

IRON COMPRISING A HUMIDITY DETECTOR**Description**

The invention relates to an iron comprising a heating element, heating control means for the heating element, and a substantially flat soleplate adapted to slide on a fabric.

5 The ironing conditions of a fabric may depend to a considerable extent on the moistness of the fabric. It is known that ironing of a damp fabric is preceded by a fabric dehumidifying step. For certain thermostat settings the electric power dissipated in the heating element may be low, which prolongs the dehumidifying step. This results in excessively long ironing times.

10 To date designers of irons have not dealt with this problem. It is an object of the invention to provide a humidity detector for an iron which can be manufactured more easily in large numbers, which is essential for such a mass product, and which can be used easily for controlling the dissipated electric power.

15 This object is achieved in that the iron has a humidity detector comprising:

- means for measuring a resistivity of the fabric, which means are flush with the soleplate of the iron to enable it to be brought into contact with the fabric,

20 - means for determining an average degree of humidity of the fabric by measuring an electric signal I resulting from variations of the resistivity caused by a movement of the iron over the fabric.

The means for measuring the resistivity comprise at least one conductive electrode which is flush with the soleplate of the iron to enable it to be brought into contact with the fabric.

25 The electrical resistance between two electrodes can be measured by means of a suitable circuit. A small value of the electrical resistance is characteristic of a moist fabric. A large value of the electrical resistance is characteristic of a dry fabric.

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The passage of the iron through zones which generally do not have the same humidity enables the humidity detector to supply an electric signal which varies depending on the position of the iron on the fabric.

5 In order to measure an average degree of humidity of the fabric an average value of the electric signal I is calculated.

It is also possible to determine the rhythm of the variations of the electric signal. By means of such a rhythm it is possible to determine whether the iron is still in use. Thus, the humidity detector can also provide a movement indication.

10 The invention will be more fully understood by means of the following drawings, which are given by way of non-limitative example and in which:

Figure 1 is a perspective view of an example of an iron provided with a humidity detector.

15 Figure 2 is a diagrammatic underneath view of an iron provided with a humidity detector.

Figure 3 is a diagram of an electrical measurement circuit.

Figure 4 is a curve representing the resistance variations DR during a drying operation.

20 Figure 5 is an example of a curve representing the variation of an output signal I (d) as a function of the displacement d.

Figure 6 shows an example of a circuit for measuring the average amplitude of the signal I.

25 Figure 7 shows an example of a circuit for measuring the average amplitude and the rhythm of the variations of the signal I.

Figure 1 shows diagrammatically an iron 30 provided with a humidity detector 60 arranged at the back of the soleplate 31 of the iron.

30 Figure 2 is a diagrammatic underneath view of an iron 30 provided with a humidity detector 60. The detector 60 comprises two electrodes 62_a, 62_b, which preferably have a rounded shape, for example hemispheric, to slide easily on the fabric. For example, stainless steel electrodes of 5 mm to 10 mm diameter may be used. These electrodes may be arranged on an elastic base 64 for a good



contact with the fabric without leaving any traces. These electrodes are connected to measurement means which determine the average amplitude of the signal I.

The electrodes are accommodated in recesses 63_a , 63_b formed in the base 64. The temperature resistance of the material of the base should be adequate to be brought into contact with more or less warm fabrics without degradation of the material.

Figure 3 is a diagram of an electrical resistance-measurement circuit. The electrodes 62_a , 62_b , which are in contact with the fabric 45, are connected to an electrical power supply 90 and to a circuit for measuring the electric current I in the circuit.

Figure 4 is a curve representing the resistance variations DR during a dehumidifying operation for an iron as shown in Figure 2. When the iron is applied and subsequently moved in the direction of its front tip with a moderately warm soleplate the humidity detector 60 will meet fabric areas which become increasingly dry (over the soleplate length of the iron). This yields a curve A as a function of the degree of drying s. It is expressed in arbitrary units.

Figure 5 shows a curve representing the variation of an output signal I as a function of the displacement d of the iron. It is representative of a signal obtained from the humidity detector. The signal consists of a sequence of halfwaves of variable amplitude. To detect the degree of humidity the average value of this signal in a predetermined time interval is calculated.

