

ELECTRIC IRON

The invention relates to an electric iron according to the preamble of patent claim 1.

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An electric iron of the generic type is known from DE 42 12 286 A1. The electric iron comprises a metallic iron sole and a U-shaped electric resistance-heating element. The heating element is embedded in a form-fitting manner in the iron sole, which is produced by diecasting. During operation of the iron, the heating element is supplied with electrical energy via electrical contacts at the ends of the two legs of the U-shaped heating element. The electrical energy introduced is dissipated to the iron sole in the form of heat by the heating element. A thermostat is provided in order to regulate the temperature of the iron sole, the thermostat sensing the current temperature of the iron sole and controlling a regulator, which switches the electric heating element on and off in dependence on the current temperature of the sole and on the ironing temperature preselected by the user.

25 For this purpose, the thermostat has a temperature sensor, which is generally formed by a bimetallic element. In order for reliable temperature regulation to take place, it has to be ensured that a change in temperature of the iron sole can be picked up directly as a change in temperature at the thermostat. The iron sole is thus usually provided with a point of contact, at which the thermostat is fastened. The point of contact generally comprises a solid dome-shaped elevation which is integrally formed directly on the iron sole.

In order that the thermostat reacts even to small temperature fluctuations in a very short period of

time, and the set temperature of the iron sole is thus maintained very accurately, DE 42 12 286 A1 proposes to provide a separate thermal-conduction bridge which leads from the point of contact to at least one leg of
5 the heating element, as a result of which a greater flow of heat can be transmitted. This solution is expedient particularly in the case where the point of contact, rather than being directly adjacent to the heating element, is spaced apart from the latter by a
10 considerable distance. The disadvantage, however, is that a separate thermal-conduction bridge which can increase the flow of heat from the heating element to the point of contact provides only insignificant improvement, if any at all, if the point of contact is
15 arranged directly on the heating element.

The object of the invention is to improve the thermal coupling of the point of contact to the heating
20 element.

This object is achieved according to the invention in that the iron sole has a gap which is formed in a locally bounded manner in the region of the point of contact and of an associated heating-element section
25 and by means of which there is at least a reduction, in a direction away from the point of contact, in the thermal conduction of the stream of heat emanating from the heating element.

30 By virtue of preventing, or at least reducing, the flow of heat from the heating element in a direction other than in the direction of the point of contact, an improved flow of heat in the direction of the point of contact is achieved. The flow of heat from the heating
35 element to the point of contact is improved in that the heat generated by the heating element is preferably transported in the direction of the point of contact and transportation of heat away from the point of contact is prevented, or at least reduced. In

particular during the first heating-up operation following switching on of the iron, local overheating is prevented. This most problematic instance of heating regulation is solved in a particularly effective manner
5 by the invention in order to prevent articles for ironing from being burned. A further improvement is achieved if the outflow of heat which has already reached the point of contact is prevented, or at least reduced.

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The gap is preferably arranged on a side of the heating element which is directed away from that side of the heating element which is oriented in the direction of the point of contact. The gap may thus be arranged on
15 those sides of the heating element which are not oriented directly onto the point of contact. In a preferred embodiment of the invention, the gap is arranged on a side of the heating-element section assigned to the point of contact which is located
20 opposite the point of contact. This position has the advantage that heat can be directed particularly effectively to the point of contact in the immediate vicinity of the heating element since the distance between this heating-element section and the point of
25 contact is at its shortest and heat losses which would be caused by a long distance are avoided.

If the point of contact is arranged eccentrically in relation to the axis of symmetry of the U-shaped
30 heating element in the vicinity of one of the two legs of the heating element, then the at least one opening can extend along the outer edge of this leg in the region of the point of contact. One possibility is for the gap or the at least one separate opening to be
35 designed as a slot in the iron sole, which extends on the outside along the U-shaped heating element.

If the iron sole is constructed such that the heating element encloses the point of contact in a U-shaped

manner, and a multiplicity of uniformly spaced-apart steam-outlet openings are distributed along the U-shaped heating element, the gap can be formed by at least one separate opening in the iron sole, this opening extending along an outer side of the U-shaped heating element. This has the advantage that the separate opening also performs a further function as a steam-passage opening.

By means of such a gap, in the region of the heating-element section assigned to the point of contact, the outflow of heat in the direction of the outer edge of the iron sole is prevented, or reduced. Since, despite the need for a shorter reaction time for the thermostat, as uniform heating of the iron sole as possible is necessary, a certain outflow of heat over the entire base surface of the iron sole is to be ensured. In order that the quickest possible reaction behavior of the thermostat is made possible, and uniform temperature distribution within the iron sole is also ensured, the slot can preferably extend over a length between 2 cm and 6 cm. The result is particularly advantageous and balanced if, with the conventional iron dimensions, the slot extends over a length between 3 cm and 5 cm on the outside along the U-shaped heating element. The slot essentially prevents or reduces the outflow of heat in the direction of the outer edge of the iron sole.

