~~What is claimed is:~~

1. A cast product comprising a cast body having a surface formed with an alumina barrier layer containing Al_2O_3,

wherein the cast body contains C: 0.3 to 0.7 mass%, Si: 0.1 to 1.5 mass%, Mn: 0.1 to 3 mass%, Cr: 15 to 40 mass%, Ni: 20 to 55 mass%, Al: 2 to 4 mass%, rare earth element: 0.005 to 0.4 mass%, W: 0.5 to 5 mass% and/or Mo: 0.1 to 3 mass%, and 25 mass% or more of Fe in the remainder and an inevitable impurity, and

80% or more of the rare earth element is La.

2. The cast product according to claim 1, wherein the rare earth element does not contain Ce.

3. The cast product according to claim 1, wherein the rare earth element contains 0.1 mass% or less of Ce.

4. The cast product according to any one of claims 1 to 3, wherein the cast body further contains at least one kind selected from the group consisting of Ti: 0.01 to 0.6 mass%, Zr: 0.01 to 0.6 mass% and Nb: 0.1 to 3.0 mass%.

5. The cast product according to any one of claims 1

to 4, wherein the cast body further contains more than 0.01 mass% and 0.1 mass% or less of B.

6. The cast product according to any one of claims 1 to 5, wherein the alumina barrier layer has a thickness of 0.05 to 3 μm.

7. The cast product according to any one of claims 1 to 6, wherein the cast body covered with the alumina barrier layer has a surface roughness (Ra) of 0.05 to 2.5 μm.

8. The cast product according to any one of claims 1 to 7, wherein the cast body is produced by centrifugal casting.

9. A method for producing a cast product having an alumina barrier layer, for use in a high temperature atmosphere, comprising:

a step of conducting a treatment by an acid solution containing a polyhydric alcohol liquid on a surface of a cast body made of a heat resistant alloy containing 15 mass% or more of Cr and 20 mass% or more of Ni, and 2 to 4 mass% of Al; and

a heat treatment step for forming an alumina barrier

layer containing Al_2O_3 on a surface by conducting a heat treatment on the cast body having subjected to the acid treatment.

10. The method for producing a cast product according to claim 9, wherein the acid treatment is conducted by a glyceregia liquid containing nitric acid, hydrochloric acid and glycerol, or by a glycol liquid containing glycol.

11. The method for producing a cast product according to claim 9, wherein the polyhydric alcohol liquid contained in the glyceregia liquid or the glycol liquid is more than 10 mass% and 40 mass% or less.

12. The method for producing a cast product according to any one of claims 9 to 11, wherein the cast body is a tube body having a bent part, and subjected to a bending process prior to the acid treatment.

13. The method for producing a cast product according to claims 9 to 12, wherein an alumina barrier layer containing Al_2O_3 having a thickness of 0.05 μm or more is formed on the surface of the cast product by a heat treatment.

14. The method for producing a cast product according to any one of claims 9 to 13, wherein the cast body contains C: 0.3 to 0.7 mass%, Si: 0.1 to 1.5 mass% or less, Mn: 0.1 to less than 3.0 mass%, Cr: 15 to 40 mass%, Ni: 20 to 55 mass%, Al: 2 to 4 mass%, rare earth element: 0.005 to 0.4 mass%, W: 0.5 to 5 mass% and/or Mo: 0.1 to 3 mass%, and the remainder of Fe and an inevitable impurity.

15. The method for producing a cast product according to claim 14, wherein the cast body contains at least one kind of Ti: 0.01 to 0.6 mass%, Zr: 0.01 to 0.6 mass% and Nb: 0.1 to 3.0 mass%.

16. The method for producing a cast product according to claim 14 or 15, wherein the cast body contains more than 0.01 mass% and 0.1 mass% or less of B.

17. A cast product produced by the method for producing a cast product according to any one of claims 9 to 16, wherein an alumina barrier layer containing Al_2O_3 with a thickness of 0.05 μm or more is formed on the surface of the cast product, and 80 area% or more of the superficial surface of the alumina barrier layer is composed of Al_2O_3.

18. A cast product comprising a straight tubular cast body of a heat resistant alloy containing 15 mass% or more of Cr and 20 mass% or more of Ni, and containing 2 to 4 mass% of Al, for use in a high temperature atmosphere,

wherein the cast body has an inner diameter of 40 mm or less and/or a length of 3000 mm or more, and the entire inner surface is covered with an alumina barrier layer containing Al_2O_3.

