CLAIMS

1.- Aircraft (1) capable of hovering comprising:

- a fuselage (2) elongated along a longitudinal axis (Y);

- at least one rotor (3a, 3b, 4) that is rotatable about an axis of rotation with respect to said fuselage (2);

- electrical drive means adapted to rotate said at least one rotor (3a, 3b, 4);

- batteries (9) adapted to power said electrical drive means; and

- a cooling system (10) of said batteries (9);

said cooling system (10) comprising:

- a first opening (20) adapted to allow air to enter;

- a plurality of second openings (21) adapted to allow air to escape;

- a passage (22), which fluidly connects said first opening (20) with at least some of said second openings (21);

said batteries (9) being placed within said passage (22) and fluidically interposed between said first opening (20) and at least some of said second openings (21);

said cooling system (10) further comprising at least one fan (23) adapted to increase the kinetic energy of the air contained in said passage (22);

said fan (23) being operated, in use, when the forward speed (v) of said aircraft (1) with respect to the ground is lower than a speed threshold value (v0) and/or when a temperature (T) of said batteries (9) exceeds a temperature threshold value (T0);

wherein it comprises at least one container (41, 42, 43) defining an inner volume (50), inside which a plurality

of said batteries (9) is contained; said batteries (9) inside said inner volume (50) defining a plurality of interstices (45) between one another and said container (41, 42, 43);

characterized in that said passage (22) comprises:

- a first duct (30), which extends starting from said first opening (20);

- at least one second duct (31, 32, 33), which branches off from said first duct (30) and fluidically connects said first duct (30) to the inner volume (50) of a respective said container (41, 42, 43); and

- said interstices (45).

2.- Aircraft according to claim 1, wherein it comprises at least two said containers (41, 42, 43) defining respective said inner volumes (50) and said passage (22) comprises at least two said second ducts (31, 32, 33), which branch off from said first duct (30) and fluidically connect said first duct (30) to the inner volume (50) of a respective said container (41, 42, 43).

3.- Aircraft according to Claim 1 or 2, wherein said fuselage (2) defines:

- a nose (5) of said aircraft (1);

- a tail (6) of said aircraft (1) opposite to said nose (5) along said longitudinal axis (Y); and

- a belly (7) interposed between said nose (5) and said tail (6) along said longitudinal axis (Y);

said first opening (20) being arranged at said nose (5) and said second openings (21) being arranged at said belly (7).

4.- Aircraft according to Claim 3, wherein said first duct (30) comprises a first section (30a) and a second

section (30b);

said first section (30a) fluidically connecting said first opening (20) to said second section (30b);

said first opening (20) being closer to said belly (7) than said second section (30b) along a first axis (Z), which is vertical in use, of said aircraft (1) and orthogonal to the longitudinal axis (Y).

5.- Aircraft according to any one of the foregoing claims, wherein said first duct (30) has a progressively decreasing section proceeding from said first opening (20) along said longitudinal axis (Y).

6.- Aircraft according to any one of the foregoing claims, wherein said passage (22) further comprises at least one auxiliary duct (34, 35);

each said auxiliary duct (34, 35) comprising a first end (34a, 35a) and a second end (34b, 35b) that are opposite to each other;

said first and second end (34a, 35a; 34b, 35b) being both directly facing said first duct (30);

each said fan (23) being arranged at a respective auxiliary duct (34, 35).

7.- Aircraft (1) capable of hovering comprising:

- a fuselage (2) elongated along a longitudinal axis (Y);

- at least one rotor (3a, 3b, 4) that is rotatable about an axis of rotation with respect to said fuselage (2);

- electrical drive means adapted to rotate said at least one rotor (3a, 3b, 4);

- batteries (9) adapted to power said electrical drive means; and

- a cooling system (10) of said batteries (9);

said cooling system (10) comprising:

- a first opening (20) adapted to allow air to enter;

- a plurality of second openings (21) adapted to allow air to escape;

