IN THE HIGH COURT OF JUSTICE **Claim No: HP 2015 000061**

CHANCERY DIVISION

PATENTS COURT

B E T W E E N :

(1) POSITEC POWER TOOLS (EUROPE) LIMITED

(2) POSITEC (MACAO COMMERCIAL OFFSHORE) LIMITED

(3) POSITEC GERMANY GmbH

Claimants

- and -

HUSQVARNA AB

Defendant

ANNEX TO AMENDED STATEMENT OF GROUNDS

Claims

1. Method for operating an automatic device (2) by means of an electronic directing system,

- said electronic directing system comprising

  - at least one first electrical cable (1,4,5,6) connected to
  - at least one first signal generator (3,7,8),
  - at least one sensing system (11,12,13) arranged on said automatic device (2),

- said sensing system (11,12,13)

  - detecting at least one magnetic field being transmitted via said cable (1,4,5,6) and propagating through the air,
  - transmitting a processed signal to at least one driving means for moving said automatic device (2) in relation to a surface,

- said driving means being arranged on said automatic device (2),
- said first signal generator (3,7,8) transmitting a current through said first cable (1,4,5,6),
- said current, during a part of time, being in a state of rest where it is substantially constant,
- said state of rest periodically being interrupted by at least one first characteristic current pulse (20),
- said first current pulse being transmitted through an electrical cable (1) that substantially demarcates the area within which the automatic device (2) is intended to operate,

characterized in that

- said sensing system (11,12,13) synchronizes the time intervals (28,29) within which it detects magnetic fields based on the properties of said first current pulse (20)~~.~~; and
- said automatic device (2) is an automatic lawnmower comprising a treatment system constituted of knives cutting the plants growing on said surface.

2. Method according to claim 1 **characterized in that** the synchronization of said time intervals (28,29), which is being made by said sensing system (11,12,13), is based on the periodicity, time occurrence and/or the duration of said first current pulse (20).

3. Method according to any of the claims 1-2 **characterized in that** said time intervals (28,29) are being adapted so that the sensing system (11,12,13) is

able to detect the presence of current pulses (20,22,24,26) transmitted through said first electrical cable (1,4,5,6) of said directing system, said sensing system (11,12,13) during the await of the next pulse (20,22,24,26) to appear disregards pulses occurring outside said time intervals (28,29).

4. Method according to any of the preceding claims **characterized in that** the current in each of said electrical cables (1 ,4,5,6) is being transmitted by one of said signal generators (3,7,8), said generator (3,7,8) synchronizing each current pulse (20,22,24,26) it transmits with other current pulses (20,22,24,26) in the directing system, and **in that** no current pulses (20,22,24,26) in the directing system will occur at the same point of time within the same period (21).

5. Method according to any of the preceding claims **characterized in that** the current in each of said electrical cables (1 ,4,5,6) is being transmitted by one of said signal generators (3,7,8), said generator (3,7,8) synchronizing each current pulse (20,22,24,26) it transmits with other current pulses (20,22,24,26) in the directing system, and **in** that the time distance between each current pulse (20,22,24,26) occurring in said directing system is large enough so that signals generated in the sensing system (11,12,13) that originate from a current pulse (20,22,24,26) has partly decayed before generated signals that originate from another current pulse (20,22,24,26) occurs.

6. Method according to any of the preceding claims **characterized in** said current in said first electrical cable (1,4,5,6) and at least a second electrical cable is transmitted from the same signal generator (3).

7. Method according to any of the preceding claims **characterized in that** said current has the same period (21) irrespective of the electrical cable (1,4,5,6) through which it is transmitted.

8. Method according to claim 7 **characterized in that** the period (21) for the directing system is selected by the user of the directing system.

9. Method according to any of the preceding claims **characterized in that** every current pulse (22,24,26) has a time of occurrence defined by the directing system and adapted to said first current pulse (20).

10. Method according to any of the preceding claims **characterized in that** a transmitted current pulse

(20,22,24,26) in each electrical cable (1,4,5,6) contains a course of events in time where the pulse is positive and negative in relation to said state of rest for the current.

11. Method according to any of the preceding claims **characterized in that** said first current pulse (20) has a pulse characteristic which differs from the characteristic of other current pulses (22,24,26) in the directing system.

12. Method according to any of the preceding claims **characterized in that** said sensing system (11,12,13) detects the magnetic field (20,22,24,26) transmitted from at least one of said electrical cables (1,4,5,6) in the whole area in which the automatic device (2) is intended to operate.

13. Method according to any of the preceding claims **characterized in that** at least one of said electrical cables (6) is connected directly to one of the other said electrical cables (1).

14. Method according to any of the preceding claims **characterized in that** the sensing system (11,12,13) only detects the magnetic field transmitted from one of said electrical cables (1,4,5,6) in a part of the area in which the automatic device (2) is intended to operate.

