Number of documents: 19

EP-926252	Titanium aluminide for precision casting and method of casting titanium aluminide IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
EP-469525	Titanium aluminides and precision cast articles made therefrom IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP11269584	Titanium aluminide for precision casting IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP2003105539	Finishing method and TiAl based alloy of TiAl based alloy IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES ION ENGINEERING RESEARCH INSTITUTE
EP-816007	Method of friction-welding a shaft to a titanium aluminide turbine rotor IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP2000345260	Ti-Al-(Mo,V,Si,Fe) alloys and method of their manufacture IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP05230569	Titanium aluminide for precision casting and casting method using the same IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP2003041336	[chitanaruminaido] casting and its grain refining method IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP09076079	It is low connecting method of the alloy steel shaft or the steel shaft and chitanaruminaido make body of revolution IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP08311585	Fe, chitanaruminaido for precision casting which includes V IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
US5839504	Precision casting titanium aluminide IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP07018392	Heat treatment method of chitanaruminaido casting part IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP06269927	Process method of [chitanaruminaido] IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP04099840	Titanium aluminide base alloy for precision casting and precision casting method thereof IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP2005082824	METHOD FOR REFORMING SURFACE OF TiAl-BASED ALLOY INTO HIGH-TEMPERATURE OXIDIZATION RESISTANT SURFACE, AND SURFACE-REFORMED PRODUCT IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES ION ENGINEERING RESEARCH INSTITUTE
JP06299306	Production of tial-based isothermally forged alloy IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP06299305	Production of tial-based forged alloy IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP06071427	Brazing method for tial IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES
JP09287038	Production of composite product of titanium-aluminum alloy and metal fiber IHI-ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES

Titanium aluminide for precision casting and method of casting titanium aluminide

EP-926252

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- **US Patent Classification**
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EP0926252	A1	1999-06-30	[EP-926252]
JPH11193431	A	1999-07-21	[JP11193431]
US6165414	A	2000-12-26	[US6165414]
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- **Abstract:**

(EP-926252)
A titanium aluminide having the following chemical composition: Al: 33.5-34.5 wt%, Fe: 1.5-2.0 wt%, V: 1.5-2.0 wt%, and B: 0.05 -0.10 wt%, with the remainder being Ti and inevitable impurities. Greatly decreased is a ratio of alpha 2 phase (Ti3 Al) precipitatable in a TiAl matrix. Accordingly, it is possible to deposit a trace amount (2-5%) of thin line-like alpha 2 phase in the TiAl matrix. This titanium aluminide is particularly suitable for precision casting.

Claims

(EP-926252)

1. A titanium aluminide for precision casting, characterized by having the following chemical composition:
Al: 33.5-34.5 wt%,
Fe: 1.5-2.0 wt%,
V: 1.5-2.0 wt%, and
B: 0.05-0.10 wt%, with the remainder being Ti and inevitable impurities.
2. A titanium aluminide for precision casting, characterized in that it has the following chemical composition:
Al: 33.5-34.5 wt%,
Fe: 1.5-2.0 wt%,
V: 1.5-2.0 wt%, and
B: 0.05-0.10 wt%, with the remainder being Ti and inevitable impurities, and a time for fracture is about 80 to 20,000 hours when a stress of about 130 to 270 MPa is applied at 760 DEG.C.
3. An article of manufacture made from titanium aluminide characterized by having the following chemical composition:
Al: 33.5-34.5 wt%,
Fe: 1.5-2.0 wt%,
V: 1.5-2.0 wt%, and
B: 0.05-0.10 wt%, with the remainder being Ti and inevitable impurities.
4. The article of manufacture according to claim 3, characterized in that the article of manufacture is a rotating or stationary part of an aircraft engine, or a rotating part of an automobile engine.
5. The article of manufacture according to claim 3 or 4, characterized in that the article of manufacture is made by precision casting.
6. A method comprising the steps of:
A) preparing a melt of TiAl having the following chemical composition:
Al: 33.5-34.5 wt%,
Fe: 1.5-2.0 wt%,
V: 1.5-2.0 wt%, and
B: 0.05-0.10 wt%, with the remainder being Ti and inevitable impurities;

7. B) molding a cast utilizing the TiAl melt;

8. C) applying a heat treatment to the cast at a temperature T given by the following equation: T (DEG.C) = (1,200 + 25 (Al(at%) - 44)) +- 10;
and
9. D) cooling the cast.
10. The method of claim 6, characterized in that the heat treatment of step C is carried out five to twenty hours.
11. The method of claim 6 or 7, characterized in that the cooling of step D is carried out at a rate of 100 +- 20 (DEG.C/hr).
12. The method of claim 6, 7 or 8, characterized in that the step B includes the substep of pouring the melt into a mold of complicated shape.
13. The method of any one of claims 6 to 9, characterized in that the step A includes substeps of acquiring an available material which has a chemical composition as close as possible to a desired chemical composition, and adjusting contents of elements included in the available material such that its chemical composition meets the above indicated criteria.
14. The method of any one of claims 6 to 10, characterized by further including the step of providing a mold to cast a blade of an aircraft engine, a rear flap of an aircraft engine or a turbocharger rotor of an automobile engine before the step B.

Titanium aluminides and precision cast articles made therefrom
EP-469525

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- **US Patent Classification**
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EP0469525	A1	1992-02-05	[EP-469525]
JPH0488140	A	1992-03-23	[JP04088140]
JPH0499841	A	1992-03-31	[JP04099841]
US5296055	A	1994-03-22	[US5296055]
EP0620287	A1	1994-10-19	[EP-620287]
EP0469525	B1	1996-04-03	[EP-469525]
DE69118459	D1	1996-05-09	[DE69118459]
DE69118459	T2	1996-11-07	[DE69118459]
JP2734756	B2	1998-04-02	[JP2734756]
EP0620287	B1	1999-11-17	[EP-620287]
DE69131791	D1	1999-12-23	[DE69131791]
DE69131791	T2	2000-06-15	[DE69131791]

- **Abstract:**
  (EP-469525)
  A titanium aluminide is composed of 31 to 34 mass% of Al, 1.5 to 3.0 mass % of Fe, 0.5 to 2.0 mass % of V, 0.18 to 0.35 mass % of B with remainder being Ti and inevitable impurities. The 0.5 to 2.0 mass % of V may be replaced with a 1.0 to 3.0 mass % of Mo or a 0.3 to 1.5 mass % of Cr. By precision casting this alloy, can be obtained a novel titanium aluminide alloy in which numerous whisker-like Ti-B compound are uniformly dispersed. The titanium aluminide alloy does not possess coarse lamellar structure which would cause crackings.

Claims

(EP-469525)

1. A titanium aluminide characterized in that the titanium aluminide comprises:

a binary Ti-Al alloy containing Ti and Al in an Al-to-Ti mass % content ratio from 0.49 to 0.54, the remainder being inevitable impurities;
and

V defined by a following formula:

V = (14.3 x Al/Ti - 6.69) +- 0.2, (I)

where V is in mass %, and Al and Ti pertain to respective content in the binary Ti-Al system in mass %.

