**Claims**

1. An ARC evaporator comprising:

- a cathode assembly comprising a cooling plate (11), a target (1) as cathode element, the target (1) having a thickness in a cross direction, a front surface (1A) disposed to be evaporated, and a back surface (1B), the front surface (1A) being parallel to the back surface (1B), the front surface and the back surface being separated from each other by a thickness of the target (1), the cathode assembly having a total height in a transversal direction and borders delimiting a total amplitude in a longitudinal direction, and the target defining a central region of the cathode assembly in the longitudinal direction, with a peripherical region of the cathode assembly extending beyond the target in the longitudinal direction,

- an electrode arranged for enabling an arc to be established between the electrode and the front surface (1A) of the target (1) for causing evaporation of at least part of the front surface of the target (1), and

- a magnetic guidance system placed in front of the back surface (1B) of the target (1) comprising means for generating one or more magnetic fields resulting in a total magnetic field comprising magnetic field lines which extend through a cross section of the target (1) and along a space in front of the front surface (1A) of the target (1) for guiding a cathode spot that results from contact of an arc to the target (1), when the arc is established between the electrode and the front surface (1A) of the target (1),

wherein the magnetic guidance system in the ARC evaporator comprises means placed in the central region for generating at least one magnetic field and means in the peripherical region for generating at least one further magnetic field, wherein the magnetic fields generated in this manner result in a total magnetic field for guiding the arc and controlling the cathode spot path at the front surface (1A) of the target, wherein the means placed in the central region comprises one electromagnetic coil (C3) for generating a magnetic field and the means placed in the peripherical region comprises two electromagnetic coils (C1, C2) for generating two further magnetic fields.

2. The ARC evaporator according to claim 1, wherein the magnetic guidance system comprises ferromagnetic material (20) disposed surrounding the means for generating the magnetic fields, wherein the ferromagnetic material (20) is distributed encircling the means with no ferromagnetic material (20) placed between the magnetic guidance system and the cathode assembly.

3. The ARC evaporator according to claim 1, wherein the magnetic guidance system comprises ferromagnetic material (20) disposed surrounding the means for generating the magnetic fields, wherein the ferromagnetic material (20) is distributed partially encircling the means with no ferromagnetic material (20) placed between the magnetic guidance system and the cathode assembly, wherein an upper part with length (S) of the electromagnetic coil (C3) placed in the central region as well as an upper part with length (S') of the electromagnetic coil (C2) placed in the peripherical region but closest to the electromagnetic coil placed in the central region is not encircled by ferromagnetic material (20), resulting in a space (Spc) comprising air, allowing in this manner that the total magnetic field that results from a sum of the generated magnetic fields exhibits more magnetic field lines that are parallel to the front surface (1A) of the target (1) in comparison with a similar arc evaporator without having said space (Spc) comprising air.

4. The ARC evaporator according to claim 3, wherein the upper length (S) is in the following range: $3mm \leq S \leq 15mm$, a target diameter (D1) is in the following range: $100mm \leq D1 \leq 150mm$ and a total diameter (D) of the cathode assembly is in the following range: $150mm \leq D \leq 200mm$.

5. The ARC evaporator according to claim 4, wherein the borders of the cathode assembly comprise a surrounding shield (15) made of ferromagnetic material, wherein the surrounding shield (15) has a total height (H) in the transversal direction, said total height (H) including a component (C) for causing a shielding effect of magnetic field lines extending in any longitudinal direction, establishing in this manner the borders of the cathode assembly as a limit of the extension of the magnetic field lines in any longitudinal direction.

6. The ARC evaporator according to claim 5, wherein the cathode assembly has a symmetrical construction comprising a disc-shaped target with a target diameter (D1)

and the cathode assembly has a total diameter (D), wherein the component (C) has a value in the following range: D/20 ≤ C ≤ D/5.

7. The ARC evaporator according to any of the preceding claims 4 to 6, wherein the target diameter is in the following range: 100mm ≤ D1 ≤ 150mm and the total diameter of the cathode assembly is in the following range: 150mm ≤ D ≤ 200mm.

8. The ARC evaporator according to any of the preceding claims, wherein the ferromagnetic material is pure iron or ARMCO pure iron or construction steel or martensitic chromium steel.

9. The ARC evaporator according to claim 8, wherein the ferromagnetic material is construction steel S355J2.

10. A coating process conducted by using an ARC evaporator according to any of the preceding claims, comprising operating the ARC evaporator by adjusting the three electromagnetic coils which constitute a coil system producing an oscillation of the magnetic field, thereby adjusting an oscillation frequency for guiding the arcs running at the front surface (1A) of the target describing circular arc traces having different diameters.

11. The coating process according to claim 10, comprising using a circular target, which comprises a first material (M1), forming an outer annular area of the target to be vaporized, and a second material (M2), forming an inner area of the target to be vaporized.

12. The coating process according to claim 11, wherein the target comprises two or more materials distributed in such a manner, that by changing the diameter of the circular arc being operated at the target surface, the target material that is being vaporized is changed.

13. The coating process according to claim 12, wherein the at least two materials are aluminum and titanium.

14. The coating process according to any of the preceding claims 11 to 13, wherein a coating formed during operation of the ARC evaporator exhibits a multilayer structure.

15. The coating process according to any of the preceding claims 10 to 14, wherein the oscillation frequency is adjusted to be in a range between 0.1 Hz and 50 Hz.