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(54) Abstract Title: **Hair iron**

(57) A hair iron 1 comprising first 3 and second 5 jaws at least one of which carries a heating element 7,9, the jaws being movable such that in use they can be moved from an open configuration in which hair can be introduced between them to a closed configuration with the hair lying between them. The hair iron may be powered by a battery unit 19, may have a safety cut-off to prevent it overheating, may be adapted so that the jaws can be locked together when not in use and the at least one heating element may comprise a thick film element 27.

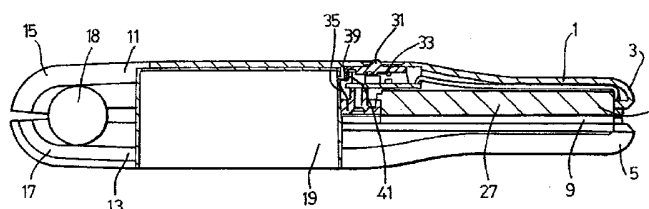


Fig. 1

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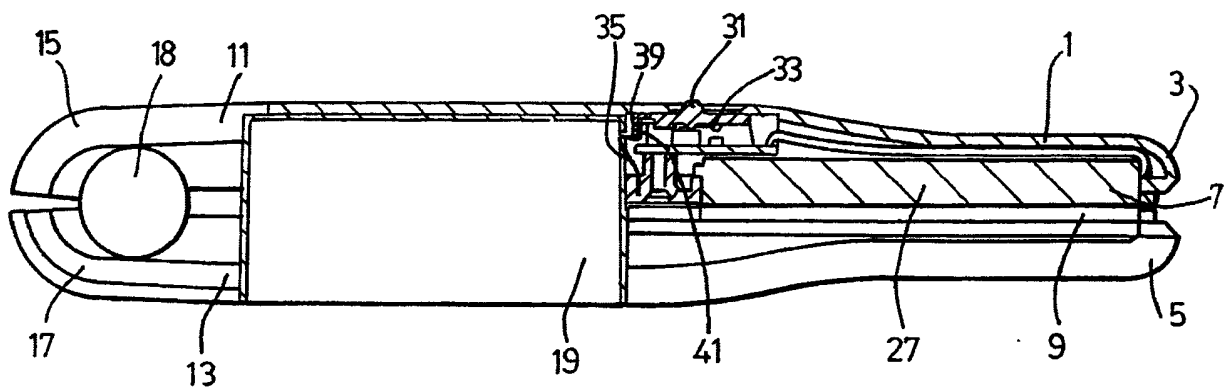