2. A method of precision casting an article, characterized in that the method comprises the steps of:
(A) preparing a titanium aluminide including a binary Ti-Al alloy containing Ti and Al in an Al-to-Ti mass % content ratio from 0.49 to 0.54, the remainder being inevitable impurities, and V defined by a following formula:

V = (14.3 x Al/Ti - 6.69) +- 0.2, (I)

where V is in mass %, and Al and Ti pertain to respective content in the binary Ti-Al system in mass %;

(B) preheating a casting mold to a temperature in an approximate range of 400 to 600 **o C;
and
(C) casting the titanium aluminide prepared in the step (A) into the casting mold preheated in the step (B).

3. A titanium aluminide characterized in that the titanium aluminide comprises:
31 to 34 mass % of Al;

1.5 to 3.0 mass% of Fe;

0.5 to 2.0 mass % of V, 1.0 to 3.0 mass % of Mo or
0.3 to 1.5 mass % of Cr;
and
0.18 to 0.35 mass % of B, with remainder being Ti and inevitable impurities.

4. A method of precision casting an article, characterized in that the method comprises the steps of:
(A) preparing a titanium aluminide including
31 to 34 mass % of Al,
1.5 to 3.0 mass % of Fe,
0.5 to 2.0 mass % of V and
0.18 to 0.35 mass % of B, with remainder being Ti and inevitable impurities;

(B) preheating a casting mold to a temperature below 400 **o C;
and
(C) casting the titanium aluminide prepared in the step (A) into the casting mold preheated in the step (B).

5. A method of precision casting an article, characterized in that the method comprises the steps of:
(A) preparing a titanium aluminide including
31 to 34 mass % of Al,
1.5 to 3.0 mass % of Fe,
1.0 to 3.0 mass % of Mo and
0.18 to 0.35 mass % of B, with remainder being Ti and inevitable impurities;

(B) preheating a casting mold to a temperature below 400 **o C;
and
(C) casting the titanium aluminide prepared in the step (A) into the casting mold preheated in the step (B).

6. A method of precision casting an article, characterzed in that the method comprises the steps of:
(A) preparing a titanium aluminide including
31 to 34 mass % of Al,
1.5 to 3.0 mass % of Fe,
0.3 to 1.5 mass % of Cr and
0.18 to 0.35 mass % of B, with remainder being Ti and inevitable impurities;

(B) preheating a casting mold to a temperature below 400 **o C;
and
(C) casting the titanium aluminide prepared in the step (A) into the casting mold preheated in the step (B).

7. A method of precision casting an article, characterized in that the method comprises the steps of:
(A) preparing a titanium aluminide including

31 to 34 mass % of Al,
1.5 to 3.0 mass % of Fe,
0.5 to 2.0 mass % of V and
0.18 to 0.35 mass % of B, with remainder being Ti and inevitable impurities;

(B) preheating a casting mold to a temperature between 400 and 600**o C;
and
(C) casting the titanium aluminide prepared in the step (A) into the casting mold preheated in the step (B).

8. A method of precision casting an article, characterized in that the method comprises the steps of:
(A) preparing a titanium aluminide including
31 to 34 mass % of Al,
1.5 to 3.0 mass % of Fe,
1.0 to 3.0 mass % of Mo and
0.18 to 0.35 mass % of B, with remainder being Ti and inevitable impurities;

(B) preheating a casting mold to a temperature between 400 and 600**o C;
and
(C) casting the titanium aluminide prepared in the step (A) into the casting mold preheated in the step (B).

9. A method of precision casting an article, characterized in that the method comprises the steps of:
(A) preparing a titanium aluminide including
31 to 34 mass % of Al,
1.5 to 3.0 mass % of Fe,
0.3 to 1.5 mass % of Cr and
0.18 to 0.35 mass % of B, with remainder being Ti and inevitable impurities;

(B) preheating a casting mold to a temperature between 400 and 600**o C;
and
(C) casting the titanium aluminide prepared in the step (A) into the casting mold preheated in the step (B).

Titanium aluminide for precision casting
JP11269584

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  1998JP-0095172 1998-03-25

- **Fampat family**

JPH11269584	A	1999-10-05	[JP11269584]
EP0952234	A1	1999-10-27	[EP-952234]
US6174495	B1	2001-01-16	[US6174495]
EP0952234	B1	2002-07-24	[EP-952234]
DE69902202	D1	2002-08-29	[DE69902202]
DE69902202	T2	2003-02-20	[DE69902202]

- **Abstract:**

(EP-952234)
Titanium aluminide for precision casting, having the following chemical composition: Al: 31.3 to 32.0 wt%, Fe: 0.5 to 1.0 wt%, V: 1.0 to 1.5 wt%, and B: 0.03 to 0.06 wt%, with the remainder being Ti and inevitable impurities. A melt of this titanium aluminide is poured into a die and cooled at a general speed. A cast will have a fully lamellar structure almost entirely in an as-cast condition. This titanium aluminide does not have precipitation of beta 2 phase in a colony grain boundary of the lamellar structure. It is therefore possible to obtain a higher degree of grain boundary serration in the as-cast condition. As a result, the titanium aluminide product has an excellent creep property.

Claims

(EP-952234)

1. A titanium aluminide for precision casting, having the following chemical composition:
Al: 31.3 to 32.0 wt%,
Fe: 0.5 to 1.0 wt%,
V: 1.0 to 1.5 wt%, and
B: 0.03 to 0.06 wt%, with the remainder being Ti and inevitable impurities.
2. The titanium aluminide for precision casting of claim 1 used as a rotating part of an automobile engine or a rotating part of an aircraft engine.
3. An article of manufacture made by casting, the article of manufacture having the following chemical composition:
Al: 31.3 to 32.0 wt%,
Fe: 0.5 to 1.0 wt%,
V: 1.0 to 1.5 wt%, and
B: 0.03 to 0.06 wt%, with the remainder being Ti and inevitable impurities, and having a fully lamellar structure almost entirely in an as-cast condition.
4. The article of manufacture of claim 3 used as a rotating part of an automobile engine or a rotating part of an aircraft engine.
5. A method of casting comprising:
preparing a melt of titanium aluminide which possesses the following chemical composition:
Al: 31.3 to 32.0 wt%,
Fe: 0.5 to 1.0 wt%,
V: 1.0 to 1.5 wt%, and
B: 0.03 to 0.06 wt%, with the remainder being Ti and inevitable impurities;

6. pouring the titanium aluminide melt into a mold;
and
7. cooling the titanium aluminide melt to obtain a cast.
8. A method comprising:
providing a melt of titanium aluminide which possesses the following chemical composition:
Al: 31.3 to 32.0 wt%,
Fe: 0.5 to 1.0 wt%,
V: 1.0 to 1.5 wt%, and
B: 0.03 to 0.06 wt%, with the remainder being Ti and inevitable impurities;

9. pouring the titanium aluminide melt into a mold;
and
10. cooling the titanium aluminide melt to obtain a cast in such a manner that a lamellar structure is precipitated almost entirely in a crystal grain and a higher degree of serration is obtained in a crystal grain boundary in an as-cast condition.
11. The method of casting of claim 5 or 6, characterized in that the mold has a complicated shape for precision casting.
12. The method of casting of claim 5, 6 or 7, characterized in that the method does not include any heat treatment.
13. The method of casting of claim 5, 6, 7 or 8, characterized in that the titanium aluminide is cooled at a rate between 15 DEG.C/sec and 150 DEG.C/sec.
14. The method of casting of claim 5, 6, 7 or 8, characterized in that the titanium aluminide is cooled at a rate between 30 DEG.C/sec and 100 DEG.C/sec.

