing face 1 and the bottom of substrate 2. Within the scope of the present invention, other suitable fasteners (e.g. other suitable bolts and nuts, only adhesives, suitable screws) may also be used.

[0018] In contrast to the embodiments shown in figures 1-4, a separate steam generator 10 is provided. The separate steam generator 10 comprises a lid 10a which is connected to the body of the steam generator by pins 14. In other embodiments of the invention, other types of fasteners may be used for fastening the lid of the steam generator to the body of the steam generator. Steam generator 10 in this embodiment is connected to the soleplate at a front attachment 13a and a rear attachment 13b. To this end, the soleplate comprises a front protruding pin and a rear protruding pin, which may be fitted in mating holes on respectively a front and rear flange of the separate steam generator 10. This is more clearly illustrated in figure 6.

[0019] In embodiments of the invention, the separate steam generator 10 may also be made of a magnesium alloy, said alloy also comprising aluminium. Weight savings etc. may accordingly also be achieved in the separate steam generator, not only in the soleplate.

[0020] In this embodiment, water enters the separate steam generator 10 through inlet 9. A separate heating element 11, dedicated to steam generation is furthermore provided. The steam formed in this process passes through an outlet 8 of the soleplate, to finally be vented through outlet holes 1a. These outlet holes 1a are provided in embossments 1b which serve as channels for distributing the steam over the ironing face (see figure 10).

[0021] Figure 7 further indicates how the heating element 3 is embedded in soleplate substrate 2. Reference sign 3a is used to indicate a pin which may be connected through suitable cables or soldering to a source of electric current. Reference sign 3b is used to indicate an isolating plug.

[0022] Figure 8 highlights detail A, which is further shown in figure 9. Figure 9 shows heating element 3 provided in substrate 2. It furthermore shows ironing face 1, with embossments 1b.. Sealing 7 is provided to avoid water and/or steam leaks.

[0023] According to the invention, the soleplate is made of a magnesium alloy, said alloy also comprising aluminium. Magnesium is thus the principal element of the alloy. Aluminium is another element of the alloy. Other elements may be other metals or non-metals.

[0024] In a preferred embodiment, the alloy is AZ91D. AZ91D is an alloy that is particularly suitable for die casting. The substrate of the soleplate may be formed essentially in a die casting process comprising the following steps: negative moulds of either side of the soleplate are provided, in which the heating element (e.g. a resistance with a metal sheath) is positioned. The two moulds are thus combined into a single mould with the heating element properly positioned inside said mould.

[0025] The molten alloy is thus injected into the mould and kept under appropriate pressure by forcing the two separate moulds together. The pressure is maintained until the alloy has solidified, after which the moulds are removed. The substrate subsequently undergoes minor treatments to e.g. remove scrap material.

[0026] The substrate of the soleplate shown in figures 1-4 can thus be formed in a single die casting step. The embodiment shown in figures 5-10 comprises a separate steam generator and a separate heating element. The soleplate and the steam generator are formed in separate die casting processes.

[0027] An improved soleplate is achieved with the present invention and the process hereinbefore described.

[0028] Although not further illustrated in the figures, it will be clear to the skilled person that an iron according to the present invention furthermore comprises e.g. a suitable handle for holding the iron, controls for setting the temperature of the heating element(s), etc.

[0029] For the sake of completeness, a complete list of reference signs used in the figures follows:

1	ironing face
1a	steam outlets
1b	embossment
2	soleplate substrate
3	heating element of soleplate
3a	pin
3b	isolating plug
4	bolt and nut
5	pin
6	washer
7	sealing
8	steam passage
9	water inlet
10	separate steam generator
10a	lid of separate steam generator
11	heating element
12	integrated steam generator
12a	chamber of integrated steam generator
12b	lid of integrated steam generator
13a	front attachment point between soleplate and steam generator
13b	rear attachment point between soleplate and steam generator
14	pin of steam generator lid
15	soleplate

Claims

1. Soleplate for an iron **characterized in that** a substrate (2) of the soleplate (15) is made of a magnesium alloy, said alloy also comprising aluminium.