- a passage (22), which fluidly connects said first opening (20) with at least some of said second openings (21);

said batteries (9) being placed within said passage (22) and fluidically interposed between said first opening (20) and at least some of said second openings (21);

said cooling system (10) further comprising at least one fan (23) adapted to increase the kinetic energy of the air contained in said passage (22);

said fan (23) being operated, in use, when the forward speed (v) of said aircraft (1) with respect to the ground is lower than a speed threshold value (v0) and/or when a temperature (T) of said batteries (9) exceeds a temperature threshold value (T0);

wherein it comprises at least one container (41, 42, 43) defining an inner volume (50), inside which a plurality of said batteries (9) is contained; said batteries (9) inside said inner volume (50) defining a plurality of interstices (45) between one another and said container (41, 42, 43);

characterized in that said passage (22) comprises at least one duct (30), which fluidly connects said first opening (20) to said at least one container (41, 42, 43);

said passage (22) further comprising at least one auxiliary duct (34, 35);

each said auxiliary duct (34, 35) comprising a first end (34a, 35a) and a second end (34b, 35b) that are opposite

to each other;

said first and second end (34a, 35a; 34b, 35b) being both directly facing said duct (30);

each said fan (23) being arranged at a respective auxiliary duct (34, 35).

8.- Aircraft according to Claim 6 or 7, wherein it comprises two said auxiliary ducts (34, 35) arranged symmetrically with respect to each other with respect to a median plane (M) of said aircraft (1) parallel to said longitudinal axis (Y).

9.- Aircraft according to any one of the preceding Claims, wherein it comprises:

- a control unit (60) operatively connected to said at least one fan (23);

- first sensor means (65) adapted to detect the temperature of said batteries (9) and operatively connected to said control unit (60); and/or

- second sensor means (70) adapted to detect the forward speed (v) of said aircraft (1) and operatively connected to said control unit (60).

10.- Aircraft according to Claim 9, wherein said second sensor means (70) comprise a flow meter.

11.- Aircraft according to Claim 9 or 10, wherein it comprises means for varying the flow rate of air entering through said first opening (20) operatively connected to said control unit (60);

said control unit (60) being programmed to command said flow rate variation means to partialise said flow rate when, in use, the temperature (T) of said batteries (9) is lower than a minimum temperature threshold value (Tmin);

said minimum temperature threshold value (Tmin) being lower than said temperature threshold value (T0).

12.- Aircraft according to any one of the preceding Claims, wherein it is a convertiplane comprising:

- said fuselage (2);

- a pair of half-wings (8) arranged on respective mutually opposite parts of said fuselage (2), and having respective free ends opposite to said fuselage (2) and aligned along a second axis transverse to said longitudinal axis (Y); and

- at least a first pair of said rotors (4) that are rotatable around respective third axes (F, G) and tiltable with respect to said half-wings (8) around a fourth axis (H) transverse to said longitudinal axis (Y).

13.- Aircraft according to Claim 12, wherein it further comprises:

- a second pair of said rotors (3a) that are rotatable around respective fifth axes (B, C) fixed with respect to said fuselage (2); and

- a third pair of said rotors (3b) that are rotatable around respective sixth axes (D, E) fixed with respect to said fuselage (2);

said first pair of rotors (4) being interposed along said longitudinal axis (Y) between said second pair of rotors (3a) and said third pair of rotors (3b);

each rotor of said first, second or third pairs of rotors (4, 3a, 3b) being operable independently of the other rotors of said first, second or third pairs of rotors (4, 3a, 3b).

14.- Aircraft according to any one of Claims 7 to 13,

wherein said fuselage (2) defines:

- a nose (5) of said aircraft (1);

- a tail (6) of said aircraft (1) opposite to said nose (5) along said longitudinal axis (Y); and

- a belly (7) interposed between said nose (5) and said tail (6) along said longitudinal axis (Y);

said first opening (20) being arranged at said nose (5) and said second openings (21) being arranged at said belly (7).

15.- Aircraft according to Claim 14, wherein said duct (30) comprises a first section (30a) and a second section (30b);

said first section (30a) fluidically connecting said first opening (20) to said second section (30b);

said first opening (20) being closer to said belly (7) than said second section (30b) along a first axis (Z), which is vertical in use, of said aircraft (1) and orthogonal to the longitudinal axis (Y).

16.- Aircraft according to any one of Claims 7 to 15, wherein said duct (30) has a progressively decreasing section proceeding from said first opening (20) along said longitudinal axis (Y).