Finishing method and TiAl based alloy of TiAl based alloy
JP2003105539

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  2001JP-0297029 2001-09-27

- **Fampat family**

JP2003105539	A	2003-04-09	[JP2003105539]
JP4776837	B2	2011-09-21	[JP4776837]

- **Abstract:**
  (JP2003105539)
  PROBLEM TO BE SOLVED: To provide a surface treatment method for a TiAl based alloy for improving its high temperature oxidation resistance. SOLUTION: A film having an Nb-containing layer 11 and a C-containing layer 12 is formed on the TiAl based alloy.

Claims

(JP2003105539)

Claims machine translated from Japanese
1. Layer and C where Nb is included in the TiAl based alloy containing
TiA which features that the tunic which possesses [mu] layer is formed
Finishing method of l based alloy.
2. The aforementioned tunic is formed with ion implantation densely
That in the claim 1 which is featured the surface of the TiAl based alloy of statement
Processing method.
3. The process which fills the Nb ion at room temperature and,
Possessing with the process which fills C ion at room temperature feature
That in the claim 2 which is done finishing how TiAl based to alloy of statement
Law.
4. Suffering which possesses with the layer which includes Nb and the layer which includes C
The TiAl based alloy which features that the membrane is formed.

Method of friction-welding a shaft to a titanium aluminide turbine rotor
EP-816007

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EP0816007	A2	1998-01-07	[EP-816007]
JPH106042	A	1998-01-13	[JP10006042]
EP0816007	A3	1998-01-28	[EP-816007]
EP0816007	B1	2003-01-29	[EP-816007]
DE69718713	D1	2003-03-06	[DE69718713]
DE69718713	T2	2003-07-03	[DE69718713]

- **Abstract:**
  (EP-816007)
  There is provided a method of friction-welding a steel shaft to a turbine rotor made of titanium aluminide, including the steps of (a) banking a heat resistant alloy onto an end surface of the shaft, (b) rotating the turbine rotor and the shaft relative to each other at a peripheral speed in the range of about 145 cm/s to about 260 cm/s both inclusive with the heat resistant alloy being compressed onto a surface of the turbine rotor, to thereby pressure-welding the shaft to the turbine rotor due to frictional heat generated by relative rotation between the shaft and the turbine rotor, and (c) shaving a peripheral portion of the shaft so that the shaft has an outer diameter which is about 80% of an original diameter thereof. The method enables to bond a turbine rotor made of titanium aluminide to a steel shaft with sufficient bonding strength without causing cracks on surfaces of the turbine rotor and shaft.

Claims

(EP-816007)

1. A method of friction-welding a steel shaft to a turbine rotor made of titanium aluminide, comprising the steps of:
(a) banking a heat resistant alloy onto an end surface of said shaft;

(b) rotating said turbine rotor and said shaft relative to each other at a peripheral speed in the range of about 145 cm/s to about 260 cm/s both inclusive with said heat resistant alloy being compressed onto a surface of said turbine rotor, to thereby pressure-welding said shaft to said turbine rotor due to frictional heat generated by relative rotation between said shaft and said turbine rotor;
and
(c) shaving a peripheral portion of said shaft.
2. The method as set forth in claim 1, wherein cracked portions are shaved off in said step (c).
3. The method as set forth in claim 1, wherein said heat resistant alloy has high binding force both to said shaft and said turbine rotor.
4. The method as set forth in claim 1 further comprising the step (d) of forming at least one hole with said heat resistant alloy, said step (d) being carried out between said steps (a) and (b).
5. The method as set forth in claim 1, wherein said heat resistant alloy is selected from a group consisting of nickel-based alloy, austenite family iron-based alloy, titanium-based alloy and cobalt-based alloy.
6. The method as set forth in claim 1, wherein said heat resistant alloy is compressed onto said turbine rotor in said step (b) under a pressure of about 30 kgf/mm**2 when frictional heat generates and about 40 kgf/mm**2 when said shaft is bonded to said turbine rotor.
7. The method as set forth in claim 1, wherein only said shaft is rotated in said step (b).
8. The method as set forth in claim 1, wherein said shaft is made of one of low alloy steel and common steel.
9. A method of friction-welding a steel shaft to a turbine rotor made of titanium aluminide, comprising the steps of:
(a) banking a heat resistant alloy onto an end surface of said shaft;

(b) rotating said turbine rotor and said shaft relative to each other at a peripheral speed in the range of about 145 cm/s to about 260 cm/s both inclusive with said heat resistant alloy being compressed onto a surface of said turbine rotor, to thereby pressure-welding said shaft to said turbine rotor due to frictional heat generated by relative rotation between said shaft and said turbine rotor;
and
(c) shaving a peripheral portion of said shaft so that said shaft has an outer diameter which is about 80% of an original diameter thereof.
10. The method as set forth in claim 9, wherein said heat resistant alloy has high binding force both to said shaft and said turbine rotor.
11. The method as set forth in claim 9 further comprising the step (d) of forming at least one hole with said heat resistant alloy, said step (d) being carried out between said steps (a) and (b).
12. The method as set forth in claim 9, wherein said heat resistant alloy is selected from a group consisting of nickel-based alloy, austenite family iron-based alloy, titanium-based alloy and cobalt-based alloy.
13. The method as set forth in claim 9, wherein said heat resistant alloy is compressed onto said turbine rotor in said step (b) under a pressure of about 30 kgf/mm**2 when frictional heat generates and about 40 kgf/mm**2 when said shaft is bonded to said turbine rotor.
14. The method as set forth in claim 9, wherein only said shaft is rotated in said step (b).
15. The method as set forth in claim 9, wherein said shaft is made of one of low alloy steel and common steel.