Fig. 1

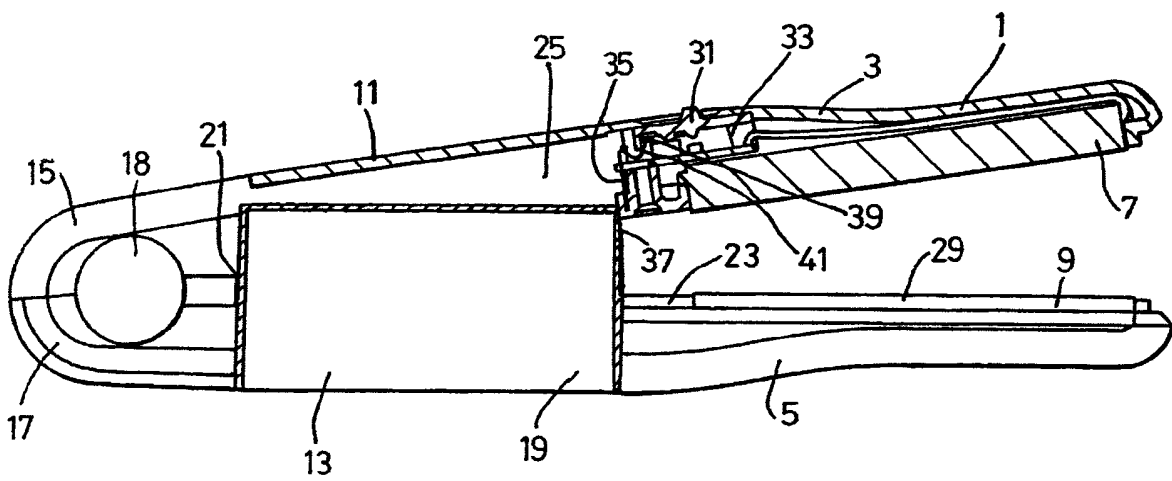


Fig. 2

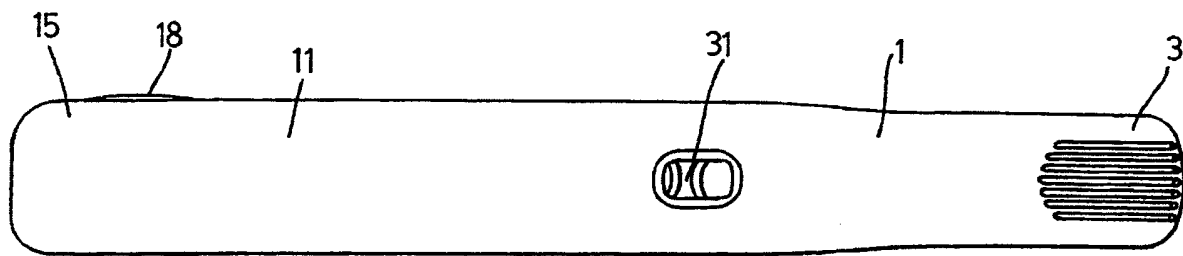


Fig. 3

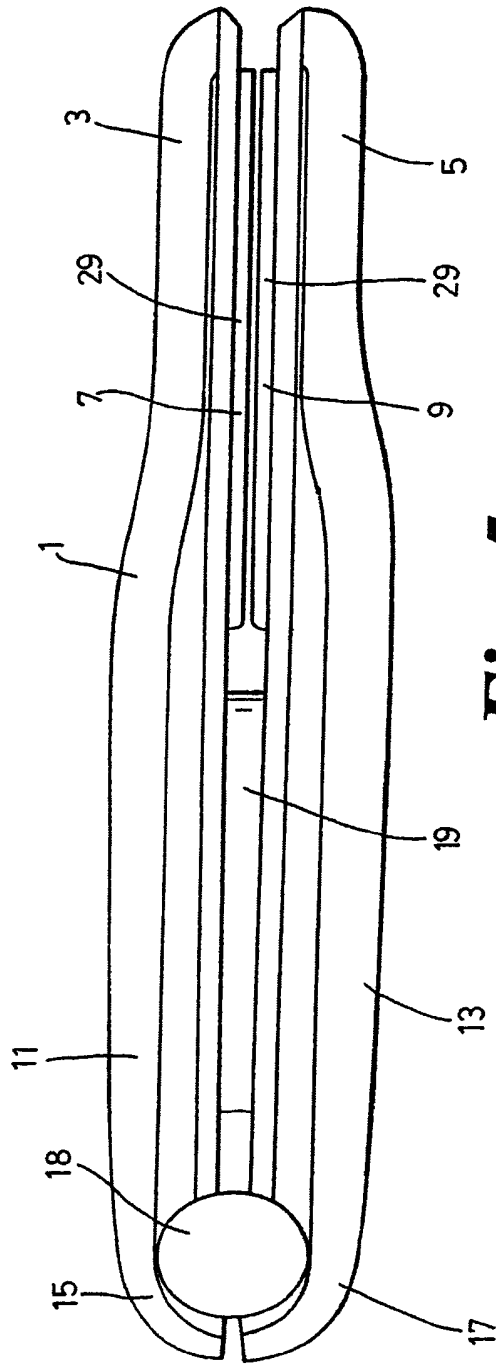