15. Method according to any of the preceding claims **characterized in that** at least one signal generator (3,7,8) transmits information to the sensing system (11,12,13) through a selective change of the properties of an information current pulse (22,26) from period to period, said information current pulse (22,26) occurring in an electrical cable at a certain point of time in relation to the first current pulse (20).

16. Method according to claim 15 **characterized in that** said selective change of the properties for the information current pulse (22,26) constitutes in a choppy current direction.

17. Method according to claim 15 **characterized in that** said selective change of the properties for the information current pulse (22,26) constitutes in selectively inhibited current pulses.

18. Method according to claim 15 **characterized in that** said selective change of the properties for the information current pulse (22,26) constitutes in current pulses with selectively different pulse width.

19. Method according to any of the claims 15 - 18 **characterized**

in that different operations are activated at the automatic device (2) based on said information, said operations for instance being a regulation of the movements of said automatic device (2) across the surface in relation to an electrical cable (1,4,5,6).

20. Method according to any of the preceding claims **characterized in that** the sensing system (11,12,13) only detects current pulses (20,22,24,26) which generates magnetic field pulses with one essential field direction.

21. Method according to any of the preceding claims **characterized in that** the sensing system (11,12,13) detects the positive and negative flank of a current pulse (20,22,24,26), whereby the time distance between these two flanks determines the processing said sensing system makes based on the detected flanks.

22. Method according to claim 21 **characterized in that** the sensing system (11,12,13) detects said flanks by detecting occurred voltage pulses.

23. Method according to any of the preceding claims **characterized in that** the sensing system (11,12,13), with knowledge of said occurred voltage pulses (50/50'), detects on which side of a cable (1,4,5,6) at least a part of the automatic device (2) is being positioned.

24. Method according to claim 23 **characterized in that** said detection refers to the fact that the sensing system (11,12,13) detects the magnetic field (50/50') which is being generated from at least one current pulse (45) and based on the properties (50/50') of said magnetic field detects on which side of a cable (1,4,5,6) at least a part of the automatic device (2) is positioned.

25. Method according to any of the claims 23 - 24 **characterized in that** said detection refers to the fact that the sensing system (11,12,13) detects the magnetic field (50/50') which is generated from at least one current pulse (45) and based on the relation between at least one current pulse (45) detected via said magnetic field (50/50') and at least one state of rest detected via said magnetic field (50/50') detects on which side of a cable (1,4,5,6) at least a part of the automatic device (2) is being positioned.

26. Method according to any of the claims 23 - 25 **characterized in that** the sensing system (11,12,13) detects on which side of a cable (1,4,5,6) at least a part

of the automatic device (2) is positioned by generating an interpretation signal (T) based on the detected magnetic field, the characteristics of said interpretation signal being dependent on which side of said cable at least a part of the automatic device (2) is positioned.

27. Method according to claim 26 **characterized in that** the sensing system (11,12,13) operates the automatic device (2) in relation to a cable (1,4,5,6) with knowledge of the characteristics of the interpretation signal (T).

28. Method according to claim 27 **characterized in that** said characteristics refers to a pulse ratio corresponding to the time division between those occasions during which a characteristic signal pulse occurs and those occasions during which no such signal pulse occurs.

29. Method according to claim 28 **characterized in that** said pulse ratio has an asymmetric characteristic.

30. Method according to any of the claims 27 - 29 **characterized in that** the sensing system (11,12,13), based on the detection on which side of a cable (1,4,5,6) at least a part of the automatic device (2) is positioned, operates the automatic device (2) in relation to a cable (1,4,5,6).

31. Method according to any of the claims 27 - 30 **characterized in that** said operation consists in the automatic device (2) being manoeuvred to a certain side of a cable (1,4,5,6).

32. Method according to any of the preceding claims **characterized in that** said current pulse and/or voltage pulse and/or signal pulse refers to a square wave.

33. Method according to any of the preceding claims **characterized in that** pulse ratio, which corresponds to the time division between those occasions during which a characteristic current pulse occurs and those occasions during which no characteristic current pulse occurs, is asymmetric.

34. Method according to any of the preceding claims **characterized in that** the sensing system (11,12,13), through detecting information from current pulses (20,22,24,26) or through detecting information from the user, activates an operation which uses the knowledge said sensing system has about the electrical cable (1,4,5,6) collected by detecting additional information sent by the electrical cable (1,4,5,6).

35. Method according to claim 34 **characterized in that** said activation of an operation means that the automatic device (2), when approaching an electrical cable (1,4,5,6), substantially follows (31 ,32) said cable (1,4,5,6) in one of its extension directions.