Ti-Al-(Mo,V,Si,Fe) alloys and method of their manufacture
JP2000345260

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- **US Patent Classification**
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  2002US-10213493 2002-08-06

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JP2000345260	A	2000-12-12	[JP2000345260]
EP1061149	A1	2000-12-20	[EP1061149]
CN1278562	A	2001-01-03	[CN1278562]
US2002195174	A1	2002-12-26	[US20020195174]
EP1061149	B1	2003-01-22	[EP1061149]
DE60001249	D1	2003-02-27	[DE60001249]
CN1113107	C	2003-07-02	[CN1113107C]
DE60001249	T2	2003-08-28	[DE60001249]
US6923934	B2	2005-08-02	[US6923934]
JP3915324	B2	2007-05-16	[JP3915324]

- **Abstract:**
  (EP1061149)
  TiAl alloy includes 46 to 50 at% of Al, 5 at% or less of combination of Mo, V and Si, provided that Si content is 0.7 at% or less, and Mo content satisfies an equation of -0.3x + 17.5 at% or less where x represents Al (at%), and the remainder being Ti and inevitable impurities. Mo may be replaced by Fe or combination of Mo and Fe. TiAl alloy is heated to a melt, poured into a mold, and cooled at a rate of 150 to 250 DEG.C/min within a temperature range of 1500 to 1100 DEG.C. The resulting product can be used as cast. If desired, however, heat treatment such as HIP or homogenization may be performed within a temperature range of 1100 to 800 DEG.C. After the heat treatment, the melt is cooled at a rate of 100 DEG.C/min or more until room temperature.

Claims

(EP1061149)

1. TiAl alloy comprising:
Al: 46 to 50 at%;

a group of Mo, V and Si, a group of Fe, V and Si, or a group of Mo, Fe, V and Si: one of the groups being contained 5 at% or less, provided that Si content is 0.7 at% or less, and Mo content satisfies an equation of -0.3x + 17.5 at% or less where x represents Al (at%);
and
the remainder being Ti and inevitable impurities.
2. TiAl alloy of claim 1, characterized in that Al is contained 48 +- 1.0 at%, Mo, Fe, or combination of Mo and Fe is contained 0.4 to 0.8 at%, V is contained 0.5 to 1.1 at%, and Si is contained 0.1 to 0.3 at%.
3. A casting method comprising the steps of:
A) preparing TiAl alloy having the following composition:
Al: 46 to 50 at%,
a group of Mo, V and Si, a group of Fe, V and Si, or a group of Mo, Fe, V and Si: one of the groups being contained 5 at% or less, provided that Si content is 0.7 at%, and Mo content satisfies an equation of -0.3x + 17.5 at% or less where x represents Al (at%), and
the remainder being Ti and inevitable impurities;

4. B) heating the TiAl alloy to a melt;

5. C) pouring the melt into a mold;
and
6. D) cooling the melt at a rate of 150 to 250 DEG.C/min within a temperature range of 1500 to 1100 DEG.C to obtain an as-cast product.
7. The casting method of claim 3, characterized in that the method further includes the step of E) heat treating the as-cast product within a temperature range of 800 to 1100 DEG.C.
8. The casting method of claim 3, characterized in that the method further includes the step of E) heat treating the as-cast product within a temperature range that satisfies the following equation: T (DEG.C) >= {1200 DEG.C + 25(Al - 44)} + 10.
9. The casting method of claim 4 or 5, characterized in that the method further includes the step of F) cooling the product at a rate of 100 DEG.C /min or more after step E.
10. The casting method of claim 3, 4 or 5, characterized in that the heat treatment is HIP or homogenization.

Titanium aluminide for precision casting and casting method using the same
JP05230569

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- **International Patent Classification**
  C22C-014/00
- **CPC Code**
  C22C-014/00

- **Publication Information**
  JPH05230569 A 1993-09-07 [JP05230569]
- **Priority Details**
  1992JP-0069832 1992-02-19

- **Fampat family**

JPH05230569	A	1993-09-07	[JP05230569]
EP0560070	A1	1993-09-15	[EP-560070]
EP0560070	B1	1996-07-31	[EP-560070]
DE69303841	D1	1996-09-05	[DE69303841]
DE69303841	T2	1997-02-20	[DE69303841]
JP3379111	B2	2003-02-17	[JP3379111]

- **Abstract:**
  (EP-560070)
  A titanium aluminide is composed of 31.5 to 33.5 weight % of Al, 1.5 to 2.3 weight % of Fe, 1.5 to 4.8 (2.1 to 3.7 exclusive) weight % of Nb, 0.07 to 0.12 weight % of B with remainder being Ti and inevitable impurities. The 1.5-2.0 weight % of Nb may be replaced with 0.5 to 2.0 weight % of V if severe oxidization resistance is not necessary. The titanium aluminide is melted and poured into a mold, and the melt is cooled in the mold naturally. (see diagramm 1 page 0)

Claims

(EP-560070)

1. A method of precision casting an article, characterized in that it comprises the steps of: (A) preparing a titanium aluminide including in weight 31.5-33.5% of Al, 1.5-2.3% of Fe, 1.5-4.8% (2.1-3.7 exclusive) of Nb and 0.07-0.12% of B with the remainder being Ti and inevitably impurities;
(B) melting the titanium aluminide;
(C) pouring the melt into the mold;
and (D) cooling the melt in a mold naturally.
2. A method of precision casting an article, characterized in that it comprises the steps of: (A) preparing a titanium aluminide including in weight 31.5-33.5% of Al, 1.5-2.3% of Fe, 1.5-2.0% of V and 0.07-0.12% of B with the remainder being Ti and inevitably impurities;
(B) melting the titanium aluminide;
(C) pouring the melt into the mold;
and (D) cooling the melt in a mold naturally.
3. The method of claim 1 or 2, characterized in that the step (B) includes heating the titanium aluminide to 1500 **o C or more and the step (D) is carried out such that the melt temperature is lowered to about 800-1000 **o C in about 20 minutes.
4. The method of claim 1, 2 or 3, characterized in that the method further includes the step of preheating the mold at about 400-600 **o C prior to the step (C).
5. The method of claim 1, 2, 3 or 4, characterized in that the step (D) is carried out such that beta phase is precipitated around a gamma particle and coarse lameller particles are not produced.
6. The method of claim 1, 2, 3, 4 or 5, characterized in that the mold is a mold for casting a thin and complex shape product.
7. A titanium nitride for precision casting, characterized in that the titanium nitride comprises in weight: 31.5-33.5% of Al;
1.5-2.3% of Fe;
1.5-4.8% (2.1-3.7 exclusive) of Nb;
and 0.07-0.12% of B, with the remainder being Ti and inevitably impurities.
8. A titanium nitride for precision casting, characterized in that the titanium nitride comprises in weight: 31.5-33.5% of Al;
1.5-2.3% of Fe;
1.5-2.0% of V;
and 0.07-0.12% of B, with the remainder being Ti and inevitably impurities.
9. The titanium nitride of claim 7 or 8, characterized in that an Al/Ti ratio is 0.49-0.55.

