Claims

1. A system for transferring electric energy to a vehicle, ~~in particular to a track bound vehicle such as a light rail vehicle (81) or to a road automobile,~~ wherein
   - the system comprises an electric conductor arrangement for producing an alternating electromagnetic field and for thereby transferring the energy to the vehicle,
   - the conductor arrangement comprises a plurality of consecutive segments (T1, T2, T3, T4, T5), wherein the segments (T1, T2, T3, T4, T5) extend in the direction of travel of the vehicle, which is defined by the track or path of travel,
   - each segment (T1, T2, T3, T4, T5) is combined with an assigned controller (CTR1) adapted to control the operation of the segment (T1, T2, T3, T4, T5) independently of the other segments (T1, T2, T3, T4, T5),
   - the controllers (CTR1) of at least two consecutive segments (T1, T2, T3, T4, T5), which follow each other in the direction of travel of the vehicle, or which follow each other opposite to the direction of travel, are connected to each other and/or to a central controlling device so that the at least two consecutive segments (T1, T2, T3, T4, T5) can be operated at the same time,
   - each segment (T1, T2, T3, T4, T5) comprises at least three alternating current lines (1, 2, 3) for carrying phases of a multi-phase alternating current in order to produce the alternating electromagnetic field,
   - the consecutive segments (T1, T2, T3, T4, T5) are electrically connected in parallel to each other to a current supply,
   - the alternating current lines (1, 2, 3) of each segment (T1, T2, T3, T4, T5) comprise a plurality of sections (5) which extend transversely to the direction of travel of the vehicle,
   - the transversely extending sections (5) of the at least three alternating current lines (1, 2, 3) of each segment (T1, T2, T3, T4, T5) form, if viewed in the direction of travel, a repeating sequence of phases of the alternating current, while the segment (T1, T2, T3, T4, T5) is operated under control of the assigned controller (CTR1), wherein each complete repetition of the sequence of phases comprises one transversely extending section (5) of each phase and the order of the phases is the same in each complete repetition,

   characterized in that
   - the controllers (CTR1) of the at least two consecutive segments (T1, T2, T3, T4, T5) and/or the central controlling device are/is adapted to operate the at least two consecutive segments (T1, T2, T3, T4, T5), so that the repeating sequence of

phases continues from one segment (T2) to the consecutive segment (T3), wherein the order of the phases is the same in the at least two consecutive segments (T1, T2, T3, T4, T5) and in each transition zone of two of the at least two consecutive segments (T1, T2, T3, T4, T5).

2. The system of claim 1, wherein the system is adapted to synchronize the assigned controllers (CTR1) of the at least two consecutive segments (T1, T2, T3, T4, T5) in a manner so that the electromagnetic field produced by the at least two consecutive segments (T1, T2, T3, T4, T5) forms a magnetic wave which moves in or opposite to the direction of travel of the vehicle, the wave being continuous in the transition zone of the consecutive segments (T1, T2, T3, T4, T5).

3. The system of claim 1 or 2, wherein, if viewed in the direction of travel from a first (T2) of the two consecutive segments (T1, T2, T3, T4, T5) to a second (T3) of the two consecutive segments (T1, T2, T3, T4, T5), a transversely extending section (5') of the first consecutive segment (T2) follows a transversely extending section (5) of the second consecutive segment (T3) in the repeating sequence of phases of the alternating current.

4. The system of one of claims 1 to 3, wherein the transversely extending sections (5) of each of the alternating current lines (1, 2, 3) are connected to each other via connecting sections (7, 8, 9), which at least partly extend in the direction of travel, so that each of the alternating current lines (1, 2, 3) follows a meandering path in the direction of travel in which the connecting sections (7, 8, 9) are located alternating on opposite sides of the conductor arrangement, and wherein the transversely extending sections (5) of a complete repetition of the phases of the repeating sequence are formed by the meandering paths of the alternating current lines (1, 2, 3) in the following manner:
   - the transversely extending section (5) of a first phase (3) of the alternating current extends from a first side (B) of the conductor arrangement towards a second side (A) of the conductor arrangement, which is the side opposite to the first side of the conductor arrangement,
   - the transversely extending section (5x) of a second phase (2) of the alternating current, which follows the first phase (3) in the order of phases, extends from the second side (A) of the conductor arrangement towards the first side (B) of the conductor arrangement,

- the transversely extending section (5y) of a third phase (1) of the alternating current, which follows the second phase (2) in the order of phases, extends from the first side (B) of the conductor arrangement towards the second side (A) of the conductor arrangement,
- if there are more than three phases, the transversely extending section(s) of the next phase or next phases in the order of phases extend(s) in the opposite direction between the first and second side of the conductor arrangement compared to the transversely extending section of the preceding phase, until the last phase is reached.