Fig. 5

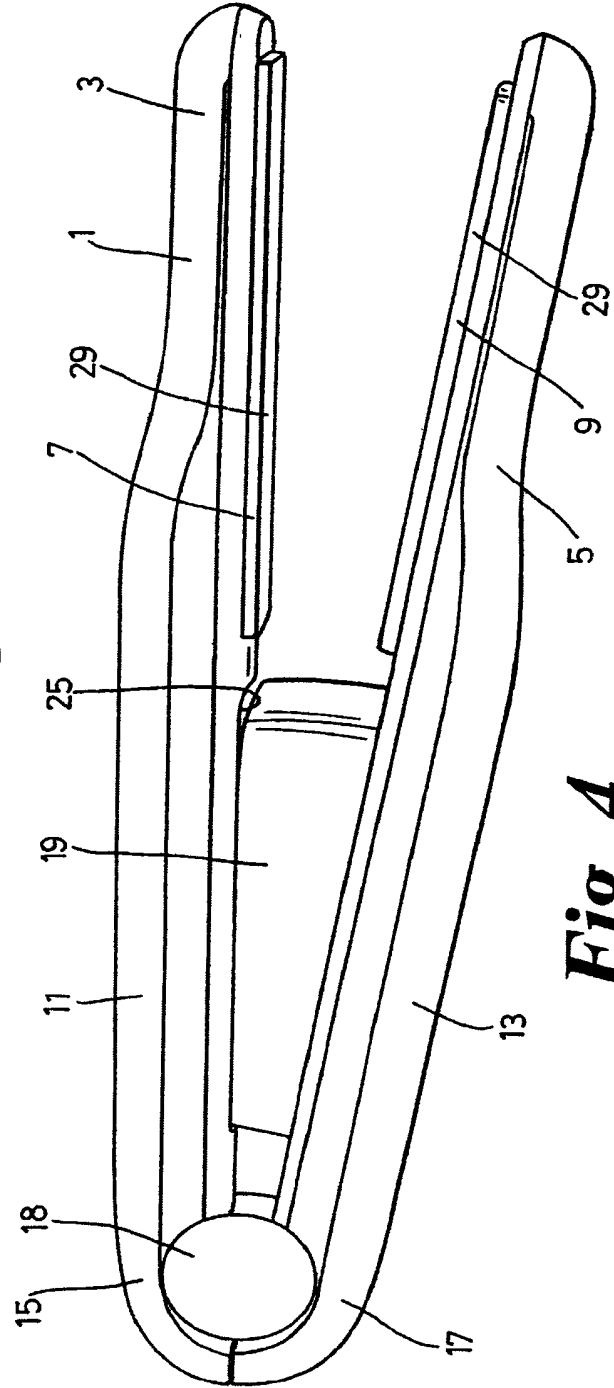


Fig. 4

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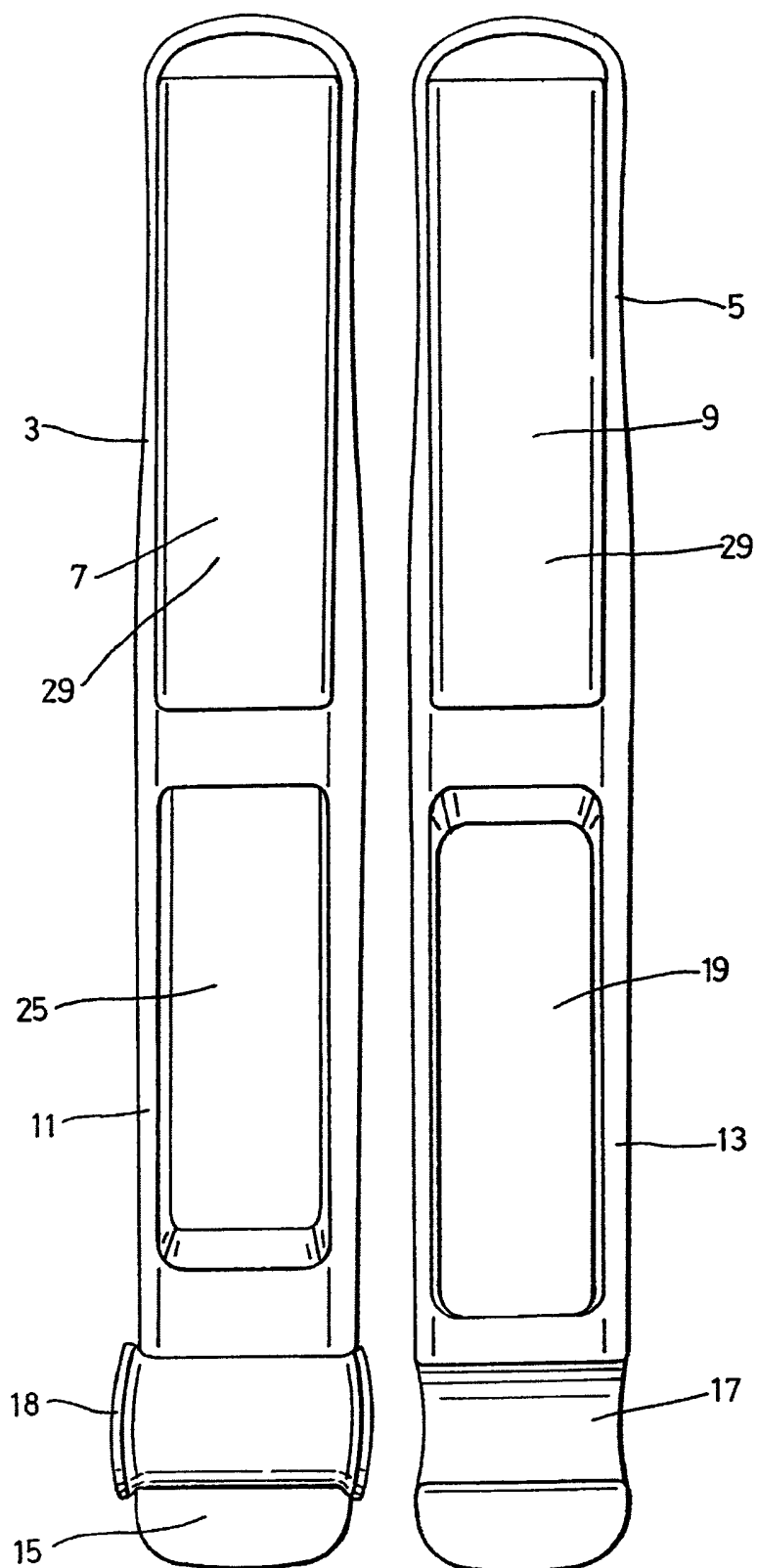