36. Method according to any of the claims 34 - 35 **characterized in that** said activation of an operation means that the automatic device (2), when being within an area surrounded by an electrical cable (1,4,5,6) and approaching said cable (1,4,5,6), changes direction and moves (30) inside said area away from said cable (1,4,5,6).

37. Method according to any of the claims 34 - 36 **characterized in that** said activation of an operation means that a user via a control device can control the movements and/or treatment that the automatic device (2) is performing.

38. Method according to any of the preceding claims **characterized in that** the sensing system (11,12,13) transmits information.

39. Method according to claim 38 **characterized in that** said transmitted information is being sent in the time interval between two occurring current pulses (20,22,24,26).

40. Electronic directing system for operating an automatic device (2),

- said electronic directing system comprising

  - at least one first electrical cable (1,4,5,6) connected to
  - at least one first signal generator (3,7,8)
  - at least one sensing system (11,12,13) arranged on said automatic device (2),

- said sensing system (11,12,13)

  - detecting at least one magnetic field being transmitted via said cable (1,4,5,6) and propagating through the air,
  - transmitting a processed signal to at least one driving means for moving said automatic device (2) in relation to a surface,

- said driving means being arranged on said automatic device (2),
- said first signal generator (3,7,8) transmitting a current through said first cable (1,4,5,6),
- said current during a part of time being in a

state of rest where it is substantially constant,
- said state of rest periodically being interrupted by at least one first characteristic current pulse (20) used to synchronize said sensing system
- said first current pulse being transmitted through an electrical cable (1) that substantially demarcates the area within which the automatic device (2) is intended to operate,

characterized in that

- said sensing system (11,12,13) synchronizes the time intervals (28,29) within which it detects magnetic fields based on the properties of said first current pulse (20)~~.~~; and
- said automatic device (2) is an automatic lawnmower comprising a treatment system constituted of knives cutting the plants growing on said surface.

41. Electronic directing system according to claim 40 **characterized in that** said current has the same period (21) irrespective of the electrical cable (1,4,5,6) through which it is transmitted.

42. Electronic directing system according to any of the claims 40 - 41 **characterized in that** every current pulse (22,24,26) has a time occurrence defined by the directing system and adapted to said first current pulse (20).

43. Electronic directing system according to any of the claims 40 - 42 **characterized in that** a transmitted current pulse (20,22,24,26) in each electrical cable (1,4,5,6) contains a course of events in time where the pulse is positive and negative in relation to said state of rest for the current.

44. Electronic directing system according to any of the claims 40 - 43 **characterized in that** said first current pulse (20) has a pulse width which differs from the pulse width of other current pulses (22,24,26) in the directing system.

45. Electronic directing system according to any of the claims 40 - 44 **characterized in that** said sensing system (11,12,13) detects the magnetic field (20,22,24,26) transmitted from at least one of said electrical cables (1,4,5,6) in the whole area in which the automatic device (2) is intended to operate.

46. Electronic directing system according to any of the claims 40 - 45 **characterized in that** at least one of said electrical cables (6) is connected directly to one of said other electrical cables (1).

47. Electronic directing system according to any of the claims 40 - 46 **characterized in that** at least one of the electrical cables (1,4,5,6) is arranged above, within or below the surface which the automatic device (2) is intended to move in relation to, said cable (1,4,5,6) thereby separating an inner area of said surface being surrounded by the cable (1 ,4,5,6) from an outside area outside said cable (1,4,5,6).

48. Electronic directing system according to any of the claims 40 - 47 **characterized in that** the sensing system (11,12,13) only detects the magnetic field transmitted from one of said electrical cables (1,4,5,6) in a part of the area in which the automatic device (2) is intended to operate.

~~49. Electronic directing system according to any of the claims 40 - 48 characterized in that the automatic device (2) is a treating robot which comprises a treatment system for treating said surface.~~

~~50.~~49. Electronic directing system according to claim 49 **characterized in that** the treatment system is operated based on information received and/or stored for treatment operations by the sensing system (11,12,13).

~~**51.** Electronic directing system according to any of the claims 49 - 50 **characterized in that** said automatic device is an automatic lawnmower, whereby said treatment system constitutes in knives cutting the plants growing on said surface.~~

~~**52.** Electronic directing system according to any of the claims 49 - 51 **characterized in that** said electronic directing system relates to an automatic vacuum cleaner, whereby said treatment system comprises parts which a normal automatic vacuum cleaner is equipped with for cleaning said surface, said parts for instance being a brush roller and a suction device.~~

~~**53.** Electronic directing system according to any of the claims 49 - 52 **characterized in that** said electronic directing system is an automatic cleaning robot, whereby said treatment system comprises parts which a normal cleaning robot is equipped with for cleaning a surface, such as tools for wet cleaning.~~