19. A cast product produced by bending a straight tubular cast body of a heat resistant alloy containing 15 mass% or more of Cr and 20 mass% or more of Ni, and containing 2 to 4 mass% of Al, for use in a high temperature atmosphere,

wherein the cast body is covered with an alumina barrier layer containing Al_2O_3 not only in a straight tube part but also in a bent portion.

20. The cast product according to claim 19 or claim 20, wherein the alumina barrier layer covers 50% or more of the bent portion, and has a thickness of 0.05 μm or more.

21. The cast product according to any one of claims 18 to 20, wherein the cast body contains C: 0.3 to 0.7 mass%, Si: 0.1 to 1.5 mass% or less, Mn: 0.1 to less than

3.0 mass%, Cr: 15 to 40 mass%, Ni: 20 to 55 mass%, Al: 2 to 4 mass%, rare earth element: 0.005 to 0.4 mass%, and W: 0.5 to 5 mass% and/or Mo: 0.1 to 3 mass%, and the remainder of Fe and an inevitable impurity.

22. The cast product according to claim 21, wherein the cast body further contains at least one kind of Ti: 0.01 to 0.6 mass%, Zr: 0.01 to 0.6 mass% and Nb: 0.1 to 3.0 mass%.

23. The cast product according to claim 21 or claim 22, wherein the cast body further contains more than 0.01 mass% and 0.1 mass% or less of B.

24. A method for producing a cast product for use in a high temperature atmosphere, obtainable by joining a first cast body and a second cast body of a heat resistant alloy containing 15 mass% or more of Cr and 20 mass% or more of Ni, and containing 2 to 4 mass% of Al by welding, comprising the steps of:

joining the first cast body and the second cast body by welding;

conducting a surface treatment on a joined welded part; and

conducting a heat treatment on the welded part having

subjected to the surface treatment.

25. The method for producing a cast product according to claim 24, wherein the surface treatment is a polishing treatment.

26. The method for producing a cast product according to claim 24, wherein the surface treatment is an acid treatment.

27. The method for producing a cast product according to claims 24 to 26, wherein an alumina barrier layer containing Al_2O_3 having a thickness of 0.05 μm or more is formed on the surface of the cast body by the heat treatment.

28. The method for producing a cast product according to any one of claims 24 to 27, wherein the first cast body and the second cast body contain C: 0.3 to 0.7 mass%, Si: 0.1 to 1.5 mass% or less, Mn: 0.1 to less than 3.0 mass%, Cr: 15 to 40 mass%, Ni: 20 to 55 mass%, Al: 2 to 4 mass%, rare earth element: 0.005 to 0.4 mass%, and W: 0.5 to 5 mass% and/or Mo: 0.1 to 3 mass%, and the remainder of Fe and an inevitable impurity.

29. The method for producing a cast product according to claim 28, wherein the first cast body and the second cast body further contain at least one kind of Ti: 0.01 to 0.6 mass%, Zr: 0.01 to 0.6 mass% and Nb: 0.1 to 3.0 mass%.

30. The method for producing a cast product according to claim 28 or 29, wherein the first cast body and the second cast body contain more than 0.01 mass% and 0.01 mass% or less of B.

31. The method for producing a cast product according to any one of claims 24 to 30, wherein the first cast body and the second cast body are respectively tubular bodies, and joined by abutment welding.

32. A cast product produced by the method for producing a cast product according to any one of claims 24 to 31, wherein on the surface of the cast product, an alumina barrier layer containing Al_2O_3 with a thickness of 0.05 μm or more is formed.

33. A cast product for use in a high temperature atmosphere, obtainable by joining a first cast body and a second cast body of a heat resistant alloy containing 15 mass% or more of Cr and 20 mass% or more of Ni, and

containing 2 to 4 mass% of Al by welding,

wherein a welded part between the first cast body and the second cast body is covered with an alumina barrier layer containing Al_2O_3.

34. The cast product according to claim 33, wherein the alumina barrier layer successively continues through the first cast body, the welded part and the second cast body.

35. The cast product according to claim 33 or 34, wherein the alumina barrier layer covers 50% or more of the welded part, and has a thickness of 0.05 μm or more.

