Claims

1. A hair dryer comprising:

a housing;

a rechargeable battery pack including at least one lithium-ion battery cell, the rechargeable battery pack disposed within the housing;

each battery cell having a discharge path;

each battery cell having a beginning of life recoverable charge capacity and an in-use recoverable charge capacity,

each battery cell further having a state of charge, the state of charge measured as a percentage of recoverable charge capacity;

each battery cell further having a state of health, the state of health determined by comparing the in-use recoverable charge capacity to the beginning of life recoverable charge capacity;

a plurality of temperature sensors that sense temperature for each battery cell;

a plurality of voltage sensors that measure voltage for each battery cell;

the battery pack electrically connected to a battery management and control module;

at least one switch to control operation of the hair dryer;

a heating assembly disposed within the housing, the heating assembly including a fan attached to a motor, and at least one heating element, wherein the motor turns the fan, which draws ambient air into an inlet and expels air through an outlet;

the heating element positioned such that air passing through the heating assembly may be heated to a temperature greater than the ambient air temperature;

the battery management and control module electrically connected to the at least one fan and the at least one heating element, wherein the battery management and control module adjusts an electrical current delivered from the battery pack to the fan and heating element to optimize the drying performance of the hair dryer and the performance of the battery pack;

the battery management and control module including at least one microprocessor and at least one storage device; and

the battery management and control module capable of measuring the temperature and the voltage of each battery cell to determine the state of charge and the health of each battery cell, and balancing the charge among the plurality of battery cells by controlling the discharge path across any of the battery cells to bleed off extra charge.

2. The hair dryer of Claim 1, wherein the battery pack includes a plurality of battery cells.
3. The hair dryer of Claim 1, wherein the heating element is a resistive heating coil.
4. The hair dryer of Claim 1, wherein the motor is a brushless three-phase electric motor.
5. The hair dryer of Claim 1, wherein the heating assembly further includes a plurality of stator vanes positioned near the fan that straighten airflow through the heating assembly.

6. The hair dryer of Claim 1, wherein the battery management and control module is housed on a printed circuit board that is located within this housing such that it separates the heating assembly from the battery pack.
7. The hair dryer of Claim 1, further including a battery indicator that displays a state of charge of the battery pack.
8. The hair dryer of Claim 1, further including a light ring located near the outlet, wherein the light ring comprises at least one LED.
9. The hair dryer of Claim 1, wherein the battery management and control module adjusts fan speed and the amount of current supplied to the heating element based on the temperature of the battery cells.
10. The hair dryer of Claim 11, wherein the battery management and control module balances the charge of the battery cells based on the temperature of the battery cells.
11. The hair dryer of Claim 1, wherein each battery cell includes two terminals.
12. The hair dryer of Claim 11, wherein each terminal is electrically connected to a terminal consolidation board.
13. The hair dryer of Claim 12, wherein the each terminal extends through a corresponding slot on a terminal consolidation board.
14. The hair dryer of Claim 13, wherein the terminal consolidation board is electrically connected to the battery management and control module.
15. A hair dryer comprising:

a housing, the housing including an air inlet and an air outlet;

a rechargeable battery pack including at least one lithium-ion battery cell, the rechargeable battery pack disposed within the housing;

each battery cell having a discharge path;

each battery cell having a beginning of life recoverable charge capacity and an in-use recoverable charge capacity,

each battery cell further having a state of charge, the state of charge measured as a percentage of recoverable charge capacity;

each battery cell further having a state of health, the state of health determined by comparing the in-use recoverable charge capacity to the beginning of life recoverable charge capacity;

each battery cell including two terminals, each of the terminals electrically connected to a terminal consolidation board;

a plurality of temperature sensors that sense a temperature in each battery cell;

a plurality of voltage sensors that measure voltage in each battery cell;

a battery management and control module having at least one microprocessor and at least one storage device, the battery management and control module electrically connected to the battery pack;

the battery management and control module capable of balancing the charge among the plurality of battery cells by controlling the discharge path across any of the battery cells to bleed off extra charge based on information received from the temperature sensors and the voltage sensors;

at least one switch to control operation of the hair dryer;

a heating assembly disposed within the housing, the heating assembly including a fan attached to a motor, and at least one heating element, wherein the motor turns the fan, which draws ambient air into the air inlet and expels air through the air outlet;

the battery management and control module positioned in the housing such that it separates the heating element from the battery pack;

the heating element positioned such that air passing through the heating assembly may be heated to a temperature greater than the ambient air temperature;

the battery management and control module electrically connected to the at least one fan and the at least one heating element;

a battery indicator that displays the state of charge of the battery pack;

a light ring located near the air outlet, the light ring comprising at least one LED;

at least one drying profile stored in the storage device; and

the battery management and control module capable of adjusting the electrical current delivered from the battery pack to the fan and delivered to the heating element according to the drying profile to adjust the amount and temperature of heated air expelled from the hair dryer during a drying cycle.