[chitanaruminaido] casting and its grain refining method
JP2003041336

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- **International Patent Classification**
  B22D-021/00 B22D-027/04 C22C-014/00 C22F-001/00 C22F-001/18

- **Publication Information**
  JP2003041336 A 2003-02-13 [JP2003041336]
- **Priority Details**
  2001JP-0232229 2001-07-31

- **Fampat family**

JP2003041336	A	2003-02-13	[JP2003041336]
JP5109217	B2	2012-12-26	[JP5109217]

- **Abstract:**

(JP2003041336)
PROBLEM TO BE SOLVED: To provide a cast article of titanium aluminide, which has fine crystal grains in the metal structure and is superior in both creep property and fatigue characteristics, and provide a crystal-grain refining method therefor. SOLUTION: The objective cast article of titanium aluminide is comprised of a Ti-Al-Mo-V alloy having a chemical composition of 46-50 atom.% Al, 5 atom.% or less in the total of Mo, V, and Si, (where a Si content is 0.7 atom.% or less, and a Mo content is 17.5-0.3x atom.% or less (x represents an Al content)), 0.1-0.4 atoms.% C, and the balance Ti with unavoidable impurities.

Claims

(JP2003041336)

Claims machine translated from Japanese
1. -Ti-Al-Mo-V system alloy with constitute do
In the [ru] chitanaruminaido casting, chemical composition, A
l: 46-50 atmoic %, Mo, each element of V, and Si
At gross 5 atmoic % below (however, as for the content of Si 0.7 atoms
% Below, as for the content of Mo 17.5-0.3x atmoic % below
(X: The content of Al))C: 0.1-0.4 atmoic %,
Remainder: It features that it is Ti and the inevitable impurity
[chitanaruminaido] casting.
2. -Ti-Al-Mo-V system alloy with constitute do
In the [ru] chitanaruminaido casting, chemical composition, A
l: 46-50 atmoic %, Mo, each element of V, and Si
At gross 5 atmoic % below (however, as for the content of Si 0.7 atoms
% Below, as for the content of Mo 17.5-0.3x atmoic % below
(X: The content of Al))B: 0.2-1.20 atom
% Remainder: Being Ti and the inevitable impurity feature
The [chitanaruminaido] casting which it does.
3. -Ti-Al-Mo-V system alloy with constitute do
In the [ru] chitanaruminaido casting, chemical composition, A
l: 46-50 atmoic %, Mo, each element of V, and Si
At gross 5 atmoic % below (however, as for the content of Si 0.7 atoms
% Below, as for the content of Mo 17.5-0.3x atmoic % below
(X: The content of Al))C: 0.1-0.4 atmoic %,
Remainder: To be Ti and the inevitable impurity, average of metallographic structure
Crystal grain size 50-300 .micro.m and during metallographic structure C where it precipitates
It features that mean diameter of the basic deposit is 1 .micro.m or less
[ru] chitanaruminaido casting.
4. -Ti-Al-Mo-V system alloy with constitute do
In the [ru] chitanaruminaido casting, chemical composition, A
l: 46-50 atmoic %, Mo, each element of V, and Si
At gross 5 atmoic % below (however, as for the content of Si 0.7 atoms
% Below, as for the content of Mo 17.5-0.3x atmoic % below
(X: The content of Al))B: 0.2-1.20 atom
% Remainder: To be Ti and the inevitable impurity, metallographic structure
Average crystal grain size 50-150 .micro.m, precipitates during metallographic structure
Average length of the [ru] B basic deposit being 2-15 .micro.m special
The [chitanaruminaido] casting which is made collection/symbol.
5. From claim 1 4 to in each case titanium of statement
Among chemical compositions of the [aruminaido] casting, Mo at least
The titanium aluminum which features that part is replaced with Fe
[naido] casting.
6. From claim 1 5 to in each case titanium of statement
Alloy *** hot water of the same chemical composition as [aruminaido] casting inside die
After casting, the occasion where that casting body is cooled, the 1500-
In temperature limits of 1100.deg.C, 150-250.deg.C/min cold
[chitanaruminaido] which features that it cools at *** speed
Grain refining method of casting.

It is low connecting method of the alloy steel shaft or the steel shaft and chitanaruminaido make body of revolution

JP09076079

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- **International Patent Classification**
  B23K-020/12 B23K-020/227 B23K-103/24 F01D-005/04
- **Publication Information**
  JPH0976079 A 1997-03-25 [JP09076079]
- **Priority Details**
  1995JP-0233617 1995-09-12

- **Fampat family**

JPH0976079	A	1997-03-25	[JP09076079]
JP3646742	B2	2005-05-11	[JP3646742]

- **Abstract:**
  (JP09076079)
  PROBLEM TO BE SOLVED: To provide sufficient strength by placing a heat resistant alloy member having a hole on the joining surface of a low alloy steel shaft and a regular steel shaft to be joined, and welding the holes to fix the heat resistant alloy member to prevent generation of cracks. SOLUTION: A low alloy steel shaft and a plain steel shaft 11 are joined with a titanium-aluminide rotary body 12 by using a friction welding equipment, the respective members are relatively rotated, and pressed against each other in the axial direction while being heated by friction, and joining is achieved through a heat resistant alloy made member 13 having a hole 14 or a heat resistant alloy member 15 formed by build-up welding. Difference in the volumetric change in the cooling is absorbed by the heat resistant alloy steel, generation of cracks in the joined part can be prevented, and sufficient strength can be obtained. COPYRIGHT: (C)1997,JPO

Claims

(JP09076079)

1. It is low the alloy steel shaft or the steel shaft
With being connecting method [chitanaruminaido] make body of revolution,
the description above it is low the connecting surface of the alloy steel shaft or the steel shaft
Welding the part of process and the said hole which place
the heat resistant alloy make component which provides the hole with the heat resistant alloy, the description above it is low alloy steel [shiyahu]
The [to] or steel shaft and the heat resistant alloy make component as one unit fixing
Process and the description above which
it does it is low alloy steel shaft or steel shaft and [chitana]
[ruminaido] make body of revolution facing turning with friction heating
While doing, pushing, the process which connects and, the it possesses low-alloy steel
Make shaft or steel shaft and [chitanaruminaido] make
Connecting method body of revolution.
2. It forms the heat resistant alloy make component, in disk condition,
It is low alloy steel shaft or steel [shiyahu] of [ru] claim 1 statement
Connecting method of [to] and [chitanaruminaido] make body of revolution.
3. It is low the alloy steel shaft or the steel shaft
With being connecting method [chitanaruminaido] make body of revolution,
the description above it is low the connecting surface of the alloy steel shaft or the steel shaft
The heat resistant alloy steel in disk condition the prosperous gold are covered process and the description above which it is low with welding alloy steel shaft or steel shaft and [chitana]
[ruminaido] make body of revolution facing turning with friction heating
While doing, pushing, the process which connects and, the it possesses low-alloy steel
Make shaft or steel shaft and [chitanaruminaido] make
Connecting method body of revolution.

Fe, chitanaruminaido for precision casting which includes V

JP08311585

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  C22C-014/00

- **Publication Information**
  JPH08311585 A 1996-11-26 [JP08311585]
- **Priority Details**
  1995JP-0121031 1995-05-19

- **Fampat family**

JPH08311585	A	1996-11-26	[JP08311585]
JP3743019	B2	2006-02-08	[JP3743019]

- **Abstract:**

(JP08311585)
PURPOSE: To provide an Fe- and V-containing titanium aluminide for precision casting, having extremely superior castability and ductility and excellent in specific strength and oxidation resistance at high temp. CONSTITUTION: This titanium aluminide consists of, by weight, 31-34% Al, 1.5-2.5% Fe, 1.5-2.0% V, 0.07-0.30% B, 0.03-0.08% Si, and the balance Ti with inevitable impurities. By the addition of Si, excellent oxidation resistance at high temp. can be provided without deteriorating castability and ductility.

