Claims

1. A system for transferring electric energy to a vehicle (81; 91)~~, in particular to a track bound vehicle (81) such as a light rail vehicle or to a road automobile (91) such as a bus,~~ [11]wherein
   - the system comprises an electric conductor arrangement (~~3,~~ T[12]) for producing an alternating electromagnetic field and for thereby transferring electromagnetic energy to the vehicle,
   - the conductor arrangement (~~3,~~ T) comprises a plurality of consecutive segments (T1, T2, T3, T4, T5, T6), wherein each segment (T1, T2, T3, T4, T5, T6) extends along a different section of the path of travel of the vehicle,
   - the system comprises an alternating current supply (3) for conducting electric energy to a plurality of the segments (T1, T2, T3, T4, T5, T6), wherein the segments (T1, T2, T3, T4, T5, T6) are electrically connected in parallel to each other with the alternating current supply (3),
   - each segment (T1, T2, T3, T4, T5, T6) is coupled to the supply (3) via an associated switching unit (13) adapted to switch on and off the segment (T1, T2, T3, T4, T5, T6) by connecting or disconnecting the segment (T1, T2, T3, T4, T5, T6) to/from the supply (3),
   - during operation of the segment (T1, T2, T3, T4, T5, T6) while the switching unit (13) is switched on, each segment (T1, T2, T3, T4, T5, T6) is coupled to the supply (3) via the associated switching unit (13) and via a constant current source (12),
   - the constant current source (12) is coupled to the segment (T1, T2, T3, T4, T5, T6) on one side and to the supply (3) on the other side and is ~~-~~adapted to keep the electric current through the segment (T1, T2, T3, T4, T5, T6) constant independently of the electric power which is transferred to one or more vehicles travelling along the segment (T1, T2, T3, T4, T5, T6).

2. The system of ~~the preceding~~ claim 1, wherein the alternating current supply (3) and the segments (T) comprise a plurality of lines, wherein each line is adapted to carry a different phase of a multi-phase alternating current, wherein each line of the plurality of the segments is coupled to a corresponding line of the alternating current supply (3) via a corresponding switch (16) of the associated switching unit (13).

3. The system of ~~one of the preceding~~ claim 1 or 2~~s~~, wherein the switching unit (13) of at least one of the segments (T1, T2, T3, T4, T5, T6) is connected with a control device

(36) adapted to automatically control the switching state of the switching unit (13) and thereby to control the operation of the segment (T1, T2, T3, T4, T5, T6).

4. The system of ~~the preceding~~ claim 3, wherein the control device (36) is connected with a signal receptor, wherein the signal receptor is adapted to receive a signal indicating that a vehicle is located in the section of the path of travel along which the segment (T1, T2, T3, T4, T5, T6) extends or is about to reach the section and the signal receptor and the signal receptor is adapted to trigger the control device (36) and the switching unit (13) correspondingly so that the vehicle is provided with energy by the segment (T1, T2, T3, T4, T5, T6).

5. The system of ~~one of the two preceding~~ claim 3 or ~~4~~, wherein the control device (36) is connected with a current sensor (37) for measuring the current through the segment (T1, T2, T3, T4, T5, T6) or through one of the lines of the segment (T1, T2, T3, T4, T5, T6) and wherein the control device (36) is adapted to switch off the segment (T1, T2, T3, T4, T5, T6) if the measured current fulfils a predetermined condition.

6. The system of one of ~~the preceding~~ claims 1 to 5, wherein the alternating current supply (3) is connected with an inverter (55) for inverting a direct current into the alternating current which is conducted to the segments (T) via the supply (3).

7. The system of one of ~~the preceding~~ claims 1 to 6, wherein at least for one of the segments (T) an associated constant current source (12) and an associated switching unit (13) are integrated in a common module (M).

8. The system of ~~the preceding~~ claim 7, wherein the common module (CM; DM) comprises the constant current sources (12) and switching units (13) associated to two segments which are consecutive segments with respect to the path of travel.

9. The system of ~~one of the two preceding~~ claim 7 or ~~8~~, wherein the common module (CM) comprises the constant current sources (12) and switching units (13) associated to two segments (T1a, T1b) which are segments of different paths of travel extending in parallel or transversely to each other.

10. A method of manufacturing a system for transferring electric energy to a vehicle~~, in particular the system of one of the preceding claims~~, including the steps:

- providing an electric conductor arrangement (~~3,~~ T) for producing an alternating electromagnetic field and for thereby transferring electromagnetic energy to the vehicle,
- providing a plurality of consecutive segments (T1, T2, T3, T4, T5, T6) as part of the conductor arrangement (~~3,~~ T), so that each segment (T1, T2, T3, T4, T5, T6) extends along a different section of the path of travel of the vehicle,
- providing an alternating current supply (3) for conducting electric energy to a plurality of the segments (T1, T2, T3, T4, T5, T6), wherein the segments (T1, T2, T3, T4, T5, T6) are electrically connected in parallel to each other with the alternating current supply (3),
- coupling each segment (T1, T2, T3, T4, T5, T6) to the supply (3) via an associated switching unit (13), wherein the switching unit (13) is adapted to switch on and off the segment (T1, T2, T3, T4, T5, T6) by connecting or disconnecting the segment (T1, T2, T3, T4, T5, T6) to/from the supply (3),
- coupling each segment (T1, T2, T3, T4, T5, T6) to the supply (3) via the associated switching unit (13) and via a constant current source (12), wherein the constant current source (12) is coupled to the segment (T1, T2, T3, T4, T5, T6) on one side and to the supply (3) on the other side and is adapted to keep the electric current through the segment (T1, T2, T3, T4, T5, T6) constant – while the segment (T1, T2, T3, T4, T5, T6) is switched on - independently of the electric power which is transferred to one or more vehicles travelling along the segment (T1, T2, T3, T4, T5, T6).

11. A method of operating a system for transferring electric energy to a vehicle, ~~in particular the system of one of the preceding claims~~, including the steps:
    - producing an alternating electromagnetic field and thereby transferring electromagnetic energy to the vehicle by using an electric conductor arrangement (~~3,~~ T),
    - using a plurality of consecutive segments (T1, T2, T3, T4, T5, T6) as part of the conductor arrangement (~~3,~~ T), wherein each segment (T1, T2, T3, T4, T5, T6) extends along a different section of the path of travel of the vehicle,
    - conducting electric energy to a plurality of the segments (T1, T2, T3, T4, T5, T6) by using an alternating current supply (3), wherein the segments (T1, T2, T3, T4, T5, T6) are electrically connected in parallel to each other with the alternating current supply (3),

- using for each segment (T1, T2, T3, T4, T5, T6) an associated switching unit (13) in order to switch on and off the segment (T1, T2, T3, T4, T5, T6) by connecting or disconnecting the segment (T1, T2, T3, T4, T5, T6) to/from the supply (3),
- keeping the electric current through the segment (T1, T2, T3, T4, T5, T6) constant – while the segment (T1, T2, T3, T4, T5, T6) is switched on - independently of the electric power which is transferred to one or more vehicles travelling along the segment (T1, T2, T3, T4, T5, T6), wherein a constant current source (12), which is coupled to the segment (T1, T2, T3, T4, T5, T6) on one side and to the supply (3) on the other side is used to keep the current constant.