Figure 6 shows a circuit 99 which determines the average amplitude of the signal I (d). This average value is then representative of the degree of humidity of the fabric. The circuit comprises a resistor R_1 connected to the input terminal 88 receiving the current I. The other end of this resistor R_1 is connected to an input of an amplifier 91 having a high input impedance. A circuit comprising a capacitor C_2 and a resistor R_2 in parallel is arranged between the input and the output of this amplifier 91. Thus, a signal representing the average degree of humidity of the fabric appears on the output 95. This signal can then be used for influencing the means 96 for controlling the iron, for example in order to increase the electric power dissipated in the heated element 97 in order to speed up the rate of dehumidification of the fabric. The other input



of the amplifier 91 may be connected to earth. The soleplate of the iron can now take the place of the electrode 62_b. The humidity detector then comprises an electrode 62_a and the soleplate 31 as the second electrode.

It is also possible to extend the circuit 91 with another circuit 89 which can calculate the rhythm of the variations of the signal I in order to detect a condition of use of the iron. In this case the means 89 comprise:

- a differentiation circuit for the electric signal I,
- and a counter (93) which measures a number of pulses appearing on the output of the differentiation circuit and which stops the control means of the iron when this number of pulses is smaller than a very small predetermined number.

Figure 7 shows a circuit by means of which it is possible to determine the degree of humidity by measuring an average amplitude (branch 99) and detecting a condition of use of the iron by measuring a number of halfwaves (branch 89). The branch 89 comprises a capacitor C₃ and a resistor R₃ connected to an input of an amplifier 92 having a high input impedance to derive the signal I and to supply pulses upon each rising and falling edge of the signal. These pulses are subsequently counted in a counter 93, which supplies a signal S on an output 94 when a limited number of pulses (for example 1 to 3) has appeared within a predetermined time interval. This signal is then used to influence the control means 96 of the iron in order to turn off the heating of the heating element 97.

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CLAIMS

1. An iron comprising a heating element (97), heating-control means (96) for the heating element, and a substantially flat soleplate (31) adapted to slide on a fabric, characterised in that the iron has a humidity detector (60) comprising:
- 5 - means (62a, 62b) for measuring a resistivity of the fabric, which means are flush with the soleplate of the iron to enable it to be brought into contact with the fabric,
- means (99) for determining an average degree of humidity of the fabric by measuring an electric signal I resulting from variations of the resistivity caused by a movement of the iron over the fabric.
- 10 2. An iron as claimed in Claim 1, characterised in that the means for measuring the resistivity comprise at least one conductive electrode (62a), (62b).
3. An iron as claimed in Claim 1 or 2, characterised in that the means (99) for determining the average degree of humidity comprise an amplifier
- 15 having a high input impedance, which amplifier receives the signal I and has an input and an output interconnected by a feedback resistor.
4. An iron as claimed in any one of the Claims 1 to 3, characterised in that it comprises means (89) for detecting the movement of the iron by measuring a rhythm of variations of said electric signal.
- 20 5. An iron as claimed in Claim 4, characterised in that the means (89) for determining the movement comprise:
- a differentiation circuit for the electric signal I,
- and a counter (93) which measures a number of pulses appearing on an output of the differentiation circuit and which stops the heating-control
- 25 means of the iron when said number of pulses is smaller than a very small predetermined number.

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ABSTRACT

IRON COMPRISING A HUMIDITY DETECTOR

An iron comprises a heating element (97) and heating-control means (96) for the heating element. It has a humidity detector (60) which measures the degree of humidity of the fabric and which influences the electric power dissipated in the heating element. In order to measure the degree of humidity a circuit (99) measures the resistivity of the fabric between two contact electrodes (62a, 62b) and subsequently averages the electric signal resulting from the movement of the iron on the fabric. A circuit (89) may be added which measures the rhythm of the variations of said electric signal and which thus detects whether the iron is in use or not in use.