5. The system of one of claims 1 to 4, wherein the vehicle is a track bound vehicle (81) or a road automobile.

6~~5~~. A method of operating a system for transferring electric energy to a vehicle, ~~in particular to a track bound vehicle such as a light rail vehicle (81) or to a road automobile,~~ wherein

- an electric conductor arrangement is operated for producing an alternating electromagnetic field and for thereby transferring the energy to the vehicle,
- a plurality of consecutive segments (T1, T2, T3, T4, T5) of the conductor arrangement is operated, wherein the segments (T1, T2, T3, T4, T5) extend in the direction of travel of the vehicle, which is defined by the track or path of travel,
- for each segment (T1, T2, T3, T4, T5), an assigned controller (CTR1) is operated to control the operation of the segment (T1, T2, T3, T4, T5) independently of the other segments (T1, T2, T3, T4, T5),
- the controllers (CTR1) of at least two consecutive segments (T1, T2, T3, T4, T5), which follow each other in the direction of travel of the vehicle, or which follow each other opposite to the direction of travel, are operated in connection with each other and/or with a central controlling device so that the at least two consecutive segments (T1, T2, T3, T4, T5) are operated at the same time,
- in each segment (T1, T2, T3, T4, T5), at least three alternating current lines (1, 2, 3) carry phases of a multi-phase alternating current in order to produce the alternating electromagnetic field,
- the consecutive segments (T1, T2, T3, T4, T5) are electrically connected in parallel to each other to a current supply,
- the alternating current lines (1, 2, 3) of each segment (T1, T2, T3, T4, T5) comprise a plurality of sections which extend transversely to the direction of travel of the vehicle,
- the transversely extending sections (5) of the at least three alternating-current lines of each segment (T1, T2, T3, T4, T5) form, if viewed in the direction of travel, a

repeating sequence of phases of the alternating current, while the segment (T1, T2, T3, T4, T5) is operated under control of the assigned controller (CTR1), wherein each complete repetition of the sequence of phases comprises one transversely extending section of each phase and the order of the phases is the same in each complete repetition,

characterized in that

- the controllers (CTR1) of the at least two consecutive segments (T1, T2, T3, T4, T5) and/or the central controlling device operate(s) the at least two consecutive segments (T1, T2, T3, T4, T5), so that the repeating sequence of phases continues from one segment (T2) to the consecutive segment (T3), wherein the order of the phases is the same in the at least two consecutive segments (T1, T2, T3, T4, T5) and in each transition zone of two of the at least two consecutive segments (T1, T2, T3, T4, T5).

76. The method of claim 65, wherein the assigned controllers (CTR1) of the at least two consecutive segments (T1, T2, T3, T4, T5) are synchronized so that the electromagnetic field produced by the at least two consecutive segments (T1, T2, T3, T4, T5) forms a magnetic wave which moves in or opposite to the direction of travel of the vehicle, the wave being continuous in the transition zone of the consecutive segments (T1, T2, T3, T4, T5).

87. The method of claim 6 or 75 ~~or 6~~, wherein, if viewed in the direction of travel from a first (T2) of the two consecutive segments (T1, T2, T3, T4, T5) to a second (T3) of the two consecutive segments (T1, T2, T3, T4, T5), a transversely extending section of the first consecutive segment (T2) follows a transversely extending section of the second consecutive segment (T3) in the repeating sequence of phases of the alternating current.

98. The method~~system~~ of one of claims 6 to 85 ~~to 7~~, wherein the transversely extending sections (5) of each of the alternating current lines (1, 2, 3) are connected to each other via connecting sections (7, 8, 9), which at least partly extend in the direction of travel, so that each of the alternating current lines (1, 2, 3) follows a meandering path in the direction of travel in which the connecting sections (7, 8, 9) are located alternating on opposite sides of the conductor arrangement, and wherein the transversely extending sections (5) of a complete repetition of the phases of the repeating sequence are formed by the meandering paths of the alternating current lines (1, 2, 3) in the following manner:

- the transversely extending section (5) of a first phase (3) of the alternating current extends from a first side (B) of the conductor arrangement towards a second side (A) of the conductor arrangement, which is the side opposite to the first side of the conductor arrangement,
- the transversely extending section (5x) of a second phase (2) of the alternating current, which follows the first phase (3) in the order of phases, extends from the second side (A) of the conductor arrangement towards the first side (B) of the conductor arrangement,
- the transversely extending section (5y) of a third phase (1) of the alternating current, which follows the second phase (2) in the order of phases, extends from the first side (B) of the conductor arrangement towards the second side (A) of the conductor arrangement,
- if there are more than three phases, the transversely extending section(s) of the next phase or next phases in the order of phases extend(s) in the opposite direction between the first and second side of the conductor arrangement compared to the transversely extending section of the preceding phase, until the last phase is reached.

