A HAIR STYLING APPLIANCE

The present invention relates to a hair styling appliance. Heated hair styling appliances are designed to use the action of heat and mechanical means or airflow to form hair into a desired shape or style.

A hair straightener utilises heated plates attached to pivoted arms which can be held, by a user, in a closed position with a tress of hair clamped between the heated plates. The tress of hair can be styled into a changed shape once the hair is heated above a transition temperature.

Both corded and cordless hair styling appliances are known, including cordless hair straighteners having a battery pack which can be recharged by the user. A typical cordless hair straightener may have a battery pack disposed in one arm, thereby creating an imbalance in the weight distribution of the hair straightener. Styling hair with hair straighteners requires a repetitive user action, and an imbalance in the weight distribution of the appliance can lead to discomfort in the hand of the user. It is therefore desirable to provide an improved hair styling apparatus.

A first ~~aspect~~example of the present ~~invention~~disclosure provides a hair styling apparatus comprising a first arm and a second arm coupled together at a hinge end thereof to allow the first arm and the second arm to be moveable between a closed position, in which a facing side of the first arm and a facing side of the second arm are adjacent, and an open position, in which the facing side of the first arm and the facing side of the second arm are spaced apart, a central pack disposed between the first arm and the second arm and coupled to the hair styling apparatus at the hinge end; and a biasing means adapted to support the central pack symmetrically between the first arm and the second arm.

In one aspect, the present disclosure refers to a hair styling apparatus comprising;
a first arm and a second arm coupled together at a hinge end thereof to allow the first arm and the second arm to be moveable between a closed position, in which a facing side of the first arm and a facing side of the second arm are adjacent, and an open position, in which the facing side of the first arm and the facing side of the second arm are spaced apart;
a central pack disposed between the first arm and the second arm and coupled to the hair styling apparatus at the hinge end, wherein the central pack comprises at least one of a power pack and a motor; and
at least two biasing means adapted to support the central pack symmetrically between the first arm and the second arm.

Such a symmetrical, balanced arrangement improves the ergonomics of the hair styling apparatus.

In use, an air gap is formed between the first arm and the central pack and also between the second arm and the central pack. Advantageously, each air gap forms thermal insulation between the arms and the central pack, thereby minimizing heat transfer between the user's hands, the central pack and heating means in the arms.

Preferably, the central pack is a power pack, and the power pack comprises at least one cell.

In a preferred ~~embodiment~~example, the central pack comprises a motor and a fan.

The hair styling apparatus may further comprise a cover connected between the first arm and the second arm, wherein the cover is adapted to protect the central pack.

Preferably, the biasing means comprises at least one spring. The at least one spring preferably comprises a first spring coupled between the first arm and the central pack, and a second spring coupled between the second arm and the central pack, wherein the first spring and the second spring are symmetrically disposed with respect to a longitudinal central axis of the hair styling apparatus. Further, the first spring and the second spring may be coil springs or leaf springs, and may be integrally formed from a metal arm casing structure.

In a preferred ~~embodiment~~example, the at least one spring comprises a torsion spring coupled to a coil spring, wherein the torsion spring may comprise a pivot and a first leg and a second leg attached to the first arm and the second arm, respectively. Further, the coil spring comprises a first end attached to the pivot via a lug, and a second end attached to the central pack.

A simple coil spring has a spring force which increases as the spring is progressively compressed. Advantageously, this arrangement of the torsion spring and the coil spring provides a progressively lower spring force as the styling apparatus arms are moved into

the closed position, whilst providing a greater spring force when the styling apparatus arms are open.

Preferably, the hair styling apparatus comprises a cover connected between the first arm and the second arm, wherein the cover is adapted to protect the central pack. More preferably, the cover is attached to the torsion spring, thereby enabling the cover to retract when the first arm and the second arm are in the closed position.

In a preferred ~~embodiment~~example the first arm and the second arm are symmetrical in structure, and are substantially identical in weight, and further the central pack is substantially symmetrical in structure about the longitudinal central axis of the hair styling apparatus.

A second ~~aspect~~example of the present ~~invention~~disclosure provides a hair styling apparatus comprising a first arm and a second arm coupled together at a hinge end thereof to allow the first arm and the second arm to be moveable between a closed position, in which a facing side of the first arm and a facing side of the second arm are adjacent, and an open position, in which the facing side of the first arm and the facing side of the second arm are spaced apart, a power pack disposed between the first arm and the second arm and coupled to the hair styling apparatus at the hinge end, wherein the power pack comprises a plurality of cells.

Preferably, the battery pack comprises four cells, wherein the four cells are interconnected and comprise four cells connected in series, or two cells connected in parallel and two cells connected in series.