10

Reference: Figure 2

Field of use: Flat-iron

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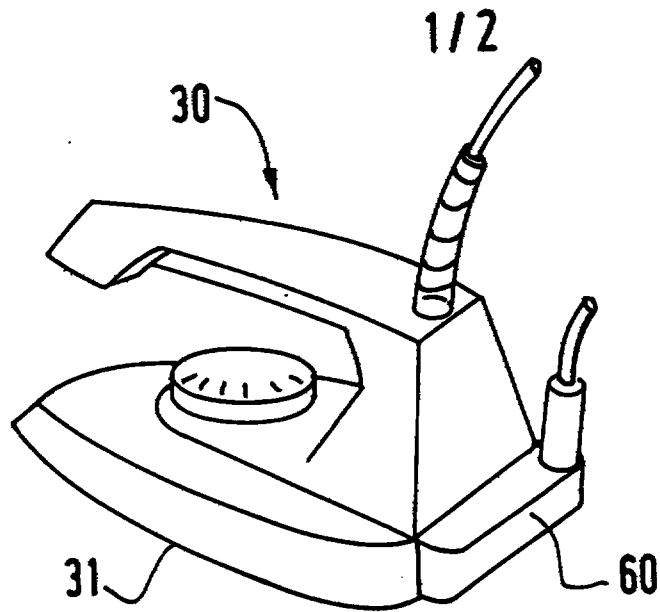


FIG. 1

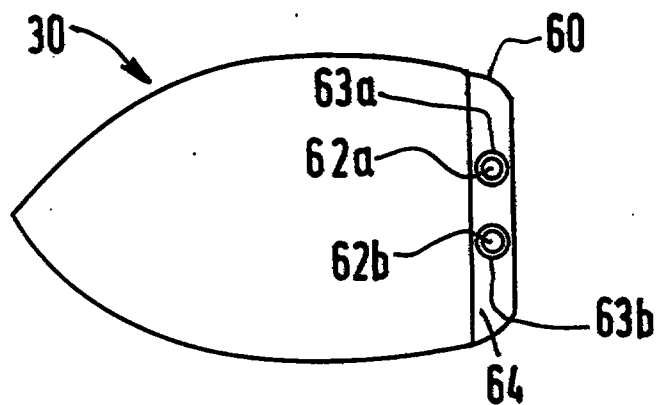


FIG. 2

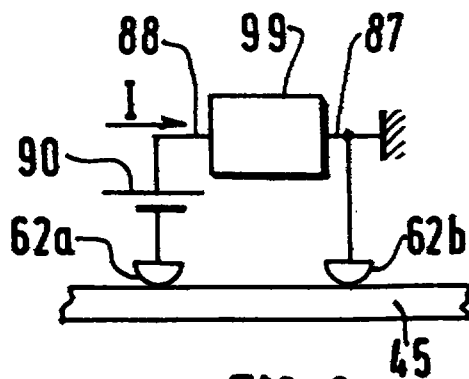


FIG. 3

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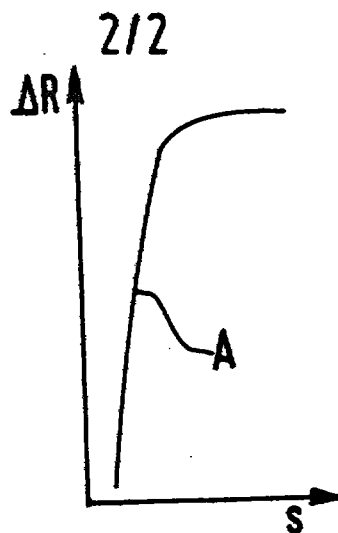