10. The method of one of claims 6 to 9, wherein the vehicle is a track bound vehicle (81) or a road automobile.

11. A method of manufacturing a system for transferring electric energy to a vehicle, ~~in particular to a track bound vehicle such as a light rail vehicle (81) or to a road automobile,~~ wherein

- an electric conductor arrangement is provided for producing an alternating electromagnetic field and for thereby transferring the energy to the vehicle,
- the conductor arrangement comprises a plurality of consecutive segments (T1, T2, T3, T4, T5), wherein the segments (T1, T2, T3, T4, T5) extend in the direction of travel of the vehicle, which is defined by the track or path of travel,
- each segment (T1, T2, T3, T4, T5) is combined with an assigned controller (CTR1) adapted to control the operation of the segment (T1, T2, T3, T4, T5) independently of the other segments (T1, T2, T3, T4, T5),
- the controllers (CTR1) of at least two consecutive segments (T1, T2, T3, T4, T5), which follow each other in the direction of travel of the vehicle, or which follow each other opposite to the direction of travel, are connected to each other and/or to a central controlling device so that the at least two consecutive segments (T1, T2, T3, T4, T5) can operated at the same time,

- each segment (T1, T2, T3, T4, T5) comprises at least three alternating current lines (1, 2, 3) for carrying phases of a multi-phase alternating current in order to produce the alternating electromagnetic field,
- the consecutive segments (T1, T2, T3, T4, T5) are electrically connected in parallel to each other to a current supply,
- the alternating current lines (1, 2, 3) of each segment (T1, T2, T3, T4, T5) comprise a plurality of sections which extend transversely to the direction of travel of the vehicle,
- the transversely extending sections (5) of the at least three alternating-current lines of each segment (T1, T2, T3, T4, T5) form, if viewed in the direction of travel, a repeating sequence of phases of the alternating current, while the segment (T1, T2, T3, T4, T5) is operated under control of the assigned controller (CTR1), wherein each complete repetition of the sequence of phases comprises one transversely extending section of each phase and the order of the phases is the same in each complete repetition,
- the controllers (CTR1) of the at least two consecutive segments (T1, T2, T3, T4, T5) and/or the central controlling device are/is adapted to operate the at least two consecutive segments (T1, T2, T3, T4, T5), so that the repeating sequence of phases continues from one segment (T2) to the consecutive segment (T3), wherein the order of the phases is the same in the at least two consecutive segments (T1, T2, T3, T4, T5) and in each transition zone of two of the at least two consecutive segments (T1, T2, T3, T4, T5)~~s~~.

12~~10~~. The method of claim 11~~9~~, wherein the system is adapted to synchronize the assigned controllers (CTR1) of the at least two consecutive segments (T1, T2, T3, T4, T5) so that the electromagnetic field produced by the at least two consecutive segments (T1, T2, T3, T4, T5) forms a magnetic wave which moves in or opposite to the direction of travel of the vehicle, the wave being continuous in the transition zone of the consecutive segments (T1, T2, T3, T4, T5).

13~~11~~. The method of claim 11 or 12~~9 or 10~~, wherein the alternating current lines (1, 2, 3) of the at least two consecutive segments (T1, T2, T3, T4, T5) are laid so that, if viewed in the direction of travel from a first of the two consecutive segments (T1, T2, T3, T4, T5) to a second of the two consecutive segments (T1, T2, T3, T4, T5), a transversely extending section of the first consecutive segment (T2) follows a transversely extending section of the second consecutive segment (T3) in the repeating sequence of phases of the alternating current.

1412. The methodsystem of one of claims 11 to 139 to 11, wherein the transversely extending sections (5) of each of the alternating current lines (1, 2, 3) are connected to each other via connecting sections (7, 8, 9), which at least partly extend in the direction of travel, so that each of the alternating current lines (1, 2, 3) follows a meandering path in the direction of travel in which the connecting sections (7, 8, 9) are located alternating on opposite sides of the conductor arrangement, and wherein the transversely extending sections (5) of a complete repetition of the phases of the repeating sequence are formed by the meandering paths of the alternating current lines (1, 2, 3) in the following manner:

- the transversely extending section (5) of a first phase (3) of the alternating current extends from a first side (B) of the conductor arrangement towards a second side (A) of the conductor arrangement, which is the side opposite to the first side of the conductor arrangement,
- the transversely extending section (5x) of a second phase (2) of the alternating current, which follows the first phase (3) in the order of phases, extends from the second side (A) of the conductor arrangement towards the first side (B) of the conductor arrangement,
- the transversely extending section (5y) of a third phase (1) of the alternating current, which follows the second phase (2) in the order of phases, extends from the first side (B) of the conductor arrangement towards the second side (A) of the conductor arrangement,
- if there are more than three phases, the transversely extending section(s) of the next phase or next phases in the order of phases extend(s) in the opposite direction between the first and second side of the conductor arrangement compared to the transversely extending section of the preceding phase, until the last phase is reached.

15. The method of one of claims 11 to 14, wherein the vehicle is a track bound vehicle (81) or a road automobile.