Fig. 6

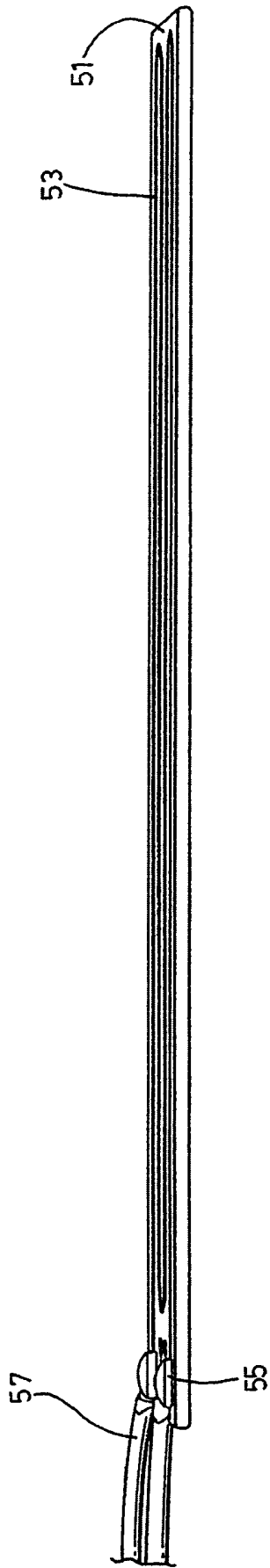


Fig. 7

4/5

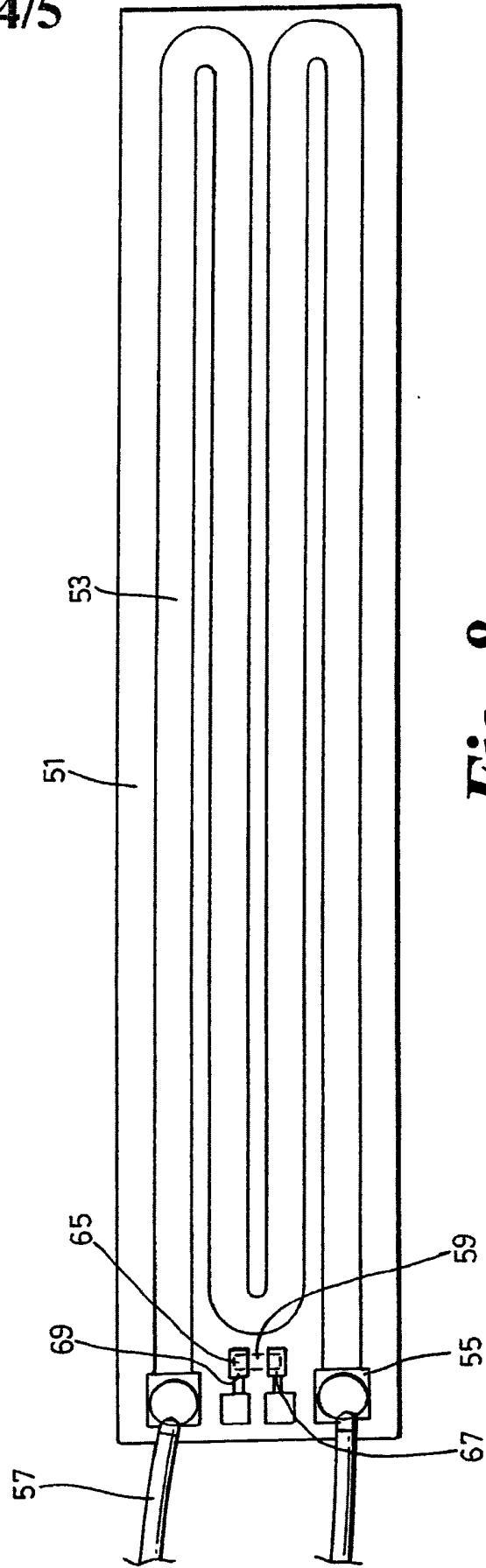


Fig. 8

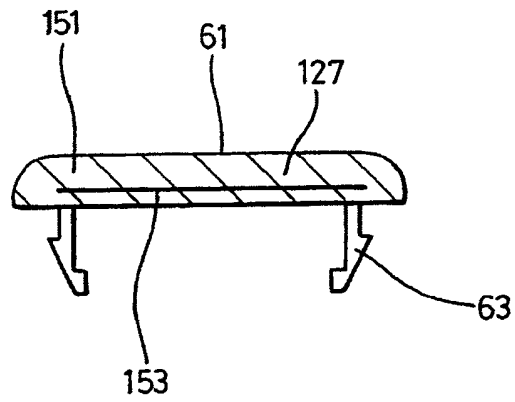


Fig. 9

IMPROVEMENTS IN AND RELATING TO HAIR IRONS

FIELD OF INVENTION

5 The present invention relates to hair irons, particularly, though not exclusively, to cordless battery powered hair irons.

BACKGROUND TO THE INVENTION

10

It is known for persons to employ hair irons to straighten their hair. There are known irons employing ceramic heating elements which comprise a layer of resistant material sandwiched between ceramic material. These irons
15 may reach operating temperature within fractions of a minute and thus may be convenient to use. However, such irons have the draw back that they are mains powered and thus a user is restricted in where they may use the irons as they require a nearby power source.

20

Accordingly, preferred embodiments of the present invention aim to address at least one disadvantage associated with known hair irons whether discussed herein or otherwise.

25

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a hair iron, comprising first and second jaws
30 at least one of which carries a heating element, the jaws being moveable such that, in use, the jaws can be moved to an open configuration and hair introduced between them and then the jaws can be moved to a closed configuration with

hair lying there between, and wherein the iron comprises connector means for connecting to a battery unit and a heating element of the iron is arranged to be powered by said battery unit.

5

Suitably, the first jaw carries a first heating element and the second jaw carries a second heating element. Suitably, the heating elements are arranged such that hair can lie between them when the jaws are in the closed
10 configuration.

Suitably, both heating elements are arranged to be powered by a single battery unit.

15 Suitably a part of each jaw removed from the heating element carried by the jaw comprises a handle portion. Suitably, the iron is arranged to be held in one hand by a user.

20 Suitably, the jaws are movably connected to one another. Suitably, the jaws are pivotally connected to one another. Suitably, the jaws are connected to one another by ends of the jaws removed from their respective heating elements.

25 Suitably, the connector means is located in one of the jaws, suitably in the handle portion thereof. Suitably, the connector means is located in an inner face of a jaw.

Suitably, the connector means comprises a receptacle for
30 receiving a battery unit and having a connector for forming an electrical connection with the battery unit. Suitably, the receptacle comprises a cavity formed in one of the jaws.

The hair iron may be arranged such that a battery unit protrudes from the inner face of a jaw in to which it is installed. Suitably, the other jaw comprises a cavity for
5 receiving a protruding part of the battery unit when the jaws are closed. Thus, the iron may be arranged to be powered by a single battery unit which may be too large to fit within one of the jaws alone. This may allow for the use of a battery unit having a greater capacity than might
10 otherwise be the case. This may also be preferable to an iron which receives a separate battery unit in each jaw as less electrical connectors may be required.

Suitably, the iron further comprises a battery unit
15 comprising a battery. The battery unit may comprise a two cell battery pack. Suitably, the battery is rechargeable. Suitably, the battery unit comprises a Li-Ion battery. The battery unit may have a recharge time of around 2 hours and a life of around 300 to 500 cycles. Suitably,
20 the battery can be recharged whilst the battery unit is installed in the iron. Suitably, the iron comprises a power input for receiving a power supply to recharge the battery. Suitably, the battery unit is arranged to provide a high current to the heating elements.

25
Suitably, the iron is arranged such that it can only operate when a manufacturer approved battery unit is installed. The iron may thus be arranged to ensure it can not operate with low quality batteries which may have a
30 dangerous performance.

Suitably, the iron comprises electronic authentication means to check that a manufacturer approved battery unit

is installed before power is supplied to the heating elements. Suitably, the authentication means is arranged to request a password from the battery unit.

- 5 The battery unit, which may be manufacturer approved, may thus comprise a battery and an electronic password storage means. Suitably, the electronic password may not be derived by reverse engineering such a battery unit. The battery unit may comprise a battery circuit which may
10 include password storage means.

Suitably, the heating elements comprise thick film heating elements.

- 15 It has generally been believed that to give the short heat up time and operating temperature required for straightening hair it is necessary to employ ceramic heating elements of the type in which a resistive material is enclosed by a ceramic sandwich. Surprisingly, the
20 present applicants have found that thick film heating elements may attain comparable operating temperatures in acceptable times with a power demand which may be particularly suited to battery powered irons.