Claims

(JP08311585)

1. With weight percentage Al: 31- 34%, Fe:
1.5 - 2.5%, V: 1.5 - 2.0%, B: 0.07-0.30
% Si: To contain the 0.03- 0.08%, the remainder Ti and non-
It features that it consists of the yes impurity, Fe, V is included
[chitanaruminaido] for precision casting.

Precision casting titanium aluminide
US5839504

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- **International Patent Classification**
  C22C-014/00
- **US Patent Classification**
  PCLO=164516000 PCLX=164047000 PCLX=164122100
- **CPC Code**
  C22C-014/00

- **Publication Information**
  US5839504 **A 1998-11-24 [US5839504]**
- **Priority Details**
  1992JP-0069832 1992-02-19
  1993US-08017563 1993-02-16
  1993US-08158658 1993-11-29

- **Fampat family**

US5839504	A	1998-11-24	[US5839504]

- **Abstract:**
  (US5839504)
  A titanium aluminide is composed of 31.5 to 33.5 weight % of Al, 1.5 to 2.3 weight % of Fe, 1.5 to 2.1 and 3.7 to 4.8 weight % of Nb, 0.07 to 0.12 weight % of B with remainder being Ti and inevitable impurities. The 1.5-2.0 weight % of Nb may be replaced with 0.5 to 2.0 weight % of V if severe oxidation resistance is not necessary. The titanium aluminide is melted and poured into a mold, and the melt is cooled in the mold naturally.

Claims

(US5839504)

I claim:

1. A method of precision casting an article, comprising the steps of:

(A) preparing a titanium aluminide including by weight 31.5-33.5% of Al, 1.5-2.3% of Fe, one of 1.5-2.1% Nb and 3.7-4.8% Nb and 0.07-0.12% of B with the remainder being Ti and inevitable impurities;

(B) melting the titanium aluminide;

(C) pouring the melt into a mold;

and

(D) cooling the melt in the mold such that the melt temperature is lowered to about 800 (degree) -1,000 (degree) C. in about 20 minutes, whereby beta phase is precipitated around gamma particles and coarse lamellar particles are not produced.

2. The method of claim 1, wherein step (B) includes heating the titanium aluminide to 1500 (degree) C. or more.

3. The method of claim 2, further including the step of preheating the mold to about 400 (degree) -600 (degree) C. prior to step (C).

4. The method of claim 3, wherein the mold is a mold for casting a thin and complex shape product.

5. A method of precision casting an article, comprising the steps of:

(A) preparing a titanium aluminide including by weight 31.5-33.5% of Al, 1.5-2.3% of Fe, 1.5-2.0% of V and 0.07-0.12% of B with the remainder being Ti and inevitable impurities,

(B) melting the titanium aluminide;

(C) pouring the melt into a mold;

and

(D) cooling the melt in the mold such that the melt temperature is lowered to about 800 (degree) -1,000 (degree) C. in about 20 minutes, whereby beta phase is precipitated around gamma particles and coarse lamellar particles are not produced.

6. The method of claim 5, wherein step (B) includes heating the titanium aluminide to 1500 (degree) C. or more.

7. The method of claim 6, further including the step of preheating the mold at about 400 (degree) -600 (degree) C. prior to step (C).

8. The method of claim 7, wherein the mold is a mold for casting a thin and complex shape product.

9. A method of precision casting an article, comprising the steps of:

(A) preparing a titanium aluminide including by weight 31.5-33.5% of Al, 1.5-2.3% of Fe, one of 1.5-2.1% of Nb and 3.7-4.8% Nb, and 0.07-0.12% of B with the remainder being Ti and inevitable impurities;

(B) melting the titanium aluminide;

(C) pouring the melt into a mold;

and

(D) cooling the melt in the mold at a cooling rate to cause the beta phase to be precipitated around gamma particles in the article and prevent the generation of coarse lamellar particles in the article.

10. The method of claim 9, wherein the step (D) is carried out such that the melt temperature is lowered to 800 (degree) -1000 (degree) C. in about 20 minutes.

11. The method of claim 9, wherein the step (B) includes heating the titanium aluminide to 1500 (degree) C. or more.

12. The method of claim 9, further including the step of preheating the mold to about 400 (degree) -600 (degree) C. prior to the step (C).

13. A method of precision casting an article, comprising the steps of:

(A) preparing a titanium aluminide including by weight 31.5-33.5% of Al, 1.5-2.3% of Fe, 1.5-2.0% of V and 0.07-0.12% of B with the remainder being Ti and inevitable impurities;

(B) melting the titanium aluminide;

(C) pouring the melt into a mold;

and

(D) cooling the melt in the mold at a cooling rate to cause the beta phase to be precipitated around gamma particles in the article and prevent the generation of coarse lamellar particles in the article.

14. The method of claim 13, wherein the step (D) is carried out such that the melt temperature is lowered to 800 (degree) -1000 (degree) C. in about 20 minutes.

15. The method of claim 13, wherein the step (B) includes heating the titanium aluminide to 1500 (degree) C. or more.

16. The method of claim 13, further including the step of preheating the mold to about 400 (degree) -600 (degree) C. prior to the step (C).

Heat treatment method of chitanaruminaido casting part

JP07018392

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- **International Patent Classification**
  C22C-014/00 C22F-001/00 C22F-001/18

- **Publication Information**
  JPH0718392 A 1995-01-20 [JP07018392]
- **Priority Details**
  1993JP-0183416 1993-06-30

- **Fampat family**

JPH0718392	A	1995-01-20	[JP07018392]
JP3493689	B2	2004-02-03	[JP3493689]

- **Abstract:**
  (JP07018392)
  PURPOSE: To improve the mechanical properties particularly of cold ductility in cast parts by executing specified heat treatment before and after machining to the cast parts. CONSTITUTION: The stock of Ti-Al-Fe.B series titanium aluminide cast parts added with, by weight, 1.4 to 2.0% V or Nb is subjected to homogenizing treatment at a temp. given by the formula I for 15 to 20hr. Furthermore, the one obtd. by subjecting the same parts stock to required machining to form into a final shape as cast parts is subjected to refining treatment at a temp. found by the formula II for 2 to 5hr. By these heat treatments, the volume ratio of the contained .alpha.(sub 2) phase is regulated to about 10%, by which the cast parts with a complicated shape excellent in ductility can be obtd. COPYRIGHT: (C)1995,JPO

Claims

(JP07018392)

Claims machine translated from Japanese
1. Ti-Al-Fe B titanium alumina
In [ido], description below (1) with formula
T (.deg.C) = {1250+25x (Al-44)}10... (1)
(However, Al is given Al content with atomic percentage)
At temperature, the casting material which administers 15-20 time homogeneity processing
To make the last form product including necessary machining, in this
(2) with formula
t (.deg.C) = {1100-25x (Al-44)}10... (2)
Administering 2-5 time quality check processing at the temperature which is given feature
That heat treatment method of the [chitanaruminaido] casting part which is done.
2. Ti-Al-Fe B titanium alumina
In [ido] weight % with, 1.4-2.0 weight % V or N
[chitanaruminaido] casting of the claim 1 statement where b is added
Heat treatment method of part.

