Claims

1. An ethylene cracking furnace, comprising:

at least one radiant section, which is provided with a bottom burner and/or a side burner, and at least one set of radiant coil arranged along a longitudinal direction of the radiant section,

wherein the radiant coil is an at least two-pass coil having an N-1 structure, N preferably being a natural number from 2 to 8; and

a manifold is arranged at an inlet end of a downstream tube of said at least two-pass coil, and an outlet end of each upstream tube of said at least two-pass coil is connected to the manifold through a curved connector.

2. The ethylene cracking furnace according to claim 1, wherein the manifold is in the form of an invertedly Y-shaped pipe or a palm-like pipe having N input ends and one output end, N equaling 2 or 4.

3. The ethylene cracking furnace according to claim 1 or 2, wherein each curved connector comprises a U-shaped elbow and an S-shaped elbow, of which one connects to the outlet end of a corresponding upstream tube, and the other connects to an inlet end of the manifold.

4. The ethylene cracking furnace according to claim 3, wherein the upstream tubes are divided into two groups each with the same number of tubes respectively arranged at two sides of the downstream tube, and wherein all of the upstream tubes and the downstream tube are arranged in a common plane.

5. The ethylene cracking furnace according to claim 4, wherein viewed from a top view of the radiant coil, with respect to the downstream tube, corresponding S-shaped elbows are respectively arranged at two sides of the plane in which the tubes are located and in parallel with each other, and/or corresponding U-shaped elbows are respectively arranged at two sides of the plane in which the tubes are located and in one and the same line.

~~6. The ethylene cracking furnace according to claim 5, wherein all the S-shaped~~

elbows are in parallel with one another.

7. The ethylene cracking furnace according to claim 5, wherein all the S-shaped elbows are divided into a plurality of groups, with all S-shaped elbows in each group in parallel with one another.

8. The ethylene cracking furnace according to claim 2, wherein when N equals 4, every two upstream tubes are first combined together via one Y-shaped pipe element before being connected to the curved connector.

9. The ethylene cracking furnace according to claim 1 or 2, wherein the upstream tubes are divided into two groups each with the same number of tubes respectively arranged at two sides of the plane in which the downstream tube is located, and

wherein with respect to the plane in which the downstream tube is located, the plane in which the upstream tubes arranged at one side of the downstream tube are located is in mirror relationship with the plane in which the upstream tubes arranged at the other side of the downstream tube are located.

10. The ethylene cracking furnace according to claim 9, wherein the upstream tubes arranged at one side of the downstream tube, the upstream tubes arranged at the other side of the downstream tube, and the downstream tube are respectively in three planes parallel with one another.

11. The ethylene cracking furnace according to claim 3, wherein the upstream tubes are all arranged at one and the same side of the downstream tube.

12. The ethylene cracking furnace according to claim 11, wherein all the upstream tubes and the downstream tube are positioned in a common plane.

13. The ethylene cracking furnace according to claim 12, wherein viewed from a top view of the radiant coil, the curved connectors of two adjacent upstream tubes are respectively located at two sides of the plane in which the tubes are located.

14. The ethylene cracking furnace according to claim 13, wherein each S-shaped

elbow connects to the outlet end of a corresponding upstream tube, and each U-shaped elbow connects to an inlet end of the manifold, and

wherein the S-shaped elbows at either side of the plane in which the tubes are located are in parallel with one another, and the U-shaped elbows at either side of the plane in which the tubes are located are in parallel with one another.

15. The ethylene cracking furnace according to claim 13, wherein each S-shaped elbow connects to a corresponding inlet end of the manifold, and each U-shaped elbow connects to the outlet end of a corresponding upstream tube, and

wherein the S-shaped elbows arranged respectively at two sides of the plane in which the tubes are located are in mirror relationship with respect to the plane in which the tubes are located.

16. The ethylene cracking furnace according to claim 13, wherein the curved connectors of two adjacent upstream tubes have the same length.

17. The ethylene cracking furnace according to claim 11, wherein all the upstream tubes are arranged in two planes respectively, which are in mirror relationship with respect to the plane in which the downstream tube is located.

18. The ethylene cracking furnace according to claim 1 or 2, wherein the tube diameter of the curved connector equals the tube diameter of the upstream tube.

19. The ethylene cracking furnace according to any one of claims 1 to 18, wherein the radiant coil is a two-pass coil, the upstream tube being the first-pass tube and the downstream tube being the second-pass tube.

20. The ethylene cracking furnace according to any one of claims 1 to 18, wherein the radiant coil is a multi-pass coil having more than two passes, the upstream tubes being odd-numbered ones while the downstream tubes being even-numbered ones.