- 25 Each thick film heating element may comprise a ceramic substrate having a film of resistive material laid thereon to form a resistive element. Such a heating element may comprise a ceramic substrate on one side only of the resistive element. Alternatively, each thick film heating
30 element may comprise a film of resistive material laid on a base to form a resistive element and which is sandwiched by a ceramic substrate. Such a heating element may comprise a base comprising carbon.

Suitably, the resistive element is substantially planar. Suitably, the resistive element has a thickness of between 5 and 20 μ m, for example around 13 μ m.

5

Suitably, the substrate is substantially planar. Suitably, the substrate has a thickness of between 0.1 and 2mm, preferably between 0.3 and 1mm, for example around 0.635mm.

10

Suitably, the substrate comprises Alumina. Suitably, the substrate comprise at least 90% by weight of Alumina, for example around 96% by weight. The substrate may thus have excellent thermal conductivity to permit heat flow and
15 assist in reaching a uniform temperature across the substrate.

Suitably, the resistive element comprises a planar screen-printed conductor track of low ohmic value which acts as a
20 resistor.

The resistive element may be constructed from a paste comprising palladium silver alloy. Suitably, the paste further comprises glass, suitably in a small amount, for
25 example less than 30% by weight.

Suitably, the heating element is formed by printing the paste onto the substrate and then drying the print and firing the paste bearing substrate.

30

Suitably, the print is fired at 700 to 1000°C, for example at around 850°C to sinter the metals to the ceramic substrate.

The actual resistance, of the resistive element, may be defined by the sheet resistivity of the paste, its final fired thickness and the geometry of the conductor track
5 itself. Suitably, the resistive element has a resistance of around 4 ohms.

The resistive element is suitably covered by a protective glaze print. Suitably, the protective print comprises a
10 carbon based print.

Suitably, the substrate bearing the glaze print is fired at 400 to 600°C, for example at around 520°C.

15 The protective print may insulate the conductive part in much the same way as solder resist on PCB's does, though conductive pads may be left uncovered so that connection wires may be soldered down using a high melting point solder.

20

Alternatively the print may be left exposed.

The hair iron may comprise a cover plate for each heating element which may be arranged to provide a contact surface
25 for engaging a users hair. A cover plate may be arranged to contact the ceramic substrate on the opposite side to that on which the resistive element is provided. Suitably, the cover plate comprises a metal cover plate. The cover plate may comprise aluminium which may be
30 extruded.

Alternatively, the ceramic substrate may be arranged to provide a contact surface for engaging a users hair. A

surface of the ceramic substrate may be polished to provide said contact surface which may be substantially smooth. A resistive element may be printed on one side of the substrate and the side of the substrate opposed to the resistive element may be polished to provide said contact surface which may be substantially smooth.

Alternatively, the heating elements may comprise a resistive element embedded within a ceramic substrate.

10 The resistive element may comprise an element having a base, suitably a carbon base. The heating elements may comprise a film of resistive material laid on to the base to form a resistive element. The ceramic substrate may comprise Alumina. A side of the ceramic substrate may be

15 polished to provide a contact surface for engaging a users hair such that the heating elements may act as contact plates. The iron may thus not require cover plates for the heating elements.

20 A heating element comprising an embedded resistive element may be formed by first laying a paste onto a base, suitably a carbon base, to form a resistive element. The heating element may then be produced by forming a first layer of a ceramic substrate in a press mould, laying the

25 resistive element onto the substrate, laying a second layer of ceramic substrate over the resistive element and pressing the layers together. Once pressed the layers may be baked in an oven, suitably for around 2 weeks at around 1500°C.

30

Suitably, the heating elements are arranged to reach operating temperature in less than 3 minutes, for example in around 2 minutes. Suitably, the heating elements are

arranged to have a temperature of around 150°C to 200°C in use, for example around 170°C to 180°C.

5 The iron may comprise protection means arranged to break the power supply to a heating element in the event of overheating of the element. The protection means may be arranged to break the power supply to both heating elements in the event of one of said elements overheating. The protection means may comprise a thermally fused
10 connector arranged to break the power supply to a heating element in the event of overheating.

Suitably, the protection means is located adjacent a heating element. Suitably, a thermally fused connector is
15 located adjacent a heating element. Suitably, said thermally fused connector is in communication with a protection circuit arranged to cause the power supply to the heating element to be broken. Suitably, the thermally fused connector comprises a solder bridge.

20

Suitably the protection means is arranged to break the power supply if the temperature of the protection means exceeds temperatures of 220°C.

25 Suitably, the jaws are biased towards their open configuration. The jaws may be spring biased to their open configuration.

Suitably, the iron comprises a control circuit arranged to
30 control the supply of power to the heating elements whilst the iron is turned on.

Suitably, the control circuit is arranged to supply power in a pulsed width modulated manner to control the temperature.

- 5 Suitably, the hair iron comprises a microcontroller to maintain the temperature of the heating elements within a required operating range.

10 Suitably, the hair iron is arranged to provide visual and/or audio signals relating to its temperature status and/or battery condition.

15 Suitably, the iron comprises locking means arranged to allow the jaws to be locked in a closed position when the iron is not in use.

Suitably, the locking means is arranged to secure the jaws in a closed configuration when the iron is turned off and the jaws are moved to the closed configuration. This may
20 substantially prevent the heating elements being contacted by persons or objects whilst they are cooling.

Suitably, the locking means is arranged so as to allow the jaws to move between open and closed configurations when
25 the iron is turned on.

Suitably, the locking means comprises a power switch for. Suitably, the power switch is slideable between on and off positions. Suitably, a switch spring provides resistance
30 to movement of the switch such that the risk of accidental movement of the switch is minimised.

