Claims

1. An ARC evaporator comprising:

- a cathode assembly comprising a cooling plate (11), a target (1) as cathode element, preferably a disc-shaped target but can be also for example a rectangular target, the target (1) having a thickness in the 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), these both surfaces being separated one of each other by the thickness of the target (1), the cathode assembly having a total height in the transversal direction and borders delimiting the total amplitude in any longitudinal direction,

- an electrode arranged for enabling that an arc between the electrode and the front surface (1A) of the target (1) can be established 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 the cross section of the target (1) and along the space in front of the front surface (1A) of the target (1) for guiding a cathode spot that results from the 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),

characterized in that:

- 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), wherein the component (C) is measured in the transversal direction from the cooling plate (11) to the end of the surrounding shield (15), wherein the end of the surrounding shield (15) exceeds the cooling plate (11) in the transversal direction for causing a shielding effect of magnetic field lines extending in any longitudinal directions, establishing in this manner the borders of the cathode assembly as limit of the extension of the magnetic field lines in any longitudinal direction, and

further characterized in that the cathode assembly has a symmetrical construction comprising a disc-shaped target with 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.

~~2. The ARC evaporator comprising according to claim 1, characterized in that the cathode assembly has a symmetrical construction comprising a disc-shaped target with 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.~~

~~3~~2. The ARC evaporator according to claim 1 ~~or 2~~, characterized in that 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.

~~4~~3. The ARC evaporator according to ~~any of the preceding~~ claim~~s~~ 1 or 2, characterized in that the ferromagnetic material is pure iron or ARMCO pure iron or construction steel or martensitic chromium steel.

~~5~~4. The ARC evaporator according to claim ~~4~~3, characterized in that the ferromagnetic material is construction steel S355J2.

~~6~~5. The ARC evaporator according to any of the preceding claims, characterized in that the magnetic guidance system in the ARC source comprises means placed in a central region for generating at least one magnetic field and means in a 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.

~~7~~6. The ARC evaporator according to claim ~~6~~5, characterized in that 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.

~~8~~7. The ARC evaporator according to claim ~~6~~5, characterized in that the means for generating the magnetic fields comprises permanent magnets and only one electromagnetic coil to be used as control coil for producing variations of the magnetic field characteristics.

~~9~~8. The ARC evaporator source according to any of the preceding claims, characterized in that the magnetic guidance system comprises ferromagnetic material (20) disposed surrounding the means for generation of magnetic field, wherein the ferromagnetic material 20 is distributed encircling the means but only no ferromagnetic material (20) is placed between the magnetic guidance system and the cathode assembly.

~~10~~9. The ARC evaporator according to claim ~~7~~6, characterized in that the magnetic guidance system comprises ferromagnetic material (20) disposed surrounding the means for generation of magnetic field, wherein the ferromagnetic material 20 is distributed partially encircling the means but no ferromagnetic material (20) is 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 the 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.

~~11~~10. The ARC evaporator according to claim ~~10~~9, characterized in that the upper length (S) is in the following range: 3mm ≤ S ≤ 15mm, the target diameter (D1) is in the following range: 100mm ≤ D1 ≤ 150mm and the total diameter (D) of the cathode assembly is in the following range: 150mm ≤ D ≤ 200mm.