Process method of [chitanaruminaido]
JP06269927

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  ARAKI TAKAHITO
- **International Patent Classification**
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- **Publication Information**
  JPH06269927 A 1994-09-27 [JP06269927]
- **Priority Details**
  1993JP-0060709 1993-03-19

- **Fampat family**

JPH06269927	A	1994-09-27	[JP06269927]
JP3146731	B2	2001-03-19	[JP3146731]

- **Abstract:**

(JP06269927)
PURPOSE:To provide the method for working titanium aluminide capable of molding the titanium aluminide to diversified shapes including thin shapes. CONSTITUTION:The titanium aluminide 14 is cast into a casting mold 10 having an internal space 12 formed to the size larger than the size of desired molded goods and the resembling shape thereof. The resulted casting 18 is etched by a soln. mixture 16 contg. nitric acid and hydrogen fluoride acid, by which the molded articles 20 are obtd. As a result, the chemical treatment is utilized and, therefore, the remaining of unnecessary stresses in the molded goods is suppressed.

Claims

(JP06269927)

Claims machine translated from Japanese

1. At the same time to be larger than the formation item which is made purpose that
At the mold which possesses the internal space of similar form [chitanaruminai]
Casting ones which cast [do], are obtained nitric acid and the hydrofluoric acid containing
Eroding processing with the mixed acid solution which it possesses, obtaining the formation item feature
That process method of [chitanaruminaido] which is done.

Titanium aluminide base alloy for precision casting and precision casting method thereof

JP04099840

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- **International Patent Classification**
  B22D-021/06 C22C-014/00 C22C-021/00
- **Publication Information**
  JPH0499840 A 1992-03-31 [JP04099840]
- **Priority Details**
  1990JP-0211666 1990-08-13
- **Fampat family**

JPH0499840	A	1992-03-31	[JP04099840]

- **Abstract:**
  (JP04099840)
  PURPOSE: To manufacture a precision-cast product having a thin complicated shape or a thin precise shape at nondefective high yield by limiting the range of the Al/Ti ratio in a Ti-Al-Y series alloy and specifying the amt. of Y to be added by a formula including the Al-Ti ratio. CONSTITUTION: In a Ti-Al-Y series alloy including inevitable impurities, the weight ratio of Al to Ti (Al-Ti ratio) is regulated to 0.48 to 0.54, and Y satisfying Y=(-8.82XAl/Ti+5.24)+-0.3 is added to obtain a titanium aluminide base alloy for precision casting. In the stage of casting, the mold temp. in a lost wax process precision casting mold is set to 400 to 600 deg.C, and in this lost wax process precision casting mold, the above titanium aluminide base alloy for precision casting is poured. In this way, a precision-cast product having <+0.8mm minimum thickness can be cast. In the above titanium aluminide base alloy for precision casting, its hardness is regulated to about <+300Hv, its structure is modified into a case one free from cracks in a casting take out process and therefore its yield can be improved. COPYRIGHT: (C)1992,JPO&Japio

Claims

(JP04099840)

JP21166690 1990-08-13 [1990JP-0211666]

METHOD FOR REFORMING SURFACE OF TiAl-BASED ALLOY INTO HIGH-TEMPERATURE OXIDIZATION RESISTANT SURFACE, AND SURFACE-REFORMED PRODUCT

JP2005082824

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  NAKAGAWA KIYOKAZU
  MATSUOKA YUKI

- **International Patent Classification**
  C22C-001/00 C22C-014/00 C23C-014/48 F01D-005/28 F01L-003/02 F02B-039/00 F02C-007/00 F16C-033/64
- **Publication Information**
  JP2005082824 A 2005-03-31 [JP2005082824]
- **Priority Details**
  2003JP-0313464 2003-09-05
- **Fampat family**

JP2005082824	A	2005-03-31	[JP2005082824]

- **Abstract:**
  (JP2005082824)
  PROBLEM TO BE SOLVED: To provide a surface-reforming method for sufficiently improving the high-temperature oxidization resistance of a member made of a Ti-Al-based alloy having a three-dimensional shape. SOLUTION: The method for improving the high-temperature oxidization resistance of the Ti-Al-based alloy comprises placing the member made of the Ti-Al -based alloy having the complicated shape in ion-containing plasma; and implanting ions of at least one metal selected from among IV, Va and VIa groups in the periodic table of elements, into the member with a plasma base ion-implanting method. COPYRIGHT: (C)2005,JPO&NCIPI

Claims

(JP2005082824)

Claims machine translated from Japanese

1. The component which consists of the Ti-Al based alloy, with plasma based ion-implantation at least, in surface layer IV in the element periodic tables, features that at least the metal ion of 1 where it is chosen from inside Va and VIa group kinds is injected resistance high-temperature oxidation surface improvement method [0002]

2. Of the Ti-Al based alloy which| With the aforementioned metal ion plasma based ion implantation, - impressing the high pressure negative pulse of 1--40kV and 10-1000 cycle in the aforementioned component, resistance high-temperature oxidation surface improvement method of the Ti-Al based alloy of the claim 1 statement which features that it injects the metal ion to the Ti-Al based alloy surface.

3. Claim 1 and being binary, thickness of metal ion implantation layer is below 1000nm above 5nm with the method of stipulating, the component which consists of the Ti-Al based alloy which features that the metal element concentration which is injected is 1-70at%.

4. The component of the claim 3 which features that the metal element is chosen from inside hafnium (Hf), molybdenum (Mo), tungsten (W), niobium (Nb) and tantalum (Ta).

5. The valve and the turbocharger of the automobile engine, the turbine engine for the aircraft and the gas turbine for generation of electricity, the component which possesses 3 dimensional form which consists of the Ti-Al based alloy of statement in either of the claim 1-4 which features that it is used for the hot dies and the bearing parts etc.

Production of tial-based isothermally forged alloy
JP06299306

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- **International Patent Classification**
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- **Publication Information**
  JPH06299306 A 1994-10-25 [JP06299306]
- **Priority Details**
  1993JP-0108794 1993-04-13

- **Fampat family**

JPH06299306	A	1994-10-25	[JP06299306]
JP3334246	B2	2002-10-15	[JP3334246]

- **Abstract:**

(JP06299306)
PURPOSE:To produce a Till-based isothermally forged alloy material excellent in hot workability. CONSTITUTION:A Till-based alloy consisting of 31.0-33.0wt.% Al, 1.8-2.0wt.% Fe, 1.4-1.8wt.% V and the balance Ti is homogenized and heat-treated by heating and holding at 1,150-1,300 deg.C for >=2hr in an inert gaseous atmosphere. The resulting alloy is further heated and held at 1,000-1,080 deg.C for >=8hr after isothermal forging if necessary.