Suitably, the iron is arranged such that when a power switch is moved to an off position and the jaws are moved to a closed configuration the jaws are locked in said closed configuration.

5

Suitably, the iron is arranged such that when the power switch is moved to an on position the jaws are unlocked and can move to an open configuration.

10 Suitably, the locking means comprises a locking member moveable between a release position and a locking position.

Suitably, the locking member is moveable between said
15 release and locking positions by a power switch. Suitably, the power switch and locking member are mechanically coupled.

Suitably, the locking means comprises a locking member
20 mounted within one jaw and arranged to secure the other jaw in a substantially fixed position relative thereto with the jaws closed. Suitably, the locking member is arranged to engage a retaining means to secure the jaws in a closed configuration. The locking member may be mounted
25 to one jaw and a battery unit mounted to the other jaw may comprise the retaining means. Alternatively, the locking member may be mounted to one jaw and the retaining means may comprise a part of the other jaw.

30 Suitably, when in the release position the locking member mounted to one jaw can not engage the retaining means to lock the jaws. The jaws may thus be freely opened and closed.

Suitably, when in the locking position the locking member can engage the retaining means when the jaws are in the closed configuration to lock the jaws.

5

Suitably, when the locking member is in the locking position the jaws can be moved from an open configuration to a closed configuration and are then automatically locked in the closed configuration.

10

Suitably, the locking member comprises a catch. Suitably, the catch is resiliently deformable between engagement and non-engagement positions.

15 Suitably, the catch is biased towards the engagement position. Suitably, the catch comprises a spring.

Suitably, when the locking member is in a closed position the catch can be displaced from an engagement position as
20 the jaws are moved to the closed configuration, in order to allow the jaws to close, and can then return to the engagement position in order to lock the jaws together.

The locking member may consist of a catch and the
25 engagement and non- engagement positions of the catch may correspond to the locking and release positions of the locking member respectively.

According to a second aspect of the present invention
30 there is provided a hair iron, comprising first and second jaws at least one of which carries a heating element, the jaws being moveable such that, in use, the jaws can be moved to an open configuration and hair introduced between

them and then the jaws can be moved to a closed configuration with hair lying there between, and wherein the iron comprises a protection means located adjacent a heating element and arranged to break a power supply to the heating element in the event of overheating of the heating element.

Suitably, the first jaw carries a first heating element and the second jaw carries a second heating element. Suitably, the heating elements are arranged such that hair can lie between them when the jaws are in the closed configuration.

Suitably, the protection means is arranged to break the power supply to either or both, preferably to both, heating elements in the event of overheating.

Suitably, the protection means comprises a thermally fused connector.

20

The hair iron may be mains powered. Alternatively, the hair iron may be battery powered.

The hair iron may comprise any feature as described in relation to the first aspect.

25

According to a third aspect of the present invention there is provided a hair iron, comprising first and second jaws at least one of which carries a heating element, the jaws being moveable such that, in use, the jaws can be moved to an open configuration and hair introduced between them and then the jaws can be moved to a closed configuration with hair lying there between, and wherein the iron comprises

30

locking means arranged to allow the jaws to be locked in a closed position when the iron is not in use.

5 Suitably, the first jaw carries a first heating element and the second jaw carries a second heating element. Suitably, the heating elements are arranged such that hair can lie between them when the jaws are in the closed configuration.

10 The hair iron may be mains powered. Alternatively, the hair iron may be battery powered.

The hair iron may comprise any feature as described in relation to the first aspect.

15

According to a fourth aspect of the present invention there is provided a hair iron, comprising first and second jaws at least one of which carries a heating element, the jaws being moveable such that, in use, the jaws can be
20 moved to an open configuration and hair introduced between them and then the jaws can be moved to a closed configuration with hair lying there between, and wherein the iron comprises a thick film heating element.

25 Suitably, the first jaw carries a first heating element and the second jaw carries a second heating element. Suitably, the heating elements are arranged such that hair can lie between them when the jaws are in the closed configuration.

30

The hair iron may be mains powered. Alternatively, the hair iron may be battery powered.

The hair iron may comprise any feature as described in relation to the first aspect.

BRIEF DESCRIPTION OF THE DRAWINGS

5

Figure 1 is a side view in partial cross section of a hair iron in a closed configuration;

Figure 2 is a side view in partial cross section of a hair
10 iron in an open configuration;

Figure 3 is a plan view of a hair iron;

Figure 4 is a perspective view of a hair iron in an open
15 configuration;

Figure 5 is a perspective view of a hair iron in a closed configuration;

20 Figure 6 is a perspective view of separated jaws of a hair iron;

Figure 7 is a perspective view of a heating element;

25 Figure 8 is an alternate perspective view of a heating element and;

Figure 9 is a cross-section of an alternative embodiment of a heating element.

30

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As best illustrated by Figures 1 and 2 a hair iron 1 comprises first and second jaws 3, 5 carrying first and second heating elements 7, 9 respectively.

The jaws 3, 5 further comprise first and second handle portions 11, 13 respectively towards ends 15, 17 removed from the heating elements 7, 9.

10

The jaws 3, 5 are pivotally connected adjacent their ends 15, 17 removed from the heating element by pivot 18. The jaws 3, 5 may thus be moved between open and closed configurations. A spring (not shown) biases the jaws 3, 5 to an open configuration.

The hair iron 1 further comprises connecting means for connecting to a battery unit 19 which powers the heating elements 7, 9. The connecting means comprises a receptacle 21 located in the handle portion 13 of second jaw 5 for receiving the battery unit 19 and a connector (not shown) for forming an electrical connection therewith.

The battery unit 19 projects beyond an inner face 23 of the second jaw 15. The first jaw 3 comprises a cavity 25 for receiving the protruding part of battery unit 19 when the jaws 3, 5 are in a closed configuration.