FIG.4

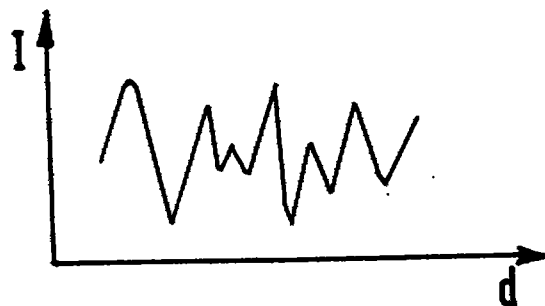


FIG.5

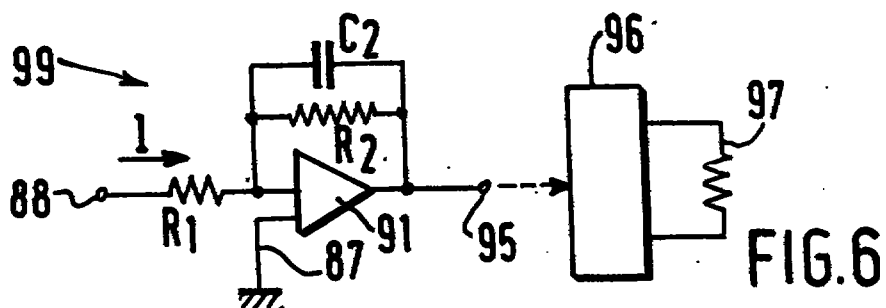


FIG.6

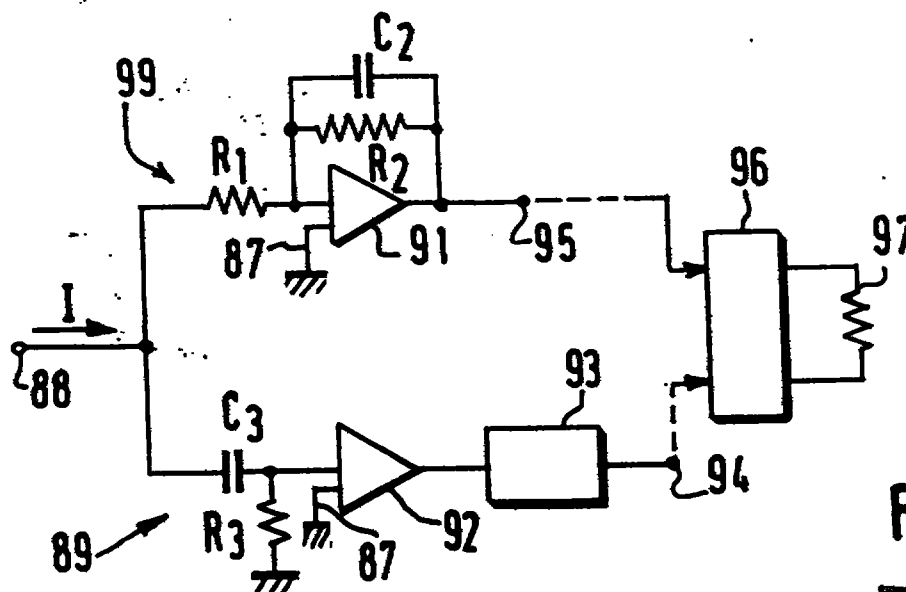
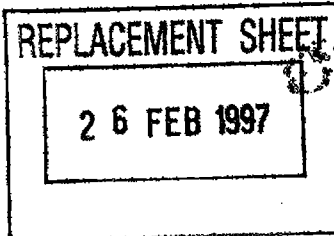


FIG.7

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This object is achieved in that the iron has a humidity detector comprising:

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- means for determining an average degree of humidity of the fabric by measuring an electric signal I resulting from variations of the resistivity caused by a movement of the iron over the fabric.

The means for measuring the resistivity comprise at least one conductive electrode which is flush with the soleplate of the iron to enable it to be brought into contact with the fabric.

The electrical resistance between two electrodes can be measured by means of a suitable circuit. A small value of the electrical resistance is characteristic of a moist fabric. A large value of the electrical resistance is characteristic of a dry fabric.

The passage of the iron through zones which generally do not have the same humidity enables the humidity detector to supply an electric signal which varies depending on the position of the iron on the fabric.

In order to measure an average degree of humidity of the fabric an average value of the electric signal I is calculated.

It is also possible to determine the rhythm of the variations of the electric signal. By means of such a rhythm it is possible to determine whether the iron is still in use. Thus, the humidity detector can also provide a movement indication.