Claims

1. An ethylene cracking furnace, comprising:

at least one radiant section, which is provided with a bottom burner and/or a side burner, and at least one set of radiant coil arranged along a longitudinal direction of the radiant section,

wherein the radiant coil is an at least two-pass coil having an N-1 structure, N preferably being a natural number from 2 to 8; and

a manifold is arranged at an inlet end of a downstream tube of said at least two-pass coil, and an outlet end of each upstream tube of said at least two-pass coil is connected to the manifold through a curved connector;

and the said manifold is in the form of an invertedly Y-shaped pipe or a palm-like pipe having N input ends and one output end, N equaling 2 or 4; and

wherein each curved connector comprises a U-shaped elbow and an S-shaped elbow, of which one connects to the outlet end of a corresponding upstream tube, and the other connects to an inlet end of the manifold.

2. The ethylene cracking furnace according to claim 1, wherein the upstream tubes are divided into two groups each with the same number of tubes respectively arranged at two sides of the downstream tube, and wherein all of the upstream tubes and the downstream tube are arranged in a common plane.

3. The ethylene cracking furnace according to claim 2, wherein viewed from a top view of the radiant coil, with respect to the downstream tube, corresponding S-shaped elbows are respectively arranged at two sides of the plane in which the tubes are located and in parallel with each other, and/or corresponding U-shaped elbows are respectively arranged at two sides of the plane in which the tubes are located and in one and the same line.

4. The ethylene cracking furnace according to claim 3, wherein all the S-shaped elbows are in parallel with one another.

5. The ethylene cracking furnace according to claim 3, wherein all the S-shaped elbows are divided into a plurality of groups, with all S-shaped elbows in each group in parallel with one another.

6. The ethylene cracking furnace according to claim 1, wherein when N equals 4, every two upstream tubes are first combined together via one Y-shaped pipe element before being connected to the curved connector.

7. The ethylene cracking furnace according to claim 1, wherein the upstream tubes are divided into two groups each with the same number of tubes respectively arranged at two sides of the plane in which the downstream tube is located, and

wherein with respect to the plane in which the downstream tube is located, the plane in which the upstream tubes arranged at one side of the downstream tube are located is in mirror relationship with the plane in which the upstream tubes arranged at the other side of the downstream tube are located.

8. The ethylene cracking furnace according to claim 7, wherein the upstream tubes arranged at one side of the downstream tube, the upstream tubes arranged at the other side of the downstream tube, and the downstream tube are respectively in three planes parallel with one another.

9. The ethylene cracking furnace according to claim 1, wherein the upstream tubes are all arranged at one and the same side of the downstream tube.

10. The ethylene cracking furnace according to claim 9, wherein all the upstream tubes and the downstream tube are positioned in a common plane.

11. The ethylene cracking furnace according to claim 10, wherein viewed from a top view of the radiant coil, the curved connectors of two adjacent upstream tubes are respectively located at two sides of the plane in which the tubes are located.

12. The ethylene cracking furnace according to claim 11, wherein each S-shaped elbow

connects to the outlet end of a corresponding upstream tube, and each U-shaped elbow connects to an inlet end of the manifold, and

wherein the S-shaped elbows at either side of the plane in which the tubes are located are in parallel with one another, and the U-shaped elbows at either side of the plane in which the tubes are located are in parallel with one another.

13. The ethylene cracking furnace according to claim 11, wherein each S-shaped elbow connects to a corresponding inlet end of the manifold, and each U-shaped elbow connects to the outlet end of a corresponding upstream tube, and

wherein the S-shaped elbows arranged respectively at two sides of the plane in which the tubes are located are in mirror relationship with respect to the plane in which the tubes are located.

14. The ethylene cracking furnace according to claim 11, wherein the curved connectors of two adjacent upstream tubes have the same length.

15. The ethylene cracking furnace according to claim 9, wherein all the upstream tubes are arranged in two planes respectively, which are in mirror relationship with respect to the plane in which the downstream tube is located.

16. The ethylene cracking furnace according to claim 1, wherein the tube diameter of the curved connector equals the tube diameter of the upstream tube.

17. The ethylene cracking furnace according to any one of claims 1 to 16, wherein the radiant coil is a two-pass coil, the upstream tube being the first-pass tube and the downstream tube being the second-pass tube.

18. The ethylene cracking furnace according to any one of claims 1 to 16, wherein the radiant coil is a multi-pass coil having more than two passes, the upstream tubes being odd-numbered ones while the downstream tubes being even-numbered ones.