CLAIMS

1. A method for managing the electrical charging of a plurality of electrical energy storage modules (Mi_X) that are used in an electrically powered transport system (1) that is intended to make a journey, said transport system including:

- at least two rolling assemblies (Ri_X);
- at least two electric drive assemblies (Ei_X), referred to as the first electric drive assembly and the second electric drive assembly, each of which is associated with a distinct rollling assembly, each electric drive assembly comprising:
    - o at least one electric motor (MOTi_Y) for driving said rolling assembly over the ground;
    - o at least one electrical energy storage module (Mi_X) that is intended to supply said electric motor with electrical power and that includes a plurality of electrical energy storage cells;
    - o at least one bidirectional voltage converter (CONVi_Y) that is arranged to control the transfer of electrical energy between said electrical energy storage module and said electric motor;
- the electrical energy storage module of the first electric drive assembly having no electrical power connection with the electrical energy storage module of the second electric drive assembly;

said method being characterized in that it comprises:

- a step of determining a target state of charge (SOCcible_T) to be reached so as to be able to make said journey completely electrically autonomously and accounting for an electrical demand for charging and discharging the electrical energy storage modules resulting from the operation of the transport system over said journey;
- a step of determining, for each storage module of the transport system, a state of charge (SOC_Mi_X) to be reached, this state of charge being determined for each module according to:
    - o the determined target state of charge (SOCcible_T);
    - o the implementation of one or more management functions on the electrical energy storage module of the system, wherein one of the one or more management functions consist of a sequence of voltage-balancing the cells of an electrical energy storage module.

2. The method as claimed in claim 1, characterized in that the state of charge (SOC_Mi_X) is also determined by accounting for a state of availability that is assigned to the electrical energy storage module over the journey.

3. The method as claimed in claim 1 or 2, characterized in that the state of charge to be reached for at least one storage module corresponds to an optimal state of charge (SOCcible_Mi_X) which is calculated from:

- the determined overall target state of charge (SOCcible_T);
- a number of modules to be charged to a particular state of charge according to said implemented one or more management function and the state of charge that is assigned to these modules;
- the total number of modules of the system.

4. The method as claimed in claim 3, characterized in that said optimal state of charge is also determined by accounting for a number of modules that are isolated, i.e. that do not participate in charging or in driving said transport system (1).

5. The method as claimed in claim 3, characterized in that it includes:

- a test step (E10) for determining whether the sequence of voltage-balancing the cells of said electrical module is required;
- a step (E20') of controlling an operation of charging the electrical energy storage module to said determined optimal state of charge, if said voltage-balancing sequence does not have to be implemented;
- a step (E40) of controlling an operation of charging the electrical energy storage module until a second state of charge that is equal to 100% is reached and the sequence of voltage-balancing the cells once this second state of charge has been reached if said balancing sequence is required and accepted.

6. The method as claimed in claim 5, characterized in that the test step (E10) is implemented on the basis of at least one stored decision criterion having a determined value.

7. The method as claimed in claim 6, characterized in that the test step (E10) includes a step of measuring the voltage across the terminals of the electrical energy storage cells of the electrical energy storage module.

8. The method as claimed in one of claims 5 to 7, characterized in that it includes a step (E50) of checking a state of progress of the sequence of voltage-balancing the cells of the electrical energy storage module, when the sequence of voltage-balancing the cells of said electrical module is determined to be required.

9. The method as claimed in claim 8, characterized in that it includes a step (E70) of holding the decision criterion at its determined value for as long as the balancing sequence is yet to be completed.

10. The method as claimed in claim 8 or 9, characterized in that it includes a step (E60) of modifying said value of the decision criterion, implemented after the end of the sequence of voltage-balancing the cells of the electrical energy storage module.

11. A system for managing the electrical charging of a plurality of electrical energy storage modules that are used in an electrically powered transport system (1) that is intended to make a journey, said transport system including:

- at least two rolling assemblies (Ri_X);
- at least two electric drive assemblies (Ei_X), referred to as the first electric drive assembly and the second electric drive assembly, each of which is associated with a distinct rolling assembly, each electric drive assembly comprising:
    - o at least one electric motor (MOTi_Y) for driving said rolling assembly over the ground;
    - o at least one electrical energy storage module (Mi_X) that is intended to supply said electric motor with electrical power and that includes a plurality of electrical energy storage cells;
    - o at least one bidirectional voltage converter (CONVi_Y) that is arranged to control the transfer of electrical energy between said electrical energy storage module and said electric motor;
- the electrical energy storage module of the first electric drive assembly having no electrical power connection with the electrical energy storage module of the second electric drive assembly;

said management system comprising processing means that are arranged so as to determine an electrical state of charge to be applied to each electrical energy storage module, characterized in that said processing means comprise:

- a block for determining a target state of charge (SOCcible_T) to be reached so as to be able to make said journey completely electrically autonomously and accounting for an electrical demand for charging and discharging the modules resulting from the operation of the transport system over said journey;
- a block for determining, for each storage module of the transport system, a state of charge (SOC_Mi_X) to be reached, this state of charge being determined for each module according to:
    - o the determined target state of charge (SOCcible_T);

o the implementation of one or more management functions on the electrical energy storage module of the system, wherein one of the one or more management functions consist of a sequence of voltage-balancing the cells of an electrical energy storage module.

12. The system as claimed in claim 11, characterized in that the state of charge (SOC_Mi_X) to be reached for each module is determined by accounting for a state of availability that is assigned to the electrical energy storage module over the journey.

13. The system as claimed in claim 11 or 12, characterized in that the state of charge to be reached for at least one storage module corresponds to an optimal state of charge (SOCcible_Mi_X) which is calculated from:

- the determined overall target state of charge (SOCcible_T);
- a number of modules to be charged to a particular state of charge according to said implemented one or more management function and the state of charge that is assigned to these modules;
- the total number of modules of the system.

14. The system as claimed in claim 13, characterized in that said optimal state of charge (SOCcible_Mi_X) is also determined by accounting for a number of modules that are isolated, i.e. that do not participate in charging or in driving said transport system (1).

15. The system as claimed in claim 14, characterized in that it includes:

- a test block that is arranged so as to determine whether an operation of implementing the sequence of voltage-balancing the cells of said electrical module is required;
- a block for controlling a charging operation until said determined optimal state of charge is reached, if said voltage-balancing sequence does not have to be implemented;
- a block for controlling a charging operation until a second state of charge that is equal to 100% is reached and the sequence of voltage-balancing the cells once this second state of charge has been reached if the balancing sequence is required and accepted.

16. The system as claimed in claim 15, characterized in that the test block is run on the basis of at least one stored decision criterion having a determined value.

17. The system as claimed in claim 16, characterized in that it includes means for measuring the voltage across the terminals of the electrical energy storage cells of the electrical energy storage module and in that said decision criterion is based on voltage measurements made by said measurement means.

18. The system as claimed in one of claims 15 to 17, characterized in that it includes a test block that is arranged so as to determine the state of progress of the sequence of voltage-balancing the cells of the electrical energy storage module.

19. The system as claimed in claim 15, characterized in that it includes a block for modifying said value of the decision criterion, run after the end of the sequence of voltage-balancing the cells of the electrical energy storage module, when the sequence of voltage-balancing the cells of said electrical module is determined to be required.