The invention will be more fully understood by means of the following drawings, which are given by way of non-limitative example and in which:

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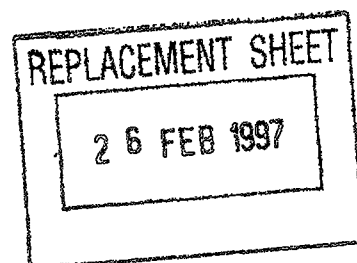
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of the amplifier 91 may be connected to earth. The soleplate of the iron can now take the place of the electrode 62_b. The humidity detector then comprises an electrode 62_a and the soleplate 31 as the second electrode.

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5. An iron as claimed in Claim 4, characterised in that the means (89) for determining the movement comprise:
 - a differentiation circuit for the electric signal I,
 - and a counter (93) which measures a number of pulses appearing on an output of the differentiation circuit and which stops the heating-control means of the iron when said number of pulses is smaller than a very small predetermined number.

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Reference: Figure 2

Field of use: Flat-iron

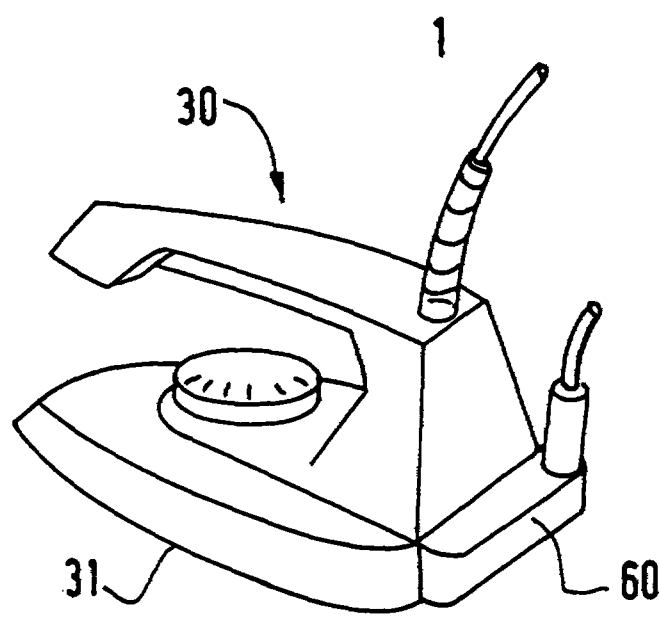


FIG. 1

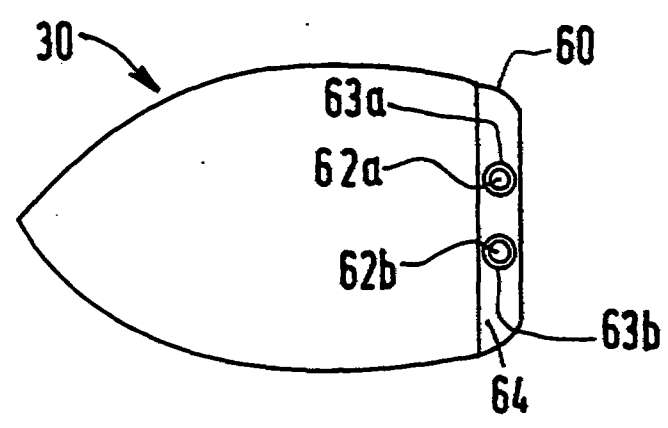


FIG. 2

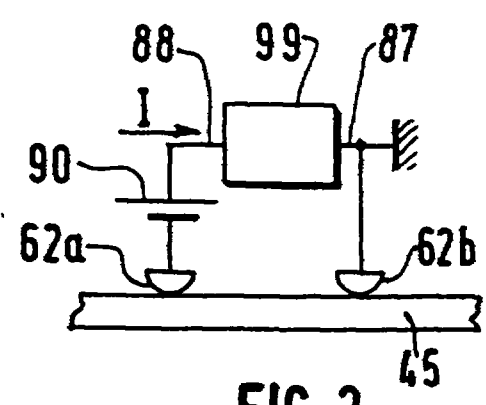


FIG. 3

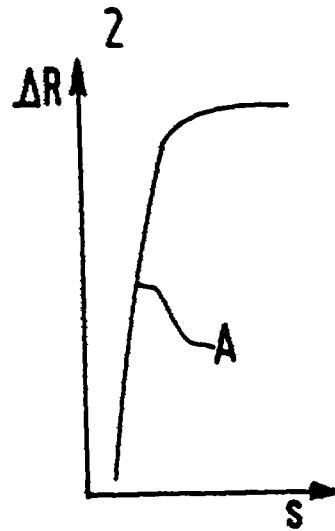


FIG.4

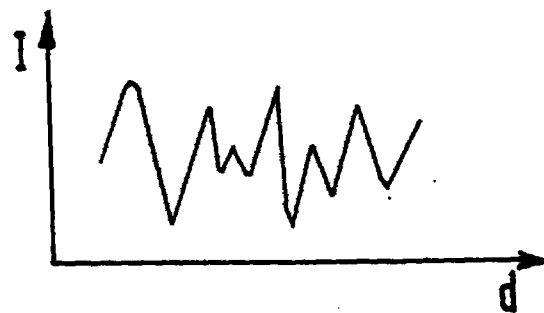


FIG.5

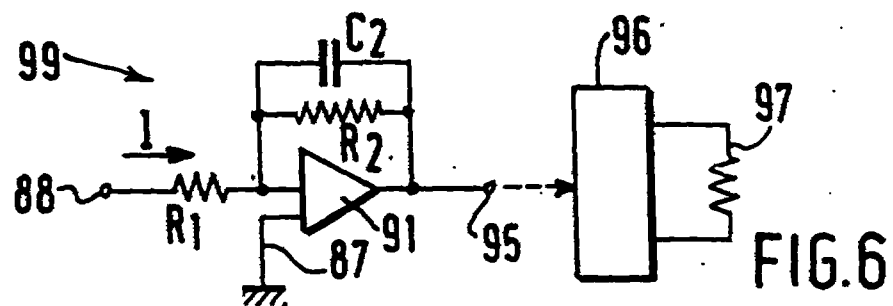


FIG.6

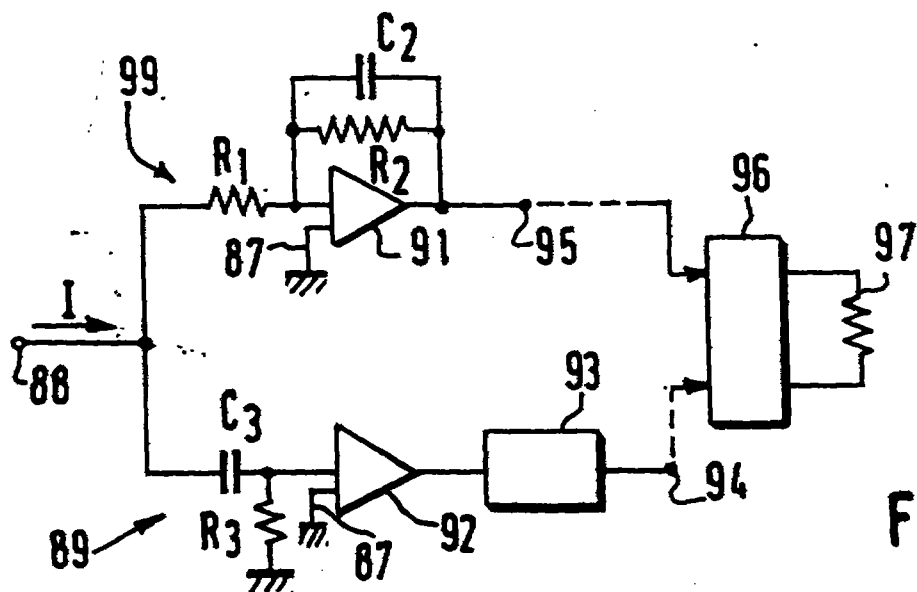


FIG.7