36. The cast product according to any one of claims 33 to 35, wherein the first cast body and the second cast body contain C: 0.3 to 0.7 mass%, Si: 0.1 to 1.5 mass% or less, Mn: 0.1 to less than 3.0 mass%, Cr: 15 to 40 mass%, Ni: 20 to 55 mass%, Al: 2 to 4 mass%, rare earth element: 0.005 to 0.4 mass%, and W: 0.5 to 5 mass% and/or Mo: 0.1 to 3 mass%, and the remainder of Fe and an inevitable impurity.

37. The cast product according to claim 36, wherein the first cast body and the second cast body further contain at least one kind of Ti: 0.01 to 0.6 mass%, Zr:

~~0.01 to 0.6 mass% and Nb: 0.1 to 3.0 mass%.~~

38. The cast product according to claim 36 or 37, wherein the first cast body and the second cast body further contain more than 0.01 mass% and 0.1 mass% or less of B.

What is claimed is:

1. A cast product comprising a cast body having a surface formed with an alumina barrier layer containing Al_2O_3,

wherein the cast body contains C: 0.3 to 0.7 mass%, Si: 0.1 to 1.5 mass%, Mn: 0.1 to 3 mass%, Cr: 15 to 40 mass%, Ni: 20 to 55 mass%, Al: 2 to 4 mass%, rare earth element: 0.005 to 0.4 mass%, W: 0.5 to 5 mass% and/or Mo: 0.1 to 3 mass%, and 25 mass% or more of Fe in the remainder and an inevitable impurity, and

80% or more of the rare earth element is La.

2. The cast product according to claim 1, wherein the rare earth element does not contain Ce.

3. The cast product according to claim 1, wherein the rare earth element contains 0.1 mass% or less of Ce.

4. The cast product according to any one of claims 1 to 3, wherein the cast body further contains at least one kind selected from the group consisting of Ti: 0.01 to 0.6 mass%, Zr: 0.01 to 0.6 mass% and Nb: 0.1 to 3.0 mass%.

5. The cast product according to any one of claims 1

to 4, wherein the cast body further contains more than 0.01 mass% and 0.1 mass% or less of B.

6. The cast product according to any one of claims 1 to 5, wherein the alumina barrier layer has a thickness of 0.05 to 3 μm.

7. The cast product according to any one of claims 1 to 6, wherein the cast body covered with the alumina barrier layer has a surface roughness (Ra) of 0.05 to 2.5 μm.

8. The cast product according to any one of claims 1 to 7, wherein the cast body is produced by centrifugal casting.

9. A method for producing the cast product having an alumina barrier layer according to any one of claims 1 to 8, comprising:

a step of conducting a treatment by an acid solution containing a polyhydric alcohol liquid on a surface of a cast body made of a heat resistant alloy containing 15 mass% or more of Cr and 20 mass% or more of Ni, and 2 to 4 mass% of Al; and

a heat treatment step for forming an alumina barrier

layer containing Al_2O_3 on a surface by conducting a heat treatment on the cast body having subjected to the acid treatment.

10. The method for producing a cast product according to claim 9, wherein the acid treatment is conducted by a glyceregia liquid containing nitric acid, hydrochloric acid and glycerol, or by a glycol liquid containing glycol.

11. The method for producing a cast product according to claim 9, wherein the polyhydric alcohol liquid contained in the glyceregia liquid or the glycol liquid is more than 10 mass% and 40 mass% or less.

12. The method for producing a cast product according to any one of claims 9 to 11, wherein the cast body is a tube body having a bent part, and subjected to a bending process prior to the acid treatment.

13. A method for producing the cast product having an alumina barrier layer according to any one of claims 1 to 8, obtainable by joining a first cast body and a second cast body by welding, comprising the steps of:

joining the first cast body and the second cast body by welding;

conducting a surface treatment on a joined welded part; and

conducting a heat treatment on the welded part having subjected to the surface treatment.

14. The method for producing a cast product according to claim 13, wherein the surface treatment is a polishing treatment.

15. The method for producing a cast product according to claim 13, wherein the surface treatment is an acid treatment.

16. The method for producing a cast product according to claim 13, wherein the first cast body and the second cast body are respectively tubular bodies, and joined by abutment welding.