In a preferred ~~embodiment~~example, each cell is a secondary cell. Each cell may be an elongate lithium-ion cell, having an electrical contact at each end. Preferably, each electrical contact is connected to a battery tab. Preferably, the battery tab comprises a yield line.

In a preferred ~~embodiment~~example, the battery tab connects two adjacent electrical contacts and has a folded arrangement, such that the battery tab is folded through 180 degrees. Further, the battery tab may have a yield line and a slot extending from an edge of the battery tab such that the slot traverses the yield line and divides in two parts at that junction, thereby forming a Y-shaped slot.

It is preferred that each electrical contact is connected to a battery tab by resistance welding. Preferably, the power pack comprises a sleeve adapted to receive a frame, such that the frame supports the four cells. Advantageously, the sleeve minimizes ingress of debris in proximity to the cells and the associated interconnections. Also, the sleeve may function to protect the cells, interconnections and PCBs if the hair styling apparatus were to suffer an impact. Further, the sleeve provides structural rigidity to the hair styling apparatus.

A third ~~aspect~~example of the present ~~invention~~disclosure provides a battery tab for connection to a cell contact, the battery tab comprising a slot, wherein a first portion of the slot extends in a straight line from an edge of the battery tab, and then divides in two parts, thereby forming a Y-shaped slot. Advantageously, such a Y-shaped slot avoids a major part of the slot being coterminous with a battery tab yield line.

Preferably, the first portion extends midway between a first pair of projections and a second pair of projections. The projections may be welded to the cell terminal by resistance welding.

A fourth ~~aspect~~example of the present ~~invention~~disclosure provides a hair styling apparatus comprising a first arm and a second arm coupled together at a hinge end thereof to allow the first arm and the second arm to be moveable between a closed position, in which a facing side of the first arm and a facing side of the second arm are adjacent, and an open position, in which the facing side of the first arm and the facing side of the second arm are spaced apart, a power pack disposed between the first arm and the second arm and coupled to the hair styling apparatus at the hinge end, and a wire harness for coupling the power

pack to a heater arrangement, wherein the wire harness has a first portion extending within the power pack and a second portion extending within the first or second arm.

The term “harness” refers to an arrangement of wires once they are assembled within a product.

Preferably, the wire harness has a point of inflection between the first portion and the second portion, and the point of inflection is in proximity to the hinge. It is preferred that the first portion of the wire harness is coupled to the power pack. Preferably, the second portion of the wire harness is coupled to the heater arrangement.

In a preferred ~~embodiment~~example, the first and second portions of the wire harness are disposed parallel to one another when the first and second arms are in a closed position. Further, the first and second portions of the wire harness may be disposed at an angle to one another when the first and second arms are in an open position. Preferably, the power pack is adapted to receive the first portion of the wire harness, and an inner surface of at least one of the first and second arms is adapted to receive the second portion the wire harness.

In a preferred ~~embodiment~~example, the heater arrangement is disposed within at least one of the first and second arms. Each of the first and second arms may comprise one wire harness or each of the first and second arms may comprise two wire harnesses. Preferably, each of the first and second arms carry the second portion of a wire harness carrying a positive charge and the second portion of a wire harness carrying a negative charge.

The four power harnesses are routed indirectly between the power source and the heater assembly. This indirect routing is achieved via articulating each harness at the hinge end of the hair styling apparatus. Advantageously, this articulation of the harnesses minimises wire fatigue and avoids any disconnect in the power route between the power source and the heaters.

A fifth ~~aspect~~example of the present ~~invention~~disclosure provides a hair styling apparatus comprising a first arm and a second arm coupled together at a hinge end thereof to allow the first arm and the second arm to be moveable between a closed position, in which a facing side of the first arm and a facing side of the second arm are adjacent, and an open position, in which the facing side of the first arm and the facing side of the second arm are spaced apart, a central pack disposed between the first arm and the second arm and coupled to the hair styling apparatus at the hinge end, and a locking means disposed within the central pack; wherein the locking means comprises an elongate lock arm disposed lengthwise within the central pack.

Preferably, the locking means further comprises a lock bar disposed symmetrically at a first end of the lock arm. Preferably, the lock arm together with the lock bar has a T-shape form. It is preferred that the locking means is adapted to move relative to the central pack and between a first position and a second position; and wherein a user interface lock button on an external surface of the central pack is connected to the locking means and is adapted to move the locking means between the first position and the second position.

Preferably, the locking means further comprises an actuator movably attached to the central pack, wherein the actuator is connected to a biasing means and the actuator is biased in an extended position.

