CLAIMS

1. A temperature-controlled tramp metal separation assembly comprising:

a core rod made of non-magnetic materials including a longitudinal axis, a chamber, a first closed end with at least an air inlet, a closed second end with at least an air outlet;

a magnetic set including a plurality of magnetic members and a plurality of spacers made of a material having a magnetic permeability or a saturation magnetization and each of the spacers being disposed between the two adjacent magnetic members; and

the magnetic set nested in the chamber along the longitudinal axis in way that an air path is formed therein so that an external cooling air flow can be introduced from the air inlet, and then discharged from the air outlet via the air path, wherein the chamber of the core rod has a first part and a second part, the magnetic set is nested in the second part to form a magnetic section, the first part forms a non-magnetic section, the temperature-controlled tramp metal separation assembly further comprises a sleeve tube made of non-magnetic materials and having a length less than that of the core rod, the sleeve tube being sleeved outside the core rod in a way that it is moveable to and fro along the longitudinal axis of the core rod and between a first position, wherein the sleeve tube corresponds to the magnetic section to capture tramp metals of the raw materials, and a second position, wherein the sleeve tube corresponds to the non-magnetic section to discharge tramp metals captured thereon.

2. The temperature-controlled tramp metal separation assembly of claim 1, wherein the core rod includes a first flat surface, a second flat surface and an arc-shaped surface, the first flat surface and the second flat surface are combined to form an upper portion of the chamber with an included angle less than 90 degrees, the arc-shaped surface are combined with the first flat surface and the second flat surface to form an arc-shaped lower portion of the chamber, each of the magnetic members and each of the spacers have a circular-shaped cross section and are nested in the lower portion of the chamber in a way that a part of the upper portion of the chamber forms the air path.

3. A temperature-controlled tramp metal separation assembly comprising:

a core rod made of non-magnetic materials including a longitudinal axis, a chamber, a first closed end with at least an air inlet, a closed second end with at least an air outlet;

a magnetic set including a plurality of magnetic members and a plurality of spacers made of a material having a magnetic permeability or a saturation magnetization and each of the spacers being disposed between the two adjacent magnetic members; and

the magnetic set nested in the chamber along the longitudinal axis in way that an air path is formed therein so that an external cooling air flow can be introduced from the air inlet, and then discharged from the air outlet via the air path, further comprising a housing including a first discharging area, a second discharging area and a feeding area between the first discharging area and the second discharging area; a sleeve tube made of non-magnetic materials and including a first portion, a second portion, a longitudinal length less than the longitudinal length of the core rod and an axial hole with an inner diameter larger than the outer diameter of the core rod; and a cooling air transmitting unit coupled with the core rod to introduce an external cooling air flow from the air inlet, and then discharged from the air outlet via the air path;

wherein the chamber of the core rod has a first part, a second part and a third part, the first part forms a first non-magnetic section, the second part forms a magnetic section by nesting the magnetic set therein, and the third part forms a second non-magnetic section, the core rod is mounted on the housing in a way that the first and second non-magnetic sections correspond respectively to the first and second discharging areas and the magnetic section corresponds to the feeding area;

the sleeve tube is sleeved outside the core rod in a way that it is moveable to and fro along the first longitudinal axis of the core rod and between a first position, wherein the first portion corresponds to the magnetic section to capture tramp metals of the raw materials and the second portion corresponds to the second non-magnetic section to discharge tramp metals captured thereon, and a second position, wherein the first portion corresponds to the first non-magnetic section to discharge tramp metals captured thereon, and the second portion corresponds to the magnetic section to capture tramp metals of the raw materials.

4. The temperature-controlled tramp metal separation assembly of claim 3, wherein

the core rod includes a first flat surface, a second flat surface and an arc-shaped surface, the first flat surface and the second flat surface are combined to form an upper portion of the chamber with an included angle less than 90 degrees, the arc-shaped surface are combined with the first flat surface and the second flat surface to form an arc-shaped lower portion of the chamber, each of the magnetic members and each of the spacers have a circular-shaped cross section and are nested in the lower portion of the chamber in a way that a part of the upper portion of the chamber forms the air path.

5. The temperature-controlled tramp metal separation assembly of claim 3, further comprising a first non-magnetic inner tube and a second non-magnetic inner tube wherein the first non-magnetic inner tube is disposed within the first part of the core rod and abuts against a first side of the magnetic set, and the second non-magnetic inner tube is disposed within the third part of the core rod and abuts against a second side of the magnetic set.

6. The temperature-controlled tramp metal separation assembly of claim 3, further comprising a temperature sensor disposed on the housing and coupled with the cooling air transmitting unit in a way that when the operating temperature of the housing is equal to or greater than a first predetermined temperature, the temperature sensor will produce a first signal to actuate the cooling air transmitting unit for introducing external cooling air flow into the air path, and when the operating temperature of the housing is equal to or lower than a second predetermined temperature, the temperature sensor will produce a second signal to stop the cooling air transmitting unit from introducing external cooling air flow into the air path.

7. The temperature-controlled tramp metal separation assembly of claim 3, wherein the housing includes a front wall, a rear wall, a first side wall, a second side wall a first inner plate and a second inner plate, the front and rear walls combine with the first and second side walls to define a receiving space within the housing, the first inner plate and the second inner plate are respectively disposed between the first side wall and the second side wall to divide the receiving space into the first discharging area, the second

discharging area and the feeding area, the core rod is adapted to pass through the first inner plate and the second inner plate and secures respectively each of ends thereof on the front and rear walls, and the sleeve tube is also adapted to pass through the first inner plate and the second inner plate in a way that it is moveable to and fro between the first and second positions; and

the temperature-controlled tramp metal separation assembly further comprises a temperature sensor mounted on a part of the first side wall located in the feeding area of the housing and coupled with the cooling air transmitting unit in a way that when the operating temperature of the housing is equal to or greater than a first predetermined temperature, the temperature sensor will produce a first signal to actuate the cooling air transmitting unit for introducing external air into the air path, and when the operating temperature of the housing is equal to or lower than a second predetermined temperature, the temperature sensor will produce a second signal to stop the cooling air transmitting unit from introducing external cooling air into the air path.

8. The temperature-controlled tramp metal separation assembly of claim 7, further comprising a plurality of the core rods and a plurality of the sleeve tubes, wherein the core rods and the sleeve tubes are divided into a plurality of groups, each of the groups is arranged in a way that each of the core rods and the sleeve tubes thereof is parallel to each other in a horizontal plane, and each of the horizontal planes is spaced apart such that the core rods and the sleeve tubes are provided in a staggered configuration to ensure contact of the raw materials with the first and second portions of the sleeve tubes; the cooling air transmitting unit includes an air introducing member with external cooling air suppliers, an air diverter having a plurality of output ends connected respectively to the air inlet of each of the core rods, and a controlling member operatively connected to the air introducing member and the air diverter.

9. The temperature-controlled tramp metal separation assembly of claim 8, further comprising a first driving plate, a second driving plate and a linear actuator, wherein the first driving plate is fixedly connected to a first end of each of the sleeve tubes and disposed in the first discharging area; the second driving plate is fixedly connected to a

second end of each of the sleeve tubes and disposed in the second discharging area, each of the driving plates is configured to be moveable along the core rods, and the linear actuator is connected with one of the driving plates for actuating the sleeve tubes to move back and forth between the first position and the second position.

10. The temperature-controlled tramp metal separation assembly of claim 9, further comprising a guiding rod disposed on one of the side walls of the housing, wherein the guiding rod has a second longitudinal axis parallel to the first longitudinal axis of the core rods and is coupled with the driving plates for guiding the back and forth movement thereof.