A second possibility by means of which the heat emanating from the heating-element section can be directed preferably in the direction of the point of contact is to define the gap as a cutout on the underside of the iron sole, the cutout extending beneath the heating-element section assigned to the point of contact. Such a gap, in the region of this heating-element section, prevents, or reduces, the outflow of heat in the direction of the base surface of the iron sole.

In order that the outflow of heat from the point of contact to the base surface of the iron sole be prevented or reduced, the gap may be formed by a cutout on the underside of the iron sole, the cutout extending beneath the point of contact. The gap here is located in the bottom of the dome-shaped point of contact.

As a result, heat which has already reached the point of contact from the heating element is not lost again by way of the base surface of the point of contact.

The heat generally transmitted laterally from the heating element to the point of contact is thus preferably directed upward in the direction of the thermostat fastened at the point of contact and the outflow of heat via the base of the point of contact into the iron sole is prevented, or reduced.

The cutout preferably has a surface area corresponding in size at least to the surface area of the point of contact. In the case of the point of contact being designed as a dome-shaped elevation, it is expedient to select the size of the surface area of the cutout to be between 4 cm^2 and 25 cm^2 . In order to ensure a particularly balanced ratio between a short reaction time of the thermostat and uniform heat distribution within the iron sole, the surface area of the cutout should preferably be between 7 cm^2 and 17 cm^2 .

The height of the gap should be between 0.5 mm and 5 mm. Particularly balanced results are achieved if the height of the gap is preferably between 2 mm and 4 mm. Selecting the abovementioned dimensions for the slot and cutout achieves a particularly short reaction time of the thermostat and largely uniform temperature distribution over the iron sole.

Sensitive articles for ironing can be processed without

any risk of being damaged on account of non-uniform temperature distribution.

5 The iron sole according to the invention can have two gaps, one gap being designed as a separate opening which extends on that side of the heating-element section which is located opposite the point of contact and the other being formed as at least one cutout on the underside of the iron sole, this cutout extending
10 beneath the heating-element section and/or the point of contact. A slot according to patent claims 3 to 5 is thus preferably combined with a cutout according to patent claims 6 to 10. These two gaps may be arranged such that they are connected to one another at at least
15 one location, i.e. the gaps merge into one another.

The thermal-isolation action of the heating-element section is thus particularly effective since there are no crosspieces remaining between the two gaps which
20 could dissipate heat.

The invention, rather than being restricted to electric steam iron also covers dry electric irons. It is possible for the iron soles of the electric irons
25 according to the invention to consist of different materials, in particular of diecast aluminum, and to be optionally provided with a separate soleplate. The soleplate here may consist preferably of stainless steel, of aluminum or be treated with enamel or ceramic
30 material. If the iron sole has a soleplate which is fastened on the underside of the iron sole and is in surface contact with the latter, one side of the cutout according to the invention or of the gap is bounded by the soleplate.

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The invention will be explained in more detail with reference to a preferred embodiment. In the figures:

Figure 1 shows a plan view of the underside of an iron

sole according to the invention,

Figure 2 shows a plan view of the top side of an iron sole according to Figure 1,

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Figure 3 shows a cross section through an iron according to the invention, and

Figure 4 shows a cross section through an iron sole according to Figure 1.

Figure 1 shows the underside of an iron sole 1 according to the invention. An electric resistance-heating element 3 is cast into the iron sole 1, which is produced by aluminum diecasting. The heating element 3 is of U-shaped design and extends along steam-passage openings 7 which connects a steam chamber 8 to the underside of the iron sole 1. Ends 9 and 10 of the two legs of the U-shaped heating element 3 project out of the steam chamber 8 and exhibit the electrical contacts.

Within the steam chamber 8, a dome-shaped point of contact 6 is cast onto the iron sole 1. The point of contact 6 forms a pedestal to which a temperature sensor 5 of a regulating device 4 is contact-connected. The dome-shaped point of contact 6 is directly adjacent to a heating-element section 14 of one leg of the U-shaped heating element 3. The dome-shaped point of contact 6 rises up on the top side of the iron sole 1. Beneath the dome-shaped point of contact 6, the gap 2b is located on the underside of the iron sole 1. The gap 2b is designed as a cutout on the underside of the iron sole 1. The gap 2b is of essentially rectangular design and has a surface area measuring 4.5 cm × 3 cm. The gap 2b, as is illustrated in figure 1, thus has a surface area of 13.5 cm².

Figure 2 shows the top side of the iron sole 1

according to the invention. The gap 2a is designed as a slot in the iron sole 1. This gap 2a extends on the outside along one leg of the U-shaped heating element 3. The slot 2a extends along a number of the steam-outlet openings 7 in the vicinity of the dome-shaped point of contact 6. The slot 2a is located on the opposite side of the leg of the heating-element 3 on which the dome-shaped point of contact 6 is adjacent to the heating-element section 14 of the U-shaped heating element 3. The slot 2a extends along an outer side 15 of the U-shaped heating element 3 over a length of 4.5 cm.