2. Soleplate according to claim 1, **characterised in that** the substrate (2) of the soleplate (15) is made of the alloy AZ91D.

3. A soleplate according to claim 1 or 2, **characterised in that** the substrate (2) of the soleplate (15) is provided with an ironing face (1) of a different material.

4. A soleplate according to claim 3, in which said ironing face (1) is a separate element connected to the substrate (2) by fasteners (4,5,6).

5. A soleplate according to claim 3, in which said ironing face (1) is a coating provided on the substrate (2).

6. Iron comprising a soleplate according to any previous claim.

7. An iron according to claim 6, **characterised in that** the soleplate (15) comprises an integrated steam generator (12).

8. An iron according to claim 6, **characterised in that** the iron furthermore comprises a separate steam generator (10) and separate heating element (11).

9. An iron according to claim 8, **characterised in that** said separate steam generator (10) is made of a magnesium alloy, said alloy also comprising aluminium.

10. Iron according to claim 9, **characterised in that** the separate steam generator (10) is made of the alloy AZ91 D.

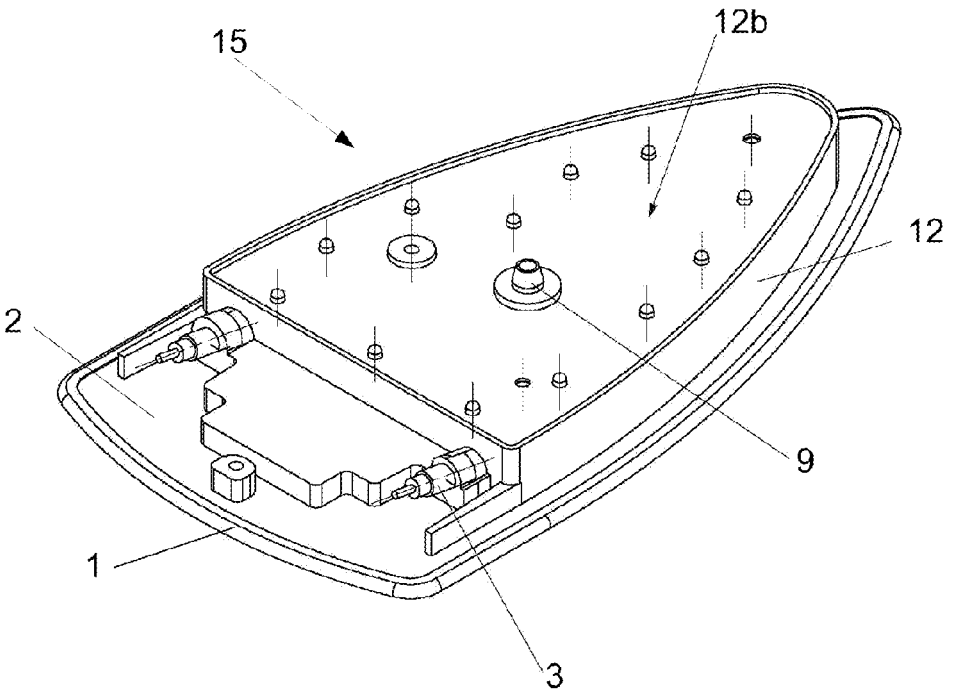

Figure 1

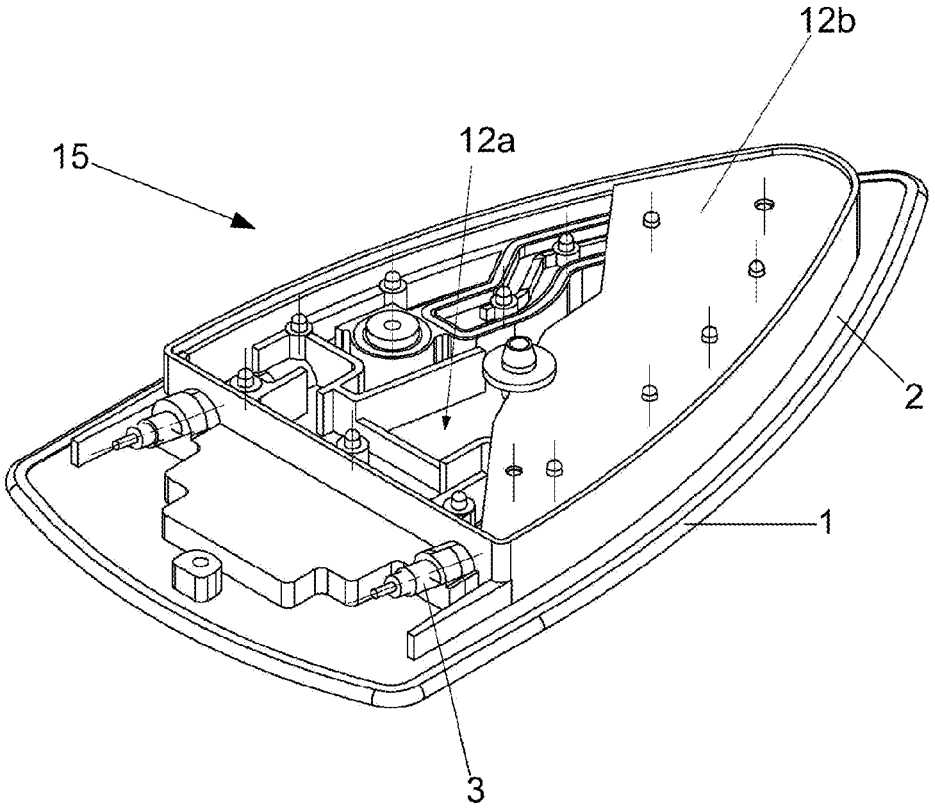

Figure 2

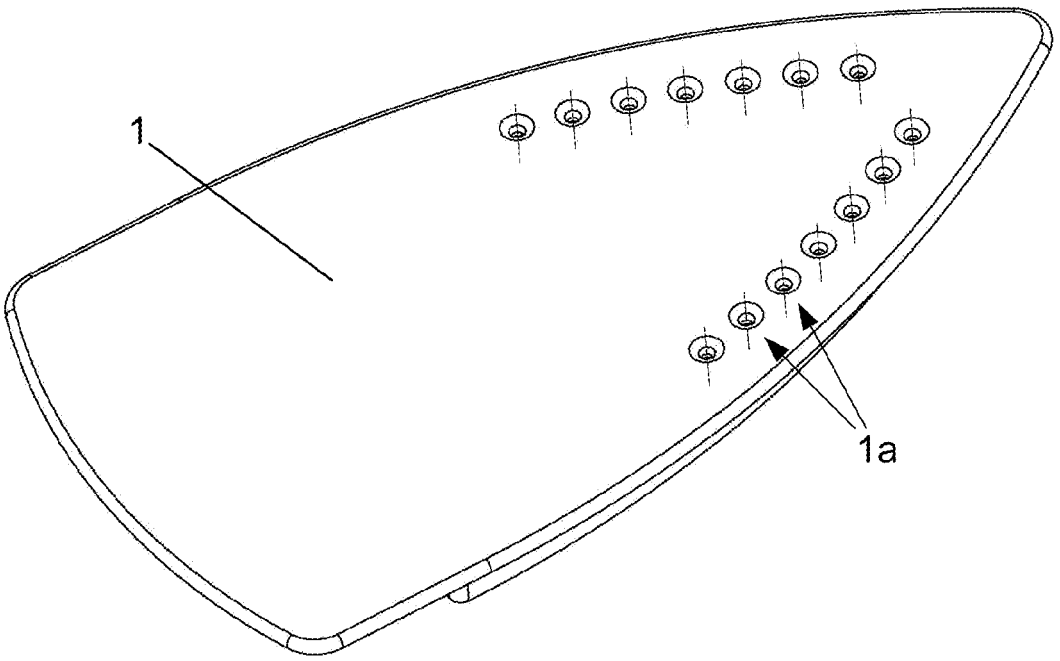

Figure 3

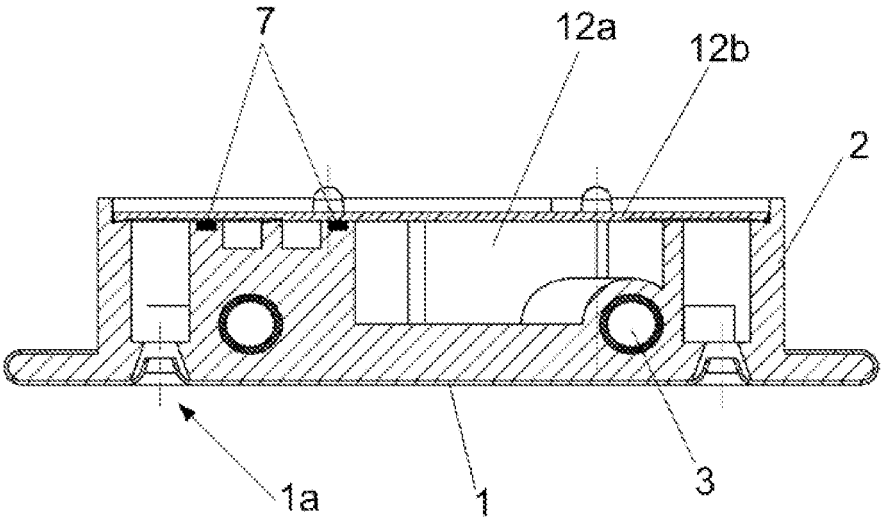

Figure 4

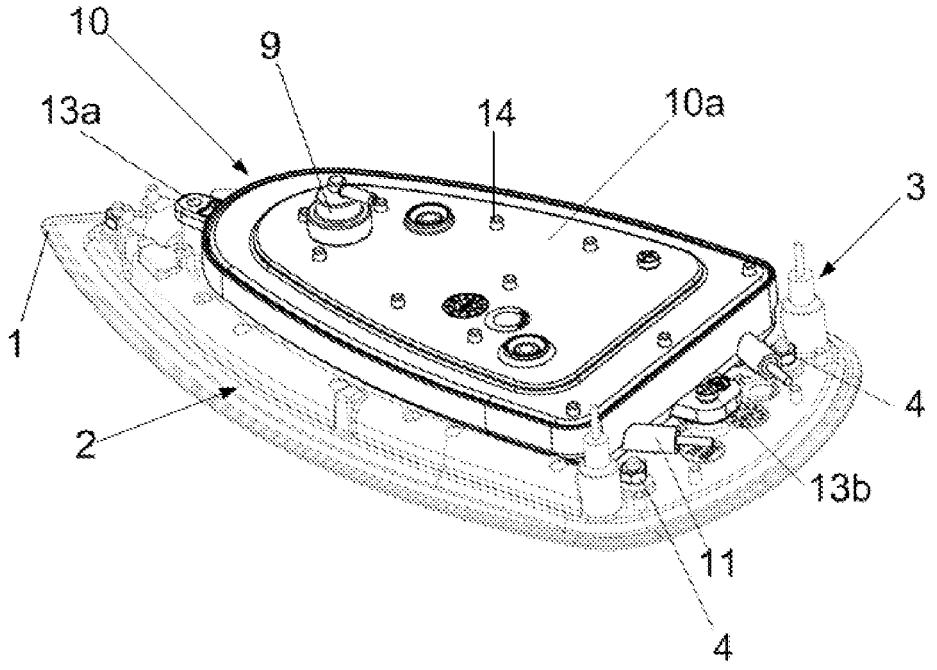

Figure 5