The actuator may be adapted to be moved into a contracted position when at least one of the first arm and the second arm is in a closed position. Preferably, the actuator is pushed into the contracted position by a protrusion from at least one of the first arm and the second arm. It is preferred that the locking means is movable between the first position and the second position when the actuator is in the contracted position, and that the locking means is immovable when the actuator is in the extended position.

Preferably, the biasing means is a spring, and more preferably, a coil spring.

A catch feature is integral to an inner surface of each of the first arm and the second arm. The catch features are formed to engage with the lock bar. Therefore, when the lock bar can be moved into the lock position, then the first and second arms are simultaneously and symmetrically locked to the central pack.

In a preferred ~~embodiment~~example, the central pack is a power pack. The central pack may comprise at least one frame and said frame is adapted to support the locking means and at least one cell and a user interface PCB. It is preferred that the lock arm is connected to the frame by a torsion spring.

In order that the present ~~invention~~disclosure may be more readily understood, an ~~embodiment~~example of the ~~invention~~disclosure will now be described, by way of example, and with reference to the accompanying drawings, in which:

Figure 1 is a side view of a hair styling apparatus according to the present invention;

Figure 2 is a side view of the hair styling apparatus shown in Figure 1 with the arms in an open position;

Figure 3 is a perspective view of a battery pack sleeve of the hair styling apparatus;

Figure 4 is an exploded view of an arrangement of cells and connectors;

Figure 5a is a side view of a connection between two of the cells shown in Figure 4;

Figure 5b illustrates a first tab layout;

Figure 5c illustrates a second tab layout;

Figure 5d illustrates a third tab layout;

CLAIMS

1. A hair styling apparatus comprising;

a first arm and a second arm coupled together at a hinge end thereof to allow the first arm and the second arm to be moveable between a closed position, in which a facing side of the first arm and a facing side of the second arm are adjacent, and an open position, in which the facing side of the first arm and the facing side of the second arm are spaced apart;

a central pack disposed between the first arm and the second arm and coupled to the hair styling apparatus at the hinge end, wherein the central pack comprises at least one of a power pack and a motor; and

~~a~~ at least two biasing means adapted to support the central pack symmetrically between the first arm and the second arm.

2. A hair styling apparatus as claimed in claim 1, wherein the central pack is a power pack.

3. A hair styling apparatus as claimed in claim 2 wherein the power pack comprises at least one cell.

4. A hair styling apparatus as claimed in claim 1, wherein the central pack comprises a motor.

5. A hair styling apparatus as claimed in claim 4, wherein the central pack comprises a fan.

6. A hair styling apparatus as claimed in claim 1, comprising a cover connected between the first arm and the second arm, wherein the cover is adapted to protect the central pack.

7. A hair styling apparatus as claimed in any preceding claim, wherein the at least two biasing means comprises at least ~~one~~ two springs.

8. A hair styling apparatus as claimed in claim 7, wherein the at least ~~one~~ two springs comprises a first spring coupled between the first arm and the central pack, and a second spring coupled between the second arm and the central pack, wherein the first spring and the second spring are symmetrically disposed with respect to a longitudinal central axis of the hair styling apparatus.

9. A hair styling apparatus as claimed in claim 8, wherein the first spring and the second spring are coil springs.

10. A hair styling apparatus as claimed in claim 8, wherein the first spring and the second spring are leaf springs.

11. A hair styling apparatus as claimed in claim 10, wherein the first spring and the second spring are integrally formed from a metal arm casing structure.

12. A hair styling apparatus as claimed in claim 7, wherein ~~the~~ at least one spring comprises a torsion spring coupled to a coil spring.

13. A hair styling apparatus as claimed in claim ~~10~~12, wherein the torsion spring comprises;
a pivot and,
a first leg and a second leg attached to the first arm and the second arm, respectively.

14. A hair styling apparatus as claimed in claim ~~11~~13, wherein the coil spring comprises a first end attached to the pivot via a lug, and a second end attached to the central pack.

15. A hair styling apparatus as claimed in claim ~~13 or claim 14~~6, wherein the cover comprises a folding ~~comprising a~~ cover connected between the first arm and the second arm~~, wherein the cover is adapted to protect the central pack~~.

16. A hair styling apparatus as claimed in any of claims 6 to 15, wherein the cover is attached to the torsion spring, thereby enabling the cover to retract when the first arm and the second arm are in the closed position.

17. A hair styling apparatus as claimed in any preceding claim, wherein the first arm and the second arm are symmetrical in structure, and are substantially identical in weight.

18. A hair styling apparatus as claimed in any preceding claim, wherein the central pack is substantially symmetrical in structure about the longitudinal central axis of the hair styling apparatus.