Claims

(JP06299306)

1. Al31.0-33.0 weight %, Fe 1.8-2.0
Weight % V 1.4-1.8 weight % to contain, the remainder from Ti
After homogeneity processing the TiAl basic alloy which becomes, in this inertness
In gas atmosphere it heats keeps of 2 hours or more with the 1150-1300.deg.C
The TiAl basic constant temperature forging alloy which features that heat treatment is administered
Production method.
2. Al31.0-33.0 weight %, Fe 1.8-2.0
Weight % V 1.4-1.8 weight % to contain, the remainder from Ti
Homogeneity to process the TiAl basic alloy which becomes, in this the inert gas
The thermal place which in atmosphere it heats keeps of 2 hours or more with the 1150-1300.deg.C
After administered reason, constant temperature forging this, with the 1000-1080.deg.C 8 o'clock
The TiAl basic constant temperature train it features that it heats keeps above between
Production method of structure alloy.

Production of tial-based forged alloy
JP06299305

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- **Publication Information**
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- **Priority Details**
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- **Fampat family**

JPH06299305	A	1994-10-25	[JP06299305]
JP3334231	B2	2002-10-15	[JP3334231]

- **Abstract:**
  (JP06299305)
  PURPOSE:To precipitate a beta-phase in the structure of a Ti- and Al-based alloy having a specified compsn. and to enable hot forging at a conventional relatively low temp. by heat-treating the alloy under specified temp. conditions. CONSTITUTION:A Ti- and Al-based alloy having a compsn. consisting of 30.0-35.0wt.% Al, 0.5-10.0wt.% beta-phase depositing element such as Fe, V, Nb, Mo or Cr and the balance Ti is heat-treated by heating and holding at 1,170-1,300 deg.C for 28hr in an inert gaseous atmosphere of Ar, etc., to deposit 5-10vol.% beta-phase in the structure as well as to homogenize the structure. A Ti and Al-based alloy capable of hot forging at a relatively low temp. of 800-950 deg.C close to a conventional forging temp. of 800-950 deg.C is produced.

Claims

(JP06299305)

1. Al30.0-35.0 weight %, I phase precipitation element
The 0.5-10.0 weight % it contains, TiA where the remainder consists of Ti
In l basic alloy in inert gas atmosphere with 1170-1300.deg.C 8 hours
TiA which features that the heat treatment which or more it heats keeps is administered
Production method of l basic forging alloy.

Brazing method for tial
JP06071427

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  JPH0671427 **A 1994-03-15 [JP06071427]**
- **Priority Details**
  1992JP-0248695 1992-08-25

- **Fampat family**

JPH0671427	A	1994-03-15	[JP06071427]

- **Abstract:**
  (JP06071427)
  PURPOSE: To prevent generation of an oxide film on TiAl joining interface by sandwiching a brazing filler metal on the surface of two sheets of base metals with applying pure Ni plating and joining with heating both base metals to the prescribed temp. CONSTITUTION: A base metal is formed with applying a pure Ni plating 2 on the surface of TiAl, sandwiching a brazing filler metal 3 between both base metals, both base metals are heated in vacuum furnace to be joined, unloading from furnace after cooled in furnace. In this TiAl brazing method brazability is improved, and its storage term is made longer as compared to conventional one, by applying Ni plating or Ni coating by PVD process on the joining interface of TiAl to suppress generation of Al oxide film. COPYRIGHT: (C)1994,JPO&Japio

Claims

(JP06071427)

Claims machine translated from Japanese
1. The surface of TiAl purely Ni plating after the acid washing
Administering, to form the basic material, pure Ni plating of 2 basic materials ***
To put the brazing filler metal to the face to face which it does, under the vacuum both basic materials specified
TiAl which features that it heats to temperature, connects
Soldering method.
2. On the surface of TiAl PVD (Physic
al VaporDeposition) Law (physical evaporation
Administering Ni coating law) with, to form the basic material, 2
In the face to face to which administers pure Ni plating of the basic material putting the brazing filler metal,
It heats both basic materials to specified temperature under the vacuum, connects
TiAl which features thing it is slow method of attaching.

Production of composite product of titanium-aluminum alloy and metal fiber
JP09287038

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- **Priority Details**
  1996JP-0100823 1996-04-23

- **Fampat family**

JPH09287038	A	1997-11-04	[JP09287038]

- **Abstract:**
  (JP09287038)
  PROBLEM TO BE SOLVED: To provide a method for producing a composite product of a Ti-Al alloy and metal fibers by which ductility is imparted to Ti-Al alloy parts, and therefore, its application to super-heat resistant parts such as turbine blades and turbine disks is made possible. SOLUTION: This method is composed of a fiber charging process 10, a powder charging process 12, a cold forging process 14 and a reaction sintering stage 16. In the fiber charging process 20, high m.p. metal fibers 1 having the m.p. higher than that of titanium and forming solid solution with titanium is charged so as to be orientated in a prescribed direction, in the powder charging process 12, a powdery mixture 2 of titanium powder and aluminum powder is charged to the space between the metal fibers, in the cold forging stage 14, the charged body 4 is subjected to compression molding at an ordinary temp. to form a mixed body 5 with a prescribed shape composed of the fibers and powder, and in the reaction sintering process 16, the mixed body is heated and is subjected to reaction sintering. Furthermore, by a compsn. regulating process 18, the composite product is obtd. The high m.p. metal fibers 1 are composed of any pure metal among Nb, Mo, W, Ta and Zr or an alloy essentially consisting of the same. COPYRIGHT: (C)1997,JPO

Claims

(JP09287038)

1. Fusion point is higher than titanium and titanium hard
The high fusion point metal fiber which forms the solution in specified direction distribution
Direction doing, between fiber filling up process and
the metal fiber which it fills up the titanium powder and the aluminum powder
Powder filling up process and the aforementioned filling up body which fill up
the mixed powder compressing forming at normal temperature from the fiber and the powder
Heating cold forging process and the aforementioned mixed union which form the mixed union
of the specified form which becomes, the reaction sinterring process which it reacts sinters and,
The TiAl alloy and the metal fiber which feature that it consists of
Production method of compound product.
2. As for the aforementioned high fusion point metal fiber, Nb, M
o, no pure metal of W, Ta and Zr or these main thing
In the claim 1 which consists of the alloy which is made the component, features thing
Compound product of TiAl alloy and metal fiber of statement production
Law.
3. Furthermore, mixed union after the reaction sinterring, approximately 110
To keep above the 0.deg.C and below approximately 1450.deg.C, the TiAl alloy
In phase the Ti-Al state diagram, (.alpha.+.gamma.) it turns to the phase territory
In the claim 1 which features the [ru] and thing the TiAl alloy of statement
Production method of compound product of metal fiber.