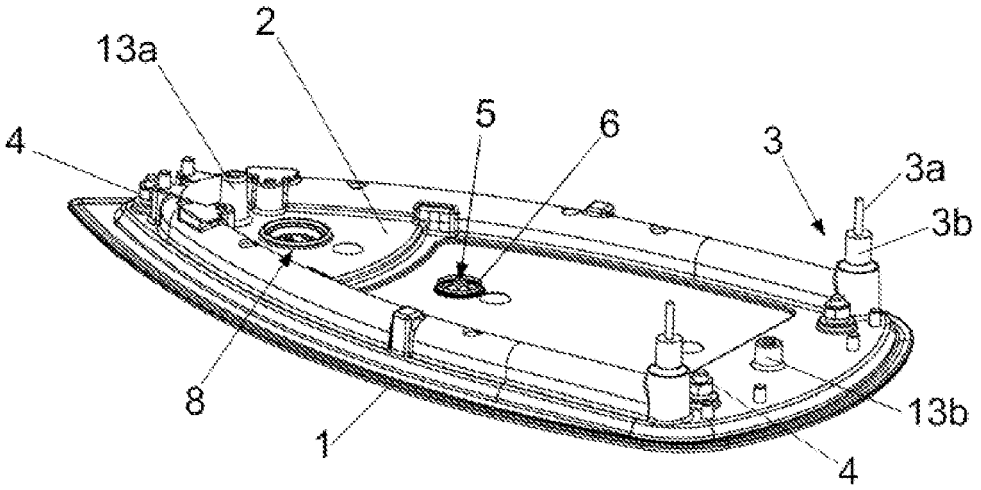

Figure 6

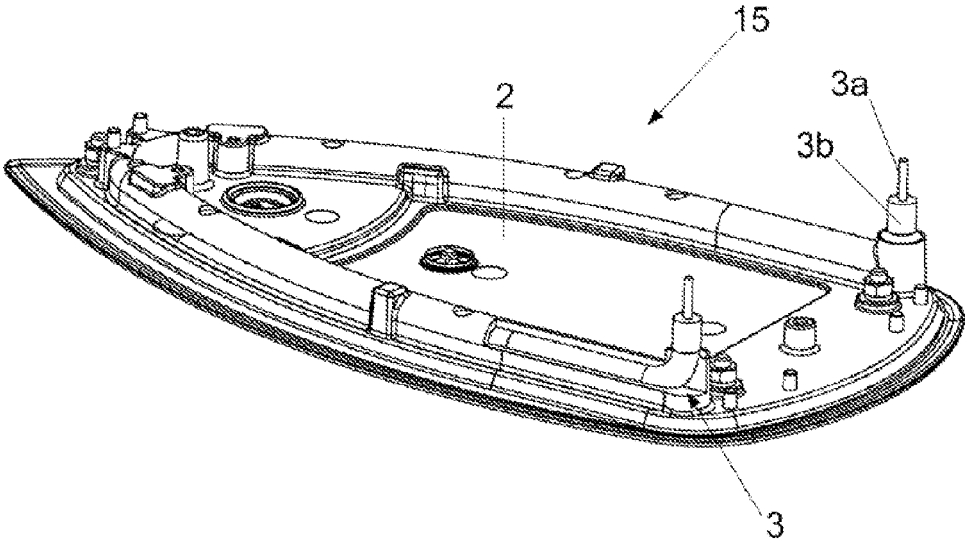

Figure 7

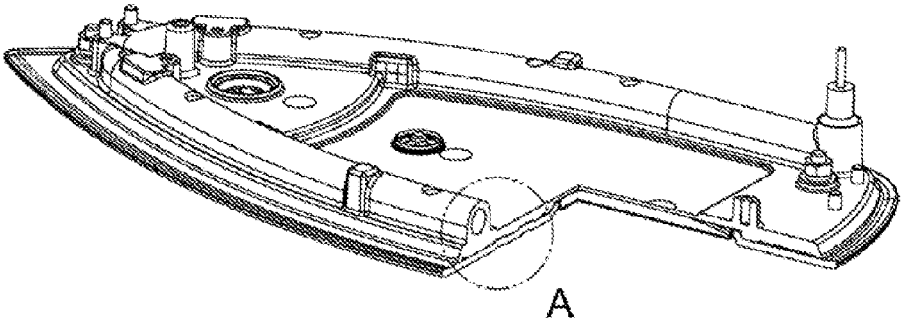

Figure 8

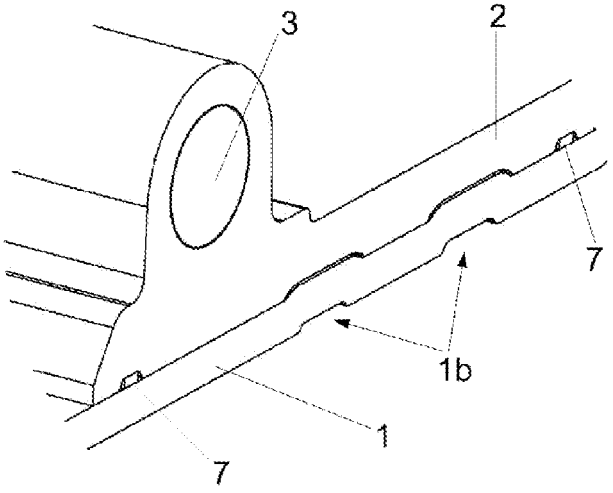

Figure 9

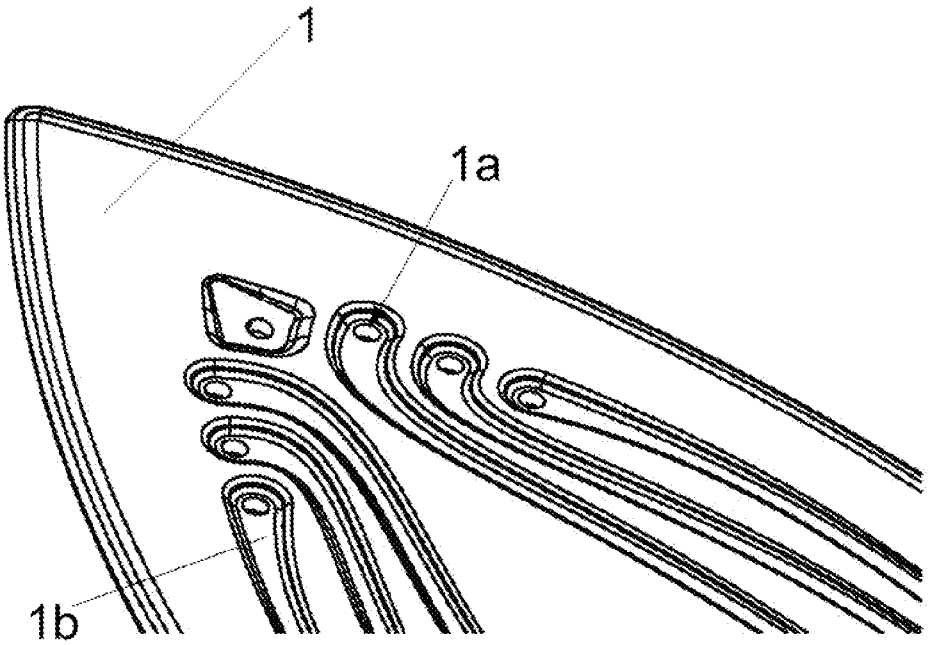

Figure 10

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 1715

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	GB 733 981 A (FAIRCHILD ENGINE & AIRPLANE) 20 July 1955 (1955-07-20) * column 3, lines 82-103; claim 1; figure 1 *	1-10	INV. D06F75/38 H05B3/26
A	EP 1 022 374 A1 (BRAUN GMBH [DE]) 26 July 2000 (2000-07-26) * paragraph [0033] *	1-10	
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TECHNICAL FIELDS SEARCHED (IPC)

D06F
H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 July 2009	Dupuis, Jean-Luc

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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06-07-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- WO 0182652 A **[0005]**
- EP 1561855 A **[0010]**