The hair iron 1 comprises battery authentication means (not shown) for requesting a password from the battery unit to ensure the battery unit is approved and thus safe before supplying power to the heating elements.

The battery unit 19 thus comprises a battery and password storage means.

- 5 The hair iron 1 also includes a power input port (not shown) located in the end 17 of the second jaw 5 to allow power to be supplied to recharge a battery contained in a battery unit 19 installed into the hair iron.
- 10 The hair iron 1 further comprises a control circuit (not shown) for controlling the supply of power to the heating elements. The control circuit is arranged to provide efficient operation of the heating elements.
- 15 The hair iron additionally comprises protection means comprising a thermally fused connector 59 located adjacent a heating element of each jaw. The connector 59 comprises a solder bridge 65 (shown in dotted outline) linking connectors 67, 69. The connectors 67, 69 are connected to
- 20 a protection circuit (not shown). The solder bridge 65 is arranged to melt and break the protection circuit, which in turn causes the power supply to a heating element to be broken, if the temperature of the thermally fused connector 59 exceeds 220°C. Thus, in the event of
- 25 overheating of the iron the thermal fuse may minimise the fire risk.

The heating elements comprise thick film heating elements 27, best illustrated by Figures 7 and 8. The hair iron

30 further comprises extruded aluminium cover plates 29 covering the thick film heating elements 27 to provide the heating elements 7, 9. Each thick film heating element 27 comprises a substrate 51 bearing a resistive element 53.

The substrate 51 comprises a 96% Alumina substrate measuring 80mm by 15mm by 0.635mm. The substrate itself has excellent thermal conductivity to permit heat flow and
5 assist in reaching a uniform temperature across the substrate.

The resistive element 53 which provides the heat output comprises a planar screen-printed conductor track of low
10 ohmic value which acts as a resistor. The resistive element 53 is constructed from a paste containing palladium silver alloy and a small amount of glass. The actual resistance, nominally 4 ohms, is defined by the sheet resistivity of the paste, its final fired thickness
15 and the geometry of the conductor track itself.

The heating element 27 is formed by printing the paste onto the substrate after which the print is dried and then fired at 850 °C to sinter the metals to the ceramic
20 substrate with a thickness of approximately 13µm. The planar resistive element is then covered by a protective glaze print that is fired at 520 °C, this print insulates the conductive part in much the same way as solder resist on PCB's does. Conductive pads 55 are left uncovered in
25 order to allow connection wires 57 to be soldered down using a high melting point solder.

Figure 9 illustrates an alternative embodiment of a heating element 127 which comprises a substrate 151 having
30 a resistive element 153 embedded therein. The resistive element 153 is located around 1mm from an underside of the heating element and around 2mm from an upperside thereof.

The heating element 127 is further provided with clips 63 to allow it to be connected to the iron.

5 An iron (not shown) employing such heating elements 127 does not comprise cover plates. Instead, a surface 61 of the substrate 151 is polished to provide a smooth contact surface for contacting a users hair. In use, the heating elements 127 thus act as a contact plates.

10 The heating element 127 is produced by forming a first layer of ceramic substrate in a press mould, laying a resistive element 127 comprising a resistive track printed onto a carbon base, onto the substrate and laying a second layer of ceramic substrate over the resistive element and
15 firmly pressing the layers together. Once the layers are pressed together they are baked in a gas oven in a cycle lasting for up to two weeks to go from cold and return to cold. Lead wires are then soldered to terminals attached to the track of the resistive element.

20

The hair iron comprises a power (on/off) switch 31. The switch is moveable between on and off positions and a switch spring 33 provides resistance to this movement to avoid the switch being accidentally knocked. The switch
25 31 is illuminated and arranged to flash when the iron is at operating temperature.

Coupled to the on-off switch is a locking member 35 which together with the power switch 31 provides locking means.
30 The locking member 35 is mounted to the first jaw 3 and moveable between a locking position (Figure 1) and a release position (Figure 2).

When in the release position the locking member 35 is arranged so as not to engage with any part of the second jaw 5 or battery unit 19 mounted thereto such that the jaws 3,5 can open and close freely. In use, when the power switch 31 is moved to the on position the locking member 35 is moved to the release position.

When in the locking position the locking member 35 is arranged to engage with retaining means formed in the battery unit 19 mounted to the second jaw 5 when the jaws are closed such that the jaws 3, 5 are held closed.

In use, when the power switch 31 is moved to the off position the locking member 35 moves to the locking position.

The locking member 35 consists of a resiliently deformable catch 36 comprising a spring biased towards an engagement position in which, when the locking member is in a locking position and the jaws are closed, it engages a recess 37 in the battery unit mounted to the second jaw 5 to lock the jaws 3, 5 together.

In the illustrated embodiment the power switch 31 comprises a leg 39 for engaging a leg 41 of the catch 36. Leg 39 restricts movement of the catch 35 towards the recess 37 of the battery unit but not away from it. Thus, as the locking member 35 consists of the catch 36 the engagement position of the catch corresponds to the locking position of the locking member and a non-engagement position to the open position of the locking member.

In use, if the iron 1 is turned off with the jaws open the locking member 35 can deform away from the engagement position and to the non-engagement position as the jaws 3, 5 are closed so as not to prevent the jaws 3, 5 being closed. The switch 31 remains in the off position when the catch moves to the non-engagement position during this operation. Once the jaws 3, 5 are closed the locking member 3, 5 returns to the engagement position thus locking the jaws 3, 5 closed.

10

It will be appreciated that a hair iron according to preferred embodiments of the present invention may advantageously allow a user to straighten their hair even when there is no convenient power source and may provide a number of safety features to protect the user.

Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

30

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same,

equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

5

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any
10 accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS:

1. A hair iron, comprising first and second jaws at least one of which carries a heating element, the jaws being
5 moveable such that, in use, the jaws can be moved to an open configuration and hair introduced between them and then the jaws can be moved to a closed configuration with hair lying there between, and wherein the iron comprises locking means arranged to
10 allow the jaws to be locked in a closed position when the iron is not in use.
2. A hair iron, comprising first and second jaws at least one of which carries a heating element, the jaws being
15 moveable such that, in use, the jaws can be moved to an open configuration and hair introduced between them and then the jaws can be moved to a closed configuration with hair lying there between, and wherein the iron comprises connector means for
20 connecting to a battery unit and a heating element of the iron is arranged to be powered by said battery unit.
3. An iron according to claim 2, wherein the connector
25 means comprises a receptacle for receiving a battery unit and having a connector for forming an electrical connection with the battery unit.
4. An iron according to claim 3, wherein the receptacle
30 comprises a cavity formed in one of the jaws and the other jaw comprises a cavity for receiving a protruding part of the battery unit when the jaws are closed.

5. An iron according to any of claims 2 or 4, wherein the iron further comprises a battery unit comprising a battery.
- 5 6. An iron according to any of claims 2 to 5, wherein the iron is arranged such that it can only operate when a manufacturer approved battery unit is installed.
- 10 7. An iron according to claim 6, wherein the iron comprises electronic authentication means to check that a manufacturer approved battery unit is installed before power is supplied to the heating elements.
- 15 8. A hair iron according to any claims 2 to 7, wherein a heating element comprises a thick film element.
9. A hair iron, comprising first and second jaws at least one of which carries a heating element, the jaws being
20 moveable such that, in use, the jaws can be moved to an open configuration and hair introduced between them and then the jaws can be moved to a closed configuration with hair lying there between, and wherein the iron comprises a thick film heating
25 element.
10. A hair iron according to claim 8 or 9, wherein each thick film heating element comprises a ceramic substrate having a film of resistive material laid
30 thereon to form a resistive element which comprises a ceramic substrate on one side only of the resistive element.

11. A hair iron according to claim 8 or 9, wherein each
thick film heating element comprises a film of
resistive material laid on a base to form a resistive
element and which is sandwiched by a ceramic
5 substrate.
12. A hair iron according to any of claims 2 to 11,
wherein the hair iron comprises a cover plate for each
heating element which is arranged to provide a contact
10 surface for engaging a users hair.
13. A hair iron according to claim 10 or 11, wherein the
ceramic substrate is arranged to provide a contact
surface for engaging a users hair.
15
14. A hair iron according to any of claims 2 to 13,
wherein the iron comprises protection means arranged
to break the power supply to a heating element in the
event of overheating of the element.
20
15. A hair iron according to claim 14, wherein the
protection means is located adjacent a heating
element.
- 25 16. A hair iron, comprising first and second jaws at least
one of which carries a heating element, the jaws being
moveable such that, in use, the jaws can be moved to
an open configuration and hair introduced between them
and then the jaws can be moved to a closed
30 configuration with hair lying there between, and
wherein the iron comprises a protection means located
adjacent a heating element and arranged to break a

power supply to the heating element in the event of overheating of the heating element.

17. A hair iron according to any of claims 14 to 16,
5 wherein the protection means comprises a thermally fused connector arranged to break the power supply to a heating element in the event of overheating.
18. A hair iron according to any preceding claim, wherein
10 the iron comprises locking means arranged to allow the jaws to be locked in a closed position when the iron is not in use.
19. A hair iron according to claim 1 or 18, wherein the
15 locking means comprises a locking member moveable between a release position and a locking position by a power switch.
20. A hair iron according to claim 19, wherein when the
20 locking member is in the locking position the jaws can be moved from an open configuration to a closed configuration and are then automatically locked in the closed configuration.
- 25 21. A hair iron substantially as herein described with reference to any of the accompanying drawings.

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Examiner: Mr Mike Leaning

Claims searched: 1&18-20

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Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1&18	GB2142817 A (CONAIR CORP.) Please see the whole document, especially figure 3 noting the latch 24 and heated barrel 3.
X,P	1&18	EP1417905 A1 (WAHL CLIPPER CORP.) Please see the figures and paragraphs 7,13 and 14. A styling iron with a locking latch 50.
X	1&18	EP1112701 A1 (PHILD CO., LTD.) Please see the figures an paragraph 21, noting the heated surface and the locking latch [not shown].
X	1&18	US6070596 A (ALTAMORE) Please see the figures and column 4 lines 8-35.
X	1&18	US5223694 A (TSUJI et al.) Please see the figures and column 2 lines 19-27 and column 4 line 54 to column 5 line 4.
X	1&18	US4739151 A (SMAL) Please see the whole document, especially the 2nd paragraph of the 'summary of the invention' and column 2 lines 6-13.
X	1&18	US4565916 A (TSUJI et al.) Please see the figures noting the locking member 38a.
A,P	-	GB2405584 A (ADVANCED CERAMICS LTD.) Please see figure 6. A battery-powered styling iron.
A	-	ES2112149 A1 (MEGATOM) Please see the translated abstract. An apparent 'thick film' heating element suitable for use in a hair iron.
A	-	WO03/056971 A1 (AMERICAN DESIGN GROUP) Please see paragraph 26. A hair styling device with a temperature regulator.
A	-	KR20030123 A (CHONG) Please see the figures and the translated abstract. A hair styling device with a sensor to prevent overheating.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

A4V

Worldwide search of patent documents classified in the following areas of the IPC

A45D

The following online and other databases have been used in the preparation of this search report

Online: WPI, EPODOC.

International Classification:

Subclass	Subgroup	Valid From
A45D	0001/04	01/01/2006
A45D	0001/06	01/01/2006
A45D	0001/28	01/01/2006