17.- Method for controlling an aircraft (1) capable of hovering; said aircraft comprising:

- a fuselage (2) elongated along a longitudinal axis (Y);

- at least one rotor (3a, 3b, 4) that is rotatable about an axis of rotation with respect to said fuselage (2);

- electrical drive means adapted to rotate said at least one rotor (3a, 3b, 4);

- batteries (9) adapted to power said electrical drive means; and

- a cooling system (10) of said batteries (9);

said cooling system (10) comprising:

- a first opening (20) adapted to allow air to enter;

- a plurality of second openings (21) adapted to allow air to escape;

- a passage (22), which places said first opening (20) in fluidic communication with at least some of said second openings (21);

said batteries (9) being placed within said passage (22) and fluidically interposed between said first opening (20) and at least some of said second openings (21);

said cooling system (10) further comprising at least one fan (23) adapted to increase the kinetic energy of the air contained in said passage (22);

said aircraft (1) further comprising at least one container (41, 42, 43) defining an inner volume (50), inside which a plurality of said batteries (9) is contained; said batteries (9) inside said inner volume (50) defining a plurality of interstices (45) between one another and said container (41, 42, 43);

said passage (22) comprising:

- a first duct (30), which extends starting from said first opening (20);

- at least one second duct (31, 32, 33), which branches off from said first duct (30) and fluidically connects said first duct (30) to the inner volume (50) of a respective said container (41, 42, 43); and

- said interstices (45);

said method being characterized in that it comprises the step of operating said fan (23) when the forward speed (v) of said aircraft (1) with respect to the ground is lower than a speed threshold value (v0) and/or when a temperature (T) of said batteries (9) exceeds a temperature threshold value (T0).

18.- Method according to claim 17, wherein said aircraft (1) comprises at least two said containers (41, 42, 43) defining respective said inner volumes (50) and said passage (22) comprises at least two said second ducts (31, 32, 33), which branch off from said first duct (30) and fluidically connect said first duct (30) to the inner volume (50) of a respective said container (41, 42, 43).

19.- Method for controlling an aircraft (1) capable of hovering; said aircraft comprising:

- a fuselage (2) elongated along a longitudinal axis (Y);

- at least one rotor (3a, 3b, 4) that is rotatable about an axis of rotation with respect to said fuselage (2);

- electrical drive means adapted to rotate said at least one rotor (3a, 3b, 4);

- batteries (9) adapted to power said electrical drive means; and

- a cooling system (10) of said batteries (9);

said cooling system (10) comprising:

- a first opening (20) adapted to allow air to enter;

- a plurality of second openings (21) adapted to allow air to escape;

- a passage (22), which places said first opening (20) in fluidic communication with at least some of said second

openings (21);

said batteries (9) being placed within said passage (22) and fluidically interposed between said first opening (20) and at least some of said second openings (21);

said cooling system (10) further comprising at least one fan (23) adapted to increase the kinetic energy of the air contained in said passage (22);

said aircraft (1) further comprising at least one container (41, 42, 43) defining an inner volume (50), inside which a plurality of said batteries (9) is contained; said batteries (9) inside said inner volume (50) defining a plurality of interstices (45) between one another and said container (41, 42, 43);

said passage (22) comprising at least one duct (30), which fluidly connects said first opening (20) to said at least one container (41, 42, 43);

said passage (22) further comprises at least one auxiliary duct (34, 35);

each said auxiliary duct (34, 35) comprising a first end (34a, 35a) and a second end (34b, 35b) that are opposite to each other;

said first and second end (34a, 35a; 34b, 35b) being both directly facing said duct (30);

each said fan (23) being arranged at a respective auxiliary duct (34, 35);

said method being characterized in that it comprises the step i) of operating said fan (23) when the forward speed (v) of said aircraft (1) with respect to the ground is lower than a speed threshold value (v0) and/or when a temperature (T) of said batteries (9) exceeds a temperature threshold

value (T0).

20.- Method according to Claim 19, comprising the further steps of:

ii) detecting the temperature of said batteries (9) by first sensor means (65); said first sensor means (65) being operatively connected to a control unit (60) of said aircraft (1); said control unit (60) being also operatively connected to said at least one fan (23);

iii) commanding flow rate variation means of said aircraft (1) to partialise the flow rate of air entering through said first opening (20) by means of said control unit (60) when the temperature (T) of said batteries (9) is lower than a minimum temperature threshold value (Tmin); said flow rate variation means being operatively connected to said control unit (60); said minimum temperature threshold value (Tmin) being lower than said temperature threshold value (T0).