Figure 3 shows the cross section through the iron sole 1 according to the invention. The dome-shaped point of contact 6 is cast on the iron sole 1, which is produced by aluminum diecasting. At the dome-shaped point of contact 6, the temperature sensor 5, which is designed in a conventional construction as a bimetallic element, is thermally coupled to the iron sole 1. The temperature sensor 5 is connected to the regulating device 4, which is fitted in a housing 12 of the iron via a rotary knob 13. The gap 2b is arranged beneath the dome-shaped point of contact 6, as seen in the cross section of the iron sole 1. The gap 2a, which is designed as a slot, directly adjoins the gap 2b, which is designed as a cutout.

As can be seen from figure 4, the gap 2a, which is designed as a slot, is connected directly to the gap 2b, which is designed as a cutout. The gap 2b, which is designed as a cutout, thus extends both beneath the heating element 3 and beneath the point of contact 6.

The gaps 2a and 2b according to the invention can be used in principle in steam irons and also in dry irons. The gaps 2a and 2b are preferably used in steam irons which have the iron sole 1, as is illustrated in figure 3, covered by a soleplate 11. The soleplate 11 here

bounds the underside of the gap 2b, which is designed as a cutout, and is in surface contact with the underside of the iron sole 1. This results in a continuous ironing surface which rests on the article
5 for ironing, and the thermal isolation of the dome-shaped point of contact 6 is ensured.

Patent Claims

1. An electric iron having an iron sole (1) heated by a heating element (3), and having a regulating device
5 (4) which is intended for regulating the heating element (3) and comprises a temperature sensor (5) which is connected thermally to the iron sole (1) at a point of contact (6), characterized in that the iron sole (1) has a gap (2) which is formed in a locally
10 bounded manner in the region of the point of contact (6) and of an associated heat-element section (14) and by means of which there is at least a reduction, in a direction away from the point of contact (6), in the thermal conduction of the stream of heat emanating from
15 the heating element (3).

2. The electric iron as claimed in claim 1, characterized in that the gap (2) is arranged on a side of the heating-element section (14) which is located
20 opposite the point of contact (6).

3. The electric iron as claimed in claim 2, characterized in that the heating element (3) encloses the point of contact (6) in a U-shaped manner, and in
25 that a multiplicity of uniformly spaced-apart steam-outlet openings (7) are distributed along the U-shaped heating element (3), and in that the gap (2) is formed by at least one separate opening (2a) in the iron sole (1), this opening extending along an outer side (15) of
30 the U-shaped heating element (3).

4. The electric iron as claimed in claim 3, characterized in that the point of contact (6) is arranged eccentrically in relation to the axis of
35 symmetry of the U-shaped heating element (3) in the vicinity of one of the two legs of the heating element (3), and in that the at least one separate opening (2a)

extends along the outer edge of this leg in the region of the point of contact (6).

5 5. The electric iron as claimed in claim 4, characterized in that the at least one separate opening (2a) is designed as a slot which extends along the outer side (15) over a length between 2 cm and 6 cm, preferably between 3 cm and 5 cm.

10 6. The electric iron as claimed in one of claims 1 to 5, characterized in that the gap (2) is formed as a first cutout (2b) on the underside of the iron sole (1), this cutout extending beneath the heating-element section (14).

15 7. The electric iron as claimed in one of claims 1 to 6, characterized in that the gap (2) is formed as a second cutout (2c) on the underside of the iron sole (1), this cutout extending beneath the point of contact
20 (6).

8. The electric iron as claimed in claim 7, characterized in that the second cutout (2c) has a surface area corresponding in size at least to the
25 surface area of the point of contact (6).

9. The electric iron as claimed in claim 7, characterized in that the surface area of the second cutout (2c) is between 4 cm² and 25 cm², preferably
30 between 7 cm² and 17 cm².

10. The electric iron as claimed in one of claims 6 to 9, characterized in that the height of the first cutout (2b) and/or of the second cutout (2c) is between 0.5 mm
35 and 5 mm, preferably between 2 mm and 4 mm.

11. The electric iron as claimed in one of the preceding claims, characterized in that two gaps (2a, 2b) are present, and in that one gap (2) is designed as

a separate opening (2a) which extends on a side of the heating-element section (14) which is located opposite the point of contact (6), and in that the other gap (2) is designed as at least one cutout (2b) on the
5 underside of the iron sole (1).

12. The electric iron as claimed in claim 11, characterized in that the at least one cutout (2b, 2c) extends beneath the heating-element section (14) and
10 beneath the heating-element section (14) and/or the point of contact (6).

13. The electric iron as claimed in claim 11 or 12, characterized in that the two gaps (2a, 2b) are
15 connected to one another.